The China Study Summary

Revealing the relationship between diet and disease

What is the China Study? And why is it so important for *your* health? The China Study is a uniquely comprehensive study that is yielding scientifically solid, groundbreaking information that can directly impact your health now and for the rest of your life – information that you can use on:

- Cancer
- Heart disease
- Osteoporosis
- And many other topics of concern to you

Did you know that only four in every 100 000 males under age 65 in China die of heart disease each year, while 67 out of 100 000 die in the US? Or that the American death rate for breast cancer is five times the rate in China?

In setting out to discover China's secret, the China Study uncovered information on the links between what we eat and how we die, information that – as *Computerland Magazine* says – is "certain to have a global impact."

What makes the China Study different from other scientific studies?

To begin with, the study is the most comprehensive data base on the multiple causes of disease ever compiled. Secondly, it examines the relationship of diet to health in a *whole* way – not only in a laboratory, and not by taking single health issues out of their lifestyle context – but by studying the way *whole diet and life patterns* affect health. Most contemporary research focuses narrowly on relationships between single nutrients, single foods, single diseases, and – if possible – single molecules! The drawbacks to such an approach were well demonstrated a few years ago by the excitement about the apparent benefits of polyunsaturated oils for reducing cholesterol. The market for safflower and sunflower oils boomed for a few years – until scientists noted that high intakes of polyunsaturates, on top of an already high-fat diet, correlated with a higher incidence of certain cancers. The rigorous research strategies of the China Study attempt to avoid such pitfalls of single-item research, by looking instead at dietary and lifestyle *patterns*. The unique design and scope of the research makes it possible for our scientists to be sure that if a certain diet reduces the incidence of breast cancer, for instance, it doesn't at the same time cause the rise of some other disease. The China Study outcomes result in solid and trustworthy dietary recommendations based on proven results and designed for optimum health.

What is the China Study?

The project, begun in 1983, is a collaborative effort between Cornell University, the Chinese Academy of Preventive Medicine, the Chinese Academy of Medical Sciences, and Oxford University, England, as well as scientists from the United States, China, Britain, France, and other countries.

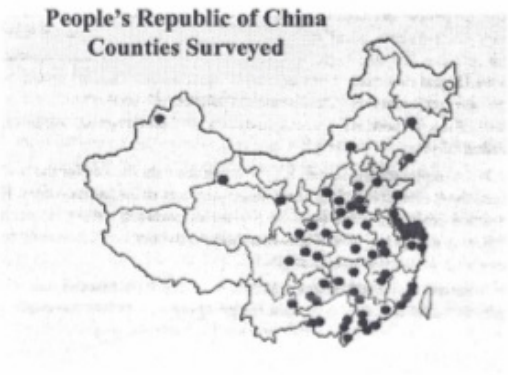
Why was rural China chosen as the site of the study? According to the principal investigators, China is a "living laboratory" for studying dietary patterns, unparalleled anywhere else in the world. This is because the Chinese, unlike our restless population, tend to spend their entire lives in the same area and eat the same kinds of locally grown foods throughout their lives. Although we wouldn't know if from the menus in most Chinese restaurants in the West, diets in China vary considerably from one region to another. Villagers on the mountainous north bank of the Yangtze River, for example, may rely on steamed breads and sweet potatoes, while only 50 miles away on the rich farmlands to the south, villagers fill their plates with rice. And not only do the diets vary, most significantly so do the disease rates.

China offered perhaps the last place in the world where such a study could be undertaken. Here in the West, whether we live in Munich or Michigan, we might, in one day, eat a Honduras-grown banana for breakfast, a Mexican taco for lunch, a Chinese stir-fry for dinner, and an Italian pastry for dessert. And then the next day something completely different. This, in addition to the fact that many of us move every year, makes such a study impossible in most countries. But, from a scientific point of view, China was perfect.

The scientists were intrigued to find out if the varying diets in different parts of China would correlate to death rates from certain diseases. To find out, they set up one of the most widespread and massive scientific investigations ever devised.

In 1983 and again in 1989, American, Chinese, and English researchers gathered information on how people live and die in 65 counties in various parts of China. As their basis for selecting the counties, they used very comprehensive – and startling – date on 80 million Chinese, compiled by the Chinese government, that showed that death rates from specific diseases varied sometimes *several hundredfold* from county to county. In choosing the counties to be researched, the scientists made sure to include counties with these unusually high or low death rates from seven different cancers: those of the nasopharynx, esophagus, stomach, liver, colorectal, lung and breast.

People's Republic of China Counties Surveyed



What, is this genetically similar population, could explain the fact that men in one part of China died of esophageal cancer 435 times more frequently than did men in another part? Or that 20 times as many women in one county suffered from breast cancer than women in a different county?

The counties surveyed stretched all the way across the Chinese land mass, from the far Northwest to the Southern coastal regions, and – in the second survey – to Taiwan, adding another 32 villages. The researchers sometimes had to travel for days across rough terrain in order to reach nomads, for example, on the Soviet border, or villagers in an oasis near the Gobi Desert.

In the 1989 survey, 10 200 Chinese and Taiwanese adults and their families were observed, measured, and interviewed for several days. Every piece of food they ate was noted. Urine and blood samples were taken. All in all, more than 1000 items of information were collected on each person! Later, when the results of the China Study became available, the information was made available to county health officials all over China.

What the Study Found

One of the first things to emerge from the China Study data concerned the fact that certain groups of diseases tend to occur in similar geographic and economic areas. Scientists have long known that the people of underdeveloped nations tend to develop different diseases than do people in richer countries. In other words, diabetes and coronary heart disease occur most frequently in geographic areas where cancer rates are also high, while pneumonia and peptic ulcer appear with TB and rheumatic heart disease in other areas. The first group of diseases are known as "the diseases of affluence," because they occur most often in more affluent countries, and the second group are often called "diseases of poverty".

What impressed the researchers was that the data showed for the first time these clusters of "rich" and "poor" diseases in the same country. It seemed clear that there must be one set of common causes for each "disease grouping". The China data offered the perfect opportunity to examine what these causes might be.

What did they find? After examining several possible factors, the scientists found that the "rich" disease grouping – including the cancers and heart disease – was associated with total blood cholesterol and urea nitrogen.

Disease Groups

Diseases of Affluence
Colon cancer, lung cancer, breast cancer, leukemia, diabetes, coronary disease, brain cancer (0-14 yr.), stomach cancer, liver cancer

Diseases of Poverty
Pneumonia, intestinal obstruction, peptic ulcer, digestive diseases, nephritis, pulmonary tuberculosis, non-TB infectious, parasitic diseases, eclampsia, rheumatic heart disease, metabolic and endocrine diseases other than diabetes, diseases of pregnancy other than eclampsia

We'll talk more about our findings on cholesterol below, so we'll just briefly say here that **a high blood level of cholesterol was consistently associated with many cancers** – including leukemia, liver, colon, rectum, lung and brain.

And what was particularly dramatic about these data was the fact that *the highest cholesterol levels in rural China were near the lowest levels found in the US.* The women in the villages that had the highest Chinese cholesterol levels – near our lowest American levels – also had the highest levels of cancers, heart disease, and diabetes, while the women in the villages with the lowest cholesterol levels had the lowest levels of these diseases.

Although most of us are familiar with cholesterol, the term "urea nitrogen" is another story. But, as the China Study data show, it is a most intriguing one with far-reaching effects on our health. Urea nitrogen is what is left over from the metabolism of protein in the body.

The more of this that we find in the blood, the higher our level of excess dietary protein. And, the China Study data show, the more meat, milk, and eggs we eat, the more likely we are to take in more protein than we need.

The findings on cholesterol and urea were remarkable, because they showed that **only small intakes of animal products were associated with significant increases in chronic degenerative diseases**. And even more exciting, that the greater percentage of plant food in our diet, the less the chance of getting these diseases. In other words, there's no threshold or stopping point at which the benefits of eating plant foods stop. Quite simply, the ore you substitute plant foods for animal foods the healthier you are likely to be.

Not surprisingly, it was the survey areas near the large Chinese cities that showed high rates of the "rich" diseases. That's because, as they become more affluent, the Chinese are beginning to eat diets richer in oils and animal products – in Shanghai and Beijing eating meat has acquired a certain social cachet.

Unfortunately, this gastronomic form of social climbing is just the diet that we now know causes so many of the diseases we suffer from in the West – cancer, heart disease, and diabetes.

- Diseases occur in groupings – the "diseases of affluence" and "diseases of poverty"
- As blood cholesterol and urea nitrogen levels rise, so do diseases of affluence – cancer, heart disease, diabetes
- Even smaller intakes of animal foods – meat, eggs and milk – are associated with significant increases of chronic degenerative diseases.

And now let's take a look in greater detail at what the China Study found out about these diseases and some other issues of great importance to your health.

Osteoporosis

Do we need more calcium in order to avoid osteoporosis, the progressive thinning of bones in the elderly? In the West we are certainly told so. The dairy industry vigorously promotes the suggestion that without its products we face an unpleasant and probably shrunken future.

Yet the data uncovered in China do not support this view. Although most Chinese consume little if any dairy and ingest low amounts of calcium in general, they appear not to be at higher risk of osteoporosis. Instead, they are at *much lower* risk for this potentially disabling disease. Hip fractures, for example, are only about one-fifth as frequent as they are in the West – a striking difference. Is it because the Chinese are more physically active? Or that they possibly adapt to a low-calcium diet? Or perhaps because they eat far less protein than we do in the West?

We do know that **high protein intakes result in calcium loss** through the urine. High protein diets – especially protein of animal foods – can cause the body to excrete more calcium than it takes in. For example, a person eating 142 grams of protein a day – which some American do – will excrete twice as much calcium in the urine as will a person taking in a more moderate 47 grams. Because our bodies need calcium to regulate many different functions, such as the functioning of our muscles and nerves, the deficit must be made up from somewhere. It turns out that it is withdrawn from our main calcium reserve "banks" – in other words, our bones, which become increasingly more fragile as their calcium is removed form them. Incidentally, 99% of our total body calcium is banked in our skeletons.

We suggest you eat plenty of vegetables such as broccoli and collard greens. The super-foods contain a good amount of calcium, without the drawbacks of high protein. One cup of broccoli, for example, contains 178 milligrams of calcium, while five dried figs have 135. With a target of perhaps 800 milligrams of high-quality, plant-derived calcium a day, it's not difficult to fill your quota. And here's a plus: vegetables contain boron, a mineral that helps keep calcium in the bones. Milk contains virtually none. And while milk does contain added vitamin D, a vitamin that helps you retain your calcium just 15 minutes a day in the sun will let your body produce all the vitamin D it needs.

- The Chinese eat almost no dairy products, and low levels of calcium-rich foods, yet get less osteoporosis than we do in the West
- High protein diets can cause the loss of calcium from our bones

Do calories make us fat?

Maybe not. Or perhaps they're not the complete answer. In China, the calorie intake per kilogram of body weight is about 30% higher than in the US. The Chinese eat about 270 more calories a day, yet they have much less obesity. This is so even for office workers. And while it's true that the Chinese office workers are hardly couch potatoes – many of them ride bicycles to work – their physical exercise is not thought to fully explain why all those extra calories don't end up as extra flab in unwanted places.

What's the explanation? In reviewing the data, we suspect that when a very low-fat, high-plant food diet is consumed, a slightly higher percentage of calories is burned off as heat rather than being laid down as body fat. There are some studies that suggest that fat may have more than 9 calories per gram – the accepted figure – and perhaps as many as 11 calories per gram, depending on whether the energy is burned or incorporated into fatty tissue in the body. The same evidence points to the conclusion that it's easier to burn off extra calories when there are more carbohydrates and less fat and protein in the diet. The possibility offers an attractive – and healthful – alternate to painful dieting!

And here's an eye-opening statistic: The Chinese eat 6-24% of their calories as fat, while Americans consume an astonishing 30-46% as fat.

- The Chinese eat almost 300 more calories than we do per day, yet are much less obese
- When consuming a very low-fat diet, a higher percentage of calories may be burned up as heat rather than being laid down as body fat.
- When fat is being burned as heat, rather than stored in the body as fat, it may have 11 rather than 9 calories per gram.

Antioxidants

What are antioxidants and why do we need them? Let's first talk about oxidants. We usually think of oxygen as a "good guy" – and it is. But it is a good guy with an unstable character. Under certain conditions our friend O2 can gain or lose an electron and then become unstable and highly reactive. It is then that it can cause damage in our bodies, and it is then that it is called an oxidant or a free radical. What causes oxygen to shift its personality? A variety of environmental conditions can bring it about, such as infection or a large intake of polyunsaturated fats. Free radicals are the culprits responsible, with other factors, for the aging of our organs, and many other ills. Since free radicals are unavoidable, it's important for our health to minimize their damage as much as possible.

How do we do this? By feeding our bodies antioxidant-rich foods – vegetables, fruits, and grains rich in the antioxidants vitamin C and E and beta carotene among many others. Many of the better-known antioxidants such as vitamin C and beta carotene are virtually

unavailable in meat or milk. Without a healthy intake of plant-based foods we may be putting ourselves at risk.

And the risks are many. The China Study research found that the lower the vitamin C and beta carotene intake, the higher the rate of esophageal and stomach cancer. Many different studies strongly indicate that these antioxidants may be helpful in protecting as from a variety of other cancers as well.

Of course, this does not mean you should go out and buy vitamin C or beta carotene supplements. The research shows these antioxidants are protective when they are eaten in whole foods; they may not be helpful at all when taken in a supplement form. Why is this? It's because, besides vitamins and antioxidants, plant foods have phytochemicals such as *indoles, phenols*, and *flavinoids*, that supplements do not. All these components probably work together as a sort of biochemical cocktail that may not have the desired effect if even one of its components is missing.

The take-home message is this: take home plenty of whole grains and deeply coloured orange and green vegetables and fruits. The deeper the colour, the richer these delicious foods are likely to be in many health promoting nutrients, including many antioxidant carotenoids besides beta carotene.

- Oxidants, or free radicals, are an important cause of aging and disease
- Antioxidants work to counteract the effects of free radicals
- In China, the lower the intake of foods rich in the antioxidants vitamin C and beta carotene, the higher the rates of esophageal and stomach cancer.
- Get your antioxidants by eating *whole* foods – fruits, vegetables and grains.

Cholesterol

In spite of years of publicity about the dangers of high cholesterol levels, the average cholesterol of people in the West is still 210-220 milligrams. This may not seem so high, until we compare it to the 125-130 average of the rural Chinese! And consider this.

Even though the average in rural would be considered extremely healthy by American standards, those Chinese who had even lower levels suffered from significantly less cancer and heart disease than their more "average" compatriots.

What causes cholesterol levels to rise? Fat, animal protein, and meat. What brings cholesterol levels down? A varied diet based on plants – vegetables, grains, and fruit. The higher the intakes of fiber and legumes – peas and beans – the lower the levels of this waxy substance that indicates so much trouble in our bodies.

We may never be able to reach the very low cholesterol levels of the Chinese, but with each small improvement in our diets we can make real gains in reducing our blood levels of this troublemaker. Considering the extraordinary benefits – decreased chance of cancer, heart disease, diabetes – it's certainly worth cutting down of those meats and cheeses and increasing our vegetables and beans. Vegetarian chili, anyone?

And here are some encouraging numbers: every one percent that you reduce your cholesterol level will reduce your chance of heart attack by *two* to *three* percent.

Indicator	China	USA
Blood cholesterol level (mg/dL)	90-170	170-290
Total fat intake (% of calories)	6-24	30-46
Body mass index (weight/height)	20.5	25.8

- Average cholesterol levels in China are only slightly more than half those in the West
- Even at these low cholesterol levels, those at the higher end of the Chinese range had significantly more cancer and heart disease than those at the lower end
- Fat and animal protein cause cholesterol levels to rise, while plant-based foods cause them to fall

Heart Disease

Because high cholesterol levels have been linked to heart disease, and – as we've seen – average cholesterol levels in China are a little more than half those in the US, it should be no surprise that death from heart disease in China is much lower than it is in the West. Yet the figures are startling. In any group of men, seventeen times as many American men will die of heart disease than will Chinese men.

Metabolic studies in humans show that animal protein raises blood cholesterol – a major risk factor for heart disease – more than does the much more feared saturated fat. This means that, in effect, **lean meats may be just as damaging to your cholesterol levels as that piece of bacon you've been avoiding.** "The Chinese experience shows that most Western coronary heart disease is unnecessary," says Dr. Richard Peto of Oxford University, one of the China Study's chief researchers.

- The incidence of deaths form heart disease is 17 times as high among American men as it is among Chinese
- All animal protein, not just fatty meats, raises cholesterol levels, which can lead to heart disease

Iron

The news from China on iron should reassure anyone concerned that a non-meat diet will leave them short of this important mineral. As a matter of fact, it turns out that eating all those vegetables and grains – perhaps combined with iron from their cooking utensils – gives the Chinese *double the iron intake* of Americans. We usually think of iron as coming from red meats, but most of the iron in China comes from plant sources. Although we know that the *heme* iron available in animal products is more easily absorbed than is the *nonheme* iron from plant matter, the Chinese have normal iron levels in spite of their low-meat diet.

In addition, scientists had been concerned that the high levels of fiber in plant-based diets might "bind" minerals such as iron, making them unavailable to the body. The China Study data clearly show that this, too, is not a matter for concern. On the contrary, those with the highest fiber intake also had, if anything, more iron-rich blood.

And while having adequate iron is necessary in order for us to have pep and energy, it turns out that taking in *too much* of this mineral – in the wrong form – can be damaging to our health.

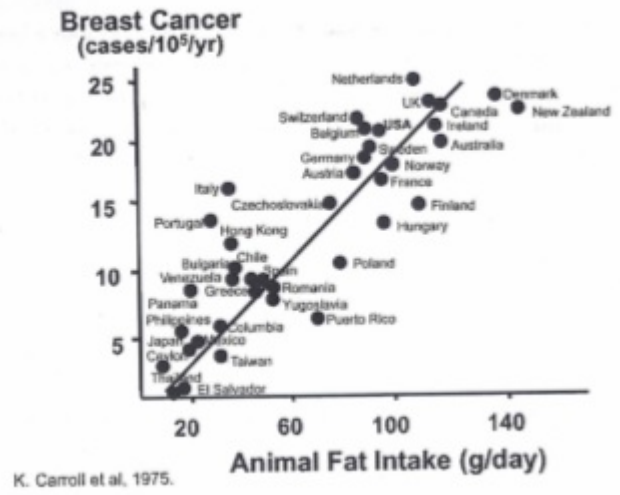
Excess iron *intake from meat* encourages free radical damage, which in turn leads to higher risk of heart attack. Interestingly, a Harvard study showed that increased iron *from vegetables*, on the other hand, poses no risk at all to our hearts!

- A plant-based diet, even with plenty of fiber, gives normal iron levels
- Too much iron from meat sources may increase risk for heart attack

Breast Cancer

In the US, almost one in eight women will get breast cancer during their lives. These are alarming statistics, but the research in China suggests that there are many things you can do to substantially reduce your risk of getting this common cancer.

First, let's take a look at breast cancer rates around the world. The graph below shows rather dramatically that the countries that have the highest rates of meat consumption also have the highest rates of breast cancer.



K. Carroll et al. 1975.

Scientists have long known that people who move from low-risk countries to high-risk countries – or the reverse – gradually take on the disease risk rates of their new country. For example, a Chinese woman moving to Pittsburgh would gradually take on the risks for getting cervical cancer of her American neighbours, while if you moved to a small Chinese village, and started eating the way the locals did, your risk of heart disease would eventually match their low rate. This is good news. What it shows is that although our genetic heritage may dispose us to certain diseases, diet and lifestyle factors are largely able to control whether these genes ever lead to disease.

What this means is that, no matter if both your grandmothers died of breast cancer, you may have the power to help avoid playing out this genetic tendency.

After analyzing their data and comparing it to date from other countries, the China Study researchers found that deaths from breast cancer were associated with five things – high intake of dietary fat, high levels of blood cholesterol, estrogen and blood testosterone, and early age at first menstruation.

We know that the first two of these – dietary fat and blood cholesterol - are directly associated with high intakes of animal foods, but what of the last three?

Estrogen is familiar to most women as the hormone that, with other hormones, regulates their monthly cycles. Scientists have known for some time that certain forms of breast cancer are particularly stimulated by high estrogen levels. And now the research shows that these hormone levels are powerfully influenced by what we eat. In China, we found that even relatively small additions to the diet of meat, milk, and fat were associated with increasing levels of estrogen and other reproductive hormones.

The researchers found that Chinese women between 35 and 64 years old had much lower blood levels of estrogen than did British women of the same age. Not only that, the Chinese women had in an added plus: much higher levels of a helpful protein that "binds" estrogen in the blood, making it less able to do its dirty work of stimulating breast cancer.

Testosterone, like estrogen, is a hormone. But unlike estrogen, it is found in much greater concentrations in men than in women. After all, as its name indicates, it's mostly made in the testes. But, yes, women do have small amounts in their bodies, where it affects libido levels. The scientists found that those women who ate more fat and animal-based foods had high blood testosterone levels, and thus higher risk for breast cancer.

Even more impressive were the findings that the younger the women were when they first menstruated (menarche), the greater their chance of getting breast cancer. Chinese girls reach menstruation usually when they are 15 to 19 years old, quite a bit later than the 10 to 14 that is the average in the US. What is the cause of this rather dramatic difference? It has to do with what girls eat. Diets high in fat, calories, and animal protein hasten the start of menstruation by accelerating growth. Young girls are rightly proud of their first periods, as a sign of their womanhood. But the price can be high when this step into adulthood comes too early. The earlier the beginning of menstruation the greater the likelihood of developing cervical as well as breast cancer.

It's not only the early age of menarche that's at issue here. Because Chinese women reach menopause at a younger age than do woman in the West, they have about 8 to 10 fewer years of hormonal surges that are associated with higher rates of breast cancer. What can we do to protect our daughters and calm our own over stimulated, troublemaking hormones? Provide a diet low in fat and animal products, and high in vegetables and grains!

And how about this for a side benefit of a plant-based diet? Later age at first menstruation could add up to substantially fewer teenage pregnancies, which are currently estimated at more than 1 million per year in the US, a figure equivalent to the entire population of San Diego, California.

- American women have a one in eight chance of getting breast cancer.

- The highest rates of breast cancer occur in the countries where people eat the most meat.
- Changing our diet to one low in animal products and high in plant products can largely control the playing out of any genetic tendency toward disease.

- Death from breast cancer is associated with high levels of dietary fat, blood cholesterol, estrogen, and testosterone, as well as early age at first menstruation, factors which are associated with diets high in animal-based foods.

Lung Cancer

The story of lung cancer in China is a very sad story of greed and ignorance. At the time of the original survey that mapped causes of death across China, the rates of lung cancer were low. But as the researchers compiled mortality rates over the next fifteen years, they found something shocking: Death rates for lung cancer were rising alarmingly.

The cause? Cigarettes. American companies, together with China's own ministries of agriculture and economics, had begun to vigorously promote tobacco use. For China, huge profits could be made from the growing and marketing of this deadly drug. Today, more and more Chinese are taking up smoking. And inadequate warnings are given to the populace that smoking may cause health problems. And so, the death toll rises. The bottom line? Of the Chinese now alive, approximately 50 million will die prematurely of lung diseases.

The Fiber-Colon Cancer connection

Almost everyone knows that increasing the fiber in our diets helps keep us regular. Oat bran and psyllium seeds have become staple remedies in many households – taken mixed with other foods to help disguise their sometimes unpleasant qualities! But these supplements really are not needed in diets rich in whole grains, vegetables, and fruits. These delicious foods are rich in natural fiber – and not only the single types of fiber available in bran and psyllium. It turns out that there are many different kinds of health-giving fiber, and that we well might need all of them – only available from whole, plant-based foods – in order to reap the fullest benefit.

And there are many benefits. The China data reveal **that the higher the intake of a wide variety of fibers, the lower the rate of bowel cancer.** This highly important finding offers hope to us in the West, where 1 in 16 people will be stricken with this disease. Each year approximately 140 000 Americans will be diagnosed with some form of bowel cancer.

Let's take a look at how the Chinese as a whole eat, compared to how Americans eat. Note that the Chinese eat *three times as much fiber* as we do!

COMPARING THE DIETS *Average Nutrient Consumption in China vs the West*		
NUTRIENT (g/day)	**CHINA**	**WEST**
Total protein	64	91
Plant protein	60	27
Dietary fiber	33	10
Starch	371	120
OTHER NUTRITIONAL FACTORS		
Calories	2 636	2 360
Fat as a percentage of calories	15	39
Calcium (mg/day)	544	1 143
Iron (mg/day)	34	18
Vitamin C (mg/day)	140	73
Total cholesterol (mg/100 ml. blood)	127	212

How does fiber help protect us from colon cancer? The fibres in whole grains and vegetables bulk up waste and speed it through the digestive tract, cutting down on the time that the body may be exposed to carcinogens in our food. In addition, they dilute bile acids that may promote colon cancer. Since scientists are not sure if it's the fiber by itself that works the protective magic, or if other components in fibrous food also play a role, it's best to get our fibre from a variety of fruits, vegetables, and grains.

Here's another provocative fact: a study of 122 000 American nurses found that those women who ate meat daily were 2 ½ times as likely to get colorectal cancer as those women who ate meat less than once a month!

- Plant-based foods are rich in a variety of fibers
- Animal-based foods have no fiber
- In China, the more fiber eaten, the lower the rate of bowel cancer

Stomach and Liver Cancers

Although, as we have seen, the rates for most cancers are relatively low in China, some areas of this vast country have an unusually high number of cases of both stomach and liver cancer. This gave the researchers an excellent opportunity to track the causes of these deadly diseases.

Until the results of the China Study were known, scientists used to believe that aflatoxin, a carcinogen found in moldy grains and beans, as a major cause of liver cancer in developing countries. But to their surprise, the researchers saw no correlation between the intake of aflatoxin and this cancer. Rather, they found that people infected with chronic viral hepatitis were predisposed to getting liver cancer. And furthermore, among these people, those with the higher cholesterol levels were more likely to be stricken with the disease.

Another infection turns out to be a culprit in stomach cancer. The data show that stomachs chronically infected with the bacterium *Helicobacter pylori* – one of the prime suspects in cases of stomach ulcers – are at increased risk for stomach cancers. In China refrigerators are rare, and so the people of certain regions have learned to preserve their foods – as did our ancestors – by fermenting or highly salting them.

Unfortunately, the more fermented or highly salted foods the Chinese eat, the more likely they are to suffer from chronic stomach conditions. But you don't need to be alarmed abut piling some delicious, fermented sauerkraut on your sandwich. It appears that it's not fermentation *per se* that's the problem, but rather it's the way fermentation is done *in China.*

There the fermentation is not done under controlled conditions, so harmful bacteria or molds often contaminate the fermentation process. It is these intruders that can help trigger the sequence that leads to cancer.

The issue of salt is a little less clear. The salt used in China for preserving foods contains potassium nitrate, known as saltpeter, as well as the form of salt commonly used in the West, sodium chloride. In any case, since common table salt, the stuff in our salt shakers, has also been associated with increased occurrence of stomach problems that can lead to stomach cancer, as well as high blood pressure and other ills, it is just as well to be safe and go light on this condiment.

When it comes to liver cancer, chronic hepatitis B and C dramatically increase risk for this disease in China. While only 0.1-0.3% of Americans are chronically infected with these forms of hepatitis, an astonishing 12-13% of the Chinese population are so infected! Although these viruses are usually passed from person to person through physical contact, contaminated water may also cause transmission. As much as we may not appreciate the chlorine and other chemicals in our water supplies, they do at least have the advantage of helping protect us from this contagious liver disease.

Even though we in the West have plenty of refrigerators and a low incidence of hepatitis B and C (although cases of the much less harmful hepatitis A are rising), we still do get stomach and liver cancers, although our rates are relatively low. Our stomachs are under attack from a variety of stresses, including the high salt intake possibly associated with stomach cancer, while our livers struggle to deal with that extra martini before dinner. In the West, a high intake of alcoholic beverages is one of the most certain causes of liver cancer. The findings of the China Study are important for us because the scientists found that *even in those people predisposed to these cancers, a higher intake of plant foods leads to fewer cases of stomach and liver cancer.*

The rates of liver cancer in China – although relatively high due to widespread chronic hepatitis – are not as high as they would be if the Chinese were actually eating sweet and sour pork and other Americanized versions of Chinese food on a regular basis! Fortunately, they don't, and we shouldn't either – at least not too frequently – if we want to help our livers stay healthy.

- The mold aflatoxin does not appear to cause liver cancer in China
- Chronic hepatitis, particularly in people with higher cholesterol levels, is associated with higher risk for liver cancer

- Too many alcoholic beverages can cause liver cancer
- Stomach cancer in China is associated with chronic infection by the bacterium *Helicobacter pylori*, as well as with consumption of improperly fermented foods and high use of salt
- Even in people predisposed to liver and stomach cancer, a high intake of plant-based foods leads to fewer causes of these diseases

The Cancer/Animal Foods link

One of the most dramatic findings of the China Study was the strong association between foods of animal origin and cancer. Was Dr. Chen Junshi, the chief Chinese researcher, surprised to find so much more cancer in villages high in these foods than those low in them? "No", he said, "We expected that because it followed animal experiments that have shown similar increases in cancer in animals on high animal protein diets."

In a series of experiments, a diet high in animal protein was fed to animals who had been exposed to a cancer-causing toxin. Their liver tumors grew rapidly. **However, the tumors stopped growing when animal protein was decreased and replaced with plant proteins.** Carcinogenesis – the development of cancer – is turned on by animal protein and turned off by plant protein, even if cancer has already been initiated. It appears that once the body has all the protein it needs – which it gets at only about 8-10 percent of the entire diet – then the excess protein begins to feed precancerous lesions and tumors. You're probably wondering – if no more than 8-10 percent total protein is recommended- how much protein is eaten by most Americans today. The answer is an eye-opening 11-22 percent of calories! And the kind of protein we take in is radically different. In China only 10% of protein is meat protein, while here a whopping 70% comes from meat and milk products.

These and other experiments suggest that it's not enough simply to make a few small dietary changes to prevent cancer, a major shift *toward* plant-based foods and *away from* animal foods is likely to produce much greater benefits. According to the National Academy of Sciences, **most cancers are related to the standard American diet.**

How does food containing animal protein cause so much trouble in the body? Scientists don't know for certain, but they do know that it affects many of our metabolic systems, and that the effects happen very quickly – within hours after eating a steak or hamburger.

Of course, it's important not to reduce our protein intake too much. We know that diets extremely low in protein compromise our immune systems, making us susceptible to infections. But it's virtually impossible, if we eat even a moderate variety of plant-based foods, not to get enough protein. Most people don't think of breads and vegetables as protein foods, but in fact a slice of bread contains 2 to 3 grams, while a half cup of broccoli about the same.

- Animal protein promotes cancer, while replacing animal protein with plant protein may stop carcinogenesis.
- Protein should make up only 8-10% of the calories in our diet.
- A reasonably varied plant-based diet will easily provide enough protein.

Other Findings

Some very preliminary findings on cancer have emerged from the China Study data, findings that will need follow-up studies and further research. First, the research analysts found that the higher the levels of copper in the blood, the higher the rate of certain cancers. And second, they noted a strong but unexplained association between cadmium in the urine and primary liver cancer. Another intriguing correlation is a relationship between herpes simplex infections and heart disease.

Growing Up

Many of us grew up believing that we needed animal protein in order to achieve our full height. "Drink your milk", we were told, "or you won't grow up to be tall and strong!" Naturally, we are concerned that our children fulfill their genetically given potential for body height. Luckily, the data from China demonstrate that animal protein is not needed in order for young bodies to grow tall. In fact, the research shows that an increased intake of animal protein is *not* associated with increased height. *The Chinese tend to be shorter than Americans, not because of lack of protein and nutrients, but because of early childhood infections and differences in genetic determinants.* This is encouraging for parents – on a plant-based diet our children can grow up not only healthy, but tall and strong as well.

- Eating more animal protein does not lead to greater height in China
- Childhood infections can lead to shorter adult heights

PMS, Menopause, and the Hormone Rollercoaster

As every woman knows who rides the month-long wave of shifting hormones, these small, chemical components of our blood can take us for quite a ride – from bloating to hot flashes to depression. And while we may not be able to completely smooth the hormonal journey, research shows that we can do quite a lot to ease our way.

As we mentioned in our section on breast cancer, the hormones circulating in our bodies are powerfully affected by what we eat. A diet high in animal foods elevates the hormones that not only trigger early menstruation, but also are associated with PMS and difficulty with menopause.

Menopause is, well, a hot topic. But it seems it is less "hot" for Chinese women. Researchers claim that these women report far fewer difficult symptoms of menopause, including hot flashes. While we don't know the precise reason for this, we do know the following very provocative facts.

- American women tend to have higher estrogen levels than Chinese women.
- Many researchers suspect that difficulties with menopause are caused by the degree that estrogen levels *fall*. In other words, if estrogen levels are not so high to begin with, their fall is far shorter, leading to fewer symptoms.
- Meat, chicken, and dairy products contain foreign estrogens that are fed to animals to increase weight and production. These estrogens float down our bloodstream to our breasts, where they may possibly slip, like keys into keyholes, into estrogen receptors. But these little keys can open doors to trouble: they have been

implicated, by some scientists, in promoting fibrocystic breast disease as well as breast cancer.

- Diets rich in plant-based foods, particularly whole grains and legumes, provide magnesium and vitamin B6, both of which appear to reduce symptoms of PMS.

- Many plant foods, such as soy products, contain *phyto-estrogens* (plant estrogens) such as *genistein* which binds to estrogen receptors in the breast or endometrium "locking out" the "bad" estrogens associated with disease. In addition, these phytoestrogens provide a natural and gentle source of estrogen as women's levels drop during menopause. Researchers hypothesize that the high intake of soy products in Asia – tofu, soy-bean juice, miso – may in part be responsible for easing the Asian women's way through this mid-life passage.

For Men: Hormone Trouble

It may not surprise you that high testosterone levels in women are associated with all sorts of illness, because, - after all – isn't testosterone the "man's hormone"? And, yes, levels of this hormone, made in the testicles and the adrenal glands, are certainly naturally much higher in men – about 20 times higher. But even in the males of our species too much testosterone can cause a variety of problems.

Prostate cancer for one. One in every ten American men will eventually be diagnosed with this disease. And while we don't know all the factors that cause this illness, we do know that high levels of testosterone trigger rapid growth of prostate cancer cells.

Men and women have many of the same hormones – men even have low levels of estrogens! The proportion of these hormones rise and fall with changes in the diet. As we noted earlier, testosterone production is accelerated by an animal-protein diet, while a diet low in fat and high in fiber slows its production and speeds its elimination.

And here's another factor that may have a bearing on your chances of getting prostate cancer. In addition to antioxidants, vitamins and other helpful nutrients, vegetables contain plant estrogens that can help normalize the proportion of testosterone to estrogen in the body. Several studies have shown that men eating diets high in phytoestrogen-containing foods – soybeans and peas for example – are less likely to develop prostate cancer.

Even more convincing are two studies that tracked a total of more than 68 000 American men. Both studies found that those men who ate the highest fat diets had 79% more advanced prostate cancer – the aggressive form – than the men who skipped the grease. Which fatty foods were the worst? Red meat, mayo and butter.

Considering all the dietary factors, it's not surprising that a study that compared prostate cancer rates of men in different countries found that men in China had the lowest advanced prostate cancer rates in the world – one in every 100 000 men – while Chinese-American men living in San Francisco had a rate 19 times as high!

And here's an extra benefit to reducing your testosterone levels. The continued existence of that mane of hair on the top of your head is partly dependent on moderate testosterone

levels. While lots of circulating testosterone will increase curly chest hair, it does, unfortunately, encourage *head hair to fall out.* Early baldness can be the result. So… what you put in your mouth really can affect the way you look, and help you keep a full head of hair!

- One in ten American men will get prostate cancer.
- High testosterone triggers rapid growth of prostate cancer.
- Eating lots of animal proteins increases testosterone.
- A low-fat, high-fiber diet lowers testosterone levels.
- American men eating the highest fat diets had almost 80% more advanced prostate cancer than the men eating the least fat.

What this Means for You

So, in light of the powerful scientific results of the China Study research, what steps can you take to safeguard your health?

By now, you have certainly gotten the message that animal-based foods should be replaced by plant-based foods as much as possible. The American Dietetic Association agrees. It notes that a low-fat meat-less diet reduces obesity, coronary heart disease, high blood pressure, diabetes, osteoporosis, kidney stones, gallstones, and cancers of the colon, beast, and lung. Dr. Dean Ornish, director of the Preventative Medicine Research Institute at the University of California, concurs: "We have to go beyond the [U.S. Dietary] guidelines, to a low-fat vegetarian diet", he says. "Animal products … are the main culprit in what is killing us. We can absolutely live better lives without them."

But don't be too hard on yourself and expect to make the switch to a basically vegetarian diet all at once. It can take time to get used to a new way of eating and to new foods. According to some scientists our "chemosensory sensitivity" toward any particular food may vary depending on what we're used to eating. In other words, we are "programmed" by what we have eaten, and it may take a while to "reprogram" our bodies to some new tastes and our new diet.

Remember this. *Each small step you take away form foods that are less than helpful to your well-being is a large step toward health and vitality.* Each bite of meat or cheese that you replace with fruit or vegetables will have a positive impact on your health. Keeping this in mind, let's take a look at the guidelines suggested by the China Study data.

- Use little or no added fats or oils. Although the current American guidelines call for no more than 30% calories from fat, our research as well as other studies indicate that 30% fat may be too much. As we eat fewer animal-based foods and our fat levels drop lower – into the 10-20% range – we see dramatic health benefits, including much lower rates of cancers and heart disease. Like the Chinese, skip the fats – and the cancer and heart disease!
- Eliminate or cut down on animal proteins of any kind. As we noted above, the body needs only about 8-10% of its calories as protein. Anything more than that, particularly if it is animal protein, is associated with a wide variety of chronic degenerative diseases. Many Americans, in an attempt to improve their health, have

cut back on fatty meats, but have replaced them with low-fat animal proteins such as chicken or low-fat milk. Sometimes their protein intake actually increases! Animal proteins should be replaced, not with low-fat versions of themselves, but with a wide variety of vegetables, grains, and fruits.

- Increase fiber-containing foods. The Chinese eat about three times as much dietary fiber as do Americans – 33 grams to our 11. The benefits range from lowered cholesterol to improved regularity to fewer cases of bowel cancer.
- Eat a generous amount of plant-based foods, taken from different parts of the plants, roots, stems, leaves, flowers (such as broccoli florets), seeds and fruits. This will help ensure that you take in a wide variety of health-giving vitamins, minerals, antioxidants, and other phytochemicals.
- Be careful with supplements. Intriguing though some correlations may be between a lack of this or that nutrient and this or that disease, drawing conclusions that the nutrient, by itself, causes the effect is tricky. We're fooling ourselves when we try to discover what is THE thing in a food, what is THE mechanism by which food works, without looking at the larger picture. In other words, the "magic bullet" approach of much of Western medicine, in which isolated drugs or nutrients are taken for specific purpose without considering their perhaps unknown other effects on the body, simply isn't a good idea.

  It's dangerous to fire magic bullets into the human body when we just do not understand all the complexities involved. Look at the excitement and consequent disappointment surrounding beta carotene supplements! We know that the high blood levels of beta carotene achieved by eating plenty of orange and green vegetables and fruits are associated with far fewer cancers of various kinds; yet the "magic bullet" of beta carotene taken in a *supplement* form simply does not work, and in fact may be associated with higher rates of some cancers.

These China Study recommendations are just the beginning. As of 1996, only a small fraction of the Study's data has been analyzed. Challenging new observations, associations, and hypotheses on the relationships between diet and disease will continue to emerge for years. "This amount of data [amassed by the China Study] is staggering," says **New Scientist.**

Conclusion

Neil Barnard, M.D., Director of the Physicians Committee for Responsible Medicine, tells us that **two thirds of Americans alive today will die of cancer or heart disease, most of it diet-related**. That's a steep food bill.

But things can change, for you and for people all over the world. Imagine this: if we add a Chinese-style diet to our modern refrigeration and food storage methods, we could end up with the best of both worlds – one that would guard us against the diseases of poverty as well as the diseases of affluence. If people the world over were to eat mostly a plant-based diet (as well as cut out recreational drugs including tobacco and alcohol), and if sanitation measures were taken in the developing countries to reduce communicable infectious

diseases, **scientists estimate that premature deaths from all diseases could be reduced by 80 to 90%!**

We now have the opportunity to live the longest, most disease-free lives in history. With the information that the China Study has given us, we can confidently take the steps to turn this opportunity into a reality.

Dr. T Colin Campbell

Dr. Campbell, chief U.S. investigator for the China Study, was an unlikely candidate for becoming one of the main scientific defenders of a non-meat diet.

"I was raised on a dairy farm and ate plenty of meat and eggs," he says, "and I wrote my Ph.D. dissertation on the ways animal protein could be produced more efficiently so we could eat more animal-based foods." But once he started doing nutritional research in the 1960s, this defender of meat consumption became convinced that, in fact, a diet as low as possible in animal-based products was a far healthier choice. "I was just paying attention to what the scientific evidence was showing me", he says. Now his diet is over 98% vegetarian, and he and his wife, Karen, have raised five children who consume an essentially plant-based diet.

Currently Jacob Gould Schurman Professor of Nutritional Biochemistry at Cornell University, Dr. Campbell has been the Senior Science Advisor to the American Institute of Cancer Research/World Research Fund. Among his many achievements – including more than 300 scientific publications – he was one of the co-authors of the National Academy of Sciences' landmark report on **Diet, Nutrition and Cancer**, which recommended increased consumption of fruits, vegetables and whole grains.

Dr. Chen Junshi of the Chinese Academy of Preventive Medicine in Beijing was Dr. Campbell's chief link to China. The idea of the collaboration first arose when Dr Chen took a year's sabbatical to work at Dr. Campbell's lab at Cornell. There, they discovered the extraordinary compilation by the Chinese Academy of Medical Sciences of death data on the Chinese population. Together, they realized that this material could provide a unique opportunity for mapping the connections between diet and disease on a scale never done before. The seeds of the China Study were born.

It was Dr. Chen who, once the National Cancer Institute funding was in place, led the massive survey undertaken across the breadth of China. Armed with computers and faxes –

in 1985 they introduced the first fax into China – the researchers carried out the beginning phases of this huge study. Today, Dr. Chen continues to lead a very busy life. Apart from his role as Deputy Director of the Institute of Nutrition and Food Hygiene at the Chinese Academy of Preventative Medicine, he serves as a member of the WHO Expert Advisory Panel on Food Safety and as an adjunct professor at Cornell University.

To learn more about this East-West Collaboration and healthy plant-based living styles recommended by Dr. T. Colin Campbell, see his community of websites at:

- https://nutritionstudies.org/

Reference (as originally published by):

Campbell, T (Ph.D.) and Cox, C. *The China Project: Revealing the Relationship Between Diet and Disease* (1996). New Century Nutrition