

Intermediate 2 Biology - Unit 3: Mammalian Physiology
Chapter 14 - Blood

Blood components

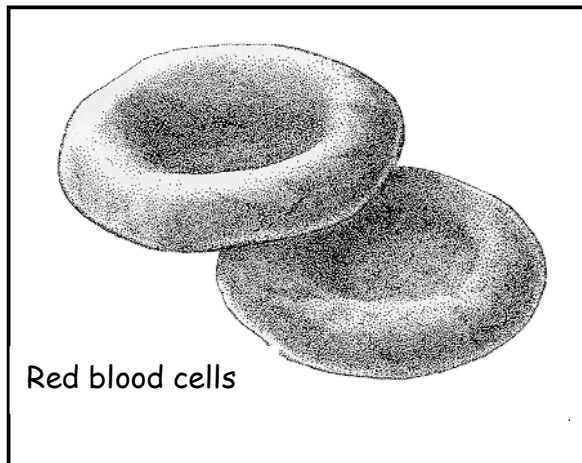
Plasma

The liquid in which the blood cells are suspended is called **plasma**. Apart from different types of blood cells plasma also carries salts and sugars. The main function of plasma is to carry carbon dioxide away from cells to the lungs. Not all of the carbon dioxide is carried in the plasma as the carbon dioxide dissolves to form carbonic acid.

Platelets

The main function of platelets is to help clot the blood when a cut occurs. Platelets are often small pieces that have fallen off of dead blood cells.

Red Blood Cells



Red blood cells are the most numerous type of blood cell. Their main function is to carry oxygen around the body.

Features of the red blood cell which make it efficient at carrying oxygen are:

1. they have no nucleus - larger surface area for binding oxygen
2. biconcave shape (indented on both sides) - larger surface area for binding oxygen
3. contain haemoglobin - allows temporary binding to oxygen
4. small and flexible - fit easily through even the smallest blood vessels.

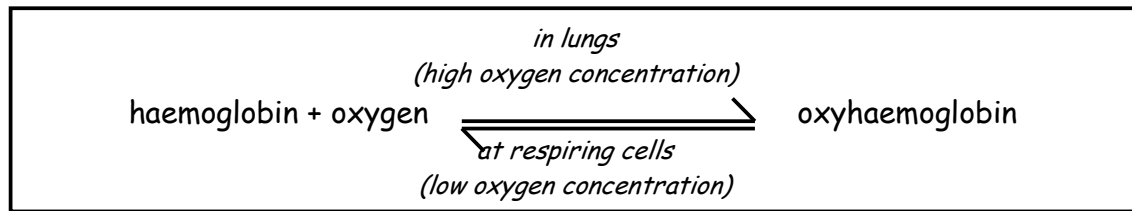
Some carbon dioxide is also carried by the red blood cells.

White Blood Cells

White blood cells are involved in defending the body against disease. They are much less numerous than red blood cells. There are two types of white blood cells that you need to know about - macrophages and lymphocytes. Lymphocytes are involved in antibody production, whilst macrophages are involved in phagocytosis.

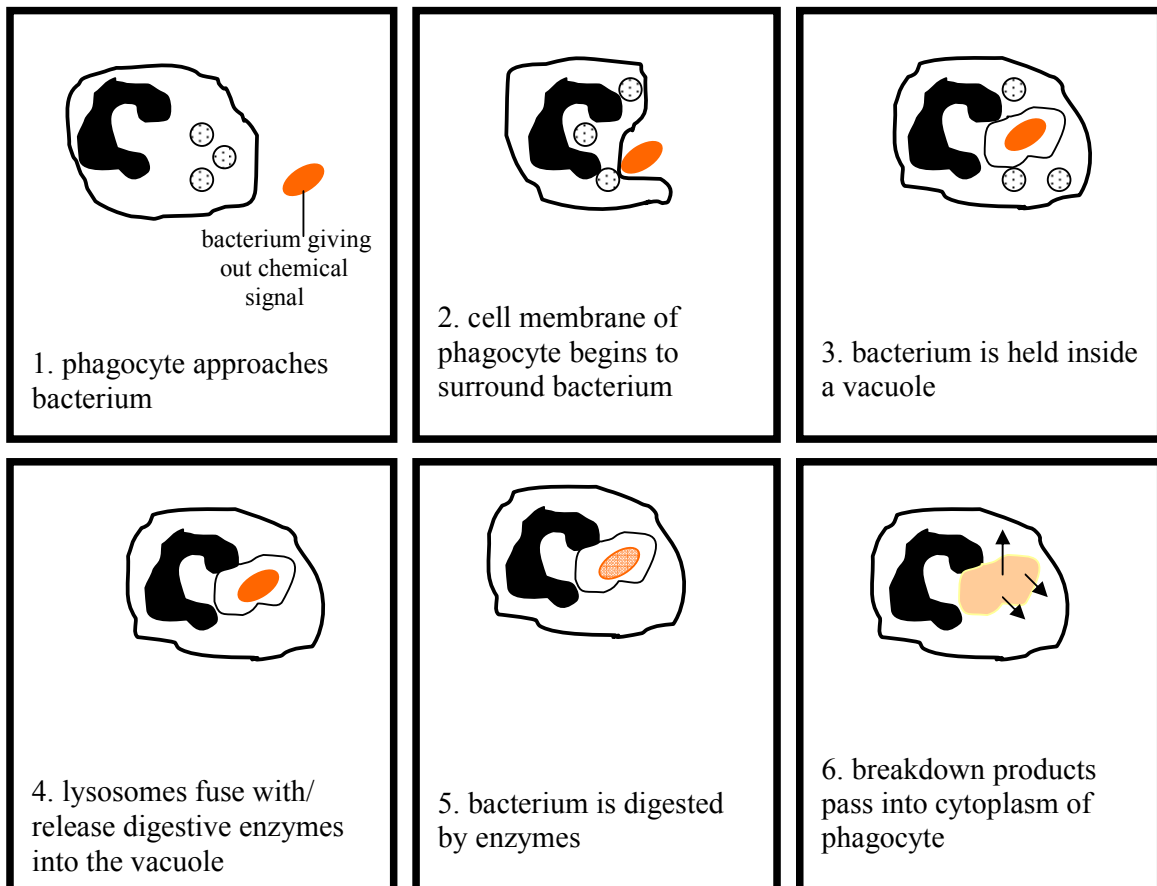
Haemoglobin

Haemoglobin has a high affinity with oxygen when the surrounding oxygen concentration is high and a low affinity for oxygen when the surrounding oxygen concentration is low.



Phagocytosis (Non-Specific Immune Response)

Phagocytosis is a non-specific immune response. The diagrams below show the sequence of events which occur when a bacteria enters the body:



Antibody production

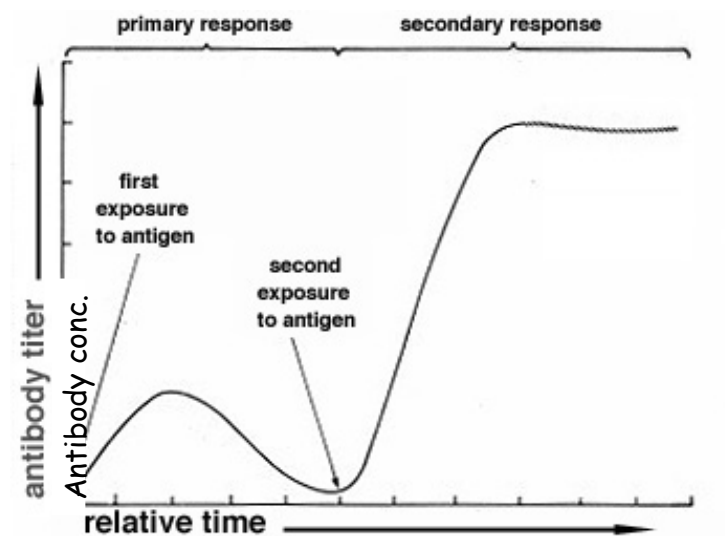
Antibody production is a specific immune response. A different antibody is produced for each pathogen. Antibodies are Y-shaped and have a receptor site on each arm. The receptor sites are shaped to be complementary to the antigens (protein-markers) on the pathogen. Antibodies bind to the antigens on the pathogen rendering it harmless.



Primary and Secondary Immune Responses

Primary immune response - first contact with an antigen

Secondary immune response - second contact with an antigen



- Secondary immune response is faster
- Secondary immune response produces a higher concentration of antibodies
- Secondary immune response maintains higher antibody concentration for a longer time

Types of immunity

<i>Type of immunity</i>	<i>Example</i>
Active - Naturally acquired	<ul style="list-style-type: none">▪ Pathogen enters body and antibodies as produced in response
Active - Artificially required	<ul style="list-style-type: none">▪ Harmless pathogen is introduced to body to stimulate antibody production (vaccination/immunisation)
Passive	<ul style="list-style-type: none">▪ Antibodies passed to baby in breast-milk▪ Antibodies passed across placenta to foetus▪ Antibodies from another species are injected into body