

The Morphology and Function of Tissue Types

Name: _____

Date: _____

Introduction: Histology is often a very difficult topic for students. You are expected to understand the morphology and function of various tissue types, and be able to identify these tissue types in a drawing or a prepared slide.

Part 1: Flash Cards

You will be given a “flash card” with information about a specific tissue type on it. Cards are clearly labeled. You must find the other members that have information about your specific tissue type.

A complete group of 3 will include cards on:

1. Type of tissue and morphology
2. Appearance of real cells (image)
3. Location/Function of tissue

Once your members “find” each other be prepared to tell the class why your cards go together and identify one cell by circling it on the image.

Part 2: Microscope Slides and Internet

Follow the instructions for making a lab drawing and based on your observations of slides under the microscope and on the websites, draw simple, accurate diagrams that illustrate the features of the 8 tissue types (see list below). Write your name clearly on the top of each paper. Be sure to clearly title the slide/tissue type and point out unique features of that cell or tissue type. In general, each diagram should be large enough to take up half a sheet of paper; all drawings should be done at high power (400x).

Drawings to hand in:

- ✓ One type of simple epithelium.
- ✓ One other type (not simple) epithelium.
- ✓ Compact bone.
- ✓ One type of cartilage.
- ✓ One other kind of connective tissue.
- ✓ All three types of muscle tissue.

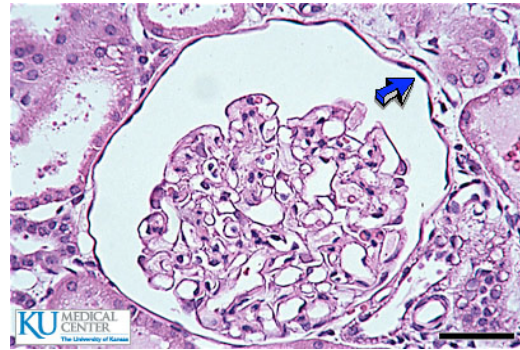
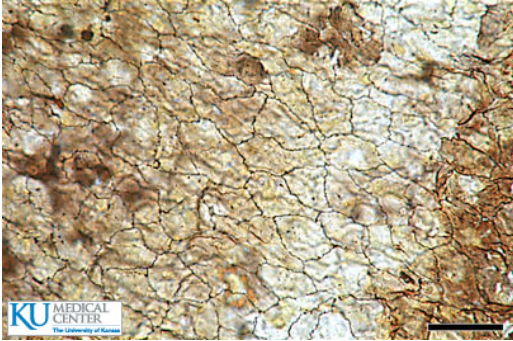
Types of tissues that we have available include:
Simple squamous epithelium, Simple cuboidal epithelium, Simple columnar epithelium, Pseudostratified epithelium (w/ cilia), Stratified squamous epithelium, Transitional epithelium, Dense connective tissue, loose (areolar) connective tissue, Adipose tissue, Cartilage, Bone, Blood, Skeletal muscle, Smooth Muscle, Cardiac Muscle, Nervous

Type: Simple squamous epithelium

Morphology:

- Cells are in one layer
- Cells are in close contact with one another
- Cells have a squashed appearance
- Covers a surface, but has one “face” exposed

Appearance of real cells



(2 different views of same cell type: L: view of exposed face R: cross section of same type of cells pointed out with arrow)

<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/epithel/epithel.htm>

Location/ Function

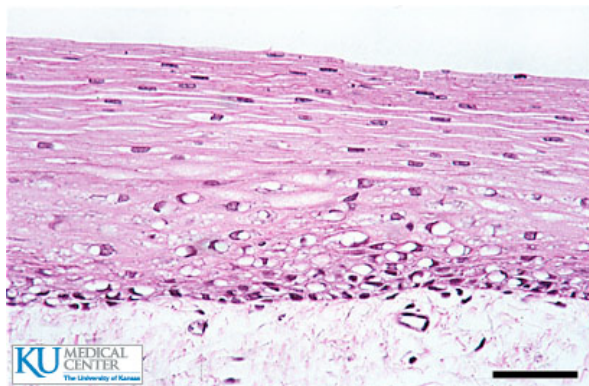
Lungs (alveoli)	Allow oxygen and carbon dioxide to <u>exchange</u> between blood and inhaled air
Capillary endothelium (the inside lining of smallest blood vessel)	Allows waste and nutrients to <u>pass</u> between body cells and circulatory system
Bowman's capsule (part of the Kidney)	Allow waste products to be <u>filtered</u> out of the blood at this kidney location

Type: Stratified squamous epithelium

Morphology:

- Made of many layers of cells
- Cells are in close contact with one another
- Cells have a squashed appearance on the upper layers but appear less flattened at lower layers where formed by mitosis
- Covers a surface, but has one “face” exposed

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/epithel/epithel.htm>

Location/ Function

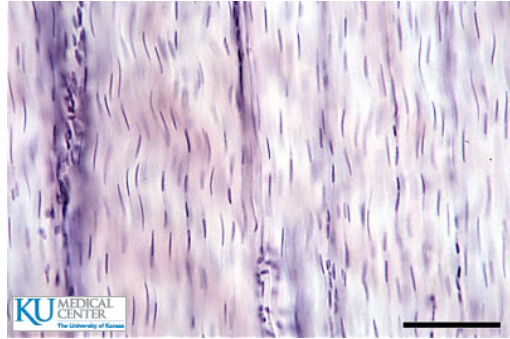
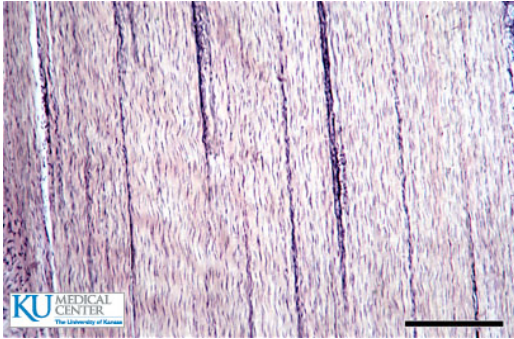
Oral cavity/ lips/ pharynx /esophagus	Lines the digestive system providing a <u>protective</u> surface against abrasion of food moving through
Skin (also has a layer of keratin)	Provides a <u>protective</u> barrier against friction, abrasion and pathogens (bacteria and virus)

Type: Dense fibrous connective tissue

Morphology:

- Cells are arranged in rows and embedded in a non living matrix of fibers
- Wavy fibers of collagen and elastin are present outside the cell
- Fibers are tightly packed parallel in a regular arrangement

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/ct/ct.htm>

Location/ Function

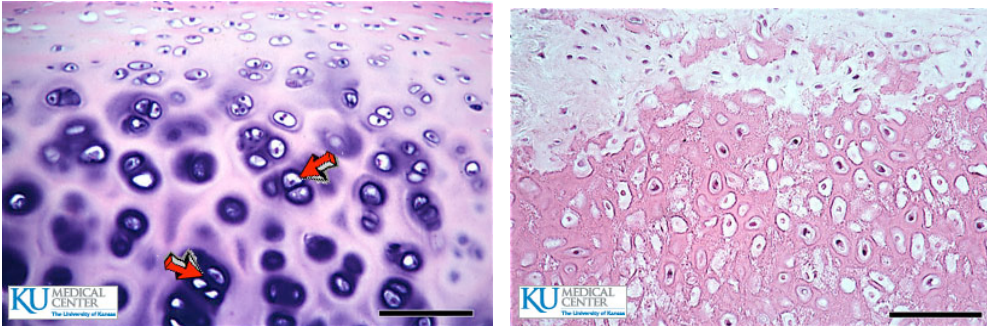
Ligaments	<u>Anchors</u> bone to bone to <u>stabilize</u> motion.
Tendons	<u>Anchors</u> skeletal muscle to bone to allow for movement

Type: Cartilage tissue

Morphology:

- Cells are arranged in an irregular pattern and embedded in a non living gel like matrix
- Cells have a rounded shape
- Have visible nucleus and are embedded in the gel in spaces called lacunae
- Cells do not have a direct blood supply

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/cart/cart.htm>

Location/ Function

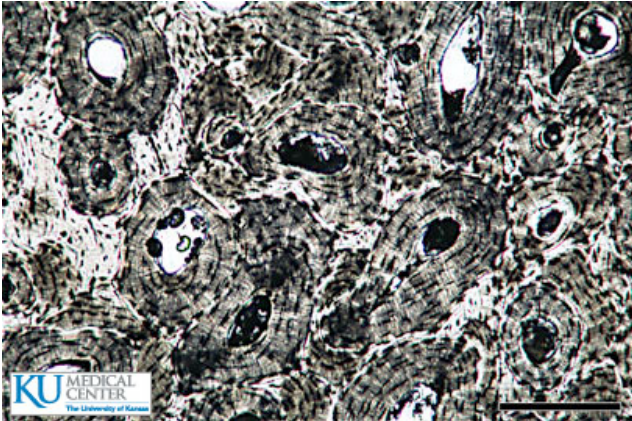
Knee joint	<u>Supports</u> weight of body and in places like the knee can <u>absorb shock</u> and <u>reduce friction</u>
Ends of ribs	<u>Protects</u> vital internal organs, but is also flexible giving the rib cage <u>flexible support</u>
Fetal skeleton	Provides <u>framework</u> for bone growth

Type: Bone

Morphology:

- Cells form in concentric layers of rings around nutrient supply canals
- Cells are embedded in a solid matrix in spaces called lacunae
- Cells are sometimes spider shaped or round with short extensions

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/bone/bone.htm>

Location/ Function

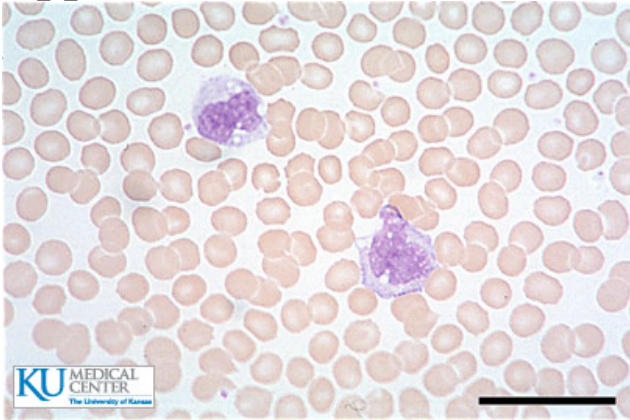
Cranium	<u>Protects</u> brain from injury
Epiphyseal plate or Growth plate	Location where cells multiply to allow for <u>growth</u> of the skeleton
Pelvis	Contains marrow where new <u>blood cells are generated</u>

Type: Blood

Morphology:

- Cells float in a fluid matrix of water and nutrients
- By volume over 90% of blood cells:
 - have no nucleus
 - are shaped like a deflated jelly donut
 - appear red
- The remaining 10% of blood cells are larger with a grainy inside appearance that often looks purple under the microscope, and can move by endocytosis

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/blood/blood.htm>

Location/ Function

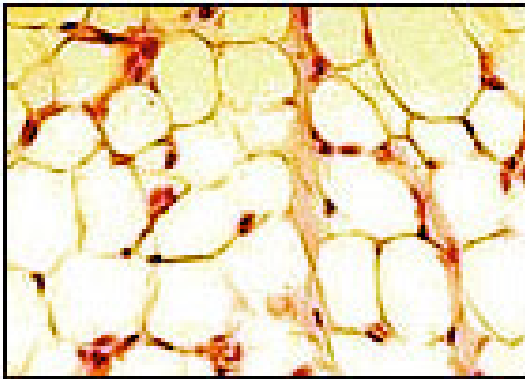
In vessels of human body	<u>Transports</u> substances like oxygen, carbon dioxide and waste products
In lymph nodes	<u>Fights infection</u> by engulfing bacteria and viruses

Type: Adipose tissue (Fat)

Morphology:

- Cells are often tightly packed
- Cells are filled with a lipid (fat) and appear “blob shaped”
- Nucleus and other organelles are pushed aside because the cell is filled with lipid
- Lipid does not appear dark when stained and viewed under microscope.

Appearance of real cells



http://en.wikipedia.org/wiki/File:Illu_connective_tissues_1.jpg

Location/ Function

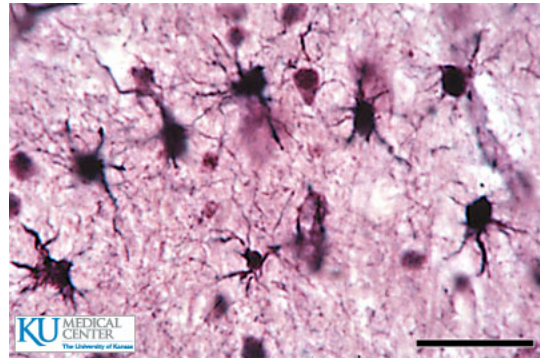
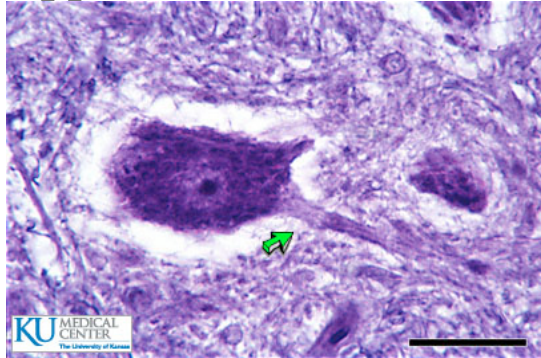
Under the surface of the skin	<u>Insulation</u> , maintains temperature <u>Storage</u> for fat
Surrounding organs in abdomen	<u>Protects</u> organs from impact <u>Insulates</u> , maintains temperature

Type: Nervous tissue

Morphology:

- Interconnected web of cells
- Vary in shape, but “typical” looking cells have a long thin arm attached to the cell body with nucleus and are able to conduct a charge long their length
- Maintain a difference in the charge (polarity) inside and outside the cell

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/nervous/nervous.htm>
<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/nervous/nervous.htm>

Location/ Function

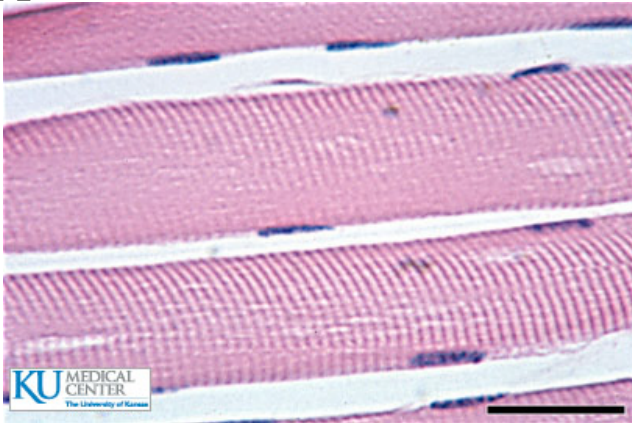
Attaching spinal cord to skeletal muscle	<u>Responds</u> to changes in the external environment quickly
Throughout the body	<u>Conducts</u> impulses both voluntary and involuntary all around the body
Brain	<u>Coordinates</u> and <u>integrates</u> body activity, to maintain homeostasis

Type: Skeletal Muscle

Morphology:

- Elongated cells
- Each cell contains many nuclei, pushed to the outside of the cell
- Found attached to bone tissue
- Striated (light/dark striped appearance)
- Cells arranged in bundles side by side

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/muscular/muscular.htm>

Location/ Function

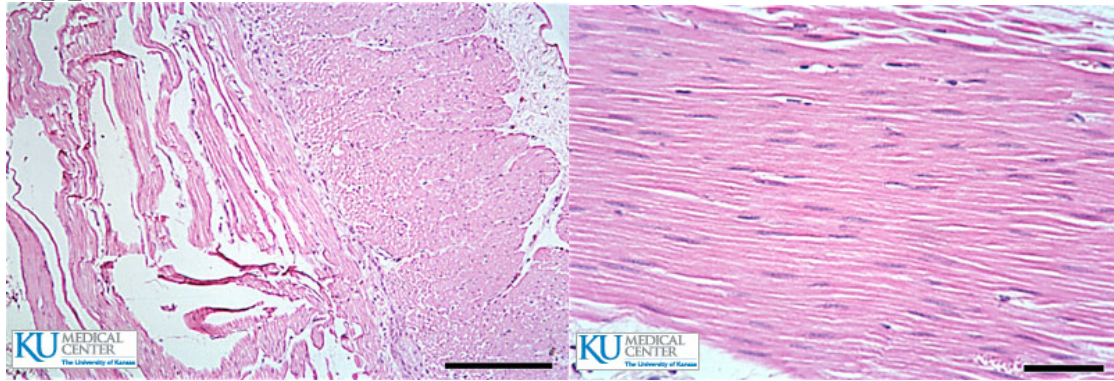
Attaching shoulder to elbow	<u>Movement</u> of lower arm
Abdominal region, under the epithelial and adipose layer	<u>Contraction</u> or shortening of muscles during twisting and bending

Type: Smooth Muscle

Morphology:

- Long thin cells with nuclei embedded in center of cell
- Cells run parallel in the same layer, but can overlap
- Often tissue layers arranged so that cells run latitudinal and longitudinal around the same organ

Appearance of real cells



L: shows arrangement of two layers of the same tissue type R: shows closer view of one layer of cells

Location/ Function

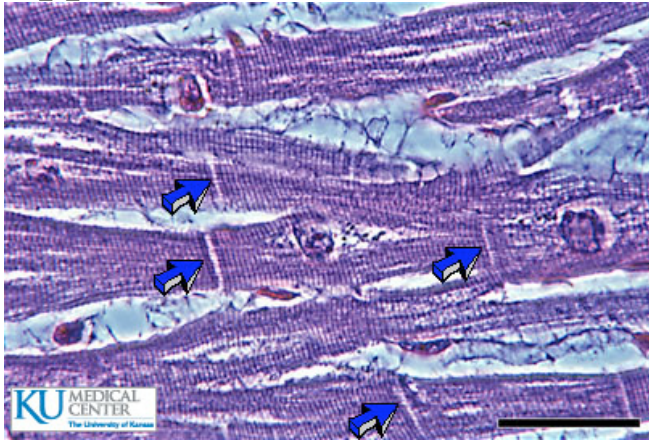
Wrapping blood vessels	Allows for <u>movement</u> of blood through the arteries
Along all the organs of the digestive system	Cells <u>contract</u> in a wave-like fashion to push food through the digestive system's hollow tube that runs from mouth to anus.

Type: Cardiac Muscle

Morphology:

- Has striations (light/dark stripes)
- Branching pattern of cells (cells often Y or V or W shaped)
- Cells separated by intercalated discs (flat surface of one cell contacts flat surface of the next cell)
- Has a central nuclei

Appearance of real cells



<http://www.kumc.edu/instruction/medicine/anatomy/histoweb/muscular/muscular.htm>

Location/ Function

Heart	Contracts and relaxes to allow blood to enter and leave the chambers of the heart. Also pushes blood through the arteries of the heart.
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