IGCSE Biology Workbook
10. Disease and Immunity

The stuff you need to know in this chapter:

Core:

- Define pathogen as a disease-causing organism
- Define transmissible disease as a disease in which the pathogen can be passed from one host to another
- State that the pathogen for a transmissible disease may be transmitted either through direct contact, e.g. through blood or other body fluids, or indirectly, e.g. from contaminated surfaces or food, from animals, or from the air
- State that the body has defences: mechanical barriers, chemical barriers, cells, which can be enhanced by vaccination
- Explain the importance of hygienic food preparation, good personal hygiene, waste disposal and sewage treatment in controlling the spread of disease

Extended:

- State that antibodies lock on to antigens leading to direct destruction of pathogens, or marking of pathogens for destruction by phagocytes
- Explain how each pathogen has its own antigens, which have specific shapes, so specific antibodies which fit the specific shapes of the antigens are needed
- Define active immunity as defence against a pathogen by antibody production in the body
- Explain that active immunity is gained after an infection by a pathogen, or by vaccination
- Explain the process of vaccination
- Explain the role of vaccination in controlling the spread of diseases
- Explain that passive immunity is short term defence against a pathogen by antibodies acquired from another individual
- State that memory cells are not produced in passive immunity
- Explain the importance of passive immunity for breast fed infants
- State that some diseases are caused by the immune system targeting and destroying body cells, limited to Type 1 diabetes

PATHOGEN AND TRANSMISSION

Define "pathogen"

Define "transmissible disease"

Explain the difference between "direct" and "indirect" transmission of diseases.

Explain how pathogens could be transmitted through the following methods...

Air:

Water or food:

Vectors:

Explain how the following things can increase the spread of pathogens...

Unhygienic food preparation (e.g. cooking in a dirty kitchen):

Not getting washed/bathed often:

Leaving rubbish to pile up:

Untreated sewage:

MECHANICAL AND CHEMICAL BARRIERS

State what is meant by a "mechanical barrier" in terms of defense against disease.

State what is meant by a "chemical barrier" in terms of defense against disease.

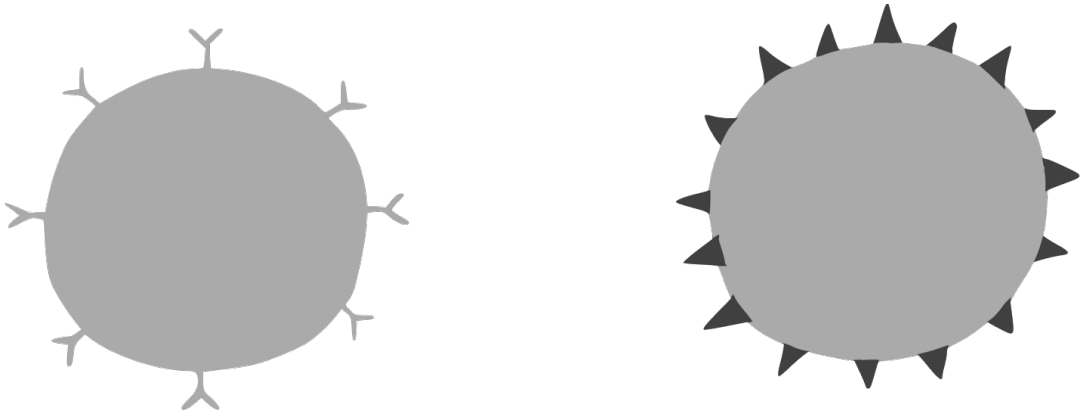
State and explain 4 barriers to disease present in/on the human body. State whether each one is mechanical or chemical

Type of barrier	How it protects the body	Chemical or mechanical?

CELL DEFENSES

The pictures below represent lymphocytes and pathogens. Label the diagram with the following words:

lymphocyte, pathogen, antigen, antibody

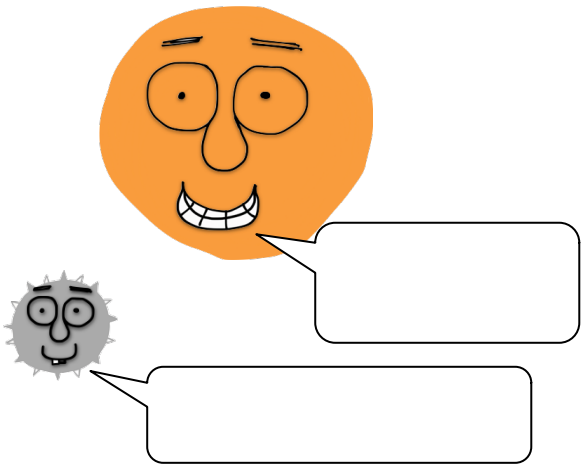


Complete the sentences below to describe how lymphocytes help the body fight pathogens. Use the following words:

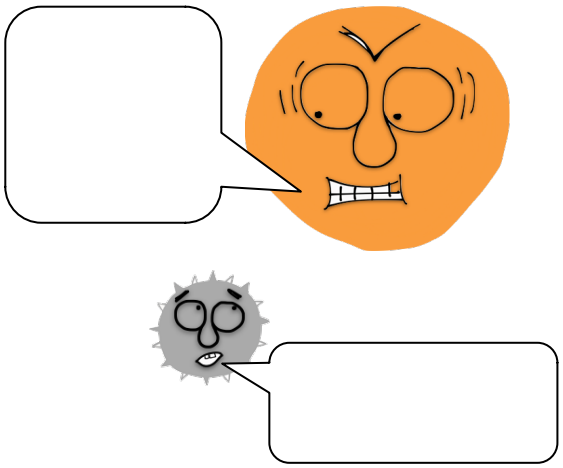
memory cells, immune, unique, antibodies, antigens, specific, phagocyte, immediately

Pathogens have _____ on the outside of them, which can be recognized by the _____ of a lymphocyte. Each type of pathogen has a _____ antigen, and your body has millions of different lymphocytes which are _____ to an antigen. When a lymphocyte finds its matching antigen it might help to destroy the pathogen or it might mark it so a _____ can find it easier. After the correct antibodies are found, _____ _____ are produced, which means the body can recognize the pathogen _____ if it enters the body again. The body is now _____.

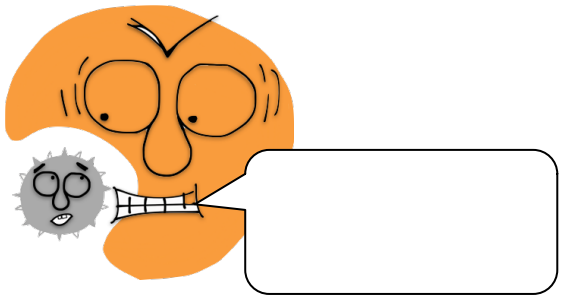
The cartoon below shows how phagocytes destroy pathogens. Add captions to the cartoon to help explain what is happening.



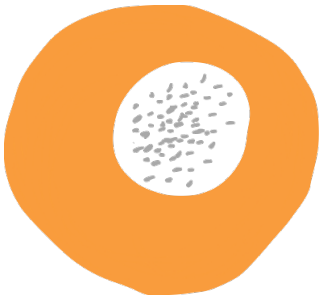
1. The pathogen enters the body



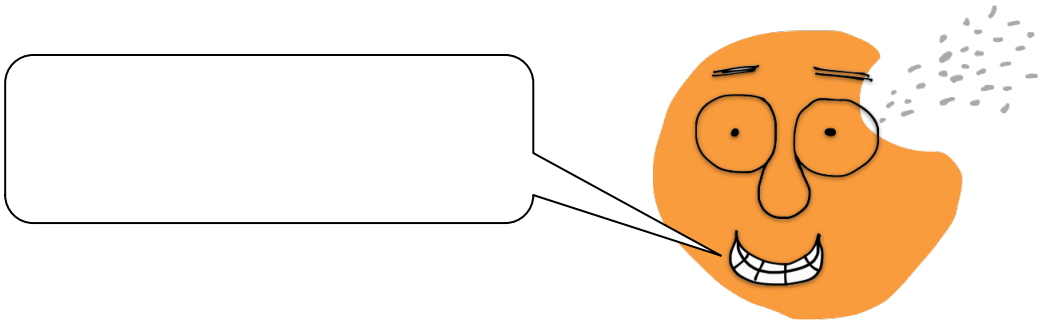
2. The phagocyte discovers the pathogen



3. The phagocytes engulfs the pathogen



4. Enzymes digest the pathogen



5. The harmless products are released from the phagocyte

Helpful hint: Students often talk about phagocytes "eating" pathogens. This might be a good way to think about what they do, but it's not really accurate (eating involves food, chewing, swallowing etc.) Phagocytes actually "engulf" cells.

IMMUNITY

Explain how breastfeeding is good for a baby's immune system

Add ticks (✓) to the table below to show the difference between passive and active immunity

	Passive immunity	Active immunity
Antibodies come from inside of the body		
Antibodies come from outside of the body		
Provided to a baby by breast milk		
Develops as a result of a new pathogen entering the body		
Given by injecting antibodies into the body		
Only last a short time		
Memory cells are produced, so it lasts a lifetime		

A vaccine usually contains a weakened or dead form of a pathogen. Explain how a vaccination creates immunity.

Explain why vaccination also helps protect people who are not vaccinated.

Explain what an autoimmune disease is.

Read the following information about blood glucose control:

> *After a meal when glucose levels rise, insulin is secreted from the pancreas, which causes the glucose level to fall back to a normal level.*

Type I diabetes is an autoimmune disease. Explain how this affects blood glucose control