C2.2 Neural signalling

What the Cell · DP Biology · note-taking sheet · statements C2.2.1–7

Name _____ **Date** _____

How to use this sheet: go through the slides and videos with it, then close them and write from memory. Use your own words and add page numbers from the book where you want more detail.

Guiding questions. How do neurons produce electrical signals and pass them along? How do neurons affect other cells?

C2.2.1 What neurons are

Textbook pp. 467–469

Draw a motor neuron. Label **cell body**, **nucleus**, **dendrites**, **axon**, **myelin sheath**, **node of Ranvier**, and add an arrow for the direction of the impulse.

What is the difference between a dendrite and an axon?

C2.2.2 How the resting potential is set up

Textbook pp. 469–470

Define **membrane potential**, **polarized** and **resting potential**. Include the typical value.

Contributor	What happens, and how it makes the inside negative
Sodium-potassium pump	
Leakage of ions	
Proteins in the cytoplasm	

Why does a "resting" neuron still use ATP?

C2.2.3 Nerve impulses are action potentials

Textbook p. 471

Sketch membrane potential against time for one action potential, with values on the voltage axis. Label where sodium ions and potassium ions move, and in which direction.

Why is a nerve impulse described as electrical, even though no electrons flow along the axon as they would in a wire?

C2.2.4 Why impulses travel at different speeds

Textbook pp. 472–475

Fibre	Diameter	Myelinated?	Approximate speed	Why
Squid giant axon				
Small non-myelinated fibre				
Mammal myelinated fibre				

Results from the online simulation: what happens to speed as diameter rises, with and without myelin?

C2.2.5 Synapses

Textbook p. 476

Draw a synapse. Label **presynaptic neuron**, **vesicles**, **mitochondrion**, **synaptic cleft**, **receptors** and **postsynaptic membrane**.

Name two kinds of cell that a neuron can signal to. Why can a signal cross a typical synapse in only one direction?

C2.2.6 and C2.2.7 Across the synapse

Textbook pp. 477–478

Complete the sequence, using acetylcholine as your example.

Step	What happens
1	An action potential reaches the synaptic knob and depolarizes the presynaptic membrane.
2	
3	
4	
5	
6	
7	An enzyme breaks down acetylcholine, and the products are reabsorbed.

What does calcium do here? What is an excitatory postsynaptic potential?

Before you finish

Tick the ones you can explain without notes. Circle anything to ask about.

- ☐ The structure of a neuron
- ☐ How the pump sets up gradients
- ☐ Why the resting potential is negative
- ☐ What an action potential is
- ☐ Why an impulse is electrical
- ☐ How diameter affects speed
- ☐ How myelin affects speed
- ☐ Why synapses work in one direction
- ☐ The role of calcium ions
- ☐ How acetylcholine triggers a response