

## **Fiber**



Fiber is found in the cell walls of plants, and functions sort of like a skeleton for the plants to help maintain their shape and structure. Human enzymes cannot digest fiber so it passes through the small intestine into the colon. This is good because it adds bulk to the stool, which makes elimination easier and helps keep the colon healthy. Some disorders like diverticulitis, constipation and irregularity may be connected with not getting enough fiber in the diet.

You can't digest fiber, but the friendly bacteria that live in the colon ferment some types. Fermentation of fiber creates substances called short chain fatty acids that help keep the intestinal walls healthy. Unfortunately it also causes the formation of intestinal gas.

Fiber can be classified as either dietary fiber or functional fiber. Dietary fiber is a natural component of the food you eat. Functional fiber has been isolated, extracted or manufactured. This type of fiber is used as a [dietary supplement](#) or added nutritional ingredient in some foods. The components of dietary fiber include cellulose, lignin, pectin, chitan, beta-glucan and oligosaccharides and there are two general categories of fiber, insoluble and soluble.

### **Insoluble Fiber and Soluble Fiber**

Another way to look at fiber is how easily it devolves in water. Soluble fiber is found in oats, citrus fruits, apples, barley, psyllium, flax seeds and beans. Soluble fiber dissolves in water, which helps soften stools, making them easier to eliminate from the body. Soluble fibers called beta-glucan bind to the bile acids that contain [cholesterol](#). So eating a diet high in this type of soluble fiber has been shown to reduce cholesterol. Insoluble fiber is found in [whole grains](#), nuts, wheat bran and vegetables. This type of fiber does not dissolve in water so it helps move material through the colon faster by increasing the bulk of the stool. This can be helpful to people who suffer from constipation or irregularity. Diets high in insoluble fiber may also decrease the risk of diabetes.

Fiber is made up of some combination of cellulose, hemicellulose, lignin, pectin, chitin, gums, beta-glucan, and resistant starches.

### **Cellulose and Hemicellulose**

Cellulose is an insoluble dietary fiber and may also be used as a functional fiber. Celluloses are long straight chains of glucose molecules and are found as the main component in cell walls of plants. The bacteria in your intestinal tract cannot ferment cellulose well either, so the main function of cellulose is to increase stool bulk and decrease the time it takes for fecal material to pass through the colon. Foods that contain large amounts of cellulose include bran, legumes, nuts, peas, roots, cabbage and apple skins.

Hemicellulose is found in bran, nuts, legumes and whole grains. This form of fiber is also found in the cell walls of plants, however hemicellulose may be made of several types of sugar. Rather than just long straight chains like cellulose, hemicellulose may have side chains and branches. Because of these variations, some hemicelluloses are soluble in water and some are insoluble, plus some forms are fermented by bacteria while others are not.

### **Lignin**

Lignin is a type of fiber with lots of branches of chemicals called phenols rather than sugar molecules. Phenols are currently being studied for a variety of health-related effects including antioxidant actions. Lignin is insoluble in water and indigestible by the friendly bacteria. Food sources include root vegetables, wheat and within berries' seeds. If you have ever made jams or jellies at home, you have probably used pectin to help your fruit gel. Pectin is another type of fiber found in the cell walls of plants that is soluble in water. But it doesn't make a good stool-bulking agent because it is a favorite fiber for the friendly bacteria in your gut to ferment so that very little passes through the colon. Pectin is found in apples, legumes, nuts and citrus fruits.

### **Chitin**

Chitin is similar to cellulose because it is insoluble in water and made up of glucose chains, but it also has [amino acids](#) attached. Chitin is interesting because this fiber is found not only in plants but also in the exoskeletons of insects and in the shells of crustaceans.

### **Gums**

Gums are soluble in water and plants secrete gum when they are damaged. A variety of types of sugars are found in the structures of gums. They are used in food manufacturing as thickening and gelling agents. Examples of gums include guar gum, carob gum, gum Arabic and xanthan gum.

## **Beta-glucans**

Beta-glucan is a water-soluble dietary fiber found in oats and barley and it is often used as a functional fiber and added to foods. Beta-glucans have been shown to reduce cholesterol levels and help control blood-sugar levels.

## **Resistant Starches**

Resistant starch is really starch, but is considered to be a fiber because amylase, the enzyme that breaks starch into individual glucose units, doesn't work on this type of starch. Resistant starch can occur naturally as starch trapped in cell walls of plants or may be formed during cooking or food processing.

According to the [Institute of Medicine](#):

*The recommended intake for total fiber for adults 50 years and younger is set at 38 grams for men and 25 grams for women, while for men and women over 50 it is 30 and 21 grams per day, respectively, due to decreased food consumption.*

Do you really need to worry about getting the different types of fiber? Probably not. As long as you eat a variety of high-fiber foods such as grains, nuts, legumes, fruits and vegetables, you will get plenty of soluble and insoluble fibers.

People who currently have low fiber diets may want to increase their daily intake of high fiber foods slowly because some fiber may increase gas and bloating. The body adjusts the increased amount of fiber over time and the gas and bloating will decrease.

## **Dietary Fiber**

You may have seen dietary fiber on the label listed as soluble fiber or insoluble fiber.

Soluble fiber is found in the following:

- Oatmeal
- Oat bran
- Nuts and seeds
- Most fruits (e.g., strawberries, blueberries, pears, and apples)
- Dry beans and peas

Insoluble fiber found in the following:

- Whole wheat bread
- Barley

- Brown rice
- Couscous
- Bulgur or whole grain cereals
- Wheat bran
- Seeds
- Most vegetables
- Fruits



Which type is best? Both! Each has important health benefits so eat a variety of these foods to get enough of both. You're also more likely to get other nutrients that you might miss if you just chose 1 or 2 high-fiber foods.

**How much dietary fiber do I need each day?**

It's recommended that you get 14 grams of dietary fiber for every 1,000 calories that you consume each day. To find out how many calories you need each day, visit [MyPyramid.gov](http://MyPyramid.gov) and enter your age, sex, height, weight, and activity level in the My Pyramid Plan tool. Then refer to the Easy Fiber Estimator to find how many grams you need.

<b>Easy Dietary Fiber Estimator</b>	
<b>Daily calorie needs</b>	<b>Daily dietary fiber needs</b>
1000	14 grams
1200	17 grams
1400	20 grams
1600	22 grams
1800	25 grams
2000	28 grams

2200	31 grams
2400	34 grams
2600	36 grams
2800	39 grams
3000	42 grams

At first, you may find it challenging to eat all of your daily fiber grams. Just take it slowly and try to choose higher-fiber foods more often. Over time, you'll gradually be eating more fiber!

Try these tips to jumpstart your intake of dietary fiber:

- Choose whole fruits more often than fruit juice. Fresh, frozen, or canned—it doesn't matter— they all count!
- Try to eat two vegetables with your evening meal.
- Keep a bowl of veggies already washed and prepared your refrigerator—try carrots, cucumbers, or celery for a quick snack.
- Make a meal around dried beans or peas (also called legumes) instead of meat. Check [www.fruitsandveggiesmatter.gov](http://www.fruitsandveggiesmatter.gov) for some new ideas.
- Choose whole grain foods more often. Take a look at the "whole grains buzz words list" below to help you decide. A good guide is to make at least ½ of your grain choices be whole grains.
- Start your day with a whole grain breakfast cereal low in added sugar. Top your cereal with fruit for even more fiber. While bananas may come to your mind first, you can add even more variety by also trying sliced peaches or berries. You can often find these fruits year-round in the frozen foods section of your grocery store.