

Things to Know for Chapter 4 – Tissues

INTRODUCTION

To prepare tissue for the microscope the samples have to be fixed and stained.

Fixing – prepares the samples but also make them not quite life-like in Appearance.

Staining – chemicals are added that bond to specific chemicals in the cell – This causes certain organelles to show up as different colors. But, Again, they don't look like they did when they were alive.

Tissues – definition – made of a group of cells and their matrix that are similar And that work together to perform a task.

PART I: EPITHELIAL TISSUE

Epithelial – covers the body (inside and outside – lines tracts)

Functions includes: protection, absorption, excretion, secretion,, filtration, sensory.

Characteristics of all epithelial tissue include:

Polarity – apical = top and basal = bottom of the cell.

Apical often has microvilli, or even cilia

Basal lies on top of “basal lamina”, which lies on top of CT

Avascular

Innervated

Regeneration – high capacity for regeneration. Especially skin.

Classification of epithelia:

Size – two kinds

Simple – one cell thick, looks like a string of fish head-to-tail

Stratified – more than one cell thick.

Shape – 3 kinds:

Squamous – flat

Cuboidal – more or less honey-comb shaped

Columnar – long. Look for an elongated nucleus.

Names of epithelial tissue:

Two-word name.

Put the size with the shape, e.g. “simple cuboidal”

Add “Epithelium” at the end, e.g. “simple cuboidal epithelium”.

There are 6 possibilities.

And there is a 7th, an oddball, called “transitional epithelium”.

It can change its shape and is found in the urinary bladder.

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The kinds of epithelial tissues:

Simple Squamous Epithelium:

Flat, thin, permeable. Used for filtration or material exchange.
Found in kidneys, in air sacs of lungs.

Simple Cuboidal Epithelium:

Looks like a string of beads. They are often in circle of half a dozen or so cells. Wall of many ductless glands.

Simple Columnar Epithelium:

Single layer of tall cells. Associated with absorption or excretion.
Lines most of the digestive tract.

Apical surfaces usually lined with microvilli.

Goblet cells, secrete mucus, associated with simple columnar.

Stratified Squamous Epithelium:

Most common of the stratified.

External part of the skin, and contains keratin.

Deeper layers of the skin are cuboidal.

Stratified Cuboidal – rare, specialized, don't try to identify on slides!

Stratified columnar – rare, specialized, don't try to identify on slides!

Glands: secretes a product, which is called a secretion. Usually epithelial tissue.

Endocrine vs exocrine:

Endocrine, AKA ductless glands, produce mostly hormones, and secrete them into the bloodstream or lymph, inside the body.

Exocrine glands, secrete their products onto the skin, outside of the body, through ducts. E.g. mucus, sweat, oil, etc.

Gland can also be classified according to how they are shaped but don't learn that for now.

Glands can also be classified according to how they work:

Merocrine, most common, they glands are not changed.

Holocrine – the glands must shatter (and die) to give up their secretion.

Apocrine – don't learn, possibly not in humans, the surface breaks off but then reforms.

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PART II: CONENCTIVE TISSUES

Four basic kinds: CT, Cartilage, Bone and Blood

Functions – extremely diverse and include binding, support, protection, insulation, and transport.

Common Origin – all CT types come from the same kind of embryonic tissue.

Vascularity – CT's can be from almost avascular all the way to blood itself.

Extracellular Matrix – nonliving, outside the cell, made of fluids + fibers.

Makeup of CT then is cells, fibers, and the “ground substance”. Typical format is areolar tissue; all others are variations of it.

Ground Substance – various fluids, sugars, and proteins, e.g. chondroitin. Usually fluid or a gel.

Fibers – provide support. Several kinds:

Collagen fibers – most abundant, strongest (stronger than steel), “white fibers”,

Elastic fibers – elastin, returns CT to its original shape, “yellow fibers”

Cells – XXX-blasts are the budding, undifferentiated cells,

XXX-cytes are the mature cells.

Examples of blasts are fibroblasts (make CT), chondroblasts (make cartilage) and Osteoblasts (make bone).

Blood cell “blasts” are different as they are not found in the blood, and are mitotic for all of their life.

XXX-Cytes, include osteocytes (common), chondrocytes, and fibrocytes. (uncommon).

Also there are odd cells – WBC's, fat cells, etc. – all different kinds of CT

KINDS OF CONNECTIVE TISSUE

Four Categories: Connective Tissue Proper, Cartilage, Bone, Blood

1. Connective Tissue Proper (AKA just “CT”)

Two subcategories – loose CT and dense CT

1A. Loose CT can be further subdivided into areolar and adipose

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Areolar CT – wraps organs, provide support and protects against infection. Lots of WBC's. Loose, lots of empty space. Holds lot of moisture. Know about edema.

Adipose CT – fat tissue. Looks like chicken wire. 18-50% of a person's weight.

1B Dense CT – dense and elastic. Most CT's are dense CT's *except* bone, cartilage and blood.

Dense CT – AKA "Fibrous CT". Lots of collagen. Very strong. Tendons and other similar structures.

2. Cartilage – sort of like Dense CT, and sort of like Bone. No nerves, avascular. Lots of chondroitin in the ground matrix. Lots of water. Cells are scarce and are found in little pits or holes – lacunae.

3. Bone AKA osseous tissue.

Very hard. Very similar to cartilage, but also has calcium salts.

Osteoblasts make the matrix and add the salts.

Osteocytes live in the lacunae, just like in cartilage.

Has good supply of blood vessels.

4. Blood. – an unusual CT

Matrix is called "plasma"

Instead of fibers, it has soluble protein molecules that can form clots.

Cells – RBC's, AKA erythrocytes.

WBC's, include lymphocytes, monocytes, eosinophils, basophils.

PART III – Nervous Tissue

AKA Neurons,

Highly branching cells with dendrons and axons.

More about them later, chapter 11

PART IV: MUSCLE TISSUE

Three basic different kinds. We will get into that in much more detail later in the semester!