

# **GANGRENE, CALCIFICATION, AND GOUT**

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**Lecture 4**  
**2023-2024**

# Gangrene

- Gangrene characterized by tissue necrosis (cell death) with supra added putrefaction.
- Caused either by infection or ischemia to a certain region of body.
- Most commonly occur in the extremities but could be occur in organs also.

# Causes of Gangrene

Diseases in which gangrene is prone to occur include :

- Arteriosclerosis
- Diabetes
- Typhus
- It also may occur after severe burns, freezing, or prolonged bed rest (bed sores).

# Types of Gangrene

**1. Dry Gangrene**

**2. Wet Gangrene**

**3. Gas Gangrene**

# Dry Gangrene

Dry gangrene predominantly **consists of coagulative** type of necrosis.

- ✓ **Causes:** Arterial occlusion (e.g. atherosclerosis).
- ✓ **Sites:** It usually involves **a limb**, generally the distal part of lower limb (leg, foot, and toe).

# Dry Gangrene

- ❖ **Gross:** Affected part is dry, shrunken (shriveled) and dark brown or black resembling the foot of a mummy. The black color is due to the iron sulfide. A line of demarcation is seen between gangrenous and adjacent normal area.
- ❖ **Microscopy:** The necrosis (coagulative type) shows smudging of soft tissue and overlying skin. The line of demarcation consists of granulation tissue with inflammatory cells.



# Wet gangrene

Wet gangrene predominantly consists of liquefactive type of necrosis.

- Causes: Due to the venous blockage (e.g. strangulated hernia).
- Sites: Occurs in moist tissues or organs (e.g. bowel, lung, mouth, etc.).

# Wet gangrene

- Gross: The affected part is soft, swollen, putrefied and dark.
- No clear line of demarcation.
- Microscopy: Liquefactive type of necrosis.





## Differences between dry and wet gangrene

Wet Gangrene	Dry Gangrene	Characteristics
Bowels	Limbs	Common site
Volvulus and intussusception	Gangrene due to atherosclerotic narrowing of blood vessel of lower limb	Examples
Commonly venous obstruction	Arterial obstruction	Cause of ischemia
abrupt	Slow	Rate of obstruction
Swollen, soft and moist	Shriveled dry (mummification) and black	Appearance of involved part
Not clear cut	Clear cut	Line of demarcation
Rapid	Slow	Spread
Poor due to severe septicemia	Fair	Prognosis

# Gas gangrene

Gas gangrene: is a **special type of wet gangrene** caused by infection with a bacterium called *Clostridium Perfringens*.

- Bacteria gather in an injury or surgical wound that has no blood supply.
- The bacterial infection produces toxins that release gas and cause tissue death (e.g. muscles and complication of operative procedures on colon).
- **Toxins produced** by *Clostridium Perfringens* cause local necrosis and edema, also this toxin circulated in blood and causing severe systemic manifestations (septicemia).

# Gas gangrene

Heart muscle

(Myocardium)

**A:** Greenish appearance of the subcutaneous fascia that containing bubbles (arrows).

**B:** Petechial hemorrhages in the endocardium (arrows).



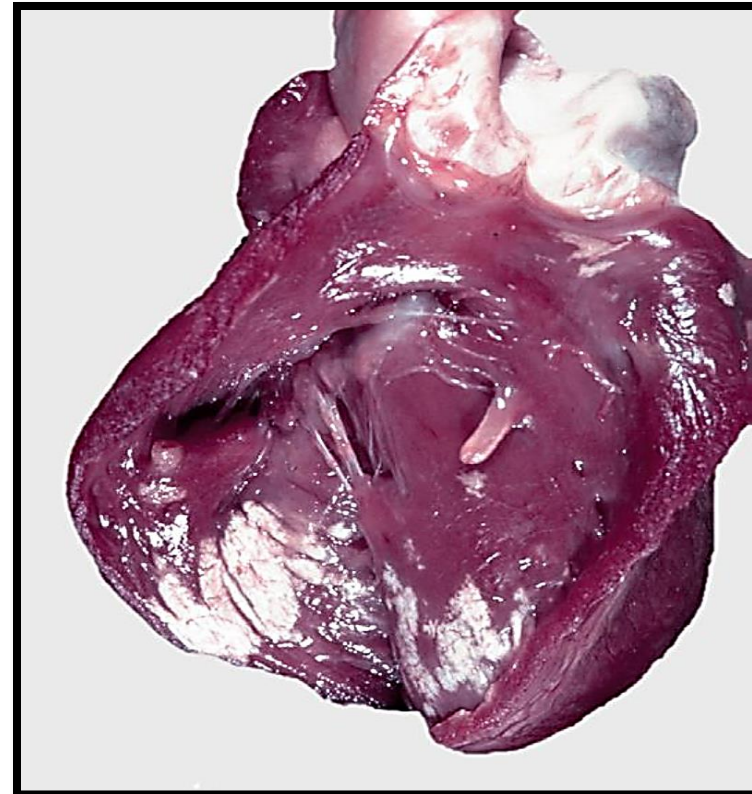
# Pathological Calcification

- Abnormal deposition of calcium salts in soft tissues other than osteoid or enamel.
- The calcium is usually deposited as calcium phosphate and calcium carbonate.
- It is also associated with deposition of small amounts of iron, magnesium and other minerals.

# Types

Pathological calcification can occur in two ways.

- 1) **Dystrophic calcification**
- 2) **Metastatic calcification**



# 1. Dystrophic

## calcification

- Plasma calcium levels and phosphate levels are normal.
- Ca deposits in injured or dead tissue such as:
  - A. Areas of necrosis of any type
  - B. In the arterial lesions of advanced atherosclerosis
  - C. Damaged heart valves

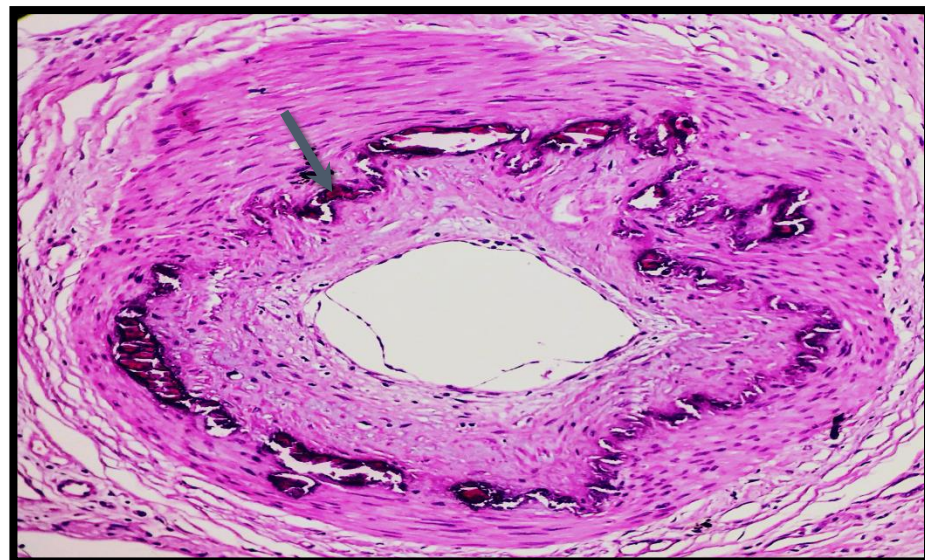
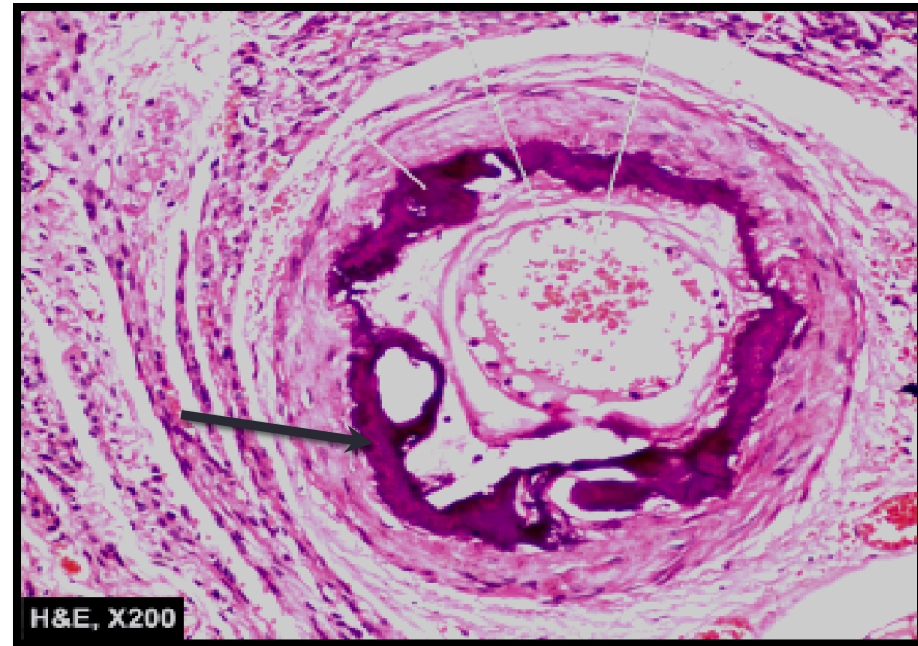
Grossly; calcium deposition occurs as fine, white granules or clumps which are gritty.





Microscopically;

- In Haematoxylin and Eosin stained sections, calcium appears as basophilic, amorphous granular or clumped.
- Special stain for calcium salts VonKossa stain (Calcium appears black in color).



## 2. Metastatic calcification

This form is associated with hypercalcemia and can occur in normal tissues. The major causes of hypercalcemia are:

- (1) Increased secretion of parathyroid hormone.
- (2) Vitamin D related disorders
- (3) Renal failure



# GOUT

- Gout is an inflammatory crystal arthropathy caused by the precipitation and deposition of uric acid crystals in the articular and periarticular tissues.
- The crystals may be monosodium urate (Gout), calcium pyrophosphate dehydrate (Pseudogout), or calcium phosphate.
- Occurs when there is excess production of uric acid (hyperuricemia), or insufficient excretion of the metabolic waste-product uric acid.

# Gout

- *Tophi* are visible nodules containing deposits of the monosodium urate crystals in the joint space.
- Commonly affected joints include larger lower-limb joints such as the knees, ankles, and midtarsal joints. Smaller joints (fingers) and more distal joints (wrists) may also be affected.



Histopathological examination of visceral gout (liver):  
Deposition or irregular accumulation of eosinophilic material (uric acid) with infiltrates of lymphoplasmocytic cells and macrophages within the hepatic parenchyma.

