# Muscle Fatigue Lab

Much of the work of the body depends on the contraction of skeletal muscles. In this experiment you will first observe the characteristics of muscle contraction and then will investigate the effects of two factors, temperature and fatigue, on the action of your muscles.

## Materials needed:

* Dishpan of water
* Narrow strip of paper, which will fit around upper arm, or string
* Ice or snow
* Rubber ball or clothespin
* Timer (clock, watch, or stop watch)

## Procedure: Muscle Action

1. Place your fingers along the angle of your jaw just in front of your ear. Grit your teeth and observe what happens to the hardness of the muscles in your cheek. What is that muscle?
2. With the thumb and little finger of one hand, span the opposite arm’s biceps (front muscle of the upper are) from the elbow to as close to the shoulder as possible. Bend the arm and observe the change in the length of the muscle.
3. Wrap a strip of paper or length of string around your upper arm and mark the circumference of your arm on the paper. Clench your fist tightly and mark the new circumference on the paper.

|  |  |  |
| --- | --- | --- |
| Student | Length Relaxed | Length Contracted |
|  |  |  |

## Effect of temperature on Muscle Action

1. Count the number of times you can make a fist in 20 seconds. Start with your hand completely outstretched and make a tight fist each time. Do it as rapidly as you can. Record the count in the table below.
2. Now submerge your hand in a dishpan of water to which has been added snow or ice so that the temperature is near the freezing pint. Leave your hand in the water for one full minute.
3. Remove your hand and immediately count how many forceful fists you can make in 20 seconds. Record in table below.

|  |  |
| --- | --- |
| Temperature | Number of Fists |
| Normal Room Temp |  |
| Ice Water |  |

## Effect of Fatigue on Muscle Action

1. Count how many times you can tightly squeeze a rubber ball or clothespin in your hand in 20 Seconds. If you are squeezing the clothespin, make sure your squeezing with your thumb and index finger, while the other fingers are held out straight. Record in Table below.

2. Repeat the squeezing nine more times and record results. If it becomes painful, slow down, but do not stop. DO NOT REST BETWEEN TRIALS! Record how many squeezes you accomplish in 20 seconds in the first column, and in the second column, record how many seconds it takes to do 9 more squeezes.

|  |  |  |
| --- | --- | --- |
|  | Number of Squeezes in 20 seconds | Seconds it takes to do 9 more squeezes |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **4** |  |  |
| **5** |  |  |
| **6** |  |  |
| **7** |  |  |
| **8** |  |  |
| **9** |  |  |
| **10** |  |  |
| **AVERAGE** |  |  |

## Analysis of Data

1. What are the three changes you observed in a muscle while it is working (contracted)?

2. What effect did the cold temperature have on the action of your hand muscles? Explain).

3. Make a line graph of your result of the fatigue experiment. Be sure to fill in values. The Y-axis is the number of squeezes and the X-axis is the number of individual trials. Insert the graph below like you would a picture.

4. What effect did fatigue have on the action of your hand muscles? Explain.

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