**Physiology**

**Muscular System – Microscopic Anatomy**

**USE TOC #13 – MM Type Notes**

**Background**

The human body is composed, microscopically, of four basic tissue types – epithelial, connective, muscle and nervous. We have looked at epithelial and connective tissues in the context of the integumentary and skeletal systems. Now we will look at muscle tissue in the context of the muscular system.

Muscle tissue makes up approximately 50% of the body’s mass. These tissues are specialized for

contraction – the ability to shorten and then return to their original shape and size. There are three subtypes of muscle tissue – skeletal, smooth and cardiac. Each varies slightly in structure and in their location, while always performing the basic function of contraction. These contractions will always produce movement – of bones-skeletal, of food and other body fluids-smooth and of blood-cardiac. The contractions of muscle tissue are also the major source of our internal body heat.

**Focus Questions**

• What are the types of muscle tissue and how can they be identified microscopically?

• What is the relationship between structure and function in the different types of muscle tissue?

**Procedure**

**A. Pre-lab Preparation**

1. Read and highlight the handout on Muscle Tissue

**B. Observing Muscle Tissue**

1. Obtain three prepared slides of – skeletal, smooth and cardiac muscle. Conduct a microscopic observation of all three at 40X, 100X and 400X. Draw your field of view for each tissue type in the space provided on the next page. \*\*\*Indicate the magnification of your drawings!

2. Make a detailed microscopic drawing of *smooth muscle tissue*. Identify the power you observed the tissue at. \*\*\*Label as many of the following structures as possible: muscle cell; nucleus; cell membrane (plasmalemma); epithelial tissue.

3. Make a detailed microscopic drawing of *cardiac muscle tissue*. Identify the power you observed the tissue at. \*\*\*Label as many of the following structures as possible: muscle cell; nucleus; cell membrane (sarcolemma); striations, intercalated disk.

4. Make a detailed microscopic drawing of *skeletal muscle tissue – cross section*. \*\*\*Label as many of the following structures as possible: muscle cell; nucleus; cell membrane (sarcolemma); endomysium; capillary.

**USE TOC #13 – MM Type Notes**

Smooth Muscle Tissue

Power:\_\_\_\_\_\_\_\_\_\_\_

Skeletal Muscle Tissue

Power:\_\_\_\_\_\_\_\_\_\_\_

Cardiac Muscle Tissue

Power:\_\_\_\_\_\_\_\_\_\_\_

**C. Comparing Muscle Tissue**

1. Complete the table, below, based on your observations and research.

**Skeletal Muscle Smooth Muscle Cardiac Muscle**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Skeletal Muscle** | **Smooth Muscle** | **Cardiac Muscle** |
| Shape |  |  |  |
| # of nuclei |  |  |  |
| Location of nuclei |  |  |  |
| Presence of striations |  |  |  |
| Location in Body |  |  |  |
| Voluntary/involuntary |  |  |  |

**Analysis Questions**

1. What is the purpose/role of the striations in the skeletal muscle?

2. What is the purpose/role of the sarcomere?

3. In addition to the blood vessels and the digestive system, identify (2) locations for smooth muscle in the human body. What is the purpose/role of the smooth muscle in those locations?

|  |  |
| --- | --- |
| Location | Purpose  |
| 1)  |  |
| 2)  |  |