MICROSCOPIC ANATOMY
OF BONE

FIGURE 5.3 PAGE 116
COMPACT BONE

- Dense bone
- Contains systems of canals that allow blood vessels to nourish bone cells (osteocytes)
- Osteon or Haversian System – entire complex unit
STRUCTURE

• Lamellae – “little layers”; concentric rings formed by lacunae

• Lacunae – “little lakes”; cavity containing osteocyte

• Canaliculi – “little channels”; outward canals that lead to all lacunae ensuring all osteocytes are nourished
• Haversian Canal – run longitudinally through the center of the osteon
• Volkmann’s Canal – run horizontally connecting each osteon
• Both contain blood vessels which nourish the bone cells
SPONGY BONE
(CANCELLOUS BONE)

- Porous
- Most abundant in short, flat & irregular bones
- Consists of interconnecting rods called trabeculae
- Support bone & store marrow
- Cavities that contain osteoblasts – immature bone cells
CHEMICAL COMPOSITION OF BONE

- Matrix consists of solid materials rich in minerals and salts
- 67% inorganic material; provides strength & hardness
- Hydroxapatite $(\text{Ca}_3(\text{PO}_4)_2)_3 \cdot \text{Ca(OH)}_2$
- 33% organic; collagenous proteins that provide reinforcement & flexibility
OSSIFICATION

• Formation of new bone from hyaline cartilage
• Cartilage model is covered with bone matrix by the osteoblast
• Hyaline model is digested away opening up the medullary canal
• Digesting occurs in all areas except on ends of bone & growth plates
BONE REMODELING

- Formation of new bone material
- Controlled by the levels of Ca in blood and the stress applied to bone
Ca Levels

- Ca drops in blood – known as hypocalcemia
- Parathyroids secrete PTH to blood
- PTH activates osteoclasts to break down bone matrix and release Ca into blood
- Hypercalcemia is the reverse conditions which deposits high levels of Ca in the blood into the bone
Gravity

• The constant pull of muscles on bone causes bony matrix to breakdown
• Osteoblast lay down new bony material
• Osteoblast becomes trapped within the bony matrix
• Osteoblast then develops into an osteocyte.