

Chapter 4: Histology: The Study of Tissues

I. Tissues and Histology

A. Tissues

1. Tissues are collections of _____ and the _____
2. The classification of tissue types is based on:
 - a. _____
 - b. _____
 - c. _____
3. Name the four primary tissue types:
 - a. _____
 - b. _____
 - c. _____
 - d. _____
4. The classification of epithelial and connective tissue is based on:
 - a. _____
 - b. _____
 - c. _____
5. The classification of muscle and nervous tissue is based on:
 - a. _____

B. Histology

1. What is histology? _____
2. What is a biopsy? _____

II. Embryonic Tissue

A. Endoderm

1. Considering position of the layers which layer is the endoderm? _____
2. Endoderm will form _____

B. Mesoderm

1. Considering position of the layers which layer is the mesoderm? _____
2. Mesoderm will form _____

C. Ectoderm

1. Considering position of the layers which layer is the ectoderm? _____
2. Ectoderm will form _____

III. Epithelial Tissue

A. General Characteristics of Epithelium

1. Epithelium is composed mostly of _____ with very little _____
2. Epithelium covers _____ and forms _____
 - a. On what body surfaces would one expect to find epithelium?

3. Define the following epithelial terms:
 - a. Free or apical surface _____
 - b. Lateral surface _____
 - c. Basal surface _____
 - d. How is a basement membrane formed? _____

 - e. What does the basement membrane do? _____

4. What holds adjacent epithelial cells together? _____
5. Epithelial tissue is "avascular" since it is not penetrated by blood vessels. So how do nutrients reach the epithelial cells? _____
 - a. Where are the most metabolically active cells? _____

B. List the Five Major Functions of Epithelia

1. _____
2. _____
3. _____
4. _____
5. _____

C. Classification of Epithelium

1. Classification is based on _____ & _____
2. Three major types of epithelium based on number of cell layers:
 - a. Observing a simple epithelium one would expect to see: _____

 - b. Observing a stratified epithelium one would expect to see: _____

 - c. Observing pseudostratified columnar epithelium one would expect to see:

 1. Where might you find this type of epithelium? _____
3. List and describe the three shapes of epithelial cells:
 - a. _____
 - b. _____
 - c. _____
4. Types of epithelium are given two names based on:
 - a. _____
 - b. _____
5. Describe how "moist stratified squamous epithelium" differs from "keratinized stratified squamous epithelium": _____

6. Transitional Epithelium
 - a. Where is it found? _____
 - b. What shape are the cells when they are not stretched? _____
 - c. What shape are the cells when they are stretched? _____

D. Functional Characteristics

1. Cell Layers and Cell Shapes
 - a. Simple epithelium functions to:
 1. _____
 2. _____

3. _____

4. _____

b. Stratified epithelium functions for _____

1. As outer cells are _____ they are _____

c. Flat and thin cells will allow _____ and _____

d. Cuboidal or columnar cells are usually involved in _____

2. Cell Surfaces

a. What do smooth surfaces do? _____

b. What do microvilli do for a cell? _____

1. Therefore they are found in cells involved in what? _____

c. Elongated microvilli are called _____

1. They are found where what is an important function? _____

d. What purpose do cilia serve in the human body? _____

3. Cell Connections

a. List the three functions of cellular connections:

1. _____

2. _____

3. _____

b. Describe the structure of a desmosome: _____

1. What does a hemidesmosome do? _____

c. Tight junctions _____ & _____

1. Where is the zonula adherens and what does it do? _____

2. The zonula occludens forms _____

a. The tight seal prevents _____

d. What does a gap junction do? _____

1. They are most important in _____ & _____

2. In ciliated epithelial cells they may _____

4. Glands

a. Glands that connect to the surface by a duct are called _____

- b. Glands that do not connect by a duct are called _____
 - 1. These glands secrete into the _____
 - 2. These glands produce _____
- c. An exocrine gland consisting of a single cell is called _____
 - 1. An example would be _____
- d. An exocrine gland consisting of many cells is called _____
 - 1. The duct system of an exocrine gland can be:
 - a. Simple which means _____
 - b. Compound which means _____
 - c. Tubular (tubule) which means _____
 - d. Acinar (acini) which means _____
 - e. Alveolar (alveoli) which means _____
- e. Describe how each of the three functional types of exocrine glands work:
 - 1. Merocrine Glands: _____

 - 2. Apocrine Glands: _____

 - 3. Holocrine Glands: _____

IV. Connective Tissue

A. General Characteristics of Connective Tissue

- 1. Connective tissue _____ are separated by _____
- 2. Connective tissue structure is _____ and performs _____

B. List the seven major categories of connective tissue function:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

7. _____

C. Cells of Connective Tissue

1. Define the function that each cell would have based on the suffix:

a. Blasts _____

b. Cytes _____

c. Clasts _____

2. What type of connective tissue does each of the following prefixes refer to:

a. Fibro _____

b. Chondro _____

c. Osteo _____

3. Adipose Cells (adipocytes)

a. What do adipose cells do? _____

b. What do adipose cells look like? _____

4. Mast Cells

a. Where are mast cells found? _____

b. What chemicals do they contain? _____

c. What is their function? _____

5. What cells continuously move into connective tissue? _____

6. What do macrophages do? _____

a. A fixed macrophage _____

b. A wandering macrophage _____

7. Embryonic connective tissue cells that persist in adult tissues are called:

a. Their potential is to _____

D. Extracellular Matrix

1. List the three major components of connective tissue matrix:

a. _____

b. _____

c. _____

2. The structure of the matrix is responsible for _____

3. Protein Fibers of the Matrix

- a. Collagen fibers are composed of _____
 - 1. Describe the structure of a collagen molecule: _____

 - 2. What are the physical properties of collagen?
_____ & _____ but _____
 - 3. How many types of collagen are there? _____
- b. Reticular fibers are actually _____
 - 1. Describe reticular fibers: _____
 - 2. Functionally reticular fibers _____
- c. Elastic fibers contain _____
 - 1. This protein has the ability to _____
 - 2. Describe an elastin molecule: _____
 - 3. How are elastin molecules arranged in the tissue? _____

- 4. Other Matrix Molecules
 - a. What is ground substance? _____
 - b. Describe the shape of hyaluronic acid molecules: _____
 - c. What quality does hyaluronic acid give to fluids? _____
 - d. What are proteoglycan monomers? _____

 - e. What can proteoglycans do when they trap large quantities of water?

 - f. What do adhesive molecules do in connective tissue? _____

V. Classification of Connective Tissue

A. Classification of connective tissue is influenced by:

- 1. _____
- 2. _____
- 3. _____

B. Embryonic Connective Tissue

1. It is properly called _____
2. Structurally it is made up of:
 - a. Irregularly _____
 - b. Surrounded by _____
 - c. In which _____
3. Where is mucous connective tissue found? _____

C. Adult Connective Tissue

1. Loose Connective Tissue
 - a. It is sometimes referred to as _____
 - b. Loose connective tissue consists of:
 1. Protein _____
 2. With numerous _____
 - c. Functionally areolar connective tissue is:
 1. _____
 2. _____
 - d. Structurally it contains _____, _____, & _____ fibers and a _____ of cells.
2. Dense Connective Tissue
 - a. Protein fibers form _____
 - b. Dense Regular Connective Tissue
 1. What does the term "regular" in the name refer to? _____
 2. Dense regular connective tissue has abundant _____
 - a. This makes the tissue appear what color? _____
 3. Dense regular collagenous connective tissue forms:
 - a. _____
 - b. _____
 - c. Dense Regular Elastic Connective Tissue
 1. Composed of bundles of _____ & abundant _____
 - a. This makes the tissue appear what color? _____
 2. Dense regular elastic connective tissue forms _____

3. Functionally when stretched they _____
- d. Dense Irregular Connective Tissue
 1. Contains protein fibers arranged _____
 2. Functionally forms sheets that have _____
 3. Where would you find dense irregular collagenous connective tissue?

 4. Where would you find dense irregular elastic connective tissue?

3. Connective Tissue with Special Properties
 - a. Adipose Tissue
 1. Consists of adipocytes containing _____
 2. Adipose is composed of _____ cells and a small amount of _____ that consists of _____
 3. Functionally adipose is:
 - a. _____
 - b. _____
 - c. _____
 - b. Reticular Tissue
 1. Forms the _____ of lymphatic tissue.
 2. Characterized by a network of _____ & _____
4. Cartilage
 - a. Cartilage is composed of cells called _____ that are in spaces called _____ inside an _____
 - b. The matrix of cartilage contains _____, _____, & _____
 - c. The proteoglycans can trap _____
 1. This allows cartilage to _____
 - d. The collagen fibers give cartilage _____
 - e. What is the perichondrium? _____
 - f. Why does cartilage heal slowly? _____
 - g. Hyaline Cartilage
 1. It has large amounts of _____ & _____

2. Where would you find hyaline cartilage?

a. _____

b. _____

c. It also covers _____

h. Fibrocartilage

1. It has more _____ than _____

2. Functionally it is slightly _____ & _____

3. Where would you find fibrocartilage? _____

i. Elastic Cartilage

1. It has _____ fibers in addition to _____ & _____

2. Where would you find elastic cartilage? _____

5. Bone

a. Bone consists of _____ & _____

b. The organic portion consists of _____ fibers, primarily _____

c. The inorganic portion consists of _____

1. What minerals do they contain? _____ & _____

d. Bone cells are called _____ & are located in _____

e. Cancellous or Spongy Bone

1. Composed of plates called _____ surrounding _____

f. Compact Bone

1. What is a lamellae? _____

g. Why does bone repair so easily? _____

6. Hemopoietic Tissue and Blood

a. Why is blood unusual among connective tissues? _____

b. What does hemopoietic tissue do? _____

c. What is yellow bone marrow composed of? _____

d. What is red bone marrow composed of? _____

VI. Muscle Tissue

A. The main characteristic of muscle tissue is _____

B. Muscle Tissue Structure

1. What does striated mean? _____
2. Therefore nonstriated would mean? _____

C. Muscle Tissue Function

1. What does voluntary mean? _____
2. What does involuntary mean? _____

D. Based on structural and functional classification (B & C above):

1. Skeletal muscle is _____
2. Cardiac muscle is _____
3. Smooth muscle is _____

VII. Nervous Tissue

A. Nervous tissue has the ability to _____

B. Describe each of the major parts of a neuron:

1. Cell body: _____
2. Nerve cell processes consist of _____
2. Dendrite: _____
 - a. A dendrite _____ the action potential and _____
3. Axon: _____
 - b. An axon usually conducts _____

C. Describe the structure of the three types of neurons:

1. Multipolar neurons have _____
2. Bipolar neurons have _____
3. Unipolar neurons have _____

D. Neuroglia are _____

1. Functionally neuroglia:
 - a. _____
 - b. _____
 - c. _____

VIII. Membranes

A. Mucous Membrane

1. It consists of _____, _____, a thick _____, & sometimes, _____
2. Mucous membranes line _____
3. Functions include _____, _____, & _____

B. Serous Membrane

1. It consists of _____ called _____, its _____ & _____
3. Serous membranes line _____
4. The membrane is moistened by _____ which _____
5. Functionally serous membranes:
 - a. Protect _____
 - b. Help _____
 - c. Act as _____

C. Synovial Membrane

1. It is composed of _____
2. Synovial membranes line _____
3. They produce a fluid rich in _____ which makes _____ thereby _____

IX. Inflammation

A. The inflammatory response:

1. Mobilizes _____
2. Isolates _____
3. Removes _____

B. List the five major manifestations (symptoms) of an inflammatory response:

1. _____
2. _____
3. _____
4. _____
5. _____

C. Mediators of inflammation include:

1. _____
2. _____
3. _____
4. _____ & others

D. Why is dilation of blood vessels beneficial? _____

E. What does increased permeability of blood vessels do? _____

F. What is edema and why does it occur? _____

G. The site of injury is "walled off" from surrounding tissues by _____

X. Tissue Repair

A. Tissue repair is the substitution of _____ for _____

B. Which type of repair results in normal function? _____

C. Which type of repair will produce scar tissue? _____

D. Classification of Cells

1. What group of cells continues to divide throughout life? _____

2. What group of cells divides only in response to injury? _____

3. What group of cells has a very limited ability to divide? _____

E. _____ heals wounds when the edges are close together.

F. _____ heals wounds when the edges are far apart.

XI. Tissues and Aging

A. In older people cells _____

B. In older people collagen fibers _____

1. Collagen connective tissue becomes less _____ & more _____

C. Elastic fibers _____, bind to _____, & become _____