



Dietary Fiber



An introduction: dietary fiber

Dietary fiber has become a household word. Most food labels in the supermarket now list dietary fiber. Even though fiber is not considered a nutrient, health professionals agree that most Americans don't get nearly enough in their diet. Why is fiber important? What does fiber do? The following information on the practical aspects of fiber in the diet as well as food sources and their dietary fiber content will answer these questions.

What is dietary fiber?

Dietary fiber is found only in plant foods like fruits, vegetables, grains and legumes. Complex carbohydrates which are not digested but are excreted from the body are called dietary fiber. Small amounts of some dietary fiber may be broken down by bacteria normally found in the intestine. Two types of dietary fiber are soluble and insoluble. Soluble fiber dissolves in water while insoluble fiber does not dissolve in water. Both types are important to health in different ways.

Soluble fiber includes gums, mucilages, pectin and some hemicelluloses. These fibers are found in all types of peas and beans like lentils, split peas, pinto beans, black beans, kidney beans, garbanzo beans, and lima beans, as well as oats, barley, and some fruits and vegetables like apples, oranges, and carrots. Fiber from psyllium seed, an ingredient in some over-the-counter laxatives, is also in this group.

Cellulose, lignin, and the rest of the hemicelluloses, are all insoluble fibers. These fibers provide structure to plants. Whole grains, wheat and corn fiber, and many vegetables like cauliflower, green beans, and potatoes are good sources of insoluble fiber. The skins of fruits and vegetables are also good sources of insoluble fiber. And, wheat bran is a good source of insoluble fiber, which is why it is added to many dry breakfast cereals.

Most foods contain mixtures of soluble and insoluble fibers. Good sources of one type of fiber usually contain some of the other types of fiber as well. When you add fiber-rich foods to your diet, you usually get the benefits of both types of fibers.

Why eat high-fiber foods?

Fiber has important benefits for health, especially because of its effect on the digestive system. The National Cancer Institute suggests that foods high in fiber may be **protective against some types of cancer**, particularly colon cancer. Colon cancer is the second leading cause of cancer deaths in the U.S. In Asian and African countries, colon cancer rates are very low. Incidence rises as these people adopt Western food and lifestyle habits.

Insoluble fiber, also known as "roughage", aids digestion by trapping water in the colon. The water that is trapped by these fibers keeps the stool soft and bulky. **This promotes regularity and prevents constipation.** Wheat bran, for example, is high in insoluble fiber. Diets high in insoluble fiber also help prevent two kinds of intestinal diseases, diverticulosis and hemorrhoids.

Soluble fiber is also beneficial in the diet. For people with diabetes, eating foods that contain soluble fiber can help **control or lower the level of sugar in their blood** and decrease insulin needs; and, studies have shown that including one or two servings of beans, oats, psyllium, or other sources of soluble fiber help lower fasting blood sugar levels.

Soluble fiber may also help **lower blood cholesterol levels**, especially LDL-cholesterol or the "bad" cholesterol. Fiber decreases blood cholesterol by binding to bile acids, which are made of cholesterol, in the gastrointestinal tract and carrying them out of the body as waste. Researchers have found that soluble fibers in beans, psyllium fiber, oats, and oat bran help lower blood cholesterol levels in many groups of people.

8/99

AZ1127

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE
TUCSON, ARIZONA 85721

Sherry Henley, M.S., R.D.

Instructional Specialist

Scottie Misner, Ph.D., R.D.

Associate Nutrition Specialist

Department of Nutritional Sciences

This information has been reviewed by university faculty.

ag.arizona.edu/pubs/health/az1127.pdf

Fiber can also play an important role in **weight control**. Foods that are rich in fiber are usually low in calories, take longer to chew, and provide a feeling of fullness. A diet rich in fresh fruits, vegetables, whole grains, beans, and peas, usually contains fewer calories than traditional diets. Also, adding more high fiber foods provides a greater variety of nutritious foods to the diet and helps insure adequate nutrients. Another way of lowering calories is to lower fat intake.

An added bonus to eating high-fiber foods is their **vitamin and mineral content is higher** compared to processed white flour or white rice. Enriched products like white flour and rice have some of the nutrients added back while whole grains have all the original vitamins and minerals.

How much fiber is enough or too much?

Americans consume an average of about 11 grams of fiber a day. The National Cancer Institute recommends an intake of 25 to 35 grams daily. It is not necessary to eat excessive amounts of high-fiber foods to increase your fiber intake to 25 to 35 grams daily. The recommended pattern for healthful eating can be seen on page 3, Table I.

To add more fiber to your diet, gradually increase the amount you eat to allow your digestive tract to adjust to the change. Adding fiber too quickly may cause gas, bloating or diarrhea. Drink plenty of water because fiber does its job by trapping water or soaking it up to keep waste products moving along the digestive tract. Drink at least eight glasses of liquids per day.

It's possible to get too much of a good thing, though. Eating 50 or more grams of dietary fiber a day may decrease the amount of minerals your body absorbs, especially zinc, iron, magnesium and calcium. Too much fiber can increase the speed at which food moves through the digestive tract, allowing too little time for some vitamins and minerals to be absorbed, and excess fiber intake can cause gas, bloating, and diarrhea, which can cause a loss of nutrients.

A word of caution before adding fiber to the diets of young children: too much fiber may fill them up too quickly. This makes it hard for them to eat enough calories for proper growth. The elderly or those who have had gastrointestinal surgery should proceed slowly when adding fiber to the diet. They are especially vulnerable to gas, bloating, diarrhea, constipation and poor absorption of nutrients. If in doubt, always check with your doctor before making any major changes.

Fiber from supplements vs. food?

The benefits of good health and nutrition are derived from eating foods high in fiber rather than adding pills or powders to a poor diet. A diet rich in high-fiber foods is also lower in fat and higher in vitamins and minerals than a low-fiber diet. So, choose a low-fat diet

with plenty of vegetables, whole grains, fruits and legumes.

How can fiber be added to the diet?

To add more fiber to your diet, check out the following suggestions and use Table II on page 3 to compare dietary fiber content of common foods:

- **Choose at least 3 servings of whole grains per day**, like whole grain breads, buns, muffins or bagels. Choose foods where the first ingredient listed on food label says "whole grain or whole wheat;" breads, buns, bagels or muffins with added wheat or oat bran; corn bread made from whole, ground cornmeal; whole grain or brown rice; crackers, cookies and other snacks with a whole grain as the first ingredient on the label; whole or part whole grain pasta.
- **Choose whole grains for breakfast**, like oatmeal, whole grain or bran cereals. Combine a high fiber cereal with your favorite cereal for more fiber, flavor and variety, or whole grain or bran muffins, waffles or pancakes. If you bake muffins or bread, substitute whole wheat flour for half the white flour or add wheat or oat bran to the recipe.
- **Choose a variety of foods**. The greater the variety of foods chosen, the better the mix of soluble and insoluble fibers.
- **Choose high fiber snacks**. Fresh fruits, raw vegetables, nuts, and popcorn make good snacks.
- **Choose legumes like dried beans or peas two to three times per week**. These are one of the best sources of fiber. They contain soluble and insoluble fiber. Beans are easy to add to the diet. They can be added to salads, soups, stews, chilis or casseroles or used instead of meat.
- **Choose fruits and vegetables and leave the skin on**. The skin on many fruits and vegetables provides one third to one half of the fiber. Seeds also provide fiber and are found in berries, kiwi, figs, and sesame seeds.
- **Choose whole fruit over juice**. Fiber found mainly in the peel and pulp is removed to produce juice. Orange juice may have some pulp added back. Whole fruit is the best fiber choice among fruit. See page 3, Table II, for Fiber Content in Common Foods.
- **Substitute higher fiber ingredients in recipes**. Replace one half of the flour with whole grain flour in homemade breads and add 1-2 T. bran to mixed dishes such as meatloaf, casseroles, or quiche.
- **Experiment with new whole grains**. Barley, buckwheat, bulger, millet, quinoa, rye berries, and wheat berries are all good sources of fiber. They can be used as breakfast foods or as substitutes for other grains that are commonly eaten. For example, bar-

ley can be used in soups and stews instead of noodles, rice or potatoes and bulger can be used in salads instead of pasta. Rye and wheat berries can be added to breads, and quinoa can be cooked and served like rice.

- **Check labels for information on fiber.** Nutrients required on food labels reflect current public health recommendations. Nutrition labels now list a Daily Reference Value (DRV) for nutrients, including fiber. The DRV for fiber is 25 grams per day based on a 2,000 calorie diet for women or 30 grams per day based on a 2,500 calorie diet for men. Food labels list the fiber content per serving, so be sure the serving size on the label is what you consume or else calculate your fiber intake based on your serving size. See the box below for food label terminology:

Food Label Terminology	
ON THE LABEL	WHAT IT MEANS
High fiber	5 grams or more per serving
Good source	2.5 but less than 5 grams per serving
More or added fiber	At least 2.5 grams more per serving than reference food

References

Bowes and Church's Food Values of Portions Commonly Used, Revised by Jean A. T. Pennington, Ph.D., R.D. 17th Edition, Lippincott Publisher. 1998

Fiber Facts, The American Dietetic Association, CATN:9117, 1995.

Fiber, Your Body's Broom, The American Dietetic Association's Complete Food and Nutrition Guide, Roberta Larson Duyff, M.S., R.D., CFCS. Chronimed Publishing. 1996

Table 1. Fiber and the Food Groups		
FOOD GROUP	SUGGESTED NUMBER OF SERVINGS PER DAY	SERVING SIZE
Vegetables	3-5	1/2 cup cooked or chopped; 1 cup raw leafy
Fruit	2-5	3/4 cup juice; 1/2 cup cooked or canned fruit; 1 piece fresh fruit; 1/2 cup berries, melon, grapes; 1/4 cup dried fruit
Breads, cereals, rice and pasta	6-11 (includes at least 3 whole-grain choices)	1 slice bread; 1 tortilla or muffin; 1/2 cup cooked rice, pasta, or cereal; 1/2-1 cup ready-to-eat cereal
Milk, yogurt and cheese	2-3	1 cup milk or yogurt; 1 1/2 ounces natural cheese
Meats, poultry, fish, dried beans and peas , nuts and eggs	2-3	2-3 ounces meat, poultry, or fish; 1/2 cup beans or peas, 1 egg or 2 Tbsp. peanut butter count as 1 ounce meat

Note: foods in **Bold** are higher in fiber.

The Carbohydrates: Sugars, Starch, and Fibers, Understanding Normal and Clinical Nutrition, Eleanor Noss Whitney, Corinne Balog Cataldo, & Sharon Rady Rolfes. 5th Edition, Wadsworth Publishing Company. 1998

Fiber, *Nutrition Action Health Letter*, Center for Science in the Public Interest, Sept. 1994

Dietary Fiber, by J. Anderson and K. Wilken, Colorado State University Cooperative Extension. May 1996

Starch and Fiber for Health by Mary P. Clarke. Kansas State University Cooperative Extension Service. October 1990

Table 2. Fiber Content of Common Foods

Vegetables (serving size: 1/2 cup unless specified)	Fiber (g)
Peas	4
Potato, baked with skin (1 med)	4
Sweet potato, baked, no skin (1 med)	4
Brussels sprouts	3
Carrots, cooked	2.5
Carrots, (1/2 c.)	2
Cabbage or spinach	2
Broccoli or asparagus	2
Cauliflower	2
Green beans	2
Lettuce, Romaine, raw (1/2 c.)	1.5
Summer squash	1.5
Lettuce, iceberg (1 1/2 c.)	1
Mushrooms (1 c.)	1
Tomato (1/2 medium)	1
Cucumber (1/2 c.)	<1
Celery (1 stalk)	<1
Beans and Soy Foods (1/2 cup unless specified)	Fiber (g)
Lentils	8
Black beans	7.5
Pinto beans	7.5
Chickpeas	6.0
Kidney beans	5.5
Lentil soup, Progresso (1 c.)	5.5
Harvestburger, Green Giant (1)	5.5
Black bean soup, Campbell's (1 c.)	5
Split pea soup, Progresso (1 c.)	5
Better'n burgers, Morningstar Farms (1)	4.5
Natural Touch vegan burgers (1)	4.5
Tofu, firm (3 oz.)	<1

Fruits	Fiber (g)
Pear, with skin (1 medium)	4
Apple, with skin (1 medium)	4
Apricots, dried (1/3 c.)	4
Figs, dried (2)	4
Strawberries (1 c.)	3.5
Orange (1 medium)	3
Banana (1 medium)	3
Cherries (1 c.)	3
Kiwi (1 medium)	2.5
Prunes, dried (3 medium)	2
Grapes (1 1/2 c.)	2
Applesauce (1/2 c.)	2
Cantaloupe (1/4 medium)	1
Watermelon (2 c.)	1
orange juice (1 cup)	1
Breads (1 slice)	Fiber (g)
Grant's Farm stone ground wheat	3
Tortilla, whole wheat (1)	3
Pita, whole wheat (1)	2.5
Oroweat 100% Whole Wheat	2
Grant's Farm Seven or 12 Grain	2
Earth Grains Pumpernickel Rye	2
Rainbo English Muffin (1)	2
Tortilla, Corn (1)	1.5
Grant's Farm Honey Grain	1
Earth Grains Plain Bagel (1)	1
Rainbo Hamburger Bun	1
Earth Grains Jewish Rye	1
Pita or Tortilla, white flour (1)	1
Roman Meal Sandwich	1
White, French, or Vienna bread	1

Grains and Pasta (serving size cooked)	Fiber (g)
Aunt Jemima Buckwheat Pancakes from Mix (4 4" pancakes)	4
Brown rice (2/3 c.)	2
Spaghetti, macaroni or pasta (1 c.)	2
Rice-A-Roni Rice Pilaf (1 c.)	1
White rice (2/3 c.)	1
Snack Foods	Fiber (g)
Peanuts, dry roasted (1/4 c.)	3
Popcorn (3 c. popped)	3
Nabisco Wheat Thins (16)	2
Tortilla Chips	2
Potato Chips	1
Cookies, Archway oatmeal (1)	1
Fig Newtons (2)	1

Cereals	Fiber (g)
Kellogg's Bran Buds (1/3 c.)	11
Kellogg's All-Bran (1/2 c.)	10
Post or Nabisco 100% Bran (1/3 c.)	8
Post Raisin Bran (1 c.)	8
Kellogg's Fruitful Bran (1 1/4 c.)	6
Quaker Oat Bran (1 c.)	6
Ralston 100% Whole Grain Wheat Chex (3/4 c.)	5
Shredded Wheat (2 biscuits)	5
Post Fruit & Fibre (1 c.)	5
Quaker Quick Oats (1 c. cooked)	4
Quaker 100% Natural Lowfat Granola (1/2 c.)	4
Kellogg's Nutri-Grain (3/4 c.)	4
Total (3/4 c.) or Wheaties (1 c.)	3
Cornflakes or Rice Krispies (1 c.)	1

Any products, services, or organizations that are mentioned, shown, or indirectly implied in this publication do not imply endorsement by The University of Arizona.