

CHAPTER 6

SKELETAL SYSTEM: BONES AND BONE TISSUE

CHAPTER OVERVIEW: This chapter introduces the histology of the skeletal system in detail. The types of bones as well as the composition, location, and function of each bone type are presented. The processes of bone growth, development, and repair are discussed.

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

Chapt. Object.	Topic Outline, Chapter 6	Figures & Tables	Transparency Acetates
1	I. Functions of the Skeletal System, p. 157 A. Support B. Protection C. Movement D. Storage E. Blood Cell Production		
1,2	II. Cartilage, P. 157 1. Chondroblasts	Fig. 6.1, p. 158	TA-98
3	2. Perichondrium 3. Appositional and Interstitial Growth		
		Predict Quest. 1	
	III. Bone Anatomy p. 158		
4	A. Bone Shape	Fig. 6.2, p.158	TA-99
	1. Long Bones	Fig. 6.3, p. 159	TA-100 TA-101
	2. Short Bones		
	3. Flat Bones	Fig. 6.5, p. 160	TA-103
	4. Irregular Bones		
	B. Bone Anatomy		
	1. Long Bones	Table 6.1, p. 160 Fig. 6.3, p.159	TA-100
	a. Diaphysis & Compact Bone		
	b. Epiphysis		

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	1) Cancellous Bone		
	2) Articular Cartilage		
	3) Epiphyseal Plate		
	c. Medullary Cavity	Fig. 6.3b, p.159	TA-100
	1) Red Bone Marrow	Fig. 6.4, p.160	TA-102
	2) Yellow Bone Marrow	Fig. 6.4, p. 160	TA-102
	d. Periosteum		
	1) Osteoblasts		
	2) Osteoclasts		
	3) Perforating (Sharpey's) Fibers		
	e. Endosteum		
	2. Short, and Irregular Bones		
	IV. Bone Histology, p. 161		
5	A. Bone Matrix	Fig. 6.6, p.161 Predict Quest. 2	TA-104
	1. Composition		
	a. 35% Organic - Collagen		
	b. 65% Inorganic		
	1) Minerals		
	2) Hydroxyapatite Crystals		
6	B. Bone Cells		
	1. Osteoblasts		
	a. Ossification or Osteogenesis	Figure 6.7, p. 162	TA-105
	2. Osteocytes		
	a. Lacunae		
	b. Canaliculi		
	3. Osteoclasts		
	4. Origin of Bone Cells		
	a. Stem Cells		
	b. Osteoprogenitor Cells		
7	C. Woven Bone		
	D. Lamellar Bone		

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7	1. Cancellous Bone	Fig. 6.8, p.163	TA-106
	a. Trabeculae	Fig. 6.9, p. 164	TA-107
	b. Oriented Along Stress Lines		
7	2. Compact Bone	Fig. 6.10, p. 165	TA-108
		Predict Quest. 3	
	a. Haversian (Central) canals		
	b. Concentric Lamellae	Fig. 6.10, p. 165	
	c. Osteons		
	d. Interstitial Lamellae		
	e. Circumferential Lamellae		
	f. Perforating (Volkmann's) Canals	Fig. 6.10, p. 165	
8	V. Bone Development, p. 164		
	A. Intramembranous Ossification	Fig. 6.11, p.166	TA-109
		Table 6.2, p.165	
	1. Osteoprogenitor Cells		
	2. Centers of Ossification	Fig. 6.11c, p. 166	
	3. Fontanel of Skull		
	B. Endochondral Ossification	Fig. 6.12, p. 167	TA-110
		Fig. 6.13, p. 168	TA-111
	1. Bone Collar on Cartilage Model	Fig. 6.13d, p. 168	TA-112
	2. Chondrocyte Hypertrophy		
	3. Calcified Cartilage		
	4. Death of Chondrocytes		
	5. Primary Ossification Centers	Fig. 6.13c, p. 168	TA-111
6. Secondary Ossification Centers	Fig. 6.13e, p. 169	TA-112	
		TA-113	
		Predict Quest. 4	
9	VI. Bone Growth, p. 170		
	A. Growth at Epiphyseal Plate	Predict Quest. 5	
	1. Appositional Growth Only	Fig. 6.14, p. 170	TA-114
	2. Zone of Resting Cartilage		TA-115
	3. Zone of Proliferation		
	4. Zone of Hypertrophy	Fig 6.15, p. 170	

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	5. Zone of Calcification		
		Predict Quest. 6	
	B. Growth at Articular Cartilage	Predict Quest. 7	
	C. Other Bone Growth		
	D. Factors Affecting Bone Growth		
10	1. Nutrition		
	a. General Nutrition		
	b. Vit. D (osteomalacia, rickets)		
	c. Vit. C (scurvy)		
	2. Hormones		
	a. Growth Hormone		
	b. Thyroid Hormone		
	c. Sex Hormones		
	1) Estrogens	Predict Quest. 8	
	2) Testosterone		
11	VII. Bone Remodeling, p. 172	Fig. 6.17, p. 172	TA-116
		Clinical Note, p. 172	
12	1. Interstitial Lamellae Formation	Fig. 6.18, p. 173	TA-117
	2. Response to Mechanical Stress		
13	VIII. Bone Repair, p. 173	Fig. 6.19, p. 174	TA-118
		Clinical Focus, p.175-177	TA-120
	1. Hematoma		
	2. Internal Callus		
	3. External Callus		
	4. Cartilage Ossification		
	5. Bone Remodeling		
14	IX. Calcium Homeostasis, p. 174	Fig. 6.20, p. 176	TA-119
	1. Parathyroid Hormone		
	2. Calcitonin		
	X. Systems Pathology, p. 178	Predict Quest. 9	
		System	

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Interactions, p.
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IMPORTANT CONSIDERATIONS: If this material is to be covered in two lectures the natural break falls after the structures and composition of bone, leaving the processes of bone formation, growth, remodeling and repair in the second grouping. If the time for a third lecture is available, bone development can be treated separately, or the process of bone repair can be presented in greater detail, making comparisons to the generalized inflammatory process already introduced in Chapter 5 on the Integumentary System.

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