

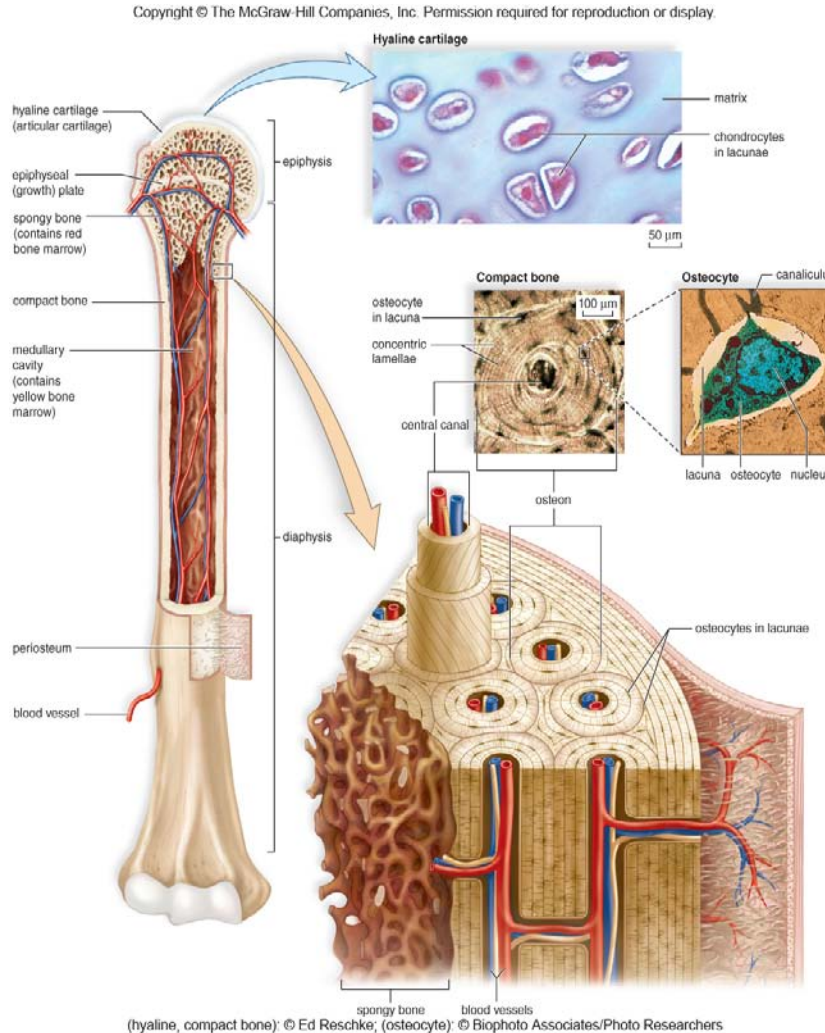
# **Skeletal Topics**

- 1. Skeletal tissues**
- 2. Bone growth & repair**
- 3. Skeletal system**
- 4. Joints**
- 5. Skeletal diseases**

# Bone Functions

- 1. support: soft tissues, muscles**
- 2. protect: organs, muscles**
- 3. produce: blood cells**
- 4. store: minerals (Ca, P)**
- 5. move: with skeletal muscles**

# Skeleton Tissues



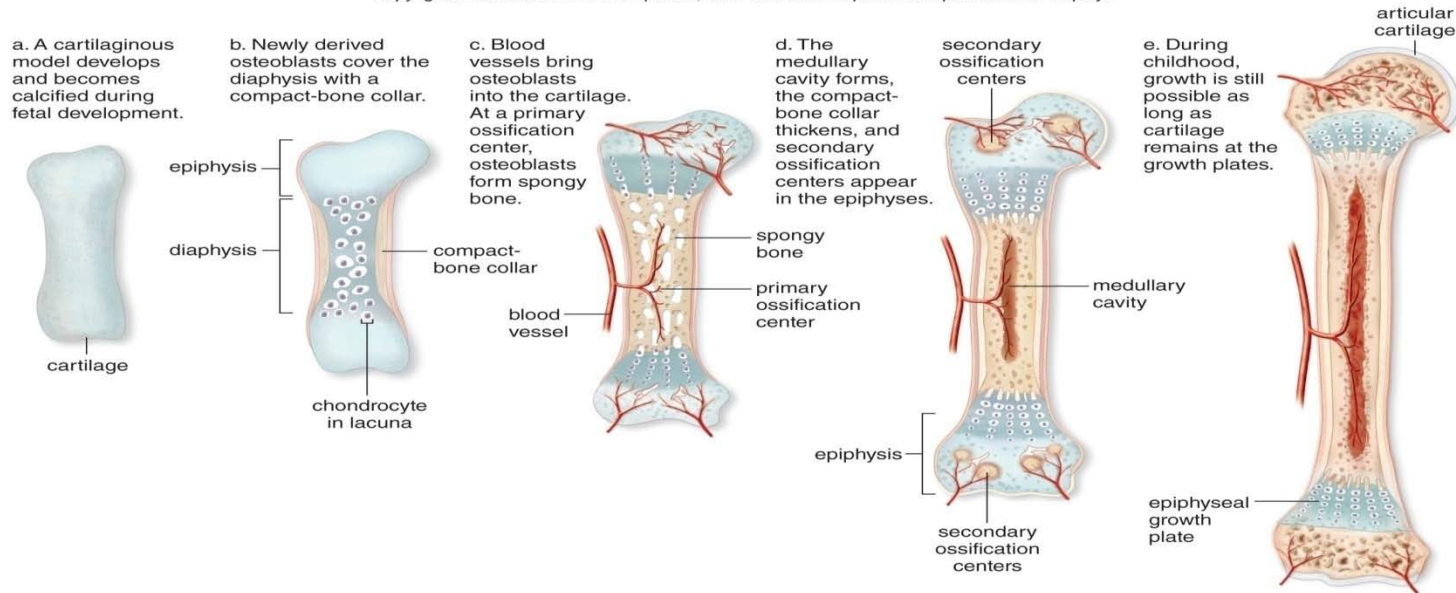
- a) **bone**
  - compact - strength
  - spongy - prod. blood
- b) **cartilage**
  - support and attachment
  - 3 types
- c) **ligaments**
  - hold bone to bone
  - (tendons - bone to muscle)

# Cartilage

- 1) fibrocartilage: thick strong fibers**
  - compress, stretch
  - menisci (knee), intervertebral discs
  
- 2) hyaline cartilage: fine strong fibers**
  - flexibility, resilience
  - articular, costal, larynx, nasal
  
- 3) elastic cartilage: thin fibers**
  - stretchy, repeated bending
  - ear, epiglottis

# Bone Growth Stages

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- 1) embryo: embryonic skeleton mostly cartilage**
- 2) childhood: cartilage hardens into bone**
- 3) adolescence: fast bone growth; "shoot up"**
- 4) adult: bone growth ends; "grown up"**
- 5) elderly: slower bone growth**
  - bone removal faster than bone growth**
  - weaker, porous bones; needs exercise**

# Physical Activity

**Why do children need to be physically active?**

**External force stimulates bone growth :**

**eg: run, walk, climb, push, pull**

**1) new force exerted: compression, resistance, weight**

**2) new bone “molding” initiated:**

**i.e. bone removal and new bone growth**

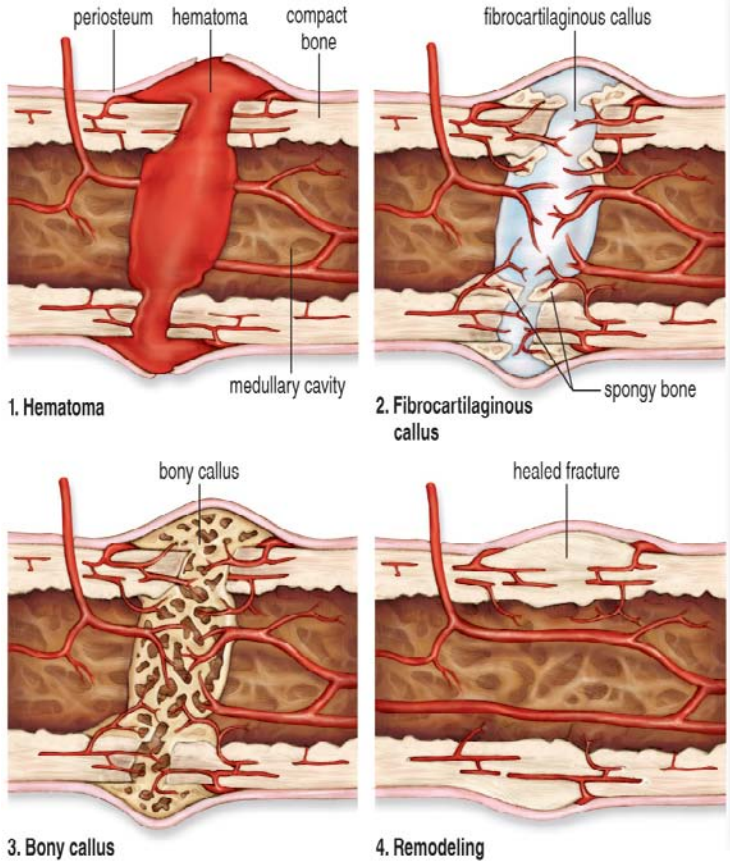
**3) match: process continues until new bone growth matches new force**

**bone growth: length & girth**

**bone repair: new bone is stronger, takes a long time**

# Bone Repair

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1. Hematoma

2. Fibrocartilaginous callus

3. Bony callus

4. Remodeling



b.

## Stages:

- 1) hematoma
- 2) cartilage callus
- 3) bone callus
- 4) stronger bone

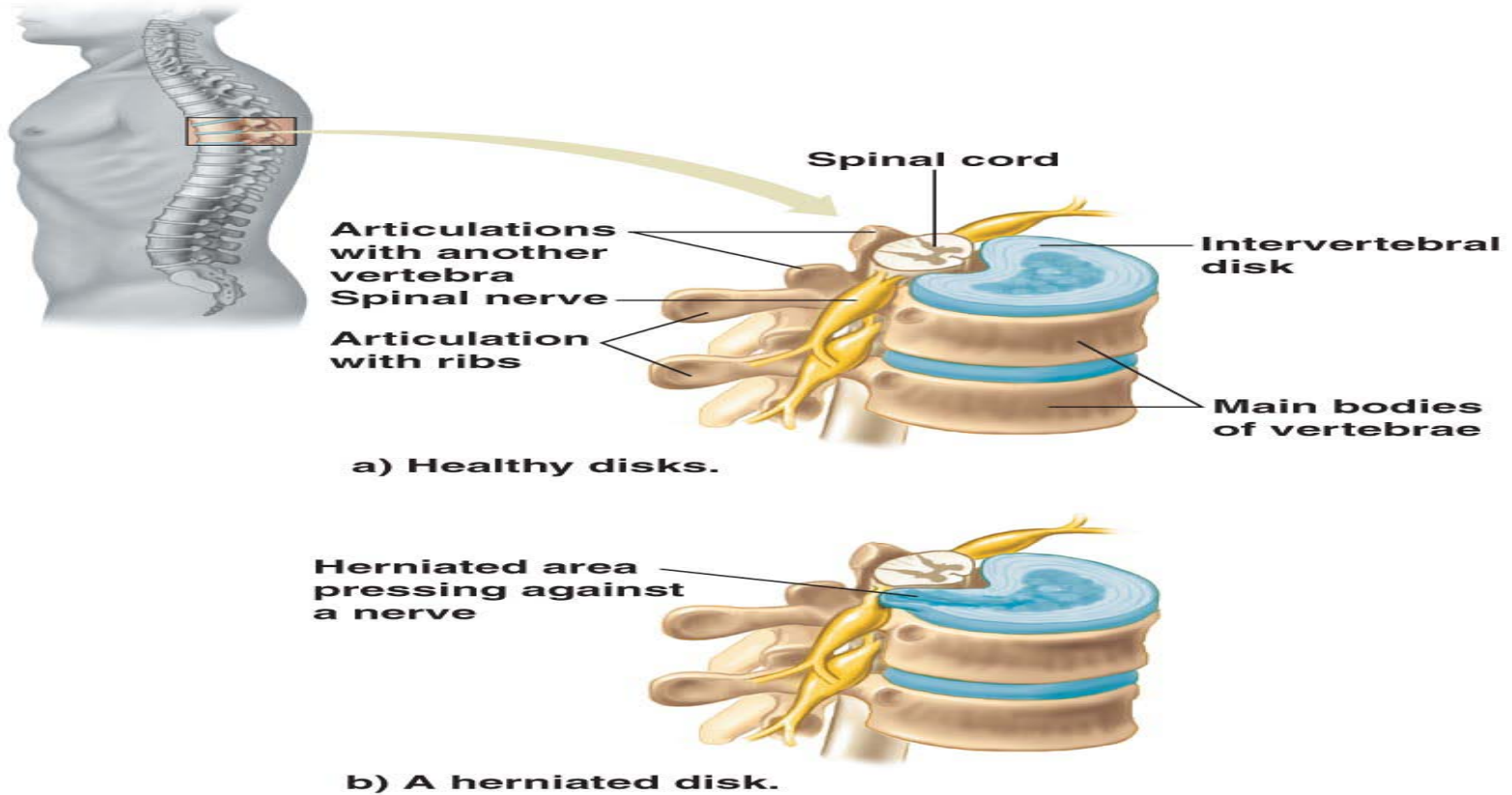
# Axial Bones

<b>1) skull</b>	<b>28</b>
- cranium 8	
- face 14	
- ear 6	
<b>2) hyoid</b>	<b>1</b>
<b>3) vertebrae</b>	<b>26</b>
- cervical 7	
- thoracic 12	
- lumbar 5	
- sacral 1	
- coccygeal 1	
<b>4) rib cage</b>	<b>25</b>
- ribs 24	
- sternum 1	
<b>total axial bones</b>	<b>80</b>



# Hernia

pinch -> continual pain



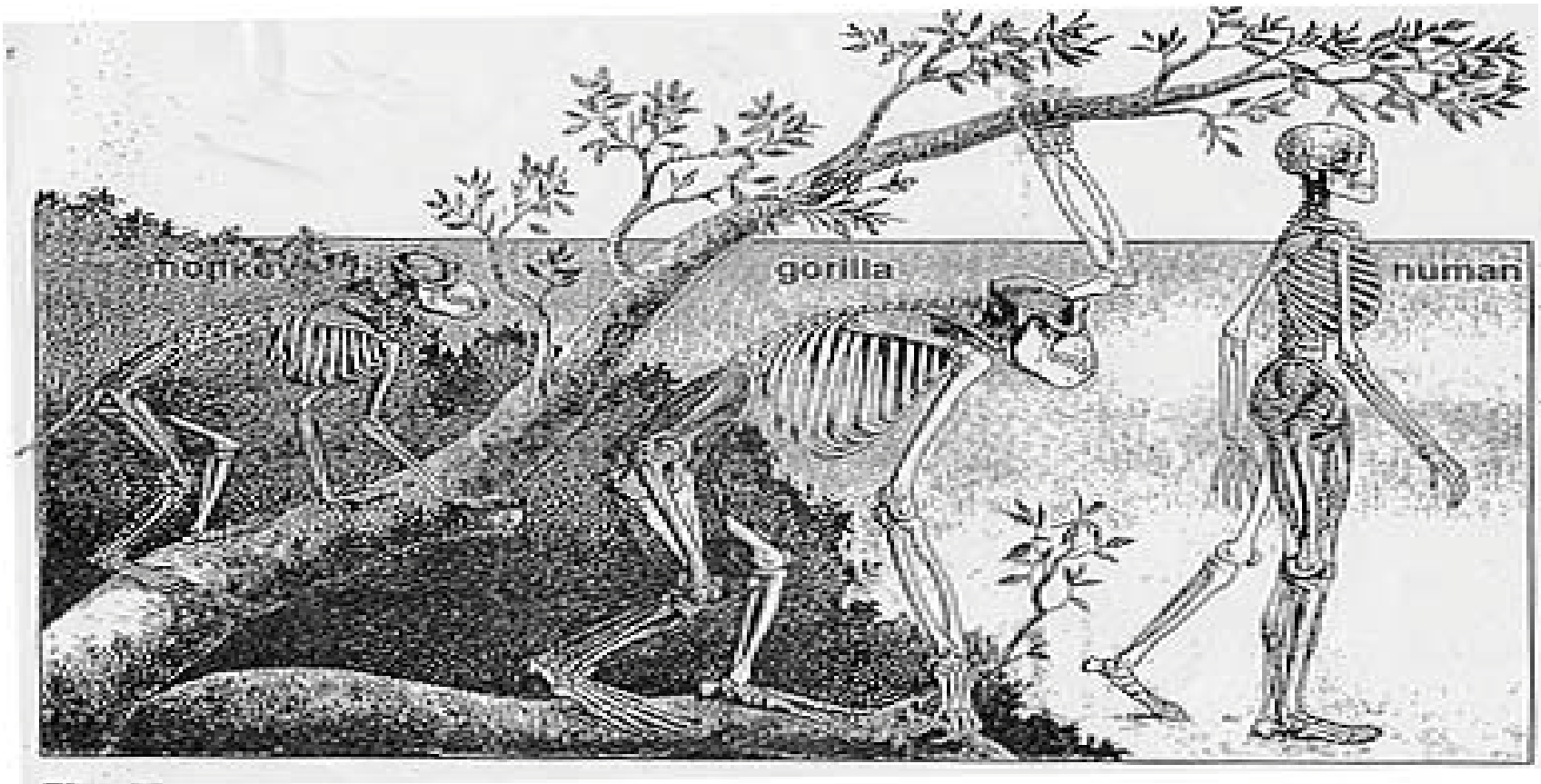
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# Appendicular Bones

<b>1) pectoral girdle</b>	<b>4</b>
<b>2) upper limbs</b>	<b>60</b>
- arms	<b>6</b>
- hands	<b>54</b>
<b>3) pelvic girdle</b>	<b>2</b>
<b>4) lower limbs</b>	<b>56</b>
- legs	<b>4</b>
- feet	<b>52</b>
<b>total appendicular bones</b>	<b>126</b>

# Monkey, gorilla, human

compare the scapula, jaw, ribcage, and pelvis



# Joint

= articulations

= points of contact between bones,

**3 types:**

**1) fibrous**

- immovable, eg skull sutures

**2) cartilaginous**

- slightly movable, eg vertebral discs

**3) synovial**

- movable, eg shoulder & elbow joints

# Osteo-arthritis

**arthritis = joint + inflammation**

- **inflammation -> swelling -> less joint space, pain, etc**

**osteo-arthritis: bone arthritis**

- **cartilage wears out, bone thickens, bone spurs**
- **pain, mobility, fatigue problems; job problems**
- **treatment:**
  - **exercise: physical therapy, Tai Chi, yoga**
  - **surgery: joint repair, joint prosthetics (implant)**

# Joint Replacement

**total joint replacement prosthetics - hip & knee  
issues: cost (\$100K), permanent bone removal,  
replacement 5-15 years, popping out**

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a.



b.

a-b: © Scott Camazine/Photo Researchers



**X ray of right knee showing total knee replacement prosthesis (co-designed by Kenneth Gustke, M.D., of Florida Orthopedic Institute).**

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# Rheumatoid Arthritis

- **auto-immune sys. arthritis (attack own joints)**
- **symptoms: small joints tender & stiff (fingers, wrist), comes & goes (rheuma = susceptible to changes)**
- **soft, weak bones -> same issues as osteo-arthritis**
- **links: osteoporosis, anemia, muscle atrophy, CV prob.**



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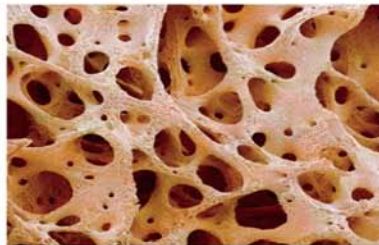
# Osteoporosis

= bone + porous

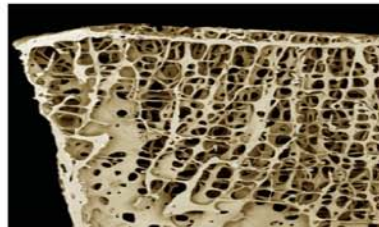
- bone loss-> brittle, easily broken bones, hunch

cause: estrogen loss (menopause), little calcium  
no weight bearing exercise, underweight

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a. Normal bone



b. Osteoporosis



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# Skeletal Diseases

**Describe the cause & effects of:**

- 1) osteoarthritis**
- 2) rheumatoid arthritis**
- 3) osteoporosis**

**\*Not collected**