

## **Building a Clay Neuron**

### **Background:**

General biology is a requirement for all middle school as well as high school students. Animal cell anatomy is a pivotal part of any biology curriculum. Neurons are a specialized cell which can be employed to aid in the understanding of all cell biology. Furthermore, neurons are one of the key elements which comprise the brain and nervous systems and are a very exciting subject for kids and adults alike.

Another key portion of this lesson plan is learning to build a representative model of a biological structure. This is often preformed in the biological sciences in order to further the understanding of the subject in question. Model construction is an important activity in that it is a hands-on learning activity. Modeling is also a learning activity in which student can use their natural creativity to aid in the learning process.

### **Objectives:**

- 1) Learn a basic understanding of the anatomy of a neuron.
- 2) Learn a basic understanding of the physiology (or the job) of a neuron.
- 3) Introduction to what neural transmitters are.
- 4) Introduction into neuronal action potentials or electrical activity.

### **Pre-Lesson Activities:**

- 1) Cell anatomy refresher.
  - a. Different organelles which are in a cell.
    - i. Mitochondria, nucleus, golgi etc.
  - b. Organelles function within cells, not totally necessary but advantageous.
    - i. Mitochondria aids in energy production
    - ii. The nucleus holds the genetic material or DNA

### **Materials:**

- 4 different colors of clay or play dough – enough to supply each student or group of students with a 5cm – 7cm ball of each color.
- Aluminum foil or wax paper – enough to supply each student or group with 1-1.5 foot strip.
- Plastic knives or spoons– used to shape the clay not totally necessary.
- A drawing on the board or a photograph of the anatomy of a neuron with labels.

### **Time:**

- Approximately one 55 minute class period to go over the power point presentation.

- Approximately one 55 minute class period to create the clay neuron model.

**Grade Level:**  
6<sup>th</sup> -8<sup>th</sup> grade

### Pre-Activity Teaching Preparation

- 1) Form the clay into 5cm-7cm round balls. Each group of students will receive 1 clay ball of each color symbolizing a specific structure in the neuron.
- 2) Prepare wax paper or aluminum foil so that each group receives a portion of paper large enough to create the clay model. (1' – 1.5')
- 3) Give each group a plastic spoon or knife to form clay.

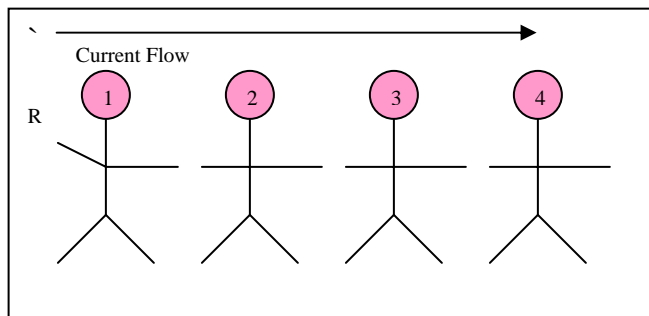
### Lead-In Activity

Neuronal cell anatomy differs from normal cell anatomy in that neurons have specific structures which are specific to the function they perform. The neuron is composed of a dendrite, axon, cell body (or soma) and a nucleus. The dendrites receive the message in the form of electrical current driven by ionic concentrations. This electrical current is carried by the axon to the cell body and then flows down to the dendrite. The dendrite is responsible for transmitting the electrical current to the next neuron's axon. This is performed in many neurons through the release of neural transmitters. Neural transmitters are small molecules which are released by one neuron's dendrite and received at the next neuron's axon.

### Lesson

**Day 1:** Day one will consist of going over the Neuron Power Point Presentation, found in the documents related to this teaching plan. All material within the power point presentation can be referenced and/or added to at the Society for Neuroscience website. This presentation takes approximately 40 minutes to complete. If the students are asking numerous questions it will take longer. The final part of day one can consist of the neuronal signaling demonstration in the above description.

**Neuronal Electrical Conductivity Activity:** One method of teaching the students how this electricity is transferred from cell to cell is to have a select number of students stand side by side, without touching. Each student is given a small vial of fluid, preferably colored water. The vial symbolizes a neural transmitter.



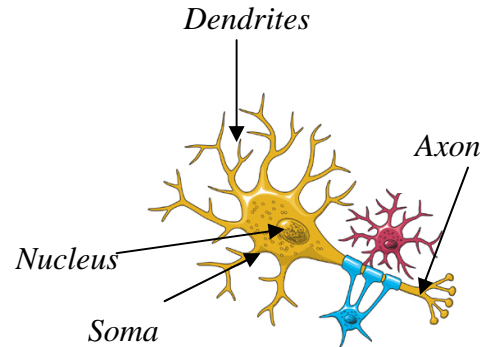
Each student symbolized a neuron within the chain, for example; neuron 1 is found in the cortex, or top portion of the brain. Neuron 4 is the neuron telling the foot muscle to move. The Child's right arm symbolizes the axon and the left arm is the dendrite.

The electrical current travels from cell to cell, from axon to dendrite via neural transmitters. Each structure of the neuron has a specific roll to play.

**Day 2:**

1) Draw a neuron on the blackboard which has the following parts labeled. The neuron from the power point presentation can also be used in order to show the students the appropriate structures.

- a. Axon
- b. Dendrite
- c. Soma
- d. Nucleus



- 2) Break students into groups of 2 – 4 students. If there is a sufficient supply of clay each student can do their own model.
- 3) Hand out the needed supplies.
  - a. Clay
  - b. Plastic fork or spoon
  - c. Wax paper or aluminum foil
- 4) Have each student or group of students make a clay model of a neuron, taking care to label the appropriate structures.

**Evaluation:**

Assessments can be made through both the crossword puzzle, pre-quiz and the post quiz found within the assessment folder. The pre-quiz should be given prior to beginning the neuron unit in order to make a proper assessment of the students learning once the post quiz has been given. The cross word puzzle can be given as homework which serves as a study guide for the post quiz as well.

**References:**

1. Society for Neuroscience Main Page: <http://web.sfn.org/>
2. Society for Neuroscience Kids Page: <http://faculty.washington.edu/chudler/neurok.html>