

Indigenous Nutrition

Using Traditional Food Knowledge to Solve Contemporary Health Problems

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I grew up on the island of Cape Breton in the Canadian province of Nova Scotia, an island called *Unama'ki* (land of fog) by the Mi'kmaq people indigenous to this region. I was taught to hunt and fish by my grandfather and father, gathered berries with my family, developed a taste for many wild foods, and enjoyed a wide assortment of produce from the family garden. These experiences expanded my enjoyment of food beyond the traditional fish, potato, and cabbage fare on the eastern coast of Canada. I was also exposed to the processed and "fast" foods then rising in cultural prominence.

Following the tradition of leaving Cape Breton/Unama'ki because of the economic conditions there, I have lived in urban areas across Canada for much of my life. Over the ensuing years I have had a keen interest in the relationship between food and culture, nutrition and health. While learning to appreciate the global diversity of food traditions from my culturally diverse friends, I have been concurrently dismayed by the dramatic changes in dietary habits associated with consumer culture. These changes in dietary habits reflect, in my opinion, a deteriorating appreciation in our personal and social connections to food as well as underlying environmental and ecological problems.

While studying science in a multidisciplinary university environment, I also pursued an interest in traditional Chinese medicine. From this emerged an effort to understand the relationship between science and traditional knowledge, particularly in the area of health and healing.¹ In traditional Chinese culture, as in Aboriginal culture, there is no clear distinction between food and medicine. In working as a healer I became in-

creasingly cognizant of the close relationship between food and many common health problems.

Several years ago I returned to what I had always considered home, the island of Cape Breton/Unama'ki. I was dismayed by many changes in the natural and cultural environments. Groundfish have become scarce; in some cases species are listed as threatened. Traditional clam beds are exhausted, and there are problems with heavy metal contamination of seafood. Off-road vehicles now crisscross the island, damaging sensitive coastal ecosystems, riparian zones, and streambeds. Young people are increasingly overweight and inactive and favor fast foods grown and produced in distant lands.

I work in a program called Integrative Science (*Toqwa'tu'kl Kijijitaqnn*) developed at the University College of Cape Breton.² This program is a new initiative to "bring together knowledges" from Western scientific and Aboriginal worldviews for the purposes of university science education and research. I have developed curriculum for a fourth-year course dealing with the "dynamics of health and healing at the organismal, population and ecosystem levels." Extensive material dealing with the epidemiology of diet-related disease and the nutrition of modern and traditional diets is included. Through course laboratories, students have the opportunity to explore their nutritional status and compare the nutritional features of traditional dietary patterns. Preliminary efforts are now under way to grow a community-based, participatory research program focused on the traditional Mi'kmaq diet as a means of cultural renewal and as a solution to the present and growing problem of diet-related disease.

NUTRITION-RELATED EPIDEMIOLOGY

Medical doctor Denis Burkitt was among the first to see a relationship between nutrition and the geographic distribution of diseases. Burkitt, trained as a physician in Britain and posted in Africa during the Second World War, noticed that patterns of disease showed striking geographic differences. Gallstones, for example, are very common in Europe and North America, yet in twenty years of surgery in Africa Burkitt reported only one case.³

In the 1970s, working with colleague Hugh Trowell among others, Burkitt became convinced that the significant differences in dietary patterns between Africa and industrialized countries played a major role in

a lack of chronic, degenerative disease in Africa. Burkitt highlighted the importance of dietary fiber and coined the term “Western diseases” to describe the collection of diet- and lifestyle-related diseases associated with Western and industrialized populations. He became an active campaigner for an emphasis on prevention and the crucial role that nutrition plays in the development of chronic, degenerative disease. Burkitt is quoted as saying: “the only way we’re going to reduce disease is to go backwards to the diet and lifestyle of our ancestors.”⁴

In 1981 Burkitt and Trowell assembled a collection of papers exploring the concept of Western disease.⁵ It was hypothesized that the following diseases, among others, could be considered as “Western”: obesity, Type II diabetes, hypertension, coronary heart disease, peripheral vascular disease, varicose veins, diverticulosis, appendicitis, kidney stones, and some forms of cancer.⁶ Criticisms of the hypothesis were based on the fact that geographical differences in disease may simply reflect genetic differences. Further, it was suggested that chronic degenerative diseases are typically not seen until later in life and that fewer people in developing nations live long enough to develop these diseases.

Studies of migrant populations helped to address these questions. It was observed that as populations adopted Western diet and lifestyle patterns, this distinct pattern of diseases began to emerge. Those who worked with coronary heart disease also pointed out that atherosclerotic plaques are seen at an early age in industrialized populations, while older members of traditional populations show little evidence of similar arterial pathology. As a population adopts a Western diet and lifestyle, Western diseases emerge in a distinct order. Obesity is among the first to appear, paralleled closely by a rising incidence of Type II diabetes. Type I diabetes remains very rare until dietary and lifestyle changes have been established for many years. Hypertension also emerges early followed by cerebrovascular disease and stroke. Angina and myocardial infarction appear later, increasing to the point of becoming a major cause of death.

Rates of obesity and diet-related disease have risen dramatically since Burkitt’s original observations. Being overweight and obesity are defined by the body mass index (BMI), a measure that takes into account weight and height (weight in kilograms/height in meters squared). While the BMI can incorrectly reflect body characteristics in some individuals (for example, very muscular, lean individuals), it is a useful measure at a population level. Overweight is defined as a BMI of greater than 25, while obe-

sity is defined as a BMI of greater than 30. For reference, a BMI of 30 would mean that someone 5 feet tall would weigh approximately 150 pounds (BMI units are Kg/m²).

In 1991 12 percent of the U.S. population was obese; this nearly doubled to 20 percent by 2001. In 1991 four U.S. states had obesity rates between 15 and 19 percent; none were above 20 percent. In 2002 twenty U.S. states had obesity rates between 15 and 19 percent, twenty-nine were between 20 and 24 percent and one state, Mississippi, exceeded 25 percent. Correspondingly, diabetes rates increased from 4.9 percent in 1990 to 7.9 percent in 2001. This same research showed that those with a BMI greater than 40 have much higher rates of diabetes, high blood pressure, elevated cholesterol, asthma, and arthritis (over seven times the risk of diabetes and over four times the risk of arthritis, for example) than those with normal range BMIs.⁷

Globally more people now are overweight than underweight [BMI of less than 17]. According to the World Health Organization over 100 million people in developing countries are affected by obesity-related problems.⁸ The high rate of obesity and very early onset of what used to be called adult-onset diabetes (Type II) has led some health scientists to question whether young people will live as long as their parents.

Indigenous populations are often disproportionately affected by changing diet and lifestyle patterns. Canada's Aboriginal people, for example, have rates of diabetes some three times the national average and higher rates of other chronic diseases. A study of northern communities showed that 29 percent of young people and 60 percent of women were obese. Sandy Lake First Nation, an Ojibwa-Cree community in northern Ontario, has a diabetes rate of 26 percent, the third highest rate in the world and some four to five times the national average.⁹ Similar problems have been documented in Australia and Latin America.¹⁰

In the United States higher rates of obesity and diabetes have been similarly identified. The Pima of Arizona, for example, have been identified as having the highest rate of diabetes in the world (approximately 50 percent).¹¹ A 1999 report on the Strong Heart Study, launched in 1988 to monitor the incidence of cardiovascular disease in Native Americans, found higher rates in American Indians compared to the general population.¹² It concluded that earlier reports of low rates of cardiovascular disease in groups such as the Pima show that innate protection from ath-

erosclerosis can be overcome by increasing rates of diabetes and other cardiovascular risk factors.

Childhood diabetes (Type I) remains rare in Aboriginal populations, but this can be expected to increase as the epidemiological shift to Western diseases becomes fully established. The low rate of Type I diabetes may reflect the more recent changes in diet and lifestyle, and if these changes become established over future generations, the rate of Type I diabetes will increase.

PREVENTION AND REVERSIBILITY

Traditional diet and lifestyle patterns provide protection against Western diseases, as rates of chronic, degenerative disease were historically very low in Indigenous populations. The interaction of changing lifestyle patterns with various genetic factors is considered the reason for the higher Aboriginal susceptibility to diet-related disease. The concept of “the thrifty gene” was used in 1962 to explain this susceptibility. According to the theory, Aboriginal people have evolved effective mechanisms for energy storage; thus, when periods of feast and famine are replaced by an ample, continuous food supply this survival trait becomes a detriment.¹³ There has been considerable ongoing research into the genetic factors affecting the susceptibility of Aboriginal populations to Western disease.¹⁴

Research with the Purepecha community in western Mexico shows this interaction between genes and environment. In populations living a Westernized lifestyle, particular genetic markers are associated with higher than normal levels of LDL cholesterol (so-called “bad” cholesterol) and insulin resistance (associated with Type II diabetes). In populations of Purepecha living a traditional lifestyle, however, no differences in LDL cholesterol were seen between those with and without the gene. Diet and lifestyle factors outweighed the genetic predisposition to higher than normal cholesterol levels associated with increased cardiovascular risk.¹⁵ The Purepecha diet was characteristically low in fat and high in fiber and complex carbohydrates, and the lifestyle entailed a high level of physical activity.

Physical activity is a crucial lifestyle factor interacting closely with dietary factors. Moderate to high levels of physical activity help to maintain energy balance and therefore contribute to the prevention of obe-

sity. Physical activity reduces the risk of heart disease, stroke, Type II diabetes, osteoporosis, colon cancer, and high blood pressure, among other chronic, degenerative health problems. Interestingly, physical activity plays an important role in mental health. Research shows that physical activity programs can be effective in the treatment of depression and anxiety.¹⁶ Recent government guidelines have increased the minimum recommended amount of physical activity from thirty minutes to sixty minutes of moderate activity per day.¹⁷

While it is clear Western diseases can be prevented, it is less clear to what extent they can be reversed using diet and lifestyle change. Denis Burkitt addressed this question in a 1994 volume entitled *Western Diseases: Their Dietary Prevention and Reversibility*, edited with nutritionist Norman Temple. One interesting project reported in the volume took place in the West Kimberly region of Australia with a group of Aborigines who had only recently adopted a Western diet and lifestyle. Elders in the community had retained the tremendous knowledge needed to live entirely off the land. At the start of the two-month project many of the participants were diabetic and had high blood pressure and poor cardiovascular risk profiles.

Samples of the food gathered by the group were collected, providing insight into the nutritional profile of the traditional diet. The traditional diet was remarkably diverse and included fish, figs, yams, kangaroo, and a delicacy known as the witchetty grub. The food was low in calories but also nutrient dense, and with the high level of physical activity associated with food gathering, participants lost an average of fifteen pounds. Since wild game is very lean, only 15 percent of calories came from fat, and the fat profile was shifted from that of a modern diet. Less saturated fat (common in the modern diet) and more mono- and polyunsaturated fats were consumed, including plenty of omega-3 fatty acids, which provide protection against atherosclerosis and other degenerative diseases.¹⁸ The fat composition of the witchetty grub, for example, resembles olive oil, a predominantly monounsaturated fat characteristic of the Mediterranean region and considered “heart healthy.” Wild plant foods are high in fiber, slowly digested, and higher in nutrient density than cultivated varieties.

Physiological assessment of the participants before and after the two-month project showed that major lifestyle change can not only prevent but even begin to reverse Western diseases over a matter of weeks. In ad-

dition to the participants' weight loss, insulin metabolism improved and blood sugar levels dropped, and blood pressure along with cholesterol and triglyceride levels improved, all important indicators of cardiovascular disease risk.¹⁹

Cardiovascular diseases characterized by atherosclerotic plaques restricting and blocking arterial blood flow dominate the morbidity and mortality pattern of Western disease. Coronary heart disease arises when the coronary arteries of the heart are affected. While traditional dietary and lifestyle patterns are protective against the disease, the important question arose as to whether dietary and lifestyle changes could actually reverse cardiovascular disease. Cardiologist Dean Ornish developed a comprehensive program to explore the reversibility of cardiovascular disease. This program involves not only radical dietary change but also levels of physical activity appropriate to the individual participants, group support, and other psychosocial interventions such as meditation.

In the Lifestyle Heart Trial, Ornish compared one group of patients randomly assigned to follow the lifestyle intervention program to another group given standard care. In the group following the lifestyle intervention program, symptoms were reduced and atherosclerotic blockage of the arteries regressed after one year. Participants were able to maintain and continue the regression after five years. In contrast, the control group offered standard lifestyle advice by their physicians showed a continued progression of the heart disease process during the five-year period of study.²⁰

The diet used in the Lifestyle Heart Trial was very low in fat (approximately 10 percent of calories) and high in complex carbohydrates such as whole grains and legumes as well as fruits and vegetables. The diet was largely vegetarian and can be compared to many traditional agriculturalist diets based on grains and legumes including the corn, bean, and squash agriculture characteristic of Amerindian cultures from the Pima in the south to the Six Nations in the Great Lakes region. Ornish also notes the importance of psychosocial and spiritual factors in reversing heart disease. He suggests that it is necessary to open the heart figuratively to open the heart literally. Similarly, Native American traditions emphasize the importance of psychosocial and spiritual dimensions in health and healing.²¹

Other studies are underway to see if radical lifestyle intervention can reverse, or at least stop, the progression of Type II diabetes. One study of

prediabetic patients found that exercise and dietary change could reduce new diabetes cases by almost 60 percent over three years, compared to a pharmaceutical drug that reduced new cases by only 31 percent. The Physicians Committee for Responsible Medicine (PCRM) based in Washington DC, is currently carrying out a clinical trial using dietary intervention to reverse diabetes. Some physicians such as PCRM head Neal Barnard feel that standard diet and lifestyle recommendations do not go far enough to be able to actually reverse disease. The PCRM diet represents a much greater change from the modern diet than does that recommended by the American Diabetes Association, the diet used by the control group in the PCRM clinical study.²²

NUTRITION IN WESTERN SCIENCE: SIMPLE VS. COMPLEX RESEARCH

Western nutritional science deals with the effects of components of food on the body. Nutritional science was founded on the discovery of food components essential as both energy and fundamental building blocks and other organic and inorganic food components essential in small amounts. The macronutrients (carbohydrates, fats, and proteins) provide energy and essential structural components, while the micronutrients (vitamins and minerals) play crucial roles in a wide range of metabolic processes. Between 1890 and 1940 thirteen vitamins were discovered based on observations of poorly nourished humans, human trials, animal experimentation, chemical analysis of foods, and laboratory research.

In many cases the characterization of essential nutrients emerged from the study of deficiency diseases. Scurvy, for example, results from a deficiency of vitamin c. British naval surgeon James Lind found in 1747 that scurvy could be cured by the use of citrus fruits. It was not until the twentieth century that the specific chemical called vitamin c or ascorbic acid was identified. Thiamin (vitamin B-1) deficiency results in a disease called beriberi, and the understanding of its relationship to polished rice in Asia preceded the isolation of the vitamin in 1926.²³

The recognition of a relationship between diet and the chronic degenerative diseases characteristic of industrialized culture is much more recent. In the case of deficiency diseases, clear cause and effect relationships

exist between disease and individual nutritional elements. In the case of Western diseases, the disease mechanisms are complex and there may be a number of different nutritional “factors” involved.

In the epilogue to the 2001 book *Nutritional Health: Strategies for Disease Prevention*, Ted Wilson and Norman Temple characterize two types of nutrition research. “Simple research” includes epidemiological, animal, and human clinical studies that have contributed the bulk of practical knowledge of nutrition. “Complex research,” in contrast, focuses on disease mechanisms. Complex research is reductionist in nature, looking at isolated fragments of food on isolated aspects of human physiology. While simple research has been most helpful in generating practical knowledge, the bulk of nutritional research efforts have focused on complex research. The effects of nutrients and phytochemicals are hard to unravel at the molecular level and then relate directly to human health. Unfortunately, the emphasis on complex research has resulted in less, more practical, simple research being carried out.²⁴

Epidemiological and human clinical studies, for example, have shown that certain long chain polyunsaturated fats such as α -linolenic acid (so-called omega-3 fatty acids) help protect against cardiovascular disease.²⁵ Reductionist research on fatty acid metabolism, in contrast, has provided few insights into the relationship between omega-3 fatty acids and heart disease. Wilson and Temple suggest that instead of asking questions like “Do supplements of beta carotene prevent cancer and how do they work?” we should be asking, “Do vegetables prevent cancer?”²⁶

T. Colin Campbell, a Cornell University nutrition scientist, also points to the importance of studying broader questions. He suggests that a “synergistic total diet effect” is hard to study, but it is central to the ability of food to either prevent or cure disease. The starting point for nutrition research, Campbell claims, is the study of broader dietary patterns such as the proportion of foods of animal versus plant origin.²⁷ Campbell’s research on the relationship between diet and disease in China has shown that increasing proportions of domesticated animal products increase the risk of Western diseases.²⁸

An idea is emerging in nutritional science that food combinations associated with broader dietary patterns provide a synergistic effect in reducing the risk of chronic diseases. Foods interact to provide additive or more than additive (synergistic) influences on health. The study of di-

etary patterns is complementary to the dominant emphasis on the study of individual nutrients or food components on particular aspects of physiology and metabolism in relation to health and disease.²⁹

Cereal grains, for example, are usually consumed in a highly refined form in the modern diet. In contrast, traditional diets that included cereal grains use them in a whole form, including the fiber, germ, and endosperm. The now apparent benefits of whole grains accrue from multiple interactions with multiple food components. Fiber includes beneficial phytochemicals embedded in the fiber matrix, and the germ contains high levels of nutrients, both of which are discarded in modern processing. Traditionally grains were coarsely and crudely ground whereas modern food technology allows for a highly pulverized flour. Such differences are now known to have important implications for glucose metabolism and the development of degenerative Western diseases such as Type II diabetes and coronary heart disease.³⁰

While much is known about the effects of particular aspects of food on various aspects of metabolism, evidenced by the debate over dietary intervention for weight loss, much remains to be discovered about the relationship between dietary patterns and health. Weight loss diets have polarized into two camps: low carbohydrate and high protein versus low fat and high carbohydrate regimens. The former argue that carbohydrates are the root of modern dietary evil and should be minimized in the diet. This approach has gained many followers amongst the public and is influencing the food industry.³¹ Others argue that dietary fat is a major culprit and should be reduced. Dean Ornish's work on coronary heart disease reversal is based on a low fat, high carbohydrate diet. In 2000 the U.S. Department of Agriculture, responsible for food and nutrition policy in the United States, hosted a debate on these issues, suggesting the need for more research.³²

Many examples of traditional dietary patterns resistant to Western disease can be found in North America, and they are characterized by both high carbohydrate, low fat diets (for example the corn and bean diets characteristic of culture groups from the Southwest to the Northeast) and high protein, low carbohydrate diets (for example, the animal-based Northern Cree and Inuit diets). While the average male BMI in the United States is 26, the !Kung in Botswana, Evenki in Russia, and Quechua in Peru average 19, 22, and 21 respectively.

The U.S. average male blood cholesterol level of approximately 200 is

compared to the !Kung, Evenki, and Quechua levels of 121, 142, and 150 respectively. (These cholesterol values are given in milligrams per deciliter, the unit preferred in the United States, and convert to 5.2 (200), 3.2 (121), 3.7 (142), and 3.9 (150) in millimoles per liter, the unit common internationally.) These Indigenous groups represent hunter-gatherer (!Kung), pastoralist (Evenki), and agriculturalist (Quechua) traditions, with a spectrum from the largely vegetarian (Quechua) to mixed plant/animal food diets.³³ Clearly, humans can thrive on a diversity of dietary patterns, and the modern diet, characteristic of industrial, consumer culture, is not one of them.

INDIGENOUS NUTRITION

Indigenous nutrition can be described as culturally and bioregionally specific food-related knowledge that results in a dietary pattern meeting basic nutritional needs while avoiding Western diseases. Indigenous nutritional knowledge emerges from Indigenous science with its distinct “ways of knowing” and integrated, holistic worldview. Traditional foodways are based on an intimate and spiritual connection to the land and entail a reciprocal relationship that must be actively maintained. Related skills involve agricultural sciences and ecosystem management, food processing, and botany. This knowledge, far from being archaic and irrelevant in this era of computers and space travel, offers solutions for modern health problems, crucial technology for a sustainable agriculture, and important approaches and tools for ecosystem “management.”

Gregory Cajete defines Native science as “a metaphor for a wide range of tribal processes of perceiving, thinking, acting, and ‘coming to know’ that have evolved through human experience with the natural world. Native science is born of a lived and storied participation with natural landscape. In its core experience, Native science is based on the perception gained from using the entire body of our senses in direct participation with the natural world.”³⁴ While in the Western cultural tradition there is a separation of science from art and religion, Native science is also religious and aesthetic. Western science focuses on the intellect and the senses; Native science also stresses the importance of intuition.³⁵

Indigenous knowledge derives from traditional teaching, empirical observation, and spiritual insight. Elders play an important role in teaching traditional knowledge. Empirical observation is honed by education

based on “listening, learning, and listening,” and spiritual insight is gained through dreams, visions, and intuitions.³⁶ Thus, in the case of nutrition it is not necessary to understand the molecular components of food in order to gain knowledge of the relationship between food and health and to develop a diet from the resources of a bioregion that can meet basic nutritional needs. As we have seen above, in Western science much practical nutrition information has derived from observation and clinical trial rather than from the molecular research with which it is typically associated.

The story of vitamin c and scurvy is often used to suggest Native American knowledge of food and medicine. As with so many European sea voyages, explorer Jacques Cartier and his crew suffered from scurvy, a disease caused by the vitamin c deficiency of the poor-quality foodstuffs eaten. According to a Canadian government publication,

The early North American Indians were familiar with this disease and knew how to prevent it. In fact, the Indians of the Quebec area came to the rescue of Jacques Cartier in the spring of 1535. The Indians advised him to feed the crew a tea made from the needles and bark of the eastern white cedar—one of the many foods they used which was a rich source of vitamin c. The men quickly regained their health and learned a valuable lesson.³⁷

In fact, the lesson was not learned well since it was not until the mid-eighteenth century that James Lind “discovered” the scurvy cure in citrus fruits and even later that the British navy adopted antiscorvy rations. Only in the twentieth century was scurvy shown to be a deficiency disease caused by a specific molecular food component now known as vitamin c. A more interesting point of view, rather than admiring the Native knowledge of how to prevent scurvy, is to wonder why the Europeans did not possess such basic nutritional knowledge at that time. Even in the arctic region so devoid of obvious vitamin c-containing plant foods, the Inuit avoided scurvy, and the Chinese, recognizing the pattern of symptoms associated with scurvy and how to prevent it, used sprouted soy beans and various citrus fruits on their global sea voyages of the early fifteenth century.³⁸

Native science, with its integrated approach to knowledge emphasizing webs of relationships rather than the study of components in isolation, is well suited to achievements in agriculture and nutrition. This is

well illustrated by the development of the “three sisters” food system. Agriculturally, an integrated agro-ecosystem has many advantages over the monoculture technology of the modern food system. Corn is a heavy nitrogen feeder, while beans are nitrogen “fixers,” bringing atmospheric nitrogen into the soil with the help of symbiotic bacteria. Corn provides structure to the trailing bean plants, while squash plants reduce weeds and shade the soil. Integrated plantings also reduce pest problems.

Protein is composed of basic building blocks called amino acids, nine of which cannot be made by the body and must be consumed in the diet. These essential amino acids are required in a specific ratio for optimal use in human metabolism. Both corn and beans are low in some amino acids, making their protein incomplete. But each food is short on amino acids abundant in the other, dramatically increasing the protein quality of the combination. Vegetarian diets were long considered to be poor in protein. In her 1971 book, *Diet for a Small Planet*, Frances Moore Lappé first publicized the idea of protein complementarity, showing how many traditional diets incorporated this principle.³⁹ Corn and beans are but one example of grain-legume combinations used around the world.

Corn is low in the water-soluble B vitamin niacin. The dietary combination of corn and beans avoids the problem of niacin deficiency and the possibility of developing the niacin deficiency disease pellagra, since beans are good sources of niacin. The corn consumed in traditional “three sisters” agriculture was also treated using lime or wood ash, making more niacin available for absorption and increasing nutritional value in other ways.⁴⁰ Lime and wood ash treatment both increase the calcium content of corn, for example.⁴¹

Six Nations culture recognized the inherent need for the “spirits” of the three sisters to be together, building a beneficial web of relationships both agriculturally and nutritionally. Traditional “corn” is much more than the modern version. Six Nations people used some fifteen species of corn, which included some sixty varieties of sweet corn, twenty-five varieties of popping corn, five varieties of flint corn, and six varieties of bread corn. Growing with this diversity of corn were sixty varieties of beans, some for soup and others for bread, along with squash, cucumbers, melons, and sunflowers. Careful plant breeding resulted in crops well suited to the conditions of the region. Supplementing agricultural foods with wild game, fish, berries, wild greens, nuts, roots, and maple sugar more than met the nutritional principle of food diversity.

Modern diets can be described as calorie dense and nutrient poor. The endosperm is commonly the only part of grains that are eaten, while the nutrient rich germ is discarded. Purified sucrose provides calories without vitamins or minerals. Even purified table salt provides sodium chloride without trace minerals. A high fat content increases calorie density, since fat has nine calories per gram compared to four calories per gram for carbohydrates and protein. Fiber intake is minimized, reducing the satiety of meals and encouraging excessive consumption. Culturally, gluttony is encouraged with “all you can eat” buffets and “super size” portions.

Traditional diets can be described as nutrient rich and calorie limited. Many wild foods are higher in nutrient content than similar cultivated foods. Wild greens are typically higher in calcium, iron, magnesium, and vitamin c, for example, than cultivated plants.⁴² Wild game is higher in many nutrients than domesticated meats, and the meat is leaner.⁴³ Wild fish has less fat and less saturated fat than farm-raised fish. Traditional fats, like ooligan grease popular in the Pacific Northwest, are more nutritious and have a better lipid profile than fats like lard.⁴⁴

Even traditional “salt,” which could include salt evaporated from the sea, plant ash, sea vegetables, or salty foods like roe, contains trace minerals such as iron, manganese, zinc, and copper.⁴⁵ Sea vegetables, the quintessential low-calorie, high-nutrient density food, were widely used by coastal peoples and traded inland.⁴⁶ Culturally, overconsumption of food was frowned upon, and the high level of physical activity associated with the traditional lifestyle fostered energy balance.

Research with a wide range of animal species has shown that reducing calories while maintaining adequate nutrient intake reduces degenerative diseases associated with aging and extends life. Effects observed include cancer prevention, reduced blood sugar and greater insulin sensitivity, and reduced age-related decline in cognitive function. The animal research is so promising that several human studies are underway in the United States.⁴⁷ Similar effects appear to accrue from intermittent fasting.⁴⁸ Indigenous people who maintain calorie moderated, nutritionally adequate diets, sometimes experience periods of calorie limitation, and recognize a healing and spiritual value in fasting.⁴⁹ These characteristics and practices help to maintain excellent health with age.

Much research has been done to attempt to understand carbohydrate metabolism better and differentiate good carbohydrates from bad. In

this effort, the glycemic index has emerged as a useful tool. When a carbohydrate food is eaten, the starch is broken down into the simple sugar glucose, which is then absorbed into the bloodstream. To measure the glycemic index of a food, volunteers are fed a standard weight of the carbohydrate portion of the food and the subsequent rise in blood glucose is recorded. This rise is compared to the effect of consuming an equivalent amount of glucose. Diets characterized by a low glycemic load (the glycemic load is the product of the glycemic index of a food and its carbohydrate content) are associated with better blood sugar control in diabetics, higher blood levels of HDL ("good") cholesterol, and lower risks of developing diabetes and cardiovascular disease.⁵⁰

The glycemic index and resulting glycemic load is a complex property of a food and how it is prepared. In modern diets high-glycemic index foods, such as white flour products and foods with added simple sugars, are common. White flour products, highly pulverized with minimal fiber, are easily and quickly converted to glucose. There is a great diversity of carbohydrate content amongst traditional Native American diets. High protein, low carbohydrate diets inherently have a low glycemic load. Carbohydrates from starchy roots represent only a small portion of the diet, and berries contain fructose, a sugar that is more slowly converted to glucose. Traditional corn, beans, and squash diets were characteristically high in carbohydrates and low in fat. Beans are known to have a very low glycemic index.

While the glycemic index of traditional corn-based foods has not been tested, it is suggested that they would have a relatively low glycemic index. Many traditional corn varieties were higher in protein than modern varieties, corn was always eaten as a whole grain, and corn flours were much more coarsely ground, all factors affecting the glycemic index. Thus, the traditional Native American diet is superior to the modern diet in its carbohydrate characteristics.

While nutrition policy has emphasized reducing dietary fat, research has begun to differentiate good fat from bad fat. Evidence suggests that the type of fat, rather than quantity, is a determining factor in the development of cardiovascular disease.⁵¹ Fats are described as saturated, monounsaturated, or polyunsaturated depending on the nature of the bonds in the long chains of carbon molecules. Reducing saturated fat and ensuring adequate intake of essential long chain polyunsaturated fats appears to be most beneficial for preventing atherosclerosis.

The modern diet is high in fat, which promotes obesity because of its high energy content, and high in saturated fats from domesticated animal products and the use of tropical oils (such as palm oil) in processed foods. A process called hydrogenation is used to harden vegetable oils and reduce polyunsaturated fats, which are prone to oxidation. The result is food products with a long shelf life and significant amounts of so-called trans fat, fat molecules with a particular molecular configuration that are associated with high risk for cardiovascular disease. A 1999 assessment estimated 100,000 coronary deaths per year in the United States could be attributed to trans fat.⁵² At the same time, essential polyunsaturated fats are often deficient because the foods in which they are present in high levels are not commonly found in the modern diet.

Fat is a pleasurable and important part of traditional Indigenous diets. The Gitskan people describe their food tradition of trading for oolichan grease: “But the lure of the grease was like the lure of gold, and every year most of our people trekked off loaded with all the surplus meat or fur they could muster to exchange for the prestigious grease, and to enjoy the reunions and trade opportunities.”⁵³ The oolichan is a small fish associated with seasonal runs in the Pacific Northwest. The oolichan can be processed to produce grease, with different grades resulting from variations in processing. The grease is used in many traditional dishes and often mixed with berries or fruit. The rendered grease is called *ha la mootxw*, or “for curing humanity,” and considered valuable for prestige and health (“caviar and cod-liver oil rolled into one”).⁵⁴ Oolichan grease is high in vitamins A and E and beneficial long chain polyunsaturated fats. Generally, the fat content of traditional foods is lower than modern foods, fats such as oolichan grease are more nutritious than modern counterparts such as lard, and the fat contains less saturated and more essential polyunsaturated fats.⁵⁵

Farmer and food system critic Brewster Kneen uses the term “distancing” to describe a key feature of the modern food system. In one sense distancing describes the gap between food consumer and food producer, a gap so large that children believe food comes from supermarkets. According to Kneen: “We are well along the way of completely separating—distancing—human nutrition from the growing of food, interposing vast and expensive industrial processes between human beings and the very simple basis of their existence.”⁵⁶

In contrast, Native foodways are based on an intimate and spiritual

connection to the land, the plants, and the animals. Ceremony and prayer help maintain this relationship. According to Cajete,

The idea that human life is maintained through constant work, sharing, and relationship with food and other sources of life underlies the Native relationship to corn and other plants with which they have formed special reciprocal compacts. When people eat the vegetables that grow in their gardens, the substance of the plants joins with the substance of the person in a way that is more than physical, it is the survival of the spirit also.⁵⁷

In the same way, the close relationship between hunter and animal is one of respect, a respect that must be maintained through every aspect of the hunt and consumption of the animal.⁵⁸

CULTURALLY RELEVANT NUTRITION EDUCATION AND FOOD POLICY

There are several approaches to addressing the growing problem of obesity and diet-related disease. On the one hand is the effort to understand the genetic and metabolic basis of diet-related disease. Coupled with nutrition policies such as reducing trans fat in the food supply and encouraging fruit and vegetable consumption, drugs and future genetic therapies can be developed to help prevent obesity and related health problems.

On the other hand, there is the realization that radical dietary change can prevent and even treat diet-related disease. Inspiration for such change can be found in the “diet of our ancestors,” as Denis Burkitt put it. Efforts to study and promote traditional diets such as the Mediterranean and Okinawan fall into this camp. An integrated approach, using both Indigenous and Western nutrition, is another possibility for the future, one that respects the diversity of Indigenous foodways and the holistic foundation of Indigenous science. For Aboriginal communities, the path of the ancestors represents both a means of cultural renewal and a solution to the problem of diet-related disease.

Food and nutrition policy in the United States is the responsibility of the U.S. Department of Agriculture (USDA), a department with inherent conflicts between agribusiness and public health. A four-food-groups approach—milk, meat, fruit and vegetables, bread and cereals—was de-

veloped in the 1950s, reflecting both the dominant northern European diet tradition and the power of the meat and dairy industries. Attempts to modify the four food groups in the late 1980s were challenged by these industries.

A “food pyramid” model was adopted in 1991, attempting to reflect the benefits of reducing fat and saturated fat and increasing fruit and vegetable consumption. The “food pyramid” stressed the greater importance of fruits and vegetables and whole grains over meat, milk, sugar, and fats. These food and nutrition policy changes were accompanied by considerable debate, lobbying by industry, and even a lawsuit by the Washington DC–based Physicians Committee for Responsible Medicine. In 2000 the PCRM won a ruling in its favor, having argued that the USDA did not disclose ties between nutrition policy committee members and the dairy, meat, and egg industries.⁵⁹

The continued inclusion of milk as an essential food shows that continued cultural and economic biases still exist in nutrition policy. The digestion of milk requires an enzyme, lactase, to digest the milk sugar lactose. While infants produce lactase, adults of most ethnic groups do not produce lactase and can experience discomfort from milk consumption. Only northern Europeans and some African groups predominantly maintain lactase production through adulthood. Studies have shown that some 90 percent of Asian Americans and 74 percent of Native Americans are lactose intolerant.⁶⁰

Milk is commonly described as a good source of calcium that can help prevent the problem of weak bones (osteoporosis). There is little evidence of a relationship between milk consumption and bone health. Countries with little or no milk consumption may show less incidence of osteoporosis than countries with high consumption. Calcium balance (the relationship between absorption and loss of calcium) is still poorly understood, and the human requirement for calcium is controversial. Intake levels recommended internationally are much lower than those recommended in the United States and Canada. Calcium balance is affected by factors that support absorption, such as vitamin D levels, and those that are associated with loss of calcium such as animal protein and caffeine intake.⁶¹ Calcium needs must be considered in relation to the overall diet and lifestyle.

Researchers who have studied the use of radical dietary change to reverse diet-related disease suggest that current recommendations repre-

sent too small a change to make a significant difference. Walter Willett and other Harvard University researchers have shown that adherence to the food pyramid guidelines does not result in better health outcomes. These researchers have proposed another pyramid reflecting the distinction between good and bad fats and good and bad carbohydrates described earlier.⁶²

Since traditional diets share these characteristics and have proven protective against diet-related disease, it is important to develop a culturally appropriate food and nutrition policy that reflects the nutritional features of traditional diets in a contemporary context. U.S. and Canadian governments have published sample "Native food guides." The Canadian example uses a four food group approach, defining a "meat, game, fish and bird" group, a "bannock, bread and cereal group," a "berries, greens and other fruit and vegetables" group, and a "foods containing calcium" group. Recommended foods in the calcium group inappropriately include milk but also list fish head soup, kelp, salmon and sardines with bones, legumes, sunflower seeds, and broccoli.⁶³

The U.S. Department of Agriculture Native American food pyramid simply takes the standard food pyramid and adds a few Native foods such as wild rice and wild game, while maintaining the milk and dairy group and a base of bread and cereals. These government models would fall into the camp of not making much difference in the end.⁶⁴

Oglala Sioux nutritionist Kibbe McGaa Conti has thrown out government nutrition policy and its associated biases and started from a more appropriate symbol, the sacred Medicine Wheel symbolizing the four directions. In the west of the Sacred Circle Model is placed water and other healthy drinks; in the north is placed lean meats such as the buffalo; in the east are berries, fruits, and vegetables; and finally in the south are corn, beans, potatoes, and squash. The Sacred Circle Model of Native Nutrition is easier to use than the standard food pyramid, says Conti: "More importantly, it's the first and only culturally-specific nutrition curriculum for Native Americans. And it's a way for us to honor our ancestors as we return to eating the traditional foods that kept them—and can keep us—healthy."⁶⁵

There is a growing recognition of the need to change current dietary patterns and of the value of traditional foodways. The Center for Indigenous Peoples' Nutrition and Environment, based at McGill University in Montreal, is a research and education resource for Indigenous Peoples

created by Canada's Aboriginal Leaders to support traditional nutrition and study the safety of traditional foods, which often have been contaminated by chemical toxins.⁶⁶ In the United States community-based traditional nutrition projects and regional and national conferences are focused on the problem of diet-related disease and the need to regain traditional foodways. The winds of change have begun to blow.

NOTES

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1. Michael P. Milburn, *The Future of Healing: Exploring the Parallels of Eastern and Western Medicine* (Freedom CA: Crossing Press, 2001).

2. University College of Cape Breton, Integrative Science Homepage, <http://faculty.uccb.ca/MSIT/default.html> (accessed February 18, 2004).

3. "Who Named It?, Denis Parsons Burkitt," <http://www.whonamedit.com/doctor.cfm/2199.html> (accessed February 18, 2004).

4. Denis Parsons Burkitt, "The Emergence of a Concept," in *Western Diseases: Their Dietary Prevention and Reversibility*, ed. Norman J. Temple and Denis Parsons Burkitt (Totowa NJ: Humana Press, 1994), 1–13.

5. Hugh C. Trowell and Denis Parsons Burkitt, *Western Diseases: Their Emergence and Prevention* (Cambridge MA: Harvard University Press, 1981).

6. Trowell and Burkitt, *Western Diseases*, xv–xvi.

7. Ali H. Mokdad et al., "The Continuing Epidemics of Obesity and Diabetes in the United States," *Journal of the American Medical Association* 286 (2001): 1195–1200; and Ali H. Mokdad et al., "Prevalence of Obesity, Diabetes, and Obesity-related Health Risk Factors," *Journal of the American Medical Association* 289 (2001): 76–79.

8. World Health Organization, "Nutrition, Controlling the Global Obesity Epidemic," <http://www.who.int/nut/obs.htm> (accessed February 18, 2004).

9. Health Canada, *A Second Diagnostic on the Health of Canada's Aboriginal People*, <http://www.hc-sc.gc.ca/fnihb/bpm/prc/>. Health Canada, *Diabetes Among Aboriginal Peoples in Canada: The Evidence*, <http://www.hc-sc.gc.ca/fnihb/bpm/prc/>. Sandy Lake Health and Diabetes Project, <http://www.sandy.lakediabetes.com/index.html> (accessed February 18, 2004).

10. Kevin G. Rowley et al., "Reduced Prevalence of Impaired Glucose Tolerance and No Change in Prevalence of Diabetes Despite Increasing BMI among Aboriginal People From a Group of Remote Homeland Communities," *Diabetes*

Care 23 (2000): 898–905; and Ricardo Uauy, Cecilia Albala, and Juliana Kain, “Obesity Trends in Latin America: Transiting from Under- to Overweight,” *Journal of Nutrition* 131 (2001): S893–S900.

11. *Building Healthy Hearts for American Indians and Alaska Natives: A Background Report* (Washington DC: National Institute of Health, 1998).

12. Barbara V. Howard et al., “Rising Tide of Cardiovascular Disease in American Indians: The Strong Heart Study,” *Circulation* 99 (1999): 2389–95.

13. James V. Neel, “Diabetes Mellitus: A Thrifty Genotype Rendered Detrimental by Progress?” *American Journal of Human Genetics* 14 (1962): 353–62.

14. See, for example, Sandy Lake Diabetes Project, Publications, <http://www.sandylakediabetes.com/publications.html> (accessed February 18, 2004).

15. Carlos A. Aguilar et al., “The Apolipoprotein E4 Allele Is Not Associated with an Abnormal Lipid Profile in a Native American Population Following Its Traditional Lifestyle,” *Atherosclerosis* 142 (1999): 409–14.

16. A. Byrne and D. G. Byrne, “The Effect of Exercise on Depression, Anxiety, and Other Mood States: A Review,” *Journal of Psychosomatic Research* 37 (1993): 565–74; and Scott A. Paluska and Thomas L. Schwenk, “Physical Activity and Mental Health: Current Concepts,” *Sports Medicine* 29 (2000): 167–79.

17. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)* (Washington DC: Food and Nutrition Board, Institute of Medicine, National Academies Press, 2002), 697–736.

18. Jehangir N. Din, David E. Newby, and Andrew D. Flapan, “Omega 3 Fatty Acids and Cardiovascular Disease—Fishing for a Natural Treatment,” *British Medical Journal* 328 (2004): 30–35.

19. See Milburn, *The Future of Healing*, 193–94.

20. Dean Ornish et al. “Intensive Lifestyle Changes for Reversal of Coronary Heart Disease,” *Journal of American Medical Association* 28 (1998): 2001–7.

21. Kenneth Cohen, “Native American Medicine,” *Alternative Therapies in Health and Medicine* 4 (1998): 45–56.

22. Physicians Committee for Responsible Medicine, “PCRM Clinical Research, Diabetes,” <http://www.pcrm.org/health/clinres/diabetes.html> (accessed February 18, 2004); and Anne Underwood, “New Ideas about Halting Diabetes,” *Newsweek*, January 20, 2003.

23. Jim Mann and A. Stewart Truswell, *Essentials of Human Nutrition* (London: Oxford University Press, 1998), 2–3.

24. Ted Wilson and Norman J. Temple, “Nutrition in the 21st Century,” in *Nutritional Health: Strategies for Disease Prevention*, ed. Ted Wilson and Norman J. Temple (Totowa NJ: Humana Press, 2001).

25. Eric Dewailly et al., “N-3 Fatty Acids and Cardiovascular Disease Risk Factors among the Inuit of Nunavik,” *American Journal of Clinical Nutrition* 74

(2001): 464–73; and Eric Dewailly et al., “Cardiovascular Disease Risk Factors and n-3 Fatty Acid Status in the Adult Population of James Bay Cree,” *American Journal of Clinical Nutrition* 76 (2002): 85–92.

26. Wilson and Temple, “Nutrition in the 21st Century.”

27. T. Colin Campbell, “The Dietary Cause of Degenerative Diseases,” in *Western Diseases: Their Dietary Prevention and Reversibility*, ed. Norman J. Temple and Denis P. Burkitt (Totowa NJ: Humana Press, 1994), 119–52.

28. T. Colin Campbell and Chen Junshi, “Diet and Chronic Degenerative Diseases: Perspectives from China,” *American Journal of Clinical Nutrition* 59 (1994): 1153S–61S.

29. David R. Jacobs Jr. and Lynn M. Steffen, “Nutrients, Foods, and Dietary Patterns as Exposures in Research: A Framework for Food Synergy,” *American Journal of Clinical Nutrition* 78 (2003): 508S–13S.

30. David J. Jenkins et al., “Glycemic Index: Overview of Implications in Health and Disease,” *American Journal of Clinical Nutrition* 76 (2002): 266S–73S; and Simin Liu et al., “A Prospective Study of Dietary Glycemic Load, Carbohydrate Intake, and Risk of Coronary Heart Disease in U.S. Women,” *American Journal of Clinical Nutrition* 71 (2000): 1455–61.

31. Atkins Web site, “Atkins Nutritional Approach,” <http://atkins.com/why/ana.html> (accessed February 18, 2004).

32. CNN, Food News, “Protein Diet vs. Low-fat: USDA Hosts Nutrition Debate,” February 25, 2000, <http://www.cnn.com/2000/FOOD/news/02/25/high.protein/> (accessed February 18, 2004).

33. William R. Leonard, “Food for Thought: Dietary Change Was a Driving Force in Human Evolution,” *Scientific American* (December 2002): 106–15.

34. Gregory Cajete, *Native Science: Natural Laws of Interdependence* (Santa Fe NM: Clear Light Publishers, 2000).

35. Evelyn Steinhauer, “Thoughts on an Indigenous Research Methodology,” *Canadian Journal of Native Education* 26 (2002): 69.

36. Steinhauer, “Thoughts on an Indigenous Research Methodology.”

37. *Native Foods and Nutrition: An Illustrated Reference Manual* (Ottawa: Health Canada, 1995), 22.

38. Gavin Menzies, *1421: The Year China Discovered the World* (New York: Bantam, 2002), 96.

39. Frances Moore Lappé, *Diet for a Small Planet* (New York: Ballantine, 1971). See Laurel Robertson, Carol Flinders, and Bronwen Godfrey, *Laurel's Kitchen: A Handbook for Vegetarian Cookery and Nutrition* (Petaluma CA: Nilgiri Press, 1976), 374–92, for a discussion of protein complementarity.

40. Robertson, Flinders, and Godfrey, *Laurel's Kitchen*, 407–8.

41. *Native Foods and Nutrition*, 38.

42. *Native Foods and Nutrition*, 38.
43. *Native Foods and Nutrition*, 34.
44. *Native Foods and Nutrition*, 42.
45. *Native Foods and Nutrition*, 49.
46. Harriet V. Kuhnlein and Nancy J. Turner, *Traditional Plant Foods of Canadian Indigenous Peoples: Nutrition, Botany, and Use*, Food and Nutrition in History and Anthropology, vol. 8 (Philadelphia: Gordon and Breach, 1991), 25–33.
47. Gary Taubes, “The Famine of Youth,” *Scientific American*, June 21, 2000; and Leonie K. Heilbronn and Eric Ravussin, “Calorie Restriction and Aging: Review of the Literature and Implications for Studies in Humans,” *American Journal of Clinical Nutrition* 78 (2003): 361–69.
48. NewScientist.com News Service, “Day-on, Day-off Diet Boosts Health,” April 28, 2003, <http://www.newscientist.com/news/news.jsp?id=ns99993668> (accessed February 18, 2004).
49. Ken Cohen, “Native American Medicine,” *Alternative Therapies in Health and Medicine* 4 (1998): 45–56.
50. David J. A. Jenkins et al., “Glycemic Index: Overview of Implications in Health and Disease,” *American Journal of Clinical Nutrition* 76 (2002): 266S–273S; and Liu et al., “A Prospective Study of Dietary Glycemic Load.”
51. Frank B. Hu, JoAnn E. Manson, and Walter C. Willett, “Types of Dietary Fat and Risk of Coronary Heart Disease: A Critical Review,” *Journal of the American College of Nutrition* 20 (2001): 5–19.
52. Harvard University Web site, “Trans Fatty Acids and Coronary Heart Disease,” <http://www.hsph.harvard.edu/reviews/transfats.html> (accessed February 18, 2004).
53. People of ’Ksan, *Gathering What the Great Nature Provided: Food Traditions of the Gitksan* (Seattle: University of Washington Press, 1980), 89.
54. *Gathering What the Great Nature Provided*, 89–93.
55. *Native Foods and Nutrition*, 42.
56. Brewster Kneen’s book, *From Land to Mouth: Understanding the Food System*, is out of print but freely available electronically as a PDF file at the Ram’s Horn, <http://www.ramshorn.bc.ca> (accessed February 18, 2004).
57. Cajete, *Native Science*, 131.
58. Fikret Berkes, *Sacred Ecology: Traditional Ecological Knowledge and Resource Management* (Philadelphia: Taylor and Francis, 1999), 83–87.
59. PCRM Web site, “News Release February 10, 2000,” <http://www.pcrm.org/news/health001002.html> (accessed February 18, 2004); and U.S. Department of Agriculture, “Food and Nutrition Information Center, Food Guide Pyramid,” <http://www.nal.usda.gov/fnic/fpyr/pyramid.html> (accessed February 18, 2004).

60. PCRM Web site, "Preventive Medicine and Nutrition, Understanding Lactose Intolerance," http://www.pcrm.org/health/Info_on_Veg_Diets/lactose_intolerance.html (accessed February 18, 2004).
61. B. E. Christopher Nordin, "Calcium Requirement Is a Sliding Scale," *American Journal of Clinical Nutrition* 71 (2000): 1381–83.
62. Walter C. Willett and Meir J. Stampfer, "Rebuilding the Food Pyramid," *Scientific American* (January 2003): 64–71; and Marjorie L. McCullough et al., "Adherence to the Dietary Guidelines for Americans and Risk of Major Chronic Disease in Men," *American Journal of Clinical Nutrition* 72 (2000): 1223–31.
63. *Native Foods and Nutrition*, 80–82.
64. U.S. Department of Agriculture Web site, "Food and Nutrition Information Center, Native American Food Pyramid," <http://www.nal.usda.gov/fnic/Fpyr/NAmFGP.html> (accessed February 18, 2004).
65. Jim Kent, "Lakota Nutritionist's Medicine Wheel Based on Traditional Foodways," Native Times.com, <http://www.okit.com/diabetes2002/kibbestory.html> (accessed April 2, 2003).
66. McGill University, Center for Indigenous People's Nutrition and Environment, <http://www.cine.mcgill.ca/> (accessed February 18, 2004).

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