



**Al-Mustaqbal University**  
**College of Science**  
**Forensic Evidence Department**  
**Second Stage**



جامعة المستقبل  
AL MUSTAQBAL UNIVERSITY

## كلية العلوم قسم الادلة الجنائية

Lecture (5)

عنوان المحاضرة

المادة : انسجه عملي .

المرحلة : الثانية

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## **The bone:**

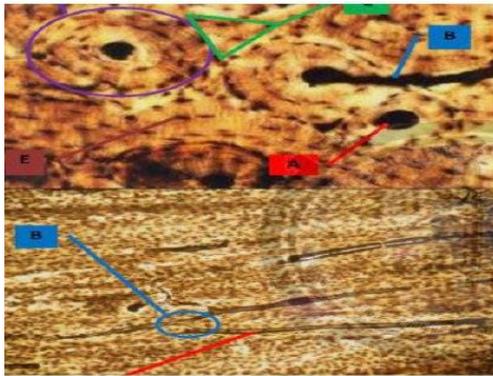
Bone tissue represents the highest degree of specialization between the connective tissues. It is a solid tissue that forms most of the structure of the upper vertebrate bodies. The bone consists of cells, fibers and a base material. But the distinctive characteristic of the bone is the presence of inorganic salts in its main substance, which is the cause of its hardness and includes calcium phosphate, calcium carbonate and other salts.

Visually, the bone is surrounded by a hard fibrous shell, the Periosteum, and the bone spaces in the interior are filled with pure Marrow tissue. The bone is characterized by two types according to its degree of solidity: the dense bone (**compact bone**), which is usually exogenous site and spongy bone and is usually internal site.

## **Compact bone:**

The interstitial material of the solid bone in the form of Bone lamellae is arranged in a special order, and is flat or arched concentric parallel to each other. Osteocytes are located within gaps surrounded by capsules and are in rows within or between bone plates and bone cells with cytoplasmic protrusions passing through the canals of the Canaliculi, extending from the gaps within the bone-penetrating interstitial material. Single-gap cannulas are associated with adjacent-cannula ducts, forming a network through which nutrients, oxygen and waste are transported. In the cross section of the solid bone we note that the centers of bony platelets is a central channel is the Haversian canal.

The Havers canal with the surrounding bony platelets is the Haversian or Osteon apparatus. In the longitudinal sections of the solid bone, the Havers channels appear parallel to the longitudinal axis of the bone. Among the Havers apparatus are bone plates called interstitial lamellae. Havers' apparatus are separated from each other by a thin layer of mutated interstitial material that looks bright and homogeneous, forming the so-called Cementing line or membrane. transported to and from the blood.



مقطع عرضي للعظم المصمت	
A- Haversian canal	قناة هافرس
B- Volkmann's canal	قناة فولكمان
C- Interstitial lamellae	الصفائح البينية
D- Haversian system	جهاز هافرس
E- Osteocyte	الخلية العظمية

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Longitudinal Section of compact bone	
مقطع طولي للعظم المصمت	
A- Haversian canal	قناة هافرس
B- Volkmann's canal	قناة فولكمان

## Spongy bone:

The interstitial material of this bone is irregularly shaped as Trabeculae. Bone marrow is surrounded by areas of cuboid, pyramidal, or flat cells with a large nucleus called osteoblast. Between osteoblasts, large cells with more than one nucleus may be observed. These cells are found in shallow pits called the Howship's lacunae, called Osteoclast cells. These cells arise either from the combination of inactive osteoblast cells or from mesenchymal tissue cells.

## Bone formation:

The bone is formed in two ways:

### 1. Intramembranous development:

Where the bone is formed within a membrane of connective tissue and called membrane bones like skull bones .

### 2-Endochondral or intracartilagenous development:

Where the bone is formed within the transparent cartilage called cartilage bone and long bones are formed in this way.

When examining a longitudinal section of Will bone formed in this way we will note the following areas:

#### 1. Reserve zone

The end of the bone is dilated and consists of young glass cartilage tissue.



## **2. Zone of proliferation**

The first area, which is effective in dividing its cells to form new cartilaginous cells, follows these cells into rows or columns parallel to the longitudinal axis of the bone. The cells of a row are flat and separated from each other by a thin interfacial material while the rows are separated by a clear interfacial material.

## **3. Maturation zone or zone of hypertrophying cells**

In this area the cells stop dividing and cartilage cells appear with the gaps they contain.

## **4. Zone of calcifying cartilage**

In this area, the interstitial material has been calcified where it appears dark in color with the base pigment.

## **5. Zone of erosion or retrogression**

The cartilaginous cells in this region are dead and decomposed, and the interstitial separating the cells of the same row is broken, so the gaps are open to each other and the cavities contain the primary marrow. The calcified cartilage plates that separate the columns from each other are still dark and dark.

## **6. Zone of ossification**

They are intertwined with the area before them and Osteoblasts arising from some cells of the first pure tissue have settled in the calcified cartilage plates and began to form a new bone material that appears to open a color of calcified cartilage.

## **7. Zone of Resorption**

This area occupies the center of the bone or the so-called bone sheath Diaphysis, and where the cavity of the myelina has increased significantly as a result of bone absorption from the center is called this cavity secondary cavity secondary marrow cavity and contains blood cells in various stages of formation and a large number of venous sinuses. And the remains of great thin lamellae.

