

# OSSIFICATION

rvsd 18 Oct 04, 15 Oct 08, 14 Oct 09

Martini's 5<sup>th</sup>: 21 Oct 02, Martinbi's 6<sup>th</sup>: 191-194, 8<sup>th</sup>: 194-205

Development of Bone:

Three types of cells associated with bone formation and maintenance:

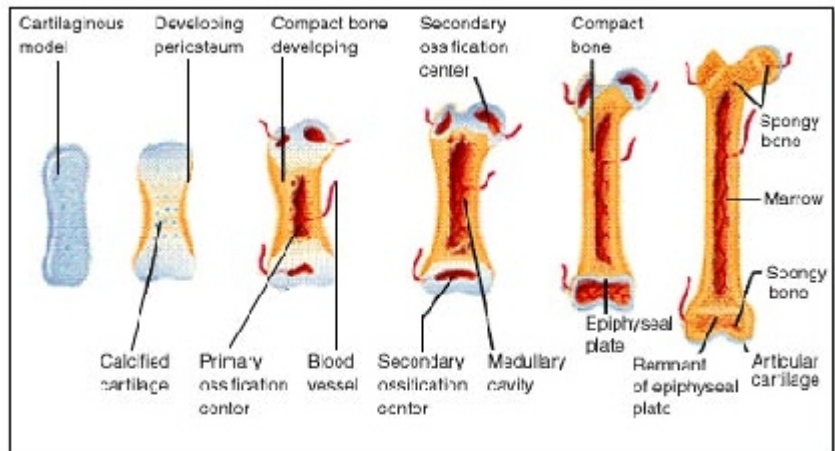
Osteoblasts	early bone forming cells
osteocytes	Bone maintenance
osteoclasts	remodel bone, release calcium

<b>Three types of ossification:</b>	embryonic:	intramembranous
	elongation:	Primary endochondrial secondary endochondrial

## Intramembranous Ossification

(also dermal bone b/c formed in deep dermis, as in the skull, scapula, etc.) page 191

- 1) collagen laid down by **fibroblasts** forming a membrane
- 2) **osteoblasts** form network of spongy bone with blood supply
- 3) **periosteal membrane** forms around, osteoblasts appear, form compact bone = diploe



## Endochondral Ossification: (of hyaline cartilage)

### Primary:

- cartilage model formed
- perichondrium converted to periosteum (osteoblasts gather inside)
- collar of compact bone forms
- internal cartilage reduced to thin partitions
- matrix begins to ossify
- chondroblasts die, starve
- osteoclasts hollow out medullary cavity as growth continues

### Secondary:

- epiphyseal cartilage enlarges by chondroblasts
- cartilage towards diaphysis ossifies
- as ossification occurs below, new cartilage forms above
- osteoclasts remodel below
- by age 25, epiphyseal cartilage replaced by **epiphyseal line**

Exercise affects bone physiology:

Bone grows in response to stress, without, salts withdrawn (astronauts can have severe bone loss)  
Responds to compressional, functional and electrical forces

## Bone formation:

- phosphate released by alkaline phosphatase
- combines with Ca under influence of calciferol to form colloidal precipitates.
- This is converted into hydroxyapatite:  $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{Ca}(\text{OH})_2$
- stressed bone forms neg charge, may stimulate alkaline phosphatase.