

# Gyulladás patológiája I.

Dr. Tímár József



# Gyulladás

Vaszkularizált élő szövet reakciója  
a lokális sejt/szövetkárosodásra

# Gyulladás okai

- Mikroorganizmusok (bacterium, gomba, virus)
- Zoonosis (féreg, protozoon, rovar)
- Toxikus anyag
- Mechanikus sérülés
- Hőhatás
- Radioaktivitás
- Endogen toxin (uraemia)
- Daganat
- Necrosis

# Gyulladás szakaszai

- Acut
- Subacut
- Chronicus





# A gyulladás fő jelei (GALENUS)

- Rubor
- Calor
- Dolor
- Tumor
- Functio laesa



# Heveny gyulladás

- Vaszkuláris jelenségek
- Sejtszintű eltérések

## Kiváltó ok

### Vasoaktiv mediatorok:

- histamin
- serotonin
- bradykinin
- anaphylatoxin
- LT, PG, PAF

### Gyulladásos mediátorok

### Kemotaktikus faktorok:

- C5a
- LTB
- peptidek (formil)
- limfokinek
- monokinek

Permeabilitás fokozódás

Chemotaxis + gyulladásos sejtek aktiválódása

**OEDEMA**  
(transsudatio: alacsony mólsúlyú  
Fehérjék, folyadék...)

### ACUT GYULLADÁS:

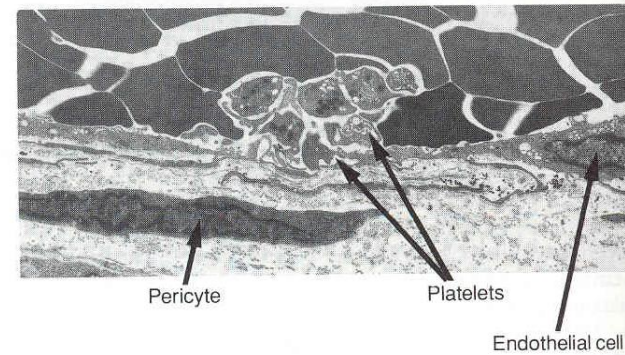
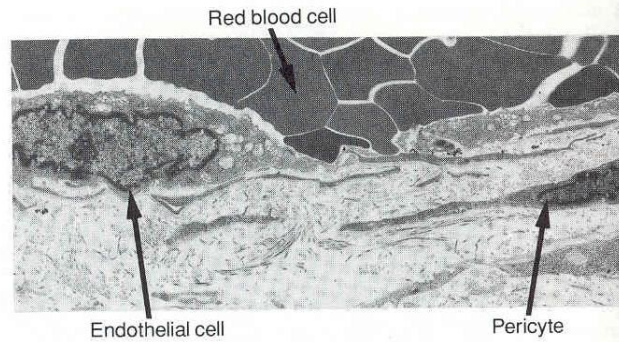
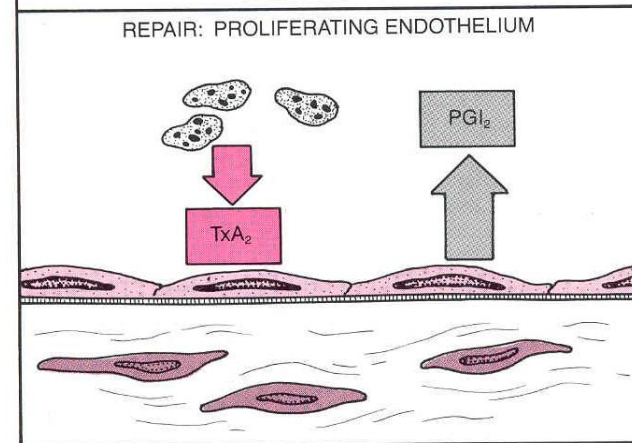
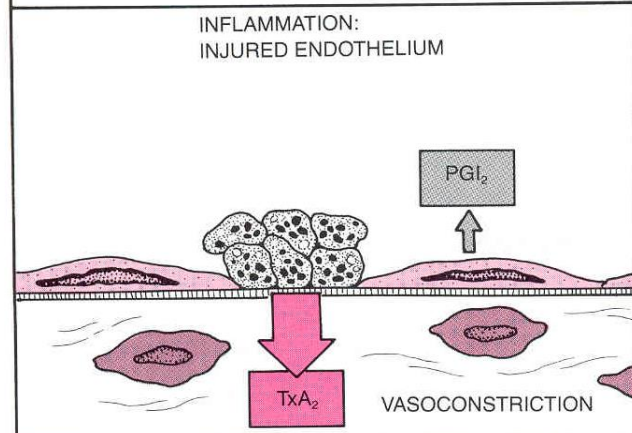
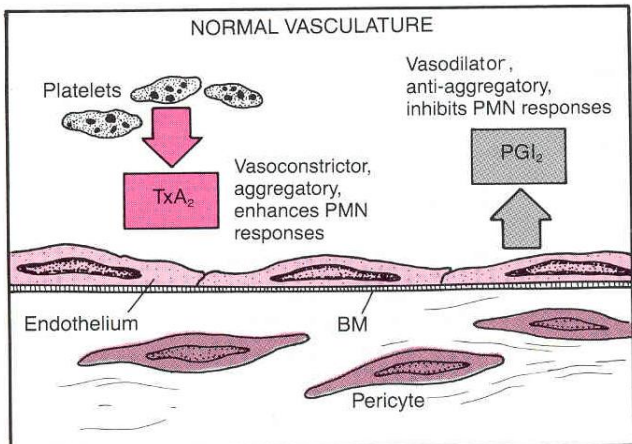
- neutrofilek
- vérlemezke
- vvt

### CHRONICUS gyulladás:

- makrofág
- limfocita
- plazmasejt

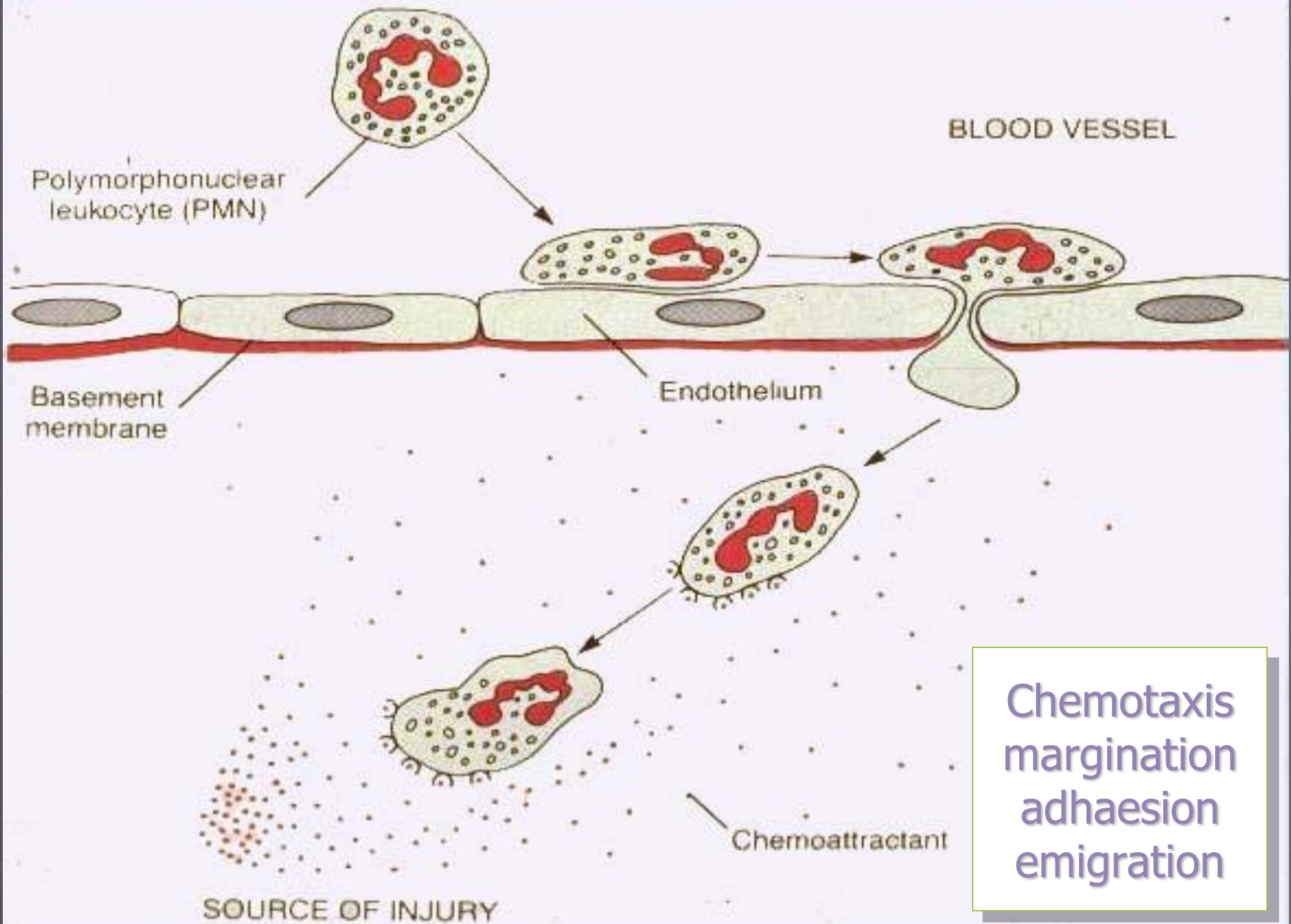
# Az endotélsejtek szerepe

- **Permeabilitás szabályozása**
  - Sejtkapcsoló struktúrák (claudin5)
  - Vesicula
  - Transendotheliális csatorna (Weiber Pallade)
- **Metabolitok termelése**
  - PGI<sub>2</sub>, Plasminogen activator uPA
  - VIII. factor, vW factor, ACE
  - EDRF, endothelin
  - Extracelluláris matrix (BM)
- **Anyagtranszport, lebontás**
  - Catecholaminok, vasoactive aminok, LDL



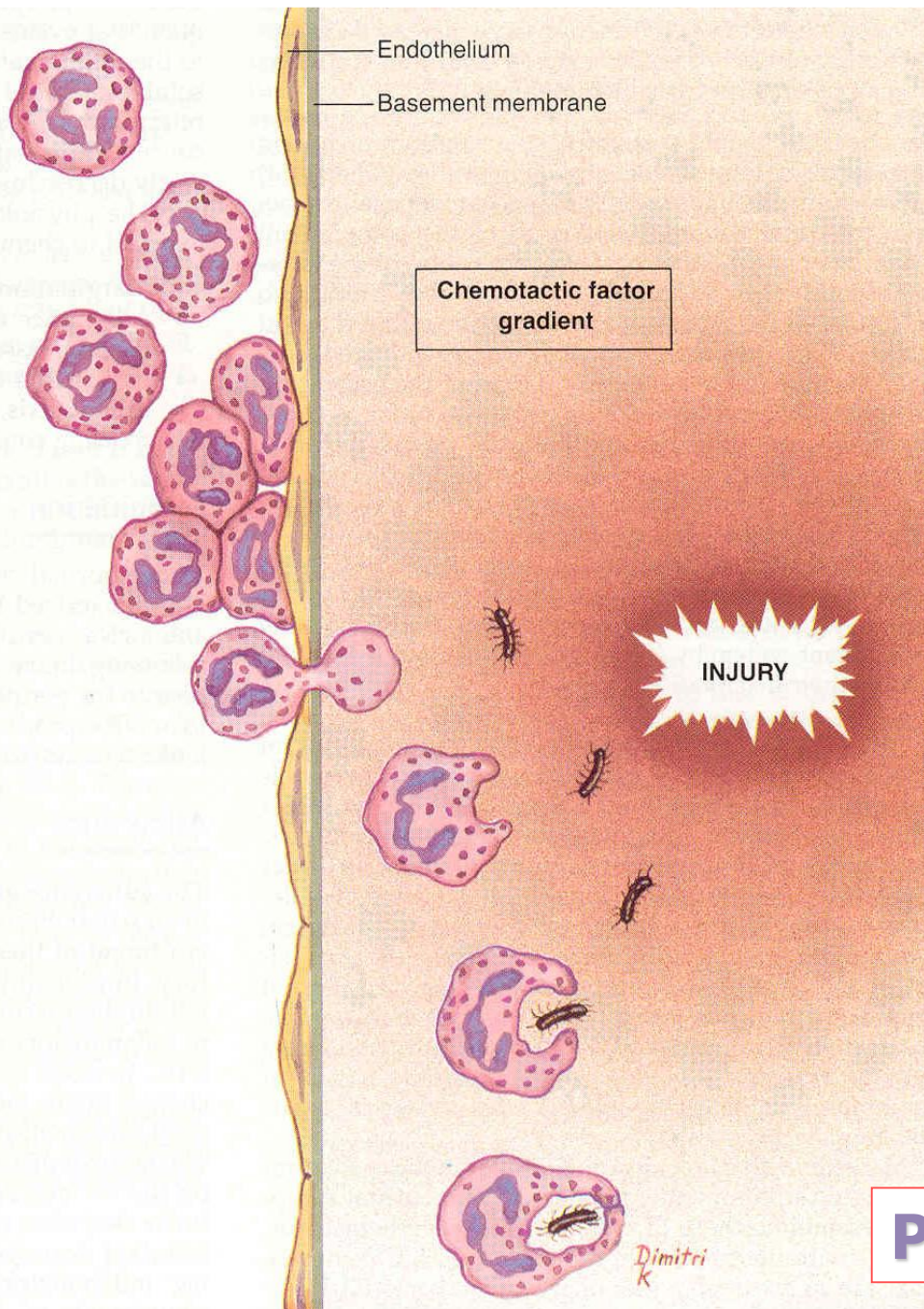
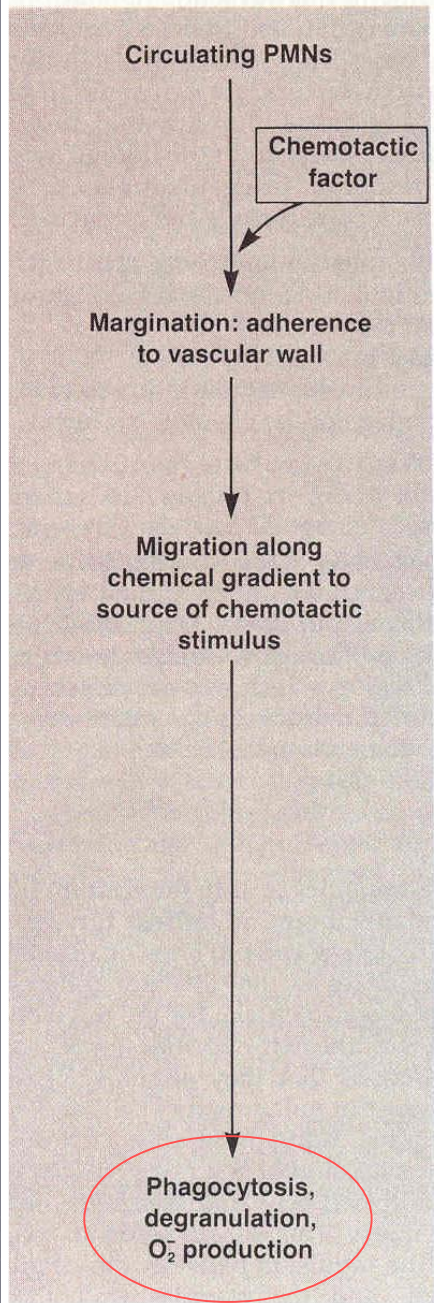
Rolling  
Docking  
Locking  
migration





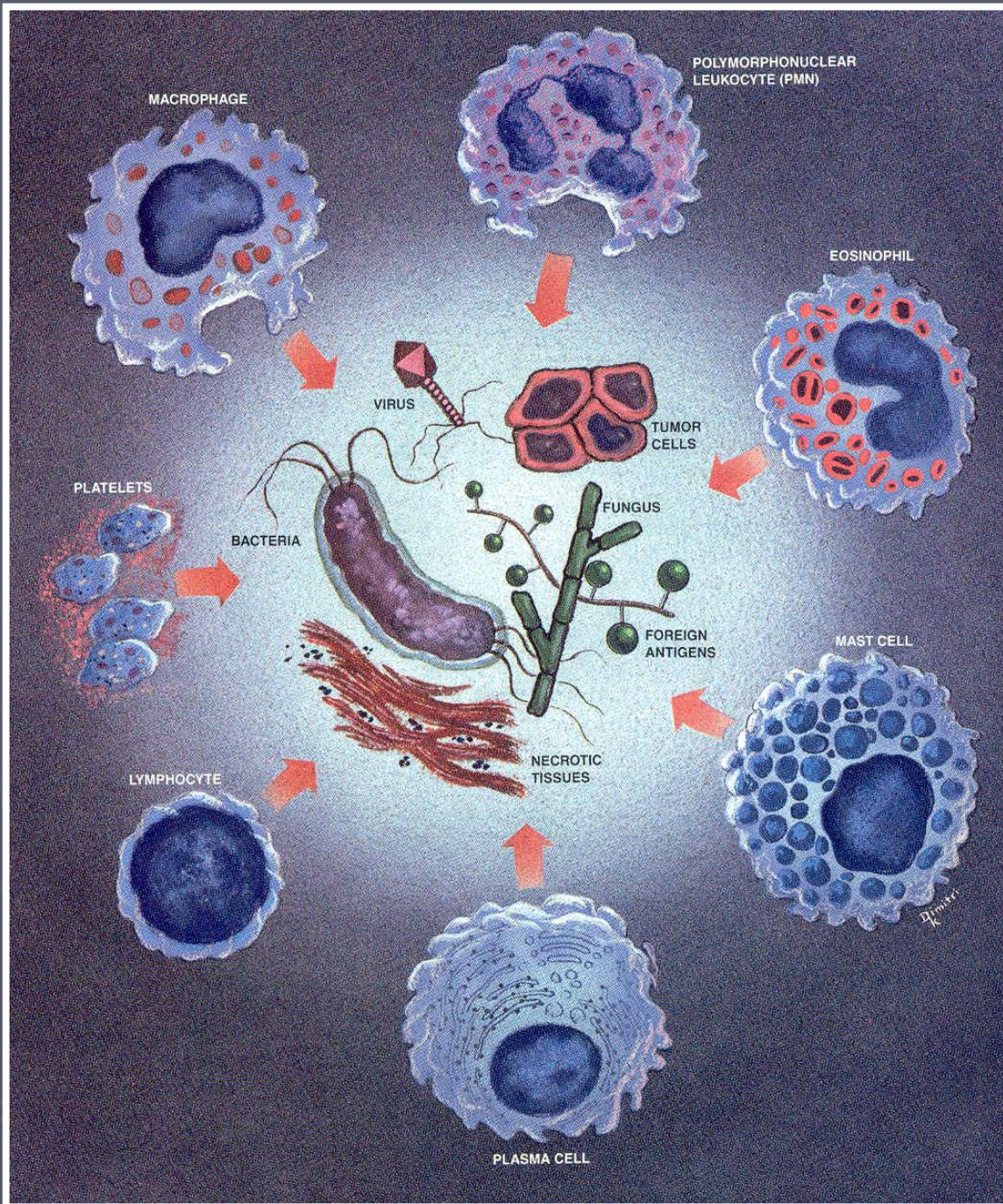
Chemotaxis  
margination  
adhesion  
emigration





# Phagocytosis





# Gyulladásos sejttípusok

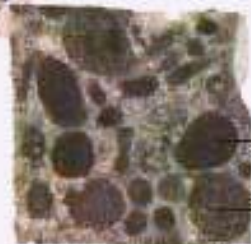
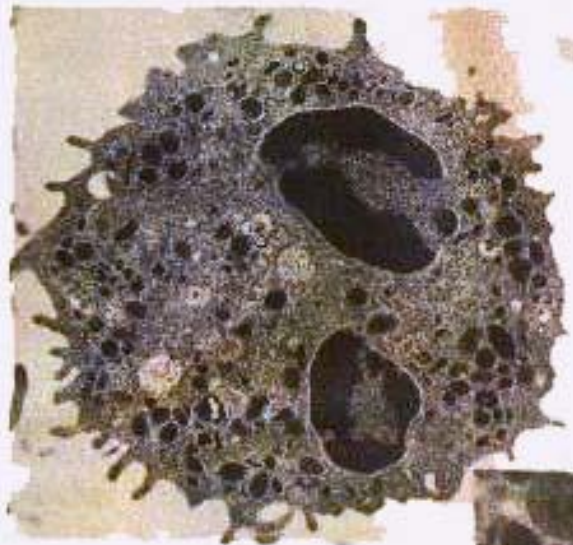
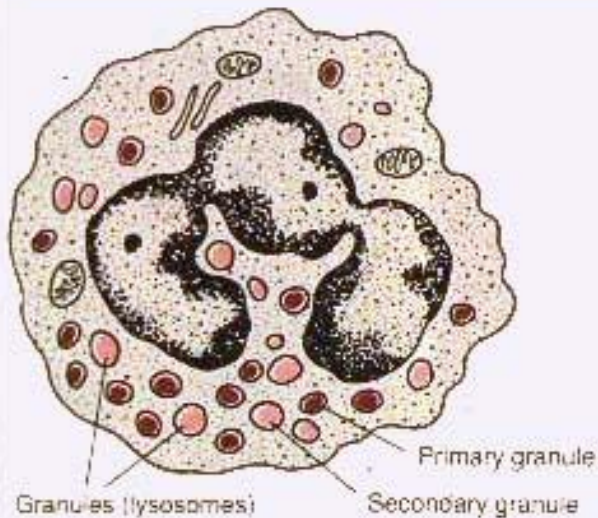


### CHARACTERISTICS AND FUNCTIONS

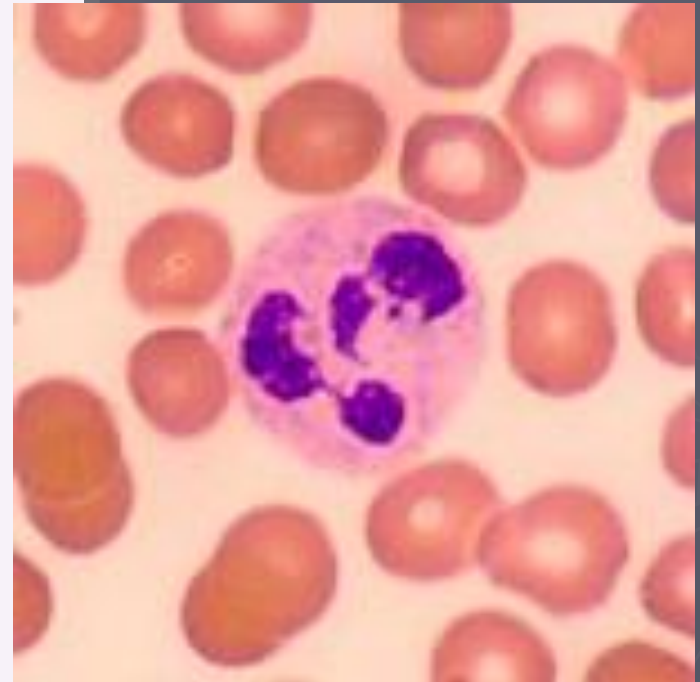
- Acute inflammation
- Bacterial and foreign body phagocytosis

### PMN INFLAMMATORY MEDIATORS

- Reactive oxygen metabolites
- Lysosomal granule contents
  - **Primary granules**
    - Phospholipase A<sub>2</sub>
    - Myeloperoxidase
    - Lysozyme
    - Cationic proteins
    - Acid hydrolases
    - Elastase
    - Cathepsins
  - **Secondary granules**
    - Phospholipase A<sub>2</sub>
    - Lysozyme
    - Alkaline phosphatase
    - Collagenase
    - Lactoferrin
    - Vitamin B<sub>12</sub> binding proteins
  - **Tertiary or C particles**
    - Gelatinase
    - Cathepsins



Primary granule  
Secondary granule



# Neutrofil granulocita

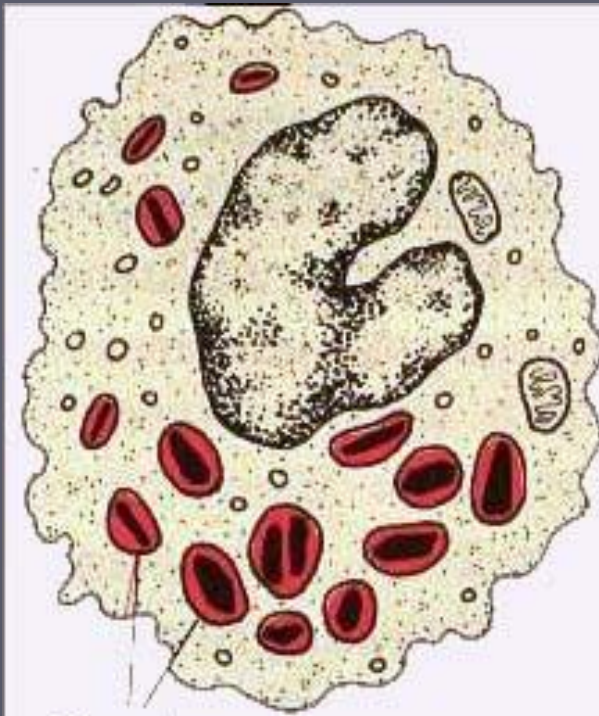




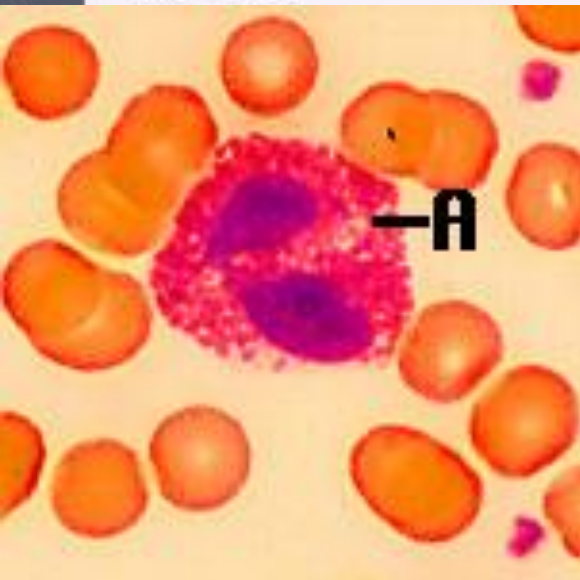
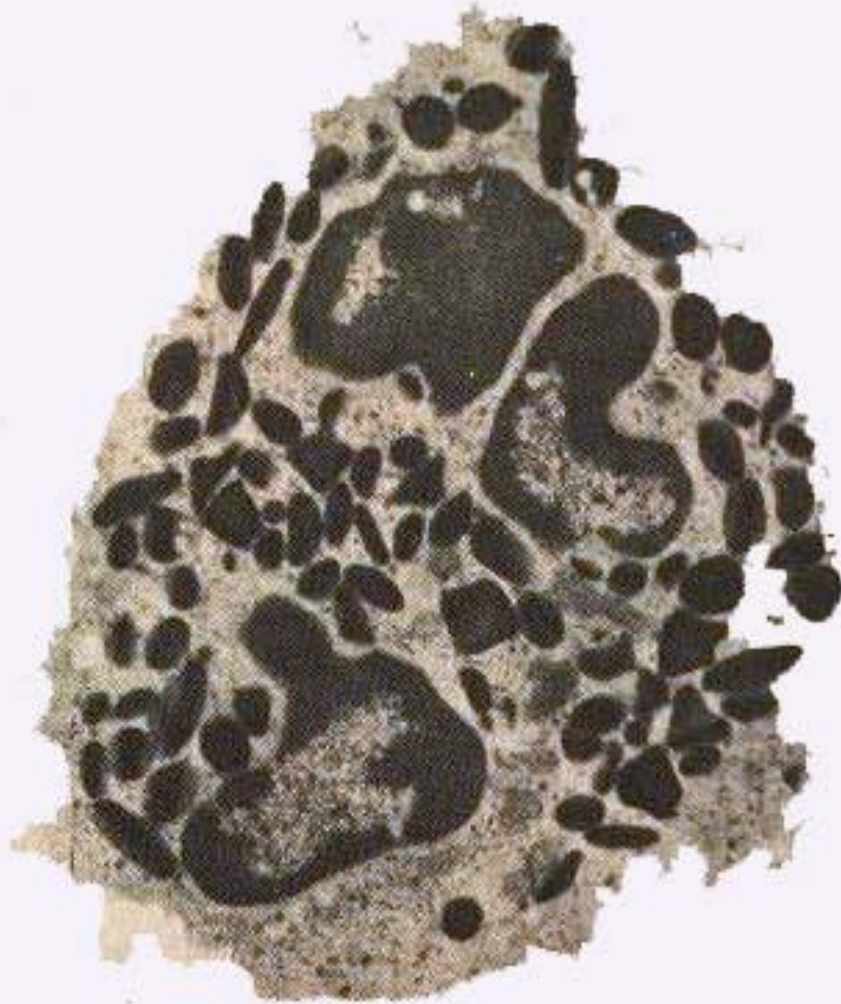
Neutrophil leukocytes in skeletal muscle

This histological image shows skeletal muscle tissue with a significant infiltration of neutrophils. The muscle fibers are arranged in parallel bundles, and the nuclei are visible at the periphery. The neutrophils are characterized by their multi-lobed nuclei and are scattered throughout the muscle tissue, indicating an inflammatory response.

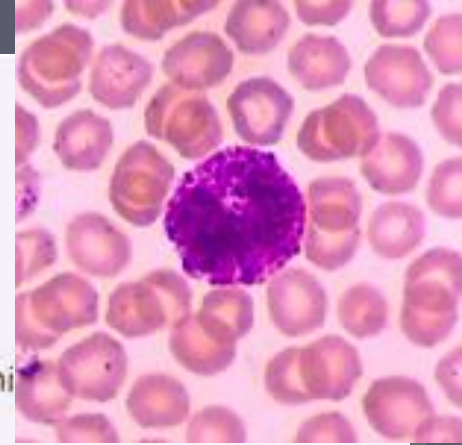




Granules



Eosinofil  
granulocita



Mast Cell (Basophil)

#### CHARACTERISTICS AND FUNCTIONS

- Binds IgE molecules
- Contains electron-dense granules

#### PRIMARY INFLAMMATORY MEDIATORS

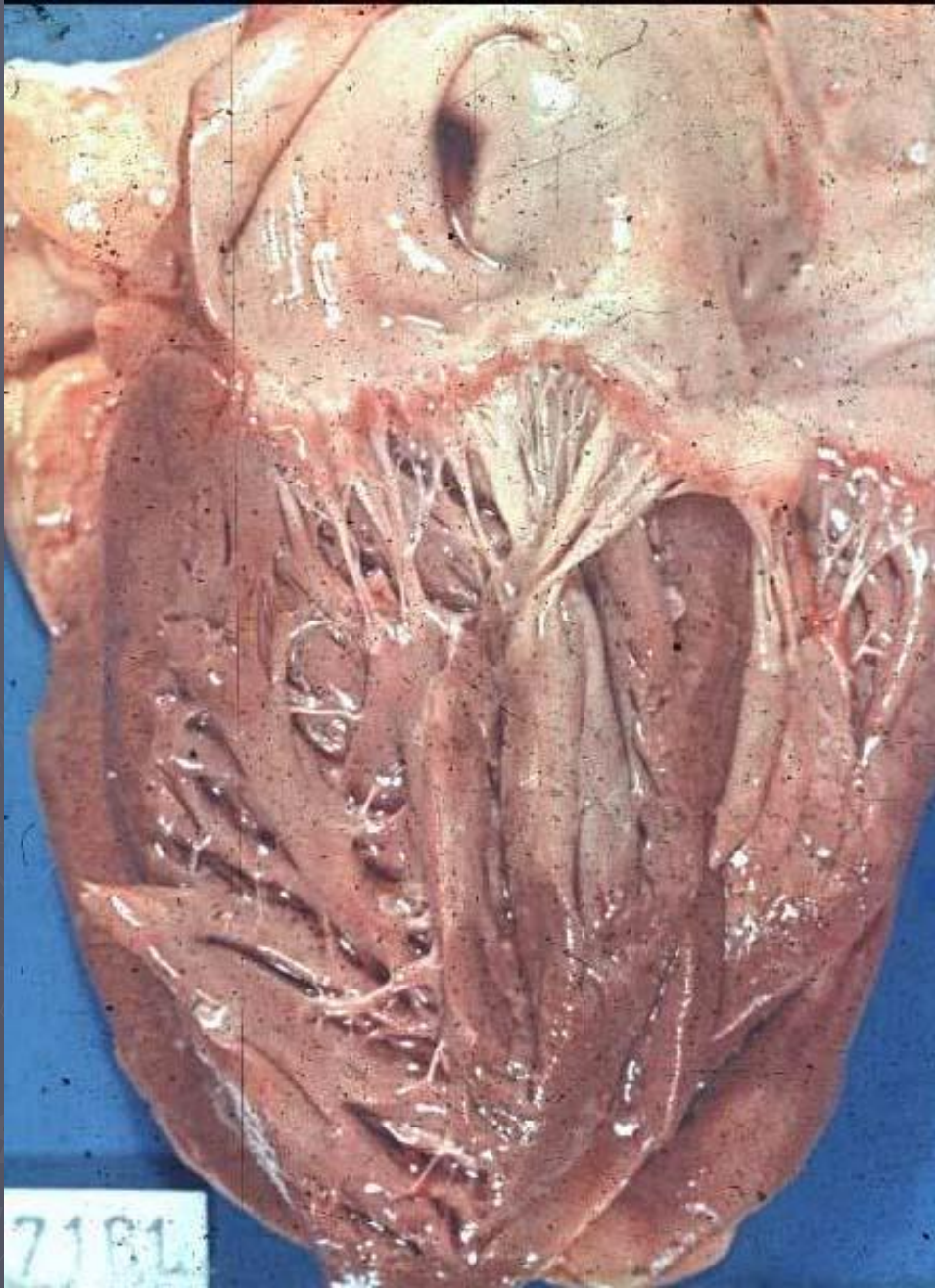
- Histamine
- Leukotrienes (LTC<sub>4</sub>, LTD<sub>4</sub>, LTE<sub>4</sub>)
- Platelet activating factor
- Eosinophil chemotactic factors

Mast cell (basophil granulocyte)



# Acut gyulladás típusai az exsudatum alapján:

- Serosus – inflammatio serosa
- Fibrinosus – inflammatio fibrinosa
- Purulens – inflammatio purulenta
- Vérzéses – inflammatio haemorrhagica
- Gangrenozus – inflammatio ichorosa seu gangraenosa



Endocarditis  
serosa



Meningitis  
serosa

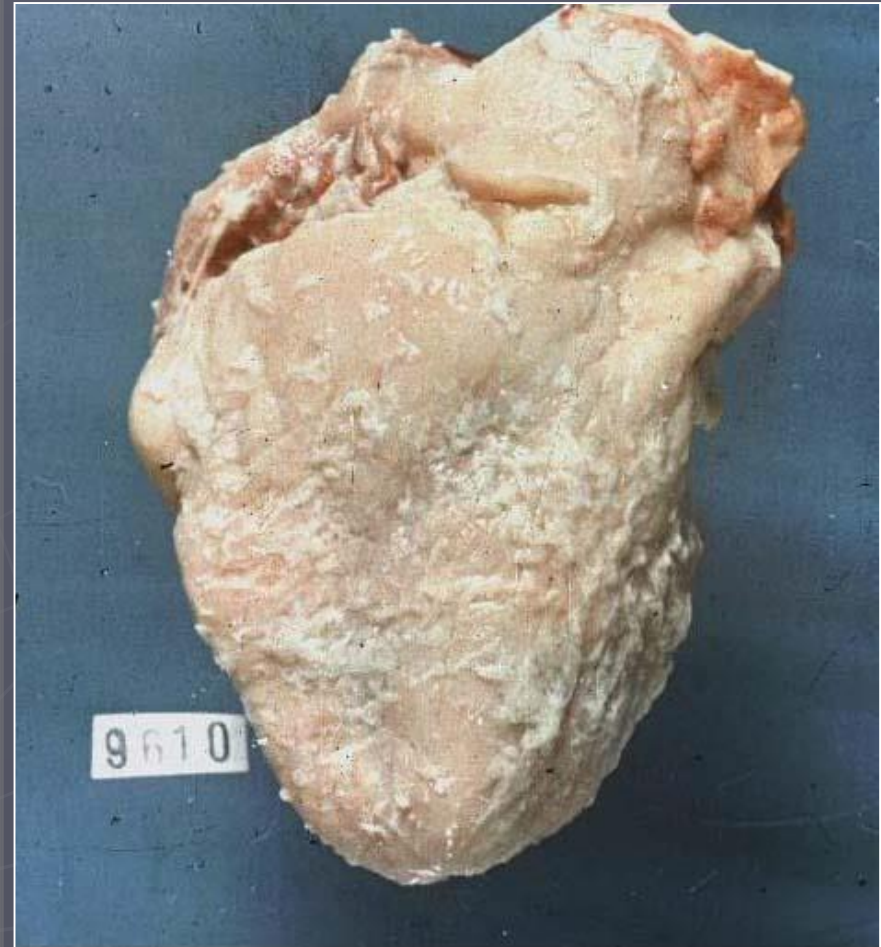
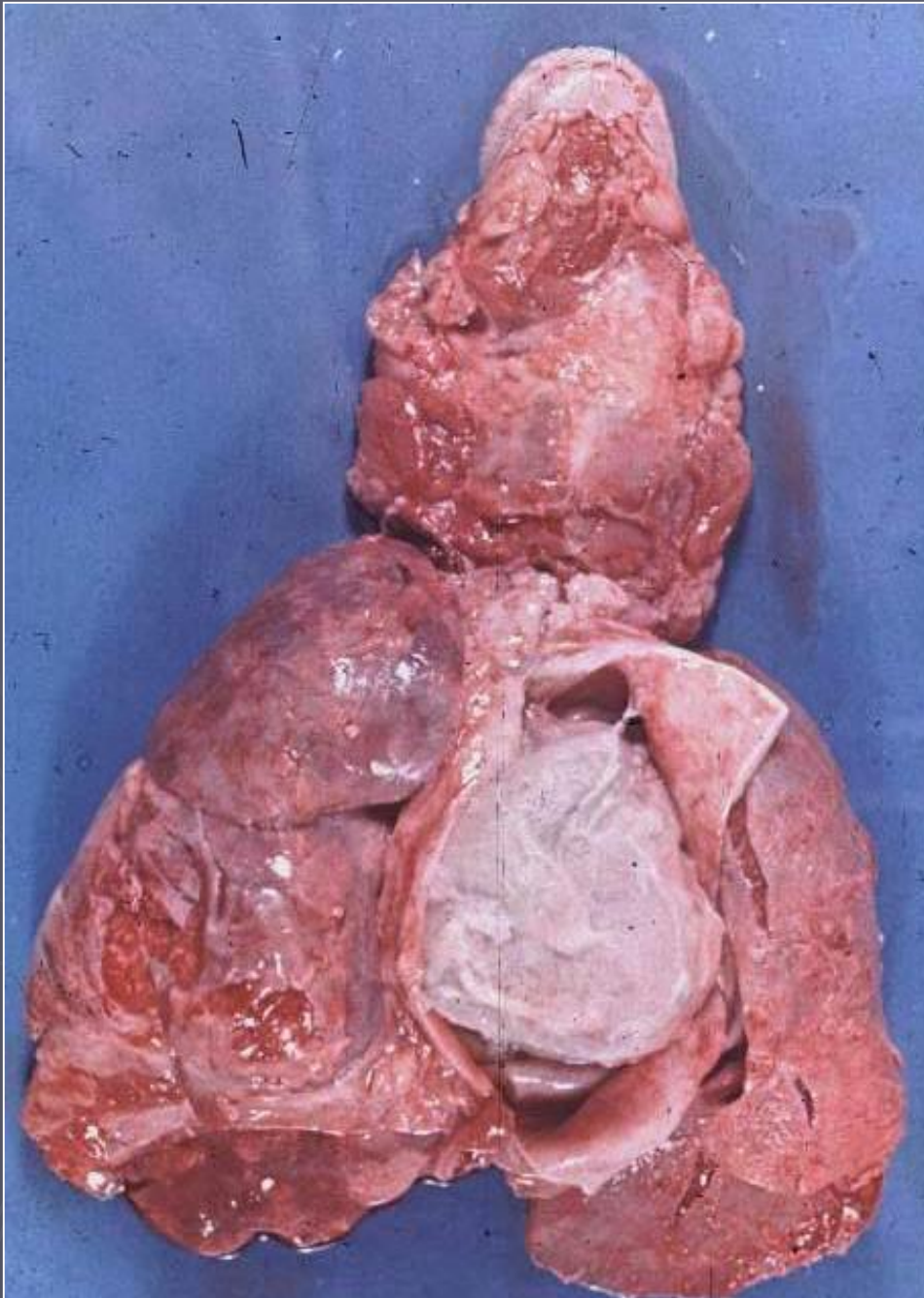


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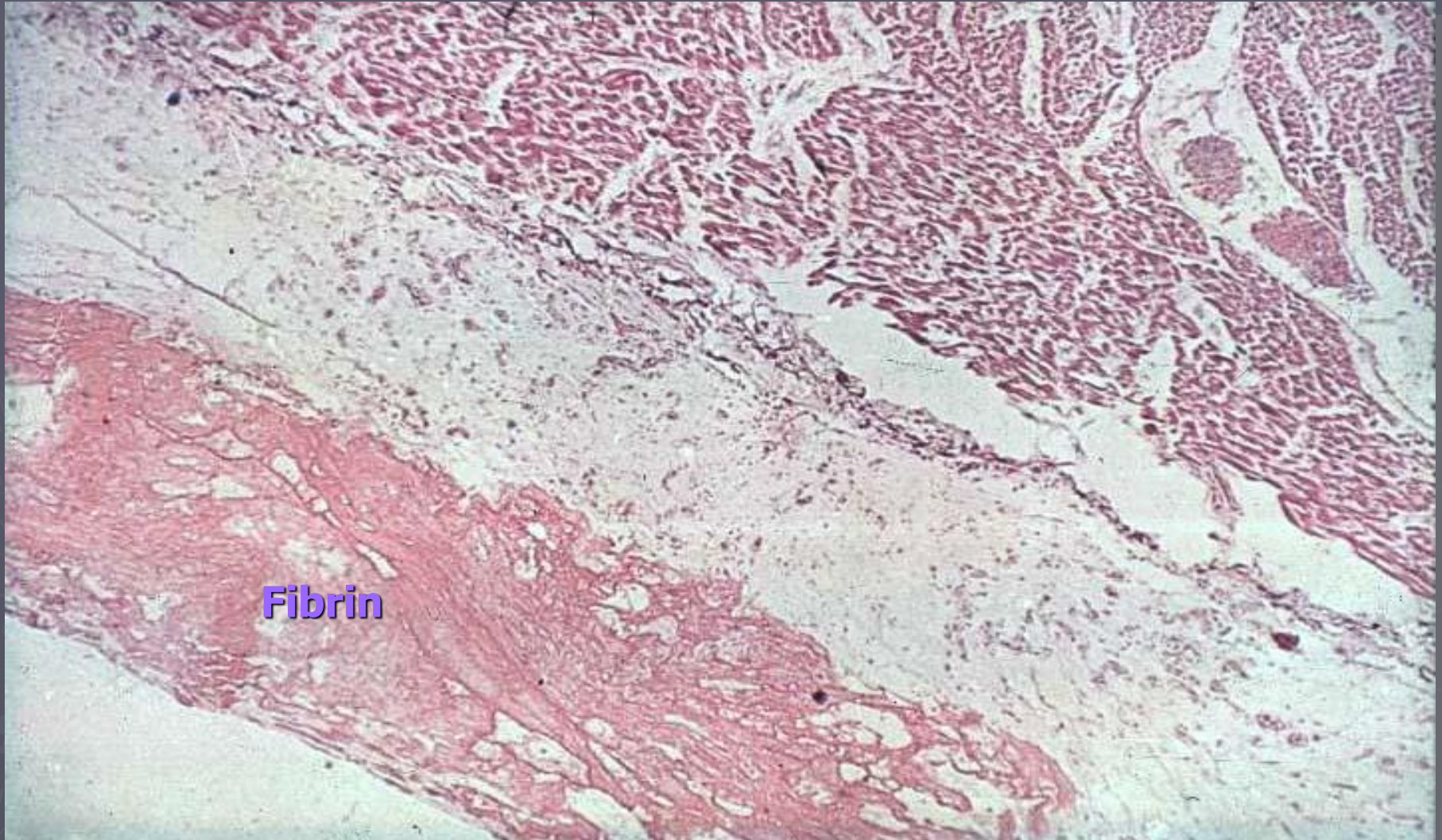


# Pericarditis fibrinosa

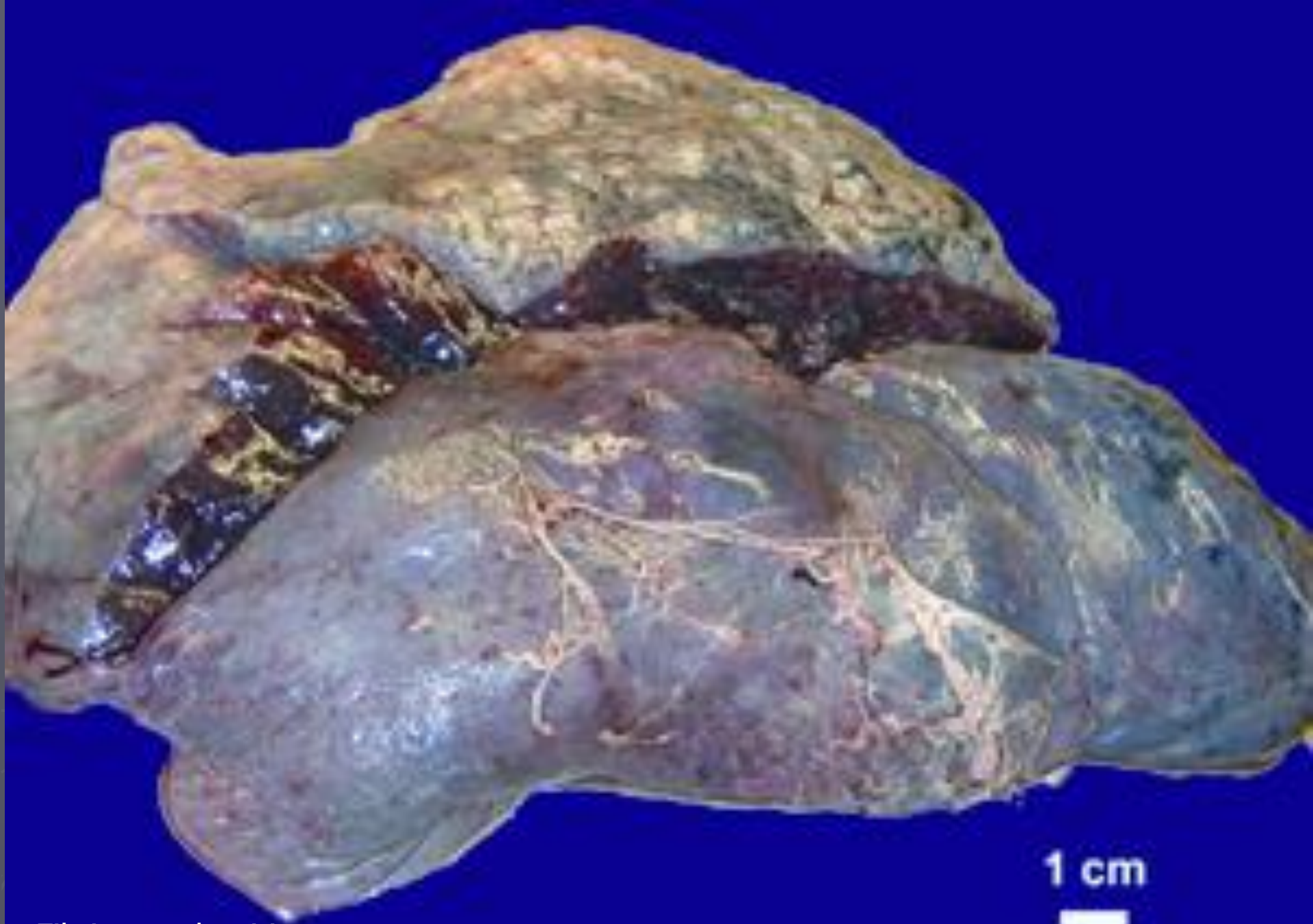




# Pericarditis fibrinosa (H&E)







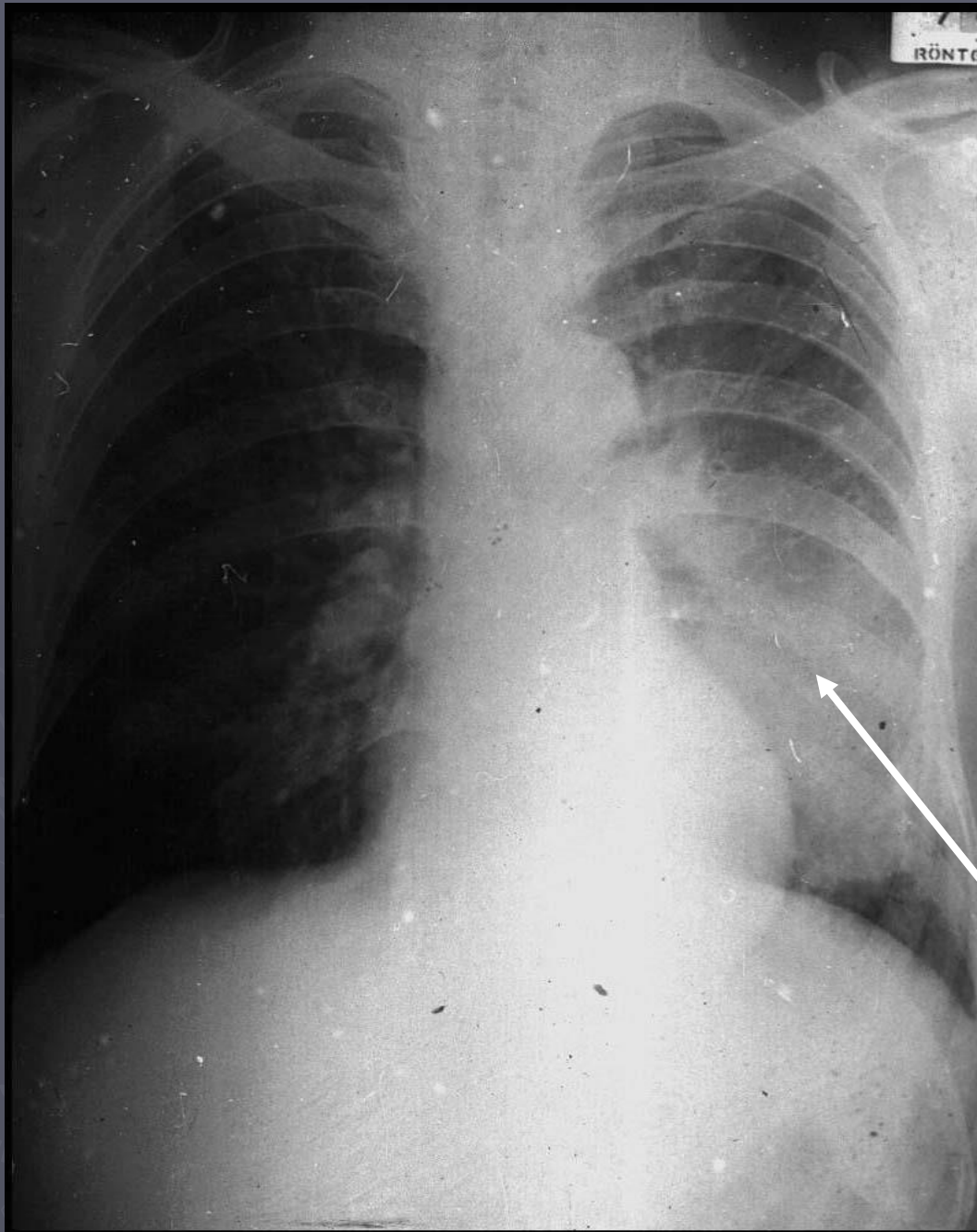
Fibrinous pleuritis

1 cm  
—



Fibrinous peritonitis

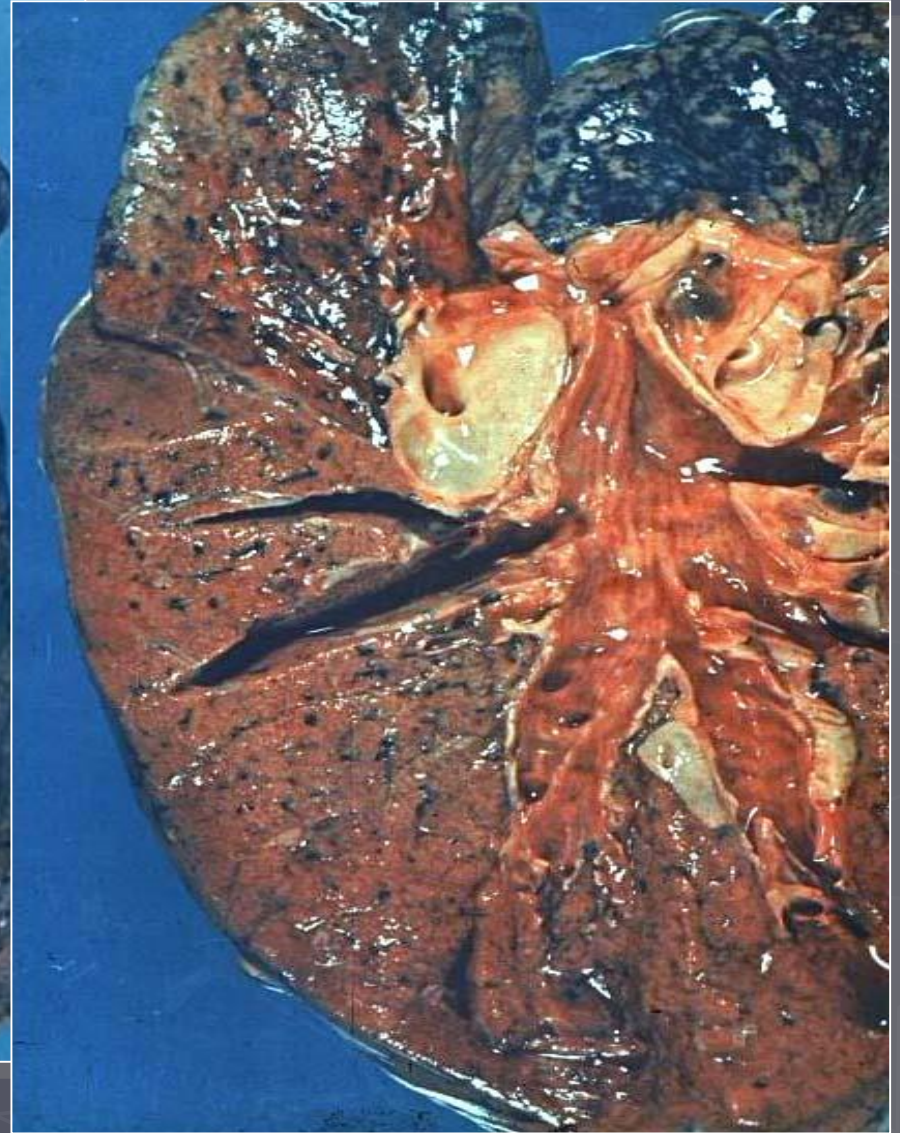




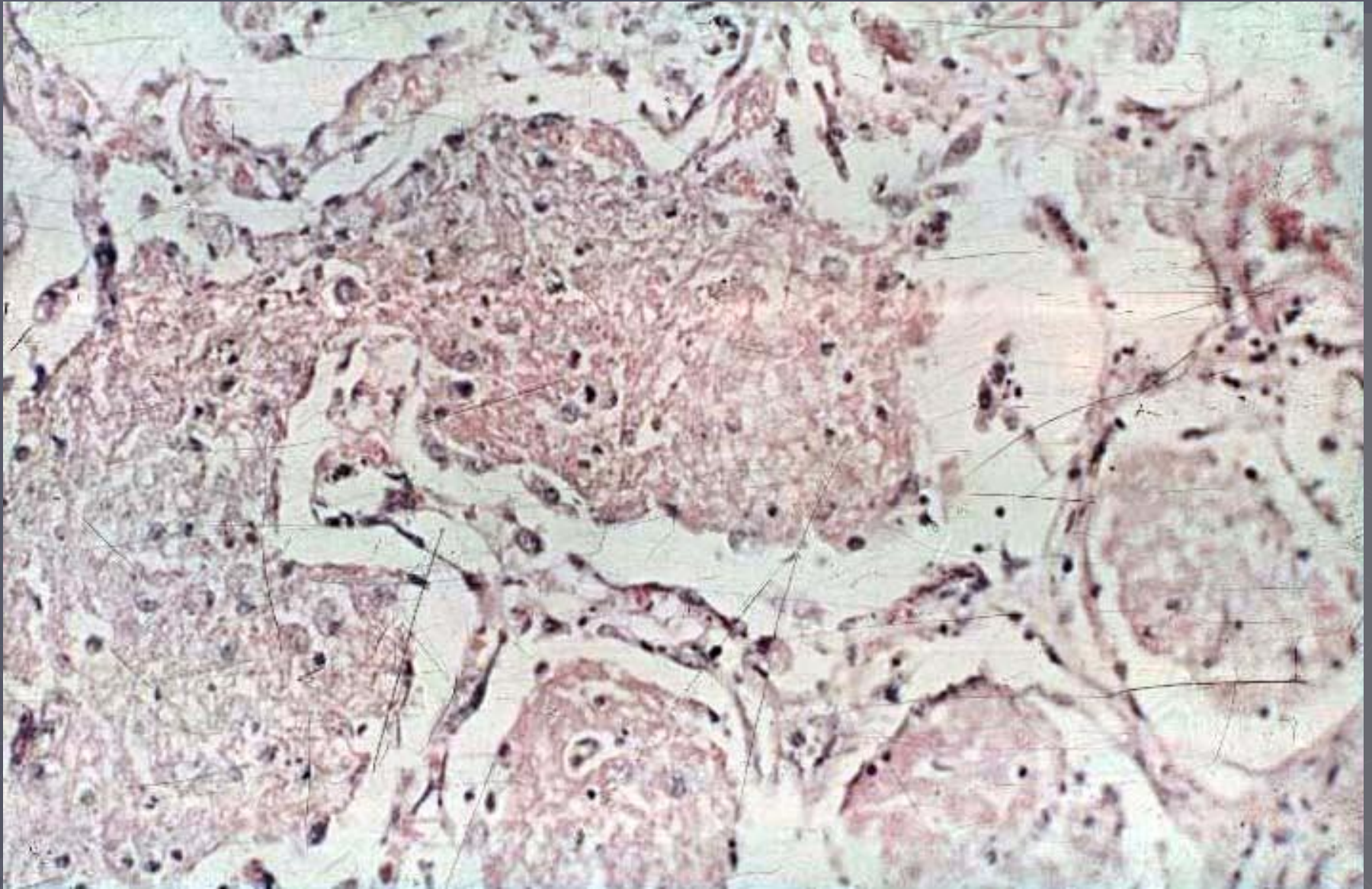
Lobaris  
pneumonia

RTG

# Lobaris pneumonia



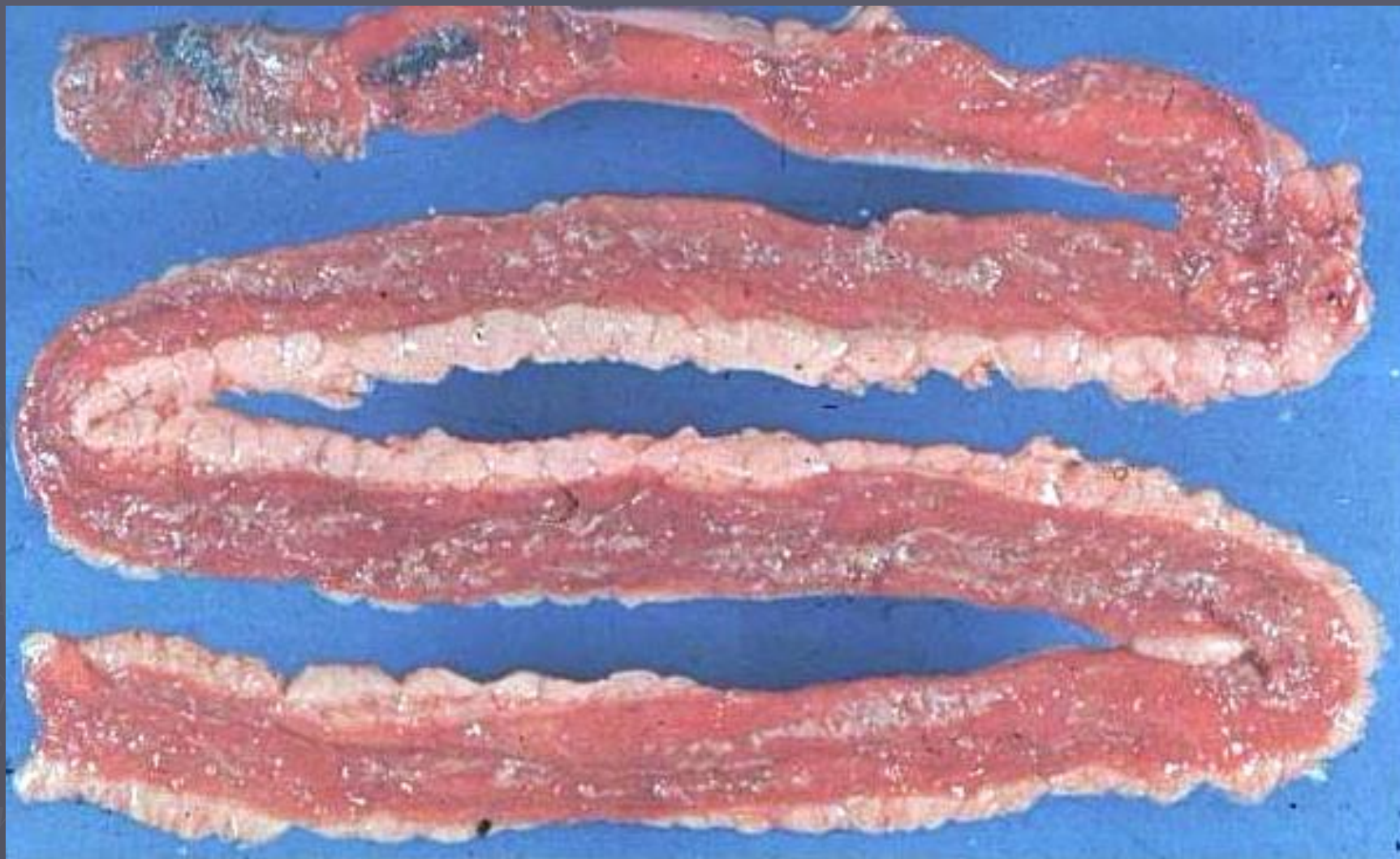




Lobaris pneumonia (H&E)

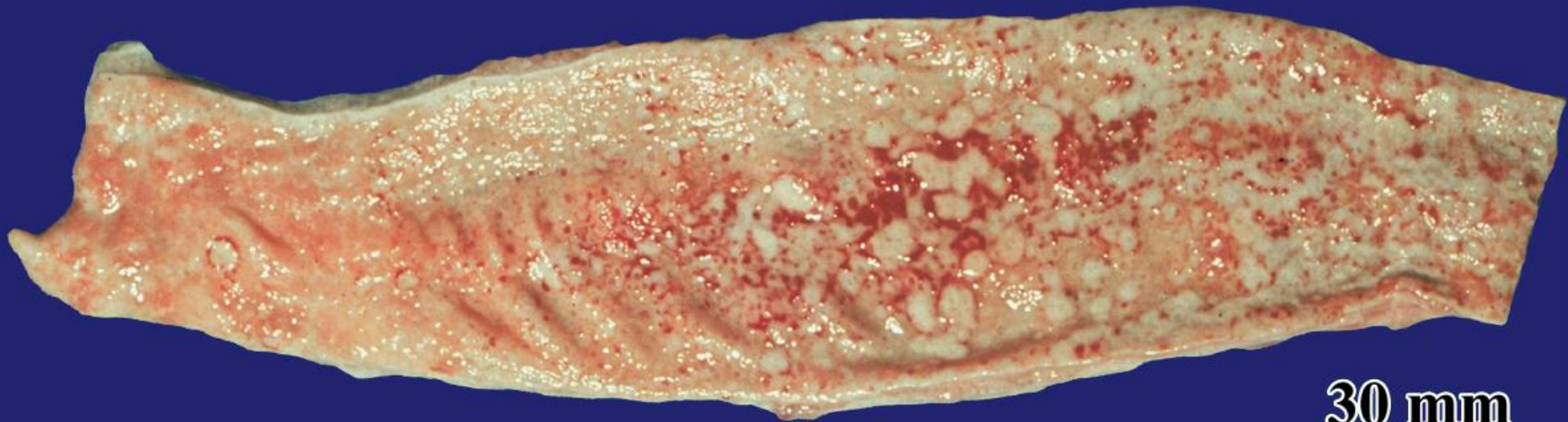


# Pseudomembranozus bélgyulladás





# Dysentery (fibrinopurulens vastagbélgyulladás)

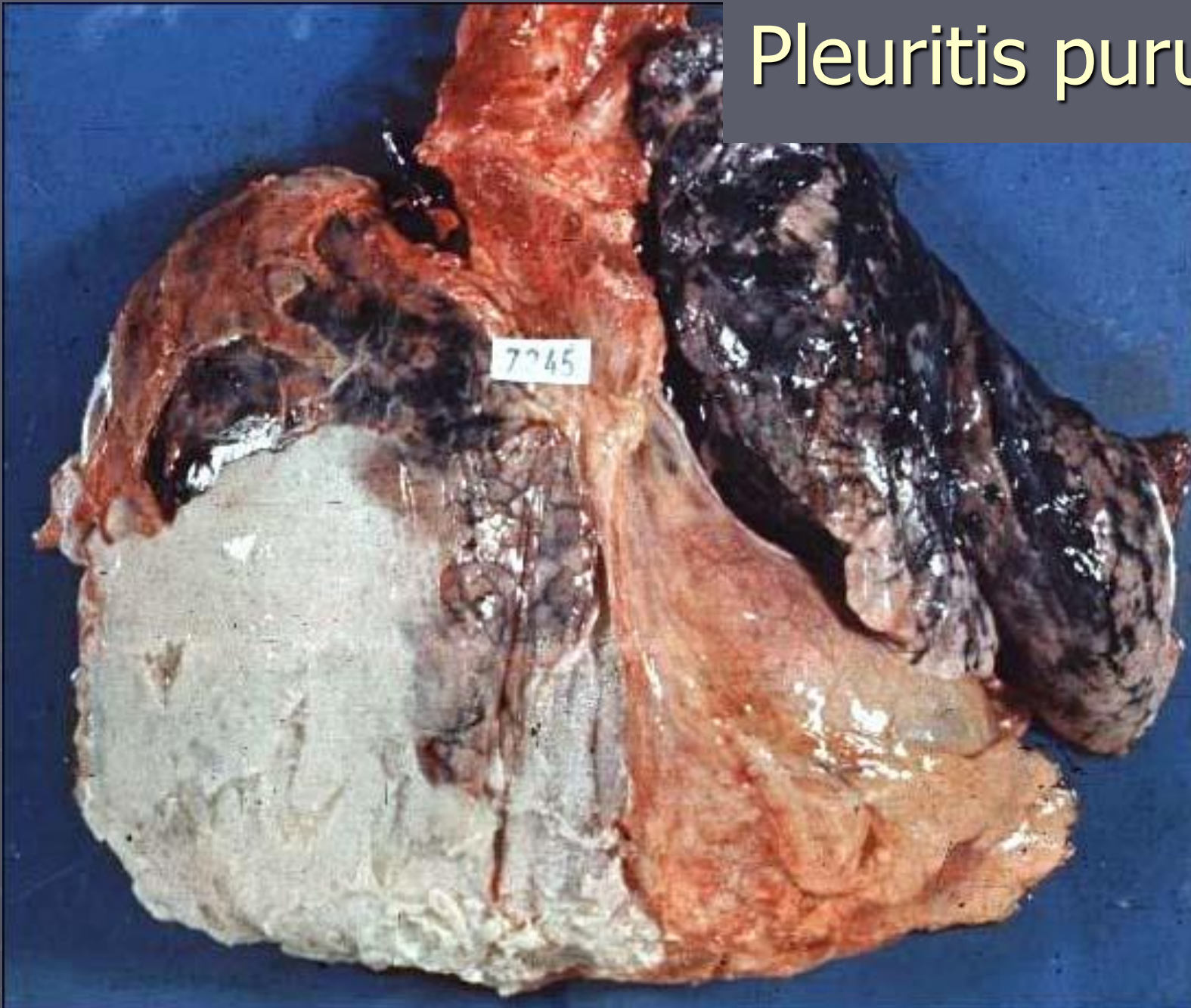


30 mm

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# Pleuritis purulenta

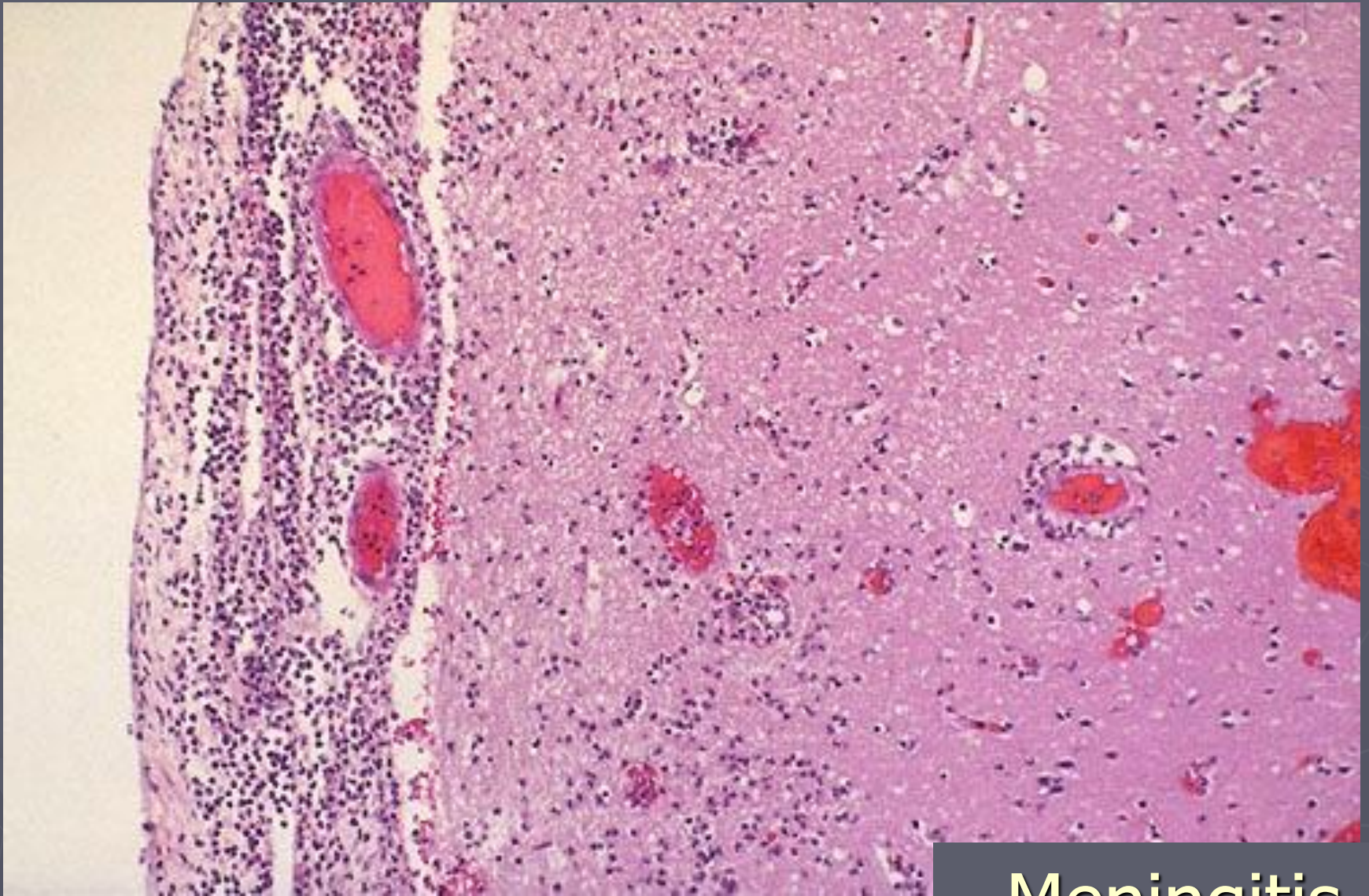






**Meningitis  
purulenta**

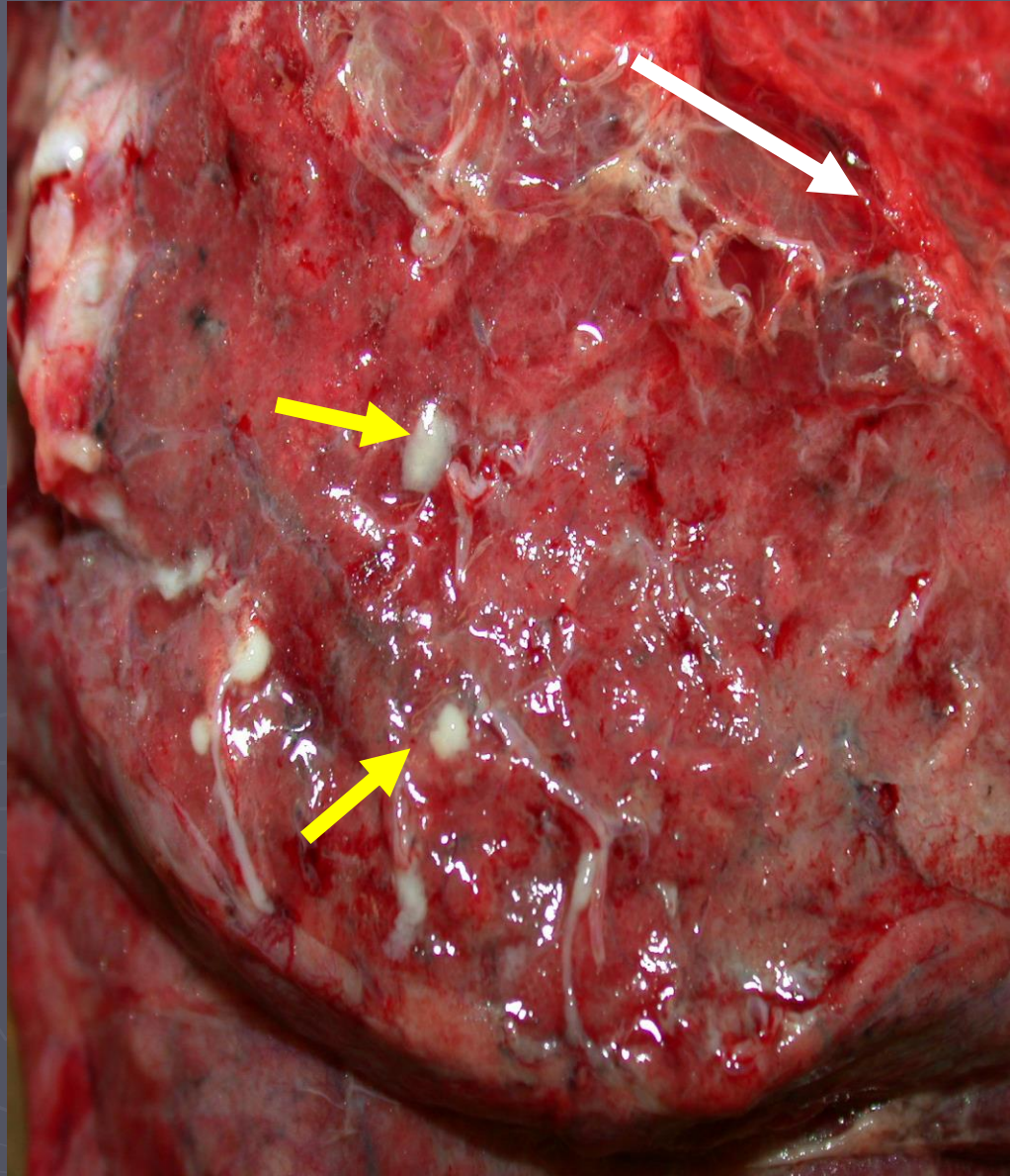




Meningitis  
purulenta



# Purulent bronchopneumonia



44761.04.24.

Preformált üregek purulens  
gyulladás, abscessus

# PUS



44756.04.05.

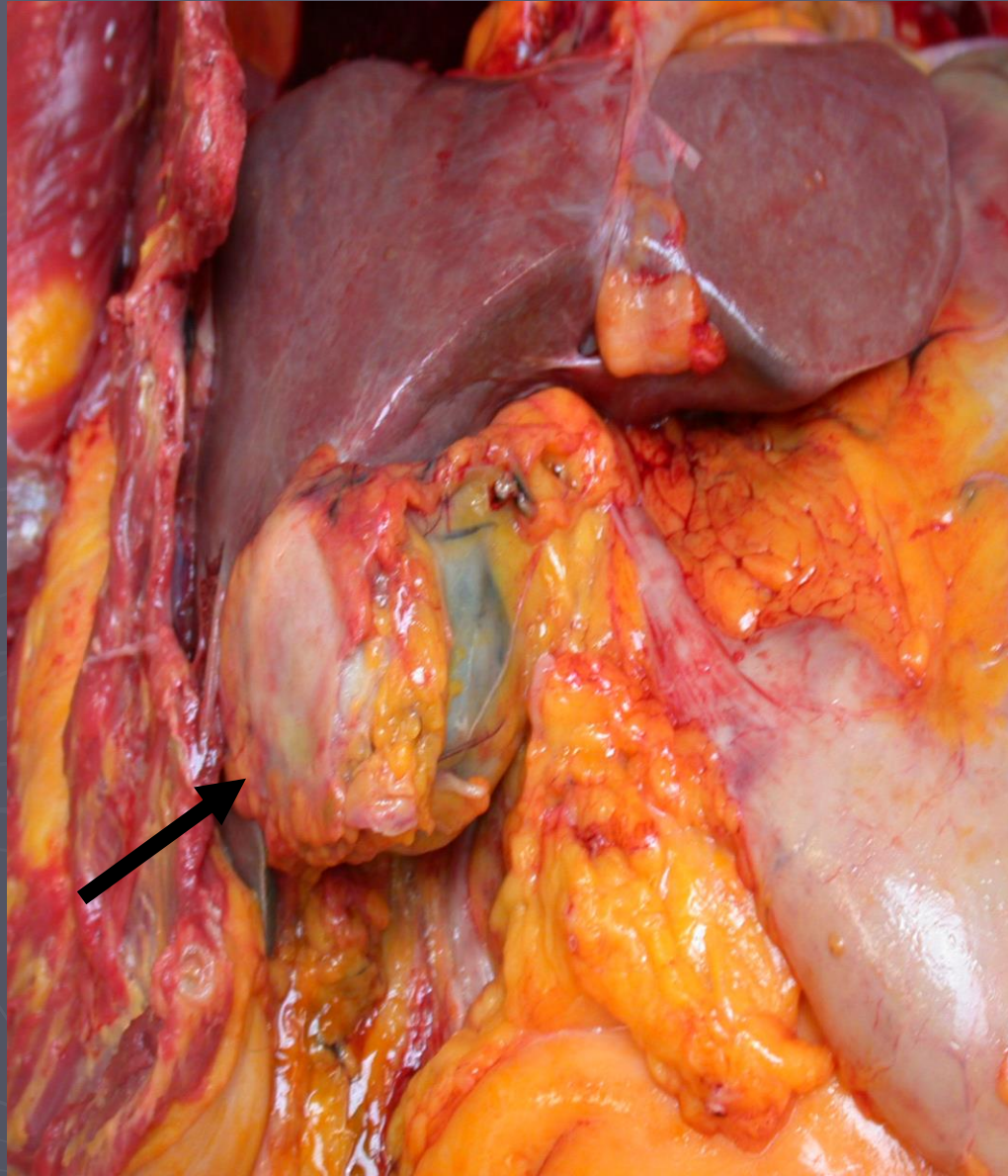


# abscess



44704.04.28.

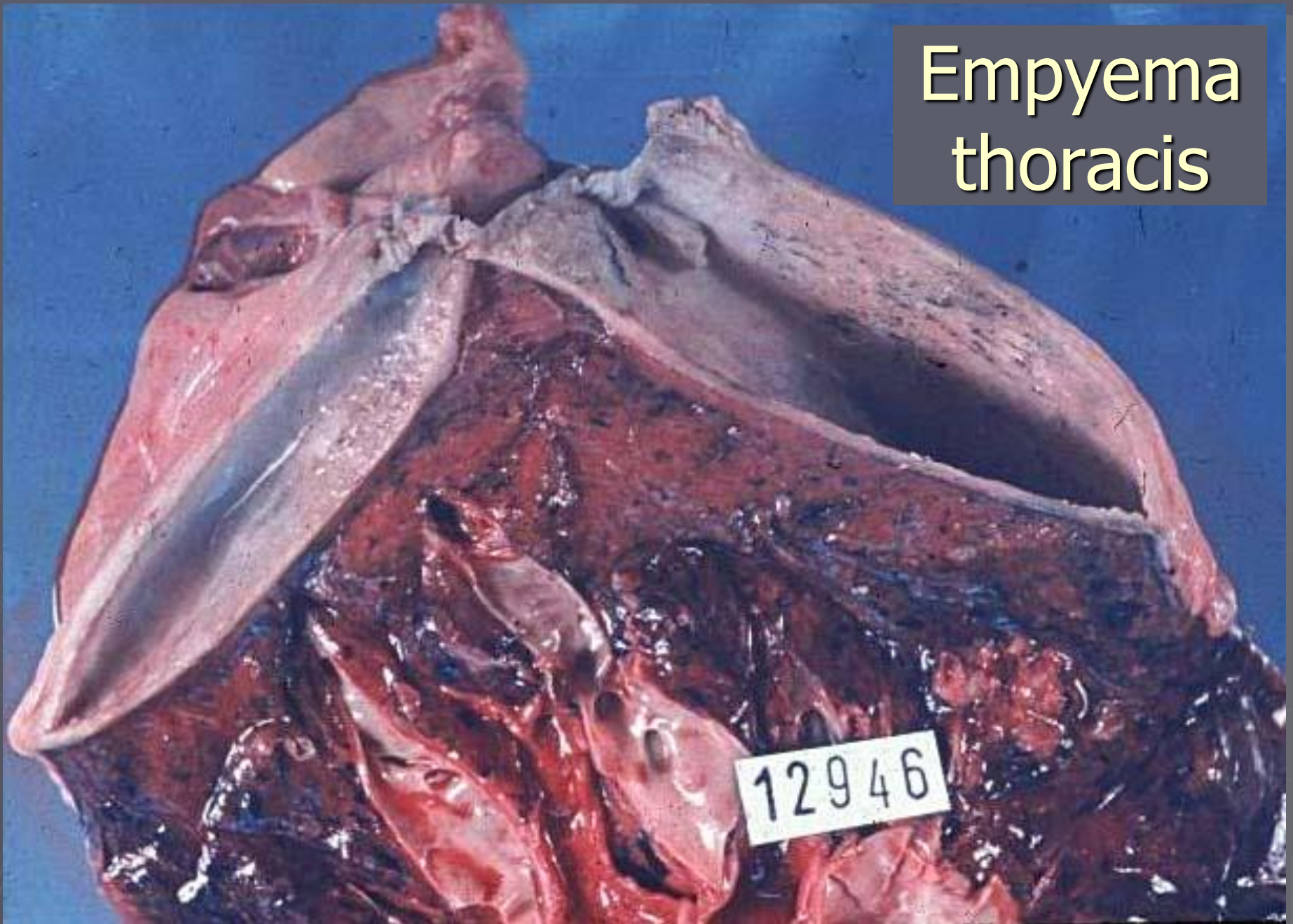
# Empyema vesicae felleae



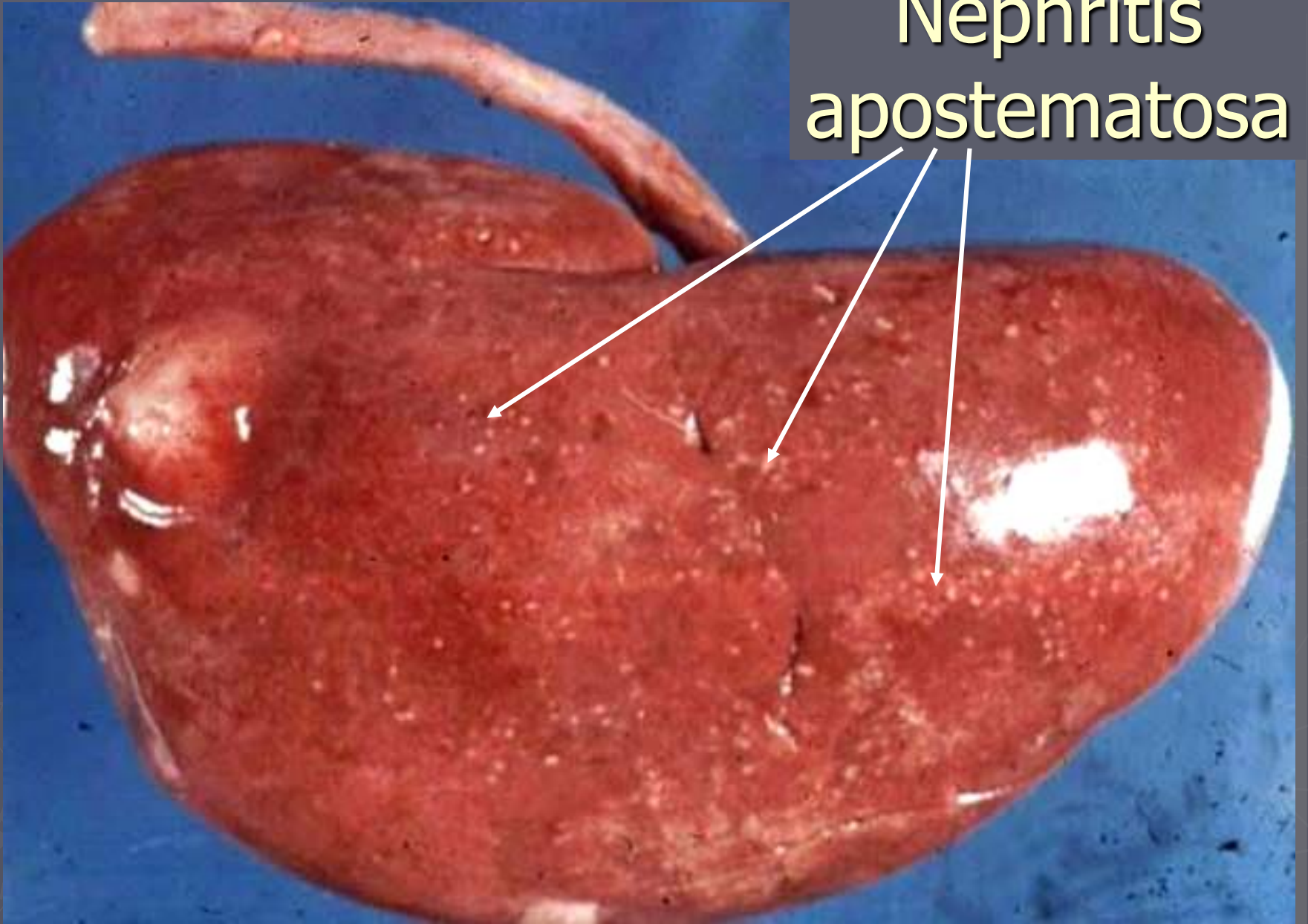
44754.04.18.



# Empyema thoracis

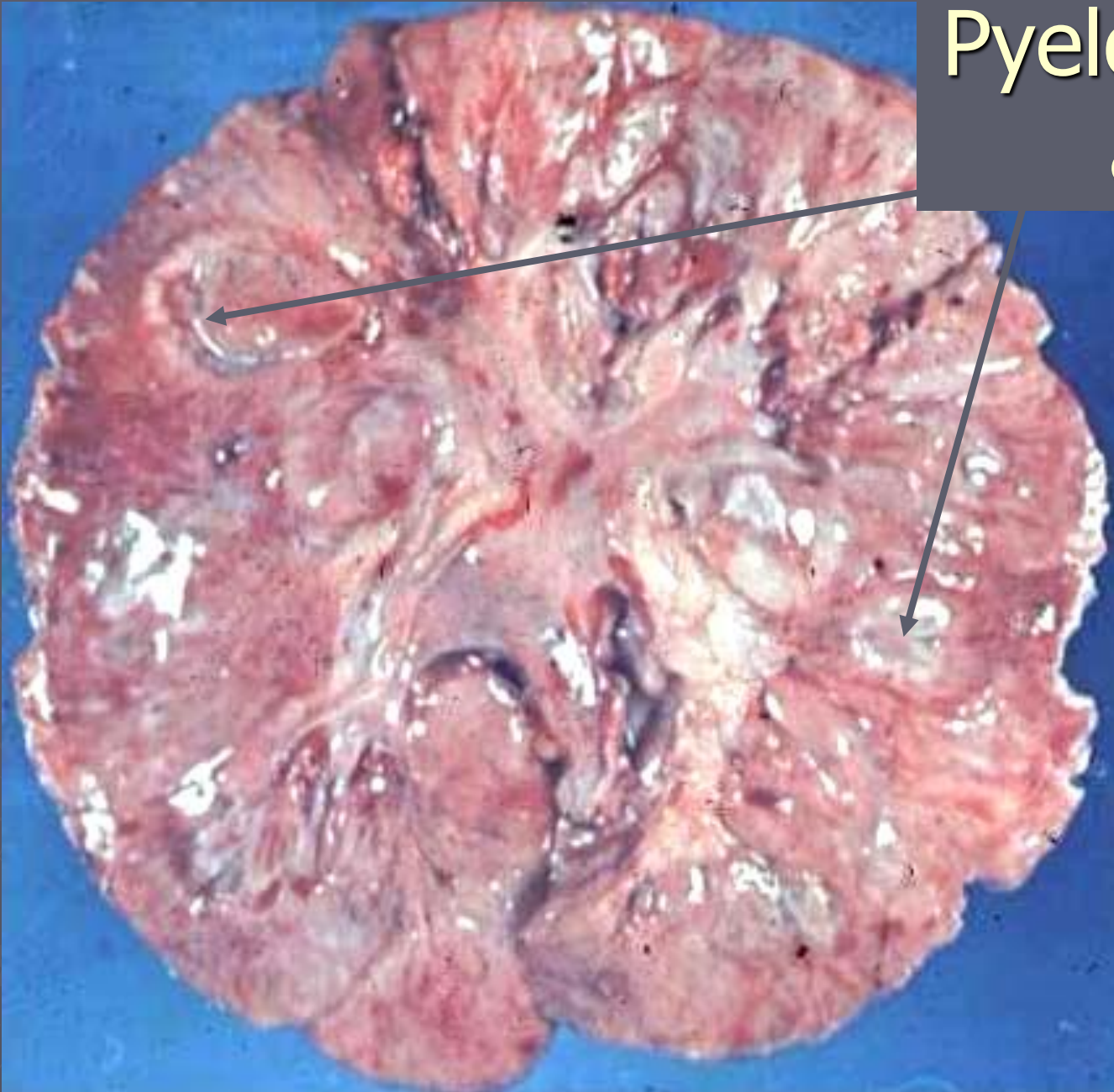


# Nephritis apostematosa

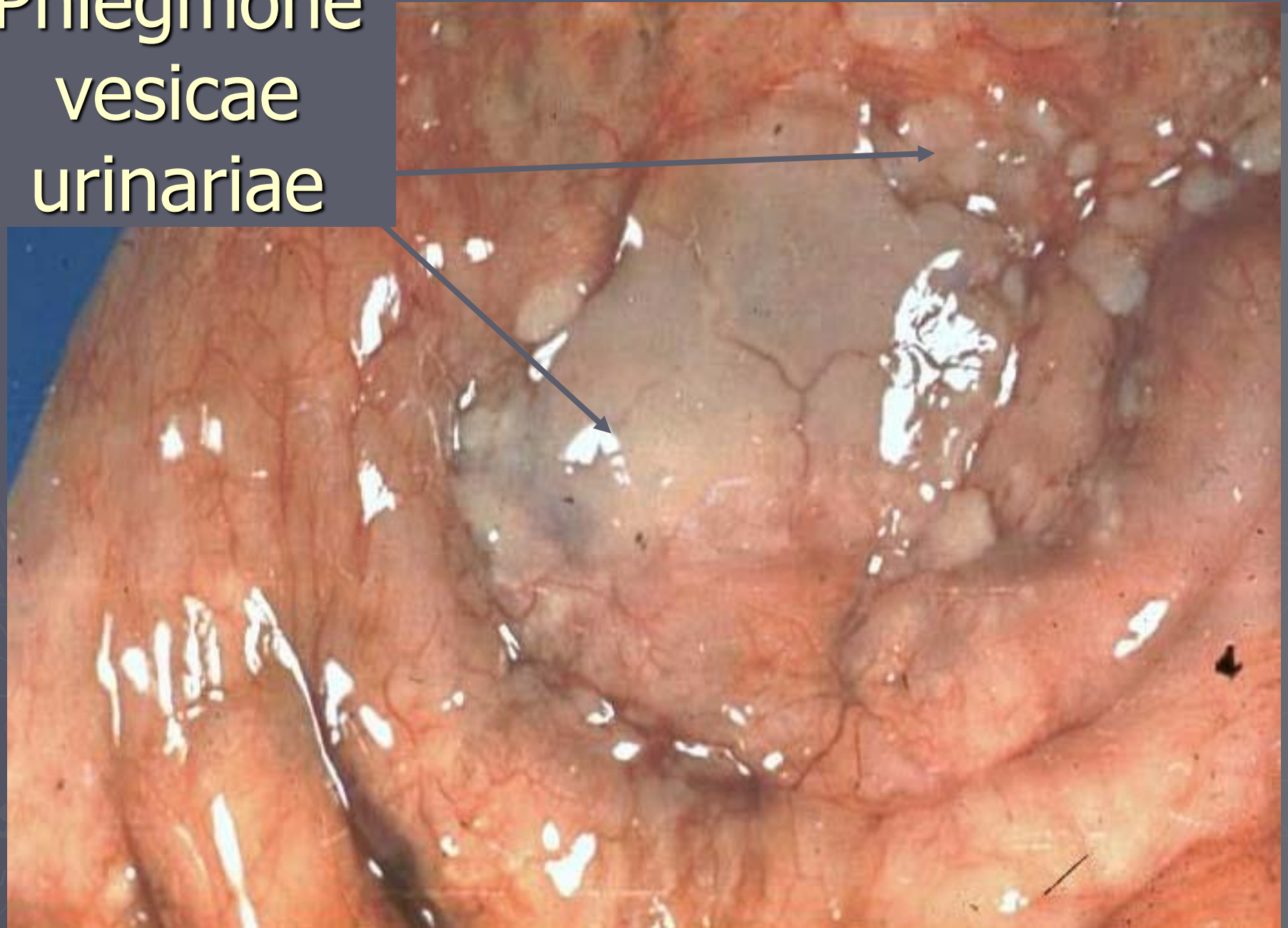




# Pyelonephritis acuta



# Phlegmone vesicae urinariae





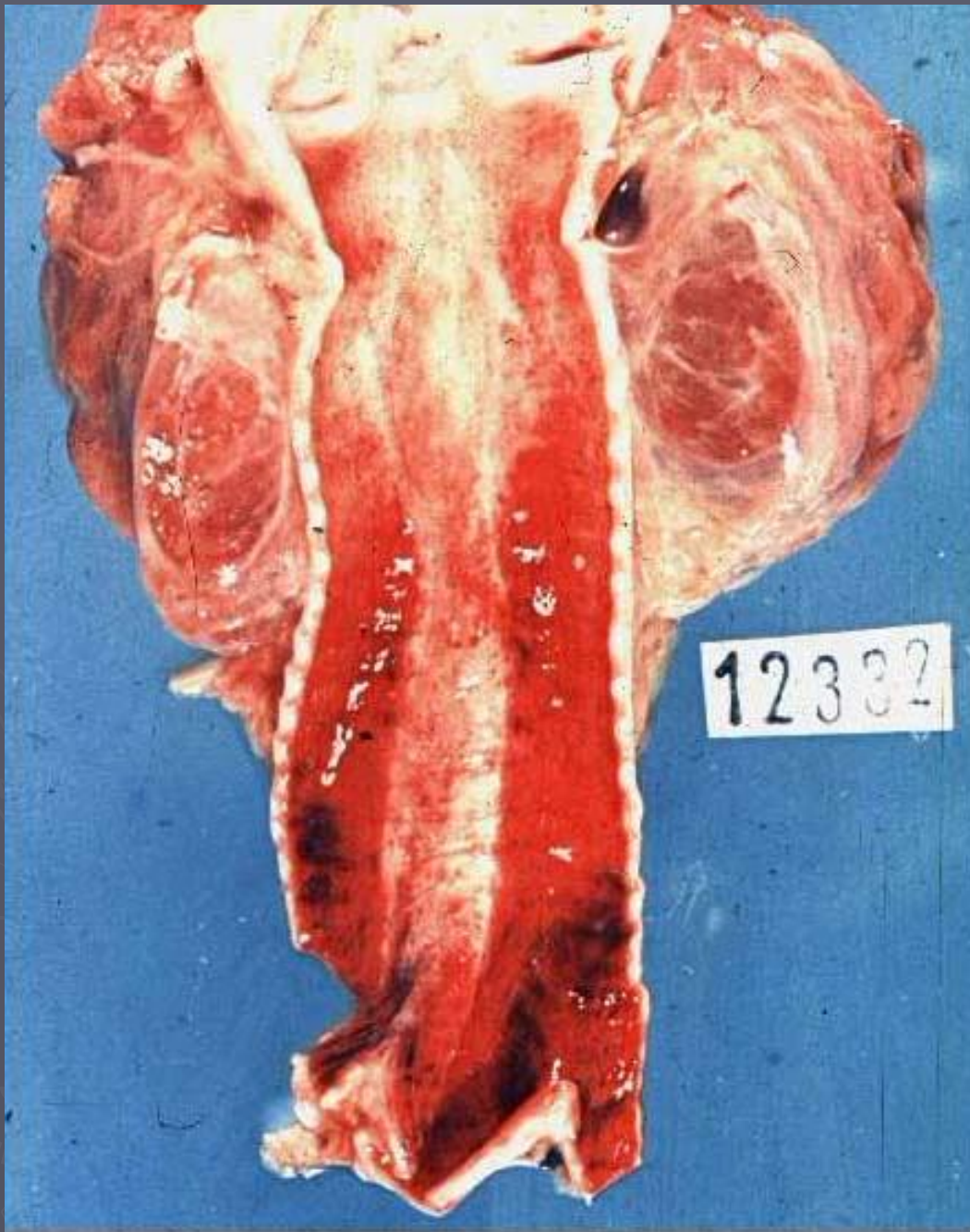


Carbunculus  
(bőr)

# Acut gyulladás típusai az exsudatum alapján:

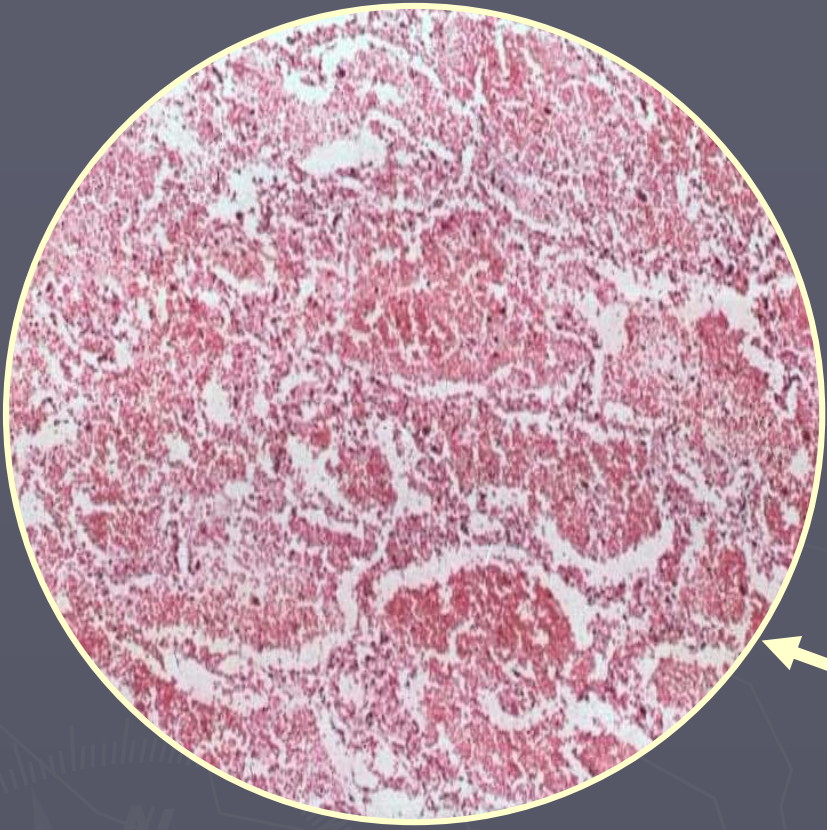
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Tracheitis  
acuta  
haemorrhagica





**Pneumonia  
haemorrhagica**



Enteritis  
haemorrhagica

13575



Anthrax  
Haemorrhagic inflammation





# Acut gyulladás típusai az exsudatum alapján:

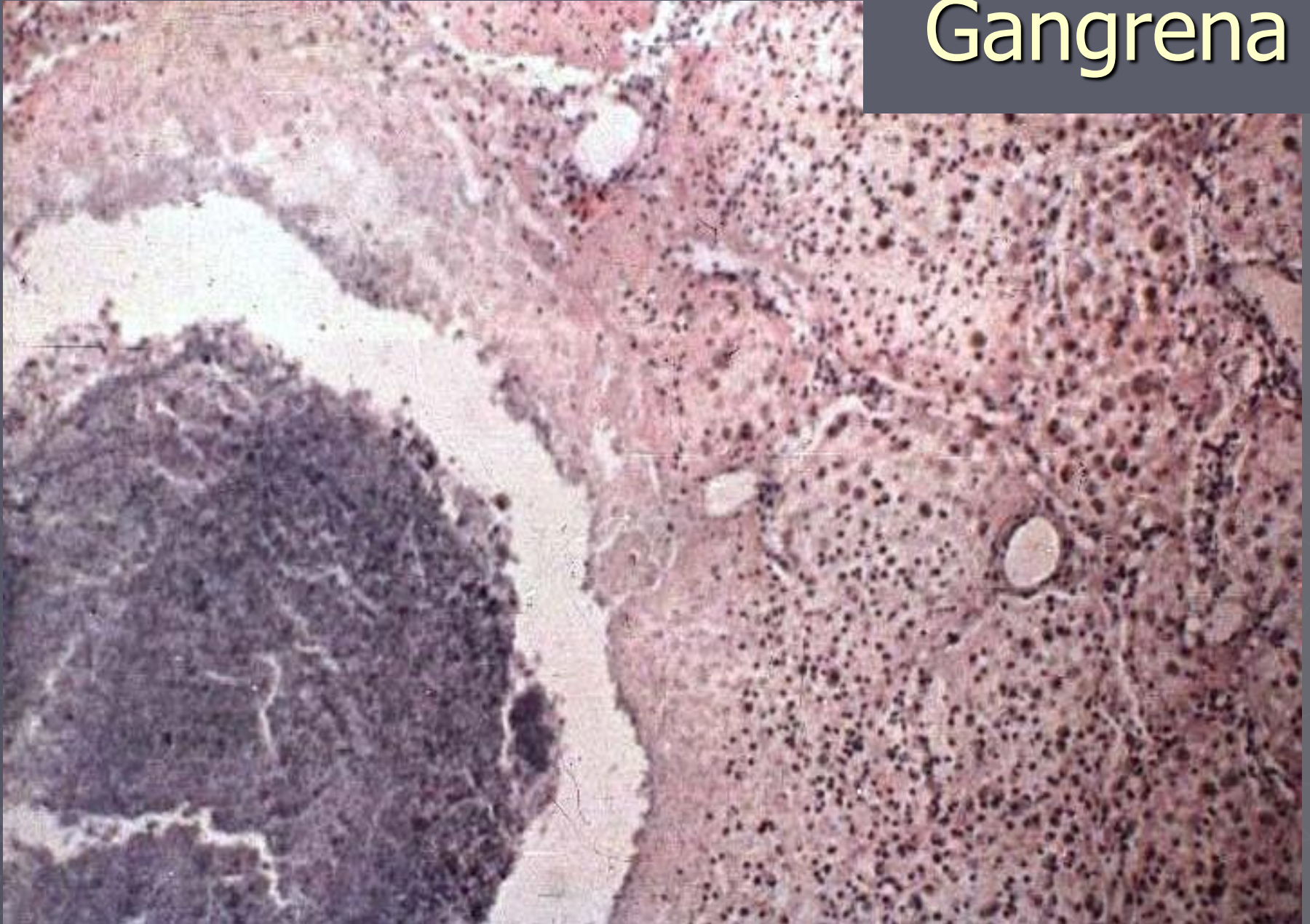
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Gangrena  
pulmonum



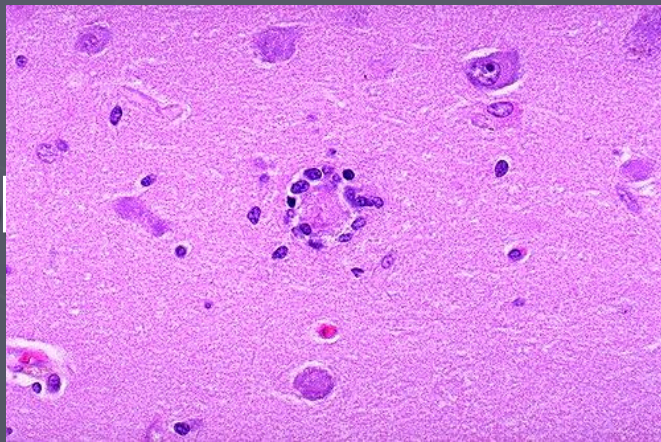
# Gangrena



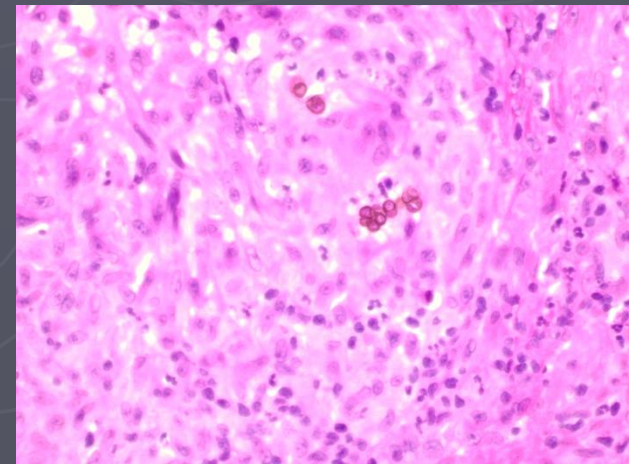


# Acut gyulladás, exsudatum, kórokok

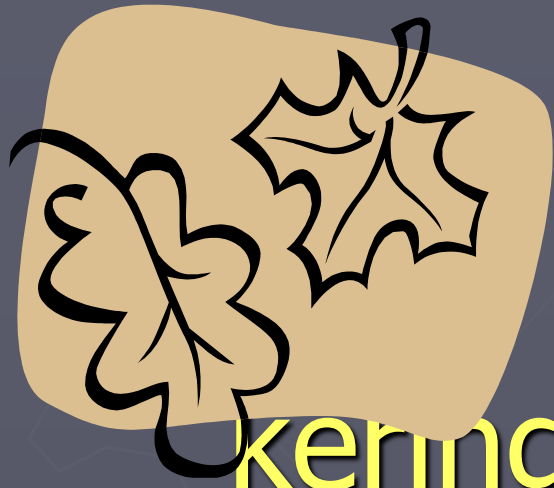
- ▶ Bacterialis: purulens, neutrofil predominancia
- ▶ Virusos: serozus/hemorragias, limfocita/makrofág



- ▶ Gombás, neutro+ eosinophyl

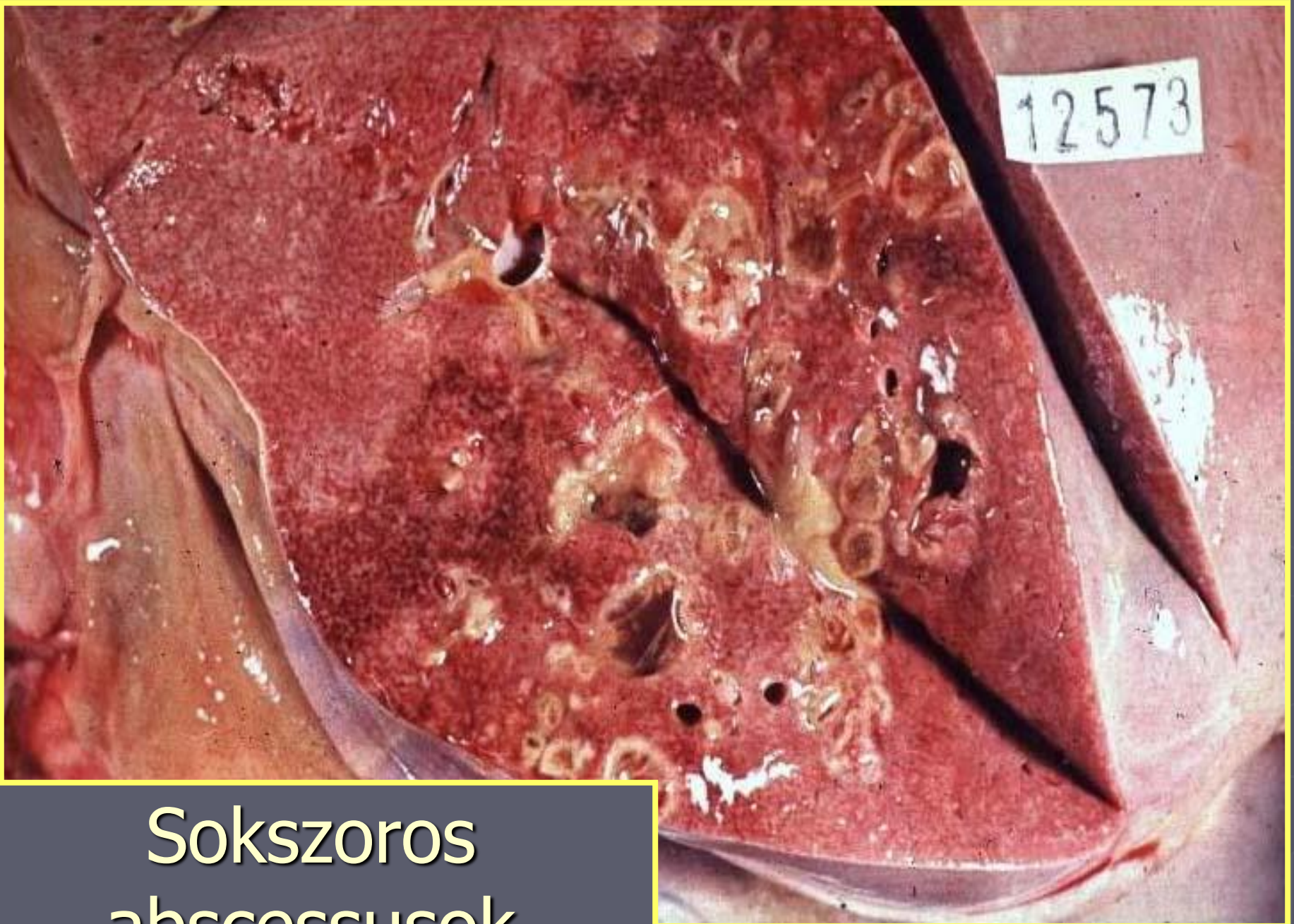






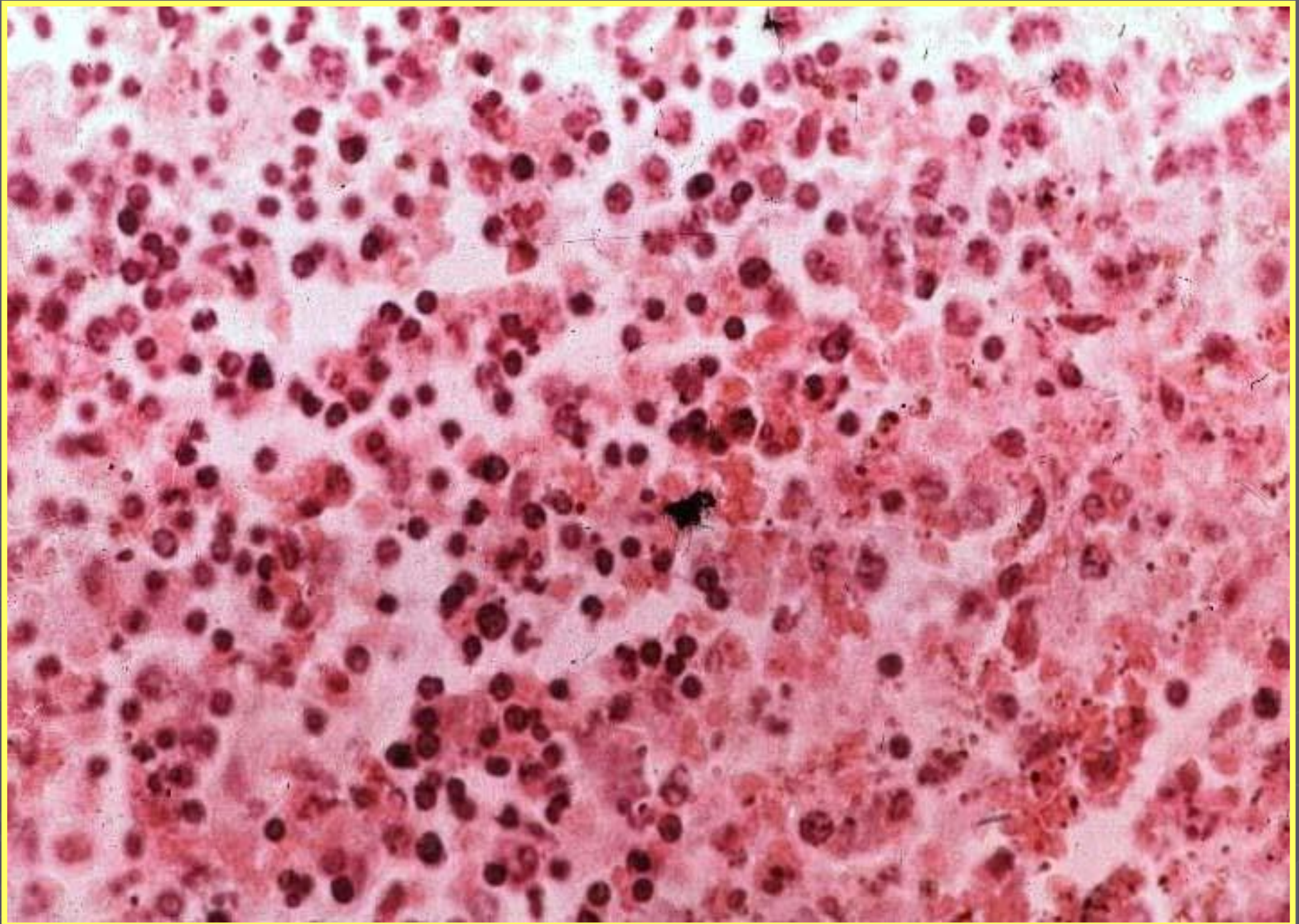
# Sepsis

keringő kórokozó+  
szisztémás acut gyulladákos  
tünetek  
szeptikus shock.....

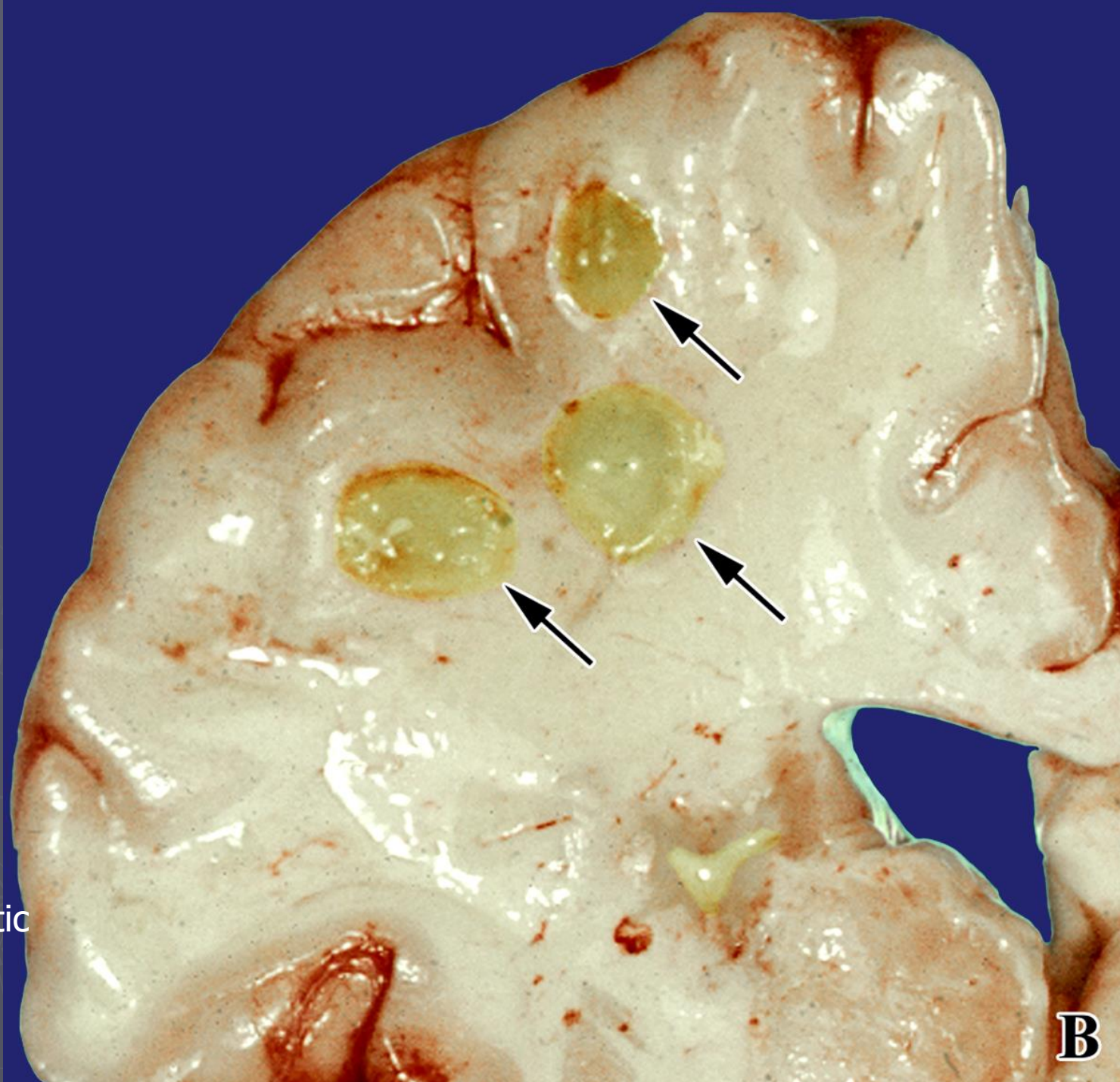


Sokszoros  
abscessusok







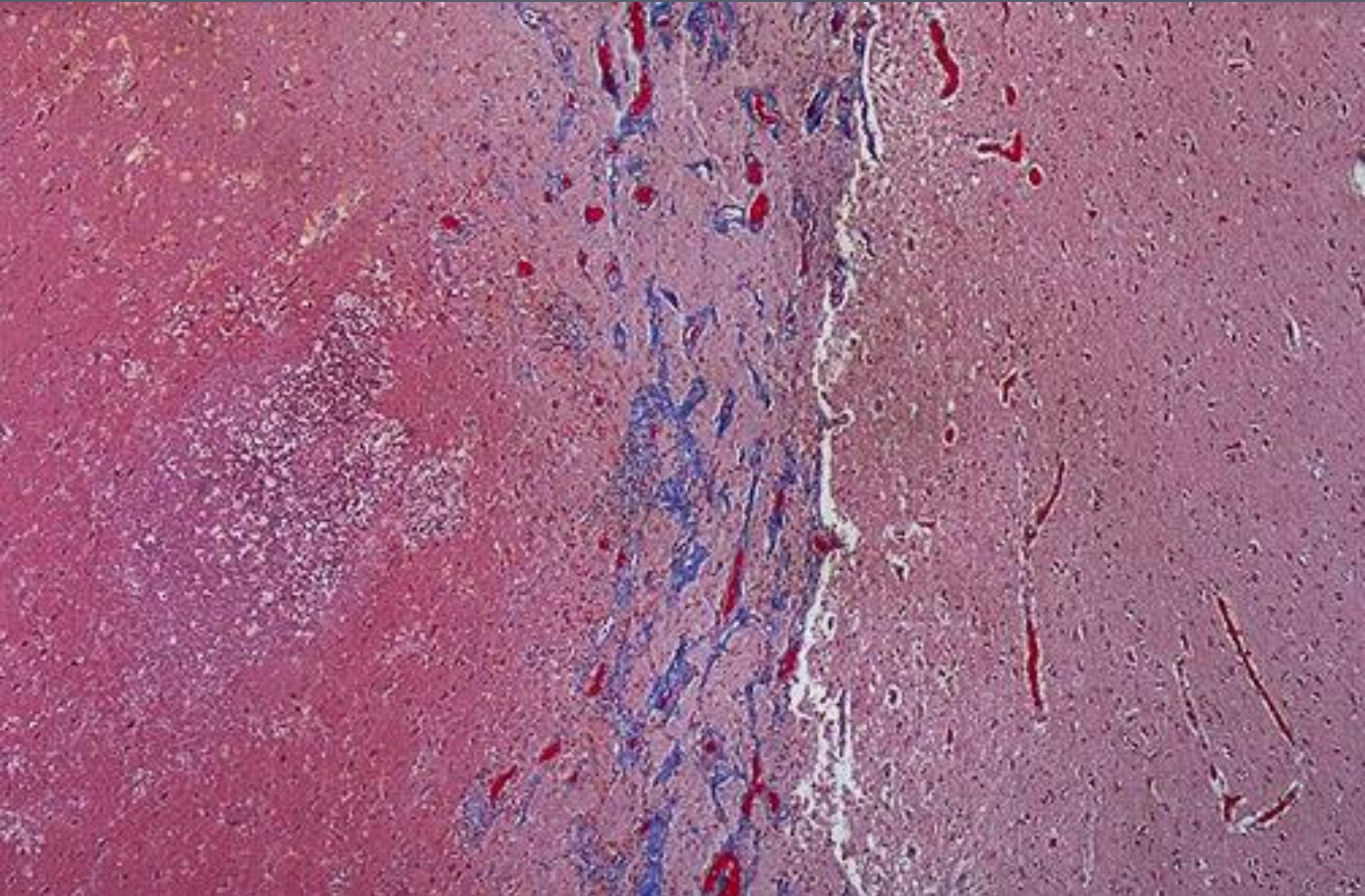


Metastatic  
brain  
abscess

**B**

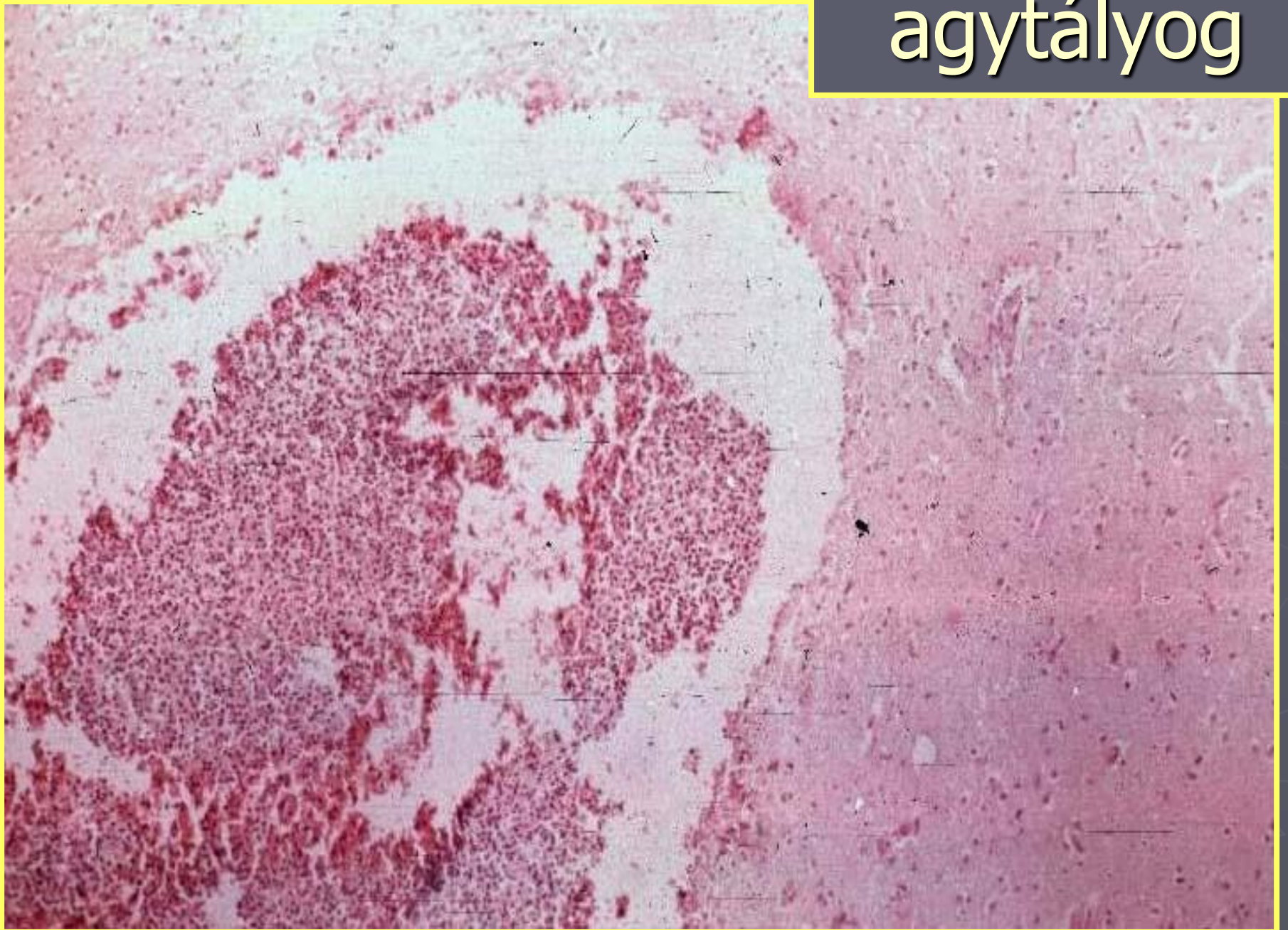


# Agyi tályog



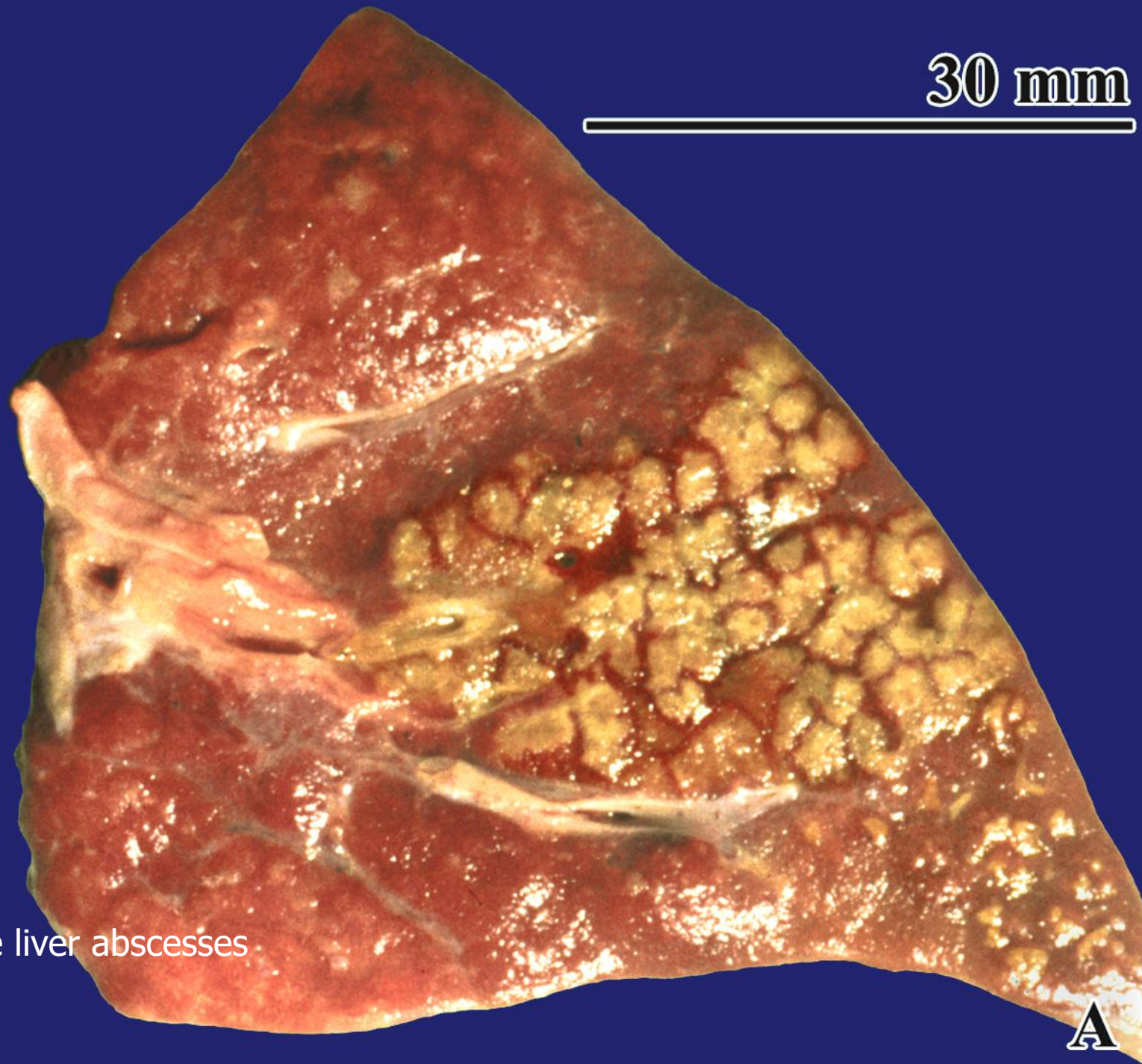


# agytályog



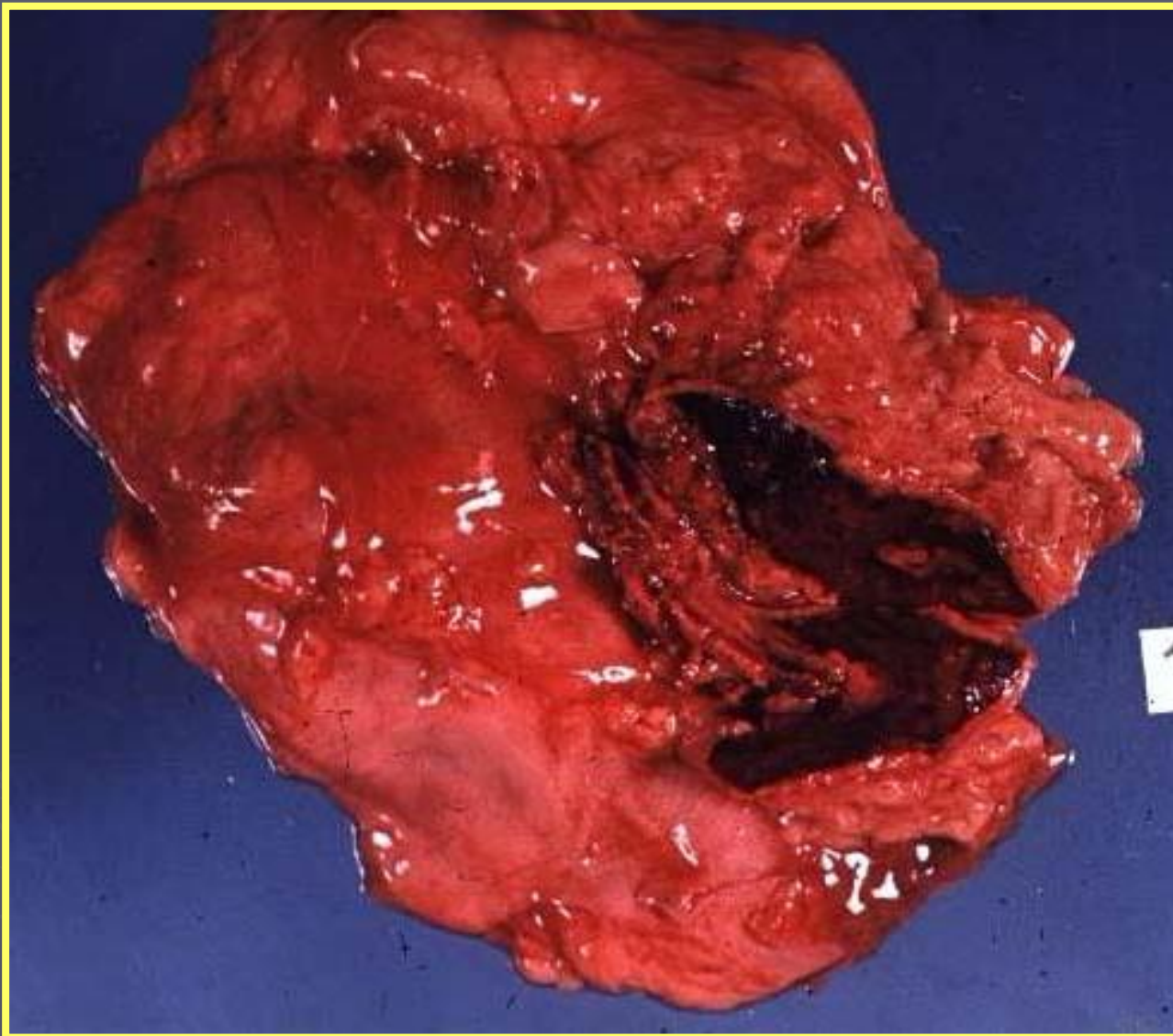


30 mm



Multiple liver abscesses

A



mellékvesevérzés  
meningococcus sepsis



# Gyulladás formái

- ▶ **Acut**
- ▶ **Subacut**
- ▶ **Chronicus**



# Subacut gyulladás

- ▶ Hetek, 1-2 hónap
- ▶ Csökkenő exsudatum
- ▶ Csökkenő oedema
- ▶ Eosinophil, lymphocyta
- ▶ **NOXIOUS AGENT + INFLAMMATION + REPARATION**



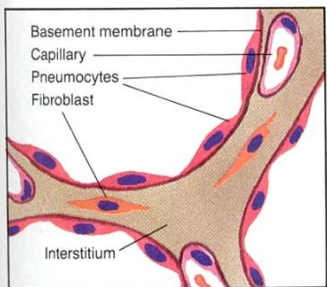
# *gyógyulás*

## *REGENERáció:*

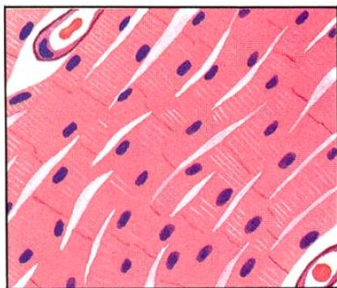
*az elpusztult szövet pótlása  
identikus sejtekkel*

*Hegesedés*

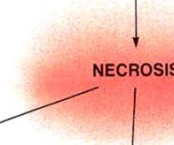
*Az elpusztult szövet pótlása  
kötőszövettel*



TISSUE OF LABILE OR STABLE CELLS  
Normal lung



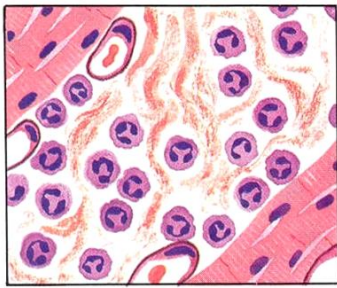
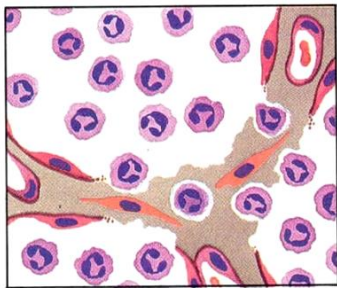
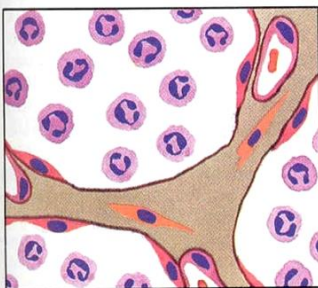
TISSUE OF PERMANENT CELLS  
Normal heart



Acute inflammation with  
intact extracellular matrix

Damaged  
extracellular matrix

Acute inflammation



Regeneration

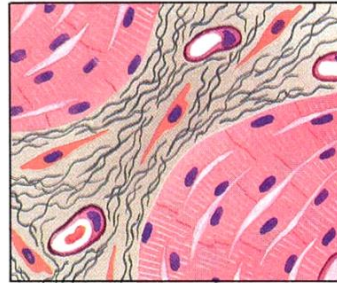
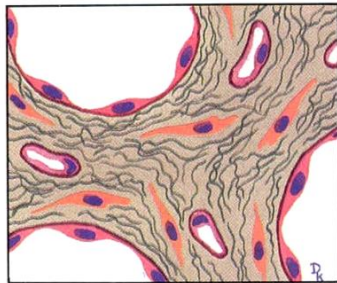
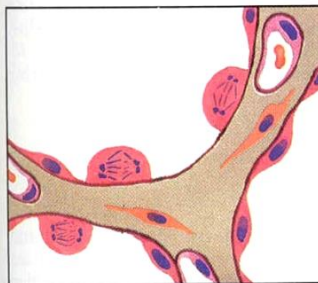
Fibrosis

Fibrosis

Normal lung

Interstitial fibrosis

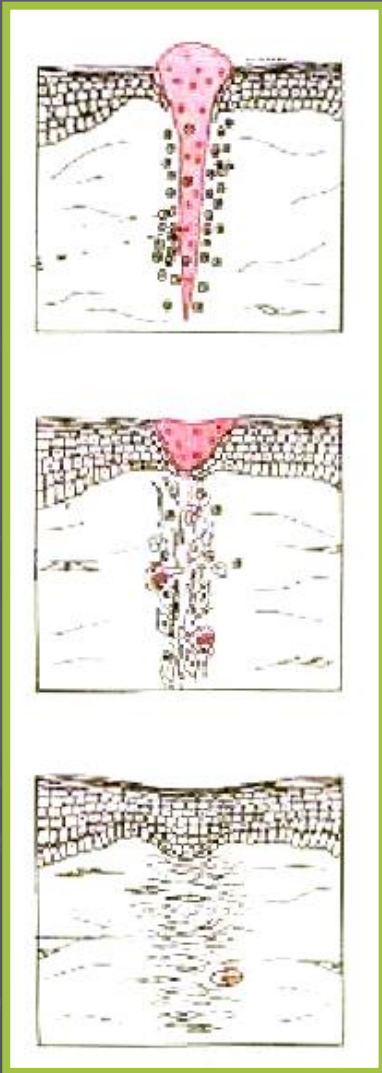
Myocardial scar



Stabil és labil sejtek...



# *Primer sebgyógyulás*

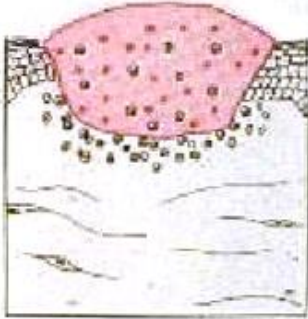


▶ *0-24<sup>h</sup>: vérrög+ neutrophilek*

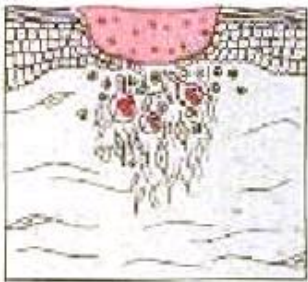
▶ *napok: granulatio szövet, hámproliferáció*

▶ *Hetek: heg szövet*

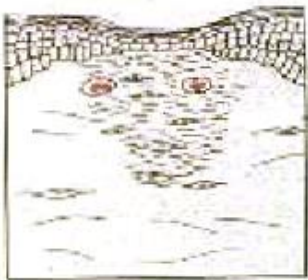
# *Másodlagos sebgyógyulás*



- ▶ *0-24<sup>h</sup>: necrosis, fibrin, gyulladáscsökkentő sejtes exsudation*

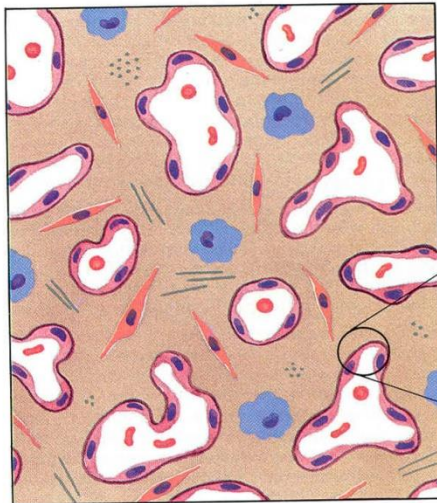


- ▶ *napok: granulatios szövet*



- ▶ *hetek: kiterjedt heg, kontrakció....*

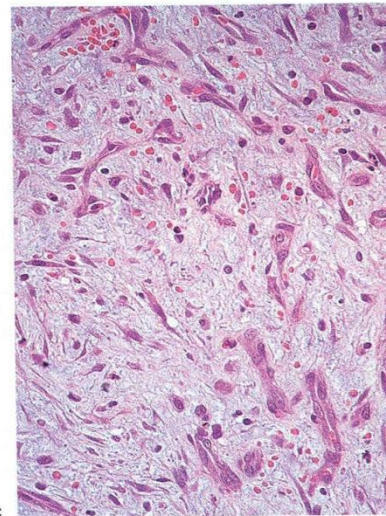
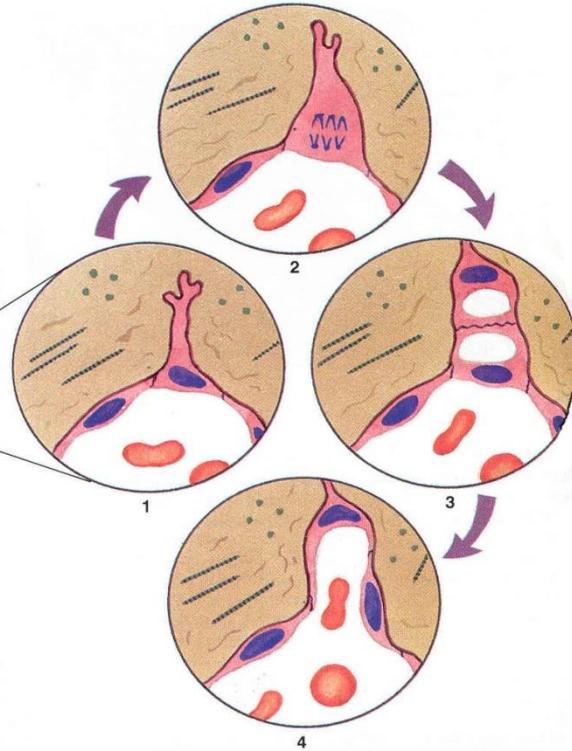




A



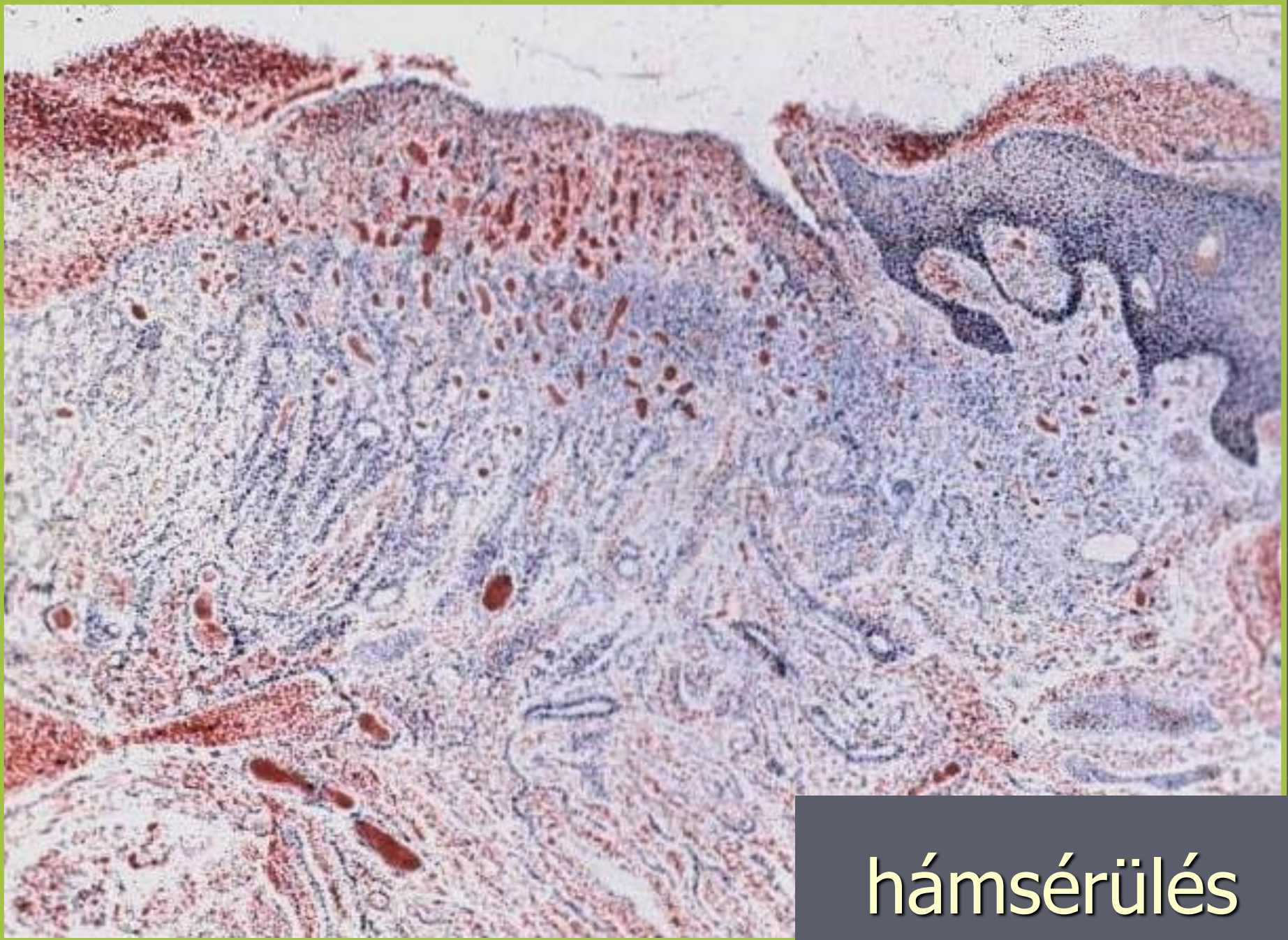
B



C

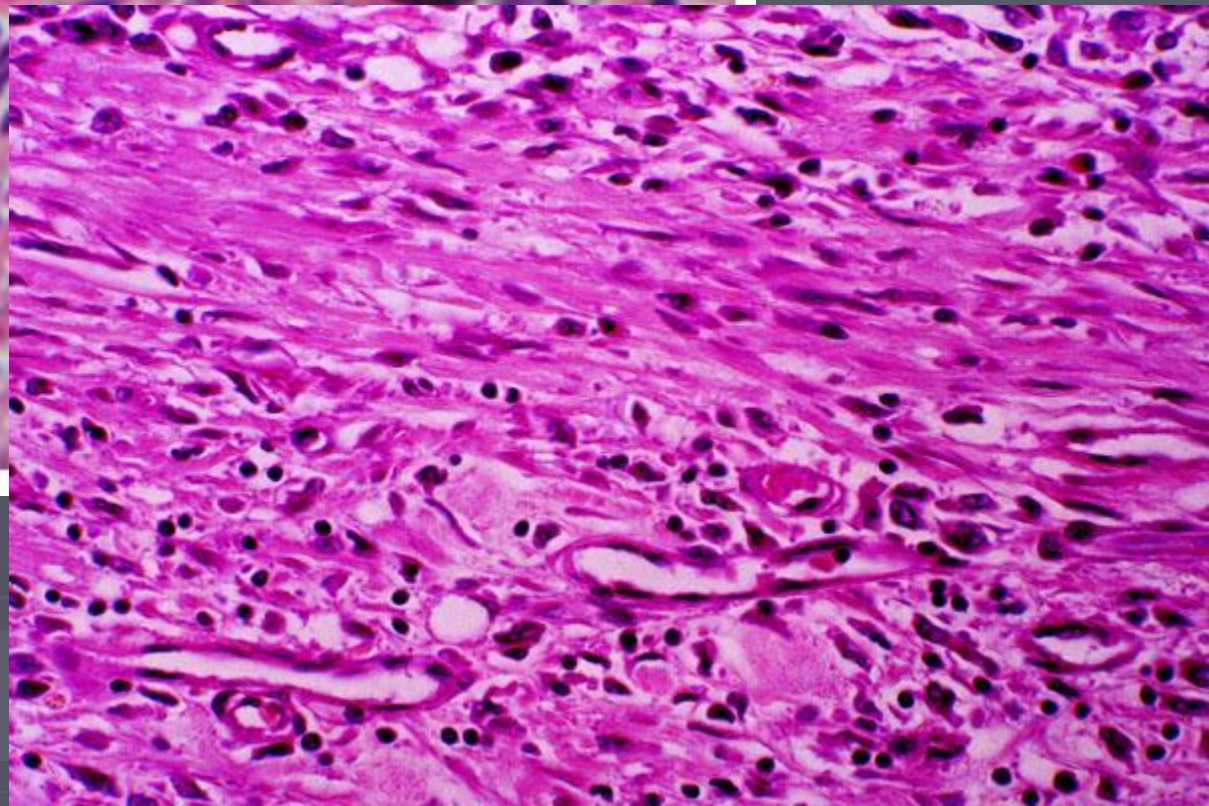
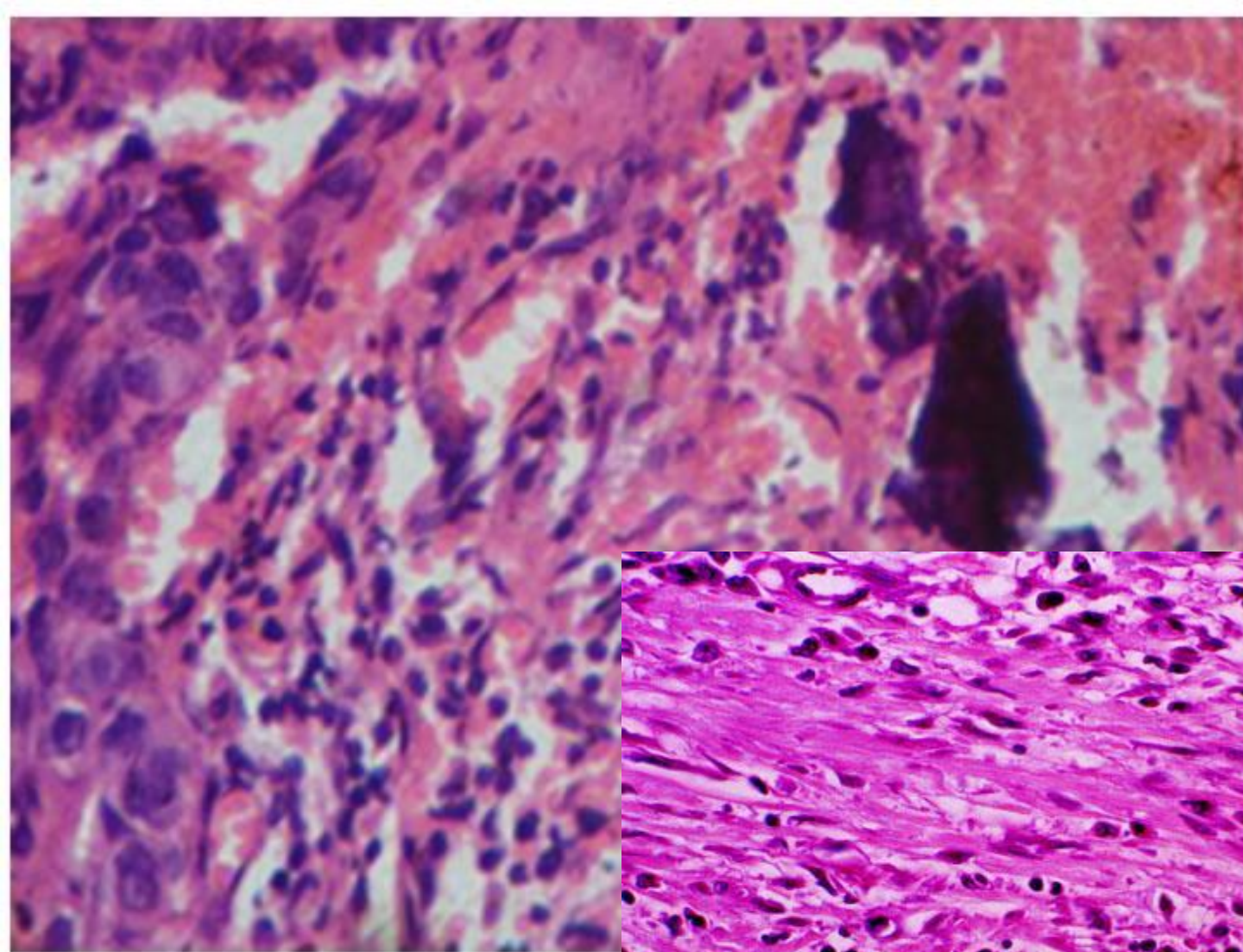
Granulációs  
szövet ----  
hegszövet



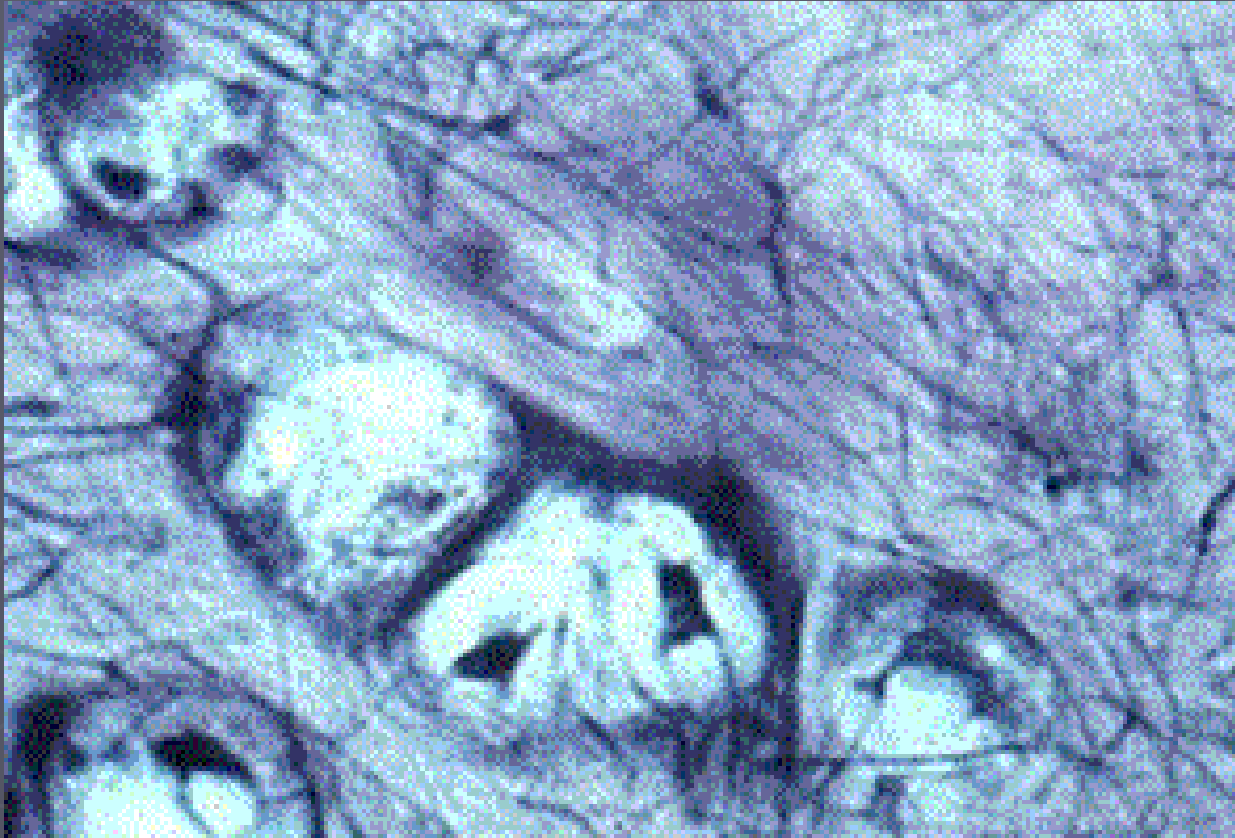


hámsérülés





Granulatio

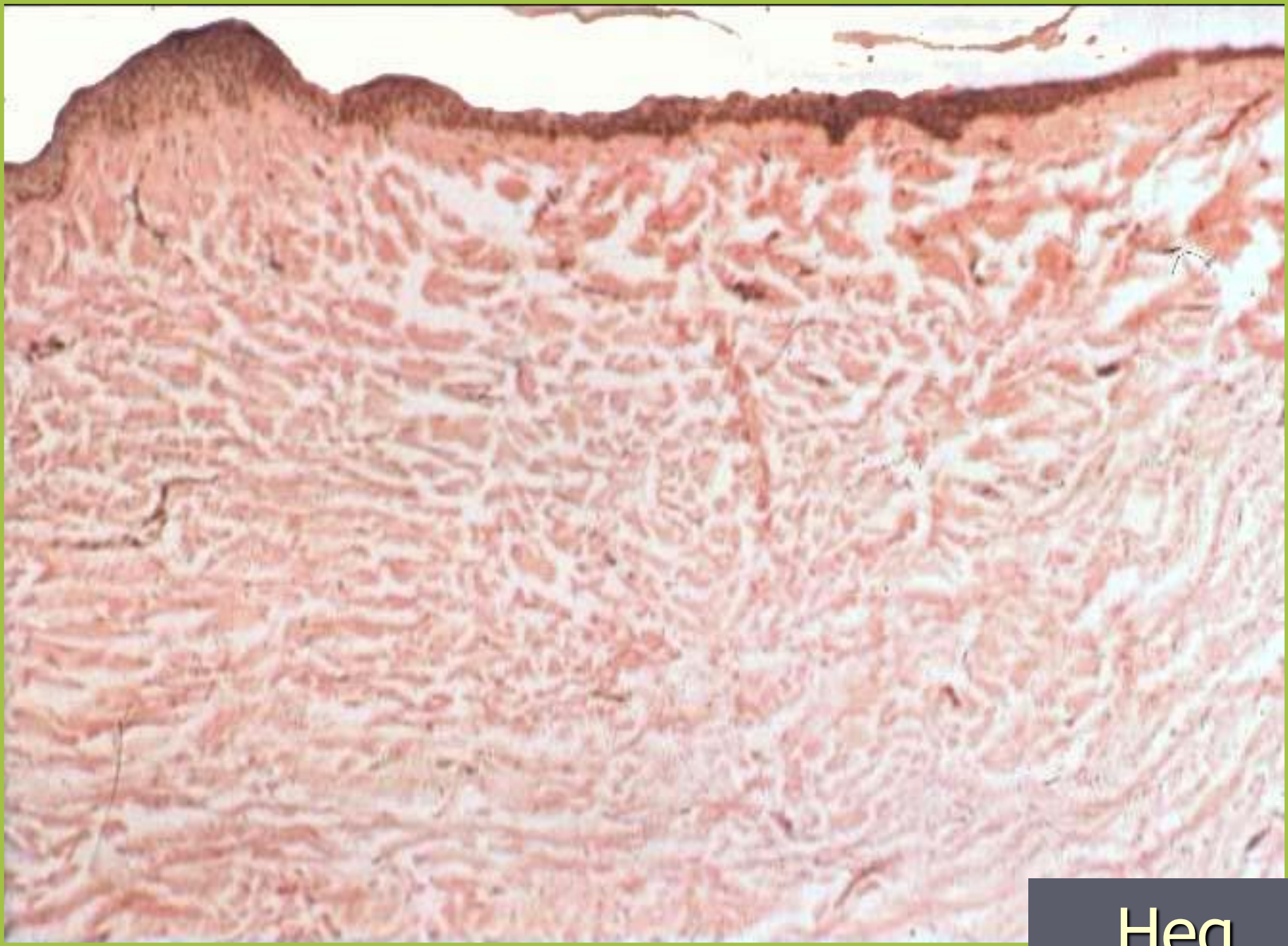


Heg - fibroblast



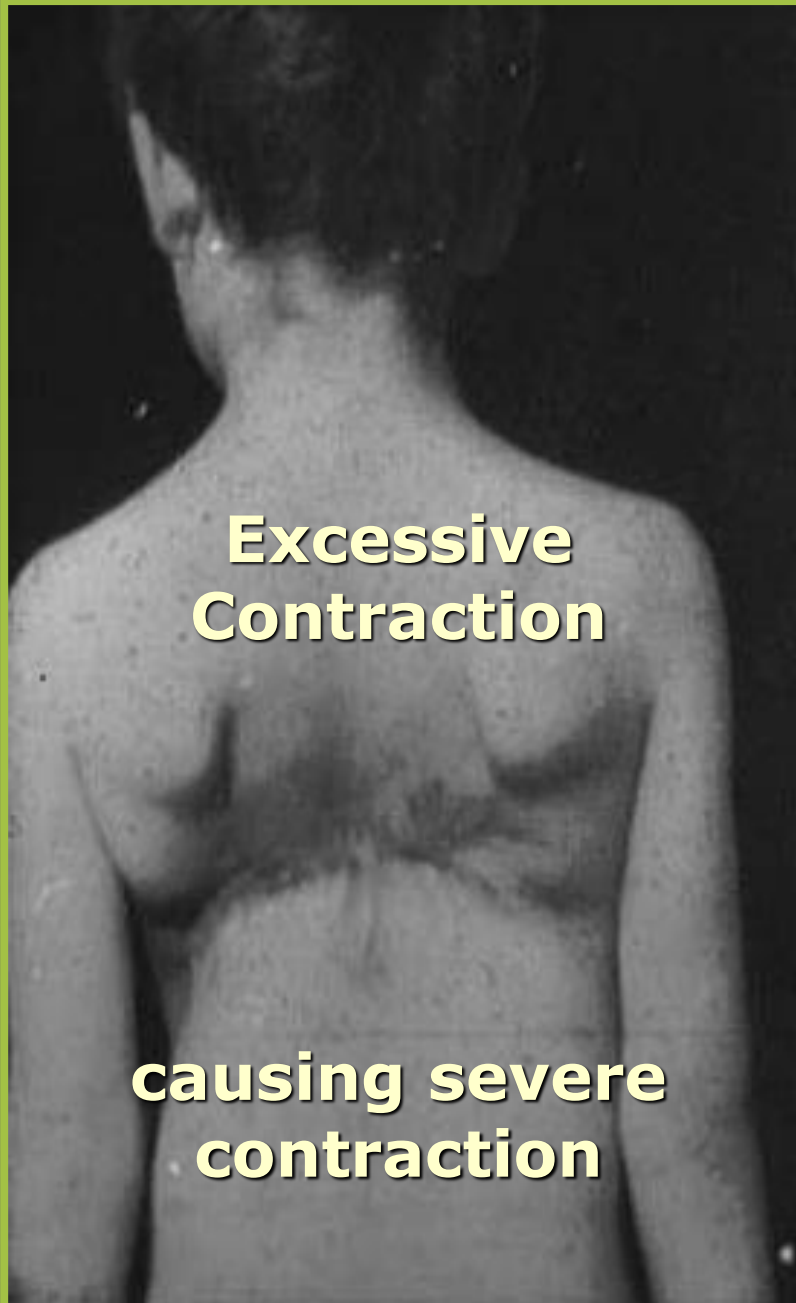


Fibroblast - TEM



Heg





**Excessive  
Contraction**

**causing severe  
contraction**



**After correction**

# *Sebgyógyulást befolyásoló tényezők*

## *helyi*

**Típus, méret, lokalizáció**

sebészi, tramás

**vérellátás**

arc, láb

**Infectio**

késedelmes, deformáló heg

**Irradiatio**

gátolt regenerációs képesség

**UV besugárzás**

fokozott proliferáció



# *Sebgyógyulást befolyásoló tényezők*

## ***Szisztémás hatások***

### **Kor**

cardiovascularis status

### **Metabolikus status**

diabetes      infectio  
hegszövettermelő képesség

### **Hormonok**

cortison, steroid,  
gátolja a hegképződést

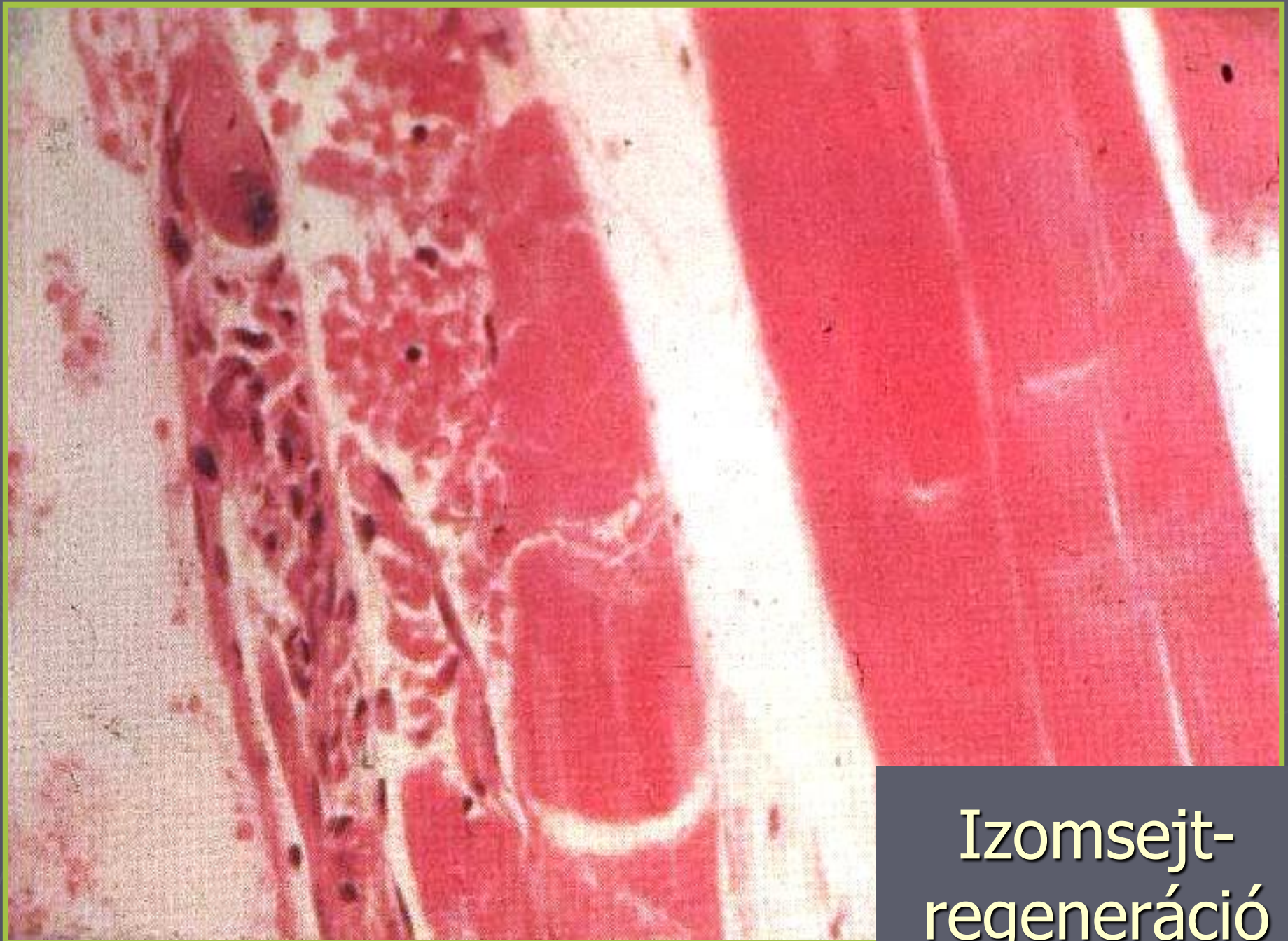
tiroxin  
oestrogen      indirekt hatások  
androgen



## ***KELOID***

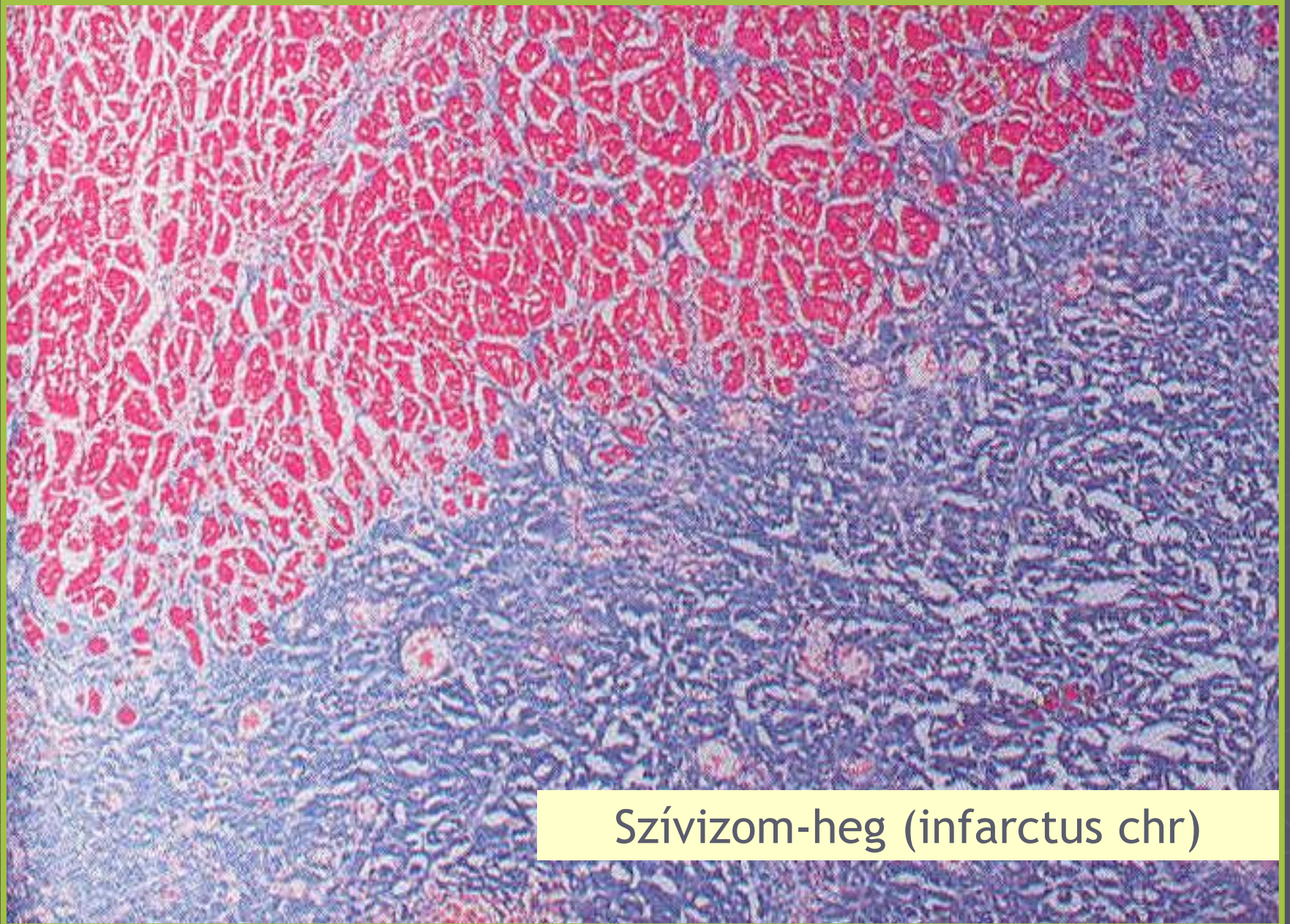
***A sebzés  
helyén  
excesszív  
hegszövet  
képződése***





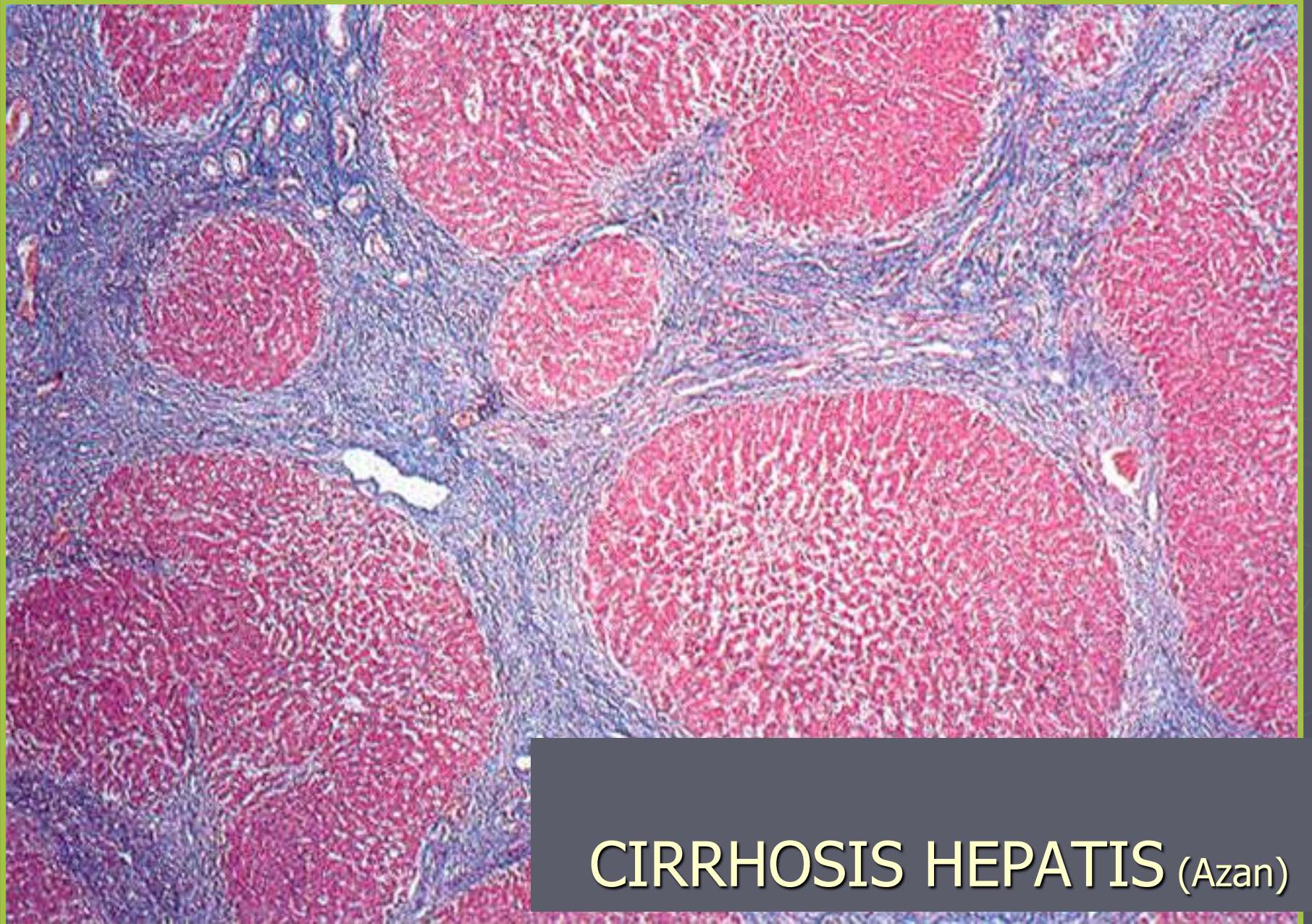
Izomsejt-  
regeneráció





Szívizom-heg (infarctus chr)





**CIRRHOSIS HEPATIS** (Azan)



# Csontregeneráció

