

Edexcel
AS level
Biology
CODE: (WBI11)
Topic 1C
Cardiovascular health
and risk



1C.1 – Risk, correlation and cause

Some of these diseases affect you randomly - there is nothing you can do to change whether you are affected or not. However, for many diseases, especially **non-communicable** (non-infectious) **conditions** such as heart disease and cancer, you can increase or lower your **risk** of becoming ill, based on factors in your lifestyle. If you understand the risk factors, you can help to make yourself and your family healthier.

WHAT IS RISK?

The word risk is used regularly in everyday conversation, but in science it has a very specific meaning. In science, risk describes the **probability** that an event will happen. Probability means the chance or likelihood of the event, calculated mathematically.

HOW DO WE PERCEIVE RISK?

The actual risk of doing something is not always the same as the sense of risk one feels. Most people don't think twice before getting into their car - but globally you have an annual risk of 1 in 5747 of being killed in a road traffic accident. On the other hand, many people get very worried before flying, but commercial flights have a 1 in 4.5-5.5 million risk of crashing. Personal perception of risk is based on a variety of factors which include:

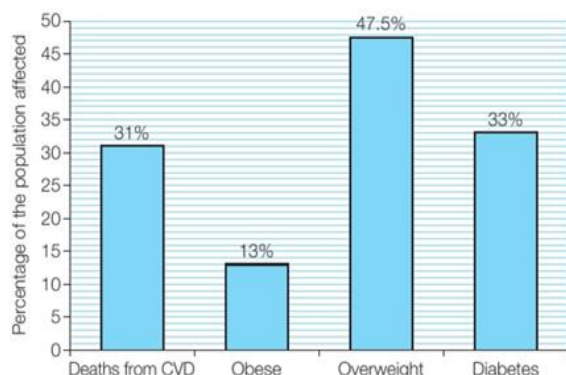
- How familiar you are with the activity
- How much you enjoy the activity
- Whether you approve of the activity.

The actual mathematical risk may play very little part in developing your personal perception of risk. People often overestimate the benefits, or minimise the risk, of behaviour that they want to continue.

EPIDIMIOLOGY

It is possible to identify the **risk factors** that may contribute to the cause of a disease. You can look at people who have the same factors and compare their risk of the disease with the average risk for the whole population. Using these techniques, it appears that there are several factors that increase the likelihood that a person will develop atherosclerosis. If many factors influence your chance of having a disease, it is called a **multifactorial disease**. The study of the patterns of diseases and their causes is called **epidemiology**.

When two different sets of data change together, there may be a link, which is called a **correlation**. However, this does not prove that one is the cause of the other. They could both be caused by something else which would explain why they change in the same way. Correlation is not the same as **causation** - further research is always needed to demonstrate a causal link.



▲ **fig B** This data shows a possible correlation between obesity, diabetes and death from cardiovascular disease (CVD). It needs more data from other sources to show that obesity can cause diabetes and CVD.

SUBJECT VOCABULARY

non-communicable conditions diseases which are not caused by pathogens and cannot be spread from one person to another
risk the probability that an event will take place
probability a measure of the chance or likelihood that an event will take place
risk factors factors which affect the risk of an event happening
multifactorial disease a disease which results from the interactions of many different factors – not from one simple cause
epidemiology the study of patterns of health and disease, to identify causes of different conditions and patterns of infection
correlation a strong tendency for two sets of data to change together
causation when a factor directly causes a specific effect

1C.2 – Investigating the causes of CVDs

DESIGNING STUDIES

Longitudinal studies are valuable in epidemiological research as they follow the same group of individuals over many years, allowing for the tracking of their known lifestyle on their health. Examples include the Münster Heart Study in Europe, the Framingham Study in the US, and the National Children's Study in the US. These studies aim to examine how environmental inputs and genetic factors interact to affect children's health and development. Larger studies, such as the National Children's Study and the UAE Healthy Future Study, combine small and large studies to provide more reliable results. These longitudinal studies provide valuable insights into the complex and varying lives of individuals, making them essential for understanding the impact of lifestyle on health.

evidence than any one of the studies alone. This is called a **metadata analysis (meta-analysis)**.

EVALUATING SCIENTIFIC STUDIES

When considering a study, you need to examine the methodology to see if it is **valid**. That means that it is properly designed to answer the question or questions being asked. You also need to see if the measurements have been carried out with **precision**. It is important to find out if other scientists have been able to repeat the methodology and have had similar results - if so, the results are considered more **reliable**.

It is also important to know who carried out the research, who funded it and where it was published. Then to decide whether any of these factors might have affected or **biased** the study. You need to **evaluate** the data and conclusions from the study in the light of all these factors.

RISK FACTORS FOR CVDS

The results from many epidemiological studies have identified a range of risk factors linked to CVDs. These factors divide into two main groups - those you can't change and those you can do something about (see Section 1C.3).

NON-MODIFIABLE RISK FACTORS FOR ATHEROSCLEROSIS

There are three main risk factors for CVDs which cannot (at the present time) be changed.

■ **Genes:** studies show that there is a genetic tendency (trend) in some families, and also in some ethnic groups, to develop CVDs. These trends can include

- arteries which are easily damaged
- a tendency to develop hypertension which can cause arterial damage and make CVDs more likely
- problems with the cholesterol balance of the body.

■ **Age:** as you get older, your blood vessels begin to lose their elasticity and to narrow slightly. This can make you more likely to suffer from CVDs, particularly heart disease.

■ **Gender:** statistically, under the age of 50, men are more likely to suffer from heart disease (and other CVDs) than women. The female hormone oestrogen, which is an important factor in the woman's menstrual cycle, appears to reduce the build-up of plaque.

LOOKING AT THE DATA

A study conducted in Sweden involving over 21,000 pairs of identical and non-identical twins found that if one twin died of heart disease between ages 36 and 55, the risk of the other twin dying was eight times higher. However, as the twins got older, one dying had less correlation with the other. This suggests a clear genetic link to heart disease in younger men but less in older men.

SUBJECT VOCABULARY

longitudinal studies scientific studies which follow the same group of individuals for many years

metadata analysis (meta-analysis) when data from all the available studies in a particular area are analysed

valid an investigation which is well designed to answer the question being asked

precision measurements with only slight variation between them

reliable evidence which can be repeated by several different scientists

biased when someone is unfairly for or against an idea (e.g. when a scientist is paid by someone with a vested interest in a specific result - they may receive benefit from the outcome)

evaluate to assess or judge the quality of a study and the significance of the results

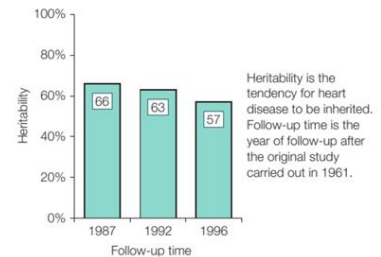
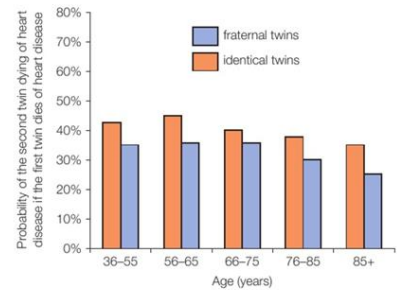


fig A These are results from an epidemiological study of male twins in Sweden published in 1994. Although this study was carried out a long time ago, the findings are still important, because of the large number of twin pairs who took part and the length of the study.

1C.3 Risk factors for cardiovascular disease

Non-modifiable factors like age, genetics, and gender affect CVD risk globally. However, the number of CVD deaths varies significantly based on location, indicating lifestyle factors play a significant role in CVD risk.

MODIFIABLE (LIFESTYLE) RISK FACTORS FOR CVDS

The development of atherosclerosis is linked to many types of CVD. Your lifestyle can affect your risk of developing atherosclerosis in the future. Epidemiological studies have shown links with smoking, diet and weight, lack of activity and high blood pressure. These are the factors we can change, so we can change our risk of developing CVDs by the lifestyle choices we make.

SMOKING AND ATHEROSCLEROSIS

Studies have shown that smokers are far more likely to develop atherosclerosis than non-smokers with a similar lifestyle. Nine out of ten people who need heart bypass surgery or stents as a result of atherosclerosis are smokers. In 2007, a Spanish study showed a clear correlation between smoking and the incidence of death from atherosclerotic heart disease. Causation was established by further research.

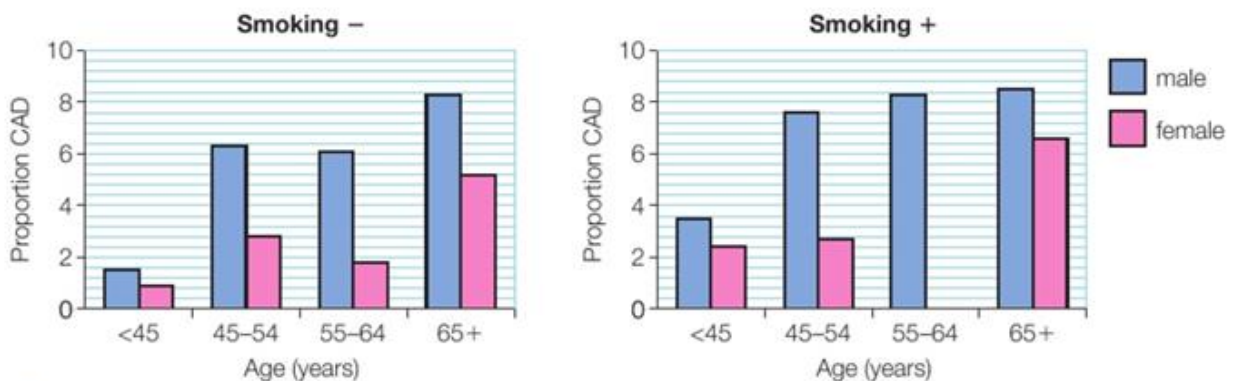


fig B Proportion of adults with coronary artery disease (CAD) depending on whether they smoke or not based on a Jordanian study in 2017.

INACTIVITY AND CVDs

Regular exercise lowers blood pressure, prevents obesity, diabetes, and cholesterol levels, balances lipoproteins, and reduces stress. It also reduces the risk of developing atherosclerosis and cardiovascular diseases (CVDs). Studies show that increased activity reduces the risk of these conditions. Exercise also helps maintain stable plaques in arteries, reducing the likelihood of breaking them. High levels of inactivity are linked to increased risk of these conditions.

HIGH BLOOD PRESSURE AND ATHEROSCLEROSIS

Blood pressure is a vital indicator of heart and blood vessel health. It fluctuates with heart rate, with healthy blood pressure around 120 mmHg at systole and 80 mmHg during diastole. Regularly above 140/90 mmHg indicates high blood pressure or hypertension, which can be a sign of atherosclerosis. Plaque build-up in arteries causes artery walls to become less flexible, narrowing the lumen, and can help diagnose the disease.



fig C Doctors can use a blood pressure monitor like this to check that your blood pressure is in the healthy range. Some people buy and use their own monitor, so they can check their blood pressure regularly to help prevent them getting CVDs

DIET, OBESITY AND ATHEROSCLEROSIS

An increasing number of studies suggest that being overweight does not directly affect your risk of developing CVDs, but it is a very important indicator of risk. Most scientists think that the best predictors of future CVDs are:

- Where fat is stored on your body
- How much exercise you do
- The levels of different fats in your blood.

Two other factors which are often a direct result of being overweight do increase the risk of atherosclerosis and CVDs. These are:

- High blood pressure - increases the risk of damage to blood vessel linings, and so of plaque formation
- Type 2 diabetes - this can result in damage to the lining of the blood vessels which increases the risk of plaque formation.

LINKS BETWEEN FACTORS

Epidemiological studies reveal that increased disease risk often stems from a combination of factors, such as smoking, which affects blood vessels and blood pressure, and changes the balance of lipoproteins in the blood, increasing the risk of atherosclerosis-related cardiovascular diseases.

PREVENTING ATHEROSCLEROSIS AND CVDs

The advice on preventing atherosclerosis and cardiovascular diseases has evolved due to more sophisticated epidemiological studies and scientific research. A balanced diet, smoking cessation, maintaining a healthy weight, avoiding high blood pressure and type 2 diabetes, reducing stress, and regular exercise are key to preventing atherosclerosis in teenagers and young children.

SUBJECT VOCABULARY

high blood pressure blood pressure that is regularly more than 140/90 mmHg; this increases your risk of developing CVDs

hypertension high blood pressure, regularly measuring over 140/90 mmHg, which increases your risk of developing CVDs

1C.4 – Diet and cardiovascular health

WEIGHT ISSUES

The developed world's abundant food supply leads to a positive energy balance, causing excess energy to be converted into fat, resulting in overweight individuals, increasing the risk of various diseases, including cardiovascular diseases.

MEASURING A HEALTHY WEIGHT: THE BODY MASS INDEX

What do we mean by 'overweight'? It isn't just how much you weigh. Doctors and scientists look at your **body mass index (BMI)** to decide if you are unhealthily heavy (see fig A). This compares your weight to your height in a simple formula:

$$\text{BMI} = \frac{\text{weight in kilograms}}{(\text{height in metres})^2}$$

For an adult, the following definitions apply:

- A BMI of less than 18.5 kg m⁻² means you are underweight
- A BMI of 18.5-25 kg m⁻² is the ideal range
- A BMI over 25 and up to 30 kg m⁻² means you are overweight
- A BMI of 30-40 kg m⁻² is considered obese
- A BMI over 40 kg m⁻² defines you as morbidly obese.

The BMI measure, developed in the mid-1800s, was initially used to classify normal, inactive individuals with average body composition. It is now widely used to determine healthy weight and predict cardiovascular disease (CVD) likelihood. However, doctors argue that BMI is limited, as it doesn't account for body composition differences and underestimates body fat in older individuals. International differences also contribute to this issue. Evidence suggests that BMI isn't a reliable predictor of CVDs alone.

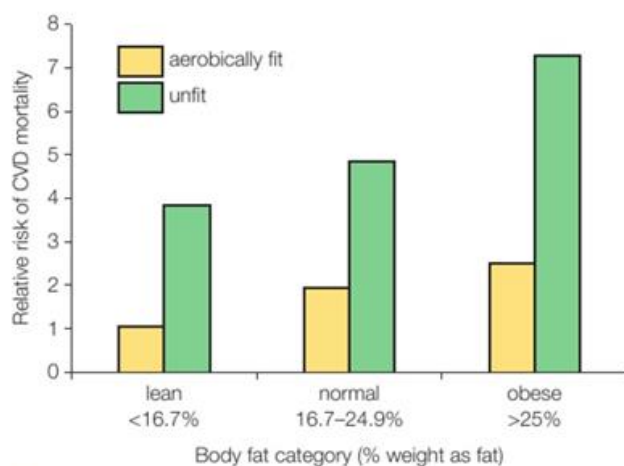


fig B The risk of dying of CVDs differs for people in different weight and fitness categories. Being overweight or obese does increase the risk – but it is not the whole story.

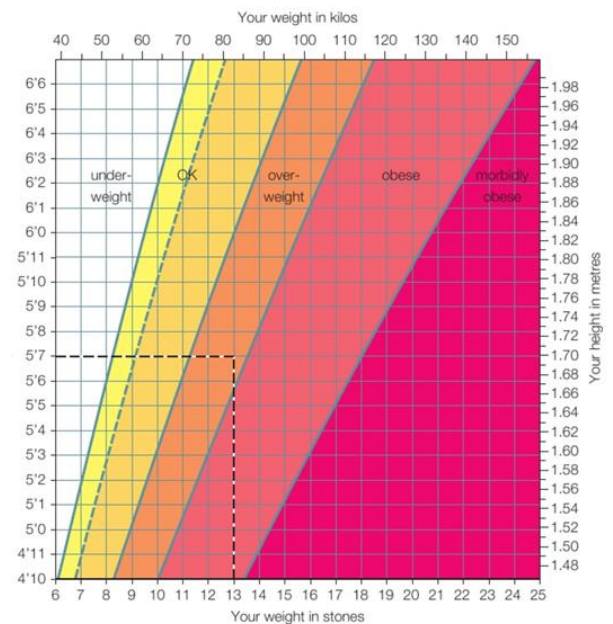


fig A Using a graph like this gives an adult a good idea of whether or not their BMI is in the healthy range.

MEASURING A HEALTHY WEIGHT: THE WAIST-TO-HIP RATIO

Increasingly, scientists are finding that a simple waist: hip ratio is the best measure of obesity, and also the best way to predict an increased risk of CVDs. The waist is measured just above the navel, and the hips at the widest point of the hips. The size of the waist is then divided by the size of the hips:

$$\frac{\text{waist size (cm)}}{\text{hip size (cm)}}$$

Waist size gives a good indication of the amount of fat a person is carrying.

GENDER	WAIST :HIP RATIO INDICATING OBESITY
Male	>0.9
Female	>0.85

To reduce obesity risk, reduce eating and exercise, maintain a healthy waist-hip ratio, and avoid CVDs. Underweight individuals can cause muscle wasting and heart damage. Around 61% of adults in England are overweight or obese, with the proportion increasing. The trend is also seen in developed countries like Saudi Arabia, Qatar, and UAE.

TACKLING OBESITY

Modern lifestyles, including energy-rich food and low exercise, are linked to weight gain due to increased energy input and decreased energy output. Solutions include taxes on fatty foods, town planning, and educating children. However, no clear scientific evidence supports these solutions. Since 2006, the number of overweight people is greater than those who do not eat enough. Waist-to-hip ratio is a better predictor of heart disease than BMI.

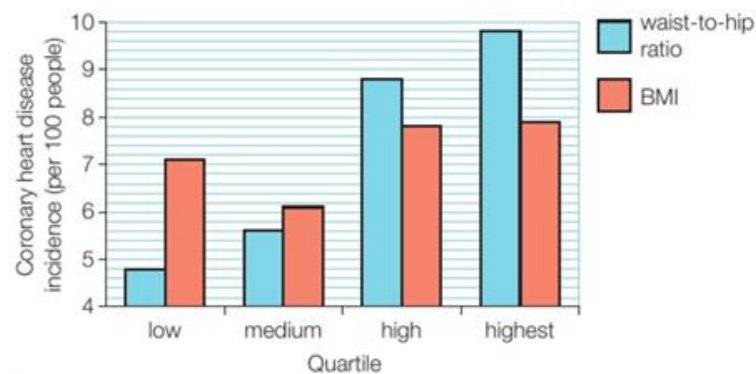


fig C This graph shows that as men become more obese, their risk of developing coronary heart disease also increases. It also shows that waist:hip ratio is a better predictor than BMI.

DIET AND CVDs

The effect of diet on the risk of developing CVDs isn't simply about becoming obese. What you eat, as well as how much you eat, seems to be very important. Many studies have looked at the general diet people eat and at the incidence of heart disease.

Diet plays a significant role in the risk of developing cardiovascular diseases (CVDs). Studies show that high levels of saturated fats in fatty meat and dairy foods, particularly in countries with high saturated fat consumption, can lead to heart disease deaths.

The link between a diet high in saturated fats and a raised incidence of CVDs shows a correlation, but not a cause. Over the last 50 years or so, many scientific studies showed that a high intake of saturated fats was often associated with high blood cholesterol levels. Cholesterol is involved in plaque formation in atherosclerosis, so this suggested a cause for the link between a high-fat diet and CVDs (see fig E).

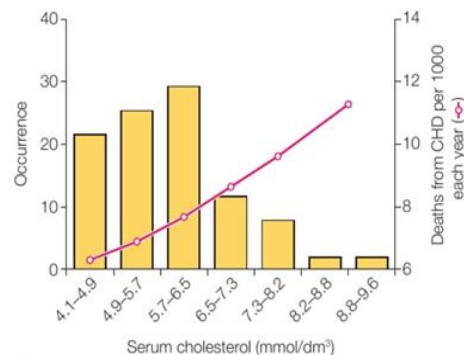


fig E The relationship between blood cholesterol levels and death from coronary heart disease (CHD) in men in the UK. The bars show the frequency with which the different cholesterol concentrations are found, while the line graph shows the number of heart attacks per 1000 men each year.

The relationship between fat in the diet and cholesterol in the blood is further complicated by lipoproteins, conjugated proteins (see Section 1B.5) which transport lipids around the body.

- **Low-density lipoproteins (LDLs)** are made from saturated fats, cholesterol and protein and bind to cell membranes before being taken into the cells. If there are high levels of some LDLs, your cell membranes become saturated and so more LDL cholesterol remains in your blood.
- **High-density lipoproteins (HDLs)** are made from unsaturated fats, cholesterol and protein. They carry cholesterol from body tissues to the liver to be broken down, lowering blood cholesterol levels. HDLs can even help to remove cholesterol from fatty plaques on the arteries which reduces the risk of atherosclerosis.

Scientists are now confident that the balance of these lipoproteins in your blood is a good indication of your risk of developing atherosclerosis and the associated CVDs (see fig F).

SUBJECT VOCABULARY

body mass index (BMI) a calculation to determine if you are a healthy weight by comparing your weight to your height in a simple formula

low-density lipoproteins (LDLs) lipoproteins which transport lipids around the body

high-density lipoproteins (HDLs) lipoproteins which transport cholesterol from body tissues to the liver and can help reduce risks of CVDs

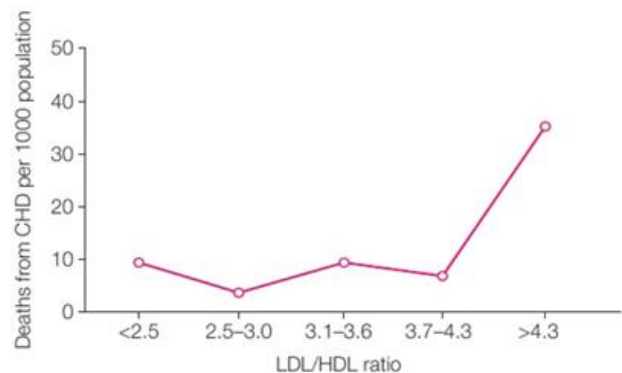


fig F This evidence from a well-known European study into heart disease appears to show a clear link between the LDL/HDL ratio and deaths from coronary heart disease (CHD).

1C.5 – Dietary antioxidants and cardiovascular disease

ANTIOXIDANTS AND HEART HEALTH

Antioxidants, found in fruits and vegetables, were once thought to protect the heart from damage. Vitamins like vitamin A, C, and E, as well as almonds and sunflower oil, were believed to be beneficial. However, recent large metadata analyses have shown that the evidence for antioxidants' health benefits is inconclusive, and some may cause harm.

VITAMIN C: A CASE STUDY

Vitamin C is crucial for connective tissue formation in bones, teeth, skin, and blood vessels. A low vitamin C diet can cause scurvy, bleeding gums, and painful joints. Damaged artery linings increase the risk of atherosclerosis and cardiovascular disease (CVD). A 1997 study found no association between vitamin C concentration and heart attack risk in 1605 Finnish men.

SUBJECT VOCABULARY

antioxidants molecules that inhibit the oxidation of other molecules which can lead to chain reactions that may damage cells

1C.6 – Using the evidence

PREVENTION IS BETTER THAN CURE

Cardiovascular disease has a negative effect on individuals, on families and on society. It costs a lot of money to treat people in hospital. When people are too ill to work, they are losing money for their families, and also for the companies where they work. Treating people with drugs to prevent them from needing surgery is cheaper for health service providers. It is even cheaper (and better for the individual) if we can stop ourselves needing the drugs. So, prevention is better than treatment for CVDs for many reasons (see fig A). However, persuading people to change their lifestyle habits is often difficult.

OVERWEIGHT OR UNDERFIT?

A study on 20000 men aged 30-83 years found that being obese and fit has a lower risk of dying from cardiovascular diseases (CVDs) than being unfit. Obesity is linked to CVDs, and many people opt for slimming diets to lose weight. Regular exercise also helps protect against CVDs, but more people choose diets over regular exercise. Being the correct weight and fit is crucial for overall health.

SO WHY DON'T PEOPLE CHANGE THEIR LIFESTYLE?

People often fail to change their lifestyle due to difficulties in distinguishing between perceived and actual risks. They may overestimate the risk of cardiovascular diseases associated with smoking, obesity, lack of exercise, or a high-salt diet. This is due to the fact that people often continue smoking to avoid weight gain, as it speeds up metabolism and reduces appetite, which helps control body mass. Additionally, the addictive nature of nicotine in tobacco smoke makes it difficult to quit. When calculating their personal risk/benefit situation, people often prioritize immediate benefits over the low risk of heart disease, leading to a lack of change in lifestyle choices.

1C.7 – The benefits and risks of treatment

CONTROLLING BLOOD PRESSURE

As you have seen, hypertension or high blood pressure is a major risk factor for cardiovascular diseases.

ANTIHYPERTENSIVES

Drugs that reduce blood pressure are known as **antihypertensives**. Some commonly prescribed antihypertensive drugs are described below.

- Treatment often begins with **diuretics**, which increase the volume of urine produced. This eliminates excess fluids and salts, so that the blood volume decreases. With less blood, a smaller volume is pumped from the heart and the blood pressure falls.
- **Beta blockers** interfere with the normal system for controlling the heart. They block the response of the heart to hormones such as adrenaline, which normally act to speed up the heart and increase the blood pressure. So, beta blockers make the heart rate slower and the contractions less strong, so the blood pressure is lower.

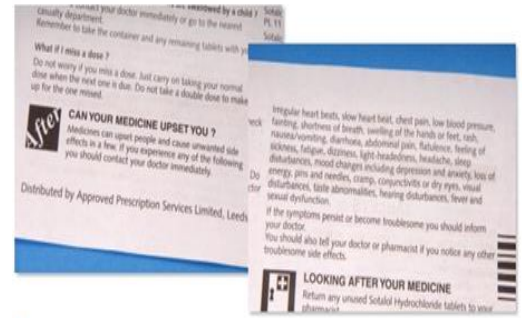
Sympathetic nerve inhibitors affect the sympathetic nerves which go from your central nervous system to all parts of your body. Sympathetic nerves stimulate your arteries to constrict, which raises your blood pressure. The inhibitors prevent these nerves signalling to the arteries, which helps to keep the arteries dilated and your blood pressure lower.

- Angiotensin is a hormone which stimulates the constriction of your blood vessels and so causes the blood pressure to rise. **ACE inhibitors** block the production of angiotensin, which reduces the constriction of your blood vessels and so keeps your blood pressure lower.

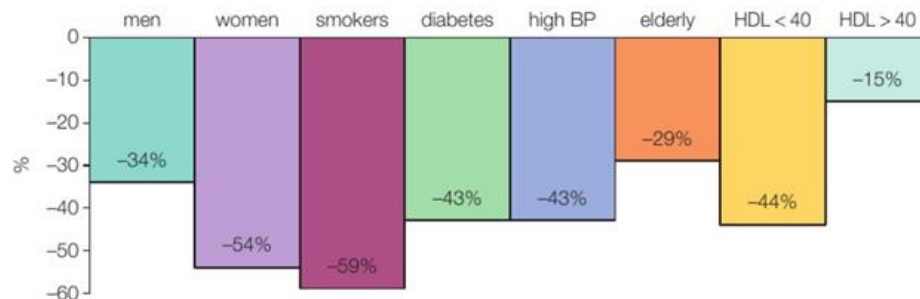
The second major risk is the side-effects that may result from the way your body reacts to the drugs. Each type of drug has its own possible side-effects (see fig A). For a drug to be given a licence for use, the benefits of the treatment must be judged to outweigh any side-effects.

STATINS

Statins are drugs that lower cholesterol levels by blocking the liver enzyme responsible for cholesterol production and reducing LDL production. They improve LDL-HDL balance, reduce inflammation in arteries, and reduce the risk of atherosclerosis. A trial with 6605 Asian Indians in the US showed statins reduce cardiovascular disease incidence in all categories.



▲ **fig A** All medically licensed drugs come with instructions and information which includes possible side-effects known to be caused by the drug.



▲ **fig B** These data show the benefits of statins in reducing the risk of CVDs in Asian Indians, who are a particularly high-risk group. Statins had a strong positive benefit to a range of patients.

A UK study showed that men who took a particular statin for five years had a lower risk of death or heart attack, even 10 years after they stopped taking the drug. The study involved 6595 middle-aged men. It showed that for the first five years, the overall risk of heart attack or death from any type of heart disease was 11.8% for the men who took the statin, compared with 15.5% for men who took a **placebo** (an inactive substance that resembles the drug but has no action in the body).

Statins are a popular drug used to lower cholesterol levels, but they can cause serious side effects such as muscle inflammation and liver problems in a small group. While most people use statins without ill effects, there are rare cases of muscle reactions that can be fatal. Additionally, statins may discourage people from consuming a healthy diet, as they do not provide protection against other ill effects of a bad diet. Plant stanols and sterols, which are similar in structure to cholesterol, are sold as food products and can lower the risk of heart disease by about 25% if used correctly.

Plant stanols and sterols, found in spreads and yoghurts, are similar to cholesterol and help reduce cholesterol absorption from the gut. They are sold as food, not a drug. While scientific evidence suggests their effectiveness, they have not undergone the same testing as statins. Regular consumption can lower heart disease risk by 25%.

ANTICOAGULANTS AND PLATELET INHIBITORY DRUGS

Following heart surgery, or after suffering from a blood clot (thrombosis), drug treatments are used to help prevent the blood clotting too easily. Here are two examples.

Warfarin is an **anticoagulant** that interferes with the manufacture of prothrombin in the body. Low prothrombin levels make the blood clot less easily (see Section 1B.2). Warfarin has been used in rat poison - in high doses the

blood will not clot at all and the rats bleed to death after the slightest injury. In humans, the dose is carefully monitored to make sure that the clotting of the blood is reduced but not prevented completely.

Platelet inhibitory drugs make the platelets less sticky, and so reduce the clotting ability of the blood. The cheapest and most common of these is aspirin (fig D) but clopidogrel is also commonly used.



▲ **fig D** Aspirin is a relatively cheap drug. It has been used traditionally as a painkiller. It is also a very effective way of preventing many cardiovascular problems.

SUBJECT VOCABULARY

antihypertensive drug which reduces high blood pressure

diuretics drugs which increase the volume of urine produced

beta blockers drugs which block the response of the heart to hormones such as adrenaline

sympathetic nerve inhibitors drugs which inhibit sympathetic nerves, keeping arteries dilated

ACE inhibitors drugs which block the production of angiotensin

side-effect a secondary, usually undesirable effect of a drug or medical treatment

statins drugs that lower the level of cholesterol in the blood

placebo an inactive substance resembling a drug being trialled which is used as an experimental control

plant stanols and sterols similar in structure to cholesterol, these compounds can help reduce blood cholesterol in those consuming them

anticoagulant a substance that interferes with the manufacture of prothrombin in the body

platelet inhibitory drugs drugs used to prevent blood clots forming by preventing platelets clumping together

Revision questions

(1) During the cardiac cycle, there are pressure changes in the left atrium, left ventricle and aorta. The graph shows these pressure changes in the left atrium, left ventricle and aorta of a person.

(iii) Use the information on the graph to calculate the heart rate of this person

(b) When the heart valves close, they make a sound. This sound can be detected and recorded. (i) State a time from the graph when the sound of an atrioventricular valve closing would be detected.

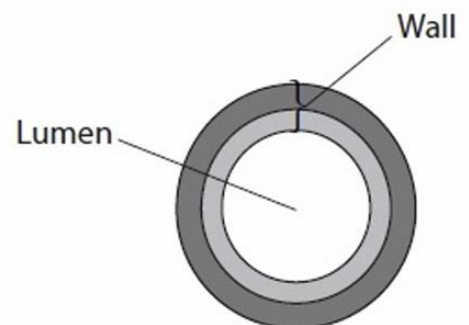
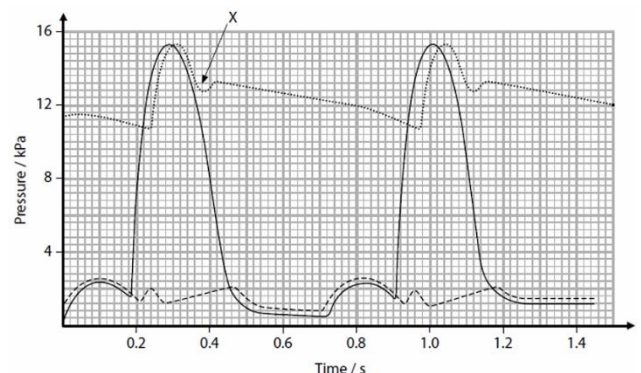
(ii) Explain why the atrioventricular valves need to close.

(2) As levels of activity increase, the heart can respond to the changing demand for oxygen. During the cardiac cycle there are pressure changes in the chambers of the heart. Explain how pressure differences in the heart ensure efficient pumping of the blood into the arteries.

(3) The diagram below shows a cross-section of an artery.

(i) The diameter of the lumen of this artery is 1.9 mm. Calculate the cross-sectional area of the lumen. Show your working. The area of a circle is calculated using the formula πr^2 , where r is the radius of the circle and $\pi = 3.14$.

(ii) Explain how the structure of an artery is related to its functions



(4) Explain why high blood pressure can increase the risk of developing cardiovascular disease (CVD).

(5) During the development of the mammalian heart, there is a hole between the left ventricle and the right ventricle.

This hole usually becomes sealed before the mammal is born. If it is not sealed, the mammal will become easily tired due to a lack of energy.

Explain why a mammal born with a hole between the two ventricles will have these symptoms.

(6) Diet is one factor that affects the development of CVD. Explain how the diet of a person could affect the development of CVD.

(7) Cardiovascular disease (CVD) is a major cause of death and disability in the UK. It has been suggested that magnesium ions are involved in regulating the ratio of HDL to LDL in the blood.

(i) Describe the role of LDLs in the development of atherosclerosis.

(ii) Explain how atherosclerosis can result in damage to heart muscle.

(8) Thrombophilia is a condition that increases the risk of blood clots forming.

This condition increases the risk of venous thromboembolism (VTE), a condition where a blood clot forms in a vein.

Thrombophilia due to the production of overactive factor V can be inherited.

Factor V is involved in the conversion of prothrombin to thrombin.

(i) Describe the role of thrombin in blood clotting.

(ii) Explain why a mutation in the gene coding for the protein factor V may increase the risk of VTE.

(9) An ischaemic stroke occurs when a blood vessel in the brain is blocked by a blood clot. Explain how a blood clot could form in a blood vessel.

(10) Atherosclerosis is more likely to occur in arteries due to the higher blood pressure in these blood vessels. A person with very high blood pressure has an increased risk of developing atherosclerosis.

(i) Describe how very high blood pressure could result in atherosclerosis.

(ii) Explain how atherosclerosis in one part of an artery could increase the likelihood of it developing in another part of the same artery.

(11) A heart attack may occur when a coronary artery is blocked with a blood clot.

The risk of this can be reduced by treatment with platelet inhibitors. Explain why platelet inhibitors would reduce the risk of a heart attack.

(12) It is possible to reduce the risk of CVD by taking medication or changing diet. Explain the role of antihypertensive drugs in reducing the risk of atherosclerosis.