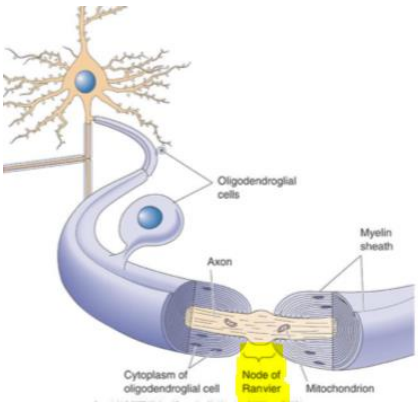
Glia and Neuron

Glia

- **Glia (supports neuronal function, no purpose in processing information)**
    - Insulates neurons
    - Supports neurons
    - Nourishes neurons
    - Out Number neurons x 10
    - **Astrocytes (Most numerous glia in the brain)**
        - Fill spaces between neurons
        - Influence if a neurite can growth or retract
        - Regulate chemical content of extracellular space → EG- astrocytes regulate potassium ions in the extracellular fluid that can interfere with proper neuronal function
    - **Myelinating Glia**
        - These glia provide layers of membrane (myeline sheath) that insulates axons
        - **Node of Ranvier:** region where the myeline sheath is periodically interrupted leaving a short length where the axonal membrane is exposed and makes signals travel faster
            - **Oligodendroglia (only in CNS)**
                - Brain and spinal cord
                - Myelinates several axons
            - **Schwann cells (only in PNS)**
                - Parts outside of skull and vertebral column
                - Myelinates only a single axon



    - **Other non-neuronal cells/structures**
        - **Ependymal cells** → Provide lining of fluid filled ventricles in the brain
        - **Microglia** → Phagocytes to remove debris left by degenerating neurons and glia (immune)
        - **Vasculature of brain** → Arteries , veins, capillaries and the sinuses

Neurons

- **Neurons:**
    - Processes information
    - Senses environmental changes
    - Communicates changes to other neurons
    - Commands body response

The prototypical Neuron (inside the neuron)

- **The soma (Perikaryon)**
    - **Cytosol:** watery fluid inside cell → salty potassium rich solution separated from outside by membrane
    - **Organelles:** membrane- enclosed structures within soma
        - **Rough endoplasmic reticulum (ER), free ribosomes, polyribosomes:** Rough ER is a major site for protein synthesis → ribosomes take amino acids and manufacture proteins
        - **Smooth ER and Golgi apparatus:** sites for preparing/sorting proteins for delivery to different cell regions (such as axon and dendrites)
        - **Mitochondria:** site of cellular respiration. Within inner membrane pyruvate enters Krebs Cycle and produces ATP (cells energy source)

- **The cytoskeleton**
    - Internal scaffolding of neuronal membrane → Gives neurons its characteristic shape
    - **Three bones**
        - Microtubules (20nm) → straight, thick wall hollow pipe → Protein: tubulin
        - Microfilaments (5nm) → Protein: actin
        - Neurofilaments (10nm) → very strong

- **Axon (found only in neurons)**
    - **3 components**
        - Hillock
        - Axon proper
        - Terminal
    - **Axon and Soma difference:**
        - ER does not extend into axon and only few/none ribosomes → therefore no protein synthesis
        - Different protein compositions between both membranes