

جامعة الانبار
كلية العلوم
قسم التقنيات الأحيائية

اسم المادة: المناعة
عنوان المحاضرة: Immunity
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Immunity

Immunity is defined as resistance to disease, specifically infectious disease.

immune system The collection of cells, tissues, and molecules that mediate resistance to infections.

immune response the coordinated reaction of these cells and molecules to infectious microbes.

Immunology is the study of the immune system and its responses to invading pathogens. The physiologic function of the immune system is to prevent infections and to eradicate established infections.

Immunology is the study of the ways in which the body defends itself from infectious agents and other foreign substances in its environment.

The immune system protects us from pathogens. It has the ability to discriminate (differentiate) between the individual's own cells and harmful invading organisms.

Immune system has two lines of defense:

- 1) Innate (non specific) immunity
- 2) Adaptive (specific) immunity

1. Innate immunity:

(also called natural or native immunity) refers to the fact that this type of host defense is always present in healthy individuals, prepared to block the entry of microbes and to rapidly eliminate microbes that do succeed in entering host tissues.

➤ **Characters**

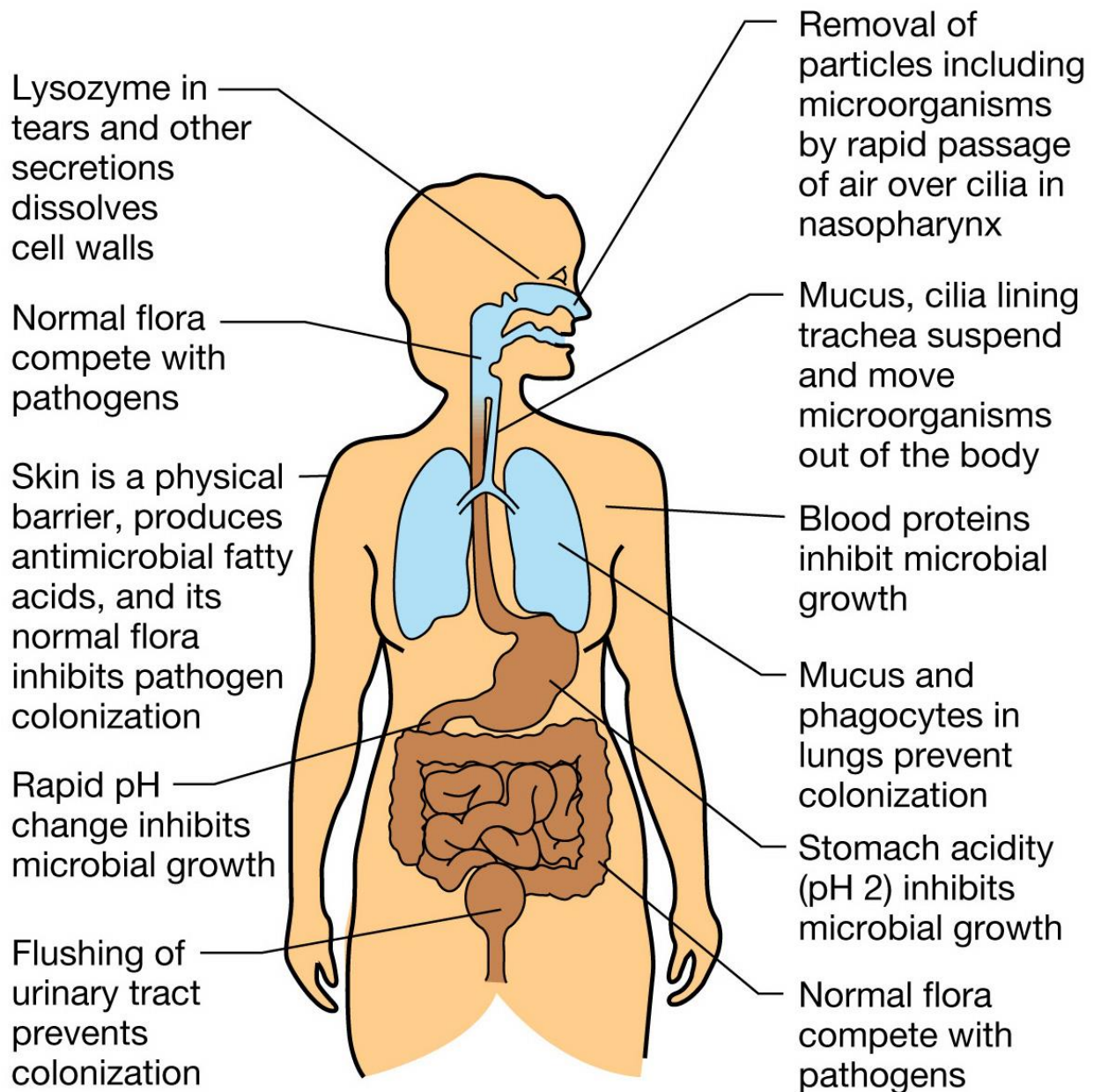
1. First line of defense
2. Rapid defense
3. The same on re-exposure to Ag
4. No memory cell
5. Recognize and react against microbes only
6. Block entry of microbes and eliminate succeeded microbes which entered the host

➤ **Components:**

1- Barriers:

- A. **Physical barriers:** protect against invasion of microbes e.g. epidermis & keratinocyte & epithelium of mucus membrane & cilia
- B. **Mechanical barrier :** longitudinal flow of air and fluid & movement of mucus by cilia
- C. **Chemical barriers:**
 - Skin: α & β defensin & lysozyme & RNase & DNase
 - Respiratory Tract: β defensin
 - Gastrointestinal tract GIT: α defensin & pepsin & lysozyme
 - HCL of stomach: kill ingested microbes
 - Tears in eye: lysozyme

D. Biological barriers: commensal microbes or flora inhibit growth of pathogenic bacteria



2. Innate immune cells: phagocytes (Macrophage & neutrophil)& NK cells

3. Cytokines: TNF & IL1 & IL12 & IFN γ & chemokines

4. Complement: Alternative pathway & lectin pathway

5. Other plasma proteins (acute phase response):

↑ Mannose Binding Lectin : participate in lectin pathway of complement

↑ C Reactive Protein: coat microbes and help in phagocytosis

NB: Recognition of microbes by the innate system: the receptors of innate cells (pathogen-recognition receptors) recognize structures called pathogen associated molecular patterns (PAMPs) shared by different microbes

2-Adaptive immunity:

(also called specific or acquired immunity) is the type of host defense that is stimulated by microbes that invade tissues, that is, it adapts to the presence of microbial invaders.

➤ Characters

1- 2nd line of defense

2-Delayed as response to infection

3-Specific for microbes & Antigen (can differentiate Antigen)

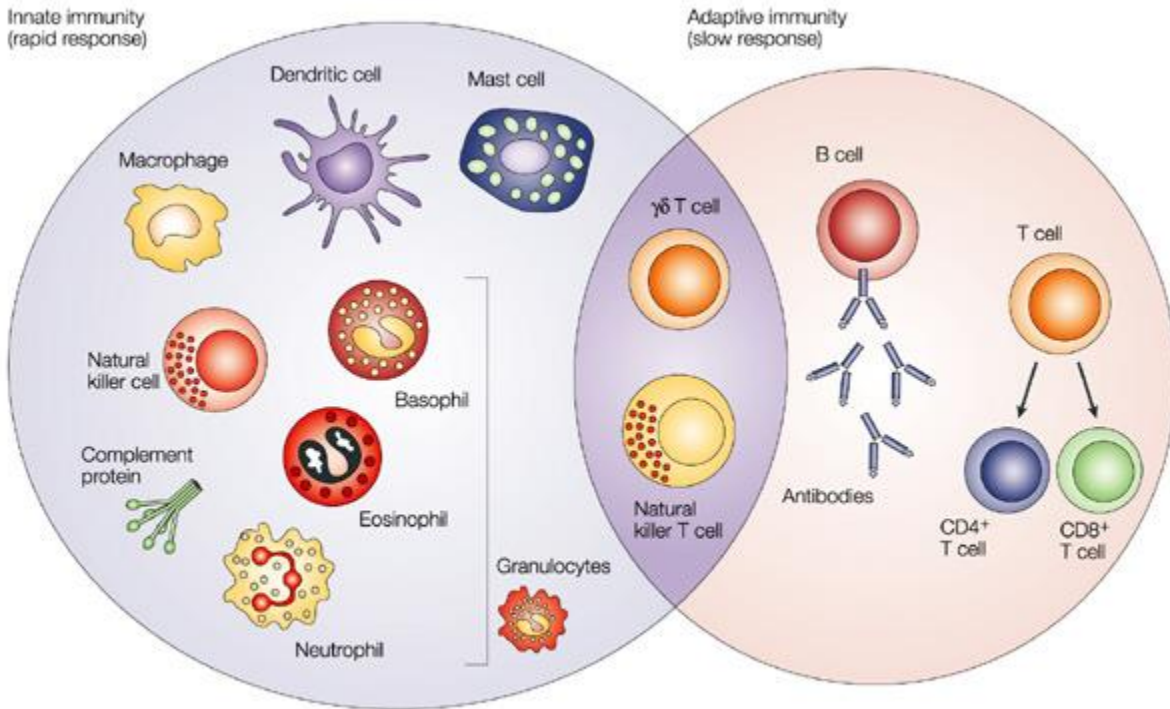
4-Has memory cell which remember microbes and give strong immune response on re-exposure

➤ Components (sequential phases)

1. Ag recognition by lymphocyte through specific receptor to Ag
2. Activation of lymphocyte → proliferation → differentiation into memory cell & effector cell
3. Elimination of microbes
4. Decline & Termination of immune response
5. Long lived memory cell.

Cells of adaptive immunity

- 1) **B lymphocyte** : produce antibodies that neutralize and eliminate extracellular microbes and toxins(humoral immunity)
- 2) **T lymphocyte**: eradicate intracellular microbes (cell mediated immunity)



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References:-

- 1- Richard Coioco and Geoffery Sunshine (2014). Immunology. Seventh edition. Wiley Blackwell.