TABLE OF CONTENTS

Preface: How to Use this Edition p. 7
Introduction: A Journey to Healing p. 8

PART ONE – CANCER BIOLOGY

Chapter One: What is Cancer? p. 9
- What is Cancer?
- Cancer is a Metabolic Disease p. 11
- Genes & Epigenetic Controls (methylation, acetylation) p. 13
- Genetic Mutations, DNA Repair, p53, PTEN p. 14
- Fetal Growth Cassette, Symmetrical Mitosis, IGFBP & Differentiation p. 18
- Biochemical Targets and Growth Factors p. 19
- NFκB, STAT-3, Ras, growth factors and their receptors, beta-catenin, TGFα & TGFβ, TNF, tyrosine kinases, PTEN, topoisomerase enzymes, viruses, MAPK, cyclin-dependent kinases, cell adhesion, apoptosis, telomeres, autophagy, differentiation, BRAC genes, PARP, placental growth factor, heat shock proteins, fibrin, Nrf2.
- Summary of Carcinogenesis p. 23
- Phases of Tumour Growth p. 24
- Cancer Cell Types p. 25
- Survival Rates, Grading, Staging p. 26
- Apoptosis p. 27
- Autophagy, Angiogenesis and Lymphangiogenesis p. 28
- Invasion p. 30
- Metastasis p. 32
- Immune evasion p. 33
- Inflammation & Cancer p. 35
- Tumour Markers p. 38

PART TWO – INTEGRATIVE ONCOLOGY

Chapter Two: Introduction to Naturopathic Cancer Care p. 40
- Starting Your Integration
- Philosophy of Naturopathic Oncology p. 41
- Primary Strategies in Naturopathic Oncology p. 43
- Diagnosing Cancer, Measuring Response to Therapy p. 44
- Standards of Care, CAM in Cancer Care p. 45

Chapter Three: Integrative Support for Medical Oncology p. 46
- Integrative Naturopathic Oncology Summary p. 47
- Surgery, Pre-Op Protocol p. 48
- Post-Op Protocol p. 49
- Radiation Therapy for Cancer; Signs & Symptoms of Radiation Injury p. 50
- Treating Exposure to Radiation from Diagnostic Imaging p. 54
- High Dose Radiotherapy Support Summary p. 56
- Treating Common Radiation Side-Effects Naturally p. 57
- Late and Chronic Effects of Radiation p. 62
- Chemotherapy p. 63
- Integrative Support for Chemotherapy p. 65
• Specific Supports for Specific Chemo Drugs, with example  p. 68
• Grading Chemo Toxicity, Treating Common Chemo Toxicities  p. 79
• Detoxifying from chemo  p. 85

PART THREE  NATUROPATHIC ONCOLOGY REMEDIES

Chapter Four: Dietetics and Supplements in Cancer  p. 89
• General dietary rules for cancer  p. 90
• Acid/alkaline balance and cancer  p. 96
• Sugar, Blood Glucose, Insulin & Cancer  p. 98
• Weight-Loss & Metabolic Cachexia  p. 101
• Protein & Cancer  p. 102
• Minerals  p. 103: boron, calcium, cesium, copper, iodine, iron, lithium, magnesium, potassium, selenium, sodium, zeolite, zinc.
• Dietary Fiber  p. 107
• Modified Citrus Pectin  p. 108
• Dietary Fats  p. 109  Good fats: Omega 9, GLA, Omega 3 – EPA, DHA & DPA
• Shark liver oil alkylglycerols, Butyrates, Bad fats  p. 110
• Vitamin D3  p. 111
• Signs & Symptoms of Hypercalcemia  p. 112
• Vitamin A, Cod liver oil,  p. 113
• Revici’s lipids  p. 114
• Calcium-D-glucarate, B-vitamin complex  p. 115
• Antioxidants  p. 116
• Vitamin C  p. 118
• IV-vitamin C  p. 119
• Vitamin K  p. 122
• Glutathione GSH,  p. 123
• N-acetyl cysteine, Grapeseed extract  p. 124
• Resveratrol  p. 125
• Bilberry, Pomegranate, Ellagic Acid,  p. 126
• Black Raspberries, Salvestrols, Quercitin  p. 127
• Carotenoids, Melatonin  p. 129
• Co-enzyme Q-10  p. 131
• Alpha-Lipoic Acid  p. 132
• Vit. E, Anti-Oxidant Summary, D-limonene  p. 133
• Mushrooms, Curcumin  p. 134
• Cabbage, Indole-3-Carbinol, Diindolylmethane  p. 135
• Garlic, Catechin, Cartilage  p. 136
• Soy Isoflavones  p. 137
• Bromelain, Bioperine, Kelly metabolic cure, Budwig diet  p. 138
• Gerson diet therapy  p. 139
• Issel’s therapy, Matthias Rath protocol, Jonathan Treasure protocol, Inspire Health, Avemar  p 140
• Mediterranean diet, Ketogenic Diet, Fasting  p. 141
• Mitochondrial rescue,  p. 142
• IV-ALA p. 144
• Dichloroacetate DCA,  p. 145
• Nebulizing ALA or DCA, p. 146

Chapter Five Botanicals & Plant Extracts
• Hoxsey Formula  p. 147
• Essiac, Oncolyn  p. 150
- Green Tea and EGCG Polyphenols p. 151
- Rooibos, Boswellia p. 153
- Curcumin p. 154
- Aloe vera, Artemesia, Wormwood, Artemesinin, Artesunate p. 155
- Red Clover, Birch/Betulinic Acid, Ginkgo biloba, Paw Paw and Graviola p. 158
- Ashwagandha, Mistletoe p. 159
- Cannabis p. 167
- Cat’s Claw, Laetrile p. 172
- Wheatgrass Milk Thistle p. 173
- Coffee, Taheebo, Chapparal, Carnivora p. 174
- Laminaria, Podophyllum, Feverfew, Horse chestnut, Plant Sterols, Sea Cucumber, Black Seed p. 175
- Berberine, Nettles, Bloodroot, Black Salve, Scudder’s Alterative. p. 176
- Botanicals deserving further investigation p. 177
- Dosing Botanicals p. 178

Chapter Six: Traditional Chinese Medicine & Cancer
- Introduction to Eight Principles and primary TCM strategies for cancer p. 179
- Mushroom Polysaccharides p. 180
- Protectival, Bu Zhong Yi Qi Wan, Siberian Ginseng, Ginseng p. 181
- FareYou, Jingli Neixao p. 182
- Ping Xiao Pian, Liu Wei Di Huang Wan, Liu Wei Hua Jie Tang, Shih Chuan Da Bu Wan, Jin Gui Shen Qi Wan, Sho-Saiko-To p. 183
- Xiao Chai Hu Tang, LingZhi Feng Wang Jiang, Yunnan Baiyao, Salvia, Polygonum, Burdock, Scute p. 184
- Isatis, Dang Gui Lu Hui, Rubia, Magnolia, Andrographites, Chinese dietetics p. 186
- Acupuncture p. 186
- Qi Gong p. 187

Chapter Seven: Energy Healing and Other Remedies
- Homeopathy p. 188
- Psychology p. 189
- Ten Tools of Triumph p. 195
- Spirituality p. 197
- Reiki healing p. 199
- Oxygen Therapies p. 2000
- EDTA Chelation, 714X, Diathermy, Rife Ray, DMSO p. 201
- Anti-Neoplastins, Hyperthermia p. 202
- Electrical Therapy, Magnetics p. 203
- Shark Cartilage, Ukrain, Urea p. 204
- Immune Therapies p. 205
- Low Dose Natrexone LDN p. 206
- Dr. Gunn’s Targeted Vaccine Hypothesis, BCG Vaccine p. 209
- Cancer Stem Cell Strategy p. 211
- Miscellaneous and Dubious p. 213

PART FIVE - NATUROPATHIC ONCOLOGY PROTOCOLS—GENERAL AND CANCER-SPECIFIC

Chapter Eight: Targets of Therapy, Protocols & Repertory
- Key Compounds for Key Therapeutic Targets p. 214
- Leading Remedies p. 217
- Foundation Protocols p. 220
- Repertory for Specific Cancers p. 221
Chapter Nine: Integrative Care of Breast Cancer
- Epidemiology, Risk Factors p. 225
- Genetic Factors p. 226
- Reducing Risk p. 228
- Diagnosis & Screening p. 229
- Biopsy p. 230
- Grading & Prognostic Indicators, Staging p. 231
- Other Prognostic Factors p. 232
- Breast Cancer Types p. 234
- Surgery, Ovarian Ablation p. 235
- Radiation, RFA, Hormone Blockade, Tamoxifen p. 236
- Aromatase inhibitors p. 238
- Testosterone p. 239
- Herceptin, Chemotherapy p. 240
- Zoledronic Acid (Bisphosphonate), Phytoestrogens p. 241
- Integrative Remedies for Breast Cancer p. 242
- Emotional Health, p.245
- Lymphedema p. 246
- Vaginal Dryness, Hot flashes, Libido p. 247

Chapter Ten: Integrative Care of Prostate Cancer
- Epidemiology, Risk Factors p. 248
- Signs and Symptoms p. 249
- PSA Testing p. 250
- Lab Tests p. 251
- Testosterone, Imaging & Scan Gleason Score p. 252
- Staging, High Risk Cases p. 253
- Surgery, Radiation p. 254
- Hormone Blockade p. 255
- Naturopathic Treatment Options in Prostate Cancer p. 257
- Avoid in Prostate Cancer, Examples of Successful Protocols p. 260

Chapter Eleven: Integrative Care of Upper GI Cancers – Esophagus, Stomach, Pancreas, Liver, Gallbladder
- Esophagus p. 261
- Stomach p. 262
- Liver & Gallbladder p. 264
- Pancreas p. 266

Chapter Twelve: Integrative Care of Colorectal Cancer
- Epidemiology, Symptoms & Screening p. 270
- 5 Year Survival rates, High Risk Signs, Tubular & Villous Adenoma, L/R-sided CRC, Mets p. 271
- Modified Duke’s Classification, Surgery, Radiation, Chemotherapy p. 272
- Targeted Therapies, Immunotherapy, Naturopathic Treatment Options in CRC p. 273
- Carcinoids (GI Neuro-Endocrine Tumours) p. 275

Chapter Thirteen: Integrative Care of Lung Cancer
- Epidemiology p. 276
- Signs and Symptoms, Staging Non-Small Cell Lung Cancer (NSCLC) p. 277
- Radiation for NSCLC, Radio-Frequency Ablation, Chemotherapy for NSCLC p. 278
- Small Cell Lung Cancer (SCLC), Mesothelioma p. 279
- Naturopathic Care of Lung Cancer p. 280
- Successful Protocols, Lung Cancer Cough Remedy p. 282
Chapter Fourteen: Integrative Care of Ovarian Cancer
- Epidemiology, Signs and Symptoms, Screening & Diagnosis  p. 283
- Histological Types, Staging, Surgery, Radiation, Chemotherapy, Hormonal Therapies  p. 284
- Immunotherapy, Naturopathic Treatment of Ovarian Cancer  p. 285

Chapter Fifteen: Integrative Care of Gynecological Cancers
- Cervical Cancer  p. 288
- Uterine Cancer  p. 291
- Vulvar Cancer  p. 292

Chapter Sixteen: Integrative Care of Skin Cancer
- Introduction  p. 293
- Basal Cell Carcinoma, Squamous Cell Carcinoma  p. 294
- Malignant Melanoma  p. 295
- Naturopathic Care of Non-Melanoma Skin Cancers  p. 297
- Lipomas  p. 298

Chapter Seventeen: Integrative Care of Brain Cancer
- Neural Cancers, Gliomas, Glioblastoma  p. 299
- Signs and Symptoms  p.300
- Meningiomas, Naturopathic Care of Brain Cancers  p. 301

Chapter Eighteen: Integrative Care of Leukemia & Lymphoma
- Hodgkin’s Disease, Non-Hodgkin’s Lymphoma  p. 304
- Criteria for Chemo in Lymphoma, Integrative Care of Lymphomas  p. 306
- Naturopathic Care of Lymphomas  p. 307
- Multiple Myeloma  p. 308
- Amyloidosis, Naturopathic Care of Multiple Myeloma  p. 309
- Myelodysplastic Syndrome  p. 311
- Myelofibrosis, Polycythemia vera, Leukemia  p. 312
- GVHD, Acute Lymphocytic Leukemia  p. 314
- Acute Myelocytic Leukemia  p. 315
- Chronic Myelocytic Leukemia, Chronic Lymphocytic Leukemia  p. 316
- Hairy-cell Leukemia, Naturopathic Leukemia Support  p. 317

Chapter Nineteen: Integrative Care of Urinary Tract Cancers
- Kidney (Renal) Cancer  p. 320
- Bladder Cancer  p. 322

Chapter Twenty: Integrative Care of Nasopharyngeal, Head and Neck, Thyroid Cancer and Sarcomas
- Nasopharyngeal, Head and Neck Cancer  p. 324
- Thyroid Cancer  p. 326
- Sarcomas  p. 327

Chapter Twenty-One: Naturopathic Medicine for Cancer Morbidity and Mortality
- Care for Complications of Cancer  p. 330
- Anemia, Ascites, Blood Clots, Bone Mets, Cachexia, Fistula, Hemorrhage, Hypercalcemia, Lymphedema, Pain, Pleural Effusion, Thrombocytopenia
  - Cancer Emergencies  p. 334
PART SIX – PREVENTING CANCER

Chapter Twenty-Two: Cancer Prevention Strategies
• Introduction, Protective Factors  p. 339
• Carbs For Cancer   p. 341
• Avoiding Carcinogens  p.342
• Electromagnetic pollution, Earthing, Grounding  p. 345
• Stress Management  p. 346
• Happiness  p. 347
• Early Detection  p. 348

Selected Scientific References - indexed  p. 349

Bibliography/ Suggested Reading List  p. 426

Acknowledgements & Thanks, Clinic Coordinates  p. 429
Preface: How To Use These Notes

This fifth iteration of my resource book in naturopathic oncology is updated with the rewards of clinical practice, study, research and reader feedback over the last several years. I hope students will find it easier to navigate, more complete, and that it will be of real service to them, their families and their patients. I also hope it will provide inspiration to their integrative physicians, residents and the entire health team.

The Introduction gives you a narrative of my personal journey through teaching, medical research and study to practicing naturopathic medicine with a focus towards cancer care.

Part One – The Biology of Cancer - introduces the basic concepts and vocabulary of naturopathic cancer care in a very straight-forward way. This is intended for those with no training in science or medicine, who just want to know the bottom line in plain English. Then I introduce the principles of naturopathic cancer care. The core products and protocols I have seen benefit many patients are introduced. Remedies are suggested for most common cancers. These are to be discussed with your doctors, who may have other suggestions.

Part Two – Integrative Oncology - shows how naturopathic supports integrate with medical therapies to improve effectiveness and reduce harm. Surgery, radiation, chemotherapy, hormone therapy and immune therapy supports are described in a brief style. Again, all cancer treatments require supervision by an attending physician.

Part Three – Naturopathic Oncology - A more detailed scientific and technical explanation of the key concepts of naturopathic oncology in integrative cancer care. I introduce the broad naturopathic repertoire of remedies. The major components and mechanism of action of many botanicals and nutraceuticals are provided. The biochemical rationale of diets and “complementary and alternative medicines” CAM programs are discussed.

Part Five – Naturopathic Treatment of Common Cancers – Alternative Medicine – A detailed look at the common cancers - their diagnosis, medical treatment, and integrative care. Naturopathic medicines which target specific growth factors, receptors, hormones, cytokines and signaling pathways are matched to specific types and stages of cancer. Leading remedies for each cancer are repertorized as primary, secondary and tertiary. Samples of protocols which have given good clinical responses are provided. You will find my best clinical pearls for the treatment of each major class of cancer. This may be the foundation of your personal prescription for healing, under the supervision of a qualified naturopathic physician.

While I give a great deal of detail on products and protocols which can give great results, you need and deserve to have an individualized program, close monitoring, and a trusted advisor in these matters. Do NOT attempt to treat yourself!

Do use this book to be informed about your best options, and what to expect them to accomplish. Get expert guidance from a licensed, accountable, health professional team experienced in treating cancer. Cancer is a life-threatening disease in most cases. You do not have the objectivity, experience or knowledge to make critical medical decisions alone. This is not just a legal disclaimer. I do not treat myself! Cancer is unforgiving of delays and poor choices.

Your cancer care team may offer other options than I have outlined in this book. This book is not a self-help manual, nor is it a cookbook. It is a contribution to the field of integrative oncology, not the final word on how you are going to get well.

Every remedy mentioned in this book may cause harm in a particular person or in combination with some other medications. It is your responsibility to seek the professional advice of your personal naturopathic physician or integrative physician to direct the use of any of these agents for any serious disease.
I hold some strong opinions against remedies many patients are taking, and even some my peers encourage. These are based on my simple criterion – either show me conventional scientific studies of merit supporting use of a high-risk agent, or show me reasonably consistent results with traditional and trusted natural remedies among those of my peers who I know to be objective and trustworthy. We verify safety and efficacy with the best available evidence. If I see little value in something purported to treat cancer, I say so. I have seen thousands of patients do many different therapies, so I have some clinical experience to report.

I hope readers will realize that we continue to learn and progress. If you find you would like to try some of the therapies from this book, that is OK, but you should be asking your naturopathic doctor what is new and exciting, and what they can add to the mix. Medical doctors hold tumour boards, meetings where cases are discussed among a multi-disciplinary team to review the latest trends in research and care, and come up with a consensus. This book is intended to be just one of the voices at that table.

**Part Six – Preventing cancer** - the new edition concludes with a discussion of the most effective treatment for cancer – prevention! Learn what to avoid, what to do, and find resources to reduce risk and maximize vitality.

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**INTRODUCTION**

**A Journey to Healing**

I was born with the help of a nurse midwife at Vancouver General Hospital. The doctor never did show up. Alternative medicine runs through my entire life. I had an epiphany at age 15 which made me aware that there was something more to healing than drugs or surgery. I had an extraordinary healing of a severe burn by Reiki therapy. It was actually a miracle. I credit my first encounter with homeopathic medicine in India in 1975 with saving my life from terrible dysentery. I have met others with similar experiences of extraordinary healing by simple, natural means.

I have finally now begun to reach a goal set so long ago, to help people with cancer using the healing power of Nature. Wonderful outcomes, even miracles, continue to occur in my life and in that of my patients. Yes, we do see more healings than cures, and some people have a very hard path despite our walking with them. Still, it is my joy to join them in hope, and offer care with loving kindness.

Natural medicines can be integrated into medical cancer therapies with great success. I have created some novel cancer treatment plans and formulas, and have found a network of other reputable doctors and scientists who have reached similar conclusions. There are many whose work parallels mine. Many of the therapies I use are becoming common among my peers in naturopathic medicine and medical oncology. Others are very time-tested classical formulae from Traditional Chinese Medicine TCM, as well as some very modern TCM advances in cancer care. My medical and naturopathic peers have mentored me and shared their excellent treatment ideas.

There are humane physicians around the world who integrate standard cancer medicine with natural therapies such as diet, detoxification, exercise, emotional support, music, and spiritual practices. These greatly impact quality of life. People have the right to choose, treatments yet “unproven” because research on them has not yet found a rich sponsor. I think anything alive has value, and so does anything perceived as supporting life. Natural therapies with plant medicines, living foods and nutritional supplements are rationally directed to immune strengthening, normalizing cell regulation, and encouraging bad cells to recycle themselves. Working with Nature, we can bring the order of biological self-regulation to bear on the chaos that is cancer. Naturally, there’s always hope!

You cannot become an oncologist with a few weeks of study of the internet. Do not embarrass yourself by trying. Every patient is the CEO of their body, and have the right to give or withhold informed consent. They should be able to get all the information they feel they need in order to make good decisions regarding treatments they will accept. *This does not mean we have to educate a patient to the level of a doctor.*

I hope this book will give educated lay people the fundamentals to make good decisions, including insight into selecting a team of qualified professionals.
PART ONE –CANCER BIOLOGY

Chapter One: What is cancer?

Cancer is not a benign or self-limiting disease. It is unstable, dangerous, and unforgiving of poor choices.

Your body is made up of trillions of cells, each a little living organism unto itself. They specialize into many different roles (differentiate), and collect into various tissues and organs. All cells should communicate and cooperate with all the others in a harmonious way, for the good of the whole.

Cancer means cells are:
- growing too fast
- growing out of control, wounding local tissues.
- losing the ability to perform the cellular tasks they should do
- learning to do things and to make cell products they should not be making
- recruiting stem cells and immune cells to support and feed them – in repair mode, vainly trying to fix the “wound that will not heal”, but unable to repair the genetic faults at the root of the malignancy.
- becoming capable of invading into places they shouldn’t go, with immune cell and stem cell support
- becoming capable of living in distant parts of the body (metastasis).

Therefore, cancer is parasitic, toxic and destructive. It can disrupt the entire biochemistry and metabolism of the body. It can eat up all the resources, wreck essential organs and ruin life support functions such as blood clotting and the immune system.

Cancers are the second leading cause of death. Only cardiovascular disease – heart attack and stroke – kills more people in North America – but cancer is very close to overtaking CVD as the #1 killer.

Epidemiology research into cancer has led many experts and textbooks to state that ‘Remarkable differences can be found in the incidence and death rates of specific forms of cancer around the world’. The biggest differences arise from cultural factors, especially diet.

Epidemiology is the study of disease trends in large populations. It gives a way to sort out the multiple factors which act to create or prevent diseases. As an example, you can look at the occurrence of heart disease in those who smoke cigarettes and compare it to the rate for non-smokers, and you can see the risk is much worse in smokers. You can then tell a smoker how much risk they are taking by smoking. Since real individuals often do some things which are good and several things which are bad - at least bad for their biology – it is only by this method that the relative role of each action can be discerned.

In the USA in the year 2001 - over 1,300,000 new people were diagnosed with cancer; treatment costs were over $100 billion US dollars. Divide by 10 to get the Canadian figures.

Cancer will affect more than 1 in 3 persons alive today in Canada. To be precise, about 1 in 2.7 females and 1 in 2.3 males will have a serious cancer. About 1 in 5 Canadians will die of cancer. Overall survival at 5 years for all cancers at all stages is about 63%. However, by excluding common treatable skin cancers, the numbers flip to 64% of those diagnosed from cancer still dying of cancer despite the best of care.

Since I was born in 1952, the incidence of cancer in the USA rose approximately 50%. When I graduated from university the lifetime chance of a Canadian woman getting breast cancer was 1 in 11. Now it is about 1 in 7. 10 % of deaths of children under age 15 are due to cancers, notably acute leukemias and brain tumours. Many of these are preventable, due to environmental factors far more than from faulty genetics or random mutations.

While early detection and small advances in treatment mean the death rate is slightly lower now, the number of people getting cancer and dying of cancer has risen steadily. Canadian death rates from cancer in the last 20 years have climbed 48%, twice the rate of growth of the population (if not “corrected for age and gender”). We have an increasing elderly demographic in Canada. Aging increases cancer risk. It is a major killer of the elderly.
There are at least 300 distinct neoplastic diseases we call cancer. Aside from the balky off-switch issue in common, the various cancers differ widely in their primary growth factors and overall biology. Cancer is not a simple disease, it has many forms, many causes, and therefore there is no simple cure. What works for one cancer at one stage in one person will not always do the same for another person, another cancer type, or the same cancer in the same person at a later stage.

Despite the best of medical care, people are right to fear it. People greatly fear both the disease and treatments. Mortal fear is to be expected if something can kill you.

Cancer has very high morbidity, meaning it causes great sickness and harm, again despite the best of modern medical care. Some are so lacking in grace as to say that a lot of the suffering of cancer patients is caused by applying the best of modern medical care. This is called iatrogenic harm. However harsh modern oncology is, and it can be savage, remember these good doctors know how awful the disease can be if untreated, and are trying their best to help with what they know. Nearly 100% of those diagnosed with cancer will suffer some harm from the treatment. They may be disfigured or maimed by the surgery, suffer various complications, be burned by the radiation and scar up, or be made very ill by the chemotherapy drugs. Orthodox treatment can kill patients, and it can trigger cancer cell formation, resulting years later in another cancer even if the first type was cured by the treatment.

Is it any wonder sensible, educated and cautious people are using all possible adjuncts to reduce the harms from cancer therapy, to increase the odds of a good response? Most find it desirable to follow disease treatments with measures to restore their full health, and to prevent a reoccurrence.

Most benign tumours do not become cancerous. However, if they get large in the wrong place they can be as damaging as cancer.

The role of genetics in cancer is surprisingly minor, considering the central role of DNA abnormalities in cancer. Studies with twins show inherited factors increase risk for stomach, colorectal, lung, breast and prostate cancers by 26 to 42%. Certain races have increased risk of certain cancers, although it is really a saw-off as they often have lower risk from other conditions.

Asian women have low risk of breast cancer, but when they move to the USA and adopt the American diet and lifestyle their risk increases by 60%. Overall, immigrants to our Western civilization lifestyle see increased cancer risk of 80% after 10 years exposure. The same diet and lifestyle habits of the Western world also give rise to increased incidence of heart disease, stroke, arthritis, diabetes, auto-immune diseases, and Alzheimers dementia.

However, a whopping 70 to 90% of cases are attributable to environmental and cultural factors rather than genetic predisposition, and are therefore theoretically preventable. For example risk arises from exposure to xenobiotics - chemicals which accidently mimic our hormones, from man-made (exogenous) hormones, tobacco, alcohol, amines, polyamines, polycyclic aromatic hydrocarbons formed by burning sugars, excess sun exposure, heavy metals, pesticides. Excess dietary intake sugar, refined carbohydrates, and corn-fed meat and dairy are contributing to the cancer epidemic.

When I worked in cancer research at the B.C. Cancer Research Foundation, Medical Biophysics Unit, there was a new laboratory set up to measure the potential to cause genetic mutation (mutagenicity) and cancer causing potential (carcinogenicity) of environmental toxins. There had been an unusual cluster of cancers in a seaside town, and it turned out they were eating mussels off of creosote-treated pilings at the wharfs. In all the years they tested compounds for mutagenicity and carcinogenicity the substance that was the most dangerous was caramel candies, such as the little caramel cubes we always get as Hallowe’en treats. It turns out scorching or burning sugars generates some serious toxins.

You should not assume Health Canada, or anyone else is actually protecting you from carcinogens. Their puny efforts are proving ineffectual at lowering our toxic burden. Our DNA is unravelling in a chemical soup approved for our consumption by agencies such as Health Canada, based on research submitted largely by the chemical,
food and drug industries. If you were not aware of it before, now understand that your health and safety has been sold out to commercial interests in the food, chemical and pharmaceutical industries.

I advocate use of the PRECAUTIONARY PRINCIPLE – if it is carcinogenic to mammals, eg rats or mice), remove it from the human diet and environment until proven safe for humans. Guy Dauncy explores this admirably in his book ‘‘101 Ways to Prevent Cancer’’

Our air is being fouled and poisoned with tars, soots, asbestos and organic oils which cause lung cancer. Vinyl chloride, and phthalates from plastics are damaging our livers. Polycarbonate plastics release estrogenic bisphenol –A. The FDA in America says 2 parts per million of bisphenol-A are safe, but one thousand times less than that – 2 parts per billion – is measurably estrogenic in humans. Recently we have seen a movement away from using plastic bottles for drinking water, and this trend now has to spread to all food and beverage containers. Use food-grade stainless steel, glass, ceramic or wooden vessels.

We eat toxic dioxins - formed from burning organic compounds - in everything. The whole planet, including the oceans are fouled with them. We all have residues of pesticides on our tissues, even if we live on an organic farm and eat only organic food. Herbicides and pesticides can end up acting like hormones and growth factors in our bodies. These xenobiotics or xenohormones are major disruptors of normal growth and development.

Food may be contaminated by highly carcinogenic fungal aflatoxins and nitrosamines, polycyclic aromatic hydrocarbons, and the ubiquitous benzopyrenes.

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Cancer has many causes, and it therefore must have many possible paths to a cure.

**CANCER IS A METABOLIC DISEASE**

Cancer begins with *oxidative stress* on the DNA of cells and their mitochondria. The mitochondria are the combustion chambers where fuels such as sugars, fats and protein amino acids are burnt with oxygen to make energy. These organelles have some of their own DNA and repair systems, and it is particularly at risk from energized forms of oxygen let loose in the process. Oxygen is highly reactive – most things on this Earth can either burn or rust. Inside our bodies we make super-reactive forms of oxygen we call **free radicals of oxygen** or **reactive oxygen species ROS.** 2 to 5% of the oxygen being used in the metabolism of glucose into energy inside our mitochondria gets loose and can form superoxide and hydroxyl radicals. These ROS release lightning bolts of energy which break up the mitochondrial DNA, and as mitochondria ride the spindles to support DNA division in mitosis, also create nuclear DNA damage and mutations.

We harness the power of these same oxygen bombs for detoxifying any chemical we want out of the body, and use them in our immune system as potent anti-microbial weapons. We therefore have natural defenses we call **anti-oxidants** which control oxygen reactions. Most antioxidants we must get from food, some we can make for ourselves. Healthy levels of antioxidants the free radical ROS levels, and DNA repair enzymes in the cell nucleus cope with the damage, if it is not too severe.

ROS also produce disulphide bonds between sulphur atoms as on cysteine moieties in DNA bases. This makes a chemical cross-link between DNA strands to form a dimer, two strands glued together, rendering both strands unreadable. Repair of some DNA dimers is possible, but if too many accumulate, the cell will die. Antioxidants protect the DNA from these sulphur bonds gluing the pages of the genetic book shut. Antioxidants which help the DNA include vitamin A, vitamin C, vitamin E, carotenes, selenium, glutathione, alpha lipoic acid and grapeseed extract. Antioxidants such as vitamin C, vitamin E, selenium, alpha lipoic acid, beta carotene (provitamin A) and related carotenes and retinoids are found in fresh whole fruits and vegetables. It is one major aspect of how plant foods help prevent or treat cancer!

ROS also deplete the stem cell pool, allowing the accumulation of senescent cells. These old cells are at higher risk of cancerous transformation, due to shortened telomeres, accumulated mutations and errors, and genomic instability.
Carcinogenesis can be just a deletion or a translocation away.

Cancer cells can counter-attack our immune cell ROS by producing immune suppressive factors such as cytokines IL-10, TGFβ and prostaglandin PGE-2.

Redox (reduction or oxidation, adding or removing electrons) reactions occur when cells are exposed to excessive levels of trace minerals such as iron and copper. Redox agents produce dangerous free radicals and reactive oxygen species ROS which can force activation or deactivation of proteins - including genetic control proteins such as transcription factor STAT-3, nuclear factor kappa-B NFκB and activator protein one AP-1.

The mitochondria have unique bacteria-like DNA, simple DNA repair systems, and extreme oxidative stress. Aging of mitochondria is associated with most chronic degenerative diseases. Mitochondrial dysfunction, and reduced biogenesis to replace lost or damaged mitochondria, impacts cellular growth through nutrient-sensing pathways. Mitochondrial mutations in TCA cycle genes SDH, FH IDH1 and IDH2 alter mitochondrial energy metabolism. Cancer cells shift from a focus on producing the energy molecule ATP, to biosynthetic pathways generating substrates for cell proliferation. Metabolic shifts precede genetic changes! Retrograde signalling pathways from cytoplasm to nucleus activate, nuclear transcription factors such as HIF1 and FOS-JUN ramp up, and chromatin structure is altered. Growth regulators turn off, oncogenes turn on, including the fetal growth cassette.

mTOR, GH, estrogen, GLUT3, insulin, IGF-1, and IFGBP are major targets to restore normal metabolism, turn off retrograde signalling (mitochondria reprogramming of nuclear DNA), to restore normal growth signals to cancer cells, to prevent or treat cancer.

Naturopathic medicines and simple drugs can rescue mitochondria and stimulate mitochondrial biogenesis- for example: PQQ, D-ALA, thiamine, D-ribose, Co-enzyme Q-10, branch-chain amino acids, exercise, sauna, cold thermogenesis and grounding. Sparking up oxidative phosphorylation alters availability of critical building blocks of replicating cells, powers repair, normalizes epigenetics and restores apoptosis in cancer cells. By removing the pyruvate metabolic bottleneck, there is no longer a need for pyruvate extraction by muscle breakdown or acetyl-co-A scavenging from body fat stores. Tumours can be biochemically altered to a metabolic and epigenetic state in which growth regulation may be restored.

Loss of mitochondria in the hypoxic stage of tumour development triggers critical loss of control of apoptosis, and epigenetic controls. Anaerobic glycolysis creates acidification. This in turn leads to gross inflammation, soon outstripping local control mechanisms. Recruitment of bone marrow/mesenchymal stem cells and immune cells initiates the rescue of cancer cells from this toxic environment. This leads to development of the final malignant properties of invasion and metastasis.

Metabolism has primacy over mutation as the foundation of malignant transformation of cells. Epigenetic and enzymatic switches control apoptosis and gene regulation. Methylation deficit, inactivation of phosphatases, up-regulation of oncogene kinases, and inactivation of controllers of exponential or symmetrical mitosis lead to cancer. Switching off of pyruvate kinase and pyruvate dehydrognase kinases favors tumour production of cellular components. As in Warburg’s time, our focus is on the role of mitochondria in creating the metabolic arc leading to malignancy. Naturopathic medicines directed at mitochondrial repolarization, oxidative metabolism and epigenetic switching are proving clinically useful.

DNA methylation controls which parts of the genetic code are active. One DNA base can accept a methyl group –CH3 a carbon with a few hydrogens attached. When methylated, that part of the DNA cannot be opened, read and used. Reduced cytosine base methylation in cancer cells increases the rate of DNA transcription and therefore expression of most genes, including the bad ones. Methylation defects produce excessive gene transcription. Demethylation will unmask viral gene and oncogene sequences embedded in our DNA, which may be a critical step in the development of cancer. Also ‘unsilenced’ by demethylation are many growth promoter genes. These make existing cancers grow even faster. Conversely, methylation can shut off any of about 1,000 tumour suppressor genes.
The “methylation paradox” is that when regulatory regions of tumour suppressor genes are hypermethylated, this triggers hypomethylation of most of the cancer cell genome. This phenomenon increases as tumours progress and become more invasive. Hypomethylation causes chromosomal instability, including translocations and deletions of genes and loss of genomic imprinting. Fortunately dietary methyl group donors and antioxidants can increase methylation, reducing malignant gene over-expression. These include vitamins B12, B2, B6, folic acid, and betaine, all found in whole foods and vegetables. Folate is critical for the synthesis of s-adenosylmethionine SAMe which is the final methyl donor to DNA. We can monitor serum homocysteine and urinary methylmalonic acid (MMA) as markers of this problem. Methylation can be stimulated with trimethyl glycine, betaine (wheat germ, seafood, beets) and glutathione.

**Acetylation** -CH3CO- of histone proteins is another epigenetic regulator of DNA function. Inhibiting histone deacetylation reverses epigenetic aberrations responsible for chemotherapy resistance and other problems..

**GENES and EPIGENETIC CONTROLS**

We have 97% the same genes as a chimpanzee. We have 90% of the same genes as a corn plant. In fact only 3% of our genetic material in every one of our cells is actually needed to code for uniquely human proteins. These proteins which are the enzymes necessary to make our biological chemicals. Some of the most significant differences between man and other beings, such as the great apes, are in genes which we also carry, but which are broken or turned off. It is astonishing how much every living thing on the planet has in common at a genetic and biochemical level. This is the crux of why we believe remedies from the natural world are generally safer, because they have to be compatible with the same basic life processes.

Only 3% of the genes humans carry actually express the code for a protein responsible for one of our biochemical reactions and materials of which we are constructed. The other 97% are gene switches, and the regulatory genes which set the timing and coordination of genes turning on and off.

Epigenetic factors which influence the genes, gene switches and controllers include methylation and histone protein acetylation. These can be strongly influenced by nutrition, and natural medicines.

Non-mutagenic factors in carcinogenesis include wounding, misregualtion of proteases such as MMP-2 and stromalysin, and increased expression of platelet-derived growth factor PDGF.

We have a lot of control over what genes do, just with our diet. Many nutraceuticals and botanicals are epigenetic regulators. Small inhibitory non-coding RNA molecules in foods bind to our DNA and reprogram it. These allow us to keep cancer genes turned on and cancer-promoting genes turned off. The symmetrical, exponential growth of cancer cells – like that of embryonic cells is switchable to normal asymmetrical mitosis - one cell replacing one cell. To regulate gene methylation: green tea polyphenols such as EGCG, and quercitin. To modulate histone protein de/acylation: green tea polyphenols, sulphorafane and other cruciferous isothiocyanates, grape cyanidins, curcumin, milk thistle silymarin, parsley apigenin, baicalein, rosemary

Cancer is presumed to be caused by mutations. The peculiar cluster of loss of growth controlling genes coincident activation of growth promoting genes is at least in part created by altered metabolic and epigenetic switching. Methylation defect, inactivation of methylation sensitive phosphatases, up-regulation of oncogene kinases, and inactivation of controllers of exponential or symmetrical mitosis lead to cancerous transformation.

Insulin-tyrosine kinase signaling increases, triggering an influx of glucose, an increase in mitosis, and an inhibition of apoptosis , ie increased cancer cell survival. Switching off of pyruvate kinase and pyruvate dehydrogenase kinases favors tumour production of cellular components. Phosphatases localize to the nucleus, dysregulating cell cycle proteins. Lipogenic citrate condensation alters histone deacetylation, reprogramming epigenetic switches to support tumour growth.

**Tyrosine kinases** are major regulators of cell growth and survival. The TK super-family of cell surface receptors transduce external signals into internal signals. These transmembrane glycoproteins bind a ligand on the outer
activating alpha (II) collagen prolyl suppresses tumo

Apoptosis follows the release of cytochrome C after the oligomerization of the mitochondrial protein Bak. p53 inactivates mitogenic oncogenes, promotes genomic stability and resistance to chemical carcinogens. It suppresses tumour growth by inhibiting angiogenesis via release of anti-angiogenic collagen fragments by activating alpha (II) collagen prolyl-4-hydroxylase.

**GENETIC MUTATIONS**

The disorganization of the information library of the cell, the genetic material in the cell center (nucleus). The chromosomes from our parents are made up of DNA organized into genes. DNA carries the code to make proteins such as enzymes. Enzymes are living catalysts which make all of life’s chemical reactions (biochemistry) happen, at body temperature and at the atmospheric pressure we live under. Every scrap of every cell, and every chemical in the body, is assembled by enzymes based on the instructions contained in the DNA.

Radiation, cancer-causing chemicals, stress hormones and everything else which can cause cancer (carcinogens) appear to produce oxidation of the DNA. This disrupts the information stored in the DNA, making a mutant gene. Many genes are the code to make a protein enzyme, a catalytic builder of life chemistry. A mutation in the information pattern in the DNA results in a wrong enzyme or no functioning enzyme at all. The chemistry of the cell is altered, and almost never for the good.

When several very specific mutations occur, without killing the cell, it can be permanently transformed into a cancer cell (carcinogenesis). It takes a multitude of insults to the cell, and an accumulation of several survival skills before a cell gets to a state of radical growth, altered so much it cannot shut off and die, no matter how damaged or stressed its mad growth makes it

An example is the loss of normal cell-to-cell communication which tells normal cells to stop growing when they are touching another cell. Cancer cells lose this contact inhibition, and keep on growing, piling up into abnormal crowded lumps of cells we call tumours.

By the time the cancer cell doubles 20 times there will be over a million cancer cells in the tumour. It will be a very small lump, perhaps 1 millimeter in diameter, too small to be causing any significant symptoms, and too small to be seen on diagnostic screening tests. The cells will be burning energy and metabolizing at 30 to 40 times the rate of normal cells of the same type.

At this point tumours may start to run low on oxygen, which we call hypoxia. The cancer must at this point have developed the ability to generate more than normal amounts of chemicals which attract new blood vessels to grow into the lump. If it cannot sustain aggressive in-growth of new blood vessels, it will stop growing rapidly, and in fact may die off completely.

The metabolic shifts induced by hypoxia, including mitochondrial changes and HIF-1 create resource deficits and damage to key DNA repair systems such as p53, PTEN. There is also up-regulation of the fetal growth gene cassette.

p53 is known as the Guardian of the DNA because it arrests the cell cycle at the G1-S checkpoint, assesses for DNA damage, attempts to repair damage and mutations, and initiates cell suicide if it is unable to make repairs. Apoptosis follows the release of cytochrome C after the oligomerization of the mitochondrial protein bak.
Dangerous and intractable cancers - melanoma, prostate, lung, bladder, cervix, breast and colorectal cancers - have early occurrence of p53 mutations which reduce apoptotic removal of abnormal cells, increasing cell proliferation and longevity. Other cancers also can develop this problem, and so become more difficult to cure. The occurrence of treatment refractory leukemia after chemotherapy or radiation therapy is not due to DNA damage from these agents. The treatments select for TP53 mutations, which pre-existed in these cancers. These mutant p53 genes no longer suppress other mutations, and so myeodysplasia and leukemias incidence rises.

Fortunately, sometimes the p53 can be encouraged to resume more normal levels of control over cell growth. Inhibiting MDM2 will restore p53 wild type dormant in many tumour cells. Natural agents supporting p53 activity can reverse the abnormal control of cell growth - which is the very core of the cancer problem. These include quercitin, curcumin, genestein, melatonin, catechin, green tea EGCG, grapeseed OPC’s, trans-resveratrol, gamma vitamin E, folate, retinoic acid, milk thistle, garlic, vitamin C. N-acetyl-cysteine and selenium also support p53 but are less used in cancer care. cMYC oncogene is inhibited by berberine.

Normalizing p53 is a prime target for the general prevention of cancers. Aging in general is now linked to lowered anti-oxidant response damaging the tumour suppressing p53-ARF pathway.

Normally the **tumour suppressor gene phosphatase and tensin homologue** PTEN opposes activation of the P13K / Akt / mTOR pathway, the gatekeeper for tumour growth. PTEN has an up-regulating feedback loop with tumour suppressor gene p53, and prolongs the half-life of p53 protein, enhancing genomic and centromere stability. PTEN down-regulates VEGF expression, IGF-1 signalling and modulates G2/M cell cycle arrest.

PTEN function can fall off due to deletion, mutation or epigenetic silencing. It is very sensitive to small chromosomal rearrangements, and is often inactivated when BRAC-1 mutations reduce DNA repair.

Cells have the genetic code on their chromosomes, in the form of DNA. Each cell has about 2 meters of DNA, coiled incredibly tightly in a double spiral with links like steps on a ladder formed by 4 alkaline chemicals called bases. Using 4 letters (bases) arranged into 3 letter words (codons) the DNA library has all the information needed to create all the different cell shapes, sizes and products to form tissues, organs and the whole individual human being. Normal cells read only parts of the whole library, and become specialized or differentiated for a particular job in a particular place.

Cells should grow until they touch another cell, then stop - this is called contact inhibition. Cellular adhesion molecules (CAM) touching another cell results in a signal being sent from the cell’s outer membrane surface to the DNA in the nucleus of the cell. It tells the DNA to stop growth of the cell, as it has reached its neighbour’s property line.

Cells should have a limited lifespan, duplicating themselves a few dozen times. Repeated copying of the genetic information produces errors and missing bits in the DNA, so it begins to look like a bad photcopy. The aging normal cell removes a bit of the end of the chromosomes called a telomere each time it is copied. When that telomere is gone, the cell cannot be copied, just like a video cassette with the little plastic tab removed cannot be recorded anymore. When the cell is old and has some errors that cannot be repaired, it will then quietly dissolve away in a natural process called apoptosis, to be replaced by a new cell.

Cancer cells develop their abnormal characteristics from epigenetic switching on of oncogenes while growth regulating genes turn off. and from random changes in the DNA called **mutations**. Most mutations do not work out to be good for a cell’s survival, but sometimes the cell gets lucky with a **non-lethal mutation** and develops the core skills that make cancer cells malignant or hostile to life:

- Excess rate of growth and cell doubling
- Invasion into normal tissues
- Spread to distant sites – metastasis

Cancer cells also become ‘**immortal**’ in the sense that they have no set lifespan. They can double and double and never throw the apoptosis off-switch to die. This means they make far more copies of their DNA than they were designed to, so the DNA becomes riddled with errors and abnormalities, making them unstable and bizarre acting.
Tumours are unpredictable because various cell lines are genetically unstable and constantly evolving new genetic variations.

Mutations can arise from DNA instability triggered by oxidative damage. The average cell must repair over 10,000 oxidative hits per cell per day. The average cancer cell has 65 to 75 distinct mutations, and some up to 100, that create the malignant properties of excess growth, invasion and ability to spread and live elsewhere.

Tumours that grow to a detectable size have mastered getting blood vessels to grow, a process called **angiogenesis**. They also must make new lymphatic vessels grow out to provide drainage of waste fluids. These new vessels are always disorganized, thin-walled and leaky, so the tumour starts to build up fluid pressure. This hydraulic ‘oncotic’ pressure eventually crushes weak vessels, lowering oxygen and nutrient supply, in turn triggering another round of new blood vessel growth. No matter how much new blood vessel growth there is to feed new tumour growth, the pressure of more cells and fluid leakage will always create areas of low oxygen.

The low oxygen zones will now start to switch from burning sugars with oxygen to making energy by fermenting sugars without oxygen. This is what yeast and other very primitive cells do for energy. It is 19 times less efficient than getting energy by burning sugars, so the tumour starts to become a bottomless pit into which the life energy starts to drain. Advanced cancer leads to fatigue and weight loss because the tumour is growing very fast but very wastefully, consuming body fat and muscle protein to feed its insatiable drive for growth.

I once made a long road trip in an old Rambler station wagon with a big V-8 motor equipped with dual Holley carburetors. You could see the gas guage falling visibly as you drove. We had to stop at pretty much every gas station on the way there and back. The next trip I took was in a Volkswagen Beetle, and I got there and back on one small tank of gas. Cancer is like the old Rambler – too big, and with a huge motor which is terribly inefficient.

The low oxygen zones in the tumour become filled with lactic acid, the same waste product you build up in your muscles after strenuous exertion. It makes a person feel sore and fatigued. Even worse, it actually makes cancer cells grow and spread even faster! Cancer cells are acidic and low in oxygen, but it is not possible to cure cancer with oxygen therapies or with alkaline pH therapies. Alkaline diets help, but not just because they are alkaline. Oxygen and pH based therapies are of little to no value. There are far better ways to treat cancer.

These fermenting wrecks of cells have no off-switch because they have turned off the combustion chambers that powered the power-down sequence. Also lost are several DNA repair systems. The cancer at this stage can continue to mutate and become ever more dangerous.

After approximately 30 to 35 doublings, the tumour will often be 1 to 2 centimeters in diameter. This is the point at which the cancer is often detected, and a diagnosis is made. Unfortunately, some patients are only diagnosed after the cancer has begun to spread.

One of the most abnormal thing about cancer cells is that they have blocked the off-switch designed to protect us from bad cells, called **apoptosis**. These malignant cells will not die, even when highly mutated, damaged and very old. They become very sick, but almost immortal. Once cancer cells pass this threshold, often before reaching a diagnosable size, they have already become very difficult to kill. Restoring the off-switch in the cancer cell is the number one goal of cancer therapy.

Cells should have a limited lifespan, duplicating themselves a few dozen times. Repeated copying of the genetic information produces errors and missing bits in the DNA, so it begins to look like a bad photcopy. The aging normal cell removes a bit of the end of the chromosomes called a telomere every time it is copied. When that telomere is gone, the cell cannot be copied, just like a videocassette with the little plastic tab removed cannot be recorded anymore. When the cell is old and has some errors that cannot be repaired, it will then quietly dissolve away in the natural process called apoptosis, to be replaced by a new cell.
When a human stem cell has doubled 50 to 70 times, or in other words when its DNA has been copied 50-70 times, it should recognize the DNA may be full of errors. It stops itself before committing to split into two new cells and checks itself for DNA nicks, missing pieces, and other glitches. This checkpoint process operates rather like the “scan disk” program on your computer. It looks through the “hard drive” in the cell, and if there are too many errors to repair, it will throw the built-in off switch for bad cells. Rather than make two bad cells out of one, the damaged cell shuts down and initiates a sequence leading to it’s replacement. This apoptosis program causes it to break up into bits, turn its membranes inside-out, so it can be recycled. It is a normal process to remove old or damaged cells for the good of the community of cells in which it lives. Deleted cells are then replaced by fresh new cells created from stem cells. The new cell starts the counter at zero, and has pristine new DNA. If a normal cell gets damaged by radiation or chemicals, it should also throw the apoptosis switch regardless of the number of times the DNA has been copied.

We are replacing cells all the time, whether they are old or damaged, or both. One fully functional but sterile cell takes the place of the one that was lost. Cancer is an aberrant growth process which produces cells where there is no need for replacements. New relatively undifferentiated cells double into fertile cells that can double again. They arise from mutated cells that have lost control and purpose.

For years I grew human and animal cells in a cancer research laboratory. Normal cells we got from patients would die off after 50 doublings, which is called the Hayflick Limit. Stem cells may double 70 times. I was good at tissue culture, but none can beat this built-in safety system. However, I also grew cancer cells, and they just go on forever, like the Energizer Bunny of cells. One cell line we used in research was “Hela cells”, from the cervical cancer of a woman named Henrietta Lacks - who died in the 1950’s. Her cancer cells are alive and well in labs all over the world. They will always grow, as long as someone keeps feeding them.

Reduced apoptosis in cancer cells increases malignancy - how dangerous a cancer is - by increasing cell survival and longevity. Old cancer cells accumulate DNA damage, DNA instability, and mutations. They get tougher to treat and are faster growing! Anti-apoptotic signaling results from activity of the bcl-2-B-cell leukemia-lymphoma two, bcl-xL, rhoA and ras genes.

**BRAC-1 and BRAC-2** are general DNA repair genes, preventing tangles in the strands of genetic material. Carriers of mutations have distinctly increased risk for cancers of the breast, pancreas, prostate, bone, pharnynx, salivary glands and GI tract. Males are specifically at risk for prostate, melanoma, breast and pancreatic cancers. If your family has clusters of these cancers you can be tested. If you carry the mutation, selenium can help reduce its expression.

**Genomic instability** is associated with carcinogenesis, and cells can have these internal defects while still appearing histologically abnormal under a microsopse. Instability includes allelic imbalance, unbalanced loci, and shortened telomeres, particularly affecting glycolytic genes. One implication of this is the “field of cancerization effect” where these genetic problems occur up to a centimeter out from tumours, providing a potential source of new cancer cells in areas that look normal, and may be described by the pathologist as clean surgical margins.

Micro-RNA contributes to carcinogenesis by reducing tumour suppressor gene expression while increasing expression of proto-oncogenes.

Other important cancer growth factors include insulin-like growth factors IGF-1 and IGF-2 made in the liver. A critical issue in prevention and reversal of cancer is the capping of cancer cells with **insulin-like growth factor one binding protein three - IGF-BP-3**, which turns off their exponential growth pattern and restores normal growth - where cells are only replaced with non-reproducing differentiated cells.
While genetics are important in the life of a cell, it is after all only a reliable way of passing down information. A living cell is made of all the products the enzymes make, and they breathe actual life into the cell. The cell must get nutrients and information from its environment. It does this through the cell membrane - its overcoat, studded with sensors and signaling devices called receptors. We use medicines to reduce the number of receptors, block the receptors, or cut off the growth factor supply to slow the growth of tumours. If we do not, cancers will develop more and more of the receptors, and even start making their own growth factors, to grow faster and faster. There are many growth factors, and all growth factors are bad for cancer.

**Loss of differentiation** means the cell forgets what it is supposed to be doing – and usually ends up concentrating on growth for its own sake. The more undifferentiated a cell is, the more likely it will lose its sense of place and purpose, and lose the controls put on it by the specialized cells around it. It also means it can be less specific about the conditions under which it can live, so it will be better able to spread and grow in the wrong places. If a cell is completely de-differentiated it is called anaplastic. If it is only partly dedifferentiated it is dysplastic. Natural agents which support cell differentiation can help a cancer cell remember how to behave appropriately, and reduce its survival in other tissues. Vitamin C is known to be a regulator of embryonic stem cell differentiation, and vitamin D regulates differentiation throughout life.

How does any cell know what part of the huge library of DNA information it is expected to use? Cells have the whole library, but open up a small part by unmasking part of the DNA. Imagine a cell entering a library, opening up a book, studying it, using the information, and becoming trained to have a certain career. Just as an electrician studies electricity while a lawyer studies law, each cell uses only part of the available library. An eye cell acts like an eye cell and a stomach cell acts like a stomach cell because each makes different special enzymes from specific parts of the DNA. These enzymes make chemical reactions happen to give that cell what it needs for its specialized or ‘differentiated’ way of life. So how does it know what part to open up and read? Because it knows where it is in space relative to other cells, within electrical, magnetic and especially chemical gradients. The signals from its surrounding network vary by how far from the top, front or middle it is. Normal cells know where they are, and behave accordingly. In fact, if they are moved too far away they may fail to grow. Cancer cells becoming undifferentiated specialize in one thing only - growing fast and spreading to new places. They can open up all sorts of new parts of the DNA code, to adapt to new surroundings. They can also open up parts of the code, using topoisomerase enzymes, to make chemicals which are toxic, or which allow other bad behaviour.
**BIOCHEMICAL TARGETS AND GROWTH FACTORS IN A CANCER CELL**

**Growth factor receptors** on the cell membranes may mutate and deliver continuous mitogenic (growth) signals, like a gas pedal that jams, putting growth on full throttle. Mitosis is another word for the doubling of the DNA and its separation and division into 2 new cells. Transmembrane receptors for growth factors, such as epidermal growth factor receptor EGFR, have an extracellular binding region (on the outside of the cell) and an intracellular kinase (on the inside of the cell wall). Ligand binding (contact with its target molecule) results in homo- or hetero-dimer formation with activation of the associated tyrosine kinase inside the cell. This triggers several intracellular pathways, such as **mitogen-activated protein kinase MAPK** and AKT / P13K, which result in increased growth, resistance to apoptosis and increased angiogenesis. All of this means more cancer cell growth.

Cell division is normally regulated by cell **growth factors** such as epidermal growth factor EGF, platelet-derived growth factor PDGF, transforming growth factor beta one TGFβ-1 and insulin-like growth factor one IGF-1. It should be obvious that we do not want cancer cells to have any more growth factors, given that it is a disease of excessive cell growth.

Normal signal transduction from the cell surface receptors to the nucleus occurs by way of **phosphorylated tyrosine kinases PTK**. A receptor activated by its growth factor will make the PTK add fats on the inside of the cell. Lipid isoprenyloid tails on PTKs activate ras proteins which become trapped in their excitatory guanidine tri-phosphate-bond GTP forms.

This activates **cyclin-dependent kinases**. Cyclins tell the cell to enter its cell cycle, its reproduction process. Cell cycle entry and progression results in cancer cell division - the cell copies itself and splits in two - and tumour growth. This step is normally regulated by Rb, Wt-1 and p53 tumour suppressor genes.

The **P13K/Akt** signaling pathway is a central regulator of critical cellular functions such as cell adhesion, angiogenesis, migration and drug resistance. It regulates crucial proteins and genes including p53, NFκB, cyclin D, Bad and mTOR. Heat shock protein ninety HSP90 can bind to Akt and chaperone it past degradation pathways and allow the cancer cell to evade apoptosis. MEK pathway often co-activates by mutation along with changes in p13K. mTOR kinases phosphorylated by Akt are activated to the state where they can increase protein synthesis and translation, if they sense glucose and amino acid nutrient availability. mTOR acts like a thalamus, switching signals from a vast metabolic network. It can shift oxidative catabolizing cells to anabolic glycolysis. mTOR will increase building of VEGF receptors. mTOR is inhibited by curcumin.

**Nuclear factor kappa-light-chain-enhancer of activated B-cells or NFκB** is a DNA transcription or copying factor which controls the expression of proteins involved in cell adhesion, migration, invasion, cell death (apoptosis), oncogenes, angiogenic factors and growth factors. It is constitutively up-regulated in most advanced cancers. It can promote cancer cell survival by preventing apoptosis. It increases risk of metastasis by increasing matrix proteases such as MMP-9. It increases adhesion factors such as galectin 3. It increases angiogenesis via increased vascular endothelial growth factor VEGF. It increases fibroblast growth factor two FGF-2. NFκB stimulates myeloid-derived immune cells in tumours to make excessive pro-inflammatory substances such as IL-1, IL-6 and IL-8. IL-1 increases release of PGE-2, increases leukocyte activity and number, stimulates endothelial cells and fibroblasts critical to angiogenesis. IL-6 is associated with fatigue from cancer. IL-8 attracts leukocytes and stimulates angiogenesis. NFκB generates tumour necrosis factor alpha TNFα. It regulates pro-inflammatory substances such as COX-2. One strategy for blocking NFκB is to inhibit EGFR – epidermal growth factor receptors. Vitamin E turns off NFκB and other pro-inflammatory genes.

**Ras** integrates regulatory signals. When stimulated, RAS activates inflammation-related proteins, such as ERKs, p38 and JUN N-terminal kinase (JNKs), to trigger downstream signalling effectors. Along with the signalling pathway, metabolism-related pathways are also turned on. Activated SRC, FYN or RAS lead to activation of PISK and AKT, and consequently turn on downstream signals. In addition, activation of AKT leads to the translocation of p27, a cell cycle inhibitor, from the nucleus to the cytosol and degradation of the protein. This event ensures formation of CDK–cyclin complexes to activate cell cycle progression.
Mutant k-ras translates EGFR activity into Map kinase pathway growth signaling. MEK1 is an important downstream component of oncogenic RAS signalling and thus is potentially a good target for disrupting MAPK signalling. Ras is particularly vulnerable to mutation by chemical carcinogens such as dyes, heavy metals and polycyclic aromatic hydrocarbons. The ras protein attaches to the inner cell membrane via farnesyl lipid (an intermediate in cholesterol synthesis), then is phosphorylated by tyrosine kinase, causing a kinase cascade, leading to increased cell growth. Mutant ras leads to continuous growth signaling. Mutant ras increases angiogenesis and lymphangiogenesis by VEGF, PDGF and FGF. Ras can be inhibited by bromelain, D-limonene, vitamins A, E, D3, quercetin, green tea EGCG, and Rasfonin from the fungus Trichurus terrrophius.

Apoptosis is increased by bax and bad genes. Bad gene, and therefore apoptosis, is strongly inhibited by epinephrine (adrenaline). This is how chronic mental and emotional stress inhibits clearance of cancer cells. This is exaggerated in those with emotional repression marked by a hyper-rational attitude which refuses to process and express stressors. If we can’t let it out and let it go, it eats away at us.

**Inflammation** reactions by the immune cells produce ROS, which increase mutation rates, DNA transcription (copying), and cell growth factors. These increase proliferation of more cancer cells.

**Fibrin:** My Chinese medicine training taught me that cancer is associated with “blood stasis”. The Chinese knew this over a thousand years ago, and it is easily diagnosed by TCM pulse and tongue assessment. About 150 years ago Western physicians began to notice cancer patients had a very high risk of forming blood clots – depending on the cancer, 7 to 30 times the normal risk.

In 2005 Italian scientists noted that one of the most common mutations – on the MET oncogene – is associated with the transformation of a cell to cancer leads to a disturbance in the clotting factors, and increased fibrin production. Fibrin is the protein net which sticky platelets cling to to make a clot. Fibrin is also a major trigger of inflammation, which makes cancer grow wildly.

The other key role of fibrin in cancer progression is that cancer cells move out of tumours by eating the fibrin strands. As they pull it in, they drag themselves beyond the tumour boundary, into the extra-cellular matrix ECM, and beyond.

**Activator protein one AP-1** is a constitutively active and inducible transcription factor which regulates cytokines. It relies on the MAPK pathway – mitogen activated protein kinases. Activator protein AP-1 is activated by hypoxia, a low oxygen level, which is seen in fast growing tumours which outstrip their blood supply.

AP-1 activation is associated with progression from pre-neoplasia to malignancy, including the acquisition of invasiveness and accelerated proliferation.

**Steroid receptor co-activator SRC-3** is also known as A1B1 oncogene. When amplified or over-expressed it initiates tumourigenesis, it is a potent growth promoter, and up-regulates matrix metalloproteinases MMP-3 and MMP-13, which promote cell migration, invasiveness and metastasis. It is often active in squamous esophageal carcinomas, and cancers of the stomach, prostate and breast. It is particularly activated in Her-2+ breast cancer, as Her-2 signalling phosphorylates A1B1. SRC-3 can create resistance to Tamoxifen therapy.

**STAT 1, 3 and 5** are signal transducers and activators of transcription – they speed copying of the DNA in cancer cells. Blocking constitutive STAT3 can inhibit cancer cells growth, invasion and metastasis, and induce apoptosis. STAT-5a/b modulates prolactin hormone. STAT-1 is strongly inhibited by green tea EGCG, while STAT-3 is strongly inhibited by indole-3-carbinol and curcumin.

**Beta-catenin** modulates genes for VEGF, PPARA, MMP-7, MTI-MMP, Survivin and transcription factors. The β-catenin protein stimulates cell-to-cell adhesion and proliferation. It is stabilized by Wnt proteins made by cancer stem cells, which use it for their self-renewal. It is reduced by the omega 3 fat DHA, and by regulating casein kinase.
Genetic expression becomes abnormal in many ways in a cancer cell. The cell may produce less than normal of growth inhibitors or may increase and facilitate DNA copying (transcription) factors. Over-production of growth factors can also occur, such as **transforming growth factor alpha TGFα** which binds to epidermal growth factor receptors, and can transform the cell growth pattern and “immortalize” a cell when over-expressed.

**Transforming growth factor beta TGFβ** transforms fibroblasts to myofibroblasts. It is an acute phase anti-inflammatory cytokine which inhibits the immune system. It is released from a protein complex called stable latency associated peptide, by pH under 3, proteases, and radiation injury.

- TGF is a potent immune-suppressor, making it harder for immune cells to find and kill cancer cells. TGFβ stops differentiation of T-cells into active cytotoxic or helper cells. TGFβ blocks production of the interleukin IL-2 needed to proliferate T-cells. It is supported in blocking immune function by interleukins IL-4, IL-5 and IL-10. TGFβ inhibits secretion of tumour necrosis factors TNFα and TNFβ, inactivating cytotoxic NK cells and lymphokine-activated killer cells. When activated by stromal cell thrombospondin-1 TGFβ suppresses T-cell effectors activated against tumour antigens, creating local immune tolerance.

- TGF is both a sensor and a signaler of oxidative stress. TGF also induces angiogenesis, making blood and lymphatic vessels grow into the tumour to feed it oxygen and nutrients, and carry away wastes.

- TGF de-regulates pericellular proteolysis - it allows cells to make enzymes which dissolve the protein barriers around it which can allow the cancer cell to creep away and spread to new sites. Cancers which produce more of this compound are extremely dangerous.

- TGFβ is generally pro-apoptotic, via several mechanisms, including the Smad pathway, P53, up-regulation of Bax, down-regualtion of Bcl-2 and Bcl-XL, and enhancement of Fas-induced apoptosis.

- Transforming growth factor alpha TGFβ is a primary ligand of epidermal growth factor receptor, an erb/HER receptor tyrosine kinase.

- TGFβ is over-expressed in cancers of the breast, stomach, pancreas, colon, rectum, prostate, ovary, non-small cell lung cancer, melanoma and glioma.

- TGFβ has been found to be active in single cancer cells metastatisizing throught the body, but must switch off for the cell to grow in its new location. TGFβ signaling is increased by surgery, radiation and chemotherapy, raising concerns these therapies may contribute to cancer spreading.

- TGFβ is not active in clumps of cancer cells moving around, which tend to lodge in lymphatics and not travel as far as single metastatic cells.

**Tumour necrosis factor TNF** and Fas gene protein ligands bind to plasma receptors to activate apoptosis initiator caspase enzymes, which then trigger “execution” caspases, which activate endonucleases and catabolic enzymes. This dissolves the damaged DNA and kills the cell.

- TNFα is an acute pro-inflammatory cytokine which stimulates the immune system. TNFα is made by macrophages, proliferating T-lymphocytes, B-cells and NK cells. It is supported in immune stimulation by interferon INFγ and interleukins IL-2, IL-6 and IL-12.

- TNFα up-regulates protease MMP-9 expression and therefore angiogenesis.

**Topoisomerase** enzymes I and II tend to be elevated in cancer cells. These enzymes open up DNA strands to be read, including oncogenes and proto-oncogenes. They break and later rejoin DNA strands, resolving strains in the helix during replication.

**Virus** activation of oncogenes can turn on changes in the DNA which lead a good cell to become permanently transformed into the cancer lifestyle. Many oncogenes appear to be identical to retrovirus sequences thought to have been spliced into our human ancestor’s DNA by viral infection many thousands of years ago. Other retroviruses may have entered the human race more recently, in vaccines extracted from animal cells infected with viruses. These new viruses are not yet oncogenic, but may evolve in that direction, as have their predecessors.

The human DNA genome library locked in the nucleus of every human cell is now cluttered with millions of viral sequences: 1.3% are complete viral genomes. 10% of our genome consists of hundreds of thousands of copies of the viral promter Alu, each only 280 base-pair sequences long. If these get turned on, all kinds of viruses lurking in the body, perhaps even lurking inside the cell’s nucleus, can become active. An immune system overwhelmed by viruses cannot fight cancer.
Viruses can cause some cancers:

- Squamous cancers such as cervical carcinoma - human papilloma virus (HPV). HPV onco-proteins target p53 protein for degradation, deregulating cell cycling, impairing tumour-specific T-cell response, and increasing immune suppressor cell activity. HPV is linked to 90% of anal cancers, 65% of vaginal cancers, 50% of vulvar cancers, 35% of penile cancers, and 60% of oropharyngeal cancers.
- Burkitt’s lymphoma, Hodgkin’s Disease and nasopharyngeal carcinoma - EBV- Epstein-Barr virus
- Inflammatory breast cancer – mouse mammaray tumour virus (MMTV)-like virus.
- Karposi’s sarcoma - herpes virus.
- Hepatocellular carcinoma / hepatoma - Hepatitis B or C virus
- T-cell leukemia and lymphoma - T-cell lymphotropic virus-1
- Lymphoma, brain, bone and mesothelioma - SV-40 simian virus.
- Merkel cell neuroendocrine skin carcinoma – Merkel cell polyomavirus.

Survival or anti-apoptotic signals arising from hormones, growth factors and cytokines may be altered by mutations affecting their cell surface receptors.

Abnormal cell-to-cell communication at cell adhesion molecules (CAM) and gap junctions causes loss of contact inhibition, so the cells keep growing even after they bump up against another cell and should stop. This makes cells pile up into hard tumours - and still they grow! An independent cell is malignant, unable to act in the interest of the common good of the body network. An example is the role of the von Hippel-Landau VHL tumour suppressor gene. VHL normally promotes transcription of E-cadherin cell adhesion molecule. Loss of VHL results in loss of E-cadherin, with subsequent development of aggressively growing and spreading cancer. The surface of a cancer cell sends its nucleus “do not die” signals more than “do die” messages, so it never dies.

PARP or poly-ADP-ribose polymerase is another DNA repair gene, which needs vitamin B3 to operate.

Angiogenesis is the growth of new blood vessels to growing tissue. It happens in healing cuts and wounds and it happens for growing cancerous tumours. Arteries run into little capillaries which supply vital blood and nutrients to nearby cells. Angiogenesis is required for growth of a tumour past a very small size - 1 to 2 millimeters in diameter. This size tumour is undetectable, still safely localized at the in situ stage. New endothelial cells in the vascular buds secrete growth stimulating polypeptides such as IGF, Gm-CSF, PDGF and IL-1. Once a cancerous tumour has mastery over angiogenesis, it can grow large enough to kill the patient.

Placental growth factor (PGF) binds to vascular-endothelial growth factor receptor one (VEGFR-1), also called FLT-1, to promote angiogenesis and tumour progression independently of VEGF.

Cells stressed by heat, cold, hypoxia or low glucose produce heat shock proteins (HSPs) which prepare the cell for additional stress. Cancer cells make HSP’s to try to stay alive despite imblanced oncoprotein signaling that would otherwise be lethal. HSP’s are in a class called chaperone proteins, which regulate client proteins such as kinases, kinase receptors (cell proliferation), MMP-2 (invasion), steroid receptors, telomerase, Akt (apoptosis) and HIF-1α (angiogenesis).

HSP-90 can resist apoptosis from radiation or chemotherapy by regulating the strongly apoptotic 17AAG protein folding client. Blocking HSP’s will increase cancer cell death. Natural HSP inhibitors include quercitin and alpha lipoic acid.

HSPs form a complex with mutant forms of p53 protein, produced by mutations on the p53 gene, and this complex disrupts normal mechanisms which would arrest the cancer cell growth cycle. Heat shock factor one (HSF-1) allows cells with malignant mutations to adapt and survive. HSF-1 modulates two oncogenic signaling pathways – extracellular signal-regulated kinase (ERK) downstream of Ras, and activation of protein kinase-A (PKA) downstream from G-coupled receptor activation. HSF-1 also blocks translation of proteins by inhibiting the mammalian target of rapamycin (mTOR) pathway. HSF-1 promotes glycolysis.
Release of heat shock proteins into the circulation stimulates an immune response. This is one of the few things a cancer cell can do which will attract the attention of an immune cell. All too often the cancer cell looks normal to the immune cells, and goes unchecked until it is so deranged it cannot be stopped. Necrotic cells release HSP-peptide complex, which stimulates cytotoxic T-cells and non-specific NK cells. Apoptotic cells expressing HSPs are taken up by dendritic cells, which then present antigens to T-cells, leading to a tumour-specific immune response. Hyperthermia (heating) treatments may work in part by increasing immune system awareness of the cancer cells.

HSP-90 inhibitors such as cisplatin can also induce cell cycle arrest, via mechanisms independent of p53.

NRF2 - (nuclear factor erythroid 2 related factor 2) is a basic “cap and collar” leucine zipper transcription factor, which regulates environmental stress response by activating the expression of genes for antioxidants and xenobiotic detoxification enzymes, anti-inflammatory response, DNA repair, molecular chaperones, and proteasome systems. The Nrf2-directed environmental stress response protects cells against variety of stressors including environmental pollutants such as electrophiles and oxidizing agents, immunotoxicants, and inflammation. It is supported by green tea, curcumin and bocapa. It is upregulated during chemotherapy, influencing drug levels in the blood.

SUMMARY OF CARCINOGENESIS

Overnutrition, faulty nutrition and acid-induced hypoxia trigger a shift from catabolic to anabolic metabolism, with increased production of biomass substrates. Carbon skeletons, purines, lipids and proteins via fermentation begin to take precedence over ATP production by oxidative phosphorylation. Retrograde signaling to the nucleus initiates a complex epigenetic and genetic process of returning to a primitive fetal type growth pattern, as seen in an embryo functioning in a low oxygen environment before the full development of the placenta and oxygen-based metabolism.

Tumour progression is characterized by progressive evolution of clones of cells with faulty DNA repair mechanisms, declining sensitivity to growth inhibition signals, reduced immune surveillance, evasion of apoptosis, sustained tumour-mediated angiogenesis, and an evolving ability to invade and metastasize. As DNA monitoring and repair breaks down, and oncogenes are unmasked, the mutation rate of cells outstrips the genetic and immune controls. A cell must accumulate several peculiar biochemical skills before it can be a cancer. Many cells die trying, making fatal mutations or missing key steps. Those that do succeed in becoming cancerous continue to mutate and develop more and more ways to grow faster than their normal neighbours. A million cells is the size of the head of a pin - undetectable, and so is called occult cancer, meaning “hidden”. By a billion cells, it is the size of a small marble, and possibly detectable by touch or scans. This is called clinical cancer and it is as few as 30 doublings old. This mass weighs about 1 gram. After diagnosis, it may take only a few to several doublings for a cancer to be really making a person sick and worse. From one gram of cancer, it only takes about 10 to 15 doublings to produce a kilogram of cancer, a burden that is so toxic, parasitic and destructive that it threatens life.

Very important in cancer are the hormone and growth factor receptors. These accept only very specific molecules, most of which are the sex hormones estrogen or testosterone, or chemicals from outside the body which are very similar, called xenohormones or xenobiotics.

Outside the cell lies the extracellular matrix ECM, made up of a gelatinous ground substance, connective tissue, blood and lymph vessels, nerves, dormant immune cells, stem cells, and more. The ECM turns out to be a major regulator of cell growth, promoting or blocking cancer development and progression. The single most important regulator in the ECM is vitamin A. It acts on the immune cells and stem cells in the area that are supporting and nurturing their neighbours.

My Chinese medicine training taught me that cancer is associated with “blood stasis”. The Chinese knew this over a thousand years ago, and it is easily diagnosed by TCM pulse and tongue assessment. About 150 years ago
Western physicians began to notice cancer patients had a very high risk of forming blood clots – depending on the cancer, 7 to 30 times normal risk of clots.

I was taught in TCM college that cancer patients who developed “fire poison” or “heat toxin” are on a slippery slope to doom, and in fact this is very true in practice. Well, this is just inflammation. Treated in a timely way, cancer patients recover and live for months or years in good health. I lectured on this to medical oncologists at Grand Rounds at the BC Cancer Agency a few years ago, and they had not realized the importance of controlling inflammation. Now it is in all the medical journals, and is a hot topic. However, they still do not consistently test for it, don’t treat it adequately, and the drugs they do use for it are dangerous.

Immune cells are attracted to cancerous tumours, due to stress signals from over-crowding and nutrient depletion. They see damaged cells, and immediately start to try to repair the problems. The entire wound-healing mechanism kicks in, creating growth factors, blood and lymph vessel support, and enzymes to assist invasion into surrounding tissues. Once cancer starts to invade adjacent tissues, it can begin to severely damage tissue and organ function, as well as that of its neighbours. I see the immune cells rescuing the cancer cells from this sick and toxic tumour environment. Macrophages engulf the cancer cell but do not consume it, providing enzymes to move through tissue. These fusion hybrids carry the cancer cells to where other immune cells can escort them and assist in setting up a new home elsewhere.

The most dangerous thing that this disease called cancer does is metastasize or spread into distant sites. It may start as a single cell entering a leaky lymph or blood vessel in the tumour, carrying it in the circulation to somewhere else. It may be by invasion into a vessel or body cavity. It may be by a clump of cells being shed during handling in surgery or even at biopsy for diagnosis. Immune cells facilitate movement through tissues by forming fusion hybrids with macrophages, and metastatic cells are escorted and supported in colonization by immune cells. If it can move out of the bloodstream, attach in a new organ, and get new blood vessels to feed it, a new metastatic tumour may form. These mets in vital organs like the brain, liver, adrenal glands and bones cause the most harm and suffering. Widespread cancer is very difficult to control, much less cure.

If the cancer cell is still much like the normal tissue it is supposed to be, we call it “well differentiated”. It will be very highly adapted to doing a specialized job in a specific place, and is not likely to be able to adapt to life in a new part of the body. If it is de-differentiated, poorly differentiated, or even worse, anaplastic, it is no longer focussed on its assigned task. All it is concentrating on is growing and invading.

However grim your medical prognosis may sound, always remember these wise words of hope:

**Cancer is only a word - not a “sentence”**

**PHASES OF TUMOUR GROWTH**

There are 3 distinct phases in the growth of a tumour.

1. **Induction** - Genetic, viral, and environmental factors trigger malignant patterns of cell growth. Ultraviolet light and radiation causes DNA base fusion. ROS add oxygen compounds to the bases. Persistent oxidative stress and synergy with promoters such as hormones, phenols, and phorbol esters contribute to mutation and dedifferentiation. Chemical alkylating agents add methyl groups to the bases. Irreversible DNA damage or mutation occurs, especially to tumour suppressor genes Rb, CDK4, cyclin d and p16. Oncogenes turn on, DNA repair and apoptosis genes are turned off, and a cancer is born.

2. **Progression** - After loss of 2 or more suppressor genes and activation of several oncogenes there follows a period of growth of the transformed malignant cell clones. The environment must continue to support mutation and development of angiogenesis, invasion of adjacent tissues, immune evasion and other malignant characteristics. The descendants or clones of the original cancer cell change into a variety of mutants, so in fact there are several types of cancer within every large tumour.
3. Proliferation - 30 doublings produce 1 gram or about a billion cells, the threshold of detection, and in 10 more doublings produce 1 kilogram of tumour, which may be incompatible with life. Heterogeneous (mixed cell type) tumours are capable of rapid growth, invasion and metastasis. These are the hallmarks of cancer.

CANCER BY CELL TYPE

Carcinomas originate in epithelial tissue, and include squamous cell, transitional cell, basal cell and adenocarcinoma. These are the most common types of cancers, and the ones the immune system is most likely to miss detecting and responding to until quite late in the course of the disease. Dermal use of immune stimulants are always indicated.

Sarcomas arise in mesenchymal tissues such as muscles, skeleton, blood vessels, lymph vessels and reticular tissue; eg. osteosarcoma, myosarcoma, fibrosarcoma. Homotoxicology drainage remedies for the mesenchyme are always indicated.

Lymphomas and leukemias begin in lymphatic reticular tissue, a subset of mesenchyme stem cells from the bone marrow, giving rise to Hodgkin’s disease, lymphatic & myeloid leukemias. In Chinese medicine we look at the kidney and spleen to regulate blood building.

Neuromas develop in nerve tissue, and include glioblastoma multiforme, astrocytoma, neuroblastoma, meningioma, and pheochromocytoma. Dietary fats, fat-soluble toxins and antioxidants are often key issues. Other malignancies - hydatidiform mole, teratoma. As for all tumours, in Traditional Chinese Medicine a lump results from stagnant blood, which stopped moving due to deficiency of chi flow, arising from constrained liver chi.

Whatever the spot on the DNA or the cell surface or where in the body, cancer arises from living beyond the safe limits of cell chemistry. This incredible self-repairing organism can take a lot of abuse. It forgives a lot of exposures and it tolerates a lot of malnutrition.

It can take up to 20 years from the time the DNA damage reaches the point where the cell is permanently transformed into a lifestyle of uncontrolled growth to the point where it starts to harm organs and the whole person. Note that tumours grow kinetics are logarithmic, meaning they grow faster and faster as they get bigger. Cancerous or malignant tumours are dangerous, toxic and parasitic. Cancer cells are out of touch with their neighbours and community, like dangerous renegades. The immune system is usually trying to repair the cancer, but cannot overcome the genetic damage, and immune cells in tumours protect it from immune attack.

Tumours are not just composed of malignant cells. They are a living community of cells with these critical components:

- cancer cells
- cancer stem cells
- tumour vasculature, which is composed of vascular endothelial cells, pericytes, smooth muscle cells, endothelial progenitors and platelets
- tumour stroma, which includes fibroblasts and specialized mesenchymal cells
- infiltrating immune cells such as macrophages, lymphocytes, granulocytes and dendritic cells
- extracellular matrix, which functions as a reservoir of substrates and growth factors
- although not physical components per se, some specific features of the tumour tissue, such as hypoxia and acidosis, can be considered as 'functional components'

All the cytokines, growth factors and biochemistry of these cells, matrix and milieu influence the tumour viability. The environment around the cancer cell must be detoxified, the cells must be nourished, and the immune cells specifically activated to create healing conditions. Balance and order can be restored from chaos.
SURVIVAL RATES

The most generally useful measure is 5 year survival disease-free. This allows comparison of the effects of different treatments. Often a patient who lives 5 years without a sign of the original cancer is truly cured. However, such survival statistics do include people who will die of their cancer due to delayed re-occurrences, who have enjoyed a long remission or pause in the disease.

Individual survival is NOT predictable with much accuracy! No one can really say with certainty how long a patient will survive. All we can predict is the average survival time, based on present standards of care. There is naturally always hope of increased life and quality of life with natural medicine support to enhance regular medical care.

There is always hope of a miracle by Divine intervention, luck, or whatever you can find to believe in. Do not ever give up! A wise man once said “Fear is faith in evil”. Believe in good and the grace of peace will come to you.

Quality of life may be severely and irrevocably diminished by medical oncology. Natural and drug adjuncts are supportive therapies which reduce harm and increase the potential for successful treatment outcomes. Allopathic medicine has reasonable success treating leukemias and lymphomas, and skin cancers. Localized in situ cancers are typically 50 to 80% curable. Spread into regional lymph nodes is a sign of aggressive disease with a poorer prognosis, often less than 50% survival. Distant metastases are rarely curable, but effective palliation can give 5 to 20% 5 year survival. For the most common cancers, which represent majority of cancer cases, there has been little significant change in survival rates in modern times. Cancer remains a traumatic disease with a generally unfavorable outcome.

GRADING

Grading is done by a pathologist looking at cancer cells stained to make them visible under a microscope. The severity of the cancerous changes is given based on the degree of differentiation of tumour cells, and on the number of mitoses with highly condensed chromatin figures - the number of cells caught in the act of making an extra copy of their DNA, in preparation for doubling into two cells. More differentiation means more normal specialization for a particular job. More mitoses mean it is growing fast.

Grades I to IV are usually assigned, a higher number meaning increasing anaplasia - loss of recognizable differentiation. Anaplastic cells are wild and dangerous.

Histology (cell architecture) does not necessarily determine the clinical behaviour of the tumour. In other words, you cannot see through a microscope exactly how the cancer will behave in the body, so grading is only part of the information needed to decide on therapies.

The practice of medicine is informed by data, but clinical judgement is based on the subjective elements of perception, experience and belief. Wisdom requires more than knowledge of averages and statistics.

STAGING

This is clinically critical information in selecting therapies and making a prognosis - an estimate of the outcome of the disease. Staging is based on the key malignant characteristics of cancer:

- proliferation - uncontrolled growth
- invasion - pushing into neighbors
- metastasis - spread to other organs

Size of the primary lesion (T)
Extent of spread into regional lymph nodes (N)
Blood-borne metastases to distant locations (M)
APOPTOSIS

Apoptosis is an off-switch for bad cells, built into every human cell. This is the ideal way to remove problem cells or cells no longer needed in the body. It is a “Magic Bullet” which gently takes out unwanted cells with no harm to any other cell. They are simply recycled.

“Programmed cell death” or cell suicide is rapid, orderly, and removes individual cells. Nearby cells are not harmed. This is a normal part of the growth and maintenance of healthy tissues. Before a cell will split into two new cells it must arrive at a checkpoint in the cell cycle, and run a test to see if the DNA is in suitable condition to be copied. A program is run which is much like “ScanDisc” utility on a computer, which checks your hard-drive for errors. The cells use the p53 gene to run a check, and if it finds over 50,000 to 60,000 nicks, breaks, errors, deletions or mutations, it knows this much damage cannot be repaired. It will throw the off-switch to kill the cell, instead of ending up with two bad cells. The cell turns inside-out, gets recycled, and is replaced by a fresh new cell derived from a local stem cell.

Energy-dependent, apoptosis requires the basic energy molecule adenosine tri-phosphate (ATP), usually made by burning sugars. This combustion of sugars for energy occurs in the mitochondria.

There are about 1,000 mitochondria in every cancer cell, inherited from your mother’s egg. There is no DNA in a mitochondria form your father. The mitochondria have their own DNA copying and repair systems. They seem to be able to throw the apoptosis death switch in cancer cells. Apoptosis pathways converge on the mitochondria after activation of the interleukin-2 converting enzymes ICE and the expression of cytoplasmatic proteases trans-glutaminases and endonucleases.

P53 tumour suppressor protein directly promotes apoptosis by interacting with the mitochondrial protein bak to cause its oligomerization and thus the release of cytochrome C. A cascade of death signals follows. Apoptotic control by mitochondria is lost when they shut down due to hypoxia. Inhibiting the enzyme pyruvate dehydrogenase kinase restores the function of the mitochondria, and can have a very dramatic tumour-killing effect.

Cells undergoing apoptosis show cell shrinkage, chromatin condensation making the DNA visible in the nucleus, surface blebbing (bubbles), and fragmentation into apoptotic bodies -membrane-bound bits of the stuff from inside the cells - the cytoplasm (liquid) and organelles (structures).

Phagocytosis or the eating and digestion of whole cells or apoptotic bodies (cell fragments) is carried out by parenchymal cells in tissues or macrophage immune cells. Digestion in their enzyme-filled organelles called lysosomes is rapid.

No inflammation or immunological reactions are created. There is no release of iron or other metallic ions that can cause oxidative stress.

Apoptosis is triggered by a preponderance of “do die” signals over “do not die” signals sent to the DNA. This is a dynamic balance, like yin and yang, both are always present – it is the overall balance that determines the net outcome.

Apoptosis is increased by bax and bad genes. As mentioned before, stress markedly inhibits the bad protein.


Other apoptosis promoters from Nature: quercitin, EGCG, melatonin, indole-3-carbinol, ellagic acid, betulinic acid, caffeine, genestein, berberine, vitamin E succinate, selenium, glutathione, and mistletoe (viscum) lectins. These are antioxidants and bioflavenoids from apples, onions, garlic, tumeric, soybeans, coffee, green tea and
other food grade plants as well as herbs or botanical medicines such as mistletoe. Perillyl alcohol is found in essential oils of lavender and palmarosa. Limonene is found in essential oils of lemon, lemongrass, orange and celery.

There is a blood test for serum cytochrome C which measures the global level of apoptosis in the body. The technique relies on an enzyme-linked immuno-absorbent assay. Above normal range suggests a high tumour mass with a low apoptotic rate, and double the risk of dying within 3 years.

**AUTOPHAGY**

Autophagy is a process of “self-eating” by internal enzymes, to purge and dissolve away unwanted material. The cells sequester cytosol or cytoplasmic organelles within double membranes, called autophagosomes. These autophagic vacuoles fuse with endosomes and then with lysosomes, and digestion ensues. This is presumed to be a mechanism to cope with damaged organelles such as mitochondria, and recycle them. It can also remove accumulations of proteins such as amyloid deposits involved in neurodegeneration. This process can even be induced in cancer cells by catastrophic inhibition of growth signals such as mTOR and other kinases. Agents which promote autophagy include temozolomide, berberine, quercetin, green tea EGCG, sulforaphane, curcumin, resveratrol, Co-enzyme Q-10 and vitamin E.

**ANGIOGENESIS & LYMPHANGIOGENESIS**

Cancers by definition are growing faster than the normal cells of their type. They can have 30 to 40 times normal basal metabolic rate. Therefore they must have even greater than normal amounts of oxygen and nutrients, requiring a blood supply greater than normal for that tissue.

Normal cells are never more than a millimeter away from a blood vessel, as oxygen can only passively diffuse through that much tissue. Therefore, past 2 mm diameter, zones of low oxygen or hypoxia will develop in tumours. If the cancer cells in tumours of about 3 mm diameter cannot recruit local support cells - stroma, immune and stem cells – to generate a higher than normal rate of blood and lymph vessel in-growth, they will fail to maintain a pathological growth rate, and probably cease to be a disease.

Hypoxic cells release chemicals which trigger new blood vessels to sprout and extend into tissues that are low in oxygen. Capillary basement membranes dissolve, a bud grows, and elongates along collagen scaffolding into the hypoxic zone.

This is called angiogenesis, and it is driven by angiogenic factors such as hypoxia-inducible factor one HIF-1, lipoxigenases LOX, insulin, insulin-like growth factors one and two IGF-1 & 2, tumour necrosis factor alpha TNFα, granulocyte macrophage colony-stimulating factor GM-CSF, focal adhesion kinase FAK, basic fibroblast growth factor bFGF, platelet derived endothelial growth factor PDGF, interleukin eight IL-8, interleukin one beta IL-1β, heptocyte growth factor, lactic acid, histamine, fibrin, prostaglandins, epidermal growth factor EGF, heat shock protein HSP-90, lipoxygenase 12-LOX, c-Src, AT-1, cyclooxygenase COX-2 and vascular-endothelial growth factor VEGF.

Obviously, complex and redundant mechanisms drive the induction of blood vessel growth. This duplication and layering of controls makes it a complex business to alter angiogenesis, and even more difficult to sustain the effectiveness of anti-angiogenic therapies.

Ischemia (hypoxia caused by reduced blood flow) and inflammation activate an endogenous cholinergic angiogenic pathway. This pathway is independent of VEGF and bFGF, and is stimulated by nicotine. Tobacco products cause blood vessels to constrict for hours after exposure, and this adds insult to injury.

Formation of new blood supply to hypoxic cells is a normal part of wound healing. Cancer is “the wound that will not heal”.

28
Tumour stromal or structural support cells become activated by cancer cells to secrete VEGF, protein dissolving MMPs and osteonectin, all of which remodel the extracellular matrix and make fibroblasts lay in the protein scaffolding into which new blood vessels can develop. Matrix metalloproteinases MMPs are zinc-dependent endopeptidases which mediate the accumulation and release of vascular-endothelial growth factor VEGF in the extracellular matrix ECM. New lymph vessels form to carry away wastes, at the same time as new blood vessels bring in nutrients.

HIF-1 occurring in the hypoxic regions of the tumour plays an important role in VEGF expression, angiogenesis, and tumour growth. IL-1β and TNFα activate NFkB to induce HIF-1 to trigger the release of VEGF. Furthermore, hypoxia induces the expression of Rac. Rac and Id-1 inhibit differentiation and DNA synthesis, increasing the stabilization of HIF-1α, resulting in the up-regulation of VEGF. HIF-1α is a new target for the anti-angiogenic therapy of hepatic (liver) cell carcinoma HCC. Curcumin (a natural compound isolated from the commonly used spice turmeric), green tea extract and its major component (-)-epigallocatechin-3-gallate, and resveratrol (a natural product commonly found in grapes and various other fruits), 3-(5′-hydroxymethyl-2′-furyl)-1-benzyl indazole (YC-1), TX-402 (a quinoxaline noxide), vitexin (a natural flavonoid compound identified as apigenin-8-C-b-D-glucopyranoside), CK2α siRNA, and rapamycin significantly inhibit hypoxia-induced angiogenesis via down-regulating the expression of HIF-1 and VEGF.

The expression of tumour suppressor von Hippel-Lindau VHL gene and p53 DNA Guardian gene are down-regulated by hypoxia.

The primary angiogenic triggering compound is vascular endothelial growth factor VEGF, a highly conserved heparin-binding glycoprotein which induces endothelial cell mitogenesis and migration, increases vascular permeability and vasodilation, induces proteinases which remodel the extracellular matrix, inhibits antigen-presenting dendritic immune cells, and inhibits endothelial cell apoptosis. VEGF expression is regulated by hypoxia, and mediated by 3 distinct cell surface receptors as well as 2 co-receptors. The tyrosine kinase domain Flk-1 and Flt-1 play a critical role in tumour angiogenesis, and have been the targets of research with humanized recombinant monoclonal antibodies.

Tumours may make excessive vascular endothelial growth factor, enslave local immune cells and stem cells to make abnormal levels of VEGF, or release platelet-derived endothelial cell growth factor alpha PDGFα to recruit stromal fibroblasts to make VEGF. However, they do not generate matching levels of angiopoietin APN, a relative of MMP. APN recruits pericytes to remodel crude blood and lymph vessels into mature forms. Therefore in tumours the vessel loops formed tend to be chaotic, thin-walled, and leaky, increasing risk of spread of cancer cells into the general circulation. The fluid build-up (edema) leaking into the tumour increases the osmotic fluid pressure in the tumour, which can squeeze off blood flow, and trigger a new round of hypoxia and angiogenesis.

By the time a cancer is of a detectable size, it is often getting most of its energy from fermenting sugars throughout the cancer cell, rather than the usual burning with oxygen in about 1,000 little structures called mitochondria. These little combustion chambers shut down when oxygen levels in the tumour drop. Fermentation or anaerobic glycolysis is about 18 times less efficient than the aerobic burning in the mitochondria, but is advantageous in that it generates building materials for new cell construction – proteins, nucleic acids, membrane lipids, etc. Fermentation also produces lactic acid as a waste product, turning the tumour quite acidic. Unfortunately lactate is a growth factor, so soon the tumour is growing even faster. Dr. Otto Warburg discovered this anaerobic behavior in the presence of oxygen, which is absent in adult tissues, and only faintly active in embryonic tissue and benign tumours. This is called the Warburg effect. The cancer cells will continue to make energy from sugars without oxygen, even if oxygen levels are restored in their part of the tumour by renewed angiogenesis. The mitochondria membranes remain hyper-polarized, suppressing activity in ion channels. Mitochondrial suppression leads to suppression of apoptosis – the cancer cell cannot throw the off-switch for bad cells, and becomes immortal.

Anti-angiogenic therapy initially will paradoxically initially increase blood flow in a tumour! Suppression of VEGF leads to an increased ratio of vessel re-modeling protein APN relative to VEGF. Unopposed VEGF makes somewhat rudimentary, leaky and inefficient blood vessels. With relatively more APN, the vessels are more
organized and efficient, and with less leakage there is less back-pressure against in-flow of blood. This is a good thing to do just before radiation therapy, to overcome the hypoxic cell problem.

Surgery is never done on a tumour if there is evidence of smaller metastatic lesions. Removing the original or ‘mother’ tumour can cause the remaining tumours to grow very quickly. As long as the mother is left in place, it puts out signals which slow angiogenesis in the others, keeping them smaller.

The abnormal stomach bacteria *Helicobacter pylori* induces angiogenesis via VEGF and IL-8. This increases risk of stomach cancer as well as upper GI ulcers and cardiovascular disease. *H. pylori* also induces EGF via AP-1.

Copper is an essential mineral, an obligatory co-factor, for many angiogenesis promoters. It is proven to reduce circulating levels of vasculoendothelial growth factor VEGF, fibroblast growth factor two FGF-2, and interleukins 6 and 8. IL-6, IL-Angiogenesis promoters angiotropin, angiogenin, and cysteine-rich proteins are copper dependent. Copper can be removed by chelating with tetrathiomolybdate TM. Treatment for three months will usually reduce copper to about 20% of baseline levels, which will often arrest tumour growth. The TM is given with food to bind the copper in the food, and also given between meals to bind-up blood copper. As copper is involved in heme synthesis and red blood cell proliferation, a side effect can be anemia and mild leukopenia, reversible on easing up the therapy. A low copper diet and zinc supplements can keep levels steady. Monitor ceruloplasmin in the blood, a protein made in the liver, incorporating 6 to 7 atoms of copper, which transports iron from the liver to the bone marrow. Use purified water if your home has copper pipes. Zinc supplementation can lower copper absorption. Green tea chelates copper, inhibits endothelial cell growth, and very significantly inhibits VEGF. Anti-copper therapies like TM only inhibit small tumours, larger ones tend to escape its effect via alternative angiogenic pathways.

*Placental growth factor* PGF binds to vascular-endothelial growth factor receptor one VEGFR-1, also called FLT-1, to promote angiogenesis and tumour progression independently of VEGF. Antibodies against PGF may be a good strategy, as they do not cause pruning of capillaries in healthy tissue, nor do they induce angiogenic rescue genes such as Fgf-1, Fgf-2, Sdf-1, MMP-9 and Cxcl-1.

The tumour endothelial marker TEM CD-276 is specifically over-expressed in the blood vessels of human tumours, but not in normal tissue and wound-healing angiogenesis. My naturopathic colleagues in the USA have developed a drug C-Statin from the common bindweed *Convolvulus arvensis*.

Anti-angiogenesis agents tend to induce tumour stasis, but not tumour regression - they stop the cancer from growing bigger but may not get rid of the cancer. Powerful anti-angiogenic drugs such as Avastin – bevacizumab, an antibody that neutralizes VEGF, can cause big problems with blood vessels in normal tissues. For example, the highly vascular choroid plexus membrane on the brain ventricles can be damaged, impairing production of cerebrospinal fluid. The result can be headaches, blurry vision, and even fatal seizures and brain swelling. Other adverse effects may include high blood pressure, loss of protein from the kidneys, and blood clots.

Natural anti-angiogenic compounds include catechin, EGCG from green tea, catechins, curcumin, vitamins A, C, D & E, mushroom shikonin, soy genestin isoflavone, milk thistle silibinin, R-alpha lipoic acid, quercitin, indole-3-carbinol, beta carotene, salicylates, taurine, melatonin, ellagic acid, grapeseed oligomeric proanthocyanidins, resveratrol, N-acetyl cysteine, MSM, flaxseed, IP6, omega 3 oils and shark liver oil. Use COX II inhibitors and inhibitors of NFkB to down-regulate inflammation.

**INVASION**

Cancer does little harm growing into a simple lump. It could be just removed by a surgeon and tossed away if that were all it could do. Because cancer cells stop communicating normally with their neighbours, they can push past them and spread into surrounding structures, and beyond. This is where the tumour becomes a serious problem. Cancer cells lose contact inhibition, primarily through changes to cell adhesion molecules and gap junction proteins. They do not stop growing when they bump up against a neighbor, as they should for the common good. Instead, they push and crowd each other and pile up into hard, compressed lumps.
Single tumour cells or even clusters of cancer cells are shed from tumours as normal cell-to-cell adherins are down-regulated, by mechanical and hydrostatic pressure, central necrosis, and by proteolytic enzymes. Adherins are like a glue or clamp that keeps cells stuck to each other.

Invasion is associated with hypercoagulability, usually the result of the MET oncogene encoding a growth factor receptor which upregulates plasminogen activator’s inhibitor type 1 and COX-2. This makes a lot of fibrin. Motility can involve creeping along ECM protein fibres such as fibrin, as they are pulled into the cancer cell for digestion. Its food becomes a path of escape, a lifeline. Receptors on the tumour cells learn to adhere to laminin and fibronectin proteins in the extracellular matrix ECM rather than just to other cells. The matrix fills in the space between cells, and learning to ride the matrix gives cancer cells a highway out of town. IL-6 is associated with hypercoagulation.

Cell motility and invasiveness increases in hypoxia. Low oxygen stimulates lipoxygenases LOX, leading to ECM collagen fibre deposition, activation of focal adhesion kinase FAK, and finally altered B1 integrin.

Membrane APN enzyme regulates invasion. Invasion is also regulated by urokinase type plasminogen activator uPA. Green tea EGCG controls this factor.

AP-1 activation is associated with the acquisition of invasiveness, including the induction of Fos to express cytokine-induced metalloproteinases. Cancer cells may over-produce proteolytic enzymes, which dissolve the extracellular matrix ECM, which binds cells together. Matrix metalloproteinases MMPs are collagenases and gelatinases which digest connective tissue and allow invasion. Structural networks of collagen proteins, glycoproteins and proteoglycans in the ECM are broken apart, allowing cancer cells to swim out of the tumour.

Breakdown products of the ECM are growth-promoting, angiogenic, and chemotactic. These increase tumour growth and movement in a vicious cycle. MMP’s stabilize tumour vasculature via regulation of platelet-derived-growth factor PDGF.

- MMP-1: an interstitial collagenase
- MMP-3: stromelysin, breaks basement membranes
- MMP-9: active in angiogenesis
- MT-1 MMP: membrane type 1 matrix metalloproteinase

Inhibitors of MMP’s include curcumin, Scutellaria baicalein, green tea EGCG, resveratrol, digestive enzymes, Zeel, Hormeel S. Collagenase inhibitors include curcumin, green tea EGCG, quercitin, grapeseed oligomeric proanthocyanidins, gotu kola, genestein, emodin, luteolin, PSK, EPA, vitamin A and vitamin C.

Growing tumours can then progressively infiltrate through the basement membrane that normally forms a boundary for a tissue. This is like a prisoner digging an escape tunnel out of where it supposed to stay – now it can get loose and do harm. Cancer cells struggle to escape from the sick, confined, acid, low oxygen toxic tumour environment. Abnormal gut bacteria such as some E.Coli, Salmonella typhimurium and Listeria monocytogenes can turn beta-casein-derived peptides into pro-invasive factors which allow tumour cells to move through collagen in the connective tissue. This is one reason some doctors advise cancer patients to avoid eating milk and cheese. Penetration into blood vessels, lymphatic channels and body cavities allows the opportunity to spread.

Invasion is a thoroughly malignant process. Cancer cells becoming invasive is a sharp turn for the worse. Tumours showing invasiveness are dangerous. Actual invasion of vessels and tissues is destructive. Invasion needs to be actively suppressed. This requires modulation of the entire immune and stem cell network supporting the malignant phenotype. In fact, huge macrophages can engulf a cancer cell, forming a fusion hybrid cell. The macrophage can enzymatically digest its way out of the toxic tumour environment, then release the rescued cancer cell!
METASTASIS

Metastases or mets are the most dangerous aspect of a malignant tumour. Successful colonization of a distant part of the body with cancer usually means much poorer chance of recovery.

Once certain organs are metastasized with cancer, life expectancy may be reduced to months. There is an urgent necessity to find a treatment that works.

A metastasis is a discontinuous secondary tumour made of one of the cell types found in the original tumour. For example, a metastasis of breast cancer to the brain means the “brain met” is still made of breast cancer cells, not brain cells.

Generally a “met” will be clones or descendants of cancer cells which are particularly mutated to be aggressive, rapidly growing, treatment-resistant, and anaplastic.

Medical procedures can increase risk of tumour cell spread. A large-needle core biopsy of breast tumours increases risk of having a positive sentinel node on biopsy by an odds ratio of 1.48, while a fine needle aspiration increases the odds ratio by 1.53, compared to surgical excision of the entire undisturbed lump of tumour. Surgery causes significant seeding of other areas in 1 to 2% of cases. Using anti-angiogenics such as green tea EGCG can reduce survival of the cancer cells let loose by surgery.

Primary sites of metastases and screening methods:

- bone - radioisotope bone scans
- liver - elevated LDH enzyme in serum
- lung - CT scan or cytology from bronchoscopy
- brain - CT or MRI scan

Metastasis is very actively promoted by TGFβ. Transforming growth factor turns fibroblasts into motile myofibroblasts.

Hypoxia induces LOX, which increases collagen fibre formation in the extracellular matrix. This activates focal adhesion kinase FAK, altering B1-integrin, increasing cell motility which can lead to metastasis.

Cancer cells secrete inflammatory factors such as versican, which stimulate immune cells to promote metastasis. This is mostly carried out by macrophages, via toll-like receptor TLR-2 and its co-receptors TLR-6 and CD-14.

Disseminated metastases must evade immune surveillance. Immune cells may be killing millions of these wandering cells daily. It is likely that all tumours shed millions of cells daily, but it is actually quite rare for such wanderers to survive.

STAT-3 transcription activator influences the spread of cancer into bones, providing a homing signal into a suitable secondary site. Indole-3-carbinol and curcumin inhibit STAT-3. Other factors active in spread of cancer to the bones include TGFβ, RANKL and Src tyrosine kinases.

TGFβ has been found to be active in single cancer cells metastasizing through the body, but must switch off for the cell to grow in its new location. TGFβ signaling is increased by surgery, radiation and chemotherapy, raising concerns these therapies may contribute to cancer spreading. TGFβ is not active in clumps of cancer cells moving around, which tend to lodge in lymphatics and not travel as far as single metastatic cells. Leptins linked to obesity strongly influence TGFβ1 and increase risk of metastasis.

A metastatic cell must then adhere to endothelial cells lining the blood vessels in the target organ. Insulin-like growth factors I and II are chemoattractants for metastases. The cell will stop and attach where it “smells” this chemical. These are high when the diet is rich in sugars and simple carbohydrates.
The metastatic cells attach to the blood vessel wall via adhesion integrin molecules. Fibronectin from fibroblasts derived from mesenchymal stem cells, and P-selectin and E-selectin from activated endothelial cells promote metastatic cell adhesion and extravasation. Endothelial cells are activated to make matrix metalloproteinase MMP-9, allowing the metastatic cells to leave the blood vessel through the basement membrane of the endothelium lining, and thus to enter the new tissue. Once in the niche, metastatic cells probably use cell-to-cell adhesion molecules such as CD-44 to attach, giving them the ability to begin cell doubling. Only an attached cell can pull two sets of chromosomes apart via a micro-tubule spindle, to form two new cells.

Metastases only grow significantly if they can stimulate angiogenesis or new blood vessel growth into their new home. It is suspected that immune cells such as macrophages, platelets, fibroblasts and local as well as bone-marrow derived progenitor stem cells are essential recruits to complete this process. Endothelial progenitor cells mediate the angiogenic switch that enables progression to a macrometastasis. Progenitors make VLA-4 which reacts with fibronectin, a fibroblast protein up-regulated by tumour growth factors.

It is thought that bone-marrow and mesenchymal stem cells actively escort cancer cells to new niches, condition the environment and foster colonization in the new tissue. Metastasized cells probably require bone-marrow-derived progenitor/stem cells to express VEGF1, and may not succeed without these support cells. VEGFR-1 myeloid cells are recruited by inflammatory and angiogenic cytokines such as VEGF-A, placental growth factor PI GF, and soluble KIT ligand. Stem cells migrate to tumours as they become larger and local immune and stem cells fail to arrest inflammation around the tumour. This is likely when they reach about 1 centimeter in diameter, when hypoxia is triggering acidification and gross inflammation, and around the time they become detectable by current common diagnostic tests.

Micrometastases in the bone marrow are very common after definitive treatment of even minimal and localized breast cancers. These can persist for many years, and increase risk of early reoccurrence.

CD8+ effector memory immune cells infiltrate tumours and restrict perineural and vascular invasion, and thus squelch metastasis.

Membrane-bound APN enzyme regulates invasion and metastasis. It is blocked by curcumin.

Natural anti-metastatics include fractionated or modified citrus pectin (MCP), larch arabinogalactan, aloe vera juice, eicosapentanoic fatty acid (EPA), conjugated linoleic acid (CLA), bromelain and heparin. Rx a very low fat diet, as a high fat diet makes cancer cell membranes aggressive, and dramatically raises risk of mets

IMMUNE EVASION

Healthy adults may produce 500 to 1000 new cancer cells daily. Dr. Kobayashi screened asymptomatic adults and estimates only 1 in 1000 is completely cancer free. 70.6% had precancerous cells, about 25% had pre-clinical cancers, and about 5% had undiagnosed clinical cancer - tumours over 1 gram.

NK cells and apoptosis remove most cancers as they arise. Natural killer NK cells are large lymphocytes specialized to kill viral infected, solid tumour or leukemic cells. Up to 15% of total lymphocytes are NK’s. Exercise increases NK cell counts.

Remedies which increase NK activity, as measured from bioactivity assays from the patient’s blood, have no reliable significant clinical effect on cancer outcomes. Beware of claims that a product will cure cancer based only on its impact on NK cell number or activity. Natural Killer cells can only kill cancer when other immune cells such as macrophages support them or at least refrain from blocking them. Tumour cells tend to attract immune and stem cells to make angiogenic and growth factors, while suppressing immune targeting of tumour cells. Macrophages are large lymphocytes which move into tumours, support its growth, and even release enzymes to help the cancer cells invade and spread.
We shed cells profusely from every tissue, such as about 50 million skin cells sloughed off per minute! Tumours may shed up to 3 to 4 million cancer cells per gram of tumour per day, yet successful metastasis is relatively rare. However, when one does escape to a new part of the body, it can produce diagnosable malignant disease in about 5 to 20 years. It is usually metastatic cancer deposits which cause the worst effects of cancer, and tend to responsible for most cancer deaths.

Cancer cells evade NK cells by expressing high levels of MHC-1 protein on their surface.

Fortuantly, immune cells do usually recognize cancer cells as being out of place when loose in the bloodstream. Most cancer cells shed into the lymph and blood vessels will be targeted and killed.

The immune system can easily be overwhelmed by cell clusters and clumps. These may arise from a traumatic blow to a tumour, cutting into the cancer for biopsy, in surgery, etc. It is relatively rare, but cancer occasionally explodes into rapid growth and spread when disturbed. To reduce or eliminate this risk I prescribe modified citrus pectin and green tea EGCG concentrate around the time of biopsy and surgery, and for 2 to 6 montyhs after.

Immune cells, stem cells and specialized mesenchymal cells literally build a zone in which cancers can hijack normal homeostatic growth restraints. Key immune compounds in this process are ROS, histamine, metalloproteinases, and cytokines.

Cytokines include interferons, lymphokines, chemokines and haematopoietic growth factors. AP-1 is an important modulator of cytokines. TNFα is a pro-inflammatory cytokine. Cytokines which modulate inflammation and angiogenesis include MCP-1, MIP-1b and IL-8. Cytokines associated with HER2 / neu + status include MIP-1b and IL-6. Cytokines associated with high-grade breast cancer: MCP-1, MIP-1b, IL-1b, IL-8, IL-10 and IL-12.

IL-6 is associated with increased risk of blood clots, stimulates VEGF, triggers low hemoglobin (anemia) and is a major growth factor for hematological malignancies. IL-6 is strongly inhibited by beta carotene and Metformin.

Interstitial immunoglobulin deposition can activate the complement cascade, creating inflammatory growth factors. The tumour microenvironment is marked by chronic inflammation, which may lead to impaired T-lymphocytes and accumulation of activated myeloid suppressor cells and regulatory T-cells, shutting off the immune response to the tumour. The normal ratio of suppressor to helper T-cells is about 4:1. Impaired T-lymphocytes are always higher in the circulation and tissues of persons with malignant tumours. A key pro-inflammatory cytokine is TNFα; it is dependent on activation of NFκB to create an anti-apoptotic condition.

When tumours get quite large and hypoxic, the inflammation is so intense it will attract bone-marrow derived stem cells. These stem cells can become enslaved to make new full-blown tumour cells de novo, and are associated with increased risk of metastasis.

Cancer cells develop the ability to block the processing of their antigens, proteins which tell the immune cells they are not behaving normally. Tumour cells evade recognition by modulation of surface proteins, antigenic degradation, absorption or shedding, shedding of TNF receptors, and induced immunosuppression. Two major factors in immune-suppression are transforming growth factor beta TGFβ and prostaglandin PGE-2.

Thymus activated immune T-cells can destroy tumour cells only with adequate tumour antigen presentation by macrophages and dendritic cells. Dendritic cells carry antigens to lymphoid tissue to present to adaptive immune cells. Naturopathic physicians use thymus for cancer/immune care: glandulars, peptide extracts, or homeopathics.

Matrix metallo-proteinase inhibitors such as green tea polyphenls improve antibody-binding to target cells, and reduce cleavage of antigens, supporting immunotherapy. MMPs are also regulated by reduction of AP-1, TNFα and IL-1β, such as by curcumin therapy.
Viral-associated cancers such as cervical squamous cell carcinoma, inflammatory breast cancer, Karposi’s sarcoma, Burkitt’s lymphoma and T-cell leukemias and lymphomas are also associated with immune suppression such as in Acquired ImmunoDeficiency Syndrome, Human Immuno-deficiency Virus, and AIDS Related Complex AIDS/HIV/ARC. Mistletoe lectin injection therapy helps suppress Epstein-Barr virus EBV and activate immune response against tumour viruses.

Melanoma, lymphoma and renal (kidney) cell carcinoma express tumour-associated antigens, and have been known to respond to immune modulating therapies such as monoclonal antibodies and vaccines. Other cancer types are less likely to respond to immune therapies.

Note that the fatigue, depressive mood and cognitive function characteristic of advanced cancer is largely due to the release of the immune cell cytokine IL-6. Metformin and beta carotene modulate IL-6. Other cytokines contribute to loss of appetite, and that “sick” feeling. TNF is associated with anorexia. Fatigue and weakness is also associated with blunting of small intestine villi and resultant malabsorption, secondary to gut inflammation and dysbiosis – disturbance of the gut bacteria flora and fauna. This in turn causes immune dysregulation issues as leaky gut syndrome disrupts the gut-associated lymphoid tissue GALT. An estimated 60 to 80% of the active immune cells in the human body live in this lymphatic network around the gastro-intestinal tract.

Current allopathic active immunotherapy techniques are still crude and expensive, but progress is being made identifying antigenic targets (molecular profiling of cancer cells), overcoming negative regulatory mechanisms, and making antibodies with attached toxins, radionuclides, and light-activated poisons. About 400 monoclonal antibodies are in clinical trials. Natural immune therapies that are very cost-effective include mistletoe lectin injection, Reishi and other medical mushroom hot water extracts, low-dose Naltrexone, Phytolacca and astragalus formulas. Some naturopathic oncologists inject 10 mL of the patient’s own blood into both of their gluteal muscles to activate an immune response against the tumour. This is called auto-hemotherapy.

In summary, the immune system can eliminate cancer cells, if in surveillance-attack mode, but sometimes gets recruited to enter repair mode, and supports tumour growth and spread. Advanced cancers can completely evade immune control and run rampant. Immune modulation or re-balancing is the goal of naturopathic oncology. We want to modulate immune function out of nurse and protective mode into attack mode, to achieve tumour dormancy, and once stable, we push on for tumour destruction and cure.

**INFLAMMATION in CANCER**

Inflammation results in the release of cytokines, as described above. Cytokines are chemical signals which trigger normal cells to grow to repair and replace tissues as they age or those damaged by infection or trauma. Cytokines can also trigger cancer cells to grow. The immune system seems to regard cancer cells as injured cells, needing support and nurturing. They set up an inflammatory response, around “the wound that will not heal”.

Inflammation indicates the tumour is getting growth factors from the immune system, and support for invasion and spread. It does not mean the immune system is attacking the tumour cells, but rather is in “repair” mode, which enables the tumour to survive and prosper. Tumour cells induce a wound-healing response in fibroblasts. However, the immune system cannot fix the energetic and genetic problems of the cancer cell, so it becomes “the wound that won’t heal”.

High levels of inflammation correspond to the Chinese medicine concept of ‘fire poison’ or ‘heat toxin’. When this is present, the patient is in great danger, and uncontrolled, death often follows soon. This is becoming recognized in Western medicine. The measurement of blood markers for systemic inflammation such as serum C-reactive protein (CRP) is now being used to assess survival prognosis. Note that high levels correspond to increase risk of death from cancer, heart disease and many other risks. The hazard rating from all causes increases about three fold with every ten fold increase in CRP.
In post-menopausal women elevated white blood cell counts, with no known infection, is potentially a warning of the onset of cancer. Leukocytes invade the tumour, but more often than they overcome the tumour cells, they are enslaved and encoded by the tumour to make growth factors such as VEGF angiogenesis factor and interleukins.

Cancer cells also recruit local (peripheral) stem cells to make VEGF and other growth factors. Tumour cells co-opt immune signaling molecules such as selectins, chemokines and their receptors to foster proliferation, survival, invasion, migration and metastasis. When inflammation in and around a tumour reaches a critical point, bone-marrow derived stem cells are then called in to manage the cell growth pattern and inflammation. Rather than healing the wound, these BMD stem cells perpetuate the tumour growth, and may contribute even more strongly to treatment resistance, re-occurrences and metastasis.

Cancer cells loose in the circulation can return to the site of origin after presumed curative therapy, attracted by interleukins IL-6 and IL-8 involved in the inflammation/repair response. They can then re-seed and cause a reoccurrence.

History of chronic use of non-steroidal anti-inflammatory drugs NSAIDS is associated with up to 50% reduced risk of breast and colon cancers. These drugs block cytokines such as prostaglandins. Prostaglandins are eicosanoids made from dietary polyunsaturated fatty acids by the action of cyclooxygenase enzymes COX -1 & 2.

COX-2 makes series-2 prostaglandins PGE-2 and PGE-2a which are hormone-like compounds acting locally to produce pain, inflammation and swelling. COX-2 and its product PGE-2 contribute to tumour viability and progression by increasing cell proliferation, inhibiting apoptosis, increasing angiogenesis, increasing invasiveness, increasing metastasis, and by immunosuppression.

CUGBP-2 protein helps normal cells regulate COX-2 production, but it is abnormally low in cancer cells.

COX-2 is stimulated by tumour promoters, growth factors, angiogenesis factors such as VEGF, and cytokines. Inducers include oncogenes Ras and Scr, ultraviolet radiation, hypoxia, IL-1, EGF, TGFβ, TNFα and benzo(a)pyrene.

COX-2 mRNA and protein overexpression is found in epithelial tumours, colorectal cancer tissue, gastric, pancreatic and many other carcinoma biopsy samples, and in brain gliomas. Increased expression is significantly correlated with unfavorable clinico-pathological characteristics such as worse tumour size, stage, de-differentiation, lymph node involvement, vascularization (angiogenesis) and metastases.

Low COX-2 expression and receptor levels strongly correlate with extended survival in cervical carcinoma - 75% 5 year survival for patients with low values versus 35% 5 year survival for those with high levels.

The hormones progesterone and estradiol estrogen up-regulate COX activity. Healthy bodies produce these hormones, but they are also taken as drugs, and in our food from use in farm animals. Many agricultural pesticides, herbicides and chemical fertilizers mimic estrogens when they enter the human body. These chemicals which act like hormones even though they are not intended to, are called ‘xenobiotics’. Xeno means foreign, man-made substances used for convenience, which turn on us and poison us.

COX-2 is linked to aromatase gene expression. PGE-2 activates aromatase to increase biosynthesis of estrogen in fat cells. This can produce a vicious cycle of estrogen dysregulation in breast cancer. Blocking the HER-2/neu signaling reduces COX-2 expression.

COX-2 up-regulates metallo-proteinases such as MMP-2 which increase tumour cell migration and invasion. Inflammation makes cancer spread.

Zinc has been found to regulate COX-2 expression in cancer better than the drugs Celecoxib or Indomethacin.
Lipoxygenase (LOX) enzymes create inflammation, pain, vasoconstriction and thrombosis promoting compounds from arachidonic acid (AA). These include hydroxyl-eicosa-tetra-enoic acids 5-HETE, 12-HETE and 15-HETE.

A third pathway produces 12-HETE and 16-HETE directly using cytochrome p-450. 5 and 12-HETE and LOX product LTB4 are longer acting than COX products, strongly stimulate cancer cell growth and progression, and inhibit apoptosis. 12-HETE is associated with reduced cell adhesion, invasion and metastasis, and correlates with advanced stage and poor differentiation.

Tumour derived PGE-2 promotes the production of the potent immunosuppressive cytokine IL-10 by lymphocytes and macrophages, while simultaneously inhibiting IL-2 production, a cytokine which dampens inflammation. PGE-2 also inhibits natural killer cells and lymphokine-activated killer cells.

Hyperinsulinemia increases PGE-2 synthesis from dihomo-gammalinolenic acid (DGLA). Another good reason to limit sugar and refined foods in the diet!

C-Reactive protein CRP is a marker in the blood for inflammation occurring somewhere in the body. High levels before cancer surgery indicate a worse prognosis, shorter disease-free intervals, advanced tumour stage, higher tumour grade and poorer overall survival. Abnormal CRP is always a danger sign.

The neutrophil to lymphocyte ratio is a useful indicator of inflammation, and corresponds well to the c-reactive protein CRP level. It is highly predictive of the risk of cancer reoccurrence. Depending on the cancer type, it is best below 3 to 5 neutrophils to each lymphocyte. Do not rely on it after Neupogen therapy, or within 2 weeks of surgery or infection.

Fibrinogen levels in the blood can also be tested to quantify the level of inflammation. Fibrinogen in the stroma around cancer cells increases actin expression, Akt signaling, NFκB, ERK, MAPKs and negative cytokines such as IL-6 and IL-8. We test blood for D-dimer and prothrombin by-product 2.

The “stiffness” of the stroma influences stem cells to generate malignant phenotypes, via mechano-transduction of cell signalling. Dysregulation of stromal collagen concentration and type is a key to cancer cell growth. This is why we suspect glucosamine sulphate and chondroitin may actually accelerate some tumours, such as prostate cancer. L-carnosine can help normalize stroma.

HIF-1 is regulated by stromal prolyl-hydroxylases. FAK and rhoGTPase alterations allow cancer cells to develop invasive podia, allowing them to tunnel out of tumours, and adhere to vascular walls. Stomal re-regulation may be supported by hydrotherapy, castor oil packs, vitamin A, and energy/spiritual work that promotes “flexibility”.

Measures to limit inflammatory eicosanoids

- restrict arachidonic acid rich foods – meat, dairy, poultry - a vegan diet does help, if correctly constructed.
- reduce refined carbohydrates - processed starches, simple sugars and alcohol
- eliminate hydrogenated fats and trans fatty acids - margarine, shortening and lard.
- reduce intake of omega 6 plant oils - especially corn oil and corn-silage fed animal foods.
- increase omega 3 oils from nuts, seeds, fish and sea mammals, and grass-fed land animals.
- ingest adequate zinc, magnesium, vitamins A, B3 and B6, C and E.
- botanical LOX inhibitors include green-lipped muscle extract, boswellia and scutellaria.
- quercitin, curcumin and EPA marine oils inhibit both LOX and COX. Food sources include onions, apples, curry and fish.
- other COX-2 inhibitors are green tea EGCG, licorice, grapeseed proanthocyanidin and garlic.
- get ApoE gene testing and follow the Perfect Gene Diet™ developed by Pamela McDonald, NP.
TUMOUR MARKERS

Cancer cells often carry mutations or have altered genetic programming turning up an abnormal production of chemicals which we may detect in the blood. For generations now, researchers have noticed the striking similarity between cells growing as a cancer and the early cells growing in the trophoblast - the early embryo stage where our lives begin, in the first trimester of gestation.

Tumours often produce characteristic metabolites, antigens and hormones which are measurable in the blood by radio-immunoassays. Rarely is a single tumour marker test sensitive or accurate enough to be diagnostic, or even an effective screening method for early warning of the onset or return of a cancer. However, some attempts have been made to use panels of several of these tests for early detection, such as the Kobayashi panel of ten markers. This concept deserves further study.

Tumour markers are being used, with some caution, to guide diagnosis, prognosis, the initial therapeutic strategy and changes in therapeutics. They tend to fall if treatment response is good, and rise if the cancer is reoccurring. While they imply a certain level of ‘tumour burden’, the amount produced by a cancer can vary, so a doubling of the level of tumour marker doesn’t necessarily mean twice as many tumour cells are present. We like to see these numbers low or zero, but people can survive well with high numbers too. Your physician may choose to not tell you these numbers, as they can cause needless concern. What you need to hear most is that the physician is monitoring you and providing definitive, rational and comprehensive care.

Carcinoembryonic antigen CEA - non-specific, this chemical indicates undifferentiated cells are present, similar to those found in an embryo, where the cells are not yet committed to being a certain tissue. CEA can be raised in benign conditions and is not sensitive in early malignancy. Elevated in 20 to 70% of cancer patients, depending on tumour site and stage. For example: if elevated to begin with, levels should fall off sharply after complete resection of colon cancer, or at least into the normal range within 4 weeks. Rising levels tend to suggest regrowth, and high levels are associated with a poorer prognosis. It rises sharply when there are liver mets. Normal is under 4.0 but it may be up to 6 in smokers.

Prostate specific antigen PSA – PSA is a glycoprotein enzyme made by the prostate gland, and its expression is conserved in nearly every case of prostate cancer, no matter how undifferentiated. Thus it is a moderately useful prostate cancer screening tool, with the rate of doubling being the most significant indicator of tumour aggressiveness. Normal is under 4.0, ideal is under 2.5. Requires expert interpretation and clinical context.

Ca class of tumour markers are carbohydrates (starches) sometimes over-produced by cancer cells:

- **Ca 19-9** – elevated in some cancers of the breast, pancreas, liver, biliary tract, stomach and colon. Normal is under 37. May be increased in inflammatory diseases of the gastrointestinal tract including pancreatitis, and may be falsely negative in patients with Lewis negative blood group.
- **Ca 15-3** – Elevated in some breast cancers. Normal is under 31.
- **Ca 125** - rising levels can indicate relapse and level of tumour burden in breast cancer. This carbohydrate antigen is a glycoprotein mucin produced by epithelial cells in the breast, ovary, and peritoneum. Normal is under 35. It can also be elevated in peritonitis, injury to the peritoneal membrane by laparoscopy, and in infections such as mononucleosis.

Human chorionic gonadotrophin beta subunit β-HCG - is useful in germ cell tumours such as testicular cancer to monitor effect of treatment and reveal relapses. Home pregnancy tests detect this hormone. The Navarro test of urinary HCG done in the Phillipines is not a valid test for other cancers, and is NOT recommended.

Alpha-fetoprotein AFP - should not occur except in fetal blood, indicates hepatoma (up in 72% of cases), pancreatic (23%), gastric (18%) or germ cell tumours (75% of nonseminomatous testicular tumours). Post-therapy return to normal levels usually correlates with effective therapy. Normal is under 8.6 ng/ml.
Lactate dehydrogenase LDH - fast growing tumours in high S-phase outstrip their blood supply and become anaerobic, producing toxic lactic acid. LDH monitors cell death in oxygen starved tumours, and is also a marker for tumour lysis (break-up). It is elevated in liver disease and blood hemolysis.

**TUMOUR MARKER BY ORGAN OR CELL TYPE**

- bone - alkaline phosphatase
- breast - CEA, CA 15-3, CA 125, CA 549, CA M26, CA M29, CA 27.29, MCA, PSA, isoferitin, tissue polypeptide antigen TPA, mammary tumour-associated glycoprotein, and kappa casein. CK-19 cytokeratin is associated with a poorer prognosis.
- carcinoma – CK-7 CK stands for cytokeratin, a protein on the outside of cells originating in the lung, mesothelium, salivary gland, breast or peritoneum.
- leukemia - β2-microglobulin, isoferitin
- liver - AFP, CEA, Ca 19-9. Liver mets - alkaline phosphatase, 5’-nucleotidase, glycolytic enzymes
- lung - CEA, TPA, TTF-1; small cell - NSE, CK-BB. Bronchial epithelium – CK-7+ and TTF-1+; Ki-67 bimarker of proliferation in the parabasal layer.
- lymphoid – CD-45
- lymphoma - β2-microglobulin, monoclonal immunoglobulins; Epstein-Barr viral antibodies in Burkitt’s lymphoma. CDK9/Cyclin T1 protein complex detects an aggressive form of Hodgkin’s disease.
- mesothelium - calretinin
- myeloma - Bence-Jones protein immunoglobulins, monoclonal immunoglobulins
- nasopharyngeal - Epstein-Barr viral antibodies, HPV antibodies.
- neuroblastoma - VMA, NSE, catecholamines; CNS - β2 microglobulin
- ovary - CEA, HCG, AFP, LPA, Ca-125, apo-lipoprotein A1, truncated transthyretin, galactosyl transferase, serum glycoprotein YKL-40, and a cleavage fragment of inter-alpha-trypsin inhibitory heavy chain H4.
- pancreas - CEA, TPA, Ca 19-9, Ca 50, pancreatic onco-fetal antigen
- prostate - prostate specific antigen PSA, standard, ultrasensitive or free PSA, and prostatic acid phosphatase PAP
- squamous cell carcinoma antigen - Normal is under 1.5
- stomach – Ca 19-9, fetal sulfoglycoprotein antigen
- testes - LDH, placental-like AP; germ cell: AFP, beta-chorionic gonadotrophin β-HCG
- thyroid - calcitonin, thyroglobulin
- vascular - CD-31 and CD-34 antigens.
PART TWO– INTEGRATIVE ONCOLOGY

Chapter Two: Introduction to Naturopathic Cancer Care:

Oncology is the medical term for cancer care and treatment. Like all of medicine, it is an art and a science, and there are many traditions and styles of practice available to you.

A naturopathic physician’s job description has been defined by the US government as “Diagnose, treat and help prevent diseases using a system of practice that is based on the natural healing capacity of individuals. May use physiological, psychological or mechanical methods. May also use natural medicines, prescription or legend drugs, foods, herbs or other natural remedies.” For a detailed look at the Canadian description of our training and practices, please see the website of the Canadian Association of Naturopathic Doctors www.cand.ca

Integrative and naturopathic oncology is the application of all the licensed and regulated medical arts to the care of the person with cancer. It is concerned with healing as well as cure, with humane care as well as medications, and with personal empowerment as well as medical interventions. We integrate all effective therapies, be they natural, drug, food, emotional, spiritual or the therapeutic relationship with your partners in health.

**Remember the contents of this book are not to be construed as medical advice to any reader.** You require professional assistance by a licensed health care provider experienced in integrative cancer care to use any method or product described in this book. **This information is only illustrative of some options for cancer care** you might discuss further with a licensed naturopathic physician or integrative medicine practitioner.

Why bother adding extra costs and complexities to treating cancer? Why should we search the margins of scientific research for novel ideas based on medicines the pharmaceutical and medical industries have long portrayed as unimportant?

The answer is that cancer deaths are rising faster than the growth of population in Canada – 48% in the last 20 years. The incidence of many cancers is on the rise too.

Furthermore, the treatments are always harsh and despite the costs and rigors of oncological medicine, about half of cases diagnosed with cancer will still die from cancer. Some sources say up to 64% still die, when relatively innocent skin cancers are subtracted. So, there is a great need to do far more to prevent, treat, support and cure cancers. I have seen naturopathic cancer strategies make an enormous contribution in almost all cases.

The most cost-effective solution for our cancer epidemic is to put together all the current healing arts and sciences available into an integrated plan.

**Starting your integration:**

1. Get a proper diagnosis, including where it is and is not in your body (staging) so we know what we are up against, and can be as aggressive as is necessary. Have your medical file including laboratory tests, scans and pathology report, and pertinent medical reports sent to your naturopathic doctor.

2. When not undergoing medical therapies such as chemo, radiation, anti-hormone or other targeted therapy, we are free to use alternative medicine. Use naturopathic medicines at all stages of cancer to restore quality of life, stabilize disease progression, create remission and cure. Start immediately with the prescribed diet supplement program, most of which will be taken from the **Leading Remedies for Integrative Cancer Care** list. Let’s call these alternative medicines “Interval Care”, as they are to be used while awaiting staging tests or medical therapies, between rounds of medical care, and on a long-term basis after the medical interventions.

3. **Integrate** naturopathic and traditional Chinese medicine directly into your medical cancer care program, prescribed by your oncologist. Not all the medicines in the Leading Remedies list are compatible with oncology procedures such as surgery, radiation, chemotherapy, hormone blockade, immune and biological therapies. Only
fully complementary natural medicines, proven to be safe and compatible will be prescribed. Keep your naturopathic physician informed of any change in your medications or medical treatment plan. You can reduce the harm and substantially increase the chance of a durable remission or cure from conventional approaches!

4. Return for regular follow-ups to keep this program well tuned to your current health needs and medications.

5. Change to whole organic foods and low sugar (low glycemic) diet.

6. Develop a maintenance program to reinforce remission and push for a cure.

7. Do NOT self-treat, including using advice from unlicensed persons, multi-level marketing products, or internet sources. You are the CEO of your own body, and a sovereign person, but you need the expertise of a naturopathic physician skilled in the arts and science of interactions between drugs and natural medicines. To marshal all your resources, anticipate what is going to happen next, and to personalize a program requires an objective person with the experience to make sound judgements. Cancer is unforgiving of mistakes and time wasted!

**A philosophy of naturopathic oncology**

The body has an innate gift for healing itself. It must be properly nourished, kept clean, and supported to do this job. Naturopathic medicines from all the healing traditions of the world are applied in a manner which respects the nature of the human being. Naturopathy is biologically sound, wholesome, and tailored to the individual patient. We have a physical body which is shaped by a genetic code inherited from people who were well adapted to a hunter-gatherer diet, radically different from the modern diet. They inhabited an unpolluted world, and had a lot less time stress. We try to help folks adapt their biology to their situation. We have an emotional life, a discerning mind, and a spiritual dimension. Naturopathic medicine keeps these in focus in its healing process.

I believe in the principle of *Vis Medicatrix Naturae* - the healing power of Nature.

I understand we are created in the divine spirit which is manifesting by expressing and experiencing itself in ways that are non-linear, non-local and yet coherent. Life is remarkably chaotic, yet more brilliantly organized than current medicine paradigms can understand.

> “The deeper we go into the facets of life, the more mysteries we encounter. Analyzing living systems, we often have to pull them to pieces, decompose complex biological happenings into simple reactions. The smaller and simpler systems we study, the more it will satisfy the rules of physics and chemistry, the more we will understand it, but also the less ‘alive’ it will be. So when we have broken down living systems to molecules and analyzed their behaviour, we may kid ourselves into believing that we know what life is, forgetting that molecules have no life at all.”
>  
> Albert Von Szent-Gyorgi, MD  Nobel laureate, discoveror of vitamin C.

Every modern disease can be improved by gentle therapies which feed, harmonize, cleanse and balance the complex biological systems that synergize in great networks that make a whole person. We start with a sound diet of whole, living foods. Food concentrates, vitamins and minerals are important to shift the health rapidly in the face of aggressive disease. In this respect they are used as drugs. Later, as health returns, we can rely on dietetics alone. I cannot fathom doctors who think a few milligrams of this drug or that drug is all important, while the pounds of chemicals we take in daily as food are ignored as irrelevant.

As a well trained and experienced researcher and scientist, I know science from nonsense. I have won several awards for raising the standards in my profession. I have seen enough scientific and clinical evidence to ethically integrate naturopathic medicine into modern oncology. If a therapy is not “proven” to the highest possible standard, then informed consent is still a reasonable basis to proceed. The safer the therapy and the greater the need, the lower we can set our threshold of what is utilitarian and can be offered in good faith. If it appears to benefit a majority of my patients and those my peers, in a reproducible way, then I think our patients have a right to know. All I require is that they get better on taking it, could become worse on stopping it, and that it be safe.
The American Food and Drug Administration FDA suggests that 2 or more randomized controlled clinical trials are needed to qualify as “substantial evidence”. This is more than an iota, but less than a preponderance.

Evidence for natural medicines in cancer care is now readily found to this level and beyond. It is fine to run an institution such as the venerable BC Cancer Agency as a research-oriented and research-driven collective, with treatment decisions screened by a panel of experts. High standards of evidence are noble. However, the present model of evidence-based medicine EBM is often used too restrictively. It may make an easy cookbook style medicine that serves reimbursement coding and legal tort defense, but translating research into humane medical practice is still an art that requires judgement and skill. Always remember that the only medical experiment that truly matters is the one you and your physician decide to try on you.

Where the rubber really hits the road in medicine is in the very personal and interactive doctor-patient relationship. All forms of medicine must ultimately in the end serve the patient’s best interests, and have to respect the patient’s right to choose or refuse any therapy offered. People do not always choose care based on volumes of scientific research. They and their doctor are actually the only ones who have ever experimented on their particular case. Sometimes they actually know what is right for themselves, even if science doesn’t.

It would be possible to describe everything scientifically, but it would make no sense; it would be without meaning, as if you described a Beethoven symphony as a variation of wave pressure.” -- Albert Einstein

Cancer is close to becoming the leading cause of death for Canadians. It is bound to strike nearly every family of two parents and a child, as nearly one in three of us will develop cancer in our lifetime. Nearly half of all patients diagnosed with cancer still eventually die of the cancer despite the best of medical care. Nearly all patients are being harmed by standard cancer therapies. This provides the rationale for more than two out of three cancer patients seeking out further cancer care from licensed practitioners of complementary and alternative medicine.

Complementary care includes measures to increase the effectiveness of medical therapies such as surgery, chemotherapy and radiation, and reduce their harm. Alternative therapies are intended to extend life and improve quality of life between and beyond medical therapies. Major cancer treatment centers in America and Asia blend drugs and surgery with herbal medicine, homeopathy, traditional Chinese medicine, nutrition and mind-body medicine. The result is improved patient outcomes.

The great weight of scientific evidence is that anti-oxidants, herbs and many other types of natural medicine and healing arts can be integrated into specific procedures of medical oncology to significantly improve responses to therapy while lessening complications. Complementary and alternative medicine is part of the current treatment model at leading oncology hospitals such as Memorial Sloan Kettering in New York, MD Anderson in Houston, Dana-Farber in Boston, Keith Block’s Integrative Cancer Care Institute in Chicago, and all the Cancer Treatment Centers of America hospitals and clinics.

Naturopathic Physicians have a potent armamentarium to tackle many of the problems of the cancer patient, at all stages of disease and at all stages of therapy. In following chapters you will learn how to use naturopathic supports for surgery, radiation and chemotherapy.

Most “spontaneous remissions” from terminal cancer are associated with major changes in diet and psychological patterns. Copying nature, we provide care intended to prolong life and restore meaning and usefulness.

After the standard medical therapies there is still a significant risk of relapse. We offer cancer suppressive natural agents which can arrest further growth and spread. I have found great inspiration from the work of John Boik who assembled world research on natural agents for cancer, and from the naturopathic doctors at Cancer Treatment Centers of America. I can tell you from twenty-five years of clinical practice which products and processes work consistently for cancer, and which do not.

Every ill person can benefit by gentle therapies which feed, harmonize, cleanse and balance the complex biological systems that synergize to make up the whole person. We start with a sound diet of whole, living foods.
We are what we eat. What else could we be made of? In all cases we want to reduce sugar and refined starches, increase clean protein, give good fats, increase fiber, and supply lots of antioxidants. Food concentrates, vitamins and minerals are important to shift the health rapidly in the face of aggressive disease. In this respect they are used as drugs. Later, as health returns, we can rely on dietetics alone – “food shall be our medicine”.

We use medicinal as well as food plants, in as whole a form as possible, and in complex combinations to take advantage of the natural synergies that exist. Every living thing on this Earth is working with the same issues, the same stresses and problems, and many strategies have evolved in other living beings to regulate growth and restore balance. We can integrate their successes into our biology to correct our health.

We use various gentle medicines which satisfy our commitment to the Hippocratic Oath, to FIRST DO NO HARM. We cannot gain health just by cutting out disease. We respect the subtle and elegant power of the mind, of the immune system, and the homeostatic regulation in the body, and address all of them with medicines which are not necessarily cancer specifics. We are treating the person, not the disease. The Chinese call my approach Fu Zheng Pai Beng, which means support and nourish the patient to fight the disease.

Healing is about restoring sufficient balance to allow proper relationships in our physical, emotional, and spiritual dimensions. We hope to create enough time and vitality to allow each person to experience the joys of life, personal relationships, and awareness of our interconnections with things greater than ourselves.

Curing cancer is not always possible. Achieving clinical stability with good quality of life is usually possible, and significant life extension is quite common.

**Primary Strategies in Naturopathic Oncology**

The more of these issues we successfully address, the greater is the likelihood of surviving the cancer with a minimum of harm:

- improve the terrain (the internal biochemical milieu) to support normal cell division, primarily by improving nutrition. Dr. Block suggests the cancer terrain is set by: oxidative stress, inflammation, insulin-like growth factor IGF-1, blood coagulation parameters, immunity and stress hormones.
- modulate epigenetics through gene methylation and histone protein deacetylation.
- stop mutation, stabilize the DNA genome and support DNA repair.
- support differentiation of cells back to their normal function.
- restore an IGFBP cap to stop cell division.
- remove promoters – environmental toxins, dietary hazards, and toxic emotional stressors such as fear and despair. Apply physical, dietary and mental hygiene principles to make a safer lifestyle.
- detoxify from accumulated carcinogens – heavy metals, POPs, solvents.
- deal with toxic emotions, address fears and feelings, practice positive attitudes and lifestyle.
- inhibit invasion and metastasis.
- enhance cell-to-cell communication.
- support apoptosis - the off-switch for bad cells - a built-in cellular program for natural removal of cells with unhealthy DNA, or cells that are no longer needed. Resuscitate the burning of sugars by oxygen in the mitochondria, to restore the off-switch in cancer cells, and cut off the dual aerobic/anaerobic economy which provides energy plus cellular building materials.
- modulate activity of bone marrow derived and local stem cells, recruited to control inflammation, which resist treatment and cause recurrence and spread.
- control inflammation and its growth factors that speed progression.
- enhance cell-to-cell communication.
- destroy tumours with natural medications - use synergistic combinations of non-toxic natural drugs to directly kill cancer.
- target specific growth factors and their receptors with natural medicines.
- support balanced immune function, including removal of toxic fungi and parasites, control viral replication, restore the good flora and fauna of the gut.
- inhibit invasion.
- stop metastasis or spread to distant sites.
- inhibit blood vessel growth into tumours and cancer cell clusters.
- reduce side-effects and symptoms of the disease and treatments.
- detoxify - from chemo drugs and other harsh medications after treatment.
- rejuvenate - restore real health and vitality.
- prevent re-occurrence or new cancers or other chronic diseases.

**Diagnosing Cancer**

Biopsy and histological evaluation are the only way to confirm cancer. This means a doctor or surgeon gives suspected tumour tissue to a medical doctor certified in the medical specialty of pathology. This expert in the structure and chemistry of living tissue looks at your cells under a microscope, and may perform various biochemical tests on your biopsy tissue. It is unethical to offer to treat as cancer a case not medically confirmed, nor can one claim a cure until all positive medical test results related to cancer are reversed in a lasting way.

Cytology is a method of looking at loose cells taken off tumours or from around them. Pap smears, washings or brushings during endoscopies, and needle aspiration are alternatives to removing the primary tumour for evaluation.

Diagnosis is supported by physical exam, scans, X-ray imaging, neurological findings, tumour specific scans, tumour markers and other chemicals in the blood such as hormones, tumour antigens and antibodies. It can be very frustrating for patients to go through test after test, as the doctors determine exactly what the nature of the cancer is, and how advanced it is. “Staging” tests show if it has spread locally or widely. Only when all this is known can the overall treatment plan be made. However, it is my firm conviction that taking steps at the first diagnosis to prevent further growth and spread can be fruitful. It is understood that the program will be fine-tuned later, and all the naturopathic and medical strategies integrated. Still, some basic and generic methods to arrest growth and spread make sense, to ease stress, and reduce the risk of the cancer running wild in the interim.

As strange as it may seem, with all the modern scans and molecular techniques, not all cancers can be definitively diagnosed. About 15% of tumours are so mutated that one cannot say with certainty what type of cell they once were, and are classed as “of unknown origin”. About 3 to 5% of cancers show up as metastases from an unknown primary source – and the source tissue or organ may never be found. Treatment cannot be as targeted.

**Measuring response to therapy**

A response to therapy is a good thing, but does not in any way guarantee longer survival, or even longer disease-free survival. For example about 75% of patients get a therapeutic response in cancers of the prostate, head and neck, ovary, chronic leukemias, multiple myeloma, mycosis fungoides and stage 3 to 4 breast cancers, yet it is rare not to have a reoccurrence. Often the recurrent cancer is quite treatment resistant.

MRI, ultrasound, ordinary X-rays and PET scans are not accurate for sizing tumours, and cannot be compared to other types of scans. CT scans are the standard for determining the size of a tumour, and therefore are best to track changes over time. Keep in mind even CTs are plus or minus 10%, so an apparent change from one scan to the next of under 10% is not necessarily real.

- **Complete response** - the disappearance of all evidence of tumour/s, including any metastases, for at least 2 measurement periods separated by at least 4 weeks.
- **Partial response** - a decrease of 50% or more in one or more measureable lesions with no progression of any lesion and no appearance of any new lesions for at least 4 weeks.
- **Stable disease** - a decrease of less than 50% to an increase up to 25% in lesion diameter = no change
- **Progression** - an increase of over 25% in diameter of a lesion or the appearance of any new lesions.
Standards of care

Patients expect every type of physician to provide good care, even if the treatment is unorthodox or experimental. I do not operate a crusade to convert people to natural medicine, and medical oncologists should not act as if they have all the answers either. We all need to get involved early, act promptly, and respond quickly.

Always act in the patient’s best interest. This means putting the patient’s welfare ahead of any desire by the practitioner for money, control, power, gratification or any self-serving interest. I define the core professional ethics as “service and sacrifice”.

Informed consent must always be obtained, preferably in writing. This basic legal principle means the patient needs to be told what the diagnosis is, what will happen without treatment, what all the treatment options are, and what the consequences of those choices will be. These must be explained in such a way that the patient actually understands them, and is able to give permission to the doctor without feeling pressured or coerced in any way. It is the patient who knows best what is right for them, and they have” the right to be wrong” – to choose care or a lifestyle different from what we would do or advise them to do.

Tumour regression frequently occurs early in the course of effective treatment. If there is no objective evidence of a reasonable response to treatment in 4 to 6 weeks, then new options must be examined, or a referral made to another practitioner for exploration of other options. Natural therapies may not act as fast as drugs, but they must act by this time frame or be abandoned. Most good outcomes begin with a response within a day or two. I always recommend an objective test such as a CT scan, PET scan, or reliable tumour marker test by 6 weeks to confirm a response. If the cancer growth and spread is not at least stabilized by that time, another therapy should be tried.

Assess every 3 months for the first year, every 6 months in the second year, and annually thereafter. Usually after 5 years cancer free the patient is considered ‘cured’. The odds of reoccurrence fall off sharply by that time. 20 year survival is about 85% of the 5 year levels.

ALTERNATIVE AND COMPLEMENTARY NATUROPATHIC MEDICINE IN CANCER CARE

There are hundreds of excellent naturopathic medicines and procedures which can help in the healing of cancer patients. These are discussed in more detail in Part Four - a deeper look at naturopathic oncology. This simpler introductory section is for the patient who does not need to know all the whys and wherefores, but just wants to know what to ask the doctor about. Consider exploring the following general subjects:

- nutrition – dietetics and food supplements
- botanicals – herbs and medicinal plants
- homeopathic remedies – for body, mind and spirit.
- traditional Chinese Medicine TCM - herbs, acupuncture, qi gong.
- psychology – stress management, mind-body healing eg Remembered Wellness CD
- expressive therapies – art, music, journaling
- intravenous oxidative medicines – vitamin C, dichloroacetate, glutathione, ozone.
- vaccines and immune therapies such as mistletoe lectins and low-dose Naltrexone.
- spiritual care – Reiki, meditation, compassion.
- referral to a professional team including social workers, occupational therapists, physiotherapists, palliative care, hospice.

You cannot become an instant expert in such a vast field. So, how are you going to get to the right program for your cancer care? Do you need homeopathic medicines, acupuncture, massage, colon therapy, detoxification, intravenous therapy, psychotherapy or expressive therapies? This clearly requires professional guidance from someone familiar with the role of each of these modalities in cancer. Consult a licensed naturopathic physician to boil it all down to something practical.
Chapter Three – Integrative Support for Medical Oncology

"Oncologists have weapons of mass destruction." Marc Gignac, ND, FABNO

In this section you will see how naturopathic care dove-tails with orthodox medical oncology to give better results with less harm. Do not let any ignoramuses with archaic attitudes convince you these naturopathic supports are unsafe or unsupported by scientific evidence. Naturally, there are real concerns about interactions between medical drugs and procedures and natural medicines, and even foods. This is not within the scope of training of medical doctors or pharmacists. Therefore you need a naturopathic physician trained in integrative oncology to make sure everything you do is compatible and synergistic.

The prevailing view in oncology, the regular medical approach to cancer, is that surgery, radiation, chemotherapy drugs, hormone blockers and some immune therapies are the only realistic treatments for cancer. Most are carcinogenic, extremely oxidative, and seem to provoke increased aggressiveness in any relapsing tumours.

These medical therapies are often described as “evidence-based”. Good scientific evidence is very expensive to generate, and so it turns out that most of what is considered “proven” to work to a high standard is drug medicine, which is owned by someone who will get a fat profit from the investment in major research. This is a serious bias. Medicine skews to that part of science and biology which is profitable. Decades of excellent functional and nutritional medicine research and practice is not integrated into the ‘evidence-based’ system. In clinical practice with individual patients, it is difficult to translate statistical averages into wisdom to guide critical decisions. It is often lower levels of evidence such as case studies which prove most useful. The careful observation, testing and insight by practitioners was once the origin of most advances in medicine, and remains a valuable resource, despite being devalued by industrial medicine.

Naturopathic oncology is not just “faith-based”! We could be proud if we only held to the standard of “judgement-based” medical practice. That would be making decisions based on good judgement, training, and experience, informed by science but also rooted in common humanity, caring, heart, spirit, and other areas of consciousness. I am quite at ease proposing the use of entirely safe medicines which have a utilitarian value when used by reputable physician peers – that do a great deal of good for a great number of people.

Really excellent news (which your oncologists and pharmacists may not even know to tell you) is that many of our successful therapies are also backed up by large scale placebo-controlled randomized trials done at universities and hospitals. We do have clinically proven natural medicines that can safely integrate with drug medicine. Do not slavishly follow any out-dated injunction to avoid mixing dietary and supplement prescriptions with your medical oncology, because “We don’t know if they are safe to combine or useful”. It takes only seconds on PubMed to find the evidence. Oncologists and pharmacists are the least likely to use alternative medicines, to refer for alternative medicine, have relevant education or clinical experience, and are the least interested in reading the scientific literature or taking continuing education in alternative medicine, of all the licensed health professions. Yet their patient population is the greatest consumer of complementary and alternative medicine (CAM), or as we prefer to say, integrative medicine. Nearly 80% of cancer patients are using these healing arts and science, so it is ethically troublesome and clinically disappointing if the oncology system is unaware of the positive values that drive their use, and the actual risks involved. All too often oncologists and their pharmacists do not ask or are simply not told by the patient what integrative supports are in play. These professions are not always taken as authorities in this field, due to perceived bias, bigotry and the blatant exaggeration of risks of CAM. There are very real concerns that need to be addressed regarding interactions between medical drugs and natural medicines – by the Naturopathic Physician trained in this area of practice.

Integration of naturopathic medicine, Chinese medicine and conventional medicine is common in China, the USA, Eorope, and now in Canada. You deserve the best!
If you are getting surgery, chemotherapy or radiation you must review all your supplement and medications. Check your chemo or specialist drug prescriptions with the pharmacists, but only rely on your naturopathic physician regards nutraceuticals, herbs, natural medicines, and supportive pharmaceuticals we prescribe. We will need to focus on what will make these harsh therapies safer and more likely to actually help. Do as much as you can of the recommended supports, but do not embellish without the express permission of your naturopathic physician in oncology.

**Integrative Naturopathic Oncology Summary**

**Supports for Surgery**
- Avoid for one week all supplements which could impact anaesthesia or blood clotting – page 48.
- Surgery mix – homeopathic *Arnica, Staphysagria, Hypericum*.
- Low-salt intake.
- Lots of zinc, vitamin A and vitamin C eg fresh, raw or juiced fruits and vegetables.
- Metastasis control with Anti-Ox-SAP *PectaSol-C* modified citrus pectin.
- Scar management with tea catechins, vit. E, rosehip oil, injection therapies.

**Supports for Radiation Therapy** from day 1 of therapy until about 3 weeks after the final dose.
- Avoid antioxidants in general, especially vitamin E. Avoid manganese, iron & copper.
- Melatonin 10-20 mg hs to tolerance (dreams, grogginess, depression). Pro-oxidant/anti-oxidant.
- *TheraCurmin* curcumin “2X strength 120 mg”. An OK antioxidant.
- Omega 3 fish oils 3,000 – 4,000 mg daily.
- Berberine 300 mg 2 to 3 times daily, may loosen bowel movements.
- Aloe-Immun 2 twice daily.
- Reishi mushroom hot water extract 2 capsules 2 to 3 times daily.
- Zinc citrate 25-30 mg twice daily at meals.
- Red wine 1 glass daily.
- No oils on skin in the radiation field.
- Low-glycemic load diet.
- *Eleutherococcus senticosus* if needed for fatigue.
- *Calendula* or *Aloe* in head/neck cancer.
- Further care as needed for radiotherapy adverse effects - see page 57.

**Supports for Chemotherapy** from day 1 of therapy until about 3 weeks after the final dose.
- Shih Chuan Da Bu Wan (Shiquan) 2 caps 3 times daily. Other astragalus formulas of note: *Deep Immune* St. Francis Herb Farm Astragalus Combo 3 caps or ½ tsp tincture twice daily, *Marrow Plus*.
- Mistletoe lectin therapy as prescribed.
- Low-dose Naltrexone 4.5 mg at bedtime or as prescribed.
- Methylcobalamin B12: 1,000 mcg sublingual daily, 2,000 mcg IM shot one week after each round.
- Melatonin 10-20 mg at bedtime only, to tolerance (dreams, grogginess, depression).
- Reishi mushroom hot water extract 2 to 3 capsules twice daily.
- Fasting or near-fasting diet 24 hours before and 48 hours after chemo, or Rx Metformin.
- Hyperthermia bi-weekly.
- Selective use of quercitin, Co-Q10, etc. with specific chemo drugs - see page 68.
- Further care as needed for chemo adverse effects - see page 79.
- Detoxify 3 or more weeks post-chemo.
INTEGRATING SURGERY SUPPORT

Surgery is almost always the best chance for a cure of cancer. If the surgeon can catch it in an early stage and get it out with clean margins, it is possible the disease is removed from the patient.

Even if surgery cannot be curative, it is best to “de-bulk” tumour burden by surgery. This gives us a smaller tumour to fight, and that takes less drugs and natural medicines.

Surgeons will usually not remove a tumour if there are metastases to major organs. Removing the “mother” tumour sometimes results in the satellite tumours suddenly growing quite wildly. If the disease staging tests such as bone scans, MRI scans, CT scans or PET scans show the cancer has spread, usually surgery is off, and you can expect to be offered whole body (systemic) treatments like chemotherapy.

When a surgeon says “We got it all”, that only means they removed all the visible cancer cell accumulations they looked for where scans detected them. There can be microscopic cancers already loose at the time of surgery. These can best be dealt with preventatively, before they can grow or mutate further.

There is always some risk of cancer reoccurrence. I do not think it is prudent to turn your back on cancer, and the conditions that gave rise to it. Therefore I advise seeking professional help in deciding on what therapies should follow surgery.

PRE-OP PREPARATION

Flaxseed 25-30 grams daily for one month pre-op reduces tumour aggressiveness and Ki67 activator protein. Grind fresh at least every 2 weeks and store flaxseed meal in the fridge. Green tea extract will also reduce Ki67.

Surgery or biopsy can spread cancer. This can involve seeding of cancer cells along a needle or catheter track, or shedding into vessels or cavities during tumour handling. It is not a common occurrence. Estimates of port-site recurrence vary from near zero for breast cancer to 17% for gallbladder cancer. I have seen cases of recurrence seeded in the surgery scars soon after surgery, including breast cancer cases. Reduce metastasis risk with PectaSol-C brand standardized modified citrus pectin MCP 1 teaspoon or 4 capsules twice daily. The lime version is then easiest to mix in water. Modified or fractionated citrus pectin, and larch arabinoglycans, work like putting flour on Scotch tape - mets can’t stick to other cells, and if they cannot attach to the vasculature walls they cannot invade and if they cannot anchor the mitotic spindle for cell division, they cannot grow. Have this at hand to start the day before your surgery or biopsy procedure, and continue for up to 6 months, then review.

Green tea EGCG is also of service in reducing metastases from surgery. Rx AOR brand 3 of 700 mg capsules daily for about 2 weeks if possible, but stop at least 3 days pre-op. It helps to regulate the the natural tissue repair systems which unfortunately can stimulate growth in occult micro-metastases or any residual tumour. These cell growth factors include vascular endothelial growth factor VEGF and matrix metalloproteinase MMP-9.

Avoid for a week all herbs and supplements which interact with sedatives and anaesthetics: St. John’s Wort Hypericum perforatum; valerian root Valeriana officinalis; kava kava Piper methysticum, ginseng Panax ginseng and Panax cinquefoilium, skullcap, passion flower, hops, melatonin, inositol, GABA and 5-hydroxy-typtophan 5-HTP. Avoid ephedra herb as it increases sympathetic nerve tone. Avoid citrus, licorice root and lindera as they increase blood pressure. Avoid peony root, milletia, Gingko biloba - gingko leaf, and high-dose niacin or niacinamide as they dilate peripheral blood vessels.

Avoid for a minimum of 3 days per-op natural medicines which can cause bleeding or clotting issues: garlic Allium sativum; ginseng root Panax ginseng or Panax cinquefoilium; bromelain; vitamin K, salvia, rehmannia, ligusticum, ginger, curcumin, atracyloides, carthamus, reishi, cordyceps, Co-enzyme Q-10, resveratrol, green tea EGCG extract. Vitamin E can be a risk to about 10% of the population, if taken in high doses ie over 800 IU daily. Vitamin C intake should not exceed 3 grams or ½ tsp daily.
Surgery mix - 6C potency homeopathics Hypericum, Staphysagria and Arnica – this formula was given to me by Dr. Andre Saine, ND, a great naturopathic homeopath. Being a classical homeopath, he dispensed them separately, but being an eclectic, I like to mix them in one bottle. He told me patients will come back and say their surgeon told them “I’ve never seen anyone heal so fast” and that is exactly what has happened in many cases. Hypericum treats nerve injury and pain, Arnica helps relieve trauma, edema, inflammation, and Staphysagria deals with the injury at an emotional and mental level. Start this the day before your procedure.

Wound healing support: vitamin C - 2,000 mg, zinc citrate - 60 mg; vitamin A 10,000 + IU daily; high protein - which might include a whey protein powder - 1 ounce (30 grams) twice daily. It is mandatory in cases with recent poor nutrition due to poor appetite, or mechanical issues such as oral or gastro-intestinal tumours. Start these supplements 2 weeks pre-op if you have been nutritionally compromised. Note: This supplementation may be reduced or even eliminated if you have been eating a very wholesome diet with fresh and raw fruits and vegetables.

Psychology – every cancer therapy can do harm, and it is necessary to describe the risks so patients can choose to give their informed consent, and go into it with eyes open. However, like food, one you have chosen this path, you must try to fully embrace it. Most problems that can arise can be moderated by expectations that it will go well. Like an Olympic athlete or an astronaut, rehearse getting the therapy many times. Visualize success and feel the benefits you are going to receive. If you can worry about side-effects and problems, you can visualize something better happening. Let it be like sunshine chasing away all your shadows. A positive attitude appears to make a real difference in outcome - less pain, less complications, faster healing, etc. Use the pharmacy in your head to create healing conditions.

If the patient has a low immune status, post-shower skin application of chlorhexidine for a few days lowers risk of surgical infection. Reduction of the skin biofilm reduces risk of skin Pseudomonas growing in a wound.

POST-OP PROTOCOL

If you are concerned about cancer spreading during surgery or biopsy, take PectaSol-C modified citrus pectin - 4 capsules or 1 teaspoon twice daily and/or NFH brand AntiOX-SAP 2 caps 3 times daily at meals to control inflammation and cancerized stem cell formation. The green tea catechins in it also reduce adhesion and scars. Support green tea extract with γVitamin E as mixed tocopherols 400 IU daily to protect kidneys and liver.

Surgery is very immunosuppressive. This is the time for homeopathic, nutritional and herbal support for the immune system - Engystol, Thymuline, Graphites, Thuja, vitamin A, vitamin C, zinc citrate, cat’s claw, Reishi mushroom. Support wound healing with zinc citrate - 30 mg twice daily with food; vitamin A - 3,000 I.U. daily; and vitamin C - 1000 mg. 3 times daily, or get these nutrients by sufficient intake of fresh and raw fruits and vegetables. Deep wounds such as from punch biopsies can be filled with a sugar paste, which sterilizes while it promotes granulation tissue. Vulneraries /wound healers: calendula - marigold flower, chickweed, comfrey leaf.

Ferdinand Sauerbrach, a thoracic surgeon, has demonstrated improved surgical wound healing and increased resistance to infection with a salt-restricted diet. Again, continue this until all wounds are completely healed.

Reduce pain, edema and blood clot risk with bromelain - 500 mg. 2 to 4 times daily, away from protein foods, and curcumin-based formulas like Inflacalm 2 -3 times daily. Ramp up physical activity as soon as possible. For problems with anaesthesia give Phosphorus 30C.

Prevent adhesions and excessive scarring with catechins 500 mg. 3 times daily, gotu kola - Centella asiatica - yielding 50 to 100 mg of triterpenic acids. Once the incision has closed, use topical Rosa mosqueta (Rosehip) cream to reduce scars and keloids. Aloe vera leaf gel increases wound strength, flexibility on healing, decreases scars and reduces risk of metastasis.
Probiotics are good bowel bacteria, essential to good health, and often diminished by stress and antibiotics. If you have a bout of diarrhea after surgery, take a capsule of enteric coated mixed bowel bacteria 2 to 3 times daily, away from food, for up to 2 months. Bismuthiols and silver help restore gut biofilms, which supports immune competence. Probiotics synergize.

N-acetyl-cysteine can help clear anaesthesia drugs to restore normal brain function. See Cancer Emergencies and Complications for a discussion on treatment of bleeding, clots, seromas, etc.

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**RADIATION THERAPY FOR CANCER**

Ionizing radiation is a standard treatment for cancer, despite significant risks, side-effects, and about 1/3 of cases failing to achieve good local control of tumours. The average failure rate is about 1 to 2% local reoccurrences per year. You may be shocked how little high-level scientific evidence there is for survival benefits from many applications of radiotherapy. Its clinical usefulness in reducing local reoccurrence by 50-60% is sufficient to assume that radiation can be a reasonable option, though not to be entered into lightly. It can really burn tissue and leave permanent damage. Here is a primer on radiotherapy:

Radiation used for cancer therapy delivers a large amount of energy in a small, localized volume along the beam line (linear energy transfer or LET). Photons or nuclear particles are used.

This energy is commonly measured in Grays (GY) – 1 joule of energy absorbed into 1 kilogram of matter. Cancer treatments range from 3 to 10 Grays. If you have been given radiation therapy once, you may only receive it again if the total dose accumulated will be under 7,000 to 8,000 CentiGrays or 70 to 80 Grays, as more is usually fatal. The human LD50 for acute radiation exposure is 4.5 Gy – half of those exposed to this level will die. Therefore any high dose must be delivered in small fractions per day, over several days or weeks, not all at once.

A second “boost” dose may be added to the usual once a day dose, late in the regime, to overcome the accelerated repopulation of tumour cells induced by radiation injury. Like all living things, these cancer cells struggle hard to survive.

*Radiation dosing is all about the volume of tissue that must be treated.* When the field of treatment is large, the amount of energy that needs to be delivered to get all the cancer cells goes up dramatically, and risk of injury and burns increases.

Electromagnetic photonic energies such as X-ray, gamma ray, or ultraviolet light produce indirect ionized particles of high energy and excited atoms with electrons in higher orbits, which are more chemically reactive. This creates havoc in our life chemistry.

High speed sub-atomic particles - electrons, protons, neutrons, pi mesons. If they have over 10 electron volts of energy – they can produce direct ionization by ejecting electrons from atoms, which then break covalent chemical bonds, produce free radicals of oxygen (ROS), and secondary particle cascades. The large particles have a short range that is dependent on their initial kinetic energy or velocity.

Oxygen is crucial to transduce the radiant energy into chemical form. The biradical nature of oxygen makes it the most important electron acceptor in biological systems. Without oxygen the radiation damage is repaired in 1/100,000th of a second. The potent radiolytic products of water, the hydroxyl radical OH* and bare protons H+ react with molecular oxygen and other reactive oxygen species ROS to form stable enough radicals to generate lipid peroxidation. Polyunsaturated fats combined with oxygen-stabilized hydroxyl radicals are the most potent bio-killers from radiation therapies. Radiation activates sphingomyelinase or ceramide synthetase which hydrolyzes the cell membrane lipid sphingomyelin, increasing ceramides, resulting in apoptosis – the cell dies.
Ionizing radiation disturbs several phases of the cell cycle. Cyclins and their respective CDKs are disrupted, leading to genomic instability. The CDK inhibitor p21 is a primary mediator of p53-dependent G1 cell cycle arrest from DNA damage from radiation. Mitotic (doubling) delay at G2 in the cell cycle is proportional to the radiation dose, prolonging the generation time, producing non-dividing cells, chromosome aberrations, giant cells and cell death.

Cells are about 70% water. Ionizing radiation usually forms hydroxyl radicals [*OH) and superoxide radicals from the water inside cells, which break strands of DNA, the genetic code. If both strands are broken, and go unrepaired, the cell may die. Cells injured by radiation will also die if abnormal connections between strands (dimers) are not repaired. Two DNA strands glued together cannot be read, and the cell loses use of a gene that may be necessary for life.

However, if one strand remains unrepaired, the cell survives, but in an altered form. DNA strand breaks induce transcription factors NFκB and p53. The NFκB will upregulate Bcl-2 genes, cell adhesion molecules, pro-apoptotic Bax, TNFa, IL-6, IL-1b, AP-1 and MMPs. It regulates over 200 genes involved in the inflammation response.

Thus radiation can kill cancer cells, but can also cause normal cells to develop into cancer. These secondary cancers can take 20 years to develop into clinical disease. Even 0.5 Gy exposure can trigger cancer. Decades after treatment there is a 6 -fold increased risk of a new solid tumour from radiotherapy for Hodgkin’s disease, 4 to 5 times increased risk of esophageal cancer after radiotherapy of breast cancer, and increased occurrence of secondary leukemias, lymphomas, breast, thyroid, lung and GI cancers.

p53, the guardian of the DNA, co-ordinates cell cycle arrest, manages apoptosis and modulates the DNA repairs process, primarily through induction of the antioxidant enzyme glutathiore peroxidase. P53 activates other anti-ROS proteins, suppresses oxidation from nitric oxide synthase, and induces DNA repair enzymes. We do not want the cancer cells to be able to repair the radiation damage, but we do want healthy cells to survive. Unfortunately the radiation disrupts important regulatory cells, creates a chronic disturbed patterns of growth, and can give rise to significant fibrosis and necrosis in all cells within the field of the radiation.

External beams such as X-ray devices, gamma ray “cobalt bomb”, linear electron megavoltage accelerators (Lineacs) and the ‘gamma knife’ units bombard the body from the outside, so much of the energy gets absorbs into overlying tissues and doesn’t reach the tumour. This is like sunlight going into water, - most of the energy is absorbed near the surface and so the deeper one goes, the less energy has penentrated.

Implants such as rapid cesium pellet brachytherapy use high dose radioactive substances placed near a cancer to deliver a very high local dose. Many of these isotopes release high energy particles with large mass which cannot penetrate too far into healthy structures around the tumour.

Radiation kills more cells at low doses than one would predict from the direct impacts, as if cells not hit by the radiation receive panic signals form the injured cells, and turn on their own death cycle. Even if only 1% of cancer cells are directly hit by radiation, up to 30% of cells will show reactive sister chromatid exchanges. Conversely, high-dose radiotherapy kills less cells than one might expect. This paradox is thought to be due to “bystander effects”. This phenomenon is an indirect action on cells distant to the radiation field, thought to be mediated by alteration in epigenetic regulation. The bystander effect becomes saturated at doses under 1 Gray, but is most prominent in high-dose radiation exposures. The abscopal or out-of-field effects injure DNA and macromolecules, causing neighbouring cells to mutate, transform and die. Bystander damage involves CX43 gap junctions responsible for cell-to-cell communication. Also involved is a factor released by the thymidine phosphorylase-5’-deoxy-5-fluoridine suicide gene system. Lipid peroxides and inosine nucleotides may be released, as well as cytokines such as TNFα, IL-6, IL-8. This will impact tumour cells, and normal endothelial cells, fibroblasts and lymphocytes. As a result, side-effects can occur well outside the area actually hit by the therapeutic radiation.

A head CT exposes a person to 1-2 mSv, or 0.1 to 0.5 rads, which is the amount of background radiation the general population receives in 4 to 8 months. An abdomen/pelvis CT is about 1-2 rads. A PET scan is about 0.43
rads to the whole body. Even the dose of one CT scan to the abdomen, pelvis or chest, 10 mSv units, gives a 1 in 1,000 chance of developing cancer. Ten CT scans gives a measurable risk of developing leukemia or lymphoma. It is estimated that 38 CTs will increase risk of cancer by about 12. If you are offered some other way to check up on your cancer, such as a magnetic resonance image MRI or a blood test for a tumour marker, you should take the opportunity to reduce your radiation exposure. During radiologic diagnostic imaging we can freely use antioxidant protectants such as grapeseed extract OPCs, melatonin, vitamin C, bioflavenoids, resveratrol, green tea extract, vitamin E, N-acetyl-cysteine, glutathione, vitamin A, pomegranate, milk thistle extract, and curcumin.

External beams such as X-ray devices, gamma ray “cobalt bomb”, linear electron megavoltage accelerators (Lineacs) and the ‘gamma knife’ units bombard the body from the outside, so much of the energy gets absorbs into overlying tissues and doesn’t reach the tumour. This is like sunlight going into water, it is absorbed near the surface and so can’t get too deep. Newer types of radiation such as proton beam and pi meson beams overcome some of this problem, acting more like depth charges, delivering a big punch deep in the tissues while sparing more of the superficial structures.

Implants such as brachytherapy use high dose radioactive substances in pellets placed near a cancer to deliver a very high local dose. Many of these isotopes release high energy particles with large mass which cannot penetrate too far into healthy structures around the tumour.

Rapidly dividing cells are most susceptible to radiation damage: cancers, small lymphocyte immune cells, bone marrow where we make blood cells, the delicate linings of blood vessels and of the gastrointestinal tract, and hair follicles. That is why radiation kills cancer but also makes the hair fall out and the gut to be disturbed by sores, vomiting and diarrhea. If the bone marrow goes down, you can bleed to death from lack of platelets, die of infection due to lack of white immune cells, or go into organ failure due to lack of red blood cells to carry oxygen in and carbon dioxide out.

**The classic symptoms of radiation toxicity:** malaise, weight loss, nausea, vomiting, diarrhea, sweats, fever and headache.

Any tissue subject to the radiation doses used for cancer therapy can be permanently altered in its growth pattern. Initially there is a robust inflammatory response by the immune system. A slow but relentless fibrosis or scarring ensues, gradually reducing blood flow. After many years, irradiated tissue may be unable to heal from trauma or surgery. Sclerosis or scarring and contraction of vascular endothelium (the lining of blood vessels) is slowly progressive, leading to endarteritis (inflamed lining), fibrosis & thrombus (clot) formation. Transforming growth facor beta one TGFβ-1 is involved in the injury response and subsequent persistent stromal changes in the collagen and hyaluronic acid of the extra-cellular matrix. TGFβ can be modulated with vitamin A, R-alpha lipoic acid, berberine, sulforaphane, rehmannia and rhubarb root. Inhibition of TGFβ by berberine is potent enough to increase the efficacy of radiation therapy. Radiation-induced fibrosis, xerostomia and other injuries can be repaired with anti-oxidants and blood vessel dilators, such as L-carnosine. Berberine has now been shown to reduce radiation pneumonitis via inhibition of sICAM-1 and TGF-β1. Curcumin and grapeseed proanthocyanidins treat pulmonary fibrosis. Avoid glucosamine or chondroitin.

Radiation to the heart is associated with increased risk of coronary artery disease. This scarring goes on relentlessly for years after the therapy. Given enough time, it will always degrade the ability of the tissue to heal normal wear and tear. Omega 3 oils may help slow this effect by thinning the blood, increasing capillary perfusion.

Radiation to the chest area, including breasts and mediastinal lymph nodes, can induce a restrictive cardiomyopathy leading in time to heart failure. Radiation to the neck and mediastimun doubles risk of stroke and triples risk of transient ischemic attacks. Treat with omega 3 marine oils. Radiation to the heart is associated with increased risk of coronary artery disease and congestive heart failure. Radiation for head and neck, and breast cancers may result in hypothyroidism, and in rare cases hyperthyroid storms. Naturopathic therapies can assist with these conditions.
The 1/3 local failure rate in radiotherapy is mostly due to the hypoxic cell problem - 2.5 to 3 times higher doses are needed for the same biological effect in low oxygen parts of tumours than for fully oxygenated cells. My research area for several years at the British Columbia Cancer Research Foundation Medical Biophysics Unit was on this “hypoxic cell problem”. We looked at new drugs and new radiation sources (pi mesons) that would kill the cells living on the edge of survival in oxygen-deprived parts of a tumour.

Hypoxia-inducible factor HIF-1 activates p53, promoting ATP metabolism and increasing resistance to radiation therapy. Using inhibitors of HIF-1 after RTx may improve efficacy.

I am pleased to tell you there are many natural agents which naturopathic doctors are trained to use which not only radiosensitize, they increase the therapeutic benefit by also reducing the harm to non-cancerous cells!

I now know that pre-treatment with natural medicines like anti-angiogenic green tea extract. Tea EGCG temporarily increases tumour oxygenation, and thus improves responses to radiotherapy. The green tea extracts need to be stopped during delivery of the radiation therapy. Pre-treatment with anti-angiogenics normalizes VEGF-APN ratios, thins the basement membranes, increasing tumour oxygenation, and thus improves responses to radiotherapy. Heat shock protein 90 HSP90, Cox-2, P-glycoprotein PKC and akt/mTOR signaling pathway inhibitors are radio-sensitizers.

Niacinamide (aka nicotinamide, a form of vitamin B3) increases local blood flow, and is a very strong radiosensitizer – it amplifies the effect of the radiation to kill more cancer cells. It is far better than the synthetic drug I was doing medical research on. It is suitable to use all through radiation therapy.

I am frequently asked about hyperbaric oxygen therapy and cancer. Using 100% oxygen under pressure certainly delivers a massive dose of oxygen. We know it cures ‘the Bends’ in divers, but will it help to kill cancer? Well, the oxygen does increase chemical damage and cancer cell death from radiation. Oxygen in really high doses does increase immune activity against cancer cells. However, it increases blood vessel growth into the tumour too. The net effect is controversial. Some of my colleagues use HBO2T to increase the effectiveness of radiation therapy, and tell me it is safe.

It is interesting to note that children are given Carbogene gas to breathe before radiation therapy to make their tumours more sensitive to the therapy. This is 80% oxygen (O2) mixed with 20% carbon dioxide (CO2). Normal air is 21% oxygen and the rest is mostly nitrogen (N2). A novel idea in contemporary radiation care is photodynamic therapy with ionized oxygen. Light of a specific wavelength is used to activate the ionically charged oxygen at the tumour only.

Radiation works primarily by inducing oxidative stress. While moderate dose anti-oxidants during radiation therapy may be associated with increased survival time, increased tumour responses, and reduced toxicity, this issue remains controversial among radiation oncologists. Certainly some high dose anti-oxidants may reduce effectiveness of radiotherapy. However, it is scientific humbug for oncologists to declare natural anti-oxidants unsafe while using high-potency synthetic anti-oxidants with radiotherapy such as Amoifostine, Mesna and Dextrazoxane, and natural -origin Pentoxifylline. There may be a research gap between natural and synthetic products motivated by economics, but the scientific principle is established. Anti-oxidants have a role in radiation therapy, but require an experienced professional to make the correct prescription. Remember also that natural substances have many components with multiple biological actions, so often the antioxidant effect is not dominant, and other more positive actions are seen. There can be a net gain in cancer cell killing and healthy cell protection with wisely-chosen antioxidants, given at the right time!

One anti-oxidant which is very well researched and shows positive effects combined with radiation therapy is melatonin. Meta-analyses of RCTs show an increase in responses, one year survival and reduced adverse effects. It certainly protects the GI mucosa, and regulates the bio-rhythms needed to coordinate healing.

Curcumin is another very valuable “antioxidant”, reducing the inflammatory response and increasing the cancer cell kill, while protecting normal cells from damage. This increases the “therapeutic differential”. The primary
action is reduction of the cytokine TGFβ, which in turn reduces fibrosis due to TGFβ-1 and the release of circulating tumour cells and therefore metastases. It also potently inhibits lipid peroxidation.

After radiation therapies there can be a prolonged suppression of bilirubin, albumin and uric acid seen on the blood tests. This effect needs to be treated with a balanced program of anti-oxidant supplementation.

The blood-thinning drug Coumadin or Warfarin does not interact well with radiation therapy, so patients are encouraged to switch to low-molecular weight heparin anti-coagulation therapy. Other anti-coagulants actually improve the efficacy of radiotherapy.

Lithium mineral protects neurons from radiation injury by reducing the number of double-strand DNA breaks.

Some of my colleagues are also supporting radiation therapy with astragalus, L-glutamine, green tea EGCG, soy isoflavones, omega 3 DHA, sea buckthorn, Siberian ginseng *Eleutherococcus senticosus*, and *Gingko biloba*. Demulcent herbs such as marshmallow root and licorice root DGL are often used to protect the throat.

In all forms of cancer therapy it is important to support the clearance from the body of damaged cells and their debris. This means giving antioxidants, liver support, and help for the circulating and the reticulo-endothelial immune system, which digest bad cells. Toxic therapies like radiation kill patients directly and indirectly, and often render them so debilitated they cannot then respond to complementary and alternative natural therapies. Integrating both orthodox and natural adjuncts (supports) helps keep the options open by protecting a reserve of vitality.

An interesting phenomenon is the beneficial and immune stimulatory effect of small doses of radiation. This is called radiation hormesis, and is like a homeopathic response. This is the Arndt-Shulz Law, that below a certain threshold, toxic substances can be bio-protective. In fact a very small dose of radiation before, or even hours after an exposure to a toxic dose of radiation will reduce DNA damage. It seems we have an adaptive response to miniscule radiation doses, with induction of DNA repair, apoptosis, anti-oxidant protection, and enhanced immune function.

Be proactive, as all doses of radiation cause injury, though the symptoms may only appear much later on. Natural protectants and healers of radiation injury include green tea, vitamin A, curcumin, vitamin E, N-acetyl-cysteine, glutathione, resveratrol, grapeseed proanthocyanidins, milk thistle silymarin, vitamin C, melatonin, carotenoids, lycopene, selenium, pomegranate, apigenin and Triphala.

**Treating Radiation Exposure from Medical Imaging**

Radiation can cause cancer. Radiation imaging such as CT scans are a big dose of radiation. PET scans actually are not much of a risk as they use a much milder type. We have repair mechanisms to deal with ambient radiation from soil, water and airborne radioactive nucleotides, and cosmic rays from further out. Exposure to imaging sources or radiation therapies for cure or palliation, adds to risk of experiencing harm. Radiation can be very toxic in the short term, and it can also trigger a relentless decline in circulation due to fibrosis or scarring of the lining of the blood vessels. Tissues can lose the ability to heal. Be proactive, as all doses of radiation cause some injury, and symptoms may not develop for an extended period of time.

To reduce damage to healthy tissue hit by radiation:
- vitamin A (retinol palmitate) - 5 X 10,000 IU twice daily for 2 days before and about 2 weeks after each scan. I prescribe drops of 10,000 IU each, but capsules are also available.
- ashwaganda herb is a significant protectors of healthy cells.
- shark liver oil alkylglycerols reduce secondary tissue damage by about 60%.
- curcumin reduces inflammation.

Other agents to consider for protection against radiation from medical imaging: quercitin, beta carotene, vitamin B1 – thiamine, vitamin B3 - niacin, vitamin B5 – pantothenic acid, selenium, glutathione, squalene, green tea,
melatonin, zinc aspartate, taurine, ginseng, reishi, cordyceps, bael fruit Aegle marmelos, marine omega 3 oils, holy basil, and maitake PSK extract.

Homeopathic medicines are helpful to restore homeostasis. Consider Radium bromatum, Radium iodatum, X-ray, Thuja occidentalis, Cadmium iodatum, Cadmium sulphuricum, Calcarea fluorica, Fluoric acidicum, Phosphoricum acidicum, Cobaltum metallicum, Rhus venatum, and Belladonna. Arsenicum bromatum is particularly helpful for radiation burns.

Dr. Christopher, master herbalist, recommended Oregon grape root Berberis aquifolium for radiation recovery. Berberine has now been shown to reduce radiation pneumonitis.

The traditional Vietnamese herb for detoxification Vigna radiata contains the flavonoid vitexin which has been shown to protect from radiation induction of weight loss, and damage to peripheral blood cells. Note that this herb treats the condition called “deficiency heat” seen by doctors of traditional Chinese medicine TCM in irradiated patients. I use Da Bu Yin Wan formula for this purpose. TCM formulas such as Radio-Support will address issues such as deficient qi, blood and yin, blood heat, and blood stasis.

**Red wine** can reduce the risk of acute radiation toxicity, including high-grade skin toxicity, without affecting anti-tumour efficacy. It is suspected that resveratrol is the active ingredient. Enjoy one glass daily for good health!

Aged garlic extracts enhance DNA repair and reduce immune suppression by radiation. Super-oxide dismutase SOD repairs radiation injury to the bladder and GI tract. SOD can be elevated significantly by taking pomegranate juice, and goji berry, also called wolfberry or Lycium barbarum.

**Probiotics** help protect the gut from radiation injury, and protect immune competence.

**Radiosensitizers**

COX-2 inhibitors selectively radiosensitize tumours. For example, curcumin is an Akt inhibitor - and the Akt / mTOR pathway mediates radio-resistance.

Quercitin, apigenin, genestein and hypericin are PKC inhibitors which regulate p-glycoprotein, which acts as a pump to export drugs out of cells, as well as acting as radiosensitizers, increasing cell sensitivity to radiation.

**Niacinamide** (nicotinamide) is a special form of vitamin B3 which increases blood flow to tumours to overcome hypoxic cancer cell resistance to radiation. The effect is very specific to tumour vasculature. I worked for years in research on this problem of hypoxia or low oxygen levels in tumours. Low oxygen areas are places cancer cells can hide out and survive radiation therapy. After millions of dollars spent on research, no drug is safer and more effective as a radiosensitizer than nicotinamide/niacinamide.

**Avoid during Radiotherapy:**

No sugar allowed! A strict low glycemic diet can markedly increase effectiveness of radiotherapy. An American study showed an 8-fold difference in responses to radiation between patients with the highest intake of sugar and the lowest. This is huge! High sugar load increases insulin-like growth factor IGF-1, which suppresses apoptotic mode of death in cancer cells induced by ionizing radiation. One exception to this rule is the use of sips of honey during radiation to prevent mouth and throat ulceration (mucositis) in head and neck cancers.

Anti-oxidants during radiation therapy is a very controversial subject, although there is good evidence that moderate doses administered prior to radiotherapy may have a net positive effect. The most controversial are beta carotene, vitamin E and co-enzyme Q10. Oncologists are comfortable with some antioxidants such as Pentoxifylline from xanthines, and synthetic anti-oxidant drugs such as Amifostine and Dexrazoxane, but are still
biased against natural forms. Pentoxyifylline 400 mg bid and mixed tocopherols 500 IU bid prevents and treats radiation sequela such as fibrosis – use up to 1 year post-Rtx.

I am absolutely sure melatonin is both safe and helpful with radiotherapy, even though it is an antioxidant. There is a clear net gain for humans using it during radiation therapy. Radiation can induce a profound drop in antioxidant status, marked by signs of oxidative stress such as persistently low serum albumin, bilirubin and uric acid.

Avoid use of supplemental manganese, iron and copper, except as in a one-a-day multivitamin. Do not use mint, rehmannia and cinnamon based herbal preparations during radiation therapy without expert guidance.

Do not put any oil-based skin care products on the skin exposed to radiation during the entire course of your radiation therapy. Your skin could be fried to a crisp! Remember that lipid peroxidation from radiation hitting fats creates rampant cell killing. You cannot wash off enough to prevent damage, so don’t use any.

**Radiation Therapy Support Summary**

Take only the following supports during the course of radiation therapy and for one month after the last dose of radiation. Any other medicines or supplements should only be considered during this time if prescribed by a physician.

**One week before radiation therapy:** pre-treat with anti-angiogenics including green tea EGCG and Can-Arrest. Stop these medicines when radiation starts.

Give also one week pre-treatment with alklyglycerols, and throughout the course of radiation, particularly if to the brain or if any marrow bones are exposed.

**During Radiation Therapy:**

**Curcumin** extract from tumeric to control inflammation and promote tumour oxygenation. TheraCumin “2X 120 mg” once or twice daily. Do not let its label as an “antioxidant” put you off, it’s safe.

**Marine source omega 3 oils** 3,000-4,000 mg are also safe anti-inflammatories to use with radiation therapy.

**Melatonin** –Improves remission rates, 1 year survival, and reduces adverse effects. Take only at bedtime, to tolerance, up to 20 mg. Melatonin is called an anti-oxidant but like vitamin C, can also be a pro-oxidant.

**No sugar!** Scrupulously follow the low glycemic diet plan. This makes a huge difference.

**Red wine** – one glass daily will reduce skin damage during radiation, without reducing efficacy.

**Mushroom** polysaccharides - hot water extract of Reishi mushroom, Rx 2 to 3 capsules twice daily.

**Niacinamide** 500 to 1,000 mg up to 3 times daily at meals. Niacinamide assists by increasing tumour blood flow.

**Berberine** reduces anorexia, nausea and fatigue in those undergoing intestinal and pelvic radiation. Protects the bladder and bowel from injury. Usual dose is 300-500 mg 2 to 3 times daily, or to bowel tolerance.

**Zinc citrate** 25 mg at each meal reduces dermatitis and mucositis, boosts immune function, improves tissue repair and healing, while improving local control of the cancer. Mandatory for radiation to the head and neck.

**Calendula** - For the sore throat and trouble swallowing in radiation to the head and neck, sip *Calendula officinalis* (marigold flower) tea or diluted tincture.

**Clay packs** – Apply a thin paste on unbroken irradiated skin 45 minutes then shower.
Ashwagandha *Withania somnifera* herb to make tumour cells more sensitive to radiation, but protects healthy cells! Rx - 2 capsules or 1 dropperful of tincture 3 times daily, at meals. This adaptogen or stress-modulator reduces adrenaline, which increases the number of cancer cells throwing the off-switch (apoptosis). It is also an immune-modulator, protecting the immune system from collapse during radiotherapy. Ashwagandha can raise DHEA, so it is not good long-term in hormone-dependent cancers. In such cases consider the related adaptogens:

- **Rhodiola** *Rhodiola rosea* improves sleep, cognition, and efficacy of radiation therapy against cancer.
- **Siberian ginseng** *Eleutherococcus senticosus* is also a good radio-protectant recommended by Keith Block, at 500 mg daily. It controls lipid peroxidation and DNA damage. Really helps fatigue, along with omega 3 oils.
- **Notoginseng** - *Panax pseudoginseng* improves the killing of cancer cells by radiotherapy.

### TREATING COMMON RADIATION SIDE-EFFECTS WITH NATUROPATHIC MEDICINE

Despite our best efforts to prevent problems, people do get hurt by the radiation. Most issues will be well addressed by the oncology doctors and nurses. However, natural medicines can be less expensive and far more effective. Do not hesitate to ask for acute naturopathic care for any radiation side-effect.

**ANEMIA** - bone marrow damage takes 1 to 3 weeks to manifest after receiving a toxic dose of a chemo drug, but then may progress to complete failure to produce any of the blood cell types. If the marrow stops making red blood cells the patient becomes anemic. Lack of red cells means not enough hemoglobin to carry oxygen out to the tissues and carbon dioxide back to the lungs to be breathed out as waste. Anemia makes a person tired and listless. Your doctor may order blood transfusions if your hemoglobin falls below 90. Use iron with caution as it is very oxidizing, making ROS which damage DNA. It is safer to check iron status by measuring serum ferritin before giving iron. **Vitamin B-12** given by intramuscular injection can kick up blood cell production. Support bone marrow with shark liver oil alkylglycerols 1 – 2 capsules three times daily, and soup made from marrow bones. **Shih Chuan Da Bu Wan** or **Shiquan** 8 pellets three times a day is brilliant. **Marrow Plus** from Health Concerns 3 - 4 capsules three times a day, **Panax ginseng** 500 to 1000 mg. twice daily. **AHCC** (active hexose correlated compound) is a proprietary Japanese low molecular weight compound from fermented shiitake and other medicinal mushrooms grown in rice bran, which has been found to prevent many chemo side-effects and increase the effectiveness of methotrexate, 5-fluorouracil and cyclophosphamide at doses of 3 grams daily. Resistance to the blood-building drug Erythropoietin therapy is reduced by co-administration of L-carnitine and vitamin A. It can also be supported with vitamin C and B-complex. Erythropoietin can cause great harm in some patients, even killing them with blood clots.

**ANOSMIA** – Loss of smell leads to loss of taste, with degradation of quality of life, and appetite. Steroid hormones are used, and we may also use **Ginkgo biloba** extract, zinc citrate, homeopathic **Zincum metallicum** or **Mercurius solubilis**, vitamin B-12 by intramuscular injection, acetyl-L-carnitine, R+ alpha lipoic acid and N-acetyl-cysteine. For loss of taste try biotin and zinc. **Coenzyme-Q-10** helps smell and metallic taste.

**APPETITE** - loss of appetite or anorexia is helped by ginger (candied is nice), bitters, peppermint, thiamine, **melatonin**, Marinol and **reishi** mushroom extract, **royal jelly**. Make small meals, and control odours. Your acupuncturist may needle ST-36, SP-6, CV-12, BL-20 and 21 for appetite. For loss of taste add LI -4. The TCM herb formula **Bu Zhong Yi Qi Wan** is recommended by myself, and by the prominent integrative medical oncologist Keith Block. Other herbs include gentian, **bitters**, catnip, fennel, peppermint, **Acorus calamus** and ginseng. Exercise helps. Zinc citrate taken at meals. An oncologist recommends a Guinness stout or a glass of dry sherry! Be aware that bromelain used in high doses as an anti-inflammatory can powerfully inhibit appetite.

**ATTITUDE** – Expectation plays a central role in the occurrence of side-effects. If the patient believes they can stay well, visualizes success, and positively affirms and embraces the therapy, they will likely do better than if they are fearful. However, it is not a trivial concern that chemo can cause great harm, even death. Anxiety is therefore normal, but high levels of depression, as measured by the Hospital Anxiety and Depression Scale (HADS) questionnaire, can predict pathological responses to chemotherapy. Such patients may display high emotional restraint and not appear severely depressed. This is a good reason to integrate mind-body medicine with orthodox protocols!
BURNS – Radiation can cause severe burning of the skin and underlying tissues in some individuals.

2 to 4 weeks: dryness, follicle epilation, erythema due to cytokine release, and melanin pigment changes.
3 to 6 weeks: dry desquamation, scaling and itching
4 to 5 weeks: moist desquamation: basal cells are lost, oozes fluid. Extreme burns cause dermal necrosis.
After 12 weeks: atrophy, fibrosis due to increased fibroblast activity, TFGβ causes dermal thickening and edema.
After 6 months: telangiectasia – red spider-web-like blood vessels visible in the skin.

Homeopathics Apis mellifica, Causticum, Cantharius, Arsenicum bromatum, X-ray 200C, Radium bromatum, Cadmium sulphuricum, and Causticum can heal radiation burns or injuries.

Do not use any oils on your skin in the field of radiation, even though you may think you can wash them off before the next radiation exposure. Oil residues increase lipid peroxidation, which can fry you to a crisp!
Note: severe skin burns and inflammation from radiotherapy do not always respond well to emollients. Use only physician-approved products on skin damaged by radiation, and monitor responses closely.

Green tea extract or Calendula (marigold flower extract) may be used on burned skin, but not in oil-based creams. Studies are underway with water-based calendula spray to prevent radiation burns.

Skin damage and burning can be treated with aloe vera leaf gel during therapy. I find the gel helps my patients, even though some negative studies have been published. Oncology nurses seem to agree with me on this.

After the last dose of radiation can we consider use of certain oils and emollients such as Rosa mosqueta (rosehip) oil with vitamin A and D3 to burnt areas. Canadian Emu oil rapidly soothes and heals mild burns and dermatitis. Rosehip oil/cream prevents and treats burn scars. Use Ferlow Brothers aloe or rosa creams - organic botanicals in a base of organic grapeseed oil, with vitamin E. Vitamin E oil may be sprayed on sloughing skin (moist desquamation). Topical Centella asiatica with vitamin E is useful for scars and strictures. For skin discoloration use vitamins A and D3 topically and orally. Grapeseed extract reduces inflammation. I use NASOBIH™ Nutra-Cream with Protovin™ grapeseed extract, often adding vitamins or oils. Colleagues use Lymphdiaral Sensitive herbal/homeopathic cream, and Boswellia cream. Some use micronized colloidal silver 10-30 ppm to prevent bacterial skin breakdown in open blisters or dehisced areas. One reports tea tree oil helps ease skin irritation.

CONSTITUTION – Number 42’s are remarkable for relieving even the stubborn constipation from codeine and morphine painkillers. #42’s are an old naturopathic remedy combining cape aloe root and sweet wormwood. It may have originated with the esteemed O. G. Carroll, ND. We also consider Hoxsey herbal tincture, aloe vera juice, psyllium fiber, acupuncture ‘Prosperity treatment’, enemas, and occasionally we refer for colonic irrigation by a certified colon therapist. We always advise good hydration, regular exercise, and establishing a bowel habit.

Suggest fruit such as prunes, papayas and rhubarb. We may recommend “Grandma’s laxative fruit spread”:

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Simmer dates in prune nectar until very soft. Spoon into a blender, add figs, raisins and prunes. Blend until smooth. Keep refrigerated. Use as a spread on toast or crackers, or eat by the spoonful. It is high-glycemic, but we have to balance competing interests in making clinical decisions. Another good formula: 2 cups bran, 2 cups applesauce, 1 cup unsweetened prune juice – take 2 to 3 tablespoons twice daily.

Use as directed stool softeners such as Colace or Docusate, glycerin or lactulose suppositories, or laxative Sennokot, which is just natural senna leaf extract. PEG 3350 (Miralax) is a polyethylene glycol osmotic laxative, dosed at 17-34 grams once daily, up to 68 grams for overnight effects.
DEHYDRATION - treat aggressively with miso broth, mango juice and electrolyte drinks such as the WHO formula – 1/2 tsp salt, 3/4 tsp baking soda, up to 8 tsp sugar or 4 Tbsp. maple syrup, and up to a cup of fruit juice to 1 liter water. Lemon juice can be added. Intravenous therapy is normal saline, 0.9% salt, with 5% glucose.

DERMATITIS - See also BURNS. Prevent injury with curcumin. My favorite remedy to correct the redness and blood vessel changes in the skin from radiation injury is the anti-inflammatory Protovin™, which contains the world’s most potent grapeseed extract OPCs - Protovin™ - and also has alpha lipoic acid, vitamin A, MSM, CoQ10, DMAE, EDTA, rosehip, essential oils, and many other brilliant natural components. Naturopathic oncologist colleagues suggest topical and oral remedies such as tea of calendula and rosemary, aloe vera inner leaf gel, lavender oil, emu oil, curcumin, honey, sea buckthorn, vitamin U, L-carnosine, green tea extracts.

DIARRHEA - BRAT diet (banana, rice, apple, toast). Peel, core and grate an apple, let stand until brown, mash and eat raw. Replace probiotic gut bacteria. I use Vitazen Ultimate Acidophilus - a potent mixture of billions of acidophilus and other probiotics, which includes FOS food for the bugs, and is enteric coated. Replace electrolyte salts as well as water, with miso soup, broth, juices or an electrolyte drink – at least an 8 ounce glass per bowel movement. World Health Organization WHO approved electrolyte replacement formula is ½ tsp salt, ¾ tsp baking soda, a cup of fruit juice, sweetened to taste with the equivalent of up to 8 tsp sugar, in 1 liter water. Intravenous rehydration: normal saline, 0.9% salt, with 5% glucose. Bentonite clay can absorb toxins. L-glutamine gives energy to heal the lining of the gut. Po Chai or Pill Curing pills are a tremendous Chinese herb for toxic diarrhea, but also consider Xiang Sha Yang Wei Pien and Ba Zheng Wan formulas. Acupuncture points ST 25 and 37. Prosperity treatment is a special acupuncture technique using 4 needles circling1 cun around the belly button, which can treat either diarrhea or constipation, with good results in about 5 minutes. I add acupuncture points ST 25 and 37 and warm BL 62. Consider omega 3 oils, macaroons and shredded coconut.

DRY MOUTH – Xerostomia is common after radiation to the neck and jaw. Prevent harm to salivary glands with prickly ash extract. There are several artificial saliva products in sprays and lozenges. Mouth Kote spray combines yerba santa herb, xylitol, sorbitol and citric acid to moisten the mouth and remove unpleasant tastes. Xylimelts discs use xylitol, peppermint and minerals. I have seen consistent benefit from acupuncture for xerostomia. I use primarily use acupuncture points on the regional Triple Warmer and Stomach meridians and the upper Conception Vessel. Give sea buckthorn oil, or tinctures of Echinacea or prickly ash (Xanthoxylum).

FATIGUE – is linked to inflammation, NFkB, CRP, IL-1β and IL-6. Aerobic exercise - start prior to therapy! Use L-carnitine 500 to 1000 mg three times daily for energy, or even better acetyl-L-carnitine. ALC crosses the blood brain barrier to help heal the brain from radiation injury. The Chinese ginseng root Panax ginseng is a wonderful tonic. I like to give 1 to 2 vials daily of the Chinese tonic herb formula Ling Chih Feng Wang Jiang with reishi mushroom, codonopsis, royal jelly and lychee fruit juice. If it is not available, give royal jelly, Codonopsis, reishi mushroom extract, or vitamin B5. Omega 3 marine oils reduce fatigue and depression by reducing interleukin IL-6. Naturopathic physicians may give intravenous drip or push of Myer’s cocktail of vitamins and minerals to boost the immune system and revitalize. We may simplify this to a shot of vitamin B12 in the rump. Chlorella algae or wheat grass juice for chlorophyll. Consider the herbs rhodiola, nettles, astragalus, Siberian ginseng Eleutherooccus senticosus, ashwagandha, shiitake and cordyceps. Reiki therapy will help! Sometimes one must just conserve energy and ask for assistance on bad days. Prepare food ahead of time and bank some down time - then use it to rest, contemplate, and visualize positive results from the therapy.

FAT NECROSIS - Radiation can cause fatty tissues to suddenly die. Rx alkylglycerols from shark liver oil 600 to 1,200 mg daily.

HAIR LOSS – Some claim vitamin E will reduce hair loss, or at least stall it. AHCC compound also claims to protect the hair follicles. Acupuncturists may use ST 36, SP 6, LV 8, BL 20 and 23, and moxa to BL 17. Afterwards, we use Shou Wu Pian tablets of bear’s foot herb Polygoni multiflori, to regrow hair more rapidly. You may have to learn to love your skull, or hats, headscarves and wigs.

LUNG INJURY - lung irradiation can result in inflammation (pneumonitis) leading to scarring (fibrosis) which becomes acute 1 to 6 months after treatment, causing cough with blood in the sputum, shortness of breath, chest...
pain, and even death. Curcumin heals lung fibrosis, along with grapeseed proanthocyanins and hawthorne berry extract, gamma tocopherol vit.E, vit. C, N-acetyl cysteine, and milk thistle extract. Nebulize glutathione.

MOUTH SORES - sores in the mouth and bleeding gums hurt, reduce eating and can get infected. Called mucositis, it can sometimes spread through the whole gastro-intestinal tract and cause GI bleeding. This can be the factor which limits using an effective dose of chemo, especially in leukemia cases. I have adapted a Chinese herbal product to this problem, with brilliant results. ‘Vitamin U’ such as Biotics Research Gastrzyme 3 tid or TCM Fare You 4 tid will generally prevent or rapidly heal mouth sores, or throughout the GI tract, including stomach ulcers, colitis and diverticulitis. It is a form of the amino-acid methionine extracted from green cabbage. Vitamin E 800 IU is said to prevent mouth sores, used topically at CTCA. Give L-glutamine at up to 10 grams per day or 2 gm/m², or one rounded teaspoonful dissolved in a warm drink three times daily. Consider liquid folic acid/folate, Glycyrrhiza as DGL licorice extract, chamomile tea or tincture, green tea with honeysuckle flower, marigold flower juice Calendula officianlis succus, chlorophyll, slippery elm bark Ulmus fulva, vitamin E gel, homeopathic Traumeel, and Radiacare oral rinse. The B.C. Cancer Agency’s “Magic Mouth Rinse” is distilled water, Nystatin anti-fungal, Benadryl elixir anti-histamine, and Solu-Cortef hydrocortisone sodium succinate. A simple oral rinse of ½ teaspoon each of baking soda and salt in a glass of warm water may be used several times a day. Adding N-acetyl-cysteine to the oral rinse improves effectiveness. Use a very soft toothbrush, or a finger or guaze pad, and consider baking soda rather than toothpaste. The mouth will be soothed by cold or frozen yoghurt and soft, bland food. Avoid over-the-counter mouthwashes such Listerine, Scope. Avoid crunchy, spicy and acid foods. Burning mouth neuropathy is treated with R-alpha lipoic acid. Try ice-chips too. Some of my American peers swear by honey for mucositis. In radiation therapy for head and neck cancers 20 ml of honey is taken 15 minutes before radiation, and this is repeated every 15 minutes for the next 6 hours. Dry mouth or xerostomia may be corrected with hyperbaric oxygen therapy, SalivaSure lozenges, or artificial saliva spray.

MUCOUS – Excess mucous, as if having a head cold, can follow RTx to the head and neck. A mouth rinse of Lidocaine and club soda will give relief.

NAUSEA - ginger is very good, as 2 capsules of root powder, as ginger tea, even as ginger ale. SeaBand is an acupressure band with a button that presses on PC-6. Needle ST-36, PC-6, HT-1, CV-12. Homeopathics Arsenicum, Nux vomica, Tabacum, Ipecac or Cuprum metallicum have often worked very well. Eat often in small amounts, especially starches like dry crackers, and drink plenty of fluids. Medical marijuana (cannabis, hemp) cannabinoids such as tetrahydrocannabinol THC does work well for some, if they can tolerate the other effects. If nausea arises from a gut reaction to stress prescribe Ventorrid (Xiao Chai Hu Tang formula). I may also prescribe Metoclopramide 10 mg before meals and at bedtime; Prochlorperazine 10 mg every 4 to 6 hours as needed; Haloperidol 0.5 to 1.0 mg every 8 to 12 hours as needed; or Dexamethasone 4 to 8 mg daily.

NERVE INJURY – Acetyl-L-carnitine (CI-if seizures) 1 to 2 grams 3 times daily and R-alpha lipoic acid, 300 mg two to three times daily for any nerve damage or neuropathy - numbness, phantom sensations or pain. IV-D-ALA 150-300 mg biweekly. N-acetyl-cysteine 1,200 mg twice daily, and 2,000 mcg methylcobalamin vitamin B-12 and vit. B-1 (thiamine) 100 – 200 mg IM shot at least every week. Pyrroloquinolone Quinone (PQQ) reduces oxidative stress, re-myelinates, regenerates mitochondria through biogenesis, reduces neuro-excitation and many other neurologic pathophysiology. Found in vegetables and fermented foods, supplement 20 mg daily. Aegantine sulphate is decarboxylated arginine, which prevents and treats neuropathy at doses of 3 to 4 grams daily. Ginkgo biloba leaf extract can help neuropathy and brain injury. L-glutamine -6 to 10 grams a day, vitamin B6 - 500 mg bid or pyridoxal-5-phosphate form 100 mg twice daily, B-complex, calcium, vitamin E, melatonin, omega 3 oils, grapeseed extract and milk thistle extract. Lion’s Mane (Hericium erinaceus) mushroom extract 400 mg daily. Some colleagues use Metagenics brand Neurosol, which contains borage GLA oil, B-complex vitamins and beta-carotene, Lion’s Mane mushroom extracts and topical 1 to 3% diclofenac cream. Traditional naturopathy for foot neuropathy and edema is the wet sock treatment, best with 1:1 dilution of vinegar. Always warm feet well, then put on wet socks, cover with dry wool socks, and go to bed.

ORGAN DAMAGE - make sure you ask the radiation oncologist and technicians to set up as narrow a beam as possible, and mask or shield vital tissues and glands- remember the squeaky wheel gets the grease. You do not have to be embarrassed to remind your care givers to slow down and focus on your safety. You will be less hassle
to them if you prevent problems before they occur. Use radio-protectants such as green tea, vitamin A, melatonin, glutathione and ashwagandha. Organs need Co-enzyme Q10 to repair; it really makes a huge difference in healing. My American colleagues suggest melatonin 20 mg twice daily, boswellia 500 mg 4 times daily, selenium to 1,000 mcg daily, medium chin triglycerides 13-26 grams, and Oralmat rye extract adaptogen. SOD from Goji berry repairs RTx injury. For brain injury from radiation add DHA from omega 3 marine oils.

**PLATELETS** - failure to make platelets or thrombocytopenia can make it impossible to form a clot, with a risk of severe hemorrhage. Your doctor may prescribe a transfusion of platelets if the count falls below 20. Papaya leaf extract often helps at 1,000 mg tid or 1 Tbsp. per dose of glycerin extract. Consider also shark live Yunnan Pai Yao Panax pseudo-ginseng 1 - 2 capsules three to four times daily is a reliable and fast therapy which I have seen out-perform synthetic drugs. The pineal gland hormone melatonin helps regulate the production of platelets, with efficacy comparable to Neupogen, and it’s a lot safer. Consider also shark liver oil alkylglycerols, licorice root, ashwagandha herb, and maitake mushroom extracts. High-dose vitamin C can help recovery. It is thought that eating fresh raw pineapple may help increase the platelet count. Avoid aspirin (ASA) and Advil (ibuprofen), Ginko biloba, and other blood thinners. Keep vitamin E dose under 600 IU daily. Report to your physician any bleeding signs such as bruising, red spots on skin, bloody urine or black, tarry stools. Avoid ginger, which reduces platelet counts and is a direct anti-coagulant. Some caution curcumin for similar reasons.

**PROCTITIS** – Give probiotic friendly bacteria culture. Inflammation of the rectum and anus from pelvic radiation can respond to hyperbaric oxygen therapy. So can urethritis or any other chronic inflammation from radiation. Daily ozone rectal insufflation. Berberine, L-glutamine, aloe vera gel, 25% DMSO gel. Use SOD, as from Goji berry. Wise Woman or homemade marigold flower extract (Calendula officinalis) suppositories for 7 nights. May be enriched with allantoin, marshmallow (Althea), homeopathic Calendula 6X, cocoa butter, retinol vitamin A and vitamin E.

**VOMITING** - treat dehydration aggressively - drink electrolyte (blood minerals) replacement, make a cup of miso soup, consider acupuncture. Replace salt and soda as well as water, or the water will not stay in the blood. WHO electrolyte replacement formula is ½ tsp salt, ¾ tsp baking soda, 8 tsp sugar/ a cup of juice per litre water.

**WEIGHT LOSS** - 80% of cancer cases are malnourished, and 40% die of malnutrition. Weight loss is a cardinal sign of cancer, and must be monitored and managed aggressively. Loss of over 20% lean body mass is critically dangerous; increase carbohydrates & protein intake. Cancer can cause cachexia, a metabolic syndrome with profound weight loss. Use marine oils rich in the fatty acid eicosapentanoic acid EPA - especially seal oil, 2 capsules twice daily with meals. You may use fish oils up to 1 Tablespoonful. daily. Consider melatonin, L-glutamine, bitter melon Momordica charantia.

**WHITE BLOOD CELLS** – Leukopenia or failure to produce enough white blood cells means a loss of vital immune cells, so the person’s resistance to infection can plummet. The neutrophils are the first responders to infection, and so are the most critical to protect. The most aggressive product to raise the count is shark liver oil alkylglycerols, in doses to 1,200 mg, or 2 capsules two to three times a day. Give 50,000 IU daily of vitamin A. Consider the Chinese herbs Siberian ginseng, astragalus, ligustrum, codonopsis, miltienia, white atractylodes, sage Salvia miltiorrhiza, lyceum, salix root, scutellaria and royal jelly. eg Shih Chuan Da Bu Wan, or perhaps Golden Flower Ji Xue formula. We may give dilute intravenous hydrochloric acid 1: 500 or 2 mg/mL, push 3 to 5 mL in saline. Naturopathic doctors have long had great success rebuilding immune health with thymus and spleen glandular extracts. I like to use homeopathic Thymoline to balance the thymus-activated immune cells. My American colleagues use Polyerga spleen peptides. I give chlorella algae, up to 20 grams daily. Botanicals to consider are poke root Phytolacca decandra or golden seal root Hydrastis 30 drops of tincture twice daily. Ayurveda suggests Podophyllum hexandrum. Acupuncture points include TW-5. Supplement zinc, selenium, vitamins A, C, E, B6 and B12. An intramuscular injection of B12 will pump up the neutrophils, our first responders to infection. Avoid crowds, avoid people with infectious illness, and wash your hands often, especially after using the toilet and before eating. Exercise. Report to your physician any sign of infection such as fever over 38ºC, chills, cough, sore throat, painful urination, or inflammation such as redness, swelling and pain anywhere.
LATE and CHRONIC EFFECTS OF RADIOTHERAPY

Radiation sets off a relentless loss of microcirculation in the field. Radiation permanently alters the extracellular matrix which surrounds and supports our cells, including the memory immune cells and stem cells in the ECM which regulate all cell growth. The area irradiated will never be the same, and in fact may become a medical problem many years later. The process of altered growth and healing is relentless and insidious, but you can do a lot to correct it naturally.

Clinical therapeutic interventions for radiation fibrosis have included empirical treatments, such as antioxidant therapies using superoxide dismutase, or vitamin E and pentoxifylline, and although evidence for therapeutic efficacy exists, further randomised studies are required.

Potential therapeutic strategies for radiation fibrosis that have shown promise in preclinical models include targeting pro-fibrotic cytokines such as:

- PDFR - platelet-derived growth factor and its receptor tyrosine kinase
- CTGF - connective tissue growth factor
- Rho/ROCK intracellular signalling pathway
- TGFβ1 - transforming growth factor beta 1
- stem cell recovery

To reduce the chronic fibrosis and other late effects in exposed tissues I prescribe:

- curcumin – micronized, liposomal, or full spectrum, usually 1 to 2 capsules twice daily at meals.
- R-alpha lipoic acid 300 mg twice daily at meals.
- vitamin A – 3,000 IU daily, after high dose loading at 30,000 IU daily ofr 2 to 3 months.
- vitamin D3 – 2,000 to 3,000 IU daily, or more if monitoring 25(OH)D.
- omega 3 marine oil - seal oil 2,000 mg or 3,000 to 4,000 mg krill or fish oil
- quercitin – 1 – 2 grams, inhibits TGFβ. Synergistic with green tea, alpha lipoic acid.
- pentoxyfyllene (Trental) 400 mg bid with 500 IU mixed tocopherol vit E - for 1 year
- restoring the gut biome speeds recovery from pelvic radiation. Eat what the bugs eat – a plant-based diet rich in fibre and lignans can generate short-chain fatty acids SCFAs to restore biome balance in as little as 3 to 4 days. You can also take probiotic friendly bacteria supplements.

Remember to always express gratitude for the care and help you have been given by your radiation oncologist, while forgiving yourself for stresses it put your body to. Try to be filled with gratitude. It is healing.
CHEMOTHERAPY

Combining natural medicine with chemotherapy is the most controversial area for integrative physicians. There are so many complex drug combinations in the standard protocols and experimental trials. The bald fact is that they are hunting through a near infinity of combinations, with little success. For a rational look at which cancers can actually respond in a meaningful way to chemo please read Questioning Chemotherapy by Dr. Ralph Moss. Ph.D. Chemo patients are often already on complex multi-drug regimes, including meds for the side-effects of chemotherapy, so it is daunting to avoid drug interactions. Radiation and most chemo drugs activate the cancer cell death sequence and thus kill the cancer cells by generating oxidative stress and ROS damage. It was wisely suggested a few years ago that antioxidant supplements would prevent these chemo drugs and radiation from working against the cancer. This would clearly be a catastrophe for the patient. It turns out it is true that high-dose anti-oxidants reduce the effect of radiation on cancer cells, and should not be taken during radiation therapy

However, a recent review of 214 studies on this issue showed only 3 potentially unfavorable interactions of specific chemo drugs with specific antioxidants. In all the rest the antioxidants reduced harm from the drugs, increased effectiveness, or most often, gave both benefits. Studies continue to show that antioxidants are not usually a problem during chemotherapy, and are actually wise to take, under professional supervision. See the References section at the end of this book. Why has this science not being used as the basis for rational prescription of these adjuncts? Integrative care can move medical oncology forward and reduce costs.

Years ago the Canadian Cancer Society sponsored a conference at Vancouver General Hospital which brought in top scientists from China. These doctors presented over 50 large scale randomized and placebo controlled clinical studies from universities and hospitals demonstrating how Traditional Chinese Medicine formulae interact with chemotherapy drugs. The TCM herbs consistently increased responses to chemo, often doubled the remissions, and consistently reduced morbidity and mortality. I have been a cancer researcher and scientist and in my opinion these are solid studies, and are as rational a basis for therapy as the rationale for the orthodox therapies they support.

In the post-chemo phase, patients need to be detoxified. Naturopathic doctors are expert at detoxification. Many doctors are entirely skeptical of the need for detoxification, but it is easily proven how loaded with toxins we all are, and people choose to be proactive. They are not typically looking for proof, they are looking for help.

For a few generations now, whenever a really poisonous substance was found in nature or made in a drug laboratory, it was immediately sent to the cancer research establishments to be evaluated as a cancer drug. The orthodox or allopathic medical treatment of cancer has emphasized cytotoxic or cell-killing medications. Chemo drugs kill rapidly dividing cells, targeting their DNA. Most of the cytotoxic effect results from apoptosis triggered by sublethal DNA damage. This is good. However, they also tend to go beyond this level of damage into necrosis, the rapid death of cells, which is a messy, inefficient and risky process, producing inflammation which is itself a promoter of tumour growth.

A common myth is that chemo drugs are somehow selective for cancer cells. Common drugs such as taxanes, anthracyclines and 5-fluorouracil actually kill healthy cells better than they kill cancer cells. Doxorubicin is ten times deadlier to good cells than cancer cells.

“Chemo” side-effects limit dosage, limit efficacy, and even kill patients. Any step we can add which reduces these risks increases the potential for the chemo to achieve its intended result. I consider it a major success to help a patient live through chemo with a reasonable reserve of health. Dr. Robert Atkins, M.D. has said in Atkin’s Health Revolution, “The damage done to the body by an unsuccessful course of chemotherapy is often so great that the patient’s immune system never recovers sufficiently to stand a fighting chance.” Immune cells are damaged in the bone marrow and also via leaky gut syndrome and disordering of the gut-associated lymphoid tissue where 70 to 80% of our active immune cells reside. Naturopathic physicians often feel that if chemo is given and fails, the hope for a response to biological treatments is also likely lost. We just too often have nothing left to work with in these damaged bodies.
Cytotoxic or cell-killing chemo poisons actually promote the spread of cancer (metastasis) by injuring cells of the immune system and cells lining inside of blood vessels.

Chemo drugs kill a constant percentage of cells in a tumour with every dose. When a drug kills 99.9999% and the tumour burden is a mere billion cells, there will still be 10,000 surviving cells. It works out that only an infinite number of doses of the drug would kill the last cancer cell. Theoretically, chemo cannot ever cure a tumour, as even one cancer cell might regrow a tumour. Fortunately, the large debris field of dead ordinary and cancer cells seems to switch the immune system into a clean-up mode that destroys the remaining cancer. It wipes the slate clean and initiates repairs. This can only happen if the immune system survives the chemotherapy. Therefore, this is part of my job description – to maintain immune health during chemo, to eradicate the last cancer cell.

A common myth is that chemo drugs are somehow selective for cancer cells. Common drugs such as taxanes, anthracyclines and 5-fluorouracil actually kill healthy cells better than they kill cancer cells. Doxorubicin is ten times deadlier to good cells than cancer cells.

The overall contribution of curative and adjuvant cytotoxic chemotherapy to 5-year survival in adults was estimated to be 2.3% in Australia and 2.1% in the USA. Cells lacking a functioning p53 DNA repair gene cannot die from chemo. This applies to 50% of cancers, especially late stage cancers. The tumours may go into remission, but they will be back.

Chemo is more effective with leukemias and lymphomas than with solid tumours, possibly due to drug delivery issues. In the disseminated cancers chemo is so successful you would be daft to not try it. Other than these blood-borne cancers, and testicular cancer, which are only 3% of all cancers, chemotherapy is not as well proven to good scientific standards to have a positive influence on survival or quality of life as you may think. There is some support for its use in sarcomas, retinoblastoma, ovarian, breast and small cell lung cancer.

This is all well known to oncology doctors, 75% of whom say they would not participate in a chemotherapy trial if they had cancer, due to its “ineffectiveness and its unacceptable toxicity”. Yet in North America 75% of cancer patients are prescribed chemo by these same doctors. In Canada, the same 75% majority of oncologists surveyed said they “would not undergo chemotherapy or recommend it to a loved one” for a majority of cancers! The more experience doctors and nurse have with chemo, the less they like using it on their own family. This sort of nonsense has cost the medical profession a lot of credibility with patients. Ultimately, we must have integrity – to be one and the same to all persons, all the time - to fulfill our professional duty to each patient. There are hard choices, to be made between the doctor and patient, in an atmosphere of trust. The question I ask myself with patients is would I take the treatment myself, or give it to my children or my dear wife? I find it very strange that today this is considered unethical. I thought it was the Golden Rule.

Chemo toxicity concerns:

- chemo is commonly toxic to other rapidly growing normal cells such as epithelial or skin-like cells lining the mucous membranes of the mouth and entire gastro-intestinal tract, causing nausea, diarrhea, vomiting, GI and mouth ulcerations.
- the lining of the blood vessels and muscle of the heart, causing congestive heart failure.
- hair follicles - thus hair often falls out to the point of baldness
- bone marrow, causing anemia through loss of replacement red blood cells, loss of platelets needed for clotting, and loss of white blood cells of the immune system with infections due to immune suppression
- nerve injury, kidney damage, lung pneumonitis, and tinnitus are also frequent problems.
- many patients get ’chemo brain’ syndrome - confusion and mental deterioration.
- chronic late effects include persistent fatigue, persistent bone marrow suppression, infertility
- most chemo drugs are known to cause cancers such as leukemia and lymphoma! These carcinogens cross-link DNA in healthy as well as cancer cells. They can also bind a single DNA strand to a protein or metal, activating frameshift mutations responsible for turning on oncogenes such as ras. Some tie the telomeres on the ends of the chromosomes into four-strand knots, creating an immortal cell. For example, high-dose chemo with epirubicin with cyclophosphamide can trigger secondary acute myeloid leukemia10 to 20 years later.
- multi-drug resistance develops in cancer cells treated with chemotherapy, and so tumours which develop after the primary therapy are very hard to treat.
- during chemotherapy do not take selenium in amounts over 200 mcg daily, or give any N-acetyl-cysteine, as these can promote chemo-resistance.

Fractionated chemo - using small doses more often over a longer time - tends to give better outcomes, as do multi-drug protocols. I was in cancer research when this radical concept of multi-drug chemo was first explored. It has made chemo more effective, but not nearly as effective as we would like to see. There is plenty of room for lots more improvements. I think integrated naturopathic supports are the biggest advance in chemotherapy we are likely to see in the near future.

An American naturopathic doctor I know had the same osteosarcoma that cost Terry Fox his leg, and later his life, but my colleague had a better therapy than Terry. He had the chemo delivered in extremely high doses only into his leg, while the circulation to his leg was isolated from the rest of the body and run through a heart-lung bypass to keep it oxygenated. He is alive and walking on both his legs decades later.

**MULTI-DRUG RESISTANCE**

Cancer cells can become resistant to many chemo drugs. Any cancers that reoccur after chemotherapy are possibly drug resistant, primarily through activation of P-glycoprotein Pgp, an ion pumping system which uses an ATP-binding cassette protein to expel cellular toxins. Pgp is an ATP-dependent efflux pump, and is also called ABCB-1 and MDR-1. Cancer cells activate the porter system to pump out chemo drugs as quick as they come in. Quercitin modulates the P-glycoprotein porter system, keeping more drug in the cancer cells. Cells lacking a functioning p53 gene cannot undergo apoptosis after chemo. This applies to 50 % of cancers, especially late stage cancers. The MDRI gene is also modulated by NFkB, STAT 3, PGE2 and COX-2 inhibitors.

Natural agents which can reverse resistance are quercitin, green tea EGCG and theanine, ginseng, curcumin, *Salvia, Euphorbia*, melatonin, vitamin C and vitamin K3.

Electrical therapy with 50 Hz AC current at 7.5 amps pulsed can down-regulate multi-drug resistance in tumour.

**INTEGRATIVE SUPPORT FOR CHEMOTHERAPY**

I will advise you on specific supports matched to your prescription. Do not take anything else without explicit permission. Take the prescribed supports during the entire course of chemo, and for 2 to 3 weeks after the last dose. If you encounter any difficulties during chemo, we have solutions, so do not hesitate to ask for further help.

**Mistletoe** lectin injection therapy is scientifically proven to support chemo and radiation. It is prescribed by more than 80% doctors in Germany and Switzerland, in their hospitals and cancer clinics. Chemo cannot actually kill the last cancer cell and cure cancer. If the chemo removes the bulk of the cancer cells, and the immune and stem cells working to support and “repair” the tumours, it can create an advantage for the immune system. Unfortunately the immune system can also be damaged or even destroyed by chemo drugs and associated medicines. However, mistletoe injections can maintain immune competence and turn the immune response to “attack mode”. The BC Cancer Agency has finally recognized that mistletoe improves chemo outcomes, increasing efficacy while reducing harm.

**Astragalus-based herbal formulas** originally form Asia also keep the immune system alive through chemo. Astragalus-based formulas are proven to the highest scientific standard to reduce harm from chemo in many large-scale university and hospital based double-blind controlled studies. Unfortunately, most have been published in Asian languages only. Their claimed efficacy and utility have been confirmed through my many years of clinical practice. My favorite is *Shih Chuan Da Bu Tang*, aka *Shiquan*. It can double the chance of a good response, while reducing side-effects by 1/3 to 1/2. Another useful formula is *Astragalus Combination* from St. Francis Herb Farm, also called *Deep Immune* formula. I prescribe 2 capsules 2 to 3 times daily (or 3 caps twice daily) to
protect the bone marrow and blood cells. Other Traditional Chinese Medicine (TCM) style formulas we may use: Chemo Support or Marrow Plus. Dr. Keith Block, MD prescribes Shih Chuan Da Bu Wan. This eminent integrative physician is a medical oncologist (chemo doc) with over 30 years experience. He is Medical Director of the Block Center for Integrative Cancer Treatment in Chicago, and Editor-in-Chief of the top journal in the field, Integrative Cancer Therapies. He is the author of the wonderful book Life Over Cancer and has a great website www.lifeovercancer.com. I am glad to see such an influential person reading the same science and bringing it to the aid of cancer patients. I dose “Shiquan” at 12 pellets twice daily. Dr. Block also will sometimes supplement melatonin, L-carnitine, rhodiola, L-theanine, R+ alpha lipoic acid (small doses) and DHA omega 3 oil with various chemo scenarios.

Reishi or other mushroom hot water extracts reduce harm, preserve immune function, increase efficacy. LDN too.

Ginger root - strongly stimulates GM-CSF to maintain immune competence.

Melatonin is proven in RCTs and meta-analyses to improve remission rates, 1 year survival and tolerability.

Vitamin B-12 as methylcobalamin prevents nerve injury and anemia. Blood tests for B-12 are pointless in chemo as the chemo drugs oxidize and ruin the vitamin, but the test doesn’t discriminate active from ruined B-12. B-12 may stimulate cancer growth, but that is not necessarily a negative during chemo, where more active cells are more likely to take up the drugs and die off. A net benefit versus risk is clearly there for regimens which include neurotoxic drugs such as cyclophosphamide, the taxanes, and the platinums.

Fasting on water only for 48 hours pre-chemo and 24 hours post-chemo improves tumour shrinkage and markedly reduces side-effects. This should only be undertaken with close supervision by a naturopathic physician, and with due regard to the vitality and weight of the patient. Generally any weight loss is rapidly recovered. For frail patients a fasting mimicking diet limits intake to 1,100 calories the first day, then 725 calories for 4 more days. A somewhat similar effect can be attained with prescription of Metformin.

Prilosec proton-pump inhibitor/antacid 3 days pre-chemo will drop IGF-1 up to 50%.

Fish oil with omega 3 DHA- is a chemo-sensitizer, improving chemo outcomes by regulating cytokines, immune cell signaling molecules. Use cautiously with blood thinning medications. There has been a rat study purporting to show cisplatin chemo is less effective if fish oil is given. Whether this applies to any other drug, even within the platinum family, is unknown, nor do we know if this effect extends to humans. There’s so much scientific evidence for the utility of fish oil in human beings undergoing chemo. I really doubt it is a valid concern.

Ashwagandha - 1 to 2 capsules 2 to 3 times daily. This adaptogen or stress-modulator reduces adrenaline to increase the number of cancer cells throwing the off-switch (apoptosis). It is also an immune-modulator, protecting the immune system from collapse during steroid use and chemotherapy. Ashwagandha can raise DHEA, so it is not good long-term in hormone-dependent cancers. In such cases consider the related adaptogens rhodiola Rhodiola rosea or Siberian ginseng Eleutherococcus senticosus.

Vitamin A –retinol supports cell regulation. Use only under direction of a physician. Doses over 3,000 IU daily may neutralize vitamin D effects at the X-R-X retinoid nuclear receptor. Use big doses short-term.

Hyperthermia can amplify chemo efficacy when used concurrently. This is not just a sauna or peat bath temperature, it is almost brutally hot. Beware bait-and-switch fraud! Really high temperatures require physician management, and professional after-care for proteolytic muscle and related tissue breakdown.

A complete program of integrative naturopathic supports must be specifically matched up to all the drugs prescribed by your medical oncologist and integrative medicine team, and your current medical condition!

Should you have side-effects or problems during chemo, which are not being taken care of by the usual drugs, please ask me or my colleagues for further help. We have some terrific tools to care for common toxicities. For
example, to protect the lining of the mouth and entire gut Fare You or Gastrazyme “vitamin U” cabbage extract tablets up to 3 times daily. Green cabbage and mung bean sprout juice protects the GI tract and improves appetite. For appetite, fatigue and immune function we use royal jelly with Reishi mushroom extract Ganoderma lucidum, and other herbs - 1 vial 1 to 2 times daily. Many gastrointestinal upsets can be prevented or quickly relieved with the TCM formula “Eight Pearls Decoction” also called Ba Zhen Tang, and similar results are seen with Bu Zhong Yi Qi Wan. Ginger root is great for nausea - 2 capsules as needed. I may prescribe Xiao Chai Hu Tang to bring blood and yin to your center, for nausea and gut reaction to stress. Homeopathic Rx’s also work well, for example Arsenicum album, Tabacum, Colubrina, or Cuprum metallicum.

Psychology is very important. You can rehearse mentally, like an astronaut would, or an Olympic athlete. The more you believe this is the right choice, and that it will go well, the less likely you are to have problems during the therapy. Release any negative attitudes and expectations! Go for your choices with faith and with gusto.

Good foods to try during rough chemo days:
- Cream of rice (congee) or oatmeal porridge.
- Broth made from marrow bones, or stock made into a pureed soup.
- Poached or soft-boiled eggs.
- Milk or yoghurt from goats, rice, soy, almonds or oats. These can also be used as a base for smoothies blended with whey or rice protein powder and a greens product such as wheatgrass, barley green, chlorella, spirulina or blue-green algae, and fruit of your choice.
- Apple sauce, mashed banana, or dried fruit soaked and poached.
- Fresh fruit and freshly made fruit juices.
- Fresh vegetable juices of carrot, cabbage, kale, spinach, celery, beet roots and tops, parsley, chard, cilantro, watercress, Chinese mung bean sprouts.
- Poached fish.

AVOID DURING CHEMOTHERAPY

A naturopathic physician in oncology or trained integrative physician can put together a concise plan to support a good response with less side-effects. The following information is one resource in selecting a natural health product protocol to safely interact with complex multi-drug chemotherapy, in a patient likely to be on several additional medications. If you experience side-effects despite these precautions, and the good care you will receive at the BC Cancer Agency and our hospitals, then please ask our clinic to assist. We have some very good options for care of mouth sores, nerve damage, nausea, pain, and many other conditions.

Oncologists were justifiably worried about the possibility that antioxidant supplementation during chemotherapy might prevent free radical formation by the oxidative chemo drugs. This would lower the number of cancer cells being damaged enough that apoptosis or programmed cell death of the cancer would switch on. Antioxidants should interfere with chemo, because we are trying to oxidize the cancer to death. However, clinically it is clear that antioxidants actually increase the ability of the chemo drugs to kill cancer cells. As it turns out, uncontrolled reactive oxygen species formed in chemotherapy lead the formation of toxic aldehydes which arrest the cancer cell’s movement through its cell cycle into the stage where apoptosis can begin. The usual net result of giving antioxidants with chemo is more cancer cells move into a death cycle than with unsupported chemo drug alone. This is called the Conklin Hypothesis. Antioxidants take you two steps forward and one step back – so the end result is still one step forward. Natural source products with a mixture of carotenoids, ascorbates, tocopherols, polyphenols and proanthocyanidins are ideal. Selenium is fine up to 200 mcg, beyond that it may increase chemo-resistance. For megadose therapy consult an orthomolecular physician.

Avoid: Several foods and natural herbs in common use can interact poorly with chemotherapy drugs, by inducing liver enzymes which clear the drugs. This can increase toxicity or result in therapeutic failure. There is no confirmed data, but some things to consider avoiding during chemo: St. John’s Wort, grapefruit, garlic, rosemary, alcohol, tobacco, and yohimbe.
Curcumin, selenium and milk thistle may be used during chemo only on the direction of an experienced integrative physician. These products can do a lot of good, but may alter drug metabolism and by the liver if directly mixed.

We are particularly concerned to avoid mixing natural supplements which use the same liver detoxification pathways as the synthetic drugs. These are usually cytochrome P-450s such as Cyp3A4, Cyp1A2, Cyp2D6, Cyp2Ea, or glucuronosyltransferases UGT1A1.

We also are concerned about interactions with transport proteins such as P-glycoprotein Pgp, a pump which bails toxins out of cells to protect them. Many cancer cells are able to up-regulate this pump during severe chemical stress, such as cytotoxic chemotherapy.

For example, quercitin, grapeseed extract and kava kava induce Cyp3A4 expression in human hepatocytes (liver cells), which metabolizes chemo drugs such as cyclophosphamide, irinotecan, etoposide, vincristine and paclitaxel. This potentially reduces their effectiveness, by increasing the speed at which they are cleared from the bloodstream. However, quercitin makes drugs like Tamoxifen more bio-available and will also help keep chemo drugs inside the cancer cells, increasing efficacy. This is due to quercitin’s modulation of p-glycoprotein - more drug is trapped inside the cancer cell, making the chemo more effective. It is a case of two steps forward, one step back – you are still one step ahead. The therapy is more effective while less toxic – perhaps we are two steps ahead after all. Therefore one must look at the overall action and determine if the net effect is positive or negative. This requires the counsel of a scientific professional who reads the totality of evidence available and makes a balanced decision.

Several foods and natural herbs in common use can interact poorly with chemotherapy drugs, by inducing liver enzymes which clear the drugs. This can make the drug too weak and result in therapeutic failure, or make the drug too strong and increase toxicity. A few natural products which do not ever seem to combine well with anything - chemo, most other drugs, most botanicals and nutriceuticals. Definitely avoid St. John’s Wort and grapefruit during any chemotherapy, and consider restricting use of garlic, rosemary, alcohol, tobacco, and yohimbe.

Be very cautious mixing chemo drugs with supplemental glutathione or products which increase it such as HMS 90 whey or N-acetyl cysteine. Curcumin and green tea act on Cyp3A4, and also up-regulate Nrf2, which may interfere with drug metabolism. Nrf2 regulates responses to environmental stress. Curcumin, selenium and milk thistle may be used during chemo only on the direction of an experienced integrative physician. These products can do a lot of good, but may alter drug metabolism by the liver if directly mixed with the wrong drug. These can ruin the therapy, or make it more harmful, so get experienced and knowledgeable help.

Be very cautious with beta carotene, vitamin E and vitamin A in chemo. Use only as directed by a physician.

A high sugar /glycemic load diet can elevate insulin-like growth factor IGF-1, which is anti-apoptotic and blunts chemo efficacy. Safe sugar substitutes are discussed in the section on naturopathic diet for cancer. Nutrasweet or Aspartame promotes drug resistance through phenylalanine derivatives. The amino acid tyrosine does the same.

**SPECIFIC SUPPORTS FOR SPECIFIC CHEMO DRUGS**

Prescribe supports for the entire course of chemo, starting from the first day and continuing for 3 to 4 weeks after the last dose. Some common supports are described in Chapter Two.

**ABIRATERONE**

This anti-androgen blocks adrenal testosterone output, may cause potassium and blood pressure issues.
ANASTRAZOLE (and LETROZOLE)

Aromatase inhibitors are synergistic with natural aromatase inhibitors quercitin, grapeseed extract, and white button mushrooms *Agaricus bisporus*, as well as the hormone modulators indole-3-carbinol and melatonin. Manage risk of bone loss with *AlkaCare* alkalizing salts, vitamin D3 with vitamin K2, vitamin C, and strontium citrate. Manage joint pains with exercise, omega 3 marine oils, topical emu oil, curcumin, serrapeptidase.

AVASTIN (BEVACIZUMAB)

Avastin is a monoclonal antibody which inhibits VEGF. Avastin interferes with blood vessel construction as part of normal wound healing. Avastin increases risk of clots, including heart attacks and strokes. Be aware the drug may also provoke bleeds of the gums, nose or female reproductive tract, hypertension, intestinal perforation and glomerulopathic proteinuria. There is about an 0.8% increased mortality in those treated with Avastin compared to chemotherapy. 2.5% of patients may be at risk of a fatal event. Do not combine with red clover, such as the Hoxsey herbal formula. Give beta glucans, such as Agaricus, Reishi or AHCC. IVC may help. Protect against gut bacteria translocation to liver/blood with probiotics, psyllium, omega 3 oils, plant-based diet.

BICLUTAMIDE (CASODEX) & ENZALUTAMIDE (XTANDI)

Biclutamide can be enhanced with ginseng, gamma oryzanol, sage and motherwort. Enzalutamide can trigger seizures, so do not mix with acetyl-L-carnitine.

BLEOMYCIN

Bleomycin is very toxic to highly oxygenated cells due to production of superoxide free radicals. It can cause serious lung damage in some patients (about 1 in 5), and the lungs remain very sensitive for years, such as to oxygen administration during surgery or for other medical conditions. It is less toxic and more effective in patients given supplemental vitamins A, C and E; selenium, taurine, squalene and green tea. It is synergistic with quercitin against human leukemia.

BORTEZOMIB (VELCADE)

Bortezomib is less effective if mixed with quercitin, green tea extract. Vitamin C and flavonoids or polyphenols in green leafy vegetables, green tea, and fruits (pomegranate, star fruit and grapefruit), have antagonistic effects, on drug efficacy, sparing multiple myeloma cells in bone and leukemic cells in the blood. Velcade is positively synergistic with curcumin, L-carnitine and modified citrus pectin.

CAMPTOTHECIN

Camptothecin is a topoisomerase enzyme inhibiting alkaloid from the Chinese “Happy Tree” *Camptotheca acuminate*. Topoisomerase helps cancer cells double by relaxing the DNA spiral, opening it up for copying. All topoisomerase poisons increase risk of later developing a secondary leukemia, because they promote chimeric fusion of non-homologous DNA strands in hematopoietic progenitor stem cells, the bone marrow stem cells which give rise to blood cells. Quercitin improves absorption of camptothecin by cancer cells. Bu Zhong Yi Qi Wan or Ba Zhen Tang herbal formulas reduce gastro-intestinal side-effects. Never mix Camptothecin with curcumin.

CARMUSTINE (BCNU)

Carmustine is a nitroso-urea compound 1,3-bis(2-chloro-ethyl)-1-nitrosourea - thus the alternate name BCNU. Beta-glucans from maitake mushroom increase efficacy against prostate cancer by inhibiting a glutathione dependent detoxifying enzyme glycoalase I (Gly-1). Synergistic with berberine as found in golden seal, barberry, coptis and other herbs.
CASODEX (BICLUTAMIDE)

Bicalutamide can be enhanced with ginseng, gamma oryzanol, sage and motherwort.

CISPLATIN, CARBOPLATIN, OXALIPLATIN

Platinum complexes cross-link DNA, and deamidate the Bcl-xL gene, which inactivates a switch that could trigger apoptosis. Monitor serum electrolytes sodium, calcium, potassium and magnesium. Giving magnesium reduces neuropathy.

Improve effectiveness with quercitin- net gain is up to 30% more apoptosis. Colleagues also suggest coenzyme Q-10, genistein, selenium, mistletoe, coriolus PSK, shiitake lentinan, resveratrol, vitamins A, niacin or a B-complex, C, and E. Platinum drugs are an exception to the rule against curcumin, as it definitely enhances their efficacy. Zinc is synergistic with all platinums. reduces chemo resistance, inhibits microtubules.

Milk thistle, curcumin and selenomethionine can blunt tumour resistance to cisplatin and carboplatin, increasing efficacy. Milk thistle is also a great liver protectant. Theanine increases drug concentration in a tumour through inhibition of the glutamate transporter via the GS-X pump. Omega 3 fish oil may prevent kidney damage and increase efficacy, but this has become controversial due to a rat study showing reduced Cisplatin efficacy. Whether this applies to humans, or to other platinum drugs is unknown.

Platinum compounds can cause severe nerve damage, hearing loss, severe kidney toxicity, nausea, vomiting, and bone marrow suppression. Reduce toxicity with astragalus (kidney protectant), L-glutamine (nerve & GI protectant), quercitin, melatonin, and vitamin C. Low vitamin E status correlates with severe peripheral nerve damage from cisplatin, so Rx 600+ mg mixed tocopherols daily, plus acetyl-L-carnitine to prevent Cisplatin ototoxicity. Sublingual or shots of vitamin B-12 as methylcobalamine are required to prevent nerve injury, and to maintain blood counts.. Selenium at 200 mcg daily reduces bone marrow suppression, kidney toxicity, and development of drug resistance. Ba Zhen Tang - Eight Pearls Decoction - reduces gastro-intestinal GI side-effects, as does Bu Zhong Yi Qi Wan formula. Some of my colleagues use Jian Pi Yi Qi Li Shui D decoction, all-trans retinoic acid ATRA, or Polygera spleen extract. The platinums reduce tissue stores of magnesium and vitamin D, so it is essential to replace these, but only moderate amounts as it interacts with Cyp3A4. Omega 3 fish oil may prevent kidney damage and increase efficacy, but this has become controversial due to a rat study showing reduced Cisplatin efficacy. Whether this applies to humans, or to other platinum drugs is unknown.

Venlafaxine (Effexor) at 50 mg 1 hour before infusion, or 37.5 mg extended release twice daily, prevents and heals neuropathy. So does weekly methyl-cobalamin vitamin B-12 and thiamine B1 shots. Cisplatin is a heat shock protein HSP-90 inhibitor, inducing cell cycle arrest independent of p53. It can be a significant radiosensitizer, given about 6 hours pre-radiation. Oxaliplatin is more effective when combined with thymoquinone from black seed Nigella sativa. Protect against gut bacteria translocation to liver/blood with psyllium, omega 3 oils and a plant-based diet. Probiotics are very helpful, but we stop giving them if the neutrophil count drops to 1.5 or less. Carboplatin is less toxic to the kidneys, but more mutagenic and damaging to the bone marrow and blood cell counts than cisplatin. Carboplatin produces electrolyte (blood minerals) imbalances, nausea and vomiting, abnormal liver function, nerve damage, and muscle pain. Consider extra glutamine and milk thistle with carboplatin, and cytokine modulators such as astragalus and ganoderma. DCA is good with carboplatin.

Do not casually mix platinum drugs with Dichloroacetate (DCA), N-acetyl cysteine (NAC), glutathione (GSH), alpha lipoic acid (ALA), Ginkgo biloba, squalene, or high dose vitamin B6. Do so as directed by a naturopathic physician trained and skilled in integrative oncology. Italian MDs use intravenous glutathione IV-GSH with cisplatin and cyclophosphamide chemo in ovarian cancer cases.

CRIZOTINIB

A new therapy for lung cancers expressing an ALK-EML4 translocation.
CYCLOPHOSPHAMIDE (CYTOXAN)

CP or Cytoxan is a mustard agent related to mustard gas used in World War I, but now banned as a weapon – except against cancer. Cyclophosphamide may cause nausea, baldness, bleeding in the urinary bladder, bone marrow damage, reduced natural killer cell activity, and increased risk of metastatic spread of cancer.

Increase effectiveness with vitamin A, beta carotene, vitamin C, vitamin E, coenzyme Q-10, folic acid and B-complex vitamins, quercitin, omega 3 oils and aloe vera juice.

Reduce toxicity with ashwagandha, melatonin Co-enzyme Q10, omega 3 oils, grapeseed extract, magnesium, selenium, Polygera spleen extract and lots of water. Always use a mushroom extract such as reishi, cordyceps, coriolus PSK, or AHCC. Red ginseng ginsenoside Rg3 reduces hemolysin, protecting the red blood cells. The TCM formula Bu Zhong Yi Qi Wan reduces toxicity and improves effectiveness. The TCM formula Yi Kang Lin is synergistic.

N-acetyl cysteine and glutathione may reduce both toxicity and effectiveness. Italian doctors are giving intravenous glutathione with cisplatin and cyclophosphamide in ovarian cancer, but I am not yet satisfied this is a bright idea. Curcumin must not be used. By reducing reactive oxygen species ROS and JNK inhibition, it may reduce death of the cancer cells by apoptosis. Do not give dichloroacetate DCA concurrently.

CYCLOSPORIN

Cyclosporin is a powerful immune suppressor, to prevent rejection of transplanted tissue, including bone marrow transplants. Grapefruit juice increases its toxicity. Do not use immune enhancing herbs or mushrooms, or plant sterols.

CYTARABINE

Cytosine arabinoside or Ara-C is an anti-metabolite derived from sea sponges. It is likely to provoke mouth sores. Curcumin increases efficacy by modulation of heat shock proteins, via HDAC6.

DEXAMETHASONE

The potent gluco-corticoid steroid Dexamethasone is widely used to reduce peri-tumoural edema in cancers in the brain. It can produce psychosis, agitation, insomnia and other manic symptoms. These issues may respond to the anti-psychotic drug Seroquel, or the sedative and hypnotic sleep drug Clonazepam. As people taper slowly off of Dex, we support their adrenal gland recovery. Cortisol may be moderated with niacinamide, B-complex, Vit. C, rhodiola, tryptophan, licorice root, or formulas such as ITT brand Cortisol Manager, and Zhi Bai Di Huang Wan.

DOXORUBICIN (ADRIAMYCIN)

Originally called Adriamycin because it was extracted from a unique fungus found only in a ruined stone tower overlooking the Adriatic Sea. Doxorubicin is an anthracine antibiotic which intercalates DNA (binds inside the spiral strands), inhibiting DNA and RNA synthesis, and can cause chromosome breaks.

Doxorubicin is a pro-oxidant, and is particularly toxic to cells low in oxygen. It is highly toxic to the muscle of the heart at total lifetime exposures of 500 mg/m2. Cardiomyocyte apoptosis is induced by endocannabinoid ananamide, preventable by CB-1 receptor inhibitors. Grapeseed extract OPCs can completely eliminate myocardial oxidative stress.

It causes myelosuppression – grossly inhibits bone marrow cells and therefore blood cell counts, especially white immune cells, ie leucopenia. It can provoke post-treatment acute myelocytic leukemia (AML), alopecia (hair loss), nausea, vomiting, and extravasation (leaking of fluid out of the blood vessels).
Improve effectiveness with vitamin A, vitamin C, grapeseed extract OPCs, vitamin E, DHA, milk thistle, mistletoe. Soy genistien reduces DNA binding with nuclear factor NFκB. Green tea theanine 50 – 200 mg daily, and quercitin 500 – 100 mg 2 to 3 times daily, help the drug accumulate in cancer cells, via the p-glycoprotein drug porter system, while sparing the heart and other healthy tissues. Curcumin also interacts with the p-glycoprotein system, but is not good with all chemo drugs.

Reduce toxicity with garlic, selenium, melatonin, grapeseed proanthocyanidins, omega 3 oils, squalene, coriolus PSP, green tea EGCG polyphenols and catechin. Berberine reduces cardiomyopathy. Adriamycin depletes the tissues of vitamins A, beta carotene, B2, B6, C, E and zinc, and supplementing with these will improve safety and efficacy. Anti-oxidants in virgin olive oil also seem to help. Vitamin B6 as pyridoxal-5-phosphate, reduces hand-foot syndrome (PPED). Pretreatment with vitamin E reduces hair loss while improving efficacy.

The most critical supports are vitamin E and Co-enzyme Q-10 to protect the heart muscle from damage, which can enlarge the heart and lead to congestive heart failure. The heart can be further supported by taurine, carnitine, Crataegus oxyacantha, Convallaria majus and Rhodiola rosea.

Do not mix with N-acetyl cysteine or glutathione antioxidants as they can increase drug resistance. Do not mix with fewfewer herb parthenolides or glucosamine.

HER-2 positive breast cancer may respond to anthracycline chemo drugs including Doxorubicin, Epirubicin, Adriamycin, Daunorubicin, Idarubicin and Mitoxantrone. However, HER-2 negative cases do not respond to anthracyclines, and they no longer represent the standard of care for these patients.

**EPIRUBICIN**

Epirubicin is less toxic to humans given melatonin supplementation. See Doxorubicin entry above.

**ERBITUX (CETUXIMAB)**

Erbitux inhibits the epidermal growth factor receptor EGFR. It is a monoclonal antibody from a human/mouse chimera. It is used primarily for head/neck cancers, lung cancers which over-express EGFR, due to an EGFR tyrosine kinase mutation, and metastatic colorectal cancers. It is not useful in advanced colorectal cancer if the patient has a κ-ras mutation at codon 12 or 13. Diarrhea may induce magnesium and potassium deficits. IV-C is OK, but not high dose oral vit. C. Beta-glucans may improve efficacy. Artemesinin is compatible.

Dermatitis is expected, and can be treated with 1% hydrocortisone cream, doxycycline 100 mg bid, and skin moisturizers. I recommend colloidal oatmeal products such Aveeno lotion and bath products. Ground oatmeal can be added to green tea extract cream with 4% niacinamide and 0.1% vit. K3. Sea buckthorn oil internally and topically can help. Consider homeopathic Silicea or Calc phos.

**ETOPOSIDE**

Podophyllum or mandrake root was the original source of this compound. Etoposide chemo is enhanced with quercitin, melatonin, vitamin A, and beta-carotene.

Avoid St. John’s Wort which increases toxicity. Avoid glucosamine sulphate, glucosamine HCl and N-acetyl-glucosamine, which reduce effectiveness of topoisomerase II inhibitors.

**EVEROLIMUS**

mTOR inhibitors like Everolimus and Temsirolimus are more effective combined with fatty acid synthase inhibitors such as green tea EGCG polyphenols, and by curcumin via YAP protein induction of p53.
5-FLUOROURACIL / 5-FU

5-Fluorouracil is a pyrimidine “anti-vitamin” or anti-metabolite agent which interferes with the metabolism of a nutrient needed to make DNA. Leucovorin, which is commonly administered as part of 5-FU-containing protocols is a form of reduced folate, and increases the affinity of 5-FU for its target enzyme, thymidylate synthase. 5-FU causes loss of appetite, nausea, mouth sores, diarrhea, baldness, kidney failure, loss of white blood cells of the immune system, rashes, skin darkening or increased tendency to burn in the sun.

Improve effectiveness with quercitin, melatonin, aloe vera, shiitake lentinan and vitamins A, vitamin C, vitamin E. Many FABNO’s recommend IV-C with FOLFOX and related chemo regimens to reduce harm. Reduce toxicity with L-glutamine, glutathione, chamomile mouthwash, coenzyme Q10, and vitamin B6.

Caution: do not mix with high doses of carotenoids, including beta carotene, lutein, and lycopene. Drinking green tea during 5-FU chemotherapy increases blood levels of the drug, so it is not recommended. Keep B6 doses under 400 mg, probably 200 mg is best. Folate supplementation can cause serious, even fatal reactions!

GEMCITABINE & CAPECITABINE

Gemcitabine is closely related to 5-FU. Gemcitabine inhibits manufacture of DNA. It also down-regulates CYP 2C9. This is one of the most effective and relatively least toxic chemotherapy drugs, and we can easily help it do even more, with less harm. Many patients just breeze through chemo with this drug. However, a small percentage of persons will have a genetic variation which causes them to metabolize this pro-drug into a very noxious chemical, and they may find it intolerable. A deficiency of cytidine deaminase (CDA) is a good predictor of early severe toxicities. They may get myelosuppression, and rarely a fatal hemolytic-uremic syndrome. Capecitabine can provoke cardiac ischemia.

Reduce tumour resistance with NFkB inhibitors such as Reishi, quercitin, GLA oils, B-complex vitamins, melatonin, alkylglycerols, astragalus gotu kola, black seed Nigella sativa, Ginkgo biloba extract. Green tea EGCG may improve efficacy while reducing GI toxicity of Capecitabine, but there are contrary arguments to this claim. Protect against gut bacteria translocation to liver/blood with probiotics, psyllium, omega 3 oils and a plant-based diet. Paw paw may be synergistic.

With Xeloda, aka Capecitabine some of my colleagues will prescribe 300 mg 2 – 3 times daily of vitamin B6 to prevent hand-foot syndrome, but some negative studies have been published regarding this approach. 200 mg seems safe, but 400 mg daily may reduce efficacy. Mapisal cream – 10% urea plus oils and antioxidants – reduces risk of hand-foot syndrome by about half. Curcumin oral and IV is said to increase efficacy of this family of 5-FU drugs, but may trigger hand-foot syndrome.

Do not mix with estradiol, soy or legume coumarins. Do not give folate supplements!.

GOSELRIN (ZOLADEX)

Zoladex is a hormone suppressant, which can be improved with ginseng, cleavers herb and gamma oryzanol.

HERCEPTIN

Herceptin targets the growth factor amplified in patients expressing the HER2/neu gene. It also can damage the heart quite severely in some cases. For heart damage take hawthorne berry Crataegus oxycantha, Lily-of-the-Valley Convallaria majus, and Cactus grandiflora, vitamin E and coenzyme Q10 to prevent or correct heart damage. I often add the homeopathic remedy Naja tripudans 6C. I am proud to say this has rapidly restored heart function in patients who otherwise would never have qualified for this therapy, due to weakening of their heat from previous chemo with drugs like Doxorubicin, or due to other causes. This approach has definitely allowed many patients to recover, and continue on in therapy, after cardiac damage forced a halt to the Herceptin therapy. It has consistently restored heart health following Herceptin therapy.
Improve efficacy with **quercitin** and **Aloe vera**. Emodin from **Aloe vera**, and quercitin, reduce HER2/neu gene expression, the root of the problem. Also support this therapy with olive oil (oleic acid), tea **EGCG** (FASN inhibitor), **Polygonum** herb, and **Reishi** mushroom extracts **Ganoderma lucidum**. **Evening primrose oil** or black currant oil gamma-linolenic acid GLA inhibits mutant HER2/neu protein, increasing Herceptin response 30 to 40-fold in these cases. It is important to control insulin-like growth factor IGF-1, which strongly interacts with the HER2/neu receptor, and Herceptin therapy. This means close adherence to the low-glycemic load diet.

**HYDROXYUREA**

Hydroxyurea or hydroxycarbamide is a common chemotherapy, which induces apoptosis by inhibition of ribonucleotide reductase enzyme. It is used in chronic myelogenous leukemia CML, polycythemia vera, and meningiomas. It is relatively benign, and is often taken for long periods of time. Prevent liver and kidney and bone marrow toxicity with Shih Chuan Da Bu Wan or Astragalus Combination, coenzyme Q-10, and milk thistle.

**IFOSFAMIDE**

Encephalopathy risk is reduced by **quercitin**, and is treated with IV **thiamine**. **Milk thistle** and **L-carnitine** reduce kidney damage. L-carnitine also protects the heart from injury. L-glutamine protects the gut. Astragalus may mildly inhibit this drug.

**IPILIMUMAB**

Immune checkpoint inhibitors such as the anti-CTLA4 antibody Ipilimumab (Yervoy) and programmed death ligand (PD-1) inhibitors stop immunosuppression and allow cytotoxic lymphocytes to attack cancer cells. Give mistletoe lectins, omega 3 oils, vit. D3 and curcumin to modulate risk of life-threatening auto-immune reactions.

**IRESSA (GEFITINIB)**

Iressa is an EGFR tyrosine kinase inhibitor. See Tarceva and Erbitux for advice on skin care, and how to increase benefit.

**IRINOTECAN**

Irinotecan is a semi-synthetic compound - a natural compound altered by a chemist - from the Chinese “Happy Tree”. Improve drug retention in the cancer cells by about 30% with **quercitin**. Theanine increases drug concentration in a tumour through inhibition of the glutamate transporter via the GS-X pump. Improve effectiveness with melatonin, milk thistle extract, curcumin, soy genestein and selenium. Treat diarrhea triggered by gut irritation from its metabolite with 2-4 charcoal capsules twice daily.

**ITRACONAZOLE**

This very liver-toxic anti-fungal is mainly used in stem cell transplant cases. It can also damage the heart. Milk thistle can reduce these risks. Do not eat grapefruit or drink grapefruit juice, it reduces efficacy.

**LETRAZOLE (FEMARA)**

Letrozole or Femara is an aromatase inhibitor capable of reducing estrogen and estrone twice as much as Anastrozole. When Letrozole fails, about 15% of cases can be rescued by the related drug Exemastane or Aromasin.

The most striking risk is thinning of the bones. Support bone health with strontium citrate, vitamin D3, vitamin K2 and exercise. Manage joint pains with excersise, omega 3 marine oils, topical emu oil, melatonin, curcumin. Support with natural AI’s quercitin, grapeseed extract, indole-3-carbinol/DIM and white button mushrooms. Also supported by Bcl-2 inhibitors such as curcumin and green tea extract.
MEGACE
Megestrol acetate or progesterone, is an estrogen receptor disruptor. Megace therapy can be enhanced with licorice root, sage, red clover, vitamins B6 and B12, and gamma oryzanol.

MELPHALEN
Avoid combining melphalen with glutamine, leucine, tyrosine or methionine supplements, as these will reduce uptake into the bloodstream, and therefore decrease efficacy. Melphalen can produce a very prolonged haematological toxicity, particularly in elderly patients. Be proactive with astragalus formulas and alkylglycerols.

MERCAPTOPURINE
Avoid mixing with xanthine oxidase inhibitors, which block purine metabolism. This includes some anti-gout drugs, quercitin, myricetin, kaempferol, cinnamon and propolis.

METHOTREXATE (MTX)
Methotrexate is an antimetabolite or anti-vitamin agent which blocks use of the B-vitamin folic acid, necessary for DNA nucleic acid and protein manufacture. It is sometimes given in a fatal dose followed by ‘leucovorin rescue’ which is calcium folinic acid. 1 in 100 patients used to die from this procedure.

MTX is toxic to the kidneys and liver. It causes nausea, vomiting, diarrhea, mouth sores, inflamed skin, blurred vision, dizziness, and loss of adequate white blood immune cells. For safety, counteract the intense production of reactive oxygen species with vitamin A, vitamin E and selenium. Improve effectiveness with milk thistle extract, licorice root and polygonum. L-glutamine increases uptake of MTX into tumours.

Do not combine with glutathione, tangeretin, or high doses of folic acid or oral vitamin C. Avoid mixing with echinacea, black cohosh root or salicylate-rich herbs such as bilberry, willow and wintergreen.

MITOMYCIN
Mitomycin is synergistic with Yi Kang Ling formula, melatonin and marine omega 3 fish or seal oil. Do not mix with beta carotene, as it reduces efficacy.

PANITUMUMAB
An inhibitor of EGFR. See Tarceva and Cetuximab.

PAZOPANIB (VOTRIENT)
Pazopanib is a dual inhibitor of EGFR and PDGFR, and an inhibitor of angiogenesis. Used in renal cell carcinoma. Watch for bleeding issues. Avoid mixing with gastric acids suppressants eg PPIs..

PREMETREXED
Oral form of Methotrexate. Premetrexed is less toxic if homocysteine levels are reduced, so give vitamin B-12 and folic acid. Vitamin B-6 reduces neutropenia.

REVLIMID (LENALIDOMIDE)
Revlimid is new analogue of thalidomide. It can cause clots such as pulmonary embolism (PE) and deep vein thrombosis (DVT), thrombocytopenia and neutropenia. Support bone marrow with astagalus, shark liver oil alkylglycerols. B-12 vitamin shots can help reduce risk of neuropathy.
**RITUXIMAB**

Rituxan is a chimeric monoclonal human antibody against CD-20 protein found on B-lymphocytes. Efficacy is enhanced by quercitin, via STAT3 inhibition, with reduced growth, increased apoptosis and down-regulation of survival genes.

**SANDOSTATIN**

Sandostatin or octreotide inhibits several kinase growth factors, but will irritate the gallbladder, so give bile salts, digestive enzymes and the TCM formula Lidan. Induces hypoglycemia, so prescribe a high protein, low fat diet with low glycemic carbs.

**SORAFENIB (NEXAVAR)**

Sorafenib inhibits several tyrosine protein kinases, including platelet-derived growth factor PDGF, vascular endothelial growth factor receptor VEGFR kinases 2 and 3, the stem cell factor receptor cKit, and Raf kinase – which links to the MAP Kinase via the Raf/Mek/Erk growth signaling pathway. It is currently approved for renal cell and hepatocellular carcinoma. Be aware of the significant risk of bleeding. Do not mix with any blood-thinners. Do not mix with Metformin. Jingli neixao can help the fatigue, diarrhea, nausea, anorexia, hypertension, and icterus. Support with curcumin and melatonin. See hand-foot syndrome under Gemcitabine & Capecitabine

**SUNITINIB (SUTENT)**

Sunitinib is a tyrosine kinase receptor inhibitor, capable of hitting multiple targets. It blocks signaling at all the platelet-derived growth factor receptors PDGFR and the vascular endothelial growth factor receptors VEGFR. By cutting off the blood supply and proliferation, it can shrink tumours. It is being used for hepatocellular carcinoma and gastro-intestinal stromal tumours. Be aware of the significant risk of bleeding. Do not mix with any blood-thinners. There is also a risk of myocardial ischemia and liver dysfunction. Green tea extract improves efficacy. Jingli neixao can help the fatigue, diarrhea, nausea, anorexia, taste changes, mouth sores, hypertension, fever and icterus. Fatigue can also be helped by Co-Q10, melatonin and astragalus. Arabinogalactans may help myelosuppression and neutropenia.

**TAMOXIFEN**

Tamoxifen is a non-steroidal anti-estrogen which binds to cytoplasmic beta estrogen receptors ERβ, and has other complex effects on hormones. It delivers about 50% reduction in the risk of a reoccurrence of breast cancer. It does not increase overall survival. Relpses after tamoxifen tend to be more lethal.

Tamoxifen can cause some serious side-effects, so integrative naturopathic support is definitely needed for safety. It can cause a 3% increased risk of blood clots, such as a deep vein thrombosis or pulmonary embolism. This risk is most pronounced for obese (high body mass index) persons. It increases risk of uterine cancer by about 1%. It also increases by about 1% the risk of retinal damage, rashes, leukorrhea, depression, liver damage and increased tumour pain. Be prepared for hot flashes and thinning hair. In the presence of bony metastases it can precipitate hypercalcemia (excess blood calcium).

Tamoxifen activity may be reduced by certain medications (eg, selective serotonin reuptake inhibitors [SSRIs]), which are potent inhibitors of the cytochrome P450 Cyp2D6 enzyme, which is involved in the activation of the drug. Effexor may be prescribed for the hot flashes. I think it wise to choose naturopathic options for mood such as 5-HTP. Acupuncture reduces hot flashes well, and the effect persists after treatment. Include acupoint LV-2. Some sources worry about combining low-dose Naltrexone and Tamoxifen, but I am unable to discern why. 

**Melatonin** is highly synergistic, reduces risks and reinforces hormone blockade. GLA oil (gamma linolenic acid) from borage or evening primrose oil at 2.8 grams daily improves effectiveness by reducing expression of estrogen
receptors. Quercitin improves effectiveness by increasing bioavailability. Vitamin E and selenium in moderate doses will improve effectiveness. Vitamin A is particularly useful, extending remission times and improving response rates.

The energy regulator Coenzyme Q-10 makes Tamoxifen more effective by increasing expression of tumour suppressor gene manganese super-oxide dismutase MnSOD. Coenzyme Q-10, vitamin B2 riboflavin and B3 as niacin or as niacinamide, reduce DNA methylation and induce DNA repair enzymes, boosting Tamoxifen efficacy. A one-a-day multivitamin is a good way to get the vitamin A, selenium, B-vitamins and vitamin E in the correct balance. It is important to control insulin-like growth factor IGF-1, which strongly interacts with estrogen receptors, and Tamoxifen therapy. This means close adherence to the low-glycemic diet.

**Indole-3-carbinol (I3C) or its analogue diindolylmethane (DIM) is complementary in estrogen receptor positive ER+ breast cancer cases as it suppresses estrogen receptor activity by a different signaling pathway, increasing the arrest of the cancer cell growth cycle.**

The use of soy foods with Tamoxifen has been a controversy, but recent evidence indicates a high degree of synergy. High soy food intake is associated with an additional 60% reduction in risk of breast cancer occurrence in women on Tamoxifen. High intake is over 40 mg of soy isoflavones daily. A better target is 60 to 80 mg. Do not use genestein supplements, only use food sources.

Do not combine Tamoxifen with high dose vitamin D (over 5,000 IU daily), flavonoids such as tangeritin or grapefruit, black cohosh root *Cimicifuga racemosa*, St. John’s wort *Hypericum perforiatum*, or red clover blossoms *Trifolium repens*, including Hoxsey herbal tonic. Smoking should be stopped, and alcohol minimized.

**TARCEVA (ERLOTINIB)**

Erlotinib commonly called Tarceva, is an EGFR inhibitor. This growth factor is also used by healthy skin, so this drug will typically cause skin disorders such as blistering and peeling. Note that skin blemishes are taken as a good sign that the epidermal growth factor is being disrupted. If there are no skin changes, the therapy is less likely to be successful against the cancer. Folks trade their complexion for living on. Use topical sea buckthorn, calendula and rosemary, and Aveeno colloidal oatmeal lotion, soap and bath soak. For red and peeling skin prescribe homeopathic *Lachesis* 200C twice weekly. See also *Erbitux* entry. It can also cause abnormal eyelash growth and dry eyes. In some cases it provokes ulceration and perforation of the cornea or of the digestive tract.

Cancer cell killing increases if combined with **indole-3-carbinol**, green tea and aglycone soy genestein. Beta-glucans may improve efficacy. Artemisinin is compatible. IV-C is OK, but not high dose oral vit. C.

Do not mix with bilberry extract, genestein, quercitin or curcumin

**TAXANES**

Taxol is from yew tree bark. Taxotere (Docetaxol) and Paclitaxel are synthetic taxanes. Taxanes can provoke anaphylactic shock reactions, so to avoid serious trouble you will be pre-treated with Benadryl and/or Decadron - an antihistamine and a steroid drug. Sensory nerve damage, muscle pain, joint pain, mouth sores, nausea, vomiting, loss of white blood immune cells, and heart toxicity can also occur.

**Methylated B-complex** vitamins improve effectiveness and prevent neuropathy. Improve efficacy further with vitamin C - 4 to 6 grams daily, vitamin E gamma tocopherol, and Iscador *mistletoe* injections. Highly synergistic with essential fatty acids such as GLA from *evening primrose oil*, and with Ashwagandha herb *Withania sonifera*. Strongly supported by vitamin D3 - improves efficacy while reducing toxicity. Soy genestein increases efficacy by reducing DNA binding with nuclear factor NFkB.
Taxanes cause joint and muscle pain by raising COX-2 enzymes which promote inflammation. Use natural COX-2 inhibitors such as omega 3 marine oils, boswellia and serrapeptidase enzymes. Curcumin may improve efficacy of Docetaxol. Some concern has been expressed about chemo-resistance via upregulation of chemo-protectant Nrf2 by curcumin, green tea, milk thistle, ashwagandha and Bacopa monniera. L-glutamine at 2 to 3 grams up to three times daily reduces risks of nerve damage and muscle pain. This can be further supported with acetyl-L-carnitine and vitamin B6 in the active pyridoxal-5-phosphate form. Pyridoxine B6 also treats skin eruptions on the hands and feet, called palmar-plantar PPE.

Do not mix with quercitin, resveratrol, berberine, N-aceetyl-cysteine, Black cohosh or St. John’s wort as they may reduce efficacy.

TEMOZOLAMIDE/TEMODAL

An alkylator, similar to cyclophosphamide, platinum and taxanes, but targets autophagy rather than apoptosis. Responses are linked to MGMT promoter methylation. Low platelets or thrombocytopenia is common. Support platelets as needed with Yunnan Bai Yao and alkylglycerols. Zinc sensitizes cancer cells to the drug. Quercitin improves efficacy. Compatible and synergistic with dichloroacetate DCA.

THALIDOMIDE

Thalidomide a potent inhibitor of blood vessel in-growth to tumours and it may also be useful for wasting syndrome. May cause nerve injury, such as numbness and pain in the limbs, which is treatable with vitamin B-12 shots, vitamin B6, benfotiamine and R-alpha lipoic acid. See also REVLIMID (Lenalidomide) entry.

VINCA ALKALOIDS

Vincristine and Vinblastin from periwinkle flower bind tubulin, and destroy mitotic spindles. The cancer cell cannot pull apart its chromosomes into two new cells. Microtubule inhibitors upregulate COX-2 enzymes, increasing inflammation. They can cause constipation, small bowel paralysis, baldness, mouth sores, inflamed skin and nerve toxicity such as foot drop, phantom sensations, and loss of tendon reflexes.

Prevent or treat nerve toxicity with vitamin B-12, L-glutamine, milk thistle extract, vitamins B6. Post-therapy use acetyl-L-carnitine, D-alpha lipoic acid, and methylcobalamin B-12 with thiamine B-1 for nerve recovery. Give COX-2 inhibitors to reduce side-effects such as joint and muscle pain, and to increase anti-tumour effects – for example omega 3 marine oils. Give stool softeners or laxatives.

Effectiveness is increased by vitamins A, C and E, as well as Cordyceps mushroom extracts. Quercitin overcomes resistance to Vincristine and Vinblastine therapy.

Vinorelbine (Navelbine) is a semi-synthetic vinca drug, enhanced by feverfew parthenolides and curcumin. However, curcumin may increase marrow toxicity, so watch for increased thrombocytopenia and neutropenia.

GRADING CHEMO TOXICITY

It is really unusual for anyone to die from chemotherapy now. You will be tested before each round of chemo to determine how your bone marrow is being affected, by counting and describing the red blood cell, white blood cells and platelets. You will also be tested to see how your vital organs, the liver and kidneys are tolerating the drugs. Your heart may sometimes be assessed, as well as your gastro-intestinal upsets will be graded. The most common grading is on a scale to four:

0 = normal range
1 = mild toxicity, continue drug at 100% of the prescribed dose
2 = moderate toxicity, reduce dose to 75% of Rx
3 = severe toxicity, reduce dose to 50% of Rx, or wait for improvement
4 = critical toxicity, may be fatal if unchecked, suspend therapy

78
Usually therapy is only reduced, slowed or suspended if more than one organ or cell type is affected. However, the most important are low platelet counts, creating risk of hemorrhage, and low white blood cells, particularly neutrophils, the first-responder immune cells necessary to survive and infection.

It is important to monitor serum albumin, a protein required to keep fluids in the vessels. It is a sign of severe oxidative stress to see a drop in albumin, bilirubin and uric acid. Untreated, it gives a poor prognosis.Prescribe antioxidants and undenatured whey protein supplements.

**Treating Common Chemo Toxicities with Naturopathic Medicine:**

The simple chemo supports you were prescribed will not always prevent reactions and damage from toxic chemotherapy drugs. Fortunately there are many more naturopathic interventions which can stabilize fitness for therapy, relieve side-effects and heal organ failure. If you have any concerns during your medical therapies which are not being addressed by your medical doctors and nurses, or you do not get relief from the drugs you have been prescribed, or side-effects, please ask your naturopathic physician for help. You may be pleasantly surprised to find there are many inexpensive, safe and very effective natural products for cancer care.

After chemo most patients will benefit from detoxification for health restoration. Our goal is real vitality, not just the elimination of overt disease.

**ANEMIA** - bone marrow damage takes 1 to 3 weeks to manifest after receiving a toxic dose of a chemo drug, but then may progress to complete failure to produce any of the blood cell types. If the marrow stops making red blood cells the patient becomes anemic. Lack of red cells means not enough hemoglobin to carry oxygen out to the tissues and carbon dioxide back to the lungs to be breathed out as waste. Anemia makes a person tired and listless. Your doctor may order blood transfusions if your hemoglobin falls below 80-90. **Make soup with marrow bones.** The most important single agent to prevent anemia and neuropathy is **Vitamin B-12**. B-12 can kick up bone marrow blood cell production overnight, and surprisingly, that may also include white blood cells and platelets. It may rapidly make a sick patient’s neutrophil counts adequate to proceed with chemo. Because chemo oxidizes the B-12 into an inert form, and the blood test cannot detect if the B-12 is in the active or the inactive form, testing for B-12 levels during chemotherapy is **not informative**. Urinary methyl-malonic acid MMA shows B-12 function. During chemo MMA can dropto virtually nil, showing the B-12 on the test was a mirage. B-12 in oral sublingual forms can be considered, but my clinical experience shows the injection is safe and often more effective. I like to give 2,000 mcg in a 2 mL IM shot at least once a month, or a week every chemo cycle. B-12 has been shown to be absolutely non-toxic, even at extreme doses. The methylcobalamin form is best for nerve repair, though it may methylate mercury, making it highly toxic. Choose the hydroxocobalamin form of B-12 if mercury is known to be elevated.

The most potent remedy for myelosuppression is **shark liver oil alkylglycerols.** Unfortunately it is a dirty oil, as sharks are top-level predators so bio-accumulate toxins and heavy metals. Use short term, as needed, to 1200 mg per day.

Use iron with caution, as it is very oxidizing, making ROS which damage DNA. It is best to check the status of iron reserves by measuring serum ferritin before giving iron. Let the reserves run down to a ferritin under 30..

Key TCM herbs to look for are astragalus and tang kuei, as in formulas such as in the brilliant **Shih Chuan Da Bu Wan** or Shiquan, dosed at 8 pellets three times a day. St. Francis Herb Farm **Deep Immune** combination ½ to 1 tsp tincture or 3 capsules twice daily, **Marrow Plus** from Health Concerns 3 - 4 capsules three times a day, **Protectival™ TCM** concentrate, 2 or more tablets 3 times daily **Millettia 9** from Seven Forests 6 tabs three times daily, **Panax ginseng** 500 to 1000 mg. twice daily. **AHCC** (active hexose correlated compound), a proprietary Japanese low molecular weight compound from fermented shiitake and other medicinal mushrooms grown in rice bran, which has been found to prevent many chemo side-effects and increase the effectiveness of methotrexate, 5-fluorouracil and cyclophosphamide at doses of 3 grams daily.
Resistance to the blood-building drug Erythropoietin therapy is reduced by co-administration of L-carnitine and vitamin A. Erythropoietin and its analogues can cause great harm in some patients, primarily thromboembolic events – in 17% of cases. They also fail to significantly reduce the need for blood transfusions.

**ANOSMIA** – Loss of smell leads to loss of taste, with degradation of quality of life, and appetite. Steroid hormones are used, and we may also use *Ginkgo biloba* extract, zinc citrate, and homeopathic *Zincum metallicum* or *Mercurius solubilis*. Heal the nerves with acetyl-L-carnitine 1,000 mg 3 times daily, R-alpha lipoic acid 300 mg 2 to 3 times daily, and 2,000 mcg methylcobalamin vitamin B-12 by intramuscular injection every week, or as needed. N-acetyl-cysteine 1,200 mg twice daily may help but must be used with caution in active cancers.

**APPETITE** - loss of appetite or anorexia is reliably helped by bitters, eg St. Francis Herb Farm brand *Canadian Bitters*, ½ tsp per meal. *Swedish Bitters* can also be used. Of course they taste quite bitter. Other remedies include ginger peppermint, thiamine, melatonin, Marinol, Megace, reishi mushroom extract, and royal jelly. Make small meals, and control odors. Your acupuncturist may needle ST-36, SP-6, CV-12, BL-20 and 21 for appetite. For loss of taste add Li -4. The TCM herb formula *Bu Zhong Yi Qi Wan* is recommended by myself, and by the prominent integrative medical oncologist Ketih Block. Other herbs include gentian, catnip, fennel, *Acorus calamus* and ginseng. Exercise helps. Zinc citrate helps, taken at mealtime. A local oncologist recommends a Guinness stout or a glass of dry sherry! Be aware that bromelain used in high doses as an anti-inflammatory can powerfully inhibit appetite.

**ATTITUDE** – Expectation plays a central role in the occurrence of side-effects. If the patient believes they can stay well, visualizes success, and positively affirms and embraces the therapy, they will likely do better than if they are fearful. However, it is not a trivial concern that chemo can cause great harm, even death. Anxiety is therefore normal, but high levels of depression, as measured by the Hospital Anxiety and Depression Scale (HADS) questionnaire, can predict pathological responses to chemotherapy. Such patients may display high emotional restraint and not appear severely depressed. This is a good reason to integrate mind-body medicine with orthodox protocols!

**CHEMO-BRAIN** – Many patients complain of “brain-fog”, a feeling of cognitive impairment, poor memory, poor concentration, and feeling “too tired to think straight”. In some cases there are severe mood changes, irritability and even frank psychosis. Chemo makes the cerebellum and cortex have to work harder on common tasks such as short term memory. Changes in the basal ganglia and frontal cortex are persistent for many years after chemo. Fortunately this responds brilliantly to **acetyl-L-carnitine**. Note that ordinary L-carnitine does not cross the blood-brain barrier nearly as well. Carnitine works best with grapeseed extract, which moderates the burst of free radicals of oxygen, and helps modulate the blood-brain barrier. Further support this with R-alpha lipoic acid, B-complex and omega 3 oils. My colleagues also suggest gotu kola, bacopa, gingko biloba, rosemary, phosphatidyl serine, PQQ, B-12 shots and Meyer’s IV cocktails. Exercise helps, and may include use of Wii balance games. NAC helps restore cognition post-anaesthesia. Remyelination uses cholesterol - stop statin drugs.

**CONSTIPATION** – “**Number 42**’s” are remarkable for relieving even the stubborn constipation from codeine and morphine painkillers. #42’s are an old naturopathic remedy made of a 2 to 1 mix of cape aloe root and wormwood. Magnesium oxide, hydroxide or citrate, enemas, colonic irrigation, taurine, vit. C, Hoxsey herbal tincture, aloe vera juice, and psyllium fiber are old-school remedies. Homeopathics may include Opium or Colubrina (aka *Nux vomica*). We always advise good hydration, and suggest fruit such as prunes, papayas and rhubarb. Grandma’s fruit spread:

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<tr>
<th>Item</th>
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<tr>
<td>Pitted dates</td>
<td>½ cup</td>
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<td>Prune nectar</td>
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<td>Figs</td>
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Simmer dates in prune nectar until very soft. Spoon into a blender, add figs, raisins and prunes. Blend until smooth. Keep refrigerated. Use as a spread on toast or crackers, or eat by the spoonful. It is high-glycemic, but we have to balance competing interests in making clinical decisions.
Another good formula is 2 cups bran, 2 cups applesauce, 1 cup unsweetened prune juice – take 2 to 3 tablespoons twice daily. I have no objection whatsoever to the use of stool softeners such as Colace or Docusate, glycerin or lactulose suppositories, or Sennokot, which is just natural senna leaf sennosides. PEG 3350 (Miralax) is a polyethylene glycol osmotic laxative, dosed at 17-34 grams once daily, up to 68 grams for overnight effects.

Acupunture such as GB 34 & 38, LI-11, KI-6 and Prosperity treatment.

**DEHYDRATION** - treat aggressively with miso broth, mango juice and electrolyte drinks such as the World Health Organization (WHO) electrolyte replacement formula – 1/2 tsp salt, 3/4 tsp baking soda, up to 8 tsp sugar or 4 Tbsp. Maple syrup, and a cup of fruit juice to 1 liter water. Lemon juice can be added. Intravenous therapy is normal saline, 0.9% salt, with 5% glucose.

**DIARRHEA** - BRAT diet (banana, rice, apple, toast). Grate an apple, let it turn brown, mash and eat. Replace probiotic gut bacteria. I use Vitazon Ultimate Acidophilus as it is a potent mixture of billions of acidophilus and other probiotics, includes FOS food for the bugs, and is enteric coated. Replace electrolyte salts as well as water, with miso soup, broth, juices or an electrolyte drink– at least an 8 ounce glass per bowel movement. WHO approved electrolyte replacement formula as above or IV rehydration. Bentonite clay can absorb toxins. L-glutamine gives energy to heal the lining of the gut. Po Chai or Pill Curing pills are a tremendous Chinese herb for toxic diarrhea, but also consider Xiang Sha Yang Wei Pien and Ba Zheng Wan formulas. Jamaicans use cerasee (Momordica charantia) tea. Acupuncture points ST 25 and 37. Prosperity treatment is a special acupuncture technique using 4 needles around the belly button, and it can treat either diarrhea or constipation, with good results in about 5 minutes. I add acupuncture points ST 25 and 37 and warm BL 62. Consider omega 3 oils, macaroons and shredded coconut.

**FATIGUE** - exercise - and start prior to therapy! Use acetyl-L-carnitine 500 to 1000 mg two to three times daily for energy. ALC crosses the blood brain barrier to help “chemo-brain”. Give American Panax ginseng 2,000+ mg.. I like to give 1 to 2 vials daily of the Chinese tonic herb formula Ling Chih Feng Wang Jiang with reishi mushroom, codonopsis, royal jelly and lychee fruit juice. If not available, give royal jelly, Codonopsis, Reishi mushroom extract, or vitamin B5. Omega 3 marine oils reduce fatigue and depression by reducing interleukin IL-6. Naturopathic physicians may give intravenous ‘Meyer’s cocktail’ of vitamins and minerals to boost the immune system and revitalize. We may simplify this to a shot of vitamin B12 in the rump. Give by mouth chlorella algae or wheat grass juice for chlorophyll. Consider the herbs rhodiola, nettles, astragalus, Siberian ginseng, ashwagandha, shiitake and cordyceps. Support the hypothalamus and circadian rhythms. Sometimes one must just conserve energy and ask for assistance on chemo days. Prepare food ahead of time and bank some down time - then use it to rest, contemplate, and visualize positive results from the therapy. Reiki therapy will help! If necessary, Rx Dexamethasone 4 mg 1 to 2 times daily.

**HAIR LOSS** – Alopecia is very common from chemotherapy. It cannot usually be prevented. Some claim vitamin E will reduce the loss, or at least stall it. AHCC compound also claims to protect the hair follicles. Acupuncturists may use ST 36, SP 6, LV 8, BL 20 and 23, and moxa to BL 17. Cooling devices or icepacks during chemo administration may protect the scalp – but may give safe haven to metastases. You will likely have to learn to love your skull, or hats, headscarves and wigs. Afterwards, we use the B-vitamin biotin and the TCM patent medicine Shou Wu Pian, which is bearsfoot herb, to regrow hair more rapidly.

**HAND-FOOT SYNDROME** – HFS or palmar-plantar erythrodysthesia PPED begins as a tingling, numbness or redness of the skin on pressure areas such as hands, feet, elbows or knees. It can progress to severe reddening and peeling of the skin at the extremities, which can impair function and lead to serious infections. Use topical emollients such as aloe vera lotion, or moisturizers such as Bag Balm. Take vitamin B6 as pyridoxal-5-phosphate, Rx 100 mg twice daily. Doses of 400 mg may reduce chemo efficacy, so beware. Avoid rubbing the skin, pressure, hot showers and sun exposure. Apply cold ad lib. Aller-C and homeopathic Apis mellifica can help reduce the histamine release, and quercitin suppresses this at the source. A topical formula to prevent hand foot syndrome can be compounded in Versabase: Diclofenac 2%, Vitamin B6 2.5% and Urea 10%. Sig: Apply a thin coat to hands and feet up to 3 times daily. Curcumin supports 5FU drug family efficacy but may trigger HFS.
HEART DAMAGE – My preferred Rx: for heart injury by chemo drugs is Co-enzyme Q-10 300 mg daily, vitamin E 400 IU daily, Convallaria majus, Crataegus oxyacantha and Naja tripudans 6CH as a tincture 1 dropperful to 1 tsp. 3 times daily. Naturopathic oncologists are also using grapeseed extract OPCs, Ginkgo biloba, omega 3 oils, L-carnitine, Angelica, Lycium and Ginseng.

KIDNEY DAMAGE – repair any organ damage with Coenzyme Q-10, in doses of 100 to 300 mg daily. R-alpha lipoic acid is crucial to restoration of the glomerular filtering basement membrane, preventing and reversing fibrosis due to the action of TGFβ-1. I give 300 mg 2 to 3 times daily, and with some caveats might give N-acetyl-cysteine, at least 500 mg twice daily. Renal tubule damage is helped by quercitin at about 1,500 mg daily. Support it with mixed anti-oxidants, particularly gamma tocopherol, as well as astragalus and omega 3 oils. The omega 3 fat docosahexanoic acid DHA prevents cisplatin nephrotoxicity. Kidney failure is sometimes averted with Jin Gui Shen Qi Wan formula, also called Rehmannia Eight or Sexoton. We also use astragalus, angelica, nettle seed, pellitory-of-the-wall and parsley-piert for kidney recovery.

LEUKOPENIA – Failure to produce immune system white blood cells can occur over a cytopenic period up to 11 days after IV chemo drugs. Immune first responders are neutrophils, so these are closely monitored and supported, to prevent lethal infections such as pneumonia. St. Francis Herb Farm Deep Immune astragalus formula 3 capsules bid is prophylactic in many cases. The most aggressive product to raise the count is shark liver oil alkylglycerols, in doses to 1200 mg. Give 50,000 IU daily of vitamin A. Consider the Chinese herbs Siberian ginseng, astragalus, ligusticum, codonopsis, melilitea, white atractylodes, salvia miltorrhizae, glycyrrhiza, salix root, scutellaria and royal jelly, eg Golden Flower Ji Xue formula, or Shih Chuan da Bu Wan (Shiquan). Naturopathic doctors have long had great success rebuilding immune health with thymus and spleen glandular extracts. A dab of eucalyptus oil under your nose will bring up white cell counts, though it may also antidote a homeopathic remedy. My American colleagues use Polyergus spleen peptides. I give chlorella algae, up to 20 grams daily. Botanicals to consider are Phytolacca (poke root) or Hydrastis (golden seal root) and Echinacea (cone flower). We may give dilute intravenous hydrochloric acid 1: 500 or 2 mg/mL, push 3 to 5 mL in saline. Ayurvedics medicine would consider Podophyllum hexandrum. Acupuncture points include TW-5. Supplement zinc, selenium, vitamin A, C, E, and B6. An intramuscular injection of B12 will pump up the neutrophils, our first responders to infection. Avoid crowds, avoid people with infectious illness, and wash your hands often, especially after using the toilet and before eating. Exercise. Report to your physician any sign of infection such as fever over 38°C, chills, cough, sore throat, painful urination, or inflammation such as redness, swelling and pain anywhere. Neupogen can cause muscle pain, which can be treated with anti-histamines such as quercitin. Chronic low lymphocytes may indicate a gluten intolerance.

MOUTH SORES – sores in the mouth and bleeding gums hurt, reduce eating and can get infected. Called mucositis, it can sometimes spread through the whole gastro-intestinal tract and cause GI bleeding. This can be the factor which limits using an effective dose of chemo, especially in leukemia cases. I have had brilliant results with ‘Vitamin U’ such as Biotics Research Gastrzyme 3 tid or TCM Fare You 4 tid. Vit. U will generally prevent or rapidly heal mouth sores, or throughout the GI tract, including stomach ulcers, colitis and diverticulitis. It is a form of the amino-acid methionine extracted from green cabbage. Vitamin E 800 IU is said to prevent mouth sores. Give L-glutamine at up to 15 grams twice per day or 2 gm/m², or one rounded teaspoonful dissolved in a warm drink three times daily. 5 grams in ½ ounce water makes a great mouth rinse – swish for 1 minute, then swallow. For children give 1 gm / m². Remember to stop L-glutamine as soon as chemo ends, unless directed to do so by a physician. It can be used more freely in end-stage palliation. Glycyrrhiza as DGL licorice extract, or glycerite extract. Chamomile tea or tincture, green tea with honeysuckle flower, marigold flower juice Calendula officinalis succus, or strong herbal teas frozen into small ice cubes/ chips. Aloe vera gel. Chlorophyll, slippery elm bark Ulmus fulva, vitamin E gel, homeopathic Traumeel. Manuka honey and baking soda. A simple oral rinse of ½ teaspoon each of baking soda and salt in a glass of warm water may be used several times a day. Use a very soft toothbrush, or a finger or guaze pad, and consider baking soda rather than toothpaste. The mouth will be soothed by cold or frozen yoghurt and soft, bland food. Avoid over-the-counter mouthwashes such Listerine, Scope. Avoid crunchy, spicy and acid foods. Radiacare oral rinse, or the BC Cancer Agency’s “Magic Mouth Rinse”: distilled water, Nystatin anti-fungal, Benadryl elixir anti-histamine, and Solu-Cortef hydrocortisone sodium succinate.
Burning mouth neuropathy is treated with R-alpha lipoic acid, and *Liu Wei Di Huang Wan* formula. Some of my American peers swear by honey for prevention of mucositis. This violates my low-glycemic rule in radiotherapy, but I can support it in radiation therapy for head and neck cancers: 20 ml of honey is taken in small sips starting 15 minutes before radiation, and this is repeated every 15 minutes for the next 6 hours. Make a cold water extract of marshmallow root 1 tblsp. per cup, overnight in the fridge.

**NAIL DAMAGE** – Fingernails and toenails can be discolored and deformed by chemotherapy drugs, with risk of pain, infection and loss of mobility. Good hygiene is important and regular pedicure and manicure by a professional is sometimes needed. Disinfectants, antibiotics and corticosteroids are sometimes used, and cushioning, petroleum jelly emolliation and sticking to roomy and comfortable shoes may be needed. I use oil of oregano topically for infection, while for repair I use chickweed cream and methylsulfonyl methane MSM.

**NAUSEA** - *ginger* is very good, as 2 capsules of root powder, as ginger tea, even as ginger ale. *SeaBand* is an acupressure band with a button that presses on PC-6. Even more potent is acupuncture needling at the points ST-36, PC-6, HT-1, CV-12. Homeopathics *Arsenicum*, *Nux vomica*, *Tabacum*, *Ipecac* or *Cuprum metallicum* have often worked very well. Eat often in small amounts, especially starches such as dry crackers, and drink plenty of fluids. Medical marijuana cannabis tetrahydrocannabinols THC and CBD do work well for some, if they can tolerate the other effects - L-citrole is useful to reduce THC intoxication. If nausea arises from a gut reaction to stress I prescribe the ancient TCM formula *Xiao Chai Hu Tang* formula, aka Ventorrid.. *Mouth Kote* with yerba santa herb, xylitol, sorbitol and citric acid can remove unpleasant tastes – “chemo mouth”

For delayed onset nausea and vomiting we give *Metoclopramide* 10 mg before meals and at bedtime, and add *Dexamethasone* 4 to 8 mg daily if needed. *Metoclopramide* is pro-kinetic and is a dopamine receptor blocker in low doses. In higher doses *Metoclopramide* has serotonin antagonist activity, but can trigger extrapyramidal side-effects, eg tremors. Adding the steroid allows better results at less problematic doses. *Mirtazapine* 15 mg is also helpful for delayed onset nausea. For the very emetic chemo drugs it is common to be given *Ondansetron* IV, but oral forms of these hydroxy-tytophan 5-HT3 receptor antagonists are available, such as *Palonosetron* 0.5 mg tablets. They are however quite expensive, very constipating, and can trigger cardiac arrhythmias. For very refractory nausea and vomiting give *Haloperidol* 0.5 to 1.0 mg every 8 to 12 hours as needed. I may also prescribe *Prochlorperazine* 5 -10 mg every 4 to 6 hours as needed; or *Dexamethasone* 4 to 8 mg daily, or both. The neurokinin one NK-1 antagonist *Aprepitant* blocks substance P in the brain and gut to prevent delayed nausea and vomiting during chemo, though it is not as useful once symptoms have appeared. Aprepitant and the new version Rolapitant are not compatible with ginger root.

**NERVE INJURY** – Some cancer clinics now offer cold gloves and socks to reduce blood flow to the extremities, protecting those delicate peripheral nerves from toxic drug exposure. The most important single agent to prevent anemia and neuropathy is *Vitamin B-12* given by intramuscular injection. Because chemo oxidizes the B-12 into an inert form, and the blood test cannot detect if the B-12 is in the active or the inactive form, only urinary MMA can detect if it is at a functional level. B-12 in oral forms can be considered, but my clinical experience shows the injection is safe and more effective. I like to give 2,000 mcg in a 2 mL shot once a week to once a month, or once every chemo cycle. B-12 has been shown to be absolutely non-toxic, even at extreme doses. *Methylcobalamin* form of B-12 is fat soluble and enters the brain and nerve tissue best, but may methylate mercury, so choose the hydroxycobalamin form if the case suggest mercury intoxication. Once nerve injury occurs I give *vitamin B1 thiamine* 100 mg with every B-12 injection, as taught by Dr.John Bastyr, ND. The fat-soluble benfotiamine form of vitamin B1 is useful at doses of 160 mg twice daily. CTCA docs use 250 mg pyridoxal-5-phosphate activated vitamin B6 for neuropathy, eg Vital Nutrients or Thorne brands. Prevent irreversible damage by chemo with *L-glutamine*, 3 to 10 grams 3 times a day. *Agmatine sulphate* is decarboxylated arginine, which prevents and treats neuropathy at doses of 3 to 4 grams daily. *Acetyl-L-carnitine* 1 to 2 grams 3 times daily and *R-alpha lipoic acid*, 300 mg bid-tid for any nerve damage or neuropathy - numbness, phantom sensations, burning mouth syndrome, or pain. *IV-D-ALA* 150-300 mg biweekly. *Pyroloquinolone quinone (PQQ)* reduces oxidative stress, remyelimates, regenerates mitochondria through biogenesis, reduces neuro-excitation and many other neurologic pathophysiologies. Found in vegetables and fermented foods, supplement 20 mg daily. N-acetyl-cysteine 1,200 mg twice daily, but it blunts many cancer therapies.. Other adjuncts we may consider are a B-complex, calcium, melatonin, vitamin E and milk thistle extract. Homeopathics of interest are *Hypericum*.
*perioliatum* and *Aconitum napellus*, as found in *Traumeel*. Contrast hydrotherapy and cold-sock treatments are often helpful. Nattokinase fibrinolytic therapy may help chemo neuropathy. *Acupuncture* can cure neuropathic pain. Some colleagues use Lion’s Mane (*Hericium erinaceus*) mushroom extracts 400 mg daily, and topical 1 to 3% diclofenac cream. Traditional naturopathy for foot neuropathy and edema is the **wet sock treatment**, best with 1:1 dilution of vinegar - warm feet first (!), put on wet socks, cover with dry wool socks, go straight to bed.

**PLATELETS** - failure to make platelets or thrombocytopenia can make it impossible to form a clot, with a risk of severe hemorrhage. Your doctor may prescribe a transfusion of platelets if the count falls below 20. *Papaya leaf extract* often helps at 1,000 mg tid or 1 Tbsp. per dose of glycerin extract. *Yunnan Pai Yao Panax pseudo-ginseng* 1 - 2 capsules three to four times daily is a reliable and fast therapy which I have seen out-perform synthetic drugs. The pineal gland hormone *melatonin* helps regulate the production of platelets, with efficacy comparable to Neupogen, and it’s a lot safer. Consider also shark liver oil *alkylglycerols*, licorice root, ashwagandha herb, and maitake mushroom extracts. High-dose *vitamin C* can help recovery. It is thought that eating fresh raw pineapple may help increase the platelet count. Some use Standard Process *Cataplex T, Tamarisk* (salt cedar) gemmotherapy or homeopathic *Ferrum phos* 6X.

Avoid aspirin (ASA) and Advil (ibuprofen), *Ginko biloba*, and other blood thinners. Ginger root reduces platelet counts, and is a direct blood thinner. Keep vitamin E doses under 600 IU daily. 400 IU daily is generally quite safe. Report to your physician any bleeding signs such as bruising, red spots on skin, bloody urine or black, tarry stools.

**VOMITING** – See Nausea. Treat dehydration aggressively - drink electrolyte (blood minerals) replacement, make a cup of miso soup, consider acupuncture. Replace salt and soda as well as water, or the water will not stay in the blood; the WHO basic electrolyte replacement formula is ½ tsp salt, ¾ tsp baking soda, up to 8 tsp sugar and a cup of juice per litre water.

**WEIGHT LOSS** - 80% of cancer cases are malnourished, and 40% die of malnutrition. Weight loss is a cardinal sign of cancer, and must be monitored and managed aggressively. Loss of over 20% lean body mass is critically dangerous; increase carbohydrates & protein intake. Cancer can cause cachexia, a metabolic syndrome with profound weight loss. Use marine oils rich in the fatty acid eicosapentanoic acid EPA - especially seal oil, 2 or more capsules twice daily with meals. You may use fish oils, up to 1 Tablespoon daily. Consider melatonin, L-glutamine, bitter melon *Momordica charantia*. Intravenous vitamin C can help stabilize weight. If needed we prescribe Dexamethasone 4 mg one to two times daily.

**WHITE BLOOD CELLS** – see LEUKOPENIA

See Complications and Emergencies
DETOXIFYING

I will examine you 3 to 4 weeks after the last dose of chemotherapy, and will typically want to detoxify you and restore immune health. I usually start with this simple program I learned from Dr. Craig Wagstaff, ND:

THREE TO SIX DAY ELIMINATION DIET
NO MEAT, NO DAIRY, NO EGGS, NO FISH, NO GRAINS

Breakfast

- **Apple or Grape juice – 8 ounces.** You can make more if you desire, but be sure that you take 8 oz at least.
- **Fresh fruit – ½ pound.** You may eat more, but try to eat at least ½ pound. You can eat any fruit(s) but please **no bananas**.
- **Herbal Tea.** One cup if desired. Dandelion root is ideal as it detoxifies both the liver and the kidneys.
- Between breakfast and lunch you should drink all the **pure, unsweetened** fruit and vegetable juice you can hold. Also eat fresh raw vegetables and fruit. The more food you put down, the more thorough the cleansing. If you cannot get fresh juices, use the unsweetened **pure** canned/frozen variety. Make up a lot of Vegetable Broth (see recipe below). If you cannot make your own broth **Organic** Vegetable Broth is available in tetra packs in most grocery stores. This is better than any of the canned vegetable juices.

RECIPE FOR BROTH

- 7 Carrots
- 1 small bunch Celery (cut finely)
- Place these ingredients in 2 quarts (8 cups) of hot water and boil for 15 minutes.
- Add:
  - One-third bunch of parsley
  - Large handful of fresh spinach (cut finely)
- Boil for 10 minutes more and drain off the juice or broth.
- Flavour with onion, okra, green peppers or garlic.

The purpose of this broth is to **FLUSH**. Drink lots of it during this cleanse, it is full of vital minerals.

Lunch

**Vegetable Broth.** – Up to two cups during the meal.

**Salad.** Make a chopped salad of fresh raw vegetables. Use a dressing of olive oil and sea salt. Use four or more vegetables from the list below:

<table>
<thead>
<tr>
<th>Artichokes</th>
<th>Cucumbers</th>
<th>Lettuce</th>
<th>Rutabagas</th>
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</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>Celery</td>
<td>Lotus</td>
<td>Spinach</td>
</tr>
<tr>
<td>Beans</td>
<td>Dandelion Greens</td>
<td>Okra</td>
<td>Squash</td>
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<tr>
<td>Beets</td>
<td>Endive</td>
<td>Onions</td>
<td>Swiss chard</td>
</tr>
<tr>
<td>Brussel Sprouts</td>
<td>Fresh Green Peas</td>
<td>Parsley</td>
<td>Tomato</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Green Peppers</td>
<td>Pumpkin</td>
<td>Turnip</td>
</tr>
<tr>
<td>Carrots</td>
<td>Kale</td>
<td></td>
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</tr>
<tr>
<td>Cauliflower</td>
<td>Kohlrabi</td>
<td></td>
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</tbody>
</table>

Other vegetables can be added, except **no potato or avocado**

**Dessert**  Fresh fruit, if desired

**Herb Tea**  After the meal, if desired
Between lunch and supper drink all the fruit and vegetable juice you desire. Eat all the fresh fruit and vegetables you want. Fill up, its medicine for you. The purge comes from the vitamins and minerals in the food so be sure to eat plenty.

**Supper**

**Vegetable Broth.** Drink two cups during the meal, more if you desire. This recipe makes about a one-day supply. You can make more if desired and place in the refrigerator, but it can be used hot or cold.

**Cooked Vegetables.** Select two or three of the different kinds of veggies listed above and cook them with oil or steam them. Eat a generous helpings – vegetables are rich in salicylates, which inhibit NFkB and therefore reduce inflammation.

**Dessert.** A salad of fresh fruits

**Tea.** After meal if desired. If you feel hungry after dinner, eat fresh fruit and drink pure fruit or vegetable juice – all you want!

**LIVER DETOX**

**Vitazan Body Detox Formula** is the ideal cleanse formula– 2 caps, 3 times daily with food. This is available in our clinic. Note the curcumin in this formula to slow Phase 1 and speed up Phase 2, reducing build-up of toxic intermediates, reducing symptoms of a “healing crisis”. Ellagic acid as found in berries and pomegranate also accomplishes this important task,

**Indole-3-Carbinol/DIM** 400-600 mg daily helps clear chemicals such as formaldehyde and solvents, and is particularly valuable for the very chemically sensitive patient.

**Dream Protein** undenatured whey powder is sugar and fat free. Quality whey supplies “conjugators” which neutralize toxic intermediates from Phase I stage. One scoop, one or two times daily. may be added to the juice/soups. Once a sulphur compound or amino-acid is conjugated or bound to a toxin, the body will not recycle it back and it will pass out in the urine or bowel movement. If dairy is not tolerated we can use MSM, soy or rice protein.

**Fibre** If you are constipated or suspect you have parasites add 1-2 Tablespoons daily of psyllium husks and fresh-ground flaxseeds.

**What to expect from this cleanse:**

The first day you may feel a slight discomfort by having changed your regular mode of eating, but do not allow this to disturb you, it is natural. On about the third or fourth day the bowels and kidneys will begin to move freely. Much toxic material will be passed. There can be symptoms of headache, perhaps nausea, gas, a few aches and pains but do not be alarmed, this is Natures way of cleaning you out. These symptoms are quite natural and to be expected. If bothersome, take whey. Around the fifth day you will feel a surge of energy, you’ll be surprised at yourself! Your complexion will become clear and your eyes will brighten and you’ll feel wonderfully clean inside. Continue on until the end of the sixth (or last) day; then seek advice about balancing your diet. If you start this diet. stick to it for at least 3 days. If you follow the instructions you will reap a wonderful reward of HEALTH.

“The Seven Day Rice Diet” is a good transition back towards a regular diet.
One to Seven Day Brown Rice Diet

General instructions:
This diet will give you all the nutrition you will need while your body cleanses and heals itself. You don’t have to go hungry, and you don’t have to count calories, weigh food or pay much attention to the selection of food. You eat whenever you are hungry, and as often as you like. While on this diet, you may experience some weight loss.

- Eat until you feel full but not engorged. It is better to eat several small meals per day rather than 3 large ones.
- Do not drink with your meals, as this dilutes the enzymes in the stomach needed to properly digest the food eaten. Wait about 10 to 15 minutes before or after eating to drink.
- If you find brown rice alone to be too bland you may flavor with Ginger, Garlic, or Bragg’s Aminos - a delicious unfermented salt-free soy sauce, available at grocery stores.

What’s allowed on the diet?
- Brown rice, preferably organic. Basmati, red and wild rice may be added for variety.
- Fresh vegetables, any kind you like, lightly steamed if you wish. Onions are especially good for cleansing and are very sweet and tasty when steamed.
- Fresh fruits, any kind, except oranges and orange juice. With fruits and vegetables, it is best to consume only organic produce whenever available. However, this is not always possible, buy in season and locally grown fruits and vegetables, wash them thoroughly before eating. When buying dried fruit, purchase only “un-sulphured” products.
- Fresh garlic, onion and ginger.
- Cayenne or chili pepper and/or a non-salt herbal seasoning (e.g. “Vegit” or “Mrs. Dash”), turmeric (curry)
- Vegetable and fruit juice – the best is fresh pressed and consumed within 20 minutes, otherwise buy quality juices with no additives, sugar, chemicals, and little or no salt.
- Green tea.
- Other foods allowed are: lentils, rice cakes, sesame seeds, ocean-going fish, free-range chicken, chickpea hummus, soy tofu and tempeh.
- Absolutely no shellfish (shrimp, oysters, scallops, clams, lobster etc) or catfish.

Cooking instructions for brown rice:
Rinse rice well, 5 or 6 times in warm water. Proportions of water to rice; 2 to 2 ½ cups of water to 1 cup of rice. Bring water to a boil, add rice, stir, cover and reduce heat to simmer or until the water has been fully absorbed. This may be 15 to 45 minutes depending on the amount and type of rice. Do not lift the lid until cooking is finished, after which the rice will be doubled in volume and fluffy-looking.

Alternate Method: Add rice to cold water in a rice cooker. Most models have a light that goes off when rice is perfectly cooked. Fast and reliable, too bad they are always aluminum pots.

Other elements we may consider for drug detox include:
- Laxatives, enemas or colonics for severe cases. Clean bowels take stress off the liver so it can cleanse.
- Probiotic gut bacteria.
- Liver herbs such as dandelion root, burdock, milk thistle, globe artichoke, black radish and chelidonium.
- Anti-oxidants including R-alpha lipoic acid and N-acetyl-cysteine.
- Infrared sauna - up to 40 minutes 1 to 2 times daily for at least 150 hours to release solvents, pesticides and heavy metals from fatty tissue.
- Acupuncture detox: LV-3, ST-36, KI-3 and 7, LU-7, LI-4, GB-20, PC-6, HT-7, GV-20 and 23, BL-13 (LU), 18 (LV) and 23 (KI); ear points: Shenmen, Sympathetic, Kidney, Liver, Lungs.
- Purified water – the best is Nikken optimized “pi-mag” water, which features microcluster water structure, making it a more powerful solvent than ordinary water.
- Lots of steamed vegetables.
- Daily aerobic exercise.
- An orderly personal schedule with adequate sleep.
- Relaxation, spiritual practice, self-expression.
• Vitamin E and N-acetyl-cysteine help detoxify after chemotherapy. Another excellent naturopathic detox protocol is described in Dr. Peter Bennett’s book the *7-Day Detox Miracle*, 2001, Prima Publishing.

Herbal kidney cleanses are often needed. Skin brushing and deep breathing contribute to waste removal. The more **emunctories** or organs of elimination we can enlist, the quicker and easier it goes.

Before detoxifying for heavy metals, you need to have any mercury-silver amalgam dental fillings taken out. This process is potentially quite harmful, if not done by a dentist with specialized equipment and training. You can really stir up a hornet’s nest in your immune system if too much mercury is released. Heavy metals are often removed by intravenous chelation therapy with agents such as EDTA, DMPS and DMSA. These are sometimes given orally, and may be supported by supplements such as chlorella algae, garlic, cilantro and N-acetyl-cysteine.

It is possible to detoxify emotionally as well as physically. You may suddenly feel old traumas, anger, have disturbed dreams or see old scars get inflamed. Report any discomfort to your naturopathic physician.

“I really believe our Western approach to cancer is flawed to its very core. Cancer cells need what EVERY healthy cell needs also. Terrorizing the entire body, or depriving the entire body of needed nutrients to eliminate cancer is a failed approach. As 21st century Naturopathic Physicians, we should be leading the path to a wiser, saner approach to this malady”.

PART FOUR - NATUROPATHIC ONCOLOGY REMEDIES

Chapter Four  DIET & FOOD SUPPLEMENTS IN CANCER

“The scientific and medical literature and theorists fail to vividly portray issues which are patently obvious to clinicians, especially those who work with nutrition.”

Dr. Mark Gignac, N.D., Cancer Treatment Centers of America

Many nutrients are associated with lowered risk of certain cancers, and are therefore preventative. Most are antioxidants and flavonoids, some are minerals, vitamins, proteins and oils. They abound in the traditional foods of our ancestors that can be hunted, milked, fished, picked or gathered.

Lowered risk from all cancers, and longer survival with cancers, is associated with low caloric intake. Overeating is a major risk that is all too commonly taken in our modern society with its energy rich agricultural foods. Overfueling causes insulin resistance, hyperinsulinism, hormonal shifts, blood fat imbalances, inflammation and metabolic aging. Periodic fasting extends the human lifespan. One day at 1,100 calories followed by 4 days of 750 calories mimicks fasting.

Good nutrition naturally supports healing. Dietary interventions with cancer patients appear to remove obstacles to cure. Many “spontaneous remissions” are associated with adoption of a rigorously wholesome diet.

When used in concentrated form, nutrients become nutraceutical drugs. I believe food and plant concentrates as dietary supplements are essential to overcome cancer. Once well, a whole foods diet must be sustained to maintain a remission.

The Grape Cure, Gerson Diet Therapy, the Macrobiotic diet, Dr. Kelley’s Nutritional Metabolic Therapy, Dr. Brusch’s Diet, the Hallelujah Acres - God’s Way Diet, Budwig and Moerman Diet all have their supporters, and may be useful to some folks, but I find them rather limiting, even extreme.

The clinical bottom line is that diet alone may not cure cancer, but bad nutritional management will contribute to reduced repair and healing, weight-loss, cachexia, fatigue and complications. Malnutrition and ination (not eating) are the direct cause of death in 22% of all cancer patients.

The absolute taboos in the diet of cancer patients are high sugar foods and red meat raised by contemporary agribusiness methods. We forbid tobacco products. I strongly urge reduction of chemical intake in all forms, by washing food better, choosing organic food, raising your own food, and by cleaning up chemicals in the home and workplace. Beyond this point we need to get personal, and tailor the diet to the individual constitution, tastes, culture, condition and disease.

The modern agricultural-based diet is significantly different from the diet of our hunter-gatherer ancestors. Our ancestors had very low rates of cancer. The protective elements they had which we now tend to lack in our diets are largely due the reduction in consumption of coarse vegetation, especially the herbaceous or aerial parts of plants. These lost protectants include calcium, potassium, fibre, omega 3 fatty acids, polyunsaturated fats, trace minerals, antioxidants, flavonoids, isoflavones and polyphenols.

For example, covalent DNA binding is associated with malignant transformation of genes, but is inhibited by phenethyl isothiocyanate in broccoli and cabbage, ellagic acid in fruits, nuts, berries, seeds and vegetables, and by polyphenolic acid flavonoids in fruits and vegetables.

Tumour promoters are inhibited by retinol and carotenoids in orange, yellow and green fruits and vegetables, vitamin E in nuts and wheat germ, organosulphur compounds in garlic and onions, curcumin in tumeric (curry) and by the vanillyl alkaloid capsaicin in chili peppers. Estrogen, progesterone and thyroid hormones are biotransformed into benign forms by indole-3-carbinol in cabbage, brussel sprouts, broccoli, cauliflower and spinach, and by selenium in garlic and seafoods.
Many herbicides and pesticides act like our hormones estrogen or testosterone. Xenobiotics or xenohormones (foreign hormones) such as dioxans and bis-phenol act like estrogen. They are fat soluble, and so accumulate in our fatty tissues. Absorption of carcinogens and xenobiotics, is reduced by fiber in fruits, vegetables, grains and nuts, and by riboflavin and chlorophyll in fruits and vegetables.

The modern diet is an experiment in nutrition which is not going well for us. The hybridized plants that are now staples in our diet have been genetically manipulated to be big and sweet and juicy, release more sugar faster because they have simpler starches and less fiber.

Until wholesome nutrition is at the core of cancer therapy and prevention, the disease will remain largely unbeatable.

**Naturopathic Diet for Cancer**

*Emphasize fresh fruits and vegetables.* Eat an entire rainbow of various plant foods. The very best foods to fight cancer are organic green vegetables and red fruits. Raw foods are alive, energizing and healing. Try salads, veggie dips, smoothies, or chunky style. For an excellent review of what safe but potently anti-cancer compounds are in these brightly colored plant foods, see the book “Foods That Fight Cancer” by Drs. Beliveau and Gingras of McGill University. Despite an obvious bias against food supplements, it is highly informative. They have also published a cookbook on this topic.

The best established diet for cancer prevention and treatment is the Mediterranean Diet. This is not a new fad based on a theory. It is based on the observed benefit of a traditional diet of people living in an agricultural, rather than a hunter-gatherer civilization. It emphasizes fresh vegetables, whole grains, olive oil, seafood, fruit, legumes, and potatoes, moderate wine, and little meat, full-fat dairy, poultry, refined cereals or sugars.

Of course all vegetables and fruit need to be washed. Most herbicides, pesticides and xenobiotics are fat soluble or sprayed in oil, so soap may be needed to remove them. If you cannot buy all organic or grow your own, thoroughly soak, wash and scub produce to remove as much of these chemicals as possible.

I do not support diets based on all raw and juiced foods. They may feel good at first, but in time they are catastrophically bad for most people. All raw food and juice plans such as the Gerson Diet, Living Foods, and the Hallelujah Acres regime are dangerous to the majority of cancer patients because they are grossly deficient in protein, and often add a high glycemic load. My Chinese medicine training argues against raw foods. Asians feel raw foods are too cold, and will poison the digestive fire. That is why you never get salads in a Chinese restaurant. However, I do suggest at least 20% of your diet be raw food such as a piece of fruit, salads or juices. Home-made fresh and raw juices such as carrot, celery, and cabbage are good as a supplement to the diet and in certain feeding issues. Beet juice should be limited to 2 ounces daily, from one medium beet, as too much beet juice will make you quite queasy. Greens such as parsley, beet tops, kale or wheatgrass make excellent additions to any fresh juice. Sprouts are very nutritious, such as those big white Chinese mung bean sprouts used in stir-fry. Apple may be added for taste.

**Animal foods** Integrative medicine doctors will tell you to eat strictly vegetarian if you have cancer, no dairy or meat. They naturally contain factors which increase tumour growth rates, notably IGF-1. This potent growth factor and hormone receptor activator is doubled when the meat or milk herd animals are fed corn. The omega 3 to 6 fat ratio in grain or corn silage fed red meats also promotes inflammation. Muscle meat contains methionine and vitamin B-12 involved in its production – and tumours feed on it avidly. I feel that small amounts of animal foods can be permitted for some cancer patients, but the quality is critical, and even then it has to be counted as a risk. Bone marrow soup during chemotherapy is an example of sensible flexibility with this rule. Find wild game, or organic meat, pasture grass fed. Grass gives meat some anti-inflammatory omega 3 oils, and the IGF-1 will be half that of grain-fed meat or milk. It is still a stress, but a step in the right direction. Buffalo (bison) and lamb are typically only grass-fed. Beef can be grass-fed, but costs more to finish on grass. It is also the accumulation of xenohormones which make common grocery and restaurant grade meats dangerous for a cancer.
patient. You must only eat clean meat grown on clean pasture feed. It must be hormone and drug free. There is not yet a certified organic system in place for animal foods, so it is buyer beware. If you find proteins or meat hard to digest, ask your naturopathic doctor if you might benefit from supplementing your stomach hydrochloric acid with betaine hydrochloride. Consider plant-source protease enzymes to augment stomach or pancreatic enzyme deficiency. Prescription Creon pancreatic enzymes are sometimes needed. Wrapping fatty foods like meat, poultry, fish or cheese in plastic wrap taints them with plasticizers which are nasty xenobiotics. Ask for meat packaged in butcher paper, and use it at home too.

**It is best to replace meat** protein with quality eggs, fish, lean poultry, organic dairy, peas, beans, nuts, seeds.

* The same rule of clean feed makes clean food goes for poultry. Birds need to be fed real grains and plant food, not some mystery filth pellets of rendered animals and waste products. Grain-fed poultry is fine, unlike grain-fed red meat.

Poultry is certainly safer than red meat, and so deserves to be more of a staple food for healing. No-one controls what is meant by “free-range” eggs or “free-range” chickens, and it is more important what they have been eating than how much exercise they got. Clean, hormone and drug free poultry is preferable. All the better if they have been able to scratch at the ground and peck at weeds, bugs and all the specks that so delight a chicken. Just like the difference between farmed salmon and wild salmon is readily apparent in the taste, smell and texture of the fish, it is obvious that poultry raised in the traditional ways of our grandparents are superior to agri-business poultry. They will cost more, but are so much more satisfying to eat, and even digest easier. This is well worth the effort and expense.

Note that **all poultry must have the fat and skin removed before cooking.** It is inflammatory.

Eggs are a wholesome food, if the chickens are fed right. I look for yolks that are brightly colored and tasty. If yours are bland and fragile, change brands. Omega 3 eggs have been given flax or other foods that are reasonably healthy for the bird, and therefore for us. We restrict egg yolks in prostate cancer or prostate disease.

Dairy farmers discovered feeding corn and corn silage to dairy cows makes them give twice as much milk. Unfortunately this also dramatically ramps up the common cancer stimulant IGF-1 insulin-like growth factor, and pro-inflammatory omega 6 fats replace good omega 3 fats.

In the USA and other places they give their dairy cows bovine growth hormone to force even more milk out of the cows - this is something I urge you to avoid. In Canada we are exposed to it in foods labelled to contain “milk ingredients”. We are now seeing certified organic milk and dairy foods. I suggest you do your due diligence and find out if the dairy you patronize feeds only grass and hay to the cows. Even better are goat and sheep milk, with better fats and less IGF-1. Cultured and soured organic milk products can be very good for you.

The issue with milk and cheese is often said to be the potential to form “mucus”. Some believe this protects cancer cells from the immune system. I do not subscribe to this theory.

Casein or milk curd, in cheese and most milk products, can form compounds which promote tumour invasiveness. A factor that can increase tumour invasion factor can be made from milk curd by bacteria that some people harbour in their gut.

*Fresh wild fish is a terrific form of protein, and easily digested. I believe Pesco-Vegetarian – a seafood and plant-based diet – is the ideal diet in cancer prevention and treatment. Every food has some issues, and some folks worry about heavy metals and nasty chemicals such as dioxins, flame retardants, and pesticides in fish and other seafood. I have an expression: “Everything casts a shadow.” We can always find a negative if we look hard enough, but because of their wonderful nutritional value, these and most foods from Nature still have a definite net health benefit. Detoxification should be a part of your lifestyle anyway, so enjoy seafood.

Avoid farmed salmon and trout, which are fed filthy things, and taste like it too.
Avoid tuna, shark, swordfish/marlin and other large predators which accumulate too much mercury. Mercury certainly promotes many cancers, and poisons our innate healing systems. Top predators also accumulate and concentrate toxic dioxins and flame retardants.

If you choose instead to be vegetarian or vegan, remember that adequate quality protein is a key to healthy immune function and the healing of tissues. I suggest everyone enjoy vegetarian meals often.

Some protein requirements may come from fresh nuts. Seeds are excellent, such as fresh sesame, flax, pumpkin, sunflower, hempseed, and chia or Salba seeds. Fresh nuts and seeds provide healthful omega 3 oils. See the book *Diet For A Small Planet* by Francis Moore-Lappé for tips on combining plant proteins.

Peas, lentils, beans and other legumes are a good source of protein and fibre. Soybeans are best eaten in fermented forms, such as miso, or unprocessed such as edemame. Avoid GMO soybeans.

Cook with extra virgin grade olive oil to obtain the healthy *omega 9* oil oleic acid. Organic grapeseed oil, sesame oil, and coconut may be used. Butter is permitted in small quantities.

Reduce or eliminate inflammation-promoting omega 6 fats: trans-fatty acids and arachidonic acid, such as corn oil, margarine, shortening, and hydrogenated fats.

Pure water, green tea, rooibos (red bush) tea and taheebo (pau d’arco) tea are the preferred beverages.

Keep your core diet clean, and you can allow yourself a little wiggle-room to bend some of the rules. The most important rule is that the better the food quality is, the more you should eat, and the worse it is, the smaller the portion size and the less often you should be having it.

The more we study food science the more concerns and confusion we find. An excellent book on this topic is Dr. Steven Bratman’s *Health Food Junkies: Orthorexia Nervosa: Overcoming the Obsession with Healthful Eating,* “Orthorexia nervosa” is a term he coined for the neurosis of overly-correct eating. We can scare ourselves into accepting only a limited and unbalanced diet. Variety is central to a healthy diet for descendants of hunter-gatherers. Eat freely, and detoxify periodically from the inevitable contaminants and toxins.

Dr. John Bastyr, ND once gave a brilliant talk on avoiding the worst thing we can swallow at mealtime — *worry* — including the fear of being poisoned and of dietary mistakes, and the guilt of eating what we actually like. Above all, be thankful for any food you decide to eat, and do not turn it into a poison by worry. Replace worry with concern. If someone makes food for you that is not on your diet, take the love and accept the kindness. Pick the best food available, but once chosen, eat it with a happy heart. Bless it to your needs, and enjoy it with gusto and gratitude.

**Sugar Feeds Most Cancers!**

**Eat a low glycemic diet** to reduce the insulin and insulin-like growth factors driving the growth of your cancer. If insulin, IGF-1, IGFR or IGFBP are listed in the “targets of therapy” in the chapter devoted to the integrative care of your type of cancer, then it is sugar sensitive. Lymphoma, breast, prostate and all GI cancers are quite sugar sensitive.

A low sugar or low glycemic load diet helps prevent most cancers, improves responses to medical therapies for cancer, and slows the progression of these cancers. Low glycemic means far less sugar and fast sugar-releasing starches, such as wheat, potatoes and bananas. Lower glycemic foods include heavy rye bread, real oatmeal porridge, peas and beans, berries and sweet potato.

Glycemic index refers to the rate at which foods turn into blood sugar. Almost all sugars and starches we eat get reprocessed in the liver into glucose. After a meal the surge of glucose or “blood sugar” in the bloodstream
causes the pancreas to release insulin. Insulin attaches to cells and pumps nutrition into them - sugars, proteins and fats. One way cancer cells grow too fast is by always having far more insulin than normal cells.

Cancer cells build more receptors on their surface for insulin. This is like putting a turbocharger on a motor. By pumping more fuel in, it is able to run faster than normal. A typical breast cancer cell will have triple the insulin loading docks compared to a non-cancerous breast cell of the same type. A prostate cancer cell has about twice the normal number of insulin receptors, and colorectal cancers have about 50% more than normal cells of the same type. They can thereby pump in more sugars, fats and proteins, which helps them grow faster than normal.

If the insulin in the blood spikes up high enough, the human liver responds by releasing insulin-like growth factors one and two IGF-1, IGF-2 which I visualize as telling the cell, “Now you have food, grow!” Many cancers will grow faster after a high sugar-load meal. A recent study showed that colon cancer cells that spread into the liver grew at 8 times the normal rate for about 3 hours after a high glycemic meal - with no obvious sugars or dessert included. This is just like throwing gas on a fire! Avoid human growth hormone HGH or related supplements, such as colostrum, which increase insulin and insulin-like growth factor IGF.

Like a diabetic, make “food exchanges” to keep the high sugar-releasing foods to smaller portions, less often. Don’t cluster too many together in a meal or too much in a day. It is all about moderation. Trade a sweet you like for a sweet you don’t care as much about.

There are many good websites with food lists, such as www.lowglycemicdiet.com Google or any other internet search engine can give you a hundred lists. There are also a lot of books on this subject in the public library system. I recommend the Glycemic Index Nutrition Package prepared by our daughter Talia Wright, RNCP nutritionist. This handy guide contains recipes, menus, further resource listings, and more. It can be purchased from our clinic. For more information read “The New Glucose Revolution”, 3rd edition, by Dr. Jennie Brand-Miller, MD, or any of her “GI” Revolution books. She does not make the cancer connection in any of her books, but she does a great job of explaining about the glycemic index and the glycemic load, with recipes and menus.

Be aware that as you peruse different lists created by various labs over the last 25 or more years, the numbers attributed to a given food may not be consistent. The current contender for the next international standard is referenced to glucose. A glycemic index of 100 is the blood sugar and insulin response seen after ingesting pure glucose, made from corn sugar, given in an amount proportional to your body surface area, as standardized in medical testing for diabetes or glucose tolerance. An old standard was referenced to the impact of eating white bread, with a difference of 40% compared to the glucose test. The glycemic index value assigned to a food also depends on the variety tested, its ripeness and what the investigator chose as a portion size. The glycemic value is only an estimate of what you will actually consume, and allow us to roughly rank foods. Don’t put too fine a point on the exact numbers. Whatever list you are looking at, the basic concept is eat less of the foods with the higher numbers, and more of the foods with the lower numbers. Assuming a rating of 100 is referenced to eating a measured amount of glucose from corn sugar, according to your body surface area, as in a diabetes or glucose tolerance medical test, then GI under 60 (plus or minus a few points) is a non-stress food that can be eaten freely. These foods should become a core part of your diet, a staple food. Those rated 65 to 80 will be less healthful, and should be limited. Those over 80 are definitely going to pump up the IGF if taken often in large amounts. Eat them a lot less often and in much smaller portions.

The real core issue is the glycemic load, or total sugar intake in a day. If you over-eat a moderate glycemic index food, it will have the same effect as less of a higher index food. It is always all about balance and moderation.

Some fruits to limit: kiwi, banana, mango, pineapple, watermelon, all dried fruit - including dates and raisins. Fruit canned in juice is OK, but not fruit canned in light or heavy syrup. Dilute fruit juices by ½, - except for red grape, pomegranate, blueberry, raspberry or unsweetened cranberry juices.

Vegetables to limit: beets (cooked), carrots (cooked), potato, corn, parsnips. Raw, grated or juiced carrots are fine, and the same goes for raw or juiced beets, in moderation.
Grains to limit: anything refined or white, and very soft breads. Very dense breads are better, such as true rye pumpernickel, also called full-korn bread, the kind that looks like a bunch of grain pressed together and is solid as a brick. If it is mostly wheat and is spongy or soft, it will be higher glycemic. The leavening process of bread making alters the starch structure, which breaks up fast into sugars in our digestive tracts. Flat unleavened breads such as wraps, pitas and tortillas have a lower glycemic index, while the same amount of that flour puffed up into a baguette or loaf will often be high glycemic. Choose organic whole grain cereals such as real oatmeal and Red River mixed grains. Bob’s Red Mill makes many fine wholegrain products.

Sticky white rice used in sushi is high glycemic. Basmati rice is superior to polished white rice, and brown rice is best. I like to mix brown, red and wild rice. Quinoa is a great rice substitute. Its a protein-rich seed, not a grain.

Provided the core foods are OK, some treats and sweets are permitted. For example, 70 – 85% cacao chocolate is OK in moderation. Use honey, maple syrup and palm sugar very moderately. Leave wiggle room for enjoyment.

Use Stevia as a sugar substitute for adding sweetness. Stevia is good for baking only up to temperatures of about 350° F. Stevia may be toxic in high amounts, and certainly is very, very sweet, so use sparingly.

Use Xylitol sugar-alcohol for higher temperature baking. Other sugar alcohols include Maltitol, Mannitol – note they all end in “-ol”. The newest is erythritol, being sold as Organic Zero. Also note that sugar alcohols can provoke diarrhea if eaten in excess. This can sometimes persist long after the intake of sugar-alcohols is stopped.

Splenda is the most user friendly synthetic sugar substitute.

Blue agave cactus syrup is promoted as a low glycemic substitute for syrups or honey. It is very high in fructose, which can increase insulin resistance and diabetes risk. Many agave products on the market are adulterated with high fructose corn syrup, which is disastrous for sugar sensitive patients. Agave is not recommended at this time. Please strictly avoid aspartame or Nutrasweet, and anything with a trace of high fructose corn syrup.

Having a salad prepared with vinegar or lemon juice with your meal, will help keep your blood glucose under control.

Combining low-glycemic foods such as legumes with high-glycemic foods also moderates glucose levels. For example, eating beans with corn tortillas, green beans with a baked potato, and mixing peas and carrots.

In addition to a low sugar load diet, we recommend you consider further measures to regulate the insulin-like growth factors such as drinking green tea, eating cooked tomatoes for lycopene, supplementing with flaxseed and vitamin D3 and most important: exercising regularly.

The bottom line: Eat food your ancestors could have hunted, fished or milked, that has been raised in as simple and natural way as possible. Read The Schwarzbein Principle by Dr. Dianna Schwarzbein, MD to see how to shop like a hunter-gatherer in a modern supermarket. www.schwarzbeinprinciple.com

For more on this subject read Beating Cancer with Nutrition by Dr. Patrick Quillin, RD, PhD Dr. Quillan works for Cancer Treatment Centers of America, and has been a real inspiration to me.

**Gastic Tube Feeding**

Liquid Hope and Anticancerize Me are examples of special foods made for G-tube feeding.

Nutrient dense fresh juices, greens, whey protein powder and other quality nutrients can be fed, provided they are made into a very thin slurry.

Medicines well dissolved in liquid can be administered if flushed with 15-30 mL water before and after each drug.
## Low Glycemic Index Summary

<table>
<thead>
<tr>
<th>Name of Food</th>
<th>GI Value</th>
<th>GI Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans and Legumes – peas, chickpeas, green beans, lentils, baked beans,</td>
<td>from 30 to 51</td>
<td>LOW</td>
</tr>
<tr>
<td>garbanzo, lima, black, pinto or navy beans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread: grain should be as unprocessed as possible and with lots of seeds.</td>
<td>from 45 to 59</td>
<td>LOW</td>
</tr>
<tr>
<td>Sprouted wheat, sourdough rye, stone-ground whole wheat, Pumpernickel.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEST: pitas, wraps, tortillas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast Cereals - Oats (large flake, steel-cut oats, not instant), Oat</td>
<td>from 34 to 58</td>
<td>LOW</td>
</tr>
<tr>
<td>bran, All Bran (Kellogg’s), Muesli with oats and various seeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bran muffins, pancakes from pancake mix. Use whole wheat flour or stone-</td>
<td>from 60 to 67</td>
<td>MED</td>
</tr>
<tr>
<td>ground flour in moderation. AVOID white flour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereal Grains - Buckwheat, bulgur wheat, quinoa, barley, oats</td>
<td>from 22 to 58</td>
<td>LOW</td>
</tr>
<tr>
<td>Cookies and Crackers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digestives cookies (plain), oatmeal cookies (plain), Wasa rye crackers</td>
<td>from 54 to 59</td>
<td>MED</td>
</tr>
<tr>
<td>Dairy Products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goat and sheep milk are better than cow milk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk (1% and 2%) Yogurt (low-fat, plain), Yoplait Lite with fruits</td>
<td>from 20 to 35</td>
<td>LOW</td>
</tr>
<tr>
<td>Cheese (low-fat), butter (organic, grass fed, in moderation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit: Berries, apple, grapes, orange, apricots, pears, peaches, plums,</td>
<td>from 0 to 57</td>
<td>LOW to MED</td>
</tr>
<tr>
<td>cherries, papaya, lemon, avocado, rhubarb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canned in pear juice is OK, but no light or heavy syrup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits to limit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banana, kiwi, mango, pineapple, watermelon, grapefruit, all dried fruit</td>
<td>&gt; 60</td>
<td>HIGH</td>
</tr>
<tr>
<td>Fats (Nuts, Oils, Spreads)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cashews, Peanuts, Almonds, almond butter, flax seeds, other nuts (in</td>
<td>10 – 22</td>
<td>LOW</td>
</tr>
<tr>
<td>moderation), olives and olive oil, sesame oil, canola oil, tahini.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat, Seafood, Protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken, turkey, and fish are preferred over any red meat. Buy only lean,</td>
<td>0</td>
<td>LOW</td>
</tr>
<tr>
<td>organic grass fed meat. Eggs in moderation, soy milk, tofu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pasta and Noodles (Al dente – not overcooked)</td>
<td>from 27 to 62</td>
<td>LOW to MED</td>
</tr>
<tr>
<td>Spaghetti (linguine, macaroni, fettucine) noodles (white and whole wheat,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>protein-enriched), rice vermicelli, Udon noodles, Soba noodles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice is OK but beware processed rice products.</td>
<td>from 50 to 58</td>
<td>LOW to MED</td>
</tr>
<tr>
<td>Brown rice, basmati, wild rice (mixed with basmati), red rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweeteners - Splenda, Stevia, Maltitol, Erythritol. Maple syrup, palm</td>
<td>from 0 to 19</td>
<td>LOW</td>
</tr>
<tr>
<td>sugar, honey-in moderation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Almost all vegetables are fine.</td>
<td>0 to 50</td>
<td>LOW to MED</td>
</tr>
<tr>
<td>Cooked carrots, corn and sweet potatoes in moderation and/or combined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with low-glycemic foods such as green beans, peas, lentils, beans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables that can release a lot of sugar:</td>
<td>from 64 to 101</td>
<td>MED to HIGH</td>
</tr>
<tr>
<td>Beets (cooked), parsnip, potatoes – high if boiled, worse when baked</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Best if combined with legumes and/or whole-grains.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: The New Glucose Revolution, Dr. Jennie Brand-Miller, Dr. Thomas M.S. Wolever, Kaye Foster-Powell, Dr. Stephen Colagiuri)
An alkalizing diet is good for cancer patients: low in salt, sugar and meat, and high intake of vegetables and plant foods — but why it works well has very little to do with pH. Extreme pH therapies are not recommended.

I often hear it said that cancer can be cured by alkalizing the tumours, but it just isn’t so. The idea that oxygen kills cancer cells is another popular myth. These widely held, but misguided beliefs are a misinterpretation of the work of Otto Warburg, whose research on the biochemistry of sugar metabolism in the 1920’s to 1940’s won him a Nobel Prize. He found that cancer cells could survive in very low oxygen conditions by switching to a yeast-like fermentation of sugars without oxygen. This causes a build up lactic acid and the cancer becomes quite acidic, ie have a low pH. From these bare facts, some mistakenly assume that:

“Cancer is created by acidic and low oxygen conditions” – This is putting the cart before the horse. Cancers certainly do occur in alkaline persons, and in well oxygenated tissues, such as the lungs. Only quite advanced cancers become acidic, never at the start. Cancer cells have several metabolic sources of acid, independent of Warburg’s famous fermentation. Oxygen levels fluctuate, from very low to very high, but even in a well oxygenated tumour, fermentation of sugars without oxygen continues vigorously, and this makes lots of lactic acid. Acidic tissues hold less oxygen, and ancestral diets had a net alkaline effect while modern diets tend to produce net acid, but the net drop in oxygen is not known to be sufficient cause for cancers to become established.

“Cancer can be cured by oxygen therapies” – It does not work. They love oxygen, and will die without it. They can be stressed to death by free radicals of oxygen, and hydrogen peroxide - but not by oxygen drops, hyperbaric oxygen, oxygen in steam cabinets, and so forth. This is a bait-and-switch illusion. To begin with, oxygen in drops or powders do not have a significant dose of oxygen to make any real change. Even if they were pure liquid oxygen, it is a tiny fraction of what you already breathe every minute. Hyperbaric oxygen makes blood vessels grow into tumours, completely canceling any other benefit. If oxygen or ozone could be taken up by our skin we could all go around with plastic bags over our heads. I think only a few creatures such as frogs and newts can actually breathe through their skin.

“Alkalizing a tumour will cure cancer” – it is not possible to alkalize a tumour significantly, but if it were possible, it would not help much in most cancers. Tumour acidification is the result of several defects in energy metabolism, including the fermentation of sugars to acids. Gross acidification occurs late in the lifespan of a tumour, and its correction will not necessarily influence its ongoing growth.

The truth is:

Tumours love the dual economy of burning some fuels with oxygen and some by fermentation, as it creates energy plus all the building blocks they need to grow new cells. They will not revert to pure oxygen burning even when oxygen is restored = the Warburg effect. No dose of O2 breathable oxygen will stop cancer growth.

While rodent studies show tumour alkalization inhibits growth, human tumours will often be de-inhibited from the acidic stress and grow even faster! [See Early and late apoptosis events in human transformed and nontransformed colonocytes are independent on intracellular acidification, Wenzel U, Daniel H. Cell Physiol Biochem. 2004; 14 (1-2): 65-76.]

An acid-ash diet turns out to be one high in pro-inflammatory omega 6 from meats and grains such as corn. Grass fed meats -free of hormones, drugs, herbicides and pesticides - and also nuts and seeds, gave our ancestors more anti-inflammatory omega 3 fats. This alone is why acidic foods need to be curtailed; inflammation gets immune cells to help cancer grow and spread. The contribution of red meat’s heme iron to inflammation is also a concern with many cancers. Grain-based high glycemic diets are acid-forming, but also increase insulin and insulin-like growth factors, which better explain the anti-cancer merits of low glycemic hunter-gatherer diet strategies.

An alkaline-ash diet is plant-based - mostly vegetables, fruits, and legumes. Plant foods provide many potent cancer-fighters such as indoles, sulforaphanes, polyphenols, ellagic acid, vitamins and minerals. These
completely explain the excellent responses seen in scientific studies on cancer patients who simply adopt a wholesome and whole foods diet, and increase physical fitness with moderate exercise. A diet rich in fruits and vegetables, low in meat, salt, sugars and high-glycemic starches is sufficiently alkalizing to support recovery from cancer.

Monitoring your urine and saliva pH is unnecessary, and potions to alkalize are pointless. Your blood is so heavily buffered against any deviation in the acid/alkaline pH balance that it takes extreme measures to shift it. "In a controlled human trial, when two diets (with maximal acid and alkaline generating capacities) were consumed, the predictable change in urine pH was significant and in the 1.02 range; however, the change of serum pH was only in the range of 0.014 pH units." (Kerstetter, Kenny, & Insogna 2011). If it does go even slightly off normal pH, a person becomes severely ill. Breathing and kidney functions are immediately altered to compensate. But, even if you accomplished a distinct alkalinization of the tumour, it would have little to no beneficial effect. Simoncini’s IV-bicarbonate therapy has shown no efficacy.

Tumour acidity is far more complicated than simply lactic acid formation from the Warburg effect. Anaerobic glycolysis proceeds in cancer cells even in the presence of normal oxygen tension. Tumours are surrounded by efficient pH buffers, and growth of human tumours is independent of intra-tumoural pH. Alkalizing a tumour is not realistic, nor useful. Alkalizing human tumours may actually increase their growth!

Eat lots of fruits, vegetables, peas and beans. Reduce salt, sugar and meat. Altering the potassium to sodium ratio, which may be just as important as pH. Remember salt impairs wound healing. Restricting salt is the key to reducing metabolic acidosis. You will become very slightly more alkaline on a proper diet and lifestyle regime, but that is only a sidebar to the real goal of getting control over the cancer.

While there is evidence one can alkalize and thereby suppress tumours in mice, this is not substantiated in humans. All that can be expected is extracellular changes in pH on a small scale. Alkalizing the extracellular milieu has been shown to increase cancer cell proliferation in many cancers. Alkalizing promotes an increase in insulin, glycolysis, growth factors, mitogens and tumour promoters. Conversely, acidification can trigger tumour regressions via cytotoxic reductions in heat shock proteins and lactate transport. However, alkalizing the human body may have anti-aging, restorative and healing potential. Do it for general health, not as a cancer cure. Genuine, effective metabolic rebalancing during cancer requires the scientific expertise of a naturopathic physician trained in integrative oncology.

**Acid/alkaline balance and cancer:**

<table>
<thead>
<tr>
<th>Tissue/fluid</th>
<th>Acceptable pH</th>
<th>Ideal pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>7.35 - 7.45</td>
<td>7.41</td>
</tr>
<tr>
<td>Urine</td>
<td>4.5 – 8.46</td>
<td>5.0 – 6.8</td>
</tr>
<tr>
<td>Saliva</td>
<td>6.0 – 7.5</td>
<td>6.60 – 6.75</td>
</tr>
<tr>
<td>Colon</td>
<td>5.0 – 8.4</td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td>1.0 – 3.5</td>
<td></td>
</tr>
</tbody>
</table>

Signs and symptoms of excess acidity:
- gallbladder, neck and shoulder pain
- headache
- acidic stomach
- coated tongue
- swollen tonsils
- cold, moist hands
- clammy skin
- skin rashes
- increased nasal mucus
- irregular, scanty or heavy menstruation
- osteoporosis
To alkalize:
- avoid excess protein intake, particularly red meat
- increase intake of fruits and vegetables
- reduce carbohydrates to a low-glycemic load
- reduce stress
- Capra goat milk whey minerals
- Reduce sodium intake (ordinary salt)
- Alkaline salts – carbonates and bicarbonates of sodium, potassium, calcium and magnesium, eg BioClinic Naturals AlkaCare pH 1 to 2 scoops daily.

SUGAR, BLOOD GLUCOSE, INSULIN & CANCER RISK

High dietary sugar intake is associated with many cancers, including breast, colorectal, biliary and melanoma. The SAD or Standard American Diet is high in refined sucrose from sugar cane or sugar beets. Sucrose, fructose and many other food sugars are mostly converted into glucose, the major sugar found in the blood-stream, and the primary energy fuel for most cells in the body.

Insulin is a protein made in the pancreas and put into the blood to move fats, sugars and proteins into cells. It must attach to the receptors on the cell membrane in order to pump nutrients into the cell. Its attachment is assisted by glucose tolerance factor (GTF), which is composed of chromium, zinc, and some B-vitamins. Insulin increases fat storage and therefore promotes excess body fat. Insulin also activates the liver enzyme HMGCoA reductase to overproduce cholesterol from carbohydrates. Exercise and stress reduction can lower insulin levels.

Insulin resistance is a complex metabolic problem where the insulin cannot get nutrients into the cells. Insulin resistance is linked to increased incidence of cancer of the colon, breast, pancreas, esophagus, uterine endometrium, and prostate. A marker for insulin resistance is the apple-shape body type with prominent abdominal obesity. Insulin resistance can also lead to “Syndrome X” with high blood pressure, cholesterol disorders, cardiovascular disease- atherosclerotic plaque, stroke and heart attacks, and other major health risks such as osteoporosis, osteoarthritis, and premature aging.

Cancer cells metabolize glucose sugar at a rate 4 to 5 times that of normal cells.

Cancer patients increase glucose production in the liver by 25 to 40%, similar to non-insulin dependent adult onset diabetics (NIDDM), also known as type 2 diabetes. Unlike diabetics, cancer patients will continue to increase sugar production even while undergoing starvation, accelerating loss of body mass. They appear to release chemicals that block other cells from ingesting sugars, shunting more to themselves.

Adenosine-mono-phosphate AMP is the energy storage molecule to which phosphate groups are added when cells collect energy form “burning” sugars or fats. The phosphates are then taken away, releasing energy to drive all activity and chemical reactions in the body, and the AMP goes back to be recharged. AMP-activated protein kinase AMPK is a critical cellular energy sensor and regulator. AMPK is inhibited by the accumulation of carbohydrates in cells, most notably in obesity, diabetes mellitus, and pre-malignancy. This confers a replicative advantage, inhibiting apoptosis. In malignancy, substrate limitation is mitigated by AMPK activation, and combined with defective tumour suppressors, the cancer cell undergoes a glycolytic switch.

When there is not enough oxygen to burn sugars in the usual way, cancer cells switch to fermentation. Loss of p53, activation of Akt and hypoxia-inducible factor one HIF-1 (induced by hypoxia or starvation) contribute to glycolysis. Fermentation is not very efficient, making about 20 times less energy from the sugar than if it were burned in the usual way by oxidation, and leaving more harmful residues in the process. Lactic acid from fermentation is highly toxic and a tumour growth promoter.

Anaerobic glycolysis allows energy production without oxygen, but also provides the tumour cells with precursors for the synthesis of cell-building materials - proteins, amino acids, nucleotides, phospholipids and
triglycerides. The net effect is that glycolysis actually improves tumour cell survival and accumulation of biomass.

Tumour dimeric pyruvate kinase M2PK is a marker for anaerobic glycolysis, which can be detected in EDTA plasma or in feces in cancer. It is also increased in inflammatory bowel disease IBD.

Malignant tumours have 1.9 to 3.0 times the insulin and related compounds seen in normal tissue. Most cancer cells have an abnormally high number of insulin receptors, compared to normal cells of the same type nearby.

Insulin is a general growth promoter. Hyperinsulinism and insulin resistance are highly pro-inflammatory, increasing IL-6, C-reactive protein, and NF kappa-B. Hyperinsulinism is seen in about 45% of early cancers, but rises to about 75% of advanced cancer cases.

C-peptide is a marker for pancreatic insulin secretion, accurately reflects the mean level of circulating insulin, and associates with cancer risk.

Post-prandial hyperinsulinemia - high blood insulin after eating - produces a significant surge in the doubling rate of hepatocellular carcinoma cells, which last for several hours after a meal that spikes up the blood sugar. Insulin excess in the bloodstream is not consistently correlated to the glycemic index of the foods due to great individual variability in digestive function and absorption faculty.

Chronic hyperinsulinism and insulin resistance increases delta-9-desaturase activity, which alters the ratio of stearic to oleic fatty acids, which may contribute to post-menopausal breast cancer.

Tumour cells can even secrete factors which block glucose uptake in healthy cells, provoking higher insulin secretion from the pancreas, stimulating further tumour growth and proliferation!

Diabetes increases risk of many cancers, such as pancreas, liver, colon, breast and uterine endometrium. Diabetes makes it harder to control many cancers, with increased rates of reoccurrence and higher mortality. However, diabetes lowers risk for prostate cancer, as low insulin leads to low testosterone levels.

Persons with Diabetes type 2 will have lower risk of cancer if they are on prescription Metformin, compared to those on sulfonylurea or insulin therapy. Metformin selectively inhibits cancer mesenchymal stem cells, blocking stage 2 oxidative phosphorylation, IL-6, AMPK activation and IGF-1.

All efforts to control blood sugar through diet and exercise will support reducing cancer risk. Naturopathic interventions for high blood sugar and insulin dysregulation include B-complex vitamins, chromium, zinc, vanadium, vitamins C and E, flaxseed, omega 3 oils, and R-alpha lipoic acid.

Insulin-like growth factor is produced in the liver. It has a very similar structure to insulin. IGF-1 is 70 amino acids long, and IGF-2 is 67. Insulin-like growth factor one (IGF-1) or somatomedin C is a mitogenic peptide which promotes cell proliferation, anabolism, clonal expansion and inhibits apoptosis. IGF-1 is involved in the decision by the cell to progress from G-0 to G-1 phase of the cell cycle. Elevated levels are associated with a several fold increase in risk of ovarian, prostate, colorectal and lung cancer.

IGF reduces apoptosis, and so high levels interfere with both radiation and chemotherapy, including cytotoxic drugs and EGFR inhibitors. The influence on response rates are quite profound, so it is critical to follow a low-glycemic diet during these medical therapies.

Insulin inhibits IGF binding proteins (IGFBP 1 & 2) and this increases IGF bioavailability. Insulin and IGF may be directly mitogenic, interact with ras protein mutations, stimulate farnesyl transferase, modulate apoptosis, and stimulate angiogenesis by increasing production of vascular endothelial growth factor.
Usually only the IGF gene inherited from the father is active, but in persons with the maternal IGF gene also activated, risk for colorectal cancer is higher. Hypomethylation of DNA in cancer cells leads to a loss of imprinting of the IGF-1 gene.

Estrogen increases IGF-1 receptors on breast cells, increasing their rate of cell division. In turn, insulin and IGF-1 increase ovarian output of estrogen, and increase free estrogen by inhibiting liver production of sex-hormone binding globulin proteins. Free IGF-1 may stimulate estrogen receptors. It’s a vicious cycle.

IGF-1 & 2 are stimulated by human growth hormone (HGH) produced in our pituitary gland. Therefore I do not recommend human growth hormone supplements, HGH releasers, or colostrum products. IGF-1 is excessive in milk from cows given recombinant bovine growth hormone (rBGH) to increase milk production. While banned from use in dairy herds in Canada, we do import and use such milk and it appears on labels as "milk ingredients".

IGF signalling is suppressed by vitamin D - another good reason to take extra vitamin D3, and to get some reasonable exposure to sunshine.

IGF-1 is strongly inhibited by green tea EGCG.

Lycopene reduces blood levels of IGF-1.

Prilosec proton pump inhibitor/antacid will reduce IGF-1 up to 50% within 3 days.

Grapeseed oligomeric proanthocyanidins up-regulate IGF binding protein three IGFBP-3.

Barnard, et al showed that the Prittiken regime – a very low fat whole food diet with exercise – markedly reduces liver production of IGF-1 and boosts IGFBP-1.

Much of the problematic IGF-1 is locally produced within the tumour cells and will not necessarily show up in the blood. A colleague suggests we test insulin and c-peptide and HgA1c with the assumption that IGF-1 is usually produced in parallel with insulin, and abnormally elevated in an insulin-resistant state.

A relatively new treatment uses injections of high doses of insulin to induce a profound hypoglycemic state in the cancer cells, concurrent with chemotherapy or intravenous alternative therapies. This is risky, but does potentiate the other therapies. The oral anti-diabetic drugs Rosiglitazone maleate – Avandia- or Pioglitazone reduce invasiveness and tumour growth by blocking peroxisome proliferators-activated receptors gamma PPARγ. Unfortunately, they also markedly increase risk of stroke and heart attack. Red wine is a PPAR inhibitor.

In naturopathic medical school I was told “sugar paralyzes the immune cells on contact”. I have visualized it like putting salt on a slug – just nasty. As it turns out, sugar has an immediate and toxic effect on immune cells, including those responsible for surveillance on cancer cells. The effect is called glucose-ascorbate antagonism. High sugar intake reduces activity in the hexose monophosphate shunt or pentose phosphate pathway, which reduces available NADPH. This lowers glutathione reduction, reducing recycling of vitamin C (ascorbate), allowing oxidative stress to build to levels which injure immune cells. They cannot produce a respiratory burst of superoxide and hydrogen peroxide against cancer cells and infectious organisms.

Above all, sugar and insulin and insulin-like growth factors are normalized by a wholesome diet and by creating a favorable ratio of lean body mass (sugar burning) to body fat (sugar storage).

An interesting unproven remedy is Salicinum. This natural glycome sugar can only be split by the enzyme beta-glucosidase, which is only active in cells which are fermenting sugars by anaerobic glycolysis. The resulting fragment binds irreversibly to NAD+, stopping energy production from fermentation. In theory this should slow down cancer cells.
WEIGHT LOSS & METABOLIC CACHEXIA

Cachexia is the wasting away of the body triggered by metabolic changes of cancer. It is far more than just loss of appetite (anorexia) and digestive power. It is a critical shift into a chemical imbalance where the body consumes itself to feed the tumour with nitrogen, citrate and other elements. It occurs very early on as even very small tumours divert resources from distant fat and muscle tissue. It is a cause of great distress, weakness, and robs the person of dignity. It is often manageable, which can prevent premature death and suffering.

Involuntary loss of 5% of lean body mass in the past 3 months or a 10% weight change in the past 6 months is a high risk negative prognostic indicator. A 20% loss is a critical condition.

Cachexia is a response to overwhelming oxidative stress. Tumour products such as lipid-mobilizing factor LMF directly stimulate lipolysis (fat burning) in a cAMP dependent system. IMPL2 protein may be released by tumours, blocking insulin response throughout the body, reducing sugar importation and triggering fat and muscle wasting. These substrates get diverted to tumours to make the components from which new cells can be constructed. NFκB activates a specific inflammatory syndrome in skeletal muscle fibres, which in turn initiates catabolism of skeletal muscle. Proteolysis-inducing factor PIF involves activation of NFκB and the acute phase protein STAT-3 transcription activator. Cachexia is also triggered by host immune factors such as the cytokines IL-1, IL-1B, IL-6, INF-gamma, TNF-alpha. TNF and upregulate ZIP14-mediated zinc accumulation in muscles, inducing myosin heavy chain loss.

Tumour necrosis factor alpha TNFa produced by macrophages, lymphocytes and NK cells, is also called cachectin because it causes anorexia and weight loss, via the hypothalamic satiety center in the brain and by inhibition of gastric emptying. It increases glucose uptake, insulin resistance, protein catabolism in skeletal muscle, depletes fat stores, and is associated with fatigue and alterations of the sense of taste. TNF also induces reactive oxygen species, which are involved in tissue wasting.

TNF can be inhibited in a clinically significant way by appropriate doses of curcumin, green tea epigallocatechins EGCG, eicosapentanoic fatty acid omega 3 oil EPA. Cachexia in cancer patients is consistently responsive to eicosapentanoic acid EPA supplements such as fish oil or seal oil. Omega 3 oil will improve quality of life, appetite and weight gain. EPA is the most effective supplement to manage weight loss. Rx at least 2 grams EPA daily. I prescribe harp seal oil, 2+ capsules twice daily. There are some distilled fish oils from sardines and anchovies, which are of acceptable quality, and krill oil may act similarly. American colleagues recommend extra virgin coconut oil for medium-chain triglycerides and coconut flour or coconut milk. Give also melatonin, vitamin E or vitamin E succinate VES, and the botanicals Uncaria tomentosa - cat’s claw and Silybum marianum - milk thistle. Royal jelly with ginseng is a pleasant and effective nutritive general tonic for the qi and blood, strengthens and invigorates the fatigued cachexic patient. Best results are seen when combined with ganoderma (reishi) mushroom. These can restore appetite, nutrient and medication absorption, and body weight. If they are very Yang deficient add more Chinese ginseng Panax ginseng, or Siberian ginseng Eleutherooccus senticosus. Homeopathic Arsenicum iodatum is helpful in cachexia. Phytolacca helps emaciation and rapid exhaustion. Colleagues use branch-chain amino acids, magnesium, colostrum, marrow-bone broth, fermented cod liver oil. L-glutamine and L-carnitine. L-carnitine is shown to inhibit inflammation and cachexia in pancreatic cancer cases.

For appetite and weight gain a prominent FABNO gives Oralmat activated rye grass extract, 3 drops sublingually thrice daily.

Dr. David Baker, MD was a family doctor in Victoria, who now works primarily with AIDS patients, locally and in Africa. David has developed an effective cure for cachexia in AIDS patients, including the anti-oxidants R-alpha lipoic acid, grapeseed extract OPCs, vitamin C, pumpkin seed and Brazil nuts.

Progesterone has a proven track record of benefiting appetite, and subjective well-being. Megace is commonly prescribed. It is presumed to down-regulate the synthesis and release of cytokines. It increases body weight, but unfortunately this is only water retention, not a change in lean body mass. Progesterone therapy can lead to blood
clots such as deep vein thrombosis, as well as menstrual spotting, and sexual dysfunctions. It is not clear if progesterone therapy will stimulate PR+ breast tumours.

Thalidomide has shown some potential benefits on appetite, nausea and well-being. Other drugs being studied are Ibuprofen at 50 mg twice daily to reduce C-reactive protein; pentifylline I.V. to reduce TNFα; and COX-2 inhibitors celecoxib or rofecoxib to modulate prostaglandins involved in cachexia as well as in the development of cancer. There are many natural COX-2 inhibitors. Corticosteroids are used to inhibit prostaglandins and to suppress TNF production. The results on appetite, food intake and quality of life are short-lived, and there are significant risks of adverse effects. Steroids are best reserved for end-stage palliation. Rx: 4 to 8 mg daily of Dexamethasone.

The drug hydrazine sulphate was developed by Dr. Joseph Gold, MD to stop the cachexic process. It was the first non-toxic chemotherapy developed, only causing some nausea and limb weakness in some cases. It is very inexpensive. It inhibits gluconeogenesis, slows or stops tumour growth, and produces significant improvement in subjective symptoms in at least half of terminal cases - in other words patients just feel better, have less pain, more energy, and increased appetite. Despite strong science from America and Russia, the cancer institutions such as the National Cancer Institute and and the American Cancer Society have systematically blocked research efforts and have marginalized this drug. Being on hydrazine sulphate does require a lot of dietary restrictions, as it interacts with many other mono-amine oxidase inhibitors in common foods and drugs. I think omega 3 EPA, L-carnitine and melatonin are much better choices.

Registered dieticians plan a diet with a daily intake of 1.4 to 1.5 g protein per kilogram of body weight, and a caloric target of 30-35 calories daily per kilogram of body weight for a cachectic stage IV oncology patient.

PROTEIN and CANCER

Protein intake is a huge modifier of outcomes. Tumours become nitrogen sinks by catabolizing skeletal muscle, recruiting amino acids for gluconeogenesis via the lactic acid Cori cycle. If we do not feed protein consistently, protein will be drawn from the patient’s flesh. Your doctor will probably test regularly for total blood protein, and the liver output of albumin and globulin proteins.

Your doctor may want to assess protein digestion by measuring stomach acid hydrogen chloride HCl, gastric and pancreatic digestive enzymes, and protein absorption. Falling albumin levels may indicate oxidative stress in the liver, particularly if you also see altered uric acid and bilirubin levels.

Some integrative oncology doctors advise against dairy foods. One reason cited is that the casein protein triggers protein will be drawn from the patient’s flesh. An enzyme that ramps up to digest it is casein kinase, which unfortunately can increase beta-catenin. This induces survivin, suppressing apoptosis while triggering hyper-proliferation of cancer cells.

Fish are generally fine if caught in the wild and eaten while still fresh. Highly recommended are salmon, pollock, sardines, sablefish, hake, herring and Pacific cod. Some farmed seafood are acceptable, such as mussels, clams, oysters, trout, tilapia. – just do some due diligence on how they are being fed.

L-glutamine is the most abundant amino acid in the human body, comprising 50 to 80% of the amino acid pool. It is used by the gut, the immune system and nervous system. Approximately 51% of the energy requirements of the upper gut mucosa comes from glutaminolysis.

L-glutamine is used medically in healing from surgery, injury, sepsis (widespread infection), and starvation. It is not commonly found in intravenous feeding (total parenteral nutrition - TPN) solutions as it rapidly hydrolyzes, so supplement with up to 30 grams daily by mouth or add to a parenteral bag for cachexia. Even 2 grams can make some difference. L-glutamine is very useful to reduce cravings for alcohol.

In cancer, glutamine is an important secondary fuel of cancer cells, generating 30 ATP energy molecules per glutamine. It is a critical stimulant of protein and nucleic acid (DNA and RNA) synthesis. L-glutamine protects the body from ammonia build-up, absorbing this toxic by-product of proteins, acting as a “nitrogen shuttle” to
divert ammonia into amino acids, amino sugars, urea, and nucleotides. It protects the gut lining from radiation and chemotherapy, suppresses prostaglandin PGE2 synthesis, and stimulates NK natural killer cells. It is critical to immune competence against infection, fuelling neutrophils, monocytes lymphocytes, improving the Th1/Th2 ratio. It reduces gut permeability changes and diarrhea caused by 5-fluorouracil. It protects from taxane neuropathy. It can prevent and treat oral mucositis. Cancer cells up-regulate glutamine transporter, and glutamine acts as a gamma-glutamyl donor. Via GGT this helps cancer cells increase glutathione levels. An exception is in leukemia bone marrow transplant cases, where it can cause glutathione depletion. Oral glutamine suppresses oxidative stress and reduces inflammation, improving host defenceses and vitality.

L-carnitine drives mitochondrial energy production. Steve Levine, PhD is researching it as a “bio-energetic” regulator of mitochondrial dysfunction in cancer cells. It can help fight fatigue, and help fuel tissue repair. Acetyl-L-carnitine is a fat-soluble form of the amino acid, which allows it to readily cross the blood-brain-barrier. Therefore it is more much useful than plain carnitine for healing nerve injury and for brain health, such as correcting “chemo-brain” – toxic cognitive impairment. It re-myelinates and reduces nerve cell apoptosis. L-carnitine is a peripheral antagonist of thyroid hormone action, so beware in cases of hypothyroidism. In particular, L-carnitine inhibits both triiodothyronine (T3) and thyroxine (T4) entry into the cell nuclei - thyroid hormone action is mainly mediated by specific nuclear receptors. Rx 1 grams, 2 to 3 times daily.

Serum albumin under 3.5 is high risk, and survival falls 33% for every point decrease. Serum albumin falls with metastases, liver disease, expanded serum volume, and renal dysfunctions, so it does not just reflect loss of lean body mass. Low albumin can be from poor protein intake from the diet or oxidative stress, or both. If albumin, uric acid and bilirubin are abnormal, treat for severe oxidative stress in the liver. Serum half-life of albumin is 3 weeks, so it changes slowly on the labs. Albumin protein holds fluid in the vessels by colloid pressure, turning blood plasma into a thin gel. When albumin is very low in the blood, blood balance throughout the body can be compromised, with ascites and effusions of fluids where they do not belong.

Alpha-lactalbumin in human breast milk induces apoptosis in malignant trophoblastic cells in the infant digestive tract. Medical whey protein supplements retain this in an active form.

Whey protein lactalbumine in cow’s milk is an excellent source of supplemental protein for cancer patients. Take 1 ounce or 30 grams of powder in liquid drink twice a day. Whey strips glutathione out of cancer cells, but raises it in normal cells! Dr. Keith Block, MD is a medical oncologist of over 30 years experience, and a leader in integrative oncology, who is generally not pro-dairy, supports the use of whey supplements in nutritionally challenged patients. Some sensitive patients using whey may experience elevated markers of inflammation, such as ESR and CRP. These cases will do better on rice protein supplements.

SeaGest is a peptide concentrate from fresh lean white fish of the North Pacific, at 12 to 20 capsules daily for wound healing, to arrest cachexia, and for general vitality. The fish is bioconverted to peptides and amino acids by bacterial fermentation. Assimilation is nearly 100%. Related products include Foundation, formerly known as SeaCure. Haelen is a nitrogen enriched fermented soy protein drink developed in Chinese hospitals to supercharge their cancer patients with protein. It tastes yucky and is really expensive.

Cancer cells tend to have abnormally increased concentrations of glycine, alanine, taurine and glutamic acid.

Methionine should be restricted as it limits the increase in hydrogen sulfide triggered by caloric restriction.

MINERALS

I am a great admirer of the late medical geographer Dr. Harold Foster, PhD. He studied the mineralization of soils around the world, and correlated dietary intake of minerals with hundreds of medical conditions. His website www.hdfoster.com was one of my favorites. He felt the keys to controlling cancer are

- avoid mercury, and detoxify if exposed
- take adequate amounts and forms of selenium - ie yeast selenium 200 – 400 mcg.
- take adequate amounts and forms of calcium
- avoid chronic exposure to ferrocyanide from road salt, including water from polluted aquifers.
BORON

Boron is ubiquitous in food, including apples, pears, grapes, bananas, peanuts, beans, salad greens, broccoli, coffee, wine. Boron is protective of bone health, in part by increasing 17-beat estradiol levels in healthy postmenopausal women, and in men. Adequate dietary boron lowers risk of lung cancer.

CALCIUM

Dr. Harold Foster, PhD the renowned medical geographer has found high calcium in soils and water corresponds to populations with lower cancer rates. The benefits of hard water were amplified if selenium was also abundant.

Calcium at 1,200 mg daily of common forms such as calcium citrate or calcium carbonate reduces cancer cell proliferation, assists re-differentiation, and binds unconjugated bile acids. It is shown to reduce risk of colon cancer, and this effect lasts long after periodic dosing. In women, it reduces risk from all cancers.

The Calcium Paradox is a toxic build-up of calcium inside cells or cellular hyper-calcinosis, occurring when blood calcium is abnormally low. Usually this occurs with low dietary intake of calcium, and/or deficiency of vitamin D3—which assists calcium’s absorption, metabolism and retention. Free calcium inside a cell moves protein kinases to the plasma membrane for phosphorylation, switching on growth and proliferation.

Low dietary calcium increases expression of the inflammatory molecule COX-2. High calcium inside the cells alters inflammatory eicosanoids via activation of NFkB, increasing lipid peroxides and thus oxidative stress in the mitochondria.

Microcrystalline hydroxyapatite ossein complex or MCHA calcium will harden the bones, reducing risk of metastases to the bones. If bone mets have occurred, this calcium will reduce or arrest the spread of cancer within bone, and generally reduces bone pain rapidly and significantly. It has bone growth factors which lay strong new bone in where it is needed, as well as preserving old bone. It increases bone density, bone mass and bone strength.

I recommend formulations with adjuncts such as strontium, magnesium citrate, vitamin C, vitamin D3, and boron. We give 2 to 3 caps twice daily. The therapeutic dose of yields 600 mg of elemental calcium. There is no need to go higher, as the product does not work by its calcium alone, but by building the protein and proteoglycan scaffolding to which the minerals are attached in the bone matrix. This is like the steel re-bar in concrete or wire mesh in a glass window. It binds the brittle minerals into a strong and flexible structure.

CESIUM

Cesium resembles and substitutes for potassium in biological systems. It is taken up strongly by cancer cells, where it can raise intracellular pH to the point of cell death and necrosis. Doses under 3 grams per day increase tumour growth – recall that alkalinizing a tumour can accelerate its growth. Doses over 6 grams are purported to treat cancer. Doses should never exceed 9 grams daily. Reactions include hypertension, diarrhea, increased salivation, nausea, locomotor impairment, and injury to the heart and kidneys. I have met a few people who appear to have benefited from cesium, but due to toxicity concerns, I am not willing to recommend it at this time.

COPPER

Copper increases blood vessel growth into tumours (angiogenesis), so excess is to be avoided strictly. Copper also suppresses mitochondrial oxidative phosphorylation, inhibiting apoptosis. Beware copper water supply pipes, kettles, pans, and other sources of exposure. Use a good water treatment system if you have copper pipes. Copper can be chelated out of the body by supplementation with R- alpha lipoic acid, N-acetyl-cysteine, MSM, curcumin and taurine. Ammonium tetrathiomolybdenate 20 mg tid with food will chelate copper more aggressively. However, copper as a trace mineral in the diet is required for the proper function of a protein called ceruloplasmin, an iron transporter. Ceruloplasmin down in the 10 to 20 mg/dl range can impair the ability of bone marrow to make red blood cells, leading to anemia. This type of anemia looks like iron deficiency, but will not respond to iron supplements.
IODINE

Iodine as found in potassium iodide, is an old-school tonic to the thyroid gland. Low thyroid is associated with poor immune function and healing. Hypothyroid is also linked to constipation, which is very detrimental to a cancer patient. I have seen patients pulled back from the brink of death by getting their bowels moving, and the relief of pain that accompanies this is also remarkable. The thyroid interacts in complex ways with sex hormone balance. For example, we will use iodine supplements to reliably get rid of fibrocystic breast lumps. Iodine helps adjust mitochondrial membrane function; delta iodolactones increase apoptosis.

Iodine deficiency is really rare since salt has been iodinized. Be aware that supplementing iodine can trigger Hashimoto’s auto-immune disease of the thyroid gland.

Dr. Max Gerson felt that iodine counteracts the neoplastic effects of the sex hormones such as estrogen. Iodine is used to make thyroid hormone, which sets the body thermostat, and how fast all the metabolic systems will run. Adequate thyroid function is critical to detoxifying the body of toxins produced by cancer cells, by toxic therapies for cancer, and especially to clear off the wastes and cell fragments as cancer cells die from a good therapy. Even natural therapies can result in a huge burden on the reticulo-endothelial system and liver detox systems, so it is critical to support the body in throwing off the diseased tissue. Potassium iodide was found in the Hoxsey formula at 3% W/V. Gerson used Lugol’s iodine solution or desiccated thyroid extracts. The recommended therapeutic dose of elemental iodine is 2 to 4 mg. daily. One drop of Lugol’s yields 2.083 mg, so the usual dose is 1 to 2 drops daily. Sometimes a patient will experience Iodism - pimples on the face, forehead or shoulders, watering eyes, and a runny nose. Rarely, allergic reactions can occur, with vomiting, cramps, fever, palpitation, and emaciation. Iodine will pass in breastmilk and will cause nursing babies to lose weight.

<table>
<thead>
<tr>
<th>Lugol’s content per drop</th>
<th>Iodine</th>
<th>Iodide</th>
<th>Total</th>
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<tr>
<td>2%</td>
<td>1.0 mg</td>
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<td>15%</td>
<td>7.5 mg</td>
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</tbody>
</table>

IRON

Iron is the mineral that makes us able to deliver oxygen around in the blood, and to carry off carbon dioxide waste. The iron is the core of the hemoglobin protein, the red in the red blood cells.

Chronic illnesses such as cancer tend to induce a chronic, low grade anemia. If your red blood cells RBCs are reduced in number, and smaller than normal in size MCV, you may have iron-deficiency anemia. However, it is important that your doctor check your blood ferritin level to check on your iron transport activity. Iron supplements are only prescribed if the ferritin is low, and only for a specific period of time. I like to Rx 30 mg of iron citrate at every meal for one month, then retest. Iron is pro-oxidant, tends to stimulate tumours, and can aggravate bacterial infections.

Iron in plant foods, such as beans, is in an electronic state that makes it hard to absorb in our digestive tract. The heme form of iron in animal foods, particularly red meat, is absorbed much more readily. Unfortunately, red meat intake is linked to increased cancer risk. I do allow patients to have some clean animal protein in their diet, if they wish. Their meat must always be grass pasture fed, and will be rich in healthy fats such as the anti-inflammatory omega 3 oils and CLA. Ordinary commercial and restaurant grade meat, finished in feedlots with corn silage and artificial diets, is higher in saturated fat and omega 6 oils, as well as the potent growth promoter IGF-1. It is believed that the heme iron in meat induces intense lipid peroxidation in the presence of these pro-inflammatory agri-business animal fats, causing cancers of the breast, colon and other organs. Cancer cells use more iron than normal cells, and so therapies that reduce iron actually can be very useful – such as artemesinin from wormwood. Perhaps the anemia in cancer cases is a natural defense mechanism. Certainly we do not want
to give iron to cancer patients unless it is really necessary, as demonstrated in blood tests showing microcytic anemia, low MCV and low ferritin (iron reserves).

To reduce an iron overload drink black tea at meals, without milk. Tea tannins bind dietary iron and prevent its absorption. Tumeric in curry and chili peppers bind iron and keep it from cancer cells. Lactoferrin and artemisinin rob the cancer cells of iron. Ammonium tetrathiomolybdenate 20 mg tid with food will chelate iron.

LITHIUM

Lithium can substitute for sodium in many cellular reactions. It inhibits glycogen synthase kinase GSK-3. It will increase circulating neutrophil granulocytes and platelets. It is known to help manage melanoma, prostate and uterine cancers, and the bony lesions of multiple myeloma. High dose inhibit promyelocytic and hairy cell leukemias, but beware – low doses increase leukemic cell proliferation. It is not recommended for lung cancer or parathyroid adenomas.

MAGNESIUM

Magnesium correlates with protection from prostate cancer, perhaps because it inhibits the secretion of insulin. It is also used in the mitochondria, important regulators of apoptosis. It is very important for heart health. Always take magnesium citrate when taking calcium supplements, for bone and heart health.

POTASSIUM

Potassium salts are perhaps the most critical minerals in controlling normal cell function, and it is absolutely certain that our ancestors ate a lot more potassium than modern humans. The agricultural diet has inflicted a huge reversal of the ratio of sodium to potassium seen in hunter-gatherer diets. Potassium is found in all vegetables, and it is a good idea to drink the water in which vegetables are cooked. Excellent food sources are potatoes and bananas. For those of you into energetics of medicines, this mineral has a very high “bovis” frequency, meaning it regulates homeostasis and supports vital life functions.

The sodium to potassium balance – Na+/K+ - influences cellular protein configurations, and shape equals function and performance in proteins. Sodium distorts and slows many metabolic enzymes, while potassium straightens them out and revs up their functionality. We call this proteosomal regulation, and it is an important issue in controlling the growth of cancer cells.

Potassium tends to be intracellular, creating a net negative electrical charge inside the cell. Sodium is primarily extracellular, creating a net positive charge outside the cell. Sodium enters cells as a carrier of glucose. Reduced ATP in cancer cells slows the sodium-potassium pump. This results in the accumulation of sodium inside the cancer cells, leading to edema, sluggish metabolism and reduced resting cellular electro-potential.

From Dr. F.W. Forbes Ross in early twentieth century London, to the Americans Professor Andrew C. Ivy, Dr. Max Gerson, and Harry Hoxsey in our time, the use of potassium iodide, potassium citrate, and potassium phosphate has been associated with cancer cures.

Potassium iodide is routinely used at 5 grains weekly, or about 50 mg daily. Certainly it is generally safe in these dosages, as it has long been used at twice this dose as an expectorant for coughs. Sometimes a patient will experience Iodism - pimples on the face, forehead or shoulders, watering eyes, and a runny nose. Rarely, allergic reactions can occur, with vomiting, cramps, fever, palpitation, and emaciation. Potassium iodide will pass in breastmilk and will cause nursing babies to lose weight.

SELENIUM

Selenium is an anti-oxidant strongly associated with cancer prevention. At intakes of at least 200 mcg daily, selenium normalizes expression of BRAC gene mutations, restoring DNA repair and preventing cancer. It is required by the Guardian of the DNA – the p53 gene protein.
Some consider it to be a useful pro-oxidant therapy at 400 to 800 mcg. It may be given intra-muscular at 1,000 mcg every second day for 3 weeks. Dr. Foster likes yeast selenium – inorganic selenium fed to yeast and then reclaimed in an organic form. Some suggest methyl-seleno-cysteine. I prefer to prescribe the yeast selenium. Organic forms of selenium may inhibit angiogenesis. Organic selenium is synergistic with the 5-LOX inhibitor Boswellia. It has been suggested recently that selenium is actually quite counter-productive in cases of prostate cancer, so we no longer use it as a therapy. I only recommend it to patients with BRAC mutations.

**SODIUM**

Salt delays wound healing after surgery. It induces swelling due to water retention by the kidneys. It can trigger fatigue. Putting extra salt on food is an addiction. Wean off it gradually, and in time you neither want it nor need it. Sodium in salt antagonizes potassium, and in the modern diet we eat a lot less potassium and a lot more sodium than our ancestors did – and this is a major factor in many chronic and degenerative diseases.

**ZEOLITE**

Volcanic lava running into sea water is a natural source of zeolite. It can be liquefied with acid and heat. Zeolites detoxify the liver, remove heavy metals and xenobiotics, alter cell membrane charge, absorb antigens, block viruses, and is said to inhibit cancer cells. The anti-cancer action is primarily attributed to activation of gene p21, a universal inhibitor of cyclin-dependent kinases. It may induce apoptosis. I have seen it give clinical relief of cancer pain. I am not sure if it does any more than that. Natural Cellular Defense is a brand taken orally at doses of 10 to 15 drops 3 to 4 times a day. This requires 4 bottles a month, but maintainence doses of 3 drops 3 times daily require 1 bottle per month. It is harmless, but contraindicated if you are taking prescription lithium or a platinum chemo drug.

**ZINC**

Zinc is anti-angiogenic by competitively reducing copper absorption. Zinc enhances apoptosis and DNA repair mechanisms. Zinc deficiency has been linked to squamous cell cancers. Zinc replenishment prevents and reverses oral and esophageal cancers, likely by regulating COX-2 inflammatory growth factor and human papillomavirus. It prevents and treats radiation dermatitis and mucositis in head and neck cancers. Zinc activates thymus gland maturation of T-cells immune function. Zinc is vital to collagen formation for normal tissue repair.

**DIETARY FIBRE**

Adequate fibre intake is associated with lower risk of colorectal cancer. Pre-agricultural “hunter-gatherer” diets were very much higher in fibre than modern diets.

Fibre contains lignans and phytoestrogens which are anti-estrogenic. Lignans, phytoestrogens and and isoflavonoids in food fibre stimulate production of sex hormone binding globulins (SHBG) which bind free estrogen. Gut fibre will diminish re-uptake of sex hormones, binds hormones and xenohormones and carries them out in the feces. Lignans can also disrupt cancer cell mitochondrial membranes.

Phyto-estrogens can be anti-estrogenic, and actually reduce growth of estrogen-sensitive cancers. Many plant estrogens bind very poorly to human estrogen receptors – they have a low affinity, due to their shape and charge variations. They can plug up a receptor, fail to stimulate a growth signal, while keeping out any high affinity estradiols.

Take a daily fiber supplement such as psyllium husks and ground flaxseed. Start with a teaspoon of each a day, and gradually increase to a heaping tablespoonful each a day. It can cause increased gas at first, and later the bowel movements can become slimy, so work to find the right dose for your best bowel function.

Flaxseed is the richest known source of lignans which bowel bacteria can convert into entrolactones. These are strongly anti-estrogenic phytoestrogens. Even one teaspoonful of flaxseed daily raises the 2-OH estrone blood
levels, and improves the ratio of good to bad estrogens. This is why the recommended dose of 2 tablespoons daily of fresh-ground flaxseed has been able to slow breast cancer growth, reduce invasiveness and impede the spread into lymph nodes. Flaxseed lignans induce production of sex-hormone binding globulin SHBG proteins, and reduce the number of receptors on cancer cells for insulin-like growth factor one IGF-1. They are also anti-angiogenic, anti-inflammatory, anti-oxidant, detoxifying, and anti-parasitic.

Psyllium husks are an excellent fibre supplement, being of a type preferred by gut bacteria to make butyrates and other beneficial short chain fats. These fats are essential for repair and normal function of the lining of the gut, and are not part of the human diet. They only can be made by probiotic bacteria from whole food fibre. Psyllium husks will interact with some prescription drugs. Psyllium reduces absorption of lithium and carbamazepine, and alters the cardiotoxic effect of digitalis, beta blockers and calcium channel blockers. Never administer these drugs at the same time as fibre supplements. Fibre supplements require professional supervision if there is a risk of bowel obstruction or other GI diseases.

PGX™ fibre from Natural Factors brand is an excellent way to manage blood sugar, reduce insulin resistance, and manage weight. Increase slowly due to potential to cause increased bowel gas. Take up to 3 to 5 before meals.

IP-6 or phytic acid up-regulates p21 and p53 genes while down-regulating mutant p53. Blocks tumour initiation and progression. At 5 to 8 grams daily it may inhibit breast and colon tumour growth. Phytic acid strongly chelates dietary minerals and medications, so take fiber away from all medicines. It tends to aggravate iron deficiency anemia in cancer patients, which can manifest as fatigue, sleepiness or feeling faint. One of my reputable and learned naturopathic colleagues co-wrote a book about IP6 titled “Too Good to Be True?” Unfortunately, I have to say my clinical experience with it has not been notable. I find there are more fruitful therapies which are easier and cheaper.

Modified Citrus Pectin

The most dangerous thing a cancer cell can do is spread to distant parts of the body and grow into a new tumour. Often it is the spread into the vital organs such as the liver, lungs or brain which causes the most suffering and is often fatal. This ability to metastasize and live in a new environment depends on the cancer cell attaching itself to the new site. If it cannot anchor its mitotic spindle, it cannot pull itself apart into two cells. No doubling of cells means no problems.

Ordinary fruit pectin can be modified by high heat and acid treatment to form small water-soluble carbohydrates which bind to proteins on cancer cells and stop them from attaching. The modified or fractionated pectin binds to galectin-3 proteins on the cancer cell surface, the major non-integrin cellular laminin-binding protein. This acts like putting flour on Scotch tape. The cancer cell coated in this small carbohydrate cannot stick anywhere to the vascular endothelium. If it cannot arrest by binding selectins on blood and lymph vessels, it cannot move out into new tissues.

Studies in mice and rats, against breast, prostate, colorectal, lung, melanoma, sarcoma and other cancers show consistent results in reducing the spread of cancer, the rate of tumour growth and blood vessel formation in new tumours. Because all cancers have these sugar-binding proteins for adhesion, it is expected to be useful in all solid tumour cancers. Galectin-3 is a marker for inflammation, and promotes cell-to-cell adhesion, cancer cell aggregation, angiogenesis, tumour growth, metastasis and fibrosis. Galectin-3 also inhibits apoptosis. Stage 3-4 tumours express less galectins, so MCP is somewhat less valuable in advanced cancers.

MCP is essential protection for patients undergoing tumour biopsy, surgery or therapy that may cause the tumour to shed cells. There is a 1 to 2% risk of spread of cancer by biopsy or surgical procedures.

MCP is appropriate also for tumours such as melanoma skin cancer which tend to spread very early in the course of the disease. Phase I trials in humans have been very successful, and phase II trials are underway.
Recent studies indicate MCP taken long-term can slow the growth of some tumours. MCP antagonizes heparin-dependent fibroblast growth factor 1 (FGF-1) and its receptor FGFR-1. MCP blocks nm23 gene expression. There is evidence it can increase the cytotoxic response of NK cells.

There is emerging evidence that MCP removes toxic heavy metals from the human body. I have observed generally better survival in patients who take it long-term, compared to similar cases who do not take it.

MCP may inhibit substances associated with capillary leakage, which would be helpful in treating ascites.

The dose is 6 to 30 grams daily, divided in 2 doses. The effect is dose-dependent, so most doctors recommend at least two teaspoons or about 8 grams of the powder daily. Quality is critical. I prescribe 1½ scoops or 4 capsules, twice daily. Use only MCP that is standardized to mostly small pieces under the ideal molecular weight of 13 kilodaltons, and with low esterification. This size and form will stick to cancer cells, which is why it has become the standard in cancer research. Products with larger pectin pieces may chelate lead and mercury, but are useless for cancer care. The standard bulk powder is quite sticky, but it can be dissolved in some water (dissolves best if it is hot water) or juice using a blender, or electric wisk. I use a Magic Bullet brand one-cup blender. The new lime version is much easier to dissolve in cool water. Most prefer to take it in vegetarian gelatin capsules, Rx 4 caps twice daily. Four of the common size “00” size capsules equal one teaspoonful. MCP is a food grade substance, and non-toxic. Bowel movements may at first be a little looser than normal.

**DIETARY FATS**

Low fat diet before diagnosis is associated with 70% lower risk of mortality in breast cancer cases. However, changing to low fat diet after diagnosis has no measurable survival benefit. While it may be too little too late, a reasonably low fat diet with a balance of fats is healthful and may reduce risk of heart disease, stroke, diabetes, and most other diseases.

Tumours increase fatty acid oxidation and lipolysis to provide the gluconeogenesis substrates glycerol and free fatty acids. This allows them to make energy without sugars.

**GOOD FATS - Omega 9, GLA, and Omega 3 EPA, DHA, DPA**

Extra virgin grade or cold-pressed olive oil has the omega 9 monounsaturated oleic fatty acid, squalene and phenolic antioxidants known to protect against cancer of the breast, colon or skin. Oleic acid inhibits conversion of arachidonic acid AA to the highly inflammatory and carcinogenic prostaglandin PGE-2. In prostate cancer this conversion is ten times that in benign prostatic hypertrophy BPH or enlarged prostate gland.

Linoleic acid is also a dietary replacement for saturated animal fats, to reduce risk of prostate cancer. Cold pressed vegetable oils with this fatty acid include sesame, grapeseed, olive and coconut.

Conjugated linoleic acid CLA from meat and milk of grass-fed animals inhibits tumour initiation and reduces metastases at 1% of dietary calories. CLA is cytotoxic and cytostatic, modulates cellular responses to tumour necrosis factor alpha, enhances cell-to-cell communication, reduces hyperinsulinemia, benefits cachexia, and increases IL-2 production. Loading dose is 100,000 to 3,000,000 units. There is a small risk of dry skin, headaches and changes in liver enzymes.

Monosaturates and gamma linolenic acid (GLA) from nuts and seeds. GLA is associated with induction of cAMP, which redifferentiates cancer cells, and restores contact inhibition. GLA reduces angiogenesis by inhibiting vascular endothelial cell motility. GLA decreases the tumour promoter prostaglandin PGE-2. GLA reduces estrogen receptor expression, synergizing with Tamoxifen. Evening primrose, black currant or borage oil are all good sources.

Omega 3 fats are found in soy, canola, walnut, almonds, flaxseed (ALA), fish oils - especially eicosapentanoic acid EPA and dihexanoic acid DHA. Omega 3 oils increase survival time in generalized malignancy. Ω3s
modulate T-cell balance, markedly increasing the helper: suppressor ratio. Support with a little mixed/gamma tocopherol vitamin E, to retard oxidation/rancidity.

EPA reduces PGE2 production by competing for arachidonic acid AA with LOX, COX-1 and COX-2. EPA alters many other cytokines and prostaglandins such as 4-series and 5-series leukotrienes, thromboxane A-3, PGI-3. The resultant anti-inflammatory, vasodilating and blood-thinning effects reduces cachexia, inhibits metastasis, promotes apoptosis, modifies cell-cell signalling, and improves immune helper-suppressor cell ratio. EPA appears to down-regulate VEGF ligands and receptors, inhibiting tumour angiogenesis.

DHA alters proteasomal regulation of beta-catenin, which modulates genes for VEGF, PPARΔ, MMP-7, MTI-MMP and survivin. DHA changes the cardiolipin lipid composition, hence changing the mitochondria membrane voltage and the cytosol membrane flexibility, adding more receptivity to other agents like cytotoxic drugs or natural agents like butyrate and R+ alpha lipoic acid. DHA inhibits TNFα, lipid peroxidation as measured by malondialdehyde MDA, and reduces inflammation as measured by CRP. It can prevent kidney damage by cisplatin chemotherapy. It increases chemo efficacy generally, by regulating cytokines such as IL-1 and IL-6.

Grass fed beef has a 2:1 ratio of Ω 6 fats to Ω 3 fats. This ratio shifts to 10:1 Ω 6:Ω 3 in cattle are fed corn silage.

SHARK LIVER OIL

Shark liver oil contains alkylglycerols which are powerful stimulants to humoral and cellular immunity, including a marked effect on NK cell activity, protein tyrosine kinases and angiogenesis. It helps recovery from bone marrow suppression after chemotherapy or radiation. Animal studies show a great synergy with probiotics. Use 6 daily of 200 mg capsules for up to 30 days maximum. Excess use may over-stimulate platelet production. Sharks are apex predators and bio-accumulate toxins such as heavy metals. This means their liver oil is ‘dirty” and should not be taken long-term.

BUTYRATES

Butyrates are four carbon fatty acids first found in butter. Butyrates are formed naturally in the gut by friendly bacteria (probiotics) digesting fibre, such as the fibre in psyllium seed husks. Butyrates stabilize the DNA and genetic code by regulating histone proteins; inhibits histone deacetylases, especially H4. Butyrates inhibit Bcl-2, increasing apoptosis. Butyrates increase p21 cyclin-dependent kinase inhibitor by 30 to 50 times, even in the presence of mutated p53. Butyrates increase nuclease access to chromatin, relaxing the strands, increasing the rate of transcription, most notably the MAPK cascade, ERK1/2 phosphorylation and induction of AP-1-like transcription factors for GSTP1 gene expression leading to increased cell glutathione-S-transferase. Butyrates may induce re-differentiation in colorectal and other cancers, reduce gut inflammation and improve absorption of magnesium. Salts of butyric acid can be made with sodium, potassium or other minerals e.g. TriButyrate sodium 4-phenylbutyrate. The taste and odor is similar to rancid butter, which naturally some find objectionable. Butyrates were found to increase colorectal cancer in some animal studies, but most studies showed great promise. Human clinical studies show minimal benefits from butyrate supplements. I prefer to prescribe psyllium husks and probiotics and let them make the butyrates where and as they are needed.

BAD FATS

Arachidonic acid AA, trans-fatty acids, excess linolenic acid LA, saturates, and omega 6 fatty acids -corn, soybean and safflower oils. Omega 6 fats are too high in the modern Western diet, such as from corn oil in margarine and shortening, and in meat fed on corn silage. These promote inflammation.

Trans-fatty acids TFA in hydrogenated oils and polyunsaturated fatty acids PUFAs are pro-oxidants and promote mutation. Too much TFA’s are common in any oil that has been over-heated, especially in frying foods or grilling. PUFA’s go rancid fast, and do not stand up well to cooking either. Cattle fed grain such as corn silage have fat with a 10:1 ratio of omega 6 fats to omega 3 fats, compared to a 2:1 ratio in purely grass fed beef. The saturated and mono-saturated fats induced in animals fed silage and artificial
diets are very prone to peroxidation, which renders them rancid and toxic. The heme iron in red meat catalyzes this oxidation of these very fats, and is probably why modern agri-business red meat is linked to higher risk of cancer occurrence, and accelerated rate of growth and progression of tumours. Meat from grass fed wild game or pasture-only fed animals is less prone to provoke lipid peroxidation and inflammation, due to a shift to omega 3 fats and CLA. Bison and lamb are generally only grass-fed. Regards other meats, you must be selective, and apply due diligence. If you cannot find appropriate wholesome meat, I ask you to choose clean and lean poultry, fish or vegetarian alternatives. If you are offered no other choice in a social situation, please eat only a small portion if it is ordinary commercial grade red meat.

VITAMIN D3

The active form of vitamin D is D3, also called 1, 25 dihydroxy –cholecalciferol or 1-25(OH)D. Taking vitamin D2 may actually lower blood levels of active D3. Vitamin D is partly activated in the kidney and becomes fully active as a vitamin and hormone on exposure to ultraviolet rays of sunshine on the skin. It is fat-soluble.

Blood levels have been found to be low in the vast majority of people, even those living in sunny places like Hawaii and Arizona. Strict sun avoidance and use of sunscreens to avoid skin cancer has contributed to the low UV exposure, and the resultant epidemic of joint problems, chondromalacia, sub-clinical rickets, and rising occurrence of cancer. Exposing some skin to sunlight can provide over 10,000 IU per day, in the Canadian summer - based on whole body exposure to a dose that provokes slight redness of the skin in healthy Caucasians. However, from October through March the ultraviolet light intensity is not strong enough to make any vitamin D3! A study on women in Toronto found 3 in 4 were markedly deficient. Put another way, only 25% of Canadians have optimal D3 in their blood. Adequate vitamin D levels are also correlated with reduced risk of premature “death from all causes”, including cardiovascular and immune diseases.

- Activates CYP-mediated xenobiotic detoxification in the gut. Note that this includes strong induction of Cyp 3A4, so high doses of vitamin D may impact metabolism of chemotherapy drugs and some targeted therapies such as Tamoxifen.
- helps bone metabolism, calcium absorption, and retention through renal reabsorption.
- with vitamin K2 it prevents intra-cellular hypercalcinosi – a trigger of carcinogenesis.
- acts directly on DNA to promote normal cell differentiation
- improves cell adhesion and gap junction communication.
- inhibits angiogenesis.
- suppresses IGF-1 signalling.
- up-regulates cyclin-dependent kinase inhibitors p27 and p21 (tumour suppressor).
- promotes apoptosis.
- vitamin D is an acute phase reactant. Serum levels drop when there is inflammation.
- may inhibit metastasis by reducing tumour secretion of collagenase enzymes.
- topically, it can reverse early pre-cancerous lesions. Combines well with grapeseed OPCs, vitamin A, retinoids, curcumin, green tea extract, vitamin C and aloe accemannon for skin healing.
- cancer cells dislike vitamin D so much that mature tumours actively neutralize this vitamin and block its activation. This anti-vitamin activity in tumours can be modulated by calcium, folate and genistein from soy. Genestein potently increases D3 and reduces it breakdown.
- Curcumin helps transport vitamin D.
- Vitamin D3 therapy reduces joint and muscle pain from aromatase inhibitor drugs.

Vitamin D3 reduces the risk of cancer by up to 60% when at adequate levels in the blood, ie. 75 to 90 nmol/L or 30 to 40 ng/mL. Year-round minimum levels of 100 to 150 nmol/L or 40 to 60 ng/mL, are widely promoted as optimal for prevention. Most NDs take level a serum level of 60 to 65 ng/mL as the ideal. If levels are under 50, they give 3,000 to 5,000 IU twice daily, and when over 50 give this once daily. To raise levels rapidly, imbibe sublingually. 40 IU intake will raise serum 25OHD by about 1 nM or 0.4 ng/ml
Vitamin D3 helps fight cancer by up-regulating PKCζ (zeta protein), via P13 kinase. PKCζ keeps tumours addicted to sugar. If allowed to drop, the cells can then turn to burning glutamine for energy, and growth accelerates. The alternative pathway of energy metabolism this creates makes tumours able to survive in conditions that would normally cause the cancer cells to die. Instead, the cancer becomes more lethal.

**Blood levels of 25(OH)D:**

<table>
<thead>
<tr>
<th>Levels (ng/mL)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>Deficient</td>
</tr>
<tr>
<td>20 - 29</td>
<td>Insufficient</td>
</tr>
<tr>
<td>30 - 35</td>
<td>Adequate</td>
</tr>
<tr>
<td>36 - 40</td>
<td>Optimal</td>
</tr>
</tbody>
</table>

It is very hard to get levels above 30 for 50% of the population with doses of 1000 IU daily. It takes 1600 – 3400 IU /daily for everyone to reach levels of adequacy -30+ ng/mL. To reach "optimal" levels the dose would be 4,000 - 10,000 IU daily. Dr. Alan Gaby does not feel comfortable with long term levels that high. He prefers 2,000 IU daily for most patients The tolerable upper intake was generally accepted to be 2,000 IU daily. It was raised to 10,000 IU daily by some doctors recently. Some American doctors are giving a single loading dose of 500,000 IU, followed by monthly doses of 50,000 IU. Surprisingly, it appears to be quite safe over the short term.

I often prescribe 5,000 IU once or twice daily for one month. I feel after that most cases should take 3,000 IU daily for 3 to 6 months, then have blood levels checked. 3,000 IU daily is safe and appropriate for most people, and I believe that at this level it reduces cardiovascular risk, and premature death from all causes. Vitamin D3 reduces risk of breast, colorectal and pancreatic cancer, but is not particularly preventative of prostate cancer.

25-OH was chosen as a metabolite because of a relatively long 1/2 life however it is one of 50 metabolites of vitamin D and therefore can give an incomplete picture of body levels. Blood measurement will fail to register tissue stores - where a lot of D3 goes when consumed in amounts greater than 2,000 IU daily. If a person’s vitamin D blood level rises, then plateaus out near 30 ng/mL after aggressive dosing, I would reduce the dosage.

Toxicity is not likely at serum levels under 75 ng/mL. Mega-dose vitamin D3 therapy, ie 5,000 IU twice daily, can provoke hypercalcemia when plasma levels exceed 240 ng/ml or over 600 nM free 1-25(OH)D. Some cases may get in trouble at a serum concentration of 125 ng/ml. Acute symptoms are rare, but neurological changes, including increased falls in the elderly, are possible consequences. Monitor closely, within the first two weeks of therapy, and ensure a good fluid intake. Serum calcium phosphate product must not exceed 70 mg/dL to minimize metastatic tissue and blood vessel calcification and avoid hypercalcemia. The persons at highest risk of developing hypercalcemia have cancer of the lung, breast, or multiple myeloma. At moderate risk are cases of lymphoma, leukemia, renal, gastro-intestinal, head and neck cancers.

**Signs and symptoms of hypercalcemia:**
- anorexia
- thirst
- nausea / vomiting
- constipation
- abdominal pain
- frequent urination
- muscle weakness
- fatigue
- confusion, disorientation, difficulty thinking
- if severe enough: heart arrhythmia, heart attack, kidney stones, coma.

**The key to preventing hypercalcemia is to give adequate vitamin K2 when taking vitamin D3.**

One of the big safety concern raised is atherosclerosis. The liver can hydroxylate only about 2,000 IU of cholecalciferol vitamin D3 a day. Higher supplemented doses get pushed into the tissues unhydroxylated.
Studies vary as to whether it is good or bad for the arteries to absorb this fat. Does it contribute to calcification or does it reduce inflammation?

A prescription drug form of 1, 25 vitamin D is Calcitriol, given weekly by injection of 0.5 mcg or more. It is the most biologically active form of vitamin D known. Weekly dosing avoids the hypercalcemia seen with daily use. Calcitriol is a potent inhibitor of prostaglandin production. In prostate cancer responses are amplified if combined with a non-steroidal anti-inflammatory drug NSAID such as Naproxen or Ibuprofen.

Contraindications to vitamin D supplementation include tuberculosis or other granulomatous diseases, sarcoidosis, or William’s syndrome.

**VITAMIN A**

Vitamin A as retinol and other retinoic acids are regulators of epithelial cell growth, and important immune modulators. Vitamin A penetrates into the very nucleus of the cell to receptor sites which regulate normal growth and differentiation. This is where the genetic mutations lurk inside a cancer cell. Retinol -

- promotes cell differentiation.
- inhibits angiogenesis.
- promotes apoptosis.
- highly protective against viral infection - retinoic acid reduces viral DNA inside cells.
- increases NK cell activity.
- decreases serum insulin-like growth factor 1 - IGF-1.
- inhibits 5-alpha reductase, reducing testosterone levels.
- increases estrogens.
- up-regulates transforming growth factor beta - TGFβ.
- improves tumour response to radiation and chemotherapy.
- protects the gut from chemotherapy.
- reduces lipid peroxidation, a critical factor in radiation injury.
- prolongs survival in advanced cancers, particularly colorectal cancer.

*Vitamin A is safe in oral doses up to 150,000 I.U. daily, for short periods, but must be under medical supervision, including monitoring serum triglycerides and bone mineral density. Ingesting over 3,000 IU daily long-term, retinol will interact poorly with vitamin D3 nuclear receptors, causing bone loss, and neutralize vitamin D’s anticancer effects.*

Beta carotene is pro-vitamin A, meaning it can be metabolized into true vitamin A. Generally about 10% of beta carotene we take in ends up being converted into vitamin A.

**Vitamin A emulsion in castor oil** is an old-school topical remedy for skin cancers and dermal metastases.

**COD LIVER OIL**

Cod liver oil is not recommended for long-term use. It has been used in Scandinavia for over 2,000 years “to support the immune system”. It is rich in vitamin A, vitamin D, squalene, EPA and DHA, all of which are theoretically antineoplastic. However, vitamin A - as retinol - and vitamin D compete for the XRX-retinoid receptor. Consequently, retinol vitamin A in high doses (over 3,000 IU daily) over some months will block all the health effects of vitamin D, including its effects on bone, heart, cancer, and so on. This explains some of the high rates of osteoporosis in Scandinavian countries, where cod liver oil use is part of the culture. When they told people to take more cod liver oil, thinking the extra vitamin D would help, osteoporosis increased!
Emanuel Revici, MD was an innovative and revolutionary thinker who developed non-toxic therapies for cancer and other diseases. Revici began researching the role of fats in cellular metabolism in the mid-1920’s, and continued this work in Manhattan at the Institute of Applied Biology from 1947 to his death in 1998 at the age of 101 years. He made house calls at the age of 100!

He tested urine pH to individualize “biologically guided chemotherapy” based on the normal daytime acidification from catabolic processes and the nightly alkalinity from anabolic processes. He described the catabolic phase as increasing entropy by electrostatic charges and fatty acid predominance. He described the anabolic phase as quantum forces which oppose degeneration and increase order. Anabolism provides “negentropy” or negative entropy, opposition to the tendency of all things to become unorganized and dispersed. Anabolism is directed by sterols such as estrogen, progesterone and adrenal hormones. Recall that body builders use anabolic steroids to bulk up. The opposite of anabolism is catabolism, the actions in the body which break down materials or cells. He used “guided lipid” therapy to balance any extreme of either phase, consisting of fatty acids, sterols, animal tissue extracts and minerals incorporated into lipids. His opus magnum was the 1961 text Research in Pathophysiology as Basis for Guided Chemotherapy with Special Application to Cancer. This work is being carried on by Dr. Lynn August, MD who continues research on creating food grade fats as medicines. Fundamental to her work is the thesis that the fats at the cell membrane are the final defense of the immune system, and that cellular fats regulate the cell’s behaviour and health. Dr. August runs a consultation service called Health Equations which interprets standard medical blood tests to yield ‘biological indices’ of the relative dominance of catabolism (breaking down), anabolism (building up), and other aspects of metabolism. Even if all the lab values for a patient are in the “normal” range, some indices may be outside a range that is consistent with stability and balance. As a general rule of thumb a lab value that is within one third of the range from the middle of the normal values to the limits of normal is within the ability of the homeostatic control mechanisms to keep things stable. However, in the outer two thirds of the normal range there is increasing instability. When several biochemical pathways become unstable, risk of disease can become significant. Thus the analysis can show degenerative tendencies so preventative corrective action can be taken before gross illness occurs. The emphasis is on correcting the diet with whole foods, and if necessary, nutritional supplements. Revici’s belief in the health value to the immune system of natural cholesterol in foods such as meat, eggs and butter is echoed in the work of Diana Schwarzbein, MD in her excellent dietary book The Schwarzbein Principle. Many chronic diseases such as diabetes, autoimmune diseases, cardiovascular disease, arthritis and cancer were not common in cultures which ate a lot of these now politically incorrect foods. Recall the “French Paradox” which is a low rate of heart disease in French people eating a lot of cheese, butter and meat cholesterol. As in all things, it is the balance and quality of the foods in the diet which is the real issue.

I certainly believe in some of the “Paleolithic Diet” principles, at least that we should eat closer to the way our ancestors did: whole foods that could be taken from Nature by picking, gathering, digging, hunting, fishing, milking. This Stone Age style of eating resulted in less cancer, heart disease, stroke, and auto-immune diseases than the modern agricultural foods diet is generating. I prefer to meld it with the Mediterranean diet and some other modern ideas on dietetics. Use it as a guide, not a rigid rejection of all things modern.

We need fear what the farmer does to the animal, not the meat itself. Wild game is a health food. Grass fed domesticated red-meat animals are nearly as good, in moderation. A chicken allowed to live the life allotted to a chicken by its Creator is a wonderful food, on which our races have thrived, until a farmer with a degree was put in charge of feeding them.

It is time to admit that veterinary and nutritional science has led us down the garden path and is spoiling our animal foods as certainly as chemicalization is despoiling the environment at large. Until they can show modern agri-business is decreasing and reversing the horrendous rates of cancer we are facing, most people will reasonably remain suspicious of the latest creations.
CALCIUM-D-GLUCARATE

A salt of glucaric acid, calcium-D-glucarate CDG naturally occurs in citrus fruits such as oranges and in vegetables such as the Cruciferae cabbage family and potatoes. It also is naturally produced by friendly gut bacteria in the colon or large intestine, where it inhibits beta-glucuronidase activity. CDG increases net elimination of fat soluble carcinogens, toxins, steroid hormones.

Glucarate increases glucoronidation in Phase II liver detoxification pathways, lowering lipids, regulating estrogen metabolism, decreasing estradiol levels, preventing hormone dependent cancers such as breast, prostate and colon. Human dose range is 1.5 to 3 grams daily, e.g. 3 capsules 1 to 2 times daily of Tyler brand.

The B-VITAMIN COMPLEX

B-vitamins are widely used throughout the body as enzyme co-factors, particularly in energy metabolism. The need for B-vitamins increases during stress, illness, cancer, chemotherapy and radiation therapy. Do NOT give B-vitamins in diabetic nephropathy.

B1 or thiamine is important in energy production, and helps regulate the mitochondria, the energy combustion chamber in cells. Mitochondria also act as a second line of control to turn off bad cells. The fat soluble form benfotiamine has been found to enter the mitochondria better, and also enters the fatty nerve cells better. This is why it is the best choice in treating nerve damage, and numbness after chemotherapy.

B2 or riboflavin is also a regulator of energy production.

B3 or niacin helps the function of the DNA repair gene polyADP ribase polymerase PARP. B3 as niacinamide is a terrific radio-sensitizer.

Folic acid is needed by p53 to regulate apoptosis. Folate, as found in green leafy vegetables, reduces risk ovary, breast and colorectal cancers. Folate supplements are not the same, and may increase cancer risk.

Vitamin B12 is very helpful in the prevention and repair of nerve injury. I will often give a shot of it intramuscularly at the nerve root, or in the buttock muscles. It is also a boost to red blood cell building in anemia. It can be a useful tonic for fatigue in elderly patients, who usually don’t absorb it well by mouth. There is no known toxic limit for B-12. It can be used freely in general practice, and high blood levels are not intrinsically dangerous. However, beware the potential for vitamin B-12 to protect and even stimulate cancer cell growth. B-12 blood levels often rise significantly in advanced cancers. Vitamin B12 has a chemical structure very similar to super-oxide dismutase SOD. In fact it is about 50% as potent as SOD in generating oxygen and hydrogen peroxide from superoxide radicals. Just as tumours store glutathione, they may use B-12 as antioxidant protection. I would not give vitamin B-12 to a cancer case unless there is a proven need for it eg a high MCV macrocytic anemia, and low blood levels of B-12. Note the exception to this rule below.

The protective and cell-cycle stimulating effect of vitamin B-12 proves to be very helpful during chemotherapy, preventing severe anemia, fatigue and neuropathy.

Note that vitamin B-12 blood levels during chemotherapy are misleading. The B-12 stores are rapidly oxidized and rendered inactive, but the ruined B-12 still shows up as B-12 in the blood tests. If you did a urinary MMA test in chemo it would detect no B-12 activity. Use it freely until chemo ends.

Vitamin B-12 blood levels can rise in a number of malignancies such as chronic myelogenous leukememia, promyelocytic leukemia and the blood dyscrasia polycythemina vera

Vitamin B-12 may also go up- in liver disease, chronic inflammation, and hypereosinophilic syndrome.
ANTI-OXIDANTS

Oxygen showed up in the atmosphere when bacteria developed blue-green pigments for photosynthesis. Later these tricks passed to algae as the little miracle of chlorophyll, which takes light and transduces and transforms it into stored chemical energy. Now all plants use this biotechnology to store the sun as food for all other living creatures. Carbon dioxide CO2 in the air is taken up by plants, with the carbon being stored as sugars, and the oxygen being released as a waste product. Oxygen O2 makes up about 21% of the air we breathe.

Oxygen reacts with almost every other element. It “oxidizes” by moving electrons, making high energy compounds. Oxygen chemistry makes possible the higher life forms which are very active. However, as useful as it is that oxygen reacts energetically, it burns many substances, and rusts many others.

Humans take up oxygen, and use it in many ways, including to combust our food to release its energy. About 2% of all the electrons moved through the electron transport system, in the process of normal energy metabolism, end up as free radicals of oxygen. Also called reactive oxygen species (ROS), free radicals are highly toxic to all cells. The most common ROS is superoxide radical which becomes hydrogen peroxide, and in the presence of iron or copper ions, becomes the highly toxic hydroxyl radical.

Free radicals are carrying an excess of energy, which can suddenly discharge like a lightning bolt, busting up DNA, cell membranes, etc., resulting in cell injury and even death.

When we have a good balance between the forces of oxidation, and its opposite, reduction, we enjoy a harmonious state of good health. Abundant plant foods in our diet give this balance. Always use supplemental antioxidants in mixtures, as occurs in foods! Single anti-oxidants are like drugs – they can unbalance homeostasis – the tendency of our bodies to remain stable - and actually cause harm. Take them the way they are found in Nature, working together as a team to detoxify, fight infection, and to rejuvenate. We start with diet. Sometimes people cannot or will not eat what is required, for a variety of sound reasons. Some cannot absorb enough, or keep down enough. Moderate doses of biological forms of vitamins and antioxidants, in proper proportions and synergistic combinations, are good medicine in such cases. We can inject and run IV nutrients too, if necessary.

The critical issue is balancing redox potential in healthy cells, tissues and organs to optimize the health and survival of the patient, while stressing the cancer cells. Antioxidants can induce selective apoptosis of cancer cells, leaving normal cells unharmed, induce differentiation in cancer cells, making them behave more normally, and reduce cancer cell proliferation - so tumours grow more slowly. Selecting the right anti-oxidant at the right point in your care requires a deep knowledge of biochemistry. Dr. Tim Birdsall, ND of Cancer Treatment Centers of America says that cancer cells accumulate anti-oxidants due to poor “gating control”, which makes them more acidic and increases their rate of apoptosis.

I do not for one minute believe that all the anti-cancer properties of anti-oxidant substances are solely due to their anti-oxidant capacity. The ability to cause an oxygenation or a reduction reaction (redox) is but one property of many biological molecules. Being an anti-oxidant neither qualifies nor disqualifies a food or supplement as a cancer remedy. Some anti-oxidants can switch into pro-oxidants, so just calling something an antioxidant is an over-simplification, misleading, and overlooks important clinical opportunities.

Oncologists have been arguing that “antioxidants” are risky with chemotherapy since reactive oxygen species formed in chemotherapy are downstream mediators which may be needed to trigger apoptosis. In other words the doctors think taking vitamins and anti-oxidants might stop their drugs from working to kill cancer cells. However, there is no science to prove this hypothesis. This does not stop these self-described “evidence-based” doctors from promulgating fear of mixing safe vitamins with dangerous drugs. They err on the side of leaving patients under-nourished and subject to the full brunt of the drugs anti-nutrient effects. Why? The political and economic system sees nothing much to gain from researching something which anyone can make and sell. If no big drug company wants to invest big money, no real work gets done. Scientists sell their services for research grants. No grants, no answers to simple questions, therefore no inclusion in so-called ‘evidence-based’ medical practice. There is a wealth of good scientific evidence to support naturopathic oncology practices. It is also
worth noting that many orthodox medical drugs and procedures lack a level of evidence approaching proof too. More research is needed on all fronts. Oncologists need to look much deeper at the scientific literature around antioxidants, and if so, they will see the rational explanation of why our patients on physician-prescribed antioxidants are doing better in chemotherapy and radiation therapy, with less harm to the patients and more harm to the cancer.

Reducing oxidative stress during chemotherapy shifts cell killing from necrosis towards apoptosis. Caspase activation and apoptosis follow cytochrome C release from mitochondria, which is an early event in cancer cells undergoing chemotherapy, therefore cancer cells may be committed to apoptosis well before ROS (reactive oxygen species or free radicals of oxygen) are generated. ROS also inhibit caspases, enzymes which disassemble the cell once pro-apoptotic signals are given. Anti-oxidants would de-inhibit the caspases, so would tend to drive apoptotic cancer cell killing.

*The Conklin Hypothesis* explains why anti-oxidants actually do not have a negative impact on the safety or efficacy of chemo drugs. In fact, studies run about 100 to 1 in favor of anti-oxidants providing real improvements in the performance and tolerability of various chemo regimens in common use. Conklin notes that cytotoxic chemotherapy typically induces massive oxidative stress – this is how it forces cancer cells into apoptosis. However, rampant lipid peroxidation ensues, creating poisonous aldehydes. Aldehydes prevent cancer cells from moving through the cell cycle to the checkpoint where apoptosis can begin. If we inhibit oxidation and aldehyde levels, we get more cancer cells able to enter apoptosis. There is slightly reduced oxidative pressure to throw the apoptosis off-switch, but more cells are entering the zone where the death switch can be thrown in the cancer cell. The net effect is two steps forward, and one step back – you are still one step ahead!

Evidence is clear that chemotherapy leaves patients vulnerable to severe deficits of anti-oxidants. Intrinsic anti-oxidants such as albumin, bilirubin and uric acid will often be depleted by chemo. Watch the lab tests for these indicators, for they are clinically very significant. Actively restore anti-oxidant balance in these patients!

The chemo drugs which create the maximum oxidative stress are anthracyclines, followed by platinum, alkylating agents, epi-podophyllotoxins, camptothecins, cyto-arabinoside. Less oxidative are purine and pyrimidine analogues, anti-metabolites, taxanes and vinca alkaloids.

Anti-oxidants may actually help promote apoptosis, may protect normal cells from the drugs, and may help coordinate the entire sequence. Apoptosis after radiation and chemotherapy agents depend on death ligand receptors. Antioxidants can help many chemotherapy agents, X-ray and hyperthermia treatments ligate or tie into these receptors - in other words, helps them kill cancer cells.

Naturopathic physicians use antioxidants discreetly with drugs, as there are a few interactions of concern. However, good research evidence supports our clinical observations of favorable interactions. I hope in time enough science is done to validate this approach to the satisfaction of all.

Dr. Prasad has recommended during chemo a basic protocol of 4 to 8 grams of vitamin C, 800 IU vitamin E as VES, 30 to 60 mg natural beta carotene, exercise, stress reduction, and a low fat, high fibre diet.

There is a convincing body of evidence that antioxidants actually help patients feel better, and in fact help them to survive. See the book “*Foods That Fight Cancer*” by Doctors Gingras and Beliveau from McGill University. They have also made a cancer-fighting cookbook. They are quite biased against food supplements, but do have some useful advice on whole antioxidant-rich foods.

The foods that have the highest natural anti-oxidant levels are, in order: red beans, red kidney beans, pinto beans, blueberries, cranberries, artichokes, blackberries, prunes, raspberries, strawberries, red delicious apples, Granny Smith apples, pecans, cherries, black plums, russet potatoes, black beans, plums, and Gala apples. Carrot juice will reduce oxidative stress measurably in humans, whereas beta-carotene pills won’t.
Oncologists do not usually mention diet during chemotherapy. Once I heard one telling a patient to avoid eating blueberries during chemo, as if that were the only source of antioxidants in the human diet. Professionals need to limit their advice to their training and competencies.

High fat diets often have a lot poly-unsaturated fatty acids (PUFA’s) which are already rancid from reacting with air or can oxidize within the body. PUFA oxidation forms strongly electrophilic aldehydes which bind to cysteine-rich extracellular domains of death ligand receptors. Antioxidants prevent PUFA oxidation, so the death receptors can stay open for business - and kill cancer cells.

Hippocrates said it well, circa 400 BC: “Food shall be your medicine!”

VITAMIN C

Vitamin C is an essential dietary factor, accelerating hydroxylation reactions in bio-synthetic pathways. It is important for immune health, connective tissue, and a myriad of vital functions.

Vitamin C status is commonly very low in persons with advanced cancer, and this deficiency is associated with shorter survival time, higher inflammatory marker C-reactive protein CRP in the blood, and low serum albumin.

Vitamin C or ascorbic acid selectively increases peroxide poisoning of cancer cells, without harming non-cancerous cells. Tumours produce less than normal of the catalase enzyme which removes naturally occurring peroxides, allowing a deadly build up of hydrogen peroxide H2O2.

Vitamin C regulates embryonic stem cell differentiation. Vitamin C also inhibits p53-induced replicative senescence through suppression of ROS production and p38 MAPK activity.

Vitamin C is also sometimes anti-apoptotic, inhibiting caspase-9 activity and suppressing induction of apoptosis by TNFa and angiotensin II. Working with vitamin E, it up-regulates anti-apoptotic Bel-2 protein and down-regulates pro-apoptotic Bax in normal tissue. Fortunately, the opposite happens in cancer cells.

Vitamin C improves mitogen responses and increases production of IL-2.

Vitamin C is very effective in reducing chemical toxicity to DNA and to the liver. Vitamin C and glutathione recycle each other.

If vitamin C is able to return to its unoxidized form after ultraviolet light exposure, sunburn cannot occur. This is best achieved with oral and topical grapeseed extract. I use the NASOBIH™ NutraCaps and topical Nutra-cream.

In moderate doses vitamin C alters hyaluronidase activity, slowing the spread of cancer.

Doses of 500 to 1,000 mg are as effective as 5,000 mg doses to increase natural killer NK cell activity, reduce apoptosis and increase mitogenesis of immune cells, restoring functionality to the immune system. Ascorbic acid is essential for the synthesis of immunoglobulins.

Large oral doses can cause gas and crampy intestinal pains. Itchy skin is sometimes seen. In these cases consider the non-acidic “buffered “ form of vitamin C, which is the mineral salts of ascorbic acid, such as calcium, potassium, sodium and magnesium ascorbates.

Serious harm can occur using high-dose vitamin C in patients with glucose-6-phosphate dehydrogenase (G6PD) deficiency, an in-born error of metabolism. It is mandatory to screen patients for this condition before prescribing intravenous vitamin C therapy.

High-dose vitamin C therapy can deplete copper levels. This inhibits angiogenesis.
Taper off high oral dose regimes slowly to avoid rebound scurvy. Allow two weeks to bring off 12 grams (1 Tbsp) a day, reducing by about 1 gram daily (¼ tsp).

Vitamin C can also act as a pro-oxidant at higher doses, and so is great to mix with with many of the chemotherapy drugs. Vitamin C therapy is incompatible with the EGFR inhibitor drugs such as Erbitux / Cetuximab.

**Intravenous Vitamin C**

Vitamin C is anti-angiogenic, anti-inflammatory, anti-glycolytic and stabilizes tissue stroma to retard progression and invasion.

At 12 grams by mouth the blood level peaks, and taking more by mouth is pointless. This is often the dose that triggers diarrhea as well.

Linus Pauling promoted use of really high doses of vitamin C for many health problems, and suggested that 50 grams a day would impact human cancer. As the bowel will not tolerate this much, he proposed putting 50 grams or more into the veins by a slow drip to reach about 6 mMol blood levels. The dehydroascorbate pro-drug must become ascorbate to be active. In these doses it is pro-oxidant, forming hydrogen peroxide from ascorbate via Fenton chemistry with copper ions in the extra-cellular space. H2O2 induces apoptosis selectively in cancer cells. Healthy cells can readily neutralize the peroxide with catalase enzyme and other redundant mechanisms. In the early studies circa 1973 in Vale of Leaven Hospital in Scotland, Dr. Ewen Cameron and his associates found intravenous vitamin C did arrest some very advanced, terminal stage cancers.

It must be noted 1 in 10 of these cases treated with IVC died abruptly from tumour lysis or internal bleeding. It is suspected that the blood came from the sudden lysis or dissolving of tumours – in other words, perhaps the therapy worked too well. The risk of tumour lysis is highest in patients with very rapidly growing and large cancers, or a very high tumour burden. The acute treatment for tumour lysis syndrome is the prescription drug Allopurinol, and aggressive hydration and alkalization with intravenous bicarbonate. Because of this reported danger of provoking sudden death, it was my policy for several years to only recommend this therapy for palliation in terminal cases, where the benefits may outweigh the risks. However, several years ago the Riordans in the USA worked out the solution to this risk. I am now reassured by my peers that this risk is extraordinarily rare, so rare that not a single death has occurred in the last decade. The risk of tumour lysis and hemorrhage can be readily managed by starting with a trial dose of 15 grams, followed by blood testing for LDH, creatinine, serum C saturation and markers of oxidative stress. If this test dose is well tolerated, the dose can then be safely ramped up to 25, then 50 and even into the 60-75 gram range.

A normal dietary serum level is 1-2 mg/dL. The target serum level for IVC is about 350 – 450 mg/dL blood, or about 30 mMol for maximum cyto-toxic effect. Exceeding this level does not increase efficacy. Some folks will not get above 300 mg/dL no matter how much we give them, especially in very ill patient. We can use a simple glucometer to estimate ascorbate serum levels. However, this is going out of fashion, and most doctors today do not check blood levels, but just give 25 to 60 grams. Higher doses really put a high sodium stress on the kidneys.

All patients need to be screened for the inherited metabolic problem glucose-6-phosphatase deficiency G6PD. People with G6PD will become very ill from high dose vitamin C, as it will rupture their red blood cells (hemolysis) causing anemia and vascular irritation. Most cases will have discovered this issue in early childhood and will advise their doctors, but we still order blood tests to be sure.

IV vitamin C can stabilize a majority of cancer cases, arresting growth and spread of tumours. It can occasionally cure advanced cancer. Best results are seen with lymphomas, lung NSCLC, cholangiocarcinoma, breast, kidney and bladder cancers. It is less successful with prostate and colon cancers. IV vitamin C can also vastly improve quality of life by increasing appetite and platelet counts, easing fatigue & pain.

IVC is very supportive during chemotherapy, improving drug uptake, and reducing resistance caused by p-glycoprotein activity. Like chemo, it is pro-oxidative. During chemo low doses of 2.5 to 25 grams are advised –
15 grams is often given. Blood levels of vitamin C normalize within 24 hours of an infusion, half-life in the blood is only about 2 hours. It can be given the same day as chemo drugs. It can be given twice in one day.

Excessive dosing can cause adverse effects such as nausea, diarrhea, hypertension, headache, persistent low blood calcium, transiently low potassium and low chloride. Most of these are caused by sodium overload. Adverse effects are rare, but can include hemolytic anemia, bleeding, reduced competence of white blood cells, kidney stones. A mild flu-like detox may occur from mobilizing persistent organic pollutants from the extracellular matrix.

Catechins in green tea rapidly transfer electrons or hydrogen from ROS damage sites on DNA, preventing the development of strand breaks. Tea catechins are very active against hydrogen peroxide, so don’t use high-dose green tea extracts within a few hours of IV vitamin C therapy.

IVC is not recommended during radiation therapy, as it increases pro-oxidant adverse effects. IV curcumin is a better choice.

Medical history:

- glucose-6-phosphatase deficiency hemolysis– test before dosing above 25 grams. Chemo can ↓G6PD!
- kidney disease, renal insufficiency, including edema – recent serum creatinine and eGFR. Monitor renal function and ramp up doses slowly doses if eGFR is under 60, and avoid IVC if under 20. Allow over 24 hours after IVC before testing eGFR or electrolytes – 36 to 48 hours is recommended. Avoid IVC in dialysis, or if creatinine is 2 to 2.5 times normal range.
- potassium deficiency – recent Chemscreen of blood.
- congestive heart failure and fluid overload disorders such as ascites.
- iron overload – check serum ferritin - raise doses slowly due to iron creating high oxidative stress.
- kidney oxalate stones are a CI – Urinalysis is required.

IV Solutions:

- use ascorbic acid 500 mg/ml.
- withdraw an equal volume of IV solution from the IV bag before adding the vit. C.
- keep osmolality below 1,200 mOsmals.
- Ringer’s lactate if 15 to 30 grams ascorbic acid.
  - 250 to 1,000 ml bag for 15 grams
  - 500 to 1,000 ml bag for 30 grams
- normal saline is used for doses up to 25 grams, sterile water is used for doses over 25 grams.
- 500 to 750 ml bag for 30 grams
- 500 to 1,000 ml bag for 60 grams
- 750 to 1,000 ml bag for 75 grams
- 1,000 ml bag for 100 grams
- add - magnesium: 1,000 mg. Magnesium chloride is preferred over magnesium sulphate.
  - calcium chloride - 1 to 2 ampoules.
  - 25 mg of zinc sulfate if targeting a virus.
  - some docs add B6-100 mg, B-12 1,000 mcg and 1 mL of B-complex, but this may reduce the pro-oxidative anti-cancer effect, according to Lamson, et al at Bastyr University.

For the comfort of the patient’s veins, we want to be sure the pH of the final IV solution is 6.5 to 7.5, and limit the osmolality to 600 mOsm/L. Some folks veins react at 500, others tolerate 900.

Administration: A sample protocol

- prep the skin with Hibiclens or another formulation of chlorhexadine digluconate with iso-propyl alcohol. If they are allergic to chlorhexadine paint on betadine and let it dry before needling.
- start with 15- 25 grams once or twice in the first week, then 30 grams, then 40 to 50 grams.
• week three increase to a maximum of 60 grams. Most do well at 25 to 50 grams.
• rare cases may need up to 75 grams, but highest doses can cause headaches, diarrhea, hypertension and persistent hypocalcemia. Sodium ascorbate causes sodium overload, with loss of calcium, potassium and chloride.
• check for ankle edema pre-treatment, during and after removal of the IV line.
• weigh the patient at each visit.
• check serum potassium, creatinine, etc. at about 3 weeks of therapy.
• infusions are given twice a week for 3 to 6 months, then may be reduced to once weekly.
• for another 6 months, then once every 2 weeks for a year, then once monthly to maintain.
• suggested flow rate is 0.5 grams per minute, and must never exceed 1 gram per minute.
• target serum level of ascorbic acid is about 400 mg/dL. Saturation falls off rapidly after infusion.
• shaking during infusion indicates low serum calcium - slowly push 10 mL calcium gluconate at less than 1 ml per minute.

Infusion Duration by Dose:

The time you will need to be at the clinic, and the cost per treatment, depend on the dose. High doses take quite a long time to administer, so patients need to be prepared — bladder empty, recently fed, and with some music or book or TV to pass the time. It takes a few minutes to hook up the IV, a few minutes to take it out, and you must remain in the clinic for at least 15 minutes after the IV, to ensure you are safe to be active and vertical again.

Assuming an infusion rate of 0.5 grams per minute (faster infusion causes hypoglycemia and chills):
• 15 grams takes 30 minutes to run, total time in care will be about 1 hour.
• 25 grams takes 50 minutes to run, total time in care will be about 1 hour and 20 minutes.
• 50 grams takes 100 minutes to run, total time in care will be about 2 hours and 10 minutes.
• 60 grams takes 120 minutes to run, total time in care will be about 2 hours and 30 minutes.
• 75 grams takes 150 minutes to run, total time in care will be about 3 hours.
• 100 grams takes 200 minutes to run, total time in care will be about 3 hours and 50 minutes.

Supportive to IV-C Therapy:
• hyperbaric oxygen HBO2T.
• ketogenic diet. Ketone tests show falsely negative after IVC.
• oral vitamin K1, or K2 menaquinone.
• oral vitamin C to bowel tolerance, maximum 12 grams or 1 level tablespoon daily.
• selenium 200 mcg 1 to 2 times daily.
• 100 to 800 mg Helixor M mistletoe in 500 mL sterile water with 50 grams vitamin C - be aware this can provoke nausea, and generalized aches and pains.
• quercitin.
• grapeseed extract.
• B-vitamins: biotin and vitamin B3 as niacinamide.
• R-alpha lipoic acid.

Do not take high-dose green tea EGCG therapy or N-acetyl-cysteine NAC on days of IV Vitamin C infusions, as they counteract the putative hydrogen peroxide effect. NAC is anti-apoptotic under some conditions.

G6PD hemolysis can be treated with vitamin E 800 IU and selenium 25 mcg.

IV-C can induce tumour lysis, particularly at over 25 grams and with necrotic tumours.
VITAMIN K

Deficiencies of vitamin K2 are associated with all-cause mortality, cardiovascular disease, osteoporosis, diabetes, many forms of cancer, dementia, and chronic inflammation. Vitamin K is pro-oxidative, and will stress cancer cells by generating free radicals of oxygen ROS.

Vitamin K1 is phylloquinone,
- made by plants and animals.
- a cofactor in normal blood coagulation, involved in post-translational modification of factor II (prothrombin), VII, IX, X and proteins C, S and Z.
- when reduced to its hydroquinone form it’s a cofactor in carboxylation of plasma protein glutamic acid residues via gamma-glutamyl-carboxylase.
- a co-factor in bone metabolism.
- Inhibits cancer cell growth, transformation, differentiation, immortalization and resistance to apoptosis.

Oral K1 in doses of 40-45 mg daily produces mild responses in some cancers. Several vitamin K-dependent proteins are ligands for receptor tyrosine kinases. RTK’s regulate cell signaling in cellular survival, transformation and replication; for example epidermal growth factor receptors, ras, ERK and MAPK pathways.

K2 is the menaquinone form,
- aka MK-n where n describes the number of isoprene side chains at the 3rd carbon.
- made by animals (MK-4) and bacterial fermentation of soy natto (MK-7).
- benefits heart, bone and liver. Slows the loss of bone, increases flexibility, strength and fracture resistance - but not bone density. Reduces the risk of liver cancer in hepatitis C cases -inhibits liver cancer cell growth and invasion via activation of protein kinase A. Also active against prostate cancer.
- activates p21.
- active against myelodysplasia and leukemia, in oral doses of 45-90 mg daily, eg MK-4 type 15 mg tid.

K3 or menadione is a synthetic provitamin.
- a radiosensitizer at IV doses of 150-200 mg per day. It also synergizes with chemo and overcomes drug resistance. Maximum dose is 250 mg/m2. A common dose is 25 mg time-release K3 twice daily.
- pro-oxidant, and synergistic with intravenous vitamin C in a ratio of 100:1. For example 25 grams ascorbic acid with 250 mg menadione, diluted in an IV bag of D5W given as a slow infusion. This combination restores DNase activity essential for apoptosis. It depletes intracellular glutathione and other sulphhydryl rich proteins by direct arylation of thiols. Because K3 is fat-soluble, most doctors prefer giving it by intramuscular injection or oral dosing, rather than in an IV.
- K3 induces cell cycle arrest via cyclin dependent kinases, such as myc and fos. The proto-oncogene c-myc codes for a nuclear protein transcription factor, while c-fos codes for a nuclear protein which is a component of AP-1 transcription complex regulating growth and tumour transformation promoters.
- Combining vitamin C with K3 causes cancer cells to die by autochizis. K3 + C are only to be used in patients who have had a laboratory test of their blood to determine that they do not have a deficiency of the enzyme glucose-6-phosphate dehydrogenase G6PDH. K3 is a potent inhibitor of G6PDH.
- Do not give N-acetyl-cysteine during a pro-oxidative agents such as vitamin K oral or IV therapy.

Adapted from “The Anticancer Effects of Vitamin K” by Davis Lamson, MS, ND and Steven Plaza, ND, LAc, Alt. Med. Rev. 2003; Vol. 8 No. 3: 303-318.

In Canada we are not permitted to give vitamin K2 at doses higher than that allowed for Vitamin K1 – which is 120 microgram (mcg). We use the MK-7 form of K2 in these 120 mcg doses. The longer isoprene side chains are associated with a longer active half-life than MK-4 commonly dosed at up to 45 milligrams (mg) daily.
GLUTATHIONE

GSH is the most powerful antioxidant substance, critical to good immune function, particularly against viral infection. However, it does not perform medically when taken by mouth. We make it from pre-cursors such as the amino acids glutamine, methionine and cysteine.

Glutathione is a detoxifier of alcohol, drugs, tobacco, pesticides, herbicides, xenobiotics, petroleum hydrocarbons, smog, pollution, heavy metals, many carcinogens and tumour promoters.

Glutathione is particularly low in cancers of the lung and liver.

Glutathione is protected and regenerated by anthocyans as found in grapeseed extract, and interacts in an antioxidant network with selenium, vitamin C, vitamin E and alpha lipoic acid. It is the hub of the network, like a crown gear in a transmission. The dangerous energy latent in a free radical of oxygen is not neutralized completely until glutathione has dealt with it. All other antioxidant-free radical combinations are in themselves still free radicals, and still capable of dropping a lightning bolt on critical bio-molecules.

Glutathione induces normal p53 activity by redox modulation, which induces apoptosis in tumours. It is a protectant in radiation and chemotherapy.

Milk whey protein has the glutathione precursor cystine. Alpha-lactalbumin in fresh human milk induces apoptosis in malignant trophoblastic cells. Studies show whey protein reduces risk of getting cancer. I do not recommend HMS90 whey powder from Immuno-Cal Labs, as it is not cost-effective for cancer, as might be claimed by some of its multi-level marketing “associates”. No matter how many packets a day they take there has never been a clear response, nor do they worsen discontinuing it. I will concede that it is useful for neurological conditions. I prefer to prescribe Dream Protein brand whey powder, which is sugar-free, and is rich in un-denatured alpha-lactalbumin and associated immune factors.

Glutathione levels drop when supplementing long-term with high doses of vitamin K3, vitamin C, L-glutamine, vitamin D and Salvia miltiorrhiza. Glutathione is significantly lowered by smoking a single cigarette. People under toxic burden should always be striving to protect their glutathione reserves.

Glutathione is reliably increased in human liver and other tissues by supplements of milk thistle herb, polygonum, grapeseed extract, pine bark pycnogenol, resveratrol, bilberry, tumeric and melatonin.

The usual IV dose we use is 1 to 2 grams, such as 10 mL of either a 100 mg/mL or 200 mg/mL diluted in 10 mL water. This is usually done once or twice a week. Some naturopathic physicians provide intravenous glutathione in a normal saline drip, concurrent with chemotherapy. I hear opposing views on the safety of IV GSH with chemotherapy. Some believe it can increase drug resistance, and increase risk of metastasis. IV GSH can provoke pulmonary edema, and so must be stopped at the first sign of persistent coughing or shortness of breath.

An alternative delivery method is 100 mg/mL injectable grade glutathione inhaled through a nebulizer once or twice daily.

Glutathione is quite remarkable for pulmonary and pericardial effusions, and ascites.

Some of my most respected peers and I fear that glutathione will interfere with most of our active cancer therapies, which are dependent on a pro-oxidant and glutathione depleting effect. Glutathione depletion will inhibit or kill melanomas and cancers of the prostate, pancreas and colon, and probably this strategy inhibits most cancers. For this reason I recommend it during detoxification and recovery, but not commonly during an active anti-tumour phase of treatment. However, glutamine and IV-GSH can up-regulate glutamine transporter, and GGT. Glutamine is a gamma-glutamyl donor. This rebalances GSH depletion in non-tumour cells, and its accumulation in cancer cells. This has a potent anti-inflammatory and growth regulating effect, restoring host defenses and vitality.
N-ACETYL-CYSTEINE

NAC is a supplement which can be converted in the body into the ultimate antioxidant glutathione GSH.

N-acetyl cysteine is the most commonly used supplement to raise GSH levels in humans. Contrary to propaganda by HMS-90 advocates trying to market cystine-rich whey supplements, NAC is perfectly safe in reasonable doses. NAC is not at all toxic or dangerous in the oral dose range of 2 to 3 grams usually prescribed by physicians. At a therapeutic dose exceeding 4 grams a day, it is possible to see runny nose, mouth sores and skin rashes, gastrointestinal upset, nausea. The primary side-effect of excess use is diarrhea. Increased hippocampal excitotoxin release can trigger dementia, bronchospasm and hypotension i.e. anaphylactic shock.

A significant lung protectant, it markedly thins excess mucus. It has long been prescribed by physicians treating severe lung congestion, emphysema, asthma, bronchitis, and tuberculosis. It turns thick, hard to expel mucus or phlegm into water, so it is easily coughed out.

NAC elevates p53 activity in transformed cells but not in normal cells. NAC may increase apoptosis in cancer cells, but there are reports of it acting as an anti-apoptotic agent. Probably best avoided in stage IV cancers. BIORC has used it in lung cancer along with other agents, and I agree this is one cancer it seems safe in.

I am not convinced that NAC, or glutathione itself, as single agents, have a significant role in controlling most cancers. Experience suggests that if combined with appropriate anti-oxidants such as grapeseed extract, yeast selenium, R-alpha lipoic acid, and mixed tocopherol vitamin E, its redox potential would be better balanced. Networks of antioxidants do perform better and more safely than single agents!

I currently prescribe it primarily as part of short-term detoxification protocols, including heavy metal detoxification. NAC chelates out toxic heavy metals and copper. Rare instances have been seen of encephalopathy, thought to be due to mobilization of heavy metals. NAC supports liver detoxification in Phase 2 conjugation reactions. Inhibits viral transcription and boosts cellular immunity. Directly inhibits TNFα. Suppresses NFκB activity, as does glutathione GSH and vitamin C. NAC also interferes with increased H2S from caloric restriction.

Do not mix with therapeutic doses of vitamin C, vitamin K3, vitamin D3, melatonin, green tea EGCG, quercitin, resveratrol, feverfew, sage and curcumin.

Top researchers and physicians in the field of integrative oncology such as Prasad, Block and Konklin advise against using NAC during chemotherapy, and also against taking big doses of the other endogenous (made in the body) anti-oxidants glutathione and alpha lipoic acid during chemo. They feel safer with the exogenous anti-oxidants, as found in food, such as vitamins C, E and natural carotenes. Never mix NAC with the platinum chemo drugs such as Cisplatin and Carboplatin.

GRAPESEED EXTRACT

Oligomeric-proanthocyanidins (OPC) including resveratrol in grape skins and seeds are powerful antioxidants, perhaps 50 times that of vitamin C and 20 times that of vitamin E. They are highly chemoprotective, and have significant effects on the vascular endothelium. OPC from pine bark was brought to Canada by Dr. Allen Tyler, ND, MD by way of the French scientist Professor Jacques Masquelier, who investigated its use by Quebec First Nations people. Modern Chinese research has shown this antioxidant to be a cancer treatment.

- potent antioxidant, OPCs activate and restore/ recycle R-alpha lipoic acid, glutathione, vitamin E and vitamin C.
- reduces ROS activation of AP-1 protein.
- OPC are significantly cytotoxic to human breast, lung and gastric adenocarcinomas, while at the same time enhancing the growth and viability of normal cells.
OPC can regulate cell cycle/apoptosis genes p53, bcl2, and c-myc. OPC increase expression of Bcl-2 gene and reduce expression of p53 and c-myc genes. This is how they reduce healthy cell apoptosis caused by chemotherapy drugs, reducing their toxicity.

- inhibits DNA synthesis.
- anti-angiogenic, reduces VEGF induction by TNFα.
- inhibits EGF.
- inhibits MAPK pathway.
- activates JNK protein, a regulator of apoptosis.
- induces cyclin kinase.
- inhibitor of p21 and Cip1.
- up-regulates insulin-like growth factor one binding protein three IGF-BP-3 by several-fold.
- aromatase inhibitor and suppressor of aromatase expression. Procyanidin B dimers suppress estrogen biosynthesis, reducing circulating estrogen by about 80%, on par with some aromatase inhibitor drugs.
- anti-inflammatory, inhibits NFxB, COX-1 and COX-2.
- anti-viral. Increases lymphocyte immune cell proliferation.
- increases natural killer cell NK activity.
- GSE causes endothelium-dependent NO-mediated relaxations of arteries. This effect involves the intracellular formation of ROS in endothelial cells leading to the Src kinase/phosphoinositide 3-kinase/Akt-dependent phosphorylation of eNOS. This may explain its effect on hot flashes, and asthma.
- restores the integrity of the blood-brain barrier.
- grapeseed extract is incompatible with N-acetyl-cysteine. NAC blocks the ability of grapeseed extract to induce apoptosis of head and neck cancer cells.

The daily therapeutic dose should be at least 400 mg daily. Usually this would be two of 100 mg capsules twice daily. Dr. Baker suggests using up to 4 capsules 4 times daily (1,600 mg) for the first week, for a potent anti-inflammatory effect. This is synergistic with omega 3 marine oils. The dose is brought down to 3 caps 4 times daily the second week, 2 caps 4 times daily the next week, then 2 caps 3 times daily thereafter. Dr. Baker and I prefer the NASOBIH™ Nutra-Caps with 100 mg Protovin™ grapeseed extract, 20 mg resveratrol, 100 mg citrus bioflavonoids, and 100 mg vitamin C.

Similar compounds are found in hawthorne berries, cocoa, almonds, and the herb Polygonum cuspidatum, aka Lycium fruit in TCM, better known as Goji or wolfberry.

One of my primary motivations to write the first edition of Naturally There’s Hope was to convey the importance of a combination of grapeseed extract, curcumin and green tea EGCG for the control of growth and spread of many cancers. There is a wonderful synergy between these non-toxic agents. Used in adequate doses of appropriate quality, responses can be quite gratifying. I do not believe the absurdly primitive concept that some herbalists put forward that grapeseed OPC’s enhance metastasis simply because they are a “circulation enhancer”. The concept of circulation enhancement is sketchy. These bioflavonoids do astringe the vascular endothelium, reducing leaks and building vessel wall integrity.

RESVERATROL

Resveratrol is a lipophilic anti-fungal called 3,4’,5-trihydroxy-trans-stilbene phytoalexin. Commonly derived from grapeskins, therefore it is present in red wine at about 9 to 28 micromoles per glass. Grape juice is high in resveratrol and quercitin. Small amounts are also found in rice, peanuts, mulberries, giant knotweed and Polygonum herb.

- antioxidant which modulates manganese-super-oxide dismutase MnSOD.
- chemo-preventative, increases glutathione retention.
- anti-angiogenic, inhibits VEGF activity.
- inhibits DNA synthesis in S-phase of the cell cycle.
- inhibits MMP-2 matrix metallo-proteinase, blocking invasion and spread.
- increases lymphocytic anti-cancer cytokines, useful in CML.
• inhibitor of nuclear transcription factor NFκB, COX-2, JNK, Bcl-2, IGFR-1.
• antioxidant which modulates manganese super-oxide dismutase MnSOD.
• pro-apoptotic via activation of caspase 3, and by a reduction in the Bcl-2/Bax ratio in favor of apoptosis.
• regulator of cyclin-dependent kinase Cdk, induces its inhibitor p21WAF1/CIP, inhibits cyclins D1 and E.
• blocks formation of estrogen-DNA adducts responsible for initiating breast cancer.
• stimulates transcription of endogenous estrogen receptor.
• inhibits BRCA-1 mutant cancer cells via reduced Survivin expression.
• suppresses CYP 1B1.
• increases IL-6.
• resveratrol accelerates hepatitis C virus (HCV) replication.

Aggarwal has done quite a bit of research on resveratrol. Not all studies suggest in vivo efficacy. It is a phytoestrogen, and safety in post-menopausal ER+ breast cancer remains to be determined. An American FABNO suggests the pterostilbene methylated forms are the most effective, and so has used Xymogen brand, Rx: 2 caps, and adds 750 mg of the trans-form in the Biotivia brand. I must comment that the scientific evidence for the clinical value of resveratrol in humans is still very weak and inconclusive. Many of my peers have lost interest in prescribing it.

BILBERRY

Vaccinium myrtillus or bilberry is a relative of the blueberry, cranberry and huckleberry. All are rich in anthocyanosides which are known to strengthen collagen.

The anthocyanidin delphinidin in bilberry is a very powerful redox recycler of glutathione. Delphinidins strongly inhibit EFR kinases, VEGF-2, ERK1/2, and chemotactic motility.

Daily dose should be over 100 mg of an extract standardized to 25 to 37% anthocyanosides.

POMEGRANATE

Pomegranate juice contains quercitin, ellagic acid, anthocyanidins, EGCG catechin, sterols, gallic acid, caffeic acid, vitamin C and iron. It has a unique ellagitannin punicalagin, the largest molecular weight polyphenol known.

Anthocyanidins and tannins in pomegranate fruit and juice inhibit tumourigenesis, inhibit angiogenesis, modulate UV-mediated phosphorylation of mitogen-activated protein kinases MAPK, and strongly inhibit activation of nuclear factor kappa B NFκB. Pomegranate down-regulates pro-inflammatory eicosanoids.

Ellagitannins in pomegranate are often hydrolyzed and absorbed as ellagic acid. The ellagic acid content is also responsible for much of pomegranate’s inhibition of prostate cancer, in doses as low as 8 ounces daily of the juice. Gut flora metabolize ellagitannins into bioactive urolithins which inhibit prostate cancer by suppressing testosterone synthesis and androgen receptor gene expression.

Pomegranate flavonoids inhibit aromatase, preventing synthesis of estrogen from adrostenedione and testosterone. They also strongly inhibit 17-estradiol growth signaling in breast cancer cells.

Pomegranate increases manganese super-oxide dismutase MnSOD in the prostate gland.

ELLAGIC ACID

Ellagic acid is found in many plant foods, including algae, but is highest in fruits and berries such as pomegranates, raspberries, blueberries, strawberries and grapes. Red wine is a significant source of ellagic acid and EGCG. The significant protective effects of a diet rich in fruits and vegetables is at least in part attributable to this compound.
This is a potent anti-oxidant phenolic, with great value as an inhibitor of DNA mutations, including the “Guardian of the DNA, the p53 gene. This is the crux of cancer prevention. Ellagic acid helps us to eliminate carcinogens such as fungal toxins, polycyclic aromatic hydrocarbons and nitrosamines.

It can act as a pro-oxidant in cancer cells, generating free radicals of oxygen ROS. This can restore the off switch in the cancer cell –the apoptosis suicide and recycling program.

It is also somewhat liver protective, anti-viral and anti-bacterial. It is a PPARγ inhibitor.

Human studies show a potent action in prostate cancer – a single eight ounce glass of unsweetened pomegranate juice daily can arrest and even reverse early prostate cancer. From cell and rodent studies one can predict with certainty the same benefit will be seen when other cancers are treated with this nutraceutical.

BLACK RASPBERRIES

Raspberry anthocyanidins can prevent oral and esophageal pre-cancerous lesions from progressing to squamous cell cancer by activating tumour suppressor genes and restoring differentiation.

SALVESTROLS

Salvestrols are a group of resveratrol-related plant anti-fungals which Dr. Gerry Potter has proposed are pro-drugs, bio-activated in cancer cells into a toxin called piceattanol. This is possible because only cancer cells have an active enzyme CYP1B1. Salvestrols may be found in organic plants stressed by fungi and molds. Sources include artichokes, rosehips, agrimony herb, hawthorne berries, plantain, burdock, chamomile, grapes, strawberries and cranberries. They are claimed to inhibit tubulin synthesis, inhibit tyrosine kinase, etc. They are said to be incompatible with flaxseed, kiwi fruit, almonds, tobacco smoke, grapefruit, lima beans, and other foods. Resveratrol or its salvestrol analogues have shown some clinical results. It looks to be synergistic with grapeseed extract and related proanthocyanidins and anthocyanidins, curcumin, epicgallo-catechin gallate EGCG, allicin and sulforaphane.

QUERCITIN

Quercitin is a natural polyphenolic bioflavenoid found in many foods and herbs, such as white oak bark, apples and onions. The average diet provides about 25 mg daily. It is the primary dietary bioflavenoid. Quercitin is 3,3’,4’,5,7-pentahydroxyflavone, a sugarless (aglycone) form of rutin, and it can easily oxidize to a quinoid form which is a redox agent. Quercetin modulates the redox state and oxidative metabolism. Inhibits high aerobic glycolysis of tumour cells and thus inhibits ATP synthesis

Quercitin is significantly higher in plants grown in organic compost versus chemical fertilizer. The plants use it to extract nitrogen from the soil.

Bioflavenoids like quercitin inhibit thyroid peroxidase (which adds the iodine to thyroid hormone) and so will aggravate hypothyroidism in patients with inadequate iodine consumption. For this reason we may combine it with potassium iodide supplementation, seaweeds, kelp, or Lugol’s iodine tincture.

An aromatase inhibitor, it reduces estrogen hormone formation in adipose tissue (fat cells). The aromatase gene CYP19 expression is promoted by prostaglandins sensitive to COX-2 inhibitors.

Binds type II estrogen receptors in breast, colon, ovary, melanoma, leukemia and meningeal cancer cells, inhibiting growth. ER-2 receptors have only a weak affinity for estrogen, and probably inhibit growth when stimulated by flavonoids. ER-2 expression is independent of ER-1 status, and the effective growth inhibition in breast cancer is equal to Tamoxifen.
Quercitin activates aryl hydrocarbon receptor AhR –dependent breast cancer resistance protein BCRP. It can be supported in this action by resveratrol, indole-3-carbinol and curcumin. It inhibits proteosomal degradation of AhR by green tea EGCG.


Inhibits heat shock proteins, which disrupts formation of complexes of mutant p53 and HSPs which would allow tumour cells to bypass normal cell cycle checkpoints. No HSP’s means no mutant p53 activity. If HSP’s are left unchecked there is a risk of shorter disease-free survival and increased chemotherapy drug resistance in breast cancer.

Enhances NK cell activity and is immune modulating. It is a powerful anti-histamine. It replaces Cimetidine for this application in cancer therapy. It is very beneficial for inhalant allergies and hay fever too.

Quercitin inhibits replication of RNA and DNA viruses. Inhibits DNA polymerases B and I.

Quercitin blocks tumour export of lactate, resulting in a lethal drop in tumour pH, triggering pH-dependent apoptosis endonucleases. Normalizes mitochondrial control of apoptosis.

Cytotoxic effect is dose-dependent. While quercitin is mutagenic to bacteria, it is not carcinogenic in humans.

Inhibits cyclooxygenase COX-2 transcription and lipoxygenase especially the LOX-5 / 5-HETE eicosanoid pathway. Reduces pro-inflammatory NFkB nuclear transcription protein. Inhibits invasion and metastasis.

Arrests p21-ras proto-oncogene, expression, a mutation found in 50% of colorectal cancers. The p21-ras mutation impairs cellular GTP-ase, allowing continual activation of the signal for DNA replication in colon cancer and many other tumour types.

Blocks peroxide inhibition of cell-cell signaling. Suppresses signal transduction pathways such as protein kinase C and casein kinase II, preventing these signals from the cell surface to the nucleus from over-riding normal growth controls. Quercitin inhibits lymphocyte tyrosine kinases.

Interferes with the porter system ion pump, also called P-glycoprotein, which can pump drugs right out of cancer cells. This is like bailing water out of a sinking boat. Giving quercitin with many chemo drugs helps hold enough chemo inside the cancer cells to overcome multi-drug resistance MDR to effect a cure. It also restricts drug resistance by inhibiton of heat shock protein HSP-70.

Increases effectiveness of radiation and chemotherapy, especially doxorubicin, ribavarin and tamoxifen.

Quercitin blocks epidermal growth factor receptor EGFR and reduces activity in the HER2 signal pathway.

My learned colleagues at the Cancer Treatment Centers of America CTCMA prescribe a quercitin combination BCQ - bromelain, curcumin and quercitin - from Vital Nutrients at doses of 2 capsules three times daily. I use a Canadian version called Can-Arrest, or may just give quercitin. Dr. Leanna Standish, ND, PhD prescribes 1,000 mg twice daily. That is typically 2 capsules twice daily. This has become my standard.

AppleBoost is an interesting new product rich in free phenols and polyphenols, including quercitin and quercitin conjugates. It is a concentrate from apple peels, with a very high anti-oxidant ORAC score. Apple extracts appear to have particular benefit in squamous cell cancers. An apple a day keeps the doctor away!

Quercetin induced apoptosis via inhibition of Akt/PKB phosphorylation, an upstream kinase of pro-survival protein kinase cascade. Inhibition of Akt phosphorylation was coupled with a significant decrease of anti-
apoptotic Bcl-2 and Bcl-XL. Quercetin caused a downregulation of Cu-Zn Superoxide Dismutase which perhaps led to an increase of reactive oxidative stress (ROS). The decrease of Bcl-2 and Bcl-XL along with this oxidative stress caused release of mitochondrial cytochrome c into the cytosol and subsequent induction of pro-caspase-9 processing.

Quercitin inhibits the proliferative effect on breast cancer cells of environmental xeno-estrogens such as bisphenol A and diethylstilbestrol DES.

Quercitin is highly synergistic with ellagic acid. The combination markedly increases activation of p53, p21 (cip1/waf1), MAP kinases, JNK1,2 and p38. This results in apoptosis in cancer cells. Quercitin is also quite synergistic with green tea EGCG and marine omega 3 oils, says a naturopathic oncologist. Other FABNOs suggest there is a synergy with sulforaphane and resveratrol.

Extreme doses are toxic to the kidneys

Reactions are extremely rare, but just to illustrate the odd things one must expect in clinical practice, one patient experienced a dull headache, band-like around the head, became very spacy, losing words and thoughts, had a general sick and nauseated feeling, with shaky, wobbly legs making it hard to stand. This repeated several times until quercitin was stopped.

**CAROTENOIDS**

Beta carotene (provitamin A), lycopene, lutein, and other carotenoids in the diet are strongly associated with reduced risk of various cancers. There may be a therapeutic role in breast, prostate and cervical cancers.

Lycopene reduces IGF-1 stimulation of cancer cell growth in hormone dependent tumours, and is best derived from cooked tomatoes. L.O.M. is a high dose supplement of lycopene and lycopene-like carotenoids phycoene and phytofluene, from a specially bred tomato. The dose is 1 tablet twice daily. Take care to keep this product out of the light.

Lutein is found in spinach, broccoli, oranges, carrots, lettuce, tomatoes, celery and green vegetables.

Synthetic beta-carotene or as a high-dose supplement without other natural carotenoids is not recommended in cancer care. These can become a catalytic pro-oxidant in high-oxygen tissues – thus an increase risk for lung cancers when given to smokers. However, retinoids reduce risk of developing cancer when given after quitting smoking. Vitamin E supports lung repair as well. Grapeseed extract is stable in the lungs, and gives an opposite, positive effect in reducing risk of lung cancer in active smokers. Of course we must urge smokers to quit, since it is the single most preventable cause of cancers.

**MELATONIN**

Melatonin is the natural indoleamine hormone produced in the pineal gland in the brain. The daily variation in light received by the eye tells the pineal gland to make bursts of melatonin. In more technical detail: the enzyme N-acetyltransferase emitted in a circadian cycle from the suprachiasmatic nucleus after photonic stimulation through the retino-hypothalamic tract converts serotonin into melatonin. This internal body clock, designed to work under natural light, makes a daily hormone tide which regulates biological rhythms.

Outdoors on a bright sunny day we are exposed to a light intensity of about 100,000 Lux. Outdoors on a dull rainy day this falls to about 10,000 Lux. However, a well-lit classroom only provides about 400 Lux of ambient light. Obviously living under artificial light is not stimulating our pineal system the way natural light does.

Pinealectomy (removal of the gland) enhances tumour growth and metastasis in experimental animals. Pineal extracts, even if melatonin-free, inhibit human cancer cells.
Working rotating night shifts or going to bed after 2 am increases risk of breast cancer, presumably due to suppression of melatonin production. Normally melatonin levels peak between 2 and 3 am. Melatonin suppresses the synthesis and secretion of sex hormones by promoting the release of gonadotropin-releasing hormone.

Melatonin production is suppressed by morning light, and that promotes alertness. The ideal light to switch off melatonin is blue light at 480 nanometers wavelength. We only see down to about 555 nm, but the closest light to 480 we see is the bright blue color of the sky on a sunny day. Beta-blocker drugs prescribed for high blood pressure and fast heart beat will depress melatonin secretion.

Long-term safety as a supplement is well established - for example melatonin has long been used in Europe in oral contraceptives. For insomnia and jet-lag we use 1 to 3 mg at bedtime. The type of sleep issue it tends to help is when people are trying to sleep at a time other than the usual 10 pm to 6 am. It can treat gastro-esophageal reflux disorder GERD. For cancer we target 10 to 20 mg, to tolerance, at “bedtime” only!

IMPORTANT NOTE: Never take melatonin at any other time than at bedtime - what we call “the hour of sleep” - in the late evening. This is 8 pm to 12 midnight only! This is an example of chronobiology, the timing of administration of medicines to match natural biological cycles. If you forget to take it during the prescribed time of day, do not take any. Wait until the next evening. The dose is reduced if the patient has nightmares or feels groggy in the morning. Rare persons experience agitation or depression when over-dosed. After about 3 years of use the dose should drop to a maximum of 5 to 6 mg at bedtime.

Avoid melatonin for patients with disseminated cancers such as leukemia, lymphoma and multiple myeloma. It may be used in such cases only short-term during chemo or radiation, if prescribed by a physician experienced in integrative oncology.

Melatonin inhibits corticotrophin-releasing factor, reducing cortisol levels and that of other adrenal corticoids. For this reason its use may be contra-indicated in patients on Prednisone or Dexamethasone or other steroid medication, or for persons with asthma, auto-immune diseases, infertility or adreno-cortical insufficiency. There is a small theoretical risk of interaction if combined with SSRI antidepressant drugs such as Paxil - it could provoke serotonin syndrome, with a sudden rise in blood pressure.

Melatonin is a balancer and stabilizer in all stages of solid tumours: Melatonin is very helpful in most cancers, not just hormone dependent types.

- improves survival time as a sole agent in terminal cancer.
- doubles survival time and response rate to conventional therapy in all hormone sensitive cancers.
- antioxidant in low doses, protecting DNA, RNA and cellular membranes from oxidation.
- pro-oxidant in cancer cells at higher doses.
- inhibits cancer initiation, anti-carcinogenic.
- modulates hormones - estrogen, testosterone, prolactin and may make tumours more hormone dependent, which is more amenable to treatment.
- blocks mitogenic effects of hormones and growth factors.
- melatonin directly and indirectly inhibits epidermal growth factor receptor EGFR.
- increases effectiveness of radiotherapy, reduces myelodysplasia.
- increases gap junctional intercellular communication.
- controls fatty acid uptake, transport and metabolism, by suppression of cAMP at plasma membranes.
- improves glucose tolerance.
- increases p53 expression.
- increases apoptosis.
- modifies cytokines, increasing host immune defenses via thymus and T-helper cell derived opioid peptides, and enhances thymocyte proliferation.
- immuno-modulator – increases INFg, IL 1, 2, and 12.
- modulates cortisol stress hormone, reducing its suppression of immune function.
• decreases circulating cytokine interleukin 6 (IL-6) significantly.
• synergistic with IL-2 therapy, increases effectiveness up to ten fold, allowing use of only 10% of the usual dose.
• NK cells have receptors for melatonin and IL-2; melatonin increases NK number and lytic activity.
• inhibits NFkB transcription factor, reducing pro-inflammatory cytokines.
• Inhibits AP-1 activator protein, decreasing cancer cell proliferation.
• down-regulates 5-lipoxygenase gene expression.
• reduces TNF secretion.
• reduces cachexia, along with omega 3 EPA and antioxidants R+ alpha lipoic acid, grapeseed extract OPCs, and vitamins C and E.
• increases response and survival with chemotherapy - reduces myelosuppression (bone marrow damage) and thrombocytopenia (loss of platelets needed for blood clotting).
• melatonin levels tend to be lowest in estrogen- receptor positive breast cancer cases.
• aromatase inhibitor/ down-regulator, blocking estrogen bio-synthesis from testosterone via CYP-19 aromatase and NADPH-CYP reductase, at serum levels of 1 nM – as seen with natural nighttime synthesis of melatonin in healthy subjects.
• decreases production of estrogen receptors in breast cells, and is a primary selective ER modulator, and therefore synergistic with Tamoxifen.
• increases serotonin, which has an anti-depressant effect.
• naturally increases with meditation (focused awareness exercises) or breathing exercises.
• occurs naturally in rice, corn and oats.
• inhibits telomerase.
• increases p53
• thermo-regulator.

Melatonin levels and cycles can be naturally regulated by sleeping in a completely dark room between 10 pm and 6 am, for a period of at least one month. A night-mask may be used. There must be no exposure to light above 50 lux intensity – which means no night-light, no exposure to the refridgerator light, no turning the light on in the bathroom at night, etc. Melatonin production is said to be disrupted by electro-magnetic fields, so it is recommended that no electrical appliances or outlets be within 1 metre from your head during sleep.

If possible get at least 20 minutes exposure to outdoor natural light in the early morning hours.

CO-ENZYME Q-10

Co-enzyme Q-10 or ubiquinone is a fat soluble antioxidant critical to cell energy production. Co-Q-10 carries protons and electrons in the inner membrane of the mitochondria - the sugar-oxygen combustion chambers inside all cells - to assist energy production. It can re-activate production of ATP bio-chemical energy for repair and healing in damaged cells, tissues and organs.

• intestinal absorption is poor, and may limit effectiveness; take with some oil or fat, - olive, flax, fish oil.
• essential for production of immuno-globulins.
• maintains vitamin E and related tocopherols and tocotrienols in an anti-oxidant state.
• Co-Q-10 is absolutely a must for any organ failure, such as congestive heart failure, liver failure or kidney failure, as may be triggered by chemotherapy drug poisoning.
• use preventatively before, during and after chemotherapy with heart-damaging drugs - for example Herceptin or the anthracyclines such as Adriamycin, Doxorubicin, Epirubicin.
• do not use Co-Q-10 during radiation therapy, as it reduces effectiveness.
• Co-Q-10- may improve survival in several types of cancer; early studies show dramatic regression rates in advanced breast cancer - in combination with alpha lipoic acid, selenium, vitamins B1 as benfotiamine, B3 as nicotinamide, vitamin C, vitamin E, beta carotene, 3-6-9 essential fatty acids, and magnesium . Co-Q-10 with appropriate adjuncts will restore mitochondrial control over apoptosis, resulting in dramatic killing of cancer cells and clearance of tumours.
Strongly inhibits metastasis in melanoma.

Reports describe clearance of liver metastases and pleural effusions.

I prescribe at least 300 mg a day of ubiquinone, or at least 100 mg of the newer ubiquinol form. At doses of 600 to 1,200 mg ubiquinone there can be problems with heartburn, headaches and fatigue.

**ALPHA LIPOIC ACID**

Alpha lipoic acid or thioctic acid is a water and fat soluble thiol antioxidant. It is called the universal anti-oxidant because it works in both the fatty cell plasma membranes and the aqueous interior (cytosol) of the cell. It is 100 times stronger inhibitor of free radicals of oxygen than vitamins E and C combined. It protects DNA, and the mitochondria energy producing part of a cell, by reducing cellular inflammation.

- increases glutathione activity.
- very supportive of detoxification from drugs and poisons.
- reduces fibrosis by down-reulating an iso-enzyme of transitional (transforming) growth factor beta TGFβ responsible for fibroblast matrix deposition. Very important in restoring kidney filtration.
- recycles vitamin C and E.
- NFkB inhibitor.
- blocks heat shock proteins.
- improves insulin function and decreases insulin resistance.
- essential for production of immunoglobulins.
- improves mitochondrial energy production by squelching oxidative stress.
- inhibits pyruvate dehydrogenase kinase (synergistic with CO-Q10), reducing lactate, increasing apoptosis.
- powerful therapy for all forms of neuropathy - from chemo drugs like the platinums or diabetes.
- reduces angiogenesis by chelating copper.
- chelates heavy metals too.
- neuroprotective.
- allows toxic homocysteine to accumulate in cancer cells.
- high doses may trigger low blood sugar (hypoglycemia) in sensitive patients.
- may inhibit thyroid function by limiting activation of T4 into T3.

R+is the naturally occurring form. The R stands for right-handed in English, and in Latin it is D for dextro. For some reason the good oral forms are called R-ALA while the intravenous forms are called D-ALA. If the product does not say R+, R or D-, but says DL- or RL- then it is synthetic, and 50% is in the L+ form. The L-form is not only useless, it is toxic. Do not waste your time, money and health on products that do not meet this standard of 100% in the R (or D) form. Rx - 300 mg two to three times daily of R-ALA. I prefer twice daily, as the higher range gives more hypoglycemia (low blood sugar) problems.

It is excellent given intravenously twice a week. Use only D-ALA, the older style racemic DL-ALA is not well tolerated or as effective. The standard dose is 150 mg D-ALA. Some go up to 300 mg, but this is really not necessary Rx: 10 mL of 15 mg/mL D-ALA in 250 mL saline. Put nothing else in the bag; as ALAis prone to oxidation, polymerization and desulfurization, and is insoluble in water. Protect from light with foil, run 1 gtt/sec, takes about 1.5 hours. Go low and slow in frail patients. Beware hypoglycemia. Evaluate after 10 treatments. Please use only injectable grade D-alpha lipoic acid sourced from Europe. Continue oral ALA twice daily dosing concurrent with the IV therapy. D-ALA can also be nebulized 1 to 2 times daily at home.

R-ALA is highly synergistic with grapeseed extract OPCs, which recycle it into its active state. It is also highly synergistic with dichloroacetate DCA, and Solomon’s seal herb, and maybe *Garcinia cambogia* hydroxycitrate . R-ALA is incompatible with artemisinin. Synergistic with curcumin in lung cancers.

Poly-MVA is a palladium-lipoic acid complex given orally 10-20 mL bid-tid, and IV at 5-40 mL in 100-250- ML saline or D5W.
VITAMIN E

Vitamin E is a family of compounds called tocopherols and tocotrienols, which are fat-soluble antioxidants. The most common natural form of vitamin E is d-alpha-tocopherol. Artificial or synthetic dl-alpha tocopherol is a mixture of the natural right handed version (d is the Latin abbreviation for dextro = right) and the quite unnatural left-handed version (1 stands for the Latin levo =left) of the tocopherol molecule. Synthetic vitamin E has never been shown to be medically useful and is of questionable safety. d-alpha tocopherol does not stand out as very useful, but is only harmful to the extent that supplements can wash out of the cell membranes the other tocopherols – beta, delta and gamma. Food sources tend to provide the mixtures. Nature knows antioxidants work in teams. I only prescribe “mixed tocopherols” which contain the gamma form of vitamin E. Ordinary “natural source” pure d-alpha tocopherol is not an acceptable substitute.

Vitamin E compounds protect fats in cell membranes from oxidizing. When vitamin E levels are too low, the cell membranes get stiff and cannot pass nutrition in and wastes out. Vitamin E promotes apoptosis independent of genes p21 and p53, especially the injectable vitamin E succinate or VES. Vitamin E stimulates cell differentiation, inhibits angiogenesis, inhibits TNF, turns off NFkB and other pro-inflammatory genes.

Vitamin E is highly protective of lungs, brain and other high oxygen tissues. In this regard it is a good match with grapeseed extract OPC’s. Vitamin E is protective against breast, colon and prostate cancer. The alpha form of tocopherol is shown to reduce risk of lung cancer - up to 53% at high doses. The alpha form is also said to be better than gamma tocopherol for prostate cancer risk – but I have my doubts if either form really have merit in prostate disease.

Vitamin E is maintained in an anti-oxidant state by Co-enzyme Q-10, and also synergizes with selenium and vitamin C.

Vitamin E is very protective against radiation damage. High doses of vitamin E may significantly reduce radiation effectiveness against cancer cells, and so are not recommended during radiotherapy.

Vitamin E increases the cytotoxic activity of 5-fluorouracil, doxorubicin and cisplatin by inducing p53. It reduces mucositis.

Vitamin E is often described as a blood thinner, but it rarely actually increases bleeding in doses up to 400 IU daily. Some individuals may see an unexplained activation of vitamin K menaquinone MK-4, so do not mix.

ANTIOXIDANT SUMMARY

- Always use natural sources and forms.
- Use moderate doses, unless you intend to have a pro-oxidative effect. High doses tend to switch into pro-oxidants, particularly in high-oxygen tissues such as the lungs and brain.
- Use mixtures, as these nutrients form a complex and inter-dependent network.
- Antioxidants alone are never a cure for cancer (and neither is oxygen) but they help us to manage the oxidative stress which is the prime driver of apoptosis of cancer cells.
- Some cancer alternative pioneers thought some foods contained oxygen inhibitors, and thus reduced the ability to oxidize toxins: tomatoes, alcohol, coffee, lentils, beans, and meats. Hoxsey and Koch warned against eating tomatoes. Legumes were not a staple in pre-agricultural diets; but seem healthy in the context of the Mediterranean diet.

D - LIMONENE

Limonene is found in citrus fruit and celery. D-limonene down-regulates K-ras to reduce epidermal growth factor receptor EGFR over-amplification.
MUSHROOMS

Common white button mushrooms *Agaricus bisporus* contain potent aromatase inhibitors, useful in breast and prostate cancers. Women who eat mushrooms frequently have reduced risk of breast cancer. See TCM chapter.

CURCUMIN

Curcumin is derived from the yellow curry spice, the tumeric root –*Curcuma longa* or *yu jin*. Dietary intake is protective against various cancers.

Induces apoptosis by altering all the Bcl-2 family of proteins. Active in many cancers, such as liver, kidney, sarcoma, colon, rectum, ovary and multiple myeloma.

Highly chemoprotective, blocks tumour induction by chemical carcinogens, inhibits cancer initiation, promotion and progression. Curcumin slows phase 1 liver detox while accelerating phase 2 detox, preventing the build-up of toxic intermediates. This makes it essential in detoxification programs, to prevent the nasty side-effects often euphemistically referred to as a “healing crisis”.

- antioxidant against superoxide, hydroxyl radicals, peroxyxnitrite.
- inhibits inducible nitric oxide synthetase by reducing its mRNA transcription.
- decreases eicosanoids such as 5-HETE and PGE-2 to strongly reduce inflammation.
- prevents activation of nuclear factor kappa B, inhibiting inflammation. It does so primarily by binding iron and copper ions which induce NFkB.
- curcumin reduces pain, and is widely used in formulas for pain and inflammation. Look for synergies with boswellia, bromelain, ginger and picorrhiza.
- stimulates the reticulo-endothelial immune system, activates phagocytosis by immune cells, reduces IL-6.
- inhibits spontaneous DNA damage from lipid peroxidation.
- induces heat shock protein HSP-70 to protect cells from stress.
- reduces activity of tumour necrosis factor alpha TNFα and basic fibroblast growth factor bFGF.
- significantly inhibits angiogenesis by blocking VEGFR and binding APN.
- significantly inhibits number and volume of tumours.
- inhibits epidermal growth factor receptor and tyrosine kinases.
- inhibits spread of cancer and invasiveness by blocking MMP-2 and MMP-9 matrix metallo-proteinases.
- reverses liver damage from fungal aflatoxins and mutagens in tobacco smokers.
- Impacts immune light chain and amyloid proteins, in leukemias and amyloidosis.

Curcumin absorbs very poorly unless combined with an adjunct such as bromelain, bioperine, lecithin, oils, or special delivery systems such as phytosomes or micronization. A favorite of my colleagues at the Cancer Treatment Centers of America is Vital Nutrients brand *BCQ*. The Canadian version is Vitazan brand *Can-Arrest*.

My preferred product is the micronized (nearly nanoparticle) curcumin *TheraCurmin* from BioClinic Naturals. This format shows 30 times baseline absorption over turmeric root. This assures it is medically useful. It is able to reduce COX-2 tumour growth signalling due to inflammation. This actually slows tumour growth, reduces pain and protects the patient’s quality of life in a clinically meaningful way.

Intravenous water-soluble curcumin is given in up to 1,000 mL of D5W. Start at 50 mg, usually go up to 100 mg, maximum dose is 125 mg. IV curcumin targets all known cytokines, inhibits bone and brain metastases, impacts cachexia and yields clinically significant improvements in quality of life QOL. Do NOT use ionic salt, liposheric or cyclodextran forms. Use only water soluble curcumin! Strictly follow Dr. Paul Anderson’s monograph. Dilute well, no more than 100 mg per 100 mL of saline or D5W. Infuse very slowly to avoid itching and swelling. Drips can go for 6 to 8 hours. Start at 10 mg/kg, best at 20 – 40 mg/kg. Highly choleric. Often at the 3rd to 7th IV they can get a dumping of bile with violent vomiting. Manage with psyllium husks pre-, during and post-IV.

Curcumin is not to be given if there is biliary duct obstruction. Curcumin binds iron, so discontinue its use if you are diagnosed with iron-deficiency anemia, or are at risk due to blood loss.
CABBAGE

Cabbage was prescribed for cancer by the great physician Hippocrates of Cos circa 400 BC. He would poultice cancerous breasts with green cabbage leaves.

A particularly valuable form of the amino-acid methionine in cabbage is a remarkable remedy for mouth sores (mucositis) in chemotherapy or radiotherapy. This compound is sometimes referred to as “Vitamin U”. It heals inflammation anywhere in the GI tract. I give Biotics Research brand Gastrazyme 2 tabs tid or the TCM formula Fare You 5 tabs tid.

Cabbage is also rich in powerful anti-cancer indoles and isothiocyanates. Indoles regulate hormone and xenobiotic metabolism and detoxification. Isothiocyanates ITCs are thio-glucoside conjugates called glucosinolates. ITC’s up-regulate anti-angiogenic factors such as IL-2 and tissue inhibitor of metalloproteinases TIMP, while down-regulating pro-angiogenic factors such as VEGF and pro-inflammatory cytokines such as IL-1β, IL-6, GM-CSF and TNFα.

Sulforaphanes are an isothiocyanate found in all the cabbage family vegetables, but especially broccoli seeds and sprouts. Even 3 minutes steaming inactivates the myrosinase enzyme that converts glucoraphinin to sulforaphane. Glucoraphinin is very bitter, and has been bred out of many varietals. In large doses it causes nausea and cardiotoxicity. Mask the taste with lime juice. Dose twice weekly, the effects are very persistent.

I3C naturally occurs in cruciferous Brassica vegetables, including broccoli, cabbage, cauliflower, brussel sprouts, kale, bok choy, watercress, radishes, horseradish, rutabaga, turnips, collard greens and mustard greens. These foods are strongly associated with broad cancer protection. I3C is released from these foods by chewing, then most converts to diindolylmethane (DIM) in the acid of the stomach. DIM is less likely than I3C to spoil quickly in heat. I3C does not alter the 2:16-OH Estrogen 1 ratio but DIM does, in 80% of women. Most FABNOs favour DIM over I3C as a therapy for breast cancer.

- strongly inhibits signal transducer and activator of transcription STAT-3 a DNA copying activator protein required for proliferation and differentiation.
- inhibits beta-catenin, a cancer trigger, ie of a leukemic blast crisis.
- inhibits platelet-derived growth factor receptor PDGFR.
- induces aryl hydrocarbon hydroxylas.e
- decreases ‘bad’ 16-OH and 4-OH estrogens by 50 %.
- increases ‘good’ 2-OH estrone and estradiol by 75 %.
- down-regulates estrogen receptor activity.
- reduces dioxin xenohormone signaling.
- inhibits breast cancer reoccurrence 90 % - compared to Tamoxifen at 60 %.
- induces apoptosis, regulates apoptosis genes; stimulates p53 phosphorylation and disrupts p53-MDM-2, its ubiquitin ligase.
- induces BRCA-1 and BRCA-2 expression, repairing DNA mutations and thus preventing as well as treating cancer.
- I3C and BRCA-1 co-inhibit estrogen receptor alpha ERα.
- DIM down-regulates androgen receptors even in hormone-refractory prostate cancer.
- arrests cancer cells in G1, as p53 release leads to induction of the p21 cyclin-dependent kinase CDK inhibitor. Down-regulates cyclin D1, CDK 2 and CDK 4.
- down-regulates phosphorylated Akt, inhibiting the mTOR signaling pathway.
- down-regulates the anti-apoptotic protein Survivin.
• strongly inducing liver phase 1 and 2 enzymes CYP 1A1 and CYP 1A2, as well as gut detox enzymes. In women it induces CYP3A2.
• increases p21 transcription, blocks ras proto-oncogene.
• regulates nuclear promoter Sp1 transcription factor.
• inhibits human papilloma virus HPV.
• protects PTEN functionality.
• inhibits urokinase uPA, associated with breast cancer growth and metastasis.
• I3C reliably reduces PSA in early prostate cancer, is great service in breast cancer, and other hormone-dependent cancers.
• It is also strongly indicated in pancreatic cancer and lymphomas, to suppress STAT3.

DIM capsules may be taken at bedtime, 200 to 400 mg. DIM is preferred over I3C by many naturopathic oncologists, but I still like I3C. Indole-3-carbinol is usually given at 600 mg daily, divided into 2 doses, at meals. I3C and DIM are also useful for other hormone overload problems such as acne, premenstrual tension, menstrual disorders and menopause. They help manage sulphite sensitivity. They probably also clear out xeno-estrogens such as organo-chloride pesticides, via induction of synthesis of the cytochrome P450 detoxification enzyme CypA1.

**GARLIC**

*Allium sativa* or garlic is a great health food. It is the best immune building food, and promotes longevity.

• immune tonic *par excellence*..
• detoxifier.
• anti-angiogenic because it boosts nitric oxide synthetase activity.
• dialyl disulphide DADS, from the breakdown of allicin, alters protein and polyamine metabolism in cancer cells, and normalizes cell cycle and adhesion properties.
• chemoprotective, anti-proliferative anti-mitotic and tumour shrinking effects have been observed with garlic extracts.

Anyone beginning to catch a cold or other illness would do well to mince some garlic cloves up and down them with a glass of warm water. That is usually the end of the problem.

**CATECHIN**

Catechins are common in tea and many plant medicines. Catechins are bioflavonoids which increase activity of antioxidant enzymes which:

• inhibit formation of adhesions after surgery.
• inhibit mutagenesis and carcinogenesis.
• induce apoptosis in a dose-dependent fashion.
• inhibit tumour growth.
• arrest malignant cells in G0-G1 phase of cell cycle.
• enhance wild type p53 expression.
• inhibit protein kinase C activation by tumour promoter.

**CARTILAGE**

The famous Cuban studies by Dr. Lane with shark cartilage may have been overstated, and those who did well in his study were taking other active treatments including the Hoxsey herbal formula. I have not been convinced that it is cost-effective, and have never prescribed it. Patients I have observed taking it have had little change.

Cartilage is avascular - it contains no blood vessels, and does contain substances which inhibit angiogenesis.
Shark cartilage had a period of popularity, but quality and price issues have deterred its wide acceptance. Frozen or dried, it is proven to have little to no effect. Bovine tracheal cartilage may have been better than shark cartilage, but it is no longer in use either.

Anti-angiogenic therapies of all types have been plagued by the ability of cancers to adapt and become resistant to these agents. There are redundant alternative pathways to making blood vessels, and the tumours find them.

**SOY ISOFLAVONES**

Soy foods are strongly associated with reduced risk of breast, prostate, and other hormone dependent cancers as well as lung cancer in smokers. Tofu increases sex hormone binding globulin and reduces the testosterone to estradiol ratio. Soy protease inhibitors help maintain cell contact inhibition and reduce tumour invasiveness.

In the lab 45 mg stimulates breast cancer cell proliferation, higher doses inhibit breast cancer. In humans it appears under 60 mg daily is anti-estrogenic, but over 80 mg daily is estrogenic.

Soy isoflavones competitively inhibit endogenous estrogen from entering receptors, reducing growth signaling. In humans the effect is consistently inhibiton of pre-menopausal ER+ breast cancer. It is harmless and may help in post-menopausal cases as well, though some still prefer to limit isoflavone supplements post-menopause and just allow soy foods.

- soy isoflavones inhibit DNA gyrase.
- soy isoflavones induce apoptosis.
- over 5 years of high-dose isoflavone supplementation can trigger uterine hyperplasia.
- fermented soy foods are more bioavailable and safer.
- unfermented soy foods can inhibit the thyroid gland.

Soy genistein is reported to

- inhibit angiogenesis.
- reduce estrogen levels, partly block estrogen receptors.
- reduce tumour cell nucleic acid synthesis.
- inhibit tumour glucose oxidation.
- inhibit topoisomerase II.
- enhance efficacy of radiotherapy.
- promote p53 activity.

Most important is the exposure to soy before menarche. Early soy intake reduces risk of ER+/PR+Her2- breast cancers by RR 0.7. Soy has an excellent synergy with Tamoxifen, so anyone on this drug should eat soy foods freely. High intake with Tamoxifen adds a 60% risk reduction.

They inhibit the akt node and HSP-90s. They also prevent cancer by inhibiting histone deacetylase enzymes, opening up activity in silenced tumour suppressor genes. This restores normal cellular function and also induces cell death in cancerous but not healthy cells. The Chinese developed a nitrogenated low temperature fermented organic soy beverage Haelan in the early 1980’s as a hospital nutrition supplement. It is extremely rich in the anti-cancer isoflavones:

- genistein 228 mcg/ml
- genistin 222 mcg/ml
- daidzein 184 mcg/ml

It is also high in protease inhibitors which reduce mutation in cancer cells. It is an excellent source of bioactive free amino acids (protein). The usual dose is 8 ounces daily. It tastes terrible.

The best form to support chemo and radition is the aglycone genestein/daidzein combination. For those with a soy allergy or sensitivity, kudzu root is rich source of these isoflavones.
**BROMELAIN**

A protein digesting enzyme extracted from pineapple stems. Better quality products will state a rating of their protein-busting activity from actual bioassays. For example, a GDU of 4 means 1 milligram of this bromelain product will liquefy 4 milligrams of animal gelatin.

- reduces tumour progression and metastases by modulating cell adhesion molecule CD44.
- anti-inflammatory – depletes kininogen and activates series 1 prostaglandins.
- reduces platelet aggregation.
- prevents clots by activating plasminogen.
- fibrinolytic, digests fibrin to break down clots safely.
- increased absorption to medically relevant blood levels of important water-insoluble bioflavenoids such as quercitin and curcumin, although this use has been superseded by new delivery systems.

**BIOPERINE**

Bioperine is a trademarked thermo-nutrient from black pepper made by Sabsina Corp. It is put into many products to improve absorption of medicinal ingredients, such as quercitin or curcumin. The usual intake is 5 mg 1 to 2 times daily. Never exceed 15 mg per day, as it will also inhibit vital glucuronidation reactions in the gut, and detoxification in the liver.

**KELLEY METABOLIC CURE**

William Kelley, MS, DDS cured himself of pancreatic cancer in 1964 with a program based on a raw food diet, supplements (up to 160 pills a day!), coffee enemas, liver flushes and pancreatic enzymes. The combination of pancreatic enzymes are intended to remove a putative immune-blocking layer on the outside of the cancer cell. Kelley claimed these would “destroy and strip away about 97% of such starch capsules, thereby enabling tumours to be recognized, digested, liquefied and removed from person’s bodies via their bloodstreams.” This is the rationale behind the popular *Mugos Wobenzyme* proteolytic enzyme products. NFH and Biotics Research make great and less expensive versions.

The use of pancreatic enzymes for cancer originated in 1902 with John Beard, an embryologist at the University of Edinburgh. Later Drs. Ernst Krebs & Ernst Krebs Jr. revived the enzyme concept, combining it with laetrile. The Kelly program will trigger an initial rise in tumour markers, and the tumours may swell. The white blood cell count will rise, and as the tumours are breaking down the patient will experience flu-like achiness, fever, headache, nausea, and irritability. The program is given in 25 day cycles with 5 days rest between cycles to allow elimination of tumour wastes. High response rates are claimed in his books *Cancer Cure* and *Cancer - Curing the Incurable.*

Recall Pottinger’s theory that solid tumours arise in sympathetic dominant cases which have low pancreatic enzymes. Nicholas Gonzalez practices a variant of the Kelly protocol, giving sympathetic dominant types a vegetarian diet with large doses of B-complex vitamins, magnesium and potassium; and lots of vigorous aerobic exercise and pancreatic enzymes. For parasympathetic dominant types with immune cell cancers such as leukemia and lymphoma he prescribes high intake of red meat, large doses of calcium, zinc, selenium, vitamin B12 and pantothenic acid - but avoids magnesium, potassium, thiamine, riboflavin and niacin. Dr. Gonzalez also routinely uses coffee enemas and glandular remedies. Doses of proteolytic enzymes range to 40 capsules daily. The whole program can end up being over 160 capsules of supplements daily! Most importantly, recent research shows enzyme-based therapy for pancreatic cancer is quite inferior to chemotherapy, with Gemcitabine giving about 10 months longer survival, on average, and far better quality of life.

**BUDWIG DIET**

Dr. Johanna Budwig, biochemist, in 1951 devised a cancer protocol centered around flaxseed oil and sulphated milk proteins. These are described in her books *Cancer -- A Fat Problem* and *The Death of the Tumour.* She says the absence of linol-acids in the average Western diet is responsible for the production of *oxydase,* which induces
cancer growth and is the cause of many other chronic disorders. The beneficial oxydase ferments (enzymes) are destroyed by heating or boiling oils in foods, and by nitrates used for preserving meat. Sulphurated oils are water-soluble and benefit oxygen and electron transfer across the cell membranes, including the mitochondria membranes.

Put in your blender or mix with an egg beater:

- 1 cup organic low-fat cottage cheese or quark.
- 2-8 Tbsp. (1.5 to 3 ounces) of organic cold-pressed flaxseed oil.
- 1-3 Tbsp. of fresh ground organic flaxseed.
- add enough water to make it soft. Acidophilus milk or buttermilk may also be used.
- if desired add a small pinch of cayenne pepper or garlic.
- minimum daily intake: 4 ounces low-fat cottage cheese with 1½ ounces flaxseed oil.
- when properly mixed the product has no oily taste and there will be no fatty residue around the rim of the container – the fats will be water-soluble!
- in the case of a very ill person, the mixture may be given in champagne, which enhances absorption as well as being palatable.

Carbohydrates containing natural sugar, such as dates, figs, pears, apples and grapes, are also included in the diet, and may be blended into the preparation for flavor. Yoghurt, poppy seed, buckwheat, oats, rice millet, chives, parsley, dill, marjoram, lemon juice, sauerkraut, greens, turnips, radishes, kohlrabi, cauliflower, walnuts and natural yeast are considered beneficial. Freshly squeezed vegetable juices are fine - carrot, celery, apple, and red beet. Grape juice is fine. Teas are allowed, particularly peppermint, rosehip and green tea.

Forbidden foods on this diet: sugar, animal fats, butter, refined oils, peanuts, commercial salad dressings, margarine, shortening and preserved meats.

Most naturopathic cancer experts have observed a lot of patients trying this approach, and are not impressed with the results. Budwig enthusiasts demand avoidance of antioxidants and herbal supplements while on this diet, which would be fine if the diet was a potent therapy, but it is not. Key goals of the Budwig approach are inhibition of epidermal growth factor receptor EGFR and 13-HODE – which are controlled far better by supplements such as melatonin and omega 3 oils.

I do not recommend this diet without modifications. For example we can cold-pressed non-GMO canola oil, extra virgin coconut oil, and extra virgin olive oil may be added for variety. Research has shown omega 3 fish oils synergize with the Budwig oil mixture. Digestive enzymes containing lipase (fat digesting enzymes) may be used instead of the quark/cottage cheese, if you are dairy intolerant or wish to take the oil straight up. I prescribe plant source digestive enzymes. Budwig certainly was aware that in her time the food supplements available were of poor quality and even commonly fraudulent. However, naturopathic physicians do reserve the option of giving those on the Budwig plan nutraceuticals and other medicines which are made to modern professional standards.

GERSON THERAPY

Dr. Max Gerson, M.D. developed a diet of primarily raw foods, with emphasis on fresh juices of vegetables, fruits. He gave his patients Lugol’s iodine solution, pancreatin enzymes for digestion, thyroid extract, mineral and vitamin supplements. He prescribed raw calf liver either orally as a juice or by injection! He was often able to arrest or even regress metastases, although he less often saw clearance of the primary tumours. He published the book *The Gerson Therapy, Results of Fifty Cases* describing cured cases, but was labelled a quack by the American Medical Association. His clinic was forced out of the U.S.A. and now operates in Tijuana, Mexico, under the direction of his daughter Charlotte. Dr. Steve Austin, N.D. was my professor of nutrition and of oncology at National College of Naturopathic Medicine in the early 1980’s. He has conducted a preliminary independent survey of the results of the Gerson approach. The diet takes great effort to make everything fresh throughout the day, and actual compliance falls off quickly once the patient returns home. However, even with
excellent compliance, which typically requires full time efforts of 2 people, results are startlingly poor. Dr. Austin says about Gerson patients, “All they do is the therapy, they don’t have a life. It’s not worth it”. The Gerson diet is just too cumbersome and too radical to be of practical importance to the average patient. Even if it were easier, it is too high in sugar load and too low in protein for cancer patients. NOT RECOMMENDED. Ditto for macrobiotic diets.

**ISSEL’S THERAPY**

Josef Issels described cancer as a series of multiple and chronic challenges and insults. Issels combined a variety of techniques to adapt to the individual patient and their current status. For over 50 years he used Coley’s toxins, a non-specific mixed bacterial vaccine. The patients for whom it provoked periodic fevers saw regression and resolution of tumours. He also used a specific autologous vaccine made from mycoplasma and related organisms found in the patient’s own blood. He emphasized correction of the pro-malignant milieu, tumour debulking, and host support. He often removed tonsils and teeth as sources of focal infections and toxicity. His work is now carried on by his son Christian Issels, ND, based in Phoenix, Arizona. He has added emphasis on comprehensive immunotherapy. Treatments may include intravenous vitamin C, auto-hemotherapy, miasmatic homeopathy, Sanum pleomorphic medicines, dendritic cell vaccines, and neural therapy.

**MATTHIAS RATH PROTOCOL**

Dr. Mathias Rath has proposed a protocol to increase apoptosis, inhibit angiogenesis, reduce tumour growth, and regulate the extra-cellular matrix ECM integrity to control invasion and metastasis:

- green tea EGCG.
- vitamin C.
- N-acetyl-cysteine.
- amino acids proline, lysine and arginine.
- minerals copper, selenium and manganese.

**JONATHAN TREASURE PROTOCOL**

Jonathan is a respected English-trained medical herbalist from Oregon. He suggests a program remarkably similar to my ideas at the time of the first edition of this book, so he is obviously a genius ;-) Here it is:

- curcumin.
- green tea EGCG.
- grapeseed OPCs.
- resveratrol.
- licorice.
- rosemary.
- ginger.

**INSPIRE HEALTH**

Inspire Health [www.inspirehealth.ca](http://www.inspirehealth.ca) has been helping people with chronic disease for decades. I encourage everyone to look at the support they provide for any major health challenge. They emphasize vegetarian dietetics, mind-body healing, stress management, visualization and meditation, and many other important topics. They have a very talented multidisciplinary team of practitioners. Recently they have generated data showing they can increase survival time in stage 3 and 4 cancers by this integrative approach.

**AVEMAR**

Avemar and Metaprol Pro are fermented wheat germ extracts with documented efficacy as an aid to improving quality of life, and survival, with chemotherapy and beyond. Wheat germ fermentation yields the natural flavones 2,6-dimethoxy-p-benzoquinone (2,6-DMBQ), a redox regulator which chaperones cancer cell glucose metabolism. It impedes cancer cell growth, increases apoptosis, inhibits metastasis and has immune-modulatory effects. It also is a mild poly (ADP-Ribose) polymerase (PARP) inhibitor – mutated cancer cells use this enzyme...
to repair DNA damage from chemo and radiation. Other PARP inhibitors include red wine, coffee, niacin, and R-alpha lipoic acid.

**MEDITERRANEAN DIET**

The traditional diets of populations around the Mediterranean Sea are both preventative and therapeutic, reducing the risk of all-cause mortality, including the top two – cardiovascular diseases and cancers. The Mediterranean diet can reduce levels of fibrinogen, C-reactive protein, interleukin-6 and homocysteine. It improves endothelial function, regulates leukocytosis and oxidized low-density lipoprotein cholesterol.

- Fresh vegetables – excluding potatoes.
- Fruits
- Nuts
- Legumes
- Grains
- Fish
- Mono-unsaturated fats such as extra virgin grade olive oil and avocado

Try to avoid plastic wrap on fatty foods such as cheese or meat. The plasticizers are nasty “xenobiotics” which means they can mimic estrogen and other growth stimulators. The worst scenario is microwaving soft plastic. If you buy food in plastic re-wrap in wax or butcher's paper or store in glass or Nalgene plastic containers.

**KETOGENIC DIET & Fasting**

Healthy cells can burn ketones for energy, but cancer cells have depleted and damaged mitochondria, which rely on glucose for energy. A low carbohydrate and high fat (medium chain triglycerides, omega 3 oils and other good fats) and high protein diet can theoretically starve cancer cells. There is only anecdotal evidence for using ketosis against brain cancers.

Ketones such as β-hydroxybutyrate and acetoacetate are direct inhibitors of tumour growth.

Urinary ketones can be checked to note the initial onset of ketosis, but do not reflect blood ketones. An established ketogenic routine will show high blood ketones and low urinary ketones.

- Blood glucose under 80 mg/dL, preferably 55-60 mg/dL...
- Blood ketones over 1, preferably 2 – 4 mmol/L

Seyfried has demonstrated that **caloric restriction** is essential to a successful ketogenic diet.

- 1200-1500 calories per day, but some lose ketosis at over 800 calories.
- No more than 12 grams of carbs per day to start, maintain at maximum of 20 grams carbohydrate per meal, and maximum 70 grams carbs a day.
- Ratio of fat to combined protein and carbs should be 2 - 4 to 1.

**Foods to include:** 30 – 45 mL daily of butter, oils of fish, flaxseed, coconut, olive, hemp, avocado; artichoke, asparagus, broccoli, Brussels sprouts, cabbage, cauliflower, celery, collards, cucumber, eggplant, kale, lettuce, mushrooms, parsley, pumpkin, radish, rutabaga, seaweed, spinach, squash, Swiss chard, tomato, turnips, watercress, zucchini. Freely eat milk, cheese, yoghurt, buffalo, venison, lean beef, chicken, turkey, pork, duck, nitrate-free bacon, sausage, eggs, salmon, halibut, cod, mackerel, red snapper, tilapia, trout, tuna, crab, crayfish, catfish, sardines, sole, lobster, mussels, oysters, scallops, shrimp.

**In moderation, after initial phase:** onions, sweet peppers, blueberries, blackberries, cherries, raspberries, strawberries; almonds, Brazil nuts, cashews, chestnuts, hazelnuts, pecans, pine nuts, pistachios, walnuts, pumpkin seeds, sesame seeds, sunflower seeds.

**Foods to avoid:** sugar, all grains: bread, pastries, rice, cereals, pasta; starchy vegetables: beets, carrots, corn, peas, parsnips, potatoes; legumes: beans, peanuts; alcohol, soft drinks, candy, hydrogenated oils, safflower, sunflower, and corn oils.
**Fasting** is an old healing technique, with potential application in oncology. It is ideal to fast on water only for 3 days to initiate a ketogenic diet. In fact fasting and near-fasting caloric restriction and weight loss appear to be at least as beneficial as ketosis.

Fasting reduces hormone metabolism, reduces Cyp P450 detoxification reactions and increases inflammatory markers and so it must be carefully managed to yield a benefit.

A short period of severe calorie restriction can mimic a fast but be less stressful: one day at 1,100 calories, followed by 3 days at 750 calories.

Longo showed fasting mice during chemotherapy - at least one day before drug administration and two days afterwards - improved outcomes.

**Cautions:** Do not fast a cachexic patient, with unstable weight, loss ≥ 10% body weight, BMI < 18, or inability to re-nourish themselves afterward.

Watch their electrolytes – eg give vegetable broth, WHO rehydration formula.

Very low-carb ketogenic diets have been associated with headaches, bad breath, easy bruising, nausea, fatigue, aching, muscle cramps, constipation, and dizziness, among other symptoms. “Induction flu” may occur around days two through five, consisting of achiness and fatigue.

Very low-carb ketogenic diets may have the potential to cause osteoporosis (thin, brittle bones), kidney stones, low blood pressure, constipation, gout, high uric acid in the blood, excessive loss of sodium and potassium in the urine, worsening of kidney disease, deficiency of calcium and vitamins A, B, C, and D, among other adverse effects.

Ketosis should be avoided by Type 1 diabetics, diabetics on Metformin, pregnant women, and those with impaired kidney function.

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**A NUTRITION BASED STRATEGY FOR CONTROLLING CANCER CELL ENERGETICS:**

**MITOCHONDRIA RESCUE HEALS CANCER**

When a cancerous tumour grows to be a mass of hyper-metabolic cells about 1 to 2 millimeters in diameter, it must get extra blood and lymph vessels or it can’t maintain its abnormal rate of growth. Oxygen and nutrients can passively diffuse only across one millimeter of human tissue before normally growing cells consume it all. As malignant cells run low on oxygen, they release distress signals that recruit peripheral stem cells and immune cells to make chemicals, such as vascular endothelial growth factor VEGF, that sprout new blood and lymph vessels, and ATP energy molecules. This all happens long before a tumour is visible to any current diagnostic test.

Cancer cells do not stop growing when they bump into each other, but continue to grow, and crowd each other. This creates hard lumps of cells all compressed together. Also, chaotic blood vessels in the tumour are typically so leaky they raise the fluid pressure so high it squashes the blood flow, and the tumour develops areas of low oxygen = hypoxia. This often occurs at about 1 centimetre diameter, which is often before diagnosis. Hypoxic cells strongly resist being killed by radiation, and the poor blood supply also precludes adequate chemo drug delivery. There may even be areas that have no oxygen at all = anoxia, and those parts of the tumour will die. Areas with severe anoxia die by necrosis, which creates an inflammatory mess.

The cancer cells survive in a low oxygen condition by switching to fermentation of sugars for energy, which is theoretically about 18 times less efficient than aerobic glycolysis. The lactic acid by-product of fermentation is a potent stimulant of cancer growth and spread. The induction of lactate dehydrogenase 5 drives anaerobic transformation, and LDH-5 strongly stimulates angiogenesis, through hypoxia-inducible factor one alpha HIF-1α. Even more important it’s the signals from the combustion chambers buring the fuel, called mitochondria, to the epigenetic switches on the DNA in the nuclear chromosomes that triggers the mutations that foster cancer.
When the nuclear chromosomes in a cell become mutated, or epigenetics are altered, cancer can arise. There is a built in defense mechanism called apoptosis – the off-switch for mutated, bad, old and damaged cells. This apoptosis program is innate in every human cell, and will turn off and recycle cells found to have passed about 50 doublings or having more than 50,000 to 60,000 errors or mutations in its DNA. The p53 gene runs this check on the DNA at the cell-cycle checkpoint just before copying the cell. It is like the Scandisc utility checking your computer hard-drive for errors. Mitochondria are a key player in the apoptosis process – the off-switch for mutated cells. There are about 1,000 mitochondria in every cell, the little combustion chambers in the cell where sugars are burned or oxidized to make energy. We inherit them from our mother’s egg. They have their own bacteria-like circular DNA and a primitive DNA repair system. They function quite independently from the rest of the cell, including the DNA of the nuclear chromosomes which came from both parents.

Mitochondria low in oxygen build up free radicals of oxygen, particularly hydrogen peroxide. Mitochondria build-up ROS doing their work, but will have excessive ROS due to hypoxia, alterations in cell membrane composition - such as DHA deficiency, and from internal genetic and epigenetic phenomena – such as acetylated/methylated mDNA. They shut down, resistance to apoptosis increases, and the cell is immortalized. It is then a zombie cell that cannot die, no matter how sick and stressed.

Inducing apoptosis is the goal of radiation and chemotherapy, and is obviously a workable strategy to treat and cure cancer. We have known for years how to wake up the mitochondria in patients with chronic fatigue syndrome and fibromyalgia. We have not been keen to try this with cancers because we did not want to give the cancer more energy to grow on! Merely removing lactic acid to “alkalize” the tumour makes no sense, and will not in itself retard tumour growth. Restoring mitochondrial function as a whole, ie. restoring oxidative phosphorylation, has been suggested as a means to restore caspase activity and thereby apoptosis, in most cancers.

Steven Levine and group have proposed “membrane-calming” as a “neuro-bioenergetic” re-balancing for aging and cancer. Membrane hyper-excitability, particularly via inducible over-expression of voltage-gated ion channels, is linked to mitochondrial dysfunction. Hexokinase HK localizes to the outer mitochondrial membrane, suppressing the caspase cascade responsible for apoptosis.

Lactate dehydrogenase LDH is a glycolytic control enzyme. In cancer cells LDH becomes independent of oxygen status, and under both aerobic and anaerobic conditions will convert pyruvate to lactate. Its kinase enzyme is one of the few kinases not turned on in cancer, and in fact it is turned off to allow the mixed metabolic economy of the cancer cell – part aerobic, part anaerobic. Pyruvate dehydrogenase PDH moves pyruvate made by glycolysis into the mitochondria. Its kinase is the other paradoxically suppressed kinase. The biochemical bottleneck this creates reduces energy production, but increases production of materials needed to build new cells – fats, proteins, carbon skeletons, precursors of nucleic acids, etc. This dual economy of aerobic and anaerobic metabolism is essential to tumour growth.

A rat study using the drug dichloroacetate DCA demonstrated that blocking the enzyme pyruvate dehydrogenase kinase - which makes lactate from pyruvate - wakes up the mitochondria in implanted human breast cancer cells, and the cancer cells immediately switch off. The bad news is that DCA can be as toxic as any chemo drug, if not used properly. After a brief flurry of self-prescribing DCA from American internet sites, the only reliable Canadian source is now an MD in Toronto or some progressive pharmacies. With medications to control side-effects, it can be a reasonably safe therapy, and real tumour shrinkage is possible. However, there are a number of absolutely non-toxic natural alternative medicines which also inhibit this enzyme and are proven to wake up the mitochondria in cancer cells in humans. These alternative agents are approved by Health Canada for over-the-counter sale – for other purposes. Each has evidence of activity in human cancers.

**Natural inhibitors of pyruvate dehydrogenase kinase:**

*R-alpha lipoic acid* (natural form) 150 to 300 mg 2 to 3 times daily. DCA inhibits PDK1. Lipoic acid inhibits PDK1 the strongest, inhibits PDK2 and 3 almost equally as strong, and has some inhibition of PDK4. ALA can trigger hypoglycemia – low blood sugar – in sensitive patients. It may also inhibit thyroid function – T4→T3.
**Vitamin B-1** or thiamine, or the fat-soluble benfotiamine 80 to 160 mg twice daily. Inject 100 mg intramuscular daily. Thiamine at moderate doses intensifies tumour growth through transketolase activation, so do not use thiamine outside the context of this protocol.

Other natural agents which evidence suggests will activate the mitochondria to turn off cancer cells, restore oxidative catabolic metabolism, adjust epigenetic switches to restore differentiation and normal growth patterns:

- **Niacinamide** – increases mitochondrial metabolism at 500 mg bid
- **Acetyl-L-carnitine** - a potent mitochondria booster, but needs ALA to regulate the ROS created. Give acetyl-L-carnitine 500 to 1,000 mg 3 times daily. L-carnitine can inhibit thyroid function. Contra-indicated if on Keppra anti-seizure medication.
- **Coenzyme Q-10** - 300 mg ubiquinone or 100 mg ubiquinol daily – absorbs best taken with fats or oils.
- quercitin - 2 of 500 mg capsules 2 to 3 times daily
- grapesed extract (oligomeric proanthocyanidins) 400–500 mg daily
- omega 3 marine source oils assist in membrane repolarization and stabilization.
- gamma tocopherol (mixed tocopherols or vitamin E) – 400 to 800 IU daily traps peroxynitrite radicals.
- reishi (Ganoderma lucidum) mushroom extract - 500 to 1,000 mg 3 times daily
- L-glutamine – primary requisite substrate for maintenance of mitochondrial membrane potential and integrity and for support of the NADPH production needed for redox control and macromolecular synthesis.
- ellagic acid – can be as 8 ounces of unsweetened pomegranate, grape or berry juices
- betulinic acid from birch leaves 20 to 40 mg/kg/day.
- riboflavin (B2) - 50 to 100 mg 2 to 3 times daily
- Polygonatum spp. lectins eg Solomon’s Seal root eg ½ tsp (30 drops) tincture 2 to 3 times daily.

**Rx:** NFH brand Mito-SAP 3 capsules twice daily at meals (or 2 tid).

There are many other agents which basic science research shows can support mitochondrial recovery, including curcumin, melatonin, selenium, SOD, glutathione, resveratrol, coriolius, berberine and iodine. Aerobic exercise can help, and foods such as olive oil, lemongrass, berries, grapes, pomegranate, apples, chili peppers, onions, garlic, the entire cabbage family (Brassicas) and whole grains.

Responses to this metabolic approach to cancer have been quite gratifying in some very advanced cases of breast and colon cancer which were escaping control. Even more exciting are the responses seen in cancers I have never had consistent results with in the past, including lung cancers and sarcomas.

These supplements have little interaction with many common oncology drugs, including Coumadin and Dexamethasone. I would not mix this program with cytotoxic chemotherapy or radiation therapy, preferring other supports during these modalities, and for about 3 weeks after the last dose of chemo or radiation. I have conflicting information on curcumin in this context, as it blocks two-pore potassium channels K2P. Therefore I do not currently combine it with ALA when the focus is mitochondrial resuscitation.

**IV-D-ALA protocol**

- twice weekly for a run of 10 treatments is typical.
- excellent right after the ALA infusions “piggy-back” DCA - eg flush the line with saline and run 250 mg.
- D-ALA from York Downs Pharmacy in Toronto, not the racemic DL-ALA, only the pure D-form!
- 150 mg IV drips –10 mL of 15 mg/mL D-ALA in 250 mL saline.
- nothing else in the bag.
- protect from light, wrap the bag with foil, dim the lights, draw blinds, flush line with saline, get the line into the patient, then add ALA to the bag.
- run at or under 1 drop/sec, takes about 1.5 hours.;
- continue oral dosing; R-ALA 300 mg twice daily at meals
Sanoviv™ and AMT have put together a “mitochondrial rescue” protocol of IV-LAMC (PolyMVA™), IV-DCA (dichloroacetate), ketogenic or very low carbohydrate diet, MCT (coconut oil, Brain Octane™ medium chain triglycerides), vitamin A, Bioforce™ ketone esters, and hyperbaric oxygen.

DICHLOROACETATE - DCA

Dichloroacetate or DCA is a great concept but can be toxic unless used with care. Nerve and liver injury can be very significant. Discontinue if you see dark urine, have liver pain, nausea, vomiting, malaise or jaundice. DCA activates pyruvate dehydrogenase kinase, triggering an influx of acetyl-CoA into mitochondria. This drives more NADH into complex I. Superoxides that form are converted into hydrogen peroxide by manganese- super oxide dismutase. The H2O2 inhibits proton (H+) efflux, reducing mitochondrial membrane potential Δψm. This opens the mitochondrial transition pore (MTP), inhibiting calcium ion entry via voltage-dependent channels. Reduced intra-mitochondrial calcium (Ca++) suppresses a tonic activation of nuclear factor of activated T lymphocytes (NFAT). NFAT1 is a nuclear transcription activator similar in action to activator protein 1 (AP-1) and nuclear factor kappa B (NFκB). This reduces Kv1.5 expression, increasing potassium ion K+ efflux, reducing inhibition of caspases, and finally triggering cancer cell apoptosis (Bonnet 2007).

This is how it is being used:

- Michelakis dosing: 12.5mg/kg bid x 1 month (i.e. 1,500 mg daily for a 60 kg person) and increase to 25mg/kg bid (3000mg qd), but reduce this by 50% upon development of toxicity. They have reported that doses to 6.25mg/kg bid (750mg qd) have not provoked any peripheral neuropathies – but it is questionable whether this dose is enough for most cancers. They suggest this range for cancers of the brain or nervous system.
- Rx: 12.5 to 50 mg/kg/day. Begin most people on 500 mg capsule or as powder dissolved in juice twice daily for 1-3 weeks.
- Most people do well at 1,000 -1,500 mg daily, that is 500 mg two or three times daily.
- we may increase the dose to 1,500 mg twice daily, until adverse symptoms arise. Within a few weeks use it can take the myelin off peripheral nerves just like in multiple sclerosis, causing pain, numbness, hand tremor and staggering. It can cause central nervous system damage including confusion, sedation, depression, anxiety, hallucinations and memory impairment. It can be toxic to the liver and it is known that it can cause cancer! It can trigger oxalate-based kidney stones and increase uric acid levels, risking gout.
- use for 1 to 3 weeks, then take 1 week off. Some colleagues dose it 4 days on and 4 days off. Just don’t bull ahead if nerve injury is reducing the quality of life significantly – give a rest to heal up, then try again.
- repeat as needed DCA has a half-life in the cerebro-spinal fluid of 5 days.

It is mandatory to give protective supports such as R+ alpha lipoic acid, benfotiamine and acetyl-L-carnitine in full medical doses! Acetyl-L-carnitine, IV-calcium and magnesium, methyl B-12 and B1 shots and R- alpha lipoic acid are used to repair nerve injury that occurs despite these prophylactic medications.

- R-alpha lipoic acid prevents nerve injury and also boosts the effectiveness of the DCA against cancer cells. I prescribe 300 mg R-ALA twice daily at meals - beware of its hypoglycemic effects at the higher doses – chills, shakiness, irritability, headache, etc. IV-D-ALA at 150 mg twice weekly is very valuable, and really great as a piggy-back after IV-DCA. Nebulize 50 – 100 mg D-ALA up to twice daily.

- Thiamine or B1 prevents peripheral neuropathy and also boosts effectiveness. Dr. Khan uses fat-soluble thiamine called benfotiamine, at 80 mg twice daily. The full dose is 2 of 80 mg capsules twice daily. Plain thiamine at 100 mg bid will also work.

- Acetyl-L-carnitine protects the nervous system, and maintains energy. The basic dose Dr. Khan suggests is 500 mg three times daily, and the full dose is 2 of 500 mg capsules three times daily. Dr. Joe Pizzorno, ND has shown that when ALA and ALC are used together there is a remarkable synergy, and far lower doses are needed. Cf: Folks who suffer from epileptic seizures cannot take acetyl-L-carnitine.

- B-12 as methylcobalamin protects the nerves. We give an injection of 2,000 mcg in the rump, once weekly, or as needed. Daily sublingual methyl-B-12 from BioClinic Naturals is also recommended.

- Pantoprazole (Pantoloc) PPI at 40 mg prevents heartburn, nausea and indigestion.

Lab tests which may be checked weekly for 4 weeks, then monthly: CBC, sodium, potassium, chloride, calcium, urea, creatinine, albumin, total bilirubin, conjugated bilirubin, AST, ALT, ALKP, GGT, LDH and glucose.
My colleague Dr. Walter Lemmo, ND, FABNO, DCA is far safer given intravenously than orally, due to rapid drug clearance. There is evidence it is quite tolerable up to 100 mg per kg of body weight. Dr. Akbar Khan, MD www.medicorcancer.com discovered suggests starting at 60 mg/kg BW, in 50 mL normal saline, infused over at least 15 minutes. After two infusions, if well tolerated, the dose may be increased step-wise to 70, 80 and even 90 mg/kg BW. The infusions are done twice a week for two weeks, then we give the patient a week break. 3 such cycles over 9 weeks is a common course of therapy. It may be repeated later, as needed.

The Lemmo IV protocol for DCA:
- DCA – 1,000→2,000→3,000 mg (4mL, 8mL, 12 mL of 250 mg/mL DCA)
- vitamin C – 2,500mg
- B-complex – 1 cc, B12 – 1 mg, B6 – 100 mg, B5 – 250 mg, B1 – 100 mg
- saline 100 ml infused over 30-60 min.
- evaluate progress after 10 infusions.

My own experience is that the IV administration is far less problematic than oral dosing, but I may still continue oral dosing with aggressive neuroprotection. Just don’t give oral DCA on the days of IV drips of DCA.

<table>
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<tr>
<th>Precede IV-DCA with IV-D-ALA</th>
<th>150 mg. Avoid DL-ALA, it is much harsher than D-ALA.</th>
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<tr>
<td>IV-D-ALA blunts adverse reactions to the DCA in most cases, and there is a wonderful synergy that dramatically increases responses, including potential tumour shrinkage. Give vit. A p.o. <strong>Monitor for liver or nerve injury.</strong></td>
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It is thought that caffeine can improve responses to DCA, in doses of about 480 mg daily or about 12 cups daily of black tea. Metformin is considered to be highly synergistic. Other suggested synergists are grapeseed extract, curcumin, quercitin, resveratrol, selenium. A colleague suggests DCA and ALA could be supported by pre- and post-treatment with garlic (oral or IV) and/or nitrilosides, aka Laetrile (oral or IV). An interesting new concept is using it only on alternating weeks with artemesinin, as DCA is said to help the cancer cells recharge with iron.

I see DCA as being particularly useful in aerobic cancers – brain and lungs for example, but less so for more anaerobic cancers such as prostate and colorectal.

**Nebulizing ALA or DCA:** Purchase injectable grade 50 mg/mL D-ALA, 250 mg/mL DCA. Always keep them out of the light as much as possible. Rent or purchase a nebulizer from a pharmacy. Use a 3 cc syringe to pull out the medicine from the rubber-top multi-dose vial – page 209 of my book describes how we get medicine from the vials – it’s talking about mistletoe, but the principle is the same. Always wipe the top of the vial with alcohol before putting away in the fridge, and keep it shielded from light just as much as you can. Put 1 mL medicine in the medicine cup of the nebulizer, which is protected from light by wrapping it with tinfoil. Over time you can try increasing the dose eg 2 mL of the D-ALA plus 3 to 4 mL sterile saline to make 5 mL total. Normal saline is 0.9% salt, sterile solutions are commonly used for contact lenses.

Turn on the pump and through a face mask or breathing tube breath in the medicine as a mist. Breathe normally. After about 10 minutes the medicine well will go dry and you’ll hear it sputtering. Turn off the nebulizer pump, and rinse everything off for next time. With a doctor’s prescription and supervision you can do this twice a day at home, it is about as effective as an intravenous drip, and a lot cheaper.

In some cases we add DCA (dichloroacetate) 250 mg/mL with the D-ALA. We start with 1 mL of each medicine, plus 3 mL of sterile saline. Later we can go up to 2 mL or 100 mg of the D-ALA per dose. Do not let stand long, as a precipitate can form.

My final word is: always be grateful that you have food, thank those who grow and deliver it, and bless those who make and serve it. Do not consume worry and stress about food choices, which can poison your meal. You may wish to bless the food to your needs, and visualize your body taking from it that which is good, and leaving the rest. Do your best to be moderate and still take pleasure in food and the sharing of it.
Chapter Six  

BOTANICALS and PLANT EXTRACTS in CANCER CARE

Many plants have shown anti-cancer properties against cancer cells in test tubes *in vitro* and in living creatures *in vivo*, but only a few have been developed further. Highly cytotoxic extracts, such as the alkaloids from periwinkle and the etopisides from Podophyllum, have occasionally been made into patented drug isolates or synthetics, crossing over into orthodox chemotherapy. Plants have almost unimaginably varied and subtle mechanisms for modulating biochemical systems. Plants are biological entities, living beings, with many survival needs in common with us. They have DNA, so cytotoxic anti-DNA compounds are uncommon. Many traditional plant medicines are treasure troves of potent but relatively non-toxic biological modifiers.

The research gap - Whole plant extracts are chemically complex mixtures of active compounds, not patentable as drugs, and are more difficult to fit into drug-style blinded studies. The elaborate formulae of Traditional Chinese Medicine, coupled with the TCM revulsion for placebo, has caused many time-proven cancer remedies to be ignored by Western medicine. Despite being used rationally by millions of doctors on billions of people for thousands of years, the white coat crowd still considers them completely “unproven”. The “scientific” doctor can put people on long-term drug therapy with a synthetic drug which may have been given to humans for as short a time as 4 to 6 weeks in a drug trial, and they will tell you they know what it will do to you. That is quite remarkable - they must be psychic! How many drugs have been recalled or faded from use when long term harm or unexpected adverse affects show up after some years of this crude human experimentation?

Still, the same brain trust will tell you ginseng is potentially dangerous because “we don’t know what it will do”. I always say a physician’s job is to manage risk, not just avoid risk. If they don’t know it is safe after millennia of use, I say prove it isn’t or step aside. The fact that drug-oriented doctors won’t research my field of medicine is not a reason for me to abandon it. I just have to be patient and wait for them to catch up.

The Hoxsey Formula, and many other botanical approaches from European, Native American and Eclectic herbology are being used today without benefit of any scientific human studies. Many other promising herbs await screening. A few like Essiac have been tested and discarded as useless. I am not so naïve that I trust the government, medical institutions and scientific community to scrutinize the home-spun remedies and sort out the good from the false, and develop the good ones into cures for us. Drug company biopirates are exploiting traditional knowledge bases, stealing biological organisms, patenting them to exclude those who own them by heritage from further access, and converting them to synthetic commodities for resale at inflated prices. I inherited my genetics from my ancestors, not Monsanto or Big Pharma.

My forebear’s knowledge is my culture, and I am an appointed steward to pass this knowledge onto future generations. I am free as a naturopathic physician to access all natural agents for healing from the world around me. Medicinal plants are part of my web of life. We actually do have some good data from historical use, known active principles, rational mechanisms of action, case studies, controlled trials, randomized trials and even meta-analyses. We can now have an evidence-based practice, but the evidence falls a bit short of proof. Its just unfortunate the research system for human trials has not embraced screening safe and inexpensive natural therapies that are unpatentable. If even a few worked out, the savings in dollars and more importantly in suffering, would be remarkable.

**HOXSEY FORMULA**

The Hoxsey herbal tonic is a fascinating bit of folklore, and a case study in how a valuable remedy has been marginalized and ignored by science.

Harry M. Hoxsey, ND (1901 - 1974) treated cancer with topical agents and an internal herbal formula. He had considerable success, and at one time ran several clinics across the United States. The formula was said to have been used in the veterinary practice of his great-grandfather since 1840. Horses with cancer were apparently cured by extracts of the herbs applied as a salve. Similar formulas are found in the textbook of Dr. Eli Jones, MD - an American homeopath and herbalist who was famous for his work in cancer at the turn of the 20th Century. A very similar formula called Syrup Trifolium Compound was developed by Parke-Davis & Company in 1890. Extract of
Trifolium Compound was a variation listed in the 1898 edition of King’s American Dispensatory. Compound Fluid Extract of Trifolium was a recognized remedy in the 1926 National Formulary. It was widely used by many physicians.

Harry Hoxsey was a home-spun legend, who had flamboyant style, and was controversial, yet achieved legal and peer recognition for being able to cure cancer. Two USA federal courts upheld the therapeutic value of the tonic, and the American Medical Association admitted that the external salve had merit. Harry wrote a book describing his methods titled *You Don’t Have to Die*. The failed attempt by Dr. Malcolm Harris, Secretary of the AMA to buy the secret tonic formula - for his own profit - resulted in years of harassment and arrests. Harry won a major settlement in a defamation lawsuit over a description of him as a “quack feeding off the flesh of the dead and the dying” and the lie that “his father’s death resulted from cancer”, when in fact it the gentleman died from the infectious disease erysipelas. Through various manipulations, including making naturopathy illegal in Texas, site of Hoxsey’s largest clinic, he was driven from the field, without any scientific investigation of his claims. Harry closed up his clinics in the USA in the late 1950’s. His former head nurse Mildred Nelson continued his clinical style in Tijuana, Mexico as the Biomedical Clinic, since 1963. Harry died in 1974, of prostate cancer. His fascinating and politically charged career was documented in the 1987 film *Hoxsey - Quack Who Cures Cancer? - How Healing Becomes a Crime*.

Hoxsey stated that cancer developed as a result of:-

- low cellular potassium ions
- poor thyroid function
- poor liver function
- poor elimination of toxins

Hoxsey may have had a mail-order degree, and may have been unsophisticated, but he had a clear concept of cancer as a disease resulting from a disturbance of the entire internal ecology and metabolism. He viewed his herbal extract as a tonic which was primarily an alternative, meaning it cleansed and strengthened all the vital organs. His view of cancer as a constitutional and blood disease is typical of the Eclectic viewpoint as espoused by Eli Jones, and by naturopathic physicians today.

Naturopathic physicians in oncology all agree cancer is a disorder of the physiology, psychology and ecology of the patient - that in fact cancer is a systemic metabolic disease affecting the entire person. We see that the genetic mutations thought by conventional medical thinkers to be the root problem of cancer, are readily modifiable by epigenetic factors including nutrition, exercise, relaxation, visualization, and other lifestyle choices. We believe that in herbs we can find the healing wisdom of the life force, *Vis Medicatrix Naturae*, the healing power of nature.

The Hoxsey cancer clinics used a secret herbal tonic of alcohol-free fluid extracts made from fresh herbs. It was independently analyzed to contain, per 5 ml:

- 20 mg red clover blossom *Trifolium pratense*
- 20 mg licorice root *Glycyrrhiza glabra*
- 20 mg burdock root *Arctium lappa*
- 20 mg buckthorn bark *Rhamnus frangula*
- 10 mg queen’s root *Stillingia sylvatica*
- 10 mg Oregon grape root *Berberis aquifolium*
- 10 mg poke root *Phytolacca decandra*
- 5 mg Honduras bark *Cascara amarga*
- 5 mg prickly ash bark *Xanthoxylum flaxineum*
- 150 mg potassium iodine KI
- U.S.P. aromatic elixir 14 flavoring syrup

Some speculate that mayapple *Podophyllum peltatum* may have been a constituent as well. This toxic herb later gave rise to the chemotherapy drug Etoposide, now in use in medical oncology.
The McLean variant of the formula adds chapparal, kelp, peach bark, and Jamaican sarsaparilla root. Dr. Richard Schulze has adapted the Dr. John Christopher variant of the Hoxsey formula to include red clover, chapparal, burdock root and seed, Oregon grape root, yellow dock, golden seal root, lobelia and garlic.

The Hoxsey herbal tonic was diluted by putting 2 fluid ounces in 14 ounces of tap water. Adult dose was 1 to 5 teaspoonfuls 4 times daily after meals and at bedtime. For children the dose was 5 to 30 drops 4 times daily. The tonic was often prescribed for 5 years, then to be taken for 3 to 4 months every Spring and Fall. Most patients tolerate it very well. Hoxsey herb mélange is blood-purifying, laxative, anti-estrogenic and detoxifying. The laxative effect is mild, but can cause problems with diarrhea. Any digestive upset can be countered with carminatives such as fennel, anise, caraway and mint. Licorice can trigger hypertension or edema, with loss of potassium.

Reactions such as a rash on the forehead, face or neck, frontal or sinus headaches, loss of appetite, nausea, weakness, discharges and bowel intolerance may occur from the potassium iodide, necessitating a reduced dosage until cleared. Iodine at these doses is not safe in pregnancy or nursing, or in cases of hyperthyroidism. I use a more modern iodine-free formula.

The patient was also given dietary restrictions, including the strict avoidance of tomatoes, pork, salt, vinegar, alcohol, sugar, white flour and processed foods. Patients were advised to drink lots of pure water, and juices such as unsweetened grape juice.

Hoxsey claimed a cure rate of 25% for internal cancers, and up to 60% for breast cancer. Hoxsey claimed a cure rate of 85% for skin and external cancers, which he treated with escharotics - salves which kill cells on contact and cause a layer of tissue to dissolve and slough off. Only the topical powders and salves applied to burn off tumours were viewed by Hoxsey as directly “anti-cancer” medications. These escharotics were very painful, and have fallen into disuse with medical advances in the field.

**Hoxsey Red Paste** - combined zinc chloride, antimony trisulphide, and bloodroot *Sanguinaria canadensis* powder. This caustic and cytotoxic paste is painful, killing all tissue it contacts. It is very useful on melanomas. This is reminiscent of the “Fell Remedy”, which pre-dates Hoxsey.

**Hoxsey Yellow Powder** - combined USP sulphur 2 oz, arsenic sulphide 0.5 oz, and 6 oz talc. Grind for a full hour in a mortar to solubilize. It only kills cancer cells. It is also very painful.

Open wounds were dusted with boric acid as a disinfectant. A healing ointment of Vaseline, rosin, refined camphor, beeswax, tincture of myrrh *Commiphora abyssinica*, and oil of spike (– spikenard or *Aralia racemosa*) was used to aid any damaged non-cancerous tissue.

Red clover blossom *Trifolium* boiled down to a tarry solid extract which was applied topically, sometimes with the addition of *Sanguinaria* extract.

*Phytolacca* F.E. (fluid extract) 1:16 dilution as a compress was put on breast tumours for 4 weeks, and would promote drainage and even expulsion of the tumours through the skin. The cancer can literally come to the surface and fall right off. Medical herbalist John Redden in Toronto was trained in this technique. You would be astounded to witness it.

Dr. Steve Austin, ND has observed that the Biomedical Center in Tijuana, Mexico is having moderate success salvaging perhaps 20% of a variety of advanced, medically terminal cases. Results of an informal and limited follow-up study were published in 1984. Mildred Nelson estimates 80% of cases respond to the therapy. A recent so-called investigation of the Hoxsey method by the University of British Columbia was “inconclusive”, citing a lack of “sufficient time, personnel and funds”. Thanks for nothing! My own experience is similar to Dr. Austin’s, seeing occasionally dramatic results in astrocytoma, lymphoma, breast cancer, etc.
I have often combined the Red Clover Combination from St. Francis Herb Farm in Cormack, Ontario, with homeopathic remedies such as Conium, Carcinosum, Arsenicum and Pascoe nosodes such as Gliom, Lymphangitis or Prostata. I prescribe ½ teaspoonful 2 to 3 times daily, in a little water, sip slowly, take no food or drink for 15 minutes. I do not use it in all cases, and I would not stake my life on it alone, but it is a reasonable adjunct in selected cases.

ESSIAC

Essiac was named by the Canadian public health nurse Rene Caisse, who learned of the formula in 1921. Rene met a patient who attributed her survival of breast cancer to a herbal mix originating with Ojibway First Nations. It is a decoction (water extraction) of:

- sheep sorrel
- slippery elm bark
- burdock root
- Indian or Turkish rhubarb root

The popular brand Flor-Essence adds watercress herb, kelp, blessed thistle and red clover to the traditional, and some would say authentic Essiac formula. Respirin Corporation owns the rights to the original Essiac formula and trade name, yet others claim their variations are the “real McCoy”.

Like the Hoxsey formula, this mixture is a rich source of anthraquinones emodin and rhein which modulate PGE2 synthesis, alter calcium transport, are anti-inflammatory, anti-tumour and anti-bacterial. Caisse had many anecdotes to tell, and had some medical referrals of cases, but scientific testing on animals at the National Institutes of Health (NIH) in Bethesda, Maryland was inconclusive, and the therapy nearly passed into history on her death. It was re-popularized recently by Elaine Alexander after a CBC radio program on Rene Caisse’s life. A standardized and authentic formula is made by Resperin Canada, who obtained the rights to her formula in 1978, just before Rene passed on.

This herbal formula is healthful, keeps the bowels moving, but is not in my experience and opinion a cancer therapy. The best results are said to be in patients who have not had extensive chemotherapy or radiation. Unfortunately, few patients we see in British Columbia fall into this category. A recent scientific study in Canada failed to demonstrate any benefit whatsoever to cancer patients. Frankly, I have seen thousands of people use it, with no discernible positive change when the go on it, or down-turn when they go off of it.

ONCOLYN

Oncolyn is a proprietary combination of polyphenols and anthocyanins developed by Dr. Arthur Djang, M.D., Ph.D., M.P.H. Dr. Djang was a prominent orthodox medical researcher who pioneered the ninhydrin technique of latent fingerprinting, the isoenzyme technique for early diagnosis of myocardial infarction, and has many scientific publications in medical and cancer research. On retiring, he travelled to China, his ancestral homeland, where he was exposed to hospitals integrating Western allopathic and Eastern TCM methods. He returned with some ideas for natural anti-cancer formulations, which he verified with cell culture and animal research techniques.

The Oncolyn formula is not published, so I do not know what it contains. My investigation suggests green tea polyphenol extract and grapeseed extract may be present, and one source suggests it may also contain a seed extract, perhaps from apples. I wish I knew exactly. It is unethical for me to prescribe secret formulas.

Oncolyn has been shown in tissue culture and rodents to be antioxidant, dismutagenic, pro-differentiation, anti-angiogenic, and anti-metastatic. Dr. Djang says 1 tablet daily will neutralize the toxins of tobacco smoking. For cancer the prescribed dose is 1 tablet with 500 mg vitamin C, 3 times daily before each meal, and vitamin E 400 I.U. twice daily. Improvement is expected in about 2 weeks.

I have observed a number of significant responses to this product, for example two cases of advanced pleural mesothelioma which made a dramatic regression. That is a tough cancer to treat by any means, so I was impressed. It is unfortunate the formula is secret, but a conversation with Dr. Djang after a public lecture about his research did
reinforce my commitment to using green tea and grapeseed extracts. A combination of bioflavonoids and polyphenols had already become a core part of my basic cancer program, based on my experience and that of other naturopathic doctors. I like to add in curcumin and other synergists. I think Oncolyn is a good product, but needs other support and refinements.

GREEN TEA and EGCG POLYPHENOL

Tea and its extracts are included under the botanicals, rather than as a food beverage, as the effective therapeutic doses are well beyond what is possible by tea consumption. It is a phyto-nutraceutical.

Unfermented green tea *Camellia sinensis* leaf is a source of polyphenols such as epigallocatechin-3-gallate EGCG, epigallocatechin EGC and epicatechin-3-gallate ECG. EGCG is an antioxidant 200 times more powerful than vitamin E. EGCG is the top contender for the most active medical principle in green tea extract.

The top leaves are steamed to inactivate enzymes which would oxidize the polyphenols into tannins. If they are not steamed, natural fermentation makes stringent tannins that make “black tea” more mouth-puckering than green tea. Many large-scale epidemiology studies show a significant preventative value in green tea as a daily beverage, particularly at intakes of 5 to 10 cups of tea daily.

However, that is a lot of fluid, and too much caffeine for many people. Black tea ranges up to 80 mg of caffeine per cup, and green tea is less, but still yields at least 10 mg per cup, and may reach 40 mg per cup. Other stimulating alkaloids in the tea leaf are theobromine and theophylline.

Encapsulated standardized extracts, low in caffeine, are necessary to reach the doses needed to use EGCG and related polyphenols as a cancer therapy. Green tea EGCG has been a core therapy in my protocols since 1996. The broad and potent effects of green tea on cancer are truly remarkable:

- inhibits many cancers by blocking cells in G0-G1 phase and arresting cells in G2-M phase of the cell cycle. This is regulated through its effects on p21 and p27 gene proteins.
- induction of apoptosis is dose dependent. Induces apoptosis in cancer cells by down-regulating anti-apoptotic bcl-2 protein, up-regulating pro-apoptotic Bax, and activation of caspases 3, 7 and 9.
- enhances wild type p53 expression.
- inhibits oncogene expression, including Kirsten-ras or K-ras which regulates tyrosine kinases.
- inhibits protein kinase C activation by tumour promoters. Protease inhibition reduces cellular proliferation, angiogenesis, inflammatory cytokine production, and increases apoptosis.
- inhibits dihydrofolate reductase, reducing synthesis of cancer cell proteins and nucleic acids.
- inhibits aryl hydrocarbon receptor by binding the receptor’s chaperone protein HSP90, increasing resistance to breast cancer. Synergistic with quercitin in regulating this receptor. By suppressing transformation of the aryl hydrocarbon receptor it protects against xenobiotic carcinogens such as dioxins. Green tea EGCG also helps detoxify from carcinogenic solvents such as benzene.
- inhibits NFκB, controlling inflammation, apoptosis and protein degradation.
- regulates human kallikreins, active in prostate cancer.
- anti-angiogenic, strongly inhibits vascular endothelial growth factor VEGF induction by IGF-1 and thus VEGF over-expression.
- inhibits IGF-1, increases IGF-BP-3, may block human growth hormone HGH or it’s receptors.
- pro-oxidant, green tea EGCG can increase hydrogen peroxide H2O2 stress on DNA. Therefore give mixed tocopherol vitamin E to balance.
- EGCG is a major proteasome inhibitor, modulating many regulatory proteins. For example, EGCG specifically inhibits multi-catalytic enzymes leading to accumulation of p27/Kip1 and IkBa, an
inhibitor of NFκB. This arrest the cell at G1, and removes protection from apoptosis by AP-1 inhibition via inhibited phosphorylation of c-jun.

- inhibits cyclin D1 and cyclin E.
- inhibits tNOX in cancer cells but not in healthy cells. tNOX is a growth regulating cell surface enzyme.
- anti-cachexic, the primary phenol catechin inhibits TNF alpha.
- promotes differentiation through modulation of transforming growth factor beta two -TGFβ-II.
- tea polyphenols are matrix protease MMP-2 and MMP-9 inhibitors, controlling tumour spread.
- inhibits topoisomerase I, an enzyme which plays a critical role in DNA metabolism and structure, making it essential for tumour cell survival. Effective drugs which inhibit this enzyme are limited by toxicity. Topoisomerase inhibitors do not mix with glucosamine compounds.
- inhibits 5-alpha-reductase, reducing testosterone levels. Inhibits ornithine decarboxylase in the prostate.
- EGCG inhibits urokinase uPA, an enzyme involved in tumour invasion and metastasis, via breaking down of the basement membrane cell junctions. uPA is over-expressed in most cancers.
- increases xanthine oxidase XO, which inhibits adenosine deaminase ADA, decreasing DNA turn-over in cancer cells.
- catechins in green tea rapidly transfer electrons or hydrogen from ROS damage sites on DNA, preventing the development of strand breaks. Very active against hydrogen peroxide, so don’t use during IV vitamin C therapy.
- green tea polyphenols reduce DNA damage from ultraviolet radiation UV-A and UV-B, reducing the inflammation, erythema, and skin cell hyper-proliferation. Thus it prevents skin cancer and will reduce the growth of established tumours in the skin.
- it will deplete gamma tocopherol vitamin E status, particularly in the kidneys and liver.
- EGCG inhibits telomerase.
- immune effects include strong enhancement of B-cell activity, increased IL-1α and IL-1β from monocytes, increased cytotoxic T-lymphocyte and NK activity, iodination of PMN’s and monocytes.
- reduces risk of cancer recurrence 50% in post-op stage I & II breast cancer.
- shown to inhibit cancers of the breast, colon, prostate, lung, esophageal, stomach, pancreas, urinary bladder, and melanoma.
- the unique amino acid theanine increases Adriamycin uptake by tumours, significantly increasing efficacy.
- synergistic with curcumin, grapeseed extract, reishi extract and quercitin.
- incompatible with intravenous vitamin C therapy. IVC clears the blood in a very short time, so just do not use green tea concentrates the day of the vitamin C drips.
- no known drug interactions. It only very weakly alters CYP3A4 activity in humans, at high doses.

The tea leaf contains 8 to 12% polyphenol antioxidants, and 1 to 4% caffeine. A cup of brewed green tea yields 10 to 40 mg caffeine. For therapy one would need to drink dozens of cups daily. Brew a better tea using water at a temperature below a hard boil. The limit is what the Chinese call “crab-eyes” size bubbles in the kettle - bigger than “shrimp-eyes” but smaller than “fish-eyes” size. A cool overnight infusion of two tablespoons green tea in a litre of room temperature water is also fine for medicinal use, if the caffeine intake is tolerable.

Green tea is an excellent primary cancer remedy, operating at many functional sites and molecular targets in cancer therapy. It prevents cancer by inhibiting DNA methyltransferases (DNMTs), regulating epigenetic methylation.
I prescribe a 95% polyphenol extract of green tea. – at least 3 daily of 700 mg capsules, usually 2 at breakfast and 1 at supper.

Green tea polyphenols absorb better if taken with bioperine from black pepper, or with tartaric acid as found in grapes, wine, bananas and tamarind. Tartaric acid is a natural dihydroxy derivative of succinic acid.

Some depletion of vitamin E stores will occur from green tea therapy, and would cause kidney injury and loss of filtration if left un-checked. Always take 400 IU daily of mixed tocopherol vitamin E containing at least 10% gamma tocopherol when on high dose EGCG medication. To protect your kidneys and liver you must have daily gamma tocopherol, not just alpha tocopherol! This applies even if you are taking a blood-thinning drug such as Warfarin (Coumadin).

Green tea extract really doesn’t hurt the liver, extracts with bad solvents do.

High dose EGCG (over 1,000 mg) can act as a pro-oxidant, creating oxidative stress in cancer cells. This can be useful in some chemotherapy regimens. Green tea has no apparent activity on Cyp1A2, Cyp2D6, Cyp12D6, and Cyp12C9 and potentially yields a mild inhibition of Cyp3A4, although one study says there is no effect from green tea catechins on Cyp3A4. Some preclinical evidence suggests possible inhibition of Cyp1A1, 2B1, 17, and 2E1, which are of little clinical relevance in chemotherapy. I do not yet give green tea concentrates during chemo, but some of my peers do.

In very rare cases green tea extract can cause liver injury leading to nausea, vomiting, abdominal pain, yellowing of the skin/eyes, dark urine, sweating, unusual tiredness and/or loss of appetite. Take with food to reduce risk.

**ROIBOOS TEA**

*Aspalathus linearis* is rooibos or red bush tea from South Africa. Rooibos is a very pleasant tasting tea which is extraordinarily anti-oxidant. It is also great to drink cold in the summer. While not proven to fight cancer, it seems healthful and adds flavor and variety. It does induce GST and UGT liver enzymes, and so may interact with some drugs which are metabolized by these pathways.

**GRAPESEED EXTRACT - See Nutrition Chapter**

**BILBERRY – See Nutrition Chapter**

**BOSWELLIA**

*Boswellia carteri* is closely related to Frankincense, a respected herb used for 5,000 years in Egypt, China and India. This gummy tree resin was a gift from the three wise men from the East (Magi) to the Christ-Child in the Christmas legend. It has always been prized as a pain reliever and natural anti-inflammatory, and was indeed a treasure of the ancient world and a gift fit for a King. Today we often use 65% extract of boswellic acid from a closely related species *Boswellia serrata* at 1,000 mg three times daily for pain and inflammation. Remember inflammation in late stage cancer is a slippery slope to disaster, so always have an anti-inflammatory component in the program.

- inhibits 5-HETE eicosanoids and lipoxygenase LOX, notably the LOX-5 series LTB-4 leukotriene.
- reduces activity of plasma betaglucoronidase and GAG synthesis.
- inhibits topoisomerase I & II better than camptothecin or etoposide drugs. Topo-II inhibitors do not mix with glucosamine compounds.
- cytotoxic and pro-apoptotic for glial (brain) cancer, nasopharngeal cancers and leukemia.
- synergistic with selenium.
- significantly reduces edema in brain cancers, reducing pressure inside the skull. It can allow reduced doses of steroids, and in some case will replace dexamerthaone for cerebral edema due to brain cancer, brain metastases, radiotherapy, chemotherapy or leukencephalopathy.
**CURCUMIN**

Curcumin is derived from the yellow curry spice turmeric *Curcuma longa* or yu jin. The turmeric root has about 3% curcumin, and medically this is standardized to about 80 to 95% purity by weight. The active principle is diferuloylmethane. Dietary intake is protective from various cancers, but the medical dose would be 90 grams a day of the root, so obviously we use the capsulated curcumin concentrates. The biggest challenge is poor absorption.

- induces apoptosis in cancers eg liver, kidney, sarcoma & colon, via the ubiquinone-proteasome pathway, and by increasing the protein expression of Bax and Bcl-xs while decreasing Bcl-2 and Bcl-X(L), releasing apoptogenic cytochrome c, and augmenting the activity of caspase-9 and caspase-3.
- inhibits NFkB and its entire inflammatory cascade.
- inhibits the master regulatory enzyme phosphorylase kinase.
- inhibits both tyrosine and serine-threonine dependent kinases.*
- powerful inhibitor of COX-2 and PGE-2 promoters of tumour growth and inflammation.
- inhibits mTOR, PKC, EGFR tyrosine kinase and TYK2.
- inhibits cancer initiation, promotion and progression.
- highly chemoprotective, blocks tumour induction by chemical carcinogens.
- reverses liver damage from fungal aflatoxins.
- reduces mutagens in tobacco smokers.
- slows phase 1 liver detox pathways while speeding up phase 2, reducing build-up of toxic intermediates.
- inhibits oncosgenes c-jun, c-fos, c-myc, NIK, MAPK’s, ERK, P13K, Akt, JNK, ikBa kinase, CDK’s,iNOS.
- inhibits TNF, MMP-9, AP-1, EGR-1, STAT1 & 3, beta-catenin, HER-2, Bcl-2, Bcl-SL, ICAM-1, TF and cyclin D1.
- decreases interleukins to strongly reduce inflammation.
- stimulates the reticulo-endothelial immune system.
- activates phagocytosis.
- inhibits complement pathways.
- inhibits spontaneous DNA damage from lipid peroxidation.
- induces heat shock protein hsp70 to protect cells from stress.
- blocks cell cycle progression at G2/S phase transition.
- significantly inhibits angiogenesis.
- blocks APN protein, reducing tumour blood flow and invasiveness.
- inhibits the Sonic Hedgehog signaling pathway.
- heals fibrosis, along with grapeseed proanthoocyanins and hawthorne berry extract.
- significantly inhibits number and volume of tumours.
- combines well with genestein from soy.
- synergistic with EGCG from green tea.
- curcumin can in rare cases trigger thrombocytopenia or low platelet count.
- it is a very mild blood thinner, meaning it increases bleeding slightly in some patients.

*Only curcumin inhibits both tyrosine-dependent kinases and serine-threonine-dependent kinases*, as noted above. Aggarwal, Lee, and colleagues at MD Anderson have shown that if oncosgenes are suppressed by TNF induction, with inhibition of AKt, INK and ikBa kinase, there will be an eventual break-out of oncosgene activity by the induction of a parallel pathway involving p44/42 MAPK and p38 MAPK. Only curcumin shuts down both signaling pathways long-term. This remarkable property prevents cancer cells developing resistance to its effects.

Very useful in radiation therapy, improving safety and efficacy. Curcumin radio-sensitizes by increasing ROS, and markedly increasing MAP kinases, leading to reduced oncosgene MDM2 expression. Radio-protective by reducing lipid peroxidation.

Curcumin can raise ROS in lung tissue, so is not used as a preventative in smokers.

Curcumin is inactivated by concurrent use of glutathione.
Curcumin absorbs poorly unless combined with an adjunct. Many years ago we used bromelain, an enzyme from pineapple stems, or bioperine or piperine extracted from black pepper. Bioperine approximately doubles curcumin absorption, but inhibits glucoronidation-dependent detoxification in the gut and liver. Compounding curcumin with phosphatidyl choline and other lecithin-like fats created even better absorption, eg BCM-95 and Meriva. Curcumin 7X, CuraMed or related brands using the BCM-95 compound are still popular. The lecithin base and volatile oils made it significantly better absorbed, and thus clinically more potent in a lower dose than previous curcumin products. Rx 1 capsule 2 to 3 times daily at meals. Thorne Meriva SR is also good, dosing at least 3 capsules daily. Some still use the older formulation such as Vital Nutrients brand BCQ - curcumin, bromelain, boswellia and quercitin, or Vitazan’s CanArrest. Some people develop upset stomachs, bloating, diarrhea and related complaints with long-term use of curcumin. In these circumstances we would switch to quercitin or grapeseed extract. Curcumin is synergistic with DHA omega 3 oils, which also improve absorption if taken at the same time.

I am now using a micronized TheraCurmin curcumin which absorbs better than any of these. I prescribe 1 – 2 twice daily at meals of the new double strength 2X 120 mg capsules. Its also great for pain. It is so well absorbed that we don’t see gastrointestinal issues anymore. A new water soluble form will soon be available from NFH.

IV curcumin Follow Dr. Paul Anderson’s protocol to the letter. Use only water-soluble preparation, (not ionic salt or lipospheric or cyclodextran forms). Dilute to not more than 100 mg per 100 mL of saline or D5W. Start at 10 mg/kg BW, increase to 20 – 40 for cancers. Infuse very slowly, up to 8 hour drips! Administer twice weekly. A potent choleric, it may provoke gallbladder or right shoulder pain. At the 3rd to 7th IV they will likely dump bile and have violent vomiting, which can be managed with psyllium husks.

Synthetic COX-2 inhibitor drugs strongly inhibited prostacyclin PGI-2, which interacted with thromboxane TxA-2 to trigger clots, mainly heart attacks and thrombo-embolic disease and stroke. Curcumin slightly increases prostacyclin PGI-2 levels, reducing risk of clots a bit.

ALOE VERA

This succulent has acemannan polysaccharides in its leaf which are immune stimulating, thymus stimulating, increase antibody-dependent cytotoxicity, and inhibit angiogenesis. Aloe emodin is anti-metastatic. Aloe reduces PGE-2, inhibits kinins, histamine and platelet aggregation.

Aloe vera extract has potent antioxidants which augment catalase, glutathione GSH and superoxide dismutase SOD. This makes it particularly valuable in reducing lipid peroxidation during radiation therapy. Use it on the skin (but never use oils or any oil-based cream!) to treat radiation burns.

Aloe root, particularly from the South African cape aloe, has a long history of use as a healer of gastro-intestinal GI ulceration and inflammation, and it relieves constipation.

I have had a number of very dramatic responses to an old laxative formula called #42’s in patients in great pain and reliant on morphine who have become morbidly constipated, with no appetite and feel gravely ill. #42’s are made with two parts sweet wormwood Artemesia vulgaris or Artemesia annua tops to one part Cape aloe Aloe capensis root powder. The usual dose is 2 capsules 3 times daily, or as needed. It is remarkable how little pain people have after their bowels move, and how their entire health picks up. Once the bowels move and pain decreases, they can reduce the narcotic pain-killers. It breaks a vicious cycle of bowel paralysis, bowel toxins from the constipation, increased pain, and more drugs. This little herbal gem has rescued a number of patients from premature death, or death without awareness due to being mentally “snowed under” by opiates.

ARTEMESIA - ARTESUNATE - WORMWOOD

Artemisia vulgaris or absinthum is a traditional medicine for parasites, including malaria. Chinese doctors call it Quinghao.

- wormwood herb relieves constipation, particularly moving the upper GI tract. It is a key component of #42 capsules for severe constipation, as seen in patients on opiod narcotic pain-killers. It also rebalances gut flora (probiotic organisms).
- increases bile flow, detoxifying the liver.
- removes many intestinal worms and parasites.
- reduces inflammatory cytokine growth promoters.
Artemesia annua or “sweet” wormwood gives off a sweet smell, even after its tiny daisy-like flowers are crushed. This earned it the nickname Sweet Annie. This herb gives us artemisinin, artenusate and artemether. Artemisinin is the form taken orally for cancer treatment, and water-soluble artemesunate is delivered by intravenous infusion.

Artemisinin:
Artemisinin is a hormone balancer, particularly reducing excess estrogen and prolactin in breast cancer.
Artemisinin is activated by ionic ferrous iron, which cancer cells accumulate. Iron is an essential cofactor for cancer cell proliferation. Most cancer cells have high rates of iron intake and express a high concentration of transferrin receptors on the cell surface. Rapid growth of abnormal cells sequesters relatively large amounts of iron mainly in the form of holotransferrin.

Dihydro-artemisinin has a peroxide bond activated by iron to generate hydrogen peroxide. This free radical of oxygen stresses cancer cells, which are always deficient in catalase enzyme. Normal cells use catalase to harmlessly dissipate the peroxides. In cancer cells the high-valent o xo-iron species create a cascade of reactive oxygen species called endoperoxides, depolarizing the mitochondrial membranes and disrupting the electron transport chain. It has a very short period of action, clearing the bloodstream in about 2 hours.

Cancer cells are approximately 100 times more susceptible to dying from artemisinin than healthy cells. The primary action is a down-regulation of nuclear factor kappa B, the master control gene for inflammation. A sign of intense inflammation in the cancer cell is high blood levels of CRP and ESR, and also mid- to high-normal LDH. These markers suggest the cancer is a good candidate for artemisinin therapy.

Artemisinin also regulates p53 DNA repair gene, and cyclin dependent kinases. Artemisinin modulates important epigenetics or DNA silencing, including methylation and histone protein acetylation.

Inhibits angiogenesis, disrupting the blood supply to tumours.
Targets translationally-controlled tumour protein TCTP.
Inhibits cysteine protease enzyme, and also a SERCA-type calcium transporter enzyme.
Induces apoptosis and slows growth in cancers such as fibrosarcoma, lymphoma, breast, pancreatic, esophageal, prostate, and ovarian/fallopian/peritoneal carcinomas. It is efficacious for squamous cell carcinomas and liver hepatocellular cancer, and also for any liver metastases from other primaries. TCM doctors say it is best for “hot cancers, and less benefit in the “metal element” cancers of the colon or lung.

Common doses run between 900 to 1,200 mg daily, usually divided into 3 doses, taken away from food.

There is evidence showing that the liver rapidly increases its ability to get rid of the drug, so that after a week it is difficult to achieve therapeutic blood levels. Also, the iron levels are largely depleted in the cancer cells after a week. Some dose one week on, one week off, but others go with 3 to 5 days on, and 9 to 11 days off. I will usually prescribe artemisinin at 300 to 400 mg three times daily. Experts place the therapeutic range at 1,200 mg daily, although responses are also seen at 900 mg daily.

Take on an empty stomach, ideally well away from food, as it interacts with dietary iron. What is usually practical is to take it 3 times a day between breakfast and lunch, between lunch and supper, and at bedtime. Artemisinin is not water soluble, in fact di-hydroartemisinin is very fat soluble. Always give with some oil such as omega 3 fish or seal oil supplement, coconut or olive oil, or full-fat dairy for optimum absorption.

Intermittent dosing also allows the cancer cells to recharge with iron, which the artemisinin will then burn up into deadly peroxides.

We only prescribe iron to cancer patients if lab tests show a deficiency. Do not self-prescribe iron supplements! Most often the patient only needs marrow support, not iron. The “anemia of chronic disease” is really the anemia of chronic inflammation. Iron deficiency anemia is not common unless the patient has the complication of an active blood loss. The blood tests may show a low MCV, which is too many small red blood cells. Most doctors will test serum ferritin and red blood cell indices to assess iron status. It is very useful to test sTfR – soluble iron tranferrin receptor. If it is greater than 28, there is a need for iron therapy. Mid-range to high-normal sTfR indicates that cancer cells are up-regulating tranferrin receptors in order to increase iron uptake.
I advise taking heme iron. Dessicated liver, donkey gelatin, and Proferrin® are examples. An alternative is iron citrate 25 – 30 mg. 3 times daily at meals after therapy is complete, to replenish liver stores, bone marrow stores, and to rebuild the red blood cell levels back to normal.

Red meat can be taken during the week off therapy, but it is best to avoid red meat during the week you are on the artemisinin. Poultry and fish are fine anytime. Synergistic foods include garlic, broccoli and all the cabbage family of vegetables.

**Synergistic with indole-3-carbinol** or DIM supplements. Rx 150 - 200 mg indole-3-carbinol with each dose of artemisinin. Synergistic with intravenous vitamin C, as pro-oxidative doses amplify the peroxide stress. We may add Helixor M or P mistletoe lectins to the IVC. Vitamin K3 or menadione is also pro-oxidative and may be synergistic.

**All antioxidant supplements are to be stopped during a week of artemisinin therapy.** This includes green tea extracts grapeseed extracts, vit. C. NAC or glutathione are used as an antidote to acute overdose, when cerebellar neuro-toxicity triggers gait disturbance. **Taking antioxidant supplements on the week off therapy is recommended. Only vitamin E is forbidden, during the entire course of artemisinin therapy.**

It may synergize with butyrate, which is produced by gut bacteria acting on fiber such as psyllium husks.

Artemisinin is compatible with Tarceva (erlotinib), a small molecule EGFR inhibitor.

Resistance to artemisinin therapy arises in the liver from the upregulation of Cyp A34. Efficacy can be improved by giving Cyp3A4 inhibiting grapefruit juice, 4 ounces daily.

**Contraindications:**

- sedentary lifestyle – works best in those more physically active.
- smokers – must be off tobacco at least 6 months.
- radiation therapy or surgery – wait until 2 months after – radiosensitizer and antiangiogenic. One exception is its use as a radiosensitizer in whole brain radiation for glioblastoma.

**Toxicity:**

- **Mild and transient symptoms can occur, but tend to clear with continued use:** cold extremities, numbness, tinnitus, dizziness, headache, GI discomfort, anorexia, nausea, vomiting, diarrhea. If these are severe or persistent, lower the daily dose or take a break.
- Increased liver enzymes AST and/or ALT, a sign of mild liver damage.
- Anemia due to loss of iron. Monitor hemoglobin levels and RDWs, immature replacement red blood cells.

**Artemix:** Combines artemether, artemesinin and artesunate. Usual dose is 1 capsule twice daily, as for artemether. Said to be easier on the liver than plain artemether.

**Artemether:** 1 mg /kg BW for 8 weeks. Usual adult dose is 40 mg twice daily, but it can all be taken in one dose. This is the more toxic form, and the limiting factor in using combination products. Take well away from food, with whole milk, ice cream, etc. After 8 weeks if responding, continue using it but every second day only, for another 3 to 4 months. Periodic use for up to 2 years can be considered, 5 days on and 5 days off. Synergize with 250 mg vitamin C and 400 IU gamma vitamin E at breakfast and lunch.

**Artesunate** is suitable for intravenous or intra-muscular injection, being water-soluble. Crosses the blood-brain barrier better than artemisinin. It promotes ferritin degradation and reacts with lysosomal iron and copper to generate an intracellular burst of reactive oxygen species, and extracellular peroxides. We reconstitute it in 8.4% bicarbonate solution and sterilize it by ultra-filtration. (in-line 0.22 microfilter). We can administer 60, 120, 180 and up to 240 mg in 100 mL D5W or saline at one drop/second. There is a wonderful synergy if we follow this rapid infusion with intravenous vitamin C, which is also pro-oxidative, and to which I may add Viscosan Helixor mistletoe. It can improve survival and QOL in stage 4 cancers! Give twice weekly, for at least 6 weeks. You may need 15 to 20 drips for a clear positive response. Maintain responders with a drip every 6 weeks plus runs of oral artemisinin during the breaks. Can be taken orally at 200 mg or 2.5 mg/kg per day for up to 4 weeks. Watch for anemia, neutropenia, lymphopenia, reduced reticulocytes, hepatotoxicity, hearing loss, tinnitus, vertigo, asthenia and increased bone turnover with elevated NTproBNP.
RED CLOVER BLOSSOMS

*Trifolium pratense* or red clover is a common ingredient in many herbal cancer formulas, including the Hoxsey Tonic.

Contains the coumarin type phyto-estrogens and tumour inhibiting compounds genistein, daidzein, biochanin and formononetin. These are the primary dietary isoflavones in Asian, Mediterranean and Latin American diets associated with lower risk of cancer.

Red clover tops contain significant levels of phytoestrogens as estriols, which are mild and can counteract the more cancer stimulating estradiols, perhaps by occupying the estrogen receptors, without triggering the same signals into the nucleus.

Iso-flavones inhibit 5- alpha-reductase, lowering dihydro-testosterone, and sequesters DHT. They are also an aromatase inhibitor.

The National Cancer Institute tested red clover 94 times, with only one slightly positive test showing insignificant activity against cancer. If it is useful, it is as an alternative as described by the Eclectic herbalists: normalizing circulation, assisting digestion, accelerating eliminative processes, thus correcting faulty metabolism. Traditional herbalists call it a “blood purifier”.

Phyto-estrogens are weak estrogens, and many have such a low affinity for the estrogen receptors that they just block up the receptor, keeping real estrogens out, and therefore block growth signaling. Only phyto-estrogens of a specific size, shape and electrical charge can distort the receptor and trigger tumour growth signals. Many phyto-estrogens such as red clover, soy and ginseng are cancer-fighters, but are best used under professional direction and supervision.

BIRCH / BETULINIC ACID

White birch bark and leaves are a source of betulin and betulinic acid, a traditional non-toxic inhibitor of tumours such as melanoma, lymphoma, lung and liver cancer. Betulinic acid decreases bcl-2 expression and cyclin D1 to inhibit proliferation, migration and to induce apoptosis in cancer cells. Chaga mushrooms grown on birch trees convert betulin in the bark to betulinic acid. Chaga mushrooms inhibit gap junctional intercellular communication via inactivation of ERK1/2 and p38 MAP kinase. JHS Naturals provides a good Chaga hot water extract.

GINKGO BILOBA

The ancient *Ginkgo biloba* tree has survived from the time of the dinosaurs. It is an extraordinary tonic for memory and peripheral circulation. In cancer we use it for peripheral neuropathy. As it interacts with intestinal Cyp 3A4, it is not used during chemotherapy. It has been studied as a protectant against ovarian cancer.

PAW PAW and GRAVIOLA

*Asimina triloba* (L.) Dunal, the paw paw tree found in the eastern USA, has far more potent annonaceous acetogenin compounds than *Annona muricata* L. aka graviola, the Brazilian paw paw or soursop.

In 1976 the National Cancer Institute found the acetogenins to be definitely cytotoxic to cancer cells. The most potent acetogenins have adjacent bis-tetrahydrofuran rings (THF), e.g. bullatacin. The mechanism of cytotoxicity is inhibition of mitochondrial Complex I electron transport, robbing the cells of ATP energy. In tumour cells they also inhibit the NADH oxidase of plasma membranes, which with ATP depletion thwarts energy dependent resistance mechanisms. It would not be sensible to attempt mitochondrial rescue while reducing energy production with paw paw or graviola. Acetogenins are especially effective against MDR cancer cells in which the drug resistance is due to ATP- dependent efflux pumps in the plasma membrane (28–31). The acetogenins decrease the function of the efflux pump (P-170 glycoprotein) and increase intracellular accumulation of anticancer agents.

Paw paw is active against breast, colon, pancreatic, prostate and other cancer cells in vitro. One test reported its activity in such a screening test to be thousands of times more potent than the common chemotherapy drug.
Adriamycin. This was an extract mixed with cancer cells in a Petri dish – that is not evidence it is good for human use. No blinded human studies have been reported. Proponents claim it is immune building, antibacterial, antiviral, antiparasitic, and tonifying. The usual dose is 2 to 5 grams twice daily of the powdered leaf, 1 to 3 ml twice daily of a 4:1 tincture, or ½ cup 1 to 3 times daily of a tea of the leaf or bark.

My experience with graviola indicates it is active against cancers, but can often cause severe gastrointestinal upset, notably emesis and diarrhea. There is evidence that it creates Parkinson’s-like lesions in the brain! Use with caution. Standardized paw paw extract is preferred, as it has little of the neurotoxic acetogens. Doses of 12.5 mg extract 4 times daily with food are well tolerated.

ASHWAGANDHA

*Withania somnifera* - ashwagandha or winter cherry is a herb from the Hindu Ayurvedic tradition. Think of it as the East Indian equivalent of ginseng. It is an adaptogen, helping the body deal with stress. It is a slightly sedative nervine, antioxidant, immune modulating, blood-building and rejuvenating. Ashwagandha prevents loss of adrenal gland function, vitamin C, and body weight when under stress. It increases function in the dopaminergic systems. Ashwagandha is anti-inflammatory, via inhibition of cyclooxygenase. It is quite non-toxic even with long-term use.

Ashwagandha is a great protectant from the damage to healthy cells by chemotherapy and radiation. It particularly protects bone marrow from damage, and stimulates stem cell proliferation to replace red blood cells, white blood cells and platelets. It also enhances therapeutic effectiveness of radiation against cancer cells because of an anti-tumour and radio-sensitizing steroidal lactone withaferin. This radio-sensitizes by dramatically reducing tumour glutathione.

Cautions:
- May increase testosterone, so it is not recommended in prostate cancer.
- Contra-indicated in hemachromatosis patients.
- May decrease tolerance to opiates and narcotic analgesics.
- May potentiate sedatives such as benzodiazepines and barbiturates.

MISTLETOE

*Viscum album* or sang ji sheng is a hemiparasitic plant which has subtle variations in its bio-active lectins depending on which species of tree it grows on, eg fir, apple, ash, oak or pine. White-berried European mistletoe or *Viscum album* has been a successful remedy for advanced cancer since 1917. Mistletoe therapy is part of “anthroposophical medicine” founded by Dr. Ita Wegman, inspired by the anthroposophical teachings of Rudolph Steiner, who also created Waldorf schools and Bio-Dynamic agriculture.

Approximately 79% of German and Swiss medical doctors advise their cancer patients to use it during chemotherapy and radiation, and is proven to reduce risk of adverse effects 50%. There is a significant reduction in anemia, neutropenia, thrombocytopenia, hepato-toxicity and nausea/vomiting. Patient care costs and loss of productivity costs are reduced by half as well.

It is also commonly used as a palliative medicine with at least a 50% response rate in advanced cancers. Quality of life and survival benefits are consistently seen in published research. Many patients go from being disabled and terribly sick to being active and functional, and this can last from months to years, even in the face of a terminal prognosis.

The brands of injectable mistletoe extracts which are the best documented are:

Viscosan, aka Helixor is a 1:20 extract from Pascoe Pharmacie, which is standardized for its *in vitro* biological activity.
- M = Mali or apple tree – for female and common cancers, IV administration.
- A = Abies or fir tree - milder, use in chemotherapy and for frail patients, children. Can be applied to leukemia and multiple myeloma.
• P = Pini or pine tree – used primarily for skin cancers including melanoma, testicular, nerve, and nasopharyngeal cancers, sarcomas, post-menopausal breast cancer, advanced and metastatic cancers. Use in lymphatic cancers such as B-cell lymphoma and CLL. P type is the most potent for stimulating the bone marrow. Can be used by IV too, but is a bit harsher.

Iscador from Weleda, is a 1:5 aqueous fermented extract, standardized for lectin and viscotoxin levels. It is also available in M and P types, but also offers:

• Qu = Quercus from white oak tree – for all digestive tract cancers from top to bottom, all uro-genital cancers including prostate, as well as thyroid, larynx and respiratory tract cancers. Use freely in male cancers.

Abnoba is pressed mistletoe juice allowed to form natural liposomes. These may increase the immune effects. Additional possible active agents include betulinic acid. In addition to apple, fir, pine and oak trees, they source mistletoe from ash, maple, almond, birch and hawthorn trees.

Mistletoe lectins are directly cyto-static and cyto-toxic to cancer cell membranes and cyto-skeleton, increasing apoptosis.

Mistletoe extracts are also anti-angiogenic, down-regulating VEGF.

They can protect, stabilize and repair DNA.

They inhibit ribosomes and protein synthesis.

Mistletoe inhibits metastasis through effects on platelet aggregation and cancer cell extravasation.

Mistletoe extracts are distinctly anti-inflammatory.

Most important of all, they effect a dramatic immune modulation.

This medicine gets the immune system to attack and remove your cancer instead of it trying in vain to nurse and fix its metabolic and genetic problems. Mistletoe lectins stimulate macrophages, cyto-toxic CD8+ T-lymphocytes, CD4+ T-cells, natural killer NK cell number and activity, dendritic antigen processing cells, and cytotoxic complement. Injections increase cytokines TNFa, IL-1, IL-2, IL-5, IL-6, GM-CSF, gamma interferon and others. Mistletoe increases Th1 and TH2 cytokines, binding T-cells to tumour receptors, activating lymphocytes against tumour antigens, and promoting eosinophilia.

It takes about 3 to 4 weeks to work up to the full dose, as we must gradually condition the immune system to react to the medicine. The neutrophils will increase rapidly, but transiently, while the lymphocytes may increase after 2 to 3 months therapy. Eosinophils increase according to the dose of lectins delivered. These immune effector cell counts are useful for monitoring response to mistletoe therapy.

Natural killer NK cells will increase in number and activity. Mistletoe will protect NK cells from damage during chemotherapy and radiation. NK cells kill cancer cells, and prevent metastasis. Mistletoe lectins are able to protect DNA, preventing sister-chromatid exchange from mutagenic chemotherapy and radiation.

Mistletoe is strongly anti-viral, so is particularly indicated in hepato-cellular carcinoma, squamous cell carcinomas, lymphomas and leukemias.

After some training and supervision most patients will self-administer every 1 to 3 days as a subcutaneous injection. A small dose is placed just under the skin surface, where immune cells stand guard. In time, at the correct dose, it should provoke a red flare like an allergic hive or welt, as the immune system reacts.

The site of the injection will get red and itchy, within 24 hours, but should not exceed 5 cm. or 2 inches in diameter, and should vanish by about 48 hours. Large, severe or persistent rashes are an indication to reduce the frequency and dosage of the medicine. Inflammatory reactions are expected, but occasionally become problematic and require desensitization procedures.

Mistletoe injections routinely provoke a mild fever - about a 1° C rise on the average. Induction of a fever of 102°F is considered an ideal reaction to IV mistletoe. A proper regulatory or healing fever will spike within a few hours of injection. Fever over 12 hours is not always healthy, and merits review. With large doses a major fever episode is
possible, which actually burns out the cancer. Artificial fever therapies have cured cases, for example Coley’s
toxins. Mistletoe can too, if properly managed.

It is common to see tumour progression decelerate or even stop, improved general health, and reduced pain. It is a
good bone marrow stimulant in drug-induced myelosuppression and in primary marrow diseases. The results I have
seen in managing advanced cancers has been dramatic. Increased survival time in many advanced cancers is well
documented in recent well-controlled clinical trials in Europe and America. Quality of life is nearly always
significantly improved. This includes reduction or elimination of pain, restoration of appetite, appropriate weight
gain, and general wellness. Over time the tumours may shrink and even disappear. Over the years, some advanced
cases are even cured. For example, actress Suzanne Sommers attributes her success over breast cancer to mistletoe.

When a good response is achieved, most other medications may be reduced or eliminated. Actual cost depends on
the dose required to get the biological response we are seeking. I have innovated some refinements which can
dramatically reduce the cost to patients, based on my prescriptive authority to transfer medicines from ampoules to
multi-dose vials. I teach physicians these methods in my courses.

Within 3 to 6 months the patient should be examined by their oncologist to confirm an objective response. This
may involve a CT scan, MRI, PetScan, or tumour marker blood test. A pause of 2 weeks is suggested every year in
the first 2 years of use, then 4 weeks off in the next 2 years, and 8 weeks break in the 5th year and beyond. If the
Iscador stops producing a local skin reaction, it may stop controlling the cancer. You must report this to your
naturopathic doctor, who will alter the dosage to restart the therapeutic response.

**Adverse Effects and Contra-Indications:**

Do not inject if there is a fever over 38°C or 100.4°F.

Do not inject until the previous immune reaction has disappeared or very nearly vanished.

The usual limiting symptoms are nausea, chills, fever, general aches and peri-lesional pains.

Because it excites an immune-response to the tumours, there can be some short-term increase in tumour size.
Tumours can increase in volume up to 40% as immune cells infiltrate and generate an inflammatory edema. This is
particularly problematic with brain tumours, primary or metastatic, and in tight compartments such as occur in the
nasopharynx, throat, and lung.

During mistletoe therapy there may very occasionally be an activation of a hidden focus of infection in the body,
such as an occult dental abscess with anaerobic bacteria. Other extremely rare occurrences are gallstones, colon
infection and regional lymph node swelling. Cachexic patients may not do as well with mistletoe, as the increase in
cytokines aggravates their metabolic wasting syndrome. Naturopathic physicians assess the vital force of the
patient before prescribing stimulatory therapies. In the right case, it can turn around the cachexia, with supports
such as reishi mushroom extract, omega 3 EPA oil, antioxidants and astragalus.

Generalized urticaria (pseudo-allergy) is dose-dependent, and responds well to infusing just saline, and if needed,
Benadryl 25-50 mg.

Angioedema may require epinephrine 0.3 mg intra-muscular injection in the acute stage. If chronic give
corticosteroid therapy eg Prednisone 20-30 mg.

Contra-indicated in:
- Pregnancy
- Breast-feeding
- Tuberculosis
- Biliary stenosis
- Liver failure
- Heart failure
Administering Mistletoe Therapy

**Iscador** therapy starts with a *Series 0* box of seven ampoules. There are 2 amps with 0.01 mg medicine, two with 0.1 mg, and three with 1.0 mg. We inject one ampoule, about 1 mL volume, sub-cutaneously, every two days. Usually there is no reaction to any of the doses in this set. If you happen to react to any of the last 3 ampoules in the Series 0 set, then you will only need a tiny dose in the future, and the treatment cost will be very, very low. Discuss how to proceed with your prescribing physician.

The traditional method would have us repeat with a second *Series 0* set of 7 ampoules, and then take a 2 week break.

Presuming no reaction was evoked by the *Series 0* set, we next progress to either the *Series 1* set, or to the *5 mg Spezial* set. The *Series 1* box has two amps with 0.1 mg of drug, two with 1.0 mg, and three with 10 mg. The *5mg Spezial* medicine has 5 mg drug in every amp, and requires refrigeration. At some point in this dose escalation we hope to see a red flare in the skin around the injection site, about 1 inch in diameter, arising in an hour or so, peaking at 24 hours, and gone by 48 hours. Note that the reactions will vary from day to day, so we are talking about the average size of the reactions.

*We do not give another dose until the previous reaction has vanished or at least diminished to a small red dot or a faint blush.*

*Ideally the immune reaction fades within 3 days, so we can dose the mistletoe 2 to 3 times weekly.*

*If the reaction is \( \frac{1}{2} \) inch (1 cm) across or less, the next dose will be higher.*

*If the reaction is 2 inches (2.5 cm) or more across, the next dose is going to be lower.*

Report to the doctor any reaction over 2 inches or 5 cm. in diameter. Big reactions take longer to clear off, so delays the next dose. Within a few doses we should be able to home in on the dose that gives the best response, the 1 inch reaction that will clear off fast enough to allow dosing the mistletoe 2 to 3 times per week.

Other signs of immune system activation by mistletoe can include flu-like symptoms, aching, shivering, and headache. It is rare, but in some cases these side-effects may necessitate a dose reduction or increased intervals between injections, or both. Usually they are minor and transient, so people commonly report they “felt something
going on, but it wasn’t a bother”. Typically after the first two weeks of getting an immune response, these secondary symptoms vanish and will not return.

Doses may be further escalated by giving multiple ampoules. Only increase dose as reactions fade to lower doses. A good dose range in chemotherapy is 5 to 30 mg.

If the reaction is fading it can be because a higher dose is required, or because your body is making antibodies against the mistletoe lectins. If a higher dose increment fails to elicit a response, seek guidance from an experienced physician. They will vary the dose according to the concept of playing a musical scale, and often at lowered doses! For example, if 20 mg stops working and dose of 25 mg and then 30 mg do not get a response, we may try alternating doses of 10, then 15, then 20 mg.

Viscosan (Helixor) therapy starts with a Series SE-I box, containing three 2 ml amps of 1 mg, three of 5 mg and one of 10 mg. It is used just the same as Iscador.

When the reaction fades, move to SE-II with two amps of 10 mg, two of 20 mg and three of 30 mg.

If needed go to SE-IV with two amps of 20 mg, two of 30 mg and three of 50 mg.

The series SE-III has one amps of 1.0 mg, two of 5 mg, three of 10 mg, and one of 20 mg. These are mainly used to fine-tune the dosing to achieve a more ideal reaction.

Viscosan also can be obtained in larger packs of 50 amps, including series, or single doses up to 100 mg per 2 mL ampoule.

Early cancers target 50 mg maximum.

In advanced, metastatic cancers a target dose is 200 mg. in a 100-150-200 rhythm.

The maximum recommended subcutaneous dose is 400 mg, but the usual dose should not exceed 1mg/kg/day.

HOW TO INJECT AMPOULES OF MISTLETOE

1. Start by cleaning the surface you will work on, then wash your hands.
2. You will always start with the Series O glass ampoules in ascending order 1 through 7, injecting 100 units every second morning for two weeks.
3. Wipe the neck of the ampoule with alcohol.
4. Get all the liquid into the bottom of the ampoule.
5. Put your thumb on the colored dot, and choke up on the neck of the ampoule with the other hand. Push back sharply on the dot to break open the ampoule.
6. Place the open ampoule on the work surface while you open the syringe cover.
7. Push the plunger of the syringe all the way in.
8. Carefully insert the needle into ampoule – if you touch the needle to the outside of the amp, you must throw away the needle and try again.
9. Tip the ampoule so the opening is somewhat downwards – the liquid will not run out.
10. Put the needle tip into the lowest point, the shoulder of the ampoule. The needle and the ampoule will make a V-shape. Keep the needle tip under the liquid surface at all times, to avoid drawing up air.
11. Pull up on the syringe plunger, drawing the liquid past the 100 unit mark on the barrel – but so not pull the plunger out of the barrel! Pay attention!
12. Point the needle straight up, tap the barrel where you see any shiny bubbles, to get the air up the needle area.
13. Carefully push the air out and any excess liquid, until the plunger edge is a the 100 unit line.
14. Wipe the skin with alcohol—usually on the tummy, not on the midline, and each time move the injection site over a few inches. Usually we just track around the navel.
15. Insert at a shallow angle, ½ the length of the needle.
16. Push in the medicine, cover with a dry cotton ball, pull out the needle.
17. Dispose of the needle in a sharps container, never in the trash. Return used needles for safe disposal.
18. Report any red reaction at the injection site to the doctor. Usually this will not occur using the series O dilutions, but will as we go into the higher strength doses.

Loading a Syringe

1. Opening an ampoule

Ampoule:
Draw from shoulder of ampoule - “Vee” or ‘hockey-stick’ shape. Keep needle tip under liquid.

INJECTING FROM A RUBBER-TOP MULTI-DOSE VIAL

1. Start by cleaning the surface you will work on, then wash your hands.
2. Check the vial for any sediment or cloudiness by shaking it. Only use the medicine if it is completely clear and transparent.
3. Wipe the top of the vial with alcohol.
4. After removing the syringe from its wrapper, make sure the needle is securely attached to the hub of the syringe barrel. Twist it on firmly until it creaks a bit, otherwise they will often leak.
5. Pull back the plunger of the syringe to the volume you will be injecting – usually this is 10 to 25 units to start. The doctor will tell you how much to take. For small doses we may use 30 unit syringes.
6. Put the needle gently into the soft central circle in the rubber top.
7. Hold the vial above the needle, and keep the needle tip in the liquid to avoid drawing up air.
8. Draw out a bit more liquid than you need.
9. Tap to bring bubbles to the needle hub area.
10. Push bubbles and excess liquid into the vial, so the plunger is at the number of units desired.
11. Pull out of the vial, with sideways pressure on the plunger to keep it from moving in syringe barrel.
12. Wipe the top of the vial again with alcohol before returning it to the fridge. Any residue left on the rubber top can grow bacteria and increase risk of contaminating the contents.
13. Check that the plunger is at the correct dose.
14. Clean the skin with alcohol, inject as usual, at a very shallow angle, only half the length of the needle.
15. Press a dry cotton ball onto the injection site for a few moments.
16. Dispose of the syringe in a proper sharps container. Clinics and pharmacies will dispose of these.
17. Report any red flare at injection site to the doctor, quoting the number of units injected.
18. You may have some initial mild immune symptoms – ie chills, achiness.
19. We seek a one inch red flare, measured horizontally at 24 hours, and hope for it to clear off by 48 hours.
20. Do not inject more mistletoe as long as a red flare persists, or if you have a fever.
21. Our goal is to give the mistletoe 2 to 3 times a week.
22. Occasional dose adjustments may be need. When in doubt, stop, and call us for guidance.

Vial: Draw from soft centre circle and keep needle in liquid.

Simplified Subcutaneous and IV Helixor Mistletoe.

A simple protocol taught to me by Dr. Sean Ceaser, ND (which I think came from our colleague Eric Marsden, ND) uses Helixor Viscosan M type, which we order in 100 mg/2 mL ampoules. P type can be used IV for certain cancers, but is just a bit edgier. We transfer these to a rubber-top multi-dose sterile glass vial for your convenience. Note that Helixor has no preservatives. Use a micron filter for sterility and to remove glass particles from opening the ampoules.

- **Two to three times a week**, about every second day, such as Monday-Wednesday-Friday inject by the following schedule, but only until you get a red immune reaction. Once you get a reaction adjust in smaller increments to fine tune the reaction.
- Week one: subcutaneously infuse 1 mg or 2 units, using a 30 unit insulin syringe or a slow IV drip
  One unit is 1/100th of a mL ( mL=millilitre, aka cubic centimetre = cc)
- The next week we do 3 infusions of 2.5 mg, or 5 units.
- The next week we do 3 infusions of 5 mg, or 10 units.
- The following week the dose is 10 mg or 20 units.
- Next week the dose is 20 mg per infusion, or 40 units, using a 100 unit insulin syringe.
- Next dose increment is 30 mg or 60 units,
- Next dose increment is 40 mg or 80 units.
- Next dose increment is 50 mg or 100 units. This is a good target dose for early cancers.

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165
The next week the dose can be 100 mg or 2 mL using a 5 mL syringe with a ½” needle, but is easier run IV.
Next dose is 200 mg or 4 mL. Because of the large volume, dump some along the needle track as you withdraw the needle.
Continue on at 100 to 200 mg dosing 2 to 3 times a week. In advanced, metastatic cancers a target dose is 200 mg. in a 100-150-200mg rhythm.
Stop the dose escalation when you get a red dermal flare from subcutaneous injection, or a high fever.
Always wait for the reaction to clear off before giving the next injection.
Adjust the dose as needed to maintain a comfortable reaction. If giving it by subcutaneous injection increase the dose if red immune flare reaction is under 1 cm, decrease the dose if it’s over 5 cm across.

**IV mistletoe basics**: at any time, but often at 50 mg level, we can inject mistletoe intravenously in 250 mL normal saline – **DRIP VERY SLOWLY! RAPID INFUSIONS CAN BE FATAL!** Contraindications to IV mistletoe include tumour fever, liver metastases, cranial tumours, and tumour compression syndromes.

Give IV at up to twice the current tolerated subcutaneous dose. European oncologists are starting at 200 to 2,000 mg IV in advanced cancers for a cytotoxic effect. Helixor mistletoe is ramped up in 100 mg increments to a maximum of 2,000 mg. or to tolerance. When fever and flu-like symptoms develop- called “cytokine release syndrome” – lower the next dose by 200 to 300 mg. Resistance to mistletoe by subcutaneous injection develops in 12 months or less so give periodic breaks. Abnoba brand *Viscum fraxini* is given IV from 10 – 60 mg, increasing by 10 mg increments, in a 50 gram IVC bag infused over 90 minutes. Increase until there is a fever or flu-like reaction. Note: fevers are rare with Helixor, and last only about 3 hours, so are easily differentiated from infection fevers.

IV adjuncts – it’s very productive to put *Viscosan* Helixor M or P in IV-vitamin C drips. This requires screening for a few medical issues, eg LDH (risk of tumour lysis) and G6PD (risk of hemolysis). We always bring the IV-C dose up slowly to see how the kidneys handle it, particularly if the eGFR is under 60. In some cases we give IV-C – mistletoe after IV-artesunate, or alternate it with ozone therapy. Also may synergize with a ketogenic diet and hyperbaric oxygen therapy. Mistletoe is synergistic with IV or nebulized *Helleboris niger* D12. Christmas rose is useful in prostatitis, edema, effusions, stroke, leukemia, lung and ovarian cancers.

**Peri-lesional** mistletoe can trigger encapsulation, making a tumour easier to remove surgically. Start at 30-50 mg placed in 3 to 5 aliquots around the tumour. Take care to avoid injection into any blood vessel or into the tumor itself. Peri-lesional injection triggers a local inflammatory swelling that can be problematic if the tumours are in the lungs, spine, head or neck. Once the inflammation subsides, tumour shrinkage is possible. *Astragalus or Panax ginseng* saponins increase antigen presentation to immune cells activated by mistletoe lectins.

We can also use mistletoe extracts by **intra-peritoneal, intra-pleural and intra-tumoural injection**. There is a risk of anaphylactic shock reactions by these routes of administration. A hospital setting is preferred. Do a subdermal challenge with 0.1 mL from a 1 mg ampoule, and wait 20 minutes to 24 hours. 200-500 mg.diluted to a volume equal to 10% of the tumour volume, (eg 15-30 mL) is injected into at least 3 to 5 points in the tumour.

Generalized urticaria (pseudo-allergy) is dose-dependent, and responds well to infusing just saline, and if needed. Benadryl 25-50 mg. Angioedema may require corticosteroid therapy. Induction of a fever of 102°F is considered an ideal reaction to IV mistletoe. The usual limiting symptoms are nausea, general aches and peri-lesional pains. Bone pain may be significantly reduced.
**CANNABIS**

*Cannabis sativa* and *Cannabis indica* have been used for spiritual and medicinal purposes around the globe, for several millennia. It is also a heritage botanical of great value for fuel, clothing, fibre, and nutrition.

Cannabis contains at least 68 cannabinoids, some say 108, including THC delta-9-tetra-hydro-cannabinol, CBD cannabidiol, plus terpenes, which give most of the aromatic flavors, and flavonoids.

THC from plants is actually much less efficient and complete a cannabinoid receptor agonist (stimulant) than *endogenous cannabinoids* we all produce naturally in our nervous system to turn down neuropathic pain and noxious stimuli (nociception). There are more cannabinoid CB1 and CB2 receptors than opiate receptors. Animals also have endocannabinoid receptors.

Cannabinoids are part of a homeostatic modulatory system which keeps us healthy by acting as a check-and-balance on molecular signalling networks. The cannabionoids work as retrograde messengers, altering synaptic plasticity - through which learning and memory occur. Pruning of memory and attention are fundamental processes for coping, enduring, and achieving mental health and happiness.

The endocannabinoid system regulates pain signalling, blood pressure, appetite, digestion, body temperature, bone density, lipogenesis, metabolism, fertility, moods, anxiety, arousal, immune function and the inflammatory response. So, cannabinoids are natural occurring in all our bodies, and are safe and medically active substances that belong to all of us as part of our biological inheritance.

The lipid endo-cannabinoids are AEA anandamide which bind to CB1 receptors, and 2-AG two-acylglycerol aka two-arachidonyl glycerol which acts on both CB1 and CB2 receptors. The exo-cannabinoid cannabidiol (CBD) in cannabis inhibits enzymatic clearance of AEA and stimulates release of 2AG.

**CB1 receptors** are particularly abundant in the central nervous system, adipose tissue (fat cells), liver, lungs, uterus and placenta. Activation of central and peripheral nervous system CB1s can be analgesic. CB1s on GABA interneurons disinhibit pain projection neurons. CB1s also alter memory and motor functions. All the psychoactive, mental and perceptual effects, sometimes considered to be negative effects, are from CB1 activity. Neurotransmitters modulated include acetylcholine, nor epinephrine, dopamine, 5-hydroxy-tryptamine, GABA and D-aspartate.

**CB2 receptors** are found in the liver, spleen, GI tract, heart, bones, kidneys and in the peripheral nervous system. Many CB2s are in immune tissues such as spleen, tonsils, lymphatics and leucocytes, including in order of concentration: B-cells, NK cells, monocytes, PMNs, T4s and T8s.

Cannabinoids binding to CB2 receptors may inhibit auto-immune diseases including multiple sclerosis, IDDM-1, RA, psoriasis and Crohn’s colitis. 2AG and therefore CBD will inhibit the TH-1 immune response, with its pro-inflammatory cytokines IL-1, IL-2, IL-8 and γIFN. Cannabinoids can inhibit TNFα, also important in Crohn’s. Note that it may not help TH2 dominant auto-immune disorders such as Grave’s disease of the thyroid and systemic sclerosis. It may be used in SLE post-post-partum or post-menopause, but not if arising in pregnancy or early in life.

Cannabinoids are synergistic with opiates for analgesia. Mu receptors are found along with CB1s on GABA interneurons which can dis-inhibit pain projection neurons. Therefore cannabis may assist in opiate drug withdrawal or dose reduction.

Cannabinoids reduce free radicals and thus are neuroprotective.

**A9-tetra-hydro-cannabinol** - THC is the most psychoactive exo-cannabinoid, particularly when metabolized to it’s Δ11 form. It acts primarily through CB1 receptors in nervous tissue. THC at 10 to 20 mg doses is equal in analgesia to 60 to 120 mg of codeine. Doses of 15 mg THC and above tend to be extremely sedating and
stupefying, even for very experienced cannabis users. Some of the THC psychoactive effects - the sativa “high” and the indica “stone”, including disorientation, drowsiness and tachycardia, can be blocked by CBD at the CB1 receptors.

**Cannabidiol - CBD** is a very important medicine for pain, nausea, tumour control and immune-modulation. It primarily acts through modulation of the endocannabinoids, as mentioned above, CBD inhibits enzymatic clearance of AEA and stimulates release of 2AG which in turn influence both CB1 and CB2 receptors. CBD also influences the vanilloid receptors, also called the TRPV-1 receptor. This receptor system was first found to be stimulated by eugenol, an essential oil from vanilla bean, and also found in cloves, nutmeg, basil, bay leaf and cinnamon. TRPV-1s are also responsive to capsaicin from cayenne pepper. This system mediates pain perception, particularly neuropathic pain. It also regulates inflammation and body temperature. CBD may also decrease inflammation via the A2A adenosine receptor, which down-regulates dopamine and glutamate in the CNS. CBDS are abundant in indica leaf and bud. See [www.cbddproject.org](http://www.cbddproject.org) Several high CBD strains are being developed, including Cannatonic which has equal proportions of CBD and THC.

CBG has anti-tumour properties, and fights infections. Island Honey strain yields 1% CBG. CBC is also anti-bacterial.

**Terpenes** are aromatic oils in which give aroma and flavor. Terpenes also have sedative and anti-depressant effects, and can moderate anxiety triggered by cannabinoids. Cannabis terpenes include pinene, linalool, terpenols, citronellol, myrcene, Caryophyllene, pulegenone, cineole, cymene and limonene. D-limonene is anti-mutagenic, anti-neoplastic and an immuno-modulator - see Boik 1998.

**Oral ingestion:** slow onset over 1 to 6 hours, huge individual variability translate into unpredictable effects. Extensive first-pass hepatic clearance reduces bioavailability to about 10%, but by rectal administration 50% bioavailability is achieved.

**Smoking:** A joint usually contains about 0.5 to 0.8 grams of cannabis. Typically this will have about 4 to 8% THC. About 20 to 70% of the THC reaches the lungs. 5 to 50% of the THC is bioavailable, ie reaches systemic circulation, with a mean 31% for CBD - cannabinoids, and 38% for CBN - cannabinoids. Plasma peaks of THC occur in 3 to 10 minutes, often before finishing a joint. Breath holding does not increase blood levels, only makes you dizzy and oxygen-deprived. Experienced tokers achieve maximal intoxication when they move a hit and the joint along. The most psychoactive metabolite 11-hydroxy-THC reaches a peak in 13 minutes. It rapidly moves into highly vascular tissues, then slowly distributes into fatty tissue. Plasma clears in about 3 hours, and the high usually lasts about 1 to 2 hours, sometimes up to 4 hours. 30% of THC content is lost to pyrollysis in smoking - this can be reduced markedly by vaporizing.

**Vaporizing:** lower temperature, particulates and markedly less toxic carbon monoxide make this much safer and cleaner than smoking, with less cannabinoids lost to pyrolysis. There is no loss of THC delivery to blood compared to smoking.

**Re: Drug testing:** THC will clear off in about 35 days, but metabolites can be detected in urine for up to 80 days.

**General effects:** Euphoria, laughter, relaxation, disinheriting, alerations of perception, time distortion, intensified sensory experiences, curiosity, and creativity. It can increase self-reflective awareness and being present in the moment, stimulate self-acceptance and the ability to sit with your own feelings, and thus have spiritual value.

“I have come to see that the right to use cannabis is even more fundamental than religious freedoms, for humanity created religions, but no matter what god you believe in, you had better believe that god created cannabis. Even from an atheistic standpoint, from the cross-cultural perspective, as possibly our oldest cultivated crop, cannabis has had an evolutionary partnership with humanity that stretches back more than ten thousand years. Indeed humanity has a natural indigenous right to all the plants of the Earth, all people and all plants, and any law that stands in the way of that natural relationship is an abomination to both God and nature.”

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Chris Bennett
Cannabis for Cancer Patients

Cannabis products can dramatically ease nausea in chemotherapy patients, stimulate appetite in cachexia, and ease chronic pain. It is THC which is anti-cachexic but pain and nausea are best managed by a synergy of CBD and THC. An excellent symptom manager is Ambrosia strain - low in THC, balanced in CBD, CBG, CBC, it is less psychoactive and improves overall wellness.

Cannabinoids suppress cancer because they can:
- directly retard cancer cell growth
- selectively kill cancer cells
- inhibit angiogenesis (THC)
- inhibit metastasis (THC + CBD)
- inhibit EGFR (THC)
- inhibit proliferation by antagonizing GPR55 receptors (CBD).
- modulate inflammatory growth factors and turn the immune system against the cancer (CBD)
- reduce free radicals of oxygen (THC and CBD).
- inhibit cancer gene expression of Id-1 protein, involved in aggressive growth and metastasis of cancers of the breast, ovary, colon, brain, prostate and melanoma (CBD).
- suppress cancers of pancreas, lung, head and neck, cholangiocarcinoma, leukemias, lymphomas.
- prevents graft-versus host disease if started at 300 mg CBD daily one week before a stem cell transplant.

Both CBD and THC are necessary to control cancer cell growth. Strains or preparations with high CBD can be potent medically while reducing some of the psychotropic effects of the THC. Indicas have more CBDs than sativa strains. CBDs can be extracted from the hemp leaves as well as the flowering tops. High CBD strains are particularly valuable for lung cancers.

Rick Simpson has emphasized high THC indica strains eg. White Widow. I have seen results with similar strains such as Chronic, Master Kush, Purple Kush, Dr. Jekyll, and Blue Cheese. The high THC levels in these strains produce significant psychoactive effects and major “body stone” or couch-lock effect. Currently those trying to advance cancer care are focusing more on lower THC levels and higher CBD content, realizing both cannabinoids are critical for pain, nausea and tumour control. CBG, CBC and terpenes also are very desireable. Sativa/indica hybrids are now commonly used to achieve the target balance of bioactives.

Sativa strains are not only too low in CBD for cancer use, they are too stimulating when in concentrated form, causing issues such as racing heart, anxiety, and extreme dry mouth. Note that the official Government of Canada marijuana strain MS-17 was a cross with GMO strains from Bayer AG, and do not contain the cannabinoids necessary to treat cancer. Clinically it was a dud.

Hemp Oil Dosing

I cannot legally prescribe cannabis. I have seen very consistent responses when it has been used under medical supervision by an experienced naturopathic doctor. In light of this I am willing to educate and direct my patients on the safe use of this drug, when I see a medical indication for it. The Senate Special Committee on Illegal Drugs 2002 allowed Canadian compassion clubs to accept confirmation of diagnosis and need for medical marijuana from “licensed health care practitioners familiar with herbal medicine”. That certainly applies to naturopathic physicians.

I am particularly supportive of the Ted Smith www.hemplogy.ca method of edible oil extraction. Olive oil captures more of the bio-actives such as terpenes than solvents. Solvents must be boiled off, losing some valuable compounds, and also leaving some toxic residues. Edible oils must be consumed in higher amounts than solvent extracts, but in all other respects seem superior, and are safer and easier to make. Ted has wonderful recipes on his website, www.cbc-canada.ca/recipes/cbcoo-official-recipe-book including formulas for cachexia such as Buddha Balls with whey and hemp seed, and topical salves. Kudos to Ted for all his activism, and his baker associate Owen for standing before the courts and winning us the right to make non-smokable medical marijuana products! A local
provider of coconut-oil extract recommends up to 5 shots daily of 25 mL of oil as an equivalent to 1 gram of solvent-extracted oil.

“PTO” or Phoenix Tears” oil, aka “RSO” (Rick Simpson Oil): I generally follow the Rick Simpson “Phoenix Tears” www.phoenixtears.ca dosing, which is to consume 60 grams of high quality Cannabis indica solvent-extracted oil within 90 days or less. Some cases will need 2 to 3 times this total amount. Generally the peak dose is one gram of oil daily, which requires a slow dose escalation to achieve tolerance. 1 to 2 months to ramp up is OK.

The safest solvent is 100% ethanol, the only alcohol we can drink, called “anhydrous” ethyl alcohol to indicate it has no water in it. Extraction with 99% iso-propyl alcohol will produce an “iso” oil of good quality. Iso alcohol costs only about 1/6th as much as ethyl alcohol. Because iso extracts the bioactives even better than ethyl, I prefer to use a blend of 50:50 isopropyl and ethyl alcohols. Avoid oils extracted with butane, naphtha or other toxic petrochemical solvents! I recommend a 15 minute cold maceration in the solvent, then filter 4 times.

If you have a double-digit gram scale the adult starting dose is 0.05 grams or about the size of a grain of rice if a more solid resin, either directly ingested or mixed in something with fat – whole milk, blended into a milkshake, in a dab of coconut oil, etc. If you draw that up in a standard “100 unit” insulin syringe, it will be about 4 units. The conversion factor is 1.4 grams per mL, so one gram is 0.71 mL, or 71 units in that insulin syringe. An mL means a milliliter, a thousandth of a litre, also called a cubic centimeter or cc. We don’t want you to take more than 100 units or 1.0 mL, under any circumstances. We use the syringes to get an accurate dose, just squirt the oil into the mouth, or use it to load a capsule, don’t poke yourself with it.

• drop the syringe full of oil into hot water for a few minutes to soften it.
• start with an amount the size of a grain of rice. For children it is as little as 1/4th of a drop to start, a mere dab on the tip of a toothpick.
• gradually increase the amount as you tolerate it.
• some folks like it at bedtime and sleep great, others wake up very dizzy and disoriented in the night and hate it. If necessary dose 3 times daily, morning, noon and night, but if night doses do bother you, try taking it no later than 5 pm.
• oil daily dose can be split up into empty gelatin capsules if you don’t like the taste. Otherwise get it onto the roof of your mouth (hard palate) and suck on it slowly, then rinse your mouth with cool water.
• work up to 1 gram which is ¼ tsp or 0.71 mL in the syringe. This amount just fills an ordinary “00” size capsule – fills the long part, then you snap the top on. However, at this maximum dose you would be best to split it into two caps of 0.36 mL (36 units on an insulin syringe) each, or three caps with 0.24 mL (24 units) per day.
• usually folks take 1 – 2 months to build up tolerance and achieve the full 1 gram daily dose.

The therapeutic goal is to consume at least 60 grams within a 90 day period.

• CBD is calming and mildly sedating at 40 mg daily, and 90 mg is a very potent dose. It has been used at up to to 450 mg daily, but probably a good target maximum is 1 mg per pound of body weight per day. We may choose to give extra CBD to get to a ratio of 4 to 1 CBD to THC to reduce the THC high.
• THC is quite intoxicating at 10 mg. Usually tolerance develops rapidly, allowing it to be increased about every 2 weeks or less, so a high dose may be reached in 1 to 2 months. Citicoline an hour before oil reduces intoxication and often allows a faster ramp up with more functionality. A useful target is about 1 mg THC per pound body weight per day.
• CBG at 8 to 10 mg daily is a welcome addition for tumour control.

Caution - see Adverse effects below. Some folks will hallucinate or become very disturbed on even minute doses of the oil. It is more of a problem if people have been heavy alcohol drinkers, or are on any psychoactive drugs, such as anti-depressant medications. These need to be stopped before attempting high dose cannabis therapy. Please have
someone standing by the first time you take it, and if you have problems, you will need to start taking B-complex vitamins twice daily. High doses of vitamin C may blunt overdose symptoms, as can citrus fruit, pine nuts, calamus root and black pepper. It is very common to be quite dizzy, lethargic, even feeling paralyzed. Give yourself space to rest and heal, don’t expect to do much else at first. Prophylactic use of L-citicoline reduces intoxication.

Once comfortable at 4 units go to 8, 12, 16, and so on, until you reach about 72 units. Take as long as you need to adjust to each dose increment, don’t hurry. If you hit a wall and don’t feel comfortable past a certain dose, hold there a week before trying the next step. You may want to go past 72 units, but do not exceed 100 units.

Using PTO oil for other disorders: For pain, muscle spasms, PTSD, depression and many other indications a high quality iso-ethyl extract of Ambrosia diluted from 48 mg/mL THC to 12 or 24 mg/mL. May be taken at a dose of 0.15 mL in a Vegi-capsule in the morning. Repeat as needed in the day. An extra-strength dose, often in the evening or at bedtime, would be 0.25 mL. For very recalcitrant issues the big dose is 0.40 mL which is 4.8 mg or XS 9.6 mg THC!

Topical uses of the oil: Olive or coconut oil extracts are wonderful for many skin disorders, and can be rubbed into sore joints. 1 mL of PTO in 5 mL coconut oil. Vitamin E can be added to preserve and to improve healing effect. Rick Simpson dilutes RSO in 5 parts 99% iso-propyl alcohol for topical use, and claims this “most medicinal plant in the world” cured his skin cancer.

Suppositories: Decarboxylate bud at 250° for 15 minutes, grind to a fine flour consistency, mix with equal parts cocoa butter that has been softened in a double boiler. Shape by rolling into cylinders on wax paper, or pour into moulds. Chill to harden. You can also use 1 to 2 grams of PTO per 100 grams of cocoa butter. If needed to harden them, add 4% beeswax to the butter in the double boiler. Some folks use coconut oil, but it is soft, needing to be hardened in a freezer or stiffened with beeswax.

Adverse Effects:

General: Dehydration, dry mouth, dizziness, anxiety, tachycardia (racing heart), reduced saliva and tears, reduced energy, weakness, light-headedness, dizziness, postural hypotension, syncope, immobility (“couch-lock”), mental clouding, confusion, dysphoria, lethargy, anxiety (fear of death or of loss of control), impaired memory, amnesia, increased reaction time, reduced motor performance, decreased attention, reduced coordination, nausea, stomachache, colored stool or urine, conjunctival injection -bloodshot eyes, bronchitis. No long-term cancer risk or cognitive decline is seen in chronic moderate users.

Psychiatric: May aggravate latent or overt schizophrenic psychosis, schizenoform psychosis, manic psychosis, depersonalization. This appears to be particularly a risk for teenagers and young adults with a family history of schizophrenic disorders. Some people will react with paranoia, agitation, panic, depression, sedation, delirium, hallucinations and delusions. Paradoxically, schizophrenia can improve with cannabis. Intoxication is aggravated by MSG – aka “Dorito Syndrome”. Intoxication is reduced by calamus root, pine nuts, citrus fruit and rind, Vit. C, black pepper. Prevent excess intoxication with 250-500 mg AOR brand L-citicoline one hour before ingesting cannabis oil, or by maintaining a CBD to THC ratio of 4 to 1.

Dependency: rate is about 9%, less than for alcohol, tobacco and most drugs. The hallmarks of dependency are compulsion, craving, loss of control of intake, continuing to use despite negative consequences in physical health or social, recreational or work activities or relationships, tolerance, persistent desire to reduce intake but inability to do so, and withdrawal reactions. N-acetyl-cysteine assists in breaking dependence.

Withdrawal reactions: Heavy users who suddenly withdraw may experience mild irritability, anger, aggression, restlessness, agitation, sleep disorder, strange dreams, depression, hyperhidrosis (sweating), loss of appetite, weight loss, rebound intraocular pressure increase. Withdrawal symptoms tend to peak at day 2 to 4, and end by 7 to 14 days. THC will clear off in about 35 days, metabolites can be detected in urine for up to 80 days.
Detoxification: delta-9-THC induces Cyp 1A1 which can interfere with chemotherapy agents and trigger unpleasant detoxification reactions. Use in chemo in moderate doses, for symptom management only.

TUMOUR LYSIS SYNDROME - is a toxic overload of the kidneys due to aggressive treatment resulting in rapid necrosis. The tumour is destroyed so fast it blows up and releases a lot of toxins in to the system. This is particularly a risk in blood-borne cancers such as leukemias and lymphomas, and if tumours are large and necrotic (rotten). This is a medical emergency. The metabolic load of rising potassium, phosphate, and uric acid, and falling calcium, results in acidosis and azotemia. A shift of any of these blood factors of over 25% relative to pre-treatment values is diagnostic. Watch for cardiac arrythmias, arthritis, weakness, lethargy, tachypnea, or coma with deep Kussmaul respirations. Fortunately it is very rare, but let’s play safe. I suggest you get your medical doctor to test you for LD– lactate dehydrogenase as soon as possible, before taking the oil. If it is abnormally high, you are high risk of this syndrome. Also test this again two weeks into therapy to see if it is rising, and let your physician know if it is. You should have your blood potassium and creatinine level tested weekly for the first 4 weeks of therapy, and then every 2 weeks. If it spikes up, you are getting tumour lysis, and need to consult a physician. Medical care involves rehydration, uric acid lowering drugs such as Allopurinol, management of renal failure, and other complex medical intervention. Support the kidneys with Co-enzyme Q-10, R-alpha lipoic acid, and goat whey minerals. Give sodium bicarbonate sufficient to raise the urine pH to over 5.0. Botanicals to consider are Pipsissewa, also known as Prince’s Pine - *Chimaphilla*, Cleavers herb - *Gallium aparene*, stinging nettle - *Urtica urens*, and parsley - *Petroselinum sativum*.

Websites of interest:
www.hempology.ca
www.cbc-canada.ca/recipes/cbcoc-official-recipe-book
www.rxmarijuana.com
www.marijuanahases.com
www.medicalmarijuanastrains.com
http://safeaccess.ca
www.nationalaccesscannabis.com
www.leafly.com
www.cbdproject.org

CAT’S CLAW

*Uncaria tomentosa* or Una de Gato is a vine from Amazonia which indigenous tribes consider a sacred plant. Cat’s claw inner bark contains pentacyclic oxindole alkaloids and carboxyl alkyl esters which are antioxidant and remarkably potent inhibitors of TNF-alpha synthesis. It may have a role in treating weight loss from cachexia and anorexia. It may reduce side effects of radiation therapy and chemotherapy – patients report less hair loss, nausea, skin problems and secondary infections. It has steroids and alkaloids with antibiotic, antifungal, antiviral and anti-allergy properties - in short, it is immune modulating. Peruvian traditional doctors are said to use it for cancers and other serious diseases, and since 1960 it has been used in some South American hospitals for cancer, with unconfirmed reports of ‘consistent results’. Prominent medical herbalist James Duke reports it is combined with curcumin and *Dracontium loretanum*, which is related to Jack-in-the-Pulpit. *In vitro* studies show 5 alkaloids with activity against lymphoma and leukemia cells. Use 1 ml of tincture or up to 2 grams of dry extract three times daily. Personally, I find little use for it. Many people use it because they believe the immune system can attack and overcome cancers – but this herb is not specific to cancer, and has little impact.

LAETRILE

Various seeds of pit fruit, such as peaches and apricots, were used for cancer by ancient Chinese, Egyptians, Greeks and Romans. Laetrile was isolated from apricot pits by Ernst Krebs, MD in the 1920’s. His son, Dr. Ernest Krebs, Jr., separated a cyanogenic compound from the enzyme emulsin, thought to dissolve the protein of the cancerous cell. He felt giving these two components separately at short intervals eliminated the toxicity seen with the whole kernal extract. The theory behind the use of these cyanide compounds is that normal cells have an enzyme rhodanase which dispels hydrocyanic gas formed during digestion. Cancer cells lack this enzyme, and have higher
than normal levels of the enzyme betaglucuronidase, which is very susceptible to hydrocyanic poisoning. The betaglucuronidase enzyme is associated with the evolution sexual reproduction, including the penetration of sperm into an egg, and is normally only found in the early embryonic stage of human life, called a trophoblast. Cancer cells are the only mature somatic cells with this enzyme in appreciable amounts. The laetrile would therefore be non-toxic to normal cells, and selectively destroy the cancer cell, targeting its unique chemical ability to digest through barriers and spread.

Dr. Kanematsu Sugiura at Sloan-Kettering found laetrile inhibits tumour growth and significantly retards metastatic spread. Despite his reputation as a meticulous scientist, his work was denied and ignored.

The Contreras Clinic in Tijuana, Mexico used it for many years. Dr. Austin and I agree that the Contreras clinic does help cancer cases, but not noticeably better than orthodox oncology. Laetrile doesn’t appear to be a miracle drug, but may be useful.

Laetrile is considered by some to be cytotoxic, presumably from the cyanide compound amygdalin. It can cause nausea, vomiting, headache and dizziness. There have been unsubstantiated reports of death from cyanide toxicity. The American Cancer Society considers it an example of the worst sort of cancer quackery. The historical record on Laetrile has been polarized and distorted. I do not know who to believe. What little science there is has been lost in a cloud of propaganda. I always prefer to work with the least toxic approach. It is difficult to trust Mexican sources of Laetrile. Some cancer patients today self-medicate with 4 to 5 raw apricot pits daily, and some claim results. This is probably the most toxic form of laetrile, and can trigger muscular weakness, respiratory distress, dizziness, nausea, vomiting, diarrhea, fever and toxaemia. Vitamin C increases cyanide absorption, so the combination of C and Laetrile is absolutely forbidden.

WHEAT GRASS JUICE
Ann Wigmore, N.D. emphatically recommends this juice, made fresh several times daily, consumed within 20 minutes of extraction. Chlorophyll has been emphasized as a cancer cure by our elders such as Dr. Fred Loffler, and Dr. Allen Tyler. It is “detoxifying”.

MILK THISTLE
*Silybum marianum* or milk thistle is the gentlest and most effective healer of the liver. The active principles include silbinin and silymarin. Silibinin is a polyphenol consisting of quercitin bound to a lignan.

Highly hepatoprotective from chemical damage, so is recommended for any patient undergoing chemotherapy. It will not increase liver clearance of chemo drugs and so will not blunt their effectiveness. It will support liver function where there are liver mets or a primary cancer of the liver. It increases bile flow, and helps the liver conserve glutathione.

- standard doses raise liver glutathione GSH about 35%, while increasing liver and small intestine GSH-S-transferase by 6 to 7 fold.
- induces Cip-1/p21 and Kip-1/p27.
- inhibits tumour necrosis factors – the TNF group.
- directly inhibits IL-1a and IL-1b production, which mediate acute phase pro-inflammation response including T and B immune cell activation.
- inhibits IL-6.
- strongly inhibits epidermal growth factor EGF, and its receptor EGFR, a driver of growth in all types of carcinoma.
- inhibits cyclin-dependent kinases cyclin-D1, CDK-2 and CDK-4.
- silibinin inhibits cancer cell growth by 48% and induces apoptosis to increase by a factor of 2.5.
- significantly reduces phospho-mitogen-activated protein kinase/extracellular signal-regulated protein kinase 1/2 (MAPK/ERK1/2) to inhibit growth. Up-regulates stress-activated protein kinase/ jun NH(2) terminal kinase (SAPK/JNK1/2) and p38 mitogen-activated protein kinase (p38 MAPK) activation.
- inhibits angiogenic factor VEGF.
- inhibits fibroblast growth factor FGF.
- inhibits insulin-like growth factor receptor IGFR.
- slows prostate, colorectal, liver and skin cancer growth.
COFFEE

Coffee contains caffeine and theophyllines which block PI-3 kinase enzyme crucial to cell growth. Coffee is also a PPARγ agonist. Moderate coffee intake is linked to lowered risk of oral, GI and breast cancers. Caffeine reduces skin damage from the ultraviolet rays in sunlight, reducing risk of non-melanoma skin cancer. It may have anti-clotting properties. Intake of 4 or more cups daily is linked to depletion of B-vitamins and calcium.

It has long been used in Mexican cancer clinics as a retention enema of 4 to 6 ounces of brewed coffee to relieve pain, presumably by flushing toxins out of the liver by increasing bile flow. This seems strange to some, but it actually works. A retention enema is not like a high-volume enema washing out the lower colon and rectal canal with a quart of more of water. A regular 6 to 8 ounce cup of coffee is cooled to body temperature. Insert ½ to ¾ cup into the rectum using a rubber bulb syringe, or a standard enema bag tube. Lay on your back in the bathtub, or with a towel under your bottom, somewhere near a bathroom. If the urge comes to expel some of the coffee, that is OK, but with a little practice it should be possible to hold it in for 10 to 15 minutes. By that time it should all have been absorbed by the hemorrhoidal veins, and be sent up the hepatic portal system straight into the liver, leaving nothing to expel.

TAHEEBO

Tabebuia avellanedae or Pau d’Arco inner bark and heartwood contain anthroquinones and napthoquinones such as lapochol. Taheebo has been used since 1960 at Santo Andre Hospital in South America on terminally ill cancer patients. Native folklore suggested that it might be useful for breast cancer, Hodgkin’s lymphoma, leukemia, cancer pain, and to increase the blood cell counts. Taheebo is anti-neoplastic, acting directly against oncogenes.

Health Canada advises it is completely harmless as a beverage, but has “no proven merit in treating cancer”. Some patients tell me it really helped them, and I have observed a few very dramatic responses to it. I would use it myself if I had cancer.

It is regarded as a treatment for overgrowth of the yeast Candida albicans, parasites, bacterial and virus infections. It is thought to reduce inflammatory growth factors, which would slow cancer growth. The inner bark chips need to be boiled for about 15 minutes, then steeped another 15 minutes. Drink it freely. As a tincture, use 15 to 20 drops 2 to 3 times daily. Very high doses can cause nausea, vomiting, and prolonged bleeding time.

CHAPPARAL

The creosote bush Harrea divertica Coville leaves and twigs contain nordihydroguaiaretic acid (NDGA). This powerful antioxidant removes glucose from the cancer cells, reducing their growth. It has a long history of use by Native American practitioners for rheumatism, arthritis, urethral complaints, lymphatic swellings, and tissue repair. It was popularized by Jason Winters, who claims it is especially effective for melanoma. He often combined it with red clover and gotu kola.

Large doses will commonly cause nausea, loss of appetite, stomach ache and vomiting. Occasional acute toxic cholestatic hepatitis and jaundice has been reported with some species of chapparal, sometimes resulting in fulminant liver failure requiring liver transplantation, or resulting in death. Clearly it is a herb to use with caution, if you are not sure of the exact species and constituents you are dealing with. However, Dr. John Bastyr, ND, and the generation of physicians he trained, used it freely in his arthritis formula, with no problems.

CARNIVORA

The Venus fly-trap plant Dionea muscipula juice is treated to remove poisonous constituents, then mixed with alcohol and water to make the patented phytonutrient Carnivora. It is an immune modulator used by some American Presidents. According to Dr. Helmut Keller, microbes, viruses, parasites and tumours are rapidly reduced by the activation of helper T-cells and inhibition of suppressor T-cells. Carnivora makes protein kinases which block the production of tumour proteins, starving the cancer cells. Carnivora also balances autoimmune disorders. A standard protocol is 12 ml. diluted in 250 ml. normal saline given intravenously in a 4 hour drip. Doses can range from 30 to 100 ml daily in 500 ml saline by a 4 hour I.V. drip. For brain cancers dilute the product in 20% mannitol to carry it across the blood-brain barrier. The product may also be taken in water or tea 120 to 250 drops daily. For disease in the respiratory tract it may be inhaled via a cool-steam vaporizer. Sterile preparations may be injected.
subcutaneously 1 ml. twice daily or intramuscularly 2 ml twice daily. An extract may be encapsulated, and taken at
doses of 1 to 2 of 125 mcg capsules up to four times a day. The reticuloendothelial system response is a fever and
increased white blood cell count. The malignant cells are robbed of energy and forced into apoptosis. I have not
used this product much clinically, and when I have the results were very disappointing.

LAMINARIA

*Laminaria spp.*, brown algae contains laminarin. Laminarin inhibits basic fibroblast growth factor BFGF, a heparin-
dependent angiogenic factor that binds to the extra-cellular matrix and cell surface receptors

PODOPHYLLUM

*Podophyllum petatrum* or Mayapple yields the irritating resin podophyllin. Tinctured to 25%, podophyllin can be
used as an escharotic to remove superficial basal or squamous cell carcinoma. I developed a formulation with
podophyllin to remove benign growths, which I call ‘Wart Death’. A component of this plant has been made into
the synthetic chemotherapy drug Etoposide.

FEVERFEW

*Tanacetum parthenium* or feverfew is rich in parthenolides which inhibit nitric oxide synthesis and 1κβ kinase-
alpha, which inhibits leukemic stem cells. Rx 3 to 4 mg of parthenolides daily. It may combine well with
 glutathione depleters such as vitamin K3, vitamin C, L-glutamine and sage *Salvia miltiorrhiza*.

HORSE CHESTNUT TREE

*Aesculus hippocastanum* leaves contain active coumarins, anticoagulants, antioxidants, and the hemolytic saponin
escin. Its favorable impact on vascular permeability is blocked by cyclo-oxygenase COX inhibitors. Escin protects
the integrity of the vascular basement membrane, inhibiting invasion and metastasis. We use it extensively for
varicose veins and hemorrhoids, both topically and internally. Use intermittently, for 2 to 4 weeks at a stretch, as it
is slightly toxic to the kidneys.

PLANT STEROLS & STEROLINS

Beta-sitosterols and sterolins were discovered in the traditional Hottentot medicinal plants of the *Hypoxis* species by
Dr. Patrick Bouic, Ph.D., an immunologist from South Africa. These common plant fats are extremely powerful
modulators of the immune system. I use them with marine omega 3 oils for all auto-immune diseases. Rx: 1 to 3
capsules daily of a professional quality extract such as Vitazen Ultra-Immune formula will increase the adrenal
hormone building block DHEA, which reduces circulating cortisol. Plant sterols, sito-sterols and DHEA are not
recommended for prostate cancer. Sterols appear to be most useful in breast cancer, lymphomas and leukemias.

It is to be considered in squamous cervical cancer because it is active against human papilloma virus, giving a
remission rate of 50% for HPV infections. Sterols and sterolins will increase IL-2, IFN-gamma, activate NK and T-
cytotoxic C8 cells to lyse cancer cells, reducing inflammation and immunosuppression. Interleukin six IL-6 is
down-regulated. Reduces 17-beta estradiol or E2 signalling.

Rare adverse events can occur, namely bone marrow injury and blood dyscrasias.

SEA CUCUMBER

Sea cucumber extract is a potent anti-coagulant 4 to 8 times more powerful than heparin. The active principle is a
fucosylated chondroitin sulfate glycosaminoglycan. It is blocks tumour cell selectin binding, which inhibits
angiogenesis and metastasis. Health Concerns brand is a good product. It can be effective in doses that have a
minimal effect on clotting time, as measured by PTT or INR testing.

BLACK SEED

Black cumin seed is a source of thymoquinone. It is considered a panacea in the Muslim world, as the Prophet
Mohammed said in the Qur’an (holy Koran) that it “cures every illness except death”. Traditional use is 1
tablespoon of seeds ground fresh in a mortar and pestle, mixed with honey and consumed before morning prayers. Thymoquinone is safe in daily doses of 1,000 to 3,000 mg daily. Supports gemcitabine chemo, modulates IL-8.

BERBERINE

Oregon grape root - *Berberis* or *Mahonia aquifolium* contains the alkaloid berberine, which has a long use in Chinese and other medical traditions as a broad-spectrum antimicrobial and anti-inflammatory. Other herbs containing this alkaloid are *Coptis chinensis* or golden-thread, andrographites, barberry *Berberis vulgaris* and golden seal root *Hydrastis canadensis*. These ‘cold’ herbs cool inflammation, including radiation injury.

- all are used for infections, including parasites. Berberine is a natural anti-biotic, immuno-stimulating, and increases leukocyte count. Do NOT use around stem cell transplantation.
- berberine is a potent herbal cytotoxic iso-quinolone alkaloid which poisons DNA topoisomerases I and II. Its pharmacological profile is very similar to the natural drug Camptothecin, which is now being used for a variety of cancers. Berberine induces apoptosis in brain cancers, leukemias and carcinomas. Reduces migration and metastasis of hepatoma (liver) cancers.
- berberine is an excellent free radical scavenger of singlet oxygen and the super-oxide anion radical.
- berberine is anti-mutagenic by modulation of DNA transcription.
- decreases levels of adhesion molecule ICAM-1 and transforming growth factor beta TGF-β1.
- berberine significantly inhibits the expression of activation antigens on T lymphocytes and also blocks the progression of cell cycles of lymphocytes, suggesting that it is immunosuppressive.
- reduces insulin resistance on par with Metformin, and does not provoke hypoglycemia.
- Reduces cardiomyopathy from doxorubicin chemo.
- Rx: 500 mg two to three times daily, to bowel tolerance.

BLOODROOT

*Sanguinaria canadensis* is a herb once known as “Puccoon” root. “Hoary puccoon” is completely unrelated - *Lithospermum officianlis* has an anti-thyroid hormone action. Bloodroot is a somewhat toxic herb. *Sanguinaria sp.* contain about 1% iso-quinolone alkyloid sanguinarine. Small doses induce emesis, large doses can kill. We use it by hormesis – a very tiny dose of a toxin is used as a stimulant. We colloquially refer to it as a “kicker” in a herbal and homeopathic formula. Use 1 to 10 drops of the tincture per dose. Bloodroot is part of Frank Beallie’s “Another Herb” tablet, with sheep sorrel, red clover and Galancia ginger. Bloodroot is an integral part of Hoxsey’s red paste escharotic. Before him it was mixed with zinc chloride in “Fell’s remedy”. Escharotics are not recommended, safer and better therapies have replaced them.

BLACK SALVE

An ointment for cancers consisted of pine tar, tallow, chapparal herb, red clover blossoms, comfrey leaf, plantain leaf, chickweed herb, mullein leaf, olive oil and soy oil. A later variant of this combined sheep sorrel, blood root, red clover and galancia ginger, covered with moist dressings of vitamin E on guaze. This sort of escharotic treatment is harsh, unreliable, and out-moded. It can damage subcutaneous tissues and accelerate metastasis in melanoma. It can create massive scars and deformity. We do not recommend black salve as it can cause severe pain, disfigurement, and is a barbaric and completely out-moded therapy.

NETTLES

Stinging nettles or *Urtica dioca* is strongly anti-inflammatory because it blocks LOX-5 series to reduce levels of leukotriene LTB4. Netle extract significantly suppresses TNFα. It can be eaten fresh as a steamed vegetable in the Springtime, 40 to 60 grams per serving. As a tea take 3 to 4 cups daily. Rx: 500 to 850 mg nettle extract twice daily, between meals.

SCUDDER’S ALTERNATIVE

BOTANICALS DESERVING FURTHER INVESTIGATION

**Rattlesnake plantain:** *Goodyera pubescens* is a scarce rainforest Orchid used by natives in North America for ulcers and cancers. Many interesting testimonials are on file at the B.C. Cancer Research Centre, and my inquiries into some of these cases suggest real potential for external and internal use. The plant is rare, delicate, and not forageable.

**Bindweed:** *Convovulus arvensis* L. is a common field weed related to Morning-glory vines. Dr. Daniel Rubin, N.D. has found it has significant C-Statin angiogenesis inhibitor properties. Farmers love to see someone pay to take this darn nuisance out of their fields!

**Graviola:** *Annona murica* was found to be very powerful but the active principles could not be made synthetically to produce a drug, so the research money dried up - or so the legend goes. It is too harsh on the GI tract to use orally. The active principles need to be delivered in a new posology. Graviola may trigger Parkinson’s disease!

**Saposhnikovia divericata:** rhizome has an acid arabigalactan polysaccharide Saposhnikovan A which is a potent potentiator of the reticulo-endothelial immune system.

**Pseudo-ginseng:** *Panax pseudoginseng var. notoginseng* because it moves stagnant blood but prevents hemorrhage.

**Violets:** *Viola papillonacea* – fresh violet leaves as infusion or a compress relieves pain and inhibits tumour growth. Used by Hippocrates and often mentioned by herbalists throughout the ages.

**Mountain mahogany:** *Cerocarpus spp.* isa relative of the birch tree. A 106 year old Paiute medicine man told Dr. Bill Mitchell, ND about this for prostate cancer. Rx: 60 drops tincture twice daily.

**Japanese plum yew:** *Cephalotaxus fortunei* bark is prescribed by Dr. Bill Mitchell, ND for lymphomas and leukemias. Rx: 30 drops tincture twice daily.

**Chinese lantern** - *Physalis alkekengi* is undergoing active research in India.

It is a fact of history that the source of many advances in orthodox medicine has been the botanical formularies of the “irregular” physicians, the homeopaths, and the herbal “wise women” and “wise men” of the world. Each time regular doctors falter, and the so-called war on cancer has indeed stalled, there are raids on the knowledge base of those on the front-lines of natural medicine. The originators of the clinical use of these valuable medicines are almost never acknowledged, for they are of course quacks for using them without the blessing of the science industry bio-pirates.

It seems as if until a God-given healing force on the planet is turned into a commodity for profit, it has no value in the current medical system. This must end. The healing power of nature has the same value as life. Without it, no medicine works.

“Today's mighty oak is just yesterday's nut that held its ground".
DOSSING CHILDREN

1. Clark's Rule is child's weight in pounds / 150 pounds = the fraction of the adult dose

2. Young's Rule is the child's age / age + 12 = the fraction of the adult dose

3. Cowling's Rule is the child's age at next birthday / 24 = fraction of adult dose

4. Hoffman's guideline is children under 12 reduce dose by 1/4, and under 7 reduce dose by 1/2

5. From King's American Dispensary:
   - 1/15 of adult dose 6 months old or younger
   - 1/12 of adult dose at 1 year old
   - 1/8 of adult dose at 2 years old
   - 1/6 of adult dose at 3 years old
   - 1/5 of adult dose at 4 years old
   - 1/3 of adult dose at 7 years old
   - 1/2 of adult dose at 14 years old
   - 2/3 of adult dose at 20 years old

DOSSING THE ELDERLY

Basing the dose on weight and strength is the best method.

Make sure that:
A. the patient is well hydrated
B. your directions are well understood
C. you have a complete list of all medications they are on and have some sense of potential drug interactions that may occur
D. their digestive capacities are being addressed adequately

1. Hoffman's guidelines
   - reduce dose by 1/4 for persons over 65 years old
   - reduce dose by 1/2 for persons over 70 years old

2. King's Dispensary:
   - 5/6 the normal adult dose between ages 65 and 75
   - 2/3 the normal adult dose between ages 70 and 100

***Your best judgement is probably the best guideline for determining individual patient needs.

DOSE - DURATION CHART
(140 gtt = 1 dram)

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The classic Eight Principles system of TCM categorizes patient’s conditions and matches up herbs in terms of hot/cold, excess/deficiency, yin/yang and interior/exterior. Further consideration is given to the state of various forms of the vital energy chi or qi, the state of the blood, the vital essences such as jing and parameters such as stagnancy, dampness, dryness, fire, wind, toxins, phlegm and obstructions. Once the language and cultural code is cracked, these are actually quite logical and simple rationales for selecting therapies. An experienced TCM practitioner will always be able to discern a strategy to improve balance and health, and can readily monitor through pulse and tongue diagnosis whether the overall state of the patient is improving or not.

**CHI DEFICIENCY** - use immuno-stimulants such as *Astragalus membranaceus* or huang qi, *Ligusticum porterii*, and licorice root. *Fuzheng peibeng* nourishing formulations like *Bu Zhong Yi Qi Wan* reinforce the body essence to build a foundation of positive chi. Ginseng and Notoginseng extracts are immune stimulating. Immune tonics work best when given early in the day, such as one dose at breakfast and another before lunch.

**STAGNANT BLOOD** - induce fibrinolysis and inhibit platelet aggregation with cayenne *Capsicum frutescens*, horse chestnut *Aesculus hippocastanum*, carthamus flower *Carthamus tinctorius*, cordyalis rhizome *Cordyalis yanhusuo*, notoginseng *Panax pseudoginseng*, myrrh, sage *Salvia miltiorrhiza*, *Sparganium simplex*, red peony root *Paeonia rubra*, and tumeric *Curcuma longa* or *Curcuma zedoaria*. Protein and tyrosine kinase inhibitors in soy miso inhibit platelet aggregation. Stagnancy from lack of chi flow makes tumours form. The Chinese use the term *huoxue huay* for enlivening the blood and dissolving stasis. Naturopathic physicians would add omega 3 marine oils, serratopeptidase or bromelain enzymes, Sanum Mucokehl, or lumbrokinase. Stagnant blood can show up as a purplish color to the tongue – which is seen 4 times in cancer cases than in healthy folks.


**CLEAR HEAT TOXINS** - inflammation or fire toxin are reduced by isatis root *Isatis tinctoria*, cassia *Cassia obtusifolia* and formulae like *Qing Wen Bai Dou Yin*. The Chinese term is *qingri jiedu* for clearing heat and eliminating toxins. Patients with a red base to the tongue covered with a thick yellow patchy coat are very hot and toxic! My TCM training put me many years ahead of oncologists in understanding the role of inflammation (heat) in cancer. *Oldenlandia* is a wonderful TCM detoxifier.

**DISPERSE MASSES** - tumours accumulate when the chi or vital force fails to move matter and it stagnates and forms into hard masses. Herbs which soften and disperse these perform the function *ruanjian sanjie*.

**DISPERSE CONGEALED PHLEGM** - phlegm and dampness can obstruct channels and create tumours. Herbs which dissolve phlegm and disperse dampness perform the function *huatan qushi*.

**POISON AGAINST POISON** - toxic herbs can be used, similar to Western style cytotoxic chemotherapy, and this is called *yidu gongdu*. This strategy of *gong xie* means “attack the disease evil”, and contrasts with the more common *fuzheng* supportive and corrective strategies.

Herbs formulae used in cancer may have many ingredients, with groups or modules of herbs designed to serve one of these core principles of treatment, and with accessory herbs which direct the others to a particular organ or meridian. Each formula is customized to the individual condition, and not just to the disease. If one aspect of the condition improves before another, that cluster of herbs may be removed from the formula. In North America we may use pill forms of the formulae, and may use two or more different formulae together, each specific to one of the treatment principles.
MEDICINAL MUSHROOM POLYSACCHARIDES

Asian traditional medicine has long used mushrooms as immune tonics, including *Coriolus versicolor*, maitake - *Grifola frondosa*, shiitake - *Lentinus edodes*, *Agaricus blazei*, *Cordyceps*, and reishi - *Ganoderma lucidum* or ling zhi. All can be effective, if good quality extracts are used. We prescribe hot water extracts only. The mushroom cell wall is cellulose, like paper or wood, it is indigestible by humans. Ground up mushroom is irritating to the liver. However, ground mushroom decocted in hot water yields up its medicinal ingredients, and is safer. Asians have always prepared this medicine as a tea or soup. A hot water extract is made by drying the tea made from the mushroom, and this concentrate is what is in the caps, not just ground up mushroom or its filamentous mycelia form. A typical dose may be 500 to 1,000 mg three times daily. I prescribe professional brands such as NFH. Several caps can stop a cold or flu in its tracks.

There are several potent medicinal mushrooms, yielding immune-active starches to hot water extraction. β-(1,3)/(1,6) D-glucan, a long-chain polymer of glucose in fungal cell walls, has been shown to modulate and stimulate the immune system, enhance hematopoiesis, amplify killing of opsonized tumour cells and increase neutrophil chemotaxis and adhesion.

**Reishi** or *Ganoderma lucidum* or ling zhi mushrooms contain cytotoxic triterpenes which have been shown to inhibit DNA synthesis via DNA polymerase beta. Reishi extracts aid in cachexia because they down-regulate TNFα. This also influences apoptosis and reduces chemo-resistance. Reishi balances inflammatory Th1 and Th2 cytokines, and gamma interferon IFNγ. Reishi reduces IL-3 and IL-4. Reishi extracts increase IL-2, IL-6, CD3, CD4, CD56 and CD+ lymphocyte counts, and mitogenic reactivity to phytohemagglutinin. Extracts inhibit transcription factors NFκB and AP-1, which in turn inhibits uro-kinase plasminogen activator uPA and its receptor uPAR. Reishi extract suppresses cell adhesion and cell migration, reducing invasiveness in breast and prostate cancers. Reishi is an adaptogen, and is very synergistic with ginseng and coriolus. I have been greatly inspired by Dr. Steven Aung, MD who uses wild reishi, and reishi formulated with pollen, pearl, *Gynostemma pentaphylla*, *Coriolus versicolor* or *Panax ginseng*.

**Coriolus versicolor** extracts PSP and PSK are proprietary hot water extracts from fungal mycelia that run about 30% high molecular weight polysaccharides (HMWPS). It is the highest of all in beta-glucans. They are proven immunomodulators via inhibition of cytokines IL-8 and TNFα. Coriolus PSK stimulates natural killer cells and lymphocytes to increase IL-2 by 2.5 fold. Trials with 1,500 mg twice daily have shown increased survival in patients undergoing chemotherapy with cisplatin for many cancers. Coriolus induces apoptosis in leukemia cells, raising IL-6 and IL-1β, while reducing IL-8. This mushroom is very useful in chemotherapy and radiation.

**Shiitake** lentinum corrects ovarian cancer resistance to cisplatin or 5-FU. In some sensitive folks raw or undercooked shiitake mushrooms can cause a florid toxic dermatitis.

**Agaricus blazei** is very high in beta-glucans. Highly synergistic with Rituximab, the R in CHOP-R chemo for non-Hodgkin’s lymphoma.

**Chaga** mushrooms grown on birch trees convert betulin in the bark to betulinic acid. JHS Naturals has a good Chaga extract. Chaga mushrooms inhibit gap junctional intercellular communication via inactivation of ERK1/2 and p38 MAP kinase.

**Cordyceps** is rumored to be contra-indicated in hormone-dependent cancers, but I am unable to determine why.

**AHCC** - active hexose correlated compound is a proprietary Japanese low molecular weight compound from fermented shiitake and other medicinal mushrooms grown in rice bran, which has been found to prevent many chemo side-effects and increase the effectiveness of methotrexate, 5-fluorouracil and cyclophosphamide when used at doses of 3 grams daily. It may also protect from radiation damage and reduce stress from surgery. It is particularly useful in protecting chemo patients from damage to bone marrow, preventing hair loss, and has demonstrated it can reduce nausea, vomiting, pain and can improve appetite.1 in 3 patients show a complete or partial response in terms of improved quality of life at dose of 3 to 6 grams daily.
In British Columbia we have many beautiful conk mushrooms which are very similar to the Asian medical mushrooms. The Chaga conk *Inonotus obliquus* grows on birch, alder, cottonwood, beech and hickory trees. The *Coriolus* relative growing here is known as *Turkey tails*, and one look at the colorful ring pattern informs why. They are considered useful as anti-virals, disinfectants and for gastro-intestinal cancers.

**PROTECTIVAL**

Protectival™ is a mixture of 15 traditional Chinese herbs to maintain immune function during chemotherapy. Most herbal extracts are concentrated to 5:1 but the decoction of these herbs in Protectival is a more potent 7:1 concentration. Over 200 pre-clinical studies culminated in a controlled clinical trial showing significant reductions in neutropenia, leukopenia and anemia. It also promotes apoptosis, inhibits cancer cell proliferation, and is anti-mutagenic. The herbal ingredients are astragalus, ligustrum, scuteallaria, atractylodes, citrus, glehnia, lyceum, milletia, oldenlandia, ophiopogon, poria, prunella, peony and red peony. All of these herbs individually have anti-cancer research to support them, and the synergy of the compounded formula is confirmed in human research. The herbs are thoroughly tested for contaminants, and processed in Taiwan into spray-dried granules. Quality control is impeccable, and meets Health Canada standards. Dose during chemo is 2 or more tablets 3 times daily. This is the best researched and most potent chemo support currently available for maintaining neutrophils, the critically important first responders of the immune system.

**BU ZHONG YI QI WAN**

Rich in high molecular weight polysaccharides HMWPS from *Lycium barbarum, Gynostemma pentaphyllum* or jiao gu lan, *Acanthopanax senticosus* or Siberian ginseng, and *Astragalus membranaceus*. Increases IL-2 and may be synergistic with melatonin and glutathione.

**SIBERIAN GINSENG**

*Eleutherococcus senticosus* or *Acanthopanax senticosus* is a wonderful herb for fatigue and stress. It is not a true ginseng, but is an adaptogen herb from Northern China and Siberia which was used for purposes similar to the ginseng of Southern China. It balances blood sugar and is strengthening. Siberian ginseng may inhibit sarcomas. Use *Wu Cha Seng* brand wild-crafted root 4 tablets twice daily.

**GINSENG**

*Panax ginseng* or Ren Shen contains ginsenosides which are known to be antineoplastic -
cytotoxic
- cause G1 arrest similar to p53 protein
- induce redifferentiation
- induce apoptosis.
- activate and modulate the reticulo-endothelial immune system
- activate p21 gene transcription, and expression of p27 protein.
- suppress Bcl-2, caspase 3, 5-alpha-reductase, androgen receptors, cell adhesion, invasion and metastasis.

Traditionally ginseng is used as a tonic for digestion and fatigue in the elderly, and as a panacea for longevity. It is proven to lower blood sugar by increasing insulin receptors, reduce stress reaction, and enhance immunity. It is believed to improve lassitude, pain tolerance, mental concentration, memory, physical vitality and appetite.

The traditional style of use is a tea of ginseng root. This is a warming and digestive stimulating beverage. The root is made into the more yang energy “red” ginseng by repeated steaming. This neutralizes certain enzymes.

Women are often given the “white” or unprocessed root, which is more yin. Put an inch or two of a stout root in a ceramic Chinese herb pot full of water, set inside a large double-boiler pot, at a low boil for a few hours.
Ginseng alone or with royal jelly and other herbs is energizing and tonifying for yang and chi deficient patients. It particularly tonifies the digestion in the elderly. In China ginseng is usually used for treatment of inflamed stomach and stomach ulcer. Ginseng may be synergistic with vitamin C for leukemia – but I don’t use high-dose vitamin C in leukemias.

The patented natural product *Careseng* is an enriched extract with 8% Rh2 and 75% related aglycan ginsenosides which are synergistic. It is said to be very potent, and strongly synergistic with cytotoxic compounds, activating execution caspases. It is claimed it can overcome multidrug resistance (MDR gene) to restore tumour sensitivity in late-stage disease. It may block angiogenesis, and may block cancer cell entry into G1 growth phase, arresting tumour growth. A synthetic form of these ginsenosides is being developed as a drug under the designation PBD-2131. Use 10 – 50 mL in very slow drips. It can cause severe chills and aches, and is high risk for anaphylaxis reactions. While many of my colleagues use it, I have yet to be convinced it has any value at all. It is very expensive, running into thousands of dollars a month for many patients. I spoke with an MD from China who did these infusions on cancer patients for 4 years, without seeing any significant responses.

**FARE YOU**

“*Fare-You Vitamin U complex*” is a pharmaceutical grade extract of green cabbage, with a few adjuncts. Vitamin U is S-methyl-L-methionine - C_{8}H_{15}NO_{3}S, Methylmethioninesulfonium Chloride aka Cabagin-U. Vitamin U is a gastric mucosa regenerator prescribed for peptic ulcers: gastric and duodenal ulcers, achyilia gastrica, hyperacidity, chronic gastitis, and regurgitation or gastro-esophageal reflux disorder GERD. I have found it to be an excellent remedy for diverticulitis, colitis, proctitis and mucositis.

This compound is also found in egg yolks, alfalfa and various green leafy vegetables. The historic Nature Cure for stomach ulcers was a quart of fresh green cabbage juice daily. Hippocrates used cabbage for cancer. Cabbage also contains indoles, sulforaphanes and iso-thiocyanates, all active against cancers.

I began to use it for mucositis (mouth sores) in chemo patients and the results are just amazing. The Leukemia Bone-Marrow Transplant Unit in Vancouver has seen it work – and would love to get funds to research it. Rx: 1 to 4 tablets three times daily.

An alternative vitamin U product is USA-made Biotics Research *Gastrazyme* 2 tablets 3 times daily at meals.

**JINGLI NEIXAO**

This traditional Chinese medicine (TCM) herbal formula is scientifically formulated, clinically tested, and found effective in the treatment of a variety of tumours. It is a herbal chemotherapy which relieves pain, detoxifies and is anti-inflammatory. Jingli is a good example of the TCM strategy of *Fu zheng pai beng*, which strives to tonify and nourish the vitality of the patient rather than attack the cancer. This is a very naturopathic concept. In TCM terms Jingli cools heat, disperses phlegm and sweeps away toxins; it relieves stagnation of phlegm - primarily by soothing and cooling the liver. Jingli will be prescribed along with other naturopathic and TCM herbs which will modify its various qualities to better fit the individuals we treat. Jingli is prepared from lab tested herbs exclusively for my patients by a local compounding herbalist. The ingredients and their rationale for use are:

**Lonicera:** Honeysuckle flowers or *chi yin hua* purge blood of heat and toxins due to their antimicrobial and anti-inflammatory properties. Softens lymphatic swellings and relieves fevers.

**Ginseng:** Ginseng root or *ren shen* improves appetite, is a tonic to the digestive organs and supplements energy by normalizing sugar metabolism.

**Angelica:** Japanese Angelica or *tang kuei* both builds and moves the blood.

**Atractylodes:** Atractylodes or *tsang shu* is a digestive tonic, relieves nausea, purges dampness, and is rich in vitamin A.

**Prunella:** All-heal or *xia ku cao* is used worldwide for liver inflammation, or stagnant inner heat. It relieves congestion of fluid and lymph.
**Pinellia:** Pinellia or *ban xia* strengthens digestion, relieves inflammation in the liver and pancreas, treats nausea, and strongly resolves phlegm.

**Sargassum:** Sargassum seaweed or *hai tsao* cools fevers, resolves phlegm, relieves congestion and softens tumours (*Oldenlandia diffusa* may be substituted for sargassum).

**Laminaria:** Ecklonia kelp or *kun pu* decongests lymph nodes, moves fluid and softens masses.

**Paonieae:** Peony or *bai shao* builds blood, purifies or detoxifies the blood, relieves pain, stops diarrhea, promotes liver function. Supports yin and ying chi.

**Bupleurum:** Bupleurum or *chai hu* is the premier liver support herb, and relieves pain. It detoxifies, cools, decongests and dispels wind.

**Poria:** Polyporus mushroom or *fu ling* tonifies the digestion, relieving nausea or diarrhea. It resolves dampness and edema. It is calming and supports good sleep.

Rx: 2 capsules, three times daily with meals (or 3 capsules twice daily).

**PING XIAO PIAN**

For solid tumours. *Alumen*, *Lacca Sinica Exsiccata* and *Guano Trogopterorum* disperse stagnation, activate the blood, which is anti-inflammatory, analgesic and promotes tissue regeneration. *Strychni* seed stimulates the heart and nervous system to promote vital energy. *Agrimoniae* herb and *Aurantii* fruit are dispersive, cardiotonic, and stimulate digestion. *Sal Nitri* and *Curcumae* root complete the formula. A variation was sold to practitioners by Eden Herbs as Can-Z.

**LIU WEI DI HUANG WAN**

A classical formula for kidney yin deficiency. For “false-fire” yin deficient patients, who show various inflammatory signs and symptoms. The key herb *Rehmannia glutinosa* tonifies the adrenal glands, prolongs the action of cortisol or the drug cortisone and antagonizes depression caused by steroid hormones. I have seen some wonderful remissions of cancer of the esophagus and stomach with this simple old formula. It heals and restores damaged kidneys too. For small cell lung cancer patients undergoing radiotherapy or chemotherapy it is shown to increase the proportion having a complete response, lengthen survival and reduce toxicity to blood elements. I give it in doses of 12 pellets twice daily of the patent medicine “Rehmannia Six”.

**LIU WEI HUA JIE TANG**

This formula supplements qi, dramatically increasing long term survival in stomach cancer.

**SHIH CHUAN DA BU WAN**

Shiquan or “Ginseng & Tang kuei Ten Herb Formula” is a TCM formula containing astragalus and ligusticum. It has a long history of use to build the qi, blood, yin and yang - and since it builds all four of the vital elements, it is rightly called a supertonic. Many large and high quality research studies from Asian universities and hospitals prove to the highest standard that this formula significantly improves responses to chemotherapy while dramatically reducing side-effects. Shih chuan da bu wan is used in China for leukemia, stomach and uterine cancers. It has been shown to stimulate hemopoietic (blood-building) factors, and interleukin production. It can potentiate the effectiveness of chemotherapy drugs and reduce their toxicity, especially leukopenia, thrombocytopenia, weight loss and fatigue. Dr. Keith Block, a famous chemo doc with over 30 years experience, has recommended this formula during chemotherapy.

**JIN GUI SHEN QI WAN**

Supplements the kidney yang. Small cell lung cancer patients undergoing radiotherapy or chemotherapy have been given this formula with a positive increase in complete remissions, lengthened survival and reduced hematological toxicity. Also called Rehmannia Eight Herb Formula, or Ba Wei Di Huang Wan. This is very good for reviving failing kidneys, in concert with Co-Q-10 and R- alpha lipoic acid.

**SHO-SAIKO-TO**

A Japanese formulation of 7 Chinese herbs being tested at the Memorial Sloan-Kettering Cancer Center for ablation of non-resectable liver cancer (hepatocellular carcinoma). Phase 1 trials in Japan showed hepatoprotective,
antiproliferative and immune-stimulating effects. This is a Kampo style standardized extraction of raw traditional herbs, prepared by Honso Pharmaceutical Co.

**XIAO CHAI HU TANG**

Minor Bupleurum Formula is a major healer of the liver, bringing blood back to the centre. improving liver blood flow and function caused by the gut reaction to stress. Nourishes the yin, cools liver heat = resolves inflammation. Its saikosaponins are strongly antiinflammatory, inhibit angiogenesis and induce apoptosis in liver cancer cells. improving liver blood flow and function caused by the gut reaction to stress. *Bupleurum chinense, Bupleurum falcatum* or chai hu is a cooling herb used to treat liver qi stagnation. The anti-inflammatory effect is due to stimulation of adrenal cortical trophic hormone (ACTH) from the pituitary gland, which in turn stimulates the adrenal gland to make more cortisol. The adrenal gland will actually increase in weight. Licorice is synergistic by reducing the breakdown of the cortisol produced. Vital immune modulation against hepatitis viruses. For immune health and nausea in chemotherapy. I prefer Canadian GMP standard Vita-Aid *Ventorrid* 2 capsules bid.

**LING ZHI FENG WANG JIANG**

The reishi mushroom *Ganoderma lucidum*, “poor-man’s ginseng” *Codonopsis pilosulae*, lychee fruit *Lycii chinensis*, and Royal jelly, the food of the Queen bee, and honey made up this pleasant and effective nutritive general tonic for the qi and blood. It greatly strengthens and invigorates the fatigue cachexic patient. It can restore appetite, nutrient and medication absorption and body weight. This was a real treasure, but is no longer being manufactured. We now use reishi, ginseng and royal jelly together for a similar effect.

**YUN NAN BAI YAO**

Yunnan Baiyao (or Paiyao) was until recently a secret formula. We now know it’s primary ingredients are *Panax pseudoginseng var. notoginseng* which contains ginsenosides and also the unique saponin notoginsenosides or pseudoginsenosides protopanaxadiol and protopanaxatriol which distinguish it from ginseng, and *Geranium sp.* related to the traditional naturopathic styptic herb *Geranium maculatum*. These scavenge superoxide radicals, contain antitumour polysaccharides, and are anticarcinogenic - but are best known as fantastic hemostatics.

- stops bleeding on contact or when taken internally. It will rapidly arrest internal bleeding in the lungs, GI tract and nasopharynx from local cancers or from leukemia.
- relieves pain and stops swelling from blood stagnation.
- corrects thrombocytopenia rapidly - platelets can double in just two weeks.
- *notoginseng* has arabinogalactan polysaccharides which are potent stimulators of the reticulo-endothelial immune system.
- *notoginseng* is a radiosensitizer, and has an anti-leukemic effect.

Use the powder directly on bleeding tissue. Take internally with water, 1 or 2 capsules or 0.25 to 0.50 grams (1/16 to 1/8 of the little glass bottle) of the loose powder. This powder was claimed to be a potent secret weapon of the Viet Cong because it saved many an isolated guerilla soldier by staunching bleeding from gunshot wounds or other trauma, when no medical assistance was available. This is why the formula was a state secret of China!

The Chinese use notoginseng unstintingly in many cancer formulations. It moves blood stagnation, or “cracks stagnant blood”. Stagnancy causes the formation of all tumours. Stagnant blood also is said to be the cause of pain. This is what we call a “crackerjack” herb for cancer.

**BURDOCK ROOT**

Burdock root *Arctium lappa* or niu bang zi contains lignans which reduce sex hormone bioavailability, induce differentiation, and inhibit tumour cell proliferation. John Boik suggests burdock seed tincture would be a useful synergist with the Hoxsey herbal formula. The Japanese eat it as “Gobi root”.

**SCUTE**

*Scutellaria baicalensis* or huang qin normalizes platelet-induced hemostasis, associated with metastasis and tumour advancement. Baicalenins a COX-2 and LOX-12 inhibitor, which can assist in narcotic reduction and is also strongly anti-inflammatory. Several cytotoxic flavones have been identified which arrest cells in G1. It has DNA binding activity, is anti-mutagenic, anti-angiogenic, stimulates lymphocytes and white blood cells in general,
inhibits conversion of fibrinogen to fibrin by thrombin, inhibits proliferation, inhibits protein tyrosine kinase, inhibits topoisomerase II, inhibits cAMP phosphodiesterase, decreases androgen receptor expression, inhibits MMP enzymes and activates caspase-3 apoptotic enzymes. It is likely most useful in prostate, breast and vaginal cancers.

**ISATIS**

*Isatis tinctoria* or “dyer’s woad” is the source of royal indigo purple dye. It is in the Brassica family and so contains anti-cancer indoles. It has beta-sitosterols which modulate the immune system. The leaves have an alkaloid tryptantrhin which is a strong COX-2 inhibitor, making it anti-inflammatory and anti-allergic. The root has traditionally been used for solid tumours and modern studies with the purified compound indirubin at 150 to 200 mg daily show responses in leukemia.

**DANG GUI LU HUI**

Effective formula for chronic myelocytic leukemia. The active principle appears to be indirubin in the qing dai or *Isatis tinctoria*, which is immune stimulating and inhibits DNA synthesis specifically in immature leukemic cells in the bone marrow. Synthetic indirubin is used at oral doses of 150-200 mg, is less toxic than the drug Myleran, but similar to hydroxyurea in GI toxicity, thrombocytopenia and marrow suppression.

**RUBIA**

*Rubia cordifolia* or qian cao gen contains a peptide which strongly inhibits tumours in vivo.

**MAGNOLIA**

Honokiol is a small-molecule polyphenol found in Magnolia. This genus also produces the related polyphenols magnolol, with similar biologic properties. Honokiol is antiangiogenic, antiinflammatory, and antiviral and antitumour. It is also slightly sedating.

**ANDROGRAPHITES**

*Andrographites paniculata* is a rich source of berberine and other factors which increase interleukin two IL-2 and interferon gamma INFγ. The sugar-coated TCM tablets *Kang Yan* are a pleasant herbal medicine.

**CHINESE DIETETICS**

Avoid beef, fatty meats, wine, goose, salt, excess sweets, and foods that are smoked, sour, fried, spicy, very rich or stimulating. Foods are classified as hot, cold, yin, yang, and so forth, allowing diets to be formulated which balance and harmonize according to the Eight Principles diagnosis obtained by pulse and tongue assessment on each contact with the patient. Mung bean sprouts and royal jelly are protective.
ACUPUNCTURE

Most people know acupuncture can relieve pain, even to the point where surgery can be done with little or no other anesthesia. However, when done in its proper context of traditional Chinese medicine TCM diagnosis and prescription, it can balance the parasympathetic and sympathetic branches of the autonomic system, reset the command and control centers in the central nervous system, and rebalance the entire organism. It reminds the various parts to reconnect and work together for the common good. This is so important in a disease such as cancer, which is all about a loss of control.

Parasympathetic stimulation with acupuncture, for example to the Vagus nerve branches in the ear, will control inflammation by down-regulating synthesis of cytokines TNF, IL-1β, IL-6, IL-18, and inducing homeostasis in the cholinergic anti-inflammatory pathway. This effect is achieved via the tyrosine kinase Jak2 and STAT-3 transcription activator. The modulation of parasympathetic tone can be assessed by looking for improved heart rate variability.

Acupuncture needling causes the local release of platelet aggregation factor PAF and kinins which set off a healing response. There is an increase in cellular immunity, IL-2 production, NK cell activity, and macrophage phagocytosis. It can modulate cortisol and other hormones.

The special point Pee Gun can be used for all masses; it is located 3 ½ cun lateral to the inferior tip of the spinous process of the twelfth thoracic vertebra. Burn 14 red bean size moxa every 7 days, on the side of the body affected by cancer. A cun is described as an “inch” - but the actual length varies from patient to patient and from one area on the body to another - it is proportional to various anatomical parts in the region. For example on the face it is the width of the eye, but on the scalp it is 1/12th the distance from the front hairline to the back hairline. Moxa is made from the leaf of the mugwort plant Artemisia vulgaris, and when lit it slowly smolders, warming the acupuncture point. Moxibustion is an alternative to needling or can be used with needles. While its smoke is relatively non-toxic, I usually would rather needle the point and then put an infrared heat lamp over the area to warm the needles gently, which has the same effect of increasing the Yang and dispersing the stagnant qi.

Turtle technique on a mass involves needles from 3 directions towards the center, and ginger moxibustion to a fourth needle into the center of a tumor. The moxa is burned in little cones set on a thin slice of fresh ginger root, which has several holes punched through it with a toothpick; this is even more Yang than plain moxa.

Primary points to consider, in the context of 8 Principles or 5 Element balancing would include PC-6 and HT-7, GV 12 and 13 coupled with BL-38.

Secondary points which activate chi and blood with LI-4 and LV-3 (the Four Gates) plus ST-36, SP-6, GV-4 and 6, CV-4 & 6, LU-9, LV-2. CV-6 is special for regeneration and stabilization.

Tertiary cancer points include SP-3, PC-6, LI-4, ST-36, CV-12, GV 20; Hwatoh jiagi 17 pairs.

Stimulate the Yang to invigorate the chi and dissolve stagnant blood with the master and coupled points of the Du channel SI-3 and BL-62, and consider also GV-4, 14, 20 & 26, BL-23 and GB-20. Needle and moxa BL-17 and 43 and GV-9 and 14 to strengthen a Yang deficient patient.

Tonify qi with CV-12; ST-36 and 44; LI 4, 10 and 11.

Prosperity treatment uses 4 points: 1 cun above, below and lateral to the umbilicus. Insert and turn clockwise starting from CV 7 for constipation. Insert and turn counter-clockwise starting with ST 25 Left for diarrhea. Supplemmental constipation points include GB-34 & ST-36.

For vomiting consider CV-12 & 22, ST-12, PC-6, ST-36 and HT-1.
To support the bone marrow use the Sea of Marrow points GV-15, 16, 19 & 20. Other anemia points to needle are BL-14 & 17 & 20, GV-4 & 14, CV-4 & 12, LV-13, SP-8 & 10, LI-11; moxibustion may be used on ST-36, SP-6 & 10, CV-4 and GV-4. For blood deficiency use Chong Mo master & control points PC-6 with contralateral SP-4.

Ascites can be moderated with ST-22 and CV-9


Immune support: SP-6, KI 3 & 6.

Dysphagia after chemo-radiation of head and neck cancers will improve with acupuncture to ST 5, 6, 7, 36; SP 6; LI 2 & 11; GB 20; GV 20; CV 23; Yintang; Ear – Shenmen & Internal secretions.

**QI GONG**

Qi gong is a traditional Chinese practice cultivating a balance of yi -intention or consciousness, with qi - vital energy - to balance mind and body. Qi gong exercises are thought to move energy through the organs, and qi gong masters are said to be able to move the energy in patients by the force of their own will. I have seen demonstrations of qi gong which are very dramatic. I have experienced the movement of palpable energy from a distance by a qi gong master. Chinese research points to improved immune function - macrophage phagocytosis, white blood cell counts, CD-20, IL-2 and NK cell activity. Cancer patients undergoing self-control qi gong therapy also demonstrated decreased inflammation, improved appetite, regularized bowel function, normalized liver function, increased self-healing, and weight gain. Late-stage cancer patients gain increased survival time. It is interesting that qi gong training is said to return the person to their “original self”, releasing them from their “socialized self”. This mirrors the concept of reinforcing the inner direction of psychic energy versus the outward directed energy, which is a focus of the psychotherapeutic approach of LeShan and Simenton. The chi energy of qi gong healing is the same universal healing energy used in Reiki and Healing Touch.
Chapter Seven : ENERGY HEALING & OTHER REMEDIES

HOMEOPATHY

Homeopathy is a 200 year old system of using very dilute substances to provoke the healing systems of the body to higher function. Vaccination is a crude form of homeopathy, using a tiny dose of a specially processed substance that in a full dose of the active substance would have provoked the actual disease in a healthy patient. It is ‘like-cures-like’, using a triggering dose to get the body to work on the problem by giving it a dose of information about the disease. Homeopathy reinforces correct functioning of the innate regulatory mechanisms for defense and repair.

It is very gentle, and results can be very gratifying. It is highly individualized, and a good homeopathic prescription takes some time and thought by an experienced practitioner.

George Vithoulkas defines health as “Freedom from physical and emotional pain, freedom from selfishness, increased adaptability and creativity.” This very holistic view is well served by homeopathy, as a true similimum or well-matched remedy will act on the physical, mental, emotional and even spiritual dimensions of life. With it we strive to optimize the dynamic expression of the person’s unique and essential nature, and bring out the most healthy variant of self that is possible.

In all cases consider Scirrhus 30 - 200 CH or Carcinosum 30 - 200 CH weekly. This does not mean give it slavishly to every patient though!

Other leading remedies are:
- Arnica montana, Carbo vegetalis, Euphorbium for pain
- Arsenicum album for drug toxicity and in palliation
- Arsenicum iodatum for cachexia.
- Hydrastis canadensis for constipation and lethargy
- Conium maculatum for hard masses.

Dr. Robin Murphy, N.D. has written an excellent alphabetical repertory with a good section on cancer under “Generals”. This is my favorite book on homeopathy. See the bibliography.

Dr. Ivo Bianchi, M.D. uses Heel brand “homotoxicology” products such as Gallium-Heel 20 drops morning and night for 2 months, to be repeated 3 to 4 times a year, for prevention - to halt oncogenesis, in cancer therapy, and to promote detoxification; Lymphomyosot for lymphatic drainage; Glyoxal-compositum to neutralize toxins released by damaged cellular processes - do not repeat too often, allow time for it to work; Traumeel to ease pain and speed healing of mucositis induced by chemotherapy. Zeel functions as a COX-2 inhibitor on par with prescription drugs.

There are many self-help books available, and progressive pharmacies are once again carrying over-the-counter homeopathic remedies. Homeopathic physicians such as naturopathic doctors are essential for best results in treating serious illness, and for advice on combining homeopathic products with other medicines. Homoeopathy both for drainage, immunity and for removing inherited taints is invaluable. It also has an important role in neutralizing industrial toxins. Medicines indicated below have special affinity on particular organs:

Acetic acidicum – stomach cancer.
Acidum hydrocyanicum – lung and skin cancer.
Acidum lacticum – breast cancer.
Aloe socotrina - colorectal cancer.
Arsenicum (Metal) album 30 – eases passing into spirit, breathlessness.
Arsenicum iodatum – cancers of the skin and urinary tract. radiation burns.
Arsenicum bromatum – melanoma and squamous skin cancers.
Asteris rubra – breast cancer.
Aurum muriaticum – oral cancer – cheeks, tongue, palate, and cancers of the ovaries, uterus and cervix.
Aurum muriaticum natronatum – cancer of the ovaries, uterus and cervix.
Baryta carbonicum and Baryta iodatum - cancer of the brain and of the lymph glands.
Bismitum – pharyngeal, esophageal and stomach cancer.
Cadmium sulphuratum. - cancer of the stomach or pancreas.
Calcarea carbonica – constitutional for the bones.
Carcinosum 200/1M - cancerous history in the family.
Ceanothus americanus – cancer of the spleen, pancreas, liver, and leukemia.
Chaga – EMF stress.
Chelidonium majus – cancer of the liver or gallbladder.
Cobaltum metallicum 30 - cancer of the lungs.
Cholesterinum - liver cancer.
Condurango - cancers of the stomach, axilla, oesophagus; painful cracks in corner of the mouth.
Conium maculatum - breast cancer.
Gallium aparense – tongue cancer.
Graphites – duodenal and pylorus cancer; scars.
Hekla lava – cancer of bones.
Hydrastis canadensis – cancers of stomach, pancreas, and upper GI tract.
Kalium chloratum – kidney damage from chemo.
Lachesis mutans – cancers of the ovary, uterus and cervix.
Leptandra – cancer of the head of the pancreas.
Lilium tigrum - cancers of the ovary, uterus and cervix.
Lycopodium – leukaemia, lung and liver cancer.
Nitricum acidicum – rectal cancer.
Ornithogalum umbellatum – stomach cancer.
Phosphorous - cancer of the pancreas and of the bones; ATP production; AEs of anaesthesia.
Phytolacca decandron – cancers of the breast and parotid gland.
Plumbum iodatum – brain cancer.
Pulsatilla nigricans – cancers of the breast, ovaries, uterus and cervix.
Ruta graveolens – rectal cancer.
Sabal serrulata – prostate cancer.
Scrophularia n.- breast cancer, Hodgkin’s lymphoma.
Sepia - cancers of the breast, ovaries, uterus and cervix.
Silicea 30 - to expel poison from the affected lesion. Immune system support.
Symphytum officinalis – bone and blood cancers.
Taurox - carbobenzoxy beta-alanyl taurine, hommachord of 3X, 6X 9X potencies – dose morning and noon.
Down-regulates IL-6 and Th2 say reputable naturopathic oncologists, in 3 - 6 weeks of use.
Terebintha – bladder cancer.
Thuja occidentalis -. Cancers of the skin, brain, kidney, stomach, colorectal, testicular, breast, prostate and leukemia; of head and neck, especially squamous carcinomas or papilloma warts, scars.

PSYCHOLOGY

“…not one single person has ever truly healed from cancer without undergoing a transformation and healing of their inner self.”

Jeremy Geffen, MD  The Journey Through Cancer

No matter where in the physical body cancer occurs, it makes a wound on the heart and the mind. Life changes with a diagnosis of any life-threatening disease. An existential challenge arouses primal defenses at all levels of our being. The response to the threat of cancer should be a realization of a need for significant change, a willingness to act, an application to self-help strategies, and achievement of quality experiences in the new modes of being.

Traditional Chinese Medicine is based on the Taoist philosophy of *living in harmony with Nature*, including adjusting lifestyle to changing seasons or circumstances. Naturopathic Medicine is based on a philosophy of *living*
in harmony with our own Nature – respecting our genetic individuality, supporting the natural processes that give us health and life, and helping a person to be true to their own way and being. Naturopathic doctors utilize the forces of Nature that support healing of the mind, body and spirit. Each of these realms contributes to a cancer patient’s cancer journey and survivorship. Every experienced physician knows that a lot of patients in their practice are expressing physical illness related to psychological and emotional factors. These are aspects of the mind, which is seated in the brain, but is most likely non-local. Everybody has complex thoughts and feelings based on prior learning, imagination, hormonal balance, nutritional status and culture. These can become imprinted into the physical body – we say “Issues get into the tissues”.

Every patient with cancer filters their experience through their culture, spiritual beliefs, prior learning, imagination, and unique consciousness. They weave a story to evaluate possible future events, and to create meaning out of the disorder. This subjective realm has potent effects on outcomes.

Social roles are impacted with a diagnosis of cancer and cancer treatment related symptoms such as fatigue, hair loss, disfigurement, scarring, adhesions, congestive heart failure, infertility, dental issues and sexual dysfunction. Family ranking, gender-defined roles and household duties may be altered. Financial stress often adds to the burden. There can be worries about reoccurrence, anxiety about becoming a burden to loved ones, and nameless fears. Angst can affect social, spiritual, marital, employment, vocational and cognitive functions. Depression can follow anxiety in many people living with cancer, and also impact people living with them.

Depression has been found to increase risk of breast cancer by 42%. In turn, cancer often elevates levels of interleukin six (IL-6), triggering cognitive dysfunction and depression. Another pro-inflammatory cytokine which is elevated in depressed patients is tumour necrosis factor alpha TNFα.

The stress hormone adrenaline (epinephrine) protects cancer cells from dying by apoptosis. Adrenaline activates PKA and BAD phosphorylation, increasing tumourigenesis. This also blunts the efficacy of chemo and radiation therapies induction of apoptosis. Learning to relax is a bona fide cancer therapy.

Grieving starts the moment the patient hears the word “cancer” from their doctor. People tend to go into denial, then anger, bargaining, depression and helplessness, before they can emerge with some resolution. It is normal to fear death, loss of control, pain, weakness, medicalization of one’s life, social ostracism, financial loss, and so on. It is important to address these concerns, give stress-busting techniques to relieve anxiety, and clarify a person’s self-image.

Studies show what people really want from their care-givers:

- non-heirarchical, integrative and collaborative relationships, particularly with doctors
- to have their expectations, goals and treatment priorities heard
- flexible scheduling of care
- value for treatment cost
- holistic patient-centered care

Patients who become ENGAGED with their own healing take responsibility for their lifestyle, emotions, and spirit. They change the things they can, and accept what they cannot. This creates serenity, and from this place all challenges can be seen as opportunities to grow and do better at extracting a meaningful life from their existence.

Biochemistry and Pathophysiology of Distress

There have been a number of studies that have found correlations between emotional states and specific cancers and that have been able to link the progression of cancer to stress and other psychological factors. For example, depression has been found to increase risk of breast cancer by 42%. In turn, cancer often elevates levels of interleukin 6 (IL-6), triggering cognitive dysfunction and depression. IL-6 has also been linked to an increased risk of metastasis. Another pro-inflammatory cytokine which is elevated in depressed patients is tumour necrosis factor alpha TNFα. TNFα is involved in angiogenesis, immune function and apoptosis.

The stress hormone adrenaline (epinephrine) stimulates tumourigenesis. Adrenaline activates phosphorylation of kinases involved in growth signal transduction from the cell surface receptors to the nucleus. This stress hormone
increases kinase PKA, which regulates sugar and fat metabolism, and BAD apoptosis regulator protein. As a result, cancer cells get more food and cannot die. Adrenaline also blunts the desired induction of apoptotic cell death by chemo and radiation therapies. Learning to relax is turning out to be a bona fide cancer therapy.

Cancer incidence, progression and mortality is linked to circadian rest/activity cycle disruption. Having a lifestyle that is out-of-sync with the circadian rhythm is associated with disturbances with the pineal gland hormone melatonin and the adrenal gland stress hormone cortisol which in turn increases a person’s risk in the following ways:

- unmitigated stress flattens the daily diurnal peaks of the adrenal stress hormone cortisol
- cortisol alters melatonin rhythm
- melatonin deficit from shift-work, and melatonin antagonists increase cancer risk
- melatonin improves cancer survival two fold

The hypothalamic pituitary adrenal (HPA) axis modulates glucocorticoid signalling. The adrenergic system can affect cancer biology by promoting tumour growth, invasion, angiogenesis, and ultimately increasing metastatic potential. Sympathetic nervous system (SNS) pathway mediates downstream effects through modulation of adrenergic signalling. Adrenergic signaling enhances glucocorticoid receptor (GR) stability and binding to DNA. In turn glucocorticoids increase the expression and affinity of beta-2 adrenergic receptors and prevent their down-regulation. Activation of the glucocorticoid receptor in estrogen receptor (ER) negative breast cancer cells has been shown to promote cancer cell survival and growth.

A strong adaptive immune response in patients with ovarian cancer has been linked to improved survival, but it is known to be impaired by active immune-suppression within their malignant tumours. Compared to those with benign ovarian neoplasms, epithelial ovarian cancer patients showed marked elevations in unstimulated and tumour-stimulated type-2 responses such as ascites and tumour infiltration by lymphocytes. Depressed and anxious mood were both associated with significantly altered cytokines IFN gamma and IL-4. This signifies greater impairment of adaptive immunity in peripheral blood and in the tumour microenvironment among ovarian cancer patients compared to those with benign tumours. A common immune-suppressant elaborated by tumours is transitional growth factor beta-1 also called transforming growth factor or TGF. This keeps immune cells in repair mode, which supports tumour growth, and prevents them from going into attack mode against the cancer.

A person’s support network has been found to be strongly correlated with survival. Those patients who lack a significant social support network are particularly vulnerable when cancer occurs. Patients who report a poor level of social well-being and support show higher pre-surgical levels of the angiogenesis cytokine VEGF. From a biochemical perspective, norepinephrine has been found to be reduced in those who have a good social support and it has also been linked to modulation of angiogenesis.

Greater forgiveness significantly correlated with better immune function, as indicated by higher CD4 cell percentages.

Talk Therapy as an Effective Cancer Therapy

The rational and scientific evaluation of psychosocial interventions in cancer is in its infancy. Clearly measures which will be useful will have to have potent psychogenicity, the ability to stimulate lasting and major change in the thoughts, moods, habits and lifestyle of these cases. Ideally, the response to the threat of cancer is a realization of a need for significant change, a willingness to act, an application to self-help strategies, and achievement of quality experiences in the new modes of being.

Shock seems to be the most common reaction when a patient hears the word “cancer” from their doctor. Shocked patients may feel a range of emotions from relief to grief reactions, including denial, anger, bargaining, depression and helplessness.

It is normal for cancer or any life-threatening disease to provoke fear of death, loss of control, pain, weakness, medicalization of one’s life, social ostracism, financial loss, and so on. It is important to address these concerns, give stress-busting techniques to relieve anxiety, clarify a person’s self-image and give hope. A medical oncologist once remarked that he was apparently unique among his medical colleagues in that he could say the word “hope” without putting “false” in front of it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one’s internal pharmacy in synch with prescribed therapies. A patient does not have to accept pain, abandonment, suffering or giving up being productive only because the future is uncertain. Hope is just having faith in good outcomes, and what people accept as a good outcome is usually just that they will have some dignity, some control, and be able to handle what will be.

*Cancer can be a doorway to change – either out of this world or into a new lifestyle.* It is natural to be wary of change. We do not always welcome the effort and losses involved in making a change. Still, it is human nature to try to see meaning, to find the lesson, to grasp that silver lining in the dark cloud. A reminder of our mortality can bring profound meaning back into the lives of patients and their families.

Lawrence LeShan was a psychologist working at the prestigious Revici cancer hospital in New York. Most of his patients there were terminal cancer cases, so he witnessed a lot of death and grief. Distraught at the relentless toll of cancer, despite his diligent care, after several years he suffered a breakdown. He took a mental health sabbatical, which resulted in completely reframing his approach. He assumed that it is quite rational for patients with cancer to have anxiety and depression. They were therefore not neurotic or crazy, so he reasoned that he had no need for psychotherapies oriented to those mental illnesses. Rather than looking for psychological defects and trying to fix them, he advocated restoration of emotional and creative expression. He found people with cancer had often lost a main emotional focus in their lives, and had lost hope of finding any satisfactory substitute. He asserted that patients with cancer need to learn how to live fully - as he puts it, “love, laugh, play, learn, sing praises and exercise”. He had remarkable success by helping them design a re-vitalized life providing meaning, authenticity, enthusiasm, zest and fulfillment. He has documented durable cures of “terminal” cases with this positive, existential psychology. LeShan made each patient feel the great joy in being true to their own way and being.

LeShan, Booth, Thomas and others have described a cancer personality profile. There is a tendency to value and live through others, with most thoughts and activities being outwardly directed. “Type C” behaviour pattern is associated with higher risk of developing cancer, and a less favorable course of the disease. Patients with this coping style:

- rarely express anger, anxiety, hostility, fear, resentment or sadness.
- inwardly experience despair, hopelessness, self-loathing, and a loss of reason to live, goals and dreams.
- are unassertive, appeasing, yielding and very cooperative.
- tend to be overly concerned with meeting the needs of others, and do not put their own needs forward.
- suffer fear of rejection which creates isolation.
- fear emotional relationships are dangerous and doomed.
- feel they can be themselves, or be loved, but never both.
- cancer may be provoked by the loss of a crucial relationship (brittle object relationship).
- may often feel the only way out is death.

Carl O. Simenton is another pioneer in psycho-oncology who has demonstrated clinical efficacy. (Simenton, 1992) He demonstrated circa 1969-1977 he could double survival time of *terminal* cases, meaning those expected to die within six months. In fact 40% were still alive at two years. Foundations of his approach are the following:

- accept responsibility, participate in your own recovery.
- forego benefits and secondary gains of illness.
- relaxation, visualization, inner guide - IF YOU CAN WORRY, YOU CAN DO IMAGERY!
- overcoming resentment.
- coping with fears of recurrence, death, pain.
- goal setting.
- family support system.
- physical exercise.

He and others have shown there is real survival value in positive affirmations, meditation, creative visualization, peer support, professional psychological facilitation, and therapy. Other de-stressing techniques may include yogic belly breathing, skin temperature biofeedback, and autogenic progressive relaxation.
Louise Hay is a lay person who has popularized Simenton’s approach of positive affirmations. Drawing from her own recovery from cancer, she believes that positive language is powerful, and if attached to feelings of success and recovery, it can be healing. It is very easy to do, as she has demonstrated in many self-help books.

Gabor Maté, MD, a prominent contemporary Canadian author and lecturer, has an extensive background in treating addictions, mental illness, and in palliative care. These intense experiences have given him insights into the connection between emotional and psychological stress and health. In several published works he gives importance to childhood exposure to abuse, neglect, trauma or violence as destabilizing forces on personality development. Dr. Maté has written a brilliant book entitled “When the Body Says No – understanding the connection between stress and health”. He believes that the patient who cannot say no to what they do not want is at higher risk of morbidity and mortality across the disease spectrum. His position is that if we do not know our own needs and identity, we cannot discern when to say no, to avoid being exploited or hurt. This has implications for obtaining informed consent to therapies. He has determined that we do not have to consciously perceive stress and emotionality for it to hurt us physically. He postulates that the physical body will say no, by introducing disease, when mental or emotional afflictions prevent us from being self-protective. His position is that if we do not know our own needs and identity, we cannot discern when to say no, to avoid being exploited or hurt. We unfortunately do not have to consciously perceive stress and emotionality for it to hurt us physically.

Pain and suffering are highly subjective experiences, with strong inputs from the cerebral cortex. How noxious a signal is depends on how threatening we find it, cultural contexts, and many other perceptions and beliefs. Pain may be more easily borne by a patient who feels hopeful in facing a challenge, compared to another whose thoughts dwell on what is lost and what is threatened by their disease. Hope is not something to avoid arousing, it is essential, for the physical therapeutic value as well as for psychological well-being. There is an opportunity for growth in every challenge, and it is quite necessary to look at all emotions and problems, and take the time to live through some processing. People who come to embrace and feel good about their cancer therapy tend to have far less side-effects than those who fear it and have morbid expectations. Anxiety and depression set a patient up for a poorer response and more harm from chemotherapy, such as anticipatory nausea.

Distress is common among cancer patients, especially those undergoing chemotherapy. Skill in stress management is associated with lower levels of anxiety and depression and better overall mental quality of life. Common de-stressing techniques include ‘mind-body’ techniques such as yogic belly breathing, skin temperature biofeedback, autogenic progressive relaxation, compassionate heart-focused meditation, journaling music and art.

Cognitive Behavioural Therapy (CBT)

Cognitive behavioural therapies (CBT) are a very useful, efficacious and practical non-drug intervention in many medical conditions. Integrative oncology practitioners refer to trained grief counselors at hospice, and to psychotherapists for hypnotherapy or CBT. A successful cognitive therapy for clinical anxiety is Time-Line Therapy. Patients are rapidly guided to revisit and reframe past experiences, but with their present maturity and dispassion. It is primarily a mental exercise, without lengthy retelling of the story, or emotive discharges. The patient however often releases the emotions of the event by putting it into a much larger perspective of their life, and even their gestation time and the influences of their parents or ancestors.

Cognitive-behavioral therapy is an evidence-based treatment readily adapted to address realistic concerns related to having cancer, such as worries about disease progression, disability, and death, targeting skills for relaxation, coping with cancer worries, and activity pacing. Adults with incurable malignancies and elevated anxiety who received at least five of the required six CBT sessions significantly decreased their anxiety. (Greer, 2012)

Dr. David Burns, MD has contributed a book and work-book on mood therapy which address cognitive distortions behind pessimism. The beneficial effects of CBT appeared to be sustained for cancer patients experiencing depression. Good psychotherapy opens up a person to new expression of their physical, psychological and spiritual selves. Patients who truly become engaged with their own healing take responsibility for their lifestyle, emotions, and spirit. They change the things they can, and accept what they cannot.
Mindfulness

Mindfulness is emerging as a key coping strategy. Mindfulness is a secular approach to meditation, and being aware of one’s physical as well as subjective states of being. Mindfulness-Based Stress Reduction (MBSR) typically involves yoga, meditation and non-judgemental awareness of the present. The first to advance this approach as clinically efficacious was the clinical psychologist Jon Kabat-Zinn of the University of Massachusetts, who carries on his work there at the Center for Mindfulness in Medicine, Health Care and Society.

In breast cancer populations MBSR has been associated with positive experiences such as calmness, connection, awareness, acceptance, and confidence. Patients report coping better with stress, anxiety and panic; being less judgemental of themselves and others; improved communication and personal relationships, taking more time and making more space for themselves. An eight-week group based MBSR intervention for women with breast cancer had clinically meaningful, statistically significant effects on depression and anxiety after 12 months’ follow-up, and medium-to-large effect sizes.

Support groups

Patients can easily become conflicted between the principles of social self-sacrifice versus the drive to seek care. Many have been raised with an aversion to selfish acts, and find it hard to navigate the boundary between being genuinely needy on account of illness, and being demanding or self-centered. It seems it helps to know that others are feeling the same things. Empathy, emotional contact and respect from peers can improve a person’s self-understanding, self-acceptance and self-appraisal. With the will to live, to fight for life, comes restoration of emotional outlets, and inner growth, even in the face of physical catastrophe. This sets the stage for healing of anxiety, despair and disappointment. As Gottard Booth says “Illness is a reminder of the purpose of life.”

Family members are often the most important source of social support for cancer patients. Long-term health-related quality of life (HRQL) study demonstrated that anger control had a positive relationship with perceived partner support. Habitual inhibition of anger showed a negative correlation with partner support. Analyses by gender revealed some clear differences. For the male patients, the wife's high level of anger expression was significantly positively related to patient mental HRQL, whereas for the female patients, their husband's anger expression was negatively correlated with the patient's mental HRQL. The anger expression styles of patients and their partners clearly modify the family atmosphere, and together are important determinants of the long-term quality of life of the cancer patients. Interventions for couples facing cancer should include a focus on mutually acceptable ways of dealing with anger and thereby support dyadic coping with cancer.

Psychotherapy can be beneficial for advanced cancer patients near the end of their lives. Although psychosocial care has been regarded as central to palliative and supportive care, there have been few empirically tested approaches to individual intervention. A brief manual was printed of a new psychotherapy referred to as Managing Cancer and Living Meaningfully (CALM). Three to six CALM sessions based on the manual were associated with profound and unique patient-identified benefits and no patient-identified risks or concerns. A qualitative study suggested that the CALM intervention provided substantial benefits for patients with advanced cancer prior to the end of life. Five interrelated benefits of the intervention regarded by participants as unique in their cancer journey were:

- a safe place to process the experience of advanced cancer.
- permission to talk about death and dying.
- assistance in managing the illness and navigating the healthcare system.
- resolution of relational strain.
- an opportunity to ‘be seen as a whole person’ within the healthcare system.

Expressive therapies

The old term “placebo response” is now being called a “meaning response”. People heal when they find meaning in their life. When they express their inner selves, they can remember love, speak their truth, and move into a still and
sacred place where they co-create a reality where they are kind to themselves and all others. Expressive therapies such as journaling, music or art help modulate neuro-endocrine-immune parameters.

Art therapy may connect the subconscious to the outer world and reveal the inner journey. Art forms such as music, dance, drawing, painting, or any chosen medium allows some individuals to bring forward emotions and express experiences, advancing them towards resolution and integration.

The keys to recovery from afflictions of mind and soul are:

- the proper perception and expression of anger
- the ability to forgive
- reaching out for social support
- practicing an attitude of gratitude – change “I have to…” to “I get to…!”
- cultivating laughter, joy and hope.

Empathy, emotional contact and respect from peers can improve a person’s self-understanding, self-acceptance and self-approval. With the will to live, to fight for life, comes restoration of emotional outlets, and inner growth, even in the face of physical catastrophe. This sets the stage for healing of anxiety, despair and disappointment.

My favorite tool is a CD of relaxation and visualization exercises called Remembered Wellness by my dear colleague Dr. Theresa Clarke, MD, Chief Medical Officer of Inspire Health clinic www.inspirehealth.ca.

**The Ten Tools of Triumph for Survivors**

Stay 100% present. We must not let our minds race ahead of us, imagining all manner of horrific outcomes. We must remain as calm, composed and lucid as we possibly can. That may be extremely difficult under the circumstances, but we cannot afford to waste priceless energy and time falling into fear. We may have little time left. We must make that time count – to its maximum. That means staying completely in the here and now.

Ignore all predictions of doom. No one can predict the future. When we hear frightening news from a reputable source such as a doctor, we are conditioned to believe what we hear. But health forecasts, like all forecasts, can prove to be inaccurate. The first thing we must do is decide what we are going to believe. If we choose life, we must see the cup as half full rather than half empty. We must believe there is still the potential for survival. This is not denial, it is determination. And it is the first manifestation of a survivor’s greatest single asset: hope.

Silence your mind. Cancer treatment and recovery is emotionally and physically grueling. The psychological stress of living on the edge is intense. It is essential that we regularly escape, re-energize and rekindle our resolve. That way, we can return to the climb stronger and more effective. But because we cannot always physically change our surroundings, we need to be mentally able to change locations. Retreat into silence.

Take charge. Every moment that follows disappointing news offers an opportunity to take control. We can arm ourselves with valuable information, decide what treatment we wish, who is going to deliver it, how and when. We can commit to taking charge of ourselves and our care. An effective plan can lead to effective action, which can lead to an effective outcome – but only if we first think rationally and act decisively to develop that plan. Action is the greatest antidote to fear. Take it.

Focus all your energy on getting better. It has been said that “Where focus goes, energy flows.” As energy is the most precious resource survivors have, we must be absolutely militant in our use of it. We must dispense it with the greatest discretion. That means balancing outside commitments and personal health in a whole new way. It also means learning to temporarily say no to the needs and wants of some others and putting our needs and wants first. Our lives depend on it.

Decide to be a survivor. We are not cancer patients. If we are alive and living with cancer, we are survivors. We must say it, and keep saying it. And we must do everything in our power to think, act and live like a survivor every day. This will not guarantee we will survive, but it will maximize our chances of doing so. To become who we are capable of becoming, we must live like we already are that person. We are survivors, period.
Patch into the power of your personal purpose. The German philosopher, Nietzsche, wrote that human beings can endure almost any how if they have a why for which to live. In other words, the greater our reason to live, the greater our chance of survival. The strength of our will to live is directly proportional to the strength of our personal purpose. Aside from hope, that purpose is the single greatest asset we have. It can become a beacon that guides us back from the edge. We must know why we want to live - and always remember it.

Measure success by effort, not outcome. Cancer is not about winning or losing. Death is not defeat. Dishonor may be. The only way to dishonor ourselves is to fail to make one hundred percent effort. Giving it everything we have means maximizing our quality of life for whatever time we have left. Quality of life, and just as importantly, quality of effort, is more important than quantity of life. If our effort is absolute, we will be triumphant no matter what the outcome.

Will yourself to move. Treatment can be physically debilitating. It can steal away your energy and leave us devoid of life and enthusiasm. But if we are to climb back, we must move. We must overcome our own inertia and sometimes, even our desire to rest. Time does not heal all wounds – we must heal our own by forcing our bodies into motion. The first step takes place in our minds.

Make essential changes in your life. Cancer is not a death sentence. It is a call to life – a wake-up call. It demands we re-examine our lives and make vital changes. If we do not, we risk returning to illness. There is no guarantee we can prevent cancer from recurring. But for whatever time we have left, we must decide what matters and what does not, what is crucial and what is optional. Change after cancer is not optional. It is essential.

The Ten Tools of Triumph for Caregivers:

Care for yourself first. If we do not care for ourselves we cannot be there to care for our loved one. Caring for ourselves can be as simple as taking a five-minute rest break, going for a walk, making sure we eat properly and sleeping in our own bed each night. Do it – every day.

Put your fears aside. We will be given statistics and a prognosis that may not be encouraging. We must decide that we are going to be on the positive side of the numbers. If there is no positive side, decide we are going to be the exception. Visualize a positive outcome. Look to other survivors. Read success stories. We must surround ourselves with hope.

Manage your mind. Beware the “Whatifs/” our minds can endlessly imagine. They will drain our energy and clutter our minds so we will be unable to process all the information coming at us. We must stop our minds from spinning by using whatever technique works for us – meditation, music, playing with our children, reading a book. A quiet mind is a clear mind. It is also a more productive and effective one.

Expect the unexpected. Change is challenging. The new drugs, treatment methods, tests, unexpected setbacks and continuous uncertainty can wear us down. We must embrace this uncertainty and adapt to it as best we can. It is part of the experience. Concentrate only on what we can control and let everything else go.

Celebrate what you have. At the end of each day, we must think of something for which we can be grateful. It could be something as simple as a smile from a friend or a snowflake on our tongue. Whatever it is, celebrate it – and remember it.

Pace yourself for the long run. Cancer is a long-term illness. The caregiver has to conserve energy to endure the journey. If we give too much too early, we will not have enough left later. So we must find our own pace and stick to it. If we put in a very long day, we must try to make the next one shorter.

Ask for assistance. Asking for help is not a sign of weakness. It is a sign of strength. It allows us to manage a demanding situation and build a support team around us. Ask for help from friends and family, but most importantly, seek psychological assistance from professionals. We cannot do it all if we ant to be effective.
Insulate yourself against anger. Anger is part of the experience – for both caregiver and survivor. If it is directed at us, remember it can be a byproduct of medications, sleeplessness, frustration and fear. Deflect it by understanding that its true target is the illness, not us. Stand tall.

Adapt to your changing role. Most of us define ourselves by what we do, and we are comfortable in those roles. But when our roles suddenly change, we can be thrown off balance and struggle to find our equilibrium. Our new role as caregiver must take priority.

Support, don’t smother. We will want to do everything we can for our loved ones, but it is possible to do too much. If they feel they are losing independence, resentment can build. Know when to back off. Ask them if they want help before giving them any. Allow them to do what they can for themselves. Stand strong apart and together.

From: Climb Back from Cancer – A Survivor and Caregiver’s Inspirational Journey. Cecilia and Alan Hobson - Everest summiteer and cancer survivor and his partner. See www.alanhobson.com “Ten Tools of Triumph” is a trademark phrase and this excerpt from his book is copyrighted material. Not to be reproduced without the author’s permission.

SPIRITUALITY

“If you want to keep your little light shining in this world you need to follow the path that it illuminates – be true to your own way and being.” - Neil McKinney reflecting on an Usui Reiki precept.

Spirituality is a dimension of life which is given great importance by some of our cancer patients, and they look for spiritual support as a dimension of their cancer care. Because it is a life-and-death struggle to overcome cancer, for many it is seen as a spiritual process. Treating this “ghost in the machine” is not an area of expertise of most medical practitioners.

A diagnosis of a life-threatening disease can create a sense of hopelessness. Stress is lessened by reasserting personal control, taking action, rather than feeling helpless. Mortality is a fact, but how to live out a life is definitely not pre-determined.

The keys to recovery from afflictions of mind and soul have been associated with:

- the proper perception and expression of anger
- the ability to forgive.
- reaching out for social support
- practicing an attitude of gratitude
- changing “I have to…” to “I get to…!”
- cultivating laughter, joy and hope.

It appears to be a healthy practice to be content with being who, what and where you are. The spiritual positivist outlook is that joy, gratitude and love are healing to the spirit, whatever the state of the physical body may be.

A terminal diagnosis means a person has time to prepare for their death. Resolution of conflicts and the giving and receiving of forgiveness can be seen as possible gifts.

Larry Dossey, MD has written extensively on the non-locality of consciousness and has taken on the controversial subject of prayer and faith as sources of healing. He has assembled the available evidence for personal values and beliefs as determinants of outcomes. Religious communities provide fellowship and a forum for spiritual practices and prayer, which may reduce loneliness, isolation, abandonment and many other negative experiences that impact enjoyment of life.

“…praying more prayers of gratitude and fewer prayers of supplication…is the proper response on realizing that the world, at heart, is more glorious, benevolent, and friendlier than we have recently supposed.” Larry Dossey, MD
Religious faith, prayers, rituals and spiritual practices are coping mechanisms that have been positively associated with better outcomes. People who believe in a higher power, and particularly those who practice their faith or religion actively, have measurably lower rates of complications, less need for medications, and tend to survive longer with more quality of life. People of faith tend to feel peace, assurance, meaning and well-being which allows them to embrace life. Faith in an afterlife or spiritual survival does correlate with an increased fighting spirit seen in cancer survivors. They fear death less, yet fight to survive more.

Many patients find religion to be an effective coping mechanism, offering them strength, comfort and hope. A study emphasized the need for including a ‘religious time-out’ before and after surgery and the offering religious leaders/groups to ensure quality care and patient satisfaction.

The Cochrane Reviews have analyzed multiple studies on intercessory prayer that treatment teams had added to health interventions; however, the reviewers could draw no conclusions about the efficacy of prayer because the studies showed either positive or no effects and used different endpoints and methodologies. An RCT had an external group offering remote Christian intercessory prayer to cancer patients. The intervention group showed significantly greater improvements over time for the primary endpoint of spiritual well-being, emotional well-being, and functional well-being.

Wholistic care may come around again to the old therapy of contact with a green, natural environment. A study of integrated medicine showed benefit to cancer patients from a program of walks in the forest, growing a vegetable garden, yoga, meditation, and support group therapy. Sessions were conducted once a week for 12 weeks. There were significant differences in functional well-being and spiritual well-being. This program improved quality of life, reduced cancer-associated fatigue and increased natural killer cell activity.

I do not believe there can be “false hope”. I believe despair and fear to be false emotions. A wise man once said “Fear is faith in evil”. Even in the face of great losses, people with hope and faith will find comfort and protection from the fact that they fear no evil.

**Fear is faith in evil -  Hope is faith that what is good will triumph.**

Place your faith in something positive. Hope is life-enhancing on a daily level, and many people also have hope concerning a possible eternity. A diagnosis of an incurable disease can create false hopelessness. Stress is lessened by reasserting personal control. Doing “everything that can be done” just feels better than giving up.

A patient does not have to accept pain, abandonment, suffering or giving up being productive only because the future is uncertain. A reminder of our mortality can bring profound meaning back into the lives of patients and their families.

A terminal diagnosis means a person has time to prepare for their death. Resolution of conflicts and the giving and receiving of forgiveness are possible gifts.

Religious faith, prayers, rituals and spiritual practices are coping mechanisms positively associated with better outcomes. People who have faith in a higher power, and particularly those who attend church or practice their religion actively have measurably lower rates of complications, less need for medications, and tend to survive longer with more quality of life. People of faith tend to feel peace, assurance, meaning and well-being which allows them to embrace life. Faith in an afterlife or spiritual survival does correlate with an increased fighting spirit seen in cancer survivors. They fear death less, yet fight to survive more.

Prayer is easy. You don’t have to have any particular faith, just a willingness to express your heart-felt desires. You can ask for or just reflect on love, gratitude, protection, guidance, surrender, forgiveness, inspiration, peace, and blessings. You can also ask for these blessings for anyone you can imagine! By practicing the Buddhist art of Loving Kindness you can enter into a mindfulness that engenders compassion and a natural equanimity.
Greater forgiveness significantly correlated with better immune function, as indicated by higher CD4 cell percentages. Simple mind-body techniques may include compassionate heart-focussed meditation, journaling, or breathing exercises.

As Gottard Booth says in *The Cancer Epidemic*, “Illness is a reminder of the purpose of life.” Rabbi Zusia said it best: “When I die, God will not ask me why I was not Moses. He will ask me why I was not Zusia.” We all have a chance here to let our little light shine, every day. That is all we actually should be concerned with.

There really is a silver lining in every cloud. There is an opportunity for growth in every challenge. People who embrace and feel good about their cancer therapy tend to have far less side-effects than those who fear it and have morbid expectations. Anxiety and depression set a patient up for a poorer response and more harm from chemotherapy.

Pain is much more easily borne by a patient who feels hopeful in facing a challenge than one whose thoughts dwell on what is lost and what is threatened by their disease. Hope is not something to avoid arousing, it is essential, for the physical therapeutic value as well as for psychological well-being. As Buddha said, “pain is inevitable, but suffering is optional.”

A weekly support group and self-hypnosis for pain was associated with doubling of life-span in advanced stage IV breast cancer, ovarian cancer and melanoma. This work by Spiegel from 1989 has not been confirmed in subsequent studies, but certainly quality of life improves, if survival does not.

To be filled with **joy, gratitude and love** is to be healed, whatever the circumstances of the physical body.

The old term “placebo response” is now being called a “meaning response”. People heal when they find meaning in their life. When they express their inner selves, they can remember love, speak their truth, and move into a still and sacred place where they co-create a reality where they are kind to themselves and all others.

**REIKI HEALING**

Healing Touch, Therapeutic Touch and Reiki are ‘energy therapies’ which have been found to be helpful in symptom and distress reduction by integrative oncology nurses. Healing touch and Therapeutic touch are now common in nursing practice, and Reiki is now being used in hospices as well as clinics. These modern reinterpretations of ancient healing practices have been shown to provide relief of pain, anxiety, including bringing increased peace and comfort at the end of life. Also, improvements were seen in sleep onset and duration. There were improved biophysical markers such as reduced blood pressure, improved heart rate, decreased cortisol, and increased natural killer cells.

Reiki means “spiritual blessing”. Reiki is the laying on of hands in a traditional manner to provide the receiver with the healing life energy The Reiki practitioner directs this healing energy to a specific part of the body or the entire body.

Some studies show Reiki was helpful in improving well-being, relaxation, pain relief, sleep quality and reducing anxiety and fatigue in cancer patients. As well as being calming, they can at times be transformative experiences, and evoke deep emotional processing.

Reiki is compatible with all other modalities of healing - traditional and alternative. It is not a religious practice. Reiki is safe, gentle and easy for all ages. You need only to relax and accept the healing energy. Your clothes remain on during your treatment. The energy offered is a blessing of universal spiritual energy which is directed by the Reiki therapist. It is not a personal energy from the Reiki practitioner. They are at most just a conduit.

All you need to do as the receiver is feel the relaxation, experience peace, safety, well being. Let your body accept the blessing of healing energy, balance and wellness.
A Reiki session is about one hour. Most folks will relax totally, even fall asleep, allowing this intelligent energy to work within the body, where ever it is needed. Your session will support your body’s natural ability to heal. Often emotions are released with the treatment, which is quite normal and very beneficial.

The laying on of Reiki hands is a natural, powerful and effective healing tool and one of the easiest to include into life. It can activate the inherent healing power that is in all of us, re-balancing the body, mind and spirit.

I have experienced and witnessed many profound healings with Reiki, and recommend it for every cancer patient.

I also encourage people to explore the simple spiritual practices and precepts of the Reiki practitioners, which allow them to offer this blessing of Spirit, regardless of their religion or belief system.

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**OXYGEN THERAPIES**

**Ozone** (O3) is a highly reactive form of oxygen which increases tissue oxygen levels. I have made clear my scorn for the wide-spread myth that oxygen somehow kills cancer cells on contact. However ozone we breath is two oxygen atoms joined together O2, and ozone O3 is a little different. Ozone can release singlet, unbound oxygen. This singlet oxygen is highly reactive. Ozone can kill viruses, and perhaps cancer cells.

On contact with ozone the red blood cells release 2,3-DPG, which shifts the oxygen disassociation of hemoglobin. Usually the hemoglobin protein will give up 1, and only rarely 2 of the 4 oxygen O2 molecules it carries. The ozone-DPG reaction releases all 4 oxygen molecules. High tissue oxygen improves tissue healing and immune response to infections.

Ozone up-regulates the immune system if given in low doses, increases superoxide dismutase (SOD), increases catalase, and detoxifies the liver. Ozone is radio-sensitizing.

Ozone is known to help with viral hepatitis. Immune cells fight viruses better when well-oxygenated. Viral associated cancers include cervical, lymphoma, leukemia, prostate, naso-pharyngeal, head and neck.

Ozone gas may be insufflated into the rectum. It may also be bubbled through 50 to 100 ml of blood which is then returned to the body (autohemotherapy). Another popular method withdraws up to 80 ml of blood and irradiates it with ultraviolet-B light, then returns it to the vein oxygenated, charged and activated.

**Hydrogen peroxide** (H2O2) is used orally, or intravenously at 0.03%, and has significant risks. Hydrogen peroxide, even that produced by our own macrophage immune cells, permanently inactivates our NK immune cells - which we need to kill cancer cells. Dark field microscopy suggests peroxide may trigger very dangerous changes in the blood. I do NOT recommend H2O2 as a cancer therapy.

I do recommend oral food grade hydrogen peroxide for gut infections with anaerobic bacteria such as *Clostridium difficile*, responsible for antibiotic-induced pseudo-membranous colitis.

We can get hydrogen peroxide to form selectively in cancer cells, but not in healthy cells, with intravenous vitamin C drips. This is the sensible way to use hydrogen peroxide in oncology!

**Hyperbaric oxygen** therapy (HBO2T) is breathing of 100% pure oxygen at elevated pressure to super-saturate the body with oxygen, and force it deep into cells. Ordinary air is about 21% oxygen, but it is the pressure, not just the concentration of oxygen, that makes this therapy so powerful. Tumours do use fermentation to make energy without oxygen, but also burn fats and carbohydrates with oxygen. They are NOT poisoned by oxygen as some people suggest. Some have also suggested HBO2T would increase tumour growth due to its power to stimulate increased angiogenesis. HBO2T has no net benefit as a cancer treatment, but may safely be given if needed for symptoms or other medical reasons. Some practitioners suggest HBO2T must never be used within 4 weeks of radiation therapy for safety concers. Nonetheless, some of my colleagues are using it during radiation therapy to
increase its potency in killing cancer cells. Oxygen fixes the radiant energy into chemical energy, creating compounds which break up big molecules, including cancerous DNA.

**EDTA CHELATION**

Chelation is an intravenous treatment which removes toxic heavy metals such as lead. EDTA chelation has been used, amid some controversy, for cardiovascular disease. It may not actually remove arterial plaque or atherosclerosis, but it does have an anti-aging effect. It is documented to disrupt bacterial biofilms, which may be a factor in cardiovascular diseases. Unanticipated benefits in cancer status have been reported. Chelation may inhibit free radicals and enhance immune defenses. Some now think the usual adjuncts of vitamin C, magnesium and B vitamins in the drips may be more active than the disodium EDTA itself. It is safe when administered by a physician certified by the American College for the Advancement of Medicine (ACAM) or equivalent. Take it 1 to 3 times per week, supplementing all the while with oral vitamin C, B complex, zinc, selenium, and anything else the routine blood analyses indicate to be imbalanced.

**714X**

Gaston Naessens argues that this chemical source of nitrogen for the body will stop the cancer cells from producing “co-carcinogenic K factor” (CKF) which protects them from immune cells. It contains camphor, organic salts, ethanol and water. 714X is injected into the lymph nodes for 3 series of 21 days each, spaced by three days off, then boosters as needed. Do not combine with vitamin E or vitamin B12 supplementation, which decrease its effectiveness. It is also incompatible with anti-angiogenics. I do not think this is any sort of major break-through in cancer care, and am not troubled by its lapse into obscurity.

**SHORT-WAVE DIATHERMY**

Dr. John Bastyr, ND said that passing 13 meter short-wave radiation through a tumour will dissolve it. The patient needs to be fit to handle the toxic debris from rapid tumour lysis (break-up). Consider also diathermy to the pituitary gland. Unfortunately these machines are rare these days, as they can disrupt computers and cell-phones in the clinic and vicinity. The magnetic field these things put out is truly extraordinary. When a diathermy machine is operating a patient with a cardiac pace-maker walking into the clinic might faint, or worse.

**RIFE RAY MACHINE**

Royal Rife in San Diego in 1934 demonstrated an electromagnetic therapy termed the Rife Ray which could be tuned to specific frequencies to destroy specific disease organisms, including viruses, within living tissue. Rife build a uniquely powerful light microscope and observed a viral size organism he associated with cancer cells, and observed his ray killing them. He then treated human tumours, and claimed great success, but was stopped from the practice by the American Medical Association by 1939. Some of my patients and colleagues have Rife devices and I do not believe they cause any harm. I have seen many patients sit around wasting many hours of the last months of their lives waiting for this contraption to do something for them. It never has. NOT RECOMMENDED

**DMSO**

Di-methyl sulfoxide or (CH3)2SO is a potent solvent, able to carry small molecules under 1,000 Kilo-Daltons through the skin. It is useful also as a carrier to move medications through cell membranes. DMSO has analgesic, vulnerary (wound healing) and anti-inflammatory properties. Intravenous use is more risky than orally or by enema. It may be a useful adjunct in leukemia, uterine and cervical cancers. It alters membrane permeability, increasing survival in colorectal and gastric cancers. Oral doses of 500 mg 4 times daily or intravenous dosing results in huge odor issues, a rather unpleasant garlic-oyster aroma. This can be reduced by concurrent administration of urea, 10 to 15 grams daily in about 6 divided doses. DMSO can cause headaches, dizziness, nausea and sedation. DMSO is also used topically, a 60% concentration being left on for about 30 minutes. Methyl sulfonyl methane (MSM) in capsule form may provide many similar benefits, and may be better in bladder cancer.
ANTINEOPLASTINS

Dr. Stanislaw Burzynski, MD, PhD developed two synthetic peptide (amino acid chain) formulations he named ‘antineo-plastins’, which switch off oncogenes and switch on tumour suppressor genes. He found these naturally occurring peptides and organic acids tend to be low in the urine of cancer patients. They are not toxic. The average dose of A10 fraction is 7.7 g/kg/day, and the As2-1 fraction is given at 0.36 g/kg/day. After 20 years of harrassment by the USA Food and Drug Administration FDA, he is now conducting approved trials through his Houston, Texas clinic. He appears to have the most success with brain and prostate cancers. I have seen a slight response in a pancreatic cancer case I attended. It costs several thousands of dollars per month. I am not currently recommending this therapy due to many patients reporting poor experiences with this clinic.

HYPERTHERMIA

Cells with a low pH (high in acid) or with nutritional deficiencies, such as hypoxic tumour cells, are more sensitive to heat damage than healthy cells. Rapidly proliferating cells are also slower to develop a tolerance to heat over 42°C. Cancer cells are generally deficient in “chaperone proteins”, including heat shock proteins HSP.

HSP cover the hydrophobic portions of amino acid chains emerging from the cell’s endoplasmic reticulum, and later assist new proteins to achieving the proper tertiary structure (shape). Heat induces apoptosis via intracellular triggers and branched chain polysaccharide alterations, and can also induce necrosis. Core body temperature elevation may be safely tolerated to about 42 to 42.5 degrees Celsius. Core body hyperthermia is not recommended in cases of liver injury or disease. Destruction of malignant tissue is expected in the range of 42 to 44°C. For each degree above 41°C half the amount of time is needed to kill the same number of cells. At 44° a malignant tumour may be destroyed in about 30 minutes. Dr. George Crile Jr. of Cleveland estimates cancerous cells are destroyed at temperatures about 3°C lower than that which will destroy adjacent normal tissue, at any given duration of exposure.

Hyperthermia in the range of 41 to 42°C for 30 to 40 minutes, or 2°C. above their baseline for 30 to 60 minutes, produces an anti-neoplastic immune response. There is up-regulation of NK cell activity and mitogenesis, increased interleukins IL-1 and IL-2, increased circulating CD4/CD8 cell ratios, and increased circulating peripheral mononuclear cells. Diaphoresis is also detoxifying. Hyperthermia is radio-sensitizing, by inhibition of repair of chromosome aberrations and single strand DNA breaks, which results in apoptosis of radiation injured cells.

Any local hyperthermia applied must achieve a tissue temperature exceeding 42 degrees celsius - or else it may be more harmful than beneficial. At temperatures less than 42 degrees celsius there may be increased perfusion and cellular metabolism without any chemopreventive actions via P53, membrane disruption, apoptosis, etc. Offering saunas and other heating as hyperthermia is a bait-and-switch fraud.

In 1891 Dr. William Coley began injecting a mixture of streptococcal bacteria endotoxins into 140 patients with advanced sarcomas to induce an artificial fever. His “metabolic hyperthermia” had positive responses directly related to the temperature reached and the duration of the fever. Dr. Issels carried on the practice with bacterial lysates. Cancer patients are often Th-2 dominant, with an immune system unresponsive to cancer. The lymphocytes just end up enslaved by the tumour making growth factors and angiogenic factors. When the Th-1 reactive state is restored, fever marks the attack of immune cells on the tumour with antigen processing, antibody, complement and cytotoxic modes of attack. This is the basis of targeted vaccine therapy with Polyvaccinium and the mistletoe lectin injection therapies.

At the turn of the 20th Century Dr. Westermark developed whole body hyperthermia in hot baths. Others worked with short wave diathermy, microwave, infrared and ultrasound heating. In 1976 Dr. Leon Parks, a cardiothoracic surgeon introduced hyperthermia by extracorporeal circulation using computerized perfusion technology. This method results in pain palliation and effective reversal of tumour growth in a significant number of patients. One of my esteemed colleagues, Dr. Garrett Swetlikoff, ND, who for many years was my personal physician, uses hyperthermia in his practice. The Heckel HT2000 whole body hyperthermia unit uses infrared A and a thermal insulation blanket to reach a core body temperature over 43° Centigrade in sessions of 1 to 2 hours.

Many naturopathic oncologists have approved hyperthermia devices using a variety of technologies such as radiowaves. They may be applied loco-regionally or heat the whole body. They can raise local temperatures to 48 - 49°C! Adverse effects can include burning and sub-cutaneous fibrosis reactions. It is contra-indicated in patients

202
unable to communicate, insensible to heat (i.e. diabetic neuropathy), and those with metal implants or pacemakers. It appears best suited to cases of liver, lung, ovary, brain or pancreatic cancer.

Ashwagandha herb is an excellent adjunct during hyperthermia.

**ELECTRICAL THERAPY**

A small electrical current applied to a tumour has an antineoplastic effect, by normalizing cell proliferation rates. Cancer cells tend to have an abnormally low trans-membrane potential (TMP) which will increase with direct current (DC) application of less than 10 volts. Cancer cells have a low voltage of about 15 - 20 millivolts. Normal cells average 75 - 90 millivolts. Normal non-dividing cells will respond to DC with a lowering of their TMP. The effect is greatest when the anode electrode is applied to the tumour. Acid and chlorine forms at the anode, alkali plus hydrogen forms at the cathode, and the cancer in the middle depolarizes, then dies.

The optimum current is 7.5 volts DC, 20 milliamperes, to a level of 35 -100 coulombs per cubic centimeter of tumour. Pads may be applied to superficial tumours for percutaneous stimulation, or electrodes can be applied to acupuncture needles for deeper tumours. Stimulation is applied for 15 to 30 minutes. Large tumours may take 100 milliamperes of current for up to 4 hours, for a dose of up to 100 coulombs of electrical energy. The treatment stings, so local anesthetic medication may be used.

The ideal tumour for this therapy is superficial and under 5 cm. in diameter. The lysis products provoke a favorable immune response. The fragments are ideal for processing by the macrophage immune cells.

The short-term response rate may be 85%. Long-term survival is higher with this adjunctive therapy in lung, esophageal liver and kidney cancers. In China this treatment is used in hundreds of hospitals, with galvanic current applied to platinum electrodes inserted into the tumour under ultrasound guidance. Incisions may be made under local anaesthetic. In Europe this has been pioneered by Nobel laureate Professor Bjorn Nordenstrom of Sweden and Dr. Rudolf Pekar of Austria. Dr. Pekar claims a 3 year remission rate of 73%. Chinese reports indicate about 35% complete remissions, 43% partial remissions, 15% unchanged, and only 7% experiencing progression of their disease. The Chinese say they see about 70% 3 year survival in total, for a wide variety of cancers.

After galvanotherapy the tumour cells may be seen to re-differentiate into fibroblasts and repair the area. Electrotherapy has little effect in advanced disease with metastases, and does not inhibit the tendency to metastasize.

Bio-electrical impedance phase angle is a marker of the health of membranes, and the fluid distribution between intracellular and extracellular water. Ordinary resistance is a function of hydration, but cell membranes add capacitive resistance. Resistance varies slightly with ethnicity, and tends to be higher in men than women. A phase angle under 5 is a general indicator of illness, and implies a worse survival time. This measurement will not be as accurate in cases of fluid overload, dehydration or third-spacing of body fluids such as ascites.

**MAGNETICS**

Magnets of 650 gauss static field strength may be used for 1 to 2 hours daily. Magnetic therapy dates back to the discovery of natural magnets in the earth in ancient China, balls of crude iron called ‘lode stones’. The Chinese were the first to discover the magnetic compass, using a sliver of magnetized iron. The earth has a strong magnetic field, and every cell and most large molecules in them has some electrical charge, which tends to line up with the magnetic field. When we live in artificial environments with electrical wires in the walls and concrete with iron rebar grids in the floors, and so on. We are blocked from our natural magnetic field, and may have strong and disorganized fields all around us. It is recommended that we not have electrical appliances such as clock radios near our heads when we sleep.

**Nikken** of Japan is the world leader in medical and health magnetic products, to wear, sleep on, and use therapeutically. They make the **Pi-Mag water** treatment system which makes water thinner, by breaking down the clumping of water into smaller ‘micro-clusters’. This water is a super solvent for better detoxification. Microcluster water forms a 3 molecule deep blanket around regulatory and dstructural proteins, supporting them,
helping them fold correctly, and stabilizing their functional shape. Magnets of appropriate strength and configuration can relieve pain, improve sleep and speed healing processes.

**SHARK CARTILAGE**

Shark cartilage was a fad I never went in for, observing no responses in those treated by other doctors. A thoroughly negative study was presented June 2, 2007 at the American Society of Clinical Oncology 43rd Annual Meeting, Abstract 7527 by Dr. Charles Lu of the MD Anderson Cancer Center. Bovine cartilage is a little better, but still not very useful. NOT RECOMMENDED Do not confuse this product with shark liver oil alkylglycerols, which are useful for low blood cell counts.

**UKRAIN**

Ukrain or NSC-631570 is a semi-synthetic compound of thiophosphoric acid triaziridide and an alkaloid chelidonine from the traditional liver herb *Chelidonium majus*. It has been used for about 20 years in Austria. The National Cancer Institute in the USA has found it active against many cancer cell types, including adenocarcinomas, epithelial carcinomas, sarcomas, melanoma and lymphomas. Ukrain selectively accumulates in tumour cells, where it is directly cytolytic and cytostatic, inhibits topoisomerases I and II, inhibits synthesis of DNA, RNA and proteins. Ukrain induces apoptosis by activation of endodesoxyribonucleases. Ukrain initially increases oxygen consumption in cells, but later it returns to normal in healthy cells but stops completely in the cancer cells! Ukrain in small doses is a biological response modifier (BRM) which means it is immune-stimulating. It can activate NK cells, improve the CD4/CD8 ratios, and increase phagocytosis by white blood cells. The dose is commonly 5 to 20 mg daily to weekly, intravenously or intramuscularly, usually 2 or 3 times a week. It is best to avoid mixing it directly with other products, and to inject each 5 ml x 5 mg ampoule slowly over a minute or more. A common strategy is to use 5 mg once a week as a BMR, alternating with 20 mg later in the week for a cancer cytolytic effect. Do not mix with cortisone, digitalis, sulphonamide antibiotics or sulfonyl urea antidiabetic drugs.

Ukrain is well-tolerated, with only moderate toxicity. There is no cumulative toxicity or late effects. Allergic or anaphylactic reactions are not seen. Ukrain is not recommended in pregnancy, breastfeeding, in growing children, or during high fever. Tumour markers may fluctuate early in therapy. Tumours may swell reversibly early in therapy, so be cautious with cancers within the skull.

Ukrain may cause some nausea, tumour swelling, dizziness, depression, insomnia, drowsiness, fatigue, apathy, restlessness, sweats, shivering, itching, increased urination, stabbing pains, tingling sensations, burning feeling in the tumour, and tumour hardening. These symptoms are said to be due to tumour lysis releasing toxic matter, and it is claimed they will disappear as the tumour is removed. That is, if the tumour is removed. Ukrain has been used for cancer of the breast, pancreas, colon, bladder, prostate, ovary, cervix, endometrium (uterus), lung, testes, head and neck, lymphoma and melanoma. Phase II studies show a doubling of median survival time in advanced pancreatic cancer, used alone or with chemotherapy. Having seen all this research, I was quite disappointed to see no highly significant response in anyone I know who has actually used it. I do NOT recommend Ukrain, as it is too expensive for the meager results it gives. It is not something I administer to my patients, and it is not currently on our list of legal drugs we are permitted to prescribe.

**UREA**

Urea concentrates in the liver, orbit, skin, lip and tongue, and so may be most useful for cancers in these tissues. Give 10 to 15 grams daily in about 6 divided doses. Used also as an adjunct to DMSO, to neutralize its bad odor.
IMMUNE THERAPIES

Remember surgery is very immunosuppressive, as are many chemotherapy drugs.

Cancer cells form all the time, and the immune system removes them safely almost all of the time. There is always some element of immune compromise when cancer becomes a disease. The immune cells actually get drawn in by inflammation, set up a repair process, it becomes chronic – “the wound that never heals”- and the immune cells end up working for the tumour.

Macrophages and other lymphocytes secrete growth factors, assist angiogenesis and contribute to invasion and tumour cell migration. Tumour-associated macrophages TAMs, always phenotype M2, migrate to hypoxic zones in tumours, remodel the matrix, and release vascular endothelial growth factor VEGF, as well as angiopoietins ANG-1 and ANG-2.

Macrophages can be made highly tumoricidal by activation with macrophage activating factor GcMAF. Gc protein is serum vitamin D3 binding protein. Cancer cells secrete nagalase, also called serum alpha-N-acetylgalactosaminidase, which deglycosylates Gc, the principle precursor of MAF. Nagalase activity in blood is normally in the range of 0.38 to 0.63 nM/min/mg protein, but in breast cancer this can rise to 2.38 to 6.28. inhibiting nagalase reverses immune-suppression and can lead to tumour eradication.

Tumour cells, peripheral stem cells, and immune cells release inflammatory mediators including:

- **chemokines** – such as CCL-2 and CCL-5 which promote migration of monocytes into tumours, where they they differentiate into macrophages. Histone deacetylation (HDAC) inhibitors increase T-cell chemokine expression, supporting PD-1 immune checkpoint inhibitors.

- **cytokines** – such as transforming growth factor beta TGFβ, tumour necrosis factor TNF, colony stimulating factor CSF, and the immune-suppressant interleukin ten IL-10. TGF is a potent immunosuppressor, making it harder for immune cells to find and kill cancer cells. TGFβ stops differentiation of T-cells into active cytotoxic or helper cells. TGFβ blocks production of IL-2 needed to proliferate T-cells. It is supported in blocking immune function by interleukins IL-4, IL-5 and IL-10. TGFβ inhibits secretion of tumour necrosis factors TNFα and TNFβ, inactivating cytotoxic NK cells and lymphokine-activated killer cells. When activated by stromal cell thrombospondin-1 TGFβ suppresses T-cell effectors activated against tumour antigens, creating local immune tolerance. TNFα is an acute pro-inflammatory cytokine which stimulates the immune system. TNFα is made by macrophages, proliferating T-lymphocytes, B-cells and NK cells. It is supported in immune stimulation by interferon INF and interleukins IL-2, IL-6 and IL-12. IL-6 is also called B-cell stimulatory factor BSF-2, and is produced by peripheral lymphocytes and monocytes. Modulate with EGCG, mushroom extracts, ALA, Vit C. Increase IL-6 with resveratrol. IL-8 is modulated by black seed Nigella sativa thymoquinone, Sophora flavescens root oxymatrine and matrine, as well as hesperidin methyl chalcone. IL-2 is generated in fatty tissue in obesity, and this product of inflammation contributes to the development of insulin resistance. IL-2 can be modulated with melatonin, plant sterols, PSK and other medical mushroom extracts such as reishi and coriolus, CLA, acupuncture, qi gong, andrographites, Bu Zhong Yi Qi Wan, astragalus, L-carnitine, taurine and vitamin C.

- **prostaglandins** – such as PGE-2, synthesized by COX-1 and COX-2 enzymes, promoter of inflammation and an immune suppressant.

Major modulators of immune tolerance of cancers are PD-1, prostaglandins, opioid growth factor and opiate receptors, IL-6, IL-13, CTLA-4 and transforming growth factor TGFβ. Regulatory T-cells within tumours are co-opted to suppress cytotoxic T-cells directed against tumour antigens. Cancer cells make cytotoxic T-lymphocyte-associated antigen 4 (CTLA-4) to inhibit our natural immune response. Tumours induce regulator CD4+ and CD25+ T-cells to block immune recognition of tumour antigens Effector T-cells may be activated peripherally to tumours, but stromal cells mask the tumour cells. Fibroblasts activated and induced by cancer cells release thrombospondin-1 which activates TGFβ to create immune tolerance and immune suppression. Tumour cells also down-regulate dendritic cell processing of tumour antigens. Without antigen recognition there is no response to the cancer by cytotoxic T-lymphocytes, natural killer NK cells, monocytes, macrophages or B-cells..
Immune therapies are limited by the fact that most cancer cells are able to disguise their abnormality until they are very well established. Common epithelial cancers - carcinomas - show a very late immune response, and often their mutation rate exceeds the plasticity of the immune system to adapt. Without immune modifiers, the immune system hasn’t a chance of picking up on the abnormalities until the patient is very sick. The cancer gets a big lead off, and the immune system can rarely catch up in time to prevent severe damage or death.

Any inflammation, infection, parasite or other immune stressor can tip the balance in a very ill cancer patient. There are many cancer fighting immune therapies that have been used, and more in active development. This is potentially the most promising new direction for contemporary cancer research. Until we can get reliable and specific anti-cancer vaccines, the general immune status of our cancer patients remains a central concern for naturopathic physicians.

The modern level of cleanliness, and the use of vaccinations and immunizations to avoid childhood and infectious diseases has been linked to the modern epidemics of immunm disorders (Greave’s hypothesis). Kids who are exposed to more germs and dirt have less allergies, less asthma, and so on. It is possible our drive to have a safe and sterile environment is making our immune systems weak, and contributing to our inability to deal with cancer cells as they form. We need an active reticulo-endothelial system, hardened by exposure to infections, to create immunity to the next disease we encounter.

Some tumours can secrete a protein that is normally present in healthy lymph nodes to attract T cells and program them to perform vital immune functions. This protein transforms the outer layer of the tumour into lymphoid-like tissue, which attracts and effectively re-programs the T cells to recognize the tumour as friend not foe, resulting in a tumour that goes undetected by the immune system. Cancer patients are often Th-2 dominant, with an immune system unresponsive to cancer. The lymphocytes just end up enslaved by the tumour making growth factors and angiogenic factors. When the Th-1 reactive state is restored, fever marks the attack of immune cells on the tumour with antigen processing, antibody, complement and cytotoxic modes of attack. This is the basis of targeted vaccine therapy with Polyvaccinium and the mistletoe lectin injection therapies. T-cell balance and immune function can be restored by omega 3 oils, vitamin E and plant sterols and sterolins. Cimetidine has been found to be an immune-modulator. It is a H2 histamine receptor blocker, and histamine negatively regulates T-helper responses. Th1/Th2 regulation is most helpful in colon cancer.

Many patients are seduced to try therapies which increase the natural killer NK cell number or activity. Unfortunately, they fail to understand that raising NK number and activity is not an indicator of anti-cancer effect. NK cells only effectively remove single cells or small nests or clusters of cancer cells. They will only attack large tumour masses and have a significant effect if directed by lymphocytes activated against the tumour, as by LDN, and supported by nutrients such as selenium, zinc, beta-carotene and reishi mushroom extract.

Saponins in herbs such as astragalus and ginseng help fragment dead cancer cells into antigens which can be presented to dendritic and other immune cells. So does halvah, a pleasant food made from ground sesame seeds. Use freely around biopsies, surgery, chemotherapy, and radiation. Natural PD-1 inhibitors to modulate the immune response against the cancer cells include beta-glucans, Coriolus and curcumin.

Natural immunity can be raised by using cross-reacting antigens. The first immunization success was the introduction of cowpox inoculation to make antibodies effective against smallpox. Jenner introduced this in 1796, and in 180 years smallpox was extinct. This is the very principle on which the great medical art and science of homeopathy is based - the use of “Similars” to provoke the body to heal itself.

Some naturopathic oncologists use auto-hemotherapy to induce an anti-tumour immune response. 10 mL of the patient’s own venous blood is injected into each side of the buttocks, deep in the gluteal muscles.

**LOW DOSE NALTREXONE**

Low-dose Naltrexone or LDN is a relatively new therapy for cancer. It was found to block inflammation in animals in the 1970’s, by Zagon at Penn State. In the 1980’s neurologist Biharis stumbled upon its anti-cancer activity on
Kaposi’s sarcoma in men with HIV/AIDS. Human studies began in 2007. Being a drug that has long been off-patent, it’s use is being driven not by pharmaceutical interests, but by clinicians who care for cancer patients.

The common use of Naltrexone in 50-200 mg daily doses is to get folks off of opiate drugs like heroin, for drug withdrawal reactions, drug overdoses, and alcohol detoxification. Fortunately, LDN therapy uses less than 10% of the doses used for drug problems, and is therefore very safe. It is encapsulated by a compounding pharmacist in an inert filler such as Avicel microcrystalline hydroxy cellulose. Other than some start-up issues, it is very comfortable to take.

L-LDN initially suppresses, then up-regulates production of beta-endorphins and met-5-enkephalins which in turn regulate immune response and cell growth. Endorphins increase NK cell number and activity, activate cytotoxic CD8+ T-cells, and may induce apoptosis via increased number and density of tumour cell endorphin receptors. It may alter cold agglutinins. D-LDN is a TLR4 antagonist, binding to NFkB and cytokine receptors, blocking IL-6, IL-12, TNFα release, for a potent anti-inflammatory effect. LDN also inhibits opioid growth factor, LDN is particularly indicated in cancers of breast, ovary, uterus, kidney, bladder, prostate, lung, throat, liver, pancreas, colon, rectum, carcinoids (neuroendocrine), neuroblastoma, lymphocytic leukemia, lymphoma and melanoma. Good responses are seen in about 60% of cases. Improvement may be seen by a month, and remission within 6 months. 50% of cases see arrest of tumour growth, and about 30% may see tumours shrink.

Dr. Berkson, MD suggests LDN with alpha lipoic acid for dermatomyositis. LDN often eases myalgia, as seen with drugs such as aromatase inhibitors, and fibromyalgia. It is very useful in auto-immune diseases and colitis such as Crohn’s. Topical gels or creams of 1% naltrexone are applied topically twice daily for psoriasis, excema, alopecia areata, open wounds, burns, and for scar or keloid prevention. You may add 0.2% aloe vera, 1,000 IU per mL vit. D3 or 2% diphenhydramine. 0.5% nasal spray can be used for sinusitis. 0.5% eyedrops can heal corneal ulcerations, and dry eyes from Sjogren’s syndrome.


- Always take LDN once daily at bedtime, or as directed. Never give twice daily or sustained release.
- Start with one 1.5 mg capsule at bedtime for the first week.
- Then take two capsules at bedtime for the next two weeks.
- Then take 3 capsules each night.
- Usually this goes very smoothly, but some folks take longer to change over the opiate receptors, and we have to slow the process down for them. Go very slow if any history of rheumatoid arthritis. Adverse effects are rare. About 2% of folks may have mild acid stomach and reflux, nausea, vomiting, dyspepsia. If at any time you get any of these issues, reduce the dose by one capsule for another 1 to 2 weeks, then try bumping it up again. If insomnia or nightmares bother, issues, you may switch to taking the medicine in the morning. Later we will go back to evening dosing for maximum opioid growth factor effect.
- If you cannot seem to tolerate 3 capsules (4.5 mg), then dump out half of one capsule and take 2 ½ caps (3.75 mg). The effective dose range is 3.0 to 4.5 mg.
- Once we establish that you can tolerate this dose, I will then write a prescription for that amount to be put into one capsule, and you will from then on take the one capsule daily at bedtime.
- If any stomach (nausea) or sleep issues arise later on, we shave off 0.5 mg.
- Note that when on LDN you will not get pain relief from any opiate analgesic – codeine, morphine, dilaudid, heroin, methadone, etc. If you need to take any of these, such as for surgery, we will cut off the LDN for 3 days (minimum 24 hours) before taking these drugs.
- You can take aspirin (ASA), Ibuprofen (Advil) or acetaminophen (Tylenol) if you need a pain-reliever.
- There are no other drug interactions.

LDN can be remarkable for neuropathic pain and complex regional pain syndrome, applying 1 to 3% naltrexone hydrochloride in a transdermal base, two to three times daily. You may also include 10% magnesium chloride, 2-5% ketamine, 2% lidocaine, 2% cyclobenzaprine, 20% ketoprofen, 2% ibuprofen, 0.2% clonidine, 2% amitriptyline, 2% guaifenesin 2%, or 2% cetyl myristoleate.
DR. GUNN'S TARGETED VACCINE HYPOTHESIS

Dr. Hal Gunn, MD is a noted General Practitioner in Oncology, and a founder of the Centre for Integrated Healing, now known as Inspire Health [www.inspirehealth.ca](http://www.inspirehealth.ca) Inspired by Dr. Roger Roger’s work with the Pitard Protocol including Staphlococcal lystate vaccine, he has proposed and patented a brilliant idea. It appears bacterial and viral vaccines will only work if the vaccine represents a specific infectious pathogen to which the cancer-bearing organ is primed to respond to. Once the embedded immune cells in the organ respond to the vaccine pathogen they are evolved to deal with, the immune response turns against the cancer. Not only are growth and invasion factors being produced by the tumour-associated immune cells now withdrawn, the immune cells turn and attack the tumour cells. This concept of targeting the organ-based immune response rather than the specific type of cancer, is really unique.

Therefore a cancer in the lung, whether it is a primary lung cancer or a metastasis from a totally different type of cancer, will only respond to a vaccine made from a lung pathogen, such as Streptococcus pyogenes. Other cancers which respond to Streptococcus pyogenes would be tissues which this bacteria infects commonly, namely lymphoma, sarcoma, melanoma, stomach and breast.

A cancer in the liver, whether a primary hepatocellular carcinoma or a metastasis to the liver from an entirely different cancer, will only respond to a vaccine made from a liver pathogen, such as Escherichia coli or Hepatitis B virus. Colorectal and pancreatic cancer would be expected to respond to a vaccine containing Escherichia coli, such as Polyvaccinium Forte PVF. BCG would be useful for bladder, colon, and stomach. Mixed respiratory virus MRV vaccine would be useful for lung cancer, as would vaccines from bacterial lung pathogens such as Klebsiella pneumoniae, Nocardia rubra, Haemophilus influenzae, and Moraxella catarrhalis. Pseudomonas aeruginosa should be useful for cancers of the lung, lymphoma and soft tissue cancers. Cervical cancer should respond to vaccines with Lactobacillus casei or human papilloma virus HPV. Multiple myeloma should respond to vaccines for viral hepatitis. Brain cancer should respond to herpes varicella zoster or chicken pox virus, as these viruses can cause encephalitis. The same should be true for meningococcal and measles vaccines. Staphylococcus aureus lystate should work anywhere staph infections are common, including skin, breast and rectum.

The Polish Polyvaccinum mixed bacterial antigen preparation has long been used by doctors in British Columbia, and has induced remissions in advanced cancer cases. A typical protocol would be 3 ampoules of Polyvaccinium Forte in a 10 ml rubber-topped multi-dose vial, and with a 100 unit insulin syringe, give 0.05 ml or 5 units of vaccine injected subcutaneously. Typical sites are the thighs or abdomen. Inject about three times a week, gradually increasing the dose by 0.01 to 0.02 cc. until it is sufficient to evoke a red flare (erythema) up to a maximum of 5 cm in diameter within 24 hours. This is the same response we look for from mistletoe injections, ie Iscador or Helixor therapy. A good response is often accompanied by a mild fever, though on occasion it may be a high fever. The usual top dose is about 0.40 cc or 40 units on the insulin syringe. Occasionally we give up to 75 units per injection without a response, in which case we continue at that dose. Within a few months a response should be evident. Best results are seen in lung cancer, lymphoma and melanoma.

Bacillus Calmette-Guerin BCG immunization is a non-specific immune enhancer from a form of tuberculosis bacteria common in cattle. A suspension of 75 mg live bacillus per ml. is smeared into a 5 cm square of 20 skin scratches every four days for a month, then once weekly, for courses of ten to sixteen applications. BCG may also be injected into tumours such as melanoma at doses of 0.05 to 0.20 ml of the suspension per nodules. It is often used for bladder cancer, where it is instilled by a catheter directly into the bladder. Therapy starts with a course of 6X weekly injections. Dosing may then be in 3 week courses every 3 to 6 months, for about 3 years. It outperforms chemotherapy for transitional cell cancer. BCG therapy can be supported with vitamins A, B6, C, E, zinc and curcumin.

Corynebacterium parvum bacteria preparation is superior to BCG for stimulating macrophages. It is given intravenously, intra-tumour, or subcutaneous by two to four injections in the lymphatic drainage field around tumours, totalling 2 mg for the first treatment, then at 2 to 4 mg per treatment. For fever, hydrothorax, cor pulmonale, thrombocytopenia, liver disorder or severe weakness consider raising the dose up to 8 mg.
Coley’s toxins from the bacteria *Streptococcus pyogenes* and *Serratia marcescens*; preparations from *Corynebacterium parvum* or *Corynebacterium pseudodipthericum*; staphage lysates from *Staphylococcus aureus* or *Staphylococcus epidermidis*; vaccines from *Eschericia coli*, *Klebsiella pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, *Streptococcus pneumoniae*, *Streptococcus salivarius*, and *Streptococcus pyogenes* induce a cytokine APO-2 ligand, which is like tumour necrosis factor TNF, but even more active in killing cancer cells.

Also used are DNCB extract or MBV mixed bacterial vaccine. Any viral vaccine can also provoke increased non-specific immunity. An example is the common MRV - mixed respiratory virus vaccine

MTH-68/N - a promising immune response modifier using paramyxovirus from chickens, weakened and modified, and given by a nasal spray. This attenuated Newcastle disease virus is harmless to humans, only occasionally provoking a “pink-eye” sort of conjunctivitis. Advanced cancer patients frequently experience disease stabilization, reduction in pain, improved performance status, and sometimes get full remissions after several months. Developed and used in Budapest, Hungary by Laszlo and Eva Csatary.

A newly discovered native picornavirus Seneca Valley Virus 001 selectively infects small cell lung caner cells and retinoblastoma cells, taking out 10,000 bad cells for every healthy cell killed. Picornaviruses include common-cold type rhinoviruses and stomach flu enteroviruses.

*Reolysin* is a patented reovirus product which infects and kills cancer cells and cancer stem cells when the intrinsic viral defense system is inactivated by upregulation of the ras pathway.

Naturopathic physicians for generations have used immune gland extracts of animal origin. Thymus gland has been given as capsules or by injection to activate or modulate T-cells. *Thymosin* 8 mg may be injected every two to three days for one to two months, including during chemo or radiation therapies. If thymic factor is substituted, the dose is about 30 mg. *Polyerga* is a pig spleen peptide extract which at 300 to 500 mg daily can increase white blood cells and their output of gamma interferon. This inhibits metastasis, improves appetite, reduces pain, improves overall vitality, and increases survival time.

Some of my American naturopathic colleagues are collecting dendritic cells from their patient’s blood and exposing them to peptide proteins derived from the surgical samples of the patient’s own tumour. The dendritic cells are the immune cells responsible for processing a foreign protein and handing it off to another immune cell to make an antibody. The dendritic cells process the tumour lysate peptides, and when returned to the patient’s bloodstream, begin to activate the host’s immune system against the cancer. The vaccine is administered three times at two week intervals, and results in increased interferon gamma INFγ as well as increased CD8+ cancer antigen-specific T-cell clones. Unfortunately it is very expensive. Mistletoe therapy can often activate the same response inside your body, at a reasonable price.

A prominent ND, PhD recommends the following for immune support:
- melatonin 20 – 40 mg
- corious PSK 600 to 1,200 mg, twice daily
- aerobic exercise 20 minutes daily

Coriolus is just one of many useful medicinal mushrooms, particularly the hot water extracts. β-(1,3)/(1,6) D-glucan, a long-chain polymer of glucose in fungal cell walls, has been shown to modulate and stimulate the immune system, enhance hematopoiesis, amplify killing of opsonized tumour cells and increase neutrophil chemotaxis and adhesion. It is a natural PD-1 immune checkpoint inhibitor.

Bee venom therapy is an excellent way of stimulating immune-arousing inflammation around a tumour.

Uric acid may increase the immune response to vaccines by up-regulating B-cell activated cytokines and amplifying immunoglobulin IgG-1. Uric acid is released by dying cells as a danger signal, and the immune system is programmed to respond vigorously to it.
Isopathic preparations have been made from the patient’s own blood, urine or tissue. Tumour biopsy tissue or anything at risk of carrying live tumour cells must of course first be reliably inactivated. Tissue is pulverized into a suspension, inactivated, then injected in the deltoid muscle of the upper arm at doses of 0.2 to 0.3 ml. every five to seven days, for a total of five to seven treatments. This may be repeated after two to four months.

Liver flukes are not “The Cure For All Cancers” as Hulda Clarke claims, but they are associated with cholangiocarcinoma in the bile ducts. Parasites in general are very common, and while the healthy patient need not fear about a few critters in the bowels, a very ill patient may benefit from removing an infestation that is robbing them of nutrition.

Histamine via H2 receptors mediates natural killer cell anticancer activity. Histamine blocks macrophage and monocyte respiratory burst of hydrogen peroxide and other ROS compounds which would otherwise irreversibly inhibit NK cell cytotoxicity and induce apoptosis in NK cells. Histamine has been shown to synergize with IL-2 and IFNa in treatment of melanoma and leukemia.

The strength of the immune system can be degraded by stress, whether physical, psychological and emotional. The immune cells have receptors on their surface and respond to neurotransmitters, the chemicals of thought and mood. This relatively new field of study is called psychoneuroimmunology. In the 1920’s the nutrition genius Francis Pottinger studied the nutrition and health of many Stone Age hunter-gatherer remnant societies from Africa to the Arctic. He proposed a theory that immune system cancers such as leukemia, lymphoma and multiple myeloma arose in persons who are parasympathetic dominant. The Autonomic nervous system has 2 parts, the Sympathetic which turns on the stress arousal reaction of “fight or flight”, and the Parasympathetic which turns it off.

Lymphocytes in the spleen and thymus gland have receptors for parasympathetic neurotransmitters. People who tend to be somewhat lethargic or laid back types are parasympathetic dominant. They are more susceptible to viruses, and overreactive to infections and inflammation triggers.

Conversely, Pottinger thought solid tumours occurred with sympathetic dominance, that is in people who are highly stressed, with low immune reactivity and low digestive function, including low pancreatic enzymes.

Determining the relative dominance of these two arms of this primitive and subconscious part of our nervous system may give a new strategy to heal the whole person. Acupuncture is one method to rapidly balance these two arms of the autonomic nervous system.

The Krebiozen therapy espoused by Professor Andrew C. Ivy was never properly tested, and remains the most interesting innovation in cancer immunology history. Made by injecting horses with the *Actinomyces* fungus from a non-cancerous tumour in cattle called “lumpy-jaw”, the resulting serum yielded an “anti-growth hormone” and would stimulate reticuloendothelial immunity in human cancer patients. Modern naturopathic physicians and homeopath using *Sanum* pleomorphic remedies from Actinomyces should find this a clue for further research. Dr. Enderlein has professed that small microbes living in the blood can assemble into this *Actinomycetes* fungus in the metabolic ruin of advanced systemic cancer. Enderlein, Gaston Naessens, Royal Rife, and others claim to see these shape-shifting critters in human blood under dark field microscopes fitted with proper condensors. Pleomorphic commensal organisms are said to be capable of spontaneously generating germs of disease in our blood when we are toxic and metabolically disordered. I admit the Sanum homeopathic remedies based on Enderlein’s fungal pathology concepts are remarkably strong and effective medicines, even though I am skeptical of the theory.

This idea of non-transmissible pathogens creating themselves from parts in our blood and cells is at odds with the conventional interpretation of the Germ Theory of Louis Pasteur. Perhaps posterity will remember that Pasteur recognized the milieu in which the disease occurred was “everything” just before he died, giving up the notion that the microbes were more important than the host environment.

Gruner, Glover, Hatsumi, Issels and others have identified a filterable creature in human blood they call a cancer virus, or a bacterium of the size of a virus. Virginia Livingstone in California makes a vaccine against an organism she calls *Progenitor crytocides* which she feels is a cause of cancer.
I believe immune-suppression might trigger superinfections, inflammation and ultimately cause cancer to flourish. We cannot merely give antifungal and antiviral medication - we must work on the biochemical terrain, the nutritional and physical environment of the cells. Naturopathic immune therapies rebalance the entire ecology to regulate inflammation, enhance immune cell surveillance for cancer cells, and control bacteria, parasites, and viruses.

Naturopathic approaches to immune support include thymus products, mushroom polysaccharides, chlorophyll, plant sterols and sterolins, and psychoneuroimmunology. Vitamin A derivative retinoic acid will decrease viral DNA such as the human papilloma virus (HPV) inside cells.

Homeopathics such as Thymuline and Engystol are excellent for viral control. I use them in cancer, but also to prevent or treat influenza and other viral illness. Immune tonics work best when given early in the day, such as one dose at breakfast and another before lunch.

**CANCER STEM CELL STRATEGY**

Stem cells are able to replace any cell that dies of old age, commits suicide because it is damaged or mutated, or is killed by injury, toxicity or disease. They can open any part of the genetic code in the chromosomes of the cell, and create a cell specialized to do the job its place in a tissue or organ requires of it. All cells have the DNA library, but most of it is locked down and unusable except very specific parts. So the stem cells wait quietly for the signal to make a replacement, pull out the blueprints, and make exactly what was lost whole again.

When a cancer gets to be a mass of cells about 1 millimeter in diameter, they must get extra blood and lymph vessels to maintain the abnormal rate of growth. They do this by engaging local (peripheral) stem cells, muscle cells, stromal cells, platelets and immune cells such as macrophages to make chemicals that sprout new vessels. If they cannot get this increase in blood and drainage, the cancer will not continue to be a disease. Note that this all happens long before a tumour is visible to any current diagnostic test.

By the time the cancer is usually diagnosed, at a diameter of about 1 centimeter, the chaotic blood vessels in the tumour are typically so leaky they cause the fluid pressure to be so high it squashes the blood flow, and the tumour develops areas of low oxygen (hypoxia). There may even be areas that have no oxygen at all (anoxia) and parts of the tumour will die. The cancer cells survive by switching to fermentation of sugars for energy, which is less efficient. Unfortunately they do not slow down for long, because the lactate by-product of fermentation is a major growth trigger that accelerates the doubling of the cancer cells. Also, low oxygen in the tumour results in another wave of new blood vessel growth (angiogenesis) into the tumour.

The conditions inside the tumour at this point are very abnormal, so the immune cells enter to try to heal the inflammation and damage, just as they would enter any damaged tissue that has lost blood flow and chemical balance. When they cannot fix the problem – and we often refer to cancer as “the wound that will not heal” – they recruit stem cells from the bone marrow. Stem cells, under conditions found in tumours, can activate oncogenes and become malignant, ie possess the power of self-renewal and essentially unlimited replicative potential. As many as 1 in 4 cells in a melanoma tumour are tumourigenic and stem-cell-like. Perhaps this is why these tumours spread early and aggressively. These cancerized stem cells are trained to produce chemicals that maintain the tumour. The abnormal cell-to-cell contacts in the tumour and the wash of growth factors convert the stem cells into malignant cells. The stem cells make actually fuse into some cancer cells, making a hybrid with the power to grow wildly. They are then able to make new full-blown tumour cells. These daughters of the stem cells are complete with all the DNA mutations and problems that make them grow too fast and behave badly towards normal tissues. Now tumour cells are doubling, while stem cells are making new tumour cells, and the tumour grows fast again.

Stem cells in tumours resist therapy by agents which target rapidly dividing cells, such as the most used cancer treatments: cytotoxic chemotherapy and radiation therapy. They grow very slowly, and are relatively inert. Chemo may actually increase cancer stem cell numbers, and the resulting cells may inherit drug resistance. CSCs resist normal cell programs that allow a cell to kill itself if it is mutated or damaged (apoptosis). They are given to
generating new mutations. Killing off the bulk of differentiated cancer cells is like cutting the head off a dandelion – as long as the stem cells remain, like the root of the dandelion in the ground, the tumour will be back.

Tumour stem cells are capable of self-renewal, moving freely through the body and of forming new tumours. A cluster of about 100 cells can generate an entire new tumour in a new location.

Cancer stem cells are more like bone-marrow derived (BMD) stem cells than peripheral stem cells. For example they express surface CD44 cell adhesion molecule, the ABC transporter Bcrp/ABCG2, and use similar pathways for invasion (chemotaxis) and spread (metastasis). The ABC transporters are ATP-binding cassette transporter proteins such as multi-drug resistance protein one MDR-1 or the P-glycoprotein “porter system” which pump toxins rapidly out of the cells, like bailing out a sinking boat. The stem cells seem to prefer to hide out in crevices in blood vessels, feeding off special nutrients made by the lining of the vessels (endothelium). BMD stem cells may make up about 0.2 to 0.8 % of tumours, are 100 fold more aggressive than the “normal” cancer cells – and those are able to kill people!

To improve therapeutic responses and to prevent reoccurrence of cancers we need to target the BMD stem cell populations in tumours. The strategies which have shown promise are:

- **inhibit NFkB**, the critical regulator of growth promoting genes in stem cells.
- **P13-kinase –mTOR/akt inhibition** selectively blocks growth of cancer stem cells.
- **promote PTEN** tumour suppressor gene activity.
- **TGF-B1** inhibition – cut off transforming growth factor beta one, an epithelial cell growth factor.
- **PPARγ agonists** deplete stem cell pools.
- inhibit beta-catenin, disrupting stem cell signaling pathways Hedgehog, Notch, Wnt and Bmi.
- block the ABC transporters such as the P-glycoprotein porter.
- block IL-8 from dying cells, which causes cancer stem cells to replicate.
- force differentiation.
- anti-angiogenesis. Angiogenesis inhibition targets malignant bone marrow-derived stem cells.

**Most promising agents for stem cell modulation:**

- **metformin** selectively inhibits cancer mesenchymal stem cells, blocking stage 2 oxidative phosphorylation, IL-6, NFkB, AMPK activation and IGF-1.
- **curcumin.**
- **vitamin A**, vitamin C, and vitamin D3.
- **glitazone** inhibits PPARγ to deplete the cancer stem cell pool.
- **IV-vitamin C with Doxycycline.**
- sulfuroraphanes – via akt and HSP90 inhibition
- indole-3-carbinol or DIM increase microRNA such as LET7, which are suppressors of mesenchymal stem cell transitions, and modulate cell differentiation.
- resveratrol.
- green tea EGCG 95% polyphenol concentrate plus vitamin E.
- mistletoe.
- grapeseed extract OPC’s.
- melatonin.
- andrographites.
- reishi mushroom (*Ganoderma lucidum*) extract.
- R-alpha lipoic acid.
- omega 3 EPA oil.
- berberine.
- black seed *Nigella sativa* thymoquinone.
- ovatodiolide from TCM herb *Anisomeles indica* aka Indian catnip.
- genestein from soy.
- piperine
• feverfew chrysanthemum parthenolides are progenitor and stem cell specific, via increased ROS, activation of p53 and nuclear factor kappa-B, unmethylation of tumour suppressor genes.
• five classes of mitochondrially-targeted antibiotics: erythromycins, the tetracyclines, the glycylcyclines, an anti-parasitic drug, and chloramphenicol. Examples are azithromycin, doxycycline, tigecycline, pyrvinium pamoate, and chloramphenicol. These drugs can eradicate cancer stem cells, in cancers such as breast, DCIS, ovarian, prostate, lung, pancreatic, melanoma, and glioblastoma.

**MISCELLANEOUS**

There are an infinity of weird and wacky cancer “cures” out there, most of decidedly uncertain benefit. I have no direct experience or knowledge to recommend trying or referring patients for these approaches, some of which may be valuable - but I cannot say which. Please get advice from a practitioner experienced with a therapy before trusting your life to:

• Bestatin UBX from *Streptomyces olivereticuli*.
• thymus glandular injections.
• oral amino acids such as Jinlong capsules.
• laetrile, also known as amygdalin, sarcarcinase, nitriloside or Vitamin B-17.
• insulin shock therapy.
• Wobenzyme N - pancreatin, bromelain and rutin.
• radiofrequency devices such as the Rife machine.
• electrotherapy for parasites such as the Beck Zapper device.
• MGN-3 with shiitake enzymes and modified arabinoxylan.
• macrobiotic diet.
• Gerson diet.
• Sun Soup - a patented herbal food with shiitake.
• *Carnivora* extract.
• colostrum transfer factors.
• *Laminaria* extract.
• cod liver oil.

**Absolutely without merit: NOT EVER RECOMMENDED**

• *Morinda citrifolia* or Noni juice.
• Hulda Clark’s parasite treatment – this pseudo-science is textbook cancer quackery.
• chondriana crystals
• blue scorpion venom drops.
• immuno-augmentative therapy (IAT).
• germanium sesquioxide supplementation.
• cesium salts to alter cellular acidity.
• live cell therapy with fetal cells or stem cells.
• ISM – Immune Systems Management, or Aminomics oral amino acid therapy.

“The universe is full of magical things patiently waiting for our wits to grow sharper.”  Eden Phillpotts, essayist.
PART FIVE - NATUROPATHIC ONCOLOGY PROTOCOLS—GENERAL AND CANCER-SPECIFIC

Chapter Eight: NATUROPATHIC THERAPIES IN ONCOLOGY

We begin to create a specific program for a specific cancer by first considering the welfare of the patient as a whole. Melded into the decision are a host of factors such as co-morbid medical conditions, medications, organ function, nutritional status, psychological condition, financial security, and social supports.

We study the targets of therapy for each cancer – the biochemical, metabolic and genetic issues, and drivers of growth which provide opportunities for intervention. This analysis suggests key compounds.

We then consider the foundation protocols which have given reasonably consistent responses:

| We match natural agents up to the **specific growth factors** known to drive a specific type of cancer to construct rational protocols for their naturopathic management. |

♦ **Key natural compounds which address the biology of cancer and target critical growth factors** ♦

**APOTOPSIS PROMOTERS** – *(the primary goal in treating all cancers)* - trigger mutated cancer cells to enter a death/recycling program: *chemotherapy, radiation*, mistletoe, green tea EGCG, quercitin, curcumin, betulinic acid, caffeine, genistein, berberine, gamma vitamin E, catechin, cayenne, poppy *Papaver somniferum* noscapine, *baicalein* from *Scutellaria, Bupleurum*, vitamin C, melatonin, ellagic acid, limonenes, indole-3-carbinol, Metformin, feverfew, ginger, garlic, R-alpha lipoic acid, taheebo, reishi, EPA oils, grapeseed extract OPC’s, trans-resveratrol, vitamin D3, lemon grass.

**MITOCHONDRIAL ACTIVATION** (restores control over the apoptosis kill switch by sparking up the oxidative-phosphorylation, disrupting the dual metabolic economy) – **R or D-alpha lipoic acid** (p.o., IV, nebulized), *thiamine*, benfotiamine, Solomon’s seal, dichoroacetate –DCA, niacin, niacinamide, magnesium malate, taurine, coenzyme Q-10, PQQ, riboflavin vitamin A, selenium, iodine, gamma vitamin E, melatonin, L-carnitine, palmitoyl-carnitine, quercitin, methylated flavones, ellagic acid, curcumin, olives and olive oil, resveratrol, grapeseed extract, *Coriolus, Ganoderma*, milk thistle silibinin, white peony root, oleic acid, berberine, isothiocyanates, indole-3-carbinol, ash wagandha, oral and IV vit. C, vit. K2 and/or K3. Acupuncture CV-4, PC-6, ST-36.

**STEM CELL REGULATORS**- (control bone marrow derived stem cells which resist therapy and create new cancer cells) - **Metformin, curcumin, vitamin A**, quercitin, green tea EGCG, grapeseed extract, ellagic acid, reishi mushroom, R- alpha lipoic acid, I3C, DIM, omega 3 oils, melatonin, mistletoe, yeast selenium, vit. C, D, E.

**NUCLEAR TRANSCRIPTION FACTOR NFκB INHIBITORS** – (control cell doubling at the DNA level and regulate inflammation) – **reishi, green tea EGCG**, ginger, silibinin, curcumin, indole-3-carbiniol, DIM, beta carotene, apigenin, melatonin, Metformin, feverfew parthenolides, selenium, zinc, R-alpha lipoic acid, vitamin C, vitamin D, vitamin K3,calcium, gamma vitamin E, N-acetyl-cysteine, quercitin, proanthocyanidins, resveratrol, emodin, genestein, guggulsterone, zerumbone, evodiamine, aspirin, salicylic acid, holy basil ursolic acid, melanin (echinacea, black cumin, tea), black seed *Nigella sativa* thymoquinone, ginkgo biloba.

**COX-2 INHIBITORS** – (control inflammation to reduce growth signals) - **curcumin, boswellia, quercitin**, ginger, isatis tinctoria, vitamin A, resveratrol, grapeseed proanthocyanidin OPC’s, green tea EGCG, bilberry, reishi, licorice, garlic, schellaria, feverfew, rosemary, bromelain, salicylates, green-lipped mussel extract, omega 3 oils – EPA, DHA, DPA, aloe vera, Zeel, propolis, CAPE, black seed *Nigella sativa* thymoquinone.

**mTOR PATHWAY INHIBITORS** – (regulate kinases involved in proliferation and angiogenesis) – curcumin, green tea EGCG, indole-3-carbinol, metformin. Synergistic with anti-apoptotics, and HSP or IGF-1 inhibitors.

IMMUNE MODULATORS – (help the immune cells recognize cancer cells and abnormal and remove them) - astragalus, ligusticum, maikake, shiitake, reishi, Shih Chuan Da Bu Wan, Xiao Chai Hu Tang or Ventorril, ashwagandha, andrographites, boswellia, rehmannia, bupleurum, curcumin. *Polygropa* spleen peptides and thymus extracts. Alkylglycerols from shark liver oil, plant sterols & sterolins, larch arabinogalactan, glycine, *Echinacea*, *Panax ginseng*, *Panax notoginseng*, curcumin, cat’s claw, and *Saposnikovia divaricate*, Metformin, Cimetidine, *ImmKine*, *Isador* or *Helixor* injectable mistletoe lectin extracts. Vaccines – Coley’s toxins, HAS, MRV, MBV and BCG.

- IL-6 is also called B-cell stimulatory factor BSF-2, raises CRP, and is produced by peripheral lymphocytes and monocytes. Modulate with EGCG, melatonin, mushroom extracts, R-ALA, vit C, resveratrol, vit D3.
- IL-8 is an attractant of neutrophils, goes up in tumor fevers, and is modulated by black seed *Nigella sativa* thymoquinone, *Sophora flavescens* root oxymatrine and matrine, as well as hesperidin methyl chalcone.
- IL-2 is generated in fatty tissue, and this product of inflammation contributes to the development of insulin resistance in obesity. IL-2 can be modulated with melatonin, plant sterols, PSK and other medical mushroom extracts such as reishi and coriolus, PLA, acupuncture, qi gong, andrographites, Bu Zhong Yi Qi Wan, astragalus, L-carnitine, taurine and vitamin C.
- IL-17 increases helper T-cells. Inhibit it with DIM.

ANTI-VIRALS – (stop viruses that cause some cancers) - *Engystol, Thymuline*, echinacea, lomatia, graviola, vitamin A, vitamin C, glutathione, honokiol (magnolia), sterols & sterolins, garlic, lycopene, green tea EGCG, curcumin colostrum, coconut oil/lauric acid, berberine, andrographites. IVglucirrinic acid 10+ mL of 8 mg/mL.

EPGENETIC MODULATORS – (prevent silencing of good tumor suppressor genes, and support DNA regulation) Regulate gene methylation: *methyl B-12*, green tea polyphenol EGCG, folate, quercetin, melatonin, curcumin, lycopene. Modulate histone protein de/acylation: *sulphorafane, curcumin*, green tea EGCG, artichoke, garcinol, grape cyanidins, quercetin, silymarin, parsley apigenin, baicalein, rosemary, genistein; beta-cryptoxanthin, L-carnitine.

p53 GENE MODULATORS - (DNA repair & modulate the apoptosis switch, which is blocked in cancer cells) - *quercitin*, curcumin, genistein, selenomethionine, melatonin, catechin, green tea EGCG, grapeseed OPC’s, trans-resveratrol, gamma vitamin E, folate, N-acetyl-cysteine, retinoic acid, milk thistle, garlic, vitamin C.

DNA REPAIR PROMOTERS – (heal the mutations that make cancer cells dangerous) - green tea EGCG, butyrate, vitamin A, vitamins B3 & B12, garlic, tea, folic acid. Parsley inhibits mutations.

ANTI-PARASITICS – (reduce immune stress) - flaxseed, psyllium husks, graviola, berberine, wormwood, oil of oregano, garlic, golden seal, cloves, black walnut, male fern, grapefruit seed extract.

EPIDERMAL GROWTH FACTOR EGF and EPIDERMAL GROWTH FACTOR RECEPTOR EGFR INHIBITORS – (control growth of carcinomas) - *silibinin* from milk thistle, curcumin, grapeseed extract OPC’s, resveratrol, green tea EGCG, quercetin (HER2), genistein, Metformin.

ANTI-ANGIOGENICS – (cut off blood supply to tumours, inhibit vascular endothelial growth factor VEGF) - catechin, green tea EGCG, *quercitin*, C-Statin, curcumin, glycine, ellagic acid, pomegranate and grapeseed anthocyanidins and proanthocyanidins, resveratrol, sea cucumber extract, beta carotene, mistletoe, shikonin, coriolar PSK, CAPE, apigenin, genistein, EPA oils, shark liver oil, selenium, zinc, luteolin, lysine, proline, vitamins A, C, D & E, modified citrus pectin, milk thistle, bupleurum, sanguinaria, rabdosia, ginseng, wormwood, scutellaria, honokiol (magnolia), poria, ginkgo, angelica and polygonum. See also COX-2 inhibitors.

ANTI-METASTATICS- (halt the spread to other organs) - *fractionated citrus pectin, green tea EGCG, EPA omega 3 oils*, Metformin, heparin, Co-enzyme Q-10, larch arabinogalactan, aloe vera juice, CLA, bromelain, beta carotene, vitamins A and C, melatonin, indole-3-carbinol, R- alpha lipoic acid, beta-sitosterol, maitake, catechin, quercitin, rutin, curcumin, mistletoe, sea cucumber extract, calcium-D-glucarate, melanin (echinacea, black cumin, tea), resveratrol, alpha linolenic acid, apigenin, usolic acid, berberine, low-dose aspirin, Avemar + vit. C.
STAT TRANSCRIPTION FACTOR INHIBITORS – (slow gene copying to block production of anti-apoptotic proteins) STAT-1: curcumin, green tea EGCG. STAT-3: indole-3-carbinol, curcumin, curcubatin Q, doxycycline.

INSULIN-LIKE GROWTH FACTOR ONE IGF-1 INHIBITORS – (stop sugar from feeding rapid cancer cell growth) - green tea EGCG, Prilosec, vit. D3, lycopene, exercise, caloric or methionine restriction, Metformin. Binding protein IGFBP3 is increased by OPC’s, flaxseed, CLA, dandelion burdock chicory, vit. D3, R- alpha lipoic acid, vanadium. Milk thistle inhibits IGF-1R. Berberine lowers insulin. Avoid sugar, colostrum, estrogen, HGH.

ACTIVATION PROTEIN ONE AP-1 INHIBITORS – (control doubling in fast-growing tumours with low oxygen) curcumin, green tea EGCG, quercitin, genistein, selenium, vitamin C, PTK inhibitors.

PLATELET-DERIVED GROWTH FACTOR RECEPTOR PDGFR INHIBITOR – green tea EGCG, and tyrosine kinase inhibitors such as vitamin K and milk thistle silymarin/silibinin. MMP inhibitors: eg. curcumin.

PROTEIN TYROSINE KINASE PTK SIGNAL INHIBITORS – (control growth signaling between the cell surface and nucleus) - curcumin, genistein, green tea EGCG, milk thistle, resevatroil, pomegranate anthocyanidins, shark liver alkylglycerols, Scutellaria, licorice, gamma vitamin E.

MATRIX METALLOPROTEINASE MMP INHIBITORS – (stop invasion into other tissues) - Scutellaria baicalin, green tea EGCG polyphenols, Metformin, reseratrol, Zeel, Hormeel, digestive enzymes, curcumin, bovine cartilage. See also AP-1 and COX-2 inhibitors. Heavy metals upregulate MMPs so test and chelate.

COLLAGENASE INHIBITORS – (stop invasion into other tissues) - green tea EGCG and EPCG, grapeseed oligomeric proanthocyanidins, anthocyanidins, reseratrol, curcumin, quercitin, mushroom polysaccharides such as coriulus PSK, Centella asiatica, luteolin, emodin, genistein, vitamin A, vitamin C, PSK extract, melatonin, and omega 3 oils EPA and DPA. Hyaluronidase inhibitors include apigenin, boswellia, gotu kola Centella asiatica, horse chestnut escin Aesculus hippocanastrum, luteolin, reseratrol, proanthocyanidins, ruscogenous, vitamin C.

INDUCERS OF DIFFERENTIATION – (make tumours act more normal, including tumour stem cells) –boswellia, butyrate, berberine, bromelain, retinoids, vitamins A and D, quercitin, calcium, soy, inositol-6-phosphate, poly-MVA, melatonin, and burdock root.

TRANSFORMING (TRANSITIONAL) GROWTH FACTOR BETA TGFβ INHIBITORS – (to control stemness, angiogenesis, metastasis, immune suppression and oxidative stress) – R-alpha lipoic acid, quercitin, curcumin, berberine, metformin, green tea EGCG, taurine, lycopene, licorice root, pokerooot, silymarin omega 3 fish oils, vitamin C. reseratrol, ginkgo biloba, rehmannia. Reduce obesity to restrict leptins linked to TGFβ-1 signaling.

BCL-2 INHIBITORS – (regulate apoptosis) - green tea extract, quercitin, curcumin, birch betulinic acid, scutellaria, hibiscus, rosemary carnosol, indole-3-carbinol, DIM, beta-sitosterol, mistletoe, ginger, vitamin C, grapeseed, reseratrol, theophylline, taheebo beta-lapachone, ginseng, andrographites, feverfew, rhabdosia.

PROTEASOMAL REGULATORS – (control expression of genes at the protein transcription level) – green tea EGCG, curcumin.

TOPOISOMERASE INHIBITORS (reduce DNA copying needed for cells to double) - green tea (I), boswellia (I & II), berberine (I & II), camptothecin, etoposide, scutellaria (II), genestein. Topoisomerase-II inhibitors do not mix with glucosamine compounds.

HEAT SHOCK PROTEIN BLOCKERS (HSP make cancer cells vulnerable to stress) - quercitin, Ashwagnadhha, R-alpha lipoic acid.

CELL-TO-CELL COMMUNICATION MODIFIERS – (make cancer cells better neighbours) -GLA, CLA, bromelain, green tea catechins, melatonin, hyaluronic acid, vitamin D, curcumin, grapeseed OPC’s, milk thistle.
CYTOTOXICS – (kill cancer cells directly) - berberine, mistletoe, graviola, isatis, Taxus, Cephalotaxus, Catharanthus, artemesinin.

TUMOUR NECROSIS FACTOR TNF INHIBITORS – (reduce inflammation and growth signals) - EPA oils, reishi, melatonin, melanin (echinacea, black cumin, tea), black seed *Nigella sativa* thymoquinone, milk thistle, cat’s claw, gamma vitamin E, vitamin A, vitamin D3, soy genestein, green tea EGCG, primrose oil, curcumin, quercitin, emodin, resveratrol, hypericin, luteolin, caffeic acid.

HORMONE MODULATORS – (cut off hormone growth signaling) - flaxseed, melatonin, indole-3-carbinol (I3C), diindolylmethane (DIM), sulphoraphane, berberine, resveratrol, quercitin, potassium iodide.

AROMATASE INHIBITORS AlS – quercitin, grapeseed procyanidin B dimers, white button mushrooms *Agaricus bisporus*, melatonin, reishi, green tea EGCG, pomegranate, progesterone, iodine.

MAST CELL DEGRANULATION INHIBITORS – (control histamine to slow growth) - quercitin, green tea EGCG, grapeseed proanthocyanidins, genestein, luteolin, apigenin, vit. C, *Eleutherococcus senticosis*.

ANTI-COAGULANTS – (blood stasis due to fibrin accumulation leads to inflammation) – omega 3 seal oil, fish EPA oils, garlic, bromelain, resveratrol, anthocyanidins, curcumin, gamma vitamin E, *Coriolus PSK, Ganoderma* (reishi), astragalus, genestein, quercitin, emodin, luteolin, *Panax ginseng, Ginkgo biloba*, lumbrokinase, nattokinase, *Salix alba*.

ANTI-CACHEXICS - (stop metabolic wasting syndrome) - EPA omega 3 oils, CLA, melatonin, gamma vitamin E, vitamin C, carnitine, green tea EGCG, cat’s claw, milk thistle.

PTEN PROTECTOR – (tumour suppressor gene) – honokiol, indole-3-carbinol, diindolymethane, curcumin, quercitin, genestein, isoflavones, butyrate, omega 3 DHA, resveratrol, astragalus, thymoquinone, rhodiola, ashwagandha, sulphoraphane, licorice root, green tea.

FIBROBLAST GROWTH FACTOR RECEPTOR FGFR - Modified citrus pectin.

BASIC FIBROBLAST GROWTH FACTOR BFGF - curcumin, R-alpha lipoic acid, milk thistle, vitamin D3, laminaria.

**Leading Remedies for Integrative Cancer Care**

The following natural medicines are my primary tools to arrest the growth and spread of most cancers. Several of these agents are usually clustered into a rational program I would call a protocol. Various protocols I have developed out of this set of remedies have been sufficient to shrink away tumours, produce good remissions, and even cure some cases. At least they may improve quality of life and slow the progress of the disease. Most of my patients become stable or better.

This section describes some of the most potent cancer therapies I know, but it is only the tip of the iceberg. This book is not intended to show you the entire naturopathic repertoire. Naturopathic physicians and their networks of healing practitioners will tailor a program to fit the person, and will select homeopathic remedies, perform acupuncture, prescribe detoxification regimes, exercise programs and more. We are a gold-mine of good ideas, and the items mentioned here are only nuggets to pique your interest.

I prescribe professional brands including BioClinic Naturals, Nutritional Fundamentals for Health (NFH), and Vitazan. I am not prescribing these to any reader of this book. I can only be responsible for their application in patients I have actually examined, interviewed, and where I have reviewed their medical records, labs and imaging. Unless I know your case and all your medications, I cannot help you.

Your health care providers will have their own knowledge and experience to contribute, and their own protocols. They may prefer other products or doses. You may receive other recommendations depending on your general
health, the type of cancer you are experiencing, and your medications. In every case, your physicians have the final word regarding your care. The following are merely reasonable suggestions worthy of your and their consideration. All are to be taken with some food, unless otherwise indicated.

**Eat whole fresh organic foods**, typically with emphasis on low glycemic load.

**Green tea EGCG 95% polyphenol concentrate (low caffeine) –** a 700 mg capsule 3 times a day. This is equal to dozens of cups of green tea as it is normally brewed. Obviously you could not drink enough tea to get this amount of medicine, so you must get it as a concentrate in a pill. EGCG stops cancer in many different ways.

**Mixed tocopherol vitamin E -** 400 IU once daily with food when on EGCG therapy to prevent kidney and liver harm from high-dose tea polyphenols. Must contain gamma tocopherol!

**Can-Arrest** – bromelain, boswellia, curcumin and quercitin - 2 capsules 3 times a day to control inflammation and its many growth factors. From Vitazan, a professional label sold only through doctors.

**Curcumin** – I currently prescribe the BioClinic Naturals micronized TheraCurmin Pro “2X strength 120 mg” 1 to 2 capsules 2 times daily. **IV curcumin** is dosed at 40 mg/Kg BW, using 20 mg/mL water soluble form, up to 6 grams, twice weekly. It may provoke gallbladder or right shoulder pain.

**Jingli Neixao** - is a Chinese herbal formula custom-made for my clinic dispensary from safe herbs. Take 2 capsules 3 times a day at meals to strengthen the organs and general vitality, including the immune system. This formula has been used in a number of Chinese hospitals. It is a tremendous tonic and healer.

**Vitamin C** - 1 level tablespoonful in water, taken in 3 or more portions daily - start with 1 tsp, then increase daily to 1 ½, 2, 2 ½ and finally 3 tsp or 1 Tbsp = 12 grams, or to bowel tolerance - which means until you get a little diarrhea. Once you are at your top dose, you must never come off it suddenly – reduce it at the same rate as you increased it, or you risk rebound scurvy. In advanced cases we may add intravenous vitamin C therapy.

**Multivitamin & minerals** - 1 capsule per day. I like a one-a-day in a capsule for my cancer patients needs. The B-vitamins are particularly important in regulating cancer’s abnormal energy production. I may Rx 2 a day.

**Benfotiamine** - a fat-soluble form of vitamin B1 (thiamine), 160 mg twice daily to regulate energy metabolism and the shut-off switch for bad cells. Thiamine is commonly dosed at 100 mg twice daily.

**Modified Citrus Pectin** - MCP – twice daily 4 caps, or about 1 tsp. blended in hot water, halts cancer spread and inhibits tumour growth. The best products are standardized by size of the pectin fragments, to maximize effectiveness.- I use only Pectasol-C. The new lime version is much more water soluble and easy to use.

**Iscador or Helixor mistletoe** – 1 ampoule by injection just under the skin about 3 times per week. Mistletoe makes the immune system stop supporting the tumour growth, and turn into attack mode. Huge impact on quality of life is expected. Mistletoe will usually stabilize advanced cancers. Over 50% of advanced cancer cases get a strongly positive response, with real life extension. Helixor M is used IV, as in IV-vitamin C drips.

**Indole-3-carbinol** – 400 to 600 mg divided into two doses daily for detoxifying and reducing growth stimulating hormones, as well as controlling various growth factors. Found in all the cabbage and mustard family food plants. DIM is equivalent, and dosed the same.

**Melatonin** – 3 to 20 mg at bedtime only - 8 pm to 12 midnight. The usual dose of this pineal gland hormone is 10 to 20 mg for cancer. Gradually increase by 3 mg per night, and drop the dose down if you get nightmares or feel depressed of groggy in the morning. Antioxidant and hormone regulator. Melatonin extends lifespan significantly.

**Coenzyme Q-10** - 300 to 400 mg ubiquinone or 100 mg ubiquinol daily, to promote repair and restoration of normal energy metabolism.
**R-alpha lipoic acid** – 300 mg 3 times daily to rescue mitochondria and turn on the off-switch for bad cells, killing the tumours. Helps detoxify from chemicals and heavy metals too. Called D-ALA for nebulizing or IV use.

**Mito-SAP** – NFH mitochondrial rescue formula to normalize cancer cells metabolism and energetics.

**Grapeseed extract** oligomeric proanthocyanidins OPCs - 200 to 500 mg 2 times daily, anti-inflammatory, antioxidant, cancer killer, normalizes blood vessels and prevents unwanted hormone production.

**Reishi mushroom** hot water extract – 2 capsules 2 to 3 times daily to balance immune responses and heal cancer.

**Ellagic acid** – as found in 8 ounces of unsweetened pomegranate, grape or berry juices – cranberry, raspberry, blueberry, blackberry. These are very powerful anti-cancer foods.

**Artemisinin** – wormwood extract burns iron out of cancer cells. Take daily for one week, then take a week break. Repeat as needed, under close medical supervision of your blood counts, iron status and liver health.

**Artesunate** - by IV, followed by IV-vitamin C gives an amazing high rate of responses in advanced cancers.

**Selenium** from yeast – 200 mcg capsule 1 to 2 times daily with food. A non-toxic organic form of the mineral selenium, which assists in repairing DNA damage, and supports thyroid hormone activation.

**Milk thistle** extract – 2 capsules or 1 dropperful tincture 3 times daily restricts the growth factor active in 85% of cancers. Also heals the liver and strongly detoxifies.

**Vitamin A** - Controls and normalizes cell growth. Used orally only short term at doses over 3,000 IU due to its impact on vitamin D receptors. Go big, but short term. Also used topically in castor oil.

**Vitamin D3** - 2000 to 3,000 IU daily, after a larger loading dose. Some protocols go as high as 500,000 IU in a single dose and 50,000 IU once monthly. Strongly prevents cancer. Cancer cells actually try to deactivate it and prevent its manufacture. Foil them by taking this potent cell growth regulator.

**Hoxsey** herbal tincture – 1 dropperful (20 -25 drops) 3 to 4 times daily - usually I will add a personalized homeopathic remedy to the tincture. Balances cell charge, hormones and liver function.

Natural medicines which can be very useful for better nutrition, to alleviate side-effects, to restore real health, and create healing conditions:

**Vitazan Milk Thistle Combination** - 2 capsules 3 times daily is a true life-saver in liver failure, and a great detoxifier. Globe artichoke, dandelion root, curcumin and alpha lipoic acid make it work beautifully.

**Vitazan Body Detox** – 2 capsules three times daily.

**L-carnitine** or **acetyl-L-carnitine** 1,000 mg 2 to 3 times daily restores energy to heal the gut, and chemo brain.

**Ginger root** – If you are nauseated take 2 ginger caps or hot grated ginger tea 1/2 hour before eating or taking any medications.

**Greens First** – 1 scoop 2 times daily. **Doctors Choice** brand tastes great and delivers the nutrition of several servings of vegetables.

**Red Alert** - 1 scoop daily as a superfood concentrate equal to several servings of fruit and vegetables.

**Dream Protein** whey – 1 scoop 2 times daily for albumin protein, strengthens weak patients and speeds healing.
Use in smoothies. Note that all capsules can be opened and made into a blender drink with fruit, milk, yoghurt or whatever is appealing. Blueberry, grape or pomegranate juices to be excellent to mask any odd flavours and odors. We can make a meal replacement which is far superior to Boost or Ensure by blending Dream Protein powder, Greens First or Red Alert, coconut oil and coconut milk, fish oil, and vitamin C powder and a multivite.

**UltraClear** defined food diet. Low stress on the gut and it’s entirely digestible. A potent tool for detoxification.

**Seal oil omega 3** - EPA, DHA and DPA - 2 capsules 2 times daily Anti-inflammatory and blood mover so it reduces pain and risk of clots. Supports the brain, heals leaky gut syndrome, and stops wasting. Fish oil may be used instead, at 3,000 – 4,000 mg daily. Sardine and anchovy oil is good, distilled oil is better.

**Aswagandha** herb 2 capsules 3 times daily helps manage stress. We may also use theanine, rhodiola or ginseng.

“**Remembered Wellness**” CD for relaxation, visualization exercises and stress management.

**Psychotherapy** can unleash the tremendous pharmacy in our brains, and the healing power of the mind and body. Counseling, hypnotherapy, neuro-linguistic programming NLP, Time-line therapy, expressive therapies (art, music journaling).

**Reiki** universal healing energy treatments for healing spirit and body. I am most enthusiastic about the Usui method, a traditional Japanese healing art. People often make dramatic shifts both physically and emotionally. It is deliciously relaxing, rejuvenating and healing.

**FOUNDATION PROTOCOLS OF NATUROPATHIC ONCOLOGY**

| “Stand before Nature and the Great Mystery, see its great wisdom and follow its guidance. Nature knows what works with the least harm” | Mark Gignac, ND, FABNO |

**Mitochondria Rescue** natural agents which wake up dormant mitochondria to restore the ability of mutated and deranged cancer cells to stop before they double, and instead recycle themselves and disappear quietly. Restoring normal oxidative metabolism shuts down fermentation reactions and acid production, cutting off the production of materials necessary to maintain formation of new cells.

- MitoSAP 3 capsules twice daily at meals. NFH brand MitoSAP contains R-alpha lipoic acid, acetyl-L-carnitine, quercetin, grapeseed proanthocyanidins, thiamine and emulsified Co-enzyme Q-10.
- OR - R-alpha lipoic acid – 300 mg bid – tid - IV D-ALA twice weekly, or D-ALA nebulized 1 to 2 times daily at home. Beware hypoglycemia, hypothyroidism.
- AND thiamine 100 – 200 mg or benfotain 160 mg bid.
- Niacinamide 500 mg bid
- Glumetza extended release Metformin 500 – 1,000 mg at meals
- Low-dose Naltrexone 4.5 mg hs
- Low glycemic, calorie restricted or ketogenic diet, or Mediterranean diet with ample omega 3 marine oils, olive oil, lemongrass, berries, pomegranate, grapes, apples, cabbage family vegetables, chili peppers, onions, garlic, and whole grains.
- Regular intense aerobic activity.

On this foundation one can develop a complete program of diet, supplements, exercise, mind-body healing, stress management, self-expression, detoxification and all the elements of Nature that create real healing conditions.

The core group of therapies I advised in the first edition *Naturally There’s Hope*, 2003
- curcumin –*TheraCumin* “2X strength” 120 mg bid.
• green tea EGCG – 3 to 4 of AOR 700 mg, with daily gamma tocopherol vitamin E to prevent renal toxicity.
• grapeseed extract OPCs –500 mg qd-bid, from Vitazan or NFH.

We commonly add the following to make a basic protocol:
• indole-3-carbinol and/or DIM – 400 - 600 mg, daily divided into two doses, at meals.
• quercitin 1,000 mg bid-tid.
• modified citrus pectin – PectaSol-C only 1 scoop or 4 capsules bid.
• nebulized D-ALA and DCA, or IV-D-ALA or Poly-MVA following IV DCA.
• IV-vitamin C - supports chemo, improves quality of life, cytotoxic to some cancers.
• whole foods, low glycemic load, pesco-vegetarian, Mediterranean diet.
• Reiki healing

Immune therapies, which are always an important part of any program:
• mistletoe lectins, by subcutaneous self administration, slow IV, or peri-lesional injection.
• low-dose Naltrexone – up to 4.5 mg hs to activate CD8+ cytotoxic T-cells
• reishi mushroom hot water extract eg NFH 2 to 3 caps bid.

Adjunct remedies sometimes required:
• artemesinin 300 - 400 mg tid orally. Take as prescribed, it is a potent drug.
• artesunate 100-120 mg IV, twice weekly. Piggy back with 25 – 60 gm IV-C
• Helixor M or P mistletoe lectins added to IV-Vitamin C drips, or injected around tumours.
• cannabis eg Phoenix Tears Oil for pain, nausea, appetite and tumour control, to 1 gm /0.71 mL daily.
• ketogenic diet
• hyperthermia
• high dose vitamin A eg 50,000 IU tid.

Lab tests commonly requested: CBC, ferritin, hs CRP, fibrinogen, HbgA1C, ceruloplasmin, serum copper, fasting insulin, IGF-1, vit. D3 - 25(OH)D, 8-OH-dG, tumour markers such as CEA, Ca-125, Ca-19-9, Ca-15-3, PSA.

SPECIFIC NATUROPATHIC ONCOLOGY REMEDIES REPETORIZED FOR SPECIFIC CANCERS

<table>
<thead>
<tr>
<th>Bladder</th>
<th>Leukemia</th>
<th>Liver &amp; Gallbladder</th>
<th>Ovary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>Lung</td>
<td>Lymphoma</td>
<td>Prostate</td>
</tr>
<tr>
<td>Breast</td>
<td>Melanoma</td>
<td>Multiple Myeloma</td>
<td>Skin</td>
</tr>
<tr>
<td>Cervical (+Vulva)</td>
<td></td>
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<tr>
<td>Colorectal</td>
<td></td>
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<td>Esophagus</td>
<td></td>
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<td>Kidney</td>
<td>Nasopharyngeal, head &amp; neck</td>
<td>Thyroid</td>
<td>Uterus</td>
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BLADDER CANCER

1° oral and IV-vit. C, low-dose Naltrexone, mistletoe lectins, reishi, green tea EGCG +γ vit.E, hyperthermia.
2° curcumin, grapeseed extract, methylsulfonylmethane MSM, sulforaphane.
3° evening primrose/GLA oil, indole-3-carbinol/DIM, milk thistle extract, carotenes, L. caseii probiotic.

BRAIN & NERVE CANCERS

1° oral & IV DCA, IV-D-ALA, Poly-MVA, boswellia, ketogenic diet, metformin, IV-vit.C, oral & IV curcumin.
2° grapeseed extract, green tea EGCG with γ vit. E, low-dose Naltrexone.
3° reishi, coriolus, or lion’s mane (Hericium erinaceus) mushroom extract, quercetin, GLA oil, cannabis
oil, detoxify targeting fat-soluble pesticides and solvents.

Acute neurologic compromise: Rx dexamethasone 4 mg bid-tid preferably early in the day.
…if chronic Rx 4 mg and increase by 1 mg per day until improved, then taper by 0.5 -1.0 mg per week.

BREAST CANCER
1° indole-3-carbinol/DIM, melatonin, LDN, oral and IV D-ALA, artemesinin, artesunate IV + IV-vit.C.
2° grapeseed extract OPCs, green tea EGCG with γ vit. E, quercitin, curcumin, mistletoe— mistletoe M for pre-menopausal, mistletoe P if post-menopausal or metastatic, Glumetza (metformin ER).
3° reishi, sulforaphane, MCP, flaxseed, Co-Q-10, detox from fat-soluble pesticides and solvents.

Triple negative: EGCG, I3C, curcumin, grapeseed, AHCC, sulforaphane, Co-Q-10, Metformin.

CARCINOID (GI NEUROENDOCRINE) TUMOUR
1° oral + IV-D-ALA, LDN, mistletoe SC + peri-lesional, Metformin ER, Cortisol Manager, Solomon’s seal.
2° curcumin, grapeseed extract OPCs, green tea EGCG + γ vit. E, milk thistle, artemesinin, artesunate + IV vit. C.
3° digestive enzymes, hesperidin, rhodiola, melatonin, vit. A suppositories, cannabis PTO, Celebrex, IV Traumeel.

CERVICAL CANCER
1° vit. A oral & suppository, LDN, reishi, mistletoe lectins, indole-3-carbinol/DIM, Vag-Pack escharotic,
2° artemesinin, IV artesunate +IV-vit. C, quercitin, grapeseed extract, green tea EGCG with γ vit. E, curcumin.
3° zinc, melatonin, plant sterols and sterolins (squamous), folate, lycopene, Thuja, vit. A or cannabis suppository.

COLORECTAL CANCER
1° low-dose Naltrexone, reishi, mistletoe lectins, oral and IV-D-ALA, IV-vit.C.
2° quercitin, grapeseed extract OPCs, green tea EGCG with γ vit. E, curcumin, Jingli neixao.
3° indole-3-carbinol/DIM, melatonin, milk thistle, cannabis suppository, artemesinin, artesunate IV + IVC.

ESOPHAGEAL CANCER
1° green tea + γ vit. E, curcumin, grapeseed extract, LDN, reishi, mistletoe lectins.
2° oral and IV-D-ALA and DCA, artemesinin (squamous cell); zinc, vit. A.
3° Liu Wei Di Huang Wan, Jingli neixao, cannabis. RTx: zinc, calendula, aloe.

KIDNEY CANCER
1° oral and IV-vit.C, IV-artesunate, oral and IV-D-ALA, low-dose Naltrexone, reishi, mistletoe lectins.
2° oral and IV curcumin, grapeseed extract, green tea EGCG with γ vit. E, niacinamide, HCA, Glumetza.
3° co-Q-10, indole-3-carbinol/DIM, melatonin, milk thistle, Cimetidine or Famotidine (Pepcid), vit. B6.

LEUKEMIA
1° mistletoe P lectins, LDN, reishi or coriolus, oral and IV curcumin, green tea EGCG + γ vit. E.
2° quercetin, taurine, R-ALA, omega 3 oils, indole-3-carbinol/DIM, vitamins A, D3, K2. Helleboris niger D12
3° cannabis PTO, co-Q-10, artemesinin, artesunate, holy basil, berberine (not with stem cell transplants), do NOT give melatonin or astragalus except during chemotherapy!

LIVER & GALLBLADDER CANCER
1° reishi, low-dose Naltrexone LDN, mistletoe lectins, oral and IV-D-ALA, IV artesunate + IV vit. C.
2° milk thistle, Jingli neixao, berberine, artemesinin – for hepatocellular cancer and all liver mets.
LUNG CANCER

1° astragalus, IV-DCA, oral and IV-D-ALA, IV-vit. C, LDN, grapeseed extract, mitochondrial rescue.
2° reishi, coriolus, or chaga mushroom extract, mistletoe lectins, curcumin, quercetin, IV or nebulized *Helleboris niger* D12.
3° artemesinin, modified citrus pectin, vit. D3, cannabis PTO. Nebulize: D-ALA, bicarbonate, curcumin, GSH.

LYMPHOMA

1° mistletoe P lectins, low-dose Naltrexone, reishi, indole-3-carbinol/DIM, IV-vit. C, vit. D3.
2° oral and IV-D-ALA, Glumetza, CoQ-10, green tea EGCG + γ vit. E, curcumin.
3° Jingli neixao, artemesinin, cannabis oil, test and eliminate food allergies/sensitivities.

MELANOMA

1° mistletoe P lectins, LDN, modified citrus pectin, betulininc acid/Chaga mushroom extract, Bifidobacterium.
3° green tea, curcumin, cannabis PTO, resveratrol, vit. D3, vit. K2, Avemar, thyroid hormone or Metformin to suppress TSH, sulforaphane, milk thistle, hesperidin methyl chalcone, *Calendula*, feverfew, omega 3s.

MULTIPLE MYELOMA

1° mistletoe lectins, LDN, reishi, oral and IV-D-ALA, vit. D3, vit. K2, indole-3-carbinol/DIM.
3° strontium citrate, berberine, artemesinin, artesunate + IV-vit. C.

MYELODYSPLATIC SYNDROME

1° mistletoe P lectins, low-dose Naltrexone, reishi, oral and IV-D-ALA, omega 3 oils, curcumin.
2° grapeseed extract, green tea EGCG + γ vit. E, milk thistle, artemesinin, modified citrus pectin, burdock root.
3° vit. D3, vit. K2, alkylglycerols, serrapeptase, avoid wheat and possibly also dairy foods.

NASOPHARYNGEAL, HEAD and NECK CANCER

2° grapeseed extract, green tea EGCG + γ vit. E, oral and IV curcumin, IV-vit. C, zinc.
3° IV-arteresunate, artemesinin (squamous cell), indole-3-carbinol/DIM, modified citrus pectin.

OVARIAN CANCER

1° mistletoe lectins, LDN, reishi, quercitin, curcumin, IV DCA/D-ALA. Alternate with IV-vit. C, IV curcumin.
2° indole-3-carbinol/DIM, melatonin, artemesinin, IV artesunate, oral R-ALA, Glumetza, vit. A. IV or nebulized *Helleboris niger* D12.
3° modified citrus pectin, genestein, resveratrol, Avemar, zinc, molybdenum. Test and treat excess copper, iron.

PANCREAS CANCER

1° indole-3-carbinol/DIM, mistletoe lectins, LDN, reishi, oral and IV D-ALA, IV-DCA, IV-arteresunate + IV-vit. C.
2° milk thistle, Jingli neixao, artemesinin, black cumin, Celebrex, niacinamide, hydroxycitrate, Glumetza.
3° modified citrus pectin, quercitin, vit. D3, acetyl-L-carnitine, digestive enzymes, castor oil packs.
PROSTATE CANCER

1° indole-3-carbinol/DIM, green tea EGCG + α vit. E, omega 3 oils, melatonin, MCP, artesuante, DCA, oral and IV-D-ALA, thiamine or benfotiamine (vit. B1). Solomon’s seal, yew and periwinkle.

SARCOMA

1° mitochondrial rescue, IV-D-ALA, IV-DCA, artemesinina (fibrosarcoma), IV-artsunate, IV-vit. C, SC and IV mistletoe P lectins (M for osteo-muscular sarcomas), modified citrus pectin.
3° green tea EGCG + α vit, E, TheraCurmin curcumin, grapeseed extract.

SKIN CANCERS

1° Efudex, Aldara, mistletoe P lectins SQ and peri-tumoural, chaga or reishi, vit. A, grapeseed extract, green tea EGCG + α vi. E. 
2° modified citrus pectin, low-dose Naltrexone, CoQ-10, quercitin, artesuinin, vit. D3 oral and topical. 
3° NASOBIH *Nutra-Cream*, milk thistle, astragalus, topical castor oil + vit. A. Emulsion, topical cannabis oil.

STOMACH CANCER

1° low-dose Naltrexone, reishi, mistletoe lectins, green tea EGCG + α vit. E, curcumin, grapeseed extract. 
2° quercetin, Jingli neixao, oral vit. C, oral and IV-D-ALA, oral artemesinin or IV artesunate + IV vit. C. 
3° milk thistle, *Aloe vera* gel, Cimetidine or famotidine H2 antagonists.

THYROID CANCER

1° mistletoe lectins, low-dose Naltrexone, reishi, oral and IV-D-ALA, IV-DCA. 
2° green tea EGCG + α vit. E, curcumin, quercitin, zinc, vit. A. 
3° milk thistle, alkylglycerols, resveratrol, ellagic acid, omega 3 oils, suppress TSH with thyroid hormone to create subclinical hypothyroidism, and/or use Metformin.

UTERINE CANCER

1° vit. A oral and suppository, low-dose Naltrexone, mistletoe lectins, reishi, indole-3-carbinol/DIM. 
2° quercitin, grapeseed extract, green tea EGCG + α vit. E, oral and IV-D-ALA, melatonin. 

VULVA

1° vit. A retinol (not carotenes for smokers!), mistletoe M lectins, low-dose Naltrexone, reishi extract. 
2° cat’s claw vine, plant sterols and sterolins, artesuinin.
3° see ‘Cervical Cancer’.

Chapter Nine: INTEGRATIVE CARE OF BREAST CANCER

EPIDEMIOLOGY
The most common cancer of women in North America is breast cancer. 1% of breast cancer cases are male. Approximately one woman in 7 in North America will develop this disease in her lifetime. Before 1971 the risk was 1 in 20! It is the second leading cause of death in American women, and the leading cause of death in the age group 40 to 55 years. The death rate had been unchanged from 1920 to 1990, but has reduced slightly in recent years. Fortunately 5-year survival is about 84%, partly because it is reasonably treatable, often curable. Risk in Asia and Africa is 4 to 5 times less, indicating the strong role of lifestyle choices, and the opportunity for prevention.

Breast cancer cells have an average doubling time of about 100 days, which is relatively slow. There is time to reflect and decide among the various treatment options.

There tends to be a slightly increased risk of reoccurrence some months after surgery, related to angiogenesis and immune dysregulation from surgical trauma. Mortality rates for breast cancer do not fall off over time, as seen with most types of cancer. The steady occurrence of relapses over the years suggests the persistence of micro-metastatic disease, even after what is now considered definitive curative treatment.

**RISK FACTORS FOR DEVELOPING BREAST CANCER**

- family history in first degree relative - mother or sister.
- early menarche (start of menstruation).
- late onset of menopause.
- estrogen excess such as estrogen replacement therapy in menopause or use of birth control pills before age 35 or longer than 5 years. Estrogen and progesterone combination hormone replacement therapy (HRT) is also linked to increased risk of gallbladder cancer, stroke, heart attack, blood clots and Alzheimer’s.
- obesity - fat cells make estrogen via aromatase enzyme.
- high fat diet, especially those high in arachidonic acid and saturated fat.
- moderate to high alcohol consumption increases risk 50 to 100%. Risk is entirely dose-dependent - for example, risk increases 45 to 50% with consumption of more than half of a glass of wine daily! Steven Bowlin of Case Western Reserve University states that 25% of breast cancers can be attributed to alcohol. The cancer risk from alcohol consumption is slightly reduced by supplementing folate and MMP-2 inhibitors such as green tea.
- excess iron load increases risk. Measure serum ferritin.
- nulliparous – never having a child – increases risk up 30%
- child-bearing after age 30. First full term pregnancy after age 25 puts up risk 40% over those having a child before 20.
- excess exposure to xenobiotics with estrogenic properties such as pesticides and herbicides. For example organochlorine pesticides like DDT increase risk of larger and more aggressive cancers.
- plasticizer bis-phenol A (BPA) accumulates in breast fat and is a potent xeno-estrogen. Found in soft plastics such as Saran wrap, food containers and water bottles. The FDA safety limit is two parts per million – 2 ppm – but it is clinically estrogenic at two parts per billion – 2 ppb.
- exposure to anti-psychotic drugs which are dopamine antagonists, and anti-emetic dopamine antagonists for vomiting, because they elevate prolactin.
- depression has been found to increase risk of breast cancer by 42%.
- calcium build-up inside cells (cellular hypercalcinosis) is a powerful trigger of carcinogenesis, and ironically is due to a lack of proper calcium intake and utilization. If you are going to stay out of the sun and use sunscreens, you had better be taking a supplement of 2,000+ IU vitamin D3 daily.
- low intake of calcium, vitamin D, vit. K2 and other bone health factors promotes metastasis into the bones.
- MMTV-like virus, a relative of the mouse mammary tumour virus, is found in 40% of USA female breast cancers, with a 5-fold increased risk of aggressive disease, and a strong link to inflammatory breast cancer. The viral genome splices into the Notch-4 locus, activating cancer stem cells.
- a high glycemic diet - high in sugar and refined starches is associated with higher risk of breast cancer and more rapid progression of the disease.
- calcium channel blocking drugs increase risk 2.5 fold after a decade.
• insulin, prolactin, insulin-like growth factors and growth hormone are breast cancer promoters. Even slightly elevated IGF-1 and IGFBP-3 indicate significant risk for breast cancer in the Harvard Nurses Study. A major prognostic indicator for breast cancer patients is the blood insulin level at the time of diagnosis.

• stress hormone adrenaline (epinephrine) blocks cancer cells throwing the apoptosis death switch. Stress reduces the effectiveness of cancer therapies. The psycho-neuro-immunological system or hypothalamic-pituitary axis regulates a number of chemicals which breast cells carry receptors for: insulin, prolactin, vitamin D, estrogen, progesterone, testosterone and other androgens.

• silicone breast implants increase risk 18X of a rare anaplastic large T-cell lymphoma, to 0.2 cases per year per 100,000 women with implants.

• breast cancer metastases preferentially target the lung when they express tumour necrosis factor TNF-related apoptosis-inducing ligand TRAIL.

• transforming growth factor beta TGFβ may be responsible for single cells metastasizing from breast tumours. Without it, only clumps tend to break off, which tend to lodge in regional lymph nodes.

• counting circulating tumour cells may predict risk in breast cancers. Best is ≤ 5, worst is ≥50.

**GENETIC FACTORS IN BREAST CANCER**

Genetic factors may only cause 5% of cases. Jewish people have slightly higher risk than other ethnicities. The DNA mutations that create and sustain cancers begin with genomic instability, marked by shortened telomere content, and allelic imbalance. These genetically aberrant cells will look normal when stained and examined under a microscope by a pathologist. They are not yet cancer, but are in the process of clonal evolution which can over time result in grossly cancerous cell behaviour and appearance. Breast cancers have been shown to have marked genomic instability in the cells up to a full centimeter out from the visible tumour margins. This is referred to as a “field of cancerization”, tissue at risk of becoming cancer, even if the gross tumour is removed. This is why we like to see “wide surgical margins”. It is likely the tumour is enslaving immune cells and stem cells to alter the intracellular matrix to promote conditions favorable to the tumours, namely abnormal control over growth and differentiation of the cells in the region.

**BRCA-1 or BRAC-2** gene on chromosome 17 normally repairs DNA tangles, independent of p53. Female carriers of mutated BRAC-1 have an 85% lifetime risk of breast and up to 50% risk of ovarian cancers. Male carriers have 4 times increased risk of developing colon cancer, and 3 times increased risk of developing prostate cancer.

BRCA/BRAC-1 deficient cells cannot keep silent areas of repetitive sequences near the telomeres of chromosomes. Normal BRAC-1 uses ubiquitin to tag these heterochromatric centres with histone DNA-packaging proteins. Mutations in BRAC-1 allow these areas to open up, flooding the cells with satellite repeat sequences which induce genomic instability, mutations and chromosome breaks. Usually the mutation is a deletion at site 33291 on chromosome 13, and is associated with increased risk of early onset breast cancer, and 4 times increased risk of uterine cancer. If this leads to mutations and small chromosomal rearrangements in the PTEN gene, then a potent tumour suppressor is inactivated, and tumour cell growth will be strongly stimulated. Abnormal cell-cycle checkpoints, transcription and cell proliferation ensues.

Carriers of BRAC mutations tend to have tumours with higher grades, more necrosis, and more proliferative activity. Male carriers have 15 times increased risk of breast cancer and 4 times increased risk of early prostate cancer.

BRAC-1 normally docks onto estrogen receptor alpha, acting as a cancer inhibitor. This protective role can be disrupted by cyclin D1, which disrupts the BRAC-1 to ERα interaction.

BRAC-1 mutation positive breast tumours are very sensitive to chemotherapy, with extremely high rates of tumour and axillary (lymph nodes in the armpit) clearance, particularly with anthracycline drugs such as Epirubicin. However, for ER+ breast cancer survival at 5 years is about 20% less than for BRAC-2 mutation carriers, or those with no mutation of the BRAC genes. So, they are easier to knock down, but harder to keep down.
Both BRAC-1 and BRAC-2 mutation carriers are less able to repair radiation damage, and have abnormally high risk of cancer induction from exposure to common diagnostic X-ray and CT-scan imaging. BRAC 1 and 2 mutations only account for less than 25% of familial risk of breast cancer. Also involved in breast cancer development are genes which relate to the control of cell growth and cell signaling such as MAP3K1, FGFR2, LSP1 and TNRC9.

BRAC-1 or BRAC-2 can also trigger heart failure, and consequently a much higher death rate from heart attacks - three to five times higher than those without this mutation. Use of heart-toxic chemotherapies such as anthracyclines is therefore higher risk in these cases.

Inhibiting the DNA repair enzyme Poly (ADP-Ribose) polymerase or PARP slows growth in BRAC-1 and BRAC-2 mutants by increasing apoptosis. PARP is a key DNA repair mechanism upregulated in triple-negative breast cancer in response to reduction in other critical pathways of DNA repair, such as BRCA1.

BRAC mutations can be normalized with epigenetic regulators such as selenium. BRAC-1 mutant cells normalize with resveratrol inhibition of Survivin expression.

The p53 tumour suppressor gene is altered in about 50% of cases of advanced metastatic disease.

Reduced p27 levels in the nucleus correlate with tumour aggressiveness and poor survival. P27 is a direct inhibitor of cyclin-dependent kinase 2 (cdk2) responsible for transcription factors that promote DNA replication. In advanced breast cancer a protein kinase Akt bars p27 from the nucleus by phosphorylating p27 in its nuclear localization signal sector. Phosphorylated P27 ends up sequestered in the cytoplasm, unable to bind up and inhibit the nuclear protein cdk2 involved in cell regulation. Akt also fosters cell proliferation, survival and motility through P13K kinase which is activated by the HER-2 and epidermal growth factor receptors.

HER-2/neu gene overexpression or amplification results in increased increased HER-2/neu protein. Too much of this transmembrane glycoprotein results in overexpression of EGFRs - epitheliod growth factor receptors. EGFR is always important in any carcinoma.

HER-2/neu + status is associated with increased NFκB activity, and therefore inflammation and all its associated growth factors. This is particularly problematic in rapidly proliferating tumours.

There is also speculation this gene may reduce estrogen and progesterone hormone receptors on the surface of the breast cancer cells, making them harder to cure. Even tumours under 1 cm in diameter and found before axillary spread high-risk for aggressive growth and spread, and they tend to go into the brain.

HER-2 positive breast cancer may respond to anthracycline chemo drugs including Doxorubicin, Epirubicin, Adriamycin, Daunorubicin, Idarubicin and Mitoxantrone. However, HER-2 negative cases do not respond to anthracyclines, and they no longer represent the standard of care for these patients.

Quercitin is able to reduce HER-2 signalling and therefore reduces activity in the EGFR. Emodin in herbs such as Aloe vera also modulate HER-2 expression.

In Her2/neu + cases we also target STAT-3, mTOR and YB-1, for example with curcumin, indole-3-carbinol and green tea EGCG.

Luminal breast cancers may have a MAP3K1 mutation.

Inflammatory breast cancer may be linked to the presence of MMTV-like gene sequences from the mouse mammary tumour virus, also found in dogs. These genetic taints are seen in 40% of breast cancers and correspond to a 5 times increased risk of aggressive disease. Consider Toll-like receptor inhibitors such as Imiquimod. Once breast cancer has occurred, the risk of a second occurrence goes up 5 fold. The five year relapse risk is 10 to 20%. A person with breast cancer is also at higher than average risk of developing cancer of the colon, ovaries or endometrium of the uterus (lining of the womb).
Genes associated with early reoccurrences: MAPK1, CDK1, Src and CALM 1, 2 & 3.
Genes associated with late reoccurrences: EGFR, Bcl-2, AR, ESR 1 & 2.

REDUCING RISK OF BREAST CANCER

High intake of dietary fiber, vitamin C, beta-carotene, lycopenes, legumes, cruciferous vegetables, green tea.

Even ¼ grapefruit daily inhibits the estrogen-clearing cytochrome P450 CYP3A4 enzyme in the liver enough to increase risk of breast cancer by as much as 30%. DO NOT EAT GRAPEFRUIT!

Low fat diet, down to 20% of calories as fat. Monosaturates such as oleic acid in canola oil and olive oil are protective. Omega 3 fatty acids are protective, as found in wild salmon, tuna, halibut, mackerel, sardines and herring; also in nuts and seeds. This is a big issue for those with estrogen-receptor negative ER- cancers.

Risk is lower in those with high HDL – the “good cholesterol”, and is better in those with high total cholesterol versus low cholesterol. Low triglycerides and low VLDL “bad cholesterol” predict a better response to treatment.

Low glycemic diet – and this is especially vital if you are sedentary, or overweight, or have been on hormone replacement therapy. A low-glycemic diet reduces risk about 22%, by controlling insulin and insulin-like growth factors.

Beans and lentils twice weekly are protective. In general vegan or plant-based diets are the lowest risk. I do insist that all animal foods be free of herbicides, pesticides, hormones and drugs. Red meat finished with grains – usually corn silage – are pro-inflammatory, whereas grass or pasture fed animals are safer, due to a more favorable omega 3 to omega 6 fat ratio.

Regular physical exercise, at least 30 minutes of aerobic exercise three times a week. The ideal is to work up to 60 minutes up to 5 times per week. Hypoxia-inducible factor alpha HIFα is associated with reduced survival and increased risk of metastases. Aerobic exercise increases circulation, and also controls blood sugar and thus insulin and insulin-like growth factors.

Sunshine and vitamin D. So many people are avoiding sun exposure and using sunscreens to reduce risk of skin cancers, but now many Canadians are showing up with vitamin D deficiency, particularly in winter. In the winter take at least 2,000 IU of vitamin D3 daily. I prefer D3 with MK-7 form of vitamin K2, 240-360 mcg daily. D helps absorb and retain calcium, but K2 drives it into the bones where it belongs, keeping it from where it does not belong. With this combination, calcium supplements are not needed.

Breastfeeding benefits your breasts - the longer the better, for you and for your baby. The breast tissue completes its differentiation and carcinogens are eliminated in the breast milk. The months during pregnancy without periods also are risk reducers, so more kids and more nursing in the past may have helped keep rates lower.

Maintain your thyroid gland. A subtle and pre-clinical hypothyroid state is a risk factor for breast cysts, fibrosis, and cancer. Iodine, exercise and immune balance are the foundation of thyroid health.

Stress management to moderate cortisol and blood sugar fluctuations.

Metastasis of breast cancer to the bones is regulated by STAT3, TGFβ, RANKL, and Src tyrosine kinases. Urokinase deficiency increases the spread of breast cancer. This can be controlled with green tea EGCG.

Maintain good bowel bacteria with enteric-coated probiotics.

Avoid use of anti-perspirants. Use natural deodorants.
Avoid alcohol, but if you must drink, take B-vitamins including folate or folic acid and vitamin B6. I prefer methylcobalamin and tetrahydrofolate and pyridoxal-5-phosphate.

4-OH-Estradiol increases cancer risk if not methylated. Provide methylation resources and avoid using these resources on chemicals you must detoxify and eliminate.

Test for and eliminate “metallo-estrogens” - the heavy metals cadmium, mercury, lead, aluminum and tin. Test copper and zinc while you area at it.

Breast cancer resistance protein BCRP is increased by intake of quercitin, resveratrol, indole-3-carbinol, green tea EGCG, and other proteasome inhibitors. Therefore eat fruits and vegetables such as apples, onions, grapes, cabbage, broccoli, and drink green tea. Dietary phytoestrogens such as soy foods modulate estrogen receptors. The dietary target for isoflavones is 40 mg daily, from foods such as miso, tofu and soy milk.

Detoxify your body of xenobiotics with an annual body cleanse. Many chemicals in plastics, pesticides, herbicides, flame retardants, etc. are hormone mimics or hormone disruptors. Health Canada and the Canadian Cancer Society claim only about 1 to 2 % of cancers can be blamed on these chemicals, but I think they are deluded or lying. The “Israeli Breast Cancer Anomaly” demonstrated that cutting 3 pesticides out of the food chain resulted in a dramatic drop of over 30% in the age-specific breast cancer mortality rate in a decade. This was after a 25 year period of continually increasing rates for breast cancer in Israel, and which continued in all other modern societies.

A naturopathic physician can guide you as to diet and herbs appropriate for your health. We can avoid a lot of risk by eating organic food, choosing natural personal hygiene and home cleaning products, and generally reducing our reliance on synthetic chemical products. Be aware that even a perfect lifestyle will not keep toxins out of your body. The environment is so contaminated with government-approved toxins that we all are at risk.

**DIAGNOSIS & SCREENING**

Breast Self Exam - recent studies suggest BSE may not be able to detect cancer early enough to alter the clinical outcome. Breast self exam BSE is no longer endorsed by many professionals, yet most breast cancer cases I see found the lump themselves - so I refuse to discourage the practice. Also, many women prefer to be proactive, and recognize that 7 to 10% of palpable masses will be missed by a mammogram. The smallest palpable mass is about 8 millimeters in diameter, which would contain about a billion cancer cells at about three fourths of their lifespan in age. Perform BSE 5 to 7 days after menses, every month. Cancer may be detected soon after a ‘normal’ mammogram. Watch for a persistent rash on the nipple, which may be the only warning of Paget’s disease.

**PHYSICAL EXAM** - professional PE by a physician or nurse should be done every 3 years between ages 20 - 40, and every 2 years thereafter. All palpable lesions should be biopsied. Most will not be malignant.

**MAMMOGRAPHY** - expert opinion about the value of mammograms has changed several times in living memory. About 0.3% of asymptomatic Canadian adult women may harbor breast cancer. The current consensus is that they are probably helpful at early detection for women over age 50. Swedish studies on women ages 48 - 69 showed up to 45% reduced mortality from breast cancer. Modern mammograms use a very low dose of radiation, in the standard two view bilateral test. There is a potential to detect masses under 5 mm diameter. The pathognomic (characteristic) lesion is a high attenuation mass with spiculated margins. These calcifications result from intracellular calcinosis. Mammography shows a false negative rate of 10 to 30%! This can be from the mass being hidden in dense breast tissue, interpretive error, and because the entire breast is not imaged. One in three masses now labeled breast cancer by screening mammography is a non-lethal “pseudo-cancer”. To avoid being over-diagnosed and over-treated, a more definitive diagnostic mammogram must be performed. Mammography can detect about 69% of cancers (sensitivity) and misdiagnose about 16% of cases (specificity). 95% of masses found by screening mammography are benign, but all should be carefully evaluated. In return for scaring the wits out of 19 out of 20 women who get a positive mammogram finding, there has been a gratifying reduction of about 15% in breast cancer deaths attributed to this screening tool. It is a fact that early detection means a better chance of a cure. Mammograms detect about 23% of breast cancers. Even those with a firm mammographic diagnosis of invasive
breast cancer have a 22% chance it will spontaneously regress without treatment. Most women with screen-detected breast cancer have not had their “life saved” by screening. They are instead either diagnosed early, with no effect on their mortality, or they are over-diagnosed. Still, it’s better to be treated early – but not too early – rather than too late.

SCINTIGRAPHY - Mibi scans are widely used in coronary disease assessment, and have been adapted for use in breast cancer diagnosis. Miraluma scans are particularly valuable if the breast tissue is quite dense, making a conventional mammogram difficult to read. The mibi scan uses an IV injection of approximately 1000 MBq of sesamibi isotope (technectium-99m hexakis 2-methoxyisonitrile) into a fasting patient who has avoided caffeine and other vasoconstrictors. The patient rests prone, breasts hanging down through openings in the table, so there is no compression applied to the breast. The mibi isotope accumulates in mitochondria, and measures metabolic activity. The procedure takes about 50 minutes. The original protocol called a Miraluma scan had approximately the same utility as mammograms. However, recently the BEST scan system has added high-dose dipyridamole (HDD) to vasodilate and enhance isotope uptake. This produces accurate discrimination of normal breast tissue from inflammation, and detects early cancers as small as 4mm diameter.

ULTRASOUND - Diagnostic ultrasound is not useful for screening, but will determine with 100% accuracy if a lesion is a cyst or a solid mass. Ultrasound can augment mammography when breast tissue is very dense. Ultrasound can only detect about 42% of breast cancers.

MAGNETIC RESONANCE IMAGING: MRI’s will not show calcifications, but will show vascularity and can therefore discriminate a local recurrence in a surgical scar. Also it is a more sensitive test for bone metastases than a bone scan. MRI can detect 96% of breast cancers, but mammograms are still the primary method of screening.

THERMOGRAPHY - very sensitive infrared cameras are being used to detect hot spots in the body, especially in the breast, which can indicate malignant changes in tissue including angiogenesis, as well as inflammation. Thermal scans easily discriminate fibrocystic lumps, as they have no thermal signature. This is the best use of breast thermography.

Hot areas can be found as much as 3 years before a cancer is diagnosable. However thermography is not an accepted tool for routine screening or primary evaluation of breast cancer, due to low sensitivity. Its sensitivity is 25%, specificity 85%, positive predictive value 24%, and negative predictive value 86%. Therefore all results suggesting cancer potential must interpreted with some caution, and verified by mammography or other means. That said, an inflamed breast deserves care.

The Bales Scientific thermal image processor is a refinement which allows images to be taken in a room that is not cold, as required for earlier scanners. Not only is this more comfortable, but after a baseline image is taken, cold air may be blown onto the breast, provoking a sympathetic nervous system response to cold stress. Normal tissue will undergo vasoconstriction and show up as cooler, but areas of new blood vessel growth will not cool.

BIOPSY

FINE NEEDLE ASPIRATION - is frequently employed, although the technique has a 5% failure rate. Ultrasound or computerized stereotactic (3D) guidance is sometimes used, mainly for non-palpable lesions. Needle biopsy techniques can sometimes create what appear to be micro-metastases into a sentinel lymph node, skewing the sense of risk the patient faces, and triggering more aggressive and damaging therapies.

CORE BIOPSY – A larger needle removes a string of tissue for pathological analysis.

EXCISIONAL BIOPSY – a more invasive procedure, but more reliable. Invasion of the tumour into the margins of the biopsy sample indicates it has not been completely removed, and indicates a more aggressive tumour type.

LYMPHATIC or VENOUS INVASION: LVI or invasion of vessels by tumour cells in a biopsy sample or surgical sample indicates the cancer has had the opportunity to metastasize, and so it is an ominous finding. These cases need aggressive care and close monitoring for some years after treatment. The blood and lymph vessels in tumours are thin-walled and leaky. High vascularity activates endothelial cell production of fibrin and IL-6 creating
coagulation and inflammation. This fosters growth and movement of cancer cells into the circulation, and often they will end up in the bone marrow. Micrometastases in the bone marrow are seen in a majority of breast cancer cases even years after presumably curative medical therapies. We know half of breast cancer cases have no spread into the lymph nodes, but half of these will still suffer a distant spread of their cancer. These vessels are their path out of the tumour.

LYMPH NODE DISSECTION - samples the lymph nodes, such as those in the armpit, for cancer spreading from the lateral breast through the tail of the breast. Breast tumours of approximately 1 cm diameter can produce cancer cells able to live in the lymphatic nodes. Lymph node positive status indicates the spread of the cancer regionally in the body, which increases the risk the cancer, can form metastatic colonies in distant sites. Removing these cancerous lymph nodes reduces the risk of a local reoccurrence of the cancer in the nodes, but it does not reduce the risk of reoccurrence of the cancer in the breast or at distant metastatic sites. The latter are generally aggressive, treatment resistant, and often fatal. Unfortunately, local control achieved by lymph node dissection does not actually increase life expectancy. Lymph node dissection is not recommended for women over age 60 who do not have any signs of lymph node involvement by physical examination by a physician. Lymph node involvement is not as ominous as distant metastases, and women who are node-positive frequently can live out a full lifespan. Node positive premenopausal women clearly benefit from chemotherapy. Node negative premenopausal women benefit less from chemotherapy. Breast carcinoma cells in a lymph node are stimulated to grow independent of anchorage by stromal cells production of the major mitogens IGF-1 and EGF.

SENTINEL NODE BIOPSY - A more conservative approach to node status, it involves the injection of a blue dye or a radioactive tracer at the tumour, and removal of the first lymph node the dye or tracer drains to. This can eliminate “strip-mining” the whole lymphatic chain, which has a high incidence of lymphedema and other morbidity. Removing lymph nodes does not improve the length of time patient will survive.

GRADING and PROGNOSTIC INDICATORS

Scarff-Bloom-Richardson (SBR) classification - scores the mitotic rate, nuclear pleomorphism and tubule formation seen by microscope.

- Grade I: 3 – 5 points = well differentiated
- Grade II: 6 – 7 points = moderately differentiated
- Grade III: 8 – 9 points = poorly differentiated.

Histological grade - rates the tissue on how much normal cellular architecture such as ductal structures are preserved.

- Grade I: well differentiated – still behaving like breast cells
- Grade II: moderately differentiated
- Grade III: poorly differentiated – very disturbed growth pattern, often capable of colonizing in new places to create a successful metastasis.

STAGING

Staging may be based on the TNM surgical rating system (see page 23), or on the clinical staging system:

- Stage 0 = intraductal cancer in situ. Mortality is only 3 to 10%.
- Stage I = small tumour under 2 cm with no + nodes
- Stage II = medium tumour 2 - 5 cm with + axillary lymph node
- Stage IIIA = large tumour over 5 cm with palpable axillary node
- Stage IIIB = tumour of any size with extension into the chest wall, skin or internal mammary lymphatic chain
- Stage IV = distant metastases and invasion into the chest wall. The presence of distant disease gives a 70 to 85% probability the patient will die from the cancer.

OTHER PROGNOSTIC FACTORS

MENOPAUSAL STATUS: #1 prognostic factor, breast cancer occurring before menopause is exposed to more estrogen, and tends to be much more dangerous.
LYMPH NODE STATUS: #2 prognostic factor, +/- for metastasis. Tumours in the medial breast spread into the thoracic and mediastinal lymph nodes, while from the lateral breast they spread into the axillary lymph chains. Negative lymph node patients have a 70% cure rate with surgery and radiation. Only 1 in 3 of those who will have a recurrence will be helped with subsequent chemotherapy. Women with positive lymph node status will have under 50% survival with surgery and radiation alone. However, taking out lymph nodes with micrometastases does not improve survival. Only sentinel nodes and palpable deposits (debulking) is needed if radiation and chemo are to be used; full axillary dissection is not needed.

S-PHASE: cell cycle analysis, looks at the proportion of cells in S-phase where new DNA is being synthesized in preparation for the division of a tumour cell into two cells. Higher values mean the tumour is growing more rapidly. In breast cancer the S-phase count can range from 1 to 20%; values over 7% give a poorer prognosis.

ESTROGEN RECEPTOR STATUS: ER+ or ER- determines the tumour sensitivity to hormone therapy. ER+ has a better prognosis, as the cells are more normal. ER-/PR- tumours express more COX-2 mRNA. Note that even weak receptor staining indicates the clinical utility of hormone-directed therapies. Low-positive is 1 to 10% staining while some labs have a cut-off of 10%+ staining to qualify as positive. ERβ+ with node + status indicates risk of more aggressive disease. ER- status is linked to higher risk of metastasis into the lungs, via disruption of endothelial contacts by TGFβ up-regulation of angiopoietin-like protein four ANGLP4. ERα+ breast cancers derive IL-6 from fibroblasts to up-regulate STAT-3 acute phase protein, allowing invasion and spreads to lungs and especially to bones. ERα+ breast cancer often gives rise to stem-cell-like phenotypes in the bone marrow or disseminated elsewhere. These increase risk of reoccurrence, and often these are resistant to the therapies that controlled the primary cancer, because they are transformed into ERα-/ERβ+/HER2+ or EGFR2+ cells. ER+ status doubles risk of bone mets relative to ER- tumours.

PROGESTERONE RECEPTOR STATUS: PR+ or PR-. PR+ may have a significantly better prognosis, as PR inhibits aromatase, Her2/neu and COX-2 expression. It is believed that ER-/PR+ represents a false negative ER result because PR is a product of an intact estrogen-ER pathway, thus PR+ is only possible if ER is also expressed. These samples should be retested to confirm the result. ER-/PR+ cases have sometimes been prescribed progestins to reduce growth and metastases. ER+/PR- cases are relatively resistant to Tamoxifen. About 50% of PR- cases will express HER2. Male breast cancers tend to be ER- /PR- and these are relatively treatment resistant.

HER-2/neu STATUS: Her-2 receptors, also called C-erb-B2 receptors, act for both epidermal and platelet-derived growth factors EGF and PDGF. These receptors are over-expressed in some breast comedo type ductal carcinoma in situ (DCIS), ovarian, lung, prostate, and stomach cancers. Associated with earlier relapses and poorer prognosis. HER-2 – breast cancers have a 5 year survival of 96%, but HER-2 + cancers have just a 68% 5- year survival, with 2.68 X increased risk of reoccurrence, and 5.5 X risk of distant reoccurrence. HER2/neu + status is associated with activation, overexpression and mutation in the P13K / Akt / mTOR pathway. Since PTEN gene normally opposes activation of this pathway, this status implies a loss of functionality PTEN; quercitin should always be considered to control this growth signaling. HER2+ with ER+/PR- is high risk for relapse with brain metastases. Treatment with targeted therapies such as Herceptin or trastuzumab is essential. Other agents used include Lapatinib (Tykerb), Pertuzumab, Vinorelbine and Docetaxol. A polyclonal HER2 vaccine, known as NeuVax., is composed of the E75 peptide, which is derived from human epidermal growth factor receptor 2 (HER2), mixed with granulocyte macrophage colony-stimulating factor (GM-CSF). The vaccine has been shown to stimulate cytotoxic T cells to specifically target cells expressing HER2. It is now in Phase III trials.

| Relapsed breast cancers can have ER / PR / HER2 status different from the primary tumour of origin. |

TRIPLE NEGATIVE: Some African-Americans and Hispanics show up “Triple negative” or ER-/ PR- / HER2- Assume BRAC-1 mutation is inactivating PTEN tumour suppressor gene. Surprisingly, BRCA mutations are associated with significantly better recurrence-free survival and a trend toward better survival. These cancers appear biologically similar to basal skin cancer. Basal type 1 variants respond to Cisplatin chemotherapy. VEGF
and basal cytokeratins are highly over-expressed. Iressa or Gefinitib is an EGFR tyrosine kinase inhibitor which blocks the over-expression of EGFR in these tumours. Many ER - cancers have active androgen receptors AR+, and can respond to anti-androgen therapies such as Biclutamide (Casodex). Mesenchymal type variants respond to the targeted therapy Dasatinib, a kinase inhibitor synergistic with quercetin. Metformin may be prescribed to modulate insulin sensitivity, and to block their mesenchymal stem-cell like features, at doses of 500 mg Glumetza (extended release Metformin) once to twice daily at meals. Expression of CD73 lowers infiltration of immune lymphocytes into the tumours, decreasing progression-free and overall survival. Also target YB-1, STAT-3, mTOR, PTKs, Src kinase, and IL-6. PARP inhibition is indicated in all hormone receptor negative breast cancers. Y-box binding protein YB-1 is a transcription/translational factor associated with poor survival, as it protects cancer cells from apoptosis. Metaplastic TNBC is a rare variant dependent on mTOR signaling. A sample protocol would be green tea EGCG, indole-3-carbinol, curcumin, Co-enzyme Q-10, selenium, grapeseed extract OPC, AHCC and sulforaphane.

TESTOSTERONE LEVEL: Women produce the male hormone testosterone, and related androgens, in the adrenal glands. The enzyme aromatase converts it into estrogen in fatty tissue and the bones. Levels over the medial value of 0.40 ng/ml of blood are associated with reduced survival time.

EPIDERMAL GROWTH FACTOR RECEPTOR STATUS: EGFR+ is associated with local spread and reduced survival time.

DNA PLOIDY: uses flow cytometry techniques to look for multiple sets of chromosomes representing cells in mitotic division, giving an average value for the amount of DNA in the tumour cells. Abnormal DNA content strongly correlates with tumour aggressiveness. Aneuploidy corresponds to poorly differentiated tumours.

E-CADHERIN: high levels of E-cadherin predict risk of metastasis and reoccurrence.

TUMOUR MARKERS: CEA, CA 125, CA 15-3, CA 19-9, CA 549, CA M26, CA M29, CA 27.29, MCA, PSA, isoferititin, tissue polypeptide antigen (TPA), mammary tumour-associated glycoprotein, kappa casein.

CYCLINS: Cyclin D1 is often overexpressed in breast cancer. Cyclin E in truncated isoforms in high amounts in tumours, as measured by the Western blot test, predicts high risk of reoccurrence and poorer survival. Australian doctors say over-expression of this regulator of the transition from G1 to S phase in the cell cycle is the most powerful predictor of breast cancer outcome.

SKIN LESIONS – breast cancer forming skin lesions are very high risk - relative risk is over fifteen times normal for systemic reoccurrence.

CIRCULATING TUMOUR CELLS – Over 5 CTCs per 7.5 mL of blood gives a poor prognosis. Counts of 3 do not indicate a good response to therapy. If they carry CK-19 mRNA the survival time is further reduced. Control inflammation to prevent re-seeding the site of origin.

MAMMASTATIN - mammastatin serum assay (MSA) is a screening blood test for breast cancer risk developed in 1998 at the University of Michigan. It has application similar to PSA testing for prostate cancer. High levels of the protein marker would normally be followed with a mammogram and/or genetic screening. Overall accuracy is about 85%. AMAS testing is just not reliable enough for us to recommend it.
BREAST CANCER TYPES

DUCTAL CARCINOMA IN SITU (DCIS) - is the proliferation of cells within the milk ducts without any invasion through the basement membrane. The mass is unicentric within a segment, and is found in occult form in about 30% of females autopsied. On mammograms DCIS will typically show microcalcifications (spicules). Pure ductal carcinoma in situ rarely metastasizes, so if the lesion is removed with the margins of the sample free of disease, sentinel node biopsy is optional. The most common form is non-comedo cribiform type. There is some controversy as to whether this is really cancer, but the long-term mortality rate is 3.3%. Progression of DCIS appears to be androgen-dependent.

Mastectomy results in only a 2% risk of local reoccurrence. Lumpectomy has up to 60% failure rate, with half of the recurrences being invasive carcinoma. Even low-grade DCIS with poor margins can gradually progress to invasive forms of breast cancer. Radiation may improve control after lumpectomy.

COMEDO type ductal carcinoma in situ (DCIS) tends to present with high nuclear grade (80% are aneuploid) and necrosis, ER-, and highly over-expressing HER/neu+. Her-2 receptors, also called C-erb-B2 receptors, act for both epidermal and platelet-derived growth factors EGF and PDGF. The comedo type is more aggressive, has a worse prognosis, and warrants prompt and aggressive treatment.

LOBULAR CARCINOMA IN SITU (LCIS) - is multicentric cancer within multiple breast lobules, which rarely produces a mass that can be detected by mammography. E-cadherin, PIK3CA and c-src, are key targets. Risk of occurrence in the other breast is 10 to 25%. About 37% will develop invasive cancer in either breast, with risk increasing by about 1% per year. Risk triples with just 3 years use of hormone replacement therapy with estrogen and progestins. The standard approach is bilateral mastectomy with immediate reconstructive surgery, never chemo or radiation.

INfiltrating ductal carcinoma (IDC) - represents 75% of all breast tumours. More frequently metastatic to bone, lung and liver.

INfiltrating lobular carcinoma (ILC) - up to 10% of breast cancers are ILC, with a tendency to metastasize to the meninges causing carcinomatous meningitis, to the eyes, ovaries, retroperitoneum and serosal surfaces, causing intestinal or urethral obstruction.

Tubular carcinoma (TC) - About 2% of breast cancers, tend to be well differentiated, rarely metastasize to the axilla, typically ER+ and PR+.

Medullary carcinoma (MC) - About 6% of breast cancers, occurring at younger ages, often metastasizing locally, producing large axillary nodes, and typically ER+, PR-, p53+

Inflammatory breast cancer (IBC) - Accounts for 1% of breast cancers, and is the the most aggressive type, with the poorest prognosis. Five year survival is only about 18%, though some aggressive new combination protocols claim about 40% 5-year disease-free survival. It could be triggered by a relative of the mouse mammary tumour virus, the MMTV-like virus. Inflammatory breast cancer cells have a stem-cell-like phenotype. There is a prolific expression of HER2, C-myc proto-oncogene, E-cadherin and angiogenesis.

The skin on the breast becomes red and dimpled due to lymphatic blockade by tumour emboli – not from inflammation! Inflammatory breast cancer cells have increased RhoC GTPase, which activates NFxkB and increases motility. There is florid invasion and metastasis, particularly lymphatic spread.

1 in 4 cases will have pain in the breast or nipple. There is rapid onset of symptoms, 90% probability of axillary lymph node involvement, progression to stage III-B, typically ER- and PR-, and up to 50% risk of contralateral breast cancer.

Male breast cancer – Usually ER-/PR- and treatment resistant, but may respond to Tamoxifen and aromatase inhibitors.
SURGERY

Breast cancer survival is only about 12% without surgery. The best hope of a cure of any cancer is surgery. I have known several brave souls who went without surgery, and some have survived many years in good health, but I do not recommend that course of action. You need to learn the importance of timing your surgery, supporting recovery with nutrition and preventing reoccurrence and metastasis with supplements such as green tea EGCG and modified citrus pectin through the surgical period of care.

LUMPECTOMY - tumour removed with at least a 1 cm margin of healthy tissue.

QUADRANTECTOMY - tumour removed with a 3 cm margin plus the overlying skin and underlying fascia.

MODIFIED RADICAL MASTECTOMY - removal of the entire breast

RADICAL MASTECTOMY - removal of the breast and underlying muscle and associated tissues. Radical mastectomy is not associated with better long-term survival than less extensive surgery, and so has been largely abandoned. NSABP in Pittsburgh published 5 and 10 year follow-up results, and now 25 year follow-up shows the same result.

Mastectomy is generally contra-indicated if there are distant metastases. Removing the larger tumour can de-inhibit growth of smaller satellite metastases. Tumours may maximize their access to nutrients while choking off their distant competitors using insulin receptor modulating proteins. Vigorous angiogenesis in the other tumours follows the removal of the primary tumour. This is why we prescribe anti-angiogenic green tea EGCG after surgery.

In premenopausal women it is critical to do the surgery during the luteal phase of the menstrual cycle. The high progesterone levels at this time lower the potent angiogenesis stimulator vascular endothelial growth factor VEGF, and are associated with much longer survival times. For example, serum progesterone at least 4 mcg/mL corresponded to 65% survival at 18 years post-surgery versus 35% for those with lower progesterone.

Angoigenin also cycles with the proliferative and the secretory phases of the menstrual cycle. It is very productive to give anti-angiogenics such as green tea EGCG and modified citrus pectin post-surgery in pre-menopausal women. This can distinctly reduce risk of recurrences of the breast cancer in the peak of “tumour dormancy escape” typically seen at 8 to 10 months post-surgery.

For small cancers under 1 cm. the standard of care is lumpectomy followed by radiation, and if ER+ Tamoxifen may be considered. The radiation doubles the chances of avoiding a relapse (local radiation after lumpectomy or breast-conserving surgery for early stage primary breast cancer will decrease 20 year rates of recurrence of cancer in that breast to about 14%, compared to about 39% with the surgery alone, regardless of node status.

Breast surgery, node biopsies and radiation therapy can ablate and scar lymphatic drainage of the arm via the axilla, causing lymphedema.

OVARIAN ABLATION

Removal of the ovaries by surgery (oophorectomy), or their destruction by Lupron chemotherapy or radiation, removes estrogen stimulation and is associated with improved survival. Survival increases 6% in pre-menopausal and 3% in peri-menopausal ER+ breast cancers. Premenopausal women with highly ER positive (score over 20) tumours may benefit from ovarian ablation more than they can benefit from chemotherapy.

RADIATION

Radiotherapy after lumpectomy surgery for DCIS cuts risk of local recurrences by approximately one half, although with minimal impact on overall survival. About 3% will see a survival benefit at 5 years, and 6% at 10 years.
The most benefit is seen in cases with lymphatic and venous invasion LVI+. Also clearly benefits cases with tumours over 3 cm, node + disease, or ER-/PR-. The least benefit is seen in cases over 70 years of age.

After mastectomy and chemotherapy, locoregional radiation increases overall survival about 10%. 50 Gy therapy in 25 fractions, plus a boost dose of 18 Gy will lower risk of reoccurrence about 50%, which is identical to endocrine therapies such as Tamoxifen, aromatase inhibitors and fulvestrant.

Lung fibrosis can occur as late as 25 years after breast irradiation. Curcumin, *Centella asiatica* and R-ALA mitigate fibrosis.

**RADIO-FREQUENCY ABLATION**

Radio-frequency ablation RFA uses the heating effect of radiowaves to bring the lumpectomy cavity to 100° C for 15 minutes. This gives clean margins and replaces radiation therapy for some cases.

**HORMONE BLOCKADE**

In general, all growth signal controllers in breast cancer are analogues of estradiol or testosterone hormones. Hormone blockade will starve tumours of promoting factors but resistance commonly develops in 5 to 6 years.

General side-effects can include hot flashes, impotence, reduced libido, breast enlargement, accelerated bone loss and osteoporosis, muscle weakness, muscle wasting, liver damage, reduced night vision, nausea, diarrhea, alcohol intolerance. Patients also show increased rates of death from cardiovascular disease, stroke, and infection.

Hot flashes are a particularly significant problem for many on hormone therapy, especially when they interrupt sleep, or are of a drenching nature. We may prescribe grapeseed extract, evening primrose oil, homeopathic *Sepia*, *Du Bu Yin Wan*, *Xiao Yao Wan*, *Xiao Chai Hu Tang* or Ventorrid; reduce caffeine and alcohol intake.

The effects on bone health are particularly acute, and require therapy. Poor calcium status and poor bone density increases risk of metastasis of breast cancer to the bones. Micrometastases into bone marrow are common and persistent. Hardening the bones will resist spread and even inhibit tumours already in the bones. I prescribe microcrystalline hydroxyapatite calcium with vitamin D3, vitamin C and magnesium citrate. Inhibiting STAT3 DNA transcription activator protein also arrests movement of breast cancer into bone.

Resistance to hormone therapies is common, and can be countered with mTOR inhibitors. Use indole-3-carbinol, green tea EGCG, curcumin. The drug Everolimus is an mTOR inhibitor.

**TAMOXIFEN**

Tamoxifen is a selective estrogen receptor modulator SERM with estrogen antagonist and partial estrogen agonist effects.

Tamoxifen will typically reduce risk of re-occurrence of breast cancer by about one-third. This translates as about a 5% increase in disease-free survival, and about 3% overall improvement in 10 year survival. It is commonly given for up to 5 years, at which point its benefits will persist for several years after it is discontinued.

It is widely used for any breast cancer with ER+ status, for those with spread into the lymph nodes and especially for post-menopausal women. It may also benefit ER- cases, but at 3 to 10 fold less benefit than ER+ cases.

It is not always indicated in pre-menopausal breast cancer. Tamoxifen combined with Goserelin is superior in safety and in reducing reoccurrence compared to standard chemotherapy drugs like cyclophosphamide, methotrexate and fluorouracil in stage I or II premenopausal hormone responsive breast cancer. These patients first have surgery to reduce the tumour burden.

It is used for male breast cancers.

Tamoxifen also increases sex hormone binding globulins (SHBG), decreases IGF, and can reduce TGF alpha. Other benefits: increased bone mass, reduced risk of heart disease, and slightly reduced risk of contralateral breast cancer (the usual 8% occurrence is brought down to 5%).
However, the contralateral tumours that do occur tend to be ER- (27% with Tamoxifen vs. 4% without the drug) which are harder to treat. Side-effects include blood clots, hot flashes, vaginal dryness or discharge, irregular menses, toxicity to the eyes with visual impairment, depression, poor concentration, asthma, and increased risk of liver cancer. Report any changes in your health to your physician and get annual eye and physical exams as a minimum.

The risk of endometrial cancer is increased by 2 to 3 fold, and requires annual screening tests. Uterine cancer and clots both develop at a rate of 1-2 women/1000 women treated over a course of 5 years. Risk of both uterine cancer and clots are higher in women > 70 years old. There is a 4% overall increased risk of hysterectomy in women on tamoxifen, yielding only a 0.01% cancer rate. Consider having patient on tamoxifen follow up with an ob/gyn annually for monitoring. Also consult with an ob/gyn if the patient has abnormal bleeding or discharge. If there is concern for an abnormality, consider a D&C procedure (dilation and curettage, ie a uterine scraping) first rather than immediate hysterectomy. Often, a slightly thickened endometrial stripe in a patient on tamoxifen is due to edema in the endometrial tissue rather than dysplasia. However, calcifications are a warning of intracellular calcnosis and possible onset of uterine cancer.

Contraindications include macular degeneration or a history of thrombo-embolic disease.

Do not take Tamoxifen with birth control pills, anti-depressant drugs of the SSRI type, Hoxsey herbal formula, grapefruit, St. John’s Wort, black cohosh root, red clover blossoms, tangeritin. Consumption of any tobacco products or alcohol is strongly discouraged while on Tamoxifen.

Breast cancer cells can also become resistant to Tamoxifen by up-regulating nuclear and cytosolic estrogen receptors, which the drug cannot reach. Poor metabolism by Cyp 2D6 may influence responses to Tamoxifen, but is not critical to success. Resistance to Tamoxifen therapy develops from ERα activation by phosphorylated receptor proteins made by p21-activated kinase Pak-1. Activation of SRC-3 - the AIB1 oncogene – can create resistance to Tamoxifen therapy. The estrogen receptor co-activator AIB-1 gene product amplifies estrogen and Tamoxifen’s estrogen agonist effect. AIB-1 is in turn amplified by HER-2. It has been found that patients who are both AIB-1 positive and HER-2 positive may not be helped by adjuvant Tamoxifen, and in fact may be harmed by it. There is data to suggest that despite reduced breast cancer recurrence rates, when it does relapse the disease is more aggressive, resulting in more deaths from breast cancer in the Tamoxifen users than in non-users.

Tamoxifen effectiveness can be enhanced with adjuncts such as melatonin, indole-3-carbinol, acetyl-L-carnitine, co-enzyme Q-10, quercitin, and vitamin A. Soy is highly synergistic with Tamoxifen – high soy food intake adds a 60% reduction in risk of a reoccurrence of cancer. Green tea extract / EGCG is also highly synergistic with Tamoxifen. High dose vitamin D therapy can theoretically inhibit Cyp3A4 and raise E2 estrogen, but I see no clinical issue with giving enough to raise the blood level to normal, or even a bit higher.

Reduced libido may be treated with oxytocin nasal spray, once daily in both nostrils, later just 2 -3 times per week. Other hormone blocker drugs include Lupron and Zoladex, analogues of luteinizing hormone releasing hormone (LHRH). These have significant risks of thrombo-embolism and pulmonary embolism. LHRH agonists can cause a flare reaction as hormones spike up, then fall. This aggravation can be spared by taking an anti-androgen for one week prior to this therapy. Soy isoflavones may ameliorate many adverse effects of these drugs, such as bone loss. Megace is synthetic progestin, antagonistic to estrogen. Mainly used in ER-/PR+ cases.

Casodex and Eulixen are anti-androgens.

Fulvestrant is an anti-estrogen, completely free of agonist activity. When breast cancer progresses despite Tamoxifen and aromatase inhibitors, this second-line drug will stabilize the disease and provide partial responses. Side effects can include fatigue, nausea and vomiting, chills, constipation, hot flashes and stomatitis. Tamoxifen and fulvestrant can increase invasiveness of ER+ cancers if they are deficient in E-cadherin intercellular adhesion.
AROMATASE INHIBITORS

Aromatase inhibitors block the enzyme estrogen synthetase which converts the androgen or masculine hormones into estrogens or female hormones. This enzyme is found in the liver, fatty tissue, muscle, skin, breast and breast tumours. Androstenedione is converted into estrone, and testosterone is converted into estradiol. Estrone estrogen is moderately growth stimulating, but estradiol is the most potent form of estrogen for promoting breast cancer cell growth. Men have this enzyme to make estrogen from testosterone in their bones.

Aromatase inhibitors are not effective in pre-menopausal women, as they cannot overcome other hormone sources such as the ovaries. To qualify, the patient must be at least 12 months since the last menstrual period, and have estradiol in the post-menopausal range < 59 pg/ml. Sometimes LHRH agonist drugs are used in peri-menopausal women to ablate the ovaries and induce a premature menopause, to allow use of the AIs.

AI’s are effective for post-menopausal breast cancer, reducing circulating estrogen about 80 - 95%. AI’s are now approved as first-line therapy in post-menopausal ER+ metastatic breast cancer. They can achieve a 40% reduction in metastases, 43 - 50% reduction in local recurrences, and an 18% reduction in deaths from breast cancer.

About 70% of breast cancer cells produce aromatase, and levels directly correspond to COX-2 expression. COX-2 creates prostaglandins, which promote the expression of the aromatase gene CYP19. COX-2 inhibitors may well produce a nice synergy with quercitin. My clinical experience with such combinations has been positive.

The third generation oral aromatase inhibitors include the reversible nonsteroidal agents Anastrozole and Letrozole, and the irreversible steroidal inhibitor Exemestane. They are becoming popular for patients with ER+ tamoxifen-refractory metastatic breast cancer.

Time to disease progression is similar to tamoxifen therapy, and so is overall survival, but AIs cut breast cancer reoccurrence about 3% more that does Tamoxifen. Menopausal symptoms occur, but are less severe than with tamoxifen, other than increased bone loss. There is also a significant reduction in the incidence of contralateral breast cancer, and a small reduction in distant metastases and endometrial cancer.

Aromatase inhibitors may be used in ER+ early stage postmenopausal breast cancer, especially in those intolerant of Tamoxifen, or concerned about thromboembolic risk.

Steroidal type AI’s such as Exemestane promote less bone loss, and inhibit late bone recurrences in the bones, but do not inhibit early recurrences as well as the non-steroidal AI drugs. Exemestane is atherogenic, raising the LDL/HDL cholesterol ration and ApoB/ApoA lipoprotein ratios. This translates to a 1% increased risk of severe cardiac events. Letrozole or Femara is an aromatase inhibitor capable of reducing estrogen and estrone twice as much as Anastrozole. When Letrozole fails, about 15% of cases can be rescued by the related drug Exemastane or Aromasin. Letrozole increases triglycerides in the blood, but Anastrazole has little impact on blood lipids.

Joint pains and stiffness can occur from AI’s, particularly if the patient has been on Taxane chemotherapy prior to use. About 20-30% of women will get joint pain, carpal tunnel syndrome or tendon and synovium effusions, and about 5% quit the therapy because of pain. Omega 3 oils, vitamin D3, devil’s claw root extract, New Zealand green-lipped muscle extract, cherry juice and melatonin can be quite helpful in these cases. Consider Ruta graveolens and vitamin B6 therapy for tendon and synovium effusions, and homeopathic remedies such as Bryonia alba, and Rhus toxicodendron. A naturopathic oncologist suggests Flexnow BSP201 high triterpene shea nut extract to manage cytokines and inflammation. Diuretics may help. Exercise definitely helps too. Arthralgias tend to ease up after about 6 months of intake. Low-dose Naltrexone LDN often eases AI myalgia, and helps the immune system kill cancer cells. Vitamin B12 may reduce AI pains, but I do not recommend this unless proven deficient. 96% of those prescribed AI’s get some adverse reactions. Arimadex (anastrozole): report elevated cholesterol, chest pain shortness of breath or, heart rhythm disturbance to your physician. Letrazole (femara): blood clots, ie myocardial infarction (heart attack). Aromasin (exemestane): hypertension.
Other possible side effects are limb swelling, anxiety, flu-like symptoms, cough, vaginal dryness, vaginal atrophy, generalized pain, acute hepatitis, and stroke.

Paradoxically, if resistance to these drugs develops, a brief prescription of estradiol will induce apoptosis via increased bcl-2 proteins. Once the tumour/s shrink a bit, anti-hormone therapy can be resumed.

**Indole-3-carbinol** (or DIM) supports AIs in preventing relapse of hormone-sensitive breast cancer.

**Melatonin** is a vital support, at up to 20 mg at bedtime, to tolerance. **Olive oil** also support AIs.

Quercetin and grapeseed extract procyanadin dimers appear to be the strongest natural AI’s. Grapeseed is able to reduce estrogens by about 80%, equivalent to early AI drugs. Green tea extract / EGCG is synergistic with AIs. Reishi, red wine, resveratrol, flaxseed, zinc, passion flower chrysin, soy genistein, natural progesterone, and white button mushrooms *Agaricus bisporus* are natural aromatase inhibitors.

Non-steroidal AI’s such as Letrozole or Anastrazole markedly effect bone loss in the first 6 months of therapy. This translates to a 1 – 2% increased risk for osteoporosis. AI’s significantly degrade bone health - so it is mandatory to support bone density, mass and strength. For example Arimidex increases risk of fracture 40% in 5 years use, reducing bone mineral density 5 to 7%, enough to push an osteopenic patient into frank osteoporosis. It is now a standard to prescribe bisphosphonate drugs such as Clodrinate, Palmidronate and Fossamax to maintain bone mineral density.

Naturopathic medicines can outperform these bone protectant drugs, and can be combined with them for the best results. **Vitamin D3** or 25(OH)D is also useful to build bone, although we do not want to give high doses, as it is a potent stimulator of the P450 cytochrome responsible for metabolizing aromatase drugs, and raises E2 estrogen levels. I prescribe 2 – 3 daily of 120 mcg MK-7 **vit. K2** with 1,000 IU vit. D3.

**Exercise** is an essential requirement for bone health.

Microcrystalline hydroxyapatite ossein complex is a bone meal product with actual bone growth factors which build bone density and mass far faster than bisphosphonates, increasing new bone, not just reducing bone loss. This means increased strength, therefore better protection from fractures. Calcium supplements are far less important than D3-K2, exercise and strontium. **Strontium** is a mineral which definitely reduces fractures, but must be taken well away from calcium supplements as they compete for absorption. If bone density is low give 2 of 340 mg AOR strontium citrate at bedtime. Always give vitamin K2 with strontium to reduce clotting risk. Strontium now carries a warning of possible increase in stroke risk, due to studies on a drug version called strontium renylate. I do not believe it is a risk to take strontium citrate, but some prominent doctors disagree. Some skeptics also say that bone density scans may appear to be twice as dense as they really are.

If resistance develops to hormone therapies such as aromatase inhibitors or Tamoxifen, give mTOR inhibitors. The drug Everolimus is used in this way. Natural remedies which inhibit mTOR include indole-3-carbinol, green tea EGCG and curcumin.

**HERCEPTIN**

Herceptin or trastuzumab is a humanized anti-HER2 monoclonal antibody which binds to trans-membrane growth factor receptors. These receptors bind to EGF and PDGF and activate tyrosine kinase activity inside the cells. Herceptin also inactivates breast cancer stem cells. Herceptin is effective against HER2 / neu positive breast cancer. Disease free survival is increased about 40% and overall survival is increased by about 34%. Treatment for 1 year is enough; even 6 months may suffice.

Unfortunately, it creates a five-fold increase in risk of significant heart damage and heart failure. Before it will be given the doctors will do a Muga scan to determine your ejection fraction EF. The EF is the percentage of the blood inside the heart chambers which can be pushed out with a single beat of the heart. LVEF is normally 50 -75%,
usually over 60%, so Herceptin will typically not be given if you start at an ejection fraction under 55%. During treatment, if the EF falls below 50% the treatment may be suspended.

Naturopathic physicians can improve heart function rapidly and safely to qualify patients for this therapy, keep them in it long enough to be curative, and to repair the damage afterwards. We use herbs centella asiatica and extract berberine as cardioprotectants. To restore LVEF give *Convallaria majus* and *Crataegus oxycantha*, coenzyme Q-10, omega 3 oils, grapeseed extract, vitamin E, and homeopathic remedies such as *Naja tripudans*. We may prescribe 32 mg daily of candesartan, an angiotensin receptor blocking drug, to protect the LVEF. Please, do not enter into Herceptin therapy unprotected!

Herceptin is now often combined with Tykerb (lapatinib), though there may be increased risk of neutropenia, diarrhea, skin rashes and liver toxicity.

**CHEMOTHERAPY IN BREAST CANCER**

Chemotherapy or Chemo uses toxic drugs to kill rapidly-dividing cells. This takes out cancer cells, but also strongly damages the lining of the gut, bone marrow, hair follicles and other healthy tissues. Most do not kill cancer cells better than healthy cells, and in fact some do far more harm to the healthy tissues. They are very indiscriminant toxins. Use of chemo is a serious life-and-death choice, so do your homework. Every therapy “casts a shadow” – there are risks from treatment and risks with no treatment. I recommend reading Dr. Ralph Moss’s book “Questioning Chemotherapy” for an objective review of the issues.

Chemotherapy is NOT justified for patients who are node negative and also have:
- tumours 1 cm or smaller
- tumours 1 to 2 cm with favorable indicators like ER+ status and a good histological grade.
- tumours with a low fatality rate such as tubular, colloid, mucinous or papillary forms
- only 3% of those treated will have a survival advantage
- chemotherapy gives a survival advantage to about 7% of node-positive women treated. It is only fair to note that chemotherapy does often give a significant disease-free remission or other positive response.

Examples of common chemo protocols:
- CMF – cytoxan, methotrexate and 5-fluorouracil.
- FAC or CAF – cyclophosphamide orally for 14 days, adriamycin and 5-FU intravenously on days 1 and 8.
- CEF or FEC – cyclophosphamide orally 14 days, epirubicin and 5-fluorouracil IV days 1 and 8.
- EC– cyclophosphamide and epirubicin.
- CMF – cyclophosphamide, methotrexate and 5-fluorouracil.
- TAC – docetaxel, adriamycin and cyclophosphamide.
- AC – adriamycin and cytoxan/cyclophosphamide.
- BRAJACTT – Adriamycin and cyclophosphamide AC every 3 weeks for 4 cycles.
  - followed by Taxol and Herceptin every 3 weeks for 4 cycles.
  - followed by Herceptin every 3 weeks, for up to 13 cycles, depending on cardiac tolerance.
  - followed by adjuvant radiation.
  - followed by long-term Tamoxifen hormone therapy.

High dose taxanes, bone marrow autologous transplantation and extended courses of high-dose chemotherapy have not yielded improved survival. It is best to use combinations of drugs to reduce toxicities. This is where naturopathic physicians in oncology can really help. We can often keep up the patient’s health to tolerate the full dose full-course therapy. I also often find my role is to make patients medically fit enough to qualify for chemotherapy or surgery. Of course, we are there to restore health and reinforce remissions after the medical therapies are finished.

Multi-drug resistance to chemo depends on the status of the multi-drug transporter MDR-1. Its expression is induced by p13 kinase, which in turn is mediated by the peri-cellular polysaccharide hyaluronan. This matrix compound also interacts with Erb-B2 and cell adhesion molecule CD-44. Reishi mushroom hot water extracts overcome chemo-resistance, inhibiting NFkB, increasing apoptosis.
ZOLEDRONIC ACID (BISPHOSPHONATE)

Zometa or zoledronic acid is a bisphosphonate bone-building drug which has been found to synergize with chemotherapy drugs for breast cancer. It serendipitously increases expression of genes and proteins involved in apoptosis and cell-cycle regulation. A rare complication is osteonecrosis of the jaw.

PHYTOESTROGENS

Phytoestrogens are plant compounds which mimic estrogen. They are analogous to estriols, the weakest of the human forms of estrogen, and are never as powerful growth stimulants as estradiol, the strongest ovarian estrogen. It is critically important to recognize that many phytoestrogens actually block up the estrogen receptors and prevent real estrogen from getting in there and making a growth signal. Therefore many plant estrogens actually stop breast cancer cell proliferation, and are valuable therapies. The tendency of oncologists and their pharmacists to lump all phytoestrogens together shows a complete ignorance of the biochemistry of plants and foods and their medical application. The critical factor is the relative binding affinity or RBA of the estrogen.

- Estradiol is 100%, by definition.
- Tamoxifen has a RBA of 80%.
- Many plant estrogens have a RBA hundreds, even thousands of times weaker. The shape, size and electrical charge on these weak estrogens is not sufficient for the receptor to close around them. Unless it can bind and alter the receptor shape, it can’t trigger a growth signal to the nucleus of the cell.

An excellent example is fresh-ground flaxseed. It is shown to be as effective as Tamoxifen in reducing breast cancer reoccurrence, yet many oncologists and the BC Cancer Agency pharmacists discourage its use and make women with ER+ tumours terrified to take it. Similarly, the weight of quality scientific evidence supports ER+ women taking soy foods, but this is still discouraged by doctors untrained in nutritional medicine. Soy is highly synergistic with Tamoxifen – high intake adds a 60% reduction in risk of a reoccurrence of cancer.

Apigenin flavone from celery is anti-angiogenic and inhibits nuclear factor kappa B - NFκB.

A diet rich in plant foods provides a balance of phyto-estrogens and botanical hormone regulators.

INTEGRATIVE REMEDIES FOR BREAST CANCER

Targets of therapy: Apoptosis off-switch, estrogen and its receptors, aromatase, insulin, insulin-like growth factor IGF-1, NFκB, COX-2, EGF, DNA hypermethylation, microsatellite instability, angiogenesis, uPA, STAT-3, TNF, P13K/Akt/mTOR, YB-1, IL-6, Survivin, SRC-3.

1° indole-3-carbinol/DIM, melatonin, LDLN, oral and IV D-ALA, artemesin, artesunate IV + IV-vit.C.
2° grapeseed extract OPCs, green tea EGCG with γ vit. E, quercitin, curcumin, mistletoe– mistletoe M for pre-menopausal, mistletoe P if post-menopausal or metastatic, Glumetza (metformin ER).
3° reishi, sulforaphane, MCP, flaxseed, Co-Q-10, detox from fat-soluble pesticides and solvents.

Triple negative: EGCG, I3C, curcumin, grapeseed, AHCC, sulforaphane, Co-Q-10, Metformin.

Note: Asterisks * or ** indicate good science, good clinical outcomes have been seen by naturopathic oncologists, and that these agents will impact multiple growth factors or other biochemical targets.

ACUPUNCTURE – Open the breast channels: LU-1, CV-17, ST-18
- Purge stagnation: LU-9, PC-7, HT-7
- Purge toxic chi: ST-36, GB-34, LV-3
- Subdue rebellious chi & return it to its origin: PC-6, CV-3
- Tonify: LU-7, SP-4, KI-6
Acupuncture produces durable results that can outperform drugs for hot flashes, libido, energy and well-being.

**ALPHA LIPOIC ACID – R-ALA inhibits TGFβ, important in ER- cancers. Rx IV-R-ALA 150 mg biweekly and orally R-ALA 300 mg bid-tid. Do not mix with curcumin without supervision.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb *Artemisia annua*. They generate peroxides in contact with cancer cell iron stores.

BROMELAIN – a protein-digesting enzyme from pineapple stems that destroys fibrin, which controls inflammation, and thus growth and angiogenesis. It also modulates CD-44 cell adhesion molecule, which controls metastasis and progression.

*CAN-ARREST – anti-inflammatory formula with boswellia, bromelain, curcumin and quercitin. This is a major weapon against breast cancer. BCQ is the American version of the CanArrest formula.

CO-ENZYME Q-10 – ubiquinone supports the mitochondria in regulating apoptosis. Human trials are limited, but early indications are very encouraging. The minimum therapeutic dose is 300 mg daily.

*CURCUMIN – from tumeric root is a major repressor of inflammation and growth factors. Do not mix with ALA.

DIET – a low-fat diet particularly benefits estrogen receptor negative ER- cases. High intake of monosaturates such as olive oil and polyunsaturated fats primarily affects post-menopausal cancer cases. The breast is mainly fatty tissue, and will accumulate fat-soluble toxins such as xenobiotic pesticides and other hormone-disrupting or hormone mimicking toxins. A good rate of turn-over of healthy fats can support better health, but remember fats need anti-oxidant support or they can turn on you. A balance of omega 3 to omega 6 fats is vital to regulate inflammation and its growth factors. Folic acid from green leafy vegetables is protective. Colored fruits and vegetables provide antioxidant mixed natural carotenoids. One valuable example is lycopene from stewed tomatoes. Fish provide needed omega 3 oils. Rice provides melatonin. Rosemary is a delightful spice which harmonizes hormones.

ELLAGIC ACID – as found in pomegranates, grapes, and all berries. Anti-angiogenic and more.

EUGENOL – from spices such as cinnamon, nutmeg, clove, basil and bayleaf. Eugenol inhibits COX-2, TNFa, PGE-2 and IL-1β.

EXERCISE – improves outcomes by a variety of mechanisms.

*FLAXSEED LIGNANS - 2 tablespoons ground flaxseed daily has been shown to reduce the rate of growth of breast tumours, and is significantly effective at reducing invasiveness and spread into the lymph nodes. Higher lignan intakes may be associated with improved survival in postmenopausal breast cancer. Flaxseed binds estrogen in the bowel, preventing re-uptake, increases the progesterone to estrogen ratio, and stimulates production of sex hormone binding globulins SHBGs, removing hormones from the bloodstream. Flaxseed is best with a low fat diet high in lignan fibre from fruit, berries, vegetables, legumes, and whole grains.

GAMMA LINOLENIC ACID - GLA - 2.8 grams or 8 capsules of evening primrose oil EPO daily gives a faster clinical response to Tamoxifen. It is synergistic with Paclitaxel. GLA produces anti-inflammatory prostaglandins, and inhibits the pro-inflammatory PGE-2. It decreases ornithine carboxylase activity in breast tumours, and reduces estrogen receptor expression.

*GRAPESEED EXTRACT – the oligomeric proanthocyanidins OPCs in grapeseed extract have a profound effect on breast cancer, as a cytotoxic, aromatase inhibitor, and antiangiogenic. Similar anthocyanidins are found in red or purple grapes, pomegranate, bilberry, raspberry, cranberry, blackberry and blueberry.
**GREEN TEA EGCG** - green tea epi-gallo catechin gallate EGCG polyphenols induce apoptosis in breast cancer cells. EGCG inhibits urokinase and matrix metallo-proteinase enzyme MMP-2, enzymes involved in tumour invasion and metastasis. Urokinase regulation inhibits insulin-like growth factor and reduces 17-beta estradiol. EGCG inhibits angiogenesis by decreasing VEGF. It is a mild anti-oxidant, and in higher doses is pro-oxidant. Give with mixed tocopherol (gamma) vitamin E to prevent liver and kidney oxidative stress. Synergistic with Tamoxifen, Fulvestrant, aromatase inhibitors and other hormone therapies.

Hoxsey – herbal tonic can cure some cases, but is estrogenic! It far outshines Essiac. I like to mix the Hoxsey as a tincture with low potency homeopathics such as *Asteris, Conium or Phytolacca* 6C to 30C.

**INDOLES** - indole-3-carbinol I3C, from the cabbage family of vegetables, converts 16-hydroxyestrogens to 2-hydroxy forms. 16-OH-estrone is highly estrogenic and initiates carcinogenic DNA damage. It is associated with obesity. The safer 2-OH forms of estrone and estradiol are increased by aerobic exercise, green tea, licorice root, and the entire cabbage family of vegetables. It is interesting to note that the famous physician Galen prescribed cabbage leaf poultices for breast cancer 2,000 years ago. I3C is anti-estrogenic, negatively modulates estrogen receptor transcription, and suppresses breast cancer invasion and migration. Use in triple-negative and HER2/neu+ cancers as well as ER+. Regulates Survivin, Akt, NFkB, uPA, MMP-9, VEGF, ERα, and BRAC-1. I3C is rapidly activated in the stomach primarily to di-indolylmethane DIM. DIM is more heat stable than I3C. Dose 400-600 mg.

**JINGLI NEIXAO** – is a tonic and digestive TCM formula for advanced disease and the seriously ill patient.

*LOW-DOSE NALTREXONE* – (LDN) activates cytotoxic CD8+ immune cells against cancer, and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

**MELATONIN** - is highly synergistic with Tamoxifen, at doses of 10 to 20 mg at bedtime. Melatonin down-regulates estrogen receptors, reduces circulating estrogen and prolactin, suppresses tumour fatty acid uptake, and blocks estrogen and epidermal growth factors. Doses prescribed may range from 3 to 18 mg; usually 12mg at bedtime only.

**METFORMIN** – metformin is a simple and safe drug used for diabetes, which can help cut off the sugar fuelling cancer cells. Some doctors titrate dose to achieve a blood sugar level of 55-65 mg/Dl. I prescribe extended release metformin eg Glumetza 500 mg 1 to 2 times daily. Increases IGFBP and inhibits insulin and IGF-1 receptors, affecting MAPK and other growth signaling pathways such as Akt and Erk1/2 - important regulators of inflammation, tumour invasion and metastasis. Metformin inactivates EGFR and inhibits HER-2. It reduces cyclins, blocking cancer cell cycle progression. It induces apoptosis via intrinsic and extrinsic pathways. It reduces activity of NF-kB, and MMP-2/9. Very helpful in HER-2+ and triple-negative breast cancers. It inhibits AMPK activation, e-cadherins, and tumour mesenchymal stem cells. It cleaves PPAR. Glitazone also inhibits PPARγ.

**MILK THISTLE** – silybinin from milk thistle extract inhibits or modulates epidermal growth factor EGF, active in all carcinomas. Regulating EGF may be useful in modulating related estrogen receptors. This wonderful herb protects and detoxifies the liver. Be aware it is mildly estrogenic.

**MISTLETOE** – injectable mistletoe is a valuable remedy at all stages of cancer, and for support of chemo and radiation. Iscador or Helixor type M is used for pre-menopausal breast cancer, and type P is suggested for post-menopausal breast cancers.

**MODIFIED CITRUS PECTIN** – fractionated citrus pectins of about 10 Kilo-Daltons molecular weight can arrest metastasis, retard growth and slow angiogenesis.

**OMEGA 3 OILS** - flaxseed and other omega 3 oils, such as fish, marine and walnut oils, reduce rates of metastasis. These also thin the blood, and must be used with caution around surgery or with blood thinning medications. Evening primrose oil gamma linolenic acid GLA is a hormone modulator.
PLANT STEROLS & STEROLINS – decrease 17-beta estradiol E-2 signaling. However they also increase DHEA and can rarely cause pancytopenias.

POMEGRANATE - pomegranate flavonoids inhibit aromatase, preventing synthesis of estrogen from adrostenedione and testosterone. They also strongly inhibit 17-estradiol growth signaling in breast cancer cells.

**QUERCITIN** - this bioflavenoid found in most foods, especially apples and onions, is an aromatase inhibitor, reducing estrogen production from testosterone in fat cells. Consider adding COX-2 inhibitors.

*REISHI – *Ganoderma lucidum mushroom hot water extract suppresses transcription factors and reduces invasiveness. It very significantly reduces nuclear factor kappa-B NFκB, which markedly increases apoptosis. Reishi extract reduces invasiveness of tumours, and inhibits DNA transcription factors. Reishi can overcome chemo-resistance in old cancers. Related mushrooms include maitake and coriolus.

RESVERATROL – found in organic fruits and berries, this natural plant antifungal agent is humans a MMP inhibitor, anti-angiogenic, NFκB inhibitor, COX-2 inhibitor, EGFR inhibitor, etc.

ROSEMARY – this herb supplies carnosol, which inhibits P-glycoprotein and synergizes vitamin D3.

SOY FOODS – highly protective diets yield about 150 mg daily of soy isoflavones. Compounds such as genistein and daidzein in soy are anti-angiogenic, antioxidant, induce cell differentiation, decrease luteinizing hormone LH and follicle stimulating hormone FSH. Dietary phytoestrogens can be anti-estrogenic, competing with estradiol for the type II estrogen binding sites. Phytoestrogens usually have a relative binding affinity to the estrogen receptor under 0.1% of the receptor binding strength of estradiol. This means it blocks up the receptor, keeping active estrogens out. 60 grams of soy foods can yield 45 mg of isoflavones, which could match the effects of Tamoxifen. Soy is now confirmed to be safe and helpful in pre-menopausal and post-menopausal cases of ER+ breast cancer.

*SULFORAPHANE – from all the Brassicas (cabbage family) vegetables, but particularly from broccoli seed sprouts. SFN potently normalizes DNA by inhibiting DNA histone deacetylases (HDACs). Epigenetic preventative and therapy. A potent hormone modulator, and very important in triple negative breast cancer.

THYROID – thyroid hormone supplements may be used to suppress thyroid-stimulating hormone TSH, a potent growth factor for breast tissue. Hypothyroidism is often subclinical in breast cancer cases, and should always be suspected if there is a history of fibrocystic breast disease.

VITAMIN A – as found in vegetables. A natural regulator of cell growth. Supplement as retinol palmitate.

VITAMIN B6 – pyridoxine 150 mg daily reduces prolactin levels. The ideal form is pyridoxal-5-phosphate.

VITAMIN C – IV – intravenous high dose ascorbate can be of benefit in late stage and palliative care. It can be used to deliver mistletoe IV, and is very synergistic with IV-artesunate.

*VITAMIN D3 - 1, 25-dihydroxy D3, a fat-soluble vitamin activated by the kidneys and sunlight on the skin, inhibits IGF-signaling and associated growth stimulation of breast cancer cells, promotes apoptosis, induces cell re-differentiation, and may have anti-estrogenic activity. However, some believe high dose vitamin D could be mildly estrogenic, increasing E2 estrogen. D3 seems especially important in estrogen receptor negative ER- breast cancer, because it regulates growth and apoptosis mechanisms which are not estrogen-dependent, such as the AR gene erbB and epidermal growth factor. Vitamin D binding protein derived macrophage activating factor strongly activates macrophages to destroy tumours. Good intake of vitamin D and calcium reduces risk of aggressive pre-menopausal breast cancer. Compared to normal levels, low vitamin D status is associated with poorer outcomes, including 94% increased chance of metastases, and 73% increased chance of dying! A recent survey showed 76% of Canadian women with breast cancer were deficient in vitamin D.

VITAMIN E - antioxidant for fatty tissue, regulates hormones, heals damaged tissue. The injectable vitamin E succinate VES form is the most potent and the most researched, but we just use oral mixed tocopherols.

VITAMIN K2 – this moves calcium into bone, sparing arteries and other tissues. Rx-120-360 mcg, daily.
VITEX – *Vitex agnes castus* or chaste tree berry lowers prolactin PL levels, increases progesterone, decreases estrogen, lowers follicle-stimulating hormone FSH and raises luteinizing hormone LH.

ZINC - to regulate angiogenesis and growth. Found in all in raw fruits and vegetables.

Bastyr University Integrative Oncology Research Center BIORC has shown significantly increased survival in stage 4 breast cancer with this protocol:

- IV artenuseate 120 mg/infusion twice a week.
- IV ascorbic acid up to 100 grams, immediately following the artesunate drip.
- *Trametes versicolor* mushroom extract 3600 mg/day.
- tetrathiomolybdate 20-120 mg/day - for copper chelation.
- curcumin 6000 mg/day.
- bromelain 1500 mg/day.
- quercetin 3000 mg/day.
- Naltrexone 3.5 mg hs.

**Caution in Breast Cancer**

DHEA - dihydro-epiandrosterone or DHEA supplements boost IGF-1 and sex hormones. IGF-1 production in the liver is increased by DHEA and also its biological activity rises due to induced changes in IGF-binding proteins.

- ashwagandha herb significantly elevates DHEA.
- maca root can increase DHEA.
- sterols and sterolins can increase DHEA levels and reduce cortisol levels.

**EMOTIONAL HEALTH**

Constrained liver chi is the start of a causal chain which leads to all tumours and lumps. Its cause is often in the emotions, such as frustration, resentment, anger - especially when these are repressed and internalized. Learning to express what you really feel is a key to true health. I have seen advanced cancer cured by forgiveness and loving resolution of conflicts, both external and internal.

You have a tremendous pharmacy between your ears you can use through faith, spirituality, psychology, and just plain fun. The stress arousal system regulates or secretes estrogen, progesterone, testosterone, androgens, prolactin, insulin, insulin-like growth factor, vitamin D which all have receptors on breast cancer cells. The stress arousal system also releases cortisol and other regulators of the psychoneuro-immunological system, the mind-body connection to immune regulation of breast cancer. We know that immune cells have receptors for all the brain chemicals (neurotransmitters) associated with every emotional state possible. This must have a purpose. In fact the ability of immune cells to function is linked to the balance of “mood” chemicals bound to them. Furthermore, the stress arousal chemical adrenaline (epinephrine) directly impairs the apoptosis “off-switch” in cancer cells.

Lawrence LeShan has had tremendous success with advanced cancer using positive psychology. Rather than looking for psychological defects and trying to fix them, he advocates restoration of emotional and creative expression. He finds cancer victims often have lost a main emotional focus in their lives, and have lost hope of finding any satisfactory substitute. He has cured cases by helping them design a re-vitalized life providing meaning, enthusiasm, zest and fulfillment. The Emotional Freedom technique developed by Gary Flint is a useful tool one can learn to move through emotional traps and fixations. A weekly support group and self-hypnosis for pain was associated with doubling of life-span in advanced stage IV breast cancer, ovarian cancer and melanoma. This work by Spiegel from 1989 has not been confirmed in subsequent studies, but certainly quality of life improves, if survival does not. Particularly vulnerable are patients who lack a significant social support network. Patients who report a poor level of social well-being show higher pre-surgical levels of the angiogenesis cytokine VEGF. Social roles are majorly impacted by cancer and cancer treatment related symptoms such as fatigue, hair loss, disfigurement, and sexual dysfunction. Gender-roles, family ranking, and household duties are altered, and financial stress adds to the burden. There are worries about reoccurrence, anxiety about becoming a burden to loved ones, and nameless fears.
LYMPHEDEMA

Lymphedema is a swelling caused by obstruction or loss of the lymphatic drainage. There is an accumulation of fluid and protein. This protein acts as a colloid or gel matrix, holding fluid by osmosis. There are about 15 litres of lymph in the human body, about 3 times the volume of blood in circulation. It leaks out of cells and percolates in very diffuse networks, eventually collecting in simple ducts and channels that direct it to flow through through lymph nodes. The nodes contain immune cells which scan for damaged cells, bacteria, viruses, and clean up a lot of the wastes. Eventually it all re-enters the bloodstream at the thoracic duct, in the upper chest. Lymph channels anywhere can be blocked by tumours, as well as by cutting or post-surgical and post-radiation scarring.

Lymphedema is most common in an arm after mastectomy, surgery to remove a cancerous breast, and particularly if the lymph nodes of the armpit have been disturbed. There are about 24 lymph nodes in an average woman’s armpit (axilla), and removing more than a couple can severely disrupt the flow of lymph. Even removal of a sentinel lymph node carries a 3% risk of lymphedema. Onset can be quite gradual and delayed. Radiation often seals the deal, with up to 34% of cases experiencing lymphedema. Onset may be delayed by years.

Symptoms include arm or adjacent trunk swelling, a feeling of tightness or heaviness, aching pain, tenderness and loss of mobility. Look for Stemmer’s sign – difficulty lifting the skin at the dorsum of the digits of the hands or feet. Swelling beyond a 10% increase in limb girth confirms the diagnosis.

Lymphedema is also associated with skin changes such as fibrosis, hyperkeratosis, cysts, fistulas and papillomas. Even small injuries can precipitate inflammation (lymphangitis) and infection (cellulitis). Scrupulous skin and nail care is important. Ketoprofen may reduce skin thickening and lymphatic repair via LTBr antagonism and reduction in plasma granulocyte CSF expression. The limb can completely lose functionality in advanced cases. Physiotherapists may offer low-level laser therapy. Registered massage therapists with advanced training in lymphology should be treating all cases. A Juzo compression sleeve can help, as can pneumatic or manual drainage massage. Self-wrapping with a compression bandage at bedtime is also helpful. Compression garments need to be replaced every six months to remain effective. Severe cases are treated with lymph-venous anastomosis micro-surgery.

Naturopathic physicians may utilize German complex homeopathics such as Lymphmyosot from Heel and botanical/homeopathics such as Lymphdiaral from Pascoe Pharmacie. Fresh Ceanothus spp. “red root” removes waste from the lymphatic system. Gingko biloba extract and selenomethionine are also thought to help. Studies show some benefit from Daflon, a micronized purified flavonoid fraction of Rutaceae aurantiae. Some FABNOs use Aesculus hippocastanum - horse chestnut seed extract and Ruscus aculeatus – butcher’s broom herb. American-trained naturopathic physicians use high dose protease (protein dissolving) and lipase (fat dissolving) enzymes, selenium, Rumex (yellow dock), Centella (Gotu kola), Gallium (Cleaver’s) and Boswellia.

Exercise is critical to move lymph. The contraction and expansion of moving muscle pumps the lymph vessels, which have no elastic or pumping action of their own. Weight-lifting and resistive exercise do not appear to be harmful. Nordic style pole-walking is recommended.

The best therapy I know is the beautiful marigold flower, Calendula officinalis. Ferlow Brothers makes a fine organic cream to rub into congested and painful areas. Calendula makes a very pleasant tea as well, for oral intake or topical use as a poultice. It can also be taken orally as a tincture – an alcohol-water extract. Support this with at least 400 mg daily of grapeseed extract. Acupuncture has been shown to be very effective for lymphedema.

HOT FLASHES

Hot flashes are often increased by hormone lowering manipulations, and we are usually reluctant to use phyto-estrogenic plant medicines. Acupuncture can be very useful – eg LV-2. Acupuncture also helps libido, mental clarity, and general balance. I prescribe the TCM herb formula Xiao Yao Wan, eg Vita-Aid Femalance 2 capsules twice daily at meals. Goji berries – 15 tid or in tea. Magnesium bisglycinate 500+ mg can relax arterial muscle. Grapeseed extract OPCs can be helpful at 200 -500 mg twice daily. Also consider fresh-ground flaxseed. Neroli essential oil from Citrus aurantium L.var.amara by inhalation appears to work without influencing estrogen levels. Black cohosh is safe and may help moods as well as vasomotor symptoms.
Miscellany: Colleagues prescribe Thorne HMC hesperidin-methyl-chalcone 500 mg bid-tid, mixed tocopherol vitamin E 400 IU bid, 5-HTP 100-150 mg prn, Megace (progesterone) if low clotting risk. A professor of naturopathic oncology tells me Maca root decreases hot flashes and increases libido, without any measureable effect on sex hormones. It is a potato-like tuber from South America. Some report benefits from homeopathic Sepia or Lachesis 200C, black cohosh root, evening primrose oil, gamma oryzanol (aka ferulic acid), a purified pollen extract called Relizen, relaxation training, exercise, and avoidance of spicy foods, caffeine and alcohol.

**LIBIDO**

Low libido is natural with aging and hormone decline. Maca root 500-1,000 mg up to 3 times daily may help arousal and orgasm. *Panax ginseng* is tonic for some. If anorgasmic add *Ginkgo biloba*. Ashwagandha or *Withania somnifera* also helps, but increases DHEA, so may be relatively contra-indicated in estrogen sensitive cancer. Testosterone drives libido in men and women. Women who lose their sex drive - both interest and arousal, during anti-estrogen therapy, can ask for a testosterone patch or cream. The patch usually delivers 300 mcg daily. 50% of women get reactions at the site of application, 20% get unwanted hair growth, about 8% get acne, balding and deepening of the voice. 50% will drop out of this therapy in the first year, despite more satisfying sexual events. There is a potential increased risk of cardiac events, due to alterations in lipoprotein metabolism. Some experts believe it increases risk of breast cancer.

**VAGINAL DRYNESS**

Vaginal dryness can cause dyspareunia – pain on intercourse, and even painful cracking of labial tissues from friction by clothing. Patients report good results with YES.VM organic vaginal moisturizer gel made by YesYesCo. Ltd. We can prescribe Replens, a patented lubricant provided in pre-filled applicators. Each packet is good for about 3 days, and is not estrogenic. NDs may prescribe 2 – 4 gm daily of EPA rich marine oils orally to increase production of natural lubrication. Sea buckthorn oil 1 capsule orally 1 to 2 times daily may also help. A simple and cheap method is to place 1 gel cap of mixed tocopherols vitamin E intra-vaginally at night for 2 weeks then drop it down to 2X per week or as needed. Consider E3 suppositories by Bezwecken daily for 5-7 days and then one to two times weekly. Severe vaginal atrophy or dryness can be treated with compounded estriol 1 mg per gram, 1 gm. intra-vaginally at bedtime for two weeks, then 2 to 3 times weekly. This is safe even for ER+ cases. If there is vulval atrophy insert ½ internally and apply ½ gm topically. Americans also use DHEA for tissue atrophy. Fenugreek husks 500 – 1,000 mg bid reduced vasomotor vaginal dryness and hot flashes in 90 days. Pomegranate seed oil 1,000 mg bid over 8 weeks improved vaginal dryness.
Chapter Ten: INTEGRATIVE CARE OF PROSTATE CANCER

EPIDEMIOLOGY

Prostate cancer is very common in developed countries. In the United States, one man in six will develop invasive prostate cancer in his lifetime. 1 in 4 African-Americans will develop prostate cancer, a rate of 137 per 100,000 in the general population. In Europe and South America the incidence is 20 to 50 per 100,000. In China the rate is only 2.3 per 100,000. Fortunately, 5-year survival rate is almost 99%. 61% live over 10 years and 49% live over 15 years from time of diagnosis.

Clearly this is typically a slow moving cancer, but it tends to become very aggressive about 15 years into its course. It spreads into the seminal vesicles, lymphatics, liver and bones. Once it gets loose, it is as dangerous as any cancer. Survival statistics are looking better in the last several years, primarily due to earlier detection. At least half of those treated with curative intent will have their disease progress.

KEY RISK FACTORS:

- high fat diet, especially saturated fats.
- elevated dietary omega 6 to omega 3 ratio is a risk.
- trans-fats as found in hydrogenated margarine and shortening promote the formation of catechol estrogen-3,4-quinone from estradiol and estrone, and this destroys DNA purine bases.
- red meat, processed meats and organ meats. Blood from vegetarians actually inhibits prostate cancer cells!
- choline from egg yolk and poultry skin and fat strongly stimulates inflammation and growth of prostate cancer, doubling risk of reoccurrence. Choline is used instead of glucose for PET scans of the prostate, because it is taken up so rapidly by the prostate cells.
- high sugar and glycemic load, such as refined grains and soft drinks, which drive up insulin and IGF-1.
- cancerous prostate cells carry up to twice as many insulin receptors as normal prostate cells, allowing the cell to be turbocharged with fuel.
- insulin-like growth factor one IGF-1 is a major growth factor for prostate cancer, amplifying the testosterone receptor, influencing energy metabolism, and unlocking mitosis (cell doubling).
- low dietary intake of antioxidants, vit. C, A, E, selenium and zinc.
- being married – presumably from being over fed.
- xenobiotics such as pesticides, herbicides and fertilizers.
- estrogens promote inflammation in the prostate, increasing cellular proliferation.
- heavy metals such as cadmium.
- smoking tobacco – among other hazards, it is a source of cadmium.
- shift work – perhaps through altered melatonin, triggering dysregulation of circadian rhythms.
- family history of prostate cancer.
- inflammation – elevated prostaglandin PGE-2 is strongly associated with prostate cancer. COX-1 and COX-2 create PGE2, which in turn induces aromatase.
- mutation on gene HPC1, which codes for an anti-vital protein, allows chronic inflammation from a virus XMRV (which causes leukemia in mice).
- anti-apoptosis gene bcl-2 is active in maintaining prostate cancers. Gene bcl-6 may also be involved.
- TGFβ up-regulation is associated with more aggressive prostate cancers.
- BRAC-2 gene carriers have 2.5 times increased risk.
- serum HER2 / neu is linked to progression, metastasis and resistance to hormone blockade. This is associated with loss of tumour suppressor PTEN and thus activation of the PI3K / Akt / mTOR pathway.
- LDL hypercholesterolemia – too much bad cholesterol.
- exposure to estrogen. Estrogen receptors (ER) in prostate tissue control expression of the telomerase gene hTERT. Increased telomerase activity marks the early stages of prostate cancer. Telomerase mRNA increases 2 to 3 fold with induction of estrogen receptors alpha & beta, up-regulating gene transcription and thus cell growth. ER alpha expression increases during the progression of prostate cancer. Risk increases with increased serum estrogen to testosterone ratio and increased 16-hydroxy to 2-hydroxy estrogen ratio.
• exposure to estrogenic xenohormones. Clean organic food, non-toxic personal care products and household cleaners and proper handling of chemicals in the home environment are a key to controlling risk. The role of pesticides remains controversial - to apologists for the chemical industry. Recent evidence points to many pesticides and herbicides acting like estrogen or other hormones in the human body. A Danish study showed the highest incidence among farmers - but the lowest incidence was among organic farmers!
• bis-phenol-A BPA in epoxy resins, polycarbonate plastics, water pipes, and the liner in metal cans for food and beverages is a xenoestrogen - a man-made substance from outside the body that acts as estrogen. It is a hormone sensitizer capable of stimulating prostate cancer growth. It can enhance DNA transcriptional efficacy in prostate cancers with androgen receptor mutations, at low, environmentally relevant doses.
• prolactin hormone is associated with high-grade aggressive prostate cancer. Inhibitors of STAT-5 a/b mediate prolactin stimulation of prostate cells, reducing growth and reoccurrence of cancer.
• seasonal variation in survival that is tentatively linked to sun exposure and activation of vitamin D3. Several studies show that men who are diagnosed with prostate cancer in the summer-autumn seasons are more likely to survive than men diagnosed in the winter-spring season.
• vasectomy is no longer considered a risk for prostate cancer,
• prostatic intraepithelial neoplasia PIN has a 50 -70% risk of progressing to prostate cancer. Treat with PGE-2, COX-2 and IGF-1 inhibitors. SMAD-4, a mediator of TGFβ and BMP signalling increases progression of PIN to prostate cancer growth, progression and metastasis.

Most men over age 70 will have evidence of localized, prostate cancer in situ at autopsy. Fortunately, it is usually very slow growing (indolent). Survival in localized disease without treatment is similar to age-matched controls. However, if the cancer begins to press on surrounding tissues, symptoms can arise such as urinary urgency, urinary hesitancy, urinary obstruction, terminal hematuria, nocturia, and pain in the pelvis or spine. Thromboembolism (clot in a vein) occurs in about 10% of cases. While early prostate cancer is relatively benign, once it is advanced and hormone-refractory it is likely to metastasize and median survival is only 6 to 12 months.

Screening should begin by age 40 in high-risk patients, and by age 50 in others. An annual digital rectal exam (DRE) by a physician can detect hard asymptomatic nodules in accessible areas of the gland. DRE and PSA tests have reduced the number of deaths from prostate cancer.

5-Alpha reductase inhibitors reduce the lifetime incidence of prostate cancer from 20.4% to 16.5%, and they reduce the incidence of undisclosed BPH by 50% the normal rate of 28.5% at age 70.

**SIGNS & SYMPTOMS**

Prostate cancer does not usually cause any symptoms in the early stages. Symptoms may mimic prostatitis or BPH: benign prostatic hypertrophy, including:
• weak or interrupted flow of urine
• frequent urination, including night-time frequency (nocturia)
• difficult urination or difficulty holding urine
• inability to urinate (anuria)
• pain or burning while urinating
• blood in the urine or semen.
• nagging pain in the low back, hips or pelvis
• loss of the lateral sulcus by digital rectal exam.
• seminal vesical swelling
• lower extremity edema
• local adenopathy
• loss of external anal sphincter tone
• bone pains – bone mets risk peaks at 2 to 3 years from diagnosis
• risk of clots is markedly elevated in prostate cancer, up to 30 times normal. Anti-coagulation therapy reduces risk of metastasis from 5% to 1%, and improves the efficacy of radiation therapy.
PSA TESTS

The prostate epithelium and periurethral glands make a protein digesting or proteolytic enzyme called prostate specific antigen PSA. This androgen-regulated serine protease is a 27 kilo-Dalton glycoprotein. Its primary function is to liquefy the seminal clot post-ejaculation, allowing the sperm to roam free to find an egg to fertilize.

PSA dissolves the seminal proteins fibronectin and seminogelin, but is also known to activate insulin-like growth factor one IGF-1 by splitting off binding protein IGF-BP. IGF is a critical stimulus of the overgrowth of the prostate in benign prostatic hypertrophy and in prostate cancer. IGF interacts with estrogen generated by aromatase enzyme from testosterone, and related xenohormones. IGF amplifies the androgen receptor. IGF unlocks mitosis.

PSA varies seasonally, presumably from phytoestrogen and xenobiotic fluctuations in the diet. It is also influenced by constipation, infection, inflammation and trauma. PSA is lowered in men taking stain drugs for cholesterol, NSAIDs for inflammation, and acetaminophen.

Prostate specific antigen PSA reflects the total amount of prostate tissue, and is a good screen for abnormal growth of the gland. The gland usually makes 0.07 ng/ml tissue, so a 30 ml gland will yield a PSA of 2.1. Normal range is 0 – 5.5. The ideal range is below 2.5 at age 60. Benign prostatic hypertrophy BPH will not put PSA above 5.5.

Total PSA measured at age 44 to 50 predicts risk of prostate cancer occurring in the next 15 to 25 years:

<table>
<thead>
<tr>
<th>PSA (ng/ml)</th>
<th>Risk of Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 0.5</td>
<td>7.5%</td>
</tr>
<tr>
<td>0.51 – 1.0</td>
<td>risk increases 2.5 fold</td>
</tr>
<tr>
<td>2.0 – 3.0</td>
<td>risk increases 19 fold</td>
</tr>
</tbody>
</table>

Most of deaths from prostate cancer are among the 25% or so of men who at age 60 had PSA levels higher than 2 ng/mL. 35% of men with early cancer and 15% with clinically significant and possibly high-grade prostate cancer will show low PSA values:

<table>
<thead>
<tr>
<th>PSA (ng/ml)</th>
<th>Probability of Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.5</td>
<td>7% have cancer</td>
</tr>
<tr>
<td>0.6 – 1.0</td>
<td>10% have cancer</td>
</tr>
<tr>
<td>1.1 – 2.0</td>
<td>17% have cancer</td>
</tr>
<tr>
<td>2.1 – 3.0</td>
<td>24% have cancer</td>
</tr>
<tr>
<td>3.1 – 4.0</td>
<td>27% have cancer</td>
</tr>
</tbody>
</table>

Probability of cancer with a non-suspicious digital rectal exam DRE and a PSA of:

<table>
<thead>
<tr>
<th>PSA (ng/ml)</th>
<th>Probability of Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2</td>
<td>1%</td>
</tr>
<tr>
<td>2 – 4</td>
<td>15%</td>
</tr>
<tr>
<td>4 – 10</td>
<td>25%</td>
</tr>
<tr>
<td>≥ 10</td>
<td>50%</td>
</tr>
</tbody>
</table>

Proposed new cut-offs for a biopsy to rule-out cancer:

<table>
<thead>
<tr>
<th>PSA (ng/ml)</th>
<th>Probability of Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 for those aged 40 to 50</td>
<td>2.5 %</td>
</tr>
<tr>
<td>3.5 for those aged 50 to 60</td>
<td>3.5 %</td>
</tr>
<tr>
<td>4.5 for those aged 60 to 70</td>
<td>4.5 %</td>
</tr>
<tr>
<td>6.5 for those aged over 70</td>
<td>6.5 %</td>
</tr>
</tbody>
</table>

PSA above “normal” i.e. over 5.5 indicates risk for prostate cancer, with a selectivity or sensitivity of only 70 to 80%, and a specificity of 60 to 70%. There are false positives, and in fact only about 35 to 45 % of cases in this range represent a serious prostate cancer. Most detected in this range are indolent and non-life-threatening cancers. In fact only one in one thousand men will lengthen their life by screening their PSA.

PSA greater than 7 predicts high risk of eventually developing aggressive disease, and a PSA over 10 predicts 50% chance of extracapsular spread of the disease. When PSA is in the range of 4-10, check free PSA or unbound antigen. If over 25% is in the free form, the chances of cancer are only 5-8%. When free PSA is under 14% there is a 59 % chance there is cancer. Free PSA ≤ 2.5 ng/ml predicts cancer will be found by biopsy.

Pro-enzyme PSA or pPSA is a 7 amino acid precursor or leader sequence, which is cleaved from the PSA to differentiate cancer from benign prostatic hypertrophy. In prostate cancer there is less efficient cleavage of the 261 amino acid pre-protein to its 244 amino acid inert pro-PSA and finally into the 237 amino acid mature protein. The
ratio of free to bound PSA is reduced in the blood of prostate cancer cases. pPSA is more sensitive than free PSA. If the percentage of pPSA exceeds the PSA level it is a strong indicator of cancer.

PSA is also called human glandular kallikrein KLK-3 or hK-3. In borderline cases a similar protein human kallikrein hK2 can verify cancer, and it is associated with increased risk of de-differentiation and lymphatic metastasis.

**Urinary PCA-3 assay** helps clarify the situation if there is an elevated PSA but the biopsy was negative. It is 72% specific for cancer, and 58% sensitive. A score of 35 or more is positive for prostate cancer. A new screening test looks for Early Prostate Cancer Antigen EPCA, with a value over 1.7 indicating a 92% likelihood of cancer.

The **PSA density** is calculated from an ultrasound measurement of the volume of the gland. A high density means rapid output, and such increased metabolism can be a sign of transition to cancer. PSAD over 0.15 should suggest a need for a trans-rectal ultrasound TRUS exam to rule out cancer.

**PSA Velocity** is the rate of change of the PSA score. The velocity is more important than the absolute number. A PSA velocity of over 0.75 ng/ml/year is suspicious for cancer in men over age 70; 0.50/yr for men age 60 to 70; and 0.25 /yr. for men age 40 to 50. Test every 6 months if the PSA increases by a value of 1 or doubles within one year. A rise of over 2 ng/ml in one year prior to diagnosis predicts a relatively high risk of death even with radical prostatectomy surgery.

Doubling in less than 3 months is high risk, with a median survival of 3 years. Doubling in under 8 months increases risk of metastasis and shorter survival. Doubling in over 15 months is low risk, with good survival rates. PSA velocity measurements can be biased downwards by low calorie intake, weight gain and high calcium intake, and biased upwards in black men.

After effective treatment of prostate cancer the PSA will often drop into the normal range. Further monitoring should employ the "ultra-sensitive PSA" test. If the PSA does not rise for 3 years post-surgery, the prognosis is good.

### LAB TESTS

**Standard work-up:**
- CBC, chem screen and U/A (complete blood cell count, blood chemistry, urine analysis).
- alkaline phosphatase - detects bone mets. Alk Phos velocity > 3.42 U/l/y predicts worde survival and bone mets in castration resistant prostate cancer.
- prostatic acid phosphatase – PAP – if elevated it suggests metastatic spread to bone.
- IGF-1 is a 4 times stronger stimulator of prostate cancer than the male hormone testosterone!
- testosterone - free and dihydrotestosterone.
- insulin, prolactin, and DHEA hormones.
- blood clotting factors.

**Less common lab tests:**
- urinary DpD - if high along with high PAP = metastasis into the bones.
- urinary prostate cancer antigen three PCA-3 gene product. PCA3 is more accurate than PSA in detecting early prostate cancers. If ≥ 35 PCA3 mRNA there is likely clinically significant (aggressive) disease.
- PSMA.
- p-27 - marker for aggressiveness, risk of metastasis and mortality.
- CEA - correlates with aggressive disease.
- e-cadherin.
- p53.
- human kallikrein 2.
- DNA ploidy analysis.
- microvessel density analysis.
- increased GOLPH-2, SPINK-1, and TMPRSS-2: ERG fusion proteins are significant predictors of prostate cancer. Urine panels of these biomarkers may turn out to be more specific than PSA testing.
• blood levels of endoglin can detect spread into lymph nodes. Endoglin is a coreceptor of TGFβ1 and β3.
• a panel of biomarkers that predicts risk is comprised of TGFβ1, IL-6, IL-6 soluble receptor, VEGF, vascular adhesion molecule 1, endoglin and urokinase plasminogen activator.
• counting circulating tumour cells predicts risk in prostate, cancers. Best is ≤ 5, worst is ≥50. Highest risk is high CTCs plus elevated LDH.
• Monitor CRP, ferritin and zinc/copper ratio.

TESTOSTERONE
Surgical castration should result in a serum testosterone of less than 15 ng/dl. Medical castration or androgen deprivation therapy ADT results in a testosterone level of about 20 to 50 ng/dl. It is commonly believed that the lower this is driven, the better the control of the prostate cancer. However in advanced PCa the tumour is so saturated with testosterone that we can use testosterone therapy of ED or muscle wasting. There are patients who present with abnormally high testosterone, whose prostate cancer cannot readily be controlled with naturopathic remedies. These are often presenting with a Gleason of 8 or more. If the PSA is rising despite our best efforts, ADT must be considered. Reinforce this with metabolic therapies, such as metformin.

IMAGING & SCANS
Trans-rectal ultrasound TRUS of the prostate locates lesions and measures the volume of the gland, useful to calculate the PSA density PSAD. Prostate cancer cells make more PSA than normal prostate cells, so high output from a small gland confirms the presence of cancer.

Endorectal magnetic resonance imaging MRI rules out capsule penetration. Cancer outside the prostatic capsule is very dangerous. MRI can also be used to find occult cancers, where PSA is suspicious, but biopsies are negative.

Chest X-ray CXR, computerized tomography CT scan, bone scan and prostascint scans rule out mets to bone, lymph and lung.

Positron emission tomography PET scans detect tissue that is hyper-metabolic. Prostate cancer lights up from radioactive choline, just as other cancers reveal themselves by avidly taking up radioactive glucose (sugar).

Three dimensional contrast-enhanced power doppler ultrasonography provides color images with great sensitivity and specificity for detecting prostate cancer. It is sensitive to increased microvessel density, and so can find cancers missed by digital rectal exam and grey-scale ultrasound imaging. Dr. Eric Yarnell, ND in Seattle, a leading naturopathic urologist, offers color Doppler ultrasound and many other advanced services.

GLEASON SCORE
Scores the degree of abnormality in the biopsied cells, with high numbers indicating a worse prognosis:

2 to 4  = well differentiated
5 to 7  = moderately differentiated
8 to 10 = poorly differentiated

Gleason 6 is considered low risk, particularly if low tumour volume ie ≤ 0.5 ml. 3+3 has 89-97% 5 year PFS – progression free survival. Gleason 7 – 3+4 PFS 85%, 4+3 PFS 72%; Gleason 8 PFS 70%, Gleason 9-10 PFS 42%. PFS does not indicate longer overall survival but 8 or more is high risk of dying of cancer.

Re-biopsy in one year. If Gleason is stable or lower then future disease progression is unlikely.

The Partin tables are a nomogram which uses the Gleason score, PSA and clinical assessment to determine if patients are likely to benefit from surgery. The 3 variables are combined in a multinomial log-linear regression to give a percent predictive probability, with 95% confidence that the patient will progress to a given final pathological stage. See http://urology.jhu.edu/prostate/partintables.php
STAGING

The Jewett system designates stages A & B as local disease, C is invasive, and D is widespread.

Stage A or T1: clinically undetectable by DRE or imaging, found at surgery.
Stage A1 or T1a: well-differentiated focal tumour.
Stage A2 or T1b: moderately or poorly differentiated tumour, may have multiple foci.
Stage T1c: elevated PSA, needle biopsy positive.
Stage A: up to 98% live 5 years or more.
Stage B or T2: tumour confined to prostate, detectable by palpation or imaging.
Stage B0 or T2a: non-palpable, detected by PSA, involves less than ½ of one lobe of the gland.
Stage B1 or T2b: single nodule in over ½ of one lobe.
Stage B2 or T2c: more extensive tumour in one or both lobes.
Stage B: up to 65% live 5 years or more from the time of diagnosis.
Stage C or T3: disease extends through the prostate capsule and may involve the seminal vesicles.
Stage C1 or T3a: clinical unilateral extra-capsular extension.
Stage T3b: bilateral extra-capsular extension.
Stage C2: extension causing bladder outlet or urethral obstruction.
Stage C: about 60% will live 5 years or more from time of diagnosis.
Stage D or T4: metastatic beyond the seminal vesicles. This represents about 20 to 30% of cases. 30% live 5 years. Most get 12 to 18 months remission from treatments and then live an average of another two years.
Stage D0: persistently elevated serum acid phosphatase.
Stage D1: invades regional lymph nodes.
Stage T4a: involves bladder neck, external sphincter or rectum.
Stage D2: distant lymph nodes positive, meets to bone or visceral organs.
Stage T4b: fixed to pelvic wall or involving levator muscles.
Stage D3: relapse of prostate cancer after adequate endocrine therapy.
The TNM system is also used.

HIGH RISK CASES

The patients at high risk for reoccurrence after primary therapy:

- small cell or ductal types – uncommon histologies.
- initial PSA greater than 10. At this level there is a 20 – 30% risk of spread beyond the gland.
- Gleason score over 8. However, prognosis is better if the PSA is still under 10.
- PSA reoccurs within 2 years of primary therapy.
- PSA doubling in less than 6 months with a slope > 0.15 ng/ml.
- reoccurrence in the axial skeleton shows a median survival of 53 months, while reoccurrence in the appendicular skeleton has a median survival of 29 months.
- STAT-5 activation is linked to early reoccurrence, loss of surface e-cadherin expression, invasion, spread.
- abnormal p53 gene expression significantly increases risk of recurrence.
- advanced metastatic prostate cancers can over-express EZH-2 messenger RNA and EZH-2 protein, which mediates cell proliferation, cellular memory, and transcriptional repression. Higher levels of this biomarker in tissue samples indicates an aggressive and advanced cancer.
- 4 times risk of reoccurrence and aggressive disease progression after radical surgery if elevated levels of B7-H3 protein, a cell-surface protein ligand which bind to receptors on lymphocytes which regulate immune response.
- a virus previously linked to sarcomas and leukemias, xenotropic murine leukemia virus-related virus XMRV, is now linked to more aggressive prostate cancer. It was found in 27% of cases in one study.
- high lactate dehydrogenase LDH.
- HER-2 overexpression.
SURGERY

BIOPSY – increases 120 day mortality to 1.3% versus 0.3% without biopsy. Infection is the main acute risk.

CRYOSURGERY – freezing off tissue layers is technically demanding, but equals or exceeds other surgical and radiotherapy techniques in efficacy, and has a relatively low rate of complications.

SYSTEMATIC SEXTANT BIOPSY – provides a Gleason grade. In localized prostate disease it can be used to predict risk of lymphatic spread by calculating it in a formula called the “Hamburg algorithm”.

PROSTATECTOMY – radical surgery has the potential to cure as long as the disease is within the gland capsule. Surgery is the preferred therapy for younger men in stage A or B. Early complications include rectal injury, thrombo-embolism, heart attacks, sepsis, anastomotic urinary leakage; urinary incontinence in 54%. Mortality rate is 1 - 2%. Late complications include erectile difficulties, incontinence and cancer relapse. Impotence rates used to be about 95% for radical prostatectomy. Recent trends to nerve-sparing surgery have reduced post-op impotence problems to about 60% for the short term - but still up to 75% long term. After surgery the PSA level should in time get down to near zero. The urethra epithelial lining will still contain some prostate cells, which can make a PSA level up to 0.2. If the PSA remains or climbs to over 0.2 it is taken as a sign of reoccurrence of the cancer.

LYMPHADENECTOMY – surgical resection of lymph nodes.

ORCHIECTOMY – surgical castration or resection of the testes to remove testosterone hormone stimulation in stage D prostate cancer.

RADIATION

Radiation can be an effective treatment for prostate cancer. It is safer than surgery for early stage cancer of the prostate, particularly for the elderly. Impotence risk is a bit less than from surgery. About 50% of men will need devices or medication to attain a functional erection.

Organs close to the prostate that may also be injured are the bladder and rectum. Morbid consequences include bowel adhesions, urinary urgency, frequency or incontinence, bladder pain, diarrhea, proctitis and rectal bleeding.

The statin drugs appear to slow the spread of aggressive forms of prostate cancer, and to radio-sensitize tumours. Red rice yeast extract contains a naturally occurring form of the statin drug Lovastatin. Anti-coagulation therapy increases the efficacy of radiation therapy to the prostate, probably by reducing iron levels.

EXTERNAL BEAM – using conventional X-ray and gamma ray sources; 3-D conformational style using leaflets to limit the treatment area.

PROTON BEAM – This is similar to what I worked on in my research years, except we busted up the protons and just used the pi-mesons. I have seen benefit in some fellows who went to the accelerator at Loma Linda in San Diego. Proton boosts to conventional stereotactic radiation reduces reoccurrences, though the overall survival benefit is equivocal.

BRACHYTHERAPY – pellets of radioactive material such as Cesium are threaded into the gland in a catheter, and left there permanently. It yields a very high dose, over a long time period. Usually the peak dose has occurred in 3 to 4 months, but significant radiation often remains for two years, and diminishes slowly thereafter. It affects the entire pelvic region. Iodine-125 brachytherapy delivering a total dose of at least 140 Gy yields 90% disease-free survival at 10 years for low-risk cases, and 78% 10 year disease-free survival for T2 stage disease. Brachytherapy is used in all stages from A to palliation in late D. It produces less urinary and sexual problems than nerve-sparing surgery, but creates slightly more bowel issues. Radiotherapy may provoke less incontinence and impotence than surgery, but will make later surgery more difficult, and has a lower cure rate than surgery alone. The perineum is highly innervated, and is very reactive to both surgery and radiation. Radiotherapy complications can include radio-
enteritis, radio-cystitis, impotence in 75%, urinary incontinence in 38%. Fecal incontinence, loose stools and stool leakage occur after radiotherapy at rates 3.6 times higher than seen with radical prostatectomy surgery.

ULTRASOUND – High intensity focused ultrasound (Ablatherm HIFU) is reported by some proponents to yield outcomes up to 93% who are biopsy negative and have a stable PSA under 1.0 ng/ml at five years. However, recent reports suggest a much, much higher early failure rate, and many adverse events and complications. I do not recommend HIFU therapy.

HORMONE BLOCKADE

Hormone blockade starves the cancer of growth promoting factors on a systemic or body-wide basis. It is useful in advanced disease or as an alternative to radiation and surgery. However, resistance commonly occurs in 5 to 6 years, and there can be increased risk of death from infections, diabetes mellitus, bone fractures and cardiovascular diseases.

Primary androgen deprivation therapy ADT is not of benefit to elderly men with localized disease.

In node positive high-risk localized cancer it is of benefit when combined post-op with radiation therapy. When androgen deprivation and radiation therapy are combined, the PSA will rise slowly and plateau by 2 years. If it continues to rise past two years, it indicates cancer recurrence.

Lupron is a synthetic analogue of gonadotropin-releasing hormone GTRH, which shuts off testicular output of testosterone, but not adrenal production. Lupron can cause hot flashes, reduce bone mineral density, raise triglycerides, and increase bad LDL cholesterol - but the adjunct use of soy ipriflavones counteracts these effects. For hot flashes grapeseed extract 400-1,000 mg, hesperidin-methyl-chalcone 500 mg bid-tid, mixed tocopherol vitamin E 400 IU bid, 5-HTP 100-150 mg prn, Maca root 4 capsules daily, acupuncture eg LV-2, Megace if low clotting risk.

Lupron is commonly combined with Flutamide, which blocks receptor access by all testosterones, regardless of tissue of origin. Note that drugs like Flutamide which specifically block cell nucleus testosterone receptors give no survival benefit over surgical castration, and can cause depression, diarrhea and dementia.

Other complications may include impotence, reduced libido, breast enlargement, muscle wasting, muscular weakness, weight gain, increased fasting blood sugar, anemia, increased serum cholesterol, increased blood urea nitrogen, acceleration of osteoporotic bone loss, and hot flashes.

Androgen-deprivation therapy lowers the red blood cell count, hemoglobin and hematocrit to female levels. The anemia typically shows up as a significant drop in hemoglobin and clinically manifests symptoms such as fatigue, coldness, dry skin, and possibly breathlessness on exertion. Muscle wasting usually is a slow erosion of endurance, strength and power. Regular exercise, both cardio and weight-training can maintain muscle and bone health, as well as improve sugar metabolism.

Androgen-deprivation therapy encourages metastasis of prostate cancer cells that remain. Suppress this risk with anti-angiogenics such as modified citrus pectin and green tea EGCG and mixed tocopherol vitamin E. Metformin synergizes with bicalutamide. Spearmint tea is said to be anti-androgenic.

Androgen-deprivation therapy triggers bone loss. Always support bone density, bone mass and bone strength with vitamin K2 and vitamin D3. If necessary add in boron, strontium citrate, vitamin C and MCHA calcium.

In advanced prostate cancer intermittent pulsing of hormone therapy has been attempted. Testosterone lowering drugs are used for a while to lower the PSA and testosterone, after which they may be stopped until the PSA returns to the baseline. Intermittent therapy with goserlin and bicalutamide allows a break when PSA level is down by 90% or under 4 mg/dL. Resume when it rises by over 10 mg/dL. Intermittent therapy may forestall onset of androgen-independence, and improve quality of life, with little to no lesser impact on survival than continuous therapy.

Studies show hot flashes from prostate cancer therapy may respond well to acupuncture treatment twice a week (LV-2), and also the newer anti-depressant drugs of the SSRI type (selective serotonin re-uptake inhibitors) such as Effexor (venlafaxine). Grapeseed extract, evening primrose oil, Da Bu Yin Wan, or Sepia may also be tried.
Recently we have seen the introduction of the anti-fungal drug Ketoconazole in relapsed and androgen-deprivation therapy resistant prostate cancer. It is a high risk ‘black box’ medication. This drug weakly inhibits Cyp-11A and Cyp-17A, involved in the synthesis of precursors to dihydroepiandrosterone DHEA and androstenedione AED. These are the building blocks for intracrine testosterone synthesis – the making of this androgen hormone inside the prostate cancer cells. The prostate cancer cell genes for androgen synthesis are up-regulated by interleukin IL-6, which we can inhibit with green tea EGCG and curcumin.

The new and potent adrenal antagonist drug Abiraterone also works by this mechanism, namely Cyp 17A inhibition. This drug can give very significant life extension. It is often combined with Prednisone steroid.

Conventional wisdom says testosterone must be eradicated - by chemical or surgical castration. However, prostate cancer occurs at a time in a man’s life when testosterone and progesterone production has sharply declined - and estradiol has risen. Remember testosterone and progesterone are estradiol antagonists, are far weaker carcinogens than estradiol, and stimulate p53 gene activity. The prostate gland has the same embryonic origin as endometrial tissue lining the womb - and endometrial cancer is clearly estrogen dependent. Estrogen stimulates the Bcl-2 oncogene, linked to prostate cancer as well as breast and endometrial cancers.

Testosterone therapy in men with untreated or low risk prostate cancer is not associated with prostate cancer progression in the short to medium term. This is consistent with the testosterone saturation model: maximal prostate cancer growth is achieved at low androgen concentrations. At under 250 ng/dl the gland may shrink and PSA could drop. Low-dose testosterone therapy may even be safe for men with treated prostate cancer without evidence of metastatic or recurrent disease.

The role of estrogen in prostate cancer is complex and confusing. Prostate cancer is also linked to exposure to hormone-disrupting xenobiotics. For example, Bisphenol-A BPA in epoxy resins and polycarbonate plastics is a xeno-estrogen. This hormone sensitizer stimulates prostate cancer cell growth. During hormonal therapy some prostate cancers develop androgen receptor mutations which allow estrogens and xeno-estrogens such as BPA to enhance transcriptional efficacy at low, environmentally relevant levels.

Boron can increase estradiol levels in the blood, so keep dietary and supplemental intake moderate. However, high enough doses of estradiol, such as from 100 mcg/d transdermal patches, can reduce testosterone to castrate levels (≤ 1.7 nMol/L or ≤ 50 ng/dL) with minimal side-effects. Thrombo-embolic risk rises, but can be managed. On the other hand, ERβ activity antagonizes ERα activity, reducing inflammation in the prostate. Encourage ERβ activity with quercitin and phytoestrogens such as red-clover, flaxseed or soy.

Other hormone therapies:
- luteinizing hormone releasing-hormone analogues: Zoladex.
- anti-androgens: Megace, Casodex, Eulixen, Chlormadinone.
- aromatase inhibitors: Arimidex.
- finasteride: Proscar.
- Tamoxifen.

Androgen-deprivation therapy-resistant prostate cancer can benefit from prescription of spironolactone, a loop diuretic drug which is anti-androgenic. Asymptomatic men with PSA ≤ 3.0, who receive regular screening, may take as a preventative a 5-alpha-reductase inhibitors linolenic acid, saw palmetto, pygeum, small-flowered willow.

Prolactin is associated with high-grade prostate cancer. This effect can be mediated by inhibitors of STAT-5a/b, to reduce tumour growth and reoccurrence. Vitex agnes-castus or Chaste tree berry lowers prolactin levels.

Progesterone does somewhat inhibit prostate cancer. Synthetic progestins such as medroxyprogesterone bind to androgen receptors better than natural progesterones. Progesterone suppresses Bcl-2 and increases p53, increasing apoptosis. Therapeutic doses are about 6 to 8 mg daily.

Immunotherapies are showing some promise in prostate cancer. NDs prescribe resihi, echinacea, mistletoe A, Myer’s Immune IV nutrition, cat’s claw vine, low-dose Naltrexone and other immunotherapies.
NATUROPATHIC TREATMENT OPTIONS IN PROSTATE CANCER

Targets of Therapy: Apoptosis off-switch, IGF-1, IGFBP, testosterone, estrogens, NFXB, COX-2, PGE-2, EGFR, TGFβ, p53, PTEN, SMAD-4, mTOR/P13K/Akt, IL-6, SRC-3, TNFa, FGF, VEGF, IL-6, anti-coagulation.

**Alpha LiPoiC Acid – R-ALA regulates insulin-like growth factor one IGF-1, and mitochondrial control of apoptosis. Rx IV-D-ALA 150 to 300 mg biweekly and orally R-ALA 300 mg bid-tid. Don’t mix with curcumin, do combine with DCA and other mitochondrial rescue agents.**

*Artemesinin or Artesunate – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.*

*Berberine – 900-1,000 mg or more daily has a methformin –like action, and is anti-inflammatory.*

**Boron – reduces cleavage of IGF from its binding protein IGFBP by PSA. Boron is mildly estrogenic.**

*Boswellia - inhibits tumour growth by inhibiting 5-lipoxygenase, DNA synthesis, and topoisomerasases I & II.*

*Cimicifuga – black cohosh modulates hormones via the aryl hydrocarbon receptor and induces apoptosis in prostate cancer cells.*

*Curcumin - blocks formation of inflammatory cytokines PGE-2 and HETE; significantly inhibits proliferation of prostate cancer cells; inhibits volume and number of prostate tumours by inhibition of angiogenesis and induction of apoptosis; may prevent progression of prostate cancer to a hormone refractory (resistant) state. LOX-5-HETE eicosanoid from arachidonic acid is as strong a growth stimulator for prostate cells.*

Delphphinidins – anthocyanidins from pigmented fruit such as blueberry and bilberry increase apoptosis and inhibit NFkB, Bel-2, Ki-67 and PCNA.

*Diabetes - diet may not cure the disease, but it usually heals the patient. Men with prostate cancer are most likely to die from some other disease, such as heart attack or stroke. Therefore it is essential to address the general health of the patient with lifestyle modifications such as weight reduction, calorie restriction – sugars and fats in particular, and regular vigorous exercise. Fish is the only recommended animal food for cancer patients. Avoid red meat, and limit poultry skin and fat, fried foods, dairy, alcohol and sugar. Emphasizing fish, fruit and vegetables will modulate and stabilize PSA, especially if weight loss is achieved. Dr. Dean Ornish has shown vegetarian diet with exercise and meditation will slow prostate cancer progression. Saturated fat promotes metastases to bones. Trans-fatty acids as found in hydrogenated fats, margarine and shortening promote the formation of catechol estrogen-3, 4-quinone from estradiol and estrone, which destroys DNA purine bases. Omega-3 fatty acids from fish and nuts protect from these toxic estrogens. Also involved in these favorable reactions are sulphur-containing amino acids, which we can get from eating beans, garlic, onions and leeks. Reduce high omega 6 foods such as silage or grain-fed red meat, corn, and corn-fed dairy. Dean Ornish has shown vegetarian diet plus exercise and meditation will slow the rise in PSA and the progression of prostate cancer.**

Blood serum from vegetarians inhibits prostate cancer cell growth in vitro 8-fold more than from cancer-free meat eaters. Control insulin levels, as with the
Schwarzbein Principle diet or the Matsen glycemic index diet. Regulate IGF-1 and IGFBP with vitamin D and lycopene foods, green tea and grapeseed oil. Buy organic, avoid pesticides and chemical ingredients that can be hormone mimics or disruptors. Risk from food and environmental chemicals is potentially higher if methylation is impaired.

ECHINACEA – a potent inhibitor of PGE2.

EXPECTANCY - watchful waiting is often appropriate in localized prostate cancer in elderly patients, as it is can be very slow-growing or indolent. This indolent phase can typically go on for 15 to 20 years before becoming and aggressive cancer. Radical surgery and radiation frequently cause harsh side-effects. Prostate cancer often occurs at an age where there are competing threats to mortality such as heart disease. Candidates for “waiting with expectancy” or “watchful waiting” have:

- A total sum Gleason score under 4 (some say up to 3+3 (6) and up to stage T2A)
- PSA less than 10 ng/ml
- diploid chromosomes = in normal pairs
- slow PSA rise (velocity) = under 1 ng/ml increase per year; stable or declining
- doubling time over 10 years.
- a life expectancy shorter than the natural course of prostate cancer, ie over age 60.

*FLAXSEED - mice bred to develop prostate cancer who were fed diets rich in flaxseeds (5% of their food intake) had half the number of tumors, and the tumors were far less aggressive and had a higher rate of apoptosis. The lignans in flax inhibit the development and the growth of prostate tumors. The lignans bind hormones and xenobiotics in the stool and increase sex hormone binding globulins in the blood.

FOLATE – high dose supplements of folate or folic acid are not recommended for prostate cancer.

*GARLIC – surprisingly active on many fronts, it’s a fountain of youth.

GINGER – inhibits 5-HETE; synergistic with capsicum from cayenne.

GOJI BERRY – goji is also called wolfberry and in Chinese medicine Lycium barbarum. Two ounces of juice 2 to 3 times daily is a potent anti-inflammatory, including the production of the critical anti-oxidant super-oxide dismutase aka SOD. Synergistic with vitamin B-12.

*GRAPESEED EXTRACT - oligomeric proanthocyanidins OPC’s increase apoptosis, reduce angiogenesis, and increase insulin-like growth factor binding protein three – IGFBP-3. Reduces proliferation, especially in synergy with green tea EGCG and curcumin.

**GREEN TEA EGCG - inhibits growth of prostate cancer by a variety of mechanisms including inhibition of 5-alpha reductase, anti-angiogenesis, arrest of cell cycle at G2-M and by inducing apoptosis. Prevents progression of PIN. Angiogenesis and VEGF-A expression needs to be suppressed after prostatectomy.

*HOMEOPATHY – Sabal serrulata, Conium maculatum, Thuja occidentalis, Carcinosum, Schirrinum, Lycopodium. Use in 30C to 200C potencies to start.

HOXSEY – herbal tonic. I use St. Francis Herb Farm Red Clover Combination and add homeopathic remedies.

HYDROXYCITRATE – Garcina cambogia fruit yields garcinol and hydroxycitrate (HCA). Prostate cells generate citrate for energy, and the HCA blocks this source of ATP and triglycerides. Rx 1,000 – 2,500 mg HCA daily. Garcinol is a HAT inhibitor which shuts down hexokinase.

**INDOLE-3-CARBINOL - diindolylmethane DIM is the activated form of indole-3-carbinol, which converts hormones like estrogen, progesterone and testosterone into less aggressive, less growth stimulating forms. DIM down-regulates the androgen receptor, even in hormone-refractory prostate cancer. It also induces arrest of growth at G1 of the cell cycle, inducing apoptosis genes. It inhibits STAT-3 DNA transcription activator. Inhibits matrix
metallo-proteinase MMP-9, which inhibits metastasis and growth of prostate cancer in the bones. Inhibits human papilloma virus HPV. I have seen it reduce PSA scores reliably.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer, and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe, reishi.

LYCOPENE – reduces growth and proliferation by up-regulating direct intercellular gap junction communication, and by reducing serum IGF-1 levels. Increases liver glutathione GSH. Use 6 mg for prevention, 30 mg for therapy (10-15 mg 2 times daily). This is not a very powerful remedy.

MAGNESIUM – magnesium bisglycinate can relax arterial smooth muscle, preventing hot flashes.

**MELATONIN - this pineal gland hormone down-regulates 5-lipoxygenase gene expression, prevents DNA oxidation, blocks the mitogenic effects of prostate cancer-promoting hormones and growth factors, and reverses LHRH resistance. It will prolong life in late stage palliative care. Dose up to 10 to 20 mg at bedtime.

*METFORMIN – supports survival, slows progression, lowers androgens, supports bicalutamide therapy. Monitor B-12 status.

*MILK THISTLE – silibinin slows prostate cancer growth, inhibits epidermal growth factor EGF.

MISTLETOE – use type Qu Iscador or type A Helixor. Helixor A works well at very low doses of 0.1 to 1 mg.

**MODIFIED CITRUS PECTIN – reduces growth, angiogenesis and metastasis. MCP is also called fractionated citrus pectin. The only brand properly standardized for medical use against cancer is PectaSol-C.

MUSHROOMS – white button mushrooms Agaricus bisporus suppress production of 5-alpha reductase enzyme. Mushroom polysaccharides such as maitake prolong survival.

OLIVE OIL - the best inhibitor of PGE2 synthesis by prostate cancer cells, which are able to convert AA to PGE2 at a rate 10 times higher than benign prostatic hypertrophy (BPH) cells. Inhibition of 5-HETE induces apoptosis.

**OMEGA 3 OIL – marine omega 3 oils are popular among naturopathic oncologists in the USA, to control inflammation, particularly PGE2.

*POMEGRANATE – the fruit, juice, fermented juice and seed oil yield a variety of inhibitors, including ellagic acid. Its polyphenols increase cell cycle arrest and apoptosis, while reducing androgen receptors and growth. Pomegranate down-regulates pro-inflammatory eicosanoids.

**QUERCITIN - inhibits 5-HETE to induce apoptosis and reduce inflammation, reduces PGE2.

RED WINE – reduces risk of prostate cancer by 6% per glass, per day! Resveratrol, anthocyanidins and proanthocyanidins are thought to be the active principles.

*REISHI – *Ganoderma* mushroom reduces transcription factors and invasiveness; regulates nuclear factor NFkB to increase apoptosis. An immune balancer par excellence. *Coriolus* or turkey-tail mushroom PSP extract is also quite active, as is related *Trametes* PSK extract.

RESVERATROL – a dietary stilbene, 5-10% of the mass of grapeskins. Inhibits carcinogens, disrupts epidermal growth factor receptor, antagonizes androgen receptors, and scavenges prostate cancer cells.

RUTIN - polyphenols in red wine induce apoptosis in prostate cancer cells. The inhibition of tumour growth was highest from the rutin, gallic acid and tannic acid, and less from the quercitin and morin polyphenols.
SAW PALMETTO - this herb is fine for slowing benign enlargement of the gland. It inhibits 5α-reductase. It does not falsely lower the PSA readings, as was once claimed. Do not mix with hormone blockade therapies.

SELENIUM – no longer recommended for prevention, it may actually increase the growth of some prostate cancers. *SOLOMON’S SEAL – Polygonatum cyrtonema lectins induce both autophagy and apoptosis in cancer cells via interference with hexokinase II, the key to tumour glycolysis. PCL activates mitochondrial ROS-p38-p53 pathway, blocks Ras-Raf and PI3K-Akt pathways and inhibits binding of EGF to its receptor.

*SOY - soy foods are the most important dietary protectant from prostate cancer risk. Soy is rich in genistein, an isoflavone which inhibits growth of prostate cancer. Genistein competitively inhibits hormones at receptors, increases sex hormone blocking gonadotrophin, reduces growth signaling by tyrosine protein kinases, and is anti-angiogenic. Protein as found in soy foods helps maintain metabolic balance and immune competence. Give with vitamin D3.

SPEARMINT – Mentha spicata - spearmint tea - lowers androgens.

SPICES – cinnamon, clove, bayleaf, nutmeg and basil contain eugenol, which reduces TNFα, IL-1b, PGE2, COX2.

SULFORAPHANE – from all the Brassicas (cabbage family) vegetables, but particularly from broccoli sprouts. Potently normalizes DNA and cell function, preventative and therapeutic.

* TAXUS – our renowned herbalist-urologist Dr. Eric Yarnell combines Yew (Taxus brevifolia) 10 drops of tincture 3 times daily with Periwinkle (Catharanthus) 2 to 3 ml of whole plant extract daily. Excess Catharanthus can cause hypoglycemia. If yew stimulates nausea, add ginger tincture. The yew is a natural source of anti-angiogenic Paclitaxel. Use concurrent with taxane chemo may reduce occurrence of drug resistance. Synergistic with melatonin. Dr. Yarnell also uses Annona, Mahonia, Trichosanthes and Cephalotaxus.

*VITAMIN D - slows the rise of PSA, inhibits cell cycle progression and may induce apoptosis. Inhibits IGF-1. Take as activated vitamin D3. Get sun on your skin in moderation. Use shade and mild aloe sunscreens to prevent sunburn. Vitamin D has a powerful synergy with soy genistein, says a notable FABNO.

VITAMIN E - VES inhibits prostate cancer cell growth and induces apoptosis in a dose-dependent manner. It significantly reduces mortality from prostate cancer. Alpha and gamma tocopherols are very active. Vitamin E is synergistic with lycopene and selenium – but none of these are very potent.

*VITAMIN K2- the MK-7 form of menaquinone has 7 isoprene side-chains at the 3rd carbon. This form is most useful in prevention of prostate cancer, and it reduces mortality from this disease, while strengthening the bones. It is found naturally in cheese, but we have concerns about the IGF-1 in cow’s milk, and the pro-inflammatory omega 6 fats from feeding dairy cows corn. In Canada we can only prescribe the MK-7 form, which we source from natto, a fermented soy food. In the USA they can access the MK-4 form, which is used at quite different doses.

ZINC - the prostate collects high concentrations of zinc. Zinc inhibits prostate cancer growth by increasing activity in gene p21, increasing apoptosis, inhibiting 5-alpha reductase, and binding prolactin and dihydrotestosterone.

Cautions in Prostate Cancer

- There are concerns about DHEA supplements, as they boost IGF-1 and sex hormones. The IGF-1 production in the liver is increased by DHEA and also its biological activity rises due to induced changes in IGF-binding proteins. The exception to this rule is a brief trial of DHEA to restore responsiveness to androgen deprivation in treatment refractory advanced prostate cancer.
- sterols and sterolins can increase DHEA levels and reduce cortisol levels.
- Maca extracts exhibit estrogenic activity in vitro however, maca does not affect serum levels of LH, FSH, prolactin, testosterone and E2 in men. Maca root can increase DHEA.
- Ashwagandha herb can significantly increase DHEA and may increase testosterone and so its use is limited to short-term radiation or chemotherapy support.
- chondroitin supplements used for arthritis may increase the spread of prostate cancer.
- Vitex agnes-castus herb increases both luteinizng hormone LH and testosterone.
Risk factors for esophageal cancer include alcohol, tobacco, fungal toxins, pickled and preserved foods, red meat, and deficiencies of vitamins and minerals.

Asians and some others are known to often get a very red and flushed face from drinking alcohol. This is linked to aldehyde dehydrogenase ALDH-2 deficiency. It is now linked to increased risk for esophageal cancer. This risk can be moderated with selenium.

p63 gene expression is elevated early in squamous cell esophageal cancer, and probably plays a role in its development. This is a homologue of the oncogene suppressor gene and DNA protector p53.

Squamous cell cancers are frequently associated with the human papilloma virus HPV.

Early detection is rare, lateral invasion and metastasis can occur very early, so most are diagnosed with disseminated disease. Metastasis is usually to the lungs, liver, bones and kidneys. 5-year survival is about 14%, making this one of the deadliest types of cancer.

First signs may be dysphagia (trouble swallowing), substernal pain, hoarse voice, coughing provoked by eating or drinking, hemorrhage and anemia.

Allopathic treatment begins with surgery, and may add adjunctive or palliative chemotherapy with 5-fluorouracil, cisplatin and mitomycin. EGFR inhibitor geitinib (Iressa) can sometimes help when other treatments fail.

Radiation is often used in palliation.

**NATUROPATHIC and INTEGRATIVE CARE OF ESOPHAGEAL CANCER**

**Targets of therapy:** Apoptosis off-switch, IGF-1, EGFR, PTKs, HPV, IL-10, IL-16, SRC-3. p53, p63.

1° green tea + γ vit. E, curcumin, grapeseed extract, LDN, reishi, mistletoe lectins.
2° oral and IV-D-ALA and DCA, artemesinin (squamous cell); zinc, vit. A.
3° Liu Wei Di Huang Wan, Jingli neixao, cannabis. RTx: zinc, calendula, aloe.

**ACUPUNCTURE** – for dysphagia needle LV 3, LI 4, CV 21, 23 and 24.

**ALOE** – *Aloe vera* leaf gel mixed into juice is a vulnerary, healing wounds and inflammation. It mildly inhibits tumour growth. Take up to 2 ounces daily. Aloe juice and root are more laxative.

**ALKYLGLYCEROLS** – from shark liver oil will inhibit protein tyrosine kinases.

*ALPHA LIPOIC ACID* – R-ALA inhibits IGF-1, promotes apoptosis.

*ARTEMESININ* or ARTESUNATE – oral artemesinin or IV artesuante are derived from Wormwood herb *Artemesia annua*. They generate peroxides in contact with tumour cell iron stores.

**CORIOLUS** – PSK or PSP mushroom extract significantly extends survival and improves quality of life.

*CURCUMIN* – COX-2 and MMP-3 inhibitor, blocks growth and invasion.

**FARE YOU** – cabbage extract heals ulceration and inflammation, regulates apoptosis. The active principle is a form of the amino acid methionine nicknamed “vitamin U”. Chinese *Fare You* Rx: 4 tablets tid.
GASTRAZYME - “vitamin U” for ulcers, inflammation. Biotics Research brand Gastrazyme Rx: 2 tablets tid.

*GRAPESEED EXTRACT – grapeseed OPCs inhibit IGF-1, EGF, and angiogenesis, regulates p53.

*GREEN TEA EGCG – blocks the insulin-like growth factor IGF-1 receptor, inhibits MMP-3, anti-angiogenic, protein tyrosine kinase inhibitor, and much more.

HOMEOPATHY – Aurum muriaticum, Condurango, Gallium aparense, Hydrastis canadensis.

INDOLE-3-CARBINOL – regulates transcription factors, induces cell cycle arrest and apoptosis.

*LIU WEI DI HUANG WAN – benefits yin, significantly improves survival. Yi Qi Yang Yin Wan can also be used, as indicated by TCM diagnosis.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer, blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE – silibinin inhibits EGFR and PTKs responsible for esophageal cancer growth.

*MISTLETOE – use Iscador Qu or Helixor A or M for males and M type for females.

QUERCITIN – induces apoptosis via mitochondria, controls tumourigenic stem cells, modulates hormone signals.

REISHI – mushroom extract inhibits protein tyrosine kinase signals, inhibits NFkB.

SELENIUM – improves survival.

STEROLS and STEROLINS – inhibit human papilloma virus HPV.

VITAMIN A – regulates differentiation, anti-viral.

*ZINC CITRATE - inhibits COX-2, prevents and treats oral and esophageal cancer.

STOMACH CANCER

Gastric cancer is a non-polypsis colorectal spectrum disease. Stomach cancer is usually an adenocarcinoma.

Risk factors include low intake of fruit and vegetables, high intake of dietary nitrites, pickled and preserved food; a history of pernicious anemia, atrophic gastritis, gastric ulcer, adenomas and family history of cancer of the stomach.

Early signs can include anorexia, early satiety, nausea, vomiting, epigastric discomfort mimicking peptic ulcer, anemia, and disseminated intravascular coagulation with consequent bruising and bleeding.

Surgery is followed by radiation, or chemotherapy with 5-fluorouracil, doxorubicin, methotrexate, cisplatin and etoposide. 5-year survival is only about 24% with allopathic care alone.

Expression of STAT-3 signal transducer and activator of transcription indicates a poorer prognosis. So consider inhibitors curcumin and indole-3-carbinol or DIM. There is an increased risk of reoccurrence in those with CD-44 polymorphisms. High CD-44 expression increase resistance to chemo and radiation, and poorer prognosis, as this protein confers stem cell-like properties.

A new treatment has increased median survival from 3.8 months to 10.3 months, using a vaccination with diptheria toxoid and gastrin-17 peptide. This mirrors Dr. Hal Gunn’s concept of tissue-targeted vaccines.
NATUROPATHIC CARE OF STOMACH CANCER

Targets of therapy: Apoptosis off-switch, IGF-1, STAT-3, EGF, EGFR, AP-1, FGF, Keratinocyte-GF, TGFβ, SRC-3, CD-44.

1° LDN, reishi, mistletoe lectins, green tea EGCG + γ vitamin E, curcumin, grapeseed extract, quercetin.
2° Jingli neixao, oral vit. C, oral and IV-D-ALA, oral artemisinin or IV artesunate + IV vit. C.
3° milk thistle, aloe vera gel, Cimetidine or famotidine H2 antagonists.

ALOE – Aloe vera leaf gel mixed into juice is a vulnerary, healing wounds and inflammation. It mildly inhibits tumour growth. Take up to 2 ounces daily. Aloe juice and root are more laxative.

*ALPHA LIPOIC ACID – R-ALA inhibits TGFβ, regulates apoptosis via mitochondria.

*ARTEMESININ or ARTESUNATE – oral artemisinin and IV artesunate are derived from Wormwood herb Artemesia annua. They generate peroxides in contact with tumour cell iron stores.

*BERBERINE - antimicrobial & cytostatic alkyloid found in Barberry, Oregon Grape root, Coptis and Scute.

CORIOLUS - PSK or PSP mushroom extract significantly extends survival and improves quality of life.

*CURCUMIN - COX-2 and MMP-3 inhibitor, blocks growth and invasion. Inhibits EGF and AP-1.

ELLAGIC ACID - detoxifies nitrosamines and fungal toxins. Found in berries, pomegranate, grapes.

FARE YOU – cabbage extract heals ulceration and inflammation, regulates apoptosis. The active principle is a form of the amino acid methionine nicknamed “vitamin U”. Chinese Fare You Rx: 4 tablets tid.

GASTRAZYME – “vitamin U” for ulcers, inflammation. Biotics Research brand Gastrazyme Rx: 2 tablets tid.

*GRAPESEED - grapeseed extract OPC’s inhibit EGF. Synergistic with curcumin and green tea.

**GREEN TEA EGCG - Blocks the insulin-like growth factor IGF-1 receptor, inhibits MMP-3, anti-angiogenic, inhibits AP-1, and inhibits DNA turn-over enzymes ADA and XO.

HOMEOPATHY – Aceticum acidum, Aurum muriaticum, Cadmium metallicum, Cadmium sulphate, Condurango, Hydrastis canadensis.

INDOLE-3-CARBINOL – regulates transcription factors, induces cell cycle arrest and apoptosis, regulates mucins.

LICORICE ROOT – Glycyrrhiza uralensis extract induces apoptosis in gastric carcinoma cells, and strongly inhibits inflammation.

*LIU WEI HUA JIE TANG – benefits yin and qi to significantly improve survival. Liu Wei Di Huang Wan can also be used.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer, and blocks opiod growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE – inhibits NFkB transcription, EGFR and related TGF-α, MMP’s, and IGF-1 while increasing IGFBP-3; modulates VEGF and cell cyclins.

*MISTLETOE – use Iscador Qu or Helixor A or M for males and M type for females.
*QUERCITIN – induces apoptosis via mitochondria, controls tumourigenic stem cells, modulates hormone signals. Inhibits EGF and AP-1.

RESVERATROL – MMP-3 and EGF inhibitor.

SELENIUM – inhibits AP-1.

SHIH CHUAN DA BU WAN – herbal tonic which supports blood cells and organs.

*SOY – genestein inhibits AP-1.

VITAMIN C – inhibits Helicobacter pylori possessing Cag-A virulence factor, a powerful source of inflammatory growth signals.

**LIVER & GALLBLADDER CANCER**

Hepatic cancer is associated with hepatitis B and C viruses, cirrhosis, alcohol, red meat intake, fungal aflatoxins, anabolic steroids, and xenobiotics.

Early signs can include obstructive jaundice, hepatomegaly, splenomegaly, anorexia, fatigue, belly pain, ascites, weight loss and elevated liver enzymes. Serum alpha-fetoprotein AFP may be elevated, and is a useful marker to follow during treatment.

90% are hepatocellular cancers. Biopsy of hepatocellular carcinoma can trigger needle-track seeding of the cancer in about 2.7% of cases. Biopsy or surgery on cholangiocarcinoma has a risk of provoking cancer spread of 16% or 1 in 6 cases. I always prescribe PectaSol-C modified citrus pectin.

The true gross pathological size of hepatomas tends to be over-estimated by CT or MRI imaging techniques.

A drop in insulin-like growth factor one IGF-1 correlates with development of hepatocellular carcinoma in cases of hepatitis-C or HCV cirrhosis.

Activating toll-like receptor 3 (TLR3) may help control HCC. Epigenetic modulation with histone deacetylase (HDAC) inhibitors may stabilize HCC. Green tea, curcumin, sulforaphane and grapeseed are examples of natural HDACIs.

SAM-e is useful for hyperbilirubinemia. Give 400 mg two to three times daily.

The favored chemotherapy is doxorubicin. Survival rates are very low - 5-year survival is only about 7.5%.

Radiofrequency ablation is sometimes possible for inoperable tumours under 4 cm in diameter. They cannot be too near major blood vessels. An umbrella-like needle array is put into the tumour, and radio waves heat the tissue to 80 -100 + degrees celsius, causing coagulation. The killing zone is actually a 5 cm sphere. A new multi-head array can burn out an 8 cm sphere, treating tumours up to 7 cm in diameter. Percutaneous radiofrequency ablation PRF is as good as cryosurgery for initial success and complications, but is superior in preventing metastatic spread. PRF is also used for renal tumours.

Liver metastases are very common from a variety of other cancers, and are treated with surgical resection where possible, with neo-adjuvant chemotherapy. Cryotherapy can be performed on unresectable masses, with an average freezing time of 18 minutes.
NATUROPATHIC CARE OF LIVER & GALLBLADDER CANCER

**Targets of therapy:** Apoptosis off-switch, P13K-akt- mTOR inhibition, viruses, EGFR, erbB, MAPK, NFκB, angiogenesis, STAT-3, IGF-1, Notch, hedgehog signaling.

1° reishi, low-dose Naltrexone LDN, mistletoe lectins, oral and IV-D-ALA, IV artesunate + IV vit. C.
2° milk thistle, Jingli neixao, berberine, artemesinin – for hepatocellular cancer and all liver mets.

*ALPHA LIPOIC ACID – is an important antioxidant for liver cell membranes. Combines well with vitamins C and E, selenium, grapeseed OPCs, and other antioxidants.

*ARTEMESININ or ARTESUNATE – oral artemesinin and IV artesunate are derived from Wormwood herb *Artemesia annua*. They generate peroxides in contact with tumour cell iron stores.

*ASTRAGALUS – controls viruses such as EBV and HVC. An essential component of *Shih Chuan Da Bu Wan.*

BERBERINE – antimicrobial alkyloid found in Barberry, Oregon Grape root, Coptis and Scute. Cytostatic to cancer cells. Reduces hedgehog signaling, cell migration and metastasis in hepatomas.

*CURCUMIN – COX-2 and MMP3 inhibitor, blocks growth and invasion. mTOR & NFκB inhibitor.

GABA – gamma-amino-butyric acid inhibits cholangiocarcinoma.

GLUTATHIONE – is the central anti-oxidant in liver detoxification and metabolism. Some docs give intravenously, or use oral precursors such as N-acetyl cysteine, milk thistle extract and selenium. Cancer cells use glutathione as a protectant so in early cancers there is concern it may stimulate growth; it is safe in palliative care where cancer cells are saturated with GSH and giving more only corrects the deficit elsewhere in the patient.

*GRAPESEED EXTRACT – OPCs modulate free radicals of oxygen and thus apoptosis. Inhibits EGF.

*GREEN TEA EGCG – blocks the insulin-like growth factor IGF-1 receptor, inhibits MMP3, anti-angiogenic, inhibits EGFR, inhibits mTOR, and much more.

HOMEOPATHY – *Ceanothus americanus* or *virginicus*, *Chelidonium majus*, *Cholesterinum*, *Lycopodium*.

HOXSEY – herbal mélange supports bile flow and suppresses cancer. May be augmented with tinctures of greater Celandine *Chelidonium majus*, fringe-tree *Chionanthus virginicus* and burdock root *Arctium lappa*.

*INDOLE-3-CARBINOL – regulates transcription factors, induces cell cycle arrest and apoptosis, mTOR signaling pathway inhibitor and STAT-3 inhibitor. DIM can be substituted at the same doses.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer, blocks opiod growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE – silibinin inhibits tumour growth and detoxifies. Inhibits EGFR and related TGFβ, MMPs, NFκB transcription, and IGF-1 - by increasing IGFBP-3. Modulates VEGF and cell cyclins.

**MISTLETOE –Use Iscador Qu or Helixor A or M for males and M type for females.

*QUERCITIN – induces apoptosis via mitochondria, controls tumourigenic stem cells, modulates hormone signals, anti-angiogenic, inhibits EGF.

**REISHI – mushroom HWE supports immune function. Reishi is very potent against hepatocellular carcinoma!
SELENIUM – for liver detox and DNA repair. Use yeast source, not selenomethionine.

*UREA – reduces angiogenesis by destabilizing fibrin stroma. Maximum dose is 30 grams daily, typically Rx: 12 to 15 grams divided in 6 doses. Mix in 1 to 2 litres of water, tomato or fruit juice, to mask the bitter taste. BUN will read high on lab tests. Within 2 weeks expect weight gain, improved wellness, tumour shrinkage and improved survival prognosis.

*VITAMIN C – anti-oxidant, detox, anti-viral. IV-C is great in cholangiocarcinoma

VITAMIN K2 – reduces tumour growth and invasiveness, using up to 45 mg daily, as MK-7 menaquinone. Delays or prevents hepatitis C carcinogenesis.

*XIAO CHAI HU TANG – minor bupleurum formula can sero-convert (cure) hepatitis C virus, a cause of hepatocellular carcinoma. It has benefited stressed livers since time immemorial. Also helps GB cancer.

ZINC CITRATE or PICOLINATE – prevents and assists healing of gallbladder cancer.

An American FABNO once recommended for cholangio-carcinoma:

- curcumin – to repair liver fibrosis.
- melatonin
- vitamin D
- GABA – up to 3 grams
- Sho Saiko ie Honso 09 – 1 packet 2 to 3 times daily (equivalent to Ventorrid or Xiao Chai Hu Tang)

CANCER of the PANCREAS

Causative factors are unclear, but there is a correlation with exposure to environmental pollutants such as polychlorinated biphenyls PCBs, used in transformers and fluorescent lighting ballast resistors, and common organochlorine solvents and pesticides.

Abnormal micro-RNA is found, promoting proto-oncogene expression, while inhibiting tumour suppressor genes. This micro-RNA differentiates a cancer of the pancreas from pancreatitis, and is a marker for tumour aggressiveness.

Methylation of the DNA must be an issue, because intake of the methyl group donor amino acid methionine is associated with drastically reduced risk. Methylcobalamin B-12, betaine, dimethylglycine DMG, quercitin and and green tea EGCG modulate methylation.

Carriers of BRAC-2 mutations have a six-fold increased risk of pancreatic cancer, but respond better to platinum chemo agents, as do the 1 in 7 cases with ‘unstable chromosomal rearrangements’.

About 90% of cases have increased expression of EGFR. \( \kappa \)Ras mutations also occur in over 90% of cases, activating the Ras-Raf signal pathway. This can increase resistance to EGFR inhibitors.

\( \kappa \)Ras controls the PKC-iota (PKCi) oncogene, essential for growth and metastasis of pancreatic cancer. PKCi is inhibited by the arthritis drug aurothiomalate.

Pancreatic cancer cells have testosterone receptors, and aromatase enzyme to convert testosterone into estrogen.

Pancreatic cancer cells over-express COX-2 by as much as 60 times normal.
Survival after surgery is 2 times greater if the tumour is negative for calcium-binding protein S100A2.

Testing both Ca 19-9 and thrombospondin-2 showed 98% specificity as a screening test to detect early pancreatic cancer. Ca 19-9 is the primary tumour marker to test pre-therapy.

CEA may also be elevated and is useful to monitor progress.

MUC-1 is an anti-apoptotic transmembrane glycoprotein mucin expressed by pancreatic cancer cells, and involved in cell to cell and cell to extracellular matrix interactions. The amount of IgG antibodies against MUC-1 circulating in the blood is a significant predictor of survival.

Asymptomatic or sub-clinical pancreatic lesions used to be called “incidentalomas”, as they were thought to be innocently benign. However, we now think they are pre-malignant, with 94% carrying a risk of transformation into an invasive malignancy.

Dietary flavonols from plant foods are linked to lower risk. These are a type of flavonoid or polyphenol. The best protectors, in order of importance, are kaempferol, quercitin and myricetin. Kaempferol is found in tea and broccoli; quercitin in onions and apples; myricetin in grapes, berries, walnuts. All fruits and vegetables are rich in a variety of flavonoids.

Adequate vitamin D intake is associated with lowered risk.

Allergy problems like asthma or hay fever are associated with lower risk of pancreatic cancer. This suggests the immune system plays some role in preventing this cancer, so it may play a role in treating it too. Immune modulation with mistletoe has produced responses in some of my patients.

Early signs are often vague, such as back pain, depression, jaundice, weight loss, anorexia, hepatomegaly (swollen liver), dark urine and light colored stool.

Most are diagnosed at about 3 cm. in diameter, but those found when under 2 cm. have a far better prognosis.

Survival is usually less than 2 years. 5-year survival is the lowest of all cancers at about 4%. Unfortunately 80% of cases have spread into regional lymph nodes and 70% have liver mets at presentation. The tumours are typically five years along before they metastasize, but in only two years more they are typically lethal.

Medical treatment is largely ineffective. Surgery can only cure in the early stages. The Whipple procedure has a 15% mortality rate, and a 10% 5 year survival rate.

The first chemo drug to show any reasonable impact at all was Gemcitabine. This is reasonably mild in terms of side-effects, doubles disease-free interval but has only a slight effect on survival time. It can sometimes extend life by some months, though some studies show only 1 month increased lifespan. Only 5% of cases get a good response with some tumour shrinkage. About 25% of cases get some stabilization or symptomatic improvement. EGFR inhibitors may sensitize to chemo-radiation. The recent combination of 5-fluorouracil, leucovorin, irinotecan, and oxaliplatin (FOLFIRINOX) is considerably more toxic than gemcitabine in a phase 3 trial. I am doubtful this will give enough benefit to justify the harm. Similar reasoning applies to Abraxane and other adjuncts being trialed.
NATUROPATHIC CARE OF PANCREATIC CANCER

Targets of therapy: Apoptosis off-switch, STAT-3, IGF-1, IGF-1R, p53, TGFβ-1, Galectin-1, VEGF, VEGFR, MYC, EGFR, NFkB, COX-2, PGE-2, PPARγ, kRas, PKCι oncogene, MMPs, Bcl-2, JNK, integrins, cell adhesion, SP-1, 3 and 4, transcription factors, myeloid-derived suppressor cell MDSC, tumour-associated macrophage TAM, Akt, small GTP-ase, Wnt/beta-catenin/Notch signaling and Hedgehog signaling.

1º I3C/DIM, mistletoe lectins, LDN, reishi, oral and IV D-ALA, IV-DCA, IV-artenusante + IV-vit. C.
2º milk thistle, Jingli neixao, artemisinin, black cumin, Celebrex, niacinamide, metformin/Glumetza.
3º modified citrus pectin, quercitin, vit. D3, acetyl-L-carnitine, digestive enzymes, castor oil packs.

ACETYL-L-CARNITINE - blocks cachexia and fatigue in pancreatic cancer, improving quality of life.

AHCC – mushroom mycelia compound

*ALPHA LIPOIC ACID – 150 to 300 mg D-ALA IV twice weekly or oral doses of 600 to 900 mg daily of R+ ALA can arrest tumour growth. Inhibits TGFβ. Synergistic with low-dose Naltrexone.

*ARTEMESININ or ARTESUNATE – oral artemesinin and IV artesunate are derived from Wormwood herb Artemesia annua. They generate peroxides in contact with tumour cell iron stores.

BLACK CUMIN – Thymoquinone from black cumin seed oil is a new idea. Give 2 to 8 gm oil daily

BROMELAIN – inhibits Ras to reduce VEGF, PDGF and FGF, inhibiting angiogenesis.

*CAN-ARREST – controls inflammation and its growth factors, such as COX-2. So does Celebrex.

CHILIS – red chili peppers contain capsaisin which inhibits inflammation in pancreas cancer.

CHIONANTHUS – Chionanthus. virginicus (fringe-tree) tincture treats pancreatic inflammation.

COENZYME Q10 – rescues mitochondria by reducing lactate. This triggers apoptosis.

*CURCUMIN – COX-2 and MMP-3 inhibitor, blocks growth and invasion. Pancreatic cancer cells can have 60 times normal COX-2.

FLAXSEED – modulates hormone growth signals, anti-androgenic.

FARE YOU – methionine from green cabbage reduces progression by acting as a methyl group donor, for epigenetic modulation of oncogenes.

FOLATE – or folic acid from green leafy vegetables donates methyl groups to silence oncogene mutations such as Ras or BRAC2.

GENISTEIN – soy genestein inhibits protein tyrosine kinases and topoisomerasases.

GLA – gamma linolenic acid as from evening primrose oil is very synergistic with gemcitabine chemo.

*GREEN TEA EGCG – blocks the insulin-like growth factor IGF-1 receptor. Curbs invasion via inhibition of MMP-3. Anti-angiogenic, - decreases angiogenesis and lymphangiogenesis by inhibition of kRas protein kinases. Strongly inhibits STAT-1 DNA transcription activator and EGFR.

HOMEOPATHY – Caarduus marianum, Cadmium sulphate, Ceanothus amricanum, Hydrastis canadensis, Phosphorus, Podophyllum pelatum.
HOXSEY – herbal tonic which can support healing.

**INDOLE-3-CARBINOL – regulates DNA transcription factor STAT-3, induces cell cycle arrest and apoptosis. Regulates hormones – pancreatic cancer cells have excess testosterone receptors and aromatase. Inhibits NFκB, Akt and MMP-9. DIM can be substituted.

*JINGLI NEIXAO – TCM herbal tonic arrests growth and spread while improving overall wellness QOL.

*LOW-DOSE NALTREXONE – (LDN) activates cytotoxic CD8+ immune cells against cancer, blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

METFORMIN – an emerging metabolic therapy and stem cell regulator.

*MILK THISTLE – silibinin inhibits tumour growth and detoxifies. Active against NFκB and EGFR.

*MISTLETOE – Iscador or Helixor can dramatically improve quality of life, and extend life significantly.

MODIFIED CITRUS PECTIN – PectaSol-C MCP reduces metastasis risk, increases survival.

OLEANDER – *Nerium oleander* leaves contain oleandrin, a fat-soluble cardiac glycoside. Oleander is an evergreen shrub related to dogbane, laurel and *Apocynum*. Oleandrin selectively injures pancreatic cancer cells and induces autophagic death by silencing the mTOR pathway. Akt phosphorylation is inhibited, and PI3 kinase as well as MAPK signaling pathways are disrupted. Oleandrin also inhibits NFκB.

*QUERCITIN – induces apoptosis via mitochondria, controls tumourigenic stem cells, modulates hormone signals, reduces ICRA, inhibits κRas, aromatase inhibitor.

*REISHI – *Ganoderma* mushroom extract strongly inhibits NFκB.

SCUTELLARIA – baicalein controls inflammation.


SOY GENESTEIN – modulates androgen receptors.

TAHEEBO – tea of Pau d’Arco bark can occasionally produce dramatic responses.

VITAMIN A – and carotene provitamin A support immune function and regulate stem cells.

VITAMIN B COMPLEX – supports Co-Q-10 to normalize energy production.

VITAMIN C – high oral or intravenous doses support survival by depletion of glutathione in the cancer cells.

*VITAMIN D3 – regulates differentiation to control stem cells responsible for metastasis and treatment resistance. Improves survival of Whipple surgical procedure.
Colorectal carcinoma (CRC) is of course linked to the food passed through the bowels! A high-fat, low fiber diet, alcohol consumption, low intake of vitamin C, folate, calcium, selenium, flavones and indoles are all risk factors. 94% of cases are over 50 years old. Risk goes up the more red meat and processed meats you eat, and down with eating more vegetables, including tomatoes.

- sedentary habits put you at risk.
- a history of breast or endometrial cancer increases risk.
- people with a history of inflammatory bowel diseases such as Crohn’s regional enteritis or ulcerative colitis (UC) have increased risk of CRC.
- Cryptosporidium parvum, usually an opportunistic organism only infecting the immuno-suppressed, can trigger colon adenocarcinoma.
- Bacteroides fragilis bacteria can overgrow in the colon, creating chronic inflammation and risk of cancer.
- central adiposity (fat around the waist and viscera of the belly) is a risk factor, and is associated with insulin resistance, high insulin and IGF growth factors, especially IGF-2 over-expression.
- most colorectal cancers start as benign polyps in the colon.
- Familial polyposis syndrome puts some people at higher risk. The stem cells in the colonic crypt produce enterocytes which mature, migrate to the top of the crypt and are shed into the lumen of the colon. Polyps are hyperplastic growths which can become inflamed and degenerate into neoplastic adenomas, followed by invasion through the crypt walls, and metastasis. Prevent cancerous conversion by dietary folate from green leafy vegetables (not supplements), fibre, pectin, calcium D-glucarate, probiotic and directed antioxidant supplementation.
- calcium reduces polyp formation and progression of hyperplastic polyps to tubular adenomas and carcinomas. Best results are seen with calcium intake over 1,200 mg, vitamin D, low fat, high fibre diet.
- COX-2 inhibitors reduce polyp conversion to neoplasia.
- colorectal cancers exhibit MET oncogene amplification of the erb-B3 pathway. Target EGFR.
- K-ras mutations are linked to polypoma and adenoma progression to colorectal cancer. K-ras controls the PKCi oncogene. Mutant K-ras status in patients may predict the risk of distant recurrence in the lung and the brain. Kras mutations are a negative predictive factor for cetuximab and panitumumab therapy. D-limonene down-regulates k-ras, correcting over-amplification of EGFR.
- neuro-endocrine tumours are common, and the primary treatment target is VEGF and angiogenesis.
- once CRC has occurred, there is a 20% chance another will occur within 5 years.
- hypomethylation leads to loss of imprinting of the IGF-1 gene.
- anal and rectal cancers have estrogen and other hormone receptors.
- circulating tumour cell count predicts risk in colon cancers. Best is ≤ 5, worst is ≥50.

**SYMPTOMS & SCREENING**

Patients may have vague abdominal pains, sometimes mimicking peptic ulcers.

There may be alteration in the bowel habit and tenesmus (urging but nothing will pass). There is often a low grade chronic but intermittent blood loss detectable by stool testing for occult blood.

Carcinoembryonic antigen (CEA) may be elevated, in direct relation to the size and extent of the tumour. Normal is under 4. When the CEA is > 5 at diagnosis, the prognosis is poorer. CEA will also be elevated from alcoholic cirrhosis, ulcerative colitis, pancreatitis, and cancers of the breast, ovary, bladder and prostate.

Lymph nodes can be screened for CEA mRNA and cytokeratin twenty CK-20 produced by disseminated CRC cells.

Feces can be screened for COX-2 mRNA, which is more sensitive than serum CEA screening. Tumour dimeric pyruvate kinase M2PK, a marker of anaerobic glycolysis measured in feces or EDTA plasma, is more accurate as a screening tool than CEA. However, it is also elevated in inflammatory bowel diseases IBD such as Crohn’s.
Colonoscopy is preferred to sigmoidoscopy, to detect adenomatous polyps and colonic carcinomas high up in the bowel. 3 to 5% of small polyps are carcinomas.

A new light test uses a 700 nanometer wavelength light source to inspect the color of the oral mucosa. Reflectance under 47.9% is a 100% sensitive indicator of risk of hereditary non-polyposis CRC. There is an alteration of the gingival extracellular matrix in these persons.

**FIVE YEAR SURVIVAL RATES**

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<th>Colon:</th>
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<th>Rectal:</th>
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<tr>
<td></td>
<td>localized – 88%</td>
<td>spreading - 58%</td>
<td>average – 62%</td>
</tr>
<tr>
<td></td>
<td>localized – 80%</td>
<td>spreading – 47%</td>
<td>average – 63%</td>
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**INDICATORS OF HIGH RISK COLORECTAL CANCER**

- Lactate dehydrogenase LDH or LD elevation in the blood indicates risk of 50% shorter survival time.
- More than 2 mets.
- ECOG performance status 2.
- Alkaline phosphatase > 3 times the upper limit of normal – liver mets usually occur in first 2 years.
- Perirectal nodes positive increases risk of lung mets.

**TUBULAR ADENOMA**

75% of neoplastic polyps are tubular adenomas. Invasiveness varies with size:

- Under 1 cm diameter = 1% chance of invasive tumour
- 1 to 2 cm diameter = 10% chance
- Over 2 cm diameter = 45% chance

**VILLOUS ADENOMA**

The larger and less common polyp, occurring in the recto-sigmoid area, or on the right in the cecum or ascending colon. 30% are invasive cancers, and they metastasize freely. Frequently associated with bleeding and a protein-rich mucus secretion. This leads to frank blood and mucus from the rectum, fatigue, and malnutrition. Blood tests may show low protein, low albumin and low potassium.

**LEFT-SIDED CRC**

62% of CRC is left-sided. *In situ* CRC develops in 1 to 2 years into annular lesions encircling the bowel. The infiltrated gut wall is flattened and may show mucosal ulceration. These produce characteristic “napkin-ring” constrictions, seen with X-rays taken with a barium contrast enema. The early warning signs are a change in bowel habit to diarrhea or constipation, and melena (blood in the stool).

**RIGHT-SIDED CRC**

38% of CRC is right-sided. These lesions tend to be clinically silent until quite large, as the cecum is spacious. Usually a bulky, fungating, cauliflower-like tumour protrudes into the lumen. There may be weakness, malaise, anaemia from blood loss, and weight loss.

**METASTASIS**

Any CRC can dissect the gut wall and invade by direct extension into adjacent tissues. Metastasis is via lymphatics and blood vessels to the regional lymph nodes, liver, lungs, bone, brain and the peritoneal serosal membrane. CRC metastases are linked to over-expression of the WNT/TCF pathway.
MODIFIED DUKE’S CLASSIFICATION

A – limited to mucosa.
B – invading deeper layers, 1 in 4 will be fatal.
B1 – into muscle layer, nodes clear.
B2 – through the entire gut wall, nodes clear.
C – regional spread, more than ½ of cases will die from it.
C1 – in gut wall and node positive.
C2 – through the entire wall and node positive.
D – distant metastatic spread.

MEDICAL TREATMENT OF COLORECTAL CANCER

SURGERY

If under 3 cm. diameter (just over an inch), local resection to remove the tumour plus adjacent mesenteric lymph nodes can be curative.

Larger rectal lesions may result in a temporary colostomy, only 15% will have to have a permanent colostomy. Large or obstructive tumours may be debulked with radiation before surgery. Check CEA before surgery. 2% may die from the surgery.

RADIATION

Patients with higher levels of p53 mutations are unresponsive to radiotherapy and have reduced survival.

Pre-operative radiotherapy at just 5 fractions in 1 week may do more than chemotherapy or post-operative radiotherapy.

Post-op adjuvant radiation in about 28 fractions over 6 weeks can improve survival where the tumour has penetrated the gut wall, involves the regional lymph nodes, is within 15 cm. of the anal verge, or has invaded the small intestine, bladder, ovaries or uterus.

Palliative radiation for inoperable tumours, for pain or excess bleeding gives 90% of cases relief within 6 weeks. Dukes stage B2 or C rectal cancers do better with radiation plus chemotherapy.

Surgery and radiation for anal cancers can have significant morbidities, such as loss of sexual function and chronic diarrhea or fecal incontinence.

CHEMOTHERAPY

The chemo drug of choice is 5-fluorouracil. Adjunctive chemo agents include levamisole or leucovorin (calcium folinic acid). Vitamins C & E synergize with 5-FU.

The response rate is poor at 20%. Adjuvant chemo does not help those with high frequency microsatellite instability in their tumour DNA. The nausea and diarrhea can be severe, and will benefit from L-glutamine supplementation. Myelosuppression is also a risk - the bone marrow is injured, so blood cells cannot be created.

Irinotecan is a topoisomerase inhibitor which inhibits cell division by inducing single strand DNA breaks. It can be useful with or after 5-FU with leucovorin rescue.

Oxaliplatin is a third generation platinum compound which cross-links DNA, inducing apoptosis. It is synergistic with 5-FU.

Taxanes work better combined with vitamin D calcitriol.
TARGETED THERAPY
Patients with advanced colorectal cancer and a K-ras mutation generally do not benefit from anti–epidermal growth factor receptor (EGFR) therapies such as Cetuximab. Yet, a large proportion of patients with K-ras wild-type tumours (40%–70%) also do not benefit from anti-EGFR targeted agents. HER3-negative, IGF1-negative, and EGFR GCN ≥2.12 tumours were independently associated with increased response rate to Cetuximab. Therefore we might look at IGF-1 and HER3 suppressors to support this targeted therapy.

IMMUNOTHERAPY
CRC produces antigens recognizable by T-cells. Monoclonal antibodies are useful after surgery, and repair postsurgical immune-suppression. Edrecolomab is monoclonal Ig2A antibody to human CRC Ep-CAM antigen.

NATUROPATHIC TREATMENT OPTIONS IN COLORECTAL CANCER

**Targets of therapy:** Apoptosis off-switch, NFkB, EGFR, erb-B3, HER-3, IGF-1, VEGF, DNA hypomethylation, STAT-3, STAT-5, lysyl oxidase LOX, beta-catenin.

1° low-dose Naltrexone, reishi, mistletoe lectins, oral and IV-D-ALA, IV-vit.C.
2° quercitin, grapeseed extract OPCs, green tea EGCG with γ vit.E, curcumin, Jingli neixao.
3° indole-3-carbolin/DIM, melatonin, milk thistle, cannabis suppository, artemesin, artesunate.

**Note:** Asterisks * or ** indicate good science, good clinical outcomes have been seen by naturopathic oncologists, and that these agents will impact multiple growth factors or other biochemical targets.

*ALPHA LIPOIC ACID* – increases apoptosis of CRC cells, inhibits IGF and NFkB.

*ARTEMESININ* or ARTESUNATE – oral artemesin or IV-artesunate are anti-malaria drugs derived from Wormwood herb *Artemesia annua*. They generate peroxides in contact with cancer cell iron stores.

AVEMAR – fermented extract of wheat germ improves survival times.

*BLACK SEED* – *Nigella sativa* or black cumin seed contains thymoquinone which is an antioxidant synergistic with green tea EGCG. The combination is similar in effectiveness to 5-FU chemotherapy. *Nigella* inhibits FSH, akt/mTOR, JNK, VEGF and cyclins.

CALCIUM – inhibits proliferation, increases differentiation in human colonic cells. This strongly prevents polyps and subsequent cancers. Use 1,200 mg daily. Calcium-D-glucarate is more costly but is the ideal detoxifier – use 1,500 mg.

CELEBREX – an anti-inflammatory drug. Rx 200 mg twice daily. Best combined with the GI-protecting drug Famotidine (Pepcid). Celebrex interacts poorly with opiates, can cause clots and renal failure.

CIMETIDINE – this H2 blocker is best know as an acid-blocker for the stomach, but it has immune-modulating properties against GI cancers. Use in up to 3 times the usual antacid doses.

CORIOLUS – PSK very significantly increases survival at doses of 3 to 6 grams daily of 25-38% high-molecular weight HMWPS hot water extract HWE.

*CURCUMIN* – highly chemopreventative in CRC, and protection lasts years after stopping supplementation. Induces heat shock protein HSP70, and apoptosis. Reduces inflammation. COX-2 inhibitors such as curcumin and aspirin reduce risk of development or reoccurrence of dysplastic polyps and adenomas by 50%. Curcumin is safer. Reduces lipid peroxidation, always high in advanced CRC.

DIET: colorectal cancer is very much a consequence of the modern agricultural diet with high glycemic carbohydrates, low fiber, low calcium, and damaged fats. Traditional hunter-gatherer dietary ingredients such as nuts and oil seeds and fish help prevent CRC. As Dr. Diana Schvarzbein, MD says, food is best if it could be “hunted, fished, milked, picked or gathered”. Identify, then avoid or desensitize food allergies or sensitivities.
FIBER – eat lots of dietary fiber as organic vegetables and fruits, and whole grains. Fibre binds cytotoxic unconjugated bile acids, steroid hormones and xenobiotics. Provides media for good bacterial flora and fauna to produce short chain fatty acids, such as butyrates which strongly regulate the DNA. Lowers insulin levels. Lowers gut pH (increases acidity). Lignans slow cell division and inhibit angiogenesis.

*FISH OILS – omega-3 oil dioxanoic acid DHA reduces polyps, especially larger ones, lowers risk of conversion to CRC. Eicosapentanoic acid EPA induces cAMP to re-differentiate CRC. Seal or krill oil may also be used. Omega 3 oils from fish or supplements at 0.3 gm per day can increase odds of survival markedly.

FOLATE – high dose supplements of folate or folic acid are not recommended for cancer. Food source B vitamins, including folate, are highly protective against colorectal cancer. Food source folate methylates and silences oncogene DNA, decreasing mucosal cell proliferation in the luminal aspect of colonic crypts. Folate is very high in green leafy vegetables, such as salad greens.

GASTRAZYME – cabbage extract heals ulceration and inflammation, regulates apoptosis

*GRAPSEED EXTRACT – proanthocyanins improve survival in poly-metastatic CRC with some restoration of body weight and quality of life. Inhibits EGF, VEGF and NFκB.

*GREEN TEA EGCG – regulates insulin-like-growth factor IGF-1, NFκB and angiogenesis.

HOMEOPATHY – Aloe socotrina, Cadmium, Carcinosum (bowel); Nitricum acidicum, Ruta graveolens (rectum).

**INDOLE-3-CARBINOL – inhibits NFκB, STAT-3, induces apoptosis, cell cycle arrest, detoxifies hormones.

*JINGLI NEIXAO – tonic and cancer suppressing TCM herbal formula for all GI cancers.

*LOW-DOSE NALTREXONE – (LDN) activates cytotoxic CD8+ immune cells against cancer, blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

MELATONIN – extends life expectancy.

*MILK THISTLE – inhibits EGFR and related TGFα, MMP’s, NFκB transcriptions, sequesters IGF-1 while increasing IGFBP-3; modulates VEGF and cell cyclins.

*MISTLETOE – injectable mistletoe Qu for males and M type for females.

MSM – methylsulfonylmethane is a non-toxic anti-inflammatory for colitis.

PROBIOTICS – Lactobacillus casei creates healing fatty acids such as butyrates from dietary fibre, reducing atypia and risk of cancer. Reduces invasiveness factors created from dairy foods by bad gut bacteria such as Listeria.

PROTEIN – support protein status, if necessary with sugar-free whey protein powder.

PSYCHOLOGY – physicians will find CRC patients are often poorly compliant and treatment resistant. They tend to internalize stress. Empower them with control. They need creativity, art and self-expression.

*QUERCITIN – inhibits EGF receptor kinase to induce apoptosis in CRC, inhibits expression of p21-ras mutations, inhibits growth by binding to ER-II receptors, inhibits NFκB and VEGF, etc.

*REISHI – Ganoderma extract strongly inhibits NFκB. Inhibits transformation of adenomas to carcinoma.

RESVERATROL – increases apoptosis, inhibits NFκB and EGF.

RETINOL – see vitamin A.


*VITAMIN A – as retinol palmitate suppresses CRC, increases survival by inhibiting lipid peroxidation.

*VITAMIN D – inhibits CRC cell proliferation by regulating DNA transcription in well-differentiated tumours expressing the cytoplasmic vitamin D receptor. Can reduce mortality by a whopping 39%. Rx: 5000 I.U. daily, twice daily to increase blood levels. Serum calcium must be monitored if on high dose therapy.
VITAMIN E – vitamin E succinate VES arrests CRC tumour cells in G1 phase, leading to apoptosis. It is associated with increased survival time in terminal CRC, combined with omega 3 oils. If injectable VES is not available, choose mixed tocopherols with gamma and delta forms.

CARCINOID (GI NEUROENDOCRINE) TUMOUR

Carcinoids are neuro-endocrine GI tumours. Carcinoid tumours often cause no symptoms for years. They may be diagnosed unexpectedly by a surgeon during an unrelated surgery or on taking x-rays for another condition. Symptoms may mimic irritable bowel syndrome IBS. Depending on the hormones they make, these early stage tumours can produce a range of symptoms including:

- facial flushing (redness and warm feeling over the face).
- diarrhea. Diarrhea and flushing suggest metastasis into the liver.
- sweating.
- abdominal pain (caused by blockage of the intestines).
- asthma, wheezing, shortness of breath.
- heart disease, rapid heartbeat, high blood pressure.
- intestinal bleeding.
- pellagra - scale-like skin sores, diarrhea, and mental disturbances from niacin depletion.
- melena (dark, tarry stools that indicate there is bleeding in the gastrointestinal tract).
- weight gain.
- secondary diabetes.
- weakness.
- rash.
- increased facial and body hair.
- neurosis – anxiety and psychosis.
- worsened by stress, strenuous exercise and drinking alcohol.

The classic diagnostic tests for carcinoid are urine 5-HIAA, and serum chromogranin-A. Serotonin is measured in the urine as 5 hydroxyindoleacetic acid 5HIAA. High levels of 5-HIAA suggests carcinoid syndrome, and very high levels indicate a carcinoid crisis. Chromogranin-A is a general marker for neuroendocrine tumours. Chromogranin-A is also elevated in prostate cancer, so also test PSA in males. Some carcinoids, particularly in the lungs, produce a neuron-specific enolase called synaptophysin.

Carcinoids respond well to octreotide LAR – long-acting somatostatin analogue. Octreotide down-regulates IGF-1, an upstream activator of P13k/akt/mTOR signaling pathway. Everolimus may be added as an mTOR inhibitor. mTOR is a central regulator of growth, proliferation, metabolism and angiogenesis.

**Targets of therapy:** Apoptosis off-switch, IGF-1, TGFα, TGFβ1, VEGF, P13k, mTOR, IL-8, fibrosis, Notch-1 signalling, proteosome inhibition, histone deacetylation, Ras/Raf, and EGFR. Pancreatic carcinoid - target mTOR.

1° oral + IV-D-ALA, LDN, mistletoe lectins SC + peri-lesional, Metformin ER, Cortisol Manager, niacin.
2° curcumin, grapeseed extract OPCs, green tea EGCG + γ vit. E, milk thistle, artemesinin, artesunate + IV vit. C.
3° digestive enzymes, hesperidin, rhodiola, melatonin, vit. A suppositories, cannabis oil, Celebrex, IV Traumeel.

Other potential agents: indole-3-carbinol, quercitin, ginkgo biloba extract, vitamin D3. Curcumin is controversial due to its ability to suppress Notch-1 signalling.

Cortisol may be moderated with niacinamide, B-complex, Vit. C, rhodiola, L-theanine, tryptophan, licorice root, ashwagandha and adrenal support formulas such as ITT brand Cortisol Manager or Thorne Research brand Cortrex.

Melatonin may ease diarrhea and cramps by modulating gut 5HTP.

**Niacin** reduces flushing and other symptoms.
Chapter Thirteen INTEGRATIVE CARE OF LUNG CANCER

EPIDEMIOLOGY

Lung cancer is a very common cancer, with high mortality. Regional and distant spread is common. More than half of cases will have widespread metastases at the time of first diagnosis and will not survive for a year.

The most significant causative factor is tobacco smoking. 30 pack years of cigarettes increases risk 20 times over non-smokers. Risk for a non-smoking spouse of a smoker is up 30%. Risk falls back near normal about 10 years after quitting smoking. Tobacco also increases risk of leukemia, as well as cancer of the mouth, esophagus, stomach, pancreas, pharynx, larynx, kidney, ureter, bladder, and cervix. It increases risk of cardiovascular disease (CVD) such as heart attack and stroke, and of course causes chronic lung diseases (COPD) such as emphysema. Even second-hand smoke dramatically increases free radicals of oxygen ROS in the lungs.

Synthetic beta carotene is associated with a higher risk of lung cancer in smokers. Beta carotene is not effective as an antioxidant in high oxygen tissues such as the lungs, and is likely converted to a pro-oxidant by tobacco poisons. The naturopathic profession concluded from these beta carotene studies that antioxidants we consider for our patients must always be from a natural source, in very moderate doses, and most important – all the antioxidants need to be taken at the same time to provide a synergistic network. Food provides antioxidants in combinations which allow them to recycle each other and support each other in managing oxidative stress on the DNA and other large bio-molecules. We know vitamin C, E (alpha tocopherol especially) and selenium work as a team, and that all dietary antioxidants require intrinsic R-alpha lipoic acid and glutathione to neutralize the extra energy they pick up from free radicals of oxygen or ROS. The best single antioxidant of all for the lungs is grapeseed extract OPCs. Dr. Arthur DeJong, MD PhD, creator of Oncolyn, claims grapeseed extract OPCs inhibit tobacco damage to the lungs.

Approximately 15% of all lung cancers are diagnosed in people who have never smoked. Non-smokers who develop lung cancer may have an abnormally high expression of p58 and cJUN N-terminal kinase.

Exposure to radon gas, entering a home from the soil and rock below, can more than double risk of lung cancer. This can occur even at levels well below the official guidelines. Particularly susceptible to radon gas are persons with a genetic variant causing reduced glutathione-S-transferase M-1. Radon injury is additive and synergistic with tobacco smoke, and other radiation exposure such as environmental uranium, and medical radionuleides.

Other independent and additive risk factors include tuberculosis, and toxic petrochemical, arsenic, asbestos,

Low intake of vegetables and lack of exercise increases risk of lung cancers. A diet high in the cabbage family of vegetables, the cruciferae, is highly protective, reducing risk of lung cancer by about a factor of 3. Tea and wine are also protective. Red and processed meat intakes are associated with increased risk of cancers of the lung. Iron content may be an active principle. Increasing fish and vegetables, while reducing red meat, is protective.

Inorganic phosphates from fertilizers are linked to higher risk.

Estrogen and progesterone receptors are found in a substantial proportion of lung cancers, and anti-estrogen agents can significantly improve lung cancer outcomes.

Bronchogenic cancers arising from the bronchial endothelial lining constitute 90% of lung cancers - squamous cell, large cell, small cell, broncho-alveolar and adenocarcinoma. 5 year survival is about 15%.

Small cell cancers have a 5-year survival rates are about 5 to 10%, making this one of the most deadly cancers, deserving very aggressive therapy. Survival time can be just a few months from diagnosis, in a majority of cases. Surgery is the best hope for a cure. Metastasis is linked to over-expression of the WNT/TCF pathway.

About 10 – 15% of cases will have a mutation in EGFR or ALK that will allow use of new targeted therapies. These new drugs are really a tremendous advance, with good survival benefits and manageable toxicities.
SIGNS & SYMPTOMS

Cough, sputum, hemoptysis (coughing up blood), respiratory stridor (breathing with great effort), frequent or persistent upper respiratory infections URI, weight loss, and fatigue.

Paraneoplastic manifestations include ACTH and HGH irregularities.

Dogs can be trained to detect 11 specific exhaled volatile organic compounds VOCs on the breath of those with lung cancer. An electronic “nose” has been developed which also reliably detects these aromatics in the breath.

STAGING NSCLC PRIMARIES

T-X: positive sputum or washings, no tumour
T-is: carcinoma in situ
T-1: tumour under 3 cm diameter
T-2: tumour 3 cm or more, or involving mainstem bronchus or visceral pleura, or subtotal atelectasis, or subtotal obstructive pneumonitis.
T-3: tumour invading the chest wall, diaphragm, mediastinal pleura, or atelectasis or obstructive pneumonitis of the entire lung.
T-4: tumour invading the mediastinum, esophagus, heart, great vessels of vertebral body. Malignant pleural effusion.
N-0: no regional lymph node metastases
N-1: in hilar or peribronchial ipsilateral nodes.
N-2: in mediastinal or subcarinal ipsilateral nodes
N-3: in any scalene or supraclavicular nodes or contralateral hilar or mediastinal nodes
M-0: no distant metastases
M-1: distant metastases
Occult: T-X N-0 M-0
Stage 0: T-is N-0 M-0
Stage I: T-1,2 N-0 M-0 5 year survival is about 45%
Stage II: T-1,2 N-1 M-0 5 year survival is 20 - 25%
Stage IIIA: T-3 N-0,1 M-0 can be treated surgically in some cases
     T-1,3 N-2 M-0
Stage IIIB: T-4 N-0,2 M-0 cannot be cured with surgery.
Stage IV: any T any N M-1+ cannot be cured with surgery.

NON-SMALL CELL LUNG CANCER - NSCLC

75% of lung cancers, the non-small cell category includes 4 subtypes with clinically similar behaviour - squamous epidermoid, adenocarcinoma, large cell, and undifferentiated.

Slow growth is common, with no rapid impact on quality of life. Often these tumours are diagnosed after 5 to 8 years of silent growth. Typically they are found as a space-occupying lesion on a routine chest X-ray or CT.

The lesion may be directly biopsied, or sputum cytology, fiber optic bronchoscopy washings or brushings, aspiration of pleural effusions, biopsy of nodes or metastatic tumours can provide a diagnosis.

Proteomic analysis of protein expression and post-translational modifications reflects the biochemical pathology and assists in making a prognosis of node involvement and of mortality risk.

A rise in the C-reactive protein CRP marker of inflammation > 0.5 mg/L is associated with progression of dysplasia to frank cancer.
Non-small cell lung cancer has a low response rate to chemotherapy, but there is potential for surgical cure if it is found while still localized. NSCLC tumours tend to necrose and bleed.

Risk of brain metastases is 14 times higher from tumours over 3.9 cm in diameter. Most brain mets occur at 2-4 years after diagnosis, rarely after 4 years.

Overall 5 year survival is 15%. Significantly poorer survival and relapse-free survival is seen in tumours expressing the cell adhesion molecule CEA CAM-1--also called AE1 / AE3. Such cases warrant aggressive adjuvant treatment.

Monoclonal antibodies targeting the epidermal growth factor receptor EGFR can cause regression of adenocarcinoma and squamous cell carcinoma of the lung, with symptomatic improvement. The natural agent for EGFR is milk thistle.

RADIATION FOR NSCLC

Radiation is sometimes given after surgery, or in late disease, but the lungs are very sensitive to radiation, and when they scar up they cannot move air. Radiotherapy actually increases early deaths about 21% in early NSCLC

Taxol is radio-sensitizing for lung tissue, as are taxanes in yew bark tea. Coriolus PSK significantly improves survival in NSCLC treated with radiation.

Proton beam radiation is used in stage 1 cases who decline or cannot take surgery. It is available at Loma Linda in San Diego, California, and several other American clinics.

Acute radiation pneumonitis may follow 1 to 6 months after therapy, with bloody cough, chest pain and breathing distress. Drugs which support recovery are prednisone, azathioprine or cyclosporine A. Consider anti-oxidants vitamin E and grapeseed extract. N-acetyl-cysteine is a lung protectant and anti-oxidant, but may be anti-apoptotic.

RADIO-FREQUENCY ABLATION

Radio-frequency ablation RFA can be considered for those patients not medically fit for surgery or radiation therapy.

Tumours must be under 3.5 cm diameter, and cannot be adjacent to major blood vessels or other vital structures. The ideal tumour size for this procedure is under 2 cm. diameter.

Probes are inserted and radio-waves heat and destroy the tumour tissue.

Two year survival is over 91%. Royal Columbian Hospital in New Westminster is currently providing this therapy.

Standard RFA devices can ablate a zone of about 5 cm. diameter, and so allowing for a 1 cm. margin, the absolute maximum tumour size treatable is 4 cm. at its largest diameter. Recent experimental multi-polar devices ablate up to 8 cm, so can theoretically it can treat well-selected tumours to a maximum diameter of 8 cm.

CHEMOTHERAPY FOR NSCLC

Cisplatin, carboplatin, mitomycin, vinblastine, ifosfamide, gemcitabine, and paclitaxel.

NSCLC up-regulates COX-2, increasing levels of prostaglandin PGE-2. COX-2 inhibitor Celecoxib has been shown to improve responses to pre-op or neo-adjuvant chemo with paclitaxel and carboplatin.

Iressa (gefitinib) is an epidermal growth factor receptor EGFR inhibitor (receptor specific tyrosine kinase inhibitor) showing some efficacy, but it is linked to deaths from interstitial pneumonia. The most common problem with it is diarrhea. Tarceva (erlotinib) is proving to be quite useful, inhibiting EGFR tyrosine kinases and therefore cell proliferation, angiogenesis, invasion, and metastasis.
Chemotherapy for metastatic NSCLC is always palliative. In general, whole-brain radiation of cancer metastases will only add about 2 months increased survival.

**SMALL CELL LUNG CANCER (SCLC)**

Small or oat cell carcinoma (SCLC) accounts for about 25% of lung cancers. It follows a very rapid clinical course, with survival of only 1 to 2 months in extensive disease. Survival is only 4 to 5 months in limited stage disease, which is defined as tumour in one hemi-thorax and regional lymph nodes, including ipsilateral (same-side) supraclavicular adenopathy (swollen nodes above the collarbone) and pleural effusion.

A primary driver of SCLC is fibroblast growth factor receptor FGFR. For this I prescribe R-alpha lipoic acid, modified citrus pectin, curcumin, milk thistle extract and vitamin D3. EGFR mutation is also a feature of SCLC.

**RADIATION FOR SCLC**

Hemi-body radiation outperforms chemo for small cell lung cancer.

**CHEMOTHERAPY FOR SCLC**

Small cell lung cancer usually responds rapidly and vigorously to chemotherapy, but if reoccurrence occurs within 3 months, then secondary chemo has no impact on survival and only a 5% response rate. If reoccurrence is more than 3 months post-primary chemo, then a 20% response rate is expected.

Limited stage disease will respond 80-90% of the time, with 12 to 18 months until reoccurrence.

Extensive stage disease will respond 60-80% of the time with 7 to 10 months until reoccurrence.

A platinum drug is usually combined with a second chemo drug i.e. cisplatin plus etoposide (from podophyllotoxin) is often the treatment of choice.

Variations include the less toxic carboplatin, plus doxorubicin, cyclophosphamide, gemcitabine or taxol (as docetaxel or paclitaxel)

Anti-angiogenic Avastin or bevacizumab combined with chemotherapy improves median survival by 2 to 2 ½ months, and increases one year median survival by 10%. There is an increased risk of hemorrhage, hemoptysis, GI perforation, hypertension and congestive heart failure.

**MESOTHELIOMA**

Mesothelioma is cancer of the pleural membranes, which lie between the lungs and the chest wall. Exposure to asbestos fibres is the leading cause. Brake mechanics are high risk, as are pipe-fitters and millwrights working with asbestos insulation, etc. Mesothelioma can have an indolent course, but when it grows rapidly, it is commonly fatal. The standard of care is cisplatin with pemetrexed. Pemetrexed is a multi-target (3 enzymes) anti-folate drug which inhibits DNA synthesis. This drug combination has a 41% response rate, with an average survival of 12 months.

Targets of therapy: NFκB, COX-2, Akt/P13K/mTOR, PTEN. I have seen good responses in mesothelioma with the product Oncolyn, presumably due to COX-2 inhibition, increasing apoptosis and reducing cell proliferation. I prefer to substitute green tea EGCG, omega 3 oils, curcumin and grapeseed extract. Indole-3-carbinol, quercitin and isoflavones help support the PTEN tumour suppressor gene.
NATUROPATHIC TREATMENT OPTIONS IN LUNG CANCER

Targets of therapy: Apoptosis off-switch, mitochondrial rescue, tyrosine kinase receptor inhibitors, NFκB, beta-catenin, COX-2, EGFR, HER-1 and HER-2, MAPK, P13K/Akt, VEGF and angiogenesis, k-Ras, MET, EML4-ALK, IL-6, IGF-1, FGFR, BRAF, DDR2, estrogen, retinoid receptor and farnesyl transferase (ras) inhibitors.

1° astragalus, IV-DCA, oral and IV-D-ALA, IV-vit. C, LDN, grapeseed extract, mitochondrial rescue.
2° reishi, corioulus, or chaga mushroom extract, mistletoe lectins, curcumin, quercetin. *Helleboris niger D12.
3° artemesinin, modified citrus pectin, vit. D3, cannabis PTO.
Nebulize: D-ALA, bicarbonate, butyrate, metformin, glutathione.

Note: Asterisks * or ** indicate good science, good clinical outcomes have been seen by naturopathic oncologists, and that these agents will impact multiple growth factors or other biochemical targets.

ACETYL-L-CARNITINE – for mitochondrial rescue. Caution regards seizures, eg if brain mets.

ALKYLGLYCEROLS – from shark liver oil inhibit angiogenesis and protein tyrosine kinases.

*ALPHA LIPOIC ACID – R-ALA inhibits NFκB, anti-oxidant, detoxifier, induces apoptosis. OK with curcumin.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb *Artemisia annua*. They generate peroxides in contact with cancer cell iron stores.

**ASTRAGALUS - a TCM chi tonic herb, often found in liquid extracts with ginseng, significantly enhances survival with small cell lung cancer. Astragalus-based herbal formulas improve survival and reduce harm when combined with platinum-based chemotherapy.

*BICARBONATE – nebulize 1.0 mL of injectable grade 8.4% sodium bicarbonate in 4 mL water, up to twice daily.

*CAN-ARREST – COX-2 inflammation inhibitors. Curcumin inhibits COX-2 and mTOR.

CHAGA – chaga mushrooms provide betulinic acid.

CO-ENZYME Q10 – restores apoptosis via mitochondria rescue, and more.

*CORIOLUS - mushroom extract PSP or PSK slows progression of NSCLC, especially in combination with radiation and chemotherapy. Maitake is NOT useful in lung cancers.

CURCUMIN – like carotenes, curcumin may increase free radicals of oxygen in lung tissue, so is not recommended as a preventative. OK to combine with R-ALA in highly aerobic lung cancers.

ELLAGIC ACID – from berries, pomegranate juice.

GENISTEIN – soy genistein inhibits protein tyrosine kinases and topoisomerases.

*GLUTATHIONE – nebulize 1.0 mL of 100 mg/mL glutathione in 4 mL water for pleural effusions.

**GRAPESEED EXTRACT – antioxidant in the high oxygen environments of the lungs and brain. OPC’s and resveratrol increase apoptosis, decrease inflammation and angiogenesis, and inhibit tumour DNA synthesis.

**GREEN TEA EGCG - anti-angiogenic, mTOR inhibitor, and much more.

HOMEOPATHY – *Acidum hydrocyanicum, Argentum nitricum, Carcinosum, Cobaltum, Kalium bichromatum, Lachesis mutus, Lycopodium, Oxalic acidum, Scirrhinum, Tuberculinum.*
*INDOLE-3-CARBINOL – causes tumour cell cycle arrest via cyclin kinases, mTOR inhibitor, anti-estrogenic.

L-CARNITINE – is used by FABNOs for bio-energetic regulation.

LIU WEI DI HUANG WAN - for deficient lung yin, as in small cell cancer. Enhances chemotherapy and radiation therapy outcomes. Cools the fires of inflammation.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer, blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MELATONIN - stabilizes cases with no liver mets and not more than one brain met. Significantly increases survival and time until progression. Tumour response rate and one year survival doubles by combining melatonin with chemotherapy.

*MILK THISTLE – anti-angiogenic plus it strongly inhibits epidermal growth factor EGF and its receptor EGFR.

MISTLETOE – Iscador or Helixor mistletoe lectins stabilize disease, improve quality of life, and extend survival. Use Iscador Qu or Helixor A or M for men, and M type for women.

*MITOCHONDRIAL RESCUE – R-alpha lipoic acid, thiamine, acetyl L-carnitine, D-ribose, Garcinia hydroxycitrate, grapeseed extract.

MUSTARD PLASTERS – an ancient remedy for cough, congestion, pneumonia, lung inflammation.

N-ACETYL-CYSTEINE - NAC is mucolytic and a lung protectant antioxidant, but it beware, it can act against pro-apoptotic therapies. BIORC reports good results used with mushrooms, curcumin, etc.

OMEGA 3 OILS – Rx 1,200 mg each of EPA and DHA, while cutting all omega 6 fats ie red meat and corn oil.

POMEGRANATE – anthocyanidins and tannins in pomegranate fruit and juice inhibit tumour progression.

*REISHI – mushroom extract inhibits NFkB and thus COX-2, especially raised in small cell lung cancer SCLC.

RESVERATROL – inhibitor of NFkB, antioxidant which modulates MnSOD, anti-angiogenic, pro-apoptotic and regulator of cyclin-dependent kinases.

SHIH CHUAN DA BU WAN – reduces metastasis.

SMOKING CESSATION – smoking tobacco alters EGFR receptors through oxidative stress, and makes these tumours resistant to tyrosine kinase inhibitors. To quit smoking take L-glutamine or Thorne Research Sulfonil to reduce cravings. Take grapeseed extract OPC’s and N-acetyl-cysteine to neutralize toxins. Homeopathic Tabacum 6C is detoxifying, and may be included in the calming tincture of oatstraw Avena sativa. Be nice to yourself. Acupuncture can really help treat any addiction. I like to “staple” the ear acupuncture points Shenmen, Liver and Lung. For a weak patient I may apply silver magrain pellets, which do not break the skin. TCM acupuncture points include LI-4, LI-20, ST-36, LV-3, PC-6, and the great trilogy at the radial wrist: LU-7, extra point Tim Mee, and a delicate puncture of “Dr. Cheung’s Secret Point” which enters above LI-5 and is directed down to LU-9 at the wrist crease.

THYMUS – Thymuline, Thymosin, thymus extracts oral or intravenous.

VACCINES - lung targeted viral or bacterial vaccines; for example Pneumo-Vax.

VITAMIN C – pro-oxidant and pro-apoptotic when used in high intravenous doses.
*VITAMIN D3 – regulates differentiation, stem cell remediation. High intake gives four times better survival in NSCLC. It improves immune function and reduces risk of death “from all causes”.

VITAMIN E - lung protectant, anti-oxidant in high oxygen tissues.

A successful protocol for NSCLC from an ND, FABNO working integratively with an MD. This illustrates the American style of integrative care, using the best of naturopathic and medical oncology:

- Taxol with Carboplatin chemo every 1 to 3 weeks
- IV Vitamin C – 25 to 50 grams concurrent with the chemo infusions.
- curcumin - 3 to 6 grams daily
- melatonin - 20 mg twice daily
- genistein - 125 mg 4 times daily
- resveratrol - 125 mg 4 times daily
- vitamin D3 - 5000 IU twice daily
- green tea extract - 2 capsules twice daily

A program I prescribed which has given three years of stable remission:

- R-alpha lipoic acid
- grapeseed extract
- gamma tocopherol
- omega 3 oil
- astragalus
- ellagic acid from berries and pomegranate as foods.
- homeopathic Arsenicum iodatum 6C.

Bastyr University Integrative Oncology Research Center BIORC has shown significantly increased survival in stage 4 NSCLC with this protocol:

- IV ascorbic acid up to 100 grams per infusion twice a week for 6 weeks as initial course
- Trametes versicolor 3600 mg/day
- curcumin 3000 mg/day
- bromelain 1500 mg/day
- quercetin 2000 mg/day
- N-acetyl cysteine 300 mg twice daily
- nebulized glutathione and N-acetyl cysteine daily.

Dr. McKinney's Cough Mix

The persistent cough in bronchial and lung cancer can be a great burden, and often the only thing that will stop it is opiates such as morphine. Since opiates actually increase cancer growth, can be sedating, and make it so we cannot use LDN, an alternative is welcome. Here is a formula I have had success with, dispensed as tinctures (alcohol and water extract):

4 parts Lobelia inflata aka Indian tobacco
4 parts Glycyrrhiza glabra aka Licorice root
4 parts Zingiber officinale aka Ginger root
1 part Sanguinaria canadensis aka Blood root.

Adult dose: 25 drops tid. (3 times daily) in a little water.

Note: Lobelia and Sanguinaria are mildly toxic herbs, so do not give to children, pregnant or nursing women. Be aware of their cautions and contra-indications, and make sure the patient understands the dose limits and red flag symptoms to report: nausea, diarrhea, sweating, etc.
Chapter Fourteen  INTEGRATIVE CARE OF OVARIAN CANCER

EPIDEMIOLOGY

The cause is unknown, but ovarian cancer is associated with cancers of the breast, colon, or uterus; p53 gene over-expression; obesity, hypertension, diabetes; nulliparity or low parity, infertility, ovarian cysts, ovulatory drugs; exposure to talcum powder in the perineal area, antihistamines, antidepressant drugs, benzodiazepine tranquilizers, hair dyes; sedentary lifestyle, and lack of sunlight. Age at onset is typically 55 to 59.

5 to 10% of cases are familial. BRAC-1 and BRAC-2 mutations account for about 15% of cases, with 2 in 3 showing serous type tumours. Salt Inducible Kinase 2 (SIK2) has been found to play a critical role in cell division and to regulate the response of some ovarian cancers to chemotherapy. Advanced, aggressive and metastatic disease usually involves increased cytoplasmic clusterin, which is anti-apoptotic. Anti-apoptotic protein Bcl-2 is elevated about 10-fold in cases of ovarian cancer.

Prolonged unopposed estrogen replacement therapy (without progesterone) increases risk 80% after 10 to 19 years of use. Risk is reduced after taking oral contraceptives more than 5 years, and by tubal ligation, breast feeding, pregnancy and early menopause. Estrogen is turned into genotoxic forms due to SNPs in Cyp1B1.

Non-steroidal anti-inflammatory drugs NSAIDs such as acetaminophen, taken long term, reduce risk by 22- 28% Aspirin 3 times per week reduces risk 40%, possibly by cyclooxygenase inhibition.

Statin drugs decrease risk and increase survival time. Bet3a-blockers reduce Src signaling. Ginkgo biloba extract taken for at least 6 months reduces risk of non-mucinous ovarian cancer by 60% . Vitamin E and C at low doses reduce risk by 60%. Tea drinking lowers risk in a dose-dependent manner, about 18% per daily cup.

Alcohol intake raises risk, but this can be reduced by intake of high-folate foods such as green leafy vegetables, or a folate supplement. Diets high in saturated fat, eggs, milk and cholesterol raise risk, while legumes and vegetables are protective.

Metastasis into the abdominal cavity is common even with small tumours, so most ovarian cancers are at an advanced stage when diagnosed. Prognosis is improved when the tumour is debulked before chemo, often by surgery, sometimes by radiation.5-year survival is about 33 - 55%. Surgery and chemo often produce a remission, but relapses are common by 1½-2 years. Relapse within 6 months shows a very dangerous tumour. There is a 75% reoccurrence rate, and tumours recurrent within 6 months tend to be very drug-resistant . If refractory to initial platinum chemo there are few choices left beyond palliation.

SIGNS & SYMPTOMS

Symptoms are non-specific, and include vague pelvic or abdominal discomfort, abdominal swelling or bloating, indigestion, urinary frequency, urinary urgency, irregular menses, abnormal vaginal bleeding, blood clots, ascites, diarrhea, constipation, appetite changes, weight loss, shortness of breath, fatigue, back pain. Palpable abdominal masses under 8 cm. in premenopausal women are usually benign. If a lumpy mass persists over 2 months, appears to grow, or develops after menopause, it should be investigated as ovarian cancer.

SCREENING & DIAGNOSIS

Pelvic exam may be followed by abdominal or transvaginal ultrasound. CT or PET scans are sometimes done.

Tumour markers include Ca-125, alpha fetoprotein AFP, human chorionic gonadotrophin HCG, lysophosphatidic acid LPA, serum glycoprotein YLK-40, apo-lipoprotein A-1, truncated transthyretin, and cleavage fragment 4 from inter-alpha-trypsin inhibitory heavy chain H4, interleukin eighteen IL-18, and fibroblast growth factor two FGF-2.

The risk of malignancy index RMI is calculated as a product of CA-125 level, an ultrasound score, and a score for the patient’s menopausal status. An experimental screening test for early detection developed at Yale achieved 95%
specificity by combining tests for four serum proteins: prolactin, leptin, osteopontin and IGF-2. Now two more protein biomarkers - macrophage inhibitory factor MIF and Ca-125 have been added, improving specificity of the 6 marker test to 99.4%.

HISTOLOGICAL TYPES

80 to 90% of ovarian cancers are epithelial adenocarcinomas. Stromal tumours are rare. Clear cell variant has the poorest prognosis. Germ cell tumours account for less than 5%, arise in teens to early 20’s; aggressive but amenable to chemotherapy.

Low malignant potential tumours - rare indolent low-grade serous carcinomas have a 5 year survival rate of over 60%, but are unresponsive to chemotherapy. Generally these are fatal by about 10 years. Most of these tumours have mutations in BRAF or KRAS genes associated with kinase signaling cascades.

STAGING

Stage I – 15% of cases, disease is limited to ovaries. Survival is 70 – 90%
Stage II – 15% of cases, there is extension of disease into pelvic tissues
Stage III – 65% of cases, peritoneal implants, which spread by local extension into the omentum, diaphragm and the liver. 5 year survival is about 20-30%.
Stage IV – 5% of cases, distant metastases. Stage IV median survival time is 13.4 months, median progression free survival is 7.1 months. Overall survival to 5 years is about 8%.

SURGERY

Debulking, oophorectomy or total abdominal hysterectomy (TAH). After a second-look laparoscopy, check CBC, chemscreen and CA-125 quarterly for at least 2 years.

RADIATION

External beam sources or local radioactive phosphorus. Seldom used due to complications like GI enteritis, liver function changes, pulmonary fibrosis, and loss of hematogenous marrow. Can be considered for palliation of metastatic disease.

CHEMOTHERAPY

Commonly used agents are cisplatin, taxol, carboplatin, adriamycin, cyclophosphamide, and topetecan. Liposomal doxorubicin (Adriamycin) is also used. 2/3 relapse within 2 years of primary therapy. Cancers which relapse within 6 months are generally unresponsive to further chemotherapy.

I.V. cisplatin is sometimes augmented with intraperitoneal cisplatin, which penetrates 1 - 2 mm or 6 - 8 cell layers. Post-chemo Ca-125 predicts risk of relapse:

- \( \leq 10 \) predicts 24 months median progression-free survival
- 11 to 20 - 17 months MPFS
- 21 to 35 - 7 months MPFS

Also watch Ca-125 velocity – any rapid shift warrants trans-vaginal ultrasound investigation.

HORMONAL THERAPY

Ovarian cancer has SNPs that increase Cyp 1B1, causing estrogens to become genotoxic. Anti-estrogens, anti-androgens, gonadal releasing hormone GNRH analogues are palliative treatments of last resort for patients who have failed cytotoxic chemotherapy. Response rates are only 4 -15%.
IMMUNOTHERAPIES

IL-2, IP LAK cells, interferon, BCG, monoclonal antibodies. Mouse studies show good responses to a combination of EGFR antibody with photodynamic therapy. I consider mistletoe therapy to be a potent immune modulator in ovarian cancer, and it activates dendritic cells to process tumour antigens. Dendritic cell processing of ovarian cancer antigens is blocked by tumour production of the immuno-suppressive interleukin ten IL-10.

NATUROPATHIC TREATMENT OPTIONS IN OVARIAN CANCER

Targets of therapy: Apoptosis off-switch, STAT3, PI3K /Akt /mTOR pathway, IGF-1, HER-2 and EGFR, VEGF, Bcl-2, MMP-2, IL-8, MYC oncogene, NFkB, PGE2, aromatase, TGFβ-1, PARP, SIK2, MAPK, MEK, ER.

1° mistletoe lectins, LDN, reishi, quercitin, melatonin, curcumin, IV DCA/D-ALA, IV-vit. C, IV curcumin.
2° indole-3-carbinol/DIM, artemesinin, IV artesunate, oral R-ALA, Celebrex, Glumetza, vit. A.
3° modified citrus pectin, genestein, resveratrol, Avemar, zinc, molybdenum. Test and treat excess copper, iron.

Note: Asterisks * or ** indicate good science, good clinical outcomes have been seen by naturopathic oncologists, and that these agents will impact multiple growth factors or other biochemical targets.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores. Alternate with IV DCA/D-ALA.

AVEMAR – fermented whata germ extract PARP inhibitor has been shown to be useful in BRAC1 mutant and non-mutant cases. New brand is Metaprol Pro. Other PARP inhibitors include red wine and R-alpha lipoic acid.

BROMELAIN - a proteolytic enzyme from pineapple stems which targets CD44 tumour cell receptor, EGFR, Ras and filamin to control tumour growth, progression, and metastasis.

CLA – conjugated linoleic acid; preferably not derived from dairy foods.

*CURCUMIN - dose-dependent toxicity to OC cells, induces apoptosis by decreasing anti-apoptotic Bcl-2.

DIET : avoid animal fats, eggs, estrogenic foods, estrogen mimicking persistent organic pollutants POPs

FLAXSEED – lectins modulate hormones through sex hormone binding globulins, oil reduces PGE2.

*GENESTEIN – see SOY

GINGKO BILoba – prevents occurrence, regulates circulation.

GINSENG - dose-dependent inhibition of growth of OC cells by RH2 ginsenosides. Enhances response to cisplatin.

GLUTATHIONE - reduces cisplatin neurotoxicity, improves chemo responses. Give intravenous glutathione or oral precursors such as N-acetyl cysteine, HMS 90 whey extract or milk thistle extract.

*GRAPESEED EXTRACT – grapeseed oligomeric proanthocyanidins are an aromatase inhibitor, COX-2 inhibitor, epidermal growth factor EGF inhibitor, and more.

*GREEN TEA EGCG - enhances Adriamycin uptake by OC cells, improving chemo response while inhibiting metastases. MMP-2 inhibitor, anti-angiogenic, and much more.

HOMEOPATHY – Aurum muriaticum natronatum, Lachesis mutus, Lilium tigrum, Pulsatilla anemone. IV or nebulized Helleboris niger D12.
**INDOLE-3-CARBINOL** – a component of the cabbage family of vegetables which converts estrogens into mild forms which cannot stimulate tumour growth. Induces cell cycle arrest, apoptosis, and growth inhibition. Inhibits STAT3 DNA transcription activator.

IRON – test for overload, chelate out iron. Do not supplement iron unless absolutely necessary.

**LOW-DOSE NALTREXONE** – (LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opiod growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

**LYCOPENE** – 6 to 30 mg may treat or prevent ovarian cancer.

**MELATONIN** - enhances IL-2 and chemotherapy responses. Reduces chemo toxicity. Improves quality of life and control in cases where no standard treatment is available.

**METFORMIN** - blocks sugar metabolism of cancers, acts similar to calorie restriction. Consider Glumetza extended release form 500 mg. Do not use if significant renal disease. Berberine may have related effects.

**MILK THISTLE** - dose-dependent inhibition of OC; potentiates Cisplatin, Carboplatin and Adriamycin responses.

**MISTLETOE** - Iscador or Helixor M type injectable mistletoe lectins are a vital biological response modifier BRM. Supports chemo and radiation, increases survival time and quality of life.

**MORINDA OLEIFERA** – the “drumstick tree” yields isothiocyanates and glucosinolates.

**MUSHROOM POLYSACCHARIDES** - shiitake lentinan corrects OC resistance to cisplatin or 5-FU. Coriolus PSK increases IL-2 by 2.5 fold, and also augments cisplatin therapy.

**NIGELLA SATIVA** – *Nigella sativa* or black seed extract contains thymoquinone. This seed inhibits FSH, akt/P13K/mTOR, JNK, VEGF and cyclins.

**OMEGA 3 OILS** – anti-inflammatory.

**QUERCITIN** - dose-dependent inhibition of OC, down-regulates OC cell signal transduction, binds to type II estrogen receptors, aromatase inhibitor, inhibits high aerobic glycolysis, arrests OC cells in G0-G1 phase, inhibits development of heat shock proteins, induces autophagy and apoptosis. Synergistic with cisplatin and genestein.

**RED RICE YEAST**- extract contains a natural statin drug. Statins are associated with increased survival in epithelial ovarian cancers.

**RESVERATROL** – as an MMP-2 inhibitor, reduces invasion and spread.

**SELENIUM** - is cytotoxic to ovarian cancer cells. Improves Taxol and Adriamycin responses by managing oxidative stress.

**SOY** - inhibits hormone responsive tumours; enhances actions of chemo drugs, radiation, and quercitin; protease inhibitors block OC cell urokinase, inhibiting invasiveness. Soy isoflavones block IL-6 production and promote transforming growth factor beta TGFβ which reduces ovarian cancer cell proliferation and viability by an estrogen dependent pathway. Protein supports metabolism and repair. Genestein reduces Cisplatin chemotherapy resistance, increases the cytotoxic effect 33 to 43%.

**VITAMIN A** - vitamin A and retinoic acids induce differentiation, apoptosis and control cell proliferation, including stem cells. Rx 50,000 IU tid for no more than 3 months.

**VITAMIN C** – High dose intravenous vitamin C can be very effective in ovarian cancer.
VITAMIN D3 - synergistic with vitamin A. Many ovarian tumours are rich in vitamin D receptors, and OC is more common in areas with less sunlight.

VITAMIN E SUCCINATE – by injection only, this non-antioxidant (redox neutral) form of d-alpha vitamin E is active against cancers, possibly via mitochondrial rescue.

ZEEL – as an MMP-2 inhibitor and anti-inflammatory, Zeel homeopathic combination, or Hormeel.

*ZINC – disrupts microtubules, synergistic with the platinum drugs.

Bastyr University Integrative Oncology Research Center BIORC has shown significantly increased survival in stage 4 ovarian cancer with this protocol:

- IV ascorbic acid up to 100 grams per infusion twice a week for 6 weeks as initial course.
- Trametes versicolor mushroom extract 3600 mg/day.
- curcumin 3000 mg/day.
- bromelain 1500 mg/day.
- quercetin 2000 mg/day.
- ECGC 1600 mg/day.
- Helixor M mistletoe s.c.
Chapter Fifteen INTEGRATIVE CARE OF UTERINE, CERVICAL & VULVAR CANCERS

CERVICAL CANCER

The widespread use of the Pap smear has reduced the death rate in North America from cancer of the cervix of the uterus. This valuable screening test was developed by Dr. George Papanicolaou in the 1930’s.

Squamous cell disease appears to be triggered by the sexually transmitted human papilloma virus HPV, particularly strains HPV-16 and HPV-18. This virus causes “genital warts” - cauliflower-like warts on any body part used sexually. The disease process does not stop with spontaneous clearance of the warts. The virus is particularly carcinogenic in association with an impaired tumour-specific T-cell response and an increase in immune suppressor cells. It now appears that HPV screening tests, at 96% sensitivity, outperforms the PAP cytology test, at 56% sensitivity, for detecting risk of cervical intra-epithelial neoplasia CIN and cervical cancer.

A new bivalent L-1 virus-like-particle VLP vaccine against strains HPV 16 and 18 is now available. This is expected to prevent up to 70% of cervical cancers. It appears reasonably safe and effective, and is being administered to pre-pubescent girls. It can reduce cancer incidence by 92%. It can also eradicate chronic infections in 95% of cases. It is possible to get cervical cancer from HPV strains 31, 33, 45, 52 and 58, which are not covered by this vaccine. It is also possible to get other life-threatening or life-damaging sexual diseases if one is not practicing safe-sex techniques.

There is a strong association with smoking tobacco, as the cervical mucus can secrete concentrates of cigarette carcinogens 10 to 20 times higher than seen in the blood. Risk of activation of cancer from HPV rises sharply in smokers.

Birth control pills in a person with folate deficiency is a risk. Always take a daily B-vitamin complex if on oral contraceptives.

The presence of E-cadherin predicts higher risk of re-occurrence and metastasis.

5-year survival is about 70.5%. This disease is quite rugged when advanced, so please treat it aggressively. Use the preventative, screening and early intervention techniques that are available!

**SIGNS & SYMPTOMS**

Warning signs include:

- abnormal bleeding - which may only be on contact, ie provoked by intercourse or medical examination.
- a foul or bloody vaginal discharge.
- ulceration of the cervix.
- pain in the back or pelvis.
- unexplained weight loss.

A Pap smear of grade IV is severe dysplasia, strongly suspicious for carcinoma in situ. Pre-invasive stages are slow-growing and usually asymptomatic. A Pap grade of V is invasive squamous cell carcinoma. 95% of biopsies will have human papilloma virus. Polyps on the cervix are rarely (1%) cancerous.

**ALLOPATHIC TREATMENT OF CERVICAL CANCER**

Allopathic treatment may follow a Pap test or biopsy guided by colposcopy. The conal biopsy technique removes localized cancer, and the cervical stump remains satisfactory for childbearing. Invasive cancer requires more radical surgery. Early treatment by surgery can be curative. However, it is resistant to cure once it has spread. Radiation may be by implants, brachytherapy or external beam. The adjacent vagina, bladder and bowels are susceptible to inflammation and fibrosis from radiotherapy. We treat this with warm sitz baths, preferably with Calendula tea added to the bath. Follow a low fibre/residue diet until the bowels heal.
NATUROPATHIC CARE OF CERVICAL CANCER

Targets of Therapy: Apoptosis off-switch, HPV, E-cadherin, EGFR, immune imbalance.

1° vit. A oral & suppository, LDN, reishi, mistletoe lectins, indole-3-carbinol/DIM, Vag-Pack escharotic.
2° artemesinin, IV artesunate + IV-vit. C, quercitin, grapeseed extract, green tea EGCG with γ vit. E, curcumin.
3° zinc, melatonin, plant sterols and sterolins (squamous), folate, lycopene, Thuja, cannabis suppository.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

DHEA – dehydroepiandrosterone DHEA strongly inhibits the proliferation and induces the death of HPV-positive and HPV-negative cervical cancer cells through an androgen- and estrogen-receptor independent mechanism.

ESCHAROTICS – “vaginal depletion packs” made by Eclectic Institute are professional naturopathic escharotics which can cure squamous cell carcinoma in situ. Active principles are vitamin A, oil of bitter orange, tea tree oil Melaleuca cajeputi, Thuja occidentalis, Hydrastis, Phytolacca, and magnesium salts. Dr. Tori Hudson, N.D. adds zinc chloride and Sanguinaria. The cervix may be cleaned with hydrogen peroxide and pre-treated with proteolytic enzymes before using the Vag-Pack paste. Repeat the Pap smear 3 months after treatment. Clinical studies have demonstrated a very high rate of remission. Dr. John Bastyr, ND used an escharotic of 1 part saturated zinc chloride (ZnCl) to 3 parts tincture of Sanguinaria. The cervix is prepared with bromelain or chymotrypsin enzymes, rinsed with Calendula succus (marigold juice), painted with escharotic, including the endocervical canal, then rinsed with Calendula succus after the abnormal tissue has blanched (turned white).

FLAXSEED – lectins modulate hormones through sex hormone binding globulins.

FOLATE – or folic acid from green leafy vegetables donates methyl groups to silence oncogene mutations such as Ras or BRAC2. 5 to 10 milligrams daily can reverse early cervical dysplasia, and reduces carcinogenesis risk from human papilloma virus HPV types 16 and 18.

*GRAPESEED EXTRACT – grapeseed oligomeric proanthocyanidins are aromatase inhibitor, and modulate cell adhesion molecule signaling.

*GREEN TEA EGCG - enhances Adriamycin uptake by OC cells, improving chemo response while inhibiting metastases. MMP-2 inhibitor, anti-angiogenic, and much more. Green tea extract can be applied directly onto cervical lesions.

*HOMEOPATHY – Aurum muriaticum natronatum, Lachesis mutus, Lilium tigrum, Engystol.

**INDOLE-3-CARBINOL – a component of the cabbage family of vegetables which converts estrogens into mild forms which cannot stimulate tumour growth. I3C has several other anti-cancer effects such as cell cycle arrest, apoptosis, and growth inhibition. Diindolylmethane DIM can be substituted; it keeps better in hot environments.

*LOW-DOSE NALTREXONE -(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

LYCOPENE – speeds clearance of HPV infection. Cooked tomatoes are a rich source.

*MELATONIN - enhances IL-2 and chemotherapy responses. Reduces chemo toxicity. Improves quality of life and control in cases where no standard treatment is available.

MISTLETOE – injectable M type mistletoe lectins activate the immune response and destroy viruses.
PSYCHOLOGY - Dr. Christiane Northrup, M.D., author of *Women’s Bodies, Women’s Wisdom* suggests that low self-esteem, religious shame about sexuality, and passive or pessimistic reactions to stress can set the stage for more severe disease.

**QUERCITIN** - down-regulates cell signal transduction: e-cadherins predict risk of metastasis and reoccurrence. Aromatase inhibitor, binds to type II estrogen receptors, inhibits high aerobic glycolysis, arrests cells in G0-G1 phase, inhibits development of heat shock proteins.

*REISHI – Ganoderma* mushroom hot water extracts support immune control of HPV. I prescribe JHS Naturals *Gano 161* 2 capsules twice daily. AHCC or *Immune 7X* can also be used.

**SELENIUM** - is cytotoxic to cancer cells. Improves Taxol and Adriamycin responses by managing oxidative stress.

*STEROLS & STEROLINS* – suppress human papilloma virus HPV. This immune modulator balances the helper-suppressor T-cell ratio and thus the tumour-specific response. Most persistent HPV infections are associated with concurrent exposure to *Chlamydia trachomatis*. I prescribe Vitazan brand *Ultra-Immune*.

**VITAMIN A** - vitamin A strongly re-differentiates these cancers. To support apoptosis and control cell proliferation, including tumourigenic stem cells. Carotenes may be given to 200,000 units daily, and vitamin A retinol at 50,000 IU. or more daily, (10K per 25 lb BW) under close supervision by a physician. Wise Woman vit. A vaginal suppositories are excellent. Remember to keep therapy short term and then attend to vitamin D status.

**VITAMIN B6 and B12** – manage energy production and cell growth. Supportive of folate biochemistry.

**VITAMIN B12** – for all viral dependent cancers. IVC, or oral doses to 12 grams daily or to bowel tolerance.

**VITAMIN D3** - synergistic with vitamin A to control stem cell differentiation.

**ZINC** – zinc citrate helps regulate squamous cell cancers, inhibits COX-2.

**HPV Protocol from NCNM:**
- folic acid -10 mg.
- vitamin C - 6 grams.
- carotenoids – 150,000 IU.
- green tea extract 500 mg.
- indole-3-carbinol or DIM - 200 to 300 mg.
- anti-viral herbs: 60 drops (1 tsp) 3 times daily of tincture 2 parts each of *Echinacea* and *Hypericum*, 1 part each of *Mahonia, Lomatium, Thuja*.
- thymus.

**Topical therapy or HPV lesions:**
An American Naturopathic oncologist reports reliable clearance of severe cases of HPV with a combination of topical 2% 2-deoxy-D-glucose with 10% cimetidine.
UTERINE CANCER

Often uterine cancer is an adenocarcinoma of the glandular epithelium of the corpus uteri – the endometrium. It is linked to exposure to unopposed estrogen. Early onset and late end of menses is a risk, as is obesity, polycystic ovary syndrome, birth control pills, hypertension and diabetes. Progesterone is protective, and can be used to reverse simple hyperplasia without atypia.

Genetic mutations include PTEN loss with resultant activation of the P13K / Akt / mTOR pathway. Early warning signs include spotting of blood between menses (metrorrhagia), any post-menopausal vaginal bleeding, colicky abdominal pains, backache, leg edema, weight loss, and there can be a cough with bloody phlegm (hemoptysis). 5-year survival is about 84%.

NATUROPATHIC CARE OF UTERINE CANCER

Targets of therapy: Apoptosis off-switch, Akt /P13K/ mTOR pathway, e-cadherins, angiogenesis, aromatase, inflammation.

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1° vit. A oral and suppository, low-dose Naltrexone, mistletoe lectins, reishi, indole-3-carbinol/DIM.
2° quercitin, grapeseed extract, green tea EGCG + γ vit. E, oral and IV-D-ALA, melatonin.
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*ALPHA LIPOIC ACID – R-ALA inhibits heat shock protein and induces apoptosis.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

BETA-CAROTENE – pro-vitamin A, supports re-differentiation, pro-apoptotic. Don’t give to smokers.

*CURCUMIN – mTOR inhibitor, anti-inflammatory.

FLAXSEED – lectins modulate hormones through sex hormone binding globulins.

FOLATE – or folic acid 5 to 10 mg from green leafy vegetables donates methyl groups to silence oncogene mutations such as Ras or BRAC2. reduces carcinogenesis risk from human papilloma virus HPV types 16 & 18.

*GREEN TEA EGCG - MMP2 inhibitor, anti-angiogenic, mTOR inhibitor, and much more. May enhance Adriamycin uptake by cancer cells, improving chemo response, while inhibiting metastases.

HOMEOPATHY – Aurum muriaticum natronatum, Lachesis mutus, Lilium tigrum.

*INDOLE-3-CARBINOL – a component of the cabbage family of vegetables which converts estrogens into mild forms which cannot stimulate tumour growth. Also has several other anti-cancer effects such as cell cycle arrest, apoptosis, growth inhibition and mTOR signaling pathway inhibitor. Dr. Maria Bell, M.D. an oncologist at the University of South Dakota Medical Center has reported dramatic results with indole-3-carbinol (I3C), seeing in 12 weeks complete regression of stage 2 and 3 cervical cancer in 4 of 8 women dosed at 200 mg. daily, and 4 of 9 dosed at 400 mg daily. Those receiving placebo had no improvement. DIM can be used in place of I3C.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.
**MELATONIN** - enhances IL-2 and chemotherapy responses. Reduces chemo toxicity. Improves quality of life and control in cases where no standard treatment is available.

**METFORMIN** – metformin is a simple and safe drug used for diabetes, which can help cut off the sugar fuelling cancer cells. Titrate dose to achieve a blood sugar level of 55-65 mg/dL. Inhibits NF-κB, MMP-2/9 and Akt and Erk1/2 signaling pathways that are known to be important regulators of inflammation, tumour invasion, metastasis.

**MISTLETOE** – M type lectins are potent immune modulators.

**PROGESTERONE** – can be very helpful in endometrial cancers.

**PSYCHOLOGY** - Dr. Christiane Northrup, M.D., author of *Women’s Bodies, Women’s Wisdom* suggests that low self-esteem, religious shame about sexuality, and passive or pessimistic reactions to stress can set the stage for more severe disease.

**QUERCITIN** - down-regulates cell signal transduction and e-cadherins to reduce risk of metastasis and reoccurrence. Aromatase inhibitor, binds to type II estrogen receptors, inhibits high aerobic glycolysis, arrests cells in G0-G1 phase, inhibits development of heat shock proteins and is anti-angiogenic.

**REISHI** – *Ganoderma* mushroom extracts support immune control of HPV.

**STEROLS & STEROLINS** – suppress human papilloma virus HPV. Most persistent HPV infections are associated with concurrent exposure to *Chlamydia trachomatis*. Target inflammation and angiogenesis in all squamous cell cancers.

**VITAMIN A** - vitamin A retinol or palmitate, retinoic acids and beta carotene in very high doses strongly re-differentiate these cancers. To support apoptosis and control cell proliferation, including tumourigenic stem cells. Carotenes may be given to 200,000 units daily, and vitamin A at 50,000 I.U. or more daily, under close supervision by a physician. Wise Woman vit. A suppositories are excellent.

**VITAMIN B6 and B12** – manage energy production and cell growth, and support folate metabolism.

**VITAMIN C** – supports healing.

**VITAMIN D3** - synergistic with vitamin A to control stem cell differentiation.

**ZINC** – zinc citrate helps regulate squamous cell cancers, inhibits COX-2.

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**VULVAR CANCER**

Associated with human papilloma virus HPV and smoking. Stop smoking! Survival rates are good if the tumour is under 4.0 cm. and there is no nodal involvement. Surgery usually cures these cases.

**NATUROPATHIC CARE OF VULVAR CANCER.**

Adjuncts to strengthen the immune system and suppress the HPV:

- plant sterols & sterolins.
- vitamin A retinol (not carotenes for smokers!).
- *Ganoderma lucidum* reishi mushroom extract
- *Una de gato* or cat’s claw vine.
- mistletoe M type lectins.
- low-dose Naltrexone.
- Artemesinin.
Chapter Sixteen INTEGRATIVE CARE OF SKIN CANCERS

Cancer of the skin is very common, and will happen to one in five North Americans. 97% will be non-melanoma cancers with a high cure rate. 89% with the more dangerous melanoma type skin cancers will survive 5 years.

Lipid peroxidation is a prominent feature of skin carcinogenesis. A low-fat diet is protective, particularly reducing processed polyunsaturated fats such as corn oil. Grapeseed extract and curcumin protect against lipid peroxidation.

DNA damage from ultraviolet rays is a major preventable causative factor. It used to be thought that the UV-B rays were causing all the skin cancer, but new research that implicates UV-A as a similar hazard.

UV-A:
- longer wavelength.
- penetrates to the bone.
- sunscreens do not block these rays.
- causes mutation.
- destroys vitamin D.

UV-B:
- penetrates skin.
- responsible for sunburns.
- initiates vitamin D synthesis.
- blocked by sunscreens.
- not a strong carcinogen.

This may explain why sunscreen use hasn’t prevented much skin cancer, but has caused wide-spread vitamin D deficiency. Vitamin D protects against skin cancer by regulating the hedgehog and β-catenin pathways and stimulating the DNA repair response.

Sun and other UV damage can be repaired with Coenzyme Q-10 and green tea EGCG, orally and topically. Mixed anti-oxidants with curcumin such as QuenchFX are powerful skin protectants working from the inside.

Skin repair cream ingredients that reverse skin degeneration and sun damage are rosehip oil, vitamin C, vitamin E, MSM, grapeseed extract, vitamin A, vitamin D3, betulinic acid, green tea extract and pomegranate extract.
The best on the market is NASOBIH.

Avoiding sun exposure has created rising rates of cancers far more dangerous than skin cancers, plus an epidemic of bone and joint problems such as chondropathies (cartilage destruction). Strict sun avoidance puts people more at risk of burning when exposed to the sun – the worst injury for aging and cancer. Furthermore, studies show diligent use of sunscreens has not halted the rising rate of skin cancers.

I believe the prudent course is gradual sun or ultraviolet exposure to develop the protective coloring we have evolved for our survival. In concert with a good plant-based diet, we can handle the stress of the ultraviolet light, and turn it to our advantage. Examples of dietary supports:
- quercitin from apples, onions, and most plants blocks tumour activator protein AP-1, a critical cause of malignant melanoma, the most dangerous skin cancer.
- curcumin -from the curry spice tumeric also blocks AP-1 and controls inflammation via NFκB.
- green tea polyphenols also block AP-1.
- pomegranate, grapes and all berries contain anthocyanidins which inhibit tumour formation.
- omega 3 oil EPA from fish, krill or seal halts inflammation, which modulates cell growth patterns.
- cod liver oil has EPA, and vit. A and D support cellular redifferentiation and growth regulation, as well as immune-modulation, but use only intermittently, as excess vit A can block vit D receptors.
- colored vegetables and fruits – contain beta carotene and other carotenoids which repair the skin.
Specific nutriceutical supplements can provide an even greater level of protection. Grapeseed extract OPCs restore vitamin C to an unoxidized state in the skin, sufficient to prevent sunburn. Use internally and topically, ie the NASOBIH™ protocol – a “naturally accelerated system for outside beauty and inner health”.

Sun sensitivity is amplified by human papilloma virus HPV infection.

High-risk pre-malignant skin lesions take up the dye toluidine blue. When in doubt, we biopsy or excise the skin lesion and let the pathologist tell us what it was.

Colleagues are using niacin cream such as NiaDyne, or castor oil with pre-emulsified vitamin A and E for pre-cancerous skin lesions. Niacinamide 500 mg bid reduces recurrence of non-melanoma skin cancers by 23%.

**BASAL CELL CARCINOMA**

BCC arises in non-keratinized cells of the basal cell layer of the epidermis, grows slowly, rarely metastasizes, but can cause extensive local damage. The characteristic lesion is a ‘rodent ulcer’, displaying a rolled indurated pearly edge with a depressed central area of necrosis. Sometimes lesions are nodular and spherical. Angiogenesis can produce characteristic telangiectasias, and there may be ischemic central necrosis.

Neglected lesions of the head and neck can invade the subcutis and nerves and spread to the bones and lungs. Risk of extensive spread of non-melanoma skin cancers is highest for basal cell carcinoma (BCC) on the nose, morpheaform BCC on the cheek, recurrent BCC in men, any skin cancer on the neck in men, location on the helix of the ear, eyelid or temple, and any lesion increasing in size pre-operatively.

Curettage and electrodesiccation, cryosurgery, laser or sharp excision may be used.

Surgery is not always an option for really bad BCCs, locally aggressive or metastatic disease, and patients who suffer from the genetic disorder of basal cell nevus syndrome BCNS. Patients with BCNS, also known as Gorlin syndrome, and BCC tumours have mutations in components of the hedgehog signaling pathway smoothened receptor that keep it constantly turned on and lead to tumour cell growth and proliferation. These patients may require hundreds of surgeries in their lifetime.

Radiation is occasionally used in treatment, more often in palliation.

Targets of therapy include epidermal growth factor receptor EGFR, and hedgehog signaling pathway smoothened receptor.

Retinoids have some utility, as do platinum-based chemotherapy agents.

**SQUAMOUS CELL CARCINOMA**

Squamous cell carcinoma SCC is a cancer of the keratinizing cells. It is sometimes called Bowen’s disease. SCC has more potential for anaplasia, rapid growth, local invasion, and if neglected, metastasis to regional lymph nodes and distant sites than basal cell carcinoma BCC. Metastasis is more likely if the lesion is on a mucosal surface such as the lips or on an injury site such as a scar or ulcer.

Ultraviolet from sunlight is the primary risk factor, but so are chemical carcinogens, inflammation, viral transformation, and mutations.

The tumour may be very irregular, and often has a surface scale or crust. It may just look like a simple sore or inflamed spot that does not heal.

Surgery is common, and a variety of modalities are used, as for basal cell carcinoma.
Radiation can be an alternative to surgery for elderly patients if lesions are on the nose, lips, canthus and eyelid.

Recombinant IL-2 improves survival in oral squamous cell carcinoma. IL-2 is synergistic with melatonin, plant sterols, PSK, astragalus, L-carnitine, taurine and vitamin C. Plant sterols may also help eradicate human papilloma virus HPV, associated with squamous cell cancers.

The anti-viral ointment Aldara - Imiquimod 5% can be effective, but not in cases of hyperkeratosis. It activates several cytokines to make an inflammation response, which in time makes an immune response against the cancer cells. The degree of inflammation must be closely monitored by the prescribing doctor to keep it at a clinically active level while keeping symptoms within a comfortable range. It will be at least a bit red and sore. Efudex topical 5% 5-fluorouracil is approximately as effective.

Regular use of prescription non-steroidal anti-inflammatory drugs NSAIDs and aspirin reduce risk by up to 60%.

Frequent intake (> 15 times) of gluco-corticoid steroids increases risk for SCC and BCC.

**MALIGNANT MELANOMA**

These dark lesions are less common, but much more dangerous. The melanocyte is of neural crest origin, and produces the brown-black pigment melanin. They occur in the skin, perianal area, rectum, vagina, upper digestive tract, and in the eye structures - choroid, iris and ciliary body. Incidence is rising world-wide.

Damage from UV-B rays is a prominent causal factor. Ultraviolet radiation induces melanoma cancer when promoted by interferon-gamma IFNɣ, a protein primarily used by the immune system for intercellular communication. This innate immune response protein is released in response to childhood sunburns. Ironically, overall sun exposure increases melanoma survival time, and melanomas from sun-exposure are less aggressive.

The characteristic lesion is asymptomatic, has irregular borders, mixed pigmentation, with possible finger-like projections. The ABCDEs of melanoma recognition are:

- **A**symmetry.
- **B**order irregularity.
- **C**olor variegation.
- **D**iameter > 6 mm, bigger around than a pencil eraser.
- **E**volving – changing size, shape, color, bleeding, itching or tenderness.

Dysplastic nevi are high risk for transformation to melanoma. 3 or more atypical moles presents a 4 fold increased risk of melanoma. However, ordinary moles do not need to be removed. Teenage acne predicts a higher incidence of moles and melanoma.

Brenner’s sign – a reddish rash near or distant from the melanoma lesion – indicates activity of platelet-derived endothelial growth factor PDEGF or PDGF.

Tumour activator protein AP-1 is a critical trigger of malignant melanoma. TROY is a biomarker and potential target of therapy, co-expressed with TNF-receptor-associated factor 6.

60% of melanomas have Raf kinase mutations increasing angiogenesis and cell proliferation. These are highly vascular tumours, so target angiogenesis in all cases. Mutation in the serine/threonine-protein kinase B-Raf increases growth signalling. The new drug for such cases Vemurafenib increases survival in about half of cases, by 2 to 7 months. Adjuvants include radiation, interferon alpha 2B, cisplatin, vinblastine, DTIC, thiotepa, nitrosoureas, and taxanes.

Melanoma growth is stimulated by anterior pituitary thyrotropin-releasing hormone TRH – also called thyroid-stimulating hormone TSH. Melanoma is more common in hypothyroid cases, associated with increased production and release of TSH. Many doctors are now prescribing thyroid hormone supplements at a level which suppresses
TRH/TSH. When borderline hyperthyroid, melanoma growth is inhibited. Metformin can lower TSH, without risk of provoking clinical hyperthyroid symptoms.

The immune system can cure melanoma. Interleukin eight IL-8 is associated with metastasis of melanoma. COX-2 also drives metastasis in melanoma. Melanomas produce the immuno-suppressing interleukin ten IL-10, blocking dendritic cell processing of tumour antigens. The new immune stimulant drug Ipilimumab increases survival by inhibiting the cytotoxic T-lymphocyte antigen CTLA-4. Another emerging idea is to culture tumour infiltrating lymphocytes from the patient’s tumour, give chemo for a week to take down the immune system, then return the TIL immune cells, called adoptive cell transfer. Interleukin two IL-2 works with activated lymphocytes to suppress melanoma. We can support IL-2 therapy with melatonin, plant sterols, astragalus, taurine, vitamin C, L-carnitine, andrographites, and mushroom extracts. Recombinant vaccines and gene therapy are under investigation. Uveal melanoma and liver mets can be treated with chemo-embolization. Cytotoxic drugs are infused with granulocyte-macrophage colony stimulating factor GM-CSF, to disrupt the tumour blood supply. GM-CSF induces antigen-processing dendritic immune cells and improves absorption of tumour antigens. Polarized CD4 helper cells and effector Th-17 T-cells, associated with auto-immunity, can cure melanoma. Bifidobacterium increase checkpoint inhibition. Ipilimumab immune checkpoint inhibitor trades a 11% better chance of being alive in 5 years for a 1.1% chance of dying from therapy or 1 in 8 chance of very serious drug adverse effects.

Tyrosinase, MART-1 (melan-A antigen), VEGF121, and PAI1 mRNA expression are significantly associated with micrometastases. Tyrosinase and MART-1 expression are significantly associated with overall survival and relapse-free survival, whereas histologically proven micrometastases and Breslow thickness are associated with relapse-free survival.

Wide excision around the lesion is required. Treatment is based on the estimated tumour thickness (Breslow’s) and level of invasion (Clark’s) plus regional lymph node involvement. Using ultrasound and digital video-microscopy, the thickness can be accurately assessed. Lesions over 1 millimeter thick necessitate sentinel lymph node sampling. Approximately 2 in 3 cases with positive sentinel nodes will have a local nodal reoccurrence. There is no increased risk with micro-metastases in a sentinel node if they are under 0.1 mm diameter, but if larger, mortality risk goes up 4 to 5-fold. 8% will have a re-occurrence within 2 years. Local reoccurrence is associated with 70% mortality within 5 years. Survival is worse if lesions are on the scalp, neck or foot.

IGFBP-7 induces apoptosis in melanoma cells. This binding protein is secreted extracellularly, and mediates growth inhibition via the BRAF tumour suppressor gene. This gene is mutated and actively promoting rapid proliferation in about 2/3 of melanomas. IGFBP-7 expression may be silenced by epigenetic hypermethylation, and if this occurs in the presence of BRAF mutation, melanoma cells escape senescence and apoptosis, and growth is uncontrolled. BRAF is a copper dependent pathway, so give zinc. A low copper diet and thiomolybdenate TM copper chelation may help.

Betulinic acid is a derivative of betulin, isolated from the bark of Betula alba, the common white birch tree. This compound is found in several other plants, including the medicinal Chaga mushroom. Betulinic acid has anti-inflammatory, anti-HIV and antineoplastic activities. Betulinic acid induces apoptosis through induction of changes in mitochondrial membrane potential, production of reactive oxygen species, and opening of mitochondrial permeability transition pores, resulting in the release of mitochondrial apoptotic factors, activation of caspases, and DNA fragmentation. Highly cytotoxic against melanoma cells. Be aware Chaga is high in oxalates, and so may trigger kidney stones or nephropathy

**Melanoma repertory**

1° mistletoe P lectins, LDN, modified citrus pectin, betulinic acid /Chaga mushroom extract, Bifidobacterium.
3° green tea, curcumin, cannabis PTO, resveratrol, vit. D3, vit. K2, Avemar, thyroid hormone and/or Metformin to suppress TSH, sulforaphane, milk thistle, hesperedin methyl chalcone, Calendula, feverfew, omega 3s.
NATUROPATHIC CARE OF NON-MELANOMA SKIN CANCERS

Targets of therapy: Apoptosis off-switch, EGFR, CD-44, MAPK kinases, PDGF, NfκB, COX-2, AP-1 protein activation, HPV, Raf kinase, IL-8 inhibition, IL-2 promotion, angiogenesis, hypermethylation, IGFBP-7, HSP-90, hedgehog signaling pathway smoothened receptor, checkpoint inhibition.

1° Efudex, Aldara, mistletoe P lectins, chaga or reishi, vit. A, grapeseed extract, green tea EGCG + vi. E.
2° modified citrus pectin, low-dose Naltrexone, Co-Q-10, quercitin, vit. D3 oral and topical.
3° NASOBIH Nutra-Cream, milk thistle, astragalus, topical castor oil + vit. A emulsion, topical cannabis oil.

*ALDARA - Rx 12 single use 250 mg. packets of 5% Imiquimod. Aldara is applied onto and for about 1 cm. around tumours. Apply 5 consecutive days of the week, for 4 to 6 weeks. The degree of immune reaction and subsequent localized inflammation must be kept at a tolerable but active state to create a cure. Adverse effects are not common, but can include fever, malaise, rigors, headaches, myalgia and fatigue. Reoccurrence is rare.

ANDROGRAPHITES – Andrographites panniculata extracts increase IL-2 activity.

*ANTI-OXIDANTS - are particularly needed by the skin. Use a face cream of rosehip oil, green tea extract, vitamin C, MSM, alpha lipoic acid, grapeseed extract and vitamin E to heal injury and prevent degeneration.

ASTRAGALUS – reduces metastasis of melanoma.

BORAGE OIL – topically it relieves itching from tumours.

*BROMELAIN - modulates cell adhesion molecule CD-44 to arrest progression, mets. Inhibits κRas mutations.

*CASTOR OIL + VIT. A EMULSION – topical redifferentiation therapy.

*CHAGA – chaga mushrooms have betulinic acid, anti-inflammatory, pro-apoptotic, and cytotoxic to melanoma. Very high in oxalates so there is a risk of stone formation or nephropathy.

*CO-ENZYME Q-10 – reduces risk of melanoma metastasis by 8 fold.

*CURCUMIN - blocks activation of AP-1 protein. Inhibits NFκB and inflammatory growth factor COX-2. Reduces invasiveness and angiogenesis.

**EFUDEX – 5% 5-Fluoro-uracil chemotherapy drug applied topically bid to basal cell carcinoma and actinic keratosis. Rx 25 gm. tubes. Wear gloves or use an applicator to apply onto tumours twice daily, for 2 to 4 weeks. Stop when an erosion reaction occurs. The lesion then heals in 1 to 2 months.

ESCHAROTICS - escharotics as used by Hoxsey and Bastyr are useful alternatives, although they can be painful. I have created a formula based on podophyllin resin I call Wart Death, which removes warts and other skin lesions.

GINGER – inhibits skin growth promoter epidermal ornitihine decarboxylase EOD.

**GRAPESEED EXTRACT – OPCs in grapeseed are able to control COX-2 growth factor created by inflammation. This can be supported by curcumin and omega 3 oils.

**GREEN TEA EGCG - reduces UV damage and inflammation. Creams with green tea extract are exceptional for healing skin lesions and radiation burns. Orally it is a major cancer remedy in high dose concentrates. Blocks activation of AP-1 protein.

HEMP OIL – hemp or “hash oil” topically can heal some skin cancers. Cancers have cannabinoid receptors.

HESPERIDIN – hesperidin methyl chalcone at up to 1,500 mg tid will suppress IL-8 in melanoma.
HOMEOPATHY – *Arsenicum bromatum, Arsenicum iodatum, Carcinosum, Conium maculatum, Lycopodium claviceps, Thuja occidentalis.*

HOXSEY – Hoxsey herbal tonic can give great support, and can be augmented with Jason Winter’s red clover adjuncts - chapparal and gotu kola. I add homeopathic remedies to Hoxsey tincture, such as *Carcinosum* nosode.

*LOW-DOSE NALTREXONE –* (LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

MELATONIN – regulates biological cycles, including IL-2 levels.

*MILK THISTLE –* modulates EGFR and related TGFα, MMP’s, NFκB transcription, IGF-1 (while increasing IGFBP3); modulates VEGF and cell cyclins. Inhibits skin cancer growth by inhibiting EGF-induced mitogen activated protein kinase MAPK and related ERK1/2 signalling pathway.

**MISTLETOE –* Iscador or Helixor P type injectable mistletoe lectins from pine trees are specific for skin cancers.

**MODIFIED CITRUS PECTIN –* inhibits metastasis and growth. Mandatory for melanoma cases.

PLANT STEROLS - IL-2 is greatly enhanced by plant sterols and sterolins such as Vitazan *Ultra-Immune.*

POMEGRANATE – anthocyanidins and tannins in pomegranate fruit and juice inhibit tumour genesis, and modulate UV-mediated phosphorylation of mitogen-activated protein kinases MAPK and activation of nuclear factor kappa B NFκB.

**QUERCITIN -* blocks activation of AP-1 protein, increases apoptosis via tyrosines, and activates the p53 gene repair system. Quercitin is particularly active against melanomas.

*RESHI –* Hot water extracts from the mushroom *Ganoderma lucidum* inhibit NFκB and modulate interleukins. Other medicinal mushroom and other plant source beta-glucans can also be used.

SOPHORA – the Sophora plant genus yields oxymatrine and matrine alkyloids and arabinogalactans which are anti-viral and anti-neoplastic. Use in squamous cell and melanoma cancers.

VACCINES - Vaccinations against smallpox (Vaccinia) and tuberculosis (BCG) are protective against melanoma. BCG can be injected right into melanoma nodules. This may give pause to the homepaths to consider miasmatic and constitutional remedies.

**VITAMIN A -* retinol palmitate, pro-vitamin A carotenides, and other mixed carotenoids reduce risk, repair skin and slow squamous cancers. Apply topically in castor oil. Long-term use of oral retinol vitamin A over 3,000 IU daily interacts unfavorably with vitamin D, affecting bone health and other tissues and organs.

*VITAMIN D 3 –* regulates differentiation and cellular growth. Associated with improved survival.

VITAMIN E – an antioxidant to use with green tea. EGCG polyphenol concentrate.

**LIPOMAS**

Lipomas are very common benign sub-dermal fatty tumours. They are only cut out if on a belt or bra line or otherwise in a place where they get irritate or in the way. Some NDs inject them with vitamin B-12. Cholegogue herbs such as *Chelidonium* and *Chimonanthus* may help clear them.
Chapter Seventeen  INTEGRATIVE CARE OF BRAIN and NERVE CANCERS

Cancer of the central nervous system is becoming more prevalent in the elderly and in children.

Unequivocal risk factors are exposure to ionizing radiation and immuno-suppression. Chlorine in water increases risk by the formation of trihalomethanes. Astrocytomas are linked to pesticide ingestion. Exposure in utero is probably most critical.

CNS tumours develop vasculature without the normal blood-brain barrier, allowing in toxins and proteins which cause edema. Thus even small lesions can compress adjacent vital structures within the closed vessel of the cranium.

Brain tumours are not malignant in the sense that they may spread to other tissues, but high grade lesions are dangerous and spread within the brain. Gliomas are particularly invasive.

A metastatic cell must then adhere to endothelial cells lining the blood vessels in the target organ. Insulin-like growth factors I and II are chemo-attractants for metastases. The cell will stop and attach where it “smells” this chemical. These are high when the diet is rich in sugars and simple carbohydrates. The metastatic cells attach to the blood vessel walls in the brain via integrin cellular adhesion molecules.

Metastases must then extravasate, or leave the blood vessel through the basement membrane of the endothelium lining to enter the new tissue. Metastases only grow significantly if they can stimulate angiogenesis or new blood vessel growth into their new home. Brain tumours tend to nest in peri-vascular niches, dependent on angiogenic factors. It is suspected that immune cells and stem cells are essential recruits to complete this process.

Diffuse tumours are inoperable. Only a few chemo drugs cross the blood-brain barrier. Chemo is almost always given in concert with radiation therapy.

MRI and stereotactic 3 dimensional guided needle biopsy techniques have improved diagnosis and treatment.

Gliomas encompass ependymomas, oligodendrogliomas and astrocytomas. They tend to be resistant to radiotherapy and other pro-apoptotic therapies. They do respond to pro-autophagy drugs such as Temozolomide, which can double survival time. Gliomas suppress the immune system to grow and spread; target IL-10, STAT-3, COX-2 and TGFβ.

Glial cells lack a normal blood-brain barrier BBB. As tight junctions in the microvasculature break down, there is the characteristic vasogenic edema around these tumours. Grapeseed extract oligomeric proanthocyanidins and boswellia help resolve this edema and restore the BBB integrity.

About half of oligodendromas have a chromosomal 1p19q co-deletion which makes these tumours highly sensitive to chemotherapy. Oligodendrogliaomas make up about 10% of all adult primary brain tumours.

Glioblastomas inactivate apoptotic pathways, and are more susceptible to induction of autophagy. Autophagy is a process of protein recycling with extensive degradation of Golgi apparatus, poly-ribosomes endoplasmic reticulum, and finally destruction of the cell nucleus.

Inactivation of mTOR can induce autophagy. This is how the drug Temozolomide acts. mTOR inhibitors are supported by P13K and Akt inhibitors, namely protein tyrosine kinase inhibitors. Targets of therapy in
glioblastoma: autophagy, NFκB, mTOR, EGFR, VEGF, PTKs, CMV. Glioblastomas are dependent on NFκB activation. Glioblastoma multiforme has MET oncogene amplification of the Erb-B3 pathway. Glioblastomas contain “stem-cell-like” glioma cells which produce 10 to 20 times normal amount of VEGF under normal oxygen levels as well as when hypoxic. The stem-cell like cells sequester into peri-vascular niches. It is thought that anti-angiogenics are a useful therapeutic target against this phenomenon. Green tea EGCG is good in this regard.

The serotonin 7 receptor is commonly overexpressed in glioblastoma. Three drugs in wide use to treat thought disorders – paliperidone, pimozide and risperidone – are also potent and well-tolerated inhibitors at serotonin receptor 7, and so could be used for growth factor deprivation in an adjunctive role in glioblastoma treatment.

A new treatment that appears promising is laser interstitial thermal therapy LITT. This is something like radiofrequency ablation, but with laser light as the heating agent. LITT uses an MRI-guided light probe to inflict thermo-coagulation on glioblastomas.

Glioblastoma multiforme (GBM) treated with the experimental heat shock protein-peptide complex-96 (HSPPC-96) vaccine plus chemoradiation showed a 146% increase in progression-free survival (PFS) and a 60% increase in overall survival (OS) compared with those receiving only standard of care.

A very significant new advance is using anti-cytomegalovirus CMV therapy such as the drug Valgancyclovir, 900 mg po, which increases survival in glioblastoma nearly four-fold at two years, compared to current standard-of-care.

**SIGNS & SYMPTOMS**

Symptoms arise from raised intracranial pressure, focal signs from edema and ischemia, and hydrocephalus from blocked CSF flow. The traditional Chinese TCM doctors call this a “dampness of the marrow with phlegm obstructing the channels”.

- headache is common, can be severe, persistent and is typically crescendo in presentation - relentlessly getting worse.
- vomiting, especially on awakening, with or without nausea.
- neck and back pain at night or early in the day, usually worse laying down and improved when standing upright.
- seizures are quite common with focal sensory and motor signs.
- behavioral and personality changes.

Corticosteroids such as Dexamethasone are very useful as palliatives as they reduce the edema and swelling dramatically within 24 to 48 hours. Rx 4 to 8 mg daily, start with 4 mg in the morning, add 2 to 4 mg at noon if need. Maximum dose is typically 12 mg daily. This is somewhat less helpful in tumours that have metastasized to the brain from elsewhere, which are less edematosus and tend to grow as firm spheres. Corticosteroids should be taken according to a circadian rhythm – none in the evening, low dose at noon to early afternoon, and high doses in the morning. Support the patient with valerian root or ashwagandha for sleep, glycine and GABA for anxiety, and adaptogens for adrenal gland function. Chromium picolinate at 600+ mcg can reduce steroid diabetes. Cortisol Manager from Integrative Therapeutics is particularly useful. Cortisol can also be boosted with Rehmannia 8 aka Ba Wei Di Huang Wan or Jin Gui Shen Qi Wan.

Post-surgical radiation may improve survival time. Radiation is an excellent palliative treatment. Gamma knife technology and related precision radiation techniques improve long-term survival with brain mets. To heal the damage from radiation to the nervous system inhibit IL-6 and TNFα – for example with omega 3 oils and nettles.

Temozolomide significantly adds to the survival benefit of radiation, reducing tumour bulk and aggressiveness and extending life, but cannot cure the disease and prevent reoccurrence. The patient most likely to benefit from Temozolomide has a methylated promoter for the gene encoding 0-6-methylguanidine-DNA methyltransferase.
Glial cells are radio-therapy resistant if they carry the gene to express Delta-EGFR. This can be overcome with an Akt inhibitor – such as curcumin or CanArrest - as the Akt/mTOR pathway mediates radio-resistance.

Chemotherapy may include the carmustine nitrosourea BCNU, or the combination of PCV: procarbazine, CCNU and vincristine.

MENINGIOMAS

Meningiomas arise in arachnoidal cap cells of the meninges, the tough fibrous wrapping around the brain and spinal cord. They are slow growing. Meningiomas are estrogen dependent, so hormone therapies are used as adjuncts to surgery. Tamoxifen can stabilize gliomas. Doses used are high, ie 120 mg twice daily. Quercitin is particularly indicated, as it binds to type II estrogen receptors which are amplified in these tumors. Meningiomas tend to also express abundant receptors for testosterone, progesterone, COX-1, COX-2 and LOX-5.

Surgery can be curative. Radiosurgery may also be possible, with gamma knife or stereotactic radiation technologies. Hydroxyurea is a common chemotherapy. It induces apoptosis in meningioma cells by inhibition of ribonucleotide reductase enzyme, and is an efficient radio-sensitizer.

NATUROPATHIC CARE OF BRAIN CANCERS

**Targets of therapy:** Apoptosis off-switch, NFκB, EGFR, PDGFR, mTOR-Akt-P13K, topoisomerase, STAT-3. Anti-angiogenics will inhibit brain cancer stem cells, which grow in peri-vascular niches. In nerve sheath tumours target IGF-1 and mTOR signaling. In glioblastoma target mTOR, HIFα, PTEN, integrins, CMV, autophagy, STAT-3, VEGF, EGFR, PTKs and NFκB.

*ALKYLGLYCEROLS – from shark liver oil inhibit glioma growth and invasion.*

*ALPHA LIPOIC ACID : R-ALA orally and IV D-ALA, and great as a piggy-back to IV-DCA*

*ARTEMESININ or ARTESUNATE – wormwood herb derivatives generate peroxides in contact with tumour cell iron stores. Support by avoiding red meat; take black tea at meals, DHA. Not very effective in glioblastoma.*

BASIC NUTRITION - the brain uses more oxygen than any other tissue, is very fatty, and so is susceptible to lipid peroxidation and always requires anti-oxidant protection such as vitamin E and grapeseed extract. It uses so much oxygen to burn a lot of sugar, so it also requires energy cofactors such as co-enzyme Q10, the B-vitamin complex, magnesium, and acetyl-L-carnitine. The fats needed for normal function and healing include the omega 3 oils EPA and DHA. The essential fatty acid GLA as found in evening primrose oil should not be given if blood sugars are high, including when on Dexamethasone steroids. GLA in these conditions promotes arachidonic acid, which makes inflammation, which brings growth factors and swelling. Reduce dietary arachidonic acid such as grains and grain-fed animal foods.

BERBERINE - assists or replaces BCNU chemotherapy. Topoisomerase inhibitor found in Berberis, Hydrastis and Coptis

BILBERRY – delphinidins inhibit EGFR kinases and VEGFR in gliomas, including glioblastoma multiforme.
**BOSWELLIA** - reduces edema in and around brain tumours, almost as well as the steroid drug Dexamethasone. It does so by inhibiting leukotriene 4 produced via the lipoxygenase LOX pathway. Boswellia can be combined with the drug to reduce the steroid dose, often to the point of replacing the drug. Boswellia can also be used to reduce swelling fast in neurological emergencies. It is also a topoisomerase inhibitor cytotoxic to gliomas. Some are using frankincense essential oil at 4 drops per dose as a substitute for boswellia extract capsules.

*CANNABIS* – Oils with THC, CBD and CBG are often active in brain cancers. Manage the high of THC by giving citicoline or CBD an hour earlier. Seizures from brain cancer are best controlled with THC, not CBD.

CAPE - caffeeic acid phenethyl ester-based propolis extract suppresses the growth of neurofibromatosis.

*CURCUMIN* – oral or IV, reduces cerebral edema and promotes autophagy in gliomas. Helps overcome radio-resistance mediated by the Akt / mTOR pathway. Inhibits platelet-derived growth factor receptor PDGFR. IV curcumin is dosed at 40 mg/Kg BW, using 20 to 50 mg/mL solution, up to 6 grams, twice weekly. It may provoke gallbladder or right shoulder pain. *Theracurmin* micronized curcumin 1 to 2 of the 2X capsules 1 to 2 times daily.

DETOX - from fat-soluble pesticides is warranted when history suggests high exposure. I use homeopathic and botanical medicine, along with a defined diet; elimination diet, brown rice diet or modified fast. Foods to increase include beets, cilantro leaf, fish, walnuts, almonds, and of course, pure water.

DEXAMETHASON – while boswellia is excellent for peri-tumoural edema, “dex” is the steroid drug most commonly used. It will arrest most seizures and neurological complications from brain tumours by removing this extra volume. In acute situations prescribe 4 mg 2 to 3 times daily. It disturbs sleep less if taken earlier in the day. For chronic use increase by 1 mg per day until improved. To taper off reduce by 0.5 to 1 mg per week. Support the patient with valerian root for sleep, glycine and GABA for anxiety, and adaptogens for adrenal gland function.

**DICHLOROACETATE** – DCA is given at 5 mg/kg body weight per day. Previous dose levels of up to 25 mg/kg BW/day can cause severe neurological damage. It’s safer to use IV at 60-90 mg/Kg BW in saline. Support with thiamine, R-alpha lipoic acid, methyl-B-12 shots, acetyl-L-carnitine, and proton pump inhibitors such as Pantoprazole. Synergistic with caffeine, grapeseed, curcumin, quercitin, selenium and perhaps resveratrol. Use IV Poly-MVA or D-ALA in glioblastoma.

GENESTEIN – soy isoflavone genestein stops gliomas by increasing apoptosis, G2/M cell cycle arrest, topoisomerase I inhibition, and protein tyrosine kinase PTK inhibition.

GLA – gamma linolenic acid dissolves gliomas on contact when placed in the surgical cavity, but cannot be taken orally when blood sugars are high, as when on corticosteroid drugs. Under high blood sugar conditions the omega 6 oil is directed to make pro-inflammatory arachidonic acid AA, and becomes pro-oxidant.

**GRAPESEED EXTRACT** - proanthocyanidins are excellent for restoring the integrity of the blood-brain-barrier, and are an effective cerebral anti-oxidant, reducing lipid peroxidation. Delphinidins in bilberry and grapeseed extracts inhibit the key glioma growth factor EGFR kinases, as well as VEGFR.

*GREEN TEA* EGCG – anti-angiogenic, removes perivascular niches that brain cancers grow in, supported by growth factors from vascular endothelial cells and local stem cells. Topoisomerase inhibitor. Inhibits mTOR signaling pathway, IGF-1, and platelet-derived growth factor receptor PDGFR.

HOMEOPATHY - *Ruta graveolens, Calcarea phosphoricum, Conium maculatum, Plumbum iodatum, Apis mellifica, Baryta carbonicum, Baryta iodatum.* Banerji method: alternate *Ruta 6C* morning and late afternoon with *Calc. phos 3X* late morning and bedtime.

HOXSEY - herbal tincture has on occasion produced dramatic responses. The red clover isoflavones modulate estrogen receptors – like Tamoxifen, which is active against gliomas.
*KETOGENIC DIET – glioma cells cannot use pyruvate in the respiration cycle. They remain in glycolysis even if ketones, oxygen and fats are available. Normal cells can burn ketones for energy. Caloric restriction of 800 – 1,500 Kcal with carbohydrate restriction results in reduced free radicals of oxygen in the mitochondria, and improved stabilization of the DNA. The target blood sugar is 55-65 mg/dL to increase ketones and reduce glucose, IGF-1, akt/mTOR. Ketogenic diets can increase risk of kidney stones, so provide 2 mEq/kg of potassium citrate. Do 1 week on, 1 week off. Avoid if BMI<18, or loss ≥10% body weight. www.charliefoundation.org www.ketogenic-diet-resource.com Metformin may produce a very similar response as KD in GBM.

*LOW-DOSE NALTREXONE –(LDN) Activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

LUTEOLIN – flavonoid which down-regulates growth factors and easily enters the brain.

MELATONIN - to regulate the pineal gland, to extend life.

*MILK THISTLE - extract inhibits EGF and NFkB.

MISTLETOE – Iscador and Helixor mistletoe extract are NOT generally recommended for tumours inside the skull – it will cause swelling around the tumour, which will increase intra-cranial pressure. Only consider Helixor A. Peritumoural edema is managed with boswellia in high doses and adjunct homeopathic *Viscum album* 30 C and *Apis mellifica* 30X, under close supervision. Use Iscador P from pine trees for peripheral nerve cancers.

OMEGA 3 OILS – 2,000 mg eicosapentanoic acid EPA and 1,000 mg dihexanoic acid DHA will reduce PGE-2 and increase PGE-3 to control inflammation.

*QUERCITIN - is particularly active against meningiomas, as it is an aromatase inhibitor, stopping local production of estrogen. Also very helpful in neuroblastomas.

*REISHI - mushroom extract controls the key growth factor NFkB. A FABNO colleague prefers “Lions’s Mane” mushroom *Hericium erinaceus* for CNS cancers.

RESVERATROL – inhibits angiogenesis and tumour growth in gliomas. Angiogenesis inhibition also targets malignant bone marrow-derived stem cells.

SCHISANDRA- schisandra inhibits chk1 kinase driver for neuroblastoma.

SCUTELLARIA - topoiso merase inhibitor and anti-inflammatory.

*SHARK LIVER OIL – alkylglycerols inhibit invasion and growth of gliomas by 50%.

STRAMONIUM - agglutinin lectin in Jimson weed *Datura stramonium* induces irreversible differentiation in astrocytic gliomas.

TARGETED VACCINES – such as chickenpox vaccine from herpes varicell zoster HVZ, to create a cytotoxic CD8+ T-cell clone response and interferon alpha INFα in peripheral nerves and the brain or spinal cord.

UKRAIN – can cause swelling around the tumour, can increase intra-cranial pressure. NOT RECOMMENDED.

VALGANCYCLOVIR - 900 mg daily by mouth – use continuously.

**VITAMIN C – intravenous doses create hydrogen peroxide H2O2 in neuroblastoma cells, causing apoptosis. A primary treatment for glioblastoma multiforme.
Cancer of the immune and blood cells tend to occur in the very young and the elderly. Fortunately the cure rate with conventional allopathic oncology is reasonably good. Unfortunately the treatments are very harsh, and carry a significant risk of provoking other cancers. Naturopathic co-care or complementary medicine has a clear role in moderating the harm, and increasing the proportion who can be cured.

IL-6 is a major growth factor for hematological malignancies. It is strongly inhibited by beta carotene, and increased by resveratrol. Low testosterone may play a role, and melatonin is always contra-indicated.

HODGKINS DISEASE

Hodgkin’s Disease HD is a cancer associated with chronic inflammation of the lymphoid tissue. Diagnosis is often by needle biopsy of lymph nodes. Risk of HD increases 4-fold with exposure to formaldehyde.

HD appears to correlate with an altered immune response to the Epstein Barr virus of infectious mononucleosis, or surgery to lymphoid tissue such as tonsillectomy or appendectomy. Occurrence spikes in February and March. Defects in cell-mediated immunity involving the T-cells are common, resulting in serious infectious complications.

Cancers associated with the Epstein-Barr virus EBV:
- Hodgkin’s disease.
- Burkitt’s lymphoma (EBV) - over-expresses MYC oncogene.
- B-cell lymphoma.
- nasal NK/T-cell lymphomas.
- some gastric cancers.

Serum EBV DNA is monitored by RTQ-PCR assay – real-time quantitative polymerase chain reaction.

Early signs include painless swollen lymph nodes, but they may become tender on consuming alcohol. There is a moderate to marked neutrophilic leukocytosis and thrombocytosis, elevated serum fibrinogen, zinc and copper, anemia, and pruritus (itchiness). The lungs, liver, spleen and bone marrow are often involved. Later signs may include anorexia, weight loss, fatigue and high fever with drenching sweats.

Aggressive Hodgkin’s lymphomas show elevated CDK9 / Cyclin T1 complex of proteins. Hodgkin’s lymphoma also overproduces a carbohydrate-binding lectin galectin one - Gal-1, which B-cell lymphomas do not produce. Survival is shorter if there are an increased number of tumour-associated CD68+ macrophages, so more aggressive therapies are indicated for this subset of patients.

Radiation can be curative in 90% of stage I to IIA cases. Prognosis is poorer if bulky lesions advance into the mediastinal lymph nodes or are found below the diaphragm. In stage III and IV the treatment of choice is chemotherapy with ABVD - adriamycin, bleomycin, vinblastine, and dacarbazine; or MOPP- mechloethamine, vincristine, prednisone and procarbazine; or BEACOPP combination. Overall survival is about 85% at 5 years. A 3 year remission often predicts a cure.

NON-HODGKINS LYMPHOMA

Lymphomas are lymphoid proliferative diseases progressing from genomic instability to chromosomal translocations involving immunoglobulin genes, cyclins, constitutive activation of NFkB and deregulation of p53 pathway and downstream, its CDK inhibitor p21. Lymphomas over-express IGF-1 and STAT3.

NHL lymphomas may arise from many causes, including the hepatitis-C, Herpes-6 and EBV viruses, and the bacteria Helicobacter pylori.
There is an 80% increased risk if you were given antibiotics over 10 times during childhood. Auto-immune disorders like rheumatoid arthritis increase risk, as will high NSAID use. Use of glucocorticoid steroids like cortisone over 15 times in the course of treatment of a chronic inflammatory disease like RA increases risk of NHL by 268 times!

Risk is increased with contamination by PCBs and furans.

Ocular adnexal MALT lymphoma is linked to infection with the avian parasite *Chlamyphilia psittaci*.

Diagnosis is usually by excisional biopsy of an enlarged lymph node. The condition is usually found when already well advanced by spread through the bloodstream.

**B-cell lymphomas** include non-Hodgkin's lymphoma, multiple myeloma, and chronic lymphocytic leukemia.

B-cell lymphomas constitutively express Bcl-6 proto-oncogene, which stifles the p53 pathway, reducing apoptosis. B-cell lymphomas up-regulate sonic hedgehog SHH signaling proteins, activating the ABC-G2 p-glycoprotein efflux pump. Counter this aberration with quercitin.

B-cell lymphomas also produce the immuno-suppressing interleukin ten IL-10, blocking dendritic cell processing of tumour antigens.

B-cell lymphomas are linked to exposure to organochlorine solvents and pesticides. Detox in an infrared sauna.

**Merkel cell** cancers are biologically similar to B-cell lymphomas.

**Mantle cell lymphomas** over-express cyclin D1, CDK, HDAC, mTOR, proteasomes, angiogenesis and anti-apoptotic Bcl-2. MCL is aggressive, responds poorly to chemotherapy, and has a relativity short survival expectancy.

**Follicular lymphomas** tend to be somewhat more indolent, with a median survival of 10 to 15 years from diagnosis. These represent about 25% of lymphomas. The typical patient presents at over 30 years of age with stage 3 to 4 disease, having had a slow-growing asymptomatic lymphadenopathy for several years. Treatment usually gets a good response, but it is invariably followed by reoccurrence. The remission period gets progressively shorter, so the disease is considered medically incurable.

Adverse risk features of follicular lymphoma:
- over 4 positive nodes.
- increased LDH.
- age over 60 years
- hemoglobin less than 120 g/l.
- stage 3 to 4 disease.

Over 90% of follicular lymphomas over-express Bcl-2, because the gene is deregulated by translocation.

Overall 5-year survival is about 58%.

Medical treatment may include radiation, alkylating CHOP protocol chemotherapy, purine analogues, stem cell transplants, monoclonal antibodies, and Bcl-2 anti-sense oligonucleotide therapy. The radioactive antibody compound Bexxar has shown high remission and response rates in low grade advanced stage NHL, with a single dose. Minimal side-effects are seen including moderately low blood counts and flu-like symptoms.

Cutaneous T-cell lymphomas such as mycoides fungoides are treated with PUVA psoralen and ultraviolet light regime, as used for psoriasis. This can produce remissions, but risks skin damage in 1 in 3 cases, and increases risk of triggering secondary cancers.
Chemotherapy will not always follow rapidly after diagnosis, as is common for most cancers. Oncologists and hematologists reserve chemo for cases experiencing “B list symptoms”:

**Criteria for Starting Chemotherapy in Lymphoma:**
- cytopenias.
- symptomatic lymphadenopathy.
- early satiety.
- hepatosplenomegaly causing visible abdominal bloating.
- constitutional symptoms such as drenching night sweats.
- obstructive uropathy or other organ compromise.
- effusions.
- high LDH.
- rapid progression.

**INTEGRATIVE CARE OF LYMPHOMAS**

CHOP + R protocol is reasonably effective for even advanced cases of follicular lymphoma. CHOP or CHOP+R can increase survival time in a meaningful way. The drugs are cyclophosphamide, doxorubicin, vincristine, prednisone, and rituximab.

Rituximab or Rituxan is only used if there are B-cells which are CD-20+. The antibody attaches to this marker to selectively deplete these cells. Rituximab maintenance therapy alone is usually quite helpful. Just four doses can double the event-free survival in follicular lymphoma.

With CHOP or CHOP+R you should give remedies such as:
- mushroom beta-glucans to improve responses with Rituximab maintenance therapy or with CHOP+R. This mushroom polysaccharide will even create responses to Rituximab in patients previously unresponsive.
- Mistletoe SQ injections or in IV-vit. C.
- vitamin D3- 3,000 to 10,000 IU daily.
- omega 3 marine oils – 3,000 to 4,000 mg daily.
- 1-a-day multivitamin + minerals for B-complex and magnesium, etc., plus a second B-complex daily.
- co-enzyme Q-10 - 300 mg daily.
- Low-dose Naltrexone.

Ginger root extract 2 capsules tid/ prn is cheaper than the drug metoclopramide, and can be as effective for the nausea and vomiting.

Do not use curcumin during this chemotherapy, as it will alter the liver detox pathways for a number of these drugs.

Some doctors worry about giving L-glutamine in B-cell lymphomas, which can readily burn this amino acid as fuel instead of sugar. It is doubtful this is important, as L-glutamine is abundant in the body without supplementation.

Some lymphoma patients will require blood-thinning drugs. Heparin is more costly than Coumadin (Warfarin), but it is far safer in lymphoma patients. There are less clots, less hemorrhages, and no deaths with low molecular weight heparin.

Many chemo drugs are pro-oxidant, which can kill cancer cells. Judicious use of moderate doses of selected antioxidants can give a benefit by reducing aldehydes, which would otherwise arrest cell cycle progression and reduce cancer cells entering the checkpoint for the apoptosis tumour death and recycling program. This is known as the Conklin hypothesis. More cancer cells get to a state where the drugs can get at them and kill them. The net effect can be improved tumour destruction while sparing healthy cells. The best anti-oxidants are grapeseed extract and melatonin. Vitamins C, E, and beta-carotene are more risky. Do not give them on chemo days.
R² therapy – combining targeted therapies Rituximab with Lenalidomide - has 98% response rate, and may make chemo obsolete in lymphoma.

If neurotoxicity crops up give R-alpha-lipoic acid 150 to 300 mg three times daily at meals. Vitamin B12 shots are also very helpful, particularly methylcobalamin.

Vitamin U: *Fare You* 4 pills tid or *Gastrazyme* 2-3 tid are brilliant for mouth sores (mucositis) or gut irritation. It is a form of methionine from cabbage.

3 weeks after the last chemo dose give lots of antioxidants, do some detox, and move onto the next phase of care:

**NATUROPATHIC LYMPHOMA CARE:**

**Targets of therapy** – Apoptosis off-switch, STAT-3, ERK, NFκB, COX-2, Bcl-2, IGF-1, HDACI.

1° mistletoe P lectins, low-dose Naltrexone, reishi, indole-3-carbinol/DIM, IV-vit. C, vit. D3.
2° oral and IV-D-ALA, Glumetza, co-enzyme -Q-10, green tea EGCG + γ vit. E, curcumin.
3° Jingli neixao, artemesinin, cannabis PTO, test and eliminate food allergies/sensitivities.

*ALPHA LIPOIC ACID – R-ALA increases apoptosis via mitochondrial rescue.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb *Artemisia annua*. They generate peroxides in contact with cancer cell iron stores.

ASTRAGALUS – a great herb during chemotherapy, but beware, it can stimulate lymphomas.

*CAN-ARREST - for curcumin, quercitin, bromelain to control inflammation and its growth factors.

CAT’S CLAW - *Una de gato* vine alkaloids have shown *in vitro* activity against lymphoma cells.

*CO-ENZYME Q-10 - repairs mitochondrial dysfunction in lymphoma stem cells.

DETOXIFY – infrared saunas and other measures to release solvents such as benzenes, xylene and toluene.

DEVIL’S CLAW ROOT - *Harpagophytum procumbens* may regress follicular lymphoma, by COX-2 inhibition.

FOOD ALLERGY – allergies and sensitivities can dramatically increase inflammation, and so should be tested for and treated in lymphoma cases. Colleagues order IgG blood tests or bio-electric impedance tests such as the Bio-Meridian screening device.

GARLIC – high dose garlic preparations prevent and treat hematological cancers.

*GRAPESEED EXTRACT – OPCs are complementary to resveratrol, quercitin and grape juice.

*GREEN TEA EGCG - EGCG concentrate suppresses many different growth factors.

HOMEOPATHICS - *Baryta carb, Baryta iodatum*, and *Phytolacca*. Hodgkin’s lymphoma is based in a Luetic miasm.

HOXSEY - herbal tonic recommended by Dr. Patrick Donovan, ND for lymphomas.

**INDOLE-3-CARBINOL – I3C inhibits the key growth factor STAT-3.

*JINGLI NEIXAO – a TCM herb formula, particularly if tumours are in the abdomen.
**LOW-DOSE NALTREXONE -(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

MELATONIN – NOT RECOMMENDED! it reduces apoptosis in malignant lymphocytes, while dramatically increasing oxidative stress of ROS in healthy cells. Use only short-term during chemotherapy, as a pro-oxidant.

*MISTLETOE – injectable mistletoe lectins at one time were controversial for lymphoma, but there are published controlled studies, and I strongly recommend it. Use Iscador or Helixor type P.

*OMEGA 3 OIL- marine omega 3 oils in large doses are showing responses. EPA and DHA modulate cytokines.

PLANT STEROLS – plant sterols and sterolins are not recommended for lymphomas except where the Epstein Barr virus EBV is involved.

*POMEGRANATE – ellagic acid, quercitin, and anthocyanidins are active against lymphoma.

QUERCITIN – inhibits lymphocyte tyrosine kinases. Inhibits p-glycoprotein efflux pump in B-cell lymphomas.

RAPAMYCIN – 2 mg M-F hs with artemesinin, for mantle cell lymphoma.

**REISHI - *Ganoderma lucidum* mushroom polysaccharides are potent immune modulators and regulators of nuclear transcription factor NFkB. Avoid immune stimulants such as *Echinacea* in lymphoma. Choose only immuno-modulators or re-balancers of the immune function. Other mushrooms, such as beta-glucan-rich *Agaricus blazei* may also be considered, but has more risk of liver injury.

SULFORAPHANE : histone deacetylase inhibitor (HDACI), regulates rogue genes.

VACCINES – lymphomas are highly immunogenic, and will respond to targeted vaccine therapy.

**VITAMIN C - anti-viral and immune balancer. Give IV-C.

*VITAMIN D3 - high dose vitamin D therapy with success in lymphoma, pioneered at Kripp’s Pharmacy.

**MULTIPLE MYELOMA**

This lymphoma is characterized by diffuse destruction of bone including lytic “punched-out” lesions in the cranium and other bones. 5-year survival rates are only about 30%.

NFkB is involved in creating these lytic bone lesions. NFkB activation is the primary trigger of multiple myeloma. NFkB increases multiple myeloma cell survival and increases treatment resistance, so target this aggressively. PTEN regulates PI3K/Akt pathway, which regulates NFkB. Rising C-reactive protein CRP and creatinine also correlate with poorer outcomes. Thymidine phosphorylase also helps MM destroy bone.

Doxorubicin and thalidomide are used, but this combination has a high risk of causing deep vein thrombosis. Thalidomide alone will give a response in many relapsed cases, 67% see no progression for 3 months, 43% last a median of 6 months, but most eventually progress by 18 months. Side-effects include some sedation, skin rash, constipation, neuropathy and neutropenia. Most can’t tolerate the top-end dose of 600 mg. Adding dexamethasone to the thalidomide doubles the response rate. Some regimes include melphalan with the prednisone and thalidomide. Overall, thalidomide extends time to progression, but not overall survival, and is very toxic. A thalidomide analog Lenalidomide (Revlimid) shows increased potency with less toxicity. Nonetheless, it can still cause neutropenia, thrombocytopenia, deep vein thrombosis and pulmonary embolism. Combined with dexamethasone it gives good response rates with impressive long-term remissions and survival. Another regime uses vincristine, oral dexamethasone and pegylated liposomal doxorubicin. Doxorubicin plus Bortezomib is very active against myeloma, even refractory cases. Bortezomib or Velcade is a proteosome inhibitor
used for relapsed multiple myeloma and mantle cell lymphoma. **Velcade** is not compatible with quercitin or green tea extract, which reduce efficacy. **Velcade** has a positive synergy with curcumin.

Arsenic trioxide is making a come-back as a therapy for myeloma. Autologous stem cell transplantation may be considered for non-responders.

Vitamin D deficiency tends to occur as multiple myeloma progresses, and is linked to poorer prognosis.

Keep urine pH at 6-7, as acidosis leads to mineral depletion in bones and higher paraprotein levels.

**CAUTION:** Vitamin B-12 has triggered rapid progression in a case of MM with macrocytic anemia, so beware.

It is also considered prudent to avoid supplements which can alter the extracellular matrix, such as hyaluronic acid, which causes resistance to the steroid drug Prednisone. Also avoid glucosamine and N-acetyl-glucosamine which will increase hyaluronan acid levels. These may increase the rate of spread.

**Amyloidosis** shares some characteristics with multiple myeloma. Both involve defects in the bone marrow production of plasma cells. Multiple myeloma is a frank cancer of the plasma cells, where the body produces a high proportion of these cells. In amyloidosis, there are fewer of these plasma cells, but they produce light-chain derived proteins that undergo a conformational change are then deposited in organs. Most affected are the kidneys and heart, and also affected are nerves, gastrointestinal tract, and potentially every organ of the body. Rx: curcumin and cinnamon. The targeted agent bortezomib (**Velcade**), which is successful in the treatment of multiple myeloma, has shown striking activity in patients with light-chain amyloidosis. Using Velcade in combination with cyclophosphamide and dexamethasone has demonstrated rapid, deep, and durable responses, better than anything seen previously. Curcumin strongly impacts fibrillary amyloid light-chain protiens. Curcumin is very useful on its own, but is also synergistic with Velcade, as is MCP.

**NATUROPATHIC CARE OF MULTIPLE MYELOMA**

**Targets:** **NFκB** is the primary element in the pathogenesis of multiple myeloma. Also target the apoptosis off-switch, STAT-3, P13K/Akt, HSP-90, PTEN, proteosome inhibition.

1° mistletoe lectins, LDN, reishi, oral and IV-D-ALA, vit. D3, vit. K2, indole-3-carbinol/DIM.

2° green tea EGCG + vE, Mugsos-Wobenzyme, Biotics *Intenzyme Forte*, or serrapeptase proteolytics.

3° strontium citrate, berberine, artemesinin, artemesunate + IV-vit. C.

**ALPHA LIPOIC ACID – R-ALA** to reduce marrow fibrosis via inhibition of platelet derived growth factor PDGF. Also inhibits NFkB. Rx IV-D-ALA 150 to 300 mg biweekly and orally R-ALA 300 mg bid-tid.

**ARTEMESININ or ARTESUNATE** – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb *Artemesia annua*. They generate peroxides in contact with cancer cell iron stores.

**BERBERINE** – anti-inflammatory and inhibits cancer cell energy metabolism.

**BORON** – hardens bones, to inhibit the growth and spread of cancer in the bones.

**CO-ENZYME Q-10** – repairs mitochondrial dysfunction in myeloma stem cells.

**CURCUMIN** – inhibits NFkB and inflammation. Positively enhances efficacy of Velcade.

**DHA** – omega 3 oil which regulates myeloma cell growth, and is an anti-inflammatory.

**DIET** – avoid wheat, and perhaps also dairy foods. Eat mushrooms.
GRAPESEED OPCs - grapeseed extract proanthocyanidins robustly inhibit NFκB.

*GREEN TEA EGCG – EGCG inhibits NFκB and mTOR. Anti-angiogenic - marrow always shows increased vascular density in myeloma. NOT OK WITH VELCADE!

HOMEOPATHICS - multiple myeloma is based in a Luetic miasm.

**INDOLE-3-CARBINOL – I3C inhibits NFκB, STAT-3 and mTOR. DIM may be substituted for I3C.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

MILK THISTLE – silybinin extract inhibits NFκB and EGFR.

*MISTLETOE – use Helixor type A or P, or Iscador type P.

*MODIFIED CITRUS PECTIN – inhibits growth and spread, supports Velcade.

**PROTEOLYTICS – protein digesting enzymes such as bromelain, trypsin, Wobenzyme (Wobe-Mugos E) or Biotics Research Intenzyme Forte inhibit inflammation. Proteolytics increase remission times and reduce mortality by 50 to 60%, by reducing TNF receptors, IL-6 and B2 microglobulin.

QUERCITIN - inhibits NFκB. NOT OK WITH VELCADE!

*REISHI – Ganoderma lucidum mushroom hot water extract is the greatest inhibitor of NFκB.

RESVERATROL - inhibits NFκB.

RETINOIDS - synergistic with vitamin D3.

VITAMIN C – hardens bone, inhibits NFκB.

*VITAMIN D3 – associated with improved survival.

*VITAMIN K2 – menaquinone hardens bone while inhibiting the cancer.

ZINC – zinc citrate helps immune competence and inhibits NFκB.

A sample protocol which has given a good response:

- milk thistle silymarin
- reishi mushroom extract
- green tea EGCG concentrate
- vitamin E
- co-enzyme Q10
- R-alpha lipoic acid
- MCHA calcium
- omega 3 oil
- grapeseed OPC extract
- Can-Arrest

310
MYELODYSPLASTIC SYNDROME

The myelodysplastic syndromes MDS are a spectrum of clonal hematopoietic stem cell disorders that are associated with distinct cytogenetic abnormalities, and persistent peripheral cytopenias. MDS is thought to be a cancer akin to leukemia. Blood cells are derived from a malignant pluripotent progenitor cell, which leads to hyperproliferative bone marrow and ineffective hematopoiesis. This can sometimes develop into overt leukemia.

The first United States epidemiologic data reported an incidence of approximately 3.6 per 100,000 people, or over 10,000 new diagnoses yearly in the USA. Neutropenia is common, and 65% of cases will die of infection. Thrombocytopenia is also common, and results in petechiae, gingival bleeding, retinal hemorrhage and other bleeding disorders. Platelets develop abnormal morphologies and aggregation defects.

Iron overload increases risk of death. Serum ferritin greater than 1,000 mcg /L is diagnostic of overload. Most cases are due to blood transfusion-related hemochromatosis. Iron can be chelated by IV medicines, or an oral chelator Deferasirox. Milk thistle and R-alpha lipoic acid chelate iron. Artesminin can burn off the iron in a blaze of endo-peroxides.

Rule out copper deficiency! We don’t often want copper as it is angiogenic, but in MDS it can be positive.

The only curative treatment is bone marrow transplantation, but only a few qualify and find a suitable donor. Immunosuppressive drugs have had some limited success. Interleukins IL-3, IL-6 and IL-11 induce platelet production or thrombopoiesis. Resveratrol can increase IL-6.

The first drug to be shown to prolong survival is Azacitidine or Vidaza. Chemotherapy with cytarabine may be used in about 40% of cases.

Hydroxyurea is a common chemotherapy, which induces apoptosis by inhibition of ribonucleotide reductase enzyme. Prevent liver and kidney and bone marrow toxicity with Shih Chuan Da Bu Wan or Astragalus Deep Immune Combination, coenzyme Q-10, and milk thistle extract.

NATUROPATHIC CARE FOR MYELODYSPLASIA

Targets: Apoptosis off-switch, anti-angiogenics, demethylation, Src family kinase inhibitors, farnesyl transferase inhibitors and differentiation agents are thought to be helpful, and are being developed as therapies for MDS.

1° mistletoe P lectins, low-dose Naltrexone, maitake or reishi, oral and IV-D-ALA, omega 3 oils, curcumin.
2° grapeseed extract, green tea EGCG + vit. E, milk thistle, artesminin, modified citrus pectin, burdock root.
3° vit. D3, vit. K2, alkylglycerols, serrapeptase, avoid wheat and possibly also dairy foods. Chelate iron.

ALKYLGLYCEROLS - shark liver oil alkylglycerols help regulate the bone marrow and angiogenesis.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artsunate are anti-malaria drugs derived from Wormwood herb Artemisia annua. They generate peroxides in contact with cancer cell iron stores.

* BURDOCK ROOT – Arctium lappa is an alterative or tonic, recommended by Bill Mitchell, ND

CAN-ARREST – for curcumin, boswellia, quercitin and bromelain.

*CURCUMIN – impacts light chain proteins.

ELLAGIC ACID – as found in pomegrante, berries and fruits, to regulate MAPK and NFκB.

*EPA – eicosapentanoic acid is an omega 3 fat which controls inflammation in the marrow.
GENESTEIN – from soy, regulates growth.

GRAPESEED – for anthocyanidins and proanthocyanidins, also found in bilberry.

*GREEN TEA EGCG – concentrate is strongly anti-angiogenic, regulates stem cells. Other stem cell regulators include vitamin A, Metformin and curcumin.

IRON – iron overload increases inflammation and risk of death. Most often this is due to transfusion-related hemochromatosis. Chelate if ferritin is over 1,000 mcg/L. Give black tea with meals, lactoferrin, artemisinin, R-ALA, milk thistle or the oral chelator drug Deferasirox. Test for copper deficiency.

**LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*REISHI – mushroom extract controls NFkB. Also consider maitake extract.

RESVERATROL – inhibits VEGF and NFkB.

VITAMIN C – IV-vitamin C paired with chelation has shown good responses.

*VITAMIN D3 – regulates cell differentiation.

*VITAMIN K2 – menatetrenone is synergistic with vitamin D3 and steroids, as long as the bone marrow is not hypocellular and the patient is not transfusion-dependent.

A truly remarkable response in myelofibrosis with JAK-2 mutation was obtained by a prominent American naturopathic doctor with this protocol:
- Quercitin 1,000 mg twice daily. A phystosomal quercetin was used to ensure absorption.
- Astaxanthin – 12 mg twice daily.
- Metformin extended release 500 mg twice daily.
- Berberine 500 mg twice daily.
- Vitamin K2 – up to 15 mg 3 times daily of MK-4 type, or 120-360 mcg of the MK-7 type.

Polycythemia vera has correlations with AML- acute myelocytic leukemia - so I treat them similarly. JAK2 mutations put myeloprogenitors into hyperdrive. Hemorrhage, clots, myelofibrosis or transformation into leukemia can occur. Growth factors include IGF-1, TGFβ, Bcl-xl/2 and IL-3. A colleague suggests we consider giving green tea EGCG, R- alpha lipoic acid, and low dose Naltrexone.

LEUKEMIA

Leukemia is a cancer of the white blood or immune cells. The problem is often mutation of the stem or progenitor cells in the bone marrow.

Greave’s Hypothesis: reduced antigenic challenge during early post-natal development may contribute to an increased risk of childhood leukemia. In other words, let kids get dirty, and play with pets. The more germs and immune stressors they encounter, the less likely they will be to develop immune cell disorders.

Acute leukemias are marked by rapid proliferation and disordered differentiation, with accumulation of large numbers of immature blast cells in the blood and bone marrow. Untreated, this can be fatal, in a few weeks to a few months.

A number of insults to the fetus during pregnancy increase risk for leukemia, including radiation, organochlorine pesticide and solvent exposure, and infections such as influenza, pneumonia, chlamydia, human papilloma virus HPV or genital herpes HSV-II. Iron supplements by the mother during pregnancy reduces risk of acute
lymphocytic leukemia in the child. Overall survival is about 42.5% at 5 years. Children tend to fare much better than adults over age 40. Treatment is arduous, and full recovery can take several years.

Methadone binds to opiod receptors on myeloid and lymphoblastic cells, activates mitochondrial pathways, caspase activation, and down-regulates the anti-apoptotic protein Bcl-xl. In vitro this kills even multi-drug resistant leukemia cells. This suggests a possible role for low dose Naltrexone LDN.

The anti-rejection immune suppressing drug Cyclosporine reduces IL-2 after bone marrow transplantation. You may use IL-2 reducing herbs to reduce risk of rejection - curcum, Ginkgo biloba, green tea and Salvia miltiorrhiza (dan shen). Quercitin might reduce risk of rejection of bone marrow transplants. Berberine and macrolide antibiotics such as azithromycin and clarithromycin are strongly contra-indicated post-transplant.

A serious and potentially fatal complication of leukemia treatment by allogenic hematopoietic stem cell transplantation is graft-versus-host disease GVHD, where the new immune cells attack the recipient. This can occur in close to half of cases. GVHD onset and severity is associated with increased serum levels of interleukin IL-7 and circulating CD-19 B-cells. Daily low-dose interleukin-2 immunotherapy in patients with active GVHD who had undergone allogeneic hematopoietic stem cell transplantation for the treatment of lymphomas and leukemias, allowed a marked reduction of use of glucocorticoids. Some help is seen with Rituximab and Bortezomib. FABNOs suggest colostrum, or Centella asiatica (gotu kola) as immune-modulators. Consider proteasome regulators such as green tea EGCG. Omega 3 marine oils, vitamin D3 and cannabidiol CBD also manage GVHD. To modulate histone protein deacetylation: sulphorafane and other cruciferous isothiocyanates, curcumin, grape cyanidins, milk thistle silymarin, parsley apigenin, baicalein, rosemary.

Some authorities say avoid megadoses of vitamin C in all leukemias, as it can paradoxically increase malignant cell proliferation. However, there is evidence high dose IV-C squelches leukemic stem cell division and slows progression.

**ACUTE LYMPHOBLASTIC LEUKEMIA**

Acute lymphoblastic or lymphocytic leukemia ALL is the most common childhood leukemia. Causes include maternal deficiency in folate, maternal exposure to agricultural chemicals during pregnancy; and paternal exposure in the workplace to paints, solvents, degreasers and chemical cleansers. Toxic chemicals in food and the environment which are high risk for childhood leukemias include hydrocarbons such as benzene, perchloroethylene, off-gassing solvents, and pesticides from food, pet products, home garden and agricultural applications. Environmental toxins which are likely a risk are dioxans, furans, tobacco smoke, 1, 3 butadiene, environmental which are high risk for childhood leukemias include hydrocarbons such as benzene, perchloroethylene, off-gassing solvents, and pesticides from food, pet products, home garden and agricultural applications. Environmental toxins which are likely a risk are dioxans, furans, tobacco smoke, 1, 3 butadiene, benz(a)pyrene, and many other volatile organic compounds. NFkB is a prominent driver of growth in ALL Rates of ALL spike after influenza epidemics. This suggests potential for a targeted vaccine strategy.

Greave’s hypothesis revisited: Children have a 50 % lower risk of ALL if they regularly attend daycare in the first few months of life, as exposure to childhood infections is protective if it occurs before expanded mutant B-cell clones can develop.

Acute leukemias present with symptoms associated with altered bone marrow production of red blood cells, white blood cells and platelets: fatigue, malaise, anorexia, bruising, low-grade fevers, anemia, and immunodeficiency. ALL has a complete remission rate of 90% in children treated with the combination chemotherapy vincristine, prednisone and asparaginase. Remission maintenance with methotrexate and mercaptopurine gives 55 to 70% long term survival. Also used are melphalan, chlorambucil, topoisomerase inhibitors, anthracyclines and etoposide. Within 5 years 14% of kids relapse, of which 1/3 are new secondary cancers induced by anti-leukemia therapies.

Adults with acute lymphocytic leukemia are treated with vincristine, prednisone, daunorubicin, methotrexate, cyclophosphamide, cytosine arabinoside, 6-thioguanine and 6-mercaptopurine, and possibly asparaginase. High risk cases receive radiation therapy as well as intensive chemotherapy. Response rates are 60 - 80% for adults, but the duration of remissions are considerably shorter, usually under two years.
Acute adult T-cell leukemia and HTLV-1 infected cells respond to the carotenoids fucoxanthin and its 2X stronger metabolite fucoxanthinol, which induce apoptosis by activation of caspases 3, 8 and 9, and cell cycle arrest at G1. Beta carotene and astaxanthin are not effective.

The acute leukemias ALL, AML and APL (pro-myelocytic), AMcL (monocytic) have increased numbers of insulin receptors. This also applies to CML, but not CLL and the lymphomas.

**ACUTE MYELOGYCTIC LEUKEMIA**

Acute myelocytic or myelomonocytic leukemia AML is the most common adult form of acute leukemia, and is the type most often seen to result from exposure to radiation or chemotherapy. Protein tyrosine kinases are a target in AML. 5% of AML cases are known to express AML1-ETO fusion protein which prevents recruitment of critical co-activators, silencing E protein transcription factors, preventing activation of tumour suppressor genes. MYC oncogene expression correlates with worse survival and more rapid recurrences.

A viral like-illness with fatigue and malaise may be followed by pain in the long bones, ribs and sternum. Unlike ALL, AML has little peripheral lymph node involvement. There are occasionally skin lesions. Watch the hygiene and immune competence of the oral and the peri-rectal areas. There are increased numbers of insulin receptors. Hyperglycemia increases mortality risk 40%, so close monitoring of blood sugar is recommended.

Blast cells may cause leukostasis syndrome, and the blast crisis phase can be fatal. This is driven by beta-catenin, which we can suppress with quercetin, vit.D3,vit.A retinol, omega 3 DHA, and indole-3-carbinol or DIM. The leukemic cells secrete platelet-derived growth factors which cause the fibroblasts to turn the bone marrow spaces fibrotic. We can block PDGF/PDGFR with green tea EGCG, curcumin, vitamin K and milk thistle extract.

AML is initially treated with combinations of cytarabine, etoposide, mitoxantrone, daunorubicin, thiguanine and all-trans-retinoic acid. Beware cell lysis syndrome with hyperuricemia and hyperuricuria. Monitor potassium. Chemo is commonly reinforced with autologous or allogenic bone marrow transplantation. Bone marrow transplants are less helpful in AML than other leukemias. Do NOT use berberine around stem cell transplantation. IV-curcumin helps in preparation for bone marrow transplantation. CBD cannabidiol 300 mg daily starting one week pre-transplant reduced GVHD.

A sample protocol which has worked very well is:
- indole-3-carbinol.
- green tea EGCG + γ vitamin E.
- CanArrest – curcumin, boswellia, quercitin and bromelain.
- reishi mushroom extract.
- Mistletoe lectin injection eg Helixor type A.

My American colleagues suggest:
- vitamin A – preferably in the form of ATRA, to induce myelomonocytic differentiation.
- vitamin D – as 1, 25 di-hydroxy vitamin D3 – as calcitriol, the activated form, to support differentiation.
- quercitin – which has high affinity for type II estrogen receptors.
- *Cephalotaxus spp*. – Plum yew bark is a natural source of taxanes.

Secondary remedies include
- holy basil
- boswellia
- barberry
- Yunnan Bai Yao
- grapeseed extract oligomeric proanthocyanidins OPCs
- *Llycopodium* homeopathic.
Feverfew parthenolides are said to specifically kill AML and CML progenitor and stem cells, and do so better than the chemo drug ara-C (Cytarabine). This idea needs further clinical development. Standardized feverfew extracts used for migraines, given in large doses, have not shown any responses in my patient population. Apparently it should work by activation of p53 and NFκB by free radicals of oxygen ROS. Perhaps feverfew will be found to synergize with other oxidative therapies.

**CHRONIC MYELOCYTIC LEUKEMIA**

CML is associated with an abnormal Philadelphia Ph chromosome, and is characterized by myeloid hyperplasia. There is an increased granulocyte-macrophage stem cell pool, leading to distinct self-renewing myeloid colonies with increased nuclear beta-catenin signaling. This is a constant source of blasts—new immature leukemic cells. This myeloid blast signaling can be moderated by enforced expression of axin. It is also driven by differentiation arrest, genomic instability, epigenetic phenomena, telomere shortening, and non-random chromosomal abnormalities. Chronic leukemias tend to show up on routine blood tests as thrombocytosis, with elevated lactic acid dehydrogenase and elevated uric acid. The lymphocytosis is typically over 5,000 cubic mm.

The disease is generally indolent, but 3 to 10% are at risk of transformation into Richter’s syndrome with an aggressive lymphoma, night sweats, weight loss, abdominal pain and lymphadenopathy. CML may also exhibit hepatomegaly, and will usually involve splenomegaly with abdominal bloating and early satiety.

CML is treated with hydroxyurea and bisulfan, although they do not stop the progression of the disease. Remission periods in the chronic phase can be prolonged with alpha-interferon. Gleevec (Imatinib mesylate) is an expensive new selective inhibitor of tyrosine kinase BCR-ABL which can restore normal blood counts in interferon-resistant CML. PPARγ agonists deplete the CML stem cell pool, eg Glitazone.

Children may receive allogenic bone marrow transplantation; adults up to age 55 may find a donor, but mortality with transplants of these stem cells is about 20%.

**Therapeutic targets** -
- tyrosine kinase inhibition - curcumin, EGCG, milk thistle, reishi extract.
- differentiation – vitamin A, vitamin D, quercitin, boswellia.
- beta-catenin inhibition – current drug therapies target the blasts, not the source. Inhibit the beta-catenin blast phase trigger! Rx vitamin A, vitamin D3, omega 3 DHA, I3C, Panax ginseng, gugulipids, tea polyphenols.
- P13k / Akt / mTOR inhibitors - curcumin, green tea EGCG.

Thus a basic CML protocol might be
- green tea EGCG
- CanArrest with curcumin, boswellia, quercitin and bromelain
- indole-3-carbinol
- reishi extract
- vitamin D3
- vitamin A
- Dang Gui Lu Hui
- resveratrol - increases lymphocytic anti-cancer cytokines.

**CHRONIC LYMPHOCYTIC LEUKEMIA**

The most common adult chronic leukemia, especially common in men. There may be fatigue, shortness of breath or bleeding problems. The blood tests show lymphocytosis over 5,000 per cubic millimeter.

Smudge cells on the blood test are actually a good sign. These are fragile B-cells with little vimentin cytoskeleton protein. If they disappear, the prognosis is worse.
The disease is generally indolent, but 3 to 10% are at risk of transformation into the aggressive lymphoma of Richter’s syndrome, marked by night sweats, weight loss, abdominal pain, and lymphadenopathy. The P53 DNA repair gene is often mutated.

CLL may be treated with chlorambucil and prednisone. Flubarabine with rituximab is also used; response is less if the cell type is ZAP70+ and CD38+. 30% of CLL cases have a 6 to 18 nucleotide sequence insertion in the promoter region of the anti-apoptotic gene MCL-1, which is in the Bcl-2 protein family. These individuals are at high risk of disease progression and resistance to chemotherapy.

CLL is inhibited by green tea EGCG and LDN.

HAIRY CELL LEUKEMIA

Hairy cell leukemia HCL is a rare, chronic and indolent lymphocytic leukemia. It arises from mutations in pluripotent stem cells. HCL patients are generally low in glutathione peroxidase, catalase and super-oxide dismutase SOD activity in their red blood cells.

HCL is treated with alpha-interferon or 2-chloro-deoxyadenosine.

NATUROPATHIC LEUKEMIA SUPPORT

**Targets of therapy:** Apoptosis off-switch, NFkB, differentiation inducers, stem cell regulators, proteasome inhibitors, tyrosine kinase inhibitors, beta-catenin inhibitors, demethylation, insulin, p53, Bcl-2, CD-44 cell adhesion molecule, PPARγ agonists.

1° mistletoe P lectins, LDN, coriolus or reishi extracts, oral and IV curcumin, green tea EGCG + γ vit. E.
2° quercitin, taurine, R-ALA, omega 3 oils, indole-3-carbinol/DIM, vitamins A, D3, K2, Helleboris niger D12.
3° cannabis PTO, CoQ-10, artemesinin, artesunate, holy basil, berberine (no with stem cell transplants).

**Do NOT** give melatonin or astragalus except during chemotherapy, as they may stimulate leukemic cells.


*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

ASTRAGALUS – a great herb in chemotherapy, but beware, it can stimulate leukemias.

ATRA – all-trans retinoic acid has survival benefit in APL.

AVEMAR – induces apoptosis in leukemia cells.

ASTRAGALUS - astragalus is only to be used during chemotherapy. Other TCM herbs to use instead are ligusticum, cordyalis, iris versicolor, arctium lappa, eleutheroecoccus, cornus, ginseng, milletia, polygonatum, psoralea and ganoderma.

BARBERRY – berberine inhibits leukemic stem cells.

BERBERINE – in doses of 750 -1,000 mg up every 3 hours for an anti-leukemic effect. Do **not** use around stem cell transplantaion.

BOSWELLIA – for leukemias.
*BROMELAIN – modulates CD44 cell adhesion molecules to reduce progression and destroy leukemic stem cells.

CANNABIS – phoenix tears oil PTO can help, but watch for tumour lysis syndrome.

CAT’S CLAW - *Una de gato* alkaloids have shown *in vitro* activity against leukemia cells.

CENTELLA ASIATICA – gotu kola is a useful immune-modulator in graft-versus-host disease.

*CO-ENZYME Q-10- repairs mitochondrial dysfunction in stem cells.

*CORIOLUS – Coriolus versicolor mushroom extracts inhibit leukemia. Only use Cordyceps after stem cell transplantation.

**CURCUMIN - synergizes with taurine and vitamin D, is directly cytotoxic, promotes apoptosis, and suppresses activation of transcription factors AP-1 and NF-kappa B in chronic myeloid leukemia CML cells. Impacts light-chain proteins. Curcumin might reduce rejection of bone marrow transplants.

DANDELION – Dandelion root induces apoptosis in leukemic cells. The best herb for liver support and detox.

DETOXIFY – infrared saunas and other measures to release solvents such as benzenes, xylene and toluene.

DIET – all leukemias except CLL show increased numbers of insulin receptors, so we prescribe a low glycemic diet.

FARE YOU – vitamin U is a form of methionine extracted from green cabbage. It heals mucositis, the primary dose-limiting side-effect in leukemia care. All leukemia patients develop painful mucositis. Half will get to stage 4 toxicity out of 4, which prevents all intake of food or liquids, may cause bleeding, and requires use of opiates for the pain. It is due to a wicked combination of high-dose chemo plus cortisone, antifungals, strong antibiotics and the anti-rejection drug cyclosporine given after bone-marrow transplant. This is preventable and treatable with timely use of Fare You or Gastrazyme tablets.

FEVERFEW – feverfew chrysanthemum extract standardized for parthenolides which inhibit AML stem cells. *in vitro* it is a better killer of leukemic stem cells than arabinase-C chemo. It is progenitor and stem cell specific, via increased reactive oxygen species, activation of p53 and nuclear factor kappa-B, unmethylates the tumour suppressor genes. Suggested dose is 20 mg tid.

*GANODERMA – the immune modulating Reishi mushroom Ganoderma lucidum mixes well with other mushrooms such as maitake, shiitake and cordyceps. AHCC mushroom extract is not recommended. Only use Cordyceps after stem cell transplantation.

GARLIC – high dose garlic preparations prevent and treat hematological cancers.

GINSENG - is synergistic with vitamin C against leukemia cells.

GLA - evening primrose oil reduces prostaglandin PGE-2, which increases apoptosis in AML and CLL.

*GRAPESEED – grapeseed extract oligomeric proanthocyanidins OPCs inhibit progression, strongly increase apoptosis via activation of JNK protein.

*GREEN TEA EGCG – inhibits CLL. Proteasome regulator. Give 2,000+ mg polyphenols/EGCG daily.

HOLY BASIL – increases apoptosis in leukemia cells.
HOMEOPATHY - leukemia viruses may be defeated with the Heel brand homeopathics Engystol and also Echinacea Compositum. Use by injection twice weekly for 2 weeks and as oral tablets twice daily for 3 weeks. Lycopodium is useful in AML. Look at Ceanothus americanus.

INDIRUBIN - from the botanicals Idigofera tinctoria or Isatis tinctoria or qing dai used in Dang Gui Long Hui Wan – an effective TCM formula for chronic myelocytic leukemia CML. The active principle appears to be indirubin in the Isatis tinctoria, which is immune stimulating and inhibits DNA synthesis specifically in immature leukemic cells in the bone marrow. Indirubin inhibits cyclin dependent kinases and glycogen synthase kinase 3 involved in G1 cell cycle phase. Synthetic indirubin is used at oral doses of 150-200 mg.

*INDOLE-3-CARBINOL – inhibits STAT-3 and beta-catenin,

*LOW-DOSE NALTREXONE – (LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

METFORMIN – selectively inhibits cancer stem cells, and inhibits IL-6. Glitazone is a PPARγ agonist which also depletes the cancer stem cell pool in leukemia.

*MISTLETOE – use Helixor P for CLL, and Helixor A for other leukemias. Iscador P may also be used.

NOTOGINSENG - Panax pseudoginseng is anti-leukemic. Rx: Yunnan Baiyao.

*OMEGA 3 OIL – DHA inhibits beta-catenin and thus inhibits blast production and the blast crisis phase switch.

*QUERCITIN - inhibits leukemia cell proliferation. It binds growth factor receptors such as type II estrogen receptors in leukemia cells. It arrests leukemia cells in G1-S interphase. Quercitin might reduce risk of rejection of bone marrow transplants.

RESVERATROL – Strongly increases apoptosis?

SHIH CHUAN - Shih Chuan Da Bu Wan or Shiquan is an astragalus-based herbal formula proven to boost chemotherapy effectiveness while strongly protecting blood cells and organs. Only use during chemo!

*TAURINE – synergistic with curcumin in acute leukemias.

*VITAMIN A - enhances bisulphan activity against CML, at 50,000 I.U. daily. Only use in high doses (over 3,000 IU daily) short term, as it interferes with vitamin D receptors. Beta-catenin inhibitor.

VITAMIN C – high dose IV-vitamin C may stop leukemic stem cell division.

*VITAMIN D3 - at 16,000 I.U. three times weekly can put chronic myelomonocytic leukemia CML in remission.

VITAMIN E - can assist with oxidative stress when tumour load is high, such as during a blast crisis.

VITAMIN K2 – induces apoptosis in APL myelogenous leukemia.
Chapter Twenty INTEGRATIVE CARE OF URINARY TRACT CANCERS

KIDNEY CANCER

5 year survival is about 62%. for kidney cancer, also called renal cell carcinoma RCC.

Tumours under 3.0 cm in diameter do not tend to metastasize. Metastectomy improves survival.

Clear cell RCC is associated with loss of functional von Hippel-Landau VHL tumour suppressor gene. VHL normally promotes transcription of E-cadherin cell adhesion molecule. Loss of VHL results in loss of E-cadherin, with subsequent development of aggressively growing and spreading cancer.

RCC over-expresses hypoxia-inducible factor one HIF-1. HIF-1 is particularly potent in making VEGF, PDGF, and TGFα when there is a mutation or hypermethylation of the tumour suppressor gene von Hippel-Lndau VHL. HIF-1 down-regulates MYC oncogene.

RCC will over-express tyrosine kinases. These associate with risk of metastasis to the brain.

RCC tumours are immunogenic, so consider vaccines, mistletoe, LDN and related immune therapies. Renal cell carcinoma can be treated by immune therapies such as interleukin IL-2 and interferon INFɤ.

High risk patients may seek inhaled interleukin IL-2 therapy, or interferon alpha INFα, but cytokine therapies have low response rates, minimal improvement in survival, significant toxicity, and give a median survival of just 12-15 months.

MRI-guided radiofrequency ablation can also be useful.

Monitor hematuria and urinary nuclear matrix protein twenty-two NMP-22. Onco-fetal RNA-binding protein IMP-3 is a biomarker for high risk of post-operative metastasis.

The NCCN kidney cancer guidelines use a scoring system developed at Memorial Sloan-Kettering to help predict survival in all renal cell cancer patients. The predictive items are:

- lactate dehydrogenase level of more than 1.5 times the upper limit of normal.
- hemoglobin level lower than normal.
- corrected serum calcium level of more than 10 mg/dL.
- interval of less than 1 year from original diagnosis to the start of systemic therapy.
- Karnofsky performance score of 70 or less.
- 2 or more sites of organ metastasis.

Patients with none of these risk factors have a median survival of 30 months. Patients with 1 or 2 risk factors have a median survival of 14 months. The prognosis for patients with 3 or more risk factors is poor, as such patients have a median survival of 5 months.

Lack of disease progression at 6 months is the best indicator for prolonged survival, not immediate response - stability is always great news in cancer patients!

Targeted therapies in use and include Sutent (tyrosine kinase), Avastin (angiogenesis), Sorafenib (serine/threonine and receptor tyrosine kinase), Torisel or temsirolimus (mTOR), Everolimus (mTOR), and in development - Axitinib (tyrosine kinase) and Pazopanib (angiogenesis).
INTEGRATIVE CARE OF RENAL CANCER

**Targets of therapy:** Apoptosis off-switch, VEGF/R, mTOR, MET, HIF-1, tumour antigens (immune therapies), EGFR, PDGFR, receptor tyrosine kinases, serine/threonine kinases, mitochondrial rescue, Akt (protein kinase B), PI3K, VHL pathway, Raf kinase. Support PTEN.

1° oral and IV-vit.C, IV-artesunate, oral and IV-D-ALA, LDN, reishi, mistletoe lectins, quercitin.
2° oral and IV curcumin, grapeseed extract, green tea EGCG with γ vit. E, niacinamide, HCA, Glumetza.
3° coQ-10, indole-3-carbinol/DIM, melatonin, milk thistle, Cimetidine or Famotidine (Pepcid), vit. B6.

*ALPHA LIPOIC ACID – R-ALA for bio-energetic regulation.

*ARTEMESININ or ARTESUNATE – oral artemisinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

BARBERRY – barberry or Berberis vulgaris is a kidney tonic, antimicrobial and astringent.

CIMETIDINE – at up to 3 times the usual doses, as an immune modulator.

*CO-ENZYME Q-10 - activates mitochondria to restore apoptosis, the off-switch for mutated cells.

*CURCUMIN – curcumin from tumeric root squelches inflammation, including COX-2 growth factor. A powerful inhibitor of the Akt/mTOR signaling pathway.

*GREEN TEA EGCG – EGCG does it all, particularly active against PDGFR, VEGFR, Akt and mTOR.

*INDOLE-3-CARBINOL – from cabbage inhibits mTOR, Akt regulator.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE - milk thistle extract inhibits EGFR and PDGFR.

**MISTLETOE – Iscador or Helixor mistletoe lectins. These tumours are highly immune-responsive. Use Iscador Qu or Helixor A for males and M type for females. Synergistic with low-dose Naltrexone.

*MITOCHONDRIAL RESCUE – R-alpha lipoic acid, thiamine, acetyl-L-carnitine, D-ribose, Co-Q-10 , indole-3-carbinol, grapeseed extract, omega 3 oils, Garcinia hydroxycitrate.

NIACINAMIDE – a form of vitamin B3 reduces hypoxia.

PYRIDOXINE – vitamin B6 is associated with lower risk of renal cell carcinoma and improved survival.

*QUERCITIN – inhibits angiogenesis, EGFR.

**VITAMIN C – use IV-C twice weekly, to 60 grams.
BLADDER CANCER

Cancers of the urinary bladder are linked to tobacco use, and other exposures to toxic chemicals. Low estrogen exposure, such as early menopause, increases risk - possibly via increased rates of urinary tract infections and hormone related bladder dysfunction.

Bladder urothelial cancer in situ has a 50% risk of transforming into an invasive cancer within 5 years. Bladder cancer 5-year survival is about 82%.

Bladder tumours are classified as a basal subtype that is chemosensitive, a p53-like subtype that is chemoresistant and prone to bone metastasis, and a luminal subtype that retains some chemosensitivity and may respond to therapy with a fibroblast growth factor inhibitor. Bladder cancer often involves HER-2 expression, involving epidermal growth factor. Matrix metalloproteinases MMPs are often up-regulated, contributing to invasion and metastasis.

Elevated survivin, an apoptosis inhibitor, is a sign of a worse prognosis. Elevated B7-H3 protein is associated with more aggressive behaviour of kidney and bladder carcinomas. This is a cell-surface ligand which binds to receptors on immune regulating lymphocytes.

Signs and symptoms of bladder cancer may include the following:
- gross or microscopic hematuria.
- irritating symptoms of dysuria, frequency, urge incontinence, and/or urgency.
- obstructive symptoms such as intermittent or decreased force of urinary stream, straining while urinating, or feeling of incomplete voiding.
- signs and symptoms of metastases or advanced disease, which may include abdominal, bone, flank, or pelvic pain; anorexia, cachexia, or pallor; lower-extremity edema; renal failure; supra-pubic palpable mass; and/or respiratory symptoms such as cough, shortness of breath, or hemoptysis.

Lymph node dissection may be extended up to the iliac bifurcation, which is appropriate. Advanced cases can have the bladder surgically removed and a new bladder made from their own bowel.

BCG is a tuberculosis vaccine which activates the host’s immune response, and is as effective as chemo for transitional cell carcinoma TCC in early stages Ta, Tis, T1. 55% can obtain a 10 year progression-free survival. Therapy begins with a 6X weekly intravesicular instillation, then 3X weekly for 3 months, then 3X weekly at 6 months and every 6 months for 2 to 3 years. Curcumin enhances BCG efficacy.

There is benefit in combining hyperthermia with intravesicular (put up into the bladder with a catheter) BCG or chemo such as mitomycin C or Doxorubicin. Interferon gamma IFN or chemo are used primarily in non-responders to BCG.

Photodynamic therapy PDT uses light to activate intravesicular hexaminolevulinate or its lipophilic ester 5-ALA.

A new screening and monitoring test is urinary telomerase by TRAP assay – telomeric repeat amplification protocol. Also under investigation is the urinary measurement of matrix metalloproteinases MMP-2 and MMP-9 as markers of neoplastic activity. Ca-125 tumour marker can be useful to rule-out bladder cancer reoccurrence.

INTEGRATIVE CARE OF BLADDER CANCER

Targets of Therapy: Apoptosis off-switch, HER-2, EGFR, survivin, tumour antigens, MMPs, FGF.

1° oral and IV-vit. C, low-dose Naltrexone, mistletoe lectins, reishi, green tea EGCG + γ vit.E, hyperthermia.
2° curcumin, grapeseed extract, methylsulfonylmethane MSM, sulforaphane.
3° evening primrose/GLA oil, indole-3-carbinol/DIM, milk thistle extract, carotenes, L. caseii probiotic.
ARTEMESININ or ARTESUNATE – oral artemisinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

CAROTENES - carotenoids luteoin, zeanthin and lycopene inhibit bladder cancer growth.

GLA – gammal linolenic acid from evening primrose or borage oils inhibits TCC.

*GREEN TEA EGCG – highly active via several mechanisms.

HOMEOPATHICS - Terebintha

INDOLE-3-CARBINOL: regulates survivin.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opiod growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE – milk thistle extract inhibits EGFR.

*MISTLETOE – Iscador or Helixor mistletoe lectins are as effective as BCG, but have less risk. Use Iscador Qu or Helixor A for males and M type for females.

*MSM – methylsulfonylmethane - is an excellent urinary tract anti-inflammatory.

*REISHI– medical mushroom hot water extracts are immuno-modulating.

*SULFORAPHANE – from raw broccoli and broccoli sprouts, it can double survival!

TCM HERBS – Chinese herbal formulae of special interest are Jingli Neixao, Ping Xiao Pian, and AntiCancerlin

**VITAMIN C – oral vitamin C acidifies the bladder, directly cytotoxic to bladder cancer cells. IV-vitamin C is also very useful.

A successful FABNO protocol in a relapsed case facing cystectomy: high dose vitamin A, zinc, vit. E, vit. D, Broccomax, fish oil omega 3s, and medicinal mushrooms. Yarrow tea was given for hematuria.
Chapter Twenty:  NASOPHARYNGEAL, HEAD & NECK, THYROID CANCER, SARCOMAS

NASOPHARYNGEAL, HEAD and NECK CANCERS

The primary autocrine growth factor in head and neck cancer is transforming growth factor alpha TGFα and therefore ultimately epidermal growth factor receptor EGFR. Mutations in the MET oncogene also amplify the Erb-B3 pathway in these cancers. Head and neck cancers also tend to over-express vascular endothelial growth factor receptor VEGFR, and can be STAT-3 dependent.

Squamous cell carcinoma of the head and neck is triggered by a complex of hyaluron glycosaminoglycan of the extracellular matrix with the cell receptor CD44 and the signal activator LARG – leukemia-associated rho-GEF. The complex binds to epidermal growth factor receptors, setting off the tumor promoter ras pathway. The complex also alters the protein filamin in the cell cytoskeleton, allowing cell shape changes permissive of cell migration and metastasis. We can disrupt this complex with bromelain enzyme! Squamous cell carcinomas of the head and neck have increased activity in the P13K/ Akt / mTOR pathway. For squamous cell carcinomas e-cadherin over-expression means a higher risk of reoccurrence or metastasis.

Laser surgery is possible in select cases, and is preferable to the knife.

There is a link between squamous cell cancers and the human papilloma virus HPV, particularly the oncogenic type 16, and sometimes type 18. This virus is now accepted as the primary cause of squamous cell carcinoma of the cervix. There is a vaccine against it called Gardasil. Smoking is also a major trigger of these cancers, amplifying the HPV oncogenicity. Blood serum can be monitored for EBV viral DNA using real-time quantitative polymerase chain reaction test, as this often is seen in incipient nasopharyngeal cancers.

Cisplatin plus radiation is the standard of care for HPV-related HNC.

Radiation therapy is generally helpful, for loco-regional control and improved survival. Mucositis is common, as is loss of saliva production. Laryngeal and swallowing issues are common, and there can be severe late fibrosis. It is essential to have dental problems rectified before radiation, as oral tissue healing is poor afterwards, and gets worse over the years.

Dysphagia after chemo-radiation of head and neck cancers will improve with acupuncture to ST 5, 6, 7, 36; SP 6; LI 2 & 11; GB 20; GV 20; CV 23; Yin Tang; ear points Shenmen and Internal secretions.

Zinc is useful to suppress these cancers, but is particularly helpful during radiation therapy. Zinc improves immune cell function and thymus gland maturation of T-cells, and assists wound healing and normal tissue repair, preventing and treating dermatitis and mucositis. I prescribe 30 mg zinc citrate three times daily, with a meal.

Cetuximab is a monoclonal antibody inhibitor of epidermal growth factor receptor EGFR. It improves outcomes as an adjunct to radiation therapy. Nimotuzumab is a new EGFR inhibitor with milder skin toxicities.

INTEGRATIVE CARE of HEAD and NECK CANCERS

Targets:  Apoptosis off-switch, EGFR, P13/akt/mTOR, STAT-3, TGFα, TGFβ-1, NFκB, COX-2, VEGFR, p53 mutations, Ras-kinases, E-cadherin. Target EBV or HPV with anti-virals and immune modulators.

2°  grapeseed extract, green tea EGCG + vit. E, oral and IV curcumin, IV-vit. C, zinc.
3°  IV-artesunate, artemisinin (squamous cell), indole-3-carbinol/DIM, modified citrus pectin.

*ALPHA LIPOIC ACID – R-ALA inhibits TGF.
*ARTEMESININ or ARTESUNATE – oral artemisinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

BOSWELLIA - in the anti-inflammatory formula Can-Arrest or alone, it reduces peri-tumoural edema.

BROMELAIN - a proteolytic enzyme from pineapple stems which targets CD44 tumour cell receptor and hyaluron. Modulation of EGFR-binding receptors prevents activation of ras proteins, which slows progression.

GRAPESEED – grapeseed extract induces apoptosis in head and neck cancer cells. Note that N-acetyl-cysteine completely blocks the good effects of grapeseed.

GREEN TEA EGCG – EGCG inhibits VEGFR, and does many other useful tasks.

*HOMEOPATHICS – use antivirals such as Engystol and Thuja occidentalis.

*INDOLE-3-CARBINOL – controls SP-1 and STAT-3 transcription activators. DIM can also be used.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE – milk thistle extract inhibits EGFR.

*MISTLETOE – Helixor A type (fir) mistletoe lectins are a potent immune modulator and anti-viral. Do not use casually if tumour is in a confined space. Viscosan Helixor A type can be tried, by experienced practitioners. For tongue, oral and laryngeal cancers Iscador suggests Qu (oak) for males, and M (apple) mistletoe for females.

PLANT STEROLS & STEROLINS – modulate the immune response against human papilloma virus HPV.

*REISHI – Ganoderma mushroom extract regulates NFkB and immune function.

TCM HERBS - Liu Wei Di Huang Wan, Shih Chuan Da Bu Wan, Jingli Neixao.

**VITAMIN A: for squamous cell carcinomas, always use in high doses up to 10,000 IU per 25 lbs. body weight. Anti-viral, redifferentiator, cell growth regulator. Helps heal radiation injury to immune and stem cells.

*VITAMIN C – anti-viral.

*ZINC – zinc citrate is anti-viral, supports immune function; always use during radiation therapy.

Sample Naturopathic Protocol for Head & Neck Cancer
A protocol which completely removed a recurrent adenocarcinoma on the tongue, possibly of salivary gland origin. It had originally had been treated with surgery and radiation, but reoccurred and spread, for which the only medical option was to surgically remove the entire tongue! This horror was avoided by taking:

- Jingli neixao.
- vitamin C to bowel tolerance.
- Can-Arrest.
- green tea EGCG with γ vitamin E.
- grapeseed extract.
- reishi mushroom extract.
- modified citrus pectin.
THYROID CANCER

Cancers of the thyroid gland are becoming more common. There may be a link to estrogen stimulation, as well as radioactive isotope or X-ray exposure. There is frequently mutant ras expression, and PPARγ-1 expression, a fusion oncogene formed by chromosomal translocation. DNA hypomethylation and histone de-acetylation contribute to epi-genetic deregulation. Mitogen-activated protein kinase MAPK intracellular signaling causes resistance to apoptosis, increased growth and increased angiogenesis. Tumours are highly vascular. The prognosis worsens with age of the patient if there is a BRAF mutation. Size of the nodule does not predict risk, but nodules in the upper pole are the highest risk.

10 year age and gender-adjusted survival can be 98%. Only anaplastic thyroid cancer has a very poor prognosis. 70% are papillary tumours. Papillary carcinoma of the thyroid is associated with hypothyroidism. There is 10% chance of spread to bones or lungs.

10% of cases are medullary carcinoma, which arise from calcitonin secreting C-cells. Monitor calcitonin and CEA. Tumours can produce ACTH and histaminases, and are associated with other concurrent endocrine tumours. Lymphatic spread is usually to the neck and mediastinum.

5 to 10% of cases are follicular carcinoma, with a risk of spread to the brain, bones, lungs and soft tissues. Metastases to the liver, lung and bone tend to grow slowly. 1 to 3% of cases are anaplastic thyroid cancers, which are very aggressive. Invasion of local tissues and structures can be rapidly lethal.

Surgery is often combined with radiation. Usually a large dose of radioactive iodine is used to ablate these tumours and their metastases. To prevent xerostomia or dry mouth, flush the iodine out of the salivary glands by sipping dilute lemon juice or real lemonade starting about 24 hours after the administration of the radioactive material. Do not start this during the therapy or for 24 hours after as that will actually increase damage to the salivary glands.

Chemotherapy is not usually of use in thyroid cancers. Suppressing TSH aggressively is no longer recommended due to osteoporosis risk and lack of evidence it suppresses recurrences.

INTEGRATIVE CARE of THYROID CANCER

Targets of therapy: Apoptosis off-switch, PTEN, NFκB, PTK, angiogenesis, TSH, Ras, PPARγ.

* mistletoe lectins, low-dose Naltrexone, reishi, oral and IV-D-ALA, IV-DCA.
* green tea EGCG + α vit. E, curcumin, quercitin, zinc, vit. A.
* milk thistle, alkylglycerols, resveratrol, ellagic acid, omega 3 oils, suppress TSH with thyroid hormone to create subclinical hypothyroidism, and/or use Metformin.

*ALKYLGLYCEROLS – from shark liver oil inhibit PTKs and angiogenesis.

*ARTEMESININ or ARTESUNATE – oral artemesinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb Artemesia annua. They generate peroxides in contact with cancer cell iron stores.

*GREEN TEA EGCG – inhibits angiogenesis and PTKs.

*LOW-DOSE NALTREXONE –(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

*MILK THISTLE – extract inhibits angiogenesis and PTKs.

METFORMIN – low doses reduce TSH, without risk of clinical hyperthyroid symptoms.
*MISTLETOE – Iscador Qu or Helixor A for males, type M for females.

*OMEGA 3 OIL – Marine omega 3 oils inhibit thyroid cancer.

*POMEGRANATE – anthocyanidins inhibit PTKs and angiogenesis.

*QUERCITIN - inhibits VEGF.

*REISHI – mushroom extract inhibits PTKs

RESVERATROL – inhibits PTKs.

THYROID – Thyroxine or other forms of thyroid hormone can be given to create subclinical hyperthyroidism in papillary thyroid cancer, as TSH is a growth factor. Try to get TSH down to 0.8 to 1.2, to patient tolerance.

VITAMIN A – retinol.

SARCOMAS

Sarcomas are connective tissue cancers, developing in soft tissue and bone. Surgery can spread sarcomas.

Sarcomas have over-activity in the P13K / Akt /mTOR signaling pathway. Sarcoma fibroblasts have altered C-Myc gene expression.

Fibromatosis produces desmoids, a low-grade and locally invasive fibrosarcoma.

Soft tissue sarcomas include “simple” tumors - synovial sarcoma, and myxoid/round cell liposarcoma, as well as genetically “complex” tumors - undifferentiated pleomorphic sarcoma, leiomyosarcoma, and liposarcomas. Soft-tissue sarcomas such as leiomyosarcoma and rhabdomyosarcoma may respond to topoisomerase-II inhibitors from the oleander plant, green tea, boswellia and berberine.

The sarcoma or connective tissue components may be mixed with carcinomatous elements, as in a mixed Mullerian tumour. The carcinomatous elements are the drivers of metastasis.

Chemo for the carcinoma elements is Carboplatin with Taxol. About 50% respond, but there is no change in survival time. Where sarcomatous elements dominate, the chemo may include Doxorubicin, Ifosfamide and Cisplatin.

Despite chemo, presence of mets gives a prognosis of under a year survival.

There is a very significantly increased risk of clots in sarcoma patients.

Given the poor outcomes often seen with both the current allopathic and naturopathic therapeutics, I was motivated to try out the newly devised mitochondrial rescue approach on sarcomas. To my great joy it has often been helpful. I had a commitment in my heart to find some help for sarcoma since meeting Terry Fox when I was in cancer radiation biophysics research.
NATUROPATHIC SARCOMA CARE

**Targets of therapy:** Apoptosis off-switch, Akt/P13K/mTOR, VEGF, EGFR, PDGFR, IGF-1, proteasome regulation, protein kinase C/B, Bcl-2, Raf kinase, topoisomerase-II.

1° mitochondrial rescue, Mito-SAP, IV-D-ALA, IV-DCA, artemesinin (fibrosarcoma), IV-artesunate, IV-vit. C, SC and IV mistletoe P lectins (M for osteo-muscular sarcomas), modified citrus pectin.


3° green tea EGCG + γ vit, E, curcumin, grapeseed extract.

ANVIRZEL – an injectable extract of oleander. Oleandrin may help with soft-tissue sarcomas

*ARTEMESININ or ARTESUNATE – oral artemisinin or IV-artesunate are anti-malaria drugs derived from Wormwood herb *Artemesia annua*. They generate peroxides in contact with cancer cell iron stores.

*CURCUMIN – Bcl-2 regulator, protein kinase inhibitor, mTOR inhibitor, proteasome regulator; blocks APN protein, reducing tumour blood flow and invasiveness. Synergistic with DHA omega 3 oils.

*GREEN TEA EGCG: proteasome inhibitor, protein kinase regulator, VEGF inhibitor, PDGFR inhibitor, synergistic with Reishi.

HOMEOPATHY – *Hekla lava, Symphytum officinalis*.

INDOLE-3-CARBINOL – regulates mTOR signaling pathway.

*LOW-DOSE NALTREXONE –*(LDN) activates cytotoxic CD8+ immune cells against cancer and blocks opioid growth factor. Patient cannot be on opiate pain meds. Synergistic with mistletoe.

MELATONIN – regulates biorhythms.

*MILK THISTLE – an EGFR and PDGFR inhibitor.

**MISTLETOE – Iscador or Helixor type P, or type M for osteo-muscular sarcomas.

**MITOCHONDRIAL RESCUE – R-alpha lipoic acid, thiamine, acetyl-L-carnitine, D-ribose, Co-enzyme 10, Solomon’s seal, marine omega 3 oils, grapeseed extract. Eg NFH brand Mito-SAP 3 caps bid.

OLEANDRIN – cardiac glycosides or cardenolides from *Nerium oleander* leaves, stems and twigs act as a topoisomerase-II inhibitor on soft-tissue sarcomas. Injectable Anvirzel oleandrin, 0.8 ml/m2/day, by IM route. There may be mild pain at the injection site, fatigue, nausea or dyspnea.

QUERCITIN – shows promise in vitro.

*REISHI – reishi mushroom extract is synergistic with green tea EGCG.

*VITAMIN D3 – inhibits fibrosarcoma proliferation, increases apoptosis and fibroblast C-Myc expression.

VITAMIN K – PDGFR inhibitor.
EXAMPLES OF SARCOMA PROTOCOLS THAT WORK

A protocol which arrested a case of leiomyosarcoma with lung metastases:
- green tea EGCG with γ vitamin E.
- grapeseed extract.
- coQ-10.
- indole-3-carbinol.
- quercetin.

Note that the tumour was growing fast until this treatment started, stopped progressing until the patient went on a reduced dose, at which point it began to grow slowly.

A protocol which stabilized a late-stage sarcoma:
- Jingli neixao.
- Can-Arrest – for curcumin.
- vitamin C to bowel tolerance.
- R-alpha lipoic acid.
- co-enzyme Q-10.
- benfotiamine B-1.
- intermittent DCA.

A protocol that regressed a nerve sheath sarcoma:
- Iscador P.
- CanArrest.
- green tea EGCG + vitamin E.
- grapeseed extract.
- milk thistle extract.
- reishi mushroom extract.

A high-grade histiocytoma in the lungs has been reported to have been controlled and gradually reduced to scar tissue by:
- omega 3 oil – 7 gm EPA and 8 gm DHA – 13/15 gm as fish oil supplements.
- olive and cold-pressed canola oil – 2 gm.
- diet emphasizing reduced intake of omega 6 fats from grains, meats and vegetable oils.

A leiomyosarcoma regressed with:
- green tea EGCG plus γ vitamin E.
- curcumin.
- co-enzyme Q-10.
- R-alpha lipoic acid.
- Iscador P.
- omega 3 oil.
- milk thistle extract.
Chapter Twenty-One – NATUROPATHIC MEDICINE FOR CANCER MORBIDITY & MORTALITY

Naturopathic Medical Care for Complications of Cancer

ANEMIA - is common in many chronic diseases. We use iron citrate, folate, B-12, and Shiquan to keep hemoglobin in the 11 - 12 range. Alkylglycerols are helpful to the marrow. Look at some of the Asian mushrooms. Transfuusions are needed if hemoglobin falls below 90, and allopaths may use Erythropoetin, a marrow stimulating hormone from the kidney (Procrit or Epigen) injected once weekly. See the heading under radiation and chemo toxicities for more details.

ASCITES - may develop from portal hypertension - pressure in the vein from the bowels to the liver - caused by liver metastases as in colon or breast cancer. Ascites may also develop from cancer in the peritoneal membranes of the pelvis - as in ovarian, breast or GI adenocarcinomas, and occasionally from malignant lymphomas in the abdomen. The mechanisms include mechanical lymphatic obstruction and release of cytokines affecting vessel permeability. When the circulating blood volume is reduced by third-spacing of colloidal protein-rich fluid, there is activation of the renin-angiotensin-aldosterone system, followed by sodium retention. *Helleboris niger* D3 or D4 can be nebulized or run IV for edema and effusions. The patient may report swelling of the abdomen and/or dyspnea. Look for shifting abdominal dullness, and a palpable fluid wave. Therapeutic paracentesis - drainage of the fluid by needle, with suction - can provoke severe protein loss. This can worsen ascites, and damage the kidneys. We prescribe 5 servings of protein daily and monitor serum albumin. *Dream Protein* whey supplements are often needed. Consider homeopathic *Apocyanum* or *Apis mellifica*. Inhale through a nebulizer 1.0 mL of 100 - 200 mg/mL injectable grade glutathione diluted in 4 mL of sterile normal saline. Alternatively, give IV 1.0 mL of 100 to 200 mg per mL glutathione in 4+ mL saline.. Selenium, *Rumex* (yellow dock), *Centella* (Gotu kola), *Gallium* (Cleaver’s) and *Boswellia*.

BLEEDING - Tumours erode into blood vessels, angiogenesis can form weak and leaky vessels, necrotic areas can erode and bleed, and clotting can be severely disturbed by a variety of mechanisms. *Yunnan Paiyao* is an excellent treatment for a hemorrhagic tendency. Consider also spotted cranesbill herb *Geranium maculatum* and Sheperd’s purse *Capsella bursa-pastoris*. Homeopaths such as *Phosphorus* can be added to tinctures as adjuncts. To stabilize coagulation when the patient is on prescribed blood thinners, take vitamin K1 - 100 mcg., always at the same time of day, and well away from the blood thinning drugs. Vitamin K1 does not build up in the system like K2 does. The diet must be tightly controlled to restrict food sources of K1, such as green leafy vegetables. Acupuncture SP-1 and LV-1 and apply a silver ma-grain.

BLOOD CLOTS – Cancer increases fibrinogen, Von Willebrand factor vWF, and antithrombin activity, increasing risk of clots in the veins about 7-fold overall. Lymphomas and leukemias increase risk up to 28-fold. The highest risk appears to be about 3 months after diagnosis, at about 58 times normal. Presence of metastases increase risk about 20-fold. Risk is also much higher if the body mass index BMI is high, as in obese patients. Prostate cancer is notorious for promoting blood clots, as are hormonal therapies such as Tamoxifen. Watch for petechiae, ecchymosis (bruising) and deep vein thrombosis. The MET oncogene creates a hyper-coagulable state via altered blood clotting inhibitors, increased fibrin. Fibrin in turn stimulates inflammation, releasing growth factors and angiogenesis. Excess fibrin may be followed later by a failure of clotting factors and thus a hemorrhagic state. Cancers often make pro-coagulants such as cytokines, ie IL-6, activators of clotting factors IX & X, increase platelet reactivity and cause venous stasis by local anatomical change. Natural control of coagulation may include *Ginkgo biloba* leaf, sea cucumber extract, green tea, green leafy vegetables, horse chestnut *Aesculus hippocastanum*, red clover blossom *Trifolium repens* and compression stockings. . Bromelain and similar protein-digesting enzymes such as Wobenzym will reduce the inflammation while gradually and safely dissolving a clot. Nattokinase, lumbrokinase and *Bolouke* are quite potent anticoagulants. Homeopaths may advise Sanum *Mucokhehl*. TCM herbs of interest include salvia, sparganium, frankincense, carthamus, myrrh, curcuma, ligusticum, persica, red peony and panax pseudo-ginseng.

BONE METASTASES - Bone mets are treated according to where they came from, ie from the breast, prostate, kidney, bronchus or thyroid gland. They retain that biology, and are not a completely new “bone cancer”. Many cancers go into the bones - for example breast and prostate cancer .
Bone scans are the best method to screen for bony mets. Monitor bone turnover with:

- urinary N-telopeptide – excess is over 100 nmol/nmol creatinine.
- bone-specific serum alkaline phosphatase – excess risk if over 146 IU/L.

NFκB helps establish osteolytic bone mets. Its nuclear localization increases bone expression of granulocyte-macrophage colony stimulating factor GMCSF, increased osteoclast activation, accelerating bone destruction. NFκB is inhibited by reishi mushroom extract, indole-3-carbinol, green tea EGCG, quercitin, and pomegranate.

Estrogen protects from bone loss by modifying immune T-cell production of cytokines TNFα and receptor activator of NFKβ ligand RANKL. These cytokines cause osteoclasts to apoptose, preventing bone resorption. Prostate cancer cells generate NFKβ and parathyroid related protein PTHrP, allowing them to resorb bone to create a niche for the metastasis. Interleukins IL-1, 3,7,11,15 and 17 increase RANKL and growth of bone mets, while interleukins IL-4,5,10, 12, 13, and 18, as well as interferons IFN-α, β, and γ inhibit RANKL and osteoclastogenesis. Other mediators of bone metastasis and growth include IGF-1, VEGF, TGF-β1 and bone morphogenic protein BMP. Cancer in the bones usually causes a lot of pain, usually described as gnawing, often worse at night. It may wake the person up from sleep. Pain may become sharp with weight-bearing, relieved by rest. Cancer in the bones can cause sudden pathological fractures and skeletal collapse. Harden the bone to prevent growth and spread of tumours, and to aid pain relief. If calcium is prescribed to support bone-building drugs, I choose MCHA calcium, properly called ‘microcrystalline hydroxyapatite ossein complex’. This is can actually increase bone mass and bone density, as it contains intact bone growth factors. Hardening bone helps to arrest tumour growth, spread, and bone pain. This biological calcium with vitamin D3 is compatible with bisphosphonate drugs like Pamidronate, and Fossamax and Didrocral. Always support it with vitamin D3 at 2,000 I.U. or more daily, and vitamin K2. In Canada we have 120 mcg doses of MK-7 form derived rom natto. Vitamin C up to 1 level tablespoonful daily also hardens bone. The mineral strontium at 680 mg daily at bedtime hardens bone as well as any drug, if not better. Boron is useful at 1 to 3 mg, but it is estrogenic. So are soy isoflavones at 100 to 150 mg daily. Other naturopathic bone health options include horsetail fern Equisetum arvense, comfrey leaf Symphytum officinalis, common boneyet Eupatorium perfoliatum, and homeopathic remedies such as Hekla lava, Phosphorus, Silicea, Calc fluor, Osseinum, and Carcinosum. Inhibiting matrix metalloproteinases will slow bone breakdown. Consider green tea EGCG polyphenols, resveratrol, curcumin, grapeseed extract and inole-3-carbinol/DIM.

For pain from bone cancer or metastases, my esteemed colleague Dr. Christoph Kind, ND suggests a low-sodium diet coupled with intravenous glucose, insulin and potassium chloride. This improves resting electro potentials on the cells via the sodium-potassium pump. Homeopathic Aurum helps bone pain. Some docs use an Ibuprofen and prednisone suppository. IV-curcumin at 20-40 mg/kg by dilute, slow infusion.

The most common medical therapy is a single high dose shot of external beam radiation. Radiation is often given as a large single palliative dose. Pain may flare up temporarily. About 70% of cases experience good pain relief in the next 5 to 20 weeks. Some will relapse. Cryoablation gives results within 1 to 2 weeks, with 54% obtaining total relief and 85% getting partial relief.

CACHEXIA - is a metabolic rate increase mediated by cytokines and marked by increased glucose production, increased fat burning and protein breakdown. 80% of cancer cases are malnourished, and 40% die of malnutrition. Weight loss is a cardinal sign of cancer, and must be monitored and managed aggressively. Loss of over 20% lean body mass is critically dangerous; increase carbohydrates & protein intake. The omega 3 oil eicosapentanoic EPA works like magic! Best from marine sources, such as fish or krill or seal oil. Consider also Vit. D3, melatonin, L-glutamine, and the bitter melon Momordica charantia. Colleagues use branch-chain amino acids, L-carnitine, coconut oil for medium-chain triglycerides, magnesium, colostrum, marrow-bone broth, homeopathic Tabacum D20, and fermented cod liver oil. The drug hydrazine sulphate can be helpful to block gluconeogenesis, available by prescription, as requires many stringent dietary restrictions and has many drug interactions. Maintain adequate protein, calories, and exercise. Cachexia is not caused by poor appetite, but stimulating appetite with reishi extract and royal jelly with ginseng helps the patient get back to eating heartily. Cannabis, reishi, bitters and vitamin B1 thiamine can also be helpful for appetite.
DERMATOMYOSITIS – Severe auto-immune reactions against skin and muscle can occur from many malignancies. Occurrence may be linked in many cases to exposure to viruses, such as Epstein-Barr EBV. We may prescribe the potent antibiotic Minocycline at 100 mg twice daily. Sterols and sterolins may assist. Dr. Berkson, MD suggests R-alpha lipoic acid and low-dose Naltrexone.

FISTULA – A fistula is vexing both to the patient and the careproviders. Surgery can help some cases. Give L-glutamine 3-10 grams tid and homeopathic Calendula 30C bid.

HYPERCALCEMIA - can result from bone mets, vitamin D metabolites made by tumours, excess intake of vitamin D, increased prostaglandin PGE-2, dehydration, and very rarely from tumour production of parathyroid hormone releasing protein PTH-RP. Symptoms may be weakness, fatigue, irritability, depression, nausea, vomiting, abdominal pain and reversible coma. Stop any supplemental vitamin D. Hydrate. Medical attention may be necessary. Prevent by always giving vitamin K2 – MK-4 or MK7 along with vitamin D3.

LYMPHEDEMA - is a swelling caused by obstruction or loss of the lymphatic drainage. Lymph channels anywhere can be blocked by tumours, as well as by cutting or post-surgical and post-radiation scarring. Lymph is a fluid that leaks out of cells, percolates through tiny spaces, eventually being collected in small ducts, flowing through lymph nodes filled with immune cells monitoring the cellular debris floating by. Eventually it all flows into the thoracic duct in the chest to rejoin the bloodstream. Lymphedema is an accumulation of fluid and protein. This protein acts as a colloid or gel matrix, holding fluid by osmosis. Lymphedema is most common in an arm after mastectomy, surgery to remove a cancerous breast, and particularly if the lymph nodes of the armpit have been disturbed. Radiation seals the deal. There may be arm swelling, pain, immobility, and tenderness. Even small injuries can precipitate inflammation in the lymph vessels (lymphangitis) and deep tissue infection (cellulitis).

The best therapy I know is the beautiful marigold flower Calendula officinalis. Ferlow Brothers Botanicals makes a fine organic Calendula cream to rub into congested and painful areas. Calendula can be taken as a tincture, and the flower makes a very pleasant tea as well.

A Juzo compression sleeve can help, as can pneumatic pumps or manual drainage massage. Registered massage therapists with advanced training in lymphology should be treating all cases.

Naturopathic physicians may utilize German complex homeopathics such as Lymphmyosot from Heel and botanical/homeopathics such as Lymphdiaral from Pascoe Pharmacie. Fresh Ceanothus spp. “red root” removes waste from the lymphatic system. American trained naturopathic physicians use high dose protease (protein dissolving) and lipase (fat dissolving) enzymes.

PAIN - The best defense against pain is to control the growth of the tumour/s or remove the cancer!
Assess pain on a scale from 1 to 10, or with kids use a visual scale such as happy vs. sad faces. Ask if the pain level is “acceptable”.

There are potent natural anti-inflammatories that are as effective as synthetic drugs, and safer. Anti-inflammatory herbs can reduce the need for dose-escalation of opioids such as morphine, preventing the constipation and stupor those heavy drugs bring. Reducing inflammation has the beneficial side-effect of slowing tumour growth. However, analgesics of great strength are not so readily found in the natural pharmacy. We can use willow bark, devil’s claw root, cayenne, and many other herbs. Frankly, they are better used in musculoskeletal pain situations. Much has been written about the need for humane and aggressive use of drug cocktails with potentially addictive drugs such as heroin in end-stage disease. Certainly we need to do all we can to ease suffering, and fear of drug addiction is not a sensible reason to refuse opiates for a person in their last days. We have a very reliable herbal therapy for the constipation caused by opiates such as morphine. If the bowels back up pain can increase dramatically, increasing need for the drugs, and conversely the drug needs are lowered when the bowels are functioning well.

Boswellic acid from frankincense gum Boswellia serrata or B. carteri is a powerful anti-inflammatory plant extract. It has also been shown to induce differentiation, induce apoptosis, and inhibit tumour cells. CanArrest from Vitazan is a potent professional product using boswellic acid and other plants extracts for pain and
inflammation. Cox-2 cyclooxygenase inhibitors: cold-water fish omega 3 fatty acids, feverfew Tanacetum parthenium, Scutellaria baicalensis, rosemary, propolis, curcumin, and grapeseed extract oligomeric proanthocyanidins -help in reducing doses of narcotics, relieving side-effects of constipation, drowsiness, stupor, and confusion. Other potent herbs for pain: Jamaican dogwood Piscidia piscipula, Chinese poppy Cordyalis spp.

Cannabinoids from marijuana as found in prescription medicines such as Marinol and Sativex reduce neuropathic pain, significantly reduce muscle spasticity, and increase sleep. I have also seen patients have a much better appetite, and it is absolutely outstanding for nausea. Vaporizing the herb is a lot healthier than smoking. Oral ingestion does produce a different response, slower onset, more deep relaxation. Cannabis may cause dizziness and impaired memory, which we off-set with L-citruline and a CBD to THC ratio of 4 to 1. I

LDN can be remarkable for neuropathic pain and complex regional pain syndrome, applying 1 to 3% naltrexone hydrochloride in a transdermal base, two to three times daily. You may also include one or more of adjuncts such as 10% magnesium chloride, 2-5% ketamine, 2% lidocaine, 2% cyclobenzaprine, 20% ketoprofen, 2% ibuprofen, 0.2% clonidine, 2% amitriptyline, 2% guaifenesin 2%, or 2% cetyl myristoleate.

The mind is sometimes mightier than matter. Mind-body interventions that relieve pain include meditation, prayer, guided imagery, relaxation exercise, hypnosis, cognitive restructuring, biofeedback, and emotional freedom technique. Art therapy, relaxation techniques, counseling, prayer, psychotherapy, positive affirmations, visualization, guided imagery, and meditation are associated with reduced pain, improved sleep, and improved quality of life. Every effort should be made to encourage the patient to approach every life-threatening illness as a challenge which brings gifts and meaning. I often recommend reading Love, Medicine & Miracles by Bernie Siegel, MD

Homeopathics for pain include Euphorbium or Phosphoricum acidicum 6 to 30 CH, every 2 hours. Secondary remedies: Apis mellifica, Arnica montana, Arsenicum album, Carbo vegetalis, Carcinosum, Colocynthis, Conium maculatum, Hydrastis canadensis. IV Traumeel reduces IL-6, pain, and inflammation ie lowering CRP.

Acupuncture is very helpful for moderate cancer pain. Acupuncture is best when prescribed within the context of authentic TCM. Commonly used pain-relieving points are LI-4, BL-60, ST-36, SP-4, GB-20, GB-43, PC-6 and LV-3. Think of KI-7 for bone pain. TENS, massage, injections and heat can be more effective if applied to nerves at acupuncture points.

Detoxification relieves pain - detox with raw food, fresh juices and liver tonifying herbs such as burdock, dandelion root, milk thistle, Xiao Chai Hu Tang, or Herbotox. Detoxification must be gently scaled to the vitality of the patient. Coffee enemas are actually helpful for pain in a toxic cancer patient. About 4 to 6 ounces of cooled fresh-brewed coffee are placed in the rectal canal and retained as long as is comfortable. Caffeine and other constituents move up the hemorrhoidal veins to the portal vein and on into the liver, increasing the bile outflow. Overuse can cause deficiencies of vitamins A and E, loss of the electrolyte mineral sodium, and dehydration.

Give IV magnesium sulfate at 2 to 8 grams in 500 – 1,000 mL, over 1 to 4 hours. Some NDs use IV-DMSO.

Colleagues use DLPA (dl-phenylalanine) from Pure Encapsulations, at 10-20 per day.

Tumours will crush organs, compress nerves, block up vessels and tubes and pressurize cavities. This is the time to move in the big guns and use high dose radiation, for example about 400 rads per dose, for 3 doses, or Prednisone (cortisone) steroids to shrink or “debulk” aggressive cancer.

PLEURAL EFFUSION – Accumulation of fluid in the lung bases and the space around the lung can make breathing difficult. If it is tapped off, there is a lot of albumin protein lost in the fluid, which should be rapidly replaced with whey supplements. I have found the homeopathic remedies Apocyanum canadensis and Apis mellifica to be very useful for lung effusions. Inhale 1-2 times daily 100 -200 mg per mL injectable grade glutathione through a nebulizer, diluted in sterile saline. Alternatively, give IV push of 1.0 mL of 100 to 200 mg
per mL glutathione in 4+ mL normal saline. Give major auto-hemotherapy with blood treated with ozone and UV. *Helleboris niger* D3 or D4 can be nebulized or run IV for edema and effusions.

**SEROMAS** - Accumulation of blood in a surgical cavity can be treated with clot dissolvers such as bromelain, serrapeptase, Wobenzym, lumbrokinase and nattokinase. Alternate homeopathic *Phytolacca* and *Symphytum.*

**THROMBOCYTOPENIA** – low platelets can result from myelosuppression in bone marrow by radiotherapy or chemotherapy, from marrow replacement with tumour, or from intravascular coagulation. Lack of platelets to make a clot can lead to serious hemorrhages, often intracranial. Your doctor may prescribe a transfusion of platelets if the count falls below 20. *Yunnan Pai Yao* or *Panax pseudo-ginseng* 1 - 2 capsules three to four times daily is a reliable and fast therapy which I have seen out-perform synthetic drugs. The pineal gland hormone melatonin helps regulate the production of platelets, with efficacy comparable to Neupogen, and it’s a lot safer. Consider also homeopathic *Phosphorus,* shark liver oil alkylglycerols, and maitake D-fraction mushroom extracts. High-dose vitamin C can help recovery. Fresh raw pineapple may increase the platelet count. Avoid aspirin ASA and Advil (ibuprofen), and other blood thinners. Keep vitamin E doses under 600 IU daily. Report to your physician signs of bleeding: bruising, red spots on skin, bloody urine or black, tarry stools.

**WHITE BLOOD CELLS** – See LEUKOPENIA

**CANCER EMERGENCIES**

The management of advanced cancers requires vigilance for morbidity which can rapidly turn to mortality. Cancer patients die prematurely of hemorrhage, obstructions, infection, malnutrition and organ failures. Pathological fractures, ascites, bleeding and seizures can be the first sign of advanced disease. Skilled naturopathic physicians can treat some of these issues, and be alert to refer others for definitive medical care.

**BOWEL OBSTRUCTION** - may occur below the ileum with colorectal tumours, lymphomas, or peritoneal metastases from ovarian adenocarcinoma. Obstruction above the ileum may occur with esophageal, gastric, pancreatic, hepatocellular and biliary tumours. Watch for early satiety, cramping abdominal pains, constipation and nausea. Vomiting may follow, becoming feculent. Signs include a distended tympanic abdomen, high-pitched and frequent bowel sounds. Later bowel sounds may be absent. Dehydration can occur from vomiting and from sequestration of fluid in the distended bowel loop – “third spacing”. Conservative management to avoid emergency surgery may include Dexamethasone 4 mg three times daily, Metoclopramide 10-20 mg every 6 hours, and naso-gastric suction. Give 10 Tbsp sesame oil. *Cannabis* (Kush) oil may relax the bowel. For prevention use a hula hoop regularly, while taking tea catechins.

**COMPRESSION INJURY** - Tumours will crush organs, compress nerves, block up vessels and tubes and pressurize cavities. There is a time for high dose radiation about 400 rads per dose for 3 doses or for Prednisone (cortisone) steroids to shrink or “debulk” aggressive cancer.

**DEPRESSION** – Mood disorders, anxiety and cognitive dysfunction are linked to elevated IL-6. I prescribe marine omega 3 oils, CanArrest and green tea EGCG to regulate IL-6, and acetyl-L-carnitine to fuel mentation.

**DISSEMINATED INTRAVASCULAR COAGULATION - DIC** - is a decline in fibrinogen and clotting factors leading to a hemorrhagic diathesis (bleeding). Neoplastic cells can release thromboplastin-like material, especially acute promyelocytic leukemia and prostate adenocarcinoma.

**DYSPNEA** – Homeopathics *Arsenicum album,* also called *Metal album,* and *Apocyanum canadensis,* tincture of Old Man’s Beard *Usnea barbata* (long term use is toxic), *Rhododendron marie* leaf as in Hsiao Keh Chuan.

**HEMORRHAGE** - Tumours erode into blood vessels, angiogenesis can form weak and leaky vessels, necrotic areas can erode and bleed, and clotting can be severely disturbed by a variety of mechanisms. Yunnan Paiyao is an excellent treatment for a hemorrhagic tendency. I use the capsule form. Consider also spotted cranesbill herb *Geranium maculatum* and Sheperd’s purse *Capsella bursa-pastoris,* which I use in tincture form. Homeopathics such as *Phosphorus* can be added as adjuncts. To stabilize coagulation when the patient is on prescribed blood
thinnings, take vitamin K1 - 100 mcg, always at the same time of day, and well away from the blood thinning drugs. Vitamin K1 does not build up in the system like K2 does. The diet must be tightly controlled to restrict food sources of K1, such as green leafy vegetables. Acupuncture SP-1 and LV-1 and apply a silver ma-grain.

**INTRACRANIAL PRESSURE** - may rise from brain and meningeal tumours to provoke symptoms such as headaches. Nausea and visual changes are also common, followed by personality changes, lethargy, and coma. Signs your doctor can see include include papilledema at the back of the eyeball, focal neurological deficits, seizures and possibly neck rigidity and pain. A dilated and fixed pupil indicates brainstem tentorial herniation, which will often progress to death by crushing the breathing centers in the brain. We use Boswellia aggressively, and it is complementary to Dexamethasone steroid.

**LEUKOSTASIS** - is a syndrome where extreme levels of circulating leukemic blast cells, i.e. over 100,000/mm3, cause multiple infarcts and hemorrhages in the lungs and brain. Supress beta-catenin!

**PARANEOPLASTIC SYNDROMES** - 3 out of 4 cancer patients will experience a remote effect of the tumour. 1 in 5 has symptoms from tumour antigens and uncontrolled autocrine hormone generation.

- **Carcinoid syndrome** occurs in gastro-intestinal GI tumours, particularly with small intestinal cancer. May cause endocardial fibrosis or bronchospastic pulmonary disease, diarrhea, abdominal cramps, malabsorption, flushing due to serotonin excess. Monitor the urinary serotonin metabolite 5-HIAA. The most common type secretes serotonin, which provokes diarrhea. Some pancreas tumours release vasoactive intestinal peptide VIP, provoking watery diarrhea. Gastrinoma carcinoids provoke stomach ulcers, insulinoma carcinoids provoke excess insulin production, and glucagonoma carcinoids provoke diabetes mellitus.
- **Multiple endocrine adenomatosis syndrome (MEA)** can provoke galactorrhea (milk secretion) and gynecomastia (breast swelling). Tumours may produce parathyroid hormone PTH, adrenocorticotrophic hormone ACTH, thyroid stimulating hormone TSH, or melanocyte stimulating hormone MSH.
- **Cutaneous** (skin) manifestations could include purpura, flushing, erythema, phlebitis, urticaria, bullae, hyperpigmentation, pruritis, erythema nodosum, and shingles.
- **Neural** (nerve) manifestations can be neuropathy, neuromyopathy, myopathy, myasthenia, progressive leukoencephalopathy, and seizures.
- **Blood cell production** may shift from aplasia to erythrocythemia from ectopic erythropoietin, a hormone normally put out by the kidney to trigger the bone marrow to make red blood cells. Hemolysis may exacerbate anemia. Hyperviscosity or thickening of the blood, from globulin proteins or their clumping by cryoprecipitation, may complicate syndromes of coagulation and fibrinolysis.
- **Kidney function** can be compromised by ectopic antidiuretic hormone (ADH) produced by small cell lung cancer. Circulating immune complexes can inflame the kidneys, causing nephrotic syndrome.
- **Rheumatic arthritis** is associated with lymphomas and ovarian cancer.
- **Amyloid** starchy deposits can occur in any organ.
- **Endocarditis** is associated with adenocarcinomas.
- **Arterial embolism** triggers infarctions which can be fatal.
- **Fever** can exacerbate fatigue and malaise. Fever control will improve patient activity and vitality. However, a slight fever can also signal good immune activity.
- **Hypercalcemia** can occur in squamous cell lung cancer, and very rarely also from tumour production of parathyroid hormone releasing protein (PTH-RP).

**PERICARDIAL TAMPOONADE** - is a fluid build-up in the pericardial sac to the point of limiting the filling of the heart in diastole with right-sided heart failure and diminished cardiac output. The patient will be anxious with oppressive chest discomfort, dyspnea, orthopnea, weakness, cough and dysphagia. There may be distended jugular veins with inspiratory swelling, faint heart sounds, tachycardia, weak arterial pulses, hypotension and pulsus paradox. There may be hepatomegaly and peripheral edema. A chest x-ray may show cardiomegaly with a “sac-like” appearance, as well as pleural effusion. Treatment is the same as for ascites: nebulized glutathione, whey protein, Wu Ling San, *Apocynum* and *Apis* homeopathics, Iscador or Helixor mistletoe.
**SPINAL CORD COMPRESSION** - can develop insidiously with muscle weakness, sensory disturbances, changes in bowel and bladder function, paresis. Paraplegia or quadriplegia can follow in as little as 12 to 24 hours.

**SUPERIOR VENA CAVA SYNDROME** - is a compression of the vein returning blood from the head and thorax to the heart. Tumours in the mediastinum, next to the heart, are the culprit. These may include primary lymphomas or metastases to the mediastinal lymph nodes from lung or breast cancer. The earliest warning sign is facial edema, which can spread to the neck and upper extremities. Later cyanosis can appear, and there may be venous distension visible on the chest. Emergency spot radiation therapy is used to shrink the tumour.

**TUMOUR LYSIS SYNDROME** - is a toxic overload of the kidneys due to aggressive treatment resulting in rapid necrosis. Most commonly seen in acute leukemias and lymphomas. The metabolic load of rising potassium, phosphate, and uric acid, and falling calcium, results in acidosis and azotemia. A shift of any of these blood factors of over 25% relative to pre-treatment values is diagnostic. Watch for cardiac arrhythmias, arthritis, weakness, lethargy, tachyypnea, or coma with deep sighing Kussmaul respirations. Test serum creatinine. Monitor serum lactate dehydrogenase enzyme LDH as a marker of necrosis. Medical care involves rehydration, uric acid lowering drugs such as Allopurinol, management of renal failure, and other complex medical intervention. Support the kidneys with Co-enzyme Q-10, R-alpha lipoic acid, and goat whey minerals. Give sodium bicarbonate sufficient to raise the urine pH to over 5.0. Botanicals to consider are Pipsissewa, also known as Prince’s pine -Chimaphilla umbellata, Cleavers herb - Gallium aparine, stinging nettle - Urtica urens and parsley - Petroselinum sativum.

**END-OF-LIFE ISSUES**

“The question is not, Will I die? but Will I die healed? The real question relates to the Quality of Life, not to the reality of death” Dr. Jean-Charles Crombez

Patients tend to want both honesty and hope when facing terminal cancer, the stage where death seems inevitable. Well, it always was inevitable, but now an expert is making a prognosis. Gnosis is just “knowing”, as in knowledge, but the ‘pro’ means the knowledge is before it happens. Doctors who play at fortune-telling use statistical probability to estimate the likely course of events. Really, it only tells you the average experience, not what to expect for any actual person. Unlikely events do happen, even if only rarely. The only certainty is that physical life ends in death. When it will come seems at times to be as much at the whim of the mind and the spirit as of the physical frame.

The reality is that the following, among many other diagnostic factors, give a very poor prognosis:

- **lymphopenia** – low white blood cell counts indicate a lack of a robust immune response to the tumour.
- **elevated LDH** – indicates tumour necrosis, associated with inflammation and toxicity.
- **low albumin protein** - a marker of oxidative stress in the liver and low protein intake.
- **liver metastases** - risk ratio 2.5.
- **lung metastases** – risk ratio 2.4.
- **cachexia** – tissue wasting, particularly if over 20% loss of body mass, or weight loss over 10 kg in the last 6 months.

Prognostic indicators of the end of life are persistent problems with:

- **low Karnofsky performance status** - ambulatory ability, self-care activities, etc. The Victoria Hospice uses the Palliative Performance Scale version 2 - PPSv2 which grades in 10% increments. See below.
- **fatigue in the final weeks of life** can be eased with Dexamethasone 4 mg bid.
- **anorexia** - oral intake, dysphagia to solids or liquids.
- **dyspnea at rest.**
- **low total white blood cell count, particularly lymphocytes.**
- **altered cognition** - confusion, delirium, stupor, somnolence.
- **edema.**
- **diarrhea.**
- **nausea and vomiting.**
• pain which becomes intractable. The relief of pain and reduction of narcotics can help move a terminal patient into the death phase.

Anorexia induces ketosis, the build up of acidic ketones in the blood. This can create mild euphoria, analgesia and over-sense of well-being. Any food intake can interrupt this defensive mechanism. It is actually not a torment to starve to death.

Determining the terminal stage of cancer and the active process of dying is an art and a science demanding all the skills and experience of a physician. In communicating such news we try to engage, listen and empathize with the patient or their guardian. It is best to be sure what the patient is needing or asking before attempting to answer it.

Making a prognosis of when someone will die is simply a guess, even for a physician. No-one can see the future, so we tend to speak about average life expectancies, based on similar cases. The patient should clearly understand the gravity of the situation. However, they should also have a little hope because some must always do better than the average. There may be various forms of healing still possible, including the experience that there has been time enough to see life through in a meaningful way. As Dr. Ronna Jevne says, “Hope is not about everything turning out OK. It is about being OK with how things turn out.”

**Palliative Performance Scale version two** - PPSv2 – as used by the Victoria Hospice

<table>
<thead>
<tr>
<th>PPS level</th>
<th>Ambulation</th>
<th>Activity &amp; evidence of disease</th>
<th>Self-care</th>
<th>Intake</th>
<th>Conscious level</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>Full</td>
<td>Normal activity &amp; work</td>
<td>Full</td>
<td>Normal</td>
<td>Full</td>
</tr>
<tr>
<td>90%</td>
<td>Full</td>
<td>Normal activity &amp; work</td>
<td>Full</td>
<td>Normal</td>
<td>Full</td>
</tr>
<tr>
<td>80%</td>
<td>Full</td>
<td>Normal activity <em>with effort</em></td>
<td>Full</td>
<td>Normal or reduced</td>
<td>Full</td>
</tr>
<tr>
<td>70%</td>
<td>Reduced</td>
<td>Unable to do normal work/job</td>
<td>Full</td>
<td>Normal or reduced</td>
<td>Full</td>
</tr>
<tr>
<td>60%</td>
<td>Reduced</td>
<td>Unable to do hobbies/house</td>
<td>Occasional assistance needed</td>
<td>Normal or reduced</td>
<td>Full or confusion</td>
</tr>
<tr>
<td>50%</td>
<td>Mainly sits or lays down</td>
<td>Unable to do any work</td>
<td>Considerable assistance needed</td>
<td>Normal or reduced</td>
<td>Full or drowsy +/- confusion</td>
</tr>
<tr>
<td>40%</td>
<td>Mainly in bed</td>
<td>Unable to do most activity</td>
<td>Mainly with assistance</td>
<td>Normal or reduced</td>
<td>Full or drowsy +/- confusion</td>
</tr>
<tr>
<td>30%</td>
<td>Totally bed bound</td>
<td>Unable to do any activity</td>
<td>Total care</td>
<td>Normal or reduced</td>
<td>Full or drowsy +/- confusion</td>
</tr>
<tr>
<td>20%</td>
<td>Totally bed bound</td>
<td>Unable to do any activity</td>
<td>Total care</td>
<td>Minimal to sips</td>
<td>Drowsy or coma +/- confusion</td>
</tr>
<tr>
<td>10%</td>
<td>Totally bed bound</td>
<td>Unable to do any activity</td>
<td>Total care</td>
<td>Mouth care only</td>
<td>+/- confusion</td>
</tr>
<tr>
<td>0%</td>
<td>Death</td>
<td>Extensive disease</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Physiological changes the family should be aware could occur in the last hours of life include:

- fatigue, with increasing time spent sleeping or somnolent.
- weakness, including inability to move, swallow, speak.
- erythema or redness where bones are prominent.
- profound loss of appetite, with severe weight loss and wasting.
- disinterest in fluid intake with dehydration and peripheral edema.
- racing heart from kidney and heart dysfunction.
- delirium with agitation, restlessness, repetitive purposeless movements, moaning and groaning.
- abnormal breathing, gurgling, aspiration, asphyxia, agonal breaths.
- cyanosis or blueing of the extremities and lips due to poor oxygenation.
- pain may only be evident by grimacing or tension at the nasion and forehead.
- a period of “golden glow” may occur, with temporarily increased lucidity and strength.
- at the time of death loss of sphincter control and blood and other fluids from orifices can occur.

The ethical decision to abandon curative therapy strategies for gentler palliative comfort-oriented care is a difficult one. The guiding principles are autonomy, non-maleficence, beneficence and justice. Prudent decisions based on informed consent, fidelity to trust, compassion, integrity and temperance result in ‘right and good’ healing actions. Physicians would be wise to study with hospice workers and call on them for support when the case is not realistically curable. Patients will often communicate their needs and problems more effectively to a non-physician. Whether it be legal advice on living wills and advanced directives, spiritual comfort, or pain control, palliation should be multidisciplinary and patient-directed. The three top medical issues to address are dyspnea, pain and depression.

The World health Organization WHO defines quality of life as “the state in which an individual, coming from a particular culture and value system, experiences conditions of existence in accordance with his aims, expectations and standards. At the same time, feelings of self-worth, self-realization and obligation to society are emphasized.”

Everyone wants to forestall death. We would prefer to die as young as possible, but as late as possible. I do place living at #1 on the list of priorities. However, those who experience at least the first stages of dying, such as cardiac arrest, who are later revived, all seem to have a pleasant experience. All lose their fear of death. Death is not a failure for the patient, and it is not a failure for the health care team. It is condition we will all have. I have been honored and amazed to share births and deaths with my loved ones and with patients. These are experiences worth having, for they define being. I think the point is to fear being too little, and use that to motivate ourselves to engage in life with gusto. Instead, we all seem to fear getting too little- including having too little life. How much is enough of anything – food, sex, power, money, years of existence? If we have been consciously present in our own lives, and have participated actively in living, we should find it easy to be grateful for all we have had. No matter who we out-live or who out-lives us, we can all say a person had a full life when they were present and understood life to be a miraculous and wondrous opportunity.

Homeopathic remedies are very helpful in the emotional and mental transitions of palliative care, e.g. Arsenicum album 30C for late stage depression and anxiety. This remedy gives ease to the final moments of life. Homeopathic leaders for the pain of terminal cancer are Euphorbium, Arnica montana, and Carbo vegetalis. Bach flower remedies are also great assists to the spirit and mind of the dying, and to those who are grieving.

Take note that normally dying patients have no appetite and may stop oral intake, even of fluids. Artificial feeding and hydration will not affect the outcome or its timing, but can increase breathlessness, edema, ascites and nausea or vomiting. It used to be thought cruel to allow a patient to dehydrate, but it turns out this releases a lot of endorphins, and people can die without pain. Oral care regards dry mouth is still indicated for comfort.

“Palliative sedation” does not hasten death, but relieves refractory vomiting, pain, agitation and delirium. Neuroleptics, benzodiazepines and opiates are combined to bring ease to the final stage before the end of all suffering.
I have always maintained that BAD THINGS HAPPEN TO GOOD PEOPLE – AND SO HAVING CANCER IS NOT ALL YOUR FAULT. Sure it matters if you chose to use tobacco products, get too much sun exposure, eat junk food, and neglect physical activity. However, this only explains about half of cancers. I have seen a lot of folks who “do everything right” their whole lives and end up diagnosed with advanced cancers. No one should ever feel ashamed or blamed for developing cancer. There are toxins in our environment, food and water that the government has approved as safe for us, knowing they will injure some folks. There is a lot of radiation loose on the planet. There are genetic factors you did not choose to be born with.

We are responsible for trying to do our best with the life we are given. There are winning strategies to reduce the risk and worry of cancer. They don’t work every time for every person, but at the very least, those who make the effort to have a healthy lifestyle will enter into the disease with a better reserve of health, and will stand up better to the rigors of treatment, and have a better chance of survival and recovery.

The primary cause of suffering in our culture is what Dr. Anita Tannis of the Center for Integrated Health in Vancouver calls “AFFLUENZA”. This is illness provoked by the relentless pursuit of more of everything. We get so stressed by a sense of time-urgency, and a feeling we need so many things. It is critically important to simplify our lifestyle, to restore an appreciation for taking a rest, simple food, and a calm inner life. We used to joke in the cancer research labs that the leading cause of cancer was – ‘mouse abuse’. Well, if you are living at a ‘rat-race’ pace, and allow the chemical corporations to adulterate your food and environment, then you are being abused, and are taking a big risk.

While you cannot avoid every genetic risk, environmental insult, and the aging process, you may be able to delay or even avoid the lifestyle diseases which kill two of every three Canadian adults. Choices that can help you avoid cancer – adding protective factors, reducing risky behaviours, and seeking early detection – may also help you avoid cardiovascular disease, diabetes, hypertension and other chronic degenerative conditions. It is never too late to adopt life-affirming habits in mind and body.

Choosing to be pro-active about cancer prevention also means becoming aware of our place in the ecology of the bio-sphere and our impact on the environment. I hope that when we learn to live within the tolerances of our biology and our in-born ability to handle stress, toxins and pathogenic factors, that we will also end up walking a bit more lightly upon the Earth. The ancient Chinese Taoist belief, that living in harmony with Nature was the key to health and happiness, is still wise and true.

PROTECTIVE FACTORS

Protecting or restoring p53 gene functionality is the primary strategy in cancer prevention.

Protection comes in many agreeable packages; delicious foods provide us with proven cancer fighters. Increasing the amount of fruits and vegetables you eat to over five servings daily adds protective ingredients such as antioxidants and bioflavonoids, resveratrol, limonene, lycopene and polyphenols to your diet. A cancer-preventative diet includes two to three servings of fruit, four to six servings of vegetables and more than seven servings of other plant foods such as whole cereal grains, beans, peas, roots and tubers daily. All the colors of the rainbow should be represented in the variety of foods you eat, but especially good cancer-fighting foods include blueberries, grapes, cherries, apples, tomatoes, celery, yams, squash, cilantro, ginger, almonds, lemons, onions, garlic, beets, broccoli and kale.

Green vegetables and green drinks such as barley grass juice and wheat grass juice are sources of that “magical” capturer of all sun energy on this planet, chlorophyll. This green substance inhibits the leading trigger of skin cancers, lipid peroxidation. Green vegetables are also powerful detoxifiers of the blood. Plant fats such as sterols and sterolins, found in all fruits and vegetables, are being studied as immune modulators that may benefit cancer patients.
**Folic acid** (also known as **folate** if bound to a mineral) found in green leafy vegetables is a significant regulator of cell development. The long-running Nurse’s Health Study showed dietary folate works well as a preventative factor against colorectal cancer. Both methylated folate and vitamin B-12 (methyltetrahydrofolate and methylcobalamin) put methyl groups into DNA to silence overactive genes. A multivitamin with B-complex vitamins such as folate or a greens powder supplement should be included in a cancer-prevention diet, especially if you eat under five servings of vegetables daily. There is a controversy at present regarding a possible increase in colorectal cancer from polyps being stimulated by high supplemental folic acid intake.

The cabbage family of vegetables gives us **indole-3-carbinol**, which reduces the activity of potentially harmful hormones such as estrogen. Excess estrogen exposure is the primary cause of breast cancer, and sex hormones are also thought to contribute to prostate, colorectal and other common cancers. Broccoli, cauliflower, brussel sprouts, cabbage, kale and bok choy also provide **isothiocyanates** which do two amazing things. They detoxify and protect the body from carcinogens by powerfully inducing Phase 2 detoxification. Isothiocyanates also directly kill cancer cells by inducing apoptosis that has been blocked by bcl-2 protein. Other detoxifying glucosinolates in the *Brassicas* (cabbage and mustard family) include **sulforaphanes** and cyanohydroxybutene.

Seeds and plants contain **lignans**, which friendly bacteria in our gut turn into weak phytoestrogens. These bind to estrogen receptors on cells and block the signal to grow. Soy is rich in lignans. Flaxseed lignans are also anti-estrogenic enough to be thought to play a role in preventing and treating hormone dependent cancers. Flaxseed lignans also increase liver output of sex-hormone binding globular proteins SHBGs which further inactivate excess hormones. I take psyllium and flaxseed daily as part of my “daily detox” regime.

Psyllium husks are converted by bacteria in the colon to short-chain fatty acids such as butyrate which regulate the abnormal DNA in cancer cells. **Flaxseed**, hemp, nuts, seeds, seafood, fish and fish oils are excellent sources of omega 3 fats which reduce arachidonic acid and prostaglandin PGE-2, associated with inflammation. Inflammation gives rise to a host of growth stimulators which can accelerate cancer.

The delicious onion family, including leeks, chives, and **garlic** contain allyl sulphide, a fat-soluble chemoprotectant, detoxifier and anti-mutagen.

**Calcium** and vitamin D reduce the risk of colorectal cancer. The best form of calcium for prevention may be calcium-D-glucarate, which some researchers believe may be the most bio-available. It is found in citrus fruit, cruciferous vegetables (cabbage family again) and apples. It inhibits beta-glucuronidase, an enzyme involved in metastasis in hormone-dependent cancers.

**Vitamin D** levels in Canadians are decreasing as more people avoid risk of sunburn from the ultraviolet radiation in sun exposure. Vitamin D is a very good regulator of growth, helping to slow the growth and spread of cancers. The Canadian Cancer Society recently noted that science shows up to 60% reduced risk of some cancers with adequate vitamin D levels, and that higher intakes are not toxic, as previously believed. They suggest a supplement of 1,000 IU daily, but I prescribe 3,000 IU daily in the winter months, and my American colleagues are using massive doses in cancer cases. It is best to give D3 with vit. K2. Vitamin D in the form of cod liver oil has been used as an immune stimulant in the dark winters of the northern latitudes for two hundred years. Cod liver oil contains so much vitamin A it will block the vitamin D receptors, so it is no longer recommended for continuous use. Cod liver oil is fine for a few weeks intermittently, but always take vitamin D3 after.

Some research has suggested that the mineral selenium, taken in moderate doses, reduces risk of many cancers by acting as an antioxidant supporting DNA surveillance and repair enzymes. We do know that areas of the world with low selenium (and calcium) in soils are seeing higher rates of cancer, and that selenium can regulate the BRAC and other DNA repair genes. In one study, reported in the Journal of the American Medical Association in 1996, doses of only 200 micrograms a day appeared to reduce skin cancer risk by half. Studies also suggest selenium worked very well with vitamin E to prevent cancer of the prostate. This issue was supposed to have been confirmed by the vast SELECT study - Selenium and Vitamin E Cancer Prevention Trial, run by the National Cancer Institute and launched in 2001, involved over 400 institutions in the United States, Puerto Rico and Canada. It failed to show a benefit from selenium regarding prostate cancer prevention. Recent reports also
cast doubt on use of selenium to fight an existing cancer. It is known that methionine stimulates cancer cell growth, so selenomethionine is no longer recommended – I will prescribe yeast based selenium – the organic form.

Green tea is rich in polyphenols, which appear to be able to suppress the growth of many cancers. The polyphenols in green tea inhibit cancer first by checking formation of new blood vessels into tumours and second by stopping spread into other tissues. A protective or preventative amount of tea is about 5 or more cups daily (2 to 10), and it would take well over 40 cups daily to treat a tumour. In clinical applications, therefore, it is used as a polyphenol extract in capsule form in addition to being enjoyed as a beverage. I prescribe 2,100 mg of 95% EGCG routinely, at doses which represents far more tea than one could drink without fatal injury to the kidneys. High dose EGCG, like any anti-oxidant, can be pro-oxidant in high doses, leading to oxidative stress on the kidneys and perhaps the liver. Fortunately a small daily dose of gamma tocopherol vitamin E solves this problem entirely.

Curry is a variable mix of Asian spices, but always includes tumeric root. Tumeric contains curcumin, which strongly quenches inflammation. Curcumin modulates detoxification by speeding up Phase 2 detoxification while slowing Phase 1. This prevents the build-up of toxic intermediates, which could cause a “healing crisis”.

Omega 3 oils are generally low in the diet relative to omega 6 oils, an imbalance which leads to increased inflammation responses. Ancestral diets were much higher in omega 3’s from nuts, seeds, grass-fed meat, fish and seafood. The modern diet is now much higher in pro-inflammatory omega 6 fats from corn silage fed meats, corn products including corn oil, all grains and cereals. Restoring the 3:6 ratio reduces risk of all degenerative diseases.

Mono-unsaturated oleic acid in olive oil is protective, as is the whole Mediterranean diet. Several world cultures found a healthy set of plant foods to maintain health and vigor. Take your pick, and get back to sensible eating.

Supplements, while not proven to prolong life, can compensate for common deficiencies in the Canadian diet. Remember that illness and cancer therapies can create metabolic and absorption issues leading to gross nutritional deficiencies. Consider supplementing a varied, whole foods organic diet with:

- methylated B-complex
- grape seed extract antioxidants 400 to 500 mg.
- vitamin D3 1,000 to 5,000 IU.
- Vitamin K2 – 240-360 mcg of MK-7 or up to 45 mg MK-4.
- fish oil, seal, krill or plant-based omega 3 fats 1,000 to 3,000 mg.
- flaxseed and/or psyllium fibre 1 to 2 Tbsp – 15 to 30 ml.
- probiotic bacteria 1 to 3 capsules.

CARBS FOR CANCER

Modern diets, high in processed foods, deliver fibre-reduced foods that release a lot of sugars into the blood very fast.) These foods are considered to have a high- glycemic index if they charge up the blood sugar faster than 60 percent when compared to eating pure glucose. After a meal the glucose goes into the blood, and the pancreas responds by releasing insulin, a pump that moves sugars, fats and proteins into cells where they can be used.

The liver responds by releasing insulin-like growth factors IGF-1 and IGF-2 to make cells double. IGF-1 & 2 are major stimulators of growth for many cancers, and as cancers get older and build more IGF receptors they grow faster, metastasizing throughout the body. IGF-1 and insulin associated with estrogen metabolism, and so this is very important in hormone-dependent cancers as well as those of the gastro-intestinal tract. There is evidence that a high-glycemic meal can accelerate the growth of liver metastases from colorectal cancer by up to eight-fold for up to three hours.
It is hypothesized that overproduction of IGF-1 from a high sugar load diet can strip a cell of its IGFBP cap and set it off into exponential growth. High-glycemic meals can include ordinary foods such as bananas and watermelon, soft breads, potatoes, parsnips, corn, beets, or cooked carrots. It is the total sugar balance which is vital, and cancer patients definitely need to carefully regulate their blood sugar. The absolute worst sugar is *high fructose corn sugar* which is widely used in soft drinks and candy. It can trigger persistent insulin problems at very low rates of consumption.

There is no excuse for the sugary “energy foods” promoted to cancer patients for “energy” during chemo and throughout oncological treatment. This dietary mismanagement has accelerated the demise of many patients.

The ideal low- glycemic sweets for cancer patients are fruits such as blueberries, strawberries, grapes, and pears. Sugar substitutes such as stevia and sugar alcohols (xylitol, maltitol, mannitol, erithrytol, etc.) are recommended. Splenda is OK. Agave syrup, aspartame (Nutrasweet) and cyclamates are not recommended.

The most effective action one can take to live longer is to reduce caloric intake. A weight gain of over five kilograms in adulthood is enough to measurably increase risk of several of the leading causes of death such as heart disease, high blood pressure, diabetes, and cancer. Remember that storage or depot fat, created from an excess intake of sugars and fats, can generate high levels of estrogens in the body. This is due to aromatase enzymes converting testosterone into estrogen. Obesity is almost as hard on the system as tobacco.

**AVOIDING CARCINOSTIC TOXINS**

*Xenohormones* or *xenobiotics* are chemicals which may have a beneficial use in agriculture or industry, but when they enter the human body they act like hormones, hormone disruptors or growth factors. They are unintentional hormones, synthetic chemical mimics of vital biological molecules. Environmental Protection Agency EPA studies showed cancer-causing dioxin, styrene, and other xenohormones in 100% of fat samples taken from human bodies in the USA. An alarm point posterior to acupoint GB34 is very tender if you are toxic.

Xenohormones are found in non-organic fruits and vegetables, animal feeds, and due to agricultural runoff, get into our water supply. Red meat animals are particularly good at concentrating the pesticides and herbicides in their feed. Eating red meat may increase your risk of cancer due to its saturated fat content, toxins produced during grilling, and pro-inflammatory omega 6 fats in corn silage feedlot animals. This is why I insist on very clean grass fed meats, or else meat replacement with vegetarian protein.

Vegetarian diets give a survival advantage for cancer. An excellent vegetarian source of protein, soy may also be a leading protective factor. While the research is not yet conclusive, soy isoflavones have been shown in some studies to reduce risk of breast and other cancers by inhibiting formation of estrogen in fat, blocking the enzyme aromatase, inhibiting estrogen receptors, turning hormones into inactive forms, and through various antioxidant mechanisms. Blood levels of estrogen may be reduced by moderate intakes of soy foods such as soy milk, miso and tofu.

*Endocrine disruptors* such as *dioxins* attach to our estrogen receptors. Dioxins are formed during the manufacture of polyvinyl chloride PVC plastics. Dioxins are also formed during incineration of waste and burning fuels such as wood, coal and oil. Over 95 percent of exposure comes from eating commercial animal fats – milk and dairy foods, eggs, and beef. Dioxins are high in farmed salmon and are found in many other fish. Green tea EGCG suppresses transformation of the aryl hydrocarbon receptor, protecting against xenobiotic carcinogens such as dioxins.

*Polychlorinated biphenyls* PCBs are persistent organic pollutants, now banned, that were used as electrical transformer cooling oil. PCBs have contaminated the entire world food-chain. For example, farmed salmon are loaded with it. PCBs are hormone mimics.

*Bisphenol A* is a common ingredient in many plastics, including those in reusable water bottles and resins lining some food cans and dental sealants. BPA can change the course of fetal development in a way that increases the risk of breast cancer.
The industrial insecticide **methylichlor** is also a potent estrogen mimic which can trigger cancer. Other toxic environmental xenohormones we are all tainted with include dieldrin, heptachlor, kepone, mirex and toxaphene.

So is the famous insecticide **DDT**, which is still in our bodies despite being banned decades ago. **Parabens** are powerful estrogen mimics. Parabens are preservatives used in cosmetics, shampoos, sunscreens, toothpastes, baby wipes, and many skin lotions and creams. They accumulate in fat, such as breast tissue. Far infrared saunas help to neutralize and remove them. Chemically, they are very similar to pthalates.

**Pthalates** are toxic plasticizers – they make soft and flexible plastic products possible. This can include PVC intravenous bags and tubing, blood transfusion storage bags, children’s toys and bottle nipples, vinyl flooring, personal care products such as detergents, soap, shampoo, deodorants, fragrances, hair spray, nail polish, and plastic food bags, plastic wrap we put food in. The pthalates will disperse into air and fats. Think about this when you have some fatty meat or cheese in plastic kitchen wrap. Do not even think about putting any of these plastics in a microwave. Pthalates are able to disrupt reproductive hormones, including male hormone cycles. According to the Environmental Protection Agency EPA, 60 percent of herbicides, 90 percent of fungicides and 30 percent of insecticides are known to be carcinogenic. Alarmingly, pesticide residues have been detected in 50 percent to 95 percent of U.S. foods. They are linked to lymphoma, leukemia, and other cancers. The worst case scenario is exposure during fetal development.

**Organophosphates** are pesticides widely used on food and in homes against mosquitos, roaches and termites. The fruits and vegetables recently found to be very contaminated with pesticide residues include strawberries, bell peppers, spinach, cherries, peaches, cantaloupe, celery, apples, apricots, green beans, grapes and cucumbers. Commercial grade foods need to be thoroughly washed to remove these residues. Use pure Castille soap and scrub thoroughly. You also may need to disinfect the food, particularly if you are immune-suppressed due to chemotherapy, radiation therapy, steroid drugs and other stressors. Soak briefly with cool water treated with food grade hydrogen peroxide or unscented Chlorox regular bleach. Non-organic commercial-grade fruits and vegetables still have a net health benefit. I still prefer organic grown, for safety and nutritional content, and still wash organic produce.

**Nitrate fertilizers** are used throughout the world to boost food production. They not only accelerate plant growth, they are able to increase the growth rate of tumours. Cancers are “nitrogen sinks”, a biological term for a high user of protein. Foods that are raised with soil composting and other biological measures of feeding less concentrated nitrogen compounds do not accelerate cancer growth. Drinking water must be purified of nitrates.

Inorganic phosphates from fertilizer, soda drinks and red meats are linked to risk of lung cancer in animals.

Despite claims that organic foods are a rip-off, I feel they have value. They are at least less toxic to us and to the environment, and they tend to have higher nutrient content. I recommend organic fruits, vegetables, beans, seeds and nuts and other organic food be staples in your diet. I insist you need to eat “organic” animal foods. Milk and cheese from organic-fed cows are increasingly available, as are free-range eggs and poultry, grass-fed red meats, and wild fish.

To avoid these chemical hazards and carcinogenic **chlorine**, it is best to choose purified water to drink. The Canadian Cancer Society estimates chlorination of our water is responsible for 1 to 2% of our cancers. We certainly want to disinfect water from pathogenic bacteria. Water borne diseases are a real risk, and many would die if we stopped treating water. However, once clean, which in Canadian standards means disinfected, water can be filtered to remove chlorine before consumption.

Water is a source of many toxins that enter human tissues. The sun evaporates the oceans and lakes into clouds, that fall back to earth as rain. Many chemical compounds boil up from land and water and rain down again. Well water should be tested for carcinogenic levels of arsenic. **Purify your water.** A simple, cheap Brita type water filter will remove 99% of the chlorine. I personally use reverse osmosis water that is oxygenated and re-mineralized in a Nikken Optimizer, or tap water run through a Nikken brand “Pi-Mag” water treatment system,
including the Aqua-Pour. Pi-mag water is the best for detoxification. I will also drink ozonated and filtered artesian spring water.

Molds and fungi produce potent mycotoxins which are a significant worldwide cause of cancer, especially liver cancer. Poor food storage can allow mold to contaminate foods such as wheat, corn and peanuts. If there is any visible trace of mold on any food, please throw it out, it is ruined. Molds also grow in homes, causing great harm to occupants.

The fungicide vinclozolin causes changes to male mice born for as many as four subsequent generations after the initial exposure. This is reminiscent of the multigenerational disaster when diethylstilbestrol DES was given to women, and ended up causing cancer in their children! DES was also used to fatten up cattle.

Ellagic acid as found in berries, grapes and pomegranate, help us to eliminate carcinogens from fungal toxins. They also help resist harm from nitrosamine and polycyclic aromatic hydrocarbons, as found smoked meats, grilled or barbecued foods.

Perfluorooctanoic acid PFOA, found in grease- and water-resistant coatings like Teflon and Gore-Tex, is a likely carcinogen, yet we wear it and cook with it.

Organic solvents and volatile organic chemicals VOCs are major indoor as well as outdoor air pollutants. Glues, resins, plastics, caulking, paints and fabrics all vent off a noxious chemical cloud. The highest risk substances are 1,3-butadiene, formaldehyde, acetaldehyde, benzene, chloroform, naphthalene, acetaldehyde and dioxins. We are exposed at work, in our cars, and in our homes. It is not easy to clean up our environments, but there are air systems that reduce harm, alternative products like low-VOC paints, and ways to get these out of our bodies such as with therapeutic saunas.

We absorb toxins through our skin and lungs, including during a shower or bath, from soaps, hair products and toiletries, fragrances and cosmetics. There are literally hundreds of thousands of unpronounceable and undesirable chemicals in your daily environment that need to be moved out and replaced by “green” products. If it is not biodegradable, it is probably degrading you. If it hurts the environment, it can hurt you. I prefer soaps, toothpastes, shampoos and related products from Ferlow Brothers Botanicals www.ferlowbotanicals.com

Chemicals that are best kept out of your home are in over 75,000 home insecticides, cleaners, glues, paints, etc. They upset the ecology in our bodies, our homes, and then on out into the land and water, to inevitably recycle back onto our dinner plate or onto our skin. Many green solutions are at hand, cheap and easy. I recommend you see the books Household Solutions 1- with Substitutions and Household Solutions 2 with Kitchen Secrets by Reena Nerbas. These gems are loaded with green alternatives to chemicals in your home, and beyond. For books and other resources see her website www.householdsolutions.org

Another excellent resource is The CancerSmart Consumer Guide- How to eliminate toxins from your home and garden products and how to make healthy choices for your family and the environment, from the Labour Environmental Alliance Society, Vancouver, B.C., www.leas.ca

Using safer products in our homes and on our bodies will take some strain off the detoxification mechanisms in the liver. The liver has to get rid of a lot of non-nutritive substances in the food and water, as well as in any drugs we take. If the liver gets bogged down in the early phase of detoxifying a carcinogen, it is caught with even more toxic oxidized carcinogens. Fortunately herbs and foods such as tumeric and raspberries can rebalance detoxification, binding the oxidized chemicals to carriers that then take them out of the body. A supervised program of detoxification is recommended once or twice a year to minimize build-up of hazardous chemicals.

Heavy metals like lead, mercury, aluminum, cadmium and arsenic are able to cause cancer. Think of testing and detoxifying heavy metal load particularly in leukemia, lymphoma and multiple myeloma and sarcoma. If you have well-water, have it checked. Avoid “silver” mercury amalgam dental fillings. Do not eat the big predator fish such as swordfish and tuna that accumulate these metals.
Nitrates and nitrites keep cured meats such as hot dog wieners and fresh-looking, but are carcinogens linked to stomach cancer. Nitrates are also consumed in produce grown with chemical fertilizers.

Salt in excess from pickled and preserved foods, such as cured meats, can also trigger stomach cancer. It is considered an acidifying nutrient. Himalayan salt sole with its higher mineral content is thought to be better than common salt.

Ferrocyanide is an anti-caking agent used in road salt all over Canada. It is also a corrosion inhibitor. Unfortunately it can break down into highly carcinogenic hydrogen cyanide gas in the presence of strong sunlight and acidic water. Cancer rates are higher in areas where road salt is applied.

Considerable gains in health come from simply not doing some foolish things, such as using tobacco products. Tobacco smoke delivers tars, benzene, cadmium, cyanide, formaldehyde and polycyclic aromatic hydrocarbons – quite a toxic cloud! Chewing tobacco is little better. 30% of all cancer risks are eliminated if you kick the tobacco habit. In Finland a successful program to curb smoking produced a reduction in lung cancer deaths proportional to the numbers who quit.

We cannot completely avoid these chemicals – they are too numerous, too widely used, and too persistent. They are ubiquitous (everywhere). Even people eating only organic food and wearing hemp and doing all the right things still test positive for toxins of concern. It is worthwhile to detoxify what we can with far-infrared saunas, milk thistle herb, flaxseed and psyllium fiber, indole-3-carbinol, dandelion root, and R- alpha lipoic acid.

Dr. Joe Pizzorno, ND monitors total body toxic load by testing oxidative stress on DNA nucleosides via 8-OHdG, which should be under 4. Chemical load is probably high if: GGT > 25; uric acid >5 mg/dL; ALT >30 U/L; Bilirubin >0.8 mg/dL; Platelets < 250,000; WBC < 6,000; or low T3 and T4. See his marvelous book on detoxification called “The Toxin Solution: How Hidden Poisons in the Air, Water, Food, and Products We Use Are Destroying Our Health--AND WHAT WE CAN DO TO FIX IT”.

**ELECTROMAGNETIC POLLUTION**

Microwave radiation from cell phones are capable of causing brain cancers in young people with heavy exposure for several years.

Common household and office devices can give off very dangerous levels of high-frequency voltage transients HFVT, and these signals also reverberate through the entire wiring of a building. HFVTs occur when AC is converted to DC in transformers and switch-mode power supplies. This includes dimmer switches, halogen lamps, compact fluorescent lights, and power adaptors for laptop computers, MP3 players, telephones, and other electronics. HFVTs can increase risk of melanoma, thyroid, uterine and other cancers by about 3 fold, or about 26% in one year!

Please do not sleep within a meter of any plug-in device. Use magnetic and other geopathic or Feng shui amendments to create a sanctuary from the power grid.

**EARTHING & GROUNDING**

Nature Cure has always included practices involving connecting with Nature. Earthing is the simple act of being in contact with the ground, such as walking barefoot on grass, on the beach sand, etc. I know of few joys as sweet as sleeping on the ground on a hot summer afternoon.

Grounding uses wired connections to an earth ground, such as sitting with your feet on a metal plate wired into your home’s ground wire, or run out and directly connected to the metal stake in the ground that completes the electrical circuit of your home. This may be particularly valuable with all the wi-fi and other electromagnetic pollution passing through us as we sit in front of our electronic devices.
MANAGE STRESS

Research shows that the management of stress is critical to maintaining good immune function. Grief and other major life stressors can play a role in triggering cancer, and the stress of fighting cancer itself can be grueling. Increased nighttime cortisol indicates inflammation and flattened cortisol rhythm increases risk of early death.

The stress hormone adrenaline – epinephrine from the adrenal glands – is able to block cancer cells from dying. Through the Bad gene, it blocks apoptosis or the cancer off-switch, making the little stinkers immortal. Ironically, if you relax, cancer cells die.

Activities which defuse stress, regulate autonomic balance and increase parasympathetic tone:
- diaphragmatic breathing is the most potent solution.
- yoga.
- meditation.
- hypnosis.
- biofeedback.
- progressive muscle relaxation exercises.
- exercise.

One of the most interesting phenomena in predicting cancer risk is the role of three factors: skipping breakfast, eating between meals, and irregular hours of sleep. These little behaviours seem to measurably increase cancer risk. While the specific mechanisms at work aren’t yet known, it may be because these factors characterize a chaotic lifestyle. Chaos is stressful both physically and mentally. Do not invite the chaos of cancer into your life.

Maintaining a positive outlook and tapping into social support systems can improve quality of life and potentially assist survival. Prayer and meditation are currently being studied as adjunct or complementary cancer therapies. Hospice and palliative care units for terminally ill patients offer meditation, Touch for Health healing, chaplain services and other spiritual solace. Finding meaning is the ultimate human creative endeavour. Through music, art, or journaling therapies, for example, a person can explore his or her reasons for wanting to live. Finding a way to approach life with zest and positive purpose is associated with some remarkable cancer recoveries.

Sloth, on the other hand, appears to be a deadly sin. In one observational study, the death rate from cancer for older men who walked more than two miles daily was half that of those who walked less than a mile each day. In another study sitting over 6 hours daily increased all-cause mortality by 56%. Exercise helps regulate blood sugar, moves the bowels, and improves immune functions such as the activity of cancer-eating natural killer NK cells. Exercise regulates the adrenal stress hormones.

At the end of your day, you go to sleep to rest and repair. Be aware that sleeping pills, especially hypnotics such as Ativan and Zopiclone, can increase cancer risk several-fold, and shorten lifespan by years! Natural methods to get to sleep are worth the effort. Sleep hygiene is a matter of good habits, and removing sleep disrupting influences from the bedroom.

One of the most important antioxidants and hormone and cell-growth regulators is melatonin, made in the pineal gland in the brain. Between 10 pm and 1 am, melatonin is produced in the pineal gland if the person is at rest in a dark place. Melatonin disturbance is a widespread problem. Any light or disturbance can disrupt this critical defensive molecule. Even a nightlight, bathroom light or the refrigerator light can disrupt the production of melatonin. Early studies suggest that disturbed sleep, as experienced by shift workers, may increase risk of cancer, probably by throwing off the melatonin cycle. Jet-lag is a syndrome associated with melatonin disruption by rapid transportation to a place with a markedly different light-dark period. You may need an entire month of sleeping from 10 pm to 6 am in a completely darkened bedroom to restore a natural melatonin rhythm.

Using alcohol as a self-medication for stress is most unwise from a mental health perspective, but alcohol is also a potent carcinogen. Excess intake is linked to breast and many other cancers. Good folate and vitamin C intake helps counteract some of the carcinogenicity of alcohol.
HAPPINESS

Notes from a lecture at the I Can Do It conference in Vancouver, BC March 12, 2011 by Robert Holden, PhD

Dr. Holden has a book “Be Happy”, an online course at www.behappy.net, an 8 week happiness training program and a 5 day intensive immersive coaching happiness program.

Dr. Holden created the UK National Health Service Happiness Project in 1993. It’s Mission Statement: “Talk happiness. Have a conversation about the big happiness that supports us and helps us fly through the best of times and the worst of times, that helps us be who we are.” The 8 week happiness program is a fast track to happiness that works and produces durable results. Scientific and psychiatric assessment of objective and subjective outcomes include demonstration of lasting changes in brain function. People report more smiles, hope, optimism, love and fun! The Six Principles of the psychology of happiness:

1. Principle of Identity: Tune into what is present, and choose to be within yourself. Following your joy is a world of difference away from searching for happiness outside ourselves or in the future. It doesn’t have to be reasonable or rational! Psychologists typically study unhappiness. Does happiness have an evolutionary value, a purpose? It acts as a compass to be authentic, to navigate according to our values, to be in synch and present in our life. It teaches us and enables us to succeed. Being happy = success. Being happy = a spiritual path. Being happy = connecting with our original energy, the fullness of our being, the heart of our hearts, our value to the world, and our authentic nature. The purpose of your life is not to arrive safely at your death! Affirmation: “Dear Joy, I’m all yours! What would you like me to do with my life today?”

2. Principle of Choice: How do we choose happiness? To do or to be? What sort of day did you decide to have today? This world appears physical, but it is really mental. We have a familiar mood we accept as natural for us. We look at it as a set point. We can change our mood, our day and our life by choosing to believe in our happiness, and by allowing ourselves to be just as we really are. It’s not about our genes or life circumstances. These have negligible effects. Choices of diet, belief and feeling result in the long-term state of mind. What 3 things could you do today to have a far better day than you imagined?

3. Principle of Abundance: Happiness is identifying the real, more than just what you really, really want. In our society there is so much more of more than ever before. In the UK in 1956 52% of people said they were really happy. Today that has fallen to 36%. Having everything only makes us semi-happy. We are static, not ecstatic. What is it we really want? To be. To be a person we like to be. To give. To give to the world, to others.

4. Principle of Healing Forgiveness: Life is a miracle, but it can also suck. Grudges, cynicism, resentments and grievances block happiness. Shift happens when we forgive wounds. Give up all hope of a better past, to have a better present. Forgiveness sets us free. Forgiveness connects us to who we are, before any grief or grievance. It takes us to a place where we are OK, before we felt broken. This restores us to our original energy. Forgiveness means being in the present, not allowing giving over our future to our past. It’s a new beginning.

5. Principle of Relationship: Make love more important than anything else. Choose happiness first, and you have also selected wealth, success, power, attractiveness, sex, health, enlightenment, authenticity - and love. Happy relationships start with happiness. Happy relationships have the capacity to love and be loved, and the goal to be a loving person.

6. Principle of Now: Have an appetite for now. Be in the now. It ends the search for happiness. Any now will do! This is the miracle of happiness. Are you waiting for a better now? Will it get more perfect? Carpe diem - Seize the day! You can be happy, but can never become happy. Be willing to choose happiness now.
EARLY DETECTION

The best diet, supplements, surroundings, and psychology cannot prevent all cancers. There are insidious threats like the radiation still circulating from Chernobyl, and from DDT used in the 1950’s and 1960’s. I have seen many patients with cancer despite a very commendable lifestyle. I can assure them they do benefit from the good basic health, fitness and habits they bring to the start of the cancer journey. The better the constitution and vitality, the quicker the recovery.

The final step in a healthy lifestyle must be wise use of early screening tests, to detect cancer while it can still be cured. Breast exams and prostate exams, PSA blood tests, and PAP smears are examples of reliable methods that may save lives. The earlier a cancer is detected the better the chance of a cure. Most of the recent gains in reducing cancer deaths come from better screening, rather than significant changes in therapy. Improvements in technologies for staging and evaluating cancers have also improved the focus and efficacy of treatments. Genetic screening helps alert doctors to who needs frequent screening tests, or would benefit from certain treatments. Investigate sudden weight loss, or any disturbing health change, including:

- Change in bowel or bladder habits.
- A sore that does not heal.
- Unusual bleeding or discharge.
- Thickening or extension of a lump.
- Indigestion or difficulty swallowing.
- Obvious change in a wart or mole.
- Nagging cough or hoarseness.

Mamamograms and self-exams: Recently there has been an advisory that monthly breast self-examinations by women are not as reliable at finding cancers as an examination by a skilled nurse or physician. Well, I agree with that, but do not agree that women should not be encouraged to examine themselves! I have had a huge number of women come in with breast cancer they found themselves! Please, let’s all do our part - self-care and professional care are not mutually exclusive. Integrate! Mammograms have been a controversy for decades. They do detect cancers, and are a net benefit in women over age 50. However, the radiation is a concern. Most abnormalities found on screening mammography turn out to be benign when followed up with a diagnostic mammogram, ultrasound, needle biopsy and other more precise investigations. A lot of women get scared out of their wits for a few weeks over nothing, in order that a few cancer cases may be found and lives saved.

The PAP smear screening for cervical cancer is routinely augmented by human papilloma virus HPV testing. Blood in the stool: Since colon cancer often results in microscopic blood in the stool, screening for fecal occult (hidden) blood will pick up many early cases. FIT test annually after age 50.

DRE and PSA: Prostate cancer screening involves a digital rectal exam DRE and a PSA blood test. Again, age 50 is a good time to start, unless family history suggests an earlier screening.

ONCOblot® is a very sensitive blood test for ENOX2 proteins produced only by tumours. It allows early diagnosis and also specifies the tissue of origin.

Biocept™ screens for circulating tumour cells and tumour DNA. Good for detecting recurrences.

Neutrophil Lymphocyte Ratio – NLR: A potential screening test for a “non-healing wound” Ideally pre-operative NLR is under 1.88. Neutrophil count to absolute lymphocyte count rising to ≥3:1 is at risk, and > 5:1 is high risk. Risk of disease progression also associates with blood fibrinogen >400 mg/dL. Watch for ↑CRP esp>10, ↑D-dimer, ↑monocytes, HgbA1C >5.6, morning glucose >100 mg/dL, TG > 150 mg/dL.

Monocyte counts may rise before diagnosis or relapse, and may rise further as disease progresses.

An annual exam by a physician is no guarantee of safety from hidden disease. It is important to report any concern to your primary care provider, and let them examine, test or refer as they see fit. There is no gain in denial, stoicism, fear or macho toughness. Cancer can be beaten, but cures happen most often in early stage cancers!
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- Quercitin p. 408
- Radiation p. 409
- Stem cells & immune cells p. 412
- Sugar, Insulin, IGF-1, Metformin p. 416
- Surgery p. 418
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II – Bibliography p. 426

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427


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