

# Copyrighted Material

# Health issues



Health is the state of physical and mental wellbeing, including being free from disease. Disease is a disorder that has specific symptoms and is not caused by injury. You need to know about factors that can cause ill health.

## 5 Types of disease

Some diseases are communicable and some are not.

### Communicable diseases

Communicable diseases are diseases that can be spread from one person to another. They are often called infectious diseases. They are caused by pathogens – microorganisms that cause disease. Examples of pathogens are:

- bacteria
- viruses
- fungi
- protists.

### Non-communicable diseases

Non-communicable diseases are diseases that cannot be passed on from one person to another.

They are usually caused by lifestyle factors, such as diet, stress, drinking and smoking, and/or failures within the body's own systems, such as autoimmune diseases and old age.

## 2 Disease interaction

Some diseases may be caused by more than one factor.

- Defects in the immune system mean a person is more likely to suffer from infectious diseases.
- Viruses living inside cells can sometimes trigger cancer. Cancer is the result of changes in cells that lead to uncontrolled growth and division.
- Immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma.
- Severe illnesses can lead to mental illnesses, including depression.

Examples include flu, measles and food poisoning.

Examples include cardiovascular diseases, some cancers and diabetes.

## 10 Worked example

Grade 4

The table shows some data on the number of cases of a disease called Ebola in an African country over a 6-week period.

Week	1	2	3	4	5	6
Number of cases of Ebola	50	7	24	81	29	58

(a) Which statement best describes the trend caused by the data?

Tick **one** box.

[1 mark]

There was no change in the number of Ebola case over the 6 weeks.

The number of Ebola cases increased slightly between week 1 and 6.

The number of Ebola cases increased considerably between week 1 and 6.

The number of Ebola cases decreased between week 1 and 6.

(b) Explain whether the disease is communicable or non-communicable [2 marks]

*It is communicable, because it spreads by contact between people.*

## 1 Exam focus

In the exam, you could be expected to interpret data from a table, graph or chart. Before answering any questions, make sure you know what the data are, what the units are, and if there are any trends.

## 10 Exam-style practice

Grade 5

- 1 State what is meant by a 'pathogen'. [1 mark]
- 2 Give **two** examples of pathogens. [2 marks]
- 3 The influenza virus can be carried in droplets in the air. Suggest how an infected person could infect someone else sitting nearby. [2 marks]



Made a start



Feeling confident



Exam ready

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# Coronary heart disease

Cardiovascular disease (CVD) involves the heart or blood vessels. It includes coronary heart disease (CHD). You need to know how different diseases of the heart occur and how they can be treated.

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## Diseases of the heart

### Blocked coronary arteries

The coronary arteries supply the heart muscle cells with blood containing oxygen and glucose.

The build-up of fatty deposits in the coronary arteries is related to high blood cholesterol levels. The deposits can narrow or even block arteries, starving the heart muscle of oxygen. This can cause a heart attack, when the heart stops beating.

### Faulty valves

The valves in the heart prevent blood from flowing backwards when the muscles of the heart contract. Sometimes the valves in the heart become faulty, preventing the valve from opening fully, or the valve may develop a leak. This makes it harder for the heart to pump blood around the body.

### Heart failure

Heart failure occurs when the heart is unable to pump blood around the body properly.

Go to page 20 for more about the heart.

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## Evaluation of treatments

- Heart surgery is serious and there is a risk of death. Also, surgery is not always successful.
- The patient's body may reject the new heart or valve.
- Artificial hearts need a source of power, such as batteries, to make them work so are inconvenient.
- Treatment using drugs, such as statins, may have harmful side effects in some people.
- Mechanical replacement valves can wear out.
- There is a slight risk of a blood clot forming at the site of the stent or valve.

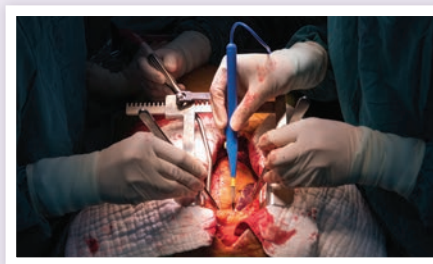


Figure 2 Heart surgery

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## Treatment

### Treating blocked coronary arteries

- Stents can be inserted into the artery to keep the artery open.
- Drugs such as statins can be used to lower blood cholesterol concentration.

### Treating faulty valves

- Biological or mechanical valves are used to replace a faulty valve, using surgery.

### Treating heart failure

- Heart or heart and lung transplants can replace damaged organs with healthy ones.
- An artificial heart may be used to keep a patient alive while they are waiting for a heart transplant. An artificial heart can also help a damaged heart rest to help it recover.

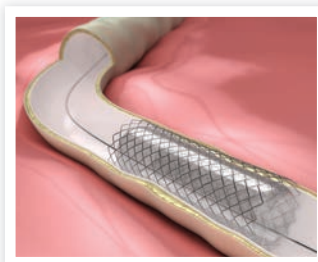


Figure 1 A stent is used to keep arteries open

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## Worked example

Grade 4

Give **two** advantages of using stents to treat coronary heart disease. [2 marks]

*They lower the risk of a heart attack and therefore prolong life for someone with coronary heart disease.*

*They are effective for a long time.*

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## Exam-style practice

Grade 4

Statins are drugs that can reduce blood cholesterol. The list below gives information about statins.

Statins:

- reduce the risk of coronary heart disease
- are a long-term drug that must be taken regularly
- reduce blood pressure which can reduce risk of other diseases
- may cause unwanted side effects such as liver damage.

Using the information given in the box:

(a) give **two** advantages of statins [2 marks]

(b) give **two** disadvantages of statins. [2 marks]





# Risk factors in disease

You need to know how lifestyle and environment can affect whether or not people develop some non-communicable diseases.

## 5 Risk factors

### Lifestyle risk factors

- Smokers are more likely than non-smokers to develop lung cancer and CVD.
- Heavy drinkers are more likely to suffer damage to the brain and liver than less heavy drinkers.
- Smoking and drinking during pregnancy increase the risk of poor growth and development in unborn babies.
- Obese people are more likely to develop Type 2 diabetes than people with a healthy weight. Body mass index is a measure of obesity.
- Lack of exercise and eating a lot of fatty food can increase the risk of developing coronary heart disease, see page 22.

### Environmental risk factors

- People who live in houses in areas affected by radioactive radon gas are more likely to develop cancer, see page 24.

## 5 Impact on non-communicable disease

### Interaction of risk factors

Many risk factors interact to increase the risk of non-communicable diseases. For example the chances of getting coronary heart disease increase dramatically for someone who smokes, drinks heavily, is obese and takes little exercise.

### Impact of lifestyle

Having a poor lifestyle can affect an individual, their family and the wider community.

### Cost implications

Local and national authorities must plan their spending on new hospitals, doctors and surgeries.

Non-communicable diseases, which lifestyle factors contribute to, affect the government's spending on the National Health Service.

## 10 Worked example

Grade 5

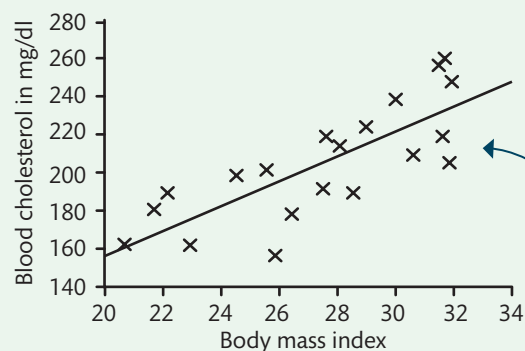
- 1 Describe the relationship between body mass index (BMI) and blood cholesterol concentration, shown in **Figure 1**. [2 marks]

*As the BMI increases so does the blood cholesterol concentration*

- 2 Blood cholesterol concentration is a risk factor for heart disease.

Use **Figure 1** to explain why a doctor would encourage an obese patient to reduce their body mass index. [2 marks]

*The graph shows the higher the BMI, the higher the blood cholesterol concentration, which increases the chances of the patient developing heart disease. Therefore, if the obese patient reduced their BMI (lost weight) they could reduce their chance of getting heart disease.*



**Figure 1** Scatter diagram showing the correlation between body mass index and blood cholesterol concentration

### Maths skills

A scatter diagram is a graph where the values of two variables are plotted against each other. The pattern of the plots might show a correlation between them.

## 2 Causal mechanisms

A causal mechanism is a process that explains how a risk factor can cause a particular disease. For example, it is the carcinogens in tobacco smoke that cause lung cancer. For many years it was thought that smoking caused lung cancer but no one had found a causal mechanism to link the two together. However, people know now that carcinogenic substances in tobacco smoke can cause cells to become cancerous.

## 10 Exam-style practice

Grades 3–4

- 1 Name **one** disease that smoking is a risk factor for. [1 mark]
- 2 A patient has been diagnosed with Type 2 diabetes. Inactivity is one risk factor for developing Type 2 diabetes. List **one** other risk factor. [1 mark]
- 3 Describe a personal cost and a national cost of Type 2 diabetes. [2 marks]



# Cancer

Cancer is caused by changes inside cells that lead to uncontrolled cell division and tissue growth. You need to know the lifestyle and genetic risk factors linked to some cancers.

## 2 Types of tumour ✓

**Benign tumours** are growths of abnormal cells. They usually grow slowly and in one area, often surrounded by a membrane. They are not cancerous and usually do not invade other parts of the body.

**Malignant tumours** are growths of abnormal cells called cancers. They often grow rapidly, invading neighbouring tissues in the body. Cancerous cells can break free from the tumour and get carried by the blood to other parts of the body. These cells continue to divide, producing secondary tumours.

## 5 Worked example Grade 5 ✓

Give **two** reasons why benign tumours are easier to treat than malignant tumours. [2 marks]

*Benign tumours are often contained in a membrane, malignant tumours spread into nearby tissues.*

## 2 Genetic risk factors ✓

Cancer is caused by changes to genes in the DNA that control cell growth. A change in the DNA of a cell is called a **mutation** (page 52).

Some people inherit genes that are more likely to mutate (change) than other genes.

This means that people are born with certain genetic risk factors, which make them more or less likely to develop cancer later in life.

## 5 Lifestyle risk factors ✓

**Carcinogens** are substances or agents that are risk factors for some cancers.

- **UV radiation in sunlight** – risk factor for skin cancer
- **smoking** – risk factor for lung cancer
- **alcohol** (drinking) – risk factor for liver and other cancers
- **asbestos** (found in some building materials) – risk factor for lung and other cancers
- **radon** (from rocks below houses in some areas) – risk factor for many cancers

## 10 Exam-style practice Grade 5 ✓

**Figure 1** is a chart showing the risk of developing cancer for people who stop smoking.

- (a) Explain what is meant by <30 on the x-axis. [1 mark]
- (b) Describe the relationship between the factors shown in the chart. [1 mark]
- (c) Suggest **one** reason why people might be at risk of lung cancer when they have never smoked. [1 mark]

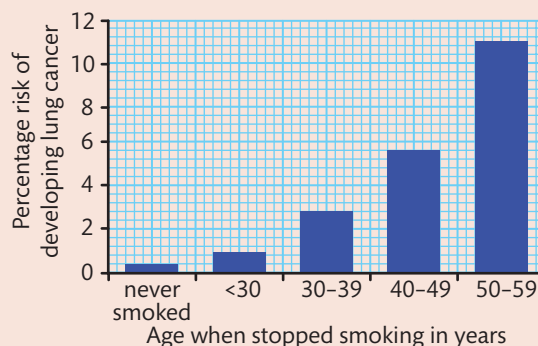


Figure 1





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# Communicable diseases

Communicable diseases are diseases that can be spread from one person to another. They are sometimes called infectious diseases. You need to know how infections can be spread.

## 5 Pathogens

**Pathogens** are microorganisms that cause infectious diseases. Once inside the body they may reproduce rapidly.

- Viruses enter cells and force them to make more copies of the virus.  
The cells are damaged when they break open to release the new viruses, which then invade other cells.
- Bacteria produce poisonous waste products called toxins. These toxins damage tissue and can make you feel ill.

Go to page 27 to revise bacterial diseases.

## 2 Four groups of pathogen

Pathogens can belong to one of these types of organism:

- 1 viruses
- 2 bacteria
- 3 fungi
- 4 protists.

Go to page 26 to revise viral diseases.

## 5 Spread of communicable diseases

Communicable diseases can be spread by:

- 1 **direct contact**, which involves touching or coming into contact with the diseased person, plant or animal
- 2 **indirect contact**, which involves touching objects that have been contaminated with the disease-causing organism, breathing in airborne disease-causing organisms, or eating or drinking contaminated food or water.

The spread of communicable diseases can be reduced or prevented by:

- reducing contact with the microorganism that causes the disease
- using physical barriers, such as surgical masks
- using the immune system to destroy the pathogen
- using drugs, such as antibiotics to destroy bacteria
- vaccination.

Go to page 29 to revise human defence systems.

## 10 Worked example

**Grade 5**

(a) Describe how bacteria make a person feel ill.

**[2 marks]**

*The bacteria produce poisonous waste products called toxins.  
These toxins damage tissue.*

(b) Cholera is a bacterial infection that is spread by drinking water contaminated with the diarrhoea of somebody who is infected with cholera.

Suggest **one** method of preventing the spread of cholera.

**[1 mark]**

*Only drink clean or treated water.*

## 5 Exam-style practice

**Grade 4**

1 Chicken pox is an infectious disease caused by a virus. Describe what is meant by the term 'infectious'. **[1 mark]**

2 The chicken pox virus is spread by touching or breathing in the virus particles that come from the blisters on an infected person.

Suggest **one** method of preventing the spread of the chicken pox virus.

**[1 mark]****Made a start****Feeling confident****Exam ready**

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# Viral diseases



A virus is an infective agent that is too small to be seen using a light microscope. You need to know about some viral diseases.

## 5 Measles

Measles is a viral disease, which affects humans. It is spread by breathing in airborne droplets from sneezes and coughs.

Symptoms include a fever, sore eyes and a red skin rash. Most people recover from the disease but fatal complications can sometimes arise. These complications include swelling of the brain, called encephalitis, and ear and eye infections. This is why most young children are vaccinated against measles.

For more about vaccinations see page 30.



**Figure 1** Measles is usually accompanied by a fever and a red skin rash.

## 5 Human Immunodeficiency Virus (HIV)

HIV causes flu-like symptoms when it first infects the body. The virus attacks the human immune system, which is why the body cannot destroy the virus.

In late-stage HIV infection, the immune system is so damaged it can no longer protect the body from other pathogens or cancers. This stage is called Acquired Immune Deficiency Syndrome (AIDS). The infected person will develop other diseases. It is these diseases that normally kill a person with HIV.

People infected with HIV can take antiviral drugs to prevent the virus from damaging their immune system.

HIV is spread by sexual contact or other exchanges of bodily fluids, such as blood when drug users share needles.

## 5 Tobacco Mosaic Virus (TMV)

Tobacco Mosaic Virus is a disease which commonly affects some types of plants, such as tomato plants.

It produces a characteristic mosaic pattern on the leaves. The TMV-affected leaves can no longer photosynthesise. This causes the plant to die because it can no longer manufacture its own food.



**Figure 2** Plant leaves with TMV

## 5 Worked example

Grade 5

Compare how HIV and the measles virus are spread.

[2 marks]

HIV can only be passed from one person to another through the transfer of body fluids. Measles can be spread by droplets coughed or sneezed out by an infectious person.

## 5 Exam-style practice

Grade 3

1 State **one** method of preventing children developing the measles virus.

[1 mark]

2 Name **one** type of plant that can be infected by the Tobacco Mosaic Virus.

[1 mark]

