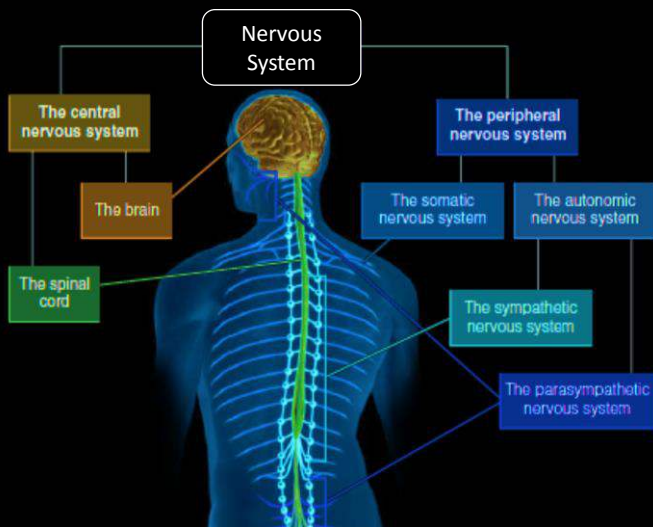


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Nervous System & Neurons

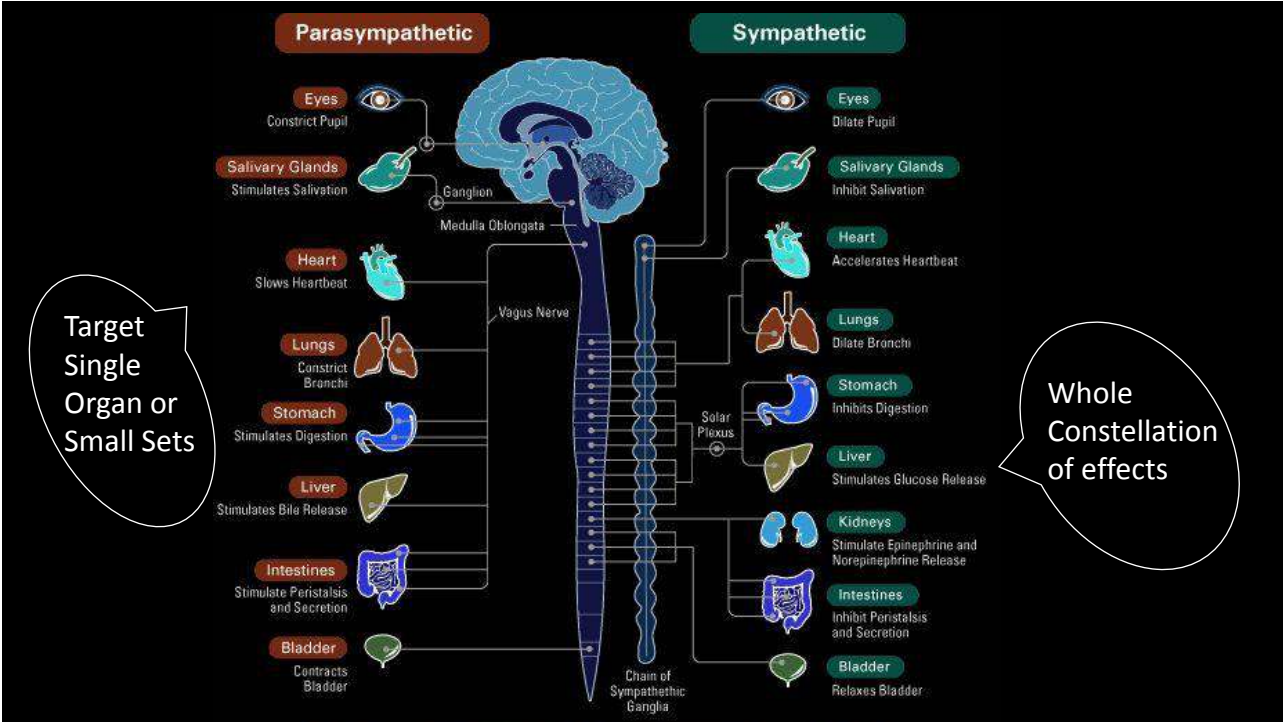
Components of Nervous System



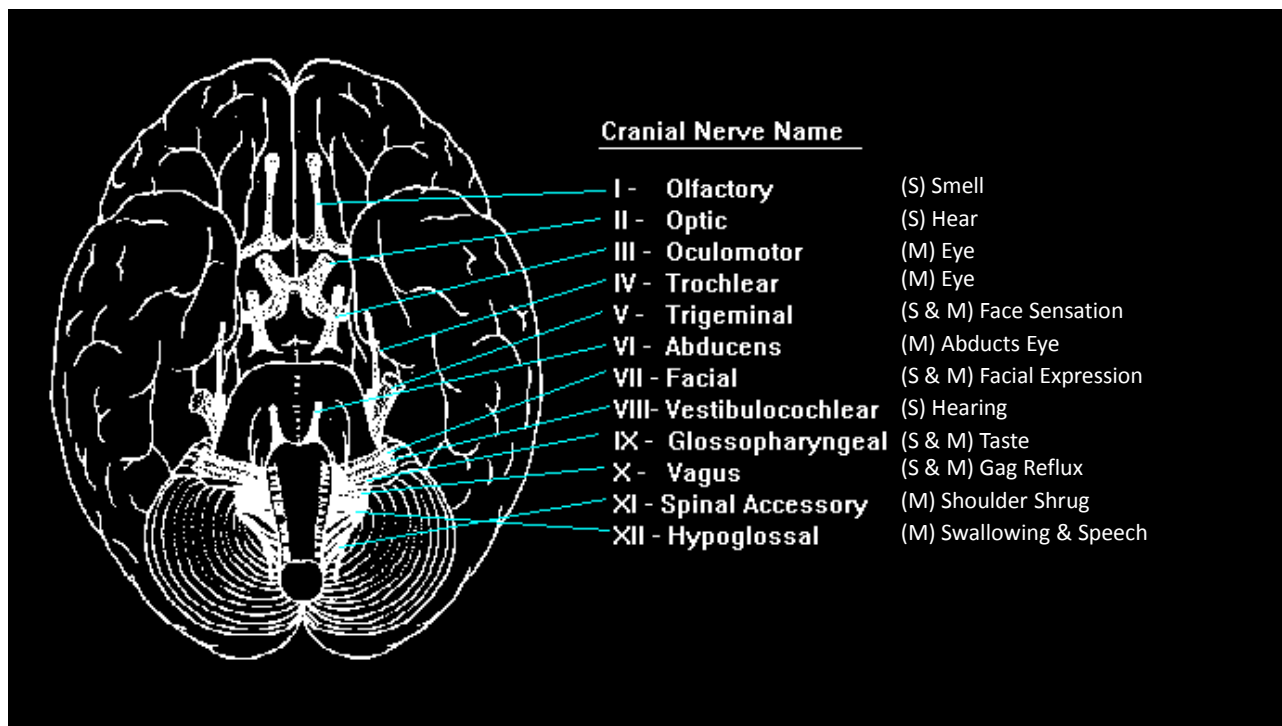
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Peripheral Nervous System

- Somatic: Message to & from sense organs & skeletal muscles – Striated Muscles
- Autonomic (self-governing): Message to & from internal organs & glands – Smooth Muscles



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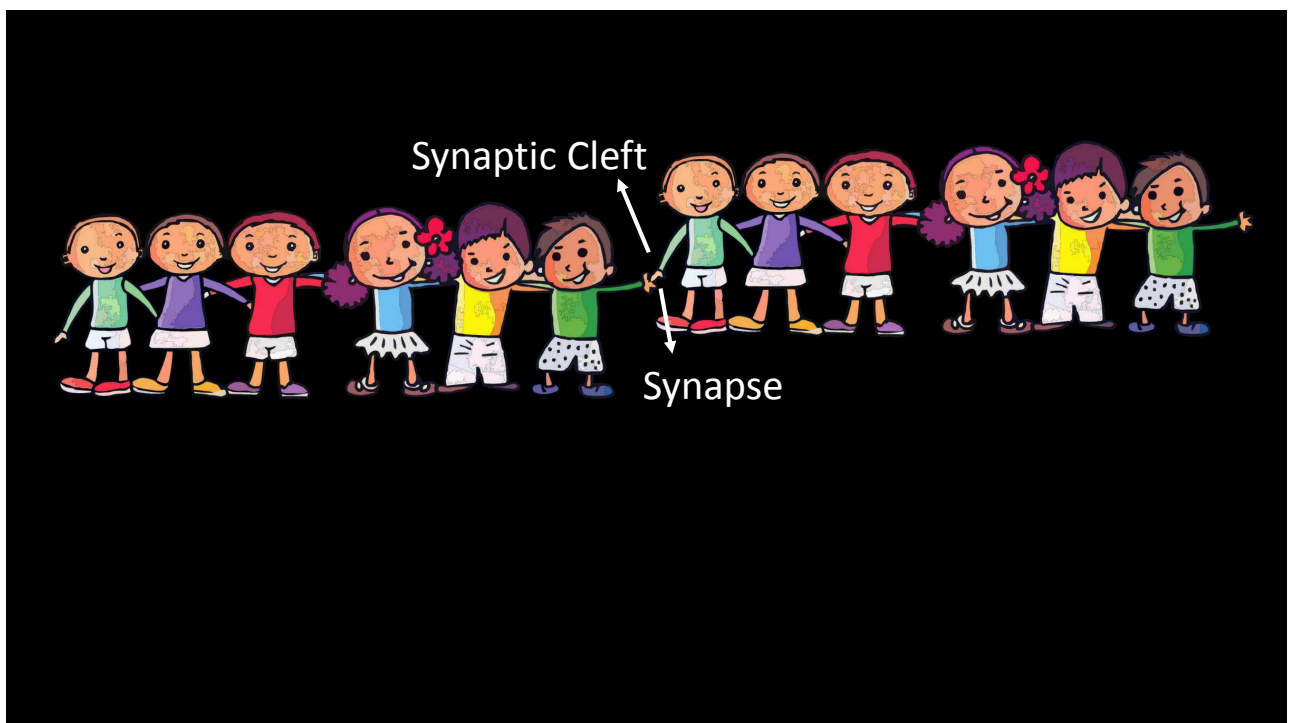
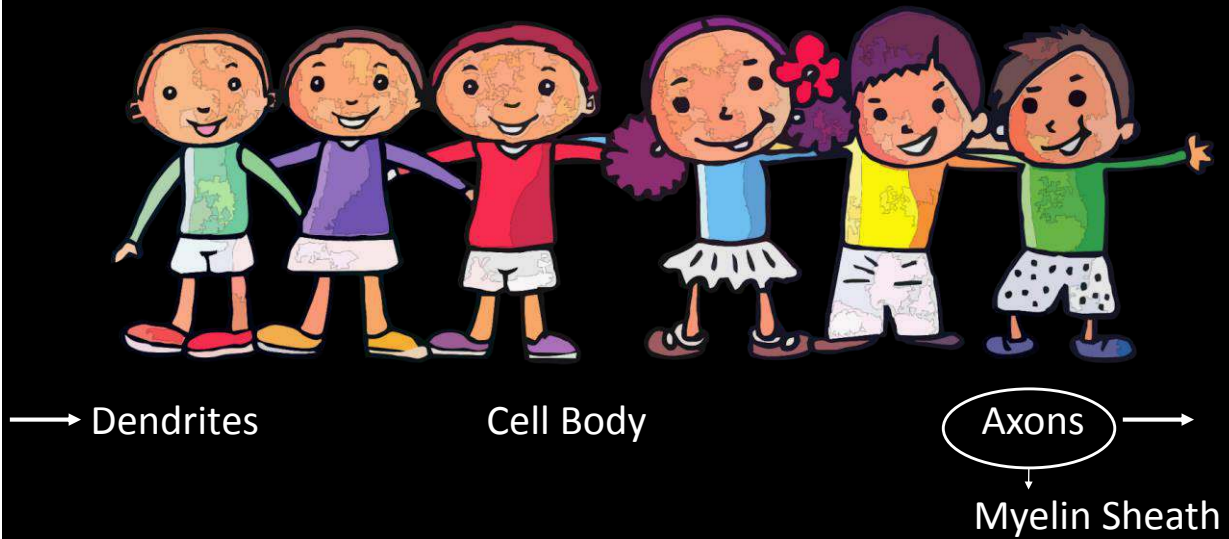


Neurons

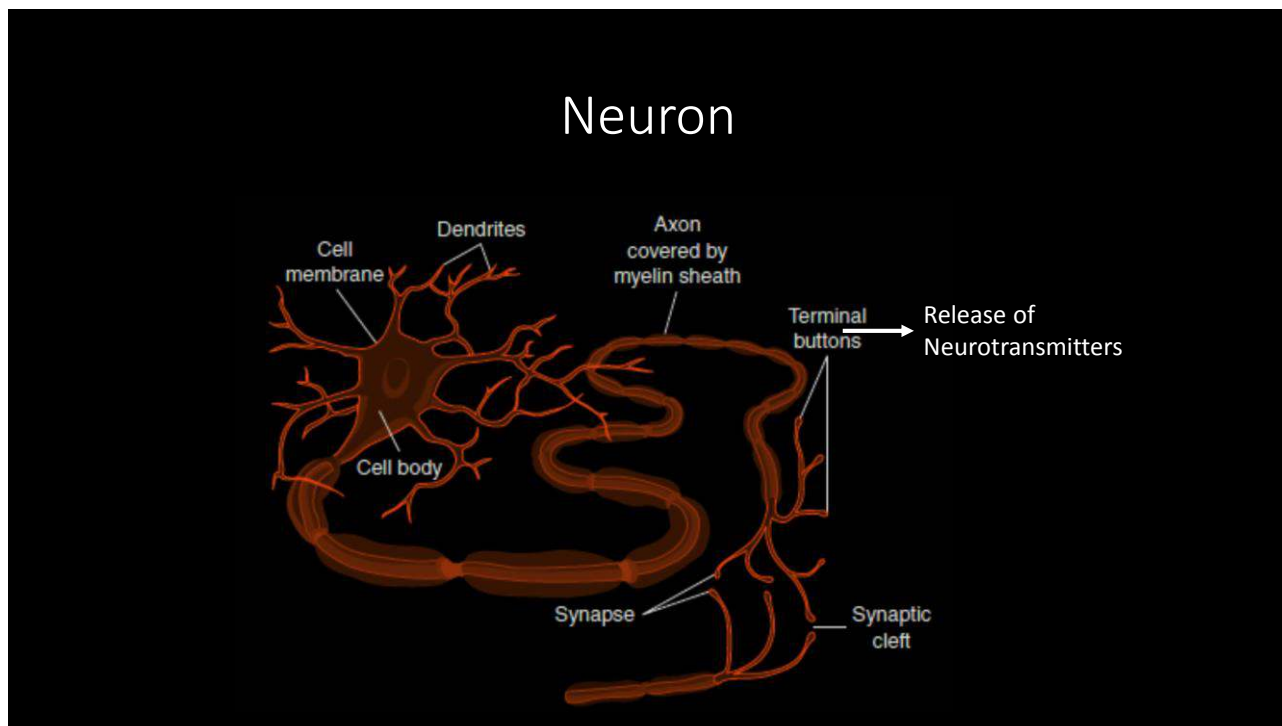
- Sensory Neurons – input from sense organs
- Motor Neurons – Stimulate muscles & movements
- Interneurons – b/w sensory & motor & interconnections
- Glial Cells – Care & feeding of neurons & connection among neurons, these are 10 times that of neurons

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Structure of Neuron



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How Information Moves?

- Nerve Impulse - Primarily Electrical
- Communication b/w neurons – Chemical – Neurotransmitters
- Neurotransmitters – Either excite or inhibit

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Nerve Impulse

- Electrically charges molecules – Ions inside neurons
- Will be discussed in separate tutorial

Neurotransmitters

Excitatory Input > Inhibitory Input
Then will cause Action Potential & will 'fire'

Chemical



Receptor

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Neurotransmitter	Mode of Action	Deficiency	Excess
Acetylcholine (blocked by drug curare)	Excitatory	<u>Alzheimer's</u>	Violent muscle contractions
Dopamine (drug cocaine behaves similarly)	Excitatory	<u>Parkinson's</u>	<u>Schizophrenia</u>
Glutamate	Excitatory	Tiredness	Neuron Death & Autism
Norepinephrine	Excitatory	Depression	Anxiety
Serotonin	Inhibitory	Anxiety, Mood Disorder, Insomnia	Autism
GABA	Inhibitory	Anxiety	<u>Sleeping & Eating Disorders</u>
Endorphin	Inhibitory	Experience Pain	No information on Pain

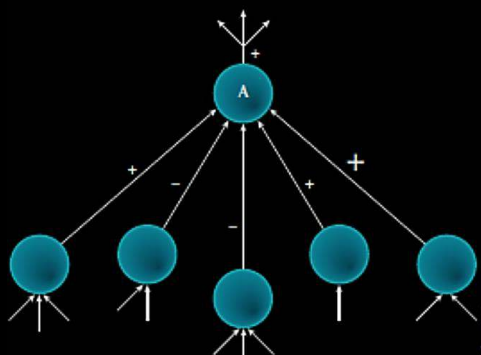
Neuropeptides

- Don't carry message directly
- Brain chemicals that regulate activity of other neurons
- Enkephalins – Opiate like regulators to relieve pain & stress
- Endorphins – by Pituitary Glands to relive pain & stress

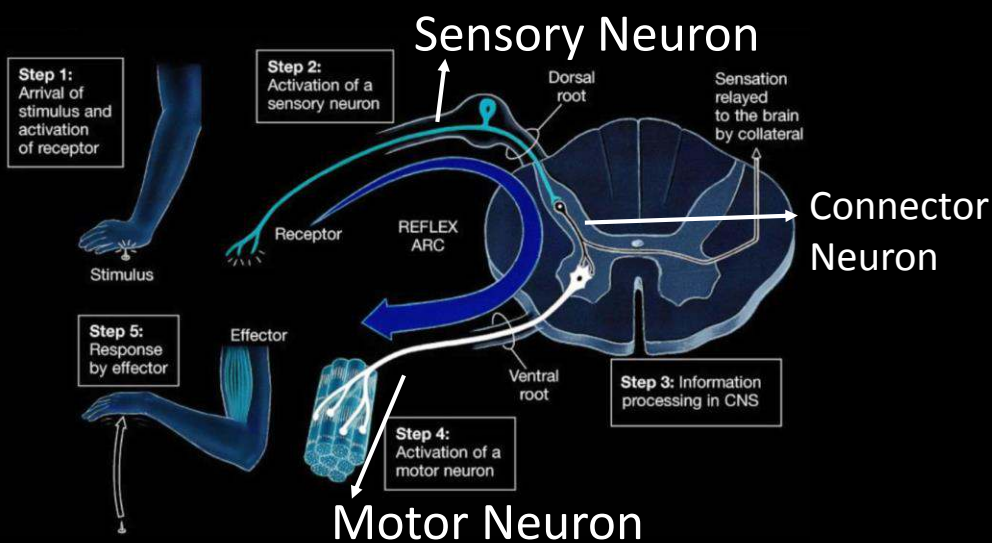
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Neural Networks

- Interlinked collection of neurons
- A reflex arc – stimulus provokes automatic response
- One neuron may weigh hundred of inputs to outward message
- Each neuron is a tiny computer – billions of neurons & trillions of synapse



Reflex Arc



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Neuroplasticity & Neurogenesis

Neuroplasticity – Capacity of brain to change in response to experience

- Hebb's rule: Repeated activation of synapse b/w 2 neuron strengthen connection between them
- If in complex situation – longer dendrites & more synapse (eg., rat)
- Human brain is neuro-plastic – patience & persistence

Neurogenesis – Growth of new neurons & production of new brain cells

- Constraint Induced Movement Therapy – Constraint right arm so that impaired left arm becomes active