

information to the CNS, and motor neurons, which transmit impulses from the CNS in the muscles and glands that then cause a response.

Neurons are found in the nervous system, sensory and motor neurons transmit information to and from the CNS, while relay neurons within the CNS form connections within between them. Many small dendrites receive information from relay neurons and transmit the impulses to the cell body. One long axon then carries impulses away. The cell body contains the nucleus and most of the cytoplasm of the cell. The axon is covered by the myelin sheath formed by Schwann cells, which rap themselves around it. Myelin has a high lipid content and forms an electrical insulation layer the speeds the transmission of impulses along the axon. Along the length of the axon, junctions where two Schwann cells meet can be seen. These junctions are known as nodes of Ranvier.

Transmission of Impulses

Neurons transmit information in the form of impulses, which are short-lived changes in electrical potential across the membrane of a neuron.

All neurons contain sodium and potassium ions. An impulse occurs as these ions move in and out through the plasma membrane.

When a neuron is not transmitting an impulse, it is said to be at its resting potential. The resting potential is the potential difference across the plasma membrane when it is not being stimulated. For most neurons, it is minus seventy millivolts. The inside of the axon is negatively charged with respect to the outside.

As a nerve impulse occurs, the distribution of charge across the membrane is reversed. For a millisecond, the membrane is said to be depolarised. As charge is reversed in one area of the axon local currents depolarise the next region so that the impulse spreads along the axon. An impulse that travels in this way is known as the action potential.

The following four points explains what happens in the plasma membrane as an action potential is generated:

- (1) When a neuron is stimulated, gated sodium channels in the membrane open and sodium ions from the outside flow in. The neuron is now said to be depolarised.
- (2) For a very brief period of time, the inside of the axon becomes positively charged with respect to the outside as sodium ions enter. At this point the sodium channels close.
- (3) Now gated potassium channels open, and potassium ions begin to leave the axon, moving down their electrochemical gradient. To re-establish the resting potential, a process known as repolarisation occurs.

(4) Because so many potassium ions start to leave, the potential difference falls below the resting potential. At this point, both sodium and potassium ions begin to close. The resting potential is re-established by the action of sodium and potassium ion pumps, which move ions back to restore the resting potential.

An action potential in one part of an axon causes the depolarisation of maybe a distant section of the axon. This occurs because local currents are setup between the adjacent regions and these cause ion channels to open, allowing sodium ions and potassium ions out of the axon. The action potential travels along the neuron like a Mexican wave. The impulse can only pass in one direction because the region behind it is still in the recovery phase of the action potential and is temporarily unable to generate a new action potential. The recovery phase is known as the refractory period.

The Synapse

A synapse is the place where two neurons meet, two neurons do not touch one another and the tiny gap of about twenty nanometres between them is known as the synaptic cleft.

The action potential must be transmitted across this gap for the impulse to pass on its way. And this is achieved for the presence of chemicals known as neurotransmitters. Neurotransmitters are held in vesicles in the presynaptic cleft until an action potential arrives. They are then released into the synaptic cleft and diffuse across the postsynaptic membrane. There they can cause another action potential to be produced. Many drugs affect synapses and influence the way that nerve impulses are transmitted. Nicotine has a similar molecular shape to acetylcholine, an effect in the postsynaptic membrane so that it transmits an action potential.

Homeostasis

The internal environment of the body remains constant within certain limits, despite changes that may occur in the external environment.

The control process that maintains conditions:

water balance, blood glucose concentration, blood pH, carbon dioxide concentration and body temperature.

Each of these has a normal or set point although may vary above or below it, for example the normal body temperature for humans is thirty-seven degrees Celsius.

Ethical Issues with IVF

Arguments in favour of IVF	Arguments against IVF
Enables infertile couples to have a family.	Unused embryos produced by IVF are frozen for a limited period and then destroyed.
Couples willing to undergo IVF treatment must have determination to become parents.	Embryos are selected for implantation, so humans, which should have the chance of life.
Embryos used in IVF treatment can be screened to ensure they are healthy and do not have certain genetic conditions that would be inherited.	Multiple births also result from IVF and this increases the risk to mothers and babies.
IVF techniques have lead to further understanding of human reproductive biology.	Infertility is a natural phenomenon, whereas IVF is not, and some religions reject to it on this basis.
	Some causes of infertility are due to genetic conditions, which may be passed onto children born as a result of IVF.

Preview from [Notesale.co.uk](https://www.notesale.co.uk)
Page 18 of 18