

Celiac Disease

Celiac disease is a condition in which the lining of the small intestine is damaged by an allergic reaction to the food protein *gluten* which is present in a number of grains. It is said to be an autoimmune disease since antibodies produced by the [immune system](#) against specific gluten components, namely gliadin, cross react with intestinal tissue which contains similar proteins.

Celiac disease is also referred to by other names including coeliac disease, c(o)eliac sprue, gluten intolerance, and gluten enteropathy.

Official figures for clinically diagnosed celiac disease put the rate at 0.05-0.27% based on results from various studies. However, it is widely accepted that the condition is underdiagnosed with many people suffering [symptoms](#) for years without they or their doctors realizing they have celiac disease. Population studies from Europe, South America, Australasia and the USA (using serology and biopsy) have shown that the prevalence may actually be between 0.33 and 1.06% in children and 0.18-1.2% in adults. This translates to as many as 1 in 80 being affected.

Cases of celiac disease are not distributed uniformly however. The disease most often effects people of European (especially Northern European) descent. Rates amongst people of African, Japanese, and Chinese descent are much lower. This is thought to be due to a combination of less genetic susceptibility and low wheat [diets](#). Risk is elevated in those with other autoimmune diseases.

The risk for developing celiac disease is elevated in people with other [autoimmune diseases](#). It is also considered to have a strong genetic component since it tends to run in families. One large multicentre study undertaken in the US found a prevalence of 0.75% in not-at-risk groups (people without other allergic/autoimmune conditions etc), 1.8% in symptomatic patients, 2.6% in second-degree relatives of a patient with celiac disease and 4.5% in first-degree relatives(1).

Symptoms

The symptoms of celiac disease are many and varied and it is considered to be a "multi-system, multi-symptom" disorder. As a result of this the condition is often mistaken for other bowel disorders and sometimes even other types of illness, as surprisingly bowel symptoms are not always present in cases of celiac disease.

The disease can appear at any time in a persons life although research showing prevalence doesn't change much between childhood and adulthood would suggest most cases appear when a person is growing up (2). Symptoms can also vary considerably throughout a persons life. For example, when a celiac disease sufferer is in their teens gastrointestinal symptoms such as diarrhea and cramping may be most prominent, in their 30's the disease may present mainly as fatigue and [depression](#), and finally in middle to old-age osteoporosis may be most troubling. This chameleon-like nature of the disease plays a large part in underdiagnosis.

The symptoms of celiac disease are so numerous that it would be impractical to list all that have been ascribed to it. The following is a list of the most common symptoms:

Classic gastrointestinal symptoms:

- Diarrhea (characteristically pale in colour, bulky and strong smelling)
- Abdominal pain
- Intestinal gas
- Distention and bloating
- Steatorrhea - fatty stools
- [Constipation](#) (far less common than diarrhea)
- Mouth ulcers
- Lactose intolerance

Malabsorption-related symptoms:

Damage to the small intestinal wall make it less able to absorb nutrients, minerals and fat-soluble [vitamins](#).

- Weight loss (often despite large appetite and food intake)
- Failure to thrive (in children)
- Fatigue and lack of energy
- Anaemia (iron malabsorption may cause iron deficiency anaemia, and folic acid and [vitamin B12](#) malabsorption may give rise to megaloblastic anaemia)
- Osteopenia (decreased mineral content of the bone) and [osteoporosis](#) (bone weakening and risk of fragility fractures). Both result from malabsorption of calcium and vitamin D resulting in deficiencies.
- Poor blood coagulation and abnormal bleeding (due to vitamin K deficiency but relatively rare)
- [Small intestine bacterial overgrowth \(SIBO\)](#) (can worsen malabsorption or cause it to persist after conventional treatment for celiac disease(3))

Other symptoms:

- Dermatitis Herpetiformis - (a skin manifestation of celiac disease characterized by blistering, and intensely itchy skin, most often found on the face, elbows, knees and buttocks.)
- IgA deficiency (present in around 2% of patients with celiac disease)
- Dental enamel defects
- Infertility - male/female
- Depression
- Neurological conditions (epilepsy, ataxia (coordination problems), myelopathy and [peripheral neuropathy](#))
- Hyposplenism (a small and underactive spleen)
- Other auto-immune disorders (including diabetes mellitus type 1, autoimmune thyroiditis, primary biliary cirrhosis, and microscopic colitis.)

Many other symptom lists are available online and in print and many are far more extensive, especially where "other symptoms" are concerned.

Due to the fact that celiac disease can cause such varied and numerous symptoms, and a single person can experience different symptoms at different times, it is very often missed by doctors. It has been estimated that it takes an average of 10 years for a patient to be correctly diagnosed with the condition. Many patients are given a number of different diagnoses prior to the correct diagnosis of celiac disease being given. The most common prior diagnoses are listed below.

The following list was taken from the Fall, 1996 Celiac Disease Foundation Newsletter.

1. Anemia
2. IBS
3. Psychological stress, nerves, imagination
4. Diarrhea
5. IBD
6. Diabetes
7. Spastic Colon
8. Ulcers
9. Virus (Viral Gastroenteritis)
10. Chronic Fatigue Syndrome
11. Weight-loss
12. Allergies
13. Amoeba, Parasites, Infection
14. Gallbladder Disease

15. Thyroid Disease
16. Cancer, Lymphoma, Digestive
17. Colitis
18. Cystic Fibrosis
19. Lactose Intolerance
20. Reflux

Data from an on-going Celiac Disease Foundation study of 600 Biopsy-proven celiacs.

Of course, the correct diagnosis of celiac disease does not always mean previous diagnoses were incorrect. It is possible for celiac disease and other conditions to be present concurrently.

Which grains cause celiac disease?

The grain most associated with celiac disease is wheat. This is due not only to its gluten content but also to the fact that it is a staple in most western nations. Wheat, specifically wheat flour, is used in everyday foods from bread and pastry, to cookies and cakes. It's therefore not unusual for a person to be eating wheat containing foods at virtually every meal.

Wheat is not the only gluten containing grain however, both barley and rye also contain the protein responsible for celiac disease. Although the association between these grains and celiac disease is not as well known to the general population as that for wheat, these grains are equally troublesome for the celiac disease sufferer.

For a long time it was generally thought that oats were also a problem for celiacs. Recent research has shed doubt on this assumption however and oats are now thought to be a problem only in a small number of people with celiac disease (4, 5). It has been suggested that oats caused symptoms in most cases due to cross contamination with other grains in the fields or during food processing.

A number of other grains that are staples in other parts of the world are free from gluten and safe for celiacs to eat. These grains include maize/corn (South America) and rice (Asia). Gluten is not present in any other group of foods.

What makes a celiac's life particularly difficult is the fact that gluten is found in a large proportion of packaged and processed foods.

How does gluten cause illness in celiac disease?

Celiac disease is caused by an immune reaction to gliadin, a specific protein that is a component of gluten. Exactly why the immune system of a celiac disease sufferer looks upon gliadin as an invader and produces antibodies to attack it is unknown. According to the Celiac Disease Foundation (www.celiac.org), research has shown that the condition is strongly associated with a group of genes on Chromosome 6. These genes (HLA class II) are involved in the regulation of the body's immune response to gliadin and other gluten protein constituents.

Gliadin closely resembles the enzyme tissue transglutaminase which is present in the tissue of the small intestine. When food containing gluten, and thus gliadin, is eaten, the body's immune system whilst attacking the food protein also attacks the tissue of the small intestine due to its tissue transglutaminase content. This immune response causes an inflammatory reaction that leads to flattening of the villi, the brush-like filaments that line the walls of the small intestine. The villi greatly increase the surface area of the small intestine and therefore increase the absorption of nutrients. The damage caused in celiac disease results in serious problems absorbing nutrients from food.

The symptoms in celiac disease are so numerous and varied as they may be caused either by inflammation of the small intestine or by malabsorption and the resulting nutrient deficiencies, or both. Gastrointestinal symptoms may result from a combination of factors with inflammation causing pain and the resulting malabsorption causing bloating and distention, as well as fatty stools. There has been a growing recognition of the intimate connection between gut and brain in recent years. The gut contains the highest concentration of nerve cells outside of the brain and for this reason has been referred to as the "second brain". The gut also contains much higher concentrations of serotonin than the brain, even though this neurotransmitter chemical is most known for its effect on mood and brain function. With this knowledge of the tight connection between gut and brain it starts to become apparent why celiac disease sufferers often experience many mood and neurological disorders.

Testing for celiac disease

Celiac disease screening may be carried out routinely for those people who have a family history of the condition, or of disorders such as anemia of unknown cause, thyroid disease, type I diabetes, or other

autoimmune disorders. In most cases however, testing for celiac disease will not be carried out unless a patient is symptomatic and the doctor suspects it.

Testing for celiac disease basically falls into two categories, blood testing for the presence of specific antibodies, and examining a tissue sample from the small intestine. Sometimes the levels of non-specific antibodies found only in the gastrointestinal tract, known as secretory IgA, may also be checked.

Antibody Testing

An antibody is a protein produced by the immune system to break down and eliminate foreign substances. Antibodies are created that target specific substances, such as viruses or bacteria, which is how immunity develops. In the case of allergies, the body produces antibodies that target substances which aren't actually harmful such as pollen (hayfever) or certain foods (food allergy). Similarly, in autoimmune disease the immune system produces antibodies that target specific tissues of the body itself. Celiac disease involves components of both allergy and autoimmune disease as antibodies are first produced against gluten proteins in food, and then against the tissue of the small intestine which have a similar chemical structure.

There are three specific antibodies that may indicate the presence of celiac disease:

Anti-Gliadin Antibody (AGA)- Testing for antibodies against gliadin are useful as an initial screening test but cannot provide a definite diagnosis of celiac disease. This is because IgG anti-gliadin antibodies are also detectable in approximately 21% of patients with other gastrointestinal disorders. The presence of anti-gliadin antibodies indicates an allergy against the gluten protein gliadin is present. A positive anti-gliadin antibody test suggests that celiac disease is a possibility and that further testing should be carried out.

Anti-Tissue Transglutaminase Antibody (tTG) - This test is more specific for celiac disease and is sometimes the only blood antibody test used by a physician diagnosing the condition. The presence of tissue transglutaminase antibodies indicates that the immune system is attacking the tissues of the small intestine. If this test is positive it is highly likely that the patient has coeliac disease. After testing positive on this test a patient will usually be sent for a biopsy to confirm the diagnosis of celiac disease. It should be noted that tTG testing is not reliable in children under the age of 2. The AGA test may be more useful in these children.

Anti-Endomysial Antibody (EMA) - Like the tTG test the EMA measures the autoantibodies (antibodies that target body tissues) that cause the small intestinal tissue damage associated with celiac disease. This test is very accurate but is not carried out as much as it was in the past, with the newer tTG being favoured in many cases. Like the tTG test, the EMA is also not reliable in children under the age of 2.

Total IgA Testing

In cases where testing for IgA anti-gliadin, anti-tissue transglutaminase, and anti-endomysial antibodies is being carried out, total IgA levels may also be tested. Low total IgA levels are associated with celiac disease.

Small Intestinal Biopsy

If a patient tests positive for celiac disease related antibodies, particularly tTG and EMA, a small intestinal biopsy is usually carried out to look for damage to the intestinal tissue to confirm the diagnosis. Small intestinal biopsies are obtained by performing an esophagogastroduodenoscopy (EGD). In this procedure the doctor inserts a flexible tube called an endoscope through the mouth and into the duodenum, the upper part of the small intestine. Once in place a flexible biopsy instrument is then passed through the endoscope so that a tissue sample from the small intestine can be taken. More than one sample is usually taken to increase accuracy. Once samples have been obtained they are studied under a microscope to look for telltale signs of celiac disease such as inflammation, loss of villi, and increased numbers of lymphocytes (white blood cells).

Treatment of Celiac Disease

Currently the only truly effective treatment for celiac disease is a gluten-free diet. When sufferers adhere to a gluten-free diet, the tissue of the small intestine starts to heal and overall health begins to improve. Over a period of a few months, the small intestine will once again become healthy and in the

majority of cases the patient's symptoms will disappear entirely. In some cases however, the celiac disease sufferer's health won't completely return to the level it was prior to them having the disease. These people may be left with persistent dermatitis herpetiformis, mouth ulcers, and osteoporosis. Some sufferers may continue to experience digestive complaints of the kind associated with [irritable bowel syndrome \(IBS\)](#), and there is also an increased risk of anxiety, fatigue, and musculoskeletal aches and pains compared with healthy individuals (6).

Despite the chance of some symptoms persisting even whilst conforming to a gluten-free diet, there is no doubt that it does indeed lead to healing of the damaged small intestinal lining and brings significant relief to almost all patients. There will usually be a period of adjustment for the patient embarking on the gluten-free diet but after a while it will become second nature and most people are able to enjoy a varied and nutritious diet that's free from gluten. Most doctors will refer celiac disease patients to a dietician who will help them adjust and educate them about alternatives to gluten/wheat containing foods.

Those on a gluten-free diet need to learn to check labels whilst food shopping. Wheat and gluten are added to a large range of products, particularly highly processed foods, often where you'd least expect. Perhaps the hardest part of adhering to the gluten-free diet involves learning which food additives contain gluten, even when gluten itself is not specifically mentioned. The following is a list of major food additives that may contain gluten:

- Starch
- Modified food starch
- Hydrolyzed vegetable protein - HVP
- Hydrolyzed plant protein - HPP
- Texturized vegetable protein - TVP
- Binders
- Fillers
- Excipients
- Malt

Some of these additives, particularly binders, fillers, and starch, are also added to numerous pharmaceutical drugs so it is important for those with celiac disease to check with their doctor or the drug company before taking anything.

Aside from the gluten-free diet, nutritional supplements will likely have to be taken for a while to correct deficiencies that have arisen as a result of malabsorption due to the damage to the small intestine caused by the disease. Doctors and/or dieticians will usually order lab tests to determine which nutrients need replacing in individual cases.

In addition, nutritional and herbal supplements which aid in the healing of the small intestine may be useful in speeding up the recovery process. These are products that are also often used for treating [leaky gut syndrome](#), also referred to as *increased intestinal permeability*.

You can learn more about some of these supplements on our [leaky gut syndrome treatment](#) page

Celiac Disease and Environmental Illnesses

Those suffering from environmental illnesses may be at increased risk for developing celiac disease. The main reason for this being that those with environmental illnesses experience a much greater number of allergies and autoimmune conditions than do otherwise healthy individuals. For example, the National Jewish Medical and Research Center in the US reports that allergies are present in 75% of CFS sufferers, compared to only 10-20% in general in the population as a whole. Sufferers of all of the Environmental Illnesses often have a history of allergies before the onset of their illness and most develop new allergies after getting a diagnosis of CFS, fibromyalgia etc. There is also a substantial body of research demonstrating that the immune systems of environmental illness sufferers are shifted towards a Th2 type response. The Th2 response is aimed at extracellular invaders such as bacteria, toxins, and allergens, and a Th2 shifted immune response is associated with an increase in allergies and autoimmune diseases (7,8,9). As we have learned, allergies and autoimmune diseases are well recognized as increasing the risk for celiac disease.

Another possible connection between environmental illnesses and celiac disease involves the gut flora. Various studies have shown disturbances of the healthy gut flora in environmental illnesses and many

doctors who specialize in treating them advocate treating overgrowth of Candida and bacteria in the intestines. Research published in the prestigious medical journal *The Lancet* in 2003 proposed that Candida in the intestine may act as a trigger for the production of antibodies against gluten and the intestinal tissue which cause celiac disease. This assertion is based on the fact that the yeast Candida contains proteins that are identical and very similar to those found in gluten, including gliadin. Candida also triggers the same tissue transglutaminase and endomysial enzymes involved in celiac disease. It is therefore possible that changes in levels and behavior of Candida in the intestines may result in an immune response to the organism which is then transferred to gluten and intestinal tissues due to the common proteins they contain. The end result would therefore be celiac disease (10).