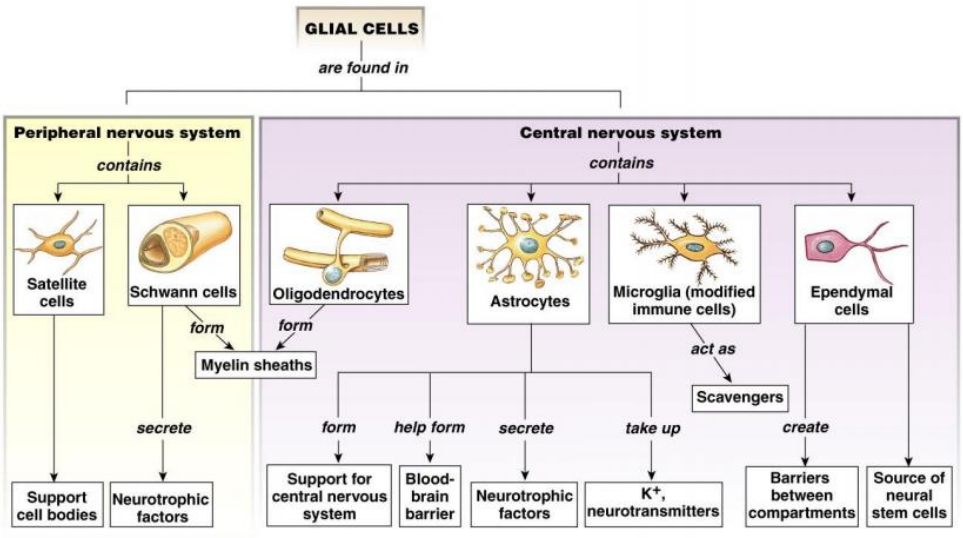
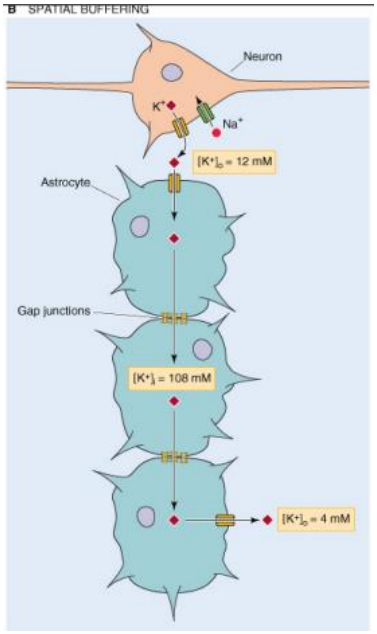
NEUR30002 Course Summary Notes

Table of Contents:





Astrocytes

- Location
  - **CNS only**
  - Restricted to small areas where processes patrol
  - Neurons are squished in between
- Roles
  - Secrete neurotrophic factors (support growth, survival and differentiation of both developing and mature neurons)
  - Take up K^+ and neurotransmitters
    - End action potentials, and prepare synaptic cleft for the next one
    - Must be rapid – as small changes have large effects on the synaptic cleft concentration
    - K+ crosses between astrocytes linked by gap junctions (6 connexins form connexon on each cell)
      - Gap junctions discriminate only by size – enables full ion flow preventing charge build-up
  - Responsiveness/signalling
    - Via neurotransmitters
    - **DO NOT conduct action potentials**
      - Depolarisation of cell initiates Ca^{2+}entry, releasing **gliotransmitters** which jump between cells **via gap junctions**
    - Also occurs through vesicular release
      - Allows signalling across larger gaps (with **ATP used as transmitter**)
      - Binds via GPCRs on other astrocytes
  - Generally act as a bridge between many elements in the CNS
    - Neurons
    - Blood vessels
    - Neighbouring domains
- Blood-brain barrier
  - Processes (“arms” of astrocytes) associate with endothelial cells of blood vessels
  - Prevents brain cells absorbing everything out of blood vessels – only what is required is transported across
  - Eg: high level of blood glutamate after meal – prevented from crossing blood-brain barrier and overstimulating neurons

Action Potentials

Resting Membrane Potential (RMP)