

Topic 6: Stimuli and response - 3.6.4.1 Principles of homeostasis and negative feedback

Define the terms:

Homeostasis

Positive feedback

Negative feedback

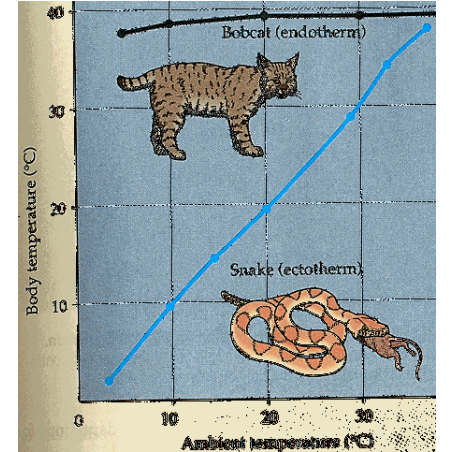
Optimum point

Receptor

Coordinator

Effector

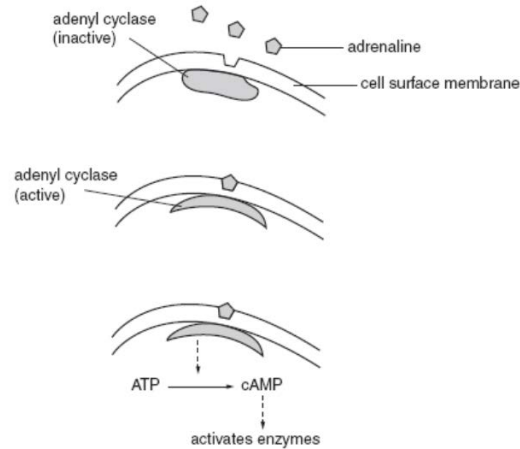
With an example describe negative feedback



With an example describe positive feedback.

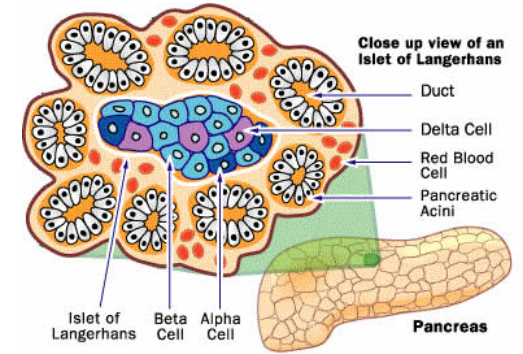
Topic 6: Stimuli and response - 3.6.4.2 Control of blood glucose concentration

Explain how a hormones works using adrenaline as an examples.

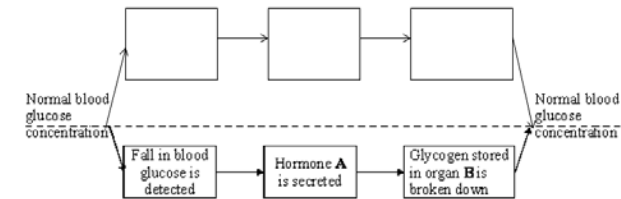


Describe the role of adrenaline in regulating the blood glucose levels.

Describe how the structure of alpha cells are specialized for producing insulin. (Year 1)



Describe the role of the liver in regulating blood glucose. You must include Glycogenesis, glycogenolysis and gluconeogenesis.



Define: Glycogenesis

Glycogenolysis

Gluconeogenesis

Topic 6: Stimuli and response - 3.6.4.2 Control of blood glucose concentration

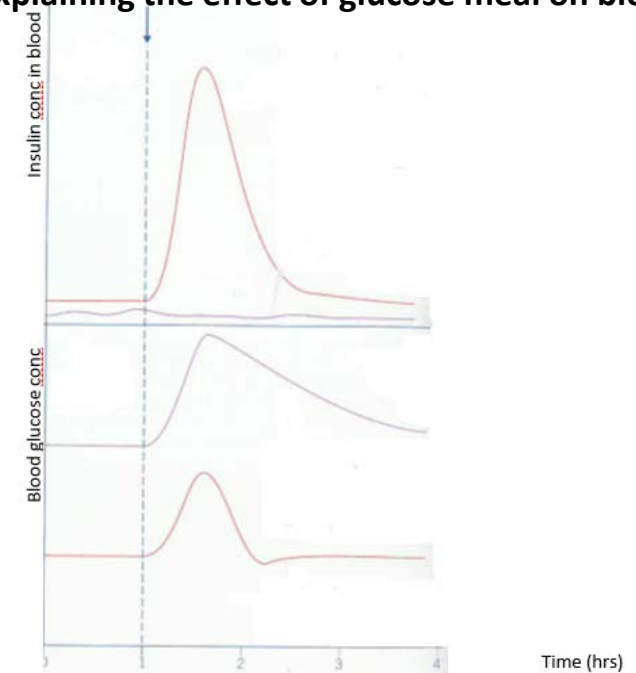
Describe type 1 and type 2 diabetes.



Describe the treatments for type 1 and type 2 diabetes.

Describe the causes for type 1 and type 2 diabetes

Add notes to the graph explaining the effect of glucose meal on blood glucose conc



(a) Give **two** ways in which people with type 1 diabetes control their blood glucose concentration.

1. _____

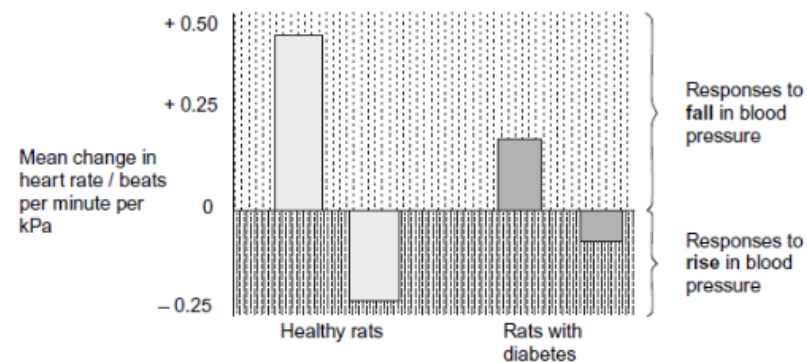
2. _____

(2)

(b) Scientists investigated the effect of diabetes on the control of heart rate in response to changes in blood pressure in rats.

The scientists found the mean changes in heart rates of healthy rats and rats with diabetes in response to rises or falls in blood pressure.

The diagram shows their results in the form they were presented.



Diabetes can damage the nervous system. The response of the rats with diabetes is different from the response of the healthy rats. Use your knowledge of the control of heart rate by the nervous system to suggest an explanation for these results.

(a) Sucrose, maltose and lactose are disaccharides.

(i) Sucrase is an enzyme. It hydrolyses sucrose during digestion. Name the products of this reaction.

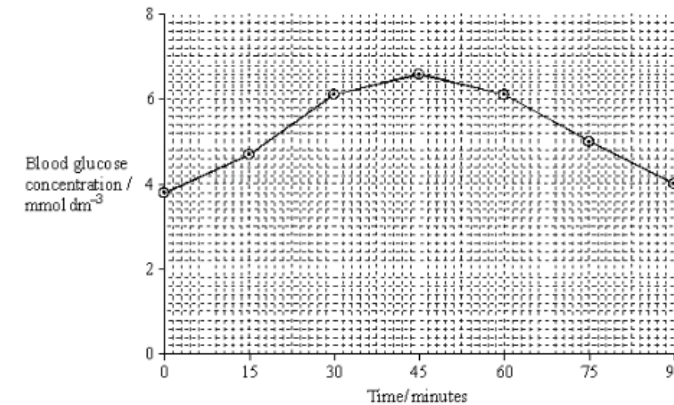
_____ and _____

(2)

(ii) Sucrase does **not** hydrolyse lactose. Use your knowledge of the way in which enzymes work to explain why.

(2)

(b) A woman was given a solution of sucrose to drink. Her blood glucose concentration was measured over the next 90 minutes. The results are shown on the graph.



(i) Describe how the woman's blood glucose concentration changed in the period shown in the graph.

(ii) Explain the results shown on the graph.

(2)

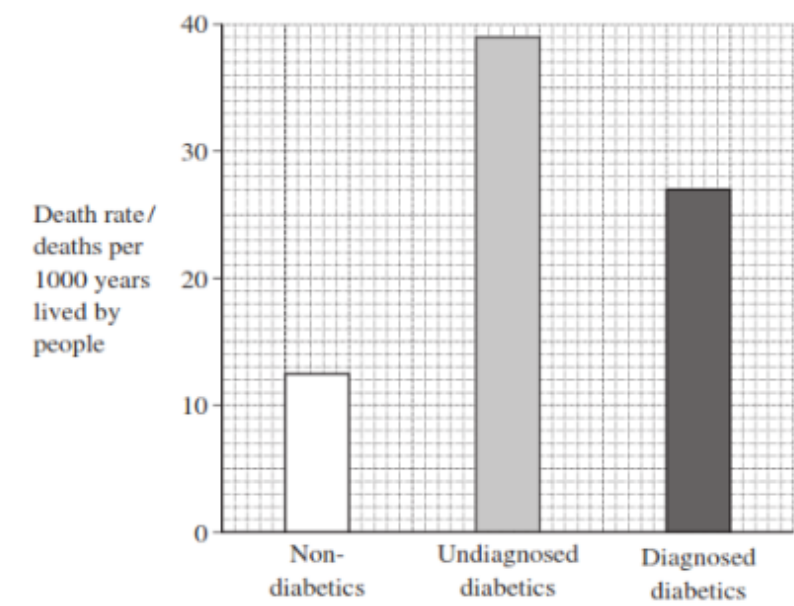
(a) Explain how insulin lowers the concentration of blood glucose.

(Extra space)

(b) Doctors studied a large group of people. They recorded the death rates for non-diabetic people, undiagnosed diabetics and diagnosed diabetics.

They gave the death rates as deaths per 1000 years lived by people.

The graph shows these death rates.



(3)

(i) Calculate the ratio of the death rate of diagnosed diabetics to undiagnosed diabetics.

Ratio

(2)

(ii) People with undiagnosed diabetes were not receiving treatments, such as insulin injections. Suggest **one** reason for the difference in death rates for undiagnosed and diagnosed diabetics.

(2)

(a) 1. Treat with insulin (injection/infusion); 2. (Control) diet/control sugar intake; 2. Accept '(regular) exercise'	2	(a) (i) Glucose; Fructose; Any order.	2
(b) 1. Damage to <u>autonomic</u> (nervous) system in diabetic rats; 2. (Could be) pressure receptors/baroreceptors (in arteries/aorta/carotid body) don't work as well; 3. Damage to medulla		(ii) Lactose has a different shape / structure; Does not fit / bind to active site of enzyme / sucrase; Only allow a second mark if reference is made to the active site. Max 1 mark if active site is described as being on the substrate.	
OR		OR	
Change in (number of) impulses to/from medulla; 4. (When pressure drops damage to) sympathetic system, so doesn't speed up (enough); 5. (When pressure rises damage to) parasympathetic system, so doesn't slow down (enough);		Active site of enzyme / sucrase has a specific shape / structure; Does not fit / bind to lactose; Do not accept same shape.	2
Accept answers in terms of what happens in healthy rats only if then qualified by statement these things don't happen/happen less in rats with diabetes 1. Accept damage to ANS 2. Ignore reference to chemoreceptors 4 and 5. Appropriate system and effect on heart rate both needed	4 max	(b) (i) Rose and fell; Peak at 45 (minutes) / concentration of 6.6 (mmol dm⁻³); (ii) Glucose (produced by digestion) is absorbed / enters blood; Decrease as used up / stored;	2

- (a) Binds to receptor on target/liver/muscle cell;

Reject reference to insulin as an enzyme

Causes more transport/carrier proteins to become active/
move to (plasma) membrane;

Glucose (diffuses) into cells (and lowers blood glucose);

(Enzymes in cells) convert glucose to glycogen;

Stimulates fatty acids/lipid/fat formation (from glucose);

Raises rate of respiration (in cells), using more glucose;

3 max

- (b) (i) 27 : 39;
1 : 1.44;

2 marks for 1 : 1.44

Accept 0.69 : 1

Accept 9 : 13

2

- (ii) One suitable reason; with explanation;

e.g. undiagnosed

Diabetic coma/brain cells not enough respiration;

Due to low blood glucose/acidosis/dehydration;

Heart attacks/coronary heart disease;

Due to faster atheroma formation/damage to arteries;

Kidney failure;

Due to damage to blood vessels;

2 max