

Pathogens and infections

Revision notes · Types of pathogen, six named infections, how they spread and are controlled, the virus lifecycle and sexually transmitted infections.

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Pathogens and infections Spec 5.4–5.8

What is a pathogen? Spec 5.4

A **pathogen** is a disease-causing organism. The four types you need to know are **viruses**, **bacteria**, **fungi** and **protists**.

Types of pathogen		
Type	Key facts	Example
Virus	Not a cell; much smaller than bacteria; can only reproduce inside a host cell	HIV
Bacterium	A single-celled organism with no nucleus	Cholera bacterium
Fungus	Includes single-celled and many-celled organisms	Chalara ash dieback fungus
Protist	A single-celled organism with a nucleus	Malaria protist

Exam tip: Link each pathogen type to an example from the spec. Examiners often ask you to name the type of pathogen that causes a named disease.

Common infections Spec 5.5

Infections you need to know		
Disease	Pathogen type	Effect on the host
Cholera	Bacterium	Causes diarrhoea
Tuberculosis	Bacterium	Causes lung damage
Chalara ash dieback	Fungus	Causes leaf loss and bark lesions in ash trees
Malaria	Protist	Causes damage to the blood and liver
HIV	Virus	Destroys white blood cells, leading to the onset of AIDS

Triple only

Triple only infections

Disease	Pathogen type	Effect on the host
Stomach ulcers (<i>Helicobacter</i>)	Bacterium	Causes stomach ulcers
Ebola	Virus	Causes haemorrhagic fever

Triple only

Haemorrhagic fever means a fever with bleeding.

How pathogens spread and how to control them Spec 5.6

To explain how to reduce the spread of a disease, first state how it is spread, then say how that route can be blocked.

Spread and control of named diseases

Disease	How it spreads	How spread can be reduced or prevented
Cholera (bacteria)	In water contaminated with sewage containing the bacteria	Provide clean drinking water; treat sewage; wash hands and cook food thoroughly
Tuberculosis (bacteria)	Airborne : droplets from coughs and sneezes	Isolate infected people; cover the mouth when coughing; good ventilation; vaccination
Chalara ash dieback (fungi)	Airborne spores carried by the wind	Destroy infected trees; restrict movement and import of ash plants
Malaria (protists)	By an animal vector: the mosquito, which carries the protist from person to person	Control mosquitoes (drain standing water, use insecticides); mosquito nets; insect repellent

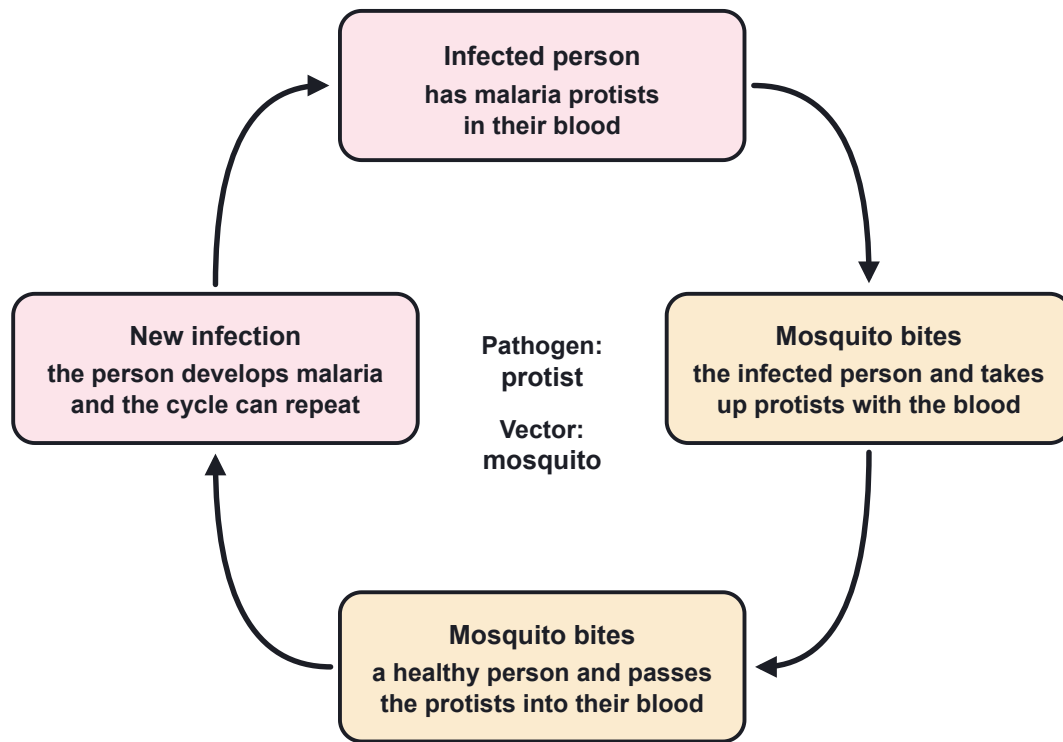
Triple only

Spread and control of Triple only diseases

Disease	How it spreads	How spread can be reduced or prevented
Stomach ulcers, <i>Helicobacter</i> (bacteria)	Oral transmission : swallowing the bacteria in food, water or from saliva	Good hygiene; handwashing; clean water and food preparation
Ebola (virus)	Contact with infected body fluids	Isolate patients; wear protective clothing; avoid contact with body fluids, including safe handling of bodies

A **vector** is an organism that carries a pathogen from one host to another without usually being harmed itself. The malaria vector is the mosquito. Killing or avoiding the vector breaks the chain.

Common mistake: Mosquitoes do not cause malaria. The protist causes it. The mosquito is only the vector that carries the protist.



The mosquito is the **vector**: it carries the malaria protist from one person to the next.

The lifecycle of a virus Spec 5.7B Triple only

Viruses are not cells and cannot reproduce on their own. They reproduce inside a host cell, using the host's cell machinery. A virus can follow one of two pathways.

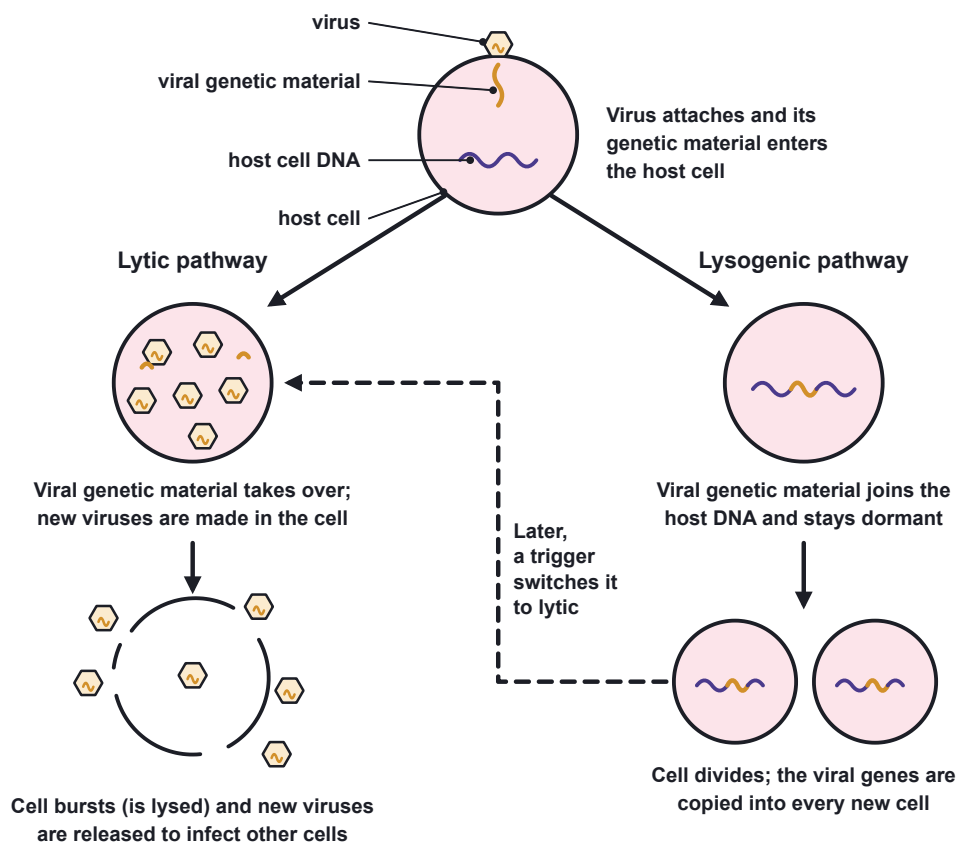
The lytic pathway

1. The virus attaches to a host cell and its genetic material enters the cell.
2. The viral genetic material takes over the host cell and the cell makes new virus parts.
3. New viruses are assembled inside the cell.
4. The cell bursts open (it is **lysed**) and the new viruses are released to infect other cells.

The lysogenic pathway

1. The virus attaches and its genetic material enters the host cell.
2. The viral genetic material becomes part of the host cell's DNA.
3. The virus stays **dormant** (inactive). The host cell does not burst and does not show harm. When the host cell divides, the viral genetic material is copied too, so every new cell contains it.
4. At a later time, something may trigger the viral genetic material to become active, and the virus then follows the lytic pathway.

Lytic and lysogenic pathways compared		
	Lytic	Lysogenic
Viral genetic material	Takes over the cell straight away	Joins the host DNA and stays inactive
New viruses made?	Yes, immediately	Not until the virus becomes active
Host cell	Burst open and killed	Survives and divides, copying the viral genes



Lytic: new viruses are made and the cell bursts. **Lysogenic:** viral genes hide in the host DNA until a trigger makes them active.

Sexually transmitted infections Spec 5.8

Sexually transmitted infections (STIs) are spread by sexual contact. You need two examples: chlamydia and HIV.

Chlamydia and HIV		
	Chlamydia	HIV
Pathogen	Bacterium	Virus
How it spreads	Unprotected sexual contact	Unprotected sexual contact; sharing needles; contact with infected blood; from an infected mother to her baby
Effects	Often no symptoms; can cause infertility	Destroys white blood cells and can lead to AIDS
How spread can be reduced	Use condoms; screening and testing; treating infected people with antibiotics; informing partners	Use condoms; do not share needles; screen donated blood; drug treatment to lower the amount of virus

Condoms act as a **barrier** that stops body fluids passing from one person to another. Using a condom, having fewer partners and being tested regularly all reduce the spread.

Exam tip: A good answer to 'how can the spread of an STI be reduced' names the method and says how it works, for example 'use a condom, which prevents body fluids passing between partners'.

Quick check

- 1 . Name the four types of pathogen.
- 2 . How is cholera spread, and how can its spread be reduced?
- 3 . What is the vector for malaria?
- 4 . Triple only: what happens to the host cell in the lytic pathway?
- 5 . Name a bacterial STI and a viral STI.

Quick check answers

Pathogens and infections

1. Viruses, bacteria, fungi and protists.
2. Through contaminated water; provide clean water and treat sewage.
3. The mosquito.
4. It bursts open (lyses), releasing new viruses.
5. Chlamydia (bacterial) and HIV (viral).