

## TYPES OF IMMUNITY

Mainly can be divided into two; **1. Innate immunity**

**2. Acquired immunity**

### INNATE IMMUNITY

- ❖ Specific
- ❖ Non- specific

### ACQUIRED IMMUNITY

- ❖ Active immunity - Natural and artificial immunity
- ❖ Passive immunity – Natural and artificial immunity

### INNATE/NATIVE IMMUNITY

It is type of protective mechanism is present by birth and known as innate immunity. It is genetically based and passed onto offspring. **Innate immunity may non- specific or specific.** Innate immunity may be considered at the level of species, race, individual.

**Species immunity** is the total resistance to a pathogens shown by all members of species. It is obtained as birth right and may be physiological and biochemical differences between the tissues of different host species.

**Racial immunity** – within a species, different races may show differences in suseptibility to infections

**Individual immunity** – the differences in innate immunity exhibited by individuals in a race.

### Mechanisms of innate immunity

**1. Barriers** – physical barriers , physiological barriers, chemical barriers, humoral barriers , cellular barriers, inflammatory barriers

**Physical barriers** - The skin act as our first line of defence against invading organisms. The desquamation of skin epithelium also helps in removing bacteria and other infectious agents that have attracted to the epithelial surface.

Movement of cilia or peristalsis helps in keeping air passages and gastrointestinal tract free from microorganisms.

The flushing action of tears and saliva helps in preventing infections of eyes and oral cavity,

Mucas of the respiratory and gastrointestinal tract traps the microbes and keep lungs and digestive system from infection free.

**Physiological barriers** – body temperature, p H, body fluids such as sebum, HCL in the stomach inhibits microbial infections.

**Chemical barriers** – saliva,tears,nasal secretions have lysozymes that destroys gram positive bacteria. Digestive enzymes in stomach kills many bacteria. Spermine and zinc present in semen have antimicrobial activity.

**Humoral barriers** – the anatomical barriers are very effective in preventing colonization of tissues by microorganisms. How ever when there is a damage to tissues, the anatomical barriers are infringed and infection may occur. Once infectious agents attacks tissuse another innate immune system comes into action. Humoral factors are found in serum

**Complement system** - it is major humoral non specific defense system. It is responsible for increased vascular permeability,recruitment of phagocytic cells, and lysis .

**Coagulation**- depending on the gravity of the tissue injury,coagulation system may or may not be activated. Some products of the coagulation can contribute to a non specific defense because of their ability to increase vascular permeability and acts as chemotactic agents for phagocytic cells.

**Lactoferrin and transferrin** - these proteins, by binding with an iron which is an essential nutrient for bacteria ,downregulates the growth of bacteria.

**Interferons** - interferons are proteins that can control virus replication in cells

**Lysozyme** - lysozymes breaks down the cell wall of bacteria

**Interleukin -1** - it induces the production of acute phase protein which are antimicrobial as they can opsonize bacteria.

## **Cellular barriers**

**Neutrophils** - these cells are engaged to the site of infection where they phagocytes invading mircoorganisms and kill them. They also contribute to collateral tissue damage that occurs during inflammation.

**Macrophages** - tissue macrophages function in phagocytosis and intracellular killing of microorganisms. Also contribute to tissue repair and act as antigen presenting cells .

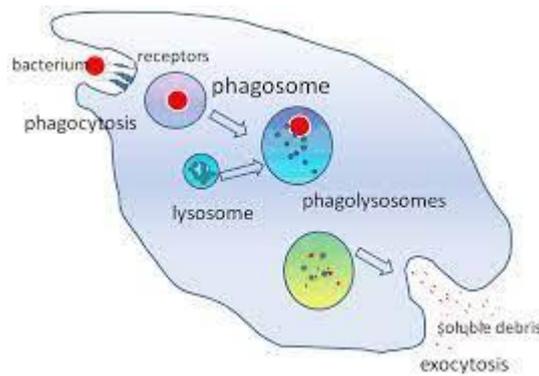
**Natural killer cells and lymphokine activated killer cells** - NK and LAK cells can non - specifically kill virus infected and tumor cells.

**Eosinophils** - the granules of eosinophils have lytic properties that help in killing certain parasites.

**Phagocytosis** - it is the cellular process of engulfing solid particles by the cell to form an internal phagosomes. Phagocytosis is a specific form of endocytosis involving the vesicular internalisation of solid particles such as bacteria . In immune system phagocytosis is a major mechanism used to remove pathogens , cell debris.

Cells have the ability to perform phagocytosis is called phagocyte. Such as neutrophils, eosinophils, basophils, histocytes,

Capsulated bacteria such pneumococci are not readily get phagocytosed except in the presence of opsonin.



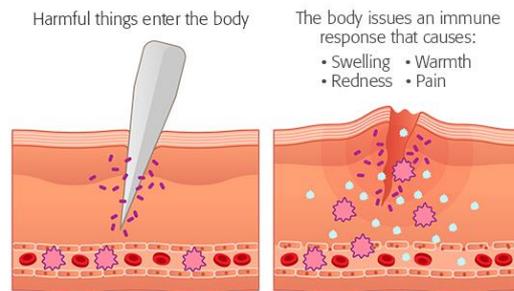
**Inflammation** - the inflammatory response is the body's natural response that occurs immediately following tissue damage. Its main functions are to defend the body against harmful substances, dispose of dead tissue and promote the renewal of normal tissue. Inflammation has two types such as acute inflammation and chronic inflammation.

Inflammation is characterised by 4 signs

- 1 . Pain - due to chemicals released by damaged cells. Such as bradykinin, histamine, prostaglandins
- 2 . tumor / swelling - due to influx of fluid into the damaged region.
3. Redness/ rubor - due to vasodilation
4. Heat / calor - due to increase in blood flow.

## Inflammation

The Skin's Immune Response



### ACQUIRED IMMUNITY

Acquired/ adaptive immunity is the immunity a person which develops during life time

1. active immunity
2. passive immunity

#### Active immunity

It is the immunity that develops by a person due to antigen attack. **It ensues due to the production of antibodies.** Antibodies are produced as a result of the presence of target antigen either as a part of an whole infecting organisms or because of the introduction of specific antigen . Active immunity sets in only after a **latent period** ( time require to activate immune system). Once developed active immunity is long lasting.

- Natural active immunity :by attack of pathogen - eg .a person once get attacked by chicken pox develops natural immunity.
- Artificial active immunity : by immunisation - eg - by taking vaccines such polio vaccine etc.

**Vaccines** are immunological preparations of live or killed microorganisms or their products. They give protections towards particular pathogens

### Passive immunity

It is also because of the presence of antibody but the particular individual does not produce the antibody. Rather antibody is produced in someone else and is introduced to the recipient. Eg. transfer of antibodies from a mother to the unborn child in the womb.

#### **Natural passive immunity**

The protection fades over the course of weeks or few months following the introduction of the particular antibody. For example a newborn carries protective maternal antibodies to several diseases including measles, mumps etc. but the end of first year of life, vaccination with MMR vaccine is necessary.

Also the antibodies transfer through colostrum is a type of natural passive immunity.

#### **Artificial passive immunity**

It is the resistance passively transfer recipient by administrating antibodies.

Eg . Administration of tetanus immunoglobulins.

