

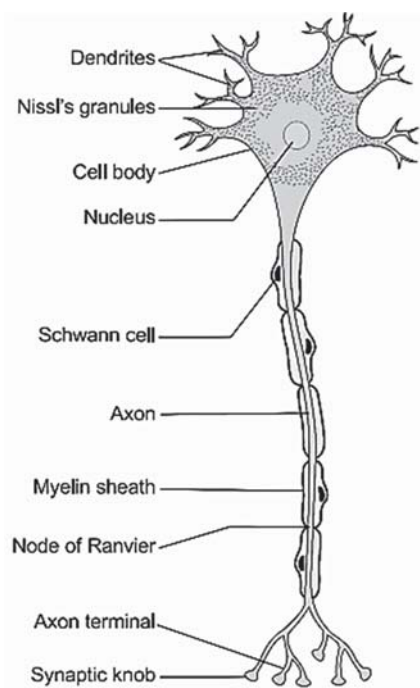
## NERVOUS (NEURAL) TISSUE

Neural tissue plays a paramount role in orchestrating the body's responsiveness to changing conditions. This specialized tissue is dedicated to transmitting messages throughout the body. The key components of the nervous system, including the brain, spinal cord, and nerves, are predominantly composed of nervous tissue. Within nervous tissue, one finds highly specialized cells known as nerve cells or neurons. Accompanying these neurons are neuroglial cells, which constitute the remainder of the neural system, providing protection and support to the neurons. Remarkably, neuroglia make up more than half the volume of neural tissue in our body.

### Neurons:

Neurons stand as the fundamental structural and functional entities within nervous tissue, demonstrating excitable characteristics. Each neuron comprises distinct components:

- **Cyton or Cell Body or Perikaryon:** The cyton is the central hub housing the nucleus and neuroplasm, a term for the cytoplasm within neurons. Notably, Nissl's granules, which are substantial and irregular masses of ribosomes and rough endoplasmic reticulum (RER), characterize the cytoplasm.
- **Dendrites:** These are brief and intricately branched extensions emanating from the cyton. Dendrites play the role of conveying impulses toward the cell body.
- **Axon or Nerve Fibre:** The axon, a singular, elongated cylindrical projection from a nerve cell, maintains a consistent thickness. Its termination culminates in a collection of branches known as terminal arborizations. Unlike the cyton, Nissl's granules are notably absent in the axon. The axon serves the crucial function of transmitting messages away from the cyton. In certain instances, the axon may be enveloped by a sheath called Neurilemma, formed by specialized glial cells called Schwann cells.



**Synapse:** When a neuron undergoes appropriate stimulation, it generates an electrical disturbance that rapidly traverses its plasma membrane. This disturbance reaching the neuron's terminal arborizations, or output region, initiates events that can either stimulate or inhibit neighboring neurons and other cells. The terminal arborizations of one neuron's axon is closely juxtaposed to the dendrites of another neuron, facilitating the transmission of impulses from one neuron to the next. This close association is referred to as a synapse.

**Chemical Transmission at Synapse:** Nerve impulses traverse the synaptic gap between neurons with the aid of specialized chemicals known as neurotransmitters, exemplified by substances like Acetylcholine. These neurotransmitters play a pivotal role in the effective communication and transfer of signals between neurons.

- **Types of Neurons:** Neurons exhibit diversity based on the number of nerve processes they possess. There are four main types:

**Unipolar Neurons:** Unipolar neurons exclusively feature a single process, usually an axon. This type is primarily encountered in early embryonic stages.

**Bipolar Neurons:** Bipolar neurons distinguish themselves by having two processes - a single axon and a dendron. These neurons are notably present in the olfactory epithelium and the retina of the eye.

**Multipolar Neurons:** Multipolar neurons stand out with multiple processes extending from the cell body. Among these processes, one is longer and functions as an axon, while the rest operate as Dendron's. Multipolar neurons are the most prevalent type and are primarily located in the brain and spinal cord.

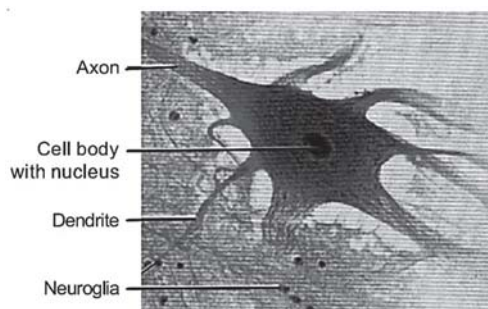
**Pseudo-Unipolar Neurons:** Pseudo-unipolar neurons, although appearing unipolar initially, are essentially bipolar. They initiate from a single process that later divides into dendrites and an axon. This specific neuron type is identified in the dorsal root ganglion of the spinal nerve.

### Types of Nerves:

- **Sensory Nerve:** A sensory nerve comprises exclusively sensory nerve fibers enveloped by a connective tissue membrane. Its primary function is to transmit impulses from the receptors to the central nervous system (CNS). These nerves play a crucial role in conveying sensory information from various parts of the body to the CNS.
- **Motor Nerve:** A motor nerve is composed of motor nerve fibers responsible for conveying impulses from the CNS to effector organs, such as muscles or glands. The activation of motor nerves results in the initiation of movement in the corresponding muscles or the stimulation of glandular activity. These nerves play a pivotal role in executing responses and actions dictated by the CNS.
- **Mixed Nerve:** A mixed nerve incorporates both sensory and motor nerve fibers within its structure. In the human body, all spinal nerves are categorized as mixed nerves. This implies that these nerves serve the dual function of transmitting sensory information from the periphery to the CNS and conveying motor commands from the CNS to the effectors, facilitating a coordinated and integrated response.

### Neuroglial Cells / Neuroglia

Neuroglial cells, also known as neuroglia, are specialized cells primarily located in the brain and spinal cord. These cells play a crucial role in supporting and protecting neurons, constituting more than 50% of the total cells in the brain. Neuroglial cells exhibit diverse shapes and are believed to act as a barrier, separating and insulating adjacent neurons. This segregation ensures that nerve impulses travel only through synapses, where neuroglial cells are absent.



**Functions of Nervous Tissue:**

- **Control of Body Activities:** Nervous tissue serves as the command center for the entire body, exerting control over various physiological activities. This control encompasses both voluntary and involuntary functions, ensuring a harmonious response to internal and external stimuli.
- **Coordination between Body Parts:** The nervous tissue plays a pivotal role in coordinating activities among different body parts during various physiological processes. This coordination is essential for the smooth execution of functions such as movement, digestion, and sensory responses.
- **Role of Dendrites and Axon:**

**Dendrites:** These are specialized processes extending from neurons towards the cyton (cell body). Their primary function is to carry nerve impulses from neighboring neurons towards the central cell body.

**Axon:** In contrast, the axon is a single, elongated projection of a nerve cell responsible for carrying impulses away from the cyton. This directional flow ensures the transmission of signals in a coordinated and organized manner, facilitating communication within the nervous system.