



Cardiovascular disease and its causes: practice questions

9 questions • 32 marks • mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 32

1 UNIT 1 STYLE [1 mark]

Which is the first event in the development of atherosclerosis?

- A. ☐ Formation of a blood clot
- B. ☐ Damage to the endothelium of the artery
- C. ☐ Narrowing of the lumen by calcium salts
- D. ☐ Formation of foam cells from macrophages

2 UNIT 1 STYLE [5 marks]

Describe the course of events that leads to atherosclerosis.

3 UNIT 1 STYLE [4 marks]

Describe the blood clotting process.

4 UNIT 1 STYLE

[4 marks]

Explain how atherosclerosis in a coronary artery can lead to a myocardial infarction (heart attack).

5 UNIT 1 STYLE

[3 marks]

Explain how smoking increases the risk of cardiovascular disease.

6 UNIT 1 STYLE

[1 mark]

How might antioxidants in the diet reduce the risk of cardiovascular disease?

- A. ☐ By neutralising free radicals that oxidise LDL
- B. ☐ By converting LDL into HDL in the blood
- C. ☐ By inhibiting thrombin, so less fibrin forms
- D. ☐ By lowering blood pressure through dilating the arteries

7 UNIT 1 STYLE

[3 marks]

Studies show that people who eat a lot of fruit and vegetables have a lower risk of CVD, but trials of antioxidant tablets show little benefit. Suggest reasons for these conflicting results.

8 UNIT 3 STYLE

[5 marks]

A student wants to compare the vitamin C content of fresh orange juice and orange juice that has been stored for a week. Describe how the student could do this using DCPIP solution.

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9 UNIT 3 STYLE

[6 marks]

A student used DCPIP to measure vitamin C in a fruit juice. A 1.0 mg cm⁻³ ascorbic acid standard needed 0.6 cm³ to decolourise 1 cm³ of DCPIP. The table shows the volume of juice needed. (i) Calculate the mean volume for each juice. (2) (ii) Calculate the vitamin C concentration of each juice, in mg cm⁻³. (2) (iii) Calculate the percentage change in concentration caused by boiling. (1) (iv) Explain the change. (1)

Volume of juice needed to decolourise 1 cm ³ of DCPIP			
Treatment	Repeat 1 / cm ³	Repeat 2 / cm ³	Repeat 3 / cm ³
Fresh juice	1.5	1.6	1.4
Juice boiled for 10 minutes	2.0	2.1	1.9

Answer = ...

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Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B: damage to the endothelium of the artery

2. [5]

- damage to the endothelium / endothelial dysfunction (1)
- LDL cholesterol enters the artery wall (1)
- inflammatory response: white blood cells / monocytes / macrophages enter and take up cholesterol (1)
- plaque / atheroma forms from cholesterol, foam cells, fibres and calcium (1)
- lumen narrows and wall loses elasticity (1)
- blood pressure rises, causing further endothelial damage (1)
- Max 5

3. [4]

- platelets / damaged tissue release thromboplastin (1)
- thromboplastin catalyses conversion of prothrombin to thrombin (1)
- thrombin catalyses conversion of soluble fibrinogen to insoluble fibrin (1)
- fibrin forms a mesh of fibres that traps blood cells / platelets, forming a clot (1)
- Max 4

4. [4]

- plaque may rupture / lumen is narrowed (1)
- clotting is triggered / a thrombus forms on the plaque (1)
- artery blocked / blood flow to part of the cardiac muscle stops (1)
- cardiac muscle cells do not receive oxygen / glucose, so cannot respire aerobically and die (1)
- Max 4

5. [3]

- carbon monoxide binds to haemoglobin, reducing oxygen transport / oxygen supply to heart muscle (1)
- nicotine increases heart rate / blood pressure (1)
- chemicals in smoke damage the endothelium, leading to atherosclerosis (1)
- platelets become stickier / clotting more likely (1)
- Max 3

6. [1]

A A: by neutralising free radicals that oxidise LDL

7. [3]

- people who eat fruit and vegetables may also exercise more / smoke less / eat less saturated fat (1)
- so the lower risk may not be caused by antioxidants (correlation is not causation) (1)
- fruit and vegetables contain other beneficial substances, such as fibre, or antioxidants work in combination (1)
- tablets may give the wrong dose / form / the trials may have been too short (1)
- Max 3

8. [5]

- add a fixed volume of DCPIP (blue) to a test tube (1)
- add the juice drop by drop from a graduated pipette / burette, shaking, until the blue colour just disappears (1)
- record the volume of juice needed; repeat and calculate a mean (1)
- repeat with the stored juice (1)
- the juice needing the smaller volume contains more vitamin C (1)
- control volume and concentration of DCPIP, temperature and the rate of adding juice (1)
- wear eye protection / wipe up spills of DCPIP (1)
- Max 5

9. [6]

- (i) fresh mean = $(1.5 + 1.6 + 1.4) \div 3 = 1.5 \text{ cm}^3$ (1)
- boiled mean = $(2.0 + 2.1 + 1.9) \div 3 = 2.0 \text{ cm}^3$ (1)
- (ii) vitamin C needed = $0.6 \text{ cm}^3 \times 1.0 \text{ mg cm}^{-3} = 0.6 \text{ mg}$ (1)
- fresh $0.6 \div 1.5 = 0.40 \text{ mg cm}^{-3}$; boiled $0.6 \div 2.0 = 0.30 \text{ mg cm}^{-3}$ (1)
- (iii) $(0.30 - 0.40) \div 0.40 \times 100 = -25 \%$ (1)
- (iv) vitamin C is destroyed / oxidised by heating (1)