

# Anaphylactic Shock (Anaphylaxis) — Symptoms and Treatment

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**As an emergency physician you are called to a child who was stung by a wasp while playing in a swimming pool. When you arrive, the little patient is barely conscious and the skin is red and covered with welts. The carotid pulse is barely palpable. ECG shows a tachycardia of 180/min. In addition, you observe strong wheezing and humming in all lung sections. The diagnosis of anaphylactic shock is made quickly. But how do you proceed from here?**



According to *Coombs and Gell*, allergies are divided into four different types:

- Immediate-type allergic reaction
- Cytotoxic-type allergic reaction
- Immune complex-type allergic reaction
- Delayed-type allergic reaction

**Anaphylactic shock belongs to the type 1 hypersensitivity or immediate-type allergic reaction.** The most common anaphylactic reactions are caused by:

- Food (including nuts, eggs, soy, etc.)
- Insect bites
- Medication (metamizole, penicillin, NSAR)

- Infections
- Inhalation of allergens (pollen, latex, etc.)

A **“first exposure” with the antigen occurs prior to an allergic reaction.** As a result of initial exposure, the body produces IgE-antibodies, which bind to the surfaces of mast cells and are specific to the sensitizing allergen. The complex immunological reaction then proceeds quickly. Once there is a **second exposure** to the same or similar allergen, the **bound IgE-antibodies** interlink with each other and **lead to degranulation** of mast cells. This leads to the release of inflammatory mediators, especially histamine and prostaglandins, followed by vascular dilatation (which leads to a drop in **blood pressure**) with an increase in the permeability of the vessels (which leads to swelling).

Anaphylactic shock is the most severe form of the type 1 reaction. This leads to redistribution of blood volume in the peripheral circulation (distributive shock), with reduced venous return and reduced cardiac output. This leads to decreased tissue perfusion and tissue hypoxia.

## Anaphylactic Symptoms

Symptoms	The release of histamine causes...
Bronchospasm, colic and rhinitis, conjunctivitis, <a href="#">bronchial asthma</a>	Peripheral vasodilation and increased vascular permeability
Erythema	Accumulation of blood in the capillary bed
Edema, <a href="#">pulmonary edema</a>	Fluid shift into the stroma
Pruritus	Urticaria
Flushing, dizziness, exanthema → hypotension, laryngeal edema, bronchospasm with <a href="#">dyspnea</a> , tachycardia, altered mental status → circulatory failure with multiple organ failures!	Hypovolemia, <a href="#">hypoxia</a> , vasodilation

## Acute Therapy of Anaphylaxis

### Treatment of anaphylactic shock includes:

- Recognize the condition early (this is critical).
- Remove or discontinue (in the case of medication or other agents) the offending allergen.
- Administer **oxygen** via face mask.
- Obtain adequate (i.e. large bore) venous access as soon as possible (needed to administer medications).
- Administer **corticosteroids** (e.g. prednisolone), and **H1- and H2-antihistamines intravenously** (high doses).
- Administer **epinephrine** (i.m. or i.v.)- patients may not have easy venous access when in shock.
- Administer crystalloids intravenous **crystalloids** to maintain volume.
- Administer fast-acting inhaled **β2-sympathomimetic**.
- Recognize that a GCS- score of < 8 requires **endotracheal intubation** for airway protection and oxygenation.

# In Order to Avoid a Shock...

**Desensitization:** The specific immunotherapy can be used for prophylactic sensitization to specific allergens, e.g. bee or wasp venom and certain types of pollen. A steady increase of the injected (subcutaneous or sublingual) antigen in minimal dosage can achieve a physiological reaction rather than an excessive IgE-antibody production. Especially younger patients with a monovalent allergy benefit from desensitization therapy.

**Emergency-kit:** Patients should carry an emergency kit with them at all times and know how and when to administer various medications, including H1-antihistamine, corticosteroids, and epinephrine.

**Breast milk diet:** reduction of developing atopic predisposition by exclusive breastfeeding during the first 4-6 months of life.

**Stimulating climate:** in the event of pollen allergies, relocation is an extreme form of prophylaxis.

## References

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