

# CAIE Biology A-level

## Topic 11: Immunity

### Notes

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# Immune response

**Physical barriers** to infection include:

- **Skin** is a **tough physical barrier** consisting of **keratin**
- **Stomach Acid** (hydrochloric acid) which **kills bacteria**
- **Gut and skin flora** – natural bacterial flora **competes with pathogens** for food and space

**Non-specific responses** of the body to infection include:

- **Inflammation** – histamines released by damaged white vessels cause vasodilation which increases the flow of blood to the infected area and increases permeability of blood vessels. As a result of that antibodies, white blood cells and plasma leak out into the infected tissue and destroy the pathogen
- **Lysozyme action** – lysozyme is an enzyme found in secretions such as tears and mucus which kills bacterial cells by damaging their cell wall
- **Interferon** – interferons prevent viruses spreading to uninfected cells by stopping protein synthesis in viruses
- **Phagocytosis** is a process in which white blood cells engulf pathogens thus destroying them by fusing a pathogen such as bacteria enclosed in a phagocytic vacuole with a lysosome.

After the pathogen is engulfed and destroyed, its chemical markers called **antigens** are then **presented on the surface of the phagocyte**. The phagocyte then becomes an **antigen presenting cell** which activates other types of immune system, immune response will be stimulated if the antigen is recognised as foreign.

**The specific immune response** is antigen specific and produces responses specific to one type of pathogen only. This type of immune response relies on **lymphocytes produced in the bone marrow**:

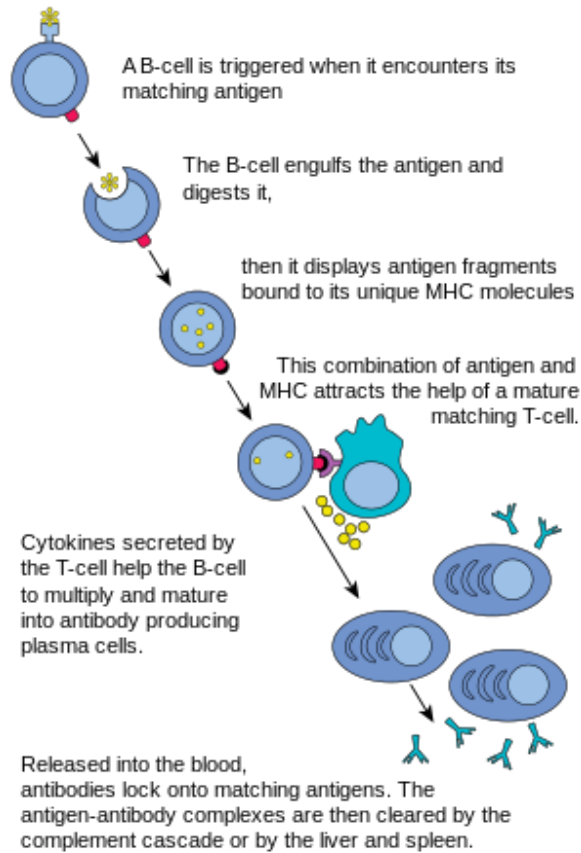
- **B cells** mature in the bone marrow and are involved in the **humoral response**
- **T cells** move from the bone marrow to the thymus gland where they mature, they are involved in **cell mediated response**

**Specific immune response glossary:**

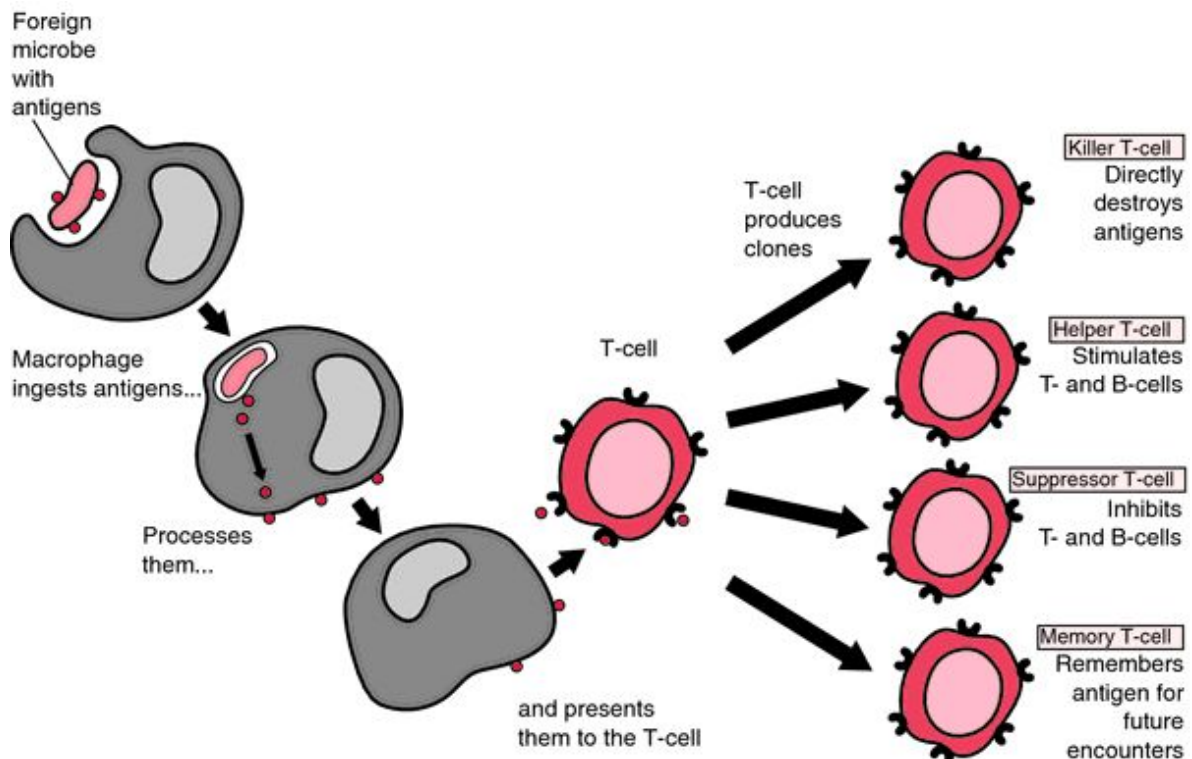
- **Memory cells** are cells which replicate themselves when exposed to an invading pathogen and remain in the lymph nodes searching for the same antigen thus resulting in a much **faster immune response**
- **B effector** cells are **antibody producing** cells
- **T helper** cells **stimulate B cells and T killer cells to divide**
- **T killer** cells **destroy pathogen infected cells**



## Humoral response



## Cell-mediated response



# Immunity

**Immunity** can either be **active or passive**; active **immunity results from the production of antibodies by the immune system** in response to the presence of an antigen whereas passive immunity results from the **introduction of antibodies from another person or animal**. There are also two subtypes of immunity; natural or artificial:

- **Natural active immunity** arises from being exposed to an antigen/getting the disease whereas **natural passive immunity** is the result of crossing of mother's antibodies through the placenta and their presence in breast milk.
- **Active artificial immunity** is acquired through vaccinations which stimulate the immune system and lead to production of antibodies whereas **passive artificial immunity** is where antibodies are injected into the body.

