

Respiratory Block

Immunology

Lecture 2

Atopy and Allergic diseases

In this document you will find some main points gathered from the 1st lecture..This document is NOT a replacement for the lecture..If you need additional information go back to the lecture or use a book as a reference so you understand everything correctly.

Hopefully all the information is correct and Hope you find them Useful.

Good Luck to everyone.

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Immunology

Atopy and Allergic diseases

Some main points you can go through and revise from:

Allergic diseases – type I reactions:

*Allergic diseases are classified under Immediate (type I) hypersensitivity

Note:

Allergy is a systemic disorder

(Atopy) The term refers to → a strong genetic predisposition for development of immediate type I reaction in certain individuals.

Note:

An atopic person is a person who has the tendency to react to an antigen (allergen) through an immediate (type I) hypersensitivity reaction

Genetics of Allergy:

*Allergy is a complex genetic disease

Location → on chromosomes 11 and 5

Chromosome 11 → encodes the IgE receptor.

* Encodes the b subunit high affinity IgE receptors (Fc receptors) *

Chromosome 5 → encodes cytokine genes that increase susceptibility IL-3 ,4, 5 , 9 & 13

Cytokine genes → promote (act on) Th 2 cells → induce an immune response by increasing the production of IgE

The likelihood (Possibility) to develop allergy is determined by:

1. Genetic factors .

*Clear hereditary pattern:

- One parent atopic → risk in child 40%
- Both parents atopic → risk in child 70%.

2. Environmental factors. → (Exposure to allergens)

Common allergens associated with type 1 H/S:

Common allergens associated with type 1 H/S.

- | | |
|---|---------------------|
| 1. House dust mites . | 5. food allergens : |
| | egg. |
| 2. insects : cockroaches. | Milk. |
| honey bee . | Peanuts. |
| black ant . | |
| 3. pollens : tree . | 6. medications : |
| grass. | Penicillin. |
| weeds. | Anesthetics. |
| 4. mold spores : aspergillus
alternaria. | |



Note:

Exposure to dust mites within the first year of life is associated with later development of asthma & possibly atopy.

Response to allergens in non-atopic individuals:

- Persons without Atopy → Low Response → Production of allergen-specific IgG1 & IgG4.
- Persons with Atopy → Exaggerated Response → Production of allergen –specific IgE antibodies.

Presentation :

Atopic individuals develop one or more of the following atopic diseases:

- allergic rhinitis
- allergic (extrinsic) asthma
- atopic dermatitis

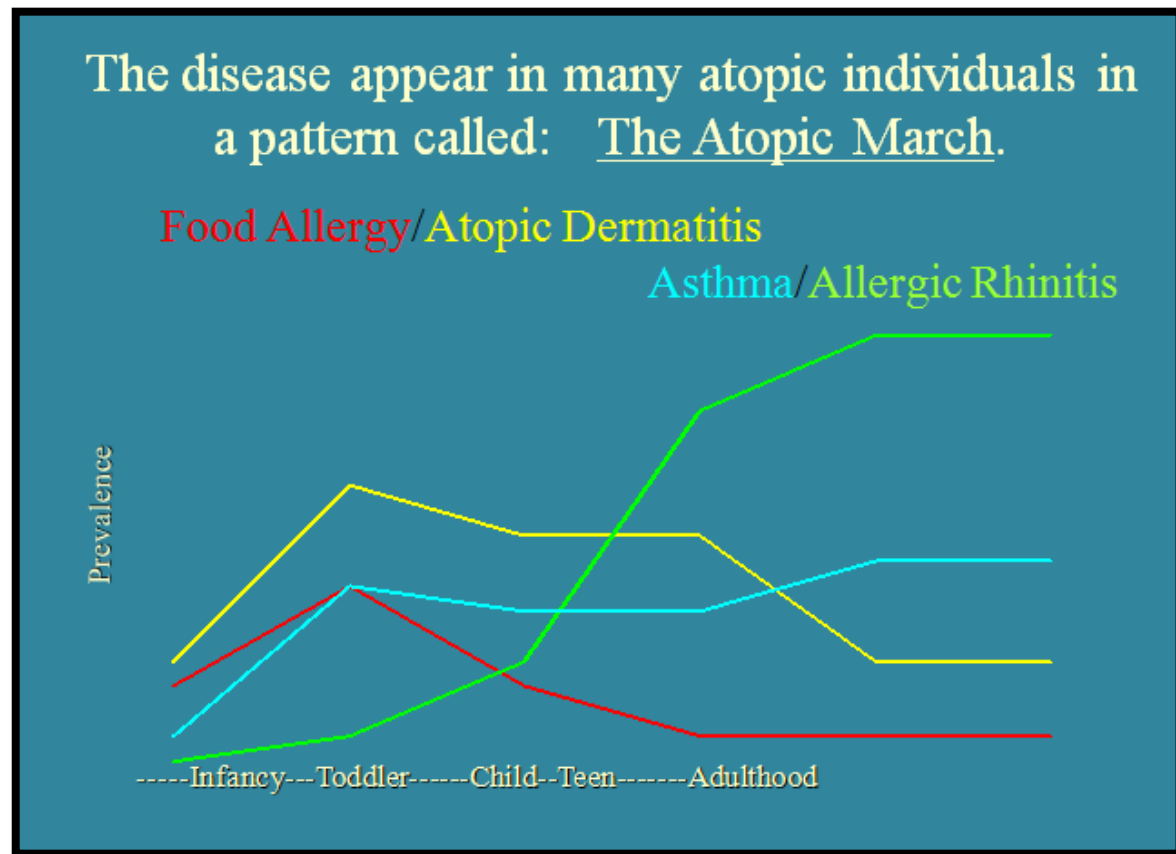
Note:

- They comprise approx. 15 – 20 % of the population.
- Atopy tend to run in families (Genetic factor)

Atopic individuals are more prone to present with other related disorders:

- Food Allergy.
- Anaphylaxis.
- Urticaria, angioedema.
- Drug Allergy.
- Insect Allergy.

The Atopic March



The atopic march shows how allergies increase or decrease as an individual gets older.

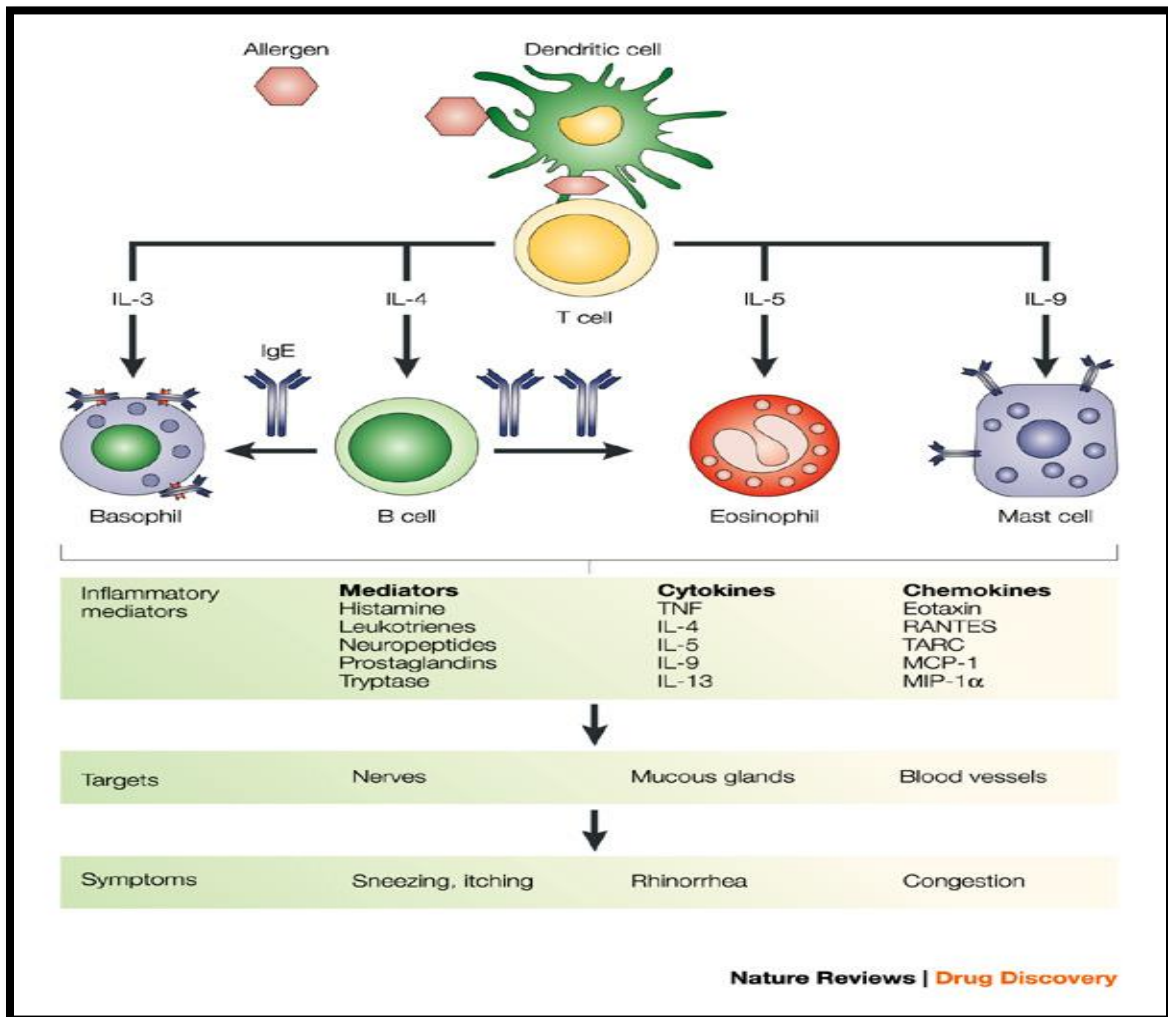
Note:

- Rhinitis → Effects the nose
- Asthma → Effects the bronchus
- Eczema and urticaria → Effects the skin
- Conjunctivitis → Effects the eyes

Allergic Rhinitis:

Inhaled allergens activate mucosal mast cells beneath the nasal epithelium → release mediators → diffuse across the mucous membranes of the nasal passages.

Pathophysiology of allergic rhinitis

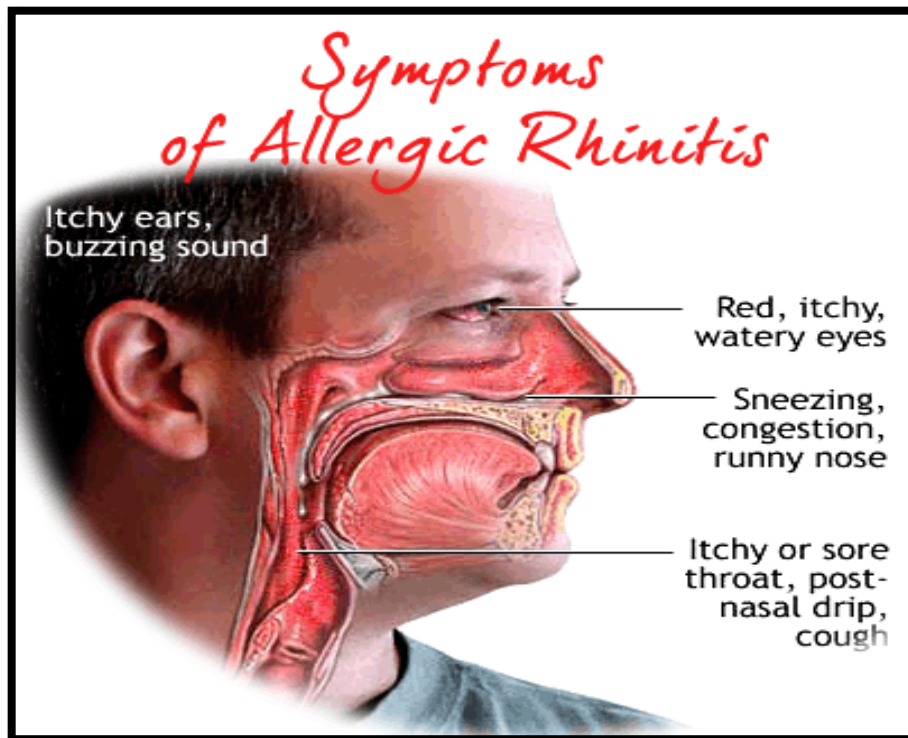


Note:

IL-4 & IL-5 are the most important IL's in allergy.

Characteristics of the immediate reaction in allergic rhinitis:

- intense itching & edema
 - local edema Blocked nasal passage
 - Nasal discharge (Rich in eosinophils)
 - Irritation of the nose (result of histamine release)
-



The picture show you allergy depending on the site:

- The Eyes → red, itchy watery eyes
- The Nose → sneezing, a lot of fluid discharge outside of the nose
- (In the back of the throat → post nasal drip)

Note:

Allergic Conjunctivitis. → Is caused by airborne allergens (allergens floating in the air) deposited in the conjunctiva of the eye

Atopic dermatitis (allergic eczema):

- -Inflammatory disease of skin that is frequently associated with family history of atopy.
- -Observed most frequently in young children, often developing during infancy.
- -Serum IgE levels are often elevated.

Note:

Inhaled allergens activate sub-mucosal mast cells in the lower airways → mast cells release the mediators → this leads to a contraction of bronchial smooth muscles

Atopic Dermatitis:

- Major criteria: (How the disease presents)
 - Pruritus (itching skin).
 - Chronic relapsing course.
 - Typical distribution of eczema
- Facial and extensor eczema in infants and children
- Flexural eczema in adults

Note:

An important feature of asthma is chronic inflammation of the airways which is a result of the influx of inflammatory cells:

- Th 2 cells secretes IL-9 & IL-13
- Eosinophils (major basic proteins)
- Neutrophils secrete proteolytic enzymes.
- Lung epithelial cells

Atopic Dermatitis and Allergen exposure:

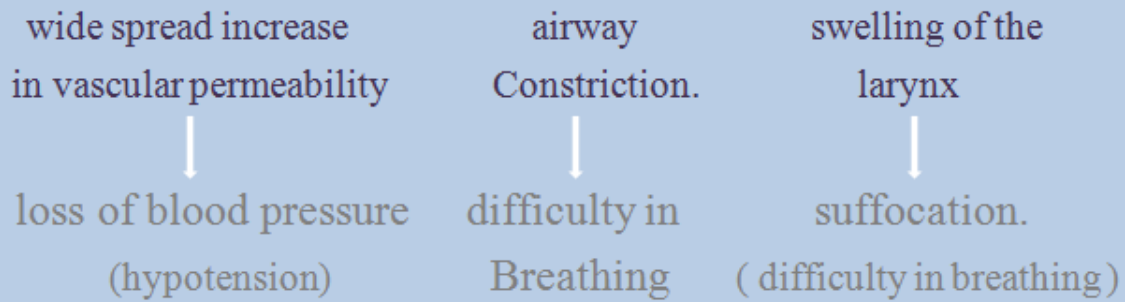
- 35% of children with AD have skin symptoms provoked by food hypersensitivity.
- Up to 80% have positive skin test to environmental allergens.
- Inhalation of dust mites causes AD flare within 24 hours.

Anaphylaxis

Anaphylaxis → a sudden, severe, potentially fatal, systemic allergic reaction that can involve various organs of the body.

- Symptoms occur within minutes to two hours after contact with the allergen.
- Minute amounts of allergens may cause a mild to life threatening reaction.

Massive mediator release into the blood result in :

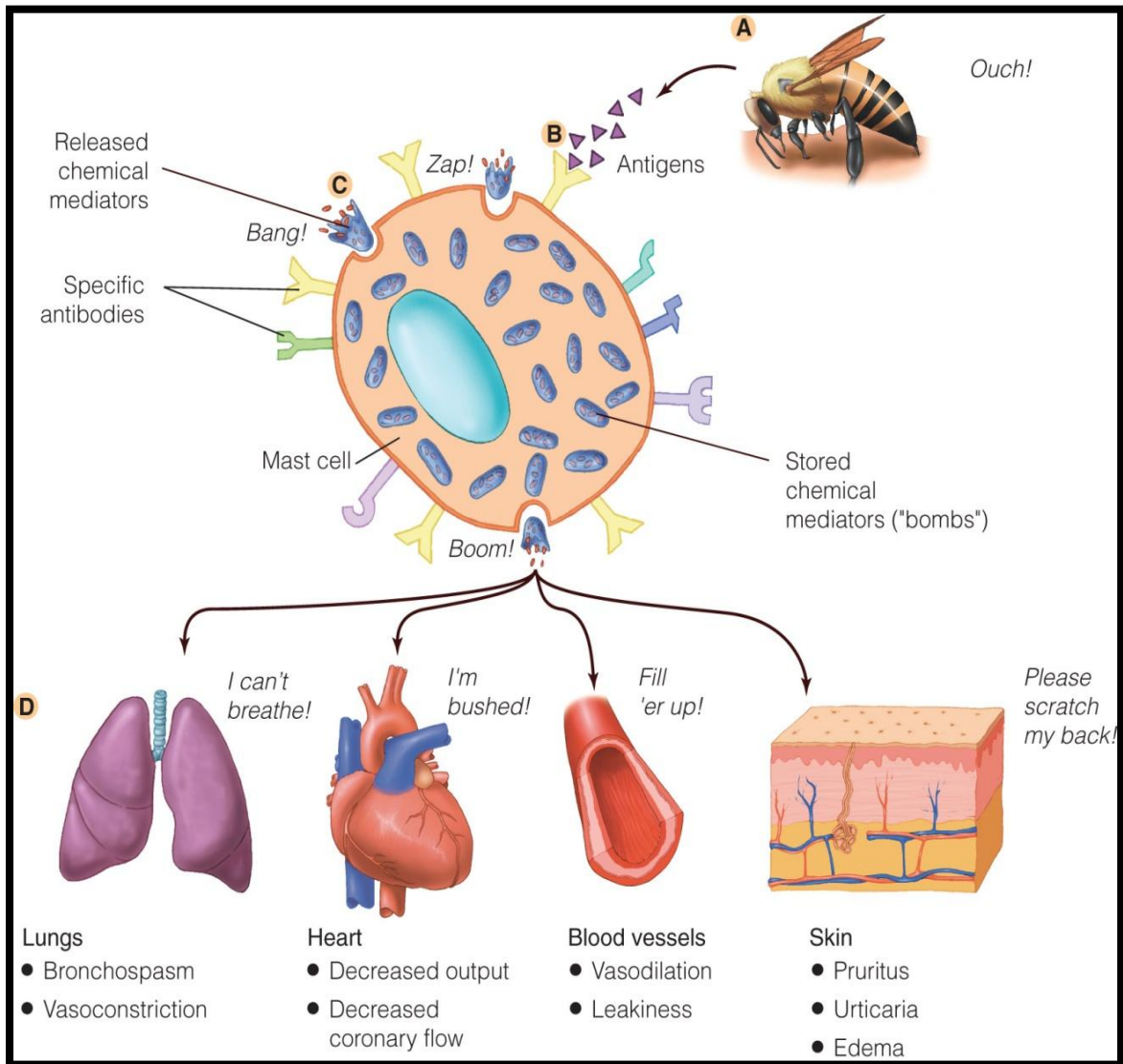


* Anaphylaxis can be rapidly fatal but can be controlled by immediate injection of epinephrine (adrenaline)

Common Causes of Anaphylaxis :

- Foods (peanuts).
- Insect venoms
 - black ant.
 - honey bee.
- Latex (gloves).
- Medications (penicillin)

Bee sting Anaphylaxis.



Clinical Manifestations of Anaphylaxis

*** Skin:**

- urticaria, angioedema

*** Upper respiratory:**

- Congestion, rhinorrhea

*** Lower respiratory:**

- Bronchospasm, or wheezing, shortness of breath, cough.

*** Gastrointestinal tract:**

- Oral itching .
- nausea, vomiting, diarrhea.

*** Cardiovascular system:**

- hypotension/shock, chest pain.

Management of Anaphylaxis

*** Administer**

- Oxygen.
- Epinephrine (adrenaline).
- Antihistamines.
- Corticosteroids.

Diagnosis of allergic reactions :

- skin prick test (SPT).
- specific IgE measurement .
- challenge tests.
- elimination – provocation tests → (food allergy)