

Exercise walk-through

14.3

Hormones

IGCSE Biology

Hormones

adrenaline (adrenal glands) – readies the body for 'fight or flight'

insulin / **glucagon** (pancreas) – control blood glucose

testosterone / **oestrogen** – male / female development

Hormones are chemicals in the blood: **slower** but **longer-lasting** than nerve impulses.

Endocrine glands, and how hormones differ from nerves

Endocrine glands

Hormones are made by **endocrine glands**, which release them straight into the blood – so they reach every organ, and only target cells respond.

Ovaries and testes

The **ovaries** make **oestrogen** for female development; the **testes** make **testosterone** for male development.

Adrenaline

It raises the breathing rate, the **heart rate**, the blood glucose **concentration** and the pupil diameter – and the **liver** releases glucose to fuel it.

Duration

That is the real difference: a nervous response is fast and short-lived, a hormonal one slower and **longer-lasting**.

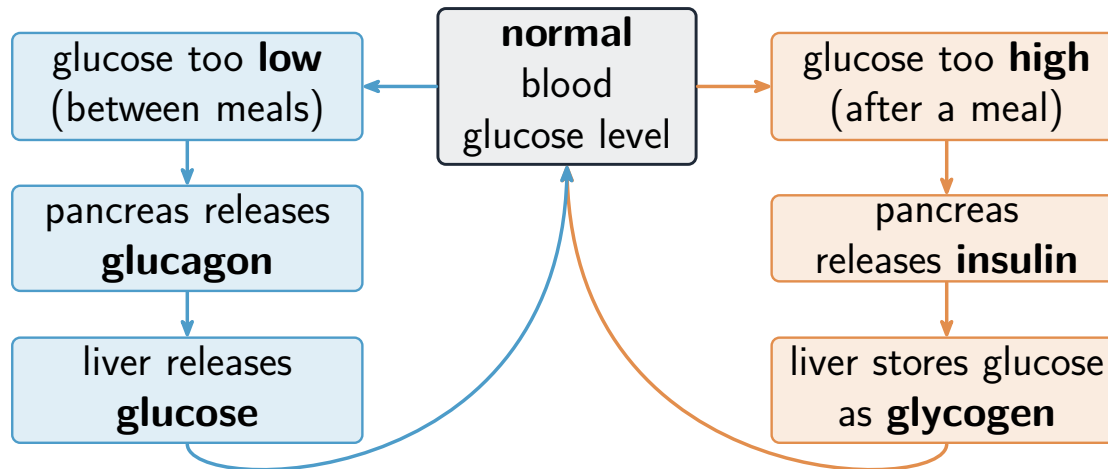
Speed, path and **duration**: three columns that separate nervous from hormonal control in any comparison question.

Homeostasis: blood glucose

Homeostasis keeps the inside steady by **negative feedback**.

- too high → insulin → store **glycogen**
- too low → glucagon → release glucose

Type 1 diabetes 1 : no insulin made.



Controlling body temperature

too hot

sweating ; **vasodilation**
– more blood to the skin loses heat

too cold

shivering ; **vasoconstriction**
– keeps heat in

Skin, blood and the set point

Too hot

You sweat, and the **arterioles** widen (**vasodilation**) so more blood flows to the skin **capillaries** and loses heat.

Too cold

Vasoconstriction narrows them, shivering releases heat from muscle, and hairs stand up to trap air.

Set point

Homeostasis keeps a constant internal **environment** by **negative feedback** : when a value moves off its **set point** , the body acts to bring it back.

Gravitropism

Plants have their own version: **gravitropism** is growth in response to **gravity** – roots down, shoots up.

The capillaries themselves do not move. It is the *arterioles* feeding them that widen or narrow.

Exercises 2.1-2.2

2.1 Define a hormone.

[2]

2.2 Name the gland that releases adrenaline.

[1]

Exercises 2.1·2.2

2.1 Define a hormone.

[2]

2.1

- a chemical made by a **gland**
 - carried in the blood, changing the activity of a **target organ**
-

2.2 Name the gland that releases adrenaline.

[1]

2.2

- adrenaline is released by the **adrenal gland**

Exercise 3.1

3.1 Compared with nervous control, hormonal control is:

[1]

☐

- A** faster and shorter-lived
- B** slower and longer-lasting
- C** electrical
- D** instant

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3.1 Compared with nervous control, hormonal control is:

[1]

☐

A faster and shorter-lived

B slower and longer-lasting

C electrical

D instant

3.1 B

- hormonal control is **slower and longer-lasting**
- A and D are nervous; C is how nerves travel

Exercise 3.2 (a)

3.2 Adrenaline is released in 'fight or flight' situations.

(a) State two effects of adrenaline on the body.

[2]

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[2]

(a)

- any **two** of: increases heart rate / increases breathing rate / raises blood glucose / widens pupils

Exercise 3.2 (b)

3.2 Adrenaline is released in 'fight or flight' situations.

(b) State how a hormone travels to its target organ.

[1]

Exercise 3.2 (b)

3.2 Adrenaline is released in 'fight or flight' situations.

(b) State how a hormone travels to its target organ.

[1]

(b)

- a hormone travels **in the blood**

Exercise 3.3 (a)

3.3 A person walking alone at night hears a sudden loud noise. Adrenaline is released.

(a) State what a hormone is, and name the type of gland that makes one. [2]

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(a)

- a hormone is a chemical messenger carried in the **blood** to target organs
- it is made by an **endocrine** (ductless) gland

Exercise 3.3 (b)

3.3 A person walking alone at night hears a sudden loud noise. Adrenaline is released.

(b) Name the gland that releases adrenaline and describe **three** effects it has on the body. [4]

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(b)

- the **adrenal glands**, just above the kidneys
- any **three** of: heart and breathing rate increase / pupils widen / blood diverted to muscles / glycogen → glucose

Exercise 3.3 (c)

3.3 A person walking alone at night hears a sudden loud noise. Adrenaline is released.

(c) Explain how each of the three effects helps the person deal with danger. [3]

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(c)

- faster heart and breathing deliver more **oxygen and glucose** to muscles
- wider pupils let in **more light**
- more blood and glucose mean more **energy** for running or fighting

Exercise 3.3 (d)

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(d) Compare nervous and hormonal control under **three** headings: how the message travels, how fast it acts, and how long the effect lasts. [3]

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(d)

- nervous: **electrical impulses along neurones**; hormonal: **chemicals in the blood**
- nervous is **very fast**; hormonal is **slower**
- nervous effects are **short-lived**; hormonal last **much longer**