Skeletal System

Functions of Bone

Support Soft tissue

Protection Internal organs

Ex's… brain, spine, heart

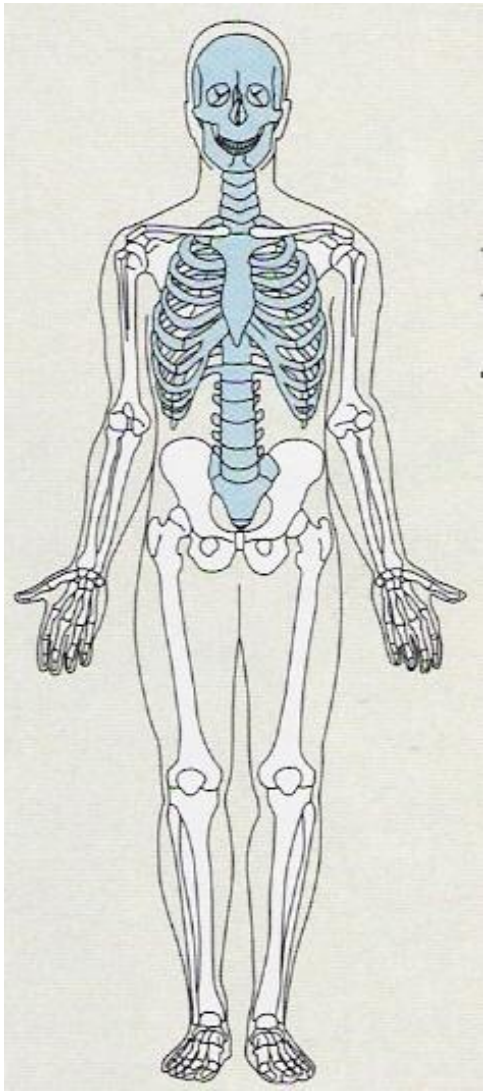
Movement assistance Due to their connection to muscles

Mineral storage and release Ca & P

Hemopoiesis Blood cell formation

Energy storage From **yellow marrow** to **red marrow**

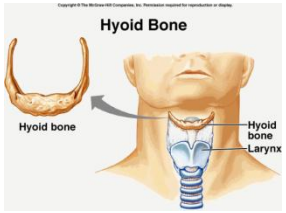
Skeletal System: Divisions



An adult skeleton consists of _____ bones. **206**

Axial Skeleton: 80 bones

Composed of: skull, hyoid bone, vertebral column, sternum, ribs



Are we born with 206 bones?

Skeletal System: Divisions

Appendicular Skeleton:

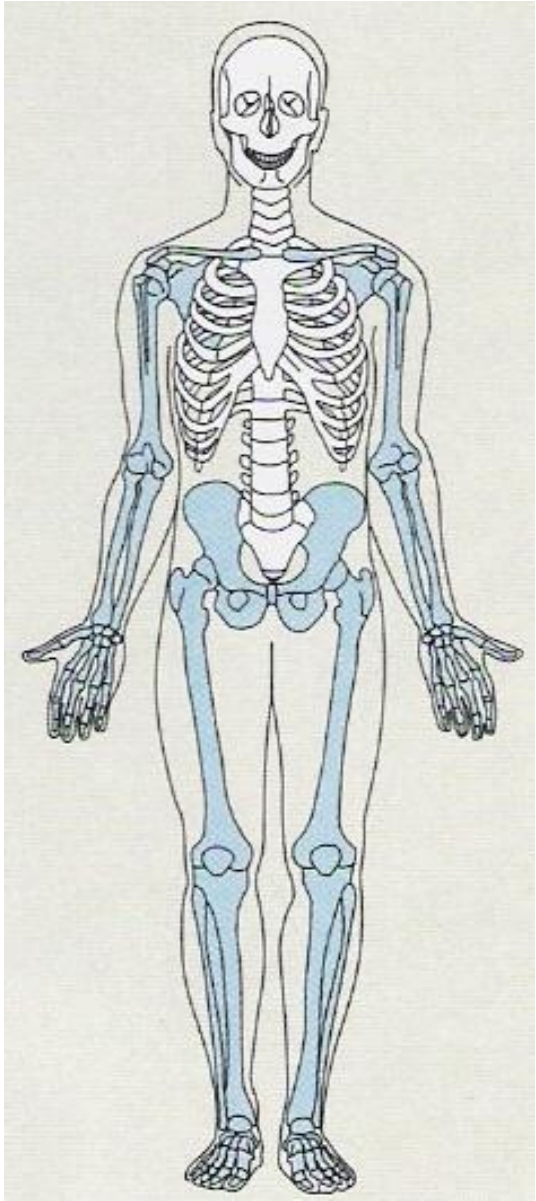
126 bones

Composed of:

Upper & lower extremities (limbs/appendages)

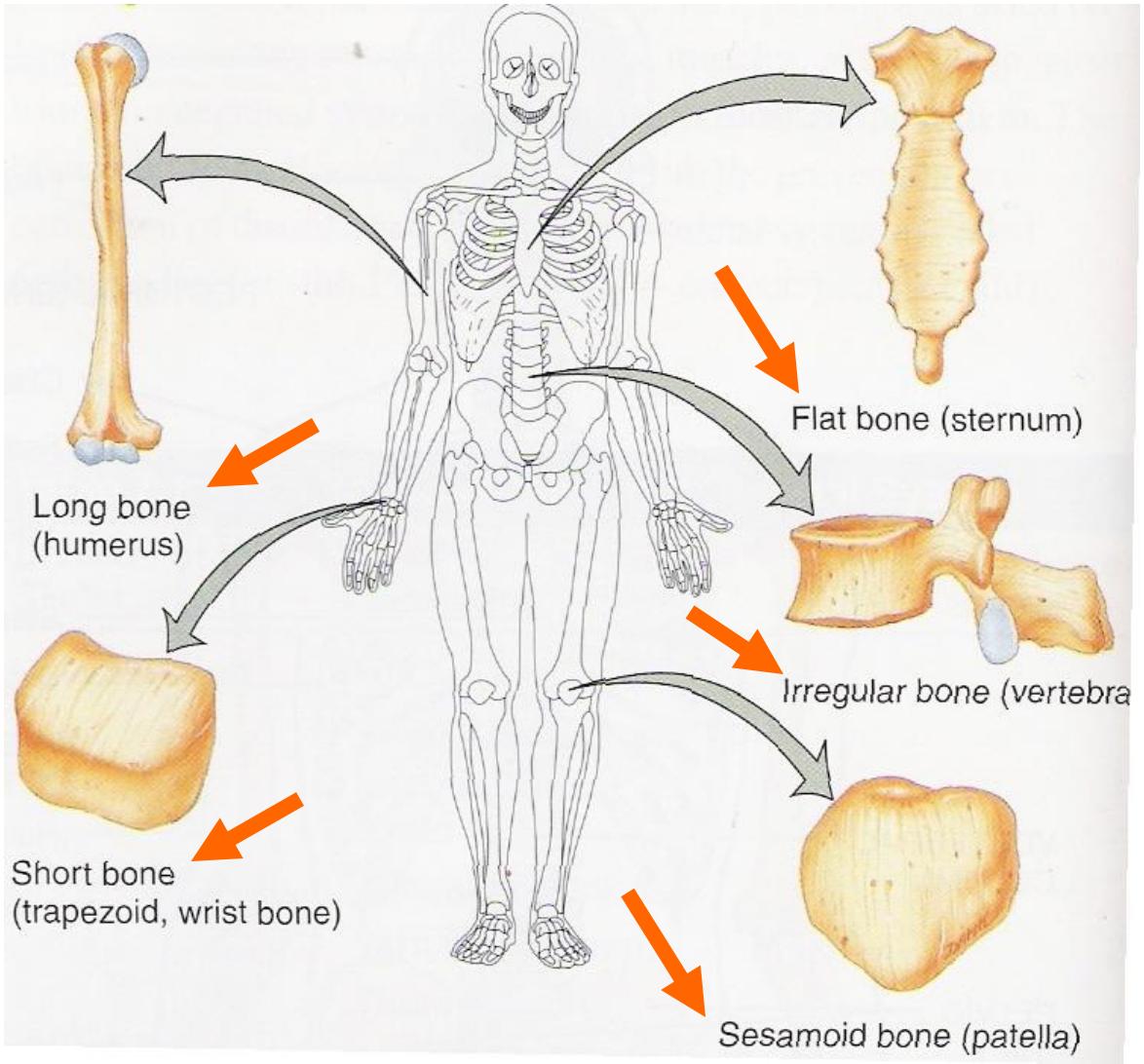
Pectoral (shoulder) girdle

Pelvic (hip) girdle



Types of Bones

Most bones are classified by…



Parts of a (long) Bone:

- Long central shaft = diaphysis
- Ends of bone = **epiphyses**
- Each epiphyses forms a joint = **articulation**
  - **Articular cartilage**
- Outer surface of bone = **periosteum**
    - Joins w/**articular cartilage** (at end)
    - Blood vessels, osteoblasts (bone growth and repair)
      - Fxn: bone nourishment, attachment to ligaments, growth/repair

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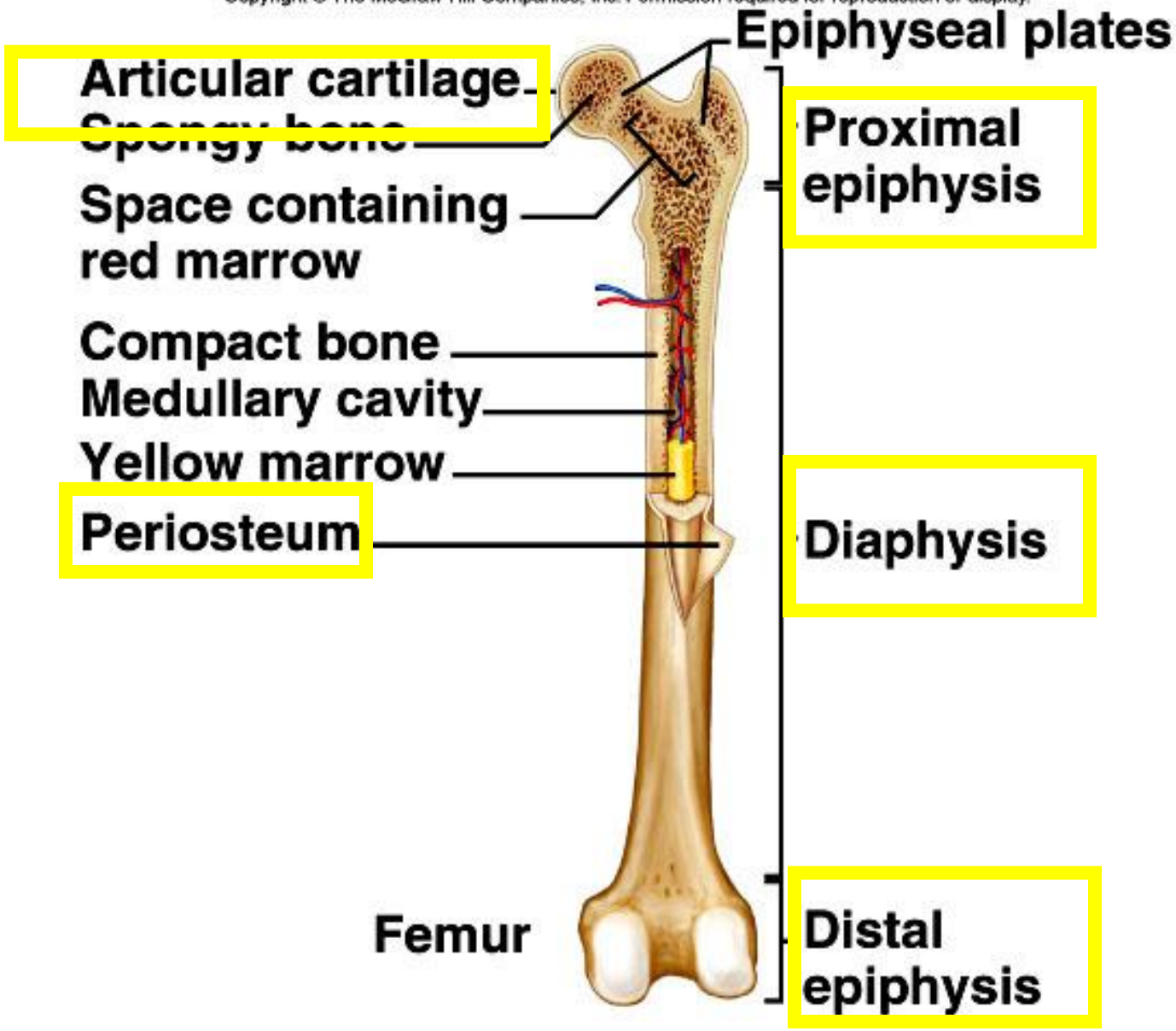

Parts of a (long) Bone: Internal Features →

- Compact bone →
  - External layer of all bones and diaphyses of long bones
  - Fxn: protection, support
  - Site of yellow marrow: rich in fatty tissue – energy storage
- Spongy bone →
  - Forms most of short, flat, irregular bones and the epiphyses of long bones
  - Site of red bone marrow

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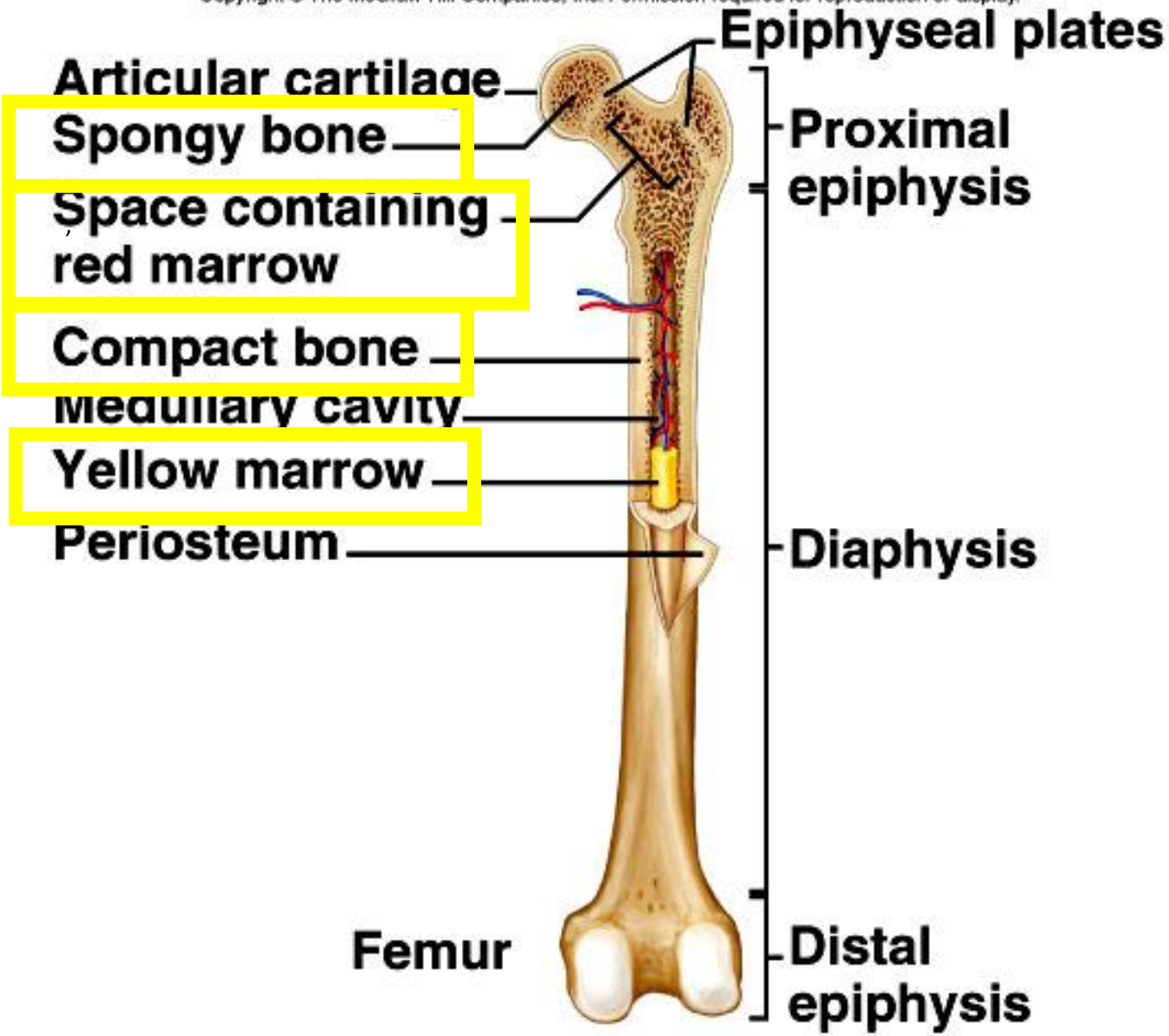
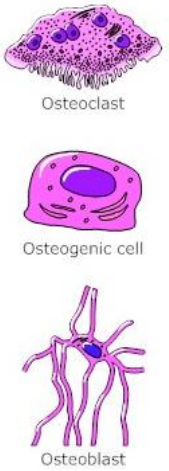
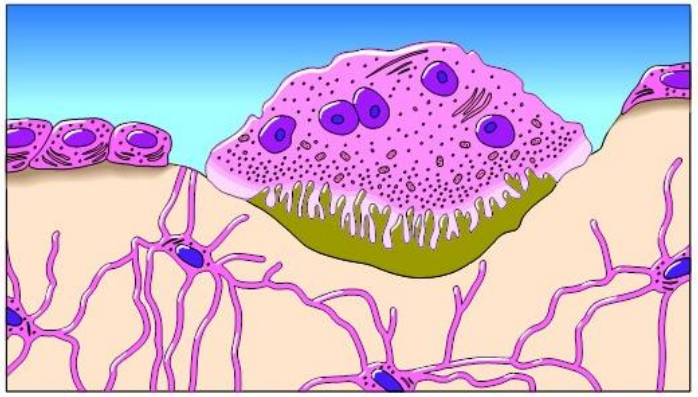


Bone Tissue Histology

- Bone (Osseous) Tissue:
  - 25% water
  - 25% protein fibers
    - collagen
  - 50% mineral salts
- Bone Cells:
  - Osteoblasts (bone building cells)
  - Osteocytes (mature bone cells)
  - Osteoclasts (bone-destroying cells)





Bone Formation (Ossification)

*Bone development begins @ 2 months of prenatal life

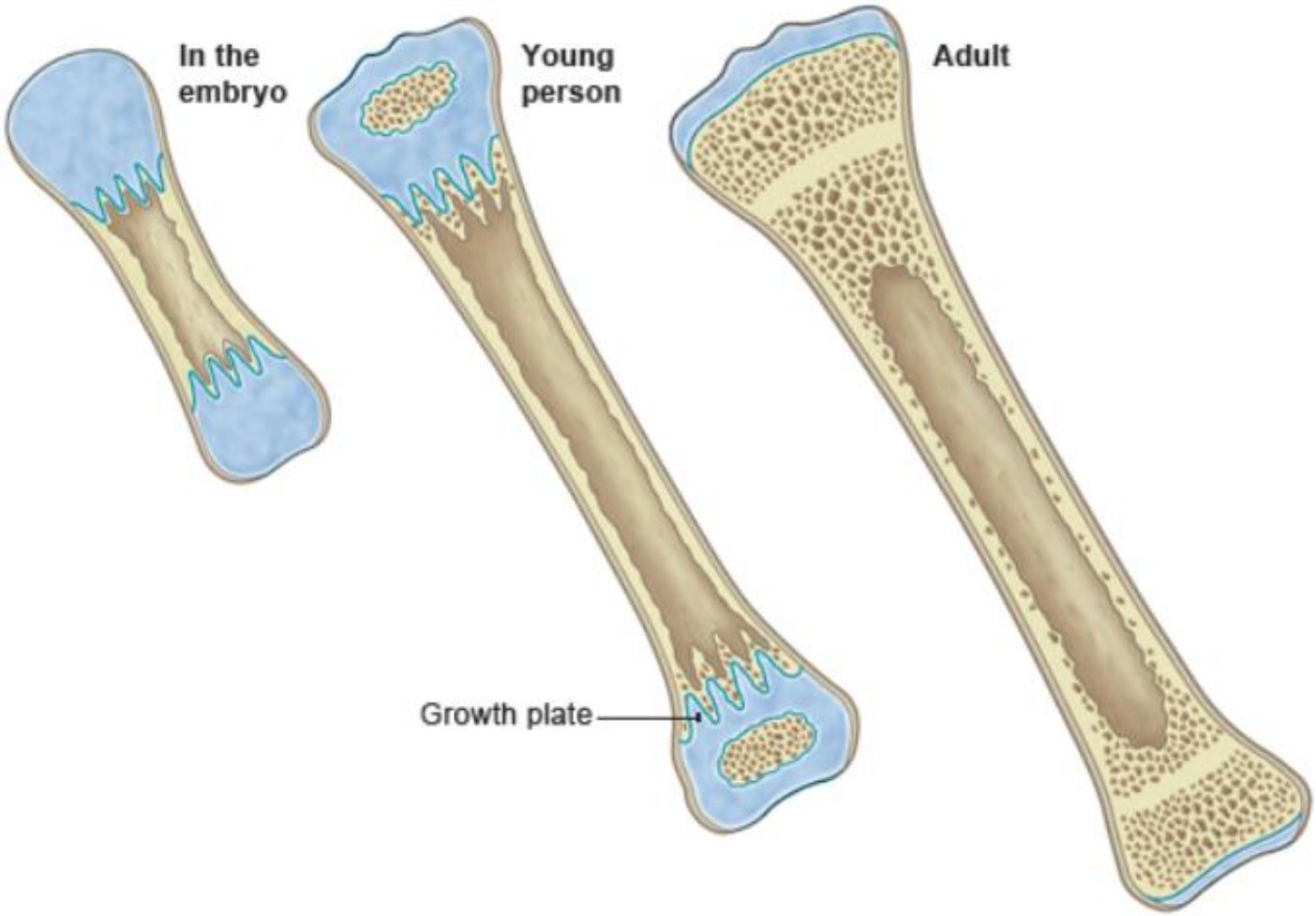
*2 types of ossification →

- 1. **Intramembranous ossification**
  - Forms from connective tissue
  - Forms flat bones of skull and mandible
- 2. **Endochondrial ossification**
  - Forms from cartilage
  - Most form this way*

Bone Growth

- **Interstitial growth**: grow in length at epiphyseal/ “growth” plate (band of cartilage)
- **Appositional growth:** grow in thickness

Bone Growth



Factors Affecting Bone Growth

- Adequate dietary intake of…
- Hormones for stimulation of bone growth during childhood
  - IGF, hGH
- Thyroid hormones and insulin
- Sex hormones

HW:

Explain WHY each of these affect bone growth *can use outside sources

Bone Resorption

- Osteoclasts break down bone tissue
- Release minerals
  - Ca transferred from bone fluid → blood

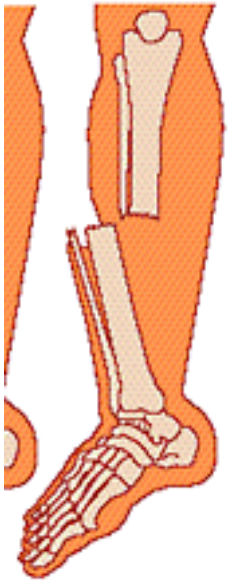
- Conditions that result in decrease in bone mass:
  - Increase resorption
  - Decrease ossification (osteoblasts)

Bone Remodeling

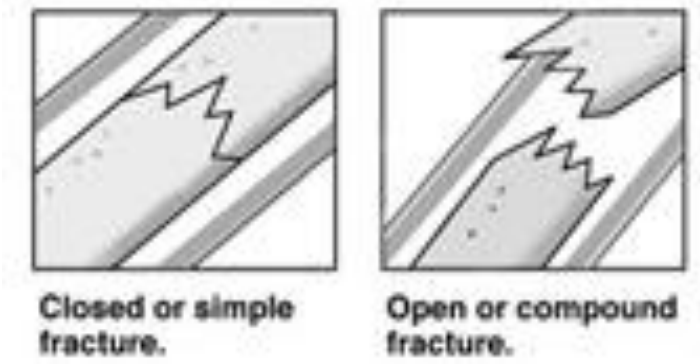
- “Replacement of old bone tissue”
  - At certain age, pituitary gland stops production of growth process
    - Epiphyseal plate → epiphyseal line
- Ex: distal femur replaced every 5-6months
- Due to undergoing large amount of stress or injury

- **Bone fractures →**
  - Break in a bone

Open vs. Closed Fractures

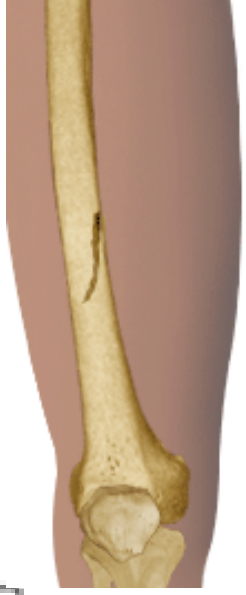


- Open →
  - AKA compound fracture
  - Bone penetrates thru skin ; “open to air”

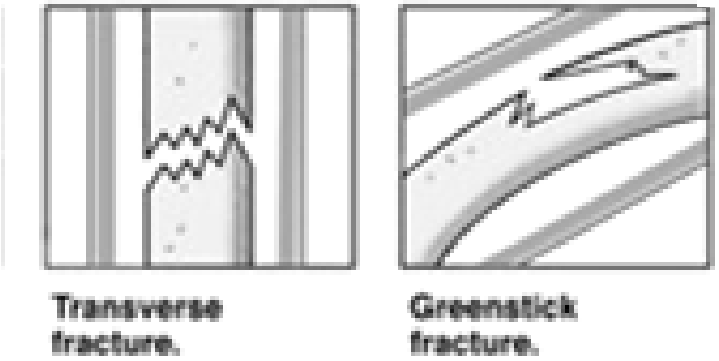


- Closed →
  - AKA simple fracture
  - Fracture intact overlying skin

Degree of Fracture



- Complete →
  - Fragments are completely separate
- Incomplete →
  - AKA greenstick
  - Break does not extend



- Comminuted →
  - Broken, splintered, crushed into >3 pieces

Bone Fracture Repair

- 1. Fracture hematoma → clot
- 2. Soft callus (after 48hrs) → procallus
- 3. Bony (hard) callus
- 4. Remodeling (end of week 1, cluster of cartilage and bone form throughout injury site) – ¾ months

Osteoporosis

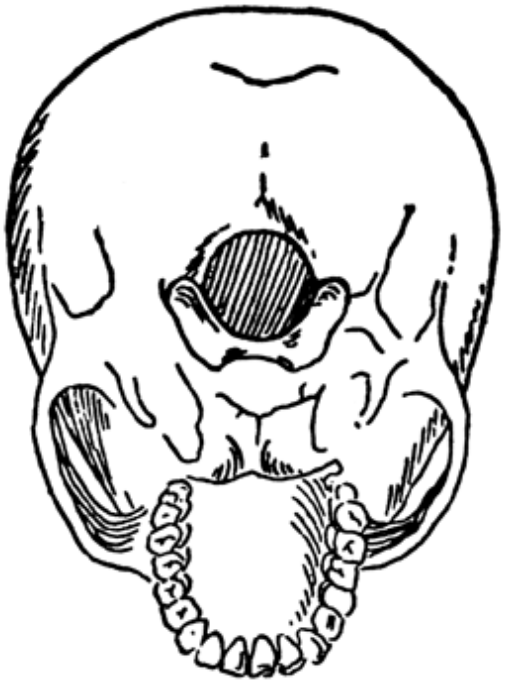
- Bone reabsoprtion outpaces bone formation
- Affects mostly who?
- Sex hormones and other hormones maintain bone tissue by stimulating osteoblasts to form new bone
- Osteoporosis is responsible for:
  - 1. backbone shrinkage (results in)
  - 2. hunched backs
  - 3. bone fractures

Osteoporosis
Risk Factors →

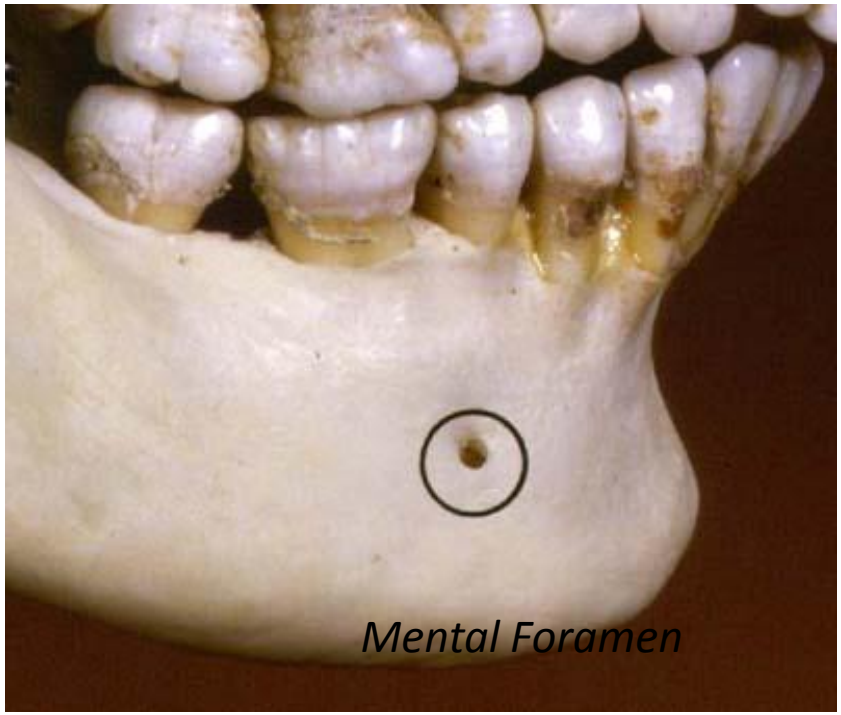
- Body build
- Weight
- Smoking
- Ca deficiency of malabsorption
- Vitamin D deficiency
- Lack of exercise
- Certain drugs
- Family history
- Menopause

Skull Topography

- Foramen – tiny openings for nerves and blood vessels

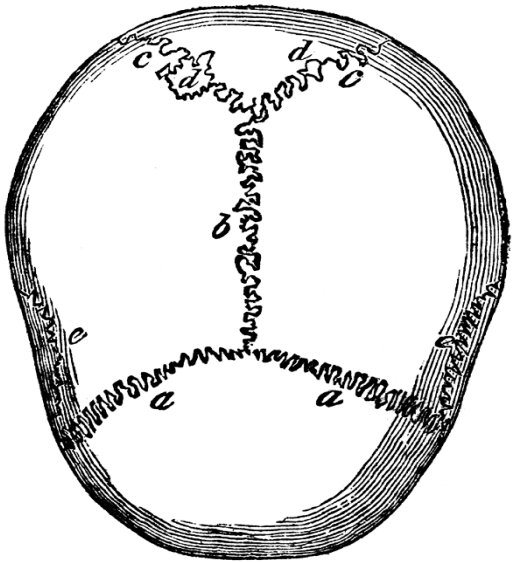


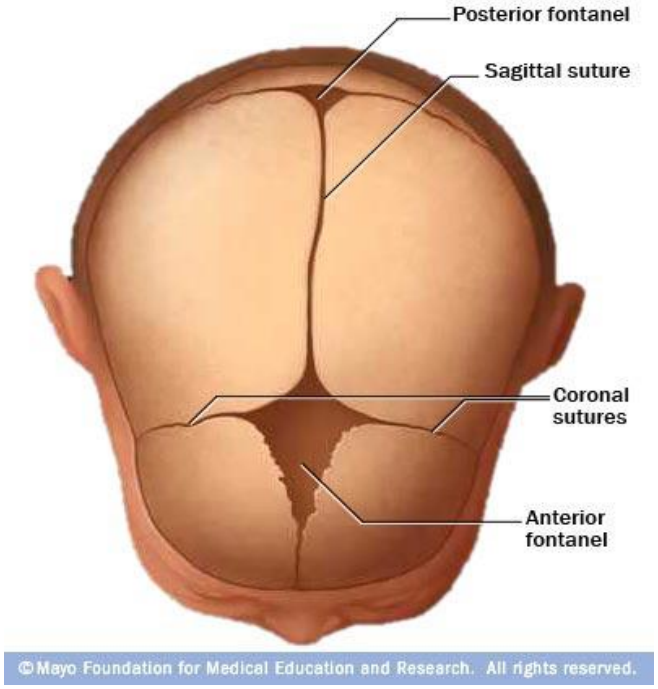
Foramen Magnum



Skull Topography

- Suture– connection btwn lg. bones
  - In fetal skulls, called fontanels
- Fissure– wide gap btwn bones





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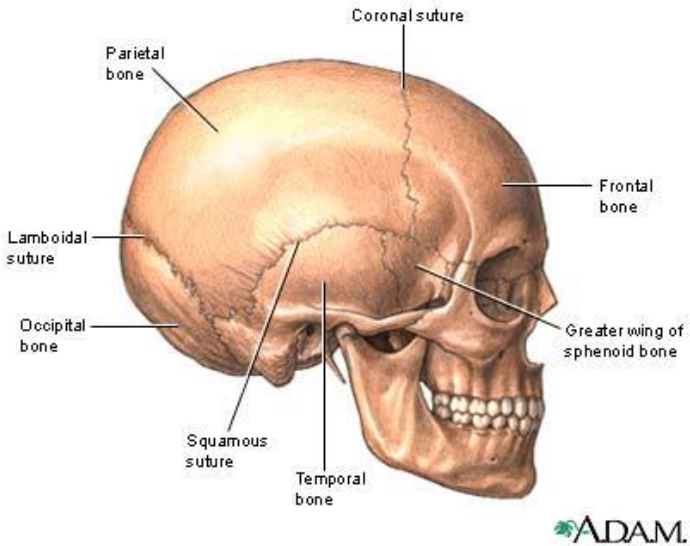
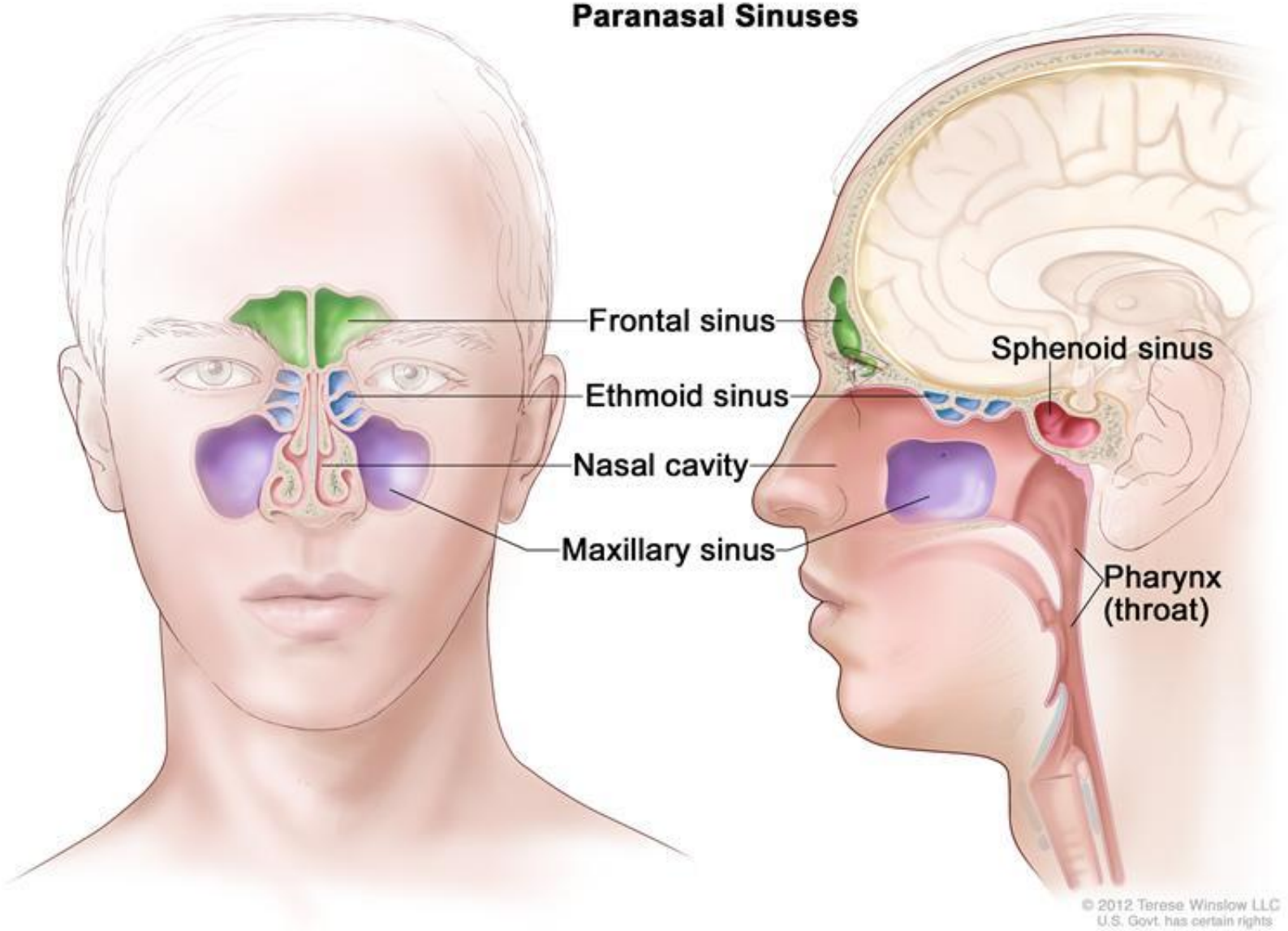
Skull Topography

- Sutures:
- 1. coronal: btwn frontal and parietal
- 2. lamboidal: btwn occipital and parietal
- 3. squamosal: btwn temporal and parietal
- 4. sagittal: between parietal



SKULL

- Chambers lined w/mucous membranes = sinuses
  - 5 → frontal, ethmoid, sphenoid, two maxillary
  - Inflammation w/in results in: sinusitis
  - Build up of fluid pressure (block in drainage) = sinus headache


Paranasal Sinuses
Frontal sinus
Ethmoid sinus
Nasal cavity
Maxillary sinus
Sphenoid sinus
Pharynx
(throat)
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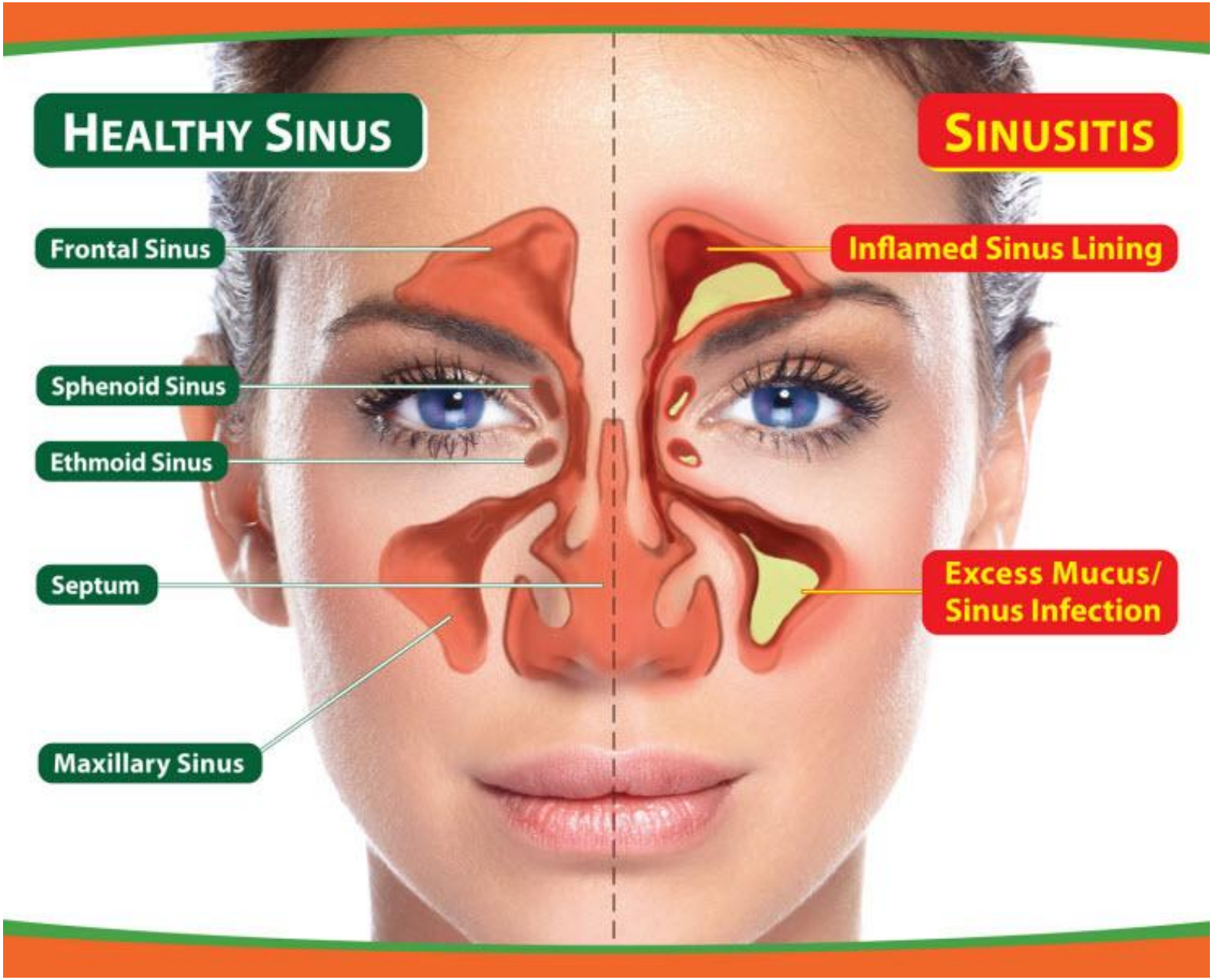
HEALTHY SINUS
SINUSITIS
Frontal Sinus
Sphenoid Sinus
Ethmoid Sinus
Septum
Maxillary Sinus
Inflamed Sinus Lining
Excess Mucus/
Sinus Infection