Cancer Support

Naturopathic Nutrition 2
Learning Outcomes

• Explain the pathophysiology of cancer and how it progresses in the human body.

• Explain the dietary factors which may increase the risk of developing cancer.

• Evaluate how dietary changes can reduce the risk of developing/promoting cancer.

• Explain various mechanisms implicated in the pathophysiology of cancer.

• Explain the various options in orthodox cancer treatment.

• Discuss complementary and nutritional therapies available as support or alternative to orthodox cancer treatments.
The Need for Action

• As a cause of death in the developed world, cancer is only surpassed by cardiovascular disease.

• Globally the number of people with cancer is projected to double by 2030.

• With the current diet and lifestyle more than 1 in 3 people will develop cancer in their lives! This is something we simply must address!

• UK: Between 1971 and 2006, the age-standardized incidence of cancer increased by around 22 per cent in males and 44 per cent in females.

(WCRF 1997, WCRF 2007, NS 2008)
Understanding Cancer

• Before understanding the impact of nutrition on cancer, it is first important to understand the biochemical and physiological determinants of the disease.

• Cancers are as a result of the interaction of genetics, epigenetics and environment of the individual.

• Cancer is also suggested to be due to mitochondrial failure which in turn is due to:
  – Lack of oxygen.
  – Toxins, esp. those that interfere with mitochondrial biochemistry.
  – Stress
  – Leading on to cellular defects and then to mutated genes such as Tumour Protein p53 etc.

• Cancer is a chronic disease.
What is Cancer?

- **Cancer**: Cells that have acquired the ability to multiply and spread without the usual biologic restraints.

- This unregulated growth is caused by damage to DNA resulting in mutations to genes that control cell division.
Human Carcinogenesis is a Multiyear Process

Cellular Characteristics Associated with Cancer

- Mitochondrial failure/damage.
- Increased DNA damage.
- Increased activity of chemokines.
- Increased activity of cytokines.
- Increased hormonally driven activity.
- Alteration in cell cycle activity.
- Activation of otherwise ‘silent’ oncogenes.
- Genomic instability.
Cancer Cells are Cells that Have Altered Function

- Self-sufficiency in growth signals (self-renewal).
- Insensitivity to anti-growth signals.
- Limitless replicative potential.
- Evasion of apoptosis.
- Ability to produce sustained angiogenesis.
- Ability to invade and metastasize.
Cancer

• **Healthy cells**: Balance between growth and programmed cell death is tightly regulated.

• **Cancer** cells are cells that grow and divide at an unregulated pace.

• **Carcinogenesis**: The initiation or generation of cancer (can be due to mitochondrial failure) is DNA damage and the process of derangement of the rate of cell division.

• **Carcinogens** are agents that interfere with mitochondrial function and/or cause DNA damage and are intimately linked with diet and lifestyle.

• To the best of our knowledge, cancer is a disease of mitochondria and genes.

• It is not a typical genetic disease – having a damaged gene does not always result in cancer, cancer development involves many factors.
Staging a Cancer

• The system of stages is conventional medicine’s method of describing the extent of the disease at the time of diagnosis.

• Staging systems for cancer evolve as we learn more about cancer, and can differ with cancer types.

• Staging assists a doctor to determine a prognosis and recommend a regimen of treatment.

• A common staging system is the T-N-M, which is then further numbered (1- 4 or I-IV)
  • T - Tumour
  • N – Nodes
  • M – Metastases
Staging a Cancer

• The stage of a particular cancer is based on the tumor’s size and location and whether it has spread:
  – Stage I is the earliest stage with only local tissue involvement.
  – Stage II cancer has spread to some surrounding tissues and perhaps to nearby lymph nodes.
  – Stage III cancer has metastasized to distant lymph nodes.
  – Stage IV cancer has spread to distant organs or other parts of the body.
Staging a Cancer

• Other common terminology includes:
  – In situ: Abnormal cells are present in the layer of cells in which they originated.
  – Localized: Cancer is limited to the organ in which it began, no evidence of spread.
  – Regional: Cancer has spread beyond the primary site to nearby lymph nodes or tissues and organs.
  – Distant: Cancer has spread from the primary site to distant tissues or organs or to distant lymph nodes.
The First Step in Oncogenesis is Epigenetic

• “Recent data suggests that cancer has a fundamentally common basis that is grounded in a polyclonal epigenetic disruption of stem/progenitor cells.”

Oncogenes

• Oncogenes are genes that code for one of the typical behaviors of cancer cells: Growth, non-responsiveness to stop signals, failure of apoptosis, invasion, metastasis.

• Oncogenes become active:
  – By a mutation that makes them constitutively active (may be inherited).
  – By epigenetic modifications such that a gene which is normally silenced becomes active (usually due to loss of methylation marks).
People are continuously exposed exogenously to varying amounts of chemicals that have been shown to have carcinogenic or mutagenic properties.

In the case of a solid tumor there can be up to a 20-40 year interval from the time of exposure of an individual to a chemical or viral carcinogen until the clinical detection of a tumor.

By the time a tumor is apparent, cancer cells have acquired the ability to divide where normal cells ought not, to invade adjacent cellular architectures, to metastasize and to kill the host.

Wogan G N et al, Environmental and chemical carcinogenesis. 2004 473-486
Cancer is a Preventable Disease

• Only 5-10 % of all cancer cases can be attributed to genetic defects, whereas the remaining 90-95% have their roots in the environment and lifestyle.

• The lifestyle factors include; smoking, diet, alcohol, obesity, infectious agents, environmental pollutants and radiation, stress and emotional issues.

• Of all cancer-related deaths; 25-30% are due to tobacco, 30-35% diet, 15-20% infections, 10-20% obesity, 4-6% alcohol, 10-15% others, which includes environmental and radiation.

• John Hopkins School of Medicine in the US reported in January 2015 that two thirds of cancers are due to bad luck - random mutations when cells divide – discuss?

Anand P et al, Cancer is a preventable disease that requires major lifestyle changes. 2008
Both epidemiological and experimental evidence shows that only a small proportion of cancers are inherited; **the rest is due to how we live.**
Anand P et al, Cancer is a preventable disease that requires major lifestyle changes. 2008
Lifestyle Cancers


Fig. 5. Various cancers that have been linked to obesity. In the USA overweight and obesity could account for 14% of all deaths from cancer in men and 20% of those in women (see 51).
Lifestyle Cancers

Fig. 3. Cancers that have been linked to alcohol and smoking. Percentages represent the cancer mortality attributable to alcohol and smoking in men and women as reported by Irigaray et al. (see 13).

Anand P et al,(2008) Cancer is a preventable disease that requires major lifestyle changes.
Genetic cancers

Fig. 2. Genes associated with risk of different cancers.

## Viruses and Bacteria Implicated in Cancer

<table>
<thead>
<tr>
<th>Virus</th>
<th>Implicated Cancer</th>
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</thead>
<tbody>
<tr>
<td>Epstein-Barr Virus</td>
<td>Non-Hodgkin’s lymphoma</td>
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<tr>
<td>HHV-8/KSHV</td>
<td>Kaposi Sarcoma</td>
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<tr>
<td>Papilloma virus</td>
<td>Carcinomas of the vulva, perineum, uterus, cervix and anus</td>
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<tr>
<td>Hepatitis B Virus</td>
<td>Hepatocellular carcinomas</td>
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<tr>
<td>HIV</td>
<td>B Cell lymphoma</td>
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<tr>
<td>Epstein-Barr Virus</td>
<td>Burkitt’s lymphoma</td>
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<td>Retro Virus</td>
<td>Adult T Cell leukaemia</td>
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<td>Helicobacter Pylori</td>
<td>Gastric cancer</td>
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• As only 5-10% of all cancer cases are attributed to inherited genetic defects, we have a major opportunity to prevent cancer.
Cancer Volcano

Low natural killer cell function

Low level of fat-soluble antioxidants

Low level of water soluble antioxidants

Production of oncoproteins

Cell mitosis

Change in cell cycle

Gene mutation

DNA repair enzyme malfunction

Cellular oxidation damage
Good News: We are in Control

- **World Cancer Research Fund**: High fruit and vegetable intake may reduce cancer incidence by 40 - 64%.

- **US National Research Council**: High fruit and vegetable intake may reduce US cancer rates and mortality by 1/3, roughly equivalent to the reduction in mortality from infectious diseases brought about by improved hygiene and better healthcare during the 19th century!

- In the November 2010 issue of Nutrition and Cancer, a study indicated that women who consumed a greater amount of vegetables and seafood were 86% less likely to be diagnosed with breast cancer.

- Avoidance of ‘junk food’ and other toxins is also of great importance!

(NCR 1982; WCRF 2007; WCRF 2009)
Good News: We are in Control

• Through good nutrition we can also improve survival rates of people with some cancers by calming down the genes responsible for cancer growth!

Cancer Support Goals

Primary goals:
• Support tumourcidal effects of allopathic treatment.
• Reduce side effects of those treatments.
• Support overall wellness.

Secondary goals:
• Support immunity.
• Reduce tumor promoting factors.
• Inhibit metastasis and tumor progression.
• Promote appropriate apoptosis.
Initiation - Dietary Carcinogens

- **Aflatoxins** (found in mouldy food).
- **Heterocyclic amines** (meat cooked at very high temperatures).
- **N-nitroso compounds** (in some spoiled foods, protein foods, cured meat).
- **Polycyclic aromatic hydrocarbons (PAH)** (products of combustion found in cooked foods, smoked foods and dark beer).
- These chemicals can start a cancer process by creating cancer cells.

(World Cancer Research Fund 1997; NRC 1982)
Diet: Red Meat

- Heavy consumption of red meat is a risk factor for several cancers, especially those of the gastrointestinal tract, but also for colorectal, prostate, bladder, breast, gastric, pancreatic and oral cancers.

- The heterocyclic amines produced during the cooking of meat are carcinogenic. Charcoal cooking and/or smoke curing of meat produces harmful carbon compounds such as pyrolysates and amino acids which have a strong cancerous effect.

Anand P et al.(2008) Cancer is a preventable disease that requires major lifestyle changes.
Diet: Fats and Sugars

- Saturated fatty acids, trans fatty acids and refined sugars and flour present in most foods have also been associated with various cancers. (1)

- Epidemiologic studies suggested a positive association between dietary fat and colon cancer. (2)

- Frequent consumption of sugar and high-sugar foods may increase the risk of pancreatic cancer by inducing frequent postprandial hyperglycemia, increasing insulin demand, and decreasing insulin sensitivity. (3)

Dietary Carcinogens - Sodium Chloride

- Common table salt has been stripped of its trace minerals, leaving only sodium and chloride - NaCl. In the UK there is added hexacyanoferrate(II), an anti-caking agent, to prevent it from absorbing moisture. This is a very unbalanced way to ingest minerals and has numerous ill health effects including increasing cancer risk.

- Diets high in salted fish (NaCl) increase the risk of nasopharyngeal cancer.

- Diets high in salted foods and table salt itself increase the risk of stomach cancer. Stomach cancer rates are highest in those parts of the world such as Japan, some parts of China and Latin America, where diets are abundant in foods preserved by NaCl salting. In Portugal, where salted foods are eaten regularly, stomach cancer mortality is the highest in Western Europe.

(WCRF1997; WCRF 2007)
Dietary Carcinogens - Sodium Chloride

- High salt intakes can damage the lining of the stomach, triggering off the cancer process.

- Daily intake of salt should be less than 2,400 milligrams (in regards to table salt, we need none!!).

- There are many alternatives to table salt which have added health benefits (other than limiting the table salt intake!). Vegetable salts, sea salt and Himalayan salt are some of the alternatives which have a complement of health promoting minerals. Table salt should not be consumed.

(AICR 2008a)
Artificial Sweeteners

- High levels of aspartame have been found in brain tumors. In the digestive tract, aspartame is split into its two component amino acids and a methyl group. During metabolism, the methyl group is converted to the toxin methanol and then to a highly toxic substance formaldehyde, which can cause severe damage to the nervous and immune systems and permanent genetic damage.

- The American Cancer Society figures show that breast cancer cases have doubled since 1981, the year aspartame was approved for use as a food additive.

- Stevia and xylitol are some of the healthier alternatives available.
Dietary Protection

- Carcinogens in foods and drinks appear to contribute only slightly to overall impact of diet on cancer risk.

- The most important effect of diet on this level is mediated by dietary actions that inhibit the cancer process.

- A wealth of evidence also exist that multiple food components can alter neoplastic proliferation as well as scheduled cell death (apoptosis).

- It is also important to consider how the omission of vital macro and micro nutrients can have an impact on the development of cancer cells.

(World Cancer Research Fund 1997; NRC 1982)
Dietary Protection

Bioactive Food Components

- DNA Repair
- Hormonal Regulation
- Differentiation
- Apoptosis
- Cell Cycle
- Carcinogen Metabolism
Initiation - Dietary Protection

- Phytochemicals and other compounds like vitamin C, etc.

- Found in plant foods, play a pivotal role in cancer prevention, by:
  - Blocking the metabolic activation of a procarcinogen, thereby inhibiting the formation of a carcinogen from precursor substances.
  - Increasing metabolic detoxification of carcinogens.
  - Preventing carcinogens from interacting with DNA, RNA.

Initiation - Dietary Protection

• Blocking agents:
  • Indole -3-carbinol
  • Sulphoraphane
  • Kolaviron

• Suppressing agents:
  • Beta Carotene
  • Curcumin
  • Gingerol

(Farombi 2004)
Dietary Promoters

- Damaged fats
- Excess protein
- Excess calories
- Excess sugar
- Omega 6: Omega 3 ratio > 6:1

- Oestrogens
- Insulin
- Growth factors (IGF-1)
- Inflammation
- Upregulation of oncogenes

High fibre
Adequate protein
Adequate calories
Whole plant foods
O6: O3 ratio 2:1
Physical activity 52

Promotion - Protection

↓ Estrogens;
↓ Insulin
↓ Growth factors (IGF-1)
↓ Inflammation
↓ Downregulation of oncogenes
↓ Upregulation of tumour suppressor genes.

(World Cancer Research Fund 2007; Heber 2006; Ornish et al 2008; Saxe 2006)
Metabolic Tumour Promoters

- **Insulin** - Promotes cancer cell proliferation and decreases apoptosis (So encourage low carbohydrate diet).

- **Oestrogens** - Induces cancer cell proliferation.

- **Oxidative stress** - Can act as cancer initiator and promoter.

- **Inflammation** - Strong association between chronic inflammation and cancer (mechanisms: promoting proliferation of cancer cells, formation of cancer blood vessels - not entirely understood).

- **IGF-1** - Potent growth factor for many cancer lines.

(Heber et al 2006)
Tumour Anti-Promoters

- **Folate** (reducing likelihood of DNA damage).

- **Antioxidants** (preventing oxidative damage and lipid peroxidation, which compound DNA damage in tumor promotion).

- **Phytochemicals** (various mechanisms).

- **Plant-based diet** (various mechanisms).

(World Cancer Research Fund 1997, Wattenberg 1985)
Micronutrient Deficiency

• Micronutrient deficiencies can mimic radiation (or chemicals) in damaging DNA.

• Folate deficiency, a common vitamin deficiency in people who eat few fruits and vegetables cause chromosome breaks in human genes.

• Selenium is important in enzymatic defenses against oxidants and deficiency would be expected to lead to oxidative DNA damage.

• Deficiencies also in B12, B6, vitamin C, vitamin E, selenium, niacin, iron and zinc are also associated with cancer risk.

B N Ames, DNA damage from micronutrient deficiencies is likely to be a major cause of cancer Mutation Research 2001 7-21
Micronutrient Deficiency

- Optimizing micronutrient intake (through better diets, can have a major impact on public health at low cost.

- Other micronutrients are likely to be added to the list of those whose deficiency causes DNA damage in the coming years.

- Tuning-up human metabolism, which varies with genetic constitution and changes with age, is likely to be a major way to minimize DNA damage, improve health and prolong healthy lifespan.

B N Ames(2001) DNA damage from micronutrient deficiencies is likely to be a major cause of cancer Mutation Research 7-21
Diet and Tumour Progression

Physical Activity

Energy Intake

Obesity

Diet (fat, protein levels; refined carbs, oils)

Hormones
(oestrogen; insulin)

and growth factors (IGF-1)

Abnormal DNA, and cell replication

Precancerous lesions

Phytochemicals
Fibre; Plant based diet

(World Cancer Research Fund 1997; 2007)
Progression Promoters

- **Excess & damaged fat**: Creates lipid peroxides and oxygen radicals further damaging DNA.
- **Excess protein**: increases IGF-1, promotes further cancer cell growth.
- **Excess omega 6**: inflammation promotes further cancer growth.
- **Aflatoxins**
- **Heterocyclic amines**
- **N-nitroso compounds**
- **Polycyclic aromatic hydrocarbons**

Creation of new cancer cells with the potential of further growth.

(World Cancer Research Fund 1997; National Research Council 1982)
Progression Anti-Promoters

- **Folate**: Reducing likelihood of DNA damage.

- **Antioxidants**: Preventing the oxidative damage and lipid peroxidation, all known to further damage to DNA in tumor progression.

- **Phytochemicals**: Various mechanisms.

- **Fibre**: Colon bacteria produce short chain fatty acids promoting death of cancer cells.

(World Cancer Research Fund 1997, Wattenberg 1985)
“Let food be thy medicine”

We need to reclaim this wisdom.
Foods and Bioactive Food Components

• More than 25,000 different bioactive components are thought to occur in the foods consumed by human beings.

• These bioactive food components may arise from:
  – Plants: Phytochemicals
  – Animal sources: Zoochemicals
  – Mushrooms: Fungochemicals
  – Metabolism of food chemicals by bacteria within the gastrointestinal tract (bacterochemicals).

Foods and Bioactive Food Components

• Defining which food component is instrumental in bringing about a phenotypic change is exceedingly challenging because of the complexity of foods and the myriad of sites where food components may function.

• For example, some of the anticarcinogenic and antitumourigenic benefits attributed to garlic may arise from not only its allyl sulfur content, but also unique proteins, flavonoids, specific minerals or fructooligosaccharides.

Multiple Sites of Action

• Since cancer incidence is projected to increase during the foreseeable future there is a desperate need for defining effective prevention strategies.

• Fortunately, mounting evidence continues to highlight dietary change as an effective and cost-efficient approach for reducing cancer risk and for modifying the biological behavior of tumors.

Dietary Carcinogens Resulting from Cooking

- Cooking food at very high temperatures, especially in flame, generates chemicals that are mutagenic or carcinogenic in experimental conditions.
Dietary Carcinogens Resulting from Cooking

- Steaming, boiling and stewing - up to 100°C.

- Baking, microwaving and roasting – up to 200°C.

- Grilling and barbecuing – up to 400°C and sometimes direct flame to cook food.

(World Cancer Research Fund 1997)
Dietary Carcinogens Resulting from Cooking:

• Grilling, frying and barbecuing protein rich foods:
  – Polycyclic aromatic hydrocarbons (PAHs) and heterocyclic amines (HCAs) found in grilled fish and meat mostly.
  – N-nitroso compounds in grilled cured products are approximately five times higher than in uncooked products.
  – Acrylamides: Starchy foods baked or fired at high temperatures (chips, crisps, sugar coated breakfast cereals).

• Acrylamides cause cancerous mutations in animals, and are being investigated for carcinogenicity in humans.

Alcohol

- In 1988, on the basis of abundant epidemiological evidence, the International Agency for Research on Cancer concluded that alcohol is a Group A carcinogen.

- It is an independent risk factor for cancers of the upper digestive tract; liver; breast; colon.

(World Cancer Research Fund 1997; Longnecker et al. 1988; Willett et al. 2000; Tomeo et al. 1999)
Alcohol

Increase in Risk of Cancer Associated with Alcohol Use:

<table>
<thead>
<tr>
<th>Convincing Evidence</th>
<th>Probable Risk</th>
<th>Insufficient Evidence</th>
</tr>
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<tbody>
<tr>
<td>Mouth</td>
<td>Liver</td>
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<td>Pharynx</td>
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<td>Larynx</td>
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<td>Breast</td>
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<td>Colorectal</td>
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(National Cancer Policy Board 2003; World Cancer Research Fund 2007)
Alcohol

- Colon Cancer Risk: Increases by 10% if you drink 1 glass of wine daily.

- Colon Cancer Risk: Increases by 25% if you drink 2 glasses of wine or 1 pint of beer daily.

- Drinking as little as one pint of beer or one large glass of wine a day increases risk of breast cancer by more than 7%.

- Mouth, Oesophagus, Larynx, Throat Cancer: Increases 168% risk with 1 glass of wine/day.

(World Cancer Research Fund 2007; Riboli et al 2002; American Cancer Society 2007; Cancer Research UK 2009a)
Alcohol

• Journal of the National Cancer Institute, 2009 Million Women Study:
  – Low to moderate alcohol consumption among women: Statistically significant increase in cancer risk (13 percent of the cancers of the breast, liver, rectum, and upper aero-digestive tract).
  – Each additional alcoholic drink regularly consumed per day was associated with 11 additional breast cancers per 1000 women up to age 75.

(Allen et al 2009)
Alcohol

• Newest Study: Drinking more than seven drinks a week is associated with a 60% higher risk of bowel cancer, compared to non-drinkers.

• According to lead researcher Professor Rachel Huxley, the most startling finding of this study was, "The strong, and largely, unknown association between high intakes of alcoholic beverages with risk of colorectal cancer. Most people probably know that being overweight and having poor dietary habits are risk factors for the disease, but most are probably unaware that other lifestyle risk factors such as alcohol consumption, cigarette smoking and diabetes are also important culprits."

(GIIH 2009)
### Increase in Risk Cancer Associated with Obesity:

<table>
<thead>
<tr>
<th>Convincing Evidence</th>
<th>Colon, Prostate, Breast, Endometrial, Kidney, Esophageal, Ovary, Non-Hodgkin’s Lymphoma, Leukemia, Multiple myeloma, Pancreas, Oesophagus.</th>
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</thead>
<tbody>
<tr>
<td>Possible</td>
<td>Gallbladder</td>
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</table>

(Source: National Cancer Policy Board 2003; Pan et al 2004)
Obesity

- 25-40% of kidney, esophageal and endometrial cancer may be attributed to obesity.
- 25 to 30% breast (postmenopausal) may be attributed to obesity.
- BMI ABOVE 23 INCREASES YOUR RISK!

(IARC 2002; Vainio and Bianchini 2002; WCRF 2007)
Obesity

- Obese / overweight people have 34% and 9% higher cancer risk respectively.

- 14% of all cancer deaths in men and 20% of all cancer deaths in women are attributable to excess body fat.

- Numerous studies - Adults and adolescents with a higher BMI have increased risk of mortality from cancer.

(Heber et al. 2006, Pan et al. 2004, Calle et al. 2003, Okasha et al. 2002)
Obesity

- Colorectal cancer risk: Increased by 15% with every 5kg/m2.

- Breast cancer risk: Increased by 13% with every 5kg/m2 in postmenopausal women.

- Endometrium cancer risk: Increased 2 - 4 times in obese women compared to lean women.

(WCRF 2007; Salazar-Martínez et al 2000; Vainio and Bianchini 2002)
Obesity

• Possible Mechanisms:

  – Excess body fat changes hormone metabolism.

  – Oestrogen levels in postmenopausal women are 50 to 100 percent higher among heavy versus lean women.

  – Oestrogen-sensitive tissues are therefore exposed to more oestrogen stimulation in heavy women, leading to a more rapid growth of oestrogen-responsive breast tumors.

(Pan et al 2004; Huang et al 1997)
Obesity

• Possible Mechanisms:

– Excess body fat promotes oxidative DNA damage.

– Excess body fat facilitates alteration in carcinogen metabolizing enzymes.

– Excess body fat changes insulin metabolism.

– Excess body fat negatively affects immune system.

(Pan et al 2004)
Obesity

Excess insulin, Excess estrogens, Stimulates cell proliferation

Promotes angiogenesis, ↑ cell proliferation

Inflammation

Leptin

Stimulates cell proliferation

Excess IGF-1

Stimulates cell division
Types of Fat and Tumour Promotion

• Saturated fat (SFA): Both epidemiological and animal studies provide evidence of positive correlation.

• Polyunsaturated fat (PUFA): Excess PUFAs promote tumorigenesis – may diminish effects of protective fats, oxidation issue?

• Omega 3 PUFA: Protection in some studies, promotion in others. e.g. protection: breast; promotion: prostate.

Types of Fat and Tumour Promotion

• **Monounsaturated Fat (MUFA):** Research inconclusive; however excess linked to higher cancer risk.

• **Transfat:** Studies on animal models indicate that trans fatty acids behave like SFAs in their effects on tumorigenesis.

(NRC 1989; WCR 2007)
Women with highest total fat (i.e. all types of fat) intake - 35% higher risk

(Wang et al. 2008)
Dietary Fat – Mechanisms of Tumour Promotion

- Promoting a cancer-friendly environment - The typical Western diet:
  - Low in fibre
  - High in fats
  - Increases oestrogen levels

Dietary Fat – Mechanisms of Tumour Promotion

• Low fat, Asian type diets, are protective against hormone dependent cancers:

  Low in fats  \rightarrow  Decrease oestrogen levels

  High in fibre
Protein – Mechanisms of Tumour Promotion

• World Cancer Research Fund: High animal protein intake may increase risk of a number of cancers, mainly colorectal, breast and endometrial.

• Animal protein, particularly dairy, raises the growth-stimulating hormone, insulin-like growth factor-1 (IGF-1).

• People with raised IGF-1 have 5.1 times higher risk of prostate cancer.

• Elevated IGF-1 promotes growth of cancer of breast, colon and lung.

• Plant protein / less protein / less calories - Decreases levels of IGF-1.

Inflammation – Mechanisms of Tumour Promotion

Oxidative Stress/Inflammation

Cancer proliferation, survival and migration
Inflammation – Mechanisms of Tumour Promotion

- Excess oils
- Higher ratio of Omega 6 to Omega 3 EFA
- Processed carbohydrates
- Products high in saturated / trans-fats

• Initiates a cascade of free radicals and inflammatory change.

(Esposito and Giugliano 2005)
Inflammation – Fat Ratios

• It is estimated that throughout most of the time of human evolution:

  – The ratio between Omega 6 and Omega 3 EFA was much lower (1 as opposed to today’s 11-15).

  – The ratio of Omega 6 to Omega 3 EFA should be between 3-1:1, as opposed to 15:1.

  – This ratio ensures maximal conversion to both EPA and DHA.

  – This corresponds to 5-8 percent of calories from Omega 6 PUFA and 1.25-2.5% of calories from Omega 3 PUFA (very minute amounts compared to Western consumption!).

(Simopolous 2000; Jenkins et al 2006, Hurley 1984; Masters 1996)
• Higher Omega 6 : Omega3 ratio can promote cancer, and inflammatory diseases.

• A ratio of 2.5:1 reduced rectal cell proliferation in patients with colorectal cancer whereas a ratio of 4:1 with the same amount of omega-3 PUFA had no effect.

• The lower omega-6 : omega-3 ratio in women with breast cancer was associated with decreased risk.
Dairy and Cancer

Possible mechanism:

- World Cancer Research Fund – Available Evidence:

<table>
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<tr>
<th>Probable Risk</th>
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<tbody>
<tr>
<td>Prostate</td>
<td>Kidney</td>
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<td>Ovary</td>
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- Consumption of milk increases blood levels of IGF-1, which has been associated with increased prostate and breast cancer risk.

(WCRF 1997; WCRF 2007; Chan et al.1998)
Cooking fish produces carcinogens called heterocyclic amines.

Fish is contaminated with cancer-causing environmental chemicals (like heavy metals and pesticides).

Omega 3 fish fats have beneficial effects on cancer; fish has less saturated fat than meat/dairy.

Fish / Cancer - Overall Effect is Unknown
Vegetarian Diets & Cancer

• The largest long-term study to date comparing disease rates among vegetarians and non-vegetarians is The 7 Day Adventists Study by the US National Institute of Health; 1958 - today:
  – After adjusting the data for age, gender and smoking, vegetarians had:
    • 88% lower risk of colon cancer.
    • 54% lower risk of prostate cancer.

• Numerous other studies: Cancer rates in vegetarians are 50-70% lower than in the general population.

(Fraser et al 2003)
Vegetarian Diets & Cancer

• However, not all vegetarian diets are protective:
  – Recent studies on British vegetarians: Similar rates of cancers to British omnivores.
    • Vegetarians were found to consume similar amounts of saturated fat, cholesterol (high consumption), fruit and vegetables (low consumption) to the rest of the population.

• Vegetarian diet is only protective if it is abundant in unprocessed plant foods!

(Fraser et al 2003; Key et al. 2003)
Fibre

- Diets high in fibre are protective against several types of cancer:
  - Colorectal (Jacobs, 1986)
  - Stomach (Modan et al, 1974)
  - Ovarian (Byers et al, 1983)
  - Endometrial (La Vecchia et al, 1986)
  - Breast (Lubin et al, 1986)

- It is possible that the major benefits come from the phytochemicals in the fruits, vegetables and wholegrains which are found alongside the fibre.

- We need a minimum of 30-35 grams of fibre per day for cancer prevention.

Reduction in serum estrogen concentration

Fibre

Increases transit time and decreases exposure to carcinogens

Reduces insulin levels.

Dilutes bile acids, believed to promote colon carcinogenesis.

(Stephen and Cummings, 1980a; Reddy et al., 1978; Reddy 1986; Rock et al 2004)
Phytonutrients

• New evidence: Official guidelines – 5 a day’ is not enough!!!
• US National Cancer Institute: Five is just the bare minimum.
• Men: At least 9 servings
• Women: At least 7 servings
• Children: At least 5 servings
• Main phytonutrients:
  – Carotenoids
  – Flavonoids
  – Organosulphides (isothiocyanates, sulphoraphane, etc)
• The highest amount of phytonutrients is present in fruits and vegetables.
Phytonutrients

Did you know?

• Only 21% of adult men and 19% of women in Ireland are meeting the current target - 5 portions a day (400g).

• Daily consumption of fruit and vegetables:
  – The Irish 276g
  – The British 350g
  – The French 467g
  – The Italian 479g
  – The Spanish 605g
Phytonutrients – Flavonoids

- American Journal of Epidemiology: Risk of breast cancer is doubled in people with low blood levels of carotenoids!

- American Journal of Clinical Nutrition: Risk of colon cancer is significantly reduced with high carotenoid intakes.

- Journal of the National Cancer Institute: Frequent consumption of tomatoes is associated with lower prostate cancer risk.

(Giovanucci et al 2002; Toniolo et al 2001)
## Phytonutrients – Flavonoids

<table>
<thead>
<tr>
<th>Brussels sprouts</th>
<th>Kale</th>
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<tbody>
<tr>
<td>Cabbage</td>
<td>Grapes</td>
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<tr>
<td>Cauliflower</td>
<td>Citrus fruit</td>
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<tr>
<td>Chinese cabbage</td>
<td>Apple</td>
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<tr>
<td>Cress</td>
<td>Pear</td>
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<tr>
<td>Daikon</td>
<td>Broccoli</td>
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<td>Kohlrabi</td>
<td>Turnip</td>
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<tr>
<td>Onions</td>
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</tbody>
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- Potent carcinogen detoxifiers – Inducers of detoxification enzymes.
- Powerful inhibitors of many cancers including human breast cancer cells.

(Guthrie and Carroll 1998; So et al 1996; Zhang and Callaway 2002)
Phytonutrients

- Antioxidants
  - Promote synthesis of detoxification enzymes
- Immune stimulants
  - Act as antiproliferative agents
- Angiogenesis inhibitors

(Elommm 1995; Talalay et al 1995; Wattenberg 1970; Engwerda et al 2001; Zawa and Duve 1997; Fotsis et al 1993)
Other Anti-Cancer Nutrients:

- Other anticancer substances:
  - Sulphur compounds of garlic (tumour growth inhibition; cancer formation inhibition).
  - Folate (fruits and vegetables; DNA protection).
  - Beta sitosterol (fruits and vegetables; tumour growth inhibition).

(Fleischauer and Arab 2001; Awad et al 1996; Duthie 1999)
Supplements and Cancer

• Position of the World Cancer Research Fund on synthetic antioxidants, vitamins and supplements:
  – Supplements should not be used for cancer prevention or by cancer survivors; We still do not know enough - nutrients in foods may have a different effect than isolated nutrients in a synthetic form: In numerous studies beta-carotene supplements increased the risk of lung cancer by up to 28%.

• However, beta-carotene from foods has a protective effect - effect of synergy with other nutrients?

(Fleischauer and Arab 2001; Awad et al 1996; Duthie 1999)
Western Diet - Cancer

- Diet that promotes cancer-friendly environment:
  - Low in fibre
  - High in fats
  - High in refined carbs
  - High in protein

  Increases estrogen levels
  Increases insulin levels

Western Diet - Cancer

- High energy intake.
- High animal protein intake. Increases IGF-1 levels.
- Dairy products.

(Heber et al 2006)
Western Diet - Cancer

- Low in phytochemicals.
- Low in fibre.

Decreased defences against cancer.

(Fliesen et al 1989)
• High in oils/fats.
• High in Omega 6 oils.
• High in processed foods and sugars.

Promotes oxidative damage, inflammation.
Obesity - Effects on Cancer Prone Cells

Pro-cancer effects
- Germ line mutation
- Cell prone to cancer
- Obesity
- Central obesity
- Adult attained height
- Metabolic syndrome
- n-6 PUFA
- Insulin-like growth factor
- Insulin
- Reactive oxygen species
- Aflatoxin
- N-nitroso compounds
- Heterocyclic amines
- Polychlorinated biphenyls
- Inflammation
- Phase I enzymes
- Zinc
- Curcumin
- Lycopene
- Vitamin A, E, C
- Organosulphur compounds
- Carcinogens, other environmental exposures
- Energy restriction
- Selenium
- Indole-3-carbinol
- n-3 PUFA

Anti-cancer effects
- Body composition
- Cell proliferation
- Organosulphur compounds
- Energy restriction
- flavonoids
- Retinoids

Normal cell

(WCRF 2007)
Recently, science provided some explanations for the naturopathic cancer treatments of Dr. Gerson, Dr. Bircher-Benner or the Hippocrates Center.

Low-fat vegan diet based on unprocessed plants, used by the naturopaths for the last century, has been shown to be very effective in cancer survivors in controlled studies.
Cancer Survival - Vegan Diet

- Vegan Diet and Sex Hormones:
  - Low fat vegan diet increases protein that binds excess oestrogens sex hormone binding globulin (SHBG) by 19% in the first 5 weeks-reducing the free oestrogens and thus their ability to stimulate existing tumours.

(PCRM 2002)
• Vegan Diet and Inflammation:
  – Low fat vegan diet is almost as effective as drugs in decreasing inflammation marker-C-reative protein.

• After 4 weeks, a vegan diet full of fruit and vegetables decreased inflammation 3 times more effectively than a control diet-based on the food pyramid.

Jenkins DJ, Kendall CW et al. JAMA 2003
Dr. Ornish’s Study on Prostate Cancer Survival; Journal of Urology: Vegan Diet and Lifestyle Changes Slow Prostate Cancer;

- In a group of men with prostate cancer PSA levels — a marker that tracks prostate cancer growth — decreased by 4 percent after one year on a low-fat vegan diet, complemented by moderate aerobic exercise and stress management.

(Ornish et al 2005)
Cancer Survival - Vegan Diet

- It is unusual for PSA levels to decrease without treatment.

- A control group saw its PSA levels rise by 6 percent.

- In addition, six of the men in the control group needed treatment during the one-year study period because their prostate cancer was progressing, but no one in the experimental group needed treatment.

(Ornish et al 2005)
The degree of compliance to a low fat vegan diet determined the degree of PSA decrease.

(Ornish et al. 2005)
Cancer Survival- Vegan Diet

• Dr. Ornish - breakthrough research:
  – Men with low risk prostate cancer who had opted for "watchful waiting", that is they had declined immediate surgery, hormonal therapy, or radiation and instead chose to follow an intensive nutrition and lifestyle regime while being monitored for tumour progression.
  – Results suggested that intensive nutrition and lifestyle changes may modulate gene expression responsible for prostate cancer growth.

(Ornish et al 2008)
Low Fat Vegan Diet Full of Unprocessed Plants

- Stimulates immune response
- Low in Omega 6
- Full of antioxidants
- Minimizes carcinogen exposure
- Lowers insulin
- Promotes synthesis of detoxification enzymes
- Lowers estrogens
- Lowers AGE, oxidative damage
- Lowers IGF-1

Creates powerful anti-cancer environment
Gerson Therapy

• Gerson therapy is perhaps the most well known dietary intervention in the field of cancer.

• Max Gerson wrote, “There is no cancer in normal metabolism” he believed. “Cancer cannot occur unless the functions of the liver, the pancreas and the immune system as well as other body functions have degenerated.”

• The Gerson therapy combines vigorous detoxification with nutrition aimed at restoring the body’s natural immunity and healing power.

Gerson Therapy

• The diet, the core of the therapy, includes organically grown fresh fruits and vegetables and thirteen glasses of freshly squeezed juices daily, taken at hourly intervals. The emphasis on fresh fruits and vegetables means the patient receives high levels of vitamin C, beta-carotene and other antioxidants that scavenge free radicals.

• The key detoxification method is the coffee enema, which patients are taught to self administer several times daily. Caffeine taken rectally is believed to stimulate the action of the liver, increase bile flow, and open the bile ducts so that the liver can excrete the toxic products of tumor breakdown more easily.

• For home study please read up on Dr Gerson’s method and Gabriel Cousens‘ wellness regime.

http://gerson.org/gerpress/the-gerson-therapy/
Dr Budwig discovered that omega-3 and omega-6 essential fatty acids play a critical role in protecting us from cancer, especially in the following three ways:

- They help maintain the health and integrity of cell membranes.
- They help promote oxygen transport into cells.
- They are required in the body’s production of prostaglandins.

Dr Budwig came to believe that cancer was a result, not of ‘too much’ cell growth, but of ‘faulty’ cell growth, or cell division. She proposed that this faulty cell division was caused by not enough essential fatty acids in the cell membrane along with an accumulation of harmful manmade fats in the cell membrane.
Budwig Diet

- The 2 key ingredients of the Budwig diet are flaxseed oil and quark or cottage cheese.

- The ratio of these may vary depending on the severity of the disease, the minimum ration is 1 tablespoon flax oil to ¼ cup of cottage cheese. Dr Budwig recommended anywhere from 3-6 tablespoons of flaxseed oil per ½ cup of cottage cheese per day. Using a blender is important to optimally mix the oil and cottage cheese and thus bind the essential fatty acids with the sulfur based compounds.
Macrobiotic Diet

- The macrobiotic diet draws on Eastern wisdom with its understanding of complementary forces (yin and yang) embodying a universal principle. Macrobiotics holds that a change in diet can not only prevent cancer but may also reverse the cancerous process and eliminate the disease even when conventional therapy is abandoned.

- It was introduced to Western society from Japan in the 1920’s. Macro meaning “large” and bios meaning “life”.

- The basic macrobiotic diet consists of:
  - 50-60% wholegrain cereals.
  - 25-30% vegetables.
  - Smaller amount of soups, beans and sea vegetables.
  - Occasional fish, seafood, seasonal fruits, nuts, seeds and condiments.

Macrobiotic Diet

• Many foods in the diet have been shown to reduce or inhibit cancer growth:
  – Miso soup, when eaten daily, has been shown to significantly reduce the frequency of stomach cancer in Japan.
  – Shiitake mushrooms have a powerful anti-tumor effect on mice.
  – Sea vegetables such as kelp, kombu and seaweed cause regression of tumors in animals. Sea vegetables also inhibit the absorption of radioactive products and help decontaminate the body after exposure to radio-active materials.
  – Cruciferous vegetables have recognized cancer inhibiting properties.

The China Study

• The China Study involved 100 adults in each of 65 provinces in China.
  – The Chinese eat far less animal protein than the Standard American Diet (SAD).

• They eat more calories per kg of body weight without apparent weight gain.
  – Campbell attributes this to thermogenesis from carbohydrate metabolism as compared to protein metabolism, and he claims that vegetarians feel more energetic and naturally exercise more, using up extra calories.

• They found that Chinese cholesterol levels are far lower than Western levels and decline as the amount of protein in the diet declines.
• The consumption of animal protein suppresses the production of active vitamin D. Low levels of active vitamin D in the body are correlated with a higher incidence of cancer, autoimmune disease and osteoporosis.

• The authors conclude that people who eat a plant food / vegan diet which avoid animal products will minimize or reverse the development of chronic disease.
Importance of Organic

- Organic fruits and vegetables are generally higher in vitamins, minerals, antioxidants when compared with conventional produce.
- Conventional agriculture which depends on heavy application of chemical fertilizers and pesticides may inhibit a plant’s natural production of cancer-fighting flavonoids.
- Pesticidal residue disrupts enzymatic activity and also has toxic, carcinogenic effects.
Essiac Tea

• The history of Essiac tea begins in the late 1800s, when a Canadian woman who was suffering with advanced breast tumors met an Indian medicine man who said he could cure her of her cancer.

• He showed her herbs in her local area, how to pick and brew them into a tea. He advised her to drink the tea every day, she did and made a recovery from the advanced cancer.

• The herbs were sheep sorrel, burdock root, slippery elm bark and turkey rhubarb root.
Anti-Oxidants

- Anti-oxidant vitamin, minerals and plant extracts have been increasingly highlighted as playing an important role in protecting the cell’s genetic material and membranes from free-radical damage, thus preserving normal cell reduction and all-round functioning.

- They are important in boosting immune function and resistance to infection.

- Most commonly used antioxidants are vitamin C, vitamin E and beta-carotene, zinc and selenium.
• Vitamin A deficiency impairs immunity by preventing normal regeneration of mucous membranes damaged by infection, and by decreasing the function of neutrophils, macrophages and natural killer cells. Vitamin A is required in the development of both helper T cells and B cells.

• Vitamin C supports the phagocytic and cytotoxic activity of lymphocytes and natural killer cells.

• Vitamin E increases T cell cytotoxic immune reactions. Higher serum levels of vitamin E are correlated with lower risks of cancer development.

• Destruction of cells by natural killer cells and production of interleukin-1, an immune regulating protein, are two immune functions known to be zinc dependent.
Healing Compounds in Food

• Researchers at the MD Anderson Cancer center reviewed a variety of phytochemicals found in fruits, vegetables and herbs to determine how they can treat cancer by influencing cell-signaling pathways. By disrupting important cellular signals, these agents can potentially stop cancer cell growth, prevent angiogenesis and cause cancer cell death (apoptosis).

• They identified and studied a long list of therapeutic agents, including:
  – 6-gingerol (found in ginger).
  – Anethole (found in anise, camphor and fennel).
  – Beta-carotene (found in carrots).

Healing Compounds in Food

- Capsaicin (found in chilli).
- Catechins (found in green tea).
- Curcumin (found in turmeric).
- Diallyl sulfide, S-allyl cysteine and allicin (found in garlic and onions).
- Diosgenin (found in fenugreek).
- Ellagic acid (found in pomegranates).
- Eugenol (found in cloves).
- Genistein (found in soybeans).

- Indole-3-carbinol (found in cruciferous vegetables).
- Limonene (found in citrus fruit).
- Lycopene (found in tomatoes).
- Resveratrol (found in red grapes, peanuts and berries).
- Silymarin (found in milk thistle).
- Ursolic acid (found in apples, pears and prunes).
Immune Enhancing Nutrients

• **Coenzyme Q10**: Enhances natural killer cell and T cell activity. It also increases cellular production of energy and prevents cellular damage by neutralizing free radicals.

• **Curcumin**: Derived from the spice turmeric, this antioxidant phytochemical enhances the phagocytic activities of macrophages in the immune system. It also inhibits the production of inflammatory cytokines that stimulate tumour growth.

• **Flavonoids**: These antioxidant nutrients protect the body by stimulating natural killer cells and by inhibiting critical enzymes that direct the inflammatory response, actions that work together to reduce inflammation and inhibit tumour growth.
Immune Enhancing Nutrients

• **Garlic**: Enhances natural killer cell function and may increase tumor cells antigenicity.

• **Green tea**: Promotes repair to DNA and encourages apoptosis of damaged cells. Also has antiangiogenesis properties, meaning it can prevent tumours from developing their own blood supply.

• **Indole 3 carbinol**: An antioxidant, neutralizes free radicals. Inhibits Human Papilloma Virus (HPV) Stops cancer cells growing and increases death rate of cancer cells. Restores p21 gene preventing synthesis of DNA for new cancer cells. Converts highly active oestrogen variants into safer oestrone.
Immune Enhancing Nutrients

- **Lycopene**: Has been shown to increase the cell-killing actions of NK cells.

- **Melatonin**: Increases cytotoxic activity of lymphocytes and helps prevent chemotherapy and radiotherapy induced bone marrow suppression. Melatonin also increases cytotoxic T cell immune actions.

- **Mushroom polysaccharides**: Stimulate lymphocytes and NK sells to secrete cytotoxines and interferon which activate immune-mediated cytotoxicity.

- **Resveratrol**: Fights yeast and fungal growth, protects and repairs DNA, kills cancer cells, prevents metastasis.
Immune Enhancing Herbs

• **Astragalus**: This herb enhances the cytotoxicity and activity of natural killer cells and macrophages and protects against reductions in blood cell counts induced by chemotherapy.

• **Echinacea**: Stimulates the activity of macrophages, natural killer cells, and lymphocytes; increases production of interferon and tumor necrosis factor alpha, and neutralises free radicals.

• **Pau d’arco**: Used to boost health and immune function. It is an anti-fungal, anti-bacterial, antiviral and anti-microbial agent.
Beta Glucans

• Work with a sugar protein called mannoprotein to stimulate and strengthen the immune system. There has been a number of clinical trials looking at the use of beta glucans in preventing post surgical infection (1), for blood count recovery after radiation and anti-tumor activity (2).

• The Memorial Sloan Kettering Cancer Centre in New York have opened numerous phase 1 trials for its use in supporting other cancer treatments (3).

• Medicinal mushrooms are a rich source of beta glucans.

(1) Babineau, TJ. Hackford, A, Kenler, A, Bistbrian B, Forse, RA. A Phase 2 multicenter, double blind, randomized placebo-controlled study of PGG Glucan in high-risk surgical patients
(2) Di Luzio, NR. Williams, DL. Comparative evaluation of the tumor inhibitory and antibacterial activity of solubilized and particulate glucan
(3) http://www.mskcc.org/mskcc/html/2874.cfm?IRBNO=05-073
B17 Amygdalin

• A powerful anti cancer complex B vitamin found in the pips of nitiloside rich fruits and plants including apples and apricots.

• This vitamin is lost to the modern Western diet, but present in the traditional diets of many isolated cultures.

• Interestingly enough research has shown that people from cultures eating a traditional vitamin B17 rich diet, like the Hunza tribe from the Himalayas, rarely contract cancer.
Medical Intervention: Surgery

• How surgery is used:
  – Diagnostic (biopsy).
  – To remove the cancerous tissue; termed ‘curative intent’ (e.g. mastectomy, prostatectomy, colon resection).
  – Palliative (to remove an obstruction).

• Surgical risks:
  – Bleeding
  – Infection
  – Thrombosis
  – Damage to local tissue
  – Reaction to anesthetic
  – Potential spread of cells
Pre-Op Preparation

• Stop smoking.

• Increase quality protein; essential for wound healing.

• Reduce caffeine – Green tea only, no coffee.

• Nutritional supplements:
  – **Vitamin A**: Required for epithelial and bone formation, immune function.
  – **Vitamin C**: Needed for collagen formation, proper immune function and as a tissue antioxidant.
  – **Bromelain**: Reduces oedema and bruising.
  – **Arginine**: Shown to stimulate the immune system, enhance wound healing and decrease rate of tumor growth (caution with herpes sufferers).

Osiecki H 2008 The physicians handbook of Clinical Nutrition
Post-Op Recovery

• To speed healing:
  – Homoeopathic Arnica and/or Staphisagria and continue all pre-op support – consider homoeopathic referral.

• Immune support:
  – Medicinal mushrooms
  – Immune system supportive vitamins and minerals.
  – Juicing

• Prevent constipation:
  – Fibre
  – Adequate hydration
Chemotherapy and Radiation

Impact of orthodox treatments – the challenges to nutritional therapy:
• Taste and olfactory changes
• Nausea
• Loss of appetite
• Mucositis
• Dysphagia
• Organ dysfunction
• Bowel obstruction
• Malabsorption / leaky gut
• Electrolyte imbalance
Chemotherapy

• **Types of use:**
  – Neoadjuvant: Prior to surgical procedure.
  – Adjuvant: After surgical procedure, aim of reducing recurrence risk.
  – Salvage: Aggressive, when other treatments have failed.
  – Palliative: Symptom management aim.

• **Side effects of chemotherapy:**
  – Nausea / vomiting
  – Constipation / diarrhea
  – Altered taste / smell
  – Infections
  – Mucositis
  – Fatigue
  – Lymphedema
  – Organ Failure
Potential Long-Term Side Effects of Chemotherapy

- Development of drug resistance.
- Increased risk of secondary cancers.
- Persistent marrow suppression.
- Infertility
- Cardiac damage.
- Persistent fatigue.
- “Chemo brain” – foggy mental processes.
Mucositis and Stomatitis

• Get dental care before starting treatment (if possible).
• Improve and increase oral hygiene.
• Glutamine
• Oral rinses - Aloe vera, liquid zinc, chamomile, slippery elm, Life Mel honey.
• Traumeel-S - A homeopathic remedy.
• Vitamin E - apply directly to sores.

Nausea and Appetite

Nausea:
• Ginger - Freshly diced ginger root tea.
• Acupuncture - Ideally the day before and day after each treatment.
• Homeopathic remedies e.g.
  i) Arsenicum album: Chilly person with anxiety and burning pains.
  ii) Ipecac: Violent nausea, little thirst, no relief from vomiting.
  iii) Nux Vomica: Irritable, sensitive, worse in the morning.

Taste changes and lack of appetite:
• Zinc
• Bland/mild tasting foods.
• Omega 3 fatty acids.

All supplements need to be checked for drug interactions.
Fatigue and Insomnia

Fatigue:
• CoEnzyme Q10
• Rest - As needed
• Exercise- Goal 30 minutes daily.
• L-carnitine

Insomnia:
• Homoeopathic melatonin.
• 5-hydroxy tryptophan (100-600mg per day).
• Chamomile tea after dinner.
• Valerian tea
• Relaxation activities

• All supplements need to be checked for drug interactions.

Skin Irritation

- Aloe vera gel
- Chamomile ointment
- Jojoba oil
- Emu oil
- Vitamin E cream
- Calendula cream
- Apricot oil
- Lavender essential oil 5 drops per 50g cream or 50ml carrier oil (do a skin patch test first).
Diarrhoea

- Glutamine (500-30000mg per day).
- Acupuncture
- Electrolyte rebalance
- Bentonite clay
- Probiotics
- Slippery elm
- Grated apple

- All supplements need to be checked for drug interactions
Constipation

- Increase activity
- Increase fibre
- Improve hydration
- Natural laxatives; figs, prunes, apricots, flax seeds
- Magnesium,
- Vitamin C
- Slippery elm
- Probiotics
- Water

- All supplements need to be checked for drug interactions
Peripheral Neuropathy

- Glutamine (1)
- Acetyl L Carnitine (2)
- Alpha lipoic acid (3)
- Methylcobalamin (4)
- Vitamin E (5)

Read more:
(1) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2697090/
(2) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1805703/
(3) http://www.ncbi.nlm.nih.gov/pubmed/12562664
(4) http://www.sciencedirect.com/science/article/pii/0022510X94902909
(5) http://www.neurology.org/content/64/1/26.full
Side Effects and Complications

Hematologic side effects:
• Thrombocytopenia
• Anaemia
• Neutropenia
• Leukopenia

Infection risk/complications:
• Leukopenia
• Mucositis / barrier compromise
• Spleen dysfunction
• Hospital acquired infections
• Port infections
Radiation

- Also known as radiation treatment or radiotherapy.
- Destroys rapidly dividing cells by damaging DNA.
- Different types:
  - External beam radiation.
  - Internal radiation therapy.
  - Systemic radiation therapy.
Side Effects

- Acute:
  - Skin irritation.
  - Damage to areas exposed to radiation beams.
  - Damage to salivary glands.
  - Hair loss (when head or neck treated).
  - Urinary problems (when abdomen treated).
  - Fatigue
  - Anaemia
  - Nausea with or without vomiting.
  - Localized burning.

- Most acute side effects disappear when treatment finishes, whilst some like salivary gland damage may be permanent.
Side Effects

• Chronic side effects:
  – Fibrosis (the replacement of healthy tissue with scar tissue).
  – Bowel damage causing diarrhoea and bleeding.
  – Memory loss
  – Infertility
  – Possibility of a secondary cancer (Dr Loiselle
    http://cancergrace.org/radiation/2011/05/09/secondary-malignancies/)
  – Impaired organ function.
Support During Radiation Treatment

- Exercise is associated with improved physical condition and less fatigue during radiation.
- Naturopathic diet
- Adequate rest and relaxation.
- Radiation burns:
  - Calendula
  - Sea Buckthorn oil
  - Honey
  - See also recommendations for skin irritation.

Yonsei Medical Journal Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2615347/
Hormone Therapy

Oestrogen receptor antagonists:
   – Tamoxifen, Fulvestrant, Toremifene

Aromatase inhibitors:
   – Anastrozole, letrozole

Gonadorelin analogues:
   – Goserelin

Side effects of anti-oestrogen therapy:
   • Hot flushes, joint pains, osteoporosis, DVT, memory/mood changes, sleep irregularities.

Types of cancers prescribed hormone therapy include:
   • Breast, ovarian, uterine, prostate and kidney.
Anti-Oestrogen Therapy Support

• Bone support:
  – Calcium/Magnesium/Vit D, Vit K, exercise.
• Joint support.
• Flax lignans (1)
• Acupuncture
• Homeopathy
• Sage tea
• Avoidance and identification of triggers/trigger foods for hot flushes.
• Exercise and lifestyle modifications.

Available at: http://www.ncbi.nlm.nih.gov/pubmed/15570004
Reducing Stress is Essential

• There is no conclusive evidence demonstrating that stress, in and of itself, causes cancer. However many studies have confirmed that ongoing stress can contribute to the development and progression of cancer.

• Stress can be physically damaging when the body gets accustomed to being out of balance. When being on high alert becomes the norm, homeostasis becomes foreign and unrecognizable.

• If the body’s systems are constantly vigilant and focused on perceived stressors, they cannot do their job of highlighting and killing cancer cells.
Stress and the Immune System

• Prolonged elevation of cortisol leads to impaired immunity. A review in the journal Lancet Oncology found that external stressors, as well as depression decrease activity of cytotoxic T cells and natural killer (NK) cells.

• The researchers conclude that “the persistent activation of the hypothalamus-pituitary-adrenal axis (and thus cortisol) in the chronic stress response and in depression probably impairs the immune response and contributes to the development and progression of some types of cancer.”

• One way stress is thought to favour cancer growth is by impairing DNA repair and/or apoptosis of damaged cells.

Aschuler and Gazella.(2010)The definitive guide to Cancer. Innovision Health Media
Movement as Medicine

- Enhanced immunity.
- Improved mood and self-image.
- Stronger muscles and bones.
- Reduced pain.
- Increased energy and vitality.
- Improved circulation of blood and lymphatic fluid.
- Improved ability to sleep.
- Improved digestion.
- Decreased risk of developing cancer.
- Increased survival after cancer diagnosis.
Additional Considerations

• Review your immune system and nervous system support lecture notes for further therapeutic tools.

• Relevant systems lectures will also provide information on how to best support the affected functions.

• Be sure to check your drug/herb/nutrient interactions and utilise referral to other health care providers.
Breast Cancer

• Normal breast cells must:
  – Develop at menarche.
  – Cycle with each menstrual cycle.
  – Develop the capability of lactation during pregnancy.
  – Lactate responding to the needs of the infant.
  – Protect the breast from bacteria introduced through the nipple.
  – Involute after lactation, but maintain the capacity to re-initiate lactation with subsequent children.
  – Involute further after menopause.
  – Repair structures in the situation of trauma, infection, oxidative stress or surgery.
Breast Cancer

• “Experimental studies have demonstrated that mammary cancer is a hormone depended multistep process that can be induced by a variety of compounds and mechanisms, that is; hormones, chemicals, radiation and viruses, in addition to or in combination with genetic factors.”

Breast Cancer

The breast is exposed to bacteria through the nipple.

The Epstein-Barr virus has been linked to invasive breast cancer.
Breast Cancer is Known to be Associated with Oestrogen

• Higher endogenous oestrogens increase risk.
• Lower reproductive lifetime increases risk.
• Anovulatory cycles (oestrogen dominance) increases risk.
• During pregnancy and for a time after the risk is increased.
• There is likely to be a lag-time between exposure and initiation of cancer.
Breast Quadrants and Breast Cancer

- Once oestrogen is metabolized it has to leave the breast via the upper quadrant, where most cancers occur.
Antiperspirant and Breast Cancer

• Aluminum based compounds are used as the active ingredient in antiperspirants. These compounds form a temporary plug within the sweat duct that stops the flow of sweat to the skin’s surface.

• Research suggests that aluminum based compounds may be absorbed by the skin and cause oestrogen like (hormonal) effects. Because oestrogen has the ability to promote the growth of cancer cells within the breast, some scientists have suggested that the aluminum-based compounds in antiperspirants may contribute to the development of breast cancer (1).

Antiperspirant and Breast Cancer

- Other research has focused on parabens, used in some deodorants as well as other toiletries, that have been shown to mimic the effect of oestrogen in the body’s cells (2).

- The hypothesis that parabens build up in breast tissue was supported by a 2004 study which found parabens in 18 of 20 samples of tissue from human breast tumours (3).

- Yet further research suggests that aluminium can free iron from transport proteins - free iron can generate inflammation, free radicals, lipid peroxidation and in the breast tissue increase cancer risk. Alcohol also frees iron from binding proteins.

IGF-1 and Breast Cancer

- IGF-1 is anti-apoptotic in breast cancer risk (1).
- IGF-1 and oestrogen are synergistic in the breast (2,3).
- IGF-1 levels in women with high oestrogen levels increase the risk of breast cancer (pre-menopause, HRT, obesity) (4,5).
- IGF-1 inhibits sex hormone binding globulin (SHBG) production in the liver (raising endogenous oestrogen levels) (6).


Lignans and Aromatase Inhibition

• “The inhibition of human preadipocyte aromatase activity by lignans and flavonoids suggests a mechanism by which consumption of lignan and flavonoid-rich plant foods may contribute to reduction of oestrogen-dependent disease, such as breast cancer.”

• “It is suggested that the high concentrations of lignans in vegetarians, by inhibiting aromatase in peripheral and/or cancer cells and lowering oestrogen levels, may play a protective role as anti-promotional compounds during growth of oestrogen-dependent cancers.”
Managing Oestrogen

Increasing 2/16 OH Oestrogen Ratio – This theory is not fully supported by current research.

- Isoflavones from soy
- DIM or I3C (cruciferous vegetables)
- Avoid alcohol
- Avoid obesity
- Flaxseed

Inhibition of β- glucoronidase:

- Bacteria in the gut that produce beta-glucoronidase increase entero-hepatic circulation of oestrogen.
- Calcium d-glucarate inhibits beta-glucoronidase.
- D-glucarate not only suppress cell proliferation and inflammation but also induce apoptosis by inhibiting beta-glucoronidase.
- Works synergistically with retinoic acid allowing lower doses of retinoic acid.
You Are the Gardner

Oestrogens are the Fertilizer

No Pregnancy
Late Age of Pregnancies
Fewer Pregnancies
Radiation
Age
Oxidative Stress

‘At risk tissue’ is the Garden

“Weed seeds” can cause DNA damage

Too many “weeds growing in the garden” can cause breast cancer

Increased Aromatase
Poor Metabolism
Impaired Excretion
Increased Alcohol

Increased Inflammation
Increased Alcohol