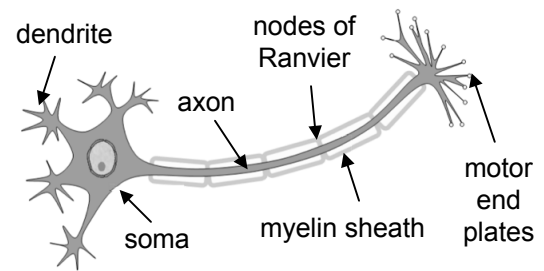


# Nerves, Hormones and Homeostasis (6.5)

## Nervous System (6.5.1 / 6.5.3)

- The nervous system is comprised of the *central nervous system* (brain & spinal cord) and *peripheral nervous system*
- The CNS contains **relay neurons** while the PNS contains **sensory neurons** (to CNS) and **motor neurons** (from CNS)

## Diagram of a motor neuron (6.5.2)



## Explain transmission within a neuron (6.5.4 / 6.5.5)

**Resting Potential:** Difference in charge across the membrane when neuron is at rest

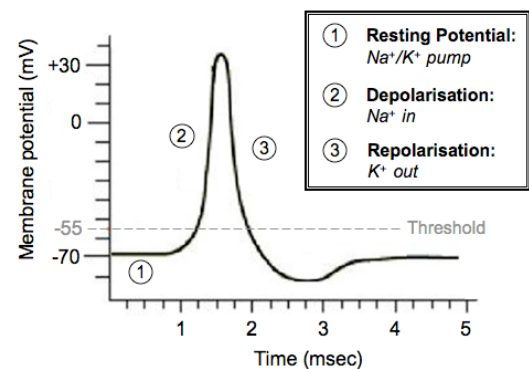
- Is maintained by  $\text{Na}^+/\text{K}^+$  pump ( $3\text{Na}^+$  out,  $2\text{K}^+$  in)
- Inside becomes negative relative to outside ( $\sim -70\text{mV}$ )

**Depolarisation:** Change from resting to action potential

- Action potential:** Difference in charge when neuron is firing
- $\text{Na}^+$  channels open;  $\text{Na}^+$  enters (potential  $\rightarrow \sim +30\text{mV}$ )
- Channels voltage-gated, so charge spreads down axon

**Repolarisation:** Change from action to resting potential

- $\text{K}^+$  channels open;  $\text{K}^+$  exits (potential  $\rightarrow \sim -70\text{mV}$ )
- $\text{Na}^+/\text{K}^+$  exchanges ions to restore resting potential

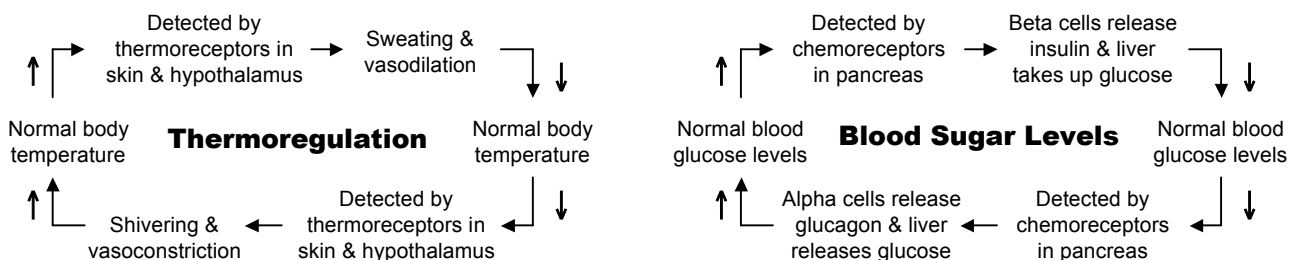


## Explain transmission between neurons (6.5.6)

- Action potential opens voltage-gated  $\text{Ca}^{2+}$  channels in axon terminals, causing the influx of  $\text{Ca}^{2+}$
- $\text{Ca}^{2+}$  causes vesicles to release neurotransmitter into the synaptic cleft
- Neurotransmitters bind to postsynaptic receptors and either excite (depolarise) or inhibit (hyperpolarise)
- Neurotransmitters are returned to presynaptic neurons via reuptake pumps,  $\text{Ca}^{2+}$  is pumped back out

## Explain homeostasis with two examples (6.5.7 - 6.5.11)

- Homeostasis** involves maintaining a constant internal environment between physiological tolerance limits
- When a significant change is detected by a receptor, **negative feedback** triggers an opposite change
- Things under homeostatic control: blood pH,  $\text{CO}_2$  levels, blood sugar levels, temperature & water balance
- The **endocrine system** may be involved, and consists of glands which release hormones into the blood



## Distinguish between type I & type II diabetes (6.5.12)

- Type I (IDDM):** Early onset (usually childhood), no insulin produced (autoimmune?), need injections
- Type II (NIDDM):** Late onset (usually adulthood), target cells insensitive to insulin, dietary control