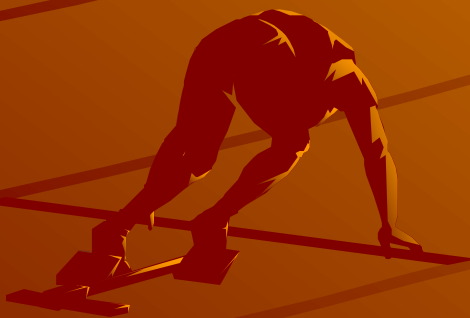


Pojivová tkáň

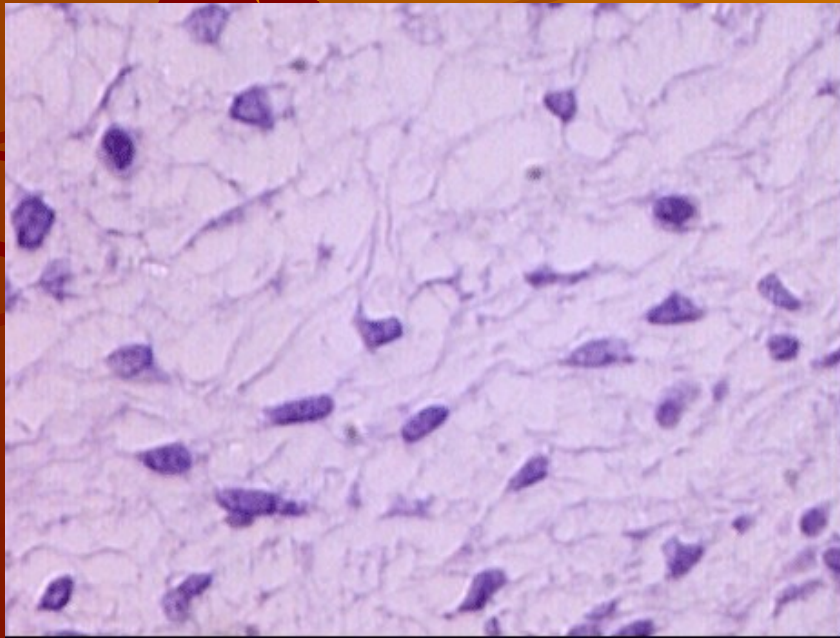
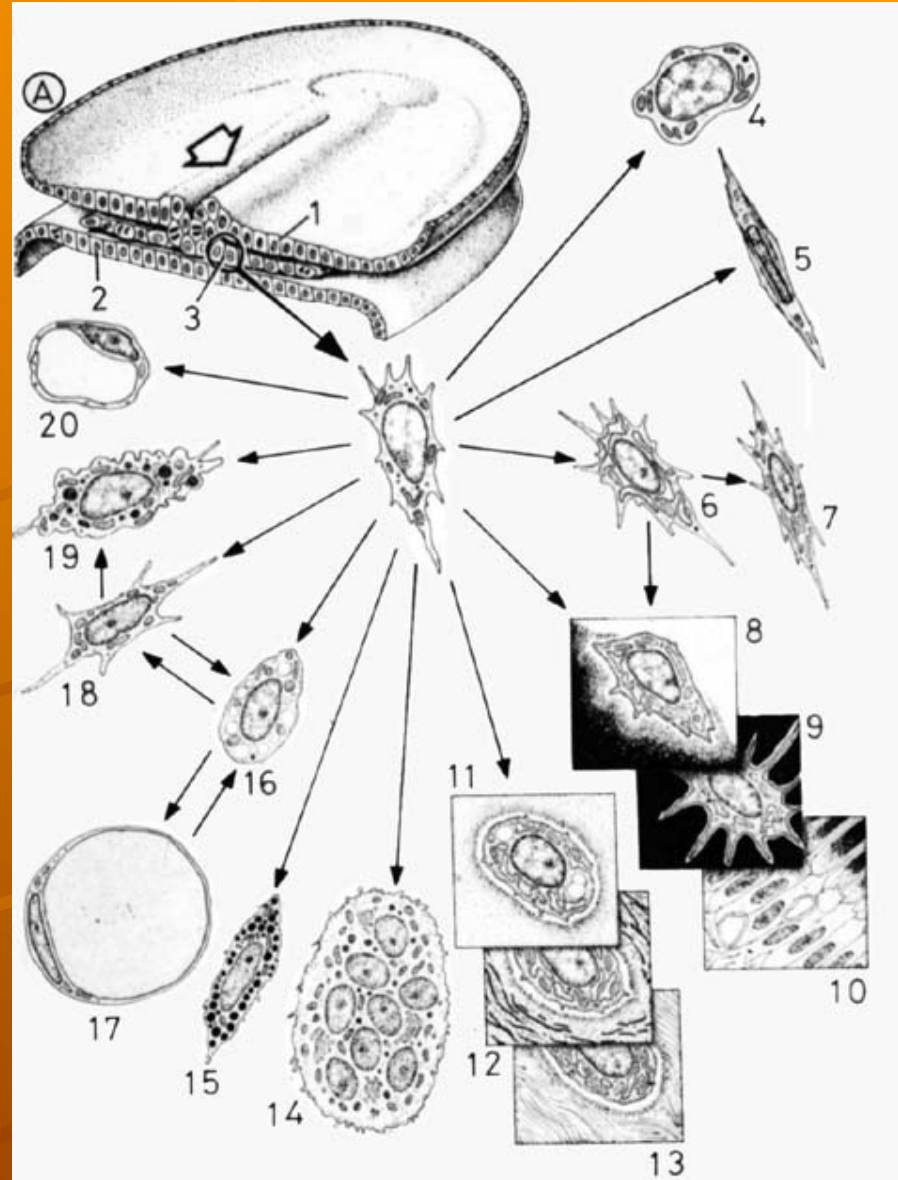
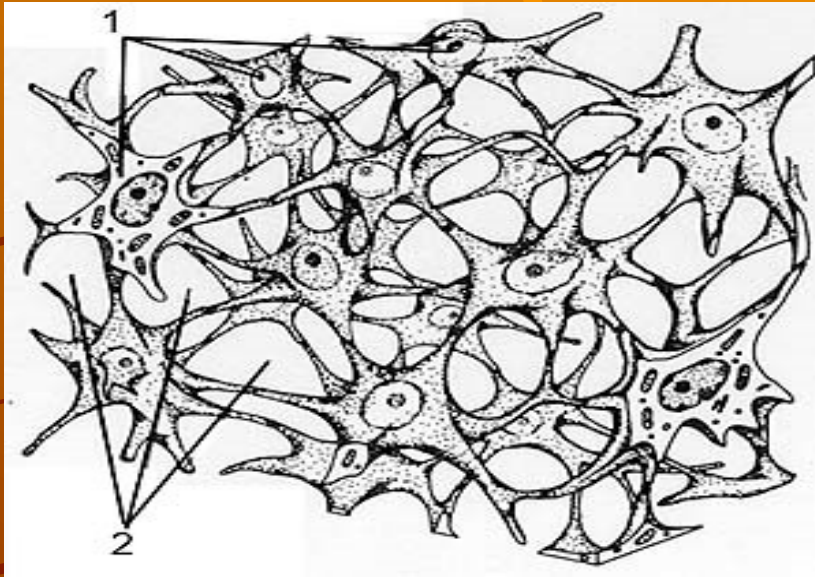
Vazivo

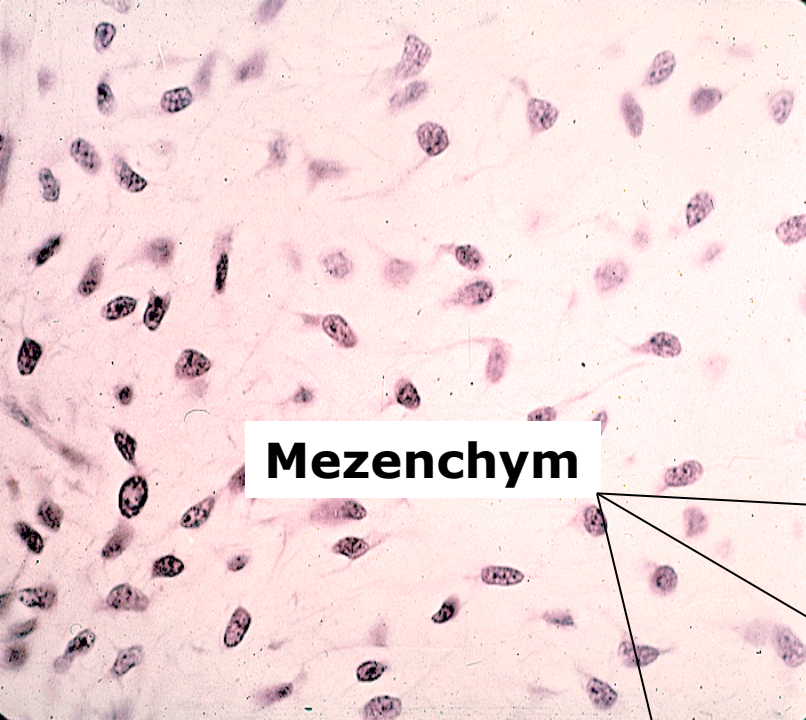
Chrupavka

Kost



Mezenchym





Mezenchym



Vazivo



Kost



Chrupavka

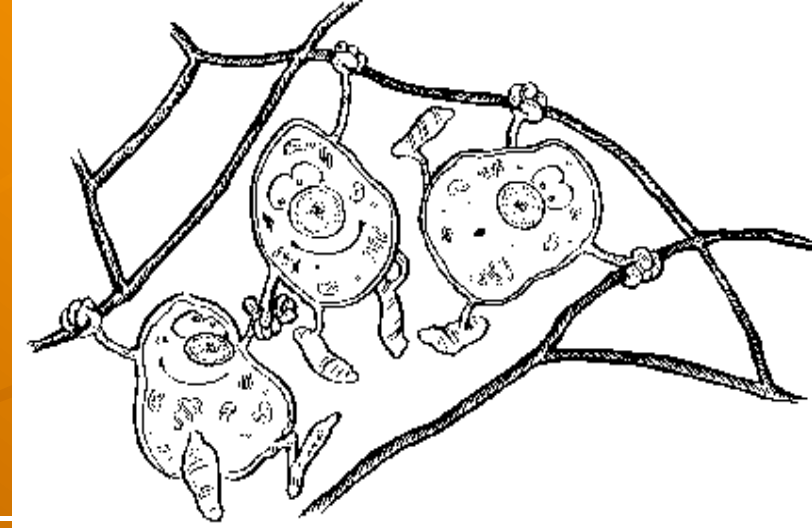
Původ a funkce

■ Původ – mezenchym

■ Funkce:

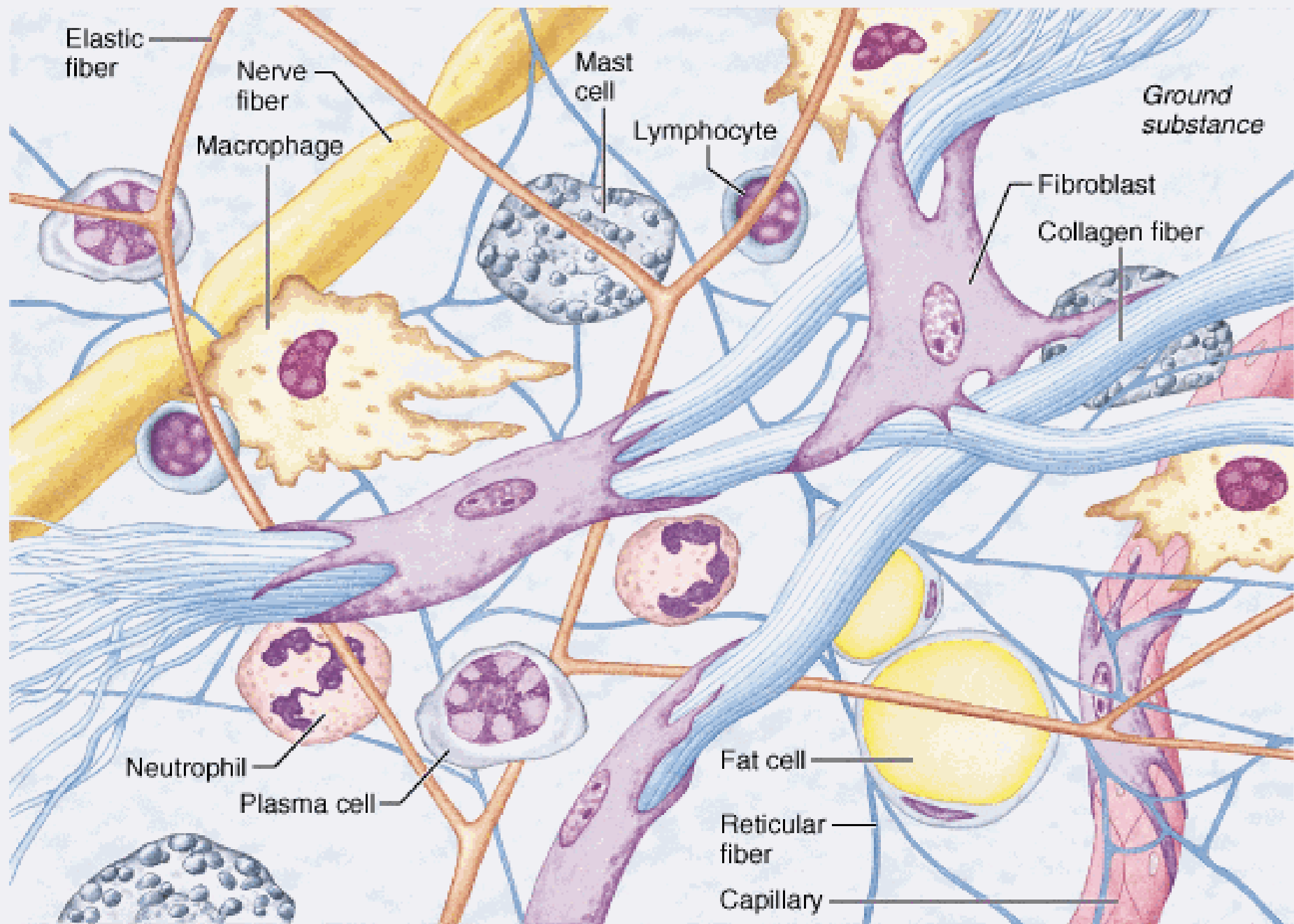
- **nutritivní** (krevní cévy, difuze živin)
- **protektivní** – imunokompetentní buňky a produkce protilátek
- **pojivová** – spojení tkání, výplň mezi orgány
- **mechanická** (podpůrná a mechanická ochrana orgánů)

VAZIVO



- ▣ Obecná stavba pojiv:
 - buňky (-blasty, -cyty)
 - mezibuněčná hmota

vlákna
základní (amorfní)
substance



Vazivo

■ Buňky

fixní
volné (bloudivé)

■ Vlákna

kolagenní
elastická
retikulární

■ Základní amorfní hmota



Buňky vaziva

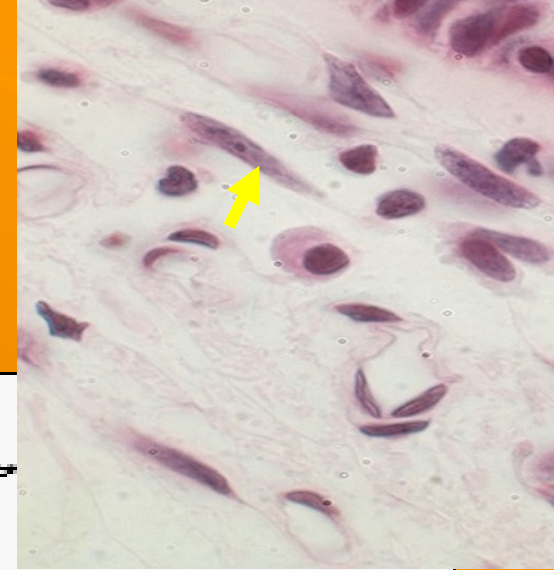
FIXNÍ

- ▣ Fibroblasty, fibrocyty
- ▣ Retikulární bb.
- ▣ Tukové bb.
- ▣ Pigmentové bb.
- ▣ Nediferencované bb.

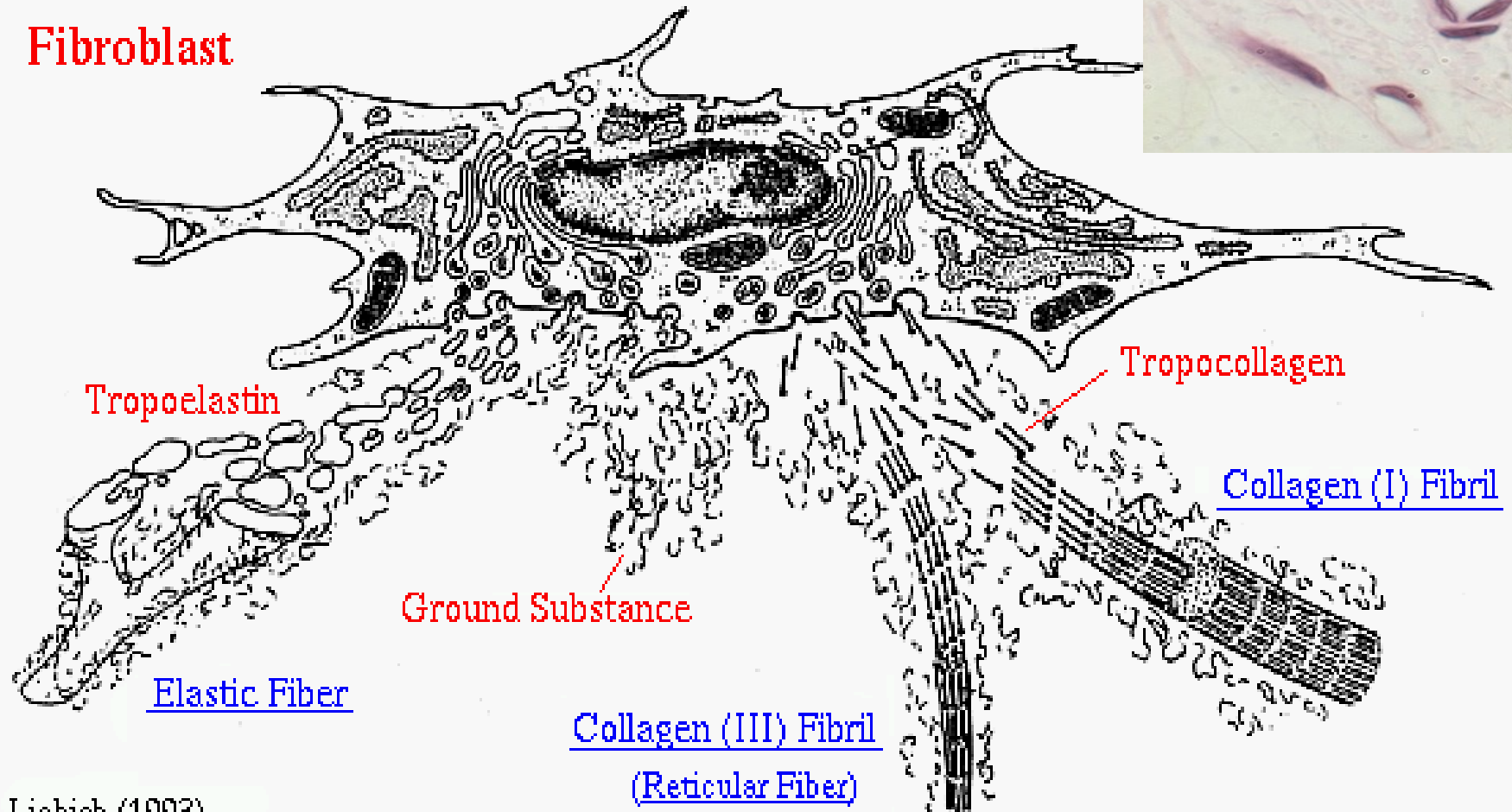
MOBILNÍ BUŇKY

- ▣ Histiocyty
▣ Makrofágy (z monocytů)
- ▣ Žírné bb.
(heparinocyty)
- ▣ Plazmatické bb. (z B-lymfocytů)
- ▣ Leukocyty

Fibroblasty, fibrocyty



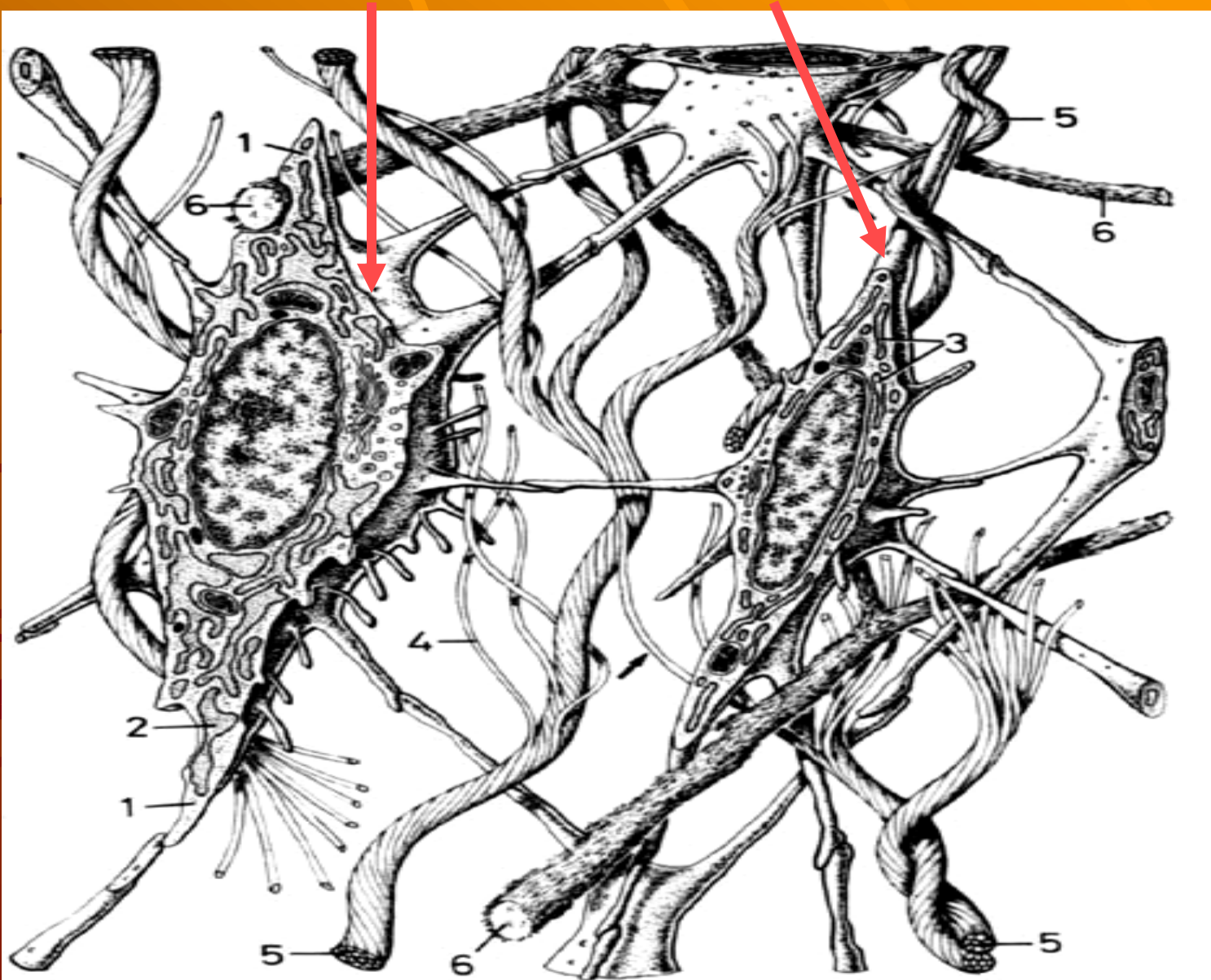
Fibroblast



Liebich (1993)

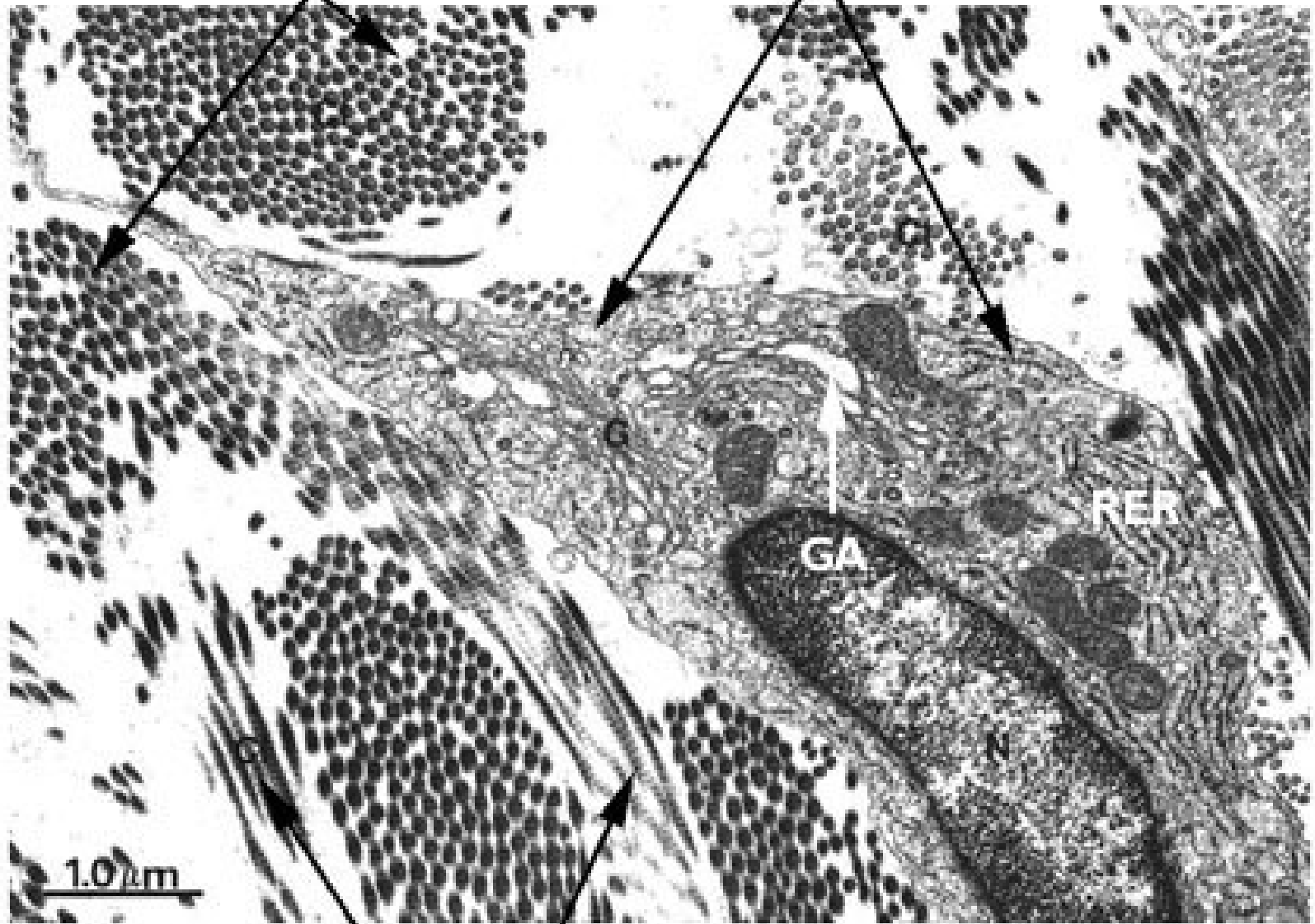
Fibroblast

Fibrocyte



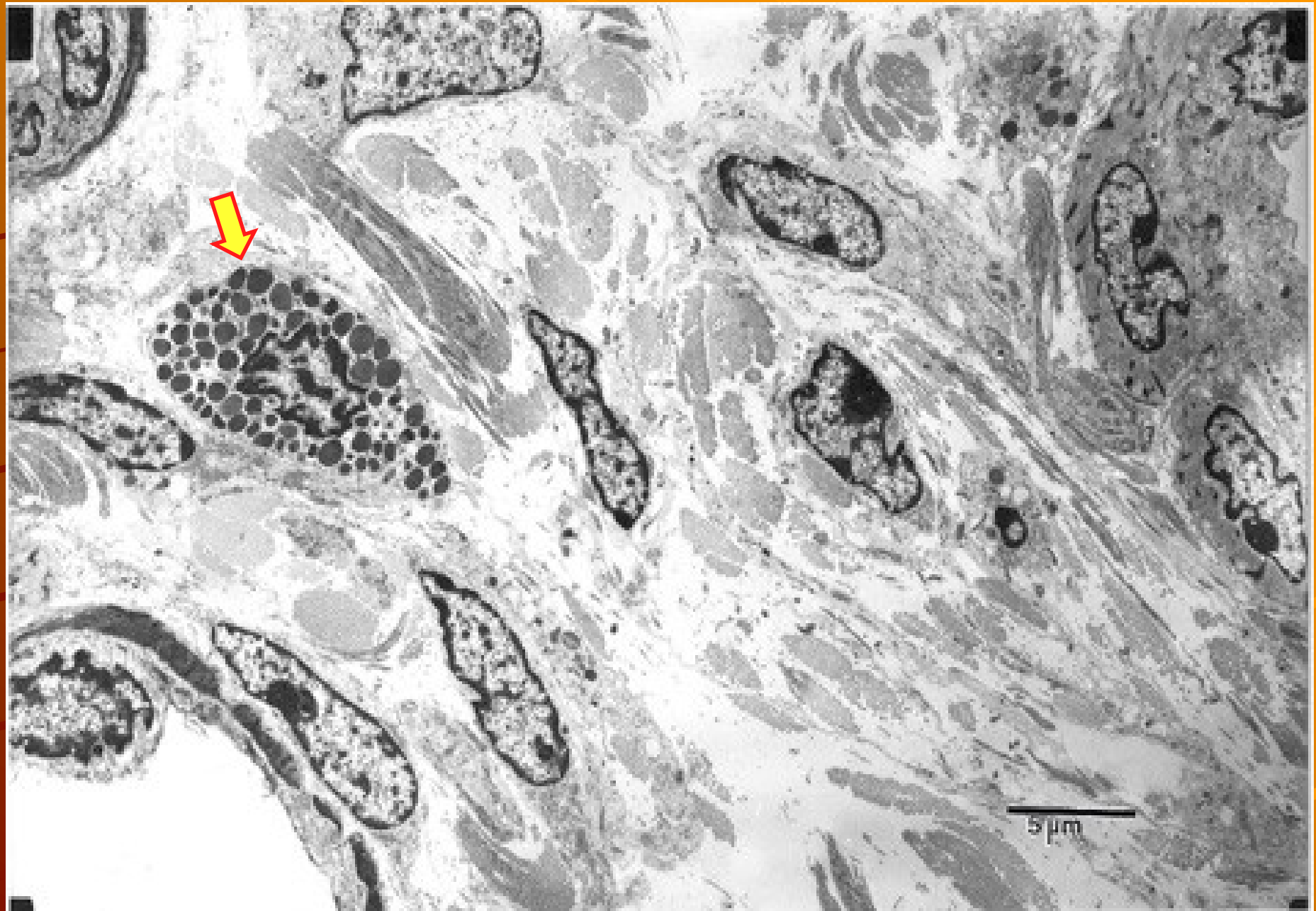
**Collagen fibers in
cross-section**

Fibroblast in active state

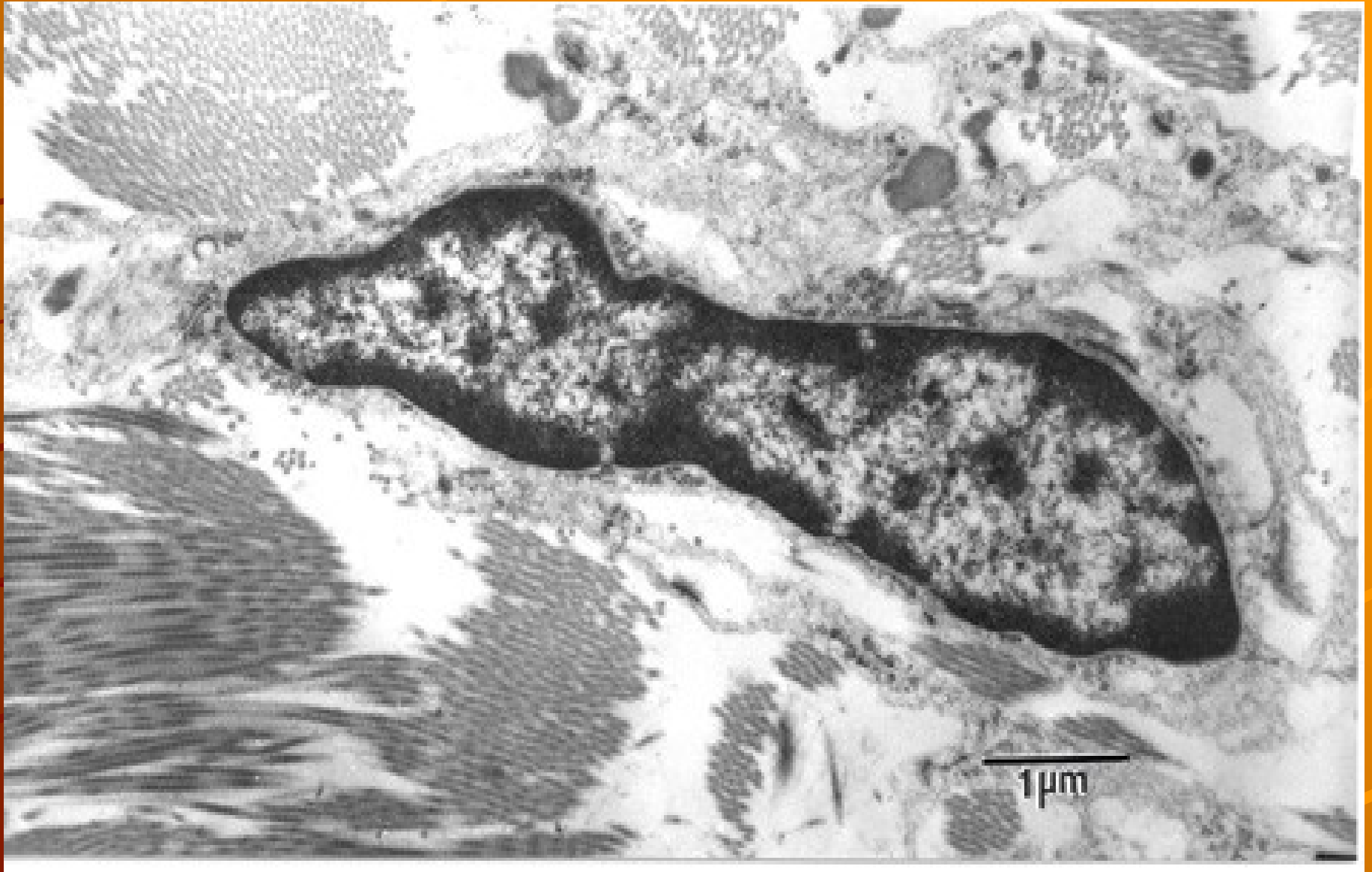


**Collagen fibers in
longitudinal section**

Fibroblasty a žírná buňka

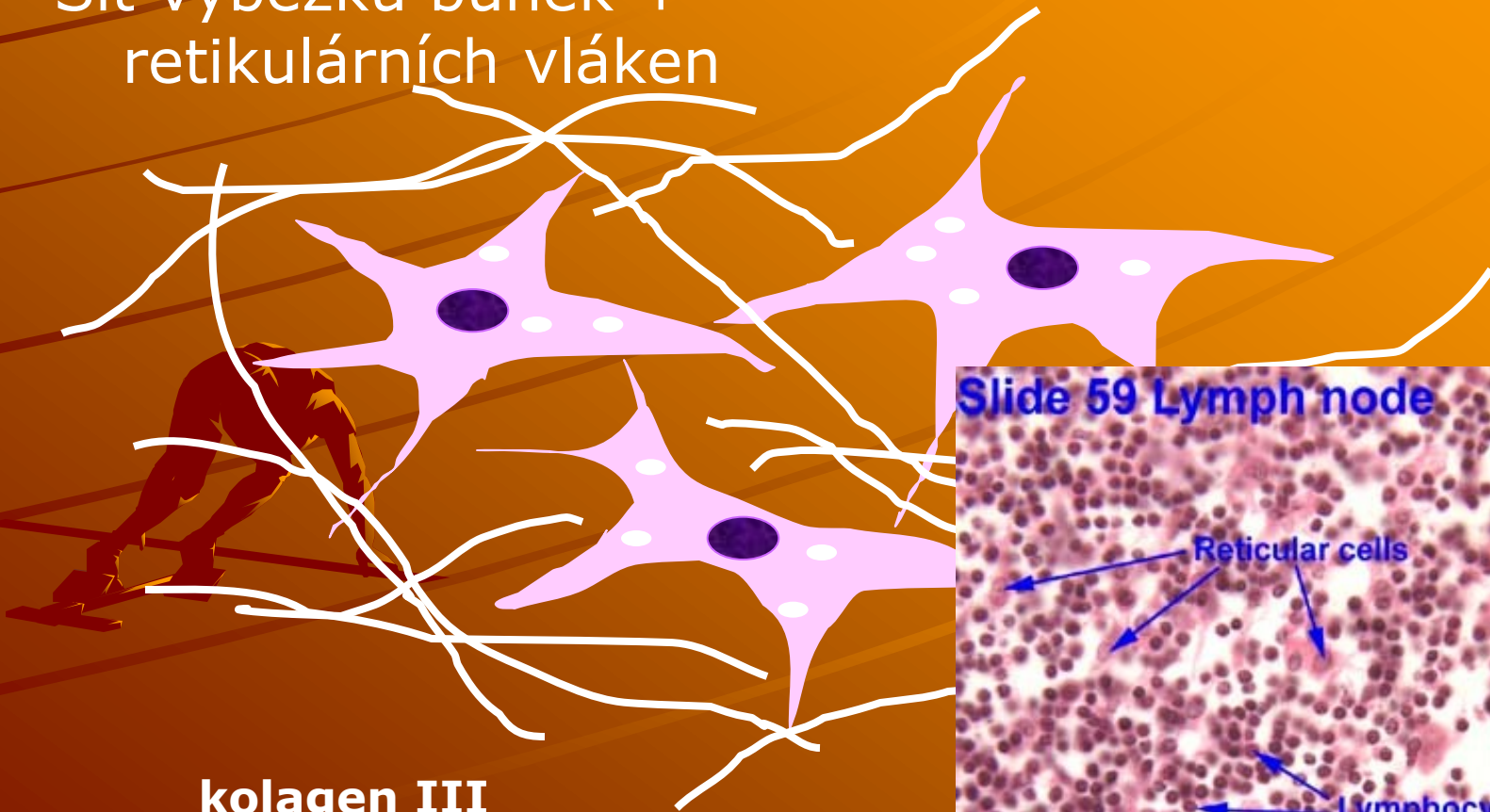


Fibroblast



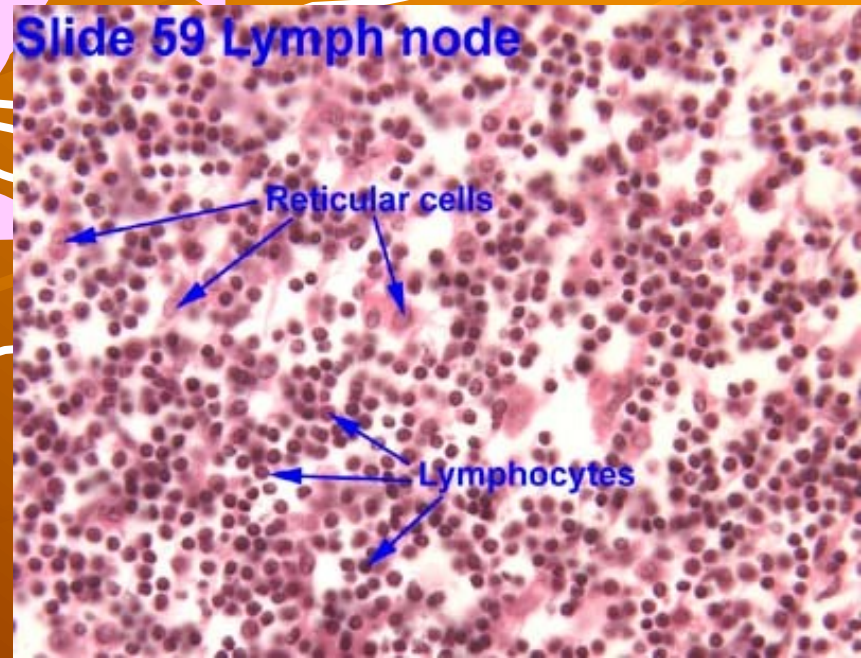
Retikulární buňka

Sít výběžků buněk +
retikulárních vláken



kolagen III

Slide 59 Lymph node

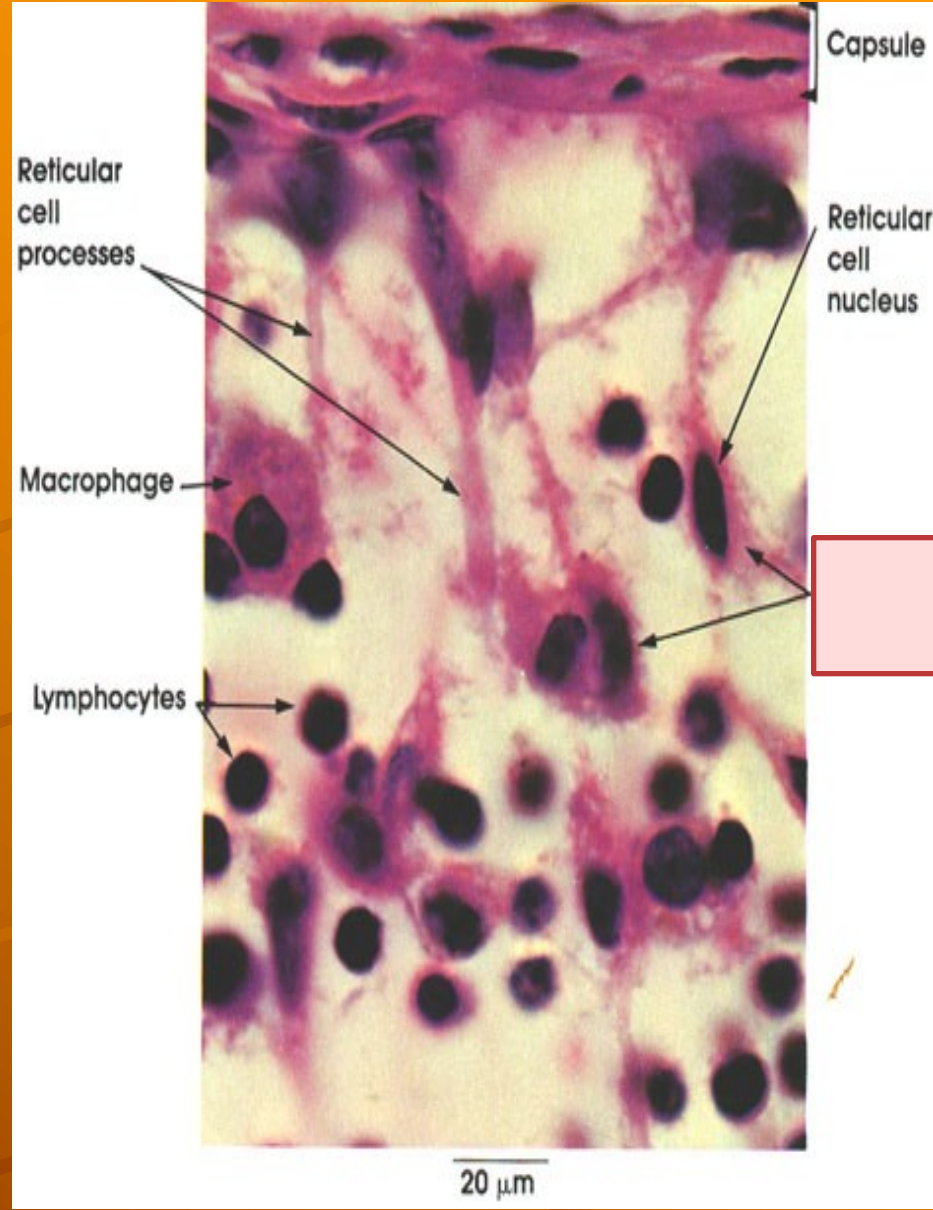


H&E - subcapsular sinus



macrophages

reticular cells



Capsule

Reticular cell nucleus

Reticular cell processes

Macrophage

Lymphocytes

20 μ m

Tukové buňky

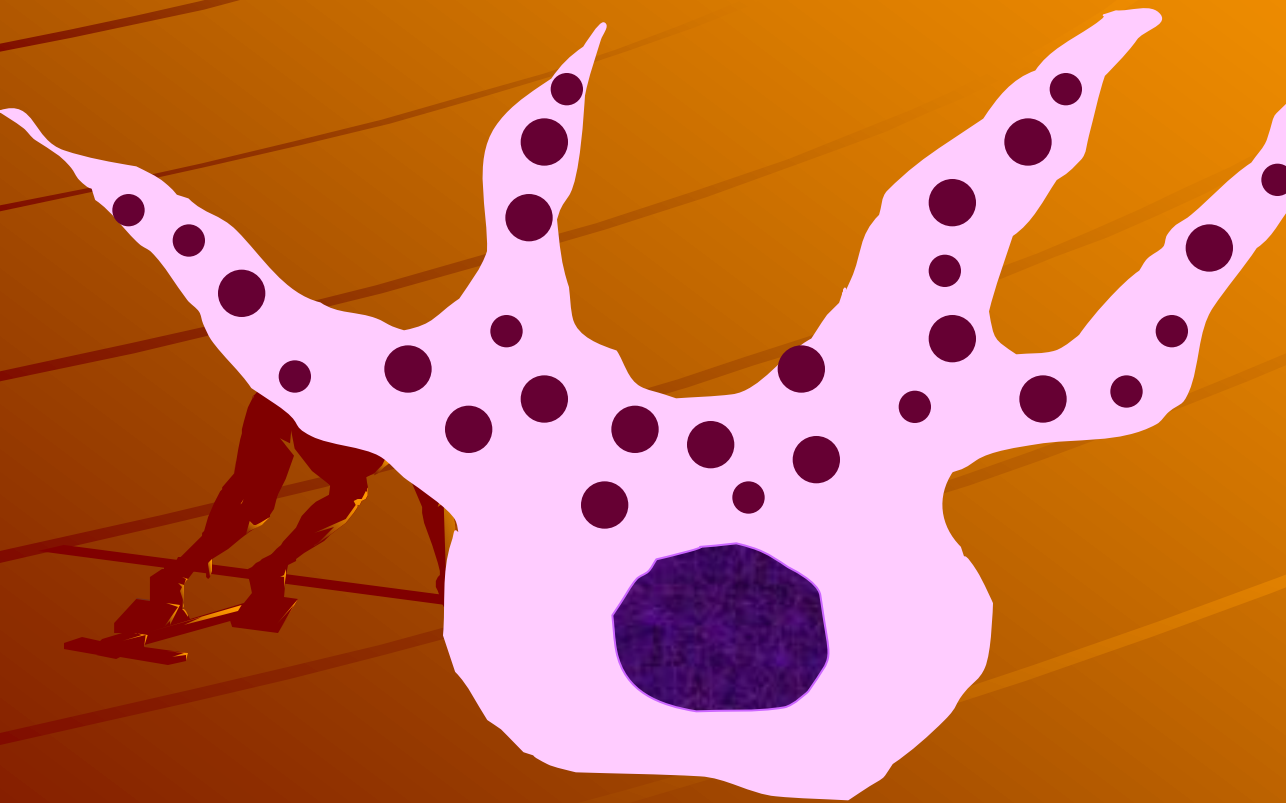
univakuolární
(bílá tuk. tkáň)

multivakuolární
(hnědá tuk. tkáň)

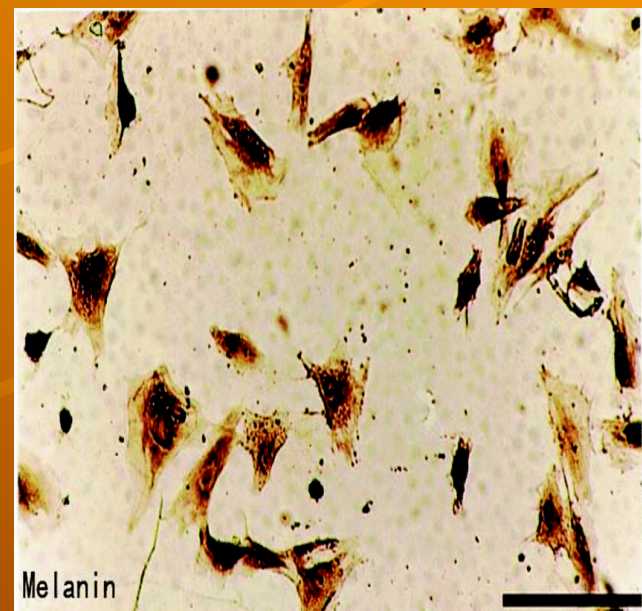
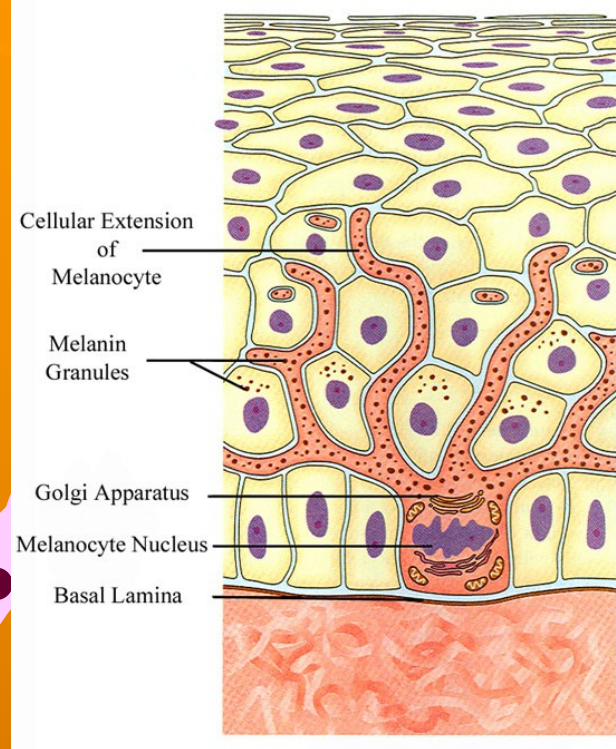


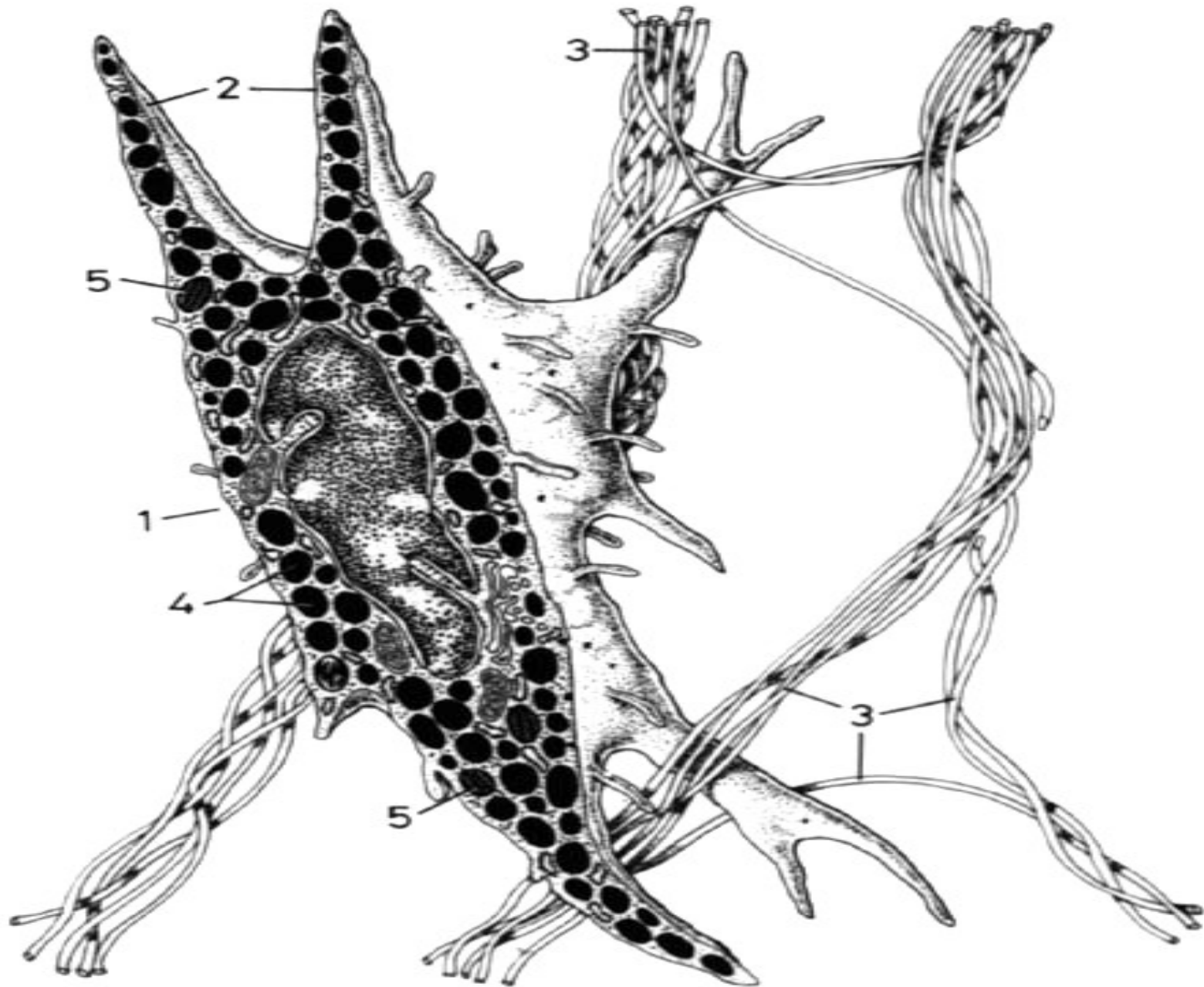
Lipidové kapky

Pigmentové buňky



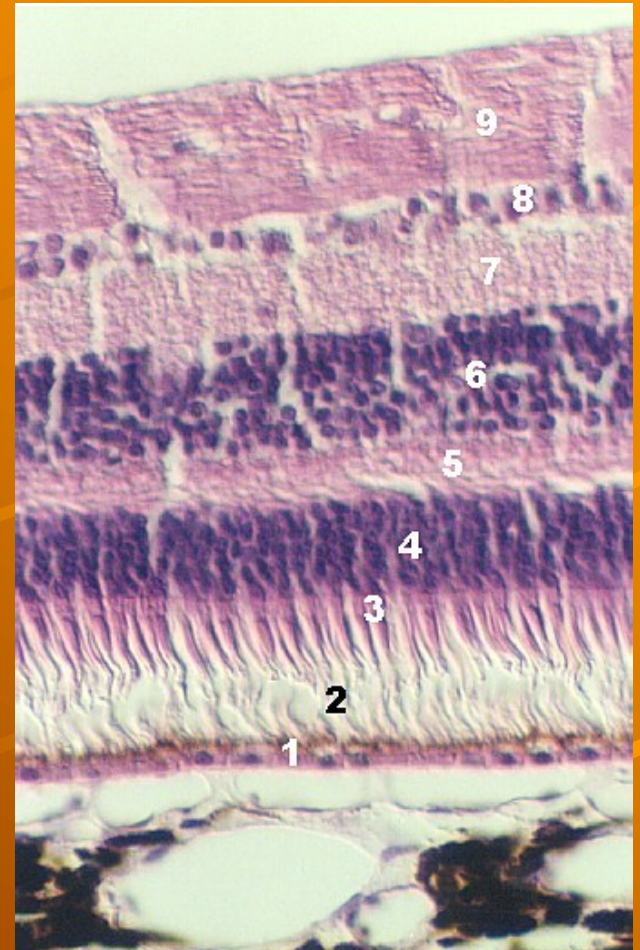
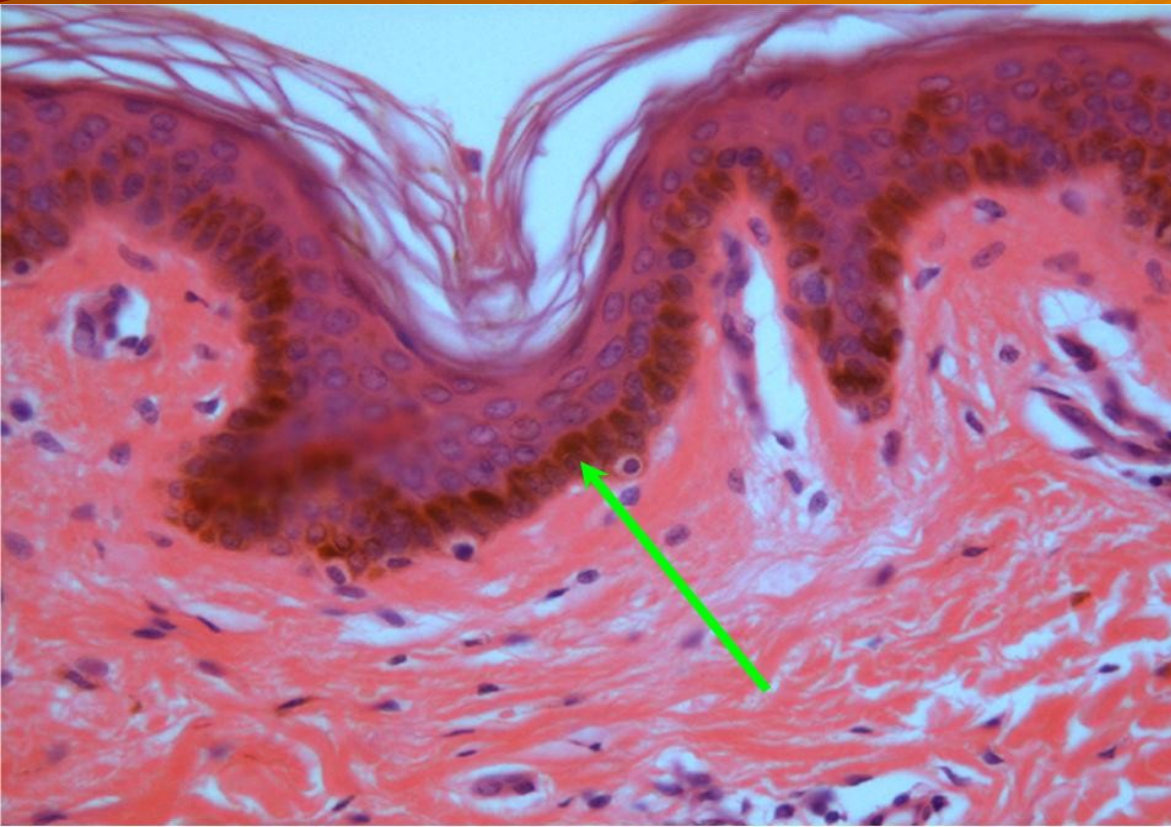
neuroektodermový původ





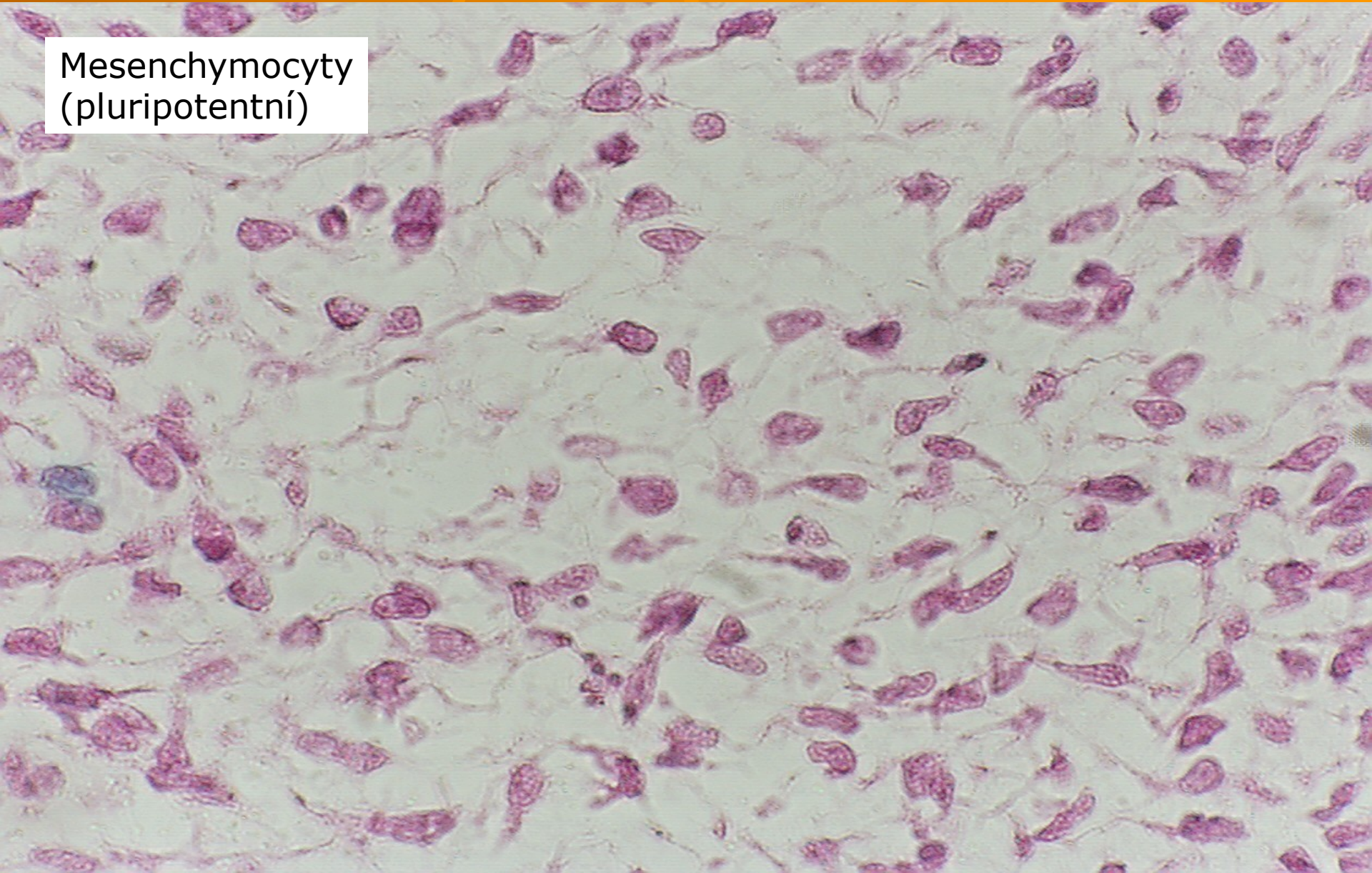
Pigmentové buňky

- ☒ Melanocyty s melanosomy
- ☒ Neuroektodermového původu
- ☒ Duhovka, cévnatka...



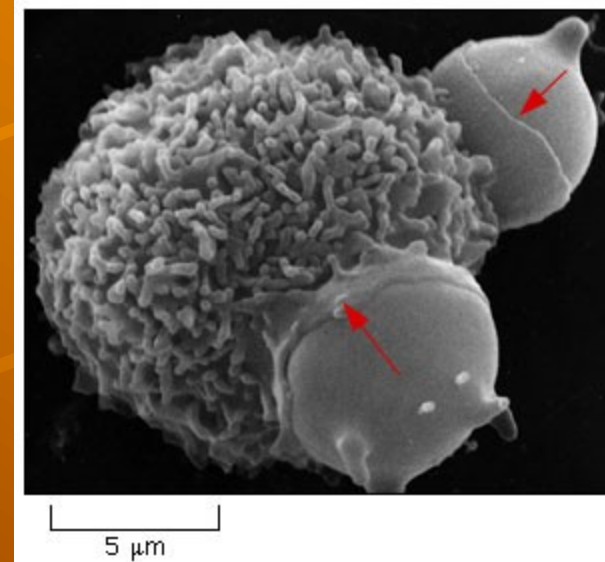
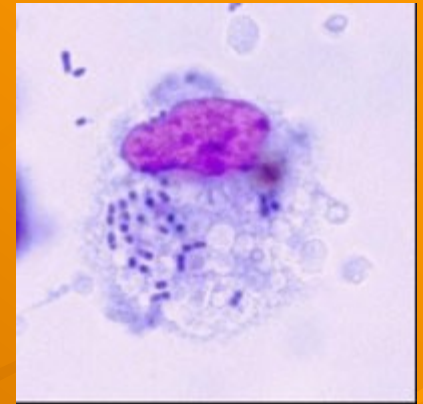
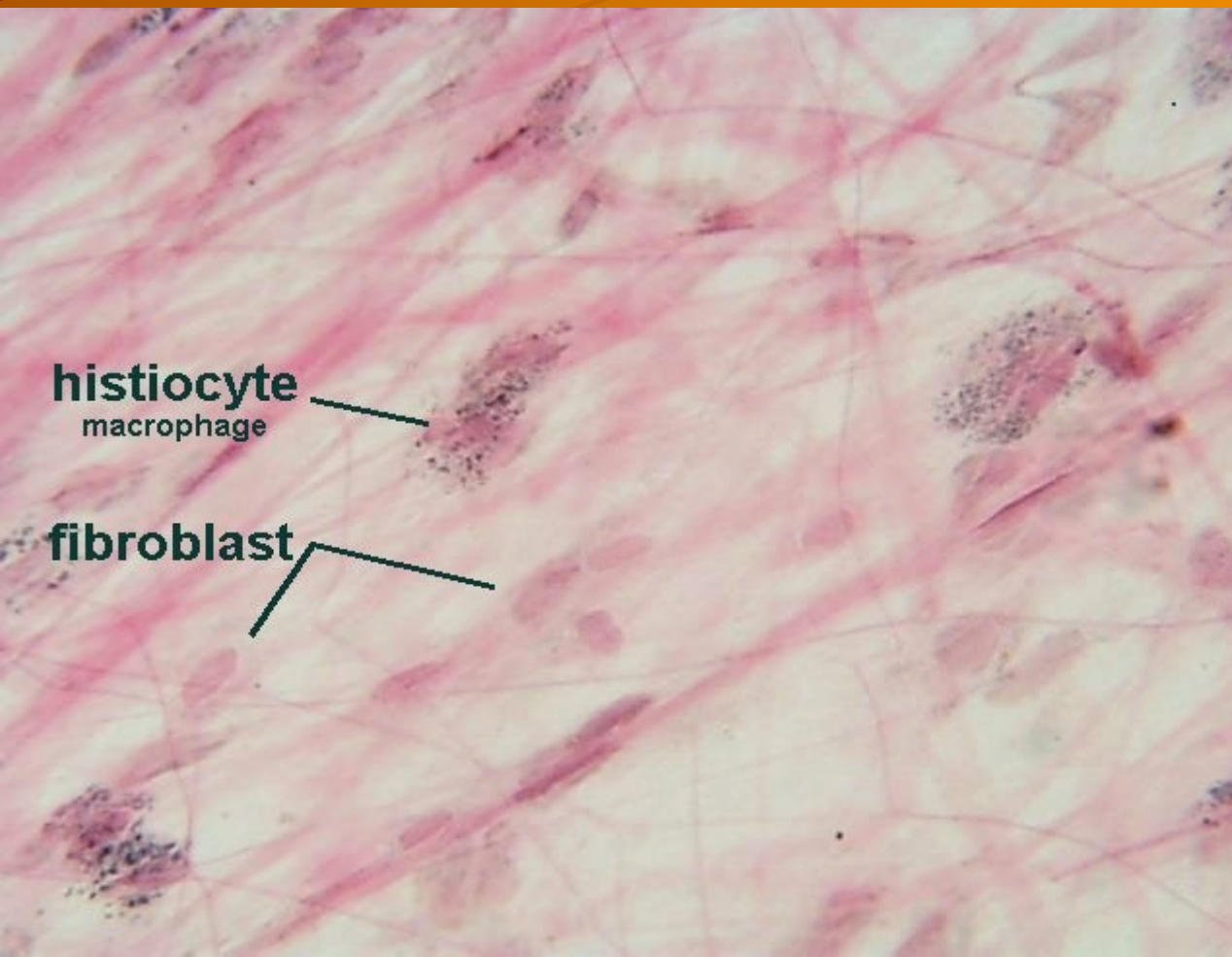
Mezenchymové buňky

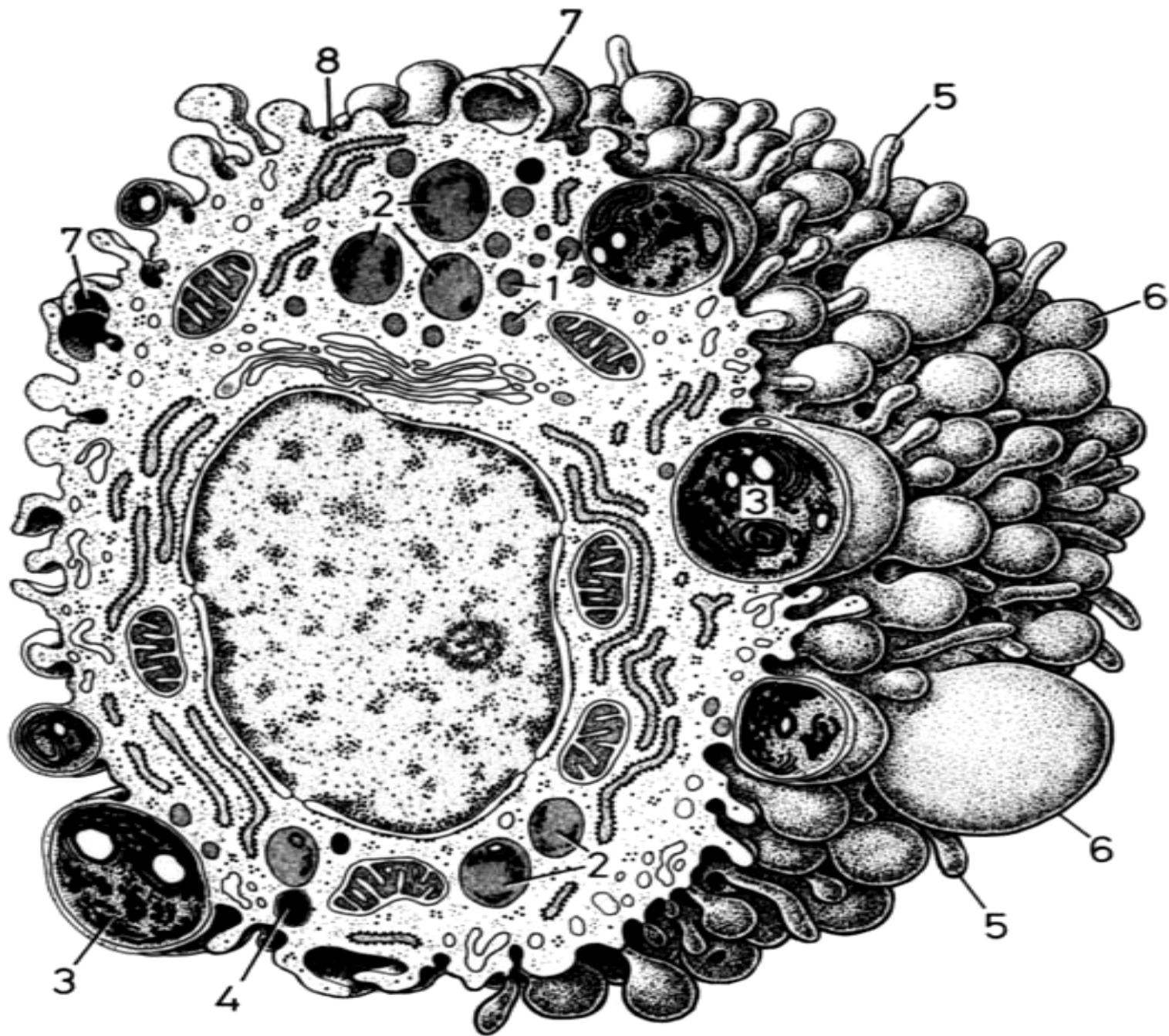
Mesenchymocyty
(pluripotentní)

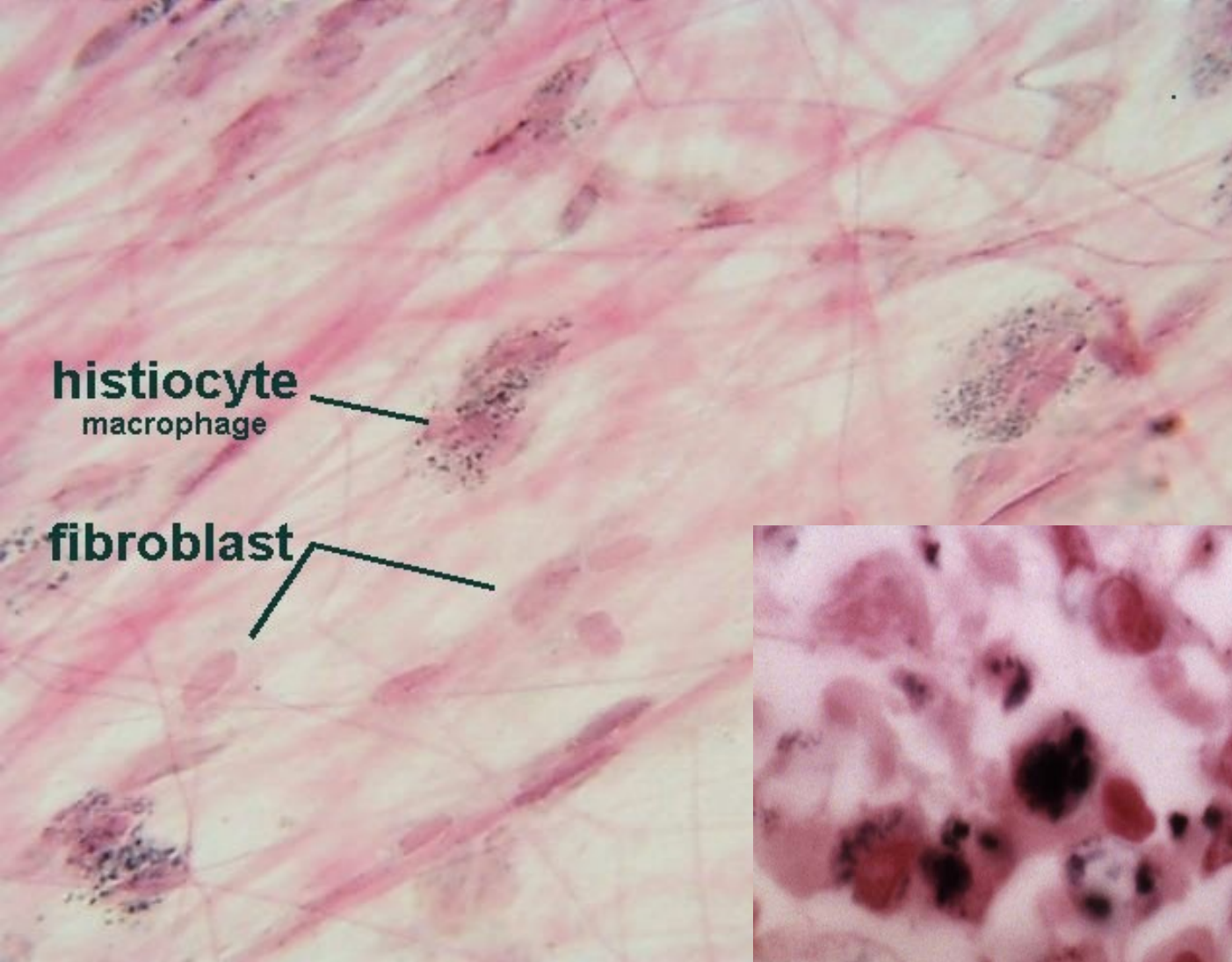


Histiocyty \Rightarrow makrofágy (monocyto-makrofágový systém)

fagocytóza

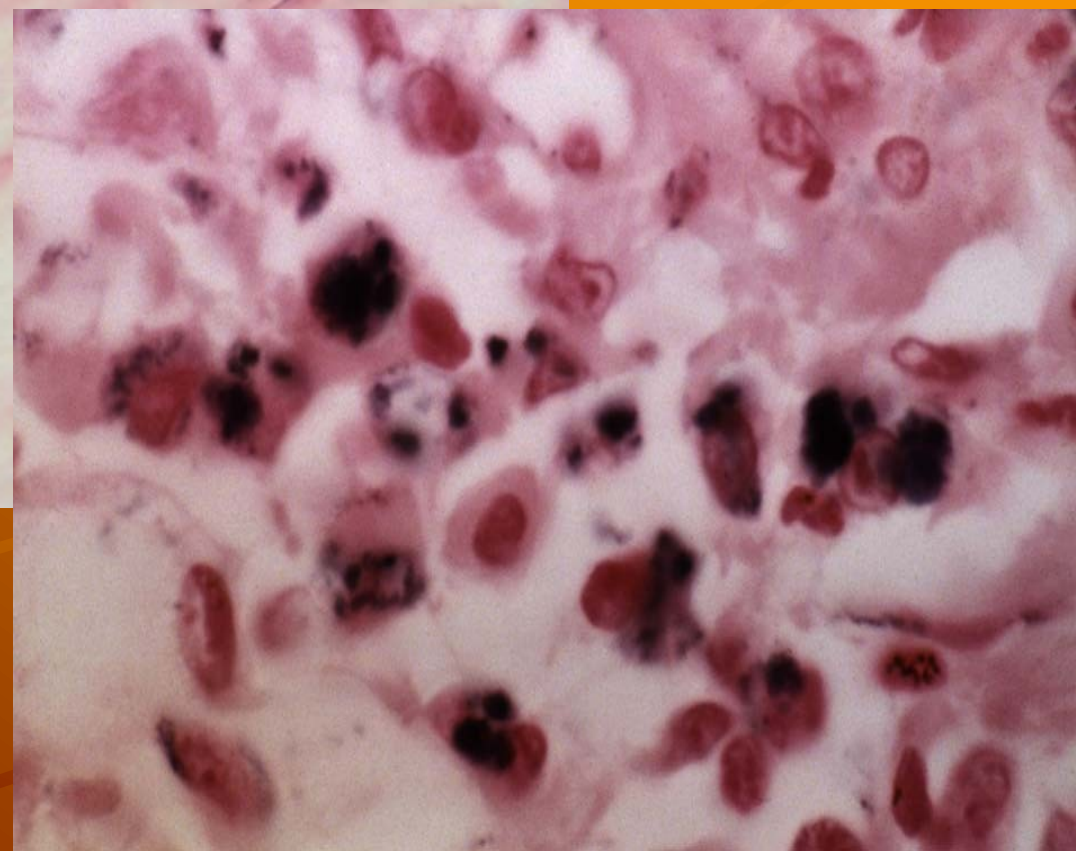




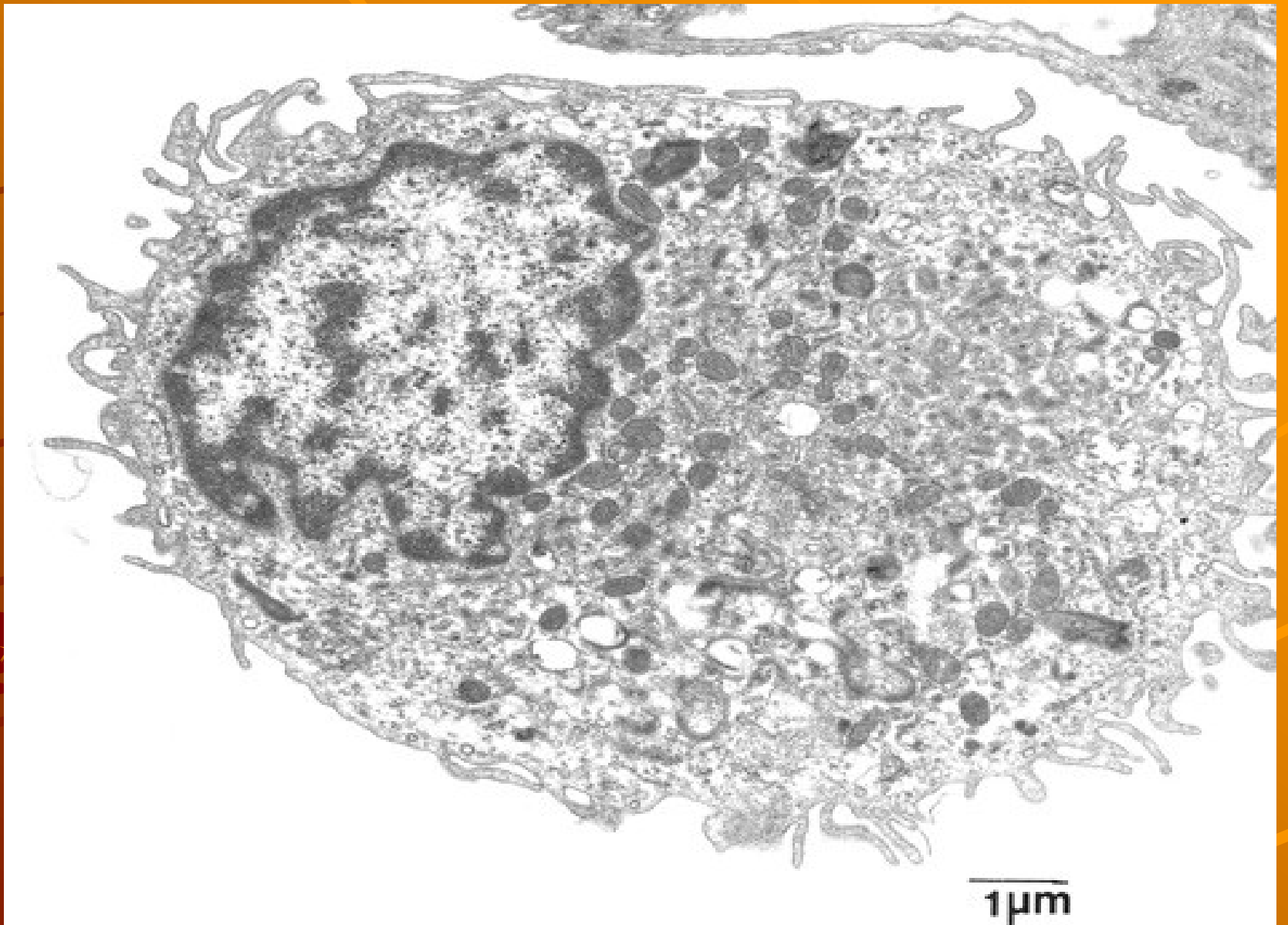


histiocyte
macrophage

fibroblast

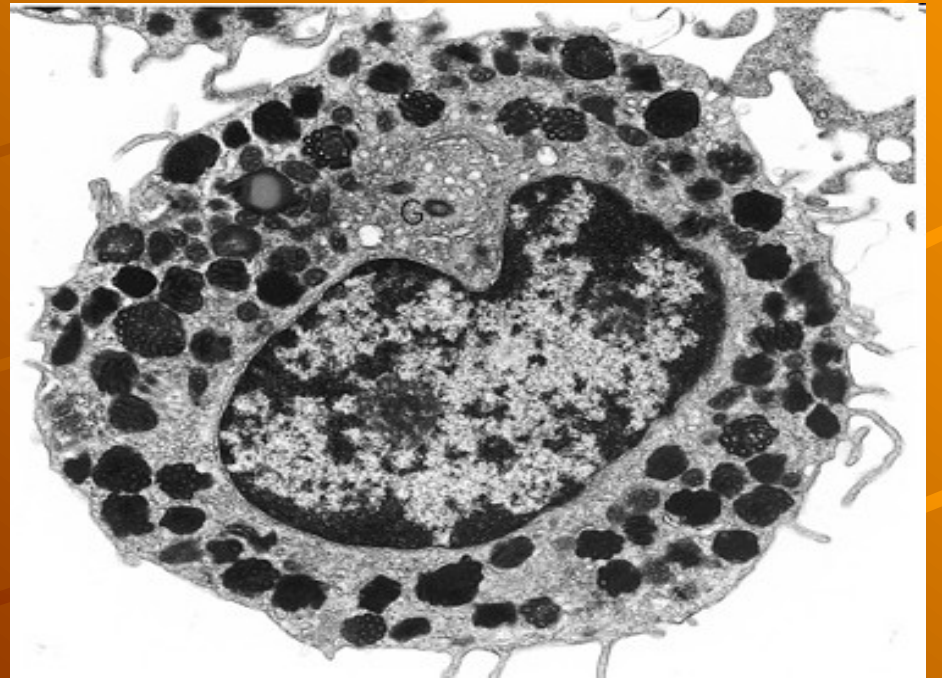


Makrofág (plíce)

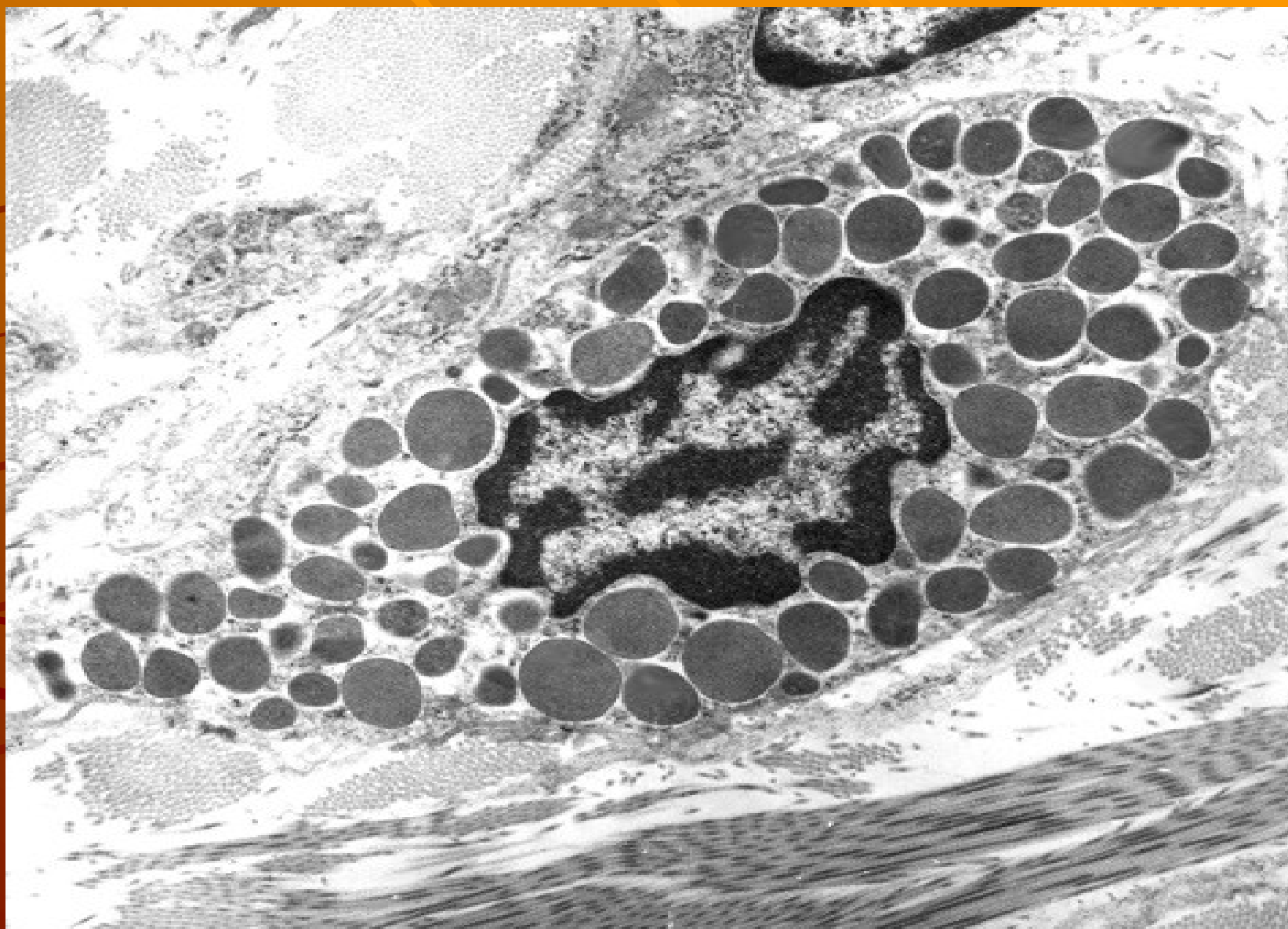


Žírné buňky

heparin, histamin
– mediatory zánětu



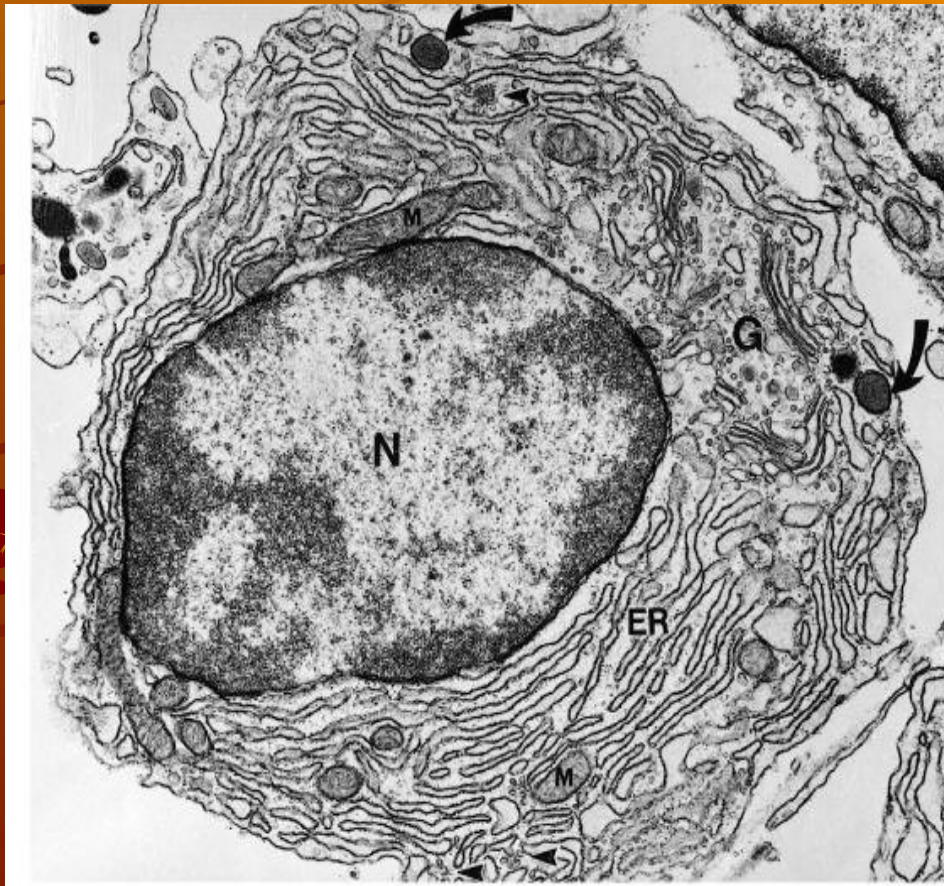
Žírná buňka

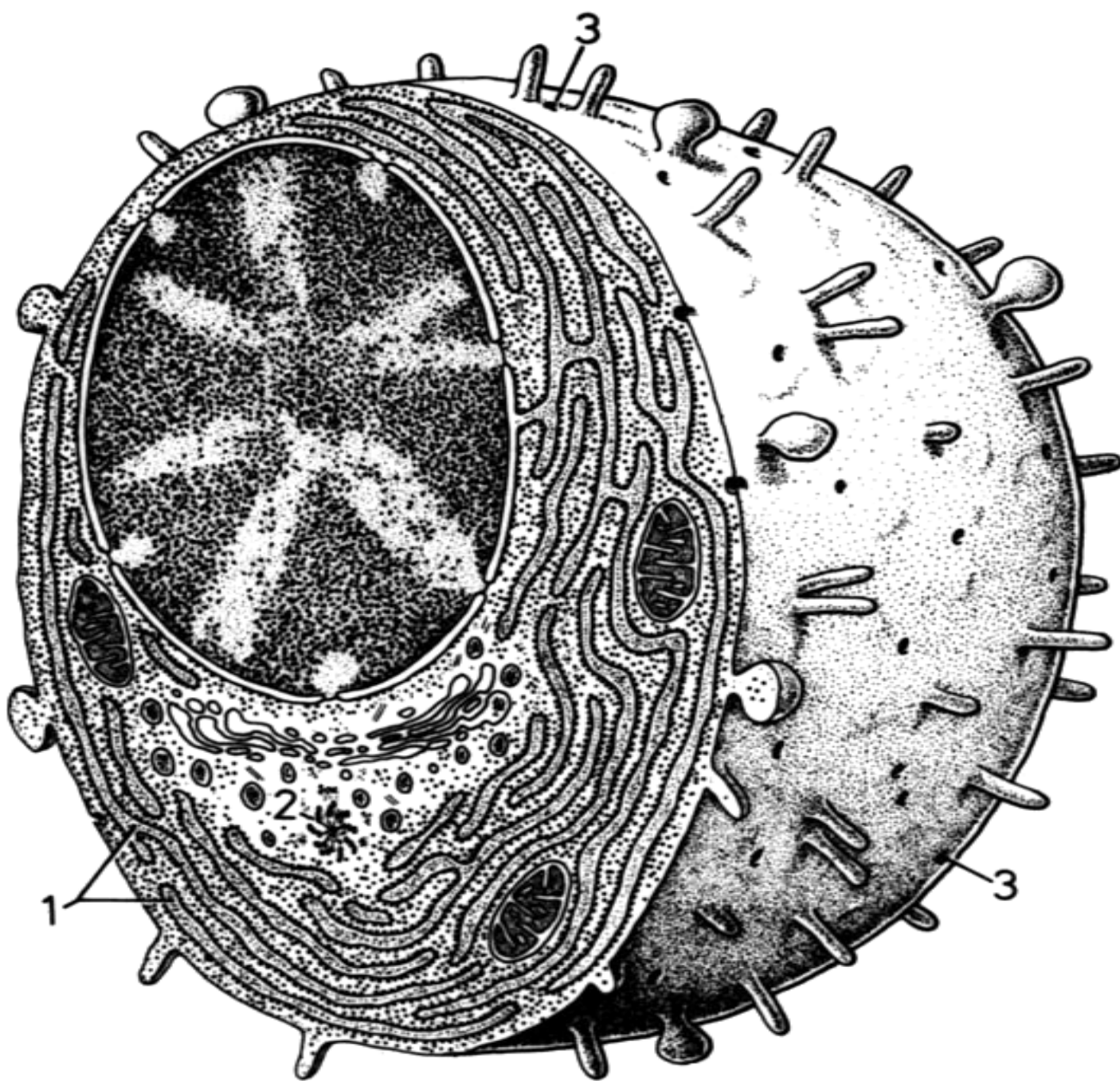


Plazmatické buňky

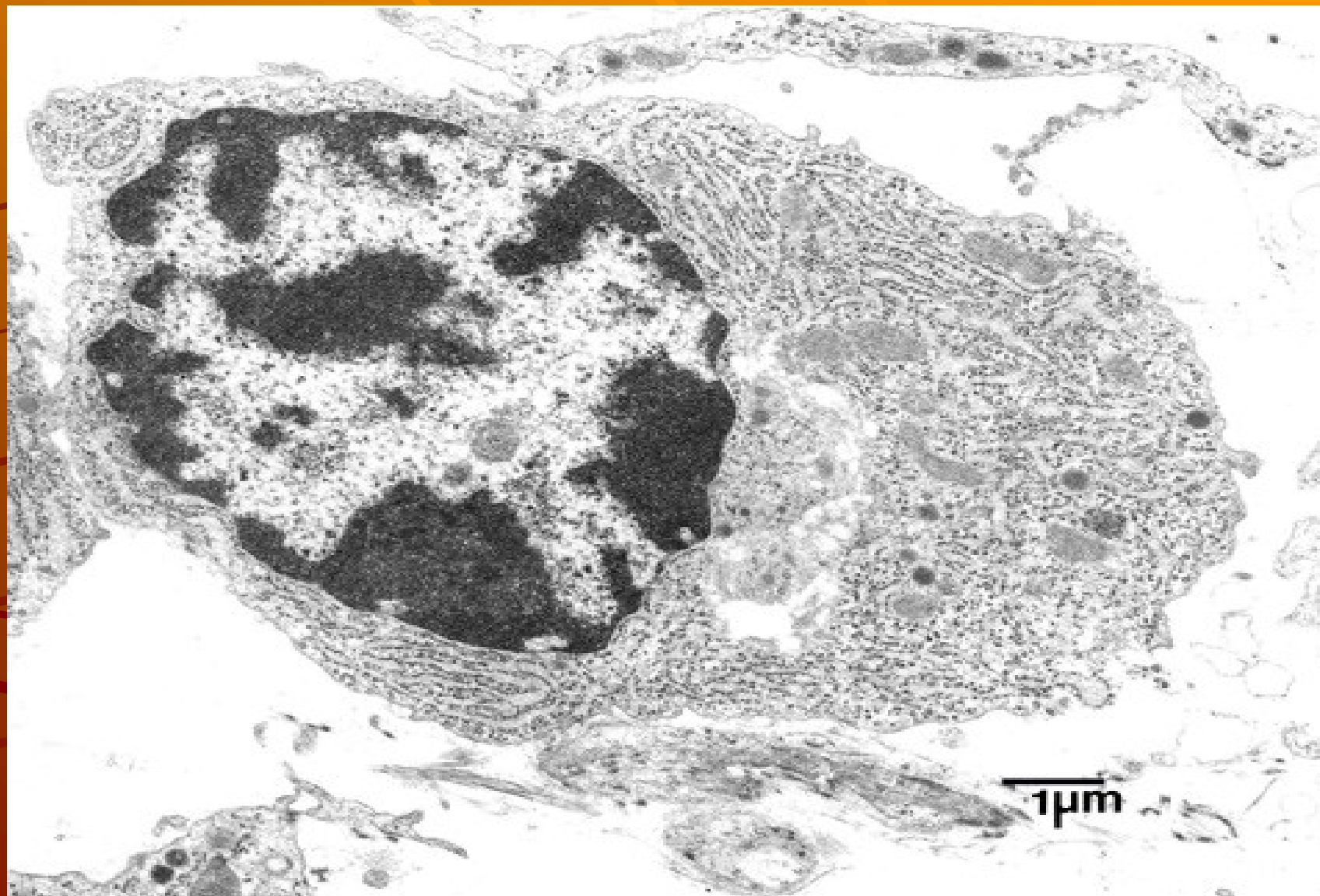
(vznikají z B-lymfocytů)

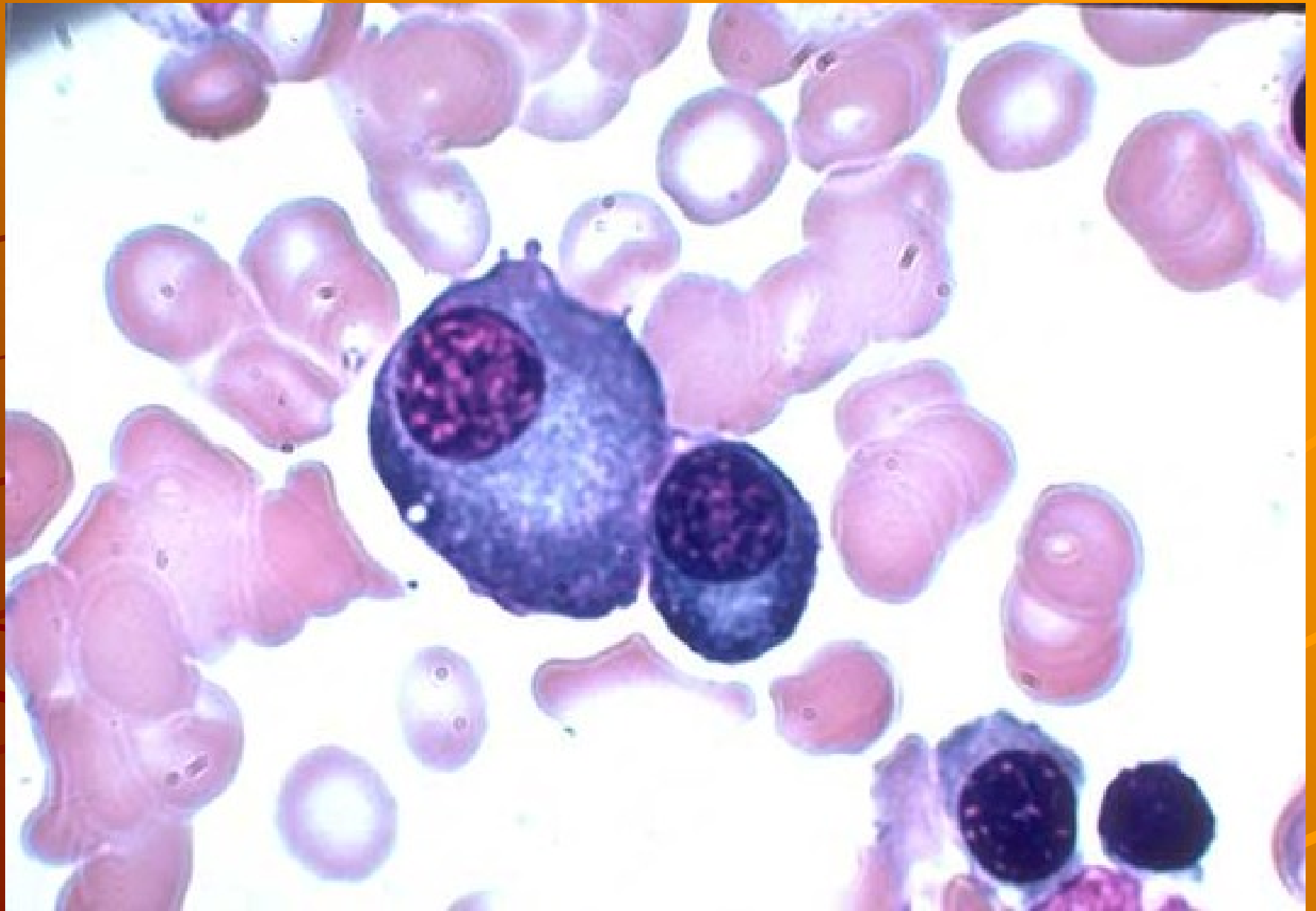
Tvoří protilátky (imunoglobuliny)





Plazmatická buňka





Základní amorfní substance

Homogenní, bezbarvá, transparentní, rosolovitá

 **glykosaminoglykany** (kys.hyaluronová, chondroitinsulfát, dermatansulfát, keratansulfát, heparansulfát)

 **proteoglykany** (syndecan, fibroglycan, agrecan)

 **glykoproteiny** (fibronektin, laminin, chondronektin, osteonektin, osteopontin)

 **H₂O, ionty**

GLYKOSAMINOGLYKANY (kyselé mukopolysacharidy)

- ◆ ***Lineární polymery hexosaminů***
(glukosamin, galaktosamin) **a**
uronových kyselin (kys.glukuronová)
- ◆ *Nesulfatované* (kys. hyaluronová)
- ◆ *Sulfatované* (chondroitin 4- a 6- sulfát,
dermatansulfát, keratansulfát,
heparansulfát)

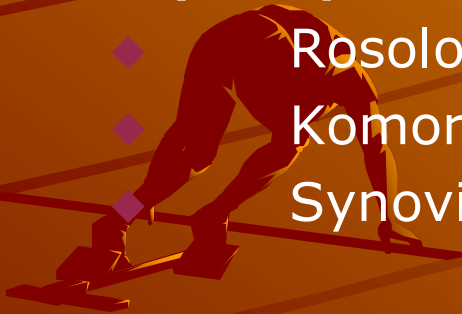
Glykosaminoglykany nesulfatované

◆ HYALURONOVÁ kyselina

N-acetylglukosamin a glukuronová kys.

Výskyt:

- ◆ Rosolovité vazivo pupečníku
- ◆ Komorový mok
- ◆ Synoviální tekutina



Glykosaminoglykany sulfatované

◆ Chondroitin 4, 6-sulfát

- ◆ Chrupavka, kost, velké cévy

◆ Dermatansulfát

- ◆ Kůže, šlachy, srdeční svalovina

◆ Keratansulfát

- ◆ Typ I – stroma rohovky
- ◆ Typ II – chrupavka a disci intervertebrales

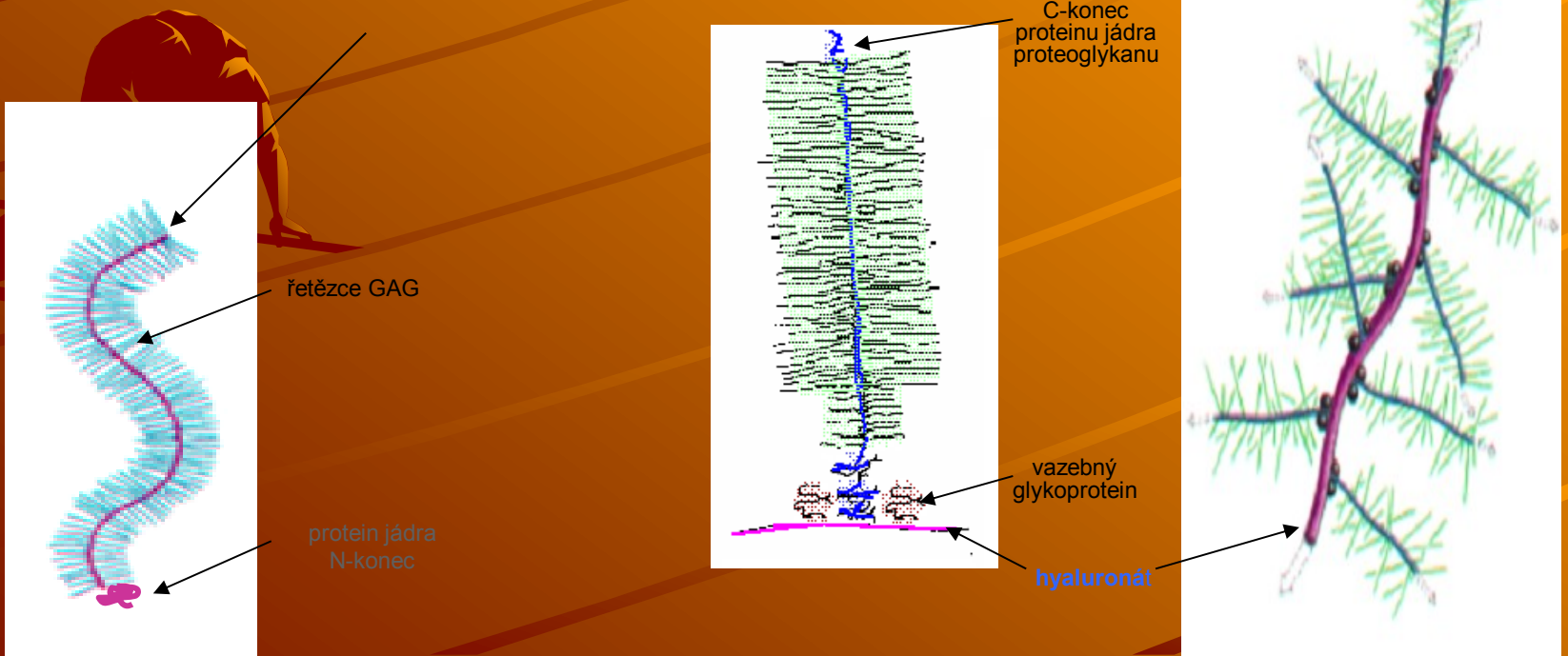
◆ Heparansulfát

- ◆ Plíce a lamina basalis



PROTEOGLYKANY

- ◆ Bílkoviné jádro + sulfatované GAG
- ◆ Agrecan - chrupavka
- ◆ Syndecan - mezenchym



GLYKOPROTEINY

liší se strukturně od proteoglykanů
proteinové jádro + oligosacharidy

- ◆ Fibronektin
- ◆ Chondronektin
- ◆ Laminin
- ◆ Osteokalcin, osteopontin

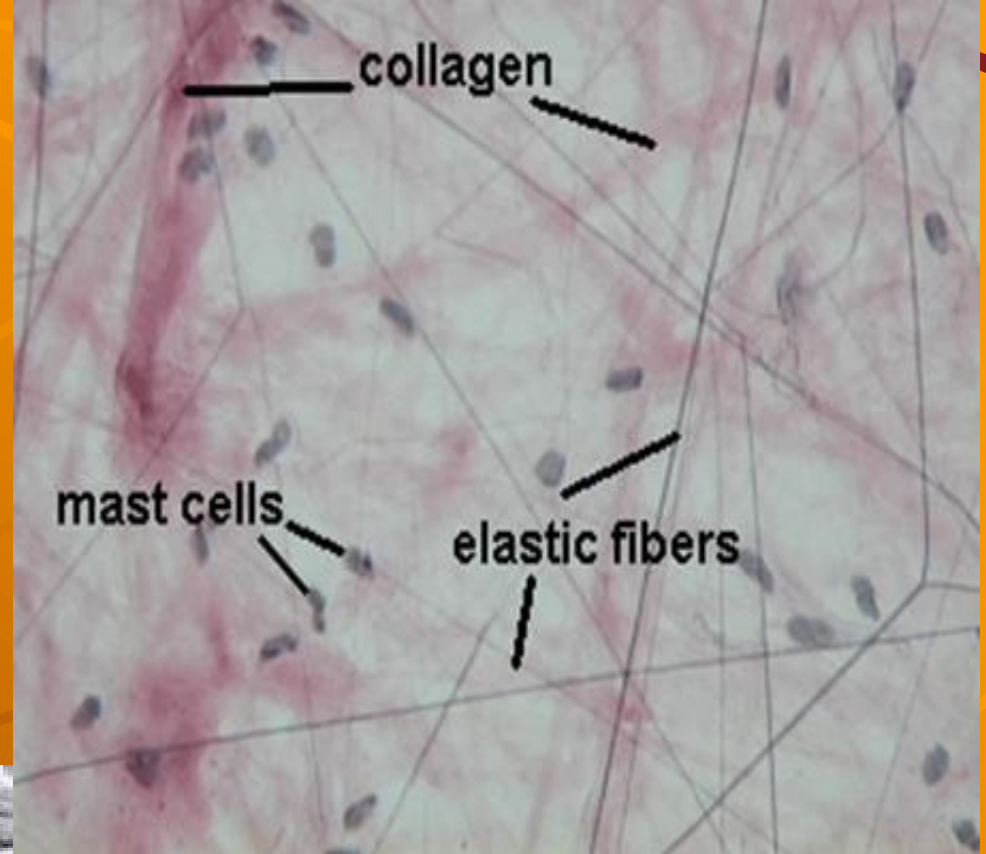
Vlákná

polypeptidové řetězce

☒ kolagenní

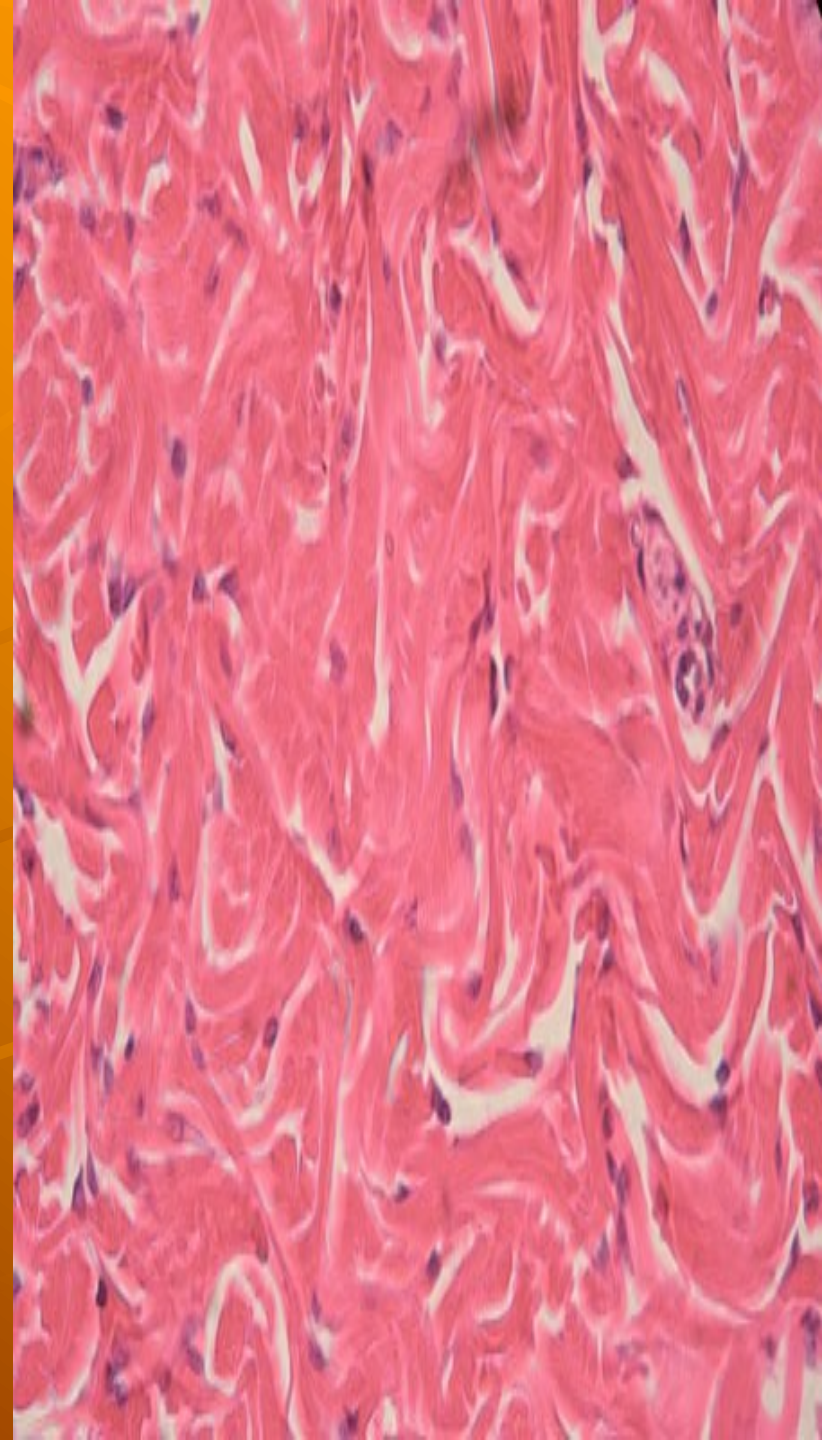
☒ retikulární

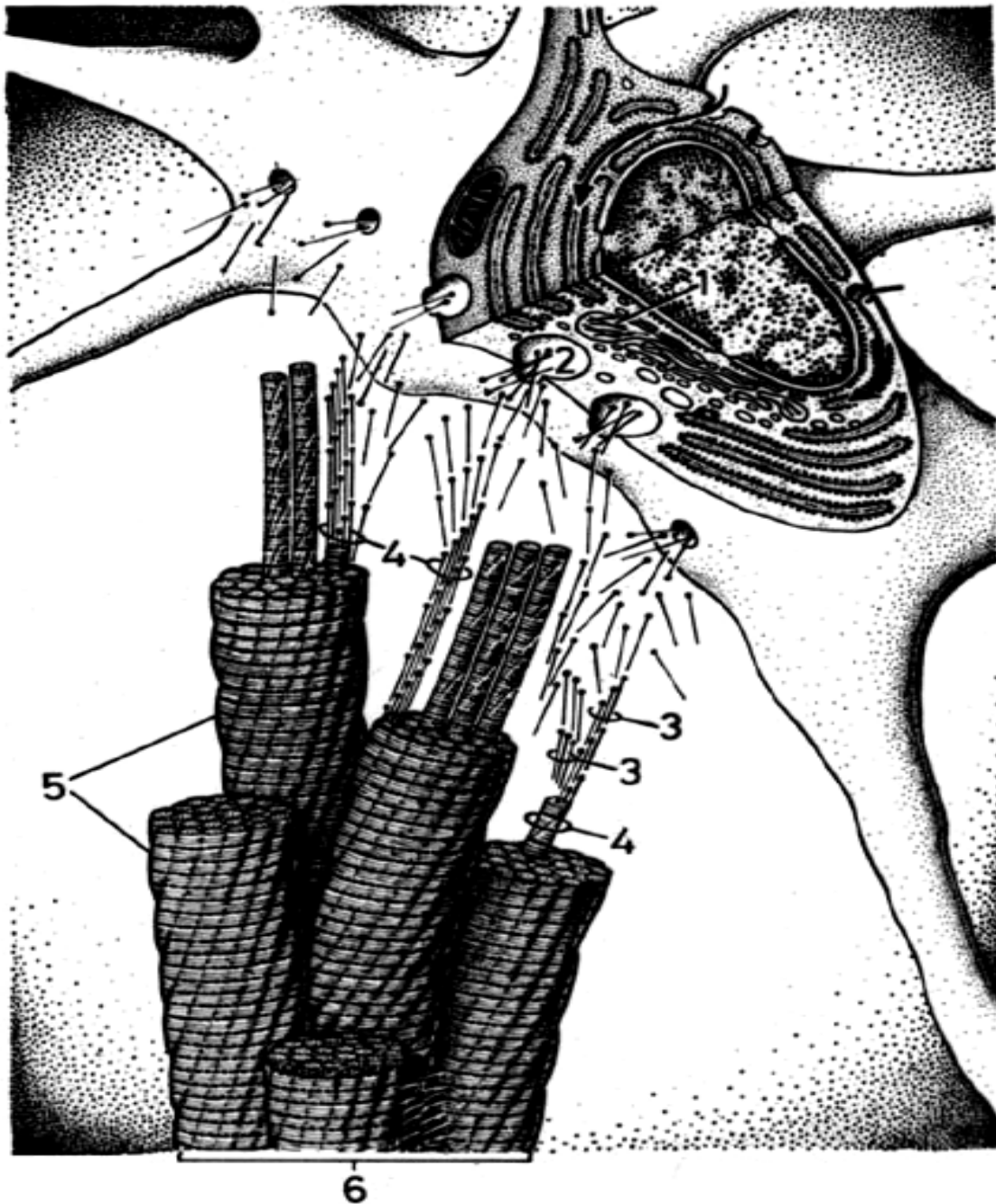
☒ elastická



Kolagenní vlákna

- „bílá“, pevná a silná, nepružná
- 1 – 20 μm \varnothing
- kolagen
- ve svazcích
- kolagenáza – digestivní enzym
- varem denaturují - kliš
- acidofilní (HE – růžově, kyselý fuchsin – červeně, šafrán – žlutě, anilinová modř – modře)



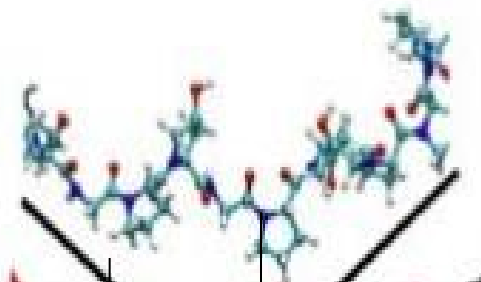


Fibroblast:

produkce a
polymerace
kolagenu a vznik
kolagenních vláken

Kolagenní vlákna

amino acids
~1 nm



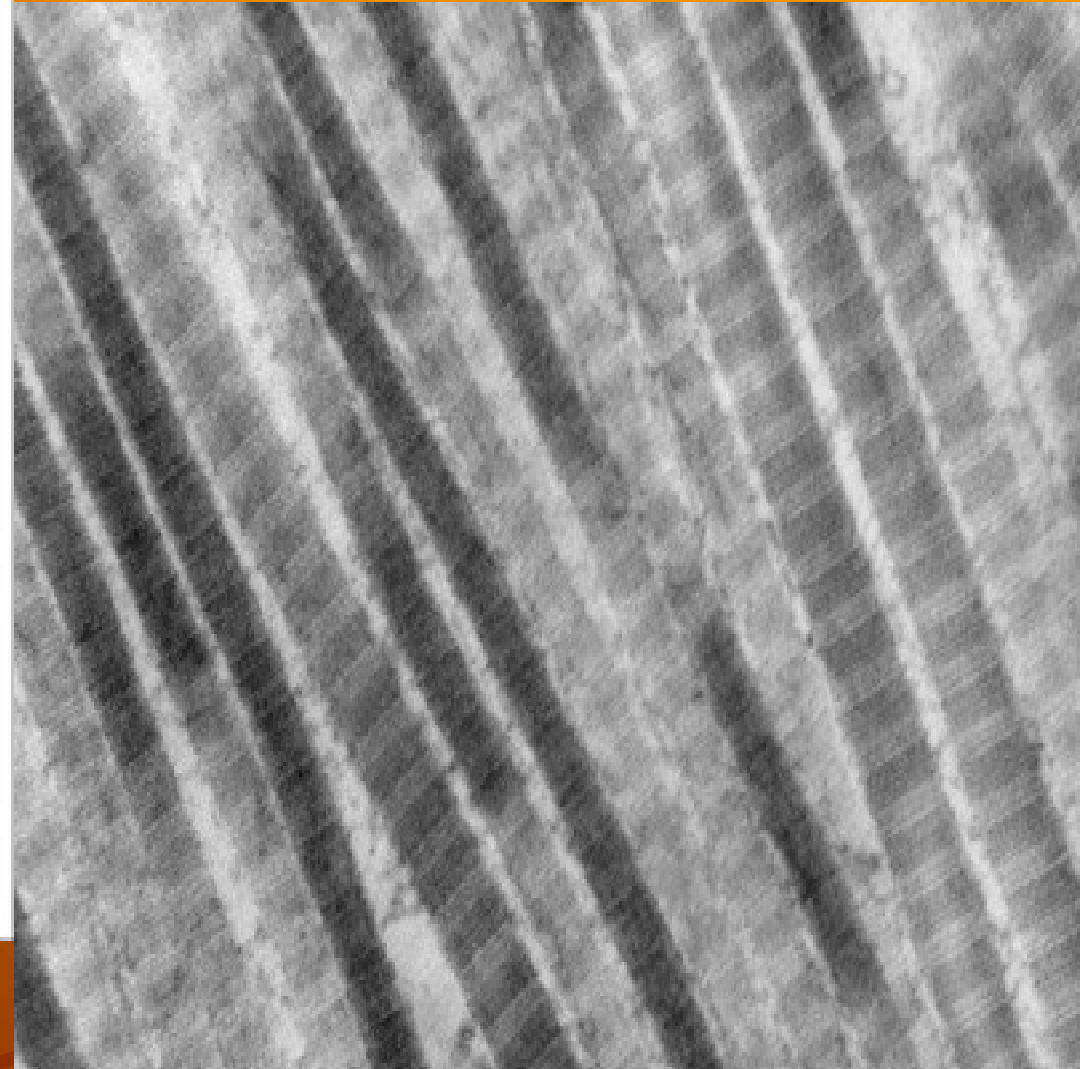
tropocollagen
~300 nm



fibrils
~1 μm



fibers
~10 μm

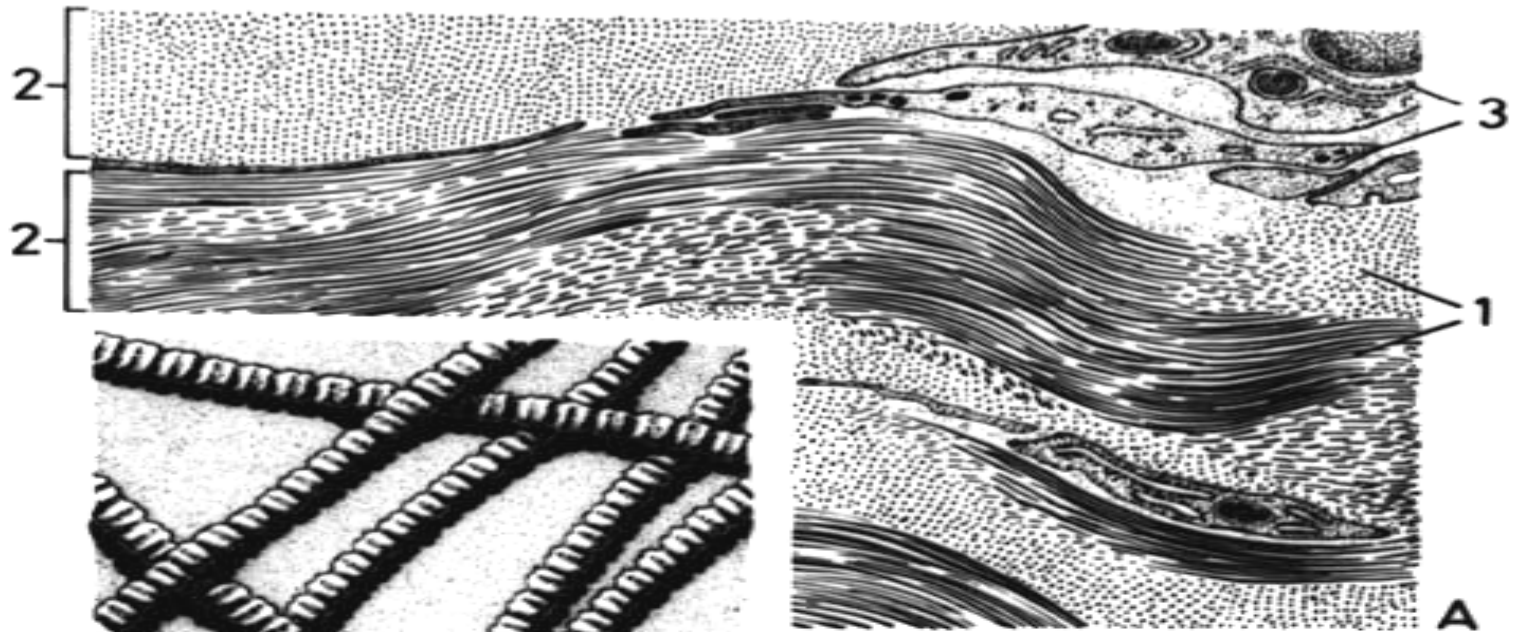


50 nm

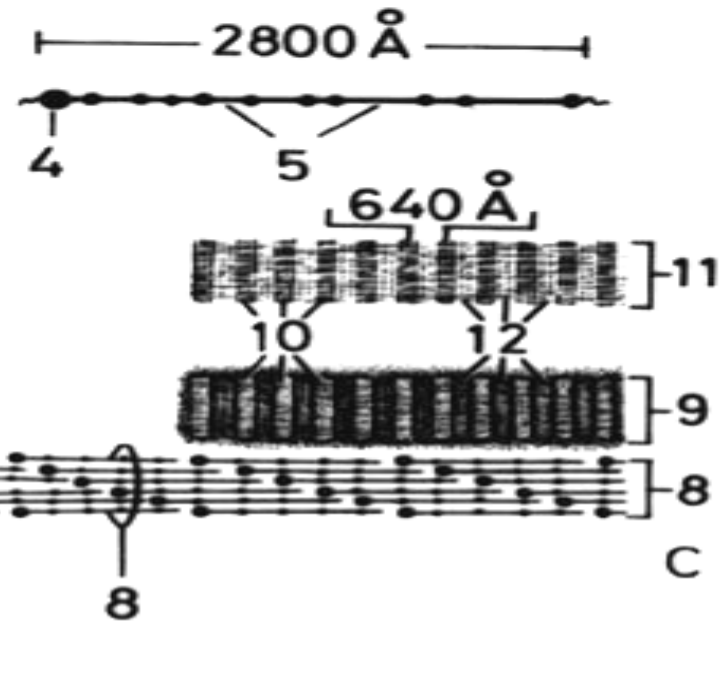
OWLungTEM

1/7/0 REMF

Příčné žíhání kolag. vláken



B



C

Typy kolagenu

výskyt a produkující buňky

I – nejčastější – fibroblasty, osteoblasty, odontoblasty

II – v chrupavce – chondroblasty

III – retikulární vlákna – retikulární bb.

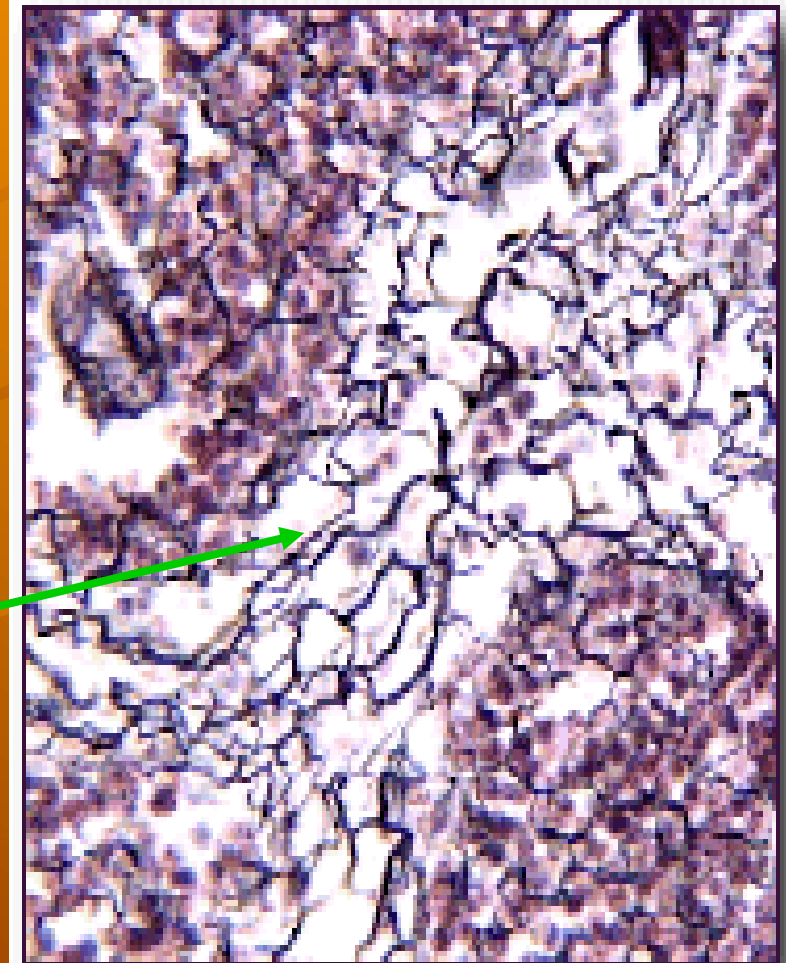
IV – „amorfní“, netvoří vlákna – epitelové bb.

Cca 40 typů kolagenu

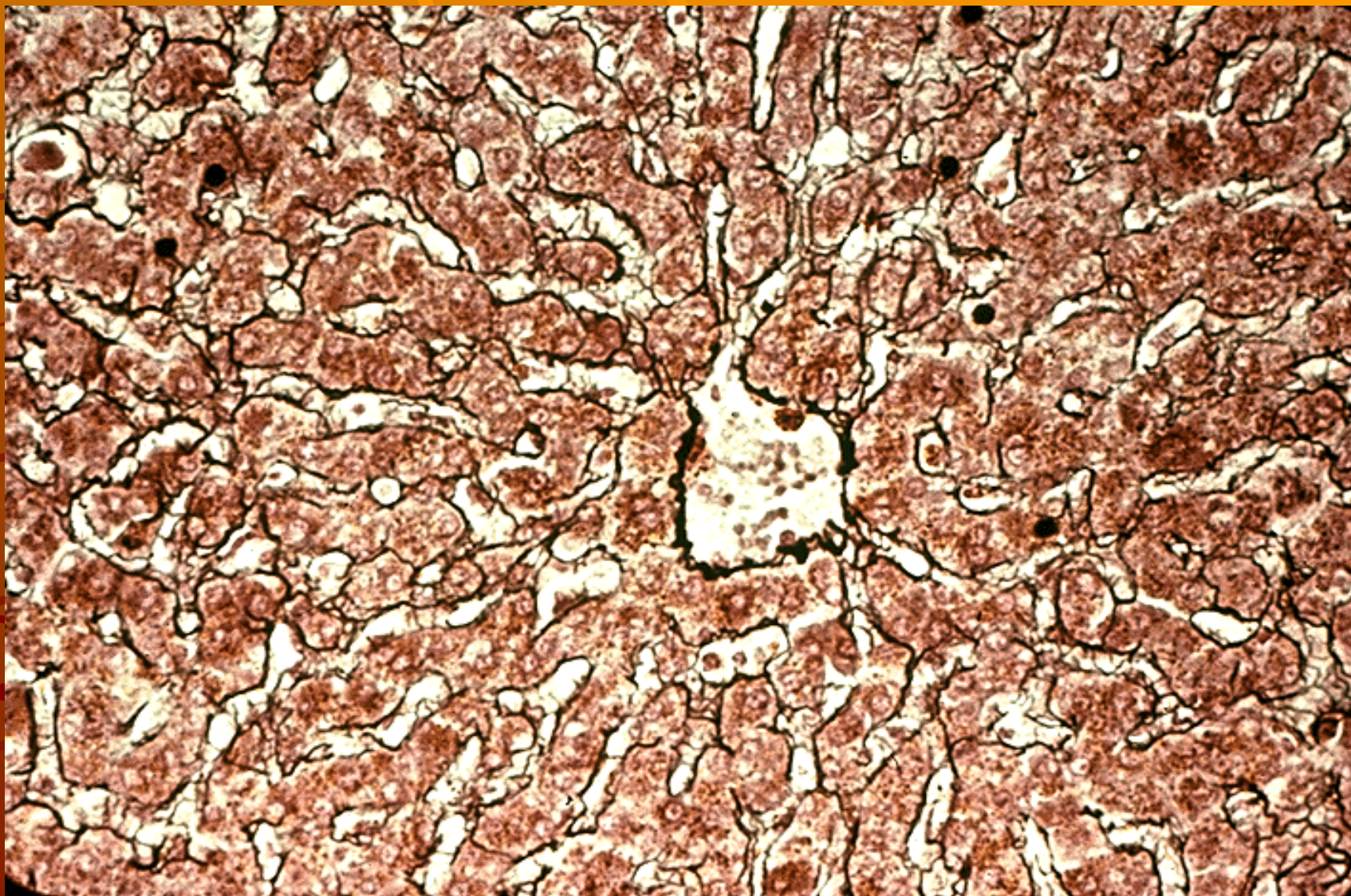


Retikulární vlákna

- kolagen III
- jemná síť (reticulum) = podpůrná složka měkkých tkání a síť pro jiné buňky (játra, kostní dřeň, lymfatické orgány)
- argyrofilie (impregnace solemi Ag)
- 0,5 – 2 μm \varnothing

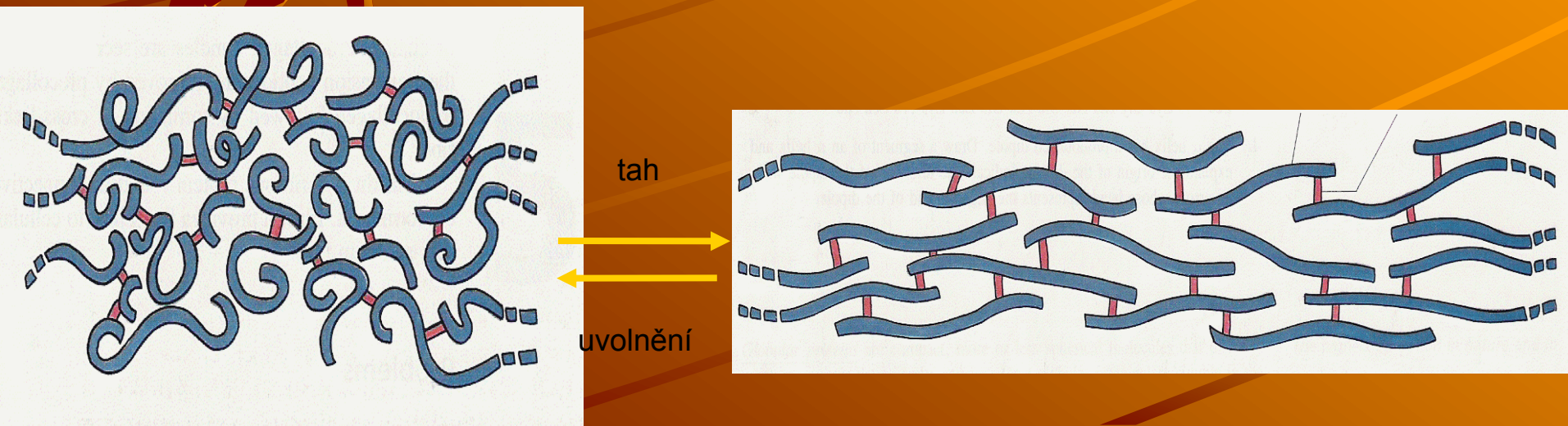


Retikulární vlákna (játra)

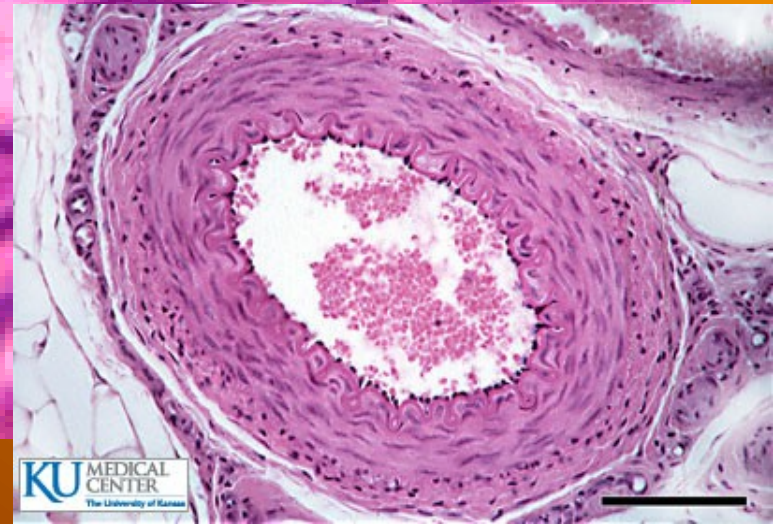
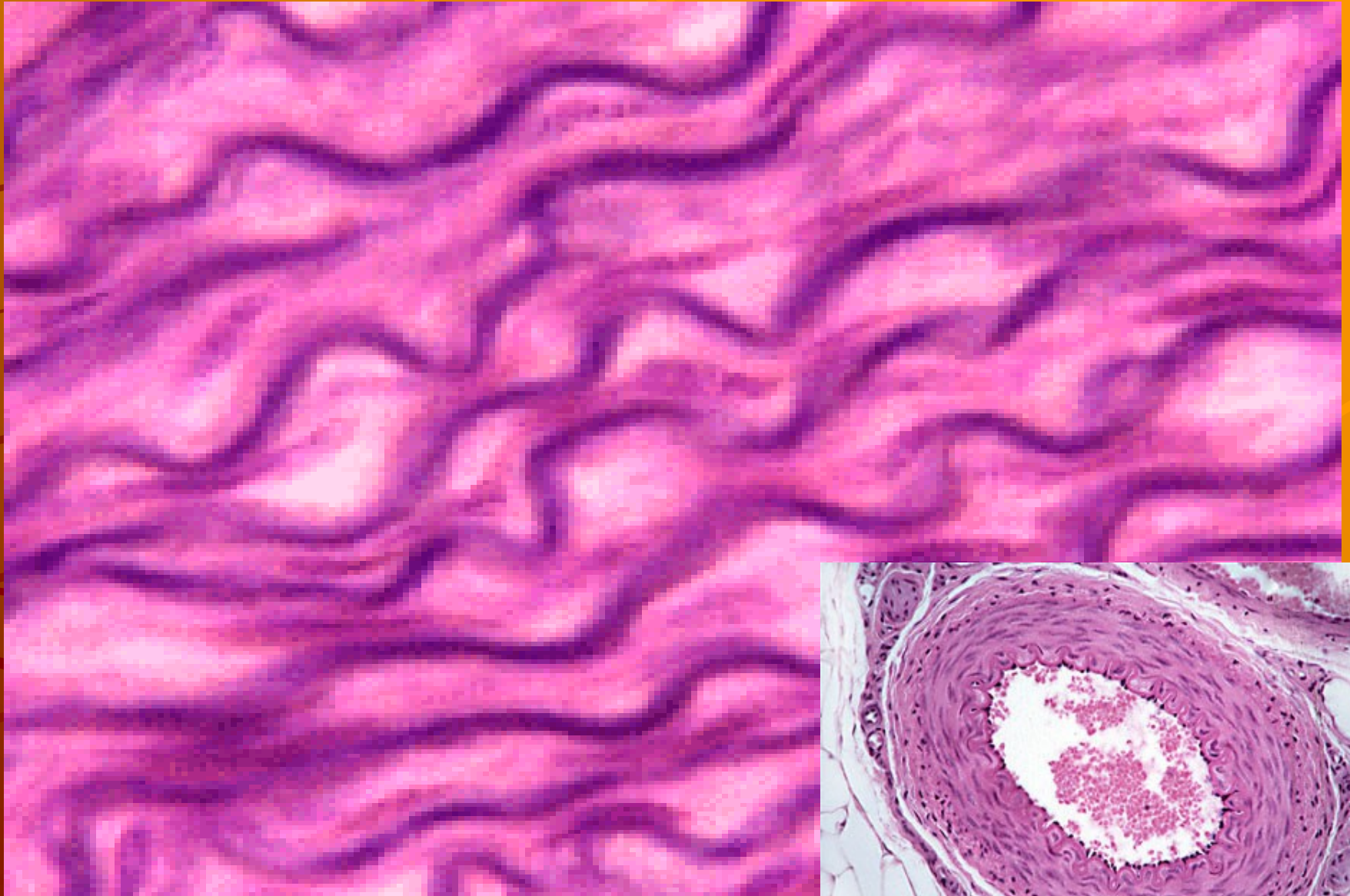


Elastická vlákna

- „žlutá“ - protein elastin - produkt fibroblastů a hladkých svalových buněk ve stěně cév
- 1-4 (12) μm \emptyset
- prodloužení až 1.5 x,
- elasticita
- (orcein nebo resorcin-fuchsin)



Svazky elastických vláken (stěna arterie)



Výskyt:

Vazy

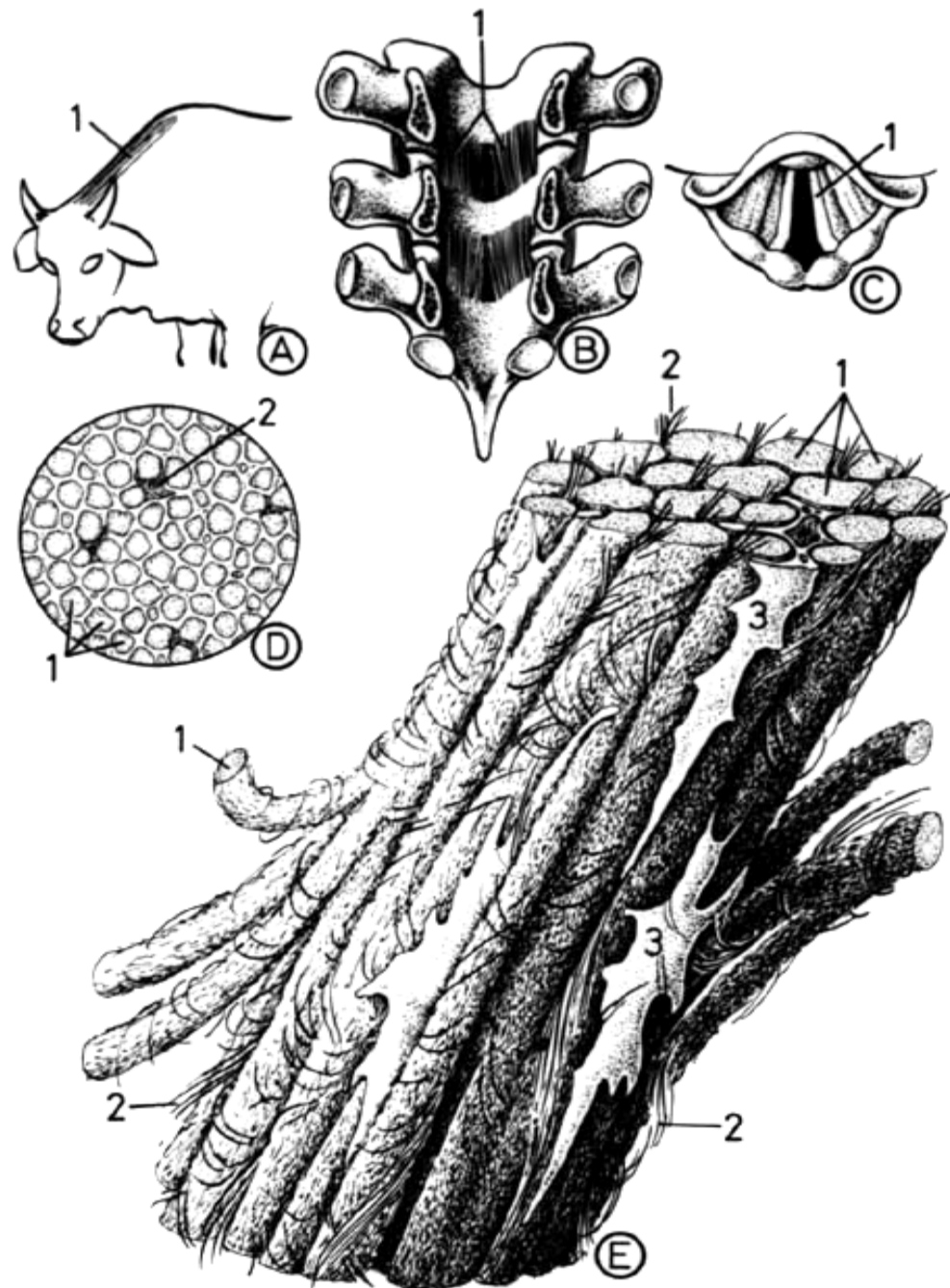
ligamenta flava

ligamenta vocalia

ligamentum nuchae

Stěna cév:

membranae fenestratae



Klasifikace vaziv

☒ Závisí na poměru a uspořádání buněk, vláken a zákl. amorfní hmoty:

☒ zákl. hmota \Rightarrow „měkká konzistence“

☒ vlákna \Rightarrow „tuhá konzistence“

☒ uspořádání vláken $\begin{cases} \rightarrow \text{pravidelné} \\ \rightarrow \text{nepravidelné} \end{cases}$

Typy vaziv

Mezenchym

Rosolovité v. (Whartonův rosol)

Kolagenní v.

→ řídké

→ husté

→ neuspořádané

→ uspořádané

Retikulární v.

Elastické v.

Tukové v.

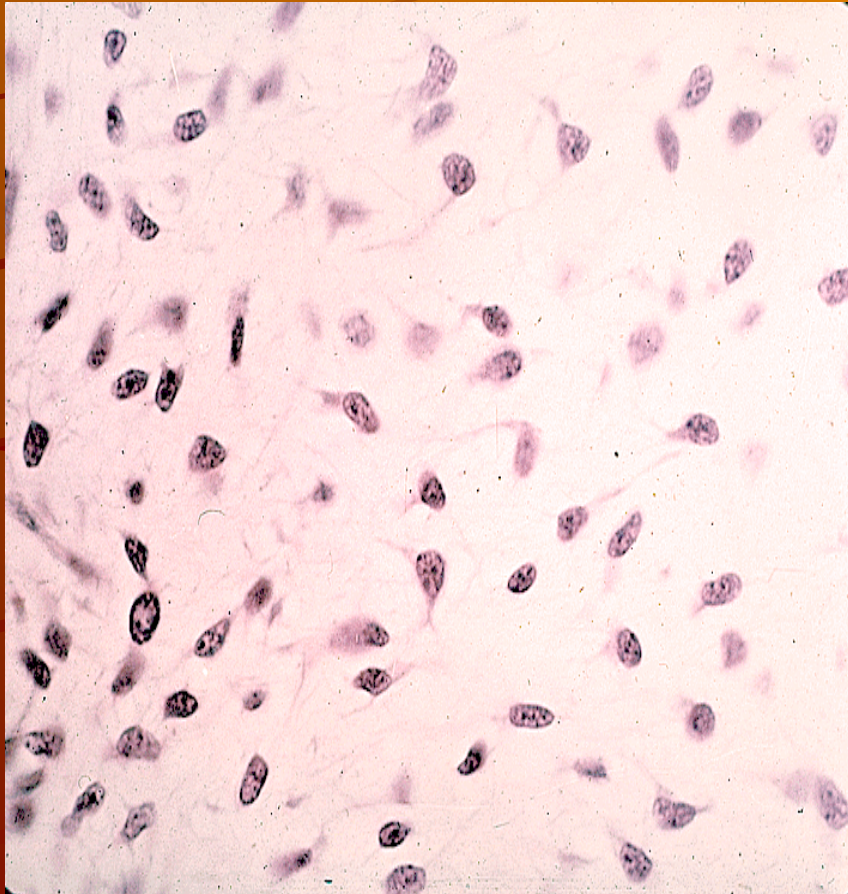
→ bílé

→ hnědé



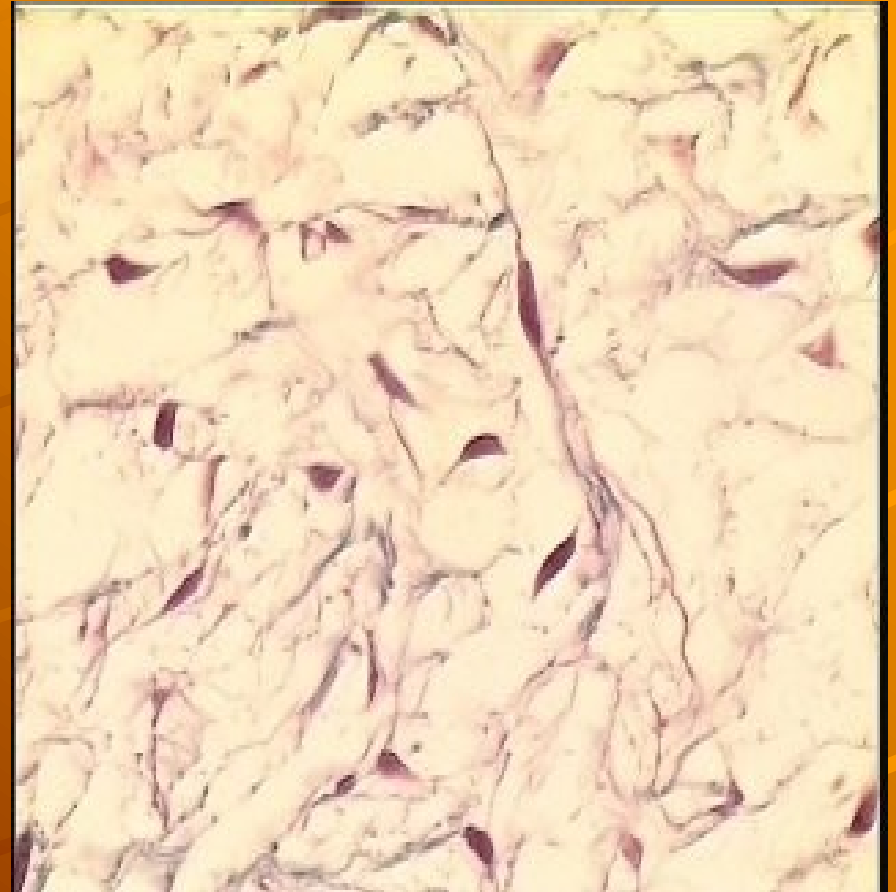
Mezenchym

embryonální vazivo

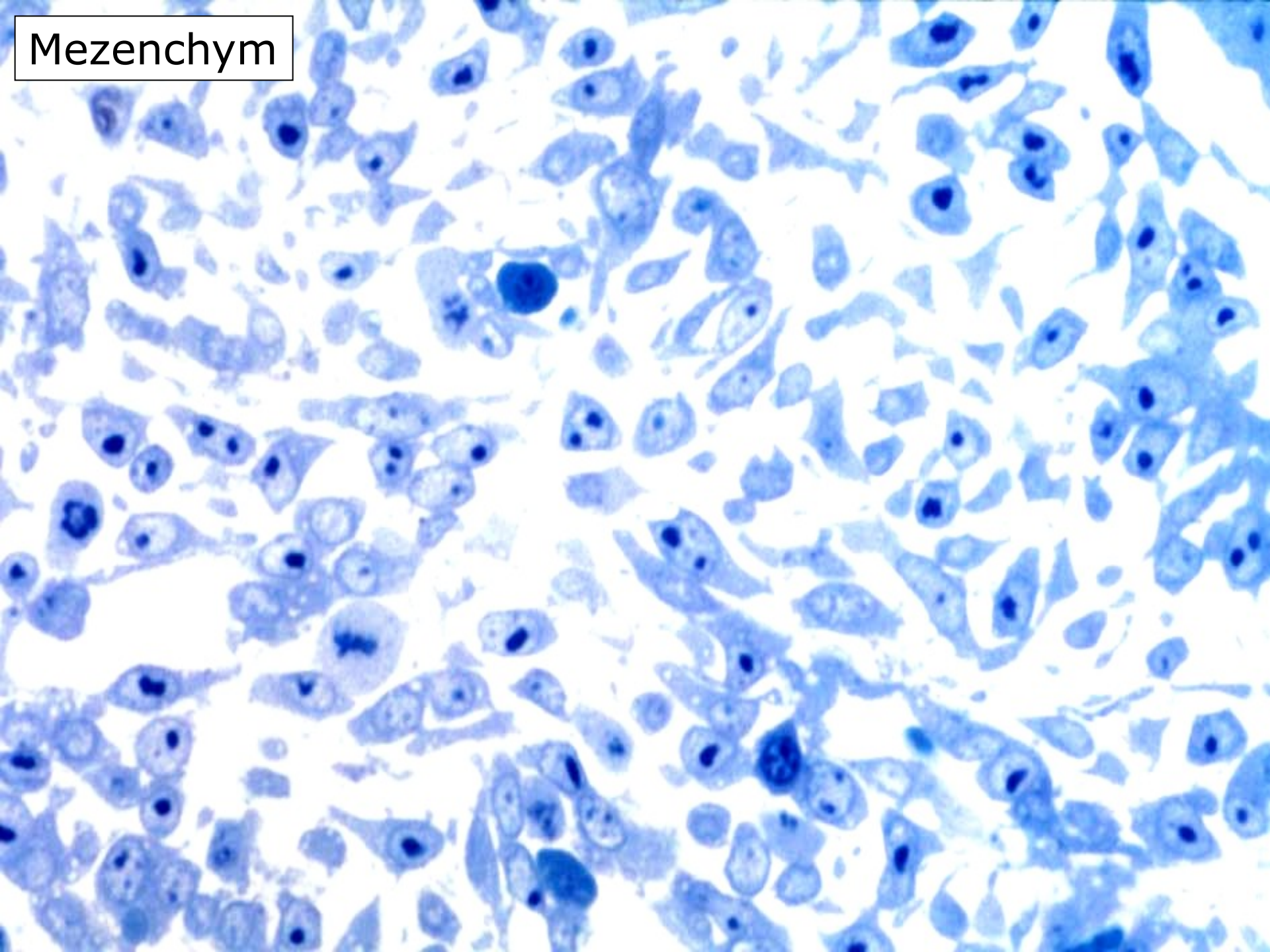


Rosolovité v.

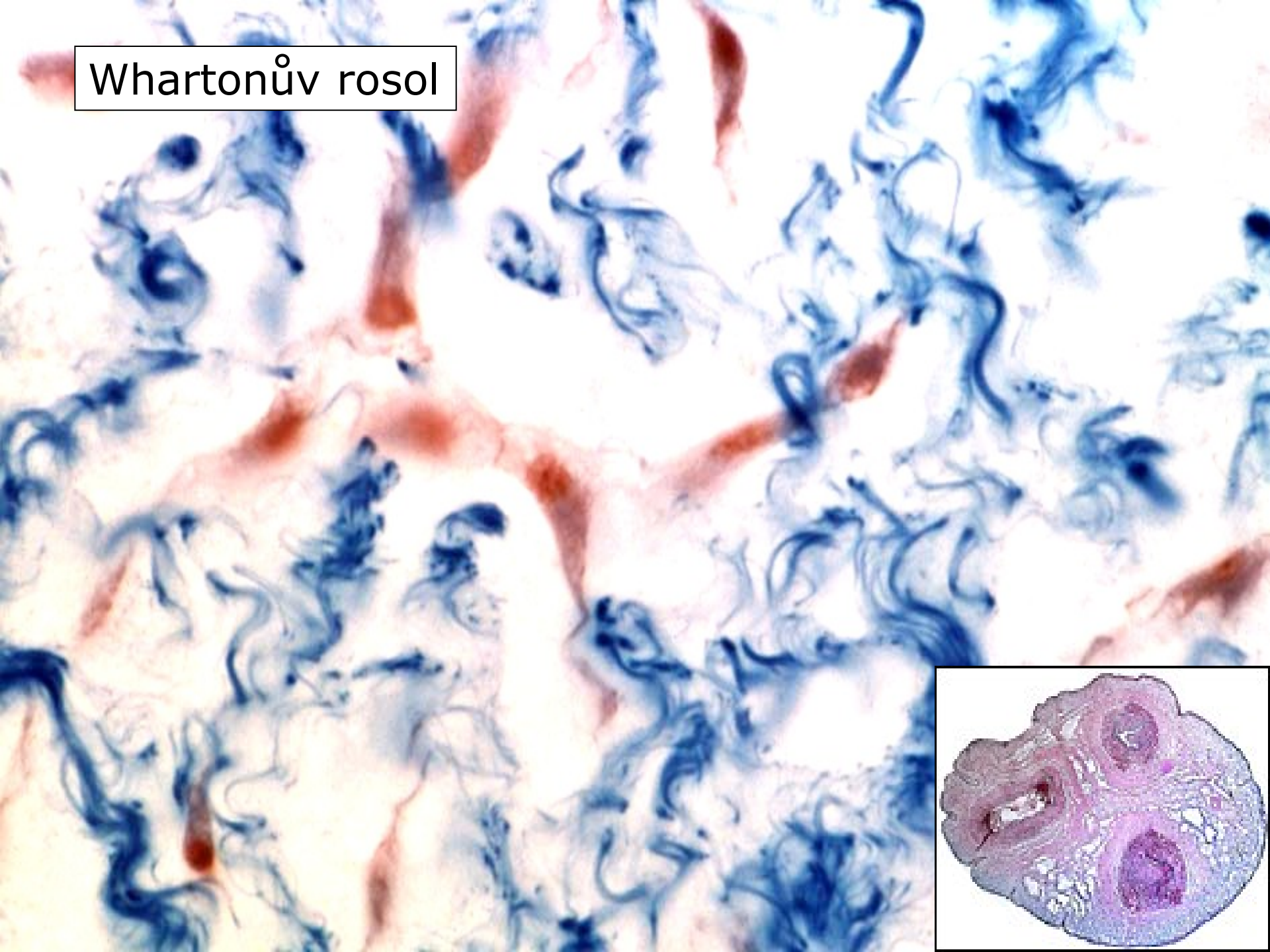
pupečník, zubní pulpa



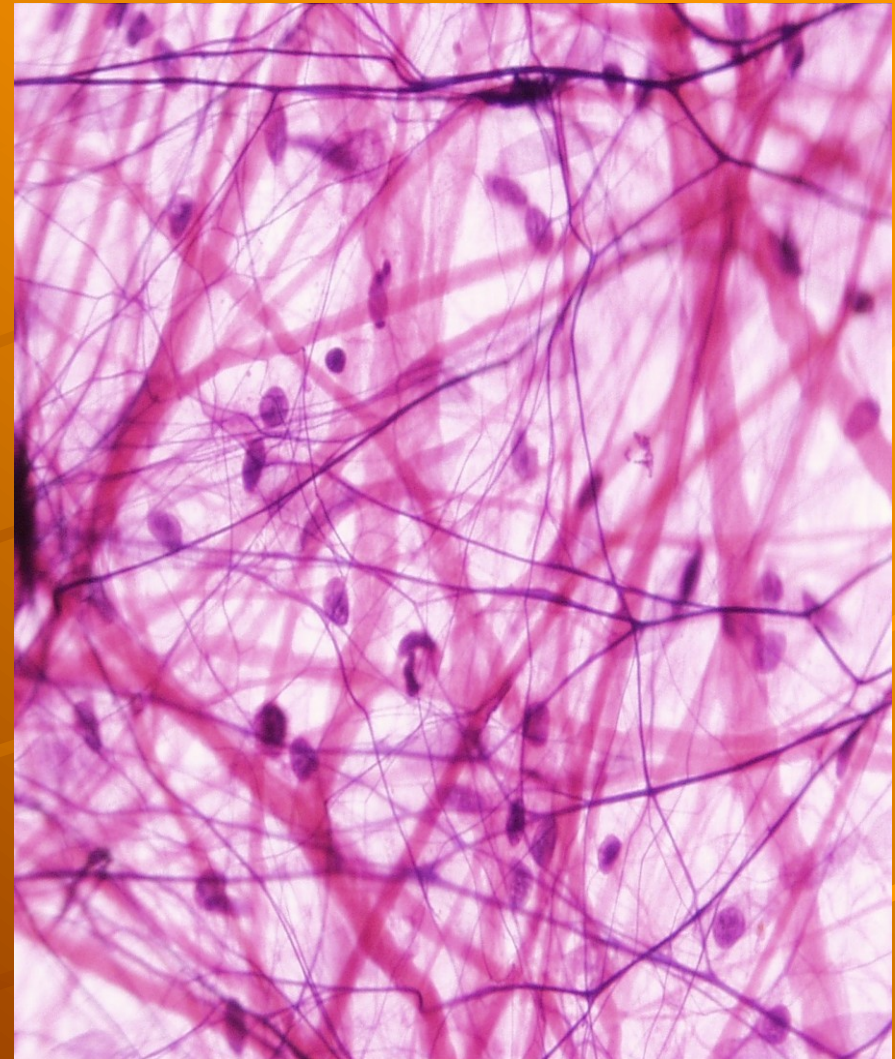
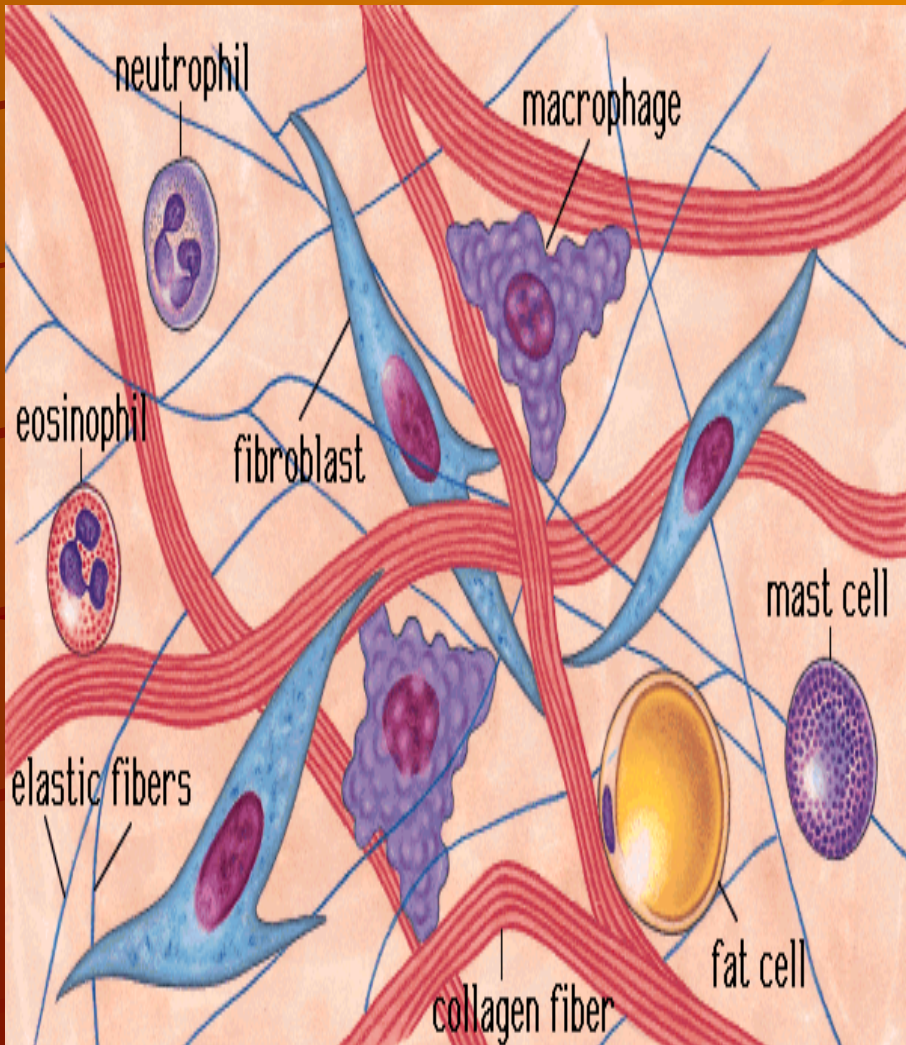
Mezenchym



Whartonův rosol

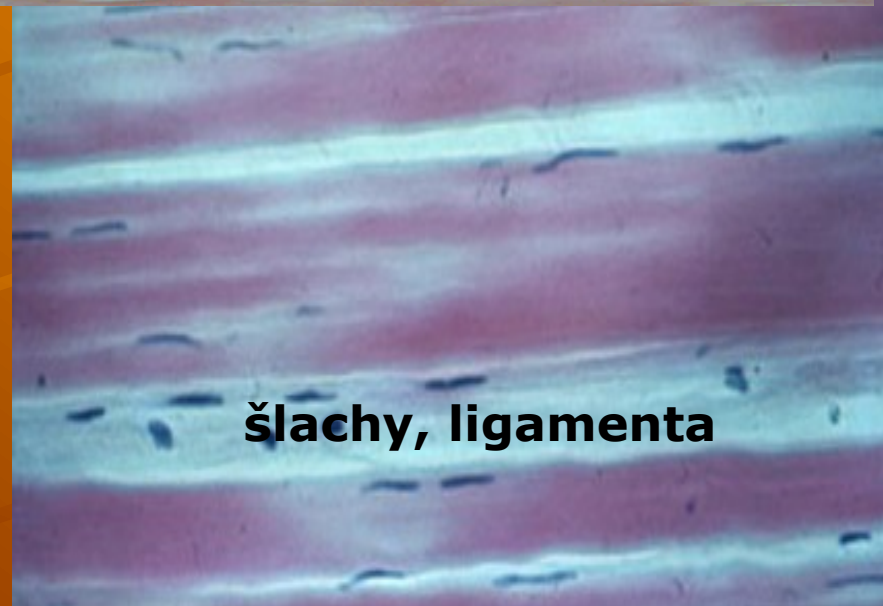
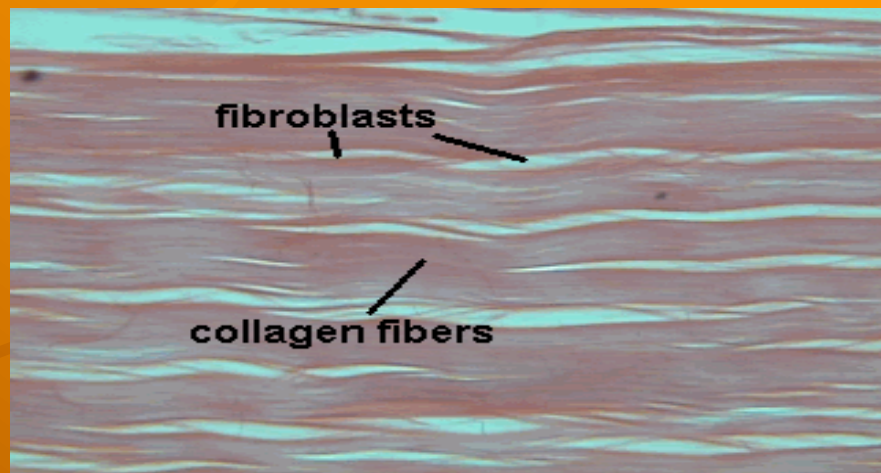
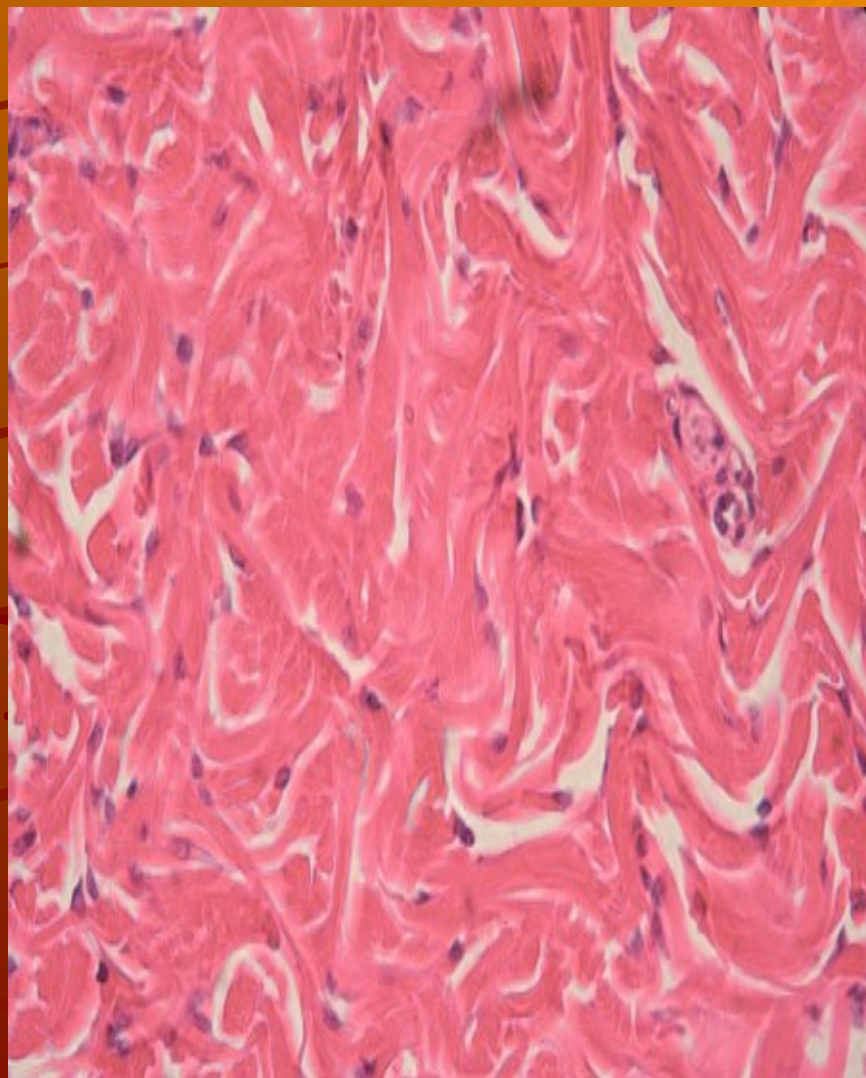


Kolagenní vazivo řídké

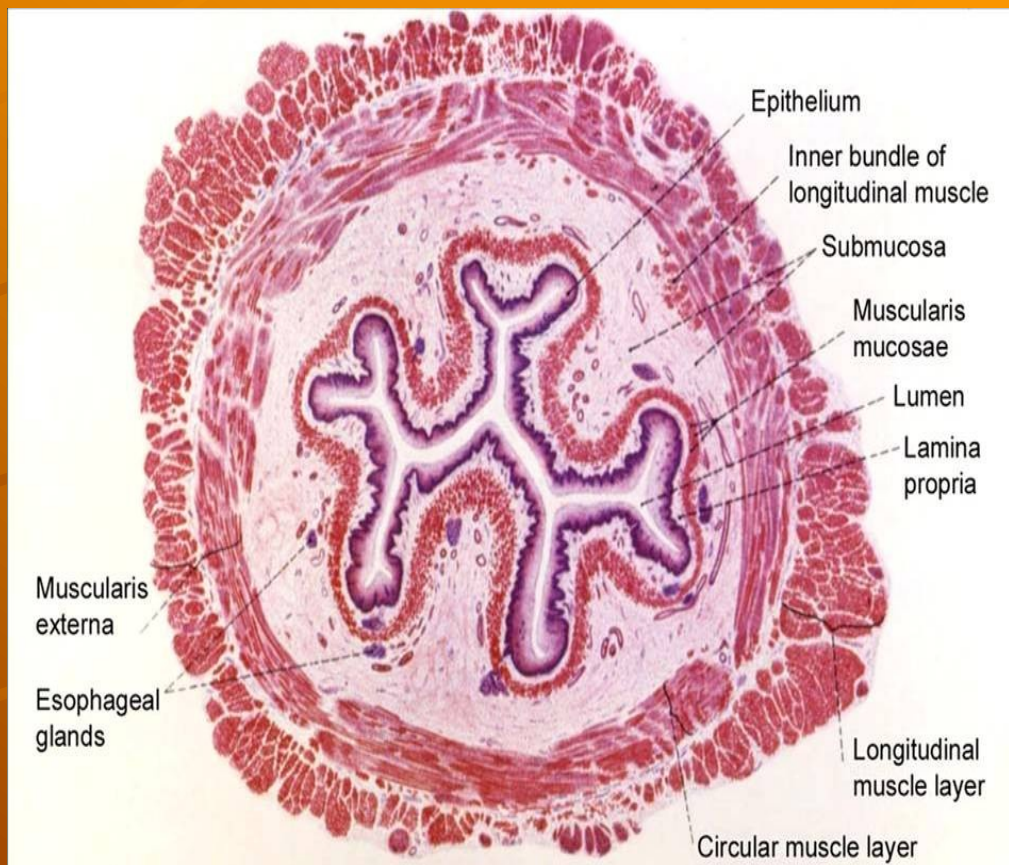
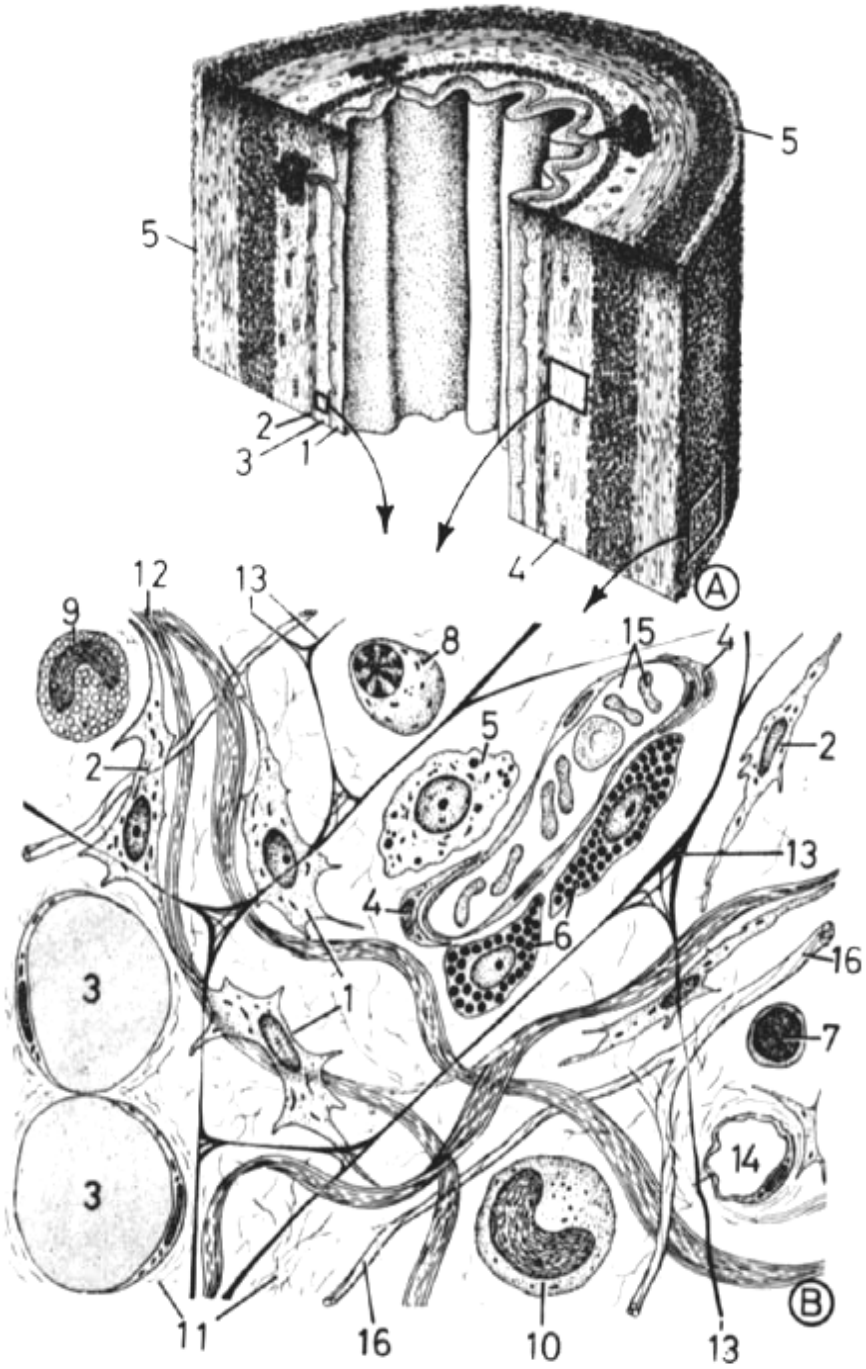


Kolagenní v. husté

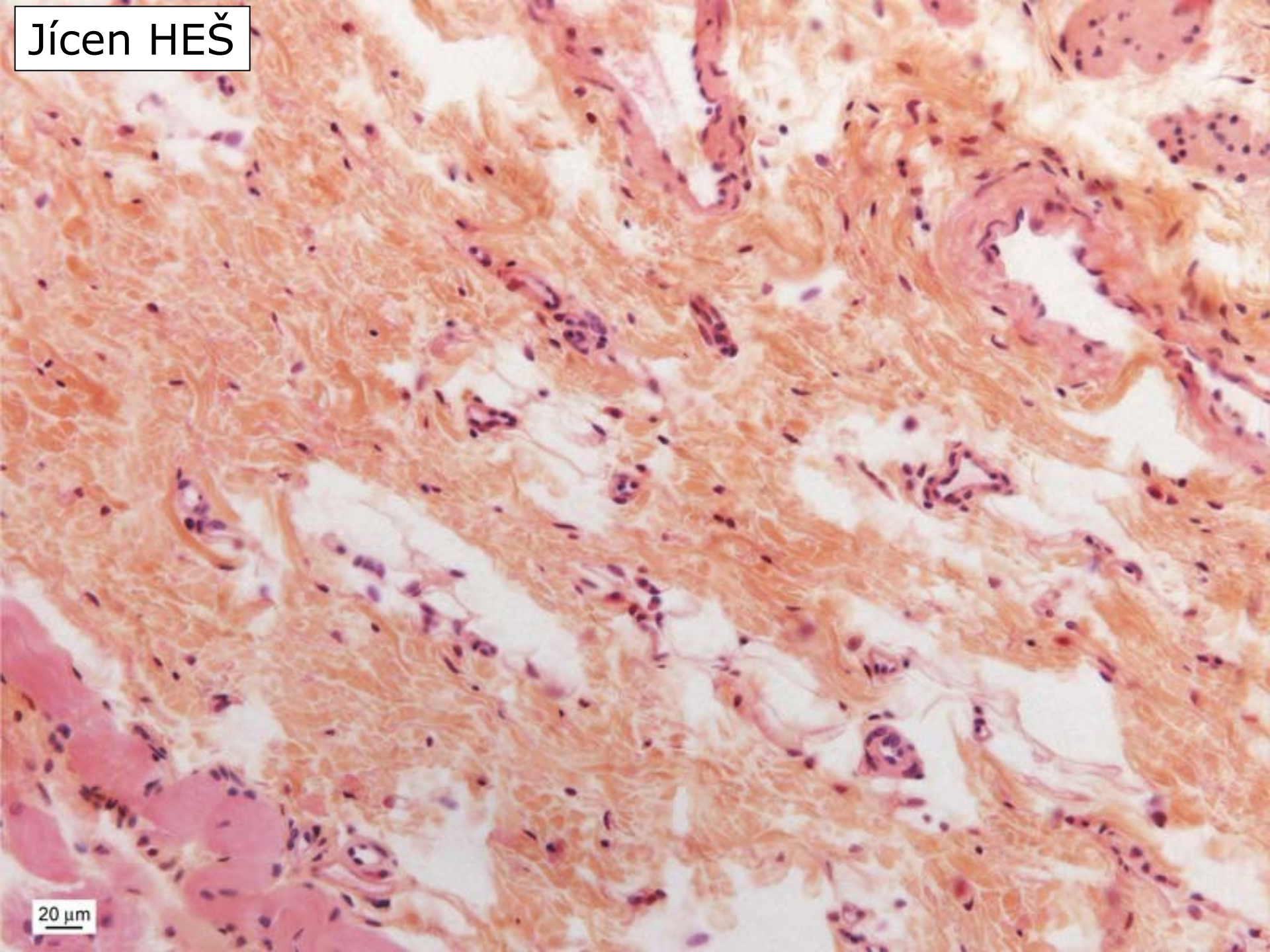
- neuspořádané
- uspořádané



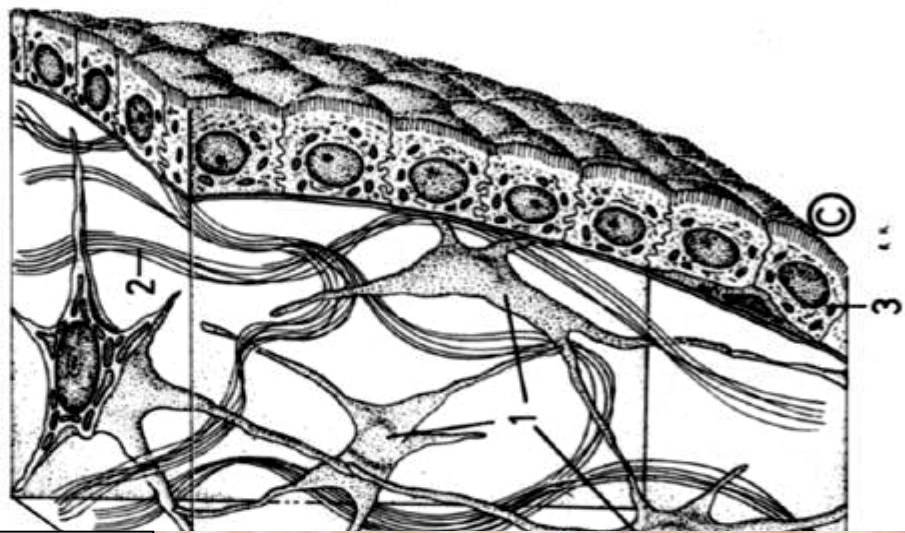
Řídké kolag. vazivo ve stěně dutého orgánu (jícen)



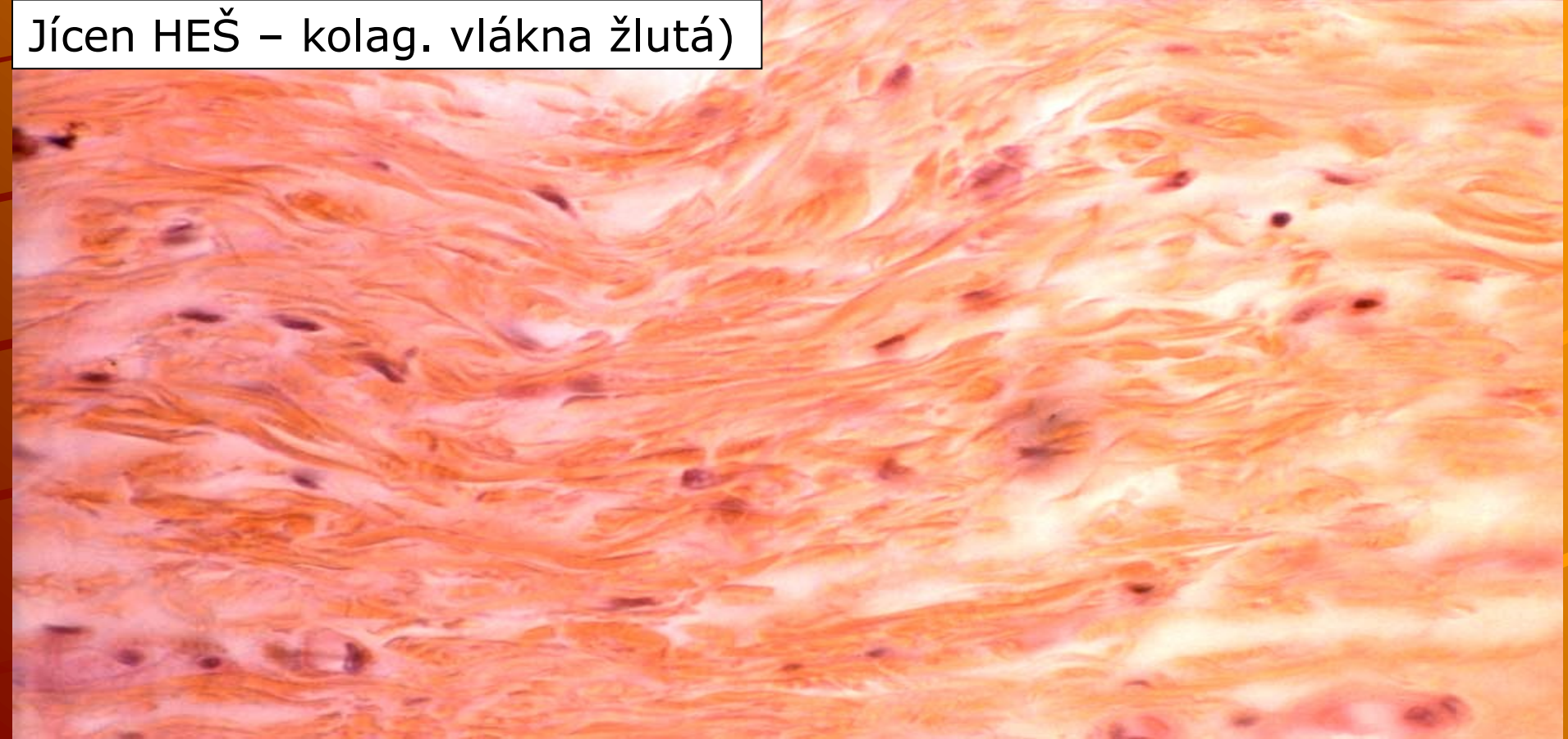
Jícen HEŠ



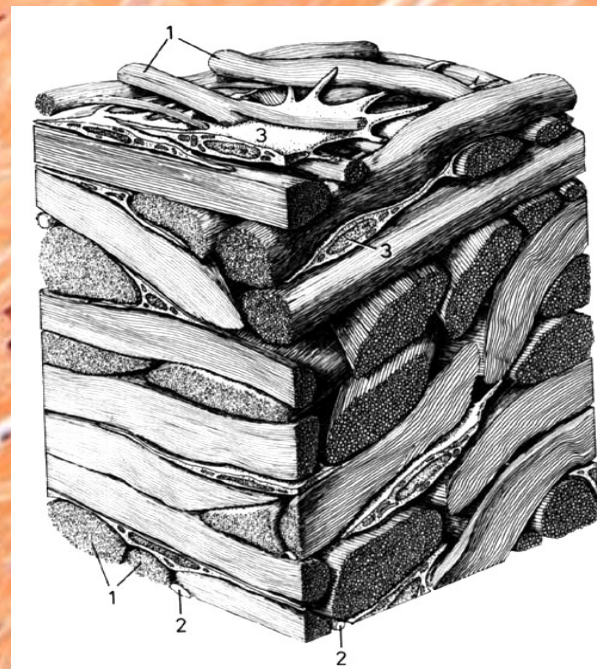
20 μ m



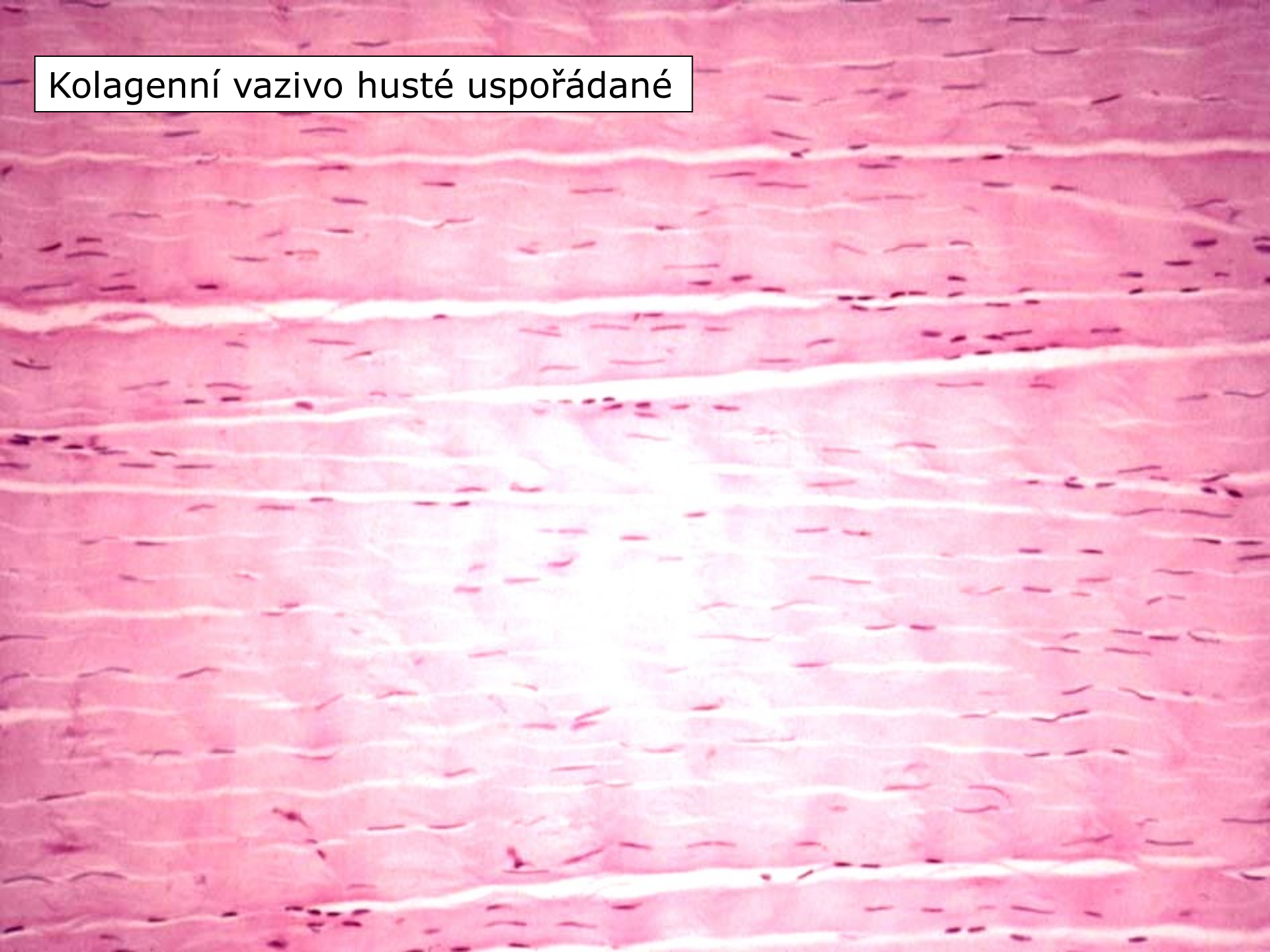
Jícen HEŠ – kolag. vlákna žlutá)



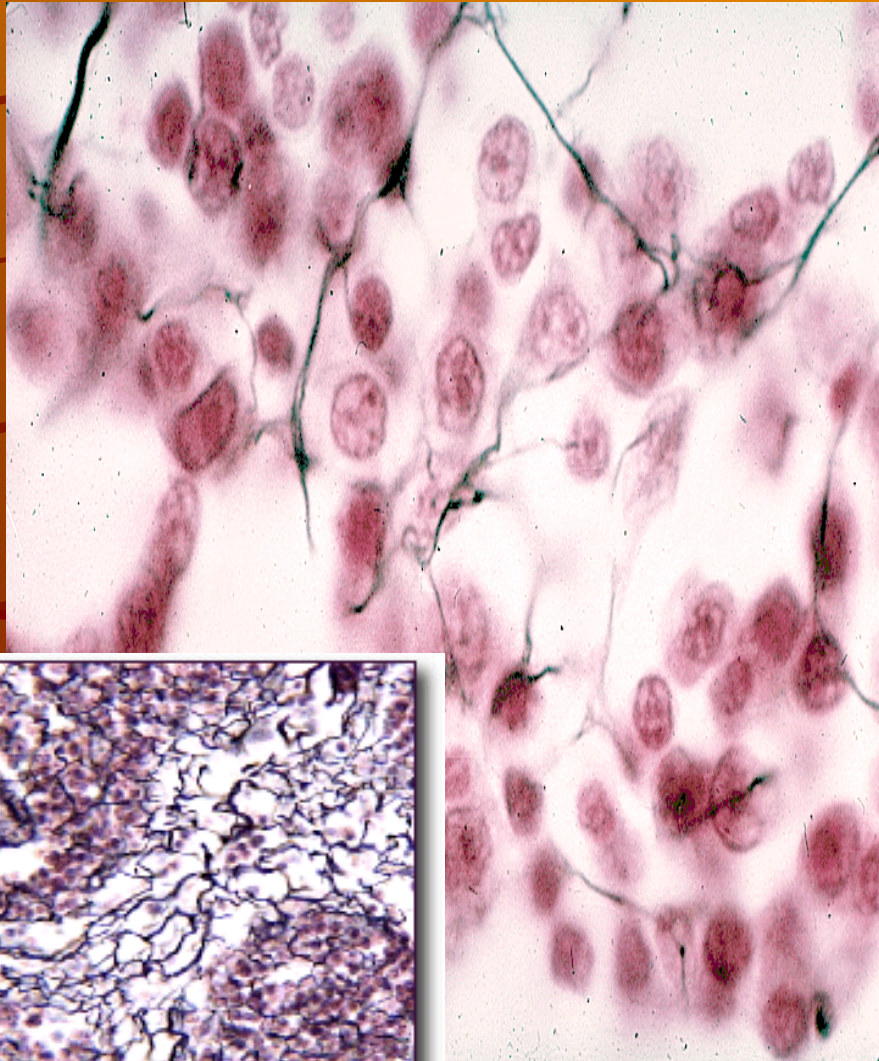
Kolagenní vazivo husté neuspořádané



Kolagenní vazivo husté uspořádané



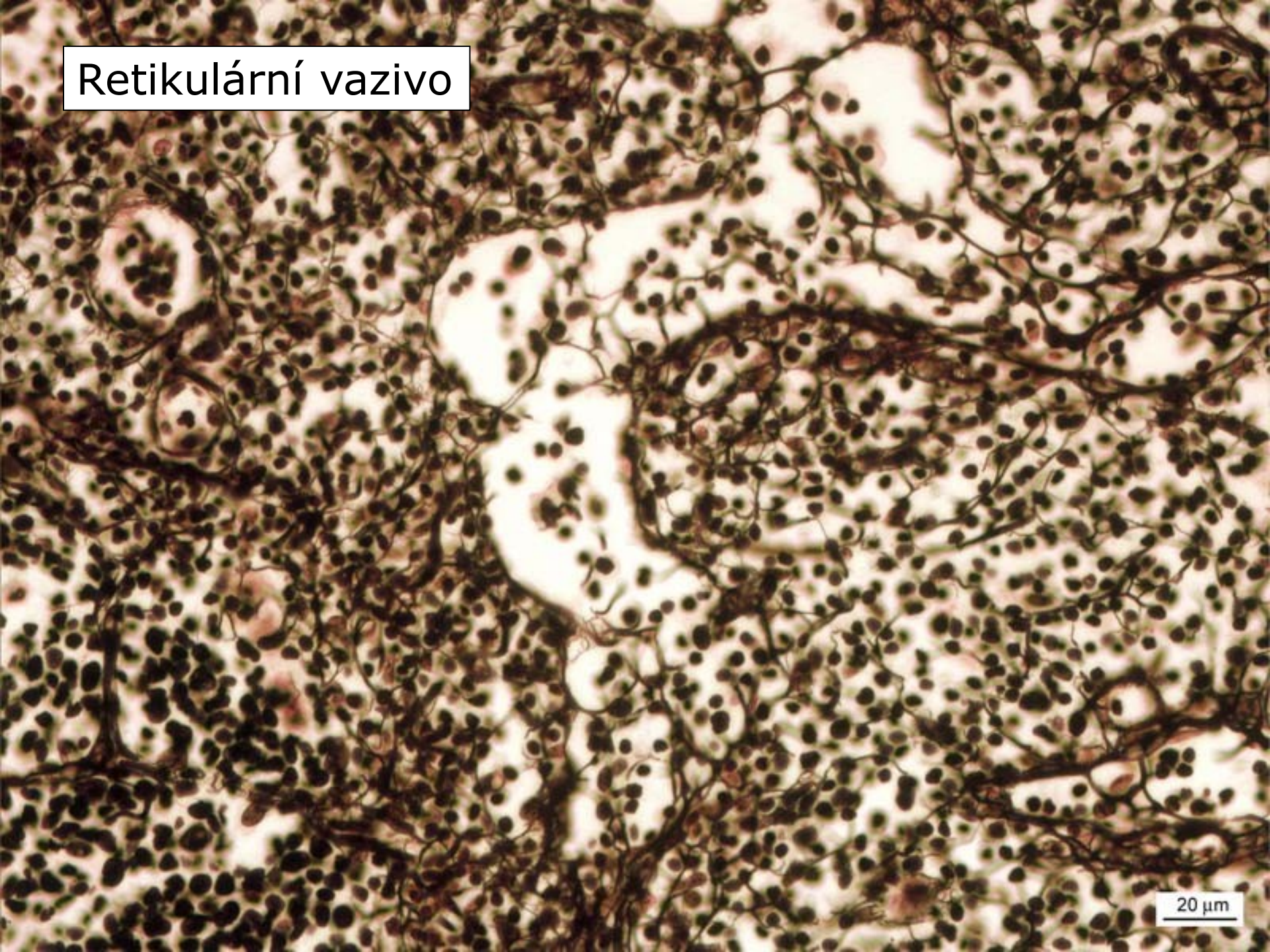
Retikulární v.



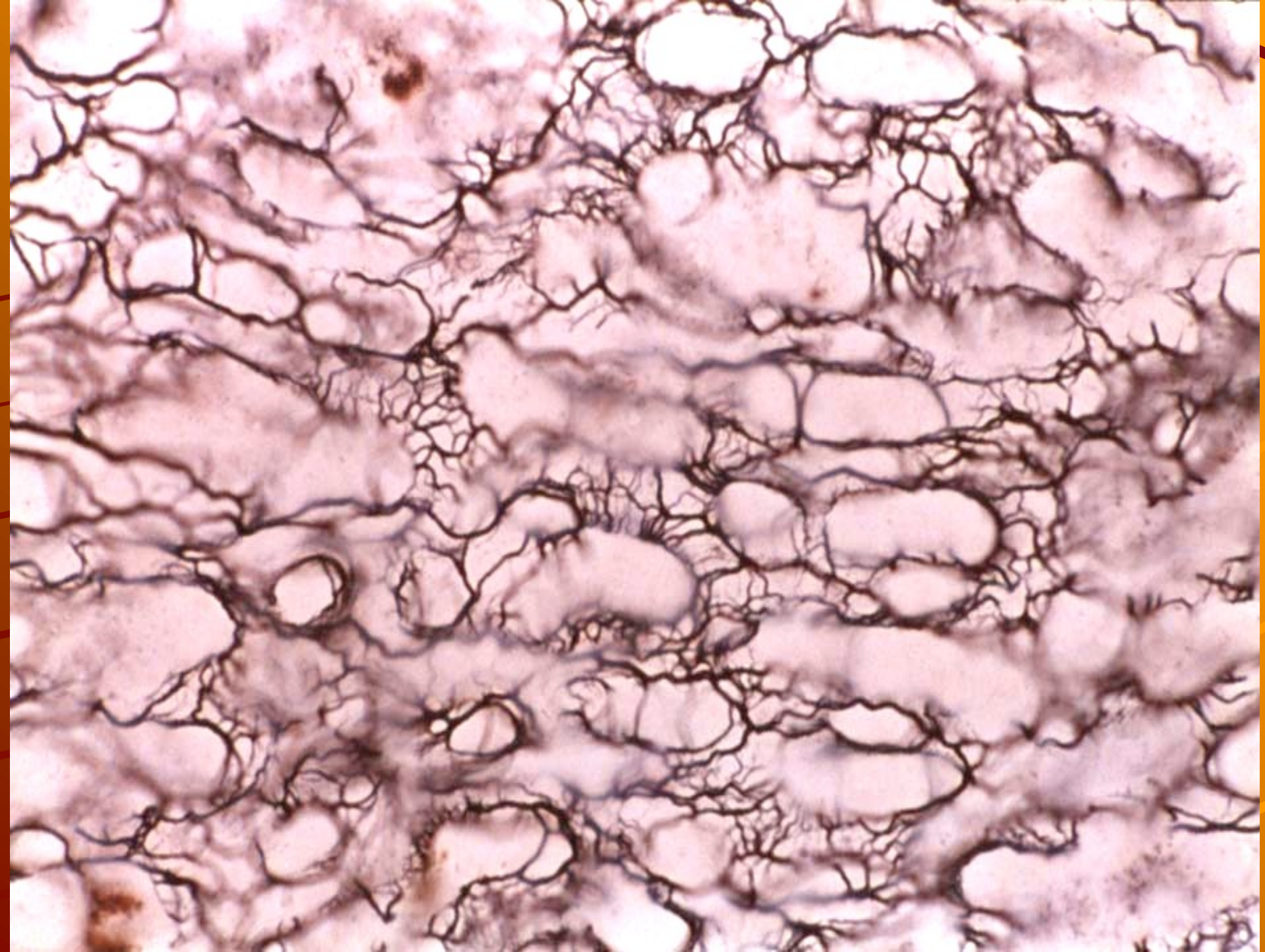
Elastické v.



Retikulární vazivo



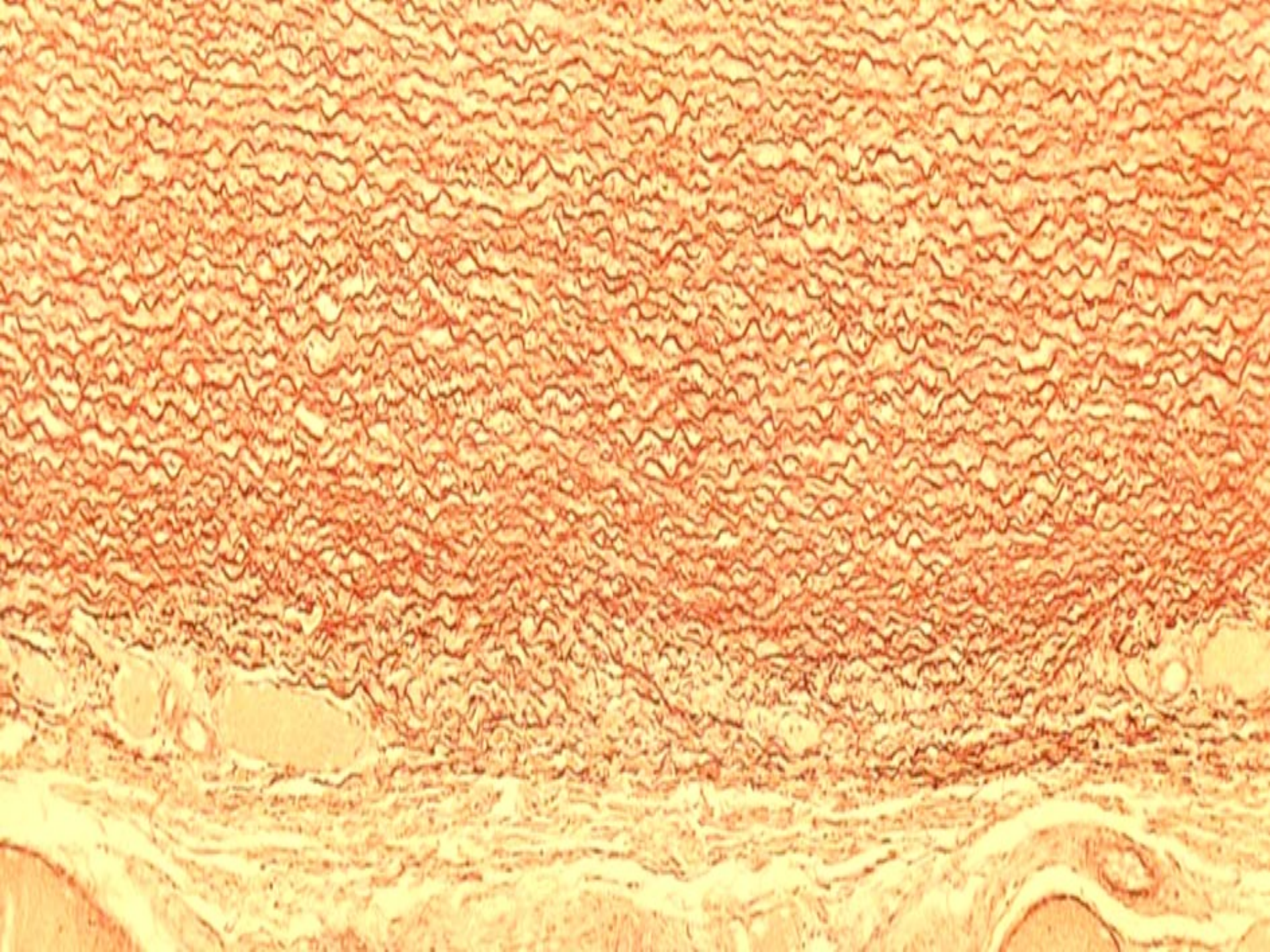
20 μ m



Elastická vlákna v membránách



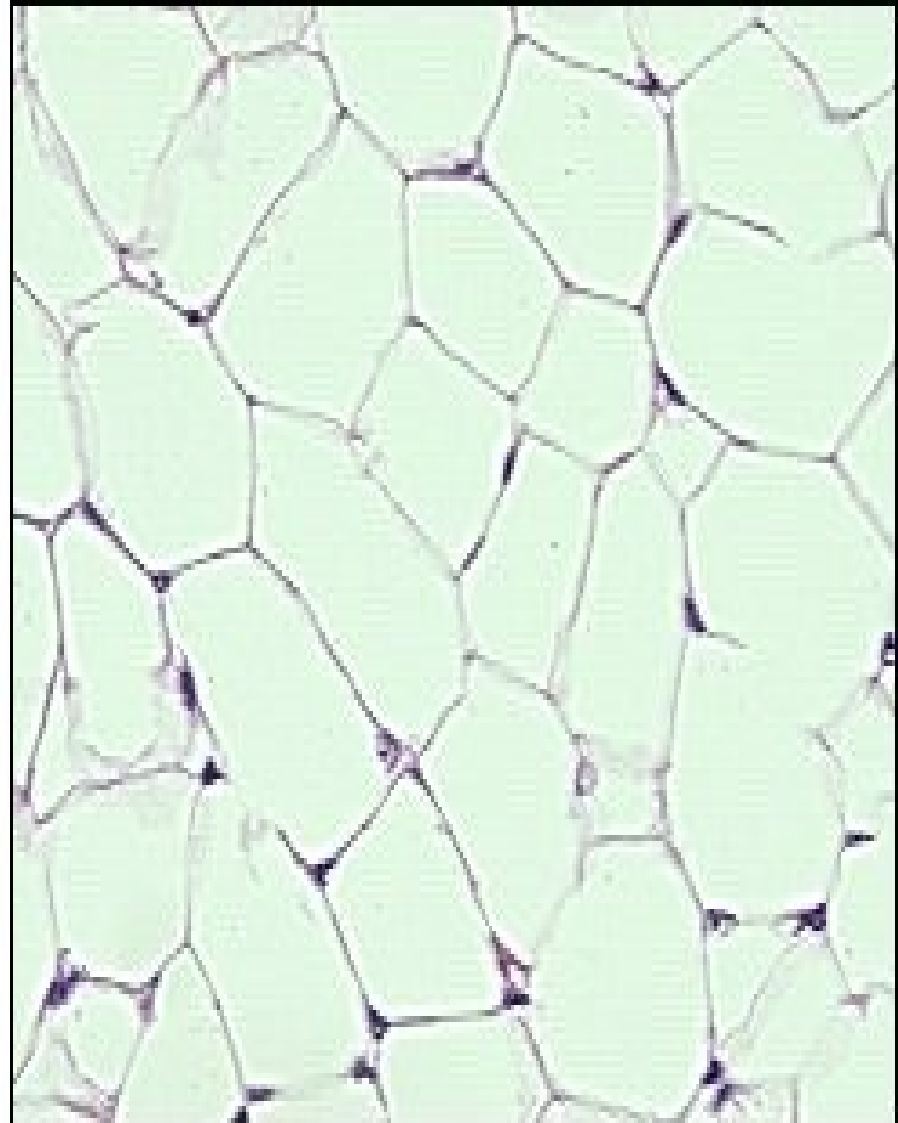
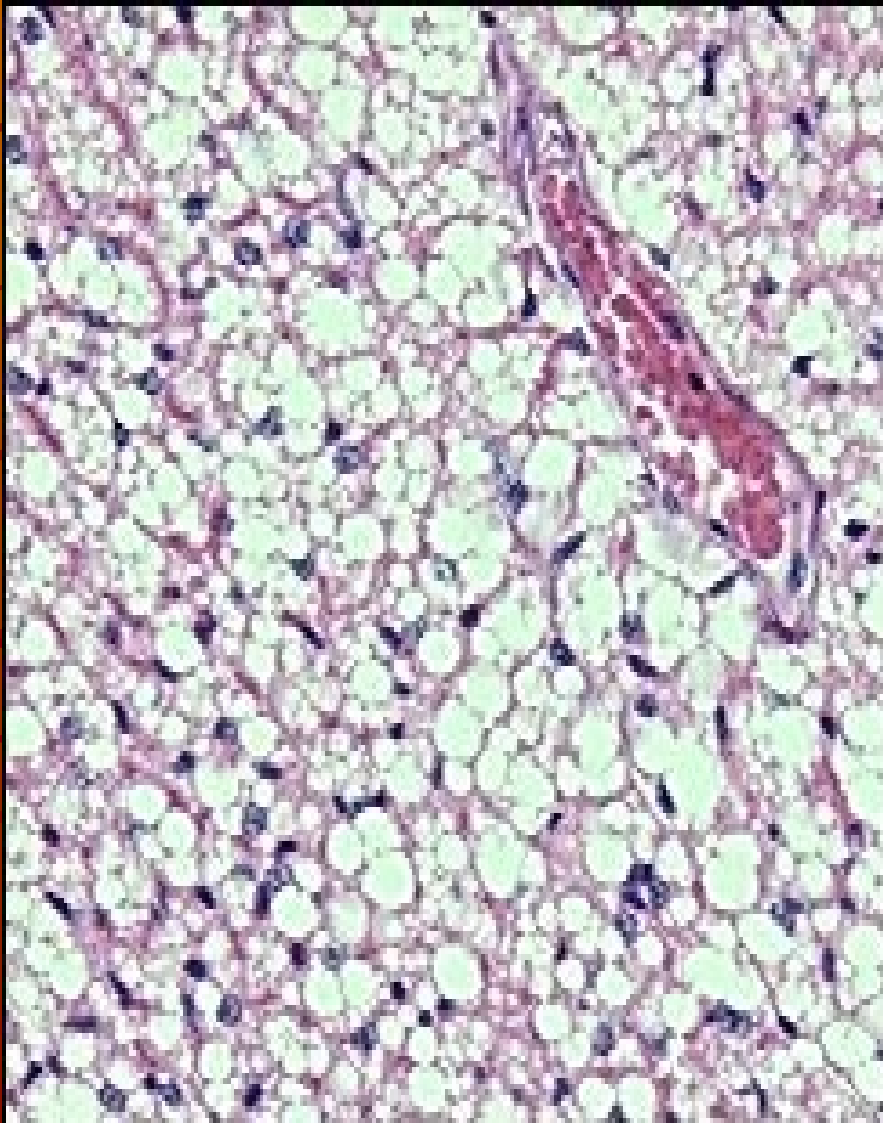
20 μ m

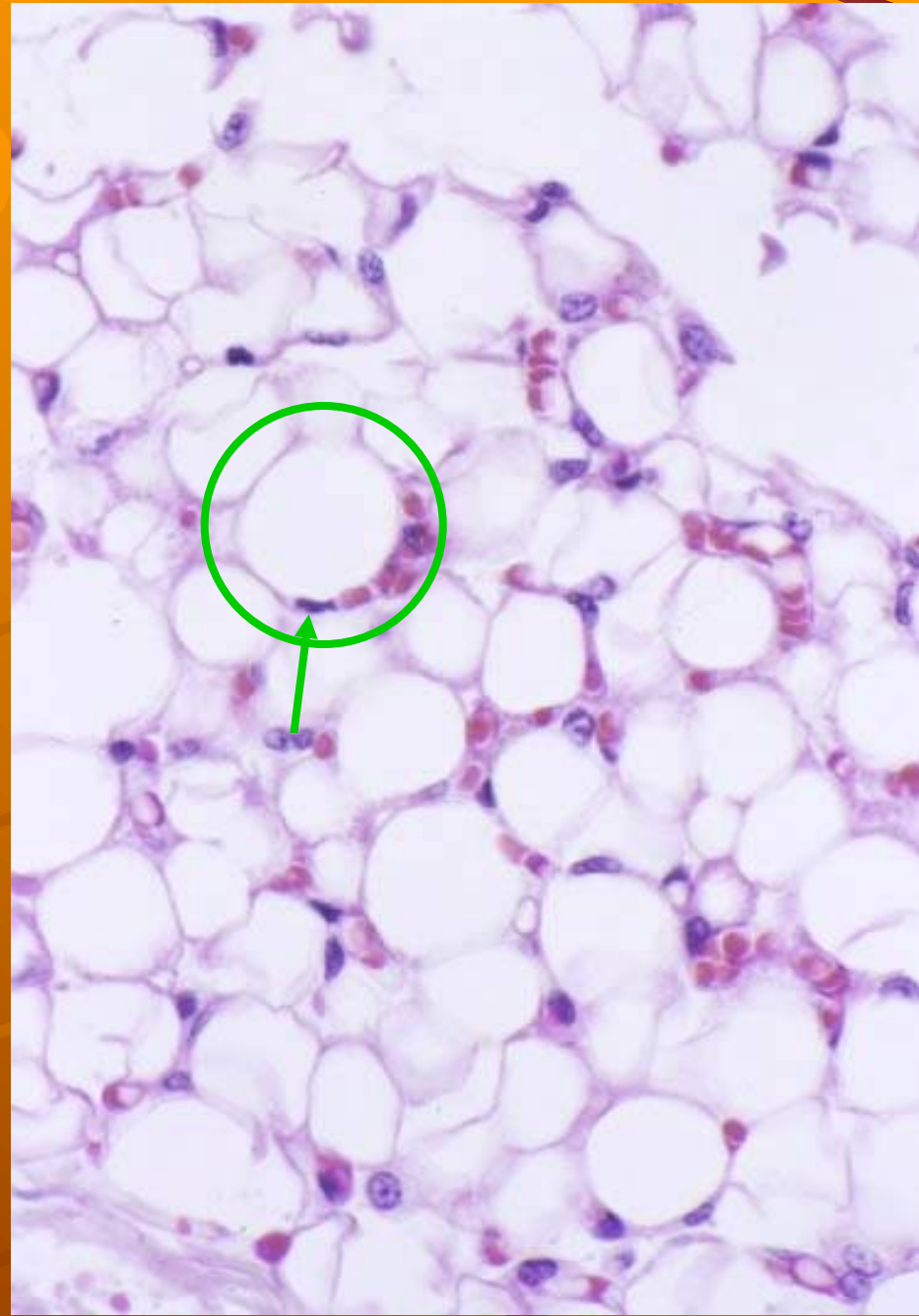
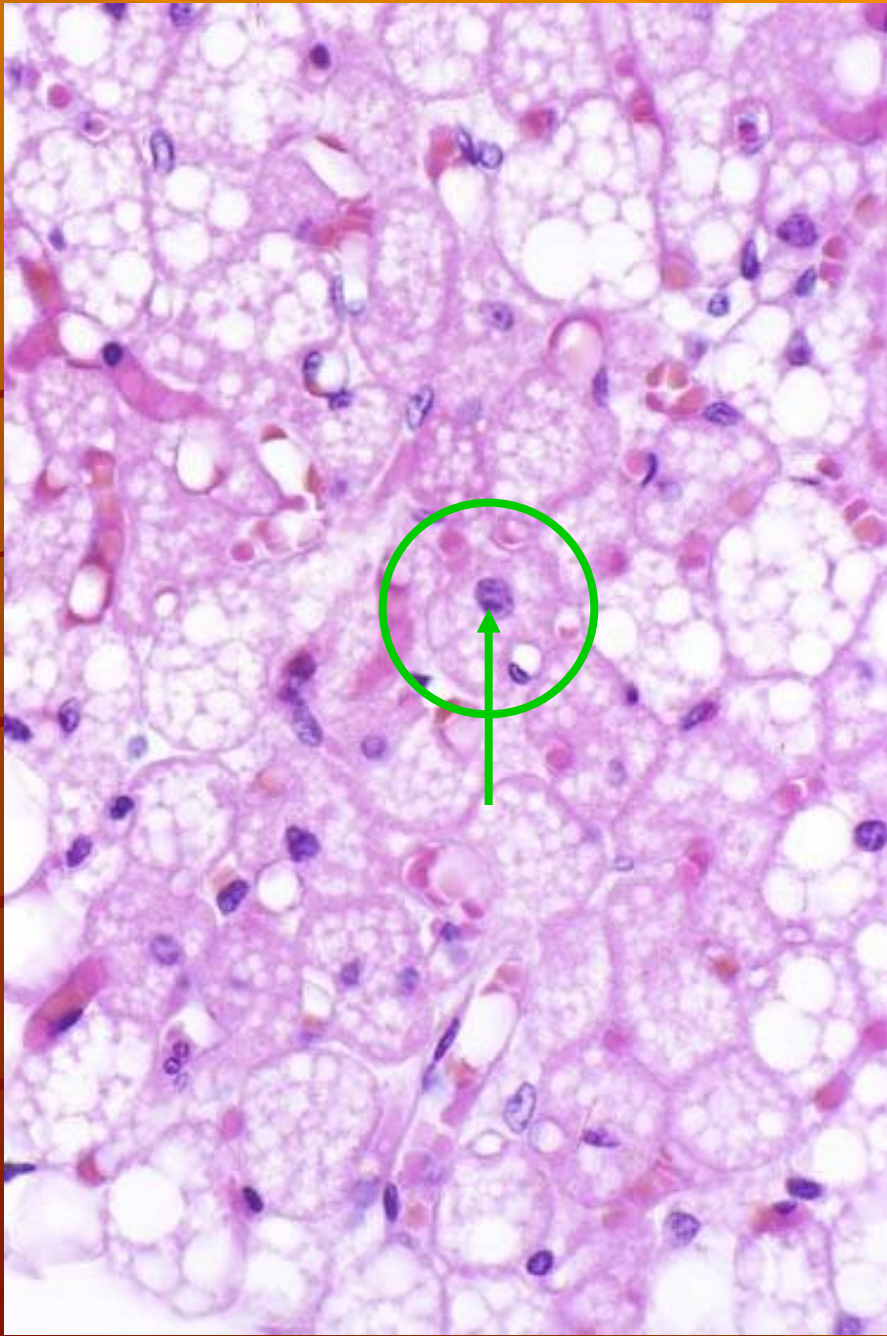


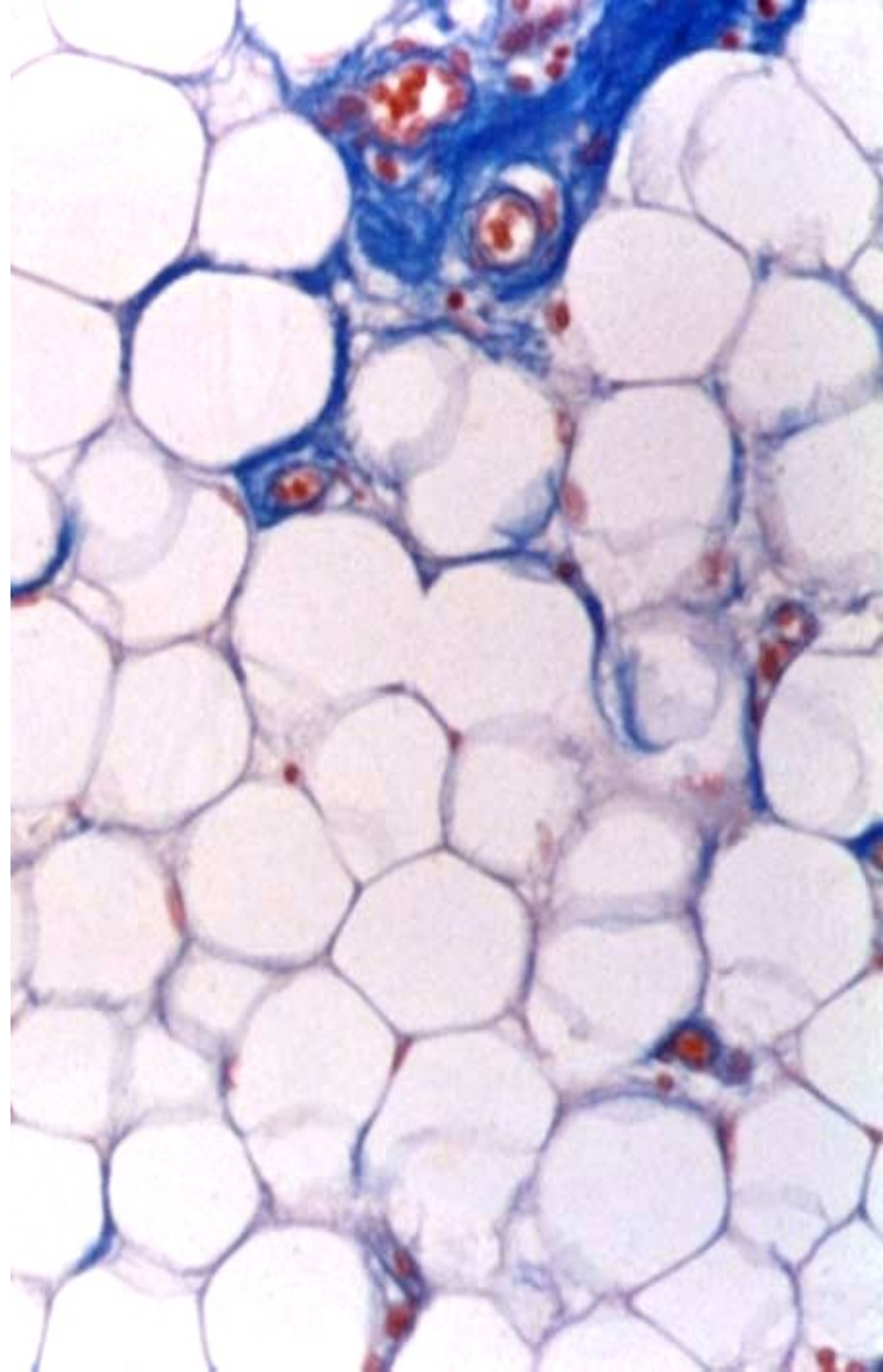
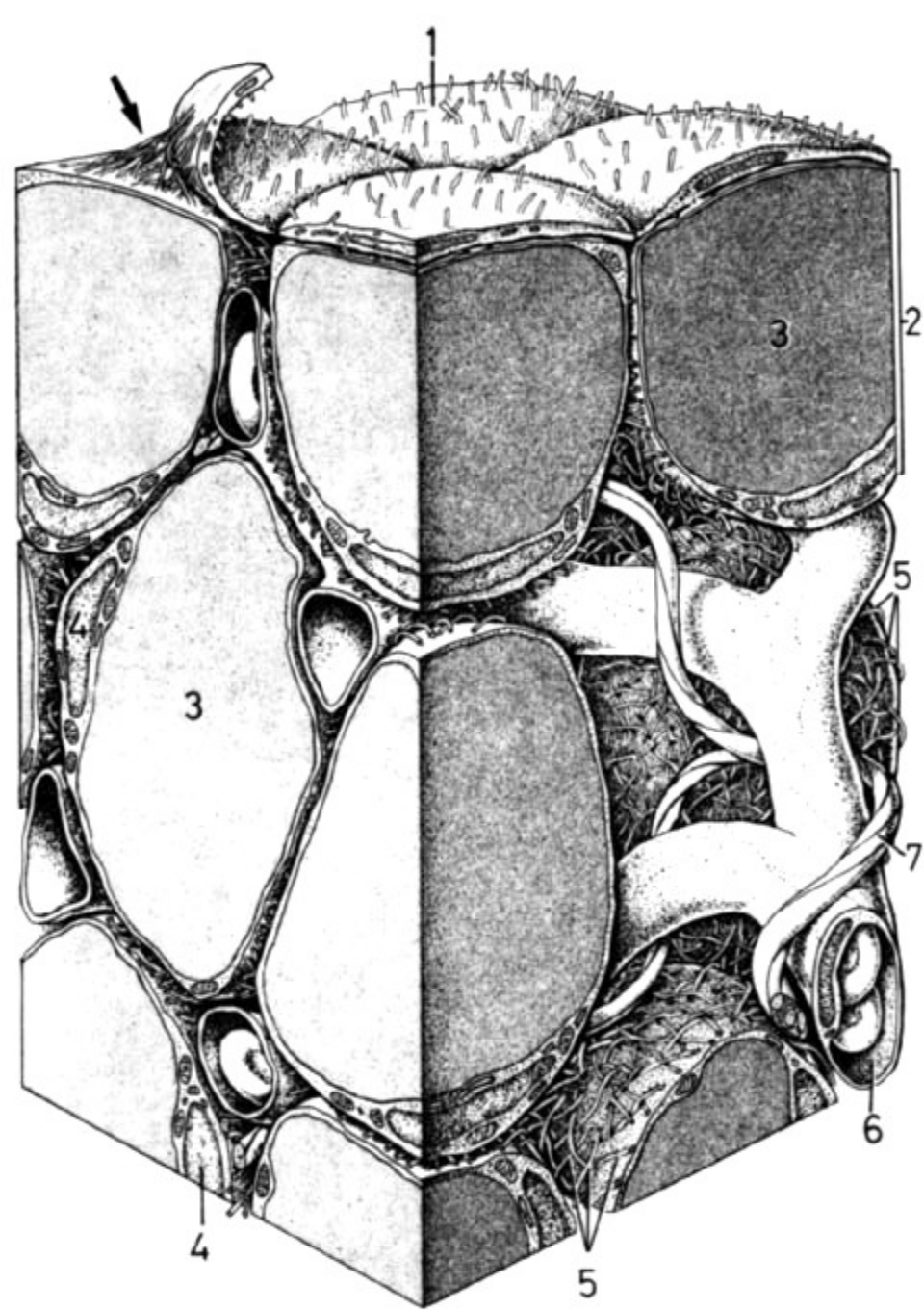
Tukové v.

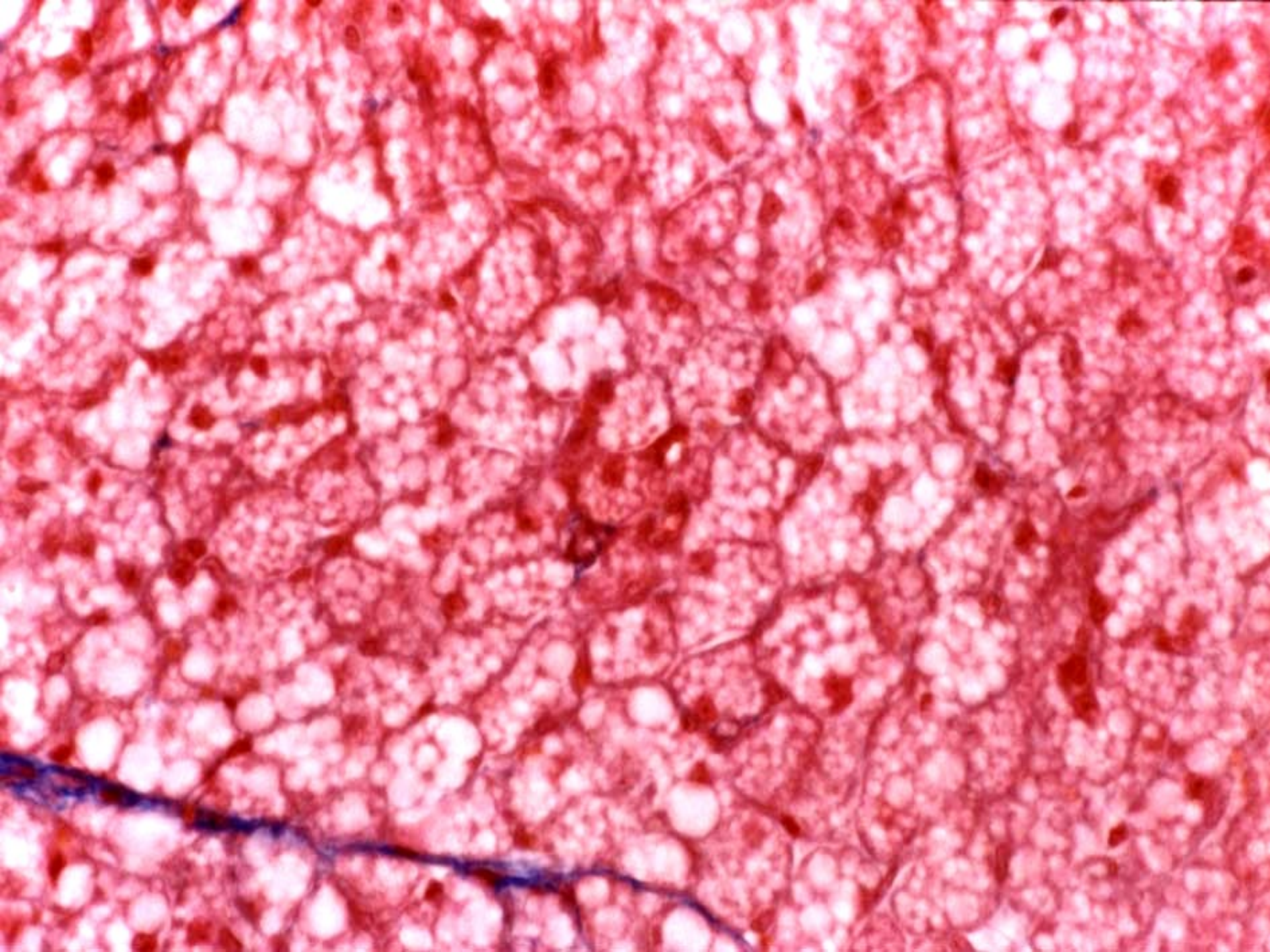
hnědé

bílé









Děkuji za pozornost

