

Muscle Fatigue Lab

Introduction

Muscle contraction requires energy in the form of ATP. ATP is produced aerobically when oxygen levels are high and anaerobically when oxygen levels are low. Lactic acid is the byproduct of anaerobic respiration, which only yields 2 ATP molecules per glucose. Muscle fatigue can occur when a buildup of lactic acid disables muscle function. In this lab you will observe the effects of fatigue in skeletal muscle contractions. For further study we will look at the effects of cold temperatures on muscle action and fatigue. During this lab you will answer two questions:

1. To what extent can muscle fatigue be observed in the muscles of the hand and forearm over a two minute period?
2. Does temperature have an effect on muscle fatigue?

Hypothesis

Hypothesis must address BOTH questions from the “*Introduction*” and must relate to observable data

Materials

Tennis ball
Clothes Pin

Ice
Water

Timer (stopwatch, clock, watch,
etc.)

Procedure

Procedure should be specific. More than 5 steps, but less than 10

Data

TRIAL (10 sec. each)	NUMBER OF TENNIS BALL SQUEEZES (normal temp.)	NUMBER OF TENNIS BALL SQUEEZES (cold temp.)	NUMBER OF CLOTHESPIN SQUEEZES (normal temp.)	NUMBER OF CLOTHESPIN SQUEEZES (cold temp.)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Include 2 graphs → Tennis ball squeezes (normal and cold temp) and Clothespin squeezes (normal and cold temp)

Results

Explain the data found in your table and graph.

Conclusion

Make sure to back up answers with the results of your experiment.

1. Did you observe muscle fatigue over the two minute trial? To what extent...extreme, moderate, or mild?
2. Does temperature have an effect on muscle action? Does it increase fatigue?
3. Compare anaerobic and aerobic respiration. Describe the characteristics of each and their relative output of ATP.
4. What causes lactic acid buildup? By which trial number did you start to experience lactic acid build up in the tennis ball trials? In the clothespin trials?
5. Is lactic acid the only thing that causes muscle fatigue? How do you know from the results of your experiment?
6. Identify at least three sources of error. Discuss the extent to which these experimental errors could affect your results.