AQA Trilogy – Biology key terms – Homeostasis and response

Homeostasis is the maintenance of a constant internal environment (temp, water, ions and glucose levels) of a cell or organism.

It maintains optimal conditions for enzyme action and all cell functions.

Hormonal system

Uses **hormones to control our body**-

Hormones - chemical messengers that travel in the blood. Slow acting, but longer effect.

The pituitary gland in the brain is a 'master gland' which secretes several hormones into the blood in response to body conditions. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects.

The endocrine system is composed of glands which secrete chemicals called hormones directly into the bloodstream.

Controlling blood glucose concentration

Blood glucose concentration is monitored and controlled by the pancreas.

If the blood glucose concentration is too high, the pancreas produces the hormone insulin that causes glucose to move from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage.

If the blood glucose concentration is too low, the pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.

glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.

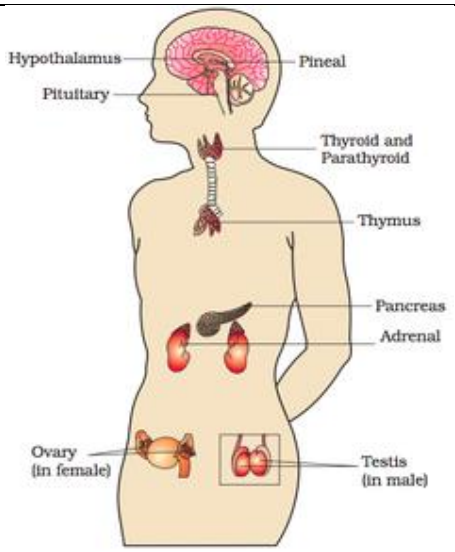

Figure 22.1 Location of endocrine glands

Diabetes

Type 1 diabetes is a disorder in which the pancreas fails to produce sufficient insulin. It is characterised by uncontrolled high blood glucose levels and is normally treated with insulin injections.

In Type 2 diabetes the body cells no longer respond to insulin produced by the pancreas. A carbohydrate controlled diet and an exercise regime are common treatments. Obesity is a risk factor for Type 2 diabetes.

Hormones in menstrual cycle:

FSH – causes eggs to mature. Made in the **pituitary** gland.

Oestrogen – makes uterus lining thicker and is made in the **ovaries**

LH stimulates the eggs to be released. Made in the **pituitary** gland.

Ovulation (release of an egg)- happens on **day 14** of menstrual cycle.

Central Nervous system (CNS)
Uses **nerves** that carry electrical impulses. Very **quick** acting. Usually short effects.

Receptors cells detect **stimuli (a change in the environment)** -have a cell membrane, nucleus and cytoplasm just like other animal cells.

Neurones – nerves that carry electrical impulses.

- The **sensory neuron** transports the impulse from the receptor cell.
- The **relay neurone** transfers the impulse from the sensory neurone to the motor neuron.
- The **motor neutron** transports the impulse to the muscle.

Synapse – a gap between two neurones.
Effectors (muscles or glands) bring responses which restore optimum levels.

Oral contraceptives

They prevent pregnancy.

They contain **oestrogen** (and sometimes progesterone). This inhibits FSH production, so no eggs mature.

Usually about 99% effective & **can stop** straight away if woman wants to get pregnant.

But must remember to take them daily & don't protect against **STIs**.

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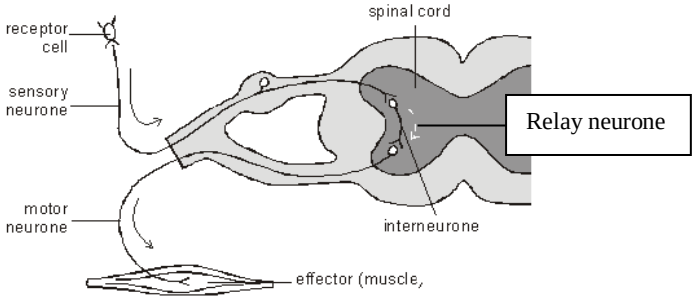
Reflex arc:

1) Stimulus is detected by **receptors**
2) **Electrical impulses** passed from **sensory neurone** to CNS (central nervous system).
3) They cross (diffuse across) the **synapse** with **chemicals** into the **relay neutron**.
4) They travel down **relay neurone** to another synapse.
5) They cross (diffuse across) this new **synapse** with **chemicals** into the **motor neutron**.
6) **The electrical impulses** travel down the **motor neurone** to **effector (muscle)**
7) The muscle contracts (makes us move) or the gland to release hormones



IVF

A technique which helps couples to have babies.

1) Women given **FSH** which help eggs to mature & **LH** to help eggs be released.
2) Egg is taken from female & **fertilised with sperm.**
3) Develops into an embryo in test tube.
4) Then inserted back into uterus of woman to develop.

Although fertility treatment gives a woman the chance to have a baby of her own:

- it is very emotionally and physically stressful
- the success rates are not high
- it can lead to multiple births which are a risk to both the babies and the mother.

Negative Feedback

Students should be able to explain the roles of thyroxine and adrenaline in the body. Adrenaline is produced by the adrenal glands in times of fear or stress. It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles, preparing the body for 'flight or fight'. Thyroxine from the thyroid gland stimulates the basal metabolic rate. It plays an important role in growth and development. Thyroxine levels are controlled by negative feedback.