OCR (B) Biology GCSE

Topic B5.6: What happens when organs and control systems stop working?

Flashcards

Which organ is responsible for the maintenance of blood glucose concentrations?

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Pancreas

How are blood glucose concentrations controlled?

How are blood glucose concentrations controlled?

Controlled by the hormones insulin and glucagon which are secreted by the pancreas

Insulin and glucagon are antagonistic hormones. What does this mean? (higher)

Insulin and glucagon are antagonistic hormones. What does this mean? (higher)

They have opposite effects which counteract one another.

Describe the role of insulin in the regulation of blood sugar levels

Describe the role of insulin in the regulation of blood sugar levels

- Causes liver and muscle cells to increase their uptake of glucose from the blood
- Glucose is converted into glycogen, a storage molecule

Describe the role of glucagon in the regulation of blood sugar levels (higher)

Describe the role of glucagon in the regulation of blood sugar levels (higher)

- Causes the breakdown of glycogen to glucose in the liver
- Glucose is released into the blood

Describe what happens when blood glucose concentrations become too high (higher)

Describe what happens when blood glucose concentrations become too high (higher)

- Blood glucose concentration increases above a set point
- Pancreas secretes insulin and stops producing glucagon
- Liver and muscle cells have receptors which insulin binds to
- They increase their uptake of glucose and convert it to glycogen
- Some glucose may be stored as lipid in tissues
- Blood glucose concentration decreases, returning to normal level

Describe what happens when blood glucose concentrations become too low (higher)

Describe what happens when blood glucose concentrations become too low (higher)

- Blood glucose concentration decreases below a set point
- Pancreas secretes glucagon and stops producing insulin
- Glucagon binds to receptors on liver cells
- Liver cells have receptors which glucagon binds to
- Glucose is released into the bloodstream
- Blood glucose concentration increases, returning to normal level

What is the control of blood glucose concentration an example of? (higher)

What is the control of blood glucose concentration an example of? (higher)

Negative feedback

What is diabetes?

What is diabetes?

A condition where the homeostatic control of blood glucose levels stops working.

Compare type 1 and type 2 diabetes

Compare type 1 and type 2 diabetes

- Type 1 diabetes occurs when insulin is no longer produced by the pancreas. Generally early-onset.
- Type 2 diabetes occurs when a person develops insulin resistance or doesn't produce enough insulin. Later-onset, often due to obesity.

How is type 1 diabetes treated? (3)

How is type 1 diabetes treated? (3)

- Daily insulin injections at meal times
- Limiting intake of refined sugars
- Regular exercise

How is type 2 diabetes treated? (3)

How is type 2 diabetes treated? (3)

- Balanced diet
  (eating fewer simple sugars and replacing them with more complex carbohydrates)
- Exercise
- Medication or insulin injections (however, these are less effective)

How does exercise help to control diabetes?

How does exercise help to control diabetes?

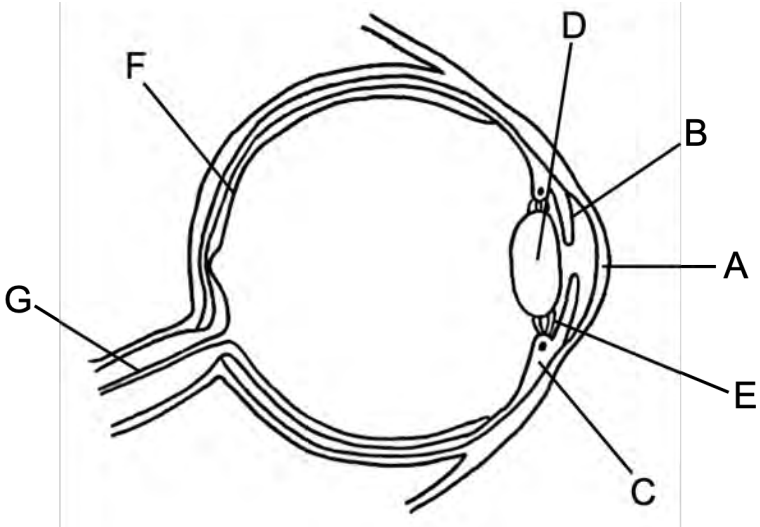
Exercise increases respiration in muscle cells. Excess glucose is removed from the blood to produce energy in the form of ATP.

Why are type 2 diabetics advised to replace simple carbohydrates with more complex carbohydrates?

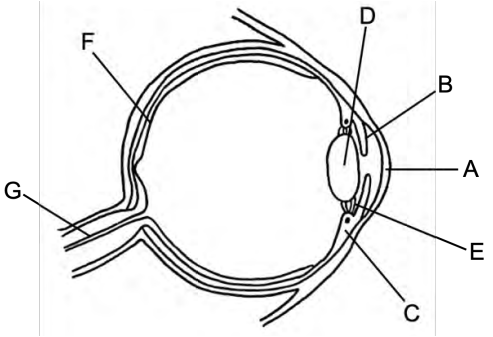
Why are type 2 diabetics advised to replace simple carbohydrates with more complex carbohydrates?

- Simple carbohydrates are broken down quickly so can raise blood glucose levels rapidly.
- Complex carbohydrates take longer to break down so have a reduced effect on blood glucose levels.

Identify the structures of the eye labelled in the diagram below (biology only)



Identify the structures of the eye labelled in the diagram below (biology only)



A = cornea

B = iris

C = ciliary muscle

D = lens

E = suspensory ligaments

F = retina

G = optic nerve

Describe the structure and function of the cornea (biology only)

Describe the structure and function of the cornea (biology only)

- Transparent outer covering of the eye
- Refracts light entering the eye

Describe the structure and function of the iris (biology only)

Describe the structure and function of the iris (biology only)

- Pigmented ring of circular muscles and radial muscles
- Controls the size of the pupil to adjust how much light enters the eye

What is the pupil? (biology only)

What is the pupil? (biology only)

A hole in the centre of the iris that allows light rays to enter the eye

Describe the structure and function of the lens (biology only)

Describe the structure and function of the lens (biology only)

- Transparent, bi-convex structure
- Suspensory ligaments attach the lens to a ring of ciliary muscle
- Refracts light, focusing it onto the retina

What is the function of the ciliary muscles and suspensory ligaments? (biology only)

What is the function of the ciliary muscles and suspensory ligaments? (biology only)

They change the shape of the lens (accomodation) to focus light onto the retina.

Describe the structure and function of the retina (biology only)

Describe the structure and function of the retina (biology only)

- Light sensitive layer containing rod and cone cells
- Converts light energy into neural signals which are sent to the brain via the optic nerve

What is the function of the optic nerve? (biology only)

What is the function of the optic nerve? (biology only)

It transmits nerve impulses to the brain from the retina.

Describe how dim light affects the size of the pupil (biology only)

Describe how dim light affects the size of the pupil (biology only)

- Light receptors detect dim light
- Circular muscles relax
- Radial muscles contract
- Pupil dilates
- More light enters the pupil

Describe how bright light affects the size of the pupil (biology only)

Describe how bright light affects the size of the pupil (biology only)

- Light receptors detect bright light
- Circular muscles contract
- Radial muscles relax
- Pupil contracts
- Less light enters the pupil

Why is the iris reflex important?
(biology only)

Why is the iris reflex important? (biology only)

It prevents bright light from damaging the retina.

What is accommodation? (biology only)

What is accommodation? (biology only)

- Process by which the elastic lens changes its shape (with the aid of ciliary muscles and suspensory ligaments) to focus on near or distant objects
- Light is focused onto the retina

Describe how the eye focuses on near objects (biology only)

Describe how the eye focuses on near objects (biology only)

- Near object
- Ciliary muscles contract
- Suspensory ligaments slacken
- Lens becomes more convex (more rounded)
- Light is refracted more
- Light rays focused onto the retina

Describe how the eye focuses on distant objects (biology only)

Describe how the eye focuses on distant objects (biology only)

- Distant object
- Ciliary muscles relax
- Suspensory ligaments tighten
- Lens becomes less convex (less rounded)
- Light is refracted less
- Light rays focused onto the retina

What is long-sightedness? (biology only)

What is long-sightedness? (biology only)

- Can focus on distant objects clearly
- Cannot focus on near objects

What are the causes of long-sightedness? (biology only)

What are the causes of long-sightedness? (biology only)

- Eyeball is too short
- Lens is less elastic (usually age-related)
- ∴ light rays are not focussed onto the retina, instead converging behind the retina

How is long-sightedness treated?
(biology only)

How is long-sightedness treated? (biology only)

- Using a convex lens (causes light rays to converge) in glasses or contact lenses
- Replacement lenses
- Laser eye surgery

What is short-sightedness?
(biology only)

What is short-sightedness? (biology only)

- Can focus on near objects clearly
- Cannot focus on distant objects

What are the causes of short-sightedness? (biology only)

What are the causes of short-sightedness? (biology only)

- Eyeball is too long
- Lens is too thick and too rounded
- ∴ light rays are not focussed onto the retina, instead converging in front of the retina

How is short-sightedness treated?
(biology only)

How is short-sightedness treated? (biology only)

- Using a concave lens (causes light rays to diverge) in glasses or contact lenses
- Replacement lenses
- Laser eye surgery

What are cataracts? (biology only)

What are cataracts? (biology only)

- A cloudy patch forms on the lens of the eye which negatively affects vision
- Vision becomes blurry, difficult to see the intensity of colours, problems with glare etc.

How are cataracts treated? (biology only)

How are cataracts treated? (biology only)

The clouded lens is exchanged for a synthetic lens during surgery.

Why is it difficult to treat damage to the nervous system? (biology only/higher)

Why is it difficult to treat damage to the nervous system? (biology only/higher)

- Damage to neurones is permanent and cannot be repaired
- Nerve cells don't divide by mitosis so dead or damaged neurones cannot be replaced