

CHAPTER 4 HISTOLOGY: THE STUDY OF TISSUES

CHAPTER OVERVIEW: This chapter introduces the major tissue types in the body and emphasizes the relation of structure and function in tissues. The structural and functional characteristics of each major tissue type are reviewed, especially in the context of identifying the tissues. The histology of the body membranes is discussed. The processes of inflammation and tissue repair are described and their importance to the human body explained.

OUTLINE (two or three fifty-minute lectures)
Seeley, A&P, 5/e

Chapt. Object.	Topic Outline, Chapter 4	Figures & Tables	Transparenc y Acetates
	I. Epithelial Tissues, p. 103		
1; 2	A. Common Characteristics	Fig. 4.1, p. 104	TA-67
	1. Little or No Extracellular Material		
	2. Covers and Lines Surfaces		
	3. Free Surface and Basement Membrane		
	4. Specialized Cell Contacts Hold Cells Together		
	5. Avascular Past Basement Membrane		
	6. Maintain Mitotic Capability		
3	B. Classification of Epithelial Tissues	Fig. 4.2, p. 104 Table 4.1, p. 108	TA-67
4	1. Based on Number of Cell Layers		
	a. Simple - One	Fig. 4.2a,b,c, p. 104-105	TA-67; TA-68
	b. Stratified - More than One	Fig. 4.2d,e,f, p. 106-107	TA-69; TA-70
	c. Pseudostratified - One, Appearing Like Several	Fig. 4.2g, p. 107	TA-70
4	2. Based on Cell Shape		
	a. Squamous = Flat	Fig. 4.2a,d, p. 104	TA-67; TA-70
	b. Cuboidal = Cube-Like	Fig. 4.2b,e, p. 105	TA-67; TA-70
	c. Columnar = Like a Column	Fig. 4.2c, g, p. 105	TA-68; TA-70
	3. Transitional - Cell Shape and Number	Fig. 4.2h, p. 108	TA-71

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	of Layers Varies With Conditions		
	C. Functional Characteristics of Epithelia	Table 4.2, p. 110-111	
4	1. Function Related to Structure	Predict Quest. 1	
	2. Free Surfaces and Modifications		
	a. Smooth - Reduce Friction		
	b. Cilia - Move Materials		
	c. Microvilli - Increase Surface Area		
5	3. Cell Connections	Fig. 4.3, p. 109	TA-72
	a. Desmosomes & Hemidesmosomes		
	b. Tight Junctions		
	1). Zonula Adherens		
	2). Zonula Occludens		
	c. Gap Junctions		
6	4. Glands		
	a. Epithelial Origin		
	b. Endocrine Glands		
	c. Exocrine Glands		
	1). Location - Adjacent to Free Surface		
	2). Structure - Unicellular and Multicellular	Fig. 4.4a, p.112	TA-73
		Fig. 4.4b-g, p. 112	TA-73
	3). Type of Secretion - Merocrine, Apocrine, Holocrine	Fig. 4.5, p. 112	TA-73
	III. Connective Tissue (CT), p. 113		
1; 7; 8	A. Common Characteristics - Lots of Extracellular Matrix - Fibers, Ground Substance & Fluid		
	B. Classification of CT	Table 4.3, p. 114	
	1. Fibrous Extracellular Matrix		
	a. Areolar (loose) CT	Fig. 4.6, p. 115	TA-74
	b. Dense Regular CT, Collagenous or Elastic	Fig. 4.6b,c, p. 115-116	TA-74; TA-75

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Object.**

Figures & Tables Transparency Acetates

	c. Dense Irregular CT, Collagenous or Elastic	Fig. 4.6d,e, p. 116-117	TA-75; TA-76
		Predict Quest. 2, 3	
	d. Special CT		
	1). Adipose Tissue	Fig. 4.6f, p. 117	TA-76
	2). Reticular Tissue	Fig. 4.6g, p. 118	TA-77
	3). Bone Marrow	Fig. 4.6h, p. 118	TA-77
	2. Fibrous and Ground Substance Matrix		
	a. Cartilage		
	1). Hyaline Cartilage	Fig.4.6i, p. 119	TA-78
		Predict Quest. 4	
	2). Fibrocartilage	Fig. 4.6j, p. 119	TA-78
	3). Elastic Cartilage	Fig. 4.6k, p. 120	TA-79
	b. Bone		
	1). Cancellous Bone	Fig.4.6l, p. 120	TA-79
	2). Compact Bone	Fig. 4.6m, p. 121	TA-80
	3. Mainly Fluid Matrix - Blood	Fig. 4.6n, p. 121	TA-80
	 III. Muscular Tissue, p. 123		
1; 10	A. Common Characteristics - Contractility Through Action of Intracellular Fibers		
	B. Classification of Muscle Types	Table 4.4, p. 124	
	1. Skeletal Muscle - Striated & Voluntary	Fig. 4.7a, p. 124	TA-81
	2. Cardiac Muscle - Striated & Involuntary	Fig. 4.7b, p. 125	TA-82
	3. Smooth Muscle - Nonstriated & Involuntary	Fig. 4.7c, p. 125	TA-82
	 IV. Nervous Tissue, p. 126		
1; 12	A. Neurons – Capable of Action Potentials		
	1. Multipolar Neurons	Fig.4.8a, p.126	TA-83
	2. Bipolar Neurons		
	3. Unipolar Neurons	Fig.4.8b, p. 127	TA-83
	B. Neuroglia - Supporting Cells	Fig. 4.9, p. 127	TA-83

Chapt. Topic Outline, Chapter 4
Object.

Figures & Tables Transparency Acetates

C. Cell Parts - Cell Body, Dendrites, Axon

13 V. Embryonic Tissue, p. 126

A. Endoderm

B. Mesoderm

C. Ectoderm

1. Neuroectoderm

2. Neural Crest Cells

14 VI. Membranes, p. 127

A. Most of Epithelium and Underlying CT

B. Types Based on Structure and Function

1. Serous Membranes - Thin Membrane and Serous Fluid Fig. 4.10b, p. 128 TA-84

2. Mucous Membranes - Thicker Membrane and Mucus Fig. 4.10a, p. 128 TA-84

3. Synovial Membranes - Modified CT and Synovial Fluid w/ Hyaluronic Acid Fig. 4.10c, p. 128 TA-84

15 VII. Inflammation, p. 128

A. Protective Response to Tissue Damage Fig. 4.11, p. 129 TA-85

B. Major signs - Redness, Heat, Swelling, Pain, and Disturbance of Function

C. Signs Produced By

1. Chemical Mediators of Inflammation - Histamine, Kinins, Prostaglandins, Leukotrienes

2. Changes in Local Blood Flow - Dilation of Blood Vessels

D. Net Result Limiting Spread of Damage

16 VIII. Tissue Repair, p. 129

Fig. 4.12, p. 131 TA-86

A. Tissue Response to Damage and Loss of Cells

1. Regeneration in Labile and Stable Cell Lines

2. Replacement in Permanent Cell Lines

B. Patterns of Tissue Repair

1. Primary Union in Wounds With Close Edges
2. Secondary Union in Wounds of Large Area or Great Extent
 - a. Significant Scarring Likely
 - b. Wound Contraction of Extensive Granulation Tissue

IMPORTANT CONSIDERATIONS: If this material is to be covered in only two lectures, the material splits nicely into discussion of the classification of tissues and then inflammation/tissue repair and tissue development. It is possible to combine the inflammation material with the material in the next chapter on the integument, which then allows two lectures for the discussion of the classification and functional characteristics of the tissues.

SEE INSTRUCTOR'S MANUAL AND COURSE SOLUTIONS MANUAL FOR ADDITIONAL RESOURCES.