

Hormones and temperature control

Revision notes · How nervous and hormonal communication differ, the sources and roles of adrenaline, insulin and the sex hormones, and temperature control by the skin.

For Edexcel International GCSE Science (Double Award) 4SD0.

Hormones and temperature control Spec 2.86, 2.93-2.95B

Nervous and hormonal communication compared Spec 2.86

Both the nervous system and the **endocrine system** control responses in the body. The endocrine system is made of **glands** that secrete **hormones** directly into the **blood**. The blood carries the hormone to its **target organ**, where it causes an effect.

Nervous and hormonal communication compared		
	Nervous communication	Hormonal communication
Message carried by	Electrical impulses along neurones	Hormones (chemicals) in the blood
Speed of response	Very fast	Slower
Length of effect	Short-lived	Longer-lasting
Where it acts	Specific effectors (muscles or glands)	Target organs, which can be anywhere in the body

Exam tip: Compare in three words: slower, longer, chemical. Hormones travel in the blood, so they reach every part of the body but only affect their target organ.

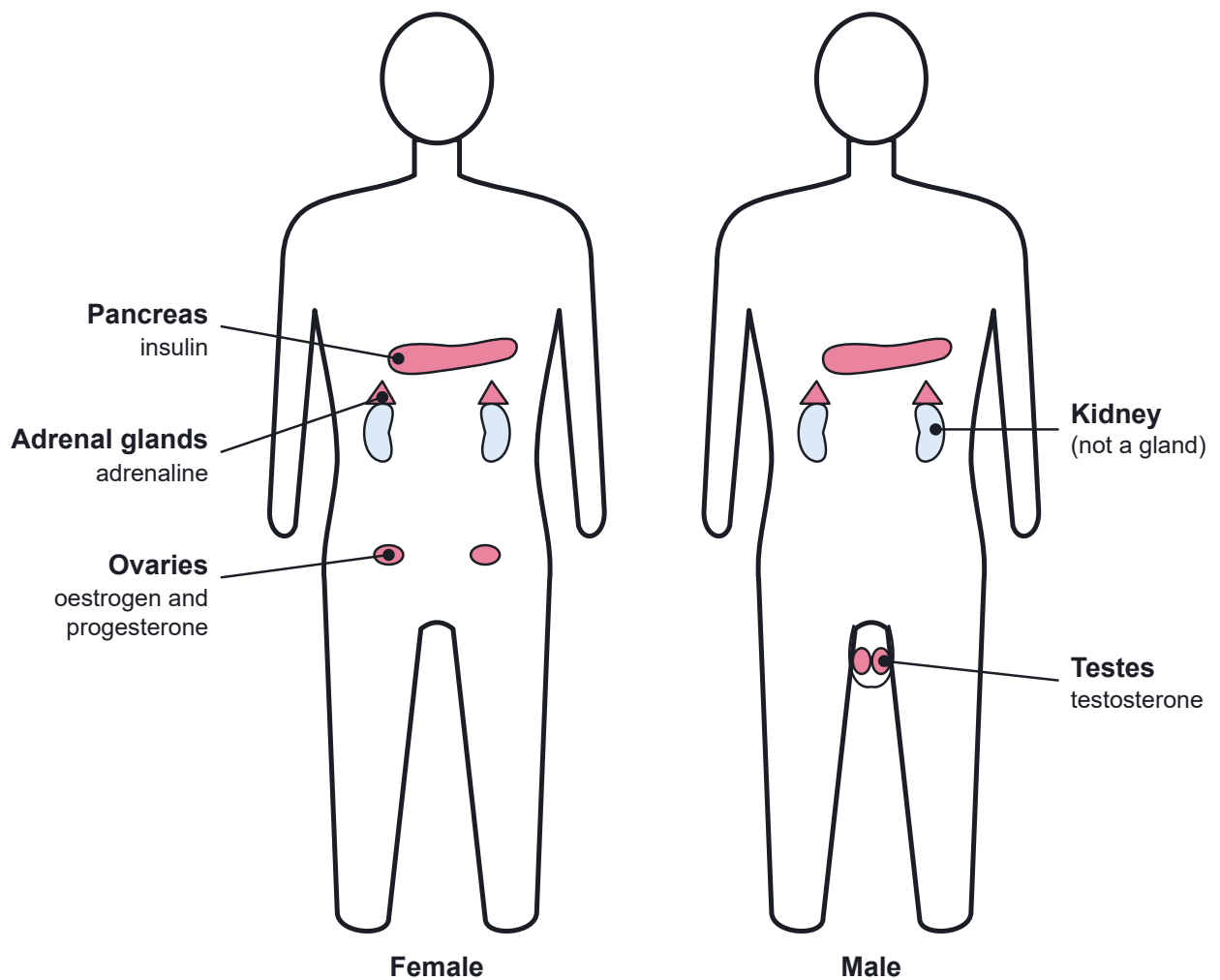
Adrenaline, insulin and the sex hormones Spec 2.94

You need to know the source, role and effects of five hormones.

Five hormones: source, role and effects

Hormone	Source	Role and effects
Adrenaline	Adrenal glands (on top of the kidneys)	Prepares the body for fight or flight . Increases heart rate, so more blood (with oxygen and glucose) reaches the muscles for respiration. Stimulates the liver to change glycogen into glucose, raising blood glucose
Insulin	Pancreas	Controls blood glucose concentration. When blood glucose is high, the pancreas secretes insulin. Insulin makes cells take up glucose from the blood and makes the liver convert glucose into glycogen for storage, so blood glucose falls
Testosterone	Testes	Main male sex hormone. Controls the development of male secondary sexual characteristics at puberty and stimulates sperm production
Oestrogen	Ovaries	Main female sex hormone. Controls the development of female secondary sexual characteristics at puberty and helps repair and build up the uterus lining in the menstrual cycle
Progesterone	Ovaries	Maintains the lining of the uterus in the second half of the menstrual cycle and during pregnancy

Common mistake: The pancreas makes insulin, but the liver stores glycogen. Do not write that the pancreas stores glucose.

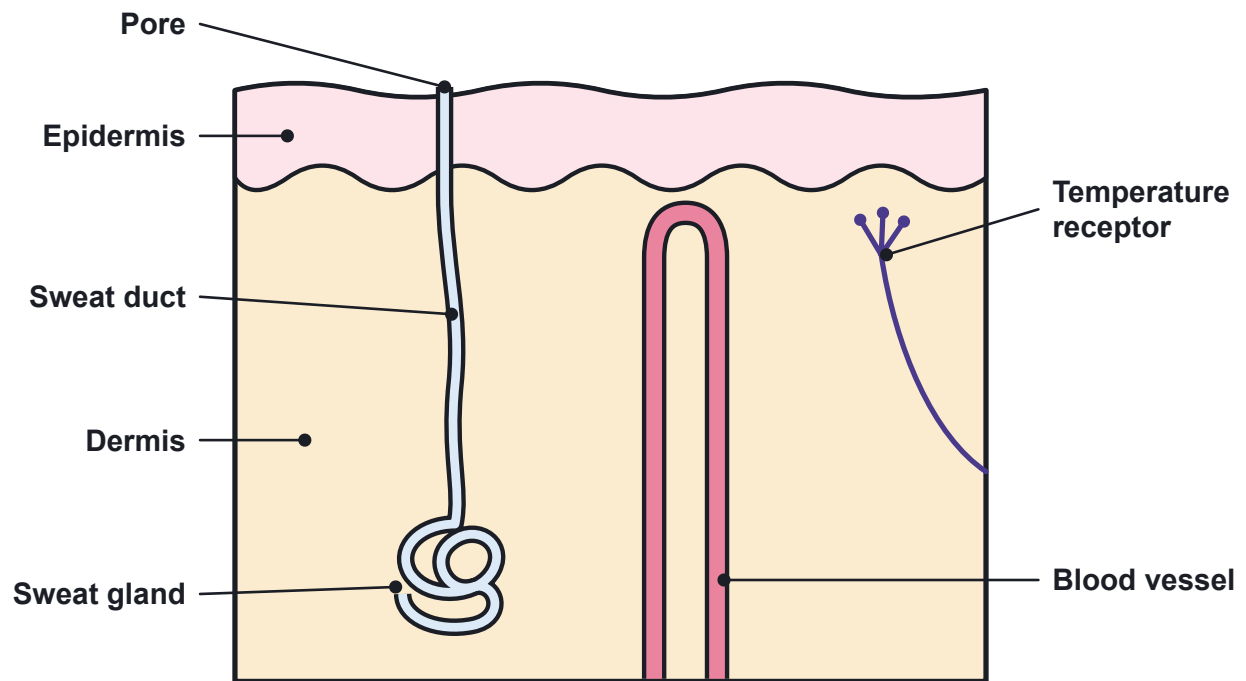


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Where the five hormones are made: **adrenal glands**, **pancreas**, **ovaries** and **testes**.

The skin and temperature control Spec 2.93

The skin helps to keep the body temperature steady. It has two main layers, the **epidermis** (thin outer layer) and the **dermis** below it. The dermis contains sweat glands, blood vessels and temperature receptors.



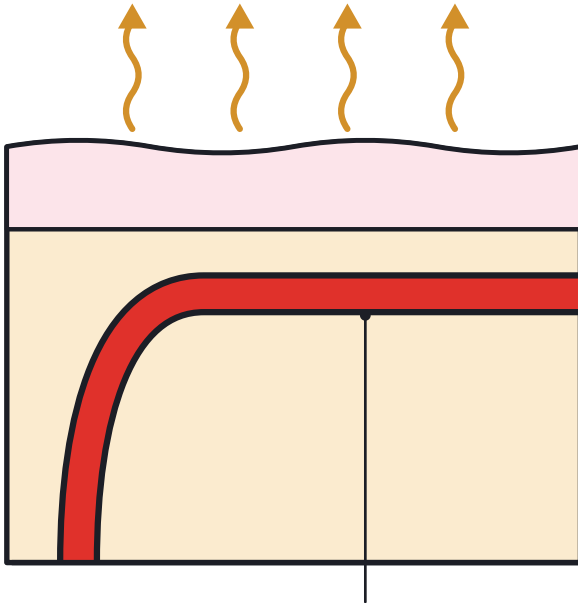
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The structures in the skin involved in **temperature regulation**.

Skin responses to temperature change		
	Body too hot	Body too cold
Sweating	Sweat glands release sweat onto the skin. Sweat evaporates and takes heat from the skin, cooling the body	Little or no sweat is produced
Blood vessels in the dermis	Vasodilation : vessels widen, more blood flows near the surface, more heat is lost	Vasoconstriction : vessels narrow, less blood flows near the surface, less heat is lost
Overall effect	More heat is lost, so body temperature falls back to normal	Less heat is lost, so body temperature rises back to normal

Too hot: vasodilation

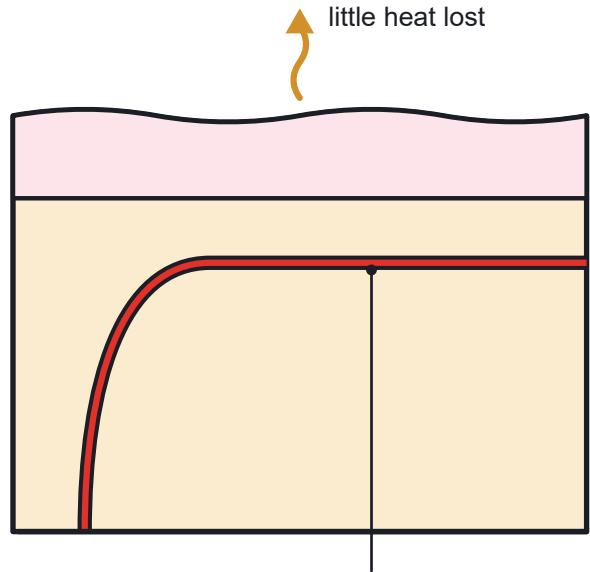
lots of heat lost



Blood vessel widens
more blood near surface

Too cold: vasoconstriction

little heat lost



Blood vessel narrows
less blood near surface

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Vasodilation brings more blood near the surface to lose heat; **vasoconstriction** reduces heat loss.

Common mistake: Blood vessels do not move up or down in the skin. They get wider (vasodilation) or narrower (vasoconstriction).

Quick check

1. Name two differences between nervous and hormonal communication.
2. Which gland makes insulin?
3. Where is adrenaline produced?
4. What happens to skin blood vessels when you are too hot?

Quick check answers

Hormones and temperature control

- 1 . Nervous is fast and short-lived using electrical impulses; hormonal is slower and longer-lasting using chemicals in the blood.
- 2 . The pancreas.
- 3 . In the adrenal glands.
- 4 . They widen (vasodilation), so more heat is lost.