

Psych Extra Credit- Lecture 1

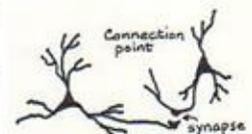
- Central Nervous System (CNS- Brain & Spinal Cord) + Peripheral Nervous System (PNS- Everything else)
 - **Sensory neurons:** collect internal & external info. They detect changes in the external or internal environment and sends information about these changes to the CNS
 - **Motor neuron:** controls muscles. Neuron located within the CNS that controls the contraction of a muscle or the secretion of a gland
 - **Interneurons:** located within the CNS
- Morphology:
 - Neurons fall into several morphological classes
 - The study of neuron shapes is called “ Neuro-anatomy”
 - In some cases the shape of the neuron is indicative of its function
- **Unipolar** – 1 branch ** side note: there are 300 billion neurons in our body**
- **Bipolar**-2 branches
- **Multipolar**- many branches
- Info is ‘summed’ at the soma, from all other dendrites
 - **Dendrites:** get info from other neurons, considered the “input.” Dendrites are also in charge of motor action
- Infor that is ‘summed’ at the soma is sent away to the **axon** (output). The axon is inside the myelin sheath. Professor Fellous referred to axons as “telephone lines”
- Flow of Information:

Information  Neurotransmitters
Spines-> Dendrites-> Soma-> Axon-> terminal **BOUTTONS** (not buttons)

- **Neurotransmitters:** serve as messengers, transmitting information from one cell to another
- **Sensory Neurons:** external or internal stimuli-> brain
- **Motor neurons:** Brains-> Muscles-> Glands
- **Bipolar Neurons:** Cilia are sensitive to physical stimuli
- **Unipolar Neurons:** dendrites are sensitive to physical stimuli
- Neurons “talk” to each other through synapses.
- **Synapse:** where the terminal bouton is almost touching the dendrites of the other neuron
- Inside a multipolar neuron:

Connections form between neurons.

- When two dendrites grow close together, a contact point is formed. A small gap at the contact point is called the **synapse**.
- Messages are sent from one neuron to another as electrical signals travel across the synapse.



- Nucleus: hosts the chromosomes, enzymes, DNA, genes, proteins
- Cytoplasm: inside the cell
- Membrane: lipid bilayer
- Mitochondria (inside cytoplasm): energy, ATP, symbiosis
- Cytoskeleton: ensemble of microtubules & other proteins that together produce the shape of the neuron
- Microtubules (all together form the cytoskeleton): axoplasmic (transport on the axon). Keeps “rigidity” (inability to be bent or forced out of shape)
- **Neurons functions:** emotion, perception, thinking, action
- **Glial (glue) cells:** support system of the neurons. 5x stronger than neurons. There are 3 types:
 - Astrocytes: “City Workers” – structural support
 - Cleanup (phagocytes)
 - Active interface between blood vessels and neurons
 - Nourishment ex: lactate

**when blood starts touching neurons a stroke can happen. Astrocytes help prevent this.

- have many processes that make them look star shaped. Maintains environment around neurons ; forms blood-brain barrier.
- Microglia: migrates to injured nerves, clears debris,
 - Smallest of glial cells
 - Activated during inflammatory reactions due to brain damage (ex: Alzheimer’s)
- Oligodendrocytes: process from cell form myelin sheaths around axons and neurons (myelination)
 - “Shwann Cells” PNS “Oligodendroglia” CNS
- Capillary brain-blood barrier:
 - Selective permeable
 - active transport: little proteins that actively transport whatever is needed ex: glucose
 - Area of postrema in the brain: this region in the brain controls vomiting
- Electrons vs. Ions
 - Electrons: “free floating” information (usable)
 - Ion: Atom/nucleus +electrons. Channeled information
- Neurons are electrical devices because they’re electrically charged
- Inside of a neuron: cytoplasm outside of a neuron: extracellular space

- The resting membrane potential- 2 forces:
 - Diffusion: from high concentration --> to low concentration
 - Electrostatic: some charges repel
- 3 ions to focus on:
 - Potassium (K) Chloride (Cl) Sodium (Na)
- Forces of diffusion: “where it goes from a lot to a little”
- Hyperpolarization: membrane potential goes more negative
- Depolarization: membrane potential goes from more positive
- Ions move in/out of the cell through ion channels
- Ion channels open when the membrane depolarizes enough (or depending on the voltage)
- K⁺ channels are slightly lower than Na⁺ channels
 - Na⁺ in → depolarize
 - K⁺ out → hyperpolarize

