    - Increased **temperature** --> Increased **KE** --> Increased movement of ions --> Increased speed of transmission
- Refractory period
    - For ensuring **unidirectionality** of impulses and to **prevent overstimulation** of nerves
    - **Absolute** refractory period
        - Axon membrane absolutely cannot initiate another action potential due to **Na+ channels already being opened** from depolarisation or are **inactivated** by **inactivation gates**
    - **Relative** refractory period
        - Action potential activation requires a **larger stimulation than normal** due to **hyperpolarisation of membrane**, hence requiring a larger stimulation than normal to hit membrane threshold

Describe the structure of a cholinergic synapse and explain how it functions, including the role of Ca 2+ ions.

The cholinergic synapse contains many mitochondria, microfilaments and **synaptic vesicles** containing **neurotransmitters** such as **acetylcholine**. The space between the presynaptic and postsynaptic neurones is known as the **synaptic cleft**. The postsynaptic membrane contains **protein receptor molecules** that neurotransmitters can bind to, as well as **enzymes that break down neurotransmitters**, such as **acetylcholinesterase**.

1. The **arrival of an impulse** at the synaptic knob **depolarises** the presynaptic membrane.
2. This opens up **voltage-gated calcium ion channels** on the presynaptic membrane and **Ca2+** diffuses **from the synaptic cleft into the synaptic knob**.
3. The influx of Ca2+ ions induces a **few synaptic vesicles to fuse with the presynaptic membrane**, releasing the acetylcholine neurotransmitters into the synaptic cleft by **exocytosis**.
4. The acetylcholine molecules diffuse across the synaptic cleft to the postsynaptic membrane. This diffusion process creates a brief **synaptic delay**.
5. On the postsynaptic membrane, **acetylcholine binds with a receptor protein** on the membrane . The binding **opens ligand-gated sodium channels**, allowing Na+ ions to flow into the neurone.
6. The influx of Na+ ions **depolarises** the postsynaptic membrane and produces an **excitatory postsynaptic potential (EPSP)**. If the depolarisation exceeds the threshold value, an **action potential is generated** and travels down the axon to the next synapse or motor end plate.
7. At the same time, acetylcholine is being **hydrolysed by acetylcholinesterase** into **choline and acetate**, which diffuses back into the **presynaptic knob** to be **recombined** to form acetylcholine once again.
8. The loss of acetylcholine from the receptors causes the **postsynaptic membrane to repolarise**.

Excitatory Post Synaptic Potential

- Amplitude fluctuates in steps --> neurotransmitters released in packets
- Amplitude of single EPSP is small but longer lasting
- Depolarisation effect of several ESPS to create action potential --> summation

Inhibitory Post Synaptic Potential

- Release of neurotransmitter increases permeability to Cl- --> membrane potential is even more negative --> even more difficult to excite neurone