Neural Communication
(aka How your nerve cells talk to each other)

Objectives

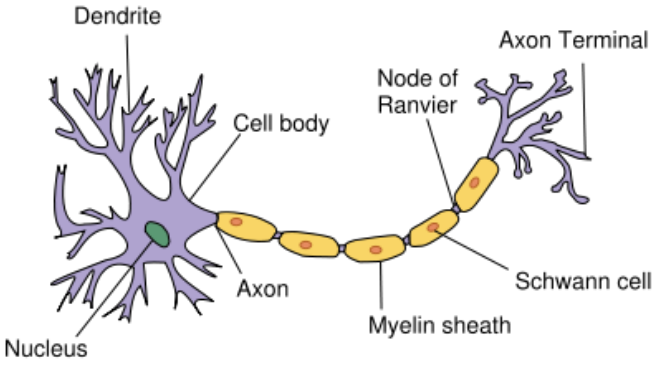
- Create a model out of Play-Doh that clearly and accurately represents the structure and function of a motor neuron
- Illustrate **action potential** in your motor neuron model
- Explain the **refractory** period, **threshold**, and the **all-or-none** response

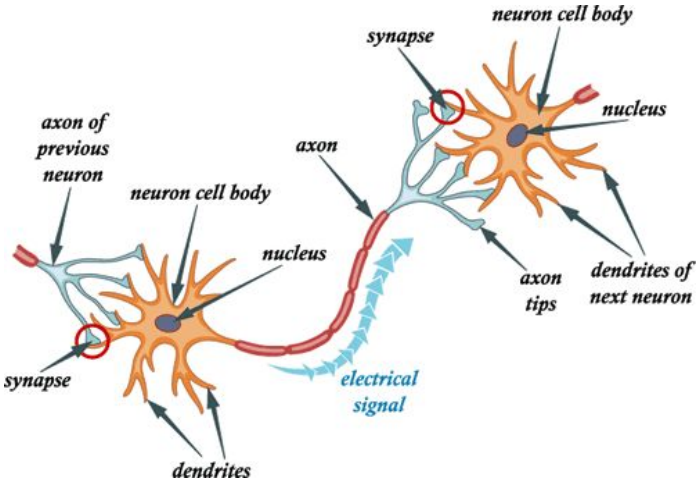
Materials needed per person

- Colored Play-Doh
- Dry-erase marker
- Clorox wipes – for clean-up or correcting mistakes written on your desk

Procedure

1. You are building your own motor neuron model, but also creating a mini-network within your team. As you now know, neurons connect to each other in a specific direction. Refer to Model 2 as a guide, and decide which direction everyone on your team needs to orient their individual neuron to accurately represent a network.
2. Using the color guide below, create a model of a motor neuron on your desk out of Play-Doh
   a. Lay the Play-Doh flat on your desk (don't try to make it stand up)
   b. Each neural component should match the shape shown in the 2-D model
   c. The size of your motor neuron should be large enough to clearly see the axon inside the Myelin sheath and the Nodes of Ranvier (your model should be larger than the one shown below!!!)
3. Label your motor neuron:
   a. Name of each structure
   b. Briefly describe the function of each structure
   c. Action Potential (refer to Model 3) – include explanations **in your own words**
4. Answer the questions on the back





Model 1
A motor neuron

Myelin sheath – helps make neural communication more efficient. Without myelin, neurons would not communicate as quickly, make behavior and mental processes occur more slowly or perhaps not occur at all.

The Nodes of Ranvier – the spaces in between the myelin sheaths that encircle the axon. These spaces are important to keep the charge going through the relatively long axon. Without these spaces, the charge might lose its intensity before reaching the end of the cell.

Model 2
Motor neurons

Color Guide

Cell Body (Soma) & Dendrites – Blue

Nucleus – White

Axon – Pink

Myelin sheath – Orange

Nodes of Ranvier – Pink

Axon Terminal - Yellow

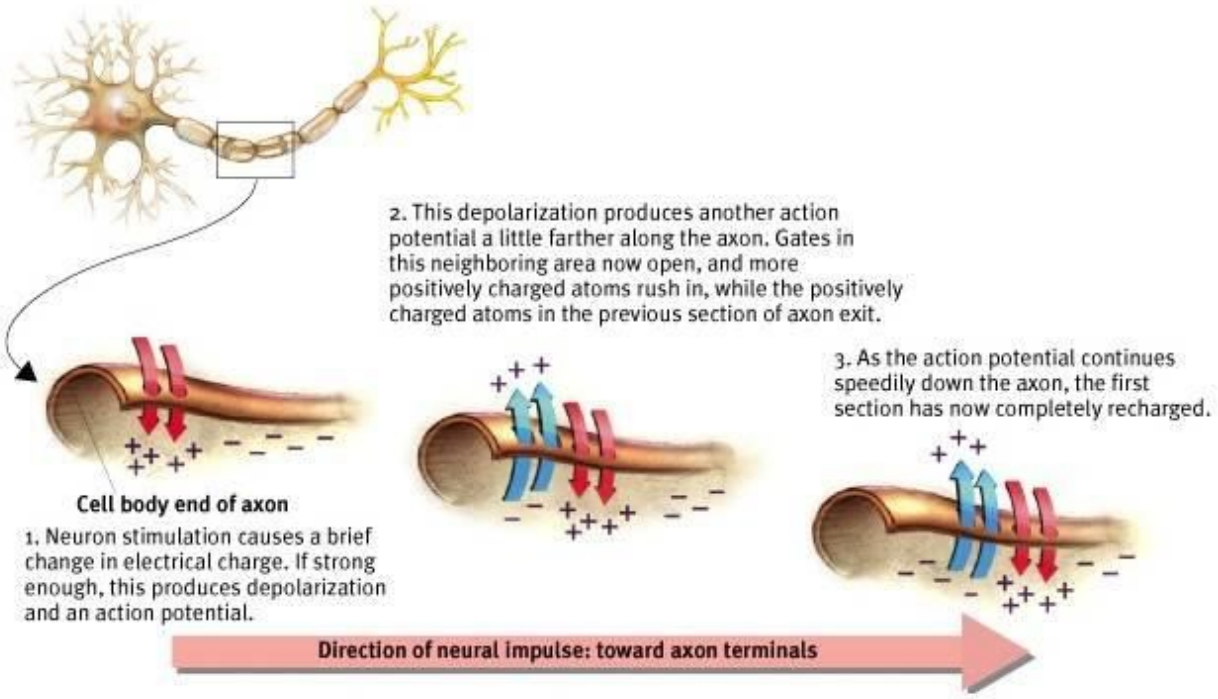
Model 3

Action Potential

Ions have a charge, either positive or negative. When these particles move, they create electricity, which is what the action potential is. Understanding HOW these particles move in relation to each other should be the focus of your study.

The natural tendency for matter is to move from a more crowded situation to a less crowded situation. The neuron is packed with negatively charged ions, with the positively charged ions positioned on the outside of the cell.

The neuron's membrane is normally impermeable, but neurotransmitters weaken it, allowing the ions to move according to the principle above.



Analysis Questions – answer in complete sentences with as much accurate detail as possible! Use your BFF for reference so that you can write complete answers, in your own words, of course. ☺

1.) What is the **refractory period**? Explain what happens during this period of rest.

2.) Explain **threshold** as it relates to action potential (p.

3.) Explain what is meant by the phrase "The neuron's reaction is an **all-or-none** response". (p.80)