# 21 - C. Glial cells

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© SPMM Course the largest in the central nervous system, sometimes reaching 100 µm in diameter. Betz cells represent about 10% of the total pyramidal cell population in layer V of the human primary motor cortex. Stellate cells are found in layer IV of the cerebral cortex (from thalamus feeding forward to pyramidal cells) and also in the cerebellum. C. Glial cells These are cells with supportive metabolic functions; they also participate in modulating neuronal functions e.g. via the production of neurosteroids. There are 3 types of glial cells:

1. Astrocytes are the most numerous of the three types. These are star-shaped cells that enable nutrition of neurons, breakdown of some neurotransmitters, and maintaining the blood-brain barrier.
2. Oligodendrocytes are seen in CNS (not in peripheral nerves, where Schwann cells replace them). They produce myelin sheaths that help in saltatory conduction (pole to pole jumping), which quicken the process of signal transmission.
3. The microglia are descendants of macrophages. They are scavenger cells that clear neuronal debris following cell death.
4. Ependymal cells are a special type of glia that cover the ventricles and facilitate CSF circulation via their ciliary processes.

BLOOD BRAIN BARRIER

The blood- brain barrier is located in endothelial cells of capillaries of the brain. Unlike the endothelial cells found elsewhere, brain’s endothelial cells have tight junctions with high electrical resistance providing an effective barrier against molecules. In addition, brain capillaries are in contact with foot processes of astrocytes that separate the capillaries from the neurons.

Lipid soluble molecules (ethanol and caffeine) can penetrate the barrier relatively easily via the lipid membranes of the cells. In contrast, water-soluble molecules such as sodium and potassium ions are unable to transverse the barrier without using specialized carrier-mediated transport mechanisms.

Inflammation such as meningitis weakens the blood brain barrier.

There are some areas of the brain that do not have a blood- brain barrier. These are so called circumventricular organs e.g. subfornical organ, area postrema (chemo receptor trigger zone), median eminence and posterior pituitary.

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