Notes for Chapter 5 on Tissues

- Four major types of tissues

1. Epithelial
2. Connective
3. Muscle
4. Nervous

1. Epithelial Tissues

Epithelial tissues have different characteristics than the other 3 groups
They are widespread in the body
They cover, line, and have one free (apical) surface
They do NOT have a blood supply
They have closely packed cells with little background (matrix)
They are classified by layers and shape
They are attached to connective tissue via a basement membrane

- Classification of Epithelial by shape and layers

Single layers are called simple
Multi layered are called stratified
A falsely stratified type is pseudostratified
Cells that are flattened are squamous
Cells that are cube shaped are cuboidal
Cells that are rectangular are columnar
Cells that change shape are transitional

- Simple squamous epithelium

Single layer of flattened cells
Large centrally located nucleus
Functions are filtration and diffusion
Locations include: walls of capillaries, alveoli of lungs

- Simple cuboidal epithelium

Single layer of cube shaped cells
Centrally located nucleus
Functions are secretion and absorption
Locations include: kidney tubules and ovaries

- Simple columnar epithelium

Cells are rectangular shaped
Nucleus at bottom
Functions are secretion and absorption
Locations include: lining of uterus, stomach, intestine
Special cells include: goblet cells (mucous) and cilia

- Pseudostratified columnar epithelium

Cells appear striated
May have cilia and goblet cells
Locations include: respiratory and reproductive systems
Functions: secretion, propulsion of mucus by cilia

- Stratified squamous epithelium

Many layers of flattened cells
Basement membrane obvious
Cells near free surface are dead
Locations include skin (keratinized tissue), mouth, throat, vagina, anal canal (nonkeratinized)
Function: protection

- Stratified cuboidal epithelium

2-3 layers thick
Rare in body
Locations include: lines ducts of mammary glands, sweat glands, salivary glands, and pancreas
Function is protection/secretion

- Stratified transitional epithelium

Changes in response to tension
Found only in urinary bladder, ureters, and urethra
Function is stretching

- Stratified Columnar Epithelium

Rare in body
2 or 3 layers thick
Found only in vas deferens and parts of pharynx

- **Glandular epithelium**

A gland consists of one or more cells that make and secrete a product

Exocrine gland secretes it's product through ducts
Endocrine glands do not have ducts, but secrete product directly into blood stream

Exocrine classification is by function and structure

Structural include unicellular like a goblet cell, and multicellular

Functional classification includes: Merocrine glands (secrete product by exocytosis), apocrine glands (product and a portion of cell are released), holocrine (product released inside an intact cell)

2. Connective Tissue

- Occur throughout the body
- Most abundant tissue by weight

- Functions are: support, protection, fill spaces, store fat, produce blood cells, protect against infection, repair tissue damage, and serve as a framework

Major characteristics

- Have a blood supply (except cartilage)
- Have a lot of matrix and Cells reproduce
- Cell types include: fibroblast (most common type), macrophages (carry on phagocytosis), mast cells (release heparin to prevent blood clotting) and histamine (that is an important chemical in inflammation and allergic reactions)
- Fibers include: collagenous (thick, contain collagen protein), elastic fibers (contain the protein elastin), and reticular fibers (thin collagenous fibers that are highly branched)

Classification

- Loose connective tissue
- Adipose connective tissue
- Reticular connective tissue
- Dense connective (regular and irregular)
- Elastic connective tissue
- Cartilage (hyaline, elastic, and fibrocartilage)
- Bone

- Blood

Loose connective

- Also known as areolar
- Contains fibroblasts that secrete collagenous and elastic fibers
- Abundant
- Locations; binds skin to underlying organs, fills spaces between muscles

Adipose

- Also known as fat
- Stores fat in adipocytes
- Found beneath skin, in spaces between muscle, behind eyeballs, around organs

Reticular connective

- Forms the stroma (background) of many soft organs
- Contains reticular fibers, and collagenous fibers
- Locations include liver and spleen

Dense Connective

- Dense regular has collagenous fibers in bundles with fibroblasts in rows between bundles

- Examples are tendons (connect muscle to bone) and ligaments (connect bone to bone)

- Dense irregular has randomly arranged collagenous fibers and are found in joint capsules for example

Elastic connective

- Contains yellow, elastic fibers in parallel strands or branching networks

- Found in attachments between vertebrae (ligamenta flava)

- Also found in walls of some hollow organs, heart, and larger airways

Cartilage

- Provides support, frameworks, attachments, protection, and a template for developing bones

- Contains chondroblasts that secrete matrix

  - 3 types of cartilage include:

a. Hyaline cartilage-found at the ends of bones, is the most common type of cartilage, and most of your bones were made from a template made of hyaline cartilage. The lacunae are scattered thorough a smooth matrix. No visible fibers**.**

b. Elastic cartilage-this cartilage makes up the ear. It has lacunae, chondrocytes, chondroblasts, and fibers in the matrix. You may think the lacunae of this one looks like an owl face. I do.!!

c. Fibrocartilage

- Found between vertebrae (intervertebral discs)
- Also found at junction between pelvic bones (symphis pubis)
- Strong, has many collagenous fibers so slides appear very wavy.

Bone

- Most rigid connective tissue because it contains calcium salts
- Microscopically forms an osteon or haversian system
- Protects and supports and helps provide movement (with muscles)
- An osteon contains a central (haversian canal), canaliculi, lamella, lacunae, and osteocytes or osteoblasts. One other type of bone cell is called an osteoclast. This one is responsible for the breaking down of bone.

Blood

- 3 types of cells: red blood cells, white blood cells, and platelets
- Fluid portion is plasma
- Produced in hematopoietic tissue of red bone marrow

3. Muscle Tissue

- Contractile
- 3 types including skeletal, smooth, and cardiac
- Skeletal is voluntary and striated
- Cardiac is found in the heart, is involuntary, striated, and contains intercalated discs
- Smooth is non-striated, is involuntary, and is found in intestines, stomach, urinary bladder, uterus, and blood vessels

4. Nervous Tissue

- Contains specialized cells called neurons
- Are able to sense change in environment and send signals (nerve impulses) to and from the brain
- Have an axon, a cell body, and a dendrite
- Have neuroglia that support and bind the components of the

nervous system, but do not generate nerve impulses

Additional materials in chapter

- **Look for clinical applications boxes throughout chapter**
- **Go to on-line learning center for this textbook.**