

ACTIVITY 2: HISTOLOGY AND INTEGUMENT

Objectives:

- 1) How to get ready: Read Chapter 4 and 5, **McKinley et al., Human Anatomy, 5e**. All text references are for this textbook.
- 2) **Identify each tissue (26 tissues) in a histology photo or microscope slide.**
- 3) **Sketch each tissue in the space provided.**
- 4) **Identify the features of the integument (skin) on a slide and/or model.**
- 5) Before next class: Preview axial skeleton terms lists from SLCC Anatomy Laboratory website or your printed laboratory manual and your textbook.

★ EPITHELIAL TISSUES: Note the following features on each tissue.

Cell Shapes:

- squamous
- cuboidal
- columnar

Number of Layers:

- simple
- stratified
- pseudostratified

Identify:

- each tissue as an epithelium
- specific type/name of tissue
- shape of cells
- number of cell layers
- specific body location of each tissue
- specialized structures, when relevant
- basement membrane, basal surface, apical surface

TABLE 1. TYPES OF EPITHELIAL TISSUES (**10 tissues to identify**)

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
<input type="checkbox"/> simple squamous epithelium	location: air sacs in lungs (alveoli), lining blood vessels, serous membranes of body cavities structure: single layer of flat cells resembling floor tiles, with a single nucleus in the center of each <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface function: rapid diffusion, filtration, and some secretion	p. 86, table 4.2a; described: pp. 84-85
stratified squamous epithelium <input type="checkbox"/> keratinized <input type="checkbox"/> non-keratinized	location: lining oral cavity, esophagus, vagina, and anus (non-keratinized); epidermis of skin (keratinized) structure: multiple layers of cells; apical cells squamous; surface cells are alive in non-keratinized; surface cells in keratinized are dead and filled with the protein keratin <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface function: protection of underlying tissue	p. 89 table 4.3a, b; described: pp. 88-91

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
<input type="checkbox"/> simple cuboidal epithelium	location: lining kidney tubules; ducts of most glands structure: single layer of cells as tall as they are wide; spherical, centrally located nucleus <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <input type="checkbox"/> lumen function: absorption and secretion	<p>p. 86 table 4.2b; described: p. 85</p>
<input type="checkbox"/> stratified cuboidal epithelium	location: large ducts in most exocrine glands structure: two or more layers of cells; cells at apical surface are cuboidal <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface function: protection and secretion	<p>p. 90 table 4.3c; described: p. 91</p>
simple columnar epithelium <input type="checkbox"/> ciliated <input type="checkbox"/> non-ciliated	location: lining of most of the digestive tract (non-ciliated); lining of uterine tubes (ciliated) structure: single layer of tall, narrow cells; oval shaped nucleus in the basal region of cells <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <input type="checkbox"/> goblet cells <input type="checkbox"/> cilia (when present) function: absorption and secretion (non-ciliated); secretion of mucin and movement of mucus along apical surface of epithelium by action of cilia (ciliated)	<p>p. 87 table 4.2c, d; described: pp. 85,88</p>
<input type="checkbox"/> stratified columnar epithelium	location: rare, found in large ducts of some exocrine glands and in some regions of the male urethra structure: two or more layers of cells; cells at the apical surface are columnar <input type="checkbox"/> basement membrane <input type="checkbox"/> basal surface <input type="checkbox"/> apical surface function: protection and secretion	<p>p. 90 table 4.3d; described: p. 91</p>

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
<input type="checkbox"/> pseudostratified columnar epithelium	<p>location: ciliated form lines most of the respiratory tract</p> <p>structure: single layer of cells with varying heights that appear multi-layered; all cells connect to the basement membrane but not all cells reach the apical surface</p> <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <input type="checkbox"/> cilia <input type="checkbox"/> goblet cells <p>function: protection; ciliated form also involved with secretion of mucin and movement of mucus across surface with ciliary action</p>	<p>p. 88 table 4.2e; described: p. 88</p>
<input type="checkbox"/> transitional epithelium	<p>location: lining of urinary bladder, ureters, and part of urethra</p> <p>structure: appearance varies, depending on whether the tissue is stretched or relaxed; shape of cells on the apical surface changes from flat to domed</p> <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <p>function: distention and relaxation to accommodate urine volume changes in the bladder, ureters, and urethra</p>	<p>p. 91 table 4.3e; described: p. 91</p>

CONNECTIVE TISSUES

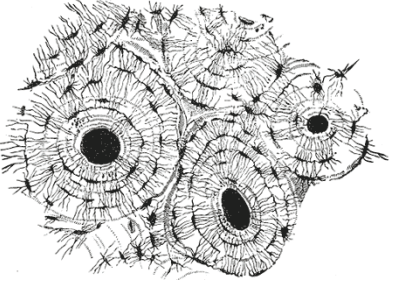
★ Identify on each slide:

- **each tissue as a** connective tissue
- **each tissue as** fluid connective tissue vs. connective tissue proper vs. supporting connective tissue
- **for connective tissue proper: identify** loose vs. dense connective tissues
- **specific name of each connective tissue**
- cells, fibers, ground substance or matrix
- **any relevant special structures**

TABLE 2. TYPES OF CONNECTIVE TISSUE (12 tissues to identify)

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
FLUID CONNECTIVE TISSUE (1 tissue)		
<input type="checkbox"/> blood	<p>location: within blood vessels (arteries, veins, and capillaries), and the heart</p> <p>structure: contains</p> <ul style="list-style-type: none"> <input type="checkbox"/> erythrocytes <input type="checkbox"/> leukocytes <input type="checkbox"/> platelets (thrombocytes) <input type="checkbox"/> plasma (matrix) <p>function: erythrocytes transport gases, leukocytes control immune response, platelets initiate blood clotting; plasma transports nutrients, wastes, and hormones throughout the body, and contains clotting elements to stop blood loss</p>	<p>p. 108, table 4.11; described: p. 105</p>
CONNECTIVE TISSUES PROPER: includes the LOOSE CONNECTIVE TISSUES and the DENSE CONNECTIVE TISSUES		
LOOSE CONNECTIVE TISSUES (3 tissues): generally have a loose association of fibers in extracellular matrix		
<input type="checkbox"/> areolar connective tissue	<p>location: subcutaneous layer; surrounding organs</p> <p>structure: vascular, matrix is gel-like with</p> <ul style="list-style-type: none"> <input type="checkbox"/> fibroblasts <input type="checkbox"/> collagen fibers <input type="checkbox"/> elastic fibers <input type="checkbox"/> ground substance <p>function: surrounds and protects tissues and organs; loosely binds epithelium to deeper tissues; provides nerve and blood vessel packing</p>	<p>p. 102 table 4.7a; described: p. 100</p>

LOOSE CONNECTIVE TISSUES, continued		
<input type="checkbox"/> reticular connective tissue	location: forms stroma of lymph nodes, spleen, thymus, and bone marrow structure: ground substance is gel-like liquid; scattered arrangement of <ul style="list-style-type: none"> <input type="checkbox"/> reticular fibers <input type="checkbox"/> extracellular matrix function: provides supportive framework for spleen, lymph nodes, thymus, and bone marrow	<p>p. 103 table 4.7c; described: p. 101</p>
<input type="checkbox"/> adipose connective tissue	location: subcutaneous layer; covers and surrounds some organs structure: closely packed <ul style="list-style-type: none"> <input type="checkbox"/> adipocytes, with nucleus squeezed to one side <input type="checkbox"/> lipid vacuole (fat droplet) function: stores energy; protects, cushions, and insulates	<p>p. 102 table 4.7b; described: p. 100</p>
DENSE CONNECTIVE TISSUES (3 tissues): generally have a dense association of fibers in the extracellular matrix		
<input type="checkbox"/> dense regular connective tissue	location: forms tendons, most ligaments structure: <ul style="list-style-type: none"> <input type="checkbox"/> collagen fibers (densely packed, parallel) <input type="checkbox"/> fibroblast nuclei <input type="checkbox"/> ground substance (scarce) function: attaches muscle to bone and bone to bone; resists stress applied in one direction	<p>p. 104 table 4.8a; described: p. 101</p>
<input type="checkbox"/> elastic connective tissue	location: walls of elastic arteries; trachea; bronchial tubes; true vocal cords; suspensory ligaments of penis structure: <ul style="list-style-type: none"> <input type="checkbox"/> elastic fibers (parallel) <input type="checkbox"/> fibroblast nuclei <input type="checkbox"/> ground substance function: allows stretching of some organs	<p>p. 105 table 4.8c; described: p. 101</p>
<input type="checkbox"/> dense irregular connective tissue	location: dermis; periosteum covering bone; perichondrium covering cartilage, organ capsules structure: <ul style="list-style-type: none"> <input type="checkbox"/> collagen fibers (bundled; randomly arranged) <input type="checkbox"/> fibroblasts <input type="checkbox"/> ground substance (more than in dense regular connective tissue) function: withstands stresses in all directions; durable	<p>p. 104 table 4.8b; described: p. 101</p>

SUPPORTING CONNECTIVE TISSUES: includes bone tissue and 3 cartilage tissues		
BONE OR OSSEOUS TISSUE (1 tissue)		
<input type="checkbox"/> compact bone	<p>location: exterior of bones of the body structure: calcified matrix arranged in</p> <ul style="list-style-type: none"> <input type="checkbox"/> osteons <input type="checkbox"/> osteocytes in lacunae <input type="checkbox"/> lamellae (concentric) <input type="checkbox"/> central canal <input type="checkbox"/> canaliculi <p>function: supports soft structures; protects vital organs; provides levers for movement; stores minerals</p>	<p>p. 107 table 4.9; described: p. 105</p> 

CARTILAGE TISSUES (3 tissues)		
<input type="checkbox"/> hyaline cartilage	<p>location: most of fetal skeleton; covers articular ends of long bones; costal cartilage; most of the larynx, trachea, and nose structure:</p> <ul style="list-style-type: none"> <input type="checkbox"/> extracellular matrix <input type="checkbox"/> lacunae <input type="checkbox"/> chondrocytes <input type="checkbox"/> perichondrium (often visible) <p>function: smooth surfaces for movement at joints; model for bone growth; supports soft tissue</p>	<p>p.106 table 4.9a; described: p. 103</p>
<input type="checkbox"/> fibrocartilage	<p>location: intervertebral discs; pubic symphysis; menisci of knee joint structure:</p> <ul style="list-style-type: none"> <input type="checkbox"/> collagen fibers (parallel) <input type="checkbox"/> extracellular matrix <input type="checkbox"/> lacunae <input type="checkbox"/> chondrocytes <p>function: resists compression; absorbs shock in some joints</p>	<p>p. 106 table 4.9b; described: p. 103</p>
<input type="checkbox"/> elastic cartilage	<p>location: external ear; epiglottis of the larynx structure: contains abundant</p> <ul style="list-style-type: none"> <input type="checkbox"/> elastic fibers (branching) <input type="checkbox"/> lacunae <input type="checkbox"/> chondrocytes <p>function: maintains structure and shape while permitting flexibility</p>	<p>p. 107 table 4.9c; described: pp. 103-104</p>

MUSCLE TISSUES

TABLE 3. TYPES OF MUSCLE TISSUE (3 tissues to identify)

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES AND SKETCH
<input type="checkbox"/> smooth muscle	location: walls of hollow internal organs: vessels, airways, stomach, bladder, and uterus structure: <ul style="list-style-type: none"><input type="checkbox"/> muscle fiber (spindle-shaped)<input type="checkbox"/> nucleus (centrally located) function: involuntary movements and motion; moves materials through internal organs	p. 111 table 4.12c; described: p.109
<input type="checkbox"/> skeletal muscle	location: attaches to bones or sometimes skin structure: <ul style="list-style-type: none"><input type="checkbox"/> muscle fiber (long, cylindrical, unbranched)<input type="checkbox"/> nuclei (multiple per fiber)<input type="checkbox"/> striations function: moves skeleton; responsible for voluntary body movements, locomotion, and heat production	p.110 table 4.12a; described: p. 109
<input type="checkbox"/> cardiac muscle	location: heart wall (myocardium) structure: <ul style="list-style-type: none"><input type="checkbox"/> muscle fiber (or cardiomyocyte) short, branched<input type="checkbox"/> nucleus (one per cell)<input type="checkbox"/> striations<input type="checkbox"/> intercalated discs (between cells) function: involuntary contraction and relaxation; pumps blood in the heart	p. 110 table 4.12b; described: p. 109

NERVOUS TISSUE

TABLE 4. NERVOUS TISSUE (**1 tissue to identify**)

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES AND SKETCH
<input type="checkbox"/> nervous tissue (from multipolar neuron smear slide)	location: brain, spinal cord, peripheral nervous tissue structures: <input type="checkbox"/> neuron <input type="checkbox"/> soma (cell body) <input type="checkbox"/> axon <input type="checkbox"/> dendrites <input type="checkbox"/> neuroglia (glial cells) function: control and communication between tissues	p. 112 table 4.13; described: p. 111



HELPFUL TERMS FOR HISTOLOGY AND INTEGUMENT

lumen: the space inside a hollow or tube, such as where blood is transported within a blood vessel

cilia: motile hair-like extension of a cell surface

microvilli: small folds projecting on the apical surface of certain types of epithelial cells, especially those of the small intestine

goblet cells: unicellular epithelial gland cells that secrete mucus

lacunae: cavity or depression

canaliculi: small passageways

papilla: nipple-like projection

INTEGUMENTARY SYSTEM: skin and accessory structures

★ STRUCTURES TO IDENTIFY ON SKIN MODEL AND/OR SLIDES

TEXT REFERENCES

Layers of the skin/ integument/ cutaneous membrane, from superficial to deep:

p.119; fig. 5.1; table 5.2

EPIDERMIS -- **most superficial layer**; keratinized stratified squamous epithelium

LAYERS OF THE EPIDERMIS: FROM BASEMENT MEMBRANE TO APICAL SURFACE

p.121; fig. 5.2

stratum basale

melanocytes

keratinocytes

stratum spinosum

epidermal dendritic (Langerhans) cells

stratum granulosum

stratum lucidum (thick skin only)

stratum corneum

epidermal ridges

DERMIS – deep to the epidermis

p.126; fig. 5.6

papillary layer (areolar connective tissue)

dermal papillae

reticular layer (dense irregular connective tissue)

hair follicles

arrector pili muscles

sebaceous (oil) glands

sudoriferous (sweat) glands

apocrine sweat gland

merocrine or eccrine sweat gland

sensory receptors

tactile (sensory) receptor or Meissner's corpuscle

lamellated (pacinian) corpuscle

HYPODERMIS OR SUBCUTANEOUS LAYER (**not part of the integument proper**) – areolar connective tissue and adipose tissue; often called **superficial fascia**