

# Homeostasis - Nerves

**Homeostasis** means to maintain a **stable internal environment**, including water and ion levels, temperature and glucose levels. These are regulated by automatic control systems in our body.

## Negative Feedback

This is the mechanism that keeps your internal body conditions constant. If the levels of something get too high or too low your body brings it back to normal.

**Level too high**



Detected by a **receptor**



**Coordination centre** receives, process the information and organises a response



**Response** produced by the effector. This counteracts the change, returning the **level back to normal**.

**Level too low**



Detected by a **receptor**



**Coordination centre** receives, process the information and organises a response



**Response** produced by the effector. This counteracts the change, returning the **level back to normal**.

Sometimes the body overcompensates (ie. level starts too high but the response makes the level too low). This is not a problem because negative feedback starts again.

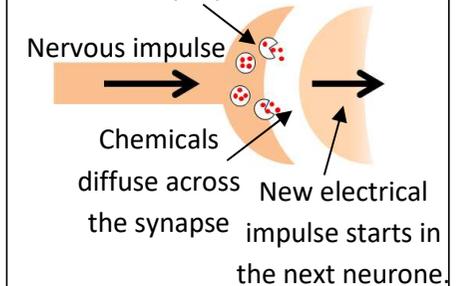
## Nervous System

This allows your body to detect and react to its surroundings.

- **Central nervous system (CNS)**. This is the brain and spinal cord. It co-ordinates the response
- **Sensory neurones** carry electrical impulses from receptors (cells that detect stimuli, eg. light receptors detect light) to the CNS.
- **Motor neurones** carry electrical impulses from the CNS to effectors
- **Effectors** are muscles and glands. They respond to electrical impulses.

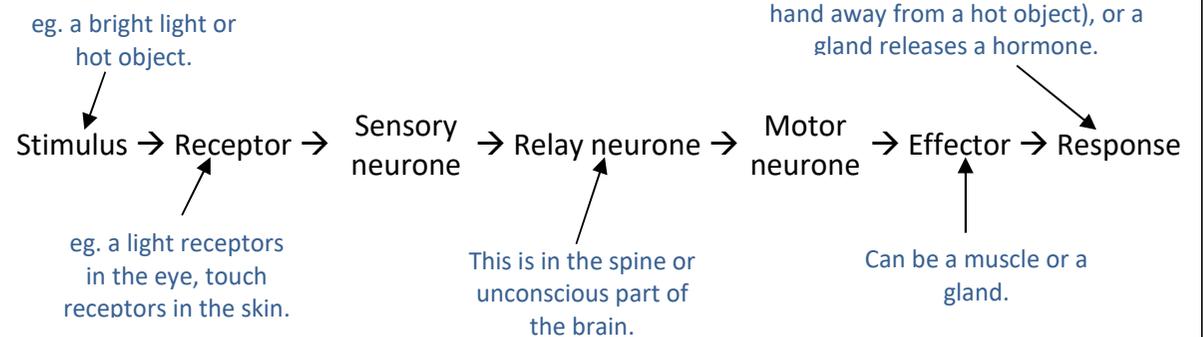
## Synapses

This is the connection between two neurones. Electrical signal causes chemicals to be released into the synapse.



## The Reflex Arc

The reflex arc helps to protect your body. The neurones go through the **spinal cord** or **unconscious** part of the brain. This means the response is very quick. The pathway the electrical impulse takes is:



# Homeostasis - Hormones

## Hormones (Endocrine System)

Hormones are **chemicals** that are released into the blood by glands. They act on a target organ and can have long lasting effects.

**Pituitary gland:** releases many hormones that act on other glands, causing them to release hormones in turn.

**Thyroid:** produces thyroxin which regulates metabolism, heart rate and temperature.

**Adrenal gland:** produces adrenaline (fight or flight hormone).

**Pancreas:** produces insulin which regulates blood glucose levels.

**Ovaries:** produce oestrogen which helps regulate the menstrual cycle.

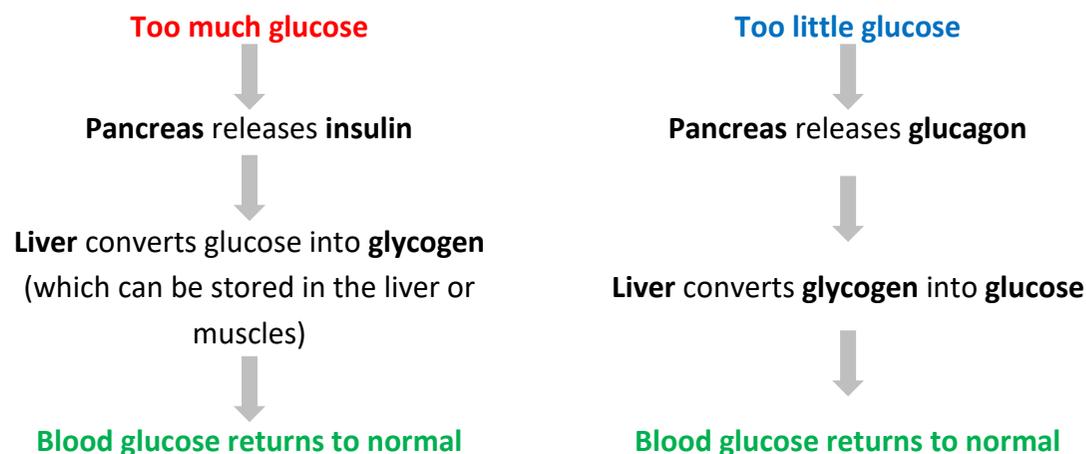
**Testes:** produce testosterone which control puberty and sperm production.

## Nerves vs Hormones

Nerves	Hormones
Electrical impulses	Chemical messages
Carried by neurones	Carried in the blood
Fast acting	Slower action
Act for a short time	Act for a long time
Act on a precise area	Act on a more general area

## Controlling Blood Glucose levels

Blood glucose levels are controlled by negative feedback. The pancreas is the organ responsible for controlling glucose levels by secreting the hormones insulin and glucagon.



## Diabetes

This is a condition where your body is unable to control blood glucose levels properly.

**Type 1:** The pancreas produces too little insulin meaning blood glucose levels can rise too high. Insulin injections are needed and the person may have to avoid sugary foods. Insulin injections are an effective treatment for type 1 diabetes.

**Type 2:** The person becomes resistant to their own insulin. Obesity increases your chance of developing type 2 diabetes. A person can help control type 2 diabetes by exercising and controlling the amount of carbohydrates they eat.