

Dietary Fibre: The Non-Nutrient in Carbohydrate Foods

<NutritionSpeak>

Dietary fibre is a group of complex carbohydrates that are not a source of energy for human beings. Because human digestive enzymes cannot break the bonds that hold fibre's sugar units together, fibre adds no calories to your diet and cannot be converted to glucose.

Ruminants (animals, such as cows, that chew the cud and have several stomachs) have a combination of digestive enzymes and digestive microbes that enable them to extract the nutrients from insoluble dietary fibre (cellulose and some hemicelluloses). But not even these creatures can breakdown lignin, an insoluble fibre in plant stems and leaves and the predominant fibre in wood.

But just because you can't digest dietary fibre doesn't mean it isn't a valuable part of your diet. The opposite is true. Dietary fibre is valuable *because* you can't digest it!

The two kinds of dietary fibre

<NutritionSpeak>

Nutritionists classify dietary fibre as either insoluble fibre or soluble fibre, depending on whether it dissolves in water. (Both kinds of fibre resist human digestive enzymes.)

- * **Insoluble fibre**, such as cellulose, some hemicelluloses, and lignin found in whole grains and other plants. This kind of dietary fibre is a natural laxative. It absorbs water, helps you feel full after eating, and stimulates your intestinal walls to contract and relax. These natural contractions, called *peristalsis*, move solid materials through your digestive tract.

By moving food quickly through your intestines, insoluble fibre may help prevent or relieve digestive disorders such as constipation or diverticulosis (infection caused by food getting stuck in small pouches in the wall of your colon). Insoluble fibre also bulks up stool and makes it softer, reducing your risk of developing hemorrhoids and lessening the discomfort if you already have them.

- * **Soluble fibre**, such as pectins in apples and beta-glucans in oats and barley, seems to lower the amount of cholesterol circulating in your blood (your *cholesterol level*). This may be why a diet rich in fibre appears to offer some protection against heart disease.

<Tip>

Here's a benefit for dieters: Soluble fibre forms gels in the presence of water, which is what happens when apples and oat bran reach your digestive tract. Like insoluble fibre, soluble fibre can make you feel full without adding calories.

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Ordinary soluble dietary fibre cannot be digested, so your body does not absorb it. But in 2002, researchers in the USA fed laboratory mice a form of soluble dietary fibre called *modified citrus pectin*. The fibre, which comes from citrus fruit, can be digested. When fed to laboratory rats, it appeared to reduce the size of tumors caused by implanted human breast and colon cancer cells. The researchers believe that the fibre prevents cancer cells from linking together to form tumors. There is still plenty more research needed before firm conclusions can be made but it does seem to add fuel to the message to eat more fruit and veg!

Getting fibre from food

You find fibre in all plant foods fruits, vegetables, and grains. But you find absolutely no fibre in foods from animals: meat, fish, poultry, milk, milk products, and eggs.

A balanced diet with lots of foods from plants gives you both insoluble and soluble fibre. Most foods that contain fibre have both kinds, although the balance usually tilts toward one or the other. For example, the predominant fibre in an apple is pectin (a soluble fibre), but an apple peel also has some cellulose, hemicellulose, and lignin.

Table 8-1 shows you which foods are the best sources of what fibre. A diet rich in plant foods (fruits, vegetables, grains) gives you adequate amounts of dietary fibre. This list shows which foods are particularly good sources of specific kinds of dietary fibre.

PLT: Please style Table 8-1 as shown on page 100 of the 2nd edition (copy provided). as

Table 8-1

Where's the Fibre?

Fibre	Found in . . .
Soluble fibre	
Pectin	Fruits (apples, strawberries, citrus fruits)

Beta-glucans	Oats, barley
Gums	Beans, cereals (oats, rice, barley), seeds, seaweed
Insoluble fibre	
Cellulose	Leaves (cabbage, spring greens), roots (carrots, parsnips), bran, whole wheat, rye, peas and beans
Hemicellulose	Seed coverings (bran, whole grains)
Lignin	Plant stems, leaves, and skin

How much fibre do you need?

According to Ministry of Agriculture, Fisheries and Food (now the Food Standards Agency) in 1998 , the average UK diet contained about 12grams of fibre a day. This is far below the recommended Dietary Reference Value (DRV) recommendation that adult UK diets should contain 18grams of fibre a day from food. There are no specific recommendations for dietary fibre in children's diets except that intake should be proportionately lower than that of adults. The panel who set the DRVs could see no benefit from increasing fibre intake to 32grams per day as is recommended in some countries.

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The amounts of dietary fibre recommended by DRVs are believed to give you the benefits you want without causing fibre -related unpleasantries.

Unpleasantries? Like what? And how will you know if you've got them?

Trust us: If you eat more than enough fibre , your body will tell you right away. All that roughage may irritate your intestinal tract, which will issue an unmistakable protest in the form of intestinal gas or diarrhoea. In extreme cases, if you don't drink enough fluid to carry the fibre you eat easily through your body, the dietary fibre may form a mass that can end up as an intestinal obstruction (for more about water, see Chapter 13).

<Tip>

If you decide to up the amount of fibre in your diet, follow our advice:

- * Do it *very* gradually, a little bit more every day. That way you're less likely to experience the kind of intestinal distress we talked about earlier. In other words, if your current diet is heavy on no-fibre foods such as meat, fish, poultry, eggs, milk, and cheese, and low-fibre foods such as white bread and white rice, don't load up on bran cereal (36.4 grams dietary fibre per 100g serving) or dried figs (6.9 grams per serving) all at once. Start by adding a serving of cornflakes (0.9 grams dietary fibre) at breakfast, maybe an apple (1.8 grams) at lunch, a pear (2.2 grams) at mid-afternoon, and a small tin of baked beans (6.9 grams) at dinner. Four simple additions, and already you're up to 18 grams dietary fibre.
- * Follow the recommendations of the Balance of Good Health (see Chapter 17) and increase your consumption of grain products, vegetables, and fruits all good sources of dietary fibre.
- * Always check the nutrition label whenever you shop (for more about the wonderfully informative guides, see Chapter 17). When choosing between similar products, just take the one with the higher fibre content per serving. For example, white pita bread generally has about 2.2 grams dietary fibre per serving. Wholemeal wheat pita bread has 5.8 grams. From a fibre standpoint, you know which works better for your body. Go for it!

By the way, dietary fibre is like a sponge. It soaks up liquid, so increasing your fibre intake may deprive your cells of the water they need to perform their daily work (for more about how your body uses the water you drink, see Chapter 13). Unless you're already drinking at least six large glasses of water every day, we and any other dietitian worth their salt suggest upping your fluid intake when you consume more fibre.

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Table 8-2 shows the amounts of all types of dietary fibre insoluble plus soluble in a 100-gram serving of specific foods. By the way, nutritionists like to measure things in terms of 100-gram portions because that makes comparing foods at a glance possible.

To find the amount of dietary fibre in your own serving, divide the gram total for the food shown in Table 8-2 (or the Appendix) by 3.5 and multiply the result by the number of grams in your portion. For example, if you're having 25 grams of cereal, the customary serving of ready-to-eat breakfast cereals, divide the gram total of dietary fibre by 25; then multiply by one. If your slice of bread weighs 35 grams, divide the gram total by 35; then multiply the result by 0.5 (one-half). Confused? Read on!

Or easier still, you can look at the nutrition label on the side of the package that gives the nutrients per portion- much more simple

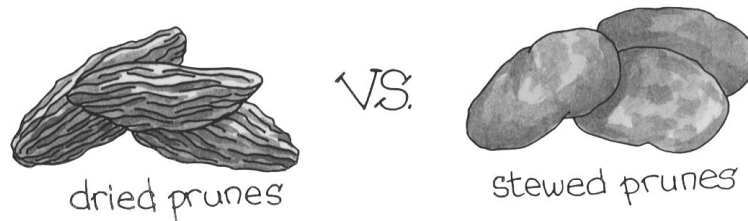
Finally, the amounts on this chart are averages. Different brand-name processed products (breads, some cereals, cooked fruits, and vegetables) may have more (or less) fibre per serving.

Fibre factoid

The amount of fibre in a serving of food may depend on whether the food is raw or cooked. For example, as you can see from Table 8-2, a 100g serving of plain dried prunes has 5.7 grams of fibre while a 100g serving of canned prunes in syrup has 2.8 grams of fibre.

Why? When you stew and can prunes, they plump up which means they absorb water and sugar. The syrup adds weight but (obviously) no fibre. So a serving of prunes-plus-syrup has slightly less fibre per ounce than a same-weight serving of plain dried prunes.

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PLT: Please style Table 8-2 as shown on pages 102-104 of 2nd edition (copy provided). As Please delete these illustrations

Table 8-2 **Getting Fibre from Food**

Food	Grams of Fibre (Englyst method) in a 100-Gram Serving (Rachel- we use 2 methods for calculating fibre in the UK- southgate and englyst, but the Englyst is likely to be the method adopted by the EU for food labeling in the future)
Bread	
Granary bread	4.3
Wholemeal bread	5.8
Pita bread (white)	2.2
Brown bread	3.5
White bread	1.5
Cereals	
All bran	24.5

Bran flakes	13.0
Cornflakes	0.9
Weetabix	9.7
Porridge (old fashioned oats)	9.0
Grains	
White flour	3.1
Spaghetti white, boiled	1.2
Spaghetti, wholemeal, boiled	3.5
Noodles, egg, boiled	0.6
Rice, cooked (brown)	0.8
Rice, cooked(white)	0.1
Oatmeal, quick cook, raw	7.1
Wheat bran	36.4
Fruits	
Apple, with skin	1.8
Apricots, dried	6.3
Figs, dried	6.9
Banana	1.1
Pear, raw	2.2
Orange	1.7
Prunes, ready to eat	5.7
Orange juice	0.1
Vegetables	
Baked beans canned in tomato sauce	3.7
Carrots	2.5
Red Kidney beans, canned	8.5
Broccoli,	2.3
Brussels sprouts, cooked	3.1

Cabbage, white,	1.8
Cauliflower,	1.6
Celery, raw	1.1
Peas frozen, boiled,	5.1
Potatoes, white, baked, w/skin	2.7
New potatoes, boiled in skin	1.5
Tomatoes, raw	1.0
Nuts and seeds	
Almonds, blanched	7.4
Cashew nuts, roasted and salted	3.2
Walnuts	3.5
Peanuts, dry-roasted	6.4
Sunflower seeds	6.0
Other	

Fibre Royal Society of Chemistry & Ministry of Agriculture, Fisheries and Foods McCance & Widdowson's The Composition of foods 5th Ed, Royal Society of Chmistry, UK, 1994

Fibre and your heart: The continuing saga of oat bran

Oat bran is the second chapter in the fibre fad that started with wheat bran around 1980. Wheat bran, the fibre in wheat, is rich in the insoluble fibres cellulose and lignin and first hit the headlines as high fibre diets for weight loss back in the 1970s.

Oat bran's "magic wand" factor is claimed to be the soluble fibre beta-glucans. For more than 30 years, scientists have known that eating foods high in soluble fibre may help lower your cholesterol, although nobody knows exactly why, one thing we do know is that oats keep you fuller for longer and make you less likely to snack on sugary and fatty snacks after you eat them. Fruits and vegetables (especially dried beans) are also high in soluble fibre as well as heart friendly antioxidant vitamins and minerals, but ounce for ounce, oats have more soluble fibre. In

addition, beta-glucans are thought to be a more effective cholesterol-buster than pectin and gum, which are the soluble fibres in most fruits and vegetables. This incomplete knowledge gave rise to oats being proclaimed as the cholesterol lowering "wonder food" and the resultant deluge of oat and oat bran diet books hit the shelves. Then in 1999 further research published in the American Journal of Clinical Nutrition concluded that the cholesterol lowering powers of soluble fibre was less than had been originally thought. Confused? Well why wouldn't you be, the point is that this is how evidence for public health messages is done, someone has a theory, runs a trial and makes a conclusion, then someone else looks at the same theory, tweaks it a bit and runs another trial and so on. Slowly but surely the evidence begins to point one way or the other but along the way their can be conflicting results which when picked up by the media often and lead to the wrong message falling into popular belief.

In 1999, The British Nutrition Foundation summarised the effects of the "cardioprotective diet" which was compiled from evidence gathered from three major studies, The DART trial in 1998, the Lyon Diet Heart Study in 1994 and the Indian cardioprotective diet trial in 1992. All three trials looked at different aspects of the cardioprotective diet which was originally derived from the Mediterranean area where consumption of oily fish, polyunsaturated oils and (for our interest right now) fruits and vegetables is high. Although the evidence pointed to the "cholesterol lowering" effect of the soluble fibre found in fruits, vegetables and indeed oats to be smaller than had once been thought, the other benefits from soluble fibre rich foods such as the antioxidant vitamins and minerals are sufficiently protective to the heart to justify the message that consumption should be increased. In the UK it is not legal to claim that a particular food can treat, prevent or cure disease, however it is possible to imply that a food may benefit health by mentioning a disease risk factor which is obviously open to wide interpretation and explains why food manufacturers will state on packaging that "oats may help lower cholesterol when eaten as part of a low fat diet and a healthy lifestyle" and that's the point- oats are a healthy nutritious food, but you can only realise all of the benefits of eating oats when they are part of that essential healthy diet and lifestyle. No food has magical powers on it's own and so these claims should be taken in context and not seen as a cure all "superfood". It's expected that the law around food labelling and the types of claims manufacturers can use on packaging will change and be "tightened up" in the next few years. We say that it's well overdue and can't come soon enough!

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