

# Physioex 8 exercise 3



**ASSIGN  
BUSTER**

## Exercise 3: Neurophysiology of Nerve Impulses Worksheet Assignment Due:

Week 4 Student instructions: Follow the step-by-step instructions for this exercise found in your text and record your answers in the spaces below.

Submit this completed document by the assignment due date found in the Syllabus. Eliciting a Nerve Impulse Activity 1: Electrical Stimulation 1. Do you see any kind of response on the oscilloscope screen? Just a flat line. 2. What was the threshold voltage, or the voltage at which you first saw an action potential? 3. 0 V 3. How does this tracing compare to the one that was generated at the threshold voltage? Very similar except that it's peak is a little higher while it drops a little more as well. 4. What reason can you give for the change? The higher the voltage the more "excitable" the signal gets.

5. Record this maximal voltage here: 4. 5 V Activity 2: Mechanical

Stimulation 1. When the glass rod is touching the nerve, what do you see on the oscilloscope screen? Another tracing. 2. How does this tracing compare with the other tracings you have generated? It is the same as the threshold trace at 3. 0V. Activity 3: Thermal Stimulation 1. What happens when the heated rod touches the nerve? It produces a trace. 2. How does this trace compare to the trace that was generated with the unheated glass bar? It is slightly more "excited" than the threshold trace but less than the maximum trace. 3. What explanation can you provide for this? Because of the heat on the bar the ions move faster than at room temperature. Activity 4: Chemical

Stimulation 1. Does the sodium chloride generate an action potential? Yes. 2. Does this tracing differ from the original threshold stimulus tracing? If so, how? No, it's the same. 3. Does the hydrochloric acid generate an action potential? Yes. 4. Does this tracing differ from the original threshold stimulus tracing? If so, how? No, it's the same. 5. To summarize your experimental

results, what kinds of stimuli can elicit an action potential? Both Sodium Chloride and Hydrochloric acid elicit an action potential. Inhibiting a Nerve Impulse Activity 5: Testing the Effects of Ether 1. What sort of trace do you see? Flat line trace. 2. What has happened to the nerve? The ether stopped nerve fiber activity to function. 3. How long does it take for the nerve to return to normal? Elapsed time was 6.30 estimated. Activity 6: Testing the Effects of Curare 1. Does this generate an action potential? Yes. 2. What explains this effect? It shouldn't elicit an action potential. Maybe it's caused by something else. 3. What do you think would be the overall effect of Curare on the organism? It should immobilize the organism. Activity 7: Testing the Effects of Lidocaine 1. Does this generate a trace? No. 2. What sort of tracing is seen at the threshold voltage? Flat line trace. 3. Why does Lidocaine have this effect on nerve fiber transmission? Because it prevents the sodium channels from opening. Nerve Conduction Velocity Activity 8: Measuring Nerve Conduction Velocity 1. Which nerve in the group has the slowest conduction velocity? Earthworm 2. What was the speed of the nerve? 4.94 msec with 8.70 conduction velocity. 3. Which nerve of the four has the fastest conduction velocity? Rat Nerve #2 4. What was the speed of the nerve? 0.94 msec with 45.74 conduction velocity. 5. What is the relationship between nerve size and conduction velocity? What are the physiological reasons for this relationship? The result in conduction velocity depends on the size or diameter of the nerve. It is because one of the major physiological reasons of neurons is conductivity which is the ability to transmit the nerve impulse to other neurons, muscles, or glands. 6. Based on the results, what is your conclusion regarding the effects of myelination on conduction velocity? What are the physiological reasons for your conclusion? Based on

the lab, it seems that myelinated nerves have faster conduction velocity. 7.

What are the evolutionary advantages achieved by the myelination of neurons? It prevents grave and debilitating conditions on the body.