

Gut Reactions: Topics in Functional Gastrointestinal Disease

Dietary Fiber: What is it?

By: W. Grant Thompson M.D., Emeritus Professor of Medicine, University of Ottawa, Ontario, Canada

Much is published on the benefits of “fiber” in the diet. Nevertheless, there is some confusion over what constitutes dietary fiber. Moreover, some of its proclaimed benefits are controversial. Therefore, it is a challenge to determine if, how much, and what kind of fiber one should take. This article addresses the nature of dietary fiber; its sources; its commonly accepted benefits, especially for the intestinal tract; and how to achieve sufficient daily fiber intake.

What is Dietary Fiber?

Dietary fiber is defined as indigestible carbohydrate, and may or may not be fibrous. Note that carbohydrate contains no nitrogen, only carbon, hydrogen, and oxygen. It derives from a process by which green plants use energy in sunlight to convert water and carbon dioxide into carbohydrates and oxygen (photosynthesis). Carbohydrate is distinct from the other two energy-producing nutrients: protein and fat. Digestible carbohydrate consists of simple carbohydrates (sugars), and complex carbohydrates (starch). The small intestine supplies digestive enzymes in its lining cells or secretions to break down (digest) the carbohydrate molecules into smaller units that can be absorbed. Thus, little if any ingested sugar or starch survives its passage through the small intestine to reach the colon. Indigestible carbohydrate or dietary fiber cannot be digested by the available human small intestinal enzymes, and therefore does reach the colon relatively intact.

As mentioned above, dietary fiber is not always fibrous. In fact, food scientists classify it into *soluble* (in water) and *insoluble* fiber – each with specific properties and possible health benefits. Soluble fiber dissolves in water; it forms a gel when water is added to it. Insoluble fiber absorbs liquid; it adds bulk to stool. Soluble fiber and insoluble fiber are both indigestible. Both types of fiber are important in the diet and have digestive system benefits. As discussed later in this article, many claim that soluble fiber has benefits beyond the *gut* (intestines). However, the actions and benefits of these two types of fiber seem to overlap.

Some Food Sources of Fiber

Food Source	Approximate Content of:		Total Fiber (g)
	Insoluble Fiber (g)	Soluble Fiber (g)	
CEREALS - DRY (1 oz)			
Bran	7	1.5	9
Oatbran	2	2	4
Oatmeal	1.5	1	2.5
Wheat Germ	3.5	.4	4
NUTS (1/2 cup)			
Almonds, roasted	7	1	8
FRUIT (1 medium fruit)			
Apple, with peel	2	1	3
Banana	1.5	.5	2
Blackberries (1/2 cup)	3	.5	3.5
Citrus Fruit (orange, grapefruit)	1.5	2	3.5
Pear, with peel	3	1	4
Prunes, canned (1/2 cup)	3	4	7
BEANS (1/2 cup)			
Black-eyed Peas	7	1	8
Kidney Beans	4	1	5
Lima Beans	3.5	1	4.5
Navy Beans	3.3	2.5	6
Northern Beans	3.5	1	5
Pinto Beans	4	2	6
BREADS (1 slice)			
Bran Bread	2	.5	2.5
Multigrain Bread	1.5	.5	2
Whole Wheat Bread	1.5	.5	2
VEGETABLES (1/2 cup)			
Broccoli	1	1	2.5
Brussels Sprouts	2	1.5	3.5
Carrots	1.5	1	2.5
Green Peas	3	.5	3.5

Source: Drossman DA, Lembo AJ. *Contemporary diagnosis and management of irritable bowel syndrome*. Pennsylvania: Handbooks in Health Care Co. 2002

The Sources of Dietary Fiber

Soluble fiber consists of gels, mucilages, pectins, and gums. It is found in oats, peas, beans, apples, oranges, pears, peaches, grapes, prunes, vegetables, and psyllium (ispaghula in the U.K). Prunes are rich in soluble fiber. Psyllium is found in some cereal products, in dietary supplements, and in commercial bulk fiber laxatives (e.g., Metamucil, Konsyl, generic). Note that some psyllium preparations are combined with a laxative, which is unnecessary for most people.

Insoluble fiber resides in fruits, vegetables, dried beans, wheat bran, seeds, popcorn, brown rice, and whole grain breads, cereals, and pasta. Wheat bran is a convenient source

of dietary fiber. It derives from the outer coating of the grain that is largely removed when the grain is milled into white flour. That is why less refined whole grain bread provides more fiber than refined white bread. The constituents of insoluble fiber include cellulose, hemicellulose, and lignin.

The Benefits of Dietary Fiber

Soluble and insoluble fibers are often lumped together as “fiber,” especially on the labels of foods, laxative preparations, or nutrition products. It appears that soluble fiber, by inactivating bile acids can reduce blood cholesterol. Insoluble fiber, on the other hand, is more effective as a bulking agent with a direct effect on gut function.