

OCR (B) Biology GCSE

Topic B2.6: How can we treat disease?

Flashcards

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What is the function of painkillers?



What is the function of painkillers?

They reduce the severity of symptoms (i.e. pain) rather than curing the disease itself.



What is an antibiotic?



What is an antibiotic?

- A substance that kills or inhibits the growth of bacteria (no effect on viruses)
- Produced by living organisms e.g. fungi



Why are bacteria becoming increasingly resistant to antibiotics?



Why are bacteria becoming increasingly resistant to antibiotics?

Due to over prescribing and antibiotic misuse e.g. not completing the entire course



How does the failure to complete an antibiotic course increase resistance?



How does the failure to complete an antibiotic course increase resistance?

- Most resistant bacteria survive
- Less competition for resources between remaining bacteria
- Reproduce rapidly, increasing antibiotic resistance



What is MRSA?



What is MRSA?

- Highly resistant strain of bacteria
- Resistant to almost all available antibiotics
- Found in hospitals



How can we reduce the spread of antibiotic-resistant bacteria?



How can we reduce the spread of antibiotic-resistant bacteria?

- Prescribe antibiotics only when necessary
- Ensure patients complete their antibiotic courses
- Reduce the use of antibiotics in farming
- Improve hygiene in hospitals



What are antivirals?



What are antivirals?

- Used to treat viral infections
- Slow down the reproduction of viruses



Why must new antivirals constantly be produced?



Why must new antivirals constantly be produced?

Viruses have a high mutation rate so their surface antigens (targeted by antivirals) are constantly changing.



Why is it difficult to produce antivirals?



Why is it difficult to produce antivirals?

- Viruses reproduce inside living cells
- Antivirals must be produced that do not harm living cells



What is coronary heart disease?



What is coronary heart disease?

- Type of cardiovascular disease (CVD)
- Build up of fatty deposits on the walls of the coronary arteries forms atheromas which reduce blood flow to the heart muscle



How can coronary heart disease lead to a heart attack?



How can coronary heart disease lead to a heart attack?

- Obstruction of a coronary artery due to an atheroma or blood clot
- Results in loss of blood supply to an area of heart muscle
- This causes death of the cells and leads to a heart attack



How can CVD be treated? (3)



How can CVD be treated? (3)

- Improving diet and lifestyle
- Medication
- Surgery



What changes to diet and lifestyle can be made to reduce the risk of CVD?



What changes to diet and lifestyle can be made to reduce the risk of CVD?

- Regular exercise
- Reduce intake of saturated fat
- Maintenance of a healthy weight
- Diet low in salt
- Reduce stress
- Stop smoking and drinking alcohol



How effective are changes to lifestyle and diet in treating CVD?



How effective are changes to lifestyle and diet in treating CVD?

Although not themselves effective in the treatment of CVD, they can enhance the efficiency of other methods of treatment.



Which medicines are used to treat CVD?
(3)



Which medicines are used to treat CVD? (3)

- Statins
- Anticoagulants
- Antihypertensives



Outline the benefits vs the risks of using statins to treat CVD



Outline the benefits vs the risks of using statins to treat CVD

- Statins lower the level of LDLs (cholesterol that contributes to atheromas) in the blood
- However, they can cause liver damage, kidney failure or problems with memory



Outline the benefits vs the risks of using anticoagulants to treat CVD



Outline the benefits vs the risks of using anticoagulants to treat CVD

- Anticoagulants reduce blood clotting, lowering the risk of a heart attack or stroke
- However, they can cause excessive bleeding



Outline the benefits vs the risks of using antihypertensives to treat CVD



Outline the benefits vs the risks of using antihypertensives to treat CVD

- Antihypertensives lower blood pressure, reducing damage to artery walls and the build up of atheromas
- However, they can have unpleasant side-effects such as headaches, dizziness or fainting



What are stents?



What are stents?

- Small, hollow tubes inserted into the lumen of arteries to keep them open
- Require surgery to insert



What are the problems with the use of stents to treat CVD?



What are the problems with the use of stents to treat CVD?

- Stents cause the growth of scar tissue in the arteries over time, further narrowing the artery lumen
- Blood clots may stick to stents



What is a coronary bypass?



What is a coronary bypass?

Using a blood vessel from another region of the body (e.g. leg, arm) to divert blood around a blockage in the coronary artery.



What does a heart transplant involve?



What does a heart transplant involve?

- Replacing a damaged heart with a donated heart
- Immunosuppressant drugs taken to prevent organ rejection



Describe the benefits of heart surgery



Describe the benefits of heart surgery

- Lifesaving
- Can provide a permanent solution to a disease



Describe the risks of heart surgery



Describe the risks of heart surgery

- Major surgery involving many risks e.g. excessive bleeding, infection etc.
- Difficult to find a suitable donor
- Risk of rejection
- Immunosuppressant drugs must be taken for life
- Long recovery time
- Expensive



Describe how 'targets' for new medicines
can be identified



Describe how 'targets' for new medicines can be identified

- Comparisons of the genomes of unaffected individuals and those who are affected by a disease to identify potential disease-causing alleles
- The alleles themselves or the proteins that they code for can be used as a target



Outline the stages of drug development



Outline the stages of drug development

1. Screening
2. Preclinical trials
3. Clinical trials



Describe the process of screening



Describe the process of screening

- Uses a machine to test large libraries of chemical substances
- Enables identification of pre-existing chemicals which may affect the target molecule
- Chemicals may be altered, allowing scientists to produce a drug that reacts with target molecules in a specific way



What do preclinical trials involve?



What do preclinical trials involve?

- Drug tested on cultured human cells and using computer models to determine its toxicity (potential to cause damage) and efficiency
- Drug then tested on live animals to establish a safe dose for humans and observe any side effects



What happens during clinical testing?



What happens during clinical testing?

- The drug is first tested on healthy human volunteers to ensure that it is safe to use and has no other unwanted effects on the body
- Drug then tested on patients with the disease to determine its efficacy. Dosage is slowly increased until an upper limit is established.



What are placebos?



What are placebos?

A substance that appears just like the real drug but has no effect on the recipient



What is a blind trial?



What is a blind trial?

- It is where the participants don't know whether they are receiving the new drug or the placebo
- Prevents the patient's bias affecting the results



What is a double-blind trial?



What is a double-blind trial?

- Neither the participants nor the doctors know who is receiving the new drug or the placebo
- Prevents bias from doctors when analysing the results



What are open-label trials?



What are open-label trials?

A trial in which both the patients and the doctors know who is taking the placebo and who is taking the new drug.



What is the problem associated with using placebos on patients with a disease?



What is the problem associated with using placebos on patients with a disease?

Is it ethical to prescribe a sick patient with a placebo knowing that it will not help their condition improve?



Why can monoclonal antibodies be used
to target cancer cells?
(biology only/higher)



Why can monoclonal antibodies be used to target cancer cells? (biology only/higher)

- Cancer cells have specific antigens called ‘tumour markers’ on their membranes
- Monoclonal antibodies are specific to one type of antigen so can be targeted to ‘tumour markers’ without damaging other cells



What are the two ways in which monoclonal antibodies can be used to treat cancer? (biology only/higher)



What are the two ways in which monoclonal antibodies can be used to treat cancer?

(biology only/higher)

- Trigger an immune response
- Carry drugs to tumour cells



Why don't tumour cells trigger an immune response? (biology only/higher)



Why don't tumour cells trigger an immune response?
(biology only/higher)

The immune system doesn't identify
'tumour markers' as non-self antigens



How can monoclonal antibodies trigger an immune response? (biology only/higher)



How can monoclonal antibodies trigger an immune response? (biology only/higher)

- MAs injected into the patient's bloodstream
- MAs are specific to 'tumour markers' so bind to cancer cells
- WBCs now recognise the cancer cells as foreign
- Immune response triggered
- Cancer cells destroyed



How can monoclonal antibodies target drugs to cancer cells? (biology only/higher)



How can monoclonal antibodies target drugs to cancer cells? (biology only/higher)

- MAs attached to an anti-cancer drug
- MAs injected into the patient's bloodstream
- MAs bind to 'tumour markers' on cancer cells
- Anti-cancer drug destroys cancer cells



Why are cancer treatments that use monoclonal antibodies favoured over traditional treatments?
(biology only/higher)



Why are cancer treatments that use monoclonal antibodies favoured over traditional treatments?

(biology only/higher)

- Radiotherapy and chemotherapy target rapidly dividing cells
- Healthy cells (e.g. hair follicle cells, bone marrow cells) are damaged as a consequence, producing unpleasant side effects
- MAs only target cancer cells, reducing damage to normal cells

