

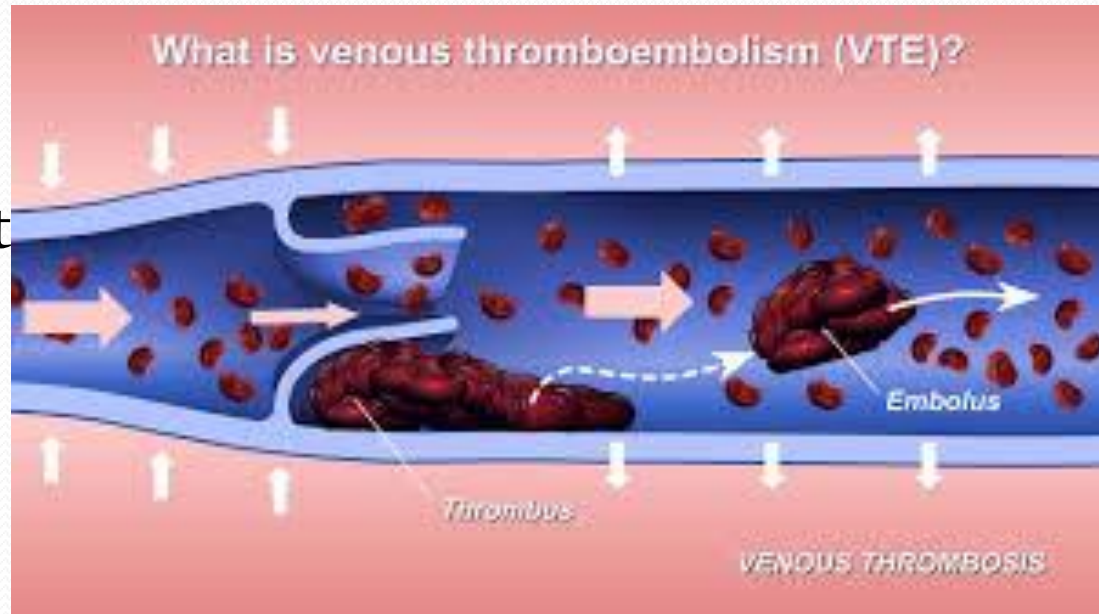
Embolism

Definition

- Emboli are particulate, fluid or gaseous material carried by the bloodstream from the site of origin or entry into the circulation to other parts of the body.
- They cause serious pathology by causing occlusion of some part of the cardiovascular system, leading to ischemic necrosis/ Infarction.

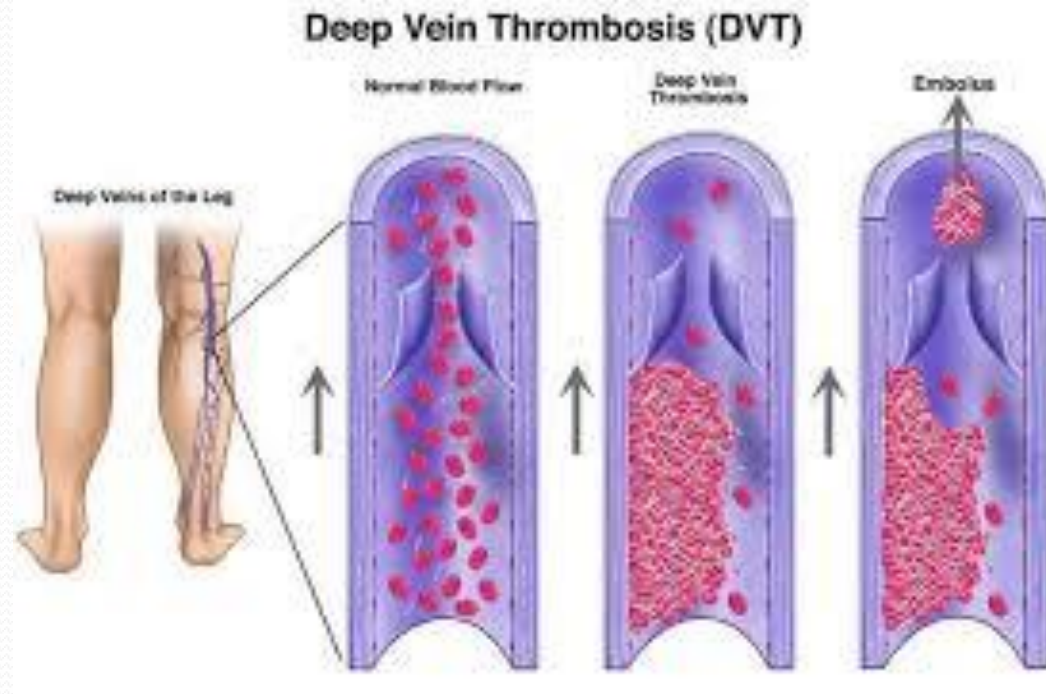
Most common type of embolism-

- Commonest type is **Thromboembolism.** (99%)
- Much less commonly it may be due to,
- Droplets of fat
- Undissolved air, or gas bubbles
- Atherosclerotic debris (cholesterol emboli)
- Tumor fragments
- Bits of bone marrow



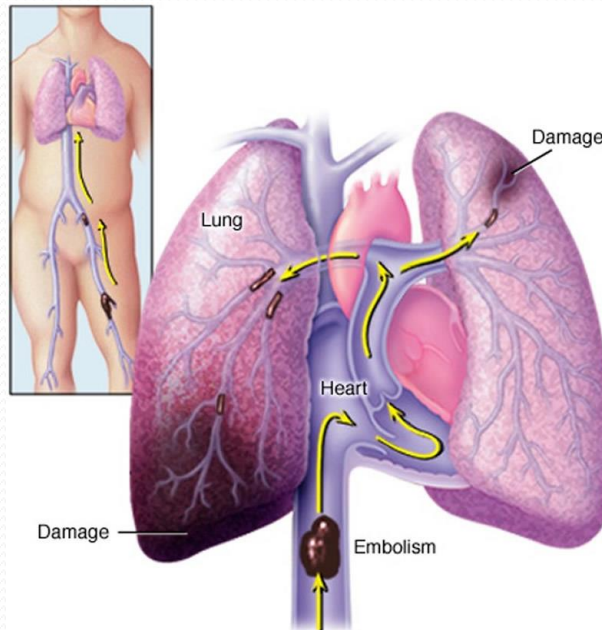
Commonest source of thrombi in thrombo- embolism

- In approximately 99% of cases venous emboli arise from veins in the leg.
- Deep calf, femoral and popliteal veins.

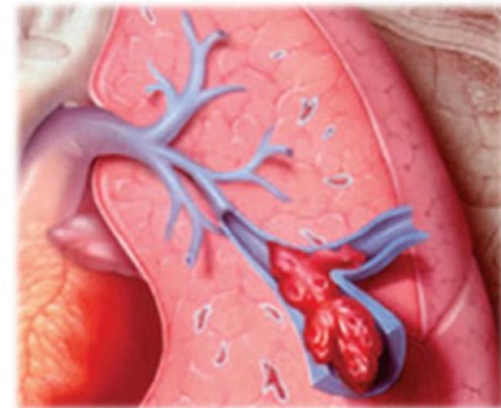


Most serious complication of thromboembolism

- Pulmonary embolism is the most serious complication of thromboembolism beginning in veins. (Anecdotal eg)
- It is called “Saddle embolism”

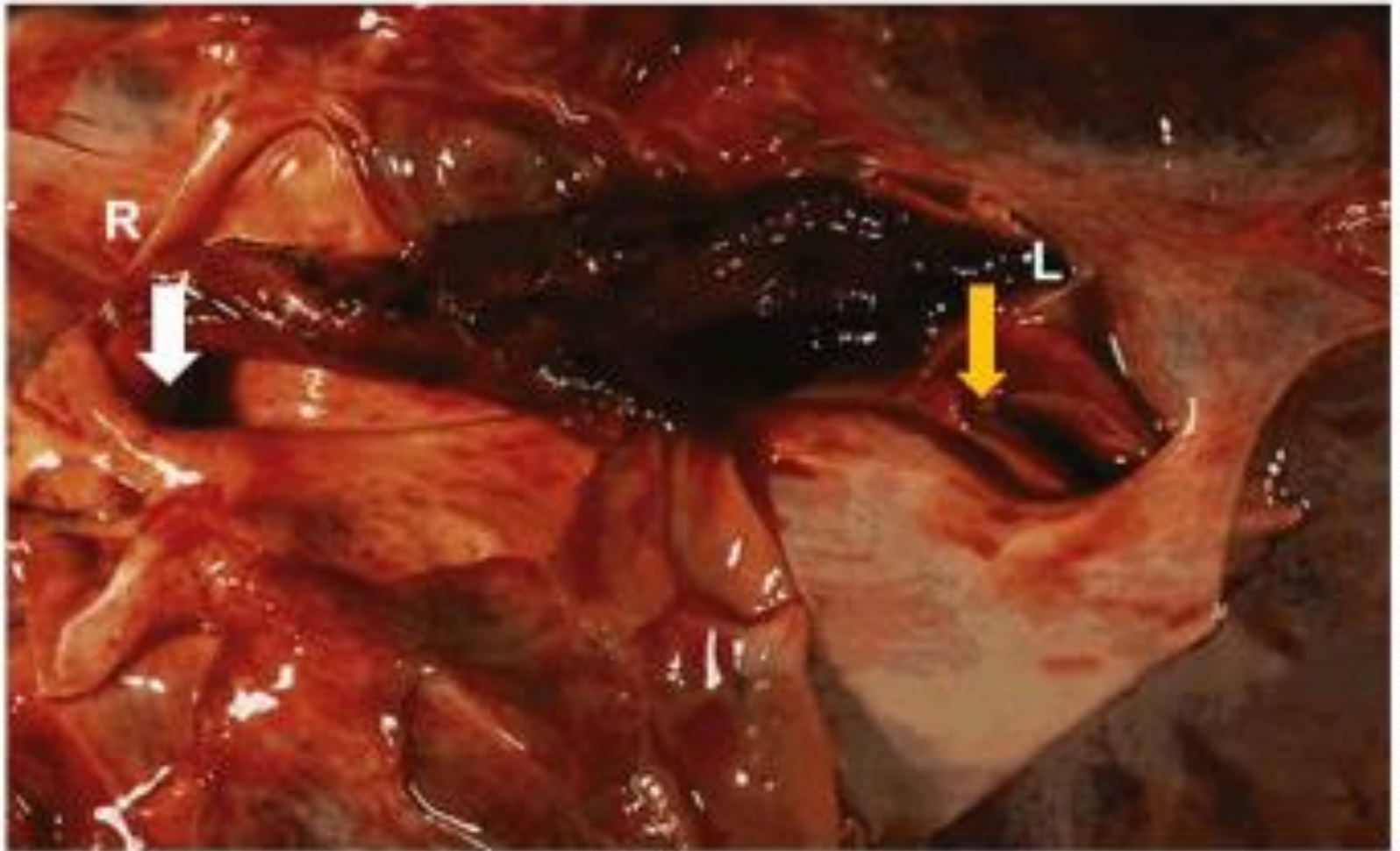


Pulmonary Embolism



Pulmonary embolism

- Occlusion of the main pulmonary artery or its main branches may cause sudden death. Such a saddle embolism typically prevents influx of blood into lungs.
- Occlusion of the branches of the pulmonary artery will cause infarcts
- The lungs have dual circulation and in normal circumstances occlusion of the branches of pulmonary artery will be compensated by an influx of blood from the bronchial artery.
- However if PE is associated with heart failure and atherosclerosis of aorta then compensatory circulation will be delayed and slow.



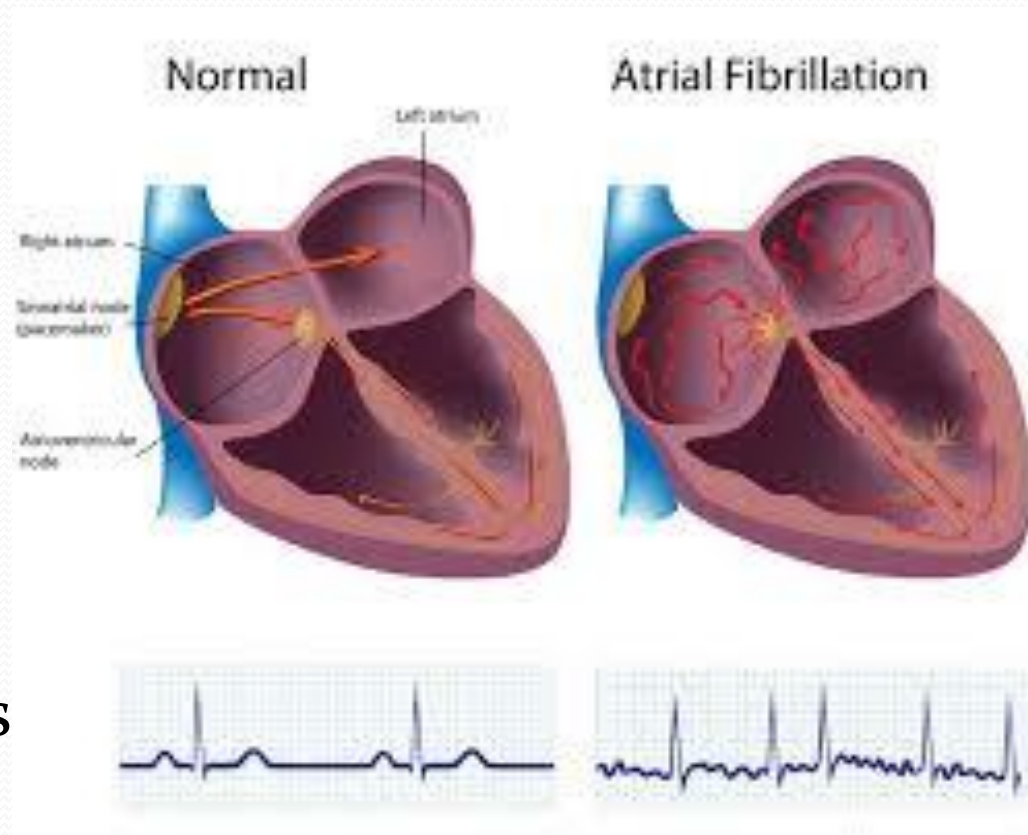
Pulmonary embolism, gross;

A Saddle embolus that bridges the pulmonary artery trunk as it divides into right and left main pulmonary arteries.

A common lab test is an increased **plasma D-dimer**

Source of arterial emboli

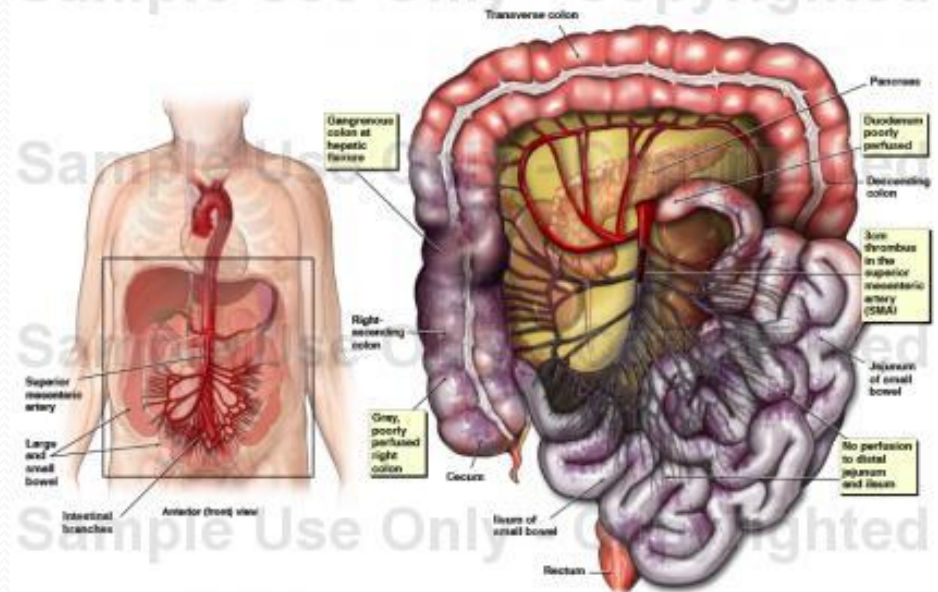
- Arterial emboli most commonly arise from intra- cardiac mural thrombi. (Clinical eg)
- Less often they take origin from mural thrombi in an aortic aneurysm or from thrombi that form over ulcerated atheromatous plaques.



Where do arterial emboli lodge most often?

- May occlude any artery depending on the size of the thrombi.
- Large thrombi occlude large arteries such as those of the legs and arms and those of celiac, mesenteric, renal, splenic or cerebral arteries.

Superior Mesenteric Artery Thrombus



Air embolism

- Is caused by entry of atmospheric air into circulation
- Or by the appearance of intra vascular nitrogen bubbles as a result of decompression.
- Air bubbles may occlude blood vessels or cause D.I.C
- D.I.C is triggered by platelets that tend to adhere to nitrogen bubbles and become activated to initiate the coagulation cascade

How does air enter into the circulation?

- During various procedures
 - Trauma or surgery on the neck accompanied by a tear in the wall of the jugular vein or the superior vena cava
 - May lead to sucking the air into blood , due to the negative pressure in thorax
 - Childbirth or abortion may allow the entry of air into uterine veins
 - Through cubital vein when blood transfusions are given under positive pressure

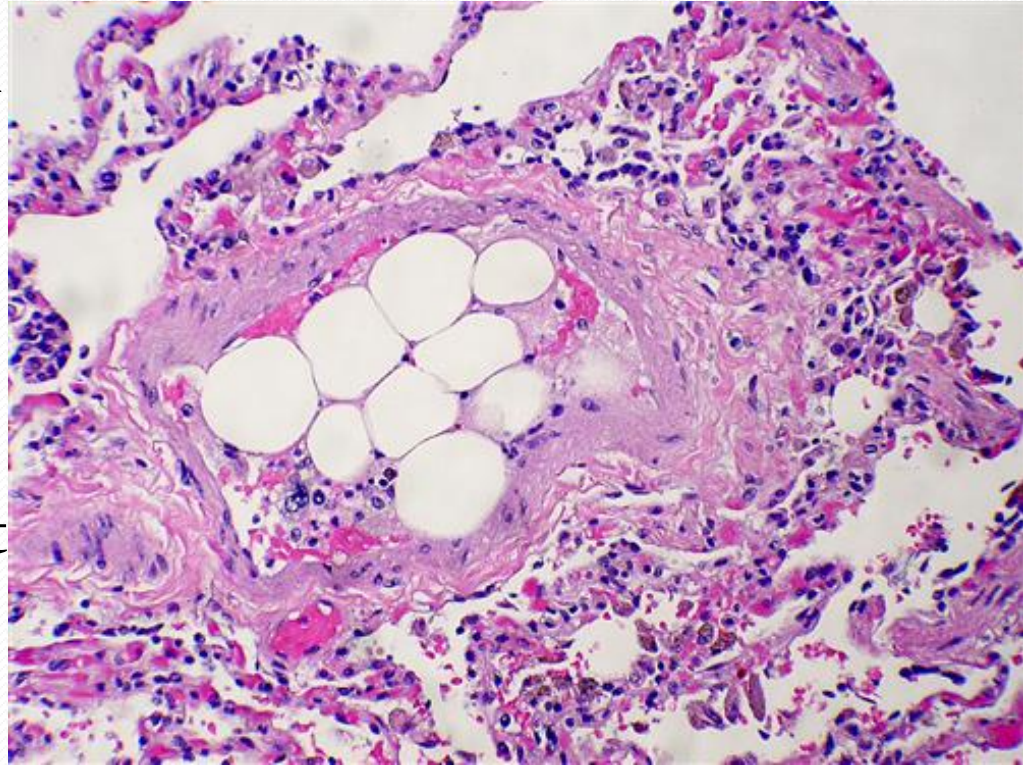


Decompression sickness

- Also called CAISSON DISEASE
- nitrogen is normally kept dissolved in blood by atmospheric pressure
- decompression is typically seen in divers who come to the surface from deep waters too fast or in pressurized caisson chambers
- This will allow nitrogen to come out of solution in the form of gaseous bubbles
- These gas bubbles occlude small blood vessels and cause painful muscle contractures(**“the bends”**) and occlusion of pulmonary blood vessels causing shortness of breath(**“the chokes”**)

FAT EMBOLISM

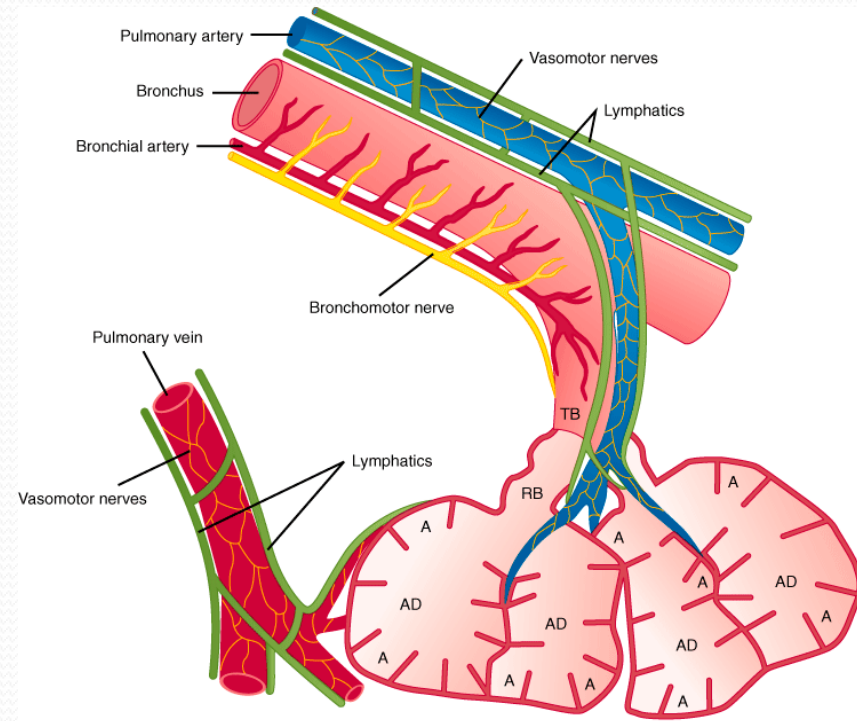
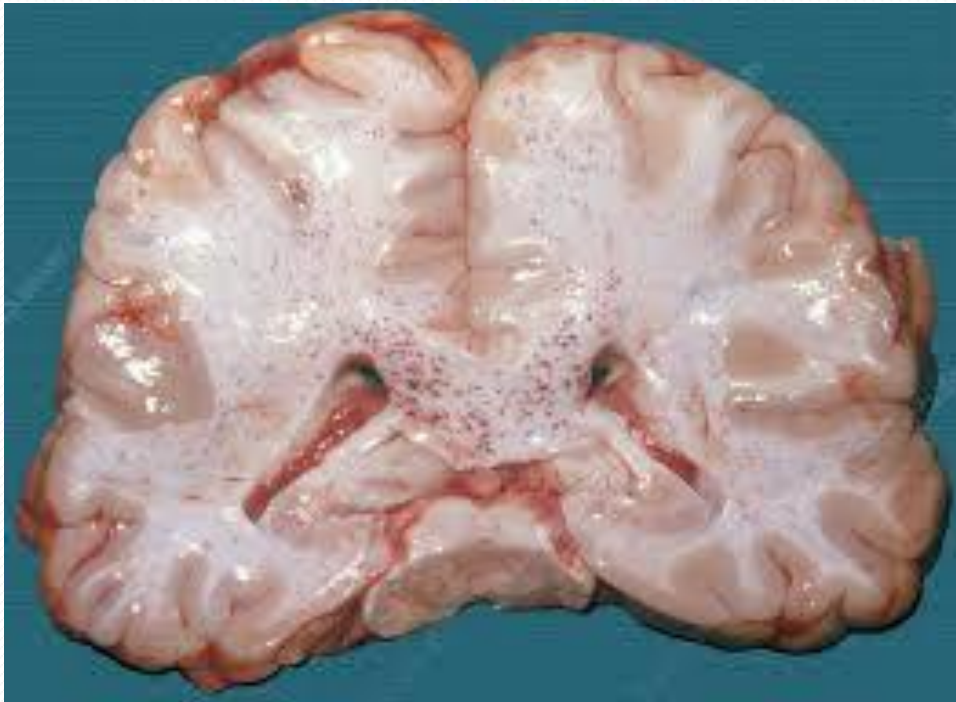
- Fat embolism results from the entry of fat globules into the circulation.
- In most instances the cause of fat embolism is fracture of long bones.
- Fat cells in the bone marrow rupture as a result of trauma releasing their contents into venous blood.
- Trauma of subcutaneous or breast fat does not cause embolism.



Clinical aspects of fat embolism

- Symptoms of fat embolism appear 1-3 days after fracture of long bones of the extremities.
- These symptoms are due to ischemia caused by the occlusion of capillaries by fat globules.
- During the first two days pt. Has typically shortness of breath, caused by occlusion of capillaries by fat globules.
- Small globules cause microscopic foci of Necrosis and pericapillary hemorrhage in both lungs and brain.

Pericapillary hemorrhage in brain and lungs



Source: McPhee SJ, Hammer GD: *Pathophysiology of Disease: An Introduction to Clinical Medicine*, 6th Edition: <http://www.accessmedicine.com>
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c/f of fat embolism

- These microscopic infarcts present as mental, sensory or motor disturbances.
- Fat globules also induce D.I.C further complicating the precarious situation

Fat Embolism syndrome

Major criteria (one necessary for diagnosis)

Petechial rash

Respiratory insufficiency

Cerebral involvement

Minor criteria (four necessary for diagnosis)

Tachycardia >120 beats/min

Fever

Retinal changes : fat or petechiae

Jaundice

Renal signs : anuria or oliguria

Thrombocytopenia

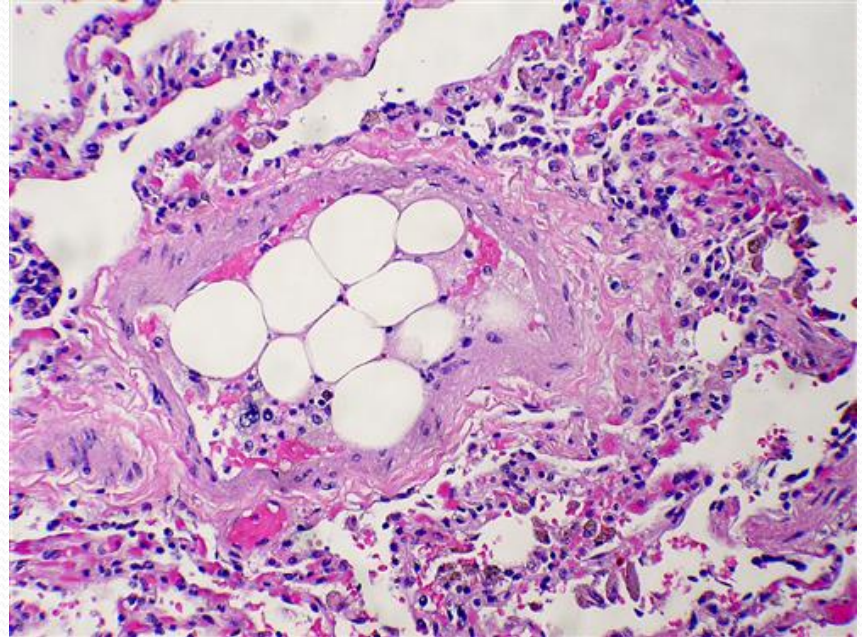
Anemia

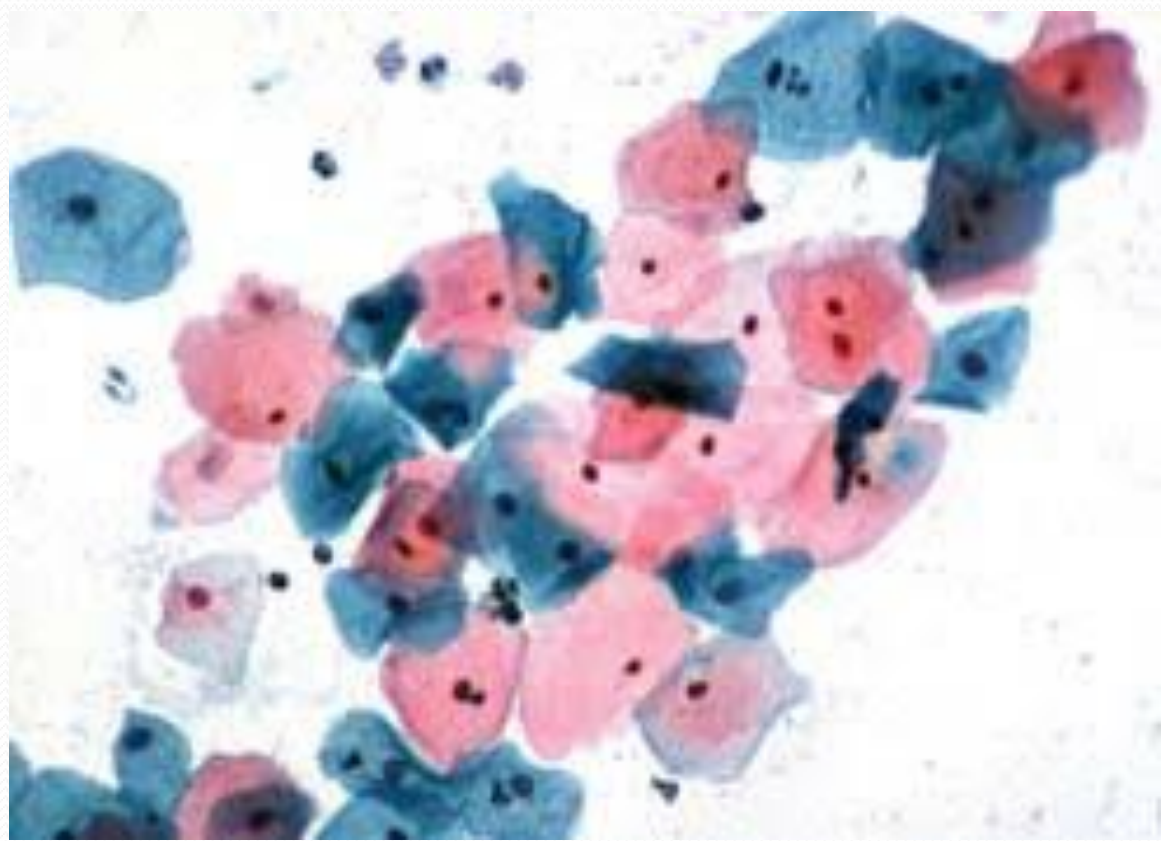
High erythrocyte sedimentation rate

Fat macroglobinemia

Autopsy findings in lethal fat embolism

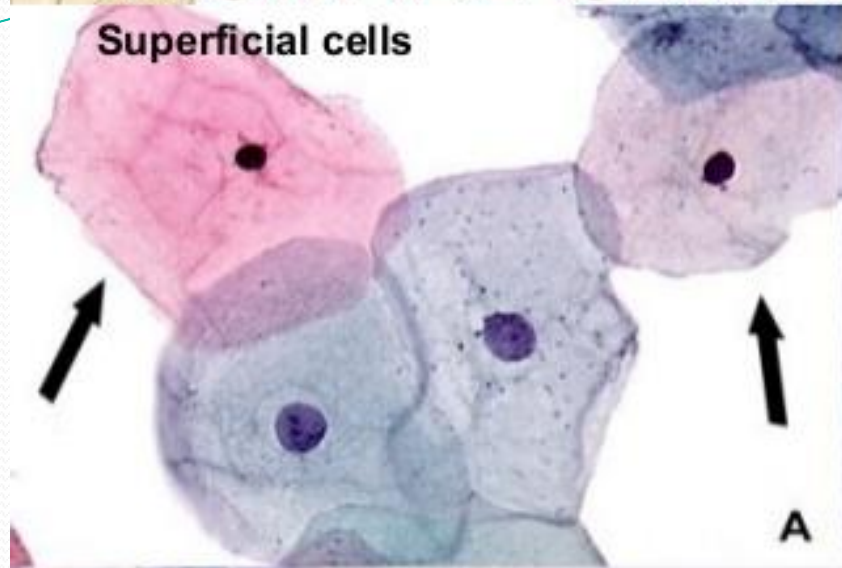
- Fat globules filling the the capillaries can be demonstrated in frozen sections of lung brain and other organs





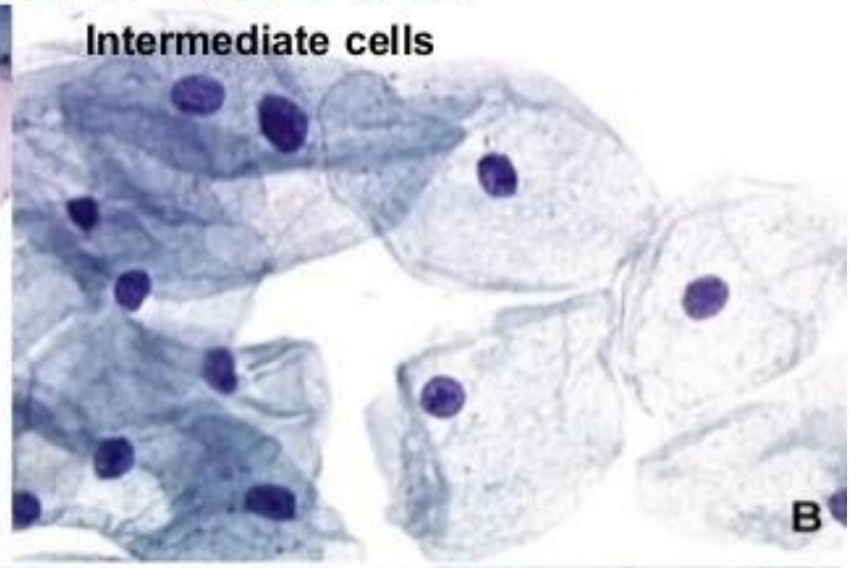
NORMAL CERVICAL CELLS

Superficial cells



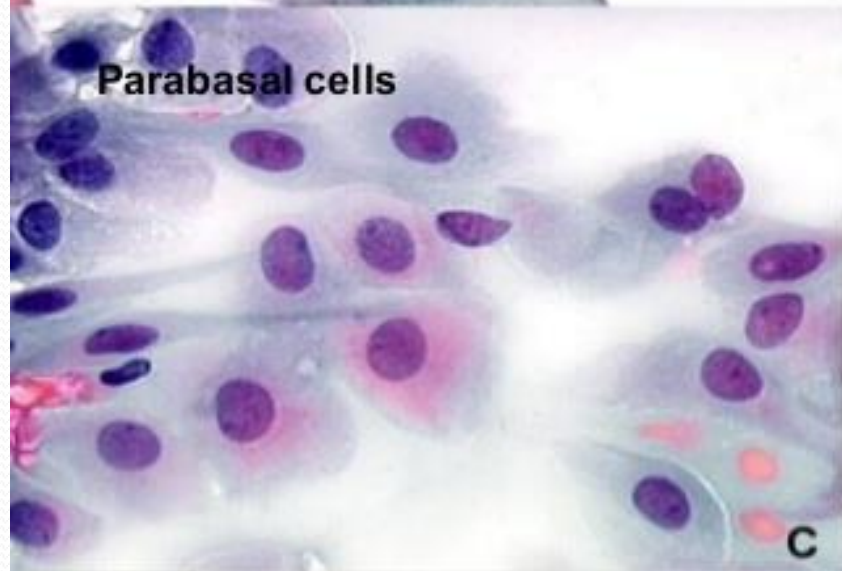
A

Intermediate cells



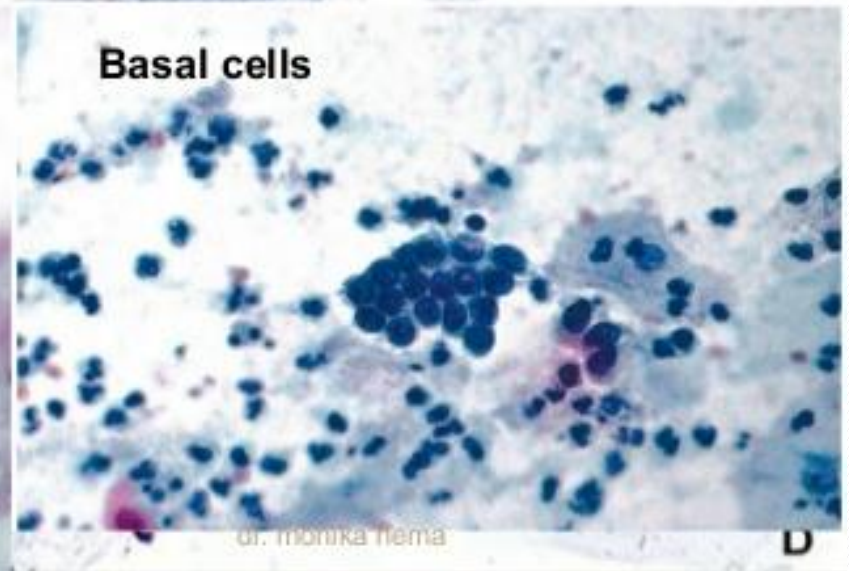
B

Parabasal cells



C

Basal cells



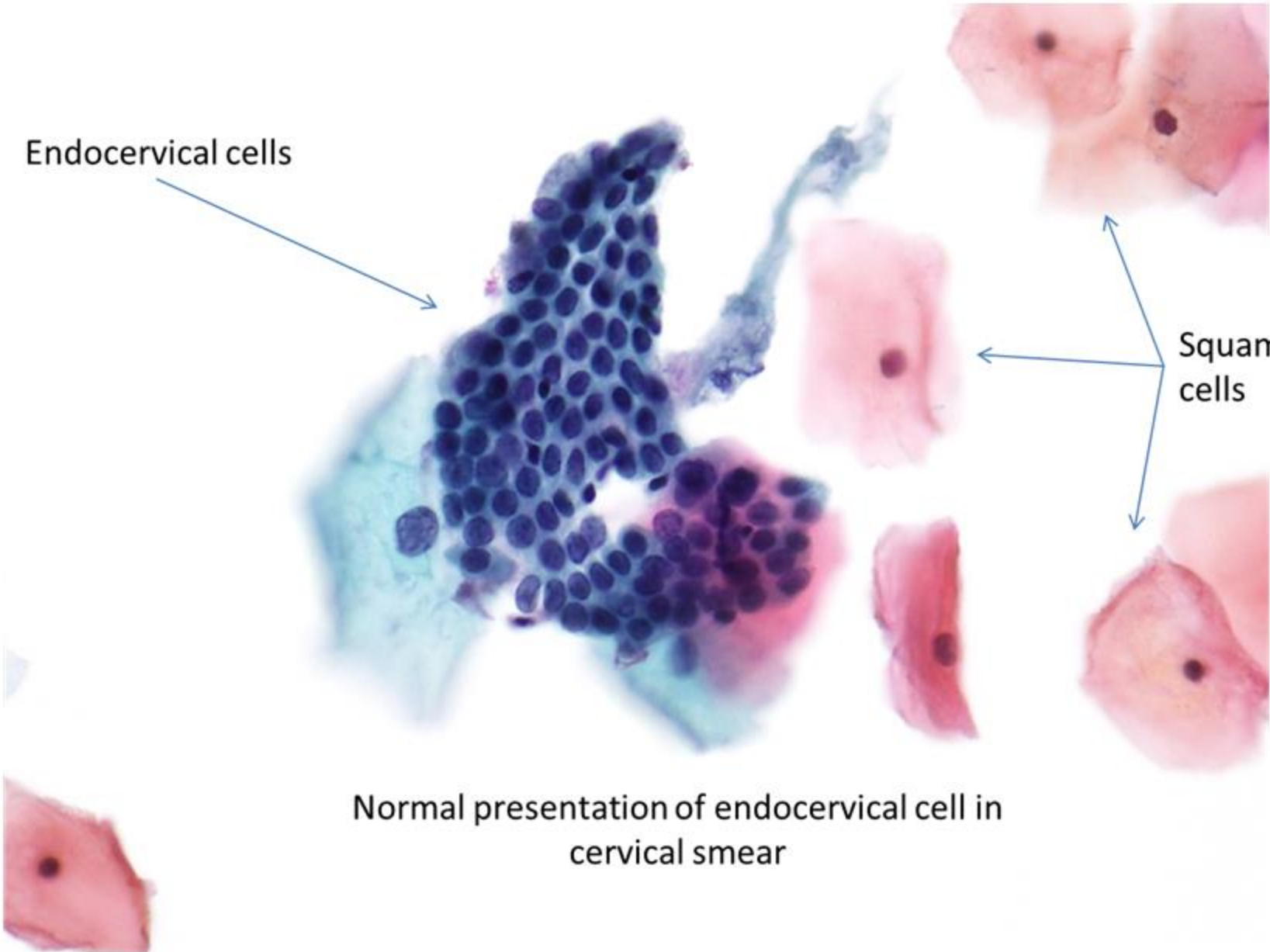
D

Dr. Monika Nema

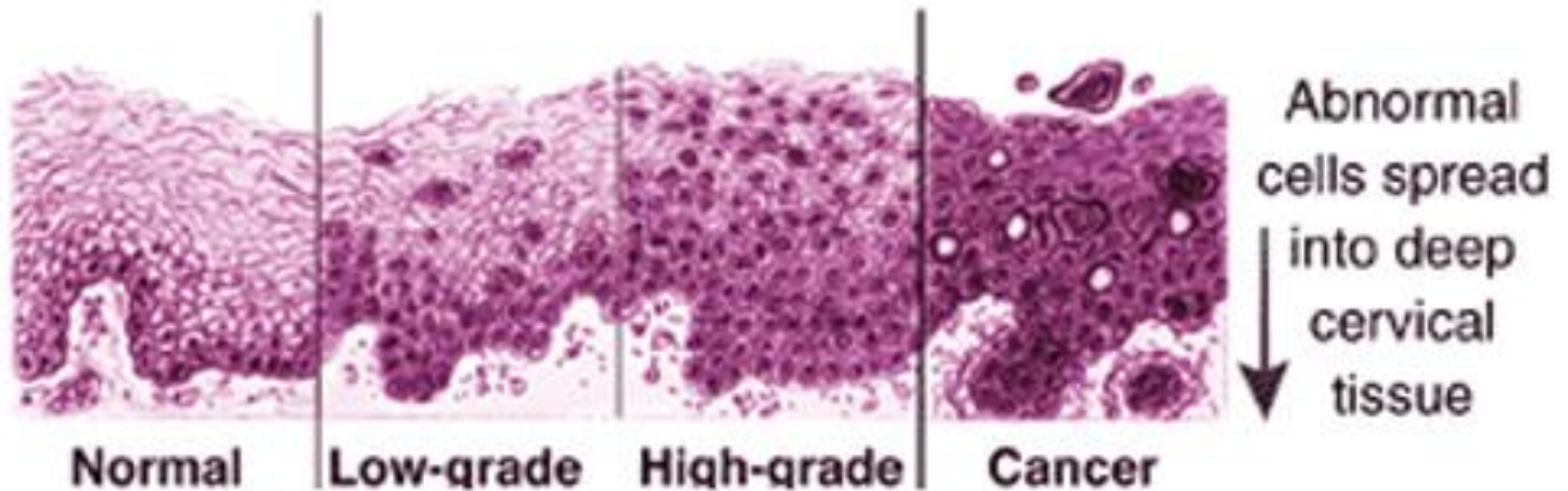
Endocervical cells

Squamous cells

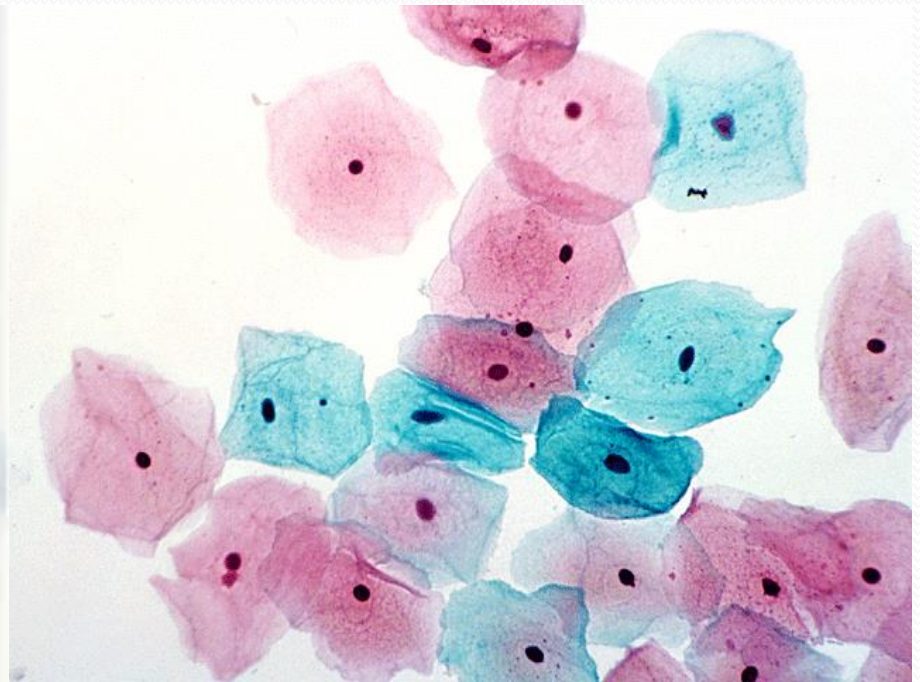
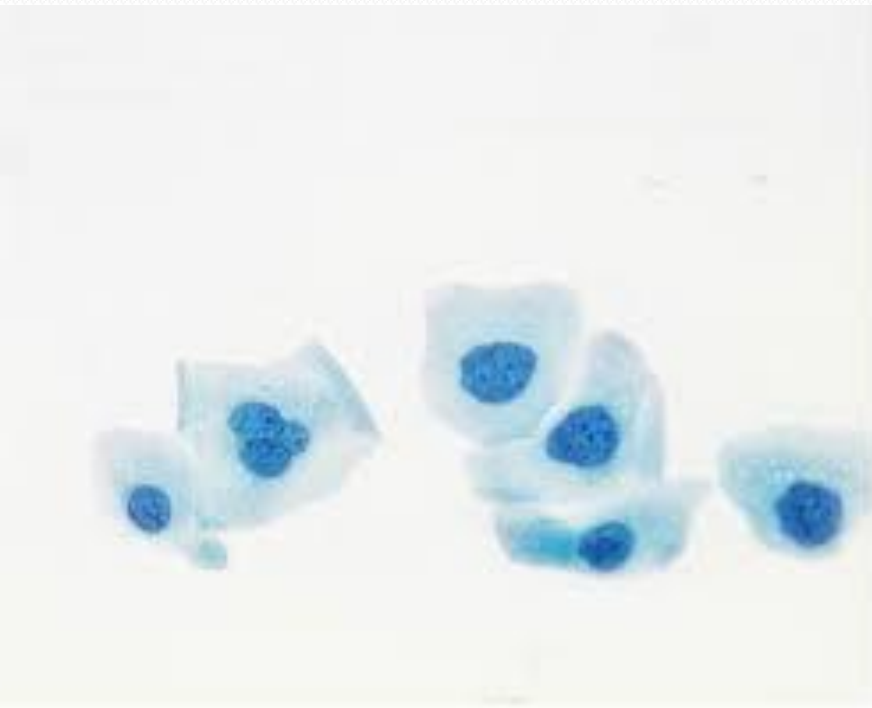
Normal presentation of endocervical cell in cervical smear



Cervical dysplasia



Normal smear compared to dysplasia



Candidiasis of cervix/vagina



Trichomonas vaginalis infection

