

Transmission of Nerve Impulses

Number of Na^+ entering is equal to K^+ leaving cell.
 $\therefore$ no longer net movement of ions.

+30

+30mV depolarised to max

② Sodium (Na^+) channels in membrane open. Na^+ ions flood into cell. Membrane becomes depolarised. Membrane voltage rises.

0

K^+ gates closed. Na^+ influx makes inside of membrane positive with respect to outside.

②

③ Sodium (Na^+) channels ^{inactive} ~~close~~ & membrane becomes repolarised. Na^+ gates shut, K^+ gates open (K^+ moves out of cell). Makes inside of cell negative again. Na^+/K^+ pump also active.

③

Membrane Potential (mV)

-55

Resting State:

Karrier gates on Na^+ & K^+ channels closed.

-70

Membrane's resting potential is maintained (-70mV)

15mV change

①

① Na^+ depolarisation of membrane

(membrane more permeable to Na^+ . Na^+ moves into cell at rapid rate, inside cell becomes more positive)

brings the potential to threshold. Via Stimulus)

Must exceed threshold for nerve impulse to be transmitted

④ Hyperpolarisation - too many K^+ move out as gates start to close. Prevents neuron from receiving another stimulus at this time.

④

membrane returns to resting state. Undershoot. Na^+ closed, K^+ still open. Returns to resting state.

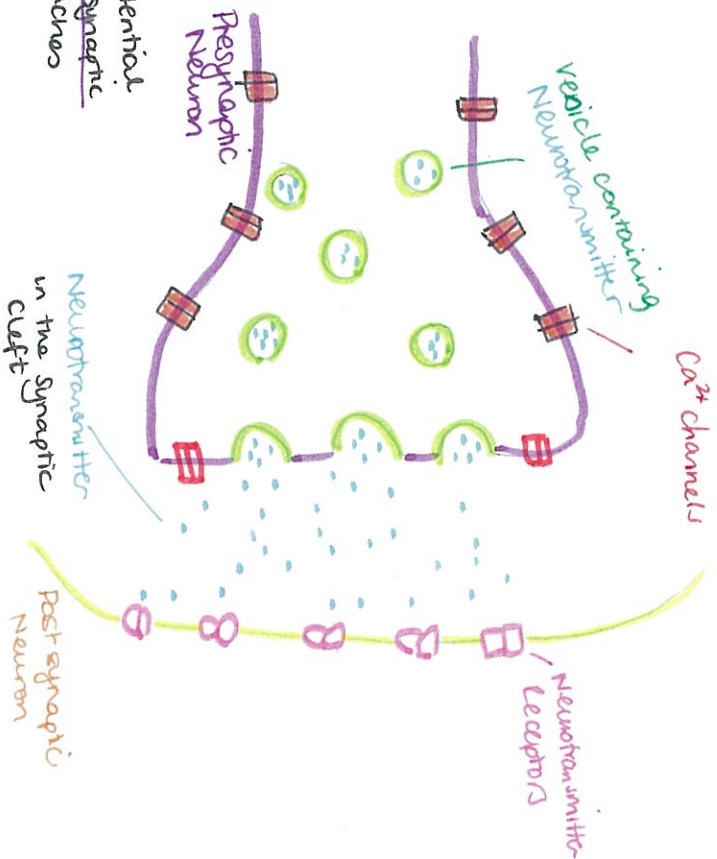
Time (ms)

ACTION POTENTIAL

THRESHOLD

Resting Membrane Potential

- ① Wave of action potential travels along presynaptic neuron, until it reaches synaptic end bulb
- ② Depolarisation of membrane at synapse causes Ca²⁺ channels to open.
- ③ Ca²⁺ ions flow into presynaptic membrane.
- ④ Ca²⁺ activates vesicles containing neurotransmitter



- ⑤ Vesicles fuse with membrane, releasing neurotransmitter into synaptic cleft.
- ⑥ Neurotransmitter diffuses across cleft & binds to neurotransmitter receptor molecules located on post synaptic neuron.

- ⑦ Binding of neurotransmitter causes receptor molecules to be activated.
- ⑧ Neurotransmitter molecules eventually break loose from receptor & drift away.
- ⑨ The neurotransmitter is deactivated by an enzyme & is reabsorbed by presynaptic neuron to be reused.