

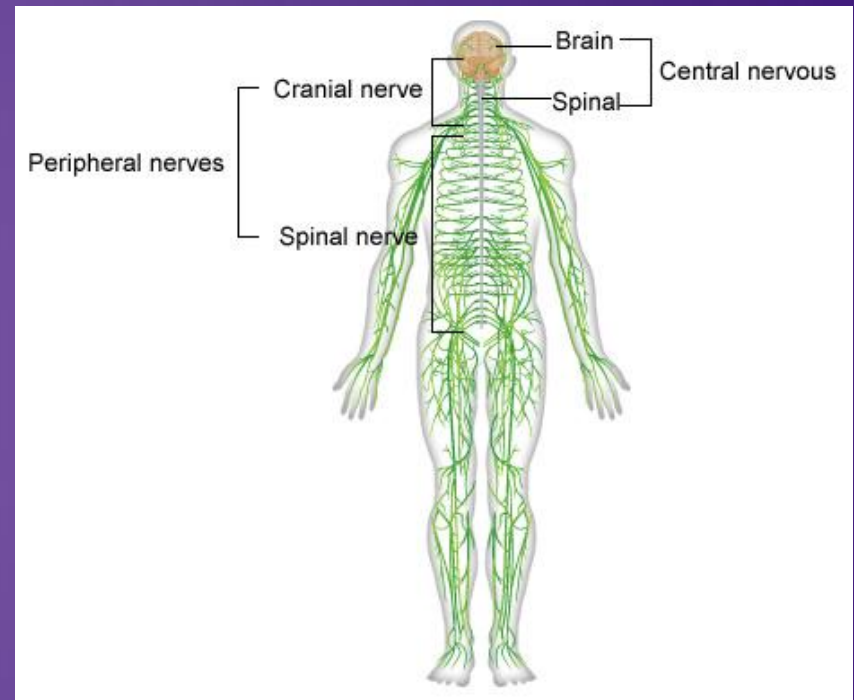
Nervous System and Neural Stem Cells

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BME 181

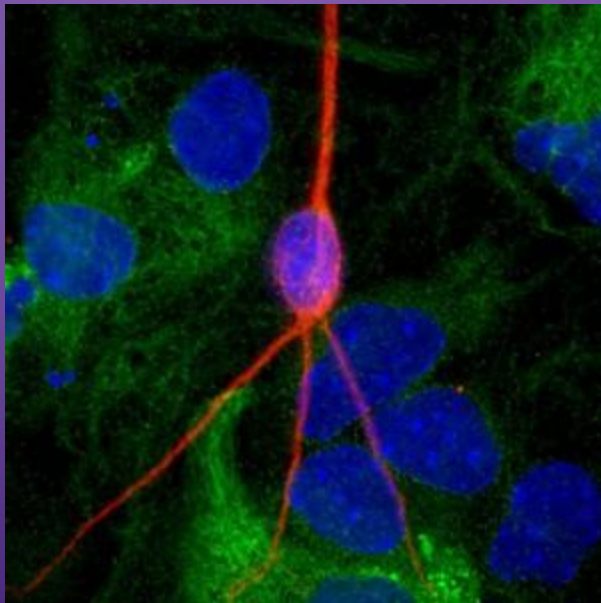
Nervous System

- Central Nervous System
 - Brain and Spinal Cord
- Peripheral Nervous System
 - Tissue outside the Central Nervous system
 - Sends motor commands away from the Central Nervous System
 - Sends sensory information to the Central Nervous System

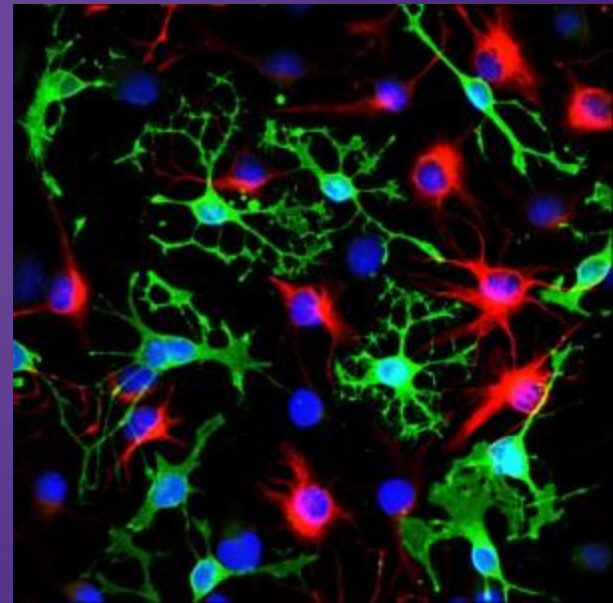


Neural Stem Cells

- Multipotent Cells
- Adult Stem Cells
- Can be differentiated to replace damaged neurons
- Can also be differentiated to glial cells



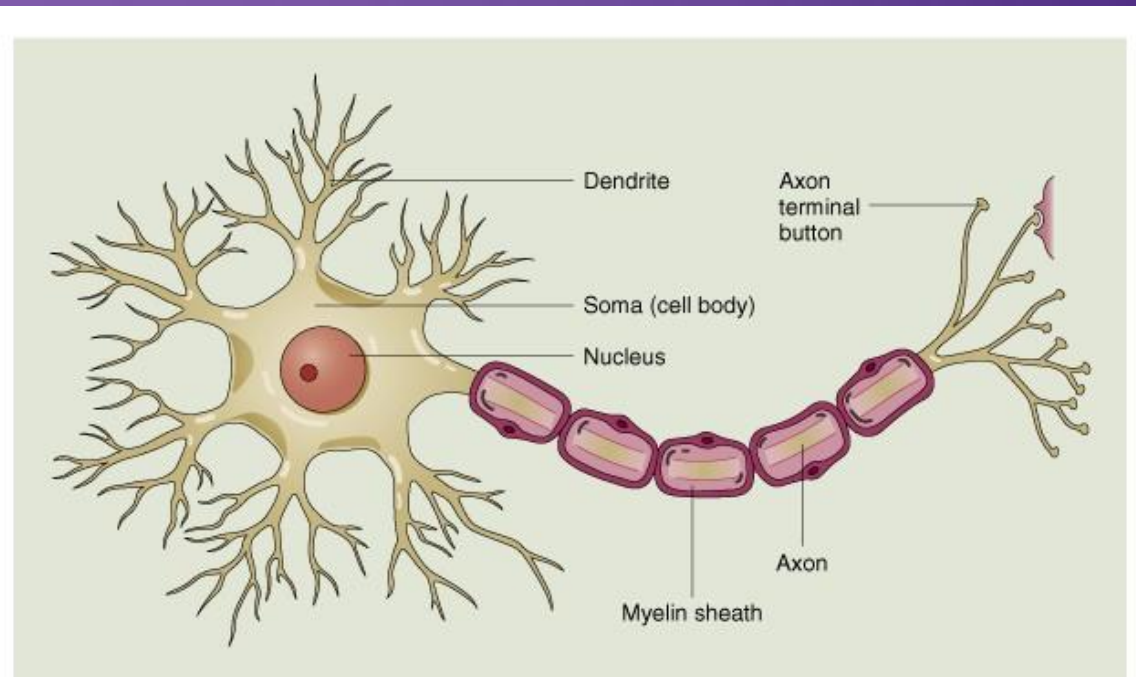
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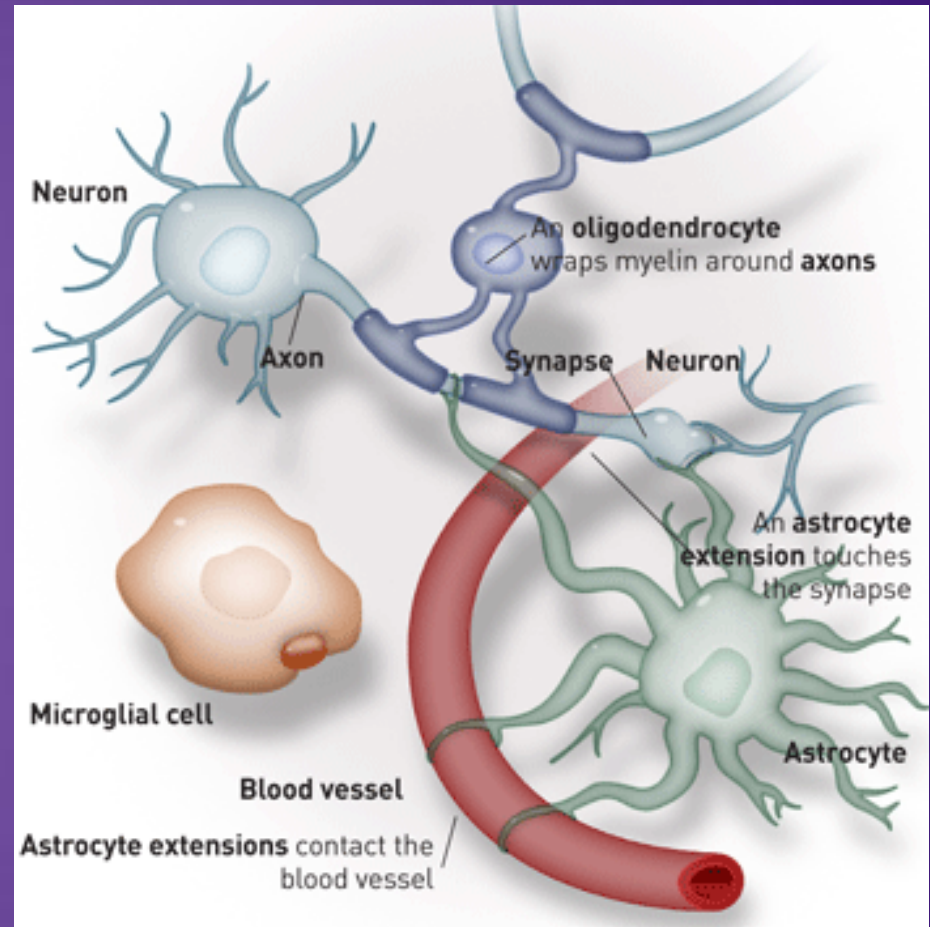
Neurons

- Nerve cells that transfer and process information in the nervous system
- Consist of a soma, axon, and dendrites

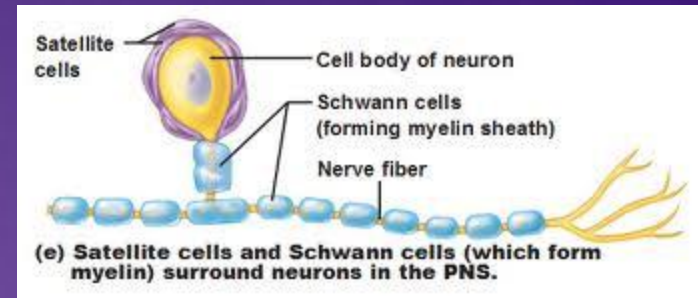


Glial Cells

- Also called neuroglia
- Supporting cells
- Main functions
 - Protect neurons
 - Hold neurons in place
 - Supply nutrients and oxygen to neurons
 - Destroy pathogens



Types of Glial Cells



- Central Nervous System

- Astrocytes – Connect neurons to blood vessels. They control blood flow, and provide nutrients and oxygen to neurons
- Oligodendrocytes – Form myelin, and create the myelin sheath
- Ependymal Cells – line ventricles in the brain and the central canal in the spinal cord. Assists in producing, circulating, and monitoring cerebrospinal fluid
- Microglia – Removes cell debris, wastes, and pathogens by phagocytosis

- Peripheral Nervous System

- Schwann Cells – Similar to Oligodendrocytes forms myelin
- Satellite cells – Protect neuron and regulates oxygen, carbon dioxide, and nutrients

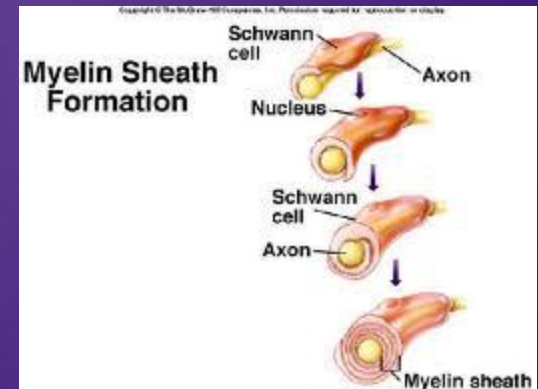
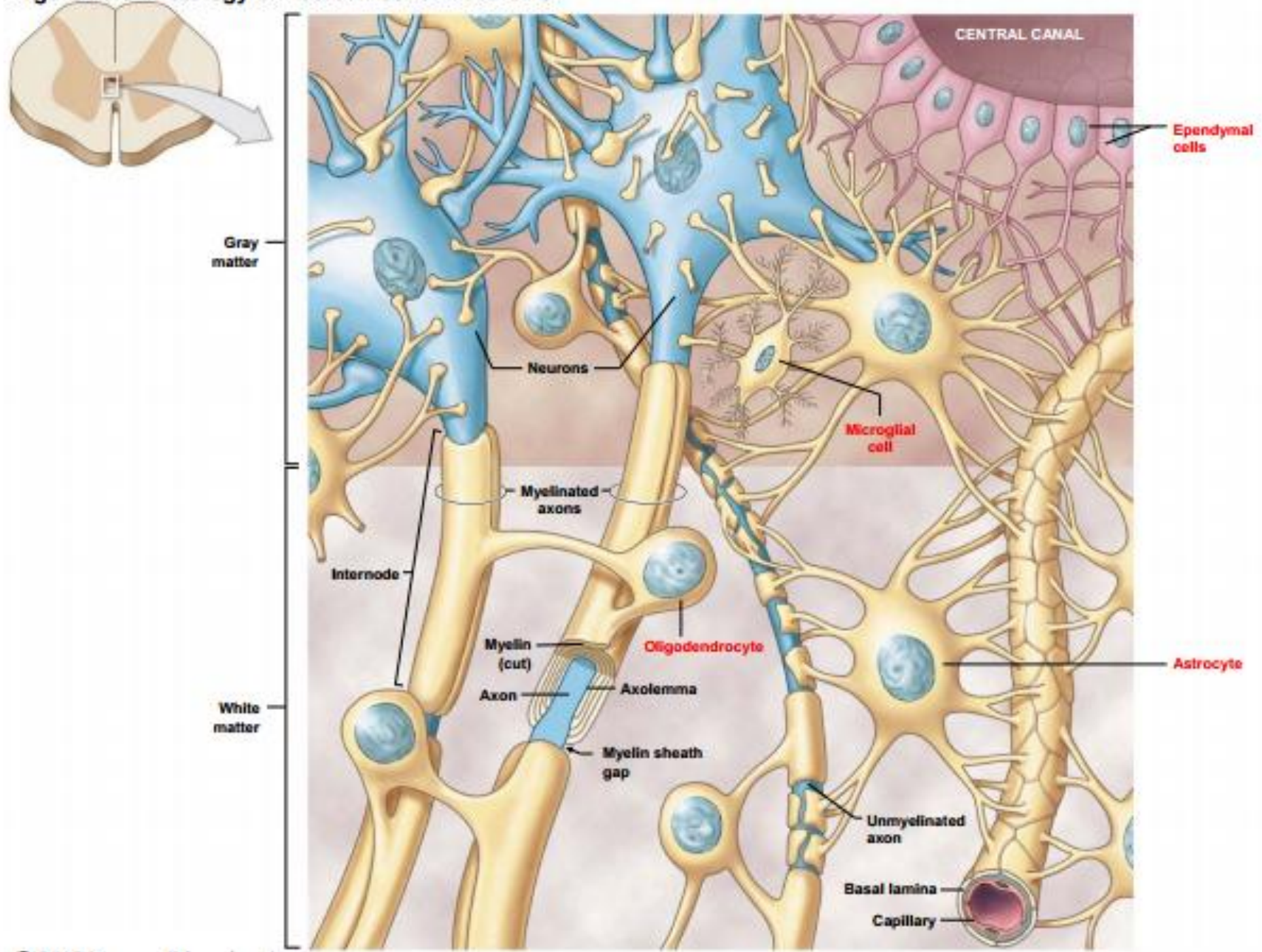


Figure 10-1 Histology of Neural Tissue in the CNS



Neural-Like Muscle Cells

- Skeletal muscle makes up about 50 percent of the body, which makes it easily accessible, and it can repair itself if it gets damaged
- Scientists at Wake Forest Baptist Medical Center think that these cells could be used to treat brain or spinal cord injury, neurodegenerative disorders, brain tumors and other diseases
- They took cells from a skeletal muscle sample and injected them into the brain, saw that the cells moved to the area of the brain where neural stem cells originate from
- Some types of stem cells will form tumors, so they injected the cells under skin and in brains, and found that no tumors formed
- They are now testing to see if these cells could turn into functioning neurons in the central nervous system

Neural Stem Cells Could Treat ALS

- Amyotrophic lateral sclerosis (ALS) is also known as Lou Gehrig's disease.
- The disease causes nerve cells in the spinal cord to die, which causes paralysis and will usually inhibit breathing
- A study showed that transplanting neural stem cells into a spinal cord slowed the disease progression
- Transplanting the cells did not repair or replace the nerve cells but helped to keep the remaining nerve cells functioning
- It is not a cure, but this procedure could help people live longer. Mice were able to live up to a year longer if they were treated with neural stem cells.

Works Cited

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