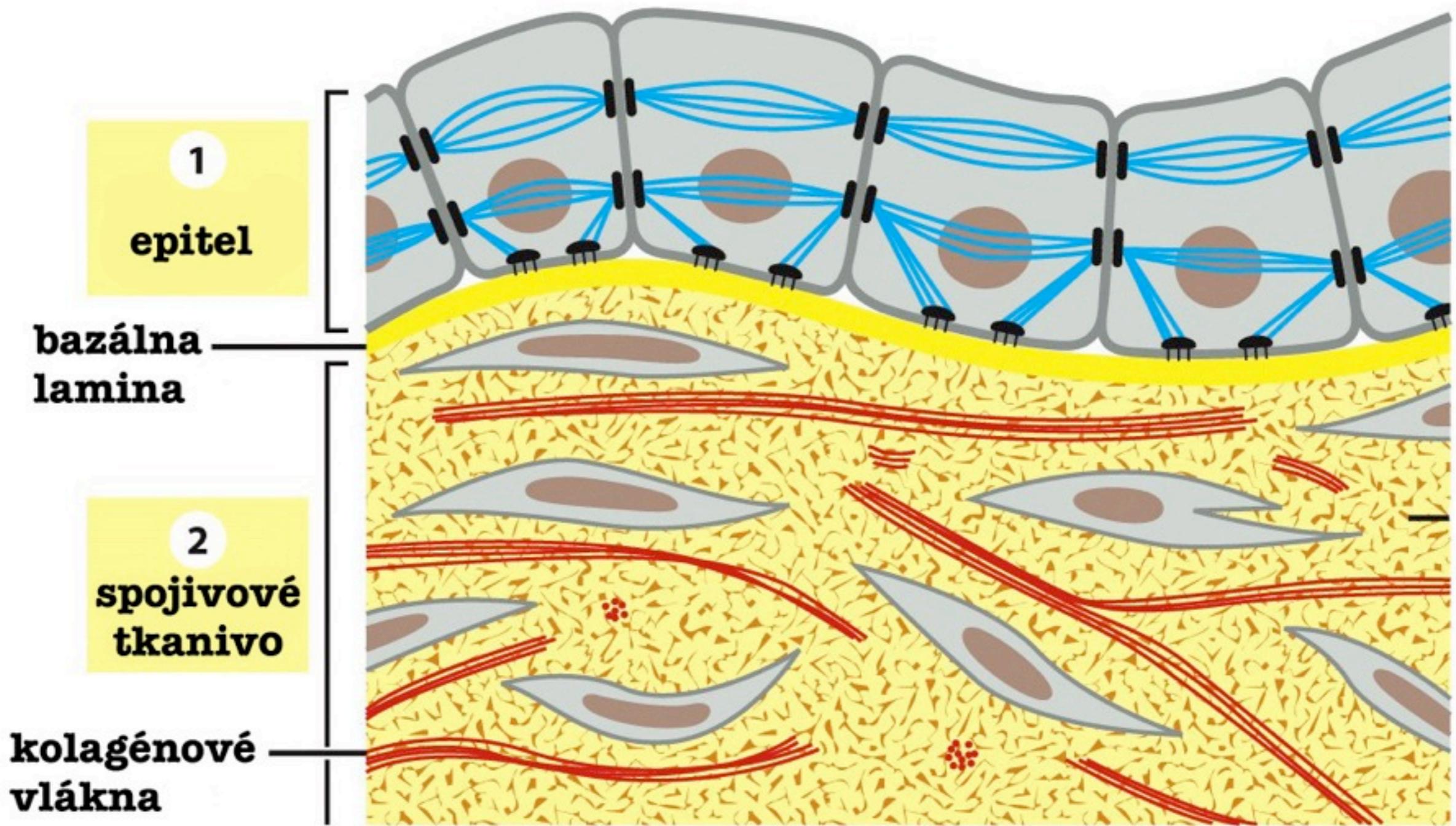


# **Bunkové spojenia a extracelulárna matrix**



# Funkčná klasifikácia bunkových spojení

## OCCLUDING JUNCTIONS

1. tight junctions (vertebrates only)
2. septate junctions (invertebrates mainly)

**tesné spoje**

## ANCHORING JUNCTIONS

Actin filament attachment sites

1. cell-cell junctions (adherens junctions)
2. cell-matrix junctions (focal adhesions)

**adhézne spoje**

Intermediate filament attachment sites

1. cell-cell junctions (desmosomes)
2. cell-matrix junctions (hemidesmosomes)

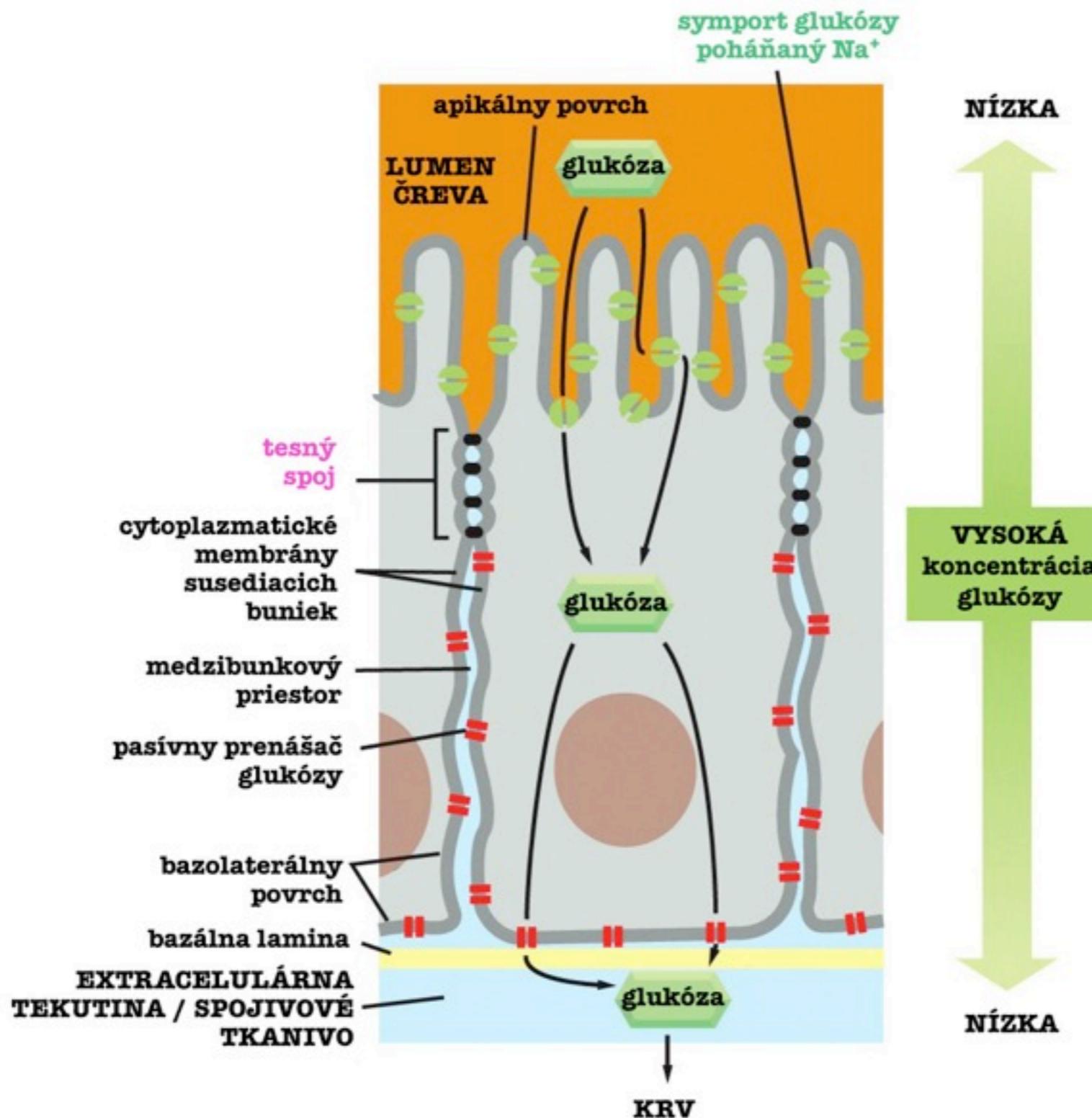
**desmozómy**  
**hemidesmozómy**

## COMMUNICATING JUNCTIONS

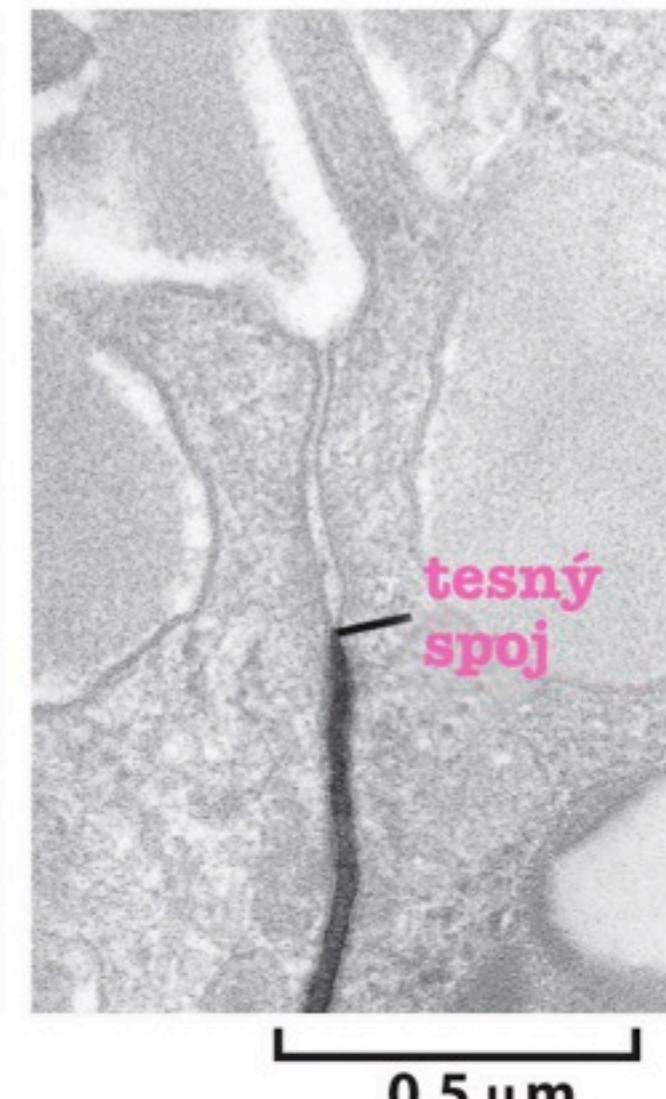
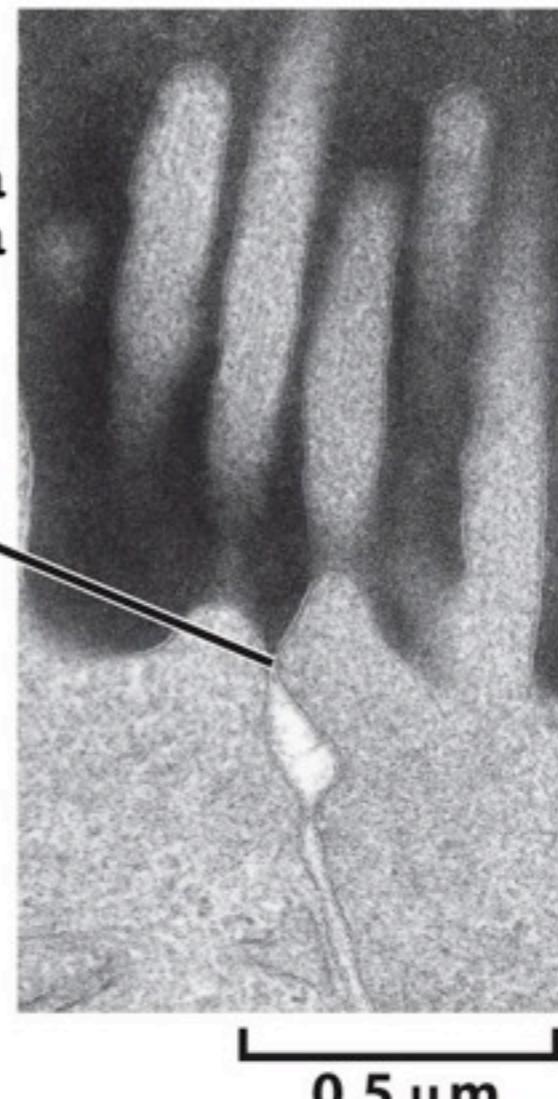
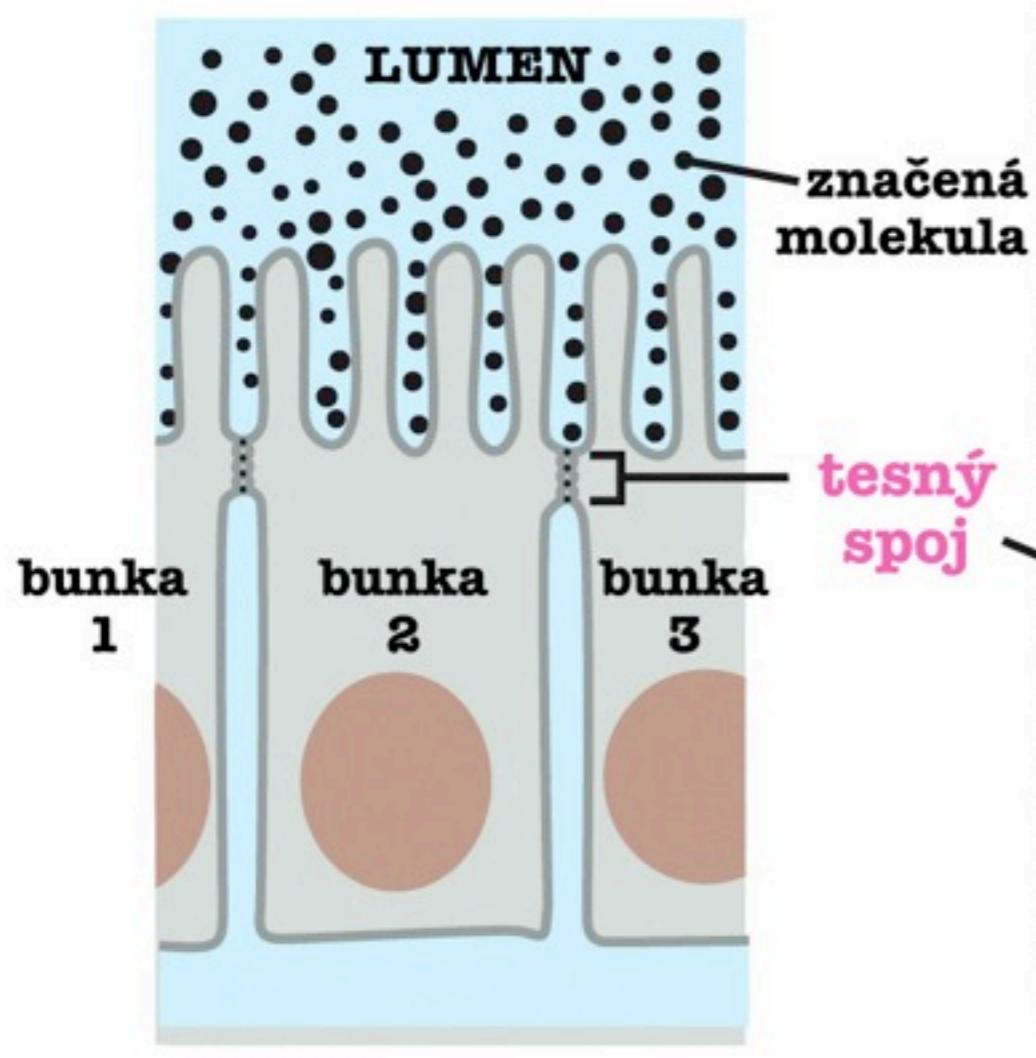
1. gap junction
2. chemical synapses
3. plasmodesmata (plants only)

**štrbinové spoje**  
chemické synapsy  
**plazmodezmy**

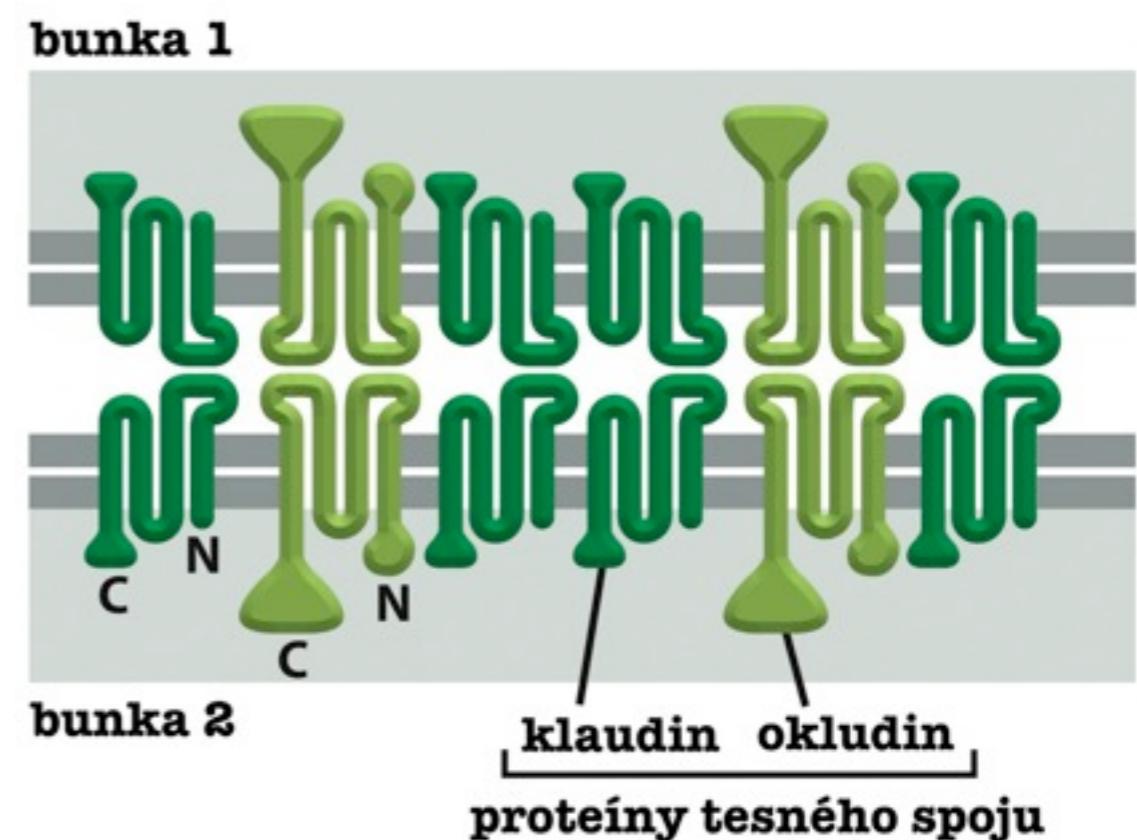
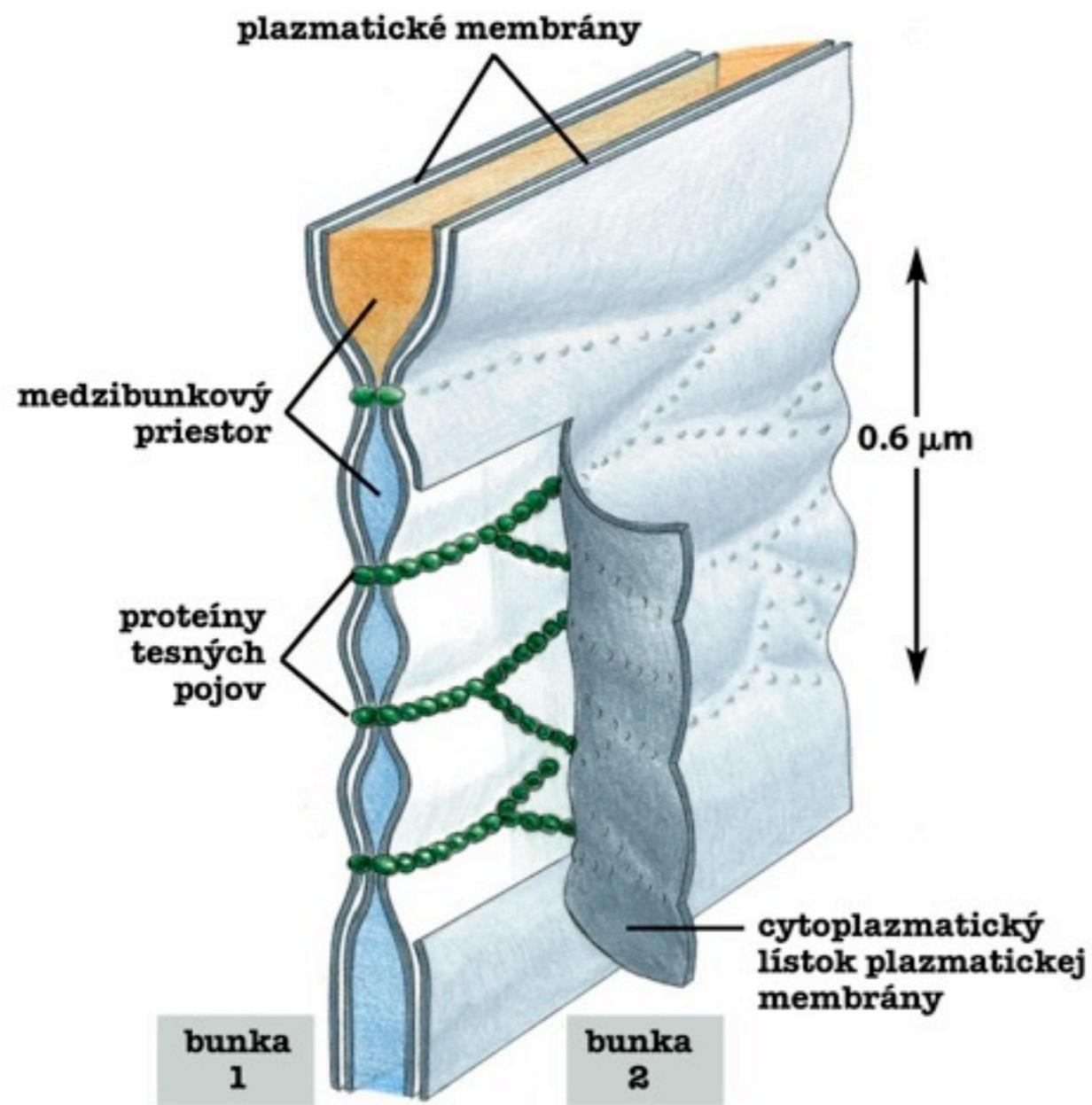
# Tesné spoje bránia difúzii látok pomedzi bunky



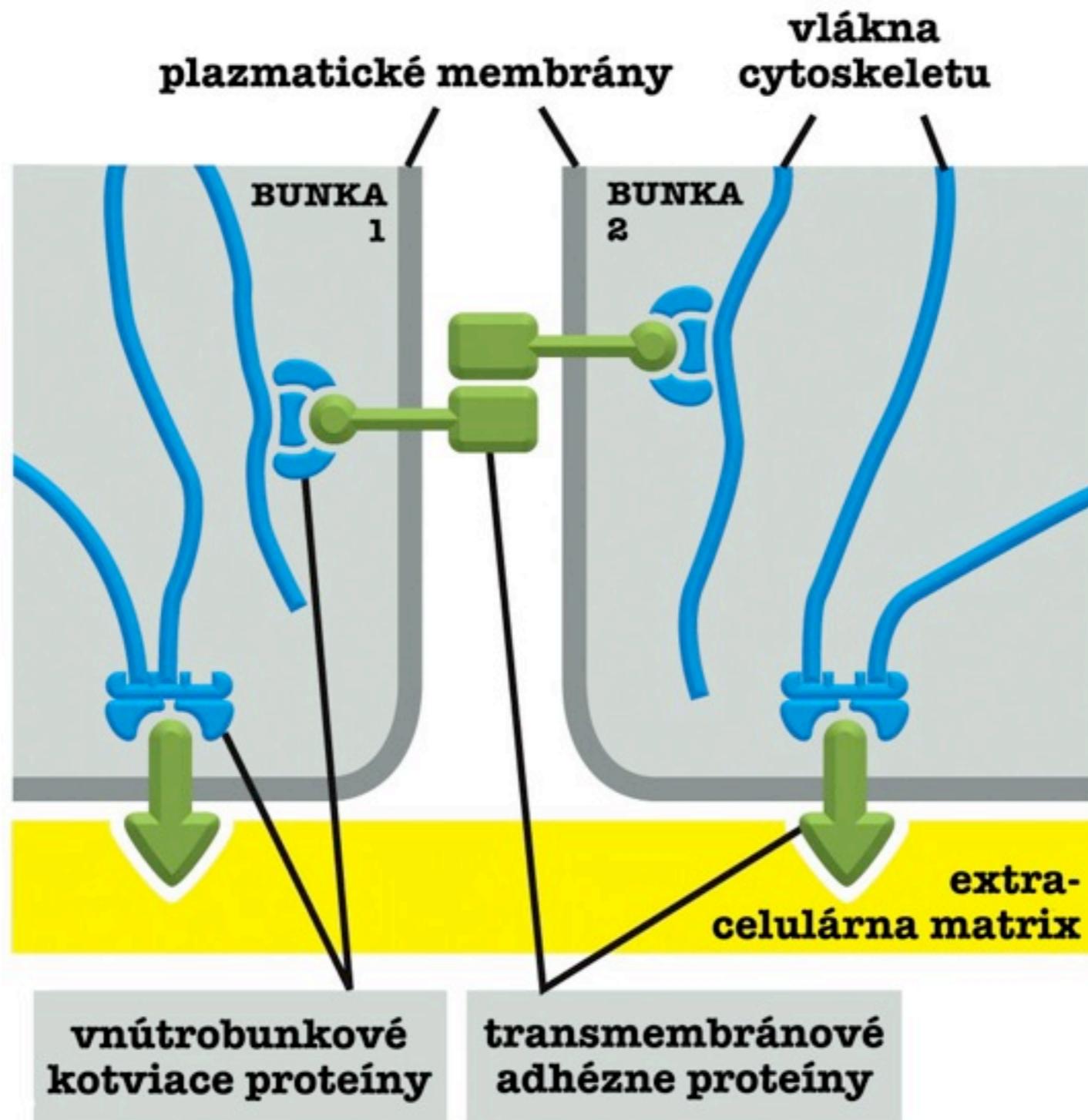
# Tesný spoj



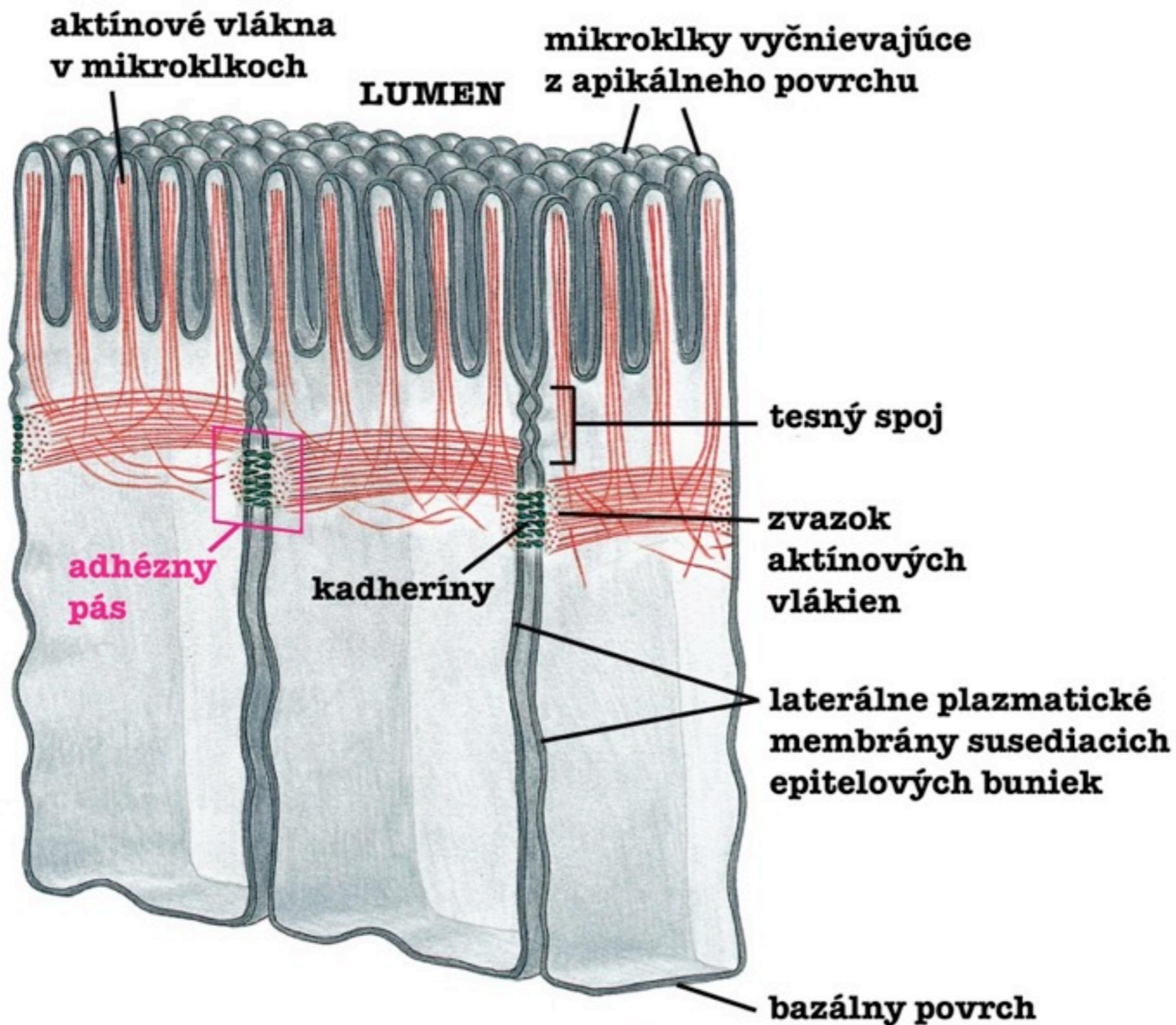
# Model tesného spoja



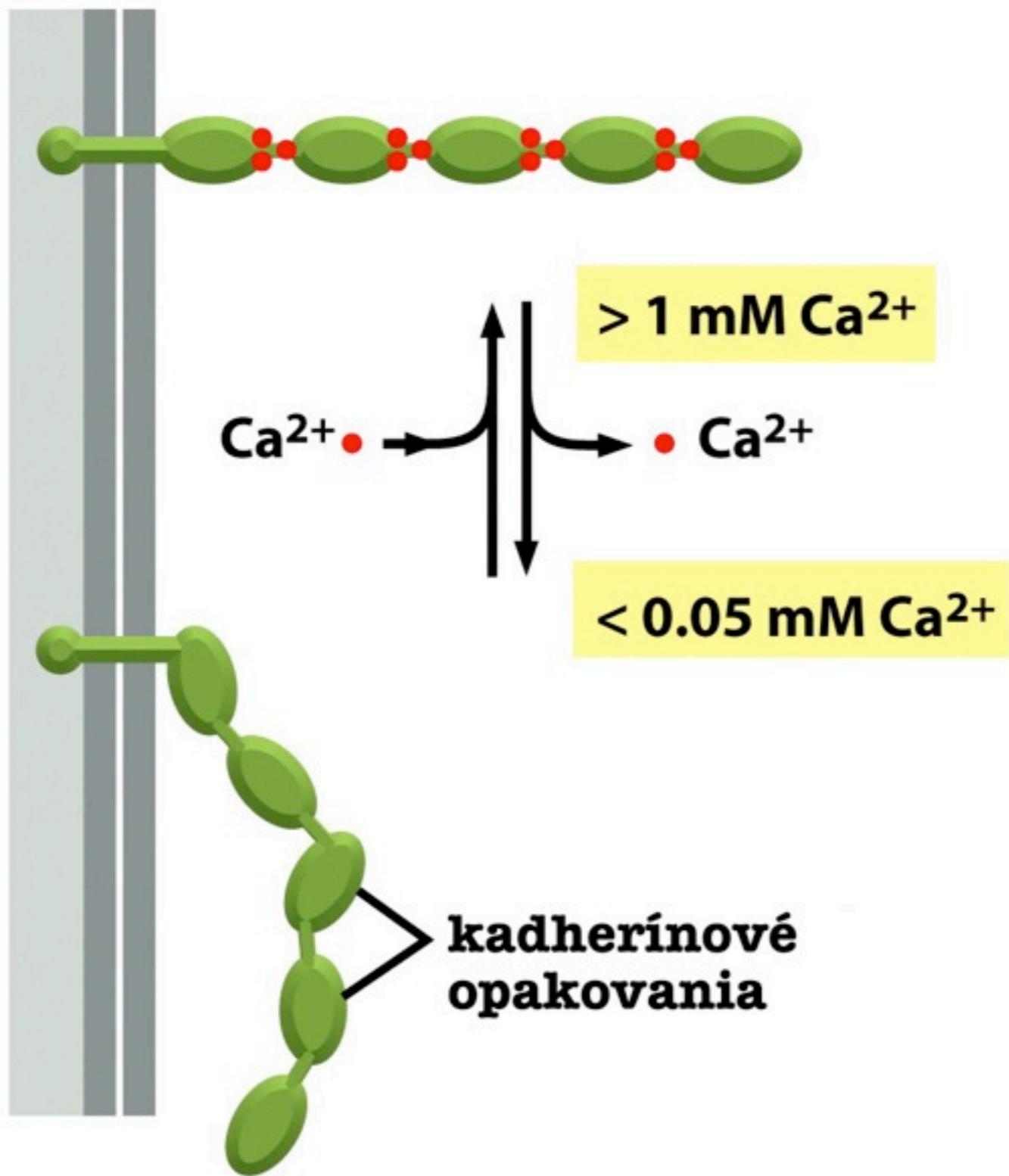
# Adhézne spoje



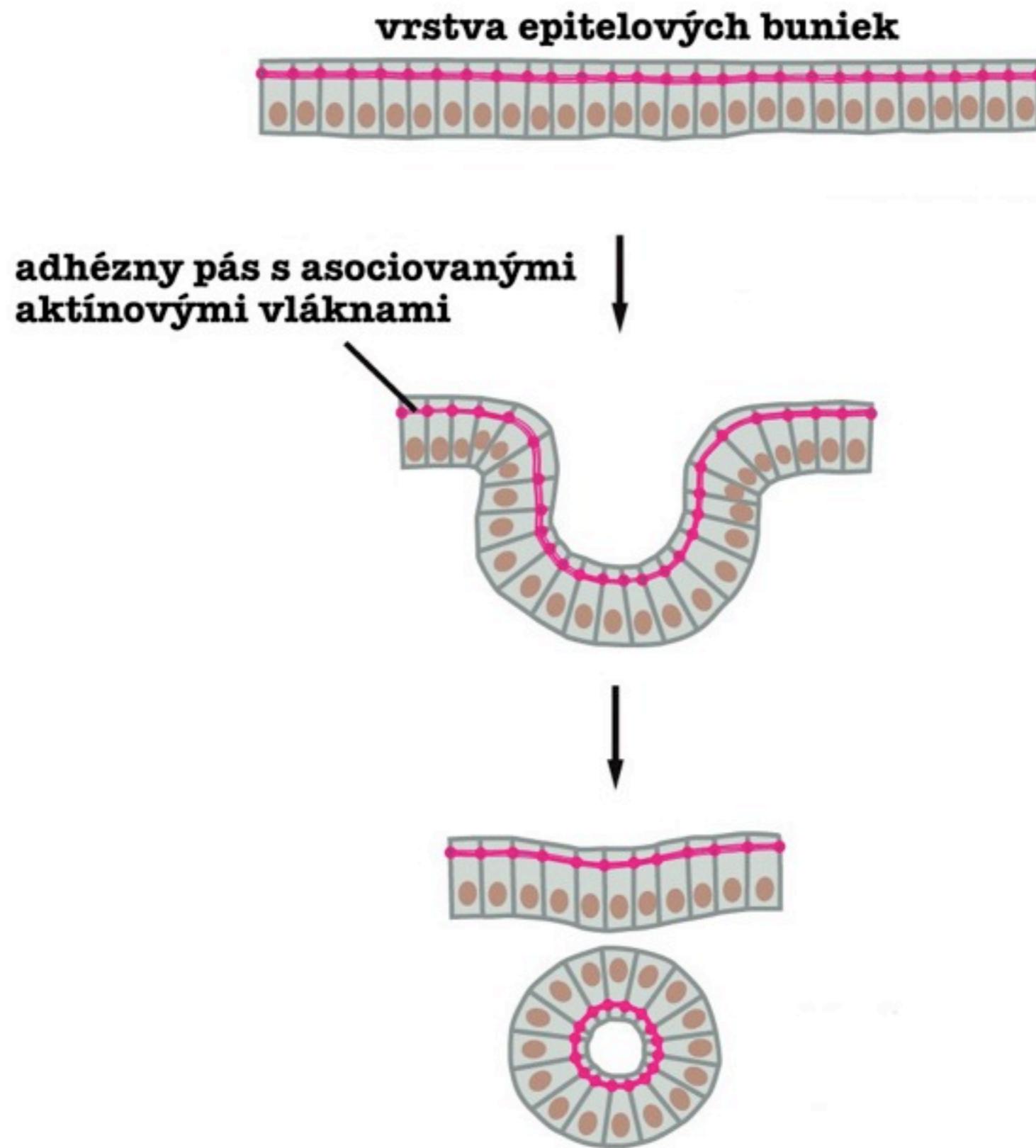
# Adhézne spoje



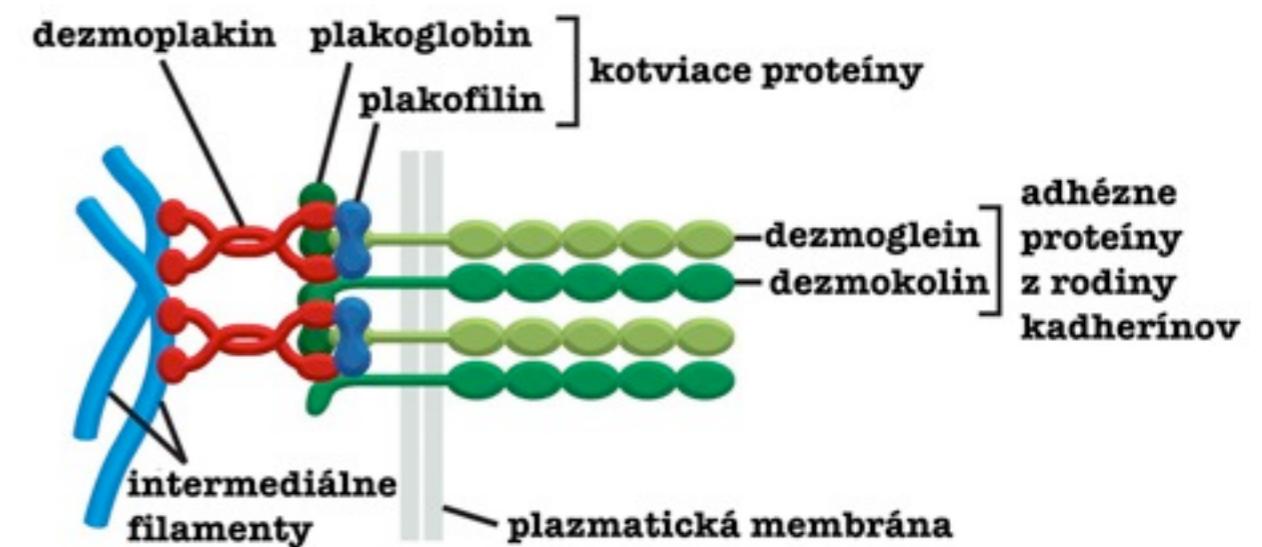
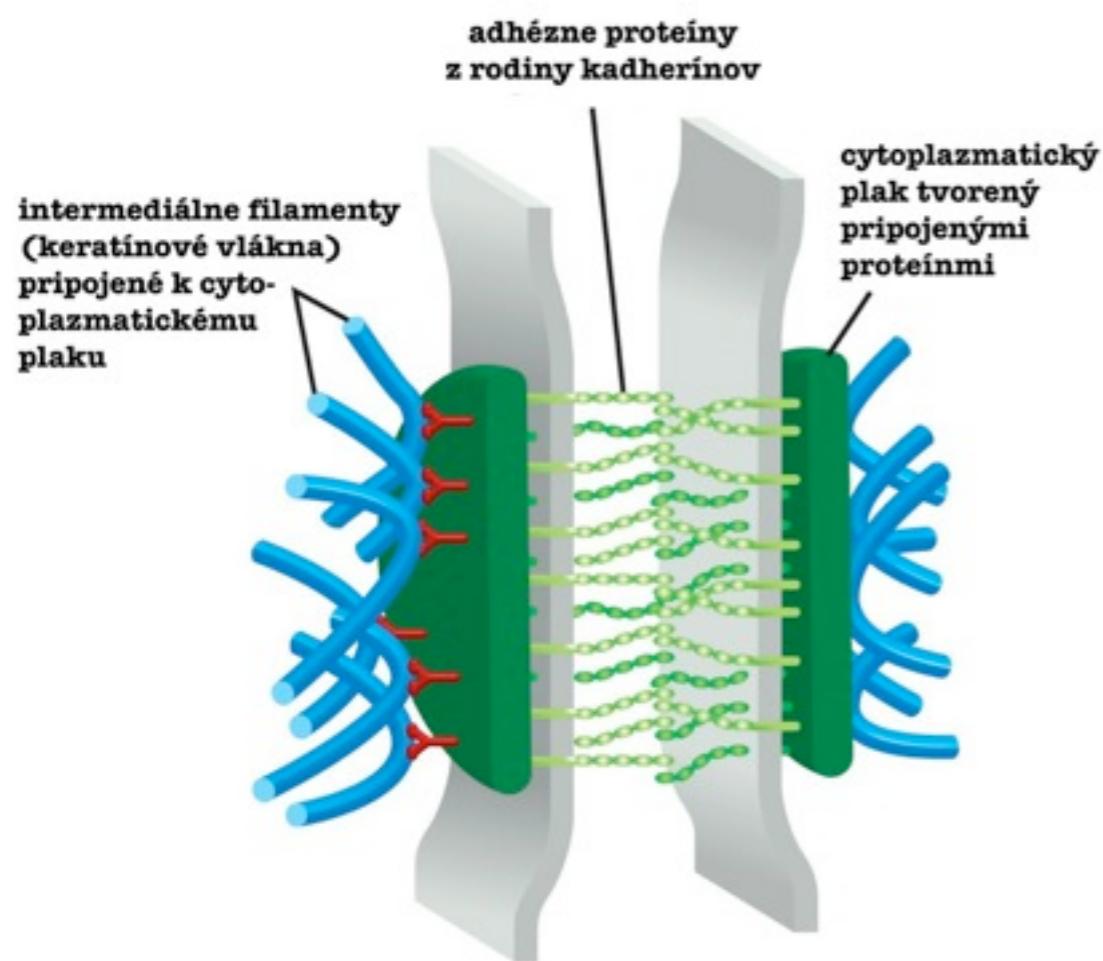
# Kadherín



# Adhézny pás



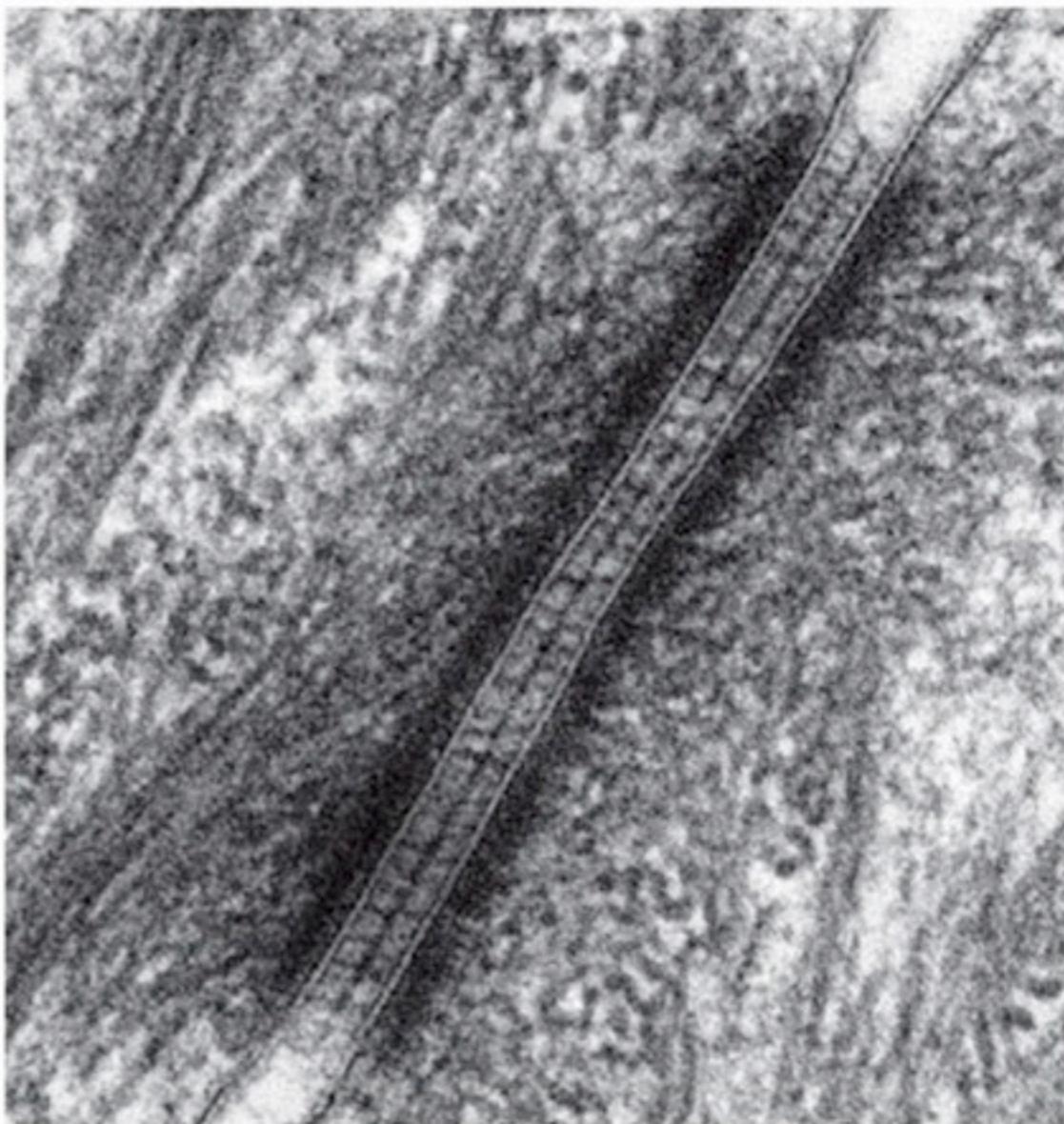
# Dezmozómy



# Dezmozómy

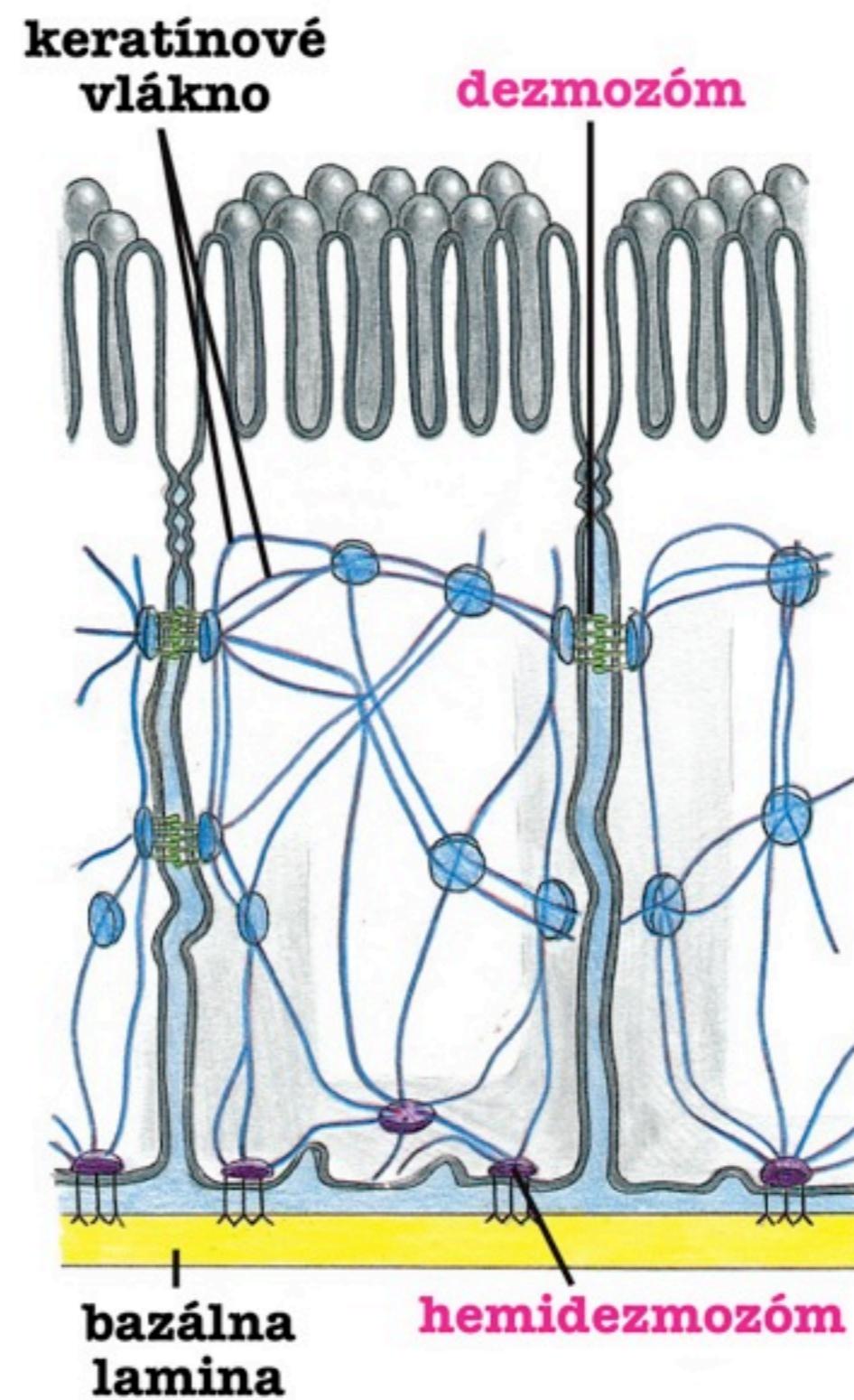


0.5 μm

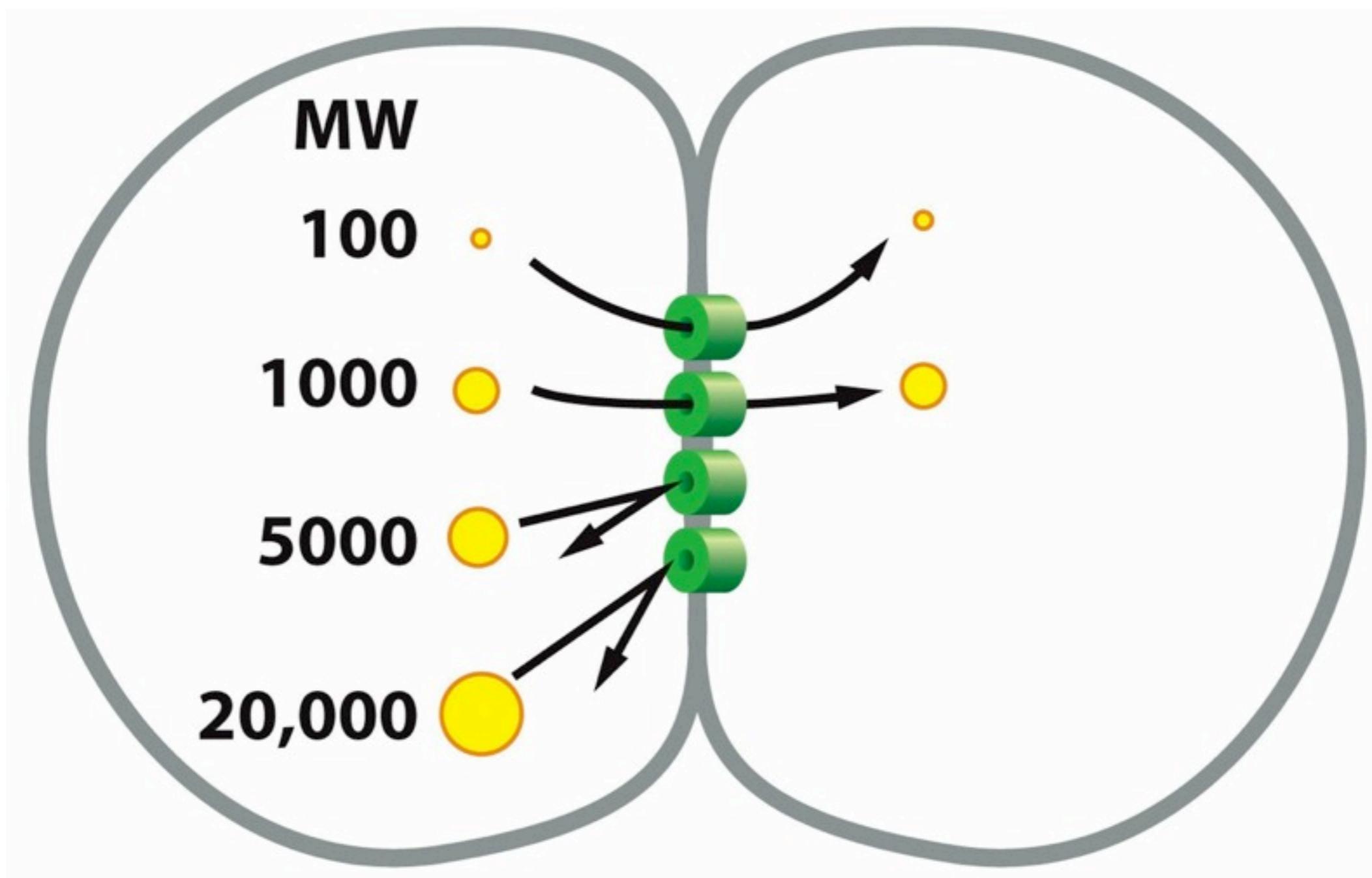


100 nm

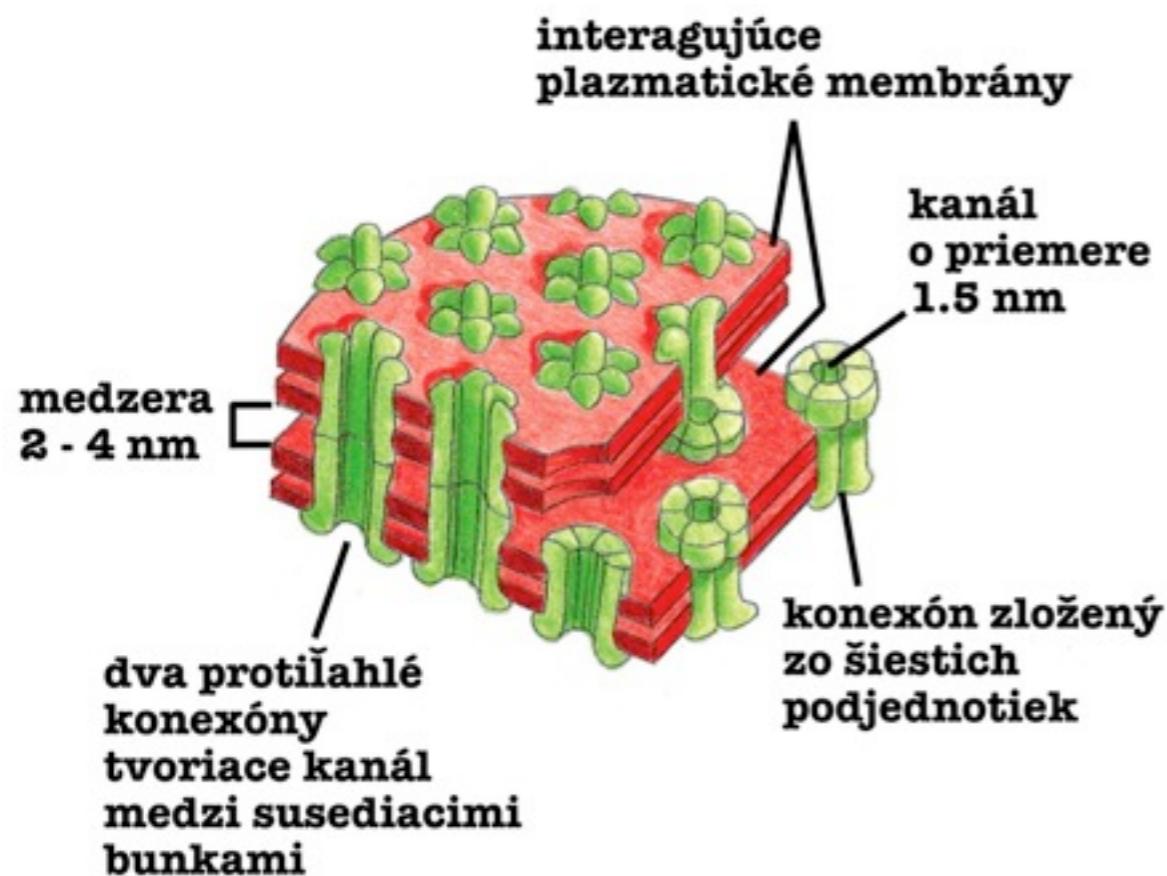
# Dezmozómy a hemidezmozómy



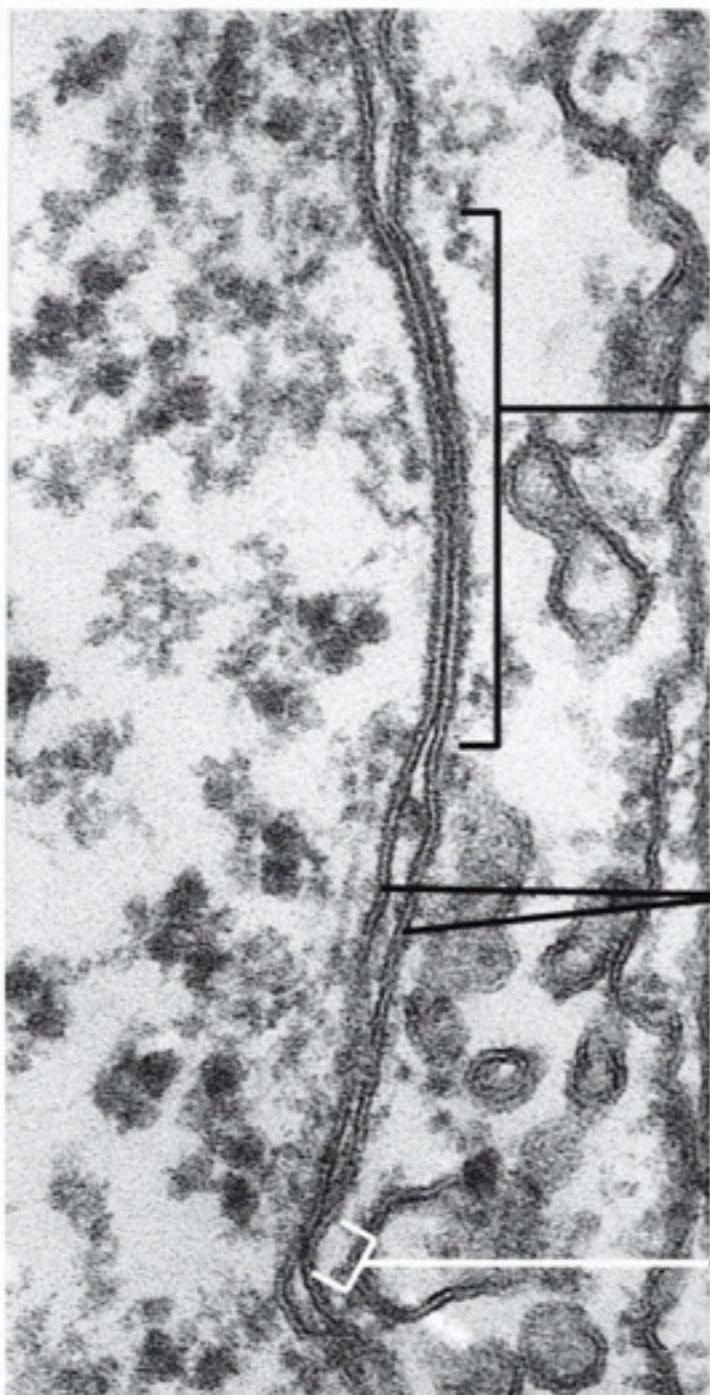
## Štrbinové spoje



# Štrbinové spoje



# Štrbinové spoje

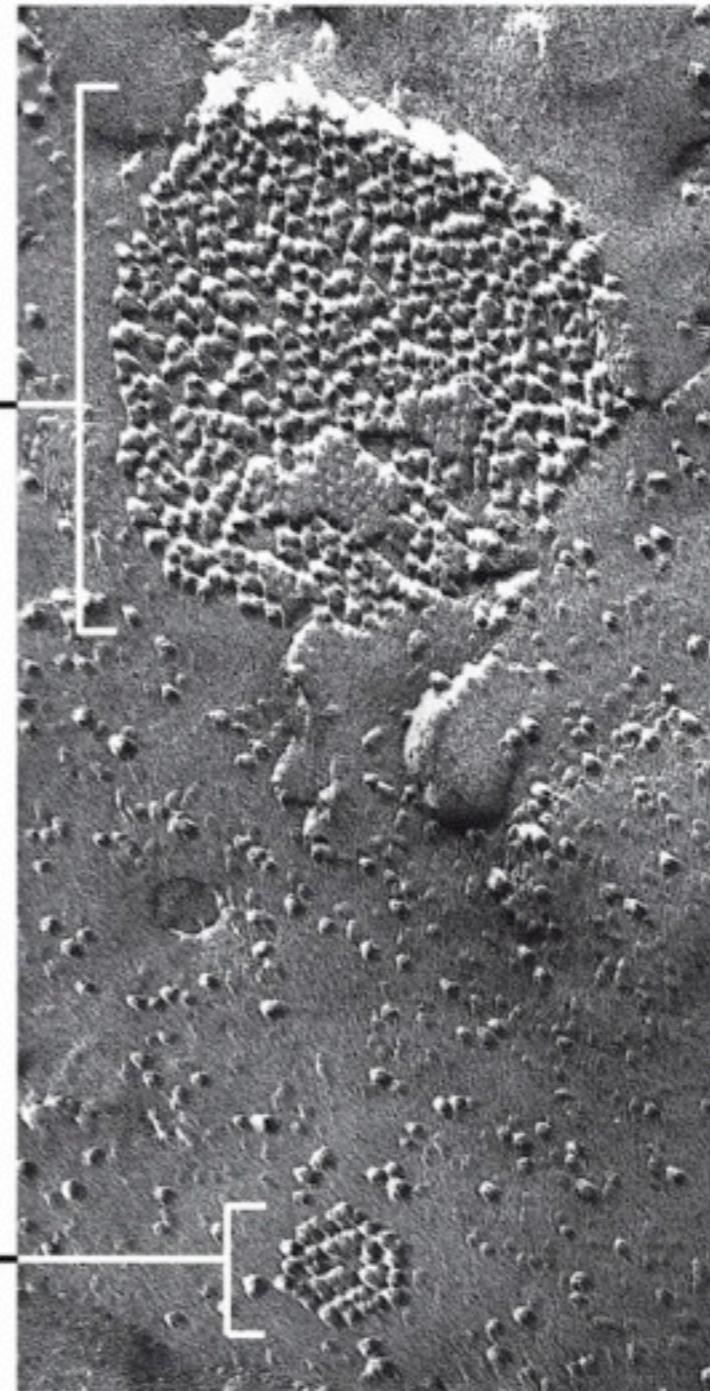


100 nm

velký  
štrbinový  
spoj

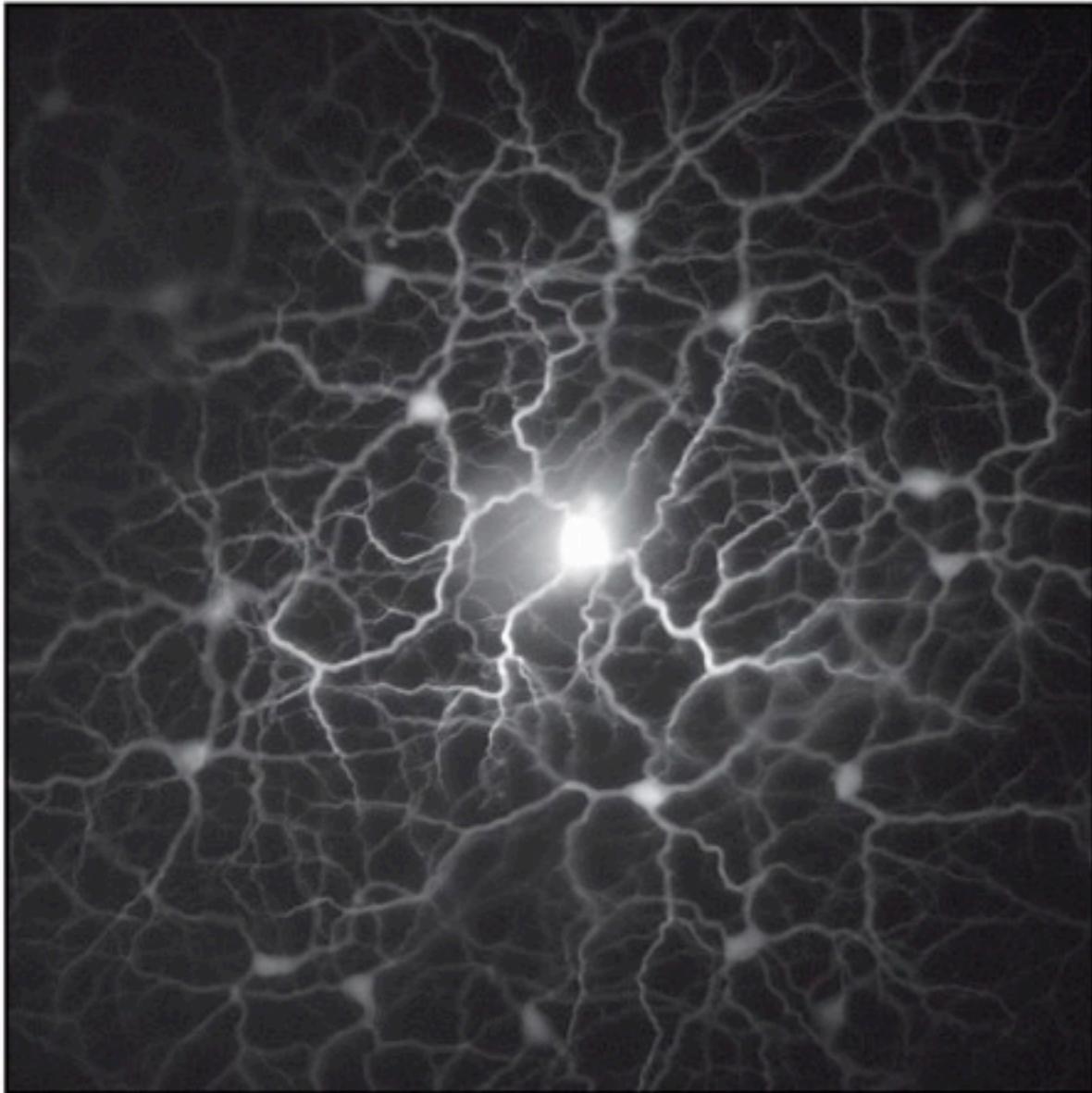
membrány

malý  
štrbinový  
spoj



100 nm

# Štrbinové spoje môžu byť regulované

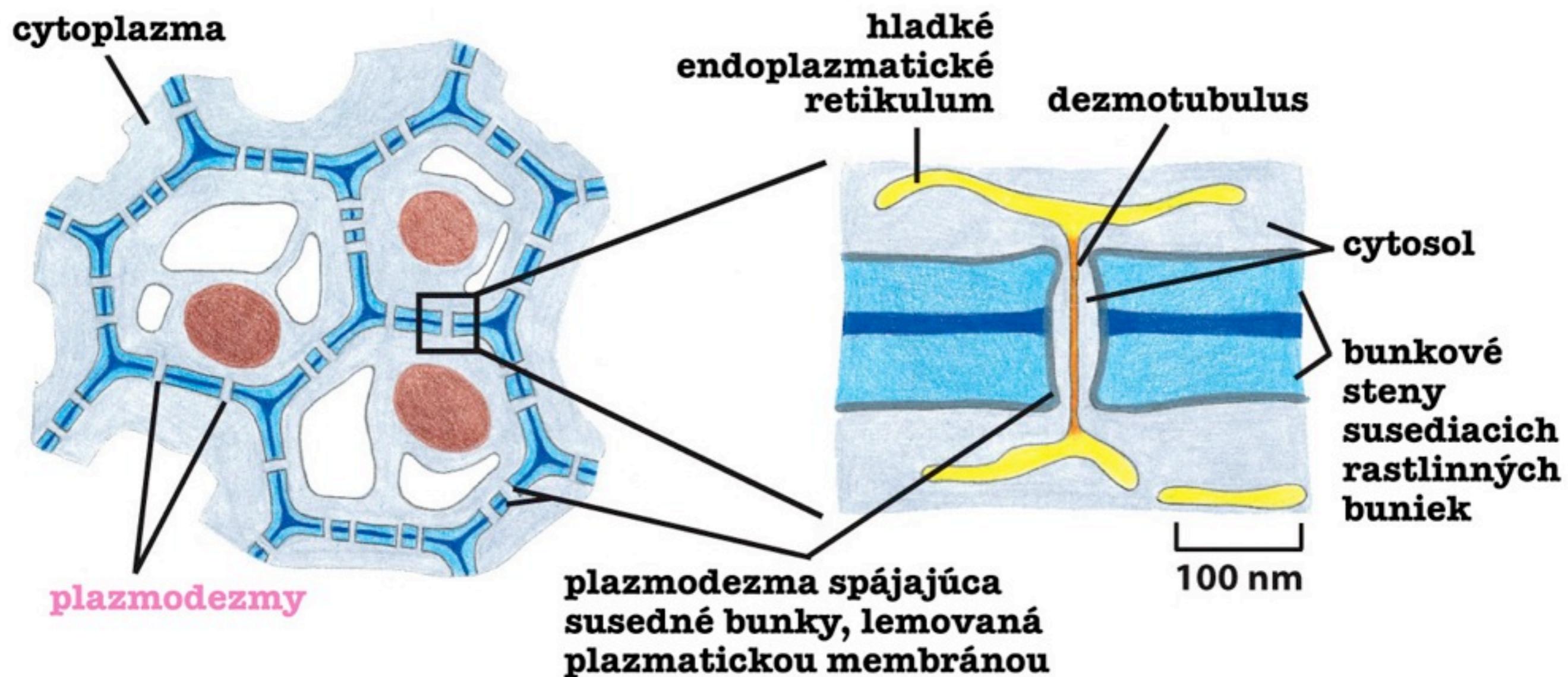


Neuróny sietnice králika s injektovanou fluorescenčnou farbičkou

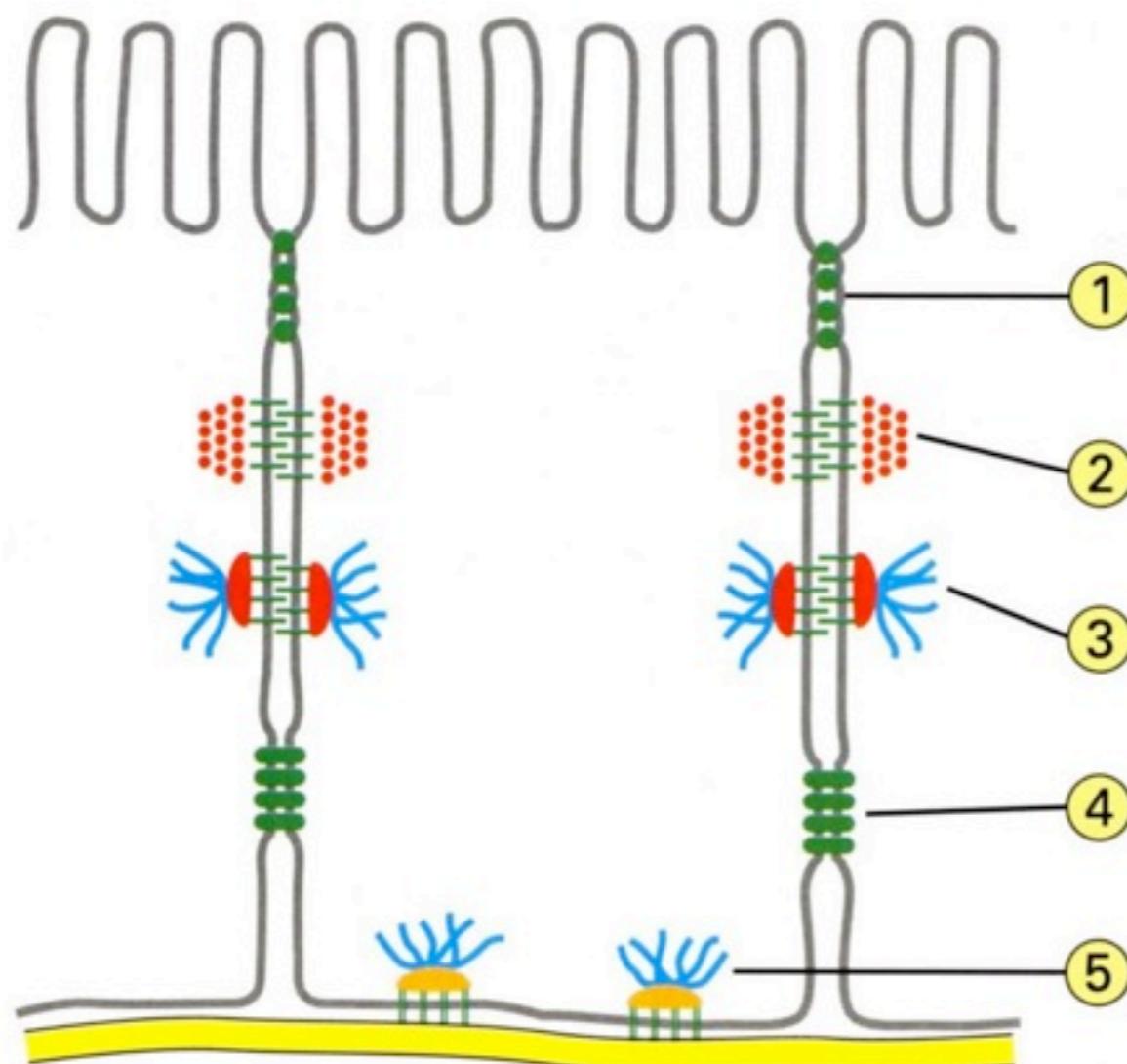
- dopamín

+ dopamín

# Plazmodezmy v rastlinách

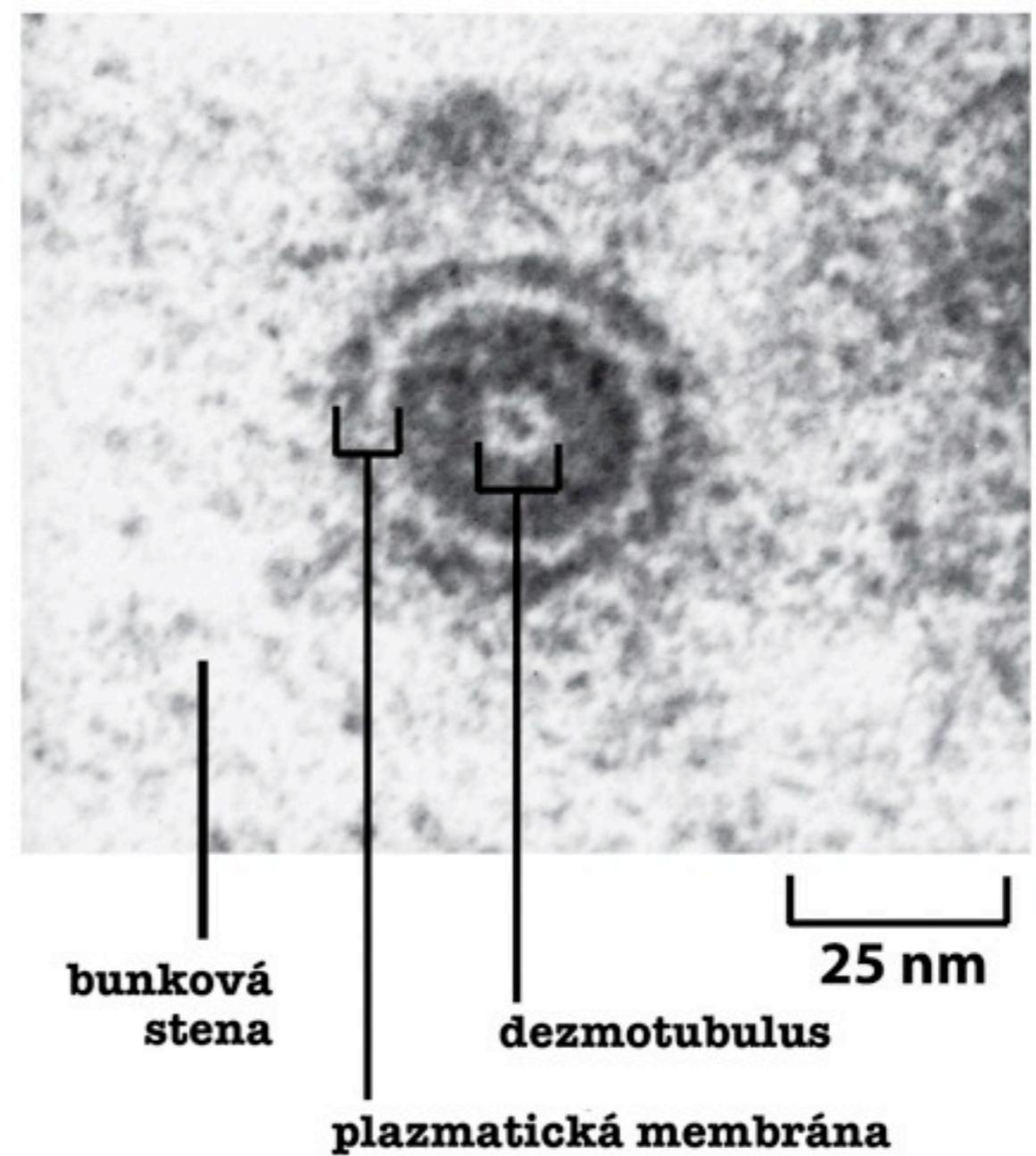
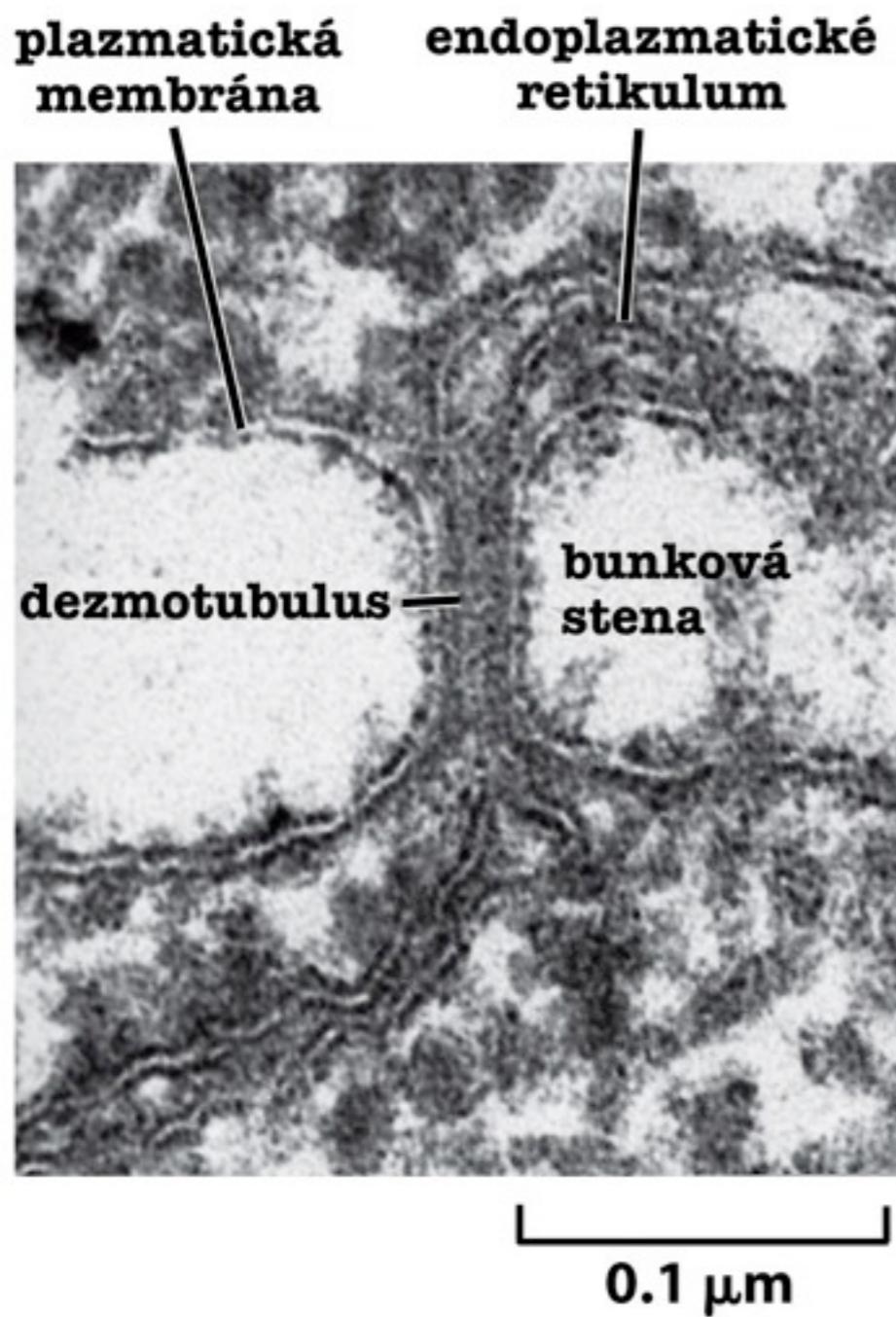


# Bunkové spojenia - prehľad



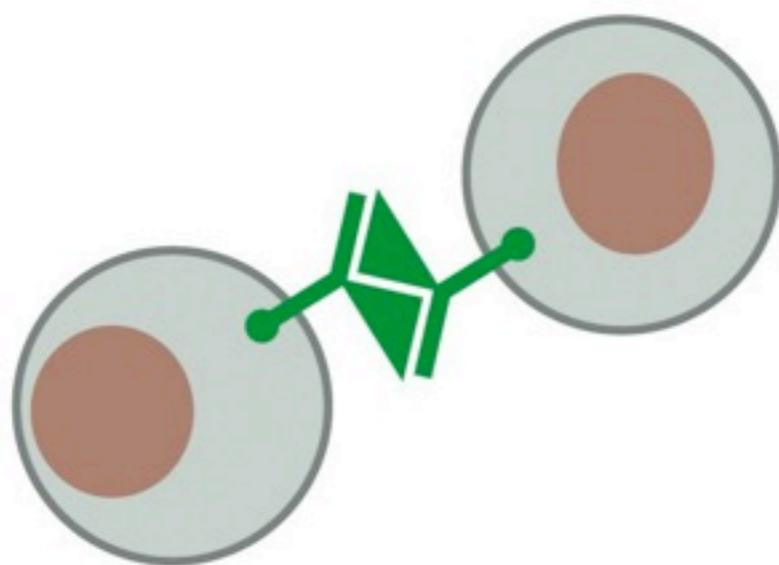
meno	funkcia
tesný spoj	tesní medzery bunkami, aby nedošlo k toku kvapaliny medzi nimi
adhézny spoj	spája zväzok aktínových vlákien jednej bunky s podobným zväzkom v susednej bunke
dezmozóm	bodový spoj, ktorý ukotvuje penvé intermediárne vlákna dvoch susedných buniek
štrbinový spoj	medzibunkový kanál, dovoluje rýchlu difúziu malých rozpustných molekúl a iónov medzi susednými bunkami
hemidezmozóm	kotví intermediárne filamenty bunky k bazálnej lamine

# Plazmodezmy v rastlinách

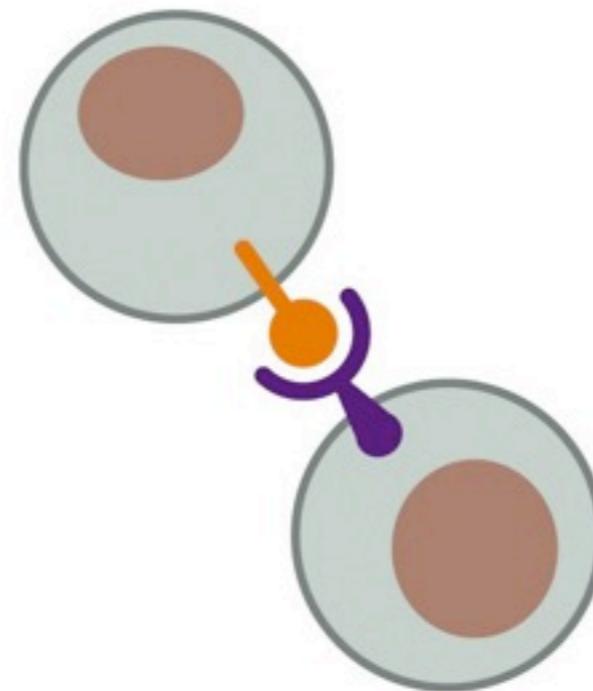


# Bunková adhézia

Molekuly bunkovej adhézie - cell adhesion molecules (CAM)



**HOMOFILNÉ**

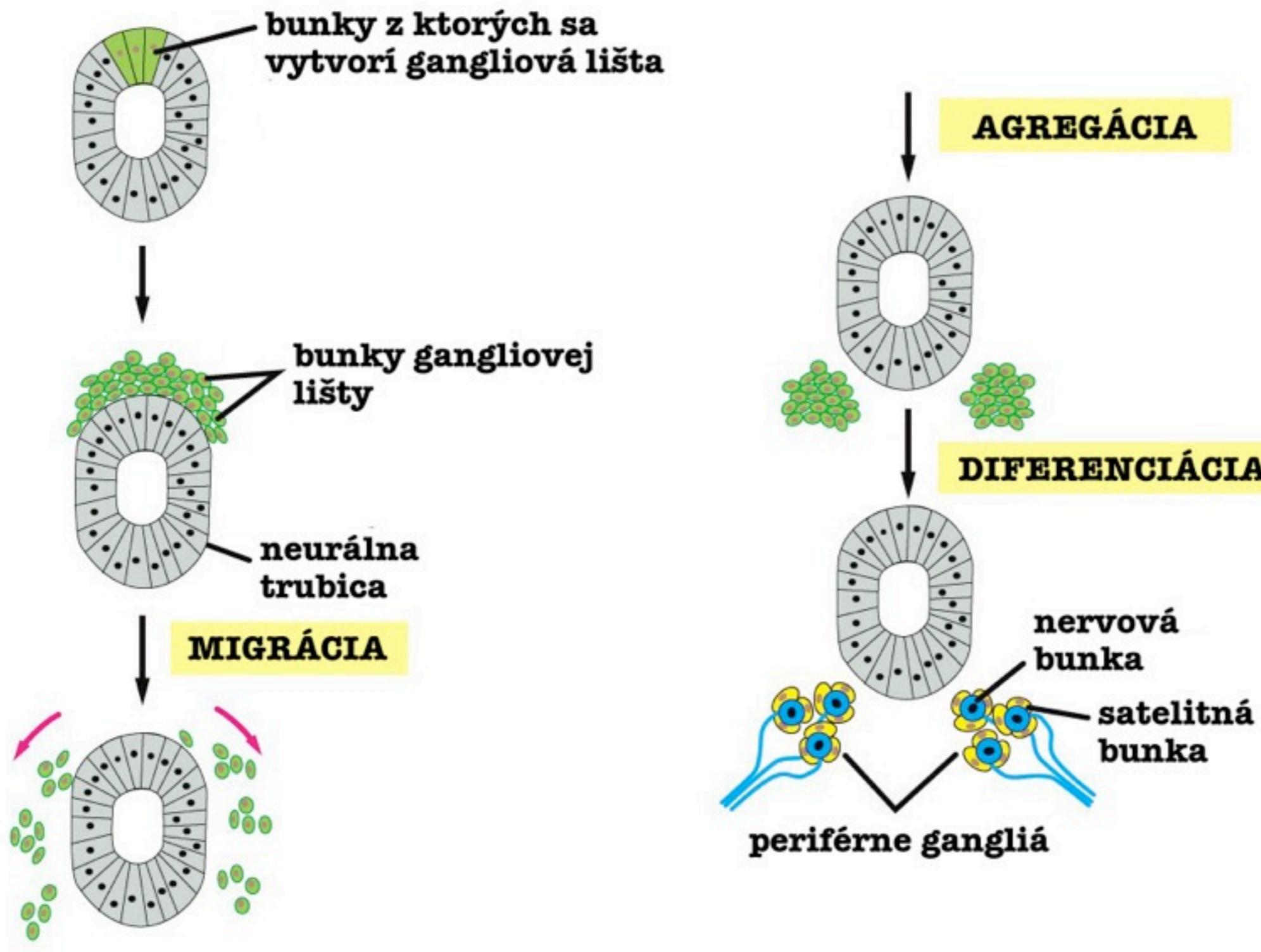


**HETEROFILNÉ**

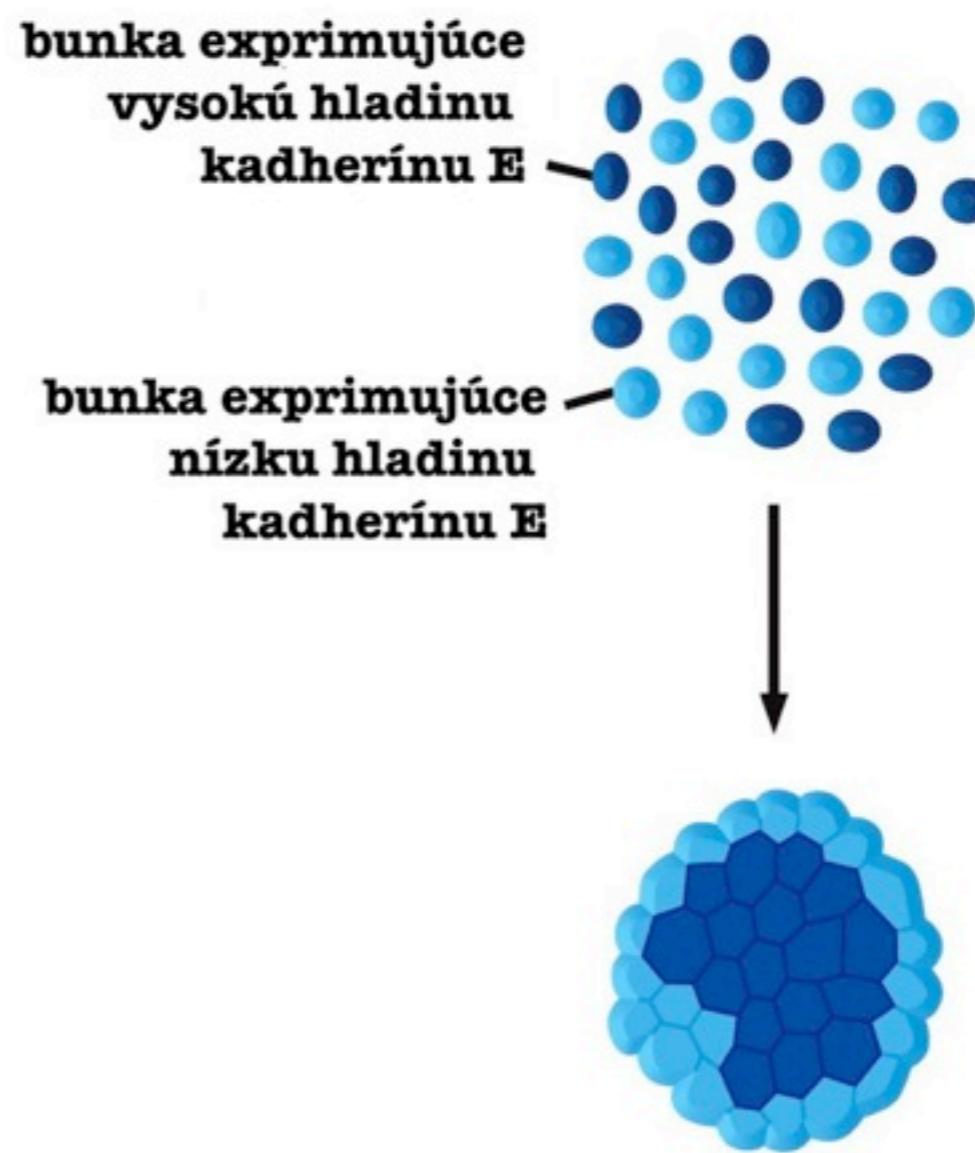
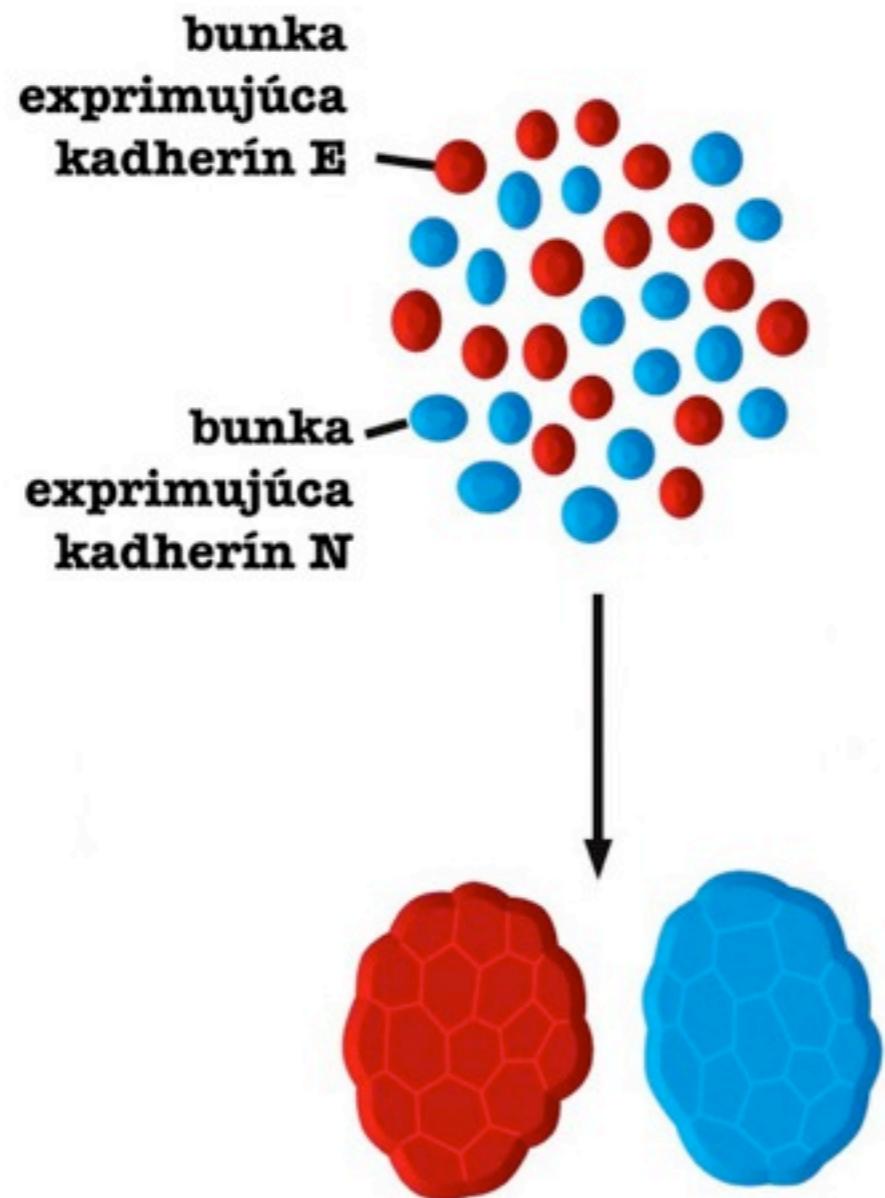
# Kadheríny



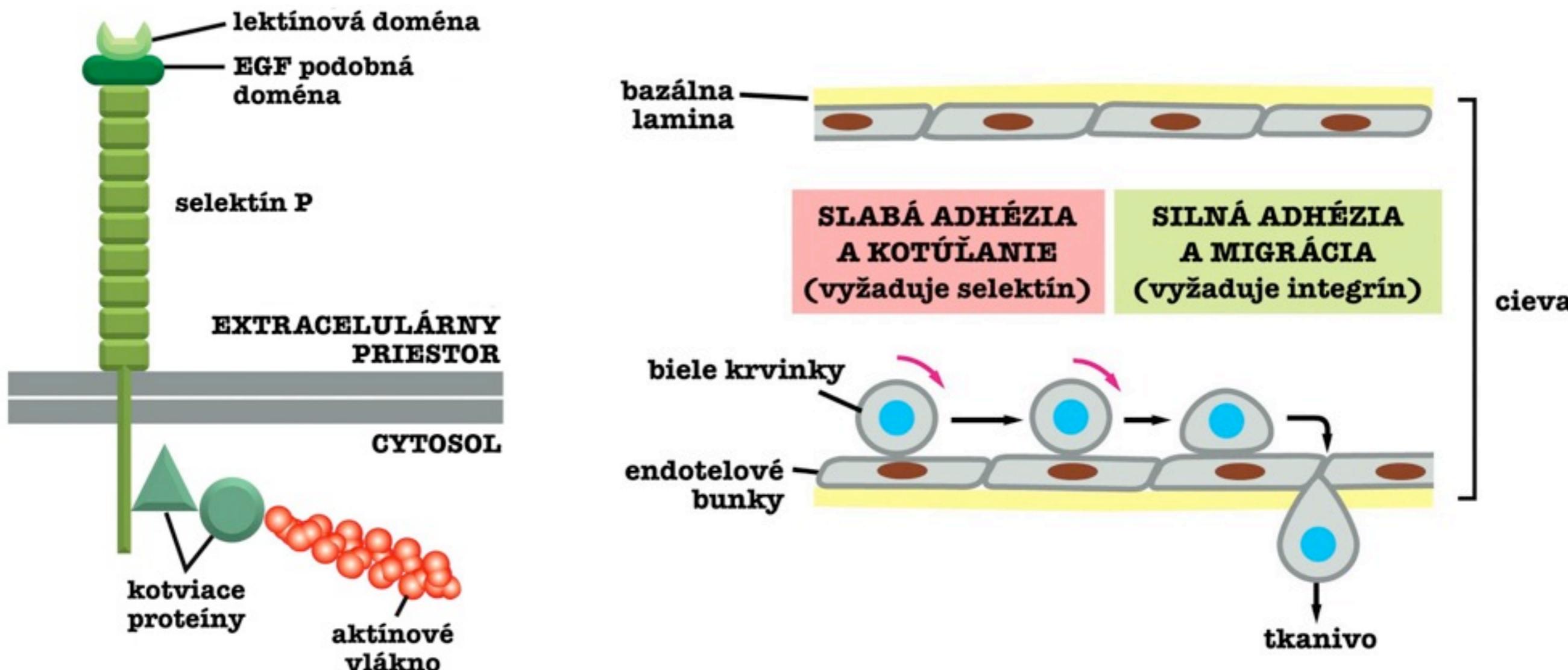
# Príklad komplexného mechanizmu vzniku tkanív



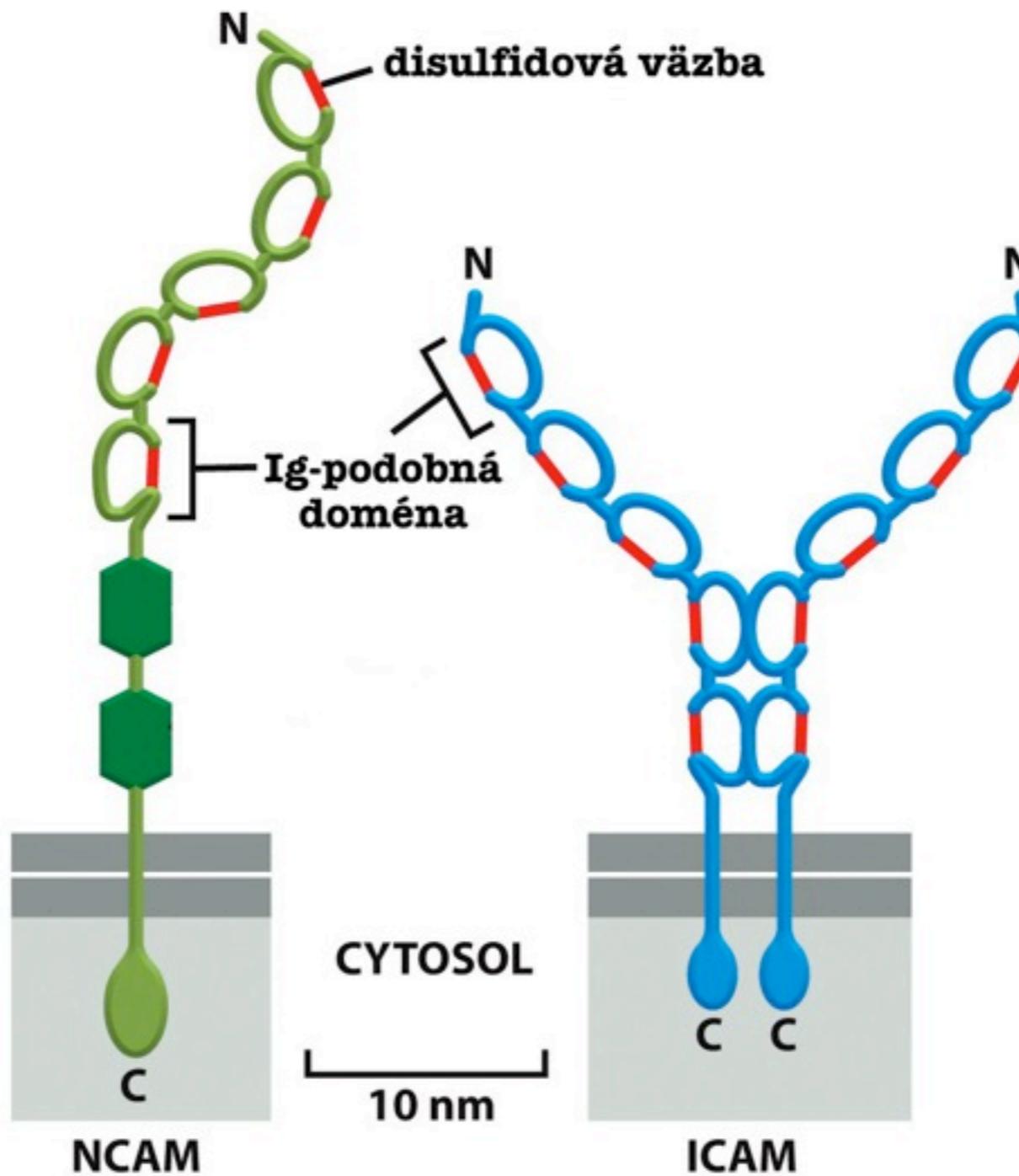
# Triedenie buniek závislé na kadheríne



# Selektíny zabezpečujú prechodnú adhéziu buniek v krvnom riečišti

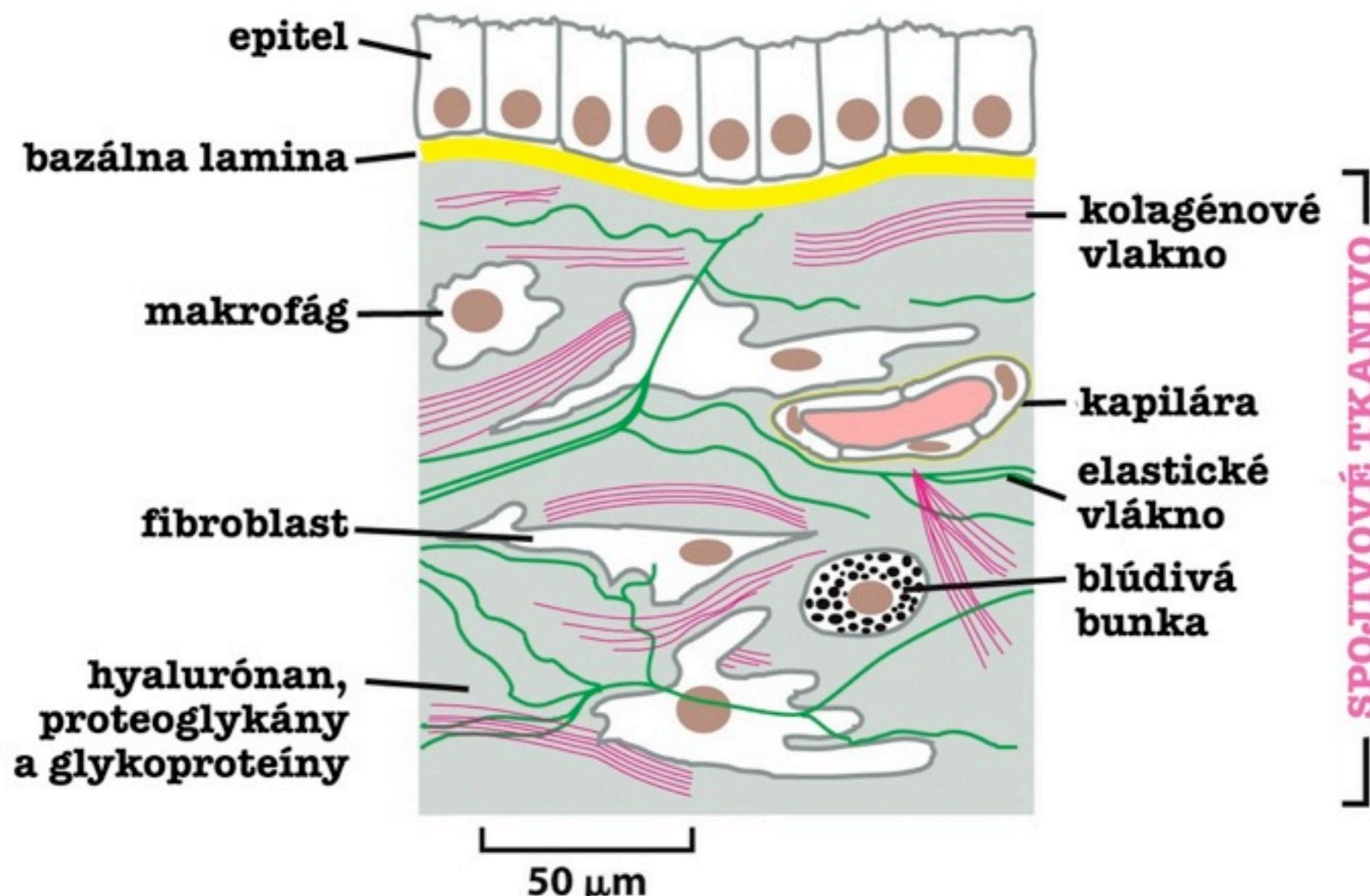


# Aj Ca-nezávislé proteíny sprostredkúvajú bunkovú adhéziu

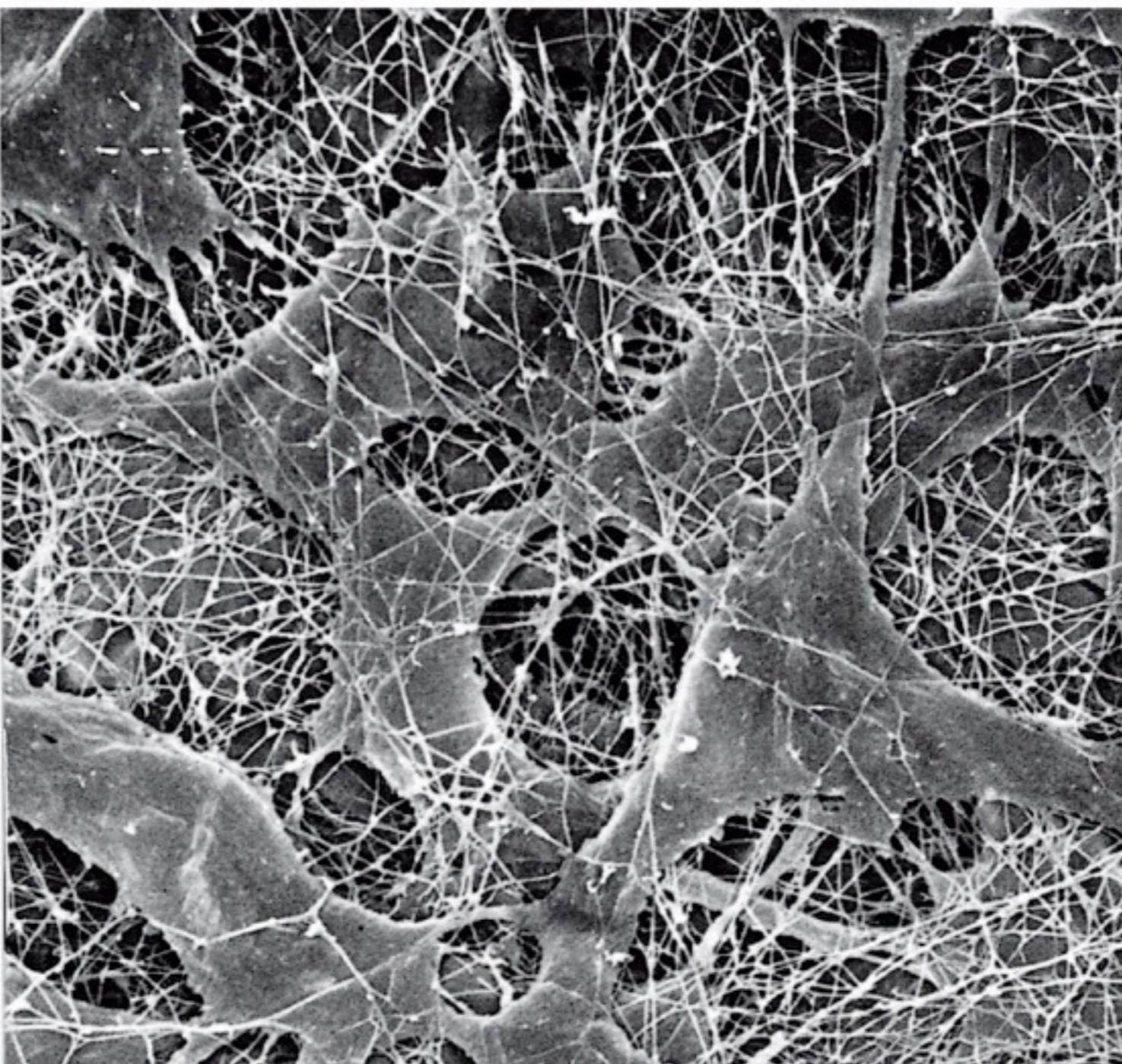


**Neural Cell Adhesion Molecule**

# Spojivové tkanivo



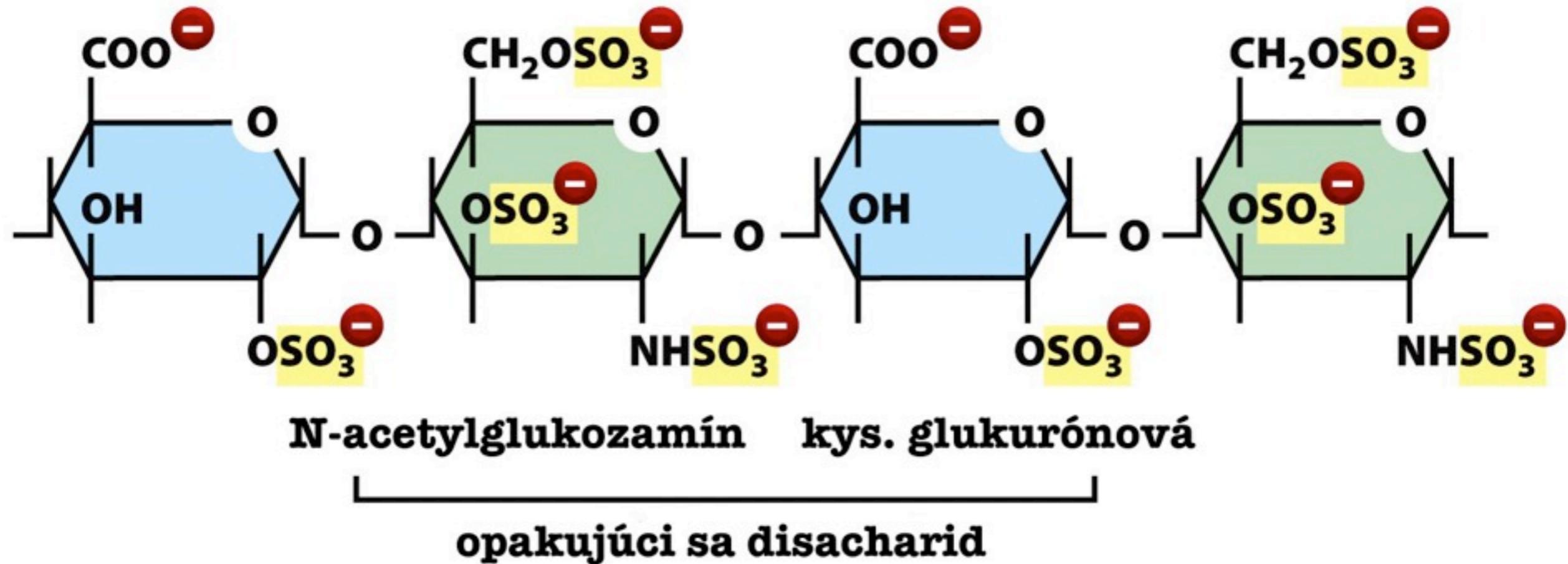
## Spojivové tkanivo



Fibroblasty v spojivovom taknive  
(rohovka potkana).

10  $\mu\text{m}$

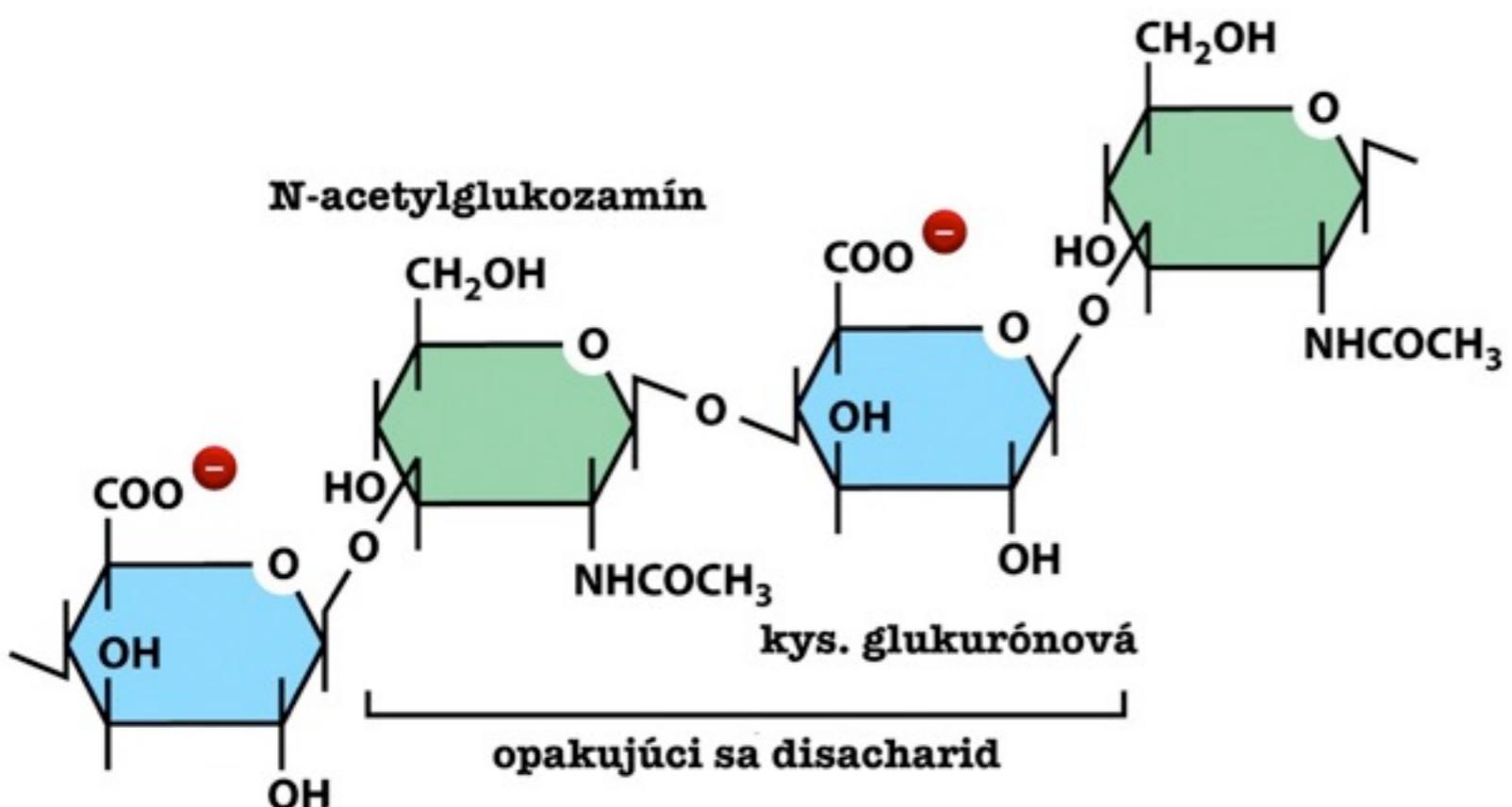
## Glykozaminoglykán



podľa sacharidových jednotiek, typu väzieb a polohy sulfátových skupín:

- hyalurónan
- chondroitin a dermatan sulfát
- heparan sulfát
- keratan sulfát

# Kyselina hyalurónová



● globulárny proteín (MW 50 000)



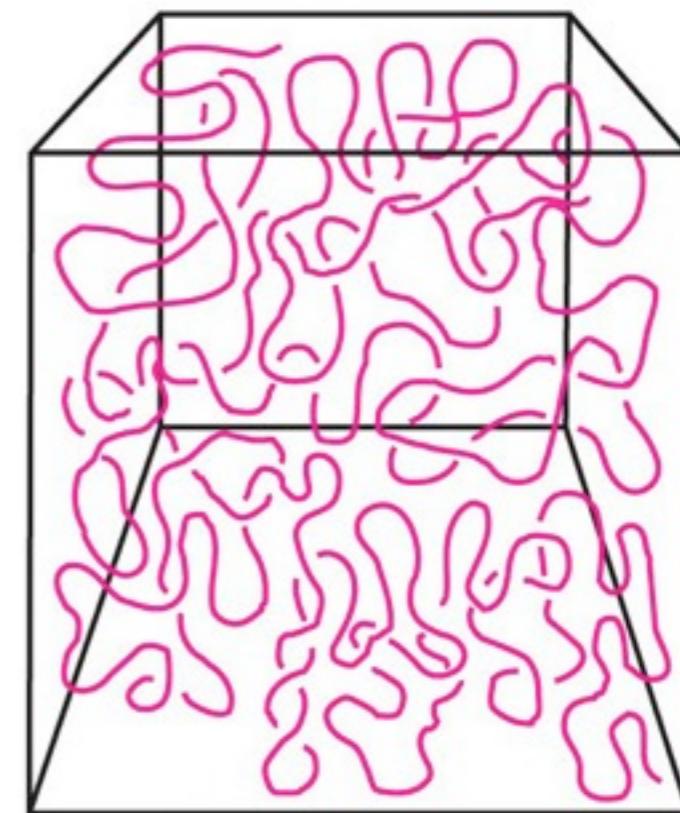
glykogén (MW 400 000)



spektrín (MW 460 000)

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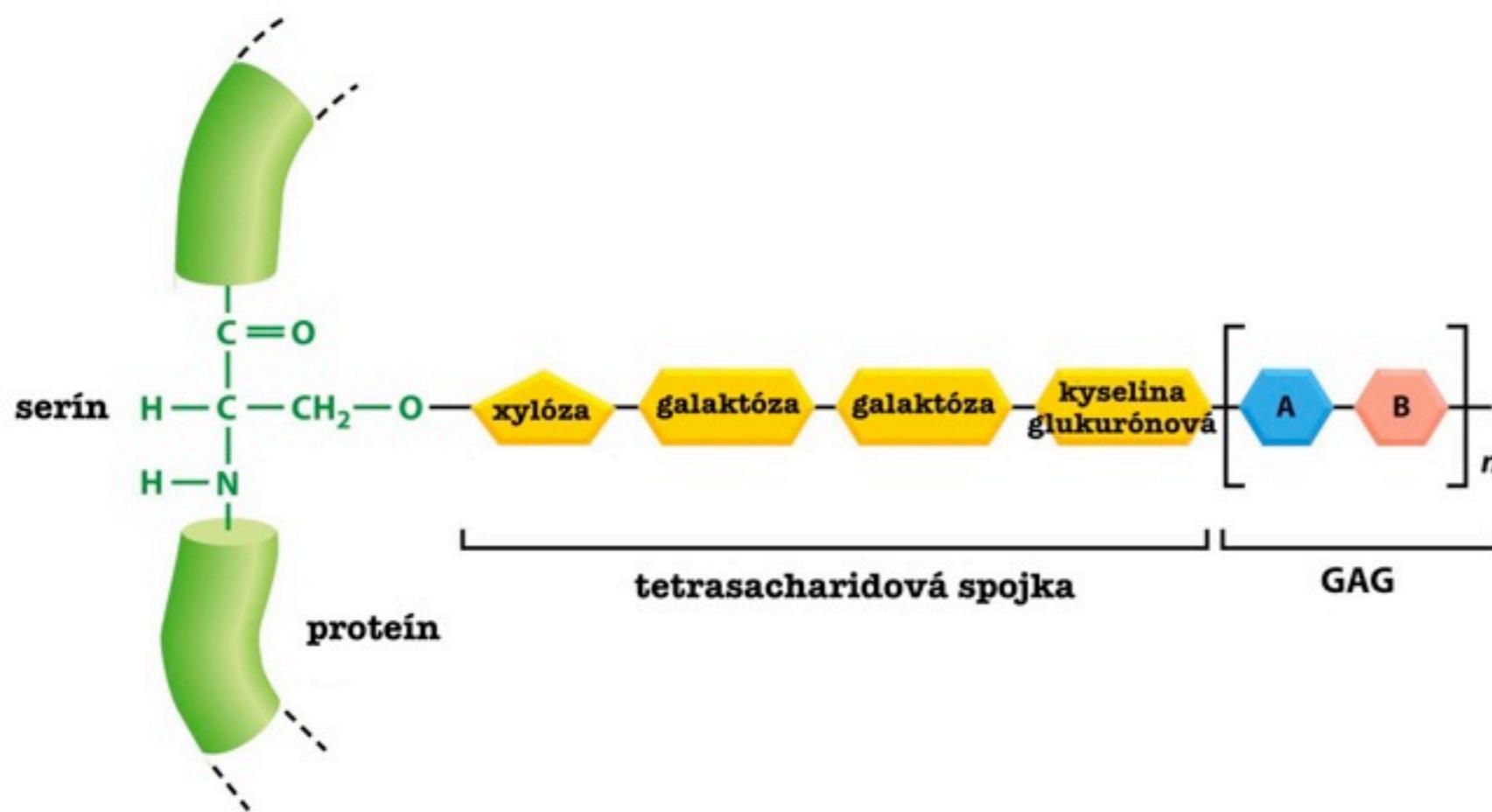
kolagén (MW 290 000)



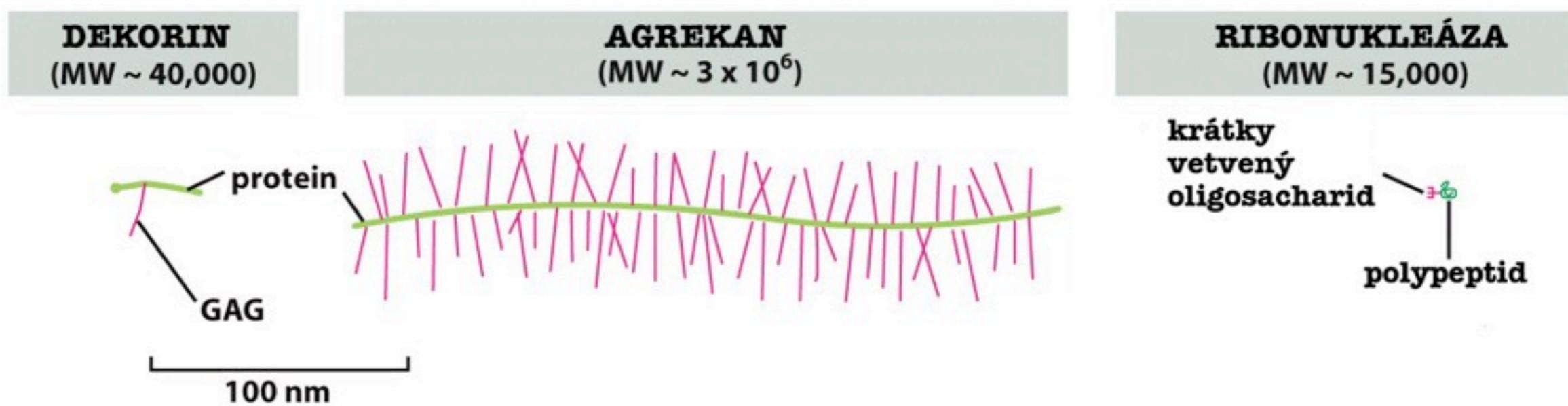
hyaluronan (MW  $8 \times 10^6$ )

300 nm

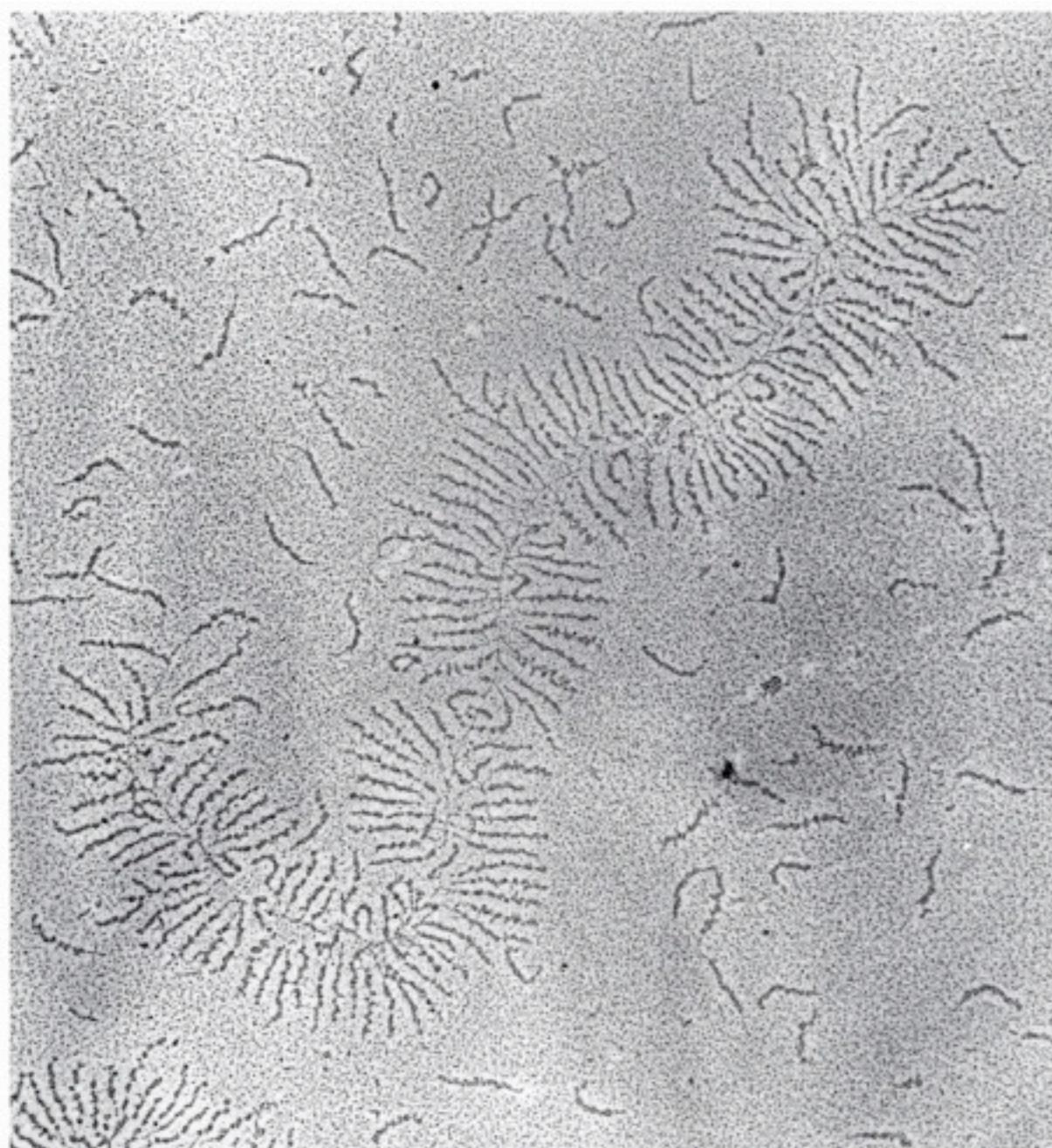
# Proteoglykán je zložený z retázcov GAG kovalentne pripojených na proteíny



príklad - agrekan (hlavný proteoglykán chrupaviek)

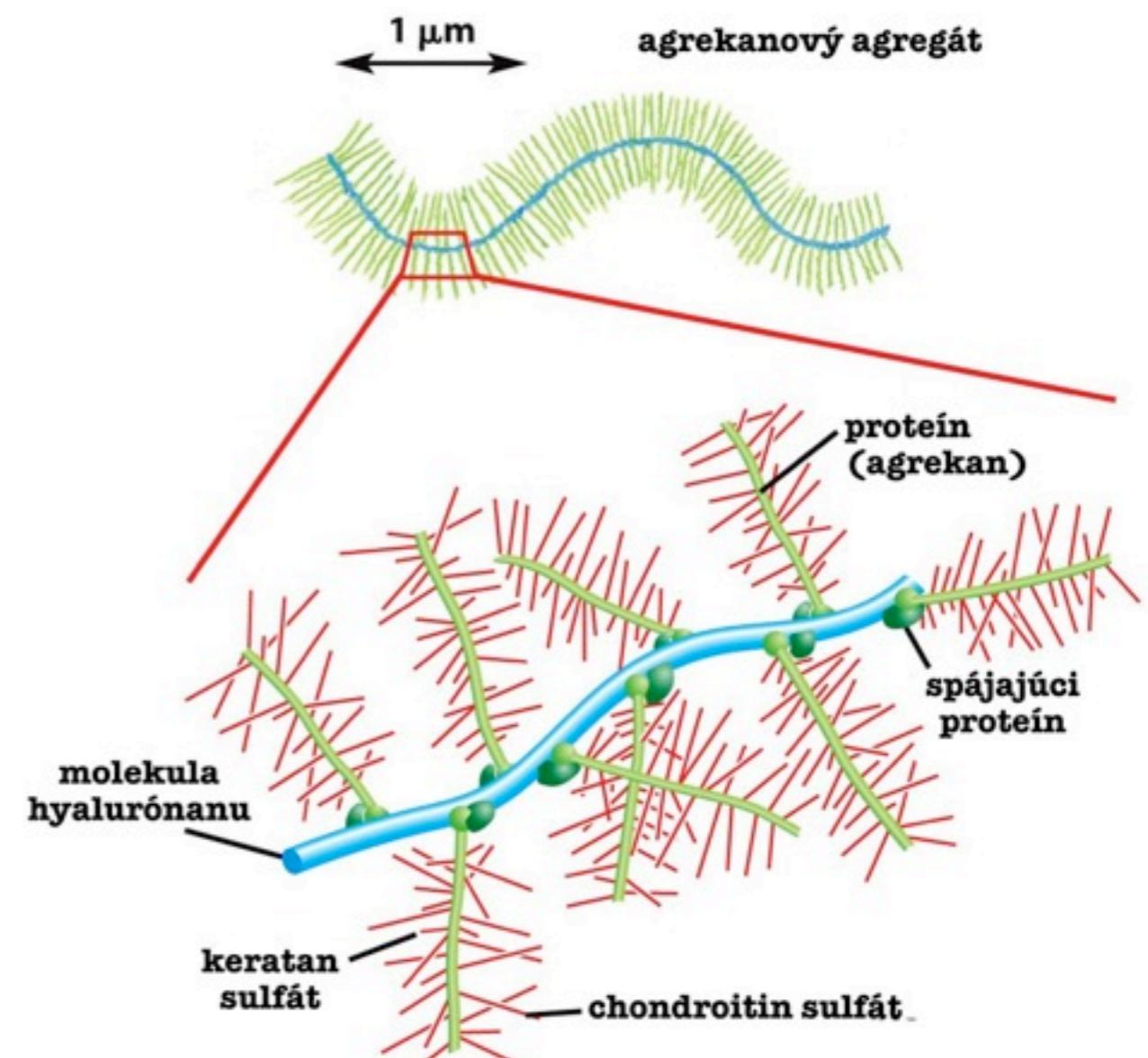


# Proteoglykány asociujú s kys. hyalurónovou

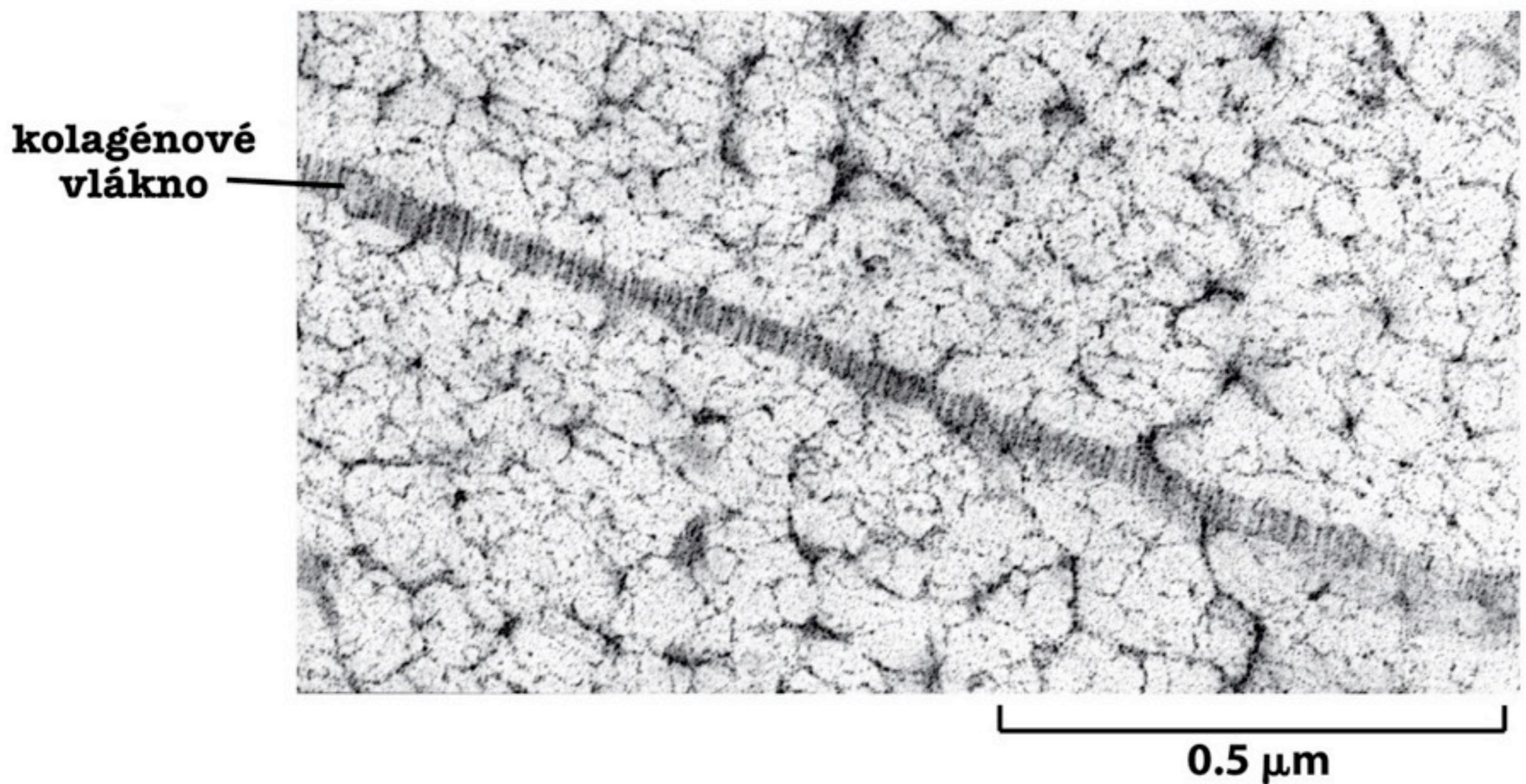


agregáty agrekanu

1 μm

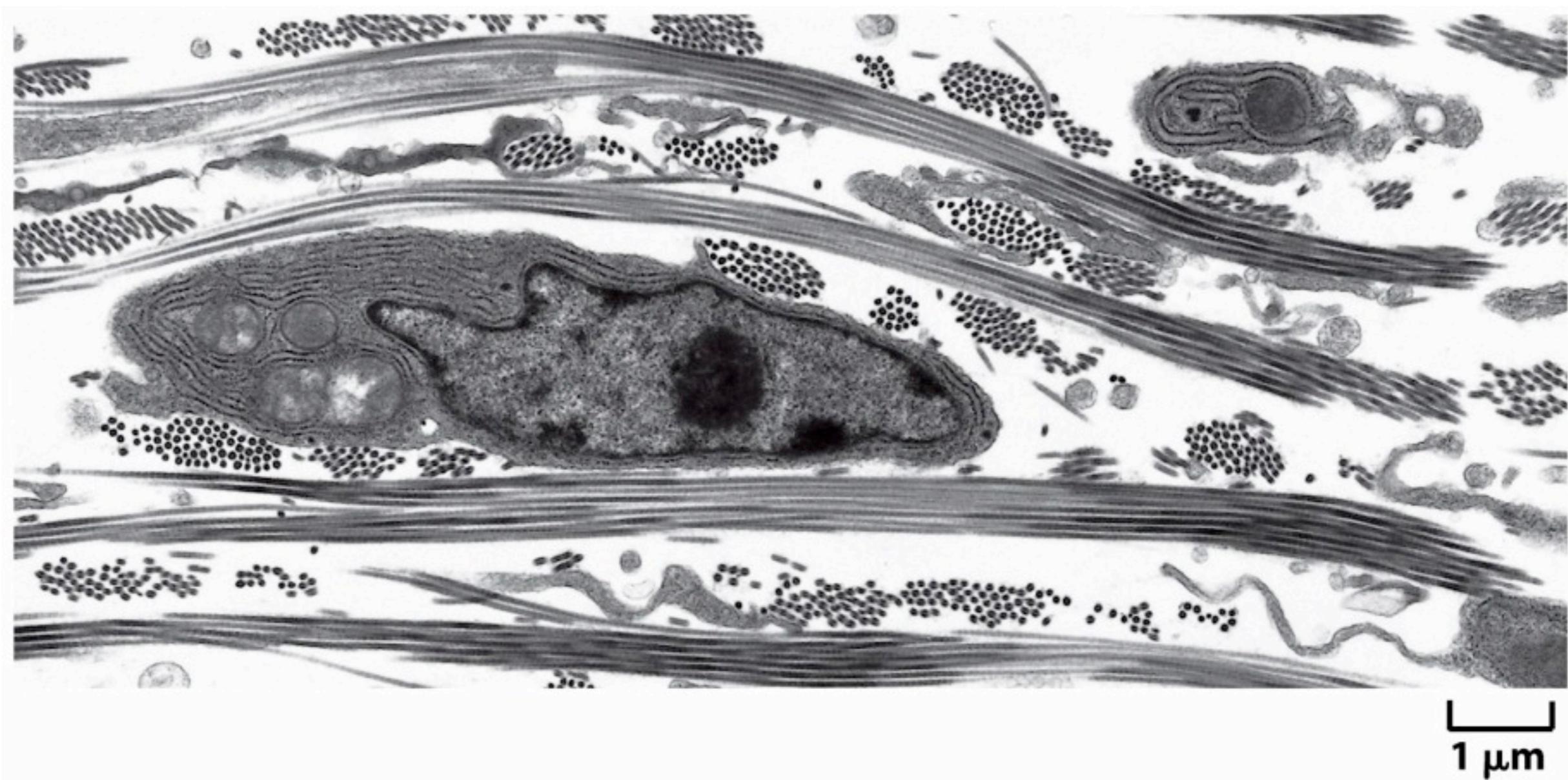


# Proteoglykán

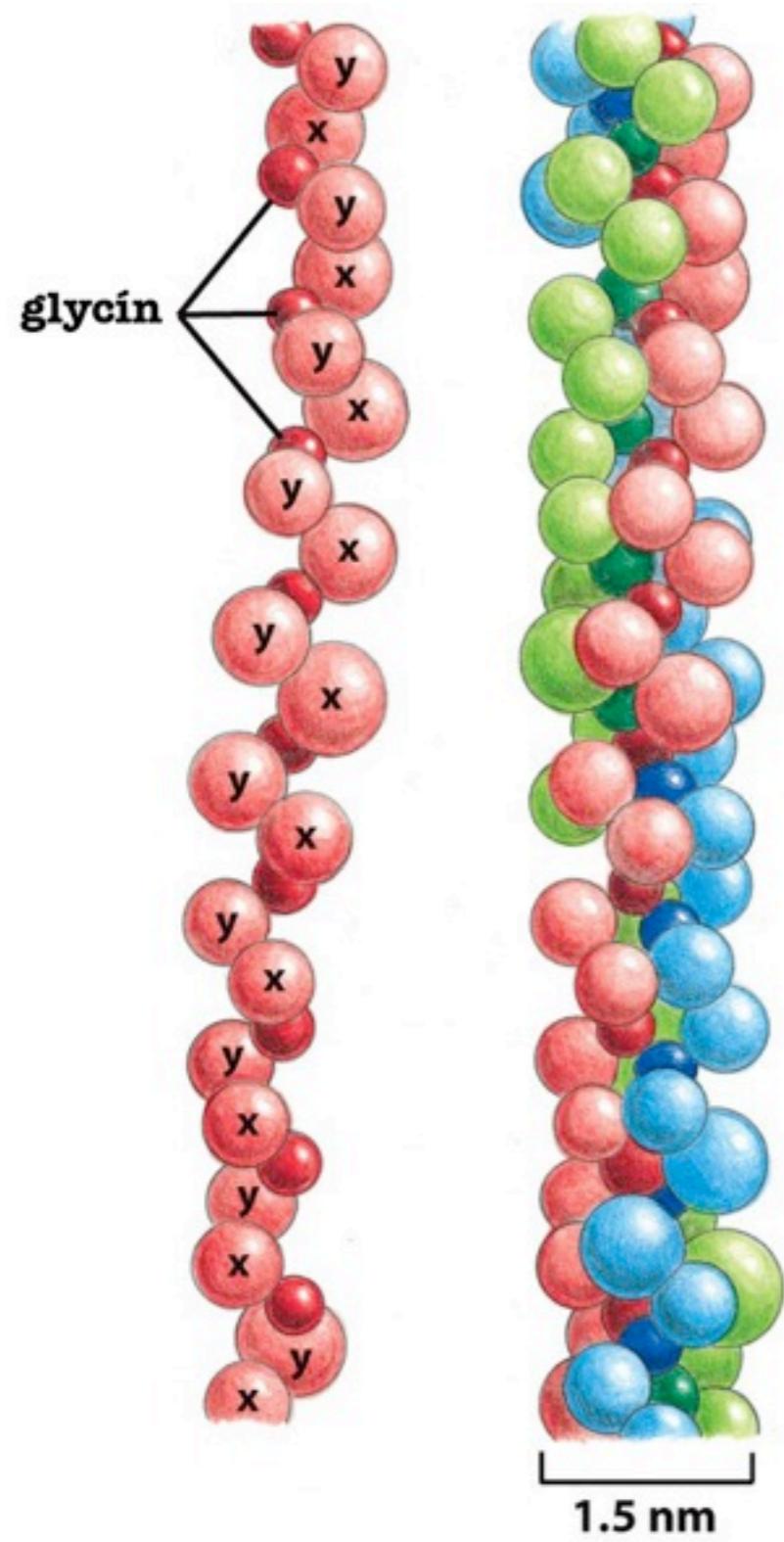


proteoglykán v extracelulárnej matrix chrupavky potkana

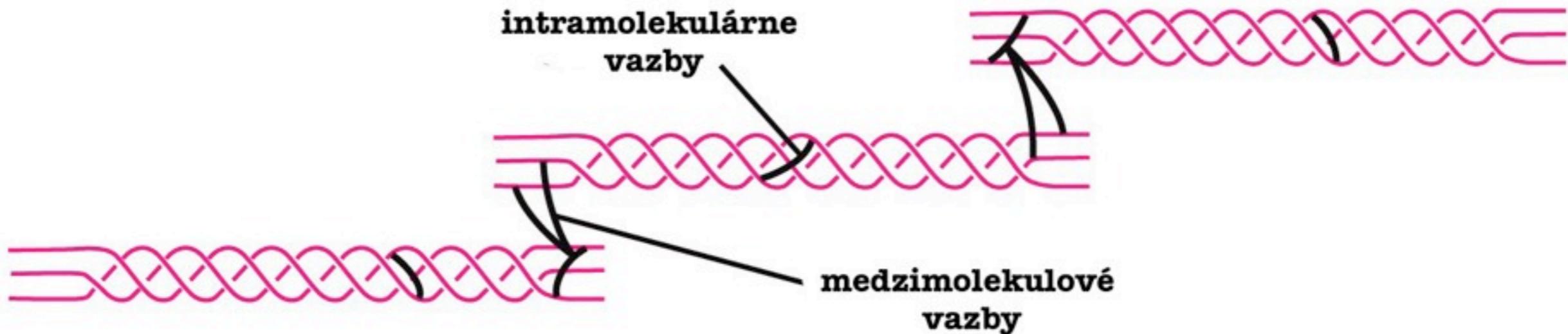
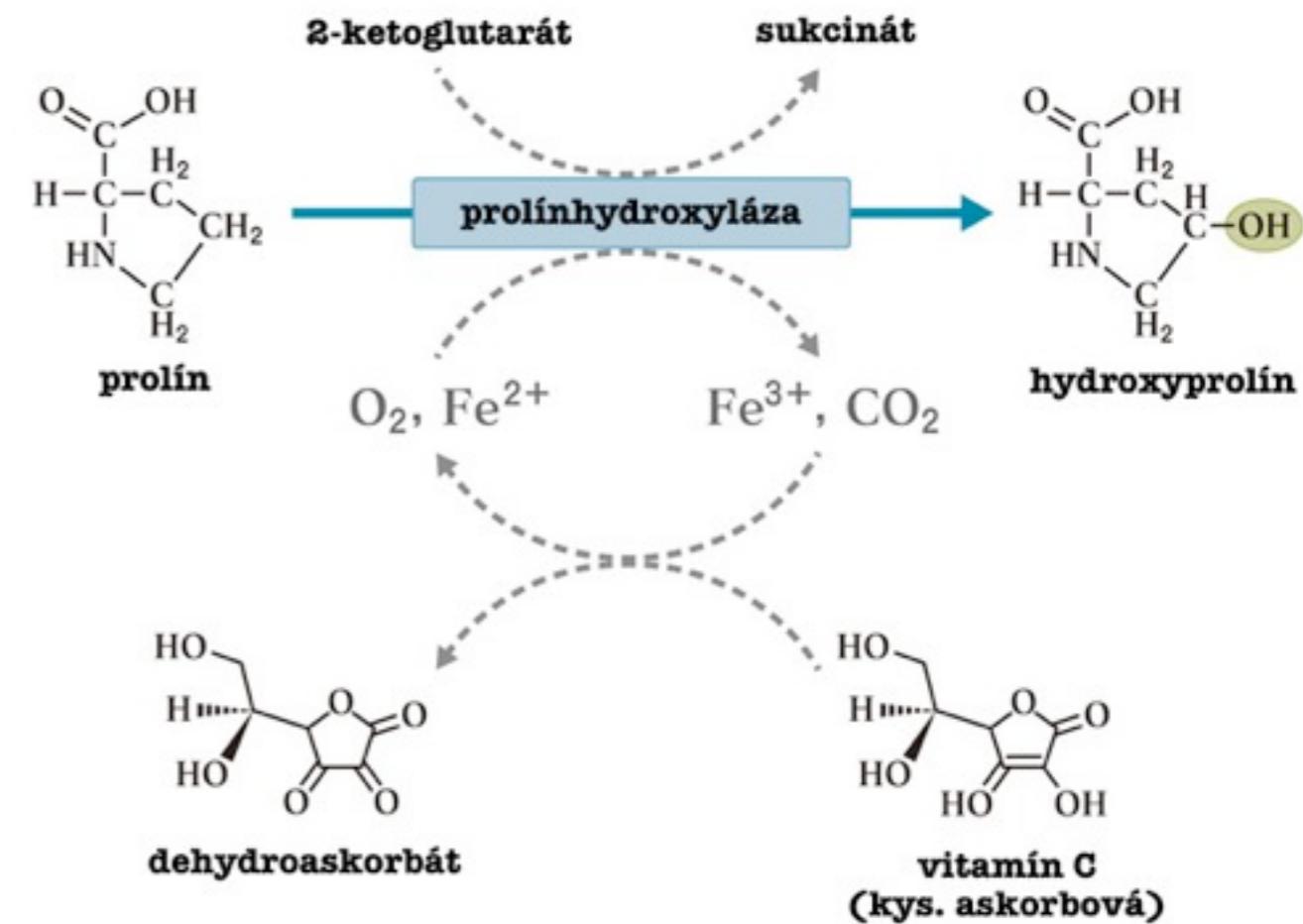
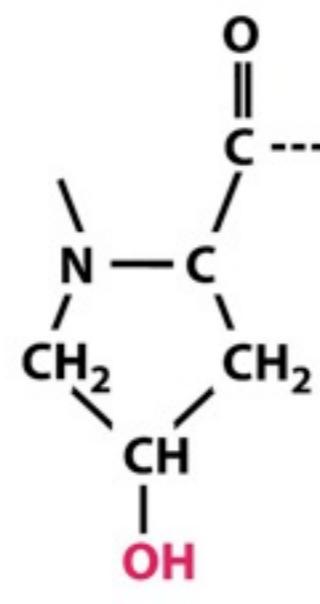
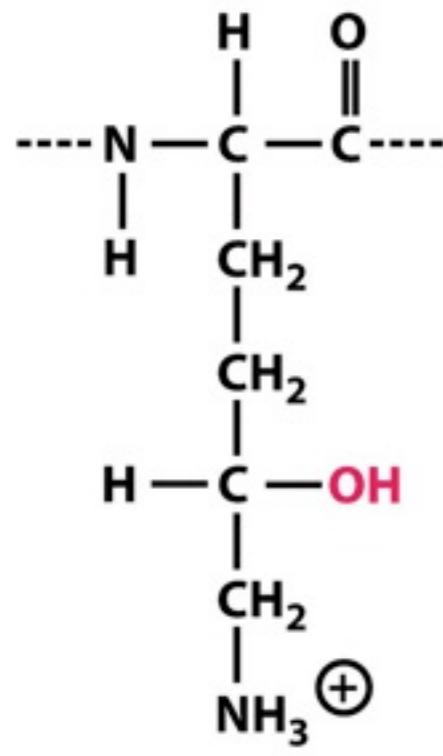
## Kolagén je hlavným proteínom extracelulárnej matrix



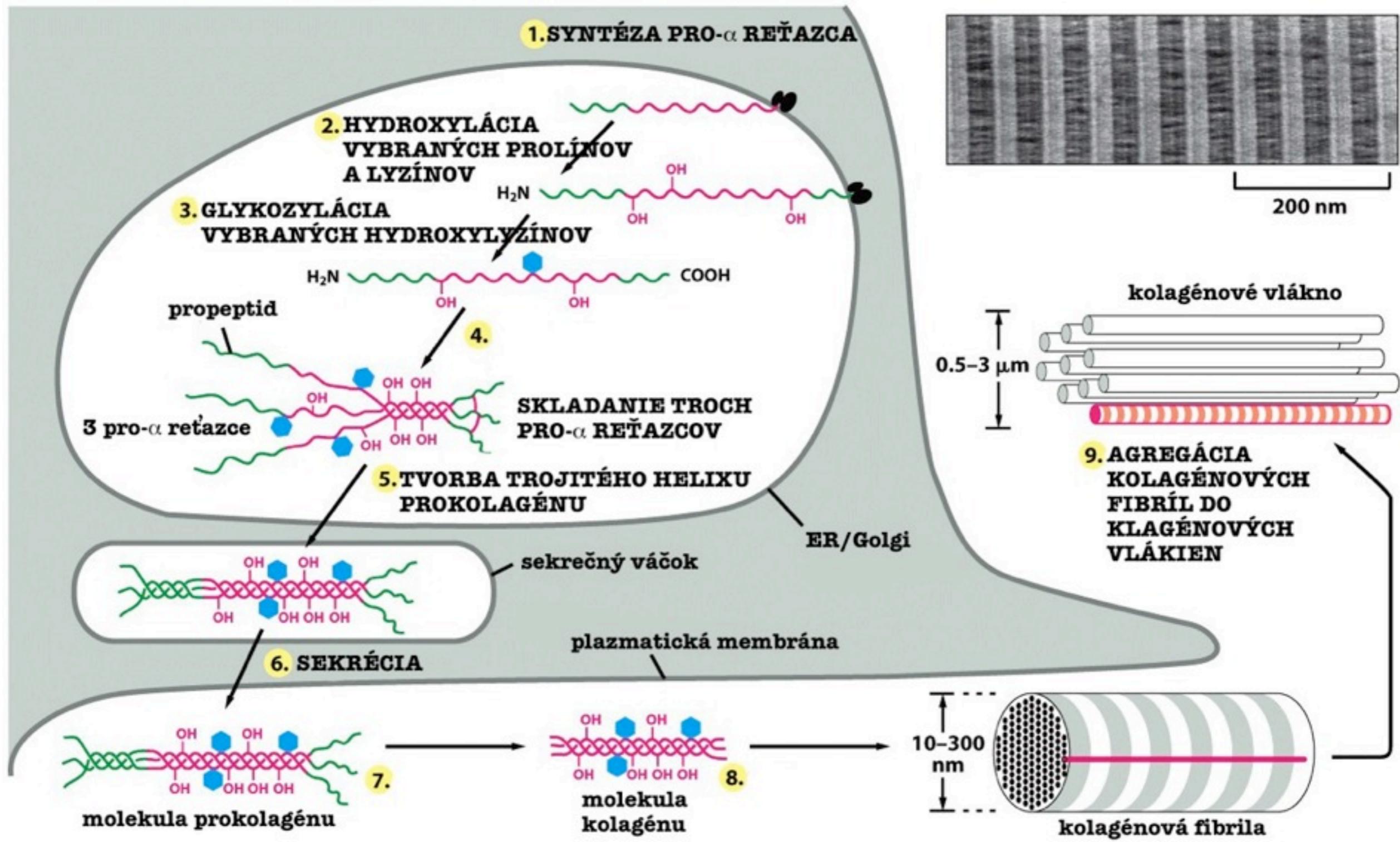
# Kolagén



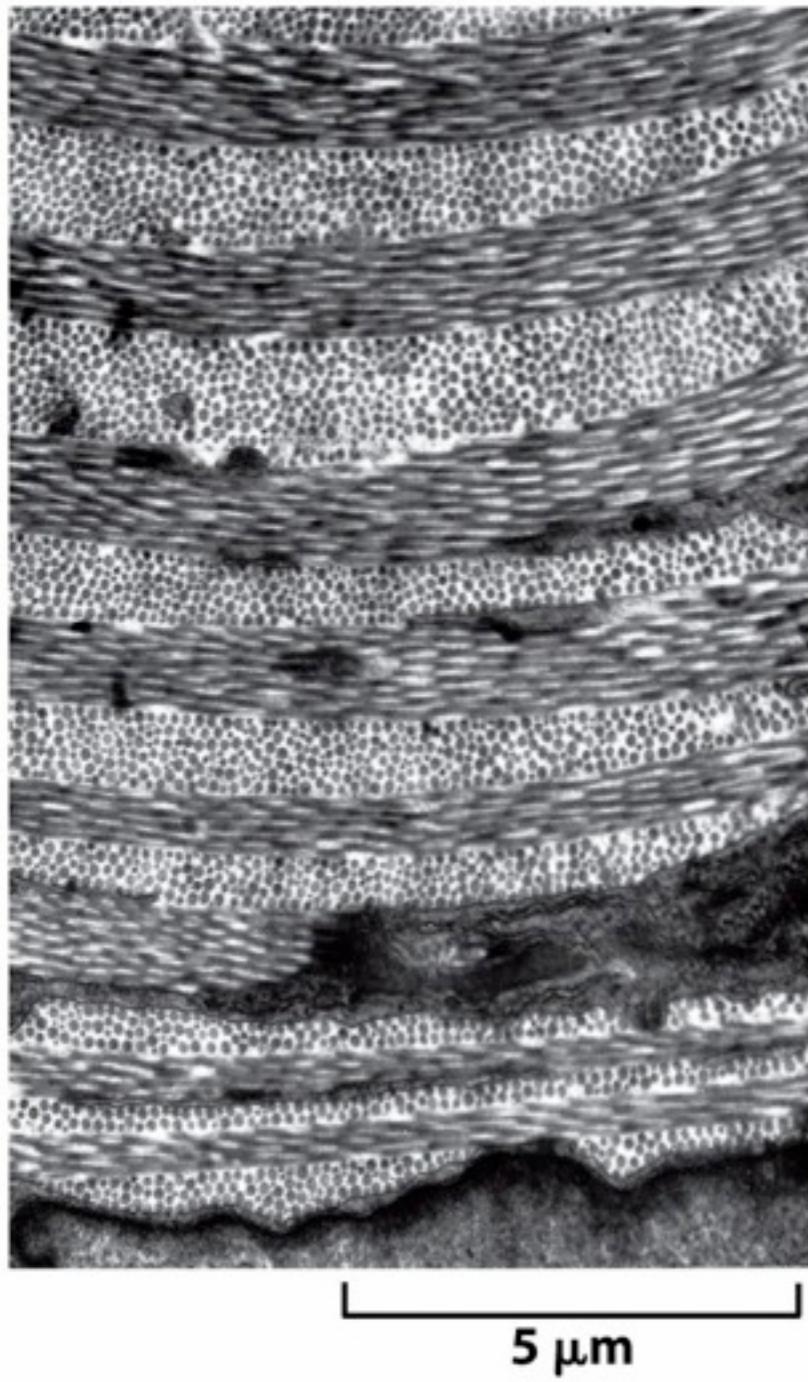
# Kolagén



# Biogenéza kolagénových vlákien

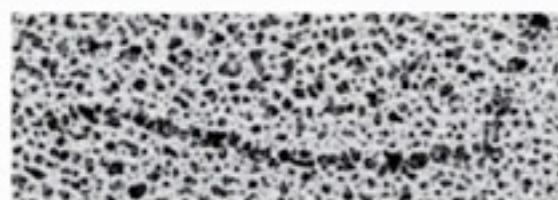
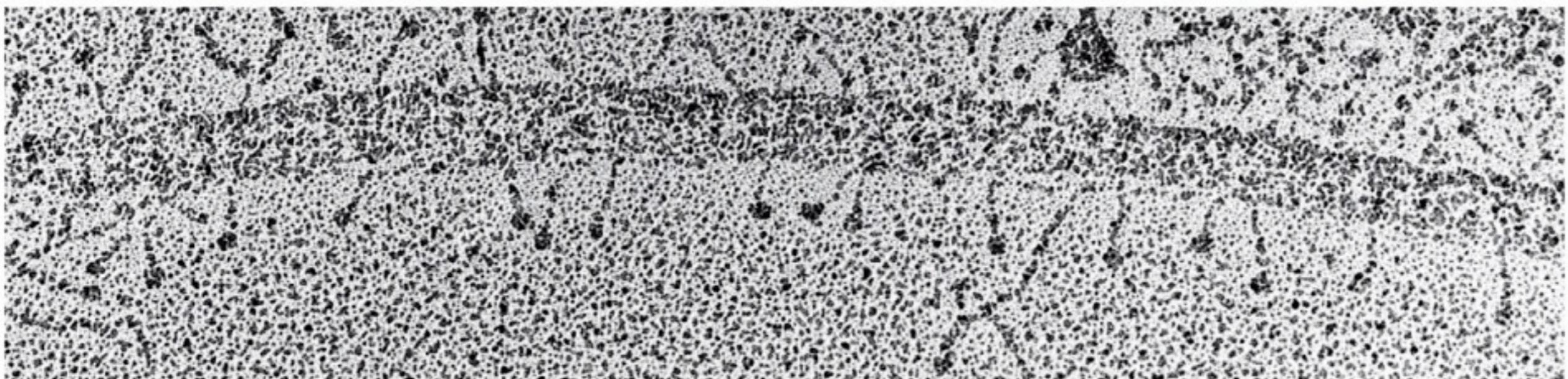


# Kolagén

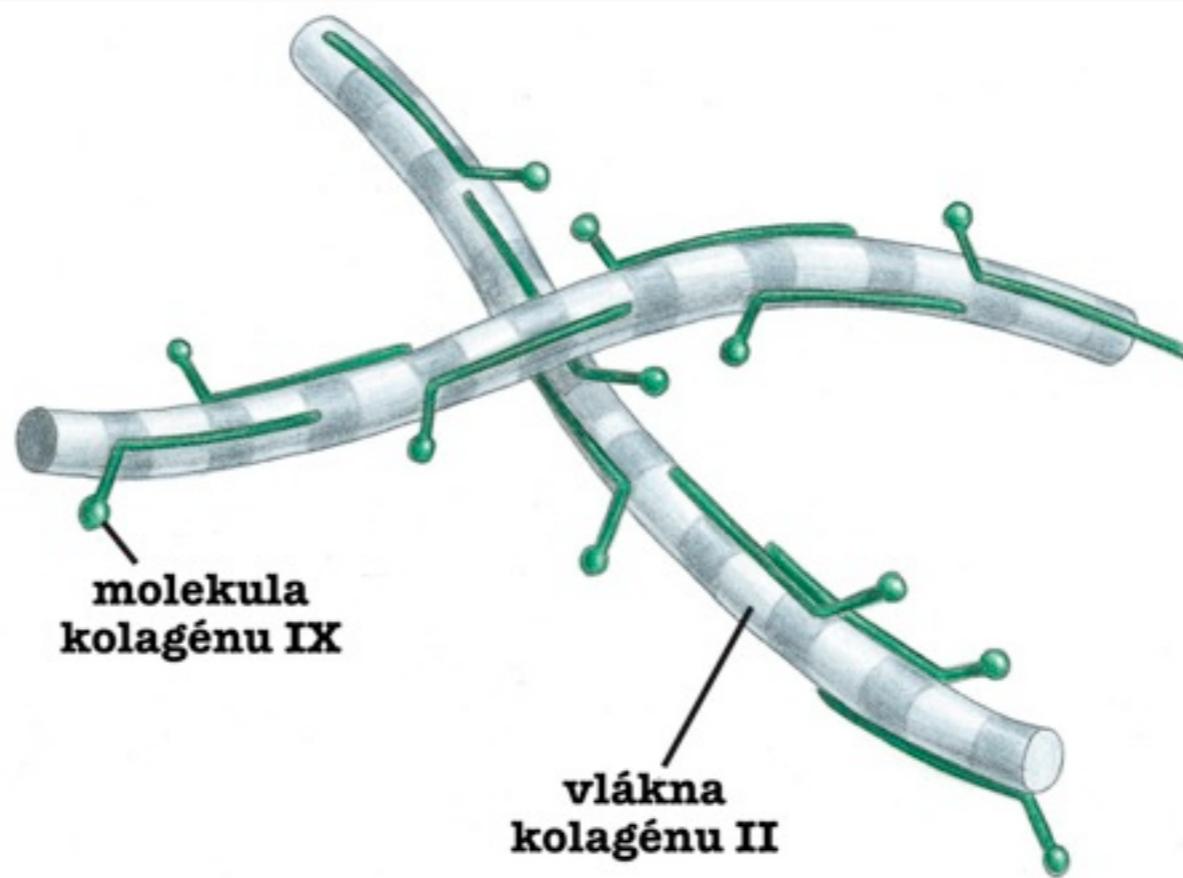


Kolagénové vlákna v koži

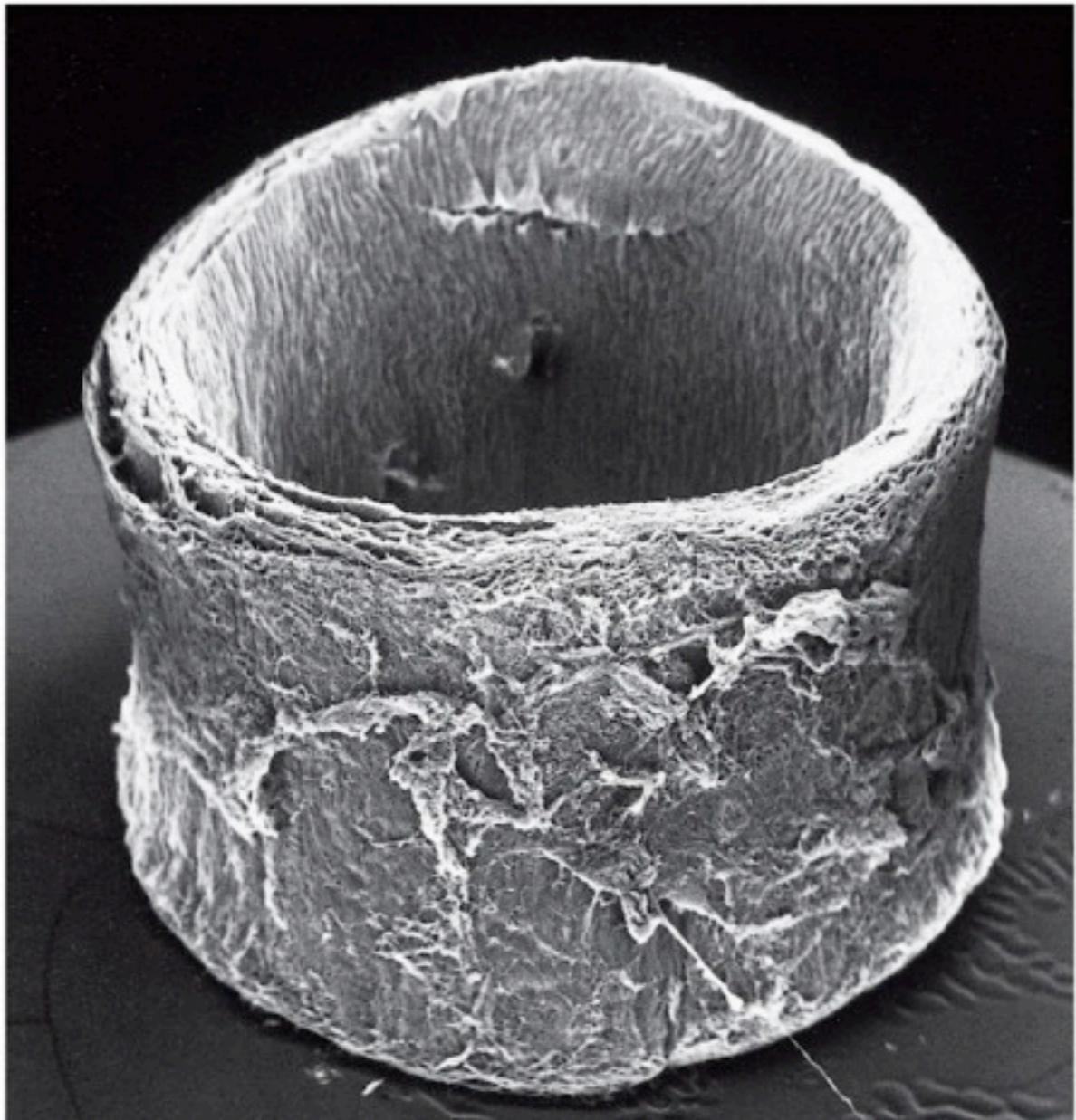
# Kolagén



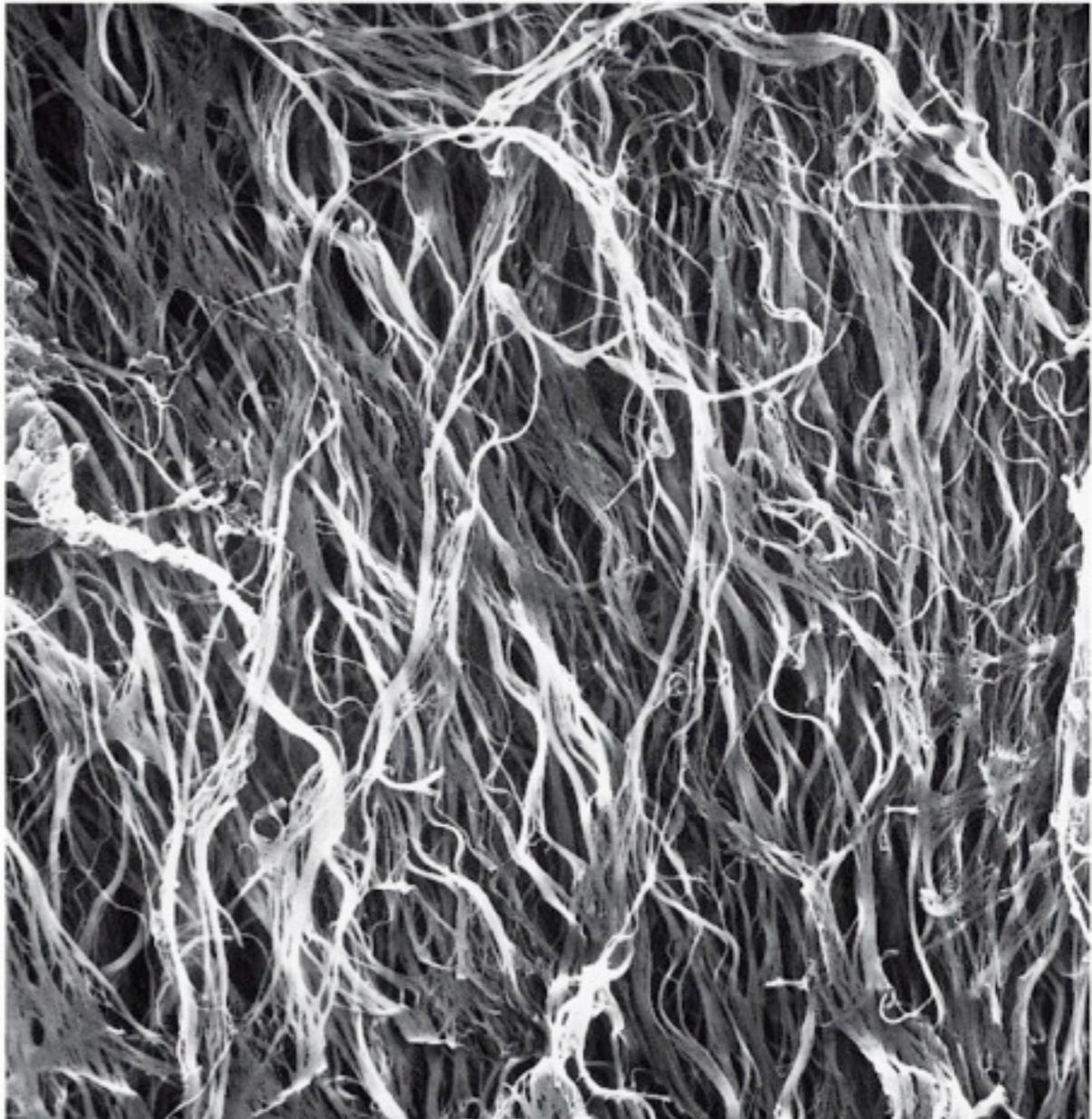
100 nm



## Elastín dáva tkanivám pružnost'

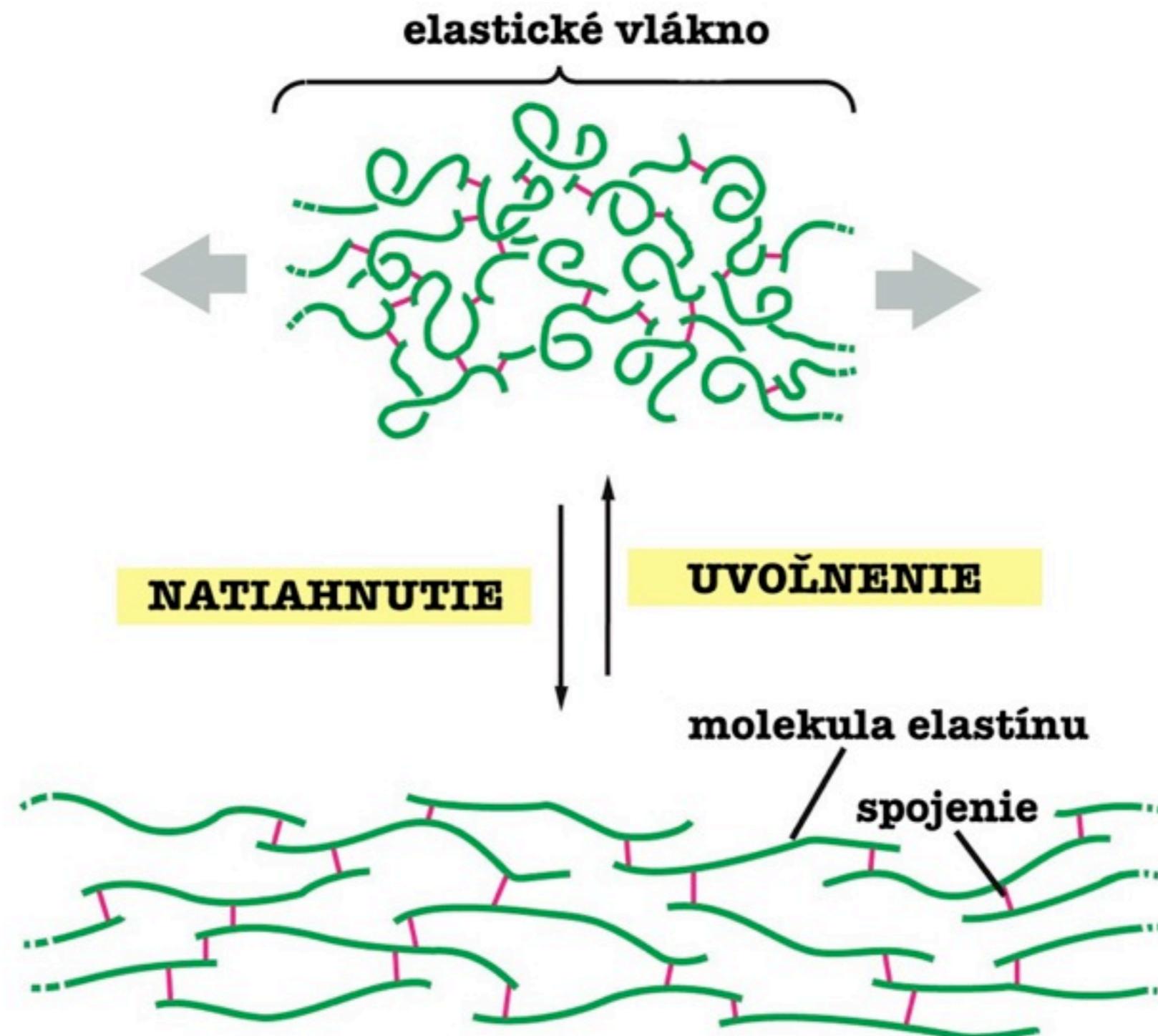


1 mm

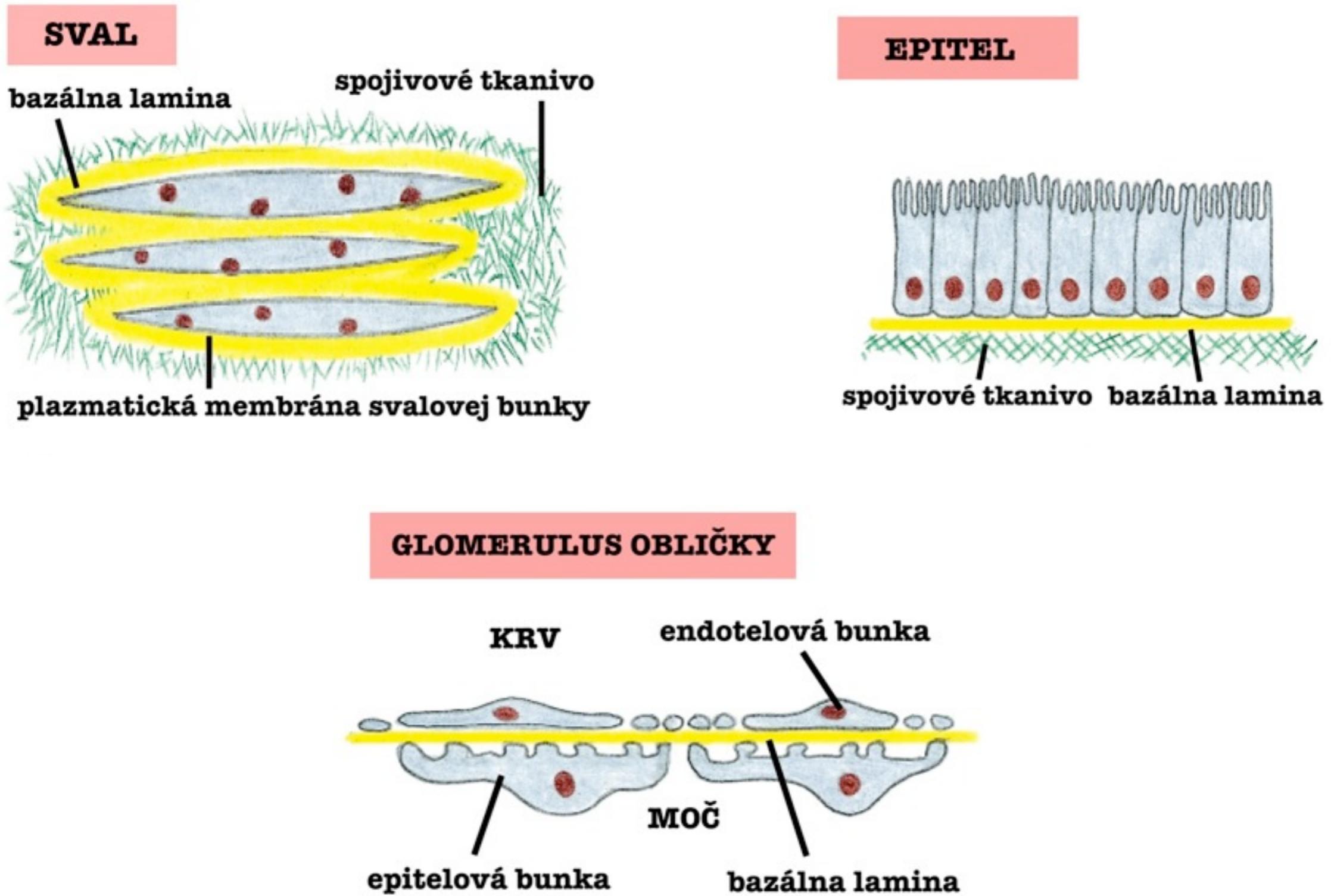


100 μm

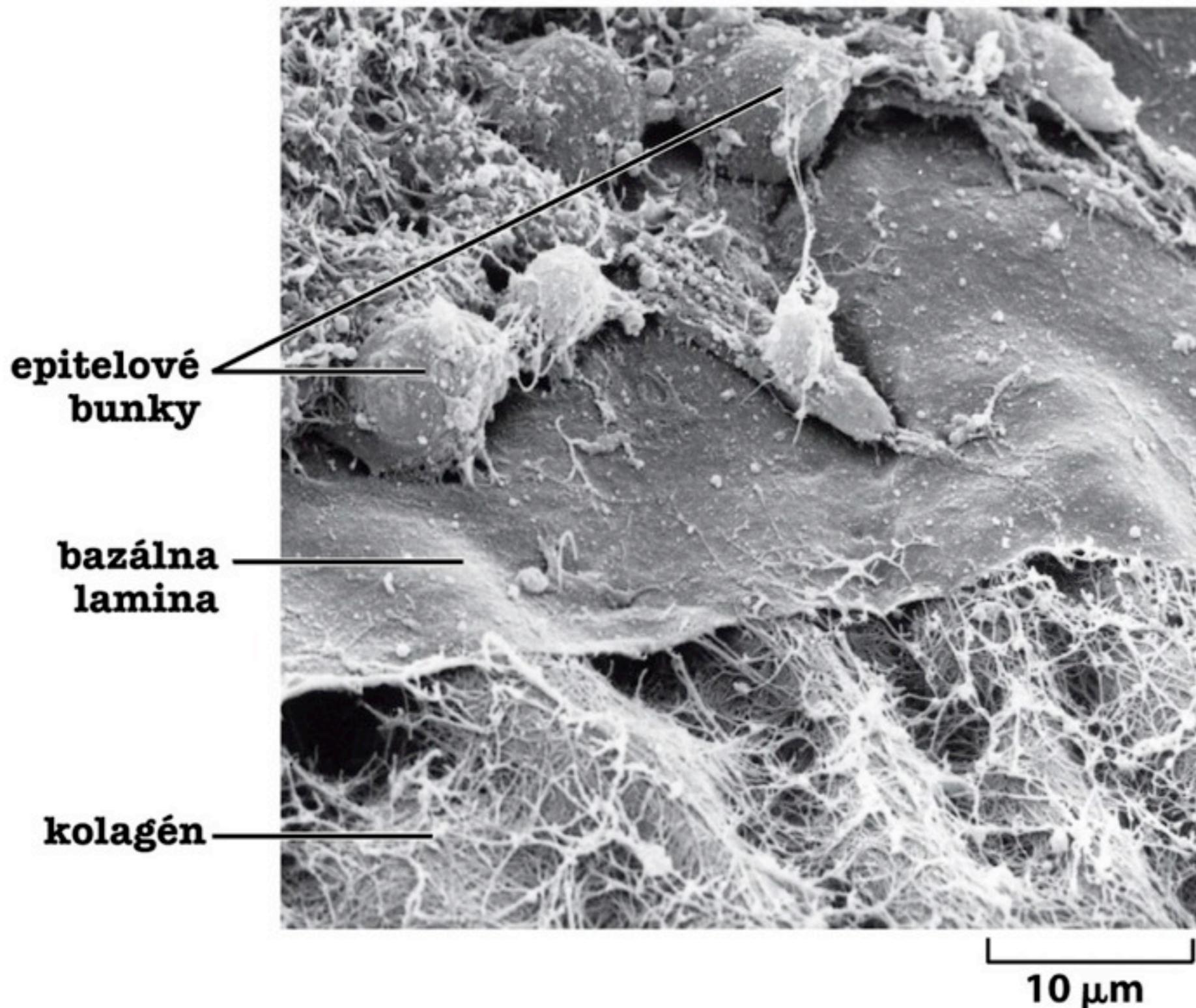
# Natáhovanie siete molekúl elastínu



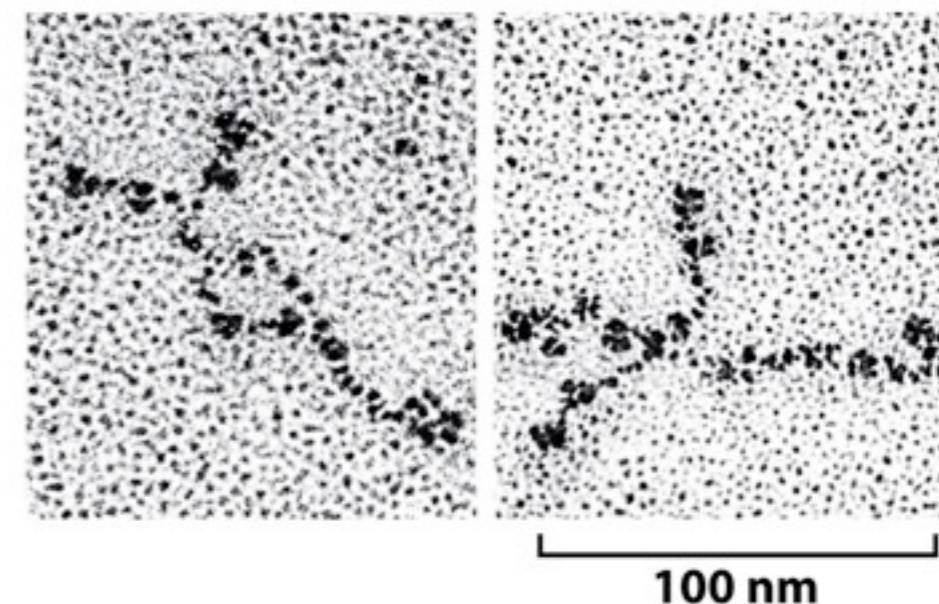
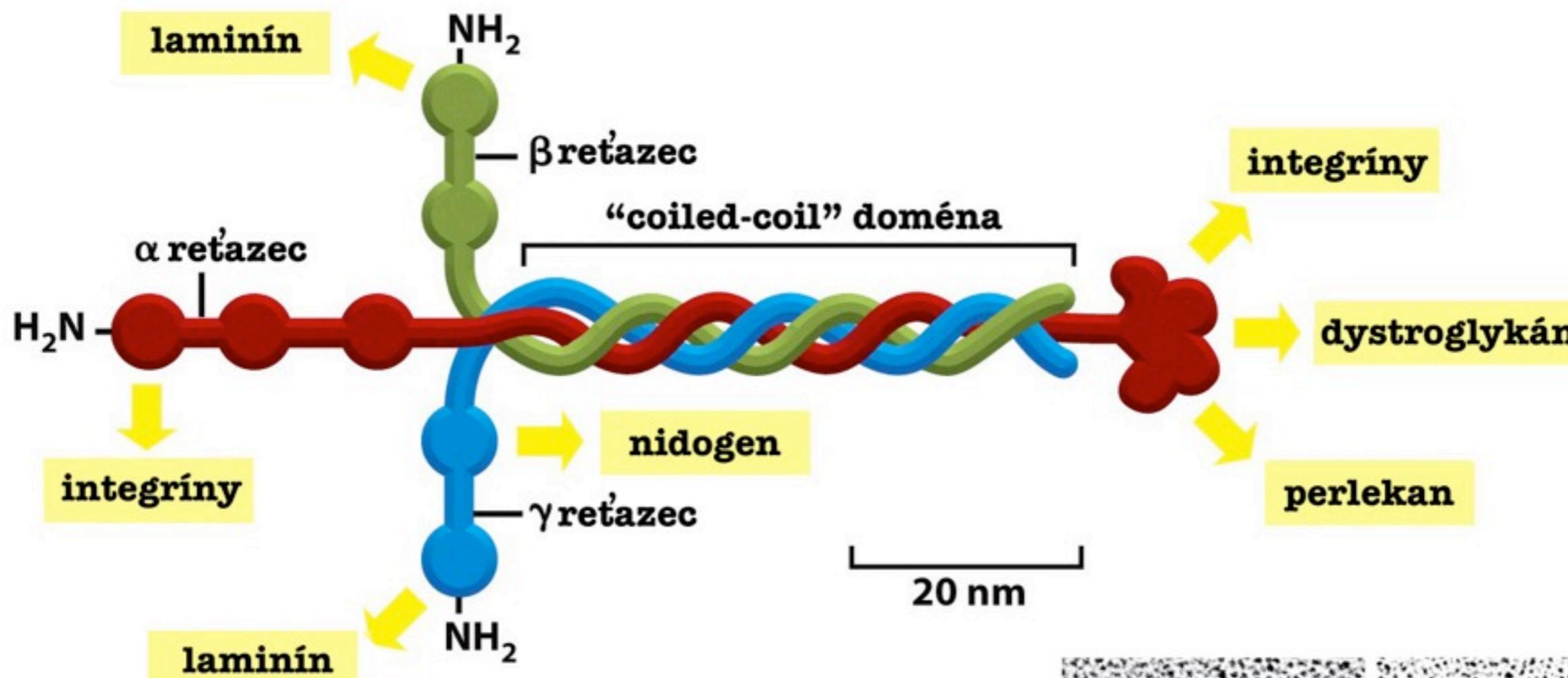
# Bazálna lamina (membrána)



## Bazálna lamina (membrána)



# Štruktúra laminínu



# Model molekulárnej štruktúry bazálnej laminy

