Cihan University/ Sulaymaniyah

College of Health Science

Medical Laboratory Analysis

4th Stage- 1st Semester

Clinical Immunology

Lecture- 7: Anaphylaxis and Allergy- Part-I

2023- 2024

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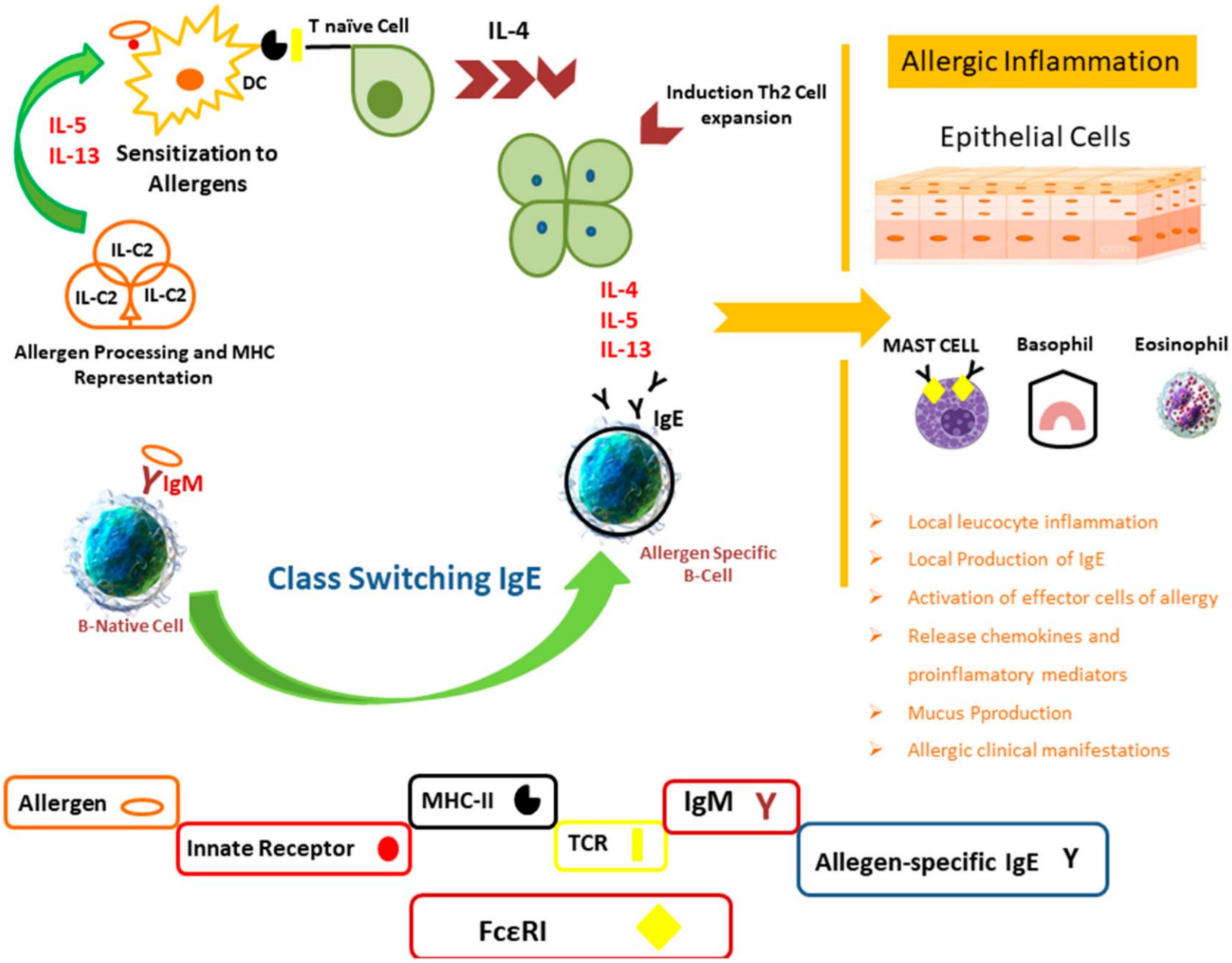
Introduction

- **Allergy** – is a conditions in which antigen specific IgE or sensitized T cells play a definite role.
- **Atopy** – is a state of disordered immunity in which Th2 lymphocytes drive an inherited tendency for hyper-production of IgE antibodies after exposure to common environmental allergens.
- **Intolerance** – is used to describe all abnormal but reproducible reactions to food when the causative mechanism is unknown.


T naïve Cell
IL-4
DC
IL-5
IL-13
Sensitization to Allergens
Induction Th2 Cell expansion
IL-C2
IL-C2
IL-C2
Allergen Processing and MHC Representation
IL-4
IL-5
IL-13
IgE
IgM
Allergen Specific B-Cell
B-Native Cell
Class Switching IgE
Allergic Inflammation
Epithelial Cells
MAST CELL
Basophil
Eosinophil
Local leucocyte inflammation
Local Production of IgE
Activation of effector cells of allergy
Release chemokines and proinflamatory mediators
Mucus Pproduction
Allergic clinical manifestations
Allergen
MHC-II
IgM
Innate Receptor
TCR
Allegen-specific IgE
FcεRI

Risk Factors for Allergic Diseases Atopy

- Age – commoner in children than adults
- Gender – commoner in boys than girls
- Family size – less common in large families
- Reduced microbial burden in developed countries (hygiene hypothesis)
- Smoking – active or passive
- High levels of antigen exposure
- Dietary factors – poor intrauterine nutrition

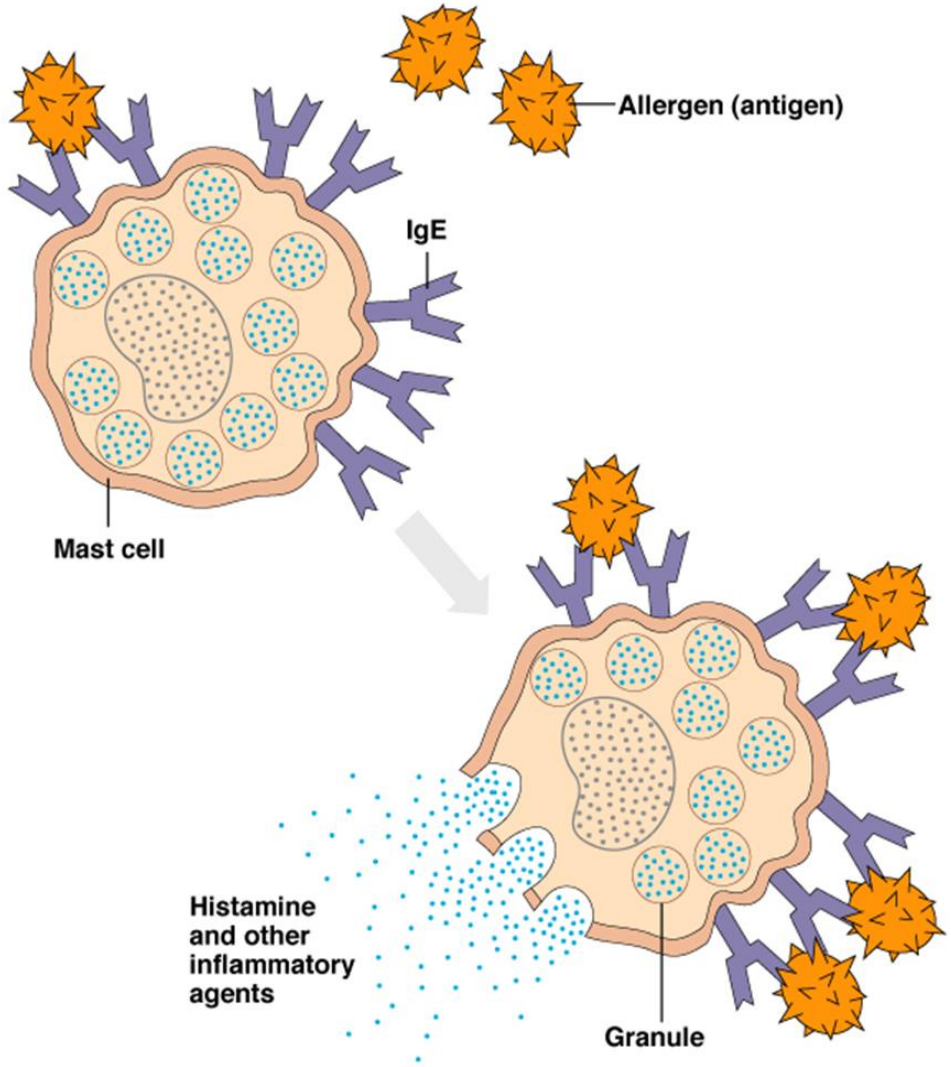
Immediate (Type I) Hypersensitivity

- It is also known as immediate or anaphylactic hypersensitivity
- The reaction takes 15-30 minutes from the time of exposure to the antigen. May sometimes be delayed (10-12 hours).
- The reaction may involve:
  - ✓ Skin (urticaria and eczema),
  - ✓ Eyes (conjunctivitis),
  - ✓ Nasopharynx (allergic rhinitis),
  - ✓ Bronchopulmonary tissues (asthma),
  - ✓ Gastrointestinal tract (gastroenteritis),
  - ✓ Systemic: anaphylactic shock from ingested or injected antigens.

Type I Hypersensitivity Reactions (Cont..)

Allergens: pollen, dust mite, insects etc.

- Mediated by **IgE.**
- The primary cellular component is **mast cell or basophil.**
- The reaction is amplified and/or modified by other cells such as **eosinophils.**



Type I Hypersensitivity Reactions (Cont..)

- It is not clear why some individuals are more prone to type-I hypersensitivity.
- It has been shown that such individuals produce more of Th2 cells that secrete IL-4, IL-5 and IL-13 which in turn favor IgE class switch.
- IgE has very high affinity for its receptor (Fcε; CD23) on mast cells and basophils.

Mediators of Immediate Hypersensitivity

A. Histamine:

1. Dilates and increases permeability of blood vessels (swelling and redness)
2. Increases mucus secretion (runny nose),
3. Causes smooth muscle contraction (e.G. Bronchi).

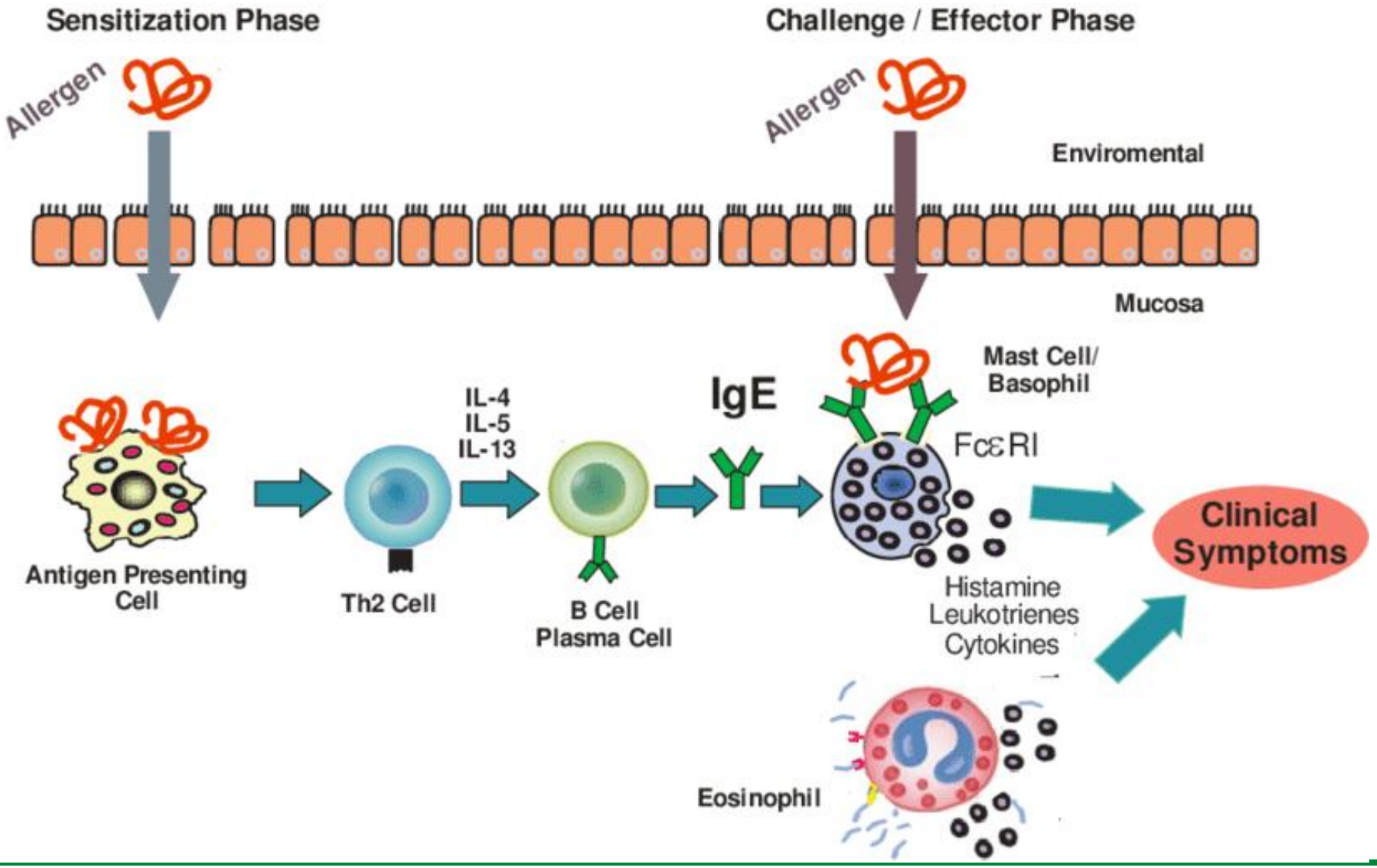
B. Prostaglandins:

1. Contraction of smooth muscle of respiratory system.
2. Increased mucus secretion.

C. Leukotrienes:

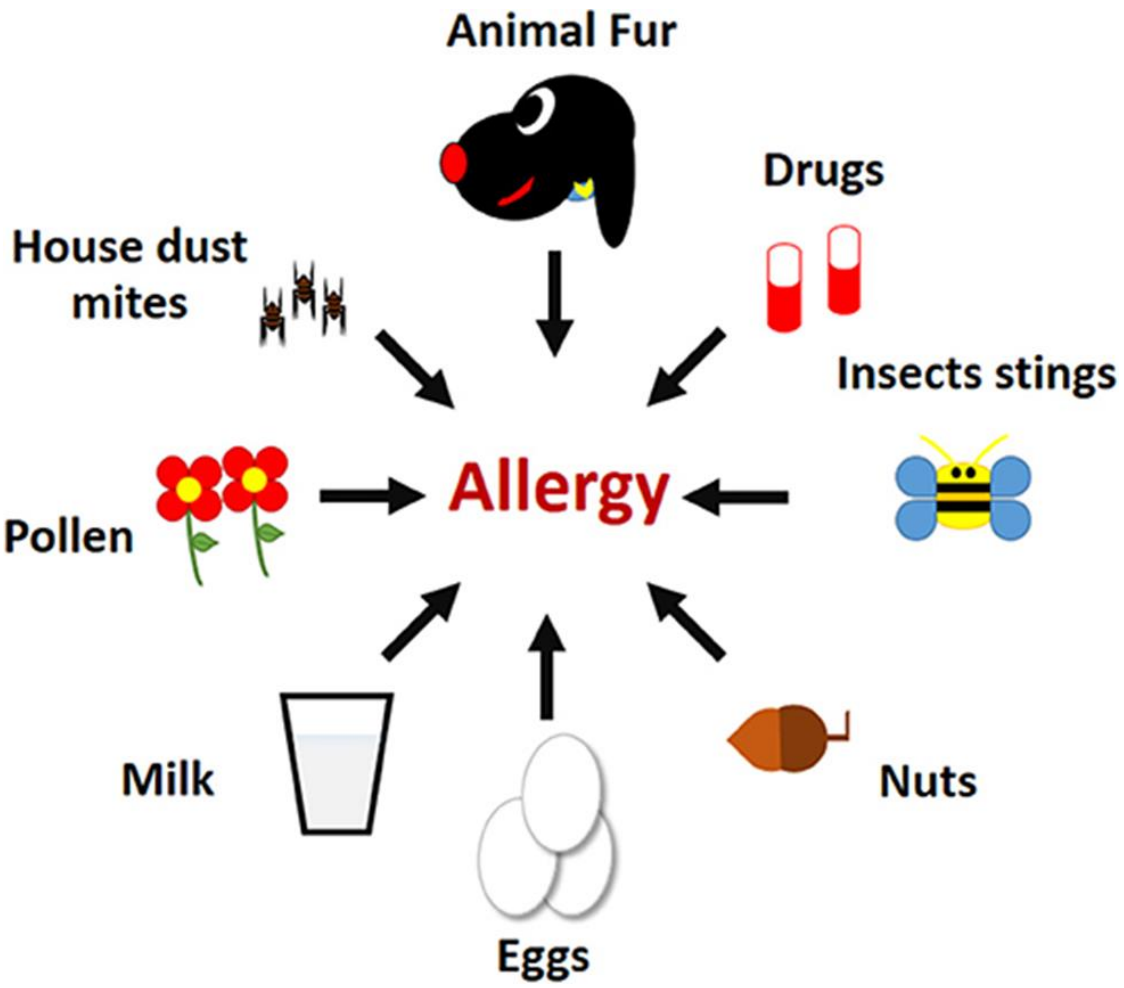
- Bronchial spasms.

Mediators of Immediate Hypersensitivity



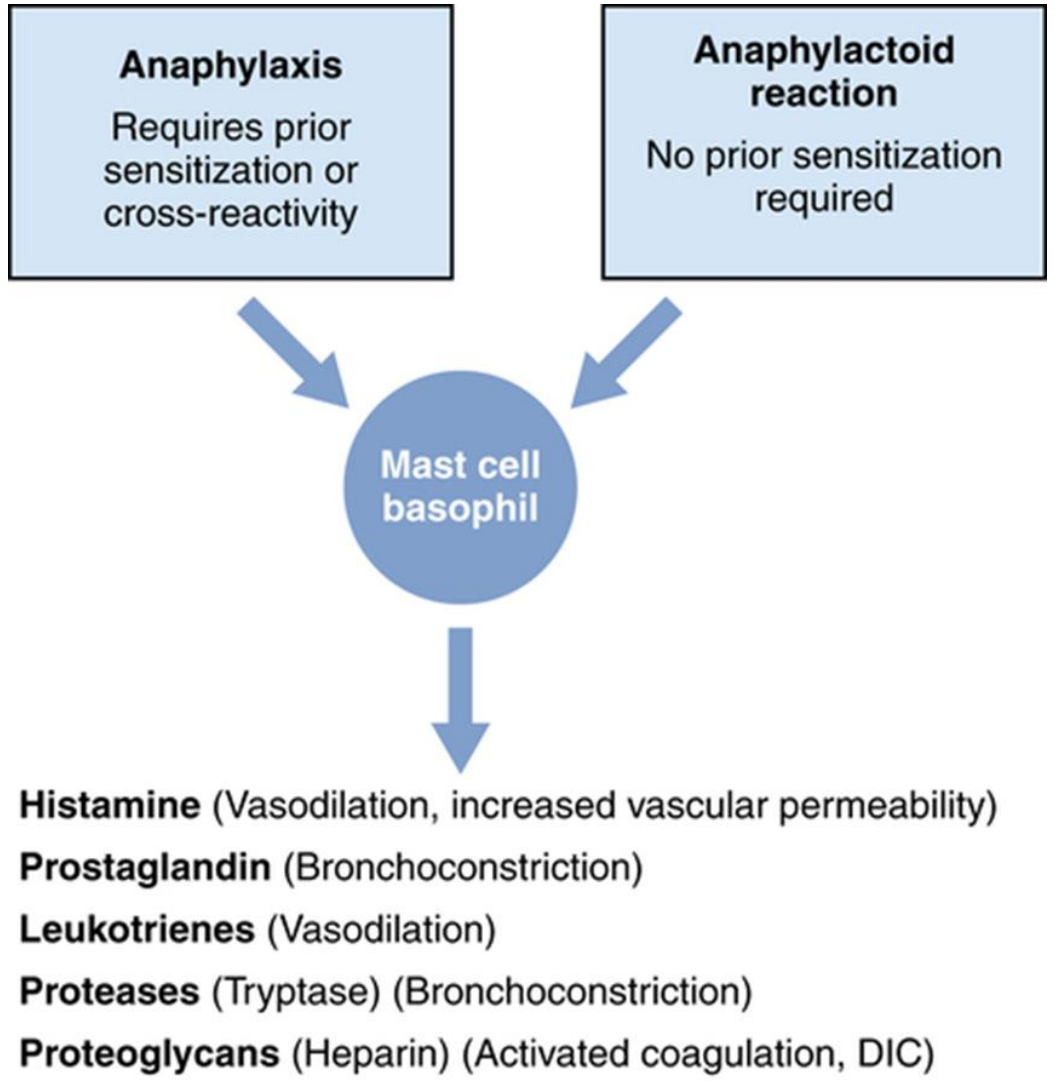
Systemic Anaphylaxis

- Systemic anaphylaxis is the most dramatic example of an immediate hypersensitivity reaction.
- Clinically, the term refers to the sudden, generalized cardiovascular collapse or bronchospasm.
- Generalized degranulation of IgE-sensitized mast cells or basophils follows antigen exposure and **previous sensitization** is therefore required.
- While anaphylaxis is uncommon, it is extremely dangerous, as it is so unexpected, and can be fatal.

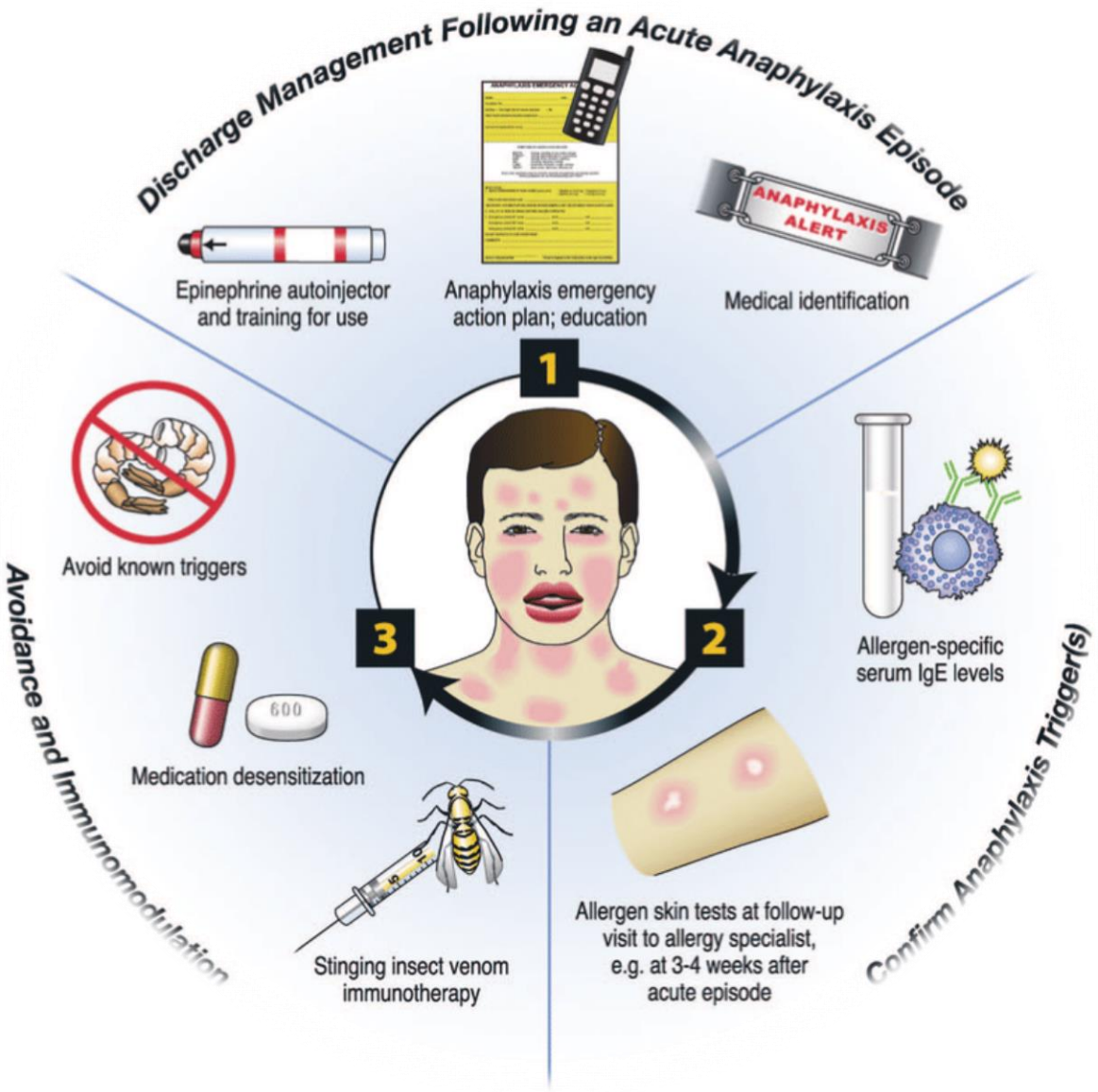


Anaphylactoid Reactions

- Anaphylaxis should be distinguished from anaphylactoid reactions. These are not mediated by IgE antibodies.
- Substances inducing anaphylactoid reactions do so by a direct action on mast cells or by alternate pathway complement activation.
- Since this is not **immunologically specific**, the person does not need to have been previously sensitized to the substance.



Management and Prevention of Future Anaphylaxis



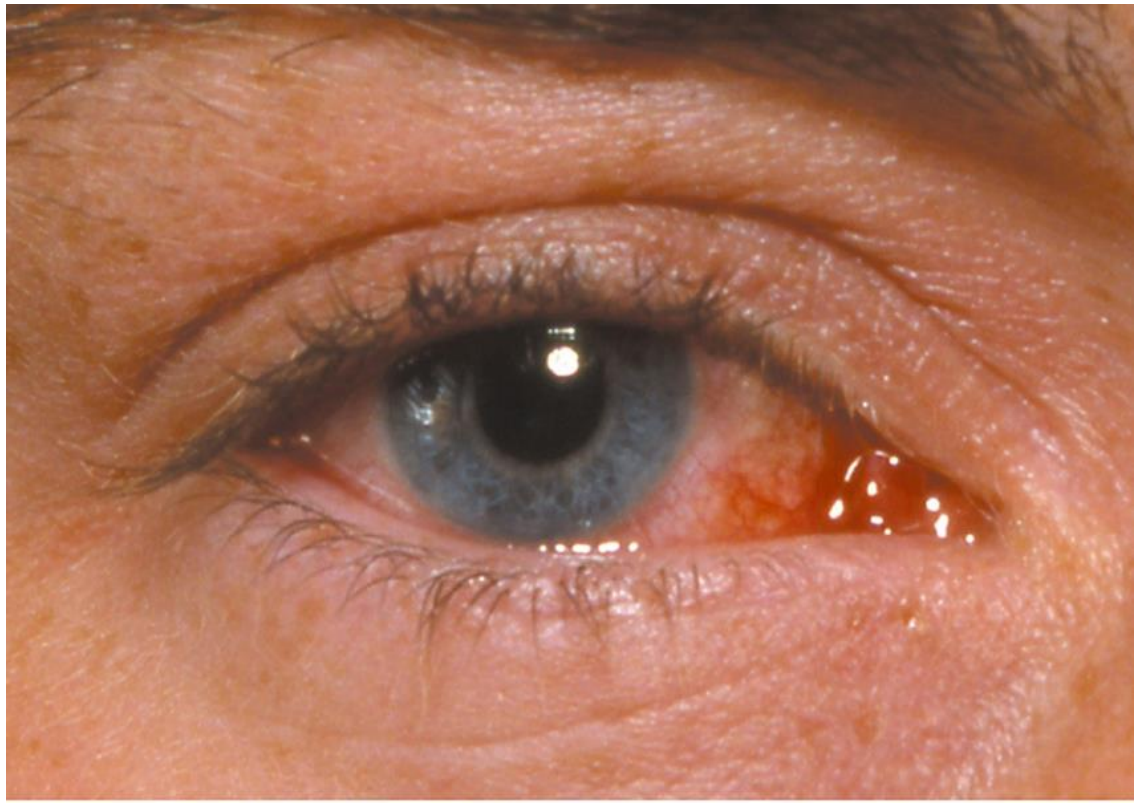
Allergic Conjunctivitis

- **Seasonal (hay fever):**
- Seasonal conjunctivitis is common and mainly affects children and young adults.
- This is a mild, bilateral disease characterized by itching, redness and excessive tear production.
- The IgE is attached to conjunctival mast cells but its site of production is uncertain, and excess free IgE is not necessarily found in the tears.
- Treatment includes pollen avoidance where possible, sodium cromoglycate eye drops to reduce mast cell sensitivity and topical or systemic antihistamines to block the effects of mediators released from mast cells.

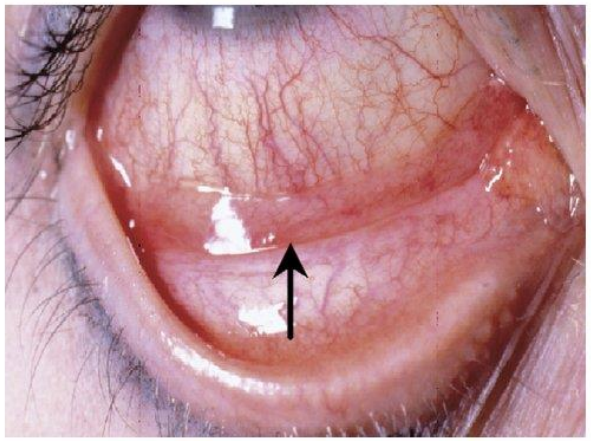
Allergic Conjunctivitis

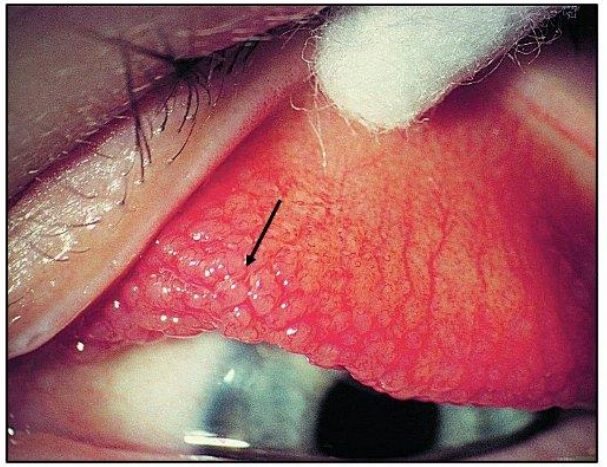
- **Perennial (vernal) conjunctivitis:**
- A more severe form of conjunctivitis, persisting throughout the year (with exacerbations in the spring).
- It is a self-limiting condition of young people (usually lasting 3–5 years) and is characterized by red eyes, photophobia, itching and a mucous discharge.
- The diagnostic feature is the formation of **giant papillae (known as cobblestones)** on the upper tarsal conjunctiva.
- These are due to oedema and hypertrophy of underlying tissue, which contains IgA- and IgE-secreting plasma cells, mast cells and eosinophils.
- Vernal conjunctivitis is often associated with atopic diseases (eczema and asthma) and most patients have high serum IgE levels, with IgE detectable in their tears.

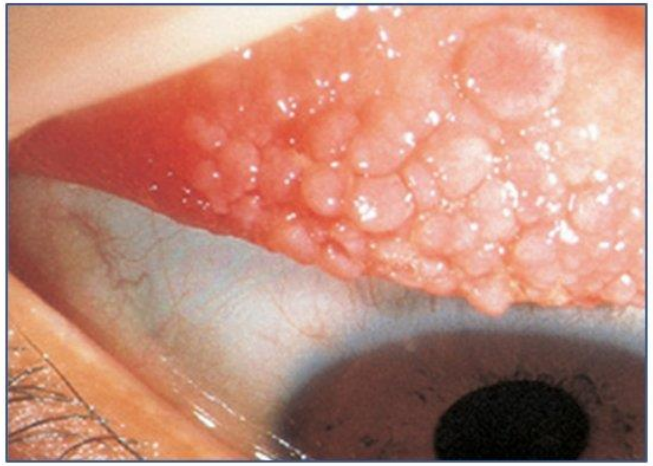
Acute Conjunctivitis



Seasonal (hay fever):







Perennial (vernal) conjunctivitis

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