

# [The transmission of pathogens biology essay](https://assignbuster.com/the-transmission-of-pathogens-biology-essay/)

Infectious diseases are caused by the transmission of pathogens, which are microorganisms such as bacteria and viruses. Pathogens can be transmitted by direct contact – horizontal and vertical transmission – and by indirect contact – vehicle-borne transmission and vector-borne transmission.

Pathogens are microorganisms that cause infectious disease. Bacteria and viruses are the main pathogens.

## Bacteria

Salmonella bacterium cell

Bacteria come in many shapes and sizes, but even the largest are only 10 micrometres long (10 millionths of a metre).

Bacteria are living cells and, in favourable conditions, can multiply rapidly. Once inside the body, they release poisons or toxins that make us feel ill.

## Viruses

Hepatitis C virus. DNA are enclosed in a protein coat.

## Transmission of pathogens

Microorganisms can be transmitted in two main ways: direct contact and indirect contact.

## Direct contact

Direct contact means that the disease-causing microbe is passed from one person to another when their bodies touch in some way.

Vertical transmission happens when microorganisms pass from a mother to her unborn baby through the placenta. German measles and HIV can pass this way.

Horizontal transmission happens when microorganisms pass from one person to another by touching, kissing or sexual intercourse.

## Examples of horizontal transmission

## type of contact

## bacterial disease

## viral disease

touching

bacterial gastroenteritis

chickenpox

kissing

bacterial meningitis

glandular fever, cold sores

sexual intercourse

gonorrhoea, syphilis

HIV, hepatitis B

## Indirect contact

Indirect contact happens when microorganisms are carried to a person in some way, instead of by actual body to body contact.

Vehicle-borne transmission involves an object carrying the disease-causing microorganism.

## Examples of vehicle-bourne transmission

## vehicle

## bacterial disease

## viral disease

droplets in the air

tuberculosis (TB)

colds, flu

water

cholera

polio

sharp objects

tetanus

HIV

food

Salmonella food poisoning

hepatitis A

Vector-borne transmission involves an animal such as an insect. For example, malaria is transmitted by mosquitoes and plague by fleas.

## The first line of defence

Most pathogens have to get inside our body to spread infection. Once they are inside, the body provides ideal living conditions – plenty of food, water and warmth. Standing in their way is our body’s immune system – the body’s co-ordinated response to the invading pathogens.

The first line of defence is the body’s natural barriers. These include:

skin

nasal hairs, mucus and cilia

tears

## The skin

Cross-section of skin

The skin covers the whole body. It protects the body from physical damage, microbe infection and dehydration. Its dry, dead outer cells are difficult for microbes to penetrate, and the sebaceous glands produce oils which help kill microbes.

## Nasal hairs, mucus and cilia

The respiratory system (or gaseous exchange tract) is protected in several ways. Nasal hairs keep out dust and larger microorganisms. Sticky mucus traps dust and microbes. These are then carried away by cilia, which are tiny hairs on the cells that line the gaseous exchange tract.

## Tears

Tears, saliva and mucus contain an enzyme called lysozyme. This destroys microorganisms.

## The second line of defence

## Scabs

If microorganisms get into the body through a cut in the skin, the most important thing is to quickly close the wound so more microorganisms cannot enter. A scab does just this. The blood contains tiny structures called platelets, and a protein called fibrin. A scab is basically platelets stuck in a fibrin mesh. The animation shows how this works.

## White blood cells

As a wound heals, nearby blood vessels widen to allow more blood to reach the area. This causes inflammation where the damaged area becomes swollen, hot and red. White blood cells called phagocytes move into the area, and destroy bacteria by engulfing and digesting them.

## The third line of defence

Pathogens contain certain chemicals that are foreign to the body and are called antigens. White blood cells called lymphocytes carry a specific type of antibody – a protein that has a chemical ‘ fit’ to a certain antigen. When a lymphocyte with the appropriate antibody meets a dangerous foreign body (pathogen containing antigen), the lymphocyte reproduces quickly, and makes many copies of the antibody that neutralises the pathogen.

Antibodies neutralise pathogens in a number of ways:

They bind to pathogens and damage or destroy them.

They coat pathogens, clumping them together so that they are easily ingested by phagocytes.

They bind to the pathogens and release chemical signals to attract more phagocytes.

Lymphocytes may also release antitoxins that stick to the appropriate toxin and stop it damaging the body.

## Tuberculosis

Tuberculosis, or TB for short, is a disease caused by a bacterium called Mycobacterium tuberculosis. The microorganisms are spread through the air in tiny droplets when an infected person sneezes or coughs. Most people who are infected do not show any symptoms. About 10 per cent of people who are infected will go on to suffer symptoms, which include:

shortness of breath

coughing

weight loss

tiredness

fever

death (in about 50 per cent of cases)

Only infected people who show symptoms of TB can spread the microorganisms to other people.

## Prevention and control of TB (Higher Tier)

The BCG (Bacillus Calmette-Guérin) vaccination protects about 75 per cent of uninfected people from becoming infected.

Antiobiotics are drugs that kill bacteria or prevent them from reproducing. Infected people who do not show any symptoms of TB are usually given a course of one antibiotic, but infected people who are showing symptoms of TB need a course of several antibiotics at once. This is to reduce the chance that strains of antibiotic-resistant bacteria will emerge.

http://www. bbc. co. uk/schools/gcsebitesize/science/edexcel/health/defendingagainstinfectionrev5. shtml