

**(a) Nervous Control**

The **nervous system** consists of:

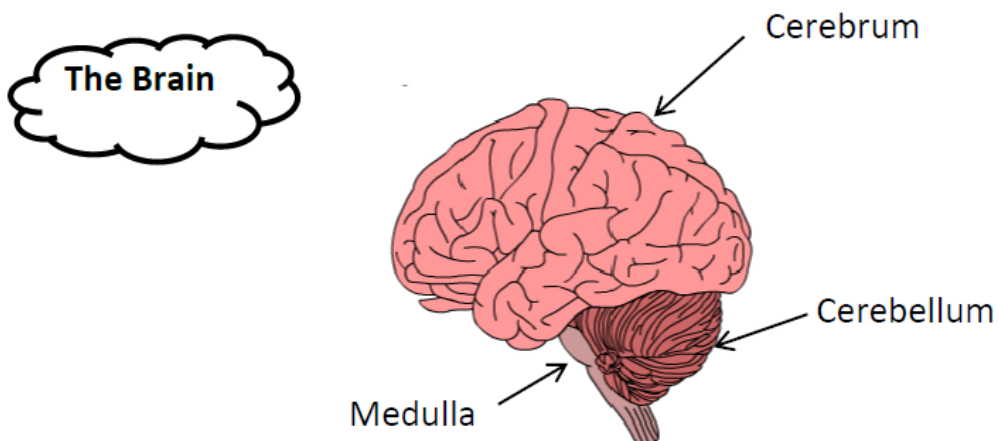
**Central Nervous System (CNS)**

**Other nerves**

The **CNS** consists of:

**Brain**

**Spinal cord**

**Part of Brain****Function**

Cerebrum

Controls memory, conscious thought, intelligence, the senses, personality

Cerebellum

Controls balance and coordination

Medulla

Controls Heart Rate, Breathing Rate

## Neurones

There are 3 types of neurones (nerves):

**Sensory neurones:**

**Pass information from the sense organs to the CNS.**

**Receptors** within sense organs detect a sensory input/stimuli and send an electrical impulse along a sensory neurone.

**Inter neurones:**

**Operate within the CNS. These process information received from the senses which require a response.**

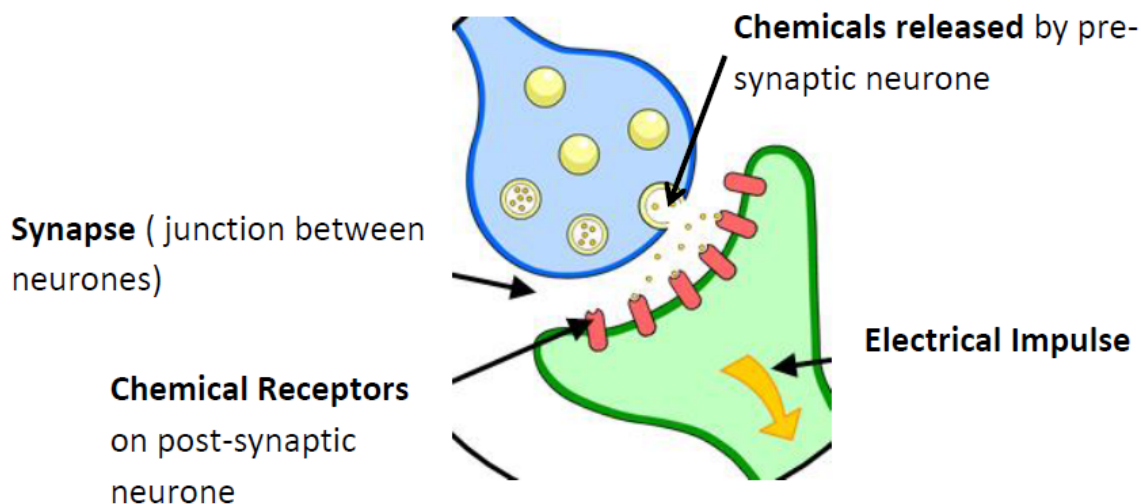
(NB: Previously referred to as relay neurones in past papers)

**Motor neurones:**

Enable a response to occur at an effector (muscle or gland). **These send electrical impulse from the inter neurone to a muscle or gland.**

**Electrical impulses** carry messages along neurones.

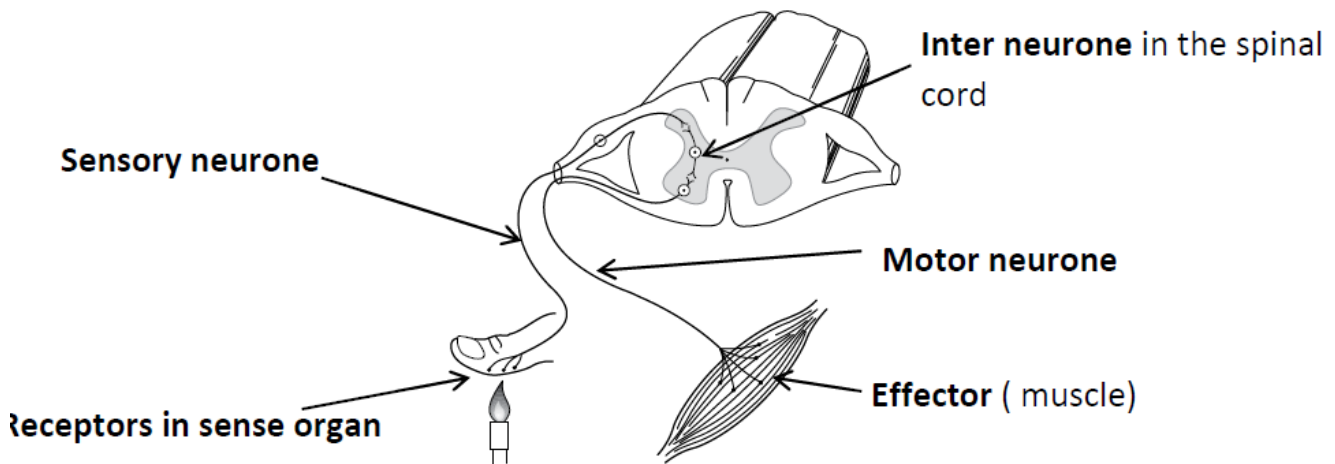
**Chemicals** transfer these messages between neurones at synapses. Synapses are gaps/junctions between one neurone and the next.



## Structure and Function of Reflex Arc

The transmission of a nerve impulse through a reflex arc results in a **Reflex Action**.

A reflex action is a **rapid, involuntary response to a stimulus** e.g limb withdrawal from a hot/sharp surface. Reflex actions are protective responses.



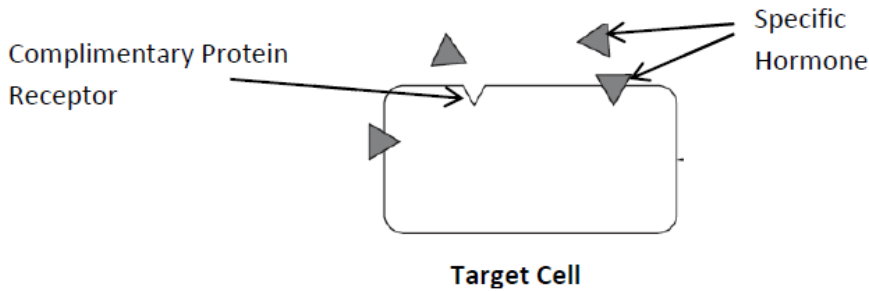
1. **Receptors** in the sense organs (e.g. skin) detect **stimulus** ( e.g. heat).
2. Electrical impulse is sent along a **sensory neurone**.
3. **Chemicals** cross synapse between sensory and inter neurone.
4. Electrical impulse is sent along **inter neurone** (in spinal cord).
5. Inter neurone **processes information**.
6. **Chemicals** cross synapse between inter and motor neurone.
7. Electrical impulse is sent along **motor neurone**.
8. **Effector ( e.g. muscle in arm)** receives impulse and makes a **response** (e.g. limb withdrawal).

## (b) Hormonal Control

The **Endocrine Glands** release **hormones** into the **bloodstream**.

Hormones are **chemical messengers**.

A **target tissue** has cells with **complimentary receptor proteins** for **specific** hormones.



The presence of complimentary receptor proteins on the target cells mean that only that tissue will be affected by these hormones.

### Blood Glucose Regulation

#### High Blood Glucose Levels

**Insulin** is a hormone which is produced in the **pancreas** but has its effect on **target cells in the liver**. It **converts excess glucose into glycogen**.

#### Low Blood Glucose Levels

**Glucagon** is a hormone which is also produced in the **pancreas** and has its effect on **different target cells in the liver**. It **breaks down stored glycogen into glucose**.

