

Fibre in food

Dietary fibre is found in cereals, fruits and vegetables. Fibre is made up of the indigestible parts or compounds of plants, which pass relatively unchanged through our stomach and intestines. The main role of fibre is to keep the digestive system healthy.

Other terms for dietary fibre include 'bulk' and 'roughage', which can be misleading since some forms of fibre are water soluble and aren't bulky or rough at all.

Fibre is a carbohydrate

Fibre is largely a carbohydrate. The building blocks of all carbohydrates are different types of sugars and they can be classified according to how many sugar molecules are combined in the carbohydrate:

- **Simple sugars** - consist of 1-2 sugar molecules; for example glucose, fructose, sucrose, maltose and lactose.
- **Oligosaccharides** - consist of 3-10 glucose molecules joined together.
- **Starch polysaccharides** - have more than 10 glucose molecules joined together.
- **Non-starch polysaccharides** - have more than 10 sugar molecules; for example xylose, arabinose and mannose.

Fibre keeps the digestive system healthy

Dietary fibre is mainly needed to keep the digestive system healthy. It also contributes to other processes, such as stabilising glucose and cholesterol levels. In countries with traditionally high fibre diets, diseases such as bowel cancer, diabetes and coronary heart disease are much less common than in the West.

Most Australians don't consume enough fibre. On average, most Australians consume 18-25g of fibre daily. The Heart Foundation recommends that adults should consume approximately 30g daily. Australian experts suggest that children should eat 10g of fibre a day plus an additional gram for every year of age. For instance, a 10 year old child should eat 15-20g of fibre per day.

Disorders that can arise from a low fibre diet include:

- Constipation
- Irritable bowel syndrome
- Diverticulitis
- Heart disease
- Some cancers.

Two types of fibre

There are broadly two categories of fibre and we need to eat both in our daily diets:

- **Soluble fibre** - includes pectins, gums and mucilage, which are found mainly in plant cells. One of its major roles is to lower blood cholesterol levels. Good sources of soluble fibre include fruits, vegetables, oat bran, barley, seed husks, flaxseed, psyllium, dried beans, lentils, peas, soymilk and soy products. Soluble fibre can also help with constipation.

- **Insoluble fibre** - includes cellulose, hemicelluloses and lignin, which make up the structural parts of plant cell walls. A major role of insoluble fibre is to add bulk to faeces and to prevent constipation and associated problems such as haemorrhoids. Good sources include wheat bran, corn bran, rice bran, the skins of fruits and vegetables, nuts, seeds, dried beans and wholegrain foods.

Both types of fibre are beneficial to the body and most plant foods contain a mixture of both types.

Resistant starch

Resistant starch, while not traditionally thought of as fibre, acts in a similar way. Resistant starch is the part of starchy food (approximately 10 per cent) that resists normal digestion. It is found in many unprocessed cereals and grains, firm bananas, potatoes and lentils, and is added to bread and breakfast cereals as Hi-Maize. It can also be formed by cooking and manufacturing processes such as snap freezing.

Resistant starch is also important in bowel health. Bacteria in the large bowel ferment and change the resistant starch into short-chain fatty acids, which are important to bowel health and may protect against cancer. These fatty acids are also absorbed into the bloodstream and may play a role in lowering blood cholesterol levels.

Fibre keeps the digestive tract healthy

The principle advantage of a diet high in fibre is the health of the digestive system. The digestive system is lined with muscles that massage food along the tract from the moment a mouthful is swallowed until the eventual waste is passed out of the bowel (a process called peristalsis). Since fibre is relatively indigestible, it adds bulk to the faeces.

Soluble fibre soaks up water like a sponge, which helps to plump out the faeces and allows it to pass through the gut more easily. It acts to slow down the rate of digestion. This slowing down effect is usually overridden by insoluble fibre, which doesn't absorb water and speeds up the time that food passes through the gut.

You must drink lots of fluid

A high fibre diet may not prevent or cure constipation unless you drink enough water every day. Some high fibre breakfast cereals may have around 10g of fibre per serve and if this cereal is not accompanied by enough fluid it may cause constipation.

Fibre and ageing

Fibre is even more important for older people. The digestive system slows down with age, so a high fibre diet becomes even more important.

Lowering blood cholesterol

Recently, there has been a great deal of interest in oat bran, since some studies showed that regular intake of foods high in soluble fibre - such as oat bran, baked beans and soybeans - reduced blood cholesterol levels. When blood cholesterol levels are high, fatty streaks and plaques are deposited along the walls of arteries. This can make them dangerously narrow and lead to an increased risk of coronary heart disease.

It is thought that soluble fibre lowers blood cholesterol by binding bile acids (which are made from cholesterol to digest dietary fats) and then excreting them. Cereal fibre seems to be more protective against coronary heart disease than the fibre from fruit and vegetables.

A method of weight control

In many cases, people who are overweight or obese have been shown to lose significant amounts of excess body fat simply by increasing the amount of dietary fibre, especially soluble fibre, in their daily diet.

Fibrous foods are often bulky and, therefore, filling. They also tend to be low in fat. Soluble fibre forms a gel that slows down the emptying of the stomach and the transit time of food through the digestive system. This extends the time a person feels satisfied or 'full'. It also delays the absorption of sugars from the intestines. This helps to maintain lower blood sugar levels and prevent a rapid rise in blood insulin levels, which has been linked with obesity and an increased risk of diabetes.

The extra chewing time often required of high fibre foods also helps contribute to feeling satisfied. As a result, a person on a high fibre diet is likely to eat less food and so consume less kilojoules (calories).

Good for people with diabetes

For people with diabetes, eating a diet high in fibre slows glucose absorption from the small intestine into the blood. This reduces the possibility of a surge of insulin, the hormone produced by the pancreas to stabilise blood glucose levels.

Conditions linked to low fibre diets

Eating a diet low in fibre can contribute to many disorders, including:

- **Constipation** - small, hard and dry faecal matter that is difficult to pass.
- **Haemorrhoids** - varicose veins of the anus.
- **Diverticulitis** - small hernias of the digestive tract caused by long term constipation.
- **Irritable bowel syndrome** - pain, flatulence and bloating of the abdomen.
- **Overweight and obesity** - carrying too much body fat.
- **Coronary heart disease** - a narrowing of the arteries due to fatty deposits.
- **Diabetes** - a condition characterised by too much glucose in the blood.
- **Colon cancer** - cancer of the large intestine.

The debate about diet, cancer and heart disease continues

Studies that show a reduced risk of some cancers and coronary heart disease have received much attention. How these apparent health benefits arise is not fully understood. It is very likely that these observed health benefits occur indirectly, through the protective effects of 'phytochemicals' (such as antioxidants) that are closely associated with the fibre components of fruits, vegetables and cereal foods. It has also been suggested that dietary fibre dilutes harmful substances and possible carcinogens present in the diet, thus reducing the gut's exposure to such compounds.

Recent studies have challenged the widely held belief that fibre reduces the risk of developing colon cancer. Differences in methodology, in particular the type of fibre used, between these recent studies and earlier ones may explain the inconsistencies in their findings.

Ways to increase your fibre intake

Simple suggestions for increasing your daily fibre intake include:

- Eat breakfast cereals that contain barley, wheat or oats.
- Switch to wholemeal or multigrain breads and brown rice.
- Add an extra vegetable to every evening meal.
- Snack on fruit, dried fruit, nuts or wholemeal crackers.

A daily intake of more than 30g can be easily achieved if you eat wholegrain cereal products, more fruit, vegetables and legumes and, instead of low fibre cakes and biscuits, have nuts or seeds as a snack or use in meals.

You don't need to eat a lot more kilojoules to increase your fibre intake; you can easily double your fibre intake without increasing your kilojoule intake by being more selective - compare the tables below.

Fibre intake of less than 20g per day

	Fibre (g)	Kilojoules (kJ)
1 cup puffed rice cereal	0.4	444
4 slices white bread	3.0	1166
1 tablespoon peanut butter	2.7	610
1 piece of fruit (apple)	1.7	268
1/2 cup canned fruit, undrained	1.4	468
1/2 cup frozen mixed vegetables	4.3	102
Mashed potato 120g	1.7	336
1 cup white cooked rice	1.0	999
2 plain dry biscuit	0.4	150
1 slice plain cake 60g	0.6	643
1 cup commercial fruit juice	0.8	391
TOTAL	17.9g	5,557kJ

Fibre intake of more than 30g per day

	Fibre (g)	Kilojoules (kJ)
2 wholewheat cereal biscuits (for example Weetbix or Vita brits)	3.2	398
4 slices wholegrain bread	5.7	1085
1 tablespoon peanut butter	2.7	610
2 pieces of fruit (apple & pear)	4.9	515
1 cup frozen mixed vegetables	8.6	203
1 small boiled potato with skin, 100g	2.8	338
1 cup white cooked spaghetti	2.5	696
2 wholemeal dry biscuit	1.5	209
25 almonds	3.0	852
1 cup whole fruit juice	0.5	362
TOTAL	35.4g	5,118kJ

A sudden increase in fibre can have explosive effects

It should be noted that a sudden switch from a low fibre diet to a high fibre diet can create some abdominal pain and increased flatulence. Also, very high fibre diets (more than 40g daily) are linked with decreased absorption of some important minerals, such as iron, zinc and calcium. This occurs when fibre binds these minerals and forms insoluble salts, which are then excreted.

This could increase the risk of developing deficiencies of these minerals in susceptible individuals. Adults should aim for a diet that contains 30-35g of fibre per day and should introduce fibre into the diet gradually to avoid any negative outcomes.

It is better to add fibre to the diet from food sources rather than from fibre supplements as these can aggravate constipation, especially if you don't increase the amount of water you drink daily.

Where to get help

- Your doctor
- An accredited practising dietitian, contact the Dietitians Association of Australia

Things to remember

- Dietary fibre is found in the indigestible parts of cereals, fruits and vegetables.
- A diet high in fibre keeps the digestive system healthy.
- Most Australians don't eat enough fibre.

This page has been produced in consultation with, and approved by:

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