Introduction

Cancer lies dormant in all of us. Like all living organisms, our bodies are making defective cells all the time. That's how tumors are born. But our bodies are also equipped with a number of mechanisms that detect and keep such cells in check. In the West, one person in four will die of cancer, but three in four will not. Their defense mechanisms will hold out, and they will die of other causes.[1, 2]

I have cancer. I was diagnosed for the first time fifteen years ago. I received conventional treatment and the cancer went into remission, but I relapsed after that. Then I decided to learn everything I could to help my body defend itself against the illness. As a physician, established researcher, and former director of the Center for Integrative Medicine at the University of Pittsburgh, I had access to invaluable information about natural approaches to prevent or help treat cancer. I've kept cancer at bay for seven years now. In this book, I'd like to tell you the stories—scientific and personal—behind what I learned.

After surgery and chemotherapy for cancer, I asked my oncologist for advice. What should I do to lead a healthy life and what precautions could I take to avoid a relapse? "There is nothing special to do. Lead your life normally. We'll do MRI scans at regular intervals and if your tumor comes back, we'll detect it early," replied this leading light of modern medicine.

"But aren't there exercises I could do, a diet to follow or to avoid? Shouldn't I be working on my mental outlook?" I asked. My colleague's answer bewildered me: "In this domain, do what you like. It can't do you any harm. But we don't have any scientific evidence that any of these approaches can prevent a relapse."

In reality, what my doctor meant was that oncology is an extraordinarily complex field that is changing at breakneck speed. He was already hard pressed to keep up with the most recent diagnostic and therapeutic procedures. We had used all the drugs and all recognized medical practices relevant to my case. In our present state of knowledge, we had reached the limits. As for more theoretical mind-body or nutritional approaches, he clearly lacked the time or interest to explore these avenues.

I know this problem as an academic physician myself. Each in our own specialty, we are rarely aware of fundamental discoveries recently published in

prestigious journals such as *Science* or *Nature*. Not until they have been the subject of large-scale human studies do we take note. Still, these major breakthroughs may sometimes enable us to protect ourselves long before they have led to new drugs or protocols that will become the mainstream treatments of tomorrow.

It took me months of research to begin to understand how I could help my body protect itself from cancer. I participated in conferences in the United States and in Europe that brought together researchers who were exploring this type of medicine, which works with the "terrain" at the same time that it addresses the disease. I scoured medical databases and combed scientific publications. I soon perceived that the available information was often incomplete and widely dispersed. It only took on its full meaning when it was brought together and combined.

Taken as a whole, the mass of scientific data reveals an essential role for our natural defenses in the battle against cancer. Thanks to key encounters with other physicians or practitioners who were already working in this field, I managed to put all this information into practice along with my treatment.

This is what I learned: If we all have a potential cancer lying dormant in us, each of us also has a body designed to fight the process of tumor development. It is up to each of us to use our body's natural defenses. Other cultures do this much better than ours.

The cancers that afflict the West—for example, breast, colon and prostate cancer—are seven to sixty times more frequent here than in Asia.[3] Nevertheless, statistics reveal that relative to men in the West, just as many precancerous microtumors are found in the prostates of Asian men who die before fifty from causes other than cancer.[4] Something in *their* way of life prevents these microtumors from developing. On the other hand, the cancer rate among Japanese people who have settled in the West catches up with ours in one or two generations.[5] Something about *our* way of life weakens our defenses against this disease.

We all live with myths that undermine our capacity to fight cancer. For example, many of us are convinced that cancer is primarily linked to our genetic makeup, rather than our lifestyle. When we look at the research, however, we can see that the contrary is true.

If cancer was transmitted essentially through genes, the cancer rate among adopted children would be the same as that among their biological—not their adoptive—parents. In Denmark, where a detailed genetic register traces each individual's origins, researchers have found the biological parents of more than a thousand children adopted at birth. The researchers' conclusion, published in the prestigious *New England Journal of Medicine,* forces us to change

all our assumptions about cancer. They found that the genes of biological parents who died of cancer before fifty had *no influence* on an adoptee's risk of developing cancer. On the other hand, death from cancer before the age of fifty of an adoptive parent (who passes on habits but not genes) increased the rate of mortality from cancer fivefold among the adoptees.[6] This study shows that lifestyle is fundamentally involved in vulnerability to cancer. All research on cancer concurs: Genetic factors contribute to at most 15 percent of mortalities from cancer. In short, there is no genetic fatality. We can all learn to protect ourselves.*

It must be stated at the outset that to date, there is no alternative approach to cancer that can cure the illness. It is completely unreasonable to try to cure cancer without the best of conventional Western medicine: surgery, chemotherapy, radiotherapy, immunotherapy, and soon, molecular genetics.

At the same time, it is completely unreasonable to rely *only* on this purely technical approach and neglect the natural capacity of our bodies to protect against tumors. We can take advantage of this natural protection to either prevent the disease or enhance the benefits of treatments.

In these pages I will tell you the story of how I changed from a scientist-researcher, completely ignorant of the body's natural defenses, to a physician who relies above all on these natural mechanisms. My cancer helped me make that change. For fifteen years I protected the secret of my disease ferociously. I love my work as a neuropsychiatrist, and I never wanted my patients to feel they had to look after me instead of letting me help them. Nor, as a researcher and teacher, did I want my ideas and my opinions to be seen as the fruit of my personal experience instead of the scientific approach that has always guided me. From a personal point of view, as everybody who has had cancer knows, I wanted to be able to go on living, fully alive, among the living. Today it is not without apprehension that I've decided to talk about it. But I am convinced that it is important to make the information that I've benefited from available to those who may wish to use it.

The first part of this book presents a new view of the mechanisms of cancer. This view is based on the fundamental but still little-known workings of the immune system, on the discovery of the inflammatory mechanisms underlying the

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* Another Scandinavian study was conducted at the Karolinska Institute in Sweden, where Nobel Prize candidates are selected. It shows that genetically identical twins, who share every single gene in their bodies, usually do not share the risk of developing cancer. Researchers conclude, again in the *New England Journal of Medicine:* "Inherited genetic factors make a minor contribution to susceptibility to most types of neoplasms." (NB: "neoplasm" means "cancer.") This finding indicates that environment plays the principal role among the causes of common cancers.[7]

growth of tumors, and on the possibility of blocking their spread by preventing new blood vessels from nourishing them.

From this new perspective on the illness follow four new approaches. Anyone can put them into practice and engage both body and mind to create their own anticancer biology. These four approaches consist of: (1) guarding ourselves against the imbalances of our environment that have developed since 1940 and promote the current epidemic of cancer, (2) adjusting our diet so as to cut back on cancer promoters and include the greatest number of phytochemical components that actively fight tumors, (3) understanding and healing the psychological wounds that feed the biological mechanisms at work in cancer, and (4) creating a relationship with our bodies that stimulates the immune system and reduces the inflammation that makes tumors grow.

But this is not a biology textbook. Confrontation with illness is a searing inner experience. I wouldn't have been able to write this book without going back over the joys and sorrows, the discoveries and failures that have made me a lot more alive today than I was fifteen years ago. I hope that by sharing them with you, I will help you find pathways of healing for your own adventure, and that it will be filled with beauty.

CHAPTER 6

The Anticancer Environment

PART 1: A CANCER EPIDEMIC

After teaching at Yale, Michael Lerner, PhD, moved to California in the seventies with a seemingly outlandish idea: He wanted to create a center whose very lifestyle could help heal, both physically and emotionally, people with serious illnesses. On this exceptionally peaceful site, perched high above the Pacific just north of San Francisco, the food is exclusively organic. People practice yoga twice a day. They feel free to speak openly to each other. Doctors with cancer sometimes come here looking for answers they didn't learn in medical school.

Over the past thirty years, Lerner and his associate Rachel Naomi Remen, MD, have helped a large number of patients—many of whom have become friends. Some have left marvelously restored; some have been healed, others have died. As the years have gone by, the center has seen a greater number of young people among the dead. Cancer now affects people who have never smoked and who have led a rather "well-balanced" life. A hidden, incomprehensible cause seems to doom thirty-year-old women to metastatic breast cancer and young, seemingly healthy men to spreading lymphoma, colon, or prostate cancer. There doesn't seem to be any logical reason why the patients are younger.

What Michael and Rachel observe at their center is in fact a worldwide phenomenon clearly identified by statisticians. Since 1940 the number of cancers has increased in all industrialized countries. This trend, which has picked up speed since 1975, is particularly striking in the young. In the United States between 1975 and 1994, the cancer rate in women under forty-five has risen by 1.6 percent *a year* and even more in men (by 1.8 percent).[1] In some Euro-

pean countries—such as France—the cancer rate has increased by 60 percent in the last twenty years.[2] As a result, we can't help wondering whether we are facing an epidemic.

When I asked an eminent professor of oncology this question three years ago, he came up with an array of answers meant to reassure the public. "There is nothing surprising about this phenomenon," he said. "As people are living longer today, compared to 1940, it's normal for the cancer rate to be higher. Besides, women give birth much later, so they are more likely to have breast cancer. Taking into account early screening, there are a greater number of cases recorded." His message was simple: We shouldn't be misled by alarmists invoking heaven knows what mysterious factors. To the contrary, we need to step up research to improve treatment and early detection, the two pillars of modern oncology. Like many of my colleagues, and like many other patients, I wanted to believe him. It was more comforting.

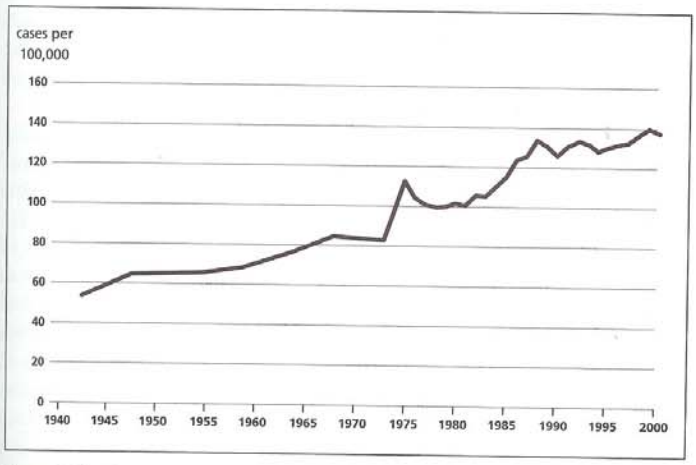

Figure 6. The rise in breast cancer cases in the United States between 1940 and 2000 (taking into account aging of the population).[3,4]

But today even this archconservative oncologist has changed his view. The facts are indeed devastating. Annie Sasco, MD, PhD, who ran the unit of epidemiology for cancer prevention at the World Health Organization (WHO) for six years, points to the figures that have probably helped change the minds

of those who refused to face reality. The rise in cancers clearly cannot be explained by population aging alone. WHO drew attention to this fact in *The Lancet* in 2004: Cancers in *children and adolescents* are among those that have risen the most since 1970.[5] True, there is a *slight* increase in risk among women who have their first child after thirty. But the age of procreation in women explains only a very small portion of the increase in cancers. The incidence of prostate cancer (which by definition affects only men) has risen still faster than that of breast cancer in Western countries.[6] It rose by 200 percent in several European countries between 1978 and 2000, by 258 percent in the United States over the same period.[7, 8] And finally, the argument concerning early screening is insufficient to explain these numbers: The increase in cancers that are not routinely screened for (pancreas, lung, brain, testicle, lymphoma) is equally striking, if not more so.[9–11]

There is indeed a cancer epidemic in the Western world.* It can even be dated, quite precisely, to World War II. A major study published in *Science* has shown, for example, that for women carrying high-risk genes (BRCA-1 or BRCA-2), the risk of developing breast cancer before age fifty has virtually *tripled* for women born after the war, compared to those born before the war.[12] †

Older physicians I have talked to are flabbergasted. In their time, cancer in a young person was very rare. One of them still remembers from medical school a thirty-five-year-old woman with breast cancer: All the medical students from the nearby departments had been invited to examine her. In the fifties, she was an exceptional case. Four or five decades later, I had cancer at thirty-one, and two of my cousins—one in Europe, the other in the United States—had cancer at forty. Forty—that was also the age at which the first childhood classmate whose bust I had noticed died. She died because of a tumor in those breasts we giggled about together in the school yard when they first started to show. Alas, the epidemiologists' figures are not just abstract numbers.

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* Technically, the word "epidemic" is used when there is a rapid rise in the number of cases of an illness. This is not true of *all* types of cancer. In the last decades, there has been a considerable reduction in stomach and ear, nose, and throat cancers in the West. Yet the rise in cancers of the breast, lung, brain, skin (melanomas), and lymphatic system (lymphomas) clearly follows an epidemic pattern.

† Another study, in Europe, shows that the risk of malignant brain tumors has also tripled for people born after the war.[13]

The Rich People's Disease

Gifted with impressive foresight, General de Gaulle founded the first international center at WHO "to determine the causes of cancer." It was set up in Lyon in 1964 and named the International Agency for Research on Cancer (IARC). Today it is the world's largest epidemiological center devoted to cancer. Epidemiology is real detective work. By association and deduction it tries to identify the causes of diseases and their progression. The science of epidemics emerged at a time when cities in Europe and America were devastated by cholera. In the middle of the nineteenth century, microbes had not yet been discovered; there was no explanation for cholera, making it all the more terrifying.

When epidemiologists have not yet identified the cause of a disease, health authorities may invent reassuring arguments to inspire confidence in whatever measures are being offered. In 1832 Americans faced a new epidemic of cholera, and the Medical Board of New York City was helpless. It published a bulletin stating that cholera victims were "either intemperate, imprudent, or prone to injury by the consumption of improper medicines." To avoid catching the disease, the board recommended not drinking alcoholic beverages, avoiding drafts, not eating salads, and "maintaining regular habits."[14] The discovery of the cholera bacillus by Robert Koch in 1883 did in fact confirm the role of raw salad in cholera's transmission. The rest was, in essence, quackery.*

Annie Sasco remembers that at twelve she wrote in her diary that someday she would be a doctor and work for WHO. Perhaps it was partly to show her father, a police sergeant and former member of the French Resistance, that she too would be capable of fighting for great causes. After medical school in France and a doctorate in epidemiology from Harvard, she spent twenty-two years at WHO's International Agency for Cancer Research. Her search for reliable data took her into the field, to China, Brazil, Central America, and Africa. The cancer maps resulting from these investigations provide the best clues to the rapid spread of the disease. She brings up maps on her computer

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* I am grateful to Sandra Steingraber, PhD, for this historical example. She introduces it in her book *Living Downstream*—essential reading on the connection between environmental pollution and the increase in cancers.[15]

In another brilliant book on cancer and the environment, Devra Lee Davis, PhD, MPH, points out that authorities in the nineteenth century did not wait for a final proof to start putting in place basic improvements in hygiene and sanitation. These saved many lives, well before the cholera vibrio was finally identified.[16]

screen showing the occurrence of various cancers and comparing the most affected with the least affected countries. The first map is stunningly clear: For the same age groups, breast, prostate, and colon cancers are diseases of the industrialized world, and particularly *Western* countries. There are nine times more such cancers in the United States and in Northern Europe than in China, Laos, or Korea, and four times more than in Japan.

After examining these maps, we can't help wondering whether Asian genes play a protective role against these cancers. But genes are not the answer here. When she was conducting her survey in China, Sasco asked a Chinese colleague how he explained the low incidence of breast cancer there. With an amused smile he answered: "It's a disease of rich women. You'll find it in Hong Kong but not here."

In fact, the cancer rate among the Chinese and Japanese in Hawaii and in San Francisco's Chinatown is fast approaching that of Westerners.[17, 18] And in the past decade, breast cancer rates in major cities of China, along with Hong Kong, have tripled.[19]

In his introduction to the report of the International Agency for Cancer Research, the general director of WHO concluded, "Up to 80% of cancers may be influenced by external factors, such as lifestyle and the environment." Indeed, the greatest success of Western medicine in the war against cancer is the quasi disappearance of cancer of the stomach in industrialized countries.

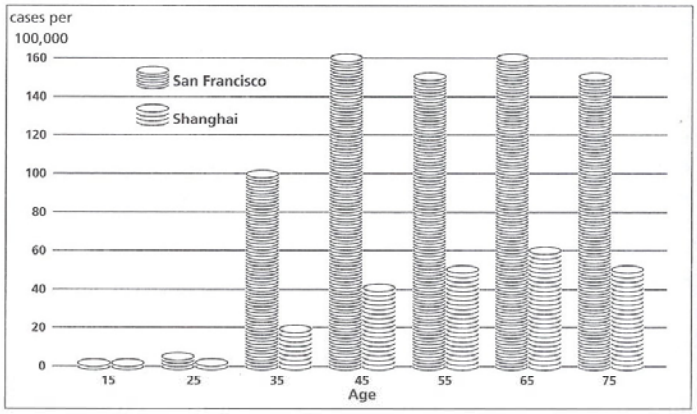

Figure 7. Breast cancer (per 100,000 women) among Chinese immigrants in San Francisco, compared to Chinese women who remained in China.[20] Cancer is a disease of the Western lifestyle.

Whereas all medical students of the 1960s were painfully familiar with this serious and common illness, which was present on every internal medicine ward, it is a disease barely discussed today in medical schools. The disappearance of gastric cancers in a matter of forty years is attributed to better refrigeration of food and less reliance on nitrates and salt for preservation: a purely "environmental" intervention.[21]

Today it is widely recognized in biology and medicine that many toxic substances present in the environment play roles in the appearance of the first cancer cells in an organism, and then in their transformation into a more aggressive tumor. This process is referred to as carcinogenesis. In a recent report, experts at the U.S. National Cancer Institute emphasized that the process of carcinogenesis doesn't just trigger the disease. *It goes on after the disease has started.*[22] Thus, it is essential to seek protection against toxins that encourage tumor growth, whether we are healthy or already affected by the disease. Detoxification is a fundamental concept in most ancient medical traditions, from Hippocrates to Ayurveda, and is absolutely necessary today.*

Like everyone else, once diagnosed with cancer, I wanted to know what I could have done to prevent it and what I now had to do so that it wouldn't come back. To my great surprise, all the answers I got were evasive and noncommittal: "We don't really know for sure the cause of your illness. Don't smoke. That's all we can advise you." It's true: Except for tobacco or asbestos and lung cancer, there are few certainties that one particular food or one particular feature of our lifestyle or profession sparks a particular cancer. But, as we shall see further on, there are enough strong suggestions to justify starting to protect ourselves right away—all the more so because it doesn't require such a great effort.

A Watershed in the Twentieth Century

Cancer is more widespread today in the West and has been increasing since 1940. Hence, we must examine what has changed in our countries since World War II. Three major factors have drastically disrupted our environment over the last fifty years:

1. The addition of large quantities of highly refined sugar to our diet
2. Changes in methods of farming and raising animals and, as a result, in our food

* The concept of detoxification usually includes two notions—an end to accumulation as well as active elimination. I use it here principally to refer to ending accumulation of toxins.

3. Exposure to a large number of chemical products that didn't exist before 1940

These are not minor changes. There is every reason to believe that these three phenomena play a major role in the spread of cancer. To protect ourselves, we first must try to understand them.

PART 2: RETURNING TO THE FOOD OF YESTERYEAR

Our genes still bear the marks of having developed several hundred thousand years ago, when we were hunters and gatherers. They were adapted over time to our ancestors' environment and especially to their food sources, and they haven't changed much since.[23] Today our bodies still expect a diet similar to the one we had when we ate the products of hunting and gathering. That diet consisted of a lot of vegetables and fruit and occasionally the meat or eggs of wild animals. It provided a balance between essential fatty acids (omega-6 and omega-3) and very little sugar and didn't include flour. (The only source of refined sugar for our ancestors was honey. They did not eat cereals.)

Today Western surveys of nutrition reveal that 56 percent of our calories come from three sources that *were nonexistent* when our genes were developing:[24]

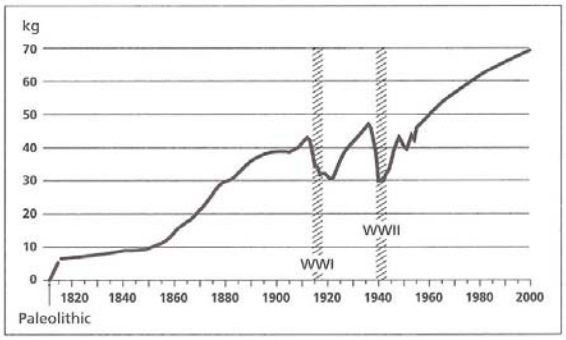

Figure 8. Changes in the consumption of refined sugar: 2 kilograms (4 pounds) a year per person during the Paleolithic (when our genetic makeup developed); 5 kilograms (11 pounds) a year in 1830; 70 kilograms (150 pounds) a year in 2000.[25]

- refined sugars (cane and beet sugar, corn syrup, etc.)
- bleached flour (white bread, white pasta, etc.)
- vegetable oils (soybean, sunflower, corn, trans fats)

It so happens these three sources contain none of the proteins, vitamins, minerals, or omega-3 fatty acids needed to keep our bodies functioning. On the other hand, they *directly* fuel the growth of cancer.

Cancer Feeds on Sugar

Consumption of refined sugar has skyrocketed. Whereas our genes developed in an environment where one person consumed at most 2 kilograms (4 pounds) of honey a year, human sugar consumption rose to 5 kilograms (11 pounds) a year in 1830 and a shocking 70 kilograms (150 pounds) a year at the end of the twentieth century.

The German biologist Otto Heinrich Warburg won the Nobel Prize in medicine for his discovery that the metabolism of malignant tumors is largely dependent on glucose consumption. (Glucose is the form of digested sugar in the body.) In fact, the PET scan commonly used to detect cancer simply measures the areas in the body that consume the most glucose. If a particular area stands out because it consumes too much sugar, cancer is very likely the cause.

When we eat sugar or white flour—foods with a high "glycemic index"—blood levels of glucose rise rapidly. The body immediately releases a dose of insulin to enable the glucose to enter cells. The secretion of insulin is accompanied by the release of another molecule, called IGF (insulinlike growth factor), whose role is to stimulate cell growth. In short, sugar nourishes tissues and makes them grow faster. Furthermore, insulin and IGF have another effect in common: They promote the factors of inflammation, which, as we saw in chapter 4, also stimulate cell growth and act, in turn, as fertilizer for tumors.

Today we know that the peaks of insulin and the secretion of IGF directly stimulate not only the growth of cancer cells[26] but also their capacity to invade neighboring tissues.[27] Moreover, after injecting breast cancer cells into mice, researchers have shown that the cancer cells are less susceptible to chemotherapy when the mouse's insulin system has been stimulated by the presence of sugar.[28] The researchers concluded that a new class of medications is needed now to fight cancer: medicines that reduce insulin peaks and IGF in the blood.

Without waiting for these new medicines, each of us can already cut back

on the amount of refined sugar and white flour we consume in our diets. It has been shown that simply reducing these two dietary factors has a rapid effect on the levels of insulin and IGF in the blood. This reduction has secondary effects, such as healthier skin.

The link between blood sugar levels and inflammation may seem farfetched. How could candy, a lump of sugar in a cup of coffee, or a slice of white bread with jam affect physiology? Yet this link is patently obvious when it comes to pimples on the skin.

Loren Cordain, PhD, is a researcher in nutrition at the University of Colorado. When he was told that certain population groups whose way of life is very different from ours had no experience of acne (which is caused by an inflammation of the epidermis, among other mechanisms), he wanted to find out how this could occur. The claim sounded preposterous. Acne is a rite of passage that affects 80 percent to 95 percent of Western adolescents. In order to investigate, Cordain accompanied a team of dermatologists to examine the skin of 1,200 adolescents cut off from the rest of the world in the Kitavan Islands of New Guinea, and 130 Ache Indians living in isolation in Paraguay. In these two groups they found *no trace whatsoever* of acne. In their article in *Archives of Dermatology,* the researchers attributed their amazing discovery to the adolescents' nutrition. The diets of these contemporary sheltered groups resemble those of our distant ancestors: no refined sugar or white flour, thus no peaks of insulin or IGF in the blood.[29]

In Australia, researchers convinced Western adolescents to try a diet restricting sugar and white flour for three months. In a few weeks, their insulin and IGF levels diminished. So did their acne.[30, 31]

In the second half of the twentieth century, a new ingredient took root and spread like a weed in Western diets: high-fructose syrup extracted from corn (a mix of fructose and glucose). Our bodies already had trouble tolerating the refined sugar we were loading up on. Now they were totally overwhelmed by this sugar syrup ubiquitous in processed foods. This concentrate is to sugar a little like what opium is to poppies. Removed from its natural matrix (there is fructose in all fruits) and mixed with glucose, it can no longer be handled by the insulin our bodies produce, at least not without collateral damage. It then becomes toxic.

There is good reason to believe that the sugar boom contributes to the cancer epidemic, as it is linked to an explosion of insulin and IGF in our bodies. Mice inoculated with breast cancer cells have been used to compare the effect on tumor growth of different foods of varying glycemic indices. After

two and a half months, two thirds (sixteen) of the twenty-four mice whose blood sugar peaked frequently were dead, compared to only one of the twenty that had been on a low-glycemic-index diet.[32] Obviously, this experiment could never be carried out on humans. But a study comparing Asian with Western populations suggests the same thing: Those who eat low-sugar Asian diets tend to have five to ten times fewer hormonally driven cancers than those with diets high in sugar and refined foods, as is typical in most industrial nations.[33]

In addition, people with diabetes (characterized by high blood sugar levels) are known to be at above-average risk for cancer.[34] In a joint American-Canadian study, Susan Hankinson, ScD, of Harvard Medical School, has shown that in a group of women under fifty, those with the highest level of IGF were *seven times* more likely to develop breast cancer than those with the lowest.[35] Another team, composed of researchers from Harvard and the University of California at San Francisco in the United States and McGill in Canada, demonstrated the same phenomenon for prostate cancer: In their group of men, the risk was as much as *nine times* greater for those with the highest levels of IGF.[36, 37] Additional studies have shown that a high glycemic index is likewise associated with cancer of the pancreas, colon, and ovaries.[38–41]

All the scientific literature points in the same direction: People who want to protect themselves from cancer should seriously reduce their consumption of processed sugar and bleached flour. This means getting used to drinking coffee without sugar. (It's easier to give up sugar in tea.) It also means making do with two or three desserts a week. (There is no limit on fruit, as long as it is not sweetened with sugar or syrup.) Another option is to use natural substitutes for sugar that don't cause a rise in blood glucose or insulin (see table 4).

Eating multicereal bread (a flour mixed with oatmeal, rye, flaxseeds, etc.) is also essential in order to slow down assimilation of the sugars coming from wheat. You can also choose bread made with traditional leaven ("sourdough") instead of the more common chemical baker's yeast, which raises the glycemic index of bread. For the same reason, ordinary white rice should be avoided and replaced by brown or white basmati rice, for which the glycemic index is lower. Above all, it's much better, as we shall see in the chapter on cancer-fighting foods, to eat vegetables and legumes (beans, peas, lentils). Not only are their glycemic indexes low, but their potent phytochemicals fight cancer growth every inch of the way.

TABLE 4. CHOOSE FOOD ACCORDING TO ITS GLYCEMIC INDEX[42]

High Glycemic Index (avoid)	Low Glycemic Index (use liberally)
Sugar (white or brown), honey, syrups (maple, fructose, dextrose)	Natural sweeteners: agave nectar, stevia (a Pacific plant), xylitol, dark chocolate (>70% cocoa)
White/bleached flours: white bread, white rice, overcooked white pasta, muffins, bagels, croissants, puffed rice cakes	Mixed whole-grain cereals: multigrain bread (not just wheat); leavened ("sourdough") bread; Basmati or Thai rice; pasta (preferably multigrain) and noodles cooked al dente; quinoa, oats, millet, buckwheat
Potatoes, especially mashed potatoes (except for the rare Nicola variety)	Lentils, peas, beans, sweet potatoes, yams
Cornflakes, Rice Krispies, and most of the other bleached or sweetened breakfast cereals	Oatmeal (porridge), muesli, All-Bran, Special K
Jams and jellies, fruit cooked in sugar, fruit in syrup	Fruit in its natural state, particularly blueberries, cherries, and raspberries, which help to regulate blood sugar levels (use agave nectar for sweetening if necessary)
Sweetened drinks: industrial fruit juices, sodas	Water flavored with lemon, thyme, or sage
	Green tea (without sugar, or with agave nectar), which combats cancer directly (see chapter 8)
Alcohol (except during meals)	One glass of red wine a day with a meal
	Garlic, onions, shallots (when mixed with other food, they help lower insulin peaks)

(SOURCE: WWW.LANUTRITION.FR AND THE UNIVERSITY OF SYDNEY RESEARCH TEAM'S WEB SITE, WWW.GLYCEMICINDEX.COM)

AGAVE NECTAR

Recently, the team at the University of Sydney that introduced the concept of "glycemic index" pointed out a natural substitute for white sugar with a very low glycemic index: agave nectar. An extract from cactus sap (used to make tequila), it tastes delicious, comparable to a light honey. It is three times sweeter than white sugar, but its glycemic index is four to five times lower than that of honey. It can be used instead of sugar or the usual syrups to sweeten tea, coffee, fruits, and desserts.

Avoiding candies and snacks *between meals* is essential. When cookies (or other sugar) are consumed between meals, there is nothing to block a rise in insulin. Only their combination with other foods—especially vegetable or fruit fibers or good fats, such as olive oil or organic butter—slows the assimilation of sugar and reduces insulin peaks. In the same way, some foods, such as onions or garlic, blueberries, cherries, or raspberries, reduce the rise in blood sugar.*

The Food Chain Imperiled

Everybody has a friend who is overweight. Ever since childhood, she has been chubby. Despite diets of all kinds and regular physical exercise, her figure has never been "normal." She worries about her heavy hips, which won't slim down. Even when she manages to stick to her diet, she doesn't lose much weight. She gains it back as soon as she stops an active diet. Yet she is very careful about avoiding butter (for the last twenty years she has used only margarine). She may even use the "balanced" polyunsaturated sunflower oil often recommended by nutritionists.

One of the great mysteries of modern epidemiology, apart from cancer, is the epidemic of obesity. After tobacco, obesity is the second-highest risk factor for cancer. The link between obesity and cancer has only recently become clear. Only now are we beginning to understand how they share a common origin. Let's look first at the riddle of obesity.

* A diet based on foods with low glycemic indexes not only reduces the chances that a cancer will progress; it has also been shown by a research team from the Hôtel-Dieu Hospital in Paris to promote a reduction in fat tissue in favor of muscle tissue.[43]

Between 1976 and 2000, Americans lowered their consumption of fats considerably (by 11 percent) and even their total calorie intake (by 4 percent). Still, obesity has gone on rising at breakneck speed. It has gone up 31 percent in this same period.[44] The head of the largest department of epidemiology and nutrition in the world, Walter Willett, MD, PhD, of Harvard, summed up the situation in his resounding article "Dietary Fat Plays a Major Role in Obesity: No."[45] This phenomenon of rising obesity alongside lowered fat comsumption, known as the American paradox, in fact now affects all of Europe, and Israel even more.[46]

A team of French researchers was the first to solve the mystery of the American paradox. Gérard Ailhaud, in his sixties, a bit overweight himself, eyes sparkling with intelligence and curiosity, set out with a simple observation. While everyone else was blaming the epidemic of obesity on junk food and lack of physical exercise, he exposed a flaw in the argument. In the United States, the mass of fatty tissue *in children under one* doubled between 1970 and 1990. In a fascinating book that tells the story of their discoveries, Pierre Weill, a biochemist and a farming engineer, as well as a fellow researcher, recalls a remark by his friend Ailhaud: "Between 6 and 11 months of age, you can't blame McDonald's, snacking, TV and lack of physical exercise!"[47]

No, infants are not overfed. They are still given the same quantity of milk, be it mother's milk or baby formula. Ailhaud and his colleague Philippe Guesnet demonstrated that the change in the *character* of milk since 1950 is responsible for infant obesity.[48, 49] This imbalance acts on the growth of both adipose tissue (fat) and cancer cells.

Junk Food for Cows and Chickens

In the natural cycle, cows give birth in spring, when the grass is most luxuriant, and produce milk for several months until summer's end. Spring grass is an especially rich source of omega-3 fatty acids; these fatty acids are therefore concentrated in the milk from cows raised in pastures and in the milk's derivatives—butter, cream, yogurt, and cheese. Omega-3s are likewise found in beef from grass-fed cattle and in eggs from free-range chickens fed with forage (rather than grain).

Starting in the fifties, the demand for milk products and beef went up so much that farmers had to look for shortcuts in the natural cycle of milk production and reduce the grazing area needed to feed a 750-kilogram (1,600-pound) cow. Pastures were thus abandoned and replaced by battery farming. Corn, soy, and wheat, which have become the principal diet for cattle, contain practically no omega-3 fatty acids. To the contrary, these food sources are rich in omega-6s. Omega-3 and omega-6 fatty acids are called "essential" because

the human body cannot make them. As a result, the quantity of omega-3s and omega-6s in our bodies stems directly from the content of the food we eat. In turn, the amounts of omega-3 and omega-6 fatty acids in our food depend on what the cows and chickens we eat have consumed in *their* feed. If they eat grass, then the meat, milk, and eggs they provide are perfectly balanced in omega-3s and omega-6s (a balance close to 1/1). If they eat corn and soy, the resulting imbalance in our bodies is as much as 1/15, even 1/40.[50]

The omega-3s and omega-6s present in our bodies constantly compete to control our body functions. Omega-6s help stock fats and promote rigidity in cells as well as coagulation and inflammation in response to outside aggression. They stimulate the production of fatty cells from birth onward. Omega-3s are involved in developing the nervous system, making cell membranes more flexible, and reducing inflammation. They also limit the production of adipose cells.[51–54] Our physiological balance depends very much on the balance between omega-3s and omega-6s in our body, and therefore in our diet. It turns out that it is this dietary balance that has changed the most in the last fifty years.

Cows are not the only farm animals affected by this change. Chicken diets have changed radically as well. Eggs—the embodiment of a natural food—no

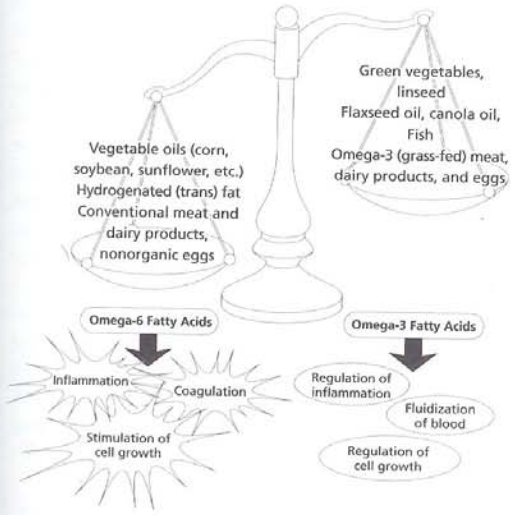

Figure 9. The imbalance between omega-6 and omega-3 fatty acids in our diets increases inflammation, coagulation, and the growth of adipose and cancer cells.

longer contain the same essential fatty acids they did fifty years ago. Artemis Simopoulos, MD, is a prominent American nutritionist who ran the department of nutrition research at the National Institutes of Health. In an unusual study published in the *New England Journal of Medicine*, she shows that eggs from chickens raised on corn (a nearly universal practice today) contain twenty times more omega-6s than omega-3s. Eggs taken from the Greek farm she grew up on retain a balance of virtually 1/1.[55]

While their diets have been radically overhauled, farm animals have sometimes been treated with hormones like estradiol and zeranol to fatten them even faster.* These hormones build up in fatty tissues and are excreted in milk. Recently a new hormone has been introduced on cattle farms to stimulate milk production: rBGH (recombinant bovine growth hormone, also called bovine somatotropin, or BST). It acts on the cow's mammary glands and can boost milk production significantly. Widely used in the United States, rBGH is still banned in Europe and Canada. Because of trade agreements, however, this hormone is likely to find its way onto dinner plates anywhere in the world through imported ingredients derived from American milk. The effects of rBGH on humans are still unknown. But we do know it promotes IGF production in cows, that this IGF is found in milk, and that it is not destroyed by pasteurization. As we have seen, IGF is a major factor in the stimulation of growth of fatty cells and also accelerates growth in malignant tumors.

Finally, the switch from grass to the corn-soy combination has another

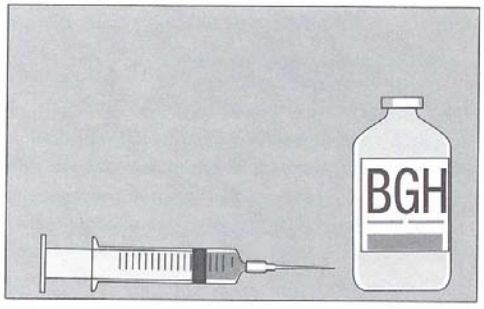

Figure 10. rBGH, the hormone injected into dairy cows in the United States to stimulate milk production. It is found in conventional (nonorganic) milk. It may stimulate the production of insulin growth factor and the growth of cancer cells in humans.

* A European law forbids this use in EU countries, but it may be repealed.

inconvenient side effect. One of the very rare components of our diets that is from an *animal* source and that has possible anticancer benefits is a fatty acid called CLA (conjugated linoleic acid).[56] Among the first to bring to light the role of CLA in fighting the growth of cancer cells was Philippe Bougnoux, MD, and his team at INRA (the National Institute for Agricultural Research in Tours, France).[57, 58] CLA is primarily found in cheese, but only if the cheese comes from grass-fed animals. Thus, by disrupting the diets of cows, goats, and sheep, we have eliminated the only anticancer benefit they might have provided.

Margarine—A Lot More Dangerous Than Butter

The last factor that has changed our diets for the worse since the sixties is the emergence of margarine and "hydrogenated" or "partially hydrogenated" trans fats. In the fifties, when a connection between animal fats and cardiovascular disease became apparent, many nutritionists and the food industry used their power of persuasion to encourage the use of industrial "vegetable" margarine instead of butter. But they overlooked the fact that these margarines contain sunflower oil (which has seventy times more omega-6s than omega-3s), soybean oil (with seven times more), and canola oil (the least unbalanced, with only three times more omega-6s than omega 3s).* While this change helped lower cholesterol levels, it provoked a sudden rise in inflammatory disorders and even, in some countries, heart attacks. In Israel, for example, religious proscriptions forbid consumption of meat and milk products in the same meal. Thus, butter is virtually excluded, and cooking techniques rely heavily on vegetable margarine (rich in omega-6s) and sunflower oil, which is much cheaper than olive oil. An "Israeli paradox"— distinct from the "American paradox"—has emerged: Israel is marked by one of the *lowest* cholesterol levels in Western countries, combined with one of the *highest* rates of myocardial infarction and obesity.[59]

In Jerusalem, Elliot Berry, MD, professor of nutrition at the Hadassah University, identified the link between cardiovascular disease, obesity, and the high omega-6 levels in Israelis. When Pierre Weill visited him to examine the links between diet and health, Berry, a practicing Jew, assured him with a grin, "You know, I don't believe in much besides God, of course, and the importance of the Omega-6/Omega-3 ratio!"[60]

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* Omega-3s and omega-6s are better balanced in some newer brands.

Processed Food: The Emergence of Trans Fats

We have been won over not just by margarine but also to a large extent by processed foods, such as cookies, crackers, pastries, pizza, or potato chips, containing "hydrogenated" or "partially hydrogenated" vegetable oils (trans fats). These are omega-6 oils (especially soy, sometimes palm or canola oil) altered to become solid at room temperature (whereas these oils are usually fluid, even in the refrigerator). This change makes them both *less* digestible and even *more* inflammatory than omega-6s in their natural state. But these oils have a practical advantage: They do not grow stale. That's why they are used in almost all the processed foods destined to spend weeks or months on supermarket shelves. Thus, it is for purely industrial and commercial motives that these harmful oils have taken over. They didn't exist before World War II, yet their production and consumption have exploded since 1940.

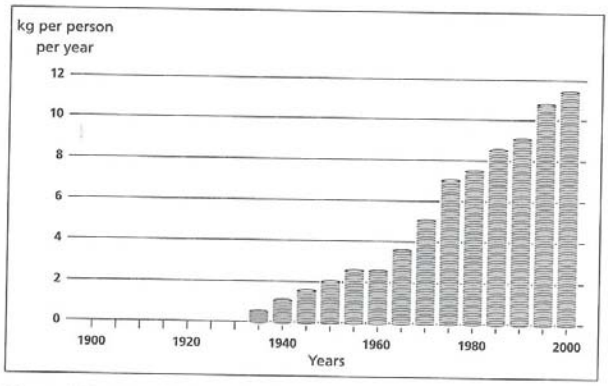

Figure 11. Increase in the production of omega-6 vegetable oils for human consumption in the twentieth century.[61]

Any food label you read will show you that these ingredients are ubiquitous. How about a single serving of a common pepperoni and cheese pizza? It weighs 192 grams (8 ounces) and contains 490 calories—more than a quarter of one person's daily needs—and 39 percent of one person's daily fat allowance. And this in a single serving of a single dish in just one meal. Coming from cheese and from corn-fed pork, these fats are rich in omega-6 fatty

acids and deprived of omega-3s. In addition, almost one fifth (4.5 grams) are trans fats. Then come 48 grams (2 ounces) of carbohydrates (one eighth of total daily intake).

This single serving of pizza is not only high in calories; it also contains three times more fat than an ordinary steak. And these fats are among the worst for our health. In recognition of this danger, as of the summer of 2007, trans fats have been banned in New York City and Philadelphia restaurants and throughout the food industry in Denmark.*

We finally have an explanation for the simultaneous epidemics of cancer and obesity. Changes in our diets over the last half century point to the culprit: a dietary imbalance in the ratio of essential fatty acids leading to the incredible overconsumption of omega-6s. This imbalance is precisely the factor associated with certain cancers, as Professor Bougnoux's team in France has shown.[64]