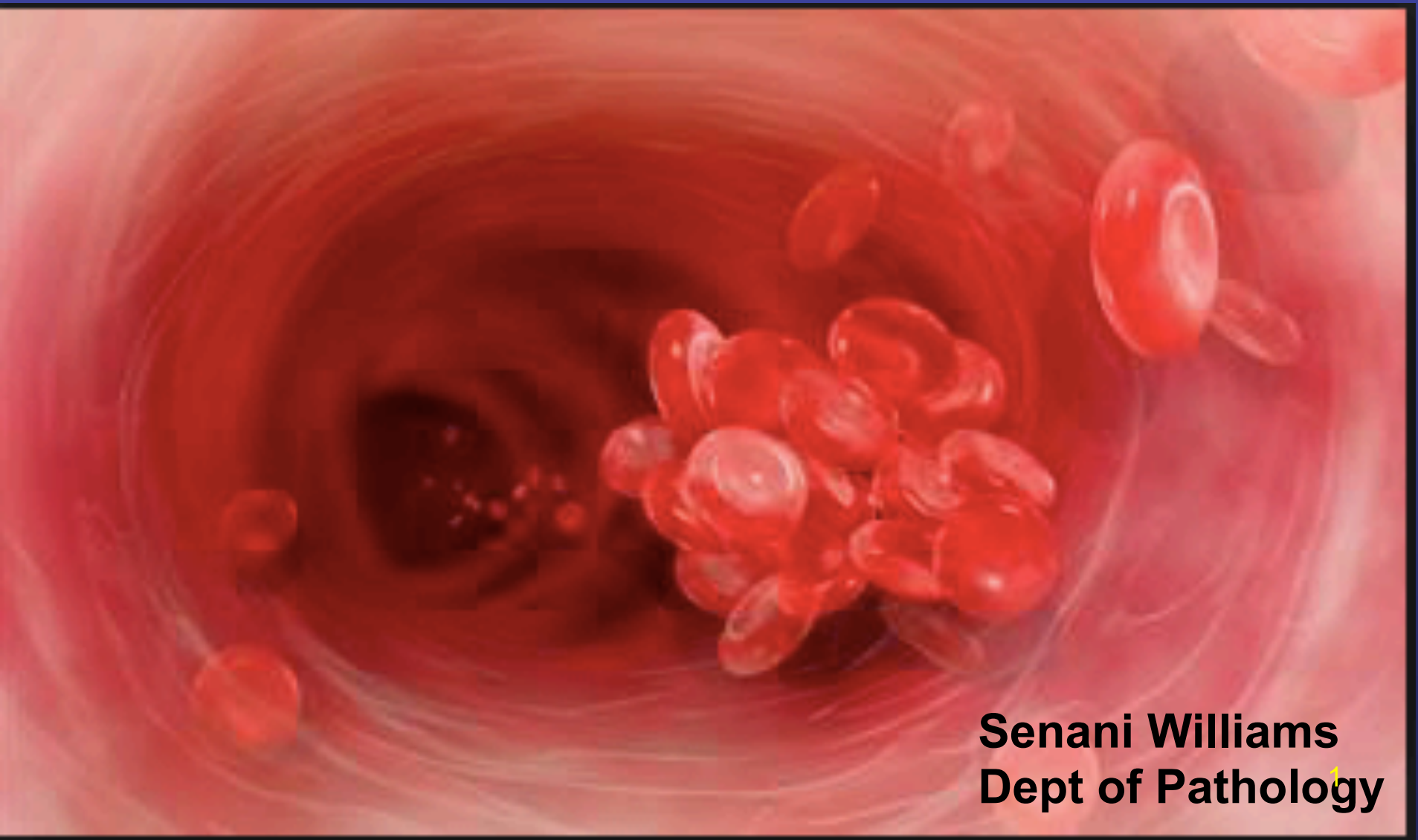
Thrombosis & Embolism



Senani Williams
Dept of Pathology

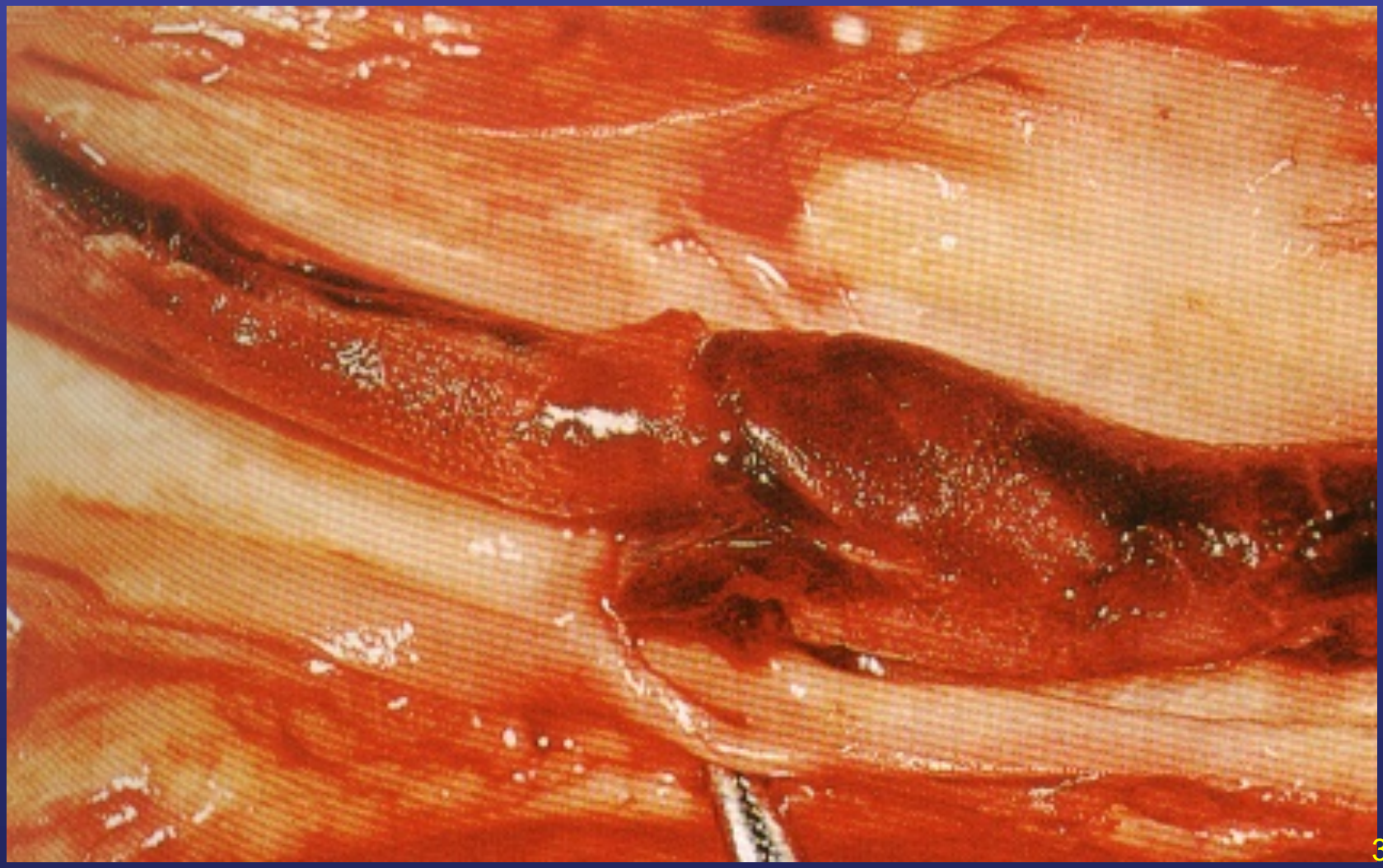
Thrombosis

- Formation of a *solid mass*
- With the *constituents of the blood*
- *Within the heart*
- *Or vascular system*
- *In a living organism*

Not a haematoma
Not post mortem

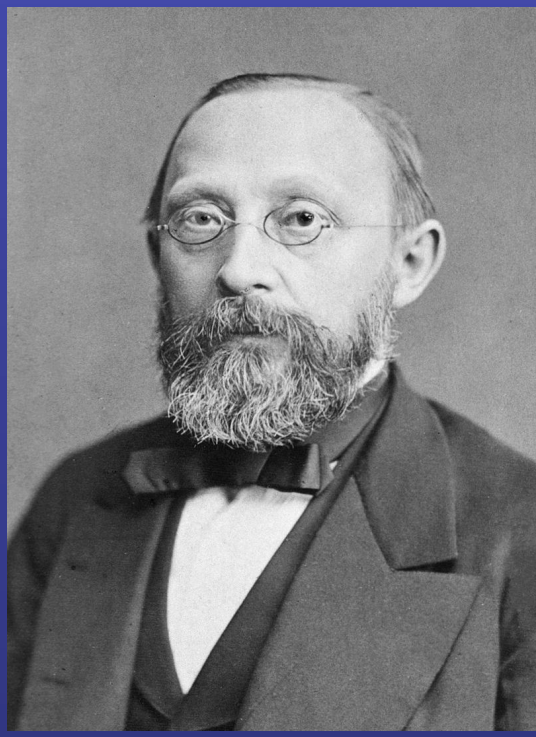
- Generally attached to endothelium
- Layers of platelets and fibrin

Thrombus

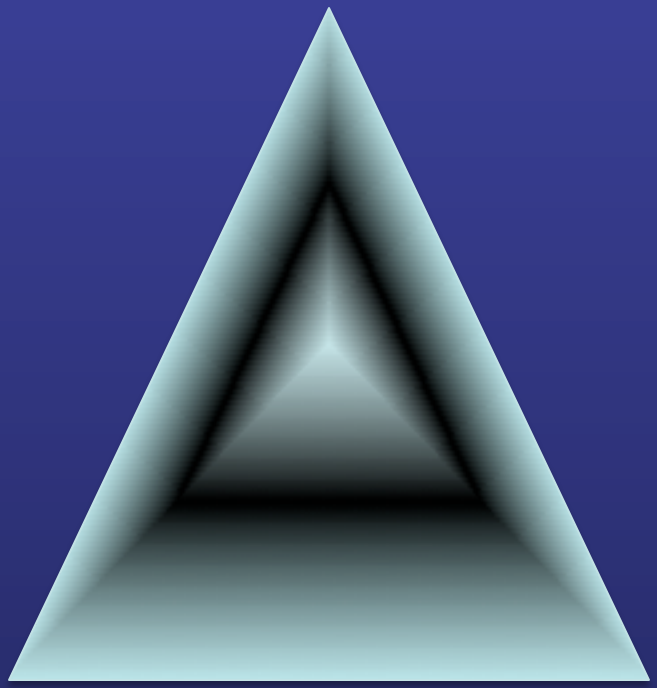


Thrombus formation

- Virchow's triad



Endothelial cell damage

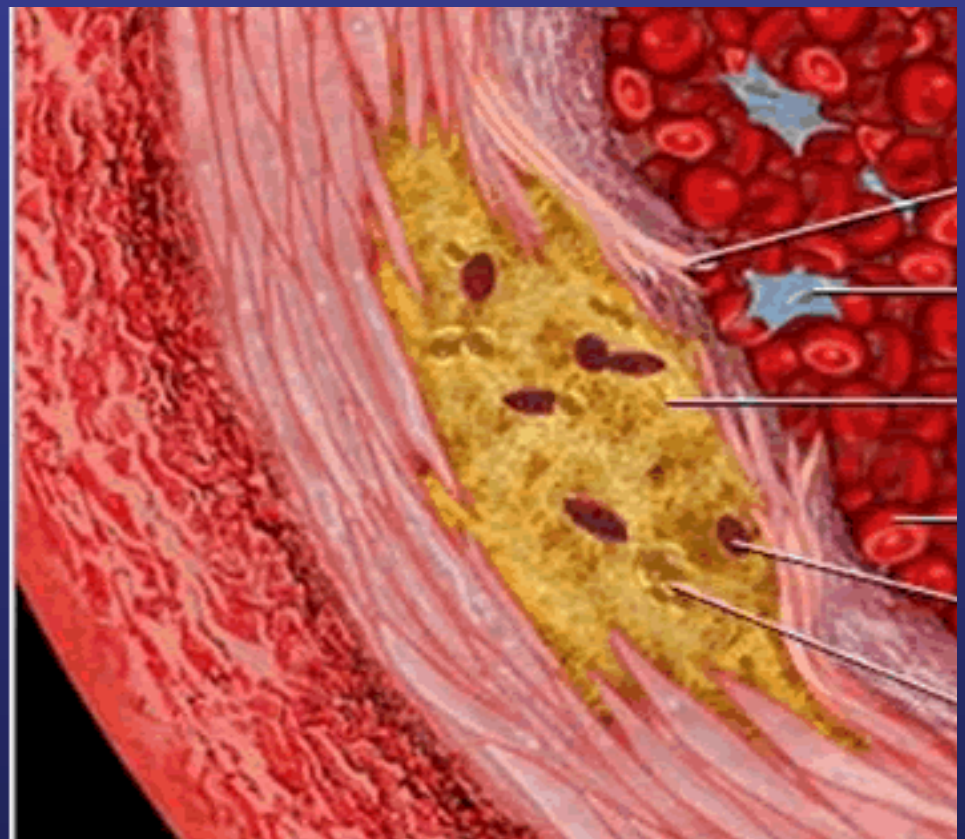


Changes in the constituents of blood itself

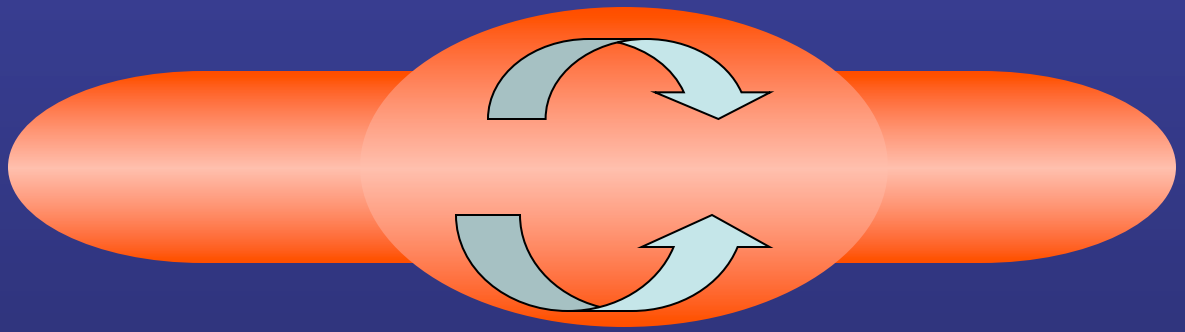
Changes in blood flow

Endothelial Damage

- Atherosclerosis
- Smoking
- Diabetes



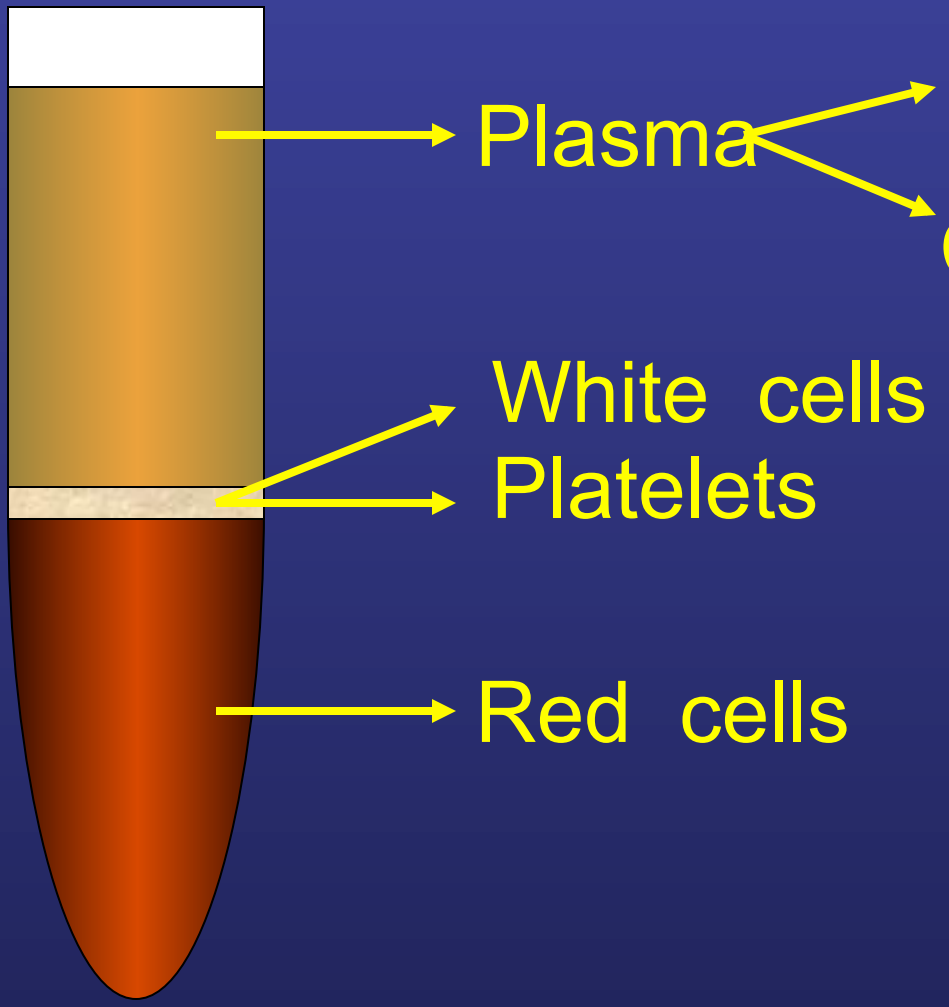
Virchow's triad
Changes in blood flow



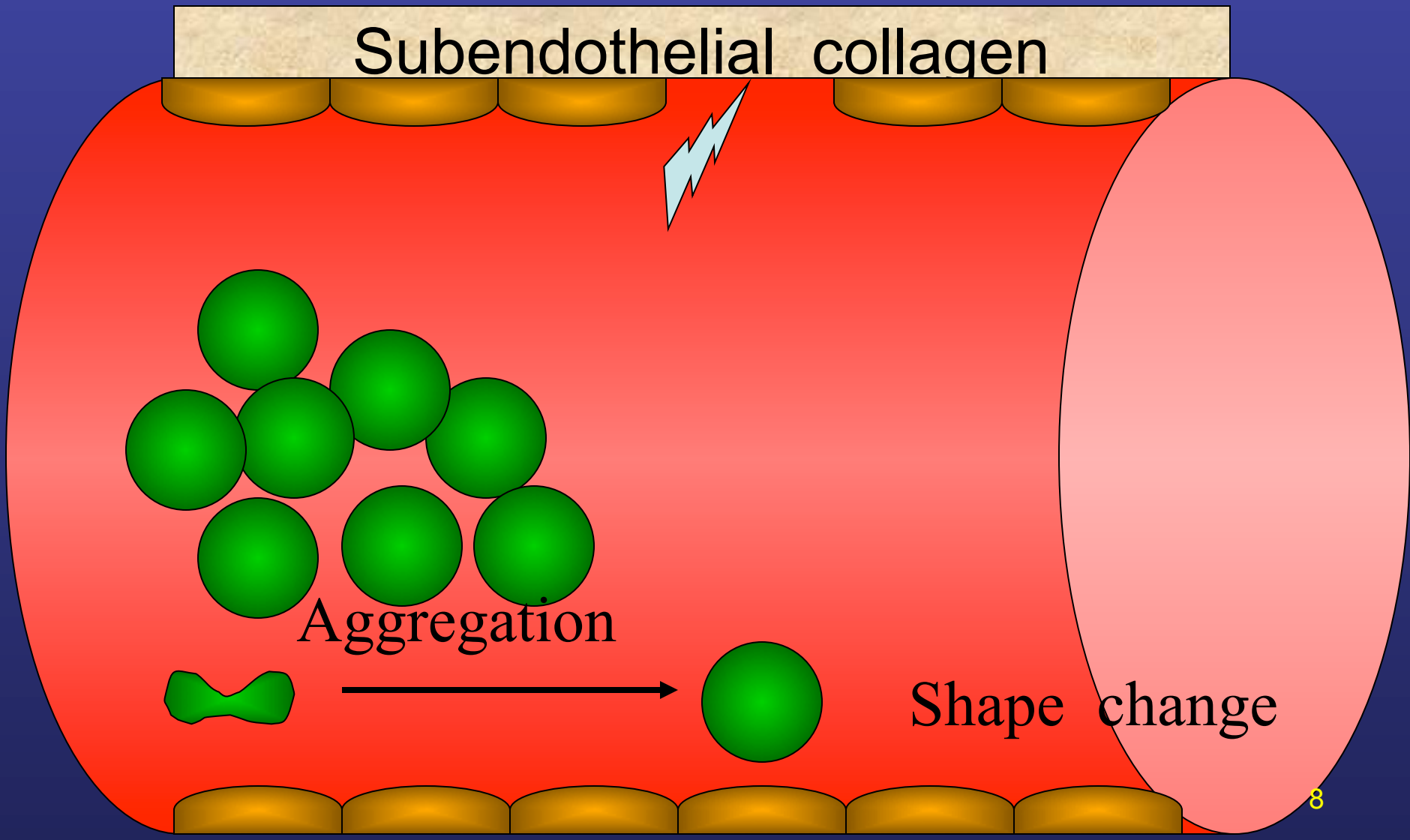
Aneurysmal dilatations

Coarctation / constrictions

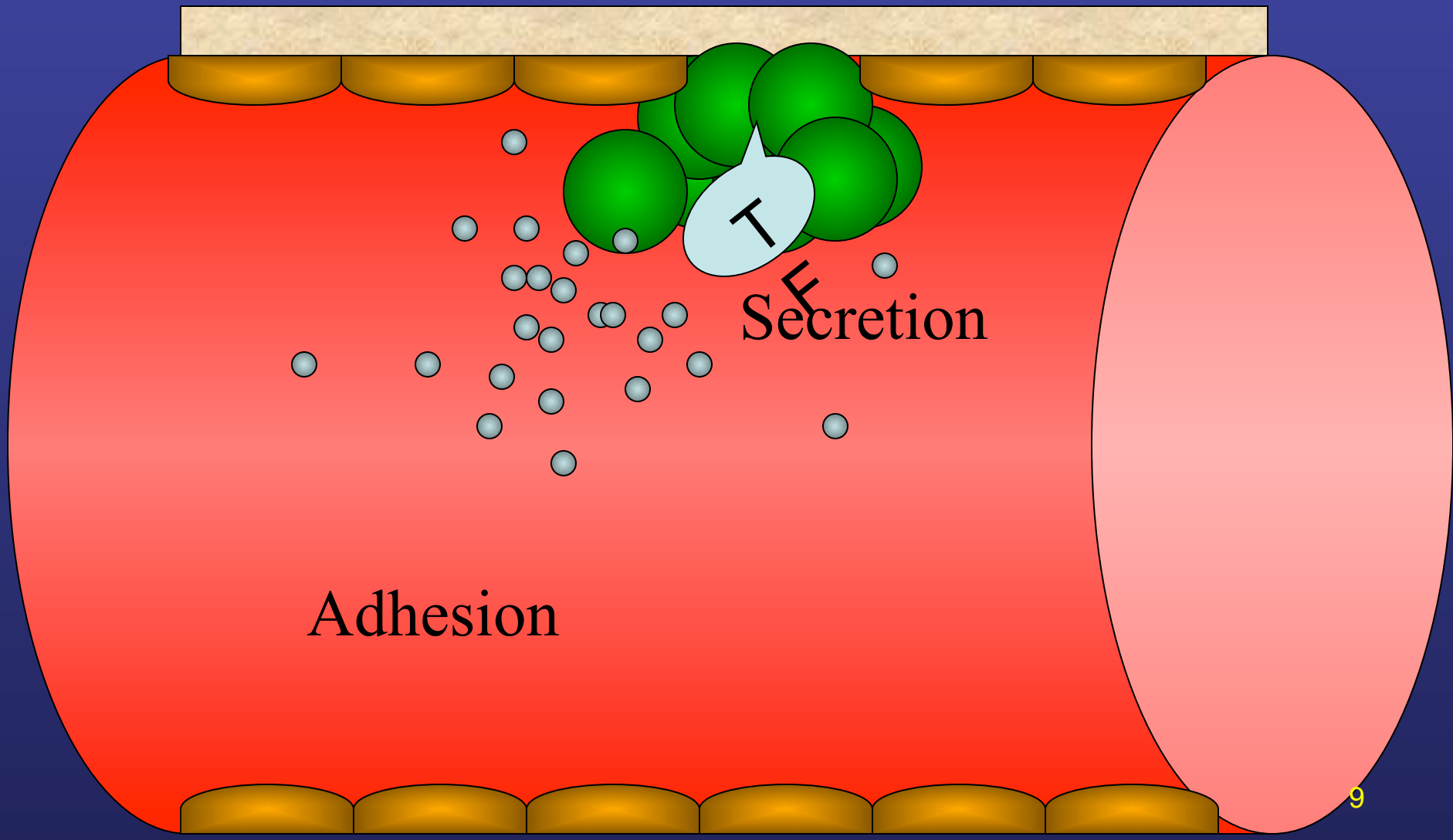
Virchow's triad
Altered constituents of blood



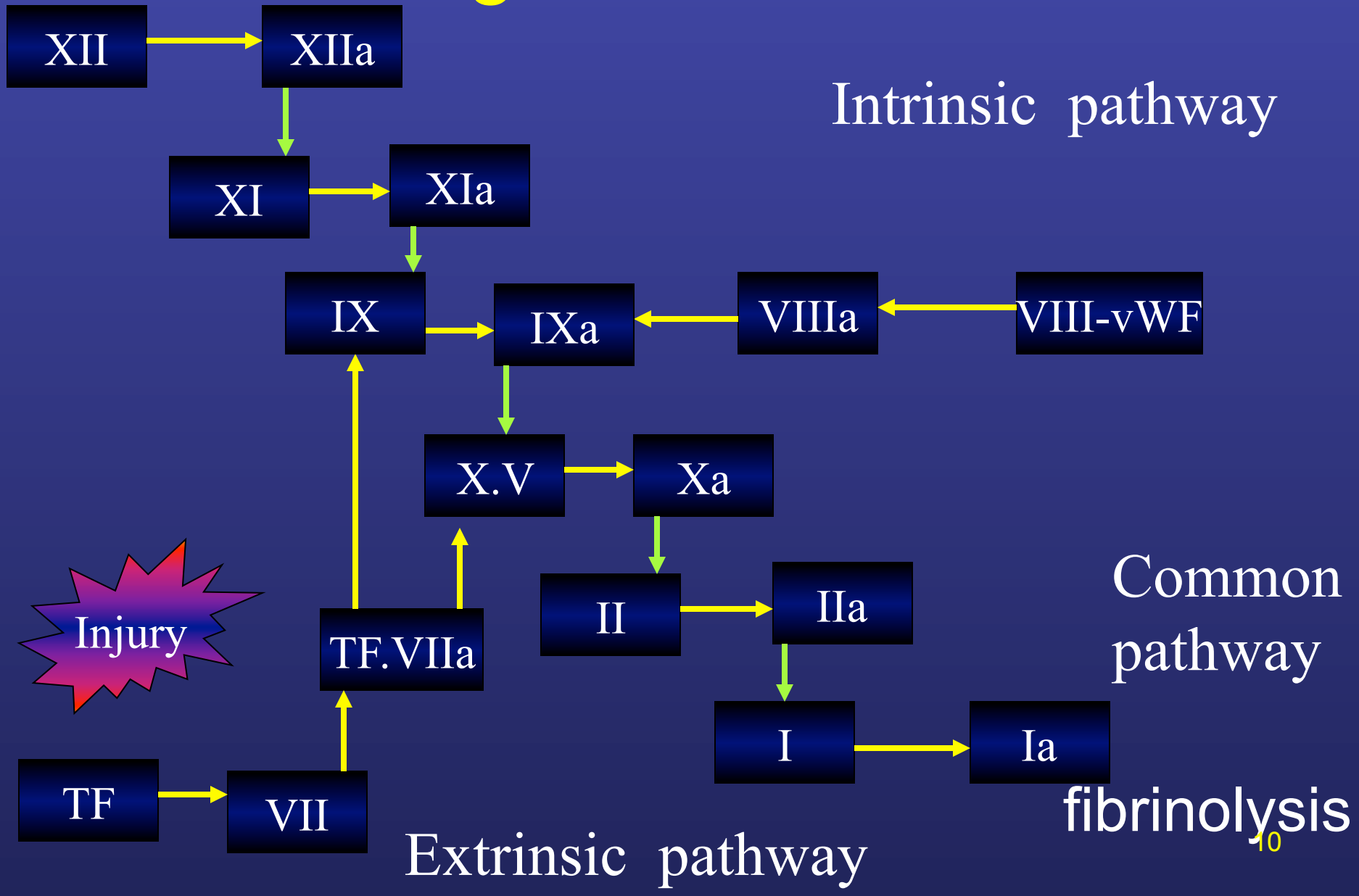
Normal haemostasis



Normal haemostasis



The Coagulation Cascade

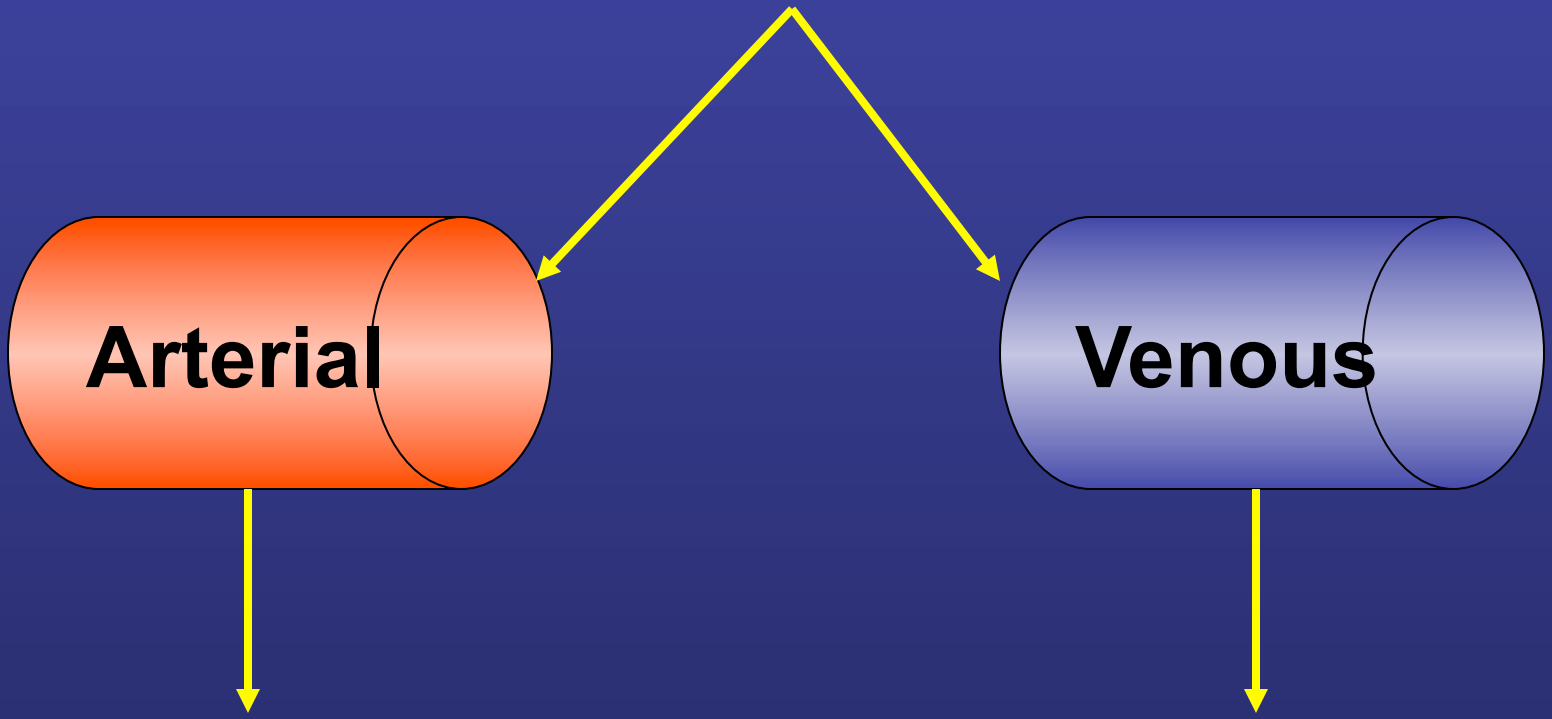


Types of thrombi

- Arterial – pale thrombi
- Predominantly fibrin and platelets

- Venous - red thrombi
- Large numbers of trapped red cells

Thrombosis



Endothelial damage
Platelets

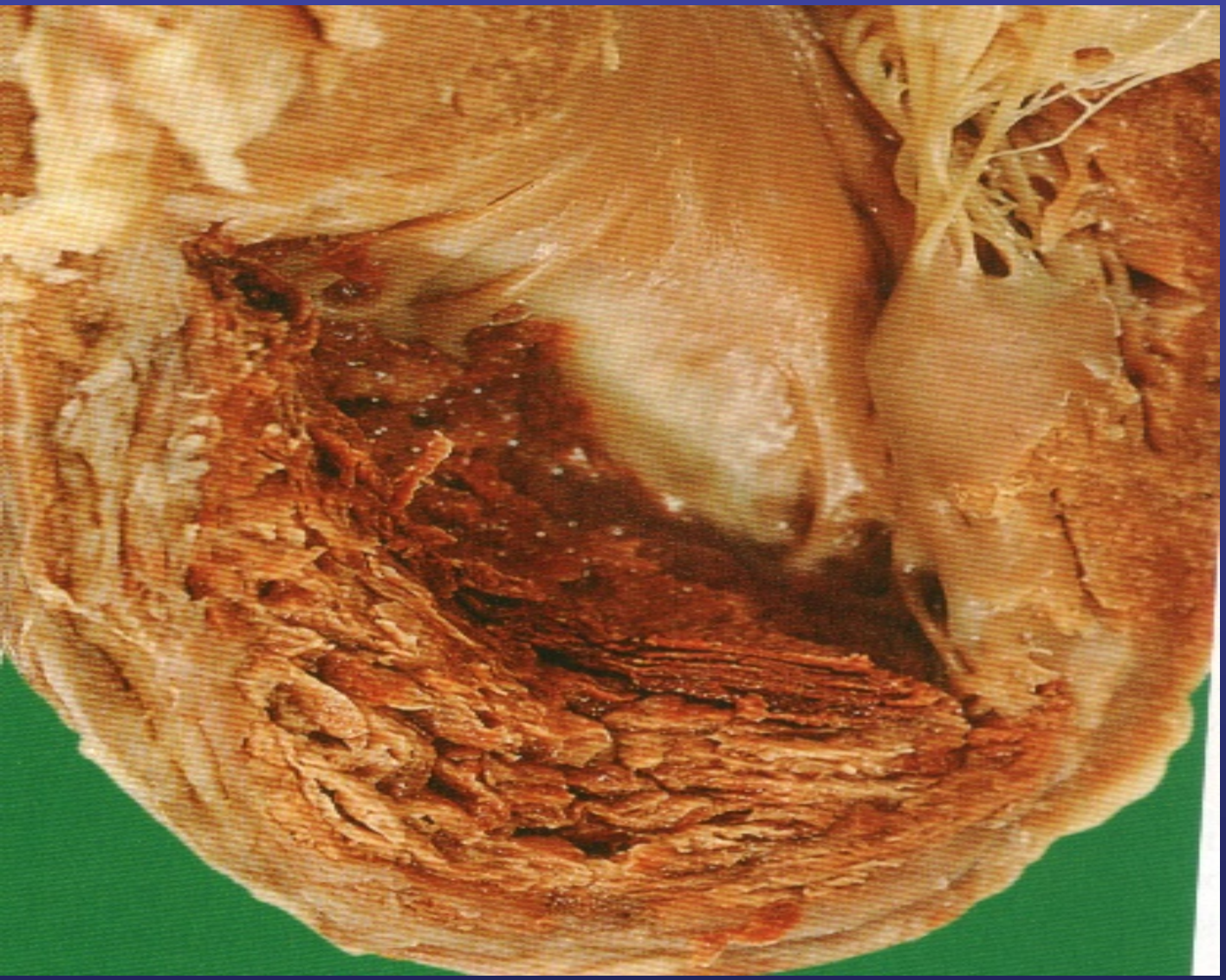
Altered flow
Altered constituents

Sites of thrombosis

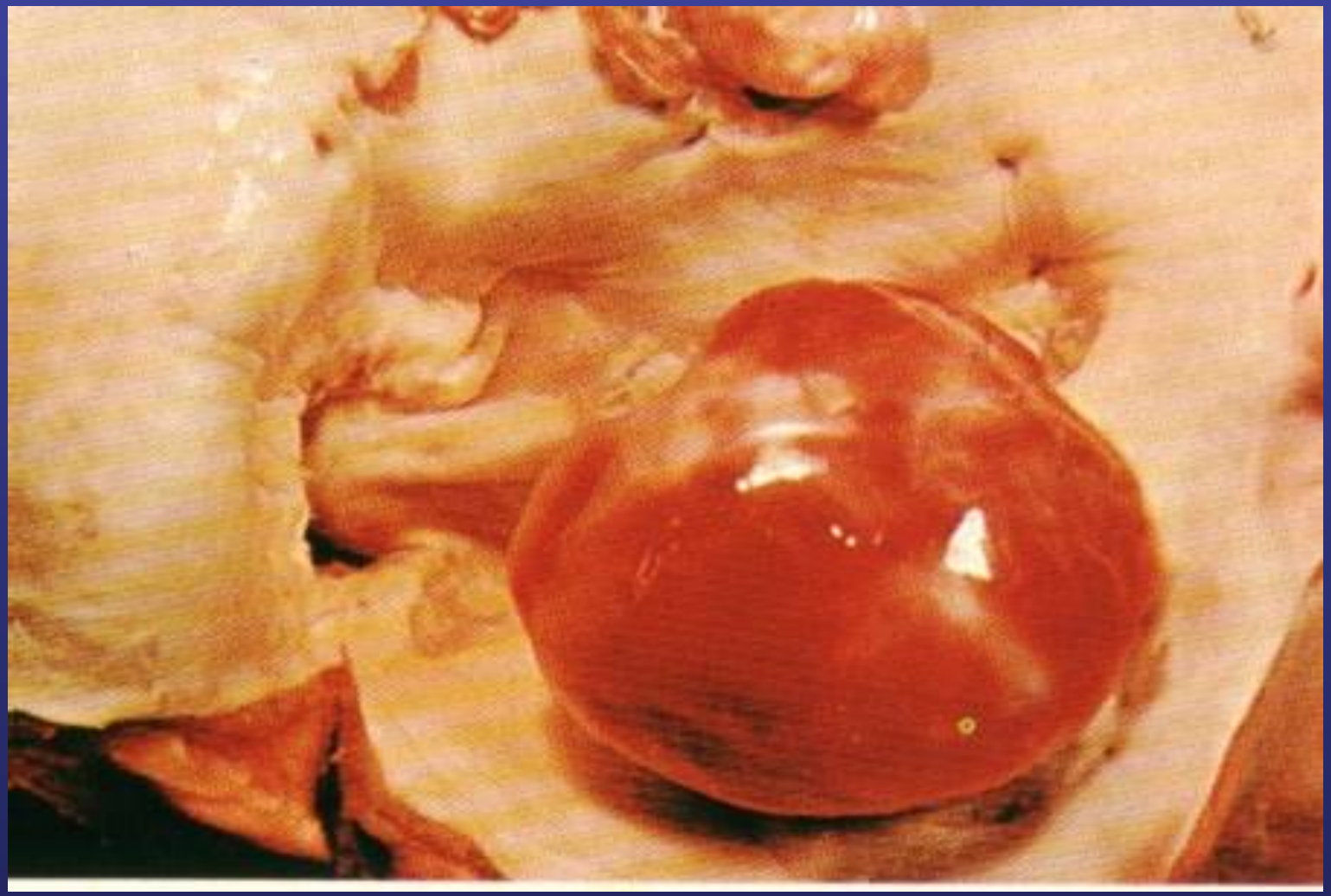
- Arterial - atherosclerosis
- Aorta, carotid circle of Willis, coronary, intestinal, limbs

- Cardiac – valves, mural – post infarction, atrial

Cardiac mural thrombosis



Atrial ball thrombus



Sites of thrombosis

- Venous thrombosis
- Thrombophlebitis – secondary to inflammation
- Phlebothrombosis – DVT in the absence of inflammation
- Causes – thrombophilia

Evolution of thrombi

- Fibrinolysis
- Organization and recanalization
- Thrombo embolism

Fibrinolysis

Injured vascular endothelial cell

↓

Plasminogen activators

PAIs → ↓

Plasminogen → Plasmin

Plasmin inhibitors → ↓

Fibrin → Fibrin degradation products

Recanalization of thrombus

Embolism

- Occlusion or obstruction of a vessel
- By an abnormal mass –
- Solid
- Liquid or
- Gaseous
- Transported from a different site by the circulation

Origin of Embolism

- Origin in systemic veins - pulmonary circulation
- Paradoxical embolism
- Origin in heart and systemic arteries – in distal systemic artery in - brain, heart, kidney, extremity, intestines

Pulmonary embolism

- The most serious complication of embolism
- 90% originate in deep veins of the leg
- Post operative
- Post partum
- Lengthy immobilization
- Cardiac failure
- OCPs

Clinical Effects

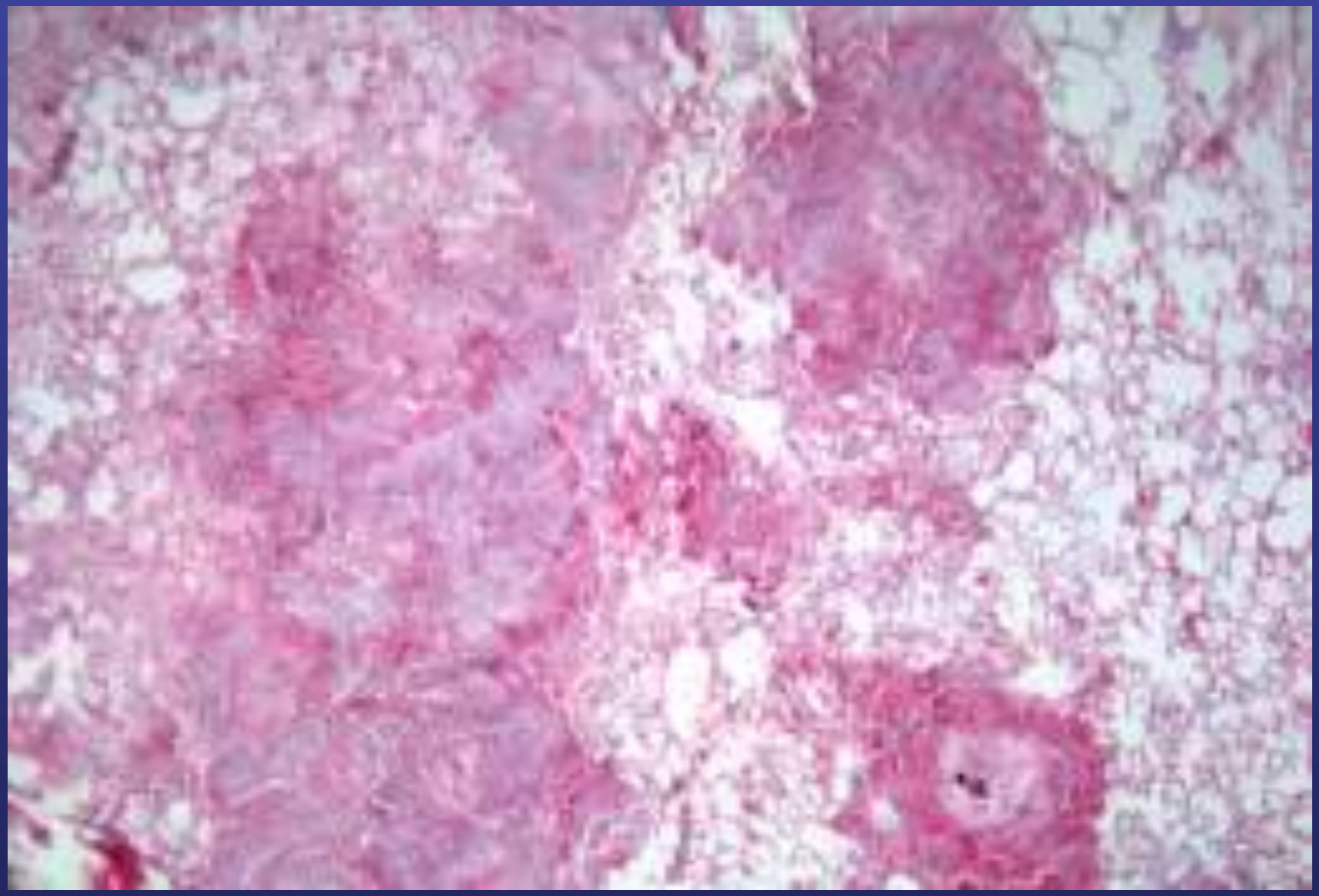
- Massive emboli – sudden death
- Medium size emboli – pulmonary infarction
- Small emboli – pulmonary hypertension

Pulmonary embolism

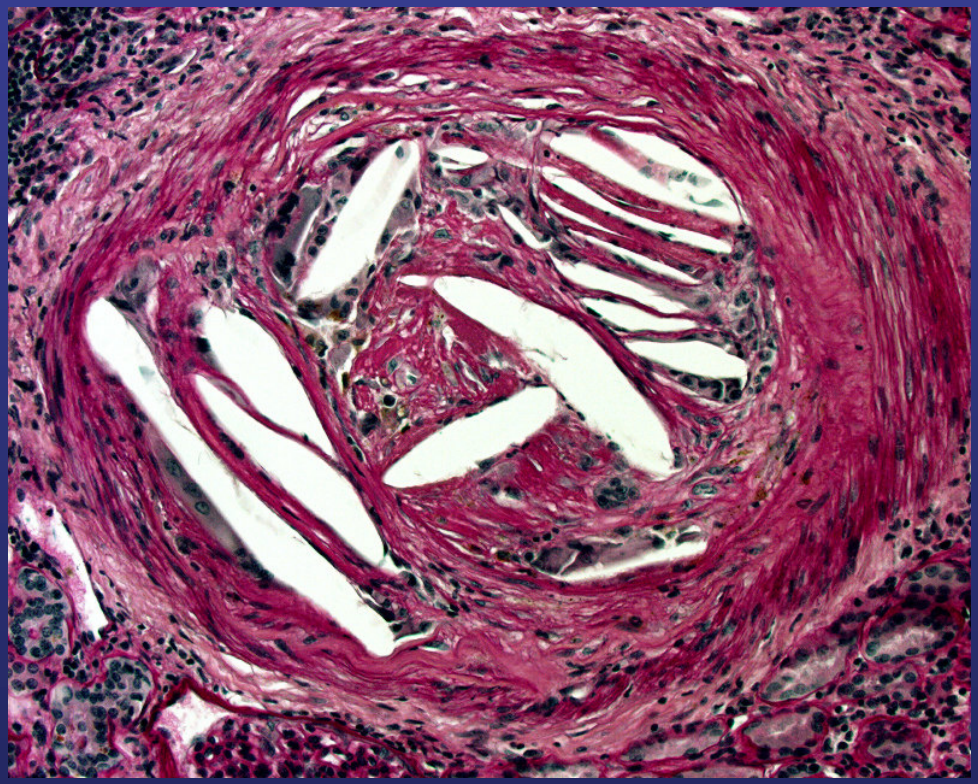
Other emboli

- Air embolism
- Fat embolism
- Marrow embolism
- Atheromatous (cholesterol) embolism
- Amniotic fluid embolism
- Foreign body

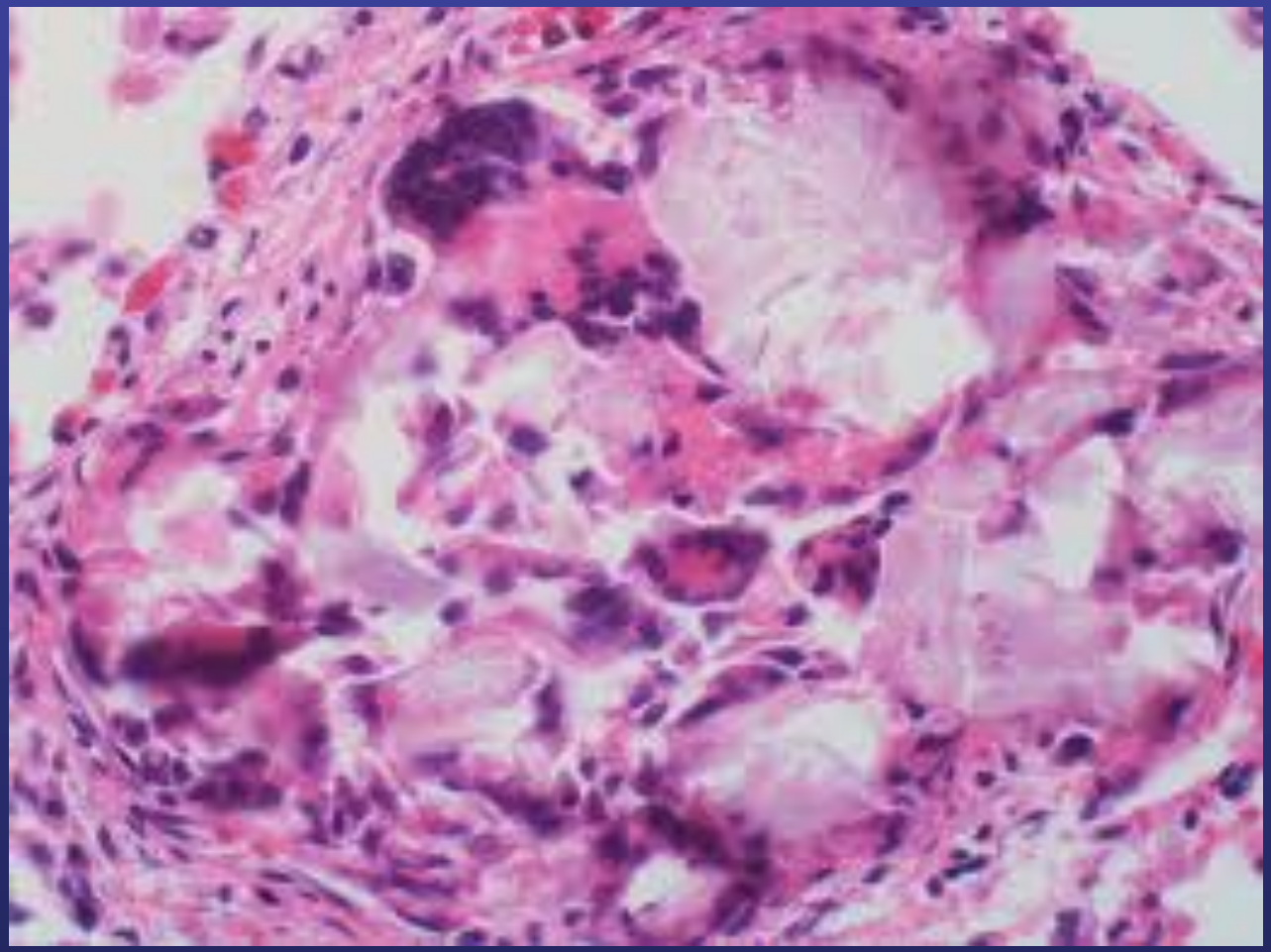
Septic Embolism



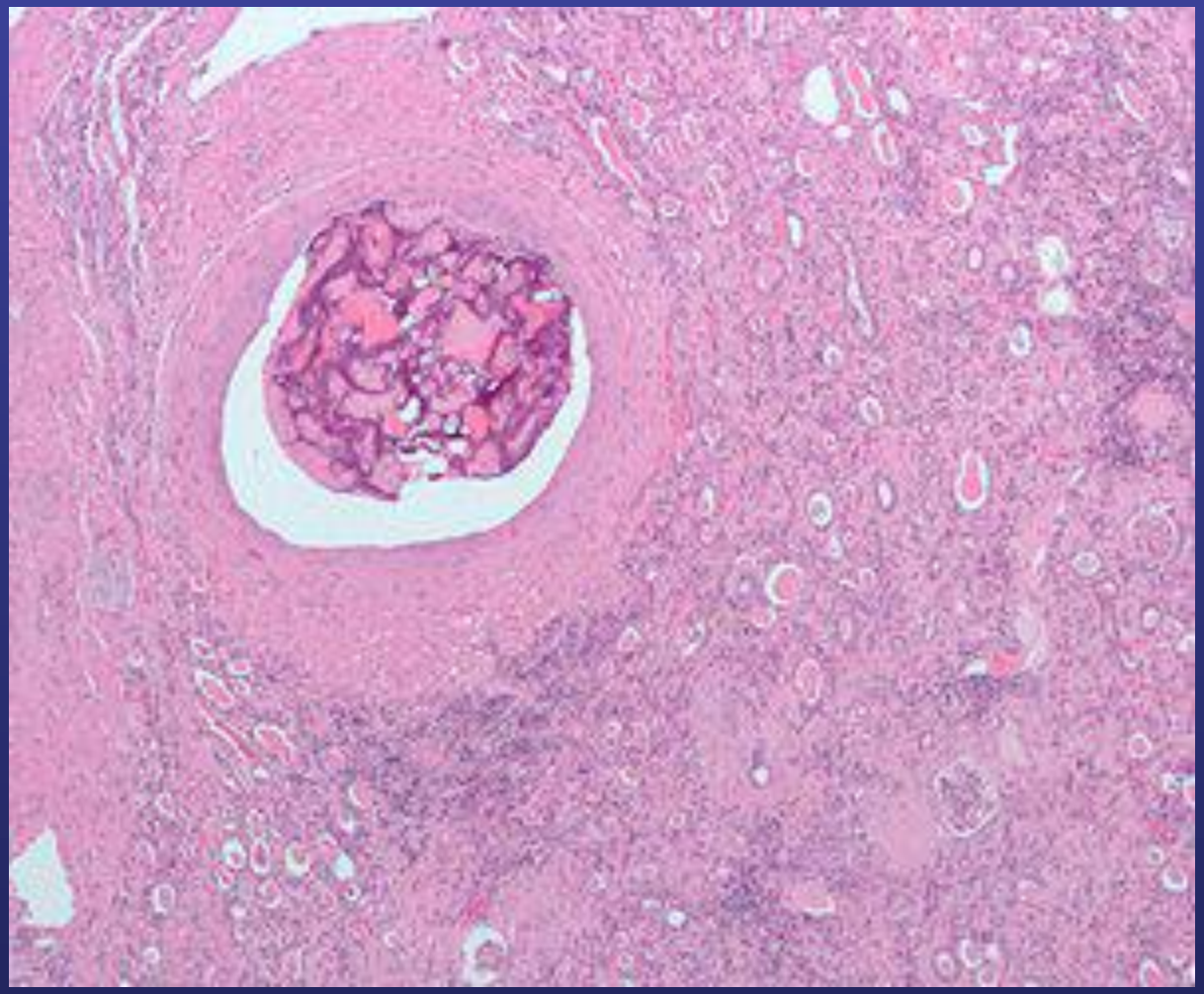
Atherosclerosomatous embolism



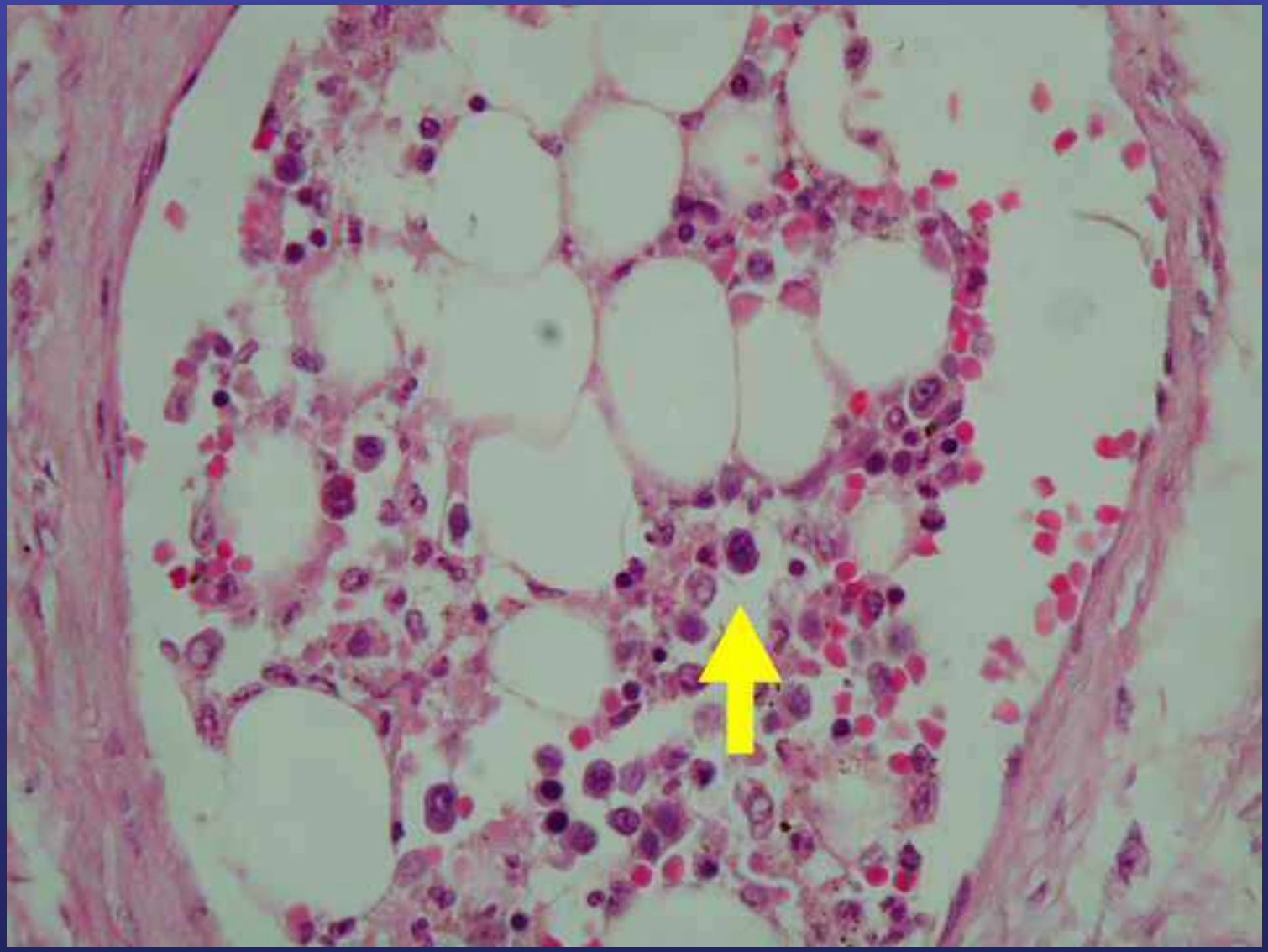
Foreign body embolism



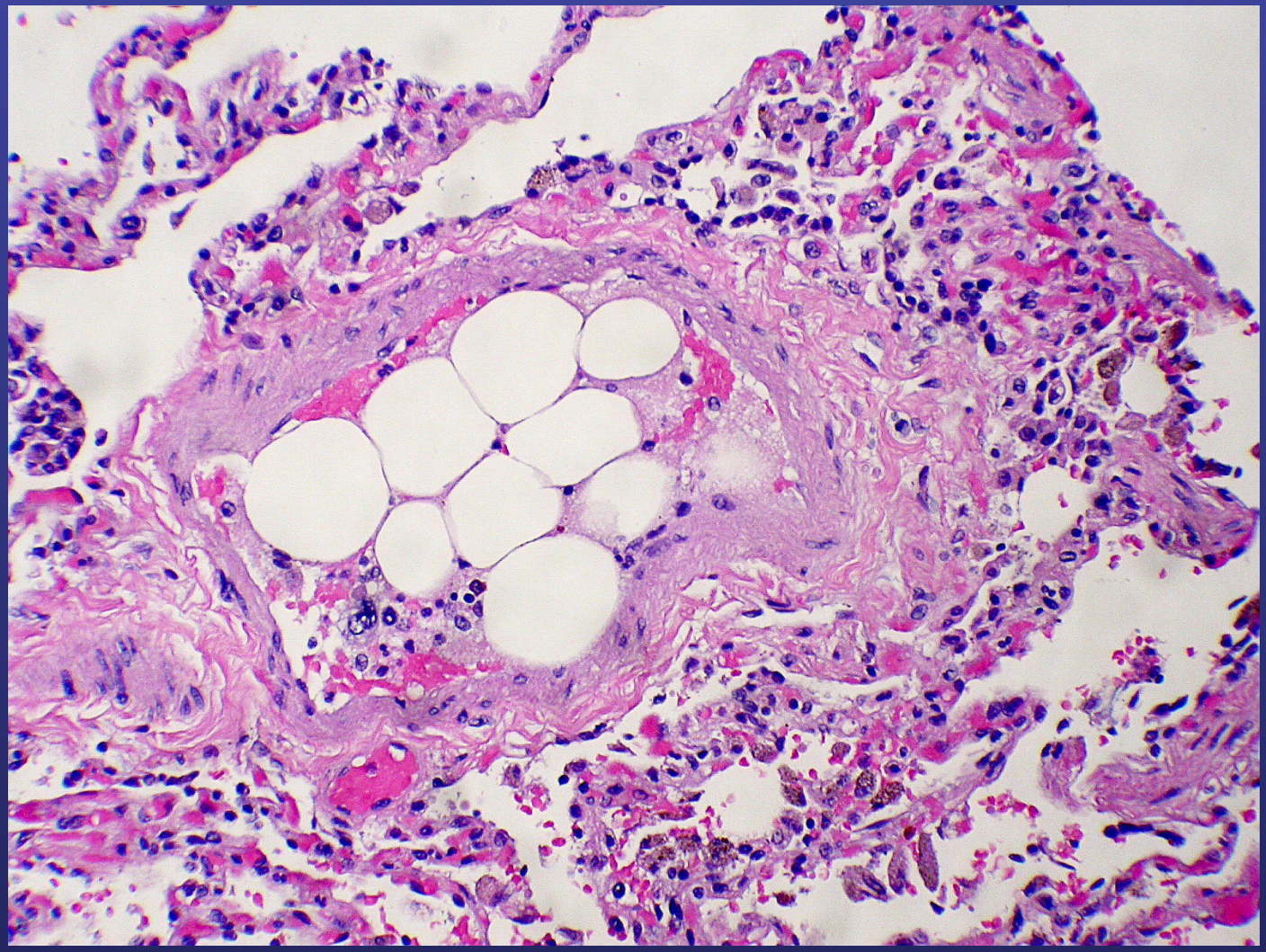
Tumour embolism



Bone marrow embolism



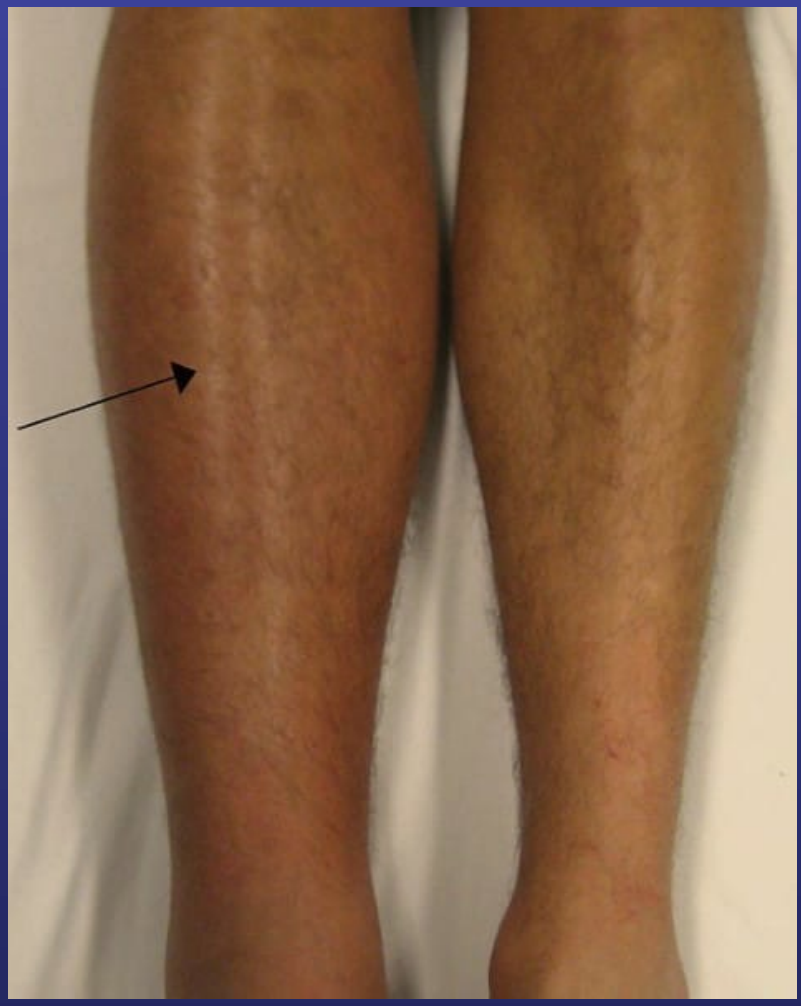
Air embolism



Fat embolism

A 45 year old woman

- Admitted to the OPD
- Pain
- Swelling of Left Calf
- After long distance flight from the US



Pathogenesis

- Pain - Why ?
- Swelling - Why ?
- Long distance flight – Problems ?