



This project received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n° 727848.



## New nordic breads and cereals

– the whole grain partnership

In the last 15 years whole grains foods have developed strongly and benefits the all people in Denmark. The aim of the Danish Whole Grain Partnership is to create target-oriented and effective activities to ensure Danes eat more whole grain and thereby improve public health. The objective is achieved through a unique partnership across sectors and disciplines including health- and patient organizations, business, government, retail and trade.

### What is whole grain?

The definition of wholegrain includes grain seeds from the following genera of the grass family Gramineae: barley (*Hordeum*), oat (*Avena*), wheat (*Triticum*), rye (*Secale*), rice (*Oryza*), millet (*Panicum*), maize (*Zea*; only as dried maize) and sorghum (*Sorghum*). The definition includes grain seeds from species, hybrids and cultivars from the above mentioned genera. A distinction is made between wholegrain and wholegrain products. The concept "wholegrain" refers to the grain itself, whereas "wholegrain products" are foods containing a minimum amount of wholegrain. Wholegrain should contribute considerably to foods being labelled as wholegrain products, and the term wholegrain should only be used on the following foods and food groups: flour and grain (including rice); bread and crisp bread; breakfast cereals; pasta and noodles. Flour and grain must be 100% wholegrain. Foods containing other ingredients than wholegrains should contain more than 50% wholegrain in dry matter (> 51%). If a product is claimed to contain wholegrain (e.g. by using a label), the wholegrain content must be declared according to predetermined instructions (Quantitative Ingredient Declaration, QUID). A content of > 51% of dry matter corresponds to a wholegrain content of at least 35% for bread, and at least 55% for crisp bread, breakfast cereals and dry pasta and noodles, according to QUID.

Grains consist of three parts: endosperm, bran, and germ. Wholegrain is defined as intact and processed (dehulled, ground, cracked, flaked or the like) grains, where the components endosperm, bran and germ are present in the same proportions as in the intact grain. Studies show that the level of milling affects the way wholegrain is digested and metabolised, and the resulting nutritional and health effects. However, data does not support a limit for milling, where the positive effect on health is larger than the negative. Therefore, the current definition does not take level of milling into consideration.

### Impact on human health

Many cohort studies have shown a significant inverse association between the intake of wholegrain (or wholegrain products) and risk of total heart disease, coronary heart disease and stroke. Wholegrain products could reduce risk factors for heart disease, mainly documented for the effect of oats on blood lipids and lipoproteins. The association is consistent, relatively strong (20-30% risk reduction), independent of other lifestyle factors, and biologically plau-

sible. The focus has mainly been on wholegrain's contribution of dietary fibres, magnesium and potassium, and antioxidants (especially vitamin E), which have documented effects on insulin sensitivity, blood lipids and lipoproteins, and blood pressure. Having said this, none of the above single components can explain the overall association. Several larger cohort studies show a relative convincing, inverse association between intake of wholegrain products and type-2 diabetes. It is mainly the content of dietary fibres and magnesium in wholegrain product that were suggested to give the possible protecting effect of wholegrain products. The association between intake of wholegrain and the risk of being overweight is the result of several American cohort studies, of which only one study has results for breakfast cereal intake.

All studies show inverse association between intake of wholegrain products and weight gain or risk of obesity. No randomised experiments have separately investigated the effect of increased intake of wholegrain products (e.g. compared to refined cereals) on body weight and weight change. The importance of wholegrain intake on weight regulation is considered a result of the content of dietary fibres in wholegrain, and the importance of dietary fibres for glucose metabolism and satiety. The effect of wholegrain intake on risk of cancer development is described in a few studies on individual types of cancer. The results are not in aligned. For colon and rectal cancer an association cannot be established. Furthermore, there is no association in risk of cancer in stomach or uterus. On the other hand, a tendency for increased risk of breast cancer was shown with high wholegrain intake. For total cancer risk in upper respiratory tract and stomach-digestive tract an inverse association to intake of wholegrain products was shown, while there was only a tendency for inverse association between wholegrain intake and total cancer. The majority of studies concern the contribution of dietary fibres (especially colon cancer), folate and, to a certain extent, vitamin B6 and magnesium from wholegrain. Also the possible effect of lignans has gained scientific interest. Presently, it is not possible to verify specific compounds in the grain seeds as being responsible for the effects of disease risk. It is most likely that it is the combination of chemical compounds found in wholegrain that are important for disease risk. It should be noted that the chemical compounds in wholegrain are highly correlated, and thus it is impossible to separate the effect of individual compounds. The association to disease risk is shown from the lowest to the highest intakes of wholegrain products



## References

Suggested readings:

Heddie Mejborn Anja Biloft-Jensen Ellen Trolle Inge Tetens, DTU, Denmark may 2008  
[www.fuldkorn.dk](http://www.fuldkorn.dk)