

Electrical Impulses of the Nervous System: Neurons in Action

Log on to <http://outreach.mcb.harvard.edu/animations.htm>. On the right hand side, you find a link for “Teacher Animations” under the heading **Neurobiology**. Click on this link and it should take you to a central menu page showing the different animations offered by this institution.

Action Potential

Play this animation beginning with the introduction. Answer the questions below as you watch or at the end of your viewing.

Introduction

- a) How is a neuron different than a nerve?
- b) What part of the neuron is designed for the action potential (electrical impulse)?
- c) How is electricity generated along the length of the neuron?
- d) What is the charge separation at rest for a neuron? How does the charge separation change when the action potential travels along the axon?
- e) What protein channels exist within the membrane and what governs their movement?
- f) Describe the function of the specialized pump?

Resting Potential

- g) Where are particular ions concentrated at rest?
- h) *What is meant by resting potential?*

Depolarization

- i) What is meant by depolarization?
- j) Complete the exercise and resolve which ion channel is opened and which ion channel is closed to cause depolarization.

Repolarization

- k) What is meant by repolarization?
- l) Complete the exercise and resolve which ion channel is opened and which ion channel is closed to cause repolarization.

Returning to Resting Potential

- m) What structure is critical for returning the potential difference to what it needs to be?

Summary of Action Potential

- n) Draw the graph indicated and show labels indicating the sequence of events in an action potential.

SBI4U- Homeostasis

Zoom out

- o) Finish watching the zoom out feature. After watching – how are neurons different than other cells you've learned about?

Synaptic Transmission

Play this animation beginning with the introduction. Answer the questions below as you watch or at the end of your viewing.

Learning and Making Connections

Sit back and watch this section to see how complex your brain has to be.

The Neuron

- i) Be sure that you know the different parts of the neuron and their function.
- ii) How do neurons communicate with each other?

Synaptic Transmission

- iii) What event is triggered once an action potential reaches the end of the presynaptic axon?
- iv) What further event is caused by this influx of ions?
- v) How does the postsynaptic neuron get activated?
- vi) What changes occur in the postsynaptic neuron that allows it to continue the electrical message?
- vii) Describe what happens to the neurotransmitter. Why is this event logical?

Exercises

- viii) Run the exercise. Describe (in simple terms) how you learn something.

The Effects of Drugs and Disease on Synaptic Transmission

Follow the introduction and then you should end up at a screen with a menu bar with different drug selections or the selection of depression. While viewing these, answer the following:

1. Why does coffee give one the extra "perk"?
2. What drug causes the largest increase in post-synaptic firing rate? (most addictive)
3. Why is alcohol called a central nervous system depressant? Propose a model as to why people are more talkative about their hidden secrets when they are drunk? (ie. Why do we release more information?)
4. What happens with depression and how do anti-depressants (eg. Prozac, Paxil, Effexor) help alleviate this effect?
5. Why, after having a cig, might people have a want to take a poop?
6. Summarize the different ways drugs can alter neuron-to-neuron transmission.