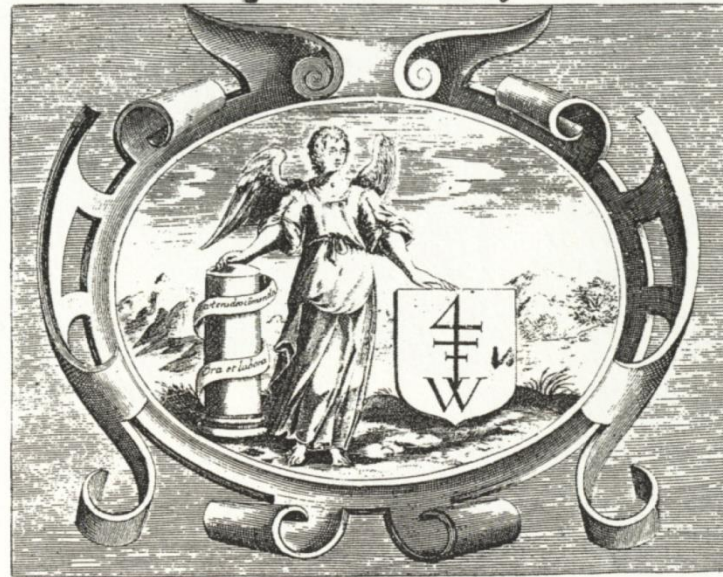


Lecture 5

EXERCITATIO
ANATOMICA DE
MOTV CORDIS ET SAN-
GVINIS IN ANIMALI-
BVS,
GVILIELMI HARVEI ANGLI,
*Medici Regii, & Professoris Anatomie in Col-
legio Medicorum Londinensi.*



FRANCOFVRTI,
Sumptibus GVILIELMI FITZERI.
ANNO M. DC. XXVIII.

DISTURBANCES OF CIRCULATION

ACTIVE HYPEREMIA (ARTERIAL)

- ★ **EXCESS OF BLOOD IN ARTERIES: PHYSIOLOGICAL WHEN MOVING, RUNNING**
- ★ **UNRECOGNIZABLE DURING AUTOPSY; DIFFICULT TO RECOGNIZE ON HISTOLOGICAL GLASS SLIDES**
- ★ **CONFIRMED IN PARALYSIS AND IRRITATION OF VESSEL-CONTROLLING NERVES BECAUSE OF INCREASE IN CONCENTRATION OF CO₂ IN THE TISSUES**
- ★ **AND IN SOME STAGES OF INFLAMMATION**

PASSIVE HYPEREMIA (VENOUS)

- ★ **EXCESS OF BLOOD IN THE VEINS**
- ★ **ALWAYS PATHOLOGICAL**
- ★ **MACROSCOPY OF ORGANS: HEAVY, DARK RED,**

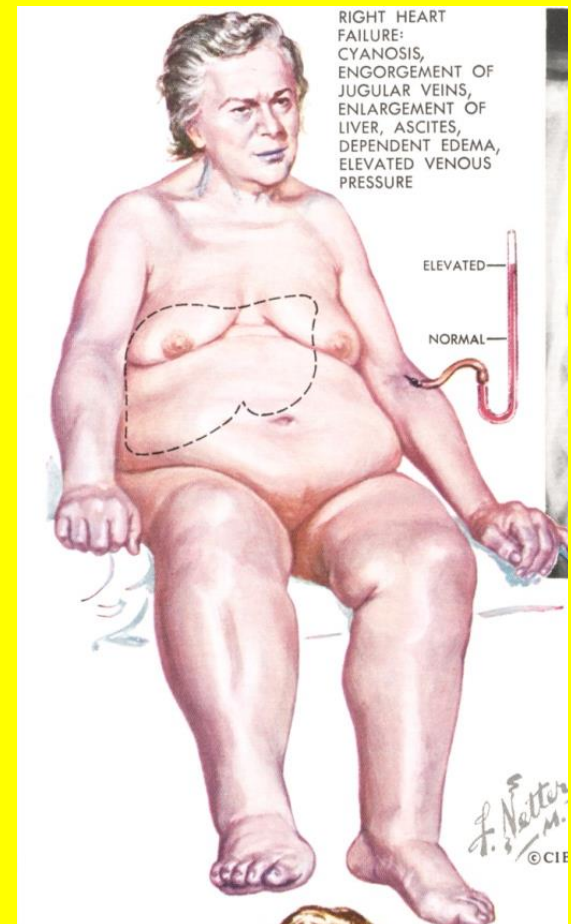
GENERALIZED VENOUS HYPEREMIA

DEVELOPS WHEN THERE IS A RESTRICTION OF BLOOD FLOW IN THE CENTRAL POINTS OF CIRCULATION – HEART AND LUNGS

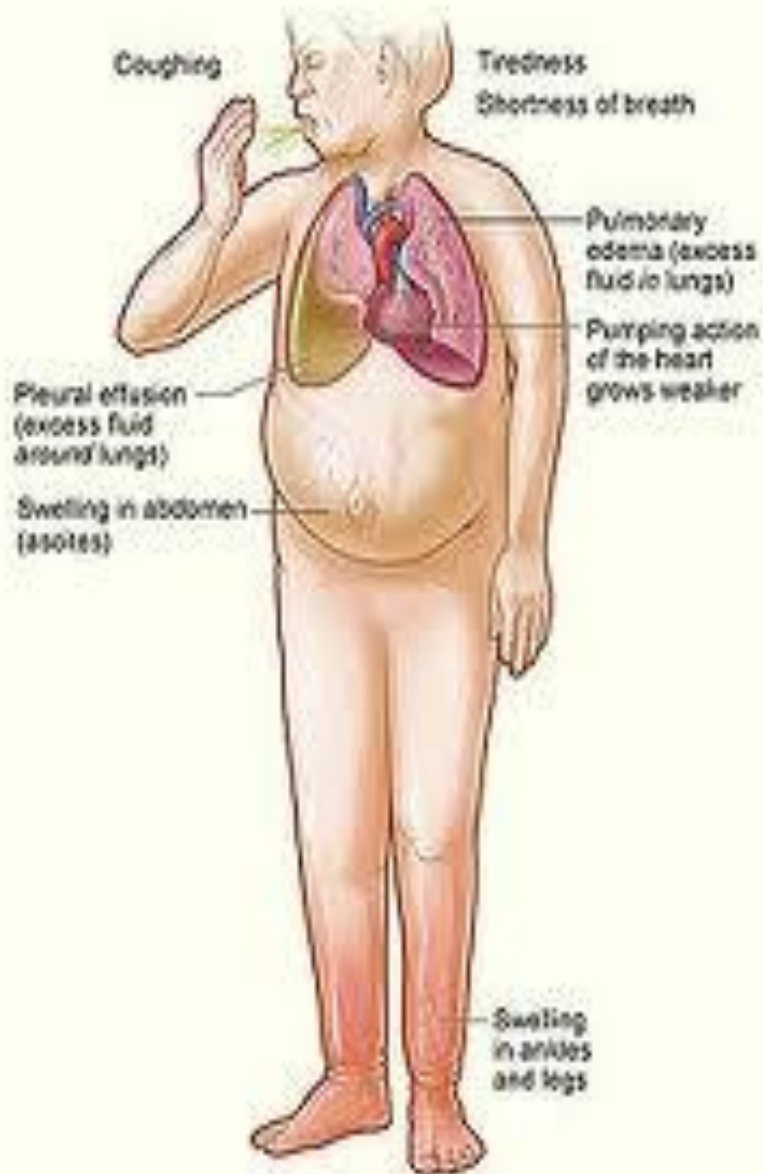
• IT IS AN EQUIVALENT OF THE CLINICAL/MORPHOLOGICAL CONDITION: CIRCULATION INSUFFICIENCY - *INSUFFICIENTIA CIRCULATORIA*

•GENERAL SYMPTOMS

- CYANOSIS
- DYSPNEA – difficult breathing
- TRANSUDATE, EDEMA - SWELLING



CIRCULATION INSUFFICIENCY



LOCAL VENOUS HYPEREMIA

E.G. THE RESTRICTION OF VENOUS FLOW THROUGH LIVER IN THE CASE OF CIRRHOSIS.

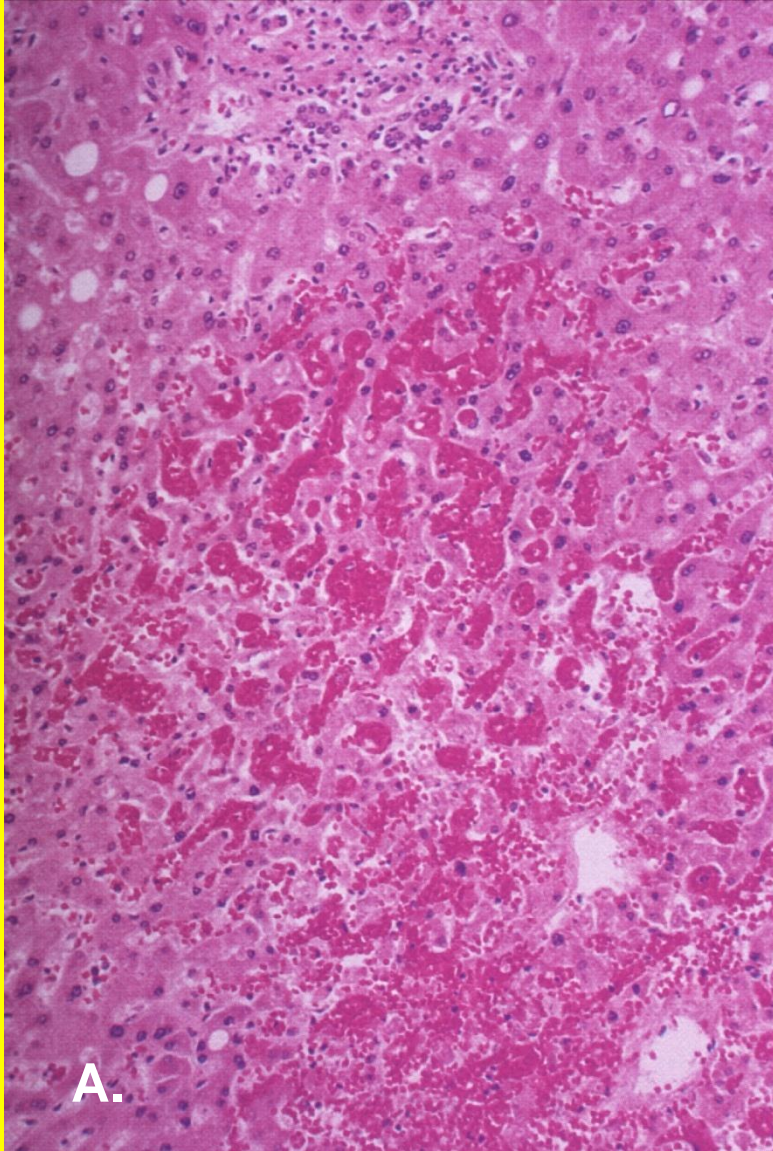
EARLY PERIOD –

**CONGESTION IN THE VEINS,
EDEMA, DEGENERATION,
HYPOXIA**

LATE PERIOD –

**STIMULATION OF FIBROBLASTS -
PRODUCTION OF COLLAGEN,
CYANOTIC INDURATION, ATROPHY OF
PARENCHYMA, HEMOSIDERIN,
NECROSIS, FUNCTIONAL DISORDERS,
COLLATERAL CIRCULATION**

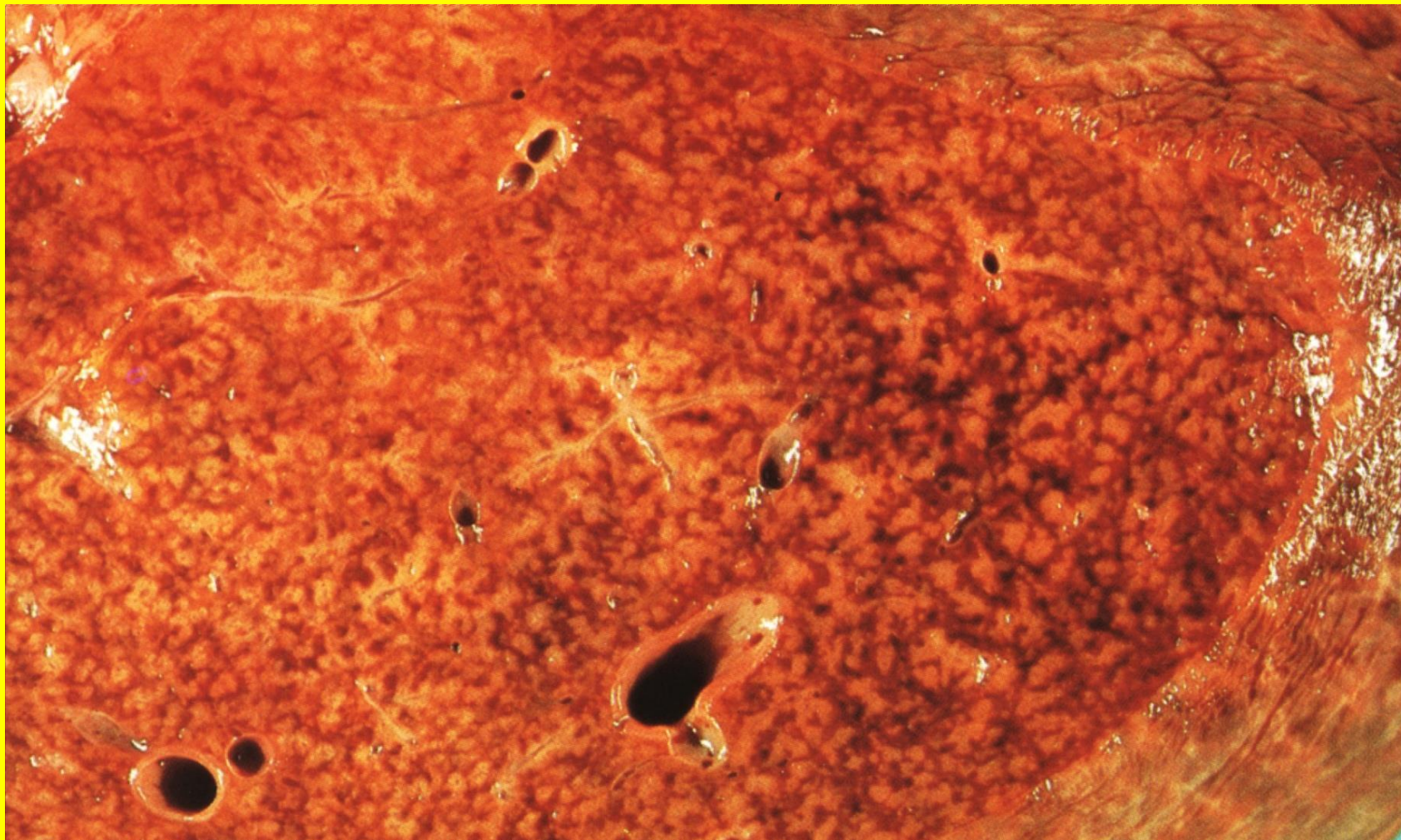
LIVER VENOSTASIS



A. ERYTHROCYTES IN LIVER SINUSES

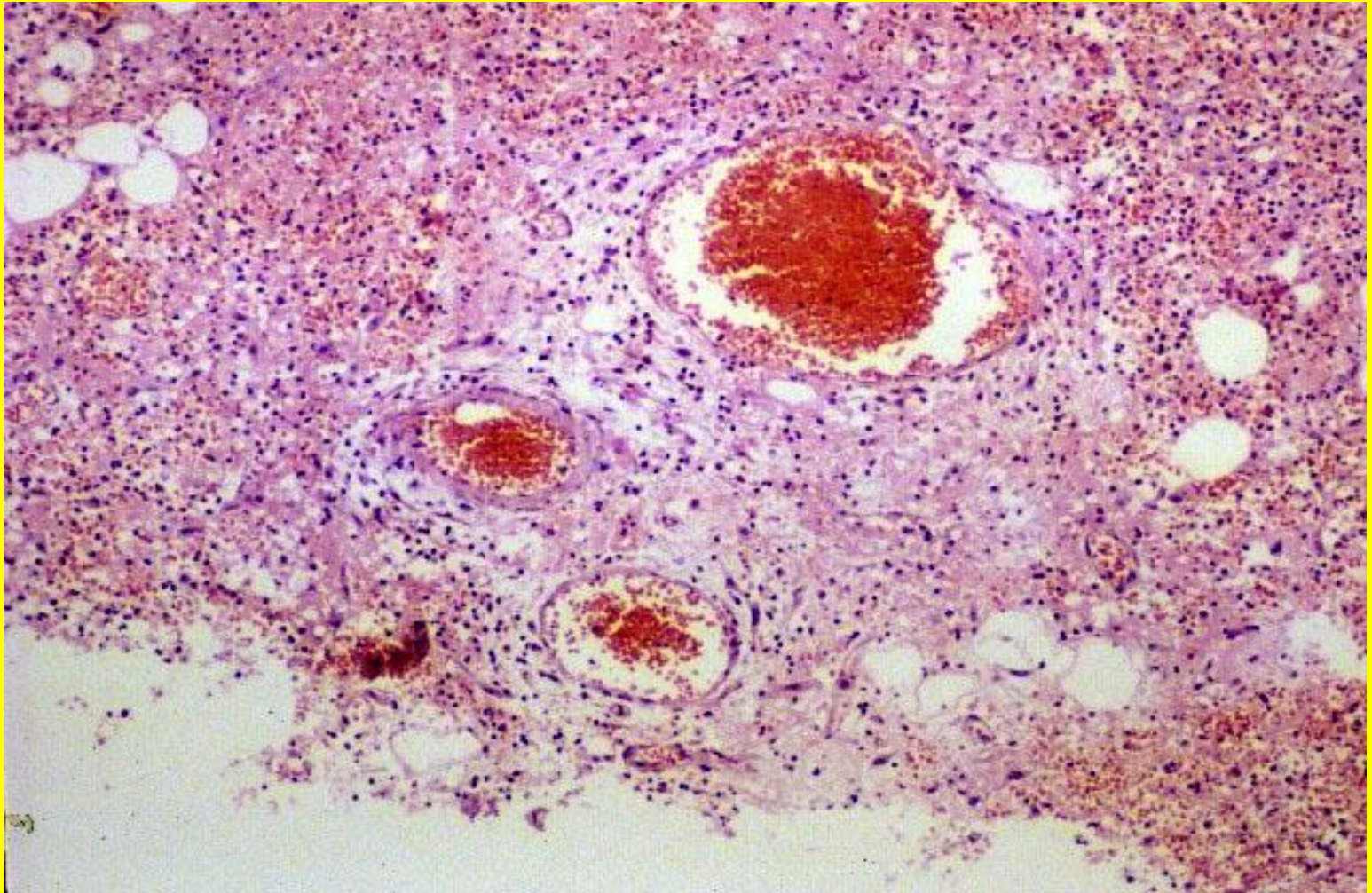
B. BLOOD IN THE AREA OF THE CENTRAL VEINS - FIBROSIS

VENOSTASIS (PASSIVE HYPEREMIA) IN LIVER

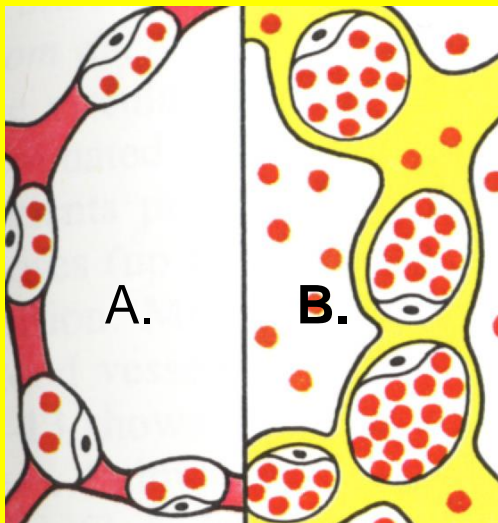


NUTMEG LIVER

VENOSTASIS (PASSIVE HYPEREMIA)

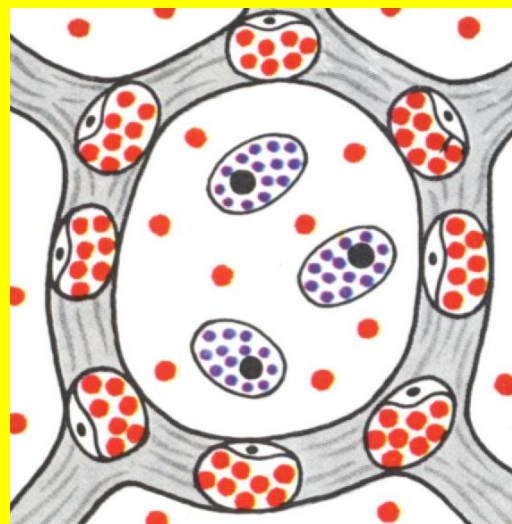


VENOUS HYPEREMIA IN LUNGS



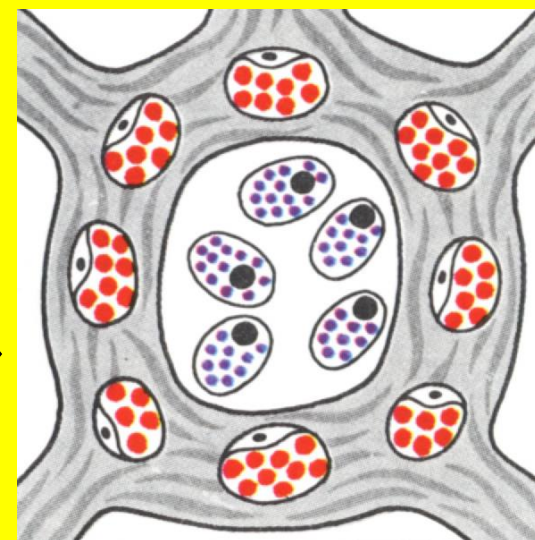
A. NORMAL LUNG

B. SEVERE BLOOD CONGESTION



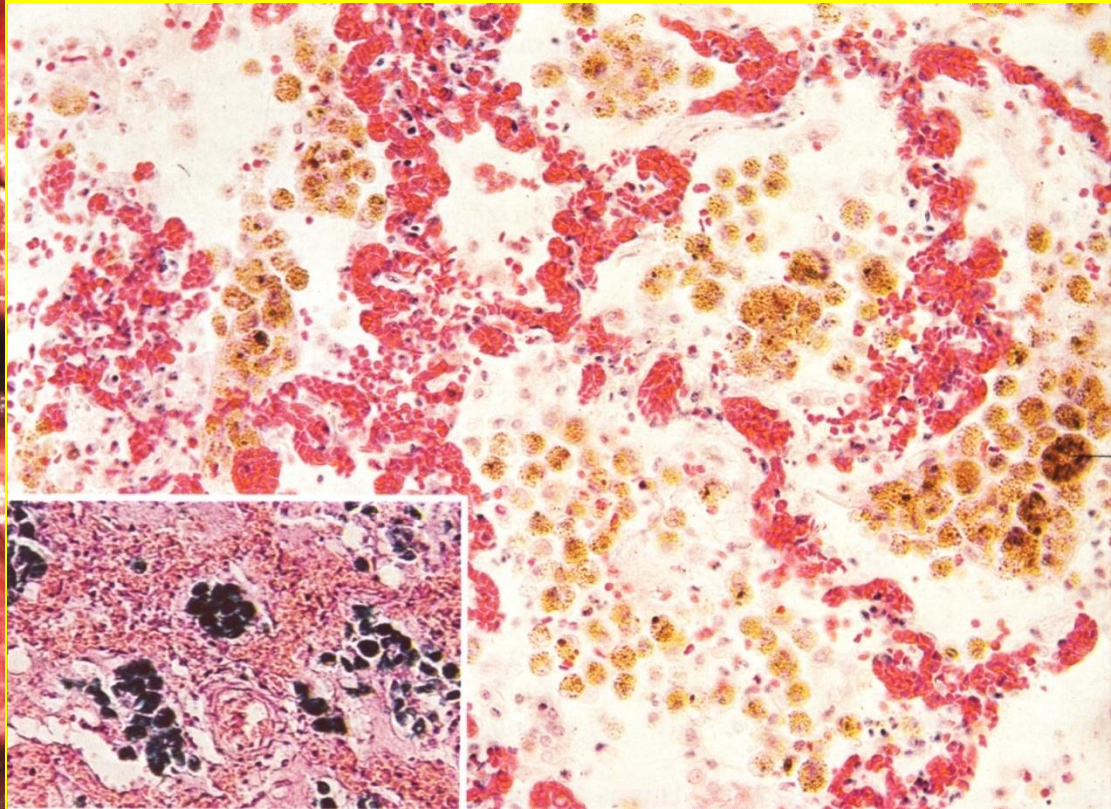
**EARLY
VENOSTASIS -
MACROPHAGES**

**CHRONIC VENOSTASIS - FIBROSIS
MACROPHAGES**



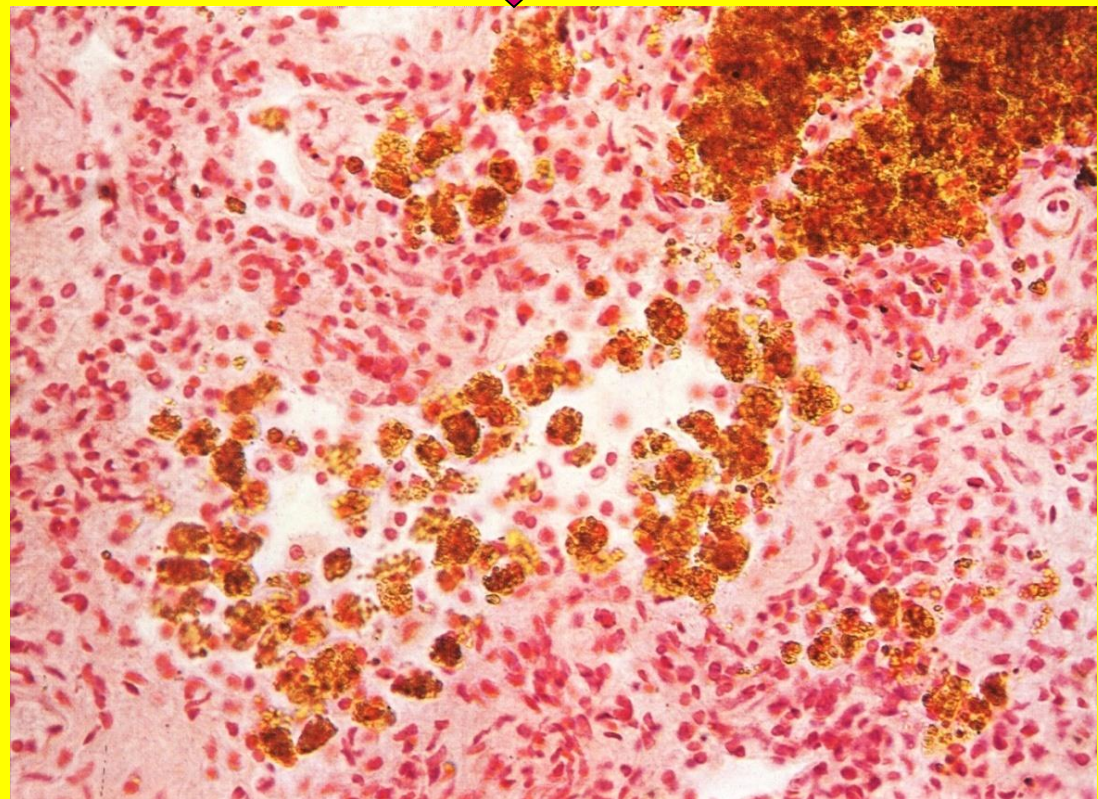
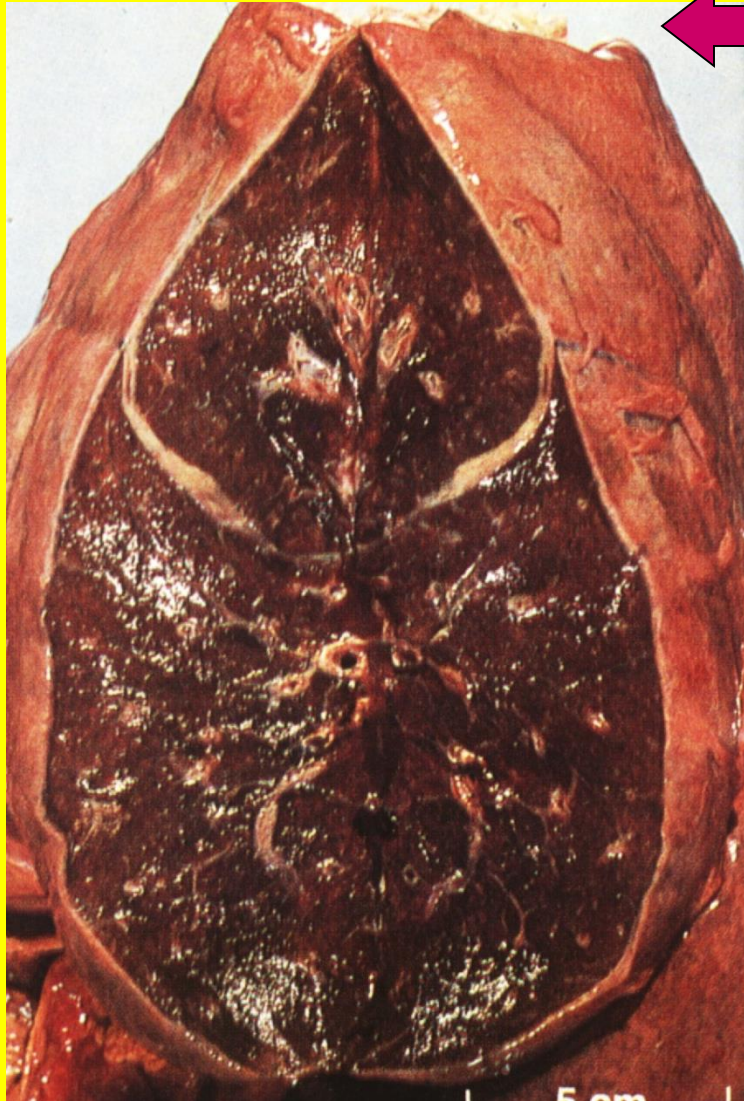
VENOUS HYPEREMIA (PASSIVE) IN LUNGS

EARLY STAGE OF VENOSTASIS IN THE LUNG

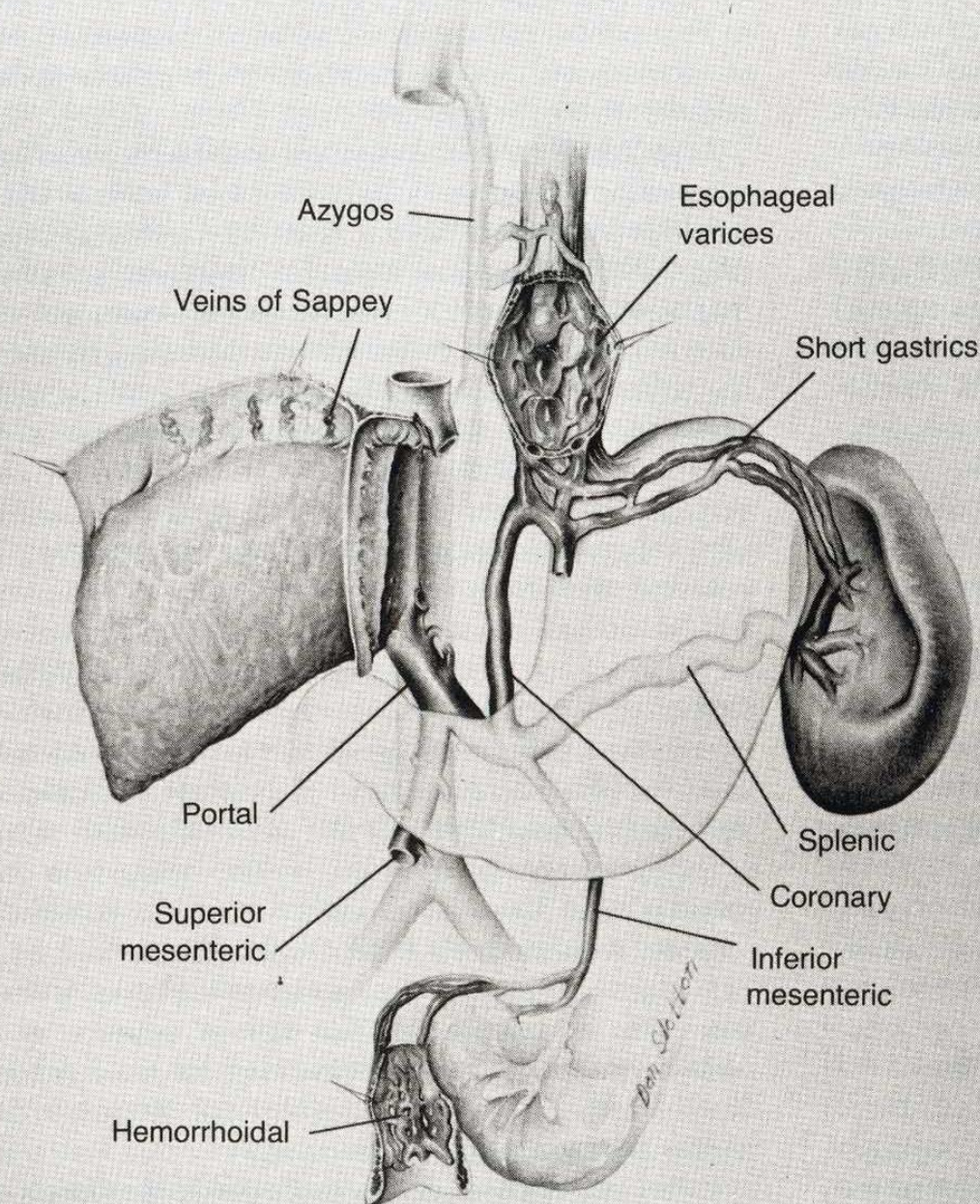


CHRONIC VENOSTASIS (HYPEREMIA) IN LUNGS

MACROSCOPIC AND
MICROSCOPIC PICTURES OF
VENOSTASIS IN THE LUNG



COLLATERAL CIRCULATION IN LIVER CIRRHOSIS

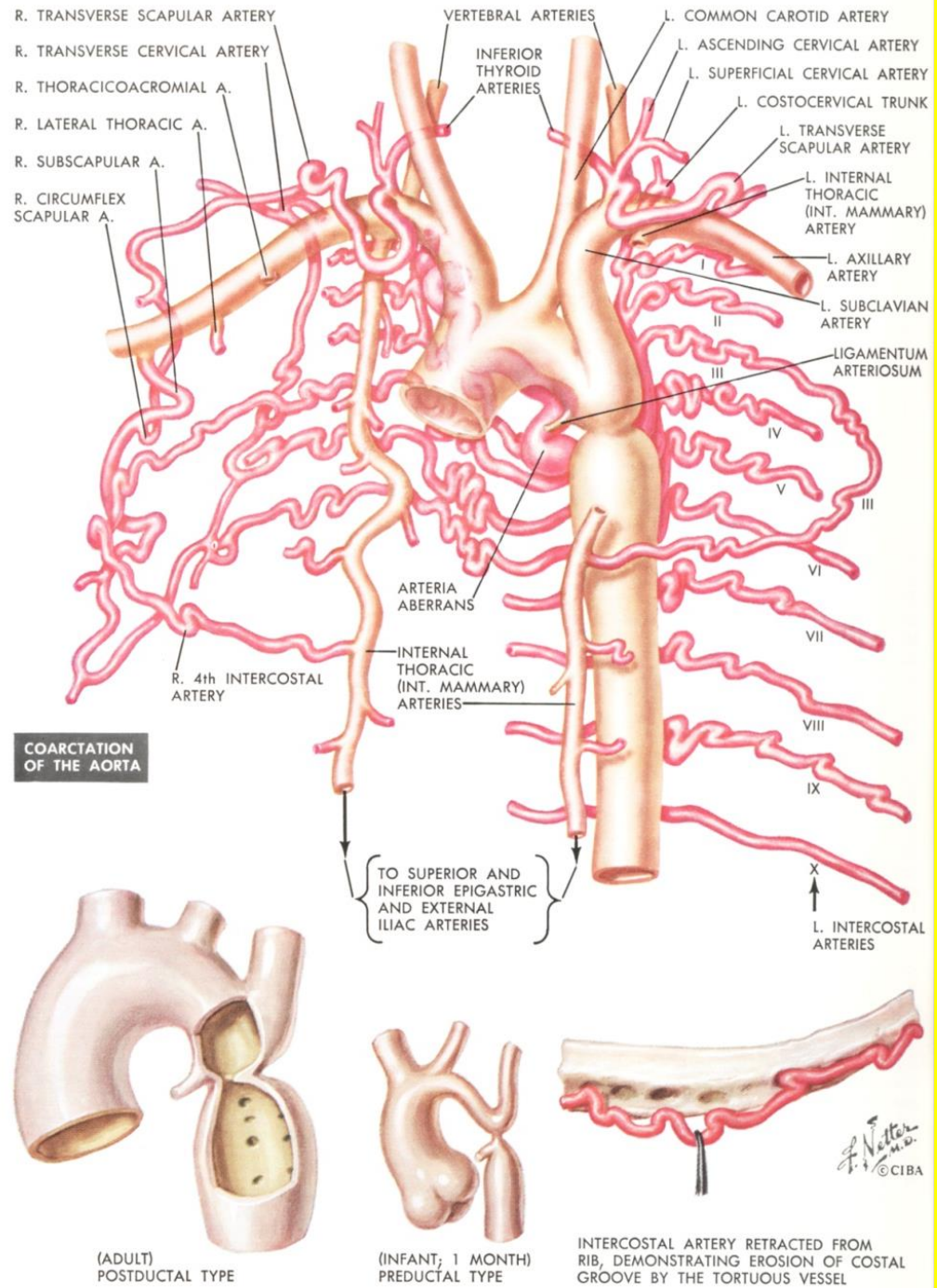


1. VARICES (ESOPHAGUS)

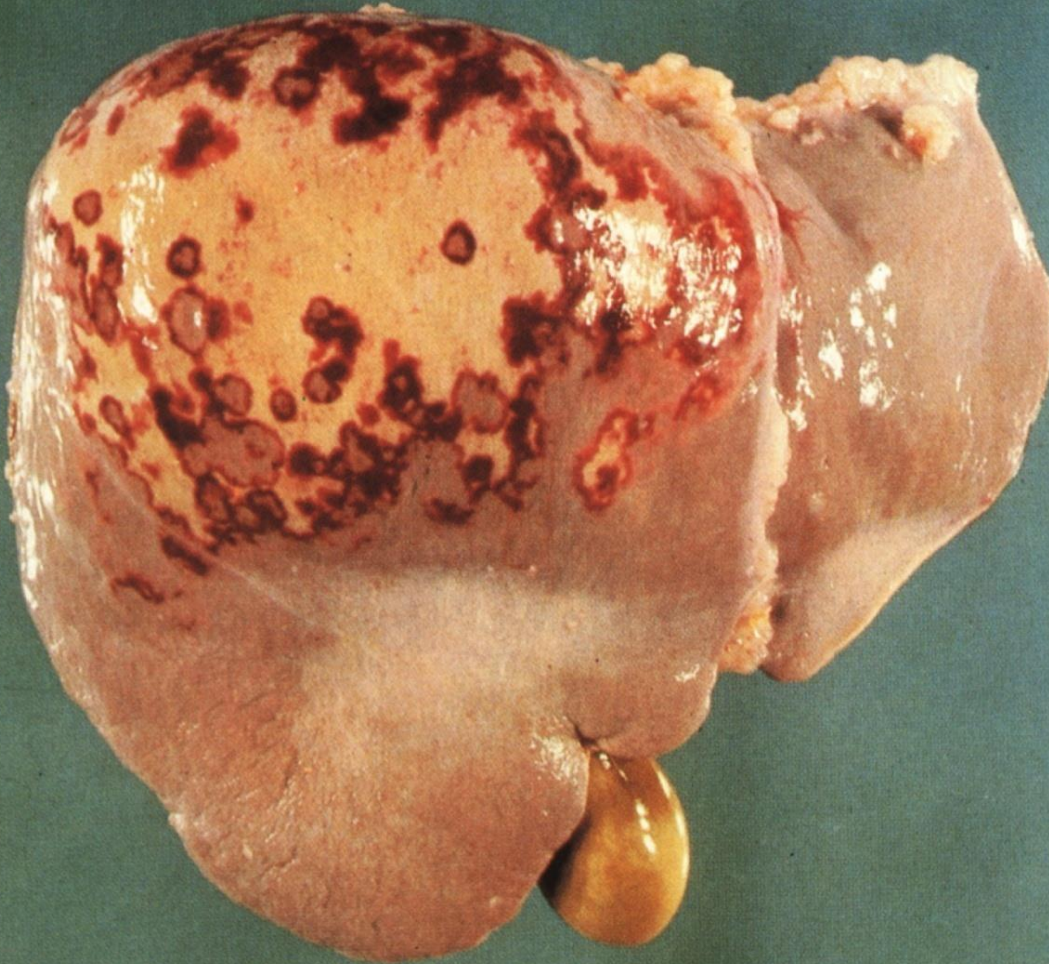
2. VARICES (HEMORRHOIDAL)

3. MEDUSA HEAD (CAPUT MEDUSAE) IN CHILDREN

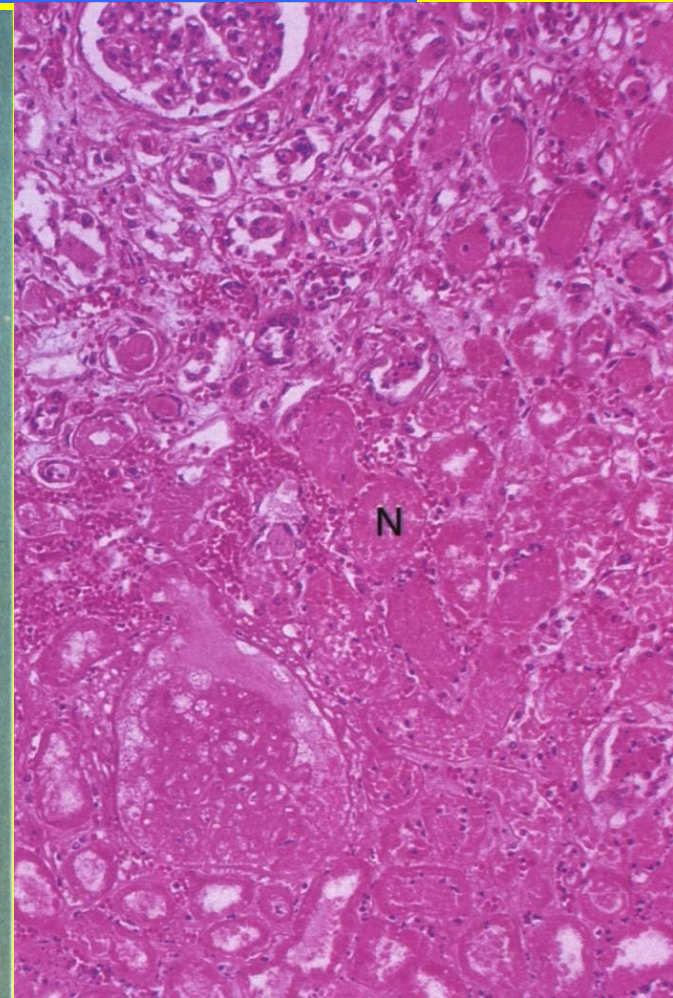
COLLATERAL CIRCULATION DUE TO COARCTATION OF AORTA



ANEMIC/PALE INFARCT - INFARCTUS PALLIDUS

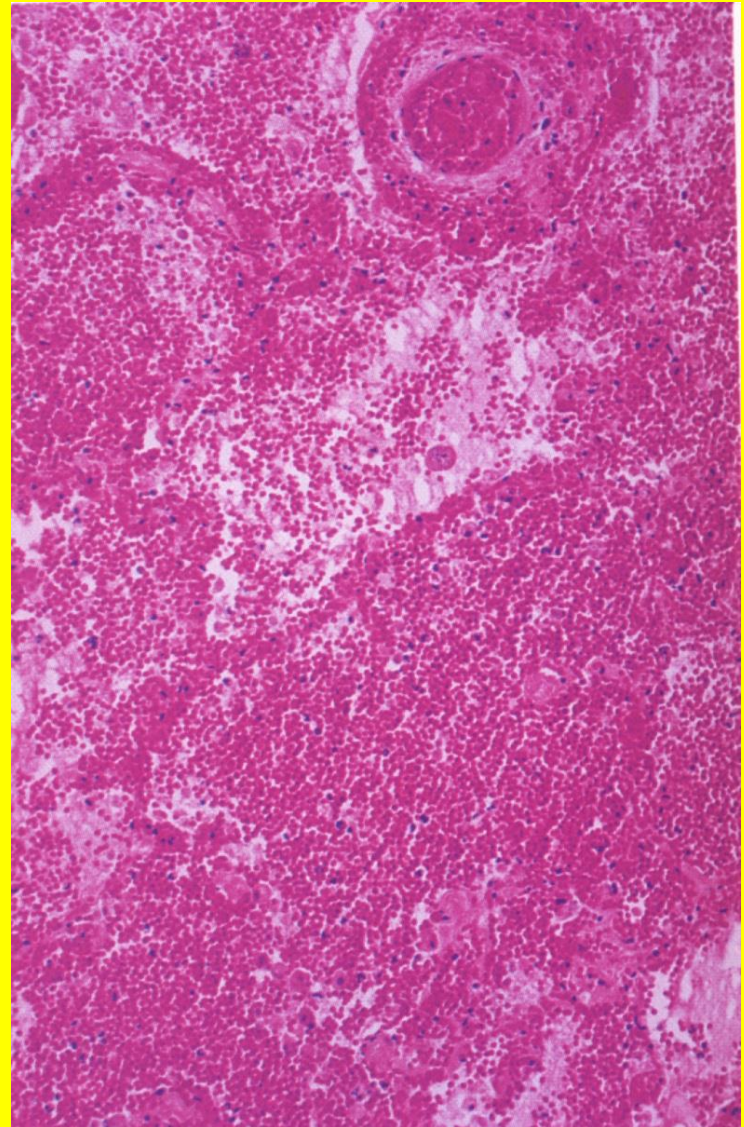
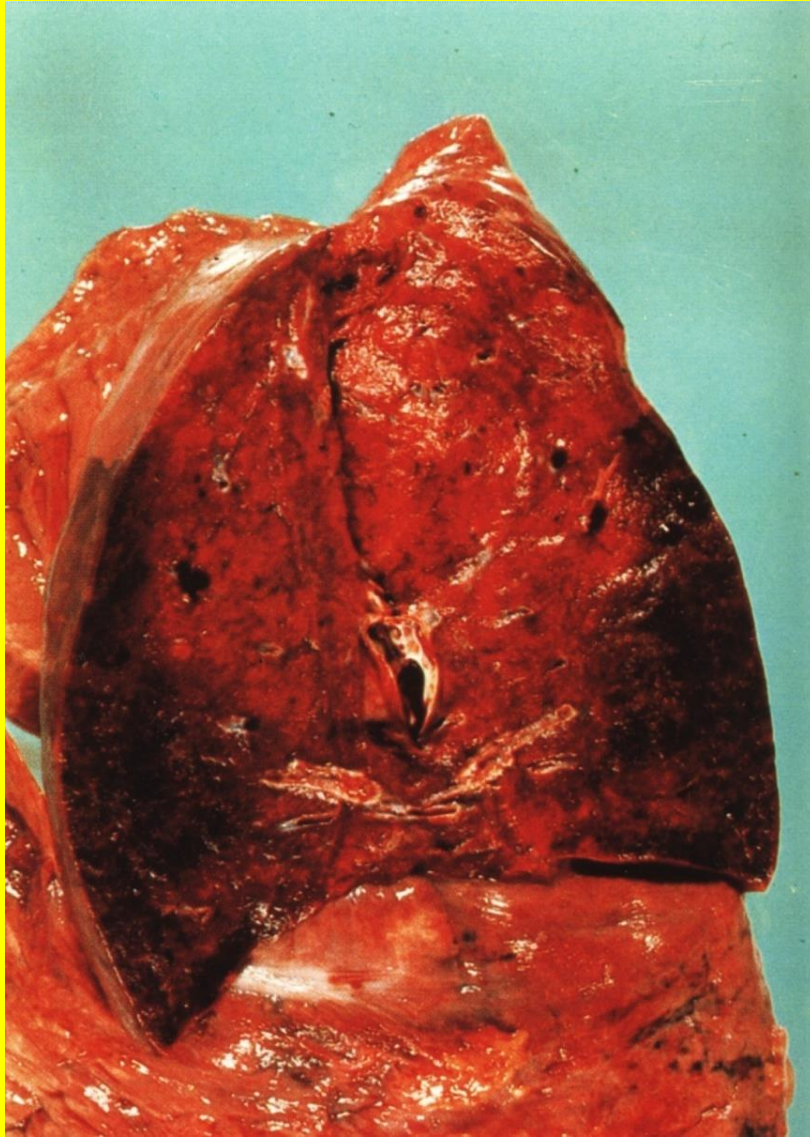


**INFARCTUS PALLIDUS – PALE
INFARCT (LIVER)**



**INFARCTUS PALLIDUS
– PALE INFARCT
(KIDNEY)**

HEMORRHAGIC INFARCT [RED, RUBER, HAEMORRHAGICUS]



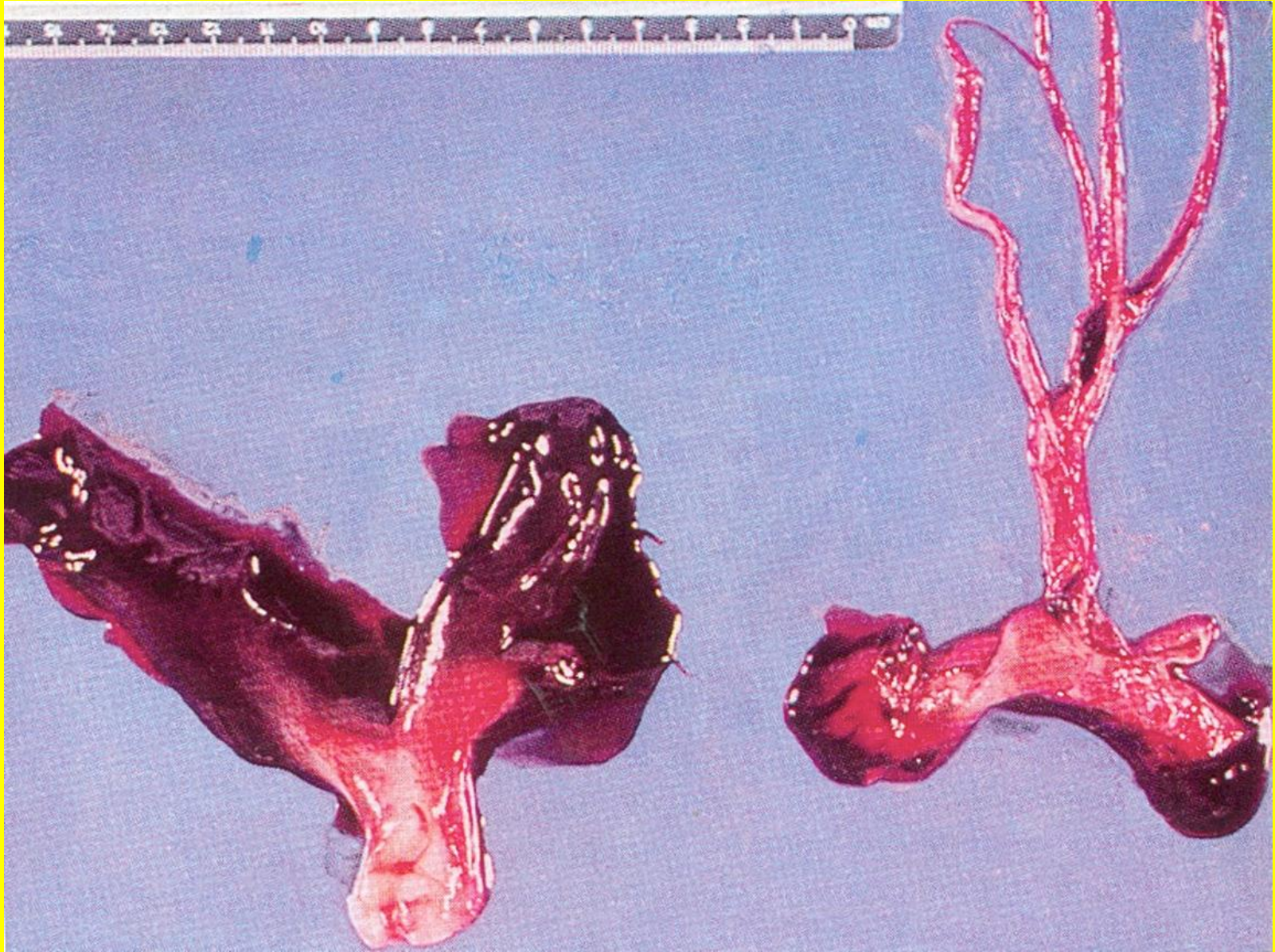
INFARCTUS HAEMORRHAGICUS (LUNG)

**AFTER DEATH: IN HEART AND IN VESSELS =
CRUOR, COAGULUM**

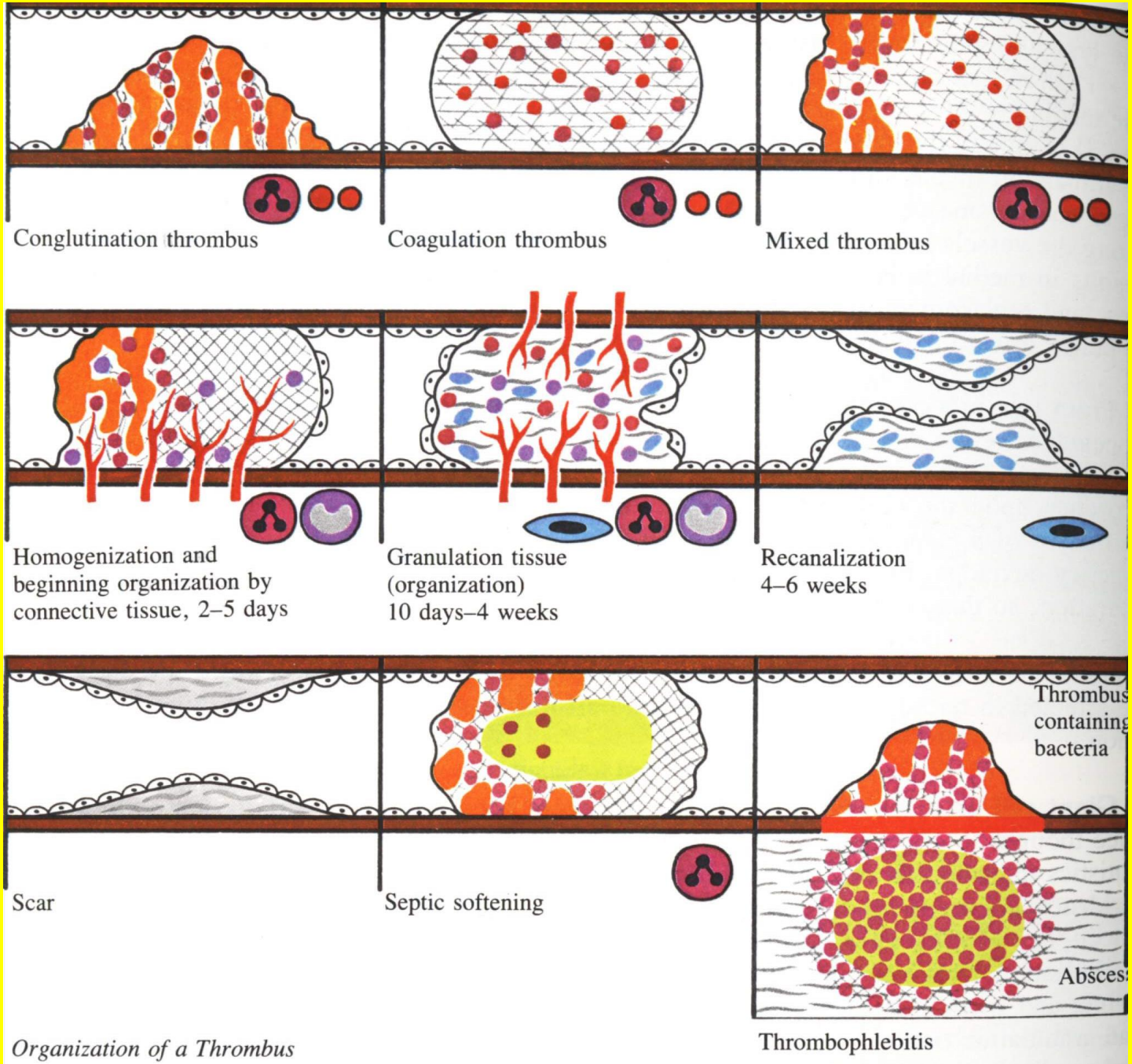
**DURING LIFE: WHEN BLOOD SPILLS BEYOND
A VESSEL = CRUOR, COAGULUM**

**DURING LIFE: WHEN BLOOD CLOTS INSIDE
VESSELS = THROMBUS, CLOT**

CRUOR - COAGULUM



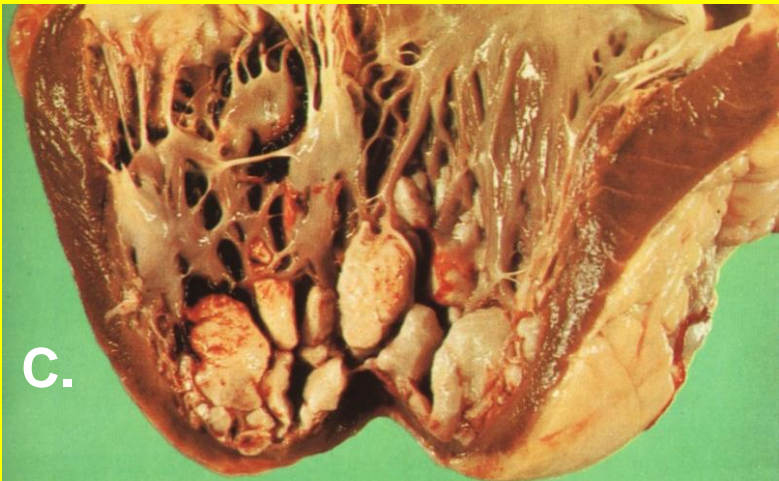
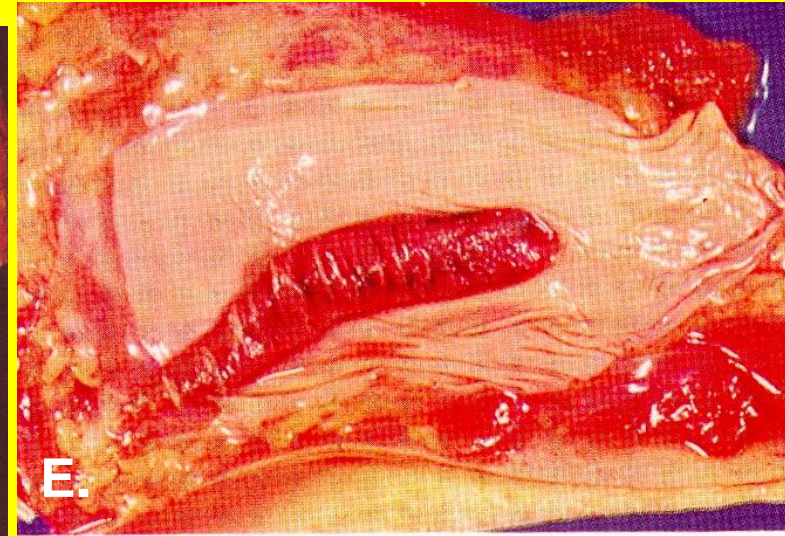
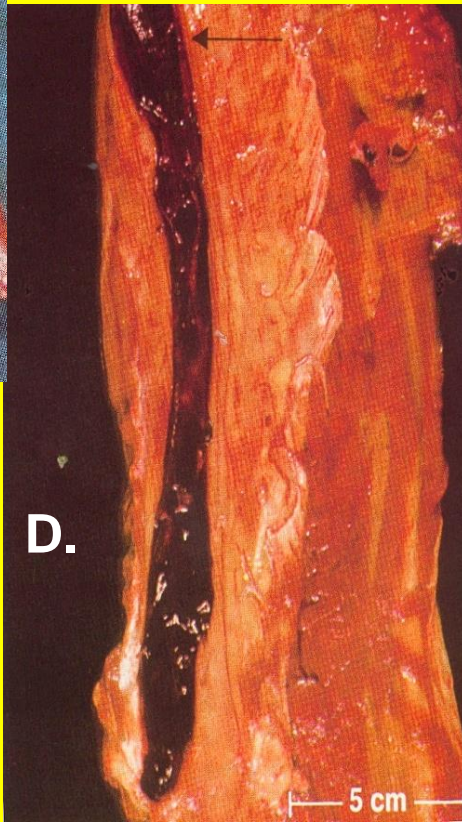
TYPES OF THROMBI AND EVOLUTION OF THROMBI



Organization of a Thrombus

Thrombophlebitis

FORMS OF THROMBI



A. PARIETAL

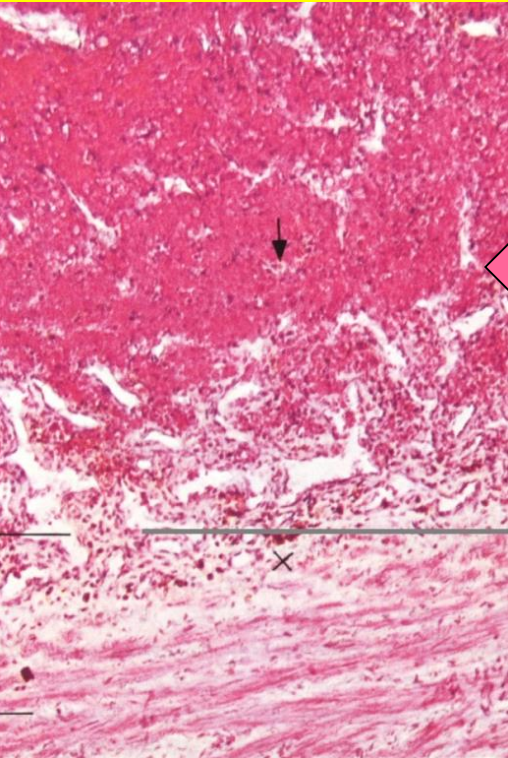
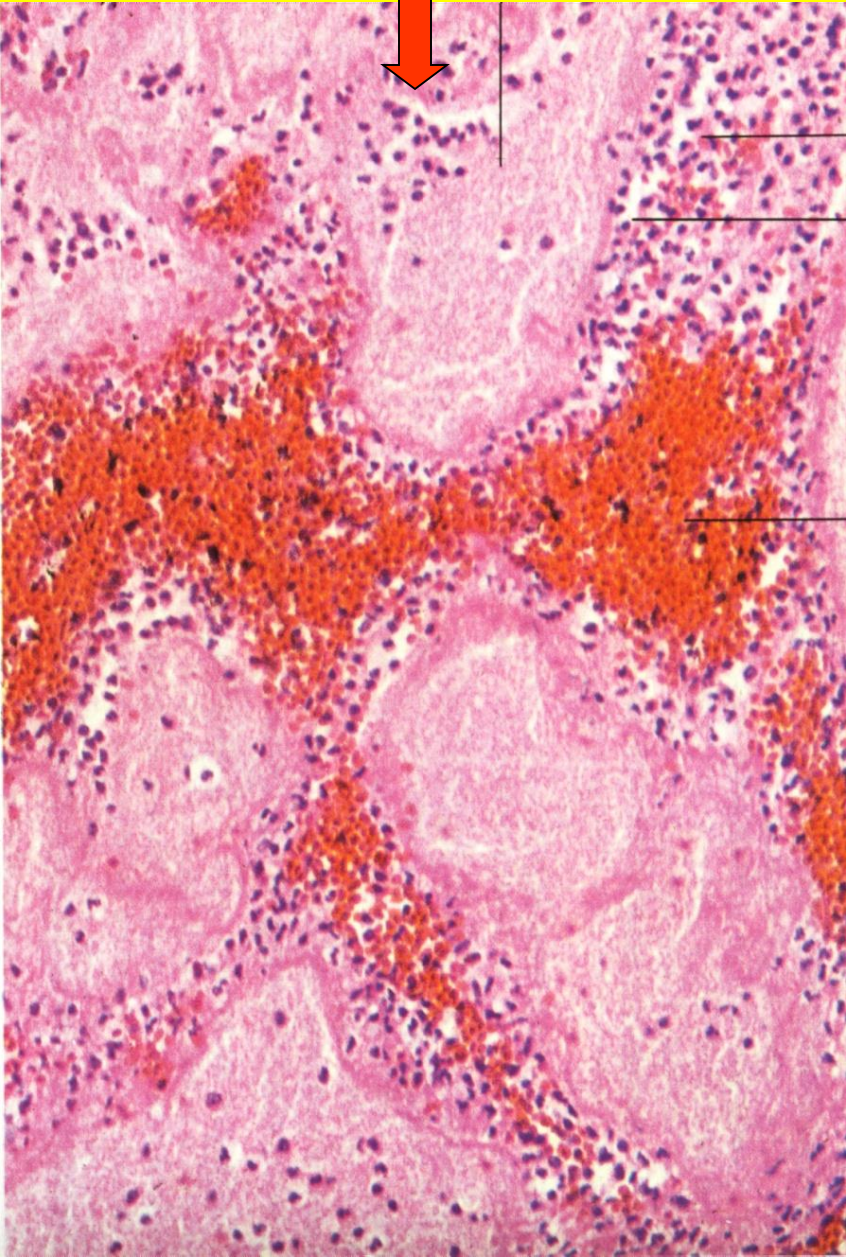
B. OBTURATING FEMORAL VEIN

C. SPHERICAL THROMBUS IN HEART

D. ELONGATED THROMBUS

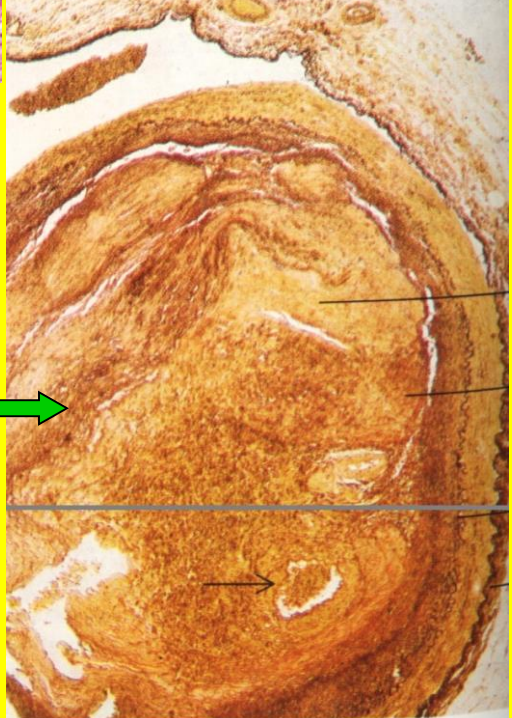
E. LAMINATED THROMBUS

RECENT THROMBUS

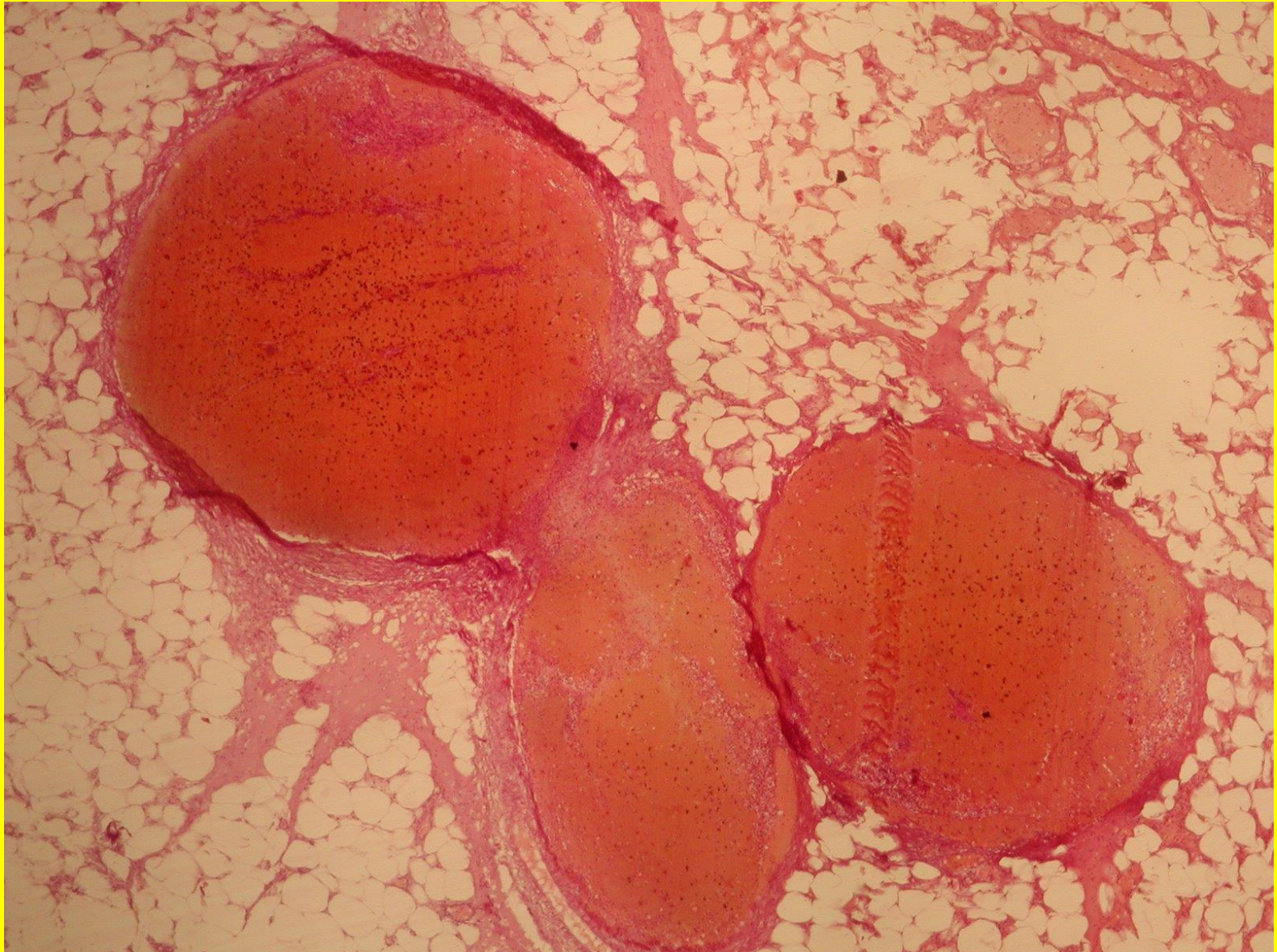


ORGANIZATION OF THROMBUS BY CONNECTIVE TISSUE

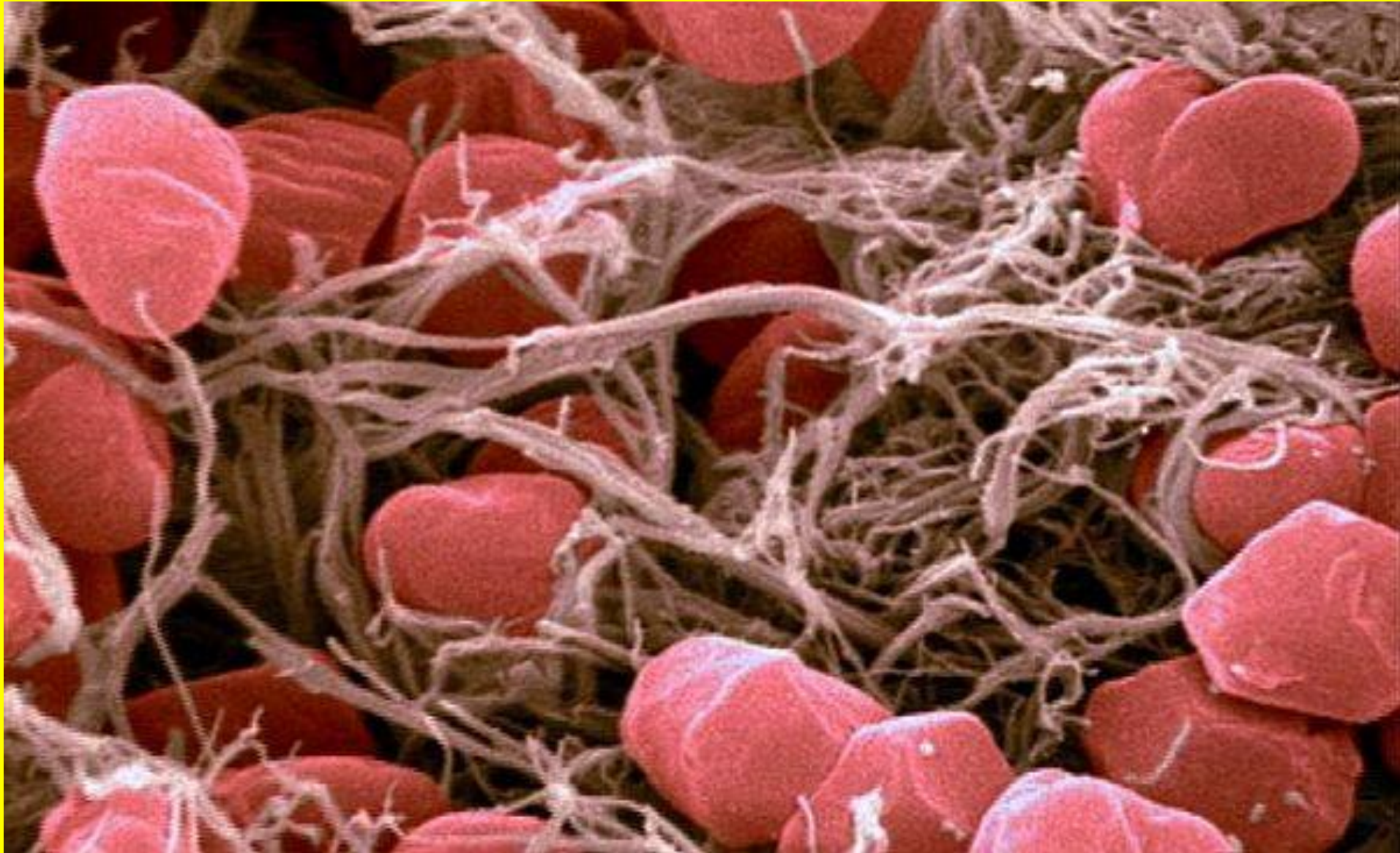
RECANALIZATION OF THROMBUS



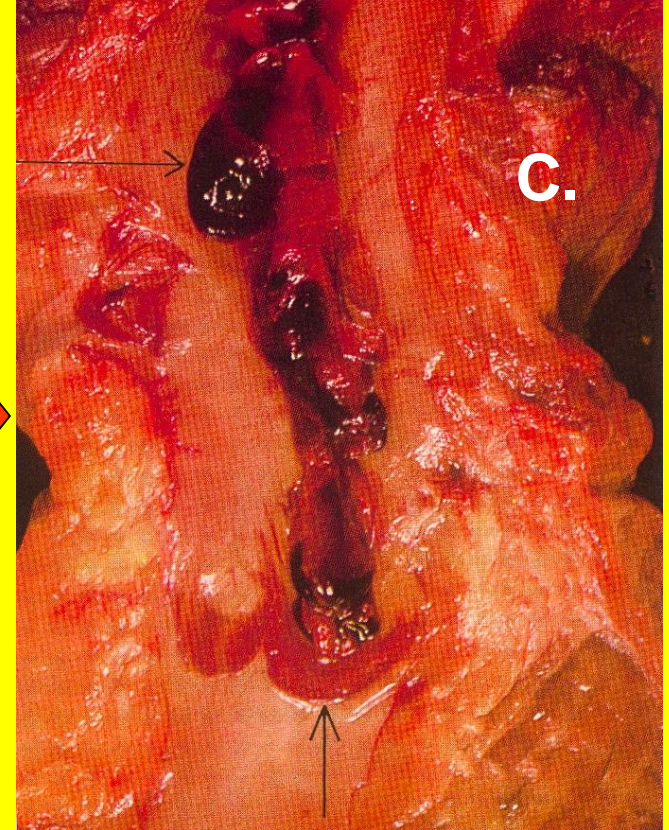
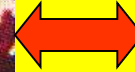
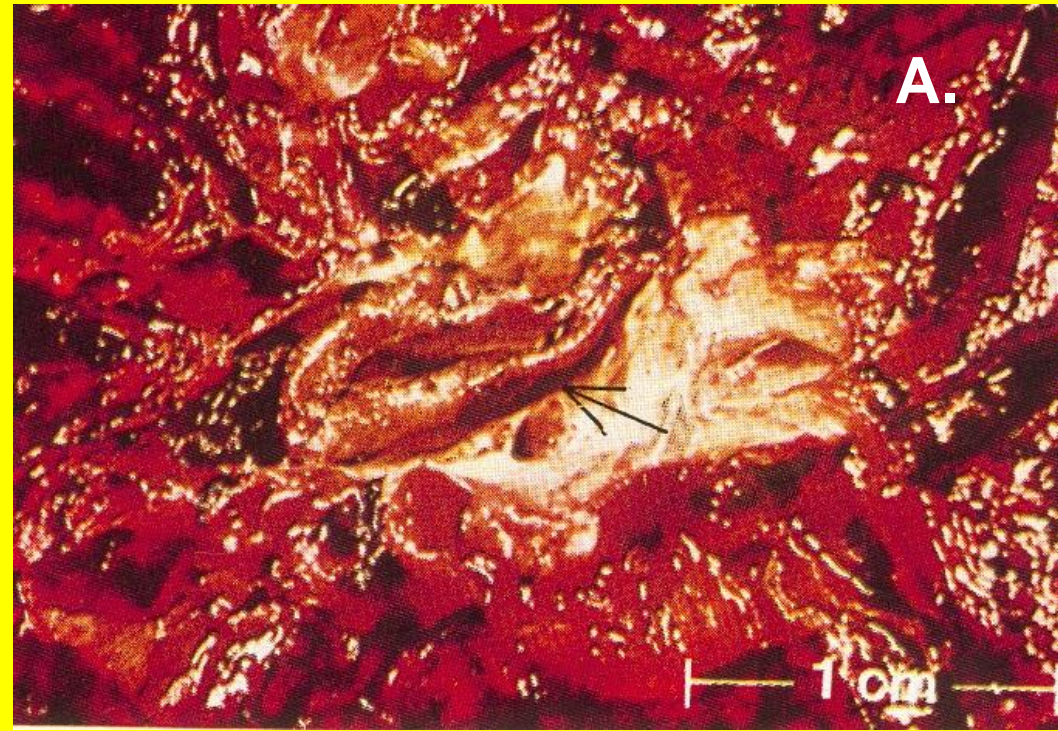
THROMBI IN VESSELS



THROMBOSIS



THROMBOTIC EMBOLISM



A. THROMBOTIC EMBOLISM IN PULMONARY ARTERY

B. THROMBOTIC EMBOLISM IN PULMONARY ARTERY-RIDING, SADDLE, STRADDLING, PANTALOON

C. ORIGIN OF EMBOLISM – THROMBOSIS OF FEMORAL VEIN

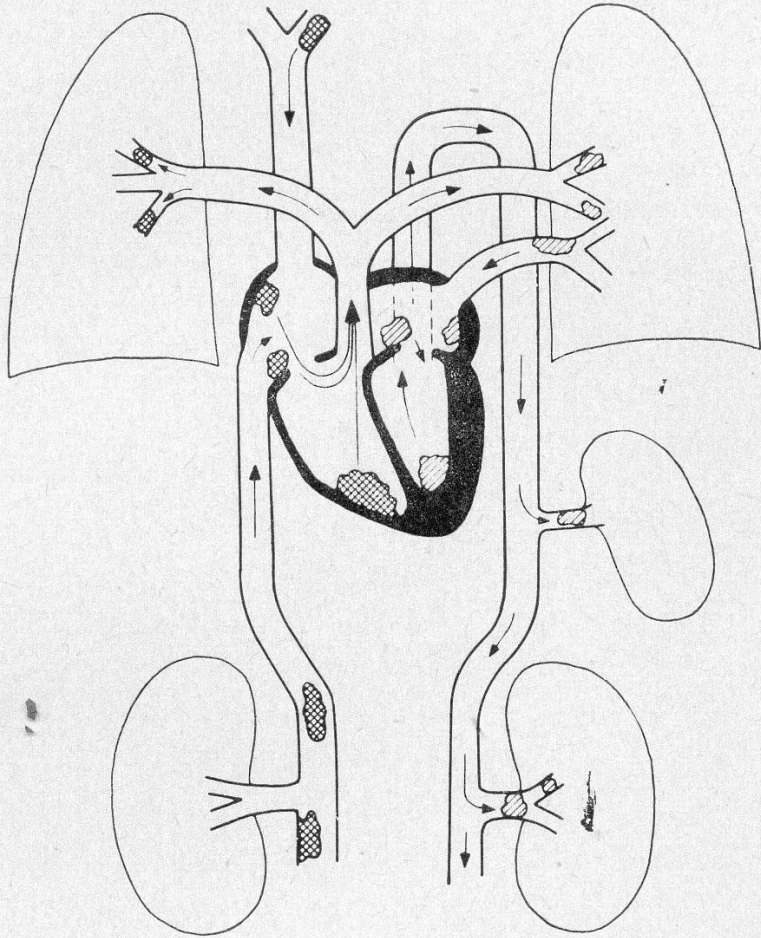


**Blood
clot
travels
from leg
to lung**

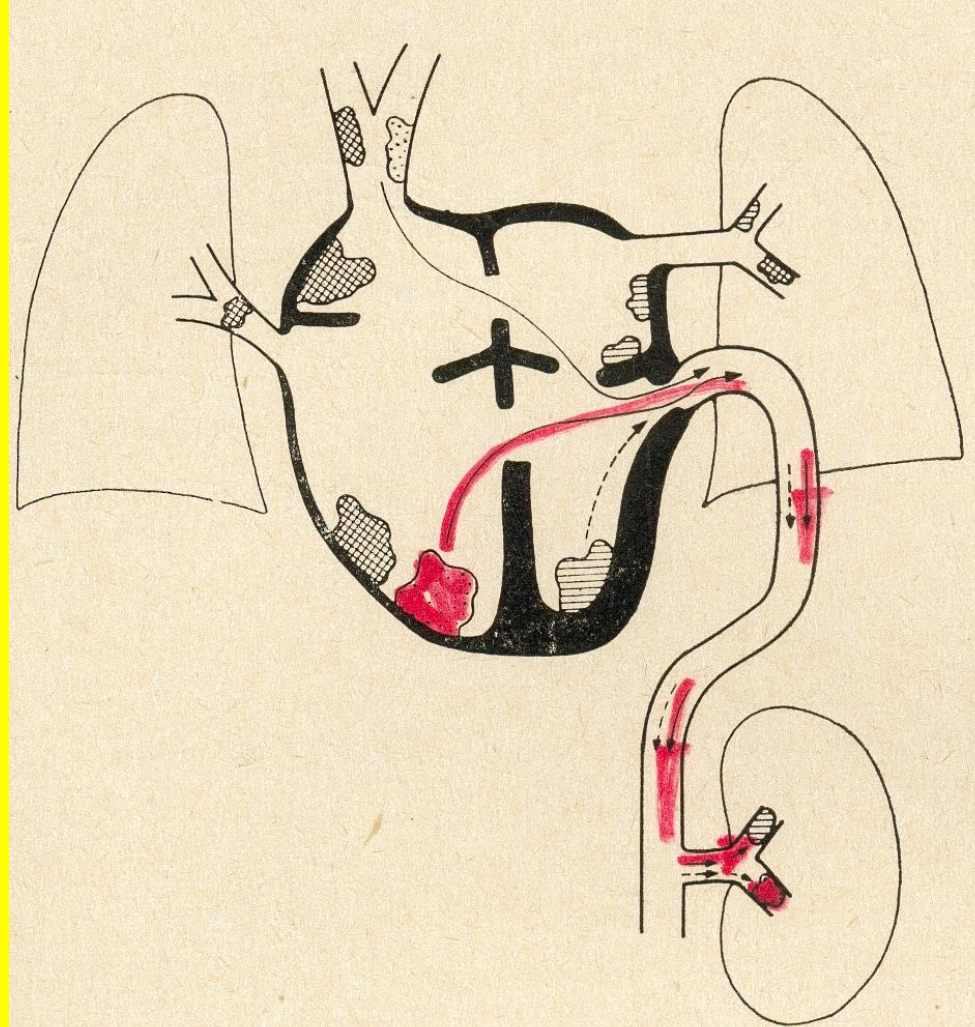


EMBOLUS – EMBOLISM

ANY SUBSTANCE THAT HAS OBTURATED A VESSEL = EMBOLUS
DEFINITION - OBTURATION OF THE LIGHT OF A VESSEL BY
A SUBSTANCE THAT WAS PRESENT IN THE BLOOD STREAM

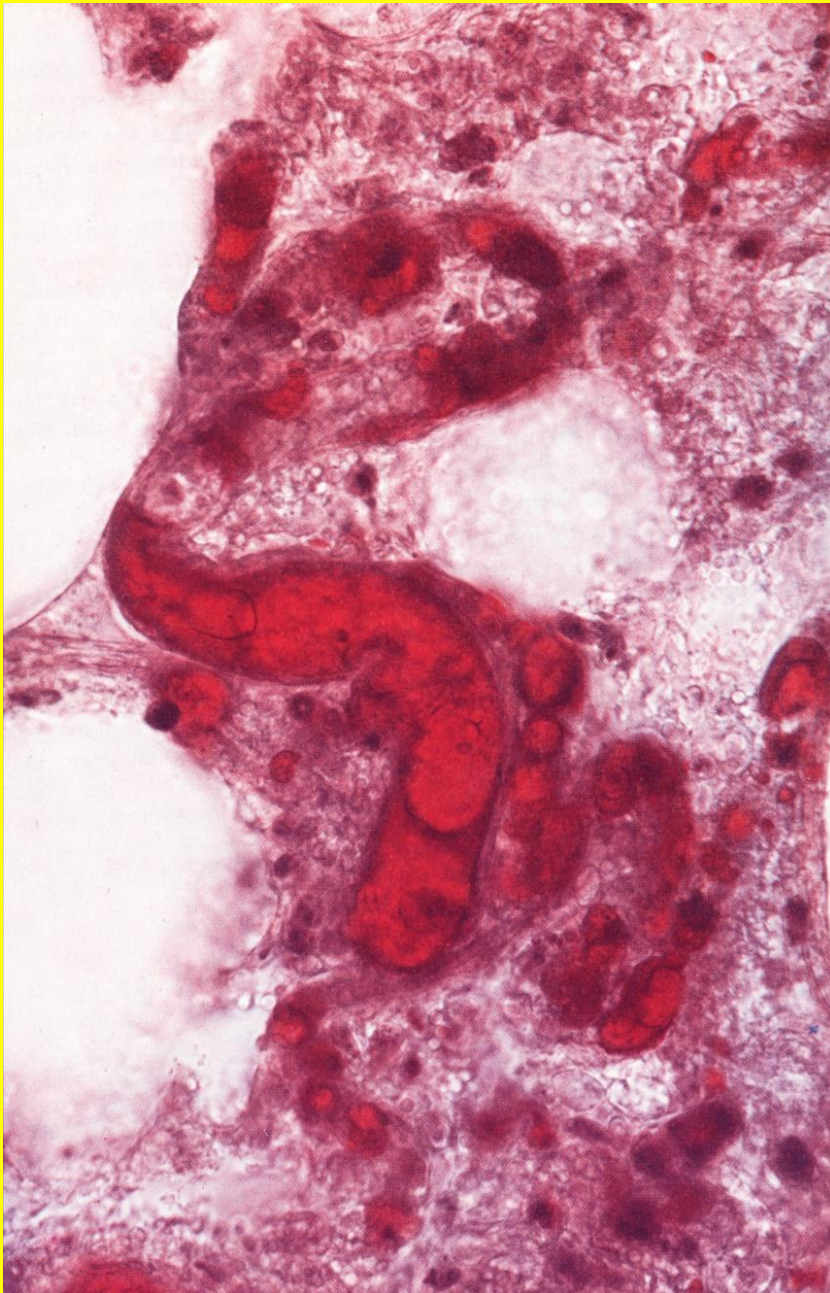


Ryc. III-10. Schemat wędrowki zakrzepów.



DIRECT EMBOLISM (ORTHOGRADE, SIMPLE) CROSSED EMBOLISM (PARADOXIC)

FAT EMBOLISM



EMBOLIAE ADIPOSAE PULMONIS

REMEMBER : FAT EMBOLISM AND OTHER EMBOLISMS CAUSED BY FLUIDS OR MATERIAL WHICH ARE SMALL IN SIZE SHOULD BE SEARCHED IN PARENCHYMA OF THE LOWER LOBI.

FAT EMBOLISM IS A PART OF DECOMPRESSION DISEASE

FAT MAY ORIGINATE FROM „RESERVE” FAT TISSUE OR FAT PRESENT IN PLASMA

FAT EMBOLISM

- Usually presenting with a delay of 12-72 h, the classical triad consists of respiratory distress, cerebral signs and petechiae. Fat embolism syndrome can go unnoticed clinically or may present as an acute fatal event within hours of the inciting injury.

FAT EMBOLISM SYNDROME

- **Clinical symptoms**

- **A. Respiratory symptoms:**

These are usually the first presenting features. Hypoxemia, tachypnoea, and dyspnoea are the initial findings. In some cases, the patients may progress to respiratory failure, requiring mechanical ventilation.

In other cases, if no ongoing embolism or infection occurs, the lung usually recovers by the third day.

FAT EMBOLISM SYNDROME

- **B. Neurological symptoms:**

The symptoms may appear within 10-120 h and are highly varying. Ranging from confusion, to seizures, and they may include irritability, anxiety, agitation, confusion, delirium, and coma, which are described as progressive changes and as single manifestation in individual cases. These symptoms are usually non-lateralizing, transient and fully reversible

Localizing signs, such as aphasia, apraxia

APHASIA is an inability to comprehend and formulate language because of damage to specific brain regions. This damage is typically caused by a cerebral vascular accident (stroke)

APRAXIA IS A MOTOR DISORDER CAUSED BY DAMAGE TO THE BRAIN IN WHICH THE INDIVIDUAL HAS DIFFICULTY WITH THE MOTOR PLANNING TO PERFORM TASKS OR MOVEMENTS WHEN ASKED, PROVIDED THAT THE REQUEST OR COMMAND IS UNDERSTOOD AND HE/SHE IS WILLING TO PERFORM THE TASK.

FAT EMBOLISM SYNDROME

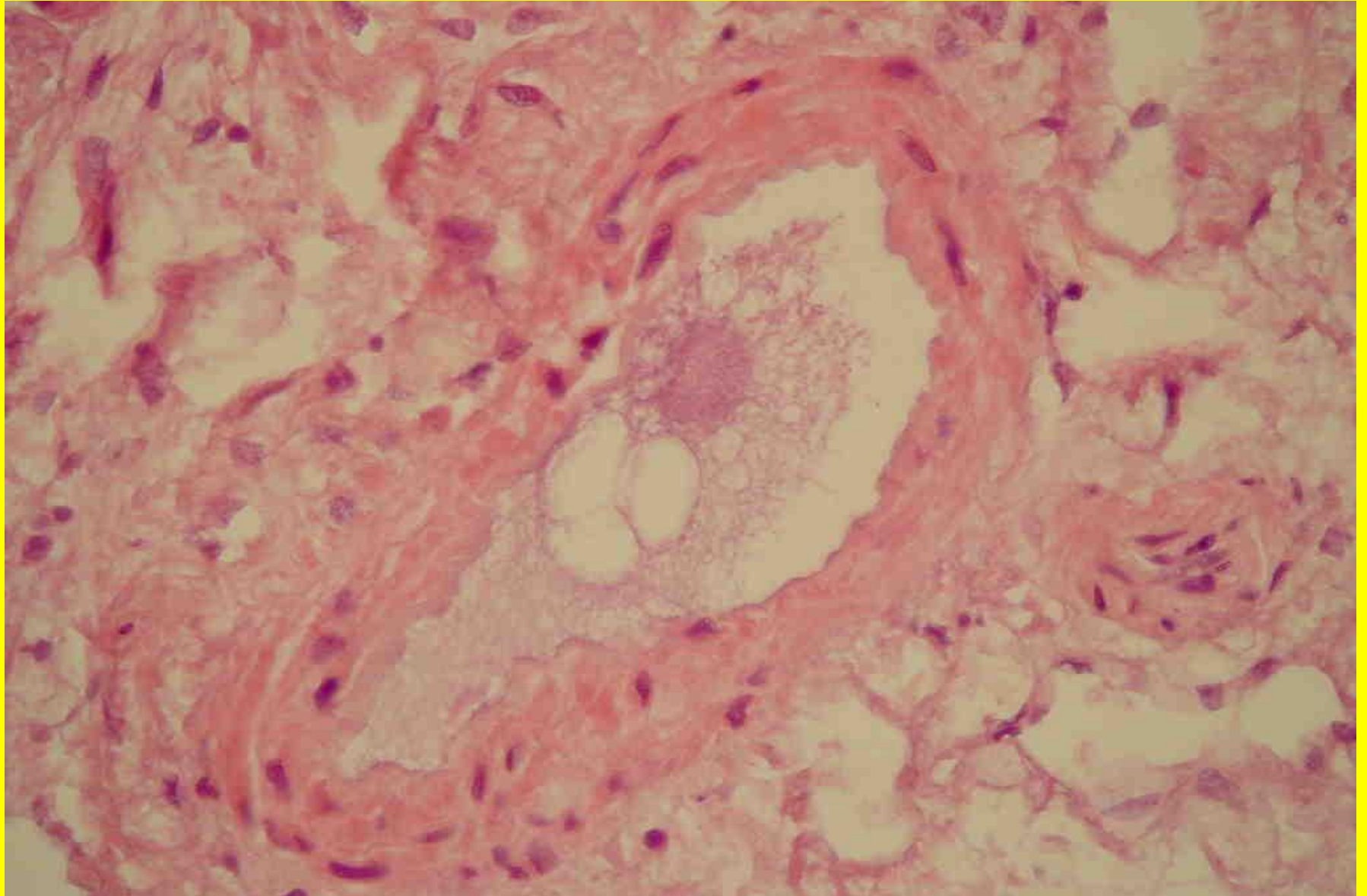
- **C. Cutaneous manifestations:**

Petechial rash may be the last component to develop in FES. Appearing within 36 h, this is believed to be pathognomonic feature of FES.

It is usually self limiting, and disappears within a week. It can be easily missed in dark skinned persons, and is to be actively sought on the upper portions of the chest and axillae.

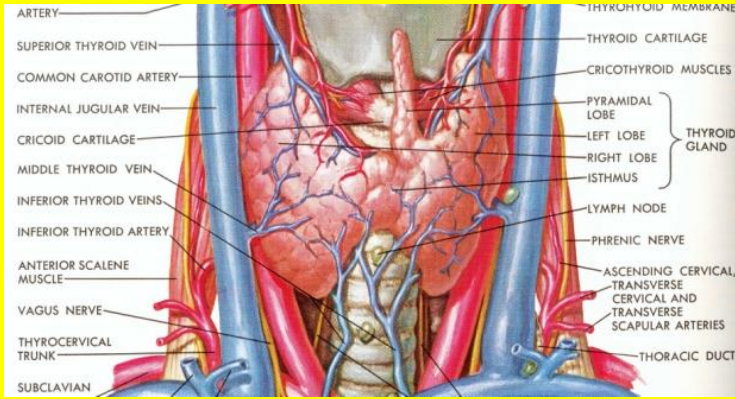
Other manifestations: Fever, tachycardia are non-specific but seen in almost all cases of FES

FAT EMBOLISM



AIR EMBOLISM

300 ML OF OXYGEN MAY KILL WHEN ADMINISTERED INTO THE CIRCULATORY SYSTEM



SURGERY IN THE HEAD AND NECK AREA

DELIVERY - ATONY OF UTERUS



DECOMPRESSION SICKNESS (DIVERS)



Decompression Sickness

- **decompression sickness (DCS), a complex resulting from changed barometric pressure, includes high-altitude–related and aerospace-related events,**
- **decompression associated also with the sudden decrease in pressures during underwater ascent, usually occurring during free or assisted dives.**

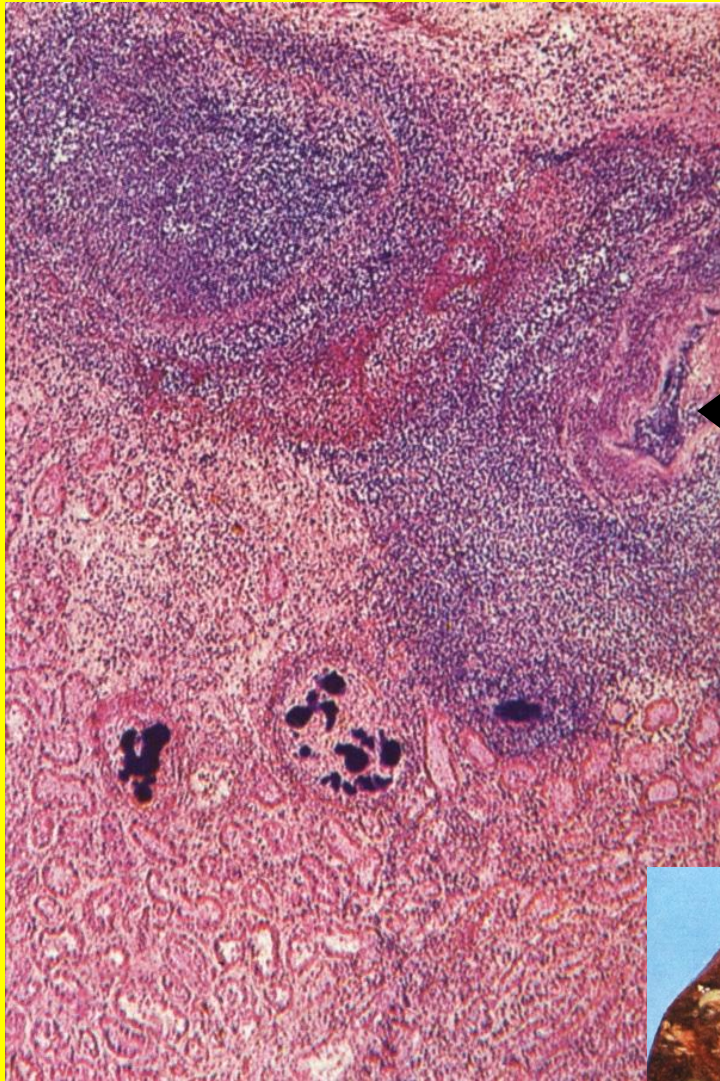
Decompression sickness

- **also called generalized barotrauma or the bends, refers to injuries caused by a rapid decrease in the pressure that surrounds you, of either air or water. It occurs most commonly in scuba or deep-sea divers, although it also can occur during high-altitude or unpressurized air travel. However, decompression sickness is rare in pressurized aircraft, such as those used for commercial flights.**

Symptoms of decompression sickness

- **include:**
- **joint pain, dizziness (vertigo), headache,**
- **difficulty thinking clearly**
- **extreme fatigue, ear tingling, numbness**
- **weakness in arms or legs**
- **a skin rash**
- **www.health.harvard.edu/diseases**

MICROBIAL EMBOLISM

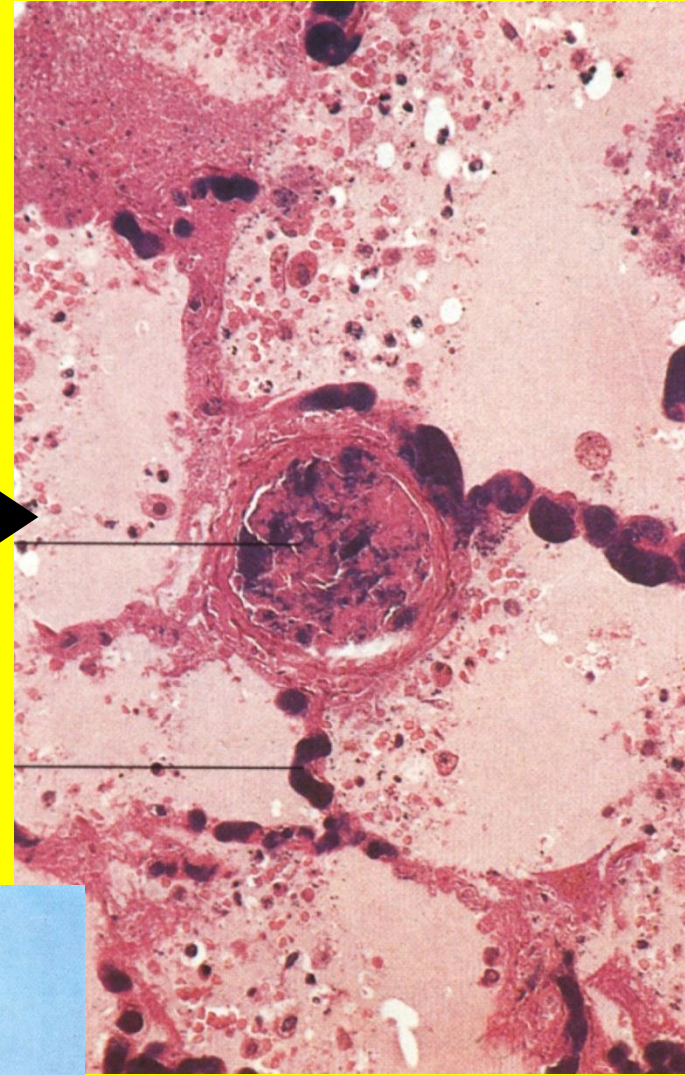


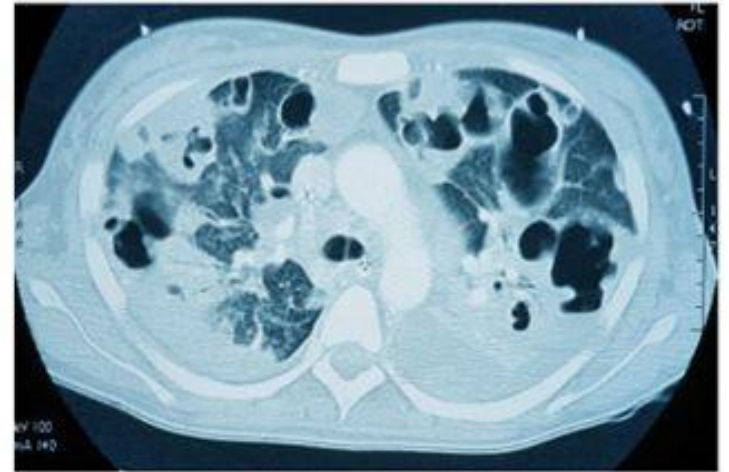
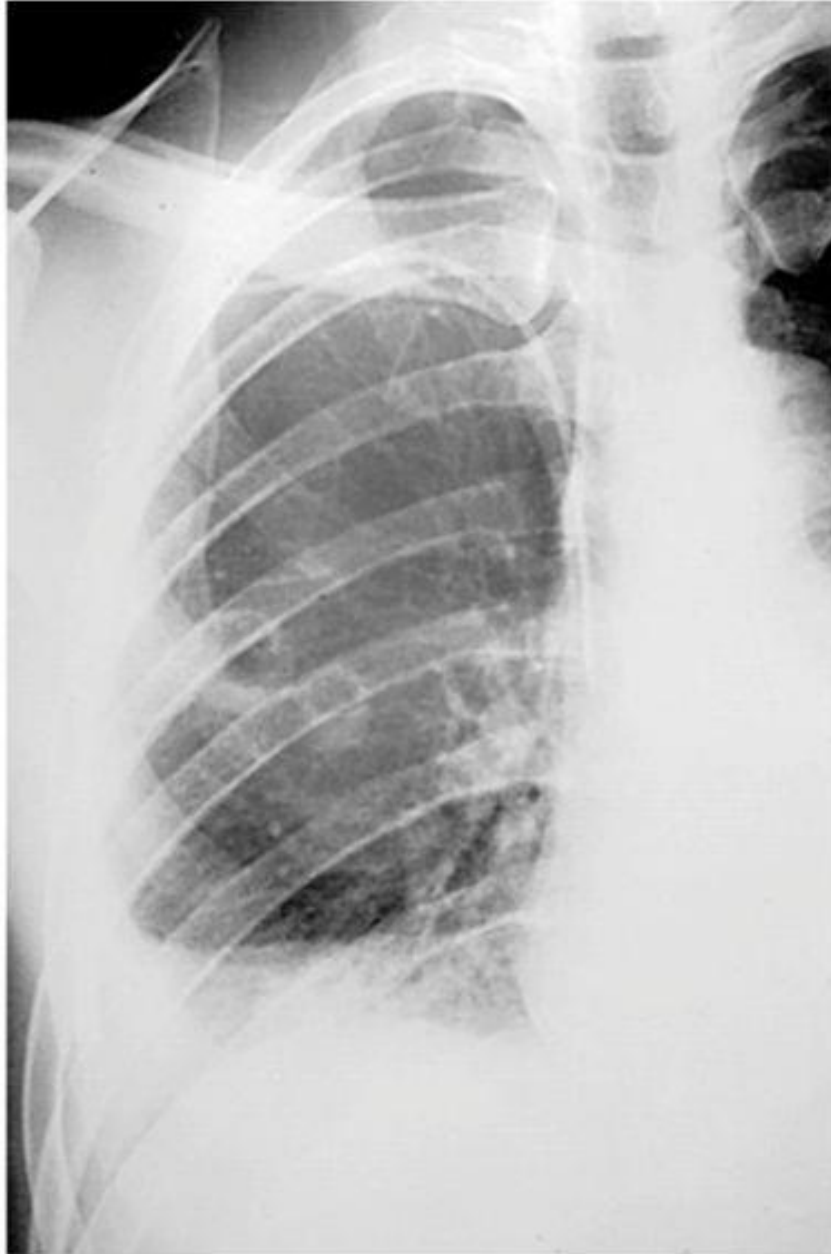
**BACTERIAL
EMBOLISM**

IN KIDNEY

IN LUNG

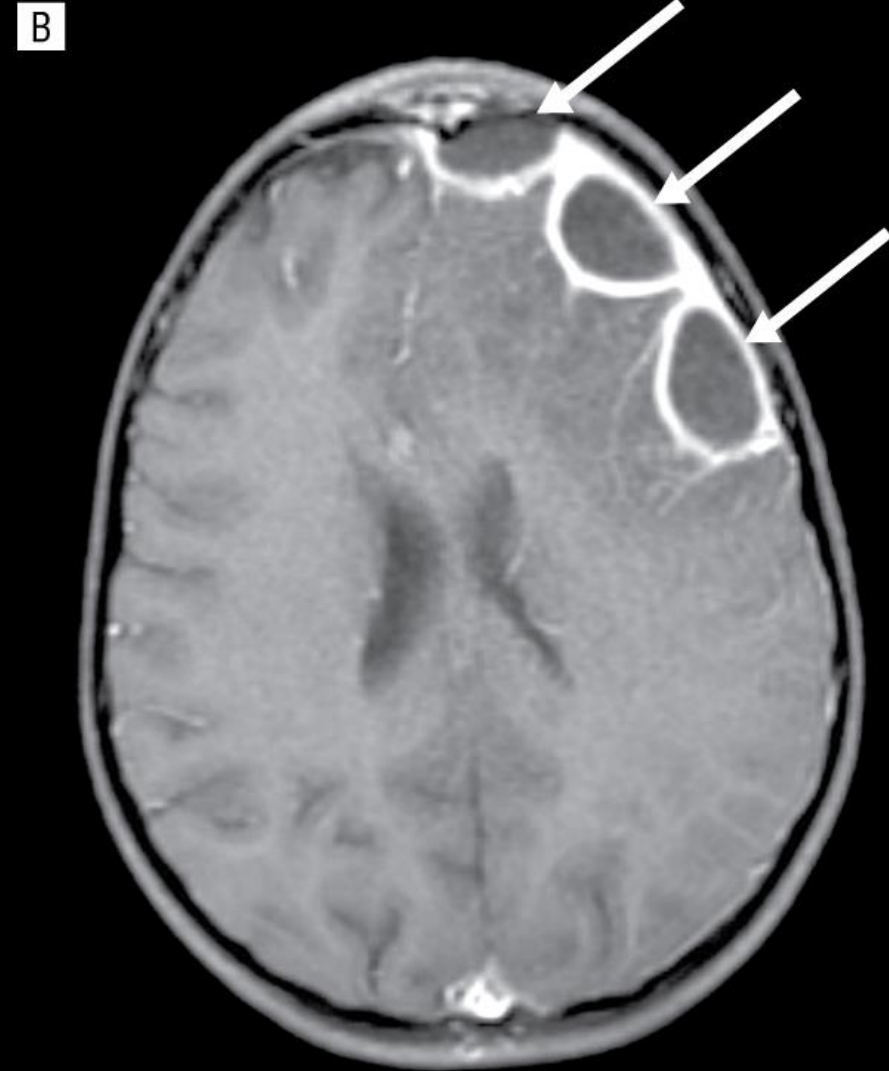
**METASTATIC
ABSCESSSES**



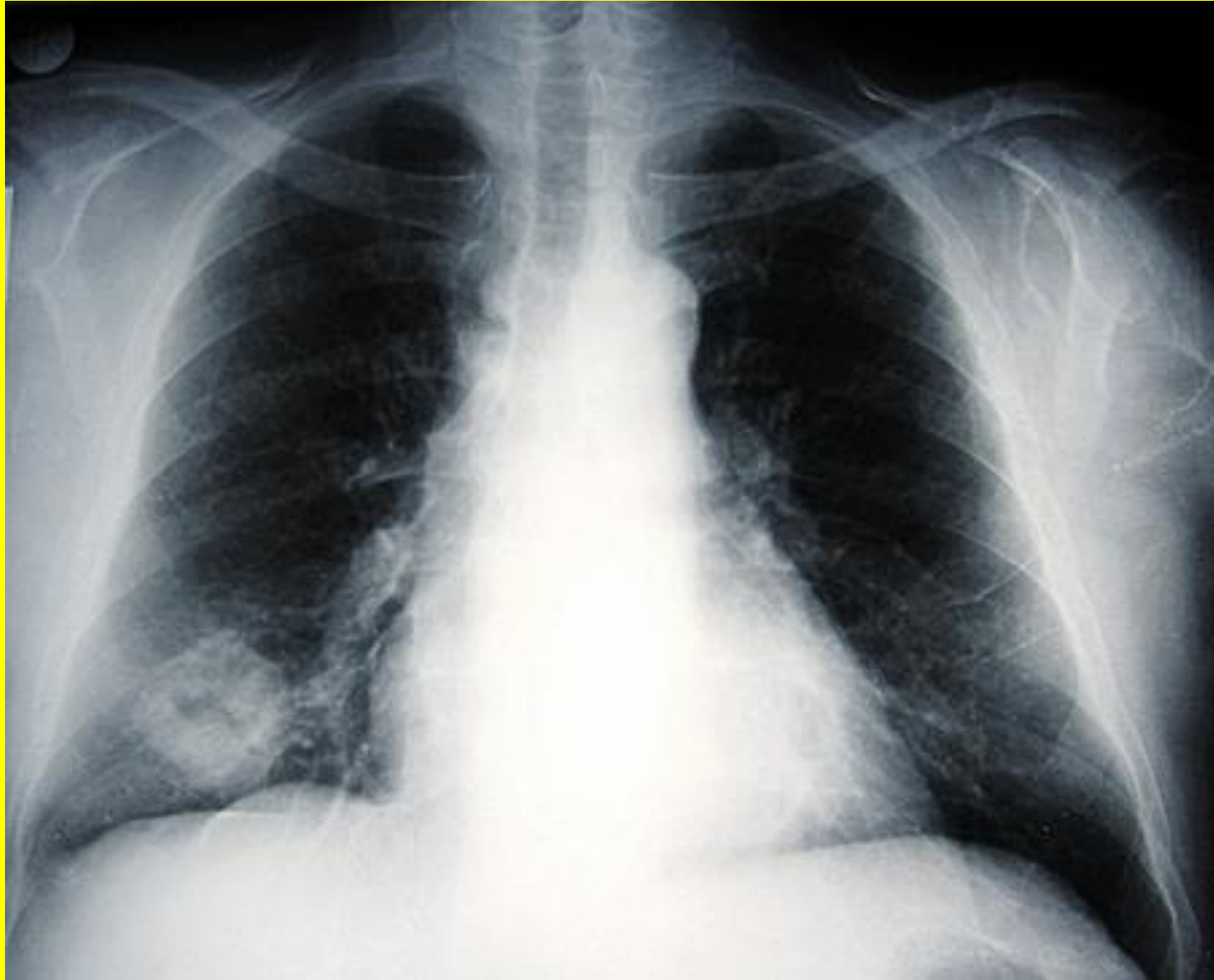


Metastatic Abscess

METASTATIC ABSCESSSES - EPIDURAL



LUNG ABSCESS



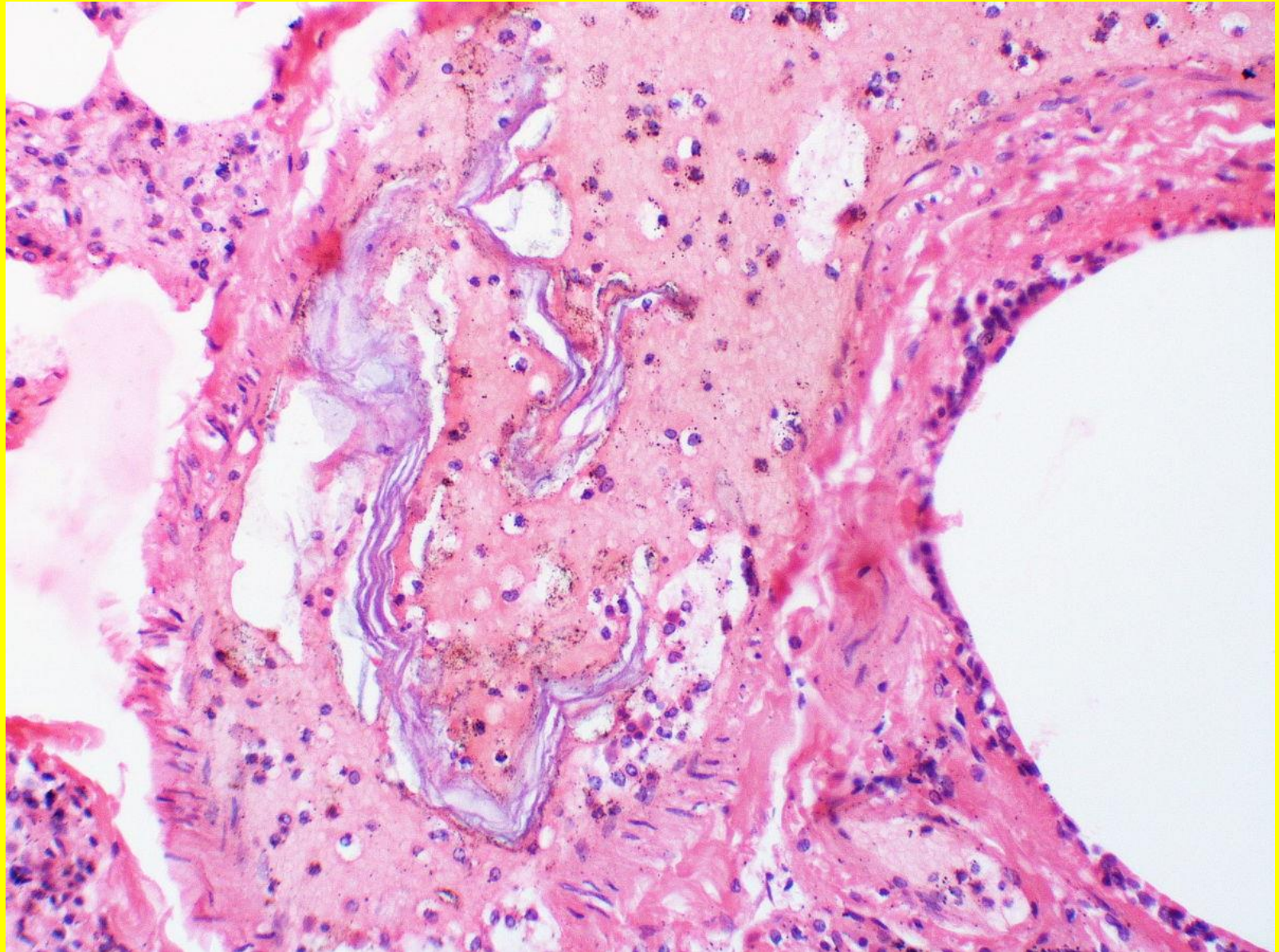
Viridans streptococci Intracranial Abscess



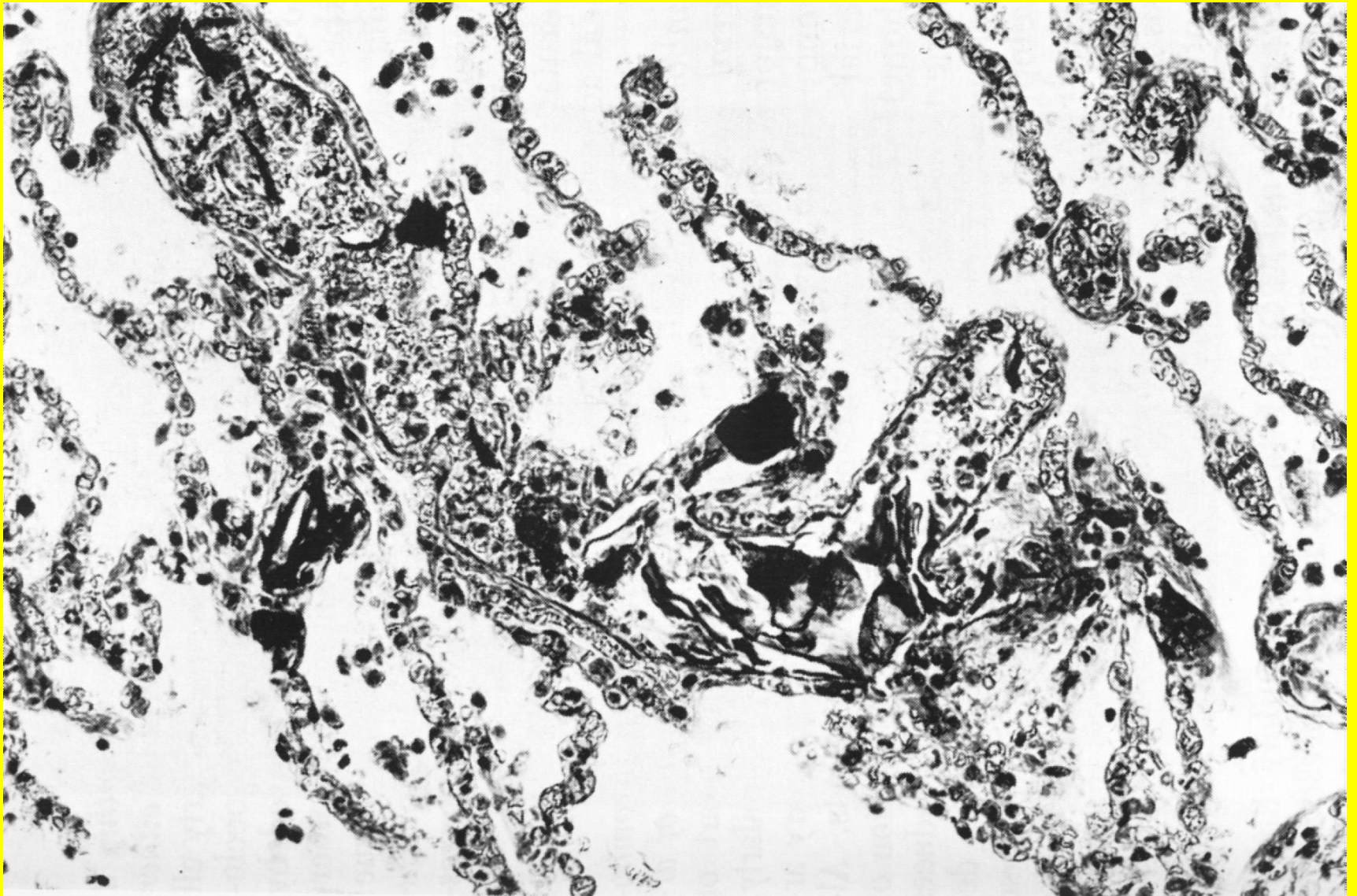
AMNIOTIC FLUID EMBOLISM

- Amniotic fluid embolism (AFE) is a life threatening obstetric emergency characterized by sudden cardiorespiratory collapse and disseminated intravascular coagulation.**
- AFE occurs in 2-8 per 100,000 deliveries and is responsible for between 7.5% to 10% of maternal mortality in the United States.**
- The diagnosis of AFE has traditionally been made at autopsy when fetal squamous cells are found in the maternal pulmonary circulation**

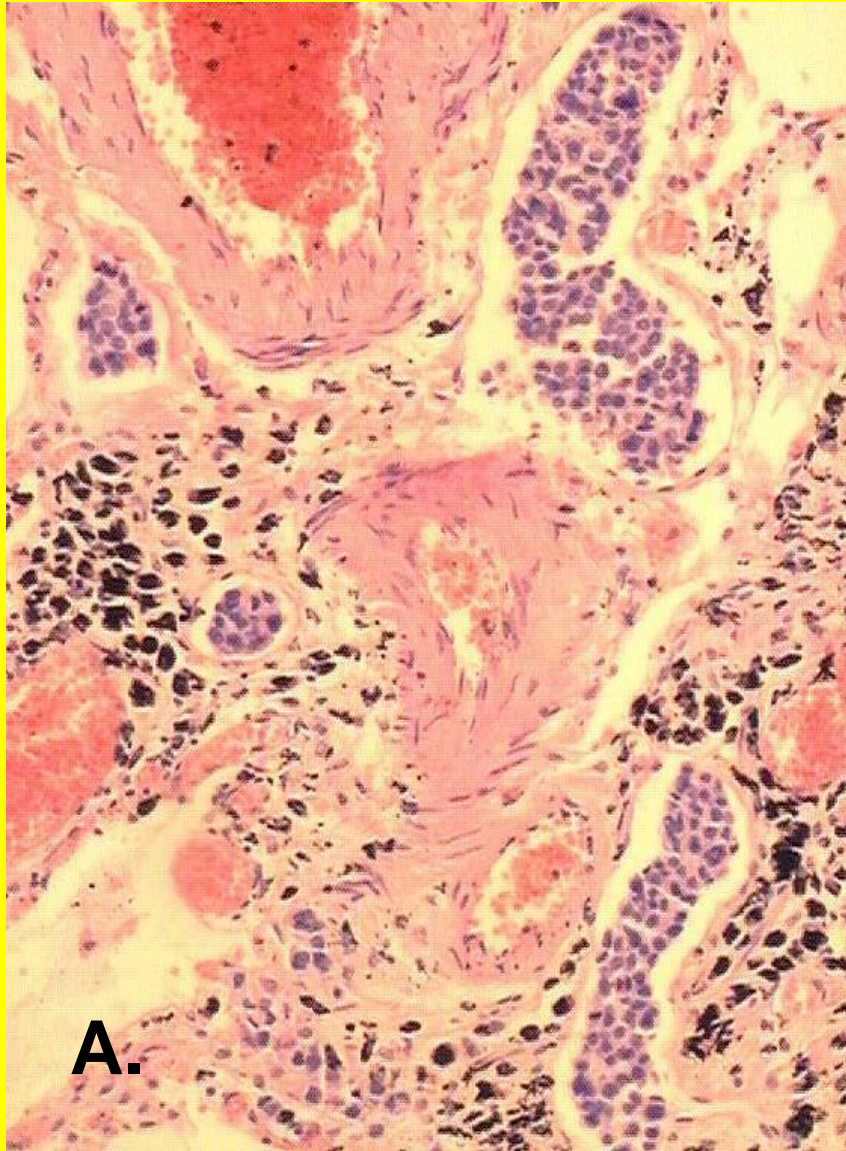
AMNIOTIC FLUID EMBOLISM



AMNIOTIC FLUID EMBOLISM



NEOPLASTIC (TUMOR, CANCER) EMBOLISM



A. MICROSCOPICAL PICTURE OF METASTATIC EMBOLISM IN LUNG
B. METASTATIC EMBOLISM IN LUNG

TONSIL CANCER with Neck Metastasis

