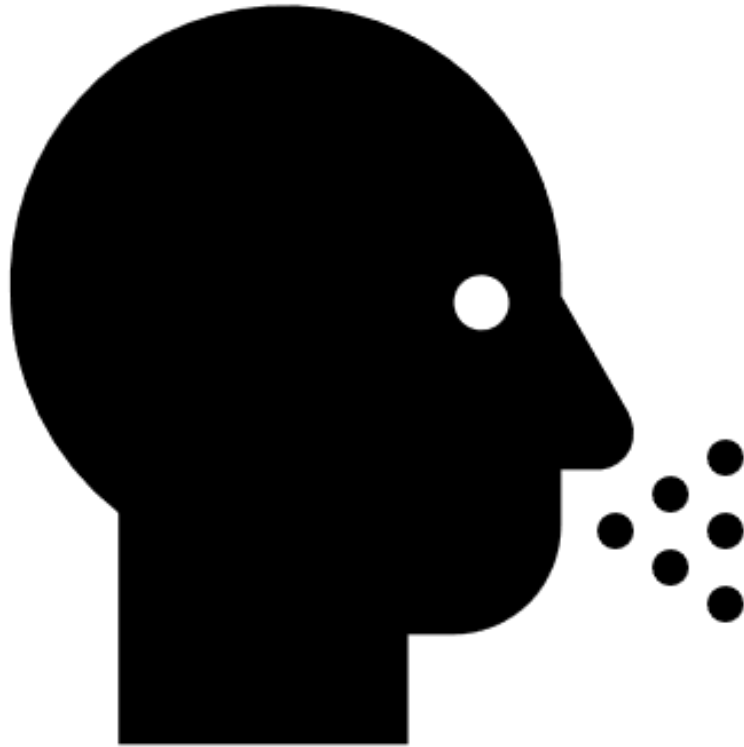


Infectious disease



Name

Class

Teacher

L1 Communicable disease

Communicable diseases are ones that can be spread between individuals. Some examples include tuberculosis, measles and flu. Communicable diseases can be caused by **pathogens** which are disease causing micro-organisms. Pathogens can be bacteria, viruses and fungi. Non-communicable diseases cannot be transmitted between individuals. Some examples include arthritis and heart attacks. Both communicable and non-communicable diseases cause ill health. Other factors like diet, stress and age can affect chances of being ill.

Pathogens are micro-organisms that cause disease. There can be many types of pathogens including bacteria, viruses, protists or fungi. The diseases caused by pathogens are known as communicable diseases as they can be spread between individuals. Pathogens can be spread in different ways. Some pathogens can be spread through the air by coughing, sneezing and even talking (droplet infection). Examples include flu (caused by a virus) and tuberculosis (caused by a bacteria). Some pathogens are spread by direct contact. For example, sexually transmitted diseases such as gonorrhoea (caused by a bacteria) and HIV/AIDS (caused by a virus). Other pathogens can be spread through water, for example, cholera or salmonella. These diseases often cause diarrhoea. Diseases often spread quicker through crowded city centres.

A table to show the different types of diseases

Communicable	Non-communicable	Non-communicable and genetic
Measles	Cancer	Cystic fibrosis
HIV	Type 2 diabetes	<u>Alzheimer's</u>
Gonorrhoea	Heart disease	Sickle cell anaemia
Malaria	Chronic kidney disease	Haemophilia

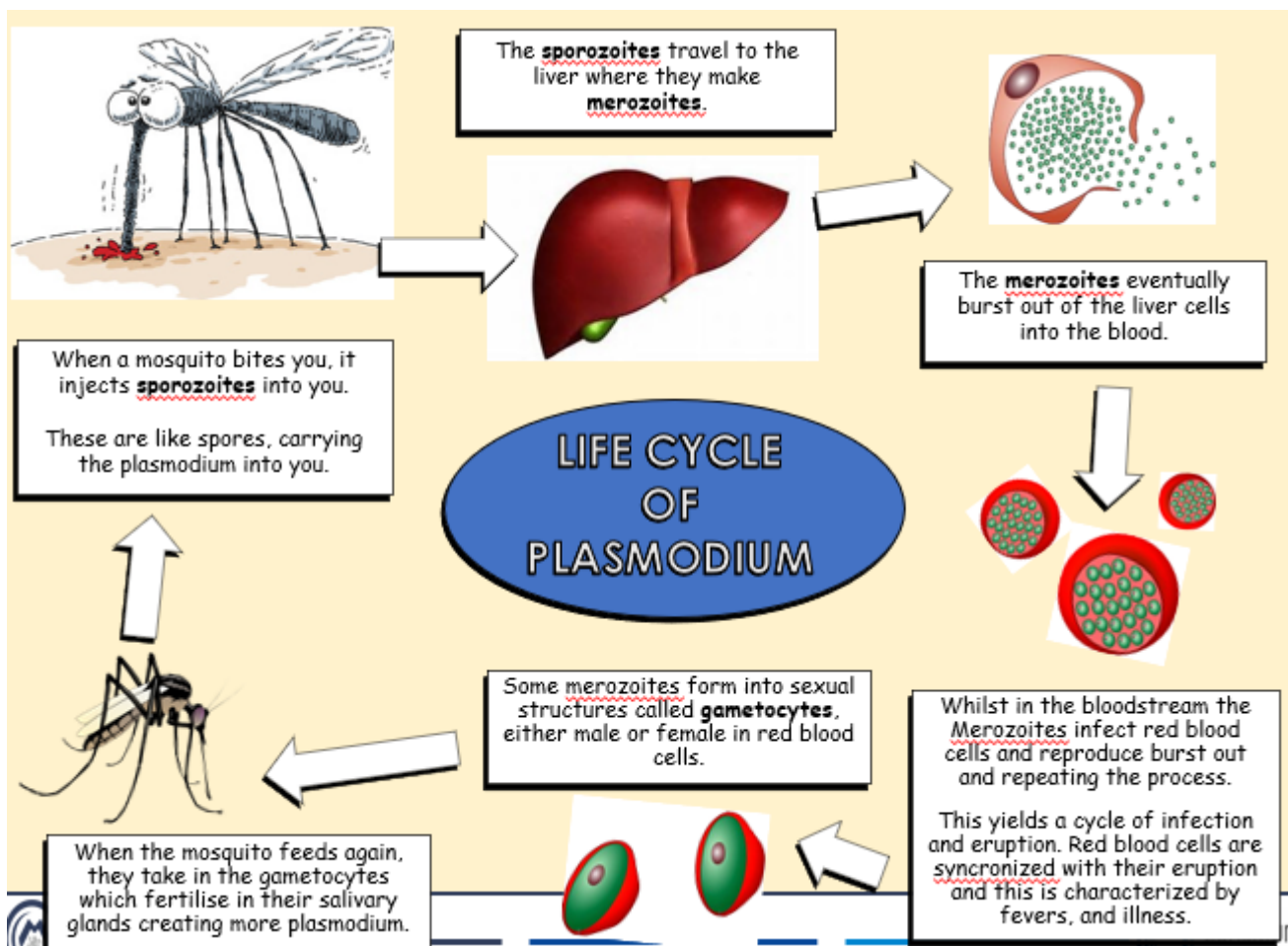
Independent Practice

1. What is the difference between a communicable and non-communicable disease?
2. What does the phrase “transmitted between individuals” mean?
3. What is a pathogen?
4. Give three examples of pathogens
5. Give three examples of communicable diseases
6. Last unit we learnt about coronary heart disease (CHD). What are the coronary arteries?
7. What causes CHD?
8. In what three ways can CHD be treated?
9. Is CHD communicable or non-communicable?
10. Give at least three factors that can affect a person’s chances of being ill.
11. Name four pathogens
12. Diseases can spread through the air, through water, or through direct contact. Give an example of a disease that spreads through air.
13. Give an example of a disease that spreads through water.
14. Give an example of a disease that spreads through direct contact
15. Why do diseases often spread quicker in cities?
16. What do we mean by the term microorganism?
17. Sydney says: “germs are microorganisms therefore all microorganisms cause disease”. Explain why Sydney is wrong.
18. Nandor sits next to Natasha who tells him that the doctor has said to her that she has CHD. Nandor moves away thinking he will catch the disease. Explain why he is wrong.
19. Finish the sentences:
20. Some pathogens cause disease and...
21. Some pathogens cause disease but...
22. Some pathogens cause disease so...

L2 Malaria

Malaria is spread by mosquitos which carry the Plasmodium protist. These are often found in areas with higher temperatures in Africa, Asia, and South and Central America. Mosquitos suck blood containing the protists from an infected person and pass them on to other people by sucking their blood. The mosquitos do not become ill and are called vectors because they transmit the disease.

The symptoms of malaria include a fever, sweats and chills, headaches, vomiting and diarrhoea. Damage is also caused to the blood and liver. Of the 200 million people infected each year, up to half die from this disease. After decades of research scientists developed the first malaria vaccine in 2021. Infection continues to be reduced by stopping individuals from being bitten. People sleep under mosquito nets and wear insect repellent to avoid bites. Antimalarial drugs are also taken, which treat the symptoms if infected.



Independent practice

1. What type of microorganism causes malaria?
2. How is malaria spread?
3. What are the common symptoms of malaria?
4. What is the name for a disease carrying organism?
5. In which areas of the world can you catch malaria?
6. What do mosquitos inject into you when they bite you?#
7. Which organ of the body is most affected by malaria?
8. Name some methods to prevent the spread of malaria.
9. Explain why malaria might not spread from a person who has caught it in Asia and has come back to the UK.
10. Suggest why in Sri Lanka (a hot, wet country in Asia) they drain swamps and wetland to help peoples health.
11. Laura says “I’ve been bitten by a mosquito, now I will definitely have malaria” Explain why she could be wrong

L3 Human defence systems

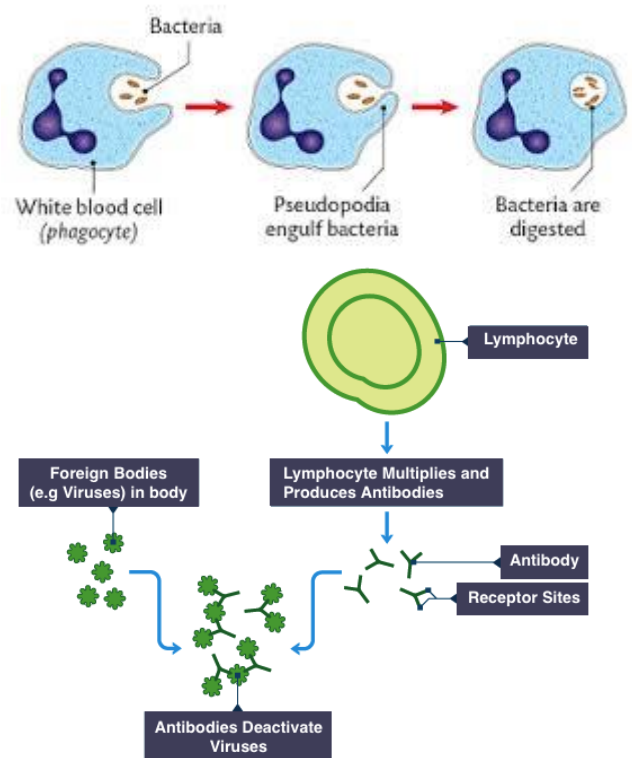
Humans live in a world surrounded by potential pathogens. Like all other organisms we have evolved defence systems to prevent us from getting ill. These defence systems are in two groups: specific and non-specific.

Non-specific defence systems: these are working all the time to prevent us from pathogens.

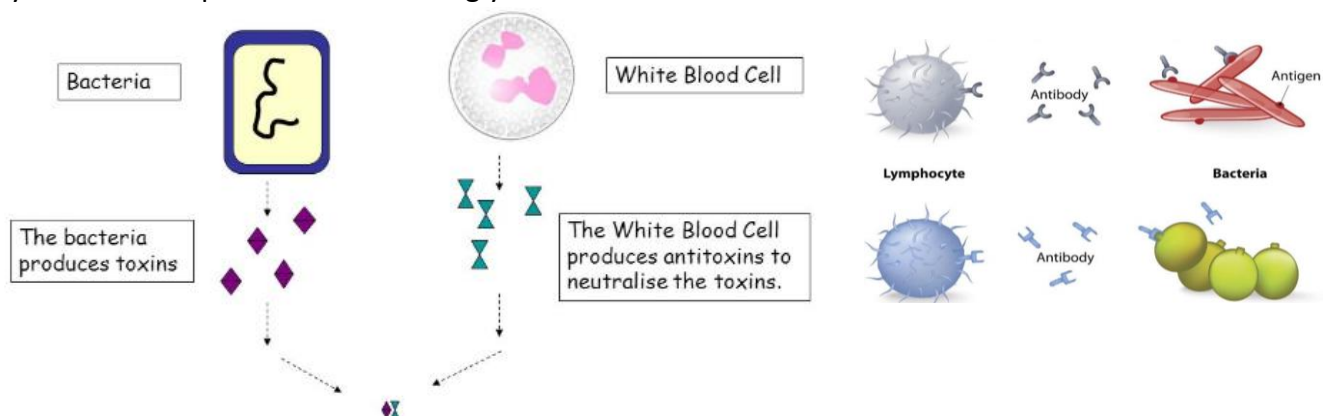
- Skin: Provides a protective barrier that prevents pathogens entering the body
- Nose: Contains tiny hairs that trap pathogens
- Trachea and bronchi: Contain ciliated epithelial cells which move mucus up to the nose. The mucus traps pathogens.
- Stomach: Contains acid. The acid destroys pathogens that are eaten

Specific defence systems: these are the immune system and they are aimed at destroying invaders

- **Phagocytosis:** White blood cells called phagocytes ingest (take in) pathogens, digesting them with enzymes so they cannot make you ill. Once the phagocytes have ingested as many pathogens as possible they die. Their dead cells form around a cut as puss
- **Antibody production:** White blood cells called lymphocytes produce antibodies. These target specific pathogens and help to destroy them. Antibodies are specific to a particular pathogen and can be rapidly made again should re-infection happen.



- **Antitoxin production:** White blood cells can also produce antitoxins. These bind to the toxins made by bacteria and prevent them hurting your cells.



Once some of the White blood cells have begun producing antibodies and antitoxins others stay ready as **memory cells**. This means they can respond quickly if they are introduced to the same pathogen again. The immune system can adapt over time and build up a 'memory' of past infections. This means that over time you become more resistant to pathogens.

Independent Practice

1. What is a pathogen?
2. List the four non-specific defence systems the body has
3. What three ways can white blood cells protect us from invading pathogens?
4. What property of the stomach helps to stop food poisoning?
5. If a person has had a specific disease before, why are they less likely to get it in future?
6. What is the main purpose of the human immune system?
7. How does our skin act as a barrier to protect us from harmful invaders?
8. What are white blood cells, and what is their role in our defense system?
9. Can you explain the difference between bacteria and viruses, and how our body defends against each?
10. What role do antibodies play in our immune system, and how are they produced?
11. How does the immune system remember and recognize previous invaders it has encountered?
12. What is the connection between a healthy lifestyle and a strong immune system?

L4 How do pathogens cause illness

Pathogens are tiny microorganisms that can cause diseases in humans, animals, and plants. They include bacteria, viruses, fungi, and parasites. These pathogens have developed various ways to reproduce and spread within their host's body, leading to the onset of symptoms that we commonly associate with illnesses.

Pathogens reproduce through different methods depending on their type. Bacteria, for instance, divide through a process called binary fission. This involves the bacterium's genetic material replicating, and then the cell splitting into two identical daughter cells. This rapid division leads to many bacteria within the body, overwhelming the immune system and causing symptoms like fever, chills, and fatigue.

Viruses, on the other hand, reproduce by infecting host cells and taking over their machinery to produce more virus particles. These new virus particles are released from the host cell and go on to infect more cells. As the virus spreads, it damages the host cells, leading to inflammation, coughing, and sneezing.

Fungi and parasites reproduce by producing spores or eggs that can be spread to other hosts through various means. Once inside a new host, these spores or eggs hatch and grow, causing damage to the host's tissues and leading to symptoms like itching, inflammation, and fever.

Pathogens cause symptoms by interfering with the normal functions of the host's body. They can release toxins that damage cells, tissues, and organs, leading to inflammation and other immune responses. For instance, bacteria like *Streptococcus pyogenes* release toxins that cause inflammation in the throat, leading to symptoms of sore throat and difficulty swallowing. Similarly, the influenza virus damages the respiratory tract, leading to symptoms like coughing, sneezing, and fever.

Pathogens can also disrupt the body's homeostasis, which is the state of balance and stability in the body's internal environment. For example, some parasites can consume nutrients from the host's body, causing malnutrition and weakness. Other pathogens can interfere with the body's ability to absorb oxygen or eliminate waste products, leading to symptoms like fatigue and difficulty breathing.

In order to protect ourselves from pathogens and their harmful effects, our immune system plays a crucial role. It detects the presence of pathogens and mounts a response to eliminate them. White blood cells, antibodies, and other immune components work together to identify and destroy pathogens, preventing them from reproducing and causing further harm.

In summary, pathogens are microorganisms that cause diseases by reproducing and spreading within the host's body. They reproduce through various methods such as binary fission, infecting host cells, and producing spores or eggs. Pathogens cause symptoms by damaging cells, releasing toxins, and disrupting the body's normal functions. The immune system plays a crucial role in defending against pathogens and preventing the onset of symptoms.

Independent practice

1. What are pathogens, and what types of microorganisms can be considered pathogens?
2. How do bacteria reproduce, and what can their rapid division lead to?
3. Explain the process of viral reproduction and how it causes symptoms.
4. How do fungi and parasites reproduce, and what symptoms can they cause?
5. How do pathogens interfere with the normal functions of the host's body?
6. What is homeostasis, and how can pathogens disrupt it?
7. What role does the immune system play in protecting the body from pathogens?
8. How do white blood cells, antibodies, and other immune components work together to fight pathogens?
9. Give an example of a bacterial infection and explain how it causes symptoms.
10. Describe a viral infection and the symptoms associated with it.
11. What are some ways to prevent the spread of pathogens?
12. How do antibiotics work, and why are they not effective against viral infections?
13. Why is it important to have a balanced and healthy immune system?
14. Can you think of any natural defenses that our body has to protect against pathogens?