

## 5.3 PATHOGENS AND DISEASE

### 5.3.1 Define pathogen.

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**Pathogen:** an organism causing disease.

### 5.3.2 State one example of a disease caused by members of each of the following groups: viruses, bacteria, fungi, protozoa, flatworms and roundworms.

*Students should know to which group the pathogen that causes each disease belongs.*

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Many different organisms can cause disease. Below you find some examples (see also section 5.3.1)

**Viruses:** e.g. chicken pox, poliomyelitis.

**Bacteria:** e.g. tetanus, tuberculosis.

**Fungi:** e.g. athlete's foot (tinea), ringworm.

**Protozoa:** e.g. malaria, sleeping sickness.

**Flatworms:** e.g. bilharzia (caused by blood fluke).

**Roundworms:** e.g. elephantiasis (caused by threadworms living in and blocking the lymphatic system).

### 5.3.3 List six methods by which pathogens are transmitted and gain entry to the body.

*Note that this is simply a list and no descriptions or details of methods are required.*

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Methods by which disease-causing agents are transmitted and gain entry to the body:

airborne droplets in the air	breathe in pass through lung epithelial
water-borne water contaminated by human faeces	drink pass through intestinal epithelium
food-borne food contaminated by human faeces	eat pass through intestinal epithelium
insect-borne insect vectors carrying pathogens	bite/sting injected straight into bloodstream
sexually transmitted pathogens transmitted during intercourse	intercourse/close proximity pass through skin
direct contact spread by skin contact/saliva	pass through skin/into digestive tract

## Human Health and Physiology

- 5.3.4 Describe the cause, transmission and effects of one human bacterial disease.  
*A locally occurring disease would be of greatest relevance to students.*

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Cholera is caused by the bacterium *Vibrio cholerae*. It is transmitted easily in areas where clear drinking water is not available. It is typical for places where a (natural) disaster has just occurred (floods, earthquake, war) which has interfered with the normal infra structure.

Cholera bacteria will leave the body of a patient with the faeces. If these faeces contaminate water, many other people drinking this water or washing their food with it can be infected. A few days later these people will suffer from severe diarrhoea, caused by the toxins produced by the bacteria. It is not unusual for these people to die of dehydration.

- 5.3.5 Explain why antibiotics are effective against bacteria but not viruses. © IBO 2001

Antibiotics, such as the aminoglycosides, chloramphenicol, erythromycins, and clindamycin, block protein synthesis in bacteria but not in eukaryotic cells. Bacteria and animal cells synthesise proteins in a similar manner, though the proteins involved are not the same. Those antibiotics that are useful as antibacterial agents use these differences to bind to or inhibit the function of the bacterial proteins. In this way, they prevent the synthesis of new proteins and new bacterial cells without damaging the 'patient'. Viruses consist of genetic material and are not complete cells. Antibiotics do not, therefore, block virus reproduction.

- 5.3.6 Explain the cause, transmission and social implications of AIDS. © IBO 2001

### **Cause:**

HIV virus; origin of the virus is not confirmed.

### **The most common methods of transmission are:**

via blood (mother/child, transfusion, contaminated needles).

via sexual intercourse (homosexual and heterosexual)

### **Social implications:**

ostracising of homosexuals ('homophobia').

ostracising of HIV positive people.

unease over bloodtransfusions.

changes in sexual behaviour of homo- and heterosexuals including reductions in promiscuity and the increased use of condoms. For more details on the life cycle of the HIV virus, see section 6.3.6.