



WHEAT ALLERGY

Shaunagh Emanuel & Di Hawarden

Dr Do-a-lot sets questions for her students on **Wheat Allergy**:



Breads and pastries are commonly made from wheat flour

Is wheat a protein?

Wheat is a species of cereal grass of the genus *Triticum* that provides edible grain kernels. The kernels contain approximately 70% starch and approximately 15% protein. The proteins in wheat have been categorised into four fractions depending on their solubility. Albumen and globulin are water-soluble structural proteins. The gliadins and glutenins are water-insoluble storage proteins. It is the gliadins and glutenins that are referred to as 'gluten'. Gluten is also present in barley and rye. Small amounts of gluten may be found in oats that are processed in factories used to process other grains.

What is the difference between wheat allergy, coeliac disease and gluten intolerance?

Coeliac disease, wheat allergy and non-coeliac gluten sensitivity (also referred to as gluten intolerance or gluten sensitivity) are distinct conditions that may have similar symptoms.

When we refer to **wheat allergy**, we mean immunoglobulin E-mediated wheat hypersensitivity. This type of immediate reaction to wheat is typically seen in children, whereas it is

rare in adults. Symptoms include gastrointestinal symptoms such as vomiting and diarrhoea, skin manifestations such as urticaria, erythema, angioedema, pruritus and worsening of atopic eczema, and respiratory symptoms such as wheeze, stridor, persistent cough, hoarse voice, respiratory distress and nasal congestion. Anaphylaxis is the most severe manifestation of wheat allergy. Testing is via skin-prick testing (SPT) or specific IgE tests.

Coeliac disease is an autoimmune T-cell-mediated delayed-type reaction that results in damage to the intestinal wall, with resulting malabsorption and a variety of both gastrointestinal and systemic symptoms. Blood tests for IgA tissue transglutaminase (tTG-IgA) in the presence of normal IgA levels are used in diagnosis. A small intestine biopsy is diagnostic. The tests are accurate only if the patient is on a gluten-containing diet at the time of testing. Treatment involves the elimination of gluten from the diet. This is typically a life-long condition. Dermatitis herpetiformis is the skin manifestation of coeliac disease. Gluten ataxia is a related condition (with positive serological markers for gluten sensitisation) that is characterised by damage to the cerebellum.

Unlike wheat allergy, **non-coeliac gluten sensitivity** (NCGS) is not an immune-mediated allergic condition for which serological testing is available; and unlike coeliac disease, it is not an autoimmune condition. It is a gluten-related condition that results in symptoms following wheat ingestion in people in whom coeliac disease and wheat allergy have been excluded. The diagnosis is made, therefore, by exclusion. Common symptoms include mental fatigue, physical fatigue, abdominal pain, bloating, flatulence and headaches.

What other forms of wheat allergy are there?

Wheat-dependent, exercise-induced anaphylaxis (WDEIA) is a relatively rare condition that is described typically in adults, mostly in females. These patients develop anaphylaxis as a result of exercising, but only if a meal containing wheat was consumed shortly before the exercise. Exercise alone, and wheat consumption alone, does not induce anaphylaxis



Cross section of a wheat kernel

in these patients. The allergen is usually omega-5-gliadin.

IgE-mediated wheat allergy may manifest as **Baker's asthma**. This is an occupational respiratory condition that occurs commonly in up to 30% of adults who work in the baking industry, where they are exposed to inhaled raw wheat flour. Occasionally patients may present with **contact urticaria** to wheat.

patients with WDIEA, in 80% of children with anaphylaxis following wheat ingestion, and in approximately 25% of children with atopic eczema and wheat allergy.

What is the treatment for wheat allergy?

Wheat allergy is treated with a wheat-free diet. This is not the same as a gluten-free diet. The gluten proteins are the water-insoluble proteins; water-soluble proteins (that is, albumen and globulin) may also be responsible for reactions. The term 'gluten free' on food packaging refers to products that contain less than 20 parts per million of gluten. This is generally low enough not to cause symptoms in people who suffer from coeliac disease, but may not be safe for people who have a true IgE-mediated wheat allergy.

Another point worth noting is that wheat allergy tends to be induced solely by wheat allergens. Other gluten-containing cereals do not typically induce symptoms in wheat-allergic individuals. So barley, rye and oats tend to be safe for people with wheat allergy. This is particularly true of oats. In children with wheat allergy, oat sensitivity is very rare.

Gluten-free products such as rice, corn flour, tapioca, millet or sorghum are usually tolerated by patients with wheat allergy, but often these products are mixed with wheat starch. If the wheat starch is not adequately purified, the product may not be safe.

Embarking on an exclusion diet of such a ubiquitous food source is difficult and requires the professional assistance of an experienced dietician. Desensitisation is a possible future treatment, but further studies are necessary to evaluate its effectiveness. Studies on infant feeding indicate that the early introduction of potentially allergenic foods into the infant diet appears to decrease the incidence of food allergies.

Which are some of the foods that may contain wheat?

Wheat is widely consumed worldwide; in fact, almost half the calories consumed today by the human population worldwide are derived from cereals. Wheat is the most popular choice of grain in Europe and the Americas. This makes wheat a difficult ingredient to avoid: flour and bran are used to make bread, breakfast cereals, pasta, couscous and pastries; wheat is added to processed meat, puddings, ice cream and cream as a binding agent; starch is

How are gluten-related disorders classified?

Gluten-related disorders might be autoimmune (coeliac disease, dermatitis herpetiformis, gluten ataxia), allergic (IgE- and non-IgE-mediated wheat allergy) or non-coeliac or NCGS (of indeterminate pathogenesis).

Is wheat allergy common?

'Wheat allergy' receives a great deal of media attention; however, true IgE-mediated wheat allergy is relatively uncommon, with a prevalence of approximately 1%. Taking all gluten-related disorders into account, it has been estimated that approximately 3% of the human population suffers from some sort of wheat-related malady, 1% wheat allergy, 1% coeliac disease and 1% non-coeliac gluten sensitivity. Wheat is one of the five most common foods to trigger allergic reactions in children, and wheat allergy is particularly common in atopic children, where the rate of diagnosis rises to approximately 15%.

Can you outgrow wheat allergy?

In the same way that children tend to outgrow egg and milk allergy, approximately 50% of children will have outgrown wheat allergy by about their seventh year and approximately 75% will be wheat tolerant by the age of 16 years. Only about 10% of children continue to suffer from symptoms into adulthood.

Are there any tests for wheat allergy, and are they any good?

SPTs and specific IgE tests are available, but sensitivity is low and there is significant cross-reactivity with grass-pollen proteins, so the tests need careful interpretation in the light of the clinical picture. A precise diagnosis of wheat allergy still relies on standardised oral challenges, which must be done in an appropriate setting under medical supervision. The best understood allergenic molecule in wheat allergy is rw-5 gliadin. The IgE specific to this molecule is found in all



used as a coating agent in sweets and medications as well as coffee grounds. Wheat is also widely used in the production of cosmetics, paper and chemicals.

Note: Semolina and couscous are wheat derivatives.

Write short notes on advice and helpful hints for patients with wheat allergy:

- Be vigilant when exposed to food, and do not be afraid to ask questions about the food that you are eating if you are uncertain about how it has been prepared or what it contains.
- Check food labels and be aware of the meaning of 'gluten free'.
- Carry emergency medication everywhere. Always. And know how and when to use it.
- Asthma must be well managed and controlled in patients with food allergies.

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