

Grains

essential for healthy eating

Grains
they're essential!



**Les produits
céréaliers,**
essentiels pour la santé !

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Grain Products - Introduction

Worldwide, three cereal grains - wheat, maize (corn) and rice make up 85% of production and 93% of per capita consumption as food.² In Canada, wheat-based products, such as breads and pastas, account for almost 82% of the grain products consumed.³ For that reason, most information in this backgrounder relates to wheat-based products.

This paper will address:

Current consumption
Categories of grain products
Whole grains and chronic disease
Carbohydrate and obesity
Ways to help consumers

Grain basics



Canada's Food Guide to Healthy Eating identifies Grain Products as an essential food group.

The Food Guide recommends Canadians four years of age and older eat between 5 to 12 servings of Grain Products daily and "choose whole grain and enriched products more often."¹

Grain products provide carbohydrate, protein, fibre, thiamin, riboflavin, niacin, folacin, iron, zinc and magnesium.

Current consumption

Intake of grain products versus recommendations

As a major staple in our diet, grain products provide the most important source of energy.

The mean intake of Grain Products is 6.9 servings per day for Canadian men and 4.9 servings per day for women, with about 30% of the adult population not eating the minimum number of 5 servings daily.^{4,5} The same survey found intakes for male and female teens was 7.6 and 6.0 servings, respectively.⁴

In a recent web-based survey, boys in grades 9 and 10 consumed an average of 6.6 servings of Grain Products each day and girls consumed an average of 4.4 servings, with 44% and 65% respectively, not consuming the minimum 5 servings.⁶

Intake of carbohydrate versus recommendations

A key macronutrient supplied by Grain Products is carbohydrate (CHO).

According to the Dietary Reference Intakes, the Acceptable Macronutrient Distribution Ranges for carbohydrate should be 45-65%.⁷ This range represents intakes that are:

- associated with reduced risk of chronic disease;
- associated with consumption of sufficient levels of essential dietary nutrients;
- based on adequate energy and physical activity to maintain energy balance.

In a 1998 national survey, the percentage of energy from carbohydrate intake was:

- between 50 and 56% for adults
- 55.9 % for male teens (ages 13-17)
- 60.3 % for female teens (ages 13-17).⁴

We have not had a national survey since 1998 to determine whether this has changed or not. However, a recent web-based survey of teens in Ontario and Alberta indicates that CHO intake is 54% of energy for boys and 56% of energy for girls.⁶

Categories of grain products

The domestically produced grain-based food supply in Canada consists of whole grain, enriched and fortified grain products.

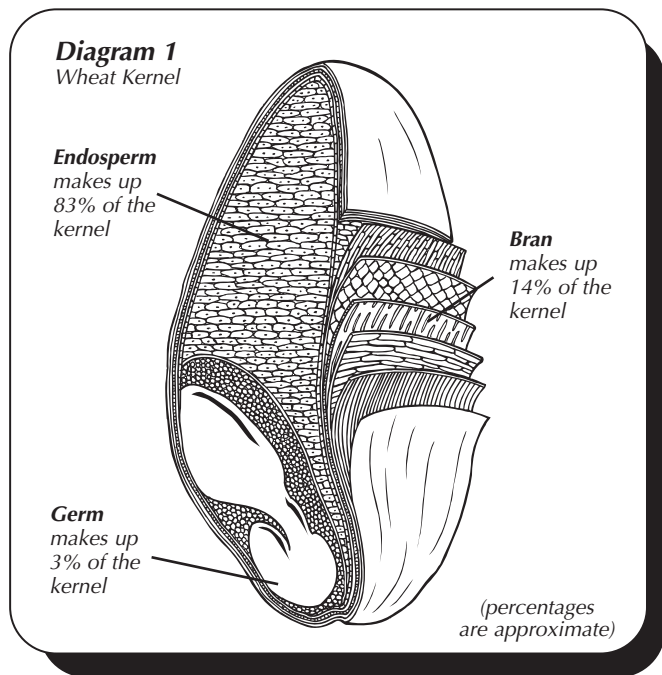
Whole grain and whole wheat products

A whole grain kernel includes—the endosperm, the bran and the germ. See Diagram 1. Canadian products labeled:

- "whole grain" contains all three parts of the grain kernel,
- "whole wheat flour" contains the endosperm and the bran,
- "enriched wheat flour" contains the endosperm.

Each part of the wheat kernel provides important nutrients. The endosperm provides carbohydrate and protein; the bran provides fibre, B-vitamins, iron and phytochemicals; and the germ provides protein, polyunsaturated fatty acids, phytochemicals, and B-vitamins.

The composition of Canadian flours and corresponding products differs from the US. In the US, whole wheat flour is labeled “whole grain” because all three parts of the kernel are included. In Canada, the germ may be removed. If it is not removed it is referred to as whole grain or whole wheat with the germ added.



Traditionally wheat was milled to remove the bran and the germ, which improves texture and shelf life. The milled flour is then enriched to ensure that important nutrients are added back. This enrichment has been mandatory in flour since 1976.⁸ Enriched wheat flour is used in the production of foods that contain flour. Whole wheat flour, whole wheat flour including the germ (sometimes called whole grain wheat flour) and any flour made from other grains cannot be enriched in Canada.

Enriched grain products

Enriched white bread, enriched pasta and rice are the main types of grain products consumed by Canadians and Americans.^{5,9}

In Canada and the United States, our enrichment standards restore the micronutrients in flour to the original levels present in whole wheat.² Table 1 gives the definition of enrichment and fortification.

Table 1

Enrichment

the practice of adding back only those micronutrients that are lost during milling and for which there is good evidence that a deficiency exists within the general population

Fortification

the addition of nutrients, whether or not they are present in the food, or the addition of levels that are much higher than the natural content

The enrichment of white flour with thiamin, riboflavin, niacin and iron has been mandatory in Newfoundland since 1944. When Newfoundland joined Confederation, the government of Canada agreed to make enrichment of flour optional. Following observations of low intake levels of these nutrients in the Nutrition Canada Survey, enrichment of wheat flour became mandatory in 1976.⁸

Currently, it is voluntary to enrich pasta, cornmeal, pre-cooked rice and breakfast cereals.¹⁰

Folic acid fortification of grain products

In 1998 it became mandatory to fortify white flour and enriched cornmeal with folic acid at 0.15 mg folic acid per 100 g of flour, and enriched pasta with folic acid levels of between 0.20 mg and 0.27 mg per 100 g of pasta.¹¹ The goal was to improve dietary folic acid intakes for the general population and specifically, to increase folic acid levels in women during their child bearing years. The food fortification strategy augmented the public education campaign advising periconceptional folic acid supplements for women in order to reduce incidence of neural tube defects.¹²

Since the mandatory fortification came into effect, the prevalence of low serum folate levels in Canada has decreased¹³ and the incidence of neural tube defects has declined by about 50% in Ontario and Nova Scotia.^{14,15,16} A study looking at folate intakes of British Columbian women showed that 64% had intakes below the Estimated Average Requirement (EAR) before fortification. After fortification, the percentage with intakes below the EAR dropped to 23%.¹⁷

In Canada, whole wheat and whole grain flour cannot be fortified with folic acid.

Whole grains and chronic disease

Note : The research does not differentiate between whole grain and whole wheat products. For the purposes of the following discussion only the term “whole grains” will be used, as this is the term used in most research papers.

Over the past few decades, there has been a wealth of research exploring the relationship between chronic disease risk and

- consumption of whole grains or,
- consumption of components of grains e.g., fibre.

The research predominately consists of epidemiologic studies, such as prospective cohorts. No cause and effect conclusions can be drawn at this point, only associations.

In addition, certain data limitations exist. For instance, food frequency questionnaires are not well developed for whole grains. Often terms such as “dark breads” are used to identify whole grains. However, whole grain breads are not necessarily dark in colour and many dark breads (e.g., pumpernickel) are not made with whole grains.¹⁸

As methodology improves, the relationship between consumption of whole grains and reduced risk of chronic disease may become even stronger.

Whole grains and mortality

Two prospective cohort studies found an inverse relationship between whole grain intake and mortality from all causes.^{19,20} This relationship was not affected by the amount of refined grain intake and was thought to be linked to the nutrients found in the fibre component of the grain.^{21,22} Similarly, a cohort study in Sweden found that those consuming a healthy diet, which included whole grain breads, had a lower incidence of mortality.²³

Whole grains and cardiovascular disease

Two reviews which cite several epidemiological studies, as well as large ongoing prospective cohort studies, agree that the consumption of whole grains is associated with a decreased risk of coronary artery disease.^{20,24,25,26} The association appears strongest with the bran component of the whole grain.²⁷

However, there is less agreement on whether whole grains are protective against ischemic stroke. One study found whole grains to be protective for women.²⁸ Another study of mixed genders did not find a protective relationship.²⁰

Whole grains and diabetes

Three recent cohort studies found a positive relationship between the intake of whole grains and reduced risk of type 2 diabetes.^{29,30,31} The mechanism for this protective role is not fully understood.

Many factors influence the glucose response to a food, including particle size and starch gelatinization.³² As such, many whole grain products and refined grain products have similar glycemic indices—they elicit similar glucose responses.²² Possible reasons that the consumption of whole grains may reduce the risk of type 2 diabetes include:

- lower body mass index (BMI) in those who consume whole grains,^{33,34}
- lower fasting insulin levels, especially in people who are overweight.^{33,35}

Whole grains and cancer

Two case-control studies and one prospective cohort study found an inverse relationship between whole grain consumption and cancer risk.^{36,37,38} Whole grains contain three components that are involved in physiological mechanisms shown in various studies to be protective against cancer.¹⁸ These include:

- fermentable carbohydrates – such as dietary fibre, resistant starch and oligosaccharides,
- antioxidants – such as phenolic acid, vitamin E and selenium, and
- phytoestrogens – such as isoflavones and lignans.

Carbohydrate and obesity

Grain products have come under attack with the current popularity of low-carbohydrate diets for weight reduction. Yet a review of low-carbohydrate diets found no evidence to support the claim that decreasing carbohydrate intake— independent of total energy intake—resulted in weight loss.

Weight loss is associated with decreased caloric intake.^{39,40} Data collected through ongoing surveys such as the US Continuing Survey of Food Intake by Individuals (CSFII) has shown that individuals, following a pattern of eating characterized by high CHO and low to moderate fat intakes, consumed less total energy and had lower BMIs when compared to individuals consuming a low CHO diet.^{41,42}

Although scientific evidence points to the contrary, people still believe that carbohydrates are fattening. In a 2005 consumer survey, TNS Canadian Facts asked 1015 adult Canadians whether they agreed or disagreed with the statement “Carbohydrates, including those found in whole grains, are fattening”.⁴³ Men are more likely than females to agree with this statement, and more Canadians (45.5%) agree compared to those who do not (42.9%).

Ways to help consumers

In addition to the tried-and-true messages about the value of grains in our diet—great taste, health benefits, source of energy and essential nutrients—there are some overlooked facts that deserve emphasis.

- Whole grain and whole wheat products both deliver fibre.
- Enriched is good...has all the nutrients of whole wheat, minus the fibre.
- All wheat flour based food products processed in Canada are enriched.
- Carbohydrates are not fattening.
- The range of choices of whole grain foods expands daily.
- Eating whole grains may lower your risk of chronic disease.
- Refined grain products can be sources of complex CHO, without being high in fat and sugar.
- Folic acid food fortification enhances our health.

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