T. Colin Campbell – The China Study: Startling Implications for Diet, Weight Loss and Long-term Health.
ISBN: 1-932100-66-0

Foreword.

You pick up an issue of *National Geographic Kids*, a magazine published by the National Geographic Society "for ages six and up, expecting to find wholesome reading for youngsters. The pages, however, are filled with ads for Twinkies, M&Ms, Frosted Flakes, Froot Loops, Hostess Cup Cakes and Xtreme Jell-O Pudding Sticks. […]

The inescapable fact is that certain people are making an awful lot of money today selling foods that are unhealthy. They want you to keep eating the foods they sell, even though doing so makes you fat, depletes your vitality and shortens and degrades your life. They want you docile, compliant and ignorant. They do not want you informed, active and passionately alive, and they are quite willing to spend billions of dollars annually to accomplish their goals. (XVII)

Introduction.

As a taxpayer who foots the bill for research and health policy in America, you deserve to know that many of the common notions you have been told about food, health and disease are wrong:

- Synthetic chemicals in the environment and in your food, as problematic as they may be, are not the main cause of cancer.
- The genes that you inherit from your parents are not the most important factors in determining whether you fall prey to any of the ten leading causes of death.
- The hope that genetic research will eventually lead to drug cures for diseases ignores more powerful solutions that can be employed today.
- Obsessively controlling your intake of any one nutrient, such as carbohydrates, fat, cholesterol or omega-3 fats, will not result in long-term health.
- Vitamins and nutrient supplements do not give you long-term protection against disease.
- Drugs and surgery don't cure the diseases that kill most Americans.
- Your doctor probably does not know what you need to do to be the healthiest you can be.

[…] The provocative results of my four decades of biomedical research, including the findings from a twenty-seven-year laboratory program (funded by the most reputable funding agencies) prove that eating right can save your life. (2)

Some of the findings, published in the most reputable scientific journals, show that:

- Dietary change can enable diabetic patients to go off their medication.
- Heart disease can be reversed with diet alone.
- Breast cancer is related to levels of female hormones in the blood, which are determined by the food we eat.
- Consuming dairy foods can increase the risk of prostate cancer.
- Antioxidants, found in fruits and vegetables, are linked to better mental performance in old age.
- Kidney stones can be prevented by a healthy diet.
- Type 1 diabetes, one of the most devastating diseases that can befall a child, is

convincingly linked to infant feeding practices.
These findings demonstrate that a good diet is the most powerful weapon we have against disease and sickness. (3)

We spend far more, per capita, on health care than any other society in the world, and yet two thirds of Americans are overweight, and over 15 million Americans have diabetes, a number that has been rising rapidly. We fall prey to heart disease as often as we did thirty years ago, and the War on Cancer, launched in the 1970s, has been a miserable failure. Half of Americans have a health problem that requires taking a prescription drug every week, and over 100 million Americans have high cholesterol.

To make matters worse, we are leading our youth down a path of disease earlier and earlier in their lives. One third of the young people in this country are overweight or at risk of becoming overweight. Increasingly, they are falling prey to a form of diabetes that used to be seen only in adults, and these young people now take more prescription drugs than every before.

These issues all come down to three things: breakfast, lunch and dinner. (3)

[…] heart disease, diabetes and obesity can be reversed by a healthy diet. Other research shows that various cancers, autoimmune diseases, bone health, kidney health, vision and brain disorders in old age (like cognitive dysfunction and Alzheimer's) are convincingly influenced by diet. Most importantly, the diet that has time and again been shown to reverse and/or prevent these diseases is the same whole foods, plant-based diet that I had found to promote optimal health in my laboratory research and in the China Study. (7)

Part I
The China Study

Chapter 1.
Problems We Face, Solutions We Need.

If you are male in this country, the American Cancer Society says that you have a 47% chance of getting cancer. If you are female, you fare a little better, but you still have a whooping 38% lifetime chance of getting cancer. (12)

[…] almost a third of the adults twenty years of age and over in this country are obese! One is considered obese if he or she is carrying more than a third of a person above and beyond a healthy weight. Similarly frightening trends have been occurring in children as young as two years of age. (13-14)

One out of thirteen Americans now has diabetes, and the ratio continues to rise. (14)

Two of the most frightening statistics show that diabetes among people in their thirties has increased 70% in less than ten years and the percentage of obese people has nearly doubled in the past thirty years. (14)

But the most pervasive killer in our culture is not obesity, diabetes or cancer. It is heart disease. Heart disease will kill one out of every three Americans. (15)

[…] physician error, medication error and adverse events from drugs or surgery kill

225,400 people per year (Chart 1.5). That makes our health care system the third leading cause of death in the United States, behind only cancer and heart disease (Chart 1.4). (15)

CHART 1.2: PERCENT OBESE POPULATION (pg 13)

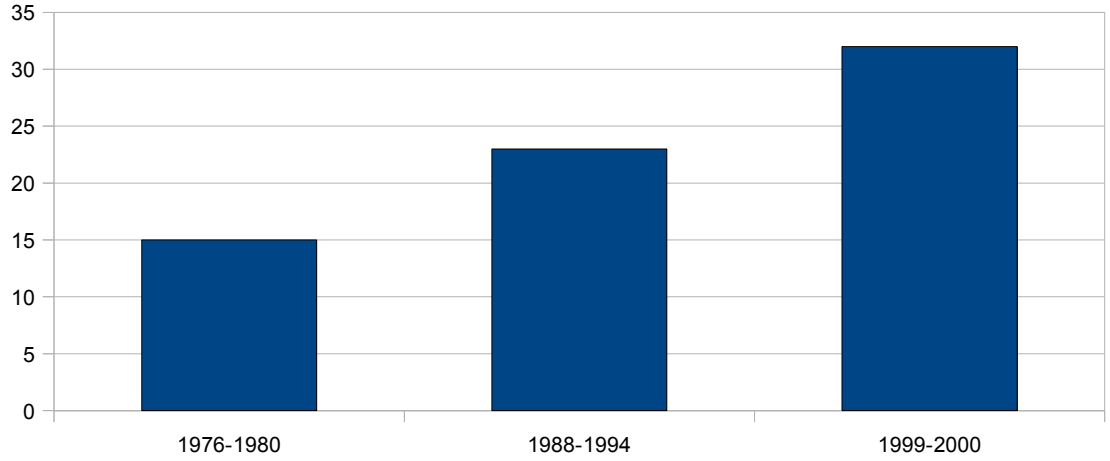


CHART 1.4: LEADING CAUSES OF DEATH (pg16)	
Causes of Death	**Deaths**
Diseases of the Heart	710,760
Cancer (Malignant Neoplasms)	553,091
Medical Care	225,400
Stroke (Cerebrovascular Diseases)	167,661
Chronic Lower Respiratory Diseases	122,009
Accidents	97,900
Diabetes Mellitus	69,301
Influenza and Pneumonia	65,313
Alzheimer's Disease	49,558
CHART 1.5: DEATH BY HEALTH CARE (pg16)	
Number of Americans Per Year Who Die From:	
Medication Errors	7,400
Unnecessary Surgery	12,000
Other Preventable Errors in Hospitals	20,000
Hospital Borne Infections	80,000
Adverse Drug Effects	106,000

If nutrition were better understood, and prevention and natural treatments were more accepted in the medical community, we would not be pouring so many toxic, potentially lethal drugs into our bodies at the last stage of disease. We would not be frantically searching for the new medicine that alleviates the symptoms but often does nothing to address the fundamental causes of our illnesses. We would not be spending our money

developing, patenting and commercializing "magic bullet" drugs that often cause additional health problems. (17)

We spent over a trillion dollars on health care in 1997. In fact, the cost of our "health" is spiraling so far out of control that the Health Care Financing Administration predicted that our system would cost 16 trillion dollars by 2030. Costs have so consistently outpaced inflation that we now spend one out of every seven dollars the economy produces on health care (Chart 1.7). (17)

[…] the World Health Organization ranked the United States thirty-seventh best in the world according to health care system performance. (17)

CHART 1.6: HEALTH CARE EXPENDITURES PER PERSON, 1997 $US (pg 18)

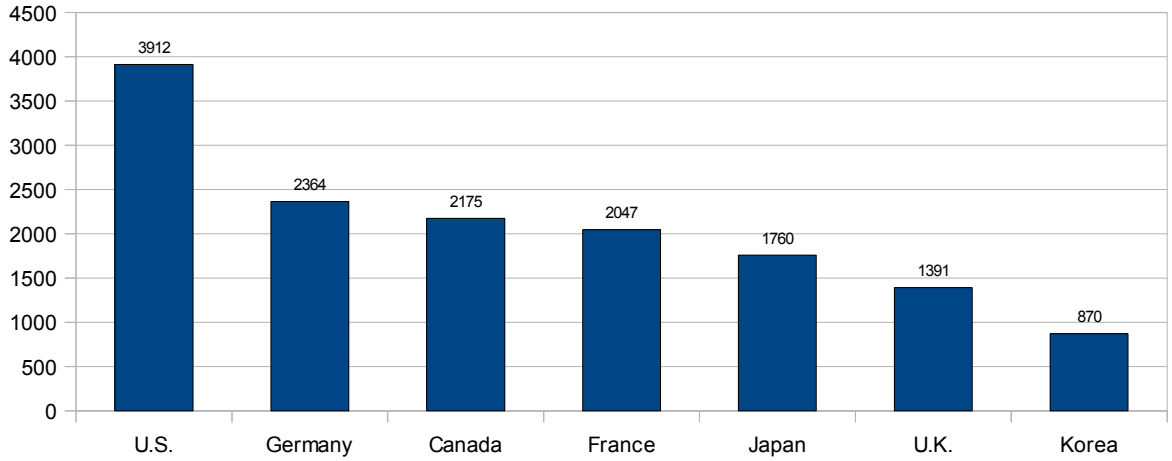
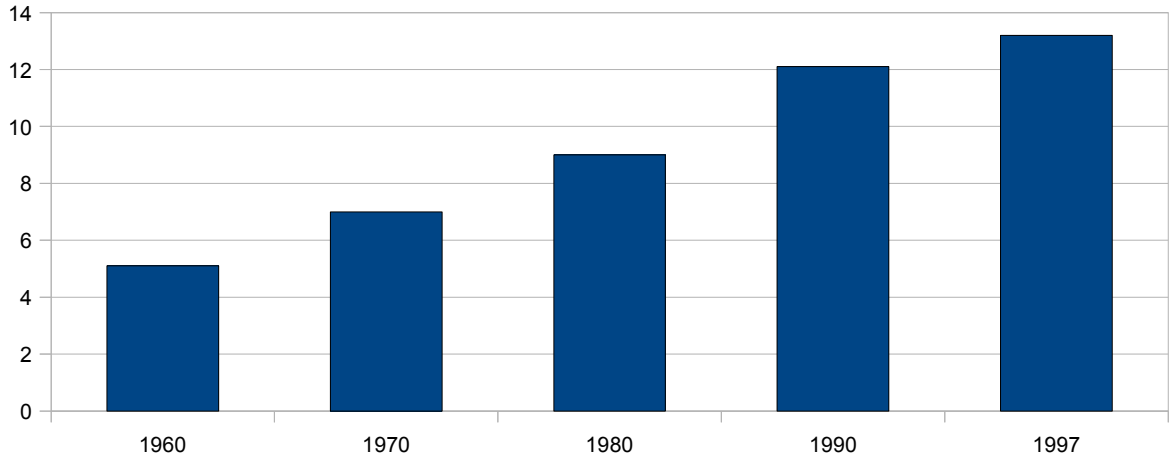


CHART 1.7: PERCENT OF U.S. GDP SPEND ON HEALTH CARE (pg 18)



Perhaps you remember the protein diet fad that gripped the country in the late 1970s. The promise was that you could lose weight by replacing the real food with a protein shake. In a very short while, almost sixty women died from the diet. (19)
[…] we scientists focus on details while ignoring the larger context. For example, we pin our efforts and our hopes on one isolated nutrient at a time, whether it is vitamin A to prevent cancer or vitamin E to prevent heart attacks. We oversimplify and disregard the infinite complexity of nature. Often, investigating minute biochemical parts of food and

trying to reach broad conclusions about diet and health leads to contradictory results. (19-20)

We now know that we can largely avoid […] "genetic" diseases even though we may harbor the gene (or genes) that is (are) responsible for the disease. But funding of genetic research continues to spiral upwards in the belief that specific genes account for the occurrence of specific diseases, in the hope that we somehow will be able to "turn off" these nasty genes. […] In my own laboratory we have shown in experimental animals that cancer growth can be turned on and off by nutrition, despite very strong genetic predisposition. (23)

Chapter 2.
A House of Proteins.

The world protein comes from the Greek word *proteios*, which means "or prime importance." (27)

Protein, fat, carbohydrate and alcohol provide virtually all of the calories that we consume. Fat, carbohydrate and protein, as *macro*nutrients, make up almost all the weight of food, aside from water, with the remaining small amount being the vitamin and mineral *micro*nutrients. The amounts of these latter *micro*nutrients needed for optimum health are tiny (milligrams to micrograms).

Protein, the most sacred of all nutrients, is a vital component of our bodies and there are hundreds of thousands of different kinds. They function as enzymes, hormones, structural tissue and transport molecules, all of which make life possible. Proteins are constructed as long chains of hundreds or thousands of amino acids, of which theyre are fifteen to twenty different kinds, depending on how they are counted. Proteins wear out on a regular basis and must be replaced. This is accomplished by consuming food that contains protein. When digested, these proteins give us a whole new supply of amino acids building blocks to use in making new protein replacements for those that wore out. Various food proteins are said to be of different quality, depending on how well they provide the needed amino acids used to replace our body proteins.

This process of disassembling and reassembling the amino acids of proteins is like someone giving us a multicolored string of beads to replace an old string of beads that we lost. However, the colored beads on the string given to use are not in the same order as the string we lost. So, we break the string and collect its beads. Then, we reconstruct our new string so that the colored beads are in the same order as our lost string. But if we are short of blue beads, for example, making our new string is going to be slowed down or stopped until we get more blue beads. This is the same concept as in making new tissue proteins to match our old worn out proteins.

About eight amino acids ("colored beads") that are needed for making our tissue proteins must be provided by the food we eat. They are called "essential" because our bodies cannot make them. If, like our string of beads, our food protein lacks enough of even one of these eight "essential" amino acids, then the synthesis of the new proteins will be slowed down or stopped. This is where the idea of protein quality comes into play. Food proteins of the highest quality are, very simply, those that provide, upon digestion, the right kinds and amounts of amino acids needed to efficiently synthesize our new tissue proteins. This is what the word "quality" really means: it is the ability of food proteins to provide the right kinds and amounts of amino acids to make our new proteins.

Can you guess what food we might eat to most efficiently provide the building blocks for our replacement proteins? The answer is human flesh. Its protein has just the right amount of the needed amino acids. But while our fellow men and women are not for dinner, we do get the next "best" protein by eating other animals. The proteins of other animals are very similar to our proteins because they mostly have the right amounts of each of the needed amino acids. These proteins can be used very efficiently and therefore are called "high quality." Among animal foods, the proteins of milk and eggs represent the best amino acid matches for our proteins, and thus are considered the highest quality. While the "lower quality" plan proteins may be lacking in one or more of the essential amino acids, as a group they *do* contain all of them.

The concept of quality really means the efficiency with which food proteins are used to promote growth. This would be well and good if the greatest efficiency equaled the greatest health, but it doesn't, and that's why the term efficiency and quality are misleading. In fact, to give you a taste of what's to come, there is a mountain of compelling research showing that "low-quality" plant protein, which allows for slow but steady synthesis of new proteins, is the healthiest type of protein. Slow but steady wins the race. The quality of protein found in a specific food is determined by seeing how fast animals would grow while consuming it. Some foods, namely those from animals, emerge with a very high protein efficiency ratio and value.

This focus on efficiency of body growth, as if it were good health, encourages the consumption of protein with the highest "quality." As any marketer will tell you, a product that is defined as being high quality instantly earns the trust of customers. For well over 100 years, we have been captive to this misleading language and have oftentimes made the unfortunate leap to thinking that more quality equals more health.

The basis for this concept of protein quality was not well known among the public, but its impact was – and still is – highly significant. People, for example, who choose to consume a plant-based diet will often ask, even today, "Where do I get my protein?" as if plants don't have protein. Even if it is known that plants have proteins, there is still the concern about its perceived poor quality. This has led people to believe that they must meticulously combine proteins from different plan sources during each meal so that they can mutually compensate for each other's amino acid deficits. However, this is overstating the case. We now know that through enormously complex metabolic systems, the human body can derive all the essential amino acids from the natural variety of plan proteins that we encounter every day. It doesn't require eating higher quantities of plan protein or meticulously planning every meal. Unfortunately, the enduring concept of protein quality has greatly obscured this information. (29-31)

Proof in science is elusive. Even more than in the "core" sciences of biology, chemistry and physics, establishing *absolute* proof in medicine and health is nearly impossible. The primary objective of research investigation is to determine only what is *likely* to be true. This is because research into health is inherently statistical. When you throw a ball in the air, will it come down? Yes, every time. That's physics. If you smoke four packs a day, will you get lung cancer? The answer is maybe. We know that your odds of getting lung cancer are much higher than if you didn't smoke, and we can tell you what those odds (statistics) are, but we can't know with certainty whether you as an individual will get lung cancer. (38)

Chapter 3.
Turning Off Cancer.

What if What if there was a chemical that experimentally turned on cancer in 100% of the test animals and its relative absence limited cancer to 0% of the animals? Furthermore, what if this chemical were capable of acting in this way at routine levels of intake […]. Finding such a chemical would be the holy grain of cancer research. […] This is exactly what I saw in the Indian research paper when I was in the Philippines. The chemical was protein, fed to rats at levels that are well within the range of normal consumption. Protein! These results were more than startling. In the Indian study, when all the rats had been predisposed to get liver cancer after being given aflatoxin, only the animals fed 20% protein got the cancer while those fed 5% got none. (47)

Cancer proceeds through three stages: initiation, promotion and progression. To use a rough analogy, the cancer process is similar to planting a lawn. Initiation is when you put the seeds in the soil, promotion is when the grass starts to grow and progression is when the grass gets completely out of control, invading the driveway, the shrubbery and the sidewalk.

So what is the process that successfully "implants" the grass seed in the soil in the first place, i.e., initiates cancer-prone cells? Chemicals that do this are called carcinogens. These chemicals are most often the byproduct of industrial processes, although small amounts may be formed in nature, as in the case with aflatoxin. These carcinogens genetically transform, or mutate, normal cells into cancer-prone cells. A mutation involves permanent alteration of the genes of the cell, with damage to its DNA.

The entire initiation stage can take place in a very short period of time, even minutes. […] But just like seeds in the soil, the initial cancer cells will not grow and multiply unless the right conditions are met. […] *Promotion is reversible, depending on whether the early cancer growth is given the right conditions in which to grow.* This is where certain dietary factors become so important. These dietary factors, called promoters, feed cancer growth. Other dietary factors, called anti-promoters, slow cancer growth. Cancer growth flourishes when there are more promoters than anti-promoters; when anti-promoters prevail cancer growth slows or stops. It is a push-pull process. The profound importance of this reversibility cannot be overemphasized.

The third phase, progression, begins when a bunch of advanced cancer cells progress in their growth until they have done their final damage. It is like the fully-grown lawn invading everything around it: the garden, driveway and sidewalk. Similarly, a developing cancer tumor may wander away from its initial site in the body and invade neighboring or distant tissues. When the cancer takes on these deadly properties, it is considered malignant. When it actually breaks away from its initial home and wanders, it is metastasizing. This final stage of cancer results in death. (49-50)

Decreasing protein intake […] from 20% to 5% not only greatly decreased enzyme activity, but did so very quickly. What does this mean? Decreasing enzyme activity via low-protein diets implied that less aflatoxin [a potent carcinogen / toxic substance] was being transformed into the dangerous aflatoxin metabolite that had the potential to bind and to mutate the DNA. (52)

[…] low-protein diets, or their equivalents, reduce tumors by the following mechanisms:

- less aflatoxin entered the cell
- cells multiplied more slowly
- multiple changes occurred within the enzyme complex to reduce its activity
- the quantity of critical components of the relevant enzymes was reduced
- less aflatoxin-DNA adducts were formed (53)

Foci are precursor clusters of cells that grow into tumors. Although most foci do not become full-blown tumor cells, they are predictive of tumor development. […] *Foci development was almost entirely dependent on how much protein was consumed, regardless of how much aflatoxin was consumed!* (54)

CHART 3.4: DIETARY PROTEIN AND FOCI FORMATION (pg 55)

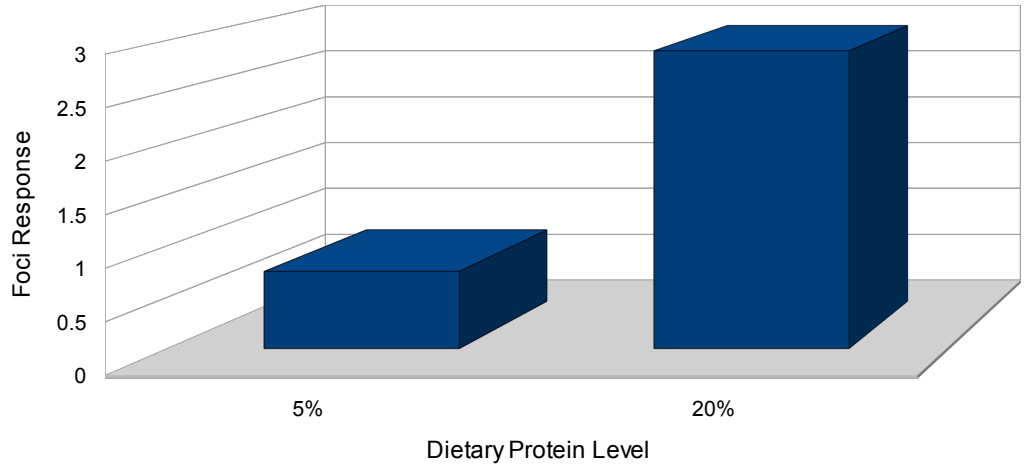
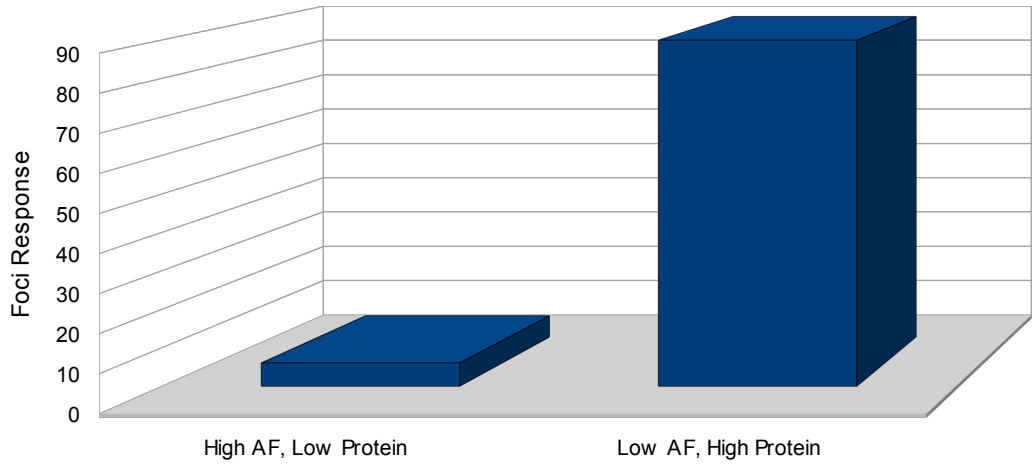


CHART 3.5: CARCINOGEN DOSE VERSUS PROTEIN INTAKE (pg 55)

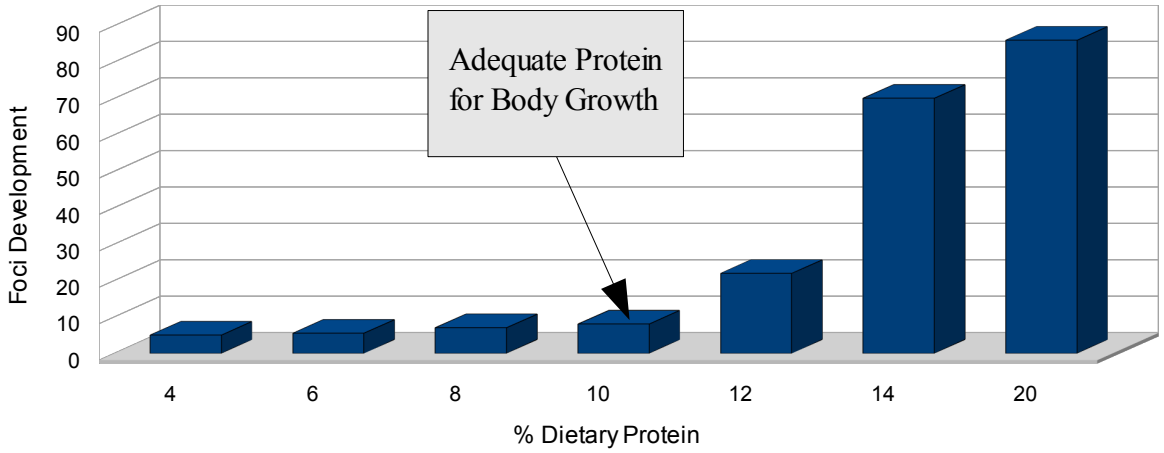


Animals starting with the most cancer initiation (high-aflatoxin dose) developed *substantially less foci* when fed the 5% protein diet. In contrast, animals initiated with a low-aflatoxin dose actually produced *substantially more foci* when subsequently fed the 20% protein diet. (56)

Foci growth could be reversed, up and down, by switching the amount of protein being consumed, and at all stages of foci development. (56)

[…] if we are exposed in the past to a carcinogen that initiates a bit of cancer that remains dormant, this cancer can still be "reawakened" by bad nutrition some time later. (57)

CHART 3.6: FOCI PROMOTION BY DIETARY PROTEIN (pg 57)



[…] foci developed only when the animals met or exceeded the amount of dietary protein (12%)needed to satisfy their body growth rate. That is, when the animals met and surpassed their requirement for protein, disease onset began.

This finding may have considerable relevance for humans even though these were rat studies. I say this because the protein required for growth in young rats and humans as well as the protein required to maintain health for adult rats and humans is remarkably similar.

According to the recommended daily allowance (RDA) for protein consumption, we humans should be getting about 10% of our energy from protein. This is considerably more than the actual amount required. But because requirements may vary from individual to individual, 10% dietary protein is recommended to insure adequate intake for virtually all people. What do most of us routinely consume? Remarkably, it is considerably more than the recommended 10%. The average American consumes 15-16% protein. Does this place us at risk for getting cancer? These animal studies hint that it does.

Ten percent dietary protein is equivalent ot eating about 50-60 grams of protein per day, depending on body weight and total calorie intake. The national average of 15-16% is about 70-100 grams of protein per day, with men at the upper part of the range and women at the lower end. In food terms, there are about twelve grams of protein in 100 calories of spinach (fifteen ounces) and five grams of protein in 100 calories of raw chick peas (just over two tablespoons). There are about thirteen grams of protein in 100 calories of porterhouse steak (just over one and a half ounces). (58)

For all of these experiments, we were using casein, which makes up 87% of cow's milk protein. So the next logical question was whether plant protein, tested in the same way, has the same effect on cancer promotion as casein. The answer is astonishing "NO." *In these experiments, plant protein did not promote cancer growth, even at the higher levels of intake.* […] *Gluten, the protein of wheat, did not produce the same results as casein, even when fed at the same 20% level.* (59)

Rats fed 20% soy protein diets did not form early foci, just like the 20% wheat protein diets. (60)

CHART 3.9A: TUMOR DEVELOPMENT AT 100 WEEKS (pg 61)

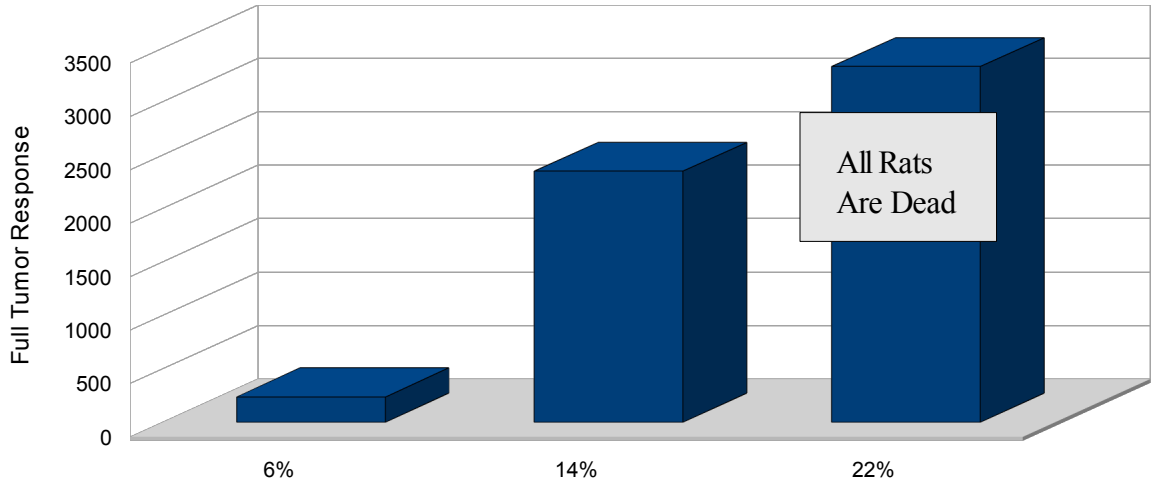
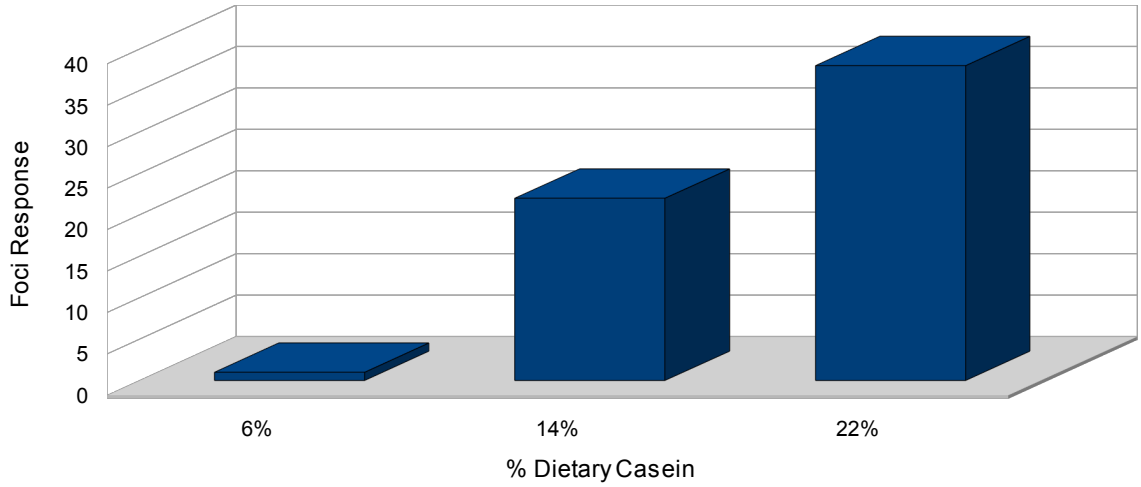


CHART 3.9B: EARLY FOCI, "LIFETIME" (pg 61)



Rats generally live for about two years, thus the study was 100 weeks in length. All animals that were administered aflatoxin and fed the regular 20% levels of casein either were dead or near death from liver tumors at 100 weeks. All animals administered the same level of aflatoxin but fed the low 5% protein diet were alive, active and thrifty, with sleek hair coats at 100 weeks. This was a virtual 100 to 0 score, something almost never seen in research and almost identical to the original research in India.

In this same experiment, we switched the diets of some rats at either forty or sixty weeks, to again investigate the reversibility of cancer promotion. Animals switched from a high-protein to a low-protein diet had significantly less tumor growth (35%-40% less!) than animals fed a high-protein diet. Animals switched from a low-protein diet to a high-protein diet halfway through their lifetime started growing tumors again. These findings on full-blown tumors confirmed our earlier findings using foci. Namely, nutritional manipulation can turn cancer "on" and "off."

We also measured early foci in these "lifetime" studies to see if their response to dietary protein was similar to that for tumor response. The correspondence between foci growth could not have been greater (Chart 3.9a).

How much more did we need to find out? I would never have dreamed that our results up to this point would be so incredibly consistent, biologically plausible and

statistically significant. We had fully confirmed the original work from India and had done it in exceptional depth.

Let there be no doubt: cow's milk protein is an exceptionally potent cancer promoter in rats dosed with aflatoxin. The fact that this promotion effect occurs at dietary protein levels (10-20%) commonly used both in rodents and humans makes it especially tantalizing – and provocative. (61-62)

[…] increasing intakes of casein promoted the development of mammary (breast) cancer. […] higher casein intake:

- promotes breast cancer in rats dosed with two experimental carcinogens (7,12-dimethybenz(a)anthracene (DBMA) and N-nitroso-methylurea (NMU))
- operates through a network of reactions that combine to increase cancer
- operates through the same female hormone system that operates in humans (65)

[…] casein affects the way cells interact with carcinogens, the way DNA reacts with carcinogens and the way cancerous cells grow. The depth and consistency of these findings strongly suggests that they are relevant for humans, for four reasons. First, rats and humans have an almost identical need for protein. Second, protein operates in humans virtually the same way it does in rats. Third, the level of protein intake causing tumor growth is the same level that humans consume. And fourth, in both rodents and humans the initiation stage is far less important than the promotion stage of cancer. This is because we are very likely "dosed" with a certain amount of carcinogens in our everyday lives, but whether they lead to full tumors depends on their promotion, or lack thereof. (65)

[…] *nutrition [is] far more important in controlling cancer promotion than the dose of the initiating carcinogen.* […] *nutrients from animal-based foods increased tumor development while nutrients from plant-based foods decreased tumor development.* (66)

Chapter 4.
Lessons from China.

The authors of a major review on diet and cancer, prepared for the U.S. Congress in 1981, estimated that genetics only determines about 2-3% *of the total cancer risk.* (71)

CHART 4.3 CHINESE AND AMERICAN DIETARY INTAKES (pg 74)		
Nutrient	China	United States
Calories (kcal/day)	2641	1989
Total fat (% of calories)	14.5	34-38
Dietary fiber (g/day)	33	12
Total protein (g/day)	64	91
Animal protein (% of cal)	0.8	10-11
Total iron (mg/day)	34	18

CHART 4.4 DISEASE GROUPINGS OBSERVED IN RURAL CHINA (pg 76)	
Diseases of Affluence (Nutritional Extravagance)	Cancer (colon, lung, breast, leukemia, childhood brain, stomach, liver), diabetes, coronary heart disease

Diseases of Poverty (Nutritional inadequacy and poor sanitation)	Pneumonia, intestinal obstruction, peptic ulcer, digestive disease, pulmonary tuberculosis, parasitic disease, rheumatic heart disease, metabolic and endocrine disease other than diabetes, diseases of pregnancy and many others

Roman numeral one (^{I}) means 95+% certainty; roman numeral two (^{II}) means 99+% certainty; and roman numeral three (^{III}) means 99.9+% certainty. No roman numeral means that the association is something less than 95% certainty. (77)

Dietary cholesterol is present in the food we eat. […] This cholesterol is found only in animal-based food and is the one we find on food labels. (77)

[…] the doctor measures the amount of cholesterol present in your blood. This second type of cholesterol, *blood cholesterol*, is made in the liver. Blood cholesterol and dietary cholesterol, although chemically identical, do not represent the same thing. (78)

The way the body makes body fat and blood cholesterol is extremely complex, involving hundreds of different chemical reactions and dozens of nutrients. Because of this complexity, the health effect of eating dietary fat and dietary cholesterol may be very different from the health effects of having high blood cholesterol (what your doctor measures) or having too much body fat. (78)

Lower blood cholesterol levels are linked to lower rates of heart disease, cancer and other Western diseases, even at levels far below those considered "safe" *in the West.* […] As blood cholesterol levels decreased from 170 mg/dL to 90 mg/dL, cancer of the liver,^{II} rectum,^{I} colon,^{II} male lung,^{I} female lung, breast, childhood leukemia, adult leukemia,^{I} childhood brain, adult brain,^{I} stomach and esophagus (throat) decreased. […] There are several types of blood cholesterol, including LDL and HDL cholesterol. LDL is the "bad" kind and HDL is the "good" kind. (78-79)

Several studies have now shown, in both experimental animals and in humans, that consuming animal-based protein increases blood cholesterol levels. Saturated fat and dietary cholesterol also raise blood cholesterol, although these nutrients are not as effective at doing this as is animal protein. In contrast, plant-based foods contain no cholesterol and, in various other ways, help to decrease the amount of cholesterol made by the body. (80)

CHART 4.5. FOODS ASSOCIATED WITH BLOOD CHOLESTEROL (pg 80)	
As intakes of meat,^{I} milk, eggs, fish,$^{I-II}$ fat^{I} and animal protein go up...	Blood Cholesterol goes up.
As intakes of plant-based foods and nutrients (including plant protein,^{I} dietary fiber,^{II} cellulose,^{II} hemicellulose,^{I} soluble carbohydrate,^{II} B-vitamins of plants (carotenes, B_2, B_3)^{I} legumes, light colored vegetables, fruit, carrots, potatoes and several cereal grains) go up...	Blood Cholesterol goes down.

The level of 30% fat [the amount of fat consumed per day from a diet] has become a benchmark, even though there is no evidence to suggest that this is a vital threshold. (82)

[…] studies showed that people who migrated from one are to another and who started eating the typical diet of their new residency assumed the disease risk of the area to which they moved. This strongly implied that diet and lifestyle were the principle causes of these diseases. It also suggested that genes are not necessarily that important. (84)

[…] only 2-3% of all cancers could be attributed to genes. (85)

[…] breast cancer [is] associated with animal fat intake but not with plant fat. (85)

Findings from rural China showed that reducing dietary fat from 24% to 6% was associated with lower breast cancer risk. However, lower dietary fat in rural China meant less consumption not only of fat but, more importantly, of animal-based food. (87)

Twenty-five women in each of the 130 villages [in China] in the survey were asked when they had their first menstrual period. The range of village averages was fifteen to nineteen years, with an average of seventeen years. The U.S. Average is roughly eleven years!

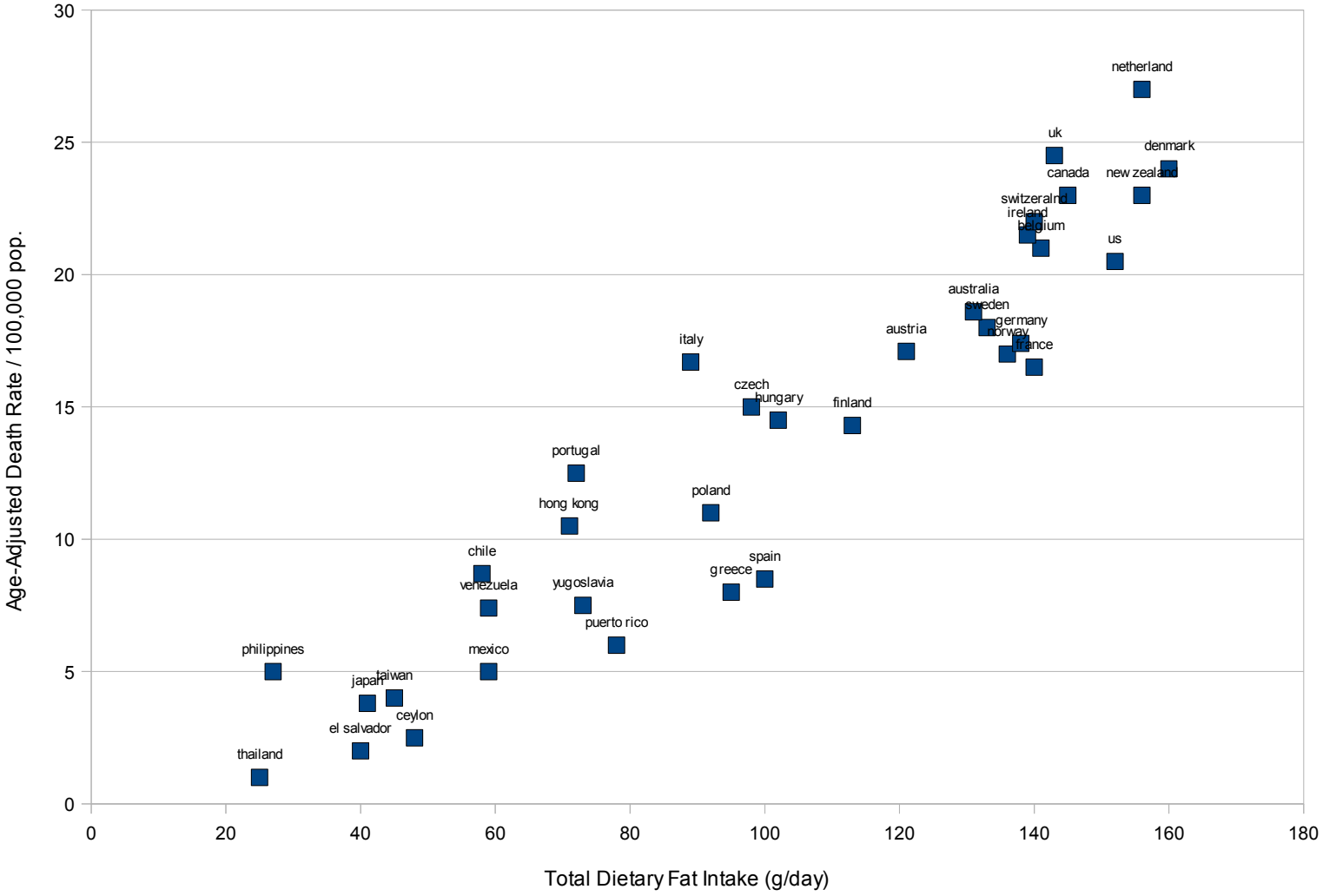
Many studies have shown that earlier menarche leads to higher risk for breast cancer. Menarche is triggered by the growth rate of the girl; the faster the growth, the earlier the age of onset. […] Early age of menarche, both in Chinese and in Western women, also leads to higher levels of blood hormones such as estrogen. These hormone levels remain high throughout the reproductive years if consumption of a diet rich in animal-based food is maintained. Under these conditions, age of menopause is deferred by three to four years,[I] thus extending the reproductive life from beginning to end by about nine to ten years and greatly increasing lifetime exposure to female hormones. Other studies have shown that an increase in years of reproductive life is associated with increased breast cancer risk. (87)

Because the length of the reproductive life of a Chinese woman is only about 75% of that of the British (or American) woman, this means that with lower estrogen levels, the Chinese woman only experiences about 35-40% of the lifetime estrogen exposure of British (and American) women. This corresponds to Chinese breast cancer rates that are only one-fifth of those of Western women.

If we don't consume enough fiber, we are susceptible to constipation-based diseases. […] these include large bowel cancer, diverticulitis, hemorrhoids and varicose veins. (89)

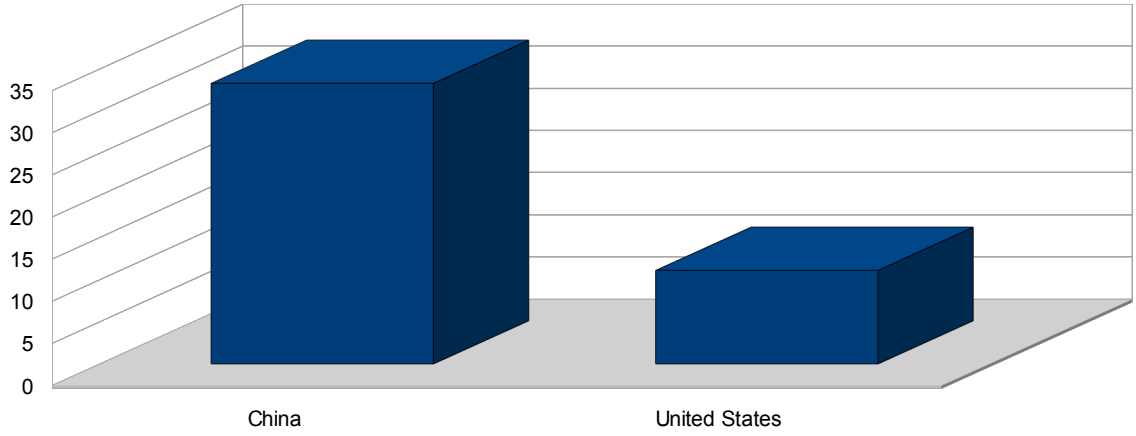
Dietary fiber is exclusively found in plant-based foods. This material, which gives rigidity to the cell walls of plants, comes in thousands of different chemical variations. It is mostly made of highly complex carbohydrate molecules. We digest very little or no fiber. Nonetheless, fiber, having few or no calories itself, helps dilute the caloric density of our diets, creates a sense of fullness and helps to shut down appetite, among other things. In doing so, it satisfies our hunger and minimizes the overconsumption of calories. (90)

CHART 4.7: TOTAL FAT INTAKE AND BREAST CANCER (pg 84)



[…] *there [is] no evidence showing that increasing fiber intake impair[s] iron absorption in the body.* […] A good indicator of how much iron is in the blood, hemoglobin, actually increase[s] with greater intakes of dietary fiber.[I] As it turns out, high-fiber foods, like wheat and corn […] also happen to be high in iron, meaning that the higher the consumption of fiber, the higher the consumption of iron.[III] (91)

CHART 4.10: AVERAGE INTAKES OF DIETARY FIBER, GM/DAY (pg 90)



High-fiber intakes also [are] associated with lower levels of blood cholesterol.[I,II] (92)

[The] link between nicely colored vegetables and their exceptional health benefits has often been noted. It turns out that there is a beautiful, scientifically sound story behind this color/health link.

The colors of fruits and vegetables are derived from a variety of chemicals called antioxidants. These chemicals are almost exclusively found in plants. They are only present in animal-based foods to the extent that animals eat them and store a small amount in their own tissues. (92)

[The] complex process [of photosynthesis] amounts to some pretty high-powered activity within the plant, all of which is driven by the exchange of electrons between molecules. Electrons are the medium of energy transfer. The site at which photosynthesis takes place is a bit like a nuclear reactor. The electrons zooming around in the plant that are changing the sunlight into chemical energy must be managed very carefully. If they stray from their rightful places in the process, they may create free radicals, which can wreak havoc in the plant. It would be like the core of a nuclear reactor leaking radioactive material (free radicals) that can be very dangerous to the surrounding area. […] [The plant] puts up a shield around potentially dangerous reactions that sponges up these highly reactive substances. The shield is made up of antioxidants that intercept and scavenge electrons that might otherwise stray from their course. (92-93)

As we are not plants, we do not carry out photosynthesis and therefore do not produce any of our own antioxidants. Fortunately the antioxidants in plants work in our bodies the same way they work in plants. It is a wonderful harmony. The plants make the antioxidant shields, and at the same time make them look incredibly appealing with beautiful, appetizing colors. Then we animals, in turn, are attracted to the plants and eat them and borrow their antioxidant shields for our own health. (93)

The most significant vitamin C association with cancer was its relationship with the number of cancer-prone families in each area. When levels of vitamin C in the blood were low, these families were *more likely* to have a high incidence of cancer.[III] Low vitamin C was prominently associated with higher risk for esophageal cancer,[III] for leukemia and cancers of the nasopharynx, breast, stomach, liver, rectum, colon and lung. (94)

The other measures of antioxidants, blood levels of alpha and beta-carotene (a vitamin precursor) and alpha and gamma tocopherol (vitamin E) are poor indicators of the effects of antioxidants. These antioxidants are transported in the blood by lipoprotein, which is the carrier of "bad" cholesterol. (94)

[…] if you want vitamin C or beta-carotene, don't reach for the pill bottle – reach for the fruit of leafy green vegetables. (95)

Almost all diet books on store shelves are variation of this one theme: eat as much protein, meat and fat as you want, but stay away from those "fatty" carbs. As you have seen already in this book, my research findings and my point of view show that eating this way is perhaps the single greatest threat to American health we currently face. (95)

[…] according to a report summarizing government food statistics, "Americans consumed thirteen *pounds* [my emphasis] more [added] fats and oils per person in 1997 than in

1970, up from 52.6 to 65.6 pounds." It is true that we have had a trend to consuming fewer of our total calories as fat, when considered as a percentage, but that's only because we have outpaced our gorging on fat by gorging on sugary junk food. (95)

In one published study funded by the Atkins Center for Complementary Medicine, researchers put fifty-one obese people on the Atkins diet. The forty-one subjects who maintained the diet over the course of six months lost an average of twenty pounds. In addition, average blood cholesterol levels decreased slightly, which was perhaps even more important. Because of these two results, this study was presented in the media as real, scientific proof that the Atkins diet works and is safe. Unfortunately, the media didn't go much deeper than that.

The first sign that all is not rosy is that these obese subjects were severely restricting their calorie intake during the study. The average American consumes about 2,250 calories per day. When the study participants were on the diet, they consumed an average of 1,450 calories per day. That's 35% fewer calories! I don't care if you eat worms and cardboard; if you eat 35% fewer calories, you will lose weight and your cholesterol levels will improve in the short fun, but that is not to say that worms and cardboard form a healthy diet. One may argue that those 1,450 calories are so satisfying that people fell full on this diet, but if you compare calorie input and calorie expenditure, it's a matter of simple math that a person cannot sustain this amount of calorie restriction over a period of years or decades without either becoming an invalid or melting away into nothing. People are notoriously unsuccessful at significantly restricting their energy intake over any long period of time, and that is why there has yet to be a long-term study that shows success with the "low-carb" diets. This, however, is only the beginning of the problem.

In this same study, funded by the Atkins group, researchers report, "At some point during the twenty-four weeks, twenty-eight subjects (68%) reported constipation, twenty-six (63%) reported bad breath, twenty-one (51%) reported headache, four (10%) noted hair loss, and one woman (1%) reported increased menstrual bleeding." They also refer to other research, saying, "Adverse effects on this diet in children have included calcium oxalate and urate kidney stones … vomiting, amenorrhea [when a girl misses her period] and … vitamin deficiencies." Additionally, they found that the dieters had a stunning 53% increase in the amount of calcium they excreted in their urine, which may spell disaster for their bone health. The weight loss, some of which is simply initial fluid loss, may come with a very high price.

A different review of low-carbohydrate diets published by researchers in Australia concludes, "complications such as heart arrhythmias, cardiac contractile function impairment, sudden death, osteoporosis, kidney damage, increased cancer risk, impairment of physical activity and lipid abnormalities can all be linked to long-term restriction of carbohydrates in the diet." One teenage girl recently died suddenly after being on a high-protein diet. In short, most people will be unable to maintain this diet for the rest of their lives, and even if anybody manages to do so, they may be asking for serious health problems down the road. I have heard one doctor call high-protein, high-fat, low-carbohydrate diets "make-yourself-sick" diets, and I think that's an appropriate moniker. You can also lose weight by undergoing chemotherapy or starting a heroin addiction, but I wouldn't recommend those either.

One final thought: the diet is not all that Atkins recommends. Indeed, most diet books are merely one part of huge food and health empires. In the case of the Atkins diet, Dr. Atkins states that many of his patients require nutrient supplements, some of which are used to combat "common dieter's problems." In one passage, after making

unsubstantiated claims about the efficacy of antioxidant supplements that contradict recent studies, he writes, "Add to the [antioxidants] the vita-nutrients known to be useful for each of the myriad medical problems my patients face, and you'll see why many of them take over thirty vitamin pills a day." *Thirty pills a day?* (96-97)

[…] there is a mountain of scientific evidence to show that the healthiest diet you can possibly consume is a *high-carbohydrate* diet. It has been shown to reverse heart disease, reverse diabetes, prevent a plethora of chronic diseases, and yes, it has been shown many times to cause significant weight loss. But it's not quite as simple as that.

At least 99% of the carbohydrates that we consume are derived from fruits, vegetables, and grains. When these foods are consumed in the unprocessed, unrefined and natural state, a large proportion of the carbohydrates are in the so-called "complex" form. This means that they are broken down in a controlled, regulated manner during digestion. This category of carbohydrates includes the many forms of dietary fiber, almost all of which remain undigested – but still provide substantial health benefits. In addition, these complex carbohydrates from whole foods are packaged with generous amounts of vitamins, minerals and accessible energy. Fruits, vegetables and whole grains are the healthiest foods you can consume, and they are primarily made of carbohydrates.

On the opposite side of the spectrum, there are highly processed, highly refined carbohydrates that have been stripped of their fiber, vitamins and minerals. Typical simple carbohydrates are found in foods like white bread, processed snack items including crackers and chips made with white flour, sweets including pastries and candy bars and sugar-laden soft drinks. These highly refined carbohydrates originate from grains or sugar plants, like sugar cane or the sugar beet. They are readily broken down during digestion to the simplest form of the carbohydrates, which are absorbed into the body to give blood sugar, or glucose. (98)

[…] if we retain only an extra fifty calories per day, this can lead to an extra ten pounds per year (100)

Consuming diets *high* in protein and fat transfers calories away from their conversion into body heat to their storage form – as body fat (unless severe calorie restriction is causing weight loss). In contrast, diets *low* in protein and fat cause calories to be "lost" as body heat. (101)

CHART 4.11a: CALORIE CONSUMPTION (pg 100)

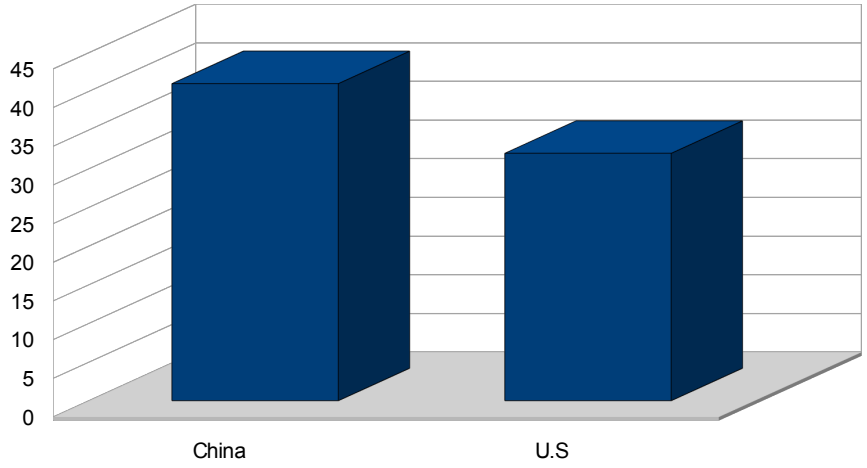
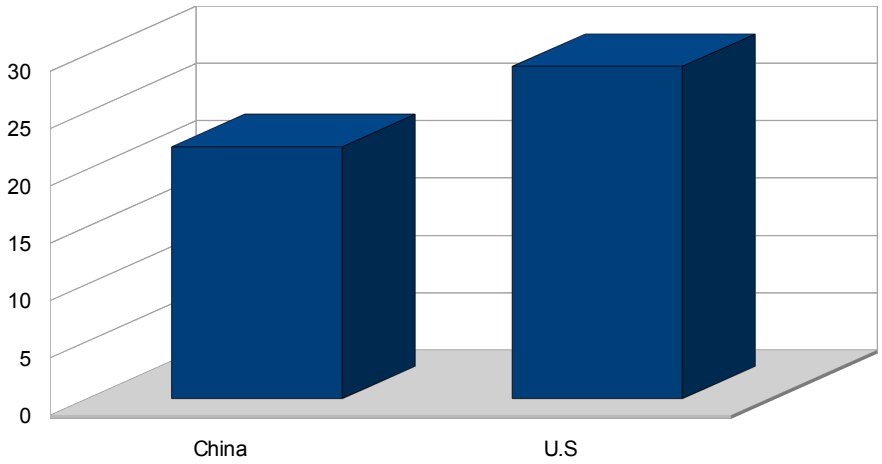


CHART 4.11b: AVERAGE BODY MASS INTAKE (pg 100)



[…] animal protein consumption [is] associated with taller and heavier[I] people, but [is] also associated with higher levels of total and bad cholesterol.[II] Furthermore, body weight, associated with animal protein intake,[I] [is] associated with more cancer[II-III] and more coronary heart disease.[II] It seems that being bigger, and presumably better, comes with very high cost. (102)

[In China Study] consuming more protein was associated with greater body size ([III] for men and [II] for women). However, this effect was primarily attributed to *plant* protein, because it makes up 90% of the total Chinese protein intake. […] *Greater plant protein intake was closely linked to greater height*[II] *and body weight*.[II] (102-103)

So why is it that people in developing nations, who consume little or no animal-based foods, are consistently smaller than Western people? This is because plant-based diets in poor areas of the world usually have insufficient variety, inadequate quantity and quality and are associated with poor public health conditions where childhood diseases are prevalent. Under these conditions, growth is stunted and people do not reach their genetic potential for adult body size. (103)

The same low-animal protein, low-fat diet that helps prevent obesity also allows people to reach their full growth potential while working other wonders as well. It better regulates blood cholesterol and reduces heart disease and a variety of cancers. (103)

[…] HBV [hepatitis B virus] initiate[s] the liver cancer but the cancer gr[ows] in response to the feeding of higher levels of casein [meat protein]. […] Individuals who are chronically infected with HBV and who consume animal-based foods have high blood cholesterol and a high rate of liver cancer. The virus provides the gun, and bad nutrition pulls the trigger. (104)

Part II
Disease of Affluence

The evidence now amassed from researchers around the world shows that the same diet that is good for the prevention of cancer is also good for the prevention of heart disease, as well as obesity, diabetes, cataracts, macular degeneration, Alzheimer's, cognitive dysfunction, multiple sclerosis, osteoporosis and other diseases. Furthermore, this diet can only benefit everyone, regardless of his or her genes or personal disposition. (110)

Chapter 5.
Broken Hearts.

If you live an average lifetime, your heart will beat about 3 billion times. (111)

Women's death rate from heart disease is *eight times higher* than their death rate from breast cancer. (111)

If there is an "American" game, it is baseball; an "American" dessert, apple pie. If there is an "American" disease, it is heart disease. (112)

[…] During this period of time [1950-1953 – Korean War], over 30,000 American soldiers were killed in battle. At the end of the war, a landmark scientific study was reportedly in the *Journal of the American Medical Association*. Military medical investigators had examined the hearts of 300 male soldiers killed in action in Korea. The soldiers, at an average age of twenty-two years, had never been diagnosed with heart problems. In dissecting these hearts, researchers found startling evidence of disease in an exceptional number of cases. *Fully 77.3% of the hearts they examined had "gross evidence" of heart disease.* (In this case, "gross" means large.) (112)

One of the key components [of heart disease] is plaque. Plaque is a greasy layer of proteins, fats (including cholesterol), immune system cells and other components that accumulate on the inner walls of the coronary arteries. (112)

So what leads to heart attacks? It turns out that it's the less severe accumulations of plaque, blocking under 50% of the artery, that often cause the heart attacks. These accumulations each have a layer of cells, called the cap, which separates the core of the plaque from the blood flowing by. In the dangerous plaques, the cap is weak and thin. Consequently, as blood rushes by, it can erode the cap until it ruptures. When the cap ruptures, the core contents of the plaque mix with the blood. The blood then begins clotting around the site of rupture. The clot grows and can quickly block off the entire artery. When the artery becomes blocked over such a short period of time, there is little chance for collateral blood flow to develop. When this happens, blood flow downstream of the rupture is severely reduced and the heart muscles don't get the oxygen they require. At this point, as heart muscle cells start to die, heart pumping mechanisms begin to fail, and the person may feel a crushing pain in the chest, or a searing pain down into an arm and up into the neck and jaw. In short, the victim starts to die. This is the process behind most of the 1.1 million heart attacks that occur in America every year. One out of three people who have a heart attack will die from it. (113)

[…] Japanese men who live in Hawaii or California have a much higher blood cholesterol level and incidence of coronary heart disease than Japanese men living in Japan. (116)

Studies in humans […] show that eating plant protein has even greater power to lower cholesterol levels than reducing fat or cholesterol intake. (119)

We now have a coronary bypass surgery, where a healthy artery is "passed" over a diseased artery, thereby bypassing the most dangerous plaque on the artery. The ultimate surgery, of course, is the heart transplant, which even utilizes an artificial heart on occasion. We also have a procedure that doesn't require cracking the chest plate

open, called coronary angioplasty, where a small balloon is inflated in a narrowed, diseased artery, squishing the plaque back against the wall, opening up the passage for increased blood flow. We have defibrillators to revive hearts, pacemakers and precise imaging techniques so that we can observe individual arteries without having to expose the heart. The past fifty years have truly been a celebration of chemicals and technology (as opposed to diet and prevention). (122)

CHART 5.1: HEART DISEASE DEATH RATES FOR MEN AGED 55 TO 59 CIRCA 1955 (page 116)

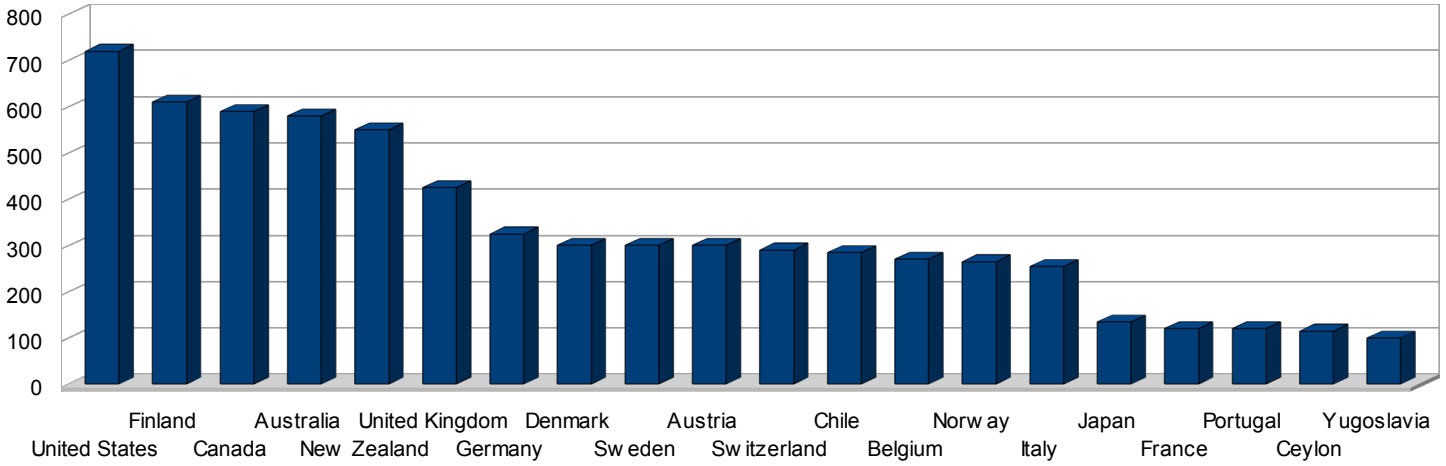
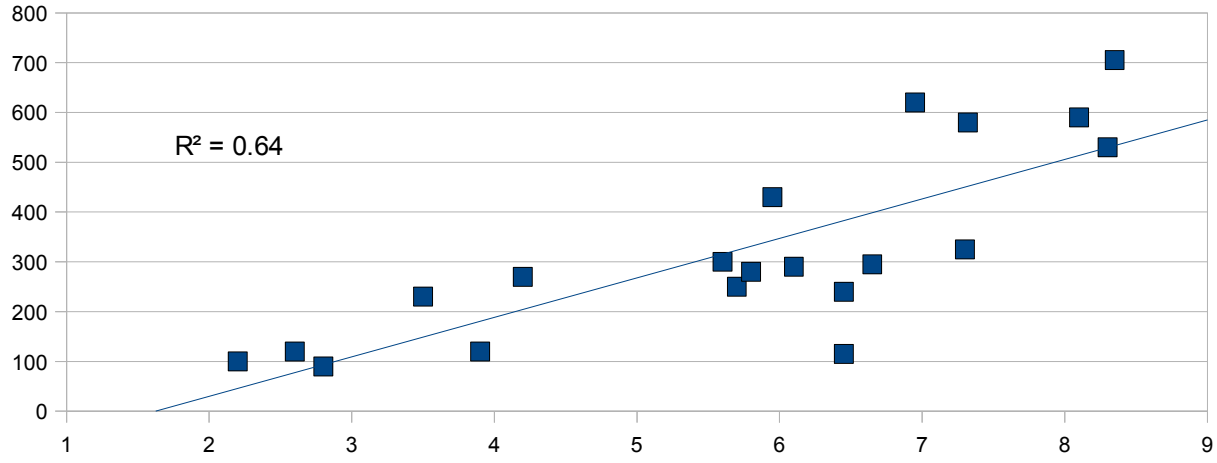


CHART 5.3: HEART DISEASE DEATH RATES FOR MEN AGED 55 TO 59 (pg 120)



[…] the incidence rate (not death rate) for heart disease is about the same as it was in the early 1970s. In other words, while we don't die as much from heart disease, we still get it as often as we used to. It seems that we simply have gotten slightly better at postponing death from heart disease, but *we have done nothing to stop the rate at which our hearts become diseased*. (123)

Bypass surgery has become particularly popular. As many as 380,000 bypass operations were performed in 1990, meaning that about 1 out of 750 Americans underwent this extreme surgery. During the operation, the patient's chest is split open, blood flow is rerouted by a series of clamps, pumps and machines, and a leg vein or chest artery is cut out and sewn over a diseased part of the heart, thereby allowing blood to bypass the most clogged arteries.

The costs are enormous. More than one of every fifty elective patients will die

because of complications during the $46,000 procedure. Other side effects include heart attack, respiratory complications, bleeding complications, infection, high blood pressure and stroke. When the vessels around the heart are clamped shut during the operation, plaque breaks off of the inner walls. Blood then carries this debris to the brain, where it causes numerous "mini" strokes. Researchers have compared the intellectual capabilities of patients before and after the operation, and found that a stunning 79% of patients "showed impairment in some aspect of cognitive function" seven days after the operation.

[…] The most pronounced benefit of this procedure is relief of angina, or chest pain. About 70-80% of patients who undergo bypass surgery remain free of this crippling chest pain for one year. *But this benefit doesn't last.* Within three years of the operation, up to one-third of patients will suffer from chest pain again. Within ten years half of the bypass patients will have died, had a heart attack or had their chest pain return. Long-term studies indicate that only certain subsets of heart disease patients live longer because of their bypass operation. Furthermore, these studies demonstrate that *those patients who undergo bypass operation do not have fewer heart attacks than those who do not have surgery.* (123-124)

The health care establishment is structured to profit from chemical and surgical intervention. Diet still takes the back seat to drugs and surgery. One criticism that is constantly leveled at the dietary argument is that patients will not make such fundamental changes. One doctor charges that Dr. Esselstyn's patients change their eating habits simply because of Esselstyn's "zealous belief." This criticism is not only wrong and insulting to patients; it is also self-fulfilling. If doctors do not believe that patients will change their diets, they will neglect to talk about diet, or will do it in an off-handed, disparaging way. There is no greater disrespect a doctor can show patients than that of withholding potentially lifesaving information based on the assumption that patients do not want to change their lifestyle.

Well-meaning institutions are not exempts from such closed-mindedness. The American Heart Association recommends a diet for heart disease that favors moderation, rather than scientific truth. The National Cholesterol Education Program does the same thing. These organizations pitch moderate diets with trivial changes as being healthy lifestyle "goals." If you are at high risk of heart disease, or if you already have the disease, they recommend that you adopt a diet containing 30% of total calories as fat (7% of total calories as saturated fat) and less than 200 mg/day of dietary cholesterol. According to them, we should also keep our total blood cholesterol level under the "desirable" level of 200 mg/dL.

These venerable organizations are not giving the American public the most up-to-date scientific information. While we are told that a total blood cholesterol level of 200 mg/dL is "desirable," *we know that 35% of heart attacks strike Americans who have cholesterol levels between 150 and 200 mg/dL* (a truly safe cholesterol levels is under 150 mg/dL). We also know that the most aggressive reversal of heart disease ever demonstrated occurred when fat was about 10% of total calorie intake. Studies have clearly demonstrated that many patients who follow the more moderate government recommended diets see a *progression of heart disease.* The innocent victims are health-conscious Americans who follow these recommendations, keeping their total cholesterol around 180 or 190 mg/dL, only to be rewarded with a heart attack leading to a premature death.

To top it off, the National Cholesterol Education Program dangerously writes, "Lifestyle changes are the most cost-effective means to reduce risk of CHD [coronary

heart disease]. Even so, to achieve maximal benefit, many persons will require LDL [cholesterol]-lowering drugs." No wonder America's health is failing. The dietary recommendations for the most diseased hearts among us, given by supposedly reputable institutions, are severely watered down and followed by the caveat that we'll probably need a lifetime of drugs anyway. (131-132)

Chapter 6.
Obesity.

Perhaps you've heard the news. Perhaps you've caught a glimpse of the staggering statistics on obesity among Americans.

Perhaps you've simply noticed that, compared to a few years ago, more people at the grocery store are overweight.

Perhaps you've been in classrooms, on playgrounds or at day care centers and noticed how many kids are already crippled with a weight problems and can't run twenty feet without getting winded.

Our struggle with weight is hard to miss these days. Open a newspaper or a magazine, or turn on the radio or TV – you know that America has a weight problem. In fact, two out of three adult Americans are overweight, and one-third of the adult population is obese. (135)

About 15% of America's youth (ages six to nineteen) are overweight. Another 15% are at risk of becoming overweight. (136)

In 1999, medical care costs relating to obesity alone were estimated to be $70 billion. In 2002, a mere three years later, the American Obesity Association listed these costs at $100 billion. This is not all. Add another $30 – 40 billion out-of-pocket money that we spend trying to keep off the weight in the first place. Going on special weight-loss diet plans and popping pills to cut our appetites or rearrange our metabolism have become a national pastime. (137)

The solution to losing weight is a whole foods, plant-based diet, coupled with a reasonable amount of exercise. It is a long-term lifestyle change, rather than a quick-fix fad, and it can provide sustained weight loss while minimizing risk of chronic disease.

Have you ever known anyone who regularly consumes fresh fruits, vegetables and whole grain foods – and rarely, if ever, consumes meats or junk foods like chips, French fries and candy bars? What is his or her weight like? If you know many people like this, you have probably noticed that they tend to have a healthy weight. Now think of traditional cultures around the world. Think of traditional Asian culture (Chinese, Japanese, Indian), where a couple of billion people have been eating a mostly plant-based diet for thousands of years. It's hard to imagine these people – at least until recently – as anything other than slender. (138)

Keeping body weight off is a long-term lifestyle choice. Gimmicks that produce impressively large, quick weight losses don't work in the long term. Short-term gains should not come along with long-term pain, like kidney problems, heart disease, cancer, bone and joint ailments and other problems that may be brought on with popular diet fads. If the weight was gained slowly, over a period of months and years, why would you expect to take it off healthily in a matter of weeks? Treating weight loss as a race doesn't work; it only makes the dieter more eager to quit the diet and go back to the eating

habits that put them in need of losing weight in the first place. One very large study of 21,105 vegetarians and vegans found that body mass index was "...lower among those who had adhered to their diet for five or more years" compared to people who had been on the diet for less than five years. (140)

So there is a solution to the weight-gain problem. But how can you apply it to your own life?

First of all, throw away ideas about counting calories. Generally speaking, you can eat as much as you want and still lose weight – *as long [as] you eat the right type of food.*[…] Secondly, stop expecting sacrifice, deprivation or blandness; there's no need. Feeling hungry is a sign that something is wrong, and prolonged hunger causes your body to slow the overall rate of metabolism in defense. Moreover, there are mechanisms in our bodies that naturally allow the right kind of plant-based foods to nourish us, without our having to think about every morsel of food we put in our mouths. It is a worry-free way to eat. Give your body the right food and it will do the right thing. (140-141)

[…] *vegetarians consume the same amount or even significantly more calories than their meat-eating counterparts, and yet are still slimmer.* […] One factor […] is the process of thermogenesis, which refers to our production of body heat during metabolism. Vegetarians have been observed to have a slightly higher rate of metabolism during rest, meaning they burn up slightly more of their ingested calories as body heat rather than depositing them as body fat. A relatively small increase in metabolic rate translates to a large number of calories burned over the course of twenty-four hours. (141-142)

Starting and stopping an exercise program is not a good idea. It is better to build it into your lifestyle so that you will become and continue to be more fit over all, not just burn off calories. […] A rough estimate derived from a good review suggested that exercising a mere fifteen to forty-five minutes per day, every day, will maintain a body weight that is eleven to eighteen pounds lighter than it would otherwise be. (142)

A plant-based diet operates on calorie balance to keep body weight under control in two ways. First, it discharges calories as body heat instead of storing them as body fat, and it doesn't take many calories to make a big difference over the course of a year. Second, a plant-based diet encourages more physical activity. And, as body weight goes down, it becomes easier to be physically active. Diet and exercise work together to decrease body weight and improve overall health. (143)

Chapter 7.
Diabetes.

Type 2 diabetes, the most common form, often accompanies obesity. As we, as a nation, continue to gain weight, our rate of diabetes spirals out of control. In the eight years from 1990 to 1998, the incidence of diabetes increased 33%. Over 8% of American adults are diabetic, and over 150,000 young people have the disease. That translates to 16 million Americans. The scariest figure? One-third of those people with diabetes don't yet know that they have it. (145)

Almost all cases of diabetes are either Type 1 or Type 2. Type 1 develops in children and adolescents, and thus is something referred to as juvenile-onset diabetes.

This form accounts for 5% to 10% of all diabetes cases. Type 2, which accounts for 90% to 95% of all cases, used to occur primarily in adults age forty and up, and thus was called adult-onset diabetes. But because up to 45% of new diabetes cases in children are Type 2 diabetes, the age-specific names are being dropped, and the two forms of diabetes are simply referred to as Type 1 and Type 2.

In both types, the disease begins with dysfunctional glucose metabolism. Normal metabolism goes like this:

- We eat food.
- The food is digested and the carbohydrate part is broken down into simple sugars, much of which is glucose.
- Glucose (blood sugar) enters the blood, and insulin is produced by the pancreas to manage its transport and distribution around the body.
- Insulin, acting like an usher, opens doors for glucose into different cells for a variety of purposes. Some of the glucose is converted to short-term energy for immediate cell use, and some is stored as long-term energy (fat) for later use.

As a person develops diabetes, this metabolic process collapses. Type 1 diabetics cannot produce adequate insulin because the insulin-producing cells of the pancreas have been destroyed. This is the result of the body attacking itself, making Type 1 diabetes an autoimmune disease. […] Type 2 diabetics can produce insulin, but the insulin doesn't do its job. This is called insulin resistance, which means that once the insulin starts "giving orders" to dispatch the blood sugar, the body doesn't pay attention. The insulin is rendered ineffective, and the blood sugar is not metabolized properly. (145-146)

[…] diabetes is diagnosed by the observation of elevated blood sugar levels, or its "spillage" into urine.

What are the long-term health risks of glucose metabolism being disrupted? Here's a summary, taken from a report from the Centers for Disease Control. (146-147)

Diabetes Complications

Heart Disease
- 2-4 times the risk of death from heart disease.

Stroke
- 2-4 times the risk of stroke.

High Blood Pressure
- Over 70% of people with diabetes have high blood pressure.

Blindness
- Diabetes is the leading cause of blindness in adults.

Kidney Disease
- Diabetes is the leading cause of end-stage kidney disease.
- Over 100,000 diabetics underwent dialysis or kidney transplantation in 1999.

Nervous System Disease
- 60% to 70% of diabetics suffer mild to severe nervous system damage.

Amputation
- Over 60% of all lower limb amputations occur with diabetics.

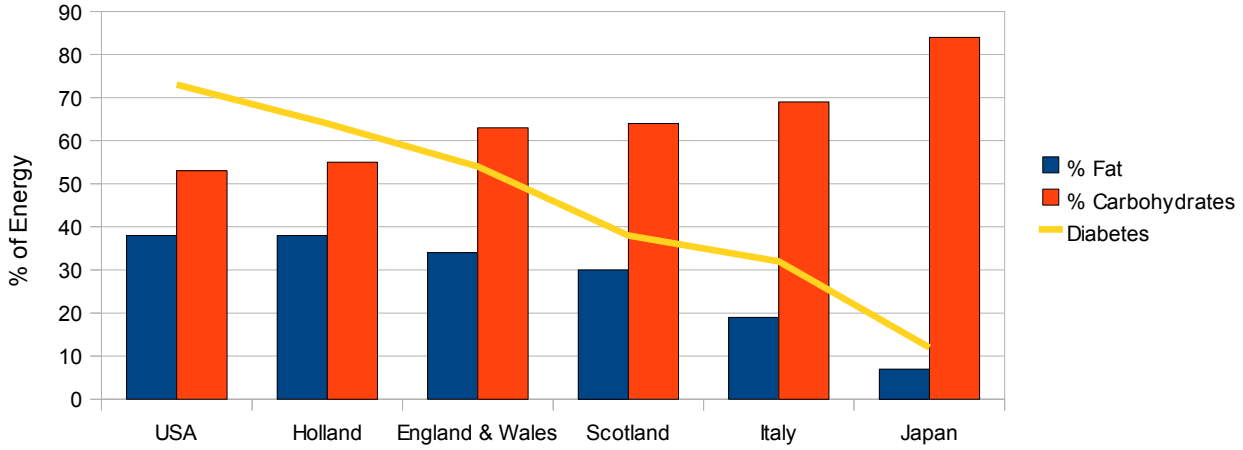
Dental Disease
- Increased frequency and severity of gum disease that can lead to tooth loss.

Pregnancy Complications

Increased Susceptibility to Other Illnesses

Death

CHART 7.1: DIETS AND DIABETES RATES, CIRCA 1925 (pg 148)



After examining four countries from Southeast Asia and south America, researchers again found that high-carbohydrate diets were linked to low rates of diabetes. Researchers noted that the country with the highest rate of diabetes, Uruguay, had a diet that was "typically 'Western' in character, being high in calories, animal protein, [total] fat and animal fat." Countries with low rates of diabetes used a diet that was "relatively lower in protein (particularly animal protein), fat and animal fat. A high proportion of calories is derived from carbohydrates, particularly from rice."

These same researchers enlarged their study to eleven countries through Central and South America and Asia. The strongest association they found with diabetes was excess weight. Populations eating the most "Western" type of diet also had the highest cholesterol levels, which in turn was strongly associated with the rate of diabetes. (149)

- Researchers found that increased fat intake was associated with an increased rate of Type 2 diabetes among 1,300 people in the San Luis valley in Colorado. They said, "The findings support the hypothesis that high-fat, low-carbohydrate diets are associated with the onset of non-insulin-dependent [Type 2] diabetes mellitus in humans."
- In the past twenty-five years, the rate at which children in Japan contract Type 2 diabetes has more than tripled. Researchers note that consumption of animal protein and animal fat has drastically increased in the past fifty years. Researchers say that this dietary shift, along with low exercise levels, might be to blame for this explosion of diabetes.
- In England and Wales the rate of diabetes markedly dropped from 1940 to 1950, largely during world War II when food consumption patterns changed markedly. During the war and its aftermath, fiber and grain intake went up and fat intake went down. People ate "lower" on the food chain because of national necessity. Around 1950, though, people gave up the grain-based diets and returned to eating more fat, more sugar and less fiber. Sure enough, diabetes rates started going up.
- Researchers studied 36,000 women in Iowa for six years. All were free of diabetes at the start of the study, but more than 1,100 cases of diabetes developed after six years. The women who were least likely to get diabetes were those that ate the most whole grains and fiber – those whose diets contained the most carbohydrates (the complex kind found in whole foods). (150-151)

[The following is based on a group of people, under supervision of Dr. Anderson, who ate a conservative, American-style diet recommended by American Diabetes Association for one week, and then switched to an experimental "veggie" diet for three weeks.] Type 1 diabetics cannot produce insulin. It is difficult to imagine any dietary change that might aid their predicament. *But after just three weeks, the Type 1 diabetic patients were able to lower their insulin medication by an average of 40%!* Their blood sugar profiles improved dramatically. *Just as importantly, their cholesterol levels dropped by 30%!* Remember, one of the dangers of being diabetic is the secondary outcomes, heart disease and stroke. Lowering risk factors for those secondary outcomes by improving the cholesterol profile is almost as important as treating high blood sugar.

Type 2 diabetics, unlike Type 1, are more "treatable" because they haven't incurred such extensive damage to their pancreas. So when Anderson's Type 2 patients ate the high-fiber, low-fat diet, the results were even more impressive. Of the twenty-five Type 2 patients, twenty-four were able to discontinue their insulin medication! Let me say that again. *All but one person were able to discontinue their insulin medication in a matter of weeks!* (152)

Yes, changing your lifestyle may seem impractical. It may seem impractical to give up meat and high-fat foods, but I wonder how practical is it to be 350 pounds and have Type 2 diabetes at the age of fifteen […]. I wonder how practical it is to have a lifelong condition that can't be cured by drugs or surgery; a condition that often leads to heart disease, stroke, blindness or amputation; a condition that might require you to inject insulin into your body every day for the rest of your life. (155)

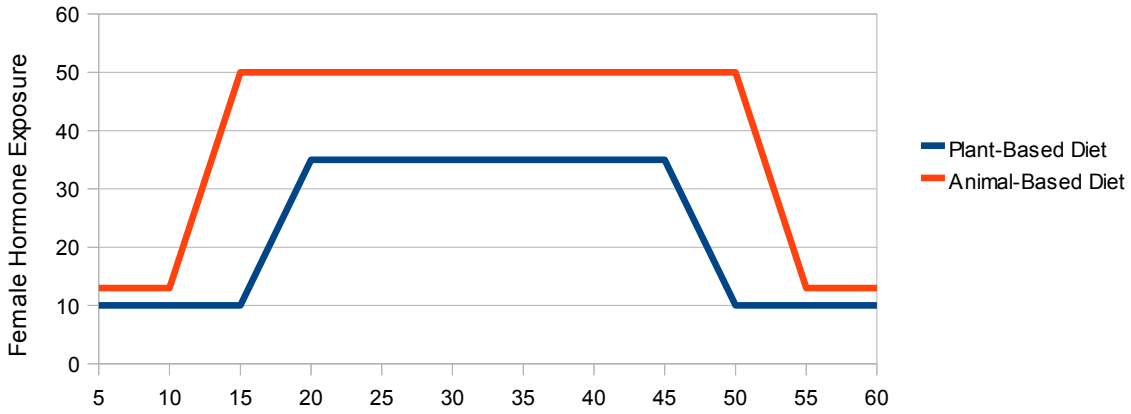
Chapter 8.
Common Cancers: Breast, Prostate, Large Bowel (Colon and Rectal).

There are at least four important breast cancer risk factors that are affected by nutrition. (159)

CHART 8.1: BREAST CANCER RISK FACTORS AND NUTRITIONAL INFLUENCE (pg 80)	
Risk of breast cancer increases when a woman has...	**A diet high in animal foods and refined carbohydrates...**
… early age of menarche (first menstruation)	… lowers the age of menarche
… late age of menopause	… raises the age of menopause
… high levels of female hormones in the blood	… increases female hormone levels
… high blood cholesterol	… increases blood cholesterol levels

With the exception of blood cholesterol, these risk factors are variation on the same theme: exposure to excess amounts of female hormones, including estrogen and progesterone, leads to an increased risk of breast cancer. Women who consume a diet rich in animal-based foods, with a reduced amount of whole, plant-based foods, reach puberty earlier and menopause later, thus extending their reproductive lives. They also have higher levels of female hormones throughout their lifespan, as shown in Chart 8.2. (160)

CHART 8.2: DIETARY INFLUENCE ON FEMALE HORMONE EXPOSURE OVER A WOMAN'S LIFETIME (PG 160)



[…] lifetime exposure to estrogen is at least 2.5 – 3.0 times higher among Western women when compared with rural Chinese women. This is a huge difference for such a critically important hormone. To use the words of one of the leading breast cancer research groups in the world, "there is overwhelming evidence that estrogen levels are a critical determinant of breast cancer risk." Estrogen directly participates in the cancer process. It also tends to indicate the presence of other female hormones that play a role in breast cancer risk. Increased levels of estrogen and related hormones are a result of the consumption of typical Western diets, high in fat and animal protein and low in dietary fiber. (160-161)

This idea that breast cancer is centered on estrogen exposure is profound because diet plays a major role in establishing estrogen exposure. This suggests that the risk of breast cancer is preventable if we eat foods that will keep estrogen levels under control. (161)

It is true that if you have a family history of breast cancer, you are at an increased risk of getting the disease. However, one research group found that less than 3% of all breast cancer cases can be attributed to family history. Even though other groups have estimated that a higher percentage of cases are due to family history, the vast majority of breast cancer in American women is not due to family history or genes. But genetic fatalism continues to define the nation's mindset.

Among the genes that influence breast cancer risk, BRCA-1 and BRCA-2 have received the most attention since their discovery in 1994. These genes, when mutated, confer a higher risk both for breast and ovarian cancers. These mutated genes may be passed on from generation to generation; that is, they are inherited genes.

In the excitement over these discoveries, however, other information has been ignored. First, only 0.2% of individuals in the general population (1 in 500) carry the mutated forms of these genes. Because of the rarity of these genetic aberrations, only a few percent of the breast cancer cases in the general population can be attributed to mutated BRCA-1 and BRCA-2 genes. Second, these genes are not the only genes that participate in the development of this disease; many more will surely be discovered. Third, the mere presence of BRCA-1, BRCA-2 or any other breast cancer gene does not guarantee disease occurrence. Environmental and dietary factors play a central role in determining whether these genes are expressed. (161-162)

With all of this new information regarding genetic risk and family history, women

are often encouraged to get screen for breast cancer. Screening is a reasonable step, especially for women who may have tested positive for the BRCA genes. But it's important to remember that doing a mammography or getting a genetic test to see if you harbor BRCA genes does not constitute prevention of breast cancer.

Screening is merely an observation to see whether the disease has progressed to an observable state. Some studies have found that groups of women who undergo frequent mammography have slightly lower mortality rates than groups of women who do not undergo frequent mammography. This implies that our cancer treatments are more likely to be successful if the cancer is found at an earlier stage. This is likely to be true, but there is some concern over the way statistics are used in this debate.

One of the statistics used to support early detection and the ensuing treatments is that once diagnosed with breast cancer, the likelihood of surviving for at least five years is higher than even before. What this really means is that with the aggressive campaign for regular screening, many women are discovering their breast cancer at an earlier stage of disease. When disease is discovered at an earlier stage it is less likely to lead to death within five years, *regardless of treatment. As a consequence, we may have an improved five-year survival rate simply because women find out that they have breast cancer earlier in the disease progression, not because our treatments have improved over time.* (163)

Women at high risk for breast cancer are given three options: watch and wait, take tamoxifen medication for the remainder of their lives or undergo mastectomy. There should be a fourth option: consuming a diet free of animal-based foods and low in refined carbohydrates, aided by regular monitoring for those at high risk. I stand by the usefulness of this fourth option even for women who have already had a first mastectomy. Using diet as an effective treatment of already-diagnosed disease has been well documented in human studies with advanced heart disease, clinically documented Type 2 diabetes […], advanced melanoma (a deadly skin cancer) and, in experimental animal studies, liver cancer. (164-165)

There is another breast cancer conversation that has been taking place for some years now. It concerns environmental chemicals. These widely distributed chemicals have been shown to disrupt hormones, although it is not clear which hormones in humans are being disrupted. These chemicals may also cause reproductive abnormalities, birth defects and Type 2 diabetes.

There are many different types of offending chemicals, most of which are commonly associated with industrial pollution. One group, including dioxins and PCBs, persist in the environment because they are not metabolized when consumed. Thus they are not excreted from the body. Because of this lack of metabolism, these chemicals accumulate in body fat and breast milk of lactating mothers. Some of these chemicals are known to promote the growth of cancer cells, although humans may not be at significant risk unless one consumes excessive quantities of meat, milk and fish. Indeed, 90–95% of our exposure to these chemicals comes from consuming animal products – yet another reason why consuming animal-based foods can be risky.

There is a second group of these environmental chemicals that are also commonly perceived to be significant causes of breast and other cancers. They are called PAHs (Polycyclic Aromatic Hydrocarbons) and are found in auto exhaust, factory smoke stacks, petroleum tar products and tobacco smoke, among other processed common to an industrial society. Unlike the PCBs and dioxins, when we consume PAHs (in food and water), we can metabolize and excrete them. But there is a snag: when the PAHs are

metabolized within the body, they produce intermediate products that react with DNA to form tightly bound complexes, or adducts (see chapter three). This is the first step in causing cancer. In fact, these chemicals have recently been shown to adversely affect the BRCA-1 and BRCA-2 genes of breast cancer cells grown in the laboratory. (165)

[…] environmental chemicals seem to play a far less significant role for breast cancer than the kind of foods we choose to eat. (166)

HRT [hormone replacement therapy] is taken by many women in order to alleviate unpleasant effects of menopause, protect bone health and prevent coronary heart disease. However, it is now becoming widely acknowledged that HRT is not as beneficial as once thought, and it may have certain severe side effects. So what are the facts?

I am writing this commentary at an opportune time because the results of some large trials of HRT use have been released in the last year. Of special interest are two large randomized intervention trials: the Women's Health Initiative (WHI) and the Heart and Estrogen/Progestin Replacement Study (HERS). Among women who take HRT, after 5.2 years the WHI trial is showing a 26% *increase* in breast cancer cases while the HERS study is seeing an even greater 30% increase. These studies are consistent. It appears that increased exposure to female hormones, via HRT, does indeed lead to more breast cancer.

It has been thought that HRT is associated with lower rates of coronary heart disease. However, this is not necessarily true. In the large WHI trial, for every 10,000 healthy postmenopausal women who took HRT, there were seven more women with heart disease, eight more with strokes and eight more with pulmonary embolism – the opposite of what had been expected. HRT may *increase* cardiovascular disease risk after all. On the other hand, HRT did have a beneficial effect on colorectal cancer and bone fracture rate. Among every 10,000 women, there were six fewer colorectal cancers and five fewer bone fractures.

So how do you make a decision with such information? Just by adding and subtracting the numbers we can see that HRT may well be the cause of more harm that good. We can tell each individual woman to make her own decision depending on which disease and which unpleasantry she fears the most, as many physicians are likely to do. But this can be a tough decision for women who are having a difficult time with menopause. These women must choose between living unaided through the emotional and physical symptoms of menopause in order to preserve a low risk of breast cancer, or taking HRT to manage their menopause discomfort while increasing their risk of breast cancer and, possibly, cardiovascular disease. To say that this scenario troubles me would be an understatement. We have spent well over a billion dollars on the research and development of these HRT medical preparations, and all we get is some apparent pluses and probably even more minuses. Calling this troubling doesn't begin to describe it.

Instead of relying on HRT, I suggest that there is a better way, using food. The argument goes like this:

- During the reproductive years, hormone levels are elevated, although the levels among women who eat plant-based diets are not as elevated.
- When women reach the end of their reproductive years, it is entirely natural for reproductive hormones of all women to drop to a low “base” level.
- As reproductive years come to an end, the lower hormone levels among plant eaters don't crash as hard as they do among animal eaters. Using hypothetical numbers to illustrate the concept, the levels of plant eaters may crash from forty to fifteen, rather than sixty to fifteen for animal eaters.

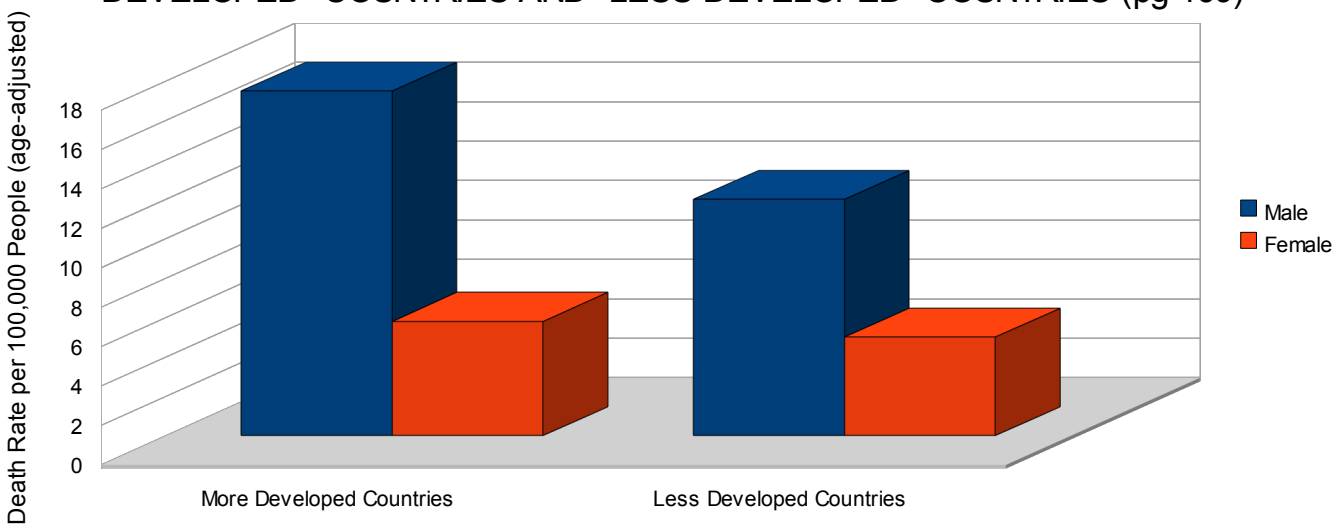
- These abrupt hormone changes in the body are what cause menopausal symptoms.
- Therefore, a plant-based diet leads to less severe hormone crash and a gentler menopause.

This argument is eminently reasonable based on what we know, although more studies would be helpful. But even if future studies fail to confirm these detail, a plant-based diet still offers the lowest risk for both breast cancer and heart disease for other reasons. It might just be the best of all worlds, something that no drug can offer. (167-168)

It seems that environmental factors, including diet, play the most important roles in colorectal cancer. Migrant studies have shown that as people move from a low-cancer risk area to a high-cancer risk area, they assume an increased risk within two generations. This suggests that diet and lifestyle are important causes of this cancer. Other studies have also found that rates of colorectal cancer change rapidly as a population's diet or lifestyle changes. These rapid changes in cancer rates within one population cannot possibly be explained by changes in inherited genes. In the context of human society, it takes thousands of years to get widespread, permanent changes in the inherited genes that are passed from one generation to the next. Clearly, something about environment or lifestyle is either preventing or enhancing the risk of getting colorectal cancer.

In a landmark paper published almost thirty years ago, researchers compared environmental factors and cancer rates in thirty-two countries around the world. One of the strongest links between any cancer and any dietary factor was between colon cancer and meat intake.

CHART 8.3: COLORECTAL CANCER DEATH RATE IN "MORE DEVELOPED" COUNTRIES AND "LESS DEVELOPED" COUNTRIES (pg 169)

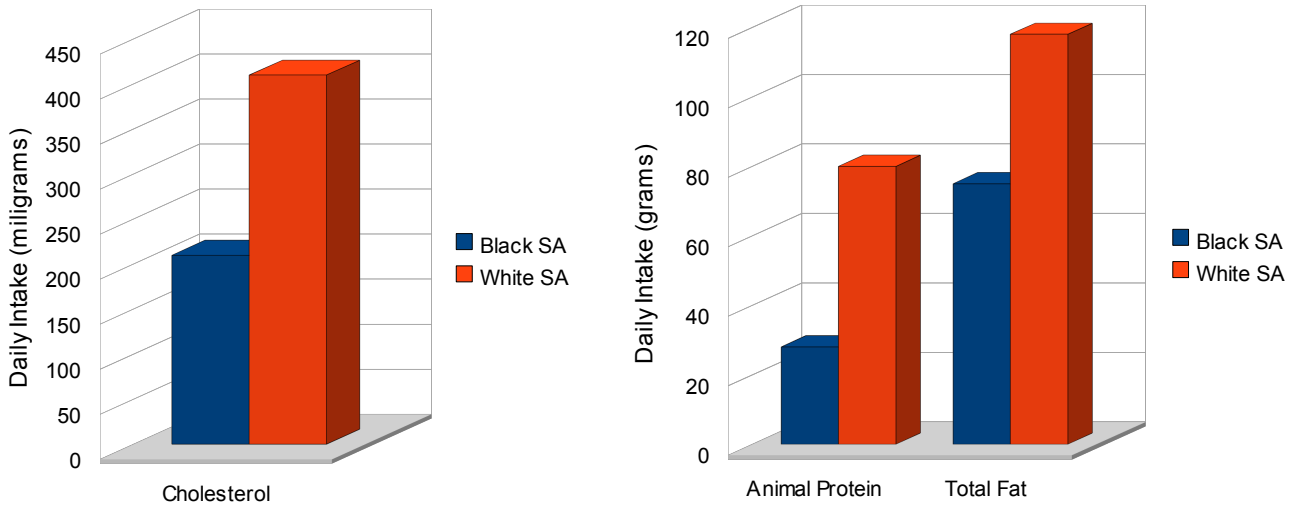


[…] people who consumed the most fiber had a 43% lower risk of colon cancer than the people who consumed the least fiber. Those who consume the most vegetable had a 52% lower risk than those who consume the least vegetables. (172)

What is clear is that diets naturally high in fiber and low in animal-based foods can prevent colorectal cancer. Even in the absence of more specific details, we can still make important public health recommendations. *The data clearly show that a whole foods, plant-based diet can dramatically lower colorectal cancer rates. We don't need to know*

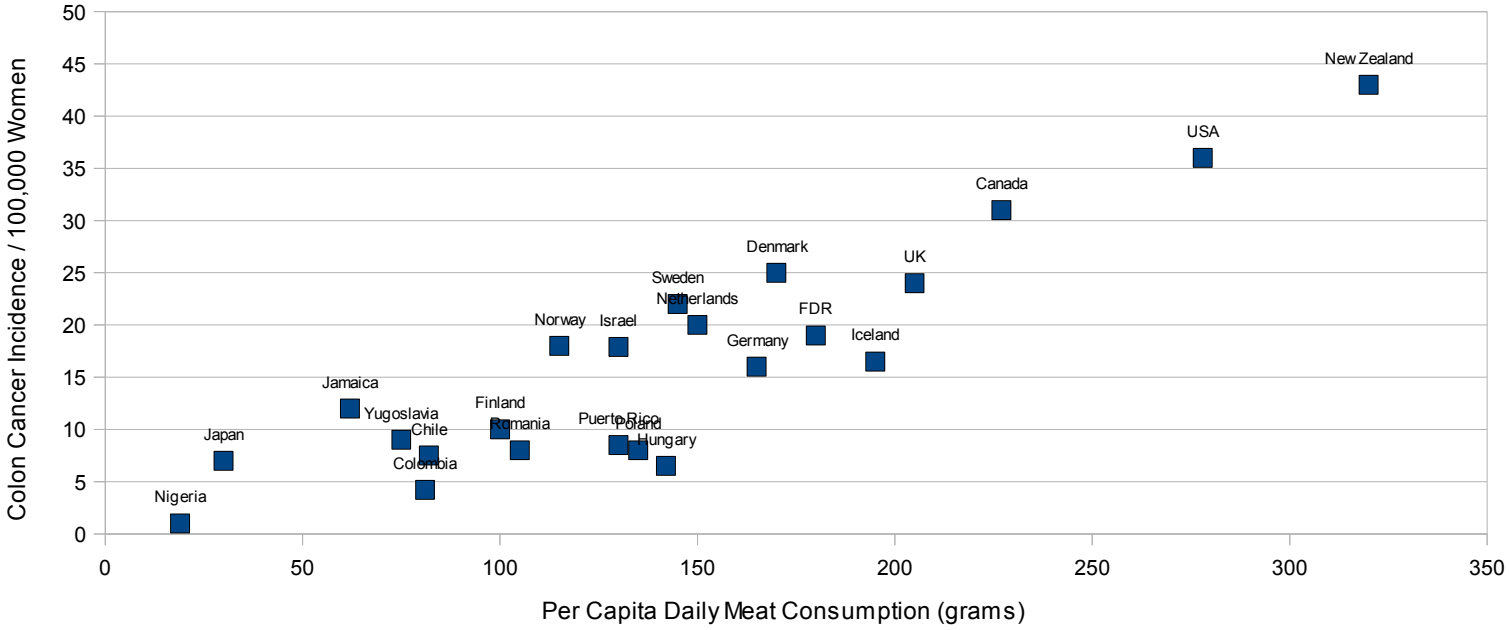
which fiber is responsible, what mechanism is involved or even how much of the effect is independently due to fiber. (174)

CHART 8.5: INTAKE OF ANIMAL PROTEIN, TOTAL FAT AND CHOLESTEROL AMONG BLACK AND WHITE SHOUTH AFRICANS (pg 173)



It has been recently noted that the same risk factors that promote colorectal cancer, a diet low in fruits and vegetables and high in animal foods and refined carbohydrates, can also promote insulin resistance syndrome. (174)

CHART 8.4: FEMALE COLON CANCER INCIDENCE AND DAILY MEAT CONSUMPTION (pg 170)



[..] there are two different types of carbohydrates; refined carbohydrates and complex carbohydrates. Refined carbohydrates are the starches and sugars obtained from plants by mechanically stripping off their outer layers, which contain most of the plant's vitamins, minerals, protein and fiber. This "food" (regular sugar, white four, etc.) has very little nutritional value. Foods such as pastas made from refined flour, sugary

cereals, white breads, candies and sugar-laden soft drinks should be avoided as much as possible. But do eat whole, complex carbohydrate-containing foods such as unprocessed fresh fruits and vegetables, and whole grain products like brown rice and oatmeal. These unprocessed carbohydrates, especially from fruits and vegetables, are exceptionally health-promoting. (174)

When people go to the doctor to get a colonoscopy, the doctor inspects the large bowel using a rectal probe and looks for abnormal tissue growth. The most commonly found abnormality is a polyp. Although it is not yet clear exactly how tumors are related to polyps, most scientists would agree that they share similar dietary associations and genetic characteristics. Those people who have noncancerous problems in the large bowel, such as polyps, often are the same people who later develop cancerous tumors. (175-176)

The prostate is a male reproductive organ about the size of a walnut, located between the bladder and the colon. It is responsible for producing some of the fluid that helps sperm on its quest to fertilize the female's egg. (177)

The first mechanism [behind the observed link between prostate cancer and diary] concerns a hormone that increases cancer cell growth, a hormone that our bodies make, as needed. This growth hormone, Insulin-like Growth Factor 1 (IGF-1), is turning out to be a predictor of cancer just as cholesterol is a predictor for heart disease. Under normal conditions, this hormone efficiently manages the rates at which cells "grow" - that is, how they reproduce themselves and how they discard old cells, all in the name of good health.

Under unhealthy conditions, however, IGF-1 becomes more active, increasing the birth and growth of new cells while simultaneously inhibiting the removal of old cells, both of which favor the development of cancer [seven studies cited]. So what does this have to do with the food we eat? It turns out that consuming animal-based foods increases the blood levels of this growth hormone, IGF-1.

With regard to prostate cancer, people with higher than normal blood levels of IGF-1 have been shown to have 5.1 times the risk of advanced-stage prostate cancer. There's more: when men also have low blood levels of a protein that binds and inactivates IGF-1, they will have *9.5 times the risk of advanced-stage prostate cancer.* Let's put a few stars by these numbers. They are big and impressive – and fundamental to this finding is the fact that we make more IGF-1 when we consume animal-based foods like meat and diary.

The second mechanism relates to vitamin D metabolism. This "vitamin" is not nutrient that we need to consume. Our body can make all that we need simply by being in sunlight fifteen to thirty minutes every couple of days. In addition to the production of vitamin D being affected by sunlight, it is also affected by the food that we eat. The formation of the most active form of vitamin D is a process that is closely monitored and controlled by our bodies. This process is a great example of our bodies' natural balancing act, affecting not only prostate cancer, but breast cancer, colon cancer, osteoporosis and autoimmune diseases like Type 1 diabetes. […] This web of reactions illustrates many similar and highly integrated reaction networks showing how food controls health.

The main component of this process is an active form of vitamin D produced in the body from the vitamin D that we get from food or sunshine. This active or "supercharged" D produces many benefits throughout the body, including the prevention of cancer, autoimmune diseases and diseases like osteoporosis. This all-important

supercharged D is not something that you get from food or from a drug. A drug composed of isolated supercharged D would be far too powerful and far too dangerous for medical use. Your body uses a carefully composed series of controls and sensors to produce just the right amount of supercharged D for each task at exactly the right time.

As it turns out, our diet can determine how much of this supercharged D is produced and how it works once it is produced. Animal protein that we consume has the tendency to block the production of supercharged D, leaving the body with low levels of this vitamin D in the blood. If these low levels persist, prostate cancer can result. Also, persistently high intakes of calcium create an environment where supercharged D declines, thus adding to the problem.

So what food substance has both animal protein and large amounts of calcium? *Milk and other dairy foods.* This fits in perfectly with the evidence that links dairy consumption with prostate cancer. This information provides what we call biological plausibility and shows how the observational data fit together. To review the mechanisms:

- Animal protein causes the body to produce more IGF-1, which in turn throws cell growth and removal out of whack, stimulating cancer development.
- Animal protein suppresses the production of "supercharged" D.
- Excessive calcium, as found in milk, also suppresses the production of "supercharged" D.
- "Supercharged" D is responsible for creating a wide variety of health benefits in the body. Persistently low levels of supercharged D create an inviting environment for different cancers, autoimmune diseases, osteoporosis and other diseases. (179-181)

Chapter 9.
Autoimmune Diseases.

Autoimmune diseases in general become more common the greater the distance from the equator. (184)

In essence, our immune system is like a military network designed to defend against foreign invaders. The "soldiers" of this network are the white blood cells, which are comprised of many different sub-groups, each having its own mission. These sub-groups are analogous to a navy, army, air force and marines, with each group of specialists doing highly specialized work.

The "recruitment center" for the system is in the marrow of our bones. The marrow is responsible for generating specialized cells called stem cells. Some of these cells are released into circulation for use elsewhere in the body; these are called B-cells (for bone). Other cells formed in the bone marrow remain immature, or unspecialized, until they travel th the thymus (an organ in the chest cavity just above the heart) where they become specialized; these are called T-cells (for thymus). These "soldier" cells, along with other specialized cells, team up to create intricate defense plans. They meet at major intersections around the body, including the spleen (just inside the left lower rib cage) and the lymph nodes. These meeting points are like command and control centers, where the "soldier cells" rearrange themselves into teams to attack foreign invaders. (184-185)

So when our immune system notices these foreign cells, or antigens, it destroys them. Each of these foreign antigens has a separate identity, which is determined by the

sequence of amino acids that comprises its proteins. It is analogous to each and every person having a different face. Because numerous amino acids are available for creating proteins, there are infinite varieties of distinctive "faces."

To counter these antigens, our immune system must customize its defense to each attack. It does this by creating a "mirror image" protein for each attacker. The mirror image is able to fit perfectly onto the antigen and destroy it. Essentially, the immune system creates a mold for each face it encounters. Every time it sees that face after the initial encounter, it uses the custom-made mold to "capture" the invader and destroy it. The mod may be a B-cell antibody or a T-cell-based receptor protein.

Remembering each defense against each invader is what immunization is all about. An initial exposure to chicken pox, for example, is a difficult battle, but the second time you encounter that virus you will know exactly how to deal with it, and the war will be shorter, less painful and much more successful. You may not even get sick. (185)

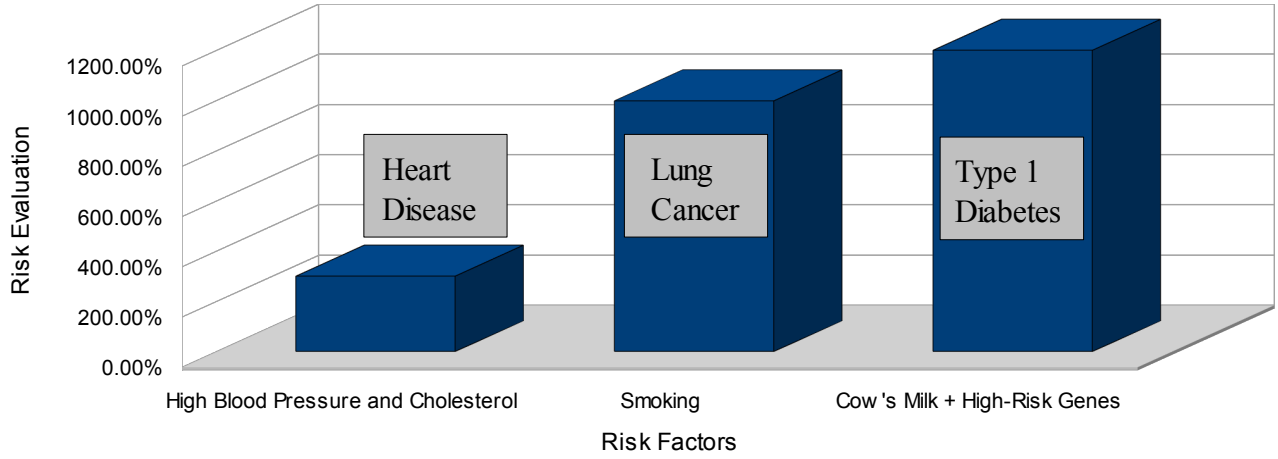
One of the fundamental mechanisms for this self-destructive behavior [autoimmune disease] is called molecular mimicry. It so happens that some of the foreign invaders that our soldier cells seek out to destroy look the same as our own cells. The immune system "molds" that fit these invaders also fit our own cells. The immune system then destroys, under some circumstances, everything that fits the mold, including our own cells. This is an extremely complex self-destructive process involving many different strategies on the part of the immune system, all of which share the same fatal flaw of not being able to distinguish "foreign" invader proteins from the proteins of our own body. […] It so happen that the antigens that trick our bodies into attacking our own cells may be in food. During the process of digestion, for example, some proteins slip into our bloodstream from the intestine without being fully broken down into their amino acid parts. The remnants of undigested proteins are treated as foreign invaders by our immune system, which sets about making molds to destroy them and sets into motion the self-destructive autoimmune process. (186)

In the case of Type 1 diabetes, the immune system attacks the pancreas cells responsible for producing insulin. This devastating, incurable disease strikes children, creating a painful and difficult experience for young families. What most people don't know, though, is that there is strong evidence that this disease is linked to diet and, more specifically, to dairy products. The ability of cow's milk protein to initiate Type 1 diabetes is well documented. The possible initiation of this disease goes like this:

- A baby is not nursed long enough and is fed cow's milk protein, perhaps in an infant formula.
- The milk reaches the small intestine, where it is digested down to its amino acid parts.
- For some infants, cow's milk is not fully digested, and small amino acid chains or fragments of the original protein remain in the intestine.
- These incompletely digested protein fragments may be absorbed into the blood.
- The immune system recognizes these fragments as foreign invaders and goes about destroying them.
- Unfortunately, some of the fragments look exactly the same as the cells of the pancreas that are responsible for making insulin.
- The immune system loses its ability to distinguish between the cow's milk protein fragments and the pancreatic cells, and destroys them both, thereby eliminating the child's ability to produce insulin.
- The infant becomes a Type 1 diabetic, and remains so for the rest of his or her life.

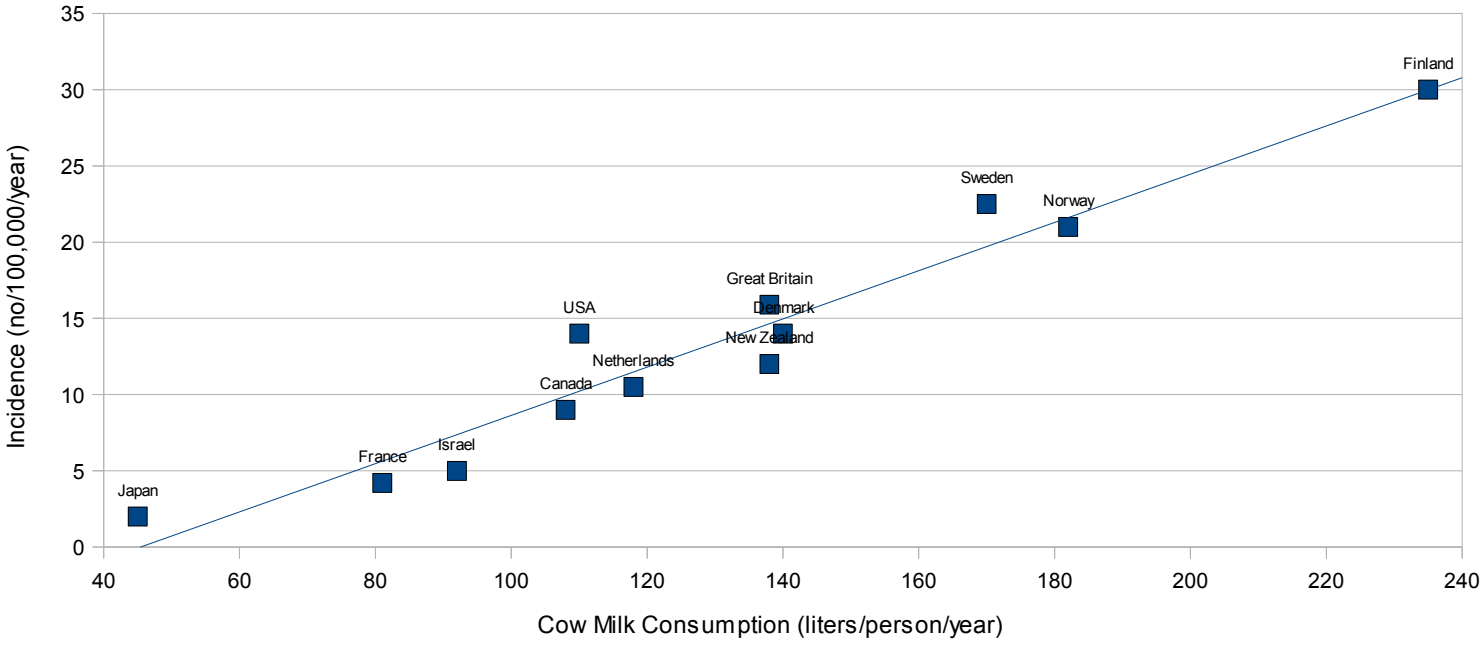
This process boils down to a truly remarkable statement: *cow's milk may cause one of the most devastating diseases that can befall a child.* (187)

CHART 9.2: RELATIVE RISKS OF VARIOUS FACTORS ON VARIOUS DISEASE OUTCOMES (pg 189)



The American Academy of Pediatrics in 1994 "strongly encouraged" that infants in families where diabetes is more common not be fed cow's milk supplements for their first two years of life. (191)

CHART 9.3: ASSOCIATION OF COW'S MILK CONSUMPTION AND INCIDENCE OF TYPE 1 DIABETES IN DIFFERENT COUNTRIES (pg 190)



Imagine looking at the front page of the newspaper and finding the following headline: "Cow's Milk the Likely Cause of Lethal Type 1 Diabetes." Because the reaction would be so strong, and the economic impact monumental, this headline won't be written anytime soon, regardless of the scientific evidence. […] if I say cigarettes are bad for you and

provide a mountain of evidence to support my contention, the tobacco companies might come along and pick out one unsolved detail and then claim that the whole idea of cigarettes being unhealthy is mired in controversy, thereby nullifying all my conclusions. This is easy to do, because there will always be unsolved details; this is the nature of science. Some groups use controversy to stifle certain ideas, impede constructive research, confuse the public and turn public policy into babble rather than substance. Sustaining controversy as a means of discrediting findings that cause economic or social discomfort is one of the greatest sins in science. (192)

Human breast milk is the perfect food for an infant, and one of the most damaging things a mother can do is to substitute the milk of a cow for her own. (194)

Multiple sclerosis (MS) is a particularly difficult autoimmune disease, both for those who have it and for those who care for its victims. It is a lifelong battle involving a variety of unpredictable and serious disabilities. MS patients often pass through episodes of acute attacks while gradually losing their ability to walk or to see. After ten to fifteen years, they often are confined to a wheelchair, and then to a bed for the rest of their lives. […] It is a disease that is initially diagnosed between twenty and forty years of age and strikes women about three times more often than men. (194)

The "multiple" symptoms of this disease represent a nervous system gone awry. The electrical signals carrying messages to and from the central nervous system (brain and spinal cord) and out through the peripheral nervous system to the rest of the body are not well coordinated and controlled. This is because the insulating cover or sheath of the nerve fibers, the myelin, is being destroyed by an autoimmune reaction. Think of what would happen to your household wiring if the electrical insulation became thin or was stripped away, leaving bare wires. The electrical signals would be short-circuited. That is what happens with MS; the wayward electrical signals may destroy cells and "burn" patches of neighboring tissue, leaving little scars or bits of sclerotic tissue. These "burns" can become serious and ultimately destroy the body. (194-195)

MS is over 100 times more prevalent in the far north than at the equator, and seven times more prevalent in south Australia (closer to the South Pole) than in north Australia. This distribution is very similar to the distribution of other autoimmune diseases, including Type 1 diabetes and rheumatoid arthritis. (195)

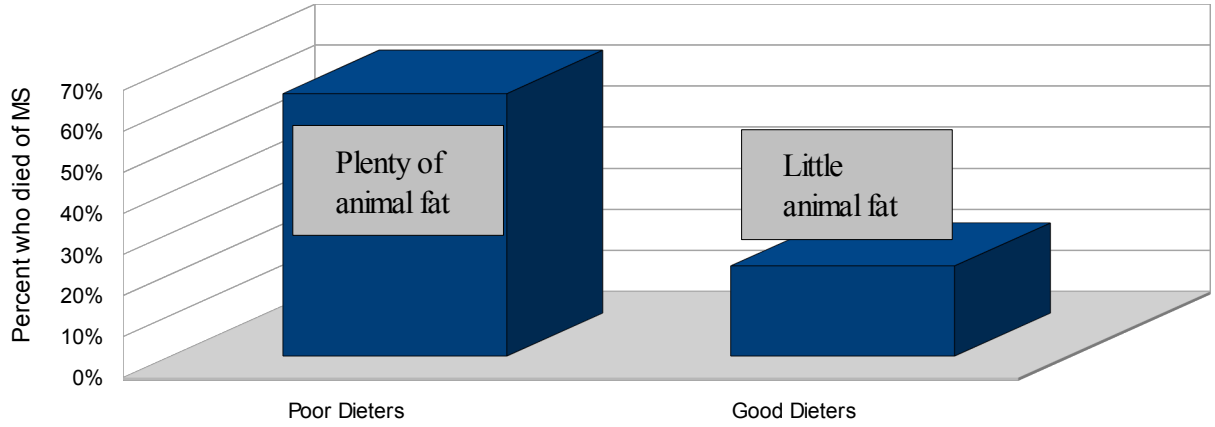
[…] cow's milk is strongly linked to MS both when comparing different countries and when comparing states within the U.S. (196)

Although MS and Type 1 diabetes share some of the same unanswered questions on the exact roles of viruses and genes and the immune system, they also share the same alarming evidence regarding diet. For both diseases, a "Western" diet is strongly associated with disease incidence. Despite the efforts of those who would rather dismiss or mire these observational studies in controversy, they paint a consistent picture. Intervention studies conducted on people already suffering from these diseases only reinforce the findings of the observational studies. (198)

Knowing the strength of the evidence against animal foods, cow's milk in particular, for both MS and Type 1 diabetes, and knowing how much in common all of the autoimmune diseases have, it is reasonable to begin thinking about food and its relationship to a

much broader group of autoimmune diseases. (200)

CHART 9.4: MS DEATH RATE AFTER 144 PATIENTS DIETED FOR THIRTY-FOUR YEARS (pg 196)



Chapter 10.
Wide-Ranging Effects: Bone, Kidney, Eye and Brain Diseases.

[…] countries that use the most cow's milk and its products […] have the highest fracture rates and the worst bone health. One possible explanation is found in a report showing an impressively strong association between animal protein intake and bone fracture rate for women in different countries. Authored in 1992 by researchers at Yale University School of Medicine, the report summarized data on protein intake and fracture rates taken from thirty-four separate surveys in sixteen countries that were published in twenty-nine peer-reviewed research publications. All the subjects in these surveys were women fifty years and older. It found that a very impressive 70% of the fracture rate was attributable to the consumption of animal protein.

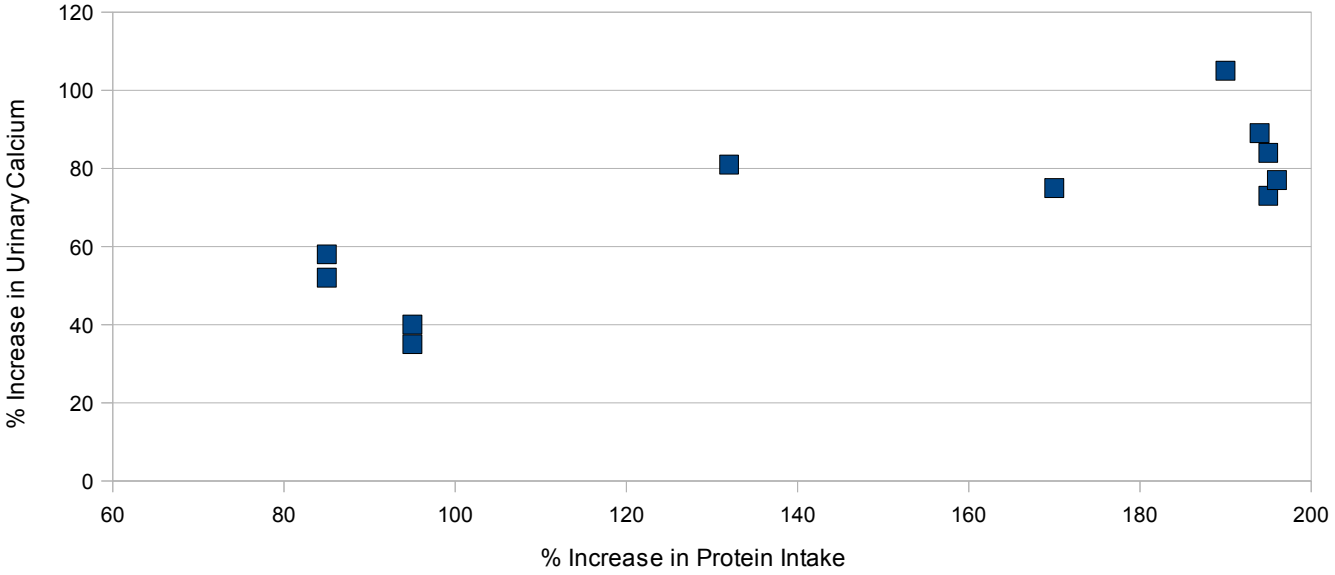
These researchers explained that animal protein, unlike plant protein, increases the acid load in the body. An increased acid load means that our body and tissues become more acidic. The body does not like this acidic environment and begins to fight it. In order to neutralize the acid, the body uses calcium, which acts as a very effective base. This calcium, however, must come from somewhere. It ends up being pulled from the bones, and the calcium loss weakens them, putting them at greater risk for fracture. (205)

In our rural China study, where the animal to plant ratio was about 10%, the fracture rate is only one-fifth that of the U.S. Nigeria shows an animal-to-plant protein ratio only about 10% that of Germany, and the hip fracture incidence is lower by over 99%. (208)

Professor Hegsted [a Harvard faculty] believes that excessively high intakes of calcium consumed over a long time impair the body's ability to control how much calcium it uses and when. Under healthy conditions, the body uses an activated form of vitamin D, calcitriol, to adjust how much calcium it absorbs from food and how much it excretes and distributes in the bone. Calcitriol is considered a hormone; when more calcium is needed, it enhances calcium absorption and restricts calcium excretion. If too much calcium is consumed over a long period of time, the body may lose its ability to regulate calcitriol, permanently or temporarily disrupting the regulation of calcium absorption and excretion. Ruining the regulatory mechanism in this way is a recipe for osteoporosis in menopausal

and post-menopausal women. Women at this stage of life must be able to enhance their utilization of calcium in a timely manner, especially if they continue to consume a diet high in animal protein. The fact that the body loses its ability to control finely tuned mechanisms when they are subjected to continuous abuse is a well-established phenomenon in biology. (208)

CHART 10.1: ASSOCIATION OF URINARY CALCIUM EXCRETION WITH DIETARY PROTEIN INTAKE (pg 206)



[…] consuming animal protein at levels above twenty-one grams per person per day (slightly less than one ounce) for the United Kingdom for the years of 1958 to 1973 is closely correlated with a high number of kidney stones formed per 10,000 individuals per year. (212)

> Urolithiasis [kidney stone formation] is a worldwide problem with appears to be aggravated by the high dairy-produce, highly energy-rich and low-fibre diets consumed in most industrialized countries … Evidence points, in particular to a high-meat protein intake as being the dominant factor … On the basis of epidemiological and biochemical studies a move toward a more vegetarian, less energy-rich diet would be predicted to reduce the risk of stone in the population. (213)

Macular degeneration is the leading cause of irreversible blindness among people over age of sixty-five. Over 1.6 million Americans suffer from this disease, many of whom become blind. As the name implies, this condition involves destruction of the macula, which is the biochemical intersection in the eye – where the energy of the light coming in is transformed into a nerve signal. The macula occupies center stage, so to speak, and it must be functional for sight to occur.

Around the macula there are fatty acids that can react with incoming light to produce a low level of highly reactive free radicals. These free radicals […] can destroy, or degenerate, neighboring tissue, including the macula. But fortunately for us, free radical damage can be repressed thanks to the antioxidants in vegetables and fruits. […]

Researchers found that a higher intake of total carotenoids was associated with a lower frequency of macular degeneration. Carotenoids are a group of antioxidants found

in the colored parts of fruits and vegetables. When carotenoid intakes were ranked, those individuals who consumed the most had 43% less disease than those who consumed the least. Not surprisingly, five out of six plant-based foods measured also were associated with lower rates of muscular degeneration (broccoli, carrots, spinach or collard greens, winter squash and sweet potato). Spinach or collard greens conferred the most protection. There was 88% less disease for people who ate these greens five or more times per week when compared with people who consumed these greens less than once per month. The only food group not showing a preventive effect was the cabbage/cauliflower/brussels sprout group, which sports the least color of the six food groups. (214-215)

Cataract formation involves the clouding of the eye lens. Corrective surgery involves removing the cloudy lens and replacing it with an artificial lens. The development of the opaque condition, like the degeneration of the macula and so many other disease conditions in our body, is closely associated with the damage created by an excess of reactive free radicals. (217)

There is now good dietary information for the two chief conditions referring to mental decline. One the modest side, there is a condition called "cognitive impairment" or "cognitive dysfunction." This condition describes the declining ability to remember and think as well as one once did. It represents a continuum of disease ranging from cases that only hint at declining abilities to those that are much more obvious and easily diagnosed.

Then there are mental dysfunctions that become serious, eve nlife threatening. These are called dementia, of which there are two main types: vascular dementia and Alzheimer's disease. Vascular dementia is primarily caused by multiple little strokes resulting from broken blood vessels in the brain. It is common for elderly people to have "silent" strokes in their later years. A stroke is considered silent if it goes undetected and undiagnosed. Each little stroke, incapacitates part of the brain. The other type of dementia, Alzheimer's, occurs when a protein substance called beta-amyloid accumulates in critical areas of the brain as a plaque, rather like the cholesterol-laden plaque that builds up in cardiovascular diseases. (218)

Not only does cognitive impairment often lead to more serious dementia, it is also associated with cardiovascular disease, stroke and adult-onset of Type 2 diabetes. All of these diseases cluster in the same populations, oftentimes in the same people. This clustering means that they share some of the same risk factors. Hypertension (high blood pressure) is one factor; another is high blood cholesterol. Both of these, of course, can be controlled by diet.

A third risk factor is the amount of those nasty free radicals, which wreak havoc on brain function in our later years. Because free radical damage is so important to the process of cognitive dysfunction and dementia, researchers believe that consuming dietary antioxidants can shield our brains from this damage, as in other diseases. Animal-based foods lack antioxidant shields and tend to activate free radical production and cell damage, while plant-based foods, with their abundant antioxidants, tend to prevent such damage. It's the same dietary cause and effect that we saw with macular degeneration.

Of course, genetics play a role, and specific genes have been identified that may increase the risk of cognitive decline. But environmental factors also play a key role, most probably the dominant one.

In a recent study, it was found that Japanese American men living in Hawaii had a higher rate of Alzheimer's disease than Japanese living in Japan. Another study found that native Africans had significantly lower rates of dementia and Alzheimer's than African Americans in Indiana. Both of these findings clearly support the idea that environment plays an important role in cognitive disorders.

Worldwide, the prevalence patterns of cognitive disorders appear to be similar to other Western diseases. Rates of Alzheimer's are low in less developed areas. A recent study compared Alzheimer's rates to dietary variables across eleven different countries and found that populations with a high fat intake and low cereal and grain intake had higher rates of the disease. (219)

In a study of 260 elderly people aged sixty-five to ninety years, it was reported that: "A diet with less fat, saturated fat and cholesterol, and more carbohydrate, fiber, vitamins (especially folate, vitamins C and E and beta-carotenes) and mineral (iron and zinc) may be advisable not only to improve the general health of the elderly but also to improve cognitive function." This conclusion advocates plant-based foods and condemns animal-based foods for optimal brain function. Yet another study on several hundred older people found that scores on mental tests were higher among those people who consumed the most vitamin C and beta-carotene. Other studies have also found that a low level of vitamin C in the blood is linked to poorer cognitive performance in old age, and some have found that B vitamins, including beta-carotene, are linked to better cognitive function.

The seven studies mentioned above all show that one or more nutrients found almost exclusively in plants are associated with a lower risk of cognitive decline in old age. Experimental animal studies have not only confirmed that plant foods are good for the brain, but they showed the mechanisms by which these foods work. Although there are important variations in some of these study findings – for example, one study only finds an association for vitamin C, and another only finds an association for beta-carotene and not vitamin C – we shouldn't miss the forest by focusing on one or two trees. No study has ever found that consuming more dietary antioxidants increases memory loss. When associations are observed, it is always the other way around. Furthermore, the association appears to be significant, although more substantial research must be done before we can know exactly how much cognitive impairment is due to diet.

What about the more serious dementia caused by strokes (vascular dementia) and Alzheimer's? How does diet affect these diseases? The dementia that is caused by the same vascular problems that lead to stroke is clearly affected by diet. In a publication from the famous Framingham Study, researchers conclude that for every three additional servings of fruits and vegetables a day, the risk of stroke will be reduced by 22%. three servings of fruits and vegetables is less than you might think. The following examples count as one serving in this study: ½ cup peaches, ¼ cup tomato sauce, ½ cup broccoli or one potato. Half a cup is not much food. In fact, the men in this study who consumed the most fruits and vegetables consumed as many as nineteen servings a day. If every three servings lower the risk by 22%, the benefit can add up fast (risk reduction approaches but cannot exceed 100%). (220-221)

Part III
The Good Nutrition Guide

I was in a restaurant recently, looking at the menu, when I noticed a very peculiar "low-carb" meal option: a massive plate of pasta topped with vegetables, otherwise known as pasta primavera. The vast majority of calories in the meal clearly came from carbohydrates. How could it be "low-carb"? Was it a misprint? I didn't think so. At various other times I've noted that salads, breads and even cinnamon buns are labeled "low-carb," even though their ingredient lists demonstrate that, in fact, the bulk of calories are provided by carbohydrates. What's going on? (223)

Chapter 11.
Eating Right: Eight Principles of Food and Health.

The benefits of a healthy lifestyle are enormous. I want you to know that you can:

- live longer
- look and feel younger
- have more energy
- lose weight
- lower your blood cholesterol
- prevent and even reverse heart disease
- lower your risk of prostate, breast and other cancers
- preserve your eyesight in your later years
- prevent and treat diabetes
- avoid surgery in many instances
- vastly decrease the need for pharmaceutical drugs
- keep your bones strong
- avoid impotence
- avoid stroke
- prevent kidney stones
- keep your baby from getting Type 1 diabetes
- alleviate constipation
- lower your blood pressure
- avoid Alzheimer's
- beat arthritis
- and more … (225-226)

PRINCIPLE #1
Nutrition represents the combined activities of countless food substances. The whole is greater than the sum of its parts.

CHART 11.1: NUTRIENTS IN SPINACH (pg 227)	
Macronutrients	
Water	Fat (many kinds)
Calories	Carbohydrate
Protein (many kinds)	Fiber
Minerals	

Calcium	Sodium
Iron	Zinc
Magnesium	Copper
Phosphorus	Manganese
Potassium	Selenium
Vitamins	
C (Ascorbic Acid)	B-6 (Pyridoxine)
B-1 (Thiamin)	Folate
B-2 (Riboflavin)	A (as carotenoids)
B-3 (Niacin)	E (tocopherosols)
Pantothenic Acid	
Fatty Acids	
14:0 (Mystric Acid)	18:1 (Oleic Acid)
16:0 (palmitic Acid)	20:1 (Eicosenoic Acid)
18:0 (Stearic Acid)	18:2 (Linoleic Acid)
16:1 (Palmitoleic Acid)	18:3 (Linolenic Acid)
Amino Acids	
Tryptophan	Valine
Threonine	Arginine
Isoleucine	Histidine
Leucine	Alanine
Lysine	Aspartic Acid
Methionine	Glutamin Acid
Cystine	Glycine
Phenylalanine	Proline
Tyrosiene	Serine
Phytosterols (many kinds)	

PRINCIPLE #2
Vitamin supplements are not a panacea for good health.

This was the late Dr. Atkins's formula. He advocated a high-protein, high-fat diet – sacrificing long-term health for short-term gain – and then advocated taking his supplements to address what he called, in his own words, the "common dieters' problems" including constipation, sugar cravings, hunger, fluid retention, fatigue, nervousness and insomnia. (229)

PRINCIPLE #3
There are virtually no nutrients in animal-based foods that are not better

provided by plants.

CHART 11.2: NUTRIENT COMPOSITION OF PLANT AND ANIMAL-BASED FOODS (PER 500 CALORIES OF ENERGY) pg 230		
Nutrient	**Plant-Based Foods***	**Animal-Based Foods****
Cholesterol (mg)	-	137
Fat (g)	4	36
Protein (g)	33	34
Beta-carotene (mcg)	29,919	17
Dietary Fiber (g)	31	-
Vitamin C (mg)	293	4
Folate (mcg)	1168	19
Vitamin E (mg_ATE)	11	0.5
Iron (mg)	20	2
Magnesium (mg)	548	51
Calcium (mg)	545	252

* Equal parts of tomatoes, spinach, lima beans, peas, potatoes
** Equal parts of beef, port, chicken, whole milk

By definition, for a food chemical to be an essential nutrient, it must meet two requirements:

- the chemical is necessary for healthy human functioning
- the chemical must be something our bodies cannot make on their own, and therefore must be obtained from an outside source

One example of a chemical that is not essential is cholesterol, a component of animal-based food that is nonexistent in plant-based food. While cholesterol is essential for health, our bodies can make all that we require; so we do not need to consume any in food. Therefore, it is not an essential nutrient.

There are four nutrients which animal-based foods have that plant-based foods, for the most part, do not: cholesterol and vitamins A, D and B_{12}. Three of these are nonessential nutrients. As discussed above, cholesterol is made by our bodies naturally. Vitamin A can be readily made by our bodies from beta-carotene, and vitamin D can be readily made by our bodies simply by exposing our skin to about fifteen minutes of sunshine every couple of days. Both of these vitamins are toxic if they are consumed in high amounts. This is one more indication that it is better to rely on the vitamin precursors, beta-carotene and sunshine, so that our bodies can readily control the timing and quantities of vitamins A and D that are needed.

Vitamin B_{12} is more problematic. Vitamin B_{12} is made by microorganisms found in the soil and by microorganisms in the intestines of animals, including our own. The amount made in our intestines is not adequately absorbed, so it is recommended that we consume B_{12} in food. Research has convincingly shown that plants grown in healthy soil that has a good concentration of vitamin B_{12} will readily absorb this nutrient. However, plans grown in "lifeless" soil (non-organic soil) may be deficient in vitamin $B_{12.}$ In the United States, most of our agriculture takes place on relatively lifeless soil, decimated from years of unnatural pesticide, herbicide and fertilizer use. So the plants grown in this soil and sold in our supermarkets lack $B_{12.}$ At one point in our history, we got B_{12} from

vegetables that hadn't been scoured of all soil. Therefore, it is not unreasonable to assume that modern Americans who eat highly cleansed plant products and no animal products are unlikely to get enough vitamin B_{12}.

Though our society's obsession with nutrient supplements seriously detracts from other, far more important nutrition information, this is not to say that supplements should always be avoided. It is estimated that we hold a three-year store of vitamin B_{12} in our bodies. If you do not eat any animal products for three years or more, or are pregnant or breastfeeding, you should consider taking a small B_{12} supplement on occasion, or going to the doctor annually to check your body levels of B vitamins and homocysteine. Likewise, if you never get sunshine exposure, especially during the winter months, you might want to take a vitamin D supplement. I would recommend taking the smallest dose you can find and making more of an effort to get outside. (231-232)

PRINCIPLE #4

Genes do not determine disease on their own. Genes function only by being activated, or expressed, and nutrition plays a critical role in determining which genes, good and bad, are expressed.

[…] it is useful to think of genes as seeds. As any good gardener knows, seeds will not grow into plants unless they have nutrient-rich soil, water and sunshine. Neither will genes be expressed unless they have a proper environment. In our body, nutrition is the environmental factor that determines the activity of genes. […] the genes that cause cancer were profoundly impacted by the consumption of protein. In my research group, we learned that we could turn the bad genes on and off simply by adjusting animal protein intake. […] So while we can say that genes are crucial to every biological process, we have some very convincing evidence that gene expression is far more important, and gene expression in controlled by environment, especially nutrition. (233-234)

PRINCIPLE #5

Nutrition can substantially control the adverse effects of noxious chemicals.

In practical terms, you aren't doing yourself much good by eating organic beef instead of conventional beef thats' been pumped full of chemicals. The organic beef might be marginally healthier, but I would never say that it was a safe choice. Both types of beef have a similar nutrient profile.

It is useful to think of this principle in another way: a chronic disease like cancer takes years to develop. Those chemicals that initiate cancer are often the ones that make headlines. What does not make headlines, however, is the fact that the disease process continues long after initiation, and can be accelerated or repressed during its promotion stage by nutrition. In other words, nutrition primarily determines whether the disease will ever do its damage. (236)

PRINCIPLE #6

The same nutrition that prevents disease in its early stages (before diagnosis) can also halt or reverse disease in its later stages (after diagnosis).

[…] cancer that is already initiated and growing in experimental animals can be slowed, halted or even reversed by good nutrition. Luckily for us, *the same good nutrition maximizes health at every stage of a disease*. In humans, we have seen research findings showing that a whole foods, plant-based diet reverses advanced heart disease,

helps obese people lose weight and helps diabetics get off their medication and return to a more normal, pre-diabetes life. Research has also shown that advanced melanoma, the deadly form of skin cancer, might be attenuated or reversed by lifestyle changes. (237)

PRINCIPLE #8
Nutrition that is truly beneficial for one chronic disease will support health across the board.

As I have come to understand more about the biochemical processes of various diseases, I have also come to see how these diseases have much in common. Because of these impressive commonalities, it only makes sense that the same good nutrition will generate health and prevent diseases *across the board*. Even if a whole foods, plant-based diet is more effective at treating heart disease than brain cancer, you can be sure that this diet will not promote one disease while stops another. It will never be "bad" for you. This one good diet can only help across the board. (238)

PRINCIPLE #8
Good nutrition creates health in all areas of our existence. All parts are interconnected.

Our food choices have an incredible impact not only on our metabolism, but also on the initiation, promotion and even reversal of disease, on our energy, on our physical activity, on our emotional and mental well-being and on our world environment. *All of these seemingly separate spheres are intimately interconnected.* (240)

Chapter 12.
How to Eat.

Food and health are anything but simple in our country. I often marvel at the complexity of various weight-loss plans. Although the writers always advertise their plan's ease of use, in reality it's never easy. Followers of these diets have to count calories, points, servings or nutrients or eat specific amounts of certain foods based on specific, mathematical rations. There are tools to be used, supplements to be taken and worksheets to be completed. It is no wonder that dieting seldom succeeds.

Eating should be an enjoyable and worry-free experience, and shouldn't rely on deprivation. Keeping it simple is essential if we are to enjoy our food.

One of the most fortunate findings from the mountain of nutritional research I've encountered is that good food and good health is simple. The biology of the relationship of food and health is exceptionally complex, but the message is still simple. The recommendations coming from the published literature are so simple that I can state them in one sentence: eat a whole foods, plant-based diet, while minimizing the consumption of refined foods, added salt and added fats. (242)

Daily supplements of vitamin B_{12}, and perhaps vitamin D for people who spend most of their time indoors and/or live in the norther climates are encouraged. For vitamin D, you shouldn't exceed RDA recommendations. (242)

EAT ALL YOU WANT (WHILE GETTING LOTS OF VARIETY) OF ANY WHOLE, UNREFINED PLANT-BASED FOOD (pg 243)	
General Category	**Specific Examples**

Fruits	Orange, okra, kiwi, red peppers, apple, cucumber, tomato, avocado, zucchini, blueberries, strawberries, green peppers, raspberries, butternut squash, pumpkin, blackberries, mangoes, eggplant, pear, watermelon, cranberries, acorn squash, papaya, grapefruit, peach
Vegetables	
Flowers	Broccoli, cauliflower (not many of the huge variety of edible flowers are commonly eaten)
Stems and Leaves	Spinach, artichokes, kale, lettuce (all varieties), cabbage, Swiss chard, collar greens, celery, asparagus, mustard greens, brussels sprouts, turnip greens, beet greens, bok choi, arugula, Belgian endive, basil, cilantro, parsley, rhubard, seaweed
Roots	Potatoes (all varieties), beets, carrots, turnips, onions, garlic, ginger, leeks, radish, rutabaga
Legumes (seed-bearing nitrogen-fixing plants)	Green beans, soybeans, peas, peanuts, adzuki beans, black beans, black-eye peas, cannellini beans, garbanzo beans, kidney beans, lentils, pinto beans, white beans
Mushrooms	White button, baby bella, cremini, Portobello, shiitake, oyster
Nuts	Walnuts, almonds, macademia, peacans, cashew, hazelnut, pistachio
Whole grains (in breads, pastas, etc)	Wheat, rice, corn, millet, sorghum, rye, oats, barley, teff, buckwheat, amaranth, quinoa, kamut, spelt
Minimize	
Refined carbohydrates	Pastas (except whole grain varieties), white bread, crackers, sugars and most cakes and pastries
Added vegetable oils	Corn oil, peanut oil, olive oil
Fish	Salmon, tuna, cod
Avoid	
Meat	Steak, hamburger, lard
Poultry	Chicken, turkey
Dairy	Cheese, milk, yogurt
Eggs	Eggs & products with a high egg content (i.e. mayonnaise)

My advice is to try to eliminate all-animal-based products from your diet, but not obsess over it. If a tasty vegetable soup has a chicken stock base, or if a hearty loaf of whole wheat bread includes a tiny amount of egg, don't worry about it. These quantities, very likely, are nutritionally unimportant. Even more importantly, the ability to relax about very minor quantities of animal-based foods makes applying this diet much easier – especially when eating out or buying already-prepared foods.

While I recommend that you not worry about small quantities of animal products in your food, I am not suggesting that you deliberately plan to incorporate small portions of meat into your daily diet. My recommendation is that you try to avoid all animal-based

products.

There are three excellent reasons to go all the way. First, following this diet requires a radical shift in your thinking about food. It's more work to just do it halfway. If you plan for animal-based products, you'll eat them – and you'll almost certainly eat more than you should. Second, you'll feel deprived. Instead of viewing your new food habit as being able to eat all the plant-based foods you want, you'll be seeing it in terms of having to limit yourself, which is not conductive to staying on the diet long-term.

If your friend had been a smoker all of his of her life and looked to you for advice, would you tell them to cut down to only two cigarettes a day, or would you tell them to quit smoking all together? It's in this way that I'm telling you that moderation, even with the best intentions, sometimes makes it more difficult to succeed. (243-244)

Part IV
Why Haven't You Heard This Before?

As you will come to see, much is governed by the Golden Rule: he who has the gold makes the rules. There are powerful, influential and enormously wealthy industries that stand to lose a vast amount of money if Americans start shifting to a plant-based diet. Their financial health depends on controlling what the public knows about nutrition and health. Like any good business enterprise, these industries do everything in tehir power to protect their profits and their shareholders.

You might be inclined to think that industry pays scientists under the table to "cook the data," bribes government officials or conducts illegal activities. Many people love a sensational story. But the powerful interests that maintain the status quo do not usually conduct illegal business. As far as I know, they do not pay scientists to "cook the data." They do not bribe elected officials or make sordid underhanded deals.

The situation is much worse.

The entire system – government, science, medicine, industry and media – promotes profits over health, technology over food and confusion over clarity. Most, but not all, of the confusion about nutrition is created in legal, fully disclosed ways and is disseminated by unsuspecting, well-intentioned people, whether they are researchers, politicians or journalists. The most damaging aspect of the system is not sensational, nor is it likely to create much of a stir upon its discovery. It is a silent enemy that few people see and understand. (249-250)

Chapter 13.
Science – The Dark Side

At the same time in the scientific community, more and more health information, specifically nutrition information, was being generated at a furious pace. In 1976, Senator George McGovern had convened a committee that drafted dietary goals recommending decreased consumption of fatty animal foods and increased consumption of fruits and vegetables because of their effects on heart disease. The first draft of this report, linking heart disease and food, caused such an uproar that a major revision was required before it was released for publication. In a personal conversation McGovern told me that he and five other powerful senators from agricultural states lost their respective election in 1980 in part because they had dared to take on the animal foods industry. (252)

When scientific evidence first emerged to show that cigarettes were dangerous, there

were hordes of health professionals who vigorously defended smoking. For example, the *Journal of the American Medical Association* continued to advertise tobacco products, and many others played their part to staunchly defended tobacco use. In many cases, these scientists were motivated by understandable caution. But there were quite a few others, particularly as the evidence against tobacco mounted, whose motivations were clearly personal bias and greed. (256)

It was clear that the AICR's [American Institute for Cancer Research] projects were beginning to hit the mark because of the hostile feedback coming from the food, medical and drug industries. It seemed that every effort was being made to discredit them.

I was surprised that government interference was particularly harsh. National and state attorney general offices questioned the AICR's status and its fund-raising procedures. The U.S. Post Office joined in the fray, questioning whether the AICR could use the mail to spread "junk" information. We all had our suspicions as to who were encouraging these government offices to quash the dissemination of this diet and cancer information. Collectively, these public agencies were making life very difficult. Why were they attacking a nonprofit organization promoting cancer research? It all came down to the fact that the AICR, like the NAS [National Academy of Sciences], was pushing an agenda that connected diet and cancer.

The American Cancer Society became an especially vigorous detractor. In its eyes, the AICR had two strikes against it: it might compete for the same funding donors, and it was trying to shift the cancer discussion toward diet. The American Cancer Society had not yet acknowledged that diet and nutrition were connected to cancer. (It wasn't until many years later in the early 1990s that it developed dietary recommendations to control cancer when the idea was receiving considerable currency with the public.) It was very much a medically-based organization invested in the conventional use of drugs, radiation and surgery. As short while before, the American Cancer Society had contacted our NAS committee about the possibility of our joining them ot produce dietary recommendation to prevent cancer. As a committee, we declined, although a couple of the people on our committee did offer their individual services. The American Cancer Society seemed to sense a big story on the horizon and didn't like the idea that another organization, the AICR, might get the credit. (262-263)

In the world of nutrition and health, scientists are not free to purse their research wherever it leads. Coming to the "wrong" conclusions, even through first-rate science, can damage your career. Trying to disseminate these "wrong" conclusions to the public, for the sake of public health, can destroy your career. Mine was not destroyed – I was lucky, and some good people stood up for me. But it could have gone much worse. (265)

Ultimately, the lesson I learned in my career had little to do with specific names of specific institutions. These lessons have more to do with what goes on behind the scenes of any large institution. What happens behind the scenes during national policy discussions, whether it happens in scientific societies, the government or in industry boardrooms, is supremely important for our health as a nation. The personal experiences […] have consequences far greater than personal aggravation and damage to my career. These experiences illustrate the dark side of science, the side that harms not just individual researchers who get in the way, but all of society. It does this by systematically attempting to conceal, defeat and destroy viewpoints that oppose the status quo. (266)

Chapter 14.
Scientific Reductionism.

[In NAS report w]e explicitly stated that "These recommendations [relationships between cancer and vitamins A, C, E, and some B vitamins] apply only to foods as sources of nutrients – not to dietary supplements of individual nutrients."

The report quickly found its way to the corporate world, which saw a major money-making opportunity. They ignored our cautionary message disinguishing foods from pills and began advertising vitamin pills as products that could prevent cancer, arrogantly citing our report as justification. (269)

[The] mistake of characterizing whole foods by the health effects of specific nutrients is what I call reductionism. For example, the health effect of a hamburger cannot be simply attributed to the effect of a few grams of saturated fat in the meat. Saturated fat is merely one ingredient. Hamburgers also include other types of fat, in addition to cholesterol, protein and very small amounts of vitamins and minerals. Even if you change the level of saturated fat in the meat, all of the other nutrients are still present and may still have harmful effects on health. It is a case of the whole (the hamburger) being greater than the sum of its parts (the saturated fat, the cholesterol, etc.). (271)

As it turns out, the low-fat meal contains more than double the protein of the high-fat meal, and almost all of it comes from animal-based foods. In addition, the low-fat meal contains almost twice as much cholesterol (Chart 14.5).

CHART 14.5: NUTRIENT CONTENTS OF TWO SAMPLE MEALS

	Low-Fat Meal #1	**Low-Fat Meal #2**
Fat (percent of total calories)	22%	54%
Protein (percent of total calories)	36%	16%
Percentage of total protein derived from animal-based foods	93%	86%
Cholesterol	307	165

An overwhelming amount of scientific information suggests that diets high in animal-based protein can have unfavorable health consequences, as can diets high in cholesterol. In the low-fat meal, the amount of both of these unhealthy nutrients is significantly *higher.* (277)

Perhaps the most rewarding finding [of one study], ironically, was the demonstration that tinkering with one nutrient at a time, while maintaining the same overall dietary patterns, does not lead to better health or to better health information. (281)

Scientists should not be ignoring ideas just because we perceive that the public does not want to hear them. Too often during my career, I have heard comments that seem to be more of an attempt to please the public than to engage in an open, honest debate, wherever it may take us. This is wrong. The role of science in a society is to observe, to ask questions, to form and test hypotheses and to interpret the findings without bias – not to kowtow to people's perceived desires. Consumers have the ultimate choice of whether to integrate our findings into their lifestyles, but we owe it to them to give them the best information possible with which to make that decision and not decide for them. It is they who paid for this research and it is only they who have the right to decide what

to do with it. (287)

Scientific investigations of the effect of single nutrients on complex diseases have little or no meaning when the main dietary effect is due to the consumption of an extraordinary collection of nutrients and other substances found in whole foods. This is especially true when no subjects in the study population consume a whole foods, plant-based diet when it is this diet that is most consistent with the biologically-based evidence, supported by the most impressive array of professional literature, consonant with the extremely low disease rates seen in the international studies, far more harmonious with a sustainable environment, possessed of the power to heal advanced disease, and has the potential, without parallel, for supporting a new, low-cost health care system. (288)

Chapter 15.
The "Science" of Industry.

While I was getting the China Study off the ground, I learned of a committee of seven prominent research scientists who had been retained by the animal-based foods industry (the National Dairy Council and the American Meat Institute) to keep tabs on any research projects in the U.S. Likely to cause harm to their industry. I knew six of the seven members, four of them quite well. (290)

One might argue that this industry-funded "spying" was not illegal, and that it is prudent for a business to keep tabs on potentially damaging information that might affect its future. I agree completely, even if it was disconcerting to find myself on the list of those being spied on. But industry does more than just keep tabs on "dangerous" research. It actively markets its version, regardless of potentially disastrous health effects, and corrupts the integrity of the science to do so. This is especially troubling when academic scientists do the spying and hide their intentions. (291)

If I may paraphrase the dairy industry's efforts: their goals are to 1) market to young children and their mothers; 2) use schools as a channel to young customers; 3) conduct and publicize research favorable to the industry.

Many people are not aware of the dairy industry's presence in our schools. But make no mistake: on nutrition information, the dairy industry reaches young children more effectively than any other industry.

The dairy industry has enlisted the public education system as the primary vehicle for increasing demand for its products. (292)

If you are curious as to what kind of "education" is being taught by the dairy industry, take a look at their Web site. When I visited the site in July 2003, one of the first bits of information to greet me was, "July is National Ice Cream Month." Upon clicking for more information on National Ice Cream Month, I read, "If you're wondering if you can have your ice cream and good nutrition too, the answer is 'yes'!" Great. So much for combating childhood obesity and diabetes! (294)

The industry has been doing this for decades, and it has been successful. I have encountered many people who, when they hear about the potential adverse effects of dairy foods, immediately say, "Milk can't be bad." Usually these people don't have any evidence to support their position; they just have a feeling that milk is good. They've always known it to be that way, and they like it that way. You can't trace some of their

opinions back to their school days, when they learned that there are seven continents, two plus two equals four, and milk is healthy. If you think about it this way, you will understand why the dairy industry has had such exceptional influence in this country by using education for its marketing purposes. (295)

At the very least, industry science often leads to public confusion (Are eggs good? Are they bad?), and at its worst, industry science leads unsuspecting consumers to foods that are actually bad for them, all in the name of better health. (298)

Corporate influence in the academic research world can take many forms, ranging from flagrant abuses of personal power to conflicts of interest, all hidden from public view. This influence does not need to be a crass payoff to researchers to fabricate data. That sort of behavior is rare. The more significant way for corporate interests to influence academic research is much more sophisticated and effective. As illustrated by the CLA [conjugated linoleic acid] example, scientists investigate a detail out of context that can be construed as a favorable message and industry exploits it for all it's worth. Almost no one knows where the CLA hypothesis started and who originally funded it. (299)

It is very easy for scientists to get caught in the reductionism web of thinking, even if they have other intentions. It has not been until recently, after a lifetime of research, that I have come to realize how damaging it is to take details out of context and to make subsequent claims about diet and health. Industry uses these details extremely well, and the results is public confusion. Every year, it seems, some new product is being touted as the key to good health. The situation is so bad that "health" sections of grocery stores are often stocked wmore with supplements and special preparations of seemingly magic ingredients that they are with real food. Don't be tricked: the healthiest section of any store is the place where they sell whole fruits and vegetables – the produce section.

Perhaps worst of all, industry corrupts scientific evidence even when its product has been linked to serious health problems. Our kids are often the most coveted targets of their marketing. The American government has passed legislation preventing cigarette and alcohol companies from marketing their products to children. Why have we ignored food? Even though it is accepted that food plays a major role in many chronic diseases, we allow food industries not only to market directly to children, but also to use public-funded school systems to do it. The long-term burden of our short-sighted indiscretion is incalculable. (303)

Chapter 16.
Government: Is It for the People?

More people die because of the way they eat than by tobacco use, accidents or any other lifestyle or environmental factor. (305)

A few quotes from the news release [from 2002 FNB – Food and Nutrition Board – report] announcing this massive 900+ page report say it all. Here is the first sentence in the news release:

> To meet the body's daily energy and nutritional needs while minimizing risk from chronic disease, adults should get 45% to 65% of their calories from carbohydrates, 20% to 35% from fat and 10% to 35% from protein...
> Further, we find:

> … added sugars should comprise no more than 25% of total calories consumed … added sugars are those incorporated into foods and beverages during production [and] major sources include candy, soft drinks, fruit drinks, pastries and other sweets.

[…] You might have trouble getting your mind around what these figures mean in everyday terms, so I have prepared the following menu plan that supplies nutrients in accordance with these guidelines (Chart 16.1).

CHART 16.1: SAMPLE MENU THAT FITS INTO THE ACCEPTABLE NUTRIENT RANGES

Meal	**Foods**
Breakfast	1 cup Froot Loops 1 cup skim milk 1 package M&M milk chocolate candies Fiber and vitamin supplements
Lunch	Grilled cheddar cheeseburger
Dinner	3 slices pepperoni pizza, 1 16 oz. Soda, 1 serving Archway sugar cookies

CHART 16.2: NUTRIENT PROFILE OF SAMPLE MENU PLAN AND REPORT RECOMMENDATIONS

Nutrient	**Sample Menu Content**	**Recommended Ranges**
Total Calories	~1800	Varies by height/weight
Protein (% of total calories)	~18%	10-35%
Fat (% of total calories)	~31%	20-35%
Carbohydrates (% of total calories)	~51%	45-65%
Sugars in Sweets, or Added Sugars (% of total calories)	~23%	Up to 25%

Folks, I'm not kidding. This disastrous menu plan fits the recommendations of the report and is supposedly consisted with "minimizing chronic disease." (307)

Perhaps the most shocking figure is the upper limit on protein intake. Relative to total calorie intake, only 5-6% dietary protein is required to replace the protein regularly excreted by the body (as amino acids). About 9-10% protein, however, is the amount that has been recommended for the past fifty years to be assured that most people at least get their 5-6% "requirement." This 9-10% recommendation is equivalent to the well-known recommended daily allowance, or RDA.

Almost all Americans exceed this 9-10% recommendation; we consume protein within the range of about 11-21%, with an average of about 15-16%. The relatively few people consuming more than 21% protein mostly are those who "pump iron," recently joined by those on high-protein diets. (308)

Early rumors of the report's [2002 report] findings indicated that the WHO/FAO [World Health Organization / Food and Agriculture Organization] was on the verge of recommending an upper safe limit of 10"% for added sugar, far lower than the 25% established by the American FNB group.

Politics, however, had early entered the discussion, as it had done in earlier reports on added sugars. According to a news release from the director-general's office at the WHO, the U.S.-based Sugar Association and the World Sugar Research Organization, who "represent the interests of the sugar growers and refiners, had mounted a strong lobbying campaign in an attempt to discredit the [WHO] report and suppress its release." They did not like setting the upper safe limit so low. According to the *Guardian* newspaper of London, the U.S. Sugar industry was threatening, "to bring the World Health Organization to its knees" unless it abandoned these guidelines on added sugar. WHO people were describing the threat "as tantamount to blackmail and worse than any pressure exerted by the tobacco industry." The U.S.-based group even publicly threatened to lobby the U.S. Congress to reduce the $406 million U.S. Funding the WHO if it persisted in keeping the upper limit so low at 10%! There were reports, after a letter was spent by the industry to Secretary of health and Human Services Tommy Thompson, that the Bush administration was inclined to side with the sugar industry. I, and many other scientists, were being encouraged at that time to contact our congressional representatives to stop this outrageous strong-armed tactic by the U.S. Sugar companies.

So, for added sugars, we now have two different upper "safe" limits: a 10% limit for the international community and 25% limit for the U.S. (309-310)

This discussion still leaves unanswered the question of how industry develops such extraordinary influence. Mostly, industry develops consultancies with a few publicly visible figures in academia, who then take leadership in policy positions outside of academia. However, these industry consultants continue to wear their academic hats. They organize symposia and workshops, write commissioned reviews, chair expert policy groups and/or become officers of key professional societies. They gravitate toward the leadership positions in science-based organizations that develop significant policy and publicity.

Once in these positions, these people then have the opportunity to assemble teams to their liking, by choosing committee members, symposia speakers, management staff, etc. the kinds of people most helpful to the team are either colleagues with similar prejudices and/or colleagues who are oblivious to who is "calling the shots." It's called "stacking the deck," and it really works.

In the case of the FNB, its panel was organized while under the chairmanship of an academic who had strong personal ties with the dairy industry. He helped in selecting the "right" people and helped in setting the agenda for the report, the most significant roles that anyone could have played. Is it surprising that the dairy industry, which must be ecstatic with the panel's findings, also helped to finance the report?

You might be surprised to learn that academic scientists can receive personal compensation from industry while simultaneously undertaking government-sponsored activities of considerable public importance. Ironically, they can even help set the agenda for the same government authorities who have long been restricted from such corporate associations. It is a huge "conflict-of-interest" loophole allowing industries to exercise their influence through the side door of academia. In effect, the entire system is essentially under the control of industry. The government and academic communities, playing their respective roles, mostly do as they are expected to do.

In addition to M&M Mars company, the corporate sponsors of the FNB report also included major food and drug companies that would benefit from higher protein and sugar allowances. The Dannon Institute, a leading dairy-based consortium promoting its own brand of nutrition information, and the International Life Sciences Institute (ILSI),

which is a front group for about fifty food, supplement and drug companies, both contributed funding for the FNB report. Corporate members include coca-Cola, Taco Bell, burger King, Nestle, Pfizer and Roche Vitamins. Some drug companies sponsored the report directly, in addition to their support through the International Life Sciences Institute. I don't recall private corporations providing support for the NAS expert panels that I served on.

It seems as if there is no end to this story. The chair of the FNB has been an important consultant to several major diary-related companies (e.g., National Dairy council, Mead Johnson Nutritionals, which is a major seller of dairy-based products, Nestle Company and a Dannon yogurt affiliate). Simultaneously, he was chair of the dietary Guidelines Committee that establishes the Food Guide Pyramid and sets national nutrition policy affecting the National School Lunch and Breakfast programs, the Food Stamp Program and the women, Infants and Children Supplemental Feeding Program (WIC). As chair of this latter committee, his personal financial associations with the food industry were not publicly revealed as required by federal law. Eventually a court order, initiated by the Physician's Committee for Responsible Medicine, was required to force him and his fellow colleagues to reveal their relationships with the food industry. Although the chair's industry associations were more substantial, *six of the eleven committee members also were shown to have ties to the dairy industry*.

The entire system of developing public nutrition information, as I originally saw with the Public Nutrition Information committee that I once chaired […], has been invaded and co-opted by industry sources that have the interest and resources to do so. They run the show. They buy a few academic hacks who have gained positions of power and who exercise considerable influence, both within academia and government.

It seems curious that while government scientists are not allowed to receive personal compensation from the private sector, their colleagues in academia can receive all that they can get. In turn, these conflicted individuals then run the show in collaboration with their government counterparts. However, restricting academics from receiving corporate consultancies is not the answer. That would only drive it underground. Rather, the situation would be best handled by making one's industry connections a matter of public disclosure. Everyone needs to know the full extent to each academic's associations with the private sector. Disclosure and full transparency is in everyone's interest. These associations should not be something we have to go to court to discover. (311-313)

Lest you think that this Food and Nutrition Board report is merely a five-second news bite that then gets filed into a dusty old cabinet somewhere in Washington, let me assure you that tens of millions of people are directly affected by this panel's findings. According to the summary of the report itself, the recommended levels of nutrient consumption that are set by this panel are

> the basis for nutrition labeling of food, for the Food Guide Pyramid and for other nutrition education programs … [They are] used to determine the types and amounts of food:
>
> - provided in the WIC (Women, Infants and Children) Supplemental Feeding Program and the Child Nutrition Programs such as School Lunch,
> - served in hospitals and nursing homes for Medicare reimbursement,
> - found in the food supply that should be fortified with specific nutrients,
> - used in a host of other important federal and state programs and activities [such as establishing reference values used in food labeling

The School Lunch Program feeds 28 million children every day. With officially

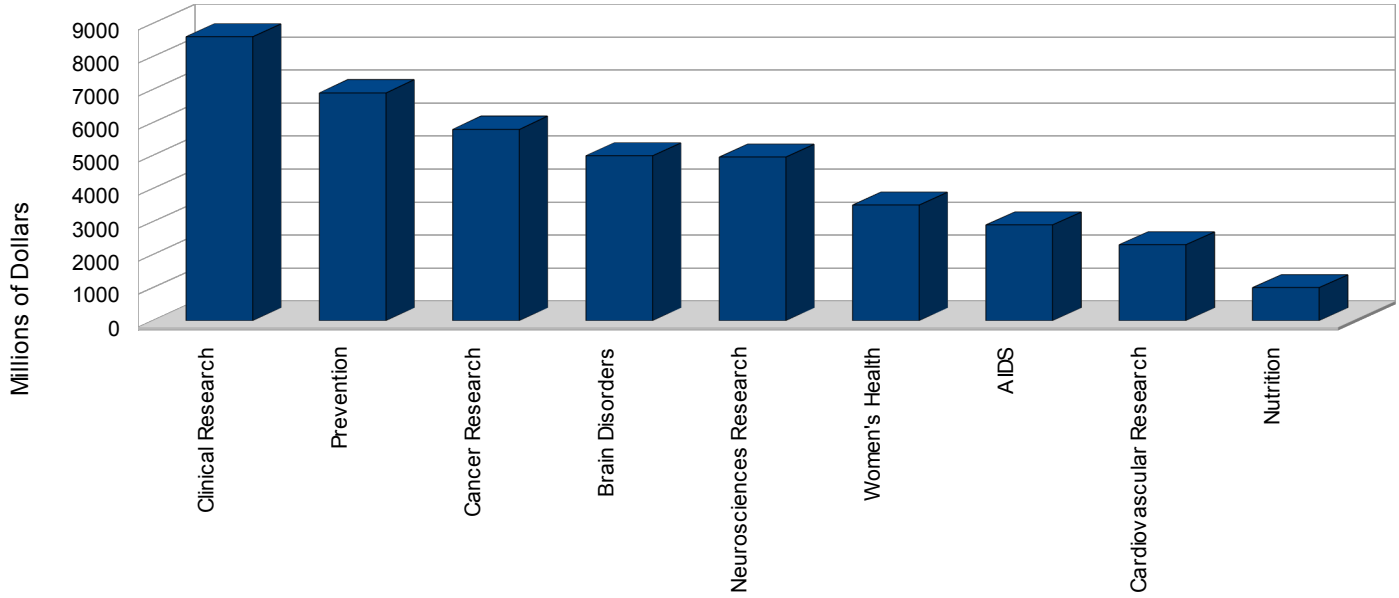
recommended consumption patterns like these, we are at liberty to put any agricultural commodity we want into the hungry mouths of children already suffering from unprecedented levels of obesity and diabetes. By the way, the 2002 FNB report does make one special exception for children: it says that they can consume up to 40% of calories as fat, up from 35% for the rest of us, while minimizing the risk of chronic disease. The Women, Infants and Children Program affects the diets of another 7 million Americans, and the Medicare hospital programs feed millions of people every year. It is safe to say that the food provided by these government programs directly feed at least 35 million Americans a month. (313)

Not only is the government failing to promote health through its recommendations and reports, it is squandering an opportunity to promote public health through scientific research. The U.S. National Institutes of Health (NIH) is responsible for funding at least 80 – 90% of all biomedical and nutrition-related research that is published in the scientific literature. To address various health topics, the NIH is comprised of twenty-seven separate institutes and centers, including its two largest, the National Cancer Institute (NCI) and the National Heart, Lung and Blood Institute. With a proposed 2005 budget of almost $29 billion, the NIH is the center of the government's gigantic medical research efforts.

In terms of nutrition research, however, something is amiss. None of these twenty-seven institutes and centers at the NIH is devoted to nutrition, despite the pivotal nature of nutrition in health, and despite the public interest in the subject. One of the arguments against having a separate institute for nutrition is that the existing institutes already concern themselves with nutrition. But this does not happen. Chart 16.3 shows the funding priorities for various health topics at the NIH.

Of the $28 NIH budget proposed for 2004, only about 3.6% is designated for projects that are related in some way to nutrition and 24% for projects that are related to prevention. That may not sound too bad. But these figures are seriously misleading.

CHART 16.3: NIH 2004 ESTIMATED FUNDING
FOR DIFFERENT HEALTH TOPICS (pg 315)



If very few of our tax dollars are used to fund nutrition research, what do they fund? Almost all of the billions of dollars of taxpayer money expended by the NIH each year funds projects to develop drugs, supplements and mechanical devices. In essence, the

vast bulk of biomedical research funded by you and me is basic research to discover products that the pharmaceutical industry can develop and market. In 2000, Dr. Marcia Angell, a former editor of the *New England Journal of Medicine*, summarized it well when she wrote:

> … the pharmaceutical industry enjoys extraordinary government protection and subsidies. Much of the early basic research that may lead to drug development is funded by the National Institutes of Health (ref. Cited). It is usually only later, when the research shows practical promise, that the drug companies become involved. The industry also enjoys great tax advantages. Not only are its research and development cost deductible, but so are its massive marketing expenses. The average tax rate of major U.S. Industries from 1993 to 1996 was 27.3% of revenues. During the same period the pharmaceutical industry was reportedly taxed at a rate of only 16.2% (ref. Cited). Most important, the drug companies enjoy seventeen-year government-granted monopolies on their new drugs – that is, patent protection. Once a drug is patented, no one else may sell it, and the drug company is free to charge whatever the traffic will bear. (316-317)

I have come to the conclusion that when it comes to health, government is not for the people; it is for the food industry and the pharmaceutical industry at the expense of the people. It is a systematic problem where industry, academia and government combine to determine the health of this country. Industry provides funding for public health reports, and academic leaders with industry ties play key roles in developing them. A revolving door exists between government jobs and industry jobs, and government research funding goes to the development of drugs and devices instead of healthy nutrition. It is a system built by people who play their isolated parts, oftentimes unaware of the top decision makers and their ulterior motives. The system is a waste of taxpayer money and is profoundly damaging to our health. (318-319)

Chapter 17.
Big Medicine: Whose Health Are They Protecting?

> You take a cardiologist and he's learned all about beta blockers, he's learned about calcium antagonists, he's learned about how to run this catheter up into your heart and blow up balloons or laser it or stent it without killing you and it's very sophisticated. And there's all the nurses and there's lights out and there's drama. I mean it's just, oh my god, the doctor blows up the balloon in his head. The ego of these people is enormous. And then someone comes along and says, "You know, I think we can cure this with brussels sprouts and broccoli." The doctor's response is, "WHAT? I learned all this crap, I'm making a freaking' fortune, and you want to take it all away?" (325-326)

In 1985 the United States National Research Council funded an expert panel report that investigated the quantity and quality of nutrition education in U.S. Medical schools. The committee's findings were clear: "The committee concluded that nutrition education programs in U.S. Medical schools are largely inadequate to meet the present and future demands of the medical profession." But this finding was nothing new. The committee noted that in 1961 the "American Medical Association Council on Foods and Nutrition reported that nutrition in the U.S. Medical schools received 'inadequate recognition, support and attention.'" In other words, over forty years ago, the doctors themselves said that their nutrition training was inadequate. Nothing had changed by 1985, and up

to the present time, articles continue to be written documenting the lack of nutrition training in medical schools.

This situation is dangerous. Nutrition training of doctors is not merely inadequate; it is practically nonexistent. In 1985, the National Research Council report found that physicians receive, on average, only twenty-one classroom hours (about two credits) of nutrition training during their four years of medical school. The majority of the schools surveyed actually taught less than twenty contact hours of nutrition, or one to two credit hours. By comparison, an undergraduate nutrition major at Cornell will receive twenty-five to forty credit hours of instruction, or about 250-500 contact hours; registered dietitians will have more than 500 contact hours. (327)

When nutrition education is provided in relation to public health problems, guess who is suppling the "educational" material? The Dannon Institute, Egg Nutrition Board, National Cattlemen's Beef Association, National Dairy council, Nestle Clinical Nutrition, Wyeth-Ayerst Laboratories, Bristol-Myers Squibb Company, Baxter Healthcare Corporation and others have all joined forces to produce a Nutrition in Medicine program and the Medical Nutrition Curriculum Initiative. Do you think that this all-star team of animal foods and drug industries representatives is going to objectively judge and promote optimal nutrition, which science has shown to be a whole foods, plant-based diet that minimizes the need for drugs? (328)

You should not assume that your doctor has any more knowledge about food and its relation to health than your neighbors and coworkers. It's a situation in which nutritionally untrained doctors prescribe milk and sugar-based meal-replacement shakes for overweight diabetics, high-meat, high-fat diets for patients who ask to lose weight and extra milk for patients who have osteoporosis. *The health damage that results from doctors' ignorance of nutrition is astounding.* (328-329)

Many prominent scientists have published scathing observations showing how corrupt the system has become. Among the common observations are:

- The drug industry ingratiates itself with medical students with free gifts, including meals, entertainment and travel; educational events, including lectures, which are little more than drug advertisements; and conferences, which include speakers who are little more than drug spokespeople.
- Graduate medical students (physician residents) and other physicians actually change their prescribing habits because of information provided by drug salespeople, even though this information is known to be "overly positive and prescribing habits are less appropriate as a result."
- Research and academic medicine merely carry out the pharmaceutical industry's bidding. This can happen because: the drug companies, and not researchers, may design the research, which allows the company to "rig" the study; the researchers may have a direct financial state in the drug company whose product they are studying; the drug company may be responsible for collecting and collating the raw data, and then only selectively allowing researchers to view the data; the drug company may retain veto power over whether the findings are published, and may retain editorial rights over any scientific publications resulting from the research; the drug company may hire a communications firm to write the scientific article, and then find researchers willing to attach their names as authors of the paper after it has already been written.
- The major scientific journals have turned into little more than marketing vehicles

> for drug companies. The leading medical journals derive their primary income from drug advertisements. This advertising is not adequately reviewed by the journal, and companies often present misleading claims about drugs. Perhaps more disconcerting, the majority of clinical trial research reported in the journals is funded by drug company money, and the financial interests of the researchers involved are not fully acknowledged. (332-333)

Dr. Marcia Angell, an ex-editor of the *New England Journal of Medicine*, wrote a scathing editorial called "Is Academic Medicine for Sale?":

> The ties between clinical researchers and industry include not only grant support, but also a host of other financial arrangements. Researchers serve as consultants to companies whose products they are studying, join advisory boards and speakers' bureaus, enter into patent and royalty arrangements, agree to be the listed authors of articles ghostwritten by interested companies, promote drugs and devices at company-sponsored symposiums and allow themselves to be plied with expensive gifts and trips to luxurious settings. Many also have equity interests in the companies. […] In terms of education, medical students and house officers, under the constant tutelage of industry representatives, *learn to rely on drugs and devices more than they probably should* [my emphasis]. As the critics of medicine so often charge, *young physicians learn that for every problem, there is a pill* [my emphasis] (and a drug company representative to explain it). They also become accustomed to receiving gifts and favors from an industry that uses these courtesies to influence their continuing education. The academic medical centers, in allowing themselves to become research outposts for industry, contribute to the overemphasis on drugs and devices." (333-334)

We pay a high price for allowing these medical biases. A recent study found that one in five new drugs will either get a "black box warning," indicating a previously unknown serious adverse reaction that may result in death or serious injury, or will be withdrawn from the market within twenty-five years. Twenty percent of all new drugs have serious unknown side effects, and more than 100,000 Americans die every years from *correctly* taking their *properly prescribed* medication. This is one of the leading causes of death in America! (335)

Chapter 18.
Repeating Histories.

As the billions of people in the developing world are accumulating more wealth and adopting the Western diet and lifestyle, problems created by nutritional excess are becoming exponentially more urgent with each passing year. In 1997, the director-general of the World Health Organization, Dr. Hiroshi Nakajima, referred to the future chronic disease burden in the developing countries as "a crisis of suffering on a global scale." (348)

Appendix A.
Q&A: Protein Effect in Experimental Rat Studies.

What was the overall health of the rats on a low-protein diet?
Many researchers have long assumed that animals fed diets this low in protein would not be healthy. However, the low-protein animals were healthier by every indication. They

lived longer, were more physically active, were slimmer and had healthy hair coats at 100 weeks while the high-protein counterpart rats were all dead. Also, animals consuming less dietary casein not only ate more calories, but they also burned off more calories. Low-protein animals consumed more oxygen, which is required for the burning of these calories, and had higher levels of a special tissue called brown adipose tissue, which is especially effective in burning off calories. This occurs through a process of "thermogenesis," i.e., the expenditure of calories as body heat. This phenomenon had already been demonstrated many years before. *Low-protein diets enhance the burning off of calories, thus leaving less calories for body weight gain and perhaps also less for tumor growth as well.* (352)

Appendix C.
The "Vitamin" D Connection.

Flocks of birds in flight or schools of fish darting about a re able to shift direction in a microsecond without bumping into each other. They seem to have a collective consciousness that knows where they are going and when they will rest. Colonies of ants and swarms of bees also integrate varying labor chores with great proficiency. But as amazing as these animal activities are, have you ever thought about how their behaviors are coordinated with such finesse? I see these same characteristics, and more, in the way that the countless factors of plant-based foods work their magic to create health at all levels within our body, among our organs and between our cells and among the enzymes and other sub-cellular particles within our cells. (361)

[…] it is our ability to make our vitamin D that leads to the idea that it is not a vitamin; it is a hormone (i.e., made in one part of our body but functioning in another part). The sun's UV rays make vitamin D from a precursor chemical located in our skin. Provided we get adequate sunshine, this is all the vitamin D we need. We can, of course, also get vitamin D from fortified milk, certain fish oils and some vitamin supplements.

The vitamin D made in our skin then travels to our liver, where it is converted by an enzyme to a vitamin D metabolite. This metabolite's main function is to serve as the body's storage form of vitamin D (while remaining mostly in the liver but also in body fat).

The next step is the crucial one. When needed, some of the storage form of vitamin D in the liver is transported to the kidney, where another enzyme converts it into a supercharged vitamin D metabolite, which is called 1,25 D. the rate at which the storage form of vitamin D is converted to the supercharged 1,25 D is a crucial reaction in this network. The 1,25 D metabolite does most of the important work of vitamin D in our bodies.

This supercharged 1,25 D is about 1,000 times more active than the storage vitamin D. supercharged 1,25 D only survives for six to eight hours once it is made. In contrast, our storage vitamin D survives for twenty days or more. This demonstrates an important principle typically found in networks like this: the far greater activity, the far shorter lifetime and the far lower amounts of the 1,25 D end product provide a very responsive system wherein the 1,25 D can quickly adjust its activity minute-by-minute and microsecond-by-microsecond as long as there is sufficient storage vitamin D to draw from. Small changes, making a big difference, can occur quickly. (362)

One of the more important things that vitamin D does, mostly through its conversion to supercharged 1,25 D, is to control the development of a wide variety of

serious diseases. For the sake of simplicity, this is schematically represented by showing the inhibition of the conversion of healthy tissue to diseased tissue by 1,25 D.

so far, we can see how adequate sunshine exposure, by ensuring enough storage form of vitamin D, helps to prevent cells from becoming diseased. This suggests that certain diseases might be more common in areas of the world where there is less sunshine, in countries nearer the North and South Poles. Indeed there is such evidence. To be more specific: *in the norther hemisphere, communities that are farther north tend to have more Type 1 diabetes, multiple sclerosis, rheumatoid arthritis, osteoporosis, breast cancer, prostate cancer and colon cancer, in addition to other diseases.* (363)

When, for example, we need more 1,25 D, parathyroid hormone induces the kidney enzyme activity to produce more 1,25 D. When there is enough 1,25 D, parathyroid hormone slows down the kidney enzyme activity. Within seconds, parathyroid hormone manages how much 1,25 D there will be at each time and place. Parathyroid hormone also acts as a conductor at several other places in this network […]. by being aware of the role of each player in its "orchestra," it coordinates, controls and finely tunes these reactions as a conductor would a symphony orchestra.

Under optimal conditions, sunshine exposure alone can supply all the vitamin D that we need to produce the all-important 1,25 D at the right time. Even the elderly, who are not able to produce as much vitamin D from sunshine, have nothing to worry about if there is enough sunshine. How much is "enough"? If you know how much sunshine causes a slight redness of your skin, then one-fourth of this amount, provided two to three times per week, is more than adequate to meet our vitamin D needs and to store some in our liver and body fat. If your skin becomes slightly red after about thirty minutes in the sun, then ten minutes, three times per week will be enough exposure to get plenty of vitamin D. (365)

There are several studies now showing that if 1,25 D remains at consistently low levels, the risk of several diseases increases. So then the question is: what causes low levels of 1,25 D? Animal protein-containing foods cause a significant decrease in 1,25 D. these proteins create an acidic environment in the blood that blocks the kidney enzyme from producing this very important metabolite.

A second factor that influences this process is calcium. Calcium in our blood is crucial for optimum muscle and nerve functioning, and it must be maintained within a fairly narrow range. The 1,25 D keeps the blood levels of calcium operating within this narrow range by monitoring and regulating how much calcium is absorbed from food being digested in the intestine, how much calcium is excreted in the urine and feces and how much is exchanged with the bone, the big supply tank for body's calcium. For example, if there is too much calcium in the blood, 1,25 D becomes less active, less calcium is absorbed and more calcium is excreted. It is a very sensitive balancing act in our bodies. As blood calcium goes up, 1,25 D goes down, and when blood calcium goes down, 1,25 D goes up. Here's the kicker; if calcium consumption is unnecessarily high, it lowers the activity of the kidney enzyme and, as a consequence, the level of 1,25 D. in other words, routinely consuming high-calcium diets is not in our best interests.

The blood levels of 1,25 D therefore are depressed both by consuming too much animal protein and too much calcium. Animal-based food, with its protein, depresses 1,25 D. cow's milk, however, is high both in protein and calcium. In fact, in one of the more extensive studies on MS that is associated with lower levels of 1,25 D, cow's milk was found to be as important a factor as latitude mentioned earlier. (366)