Lab 9

Title: Muscle Physiology

Purpose: Several experimental techniques were used in this lab to look at the various aspects of skeletal, cardiac, and smooth muscle contraction. We looked at how the neurotransmitters norepinephrine and acetylcholine affect the rates at which cardiac and smooth muscle contract. There was also a demonstration of how to record an electromyogram (EMG) and how oxygen availability affects skeletal muscles.

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 CAAMI 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 CAAMI 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 Labscribe3 program by clicking on the Labscribe3 icon on the desktop. As soon as the program opens, you should see a window pop up that says “Hardware foundIWX214:2008 124,” click “OK.”61

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 dropdown window should be a tab called “Human Muscle.” Click on that tab and that should lead you to another dropdown list with the second tab from the top called “AntagonisticMuscle,” 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. 91.). 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 order:+2,2 on the posterior and +1,1 and ground on the anterior (Fig.91.) 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.The experimental set up should look like the illustration in Fig. 92.Fig. 91 Electrode placement Fi g. 92 Experimental setup 62.

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 see below)in the Mark box to the right of the Mark button. Click the red “Rec” button.

Results:

Time	EMG	Muscle Force	
0	0.000	0.000000	0.197806
1	0.001	0.000000	0.197433
2	0.002	0.000000	0.197433
3	0.003	0.000000	0.197433
4	0.004	0.000000	0.197433
...	...	...	...
60699	60.699	0.072174	0.192961
60700	60.700	-0.005325	0.192961
60701	60.701	-0.067323	0.192961
60702	60.702	-0.051317	0.192961
60703	60.703	0.007961	0.192961

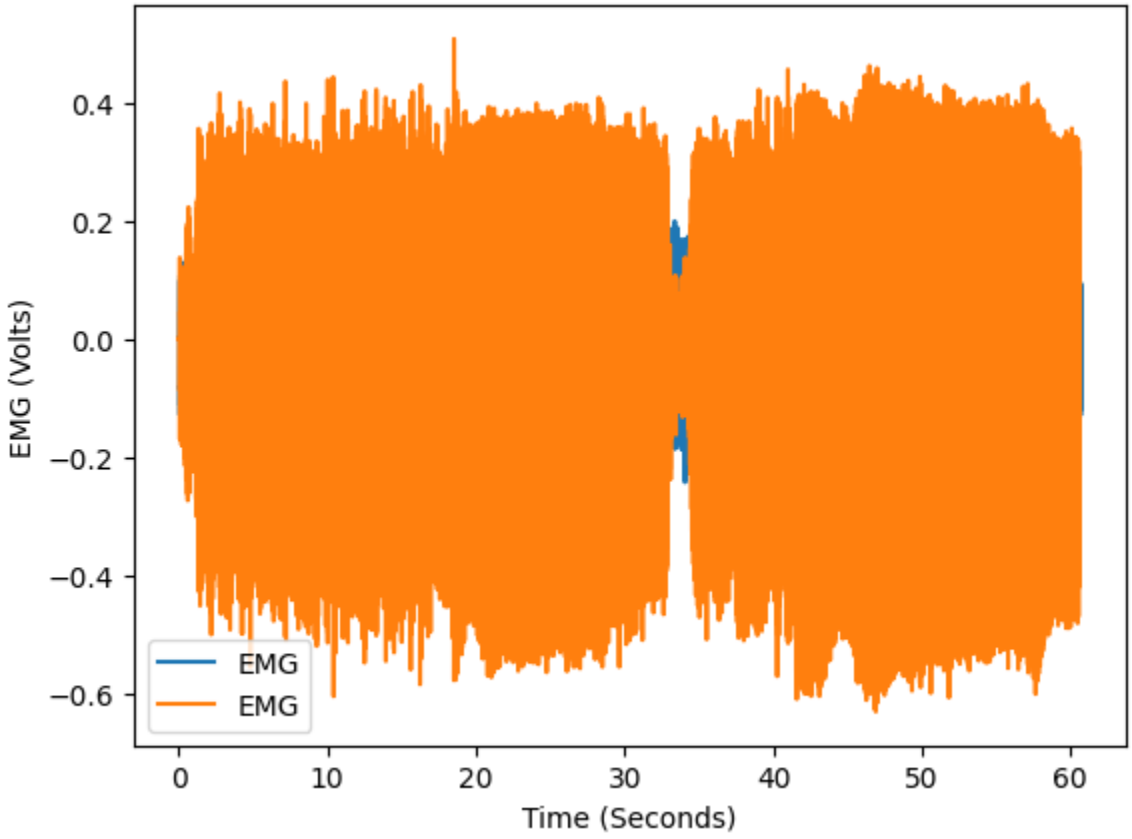
60704 rows × 3 columns

Time	EMG	Muscle Force	
0	0.000	0.000000	0.196315
1	0.001	0.000000	0.196315
2	0.002	0.000000	0.196315
3	0.003	0.000000	0.196315
4	0.004	0.000000	0.196315
...	...	...	...
60571	60.571	-0.117228	0.191470
60572	60.572	0.113270	0.191470
60573	60.573	0.081846	0.191470
60574	60.574	-0.001693	0.191470
60575	60.575	-0.092189	0.191470

Lab 9

60576 rows × 3 columns

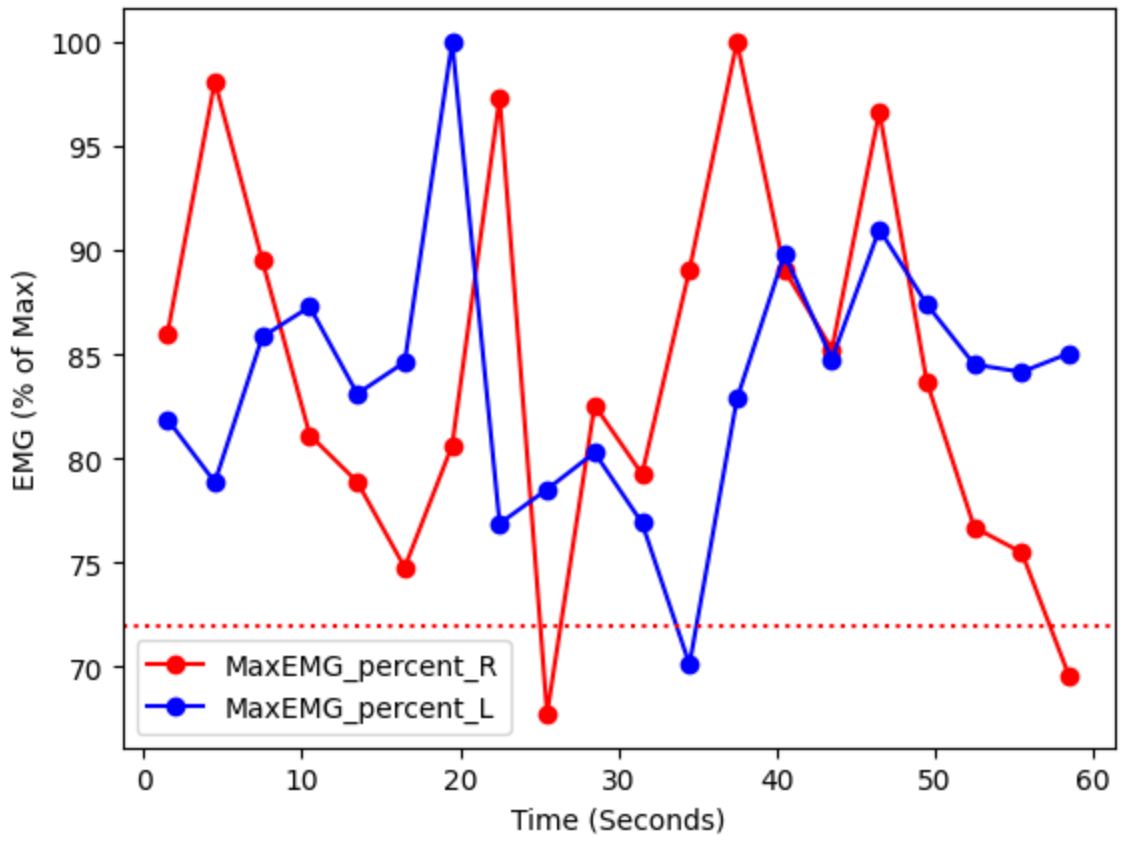
Text(0, 0.5, 'EMG (Volts)')

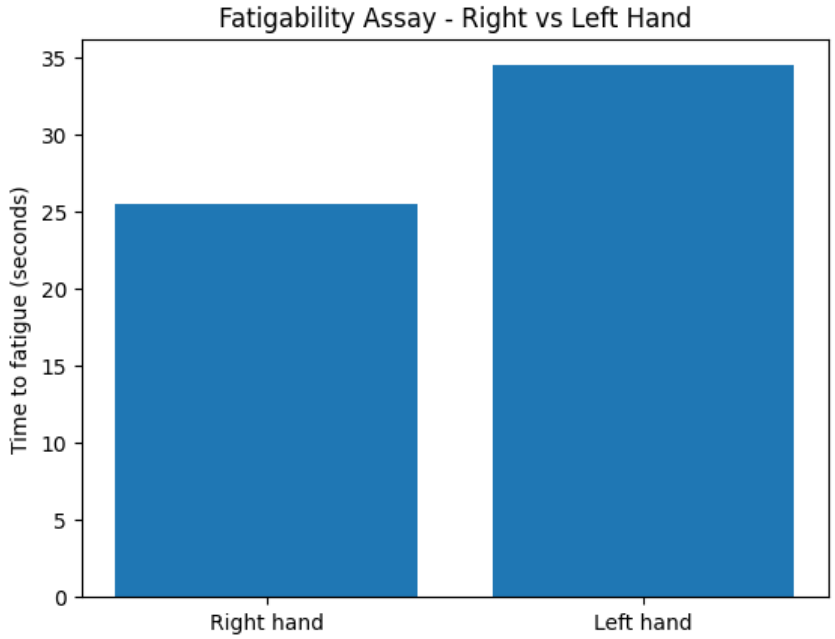


	Time	MaxEMG_R	MaxEMG_percent_R
0	1.4995	0.218256	85.958355
1	4.4995	0.249096	98.104439
2	7.4995	0.227274	89.510021
3	10.4995	0.205974	81.121189
4	13.4995	0.200266	78.873140
5	16.4995	0.189834	74.764581
6	19.4995	0.204703	80.620616
7	22.4995	0.247146	97.336447
8	25.4995	0.171985	67.734897
9	28.4995	0.209612	82.553986
10	31.4995	0.201226	79.251228
11	34.4995	0.226124	89.057103

12	37.4995	0.253909	100.000000
13	40.4995	0.226119	89.055134
14	43.4995	0.216409	85.230929
15	46.4995	0.245412	96.653525
16	49.4995	0.212474	83.681161
17	52.4995	0.194717	76.687711
18	55.4995	0.191658	75.482949
19	58.4995	0.176575	69.542631

	Time	**MaxEMG_L**	**MaxEMG_percent_L**
0	1.4995	0.415469	81.883238
1	4.4995	0.400126	78.859343
2	7.4995	0.435538	85.838563
3	10.4995	0.442853	87.280249
4	13.4995	0.421653	83.102020
5	16.4995	0.429360	84.620964
6	19.4995	0.507392	100.000000
7	22.4995	0.390047	76.872911
8	25.4995	0.398381	78.515428
9	28.4995	0.407339	80.280927
10	31.4995	0.390198	76.902671
11	34.4995	0.355710	70.105559
12	37.4995	0.420407	82.856450
13	40.4995	0.455714	89.814975
14	43.4995	0.430109	84.768581
15	46.4995	0.461749	91.004391
16	49.4995	0.443442	87.396333
17	52.4995	0.428789	84.508427
18	55.4995	0.426972	84.150322
19	58.4995	0.431523	85.047261





Discussion: Through this lab, the ideas of agonist, antagonist, and synergist muscles were demonstrated. The muscle that is principally in charge of a certain movement is known as the

agonist or prime mover. A muscle that is antagonistic to the agonist will contract against it. A synergist will support the agonist and assist them improve a certain move.

Conclusion: I noticed a slight variation in the right arm's fatigability after this trial. A little difference was seen, reaching the 30th percentile.