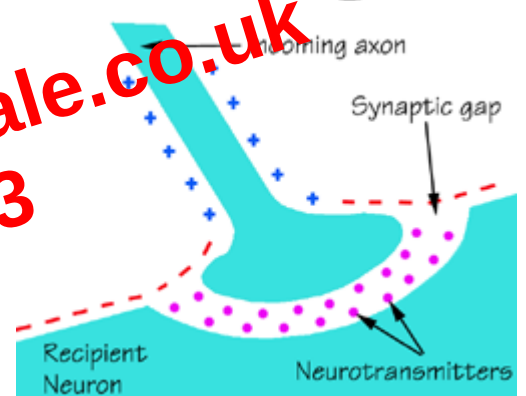
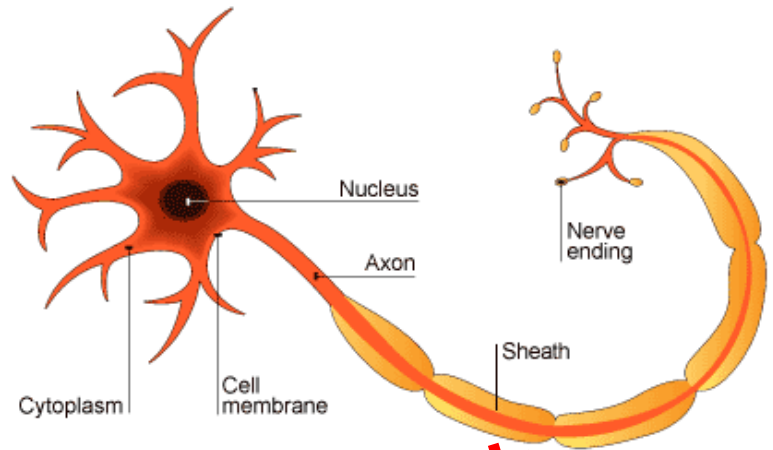


Hormones, chemical messengers in the blood that activate target cells

- Chemicals produced in various glands (endocrine glands)
- Released directly into the blood, which carries it to other parts of the body
- Only affect particular areas
- Target cells, the one affected by the hormone
- Target organ, an organ made up of target cells
- Travel at the speed of blood
- Long lasting effects
- 

Neurones, transmit information as electric impulses around the body

- Dendrons, branched endings, to connect with other neurones
- Axon, electrical impulses travel along it
- Myelin Sheath, electrical insulator, stops the impulse getting lost, speeds it up
- Neurones are long, speeds up the impulse (connecting with other neurones slows the impulse down, one long one is quicker than many short ones)
- Synapse, connection between two neurones (by nerve ending)
  - Neurotransmitters, chemicals which diffuse across the gap between 2 neurones, carrying the information from the electrical impulse
  - Neurotransmitters set off a new electrical impulse in the next neurone



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| NERVES                | HORMONES              |
|-----------------------|-----------------------|
| Fast Message          | Slower message        |
| Act for a short time  | Act for a long time   |
| Act on a precise area | Act on a general area |
| Electrical message    | Chemical message      |

## The Nervous System

- Stimulus, a change in your environment that you may need to react to
  - Sense organs detect stimuli
    - Eyes, light receptors
    - Ears, sound and “balance” receptors
    - Nose, smell receptors, sensitive to chemical stimuli
    - Tongue, taste receptors, sensitive to bitter, salt, sweet, sour and savoury (chemical stimuli)
    - Skin, sensitive to touch (pressure) and temperature change
  - Receptors, groups of cells sensitive to a stimulus, change stimulus energy into electrical impulses

Central nervous system (CNS) coordinates a result

- A stimulus is detected by receptors in a sense organ, the information is sent (as electrical impulses) along sensory neurones to the CNS
- The CNS, the brain and the spinal cord, coordinates a response (decides what to do about the stimulus)
- Then sends information to an effector along a motor neurone.
- The effector then responds accordingly
  - Sensory Neurones
    - Long dendrons and short axons
    - Carry nerve impulses from the receptors to the CNS
  - Relay Neurones
    - Short dendrons and short axons
    - Carry nerve impulses from sensory neurones to motor neurones
  - Motor Neurones
    - Many short Dendrons and one long axon
    - Carry impulses from the CNS to the effectors
  - Effectors
    - Muscles and glands
    - Muscles contract in response to a nervous impulse
    - Glands secrete substances in response to a nervous impulse (Hormones)

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Reflexes, automatic responses to certain stimuli, reduce the chances of being injured

- E.g. Someone shines a bright light in your eyes, your pupils automatically get smaller so that less light gets into the eye – this stops it getting damaged
- The passage of information in a reflex (from receptor to effector) is called a reflex arc

Reflex arc, goes through the central nervous system

1. The neurones in reflex arcs go through the spinal cord or an unconscious part of the brain
2. A stimulus (bee sting) is detected by receptors, impulses are sent along a sensory neurone to the CNS
3. In the CNS the sensory neurone passes on the message to a relay neurone
4. Relay neurones relay the impulses to a motor neurone
5. The impulses then travel along the motor neurone to the effector
6. The muscle then acts (contracts to move hand away from bee)
7. You don't have to think about the response it's quicker than a normal response

