6.2 NERVOUS COORDINATION

Neuron = nerve cell

Structure

- Dendrites – carry nerve impulses towards cell body
- Cell body
- Schwann cells
- Axon – single fibre that carries impulses away from cell body
- Adapted to carry rapid nerve impulses
- Axons can be myelinated
- Myelin sheath and nodes of Ranvier between

Nerve impulses

Resting membrane potential

- Around –65mV, in a polarised state
- Sodium–potassium pump in axon membrane
- 3 sodium ions out, 2 potassium ions in
- Protein channels allow ions to diffuse in and out
- Membrane is more permeable to K+ ions, so some K+ ions diffuse back out

Action potential

- Stimulus opens voltage-gated sodium channels
- Influx of sodium ions cause depolarisation of axon, which reaches a threshold
- All-or-nothing principle
- Action potential – wave of depolarisation
- At +40mV, sodium channels close and potassium channels open
- Repolarisation
- Hyperpolarisation – temporary overshoot of outward potassium ions
- Sodium–potassium channel returns membrane potential to –65mV
- Refractory period
- Discrete impulses
- Limits number of impulses
- Unidirectionality

- Saltatory conduction
- Affected by diameter, temperature and myelin sheath

Synaptic transmission

Synapse

- Always from presynaptic neurone to postsynaptic neurone
- Unidirectionality
- Summation
- Temporal – one presynaptic neurone firing many times
- Spatial – multiple presynaptic neurones
- Inhibitory synapses
- Chloride ions enter postsynaptic neurone
- Hyperpolarisation
- Junction between 2 neurons
- Neuromuscular junction – between motor neurone and muscle end plate

AQA

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