Lilia Sanchez

Laboratory 9-MUSCLE PHYSIOLOGY

October 10, 2023

PURPOSE: DEMONSTRATION OF THE ELECTROMYOGRAPH-THE EFFECT OF THE AGONIST, ANTAGONIST, AND SYNERGIST DURING SKELETAL MUSCLE CONTRACTION

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 Iworx unit is on, the red indicator light on the Iworx unit should light up and you may hear the USB chime from the laptop if the laptop does not default to mute (many are set to default to mute).

2.Open the Labscribe 3 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 foundIWX214:2008-1-24,” click “OK.”

3.In the second from the top row (the row that says, “File Edit View Tools Settings Advanced External Devices Help”), 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. Instruct 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 (Fig. 9-1.). Let the reader. 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 order: +2, -2on the posterior and +1,-1 and ground on the anterior. Snap the lead 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. Type the student’s name and the appropriate letter for the activity (A, B, C, D) in the Mark box to the right of the Mark button.

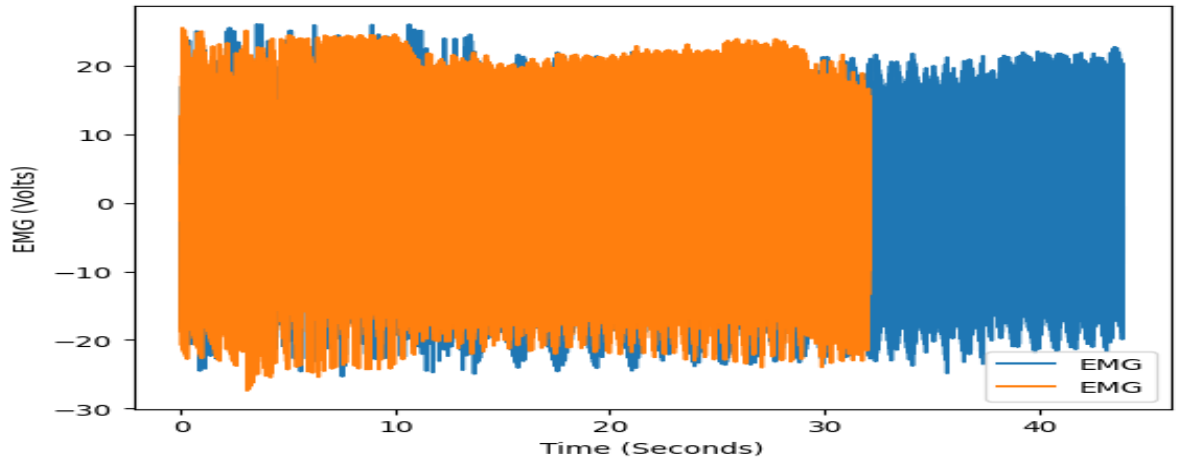
Click the red “Rec” button to begin the recording; then, press the Enter key on the keyboard to mark the beginning of each the activity. The recording for exercise “A” should look like Fig. 9-3. If you do not see anything, try clicking on the Auto Scale tab and/or checking the electrode contacts.

7. Firmly squeeze a tennis ball as rapidly as possible with your non-dominant hand until you feel fatigued and can no longer squeeze it. Record the duration of this effort.

8. Repeat the squeezing exercise with your dominant arm. Record the time duration of this effort. (NOTE: it is important to stop at the same sensation of fatigue, or “burn,” as the non-dominant arm.)

Evaluate the differences between the two duration measurements obtained in terms of energy demands of skeletal muscle and fatigue.

RESULTS:



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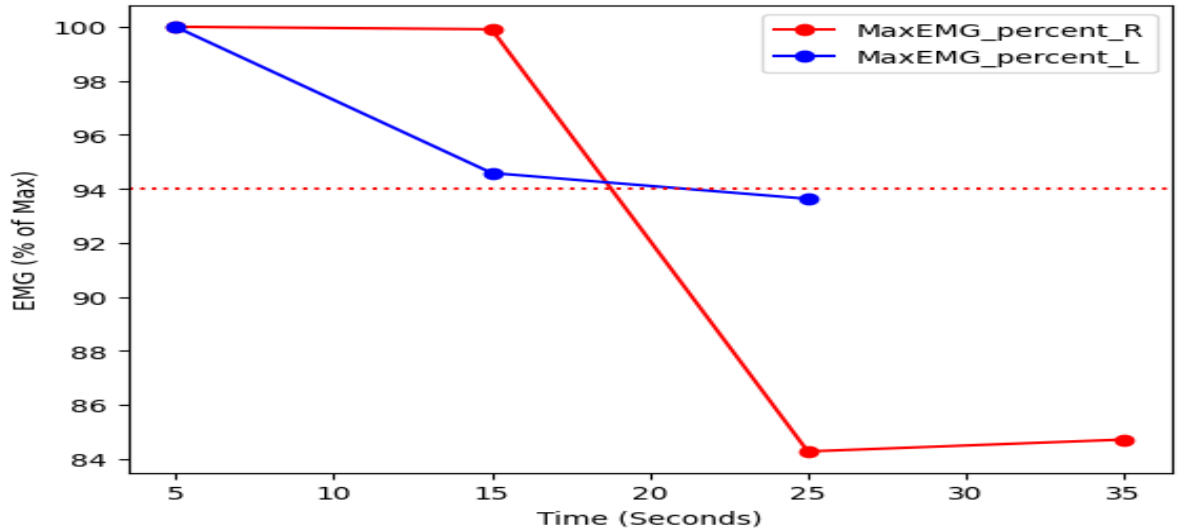

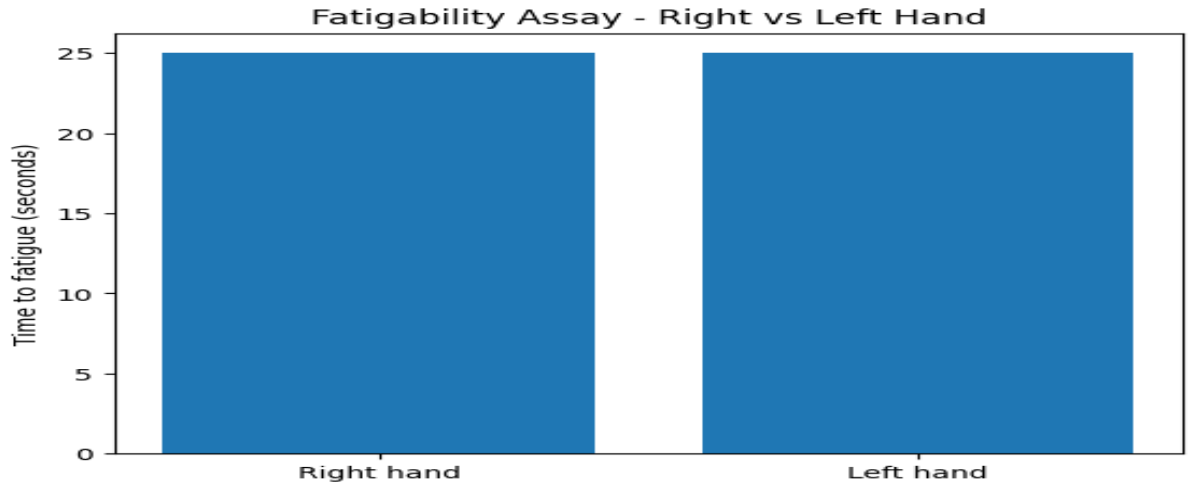

DISCUSSION:

In review of the study results, skeletal muscle contraction begins after a latent period and then goes directly into the contraction period. These results produced up to 20 V during contraction which were sustained for up to 15 seconds on the right hand and about 15 V for the left hand for up to 15 seconds

as well. After the initial 15 seconds, the energy level of the right hand made a significant drop, at which point maintained the lower level of force of contraction. As for the left hand, it produced a lower level of force (by about 5%) at initiation and then gradually began to decrease. The force of the contraction was noted to last 25 seconds, where the right hand lasted approximately 35 seconds.

CONCLUSION:

In conclusion, the skeletal muscle fibers contact a nerve fiber at a neuromuscular junction at which point transmits the action potential of the neuron to the muscle cell membrane. Skeletal muscle cells exert rapid contractions of short duration and are subject to early fatigue.