

10/03/21

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Date _____
Page _____

Unit - III

Concept Of Immunity

- Immunology is the study of defense preparale to infectious disease.
- It is imp. branch of biochemistry that deals with immunity and immune system.

Immunity

Immunity is the balance state of multicellular organisms having adequate biological defences to fight infectious diseases or other unwanted biological invasion, while having adequate tolerance to avoid allergy & autoimmune diseases.

Immunity dealing with the adaptive response to the infective agent.

There are formidable range of infectious agents that can cause the human body as a sanctuary to raise their offsprings.

The immune system faces the task of a providing a defense mechanism to establish a state that is k/n as immunity to infection.

There are 2 basic forms of immunity -
Innate and Acquired

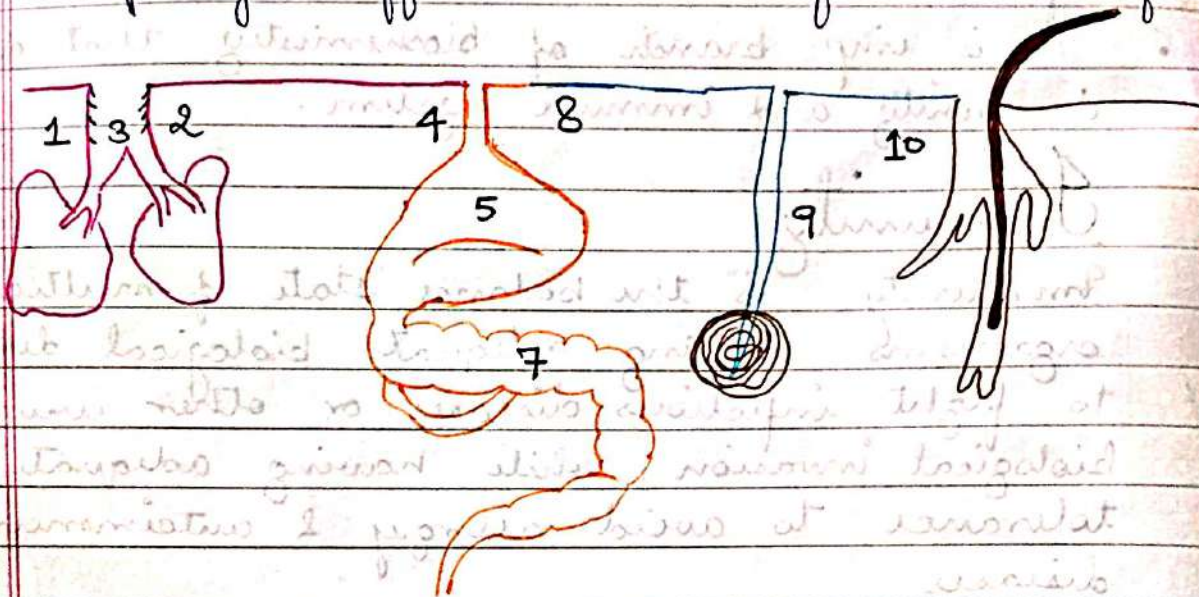
Innate Immunity / Native Immunity

This type of immunity results from general process, rather than from the process devicted at specific disease org. the healthy individual is able to protect himself from potentially

harmful microorganisms from env. by a no. of very effected mechanism present from birth which do. not depend upon having previous exposure, of any particular organisms.

Inborn mechanisms are non specific

Natural barriers to infectious agents are simple yet effective means of innate defense.



- | | | |
|--------------------|-----------------------|-------------------|
| 1.) Cilia | 4.) Intestinal mucus | 7.) Colonic flora |
| 2.) Mucus | 5.) Acidic & Gastric | 8.) Intact skin |
| 3.) Cough Reflexes | 6.) Intestinal Enzyme | 9.) Sweat |
| 10.) Sebum. | | |

lia 1.) A major form of defense is intact skin, which is impermeable to most infectious agents.

2.) Sweat & sebaceous glands are the most potential points of entry for the infectious agents. However, most bacteria fail to enter due to the low pH & direct inhibitory effect of lysozymes, lactic acid & fatty acid in sweat & sebaceous secretion.

Lysozymes are nucleopolysaccharides that attacks bacteria, basic polypeptides, inactivate certain types of gram + bacteria. Complex compound of protein destroy bacteria.

③ Mucous gland secretion of the tracks that cannot internal organs to external surface form an imp form of defense.

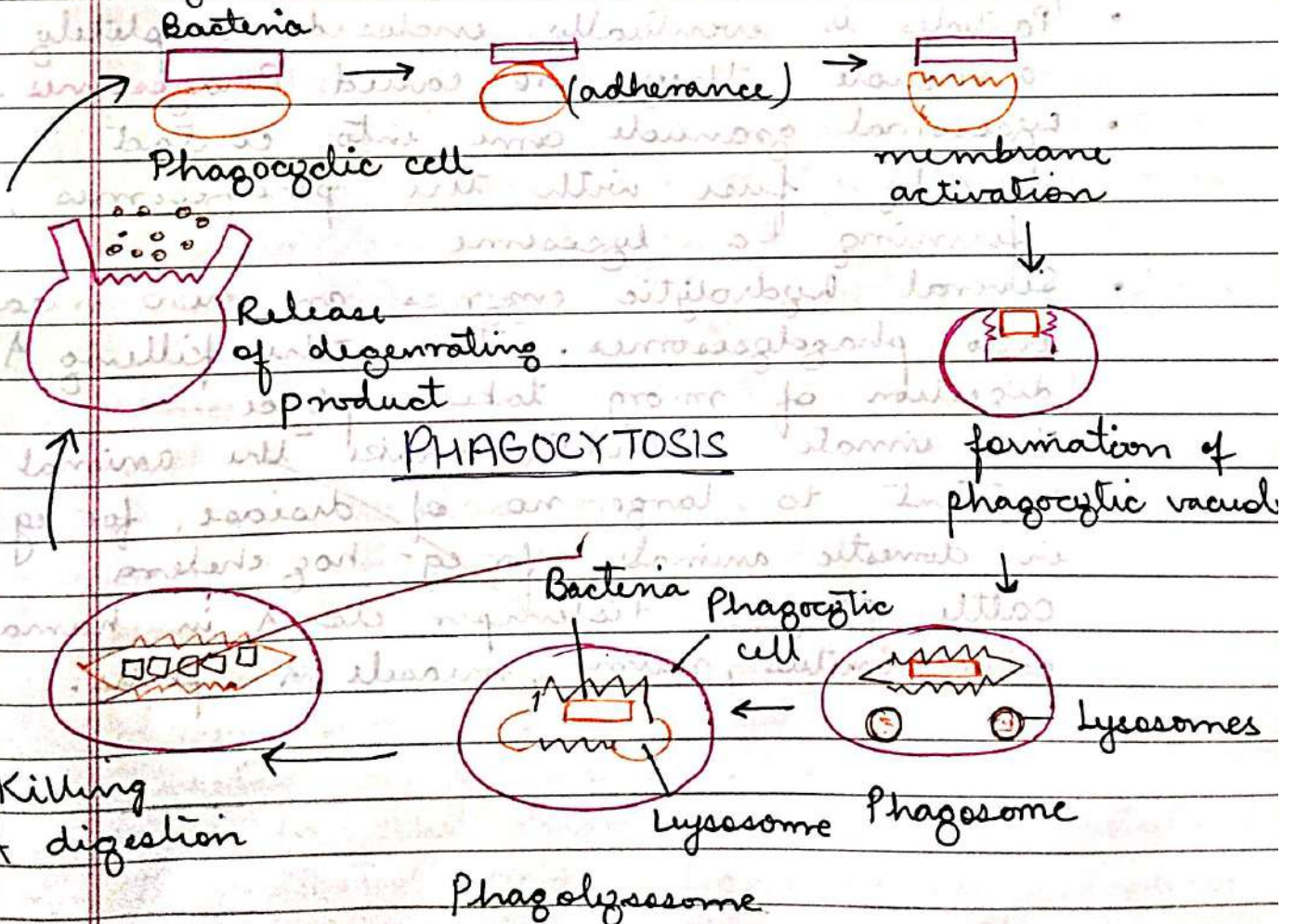
They interact & immobilise bacteria & hence prevent adherence & colonization of epithelial surface.

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④ Hairs, all the external layers, the ciliated mucous membrane of respiratory track, help drive intract. org. upwards & outwards.

• Washing action of tears, saliva & urine are the other factors which help to protect these track.

• Many secretion contain bactericidal components. such as acid & gastric juice, spermatid & zinc isemen, lacto-peroxidase in milk, lysozymes in tears, nasal secretion & saliva & proteolytic enzyme in intestinal secretion.

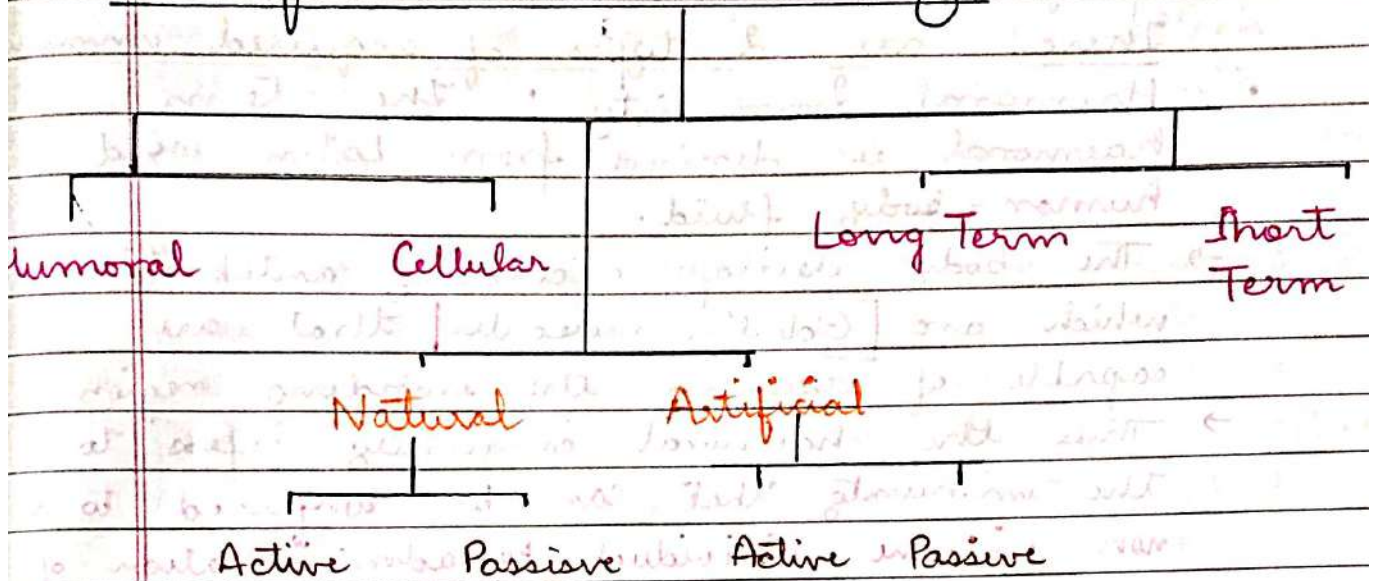


- If m. org. penetrates the body, WBC shows phagocytosis.
- Macrophage system also shows defence.

Phagocytosis

- The engulfment & digestion of infectious agent is k/n as phagocytosis. It is a multiphasic action -
 - Attachment
 - Ingestion &
 - Intracellular killing
- Attachment takes place through receptor & adherent particle may initiate ingestion by activating an actin-myosin contractile system which extends pseudopods around the particles.
- Particles is eventually enclosed completely in a vacuole, they are called **Phagosomes**.
- Lysosomal granule come into contact & finally fuse with the phagosomes, forming a lysosome.
- Several hydrolytic enzymes are now released into phagosomes. Then the killing & digestion of m. org. takes place.
- The innate immunity make the animal resistant to large no. of disease, for eg - in domestic animals, for eg - hog cholera, cattle plague, distemper etc & in human polio virus, mumps, measles & septitis.

Acquired Immunity



Definition :

- This is the most second line of defense - In this the antigen invading the org. & form the cells of immune system, namely **macrophages** & **activated lymphocytes**, that attacks & destroy the specific org. & toxins.
- Acquired immunity is when the body is exposed to various antigens & gives defense i.e., specific to the antigen.
- When we are exposed to a diff. antigen diff. B & T cells are formed as lymphocytes develop they are normally learned to recognize body & tissues i.e., cells & diff. from tissue & body called **nonself**.
- Lymphocytes are a special types of W.B.C.
 - β Lymphocytes produce antibodies, antibodies attached to a specific antigen & make it easier for the phagocytes to destroy antigen.
 - T lymphocytes attack antigen directly & provide control of the immune response.

- B cells + T cells develop that are specific for one antigen type.

There are 2 types of acquired immunity

- Humoral Immunity: The term humoral is derived from Latin word **humor** = body fluid.

→ The body develops circulating antibodies which are **Globulin molecules** that are capable of attacking the invading region.

→ Thus the humoral immunity refers to the immunity that can be conferred to a non immune individual by administration of serum antibodies from an immune individuals.

→ In this form of immunity - Globulins or antibodies, or immunoglobulins appear in blood.

→ There are 5 types of IG -

IgG, IgM, IgA, IgE, IgD

→ In general antibody producing cells called **plasmocytes** secrete Ig of 1 class.

For eg: IgA secreted by **plasmocytes** present in **mucosa**.

Humoral im: transferred by serum antibody.

- Cell mediated immunity - In response of antigen, effector T cells generated, which are responsible for this type of immunity

→ Cell mediated immunity can only be transferred by immune T cells.

→ Both activated **TH** cells & cytotoxic T lymphocytes serve as effector cells in cell immunity.

→ Cytokines secreted by **TH** cells can activate various phagocytic cells, enabling

them to phagocytosis & kill micro-organisms.

- This type of response is specially imp. in host-defence against intracellular bacteria.
- Cytotoxic T-lymphocytes participate in cell mediated immune reaction by killing altered self cells.
- They play imp. role in killing virus infected cells & tumor cells.
- The end result of cellular immune reaction is destruction of antigen, either through the action of sensitized T lymphocytes or by the activity of lymphocytotoxins.

★ Acquired immunity again is of 2 forms -

- Natural immunity
- Artificial immunity

Natural Immunity - It is of 2 types -

- 1) Actively acquired immunity is developed as a result of initial infection of pathogenic m. org or due to deliberate artificial immunization by vaccination or inoculation.
- 2) Passively acquired immunity is the one which is new born child receive from mother by flow of maternal antibodies through placenta.

Artificial Immunity • It is of 2 types

- 1) Actively acquired immunity • Host build up in itself by an antigen & last long term, sometimes life long.

2.) Passive Acquired Immunity : Acquire through transfer of antibodies or activated F cells from an immune host by infection or infusion. It is short lived usually lasting only a few months.

* Acquired Immunity may be a Life Time Immunity or Short Life.

1.) Life Long Immunity : Some infections such as Diphtheria, whooping cough, mumps usually induce life time immunity.

2.) Short Lived Immunity : Common cold, influenza, Mumps & dysentery confer immunity for a short time i.e., for a few weeks only.

