Inside a Muscle Fiber Lab

Name _____

Date _____

Period _____

mrsajdak.com/muscle-fiber · © Ryan Sajdak · CC BY-NC-SA 4.0

Do Now This is a real electron microscope picture of the inside of one human muscle cell. It is magnified many thousands of times. 2 minutes, before you open the lab

A. Describe the pattern you see.

B. A muscle fiber is: ☐ A bundle of cells ☐ One whole cell ☐ A thread inside a cell

☐ I can label the parts of a skeletal muscle fiber.

☐ I can name the bands of a sarcomere and the filaments that make them.

☐ I can relate each part of a fiber to its job.

Part 1. Parts of a fiber (Tab 1)

SEP 2 Developing and Using Models · CCC Systems and System Models

Click every part in the drawing. Read what each one looks like. Then do Step 2, Look closely.

1. Describe what each part looks like, in a few words.

Part	What it looks like	Part	What it looks like
Sarcolemma		**Myofibril**	
T-tubule		**Mitochondrion**	
SR		**Nucleus**	

2. Look closely. Tick one in each row.

Which part covers the whole cell?	☐ Myofibril ☐ Sarcolemma ☐ SR
Which part wraps each myofibril like a net?	☐ T-tubule ☐ Nucleus ☐ SR
Where are the nuclei?	☐ in the center ☐ at the edge ☐ inside myofibrils

3. Which part fills most of the inside of the fiber? ☐ Myofibrils ☐ Mitochondria ☐ Nuclei

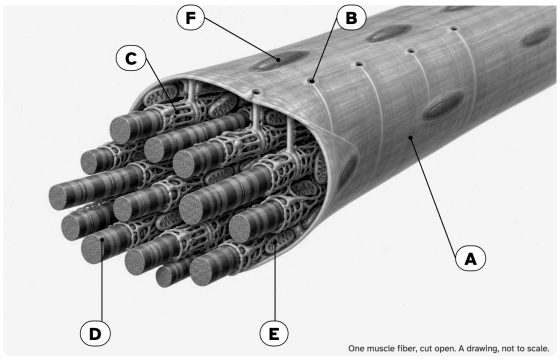
4. Predict. The T-tubules are holes in the outer skin that lead into tubes going deep inside. Why might the cell need tubes that go inside?

READ FIRST. In the lab, find the green Learn It box and read it. Then answer 5 to 7.

5. Which part does each job? Tick one in each row.

Carries the signal deep inside the fiber.	☐ T-tubule ☐ SR ☐ Mitochondrion ☐ Myofibril
Stores calcium, lets it out on a signal.	☐ T-tubule ☐ SR ☐ Mitochondrion ☐ Myofibril
Makes ATP, the energy for pulling.	☐ T-tubule ☐ SR ☐ Mitochondrion ☐ Myofibril
Does the pulling.	☐ T-tubule ☐ SR ☐ Mitochondrion ☐ Myofibril

6. Label the drawing. Write the name of each lettered part.



One muscle fiber, cut open. A drawing, not to scale.

Letter	Part
A	
B	
C	
D	
E	
F	

7. Model check (SEP 2). A fiber is one cell, and it can be longer than your hand. Why does it need T-tubules to carry the signal inside, and not just the sarcolemma?

Part 2. Read the stripes (Tab 2)

SEP 4 Analyzing and Interpreting Data · CCC Structure and Function

Click spots 1 to 4. Read how dark the picture is, and look at the slice of filaments under each spot.

8. Copy your records for each spot.

Spot	Darkness (0 to 100)	Thick filaments?	Thin filaments?
1			
2			
3			
4			

9. Which spot is darkest? _____ Which spot is lightest? _____

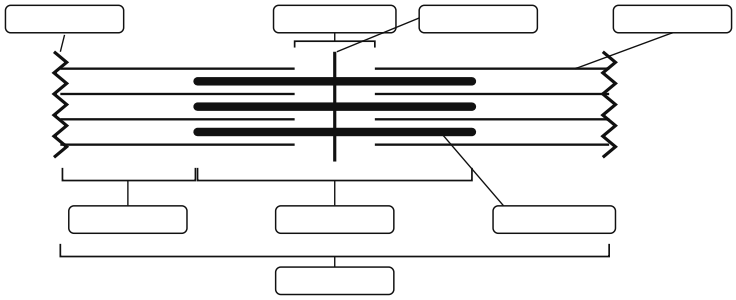
10. Use the data. Spot 1 has only thin filaments. Spot 3 has thick and thin filaments. Which spot is darker, and why?

READ FIRST. In the lab, find the green Learn It box and read it. Then answer 11 to 13.

11. Name each spot: I band, Z line, A band or H zone.

Spot 1	Spot 2	Spot 3	Spot 4

12. Label the sarcomere. Write a name in each box.



13. Thick filaments are made of _____. Thin filaments are made mostly of _____. One sarcomere goes from one _____ to the next.

Part 3. Built for the job (Tab 3)

SEP 6 Constructing Explanations · CCC Structure and Function

Click all three parts. Read the bars for each muscle.

14. Copy the records table from the lab. Write "none" where a muscle has no bar (not measured).

Muscle	Myofibrils (%)	Mitochondria (%)	SR (%)
Human thigh			
Hummingbird flight muscle			
Rattlesnake tail muscle			
Mouse leg, fast muscle			
Mouse leg, slow muscle			

15. The rattlesnake tail muscle has 26% SR. A slow mouse leg muscle has 2.9%. About how many times as much SR does the rattlesnake tail have? Show your math. _____

16. Which muscle has the most mitochondria? _____ What is its job?

READ FIRST. In the lab, find the green Learn It box and read it. Then answer 17 to 18.

17. Trade-off. The rattlesnake tail muscle is fast and never tires, but it is weak. Use the data to explain why it is weak.

18. Explain it (SEP 6). A marathon runner's leg muscles work for over two hours. A weightlifter's leg muscles pull as hard as they can for two seconds. Which needs more mitochondria in its fibers, and which needs more myofibrils?

Claim	
Evidence from the lab	
Reasoning	