Carbohydrates: Good Carbs Guide the Way

Introduction

We've come a long way from the days when one of the knee-jerk answers to the question "What should I eat?" was "You can't go wrong with carbohydrates." We now know that carbohydrates, the staple of most diets, aren't all good or all bad. Some kinds promote health while others, when eaten often and in large quantities, actually will increase the risk for diabetes and coronary heart disease.

The wild popularity of the Atkins, South Beach, and other low-carbohydrate diets led many Americans to believe that carbohydrates are "bad," the source of unflattering flab, and a cause of the obesity epidemic. That's a dangerous oversimplification, on a par with "fat is bad." Easily digested carbohydrates from white bread, white rice, pastries, sugared sodas, and other highly processed foods may, indeed, contribute to weight gain and interfere with weight loss. Whole grains, beans, fruits, vegetables, and other sources of intact carbohydrates do just the opposite—they promote good health.

Don't be misled by the blanket pronouncements on the dangers of carbohydrates. They are an important part of a healthy diet. Carbohydrates provide the body with the fuel it needs for physical activity and for proper organ function. The best sources of carbohydrates—fruits, vegetables, and whole grains—deliver essential vitamins and minerals, fiber, and a host of important phytonutrients.

What Are Carbohydrates?

Carbohydrates are found in a wide array of foods—bread, beans, milk, popcorn, potatoes, cookies, spaghetti, soft drinks, corn, and cherry pie. They also come in a variety of forms. The most common and abundant forms are sugars, fibers, and starches.

The basic building block of every carbohydrate is a sugar molecule, a simple union of carbon, hydrogen, and oxygen. Starches and fibers are essentially chains of sugar molecules. Some contain hundreds of sugars. Some chains are straight, others branch wildly.

Carbohydrates were once grouped into two main categories. Simple carbohydrates included sugars such as fruit sugar (fructose), corn or grape sugar (dextrose or glucose), and table sugar (sucrose). Complex carbohydrates included everything made of three or more linked sugars. Complex carbohydrates were thought to be the healthiest to eat, while simple carbohydrates weren't so great. It turns out that the picture is more complicated than that.

The digestive system handles all carbohydrates in much the same way—it breaks them down (or tries to break them down) into single sugar molecules, since only these are small enough to cross into the bloodstream. It also converts most digestible carbohydrates into glucose (also known as blood sugar), because cells are designed to use this as a universal energy source.

Fiber is an exception. It is put together in such a way that it can't be broken down into sugar molecules, and so it passes through the body undigested. Fiber comes in two varieties: soluble fiber dissolves in water, while insoluble fiber does not. Although neither type nourishes the body, they promote health in many ways. Soluble fiber binds to fatty substances in the intestines and carries them out as a waste, thus lowering low-density lipoprotein (LDL, or bad cholesterol). It also helps regulate the body's use of sugars, helping to keep hunger and...
blood sugar in check. Insoluble fiber helps push food through the intestinal tract, promoting regularity and helping prevent constipation.

**When Sugar Management Goes Awry: Insulin and Diabetes**

When you eat a food containing carbohydrates, the digestive system breaks down the digestible ones into sugar, which then enters the blood. As blood sugar levels rise, special cells in the pancreas churn out more and more insulin, a hormone that signals cells to absorb blood sugar for energy or storage. As cells sponge up blood sugar, its levels in the bloodstream begin to fall. That's when other cells in the pancreas start making glucagon, a hormone that tells the liver to start releasing stored sugar. This interplay of insulin and glucagon ensure that cells throughout the body, and especially in the brain, have a steady supply of blood sugar.

In some people, this cycle doesn't work properly. People with type 1 diabetes (once called insulin-dependent or juvenile diabetes) don't make enough insulin, so their cells can't absorb sugar. People with type 2 diabetes (once called non-insulin-dependent, or adult-onset diabetes) generally start out with a different problem—their cells don't respond well to insulin's "open up for sugar" signal. This condition (known as insulin resistance) causes blood sugar and insulin levels to stay high long after eating. Over time, the heavy demands made on the insulin-making cells wears them out, and insulin production slows, then it stops all together making you a diabetic.

Insulin resistance isn't just a blood sugar problem. It has also been linked with a variety of other problems, including high blood pressure, high levels of triglycerides, low HDL (good) cholesterol, and excess weight. In fact, it travels with these problems so often that the combination has been given the name metabolic syndrome. Alone and as part of the metabolic syndrome, insulin resistance can lead to type 2 diabetes, heart disease, and possibly some cancers.

Genes, a sedentary lifestyle, being overweight, and a diet rich in processed carbohydrates can each promote insulin resistance. (The combination is far worse.) Data from the Insulin Resistance Atherosclerosis Study suggests that cutting back on refined grains and eating more whole grains in their place can improve insulin sensitivity. (2) As described in "Health Gains from Whole Grains", the benefit of eating whole grains extends far beyond insulin to helping prevent type 2 diabetes, atherosclerosis (the build-up of cholesterol-filled patches that clog and narrow artery walls), heart disease, colorectal cancer, and premature death from non-cardiac, non-cancer causes.

**Carbohydrates and the Glycemic Index**

Dividing carbohydrates into simple and complex makes sense on a chemical level. But it doesn't do much to explain what happens to different kinds of carbohydrates inside the body. For example, the starch in white bread and French-fried potatoes clearly qualifies as a complex carbohydrate. Yet the body converts this starch to blood sugar nearly as fast as it processes pure glucose. Fructose (fruit sugar) is a simple carbohydrate, but it has a minimal effect on blood sugar.

A new system, called the glycemic index, aims to classify carbohydrates based on how quickly and how high they boost blood sugar compared to pure glucose. (3) Foods with a high glycemic index, like white bread, cause rapid spikes in blood sugar. Foods with a low glycemic index, like whole oats, are digested more slowly, causing a lower and gentler change in blood sugar. Foods with a score of 70 or higher are defined as having a high glycemic index; those with a score of 55 or below have a low glycemic index.

The most comprehensive list of the glycemic index of foods was published in the July 2002, issue of the *American Journal of Clinical Nutrition*. (4) It included almost 750 foods, ranging from angel food cake to yams.
The University of Sydney in Australia maintains an updated searchable database at [www.glycemicindex.com](http://www.glycemicindex.com) that now has almost 1,600 entries.

Diets rich in high-glycemic-index foods, which cause quick and strong increases in blood sugar levels, have been linked to an increased risk for diabetes, (5) heart disease, (6, 7) and overweight, (8, 9,10) and there is preliminary work linking high-glycemic diets to age-related macular degeneration, (11) ovulatory infertility, (12) and colorectal cancer. (13) Foods with a low glycemic index have been shown to help control type 2 diabetes and improve weight loss. Other studies, though, have found that the glycemic index has little effect on weight or health. This sort of flip-flop is part of the normal process of science, and it means that the true value of the glycemic index remains to be determined. In the meantime, eating whole grains, beans, fruits, and vegetables—all foods with a low glycemic index—is indisputably good for many aspects of health.

One of the most important factors that determine a food's glycemic index is how much it has been processed. Milling and grinding removes the fiber-rich outer bran and the vitamin- and mineral-rich inner germ, leaving mostly the starchy endosperm.

One thing that a food's glycemic index does not tell us is how much digestible carbohydrate it delivers. Take watermelon as an example. The sweet-tasting fruit has a very high glycemic index. But a slice of watermelon has only a small amount of carbohydrate per serving (as the name suggests, watermelon is made up mostly of water). That's why researchers developed a related way to classify foods that takes into account both the amount of carbohydrate in the food and the impact of that carbohydrate on blood sugar levels. This measure is called the glycemic load. (14, 15) A food's glycemic load is determined by multiplying its glycemic index by the amount of carbohydrate it contains. In general, a glycemic load of 20 or more is high, 11 to 19 is medium, and 10 or under is low.

You can't use the glycemic index to rule your dietary choices. For example, a Snickers bar has a glycemic index of 41, marking it as a low glycemic index food. But it is far from a health food. Instead, use it as a general guide. Whenever possible, replace highly processed grains, cereals, and sugars with minimally processed whole grain products. And only eat potatoes—once on the list of preferred complex carbohydrates—OCCASIONALLY because of their high glycemic index and glycemic load.

### Low-Carbohydrate Diets: Choose Good Carbs, not No Carbs

Some popular diets treat carbohydrates as if they are all evil, the root of all body fat and excess weight. That was certainly true for the original Atkins diet, which popularized the no-carb approach to dieting. And there is some evidence that a low-carbohydrate diet may help people lose weight more quickly than a low-fat diet, although so far, that evidence is short term.

In two short, head-to-head trials, (16, 17) low-carb approaches worked better than low-fat diets. A later year-long study, published in 2007 in the *Journal of the American Medical Association*, showed the same thing. In this study, overweight, premenopausal women went on one of four diets: Atkins, Zone, Ornish, or LEARN, a standard low-fat, moderately high-carbohydrate diet. The women in all four groups steadily lost weight for the first six months, with the most rapid weight loss occurring among the Atkins dieters. After that, most of the women started to regain weight. At the end of a year, it looked as though the women in the Atkins group had lost the most weight, about 10 pounds, compared with a loss of almost 6 pounds for the LEARN group, 5 for the Ornish group, and 3.5 for the Zone group. (18) Levels of harmful LDL, protective HDL, and other blood lipids were at least as good among women on the Atkins diet as among those on the low-fat diet.
If you read the fine print of the study, though, it turns out that few of the women actually stuck with their assigned diets. Those on the Atkins diet were supposed to limit their carbohydrate intake to 50 grams a day, but they took in almost triple that amount. The Ornish dieters were supposed to limit their fat intake to under 10 percent of their daily calories, but they got about 30 percent from fat. There were similar deviations for the Zone and LEARN groups.

What about longer term studies? POUNDS LOST (Preventing Overweight Using Novel Dietary Strategies), a two-year head-to-head trial comparing different weight loss strategies found that low-carb, low-fat, and Mediterranean-style diets worked equally well in the long run, and that there was no speed advantage for one diet over another. (20) What this and other diet comparisons tell us is that sticking with a diet is more important than the diet itself.

No one knows the long-term effects of eating little or no carbohydrates. Equally worrisome is the inclusion of unhealthy fats in some of these diets.

If you want to go the lower carb route, try to include some fruits, vegetables, and whole grain carbohydrates every day. They contain a host of vitamins, minerals, and phytonutrients that are essential for good health and that you can’t get out of a supplement bottle. And do your heart a favor by choosing healthy fats and proteins to go along with those healthy carbohydrates: A 20-year prospective study of 82,802 women looked at the relationship between lower carbohydrate diets and heart disease; a subsequent study looked at lower carbohydrate diets and risk of diabetes. Women who ate low-carbohydrate diets that were high in vegetable sources of fat or protein had a 30 percent lower risk of heart disease (7) and a modestly lower risk of type 2 diabetes. (19) compared to women who ate high-carbohydrate, low-fat diets. But women who ate low-carbohydrate diets that were high in animal fats or proteins did not have a reduced risk of heart disease or diabetes.(7, 19)

Adding Good Carbohydrates

For optimal health, get your grains intact from foods such as whole wheat bread, brown rice, whole grain pasta, and other possibly unfamiliar grains like quinoa, whole oats, and bulgur. Not only will these foods help protect you against a range of chronic diseases, they can also please your palate and your eyes.

Until recently, you could only get whole-grain products in organic or non-traditional stores. Today they are popping up in more and more mainstream grocery stores. Here are some suggestions for adding more good carbohydrates to your diet:

- **Start the day with whole grains.** If you're partial to hot cereals, try old-fashioned or steel-cut oats. If you're a cold cereal person, look for one that lists whole wheat, whole oats, or other whole grain first on the ingredient list.
- **Use whole grain breads for lunch or snacks.** Check the label to make sure that whole wheat or another WHOLE grain is the first ingredient listed.
- **Bag the potatoes.** Instead, try brown rice or even "newer" grains like bulgur, wheat berries, millet, or hulled barley with your dinner.
- **Pick up some whole wheat pasta.** If the whole grain products are too chewy for you, look for those that are made with half whole-wheat flour and half semolina.
- **Bring on the beans.** Beans are an excellent source of slowly digested carbohydrates as well as a great source of protein.
References


**Rebuilding the Food Pyramid**

*WALTER C WILLETT & MEIR J STAMPFER / Scientific American Jan03*

In 1992 the U.S. Department of Agriculture officially released the Food Guide Pyramid, which was intended to help the American public make dietary choices that would maintain good health and reduce the risk of chronic disease. The recommendations embodied in the pyramid soon became well known: people should minimize their consumption of fats and oils but should eat six to 11 servings a day of foods rich in complex carbohydrates -- bread, cereal, rice, pasta and so on. The food pyramid also recommended generous amounts of vegetables (including potatoes, another plentiful source of complex carbohydrates), fruit and dairy products, and at least two servings a day from the meat and beans group, which lumped together red meat with poultry, fish, nuts, legumes and eggs.

Even when the pyramid was being developed, though, nutritionists had long known that some types of fat are essential to health and can reduce the risk of cardiovascular disease. Furthermore, scientists had found little evidence that a high intake of carbohydrates is beneficial. Since 1992 more and more research has shown that the USDA pyramid is grossly flawed. By promoting the consumption of all complex carbohydrates and eschewing all fats and oils, the pyramid provides misleading guidance. In short, not all fats are bad for you, and by no means are all complex carbohydrates good for you. The USDA's Center for Nutrition Policy and Promotion is now reassessing the pyramid, but this effort is not expected to be completed until 2004. In the meantime, we have drawn up a new pyramid that better reflects the current understanding of the relation between diet and health. Studies indicate that adherence to the recommendations in the revised pyramid can significantly reduce the risk of cardiovascular disease for both men and women.

How did the original USDA pyramid go so wrong? In part, nutritionists fell victim to a desire to simplify their dietary recommendations. Researchers had known for decades that saturated fat--found in abundance in red meat and dairy products--raises cholesterol levels in the blood. High cholesterol levels, in turn, are associated with a high risk of coronary heart disease (heart attacks and other ailments caused by the blockage of the arteries to the heart). In the 1960s controlled feeding studies, in which the participants eat carefully prescribed diets for several weeks, substantiated that saturated fat increases cholesterol levels. But the studies also showed that polyunsaturated fat--found in vegetable oils and fish--reduces cholesterol. Thus, dietary advice during the 1960s...
and 1970s emphasized the replacement of saturated fat with polyunsaturated fat, not total fat reduction. (The subsequent doubling of polyunsaturated fat consumption among Americans probably contributed greatly to the halving of coronary heart disease rates in the U.S. during the 1970s and 1980s.)

Overview/The Food Guide Pyramid

- The U.S. Department of Agriculture's Food Guide Pyramid, introduced in 1992, recommended that people avoid fats but eat plenty of carbohydrate-rich foods such as bread, cereal, rice and pasta. The goal was to reduce the consumption of saturated fat, which raises cholesterol levels.
- Researchers have found that a high intake of refined carbohydrates such as white bread and white rice can wreak havoc on the body's glucose and insulin levels. Replacing these carbohydrates with healthy fats-monounsaturated or polyunsaturated—actually lowers one's risk of heart disease.
- Nutritionists are now proposing a new food pyramid that encourages the consumption of healthy fats and whole grain foods but recommends avoiding refined carbohydrates, butter and red meat.

The notion that fat in general is to be avoided stems mainly from observations that affluent Western countries have both high intakes of fat and high rates of coronary heart disease. This correlation, however, is limited to saturated fat. Societies in which people eat relatively large portions of monounsaturated and polyunsaturated fat tend to have lower rates of heart disease [see illustration on next page]. On the Greek island of Crete, for example, the traditional diet contained much olive oil (a rich source of monounsaturated fat) and fish (a source of polyunsaturated fat). Although fat constituted 40 percent of the calories in this diet, the rate of heart disease for those who followed it was lower than the rate for those who followed the traditional diets of Japan, in which fat made up only 8 to 10 percent of the calories. Furthermore, international comparisons can be misleading: many negative influences on health, such as smoking, physical inactivity and high amounts of body fat, are also correlated with Western affluence.

Unfortunately, many nutritionists decided it would be too difficult to educate the public about these subtleties. Instead they put out a clear, simple message: "Fat is bad." Because saturated fat represents about 40 percent of all fat consumed in the U.S., the rationale of the USDA was that advocating a low-fat diet would naturally reduce the intake of saturated fat. This recommendation was soon reinforced by the food industry, which began selling cookies, chips and other products that were low in fat but often high in sweeteners such as high-fructose corn syrup.

When the food pyramid was being developed, the typical American got about 40 percent of his or her calories from fat, about 15 percent from protein and about 45 percent from carbohydrates. Nutritionists did not want to suggest eating more protein, because many sources of protein (red meat, for example) are also heavy in saturated fat. So the "Fat is bad" mantra led to the corollary "Carbs are good." Dietary guidelines from the American Heart Association and other groups recommended that people get at least half their calories from carbohydrates and no more than 30 percent from fat. This 30 percent limit has become so entrenched among nutritionists that even the sophisticated observer could be forgiven for thinking that many studies must show that individuals with that level of fat intake enjoyed better health than those with higher levels. But no study has demonstrated long-term health benefits that can be directly attributed to a low-fat diet. The 30 percent limit on fat was essentially drawn from thin air.

The wisdom of this direction became even more questionable after researchers found that the two main cholesterol-carrying chemicals-low-density lipoprotein (LDL), popularly known as "bad cholesterol," and high-density lipoprotein (HDL), known as "good cholesterol"—have very different effects on the risk of coronary heart disease. Increasing the ratio of LDL to HDL in the blood raises the risk, whereas decreasing the ratio lowers it. By the early 1990s controlled feeding studies had shown that when a person replaces calories from saturated fat with an equal amount of calories from carbohydrates the levels of LDL and total cholesterol fall, but the level of
HDL also falls. Because the ratio of LDL to HDL does not change, there is only a small reduction in the person's risk of heart disease. Moreover, the switch to carbohydrates boosts the blood levels of triglycerides, the component molecules of fat, probably because of effects on the body's endocrine system. High triglyceride levels are also associated with a high risk of heart disease.

The effects are more grievous when a person switches from either monounsaturated or polyunsaturated fat to carbohydrates. LDL levels rise and HDL levels drop, making the cholesterol ratio worse. In contrast, replacing saturated fat with either monounsaturated or polyunsaturated fat improves this ratio and would be expected to reduce heart disease. The only fats that are significantly more deleterious than carbohydrates are the trans-unsaturated fatty acids; these are produced by the partial hydrogenation of liquid vegetable oil, which causes it to solidify. Found in many margarines, baked goods and fried foods, trans fats are uniquely bad for you because they raise LDL and triglycerides while reducing HDL.

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**Fat and Heart Disease**

<table>
<thead>
<tr>
<th>Percent of calories from fat in traditional diet</th>
<th>Incidence of coronary heart disease per 10,000 men over a period of 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Japan - fish, rice</td>
<td>3,800</td>
</tr>
<tr>
<td>B = Eastern Finland - butter, milk</td>
<td>40%</td>
</tr>
<tr>
<td>C = Crete - olive oil, fruits</td>
<td>500</td>
</tr>
</tbody>
</table>

INTERNATIONAL COMPARISONS reveal that total fat intake is a poor indicator of heart disease risk. What is important is the type of fat consumed. In regions where saturated fats traditionally made up much of the diet (for example, eastern Finland), rates of heart disease were much higher than in areas where monounsaturated fats were prevalent (such as the Greek island of Crete). Crete's Mediterranean diet, based on olive oil, was even better for the heart than the low-fat traditional diet of Japan.

**The Big Picture**

TO EVALUATE FULLY the health effects of diet, though, one must look beyond cholesterol ratios and triglyceride levels. The foods we eat can cause heart disease through many other pathways, including raising blood pressure or boosting the tendency of blood to clot. And other foods can prevent heart disease in surprising ways; for instance, omega-3 fatty acids (found in fish and some plant oils) can reduce the likelihood of ventricular fibrillation, a heart rhythm disturbance that causes sudden death.

The ideal method for assessing all these adverse and beneficial effects would be to conduct large-scale trials in which individuals are randomly assigned to one diet or another and followed for many years. Because of practical constraints and cost, few such studies have been conducted, and most of these have focused on patients who already suffer from heart disease. Though limited, these studies have supported the benefits of replacing saturated fat with polyunsaturated fat, but not with carbohydrates.
The best alternative is to conduct large epidemiological studies in which the diets of many people are periodically assessed and the participants are monitored for the development of heart disease and other conditions. One of the best-known examples of this research is the Nurses' Health Study, which was begun in 1976 to evaluate the effects of oral contraceptives but was soon extended to nutrition as well. Our group at Harvard University has followed nearly 90,000 women in this study who first completed detailed questionnaires on diet in 1980, as well as more than 50,000 men who were enrolled in the Health Professionals Follow-Up Study in 1986.

After adjusting the analysis to account for smoking, physical activity and other recognized risk factors, we found that a participant's risk of heart disease was strongly influenced by the type of dietary fat consumed. Eating trans fat increased the risk substantially, and eating saturated fat increased it slightly. In contrast, eating monounsaturated and polyunsaturated fats decreased the risk-just as the controlled feeding studies predicted. Because these two effects counterbalanced each other, higher overall consumption of fat did not lead to higher rates of coronary heart disease. This finding reinforced a 1989 report by the National Academy of Sciences that concluded that total fat intake alone was not associated with heart disease risk.

But what about illnesses besides coronary heart disease? High rates of breast, colon and prostate cancers in affluent Western countries have led to the belief that the consumption of fat, particularly animal fat, may be a risk factor. But large epidemiological studies have shown little evidence that total fat consumption or intakes of specific types of fat during midlife affect the risks of breast or colon cancer. Some studies have indicated that prostate cancer and the consumption of animal fat may be associated, but reassuringly there is no suggestion that vegetable oils increase any cancer risk. Indeed, some studies have suggested that vegetable oils may slightly reduce such risks. Thus, it is reasonable to make decisions about dietary fat on the basis of its effects on cardiovascular disease, not cancer.

Finally, one must consider the impact of fat consumption on obesity, the most serious nutritional problem in the U.S. Obesity is a major risk factor for several diseases, including type 2 diabetes (also called adult-onset diabetes), coronary heart disease, and cancers of the breast, colon, kidney and esophagus. Many nutritionists believe that eating fat can contribute to weight gain because fat contains more calories per gram than protein or carbohydrates. Also, the process of storing dietary fat in the body may be more efficient than the conversion of carbohydrates to body fat. But recent controlled feeding studies have shown that these considerations are not practically important. The best way to avoid obesity is to limit your total calories, not just the fat calories. So the critical issue is whether the fat composition of a diet can influence one's ability to control caloric intake. In other words, does eating fat leave you more or less hungry than eating protein or carbohydrates? There are various theories about why one diet should be better than another, but few long-term studies have been done. In randomized trials, individuals assigned to low-fat diets tend to lose a few pounds during the first months but then regain the weight. In studies lasting a year or longer, low-fat diets have consistently not led to greater weight loss.

**Carbo-Loading**

NOW LET'S LOOK at the health effects of carbohydrates. Complex carbohydrates consist of long chains of sugar units such as glucose and fructose; sugars contain only one or two units. Because of concerns that sugars offer nothing but "empty calories"-that is, no vitamins, minerals or other nutrients-complex carbohydrates form the base of the USDA food pyramid. But refined carbohydrates, such as white bread and white rice, can be very quickly broken down to glucose, the primary fuel for the body. The refining process produces an easily absorbed form of starch which is defined as glucose molecules bound together-and also removes many vitamins and minerals and fiber. Thus, these carbohydrates increase glucose levels in the blood more than whole grains do. (Whole grains have not been milled into fine flour.)
Or consider potatoes. Eating a boiled potato raises blood sugar levels higher than eating the same amount of calories from table sugar. Because potatoes are mostly starch, they can be rapidly metabolized to glucose. In contrast, table sugar (sucrose) is a disaccharide consisting of one molecule of glucose and one molecule of fructose. Fructose takes longer to convert to glucose, hence the slower rise in blood glucose levels.

A rapid increase in blood sugar stimulates a large release of insulin, the hormone that directs glucose to the muscles and liver. As a result, blood sugar plummets, sometimes even going below the baseline. High levels of glucose and insulin can have negative effects on cardiovascular health, raising triglycerides and lowering HDL (the good cholesterol). The precipitous decline in glucose can also lead to more hunger after a carbohydrate-rich meal and thus contribute to overeating and obesity.

In our epidemiological studies, we have found that a high intake of starch from refined grains and potatoes is associated with a high risk of type 2 diabetes and coronary heart disease. Conversely, a greater intake of fiber is related to a lower risk of these illnesses. Interestingly, though, the consumption of fiber did not lower the risk of colon cancer, as had been hypothesized earlier.

Overweight, inactive people can become resistant to insulin's effects and therefore require more of the hormone to regulate their blood sugar. Recent evidence indicates that the adverse metabolic response to carbohydrates is substantially worse among people who already have insulin resistance. This finding may account for the ability of peasant farmers in Asia and elsewhere, who are extremely lean and active, to consume large amounts of refined carbohydrates without experiencing diabetes or heart disease, whereas the same diet in a more sedentary population can have devastating effects.

**Eat Your Veggies**

High intake of fruits and vegetables is perhaps the least controversial aspect of the food pyramid. A reduction in cancer risk has been a widely promoted benefit. But most of the evidence for this benefit has come from case-control studies, in which patients with cancer and selected control subjects are asked about their earlier diets. These retrospective studies are susceptible to numerous biases, and recent findings from large prospective studies (including our own) have tended to show little relation between overall fruit and vegetable consumption and cancer incidence. (Specific nutrients in fruits and vegetables may offer benefits, though; for instance, the folic acid in green leafy vegetables may reduce the risk of colon cancer, and the lycopene found in tomatoes may lower the risk of prostate cancer.)

The real value of eating fruits and vegetable may be in reducing the risk of cardiovascular disease. Folic acid and potassium appear to contribute to this effect, which has been seen in several epidemiological studies. Inadequate consumption of folic acid is responsible for higher risks of serious birth defects as well, and low intake of lutein, a pigment in green leafy vegetables, has been associated with greater risks of cataracts and degeneration of the retina. Fruits and vegetables are also the primary source of many vitamins needed for good health. Thus, there are good reasons to consume the recommended five servings a day, even if doing so has little impact on cancer risk. The inclusion of potatoes as a vegetable in the USDA pyramid has little justification, however; being mainly starch; potatoes do not confer the benefits seen for other vegetables.
Benefits of the New Pyramid

HEALTH EFFECTS OF THE NEW RECOMMENDATIONS in the revised food pyramid were gauged by studying disease rates among 67,271 women in the Nurses’ Health Study and 38,615 men in the Health Professionals Follow-Up Study. Women and men in the fifth quintile (the 20 percent whose diets were closest to the pyramid’s recommendations) had significantly lower rates of cardiovascular disease than those in the first quintile (the 20 percent who strayed the most from the pyramid). The dietary recommendations had no significant effect on cancer risk, however.

Another flaw in the USDA pyramid is its failure to recognize the important health differences between red meat (beef, pork and lamb) and the other foods in the meat and beans group (poultry, fish, legumes, nuts and eggs). High consumption of red meat has been associated with an increased risk of coronary heart disease, probably because of its high content of saturated fat and cholesterol. Red meat also raises the risk of type 2 diabetes and colon cancer. The elevated risk of colon cancer may be related in part to the carcinogens produced during cooking and the chemicals found in processed meats such as salami and bologna.

Poultry and fish, in contrast, contain less saturated fat and more unsaturated fat than red meat does. Fish is a rich source of the essential omega-3 fatty acids as well. Not surprisingly, studies have shown that people who replace red meat with chicken and fish have a lower risk of coronary heart disease and colon cancer. Eggs are high in cholesterol, but consumption of up to one a day does not appear to have adverse effects on heart disease risk (except among diabetics), probably because the effects of a slightly higher cholesterol level are counterbalanced by other nutritional benefits. Many people have avoided nuts because of their high fat content, but the fat in nuts, including peanuts, is mainly unsaturated, and walnuts in particular are a good source of omega-3 fatty acids. Controlled feeding studies show that nuts improve blood cholesterol ratios, and epidemiological studies indicate that they lower the risk of heart disease and diabetes. Also, people who eat nuts are actually less likely to be obese; perhaps because nuts are more satisfying to the appetite, eating them seems to have the effect of significantly reducing the intake of other foods.

Yet another concern regarding the USDA pyramid is that it promotes over-consumption of dairy products, recommending the equivalent of two or three glasses of milk a day. This advice is usually justified by dairy’s calcium content, which is believed to prevent osteoporosis and bone fractures. But the highest rates of fractures are found in countries with high dairy consumption, and large prospective studies have not shown a lower risk of fractures among those who eat plenty of dairy products. Calcium is an essential nutrient, but the requirements for bone health have probably been overstated. What is more, we cannot assume that high dairy consumption is safe: in several studies, men who consumed large amounts of dairy products experienced an increased risk of...
prostate cancer, and in some studies, women with high intakes had elevated rates of ovarian cancer. Although fat was initially assumed to be the responsible factor, this has not been supported in more detailed analyses. High calcium intake itself seemed most clearly related to the risk of prostate cancer.

More research is needed to determine the health effects of dairy products, but at the moment it seems imprudent to recommend high consumption. Most adults who are following a good overall diet can get the necessary amount of calcium by consuming the equivalent of one glass of milk a day. Under certain circumstances, such as after menopause, people may need more calcium than usual, but it can be obtained at lower cost and without saturated fat or calories by taking a supplement.

**A Healthier Pyramid**

ALTHOUGH THE USDA'S food pyramid has become an icon of nutrition over the past decade, until recently no studies had evaluated the health of individuals who followed its guidelines. It very likely has some benefits, especially from a high intake of fruits and vegetables. And a decrease in total fat intake would tend to reduce the consumption of harmful saturated and trans fats. But the pyramid could also lead people to eat fewer of the healthy unsaturated fats and more refined starches, so the benefits might be negated by the harm.

To evaluate the overall impact, we used the Healthy Eating Index (HEI), a score developed by the USDA to measure adherence to the pyramid and its accompanying dietary guidelines in federal nutrition programs. From the data collected in our large epidemiological studies, we calculated each participant's HEI score and then examined the relation of these scores to subsequent risk of major chronic disease (defined as heart attack, stroke, cancer or nontraumatic death from any cause). When we compared people in the same age groups, women and men with the highest HEI scores did have a lower risk of major chronic disease. But these individuals also smoked less, exercised more and had generally healthier lifestyles than the other participants. After adjusting for these variables, we found that participants with the highest HEI scores did not experience significantly better overall health outcomes. As predicted, the pyramid's harms counterbalanced its benefits.

Because the goal of the pyramid was a worthy one-to encourage healthy dietary choices-we have tried to develop an alternative derived from the best available knowledge. Our revised pyramid [see illustration at top] emphasizes weight control through exercising daily and avoiding an excessive total intake of calories. This pyramid recommends that the bulk of one's diet should consist of healthy fats (liquid vegetable oils such as olive, canola, soy, corn, sunflower and peanut) and healthy carbohydrates (whole grain foods such as whole wheat bread, oatmeal and brown rice). If both the fats and carbohydrates in your diet are healthy, you probably do not have to worry too much about the percentages of total calories coming from each. Vegetables and fruits should also be eaten in abundance. Moderate amounts of healthy sources of protein (nuts, legumes, fish, poultry and eggs) are encouraged, but dairy consumption should be limited to one to two servings a day. The revised pyramid recommends minimizing the consumption of red meat, butter, refined grains (including white bread, white rice and white pasta), potatoes and sugar.

Trans fat does not appear at all in the pyramid, because it has no place in a healthy diet. A multiple vitamin is suggested for most people, and moderate alcohol consumption can be a worthwhile option (if not contraindicated by specific health conditions or medications). This last recommendation comes with a caveat: drinking no alcohol is clearly better than drinking too much. But more and more studies are showing the benefits of moderate alcohol consumption (in any form: wine, beer or spirits) to the cardiovascular system.

Can we show that our pyramid is healthier than the USDA's? We created a new Healthy Eating Index that measured how closely a person's diet followed our recommendations. Applying this revised index to our epidemiological studies, we found that men and women who were eating in accordance with the new pyramid had a lower risk of major chronic disease [see illustration on opposite page].
This benefit resulted almost entirely from significant reductions in the risk of cardiovascular disease—up to 30 percent for women and 40 percent for men. Following the new pyramid's guidelines did not, however, lower the risk of cancer. Weight control and physical activity, rather than specific food choices, are associated with a reduced risk of many cancers.

Of course, uncertainties still cloud our understanding of the relation between diet and health. More research is needed to examine the role of dairy products, the health effects of specific fruits and vegetables, the risks and benefits of vitamin supplements, and the long-term effects of diet during childhood and early adult life. The interaction of dietary factors with genetic predisposition should also be investigated, although its importance remains to be determined.

Another challenge will be to ensure that the information about nutrition given to the public is based strictly on scientific evidence. The USDA may not be the best government agency to develop objective nutritional guidelines, because it may be too closely linked to the agricultural industry. The food pyramid should be rebuilt in a setting that is well insulated from political and economic interests.

MORE TO EXPLORE


The Authors

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What Symptoms to Expect When You Improve Your Diet
by: Dr. Stanley S. Bass

INTRODUCTION
If I were asked what is the area of greatest misunderstanding and confusion in the field of nutrition, I would immediately be forced to reply, it is the failure to properly understand and interpret the symptoms and changes which follow the beginning of a better nutritional program.

HIGHER QUALITY NUTRITION
What is meant by a better nutritional program? It is the introduction of foods of higher quality in place of lower quality ones.

For example, if a person replaces a protein rich food such as pork with beef, the beef may be considered the superior of the two - due to its easier digestibility, lower and less saturated fat content, etc. Similarly chicken is superior to beef, and fish is superior to chicken because of its more rapid digestibility and lower saturated fat content. Lima beans, lentils or chick peas, which are eaten at the same meal with vegetables, are superior in all the nutrients needed to rebuild health. As we go higher on the scale of quality, we begin to include protein rich food which may be eaten in the unfired (raw) state, such as cheese which is made from raw milk and unsalted. Then we ascend to the nuts and seeds which are eaten in the natural state (raw and unsalted).

HIGHEST QUALITY - RAW FOOD
To summarize: the closer the food comes to the natural state in which it occurs, or the closer to its raw, unfired (raw) form, the higher its quality. In this condition, all the enzymes are found intact. The amino acids are in their finest form. The minerals, vitamins, trace elements, carbohydrates and "life force" are present. The life force, in turn is capable of reproducing healthy tissue.

This same classification of quality which we analyzed in relation to protein rich foods applies to the carbohydrates (the starch and sugar-rich foods), the fats and the mineral-rich foods.

TOXIC SUBSTANCES
The quality of a nutritional program is also improved by omitting toxic substances such, as coffee, tea, chocolate, tobacco, salt, etc. from your diet.

FOODS AND RECOVERY FROM ILLNESS
What is the relation of quality of foods to recovery from illness?
It is this in a nutshell: The higher the quality of food we eat, the quicker we recover from disease, provided we are able to digest and assimilate properly.

To this must be added the knowledge of

- proper food combining
- the correct quantity of food to be consumed (of each type) in the meal
- the correct time for eating

REMARKABLE CHANGES
Now - what happens when a person follows these rules and makes a decided improvement in the quality of food consumed?

Remarkable things begin to happen to the body as well as the mind. The amazing intelligence present in every cell
of the body and the wisdom of the body in its operation, immediately becomes manifest. The rule may be stated thusly: When the quality of the food coming into the body is of higher quality than the tissues which the body is made of, **the body begins to discard the lower grade materials and tissues to make room for the superior materials** which it uses to make new and healthier tissue.

**NATURE SELF-CURING**

This is the plan of Nature - the body is very selective and always aims for improvement for better health. **The body always tries to produce health and always will, unless our interference is too great.** Only then do we fail to recover and degenerate further into disease.

The self-curing nature of many conditions such as colds, fevers, cuts, swellings, injuries, etc., furnishes endless examples of how the body tends towards health - always - unless we do something to stop the process.

**MILD OR SEVERE SYMPTOMS**

You may be eating perfectly in regard to quantity, quality and observing all the correct rules, and still symptoms will occur. Those who have lived better lives in the past - who have eaten better foods and who have abused their bodies less with overeating will have reactions ranging from almost none at all or very mild symptoms which may be uncomfortable or acute. Those who have lived worse lives and poisoned themselves more will experience more severe symptoms - if their liver, kidneys, or other important eliminating organs have been damaged. When they have been renovated to the point of fair working order, they will no longer produce symptoms.

**EXAMPLES**

Headaches may occur at the beginning: fever and/or colds may also appear: the skin may break out; there may be a short interval of bowel sluggishness, bowel bloating/discomfort, nausea, vomiting, or occasional diarrhea. Feelings of tiredness and weakness, disinclination to exercise, nervousness, irritability, negativity or mental depression, frequent urination etc.

However, the great majority of people find their reactions tolerable and are encouraged to bear with them, because of the many improvements which have already occurred and are becoming more evident with each day. This acts as an inspirational force to them.

**SYMPTOMS WILL DIFFER**

The symptoms will vary according to the materials being discarded, the condition of the organs involved in the elimination and the amount of energy you have available. The more you rest and sleep when symptoms are present, the milder they are and the more quickly they are terminated. Be happy you are having symptoms. **This is a significant sign you are improving your health.**

**YOUNGER AND HEALTHIER EVERY DAY**

Realize deeply that your body is becoming younger and healthier every day, because you are throwing off more and more wastes which would eventually have brought pain, disease and much suffering.

Those who have the worst symptom-reactions and follow through to their successful termination are thus avoiding some of the worst disease which would eventually have developed had they continued their careless eating habits.
SIMPLE CARBOHYDRATES

WHITE FLOUR
WHITE SUGAR
WHITE RICE
WHITE POTATOES
WHITE PASTA
MOST BREADS
BAGELS
SUGARY CEREALS
CRACKERS
MUFFINS
PANCAKES
PRETZELS
ROOTED VEGETABLES (BEETS, PARSNIPS, RUTABAGA, TURNIPS)

DOUGHNUTS
COOKIES
CAKES
BROWNIES
PIES
BUNS
ROLLS
MOST BOXED FOODS
WATERMELON
WAFFLES
CHIPS
CORN

COMPLEX CARBOHYDRATES

WHOLE GRAINS:
BROWN RICE
BRAN
OATS
COUSCOUS

WHOLE WHEAT
QUINOA
BARLEY

FRUIT: (ALL WITH A FEW LIMITS)
ALL BERRIES
CHERRIES
APRICOTS
APPLES
GRAPEFRUIT
PEACHES
GRAPES
KIWI
PEAR
PINEAPPLE
ORANGES

VEGETABLES: (ALL WITH A FEW LIMITS)
SWEET POTATOES
BROCCOLI
CAULIFLOWER
BEANS/LENTILS
LETTUCE-(GREENS)-ROMAINE
PEPPERS
ONION
MUSHROOM
ASPARAGUS
BRUSSEL SPROUTS
CELERY
CUCUMBER
SPINACH
TOMATO
GARLIC
Week 3 Objectives

1.) Continue to food journal. After the carb lecture, we will now be counting calories, protein, and total carbs.

2.) If you have not completed the objectives of weeks 1 and 2, you will need to go back and complete those objectives before moving onto week three objectives.

3.) AVOID THE BAD (SIMPLE) CARBOHYDRATES. While we do not expect you to be able to rid yourself of all simple carbs the first week working on your carbs, be aware the more you eliminate the wrong carbs that you consume, the healthier you will become. On top of your health, if you have weight to lose (in particular belly weight) you will lose more by eliminating as many (if not all) simple carbs from your diet.

4.) Go thru your kitchen cupboards and fridge and when you discover a carbohydrate apply the carb formula given to you in class. If it does not pass our formula it is a simple carb and should be eliminated from your diet. If it is a good carb, then continue to use those carbs (where we have told you) as one of your good carb choices. Remember: TIMING OF CARBS IS KEY!

5.) Everyone needs to strive to consume their required servings of fruits and vegetables per day. While this seems hard to do, as with all of the information we have taught you, take baby steps towards improving your food choices. Eating more fruits and vegetables today as compared to yesterday is an improvement towards better health.

6.) How’s your protein’s doing? Are you getting in enough calories and protein yet? Keep striving to improve your intake until you reach your targeted goal numbers as reflected on your bibles.

7.) How’s your water intake? Are you drinking enough yet? Keep moving forward...in due time it all comes!

8.) If you play “follow the leader” well, your weigh-in could potentially be one of your BEST weigh-ins!!

9.) It’s your time to make good nutritional choices for life. WE KNOW you can do this and with a strong determination to have good health, YOU KNOW you can too!

HAVE A FANTASTIC WEEK!!