Hemodynamic disorders

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Practical

Edema: is abnormal increase in interstitial fluid within tissues

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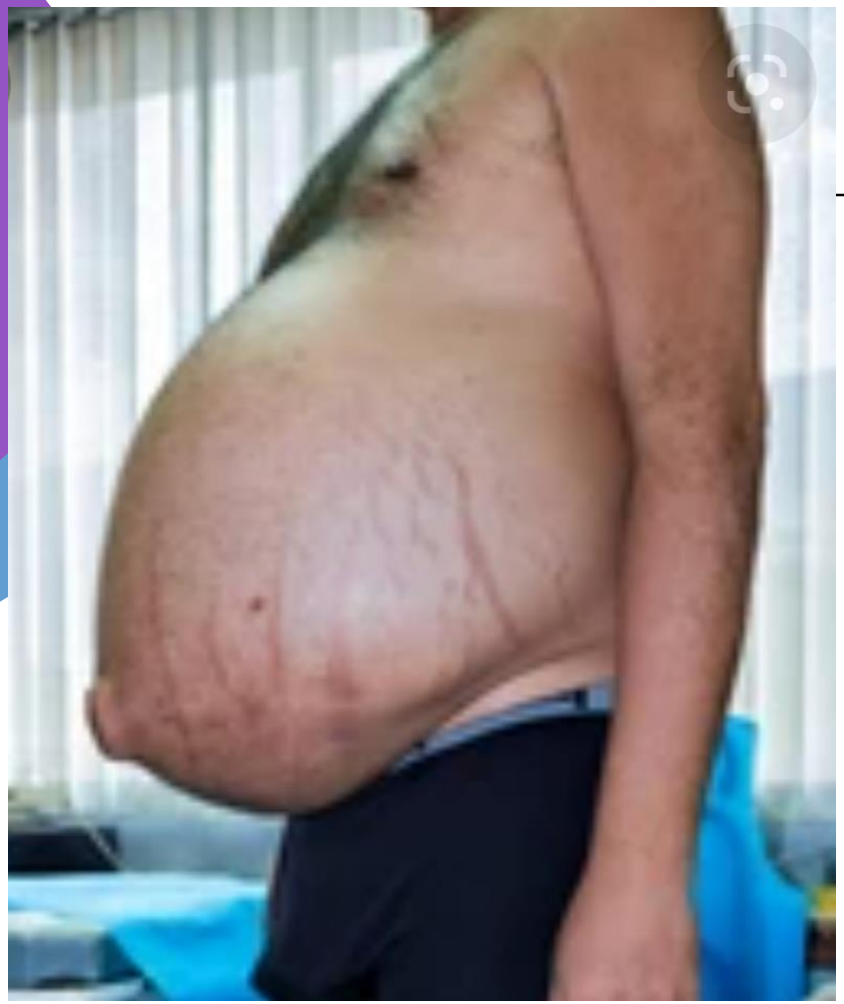
Pathophysiological classification of edema:

A- Inflammatory Edema

B- Non-Inflammatory Edema

1. **Increased Hydrostatic Pressure**
2. **Reduced Plasma Osmotic Pressure**
3. **Lymphatic Obstruction**
4. **Sodium Retention**

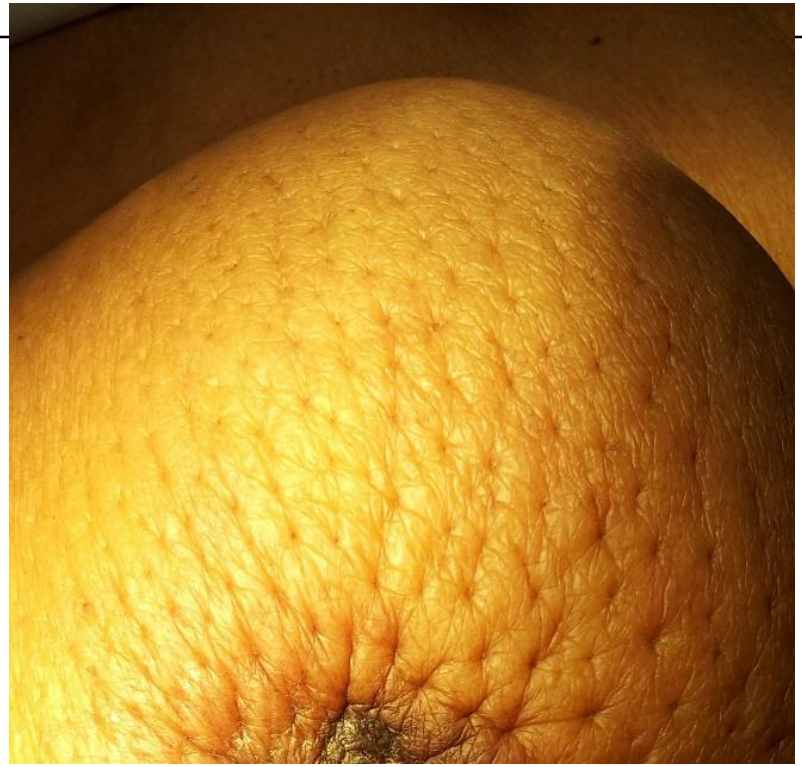


Ascites : abnormal collection of fluids in peritoneal cavity

Anasarca : severe and generalized edema with widespread subcutaneous tissue swelling occur in cirrhosis ,heart and renal failure

Lymphatic obstruction:

Usually cause localized edema



Filariasis which causes lymphatic obstruction& lymph node fibrosis in inguinal region leading to edema of genitalia& lower limb (elephantiasis).

In CA breast, infiltration & obstruction of superficial lymphatics will cause edema of breast skin (peau-de-orange) due to depression of the skin at site of hair follicles.

HYPERMIA AND CONGESTION

Both mean local increase in blood volumes.

	HYPEREMIA	CONGESTION
1	An active process	A passive process
2	Increased blood flow (vasodilatation)	Impaired blood flow
3	During exercise & in inflammation	Venous obstruction & cardiac failure
4	Oxygenated blood (Redder)	Deoxygenated blood (Cyanosed)

Morphology of generalized congestion:

Liver

chronic venous congestion of liver resulting from right sided heart failure

Grossly: mottled appearance similar to the **nut meg (** Nut meg liver)

Microscopically:

Congestion of the central venule, necrosis of the surrounding hepatocytes because of pressure &hypoxia

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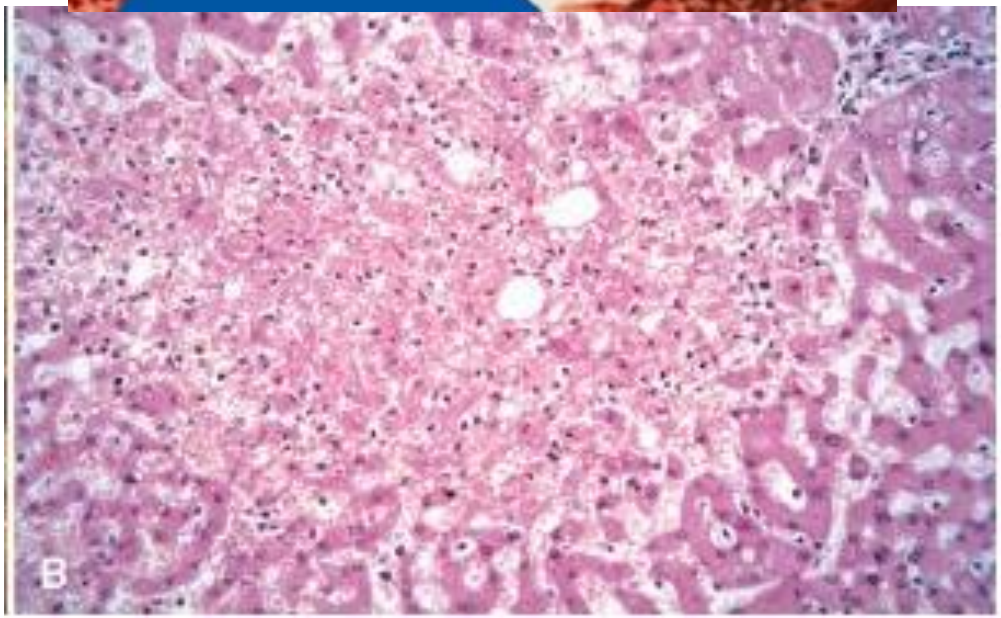
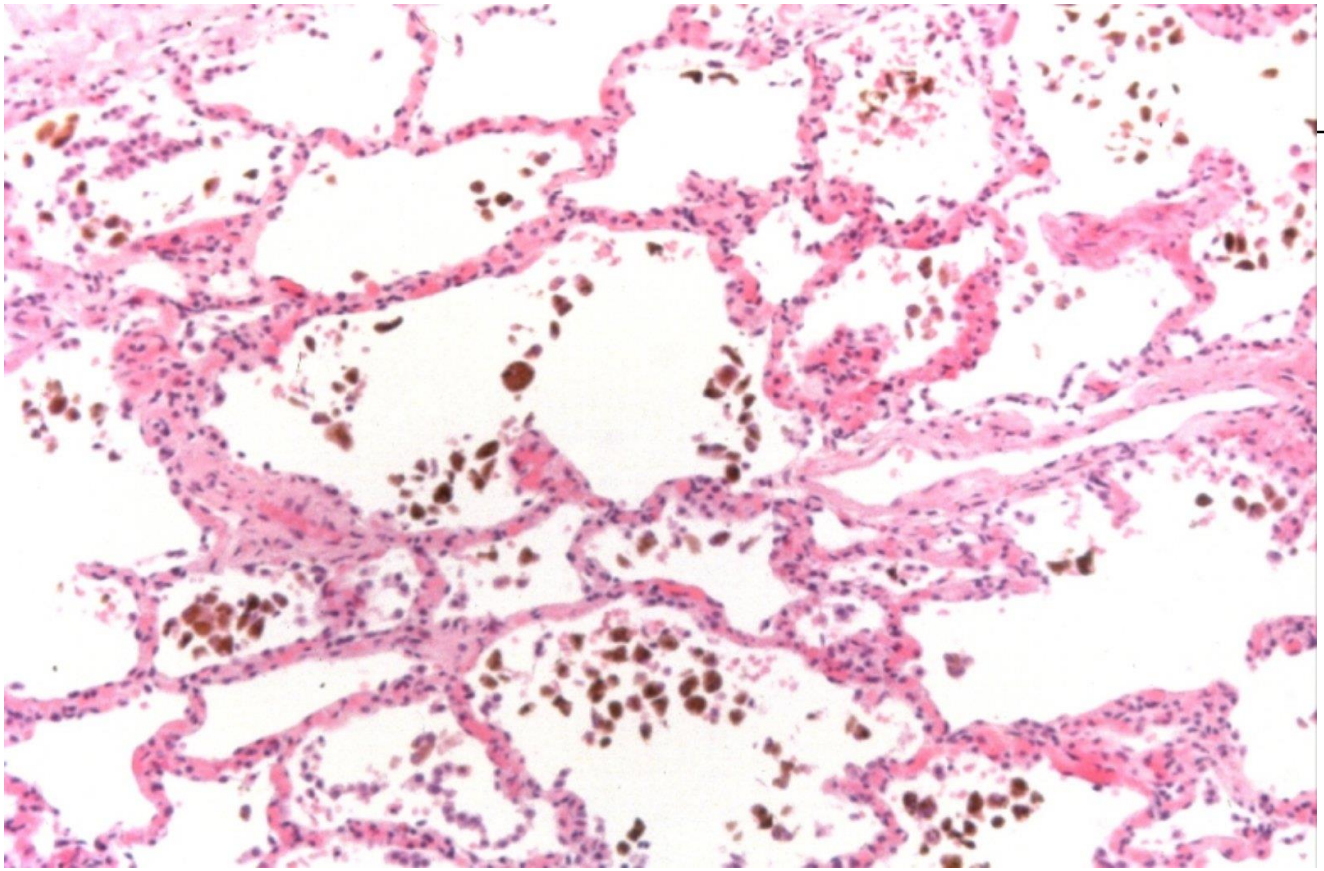


Pulmonary venous congestion:



as in left ventricular failure where there is accumulation of blood in the surrounding dilated capillaries due to congestion , RBCs will escape to the alveolar space & engulfed by macrophages resulting in hemosiderin laden macrophages called (heart failure cells)

THROMBOSIS:

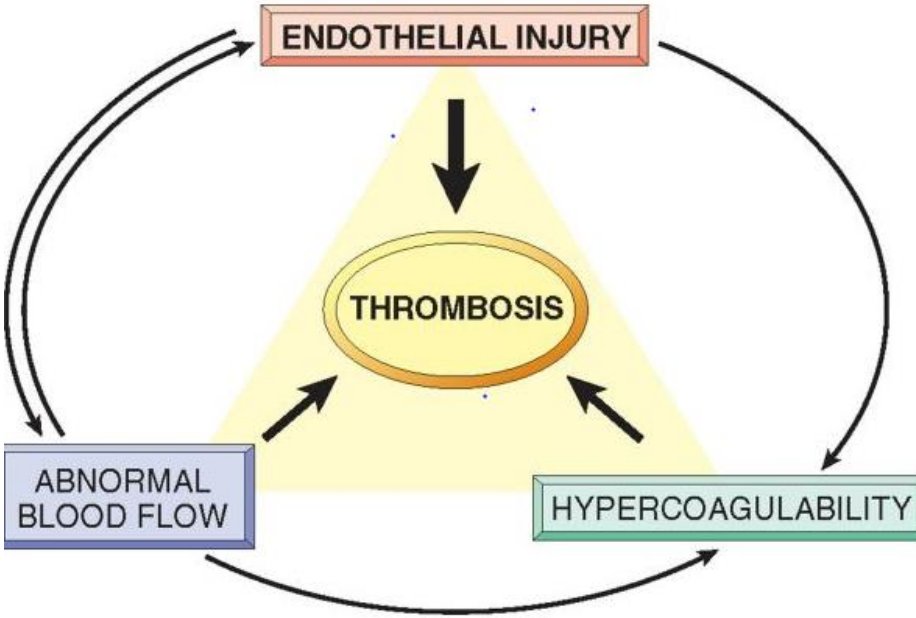
Formation of solid or semisolid mass from blood constituents within the cardiovascular system during life.

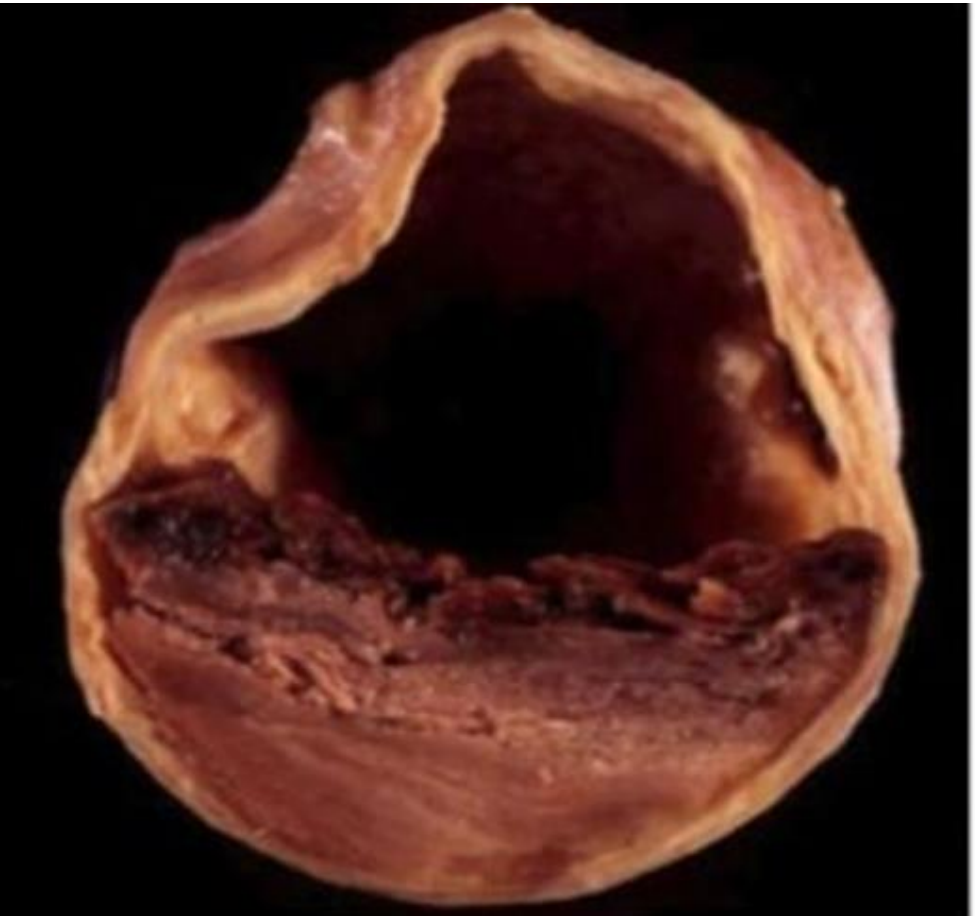
Pathogenesis: (virchows triad):

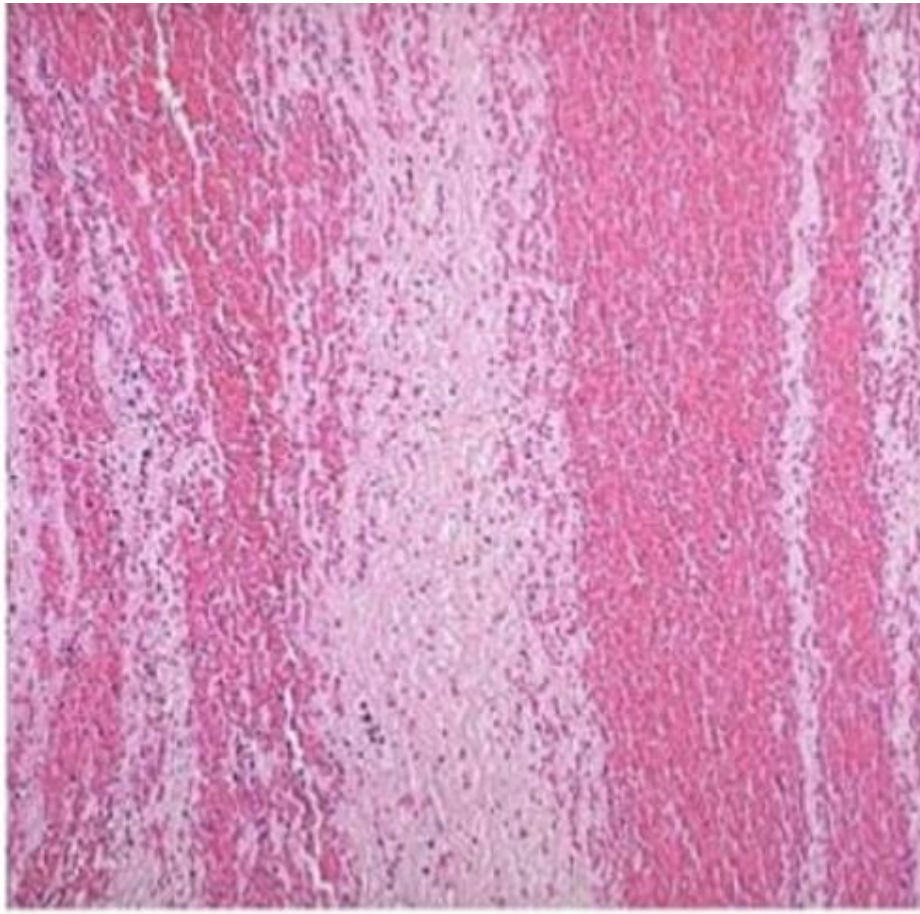
1- Endothelial injury

2- Alteration of blood flow

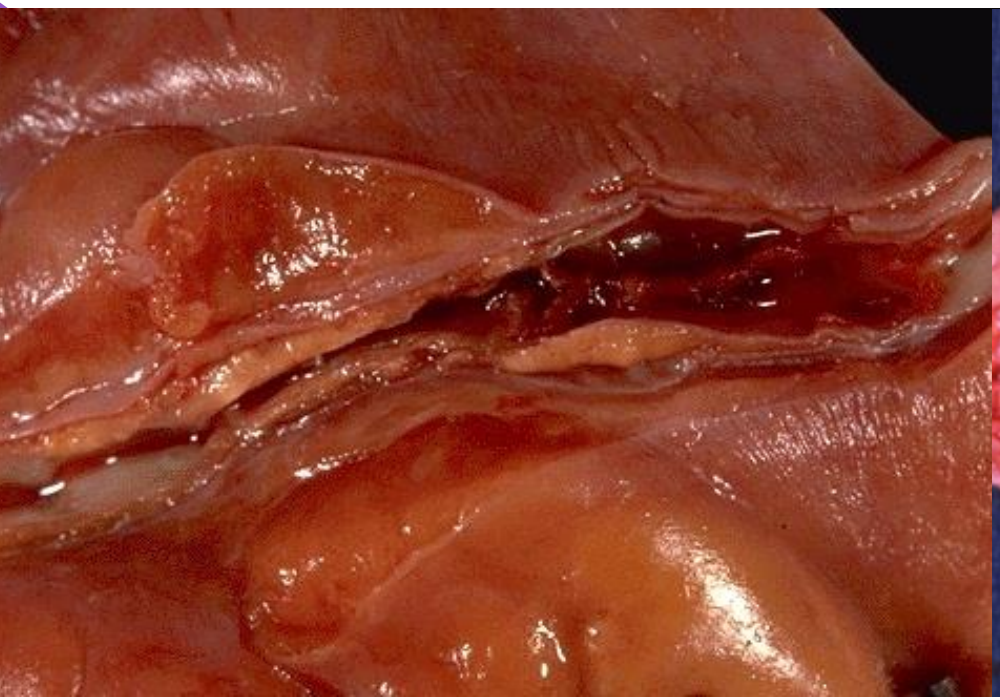
3- Hypercoagulability



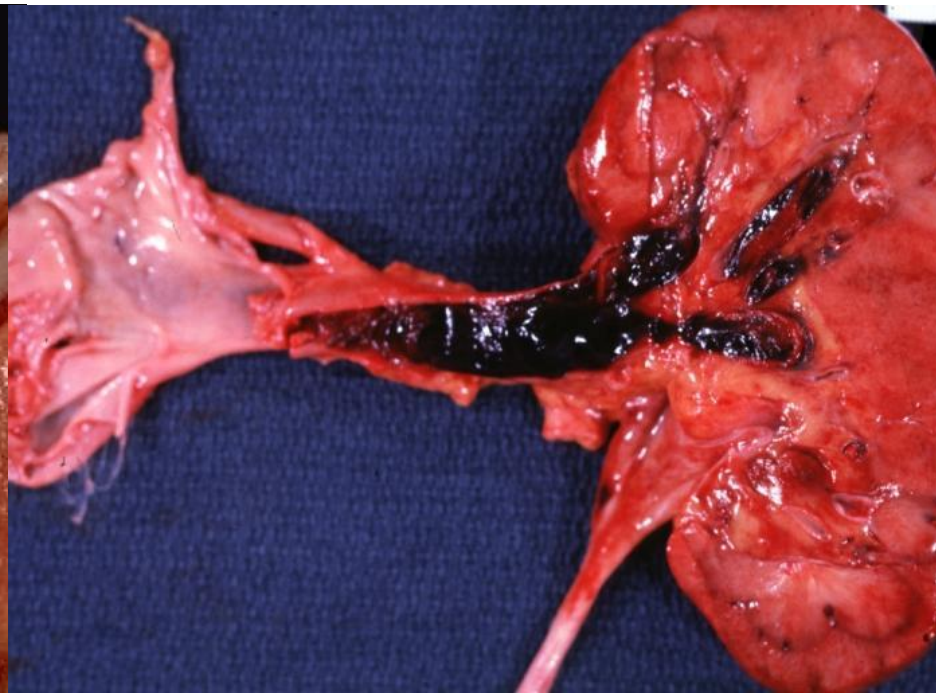




Thrombus often have laminated appearance called **lines of Zahn**; these represent pale platelet and fibrin deposits alternating with darker red cell–rich layers. Such laminations signify that a thrombus has formed in flowing blood; their presence can therefore distinguish **antemortem** thrombosis from the bland non laminated clots that occur **postmortem.**



Thrombus in the coronary (White)



Renal vein thrombosis (Red)

Arterial thrombi: (white thrombi)

- Usually occlusive.
- Most common sites are coronary, cerebral &femoral arteries,
- Firmly adheres to arterial wall.
- Grayish white &composed of platelets, fibrin(lines of Zhan).

Venous thrombi: (red thrombi)

- Almost occlusive because they form in slowly moving blood.
- They contain more RBCs, known as red or stasis thrombi.
- Soft, gelatinous.
- 90% affect veins of lower limbs.

POST MORTEM THROMBUS:

- **Confused with venous (red) thrombus.**
- They are gelatinous with dark red dependent portion where RBCs settled by gravity with **yellow fat "chicken fat" supernatant.**
- Not attached to arterial wall.
- While red thrombi are: more firm, almost always have point of attachment

Embolism:

An embolus is a detached intravascular mass that is carried by blood to a site distant from point of origin. 90% is thrombotic.

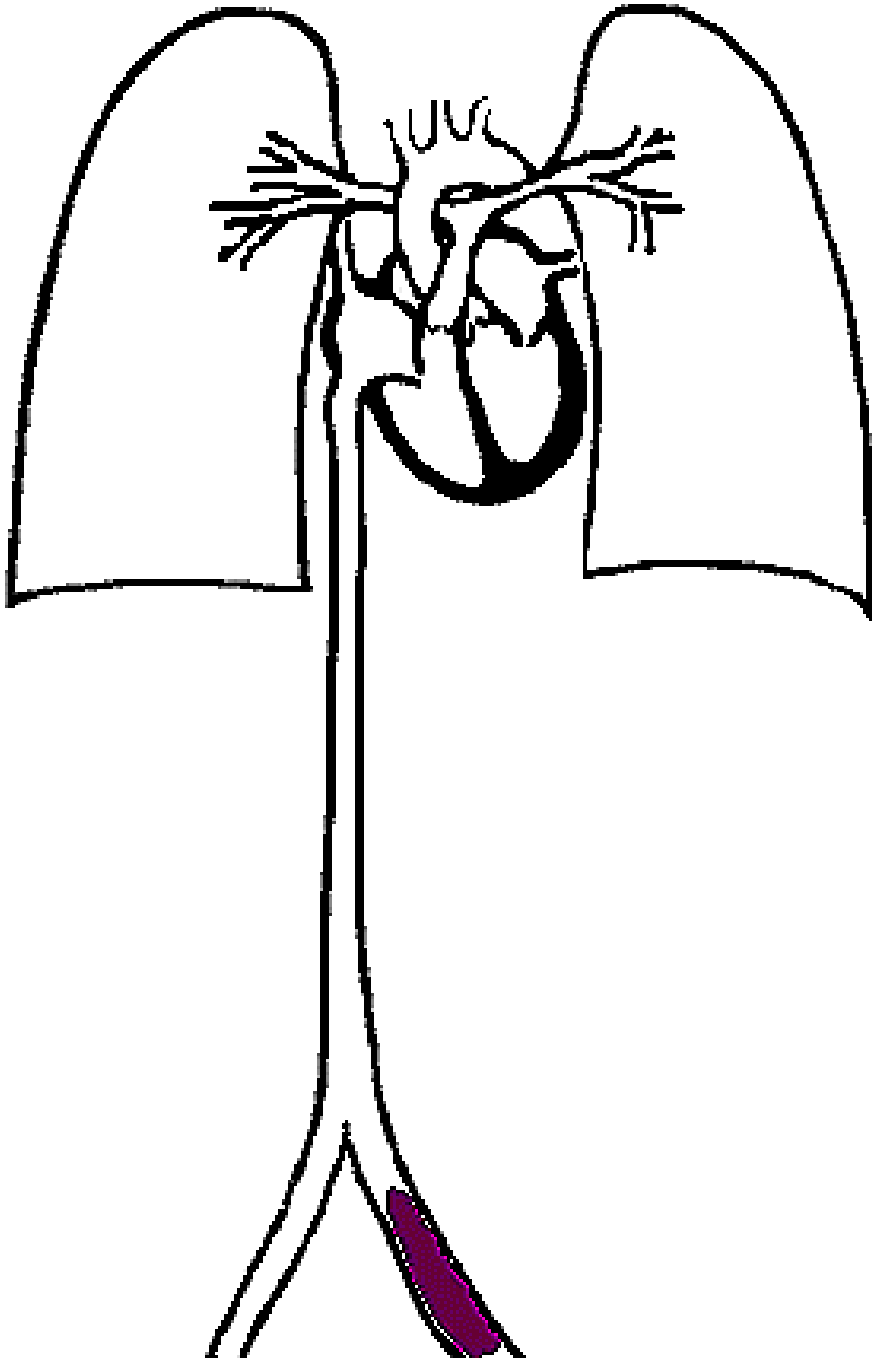
Types of emboli according to the constituents:

1. Solid 2. Liquid 3. Gaseous

Pulmonary thromboembolism

The effect of pulmonary embolism depend on:
Size of embolus and state of pulmonary circulation.

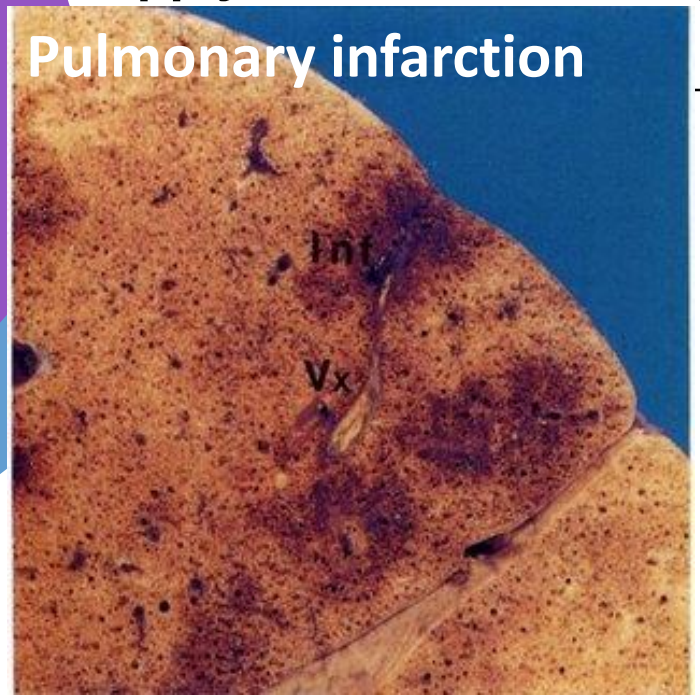
Embolus from a lower extremity deep venous thrombosis, impacted in a pulmonary artery branch (saddle shape embolus).



A pulmonary embolus (PE), begins as a thrombus, typically forming in a large leg or pelvic vein. It dislodges and travels up the inferior vena cava, through the right side of the heart, and into the main pulmonary arteries as they branch.

Infarction

Area of ischemic necrosis caused by occlusion of either arterial supply or venous drainage in particular tissue.



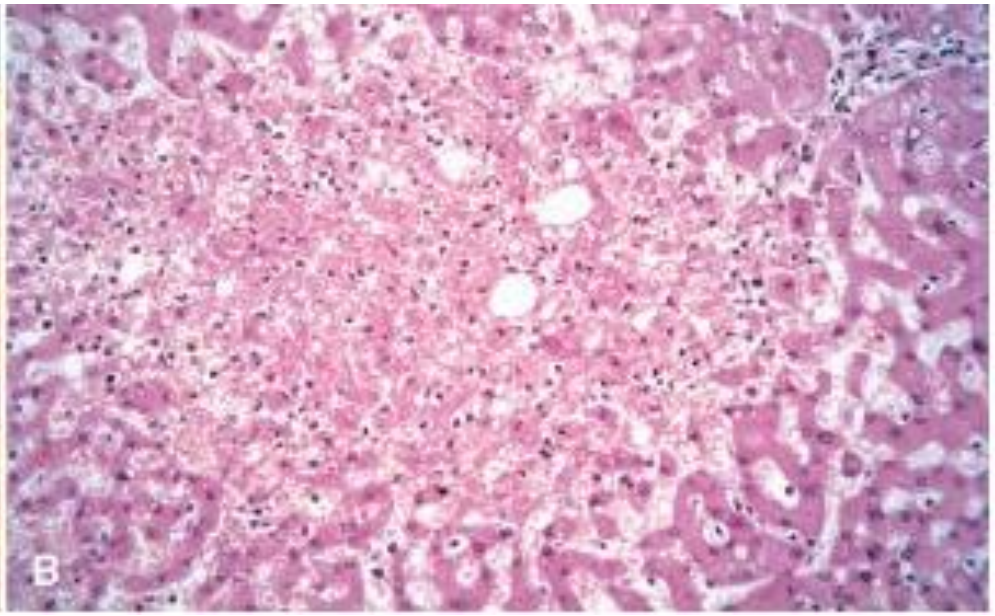
Red Infarct: occur with:

1- Venous occlusion.
2- Loose tissues e.g. lung
3- Tissues with dual circulation e.g. lung & small intestines.
4- Tissues that previously congested
5- When flow **re-established to a site of previous arterial occlusion & necrosis**

White Infarct: Occur with:

1- Arterial occlusion.
2- Solid organs (heart, spleen, kidney

Slides +pictures



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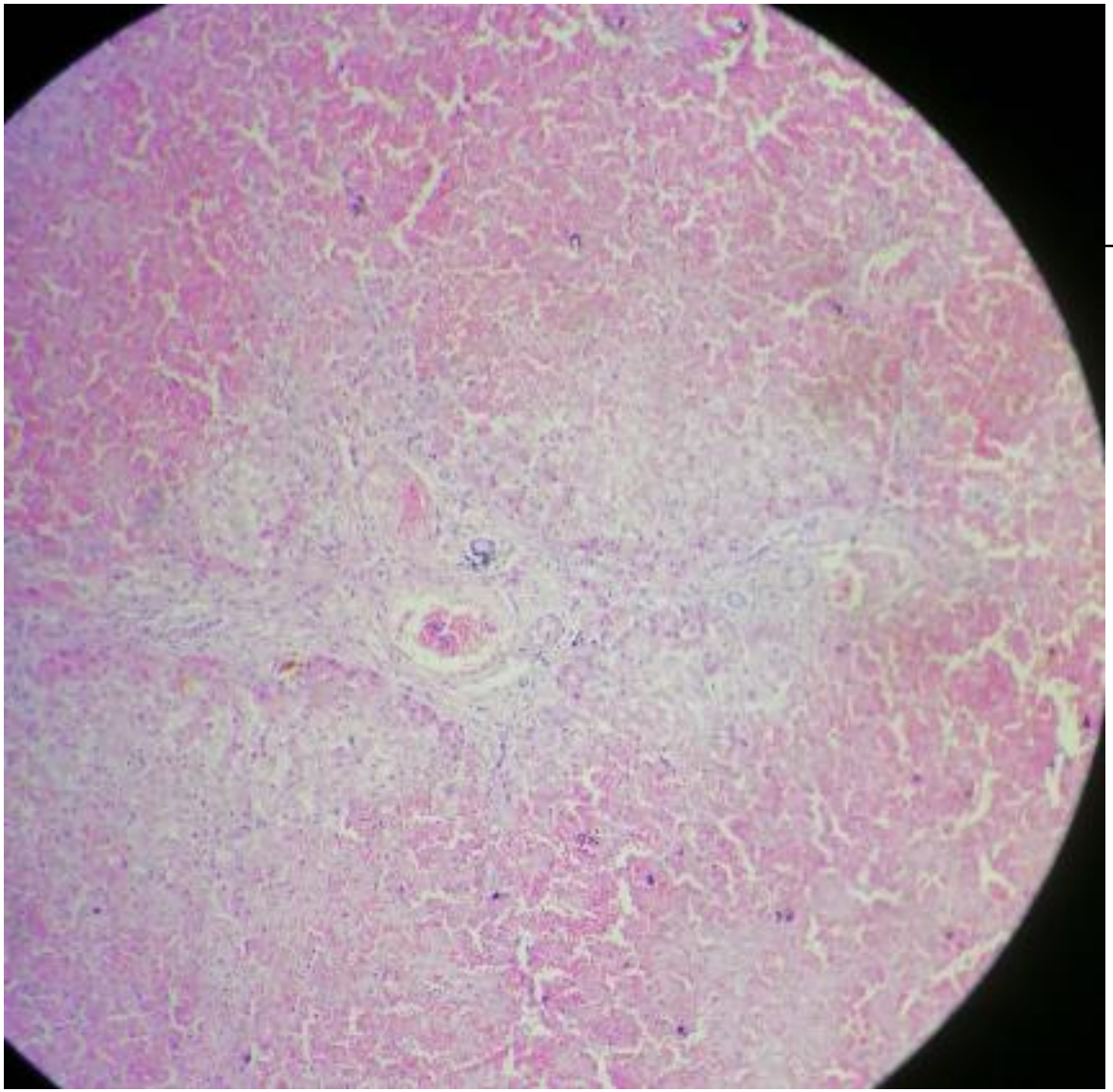

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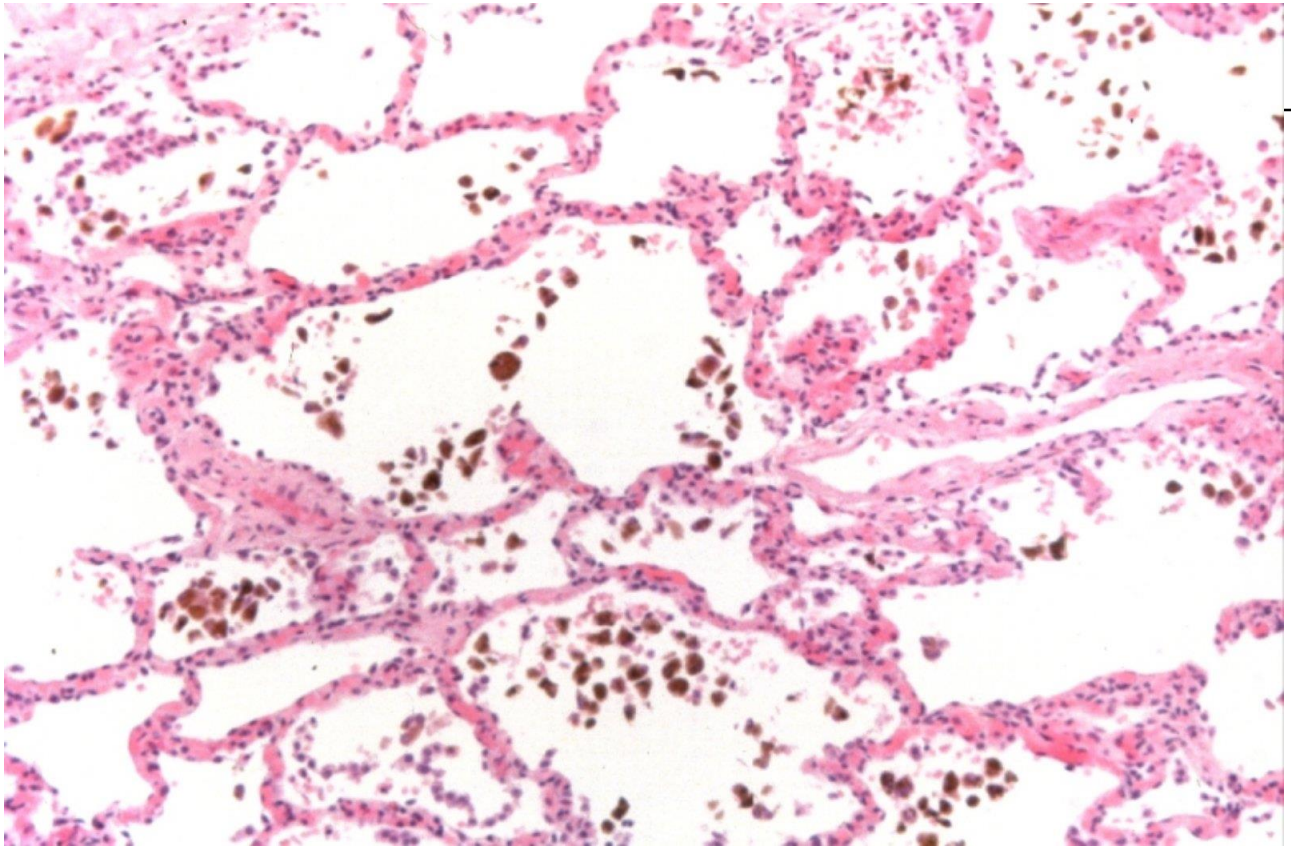
Pulmonary venous congestion:



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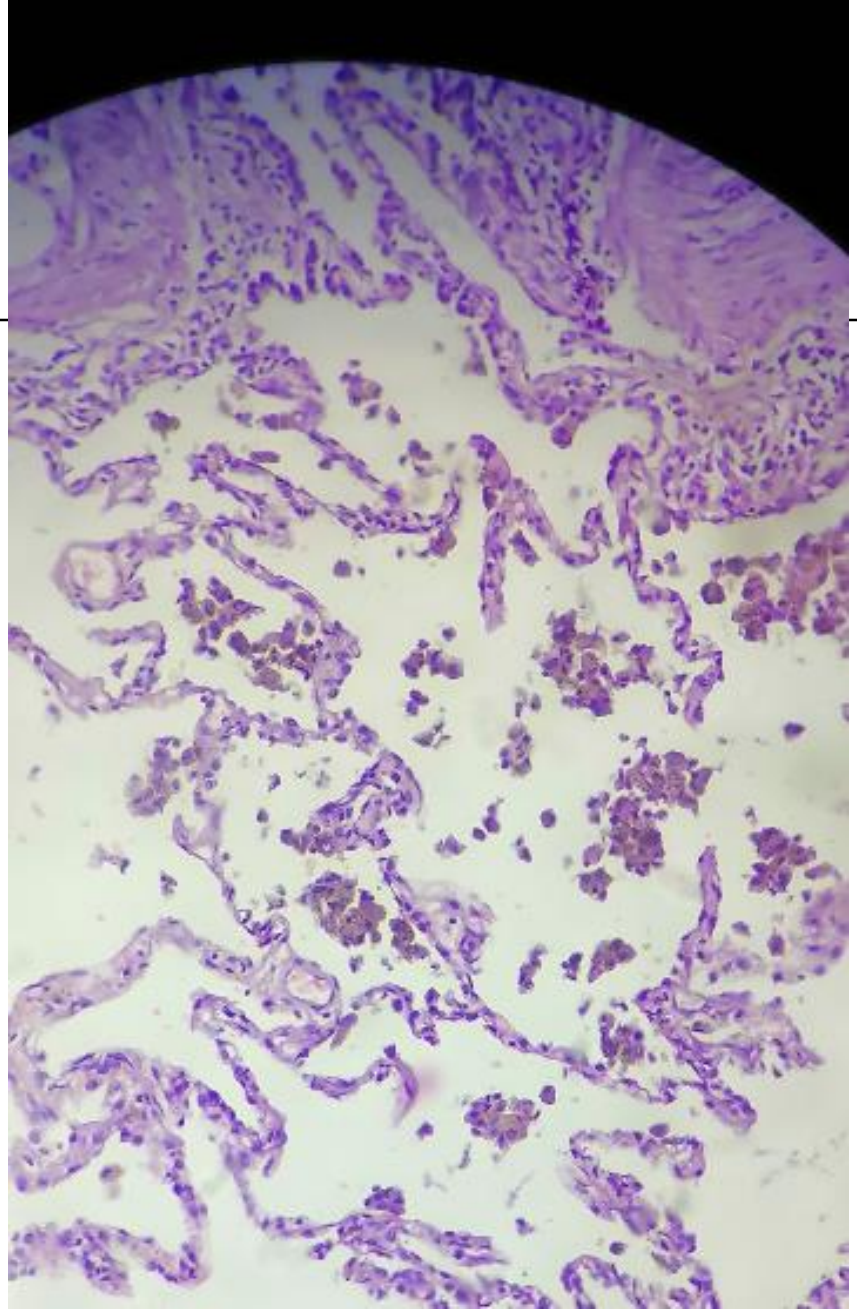

Chronic pulmonary congestion

Thank You