

Unit B6

Brain and Mind

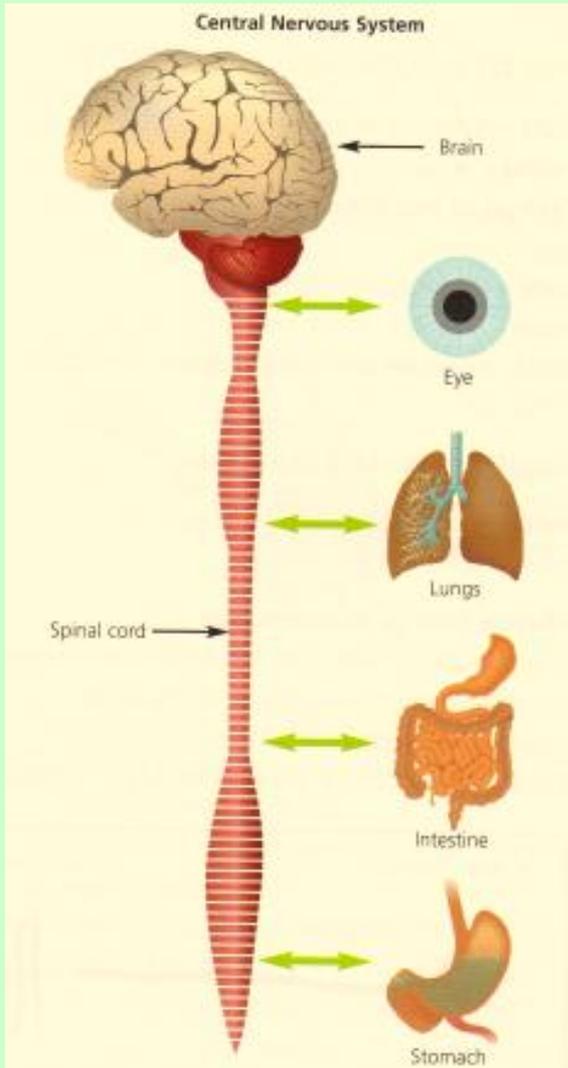
The topics in this unit are:

-  1 - Central nervous system
-  2 - Types of receptor
-  3 - Receptors and effectors
-  4 - Neurons
-  5 - Synapses
-  6 - Simple reflexes
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Central Nervous System

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The **central nervous system** allows an organism to **react** to their surroundings and **respond**



The central nervous system (**brain and spinal cord**) is connected to the body via **neurons**

These neurons send **messages** all over the body

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Types of Receptor

A receptor detects changes in the environment

Examples of receptors are

in the **eyes** to detect **light**



in the **ears** to detect **sound**

in the **tongue** to detect **taste**

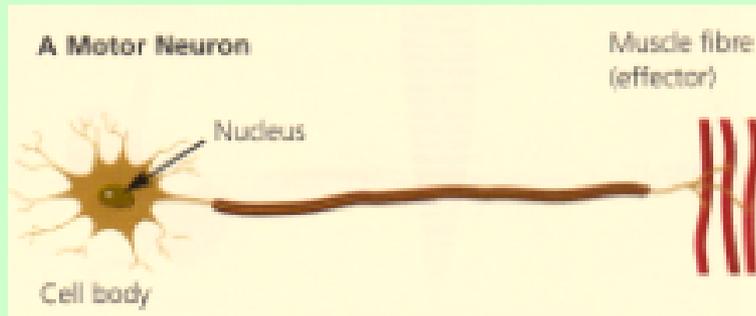


in the **nose** to detect **smell**

in the **skin** to detect **touch, pressure and temperature**

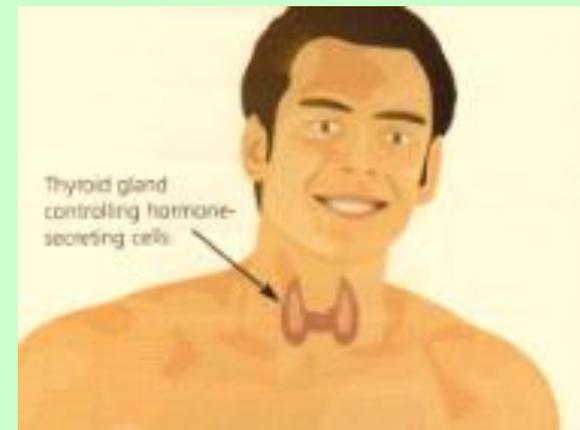
Receptors and Effectors

Once a change has been detected by receptors, effectors in the body can respond



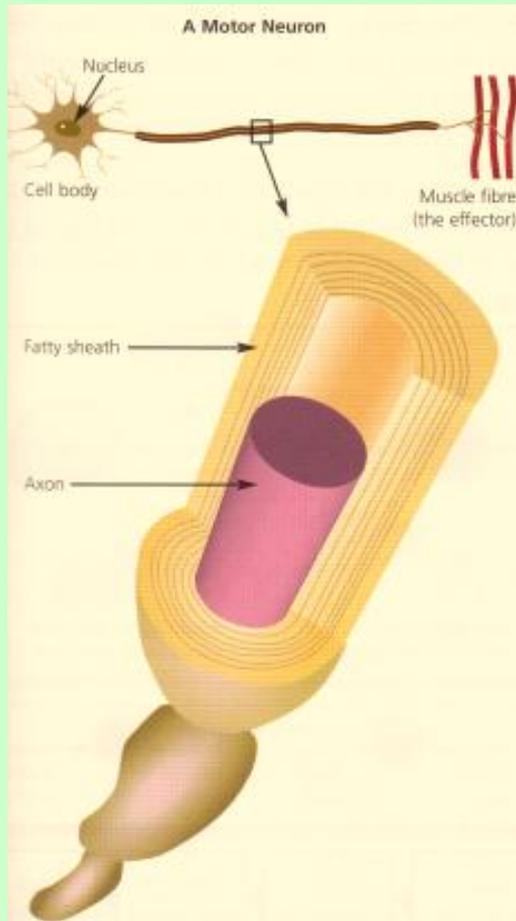
Muscle cells are effectors. Impulses cause these cells to contract

Some impulses can trigger the release of a hormone into the bloodstream which is transported to where it is needed



Neurons

Neurons are cells that carry **electrical signals** eg a nerve impulse



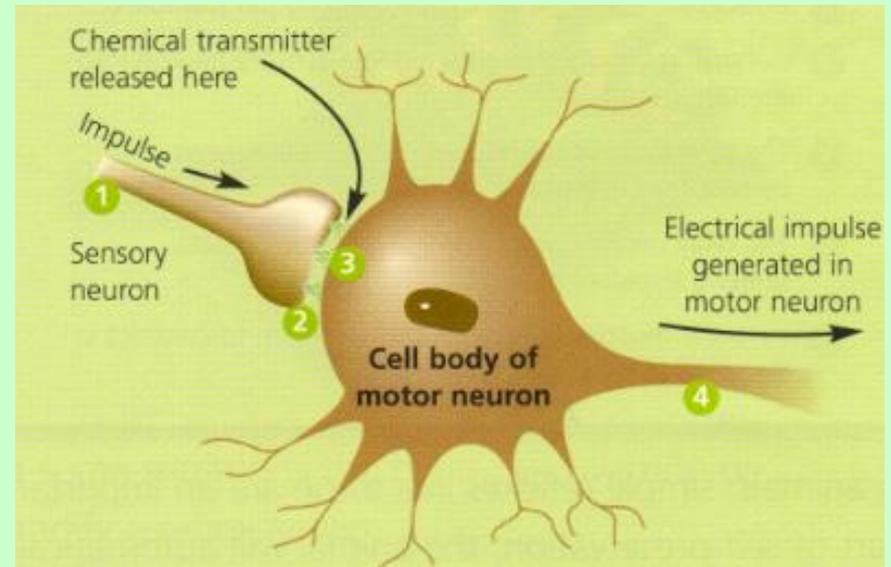
They are **long** to make connections from one part of the body to another.

They **branch** to allow a single neuron to act on lots of other neurons.

Synapses

Synapses are the **gaps** between neurons. They allow the brain to form **neural pathways**.

1. Electrical signal (nerve impulse) moves through sensory neurons
2. Chemicals are released into synapse
3. Neurotransmitters bind with receptors on motor neurons
4. Electrical signal (nerve impulse) is sent through motor neuron



Simple Reflexes

Newborn babies show **simple reflexes** for a short time after birth

Startle reflex - baby shoots out arms and legs when startled

Grasping reflex - baby tightly grasps a finger that is placed in its hand



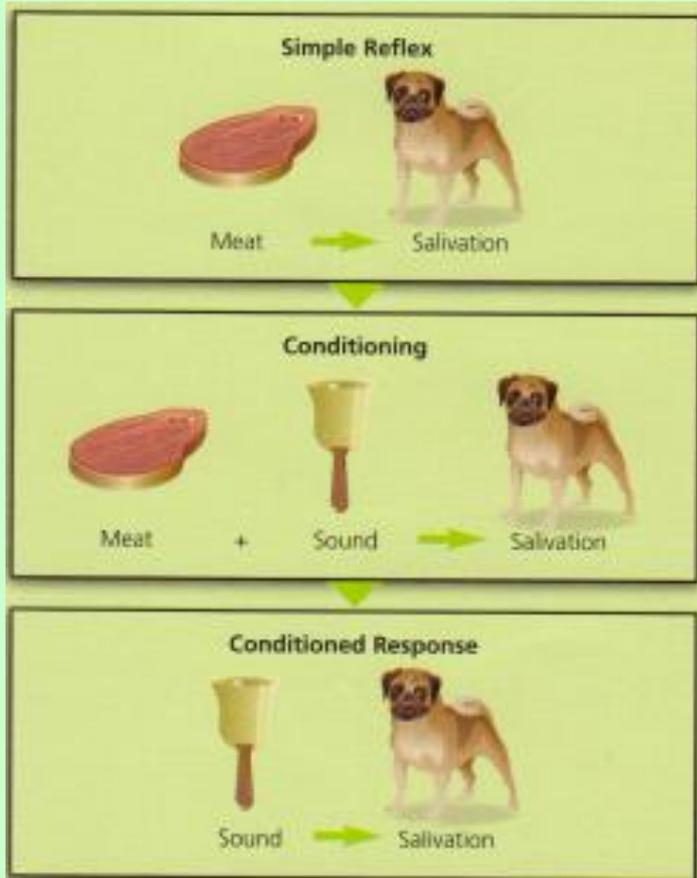
Adults also exhibit simple reflexes

Pupil reflex in the eye stops **bright light** from damaging the retina



Conditioned Reflexes

A **conditioned reflex** is formed by building an association between a **new stimulus** and the stimulus that **naturally** triggers the response.



A scientist named **Pavlov** noticed that when a dog sees and smells meat, it starts to **salivate**.

In his experiment, he rang a **bell** whenever meat was shown and given to the dog.

Eventually, ringing the bell, without meat present, caused the dog to **salivate**

Feral Children

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If **neural pathways** are not used then they are **destroyed**.

If a new skill, such as **language**, has not been learned by a particular stage in development, an animal or child may **not** be able to learn it in the same way.

Feral children are children who have been **isolated** in some way so don't go through **normal development**.

In the absence of other humans, they never gain the ability to talk other than to **grunt**.

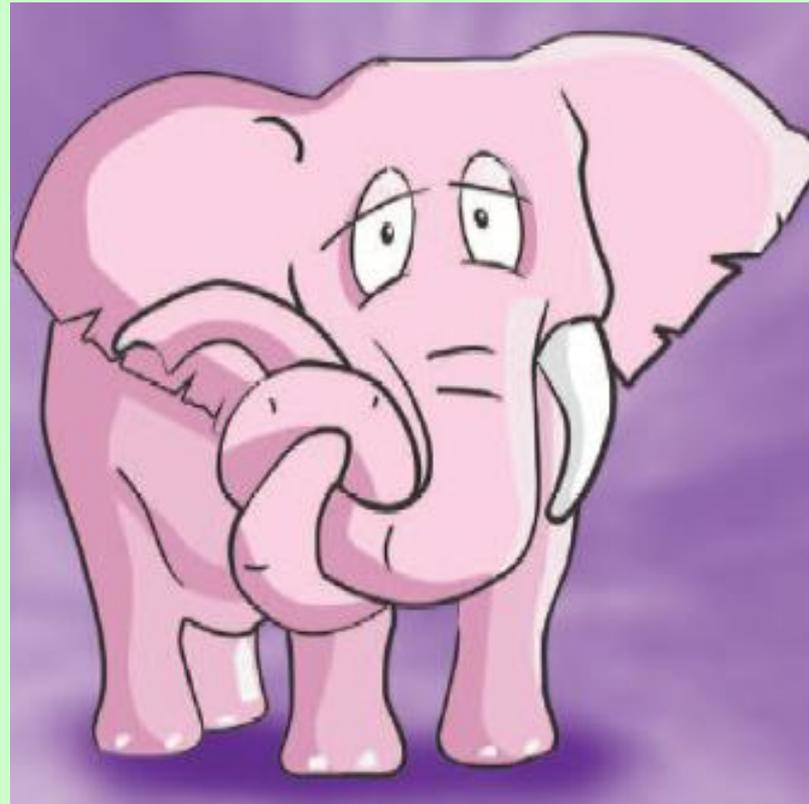
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Memory

Memory is the ability to **store** and **retrieve** information

There are two types of memory

- **short term memory**
- **long term memory**



Short Term Memory

Short term memory is the capability of storing a **limited** amount of information for a **limited amount** of time (approximately 15-30) seconds

Using short term memory, it is believed **seven** separate pieces of information can be stored

Example

A 7 digit number

2371979

By chunking it, it could be stored as 3 out of the 7

23 71 979

Long Term Memory

Long term memory is where information is stored in the brain through **repetition**, which **strengthens** the neural pathways

Humans are more likely to remember information if:

- it is **repeated** several times
- a strong **stimulus** is associated such as colour, sound
- there is a **pattern** to it

Affecting the Central Nervous System

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Many **drugs** can cause changes in the **speed** that the nerve impulses to the brain are sent

Drugs and toxins can **prevent** impulses from travelling **across** synapses

Alcohol has a direct effect on chemical transmitters in the brain

The **more** alcohol consumed, the **slower** the signals are sent



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