

Pathogens and transmission

Revision notes · What pathogens are, how they spread, the body defences, hygiene and sanitation, and cholera.

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Pathogens and transmission Spec 10.1.1–10.1.5, 10.1.16–10.1.17

Pathogens and how they are transmitted Spec 10.1.1, 10.1.2, 10.1.3

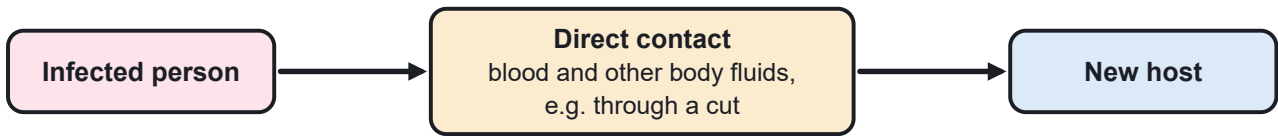
A **pathogen** is a disease-causing organism. Bacteria, viruses, fungi and protists can all be pathogens.

A **transmissible disease** is a disease in which the pathogen can be passed from one host to another. The host is the organism the pathogen lives in or on.

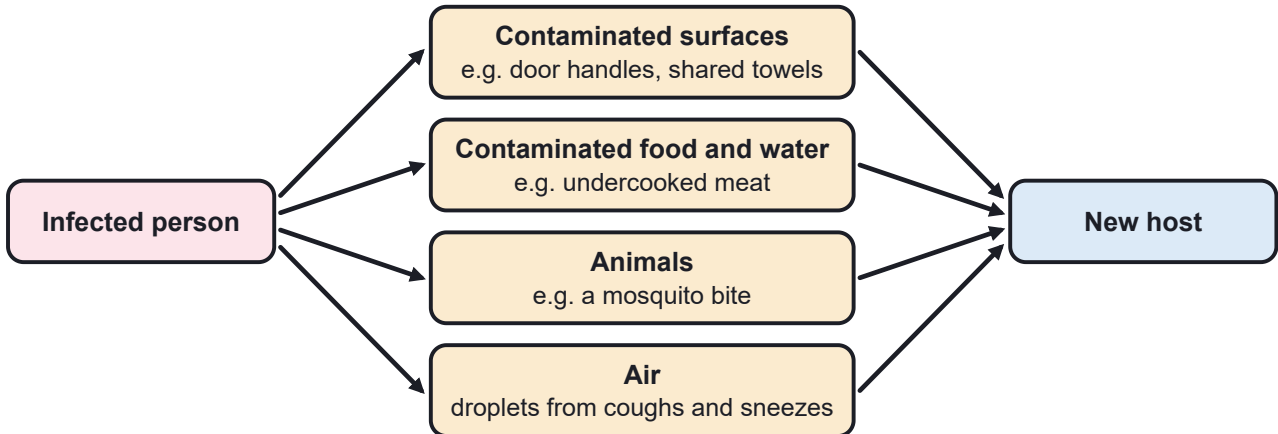
How pathogens are transmitted

Direct and indirect transmission		
Route	What happens	Examples
Direct contact	The pathogen passes straight from an infected person to another person.	Blood and other body fluids, for example through a cut or by sexual contact
Indirect: contaminated surfaces	The pathogen is left on an object or surface and picked up later.	Door handles, shared towels
Indirect: food and water	The pathogen is swallowed in food or drink that is contaminated.	Undercooked meat, unclean drinking water
Indirect: animals	An animal carries the pathogen from one host to another.	A mosquito that bites an infected person and then a healthy person
Indirect: air	Pathogens are carried in tiny droplets from coughs and sneezes and breathed in.	Droplets from an infected person

Direct transmission



Indirect transmission



Pathogens reach a new host by **direct contact** or **indirectly** through surfaces, food and water, animals or air.

Exam tip: Say 'transmissible' and 'passed from one host to another'. Do not just write 'catching'.

Body defences Spec 10.1.4

The body has defences that stop pathogens getting in, and others that destroy the ones that do get in.

Body defences	
Defence	How it protects the body
Skin	Forms a tough barrier that stops pathogens entering the body.
Hairs in the nose	Trap dust and pathogens in the air that is breathed in.
Mucus	Sticky liquid in the nose and airways that traps pathogens so they can be removed.
Stomach acid	Kills most pathogens that are swallowed in food and drink.
White blood cells	Destroy pathogens that get inside the body, for example by ingesting them (phagocytes) or by making antibodies (lymphocytes).

Common mistake: Hairs and mucus do not kill pathogens. They trap them. Stomach acid and white blood cells are the defences that kill or destroy pathogens.

Controlling the spread of disease Spec 10.1.5

Good public health stops pathogens reaching people in the first place. Each measure breaks a **transmission** route, so fewer people take in the pathogen.

Controlling the spread of disease

Measure	Why it is important
A clean water supply	Drinking water is treated so it does not contain pathogens. This stops water-borne diseases, such as cholera, spreading.
Hygienic food preparation	Washing hands and surfaces, cooking food thoroughly and storing it correctly stops pathogens getting into food or growing in it.
Good personal hygiene	Washing hands, especially after using the toilet and before eating, removes pathogens and stops them being passed on.
Waste disposal	Rubbish is removed and dealt with so that pathogens in it cannot contaminate food, water or surfaces, and animals that carry pathogens are not attracted.
Sewage treatment	Sewage contains pathogens from human faeces. Treating it means it does not contaminate drinking water or food crops. The stages of sewage treatment are not required.

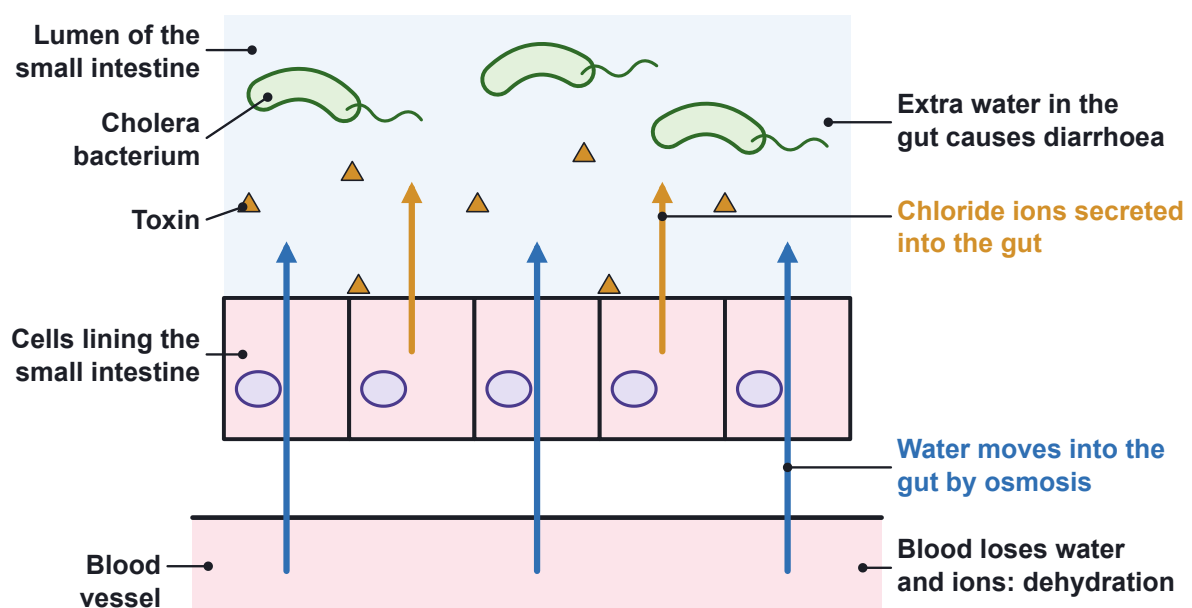
Exam tip: Link every measure to a route: the pathogen is kept out of water, food or off hands. 'It keeps things clean' earns no mark.

Cholera Spec 10.1.16, 10.1.17 Supplement

Cholera is a disease caused by a bacterium. It is transmitted in contaminated water, so it spreads where drinking water is not clean or sewage is not treated.

The cholera bacterium lives in the small intestine and produces a **toxin**. The toxin has these effects:

1. The toxin causes cells lining the small intestine to secrete chloride ions into the small intestine.
2. The chloride ions lower the water potential in the gut, so water moves into the gut from the blood by **osmosis**.
3. The extra water causes **diarrhoea**.
4. Large amounts of water and ions are lost from the body, so the person becomes **dehydrated** and loses ions from the blood.



The cholera toxin makes lining cells secrete **chloride ions** into the gut, so water follows by **osmosis**, causing diarrhoea and dehydration.

Exam tip: Put the sequence in order: toxin, chloride ions secreted, water moves in by osmosis, diarrhoea. Name osmosis.

Quick check

1. What is a pathogen?
2. What is a transmissible disease?
3. Name the body defences in the syllabus.
4. **Supplement** Which route of transmission is cholera associated with?

Quick check answers

Pathogens and transmission

1. A disease-causing organism.
2. A disease in which the pathogen can be passed from one host to another.
3. Skin, hairs in the nose, mucus, stomach acid and white blood cells.
4. Contaminated water.