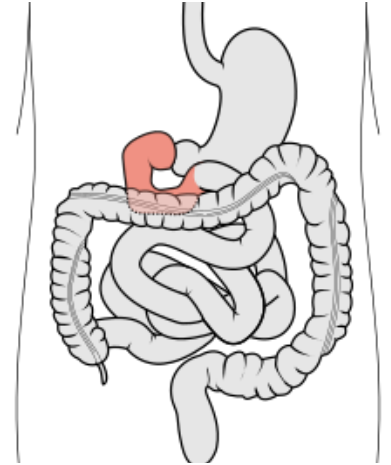


Name:

## Case Study - Celiac Disease

Jen was in college when she was diagnosed with celiac disease, though symptoms of her digestive system problems appeared earlier in life. What she considered a “sensitive stomach” was actually an **autoimmune disease**. Foods that contain gluten would trigger her immune system and damage the small intestine. This meant that Jen was not digesting food properly, resulting in weight loss. She was also experiencing other symptoms, such as vomiting, diarrhea, and acid reflux. You can read about Jen’s story at her [blog](#).

What is **celiac disease**? The word “celiac” means related to the abdomen, a reference to the observation that patients often have symptoms related to the stomach. It is also classified as a **chronic disease**, which refers to diseases that have ongoing symptoms for a year or more. Viruses that cause diarrhea or vomiting only last a few days and would not be considered chronic.



1. Why is celiac disease considered an autoimmune disease?

2. How is celiac disease different from infectious diseases of the gut?

3. Examine the graphic of the digestive system. List the structures that food passes through in order starting at the mouth. (You may need to reference your notes or other materials.)

### Symptoms (and Signs)

Signs of celiac disease can appear in childhood. Parents may notice that children aren’t growing as quickly as they should. Children can experience gastrointestinal problems, like diarrhea and vomiting. Some symptoms may be mild and can go undiagnosed for years. Anemia can result from untreated celiac disease because the person is not absorbing nutrients. This is particularly problematic in children where malabsorption of nutrients can result in growth retardation and neurological problems.

Doctors may diagnose a person with [IBS](#) (irritable bowel syndrome) which is a generalized diagnosis for a variety of symptoms that affect the gut. . Further tests may be needed to determine if the IBS is caused by celiac disease, or several other gastrointestinal diseases like Crohn’s disease or ulcerative colitis.

4. What is a gastrointestinal disease?

5. Why is malabsorption a problem for children?

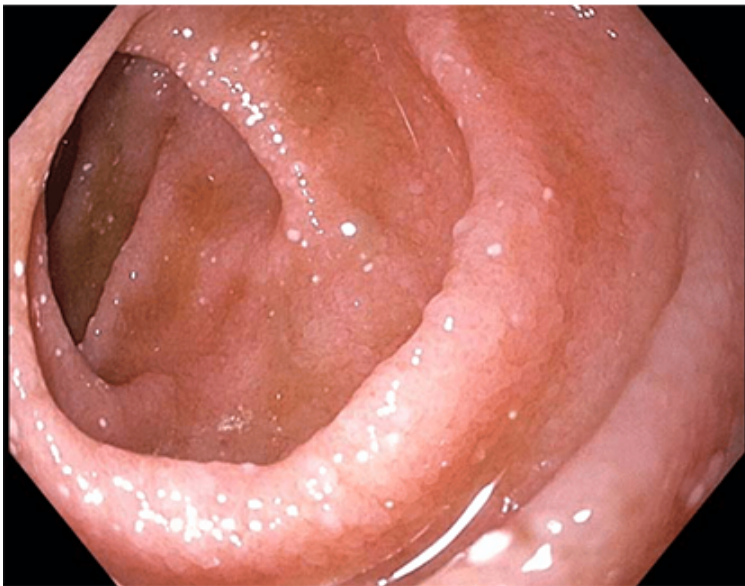
6. What is the difference between IBS and celiac disease?

## Diagnosis

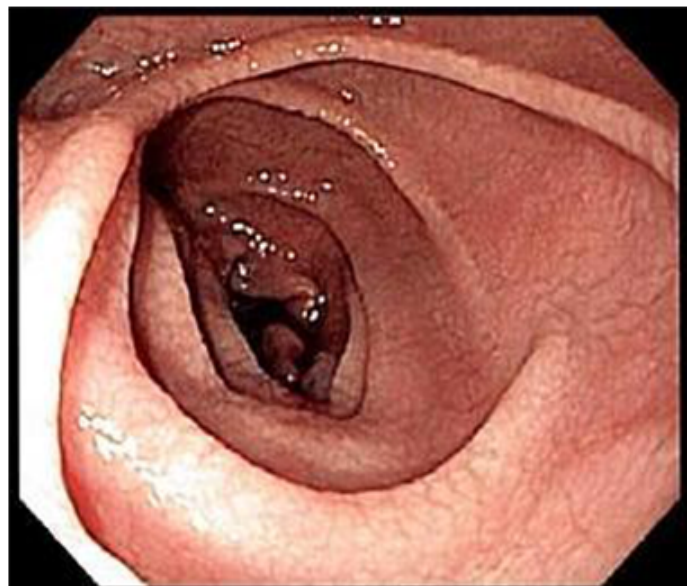
Celiac disease is an autoimmune disease, meaning that antibodies produced by the body's own cells damage the lining of the gut. These antibodies can be detected in the blood with a **serology test**. Doctors may also order an endoscopy procedure to view the lining of the gut and take a **biopsy** to view the cells. This test uses a long tube with a tiny camera that is passed into the throat and to the small intestine.

The duodenum in those with celiac disease has a characteristic appearance, where the surface (mucosa) has a cracked texture, which is referred to as "scalloping." Doctors will also note that there is a decreased amount of folding along the canal. Both indicate that the cells of the mucosa have been damaged.

**Genetic tests** can also reveal two specific genes related to celiac disease. This gene is associated with a variant in the HLA protein. The protein is involved with the immune system's ability to recognize its own cells. The genetic component of celiac disease means that it can run in families.



Normal endoscope of duodenum  
(via researchgate.net)



Abnormal endoscope / celiac disease  
(via rwikimedia commons)

7. What is the difference between a serology test and a biopsy?

8. Compare the normal mucosa to the mucosa of someone with celiac disease.

**Biopsy Results** - A sample of cells taken from the mucosa (lining of the gut) reveals several pathologies associated with celiac disease.

A) Fingerlike projections of the lining called villi become shorter and flatten, this is called **villous atrophy**. The flattened villi make it more difficult for nutrients to be absorbed.

B) An increased number of white blood cells, **lymphocytes** can be detected. These cells indicate a heightened immune response.

C) Glands, called the **crypts of Lieberkuhn**, are located between the villi. These glands will become more numerous and enlarged as the disease progresses, possibly as a way for the body to compensate for the loss of villi.

D) Over time, the small intestine will become flattened and unable to absorb nutrients, a condition called **hypoplasia**. This is visible on an endoscopy test also, with the lining having a flat, scalloped appearance.

9. The image shows the immunopathology of celiac disease in five stages. Match the description to the phase. The slide at zero is the normal condition. Use the letters and descriptions above (they are not in order).

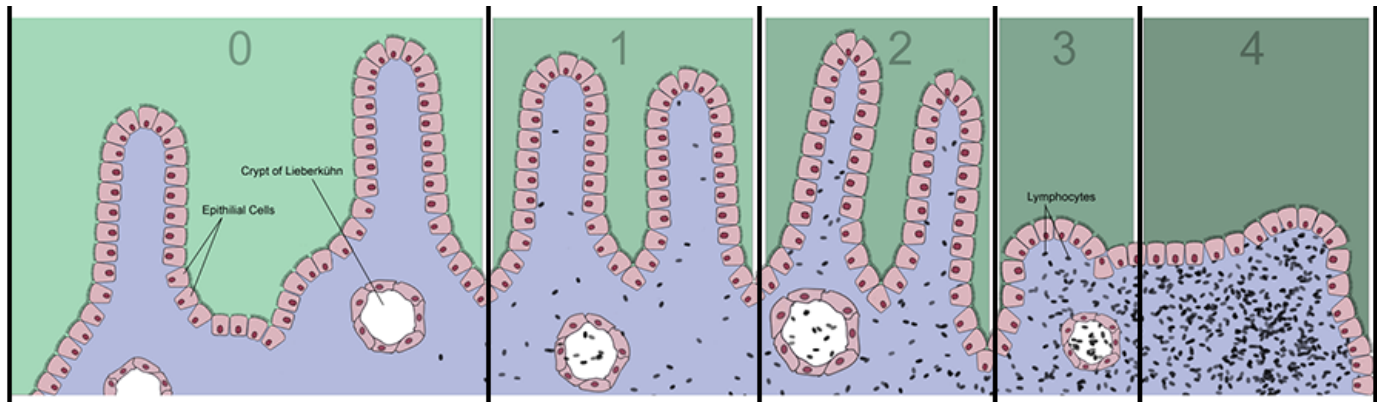


Image Source: [https://commons.wikimedia.org/wiki/File:Coeliac\\_Disease.png](https://commons.wikimedia.org/wiki/File:Coeliac_Disease.png)

Normal				
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10. Celiac Disease can be classified as different types, related to the severity of three indicators: IEL (epithelial lymphocytes), crypts, and villi.

The modified Marsh classification [42].

	Type 0	Type 1	Type 2	Type 3a	Type 3b	Type 3c
IEL	<40	>40	>40	>40	>40	>40
Crypts	Normal	Normal	Hypertrophic	Hypertrophic	Hypertrophic	Hypertrophic
Villi	Normal	Normal	Normal	Mild atrophy	Marked atrophy	Absent

11. If Jen’s biopsy showed that she had hypertrophic crypts, mild atrophy in the villi, and IEL greater than 40, which type of celiac would she be classified as?

12. What do the words “hypertrophic” and “atrophic” mean?

13. Why would the absence of villi in Type 3c be a problem?

## Treatment

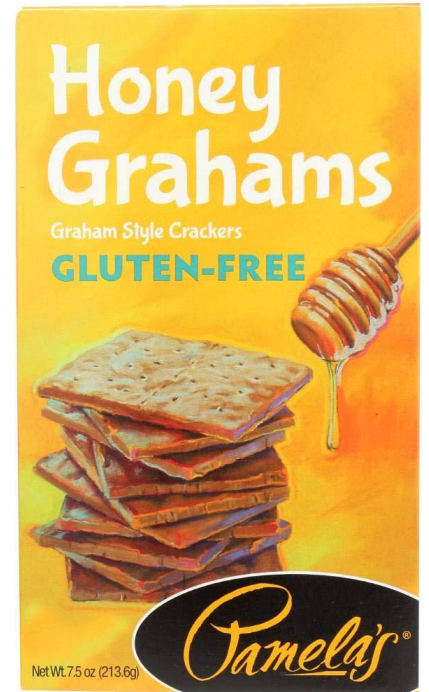
Celiac disease is caused by the body's reaction to **gluten**, which is a type of protein found in wheat and other grains. The gluten in these grains causes an abnormal immune response, which is why celiac disease is classified as an autoimmune disease. Antibodies produced by the white blood cells cause an **inflammatory reaction** that leads to the damage to the mucosa of the small intestine. In some cases, this reaction may even manifest as a rash on the skin.

The treatment for the disease may sound simple, but for people that have celiac, it can be life changing. To prevent further damage to the intestines and allow the body to repair previous damage, the person must remove gluten from their diet. Wheat and grains are a major component of most western diets, it is in cereal, bread, pasta and many foods that are common at the dinner table. To treat celiac disease, a person must commit to a very restrictive diet. Even small amounts of gluten can trigger flare-ups in symptoms.

As more people become aware of this disease, grocery stores have created sections for shoppers who need to avoid gluten. It is estimated that about .5% of people in North America have celiac disease, that's about 5 out of 1000.

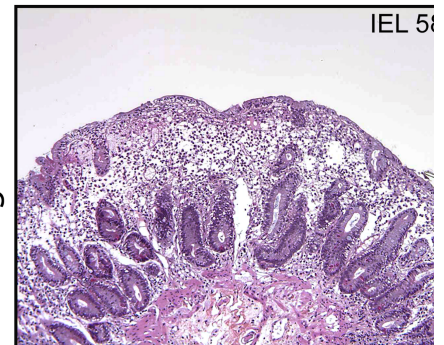
14. Plan a gluten-free day for someone with celiac disease. What will that person eat for breakfast, lunch and dinner? (*Do not just add "gluten-free" to your items.*)

15. Imagine your little sister has been diagnosed with celiac disease, and she doesn't understand why she can't have her favorite cereal anymore. You have the cards shown in the image to show her. Explain the disease using the cards shown in a way that an eight-year-old can understand.

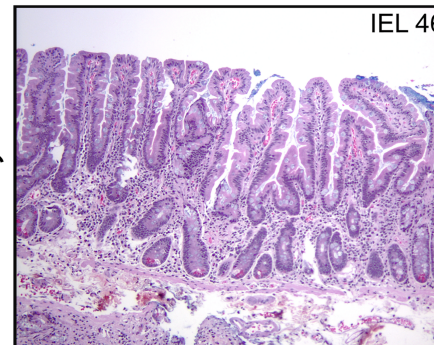


CD496

Diagnosis



Recovery



Source:

<https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0010001>



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Abnormal Endoscope Image:

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Strongyloides Duodenitis in an Immunosuppressed Patient with Lupus Nephritis - Scientific Figure on ResearchGate. Available from [https://www.researchgate.net/figure/Normal-endoscopic-appearance-of-the-second-part-of-the-duodenum\\_fig1\\_325473928](https://www.researchgate.net/figure/Normal-endoscopic-appearance-of-the-second-part-of-the-duodenum_fig1_325473928) [accessed 28 Mar, 2021]

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Marsh Classification via [NCBI: Celiac Disease](#)

Holtmeier, W., & Caspary, W. F. (2006). Celiac disease. Orphanet Journal of Rare Diseases, 1(1).

<https://doi.org/10.1186/1750-1172-1-3>

Diagnosis and Recovery via <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0010001> [Creative Commons Attribution-Share Alike 3.0 Unported](#) license