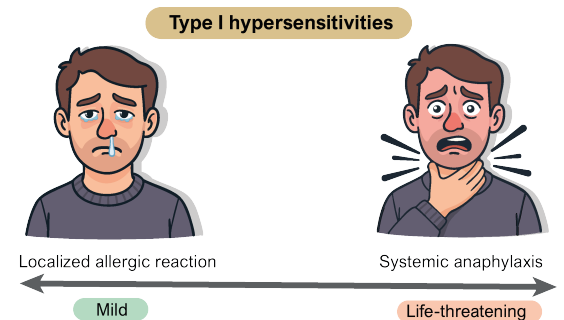
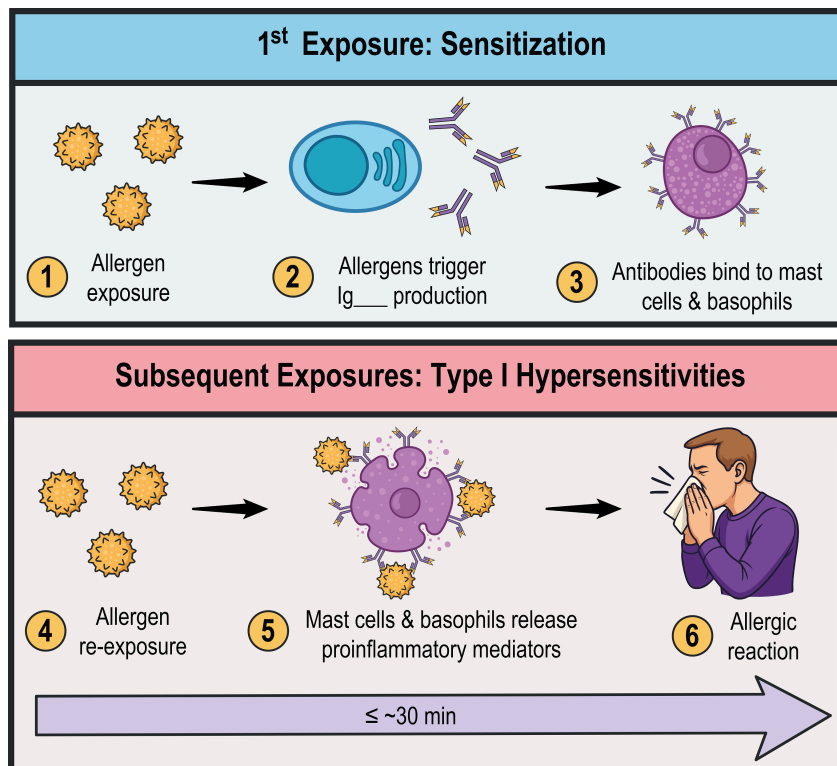


TOPIC: TYPE I HYPERSENSITIVITIES

Type I Hypersensitivities

- ◆ **Type I Hypersensitivity:** a _____ allergic reaction ($\leq \sim 30$ min) to an allergen, mediated by Ig_____ antibodies.
 - **Allergic Reaction:** any hypersensitivity (usually Type I) in response to an _____.
 - **Allergen:** an *exogenous* _____ that causes sensitization & subsequent hypersensitivities.
- ◆ Type I are the most *common & unpredictable*.



EXAMPLE

Jim uses a new shampoo for the first time and does not notice any adverse reactions. A few days later when Jim uses the same shampoo again, his skin becomes red, itchy, and appears to have a rash. Why did Jim have adverse side effects to the shampoo after his second use but not his first use?

- a) His hair was too dirty during the first exposure, so the shampoo wouldn't have got through to his skin.
- b) After his first use, Jim was sensitized to the allergens in the shampoo & his immune system developed a defense against them.
- c) Allergic reactions always get worse after each additional exposure to allergens.
- d) Jim's immune system did not interact with the allergens in the shampoo during the first exposure.

TOPIC: TYPE I HYPERSENSITIVITIES

PRACTICE

In type I hypersensitivity, an allergic reaction is triggered when the antigen:

- a) Binds to free IgG antibodies in the blood, attracting proinflammatory mediators.
- b) Binds to surface antigens on mast cells & basophils.
- c) Binds to IgE antibodies on the surface of mast cells and basophils.
- d) Binds to free IgM antibodies in the blood.

PRACTICE

Which of the following is an example of a type I hypersensitivity reaction?

- a) An individual develops red and itchy skin a few days after touching poison ivy.
- b) An individual breaks out in hives a few minutes after using a new perfume.
- c) An individual develops blood clots the day after being given the wrong blood type in a blood transfusion.
- d) An individual has chronic joint inflammation due to small immune complexes in their body.

TOPIC: TYPE I HYPERSENSITIVITIES

Localized Allergic Reactions vs. Systemic Anaphylaxis

◆ Recall: Type I hypersensitivities range from localized allergic reactions to systemic anaphylaxis:

Localized Allergic Reactions			Systemic Anaphylaxis
Mediators _____ to exposure site or single organ system.			Widespread mediator release spreads in body & impacts _____ organ systems.
Usually is _____ life-threatening; symptoms are mild.			Life-threatening; may result in <i>anaphylactic shock</i> (low blood pressure), failure of vital organs, &/or suffocation.
Symptoms include skin rash, sneezing, runny nose, itchy eyes, etc.			Extensive blood vessel _____ & leakage → <i>drop</i> in systemic blood pressure → _____ blood flow.
Common allergens: pollens, dust mites, animal dander, molds, certain foods.			Common allergens: insect stings, foods (e.g., peanuts, shellfish), drugs (e.g., penicillin), latex.
Controlled with <i>anti-histamine</i> medication.			Controlled with injection of <i>epinephrine</i> (EpiPen®).

NOTE: It's _____ fully understood what triggers a localized vs systemic reaction.

EXAMPLE

Mark the following symptoms with either an “L” if they are a typical symptom of localized allergic reactions, or an “S” if they are a typical symptom of systemic anaphylaxis:

Itchy eyes	
Extreme constriction of airways & difficulty breathing	
Enhanced mucus secretion & runny nose	
Heart failure due to decreased blood pressure	
Skin rash at the site of allergen contact	

PRACTICE

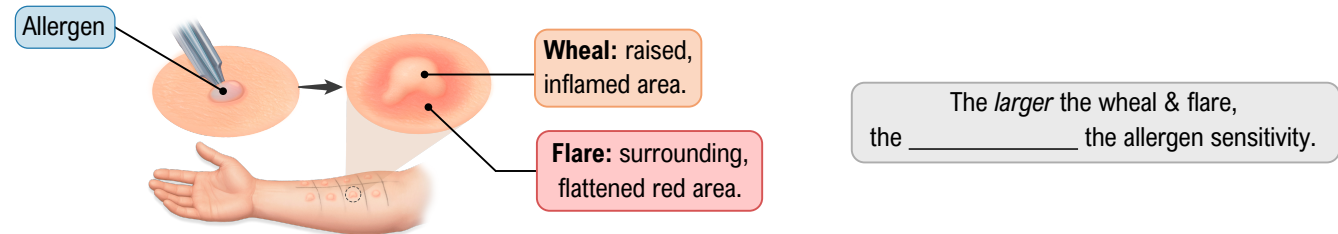
Systemic anaphylaxis can be extremely dangerous and even life-threatening. Which of the following methods is commonly used to rapidly counteract the effects of systemic anaphylaxis?

- a) Immunosuppressant drugs.
- b) Local anesthesia.
- c) Injectable epinephrine.
- d) An injectable dose of the allergen.

TOPIC: TYPE I HYPERSENSITIVITIES

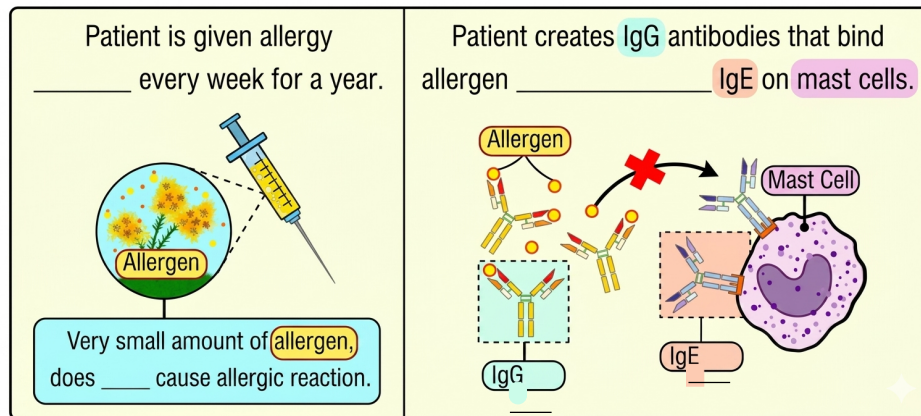
Diagnosing & Treating Allergies

◆ **Prick Puncture Skin Test (PPST):** used to _____ allergies; allergen “pricked” under skin → wheal & flare.



◆ **Desensitization:** gradually increasing dosage of allergen injections; aims to reduce severity of allergic response.

- Mechanism is not fully understood, but process may *stimulate* production of Ig_____ antibodies (instead of IgE).



Memory Tool: IgE = Enemy
IgG = Good guys

EXAMPLE

Which of the following terms is mismatched with its description?

- IgE antibodies: often bound to mast cells/basophils. Can bind to allergens to trigger degranulation.
- IgG antibodies: can intercept allergens & neutralize them before they bind to IgE antibodies.
- Wheal: raised, inflamed area on the skin that forms in response to an allergen.
- Flare: term used to describe systematic anaphylaxis in response to an allergen administered during a test.

PRACTICE

Which statement about the mechanism & desired outcome of desensitization immunotherapy is correct?

- It will increase the number of IgE antibodies, saturating the receptors on mast cells/basophils which prevents them from degranulating.
- It shifts the immune response toward allergen-specific IgG antibodies, which intercept antigens before they can bind to IgE antibodies on mast cells/basophils.
- It promotes IgG antibody production to intensify the response of wheal-flare reactions, improving their diagnostic accuracy.
- It reduces the number of all antibodies, thereby weakening the allergic reaction.