**Tissues (Histology)** – Ch. 3
Human Anatomy lecture

## I. Histology – the study of tissues

A. 4 basic tissue types
- ⇒ epithelial
- ⇒ connective
- ⇒ muscle
- ⇒ nervous

B. Usually found in <u>combinations</u> to form organs.

C. As you examine slides, note:
1. cell size, shape, features
2. position of nucleus
3. extracellular material – how much, features

-sketch-

D. Also realize that on most slides, 3-D structures have been sliced to 2-D
→ Fig. 3.1 & 3.2

## II. Epithelial tissues

A. Two major types
1. covering & lining epithelium – our emphasis now
2. glandular epithelium – p. 73
   - ⇒ <u>exo</u>crine – secrete outside body or into lumen (cavity) of an organ
     Ex.: salivary glands
   - ⇒ <u>endo</u>crine – secrete into the bloodstream
     Ex.: thyroid gland

B. Structural features → **KNOW FIG. 3.31**
1. closely packed cells → continuous sheets
2. <u>a</u>vascular
3. attached to adjacent connective tissue (c.t.)
   by <u>basement membrane</u> → <u>a</u>cellular glue

C. Covering and lining epithelia

1. classified based on number of layers– KNOW Fig. 3.3a
   - simple = single
   - stratified =
     ↳"layered"
   - pseudostratified
     ↳"false"
2. classified based on cell shape – KNOW Fig. 3.3b
   - squamous = flat
     ↳"scale"
   - cuboidal
   - columnar
   - transitional

D. Functions

1. protection
2. filtration & diffusion barrier
3. secretion and excretion
4. digestion and absorption

E. *****You're responsible for 5 types (in lab)

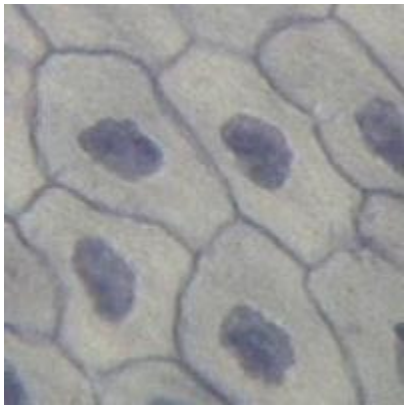
⇒ description and ID
⇒ function
⇒ location

Ex: simple squamous epithelium – Fig. 3.4 (sectioned)
or
http://www.gwc.maricopa.edu/class/bio201/histoprc/prac4q.htm
(whole mount)

-func. – diffusion of $O_2$, $CO_2$, and filtration

-loc. – air sacs of the lungs and in the kidneys

-sketch-



**III. Connective tissues**

A. Structural features

1. widely spaced cells with abundant intercellular material called matrix

2. major cell type is the fibroblast → secretes matrix
   "sprout" or "bud" ↵ ↳ = active, young cell
3. **matrix** contains protein fibers embedded in amorphous **ground substance**
   → 3 protein fiber types:
   - collagen – "ropes"
   - elastic – "rubber bands"
   - reticular – "hairnet"
     "net" ↵
4. highly vascular (except tendons & cartilage)
5. good nerve supply

B. Functions

1. structural — binds, supports, protects, strengthens
2. insulates and cushions
3. transports (blood)
4. energy storage (adipose – "fat")

C. Classified based on fiber type and matrix composition

*you'll learn 6 types in lab

Ex: areolar (loose) connective tissue (Fig. 3.14)

-sketch-

Func. – "all-purpose glue" and packing material

Loc. – beneath skin, in and around most organs

**IV. Epithelial membranes = epithelium + c.t. (areolar)**

A. mucous membranes (mucosa) – **Fig. 3.31**

1. line cavities exposed to the exterior
2. epithelium secretes mucus
3. c.t. layer is called – lamina propria

B. serous membranes (serosa)

1. line cavities not exposed to the outside

2. epithelium forms a bag that secretes and contains only small amounts of watery fluid, **not any organs**
   - designed to lubricate → reduce friction

3. locations
   ⇒ **pleura (2)** – lungs
   ⇒ **pericardium** – heart
   "around"↵ ↳"heart"

   ⇒ **peritoneum** – abdominopelvic cavity

C. Cutaneous membrane = skin

**V. Muscle tissues**

A. Structural features
   -- elongated cells with internal organization allowing contraction

B. Functions
   -voluntary movement
   -posture
   -generate heat

C. Types (p. 72)
   1. skeletal muscle (Fig. 3.25)

-sketch-

- cylindrical, striated (bands), and multinucleate cells (called **fibers)**
- func. – voluntary movement
- loc. – attached to bone or skin

2. cardiac muscle (Fig. 3.26)

-sketch-

- striated, branched cells (**cardiocytes**)
- central nucleus
- func. – pump blood
- loc. – heart wall

3. smooth muscle (Fig. 3.27)

-sketch-

- small, nonstriated cells, called **myocytes** (along with cardiocytes)
- fusiform cells with central nucleus

- func. – move organs contents, change diameter of tubes
- loc. – walls of organs

**VI. Nervous tissue**

A. Not subdivided into types – nervous system organs based on cells rather than tissues

B. Concentrated in brain and spinal cord, but located everywhere to sense & control (= functions)

C. Structural features → two main cell types (Fig. 3.24)

1. neuron (nerve cell)

– typically stellate soma
↳"body"

– short, highly branched **dendrites** → carry information towards soma
"tree" ↵

– long **axon** (nerve fiber) → carries information away from soma

-sketch-

2. neuroglia or glial cells – nervous "c.t." → very small cells
↳ "glue"

**VII. Neuromuscular junction (NMJ)** – (Fig. 10.11a, p. 248)

- shows 2 major tissue types
- shows 2 "fiber" types

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- func.: point at which a nerve cell initiates muscle contraction
- loc.: many in all skeletal muscles