Innate and Active Immunity :-

1) **Innate Immunity :-** It is the body's 1st line of defence and is present from birth.

It is non-specific defense mechanisms.

It provides rapid protection but does not have memory of previous infections (no memory cells)

Eg :- i) Physical barriers :- Skin, mucous membranes of nose

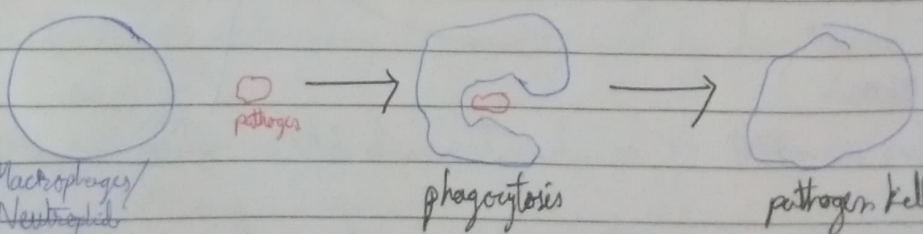
ii) Chemical defenses :- Saliva, stomach acids.

iii) Cellular components :-

- Phagocytes (macrophages & neutrophils) → phagocytosis (engulf & digest pathogens)
- Natural Killer cells (NK cells) → attack & kill infected/cancerous cells

Advantages :- • Rapid response :- Immediate defence against pathogens
• Broad protection :- Protects against a wide variety of pathogens without prior need for exposure.

Disadvantages :- • Non-Specific :- Cannot target specific pathogens
• No Memory :- Does not provide long lasting immunity after killing pathogen



2) Adaptive Immunity :- It involves cell-mediated and humoral response (3rd line of defence)

It is specific defense mechanism

It provides slower protection but have long-term protection through immunological ~~response~~ memory

Eg :- i) B cells :- Lymphocytes that produce antibodies to recognise and neutralize pathogens.

ii) T cells :- Lymphocytes that help regulate immune response and directly destroy infected cells.

→ Helper T cells :- Activate other immune cells (like B cells)
→ Cytotoxic T cells :- Kill infected cells directly

iii) Vaccines :- A weakened or ~~inf~~ inactivated pathogen is introduced to body, triggering an immune response and creating immunological memory.

Advantages :- • Specificity :- Immune response highly focused on specific pathogen, avoiding damage to other body tissues.
• Long Term Protection :- After 1st exposure to pathogen, the adaptive immune system remembers how to deal with the pathogen through Memory cells (Produced from B & T cells)

Disadvantages :- • Delayed Response :- It takes time to activate this immunity (from several days to weeks even)
• Requires Prior Exposure :- After being exposed to pathogen, it "learns" about the pathogen