Action Potentials Notebook

## Action Potentials Notebook

You may work the data as part of your group, but your analysis and answers to the *questions* below should be your own work and in your own words.

Download the [MS Word version of this](ActionPotentials_notebook.docx).

#### Table 1. Coactivation

|  |  |  |
| --- | --- | --- |
|  | **mean RMS Biceps Amplitude** (mV.s) | **mean RMS Triceps Amplitude** (mV.s) |
| **Biceps Contracting** |  |  |
| **Triceps Contracting** |  |  |

1. Look at the graph of the data recording. Describe what you see in the traces.
2. When the biceps is contracting, is the triceps active or inactive? What about the reverse? What might explain that pattern of co-activation?

#### Table 2. Evoked EMG

|  |  |
| --- | --- |
| **Stimulus Location** | **Latency (ms)** |
| **Wrist** |  |
| **Elbow** |  |
| **Difference** |  |
| **Distance BetweenStimulation Sites (mm)** |  |

**Table 3. Nerve Conduction Velocity**

|  |  |
| --- | --- |
| **Group or person** | **Nerve Conduction Velocity (m/s)** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

1. What was the nerve conduction velocity of the volunteer’s nerve? How does it compare with the nerve conduction velocity of members of the other groups?
2. Based on the calculation for nerve conduction velocity, how long would it take for a nerve impulse to travel from the spinal cord to the big toe? Assume the distance traveled is 1 m.
3. How would you expect nerve conduction velocity to change if you developed multiple sclerosis, and why?
4. Compare your nerve conduction velocity to that of an elephant and shrew. Does your nerve conduction velocity fit the scaling equation provided in More et al.?
5. In the procedure you stimulate at two different locations along the median nerve, but measure the reaction at the same point, the abductor policis muscle. More et al. also stimulated in two locations. If we are interested in **axonal conduction velocity**, which is a distance divided by a time, why is it necessary to measure in two or three different places when each one would offer a distance and a time? To answer this, you need to consider what we *want* to calculate (**axonal conduction velocity**) and what we are *actually* measuring (stimulation time and muscle reaction). What are the steps that happen between stimulation and muscle reaction?
6. As a followup to the previous question, increasing the stimulus voltage from first response to maximal results in a greater amplitude of the EMG sensed in the distal receiving electrodes. But further increasing the stimulus to supra-maximal does not result in an increase in the EMG. Why did the nerve transmit a signal of increasing magnitude up to a point, and why did it not increase further? What were the receiving electrodes actually recording?