

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



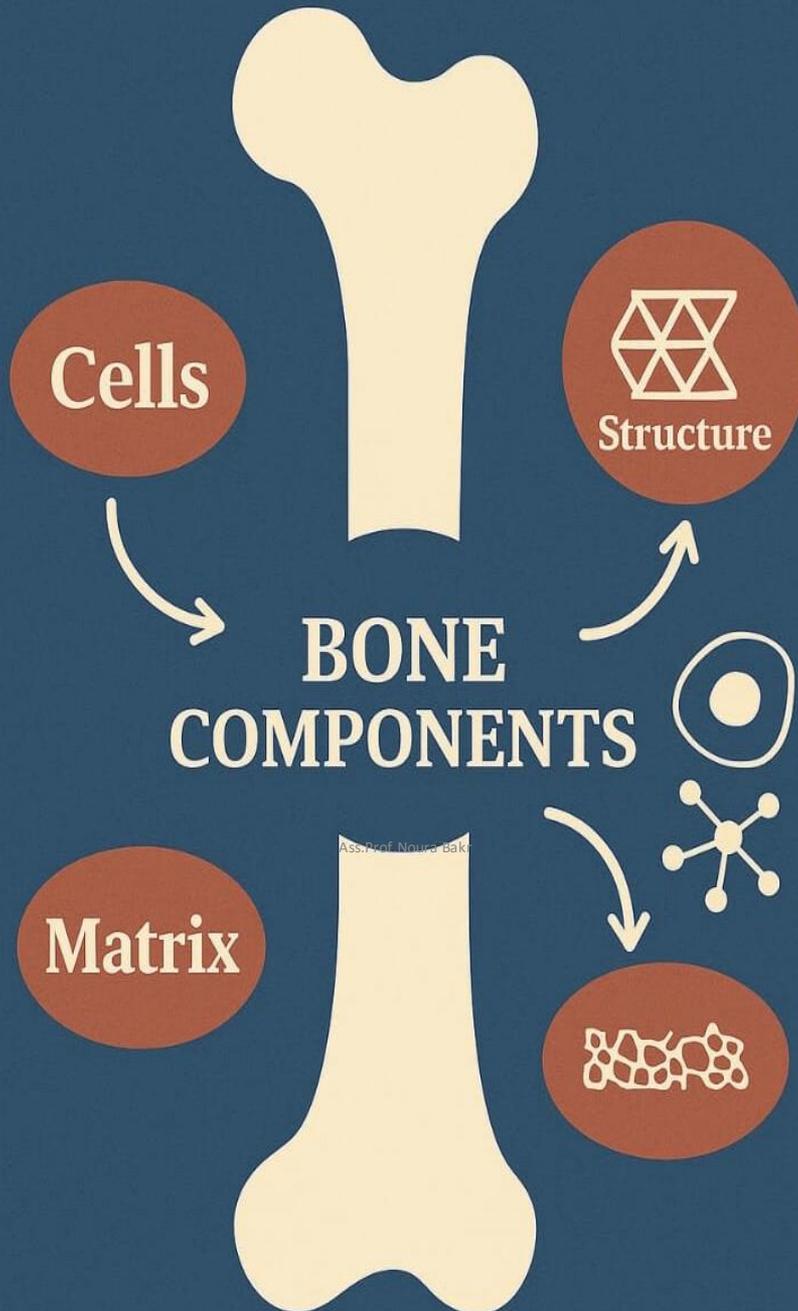
Bone & ALVEOLAR PROCESS

(part 1)

Basic items

- *Bone structure & cells*
- *Bone types & histologic structure for each types*
- *Incremental lines of bone & its indication*
- *Alveolar bone process micro and macro structure*
- *Bundle bone & clinical , histological, functional and radiographical name*
- *Cortical plate and its clinical significance*
- *Central spongiosa, histological & radiographic*

BONE MATRIX



1 - Organic Component

- Collagen Fibers
- Ground Substance

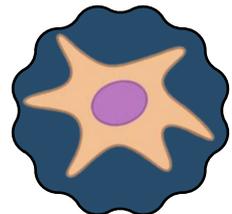
2- Inorganic Component

Hydroxyapatite Crystals ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$)

BONE CELLS



Function •



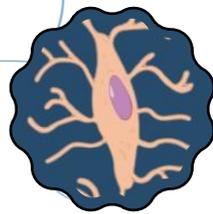
OSTEOPROGENITOR

divide by mitosis to give any other type of bone cells



OSTEOBLASTS

1-bone formation.
2-secretiion of growth factors.
3-controlling influence in activating osteoclasts.



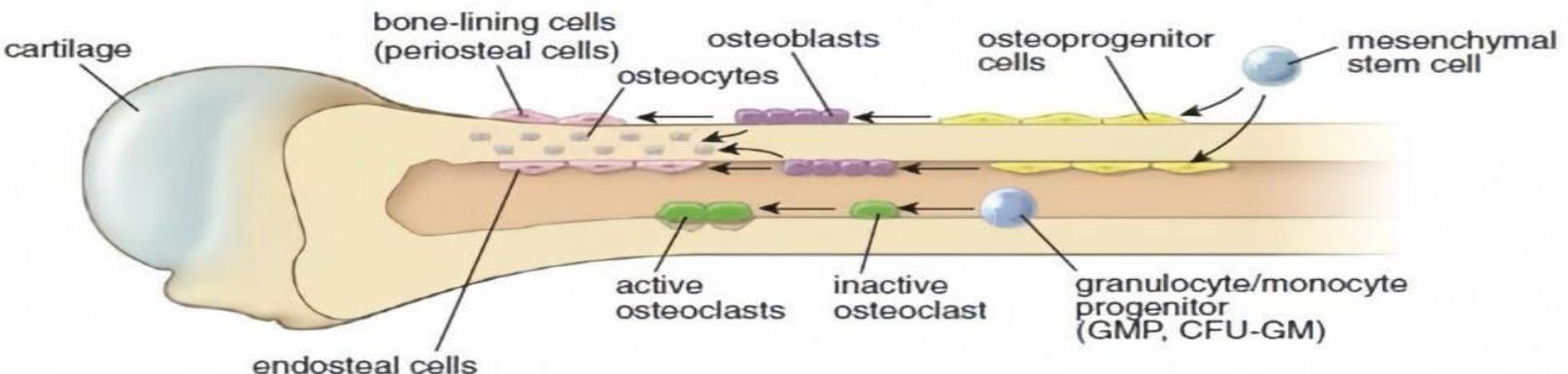
OSTEOCYTES

1-maintain bone integrity.
2-maintain bone vitality.



OSTEOCLASTS

resorption of the bone by acid phosphate enzyme.



► The Remodeling Cycle

Bone is a dynamic tissue that undergoes constant remodeling—**balance between breaking down old bone and building new bone.**

This process is directly tied to hormonal metabolism:

👉 **Resorption (Releasing Calcium):** Specialized cells called **osteoclasts** break down bone tissue (alkaline phosphatase E).

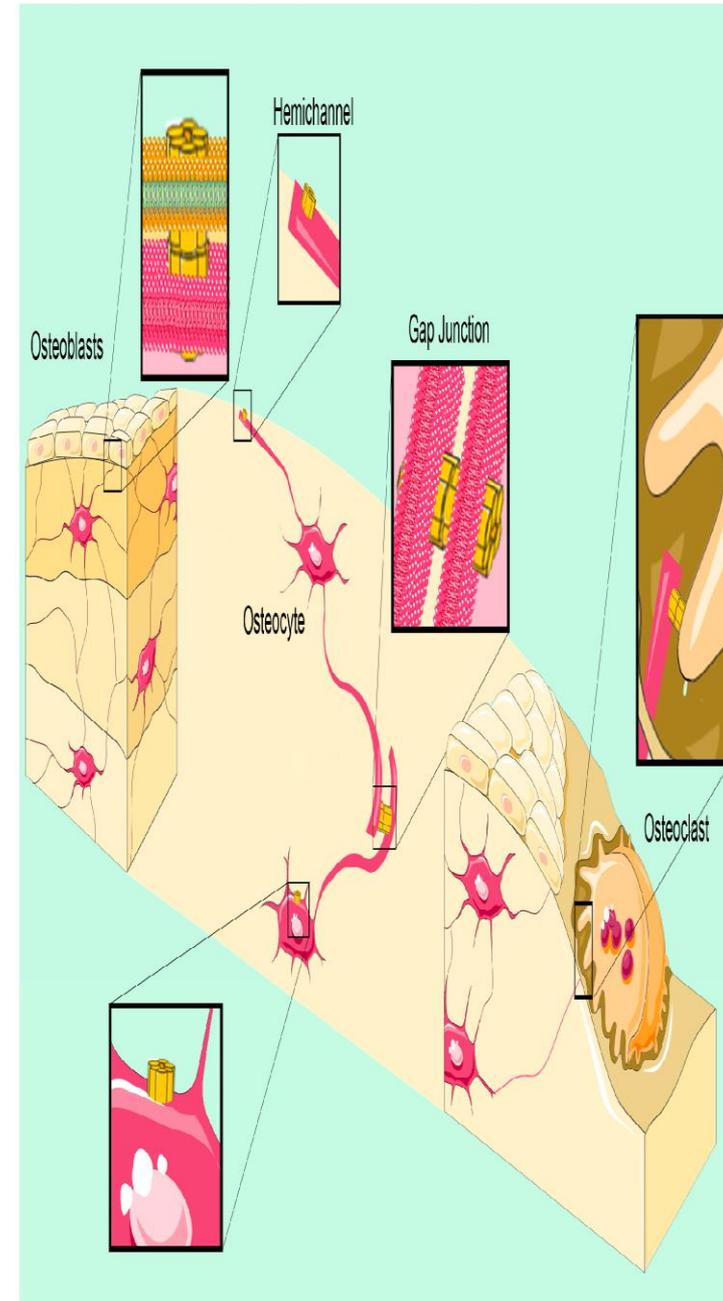
👉 **Formation (Storing Calcium):** Specialized Cells called **osteoblasts** build new bone matrix and mineralize it by depositing calcium and phosphate from the blood (Acid phosphatase E).

Osteocyte cells

They are osteoblast entrapped cell within the bone matrix.

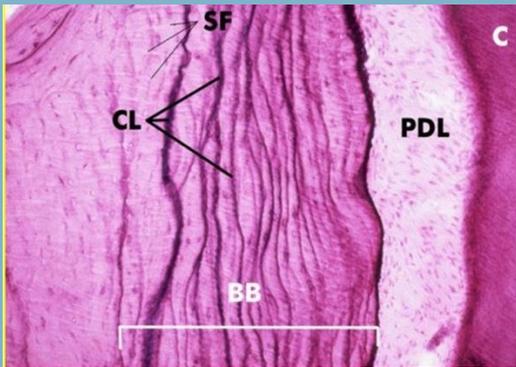
Function: -

- maintenance of bone matrix, and prevent hypermineralization. (formation of functional syncytium (osteocyte – osteoblast complex) to prevent (sclerosis) •
- Help in Ca release from bone to blood.
- controlling bone remodeling.
- Contain alkaline phosphatase to prevent dissolution of bone salts



HISTOLOGICAL STRUCTURE

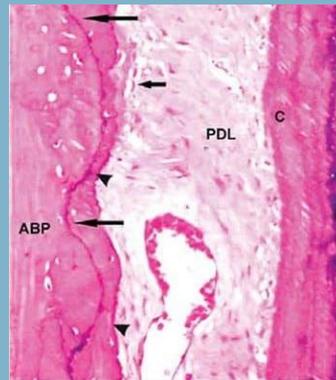
Incremental Lines of The Bone



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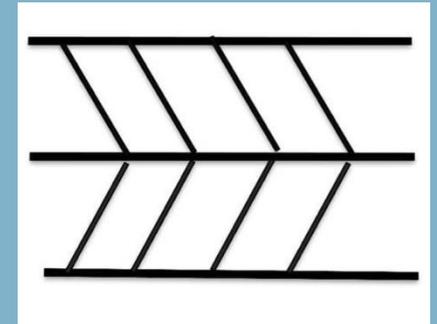
Resting line

Dark blue lines represent periods of rest of osteoblasts (rhythmic manner of bone formation).



Reversal line

Blue scalloped lines represent post osteoclastic activity.



Faint Line

Appear by Silver stain; due to abrupt change in direction of collagen fibres of each successive lamella

TYPES OF BONE

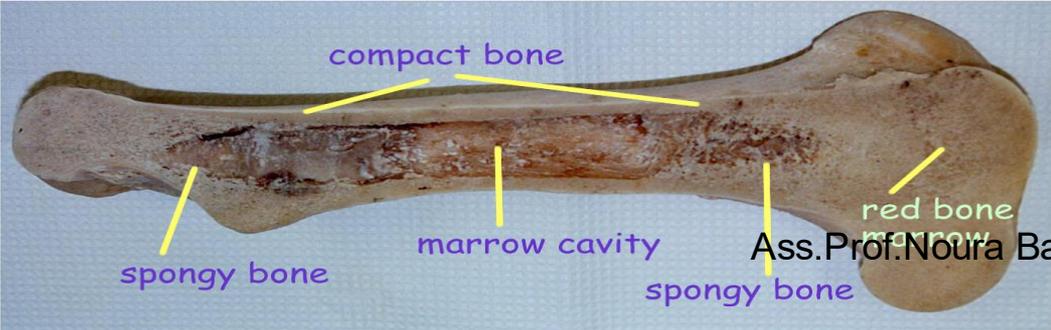
1 – LAMELLAR BONE

2 – Non LAMELLAR BONE

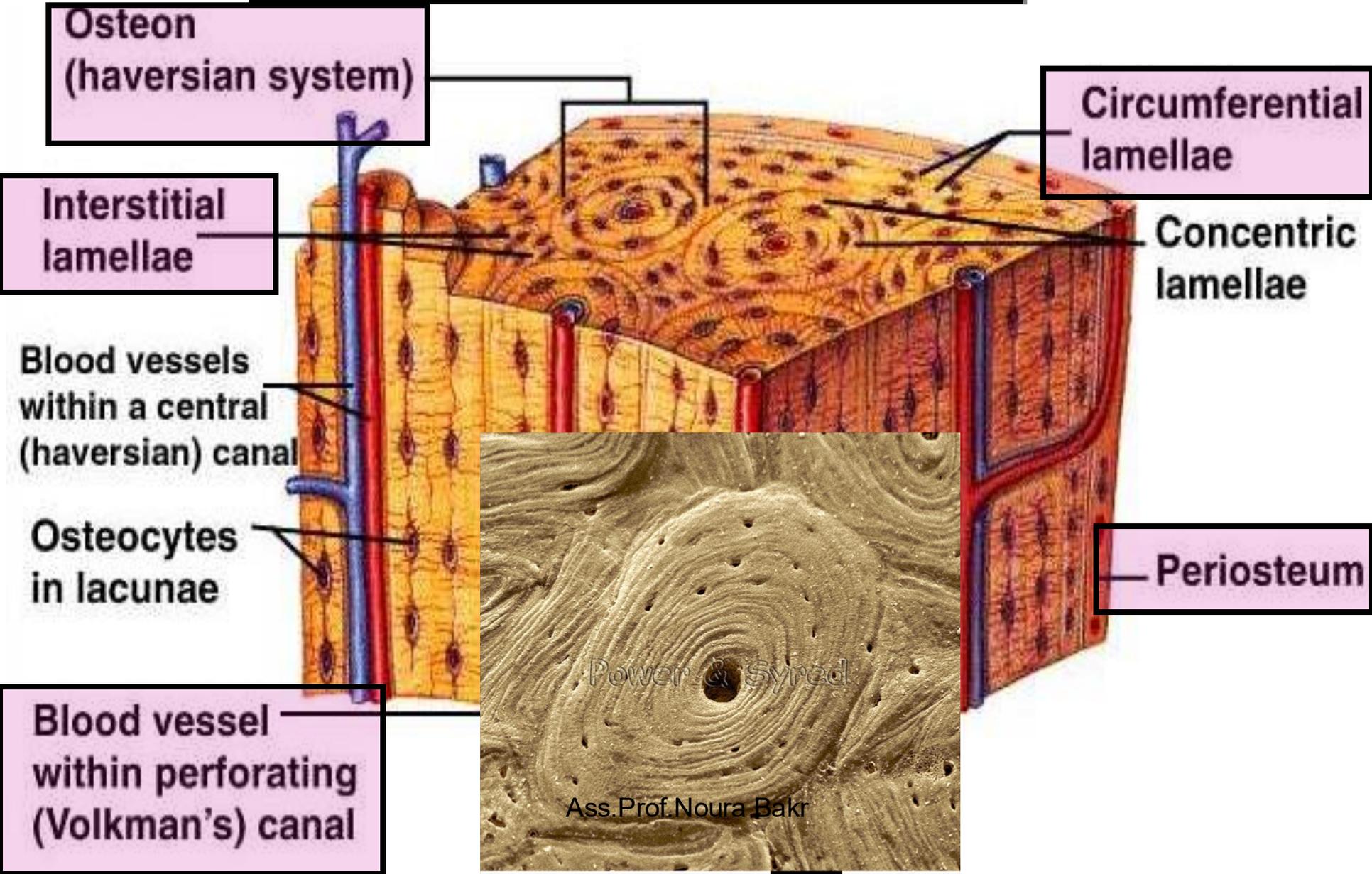
(WOVEN BONE).

3 – BUNDLE BONE.

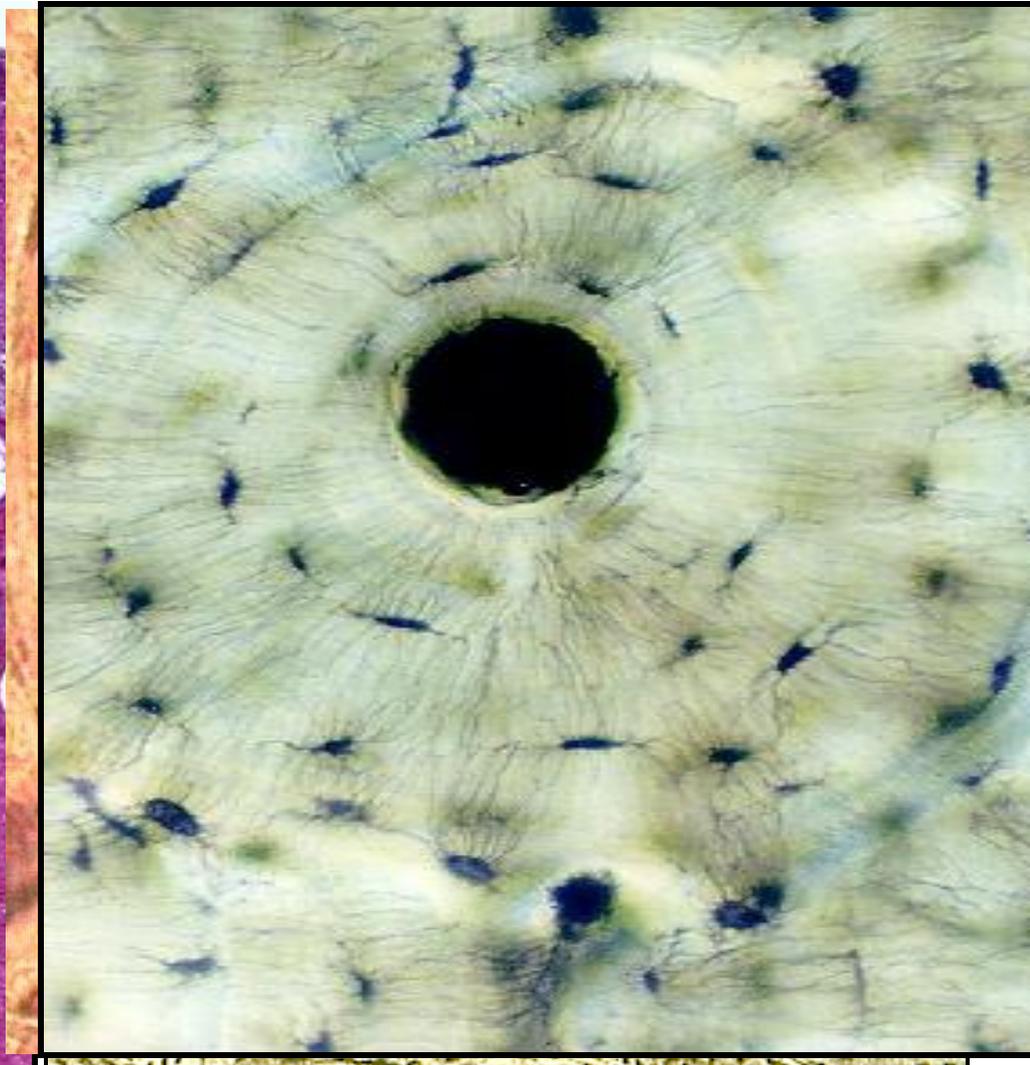
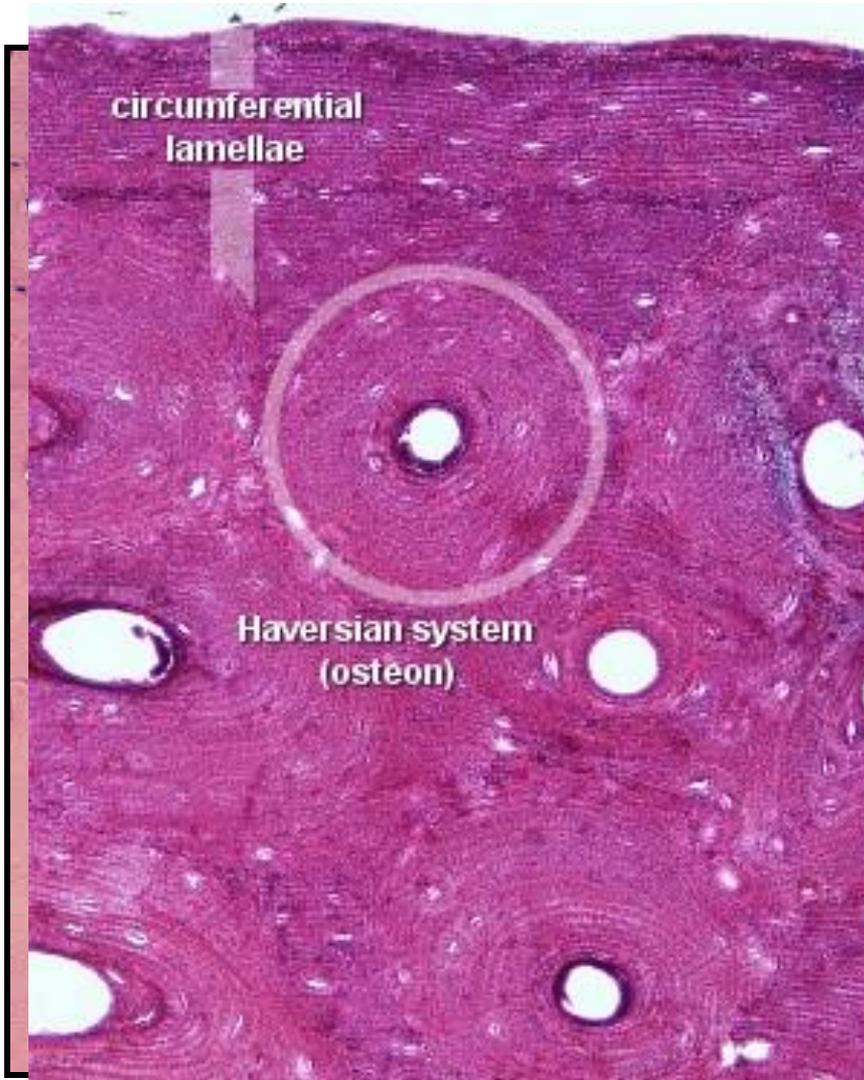
1- lamellar Bone



A – COMPACT BONE



Compact Bone

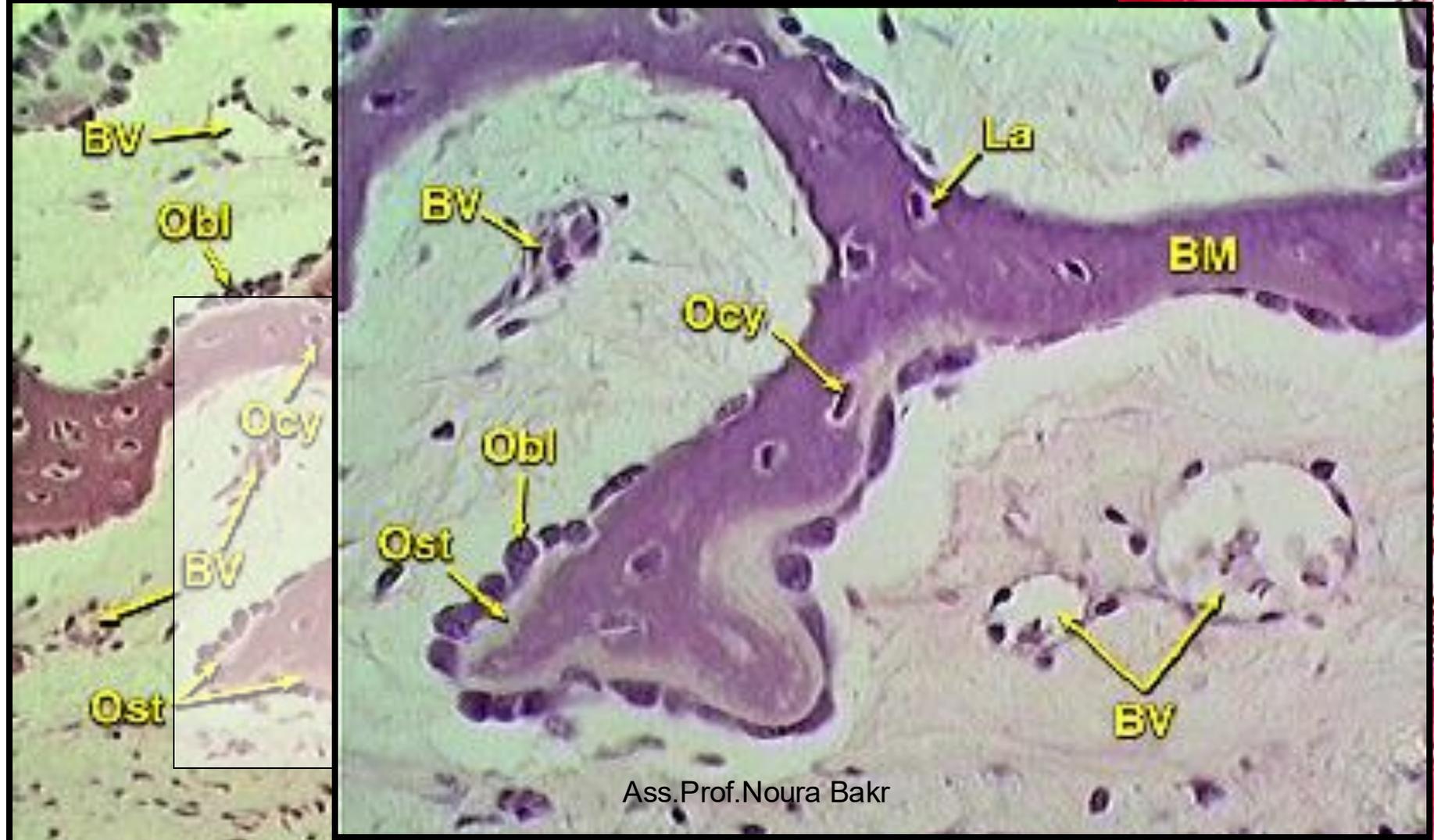


DECALCIFIED SECTION

Ass.Prof.Noura Bakr

GROUND SECTION

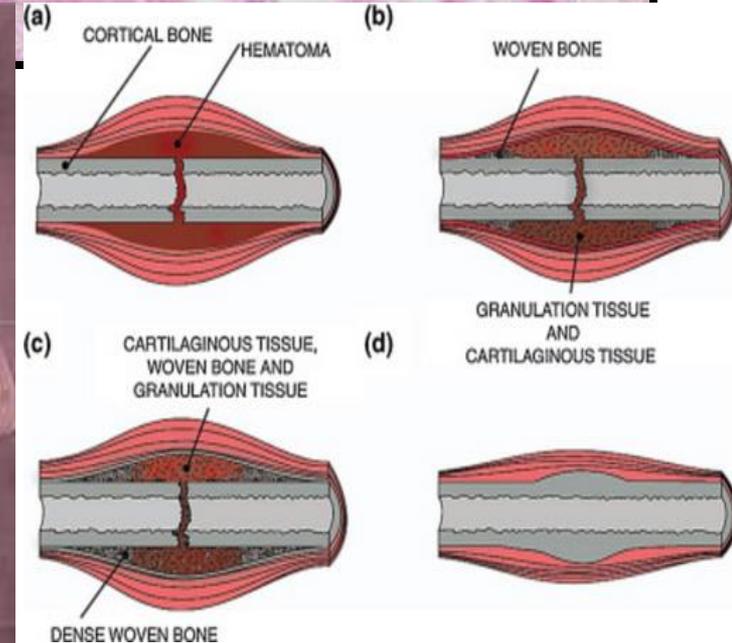
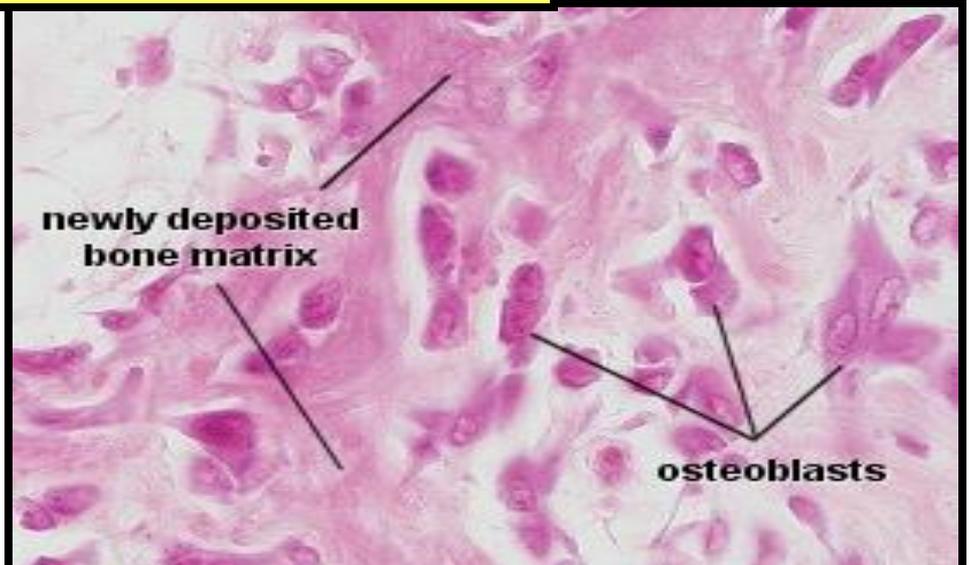
B - SPONGY BONE



2 - Woven Bone

FOUND in areas where bone is laid for the **first time** in a new situation:

- Bone of the foetus = ***Embryonic bone.***
- Callus of fracture = ***Bone of emergency.***
- Healing sockets after tooth extraction.



WOVEN BONE (Histology)

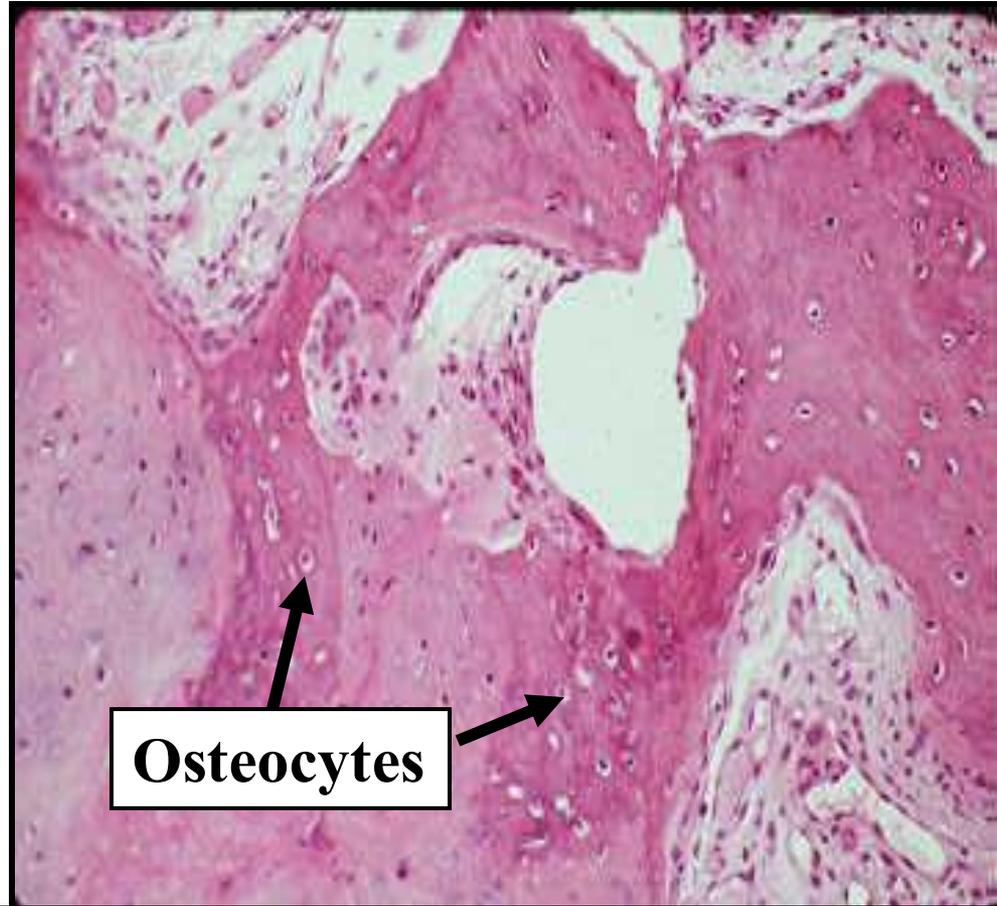
1 – Great number, larger size and irregular arrangement of *osteocytes*.

2 – Numerous and irregularly arranged *collagen fibers*.

3 – Higher *proteoglycans*.

4 – Increase in the organic substance and decrease in the inorganic contents.

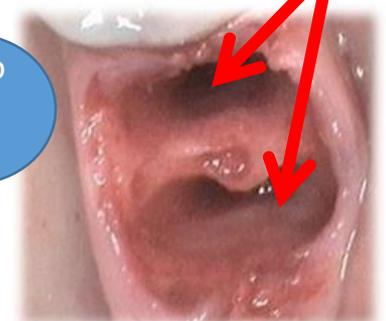
5 – Also it is *more radiolucent* in the X-ray



Note: *The bone of emergency* never change directly into lamellar bone but it must be resorbed and then replaced by lamellar bone.

Clinical consideration failure of woven bone formation after tooth extraction in the socket

- **Dry socket** formation due to failure of blood clot formation with subsequent failure of woven bone formation.
- The **dry socket** leaves underlying nerves exposed, which is very painful. The condition is treated by a dentist who cleans the wound and places a special dressing (Alveogel) into the **socket**.

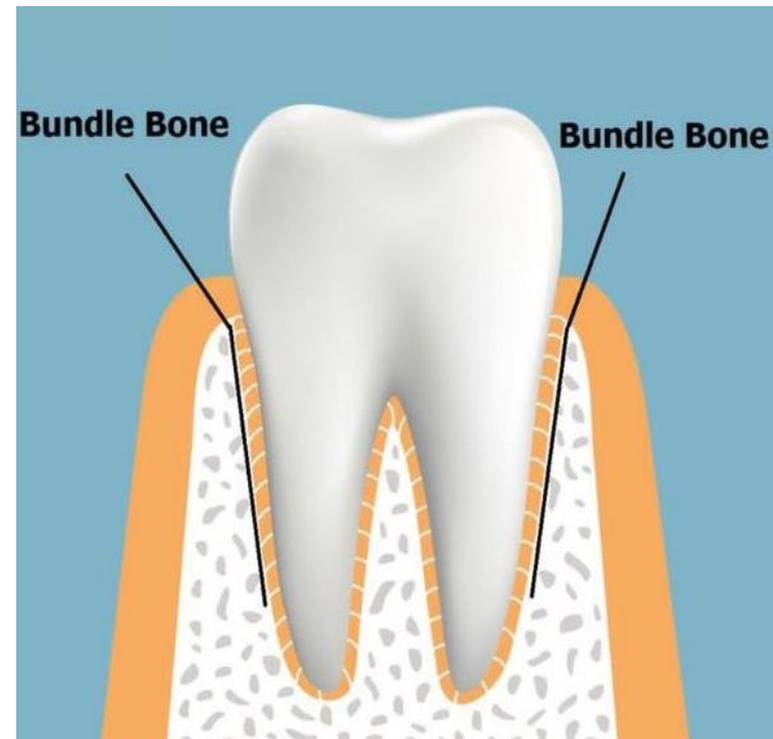
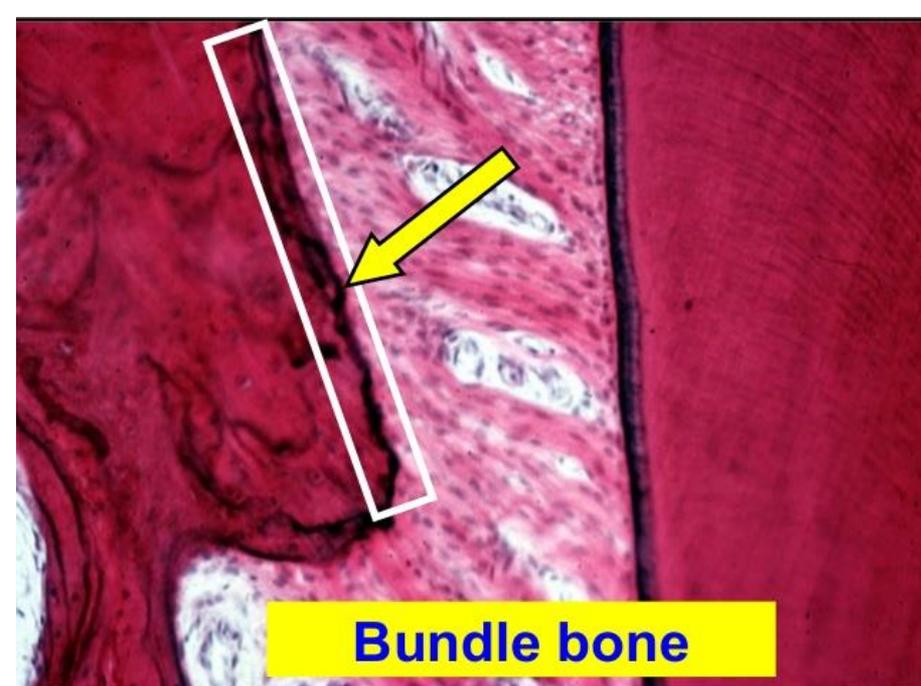


NORMA

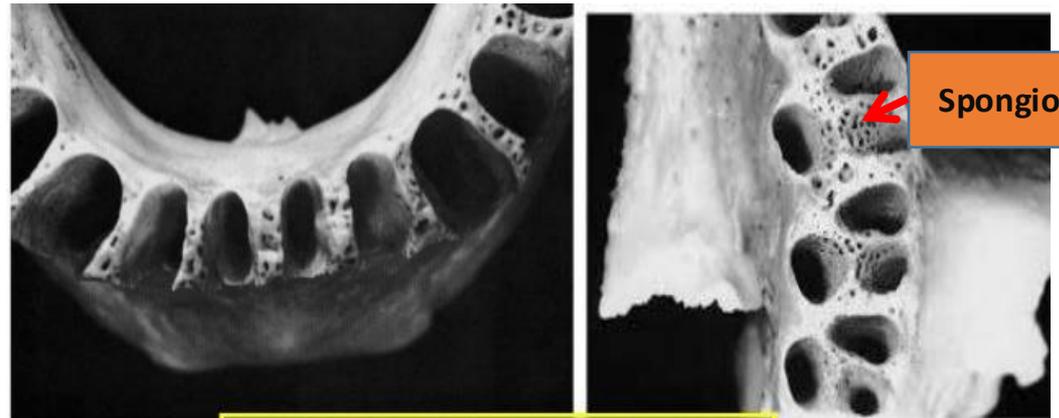
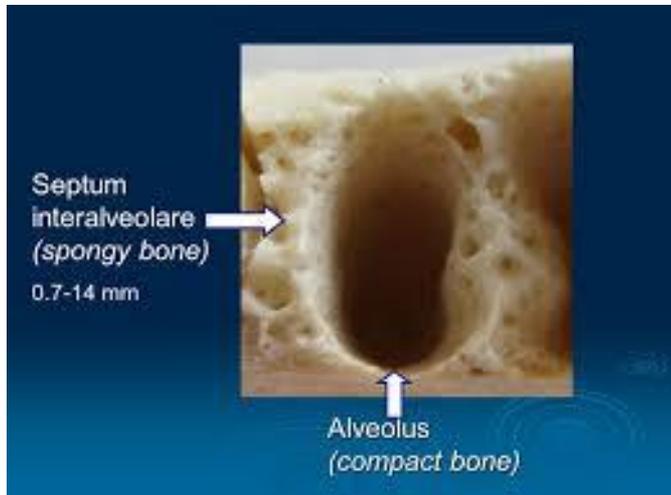
Dry socket
DEPARTEMENT

3- BUNDLE BONE

- Found adjacent to the periosteum and PDL forming the inner wall of the socket.
- It has coarse collagen fibres arranged parallel to each other and perpendicular to Sharpey's fibres.



Roots of adjacent teeth are separated by inter-dental septa while roots of the same tooth are separated by inter-radicular septa.





THE ANIK
YOMI