Immunity- “A Double Edged Sword”

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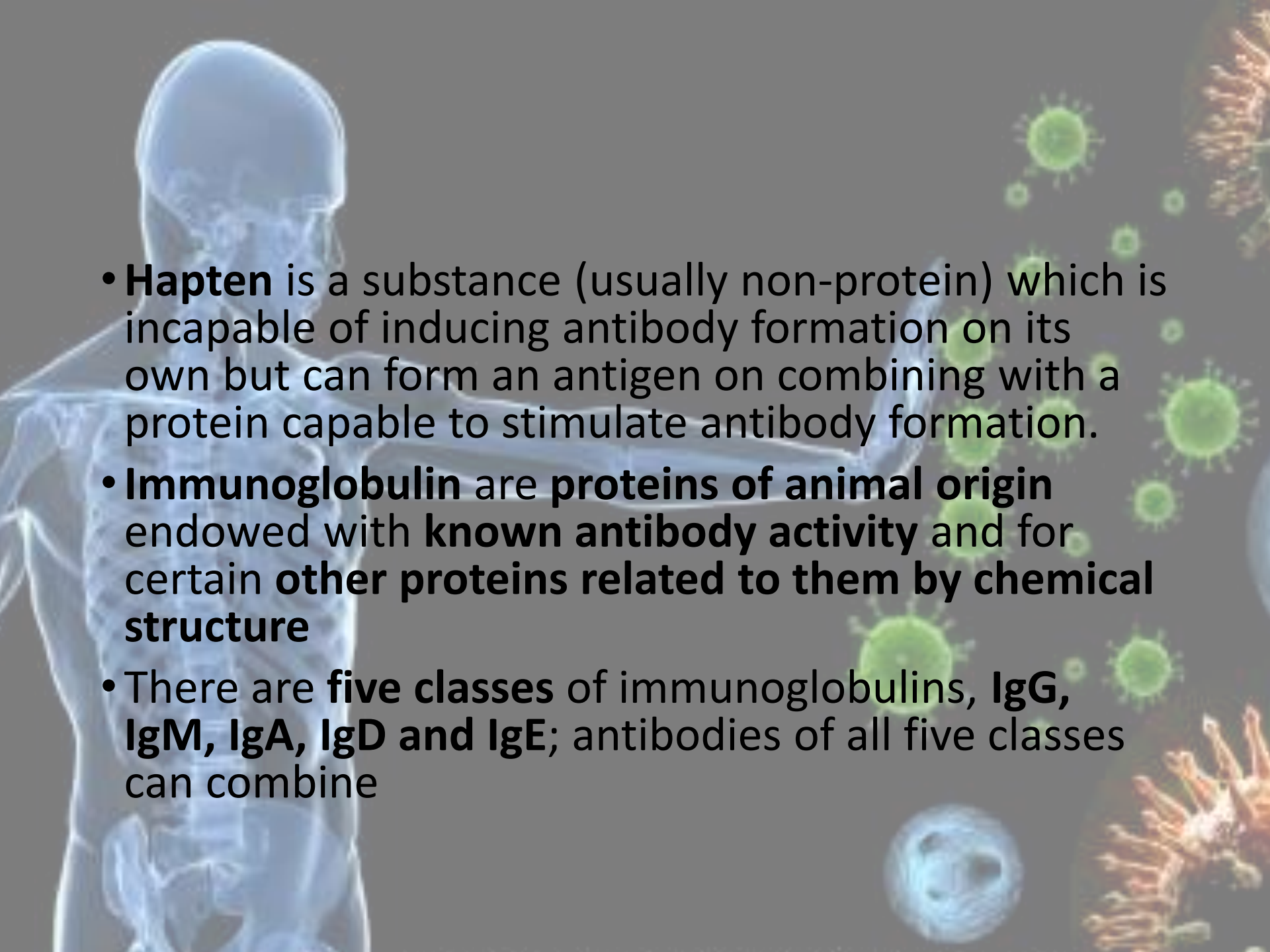
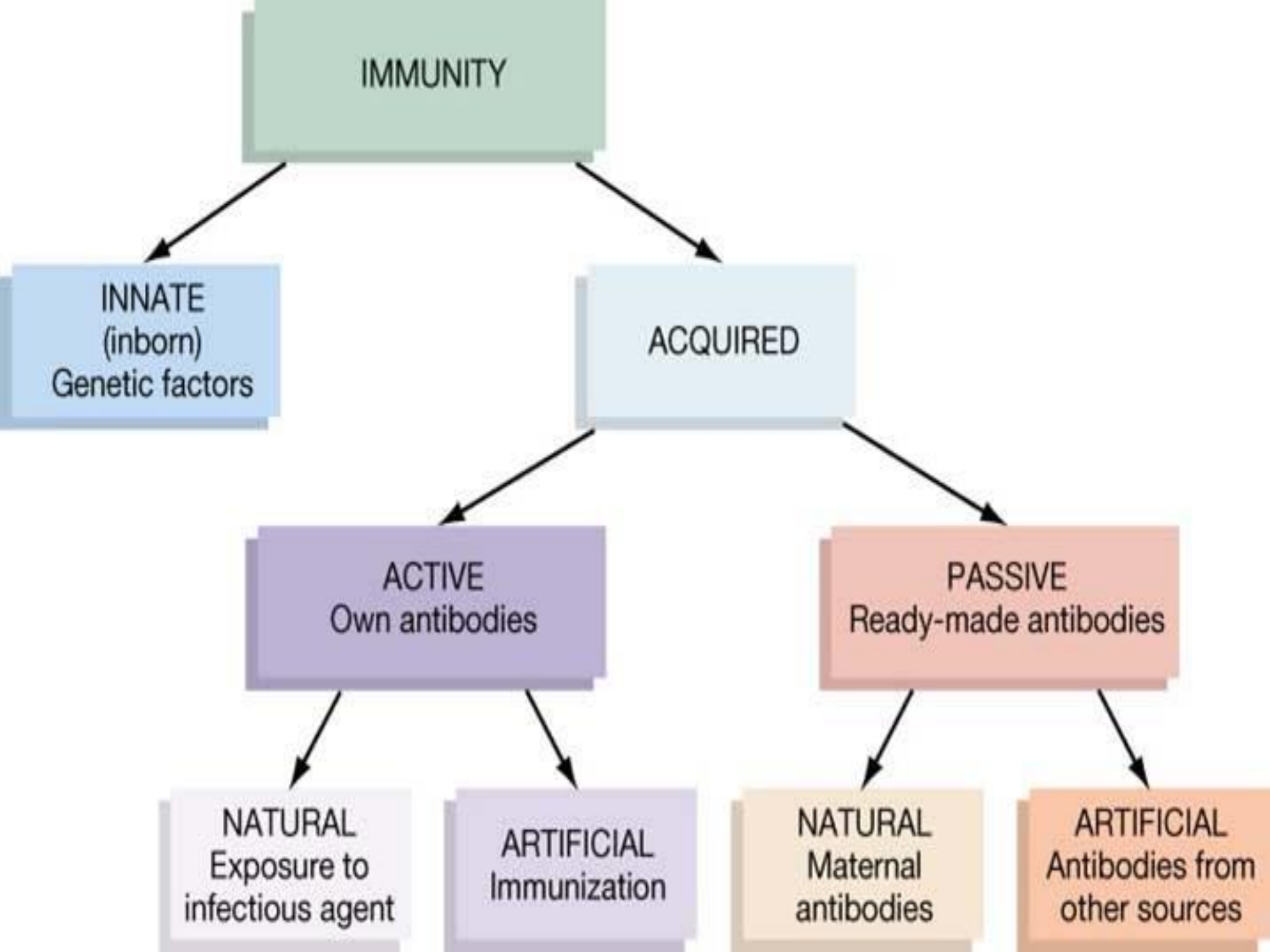
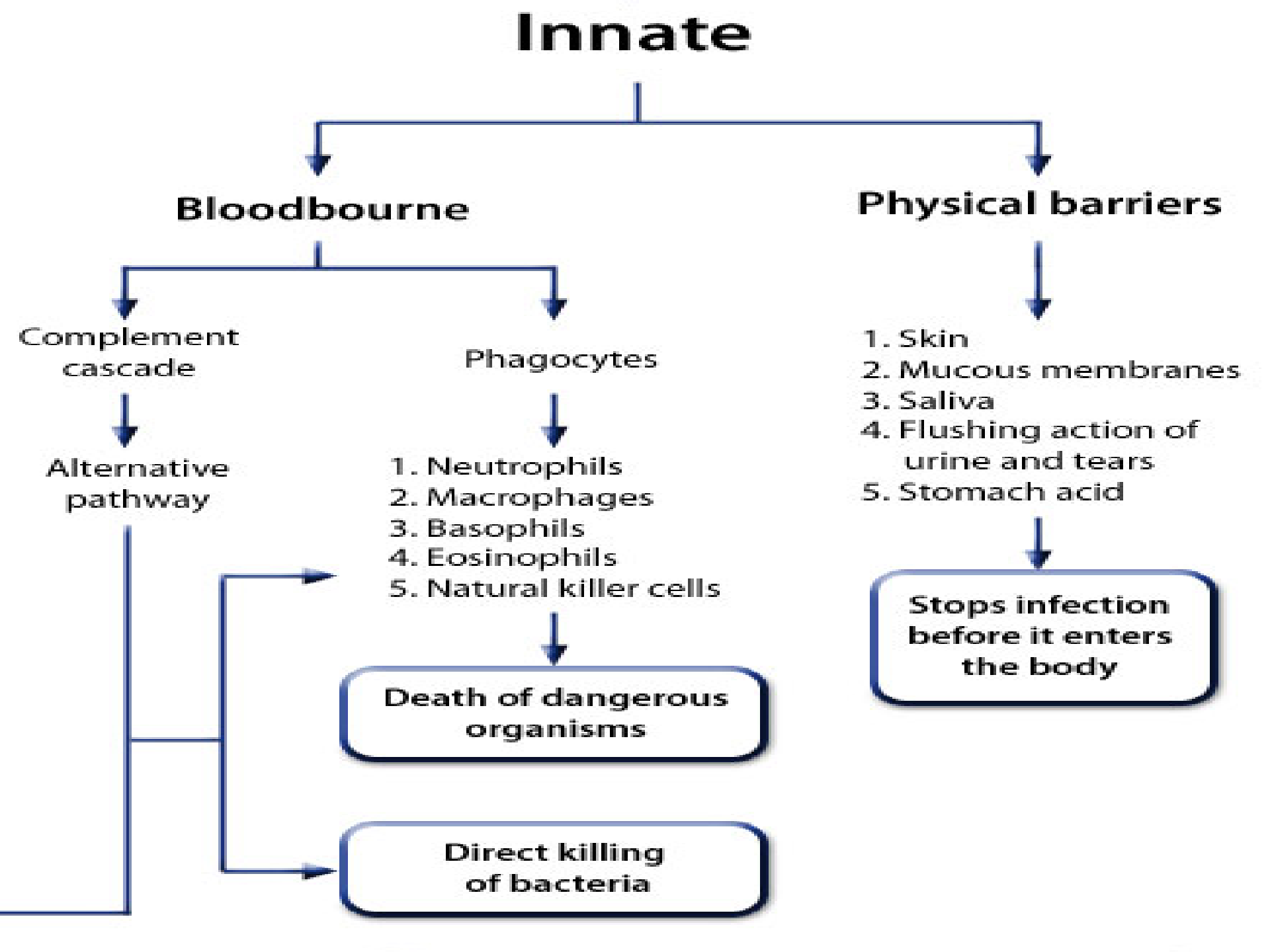
Immunity-The ability of the body to neutralize and eliminate the potential pathogens and their toxic products.

- **Antigen** is a substance (usually protein) when introduced into the body, **stimulates production of an antibody** with which it **reacts specifically** and in an **observable manner.**
- **Antibody** is a **glycoprotein** molecule formed by the immune system **in response to an antigenic stimulus** found in blood, bodily secretions or on mucous surfaces, and binds to the specific antigen responsible for its production, thereby inactivating it.specifically with antigens



- **Hapten** is a substance (usually non-protein) which is incapable of inducing antibody formation on its own but can form an antigen on combining with a protein capable to stimulate antibody formation.
- **Immunoglobulin** are **proteins of animal origin** endowed with **known antibody activity** and for certain **other proteins related to them by chemical structure**
- There are **five classes** of immunoglobulins, **IgG, IgM, IgA, IgD and IgE**; antibodies of all five classes can combine


IMMUNITY
INNATE
(inborn)
Genetic factors
ACQUIRED
ACTIVE
Own antibodies
PASSIVE
Ready-made antibodies
NATURAL
Exposure to
infectious agent
ARTIFICIAL
Immunization
NATURAL
Maternal
antibodies
ARTIFICIAL
Antibodies from
other sources


Innate
Bloodbourne
Physical barriers
Complement cascade
Phagocytes
1. Skin
2. Mucous membranes
3. Saliva
4. Flushing action of urine and tears
5. Stomach acid
Alternative pathway
1. Neutrophils
2. Macrophages
3. Basophils
4. Eosinophils
5. Natural killer cells
Stops infection before it enters the body
Death of dangerous organisms
Direct killing of bacteria

COMPONENTS OF IMMUNE SYSTEM

- **Innate, or natural, immunity** is primitive, does not require priming, and is of relatively **low affinity**, but is **broadly reactive**. It comprises of
  - **Humoral: Complement system**
  - **Cellular: Granulocytes, Monocytes/macrophages, Natural killer cells, Mast cells**
- **Adaptive, or learned, immunity** is **antigen-specific**, depends upon antigen exposure or priming, and can be of very **high affinity**. It comprises of
  - **Humoral: B lymphocytes (antibodies)**
  - **Cellular: T lymphocytes (helper, cytotoxic, and suppressor cells)**
- The components of both of them are **interdependent, and interlinked** for their functions.
- The **innate immune system is most active early in an immune response** and **adaptive immunity become progressively dominant** over time.
- **Humoral immunity** is mediated by **soluble antibody proteins**, and **cellular immunity** by **lymphocytes**.

ACTIVE IMMUNITY

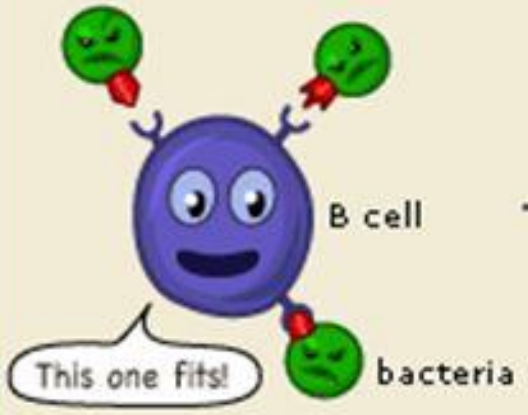
- It is defined as resistance developed by an individual as a result of an antigenic stimulus.
- It is of two types:
  - **Natural :** following **clinical or subclinical infection**
    - **Lifelong immunity:** following measles, polio, chickenpox
    - **Short lived:** in case of viral flu, influenza etc.
    - **Only till infection is active:** in case of Syphilis
  - **Artificial:** following **immunization** with an antigen
    - **killed vaccine**: Cholera, Injectable Polio, Hepatitis A
    - **live attenuated vaccine**: BCG, Oral Polio, Chickenpox, MMR
    - **subunit**: Typhoid Vi antigen, Hepatitis B
    - **toxoid:** Tetanus, DTP

PASSIVE IMMUNITY

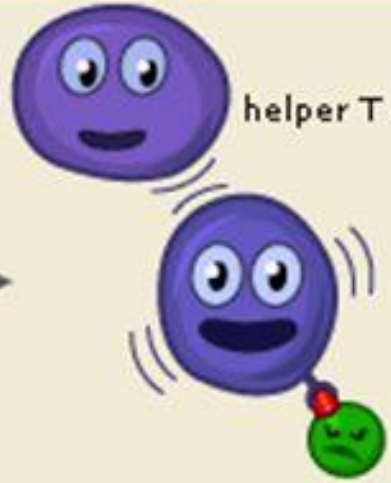
- It can be defined as a resistance transmitted to an individual in a 'ready-made' form. That is- antibodies produced in one body are transferred to another parentarally.
- It can be of two type:
  - **Natural:** foetus receiving mother's antibodies through placenta, and breast feeding (colostrum)- protection for upto 3 months
  - **Artificial:** antisera containing antibodies from other human/animal source (hyperimmune sera)
    - **Animal source:** horse serum
- **Human source:** convalescent sera (sera of patient recovering from the particular infection), pooled human-globulin (e.g. TIG- tetanus immunoglobulin)

COMPONENTS OF IMMUNE SYSTEM:

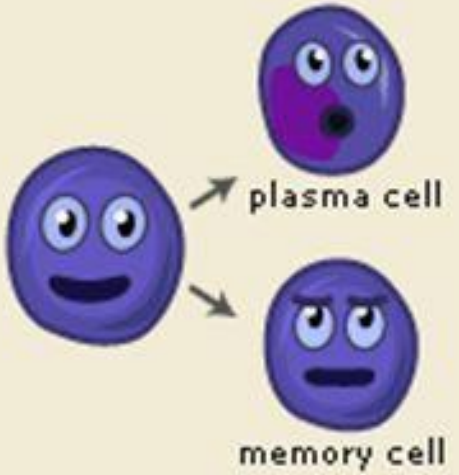
- **B lymphocytes (B cells): Source of antibodies**, which participate in immunity either by **directly neutralizing** extracellular microbes or by **activating complement and certain effector cells (neutrophils and macrophages)** to kill microorganisms.
  - Can recognize and bind to intact antigens **directly.**
  - **Immunoglobulins (antibodies)** on the *B* lymphocyte surface are **receptors** for a large variety of specific structural conformations.
  - A specific immune response begins with the *binding* of antigen by lymphocytes carrying specific receptors with the appropriate antigen-binding site. *B*-lymphocytes "*recognize*" antigen surface structures by means of *membrane receptors* that resemble the antibodies formed subsequently.



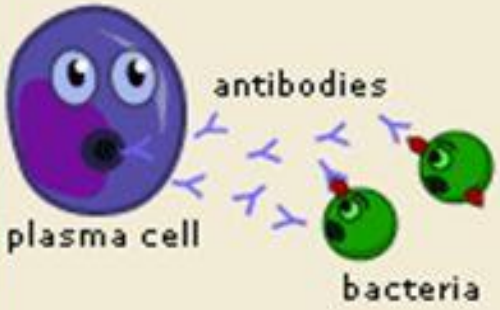
1.
The B cell finds an antigen which matches its receptors.



2.
It waits until it is activated by a helper T cell.

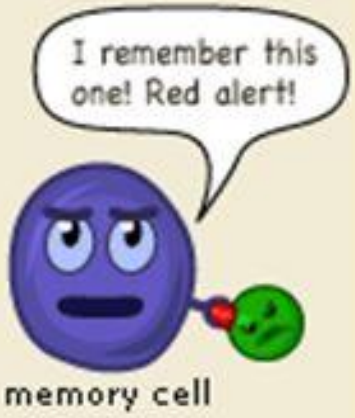


3.
Then the B cell divides to produce plasma and memory cells.



4.
Plasma cells produce antibodies that attach to the current type of invader.

5.
"Eater cells," prefer intruders marked with antibodies, and "eat" loads of them.

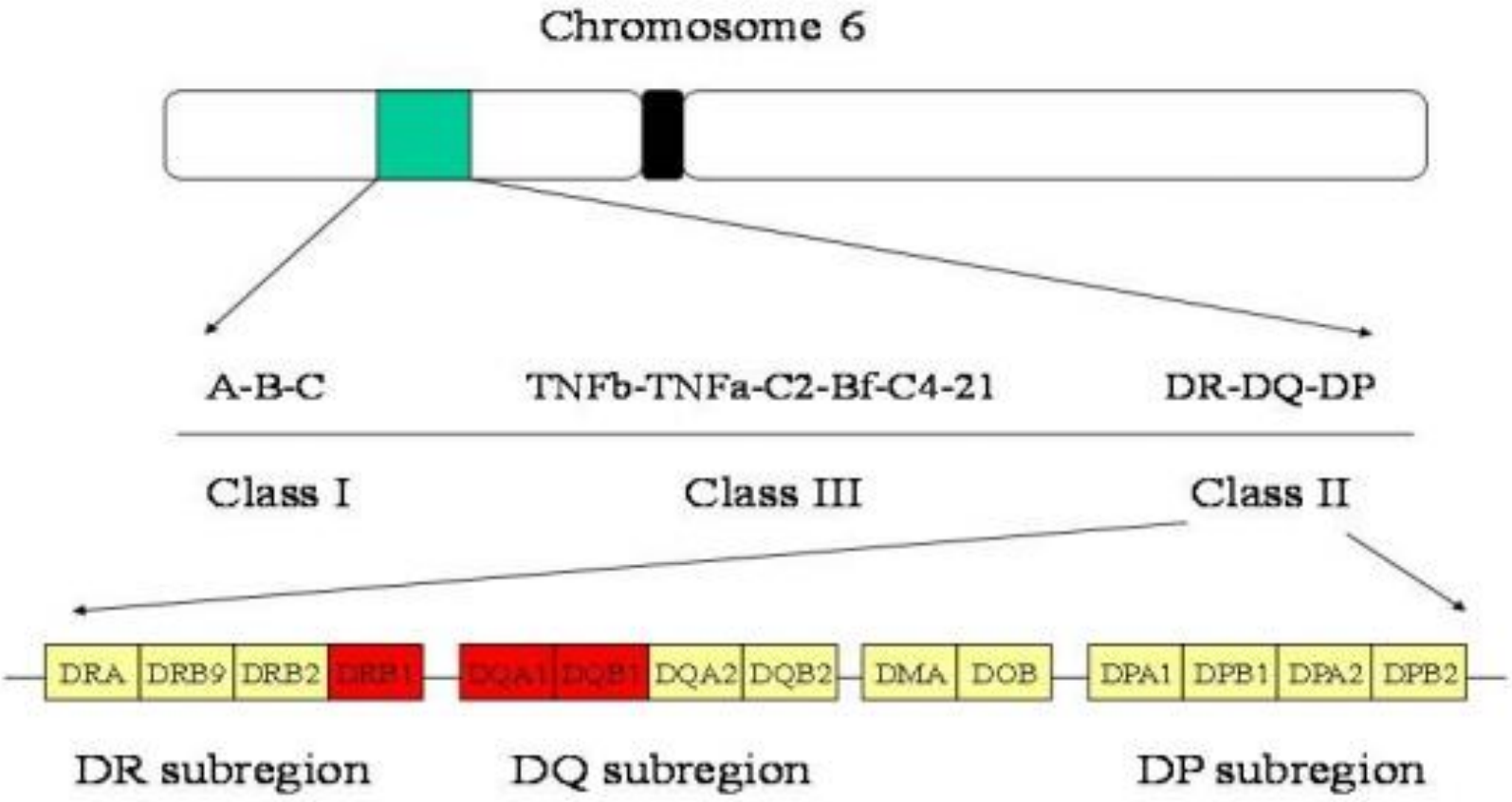


6.
If the same intruder invades again, memory cells help the immune system to activate much faster.

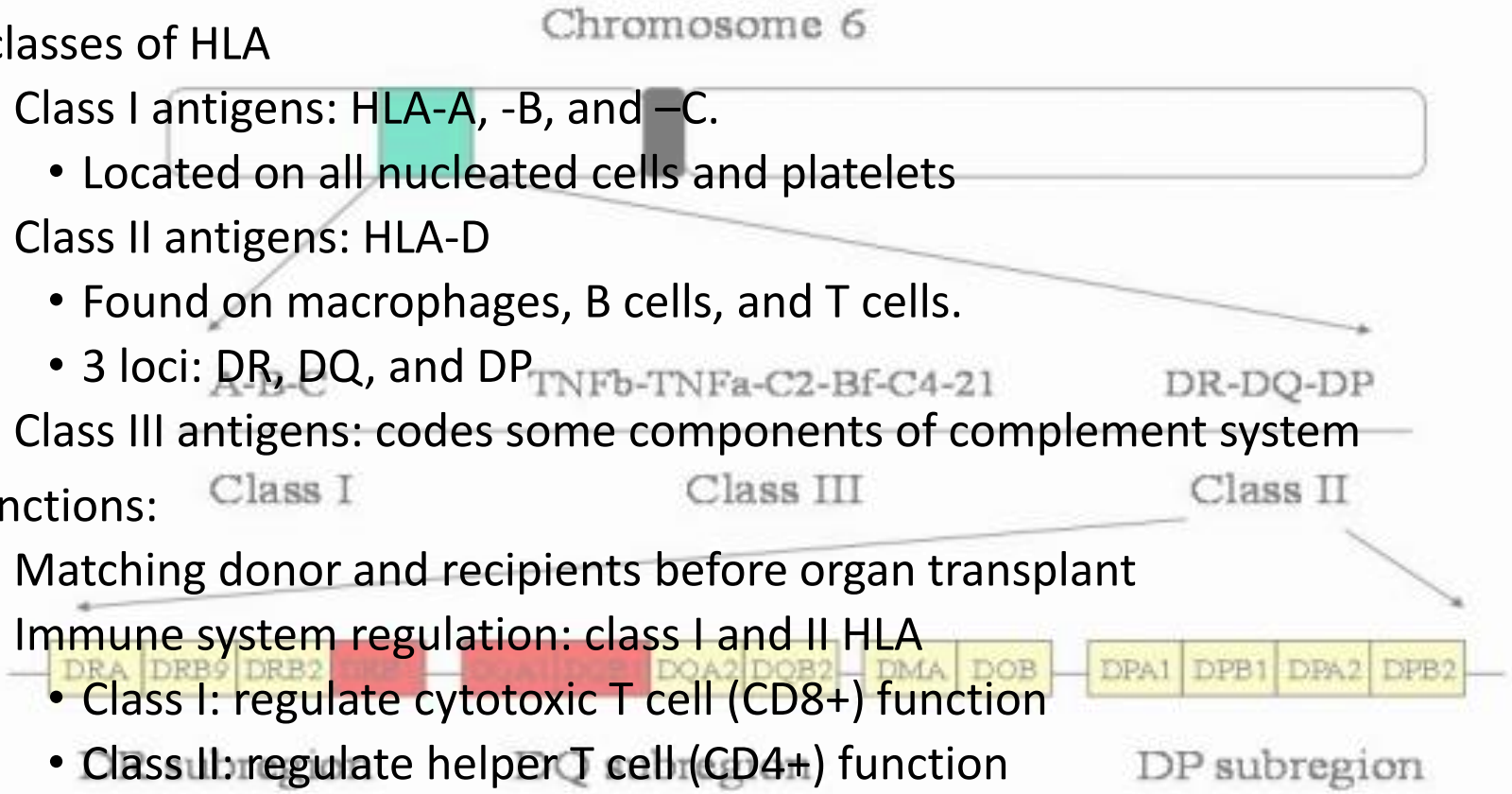
- **T lymphocytes (T cells): directly lyse** targets (accomplished by cytotoxic T cells) or **orchestrate the immune response** of other cells by **producing soluble protein mediators**(cytokines- made by helper T cells).
  - *T* cells can only react with antigens that are **processed** (proteolytically fragmented into smaller pieces) **and presented** by other cells **in the context of major histocompatibility complex (MHC) molecules**.
  - Thus, it requires both **antigen-presenting cells** (APCs, including macrophages and dendritic cells) and **effectors cells** (including macrophages).
  - T-helper cells carry adjacent CD-3 and CD-4 complexes
  - Cytotoxic T-cells carry a CD-8 complex.
  - The CD proteins assist in docking to the MHC.


NK
FAN!
THIS CELL ISN'T RIGHT!
I MUST DESTROY IT QUICKLY
BEFORE IT RELEASES
A BUNCH OF NEW VIRUSES

- **Natural Killer (NK) cells:** are a distinct **subset of lymphocytes** that act as a f**irst line of defense**.
- **Cytokines**: required **for activation of lymphocytes**
  - **Interleukin-1** (formed by macrophages)
  - **Various interleukins (IL), includingIL-2**(formed by T-helper cells).
- Once activated by specific antigen recognition via their respective clonally restricted cell-surface receptors, both *B and T* lymphocytes are triggered to *differentiate* and *divide*, leading to release of *soluble mediators (cytokines, lymphokines)* that perform as effectors and regulators of the immune response.


Chromosome 6
A-B-C
TNFb-TNFa-C2-Bf-C4-21
DR-DQ-DP
Class I
Class III
Class II
DRA
DRB9
DRB2
DRP1
DQA1
DQB1
DQA2
DQB2
DMA
DOB
DPA1
DPB1
DPA2
DPB2
DR subregion
DQ subregion
DP subregion

- **HLA SYSTEM: Human Leucocyte Antigen System- because they were first described on leucocytes**
- Located on chromosome 6- occupy four loci: A, B, C, D.
- Marked variation in alleic genes- hence they are highly polymorphic
- 3 classes of HLA
  - Class I antigens: HLA-A, -B, and –C.
    - Located on all nucleated cells and platelets
  - Class II antigens: HLA-D
    - Found on macrophages, B cells, and T cells.
    - 3 loci: DR, DQ, and DP
  - Class III antigens: codes some components of complement system
- Functions:
  - Matching donor and recipients before organ transplant
  - Immune system regulation: class I and II HLA
    - Class I: regulate cytotoxic T cell (CD8+) function
    - Class II: regulate helper T cell (CD4+) function
  - Disease association:
    - Autoimmune (e.g. rheumatic arthritis, type I diabetes mellitus etc.)
    - Inflammatory (e.g. ankylosing spondylitis)
    - Inherited metabolic diseases (idiopathic hemochromatosis)



The immune system can fail in one of three ways:

- **IMMUNODEFICIENCY (INEFFECTIVE IMMUNE RESPONSE):** An immune response is comprised of a multitude of cells, cytokines, and reactions. If any one part of an individual's immune system is defective, the individual may not be able to fight infections adequately. Immunodeficiency may be hereditary, manifesting shortly after birth, or may be acquired as the result of viral (ie, HIV) infection or medication (i.e, chemotherapy).
- **AUTOIMMUNITY (INAPPROPRIATE REACTION TO SELF):** A normally functioning immune system recognizes foreign antigens and reacts against them; it simultaneously recognizes its own tissues as self and mounts no reaction. If the system reacts against self-components, autoimmune disease occurs. The body produces antibodies against its own tissues and therefore causes damage. These autoantibodies play a significant role in the pathogenesis of diseases such as pemphigus, pemphigoid, and Hashimoto's thyroiditis.

HYPERSENSITIVITY (OVERACTIVE IMMUNE RESPONSE): Occasionally, immune reactions are out of proportion to the damage caused by a pathogen, or the immune system produces a reaction to a harmless antigen, causing hypersensitivity reactions. The immediate (type I) reaction responsible for anaphylactic shock, angioedema, and hives is caused when IgE and antigens bind to basophils and mast cells, resulting in the release of chemical mediators such as histamine and platelet-activating factor. These substances contract smooth muscle and cause an accumulation of extravascular fluid by increasing vascular permeability. The delayed-type hypersensitivity reaction is mediated by a T-cell response rather than by antibodies and leads to granulomatous inflammation. Two examples of this reaction are inflammation resulting from a tuberculin test and contact allergy to a topical antigen.

Importance to dentist

- The modern dentist uses a wide variety of drugs to treat patients, including antibiotics, hypnotics, and anesthetics. All practitioners who use these medications must know how to manage adverse reactions triggered by these agents.
- A dental practitioner also uses a wide range of materials, such as impression materials, adhesives, latex, and restorative and endodontic materials that contain potential allergens.
- These include preservatives, coloring agents, fixatives, binding agents, flavorings, and latex.

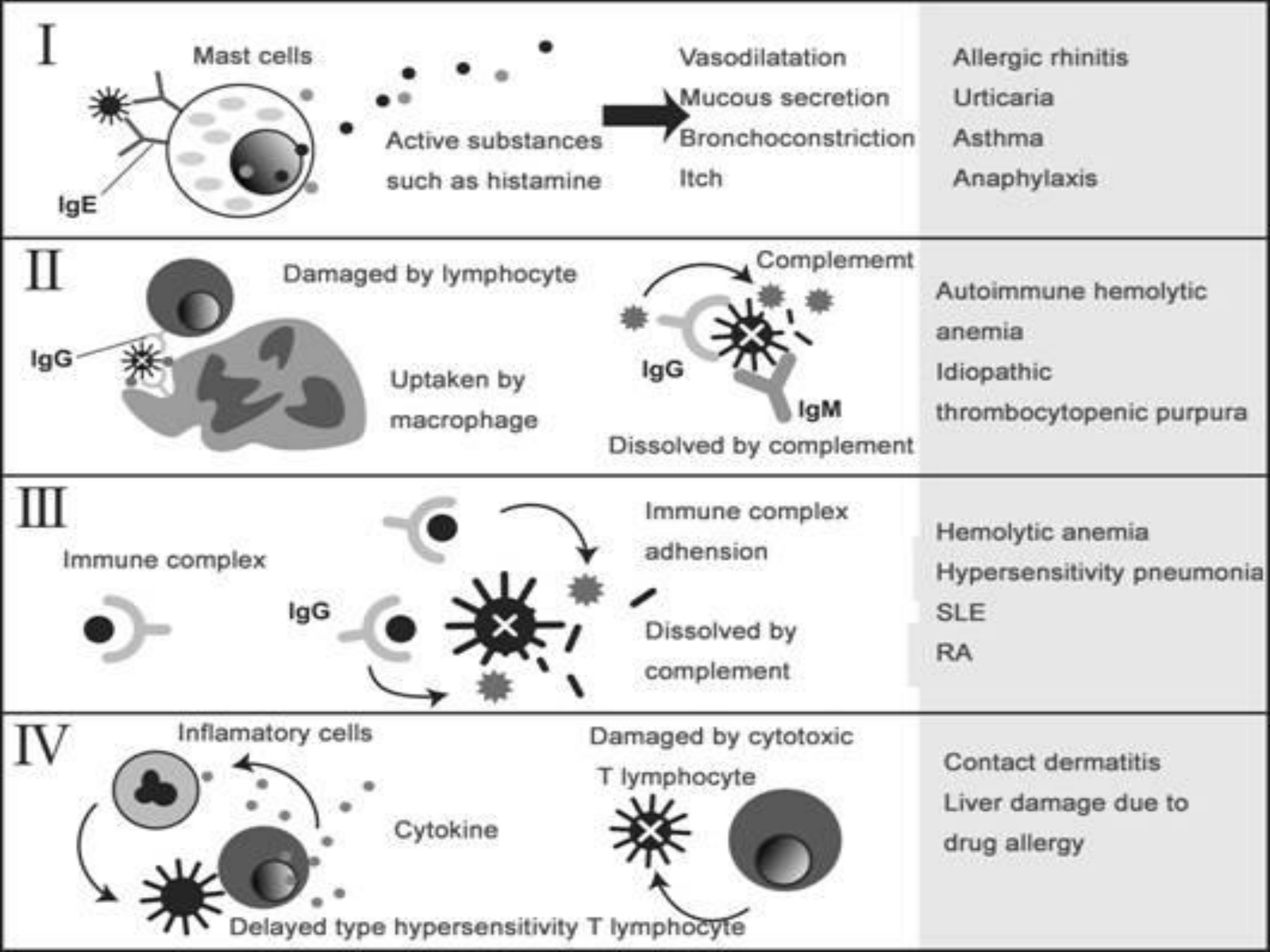
Hypersensitivity-”It is defined as a state of exaggerated immune response to an antigen”

Immediate hypersensitivity	Delayed hypersensitivity
1.Appears & recedes rapidly	1.Appears slowly & lasts longer
2.Induced by antigens or haptens by any route	2.Antigens or haptens intradermally or by skin contact
3.˝Antibody mediated ˝ reaction – circulating antibodies present & responsible for reaction	3.˝ Cell – mediated reaction ˝ - Not necessary for circulating antibodies
4. Passive transfer with serum possible	4. Possible with T – cells or transfer factor
5.Desensitizaton easy , but short lived	5.Difficult ,but long lasting

Type	Prototype Disorder
Immediate (type I) hypersensitivity	Anaphylaxis; allergies; bronchial asthma (atopic forms)
Antibody-mediated (type II) hypersensitivity	Autoimmune hemolytic anemia; Goodpasture syndrome
Immune complex-mediated (type III) hypersensitivity	Systemic lupus erythematosus; some forms of glomerulonephritis; serum sickness; Arthus reaction
Cell-mediated (type IV) hypersensitivity	Contact dermatitis; multiple sclerosis; type I, diabetes; transplant rejection; tuberculosis

Immune Mechanisms	Pathologic Lesions
Production of IgE antibody → immediate release of vasoactive amines and other mediators from mast cells; recruitment of inflammatory cells (late-phase reaction)	Vascular dilation, edema, smooth muscle contraction, mucus production, inflammation
Production of IgG, IgM → binds to antigen on target cell or tissue → phagocytosis or lysis of target cell by activated complement or Fc receptors; recruitment of leukocytes	Cell lysis; inflammation
Deposition of antigen-antibody complexes → complement activation → recruitment of leukocytes by complement products and Fc receptors → release of enzymes and other toxic molecules	Necrotizing vasculitis (fibrinoid necrosis); inflammation
Activated T lymphocytes → i) release of cytokines and macrophage activation; ii) T cell-mediated cytotoxicity	Perivascular cellular infiltrates; edema; cell destruction; granuloma formation

	Type-I (anaphylactic)	Type-II (cytotoxic & cytolytic)	Type-III (immune Complex)	Type-IV (delayed type)
Antibody	IgE	IgG, IgM	IgG, IgM	None
Antigen	Exogenous	Cell surface	Soluble	Tissue and organs
Response time	15-30 minutes	Minutes- hours	3-8 hours	48-72 hours
Appearance	Wheal and flare	Lysis and necrosis	Erythema, edema and necrosis	Erythema and induration
Histology	Basophils and eosinophils	Antibody and complement	Complement and neutrophils	Macrophages and T cells
Transferred with	Antibody	Antibody	Antibody	T- cells
Examples	Allergic asthma, Hay fever, drug allergy, latex allergy, oral allergy syndrome.	Erythroblastosis fetalis, Good-pasture's nephritis ,autoimmune diseases like pemphigus ,myasthenia gravis, Grave's disease.	SLE, farmer's Lung disease, Serum sickness	Tuberculin test, Contact dermatitis, lichen planus & lichenoid reactons

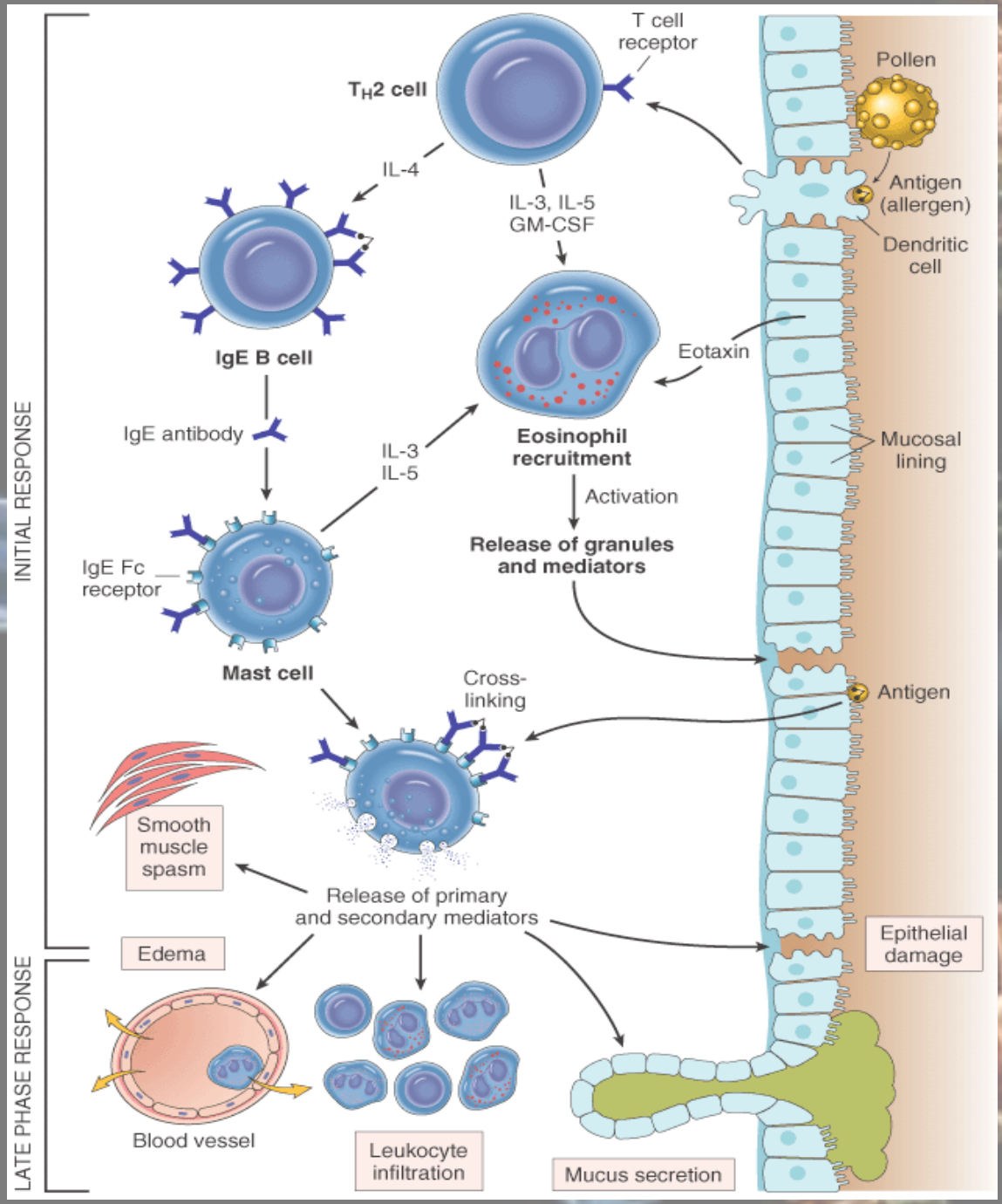

I
Mast cells
IgE
Active substances
such as histamine
Vasodilatation
Mucous secretion
Bronchoconstriction
Itch
Allergic rhinitis
Urticaria
Asthma
Anaphylaxis
II
Damaged by lymphocyte
IgG
Uptaken by
macrophage
Complememt
IgG
IgM
Dissolved by complement
Autoimmune hemolytic
anemia
Idiopathic
thrombocytopenic purpura
III
Immune complex
Immune complex
IgG
adhension
Dissolved by
complement
Hemolytic anemia
Hypersensitivity pneumonia
SLE
RA
IV
Inflamatory cells
Cytokine
Delayed type hypersensitivity T lymphocyte
Damaged by cytotoxic
T lymphocyte
Contact dermatitis
Liver damage due to
drug allergy

Type I (Anaphylactic) Reactions

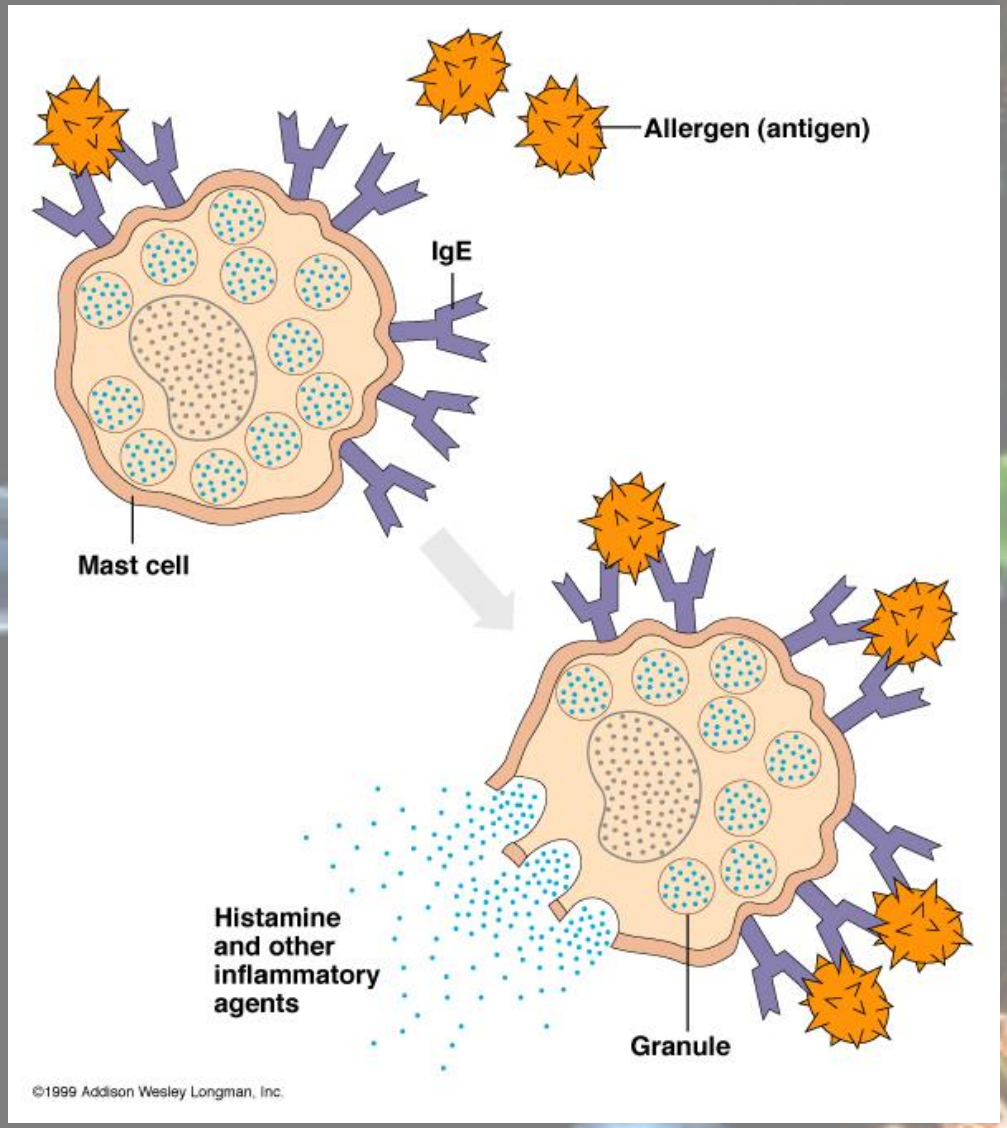
- Occur within minutes of exposure to antigen
- Antigens combine with IgE antibodies
- IgE binds to mast cells and basophils, causing them to undergo *degranulation* and release several mediators:
  - Histamine: Dilates and increases permeability of blood vessels (swelling and redness), increases mucus secretion (runny nose), smooth muscle contraction (bronchi).
  - Prostaglandins: Contraction of smooth muscle of respiratory system and increased mucus secretion.
  - Leukotrienes: Bronchial spasms.

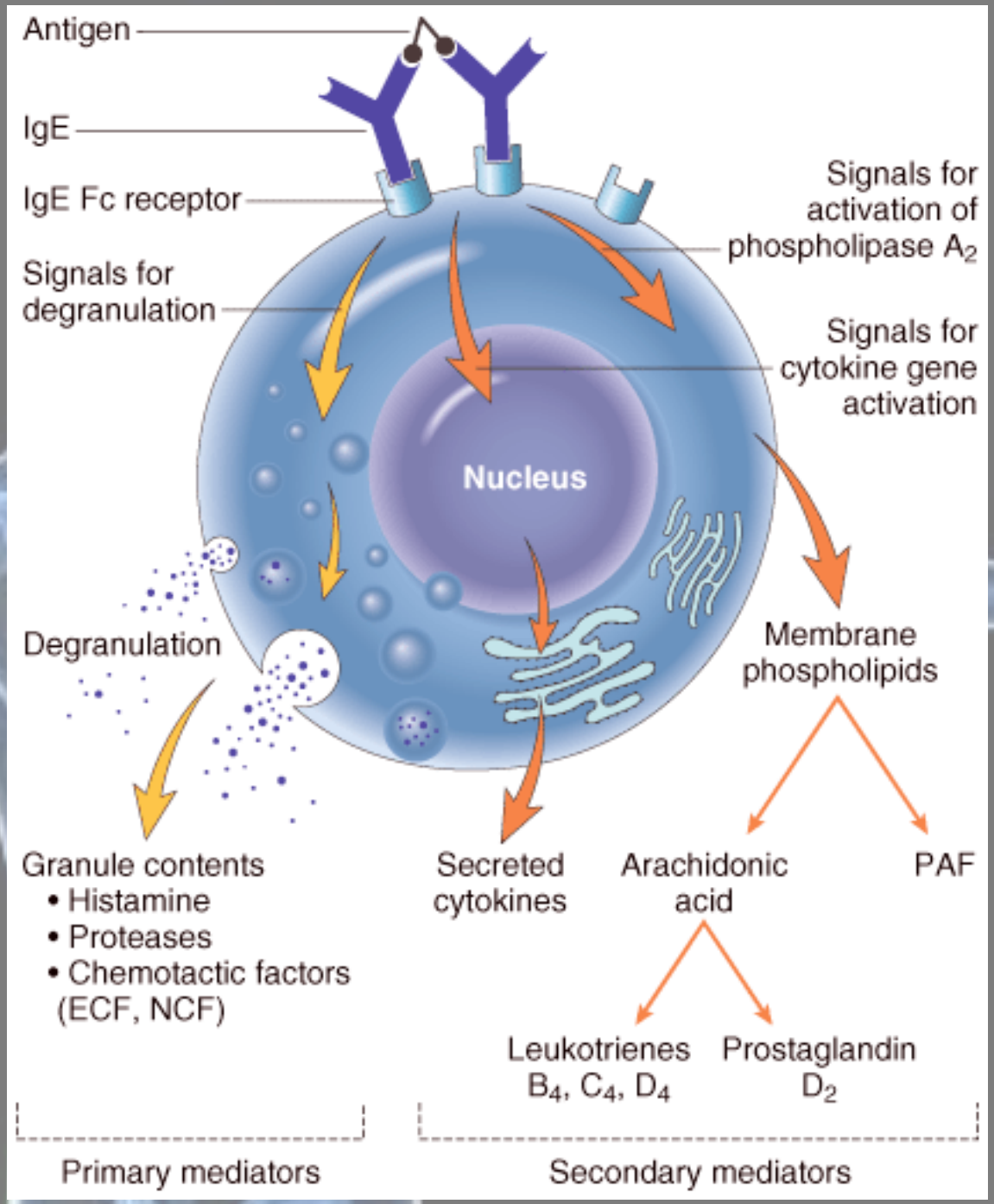
- These substances cause vasodilation and increased capillary permeability, ultimately leading to fluid and leukocyte accumulation in the tissues and edema formation

Pathogenesis of immediate (type I) hypersensitivity reaction. The late-phase reaction is dominated by leukocyte infiltration and tissue injury. TH 2, T-helper type 2 CD4 cells

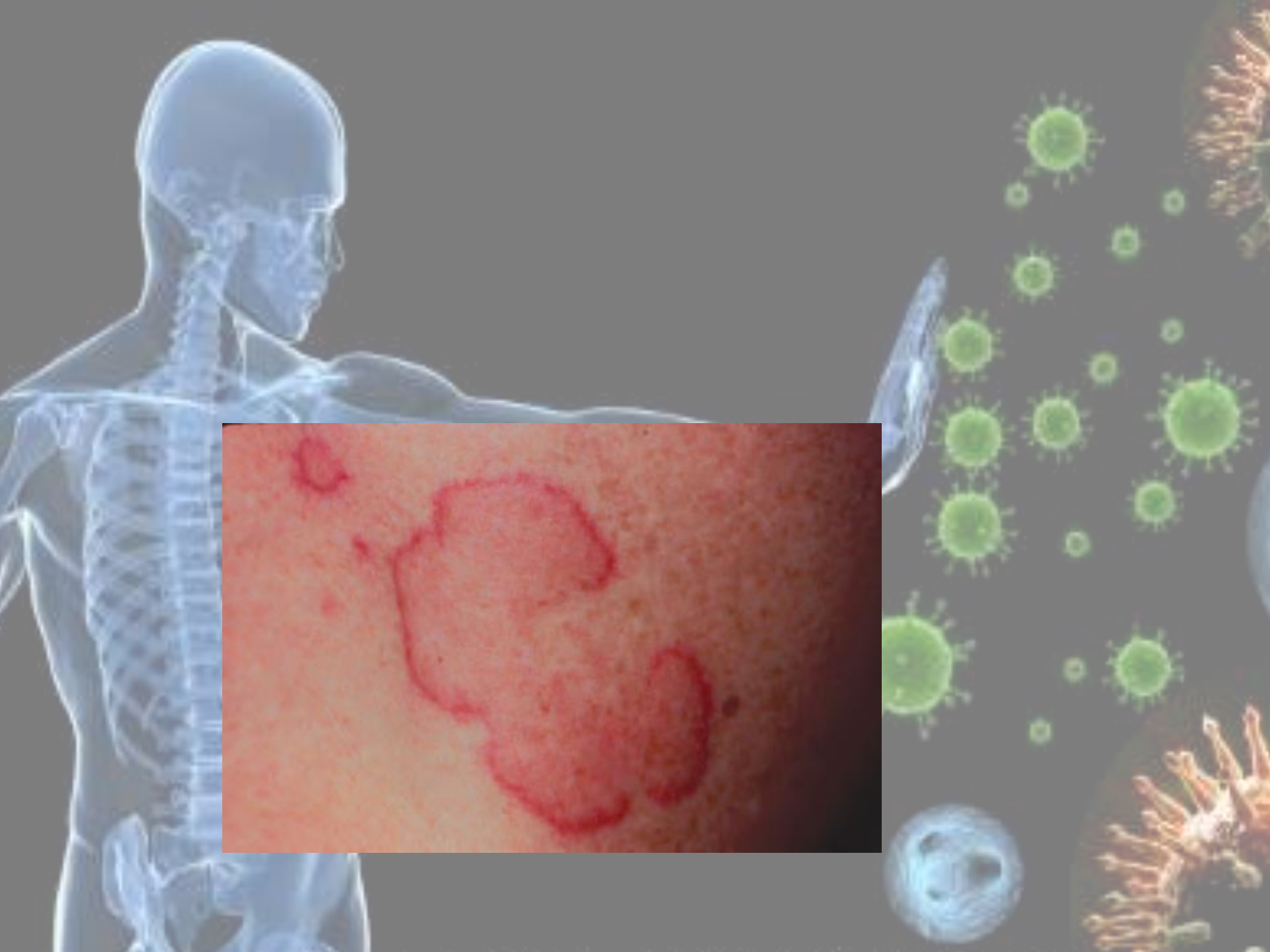


Mast Cells and the Allergic Response





Activation of mast cells in immediate hypersensitivity and release of their mediators. ECF, eosinophil chemotactic factor; NCF, neutrophil chemotactic factor; PAF, plateletactivating factor.



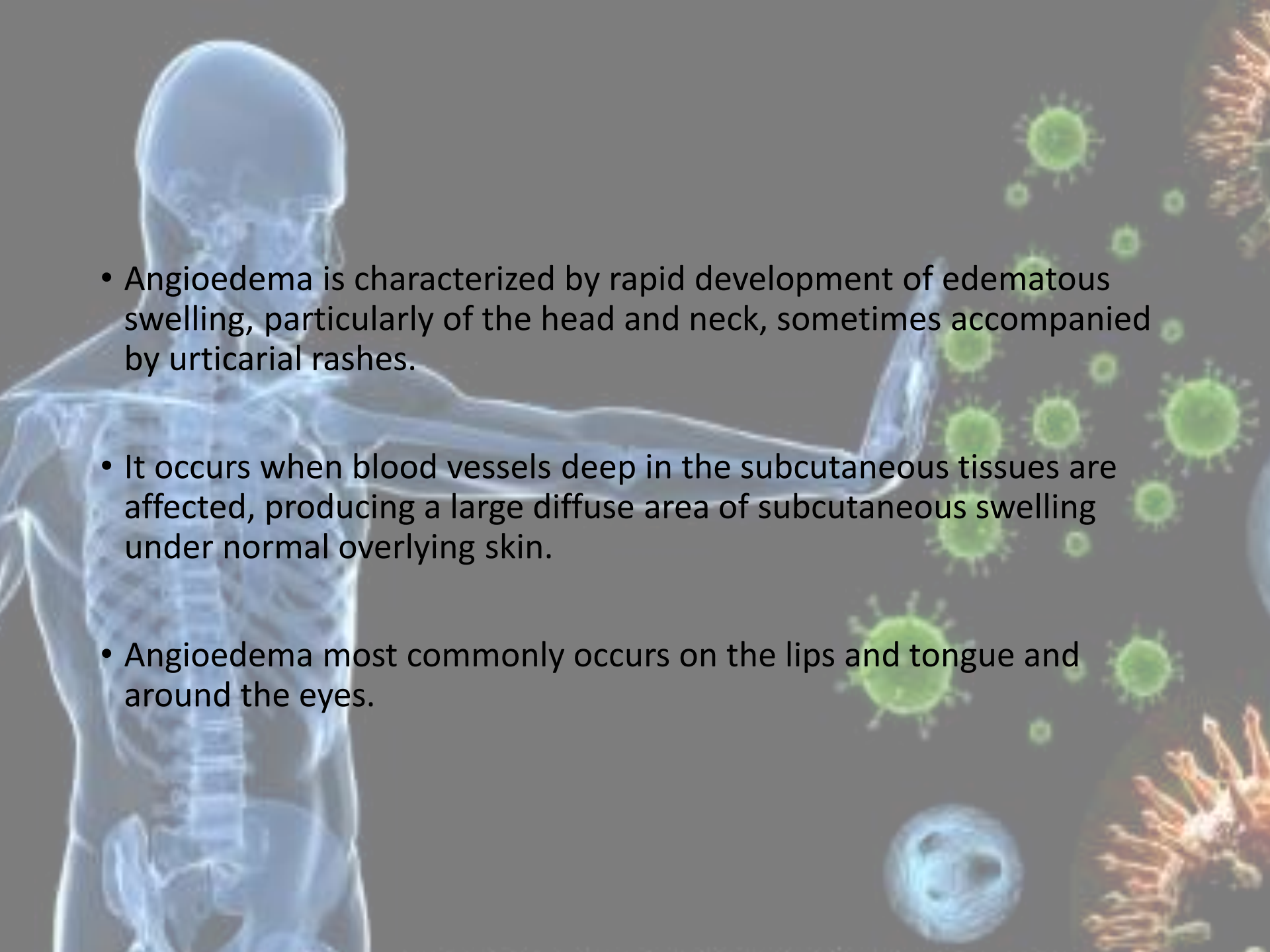
Anaphylactic shock: Massive drop in blood pressure. Can be fatal in minutes.

Localized Anaphylaxis

- involving superficial blood vessels results in urticaria (hives).
- **Urticaria** begins with pruritus in the area where histamine and other active substances are released.
- **Wheals (welts)** then appear on the skin as an area of localized edema on an erythematous base

→Urticaria of the lips and the oral mucosa

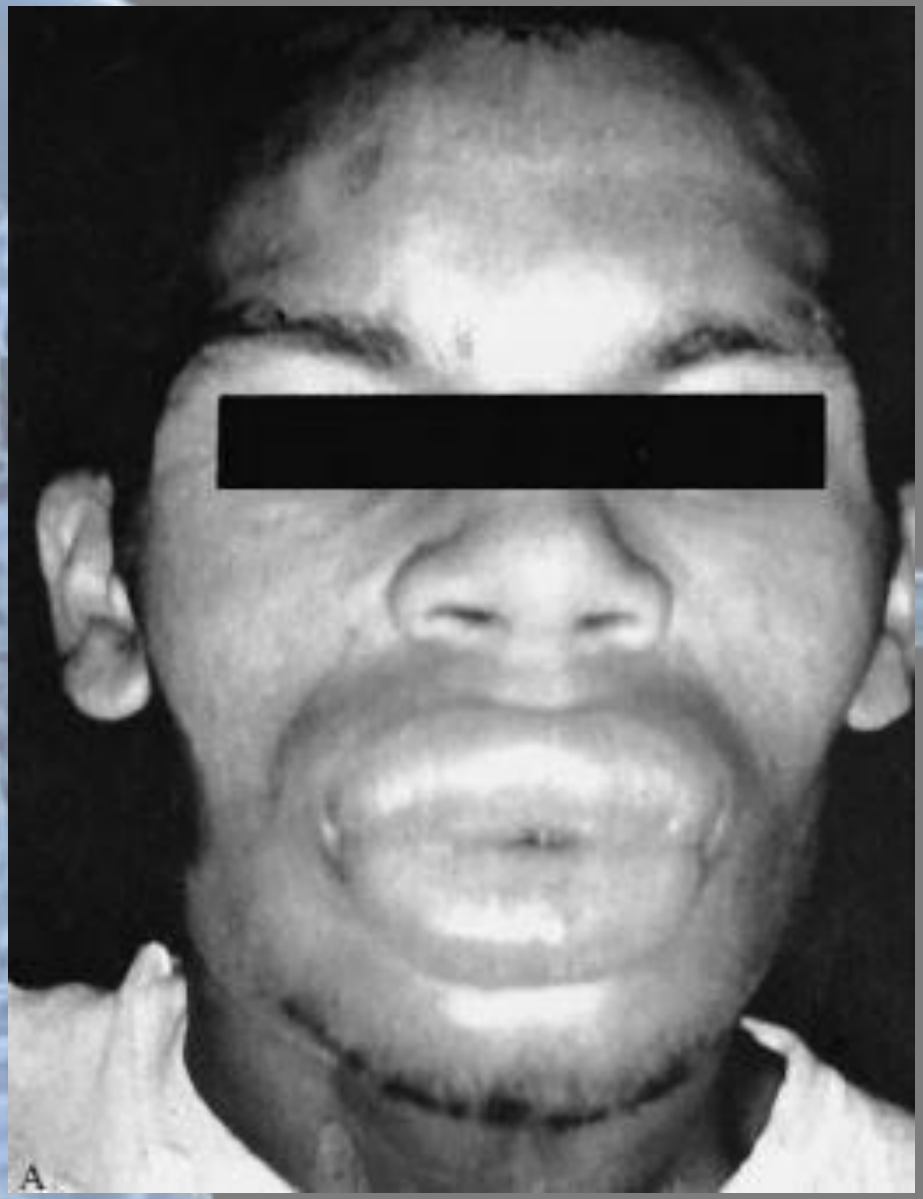
- Common food allergens include chocolate, nuts, shellfish, and tomatoes.
- Drugs such as penicillin and aspirin may cause urticaria,
- cold, heat, or even pressure
- Impression compounds, coloring agents and preservatives, and ingredients of mouthwashes

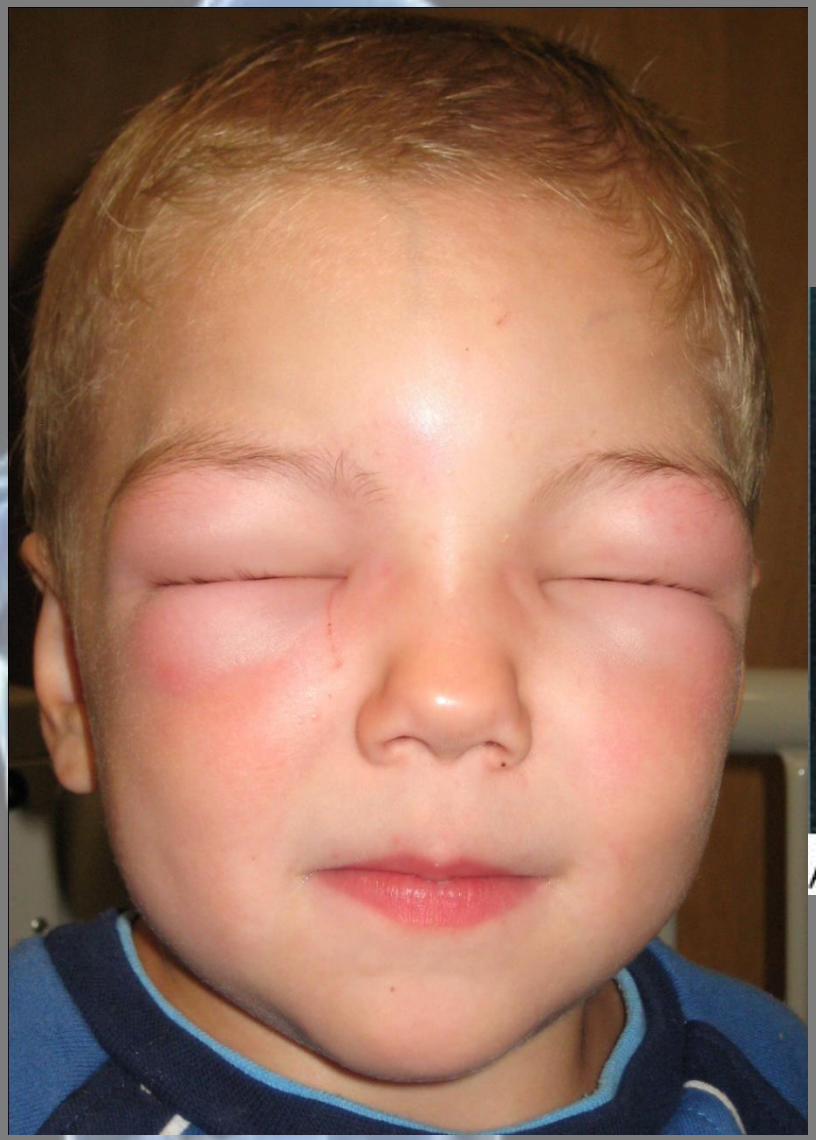


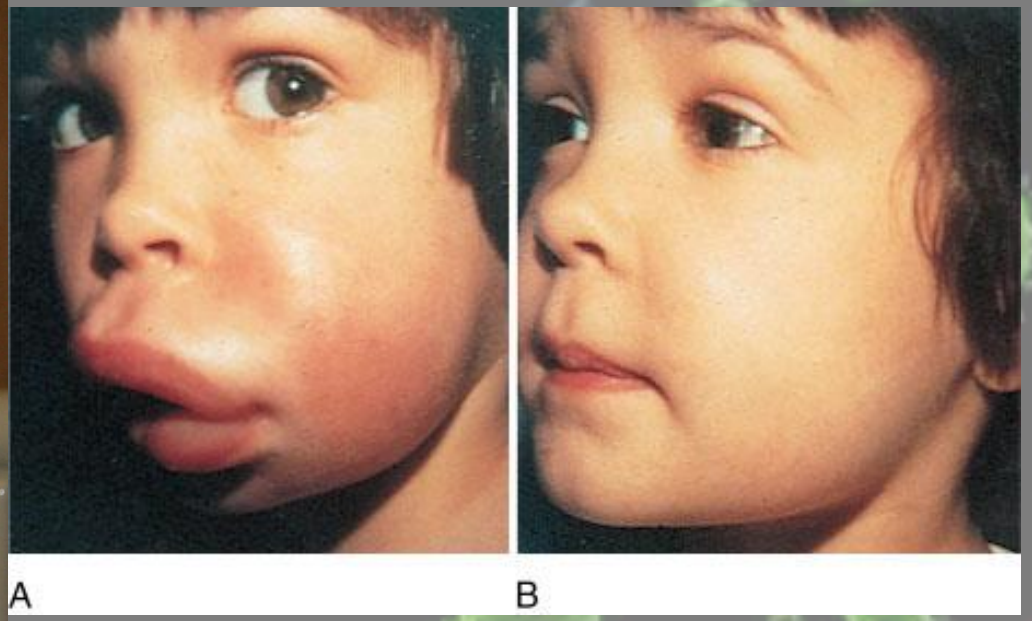
- Angioedema is characterized by rapid development of edematous swelling, particularly of the head and neck, sometimes accompanied by urticarial rashes.

- It occurs when blood vessels deep in the subcutaneous tissues are affected, producing a large diffuse area of subcutaneous swelling under normal overlying skin.

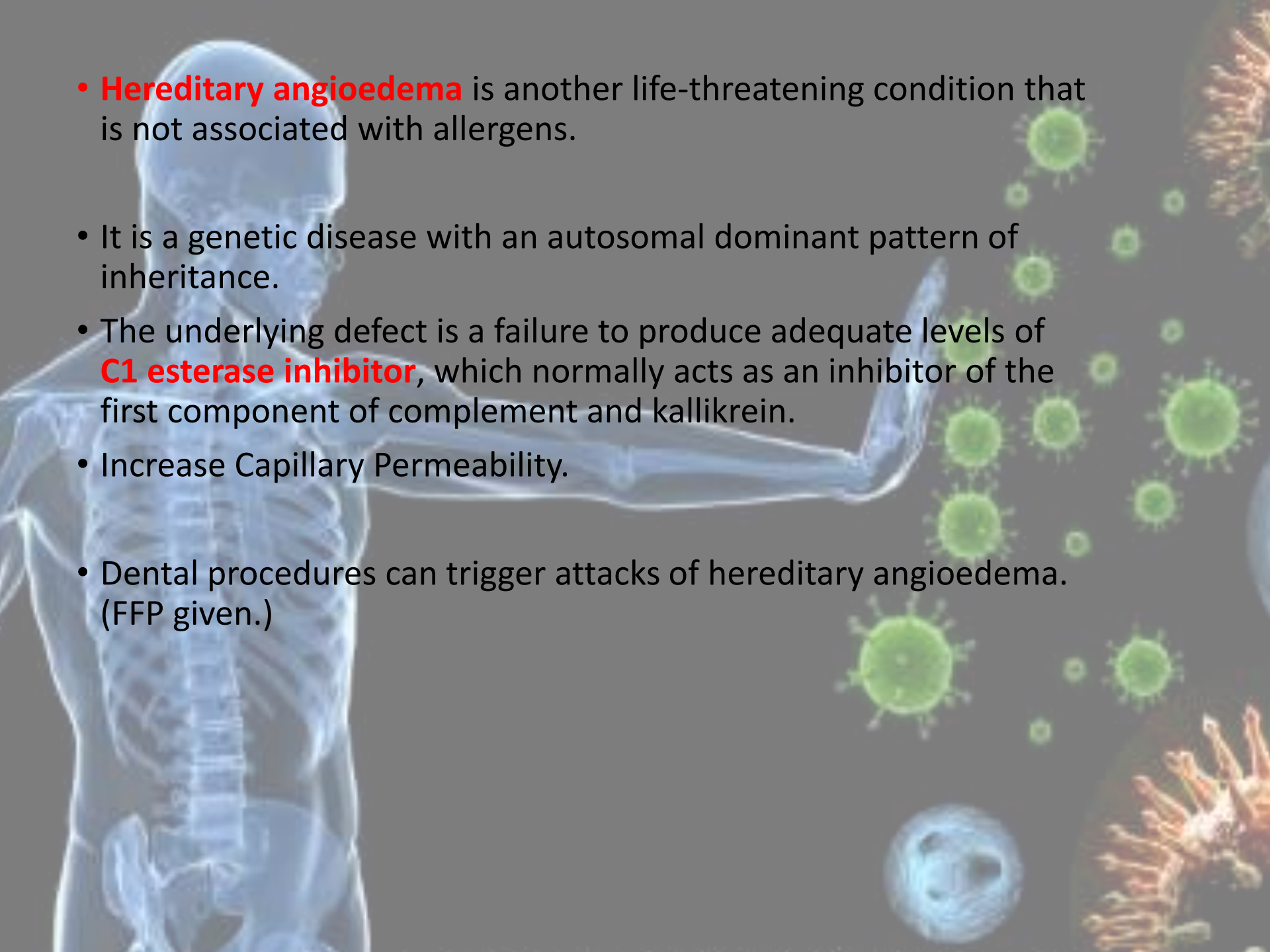
- Angioedema most commonly occurs on the lips and tongue and around the eyes.


A





A B

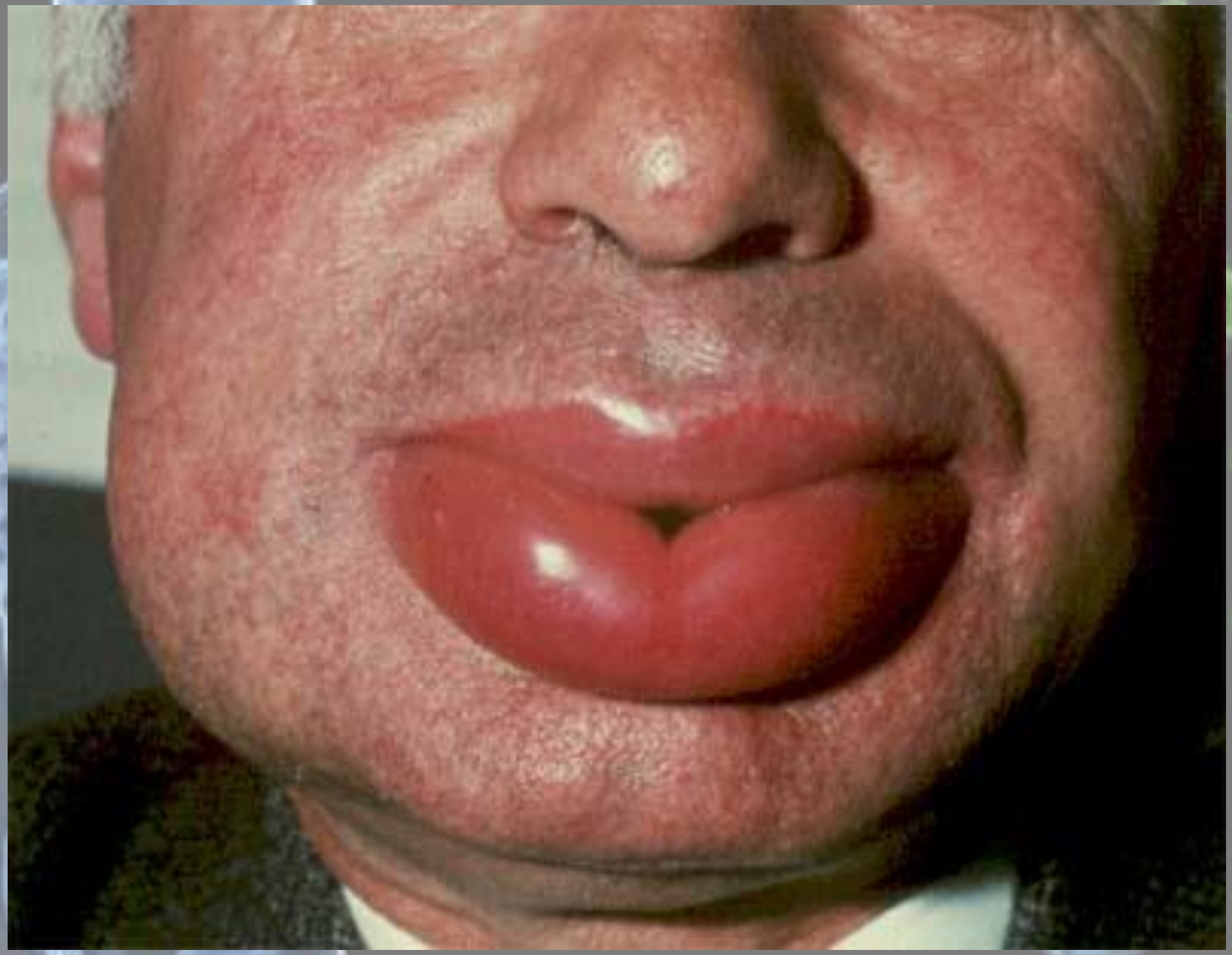


- **Hereditary angioedema** is another life-threatening condition that is not associated with allergens.

- It is a genetic disease with an autosomal dominant pattern of inheritance.
- The underlying defect is a failure to produce adequate levels of **C1 esterase inhibitor**, which normally acts as an inhibitor of the first component of complement and kallikrein.
- Increase Capillary Permeability.

- Dental procedures can trigger attacks of hereditary angioedema. (FFP given.)

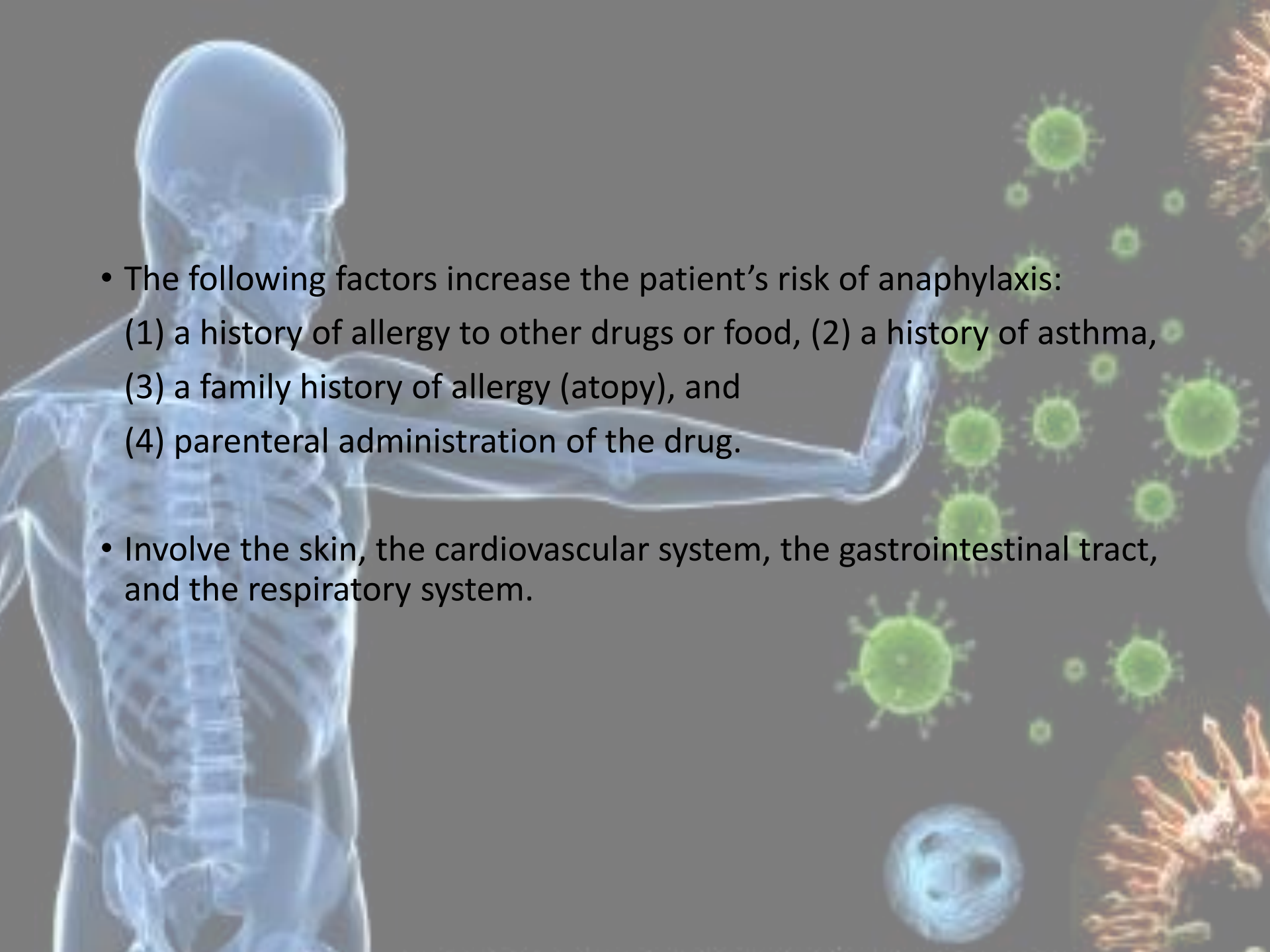
Hereditary angioneurotic oedema



Generalized Anaph ylaxis

- an allergic emergency.
- Reaction of IgE antibodies to an allergen causing the release of histamine, bradykinin, and slow reactive substance of anaphylaxis (SRSA) from mast cells and later eosinophil chemotactic factor (ECF).

- These chemical mediators cause the contractio of smooth muscles of the respiratory and intestinal tracts, as well as increased vascular permeability.



- The following factors increase the patient's risk of anaphylaxis:
  (1) a history of allergy to other drugs or food, (2) a history of asthma,
  (3) a family history of allergy (atopy), and
  (4) parenteral administration of the drug.

- Involve the skin, the cardiovascular system, the gastrointestinal tract, and the respiratory system.

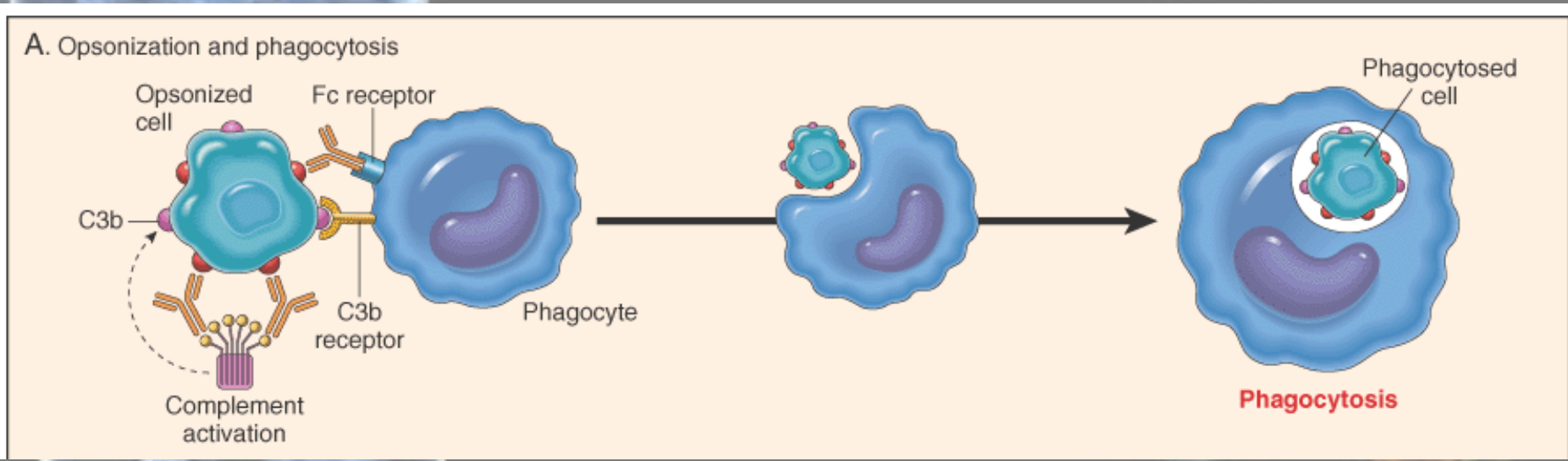
Treatment

- 0.5 mL of epinephrine (1:1,000) subcutaneously or, preferably, intramuscularly. [repeated every 10 minutes]
- Oxygen,
- Recumbent position with the lower extremities elevated
- Given fluids intravenously, and transported to hospital
- 50 mg of diphenhydramine hydrochloride
- For bronchospasm, slowly inject 250 mg of aminophylline intravenously
- Airway
- Steroids
- Isotonic saline

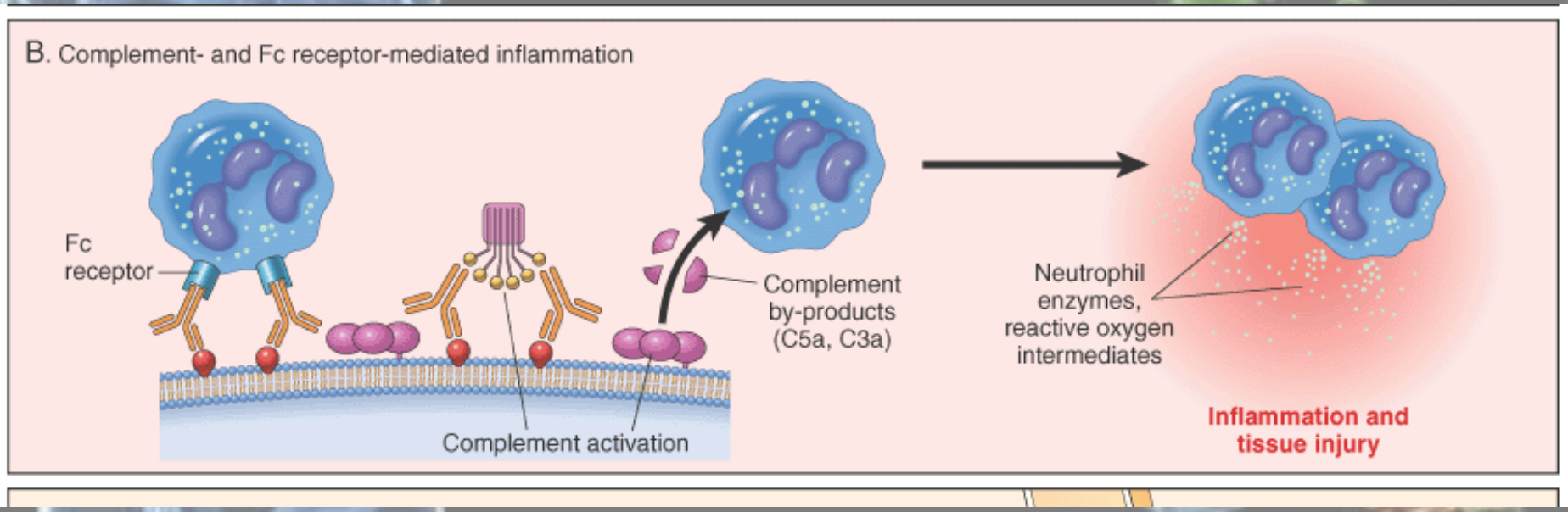
Type II (Cytotoxic) Reactions

- Involve activation of complement by IgG or IgM binding to an antigenic cell.
- Antigenic cell is lysed.
- Transfusion reactions:
  - ABO Blood group system: Type O is universal donor. Incompatible donor cells are lysed as they enter bloodstream.
  - Rh Blood Group System: 85% of population is Rh positive. Those who are Rh negative can be sensitized to destroy Rh positive blood cells.
    - Hemolytic disease of newborn: Fetal cells are destroyed by maternal anti-Rh antibodies that cross the placenta.

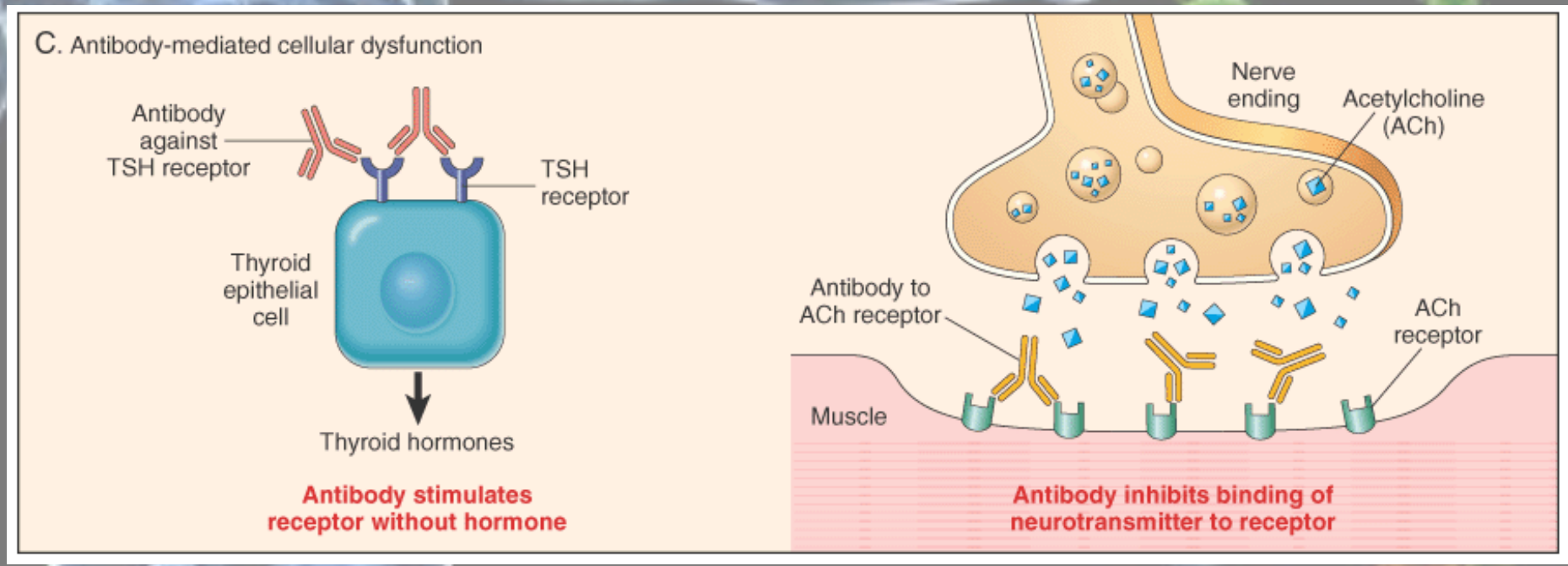
(1) *transfusion reactions, in which cells from an incompatible donor react with and are* opsonized by preformed antibody in the host;
(2) *erythroblastosis fetalis, in which there is an antigenic difference between the mother and the fetus, and antibodies (of the IgG class) from* the mother cross the placenta and cause destruction of fetal red cells;
(3) *autoimmune hemolytic anemia, agranulocytosis, and thrombocytopenia, in which individuals produce antibodies to* their own blood cells, which are then destroyed; and
(4) *certain drug reactions, in which antibodies are produced that react with the drug, which may be attached to the surface of* erythrocytes or other cells.



Antibody-mediated inflammation is the mechanism responsible for tissue injury in some forms of *glomerulonephritis, vascular rejection in organ grafts, and other diseases*



In some cases, antibodies directed against cell-surface receptors impair or dysregulate function without causing cell injury or inflammation. For example, in (1) *myasthenia gravis, antibodies* reactive with acetylcholine receptors in the motor end-plates of skeletal muscles impair neuromuscular transmission and therefore cause muscle weakness.
In pemphigus vulgaris, antibodies against desmosomes disrupt intercellular junctions in epidermis, leading to the formation of skin vesicles. The converse (i.e., antibody-mediated stimulation of cell function) is noted in *Graves disease. In this disorder, antibodies against the thyroid-stimulating hormone receptor on thyroid epithelial cells stimulate the cells, resulting in hyperthyroidism.*



Disease	Target Antigen
Autoimmune hemolytic anemia	Erythrocyte membrane proteins (Rh blood group antigens, I antigen)
Autoimmune thrombocytopenic purpura	Platelet membrane proteins (gpIIb:IIIa intergrin)
Pemphigus vulgaris	Proteins in intercellular junctions of epidermal cells (epidermal cadherin)
Vasculitis caused by ANCA	Neutrophil granule proteins, presumably released from activated neutrophils
Goodpasture syndrome	Noncollagenous protein in basement membranes of kidney glomeruli and lung alveoli
Acute rheumatic fever	Streptococcal cell wall antigen; antibody cross-reacts with myocardial antigen
Myasthenia gravis	Acetylcholine receptor
Graves disease (hyperthyroidism)	TSH receptor
Insulin-resistant diabetes	Insulin receptor
Pernicious anemia	Intrinsic factor of gastric parietal cells

Mechanisms of Disease	Clinicopathologic Manifestations
Opsonization and phagocytosis of erythrocytes	Hemolysis, anemia
Opsonization and phagocytosis of platelets	Bleeding
Antibody-mediated activation of proteases, disruption of intercellular adhesions	Skin vesicles (bullae)
Neutrophil degranulation and inflammation	Vasculitis
Complement- and Fc receptor-mediated inflammation	Nephritis, lung hemorrhage
Inflammation, macrophage activation	Myocarditis, arthritis
Antibody inhibits acetylcholine binding, down-modulates receptors	Muscle weakness, paralysis
Antibody-mediated stimulation of TSH receptors	Hyperthyroidism
Antibody inhibits binding of insulin	Hyperglycemia, ketoacidosis
Neutralization of intrinsic factor, decreased absorption of vitamin B_{12}	Abnormal erythropoiesis, anemia

In dentistry serum sickness

- Major symptoms consist of fever, swelling, lymphadenopathy, joint and muscle pains, and rash.
- Less common manifestations include peripheral neuritis, kidney disease, and myocardial ischemia. Serum sickness is usually self-limiting, with spontaneous recovery in 1 to 3 weeks.
- Treatment is symptomatic; aspirin is given for arthralgia, and antihistamines are given for the skin rash. Severe cases should be treated with a short course of systemic corticosteroids, which significantly shortens the course of the disease.
- Although this reaction is rare, the dentist who is prescribing penicillin should be aware of the possibility of serum sickness occurring weeks after use of the drug. It is thought that penicillin binds to host proteins to form a recognizable antigen, and as antibodies form, they meet across vessel walls and give a localized vasculitis.

Type III (Immune Complex) Reactions

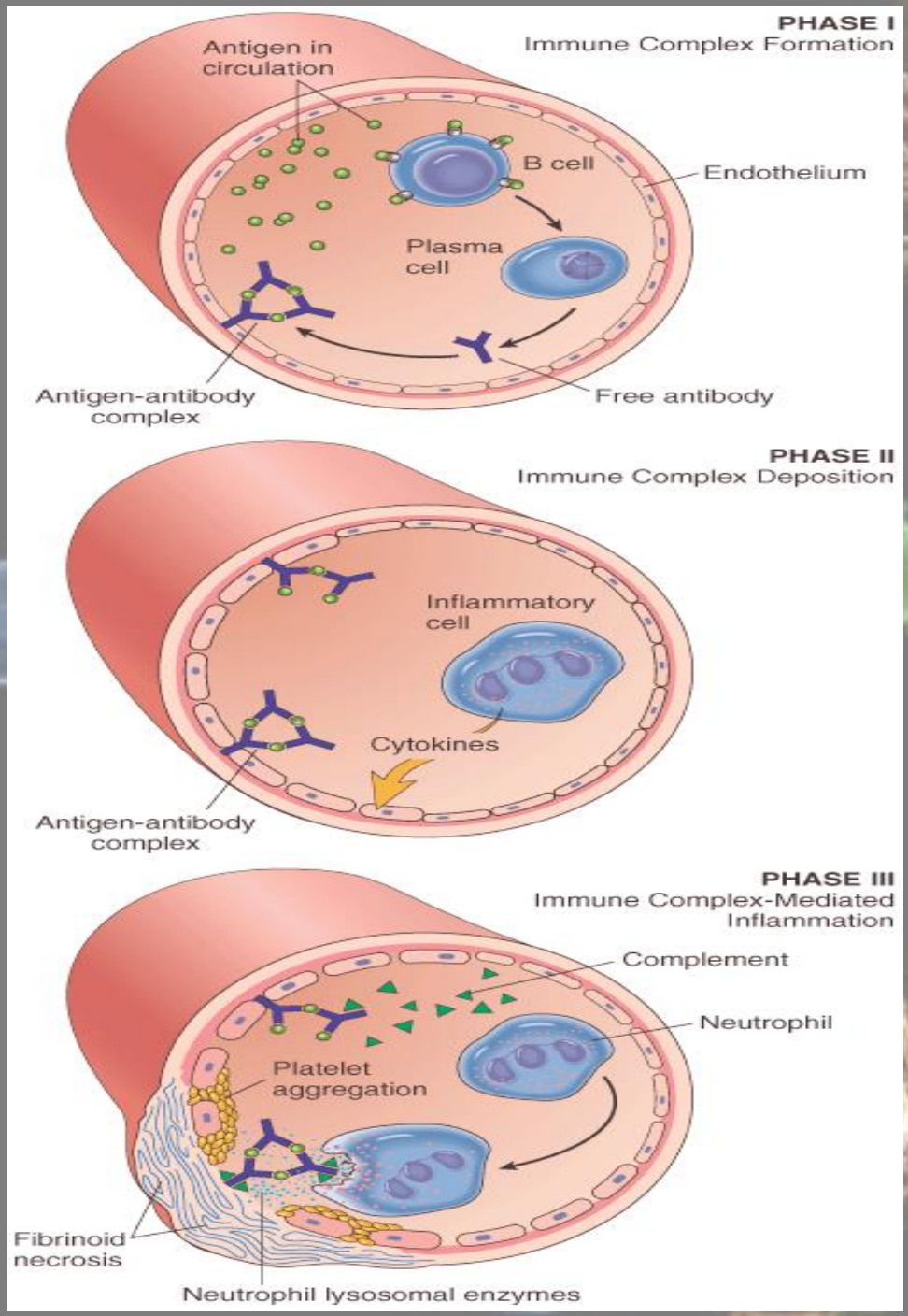
- Involve reactions against ***soluble*** antigens circulating in serum.
- Usually involve IgA antibodies.
- Antibody-Antigen immune complexes are deposited in organs, activate complement, and cause inflammatory damage.
  - Glomerulonephritis: Inflammatory kidney damage.
- Occurs with slightly high antigen-antibody ratio is present.

1. SLE 2. PA 3. poststreptococcal PSGN 4. AGN 5. reactive arthritis
6. arthus reaction 7. serum sickness

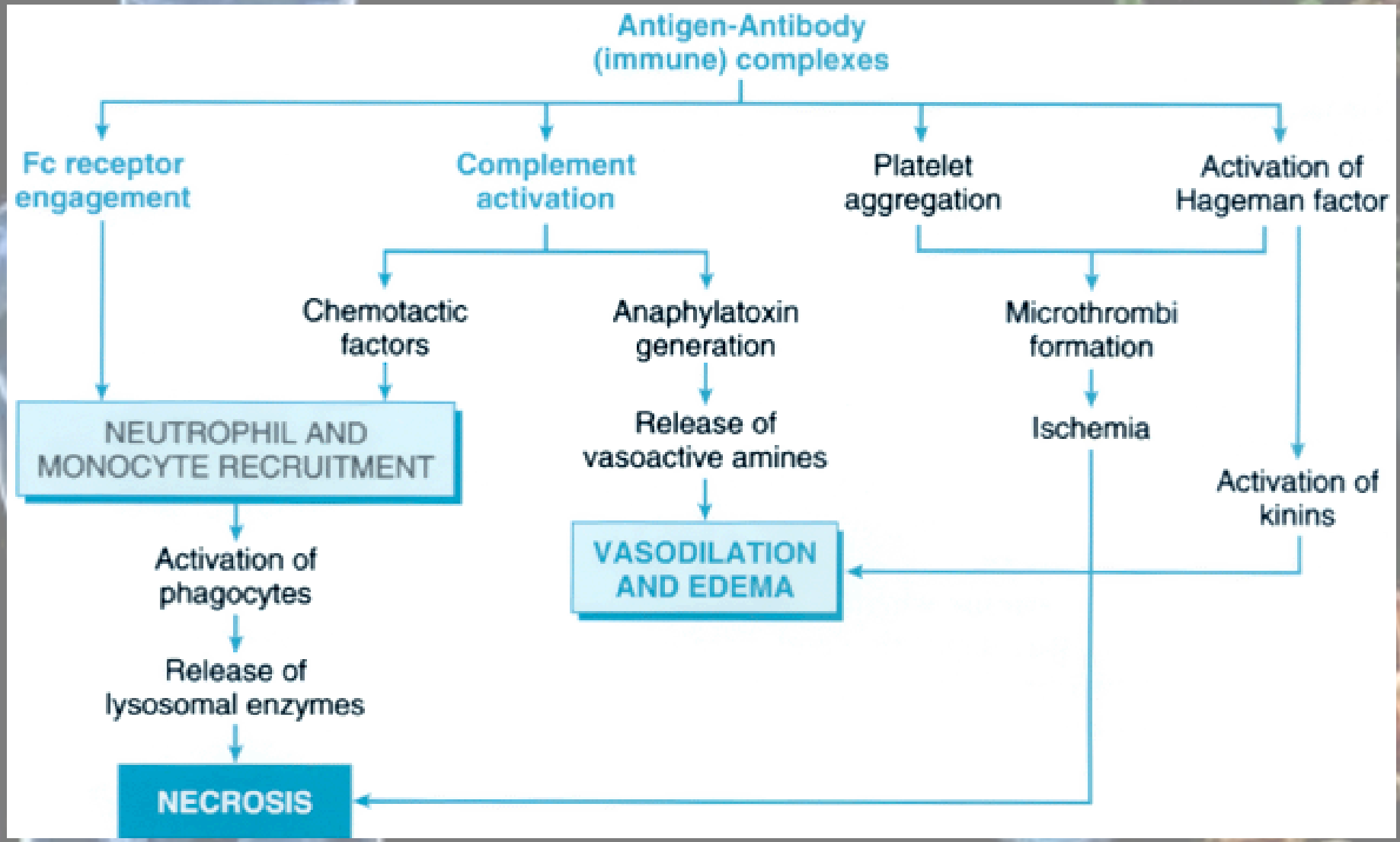
Antigen Involved
DNA, nucleoproteins, others
Hepatitis B virus surface antigen (in some cases)
Streptococcal cell wall antigen(s); may be "planted" in glomerular basement membrane
Bacterial antigens *(Treponema)*; parasite antigens (malaria, schistosomes); tumor antigens
Bacterial antigens *(Yersinia)*
Various foreign proteins
Various proteins, e.g., foreign serum (anti-thymocyte globulin)

Disease	Clinicopathologic Manifestations
Systemic lupus erythematosus	Nephritis, arthritis, vasculitis
Polyarteritis nodosa	Vasculitis
Poststreptococcal glomerulonephritis	Nephritis
Acute glomerulonephritis	Nephritis
Reactive arthritis	Acute arthritis
Arthus reaction	Cutaneous vasculitis
Serum sickness	Arthritis, vasculitis, nephritis

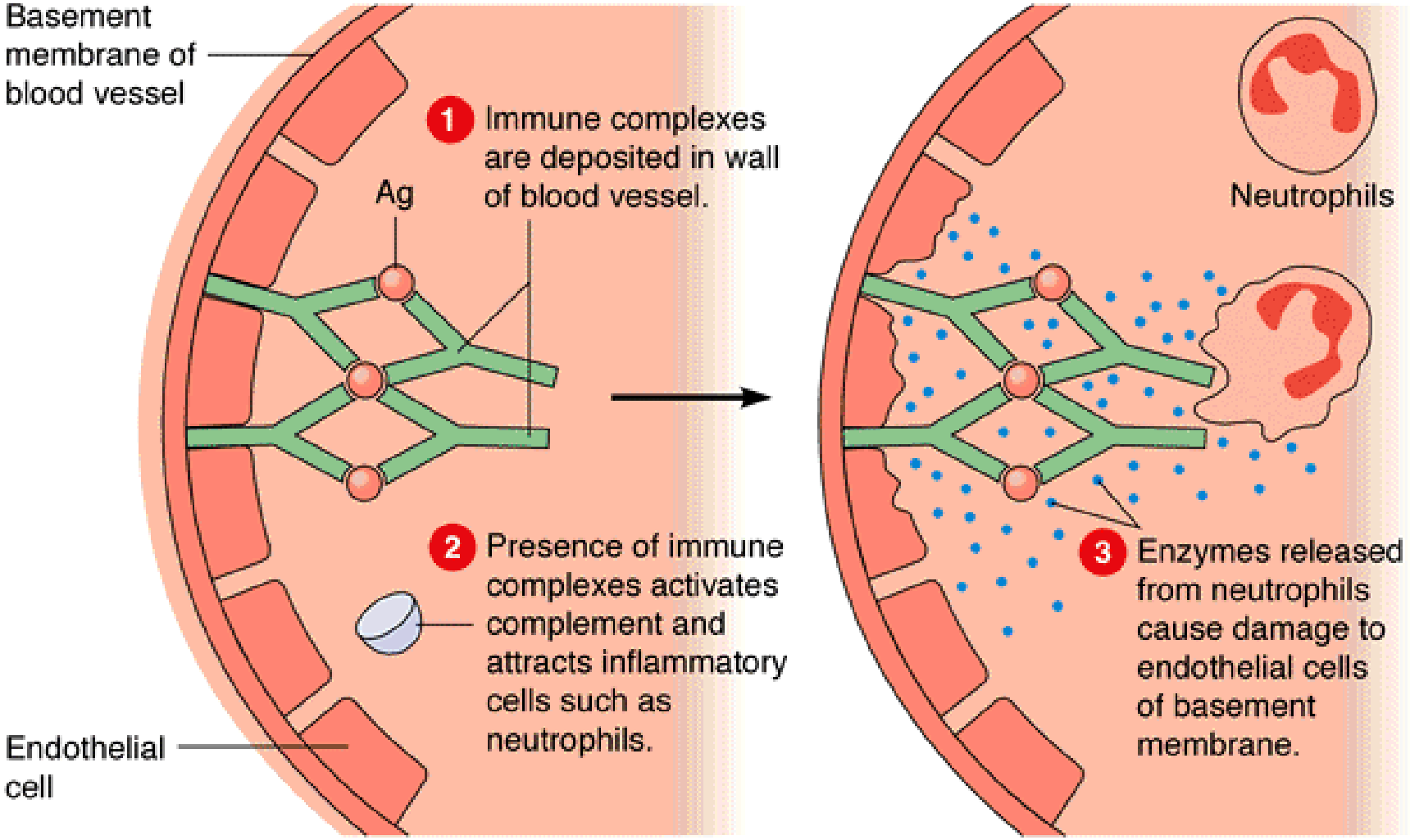
Schematic illustration of the three sequential phases in the induction of systemic immune complex-mediated disease (type III hypersensitivity



Pathogenesis of immune complex-mediated tissue injury.



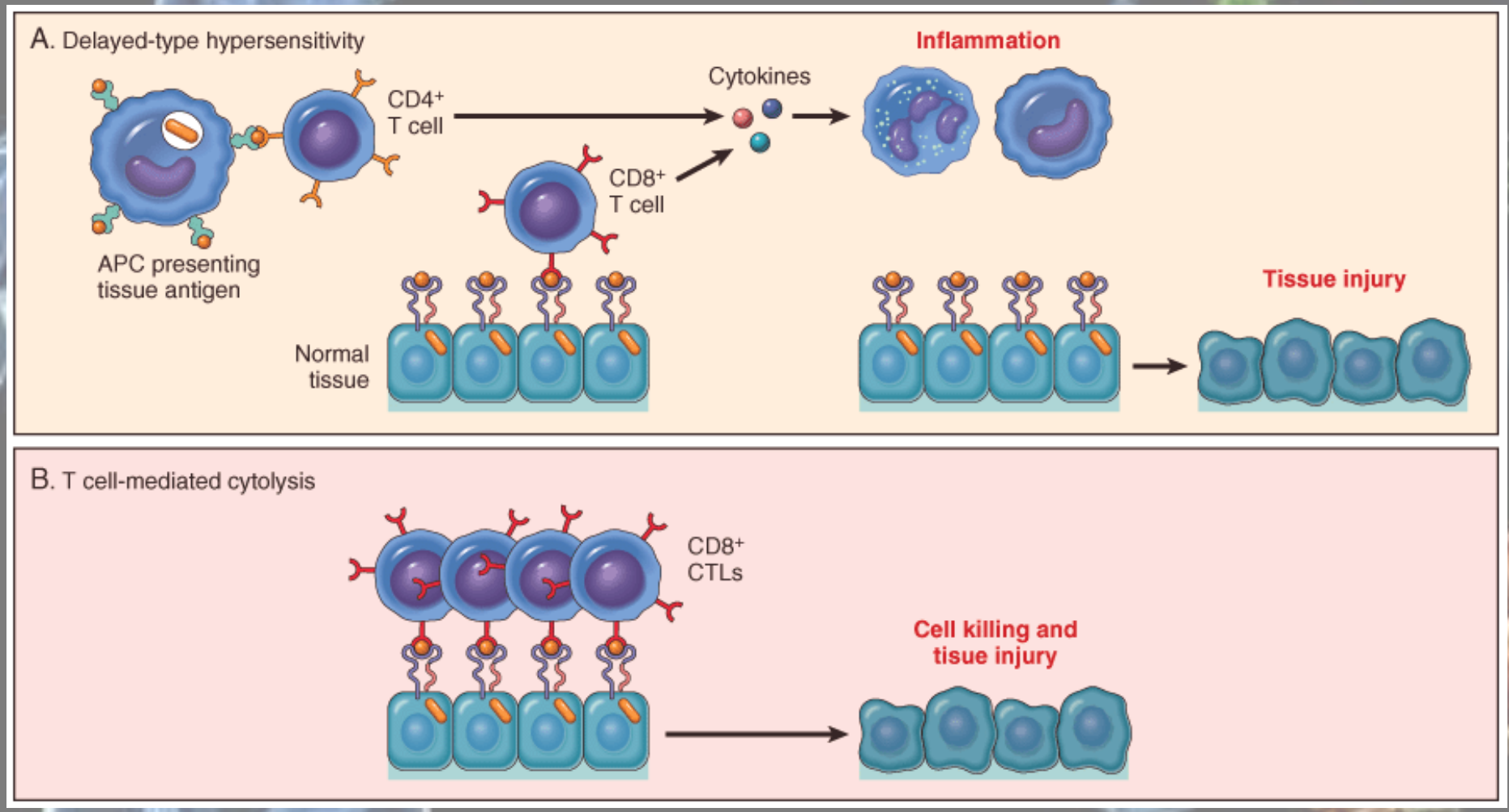
Immune Complex Mediated Hypersensitivity



Type IV (Cell-Mediated) Reactions

- Involve reactions by T_D memory cells.
  - First contact sensitizes person.
  - Subsequent contacts elicit a reaction.
- Reactions are *delayed* by one or more days (delayed type hypersensitivity).
  - Delay is due to migration of macrophages and T cells to site of foreign antigens.
- Reactions are frequently displayed on the skin: itching, redness, swelling, pain.
  - Tuberculosis skin test
  - Poison ivy
  - Metals
  - Latex in gloves (3% of health care workers)
- Anaphylactic shock may occur.

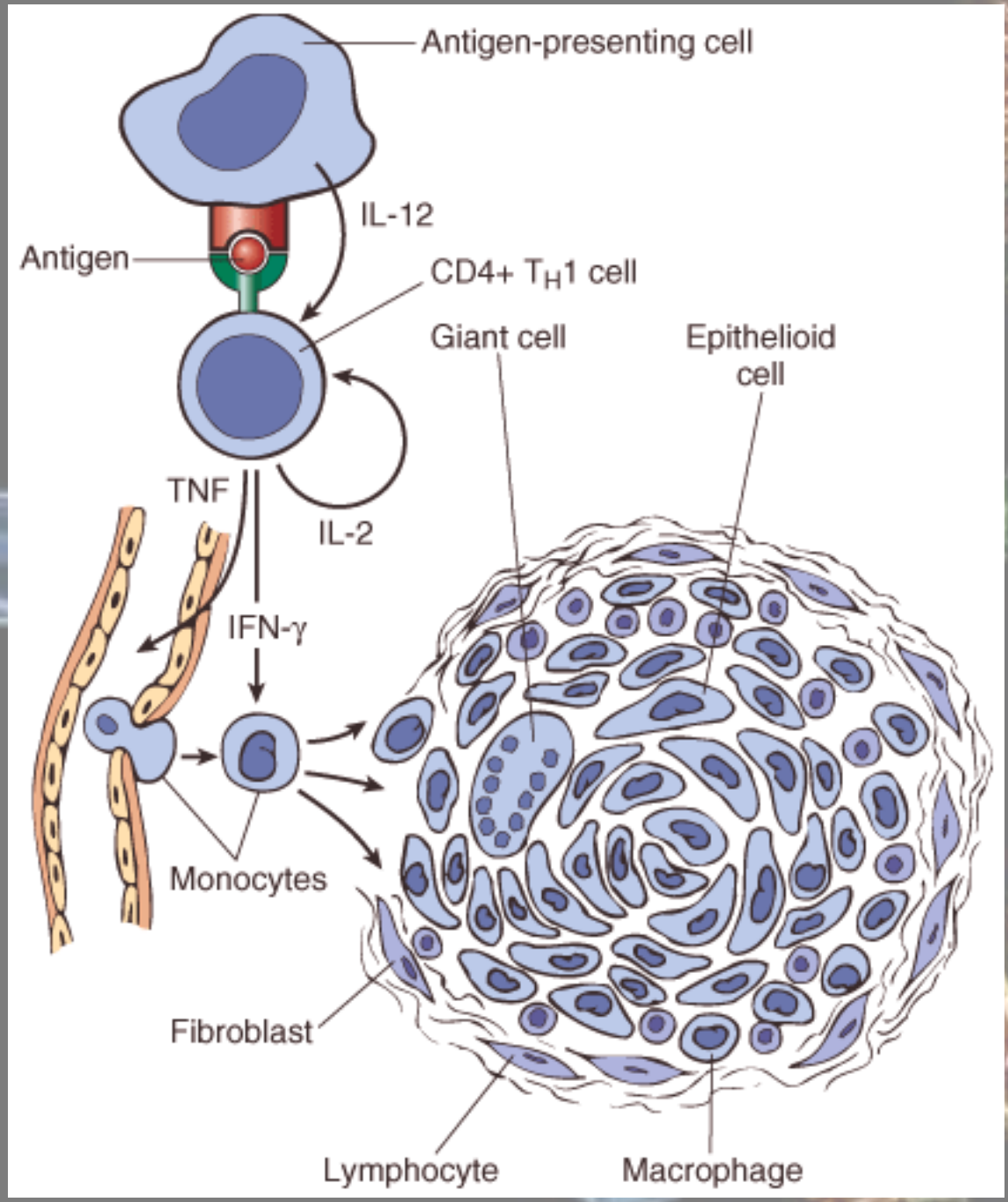
Mechanisms of (type IV) T cell mediated hypersensitivity reaction *A, In delayed type hypersensitivity reactions, CD4+ T cells (and sometimes CD8+ cells) respond to tissue* antigens by secreting cytokines that stimulate inflammation and activate phagocytes, leading to tissue injury. *B, In some diseases, CD8+ cytolytic T lymphocytes (CTLs) directly kill tissue* cells. APC, antigenpresenting cell.



Disease	Specificity of Pathogenic T Cells
Type 1 diabetes mellitus	Antigens of pancreatic islet β cells (insulin, glutamic acid decarboxylase, others)
Multiple sclerosis	Protein antigens in central nervous system myelin (myelin basic protein, proteolipid protein)
Rheumatoid arthritis	Unknown antigen in joint synovium (type II collagen?); role of antibodies?

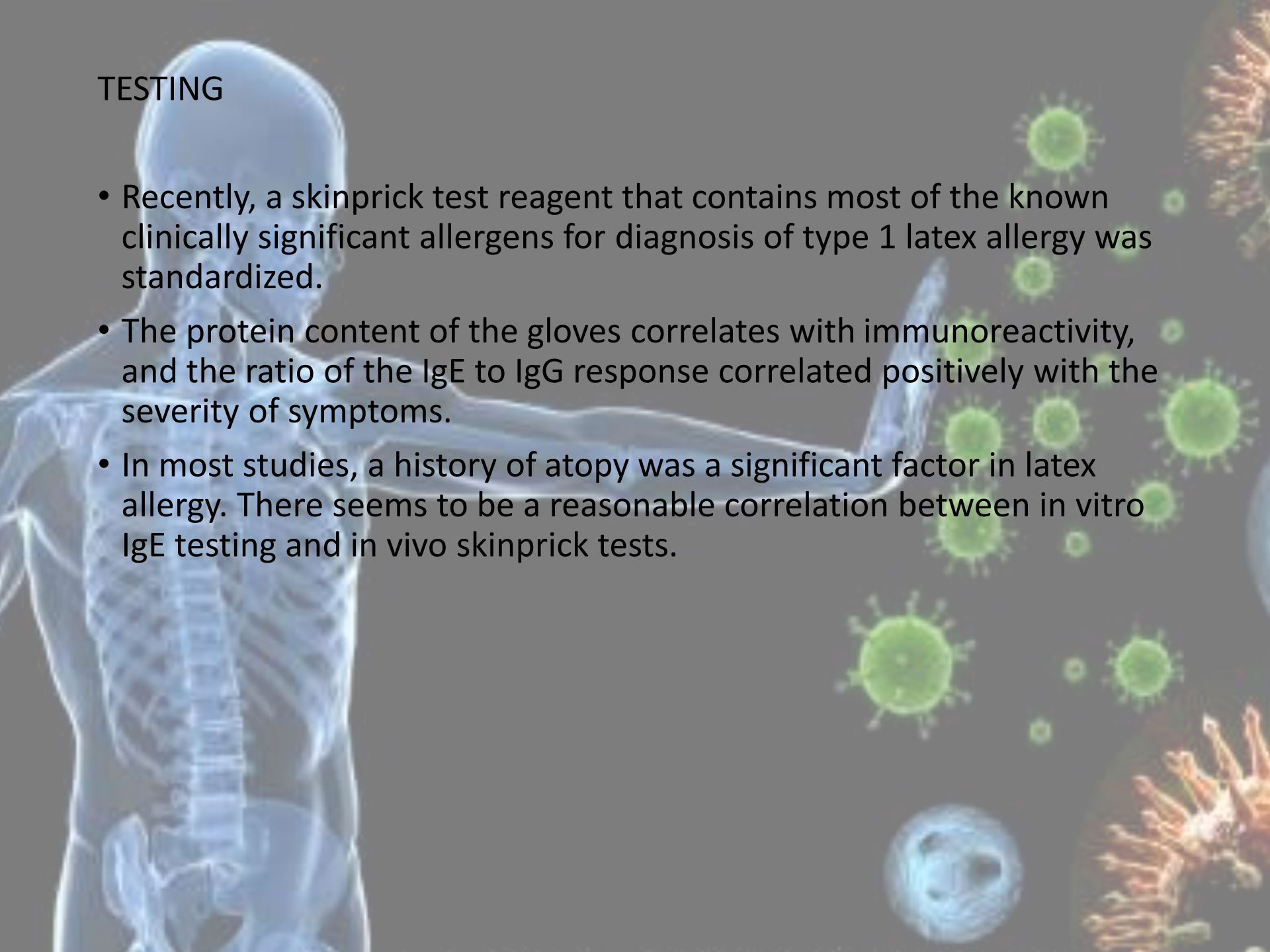
Clinicopathologic Manifestations
Insulitis (chronic inflammation in islets), destruction of β cells; diabetes
Demyelination in CNS with perivascular inflammation; paralysis, ocular lesions
Chronic arthritis with inflammation, destruction of articular cartilage and bone

Contact dermatitis showing an epidermal blister (vesicle) with dermal and epidermal mononuclear infiltrates.



Latex allergy

- Latex allergy has been noticed with increasing frequency over the last few years. The increased use of protective gloves has led to numerous undesirable cutaneous and mucosal reactions.
- Dental staff and students appear to be at high risk of latex sensitization, which occurs as early as the second year of glove use.
- Much of the sensitization appears to have been by inhalation of the glove powder.
- The symptoms of latex allergy are usually those of type 1 hypersensitivity, but contact dermatitis to rubber chemicals is also well described.



TESTING

- Recently, a skinprick test reagent that contains most of the known clinically significant allergens for diagnosis of type 1 latex allergy was standardized.
- The protein content of the gloves correlates with immunoreactivity, and the ratio of the IgE to IgG response correlated positively with the severity of symptoms.
- In most studies, a history of atopy was a significant factor in latex allergy. There seems to be a reasonable correlation between in vitro IgE testing and in vivo skinprick tests.

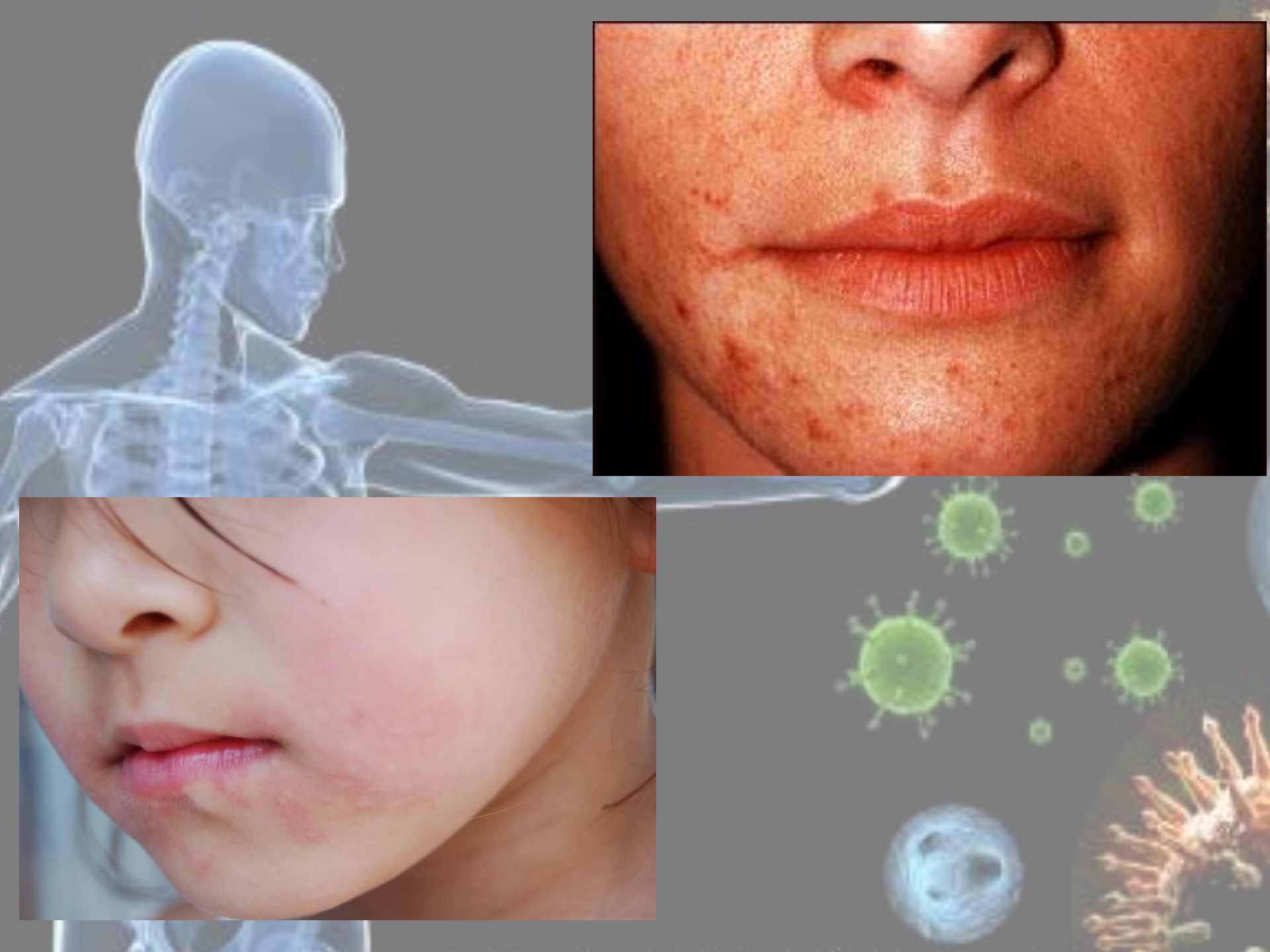
Management

- Patients with latex allergy may also show high levels of positive responses to certain foods, so a good medical history is imperative.
- Originally, urticaria, rhinitis, and eyelid edema were identified as immediate manifestations of latex allergy. Severe systemic reactions (such as asthma and anaphylaxis), which may result in permanent disability or even death, have now been recognized.
- In the health care setting, the two major strategies for management are the safe care of the latex allergic patient and the prevention and treatment of occupational latex allergy in employees.

- distinction between an immediate hypersensitivity reaction to latex and an allergic contact dermatitis due to other irritants must be established.
- At initial evaluation, latex allergy status should be established by the history and documented clearly on the chart.
- Any history of an immediate hypersensitivity reaction to latex necessitates a latex-free environment for that person.
- The operatory should include nonlatex products “hypoallergenic” latex gloves or latex-containing products (such as blood pressure cuffs and disposable tourniquets) should not be worn or used in the vicinity of persons who are allergic to latex.
- Premedication with antihistamines, steroids, and histamine H2-blocking agents is sometimes carried out in operating rooms, but anaphylactic reactions have occurred despite such pretreatment.
- Workers who are irritated by gloves should change the type of gloves worn or change the type of soap used for scrubbing.

Oral Allergy Syndrome

- Swelling of the lips, tongue and palate, and throat, along with oral pruritis and irritation, sometimes associated with other allergic clinical features, including rhinoconjunctivitis,
- urticaria, and even anaphylaxis, has been termed the oral allergy syndrome.
- It seems to be precipitated by fresh foods, including apples, in people who have been sensitized to cross-reacting allergens in pollens, particularly birch.



Primary Immune Deficiency:

1) B- Cell:

a. X-Linked Agammaglobinopathies
b. IgA Deficiency
c. IgG Subclass Deficiency
d. Hyper IgM

2) T-Cell

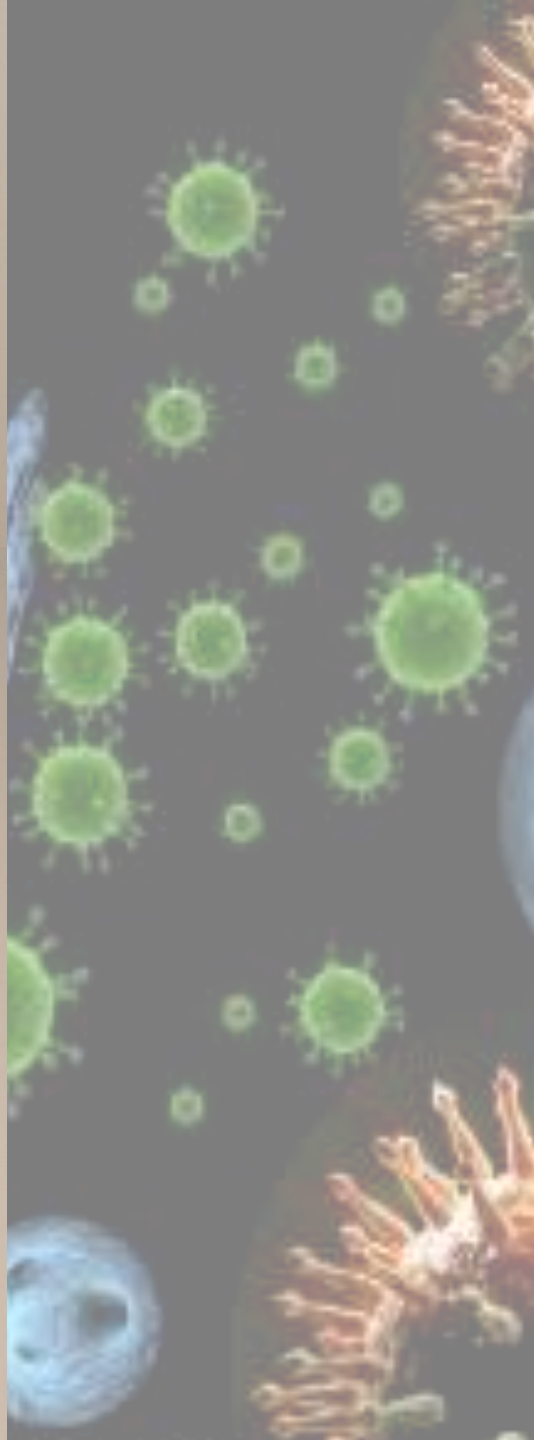
a. Severe Combined Immunodeficiency
b. Adenosine Deaminase Deficiency
c. MHC- II Deficiency
d. Di George Syndrome Anomaly
e. Wiskott- Aldrich Syndrome

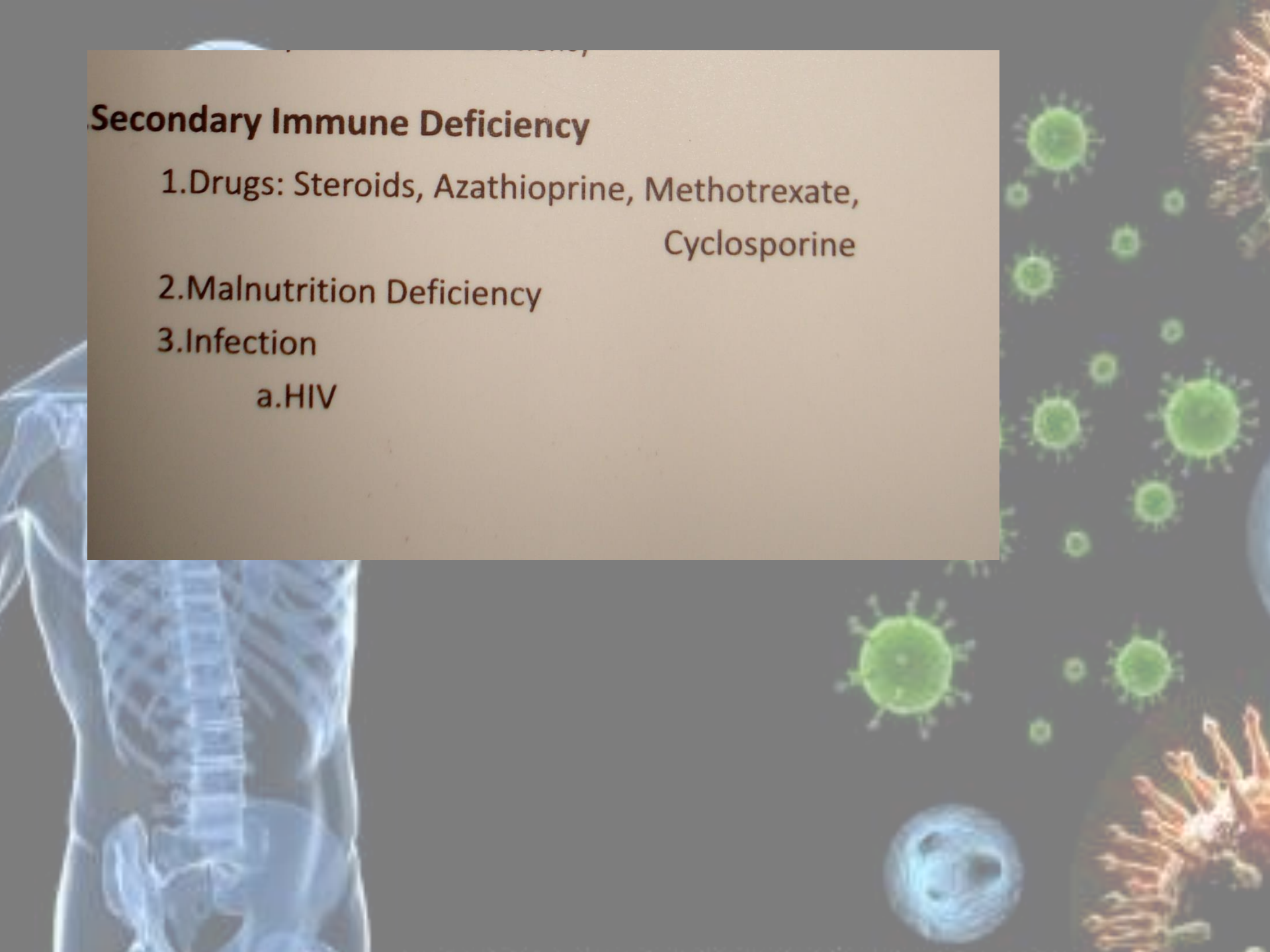
3. Genetic Deficiency

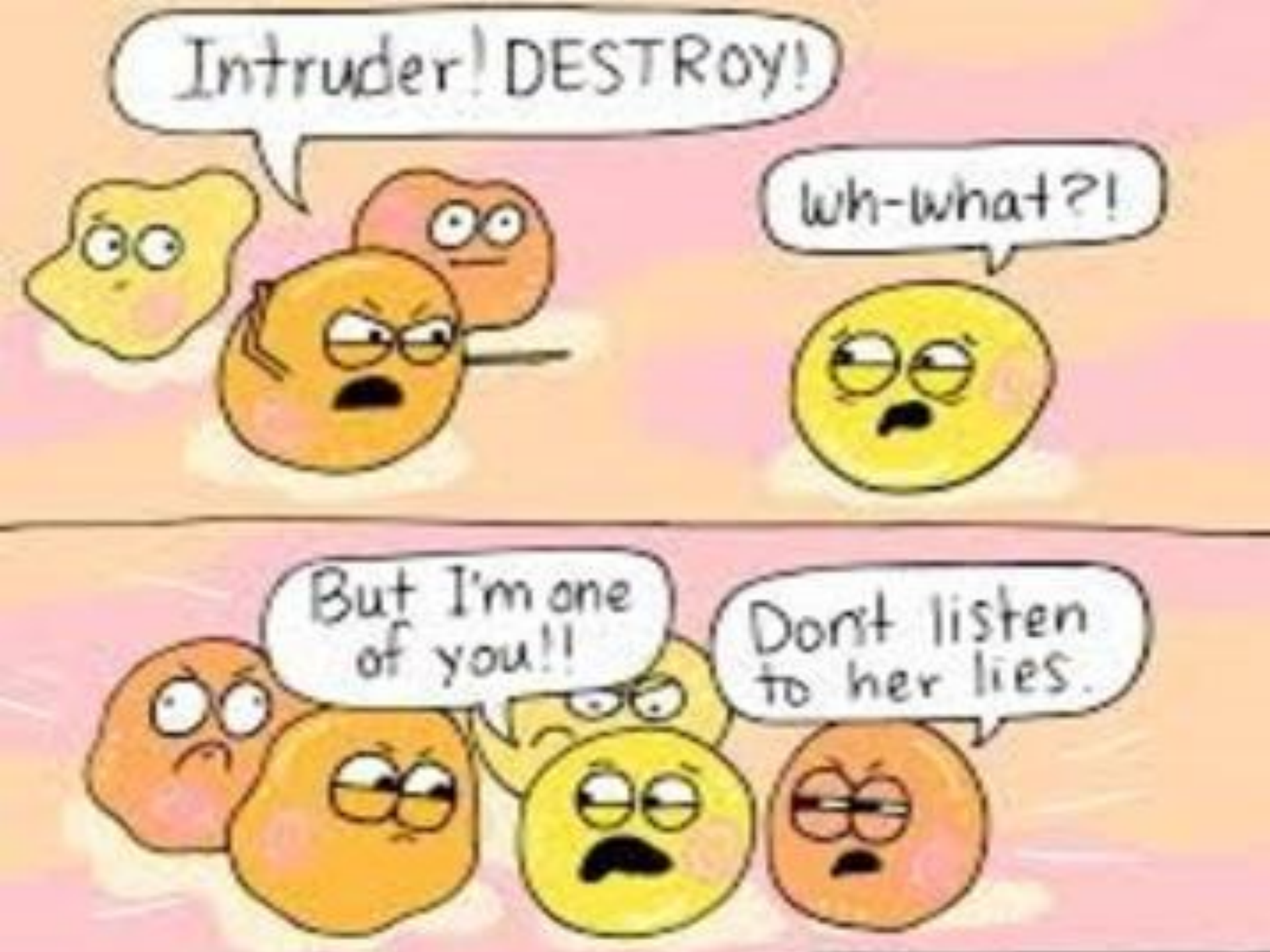
a. Immunocomplex Deficiency Systemic Lupus Erythematosus
b. Angioedema
c. Recurrent Pyogenic Infection
d. Recurrent Herpes Infection

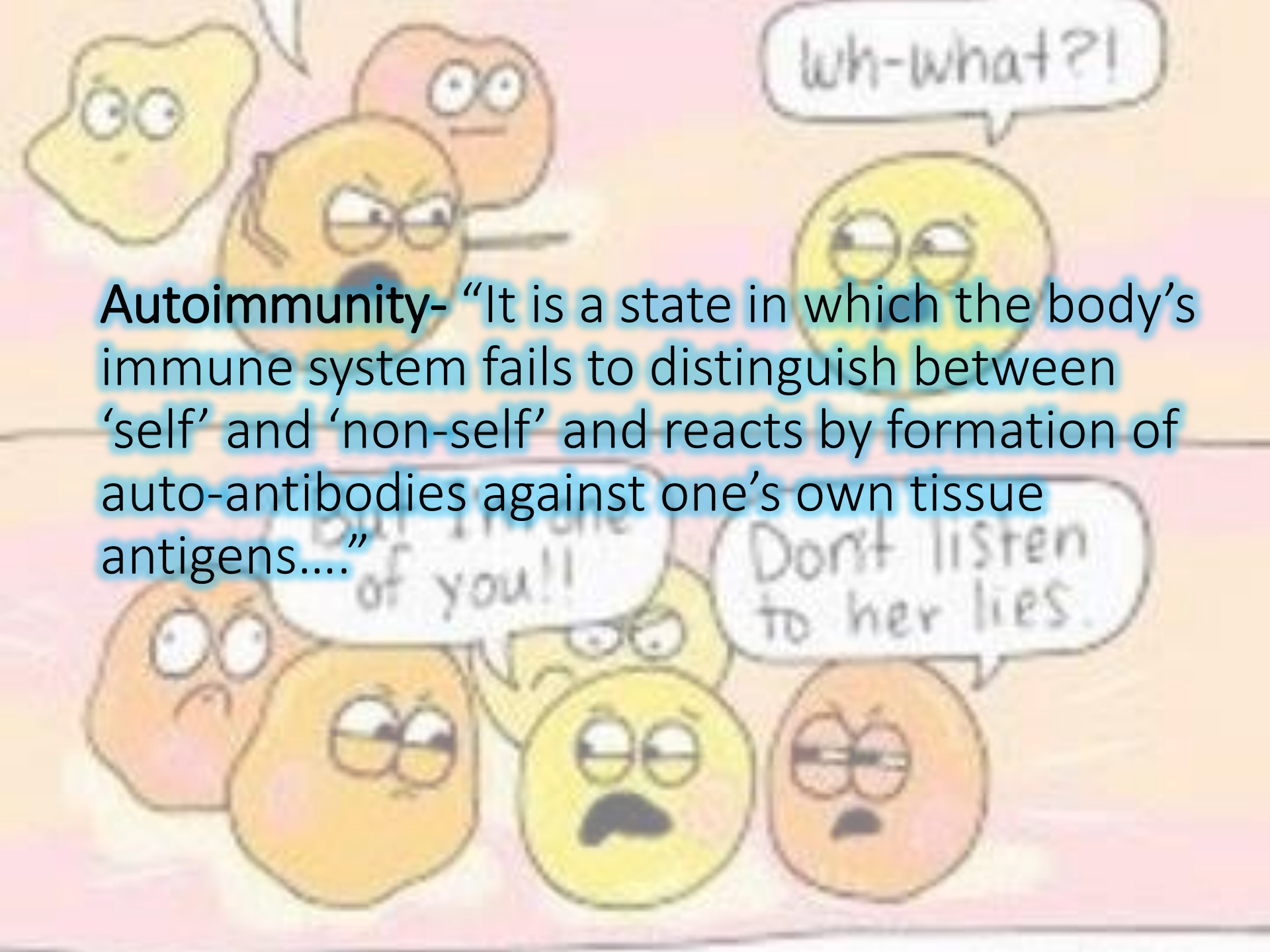
4. Phagocytosis

a. Chronic Granulomatous Disease
b. Leucocytic Adhesion Deficiency




Secondary Immune Deficiency
1.Drugs: Steroids, Azathioprine, Methotrexate,
Cyclosporine
2.Malnutrition Deficiency
3.Infection
a.HIV


Intruder! DESTROY!
Wh-what?!
But I'm one of you!!
Dont listen to her lies.



Autoimmunity- "It is a state in which the body's immune system fails to distinguish between 'self' and 'non-self' and reacts by formation of auto-antibodies against one's own tissue antigens...."

Auto Immune Disorders

They are classified on the basis of involvement of the organ and organ system

I. Blood: Hemolytic anemia, Thrombocytopenia, leucocytopenia

II. GIT: Pernicious anemia, Chron's Disease

III. Endocrine: Thyroid: Hashimoto's Thyroiditis Pancreas: Insulin Dependent Diabetes type I

IV. Connective tissue: Lupus Erythematous, Systemic Scleroderma, Erythema Multiforme, Dermatomycositis

V. CVS: Polyartheritis Nodusa, Wegener's Granulomatosis, Temporal Arteritis, Endocarditis and Myocarditis

VI. Locomotion: Rheumatoid arthritis, Psoriatic Arthritis, Myasthenia Gravis

VII. Skin And Mucosa: Pemphigoid- Bullous, Benign, Cicatrial, Behcet's syndrome, Desquamtive Gingivitis, Recurrent Apthous syndrome, Lichen Planus

VIII. Salivary: Sjogren's Syndrome

IX. Nervous System: Polyneuritis and Multiple Sclerosis.