Name:_____Per:___Date:_____

Marathon Mouse Activity (A) **/35**

Marathon Mouse NOVA video

Background

In this hypothetical experiment, scientists treated four mice in four different ways in order to investigate the effect of an experimental drug. All received similar amounts of food and water. Researchers wanted to know how these different treatments changed the muscles and affected endurance. Your challenge is to compare muscle cells from the mice and determine the effects of each treatment.

PRE-LAB

1. In the space below, **summarize the function of mitochondria**. Refer to research conducted from the Where Do You Get Your Energy activity if necessary. 3 pts

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2. In each situation below, predict how the number of mitochondria-rich cells would change. 4 pts

Mouse Treatment	**Change in the number of mitochondria-rich cells from before and after the experiment (increase, decrease, stay the same). AND why you predicted this outcome?**
Experimental Drug GW1516 only	
No Exercise and no experimental drug	
Exercise only and no experimental drug	
Experimental Drug GW1516 and exercise	

3. In the diagram below, using arrows, label the following structures: *inner membrane, outer membrane, intermembrane space, cristae, matrix, DNA,* and *ribosome.* Lastly, label where the processes of *glycolysis (G)*, *Kreb's cycle (K)*, and the *electron transport chain (E)* occurs.

LAB ACTIVITY

4. Get an envelope from Mr. F containing images of muscle tissues from the four mice before and after the experiment. Watch the simulation to see experiment conducted. In the table below, match the muscle biopsy results with the mouse tested. Give an explanation to support choice made. 8 pts

Mouse Treatment	**Biopsy Choice (A-D)**	**Reasoning**
Experimental Drug GW1516 only		
No Exercise		
Exercise only		
Experimental Drug GW1516 and exercise		

Analysis Questions 10 pts

1. Based on the results is the drug effective? Be sure to support your conclusion with data. 3 pts

2. Which mouse was the control group? Explain how do you know? 3 pts

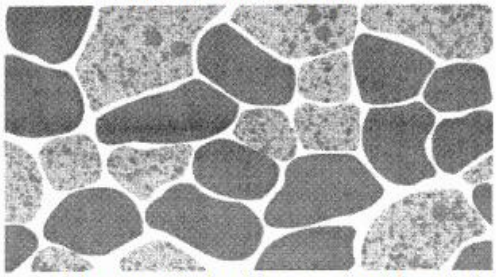
3. List some pros (benefits) and cons (trade-offs) of a drug that can produce the same effects as exercise. 4 pts

4. Explain how the drug GW1516 interacts with the gene PPAR delta and exercise to achieve the desired results. How does the drug AICAR improve the GW1516 drug's effectiveness?

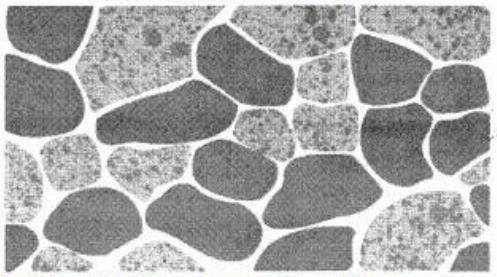
5. Beneath all this experimentation, how are mitochondria connected to what you observed in the discussion and data from the study?

Biopsy A

Muscle cells before experiment



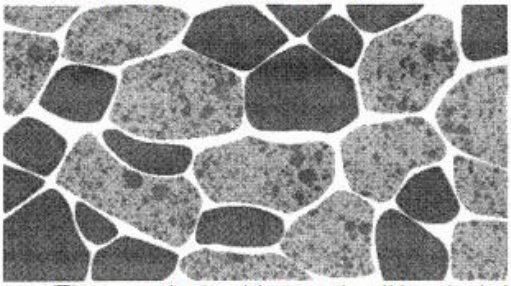
Muscle cells at end of experiment



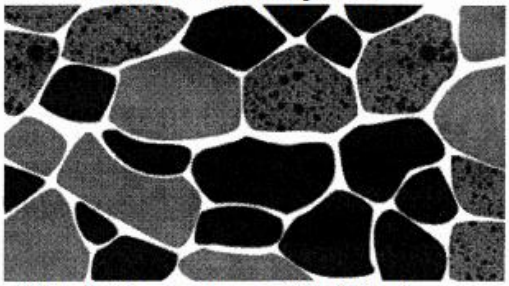
(The more mitochondria a muscle cell has, the darker it will be. Both images are magnified 40 times)

Biopsy B

Muscle cells before experiment



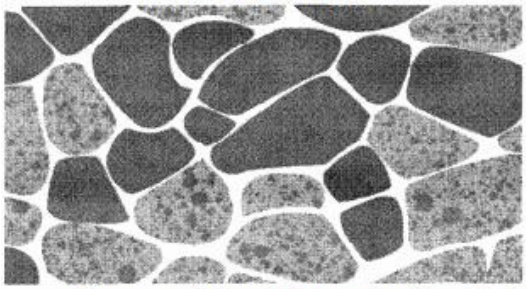
Muscle cells at end of experiment



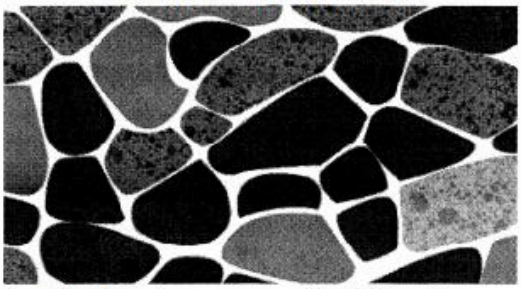
(The more mitochondria a muscle cell has, the darker it will be. Both images are magnified 40 times)

Biopsy C

Muscle cells before experiment



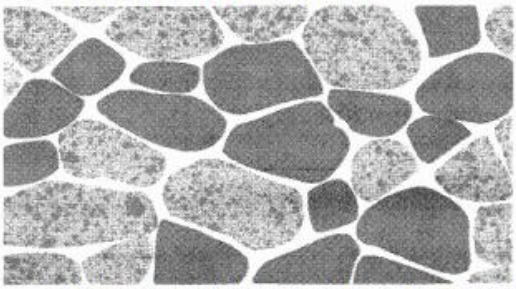
Muscle cells at end of experiment



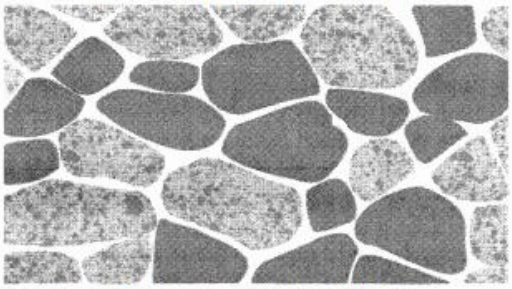
(The more mitochondria a muscle cell has, the darker it will be. Both images are magnified 40 times)

Biopsy D

Muscle cells before experiment



Muscle cells at end of experiment



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