Lab #4 – Histology

Objectives

By the end of this lab, students will be able to:

- Explain the meanings of major histological terms (for epithelial, connective, and muscle tissues).
- Identify each type of underlined epithelial tissue on tissue images.
- List the main locations of each type of epithelial tissue. *(Reference the Tissue Location & Function Guide.)*
- List the functions of each type of epithelial tissue. *(Reference the Tissue Location & Function Guide.)*
- Identify each type of connective tissue on tissue images.
- List the main locations of each type of connective tissue. *(Reference the Tissue Location & Function Guide.)*
- List the functions of each type of connective tissue. *(Reference the Tissue Location & Function Guide.)*
- Identify each type of muscle tissue on tissue images.
- List the main locations of each type of muscle tissue.
- List the functions of each type of muscle tissue.
- Identify nervous tissue on images taken from prepared slides.
- List the main locations of nervous tissue.
- List the functions of each type of cell in nervous tissue.

Part 1 – Epithelial Tissue

1. Epithelial tissues are named based on the shape of their cells & the number of layers those cells are arranged in. Use your textbook (and the Introduction page in the Virtual Lab) to match each epithelial tissue term with the best description of its meaning. Terms include:

   Columnar, cuboidal, pseudostratified, simple, squamous, stratified, transitional

   _____: the flat, scale-like epithelial cell shape

   _____: the "tall & skinny" epithelial cell shape

   _____: the square epithelial cell shape

   _____: the changing epithelial cell shape

   _____: one layer of epithelial cells

   _____: more than one layer of epithelial cells

   _____: one layer of epithelial cells that **looks like** more than one

2. When epithelial tissue is observed with a microscope, several important structures can be identified. Match each structure with the best description of its meaning. Structures include:

Apical surface, basal surface, basement membrane, cilia, goblet cells, lumen, microvilli

_____: the central open space (in the middle of an organ)

_____: the surface of an epithelial cell that is facing the lumen / external environment

_____: the protein-rich connective tissue layer found underneath epithelial tissue

_____: the surface of an epithelial cell that is facing the basement membrane

_____: the mucus-producing cells found in columnar epithelium

_____: the long, hair-like projections that assist with movement across epithelial tissues

_____: the "fuzzy"-looking membrane folds that assist with absorption in epithelial cells

3. As you complete the Epithelial Tissues Virtual lab, you will focus virtual slides of many different epithelial tissue types. Sketch a picture of each tissue type in its spot in this packet (or take a picture with your phone & paste it in!).
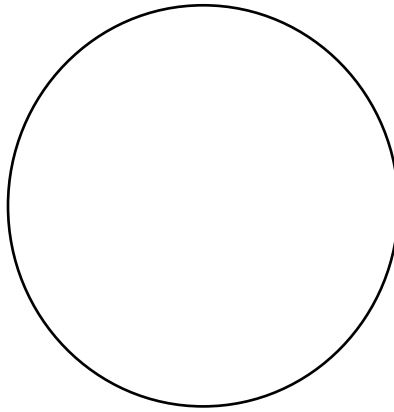
Then, use the Tissue Location & Function guide (in this week's Lecture Resources area) to summarize the most important Locations & Functions for each tissue type.
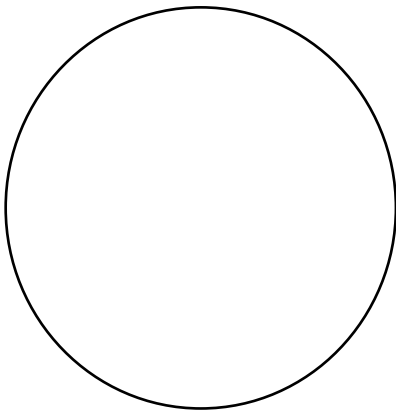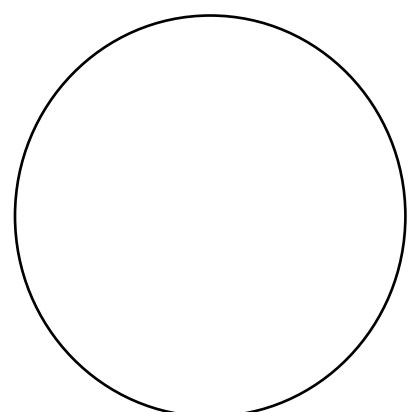
Simple Squamous Epithelium

Simple Cuboidal Epithelium

Non-Ciliated Simple Columnar Epithelium

Location(s):

Location(s):

Location(s):
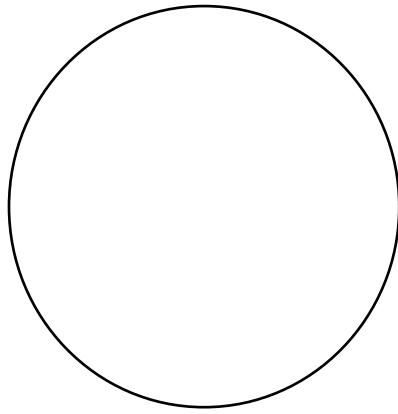
Function(s):

Function(s):
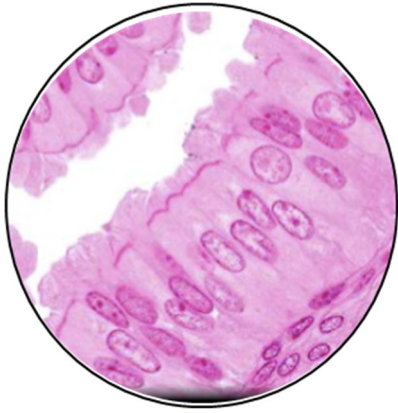
Function(s):

**Ciliated Simple Columnar
Epithelium**
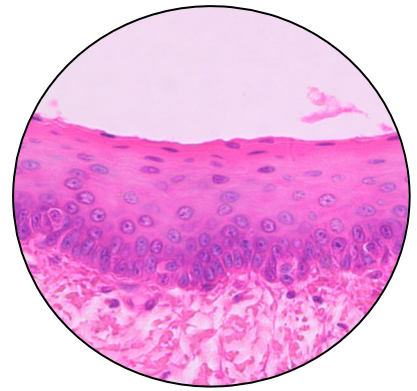*(not in the Virtual Lab)*

Location(s):

Function(s):

**Ciliated Pseudostratified
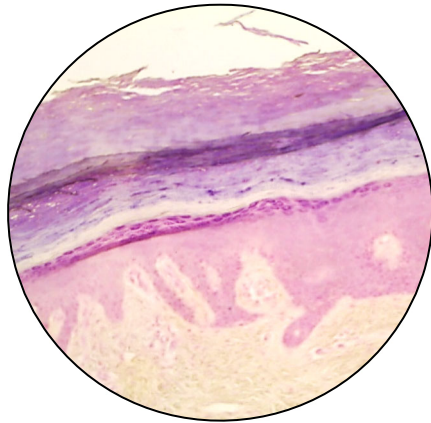Columnar Epithelium**

Location(s):

Function(s):

**Non-Keratinized Stratified
Squamous Epithelium**
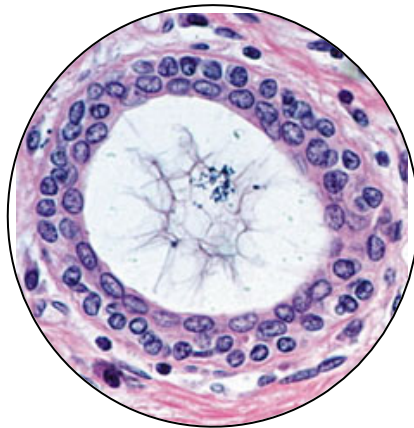*(not in the Virtual Lab)*

Location(s):

Function(s):

**Keratinized Stratified Squamous
Epithelium**
(not in the Virtual Lab)

Location(s):

Function(s):

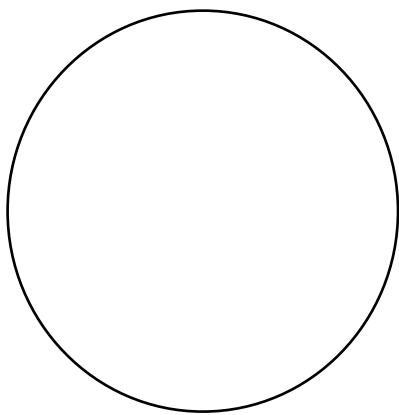**Stratified Cuboidal
Epithelium**
(not in the Virtual Lab)

Location(s):

Function(s):

**Stratified Columnar
Epithelium**
(not in the Virtual Lab)

Location(s):

Function(s):

○

Transitional Epithelium

Location(s):

Function(s):

Stop & Think it Through!

The name of epithelial tissues tells us a lot about their appearance. What do the following epithelial tissue names tell us?

<u>Simple</u> **cuboidal** epithelium:

<u>Number</u> of layers:

Shape of cells:

<u>Stratified</u> **squamous** epithelium:

<u>Number</u> of layers:

Shape of cells:

<u>Pseudostratified</u> **columnar** epithelium:

<u>Number</u> of layers:

Shape of cells:

Part 2 – Connective Tissue

1. Connective tissue is made of cells, ground substance, and proteins. Use your textbook (and the Virtual Lab's Introduction page) to match each connective tissue structure with its best description. Components include:

Adipocytes, chondrocytes, collagen fibers, elastic fibers, erythrocytes, Fibroblasts, ground substance, leukocytes, osteocytes, reticular fibers

_____: the noncellular material found outside the cells in connective tissue

_____: the thick, strong proteins that increase the strength of connective tissue

_____: the dark, stretching proteins that allow connective tissues to stretch

_____: the thin, branching proteins that create a scaffold for filtration & shape

_____: the protein-producing cells in most connective tissues

_____: the specialized cell that stores lipids (in adipose tissue)

_____: the specialized cell found in all types of cartilage

_____: the specialized cell found in all types of bone tissue

_____: the specialized blood cell that assists with oxygen transport

_____: the specialized blood cell that assists with immune reactions

2. Connective tissues are classified into 4 different groups: loose connective tissue (CT) proper, dense connective tissue (CT) proper, supporting connective tissue (CT), and fluid connective tissue (CT). In the space below, sort each type of connective tissue (from the pages that follow) into the correct category.

Loose CT Proper   **Dense CT Proper**

Supporting CT   **Fluid CT**

3. As you complete the Connective Tissues Virtual lab, you will focus virtual slides of many different connective tissue types. Sketch a picture of each tissue type in its spot in this packet (or take a picture with your phone & paste it in!).

    Then, use the Tissue Location & Function guide (in this week's Lecture Resources area) to summarize the most important Locations & Functions for each tissue type.
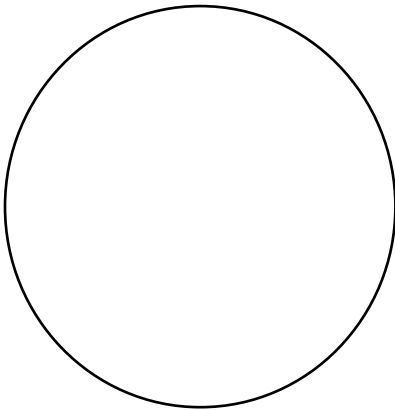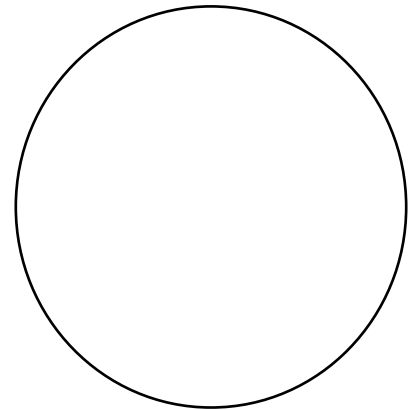
Areolar Loose Connective Tissue   **Reticular Loose Connective Tissue**   **Adipose Loose Connective Tissue**
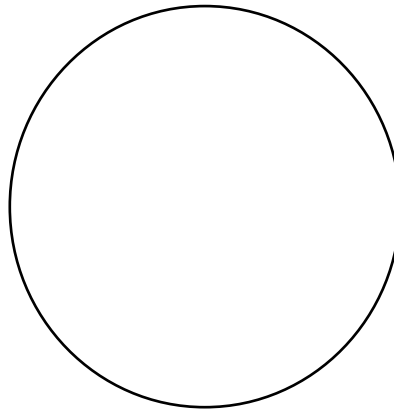
Location(s):   *Location(s):*   *Location(s):*
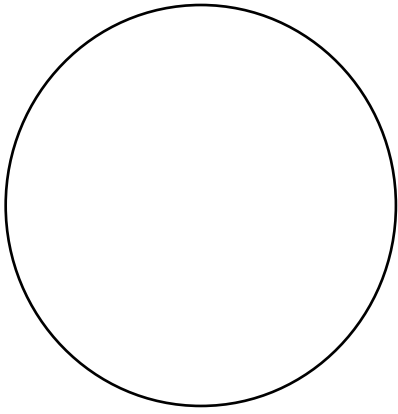
Function(s):   *Function(s):*   *Function(s):*
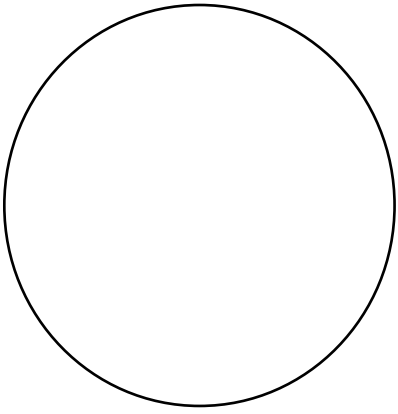
Dense Irregular Connective Tissue
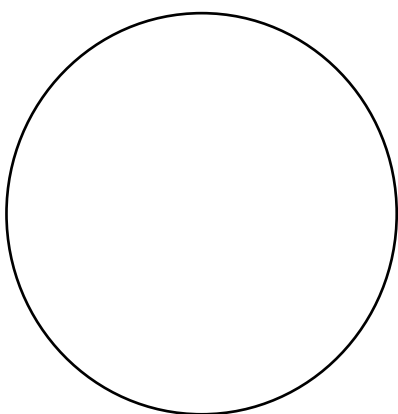
Location(s):

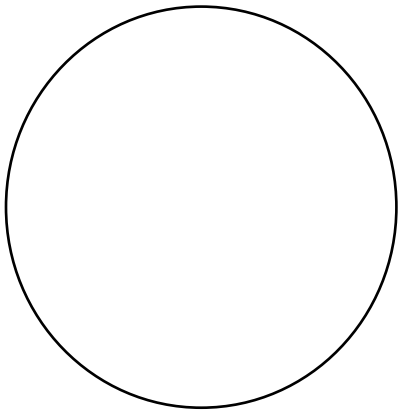*Function(s):*

Dense Regular Connective Tissue

Location(s):
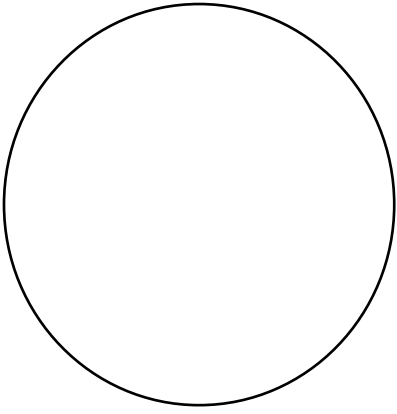
Function(s):

Elastic Connective Tissue

Location(s):
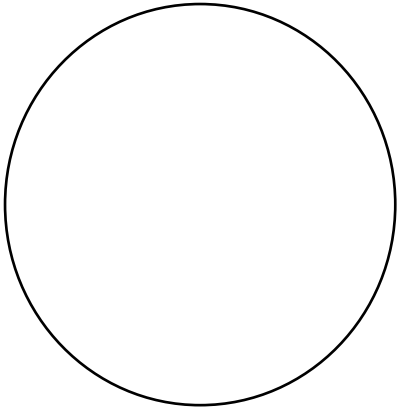
Function(s):

Hyaline Cartilage

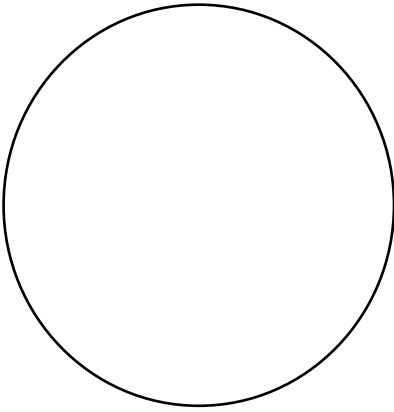*Location(s):*

Function(s):

Fibrocartilage

Location(s):
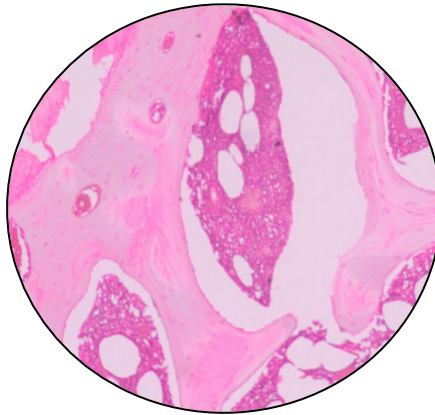
Function(s):

Elastic Cartilage

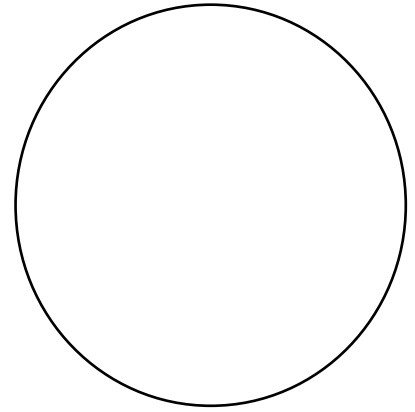*Location(s):*

Function(s):

Compact Bone Connective Tissue

Spongy Bone Connective Tissue
(not in the Virtual Lab)

Blood Connective Tissue

Location(s):

Location(s):

Location(s):

Function(s):

Function(s):

Function(s):

_____

Part 3 – Muscle Tissue

1. Muscle tissue is described using several unique terms. Use your textbook (or the Muscle Tissue Virtual Lab) to match each muscle tissue term with its best description. Terms include:

   Intercalated disc, multinucleate, non-striated, striated

   _____: muscle cells that have dark & light bands of contractile proteins

   _____: muscle cells that do NOT have dark & light bands of contractile proteins

   _____: muscle cells with more than one nucleus

   _____: the bands of protein-rich connections between cardiac muscle cells

2. As you complete the Muscle Tissues Virtual lab, you will focus virtual slides of the three different muscle tissue types. Sketch a picture of each tissue type in its spot in this packet (or take a picture with your phone & paste it in!).
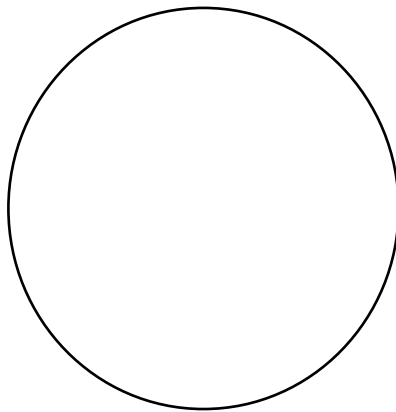
   Then, use the Tissue Location & Function guide (in this week's Lecture Resources area) to summarize the most important Locations & Functions for each tissue type.
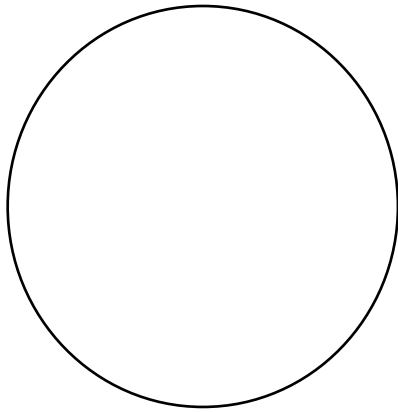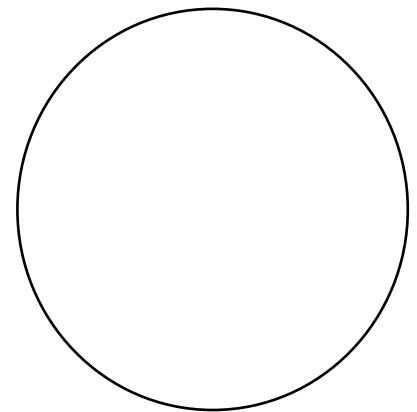
Skeletal Muscle Tissue

Location(s):

Function(s):

Smooth Muscle Tissue

Location(s):

Function(s):


Cardiac Muscle Tissue

Location(s):

Function(s):

Part 4 – Nervous Tissue

Nervous tissue is made of two types of cells: neurons & neuroglia.

As you complete the Nervous Tissue Virtual Lab, you will focus a virtual slide with nervous tissue on it. Sketch a picture of this tissue in its spot in this packet (or take a picture with your phone & paste it in!).

Then, use your textbook (or the Tissue Location & Function Guide) to describe the locations & functions of each type of cell.
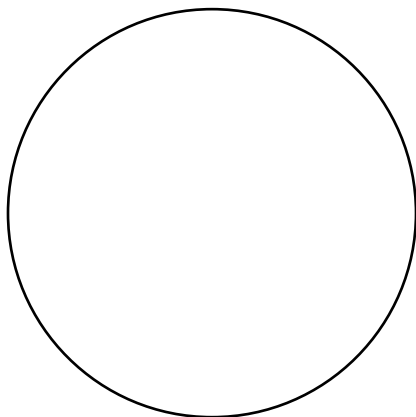
Nervous Tissue

Location(s) of neurons:

Function(s) of neurons:

Location(s) of neuroglia:

Functions(s) of neuroglia: