

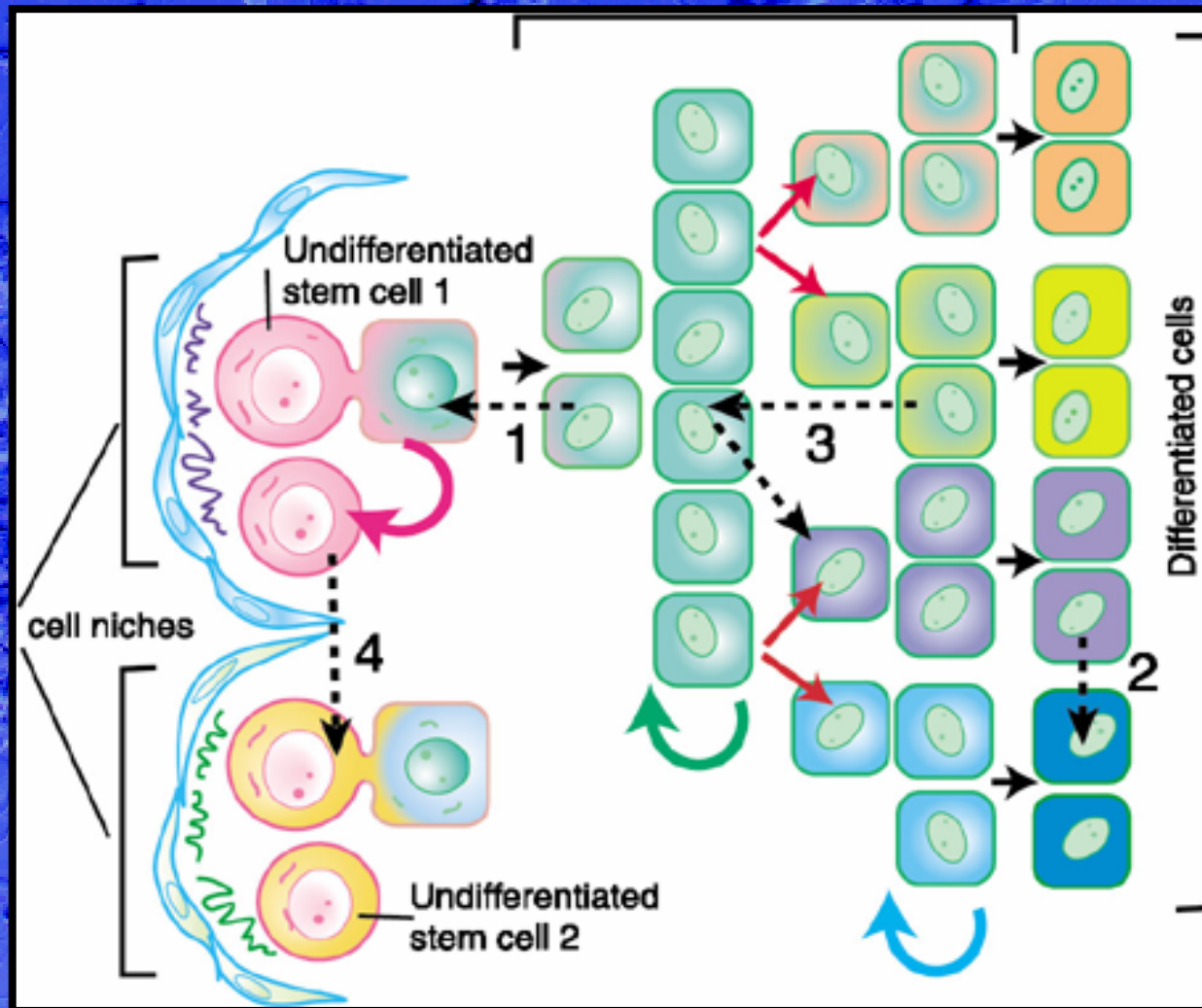
The background of the slide is a microscopic image of plant tissue, likely a cross-section of a stem. It shows a central vascular bundle with distinct xylem and phloem regions, surrounded by cortical cells and epidermal layers. The entire image is overlaid with a semi-transparent blue filter.

Úvod do studia biologie kmenových buněk

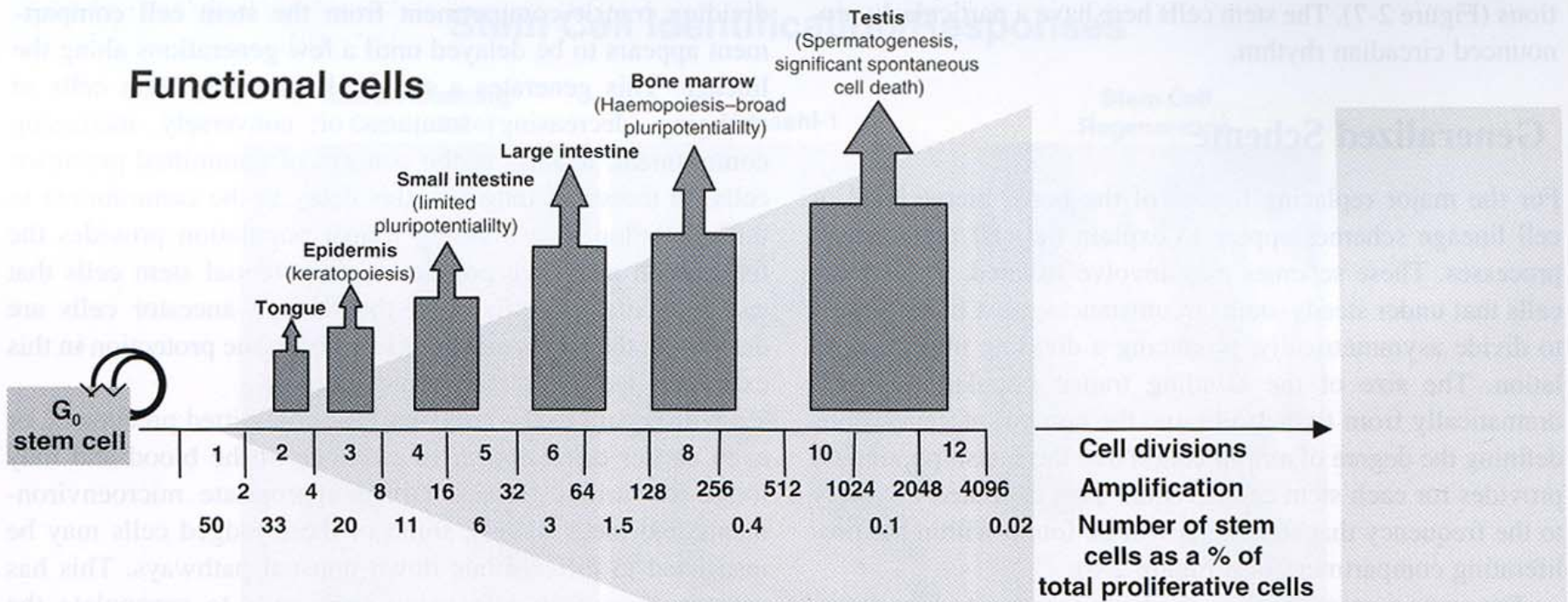
Jiří Pacherník
e-mail: jipa@sci.muni.cz
tel: 532 146 223

Co jsou kmenové buňky?

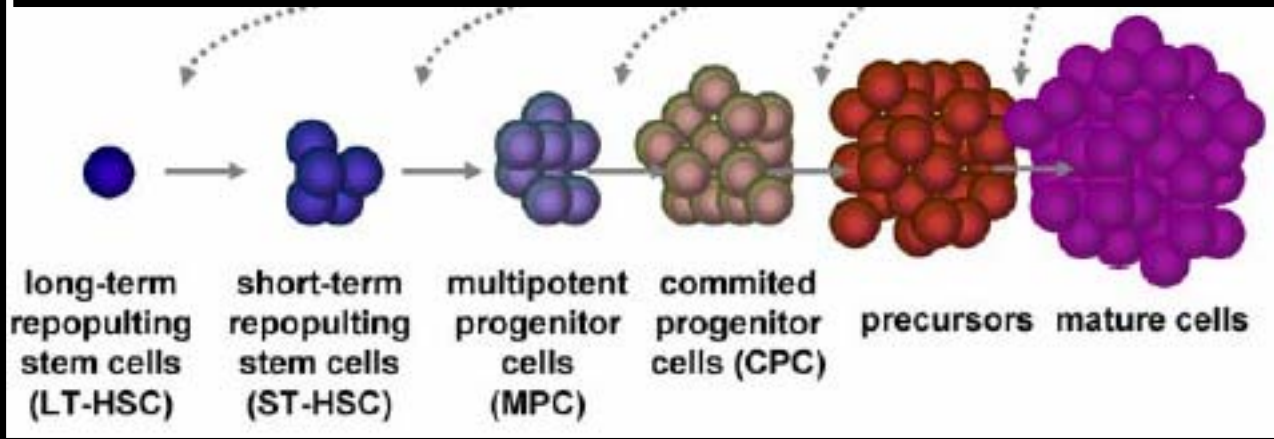
- buňky schopné vlastní obnovy (sebeobnova)
- buňky schopné dávat vznik jiným typům buněk (schopnost diferenciacce / rozrůžňování)



Functional cells

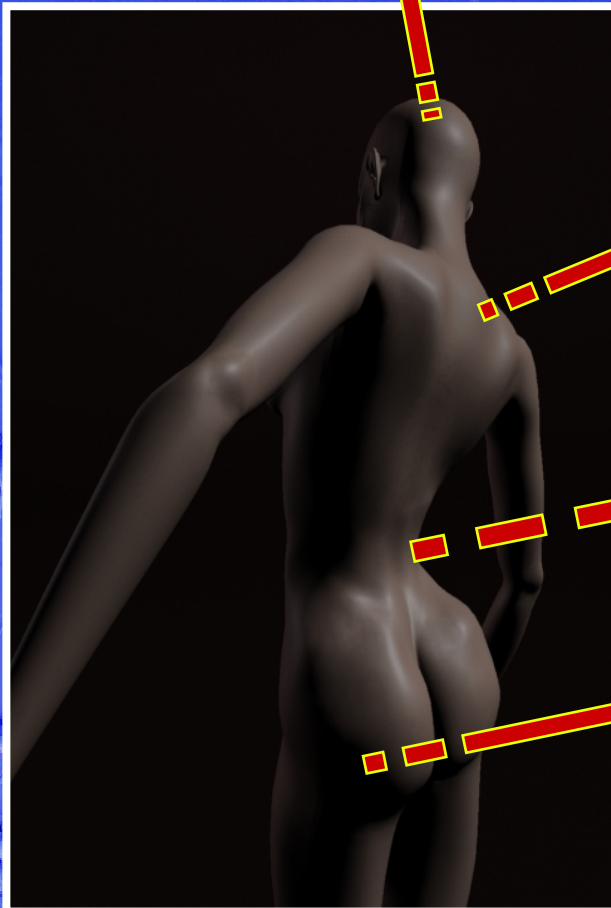
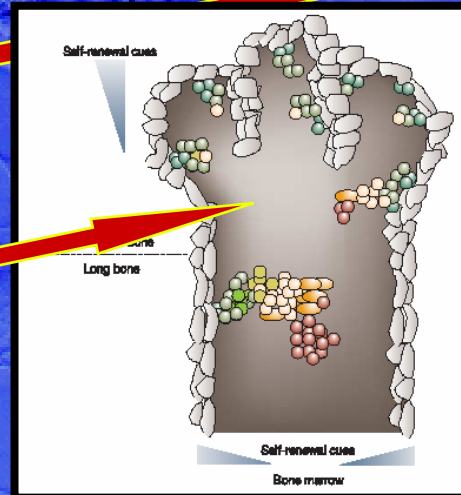
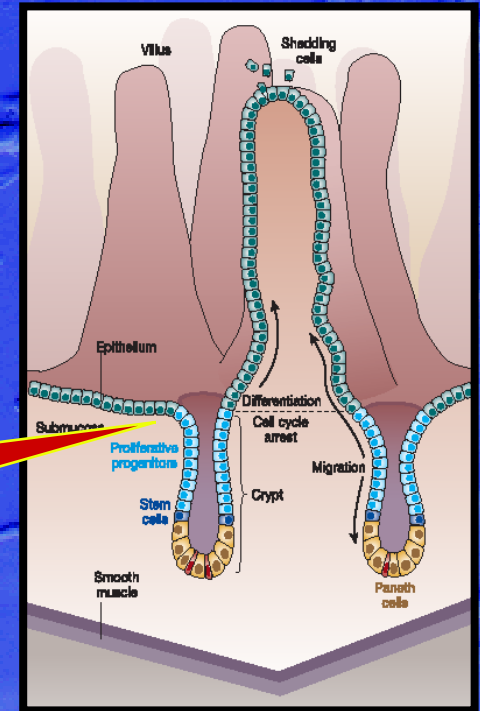
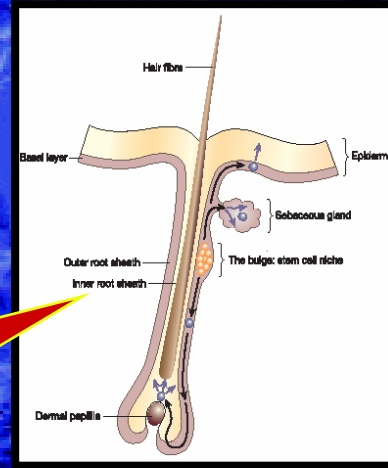
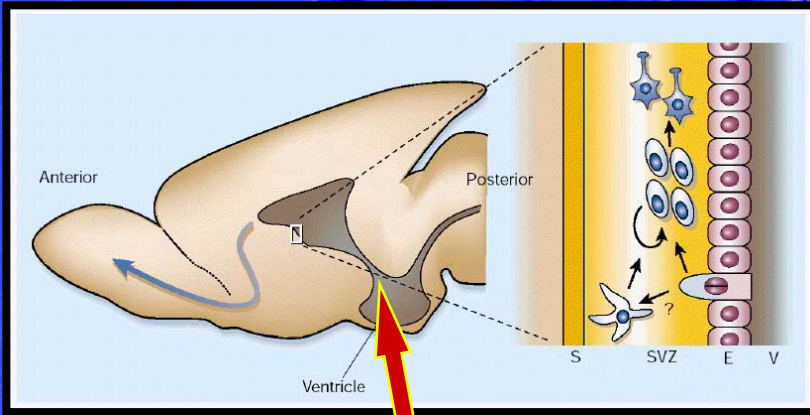


Kmenové buňky tvoří jen zlomek buněk dané tkáně/organismu !



Functional Cells

Kmenové buňky v dospělém organismu



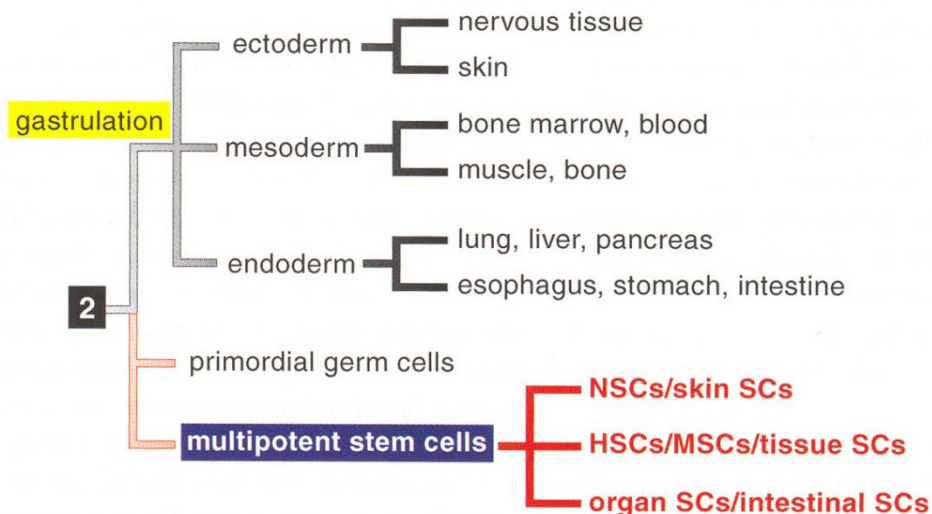
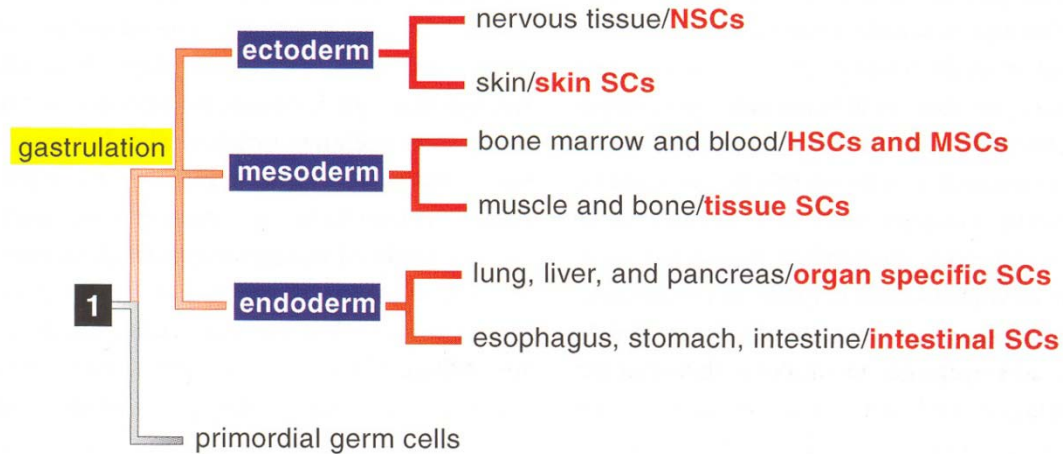
+ další tkáně

Proč nás kmenové buňky tak zajímají?

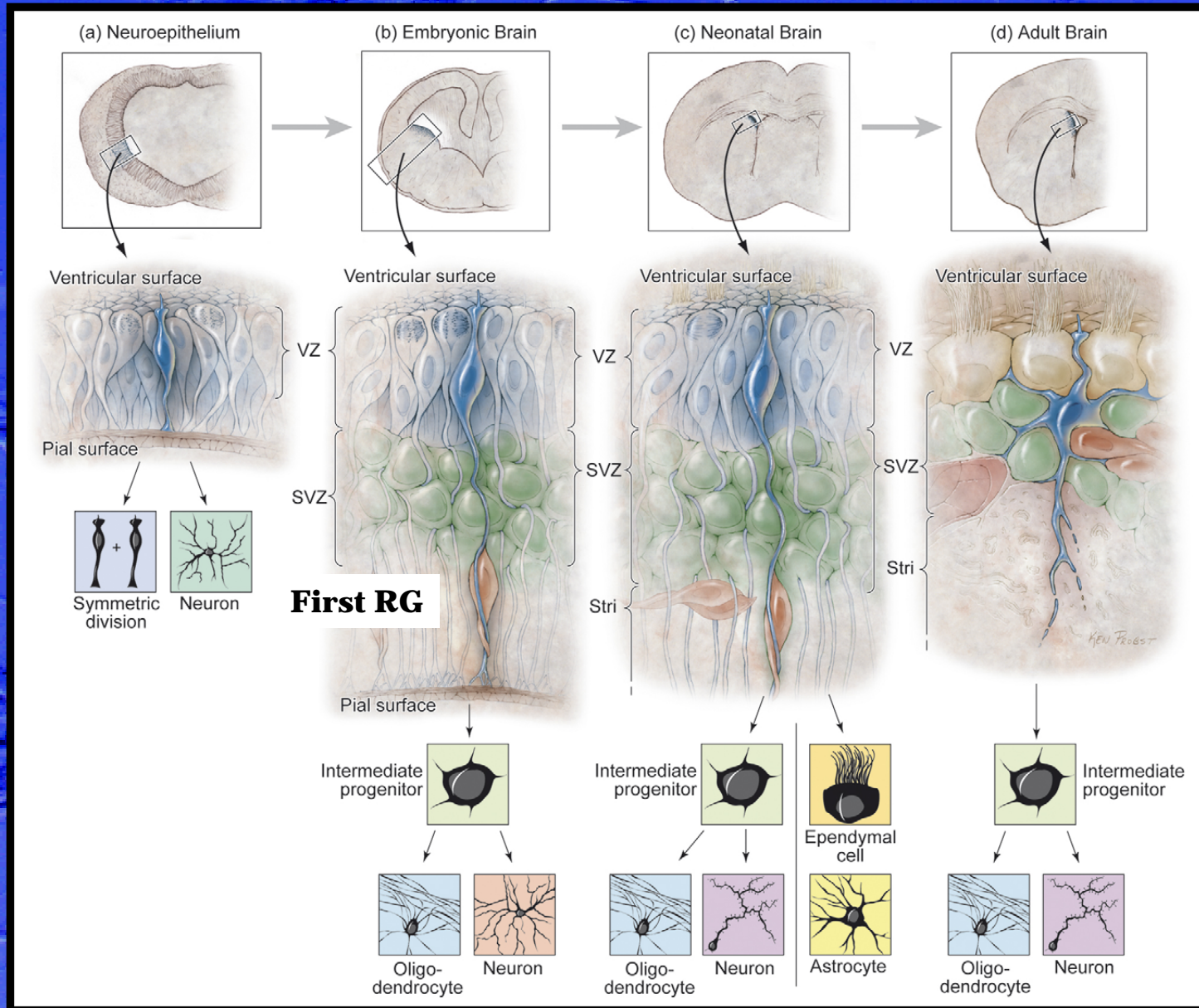
- „neomezený“ zdroj nových buněk pro regeneraci tkání
 - => nezbytné pro zachování homeostázy
 - => zajímavé pro transplantace a buněčnou terapii
- „nemocné“ kmenové buňky
 - => vznik a relaps nádorových onemocnění
 - => poruchy ve schopnosti regenerace, růstu, ..

Co nás na kmenových buňkách zajímá?

Jejich původ během ontogeneze, jak vznikají?



Neuroepithelium → radial glia (RG) → astrocyte-like NSC

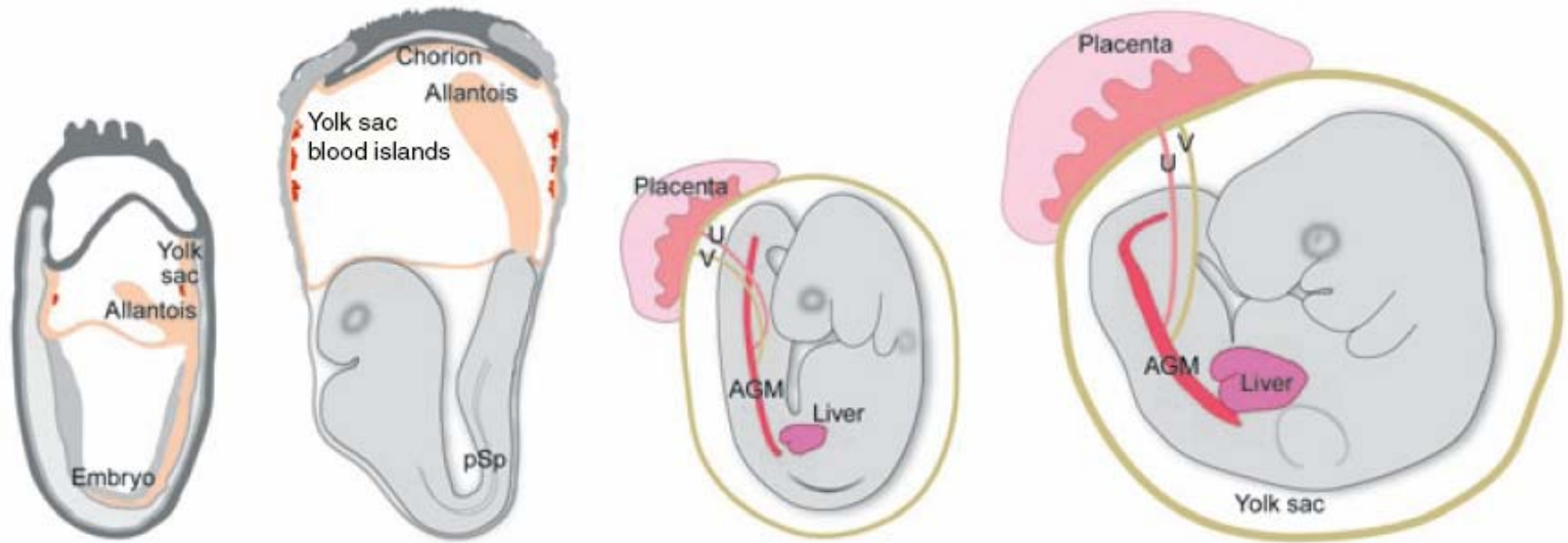


E8-9

E9-birth

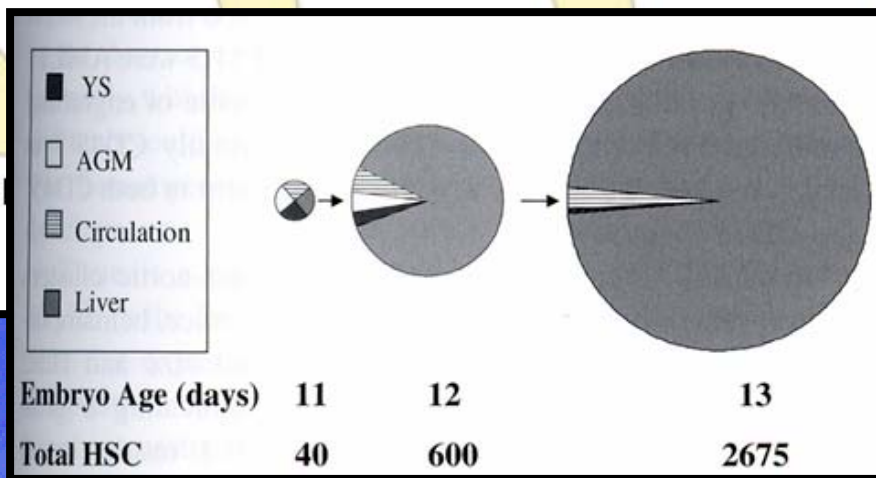
(Merkle 2006)

Původ hematopoetických/krvetvorných kmenových buněk



Hemangioblast

Hemogenic endothelium

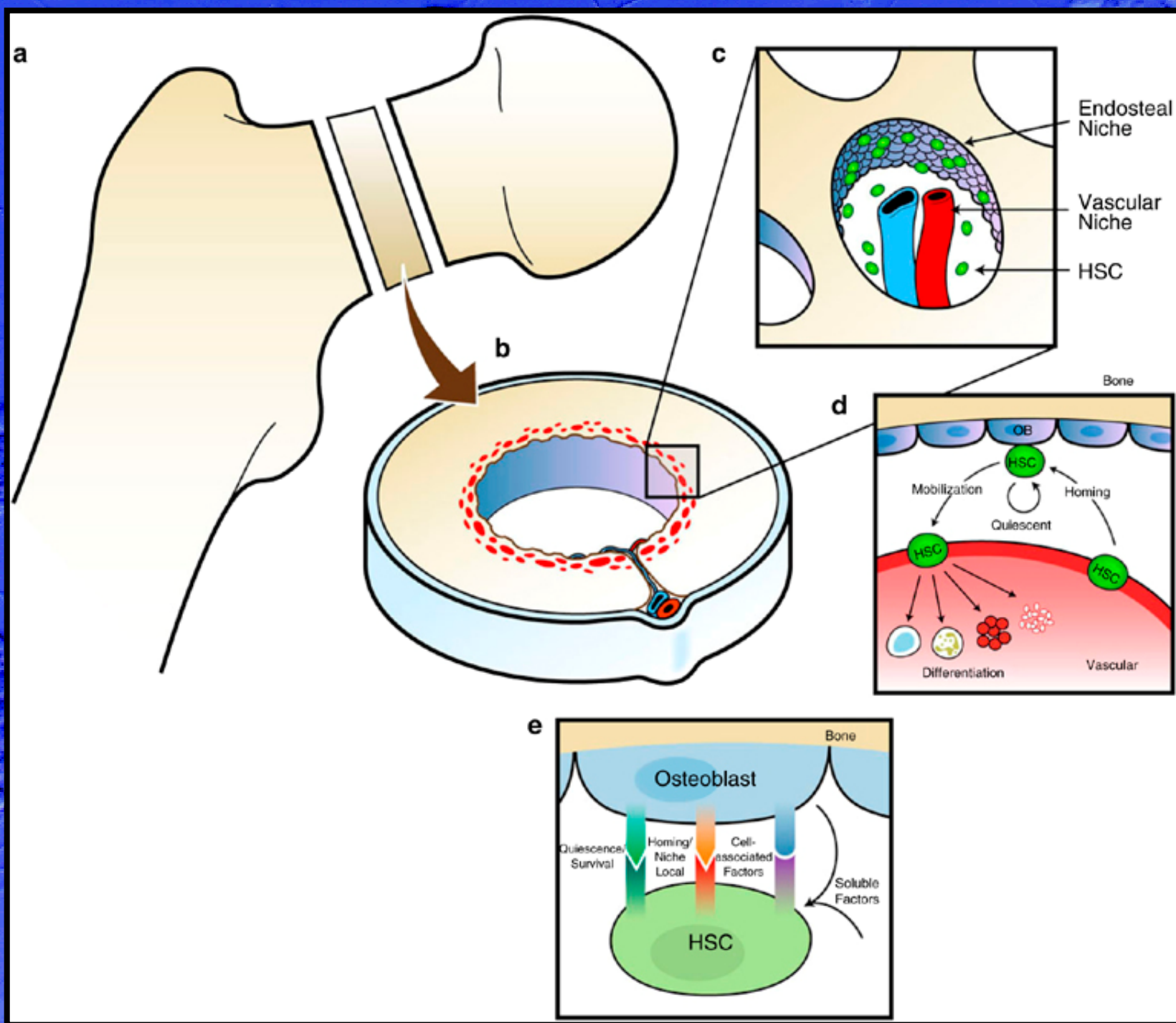


Meta-definitive

Adult-definitive

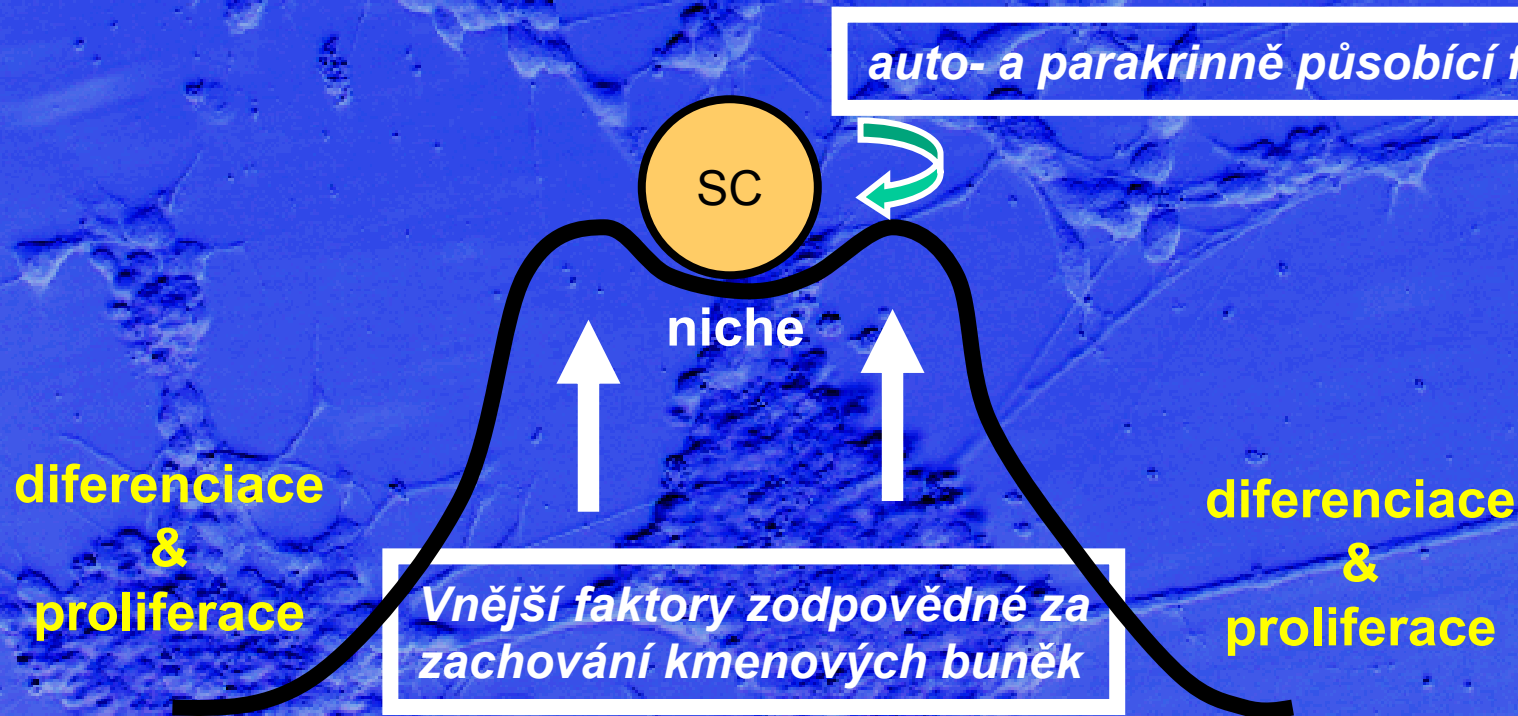
CFU-S
Neonatal HSCs

HSCs

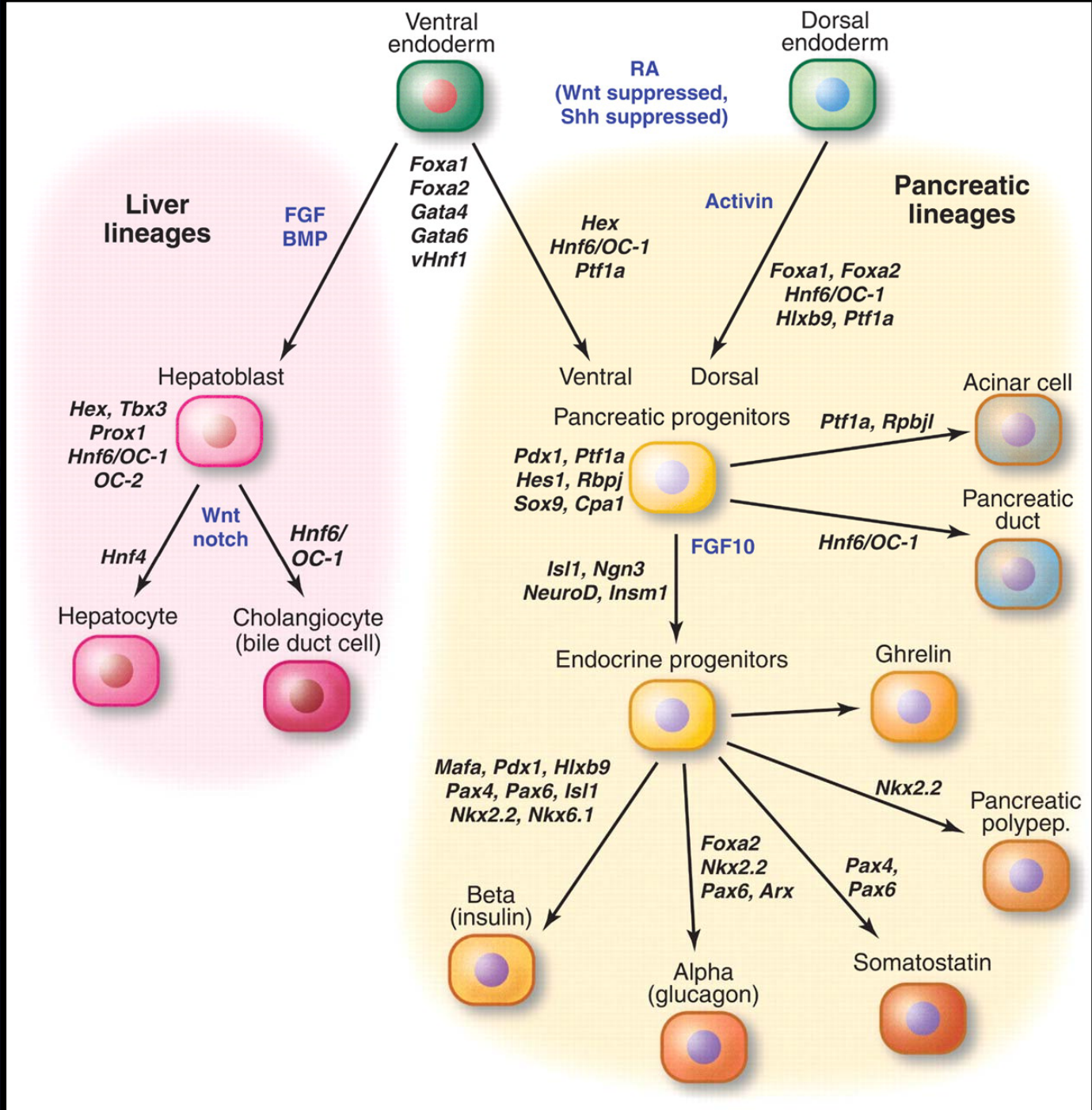


Co nás na kmenových buňkách zajímá?

Jaké vnější a jejich vnitřní faktory regulují jejich existenci?

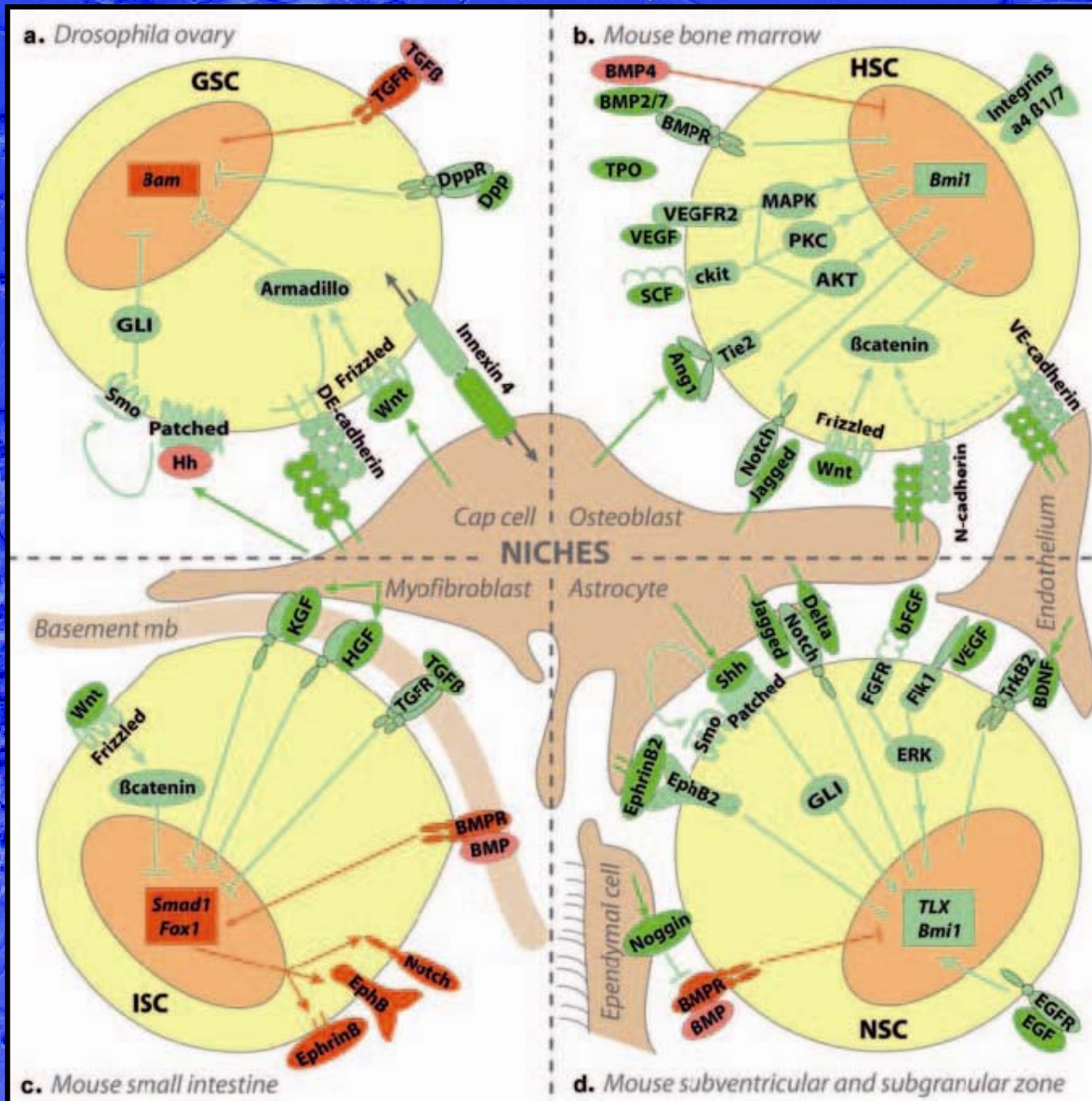


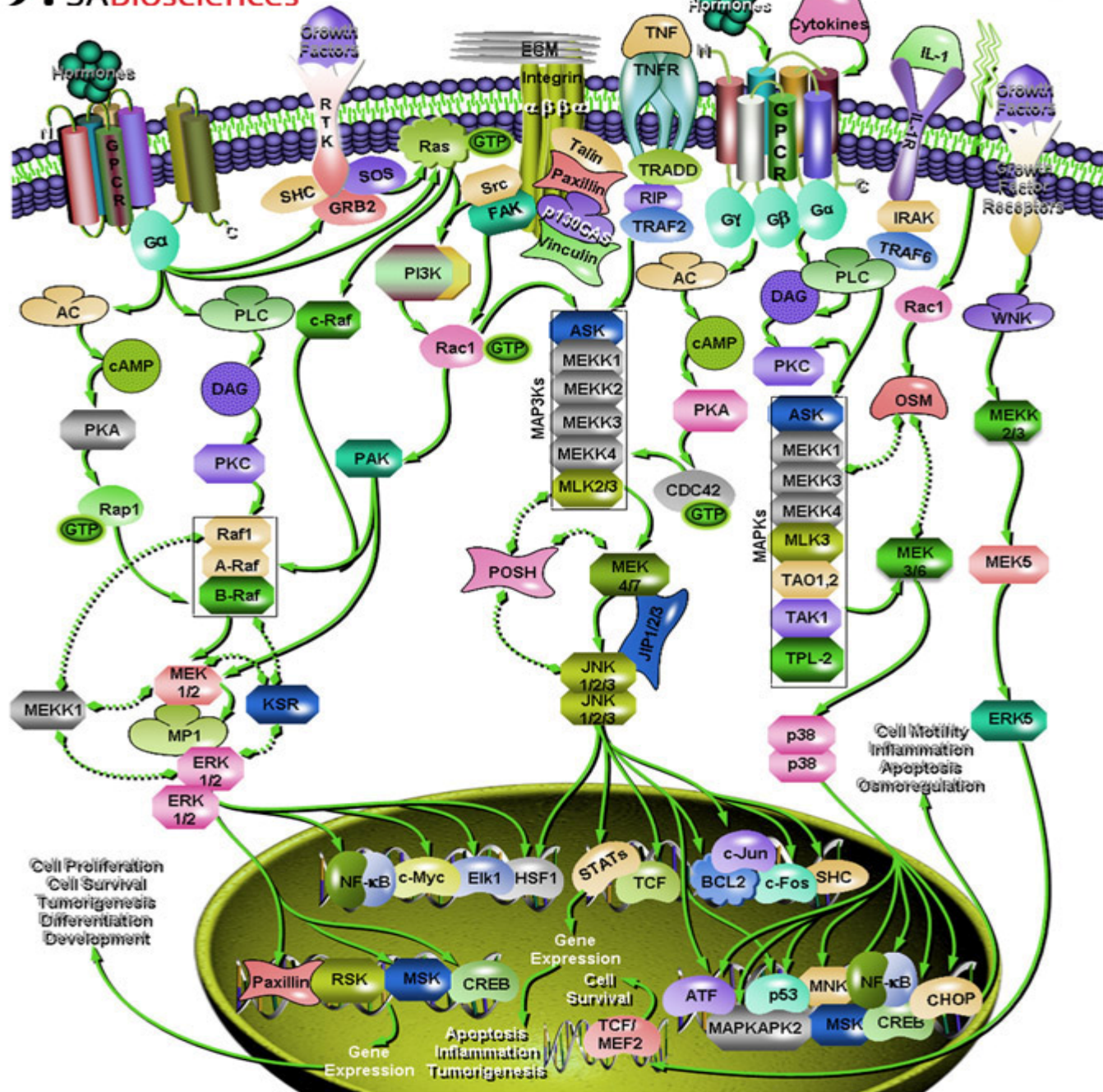
Diferenciace = rozrůžňování => vznik jiných typů buněk
Proliferace = dělení buněk => zvyšování počtu buněk



Niche

(Naveiras, 2006)

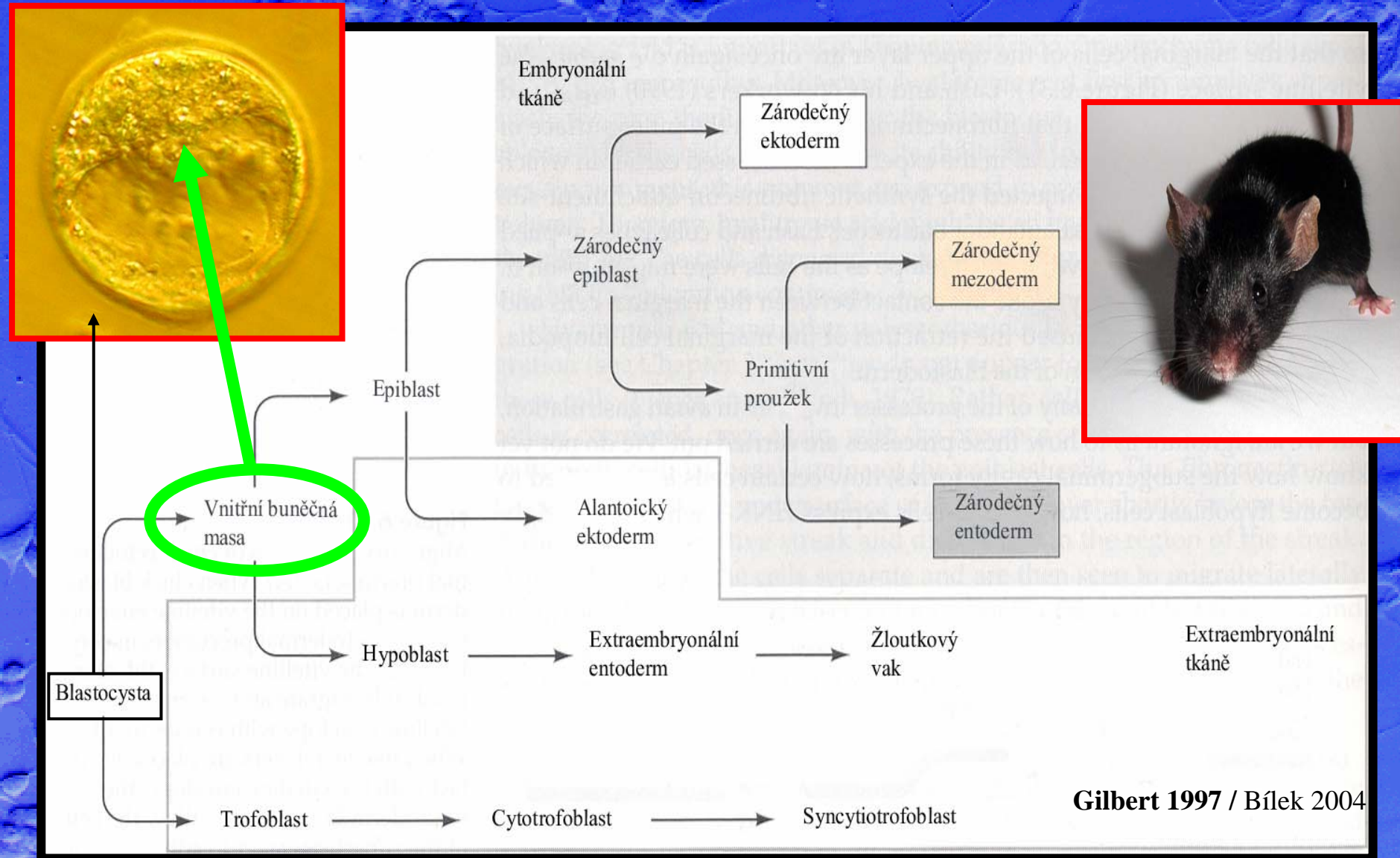




Verifikace kmenových buněk sebeobnova x schopnost diferenciaci

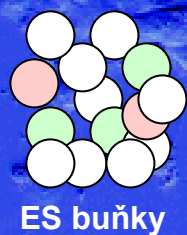
- ❖ specifické znaky/markery a vlastnosti (vývojově specifické)
- ❖ sebeobnova - nesmrtelnost
- ❖ diferenciaci in vitro
- ❖ diferenciaci in vivo

Embryonální kmenové buňky (ES - embryonic stem cell)



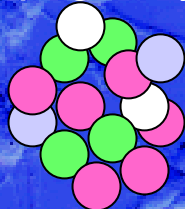
Model pro studium vzniku a zachování somatických kmenových buněk

kultivace



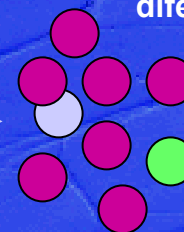
indukce

progenitory



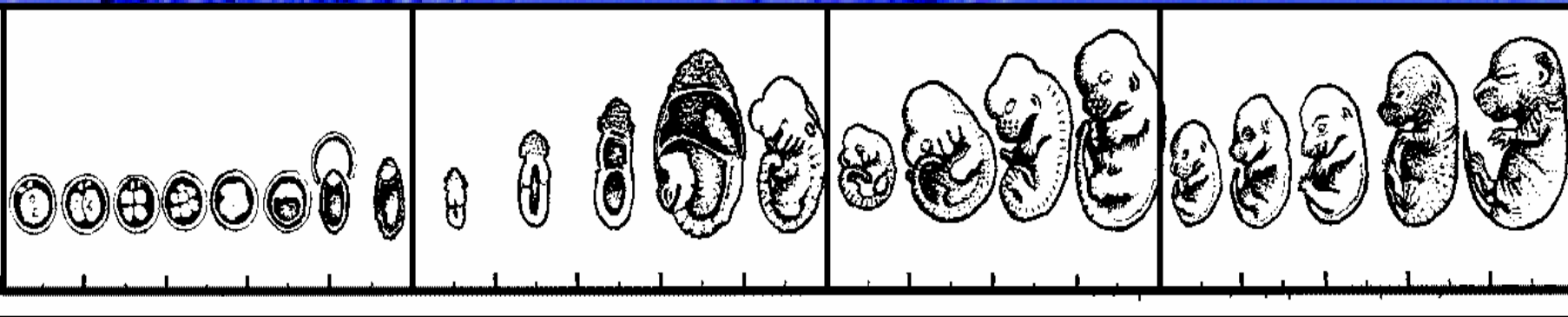
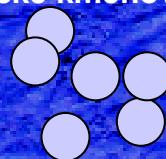
selekcce

diferencované buňky

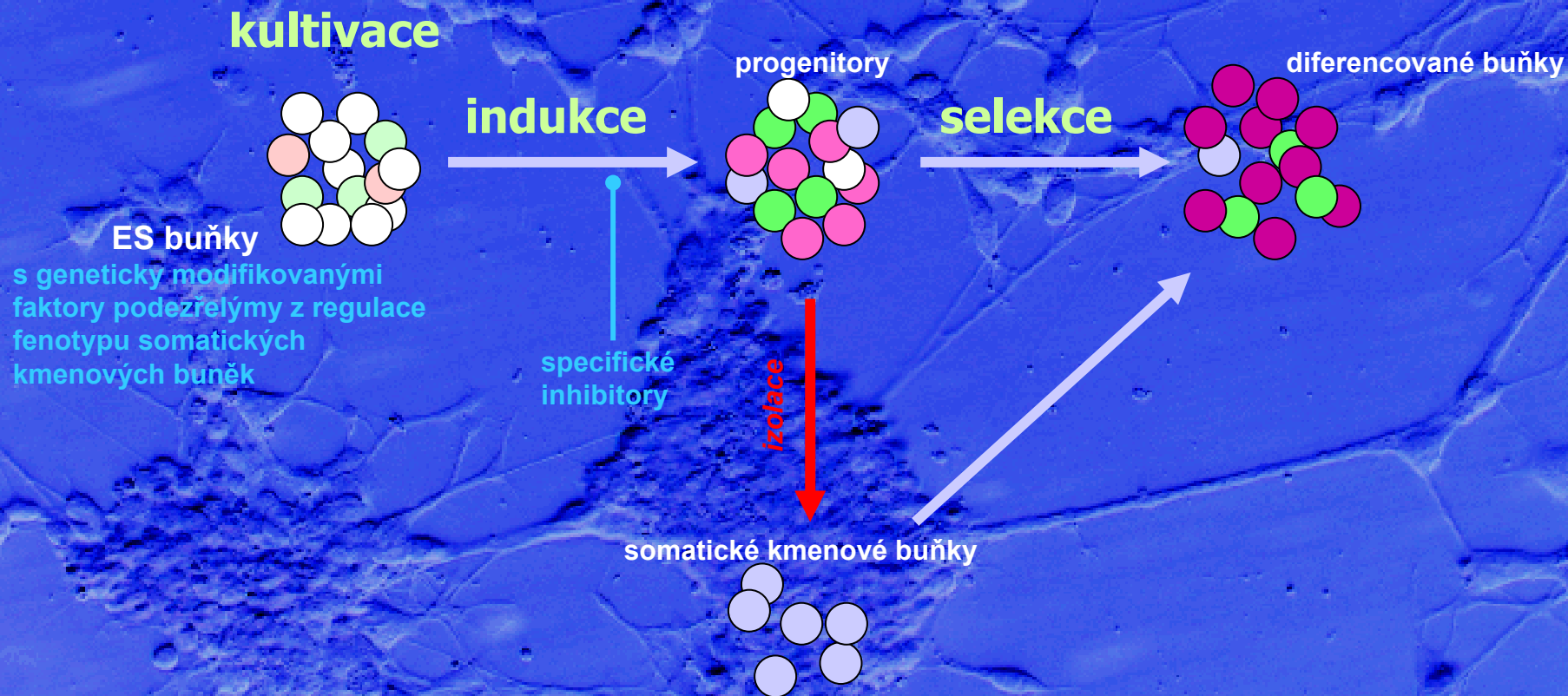


izolace

somatické kmenové buňky



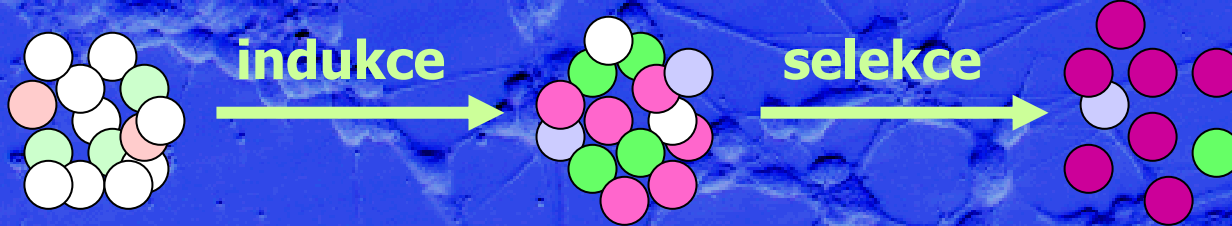
Model pro studium vzniku a zachování somatických kmenových buněk v našich experimentech



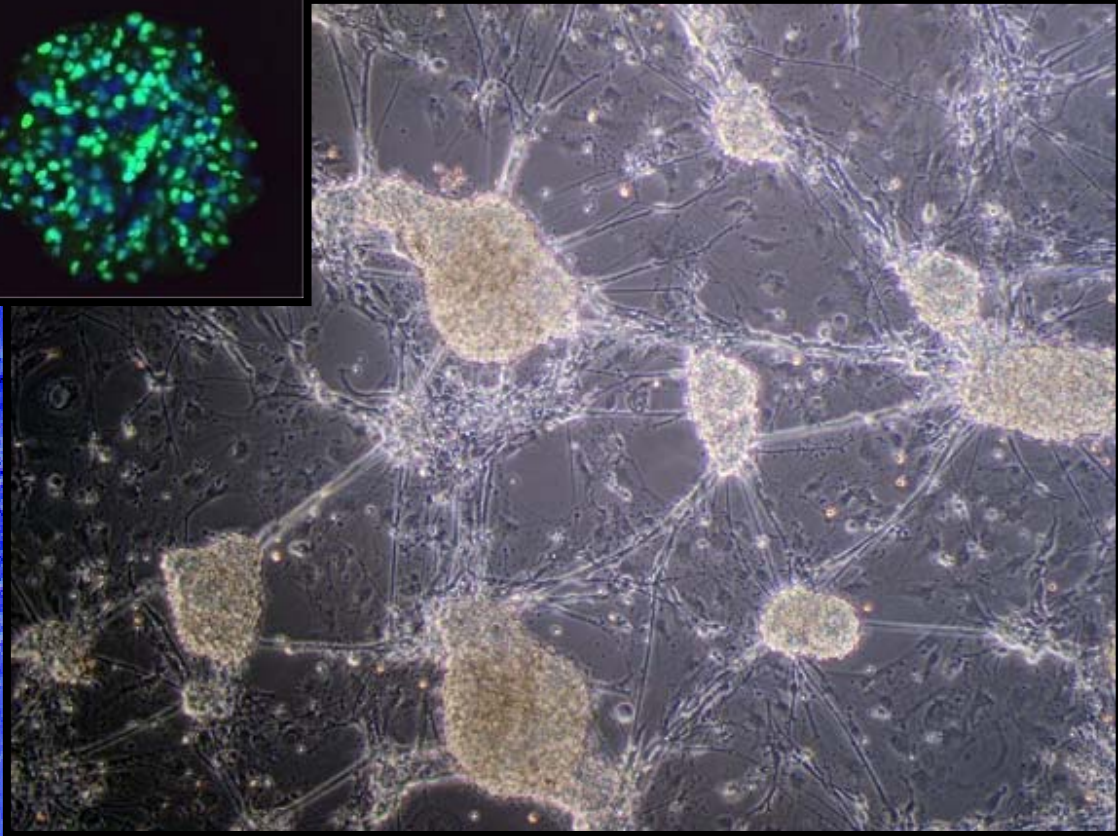
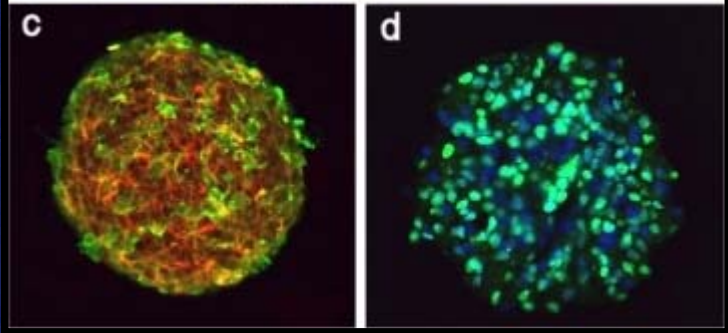
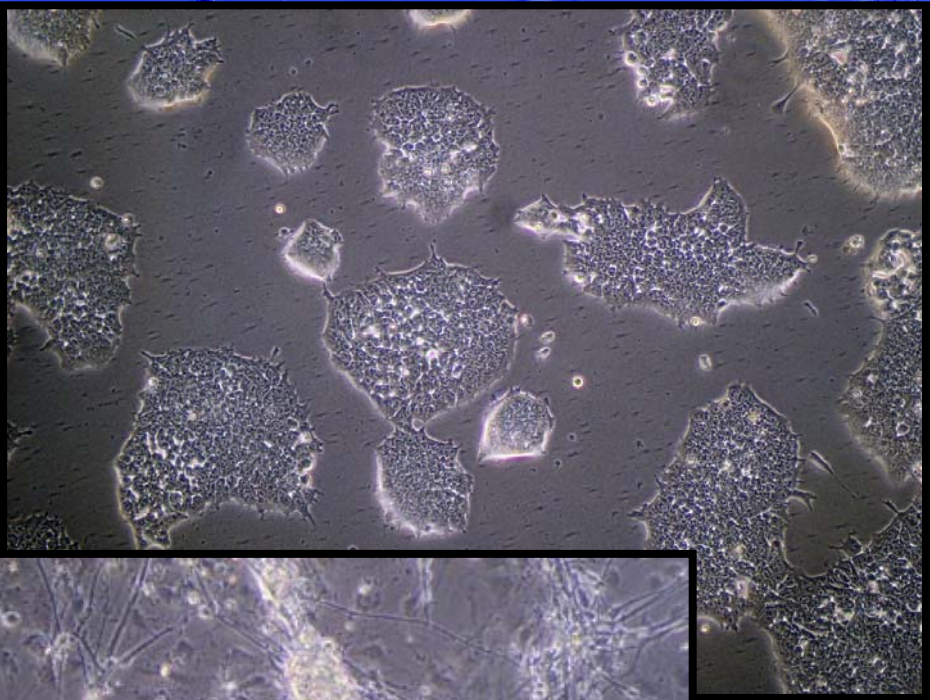
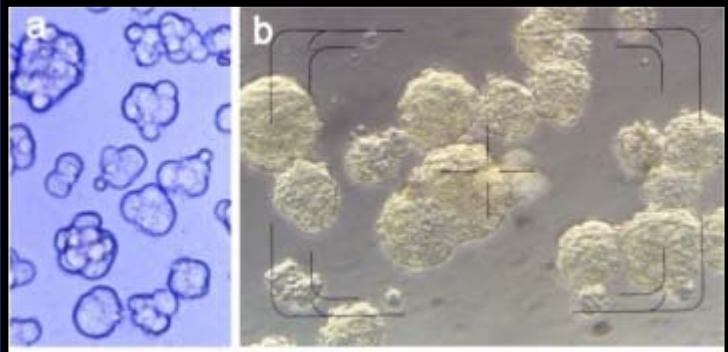
- četnost vzniklých somatických kmenových buněk
- jejich vlastnosti (fenotyp a potenciál pro další diferenciaci)

Diferenciace ES buněk *in vitro*

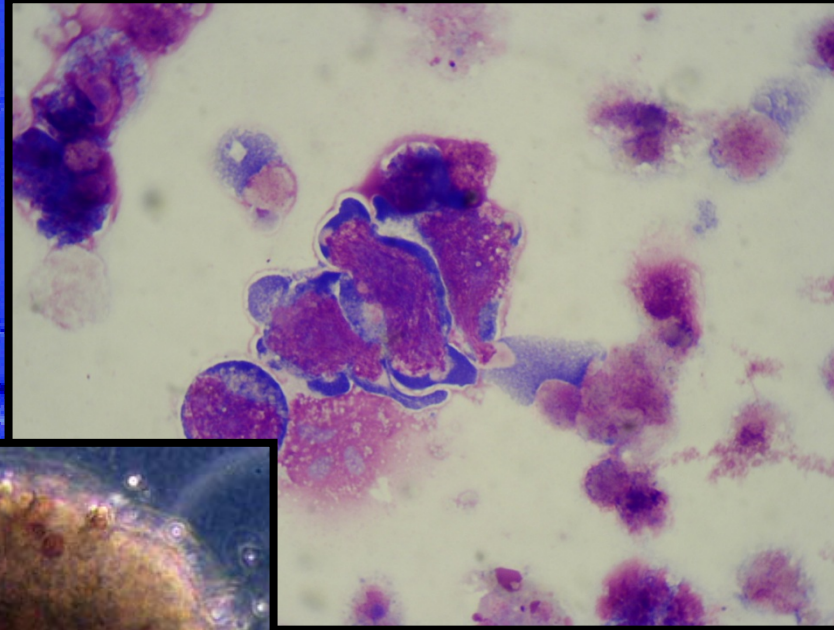
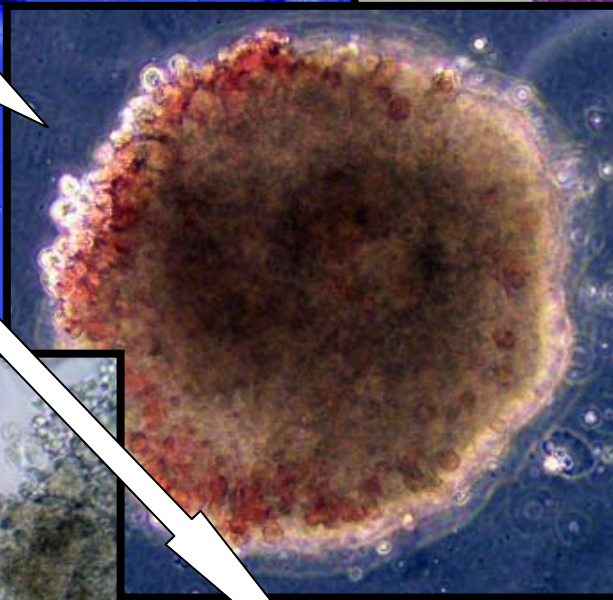
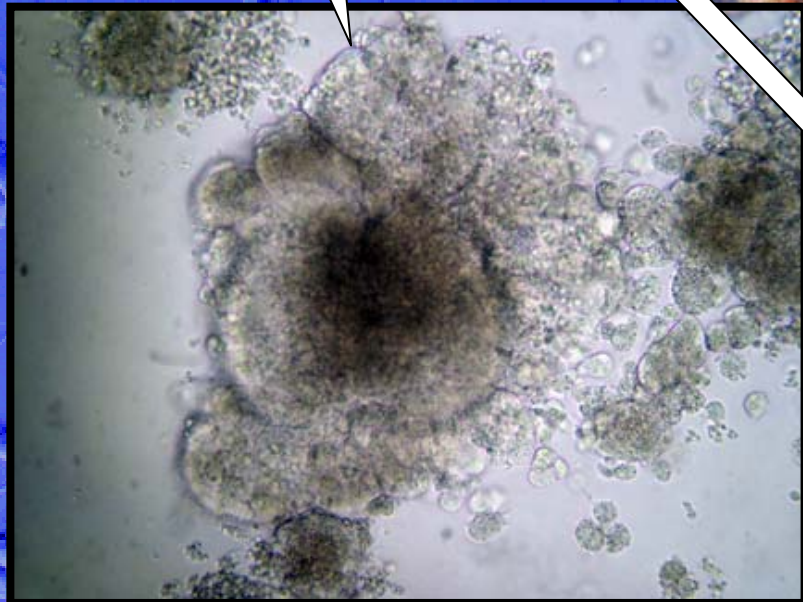
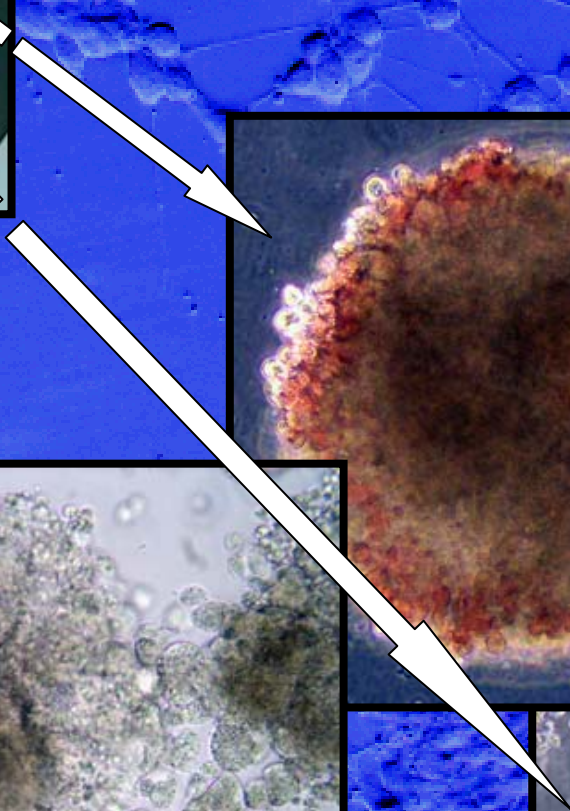
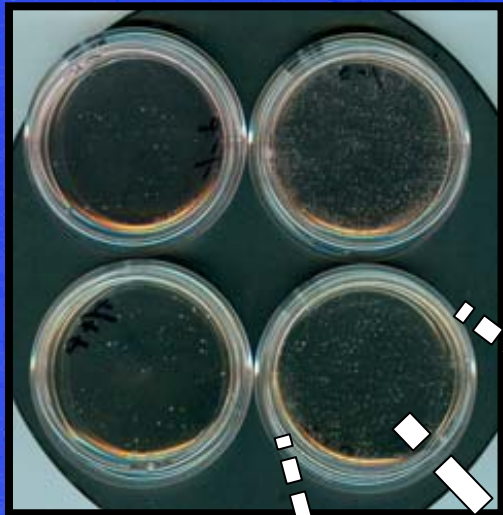
kultivace



Neurogeneze



Hematopoéza



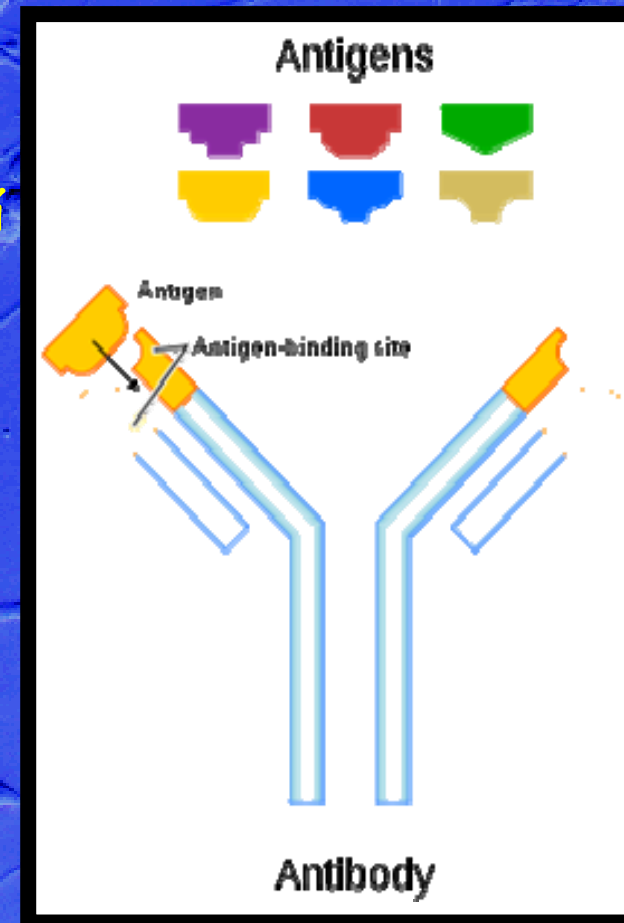
Laboratoř





Protilátky - Ab = antibody

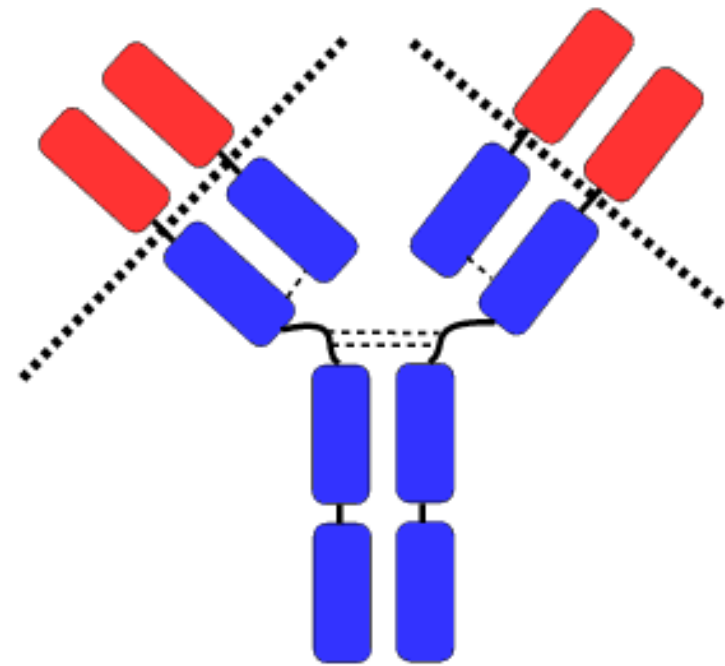
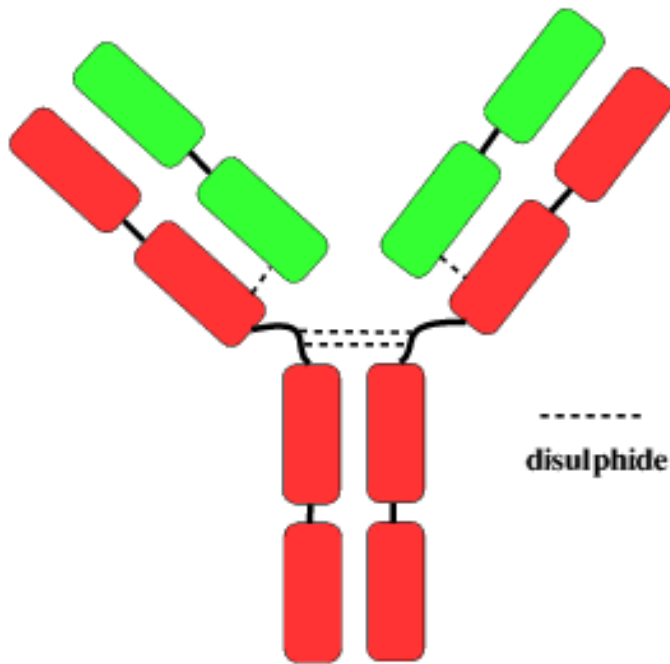
- produkt plasmatických buněk (zralé B-lymfocyty)
- bílkovina/protein, 4 proteinové řetězce, 2 lehké a 2 těžké
- rozpoznání cizorodého materiálu - antigenu
 - => regulace imunitních/obranných reakcí
- detekce antigenů ve výzkumu
- antigen - látka na kterou je protilátka se schopná specificky navázat
- imunogen - struktura schopná vyvolat tvorbu protilátek
- monoklonální x polyklonální => dle původu (jeden nebo více klonů produkujících buněk)
- primární x sekundární x terciální => dle použití...



Basic structure of an Antibody

Light chain

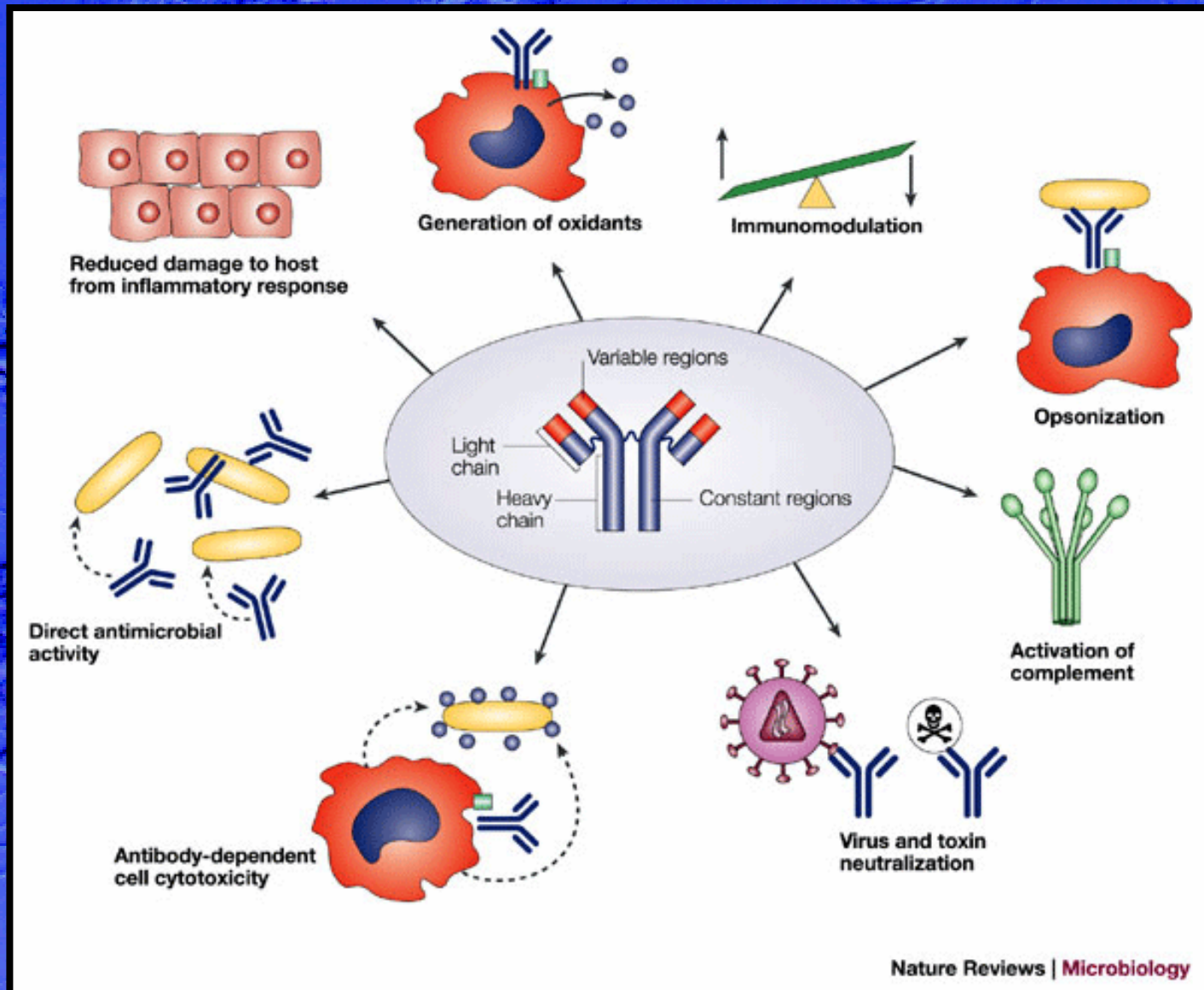
Variable region



Heavy chain

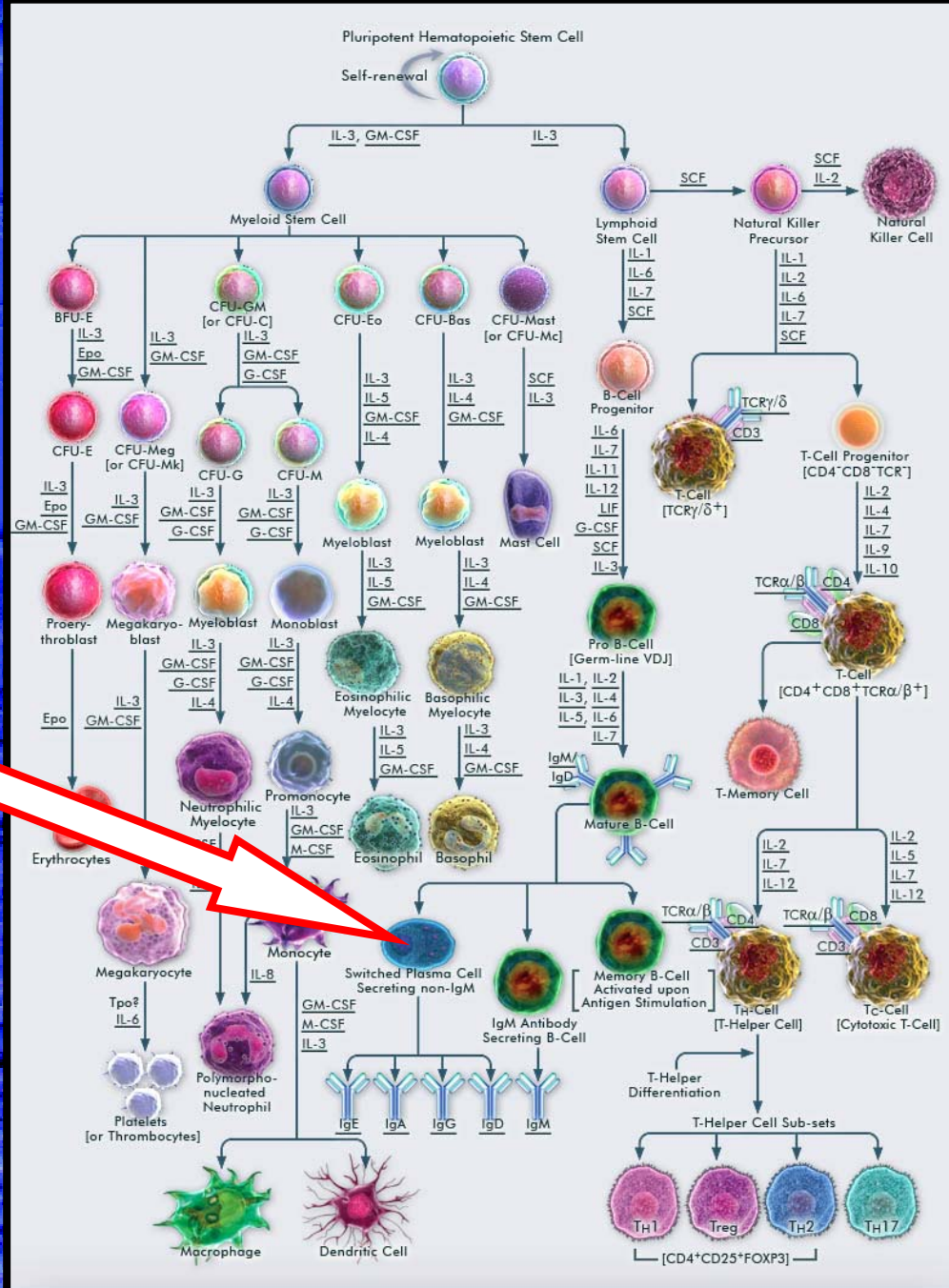
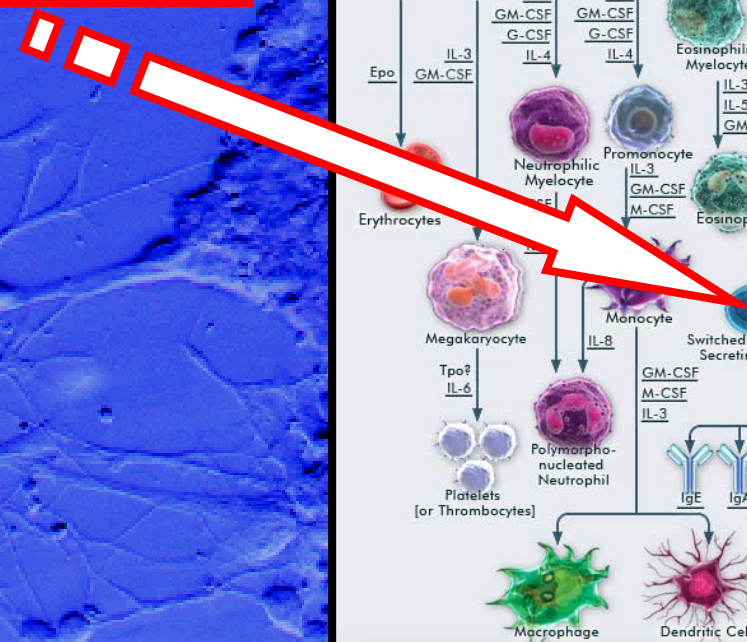
Constant region

Úloha protilátek v organismu



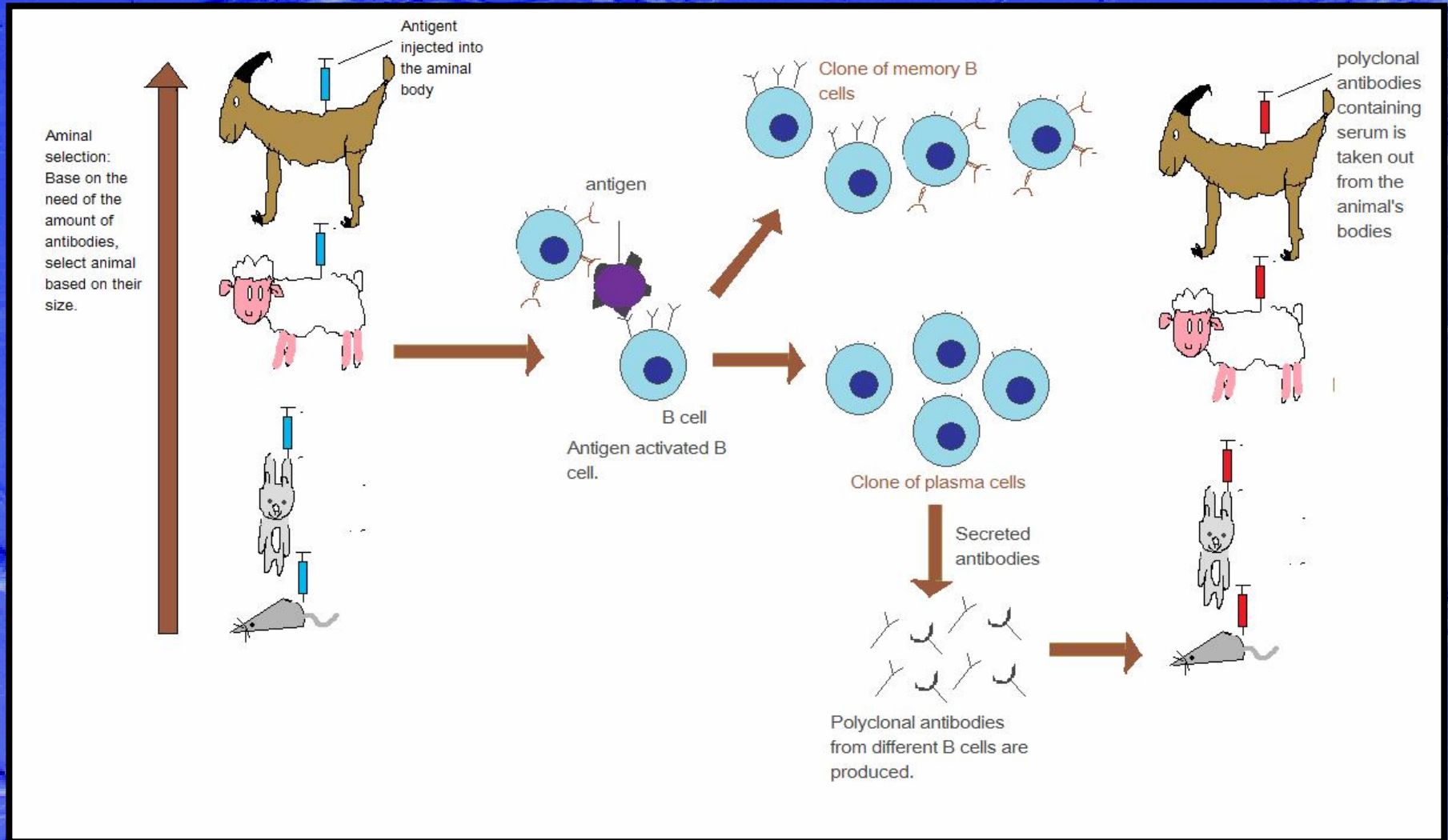
Kde protilátky vznikají?

Jsou produkovány plasmatickými B-lymfocyty!



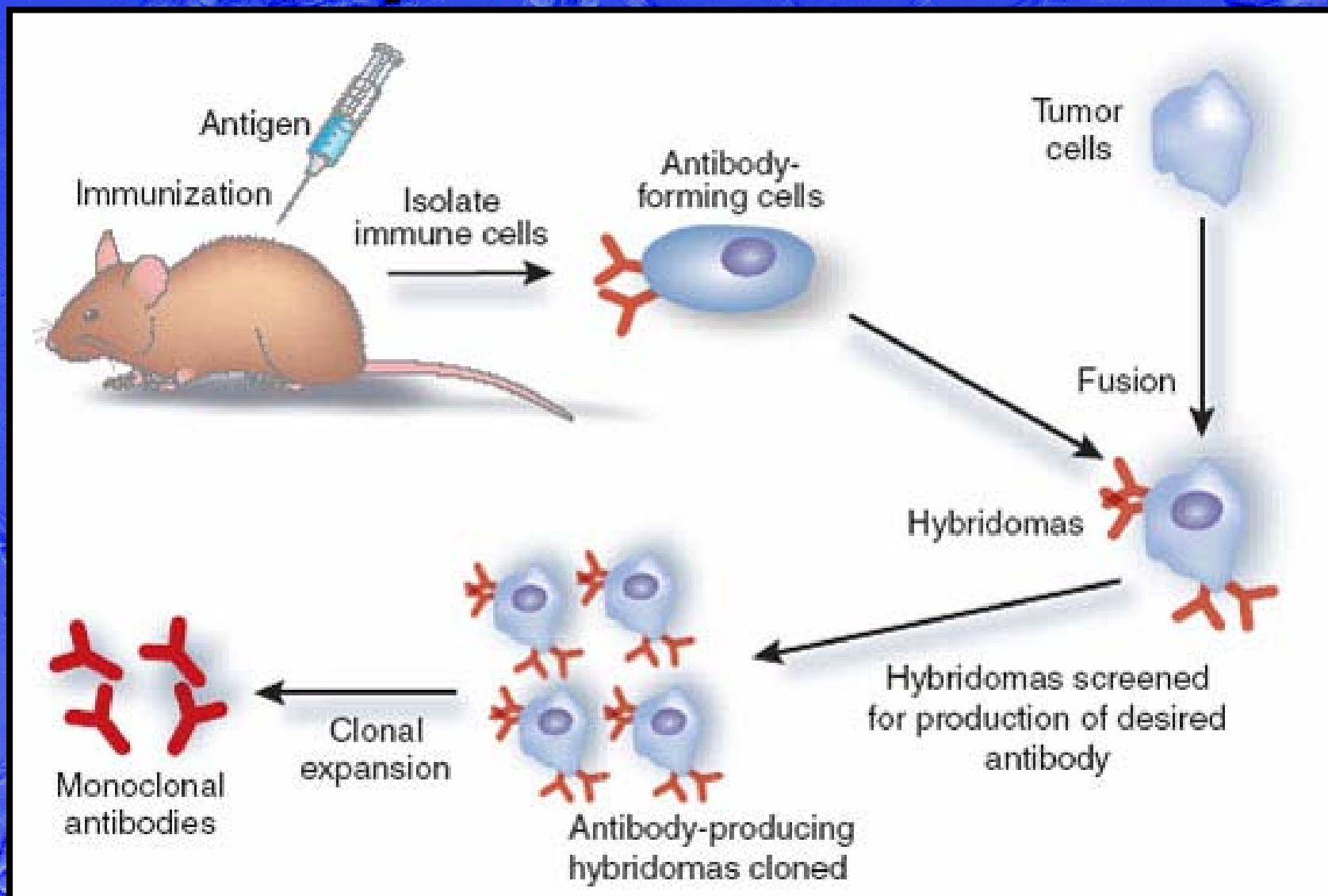
Polyklonální protilátky

- původem z více klonů

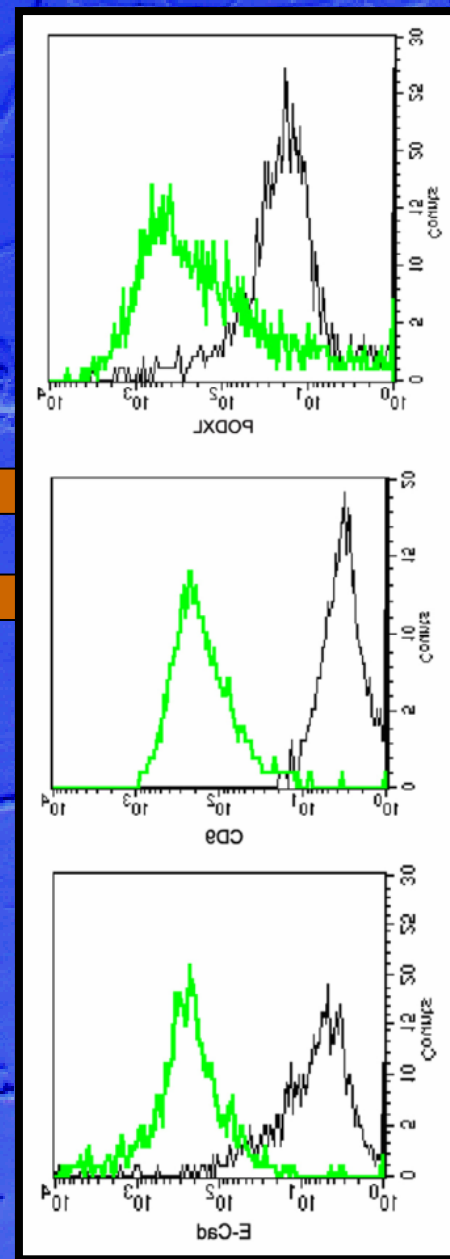
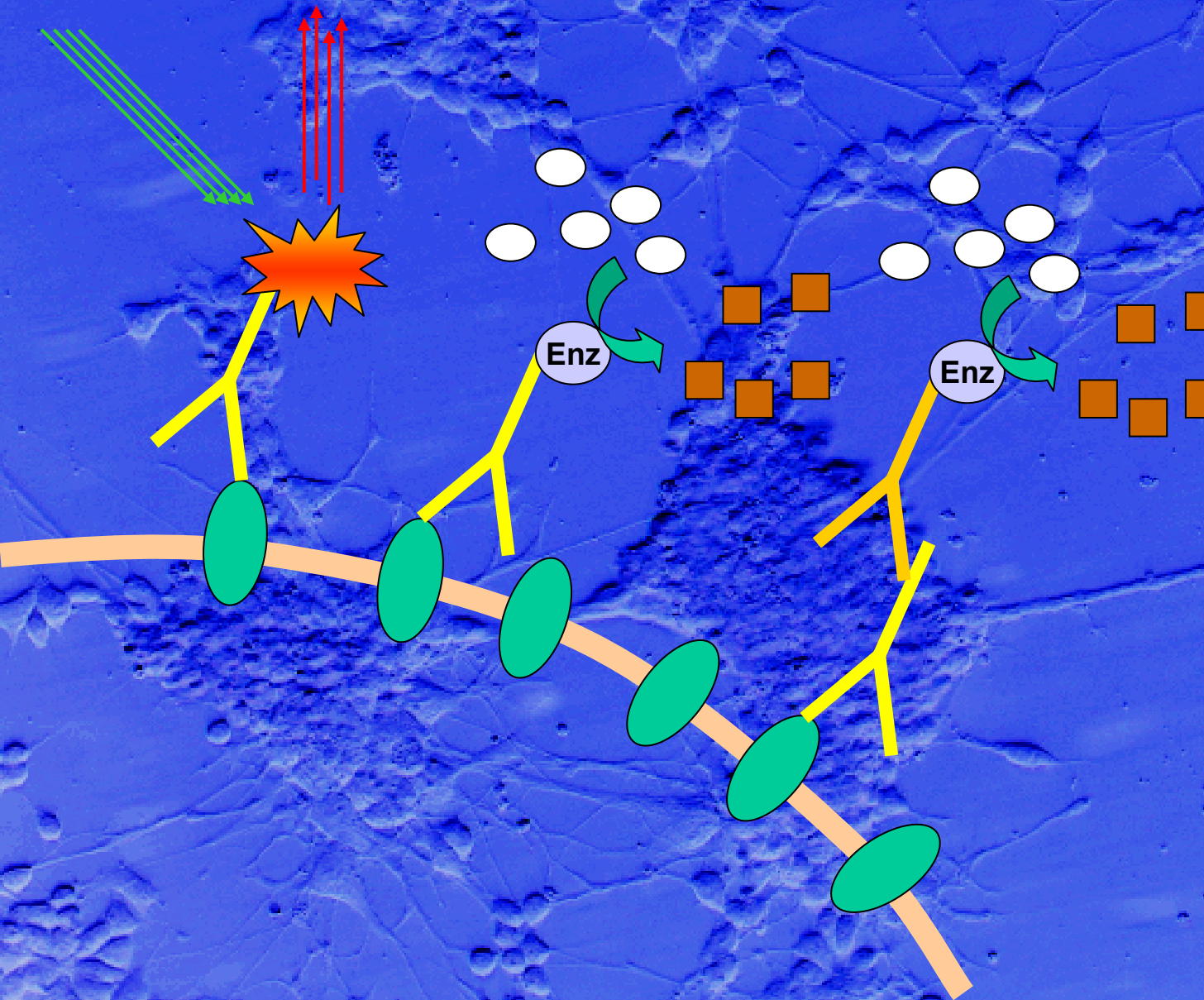


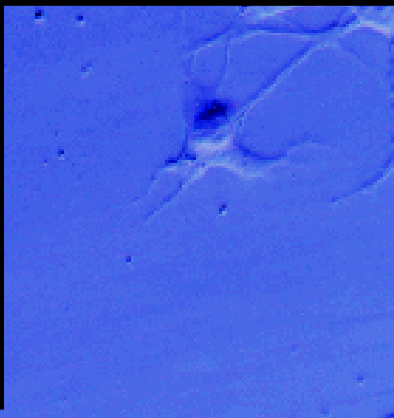
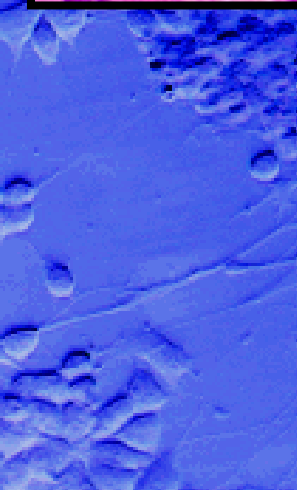
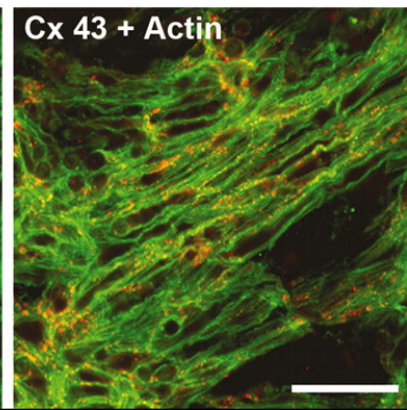
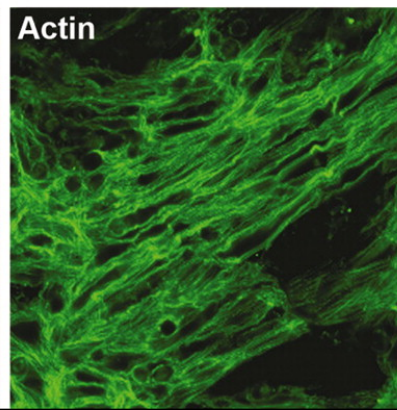
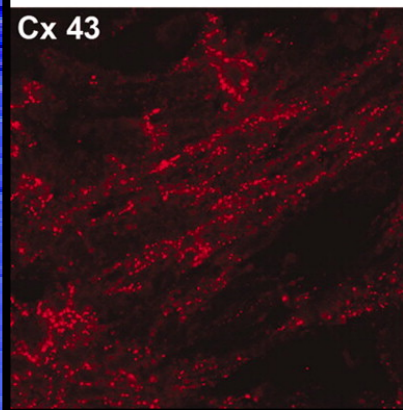
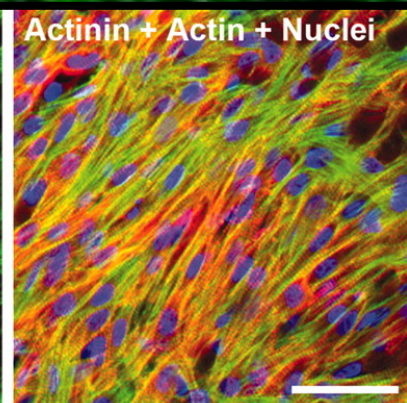
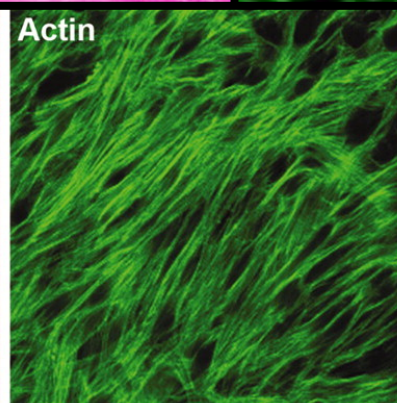
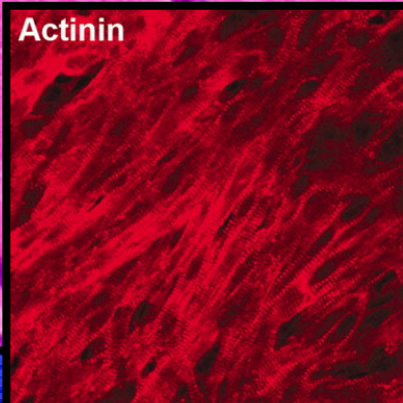
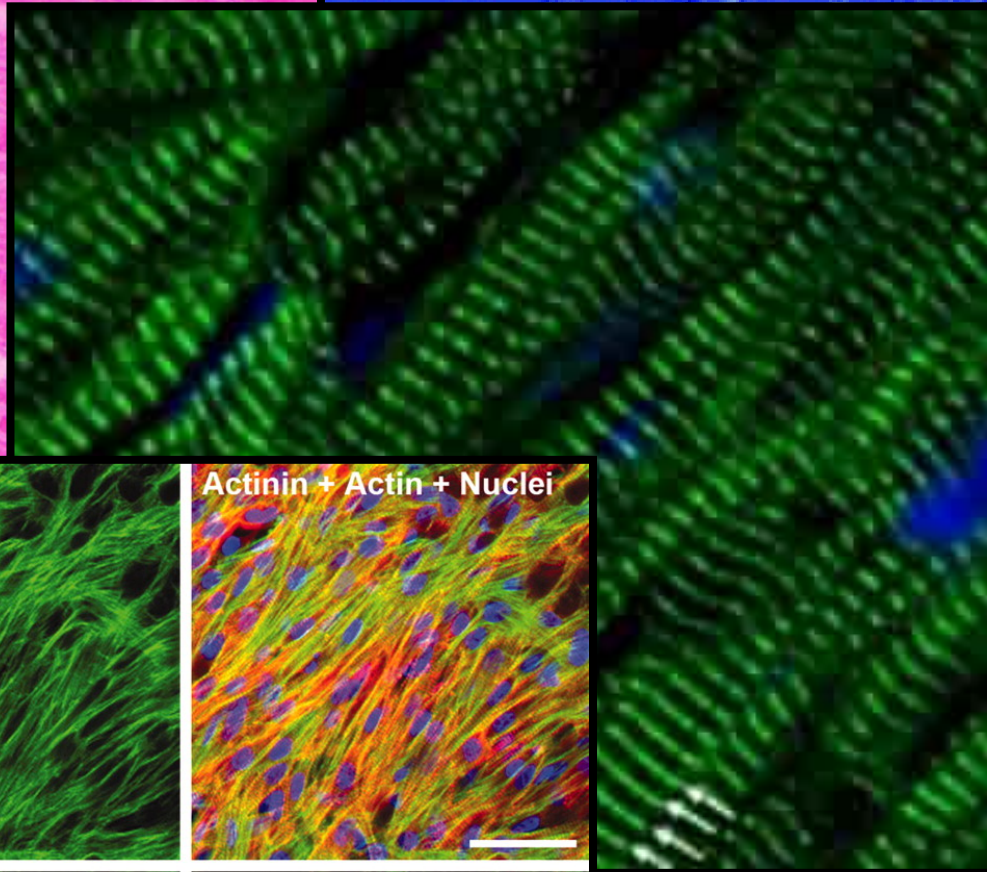
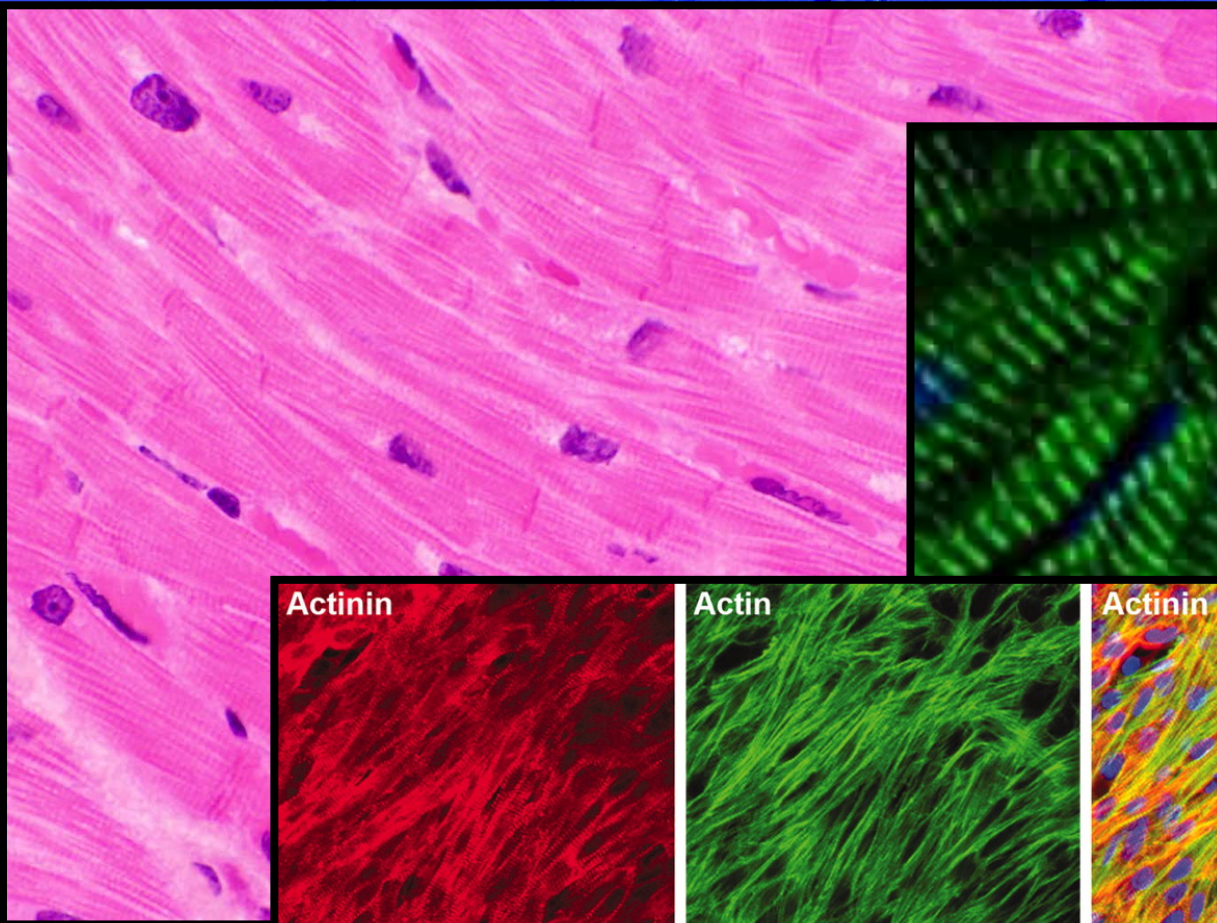
Monoklonální protilátky

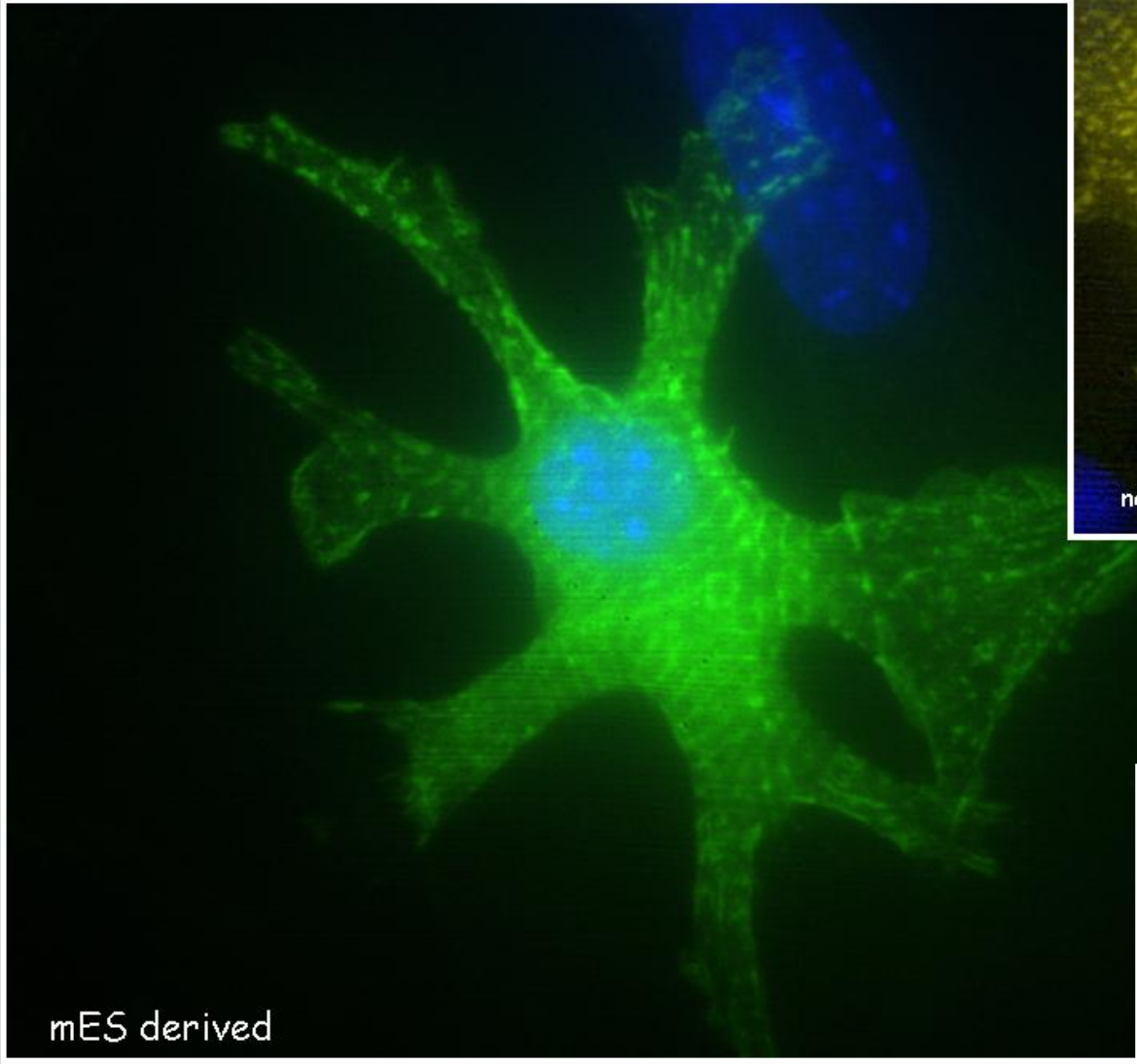
- původem z jediného klonu!!!



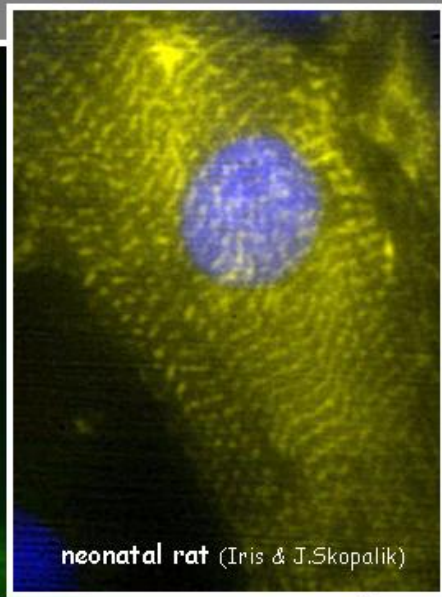
Schematický princip imunodetekce



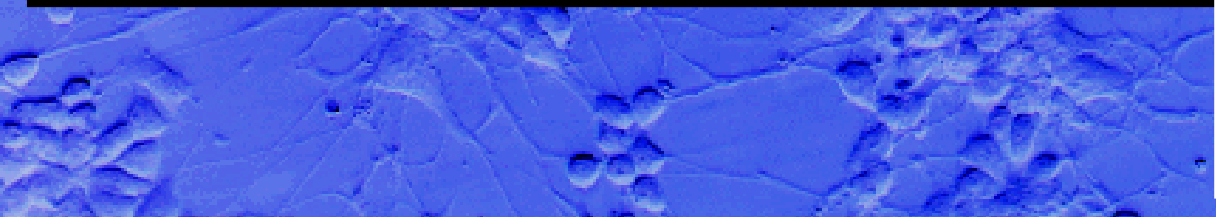
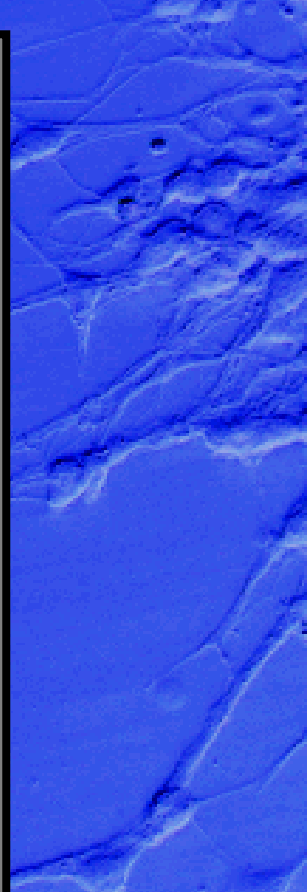
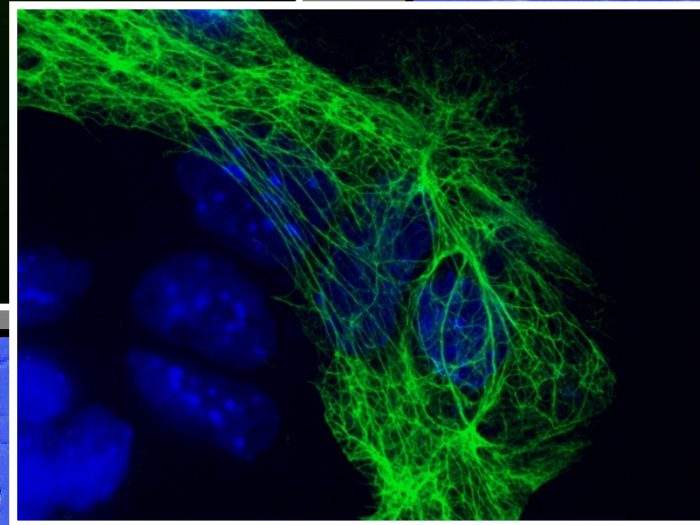


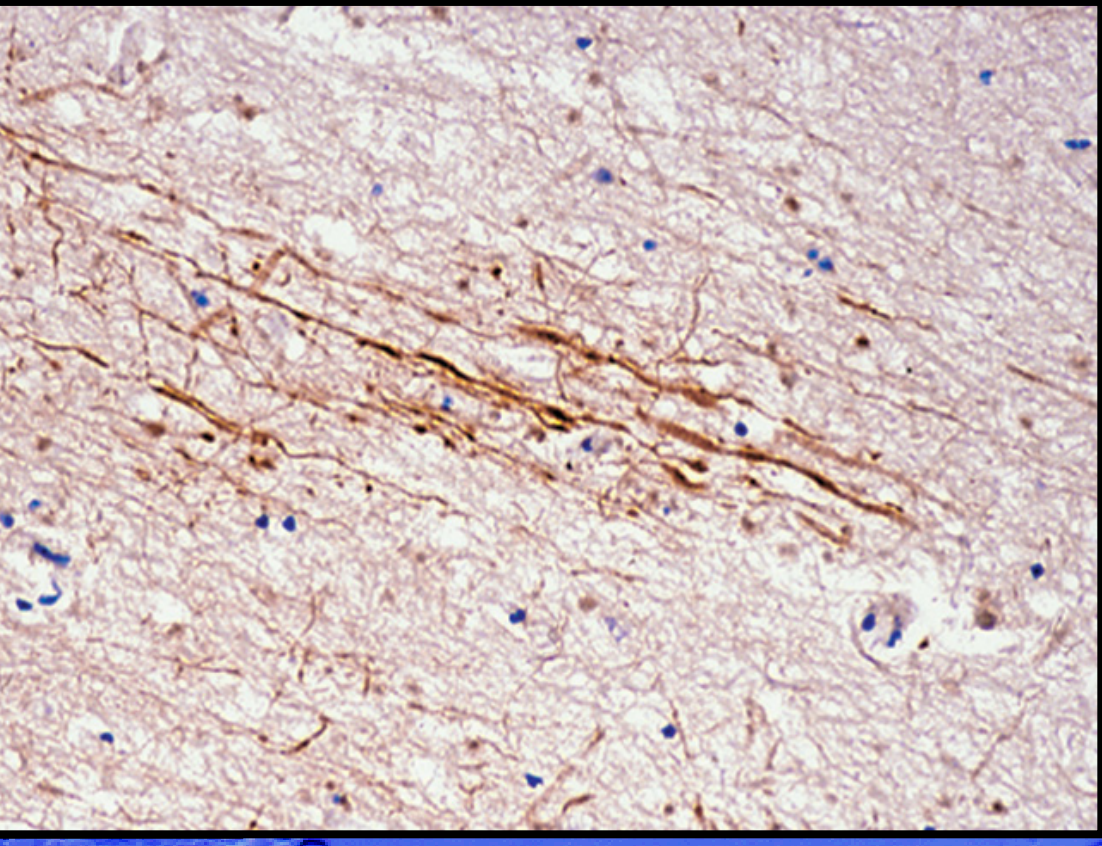
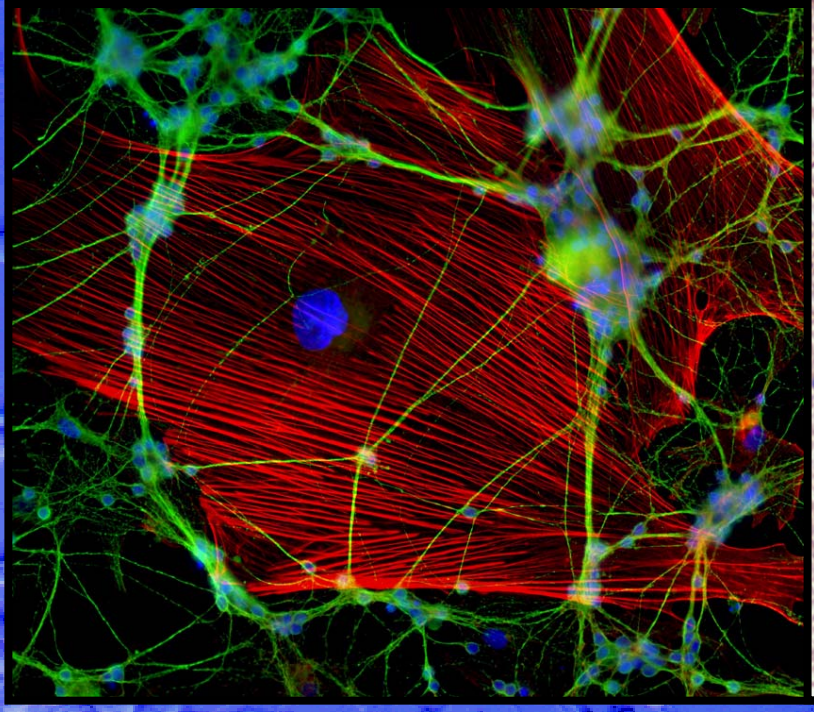
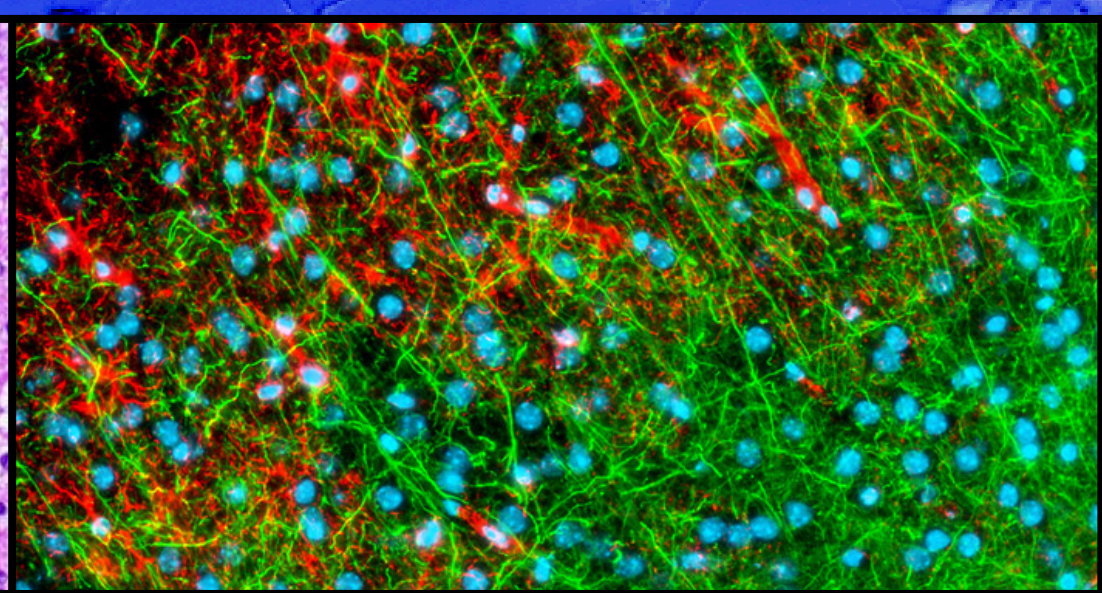
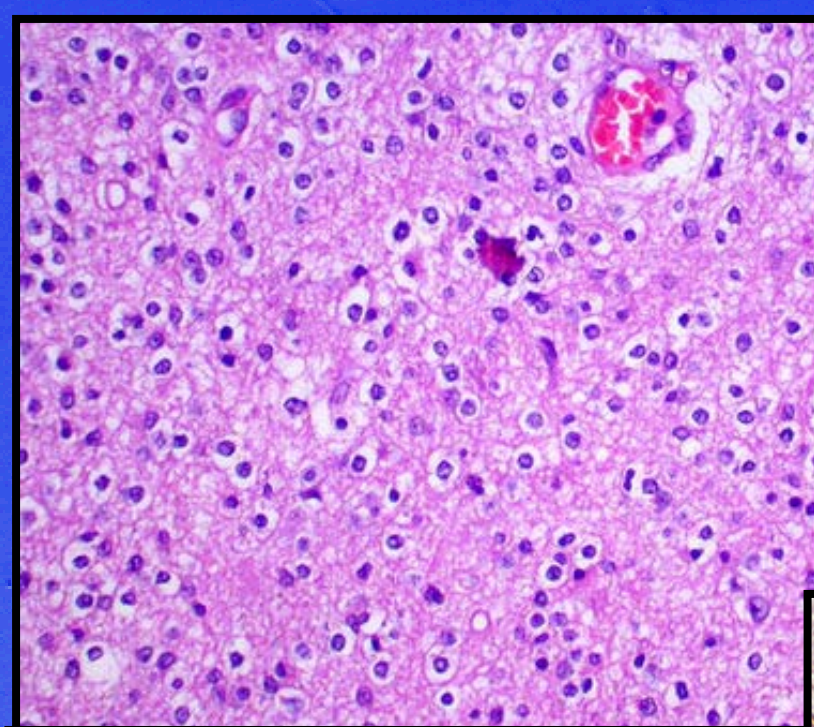


mES derived

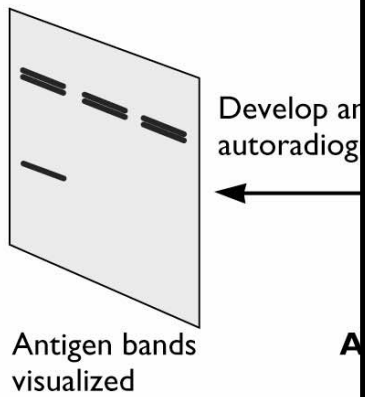
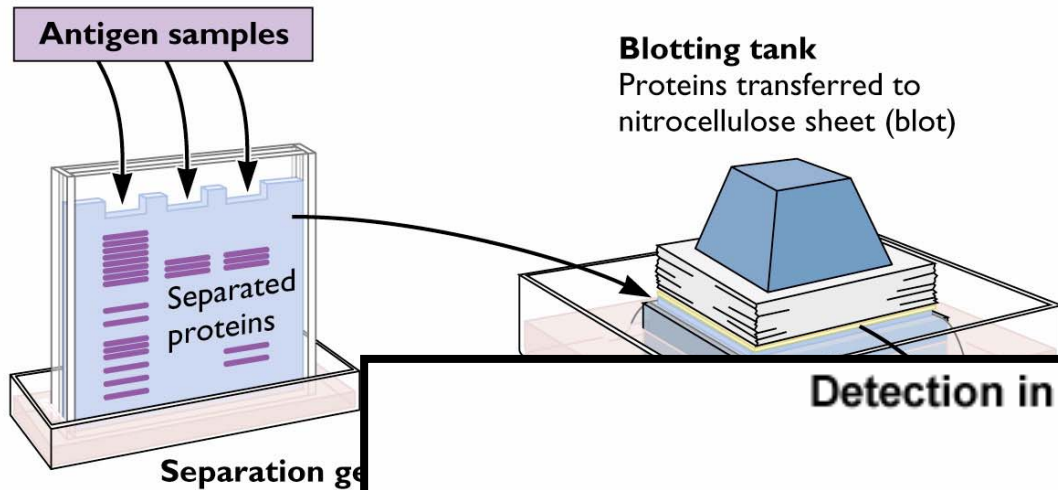


neonatal rat (Iris & J.Skopalik)





Western blot



Detection in Western Blots

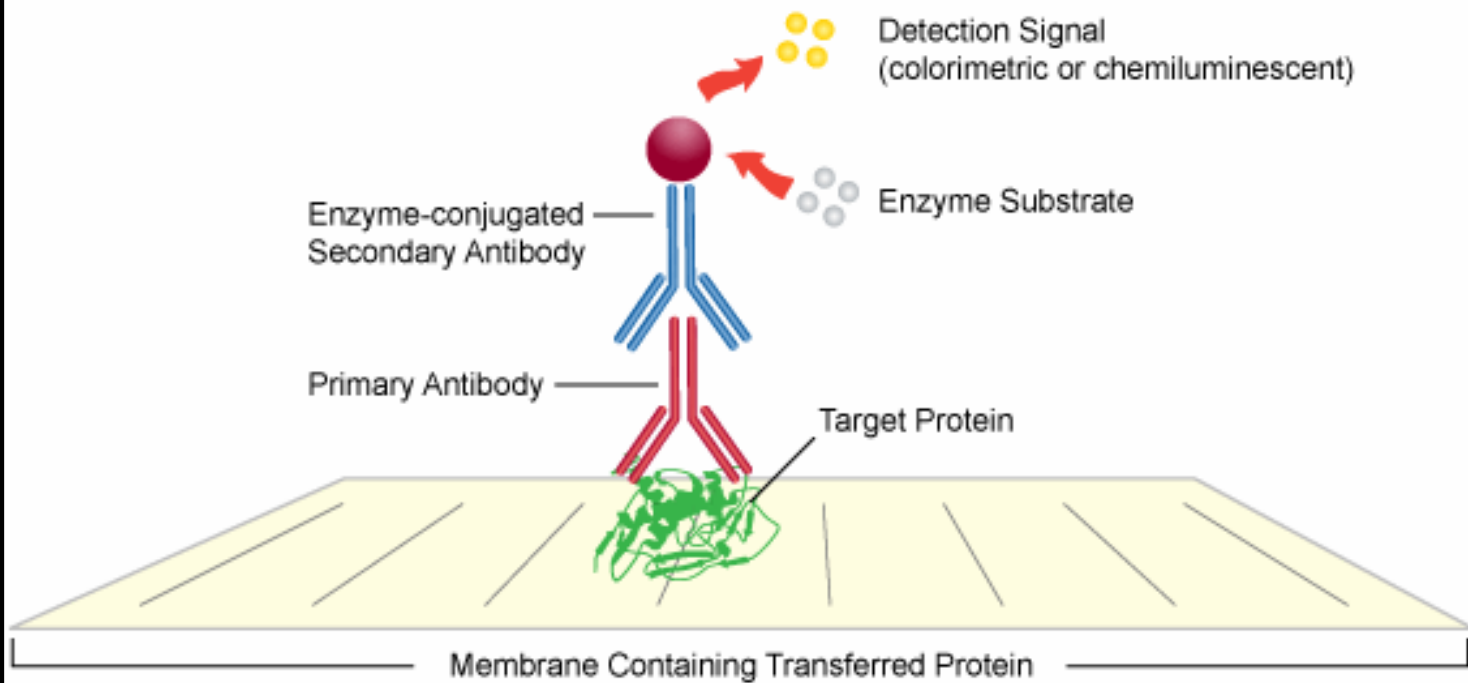
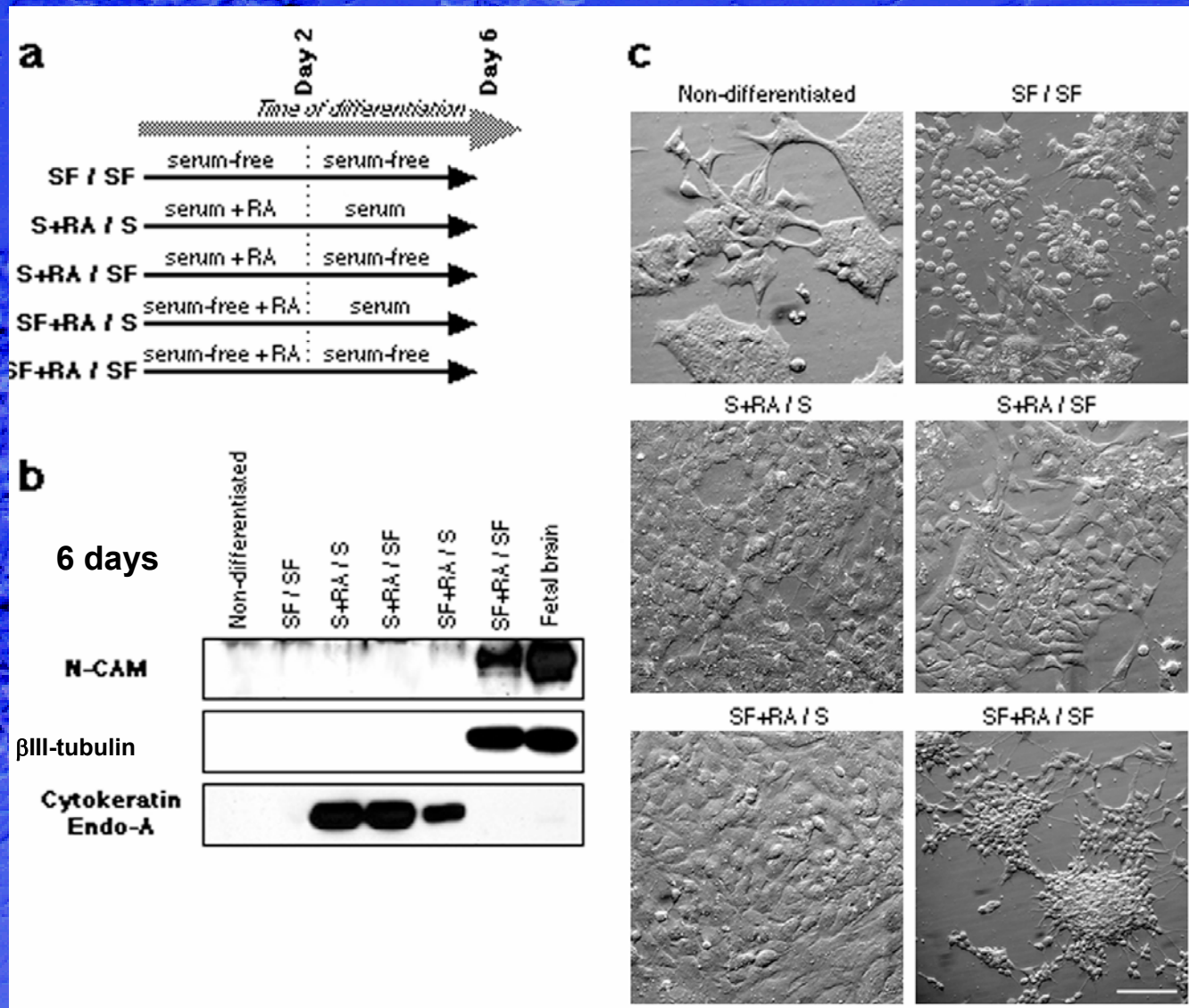


Diagram 2: Illustration of detection in Western Blots.

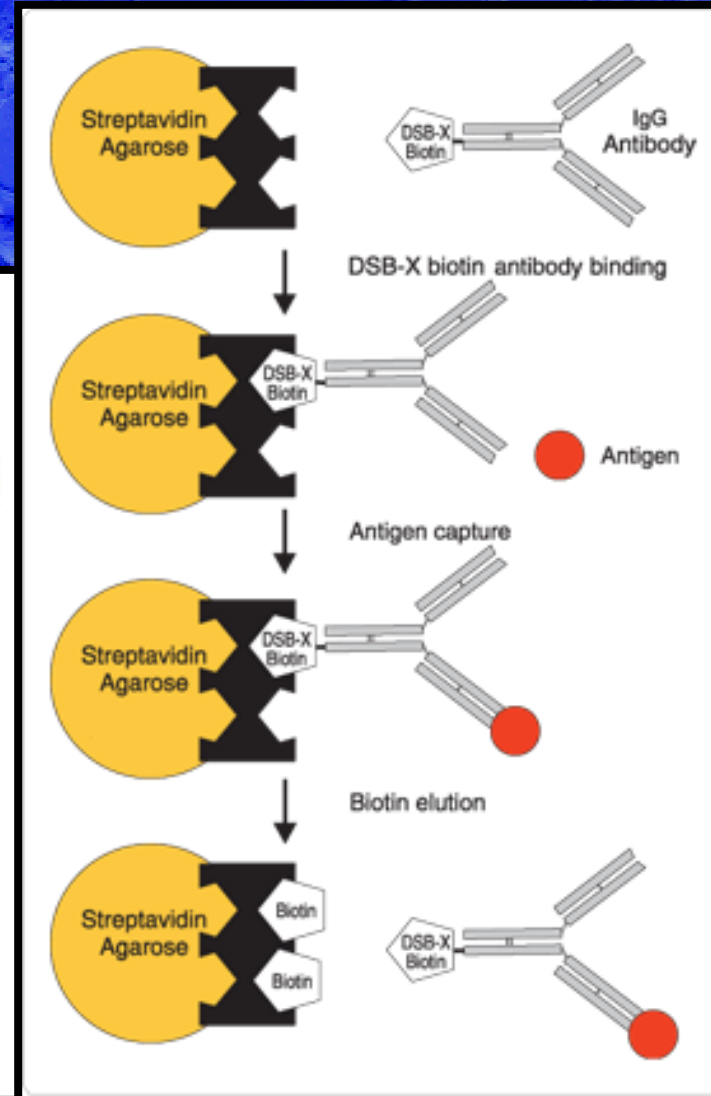
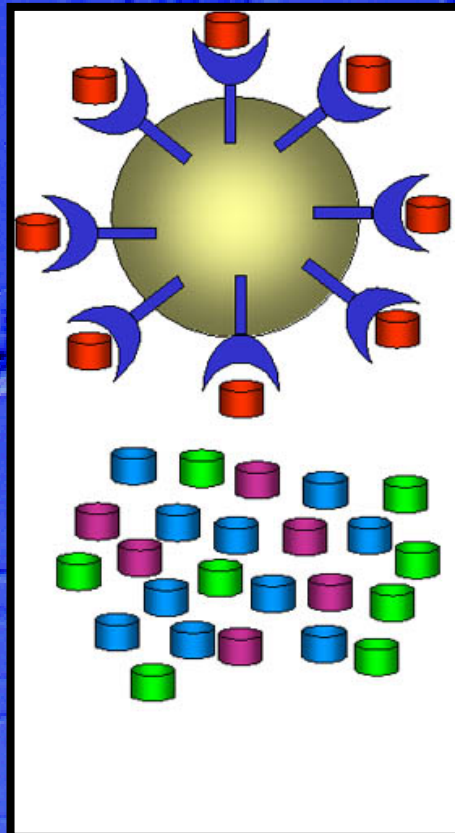
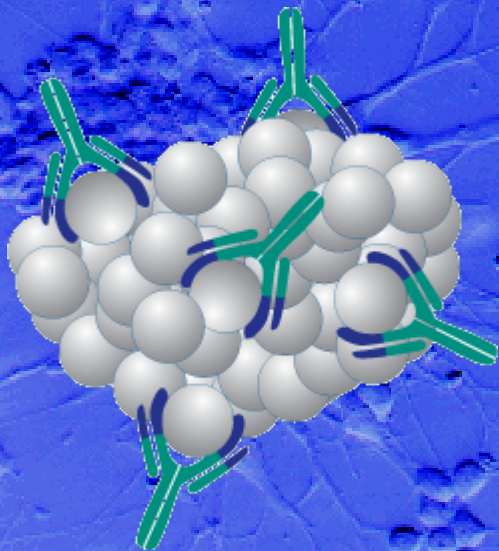
Účinek séra na RA indukovanou neurální diferenciací



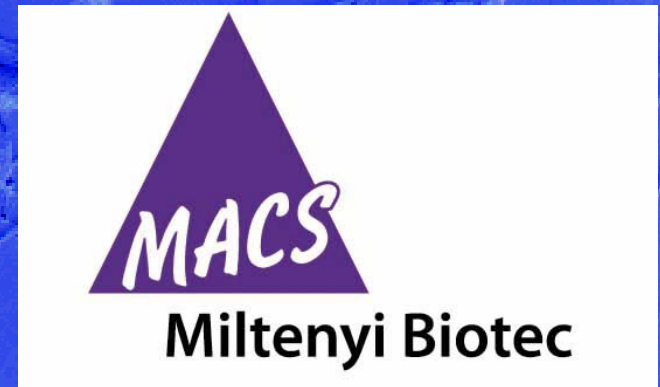
Afinitní chromatografie + imunoprecipitace

- purifikace a separace látek
- hledání partnerů v komplexech molekul
- studium struktury molekul a komplexů molekul

ELISA techniky,...



Protilátky jsou komerčně dostupné....



Děkuji za pozornost.

