

The Power of Wholegrains - Staking a Claim to Good Health

Prof. David Richardson

Recent large-scale epidemiological studies have shown that regular consumption of wholegrain cereals can offer potential health benefits, including reduced risk of heart disease and certain cancers (Richardson, 2000)

Cereal grains like wholewheat, brown rice, whole oats, maize and rye have been the mainstay of the diet for centuries. From pasta in Italy to porridge in Scotland, the range of grain products consumed around the world is truly amazing. A sizeable proportion of the energy intake in the UK and elsewhere comes from grains, yet the vast majority are eaten in refined form. In the milling process, the outer parts of the grain - the bran and germ - are removed, leaving the starchy endosperm, which is ground to produce white flours. Because many of the nutrients and phytoprotective substances are concentrated in the outer parts of the grain, the refining of grains can result in significant losses of nutritional value (Pedersen *et al.*, 1989). Nutrients found in wholegrains include vitamin E, the vitamin B complex, selenium, zinc, copper, iron, magnesium and phosphorus. In addition to these essential vitamins and minerals, wholegrains contain complex carbohydrates, protein and protective substances such as lignans (plant phytoestrogens, which are reported to have health-promoting properties against

heart disease and cancer).

Wholegrain foods are, therefore, important sources of nutrients and protective substances that are in short supply in our diet, and it is thought that like fruit and vegetables, these wholefoods deliver "packages" of constituents that may work synergistically to promote health and reduce risk of disease.

Wholegrains and health

A diet rich in wholegrains and other plant foods is associated with several health benefits, which are shown in Table 1.

Heart disease: numerous studies show benefits associated with decreased risk of disease

Cancer: many studies suggest that regular consumption of wholegrains as part of a low-fat diet reduces the risk of certain cancers including stomach, colon, mouth and gall bladder

Diabetes and blood sugar control: some studies have associated a low-fat diet rich in wholegrains and other plant components-the bran, germ and endosperm breakfast cereals and crackers.

Health claims

The main sources are bread. In 1999 the US Food and Drug Administration approved a health claim for use on food labels of products that contain at least 51%

wholegrain by weight. The claim reads: "*Diets rich in wholegrain foods and other plant foods and which are low in total fat, saturated fat and cholesterol may reduce the risk of heart disease and some cancers*" (USFDA, 1999). The claim is intended to help consumers identify foods containing wholegrains and encourage consumption by describing relationships between wholegrains and disease prevention. The US Department of Agriculture is now tracking progress in their public health message to increase consumption of wholegrain foods.

In the UK the Joint Health Claims Initiative (JHCI) Expert Committee concluded its review of the evidence for a generic health claim for wholegrain foods and heart health (JHCI, 2002). Seven leading scientists assessed the totality of the evidence and concluded that people with a healthy heart tend to eat more wholegrain foods as part of a healthy lifestyle. To date most of the evidence has been based on observational studies, but there are now major international research initiatives underway that aim to establish the underlying mechanisms that could explain why eating more wholegrain foods can improve health. Table 2 shows how to get more wholegrain foods into the diet.

- Check the label: food products rich in wholegrain always have wholegrain, wholewheat, wholemeal etc listed as the first ingredient
- Eat wholegrain or wholemeal breads
- Choose wholegrain breakfast cereals as one of the easiest ways to include wholegrains in the diet
- Select sandwiches made with wholegrain or wholemeal bread Choose brown rice instead of white rice
- Try wholewheat pasta, pizzas and pancakes
- Use wholegrain biscuits and crackers with cheese
- Bake with wholemeal flour

Conclusion

There is a wealth of epidemiological evidence to suggest that at least one serving of wholegrain foods per day can be protective against chronic diseases such as Type 2 diabetes, CHD and some cancers. Despite this knowledge of the power of wholegrain, almost one third of adults in the UK do not eat wholegrains on a daily basis and over 90% do not consume the recommended three servings a day. By encouraging people to increase consumption of wholegrain foods, a positive health message is being communicated. Furthermore, the greater consumption of wholegrain foods with complex carbohydrates, cereal fibres and lower fat may delay the onset of hunger, lower overall calorie intake for the day, and help people maintain healthy weight (Smith *et al.*, 2001). Would it not be reduced rate of CHD. The benefits were continuous for each 5 g/day increase in cereal fibre. Similarly, in the US Health Professionals Study of almost 44 000 men, fibre intake from wholegrain cereals was most strongly associated with reduced risk of fatal and non-

fatal myocardial infarction. The study demonstrated that for every 1 a-gram increase in cereal fibre there was a 29% decrease in risk

of CHD (Rimm *et al.*, 1996).

Wholegrain foods and reduced risk of cancer

The protective effects of wholegrain extend to cancers, especially of the digestive system. A recent analysis includes 40 case-control studies of 20 types of cancer (Jacobs *et al.*, 1995; Chatenoud *et al.*, 1998; Jacobs *et al.* 1998), where cancers showing the greatest risk reduction have been cancers of the stomach, colon, mouth and gall bladder. Several theories have been put forward to explain the observation, including the fact that wholegrains are rich sources of fermentable carbohydrates, which are transformed by the intestinal flora into short-chain fatty acids, including butyric acid. These acids reduce the activity of certain cancer-causing factors. Wholegrains are also good sources of a wide range of phytoprotective substances with anti-carcinogenic properties, which may inhibit DNA damage and suppress cancer cell growth. Wholegrain cereal fibre is also known to increase faecal bulk and decrease transit time, which allows less opportunity for faecal mutagens to interact with the intestinal epithelium.

The evidence from prospective and case-control studies suggests that greater consumption of wholegrains could have important public health implications for reduced risk of cancer, especially gastro-intestinal cancer (Hill, 1999).

The role of whole Grains in blood sugar control

Dietary carbohydrates may influence the development of Type 2 (non- insulin-dependent) diabetes, for example, through effects on blood glucose and insulin concentrations. Wholegrains are high in complex carbohydrates and fibre and they tend to have low glycaemic indices, which produce smaller rises in blood sugar and insulin (Foster-Powell and Brand Miller, 1995). In a seven-year study of men and women, a strong inverse relationship between consumption of wholegrains and falling insulin levels was found (Pereira *et al.*, 1998) and the intake of fibre from wholegrain cereals has been shown to be inversely related to Type 2 diabetes (Salmeron *et al.*, 1997a, 1997b). In summary, both population- based and clinical studies suggest that regular consumption of wholegrain in the diet may be an effective way to lower risk of developing Type 2 diabetes.

Consumption of wholegrains in the UK

Results of a survey on consumption of wholegrains in the UK, which was carried out by the MRC Human Nutrition Research Unit in Cambridge, indicate that consumption of wholegrain is well below the amount associated with significant health and nutritional benefits and that there is a lack of knowledge in the UK about the potential health benefit of wholegrain foods (Lang *et al.*, 2001). In the USA the dietary guidelines have been revised to recommend 6 to 11 servings of grains per day, three of which should consist of a variety of wholegrain foods (USDA, 2001). Most of the wholegrains consumed in the UK are in pulverised forms, namely flours and bread as well as breakfast cereals, which are usually shredded, flaked or puffed wholegrain

foods. In the UK the use of the word "wholegrain" refers to products that incorporate all three foods with a lower incidence of diabetes and improved blood sugar control

Digestive health: eating plenty of wholegrain foods is an excellent way to increase fibre intake, which helps to promote regularity and significantly lowers the occurrence of digestive troubles.

Wholegrain foods and reduced risk of heart disease

The real power of wholegrains lies in their protective effects against coronary heart disease (CHD; Truswell, 2002). Age-standardised death rates for CHD show that the UK, particularly Scotland and Northern Ireland, has one of the highest rates compared with most other comparable countries. CHD is a major killer disease in the UK, accounting for one in five of all deaths (BHF, 2000).

Although CHD is a multifactorial condition, diet and a healthy lifestyle including regular exercise, are among the major and modifiable contributors to the disease. For food-based strategies and dietary goals that target the whole population, the greater consumption of wholegrains could be an attractive option to tackle this disease.

In a nine-year prospective study of over 34 000 women aged 55-69 years in

Iowa, USA, people who reported eating at least one serving of wholegrain a day had a substantially lower risk of death from CHD than those who ate almost none

(Jacobs *et al.*, 1999). Women with the higher intakes of wholegrain foods were of

higher socio-economic status, had healthier lifestyles, lower body mass index and less baseline disease. When adjusted for these potentially confounding variables, the inverse association between wholegrain consumption and CHD was attenuated, but remained highly significant. Further data from a prospective epidemiological study on nurses' health (Liu *et al.*, 1999), which extended over a 10-year period, again found a strong inverse association between intake of wholegrain foods and risk of CHD. Those women who ate about 2.7 servings of wholegrain foods per day had a 30% decreased risk of CHD compared with those eating only 0.13 servings a day. This relationship persisted after adjustment for other lifestyle characteristics, including fat intake, and even after adjustments were made for greater intakes of many constituents of wholegrains, including dietary fibre, vitamin E and folate, which have been independently associated

with reduced risk of CHD. This observation suggests additional protective effects of other constituents or their interactions. Unlike the findings in the Iowa

Women's Health Study, the relationship between intake of wholegrains and decreased risk of CHD appeared to be continuous, with no apparent threshold.

There is an extensive literature that supports the assertion that the fibre component of wholegrain foods may also have protective effects against heart disease. In an examination of the data from the Nurses' Health Study, a large, prospective cohort

study of US women followed up for 10 years, the results supported the hypothesis that higher fibre intake, particularly from cereal sources, reduces the risk of CHD (Wolk *et al.*, 1999). For a 10 g/day increase in total fibre intake, the difference between the lowest and highest quintiles, the multivariate relative risk of total CHD events was 0.81 (95% confidence interval, 0.66-0.99). After controlling for age, cardiovascular risk factors, dietary factors and multivitamins use, among all the different sources of dietary fibre from cereals, vegetables and fruit, only cereal fibre was strongly associated with a 27%

Q. David Saxby, Huntington

Are there no negatives at all?

A. The only things that have been flagged up have been about the phytate contents of the whole grain flours and the possibility of altering the bioavailability of some of the trace elements such as zinc and copper. To my mind it is highly unlikely that the levels that are being recommended for greater consumption on wholegrain would have any negative physiological effects. The phytate argument is actually rather a classical approach that nutritionists use, it's outdated and there is a tremendous amount of evidence to show that the phytate component can have beneficial effects as well.

Qs. John White, London

Q.1 What is likely to be the relationship between the JHCI and Europe once the regulators regime is set up there?

Q.2 The claim talks about healthy lifestyle, is there any discussion or is there likely to be any pressure for that to encompass compositional criteria?

Q.3 From your experience in the breakfast cereal market what has been the impact on sales?

Q.4 Can I have your view on whether, you could categorise this as a development of functional foods or whether it is enhanced staples?

A1. JHCI – In the proposed regulation that came out of Brussels, they are suggesting that all the health claims should be regulated by the new European Food Safety Authority. I think that's the likely direction it will go but I know that in many of the industry responses that we've made so far the idea is that we would look for degrees of subsidiarity. We do not know how that will work in practice. FDF believe that it has been strategically useful to develop the JHCI – it brought the regulators, the consumers and the industry regulators together when before their views were totally polarised. We've opened the door to health claims and reduction of risk disease

claims on food. My advice is that it will take a couple of years for the European central organisation set up and its worth hanging in there to make the JHCI work and keep it in its entirety.

A2. In the US compositional criteria was set that any wholegrain claim should have at least 51% by weight of wholegrain at the mixing bowl stage. They also have compositional criteria which link in the content of fat (saturated) and cholesterol . In the UK claim we didn't get the compositional criteria and that was a deliberate act on my part as I'm inherently opposed to compositional criteria. I think you have to use common sense but if you are looking for product innovation you want to have as much flexibility as possible. The FSA are quite keen to introduce compositional criteria of some kind on health claims.

A3. Sales – it has been dramatic. Products have been transformed with the health claims and it has made a significant difference to sales.

A4. These are nature's functional foods. A component of food in our diet that is inherently known as being healthy and natural and it is all those things that are in the consumers mind and you don't have to educate them about that. You are adding to their already good perceptions of a staple food.

Q. Laurie Pearson, Northampton

Your definition of this wholegrain, a lot of what you are saying is related around wheat, can you spread that over to the other grains e.g. maize?

A. At the moment it relates to all the major cereal grains. The focus has been on wheat predominantly but it could equally apply to other grains as well. The ones that have used heart health and cholesterol lowering claims significantly have been the wheat grains and oats. It hasn't been done so much on other products yet.

Q. Paul Heygate, Northamptonshire

Will the GI be great for this industry?

A. There is growing interest in the Glaecemic Index, GI. Some foods cause a sudden surge of blood glucose after they've been consumed. There are now associations between the GI response after a carbohydrate meal and your predisposition to type-2 diabetes. There is increasing scientific evidence to show that if you have foods with lower GI this may well be beneficial and reduce risk of some of these conditions. There is quite a bit of work going on in the area of research and already in Australia they are using GI logo on food products. Carbohydrates and fibres are likely to have

a lower GI. Breads have different GI's, and it is used as the standard. That fact is a positive, since everything else is compared to bread, and is a useful position to be in.