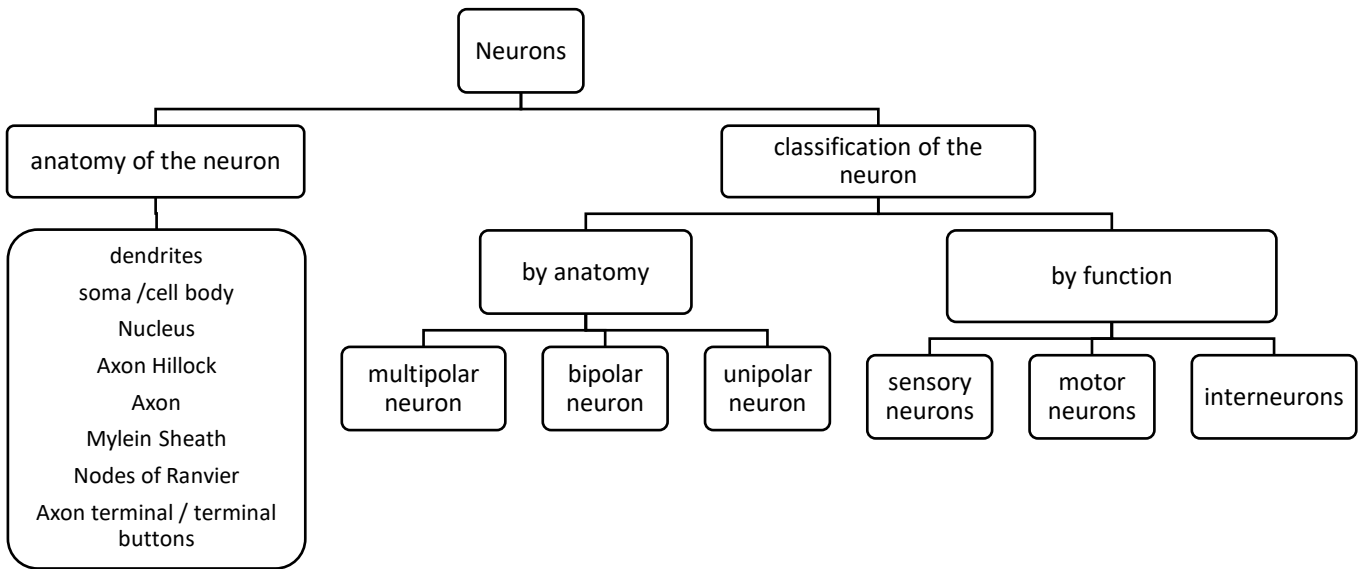


Nervous System Overview

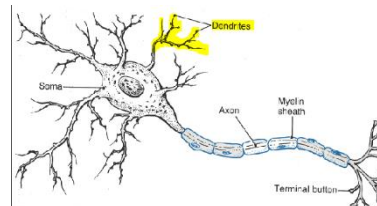


Anatomy of the neuron

- Neurons are nerve cells and the basic unit of the nervous system and transmit information to the brain
- Human brains has 86 billion neurons
- 160,000km end to end

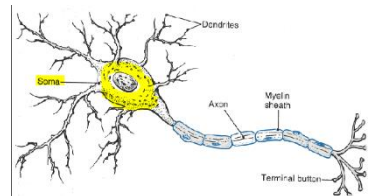
Dendrites

- Branch like structures that receive information from other cells



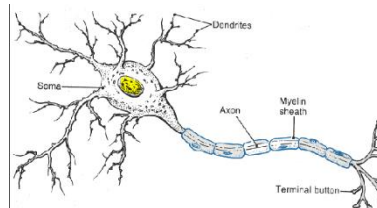
Soma / Cell body

- Includes the nucleus, it protects the nucleus and cell contents
- The phospholipid bilayer maintains the negative charge within the cell



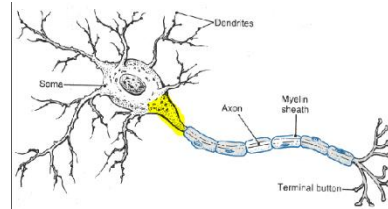
Nucleus

- 'engine room' of the cell
- Contains the genetic material
- If neuron receives simulation from dendrites it passes the manipulated input through the axon and to the dendrite of the next neuron. Nucleus produces *neurotransmitters*



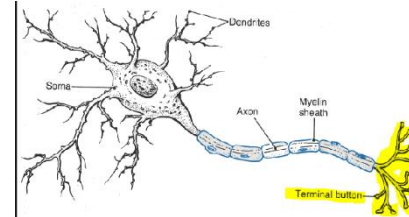
Axon Hillock

- The gatekeeper of transmission: this is where it is decided whether or not action potential is fired



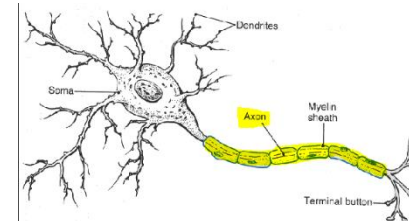
Axon terminals/ terminal buttons

- Chemical messages are sent from these terminals
- Gap between neurons are called synapses. Axon terminals are considered 'pre-synaptic' and dendrites are 'post-synaptic'



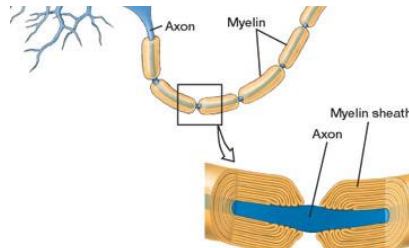
Axon

- Long nerve fibre
- Transmits information to other neurons
- Conducts the electrical signals from the cell body



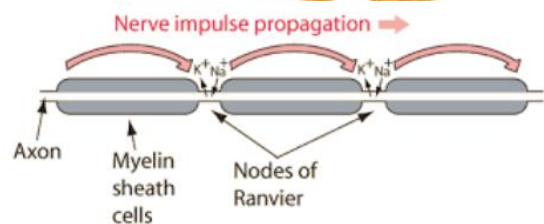
Myelin sheath

- Coating that insulates the axon, composed of primarily of lipids (fats)
- Allows for faster signalling
- Produced by Schwann cells
- Myelinated axons give some portions of the brain a white appearance



Nodes of Ranvier

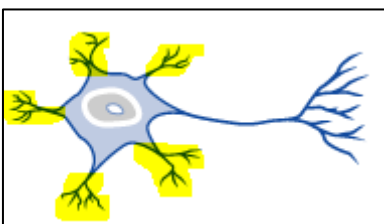
- Bare axon
- Allows the transmission to continue down the axon



Classification of Neuron by Anatomy

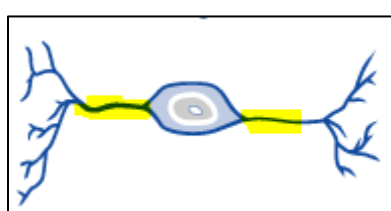
Multipolar Neuron

- Long axon and lots of dendrites
- (i.e. lots of extensions from cell body)



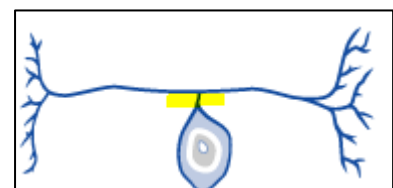
Bipolar Neuron

- 2 extensions from cell body



Unipolar Neuron

- 1 extension from the cell body



Classification of Neuron by Function

Sensory Neurons

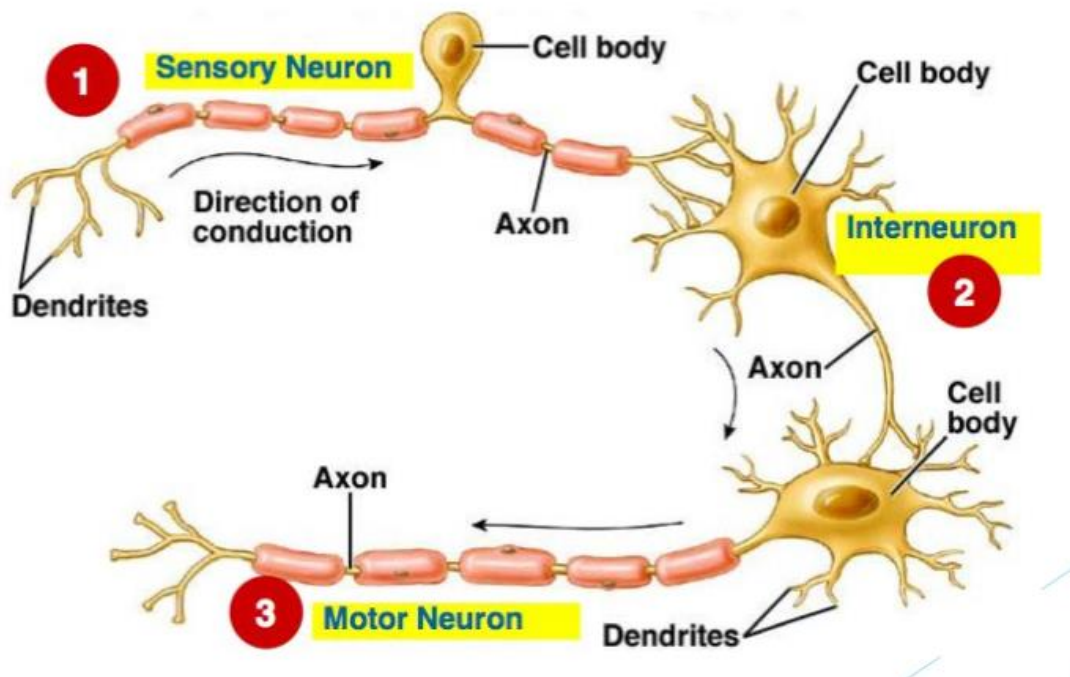
- Transmit information from sensory cells (receptors) to the brain
- Sensory neurons are activated by sensory input (e.g. light received by photoreceptors or touch received by mechanoreceptors)
- Unipolar or bipolar cells
- Afferent signal (afferent: conducted towards something, i.e towards the brain)

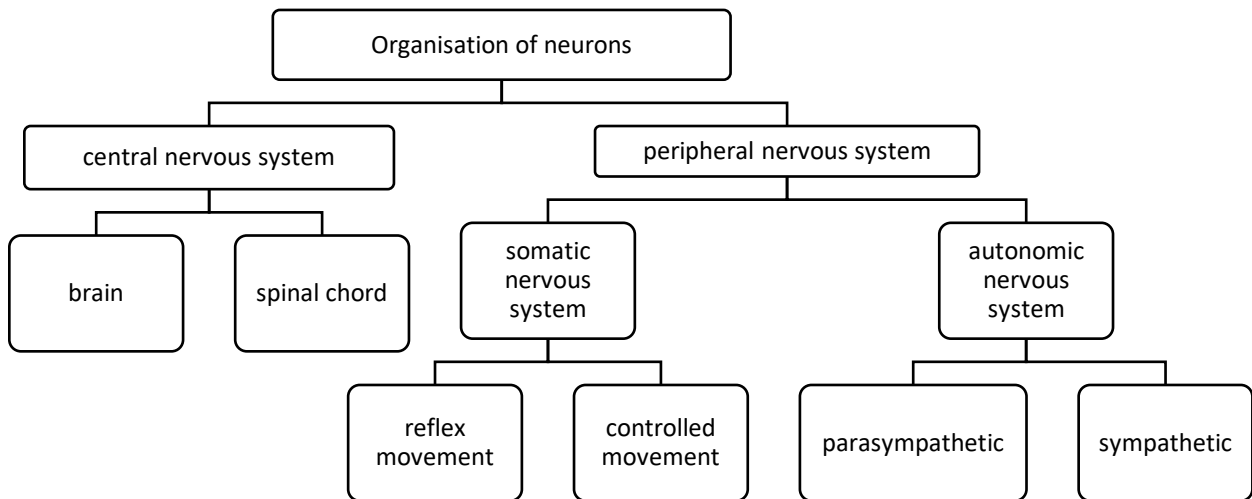
Inter Neurons

- Connect neurons with one another
- Neurons within the brain
- Multipolar cells
- Involved in higher order processing – memory, cognition

Motor Neurons

- Transmits information from the brain to the periphery (glands and muscles of the body)
- Cell body located in spinal cord and axon projects to the periphery to control muscles
- Multipolar cells
- Efferent signal (efferent: conducting outwards)





CNS includes the brain and spinal cord, PNS includes all other nerves

Central Nervous system

- Directs psychological and basic life processes; responds to stimuli
- Spinal cord: receives sensory input, sends info to brain and responds with motor input
- Brain: directs psychological activity, processes information and maintains life support

Peripheral Nervous system

Somatic Nervous system

- Transmits sensory information to CNS (brain and spinal cord)
- And controls body movements in skeletal muscles (motor neurons)
- Involved in voluntary actions (standing up or shaking one’s hand)
- Involved in involuntary actions (adjusting posture)

Autonomic Nervous system

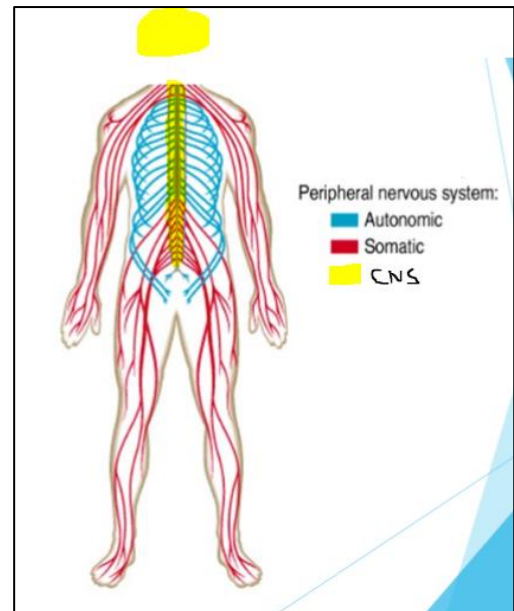
- Serves basic life functions (beating of heart and response to stress)

Sympathetic nervous system

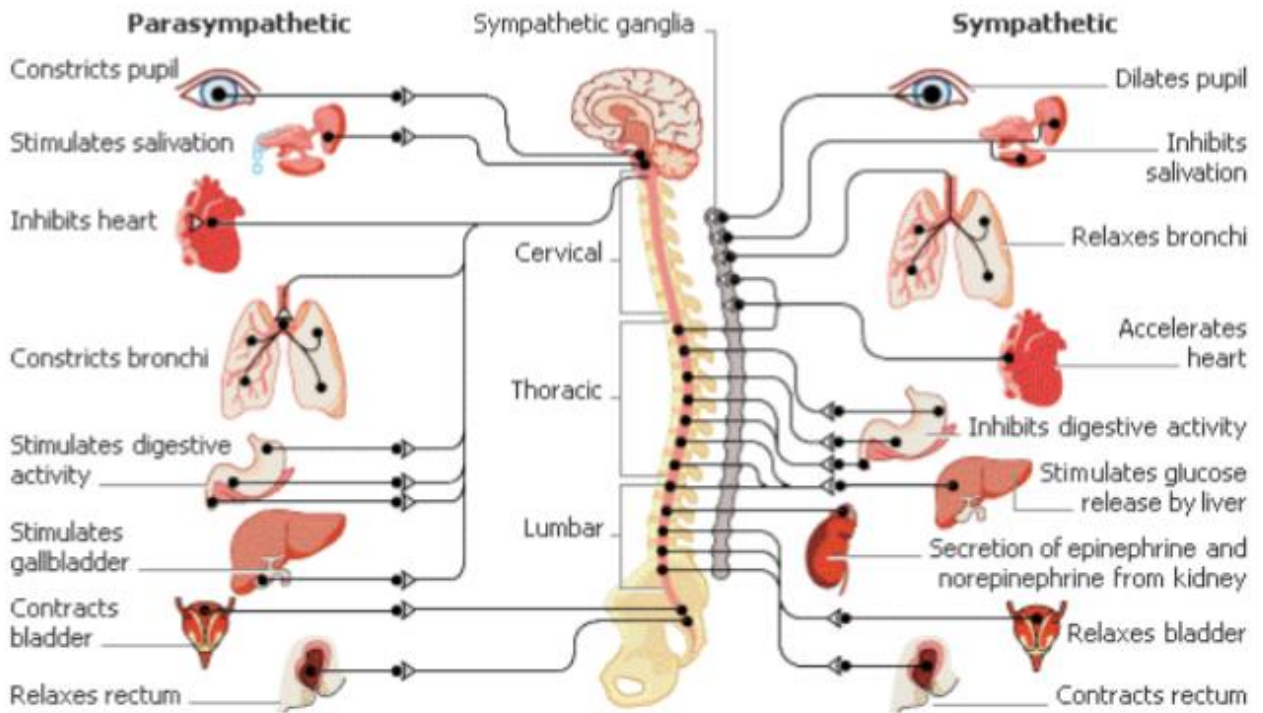
- Activated in response to threats (emergency system)
- E.g. increases heart rate, causes hairs on body to stand erect, redirects oxygen to muscles

Parasympathetic nervous system

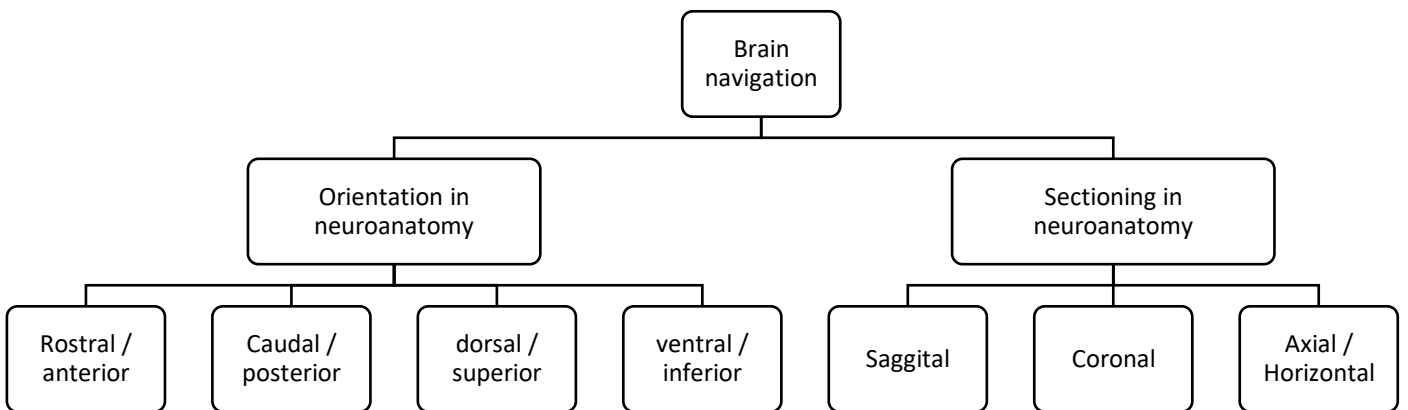
- Normal bodily functions



**the relationship between sympathetic and parasympathetic nervous system is that it is a balancing act. During emergency sympathetic nervous system works, once emergency has passed parasympathetic nervous system resumes control, reversing sympathetic responses and returning to normal body



Introduction to neuroanatomy



Orientation in neuroanatomy

Rostral / anterior

- Moving towards the front

Caudal / posterior

- Moving towards the back

Dorsal / Superior

- Moving up

Ventral / inferior

- Moving down

