

The Big Squeeze Lab

Cell Energy - Anaerobic Respiration

Name: _____

I worked with: _____



Introduction: As you know, there are two types of cellular respiration.

Aerobic respiration is the breakdown of sugars in the presence of oxygen to produce ATP energy, CO₂ and H₂O. **Anaerobic respiration** is the breakdown of sugars in the absence of oxygen to produce ATP energy. There are two kinds of anaerobic respiration: **alcoholic fermentation** and **lactic acid fermentation**. In this lab we will be examining why we fatigue and get sore during prolonged exercise. Partners (2) will have one tennis ball and take turns either squeezing or timing/recording.

Objectives: By the end of this activity, you will be able to...

- Record and graph experimental data and manipulate an experiment with testable hypotheses.
- Determine when muscle cells convert from the aerobic respiration pathway to anaerobic respiration.
- Analyze the importance of the metabolic pathway of anaerobic respiration and its effect in muscle cells.

Instructions: PART ONE

1. While 1 person squeezes (the “squeezer”) will *count how many times they can fully squeeze a tennis ball over a 20 second time period. A legal squeeze produces a visible dent in the tennis ball!*
2. The “squeezer” will *rest for 20 seconds between each of the ten trials and write down their count.*
3. The “timer” will *start the stop watch and time each 20 second trial and each 20 second rest period.*
4. After each trial the “timer” will *jot down how many squeezes their partner did in the elapsed time on their partner’s Data table One.*

Data Table One:

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10
# of squeezes in 20 seconds										

Graph # 1: Be sure to include a title (remember you are **comparing** trials!) Write in an appropriate scale for the x and y-axis.

Title: _____

Number of Squeezes in 20 sec



Instructions: PART TWO

- Let's change things up a bit. Decide with your partner on a new amount of time to "squeeze," "rest," or some other variable such as switching to the less dominant hand, a partner of a different gender, etc.

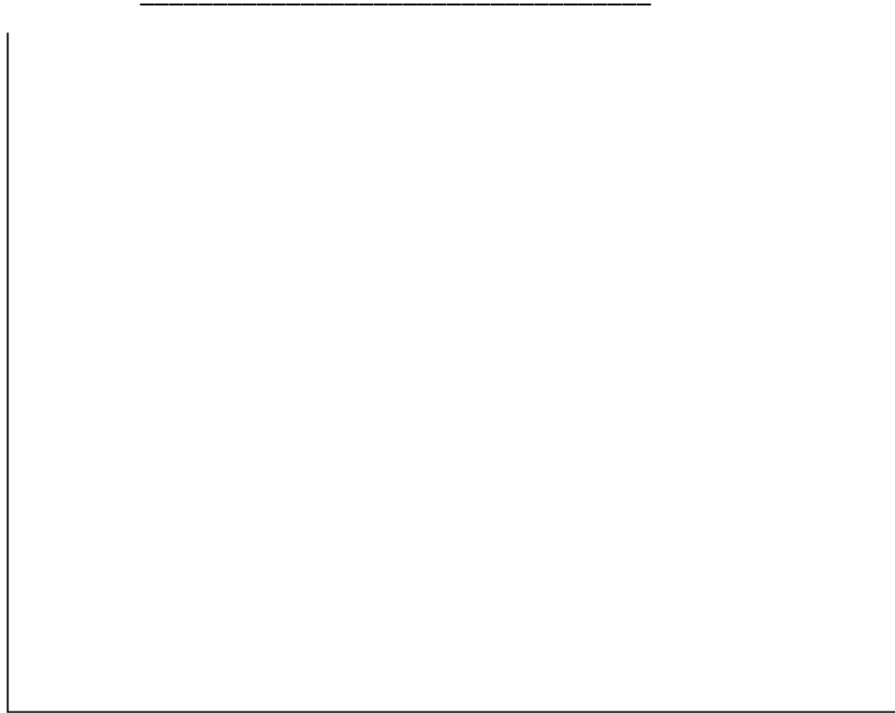
Describe the variable you will manipulate here: _____

Hypothesis : How do you think that your new variable will affect your results?

Data Table Two: Put your ideas to the test! Make sure to fill out your data table (for each person) below.

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10
# of squeezes in _____ seconds										

Now, graph your results again!



Analysis and Conclusion Questions: Please answer the following questions.

- What do "aerobic" and "anaerobic" mean?
- What produces more ATP energy? Aerobic or Anaerobic Respiration?

3. What type of cellular respiration were your hand muscles using **before squeezing the tennis ball** and what type of cellular respiration were your hand muscles using **once you started to get sore?**

Before: _____ After: _____

4. Did squeezing the tennis ball get easier or harder to do over the ten trials? **Explain.**
5. At what point in experiment one do you think that your muscle cells converted from aerobic respiration to lactic acid fermentation? (Refer to your graph number one.)
6. At what point in experiment two do you think that your muscle cells converted from aerobic respiration to lactic acid fermentation? (Refer to your graph number two.)
7. Why did your muscles start to get sore after a while? (See question 1 under the **PRODUCTS** section.)

Extension Questions: Please answer the following questions.

8. What were the differences between your two experiments? How did changing a variable (i.e. squeeze time, rest time or some other variable you chose) lead to different results? Discuss your findings here.
9. What would happen if you did not stop squeezing the tennis ball? What do you think would happen to your muscle cells and body as a whole? Could you survive off of lactic acid fermentation alone?
10. Explain how the food you ate today contributed to the energy you used for this lab: