

[Home](#)[Interpreting News  
on Diet](#)[Food Pyramids](#)[Fats & Cholesterol](#)[Carbohydrates](#)[Protein](#)[Fiber](#)[Fruit & Vegetables](#)[Calcium & Milk](#)[Alcohol](#)[Vitamins](#)[Healthy Weight](#)[Exercise](#)[Type 2 Diabetes](#)[More Information](#)

## Protein

### Protein: Moving Closer to Center Stage

Until recently, protein got little attention. Like a quiet child in a classroom of rowdies, it was often overshadowed by fat, carbohydrates, and vitamins.

That's changing. Lately there's been an explosion of interest in protein, largely triggered by high-protein diets for weight loss.



Surprisingly little is known about protein and health. We know that adults need a minimum of 1 gram of protein for every kilogram of body weight per day to keep from slowly breaking down their own tissues. That's about 9 grams of protein for every 20 pounds. Beyond that, there's relatively little solid information on the ideal amount of protein in the diet, a healthy target for calories contributed by protein, or the best kinds of protein.

Around the world, millions of people don't get enough protein. Protein malnutrition leads to the condition known as kwashiorkor. Lack of protein can cause growth failure, loss of muscle mass, decreased immunity, weakening of the heart and respiratory system, and death.

In the United States and other developed countries, getting the minimum daily requirement of protein is easy. Cereal with milk for breakfast, a peanut butter and jelly sandwich for lunch, and a piece of fish with a side of beans for dinner adds up to about 70 grams of protein, plenty for the average adult.

Can you get too much protein? Digesting it releases acids that the body usually neutralizes with calcium and other buffering agents in the blood. Eating lots of protein, such as the amounts recommended in the so-called low-carb or no-carb diets, takes lots of calcium. Some of this may be pulled from bone. Following a high-protein diet for a few weeks probably won't have much effect on bone strength. Doing it for a long time,

### What is Protein?

Take away the water and about 75 percent of your weight is protein. This chemical family is found throughout the body. It's in muscle, bone, skin, hair, and virtually every other body part or tissue. It makes up the enzymes that power many chemical reactions and the hemoglobin that carries oxygen in your blood. At least 10,000 different proteins make you what you are and keep you that way.

Twenty or so basic building blocks, called amino acids, provide the raw material for all proteins. Following genetic instructions, the body strings together amino acids. Some genes call for short chains, others are blueprints for long chains that fold, origami-like, into intricate, three-dimensional structures.

Because the body doesn't store amino acids, as it does fats or carbohydrates, it needs a daily supply of amino acids to make new protein.

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### Protein

though, could weaken bone. In the Nurses' Health Study, for example, women who ate more than 95 grams of protein a day were 20 percent more likely to have broken a wrist over a 12-year period when compared to those who ate an average amount of protein (less than 68 grams a day).<sup>(1)</sup> Although more research is clearly needed to define the optimal amount of daily protein, these results suggest that long-term high-protein diets should be used with caution, if at all.

### All protein isn't alike

Some of the protein you eat contains all the amino acids needed to build new proteins. This kind is called complete protein. Animal sources of protein tend to be complete. Other protein sources lack one or more amino acids that the body can't make from scratch or create by modifying another amino acid. Called incomplete proteins, these usually come from fruits, vegetables, grains, and nuts.

Vegetarians need to be aware of this. To get all the amino acids needed to make new protein - and thus to keep the body's systems in good shape - people who don't eat meat, fish, poultry, eggs, or dairy products should eat a variety of protein-containing foods each day.

### The protein package

Animal protein and vegetable protein probably have the same effects on health. It's the protein package that's likely to make a difference. A 6-ounce broiled Porterhouse steak is a great source of complete protein - 38 grams worth. But it also delivers 44 grams of fat, 16 of them saturated.<sup>(2)</sup> That's almost three-fourths of the recommended daily intake for saturated fat. The same amount of salmon gives you 34 grams of protein and 18 grams of fat, 4 of them saturated.<sup>(2)</sup> A cup of cooked lentils has 18 grams of protein, but under 1 gram of fat.<sup>(2)</sup>

The bottom line is that it's important to pay attention to what comes along with the protein in your food choices. If you are partial to beef, stick with the leanest cuts. Fish or poultry are excellent alternatives. Even better options are vegetable sources of protein, such as beans, nuts, and whole grains.

### Protein and chronic disease

The most solid connection between proteins and health has to do with allergies. Proteins in food and the environment are responsible for these overreactions of the immune system to what should be harmless proteins. Beyond that, relatively little

## Nuts for the Heart



Many people think of nuts as just another junk food snack. In reality, nuts are excellent sources of protein and other healthful nutrients.

One surprising finding from nutrition research is that people who regularly eat nuts are less likely to have heart attacks or die from heart disease than those who rarely eat them. Several of the largest cohort studies, including the Adventist Study, the Iowa Women's Health Study, the Nurses' Health Study, and the Physicians' Health Study have shown a consistent 30 percent to 50 percent lower risk of myocardial infarction, sudden cardiac death, or cardiovascular disease associated with eating nuts several times a week. In fact, the [FDA](#) now allows some nuts and foods made with them to carry this claim: "Eating a diet that includes one ounce of nuts daily can reduce your risk of heart disease."

There are several ways that

evidence has been gathered regarding the effect of protein on the development of chronic diseases.

- **Cardiovascular disease:** To date, only one large, prospective study - the Nurses' Health Study - has investigated the association between dietary protein and heart disease or stroke. In this study, women who ate the most protein (about 110 grams per day) were 25 percent less likely to have had a heart attack or to have died of heart disease than the women who ate the least protein (about 68 grams per day) over a 14-year period.(3) Whether the protein came from animals or vegetables or whether it was part of low-fat or higher-fat diets didn't seem to matter. These results offer reassurance that eating a lot of protein doesn't harm the heart. In fact, it is possible that eating more protein while cutting back on easily digested carbohydrates may benefit the heart.
- **Diabetes:** Although proteins found in cow's milk have been implicated in the development of type 1 diabetes (formerly called juvenile or insulin-dependent diabetes), ongoing research has yielded inconsistent results.(4) Later in life, the amount of protein in the diet doesn't seem to adversely affect the development of type 2 (adult-onset) diabetes, although research in this area is ongoing.
- **Cancer:** There's no good evidence that eating a little protein or a lot of it influences cancer risk.

## Protein and weight control

The notion that you could lose weight by cutting out carbohydrates and eating plenty of protein was once tut-tutted by the medical establishment partly because such diets were based on little more than interesting ideas and speculation. In the past two years, head-to-head trials that pitted high-protein, low-carbohydrate diets against low-fat, high-carbohydrate diets have given them a scientific leg to stand on. These trials show that high-protein, low-carbohydrate diets may work more quickly than low-fat diets, at least in the first six months. After a year or so, though, weight loss is about equal.(5-9) Compared with a low-fat, high-carbohydrate diet, a higher-protein diet that goes easy on saturated and trans fats may decrease the amount of triglycerides in the blood, which is also good for the heart.

Why do high-protein, low-carb diets seem to work more quickly than low-fat, high-carbohydrate diets? First, chicken, beef, fish, beans, or other high-protein foods slow the

nuts could have such an effect. The unsaturated fats they contain help lower LDL (bad) cholesterol and raise HDL (good) cholesterol. One group of unsaturated fat found in walnuts, the omega-3 fatty acids, appears to prevent the development of erratic heart rhythms. Omega-3 fatty acids (which are also found in fatty fish such as salmon and bluefish) may also prevent blood clots, much as aspirin does. Nuts are rich in arginine, an amino acid needed to make a molecule called nitric oxide that relaxes constricted blood vessels and eases blood flow. They also contain vitamin E, folic acid, potassium, fiber, and other healthful nutrients.

Eating nuts won't do much good if you gobble them in addition to your usual snacks and meals. At 185 calories per ounce, a handful of walnuts a day could add 10 pounds or more in a year if you don't cut back on something else. This weight gain would tip the scales toward heart disease, not away from it. Instead, eat nuts instead of chips or other, less healthy snacks. Or try using them instead of meat in main dishes, or as a healthful crunch in salads

movement of food from the stomach to the intestine. Slower stomach emptying means you feel full for longer and get hungrier later. Second, protein's gentle, steady effect on blood sugar avoids the quick, steep rise in blood sugar and just as quick hunger-bell-ringing fall that occurs after eating a rapidly digested carbohydrate, like white bread or baked potato. Third, the body uses more energy to digest protein than it does to digest fat or carbohydrate.[\(10\)](#)

There's no need to go overboard on protein and eat it to the exclusion of everything else. Avoiding fruits, vegetables, and whole grains means missing out on healthful fiber, vitamins, minerals, and other phytonutrients. It's also important to pay attention to what accompanies protein. Choosing high-protein foods that are low in saturated fat will help the heart even as it helps the waistline.

### **Straight talk about soy**

One protein source that has been getting a lot of attention is soybeans. Some research suggests that regularly eating soy-based foods lowers cholesterol, chills hot flashes, prevents breast and prostate cancer, aids weight loss, and wards off osteoporosis.[\(11\)](#) These effects may be due to a unique characteristic of soybeans - their high concentrations of isoflavones, a type of plant-made estrogen.

**The U.S. Food and Drug Administration now allows food makers to claim on the label of low-fat foods containing at least 6.25 grams of soy protein that soy can help reduce the risk of heart disease. [\(1\)](#)**

This research has prompted scads of media reports touting the joys of soy. It also has food makers churning out new soy products that are beginning to move into the mainstream. In Boston, for example, soymilk is now advertised on the radio during Boston Red Sox games, alongside donuts, oil additives, and beer.

The U.S. Food and Drug Administration now allows food makers to claim on the labels of low-fat foods containing at least 6.25 grams of soy protein that soy can help reduce the risk of heart disease.[\(12\)](#)

As is so often the case, though, many of the claims made for soy go far beyond the available evidence.

- **Heart disease:** There's decent evidence that soy lowers cholesterol levels. A 1995 meta-analysis of 38 controlled clinical trials showed that eating

approximately 50 grams of soy protein a day in place of animal protein reduced total cholesterol levels by 9.3 percent, LDL cholesterol by 12.9 percent, and triglycerides by 10.5 percent.[\(13\)](#) Such reductions, if sustained over time, could mean a 20 percent reduction in the risk of heart attack, stroke, or other forms of cardiovascular disease. Individuals with very high cholesterol levels, in the vicinity of 300 mg/dL, appeared to benefit most from eating soy-based foods. Keep in mind that 50 grams of soy protein is the equivalent of 1½ pounds of tofu or eight 8-ounce glasses of soymilk a day. The American Heart Association now recommends including soy-based foods as part of a heart-healthy diet.[\(14\)](#)

- **Hot flashes:** Soy has also been investigated as a treatment for hot flashes and other problems that often accompany menopause. In theory, this makes sense. Soybeans are rich in plant estrogens, also called phytoestrogens. In some tissues, these substances mimic the action of estrogen. So they could cool hot flashes by giving a woman an estrogen-like boost during a time of dwindling estrogen levels. Yet carefully controlled studies haven't found this to be the case.[\(15, 16\)](#)
- **Breast cancer:** In some tissues, phytoestrogens block the action of estrogen. If this occurs in breast tissue, for example, then eating soy could reduce the risk of breast cancer because estrogen stimulates the growth and multiplication of breast and breast cancer cells. However, studies to date haven't provided a clear answer, with some showing a benefit and others showing no association between soy consumption and breast cancer.[\(11\)](#) In fact, a handful of unsettling reports suggest that concentrated supplements of soy proteins may stimulate the growth of breast cancer cells.[\(17, 18\)](#) Large prospective studies now underway should offer better information regarding soy and breast cancer risk.
- **Memory and thinking ability:** A few studies have raised the possibility that eating soy could help prevent the age-related loss of memory or decline in cognitive function. Two recent trials have yielded contradictory results in this area, with one showing a benefit for soy [\(19\)](#) and another showing no benefit.[\(20\)](#) Others go further, and suggest that too much soy could lead to memory problems. Among older women of Japanese

ancestry living in Hawaii, those who relied on the traditional soy-based diet were more likely to have cognitive problems than those who switched to a more Western diet.(21)

### The Bottom Line: Recommendations for Protein Intake:

- **Get a good mix of proteins.** Almost any reasonable diet will give you enough protein each day. Eating a variety of foods will ensure that you get all of the amino acids you need.
- **Pay attention to the protein package.** You rarely eat straight protein. Some comes packaged with lots of unhealthy fat, like when you eat marbled beef or drink whole milk. If you eat meat, steer yourself toward the leanest cuts. If you like dairy products, skim or low-fat versions are healthier choices. Beans, soy, nuts, and whole grains offer protein without much saturated fat and with plenty of healthful fiber and micronutrients.
- **Balance carbohydrates and protein.** Cutting back on highly processed carbohydrates and increasing protein improves levels of blood triglycerides and HDL, and so may reduce your chances of having a heart attack, stroke, or other form of cardiovascular disease. It may also make you feel full longer, and stave off hunger pangs. Too much protein, though, could weaken bones.
- **Eat soy in moderation.** Soybeans, tofu, and other soy-based foods are an excellent alternative to red meat. But don't go overboard. Two to four servings a week is a good target. And stay away from supplements that contain concentrated soy protein or soy extracts, such as isoflavones. Larger amounts of soy may soothe hot flashes and other menopause-associated problems, but the evidence for this is weak.

### Dietary Sources of Protein

Food	Serving	Weight in grams	Protein grams	% Daily Value
Hamburger, extra lean	6 ounces	170	48.6	97
Chicken, roasted	6 ounces	170	42.5	85

Fish	6 ounces	170	41.2	82
Tuna, water packed	6 ounces	170	40.1	80
Beefsteak, broiled	6 ounces	170	38.6	77
Cottage cheese	1 cup	225	28.1	56
Cheese pizza	2 slices	128	15.4	31
Yogurt, low fat	8 ounces	227	11.9	24
Tofu	1/2 cup	126	10.1	20
Lentils, cooked	1/2 cup	99	9	18
Skim milk	1 cup	245	8.4	17
Split peas, cooked	1/2 cup	98	8.1	16
Whole milk	1 cup	244	8	16
Lentil soup	1 cup	242	7.8	16
Kidney beans, cooked	1/2 cup	87	7.6	15
Cheddar cheese	1 ounce	28	7.1	14
Macaroni, cooked	1 cup	140	6.8	14
Soymilk	1 cup	245	6.7	13
Egg	1 large	50	6.3	13
Whole wheat bread	2 slices	56	5.4	11
White bread	2 slices	60	4.9	10
Rice, cooked	1 cup	158	4.3	9
Broccoli, cooked	5 inch piece	140	4.2	8
Baked potato	2x5 inches	156	3	6
Corn, cooked	1 ear	77	2.6	5

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