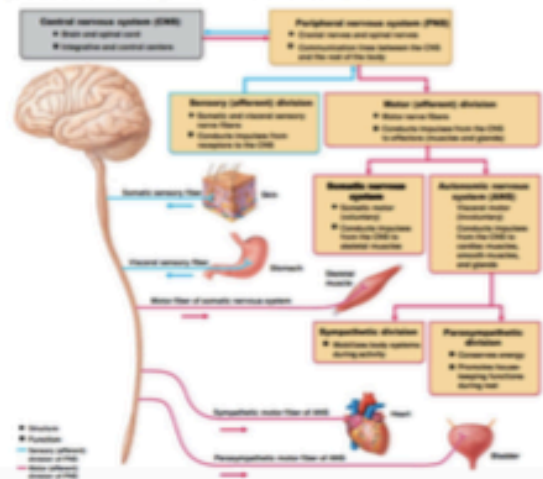


2. Nervous system:

- **Central nervous system**- brain and spinal cord, main control centre
- **Peripheral nervous system**
 - o nerves branching off the brain
 - o for communication
 - o works in both directions



Figure 13.2: Levels of organization in the nervous system.

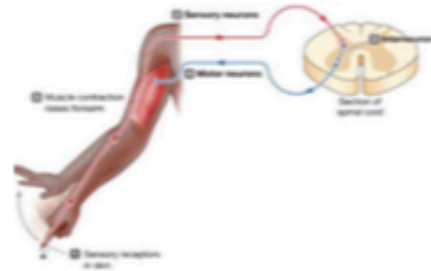


- Sensory division (afferent) – picks up sensory stimulus
 - Motor division (efferent) – sends from brain to muscles and glands
 - Somatic nervous system – voluntary
 - Autonomic nervous system- involuntary e.g. heartbeat
 - o Sympathetic division- mobilises body
 - o Parasympathetic division – relaxes the body
- Glial cells – provide support, nutrition, insulation and help with signal transmission
 - o CNS:
 - Astrocytes – exchange materials between neurons and capillaries
 - Found in CNS, most abundant and versatile
 - Microglial cells – immune defence against invading microorganisms
 - Ependymal cells – create, secrete, circulate cerebrospinal fluid
 - Oligodendrocytes- produce an insulating barrier (Myelin sheath)
 - o PNS:
 - Satellite cells – surround/ support neuron cell bodies (like astrocytes)
 - Schwann cells – like oligodendrocytes
- Neurons
 - o Some of the longest lived cells in the body
 - o Amitotic - Irreplaceable
 - o High metabolic rate – need steady replacement of energy
 - o Sensory (afferent) – transmit impulses from sensory receptors toward CNS (most are unipolar) - long dendrites and short axon
 - Mechanoreceptors – mechanical stimuli – tension, pressure, distortion
 - Thermo receptors – temperature
 - Nociceptors – injury, pain
 - Photoreceptors – electromagnetic radiation – wavelengths of visible light
 - Chemoreceptors – chemical stimuli – senses (taste, smell etc.)

- Motor (efferent) – impulse moves from CNS to the rest of the body (most are multipolar) – CNS to muscles – long axon, short dendrites
- Interneurons (association neurons) – impulse moves between sensory and motor neurons. found in CNS (most are multipolar) - connect neurons – different shape
- Differentiating nerve cells:
 - How many processes extend from the body (multi/bi/unipolar)
 - Which way an impulse travel through a neuron in relation to the brain and spine (sensory or motor neurons)
- E.g. multiple sclerosis – abnormal sensations, visual disturbances, motor dysfunctions, imbalance, pain

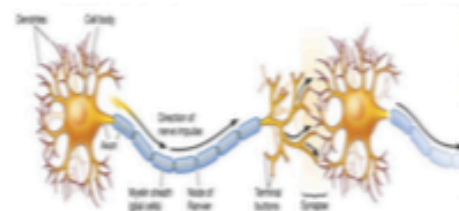
Nerve cells:

- Powered by electrical impulses and communicate with other nerve cells through chemical signals
- 3 basic phases:
 - reception: Chemical signals are received from neighbouring neurons
 - Integration: incoming signals are assessed
 - Transmission: Signals are passed on to other receiving neurons



Neuron structure:

- Dendrite: detects chemical signals from neighbouring neurons
- Cell body (soma): collects and integrates information
- Axon: transmits electrical impulses
- Terminal buttons: bulbous end of an axon
- Synapse: supports chemical communication between neurons
 - Synaptic cleft: narrow gap between terminal button (presynaptic membrane) and dendrite (postsynaptic membrane) of neighbouring neuron
- Myelin sheath: encases and insulates axons
 - Composed of glial cells
 - Nodes of Ranvier: spaces between glial cells



Neurotransmission:

- Electrochemical
- Signals conducted are created by movement of salts- sodium, chloride, potassium
- Neurotransmitter: chemical substances that transmit signals from one neuron to another
- Neurotransmission- Neurons do not ever touch – communicate between neurons