KEY CONCEPTS

■ Nutrition advice is confusing. Scientists have difficulty deriving clear guidelines because a study of an individual nutrient fails to produce an understanding of what happens to it when mixed with other nutrients in the body.

■ The picture becomes more clouded because industry groups constantly press their message to both government agencies and consumers about the benefits of eating particular food products.

■ The simplest message may be the best: do not overeat, exercise more, consume mostly fruits, vegetables and whole grains, and avoid junk foods.

—The Editors

EATING MADE SIMPLE

How do you cope with a mountain of conflicting diet advice?

By Marion Nestle

As a nutrition professor, I am constantly asked why nutrition advice seems to change so much and why experts so often disagree. Whose information, people ask, can we trust? I’m tempted to say, “Mine, of course,” but I understand the problem. Yes, nutrition advice seems endlessly mired in scientific argument, the self-interest of food companies and compromises by government regulators. Nevertheless, basic dietary principles are not in dispute: eat less; move more; eat fruits, vegetables and whole grains; and avoid too much junk food.

“Eat less” means consume fewer calories, which translates into eating smaller portions and steering clear of frequent between-meal snacks. “Move more” refers to the need to balance calorie intake with physical activity. Eating fruits, vegetables and whole grains provides nutrients unavailable from other foods. Avoiding junk food means to shun “foods of minimal nutritional value”—highly processed sweets and snacks laden with salt, sugars and artificial additives. Soft drinks are the prototypical junk food; they contain sweeteners but few or no nutrients.

If you follow these precepts, other aspects of the diet matter much less. Ironically, this advice has not changed in years. The noted cardiologist Ancel Keys (who died in 2004 at the age of
OVERABUNDANCE of food choices confronts shoppers and diners every day.
In 1959 Ancel and Margaret Keys offered the following—familiar and still useful—precepts regarding nutrition and activity:

- Do not get fat; if you are fat, reduce.
- Restrict saturated fats: fats in beef, pork, lamb, sausages, margarine and solid shortenings; fats in dairy products.
- Prefer vegetable oils to solid fats but keep total fats under 30 percent of your diet calories.
- Favor fresh vegetables, fruits and nonfat milk products.
- Avoid heavy use of salt and refined sugar.
- Good diets do not depend on drugs and fancy preparations.
- Get plenty of exercise and outdoor recreation.

100) and his wife, Margaret, suggested similar principles for preventing coronary heart disease nearly 50 years ago (see sidebar at left).

But I can see why dietary advice seems like a moving target. Nutrition research is so difficult to conduct that it seldom produces unambiguous results. Ambiguity requires interpretation. And interpretation is influenced by the individual’s point of view, which can become thoroughly entangled with the science.

**Nutrition Science Challenges**

This scientific uncertainty is not overly surprising given that humans eat so many different foods. For any individual, the health effects of diets are modulated by genetics but also by education and income levels, job satisfaction, physical fitness, and the use of cigarettes or alcohol. To simplify this situation, researchers typically examine the effects of single dietary components one by one.

Studies focusing on one nutrient in isolation have worked splendidly to explain symptoms caused by deficiencies of vitamins or minerals. But this approach is less useful for chronic conditions such as coronary heart disease and diabetes that are caused by the interaction of dietary, genetic, behavioral and social factors. If nutrition science seems puzzling, it is because researchers typically examine single dietary components one by one.

Organic foods have been shown to leave people who eat them with fewer synthetic pesticides in their bodies than are found in those who consume conventional foods. Proving that organics contain more vitamins or antioxidants is more difficult, but preliminary studies clearly suggest that they do.

Overall dietary pattern that really counts most.

For chronic diseases, single nutrients usually alter risk by amounts too small to measure except through large, costly population studies. As seen recently in the Women’s Health Initiative, a clinical trial that examined the effects of low-fat diets on heart disease and cancer, participants were unable to stick with the restrictive dietary protocols. Because humans cannot be caged and fed measured formulas, the diets of experimental and control study groups tend to converge, making differences indistinguishable over the long run—even with fancy statistics.

**It’s the Calories**

Food companies prefer studies of single nutrients because they can use the results to sell products. Add vitamins to candies, and you can market them as health foods. Health claims on the labels of junk foods distract consumers from their caloric content. This practice matters because when it comes to obesity—which dominates nutrition problems even in some of the poorest countries of the world—it is the calories that count. Obesity arises when people consume significantly more calories than they expend in physical activity.

America’s obesity rates began to rise sharply in the early 1980s. Sociologists often attribute the “calories in” side of this trend to the demands of an overwork population for convenience foods—prepared, packaged products and restaurant meals that usually contain more calories than home-cooked meals.

But other social forces also promoted the caloric imbalance. The arrival of the Reagan administration in 1980 increased the pace of industry deregulation, removing controls on agricultural production and encouraging farmers to grow more food. Calories available per capita in the national food supply (that produced by American farmers, plus imports, less exports) rose from 3,200 a day in 1980 to 3,900 a day two decades later (see box on opposite page).

The early 1980s also marked the advent of the “shareholder value movement” on Wall Street. Stockholder demands for higher short-term returns on investments forced food comp-
Companies to expand sales in a marketplace that already contained excessive calories. Food companies responded by seeking new sales and marketing opportunities. They encouraged formerly shunned practices that eventually changed social norms, such as frequent between-meal snacking, eating in book and clothing stores, and serving larger portions. The industry continued to sponsor organizations and journals that focus on nutrition-related subjects and intensified its efforts to lobby government for favorable dietary advice. Then and now food lobbyists have promoted positive interpretations of scientific studies, sponsored research that can be used as a basis for health claims, and attacked critics, myself among them, as proponents of “junk science.” If anything, such activities only add to public confusion.

**FOOD FACTOIDS**

- To reduce your weight by a pound of fat a week, eat 500 fewer calories each day.
- Carbohydrates and proteins have about 4 calories per gram. Food fats contain more than twice as much: 9 calories per gram. A teaspoon holds about 5 grams.
- Alcohol is metabolized in a way that promotes accumulation of fat in the liver, leading to the proverbial beer belly.
- An adult expends about 100 calories for every mile walked or run. It takes nearly three miles to burn off the calories in a 20-ounce soft drink.

Supermarkets as “Ground Zero”

No matter whom I speak to, I hear pleas for help in dealing with supermarkets, considered by shoppers as “ground zero” for distinguishing health claims from scientific advice. So I spent a year visiting supermarkets to help people think more clearly about food choices. The result was my book *What to Eat*.

Supermarkets provide a vital public service but are not social services agencies. Their job is to sell as much food as possible. Every aspect of store design—from shelf position to background music—is based on marketing research. Because this research shows that the more products customers see, the more they buy, a store’s objective is to expose shoppers to the maximum number of products they will tolerate viewing.

**AS FOOD CALORIES SWELL, SO DO WAISTLINES**

A substantial rise in U.S. obesity rates during the past few decades was paralleled by increases in the availability of larger portion sizes, total calories, caloric sweeteners and sugary soft drinks in the food supply. The apparent dip in three of these measures (calories, sugars and sugary soft drinks) after 1998 may be explained by greater use of artificial sweeteners and the partial replacement of sugary soft drinks with beverages that are not sweetened with sugars.

**U.S. OBESITY RATES ON THE RISE**

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**SUPER-SIZE PORTIONS GROW**

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**CALORIES AVAILABLE**

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**CALORIC SWEETENERS AVAILABLE**

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**SUGARY SOFT DRINKS AVAILABLE**

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If consumers are confused about which foods to buy, it is surely because the choices require knowledge of issues that are not easily resolved by science and are strongly swayed by social and economic considerations. Such decisions play out every day in every store aisle.

Are Organics Healthier?
Organic foods are the fastest-growing segment of the industry, in part because people are willing to pay more for foods that they believe are healthier and more nutritious. The U.S. Department of Agriculture forbids producers of “Certified Organic” fruits and vegetables from using synthetic pesticides, herbicides, fertilizers, genetically modified seeds, irradiation or fertilizer derived from sewage sludge. It licenses inspectors to ensure that producers follow those rules. Although the USDA is responsible for organics, its principal mandate is to promote conventional agriculture, which explains why the department asserts that it “makes no claims that organically produced food is safer or more nutritious than conventionally produced food. Organic food differs from conventionally grown food in the way it is grown, handled and processed.”

This statement implies that such differences are unimportant. Critics of organic foods would agree; they question the reliability of organic certification and the productivity, safety and health benefits of organic production methods.

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**FLAWED FOOD PYRAMIDS**

Whether you found the food pyramid created by the U.S. Department of Agriculture in 1992 beneficial or not, it was at least simple to use. The familiar triangular nutrition guide suggested how much of each food category—grains, dairy products, fruits and vegetables, meats and fats, oils and sweets—one should eat every day.

But in my opinion, the USDA’s 2005 replacement, MyPyramid, is a disaster. The process the agriculture agency employed to replace the 1992 food pyramid (left) has been kept secret. It remains a mystery, for example, just how the department came up with a design for a new food guide that emphasizes physical activity but is devoid of food (right). According to the USDA staff, people should keep physically active, eat in moderation, make personalized food choices, eat a variety of foods in the recommended number of servings, and pursue gradual dietary improvement. The color and width of the vertical bands of MyPyramid are meant to denote food groups and servings, but the only way to know this in detail is to log on to a computer. Users must go to www.pyramid.gov and type in gender, age and activity level to obtain a “personalized” dietary plan at one of a dozen calorie levels.

People who seek advice from this site, and millions have, find diets plans notable for the large amounts of food they seem to recommend and for the virtual absence of appeals to “eat less” or to “avoid” certain foods. Critics, not surprisingly, discern the strong influence of food industry lobbyists here. I myself, for example, am expected to consume four cups of fruits and vegetables, six ounces of grains, five ounces of meat and, of course, three cups of milk a day, along with a couple of hundred “discretionary calories” that I can spend on junk foods. For all its flaws, the 1992 pyramid was easier to understand and use.

What MyPyramid really lacks is any notion of a hierarchical ranking of the items in a single food group in terms of nutritional desirability. The preliminary design of MyPyramid in 2004 looked much like the final version with one critical exception: it illustrated a hierarchy of desirable food choices. The grain band, for instance, placed whole-grain bread at the bottom (a positive ranking), pasta about halfway up (a middle rank) and cinnamon buns at the top (“eat less”). In the final version, the USDA eliminated all traces of hierarchy, presumably because food companies do not want federal agencies to advise eating less of their products, useful as such recommendations might be to an overweight public.

—M.N.
Meanwhile the organic food industry longs for research to address such criticisms, but studies are expensive and difficult to conduct. Nevertheless, existing research in this area has established that organic farms are nearly as productive as conventional farms, use less energy and leave soils in better condition. People who eat foods grown without synthetic pesticides ought to have fewer such chemicals in their bodies, and they do. Because the organic rules require pretreatment of manure and other steps to reduce the amount of pathogens in soil treatments, organic foods should be just as safe—or safer—than conventional foods.

Similarly, organic foods ought to be at least as nutritious as conventional foods. And proving organics to be more nutritious could help justify their higher prices. For minerals, this task is not difficult. The mineral content of plants depends on the amounts present in the soil in which they are grown. Organic foods are cultivated in richer soils, so their mineral content is higher.

But differences are harder to demonstrate for vitamins or antioxidants (plant substances that reduce tissue damage induced by free radicals); higher levels of these nutrients relate more to a food plant’s genetic strain or protection from unfavorable conditions after harvesting than to production methods. Still, preliminary studies show benefits: organic peaches and pears contain greater quantities of vitamins C and E, and organic berries and corn contain more antioxidants.

Further research will likely confirm that organic foods contain higher nutrient levels, but it is unclear whether these nutrients would make a measurable improvement in health. All fruits and vegetables contain useful nutrients, albeit in different combinations and concentrations. Eating a variety of food plants is surely more important to health than small differences in the nutrient content of any one food. Organics may be somewhat healthier to eat, but they are far less likely to damage the environment, and that is reason enough to choose them at the supermarket.

**Dairy and Calcium**

Scientists cannot easily resolve questions about the health effects of dairy foods. Milk has many components, and the health of people who consume milk or dairy foods is influenced by everything else they eat and do. But this area of research is especially controversial because it affects an industry that vigorously promotes dairy products as beneficial and opposes suggestions to the contrary.

Dairy foods contribute about 70 percent of the calcium in American diets. This necessary mineral is a principal constituent of bones, which constantly lose and regain calcium during normal metabolism. Diets must contain enough calcium to replace losses, or else bones become prone to fracture. Experts advise consumption of at least one gram of calcium a day to replace everyday losses. Only dairy foods provide this much calcium without supplementation.

But bones are not just made of calcium; they require the full complement of essential nutrients to maintain strength. Bones are stronger in people who are physically active and who do not smoke cigarettes or drink much alcohol. Studies examining the effects of single nutrients in dairy foods show that some nutritional factors—magnesium, potassium, vitamin D and lactose, for example—promote calcium re-
tention in bones. Others, such as protein, phosphorus and sodium, foster calcium excretion. So bone strength depends more on overall patterns of diet and behavior than simply on calcium intake.

Populations that do not typically consume dairy products appear to exhibit lower rates of bone fracture despite consuming far less calcium than recommended [see sidebar on opposite page]. Why this is so is unclear. Perhaps their diets contain less protein from meat and dairy foods, less sodium from processed foods and less phosphorus from soft drinks, so they retain calcium more effectively. The fact that calcium balance depends on multiple factors could explain why rates of osteoporosis (bone density loss) are highest in countries where people eat the most dairy foods. Further research may clarify such counterintuitive observations.

In the meantime, dairy foods are fine to eat if you like them, but they are not a nutritional requirement. Think of cows: they do not drink milk after weaning, but their bones support bodies weighing 800 pounds or more. Cows feed on grass, and grass contains calcium in small amounts—but those amounts add up. If you eat plenty of fruits, vegetables and whole grains, you can have healthy bones without having to consume dairy foods.

A Meaty Debate

Critics point to meat as the culprit responsible for elevating blood cholesterol, along with raising risks for heart disease, cancer and other...
conditions. Supporters cite the lack of compelling science to justify such allegations; they emphasize the nutritional benefits of meat protein, vitamins and minerals. Indeed, studies in developing countries demonstrate health improvements when growing children are fed even small amounts of meat.

But because bacteria in a cow’s rumen attach hydrogen atoms to unsaturated fatty acids, beef fat is highly saturated—the kind of fat that increases the risk of coronary heart disease. All fats and oils contain some saturated fatty acids, but animal fats, especially those from beef, have more saturated fatty acids than vegetable fats. Nutritionists recommend eating no more than a heaping tablespoon (20 grams) of saturated fatty acids a day. Beef eaters easily meet or exceed this limit. The smallest McDonald’s cheeseburger contains 6 grams of saturated fatty acids, but a Hardee’s Monster Thickburger has 45 grams.

Why meat might boost cancer risks, however, is a matter of speculation. Scientists began to link meat to cancer in the 1970s, but even after decades of subsequent research they remain unsure if the relevant factor might be fat, saturated fat, protein, carcinogens or something else related to meat. By the late 1990s experts could conclude only that eating beef probably increases the risk of colon and rectal cancers and possibly enhances the odds of acquiring breast, prostate and perhaps other cancers. Faced with this uncertainty, the American Cancer Society suggests selecting leaner cuts, smaller portions

The Atkins plan, which advises dieters to be less concerned about fat, steers people toward vegetables and protein and away from sugars and refined carbohydrates. “Maybe low carb is a better simple message to the public than low fat,” Gardner says. “We tell them low carb, and they get it. They cut out a couple of sodas or a couple of cookies, and that adds up.”

James Hill, a psychologist and authority on weight loss, agrees that the Atkins approach has virtues. “The Atkins diet is a great way to lose weight,” he says. But it “is not a way to keep weight off,” he asserts. “There’s no way you can do it forever.”

Hill is not terribly interested in comparing diets or devising new ones. “I think the weight-loss part is something we do pretty well,” he says. One of his areas of research concerns individuals who have reduced their weight and sustained it. Hill and Rena Wing of Brown University have established what they call the National Weight Control Registry to collect data on people who have cut at least 30 pounds and kept them off for a year. Many have lost much more—the average is a 70-pound weight loss maintained for six years. “If you look at how they lost weight, there’s no commonality at all,” Hill says. But “if you look at how they kept it off, there’s a lot of commonality.”

The key, he continues, is exercise. “Activity becomes the driver; food restriction doesn’t do it. The idea that for the rest of your life you’re going to be hungry all the time—that’s just silly.” People in the registry get an average of an hour of physical activity every day, with some exercising for as much as 90 minutes a day. They also keep the fat in their diet relatively low, at about 25 percent of their calorie intake. Nearly all of them eat breakfast every day, and they weigh themselves regularly. “They tell us two things,” Hill says. “The quality of life is higher—life is better than it was before.” And “they get to the point with physical activity where they don’t say they love it, but they say ‘it’s part of my life.’”

Hill admits that fitting an hour or more of exercise into the day is difficult, which is why he also focuses on prevention. Many of these people might never have become obese initially if they had exercised a mere 15 to 20 minutes a day. “I think you pay a price for having been obese,” he states, “and you have to do a lot of activity to make up for that.”

Paul Raeburn writes about science, policy and the environment from New York City.

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and alternatives such as chicken, fish or beans—steps consistent with today’s basic advice about what to eat.

Fish and Heart Disease
Fatty fish are the most important sources of long-chain omega-3 fatty acids. In the early 1970s Danish investigators observed surprisingly low frequencies of heart disease among indigenous populations in Greenland that typically ate fatty fish, seals and whales. The researchers attributed the protective effect to the foods’ content of omega-3 fatty acids. Some subsequent studies—but by no means all—confirm this idea.

Because large, fatty fish are likely to have accumulated methylmercury and other toxins through predation, however, eating them raises questions about the balance between benefits and risks. Understandably, the fish industry is eager to prove that the health benefits of omega-3s outweigh any risks from eating fish.

Even independent studies on omega-3 fats can be interpreted differently. In 2004 the National Oceanic and Atmospheric Administration—for fish, the agency equivalent to the USDA—asked the Institute of Medicine (IOM) to review studies of the benefits and risks of consuming seafood. The ensuing review of the research on heart disease risk illustrates the challenge such work poses for interpretation.

The IOM’s October 2006 report concluded that eating seafood reduces the risk of heart disease but judged the studies too inconsistent to decide if omega-3 fats were responsible. In contrast, investigators from the Harvard School of Public Health published a much more positive report in the Journal of the American Medical

DESIGNER SUPERMARKETS
Marketing experts design nearly every feature of food stores—from product placement to mood music—to maximize sales.

When customers enter a grocery store, the first thing they see is typically something colorful, aromatic and enticing—fresh produce, for example.

The long center aisles and aisle-end displays are jam-packed with products, forcing shoppers to pass by many items that they might purchase on impulse.

Food companies pay supermarkets to get their products—salty chips and other junk foods—positioned prominently in huge displays.

Checkout lines are plastered with candy and other junk food items—the last temptation.

Sodas and Obesity
Sugars and corn sweeteners account for a large fraction of the calories in many supermarket foods, and virtually all the calories in drinks—soft, sports and juice—come from added sugars.

In a trend that correlates closely with rising rates of obesity, daily per capita consumption of sweetened beverages has grown by about 200 calories since the early 1980s. Although common sense suggests that this increase might have something to do with weight gain, beverage makers argue that studies cannot prove that sugary drinks alone—independent of calories or other foods in the diet—boost the risk of obesi-
ty. The evidence, they say correctly, is circumstantial. But pediatricians often see obese children in their practices who consume more than 1,000 calories a day from sweetened drinks alone, and several studies indicate that children who habitually consume sugary beverages take in more calories and weigh more than those who do not.

Nevertheless, the effects of sweetened drinks on obesity continue to be subject to interpretation. In 2006, for example, a systematic review funded by independent sources found sweetened drinks to promote obesity in both children and adults. But a review that same year sponsored in part by a beverage trade association concluded that soft drinks have no special role in obesity. The industry-funded researchers criticized existing studies as being short-term and inconclusive, and pointed to studies finding that people lose weight when they substitute sweetened drinks for their usual meals.

These differences imply the need to scrutinize food industry sponsorship of research itself. Although many researchers are offended by suggestions that funding support might affect the way they design or interpret studies, systematic analyses say otherwise. In 2007 investigators classified studies of the effects of sweetened and other beverages on health according to who had sponsored them. Industry-supported studies were more likely to yield results favorable to the sponsor than those funded by independent sources. Even though scientists may not be able to prove that sweetened drinks cause obesity, it makes sense for anyone interested in losing weight to consume less of them.

The examples I have discussed illustrate why nutrition science seems so controversial. Without improved methods to ensure compliance with dietary regimens, research debates are likely to rage unabated. Opposing points of view and the focus of studies and food advertising on single nutrients rather than on dietary patterns continue to fuel these disputes. While we wait for investigators to find better ways to study nutrition and health, my approach—eat less, move more, eat a largely plant-based diet, and avoid eating too much junk food—makes sense and leaves you plenty of opportunity to enjoy your dinner.