**Muscle Fibers at Work Lab Protocol***Courtesy of Dr. Kristin Ackerman*

Welcome to Physiology Lab! Today we are going to learn about how skeletal muscles help us to do work. In this activity, you are going to “hook up” electrodes to your forearms and digitally monitor on the computer how hard the muscles in your hands work.

**Experimental Objectives:**

1. To observe and record the activity of your skeletal muscle.

2. To determine which hand is actually stronger-your dominant or non-dominant hand.

3. To determine if competition or doing hard work helps your muscles to work harder.

***Scientific Question #1***: Is my dominant hand stronger than my non-dominant hand?

***Hypothesis:*** I hypothesize that….

**Experimental Methods:**

1. Attach three electrode pads to both forearms (Fig. 1: displayed on the board) with one near the inside of your elbow, one on the side of your wrist near you little finger, and the last one on your wrist on the side of your thumb. Make sure you are placing the electrode pads on muscle.

***Question:*** Which hand is your dominant hand? Which hand is your non-dominant hand?

2. Clip the Electrode Leads/Wires to the Subjects “dominant” arm, following the color code where the white wire (negative electrode) hooks near the elbow, the red wire (positive electrode) hooks below the thumb, and the black wire (ground electrode) hooks below the little finger.

3. Subjects gets into a seated position, facing the computer monitor.

4. The program is already on and ready to use, but first you must calibrate the system. Click “calibrate”. Wait a couple seconds and then squeeze the black dynameter as hard as possible for 2-3 seconds and then release.

5. Wait for the calibration to stop. Does your data look like graph on the computer screen? If “yes” then click continue.

If “no”, then get the instructor and recalibrate.

First, you will proceed with collecting data from your “dominant arm”. You are going to perform a series of Clench-Release Cycles and these will be measured on the computer monitor. First, you will lightly squeeze the dynameter for 2 seconds and release, then immediately squeeze or clench a little harder (hold for 2 seconds) and relax, keep increasing your grip until the 4th grip is at your maximum.

6. Start with your arm relaxed. Click “Record” and perform you series of 4 Clench-Release Cycles where the first should be a “very light” squeeze/clench and the 4th is at your maximum. Click suspend. Your data should show 4 burst or peaks on the screen (example is on your computer screen). Record/shade in your data on the graph below for “Dominant Hand, Experiment #1 and then click “Continue” and repeat the experiment on your “dominant hand”.

Again record/shade in your data on your graph for Dominant Hand, Experiment #2. Average your data and record in the third graph.

7. Repeat step 6 using your non-dominant hand. Record your data on the following chart.

***Question:*** Which hand was stronger- your dominant or non-dominant?

***Question:*** Was your hypothesis correct? What data do you have to support this?

***Scientific Question #2:*** Can our “strongest” gripping hand become stronger when we are faced with competition or hard work?

***Hypothesis:*** I hypothesize that…..

**Experimental Methods:**

1. Clip the Electrode Leads/Wires to the Subjects “strongest” arm, following the color code where the white wire (negative electrode) hooks near the elbow, the red wire (positive electrode) hooks below the thumb, and the black wire (ground electrode) hooks below the little finger.

2. Subjects gets into a seated position, facing the computer monitor.

3. Start with your arm relaxed. Click “Record” and perform you series of 4 Clench-Release Cycles where the first should be a “very light” squeeze/clench and the 4th is at your maximum. The fifth Cycle will be while you are arm wrestling. Click suspend.

4. Record you data on your graph.

***Question:*** Was your hand “stronger” when you performed a hard activity such as arm wrestling than when you performed your “strongest” grip?

What evidence do you have to support your answer?

***Question:*** Was your hypothesis correct? What data do you have to support this?