

Notes for a Talk on
The Immune System, Food, and Cancer: a Report on Recent Research
 (with an appendix describing a plant-based diet and another describing my encounter with lymphoma)

by
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(Versions the Notes below were delivered as talks to the Lymphoma Support Group of Ottawa on June 2, 2009, on June 4, 2013 and on December 6, 2016. It was given to the Leukemia Association of Ottawa on October 27, 2009, on April 24 2012, on May 26, 2014 and on January 24, 2017. Since September of 2011, earlier versions of these Notes have been posted on the website of the Canadian Breast Cancer Network <<http://www.cbcn.ca/index.php?pageaction=content.page&id=7424&lang=en>>. They are also now posted on the website of the Lymphoma Support Group of Ottawa <www.lsgo.ca>. This text has been revised many times, most recently on November 8, 2017/. It is mostly in point-form in order to make revision easy. You are welcome to share these Notes with anyone as long as you share the whole text and not an excerpt. Comments are welcome.)

These Notes are the result of a cancer survivor's continuing search for expert answers to a simple question:

- What diet will make the occurrence or recurrence of cancer less likely?
 - the Notes are especially concerned with cancers of the blood (such as lymphomas) but they are also applicable to other types of cancer because it is the immune system must that must cope with all forms of this disease
 - as no food is known to cause cancer of any kind, these Notes are essentially about the risks involved in eating or not eating certain kinds of food
 - there is much scientific evidence about these risks and it is not being well communicated

These Notes are a report on this research and do not offer original findings, although some questions may be novel; this report takes into consideration research that many advisors on health seem to have dismissed or overlooked or forgotten about

The Notes are presented in thirteen Parts followed by a list of references and two appendices. Appendix 1 describes my own diet—or how I have translated theory into practice--and a recipe for minestrone soup. Appendix 2 is a brief history of my experience of Non-Hodgkin's Lymphoma, a type of blood cancer.

When I began compiling these Notes about eight years ago, my main goal was to find out if there anything that I and other cancer survivors could do to reduce the risk of a recurrence of lymphoma. The Recommendations listed below remain my summary answer to this question.

As I point out at the end of Appendix 2 below (p. 51), I now also believe that my lymphoma may have been caused by an unrecognized sensitivity to certain foods

that caused chronic stress to the main part of my immune system. I therefore discuss the problem of food sensitivity in Part D below.

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Summary recommendations: The risk of developing or re-developing cancer of the blood (or any other cancer) can be reduced by doing the following:

1. Eating either a whole-food, plant-based diet (as recommended by T. Colin Campbell in Parts E, I, and K and Michael Greger in Part G) or following the Plant Programme--a Western adaptation of an Asian-type diet (as recommended by Jane Plant in Part F)
2. Eating and drinking each day many foods rich in anti-oxidants (see Part E)
3. Maintaining through either supplements or sun exposure or diet a blood level of vitamin D3 that is 100-150 nmol/L in the Canadian system or 40-60 ng /ml in the U.S. system (Part G). A supplement of about 5000 IUs a day is needed for an adult in the Canadian climate (see Part I)
4. Avoiding the eating dairy products in any form (Parts F, G, and H)
5. Avoiding a diet that is more than 10% protein (Parts F, G, and H)--a guideline that can be easily followed by eating a whole-food, plant-based diet
6. Avoiding nearly all processed foods
7. Avoiding eating any foods that cause chronic intestinal inflammation (Part D)

Part A: Introduction

My purpose today:

To invite you to consider to some ideas about the immune system and food

To share with you some sources of information about this topic--mainly books, articles, and websites--that I have found personally helpful

To draw your attention to some risk factors for cancers of the blood that seem well supported by scientific studies but are rarely communicated to patients by caregivers

To suggest steps that might be of practical value to you in counteracting cancers of the blood (leukemias, lymphomas, and multiple myelomas) as well as other types of cancer

If you are suffering from any of these blood cancers, nothing that I say today should be considered as an alternative to science-based medical protocols for the treatments of these diseases:

- medical protocols can give you a chance of recovery and these protocols are the same in every country in the world
- medical technologies are powerful and helpful
- the information that I'm about to share is complementary: it might have helped you to prevent developing cancer in the first place (if you happen to have it); it might improve your chances of recovery if you now have cancer; and it might help to prevent a relapse

At the end of my talk, I will give you a list of books and other material to read in case you would like to check out for yourself the research I will be referring to

My modest qualifications:

Like many of you, I'm a patient and a non-expert:

- I'm not an immunologist or microbiologist
- I'm not a nutritionist or dietician

But like you, I have some knowledge:

- I've been eating food three times a day for 82 years (my weakest qualification) and for eleven years since my bout with cancer
- I've have had a direct experience of a major disorder in my immune system (Primary Lymphoma of the Bone) [See Appendix 2 for a brief account of my lymphoma and a suggestion about its possible cause]
- I can read

- I gained some understanding of the principles of argument through teaching this subject for many years in a university and through my involvement with editing a scholarly journal
- I have no conflicts of interest
- I welcome suggestions from readers about the need for corrections or amendments

Part B: Sources of information and conflicts of interest

Conflicts of interest are a large problem when considering information about food and the immune system

- (i) *There are conflicts of interest among drug companies and physicians*
 - for some analyses of this problem, see Marcia Angell (2009), T. Colin Campbell (2006) pp. 192-194, 289-341; and Jane Plant (2007) *passim*, and Michael Greger's "Conflicts of Interest"
 - Angell "estimate[s] from the annual reports of the top nine U.S. drug companies that the amount physicians receive from the drug companies comes to "tens of billions of dollars per year" (p. 2 of the web download of her article)
 - she reports that a recent survey in the U. S. indicates
 - that two thirds of academic medical centers hold equity interest in the same companies that sponsor research within the same institution (Angell, p.3)
 - that 3/5 of medical chairs [in the U.S.] received personal income from drug companies (Angell, p.3)
 - for a comprehensive, detailed list of payments made by pharmaceutical companies to U. S. physicians, use the search engine at <https://www.cms.gov/openpayments/>
 - although similar data is not available for Canadian physicians, there is good reason to assume that payments to them are similar (see Kelly Grant)
 - drug companies and most physicians have little interest in the relation between food and disease and even less interest in the relation between food and health
 - the second of these relations does not form a significant part of the training of physicians
 - the drug industry is interested primarily in selling drugs for a profit in order to treat disease
- (ii) *There are conflicts of interest among scientists employed by the food industry*
 - the food industry in general is interested primarily in selling food for a profit and not in public health (see Marion Nestle in the readings below)
 - especially profitable is food that has a good taste, a good colour, a good texture, and a long shelf life
 - these qualities are often simulated by additives, some of which may not be conducive to health (See Peter Cox in the list of readings below for a description of some three thousand additives used in the production of industrial foods)
 - it is not legally necessary to list many of these additives on labels

- some scientists employed by the food industry, despite their conflicts of interest, are critical of the research of independent scientists about the adverse health effects of certain foods or additives
- the dairy industry and the beef, pork, and chicken industries employ scientists to promote their businesses
- Dietitians of Canada, which licenses dietitians and serves as the national accrediting organization for baccalaureate programs in dietetic education, is influenced by special interests in the food, soft-drink, and pharmaceutical industries (see Sybil Hebert); in the U.S.A. the Academy of Nutrition and Dietetics [formerly the American Dietetic Association] is influenced in a similar way (see Nestle (2001); see also L.I. Lesser, and T. Colin Campbell, *Whole* pp. 264-281)

(iii) *There are conflicts between some charitable societies and their advisors and financial donors*

- some charitable societies in the health-care field are partly funded by drug companies and/or by food companies and/or by financially dependent physicians and scientists
 - as a consequence, they have biases concerning the kind of research they are willing to support and the advice they are willing to disseminate to the public
 - for a discussion of this problem with specific examples in the U.K, see Jane Plant (2007) concerning the dairy industry; for recent Canadian examples, see Ashton and Matthew Embry concerning the MS Society of Canada and see Yoni Freedhoff (2007) concerning the Heart and Stroke Foundation

(iv) *There are sometimes conflicts on governmental advisory panels*

- in the U.S, some governmental advisory panels on food and health include scientists and/or physicians who are partly dependent on the drug or food industry for their income and thus have conflicts of interest
- in Canada, Health Canada has been instructed by the government to help drug companies bring their wares to market (see Terence H. Young)
- Canada's Food Guide has been drawn up by Health Canada with robust input from special interests in the food industry (see Southamstar Network; Ken Rubin; Yoni Freedhoff (2006), Yoni Freedhoff (2010); Norm Campbell et al).
 - the Guide rarely discriminates between whole foods and industrial processed foods with their additives
 - although the scientific rationale for the Guide recommends a protein intake of about 10% of calories, this rationale (and presumably the Guide) nevertheless allows for a much higher consumption of protein up to 35% of energy (or calorie) intake (see Health Canada, Stefa W. Katamay et al)
 - for a summary of research concerning the adverse health effects of a high protein diet in which protein accounts for 10% to 35% of energy intake, see Cornelia Metges & Christian Barth

- for a comment on how much protein (as well as fibre) are needed in a healthy diet, see Michael Greger's "Do Vegetarians Get Enough Protein"
- the Guide is partly based on the Recommended Daily Intake (RDI) of a set of specific nutrients (vitamins, minerals, fibers, etc) that are needed for the prevention of chronic diseases; but its scientific basis does not seem to have included a consideration of research about how whole foods with their thousands of phytochemicals, hormones, enzymes, and acid-base qualities affect human health
- in sum, Canada's Food Guide is partly based on a narrow selection of scientific studies and does not take into consideration much of the research that I will be referring to below

(v) *There are conflicts of interest in the media*

- for American examples, see Colin T. Campbell (*Whole*, pp. 231-246)

(vi) *The need for scepticism*

- the source of *any* information about the immune system and food should thus be scrutinized for conflicts of interest
- the main danger resulting from these conflicts is not so much the communication of misinformation by the drug, food and medical communities as a willingness to ignore, or to remain silent about, or even to ridicule certain important information
- these conflicts also have a bearing on priorities for research
- this bias-through-omission is very hard to notice, for the act of noticing depends on a prior knowledge of the omission itself
- interests and conflicts-of-interest may partly explain why vitally important scientific information about the immune system and food is not reaching many people, including even those afflicted with cancer
- information about nutrition from various kinds of professional experts should be taken seriously **only when these experts have no conflicts of interest** and only when their specific claims are well referenced to scientific studies carried out by persons who are also without conflicts of interest
- to the best of my knowledge, authors of the four, well-referenced books discussed below do not have conflicts of interest

Before referring these four studies, however, I would like to say a few words about the size and complexity of the immune system

Part C: *What every cancer survivor needs to know about the immune system*

What is the immune system?

It is a cellular and hormonal system for enabling certain special cells in our body to identify, destroy, and remember foreign things that are incompatible with our body.

- The special cells of the immune system include:
 - white blood cells of different kinds (and their cancerous hyper-production is called lymphoma).

- white blood cells or leukocytes come in three main types and several sub-types and each type has a special function
 - For a rudimentary description of these types, see Robert Berkow, pp. 806-810, 835-853; www.funsci.com/fun3_en/blood/blood.htm; Alice Roberts pp.346-349)
 - the three main types are as follows:
 - (i) innate leukocyte cells that respond in similar, inherited ways to various infections
 - (ii) a group of adaptive cells (namely B cells) that produce antibodies for the identifying and targeting pathogens
 - (iii) a second group of adaptive cells (namely T cells) that destroy targeted pathogens.
- The Wikipedia article on “bone marrow” notes that human bone marrow produces about 500 billion blood cells every day, and about 16% of these are lymphocytes—some 80 billion
 - cancers of the blood affect the white cells in one or another of their stages of development in bone marrow even before they circulate elsewhere
 - the white cells include:
 - the “blasts” or seeds of cells from which white cells are formed
 - their malformation is called leukemia (For an elementary description of the different types of leukemia, see Berkow, pp. 840-845)
 - the killer T-cells and the different types of antibody-generating B cells
 - their malformations have many different names depending on the type and sub-type (Diffuse Large B Cell, Mantle cell, etc)
 - (For a basic description of antibody cells, see Berkow, pp. 855-857)
- Red blood cells that have matured cannot become cancerous, for they shed their nucleus (including their DNA) as they grow
- A hemopathologist at the Ottawa General Hospital, Dr. Linda Lacroix, informed the Lymphoma Support Group of Ottawa in a talk given to the LSGO on May 4th, 2010 that all cancerous blood cells “look just like normal cells”; only their excessive quantity appears to be abnormal. Pathology reports are evidently based on what cells look like from the outside. (For a good description of how pathologists diagnose different types of lymphoma, go to www.lymphoma.org. At the bottom of the home page, select “Webcasts and Podcasts”; on this page, select “Understanding Lymphomas” and under this heading select “What is Lymphoma? A Pathologist's Perspective” by Randy Gascoyne, MD (2009))
- A distinguished microbiologist in California, Mina Bissell, has recently learned that all cells communicate with a surrounding "extra cellular matrix" [ECM]
 - A matrix [=“womb” in Greek] consists of proteins secreted by cells that make a microenvironment for the cells and tissue
 - The ECM of white blood cells is blood plasma [See the *Wikipedia* article on plasma]
 - The ECM contains many signals to cells
 - these signals helps to control the function of cells and the architecture of tissues made by them (e.g. a nose or elbow or brain or eye or a blood cell)

- Bissell has learned that gene expression is controlled by a "dynamic reciprocity" between the DNA of a cell and the signals it receives from cells in its surrounding matrix
 - No one knows yet how this language or communication works but it is a two-way street
 - Bissell has demonstrated that when cancerous breast cells are inserted within a relevant matrix they cease to be cancerous and when non-cancerous cells are removed from their matrix, they become cancerous
 - You can google Mina Bissell or find her giving a TED talk on Youtube or read about her on Wikipedia
- Cedric Garland has noted that calcium and Vitamin D are the main components of "cadherens" that help to keep blood cells closely associated within their matrices in bones
 - see the discussion of Vitamin D below.

The immune system is very complex and intelligent

- As we interact with our world, foreign things are encountered:
 - in the food we eat
 - in the air we breathe
 - in the substances that touch our skin, our mucous membranes, and our digestive system
 - scientists seem agreed that 70% to 80% of the lymphatic system is located around the intestine [source needed]
- these foreign things include:
 - pathogens (toxic bacteria and viruses)
 - allergens
 - certain kinds of harmful light
 - poisons
- these foreign things also include
 - any of our own cells which have been formed defectively during the process of cell division (or mitosis)

Causes of the very rapid reproduction of cells in an immune response include the following:

1. exposure to, or ingestion of, pathogens, allergens, and toxic substances in the environment
2. an infection within the body
3. hormonal mis-signaling
4. malnutrition
5. faulty gene expression or inhibition (when our DNA is inaccurately transcribed by our RNA while forming new daughter cells)
6. oxidation with free-radical damage
 - the most toxic substance that our cells encounter is oxygen because it forms harmful "reactive oxidative species"[ROS]
 - it has been estimated that ROSs make about 10,000 hits on every cell of your body every day [see Susan Aldridge, pp. 166-167]

--eating plenty of fruits and vegetables (with their antioxidants)
can help cells fend off the harmful hits of ROSs

7. food sensitivities or intolerances, which can cause inflammation
and lesions of the intestine where most of the white cells are
situated

8. a failure of certain "suppressive forces" (see Part I below)

--Scientists report that the human body has about 100 trillion cells—the exact
number is an educated guess and some scientists estimate the count as merely
“over 60 trillion”

--100 trillion may be expressed in figures as 100,000,000,000,000

--within each one of these cells is your DNA

--your DNA uses the same code that forms all living things, including
the mouse in your basement, the fly on your wall, and the tree in your
garden

--it is only the messages that vary, not the code

--about 3% of your DNA is used for the formation of protein structures
needed by your body

--about 97% of you DNA is not used or “expressed” in this way

--this part of your DNA was once referred to as “junk DNA” when
scientists did not understand its function

--it is now known as the “epigenome”

--scientists know that the epigenome regulates the expression
and non-expression of the protein-forming DNA genes

--molecular biologists know only a little about how the
epigenome exercises its control, which is called epigenetic
mutation

--gene expression can be either permanent or transient

--changes in expression can be effected by the application
to DNA of the following:

--hormones (including estrogen and IGF (insulin-like
growth factor)) (see Nessa Carey, 73 and below)

--fatty acids produced by bacteria in the gut (Carey,
73)

--certain drugs (Carey, 73)

--radiation

--certain globular proteins (called “histones”), which
form a core around which the DNA ribbon is
wrapped and which can modify gene expression
temporarily in at least fifty different ways (Carey,
68; see also Chris Woollams)

--certain groups of atoms, which can change the
expression of DNA semi-permanently:

--a “methyl” group (consisting of one atom of
carbon and three of hydrogen) can turn certain
genes on (methylation) (Carey 54-74)

--foods containing elements from which the
human body can synthesize methyl include

- certain animal products and many fruits, vegetables, grains, seeds, and nuts
 - an “acetyl” group (consisting of one atom of carbon, three of hydrogen, and one of oxygen) can turn genes off (acetylation) (Carey 54-74)
 - foods containing elements from which the body can synthesize acetyl include certain animal products and many vegetables, grains, seeds, and nuts
- Epigenetic modification can effect great changes in a body:
 - for example, when a caterpillar is transformed into a butterfly, the transformation is the result of the epigenetic expression of its unchanging DNA (Carey, 305)
 - likewise, when you were gradually transformed from a fetus into an adult, epigenetic modification effected this transformation and prevented a reversal (Carey, 19-22)
- as a Google search will quickly tell you, there is a whole new field of science, nutrigenomics, now under development in order to describe how gene expression can be affected by certain nutrients reaching the cell
 - for example, several “histones” (see above) are abundantly present in asparagus,
 - for example, in vitro and in vivo studies indicate that several food components can act against the replication of certain types of cancer stem cells
 - these components include “curcumin [a part of tumeric], sulforaphane [which is present in cauliflower], soy isoflavone, epigallocatechin-3-gallate [a component of green tea], resveratrol [a component of red grapes and red wine], lycopene [in tomatoes], piperine [in black pepper] and vitamin D(3)” [See Y. Li, Wicha MS, Schwartz SJ, Sun D]
 - for example, scientists at McMaster University, McGill University and elsewhere have recently published a study indicating that the risk of heart disease conferred by the expression of certain genes “appears to be modified by a prudent diet high in raw fruits and vegetables” [see Ron Do, Changchun Xie, Xiaohe Zhang et al]. Lymphomas are also known to be associated with the expression of certain genes [see Cherie Dunphy], but, to the best of my knowledge, the effect of diet on their expression still awaits investigation
 - for example, scientists at the Mayo Clinic report that people who have higher intakes of vitamin K (present in all green leafy vegetables, especially parsley) in their diet have a lower risk of developing Non-Hodgkin lymphoma (See James Cerhan et al).
 - The precise way in which Vitamin K protects against lymphoma is not understood by scientists. They have noted, however, that it can inhibit the action of certain “cytokines” (i.e. molecules that send signals between cells), and cytokines are involved in signaling

inflammation and in influencing the life-and-death cycle of cells

- about 1% of your body's cells, or about 1 trillion, form part of the immune system
 - as noted above, they originate and are fully formed in bone marrow and circulate throughout the body
 - they are then found in lymph glands and the spleen but most are concentrated in the gut
- in some animals, white cells have their own special circulatory system
- in human beings, white cells circulate as a result of our bodily movement or exercise
- all cancerous white blood cells can be variously distributed
 - cancerous cells that remain in the bone can cause "Primary Lymphoma of the Bone" even though there are no lymph nodes in bone marrow
 - or such cells can be widely dispersed or diffused in lymph tissue,
 - follicular lymphoma refers to cancerous white blood cells concentrated in the follicles of lymph glands, and
 - mantle-cell lymphoma refers to such cells concentrated in the cortexes of lymph glands, etc.
 - although all B cells are made in the bone marrow (where cancerous B cells sometimes remain and cause painful bone "lesions"), they are called "diffuse" because sometimes they spread out affecting many different parts of the body (e.g lymphoma of the lungs, lymphoma of the colon, lymphoma of the spleen, lymphoma of the heart)
 - in the lung and heart, cancerous B cells can cause fluid to accumulate or embolisms to form; in the colon, they can cause diarrhea
 - there are about 30 different kinds of lymphoma
- the biochemistry of cells is highly complex and not fully understood even by micro-biologists and bio-chemists so that, although cancerous white blood cells may look like normal cells on the outside, there may be differences within
- all cells in our body, including leukocytes, must constantly renew themselves through division
- when cells reproduce, their DNA can be altered through chance mutation or through injury from free radicals, or through epigenetic mutation (see above), which can be caused by inflammation
- as mentioned above, cells are complex things
 - they consist of several "organelles" (or cellular sub-units), including an organelle for our DNA
 - the outer membrane of a cell is a fatty fluid (Russell, 96)
 - the outer membrane of each cell has many thousands of openings, which include
 - some for receiving nutrients and discharging waste products
 - some for communicating with other cells bio-chemically

- some for receiving signals from hormones
 - a single cell can have from 500 to 100,000 receptors for a single hormone (Russell, 165)
- our genes and epigenetic modifications determine the proteins made by cells
 - but some proteins can take an alternative (or mirror-image) form that may be harmful, and scientists do not yet understand this process (Dawkins, 236)
 - cells also receive instructions from “extra-cellular matrices” (see Bissell above)
- the rate of division among leukocyte B cells when confronted with foreign entities is many thousands of times greater than the rate of division among many other types of cells, partly as a result of “somatic hypermutation” (see the Wikipedia article on “somatic hypermutation”)
 - the extremely high rate of cell division in our white blood cells may explain why they are susceptible to cancer, just as certain other parts of our body that have cells with a high rate of renewal are also susceptible to cancer (e.g. our skin, lungs, mucous membranes, breasts, ovaries, prostate gland, and colon)
- somatic hypermutation can change the receptors on a cell without changing its DNA
- the main function of this large number of immune-system cells and their high rate of renewal is to screen constantly the food we ingest and some thousand trillion bacteria that inhabit the body
 - as there are about ten bacteria in the body for every cell, the human body is really a kind of bio-dome (see Jessica Snyder Sachs, *passim*)
 - most of these bacteria are located in the gut, with smaller numbers on mucous membranes as well as on or in other parts of the body
 - in the gut, one of the main functions of bacteria is to help with the breakdown of food into some 26 amino acids (basic proteins) so that they can be digested (i.e. absorbed through the wall of the intestine) and then rebuilt into thousands of different complex proteins. (These proteins are not the same as food proteins)
- scientists know much less about our gut bacteria than they do about our cells
- a major research project is now underway to identify for the first time all the different types of bacteria and to describe their respective functions, especially in the digestive process [see National Institutes of Health]
 - A fatty acid called "butyrate," which microbes make in the gut from dietary fibre, is now known to play an important role in regulating the degree to which the immune system's response to food is inflammatory
 - For a discussion of "butyrate," use the search function on the website <nutritionfacts.org> to see Michael Greger's report entitled “Prebiotics: Tending Our Inner Garden”).

- Evidently, eating an abundance of fibre in fruits and vegetables is a necessary condition for the microbial production of this immune-system regulator.

Part D: The Immune System, the Gut, and Food Sensitivity

- the immune system and food are thus very closely related: leukocytes, like all cells, must have nourishment in order to live, yet food cannot be digested safely unless it has been broken down by bacteria that have been screened by the immune system's leukocytes
 - there is therefore a heavy concentration of "gut-associated-lymphatic-tissue" (GALT) in the digestive tract near the colon and the spleen
 - the spleen is an organ that acts like a lymph node for the filtering of white blood cells and other parts of blood
- persons whose digestion is impaired by gluten sensitivity (including persons with celiac disease) are more than four times more likely to develop Non-Hodgkin's Lymphoma than persons whose digestion is normal [See studies by E.V. Kane et al, and by Catassi C, Fabiani E, Corrao G et al]
 - gluten sensitivity causes the white B-cells to attach antibodies called immunoglobulins [IgG] to certain inflammatory proteins, especially gliadin, which is the glutinous protein found in wheat and, to a lesser extent, in barley and rye
 - the fact that gluten sensitivity is a risk factor for Non-Hodgkin's Lymphoma and certain other cancers has been observed but not explained, although one reason for the association seems obvious:
 - the area of the inner mucous surface of the gut with all its folds and villi is more than a hundred times larger than the surface of the skin
 - about 80% of the body's immune system is situated around the gut in order to ensure that all food elements being absorbed by the intestine are compatible with the body
 - irritation and inflammation of this huge area through the ingestion of incompatible foods places an extremely heavy burden on the immune system
 - much evidence indicates that chronic inflammation increases the risk of cancer [E. Shacter and SA Weitzman review this evidence]
 - a feeling of pain is often not associated with the presence of this irritation/inflammation
 - anyone suffering from lymphoma should therefore check for a sensitivity to gluten and dairy (which includes a protein similar to that of gluten)
 - gluten sensitivity, like cancer of the intestine, is difficult to diagnose and frequently goes undetected, although the presence of gliadin antibodies in stools, blood, or saliva can confirm the condition
 - food groups that rarely cause food intolerance include certain fruits, and nightshade vegetables

- scientists have also reported from their study of mice that certain food additives called emulsifiers may also cause inflammation in the intestine,
 - emulsifiers contain detergent-like molecules that enable oils to blend smoothly with non-oils and they are added to "ice- cream, margarine, packaged bread, and many processed foods" (see Benoit Chassaing et al)
- common symptoms of food intolerance include one or more of the following:
 - loose stools
 - mucous in throat or nose upon waking
 - gas and flatulence
 - shortness of breath,
 - COPD [chronic obstructive pulmonary disorder]
 - bloating
 - insomnia
 - steatorrhea (fatty stools)
 - caustic stools
 - constipation
 - tiny sores or blisters that appear at the same spots on opposite sides of the body (dermatitis herpetiformis)
 - depression
 - anyone who suspects a connection between food and depression can go to <foodforthebrain.org>, click on "depression" (a condition that is sometimes caused by a food intolerance or sensitivity) and answer the intolerance-related questionnaire
 - gluten sensitivity is well described and discussed in a book by Shari Lieberman and in a commercial video entitled "Gluten Sensitivity--What is it?" by Peter Osborne
 - the recent increase in gluten sensitivity is associated with a greatly increased use of the pesticide Roundup now sprayed on virtually all non-organic wheat fields just prior to harvest (see Anthony Samsel and Stephanie Seneff)
 - certain other auto-immune and inflammatory conditions (for example rheumatoid arthritis and lupus) also increase one's relative risk of developing lymphoma (Smedby)
 - as food intolerances are frequently tolerated for many years while they go unrecognized and undiagnosed, their associated risk for lymphoma (as well as for other disorders such as COPD) may be greatly underestimated
- May I now describe four books that contain important--and often overlooked--information about the immune system and food
 - these monographs are not inconsistent with each other in the information they contain, although there are some differences among them.
 - they are all written by well-qualified scientists without conflicts of interest

- they are all interested in, and knowledgeable about, the relation between food and disease as well as the relation between food and health

Part E: *The research of Richard Béliveau and Denis Gingras: anti-oxidants and phyto-chemicals*

--*Foods to Fight Cancer* is by two Quebec researchers, Richard Béliveau and Denis Gingras.

- both authors are research scientists in the Molecular Medicine Laboratory attached to the St Justine Hospital in Montreal
- their book is clearly written and beautifully illustrated —nice enough to be on any coffee table.
- it includes the following:
 - a statement about our risk of developing cancer (now 1 in 3)
 - a statement concerning the risk factors for developing cancer (one-third of all cancers are related to poor dietary habits or the food we eat)
 - an Atlas of the world showing the incidence of cancer (p.17) which indicates that Asia has relatively little cancer while the West has high rates of the disease
 - tables indicating that diet is far more important than race in determining who gets cancer
 - a brief description of the general characteristics of the cell\
 - a summary of the conventional stages of cancer growth: initiation, promotion, and progression
 - for modifications of this conventional view, see the work by Mina Bissell (discussed below) on inter-cellular communication and the work by Cedric Garland (also discussed below) on the DINOMIT model of cancer
 - both Bissell and Garland offer important ideas about the initiation phase of cancer
 - a brief account of various medical ways of treating cancer
 - a short history of human food
 - hominids appear about 15 million years ago
 - cooking starts about 300,000 years ago
 - homo sapiens appears about 200,000 years ago and eats food that is hunted and/or gathered
 - then two big revolutions occur:
 - the agricultural revolution about 8000 years ago (see Diamond)
 - the industrialization of food that occurred just yesterday (see Pollan (2007))
 - until just yesterday, our only medicines were foods (including herbs and spices) and our knowledge about what foods we should eat was a part of traditional culture
 - Béliveau and Gingras observe that food contains many powerful anti-cancer agents and eating the right foods is really a kind of nutrition therapy that is non-toxic
 - they emphasize the importance of phytochemicals (phyto=plant)

- about 4,000 of these chemicals have been identified and very little is known about them
- there are about four major families of them, six classes, and 11 sub-classes
- some phytochemicals are able to absorb free radicals and render them harmless
- others are able to block carcinogenic initiation in the cell
- still others can block the promotion and progression of cancer cells
- the rest of their book is about the delightful properties of specific foods that can fight cancer
- these foods include:
 - cabbage,
 - onions and garlic,
 - soy,
 - turmeric,
 - green tea (especially Sen-cha tea)
 - several types of berry
 - omega-3 fatty acids
 - tomatoes
 - red wine and
 - chocolate (with 80% cocoa)
- Béliveau and Gingras also present (p.133) a useful table entitled "Antioxidant activity of selected fruits and vegetables." For a further discussion of antioxidants, see the survey of 3139 foods by Monica H. Carlsen et al. and several informative videos by Michael Greger at www.nutritionfacts.org (also listed below).

Part F: *The research of T. Colin Campbell: protein, dairy, Asian diets, a whole-food, plant-based diet (p. 16)*

- A second book is *The China Study* by T. Colin Campbell and his son Thomas M. Campbell
 - Colin Campbell is a very senior U.S. scientist with no conflicts of interest
 - before retiring he was a nutritional bio-chemist at Cornell University.
 - he co-authored the world's largest epidemiological study on diet and mortality (see Chen Junshi et al)
 - *The China Study* is a layman's summary of some of his academic research
 - Campbell also wrote many important articles (all published in highly reputable journals) on the effect of diet on cancerous cells in the livers of rats and mice.
- he learned from his epidemiological study in China [see Junshi et al] that many types of cancer (including cancer of the immune system, breast cancer, and prostate cancer) are quite rare in that country and that the traditional diet of the Chinese consists of less than 10% to 12% protein

- from his experiments with rats, he also discovered
 - that a low (5%) protein diet dramatically and consistently represses tumour initiation and promotion and does so 100% of the time (pp. 50-53)
 - that, when dietary protein exceeds 10% of the diet (an amount adequate for bodily growth), pre-cancerous “foci” cells increase dramatically (p. 57)
 - that “not all proteins are alike” in their effect on cancerous cells
 - that certain plant-based proteins (soy and wheat) do not promote pre-cancerous cells (p. 59)
 - that a certain animal-based protein (namely casein, which is the main protein in cow’s milk) is a strong promoter of cancerous cells
 - that experiments on mice produce results similar to the experiments on rats (p. 59)
 - that similar results were obtained when different toxic elements were used to initiate the tumours

- Campbell and his colleagues also studied the dietary effect of fish protein, dietary fats, and carotenoids on cancers of the pancreas and liver in rats:
 - they learned that “nutrition was always far more important in controlling cancer promotion than the amount of the carcinogen used to initiate the cancer”
 - that nutrients from animal-based food increased tumour development
 - that nutrients from plant-based food decreased tumour development

- Although Campbell’s descriptions of the effects of diet on tumours do not refer explicitly to the immune system, one can infer that the immune system must have been directly involved in producing these effects.

- Campbell describes the immune system in Chapter 9 of his book and discusses possible and/or probable links between animal-based food (especially dairy) and seventeen autoimmune diseases, including type I diabetes, rheumatoid arthritis, and multiple sclerosis. (For a discussion of pros and cons of limiting protein calories, especially animal protein, see Campbell’s comments in Campbell and Cordain, “The Protein Debate”)

Part G: *The reflective inquiry of Jane Plant: dairy, natural hormones, food additives, traditional Asian diets, the Plant Programme*

- A third helpful book is Jane Plant’s *Your Life in Your Hands: Understand, Prevent, and Overcome Breast and Ovarian Cancer* (fourth edition, 2007)
 - although the first edition of this book was published in 2000 and more than four million copies have been sold worldwide with translations into fifteen languages, I know of no edition of it ever being stocked in bookstores in Canada
 - it makes a very important contribution to an understanding of the immune system and food and cancers of all kinds
 - like T. Colin Campbell, Jane Plant is a scientist and a university professor not a physician (although she has recently been made a Fellow of the Royal Society of Medicine in the U. K. for her outstanding contributions to medicine)
 - she has a strong interest in the relation of food to both health and disease

- after writing *Your Life* ...she wrote important books (listed in the reference section) on the relation between diet and depression, between diet and osteoporosis, and between diet and prostate cancer
- Plant is respectful of physicians as applied human biologists and believes that medical protocols should be followed when they are based on the best science available
- she laments, however, that certain medical protocols are not in accord with well-established scientific information
- she receives no consulting fees from any drug company or the food industry and thus has no conflict of interest
- her special field is geo-chemistry, and her research has included work on trace minerals in Asia in relation to environmental problems and the health of both human beings and animals
- for many years she was the Chief Scientist for the British Geological Survey
- her interest in cancer was the result of her own remarkable experience with this disease and her remedy, which she describes in the first part of her book
- Plant's interest in cancer then took the form a general review of some 500 scientific studies relating to the disease
- she also describes a set of practical dietary guidelines, based on this scientific review, for countering several forms of the disease
- her review of literature encompasses work done in both human and veterinarian medicine as well as in epidemiology, nutritional biochemistry, and in her own field of geo-chemistry
- Plant's review, like the research of Campbell, focuses on what has been learned by scientists about the effect of different kinds of proteins on human health and the risky properties of certain natural hormonal proteins in dairy products, including milk, cheese, yogurt, and beef.
- her analysis is based on an abundance of references to articles in peer-reviewed scientific journals, including some articles by Campbell
- she reports:
 - that cow's milk, like the milk of all mammals, contains naturally about a dozen growth hormones, the most important being Insulin Growth Factor-I (or IGF-I)
 - that the amount of IGF-I is proportionately much greater in cow's milk than in human milk
 - that the growth hormones in milk and beef are the cow's way of signalling to the calf to grow about 1 kilogram per day (Plant 86)
 - that when cow's milk or any of its derivatives (cheese, cottage cheese, yogurt, etc) are consumed as food by human beings, these hormones are not destroyed in the gut (as a few scientists claim) but send the same signal to our cells for extremely rapid growth and delayed cell death (apoptosis)
 - that scientific studies by independent investigators indicate that eating or drinking dairy products increases significantly the risk of breast cancer in women and prostate cancer in men
 - that eating dairy products may also increase the risk of colon cancer

- much research has been done on the relationship between Insulin-like Growth Factor-I and other kinds of cancer, especially cancers of the immune system
 - IGF-1 is associated with lymphoma, thyroid cancer, colon cancer, and pancreatic cancer
 - for an investigation of IGF-I and lymphoma, see J. Gjerset
 - for a study of the association between IGF-1 and cancer of all kinds in older men, see Jacqueline M. Major et al
 - for a summary of research about milk and other diseases, see Justine Butler
- as well as identifying certain foods that increase the risk for several types of cancer, Plant describes the kinds of foods and dietary principals that are likely to reduce this risk--the Plant Programme
 - in collaboration with Gill Tidey (a dietitian), she has published a book on this subject with the same title
 - in a nutshell, she recommends certain lifestyle factors and a Western version of a traditional, Asian-type diet
 - her Plant Programme for eating in the Asian way is not a diet but a set of guidelines
 - citing a study by T. Colin Campbell, Plant notes that, if one eats the way the Chinese do, one will actually consume more calories (2630 per day on average) than in the U.S. (2360 per day)
 - the big difference between the Chinese diet and a Western diet lies in the sources of those calories:
 - in China, approximately:
 - 1% of one's calories comes from *animal* protein (not 11% as in the U.S.)
 - 5% come from alcohol (not 7%)
 - 10% come from vegetable protein (not 6%)
 - 14% come from fat (not 36%)
 - 70% come from carbohydrates (not 40%)
 - in China, the people
 - consume far less food-based hormones (especially those in dairy and beef) and far more soy
 - eat far more foods that protect against cancer (e.g. fruits and vegetables)
 - Plant recommends that the body have a good supply of micronutrients, especially a high quality fish oil and foods containing three nutrients necessary for normal cell division (iodine, zinc, and folic acid)
 - one symptom of a deficiency of these latter three nutrients is itchy skin or skin with lesions
 - iodine, zinc, and folic acid all have natural sources (which you can look up through Google)
 - Plant recommends that
 - one reduce the intake of free radicals that can damage DNA (e.g. Plant recommends against the micro-waving of food)
 - one eat foods that are fresh and organically grown
 - one reduce to a minimum food that has been refined, tinned, preserved or overcooked
 - one provide for a maximum of choice and variety in one's diet (at least 30 different foods a day)

- Plant and Tiedey also recommend the following:
 - eating whole foods rather than supplements
 - being careful about food packaging because of certain chemicals in packaging that can mimic growth hormones
 - cooking food lightly or eating it raw
 - avoiding harmful substances in the environment (e.g.dioxins, pcb s, etc.)

Part H: Michael Greger's reports at <nutritionfacts.org> and his book *How Not to Die*

- Michael Greger is an American physician with an interest in clinical nutrition
- he developed this interest in his youth after seeing his grandmother live for thirty-one years after being diagnosed with end-stage heart disease
 - she followed the low-fat, unrefined carbohydrate diet recommended by Nathaniel Pritikin (see Wikipedia: Pritikin) and Greger was impressed
 - while attending the Cornell University School of Agriculture and Life as an undergraduate he wrote informally about mad-cow disease and published his concerns on his website [Wikipedia: Greger]
 - in 1998, "he appeared as an expert witness testifying about bovine spongiform encephalopathy [mad-cow disease] when cattle producers unsuccessfully sued [Oprah Winfrey](#) for [libel](#) over statements she made about the safety of meat in 1996" [Wikipedia: Greger]
 - before graduating from Tufts University School of Medicine in 1999, he worked on issues related to mad-cow disease at Farm Sanctuary--a safe haven for animals in the U.S.A.--and became a vegan after witnessing the treatment of livestock on commercial farms
 - after graduation, he published a book in 2004 critical of the Atkins diet and other low-carb diets
 - he also visited medical schools urging them (unsuccessfully) to revise their curriculum by including instruction on nutrition
 - in 2005, he was appointed to "the farm animal welfare division of the [United States] Humane Society as Director of Public Health and Animal Agriculture" [Wikipedia: Greger]
 - in 2008, he (among others) testified before the U.S. Congress concerning the use of "downer" animals by the Westland Meat Packing Company
 - as a result of this case and public concern about possible mad-cow disease in downer animals, the U.S. Department of Agriculture removed some 143 million pounds of beef from the market
 - some of this beef had been destined for school-lunch programmes
 - in 2011, Greger made a major contribution to public health by establishing a website to make available to the public scientific research on nutrition: <nutritionfacts.org>
 - Greger describes this website as "the first science-based, non-commercial website to provide free daily videos and articles on the latest discoveries in nutrition" [www.drgreger.org/]

- he was given the seed funding for www.nutritionfacts.org by the charitable foundation of two generous and thoughtful Canadians, Jesse & Julie Rasch [see www.raschfoundation.org]
- the Jesse and Julie Rasch Foundation recently commissioned and published an informative paper entitled "Hodgkin's Lymphoma: A Product of the (Micro)Environment?"
- to achieve the stated goal of this website, Greger employs a research staff of 19 who are assisted by many volunteers
- together they must read and about 10,000 articles on nutrition that are now published annually by the scientific community
- the preparation of Greger's bi-weekly reports on research involves making a short video
- each video report includes the following:
 - images of the research papers under discussion
 - a text of Greger's remarks
 - a list of all papers cited with links to their original sources so that readers may have easy access to cited research
- the preparation of a report also involves correlating new literature with older research about what foods are most conducive to health
- www.nutritionfacts.org contains two reports on how Greger selects his material and makes his reports: "Behind the Scenes at NutritionFacts.org" and "The Philosophy of NutritionFacts.org"
 - more than a thousand of these reports can be easily accessed through the search function on the website's home page
- nutritionfacts.org includes reports referring to lymphoma and such topics as the following:
 - organic vs. non-organic food
 - types of consumed meat
 - food antioxidants
 - neutropenic diets
 - turmeric
 - chronic exposure to raw animal proteins
 - dioxins and viruses in poultry
 - fibre
 - blueberries

In 2015, Greger, with Gene Stone, wrote *How Not To Die* (New York, Flatiron Books)

- Part 1 of this book is based mainly on the many reports written for nutritionfacts.org
 - like Campbell, Greger is interested not only in the effects of eating particular foods but also in the effect on health of whole diets
 - each of its 15 chapters deals with the relation of nutritional research to a particular disease or condition (heart disease, lung diseases, brain diseases, , infections, diabetes, etc)
 - Chapter 5, entitled "How Not to Die from Infections" is deals partly with the immune system and how to strengthen it through diet and exercise
 - it is also concerned with how to avoid many diseases that have migrated from other species to human beings

- Chapter 9, entitled "How Not to Die from Blood Cancers," includes a discussion of lymphoma (while other chapters discuss cancers of the digestive system, breast, and prostate)
- Greger notes that there are three main types of blood cancer: leukemia, lymphoma, and myeloma
 - these types have the following occurrence rates in the U.S. each year:
 - leukemia: 52,000 diagnosed; 24,000 deaths
 - lymphoma 70,000 diagnosed; 19,000 deaths
 - myeloma 24,000 diagnosed; 11,000 deaths
- Foods associated with a decreased risk of blood cancer include the following:
 - a plant-based diet (as indicated by research at Oxford noted elsewhere)[T.J. Key et al] -
 - three or more servings of green, leafy vegetables and citrus fruits a day as indicated by a study of the survival rate done at Yale University's School of Public Health of some 568 women with Non-Hodgkin's Lymphoma over about eight years [Han X, Zheng T, Foss F et al]
 - dietary antioxidants found in vegetables and fruits as indicated by the Iowa Women's Health Study that "has followed more than 35,000 women for decades" [Thompson CA, Habermann TM, Wand AH et al]
 - the abstract of this Report indicates that a "greater total intake of fruits and vegetables ... [especially] yellow/orange ... and cruciferous vegetables, ... broccoli ... and apple juice/cider ... were associated with lower NHL [Non-Hodgkin's Lymphoma] risk. There were no strong associations for other antioxidant-rich foods, including whole grains, chocolate, tea or nuts. Overall, these associations were mainly observed for follicular lymphoma and were weaker or not apparent for DLBCL [Diffuse Large B-Cell Lymphoma]."
 - foods containing antioxidants as indicated by research done at the Mayo Clinic involving 603 cases of persons with lymphoma and a control cohort of more than 1000 [Holtan SG, O'Connor HM, Fredericksen ZS]
 - this study reports that the foods involving an inverse correlation with lymphoma risk included vegetable oils and vegetables but not fruits, whole grain bread, peanuts, chocolate candy, green tea and black tea; supplements were without effect
 - Greger reports that this research indicated that those who ate five or more servings of green leafy vegetables a week had "roughly half the odds of getting lymphoma compared with those who ate less than one serving a week" (p. 157)
 - Greger reports that acai berries, cloves, cinnamon, and purple cabbage are all rich in antioxidants according to the U.S. Department of Agriculture database [Haytowitz DB, Bhagwat SA]

- Foods associated with an increased risk of non-Hodgkin's lymphoma in older women include the following:
 - animal fat, saturated fat, and monounsaturated fat (but not vegetable or polyunsaturated fats), animal protein (but not vegetable protein or milk or dairy products) [Chiu BC, Cerhan JR, Folsom AR, et al.]
- Greger discusses several studies indicating an association between risk of lymphoma and exposure to meat, especially poultry
 - higher than normal rates of blood cancer are found among "farmers [of animals], slaughterhouse workers, and butchers"
 - although the reason for this association is not understood, researchers have suggested it might involve the presence of certain viruses in animal flesh (which can modify DNA) or "drugs such as antibiotics" or dioxins [pp.160-162]

In Part 2 of *How Not to Die*, Greger describes his own personal diet--a matter not discussed on his <nutritionfacts.org> website--so that the reader can benefit from everything he has learned about the practicalities eating

--with this goal in mind, he offers two simple tools:

1. "a Traffic Light [TL] system for the quickly identify the healthiest options"

--the Traffic Light system has three categories:

Green: unprocessed plant foods

Yellow: processed plant food and unprocessed animal foods

Red: ultra-processed plant foods and processed animal foods

- the TL system includes a helpful definition of "processed" and an explanation of the inadequacy of the U.S. Department of Agriculture's Dietary Guidelines for Americans--a document with shortcomings similar to those in Canada's Food Guide for Healthy Eating
2. "a Daily Dozen checklist" for including the healthiest foods in one's diet
 - the Daily Dozen checklist refers to the following:
 - Beans (including lentils, edamame, and tempeh): 3 servings
 - Berries: 1 serving
 - Other Fruits (including apples, dried apricots, avacados and 24 other fruits): 3 servings
 - Cruciferous vegetables (including arugula, cabbage, collard greens, kale, radishes, turnip greens, and watercress): 1 serving
 - Greens (including arugula, beet greens, collard greens, kale, mesclun mix, mustard greens, sorrel, spinach, Swiss chard, turnip greens): 2 servings
 - Other Vegetables (including some eighteen from land and sea): 2 servings

- Flaxseeds (golden or brown): a tablespoon, ground
- Nuts and Seeds (including almonds, brazil nuts and eleven other kinds as well as nut/seed butters): 1 serving of a 1/4 cup
- Herbs and Spices (including 32 of them), especially turmeric
- Whole Grains
- Beverages
- Exercise

Greger then discusses each of these food types in 12 separate chapters, with comments on such matters as the following: serving sizes, the problem of additives, the nutritional qualities of certain foods within each category, packaging, the physiological effects of eating certain foods, frozen vs fresh food, recipes, etc

- these chapters are a handbook of culinary wisdom supported by scientific studies

The last part of his book (pp. 413-554) lists his references--some 2634 scientific articles.

- I know of no other book on nutrition and disease that is based on such a wealth of scientific material

Part I: *Vitamin D: recommendations, inter-cellular communication and the DINAMITE theory of cancer*

- Many cells in the immune system have receptors for Vitamin D, and the immune system cannot function well without this hormone
 - scientists at Oxford University have learned that vitamin D
 - interacts with receptors in more than 30 tissues and organs of the body (Oliver Gillie, p.7),
 - occupies some 2776 “genomic positions” and thousands of sites in lymphoblastoid cells i.e. cells that are developing from blasts (=seeds) or stem cells (see Ramagopalan et al)
 - influences the expression of some 229 genes (see Ramagopalan et al)
 - scientists at the Boston University Medical Center (see A. Hossein-Nezhadet al) have learned through an analysis of white blood cells
 - that “Vitamin D3 supplementation . . . was associated with at least a 1.5 fold alteration in the expression of 291 genes”
 - that “seventeen of these genes have been shown to be important for transcriptional regulation, immune function, response to stress and DNA repair”

- and that “any improvement in vitamin D status will significantly affect [the] expression of genes ... [indirectly] linked to cancer, autoimmune disorders and cardiovascular disease”
 - Vitamin D evidently helps to regulate cellular differentiation and proliferation as well as cell death (apoptosis) and the formation of blood vessels (angiogenesis)
- for a description of the natural sources of this vitamin and its role in the immune system, see Colin Campbell’s comments in his appendix to *The China Study*
- see also the study listed below by M. Drake and others (who have declared that they have no conflicts of interest)
- Drake and his colleagues found that 50% of the hundreds of Diffuse-Large-B-Cell Lymphoma patients whom they studied at their clinics in the northern U.S. states of Minnesota, Iowa, and New York were deficient in Vitamin D and that the those patients who were deficient had a significantly lower overall and event-free survival rate associated with their treatments
- until recently, there has been disagreement about what constitutes a healthful level of Vitamin D
- from 1968 to 2010, the RDA (Recommended Dietary Allowance) was 400 to 600 International Units (IUs) daily
 - in 2010, the RDA was raised to 600 IUs for persons under 70 and 800 IUs for persons age 70 and over) with a recommended possible maximum of 4000 IUs (Institute of Medicine)
 - in 2014, scientists discovered that a mathematical error in the computing of the RDA for D had led to an RDA that was too low by a factor of 10 (see Paul J. Veugelers and John Paul Ekwaru).
- scientists now know
- that the current RDA recommendations are far too low (see also John Cannell, Cedric Garland, Oliver Gillie, William Grant, and Reinhold Vieth)
- many physicians and scientists now recommend that persons living in the northern latitudes (above 35 degrees latitude) obtain four to five thousand units a day of this hormone, especially when the sun is low in the sky.
- there is reason to believe, however, that the beneficial effects of even large amounts of vitamin D supplements may be totally negated by Vitamin A supplements in the form of fish-oil-based retinal; the absorption of Vitamin D, however, is not blocked by Vitamin A in the vegetable forms of beta-carotene (see Cannell, February 2010)
 - a panel of scientists advising the “D*Action” campaign sponsored by GrassrootsHealth.net are advising that everyone should take whatever quantity of Vitamin D3 is needed to ensure (through testing) that their [blood] serum level of 25(OH)D is in the range of 40-60 ng/ml or 100-150 nmol/L
 - for a summary of some research that is basic to this campaign, see the video talk by Carole Baggerly
 - I have been taking 5000 IUs a day for the past three years and my

- 25(OH)D level is currently 126 nmol/L –or about right
- one of the scientists associated with the “D*Action” campaign, Dr Cedric F. Garland, observes in two publications listed below
 - that Vitamin D is necessary for the adherence of developing cells to their particular community of cells
 - that the adherence of cells is a necessary condition for the communication among cells that regulates their normal growth
 - that an untimely disjunction (or separation) of cells makes possible the development of cancer because a separated cell can no longer receive the signals it needs from other cells to develop normally and is at liberty to mutate in uncontrolled ways
 - that the disjunction (or separation) of cells should therefore be recognized as the first stage of cancer development
 - although blood cells circulate freely or diffusely throughout the body when mature, all types of blood cells develop from stem cells joined closely together in niches of bone marrow where good communication among them helps to regulate their growth (see the articles on “hematopoiesis” and “bone marrow” in Wikipedia)]
 - for a detailed description of Garland’s “DINOMIT” theory of cancer development, the first stage of which is cell “disjunction,” see his lecture and article listed below
 - Garland’s theory should be read in the context of work by Mina Cohen on inter-cellular communication
 - for a bibliography of scholarly research relating specifically to vitamin D and lymphoma, go to www.vitamindcouncil.org, click on the Research tab, scroll down to Lymphoma, and select this heading.
 - Several of the studies listed there indicate that there is an inverse relation between sun exposure and cancers of the blood
 - for summaries of current research on vitamin D, consult the following:
 - “vitamindcouncil.org”
 - “grassrootshealth.net”
 - "vitamin D*Action"

Part J: *Gene-expression and food*

- The three books I have been describing do not include a discussion of gene expression and food; for helpful comments on this subject, see Sang-Woon Choi and Simonetta Friso.
 - they report--especially in Table I (“Epigenetic roles of nutrition in physiologic and pathologic processes”)--that the regulation of genes can be affected by such food components as folate, choline, alcohol, methyl, acetyl, and many others
 - information about which foods contain these components is readily available on the web. A well-balanced diet with plenty of variety—

including a plant-based diet--would include all the food components needed for healthy gene expression

--See also the fine essay by Sayer Ji, "Why Food is Actually Information"

Part K: *Three insights and some questions*

Three discoveries about cancer that raise many questions are the following:

- Firstly, in 1931 the German physician and scientist Otto Warburg was awarded the Nobel Prize for his discovery that all cancer cells get most of their energy by metabolizing glucose anaerobically (i.e. without oxygen) through fermentation (as did all cells millions of years ago in their evolutionary development) whereas normal cells metabolize glucose aerobically--and much more efficiently--through oxidation and a complex process of energy transfer within the cell mitochondria
- Although Warburg was certain that cancer is caused by the failure of the mitochondria to metabolize glucose aerobically, later scientists have maintained that anaerobic metabolism is not cancer's cause but its effect--now called the "Warburg Effect"
 - The cause of the cellular switch to the anaerobic metabolism, which leaves a residue of glucose that is easily detected, is still not understood
 - Yet scanning for the presence of sugar (glucose) in cells is the basis for our modern technology for detecting the presence of cancer--Positron Emission Tomography [PET]
- Warburg's discovery that there is, at the very least, a close association between cancer and the way energy is produced in cellular metabolism is a well-established fact
 - Human beings have only two sources of energy: oxygen derived from breathing and nutrients derived from the digestion of food
 - More research on the relation between cancer and diet (including the absorption and malabsorption of food and oxygen) would be welcome
 - this research should also include a consideration of food intolerances
 - food intolerances, as noted above, may cause inflammation in the intestine (where 80% of the immune system is situated) or elsewhere
 - Why are some cells unable to metabolize glucose aerobically?
 - Is it because too little oxygen is being delivered to the cell by the blood ?
 - Is it for lack of the right food (as Warburg himself suggested)
 - Is it because the thin fatty membranes that enclose all cells and act as cellular gateways for oxygen are less able to admit oxygen because they have been degraded by the processed fats that now form part of our diet (as suggested by Peskin & Carter)?
 - Is it because of defects in some other parts of the cell?
 - Is it because we are eating too much sugar?

Secondly, over the years since 1931, scientists have identified many forces involved in the development of cancer, some of them suppressive and others promotional.

- The distinguished microbiologist Mina J. Bissell and her colleague William C. Hines allude to many of these forces in their essay "Why don't we get more cancer? A proposed role of the microenvironment in restraining cancer progression".
 - They make clear that a cell's microenvironment contains many different elements and that there is constant communication among these substances.
 - They refer to the fact that many persons, often unknowingly, live their whole lives with occult cancerous growths that remain perfectly stable and harmless.
 - They then provide strong evidence for their claim that, whereas DNA initiates cancer, whether or not cancer continues to develop depends on local forces outside the cell.
- They list of some eight "suppressive forces" and fifteen "promotional forces" These forces are found in female breast tissue but they are also present in bone marrow where blood is made. In the summary of them below, I have added within round brackets--with help mainly from *Wikipedia*--short definitions of several of these forces. In square brackets, I indicate whether or not I have been able to find research on nutrition relating to those forces. (I am aware that much important nutritional research about cancer is holistic rather than force-specific.)

--Suppressive Forces

Tissue architecture (This factor refers to the arrangement of cells influencing the formation and maintenance of tissues. Bissell's research indicates that specific arrangements depend on communication among cells and surrounding entities.) [No nutritional research found on tissue architecture]

Tissue-specific Extra Cellular Matrices or ECMs (*Wikipedia* states that an Extra Cellular Matrix refers to "a collection of extracellular molecules secreted by cells that provides structural and biochemical support to the surrounding cells". As noted above, "matrix" is derived from the Greek word for womb, and a biological matrix is a mini-structure within tissue architecture; the ECM of white blood cells is blood plasma. In bone marrow the ECMs would presumably be formed partly by "cadherens" made from calcium and the vitamin D hormone (as mentioned in Part 5 of these Notes). Communication among the various elements in a matrix affects the cells it contains.) [Little nutritional research found, especially on the relation between white blood cells and their ECM plasma]

Myoepithelial cells (These cells are found mainly in various glands--sweat, mammary, tear, salivary, etc.--and they are able to produce fluids that affect other cells. Some myoepithelial cells are found in bone.) [Some nutritional research found]

Tissue Macrophage (This collective term refers to the different types of macrophage present in tissue throughout the body. *Wikipedia* explains that a particular macrophage (macro=large; phagein=eat) is a kind of white blood cell that can, among other actions, engulf and destroy "anything else that does not have the types of proteins specific to the surface of healthy body cells on its surface" including cancer cells) [No nutritional research found]

Matrix Metalloproteinases Inhibitors [MMPiS] (*Wikipedia* explains that MMPiS are inhibitors of zinc-dependant enzymes called metalloproteinases. If not suppressed, these enzymes are capable of degrading proteins in an Extra-Cellular Matrix and of playing a major role in the behaviours of cells. An "enzyme" is "macromolecular biological catalyst," and enzymes are "known to catalyze [i.e. accelerate] more than 5,000 biochemical reaction types." As MMPiS can inhibit cell migration they have antiangiogenic [anti-blood-vessel-forming] effects) [Some nutritional research found]

Normal metabolism (See the *Wikipedia* article on "metabolism" in its two forms) [Much nutritional research found, including the work of Béliveau and Gingras noted above]

Antioxidants (*Wikipedia* reports that "oxidation" is a chemical reaction necessary for life but involving the production of "free radicals." Free radicals are elements that have become unstable because of a loss of electrons. They can start a chain reaction within a cell leading to its damage or death. An antioxidant is a molecule that inhibits the oxidation of other molecules. [Much nutritional research found]

Fibroblasts (*Wikipedia* explains that fibroblasts are "a type of cell that synthesizes extracellular matrices and collagen." Collagen is the main structural protein in the extracellular space of animal tissues. Fibroblasts are the most common cells in the connective tissue in animals. The syllable "blast" is used in cellular biology to denote a stem cell. Like all cells, fibroblasts send signals to other cells.) [Some nutritional research found]

Promotional forces

Loss of tissue architecture (For a definition of tissue architecture, see the preceding section) [Some nutritional research found, especially as the loss relates to muscles]

Aberrant Extra-Cellular Matrices (For ECMs, see above) [Some nutritional research found, especially as the loss relates to muscles and to Vitamin D; research relating to blood cancers awaits investigation]]

Aberrant Myoepithelial cells (For a definition of these cells, see above.) [Some nutritional research found]

Cancer Associated Fibroblasts (CAFs: see above for "fibroblast") [No nutritional research found]

Inflammation (*Wikipedia* defines "inflammation as part of the complex biological response of body tissues to harmful stimuli . . . [It] is a protective response that involves immune cells, blood vessels, and molecular mediators. The purpose of inflammation is to eliminate the initial cause of cell injury, clear out necrotic cells and tissues damaged from the original insult and the inflammatory process, and to initiate tissue repair." [Much nutritional research found, some of it mentioned in these Notes]

Fibrosis (*Wikipedia* explains that fibrosis is the formation of excess fibrous [connective tissue](#) in an organ or tissue in a reparative or reactive process) [Some nutritional research found]

Tumour-associated macrophage (TAM) (For "macrophage" see above; *Wikipedia* explains that TAMs are derived from normal macrophages but are found "in close proximity or within [tumor](#) masses. ... The function of TAMs is controversial as there is growing evidence for their involvement in both pro-tumor . . . as well as anti-tumor . . . processes") [No nutritional research found]

Angiogenesis (*Wikipedia* states that "angiogenesis is the physiological process through which new blood vessels form from pre-existing vessels" and that it can be either benign or, if it nourishes tumours, malignant) [Much nutritional research found]

Cytokines (A type of small protein used in cell signalling; *Wikipedia* explains that this signalling is "a complex system of communication that governs basic cellular activities and coordinates cell actions." Cytokines can enhance or suppress immunity) [Much nutritional research found]

MMPs/aberrant proteases (For MMPs see above. *Wikipedia* states that a "protease" is any enzyme that begins a breakdown of protein; an abnormal breakdown of proteins is associated with many diseases including cancer) [Some nutritional research found]

Reactive Oxygen Species (*Wikipedia* reports that Reactive Oxygen Species "are formed as a natural byproduct of the normal metabolism of oxygen and have important roles in cell signaling and homeostasis." In Chemistry, the term "species" refers to an ensemble of identical chemical units (e.g. molecular entities) that have been part of a chemical process. "Reactive" in this context indicates that the

ensemble of oxygen units are able to form new substances by the addition of atoms from another reactant. As noted above on page 8, these substances attack each cell about 10,000 times a day and can damage a cell's structure, including its DNA, when there is "oxidative stress" This type of stress occurs when there is an imbalance between the Reactive Oxygen Species and the body's ability to detoxify them with the help of antioxidants) [Much nutritional search is available on antioxidants, including the work by Béliveau and Gingras discussed above]

Growth factors (*Wikipedia* states that a "growth factor" is "a naturally occurring substance capable of stimulating cellular growth, proliferation, healing, and cellular differentiation." An abnormal growth, proliferation, and differentiation of cells can all promote cancer) [Much nutritional research found, including the extensive review of literature by Jane Plant on the Insulin-like Growth Factors found naturally in dairy (see Part X above)]

Hormones (*Wikipedia* defines hormones as "any member of a class of signaling molecules produced by glands in multicellular organisms that are transported by the circulatory system to target distant organs to regulate physiology and behaviour") [Much nutritional research found]

Mutagens (*Wikipedia* defines "mutagen" in the context of genetics "as a physical or chemical agent that changes the genetic material, usually DNA, of an organism and thus increases the frequency of mutations above the natural background level) [Much nutritional research found]

-- The forces listed above are worth considering because they are a reminder of the complexities of cancer causation and/or its progression and of the important signalling that is constantly going on among many different cellular systems in our body. As noted above, Mina Bissell is an important authority on the subject of cancer causation partly because she has demonstrated experimentally that cells can receive cancer-determining instructions not only from their DNA but also from other cells and molecules in their micro-environment. Furthermore, she he has been able to make cells cancerous simply by removing them from their immediate environment and to restore them to normality by returning them to their home (Bissell, TED Talk]. DNA, in other words, is evidently only one important source of instructions among many elements that guide the behaviour of cells.

Bissell's research makes clear, in fact, that the causation or progression of cancer involves many different systems or networks of cells and the decisions by the millions of cells within each of these networks. Cancer, in other other words, is caused not by a simple chaining (or concatenation) of cellular events in which something causes a malformation in cell A, which then causes the same malformation in cell B, in cell C, and so forth--as if cells interacted like balls on

a billiard table. Rather, its progression is the result of a highly complex interaction of different cellular systems. Its causation is reticulated—the work of a network of networks and of the millions of cells contained therein.

- Because, as Bissell reports, virtually everyone lives with some cancer and because it fails to progress in three-quarters of the population, our bodies must know a great deal about how to keep it at bay. Could this knowledge include knowing how to eat the right kinds of food, how to sleep well and exercise? Could it also include knowing how to avoid stress, chronic inflammation, and incompatible qualities in the environment?
 - As for food in particular, what type of food can strengthen the suppressive forces and weaken promotional forces listed above?
 - What foods can affect both the expression of genes and communication between cells?
- Thirdly, Professor T. Colin Campbell defines an important problem in his essay "Cancer: Is It Just Bad Luck or Failed Research." He summarizes the conventional view (as presented recently by C. Tomasetti, C. and B. Vogelstein) that cancer is caused by a genetic mutation resulting from either an environmental carcinogen or some kind of radiation or, most often, random mutations of no known cause. According to this "mutation theory of cancer," a mutated cell spreads to other cells through replication and, as this replication occurs, mutated cells undergo further abnormal changes. Treatment then typically consists of removing the carcinogen (if it is known) and killing the abnormal cells through radiation and/or chemotherapy and/or surgery. Campbell believes that this theory can do little to help find a cure for the disease in its many forms and that the theory overlooks important research about how diet can regulate cancer growth.
- Campbell's alternative theory is described briefly above, it may be recalled, in comments on his book *The China Study*.. His argument is based partly on replicable experiments in which he and colleagues fed different foods to mice and rats after they had been given a carcinogen that produced cancer in their livers [For scholarly descriptions of these experiments, see the three journal articles listed below under the following names: B.S. Appleton & T. C. Campbell 1983a and 1983b, and L.D. Youngman & T. C. Campbell.] Campbell recalls that "when protein consumption was *decreased to the amount adequate for good health, cancer growth was reversed*. Remarkably, cancer growth could be turned on, then off, then on, then off again by a nutrition protocol that *did not* involve mutations. Further, promotion of cancer growth occurred with animal-based protein, not plant-based protein." The implications of this finding seem momentous and raise the following questions:
- Should human beings be eating a plant-based diet?
 - Should all scientists conducting cancer research be required to study science-based nutrition--a field of study that is currently being augmented by about 9000 papers each year?

The three articles summarized above are important and complementary. The first makes clear that cancer is closely related to the cellular metabolism of energy. The second indicates that cancer is the result of both genetic mutation in cells and the interaction between cells and many elements in their

microenvironment. The third refers to research indicating that some cancers can be switched on and off repeatedly by the kind of food that is eaten. Nutrition and cancer are related.

Part L: *Further comments*

The four books by Béliveau & Gingras, the Campbells, Plant, and Greger all recommend a diet consisting either mainly, or entirely, of plant-based foods (including vegetables, fruits, grains, seeds, nuts, and spices).

Béliveau & Gingras are not vegetarians and their research on the anti-oxidant properties of certain foods is much more narrowly focussed than that of the Campbells, Plant, and Greger. Béliveau & Gingras are silent on the question of dairy and, in a later book, advise on how to cook meat. But I know from following their advice that you will have virtually no space left in your stomach for either meat or dairy if you eat all plant-based foods that they recommend in the daily quantities they suggest.

The Campbells recommend a whole-food, plant-based diet and caution against eating meat or dairy products of any kind as risky. Their recommendation is partly based on the properties of animal proteins. Campbell notes (in Campbell and Lordain) that these proteins can have adverse effects on human biological systems for acid-base buffering, hormonal messaging, and enzyme activities. They can thus set the stage for “a variety of adverse health outcomes.” His recommendation that protein from **all** sources not exceed 10% of one’s calorie intake can be easily achieved by eating a plant-based diet. For comments by Campbell and others on dietary treatments for different types of illness (including leukemia and many other types of cancer), see the website of the T. Colin Campbell Foundation (where leukemia is discussed under the heading of oncology). See also the documentary film by Monica Beach Media, *Forks over Knives* and several research reports on the website of Michael Greger, especially his reports on “Methionine” and “Uprooting the Leading Causes of Death.” For specific suggestions for a plant-based menu that is consistent with Campbell’s research, see Gene Stone’s *Forks over Knives: The Plant-Based Way to Health* and the Appendix to these Notes, which describes my own diet.

Plant likewise recommends against eating beef and dairy products as high risk--almost as risky as smoking--but does not rule out small quantities of safely wrapped, non-processed, carefully prepared, organic, non-beef meat (preferably wild). Her research is mainly about the properties of certain animal proteins and their hormones and about the importance of a certain kind of balance in the diet.

Although these studies have much in common, there is evidence that Campbell’s whole-food, plant-based diet, with proteins from all sources not exceeding 10% of diet calories, may be the safest, especially with respect to cancers of the blood. There are four noteworthy epidemiological studies that support this conclusion:

- One is a recently published article entitled “Cancer incidence in British vegetarians” by seven researchers led by T.J. Key at Oxford. It reports the results of an epidemiological study involving some 61,566 British men and women.
- about half of this group, some 32,403, were meat eaters

--20,601 were vegetarians

--and 8,562 were non-meat eaters who ate fish ("fish-eaters")

The cancers that afflicted everyone in these three groups were then observed over a period of 12.2 years. The results of the survey indicate:

--that, when compared to the meat eaters, the relative risk of developing any kind of cancer may be 12% less for the vegetarians and 18% less for vegetarian fish-eaters

--and that **the relative risk of developing a cancer of the blood may be 45% less for the vegetarians and 15% less for the fish eaters**

The second is an article entitled "The Oxford Vegetarian Study: an overview" by Paul N Appleby and three others. This study also involved a large number of British subjects, some 6000 vegetarians and 5000 non-vegetarian control subjects, and it reported, among other things, on the causes of death among the two groups over a period of about 12 years. This study notes:

--that the relative risk of dying from any cause was about 20% less for the vegetarian group than for the meat eating-group.

--and that **the non-meat-eaters had a 39% smaller chance** (or "death-rate ratio") **of dying from any kind of cancer**

The third study describes a robust association between all-cause, cancer, and cardiovascular mortality and the consumption of fruits and vegetables (see Oyebode et al). This complex analysis tracked the mortality of 62,226 English subjects over a period of 7.7 years and correlated their deaths with their in-take of fruits and vegetables. The study, which was carried out by investigators without conflicts of interest, found among other things:

--that those persons eating of seven plus servings of fruits and vegetables a day, when compared to those who ate less than one serving a day, had a 25% lower death rate from cancer and 31% lower death rate from cardio-vascular disease

--that the greater the consumption of fruits and vegetables up to a maximum of seven plus servings a day, the greater the protective effect

--that the consumption of vegetables had a greater protective effect than the consumption of fruit

--that the consumption of canned /frozen fruit was associated with increased mortality (the question asked by the investigators did not distinguish between canned and frozen fruits)

--for a report about a large scale survey that reaches different conclusions about the value of consuming more than three servings of fruits and vegetables each day, see Dehghan, Mahshid, Andrew Mente, Xiaohe Zhang et al. For a discussion of problematic aspects of this study, see Kahlevo, Hana.

The fourth study was carried out by Tongzhang Zheng, T. R. Holford, B. Leaderer and ten others at Yale University in a study entitled "Diet and Nutrient Intakes and Risk of Non-Hodgkin's Lymphoma in Connecticut Women." This research involved some 601 cases and 717 controls who were followed for a six-year period to evaluate "the relation between diet and the risk of non-Hodgkin's lymphoma." This study found that a significantly higher risk of the disease was associated with the consumption of animal protein, saturated fat, retinol,

eggs, and dairy products but a reduced risk was associated with a high intake of dietary fibre, with polyunsaturated fat [e.g. nuts, seeds, fish, seed oils, and oysters] and with "several fruit and vegetable items." They found no relation between the disease and the intake of monounsaturated fat [olive oil is rich in this fat] and vegetable protein.

It is studies such as these, as well as the arguments of the four books described above, that have led me to favour foods that are whole, unprocessed, and plant-based as a way of minimizing the risk of cancer of the immune system.

In the Appendix below "What this crocodile has for dinner" I describe the dietary programme that I am following as a way of translating theory into practice.

Part M: *Conclusions*

1. During the past hundred years, whole foods have been to a large extent displaced by tens of thousands of industrial foods manufactured with thousands of additives. There has also been a huge increase in the per capita consumption of products containing corn, meat, and dairy and their derivatives. Little is known--and little research is being carried out--about the long term effects of these changes on the human immune system despite growing concerns about increases in Alzheimer's disease, diabetes, obesity, and cancer. Nearly all research is devoted to the lucrative task of finding cures for disease rather than disease prevention. Until more is known, all processed foods should be treated with caution and avoided if possible.
2. Because physicians receive little or no training in nutrition and because the training of dietitians is strongly influenced by special interest groups, few members of these professions--Michael Greger is a remarkable exception--can offer trustworthy advice about food. Likewise, few scientists working in the field of oncology have a knowledge of nutrition
3. Because the formulation of Canada's Food Guide has also been influenced by special interest groups and because adhering to the Guide is likely to lead to the consumption of high levels of certain nutrients (e.g. protein and fat) that are associated with cancer as well as several other diseases, the Guide is unreliable.
4. Scientists do not (yet) understand the biological processes that cause the many different forms of cancer in the complex micro-world of cells. Nevertheless, they have described many associations between cancers and other factors. Some of these associations are epidemiological, others environmental, and still others biological. All of them should be taken into consideration..
5. Richard Béliveau, T. Colin Campbell, and Jane Plant are three scientists without conflicts of interest and they are all well versed in nutrition. They have described strong associations between the immune system and food. They have

also described biological processes that may partly explain these associations. The remarkable studies of these scientists are corroborated by the work of many other investigators and should be taken seriously.

6. More than anyone else, the physician Michael Greger has publicly summarized and synthesized scientific information relating to nutrition and disease, and his research and recommendations should be respected.

7. There is strong evidence that low levels of Vitamin D₃--25(OH)D₃--are inversely associated with cancer: the higher the level of vitamin D, the lower the chances of developing cancer. Cedric F. Garland and his colleagues at the D*Action campaign and John Cannell at the Vitamin D Council have observed that most people living in Canada and the U.S. are now experiencing a Vitamin-D-deficiency epidemic. Everyone living north of 35 degrees latitude should get enough sunshine or take enough D₃ to ensure that their serum level of D₃ is in the range of 40-60 ng/ml or 100-150 nmol/L.

8. Because chronic inflammation can be carcinogenic and because food intolerances can cause chronic inflammation in the gut, one should eliminate from one's diet any food or foods not tolerated.

9. Strong evidence from senior scientists without conflicts of interest indicate that a whole-food, plant-based diet similar to the one followed in Asia for thousands of years has important advantages. It minimizes the ingestion of the risky Insulin-like Growth Factors and certain other risky substances not discussed in my remarks above. While supplying a needed amount of protein and fat, it enables one to avoid the risks associated with eating too much of these two food elements. It provides abundant energy and helps to keep one's weight at an optimum level. It reduces significantly one's chances of developing cancer.

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Appendix 1:

What this crocodile has for dinner--or some foods in my whole-food, plant-based diet (November 08 201g7)

In general, I try to follow the recommendations of T. Colin Campbell. This means eating a whole-food, plant-based diet, especially fruits, vegetables, certain grains, legumes, nuts, and seeds. I try to ensure that I do not ingest hormones from animals (as recommended by Jane Plant) and that protein from **all** sources forms not more than 10% of my calories (as recommended by Campbell and other scientists). Generally speaking, a plant-based diet will yield this ratio and calorie counting is unnecessary. If I wish to check out the protein-calorie ratio of any food, I go to www.nutritiondata.self.com where I select the "Nutrition Search Tool" and then on the bottom of this Tool page, I select "Caloric Ratio Search." As I have recently been diagnosed as having a sensitivity to gluten, I have eliminated glutinous grains (wheat, barley, rye and maybe oatmeal) from my diet.

To avoid risky IGF hormones and to keep my protein intake to about 10% of calories, I eat no meat or other proteins derived from land animals (including dairy). I am not a cook, and the diet that I describe below does not include any of the recipes recommended by Jane Plant in the Plant Programme or the recipes to be found on the website of the T. Colin Campbell Foundation and in the book edited by Gene Stone, *Forks over Knives* (which can be ordered on line from The Book Depository). Two additional books with good recipes are the following: Julieanna Hever, *The Complete Idiot's Guide to Plant-Based Nutrition* (New York: Penguin Group (Alpha Books), 2011) and LeAnne Campbell Disla, *Whole Plants Cookbook* (Durham, North Carolina, Crazy Frog Books, 2011)

I eat when I'm hungry and drink when I'm dry. I do not count calories.

BREAKFAST:

For starters, while making coffee and tea, I snack on a couple of **cherry tomatoes** and two or three **walnuts** and a couple of **almonds**. I then make:

Jim's Incomparable Compote

In a large bowl (8 inches wide and 2 inches deep inside), I place the following nine items:

- whole grains** (4 to 6 heaping tablespoons of **two** different grains that have been pre-cooked in **unsalted** water and re-heated e.g. whole-grain rice {brown, red, and/or black}, quinoa, oatmeal, etc)
- flaxseed** (a heaping tablespoon of any kind, freshly ground)
- blueberries** (a handful)

pineapple (one fresh slice diced)
rasberries (seven or eight)
strawberries (several diced)
prunes (two--water-soaked, refrigerated, and uncooked)
apricots (two--water-soaked, refrigerated, and uncooked)

Depending on the season, I sometimes use other fruits: **melon, kiwi, grapes, etc.** Should I still feel hungry, I eat a **tangerine** or an **apple**

Preparation: About once a week, I cook one heaping cup of two combined grains in two heaping cups of unsalted water for about 30 minutes and then refrigerate the resulting cereal. For breakfast, I put one serving in a small frying pan with a tablespoon of water and heat for a minute or two until the water steams the grains. I then pour the grains into a bowl (which I sometimes pre-heat in a microwave oven) and add the ground flaxseed and fruits.

I also soak a week's supply of prunes and apricots in water, refrigerate them uncooked, and ladle them out as needed.

Preparation time: 5 to 10 minutes.

Sources: I buy rice and flaxseed in quantity at the Middle East Store. I buy shelled walnuts and almonds at Costco.

OR (rarely)

I eat some **fruit**, preferably a large whole **apple**, or sometimes a **half a grapefruit**, or a big **orange**, or several **tangerines**, or some **peaches**, or a **banana** or some **blueberries** or a **mango**. While eating this fruit, I sometimes munch on a various **nuts** and **seeds** such **redskin peanuts**, a few **pumpkin seeds** (rich in zinc), some roasted and/or raw **sunflower seeds**, a couple of **walnuts**, an **avacado**, some roasted **soy nuts**, a few **almonds**, and a few **raisins** or **dates**.

I always eat a small piece of dried Korean **kombu** or **kelp**. (I buy this seaweed at either Costco or the Kowloon Market on Somerset Street, and I eat it mainly for the iodine, which is critically important for health of all cells, especially those of the skin. If my wife Heather is away from home, I add the kelp to a soup later in the day rather than chew on it separately.) I also sometimes eat a small spoonful of **fenugreek seeds** (soaked overnight) to help keep my blood glucose at a safe level.

I find that this breakfast keeps the hounds at bay until about noon, even when I play tennis or curl.

LUNCH

For lunch, my whole meal is normally a special salad in a large bowl (at least 8 and 1/2 inches wide and 2 and 1/2 inches deep inside):

Jim's Superior Salad

- green leaves** (two handfuls of either romane lettuce or spinach or kale)
- cucumber** (several slices unpeeled and diced)
- bell peppers** (some red, green, yellow or orange chopped)
- onion** (a couple of slices, diced)
- cabbage (red or green)** (a slice diced) or **coleslaw**
- avocado** (one-half, diced)
- carrot** (some pieces)
- broccoli** (some pieces)
- cauliflower** (some pieces)
- sunflower seeds** (a sprinkling)
- beans or chickpeas or lentils** (three tablespoons) (the beans can be white, brown, black, lima, navy, fava, black-eyed, etc.)
- raisins or currants** (a handful)
- salad dressing** (balsamic vinegar, Italian seasoning, turmeric and water)

Preparation time: 10 minutes

Preparation: This consists mainly of cutting the veggies and preparing the dressing. The legumes can come cooked from a can. About every five days, I open a can of beans, drain the water, rinse the contents, and pour the contents into a container. I then add a little olive oil as a preservative, stir, and refrigerate. (Without the olive oil, the legumes become smelly.)

The salad dressing is easy to make. In a small, flat-bottomed bowl, pour in enough balsamic vinegar to cover its bottom. Add an equal amount of tap water, a handful of Italian Seasoning, and a quarter teaspoon of turmeric. Stir once or twice, pour over the salad, and toss.

Sources: I buy my legumes at Walmart, It sells a wide variety of good quality, cooked, canned beans at a very reasonable price. Good olive oil and Italian seasoning are available at Costco. Turmeric comes from the Middle East Store

Snacks: If I feel hungry, I eat an apple or an orange or a couple of dried dates or some nuts or sunflower seeds.

On rare occasions I have a **chick-pea salad** (bought at a deli) and **tabouli** (bought at a deli) or **pakorras** or **falafels** (made from **chick peas**) with some **salad**.

DINNER

My evening meal, especially in cold weather, is frequently a large bowl of soup. My favourite soups are homemade **Minestrone Soup** (see below for recipe) and **Curried Lentil Soup**

I also have such dishes as the following:

- Gluten-free pasta** (garnished with **garlic** and **tomatoes** or **tomato sauce** or **pesto**) and some **vegetables** or a small **salad**
- A stir-fry made with **vegetables** and pieces of **tofu** and **cashews**, and **brown rice**
- three or four **vegetables** (e.g. **potatoes**, **onion**, **turnip**, **garlic**, **sweet potato** and **asparagus**) baked and garnished with olive oil
- peppercorn** or **spaghetti squash** baked and stuffed with nuts and seeds
- a stir-fry of **mushrooms**, **tomatos**, **onions**, and **rice**

If I have time, I follow any of the main-course recipes included in the cook books listed above

SNACKS

Nuts of all kinds, **seeds**, **raisins**, **dates**, **fruit** of any kind, **rice cakes** topped with **pure peanut butter** and **banana** or **lettuce leaves**, **peanuts**

SUPPLEMENTS

vitamin D3 (5 thousand units). My D3 level is currently 126 nmol/L

B12 –three times a week

I take some medically prescribed thyroxin for an underactive thyroid

Before going to bed, I take one-half teaspoon of **taurine** powder, which keeps my eyes from being bothered by bright light and prevents (I hope) macular degeneration.

Note: I have followed this diet for about five years after 77 years of eating meat and dairy; and I have been gluten free for about four years. This diet enables me to maintain a constant weight without ever counting calories or going hungry and it supplies plenty of energy. I find the plant-based food delicious and hope that it may also help to ward off a recurrence of lymphoma. It takes about a month to become accustomed to this diet.

Appendix 2

Minestrone Soup –1 to 2 gallons—enough for a week

Ingredients

- olive oil-- ¼ cup or enough to cover the bottom of a large pot
- sweet onions-- 2 large or 3 to 4 smaller ones
- Italian seasoning (from Costco)—at least 3 or 4 heaping tablespoons
- 3 parsnips in chunks
- 4 large carrots-- in small chunks
- cabbage (any kind)—1/4 head or 12 brussels sprouts halved
- small potatoes—several chunked
- 1 or 2 zucchinis —chunked
- any other veggies in fridge—chunked
- mixed beans or chick peas or black beans—2 cans (drained and washed) or two cups of beans that I have soaked for twelve hours and boiled until soft
- Italian tomatoes [which are sweet]—2 cans chunked
- salt to taste (not much is needed because the Italian seasoning contains salt)
- chile flakes (from Costco)—optional—can be added to cooked servings
- garlic or garlic powder (from Costco)—two tablespoons or to taste
- pepper to taste

Preparation (about 45 minutes to an hour)

1. Heat olive oil in large pot—at least one gallon or about a cubic foot—over a low heat
2. While the olive oil is heating, dice the onions and garlic. Then cook them in the olive oil over a medium heat and stir occasionally until translucent. If needed to prevent the onions from burning, add half a cup or so of water to the oil
3. Add all spices—Italian seasoning, garlic powder, poultry seasoning if you have it, pepper
4. While the onions and spices are cooking, chunk all vegetables and put in a container (after cutting, the veggies should fill a container or saucepan (about two or three litres)
5. Add veggies to the onions, stir, and cook for a couple of minutes
6. Add two cups or cans of beans or chick peas
8. Bring to a boil, then lower to a low simmer, and cook for an hour or so
7. Add two cans of Italian tomatoes
7. Add about two or three three litres of water to the mixture so that it is covered
9. Either eat the soup or cool it outside and place the big pot in a fridge for many future meals. It will keep for at least 10 days. You can always add a little water if desired.

Note: As this recipe makes about 10 litres of soup, you will need a large pot that will also go into your refrigerator.

Appendix 3: Primary Lymphoma of the Bone: my case history

In the spring of 2005, I was a 72-year-old male, about 5'10" in height and 175 lbs in weight, in good health and high spirits. My eating habits were conventional. I am married to an adorable wife and have three loving children--all of whom were close by my side during the events described below. I was physically active (on the tennis courts) and had never experienced a long or serious illness.

In mid-March of 2005, on the night following my return from a holiday in Mexico, I awakened at about 5:00 a.m. with an inexplicable, acute pain in my left shin bone. The hurt was so great that I thought I had somehow fractured my left leg in my sleep. I was driven immediately by my wife to the emergency department of our local hospital. After several hours, I was seen by a physician, given a sedative, and dismissed without a diagnosis. In the days that followed, the pain in my leg subsided. But the joints around my neck became very sore on movement, my backbone hurt so much that getting out of bed became a slow painful operation, and my ribs began to hurt when I inhaled. I also began to sweat at night.

After a few days, I visited my family physician. She recommended that I consult a rheumatologist. He diagnosed my condition as "polymyalgia rheumatica" and prescribed the drug Prednisone--a kind of synthetic steroid hormone that can counteract inflammation. Nevertheless, after taking the Prednisone over the next two months of April and May, my condition became steadily worse, despite massages by two physiotherapists, two courses of acupuncture, and a consultation with another physician. On one or two occasions I was taken to the hospital by ambulance because inhaling air was so painful that I became short of oxygen. Although I read several hundred abstracts of medical articles online, I could find none that described my condition. Nor were the symptoms listed on the website of Lymphoma Canada of any help.

In June, after it became clear that the Prednisone was not improving my condition, my rheumatologist ordered a bone scan--the kind of scan that can image inflammation rather than measure density. After receiving the results of this scan, he informed me that there appeared to be cancer in virtually every bone in body and that I should therefore have a CT [computerized tomography] scan to find out the original source of the cancer. A CT scan, however, revealed no source of inflammation outside the bones. A few days later, an MRI [magnetic resonance imaging] image of my painful spine indicated that one part of my spine had so many lesions that I was in danger of losing the use of my legs. I was therefore immediately admitted to hospital, ordered to lie on a gurney, and told not to move. A haematologist soon did a biopsy of the marrow in one of my hip bones. The pathologist to whom this biopsy was sent for analysis reported that some of the white blood cells in my marrow were malformed by a non-Hodgkin's type of cancer called Diffuse Large B-cell Lymphoma (DLBCL). I was told that these cancerous cells had been causing the lesions in my bones. (By this time my left shin bone had developed a fracture line down the front of it and none of my lymph nodes were affected.) This cancer was at Stage Four +, and my family and I were informed that my chances of living beyond that summer were about 10%. Surgeons, who were consulted about the condition of my spine, recommended against any attempt at surgical repair because such an operation would be painful and possibly ineffective, especially in the context of my dim prognosis.

I was informed that my treatment was to be the conventional chemotherapy for DLBCL, namely CHOP-R, [cyclophosphamide, hydroxydaunorubicin hydrochloride, vincristine (Oncovin), prednisone and rituximab] in the form of eight treatments over a period of six months. Before this chemotherapy began, however, I was to have 10 radiation treatments of my bones. I remained in hospital for about the next three weeks having radiation and other tests. In my third week, a chest x-ray indicated that there were about a dozen embolisms or blood clots in my lungs, caused, I assume, by my cancerous blood. For the next eight months, I injected myself daily with a blood thinner to help prevent the clots from reaching my brain where they could have been lethal. (My perceptive attending physician ordered this life-saving x-ray after observing that I had shortness of breath while getting out of bed.) Returning home from the hospital in early July, I visited the haematology clinic for the prescribed chemotherapy treatments and for occasional blood transfusions to raise a low white blood-cell count. I also had a series of injections in my spinal cord [intrathecal chemotherapy] in case any cancerous white blood cells had reached my brain. Kind nurses visited me at home frequently, and I was equipped with two walkers (one for upstairs and one for down), bed-bars, and other things to make moving possible. I was also in frequent touch with members of the Lymphoma Support Group of Ottawa, and they were helpfully informative.

By the end of 2005, except for taking a blood thinner for another half year or so, my treatment was complete. My bones and joints were free of pain. I began to grow stronger, although my hands and feet usually felt cold. I returned to the tennis courts. With the help of a kind librarian at the Ottawa General Hospital, I learned that the name for the specific type of lymphoma I had experienced was "Primary Lymphoma of the Bone" and that this type of blood cancer accounted for about 5% of all lymphoma cases.

After five annual checkups, I was declared cancer-free in 2010.

In 2012, after developing a worrisome shortness of breath, I discovered that I was sensitive to gluten and to a similar protein in dairy. A stool analysis also confirmed this sensitivity. I modified my diet accordingly and recovered most of my wind within about two weeks.

In 2013, I developed a tiny patch of squamous-cell cancer--a relatively harmless form of cancer--on the skin of my cheek; it was removed surgically. In 2016, I again developed a tiny patch of squamous cell skin cancer, this time on my back. It was also quickly removed, and the surgeon commented that the cancerous growth was on tissue that seemed somewhat scarred by the radiation.

I am currently (2016) in excellent health and still most grateful for the kind and thoughtful treatment given me by nurses and physicians in 2005 and later. Postscript: As the chemo fog lifted from my brain in 2006, I felt determined to do what I could to never ever repeat the experience I had been through. I began reading and making inquiries. The Notes to which this brief case history is appended are the outcome of that determination. The first draft was written about 2008. I have been revising it from time to time ever since and posting each draft on the web in order to share my findings with others. As my wife would be the first to tell you, I have changed my diet radically as a result of my research.

Post-Postscript:

Six facts and two reasonable inferences now help me to understand a possible, if not probable, cause of my lymphoma:

1. The surface area of the gut is the size of a tennis court
2. 80% of one's lymphatic system is situated around the gut to ensure that the daily food absorbed through the intestine is compatible with one's body
3. To perform this function over such a large area, white blood cells re-produce themselves a thousand times faster than other cells in the body
4. Chronic inflammation, which places an increased burden on the immune system, increases one's risk of developing cancer
5. I failed to recognize and remedy a sensitivity to gluten and dairy over many decades
6. My symptoms over many years were consistent with a mild chronic inflammation in my gut
7. Chronic inflammation in the gut would have caused stress to my white blood cells, especially my diffuse, large B-cells which have the function of producing antibodies or Y-shaped proteins that can lock on to harmful agents in order to either neutralize them or identify them for destruction by other types of white blood cell
8. It seems probable that this inflammation and stress greatly increased my risk of developing cancer of the white blood cells

James Steele

Appendix 4: Chemotherapy: Three informative articles and a book

Abel, U., ‘Chemotherapy of Advanced Epithelial Cancer: a critical review’, *Biomedicine and Pharmacotherapy*, 1992; 46: 439-452. Online. (Although this article discusses the kinds of lymphoma that involve tumours in lymph glands, it is not about such non-epithelial cancers of the blood as leukemia or primary lymphoma of the bone (which is a blood disorder that does not involve lymph tumors although the it may cause bone lesions).

Morgan G, Ward R, Barton M. The contribution of cytotoxic chemotherapy to 5-year survival in adult malignancies. *Clin Oncol (R Coll Radiol)* 2004;16:549-60. Although abstracts of this article are available online, the full text is available only for a substantial fee. There is, however, a summary of the contents of this article (including a comment on the small survival effect of chemotherapy in relation to lymphoma) in the essay by Peter H. Wise listed next.

Wise Peter H. Cancer drugs, survival, and ethics *BMJ* 2016; 355 :i5792. Online

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