

# WJEC Wales Biology GCSE

## 2.5 (f) to (m) - Homeostasis

### Flashcards

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# What is homeostasis?



# What is homeostasis?

The maintenance of a stable internal environment in the body despite fluctuations in internal and external conditions.



# Why is homeostasis important?



# Why is homeostasis important?

To ensure optimum conditions for enzymes and cellular processes in the body



What type of chemicals help to ensure optimum conditions within the body?



What type of chemicals help to ensure optimum conditions within the body?

Hormones



# What is a hormone?





# What is a hormone?

- A cell signalling molecule produced by endocrine glands and released into the blood
- Travels to a target organ and binds, initiating a response



State three conditions within the body that must be controlled by homeostasis



State three conditions within the body that must be controlled by homeostasis

- Temperature
- Blood glucose concentration
- Water levels



# Why must body temperature be controlled?



# Why must body temperature be controlled?

- Enzymes work best at their optimum temperature
- Deviations from this optimum temperature decrease the rate of enzyme-controlled reactions



What is the optimum temperature for enzymes in the human body?

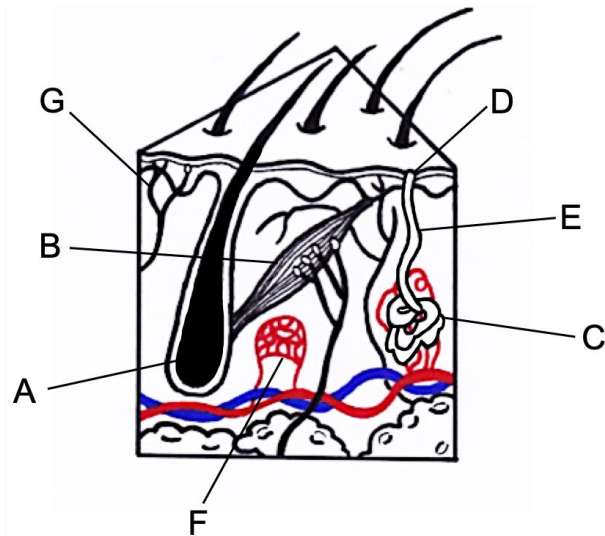


What is the optimum temperature for enzymes in the human body?

37°C



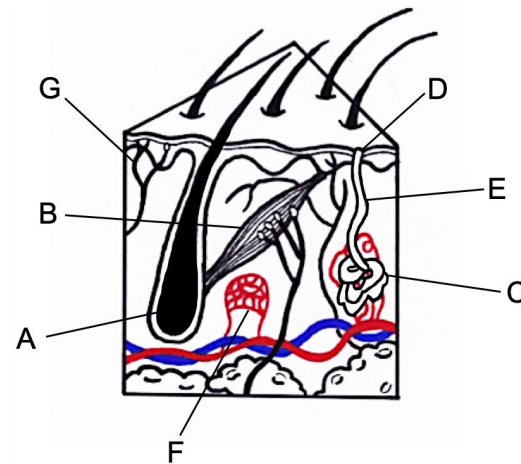
# Identify the structures of the skin labelled in the diagram below





Identify the structures of the skin labelled in the diagram below

<b>A</b>	hair follicle	<b>E</b>	sweat duct
<b>B</b>	erector muscle	<b>F</b>	blood capillaries
<b>C</b>	sweat gland	<b>G</b>	nerve fibre
<b>D</b>	sweat pore		



Outline the responses of the body to an increase in temperature above  $37^{\circ}\text{C}$  (3)



Outline the responses of the body to an increase in temperature above  $37^{\circ}\text{C}$  (3)

- Vasodilation
- Sweating
- Erector muscles relax, hairs lie flat



# What structures produce sweat?



# What structures produce sweat?

## Sweat glands



# How does sweating help to reduce body temperature?



How does sweating help to reduce body temperature?

Heat energy is used to evaporate sweat.  
Increased heat transfer from the skin to the environment decreases body temperature.



# What is vasodilation?





# What is vasodilation?

- Dilation of blood vessels near the skin surface
- Blood flows closer to the skin surface
- Greater heat loss to the surroundings



Outline the responses of the body to a decrease in temperature below  $37^{\circ}\text{C}$  (4)



Outline the responses of the body to a decrease in temperature below  $37^{\circ}\text{C}$  (4)

- Vasoconstriction
- Shivering
- Hair erector muscles contract
- Little sweat is produced



# How does shivering help to increase body temperature?



How does shivering help to increase body temperature?

Involuntary contraction of muscles generates heat energy from respiration



How does the contraction of hair erector muscles help to increase body temperature?



How does the contraction of hair erector muscles help to increase body temperature?

Hairs stand on end creating pockets of air between hairs and a layer of insulation.



# What is vasoconstriction?





# What is vasoconstriction?

- Constriction of blood vessels near skin surface
- Less blood flows close to the skin surface
- Less heat loss to the surroundings



# Why must blood glucose concentrations be controlled?



## Why must blood glucose concentrations be controlled?

- If blood glucose concentrations rise too high the body risks dehydration
- If blood glucose concentrations become too low the rate of cellular respiration decreases



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



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

Pancreas



# How are blood glucose concentrations controlled?



# How are blood glucose concentrations controlled?

Blood glucose is controlled by insulin (a hormone) which is secreted by the pancreas



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



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



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 cells convert glucose to glycogen which is stored
- 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
- Liver cells convert glycogen into glucose which is released into blood
- Blood glucose concentration increases, returning to normal level



# What is diabetes?



# What is diabetes?

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



# What are the two types of diabetes?



# What are the two types of diabetes?

- Type 1 diabetes
- Type 2 diabetes



# What is the cause of type 1 diabetes?



# What is the cause of type 1 diabetes?

- Immune system attacks and destroys insulin-producing cells
- ∴ pancreas does not produce enough insulin



# How is type 1 diabetes treated? (3)





## How is type 1 diabetes treated? (3)

- Daily insulin injections at meal times
- Managing diet (limiting intake of refined sugars)
- Regularly testing blood glucose levels



# What is the cause of type 2 diabetes?



# What is the cause of type 2 diabetes?

Person develops insulin resistance (often due to obesity)



# How is type 2 diabetes treated? (3)



## How is type 2 diabetes treated? (3)

- Managing diet (limiting intake of refined sugars)
- Regular exercise
- Drugs e.g. metformin



# What is a drug?



# What is a drug?

A substance that affects chemical processes within the body



# Describe the effects of alcohol on the body





## Describe the effects of alcohol on the body

- Decreased reaction time
- Addictive
- Causes liver damage, cardiovascular disease etc.

