LABORATORY 9 – MUSCLE PHYSIOLOGY

Purpose:

This report aims to analyze skeletal, cardiac, and smooth muscle behavior, focusing on neurotransmitter effects on cardiac and smooth muscle contraction rates. It also demonstrates recording electromyograms (EMGs) for skeletal muscle activity and explores the impact of oxygen levels on skeletal muscle performance, elucidating distinct muscle characteristics and their responses to stimuli.

Procedures:

Preparation:

a. Connect the IWX/214 unit to the laptop using a USB cable. Insert the C-AAMI-504 EEG cable into Channels 1 and 2 of the IWX/214.

b. Ensure color-coded lead wires are correctly placed in the C-AAMI-504 EEG cable. Start the laptop first, then turn on the IWX/214 unit.

Software Setup:

a. Click the Labscribe3 icon on the desktop and select "OK" when prompted with "Hardware found IWX214:2008-1-24."

b. Access the "Settings" tab in Labscribe3 (found in the second row).

c. Choose "Human Muscle" and then select "Antagonistic Muscle." Close any unnecessary pop-up windows.

Subject Preparation:

a. Ask the subject to remove any jewelry from their arm and wrist.

b. Clean the skin on the forearm where electrodes will be placed using an alcohol swab. Allow the area to dry thoroughly.

Electrode Placement:

a. Take disposable electrodes out of their plastic shields.

b. Place electrodes on the skin of the forearm according to the provided illustration (Fig. 9-1).

c. Arrange the electrodes in this order: +2, -2 on the posterior, +1, -1, and ground on the anterior of the forearm.

Connecting Lead Wires:

a. Attach the lead wires as follows:

- Red “+1” lead to the proximal electrode on the anterior surface.
- Black “-1” lead to the distal electrode on the anterior forearm.
- Green “C” lead (ground) to the remaining electrode on the anterior surface.
- White “+2” lead to the proximal electrode on the posterior forearm.

- Brown “-2” lead to the distal electrode on the posterior surface.

EMG Recording:

a. Launch recording on Labscribe3 by clicking the red “Rec” button.

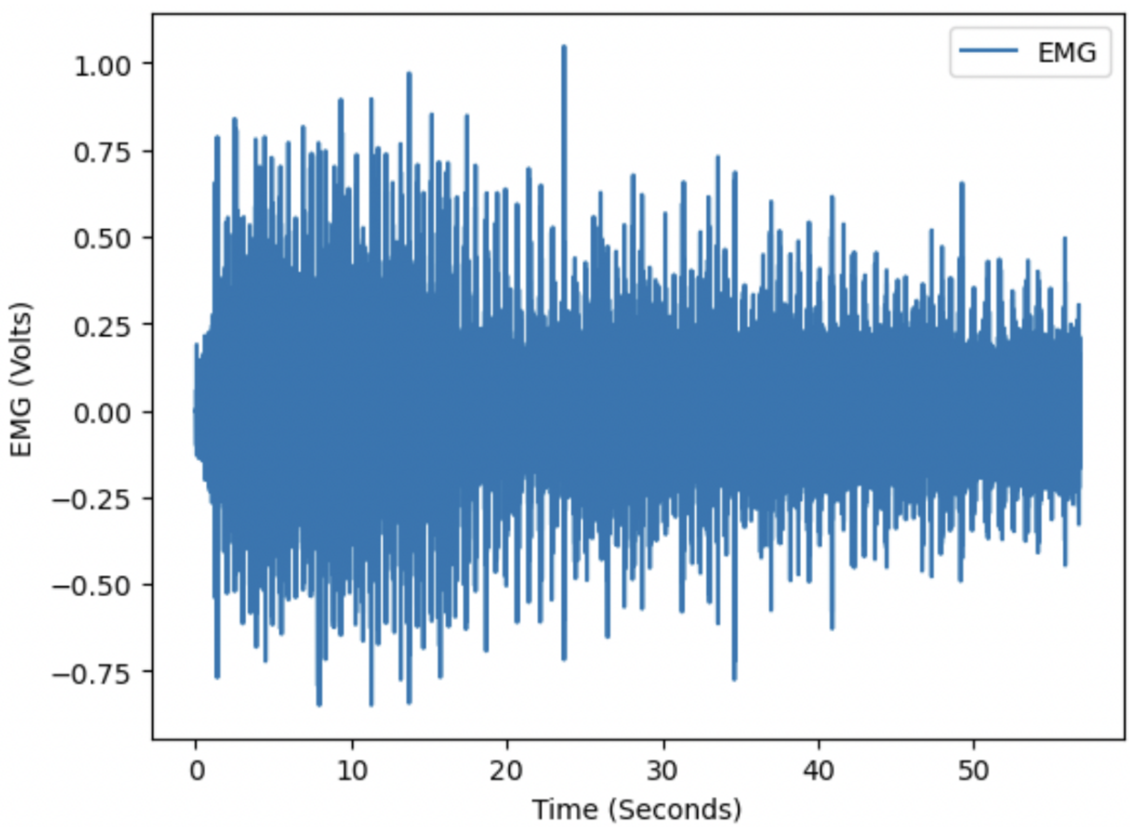
b. At the start of each activity (labeled A, B, C, D), press "Enter" on the keyboard to mark the beginning of the recording.

c. Ensure the recorded EMG patterns correspond to the expected readings shown in Fig. 9-3.

d. If no readings are visible, check settings such as AutoScale and electrode contacts.

e. Repeat the recording process for each activity, ensuring accurate and consistent recordings.

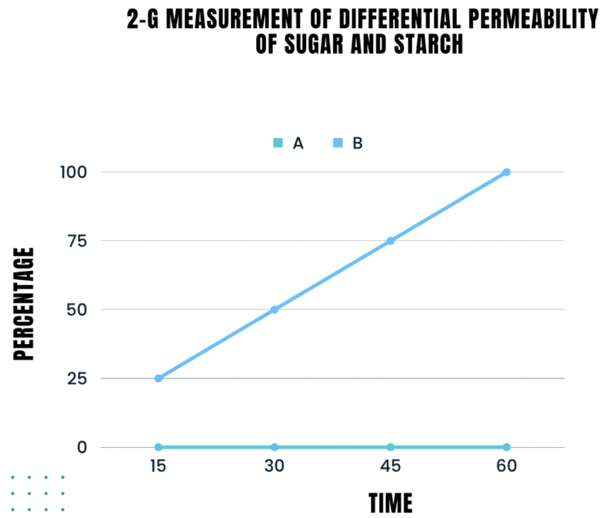
Results:



Discussion: The laboratory aimed to explore various muscle behaviors and their responses to stimuli, including neurotransmitter effects on cardiac and smooth muscles and the impact of oxygen levels on skeletal muscle performance. The EMG recordings demonstrated distinct muscle characteristics effectively. However, the software setup and electrode placement were somewhat tricky to navigate initially, requiring meticulous attention to detail for accurate recordings.

Conclusion: In conclusion, the experiment effectively showcased the distinct behaviors of skeletal, cardiac, and smooth muscles. The EMG recordings provided valuable insights, despite initial software complexities and electrode placement intricacies, highlighting the importance of precision in experimental setup for accurate muscle activity measurements.

2-G Measurement of differential permeability of sugar and starch



Discussion: In conclusion, the series of experiments delved into fundamental biological processes, yielding valuable insights. The investigation of diffusion through liquids unveiled the temperature's impact on diffusion rates, with a constructed graph illustrating the relationship. Diffusion through agar highlighted the role of molecular properties in varying diffusion rates. The filtration experiment underscored how solution thickness affects filtration dynamics. Osmosis experiments provided a comprehensive view of water movement across membranes, emphasizing osmotic equilibrium. Differential permeability insights elucidated membrane selectivity. Lastly, the tonicity experiment demonstrated cellular responses to different solutions. Collectively, these experiments contribute significantly to understanding diffusion, osmosis, filtration, and cellular behaviors under varying conditions, spanning implications across scientific, medical, and engineering domains.

Conclusion: In conclusion, the experiments delved into diffusion, osmosis, filtration, and tonicity. These investigations shed light on temperature's effect on diffusion, filtration dynamics, water movement in osmosis, and the impact of tonicity on red blood cells. Collectively, they provide valuable insights into fundamental biological processes and their underlying principles.