Tissues and Membranes

I. In the Beginning …

a. Egg + sperm →

b. 1 cell divides to make 2, 2 divide to make 4, 4 divide to make 8, and then?

c.

d.

e. Totipotent:
f. Pluripotent:

II. Tissues
a. Tissues are groups of cells that are similar in to each other in structure and function
b. Like the individual tiles arranged as a beautiful floor, cells are placed in various patterns to make different tissues

III. Epithelial Tissue

a.

b. Forms large, continuous sheets

c.

d. Sheets of epithelium also line most of the inner cavities … mouth, respiratory tract, reproductive tract.

e. What does epithelial tissue do?
    i. Primarily concerned with protection, absorption & secretion

    ii. Protection-

    iii. Absorption-

    iv. Secretion-

f. Epithelial Tissue Characteristics
    i. Has two surfaces
        1. Apical surface

        2. The bottom is attached to a basement membrane: a very thin material that anchors the epithelium to the underlying structure

    ii. Has no blood supply _____ - it gets nourishment from blood supply of underlying tissue
    iii.

g. Classifying Epithelial Tissue

    i.

    ii.

h. Has 3 shapes

   i.

   ii.

   iii.

g. Squamous Epithelium

h. Cuboidal Epithelium

i. Columnar Epithelium

j. Layers
   a. Simple

   b. Stratified

k. Shape and number of layers are used to describe the various types of epithelium EX: simple squamous epithelium- single layer of flat cells

l. Simple squamous epithelium
   a. Single layer of flat cells with an underlying basement membrane
   b. They are so thin, they are found where substances move by rapid diffusion or filtration

   c. EX:

m. Simple columnar epithelium

a. Single layer of columnar cells attached to a basement membrane

b. Line the entire digestive tract
c.

n. Pseudostratified ciliated columnar epithelium

a.

b. cells appear multilayered but they are not

c. Cilia:

o. Stratified Epithelium

a. More than one layer

b.

c.

d. Found in tissue exposed to everyday wear and tear – mouth, esophagus, skin

p. Transitional Epithelium

a.

b. They are transitional because the cells slide past one another when the tissue is stretched

c. The cells appear stratified when the urinary bladder is empty (unstretched) and simple when the bladder is full (stretched).

q. Simple Cuboidal Epithelium

a.

b.

r. Glandular epithelium

a. Gland- cells that secrete a particular substance

b. Simple cuboidal epilethium wrapped in a tube

c. Two types of glands
   i. Exocrine
      1. Exocrine glands have ducts into which the exocrine secretions are released before reaching body surfaces or body cavities
      2. EX:

   ii. Endocrine

      1.

      2. Hormones are secreted directly into the blood stream

      3. The blood then carries them to their sites of action

4. EX:

IV. Connective Tissue

a. The most abundant of the 4 tissue types, widely distributed throughout the body
b. Connective tissue connects, or binds together, the parts of the body

c.

d. Although connective tissue types do not resemble each other very closely, they share two characteristics:
    i. Most connective tissue, except ligament, tendons, and cartilage, has a good blood supply
        1. Ligaments, tendons and cartilage have no blood supply which is why these areas take so long to heal when injured

    ii.

e. Extracellular matrix

    i. Extracellular matrix is what makes the various types of connective tissues so different

    ii. Extracellular matrix-

    iii. The cell makes the matrix and then secretes it into the extracellular spaces. In other words, they make the bed that they lie in.

iv. The hardness can vary from cell type to the next

v. The extracellular matrix may be:

1.

2.

3.

vi. The amount of extracellular matrix varies from one cell type to the next.

vii. Also found in the matrix of most connective tissue are protein fibers

viii. Types of fibers-

1.

2.

3.

ix. Collagen Injections
    1. Recently, injections of collagen have been used cosmetically to remove unwanted lines and wrinkles

2.

3.

f. Types of Connective Tissue
    i. Loose
    ii. Adipose
    iii. Dense fibrous connective
    iv. Reticular
    v. Cartilage
    vi. Bone
    vii. Blood

g. Loose connective tissue
    i.
    ii. Made up of fibroblasts and gel-like extracellular matrix
    iii.
    iv. Acts like tissue glue, holding organs in position

h. Adipose
    i.
    ii. A type of loose connective tissue in which the fibroblasts enlarge and store fat
    iii. Forms the tissue layer underlying the skin
    iv.

i. Dense Fibrous Connective Tissue
    i. Composed of fibroblasts and extracellular matrix that contains many collagen and elastic fibers
    ii. The fibroblasts secrete fibers into the extracellular matrix

    iii.

    iv. Tendons-

    v. Ligaments-

        1. Ligaments contain more elastic fibers than tendons do, they stretch more easily
        2.

        3. If the stretching is excessive, tendons and ligaments can tear, causing severe pain and impaired mobility
        4. A ruptured Achilles tendon is a serious injury – it attaches the leg muscles to the heel

j. Reticular Tissue
    i. Characterized by a network of delicately interwoven reticular (fine collagen) fibers
    ii. Forms the internal framework for lymphoid tissue – spleen, lymph nodes & bone marrow

k. Cartilage

    i.

ii. The chondrocytes secrete a protein extracellular matrix that is firm, smooth & flexible.

iii.

iv. Three types of cartilage:

1. Hyaline-

a. Hyaline is also found in the fetal skeleton. As the fetal matures, the cartilage ossifies, or is converted to bone.

2. Elastic – found in the ear

3. Fibrocartilage-

l. Bone

i.

ii.

iii. Osteocytes secrete an extracellular matrix that includes collagen, calcium, salts, minerals which make the bone hard.

iv.

v. The hardness helps support the weight of the body for standing and moving
vi. The bone also acts like a storage site for mineral salts, especially calcium and phosphorus
vii. When this mineralization of bone tissue is diminished, as in osteoporosis, the bone is weakened and tends to break easily.

viii.

ix. Calcium is needed throughout the life cycle, but is especially important during childhood, when bones are growing, and after menopause, when estrogen levels in women decline.

x.

m. Blood
   i. Blood is a unique type of connective tissue

   ii.

   iii. Plasma contains fibrous plasma proteins that re not seen unless clots form

   iv. Blood-

n. Nervous Tissue

   i.

ii. Consists of 2 types of cells:

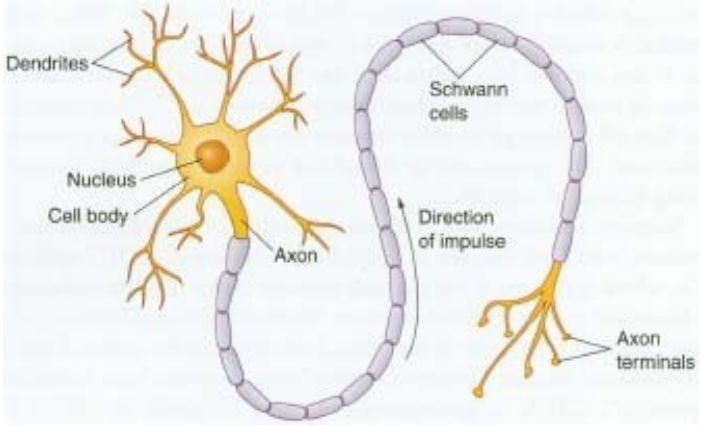
iii. Neurons-

iv. The neuron has 3 parts-

1. Dendrites-

2. Cell body-

3. Axon-



o. Muscle Tissue

i.

ii.

iii. Because the cells are long and slender, they are called fibers rather than cells

iv. Three types of muscle-

v. Skeletal muscle

1.

2. Voluntary

3.

4.

5. Skeletal muscle move the skeleton, maintain posture, stabilize joints

vi. Smooth Muscle

1. Found in the walls of the viscera (organs), such as stomach, intestines, and bladder
2. Also found in tubes, such as bronchioles (breathing passages) and blood vessels

3.

4.

vii. Cardiac Muscle

1.

2.

3.

4. Has intercalated disks so cells can communicate with each other efficiently

V. Tissue Repair

a.

b. Two ways:

i.

ii.

c. Regeneration:

d.

e. Fibrosis:

f. The fibers of scar tissue pull the edges of wound together and strengthen the area

g. Damaged skeletal muscle, cardiac muscle, and nervous tissue do not undergo mitosis and must be replaced by scar tissue.

VI. Membranes

a. Membranes are thin sheets of tissues that cover surfaces, line body cavities, surround organs

b. Cutaneous membrane-

c. Mucus membrane-

i. Include digestive, urinary, reproductive, respiratory tracts

ii.

d. Serous membranes-

i. They secrete a thin, watery fluid that allows membranes to slide past one another with little friction

ii. Three serous membranes

1. pleura-

2. pericardium-

3. peritoneum-