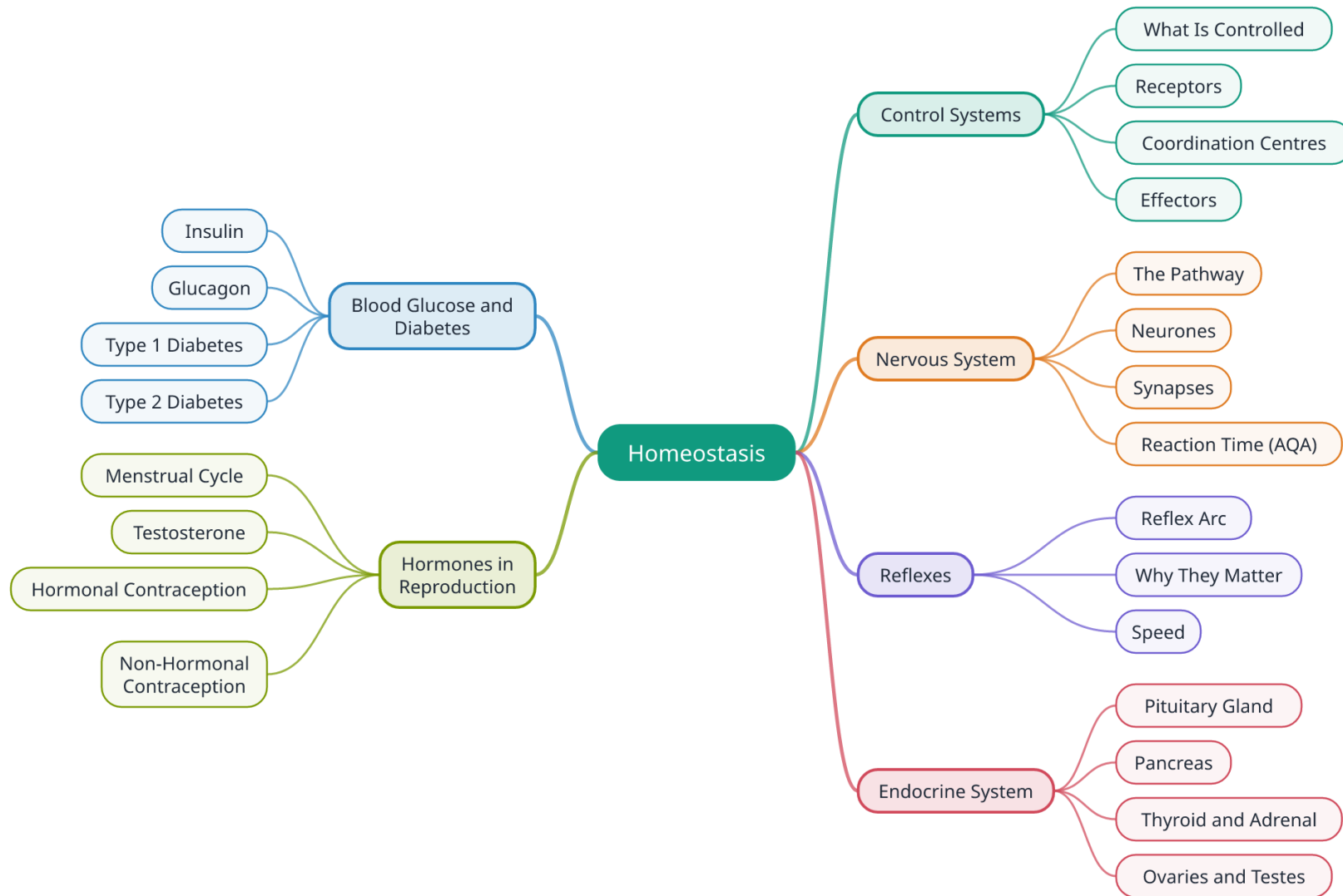


Homeostasis and Response Mind Map (GCSE)

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Homeostasis and Response mind map explained

Control Systems

Homeostasis is the regulation of the internal conditions of a cell or organism to keep them at the best level for enzymes and cells to work.

What Is Controlled

Blood glucose concentration, body temperature and water levels.

Receptors

Cells that detect stimuli, which are changes in the environment.

Coordination Centres

The brain, spinal cord and pancreas receive and process information from receptors.

Effectors

Muscles or glands that bring about a response to restore the right level.

Nervous System

Lets the body react quickly to its surroundings and coordinate its behaviour.

The Pathway

stimulus -> receptor -> coordinator -> effector -> response

Neurones

Sensory neurones carry impulses from receptors to the central nervous system; relay neurones pass them on; motor neurones carry them to effectors.

Synapses

The gap between two neurones. A chemical is released and diffuses across the gap, starting an impulse in the next neurone.

Reaction Time (AQA)

AQA required practical: investigate how a factor, such as caffeine or practice, affects reaction time, for example with a ruler drop test.

Reflexes

Automatic and rapid responses that do not involve the conscious part of the brain.

Reflex Arc

receptor -> sensory neurone -> relay neurone (in the spinal cord) -> motor neurone -> effector

Why They Matter

They protect the body from harm, for example pulling your hand away from something hot.

Speed

Reflexes are fast because the impulse skips the conscious part of the brain.

Endocrine System

Glands secrete hormones directly into the blood, which carries them to a target organ. Effects are slower than nerves but last longer.

Pituitary Gland

The master gland in the brain. Its hormones act on other glands to make them release hormones.

Pancreas

Produces insulin, and glucagon, to control blood glucose.

Thyroid and Adrenal

The thyroid makes thyroxine, which controls metabolic rate. The adrenal glands make adrenaline, which prepares the body for fight or flight.

Ovaries and Testes

Ovaries make oestrogen; testes make testosterone.

Blood Glucose and Diabetes

The pancreas monitors and controls blood glucose concentration.

Insulin

When blood glucose is too high, the pancreas releases insulin. Glucose moves from the blood into cells, and in the liver and muscles excess glucose is stored as glycogen.

Glucagon

Higher tier. When blood glucose is too low, the pancreas releases glucagon, which converts glycogen back into glucose.

Type 1 Diabetes

The pancreas produces too little insulin, so blood glucose can rise uncontrollably. Treated with insulin injections.

Type 2 Diabetes

Body cells no longer respond to insulin. Treated with a carbohydrate-controlled diet and exercise. Obesity is a risk factor.

Hormones in Reproduction

Hormones control puberty, the menstrual cycle and many forms of contraception.

Menstrual Cycle

- FSH: makes eggs mature in the ovary
- LH: stimulates the release of an egg (ovulation)
- Oestrogen and progesterone: build up and maintain the lining of the uterus

Testosterone

The main male hormone, which stimulates sperm production.

Hormonal Contraception

The pill, implants, injections and patches use hormones to stop eggs maturing or being released.

Non-Hormonal Contraception

Condoms and diaphragms (barriers), intrauterine devices, spermicides, abstaining around ovulation, and surgery.

How to revise with this mind map

1. Learn the reflex arc in order, from receptor to effector, and be able to label it on a diagram. It is one of the most common questions in this topic.
2. Compare nervous and hormonal control: how the message travels, how fast it acts and how long the effect lasts.
3. For blood glucose, practise the feedback loop both ways: what happens when glucose is too high, and what happens when it is too low.
4. Know the two types of diabetes by cause and treatment. Type 1 means too little insulin; Type 2 means cells do not respond to it.
5. Make it yours. Build your own homeostasis map in Mindmapi from your class notes, and ask the AI about any branch you are unsure of. The answer is saved into that branch's notes for next time.