Histology Cheat Sheet

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Epithelia Tissue

Avascular; innervated

Forms boundaries

Polarity

Specialized contacts

Supported by connective tissue

Can regenerate

Simple Squamous

Cells flattened laterally

Cytoplasm is sparse

Function where rapid diffusion is priority

Secretes lubricating substances in serosae

FOUND IN: kidney; lungs; lining of heart; lymphatic vessels

Simple Cuboidal Epithelia

Single layer of cells

For secretion and absorption

Forms walls of smallest ducts of glands

FOUND IN: kidney tubules and ovary surface

Simple Columnar Epithelium

Single layer of tall, closely packed cells

Absorption; secretion of mucus, enzymes

FOUND IN: most of digestive tract, excretory ducts, uterine tubes

Pseudostratified Columnar Epithelium

Cells vary in height; some don't reach surface

May contain mucus-secreting cells and bear cilia

Secretes substances (mucus) & propulsion of mucus by cilia

FOUND IN: ducts of large glands; trachea

Stratified Squamous Epithelia

Most widespread of stratified epithelia

Free surface squamous, deeper layers cuboidal or columnar

Located for wear and tear

Farthest from basal layer (nutrients) less viable

Forms epidermis of skin, moist linings of esophagus

Stratified Cuboidal Epithelia

Very rare

Found in some sweat and mammary glands

Typically two cell layers thick

Stratified Columnar Epithelia

Limited distribution in body

Only apical layer is columnar

FOUND IN: some glandular ducts; transition areas between other epithelia

Transitional Epthelia

Forms lining of hollow urinary organs

Basal layer is cuboidal or columnar

Ability to change shape with stretch

Apical cells vary in appearance

Glandular Epithelia

One or more cells that makes and secretes a fluid called secretion

Classified by site of product release and relative # of cells forming gland

Glands

Endocrine Glands	Exocrine Glands
*Ductless; secretions not released into a duct	Secretions released onto body surfaces or cavities
Secretes hormones by excocytosis	More numerous than endocrine
Hormones travel through blood or lymph to target organ	Secrets into ducts

Unicellular Exocrine Glands

Mucous cells and Goblet cells

Found in epithelial lining of intestinal and respiratory tracts

All produce *mucin* (dissolves in water to form mucus)

Multicellular Exocrine Glands

Merocrine Gland	Apocrine Gland	Holocrine Gland
Produce secretion, but gland is not damaged	Bud secretions off through vesicles	Secretions destroy cell
Most common type; Secretes products as produced	Only apex ruptures	Accumu-lates product then ruptures

Composed of a duct and secretory unit; usually surrounded by supported connective tissue

Connective Tissue

Most abundant of primary tissues	Has mesenchyme
Binding and support	Varying degrees of vascularity
Protecting	Has extrac-ellular matrix
Insulating	
Storing reserve fuel	
Transporting substances	

Connective Tissue Fibers

Collagen	Elastic	Reticular

Connective Tissue Fibers (cont)

Strongest; most abundant	Networks of elastin fibers	Highly branched collag-enous fibers
Tough provides tensile strength		

Cells in Connective Tissue

"Blast" cells are *immature form; mitotically active; secrete ground substances and fibers*
Fibroblasts *in connective tissue proper*
Chondroblasts *in cartilage*
Osteoblasts *in bone*
Hematopoietic stem cells *in bone marrow*
"Cyte" cells are *mature form; maintain matrix*
Chondrocytes *in cartilage*
Osteocytes *in bone*

Other Cell Types in Connective Tissue

Fat Cells *store nutrients*
White Blood Cells *Tissue response to injury*
Mast Cells *Initiate local inflam-matory response against foreign bodies*

Other Cell Types in Connective Tissue (cont)

Macrophages *Phagocytic cells that "eat" dead cells, microorganisms; immune system*

Connective Tissue Proper

Loose Connective Tissue	Dense Connective Tissue
Areolar	Dense Regular
Adipose	Dense Irregular
Reticular	Elastic

All connective tissue except bone, cartilage, and blood

Areolar Connective Tissue

Support and bind other tissues
Most widely distributed
Provides reservoir of water and salts
Defend against infection
Store nutrients as fat
Has fibroblasts
Loose arrangement of fibers
When inflamed it soaks up fluid → edema

Adipose Tissue

White Fat	Brown Fat
Cell is *adipo-cyte*	Use lipid fuels to heat bloodstream
Scanty matrix	Does not use ATP

Adipose Tissue (cont)

Richly vascul-arized	Found mosty in infants
Shock absorption, insulation, energy storage	

Reticular Connective Tissue

Resembles areolar but fibers are reticular fibers
Fibroblasts called *reticular cells*
Supports free blood cells in lymph nodes, spleen, and bone marrow

Dense Regular Connective Tissue

Closely packed bundles of collagen fibers; runs parallel to direction of pull
Fibroblasts manufacture fibers and ground substance
Few Cells
Poorly vascularized

Dense Irregular Connective Tissue

Same elements but bundles of collagen are thicker and irregularly arranged
Resists tension from many directions
Provides structural strength

Elastic Connective Tissue

Some ligaments very elastic (ones connecting adjacent vertebrae)
Allows recoil after stretching
Found in walls of large arteries

Cartilage

⊗ Contains chondroblasts and chondrocytes
⊗ Tough yet flexible
⊗ Lacks nerve fibers
⊗ Up to 80% water so it can rebound after compression
★ **Avascular** so receives nutrients from membrane surrounding it (*perichondruim*)

Types of Cartilage

Hyaline	Elastic	Fibroca-rtilage
Amorphous but firm matrix	Elastic fibers in matrix	Matrix less firm than hyaline
Supports and reinforces	Maintains shape of structure	Thick collagen fibers dominate
Resilient cushion	Allows great flexibility	Absorbs compre-ssive shock
Resists compre-ssion	Supports external ear	Discs of knee joint
Costal cartilage of ribs		

Bone

- aka *osseous tissue*
- Supports and protects body structures
- Stores fat and synthesizes blood cells in cavities
- More collagen than cartilage
- Has inorganic calcuim salts
- Osteoblasts product matrix
- Osteocytes maintain matrix
- Osteons are structural units
- Richly vascularized

*Cartilage **DOES NOT** turn into bone*

Blood

- Most atypical connective tissue--is a fluid
- Red blood cells most common cell type
- Also contains white blood cells and platelets
- Fibers are soluble proteins that precipitate during blood clotting
- Functions in transport

Muscle Tissue

Highly vascularized

Responsible for most types of movement

Skeletal Muscle

Found in skeletal muscle

Voluntary movement

Long, cylindrical, multinucleate cells; has striations

Cardiac Muscle

Found in walls of heart

Involuntary control

Branching, striated, generally uninucleate cells

Contains intercalated discs

Smooth Muscle

Spindle-shaped cells with central nuclei

No striations

Cells arranged closely to form cheets

Involuntary control; propels substances along passageway

Found mostly in walls of hollow organs

Nervous Tissue

Main component of nervous system

Transmit electrical signals from sensory receptors to effectors

Neurons

Specialized nerve cells that generate and conduct nerve impulses

Branching cells

Located in brain, spinal cord, and nerves

Neuroglia

Supporting cells that support, insulate, and protect neurons

Covering and Lining Membranes

Cutaneous	Mucous	Serous
Skin	Mucosa indicates location; not composition	*Serosae* found in ventral cavity
Dry Membrane	All called *mucosae*	Parietal serosae line internal body cavity walls
Keratinized strat. squamous attached to thick layer of connective tissue (dermis)	Moist membrane bathed by secretions	Visceral serosae cover internal organs
	May secrete mucus	Serous fluid between layers

Covering and Lining Membranes (cont)

Epithelial sheet lies over layer of connective tissue called **lamina propria**	Moist membranes
	Mesothelium rests on thin areolar connective tissue

Composed of at least two primary tissue types

- Epithelium bound to underlying connective tissue proper
- Are simple organs