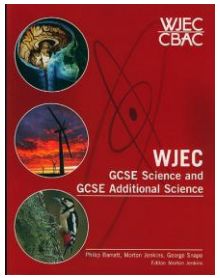
GCSE Science
Chapter 2

Nervous System



Why do animals have a Nervous System?

Animals need to be aware of changes in their surroundings.

They need to respond to a **STIMULUS** (plural **STIMULI**).

Examples of stimuli are:

Touch

Light

Chemicals

Temperature

Sound

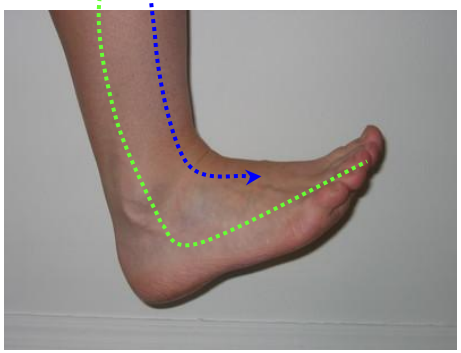
We react to changes in our environment because of our sense organs.

These contain group of receptor cells.

On the next slide we see how a person's nervous system reacts to stubbing a toe …

The pressure received by the cells in your skin causes an electrical signal (nerve impulse) to travel to your central nervous system (spinal cord and brain).

CENTRAL NERVOUS SYSTEM

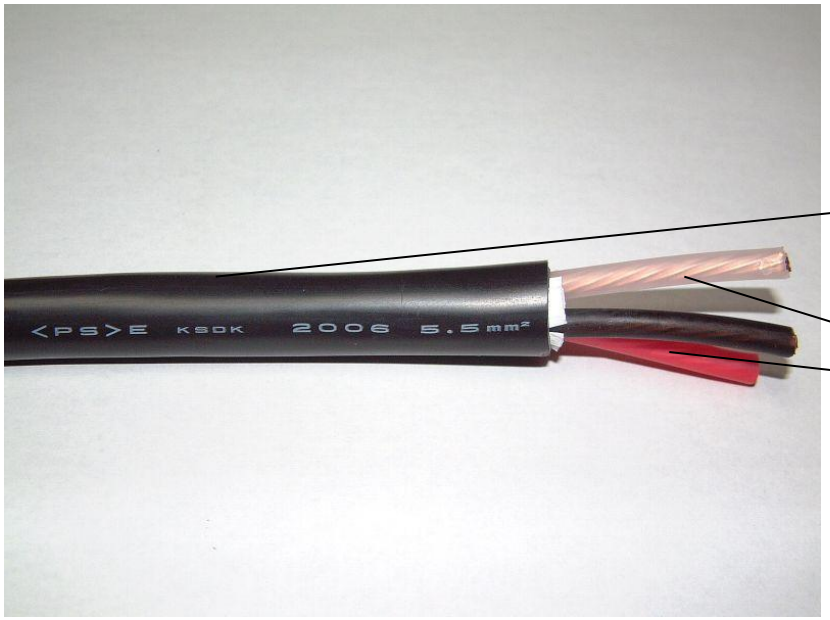


The nerve impulse is relayed very quickly back to the muscles in your foot. These muscles then contract to move your foot away.

In the meantime, you're brain has registered the feeling of pain and you become aware of the problem.

What are Nerves?

Nerve cells are like an electrical cable made up of insulated wires bound up together.



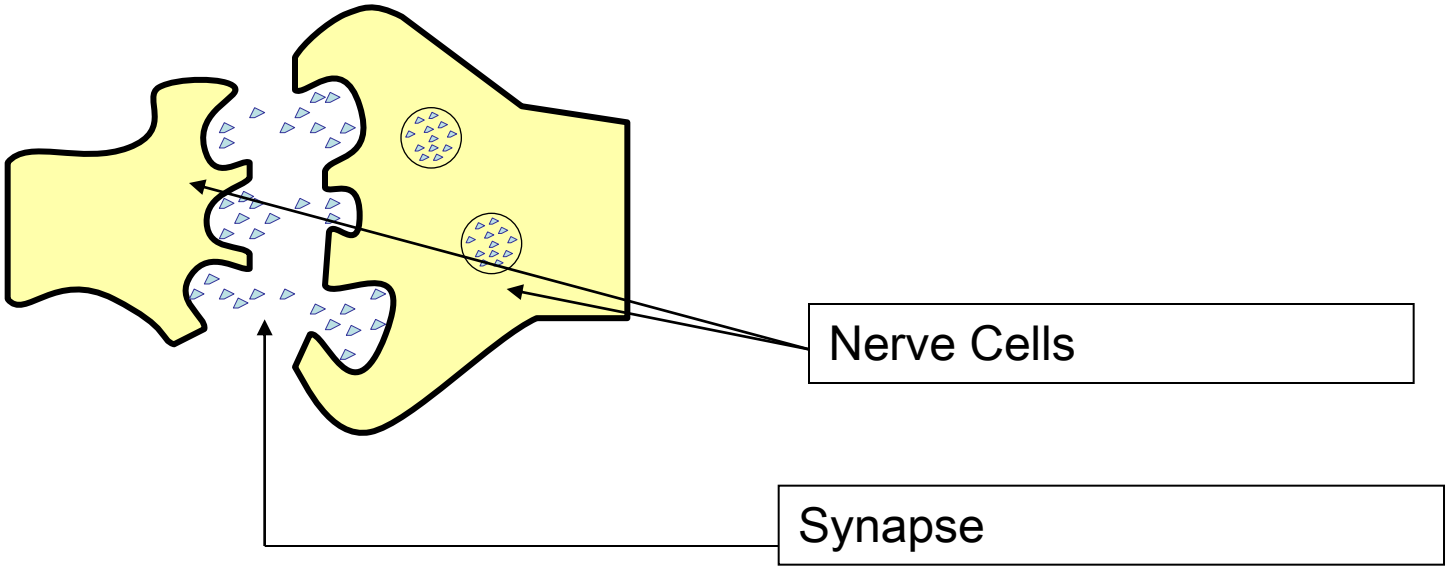
Nerves that carry impulses to activate muscles are called MOTOR NERVES.

The nerves carrying the impulses away from the sense organs towards the central nervous system are called the

SENSORY NERVES

Synapses

Nerve cells never really touch one another, because there is always a tiny space between them. This space is called a synapse. A nerve impulse therefore has to cross the gap.



Mind the gap!

The nerve impulse crosses the gap using special chemicals (called neurotransmitters) that are released from one nerve ending and received by the other.

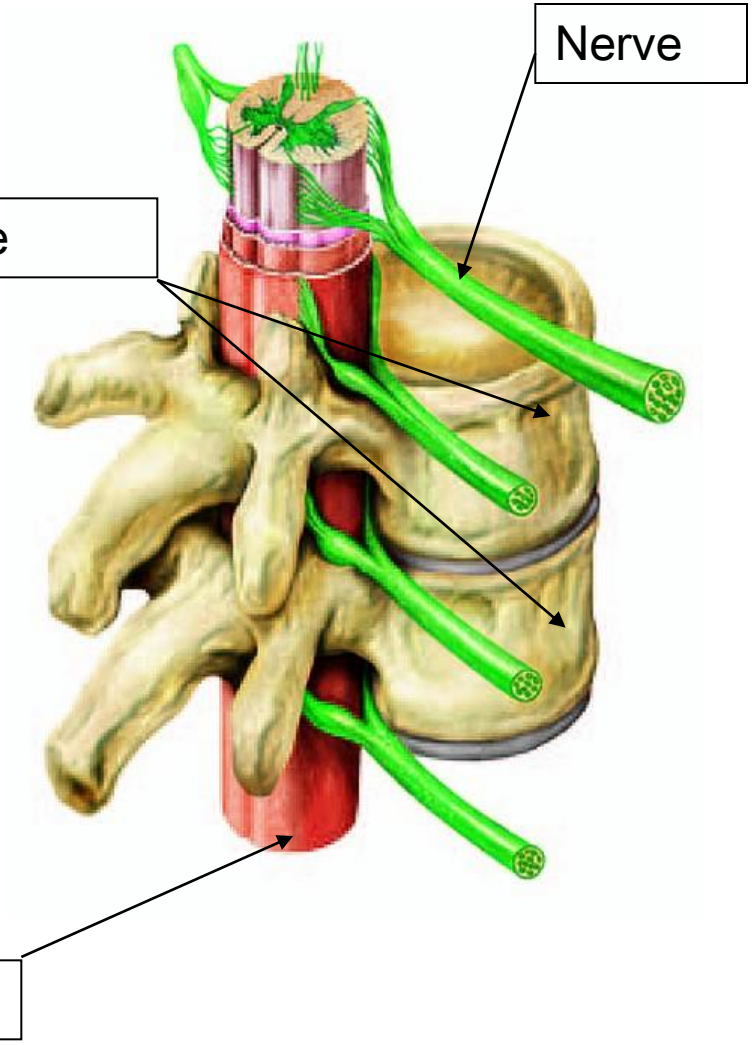
The nerve cell receiving the chemical will carry the impulse forward.

If you compare this transfer of nerve impulse to a relay race, the two runners would be the nerves and the baton would be the chemical (called neurotransmitter).

The Spinal Chord

The spinal cord extends down from the brain, protected by the bones of the spine, the vertebrae.

The spinal nerves branch off the cord and pass out between the vertebrae. They divide to make up the nerves that supply the organs.



Reflex Actions

This is the simplest type of nervous reaction in humans. It involves two or three nerves that link a receptor (sense organ) to an effector (muscle or gland) via the central nervous system (spinal cord or the brain).

It is a quick, automatic reaction that does not involve conscious effort and may not involve the brain.

Knee Jerk Reaction

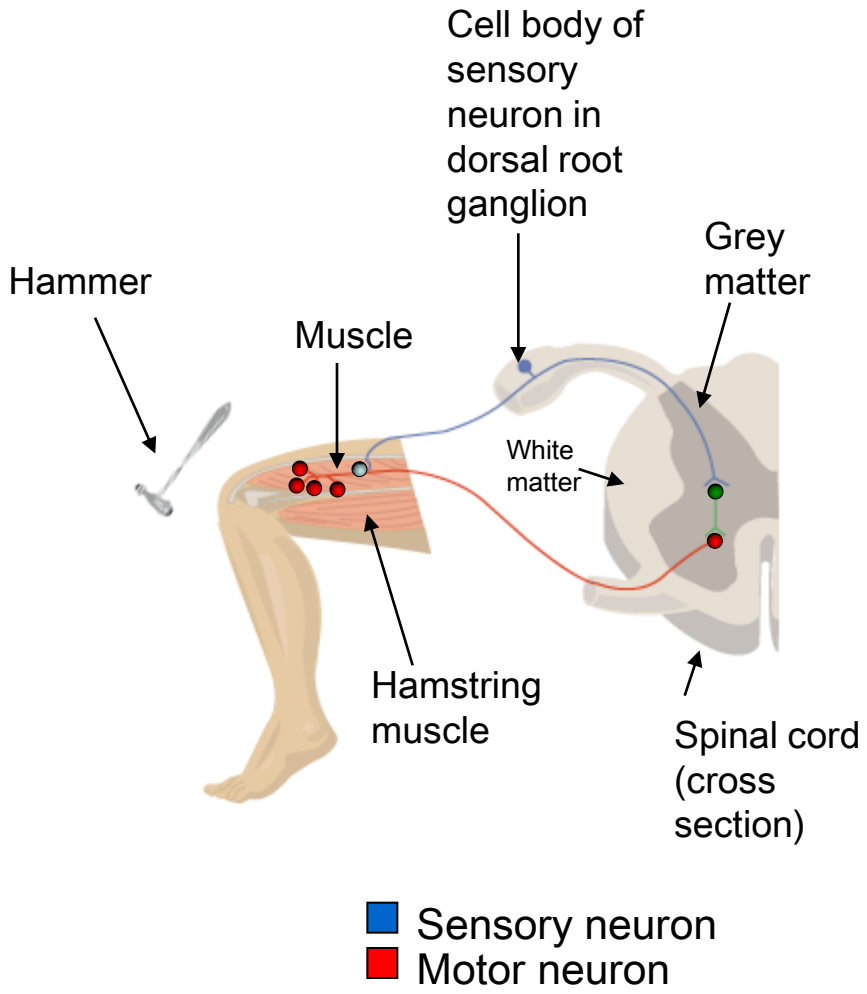
This is a simple reflex reaction in humans.

If you sit on the edge of a bench and let your knee swing freely, then tap your leg just below the kneecap with a narrow object ….

You should have found that your lower leg jerked upwards. This is because the tap stimulates receptor cells in the lower leg.

Follow the sequence of events in the following diagram …

Knee Jerk Reflex



- An impulse travels along the sensory nerve cell
- It crosses the synapse to a connecting nerve cell in the centre of the spinal cord.
- This nerve cell stimulates the motor nerve cell through another synapse, and the impulse travels to muscles in the leg that contract, causing the jerking movement.

This all happens in a split second.

Examples of Other Reflexes