

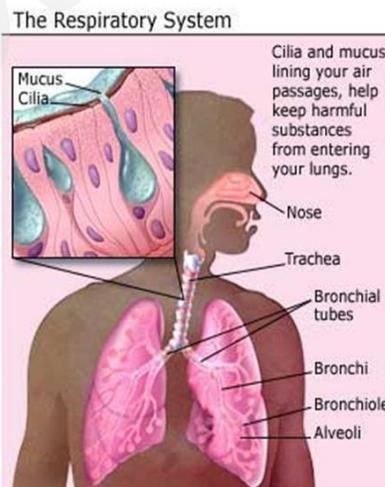
Diseases and Immunity

(IGCSE Biology Syllabus 2016-2018)

- **Pathogen:** Disease-causing organism
- **Transmissible disease:** a disease in which the pathogen can be passed from one host to another
- **Method of transmission:**
 - Direct contact → blood or body fluids
 - Indirect contact → contaminated food or water or air
- **Body Defences:**
 - **Mechanical barriers** → skin (thick outer layer of dead cells) and hairs in the nose to trap dust
 - **Chemical barriers** → sticky mucus to trap pathogens and stomach acid which kill the bacteria in food

- **Nose** is lined with hair and mucus to trap dust / dirt.

- **Trachea** is lined with cilia (tiny hairs) and mucus for the same purpose.



- **Cells** → pathogen that manage to get through all these defences are usually destroyed by **white blood cells**:

Phagocyte	Lymphocyte
Phagocytosis: engulf pathogen, vesicles fuse with vacuole, enzymes digest bacteria	Produce antibodies (Y-shaped protein) that bind to the antigen on surface of pathogen Function of antibodies: <ul style="list-style-type: none"> - Specific: the shape of antibody is complementary to the shape of antigen on the surface of the pathogen membrane - Antibody leads to destruction of pathogen: making of pathogen engulf by phagocyte OR make a hole on the surface of pathogen

The Immune System

Active		Passive	
Defense against a pathogen by <u>antibody production in the body</u>		Short term defense against a pathogen by <u>antibodies acquired from another individual</u>	
Natural	Artificial	Natural	Artificial
Infection by a pathogen <ul style="list-style-type: none"> - Antigens on pathogen trigger immune response by lymphocytes which produces antibodies and memory cells which divide rapidly on the second infection 	Vaccination <ul style="list-style-type: none"> - Harmless pathogen which has antigens given - Antigens trigger an immune response by lymphocytes which produces antibodies 	Mother to infant: breast milk <ul style="list-style-type: none"> - Breast milk contains antibodies from the mother - Young's baby immune system is not well developed and so the mother's antibodies can protect the baby against any disease 	Injection of serum containing antibodies to an individual who have been infected with a particular pathogen <ul style="list-style-type: none"> - Short lived - Requires repeated administration of serum containing the antibodies

Autoimmune disease

E.g. Type 1 diabetes

- Immune system targets and destroys pancreatic cells → pancreatic cells unable to produce insulin hormone

Virus that target immune system

E.g. AIDS/HIV

- HIV virus reproduces and kill lymphocyte → number of lymphocytes greatly reduce → patients are susceptible to all kinds of disease