

Gluten

What is Gluten?

Gluten refers to the proteins in cereal grains, such as **wheat, barley and rye**. It is found in the endosperm which nourishes plant embryos during germination. Gluten is a mixture of hundreds of proteins, although it is primarily made up of two different classes of proteins: *gliadin*, which gives bread the ability to rise during baking, and *glutenin*, which is responsible for dough's elasticity.

Wheat is commonly found in:

- Breads
- Cereals
- Baked goods
- Sauces
- Soups
- Salad dressings
- Pastas



Barley is commonly found in:

- Malt (malted barley flour, malted milk and milkshakes, malt extract, malt vinegar)
- Food coloring
- Beer
- Soups
- Brewer's Yeast

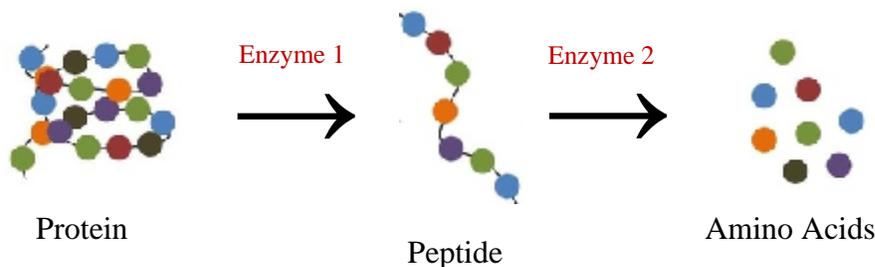


Rye is commonly found in:

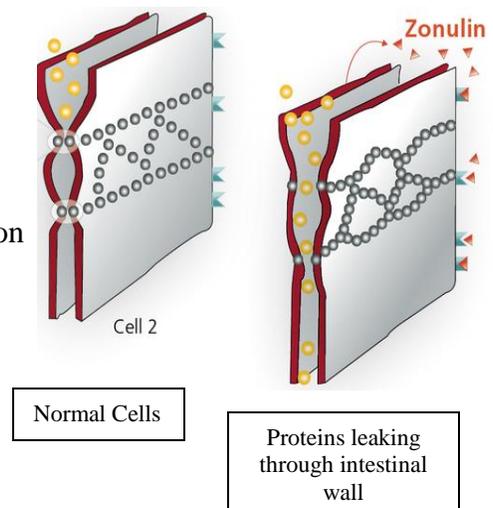
- Rye breads, such as pumpernickel
- Rye beer
- Cereals



Digestion of Proteins



Gluten is a protein with an unusual composition and our enzymes do not recognize the sequence of amino acids in gluten so it cannot be completely broken down. This poor digestibility may have no consequences for the majority of people but for a minority, it leads to symptoms. Gluten increases zonulin (an inflammatory protein) production and zonulin increases intestinal permeability, allowing more proteins to travel through the gut wall and challenge the immune system (potentially leading to inflammation, autoimmunity, and cancer). This mechanism may affect **100%** of humans.



The Development of Celiac Disease (an autoimmune condition)

- Partially digested gluten leaks through the intestine after zonulin is released.
- The immune system is triggered and starts to fight the leaked gluten.
- Nearby intestinal cells are damaged.
- Future exposure of gluten causes inflammation in the gut.

What Happens in the Gut Doesn't Stay in the Gut

- In some patients, immune cells will leave the intestines and can go anywhere in the body
 - If they reach the joints, they can cause joint pain
 - If they reach the nerves, they can cause peripheral neuropathy
 - If they reach the skin, they can cause dermatitis (rash)

Non-Celiac Gluten Sensitivity

- Symptoms that can be experienced include:
 - abdominal pain, headache, foggy mind, and chronic fatigue
- Can play a role in many illnesses
 - Has been found in patients with:
 - Chronic headaches
 - ADHD
 - Depression
 - Movement disorders
 - Schizophrenia
 - Dementia
- It is difficult to diagnose NCGS on a purely clinical basis, it is vital to rule out other possible causes of symptoms first and then consider a gluten-free diet trial.

What Triggers a Loss of Tolerance to Gluten?

- Change in microbiome (bugs in your gut) which leads to change in gene expression
- Once the genes are turned on, the condition is permanent and irreversible
- A gluten-free diet stops inflammation because there is no enemy to fight
- If gluten is ever reintroduced, the immune system will be reactivated

Knowledge is Power

- Gluten can open the door to many different problems
- Restrict gluten
- Rebuild the gut lining
- Use probiotics

References

1. What is gluten? Celiac Disease Foundation. www.celiac.org/live-gluten-free.
2. Perlmutter, D. (2014). Eliminating gluten as the 1st step in preventing brain conditions. [Powerpoint slides]. Retrieved from www.theglutensummit.com.
3. Fasano, A. (2014). Why creating the healthiest intestinal environment possible can arrest your vulnerability to the #3 cause of getting sick and dying. [Powerpoint slides]. Retrieved from www.theglutensummit.com.

Prepared by: Jacqueline Nissen, UIC College of Pharmacy, PharmD Candidate 2018
Prepared for: Robert Listeki Pharmacist, Glen Ellyn Pharmacy

