

Digestive Diseases
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A service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), NIH

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Celiac Disease

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Conference on Celiac Disease](#) (2004)

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What is celiac disease?

Celiac disease is a digestive disease that damages the small intestine and interferes with absorption of nutrients from food. People who have celiac disease cannot tolerate a protein called gluten, which is found in wheat, rye, and barley. When people with celiac disease eat foods containing gluten, their immune system responds by damaging the small intestine. Specifically, tiny fingerlike protrusions, called villi, on the lining of the small intestine are lost. Nutrients from food are absorbed into the bloodstream through these villi. Without villi, a person becomes malnourished—regardless of the quantity of food eaten.

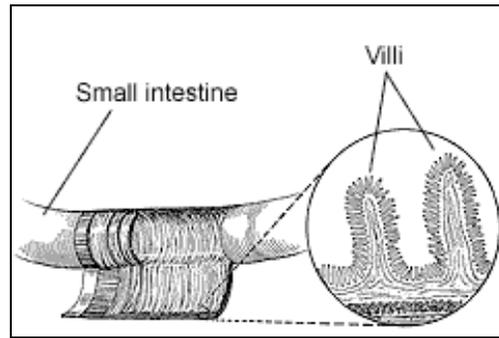
Because the body's own immune system causes the damage, celiac disease is considered an autoimmune disorder. However, it is also classified as a disease of malabsorption because nutrients are not absorbed. Celiac disease is also known as celiac sprue, nontropical sprue, and gluten-sensitive enteropathy.

Celiac disease is a genetic disease, meaning that it runs in families. Sometimes the disease is triggered—or becomes active for the first time—after surgery, pregnancy, childbirth, viral infection, or severe emotional stress.

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What are the symptoms?

Celiac disease affects people differently. Some people develop symptoms as children, others as adults. One factor thought to play a role in when and how celiac appears is whether and how long a person was breastfed—the longer one was breastfed, the later symptoms of celiac disease appear and the more atypical the symptoms. Other factors include the age at which one began eating foods containing gluten and how much gluten is eaten.



Villi on the lining of the small intestine help absorb nutrients.

Symptoms may or may not occur in the digestive system. For example, one person might have diarrhea and abdominal pain, while another person has irritability or depression. In fact, irritability is one of the most common symptoms in children.

Symptoms of celiac disease may include one or more of the following:

- recurring abdominal bloating and pain
- chronic diarrhea
- weight loss
- pale, foul-smelling stool
- unexplained anemia (low count of red blood cells)
- gas
- bone pain
- behavior changes
- muscle cramps
- fatigue
- delayed growth
- failure to thrive in infants
- pain in the joints
- seizures
- tingling numbness in the legs (from nerve damage)
- pale sores inside the mouth, called aphthous ulcers
- painful skin rash, called dermatitis herpetiformis
- tooth discoloration or loss of enamel
- missed menstrual periods (often because of excessive weight loss)

Anemia, delayed growth, and weight loss are signs of malnutrition—not getting enough nutrients. Malnutrition is a serious problem for anyone, but particularly for

children because they need adequate nutrition to develop properly.

Some people with celiac disease may not have symptoms. The undamaged part of their small intestine is able to absorb enough nutrients to prevent symptoms. However, people without symptoms are still at risk for the complications of celiac disease. See [Complications](#).

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How is celiac disease diagnosed?

Diagnosing celiac disease can be difficult because some of its symptoms are similar to those of other diseases, including irritable bowel syndrome, Crohn's disease, ulcerative colitis, diverticulosis, intestinal infections, chronic fatigue syndrome, and depression.

Recently, researchers discovered that people with celiac disease have higher than normal levels of certain antibodies in their blood. Antibodies are produced by the immune system in response to substances that the body perceives to be threatening. To diagnose celiac disease, physicians test blood to measure levels of antibodies to endomysium and tissue transglutaminase.

If the tests and symptoms suggest celiac disease, the physician may remove a tiny piece of tissue from the small intestine to check for damage to the villi. This is done in a procedure called a biopsy: the physician eases a long, thin tube called an endoscope through the mouth and stomach into the small intestine, and then takes a sample of tissue using instruments passed through the endoscope. Biopsy of the small intestine is the best way to diagnose celiac disease.

Screening

Screening for celiac disease involves testing asymptomatic people for the antibodies (see above). Americans are not routinely screened for celiac disease. However, because celiac disease is hereditary, family members—particularly first-degree relatives—of people who have been diagnosed may need to be tested for the disease. About 10 percent of an affected person's first-degree relatives (parents, siblings, or children) will also have the disease. The longer a person goes undiagnosed and untreated, the greater the chance of developing malnutrition and other complications.

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What is the treatment?

The only treatment for celiac disease is to follow a gluten-free diet—that is, to avoid all foods that contain gluten. For most people, following this diet will stop symptoms, heal existing intestinal damage, and prevent further damage. Improvements begin within days of starting the diet, and the small intestine is usually completely healed—meaning the villi are intact and working—in 3 to 6 months. (It may take up to 2 years for older adults.)

The gluten-free diet is a lifetime requirement. Eating any gluten, no matter how small an amount, can damage the intestine. This is true for anyone with the disease, including people who do not have noticeable symptoms. Depending on a person's age at diagnosis, some problems, such as delayed growth and tooth discoloration, may not improve.

A small percentage of people with celiac disease do not improve on the gluten-free diet. These people often have severely damaged intestines that cannot heal even

after they eliminate gluten from their diet. Because their intestines are not absorbing enough nutrients, they may need to receive intravenous nutrition supplements. Drug treatments are being evaluated for unresponsive celiac disease. These patients may need to be evaluated for complications of the disease.

The Gluten-Free Diet

A gluten-free diet means avoiding all foods that contain wheat (including spelt, triticale, and kamut), rye, and barley—in other words, most grain, pasta, cereal, and many processed foods. Despite these restrictions, people with celiac disease can eat a well-balanced diet with a variety of foods, including bread and pasta. For example, instead of wheat flour, people can use potato, rice, soy, or bean flour. Or, they can buy gluten-free bread, pasta, and other products from special food companies.

Whether people with celiac disease should avoid oats is controversial because some people have been able to eat oats without having a reaction. Scientists are doing studies to find out whether people with celiac disease can tolerate oats. Until the studies are complete, people with celiac disease should follow their physician or dietitian's advice about eating oats. A dietitian is a health care professional who specializes in food and nutrition.

Plain meat, fish, rice, fruits, and vegetables do not contain gluten, so people with celiac disease can eat as much of these foods as they like. Examples of foods that are safe to eat and those that are not are provided below.

The gluten-free diet is complicated. It requires a completely new approach to eating that affects a person's entire life. People with celiac disease have to be extremely careful about what they buy for lunch at school or work, eat at cocktail parties, or grab from the refrigerator for a midnight snack. Eating out can be a challenge as the person with celiac disease learns to scrutinize the menu for foods with gluten and question the waiter or chef about possible hidden sources of gluten. Hidden sources of gluten include additives, preservatives, and stabilizers found in processed food, medicines, and mouthwash. If ingredients are not itemized, you may want to check with the manufacturer of the product. With practice, screening for gluten becomes second nature.

A dietitian can help people learn about their new diet. Also, support groups are particularly helpful for newly diagnosed people and their families as they learn to adjust to a new way of life.

The Gluten-Free Diet: Some Examples

Following are examples of foods that are allowed and those that should be avoided when eating gluten-free. Please note that this is not a complete list. People are encouraged to discuss gluten-free food choices with a physician or dietitian who specializes in celiac disease. Also, it is important to read all food ingredient lists carefully to make sure that the food does not contain gluten.

Food Categories	Foods Recommended	Foods To Omit	Tips
Breads, cereals, rice, and pasta: 6–11 servings each day			
Serving size = 1 slice bread, 1 cup ready-to-eat cereal, 1/2 cup cooked cereal,	• Breads or bread products made from corn, rice, soy, arrowroot corn or potato starch, pea, potato or whole-bean flour, tapioca, sago, rice	• Breads and baked products containing wheat, rye, triticale, barley, oats, wheat germ or bran, graham, gluten or durum	Use corn, rice, soy, arrowroot, tapioca, and potato flours or a mixture instead of wheat

rice, or pasta; 1/2 bun, bagel, or English muffin	bran, cornmeal, buckwheat, millet, flax, teff, sorghum, amaranth, and quinoa • Hot cereals made from soy, hominy, hominy grits, brown and white rice, buckwheat groats, millet, cornmeal, and quinoa flakes • Puffed corn, rice or millet, and other rice and corn made with allowed ingredients • Rice, rice noodles, and pastas made from allowed ingredients • Some rice crackers and cakes, popped corn cakes made from allowed ingredients	flour, wheat starch, oat bran, bulgur, farina, wheat-based semolina, spelt, kamut • Cereals made from wheat, rye, triticale, barley, and oats; cereals with added malt extract and malt flavorings • Pastas made from ingredients above • Most crackers	flours in recipes. Experiment with gluten-free products. Some may be purchased from your supermarket, health food store, or direct from the manufacturer.
Food Categories	Foods Recommended	Foods To Omit	Tips
Vegetables: 3–5 servings each day			
Serving size = 1 cup raw leafy, 1/2 cup cooked or chopped, 3/4 cup juice	• All plain, fresh, frozen, or canned vegetables made with allowed ingredients	• Any creamed or breaded vegetables (unless non- allowed ingredients are used), canned baked beans • Some french fries	Buy plain, frozen, or canned vegetables and season with herbs, spices, or sauces made with allowed ingredients.
Food Categories	Foods Recommended	Foods To Omit	Tips
Fruits: 2–4 servings each day			
Serving size = 1 medium size, 1/2 cup canned, 3/4 cup juice, 1/4 cup dried	• All fruits and fruit juices	• Some commercial fruit pie fillings and dried fruit	
Food Categories	Foods Recommended	Foods To Omit	Tips
Milk, yogurt, and cheese: 2–3 servings each day			
Serving size = 1 cup milk or yogurt, 1 1/2 oz natural cheese, 2 oz processed cheese	• All milk and milk products except those made with gluten additives • Aged cheese	• Malted milk • Some milk drinks, flavored or frozen yogurt	Contact the food manufacturer for product information if the ingredients are not listed on the label.
Food Categories	Foods Recommended	Foods To Omit	Tips
Meats, poultry, fish, dry beans and peas, eggs, and nuts: 2–3 servings or total of 6 oz daily			
Serving size = 2–3 oz cooked; count 1 egg, 1/2 cup cooked beans, 2 tbsp peanut butter, or	• All meat, poultry, fish, and shellfish; eggs • Dry peas and beans, nuts, peanut butter, soybeans • Cold cuts, frankfurters, or sausage without fillers	• Any prepared with wheat, rye, oats, barley, gluten stabilizers, or fillers including some frankfurters, cold cuts, sandwich spreads, sausages, and canned	When dining out, select meat, poultry, or fish made without breading, gravies, or sauces.

1/4 cup nuts as 1 oz of meat		meats • Self-basting turkey • Some egg substitutes	
Food Categories	Foods Recommended	Foods To Omit	Tips
Fats, snacks, sweets, condiments, and beverages			
	<ul style="list-style-type: none"> • Butter, margarine, salad dressings, sauces, soups, and desserts made with allowed ingredients • Sugar, honey, jelly, jam, hard candy, plain chocolate, coconut, molasses, marshmallows, meringues • Pure instant or ground coffee, tea, carbonated drinks, wine (made in U.S.), rum, alcohol distilled from cereals such as gin, vodka, and whiskey • Most seasonings and flavorings 	<ul style="list-style-type: none"> • Commercial salad dressings, prepared soups, condiments, sauces and seasonings prepared with ingredients listed above • Hot cocoa mixes, nondairy cream substitutes, flavored instant coffee, herbal tea, and beer • Beer, ale, cereal, and malted beverages • Licorice 	Store all gluten-free products in your refrigerator or freezer because they do not contain preservatives. Remember to avoid sauces, gravies, canned fish, and other products with HVP/HPP made from wheat protein.

2001, the American Dietetic Association. "Patient Education Materials: Supplement to the Manual of Clinical Dietetics." 3rd ed. Used with permission.

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What are the complications of celiac disease?

Damage to the small intestine and the resulting problems with nutrient absorption put a person with celiac disease at risk for several diseases and health problems.

- **Lymphoma and adenocarcinoma** are types of cancer that can develop in the intestine.
- **Osteoporosis** is a condition in which the bones become weak, brittle, and prone to breaking. Poor calcium absorption is a contributing factor to osteoporosis.
- **Miscarriage and congenital malformation** of the baby, such as neural tube defects, are risks for untreated pregnant women with celiac disease because of malabsorption of nutrients.
- **Short stature** results when childhood celiac disease prevents nutrient absorption during the years when nutrition is critical to a child's normal growth and development. Children who are diagnosed and treated before their growth stops may have a catch-up period.
- **Seizures**, or convulsions, result from inadequate absorption of folic acid. Lack of folic acid causes calcium deposits, called calcifications, to form in the brain, which in turn cause seizures.

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How common is celiac disease?

Celiac disease is the most common genetic disease in Europe. In Italy about 1 in

250 people and in Ireland about 1 in 300 people have celiac disease. Recent studies have shown that it may be more common in Africa, South America, and Asia than previously believed.

Until recently, celiac disease was thought to be uncommon in the United States. However, studies have shown that celiac disease occurs in an estimated 1 in 133 Americans. Among people who have a first-degree relative diagnosed with celiac, as many as 1 in 22 people may have the disease. A recent study in which random blood samples from the Red Cross were tested for celiac disease suggests that as many as 1 in every 250 Americans may have it. Celiac disease could be underdiagnosed in the United States for a number of reasons:

- Celiac symptoms can be attributed to other problems.
- Many doctors are not knowledgeable about the disease.
- Only a handful of U.S. laboratories are experienced and skilled in testing for celiac disease.

More research is needed to find out the true prevalence of celiac disease among Americans.

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Diseases Linked to Celiac Disease

People with celiac disease tend to have other autoimmune diseases as well, including

- dermatitis herpetiformis
- thyroid disease
- systemic lupus erythematosus
- type 1 diabetes
- liver disease
- collagen vascular disease
- rheumatoid arthritis
- Sjögren's syndrome

The connection between celiac and these diseases may be genetic.

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Dermatitis Herpetiformis

Dermatitis herpetiformis (DH) is a severe itchy, blistering skin disease caused by gluten intolerance. DH is related to celiac disease because both are autoimmune disorders caused by gluten intolerance, but they are separate diseases. The rash usually occurs on the elbows, knees, and buttocks.

Although people with DH do not usually have digestive symptoms, they often have the same intestinal damage as people with celiac disease.

DH is diagnosed by a skin biopsy, which involves removing a tiny piece of skin near the rash and testing it for the IgA antibody. DH is treated with a [gluten-free diet](#) and medication to control the rash, such as dapsone or sulfapyridine. Drug treatment may last several years.

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Points to Remember

- People with celiac disease cannot tolerate gluten, a protein in wheat, rye, barley, and possibly oats.
- Celiac disease damages the small intestine and interferes with nutrient absorption.
- Treatment is important because people with celiac disease could develop complications like cancer, osteoporosis, anemia, and seizures.
- A person with celiac disease may or may not have symptoms.
- Diagnosis involves blood tests and biopsy.
- Because celiac disease is hereditary, family members of a person with celiac disease may need to be tested.
- Celiac disease is treated by eliminating all gluten from the diet. The gluten-free diet is a lifetime requirement.

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Publications produced by the clearinghouse are carefully reviewed by both NIDDK scientists and outside experts.

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