

**Purpose:** This exercise will demonstrate the concepts of agonist, antagonist and synergist muscles. An agonist, or prime mover, is the muscle primarily responsible for a given movement. An antagonist muscle will work in opposition to the agonist. A synergist will aid the agonist and help refine a given movement.

## **Procedure:**

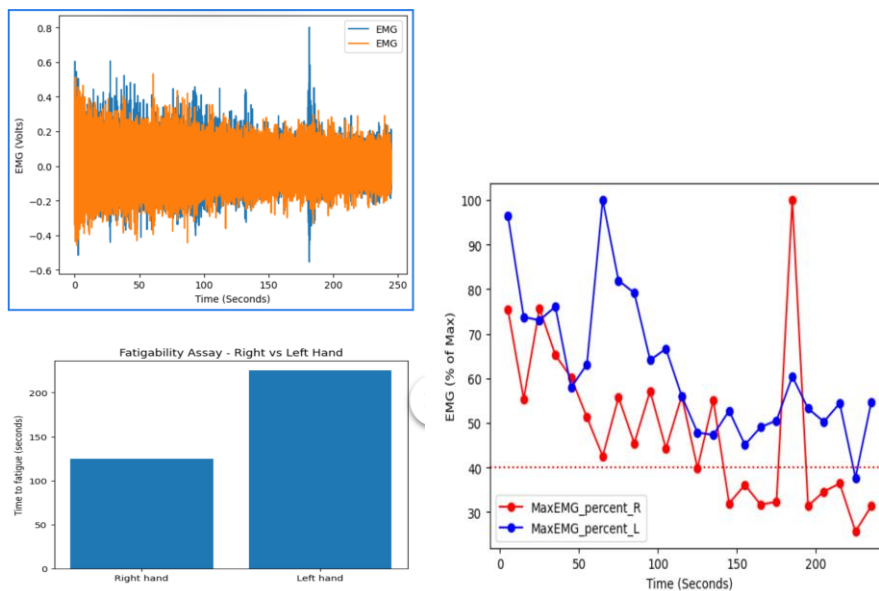
1: To get things started:

- Before you turn anything on, be sure the IWX/214 unit is plugged in, and that the IWX/214 unit is connected to the laptop by USB cable.
- Be sure that the C-AAMI-504 EEG cable is inserted into the isolated inputs of Channels 1 and 2 of the IWX/214. Be sure that the color-coded lead wires are correctly inserted in the lead pedestal of the C-AAMI-504 EEG cable. Insert the connectors on the electrode lead wires into the color-coded matching sockets on the lead pedestal of the ECG cable.
  - Once everything is connected FIRST turn on the laptop and allow it to fully boot up before you turn on the IWX/214 unit. Once the iWorkx unit is on, the red indicator light on the Iworkx unit should light up and you may hear the USB chime from the laptop if the laptop does not default to mute.
- 2. Open the Labscribe2 program by clicking on the Labscribe 3 icon on the desktop. As soon as the program opens, you should see a window pop-up that says "Hardware found IWX214:2008-1-24" click ok.
- 3. In the second from the top row, click on the "Settings" tab. About halfway down the drop- down window should be a tab called "human muscle". Click on that tab and that should lead you to another drop down list with the second tab from the top called "Antagonistic Muscle", click on that tab and then close the pdf file that appears, you don't need it.
- 4. Insert the subject to remove all jewelry from his/ her arm and wrist. Use an alcohol swab to clean the regions of skin on the forearm you are going to use. Let the area dry. Remove a disposable electrode from its plastic shield and apply the electrode to the six locations.
- 5. Place the electrodes. From proximal to distal on the forearm in the following orders +2, -2. On the posterior and +1, -1 and ground on the anterior. Snap the bye leads wires onto the electrodes as follows.
  - The red "+1" lead is attached to the proximal electrode on the anterior surface.

- The black “-1” lead is attached to the distal electrode on the anterior forearm.
- The green “C” lead (the ground) is attached to the remaining electrode on the anterior surface.
- The white “+2” lead is attached to the proximal electrode on the posterior forearm.
- The brown “-2” lead is attached to the distal electrode on the posterior surface.

6. Record an EMG of the muscles of the forearm illustrating agonistic and antagonistic muscle activity for each of the exercises described below. Click the red “rec” button to begin the recording; then press the Enter key on the keyboard to mark the beginning of each activity. The recording for exercise “A” should look like figure 9-3. If you do not see anything, try clicking on the Auto scale tab and / or checking the electrode contacts. Repeat these procedures for each of the remaining activities.

## Results:



**Discussion:** Data shows that the left hand takes around 225 seconds to reach fatigue while the right takes 125 seconds to fatigue. Time at ~40 % of max for left hand: 224.9995 seconds

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**Conclusion:** A muscle twitch has a latent period, a contraction phase, and a relaxation phase. A graded muscle response allows variation in muscle tension. Summation occurs as successive stimuli are added together to produce a stronger muscle contraction. Physical training induces adaptive changes in skeletal muscle. These changes are localized to the active muscle with their magnitude depending upon the nature, time and intensity, of the training regimen. The most notable changes are increased concentrations of mitochondria and glycogen. Acetylcholine, the major excitatory Neu transmitter to the smooth muscle of mammalian intestine, is known to depolarize smooth muscle cells with an apparent increase in membrane conductance. Norepinephrine also acts directly on intestinal smooth muscle cells to cause relaxation through activation of B3-adrenoceptors, which are coupled to Gs and PKA(11). During isometric contractions, muscles do not shorten. More tension is generated. During isometric contractions, the muscle shortens with the tension that's being put on the muscle. During everyday activities and light exercise, the mitochondria of muscle fibers produce ATP in a process called aerobic respiration. Aerobic respiration requires the presence of oxygen to break down food energy (usually glucose and fat) to generate ATP for muscle contractions.