Diabetes & Controlling Blood Glucose

1 How does the pancreas regulate high glucose levels?

- High levels of glucose in the blood are detected by the pancreas and cause it to release insulin
- Insulin travels around the body in the blood and binds to receptors on various cells
- Particular liver and muscle cells
- And causes them to take in glucose from the bloodstream and convert it to glycogen
- This bring the blood glucose levels back down

[3 marks]

2 Why do we need to maintain our blood glucose levels?

- We need a constant supply of glucose to keep our tissues functions, especially our brain - otherwise could pass out / die
- High levels can damage our blood vessels

[1 mark]

3 What is the difference between type 1 and type 2 diabetes

- Type 1 is 'early onset', i.e. occurs in childhood or teenage years
- Whereas type 2 occurs in older age groups
- In type 1 the pancreas doesn't produce enough insulin
- In type 2 cells around the body are unresponsive to the insulin produced
- Could also discuss treatments as below

[4 marks]

4 Discuss the similarities and differences between the treatments of type 1 and type 2 diabetes

- Both are treated with a healthy low sugar diet
- Both should involve regular exercise - (although type 1 is more focussed on regularity, whereas type 2 is often focussed on weight-loss)
- Type 1 includes insulin injections after meals
- Type 2 can involve drugs, but insulin is not a common treatment

[3 marks]

5 Discuss how the government could reduce the incidence (rate of new cases) of diabetes

- Tax on unhealthy foods
- Subsidies on healthy foods
- Encourage exercise e.g. build more sport facilities
- Earlier intervention in people developing diabetes
- Most would be focussed on type 2 as type 1 is difficult to prevent

[3 marks]

Higher Tier

6 Where is glucagon released from?

- The pancreas

[1 mark]

7 What is the role of glucagon in the body?

- Glucagon is released in the blood when blood glucose concentrations are low
- It binds to receptors on cells around the body, particularly liver cells
- This causes the liver cells to break down stored glycogen into glucose and release it in the blood
- This brings the blood glucose levels back up to normal

[3 marks]

8 What is a negative feedback cycle and how does it play a role in glucose regulation?

- Negative feedback is a regulatory mechanism in which a 'stimulus' causes an opposite 'output' in order to maintain an ideal level of whatever is being regulated
- So when glucose levels rise too high, that stimulus is detected by the pancreas which releases insulin
  - Which in turn brings the glucose levels back down
- But if they drop below the ideal level, this is also detected by the pancreas which releases glucagon
  - Which in turn bring the blood glucose levels back up to normal

[4 marks]

[Total 22 marks]