

# Dairy Products and Allergies

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## Food allergies: generalities

### 1. What are food allergies?

Food allergies – also referred to as hypersensitivities – can be defined as exaggerated reactions by the immune system \* (the body's system of defence) to food components it considers as intruders (aggressors).

The food allergen \* (called trophallergen \*) is generally a protein or an amino-acid sequence (epitope \*).

Food allergies can be explained as breakdowns in the body's normal immune response (which usually tolerates food proteins). Allergic people have a genetic predisposition, which impairs their body to tolerate these food proteins.

### 2. What are their mechanisms of action?

Food allergies are always a reaction by the immune system. The mechanisms involved can be different, the mechanism the best known depends on immunoglobulins E (IgE). Stated simply:

- at the time of the first contact with the allergen (which can be through skin, digestive, nasal, bronchial, eye contact), the immune system produces antibodies \*, immunoglobulins E (IgE), which fix themselves on various cells (skin, mucuous, blood ...) Generally there are no symptoms during this sensitization/allergization phase. The body is being prepared for allergic reaction.
- When, at a later date, there is a contact with the same allergen, the IgE can immediately recognize it. Consequently a whole chain of reactions is initiated leading

to the release of a number of substances (mediators \*), histamine \* in particular, which are at the origin of clinical signs of the allergy.

There are also other mechanisms (non IgE mediated). These involve other antibodies (IgG), immune complexes or a cell response (T lymphocytes).

In the context of IgE mediated allergies, reactions generally occur very quickly after consumption of the food: a few minutes to a few hours. Allergies connected to activation of T lymphocytes occur between 24h and 72h after contact with the allergen (they are referred to as delayed allergies).

### 3. How do they occur?

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The clinical manifestations of allergies are many and of variable intensity depending on the individual. Some, fortunately rare, like Quincke's edema \*, or anaphylactic shock \* can lead to death. More commonly, three types of symptoms can be distinguished:

- **gastro-intestinal**: nausea, vomiting, cramps, abdominal pain, diarrhea
- **dermatological**: hives, eczema, itching, canker sores, swelling of the lips
- **respiratory and ocular**: sneezing, rhino, conjunctivitis, cough, asthma

Certain factors – like exertion, the use of certain medicines, alcohol – can favour or reveal food allergies.

### 4. Are food allergies frequent?

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Food allergies seem to have been increasing over the past few years (changes in the food environment, hygienist theory, better detection ...).

In France, they are estimated to affect approximately 3 people in 100. While allergies can appear at any age, they are nevertheless more frequent in children under 15; 6 to 8 children in 100 appear to be concerned.

Allergies are more frequent in individuals with a genetic predisposition (atopia\*). Therefore, for a child, the risk of being allergic is greater if one of the parents is allergic and even more so if both are.

*To be noted: a number of people say that they are allergic when in fact they are not. Not all reactions to food are allergic reactions. There are other reactions, such as food intolerances\* or even pseudo-allergies\* leading to clinical manifestations similar to allergies but not involving immune mechanisms.*

### 5. What foods are involved most often?

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Despite the wide range of foods consumed by man, the number of foods involved in most food allergies is relatively low. It is estimated that 90% of food allergies involve 7 foods: eggs, peanuts, milk, nuts, wheat, fish, shellfish (and soy in the United States).

For young people under 15 years of age, in France, eggs are the most frequent allergen (34% of cases), followed by peanuts\* (25%), milk (8%) and fish (5%). These are followed by shellfish and molluscs, and allergens of plant origin: nuts\*, wheat, legumes\* (soy ...), kiwi, mustard ... The order of number of cases varies with age.

For adults, allergens of plant origin are preponderant (these allergies increase with age, as does sensitivity to pollens): latex\*, rosaceae\*, nuts, prunoides, apiaceae/umbelliferae\*.

The minimal amount of food setting off an allergy is quite variable from person to person. Some individuals can react to a µg (this is often the case for peanuts).

- In children, allergies are predominantly in males; in adults, they are predominantly in females.
- It is possible to be allergic to several foods (poly-allergies\* and cross allergies\*).
- There is a connection between consumption habits and an allergen type population. Hence, the allergy to rice is particularly frequent in Japan, to fish in northern countries and to tomatoes in Italy.
- French experts observe a disturbing rise in certain allergies and emergence of new allergens: spices, condiments, exotic fruits, sesame, sunflower, lupine, rye seeds, wheat isolate, goat's and ewe's milk. They are concerned by the growing use of allergenic proteins as additives and/or technological aids.

## 6. How are allergies diagnosed and treated?

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The diagnosis – performed by an allergist – is based on questioning, a detailed clinical examination and a diet survey, cuti\*- and/or provocation\* tests and biological determinations (IgE ...).

Long term care is based mainly on total exclusion (avoidance) of foods that might contain the incriminated allergen; hence the importance of labelling and fear of masked allergens\*.

The prognosis of recovery is variable depending on the allergen and the age. Putting things simply, we can make a distinction between allergies that:

- decrease with age: eggs, milk, fish (more or less foods of animal origin)
- increase with age: umbelliferae, rosaceae, latex (more or less foods of vegetable origin)
- unchanged with age: peanuts, various nuts

## 7. Is prevention possible?

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- **Pregnant women with family history**, are usually advised to avoid peanuts during pregnancy. In very rare cases, eggs or milk proteins can be excluded from the diet of expectant mothers; nutritional supervision is absolutely necessary in order to avoid any deficiencies (calcium in particular).
- **For infants with food allergy risk**, breast-feeding is highly recommended to the age of 6 months, followed by complete breast-feeding or replaced by a hypoallergenic milk. For the duration of breast-feeding, it is preferable that the mother also exclude peanuts. Up until recently, food diversification was generally delayed and “risky” foods were introduced later (fish after 12 months and eggs, peanuts, nuts, hazelnuts, almonds after 2 years).

However, recent studies appear to show that diversification that is initiated too late increases the risk of allergies. New recommendations tend towards normal diversification.

## Allergy to cow's milk

### 8. Are all reactions to milk due to allergy?

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There are two principal types of reactions to milk: lactose intolerance and true allergy. Their clinical manifestations, when they are digestive (vomiting, diarrhea, colic) can be confused, but the causes are different:

- Lactose intolerance\* is not connected with an immune mechanism but rather is caused by an enzyme deficiency.
- Cow's milk protein allergy (CMPA\*) – like other allergies – is connected to an immune mechanism. Other than digestive reactions it also leads to skin and/or respiratory reactions. All milk proteins are potentially allergenic, but the most frequent ones are caseins ( $\alpha$ ,  $\beta$ ,  $\kappa$ ),  $\beta$ -lactoglobulin and  $\beta$ -lactalbumin.

*To be noted: some individuals can develop "pseudo allergies" after consuming histamine-rich cheeses.*

### 9. How does the allergy to cow's milk proteins occur?

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CMPA affects mainly children under 3 years of age and appears mainly in infants when cow's milk is introduced in their diet. If there has been sensitisation in utero or through breast milk, it can occur from the first bottle. Typically there are skin reactions (severe hives). Digestive (with vomiting and/or diarrhea) or respiratory (asthma) symptoms are possible. Anaphylaxis and serious symptoms are relatively rare (about 15% of cases of CMPA).

*To be noted: in adults CMPA is rare but can be serious.*

### 10. How can it be treated?

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Treatment involves strict avoidance of cow's milk and all its by-products, including products containing milk, milk proteins (lactoproteins, whey proteins, caseins, caseinates, lactalbumin, etc.) and lactose (possible contamination with milk proteins). Butter may also be excluded in certain cases of allergy.

CMPA usually disappears by the age of 3 years and in 80 to 90% of cases by the age of 6 years. The prognosis is more favourable for milk allergies of digestive nature. When CMPA occurs with breast feeding or is associated with multiple food allergies, the prognosis is not as favourable. The baby is fed with a protein hydrolysate. The re-introduction of milk is supervised in hospital.

*Goat's and ewe's milks are not recommended for allergic children or children presenting a risk of allergy (risks of cross reactions with cow's milk and allergies specific to those milks); plant-extract drinks – as well as preparations based on non hydrolyzed proteins- also are not recommended.*

## Regulations and information

### 11. What about product labelling?

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To date, legislation requires labelling on pre-packaged products of 14 allergens that have been voluntarily added to food:

Cereals containing gluten and cereal-based products containing gluten; shellfish and shellfish-based products; eggs and egg-based products; fish and fish-based products; peanuts and peanut-based products; soy and soy-based products; milk and dairy products (including lactose); nuts and by-products; sesame seeds and sesame-based products; sulfite in concentrations of at least 10mg/kg; celery; mustard; lupin and by-products; molluscs and by-products.

Involuntary contamination of a food by an allergen (owing, e.g., to proximity of production lines) is still a problem for allergic people and for industries. Precautionary labelling such as “may contain” or even “possible traces of” is sometimes used.

### 12. How are allergic people informed?

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Allergic people can consult labels (allergen list, ingredient list), contact quality and/or consumer services of companies and associations of allergy sufferers who provide many documents.

### Summary

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Cow 's milk allergy is an immune reaction affecting genetically predisposed individuals. It is rare in adults. It concerns mainly children under 3 years of age and generally disappears as the child ages. It can result in various symptoms: digestive, skin, respiratory ... The diagnosis is established from specific medical tests and an avoidance diet is then prescribed.

## Annex 1 Glossary of terms

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**Allergen:** Component (generally protein) which can cause allergic reactions.

**Anaphylaxis:** Serious disorder leading to severe cardio-respiratory insufficiencies.

**Antibody:** Substance made by the body to combat an antigen. In the allergy sufferer, the allergens are the antigens and the immunoglobulins E or IgE are the antibodies.

**Antigen:** Foreign substance causing the formation of antibodies.

**Atopy:** The abnormal capacity to synthesize specific IgE antibodies vis-à-vis allergens coming into contact with the body by natural means. Food allergies are atopic diseases.

**Challenge tests:** These tests are carried out in hospital. After a period of avoidance, the subject is re-exposed to the allergen e.g. by contact with the lips or by swallowing. Diagnosis can be confirmed and the reaction threshold can be determined. These tests allow one to observe the onset of a tolerance over time.

**CMPA:** Cow's Milk Protein Allergy.

**Cross allergies:** Allergies that can be explained by similarity in structure between the allergens involved. Examples of cross allergies:

- Food-food: peanut with lupin, nuts or legumes;
- Food-pneumallergens\*: fruits or vegetables and birch pollen;
- Food-latex: kiwi, banana, avocado, chestnut, fig and rubber gloves.

**Cross contamination:** Contamination of foodstuffs by an allergen during manufacture, storage, transport or possible recycling.

**Cuti-tests:** there are basically three:

- **Skin prick tests:** very small amounts of allergen extracts are deposited on the skin (arm, back ...). A prick is made with a needle through this extract. If the person is allergic, redness and swelling occur within 15 to 20 minutes. The IgE dependent sensitisation can thus be assessed.
- **Intradermal reactions test:** injection of small quantities of allergen under the skin.
- **Patch test:** a small dose of allergen is applied to the skin and held in place for 48 hours with tape. Delayed sensitisation is then assessed.

**Epitope:** Sequence of amino acids responsible for the allergising capacity of a protein.

**Histamine:** amine present in variable quantities in all tissues in an inactive bound form. Released during allergy, its most significant property is the dilatation of capillary veins.

**Immune system:** defends the body against external aggressions (bacteria, parasites ...). The foreign substance (antigen) is destroyed through the production of antibodies and many other substances.

**Intolerances:** although occurring after ingestion of a food, these reactions do not involve the immuno-allergic mechanism. They can be the result of an enzymatic deficiency (e.g. a lactase deficiency in the case of lactose intolerance).

**Latex group:** avocado, banana, chestnut, kiwi, fig, buckwheat. Risk of cross-allergy with latex (rubber gloves for example).

**Legumes:** peanuts, soy, peas, beans, lentils, broad beans.

**Major allergens:** Allergens contained in the following products as well as in all by-products or “-based” products: gluten, shellfish, eggs, fish, peanuts, soy, milk (including lactose), nuts, sesame seeds, sulfites (at least 10 mg/kg), celery, mustard, lupin and by-products, molluscs and by-products.

**Masked allergens:** Allergens not shown on the label (ex: the term vegetable oils can include peanut oil; processing aids can contain allergens ...), and/or be present incidentally in a product.

**Mediators:** the main substances involved in allergic reaction are histamine\*, prostaglandins, leukotrienes, PAF (platelet activator) and cytokines.

**Nut group:** almond, hazelnut, walnut, Brazil nut, cashew nut, pecan, pine nut, pistachio

**Peanut:** can be eaten as a nut, in peanut butter, oil, or as an additive ... Often a serious allergy, increasing in frequency, with sensitisation in increasingly young children.

**Pneumo-allergens:** allergens that penetrate the body through the respiratory system (mites, dusts, moulds, fur, cockroaches, pollens ...)

**Poly-allergy or multiple food allergy syndrome:** at least two food allergies in the same person. Its frequency is rising constantly and is reported to concern more than 40% of allergic children under the age of 1 year. The allergens most often involved are eggs, milk, wheat flour and peanuts.

**Pseudo-allergies:** Pseudo-allergies arise from the presence of substances in a food that in certain subjects are capable of causing clinical reactions that approach those of allergies without actually activating the immuno-allergic mechanism. The most frequent ones are due to:

- histamine: the food contains a lot of histamine (certain fermented cheeses, sauerkraut, fermented drinks ...) or is capable of triggering its release (strawberries, tomatoes, egg white, shellfish ...);
- tyramine: certain cheeses (emmental, gruyere, cheddar, Roquefort, brie ...), chocolate and kippers are tyramine-rich.

**Rosacea:** apricots, cherries, strawberries, raspberries, hazelnuts, peaches, pears, apples, plums.



**Quincke's edema:** sudden swelling of the face, neck and/or larynx responsible for respiratory distress.

**Trophallergen:** Food allergen (glycoprotein or, more rarely, polysaccharide) of animal or plant origin.

**Umbelliferae / Apiaceae:** dill, carrots, coriander, celery, caraway, anis, fennel, parsley seeds ...