

# MUSCLE HISTOLOGY LAB

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[http://Biology.clc.uc.edu/Fankhauser/Labs/Anatomy\\_&\\_Physiology/A&P201/Muscle\\_Histology/Muscle\\_Histology.htm](http://Biology.clc.uc.edu/Fankhauser/Labs/Anatomy_&_Physiology/A&P201/Muscle_Histology/Muscle_Histology.htm)

See Martini, 5<sup>th</sup>, pp 270-300, Eroschenko's 9<sup>th</sup>, pp 75-83.

Muscle is a contractile tissue which generates tension through the molecular pull exerted on actin by myosin fibers in the sarcomere (review these terms in your text). There are three histological classes of muscle, each of which function in a unique way.

**Smooth muscle** cells possess a single nucleus, have sarcomeres which are not arranged in a repeating fashion, and therefore the cells lack visible features. These cells are slow contracting, and are responsible for involuntary visceral contractions (peristalsis, uterine contractions, bladder contraction, "bristling" of skin hairs, etc).

**Striated muscle** consists of multinucleated cells (which form a muscle "fiber"). It owes its striations to regular, repeated arrangement of sarcomeres. It is voluntary, rapid acting, and relatively easily fatigued. It is also known as skeletal muscle, and is responsible for movement of bones.

**Cardiac muscle**, also termed striated involuntary muscle, is found only in the heart. Its cells usually contain a single centrally located nucleus, display striations as in striated muscle, but, due to branching interconnections, appear woven-like under the microscope. It is capable of intrinsically initiated rhythmic contraction. Its diagnostic intercalations are visible when treated with iron-containing stains

Draw each slide at 400x:

- a) (slide 16) **Smooth Muscle**. (Carefully follow microscope protocol--these are hard to see.) VE: fig 5-2, p 77

(Draw three or four of these teased out individual smooth muscle cells.)

|                      |  |
|----------------------|--|
| nuclei               | located half way between ends of the cells |
| smooth muscle fibers | "spindle" shaped (tapered at each end)     |

- b) (slide 17) **Striated Muscle**, VE: fig 5-3, p 79 and 5-9, p 85

|                           |   |
|---------------------------|---|
| perimysium                | material binding muscle fascicles together (dark encircling material) |
| muscle fascicle           | bundle of muscle fibers: include them in both c. s. and l. s.         |
| endomysium                | binds individual fibers into a muscle fascicle (lines between fibers) |
| muscle fiber              | formed from fused muscle cells, show in both c. s. and l. s.          |
| nuclei of muscle fibers   | note that they are multiple and pushed to the edge of the fiber       |
| capillaries in endomysium | clearly defined round holes at junctions of fibers                    |
| A band                    | dark band in the cross striations, corresponds to myosin fibers       |
| I band                    | light band, corresponds to space between ends of myosin               |

- c) (slide 18) **Cardiac Muscle**, VE: fig 5-7 & 5-10, p 83 & 85

|                          |   |
|--------------------------|---|
| nucleus of cardiac fiber | larger, in central position in cardiac fiber                                    |
| interwoven fibers        | characteristic of cardiac muscle  |
| intercalated discs       | join adjacent cardiac fibers end to end, only visible in iron stained specimens |
| perinuclear sarcoplasm   | space around the nucleus lacking banding, not seen in striated muscle           |