Wheat

What We Know

› Wheat, or Triticum aestivum, is a member of the grasses family, Poaceae (also known as Gramineae), and is classified as a grain. It is believed that wheat originated as a food source in southwest Asia over 12,000 years ago. Today, approximately a third of the world’s population relies on wheat as a food staple (3,4,5,7,8,10,16,17)

• The nutritional value of wheat varies widely according to the degree of its refinement. In an unprocessed state, which includes the bran and germ, 100% whole wheat contains many valuable nutrients, including vitamins B₁, B₂, B₃, and E and manganese, magnesium, calcium, phosphorus, zinc, copper, iron, and tryptophan. Although wheat is an excellent source of dietary fiber, in the United States most of the wheat used to produce breads, pastas, cookies, and cereals is processed into a 60% extraction (i.e., 40% of the original wheat, including the bran and germ, has been removed) of bleached white flour. Because this degree of refinement strips the wheat of over half of its nutritional value, in 1941 white flour enrichment with vitamins B₁, B₂, B₃, and iron was initiated in the U.S. Even with refortification, white flour is significantly inferior to 100% whole wheat flour in its nutritional content. Regular consumption of foods made from refined grain is associated with weight gain, increased risk for insulin resistance and diabetes mellitus, type 2 (DM2), and cardiovascular disease; consumption of whole grains is protective against these conditions. Nutritional benefits of consuming 100% whole wheat include lowering cholesterol levels and blood pressure, slowing the absorption of glucose and stabilizing blood glucose levels, and promoting bowel regularity

• Many persons are intolerant to wheat, and wheat is identified as one of the 8 major food allergens in the U.S. in addition to peanuts, tree nuts, cow’s milk, shellfish, soy, eggs, and fish. Some individuals must avoid or completely eliminate dietary wheat to prevent harmful effects of wheat intolerance, including intestinal damage that is characteristic of celiac disease (CD; also called gluten-sensitive enteropathy, celiac sprue, and nontropical sprue). Although there is speculation that following a wheat-free diet could benefit persons with autism, evidence for this is lacking

› Action of wheat (3,4,6,7,8,11,16,17)

• Whole wheat bread typically provides 2 g of dietary fiber/slice. Benefits of dietary fiber include that it
  – binds with water and slows the digestive process, allowing more effective physiologic management of post-prandial (i.e., after eating) glucose and insulin responses
  – increases the volume of the intestinal contents, which hinders the absorption of cholesterol. The added bulk also promotes more regular bowel movements, which improve intestinal health

• Wheat contains vitamins B₁, B₂, and B₃, which create energy by aiding the metabolism of carbohydrates, provide cardiovascular protection, maintain the nervous system, and support the production of red blood cells, hormones, and essential cholesterol

• Whole wheat contains betaine, a metabolite of choline that reduces inflammation

• Whole wheat has many phytonutrients (i.e., beneficial plant-derived chemicals), which serve as antioxidants, have anti-cancer properties, and reduce inflammation. One important phytonutrient in whole wheat is the lignan enterolactone, which has estrogen-like effects. Increasing serum levels of enterolactones may help protect against heart disease and hormone-dependent cancers such as breast and prostate cancers
Wheat germ is rich in vitamin E, a fat-soluble vitamin that functions primarily as an antioxidant, but also maintains cell membranes, assists in vitamin K absorption, and contributes to immune system function.

Recommended dosage and administration

The U.S. Food and Drug Administration (FDA) recommends 25–30 grams of dietary fiber intake per day, the amount provided in about 2 cups of 100% whole wheat flour.

Celiac disease

One of the major health concerns associated with wheat consumption is CD. CD is a chronic, autoimmune, inflammatory disorder of the small bowel that is triggered by a hypersensitivity to gluten in genetically predisposed individuals.

- Gluten is most commonly associated with wheat, but is also found on the surface layer of the cereal grains barley and rye.
- Signs and symptoms of CD include extra-intestinal manifestations such as chronic fatigue, iron deficiency anemia, dental enamel hypoplasia, infertility, neurologic disorders, dermatitis herpetiformis (i.e., skin rash), peripheral neuropathy, skeletal disorders (e.g., osteoporosis), and generalized pain.
- In some cases, CD is subclinical and patients appear asymptomatic, but results of serologic tests and villi sampling are positive for CD.
- Risk factors include a family history of CD or other autoimmune disorders, most commonly diabetes mellitus, type 1 (DM1).

A life-long gluten-free diet (GFD) is the primary treatment for individuals diagnosed with CD.

No information is available in the medical literature about the interaction of wheat with medications.

Recent research findings on wheat

Researchers have found that the dietary fiber in wheat promotes the growth of flora (i.e., beneficial bacteria) in the intestines. This prebiotic action increases the formation of fermentation products (e.g., the short-chain fatty acids [SCFA] butyrate, propionate, and acetate) that inhibit the growth of and induce apoptosis in cancer cells in the colon. SCFA serve as an energy source to normal cells, enhancing their survival.

Diets high in simple carbohydrates (e.g., diets containing refined wheat flour) are associated with dyslipidemia and diabetes mellitus. Even whole grains have a relatively high glycemic index, which can cause elevated blood glucose levels that lead to increased production of insulin. Diet modification for the prevention of obesity, heart disease, and diabetes mellitus should include adding sources of unsaturated fats, lean proteins, fruits, vegetables, and whole grains.

 Researchers have evaluated patients who avoid wheat and/or gluten (PWAWG) due to possible intolerance in order to identify common clinical features among them, as well as similar and differing characteristics when compared to individuals with CD. The study revealed similar characteristics among the CD and the PWAWG groups when comparing comorbidities, mean BMI, and mean hemoglobin levels. The mechanism of these similarities is not understood.

Currently, the only treatment for CD is complete and permanent elimination of dietary gluten. Ingesting even small amounts of gluten can damage the intestinal mucosa of patients with CD, requiring that gluten-free foods be prepared separately from foods containing gluten in order to prevent cross-contamination. Gluten is also present in the ingredients of many processed foods; extensive knowledge of food products and careful reading of all food labels are vital to avoid unintentional gluten exposure.

Common food ingredients that contain gluten include malt flavoring, dextrin, hydrolyzed plant proteins, modified food starch, dextrins, and a variety of seasonings.

Avoiding nonfood sources of gluten that can be ingested is also important. Examples of nonfood sources of gluten include certain toothpastes, medications, dietary supplements, lipsticks, postage stamps, and envelopes.

What We Can Do

Become knowledgeable about the physiologic risks and benefits of wheat consumption so you can accurately assess your patients’ personal characteristics and health education needs; share this information with your colleagues.

Assess your patients’ dietary habits and educate regarding the importance of consuming a diet that is high in nutrition and contains a variety of fruits, vegetables, whole grains, and lean meats, as appropriate to individualized patient characteristics.

Educate your patients that whole wheat can be beneficial to health because it contains a high amount of fiber and valuable nutrients.

Warn your patients that consuming large amounts of refined wheat is associated with obesity, DM2, and CVD.

Warn your patients about the potential for allergic reaction to wheat.
Related Guidelines

The American Heart Association (AHA) dietary and lifestyle recommendations regarding the consumption of wheat include the following:¹⁸

• Eat 25–30 g of fiber/day (food sources: whole wheat, oat bran, barley, nuts, seeds, beans, lentils, peas, and fruits and vegetables)
• At least half of all grains consumed should be whole grains
References


