

HYPERSENSITIVITY REACTIONS (ALLERGIES) P. 822 / 797

Film Clip 11: 29501 → allergies (4 min)

- When a person's immune system reacts excessively to an antigen that is actually quite harmless. E.g. pollen, dust mites, mold, foods, etc.
- Your immune reaction is the problem. The response is causing inflammation and tissue damage
- The antigen eliciting this response is called an ALLERGEN.

A. IMMEDIATE HYPERSENSITIVITIES (see fig. p. 823 / 798)

- response time = seconds or minutes
- is Antibody-mediated
- Initial exposure to allergen produces a primary response that is usually free of symptoms.
- An activated B-cell clones itself into plasma cells to produce IgE antibodies.
- Antibodies attach to MAST cells and BASOPHILS to act like receptor sites for allergens in future exposures

- Upon a 2nd, 3rd, or 4th exposure the allergen binds to the surface of mast cells and basophils triggering the release of inflammatory chemicals esp. HISTAMINE causing (possibly):
 - Runny nose, itchy watery eyes, sneezing, etc.
 - ↑vasodilation & ↑permeability → therefore redness and swelling
 - ↑mucus production and swollen airways → therefore difficulty breathing

1. If this response is LOCALIZED in a relatively small area:

- Is mostly a nuisance, not life threatening.
- S&S: depends on method of exposure
 - A) If the allergen is airborne and inhaled (e.g. pollens, animal dander or saliva, dust mites) then S&S often include: runny nose, itchy/watery eyes, itching red skin (hives)
 - if the reaction includes spasms of the airways and mucus plugs then we call it ASTHMA (comes in varying degrees of severity)
 - B) If allergen is ingested then pt. shows S&S of abdominal distress such as cramping, vomiting, and diarrhea
 - some FOOD ALLERGIES are of this type

- Local reactions usually respond well to ANTIHISTAMINES such as Benadryl and/or inhalable BRONCHODILATORS for asthma.

2. If this response is **SYSTEMIC (body-wide)** (which is rare) it is referred to as **ANAPHYLACTIC SHOCK** and is **life-threatening**.
- Happens most often when the allergen enters the blood stream rapidly such as with injected drugs, bee stings, etc.
 - The allergen is transported quickly throughout the entire body by your circulating blood
 - The effect on the mast cells and basophils is basically the same but since it involves so many the result is life-threatening.
 - Tongue and airways may swell rapidly causing SOB
 - lots of blood vessels dilate and the outward fluid shift due to \uparrow permeability causes BP to \downarrow

 - Treatment is with EPINEPHRINE which dilates bronchioles and constricts vessels.

Some people have inherited the ability to have an anaphylactic reaction on the very first exposure (without being sensitized).

B. DELAYED HYPERSENSITIVITIES

- response time = 1-3 days
- are mediated by T cells
- activation of T cells causes release of CYTOKINES that;
 1. Attract numerous macrophages and whip them into a feeding frenzy. The activity of the macrophages is excessive resulting in tissue destruction, inflammation, itching, etc.
 2. produce powerful inflammatory responses
- most cases referred to as ALLERGIC CONTACT DERMATITIS
- e.g. poison ivy, cosmetics, soaps

- since this reaction is triggered by cytokines rather than histamine... antihistamines are not effective
- Corticosteroids are effective because they have broader “anti-inflammatory” effects rather than just “antihistamine.”