

# Gliadin

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**Gliadin** (a type of prolamin) is a class of proteins present in wheat and several other cereals within the grass genus *Triticum*. Gliadins, which are a component of gluten, are essential for giving bread the ability to rise properly during baking. Gliadins and glutenins are the two main components of the gluten fraction of the wheat seed. This gluten is found in products such as wheat flour. Gluten is split about evenly between the gliadins and glutenins, although there are variations found in different sources.

Gliadin is the water-insoluble component of gluten, and glutenin is water-soluble.<sup>[1]</sup> There are three main types of gliadin ( $\alpha$ ,  $\gamma$ , and  $\omega$ ), to which the body is intolerant in coeliac (or celiac) disease. Diagnosis of this disease has recently been improving.

Gliadin can cross the intestinal epithelium. Breast milk of healthy human mothers who eat gluten-containing foods presents high levels of non-degraded gliadin.<sup>[2][3]</sup>

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## Types

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The  $\alpha$ ,  $\gamma$ , and  $\omega$  gliadin types are separated and distinguished based on their amino acid sequences.<sup>[4]</sup>

- $\alpha$ -/ $\beta$ -gliadins – soluble in low-percentage alcohols.

- $\gamma$ -gliadins – ancestral form of cysteine-rich gliadin with only intrachain disulfide bridges
- $\omega$ -gliadins – soluble in higher percentages, 30–50% acidic acetonitrile.

## Biochemistry

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Gliadins are prolamins and are separated on the basis of electrophoretic mobility and isoelectric focusing. Gliadin peptides cross the intestinal barrier by active transport.

## Metabolism

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Gliadins are known for their role, along with glutenin, in the formation of gluten. They are slightly soluble in ethanol and contain only intramolecular disulfide links. They also cause some of the best examples of food-derived pathogenesis. People with gluten-sensitive enteropathy (the severe form of which is celiac disease) are sensitive to  $\alpha$ ,  $\beta$ , and  $\gamma$  gliadins. Those with WD urticaria and Baker's asthma are sensitive to  $\omega$ -gliadins.

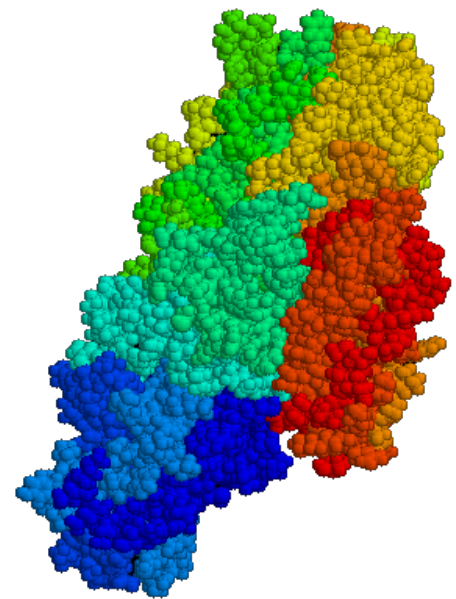
Gliadin can also serve as a useful delivery method for sensitive enzymes (such as superoxide dismutase, which is fused with gliadin to form glisodin) – this helps protect them from stomach acids that cause breakdown.

For useful description of the gliadins see:

- Triticeae glutens
- Immunochemistry of gluten

### Deamidated gliadin

Deamidated gliadin is produced by acid or enzymatic treatment of gluten. The enzyme tissue transglutaminase converts some of the abundant glutamines to glutamic acid. This is done because gliadins are soluble in alcohol and cannot be mixed with other foods (like milk) without changing the foods' qualities. Deamidated gliadin is soluble in water. The cellular immunity to deamidated  $\alpha$ -/ $\beta$ -gliadin is much greater than  $\alpha$ / $\beta$ -gliadin and can result in symptomatic gluten-sensitive enteropathy.



Tissue transglutaminase

## Celiac disease

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Celiac disease is a chronic, immune-mediated intestinal disorder, in which the body becomes intolerant to gliadin, which is a component of gluten.<sup>[5]</sup> Individuals with celiac disease exhibit a lifelong intolerance of wheat, barley and rye – all of which contain prolamins.<sup>[6]</sup> Gliadin proteins have the ability to provoke an autoimmune enteropathy caused by an abnormal immune response in genetically susceptible individuals. Specific amino acid sequences within the gliadin proteins are responsible for this activity.<sup>[6][7]</sup>

The main problems with this disease is that it often goes unrecognized for many years, in which it can cause serious damage to several organs,<sup>[8]</sup> and most cases currently remain unrecognized, undiagnosed and untreated. Mainly intestinal villi destruction mediated by Interferon Gamma and CD 4(+).<sup>[9][10][11][12]</sup> Celiac disease with "non-classic symptoms" is the most common clinical type and occurs in older children (over 2 years old), adolescents and adults.<sup>[8]</sup> It is characterized by milder or even absent gastrointestinal symptoms and a wide spectrum of non-intestinal manifestations that can involve any organ of the body, and very frequently may be completely asymptomatic<sup>[11]</sup> both in children (at least in 43% of the cases<sup>[13]</sup>) and adults.<sup>[11]</sup> Untreated celiac disease may cause malabsorption, reduced quality of life, iron deficiency, osteoporosis, an increased risk of intestinal lymphomas and greater mortality.<sup>[14]</sup> It is associated with some autoimmune diseases, such as diabetes mellitus type 1, thyroiditis,<sup>[15]</sup> gluten ataxia, psoriasis, vitiligo, autoimmune hepatitis, dermatitis herpetiformis, primary sclerosing cholangitis, and more.<sup>[15]</sup>

The only available treatment for celiac disease is a strict gluten-free diet in which the diseased person does not ingest any gluten. There have been searches for an affordable and much better treatment, but the only treatment remains to abstain from ingesting any gluten.<sup>[8]</sup>

## See also

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- Anti-gliadin antibodies
- Gluten immunochemistry
- Glutenin
- Non-celiac gluten sensitivity
- Gluten-related disorders
- Intestinal permeability

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## External links

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- Gliadin (<https://meshb.nlm.nih.gov/record/ui?name=Gliadin>) at the US National Library of Medicine Medical Subject Headings (MeSH)
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