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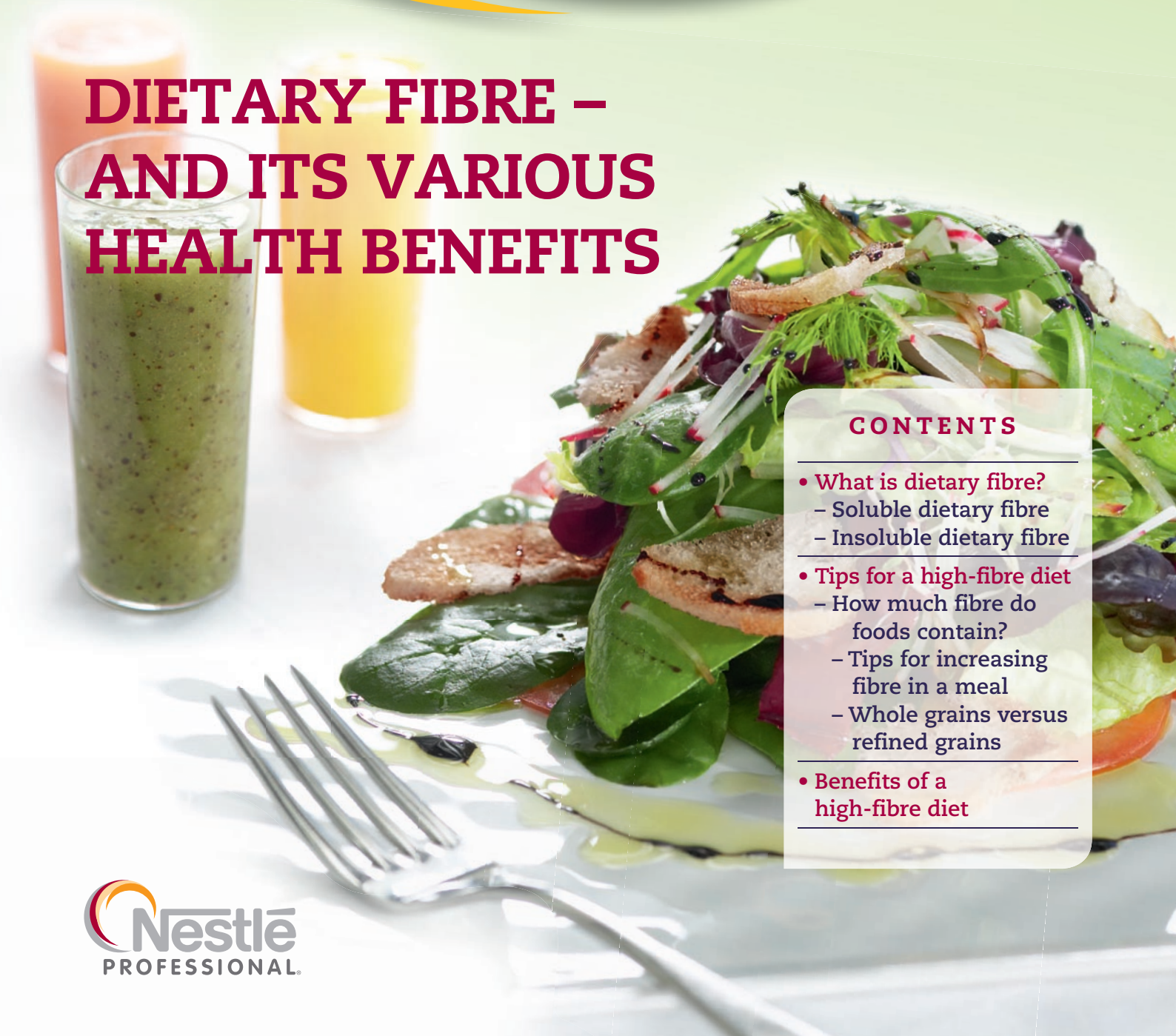
nutri pro®

Nestlé Professional Nutrition Magazine

DIETARY FIBRE – AND ITS VARIOUS HEALTH BENEFITS



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Nestlé PROFESSIONAL

DIETARY FIBRE and its various health benefits

EDITORIAL

Dear All

The term "dietary fibre" is now well accepted by health professionals because of a significant amount of scientific evidence showing that consumption of dietary fibre reduces the risk of developing specific chronic diseases or conditions. Most prominent of these are coronary heart disease, Type II diabetes, certain types of cancers, as well as obesity. Some regulatory authorities have already approved specific health claims based on the available scientific substantiation. We hope you have an enriching reading experience.

Werner Bauer, Executive Vice President
Chief Technology Officer

Dear Reader

Dietary fibre is an extremely important component of a balanced diet. It has numerous functions in the human body and is also linked to the prevention of many diseases. Most people, however, do not eat enough dietary fibre. Their daily intake is only half of the amount that is recommended for a healthy diet.

This NutriPro gives you information about the different types of dietary fibres, the primary sources and the benefits of a high-fibre diet. For your daily work, it gives you tips how to implement more fibre in meal planning for breakfast, lunch and dinner.

Sascha Türler-Inderbitzin, NESTLÉ PROFESSIONAL
Strategic Business Division

What is dietary fibre?

The term dietary fibre – commonly called fibre – describes a number of different substances such as cellulose, pectin, lignin and guar. All of them are naturally found only in plants and are resistant to digestion in, and absorption by, the human small intestine. Partial, or even complete, fermentation does occur, however, in the large intestine.
Dietary fibre is classified into two basic types: soluble fibre and insoluble fibre. Solubility determines their various physiological effects.

Soluble dietary fibre

Soluble dietary fibre partially dissolves in water and forms a gel when cooling (e.g. pectin). It can also be digested and metabolised by bacteria in the large intestine. This metabolism produces gas and short chain fatty acids that can be absorbed in small quantities by the body. The most important forms of soluble dietary fibre are pectin, gums, guar and some hemicelluloses. Food sources rich in these types of fibre components include legumes, vegetables, fruits, oat bran and seeds. Research shows that soluble fibre lowers cholesterol (important in the prevention of heart disease) and slows the absorption of glucose, thereby reducing fluctuations in blood glucose (important in glucose control for people with diabetes).

Insoluble dietary fibre

Insoluble dietary fibre does not dissolve in water and passes through the gastrointestinal tract without being changed. The most important forms are cellulose, hemicellulose and lignin. Insoluble fibres are found in whole grain products, especially whole grain breakfast cereals, wheat bran and some vegetables. Research shows that insoluble fibre appears to speed the passage of foods through the stomach and intestines (important, for example, in the prevention of constipation) and possibly reduces the risk of colorectal cancer.

Vegetables and fruits (any plant product for that matter) contain both soluble and insoluble fibre, but depending on the type and degree of ripeness of vegetable or fruit, the soluble to insoluble fibre ratio may vary.

PRIMARY SOURCES OF DIFFERENT KINDS OF FIBRES

Soluble dietary fibre

Grain products:
- oatmeal
- oat bran
- barley

Fruits:
- apples
- blueberries
- citrus fruits
- pears
- strawberries

Legumes:
- beans
- dried peas
- lentils

Insoluble dietary fibre

Grain products:
- whole wheat bread
- whole wheat pasta
- couscous
- brown rice
- bulgur
- whole grain breakfast cereals
- wheat bran

Vegetables:
- carrots
- cucumbers
- celery
- maize
- seeds
- tomatoes
- zucchini

Legumes:
- beans
- lentils

GOOD TO KNOW

Pectin

Pectin is found naturally in fruits (e.g. apples, plums, quinces, citrus fruits) and vegetables (e.g. carrots, potatoes). The main use for pectin in the food industry is as a gelling/thickening agent and stabilizer for foods such as jams, jellies, sweets, dairy products and canned foods. It is also used (in addition to gums) as a substitute for fat in reduced-fat products, e.g. in baked goods.

Resistant starch

The term dietary fibre also includes a type of starch that resists digestion in the small intestines of healthy people and passes unchanged into the large intestine. It is commonly referred to as resistant starch. Some types of resistant starch – at the moment four classes of resistant starch have been identified – exist naturally and are mainly found in potatoes (especially when cooked and then cooled), under-ripe bananas, whole or partly-milled grains and in breakfast cereals.
The food industry uses these resistant starches in different ways. When added to food such as bread, biscuits, sweet goods, pasta, nutritional bars and cereal, resistant starch can increase fibre content without affecting taste or texture. Resistant starch also lowers the caloric content of foods when it is used to replace flour or other rapidly digested carbohydrates. Natural resistant starch delivers between 2–3 kcal/gram (8–12 kJ/gram) of ingredient, which contrasts with 4 kcal/gram (16 kJ/gram) for “normal” carbohydrates.

DIETARY FIBRE

Fibre content in different kinds of foods:

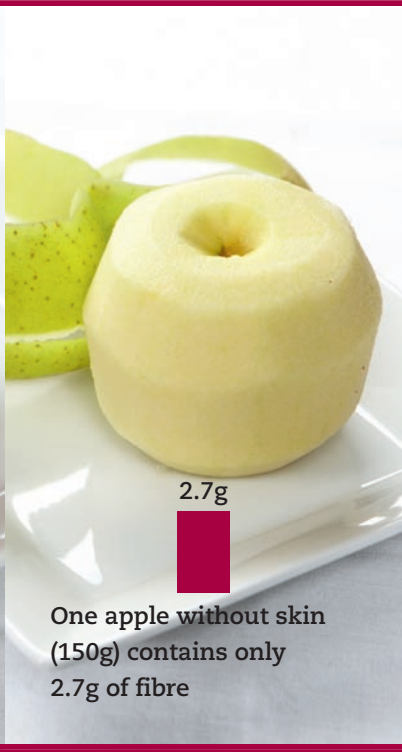
One portion of whole wheat pasta (200g cooked) contains 9g of fibre

One portion of penne pasta (200g cooked) contains only 2.3g of fibre

Two slices of mixed-grain wholemeal bread (70g) contain 3.5g of fibre

One croissant (70g) contains only 0.7g of fibre

One apple with skin (150g) contains 3.3g of fibre



One apple without skin (150g) contains only 2.7g of fibre

One bowl of bran flakes (30g) contains 4.5g of fibre

One bowl of corn flakes (30g) contains only 0.3g of fibre

200g of brown, long-grain rice (cooked) contains 1.8g of fibre

200g of white, long-grain rice (parboiled, unenriched, cooked) contains only 0.2g

Tips for a high-fibre diet

How much fibre do foods contain?

The fibre content and composition of the different types of fibre varies depending on the type of vegetables or fruits, maturity or time of harvest, growing environment, storage conditions, etc. For example, vegetables harvested during a younger growth stage are likely to contain a higher amount of pectin and hemicellulose (soluble fibres) and less cellulose and lignin (insoluble fibres) than when harvested at later growth stages. As a general rule, the concentration of insoluble fibre components increases with the maturity of the vegetable or fruit, whereas the content of the soluble fibre components can vary depending on the type of soluble fibre.

Good food sources for fibres are:

- Grains and whole wheat products
- Vegetables and legumes (e.g. beans, peas)
- Fruits

Tips for increasing fibre in a meal

General tips

- Removing the skin from fruits and vegetables decreases their fibre content.
- Whole foods are generally better than fibre supplements. Fibre supplements do not provide the vitamins, minerals and other beneficial nutrients that high-fibre foods do.

GOOD TO KNOW

Serving recommendations

For the daily recommendation of 20–35g of fibre (adults) we must eat at least 5 servings of fruits and vegetables, and a minimum of 2 whole grain food servings per day. The following are examples of one serving:

- One fruit and vegetable serving:
  - a small glass of 100% fruit or vegetable juice (¾ cup or 6oz)
  - a medium-sized piece of fruit (one orange, small banana, medium-sized apple)
  - 1 cup of raw salad greens
  - ½ cup of cooked vegetables
  - ½ cup of cut-up fruit or vegetables
  - ¼ cup of dried fruit
  - ½ cup of dried beans or peas
- One whole grain serving:
  - ½ cup of cooked brown rice, pasta, or cooked cereal
  - 1 ounce of dry whole wheat pasta, brown rice or other dry grain
  - 1 slice of whole wheat bread
  - 1 small muffin (one ounce)
  - 1 cup of ready-to-eat cereal

GOOD TO REMEMBER

Recommended consumption for adults

WHO:	> 25g	
USA:	19–50 years:	25g (♀) or 38g (♂)
	50+ years:	21g (♀) or 30g (♂)
D, A, CH:		30g

DIETARY FIBRE and its various health benefits

For breakfast

- Serve high-fibre cereals (e.g. bran flakes, oatmeal) or muesli with a combination of fresh (e.g. berries, apples) and dried fruits (e.g. raisins, apricots, plums), and a low-fat milk or low-fat dairy product.
- Serve fresh fruits or fresh fruit salad.
- Add waffles or pancakes with fresh fruits (e.g. berries, bananas, peach) or a composition of fresh and dried fruit salad.
- Substitute whole wheat or oat flour for up to half of the flour in pancake, waffle or muffins. Remark: they may need a bit more leavening.
- Serve eggs/omelettes with vegetables such as peppers, sweet corn, artichokes, mushrooms or tomatoes.
- Serve wholemeal toast instead of white toast.

For snacks

- Serve bran muffins as snacks.
- Serve nachos with refried black beans, baked tortilla chips and salsa.
- Add more whole grain flour or oatmeal when making cookies or other baked treats.

SERVING TIPS

Breakfast

- ½ cup (around 70g) of oatmeal with 1 large apple (with skin, cut)
- ½ cup of bran cereals
- 3 tbsp of unsweetened muesli with 1 banana and 4 dried apricot halves
- 3 slices of wholemeal bread, 2 tbsp of peanut butter and 1 peach
- Fresh fruit salad with 1 apple, 1 orange and 1 cup of strawberries
- An omelette with 100g of mushrooms, 50g of onions, 100g of red pepper and 3 slices of wholemeal toast

SERVING TIPS

Snacks

- Oat bran muffin (1 medium = 5.2g of fibre)
- 1 cup of blackberries (around 8g of fibre)
- 3 dried figs (around 10g of fibre)

For lunch/dinner

- Serve antipasti (prepared with a highly polyunsaturated oil) containing high-fibre vegetables, e.g. eggplant, okra, tomatoes, olives, black beans or spinach.
- Serve a salad (e.g. with raw carrots, green leafy vegetables, tomatoes, blanched broccoli) or steamed vegetables to every menu.
- Try an unsweetened, whole grain ready-to-eat cereal as croutons in salad or instead of crackers with soup.
- Offer fresh vegetable wraps.
- For wraps: Try to substitute whole grain flour for half of the white flour.
- For sandwiches: Use – whenever possible – wholemeal bread for sandwiches and serve it with salad.
- Replace – whenever possible – white rice, bread, and pasta, with brown rice and whole wheat grain products.
- Try to use other whole grain products such as bulgur, couscous or barley instead of white rice.
- Serve packed potatoes with a low fat cream with dried tomatoes (cut), yellow pepper and spring onions.
- Add lentils, pearl barley, brown rice or cracked wheat to casseroles and soups.
- Serve more dried beans and peas, such as pinto beans, kidney beans and lentils (e.g. cooked in flavoured liquid, such as stock, vegetable stock with fresh herbs, lemon, or wine) or with other vegetables, such as in side dishes or salads.
- Serve a fresh fruit salad completed with some roasted seeds (e.g. sunflower, pumpkin seeds or pine nuts) as dessert.

SERVING TIPS

Lunch/Dinner

- Antipasti with a minimum of 100g of okra, 1 yellow sweet pepper, 20g of dried red tomatoes and 100g of eggplant
- A salad with a minimum of 250g of broccoli, 10g of pine nuts and 100g of carrots
- 1 cup of whole wheat macaroni with a sauce of 1 cup of frozen mixed vegetables and 2 tomatoes
- 1 cup of whole wheat egg noodles with 100g of soybeans, 1 carrot and 50g of spring onions
- A dish with bulgur (80g of bulgur raw/person) and different kinds of vegetables
- A sandwich with 2 slices of wholemeal bread and a minimum of 1 tomato and 100g of artichokes (hearts, cooked)

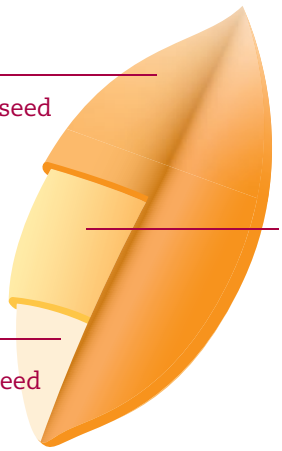
DIETARY FIBRE and its various health benefits

Whole grains versus refined grains

Whole grain products are made from the entire grain seed, usually called the kernel. This includes the bran, the endosperm, and the germ (see figure). The bran contains most of the fibre and is a good source of B vitamins (e.g. thiamine, riboflavin) and minerals (e.g. iron, zinc), while the germ is a source of oil and is rich in vitamin E. With refined grains, the grains are milled, which removes the bran and the germ, as well as the fibre, iron and many B vitamins. Only the endosperm – the part that contains the starch – remains. To compensate for the removal of vitamins and minerals during the milling process, many refined grain products are enriched with some of the original nutrients – such as thiamine, riboflavin, niacin and iron. Enrichment, however, doesn't restore the content of insoluble fibre.

Whole wheat flour

White flour (refined)



Bran
"Outer shell" protects seed
- Fibre
- B vitamins
- Trace minerals

Germ
Nourishment for the seed
- B vitamins
- Vitamin E
- Trace minerals
- Phytonutrients

Endosperm
Provides energy
- Carbohydrate
- Protein
- B vitamins

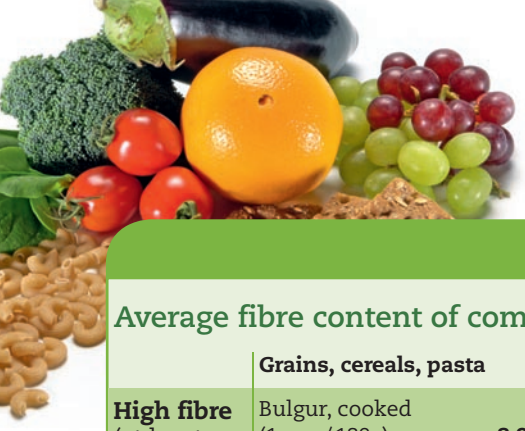
Partially refined flour

EXAMPLE FOR DAILY MEALS

For breakfast
1 cup of ready-to-eat cereal with one medium-sized apple with skin and a small glass of fresh fruit juice

For a snack in the morning
1 carrot, 1 red or yellow pepper or other pieces of vegetable sticks

For lunch
1 bowl of minestrone (v
and whole wheat pasta



GOOD TO KNOW

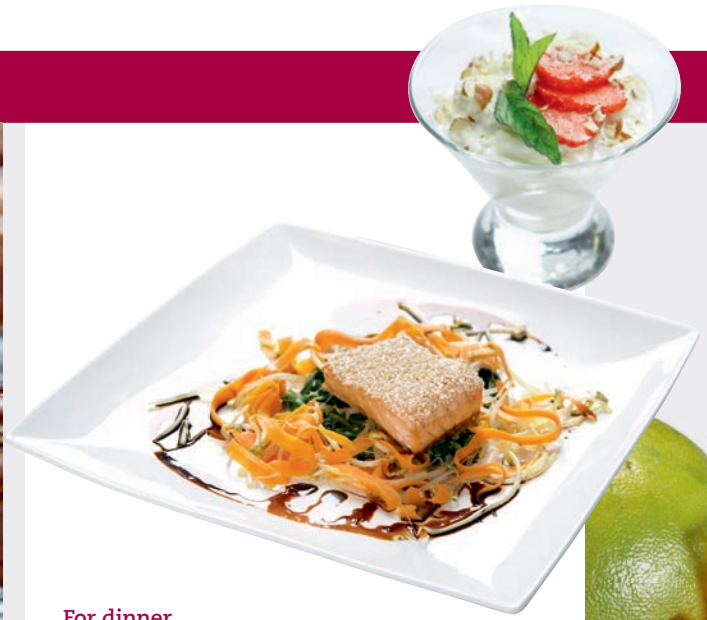
Average fibre content of common foods

	Grains, cereals, pasta	Vegetables	Legumes	Fruits
High fibre (at least 6g/100g)	Bulgur, cooked (1 cup/182g) **8.2g** Spaghetti, whole wheat, cooked (1 cup/140g) **6.3g**	Peas, fresh, cooked (1 cup/160g) **8.8g** Spinach, cooked (1 cup/180g) **8.8g**	Beans, black, cooked (1 cup/172g) **15.0g** Beans, kidney, red, cooked (1 cup/177g) **13.0g** Beans, lima, large, cooked (1 cup/188g) **13.2g** Lentils, cooked (1 cup/198g) **15.6g**	Avocado, without skin (1 fruit/136g) **9.2g**
Medium fibre (3–6g/100g)	English muffin, whole wheat (1/66g) **4.4g** Rice, brown, long-grain, cooked (1 cup/195g) **3.5g** Oatmeal (1 cup/136g) **4.0g** Bran flakes (1 cup/136g) **5.0g**	Beans, green, cooked, snap(1 cup/125g) **4.0g**		Apple, with skin (1 medium/150g) **3.3g** Banana (1 medium/118g) **3.1g** Orange (1 fruit/141g) **3.4g** Strawberries (1 cup/152g) **3.0g**
Low fibre (less than 3g/100g)	Bread, whole wheat (1 slice) **1.9g** Bread, rye (1 slice) **1.9g** Bread, mixed-grain (1 slice) **1.7g** Bread, cracked-wheat (1 slice) **1.4g** Couscous (1 cup/157g) **2.2g** Noodles, egg, cooked, unenriched (1 cup/160g) **1.9g**	Broccoli, cooked (chopped) (½ cup/78g) **2.6g** Cabbage (pak-choi), cooked, shredded (1 cup/170g) **1.7g** Carrots, cooked (½ cup/78g) **2.3g** Eggplant, cooked (1 cup/99g) **2.5g** Okra, cooked (½ cup/80g) **2.0g**		Peach (1 medium/150g) **2.2g**

Remark: The British Nutrition Foundation has issued the following guidelines for labelling food.
"High fibre" should contain 6g of fibre per 100g or ml. A source of fibre should contain 3g of fibre per 100g or ml.

egetables with beans
) and one small salad

For a snack in the afternoon
1 wholemeal muffin with oats (one ounce)



For dinner
½ cup of vegetables and 1 piece of salmon with whole wheat pasta and a fruit based dessert

GOOD TO KNOW

Don't be fooled

Don't be confused or deceived by terminology. "Wheat flour", "unbleached wheat flour", or "stoned wheat" do not have the same meaning as "whole wheat". Only "whole wheat" contains all the elements of the entire natural grain. The other terms only imply they do but, in reality, they only contain one element – the endosperm or starch component.
You also should not be confused or deceived by products that claim to be "made with whole wheat", "made with whole grain" or "made with oatmeal". These statements imply that the entire product is made of whole grain but this is often not the case. The statements are qualitative and not quantitative. They do not actually tell you how much whole wheat, whole grain, or oatmeal is in the product.

Benefits of a high-fibre diet

General aspects

High-fibre foods generally have a low fat content, especially saturated fatty acids, cholesterol, and are normally low in sugar. On the other hand, they are good sources of vitamins, minerals and phytochemicals that are important for overall health. Furthermore, a high-fibre diet is filling, which reduces appetite; on the whole, it has a low calorie content. This kind of diet is a very good way to control weight and prevent obesity.
Eating excessive amounts of dietary fibre, typically in large quantities of wheat bran (more than 35g per day) or fibre in supplemental form may cause undesirable effects, such as reducing the absorption or increasing the excretion of minerals. But these effects are not important for a normal high-fibre diet.
Sometimes, a sudden increase of high-fibre foods can cause flatulence along with abdominal discomfort and, sometimes, diarrhoea. Some herbs, like caraway, can reduce this effect.

Controlling blood sugar levels

Soluble fibre also helps to normalise blood glucose levels by slowing down the absorption of sugar and increasing insulin sensitivity. As a result, high-fibre foods play a role in the dietary treatment of Type 2 diabetes.

Reducing cholesterol levels

A high cholesterol level, together with other factors (e.g. high blood pressure and obesity) may increase the risk of heart disease. Many studies show that eating a high total fibre diet is associated with a lower risk of coronary heart disease compared to a low fibre intake. One of the reasons for this is that soluble fibre, particularly from beans, oats, flaxseeds and fruits, helps to lower total blood cholesterol levels by lowering the amount of low-density lipoprotein (LDL), or "bad" cholesterol. The main mechanisms responsible for lowering blood cholesterol levels with soluble fibre are a reduction in the absorption of dietary cholesterol.

Prevents gastrointestinal disease

Fibre from fruits and vegetables, especially that from wheat bran and oat bran, increase the weight and stool size by retaining water in the intestinal lumen and thereby making faecal material softer. This helps to reduce the incidence of constipation and haemorrhoids. It goes almost without saying that the adequate consumption of water is necessary for dietary fibre to have such an effect. Furthermore, a high-fibre diet reduces the possibility of diverticulitis, an inflammation of the intestine (colon) that is a common condition in elderly people.

Protection against colon cancer

There is scientific evidence to suggest that dietary fibre can reduce the risk of certain types of cancer, particularly breast and colon cancer. The evidence, however, is not conclusive at the moment.
Nevertheless, fibre has many demonstrated benefits and protective effects, which make a high-fibre diet a very good recommendation for a healthy life.

QUIZ

1. **Which of the following substances is a dietary fibre?**
   A Fructose
   I Cellulose
   E Trans fatty acids
2. **Refined grain includes:**
   O the bran, the endosperm and the germ
   N the endosperm
3. **A high-fibre diet may:**
   N prevent lactose intolerance
   B reduce the cholesterol level
   P increase sales figures
4. **The concentration of soluble fibre in fruits and vegetables:**
   I decreases with maturity
   H increases with maturity
   G doesn't vary with maturity
5. **High-fibre foods are:**
   M nutrient-dense
   H nutrient-poor
6. **What is the daily fibre recommendation for adults?**
   O 15–20g
   B 20–25g
   A 20–35g
7. **Dietary fibre can be divided into:**
   F mono, di and polysaccharides
   M saturated and unsaturated
   V soluble and insoluble
8. **Good food sources for fibre are:**
   T whole wheat products
   B sweets
   D meat and meat products

Answer: VITAMIN B

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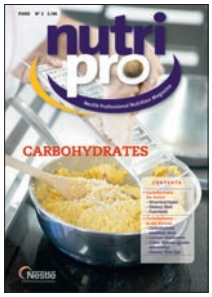

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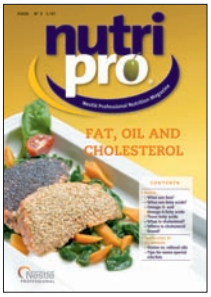

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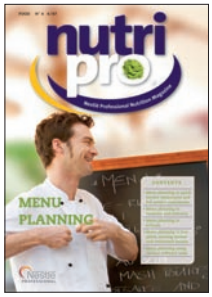

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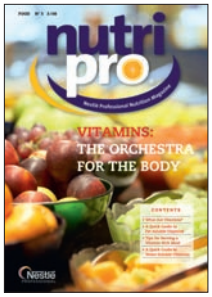
Menu Planning



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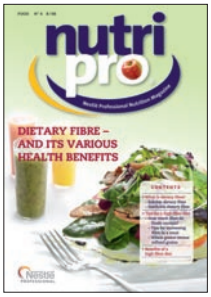
Vitamins:
The Orchestra
For The Body



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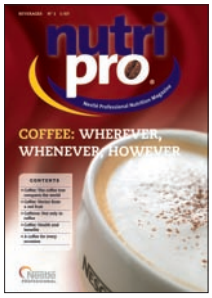
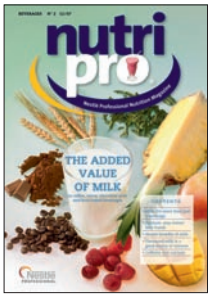


NutriPro Beverages
Nr. 1
Coffee: Wherever,
Whenever, However



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