Neuroglia

Glial cells function in the nutritive and structural support of neurons by controlling the neuronal microenvironment. In fact, they are more abundant than the neurons themselves. Different types are found in the CNS vs the PNS:

CNS neuroglia are mostly derived from cells in the neural tube. They all have small, dark, round nuclei. They include

- **astrocytes:** most abundant of the CNS glial cells
  - many branching processes re-inforced by intermediate filaments (made of glial fibrillary proteins) form supporting scaffold
  - many gap junctions
  - several types:
    - fibrous: many thin processes, predominate in white matter
    - protoplasmic: shorter processes, predominate in grey matter
    - radial (aka radial glia): guide and support differentiating neurons
  - processes can associate and thus regulate synapses
  - regulate ionic concentrations
  - create blood-brain barrier via perivascular feet
  - convert glucose to lactate
  - processes form glial limiting membrane at the meninges
  - form astrocytic scar tissue
- **oligodendrocytes**
  - darker, round nucleus
  - much RER and Golgi apparatus
  - extend many processes, which become flat and form (consisting of cell membrane) around axons
    - neurons are not covered by neurilemma nor endoneurium in CNS (unlike in the PNS)
- **microglia**
  - smallest of the neuroglia
  - small, dark, elongated nuclei
  - originate from monocytes in bone marrow
  - phagocytose damaged or foreign substances
- **ependymal cells**
  - columnar or cuboidal shape
  - no basal lamina (unlike epithelium)
  - line ventricles and central canal of CNS
  - can have microvilli (absorption) and cilia (flow of CSF, which they secrete)

PNS neuroglia are derived from neural crest cells. They include

- **Schwann cells**
  - noticeable nuclei
  - form myelin sheath that covers large axons
  - mesaxon noticeable afterward (edge-to-edge contact of parallel plasma membranes of a Schwann cell)
  - unlike oligodendrocytes, cover only portion of an axon
- **Satellite glial cells**
  - form a thin glial layer around large perikarya
  - trophic function: insulation, nourishment, regulation of environment