

Marathon Muscles

How different are muscles enhanced by drugs from ones enhanced by exercise? In this hypothetical experiment, scientists treated four mice in four different ways. One was exercised regularly. A second and third were given experimental drugs (called X and Y). A fourth was just left in its cage. 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.

Procedure

- In the space below, summarize the function of mitochondria. (If possible, review the function of mitochondria by watching the animation Where Do You Get Your Energy? at: www.teachersdomain.org/resource/lspso7.sci.life. stru.cellenergy/.)
- **2** In each situation below, predict how the number of mitochondria-rich cells would change.

Mouse Treatment	Change in number of mitochondria-rich cells at end of experiment
1 No exercise	
2 Lots of exercise	
3 Experimental Drug X	
4 Experimental Drug Y	

3 Get an envelope from your teacher containing images of muscle tissues from two of the four mice before and after the experiment. In the table below, enter the number of mitochondria-rich muscle cells shown in each image. Then, enter your data on the class data table.

Mouse Number and Treatment	Number of mitochondria-rich cells at beginning of experiment	Number of mitochondria-rich cells at end of experiment

Questions Write your answers on a separate sheet of paper.

- 1 Explain your conclusions about how and why each treatment affected the number of mitochondria-rich cells for each of the four mice.
- **2** In both the Marathon Mouse experiment and the hypothetical experiment above, one mouse received no special treatment. What was the purpose of having this mouse in the experiment?
- 3 List some pros and cons of a drug that can produce the same effects as exercise.
- **4** Imagine that you could design an animal with great endurance, either flying, running, or swimming. Draw the animal and label its endurance characteristics. (If possible, watch the video *How the Body Responds to Exercise* at: www.teachersdomain.org/resource/oero8.sci.life.reg.exercise/.)