

Investigation 10.A: Observing Muscle Tissue

Questions: How do the three types of muscle tissue differ under microscopic examination? What conditions are necessary for a muscle fibre to contract?

Safety Precautions



Make sure that your hands are dry when handling electrical equipment. Handle microscope slides carefully, since they can break easily and cause cuts.

Materials

- petri dish with glycerol
- light microscope
- small forceps or tweezers
- teasing needle
- prepared slides of different and skeletal muscle tissue muscle tissues
- dropper pipette
- 2 microscope slides
- 2 cover slips

Procedure

Part 1

1. Place the slide of the skeletal muscle tissue on the microscope stage, and focus using the low-power lens.
2. Scan the slide to find an area where you can observe individual muscle fibres.
3. Observe the fibres, using Figure 10.1 for reference. In the following table, record your observations of the fibres, including their organization, the presence or absence of striations, and the presence (and number) or absence of nuclei in each fibre.

Data Table for Part 1

Type of muscle	Organization of fibres	Description of fibres	Description of nuclei
skeletal			
smooth			
cardiac			

4. Make your own drawing of skeletal muscle tissue on the following page. Label your drawing as completely as you can, and estimate the size of the cells.
5. Repeat steps 2 to 5 until you have observed all three types of muscle tissue.
6. Answer Analysis questions 1 to 3 and Conclusion question 5.

CHAPTER 10	Investigation 10.A: Observing Muscle Tissue (cont'd)	BLM 10.1.2
HANDOUT		

Drawing of skeletal muscle tissue

Drawing of smooth muscle tissue

Drawing of cardiac muscle tissue

CHAPTER 10	Investigation 10.A: Observing Muscle Tissue (cont'd)	BLM 10.1.2
HANDOUT		

Part 2

- Label two slides 1 and 2. On each slide, mount a strand of glycerinated muscle fibres in a drop of glycerol. Place each slide on a ruler, and measure the length of the strand. Record the length of each strand in the first row of the following data table.

Data Table for Part 2

Solution	Length (mm)	
	Slide 1	Slide 2
glycerol alone		
potassium-magnesium salt solution alone		
ATP alone		
both salt solution and ATP		

- If there is more than a small drop of glycerol on each slide, soak up the excess with a piece of lens paper held at the edge of the glycerol, farthest from the fibre strand.
- To slide 1, add a few drops of the salt solution that contains potassium ions and magnesium ions. Measure any change in the length of the strand, and record your results.
- To slide 2, add a few drops of ATP solution. Measure and record any change in the length of the strand.
- Now add ATP solution to slide 1. Measure and record any change in the length of the strand.
- To slide 2, add a few drops of the potassium-magnesium solution. Measure and record any change in the length of the strand.
- Answer Analysis question 4 and Conclusion questions 6 and 7.

Analysis

- Describe each type of muscle tissue.

CHAPTER 10	Investigation 10.A: Observing Muscle Tissue (cont'd)	BLM 10.1.2
HANDOUT		

2. Explain the difference between voluntary and involuntary muscle. Is it possible to tell from your observations whether muscle tissue is voluntary or involuntary? Explain.

3. Cardiac muscle is only found in the heart. Suggest a reason why the heart needs a unique type of muscle.

4. Summarize your observations of the strand of muscle fibres in Part 2, noting which variables were controlled and which were manipulated.

CHAPTER 10	Investigation 10.A: Observing Muscle Tissue (cont'd)	BLM 10.1.2
HANDOUT		

Conclusions

5. Make a statement that correlates the observed structure of each type of muscle fibre to its function in the body.

6. Based on your observations, identify the factors required for a muscle fibre to contract.

7. Based on your observations, and given that a whole muscle is comprised of numerous muscle fibres, suggest a plausible mechanism for the contraction of skeletal muscle in the body.