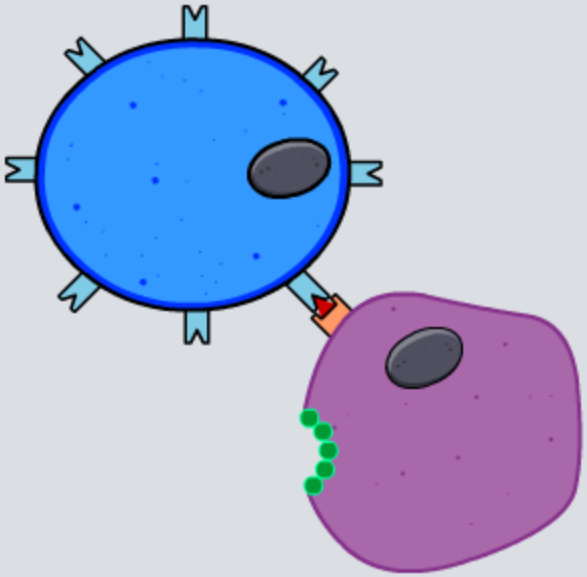
Immune Responses

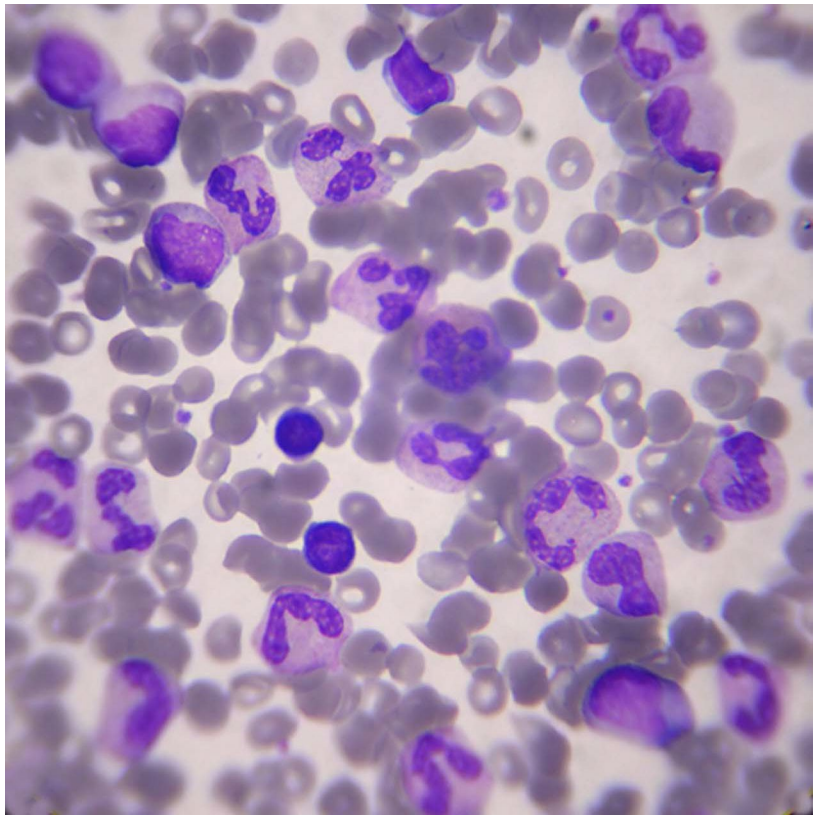


What is the immune system?

The **immune system** is a group of cells, tissues, organs and mechanisms that defend an organism against **pathogens** (disease-causing organisms) and other foreign substances.

An **immune response** is a complex series of specific and non-specific processes involving a range of cells and chemicals.

If the body successfully fights an infection, it will respond more quickly and effectively if the same pathogen is re-encountered.



How does the body respond to an antigen?

antigen

skin or mucous membrane

show

Non-specific immune response

The **non-specific** or **innate immune response** quickly targets a wide range of pathogens and foreign substances. **Phagocytosis**, **inflammation** and the antimicrobial proteins **lysozyme** and **interferons** are all part of this immune response.

- **Lysozyme** is an enzyme that disrupts the cell walls of gram-positive bacteria by digesting the peptidoglycan. It is found in human tears, saliva and lysosomes.

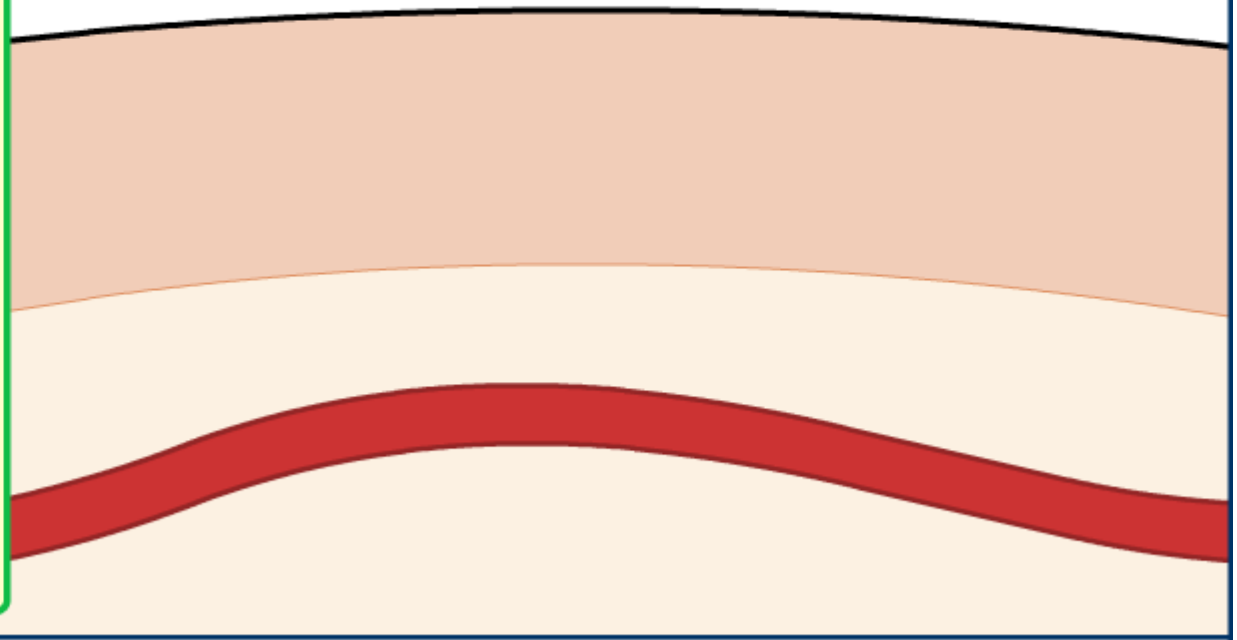
- **Interferons** are proteins produced by virus-infected body cells in response to the virus. Interferons trigger the production of a second protein that inhibits viral replication by binding to mRNA coded by the virus.

What happens during inflammation?

What happens during inflammation and phagocytosis?

Inflammation is a localized response to injury or infection characterized by swelling, redness, heat and pain. It helps to reduce damage and destroy pathogens.

Click "**play**" or the skin to find out more.



Non-specific immunity: true or false?

Specific immune response

The **specific** or **adaptive immune response** can target a specific pathogen, although it is slower to act than the non-specific response.

It features two main types of response to pathogens:

- the **cellular** or **cell-mediated** response involves highly-specialized cells that target pathogens inside cells.
- the **humoral** or **antibody-mediated** response targets pathogens in body fluids with **antibodies**.

What are lymphocytes?

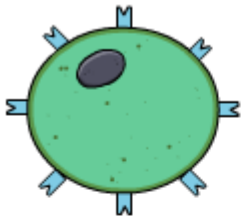
Lymphocytes are a type of white blood cell (**leukocyte**) found in the blood and lymph nodes.

Lymphocytes recognize **antigen** molecules on the surface of pathogens, and coordinate the immune response against that pathogen.

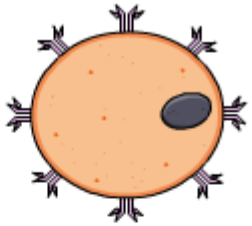
Collectively, lymphocytes can recognize millions of different antigens, due to the large variation of lymphocytes produced.

Different types of lymphocytes

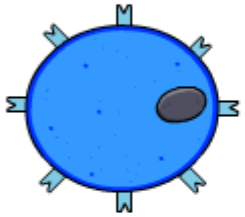
What are the roles of the T cells and B cells?



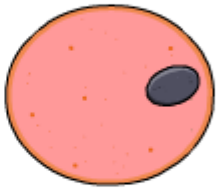
helper T cell



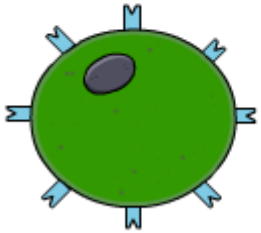
effector B cells

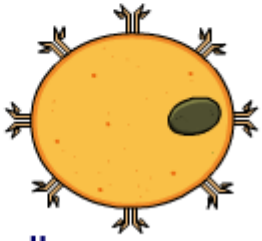


cytotoxic T cell



plasma cell





memory cells

Lymphocytes are a type of white blood cell found in the blood and lymph nodes, and which are produced by stem cells in bone marrow. The two main types are **T cells** and **B cells**.

Click on each cell to find out more about their role in the immune response.

Cellular immune response

What happens during the cellular immune response?

Once a pathogen is detected the immune system mounts a specific response against it.

Click "**play**" or the macrophage to find out more about the **cellular immune response** to a pathogen.

Humoral immune response

What happens during the humoral immune response?

Once a pathogen is detected the immune system mounts a specific response against it.

Click "**play**" or the macrophage to find out more about the **humoral immune response** to a pathogen.

Humoral and cellular response

Do these describe cellular, humoral or both responses?

cellular	humoral	both

can neutralize pathogens