

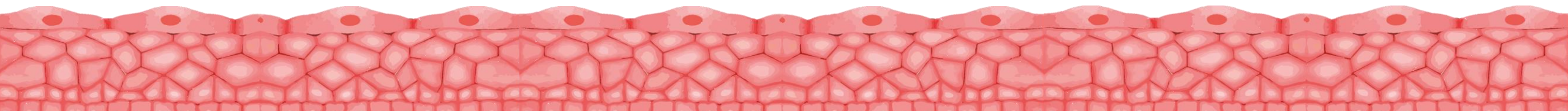
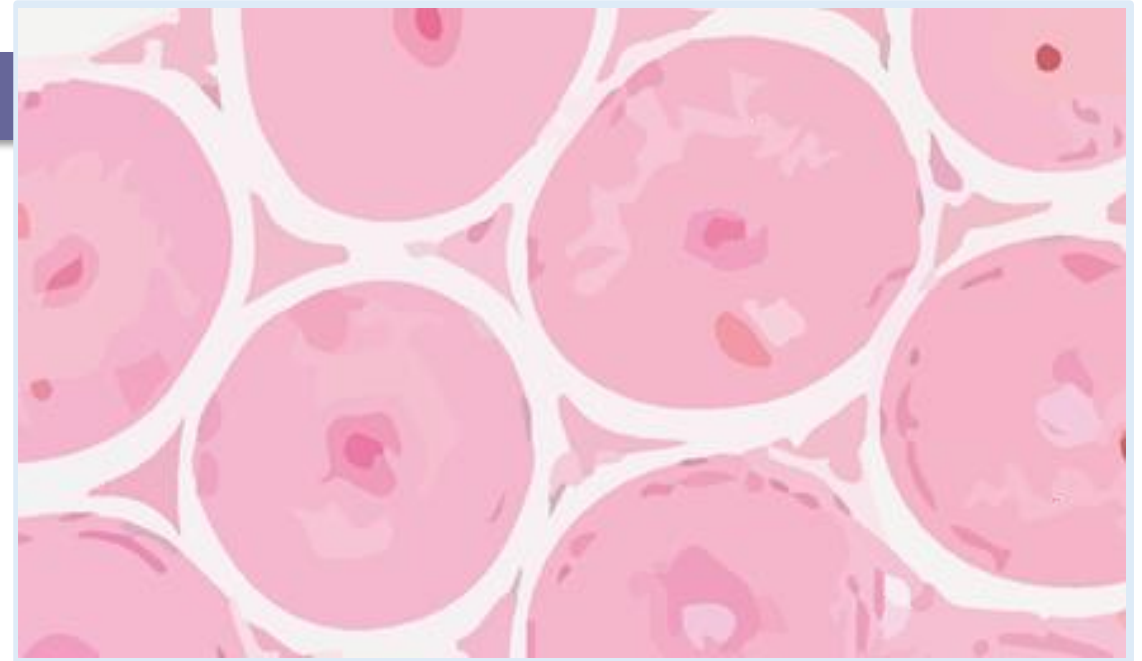
2

VEZIVNO TKIVO

Textus connectivus

Citologija i tkiva

Mijat BOŽOVIĆ



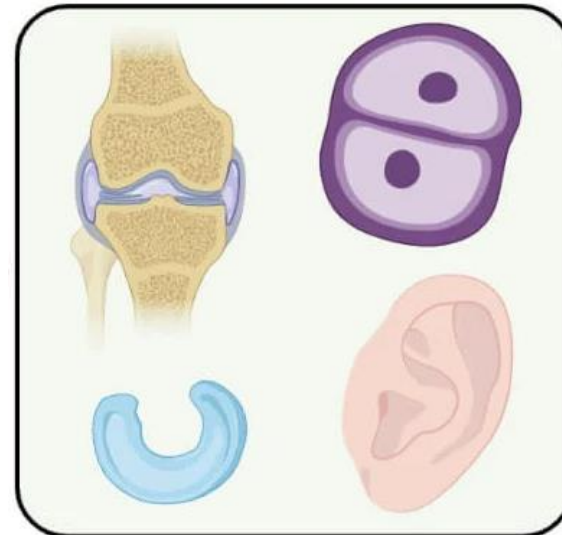
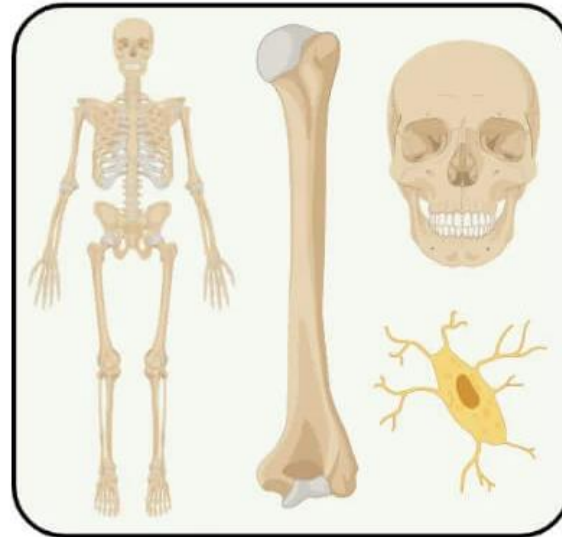
OSVRT

POTPORNA VEZIVNA TKIVA

Potporna tkiva
potpora mekim tkivima i organima

Formiraju skelet
zamjena hrskavičavog
embrionalnog skeleta koštanim

Lokomotorni aparat
u sprezi sa skeletnim
mišićima omogućavaju kretanje



Mirujuće ćelije
nalaze se na površini

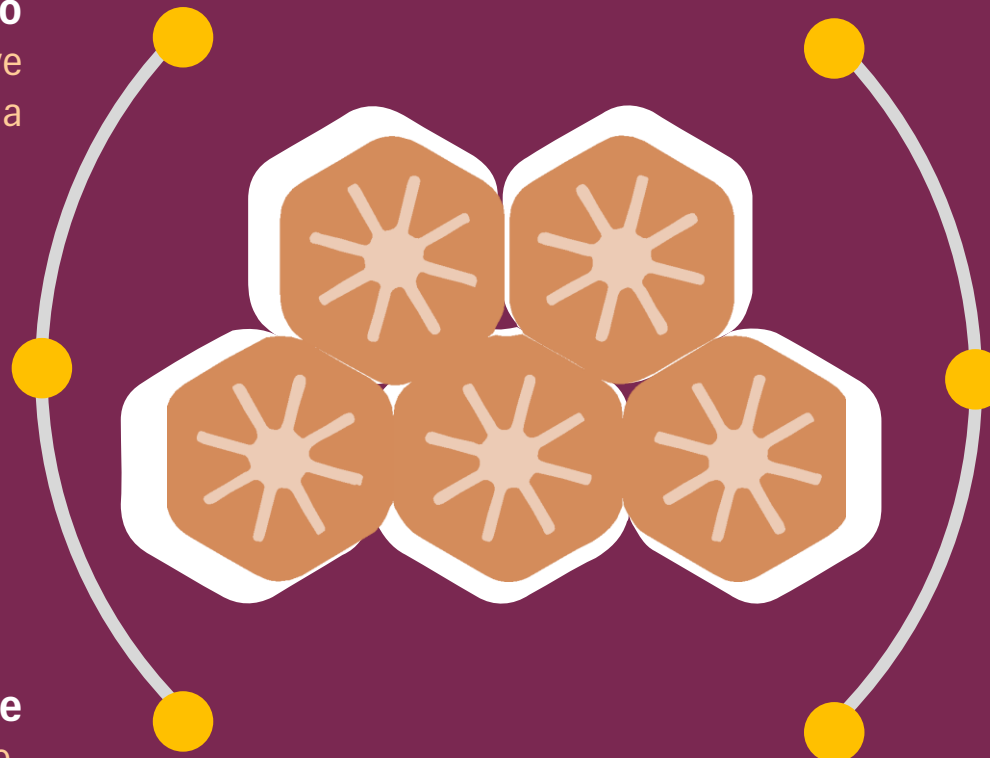
Zrele ćelije
zarobljene u čvrstoj međućelijskoj masi

Ekstracelularni matriks
svojstva ovih tkiva zasnovana na
karakteristikama ECM, ne toliko ćelija

Avaskularno tkivo
ne sadrži krvne i limfne sudove
niti nervna vlakna

ECM je čvrst
čine ga kolagena i/ili elastična vlakna i
osnovna supstanca bogata
glikozaminoglikanima i
proteoglikanima

Ćelije hrskavice
hondrogene ćelije,
hondroblasti i hondociti



Hondrociti u lakunama

kod mlade hrskavice samo po 1 u lakuni ali
u zreloj izogene grupe od 2-8 hondrocita

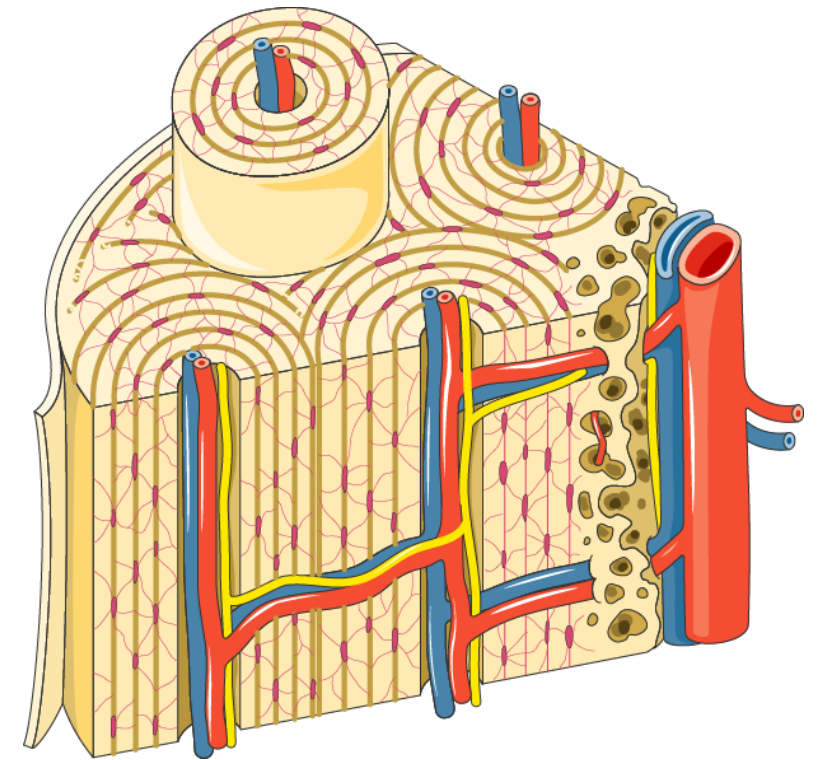
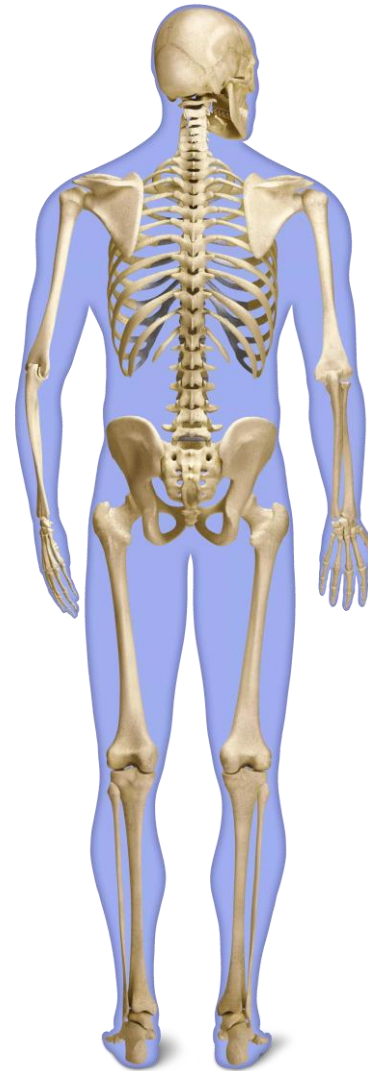
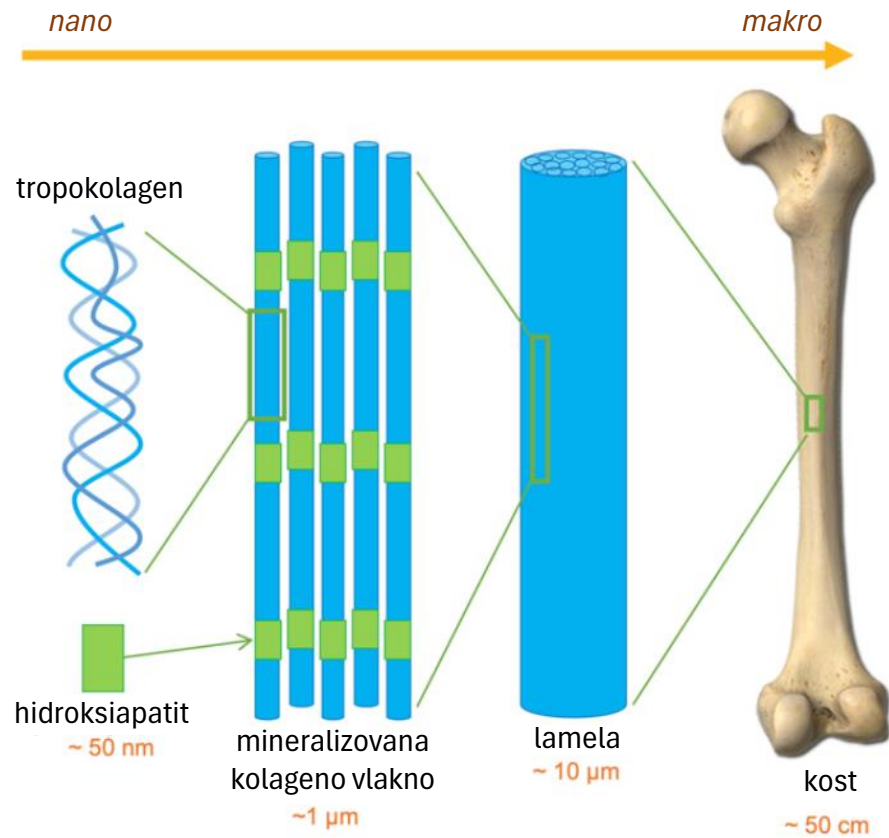
Perihondrijum

omotač hrskavice od gustog
vezivnog tkiva

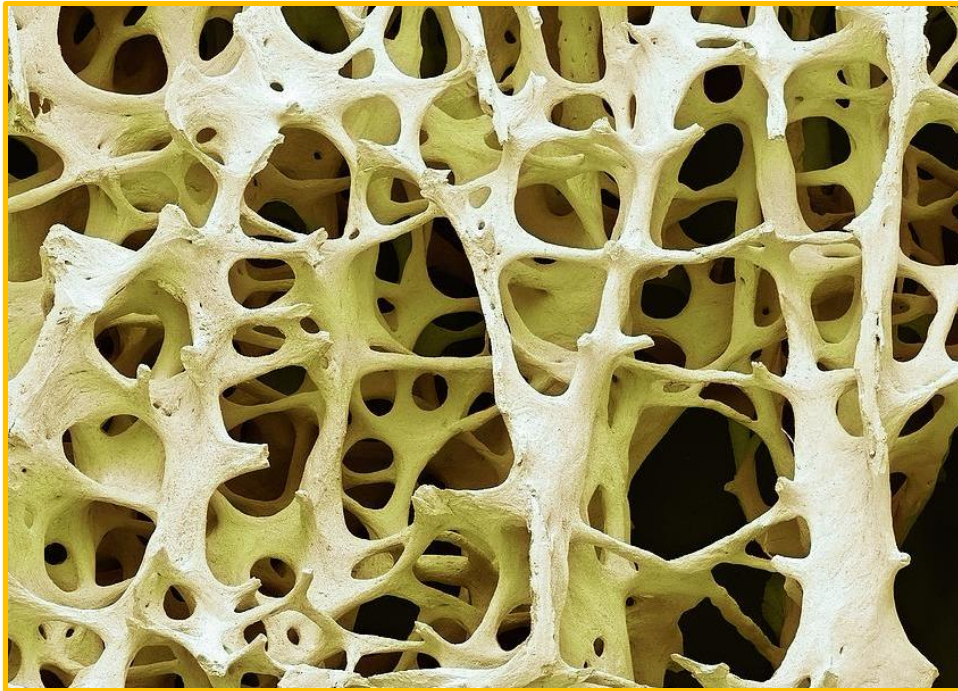
Rast hrskavice

najčešće apozicioni: uslovljava debljanje
hrskavice a promjene se dešavaju u
perihondrijumu

4. *Textus osseus*



Funkcije koštanog tkiva



potpora
tijelu

zajedno sa mišićima
omogućava kretanje

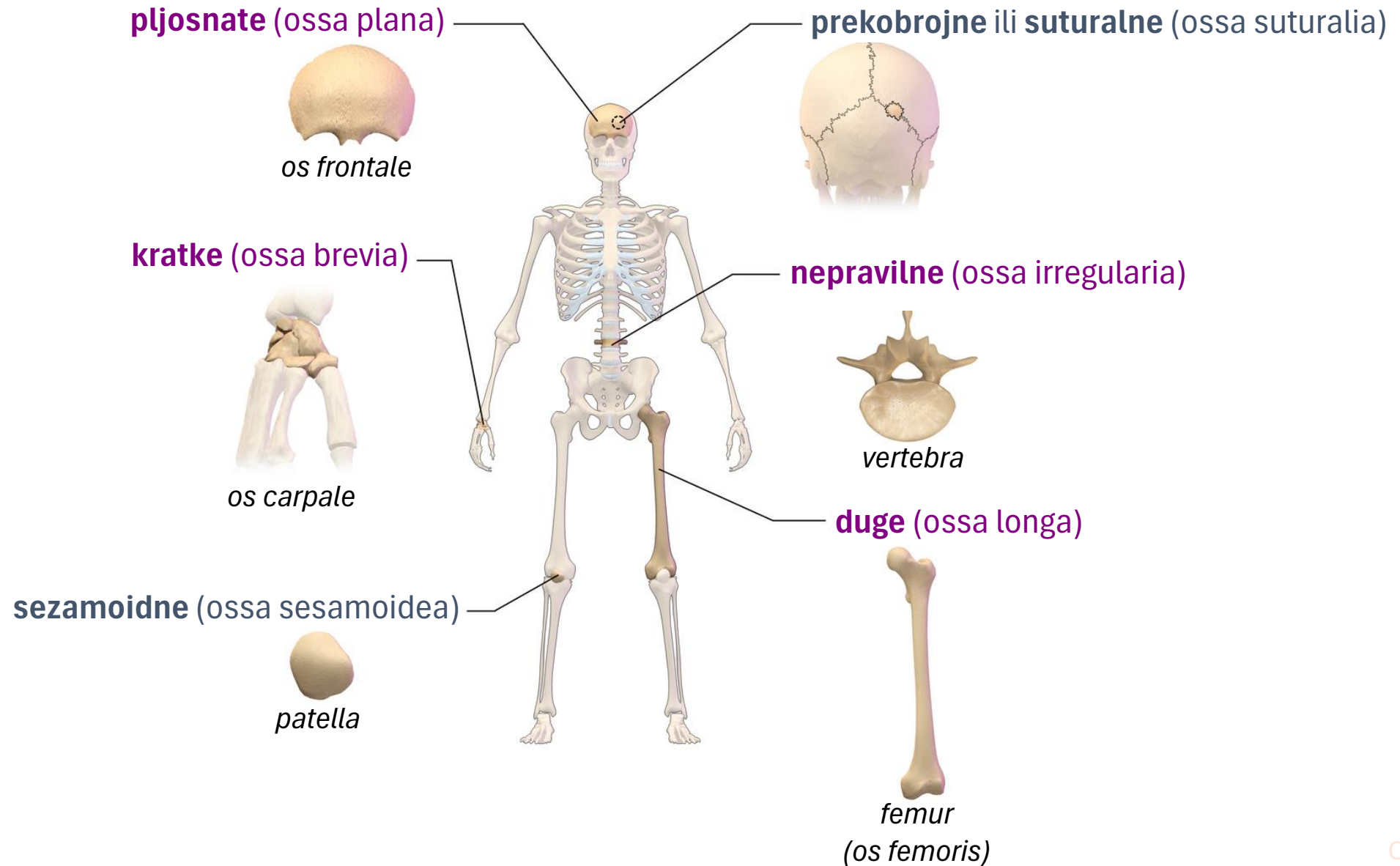
zaštita
vitalnih organa

štiti organe u lobanjskoj i
grudnoj duplji kao i koštanu srž
u kojoj se obavlja hematopoeza

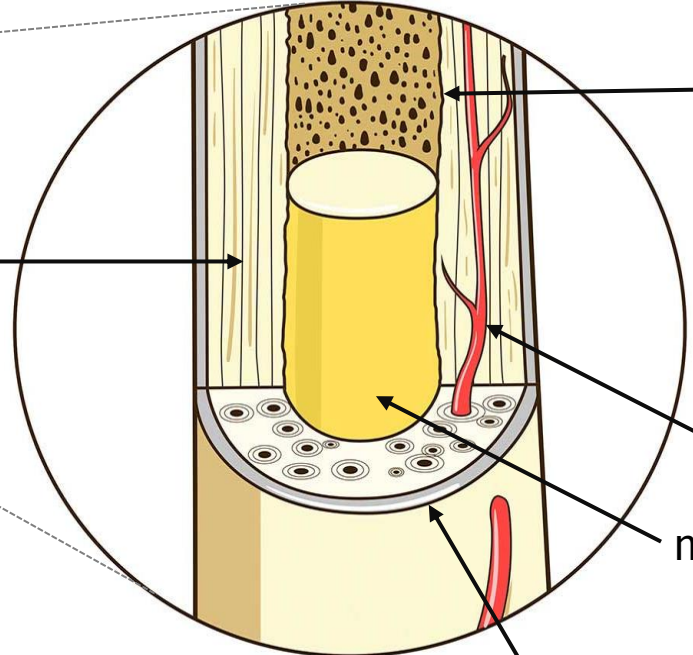
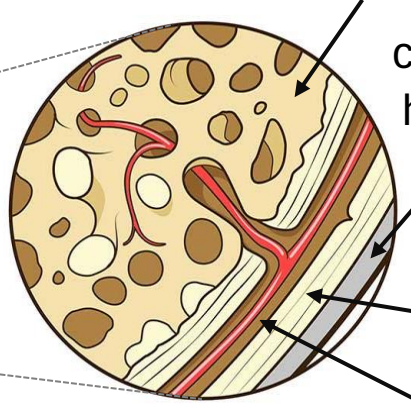
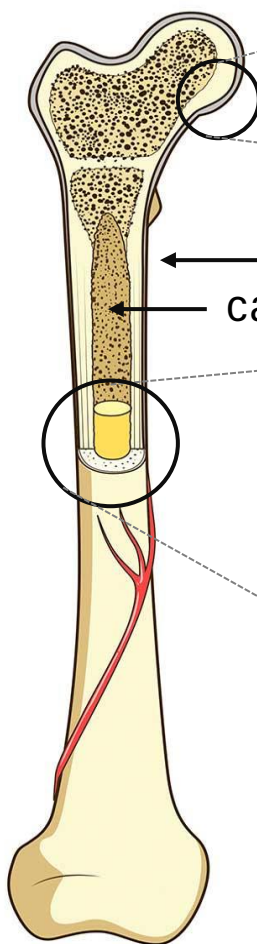
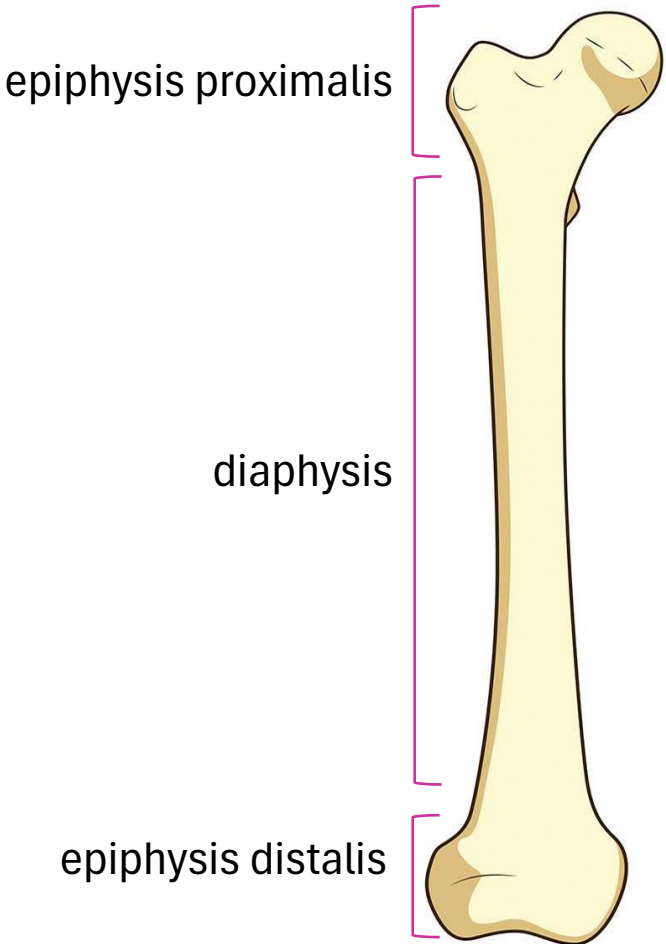
rezervoar
minerala

dinamički uravnotežen
rezervoar Ca jona i fosfata
koji se po potrebi mogu
deponovati ili mobilisati

Kosti prema obliku



Struktura duge kosti



substantia spongiosa

cartilago hyalinis

substantia compacta

arteria nutricia

endosteum

substantia compacta

arteria nutricia

medulla ossium

periosteum

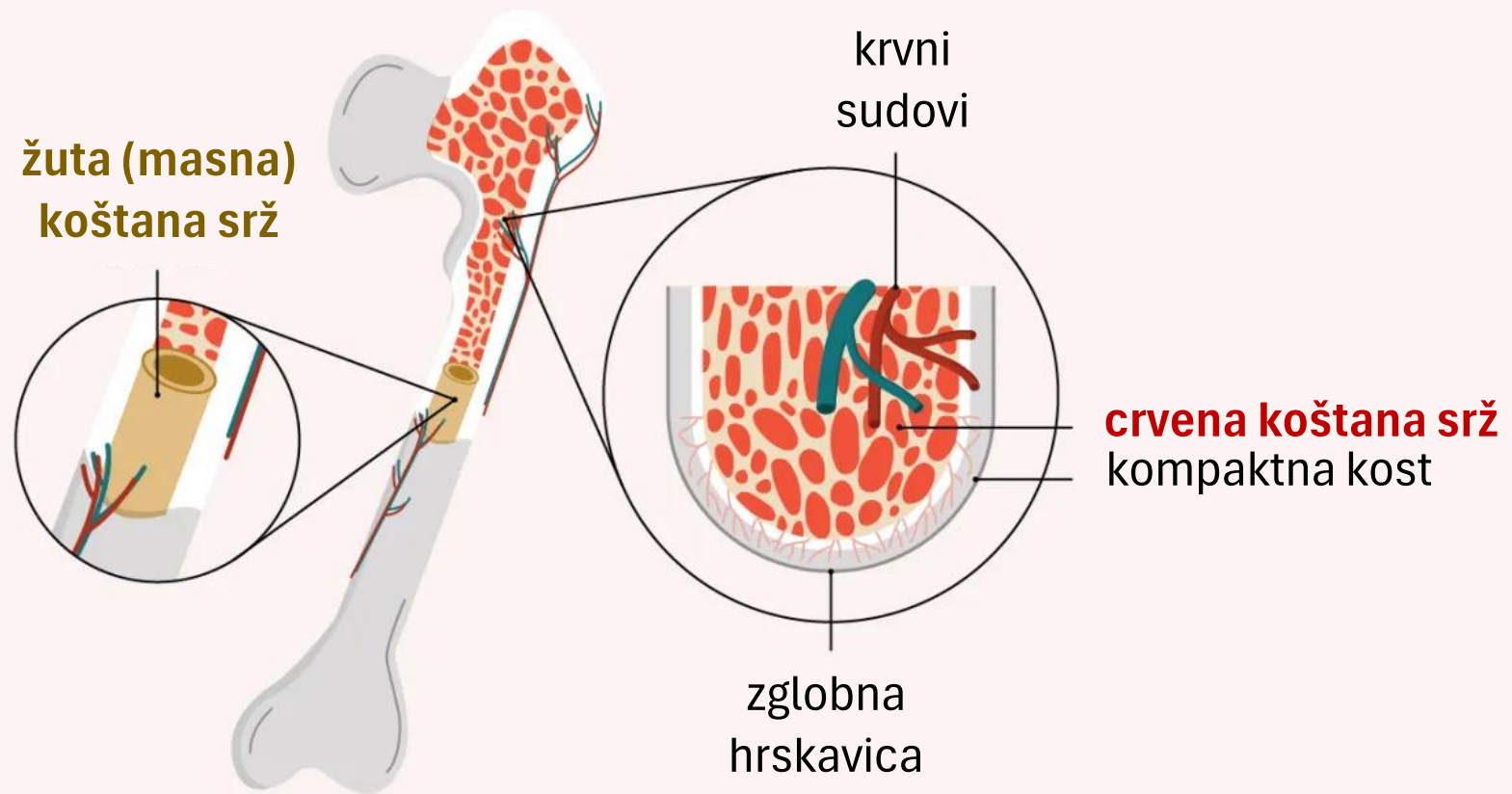
epiphysis proximalis

diaphysis

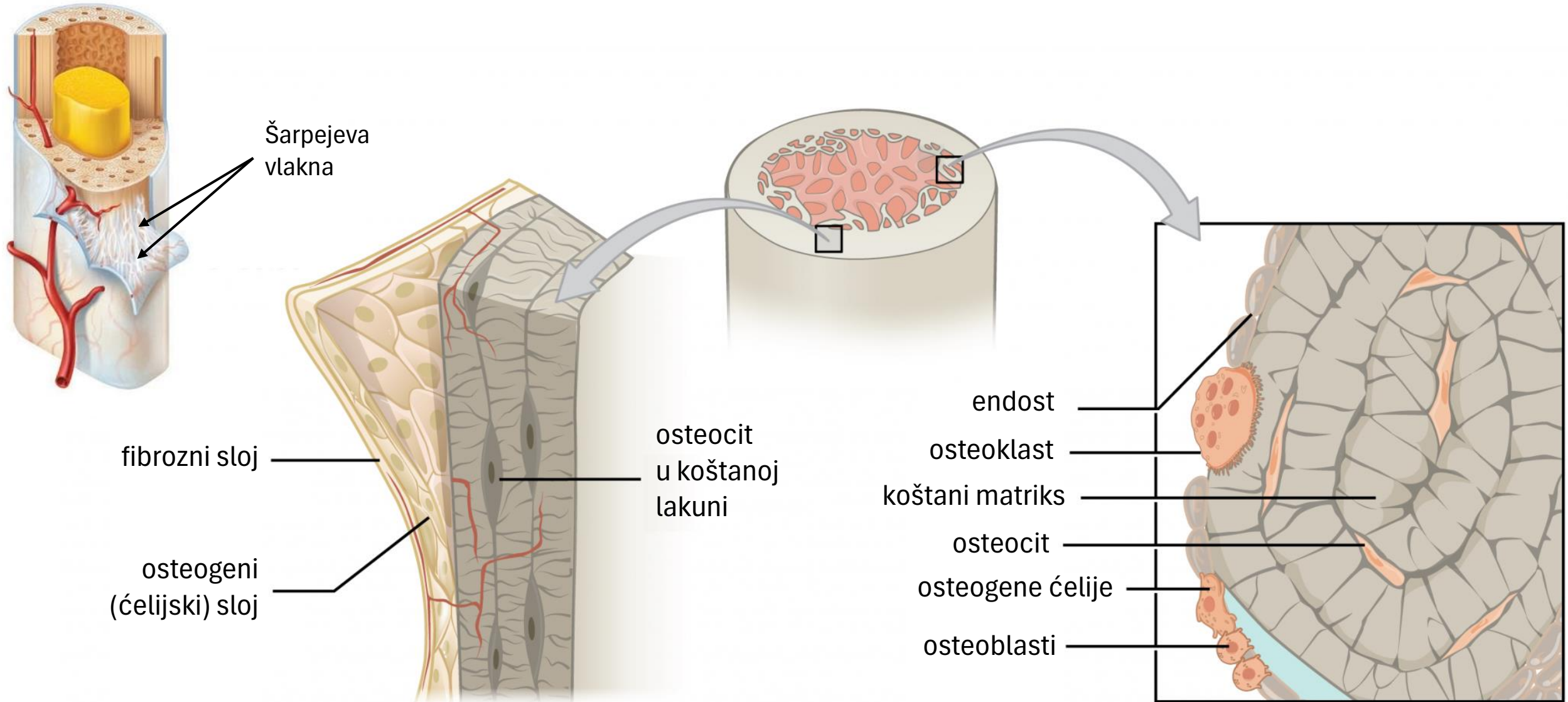
epiphysis distalis

periosteum
cavum medullare

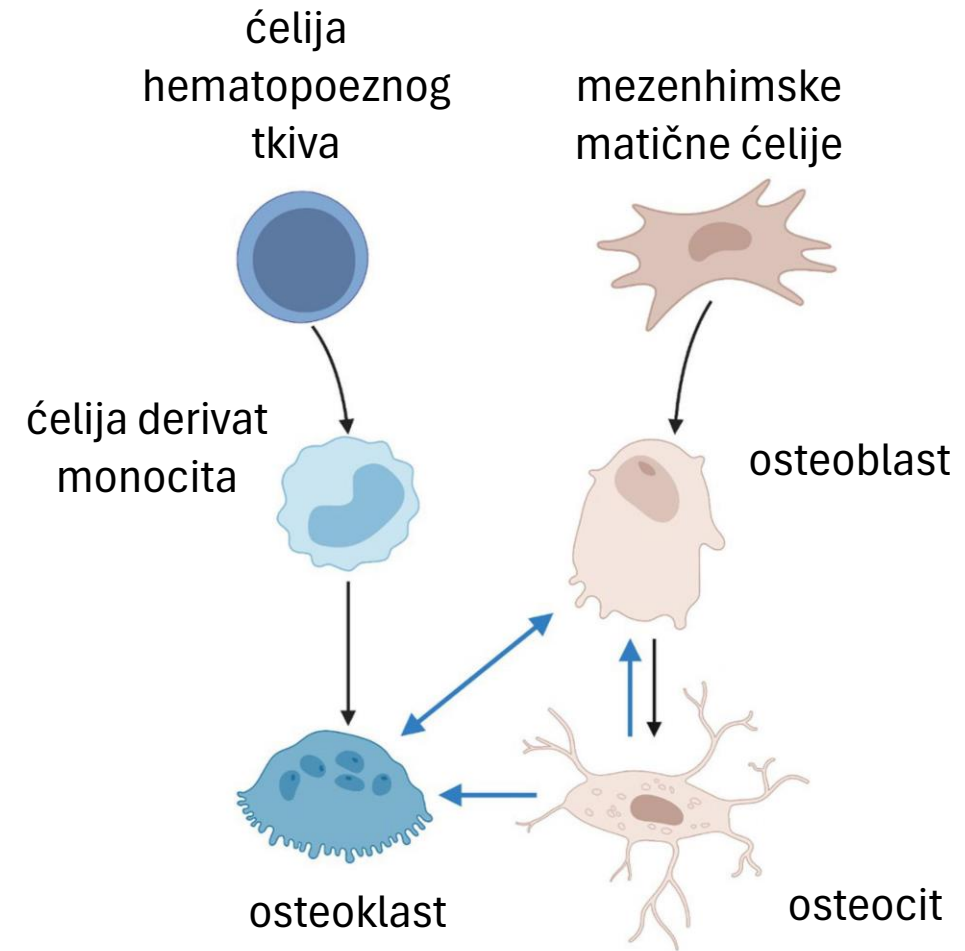
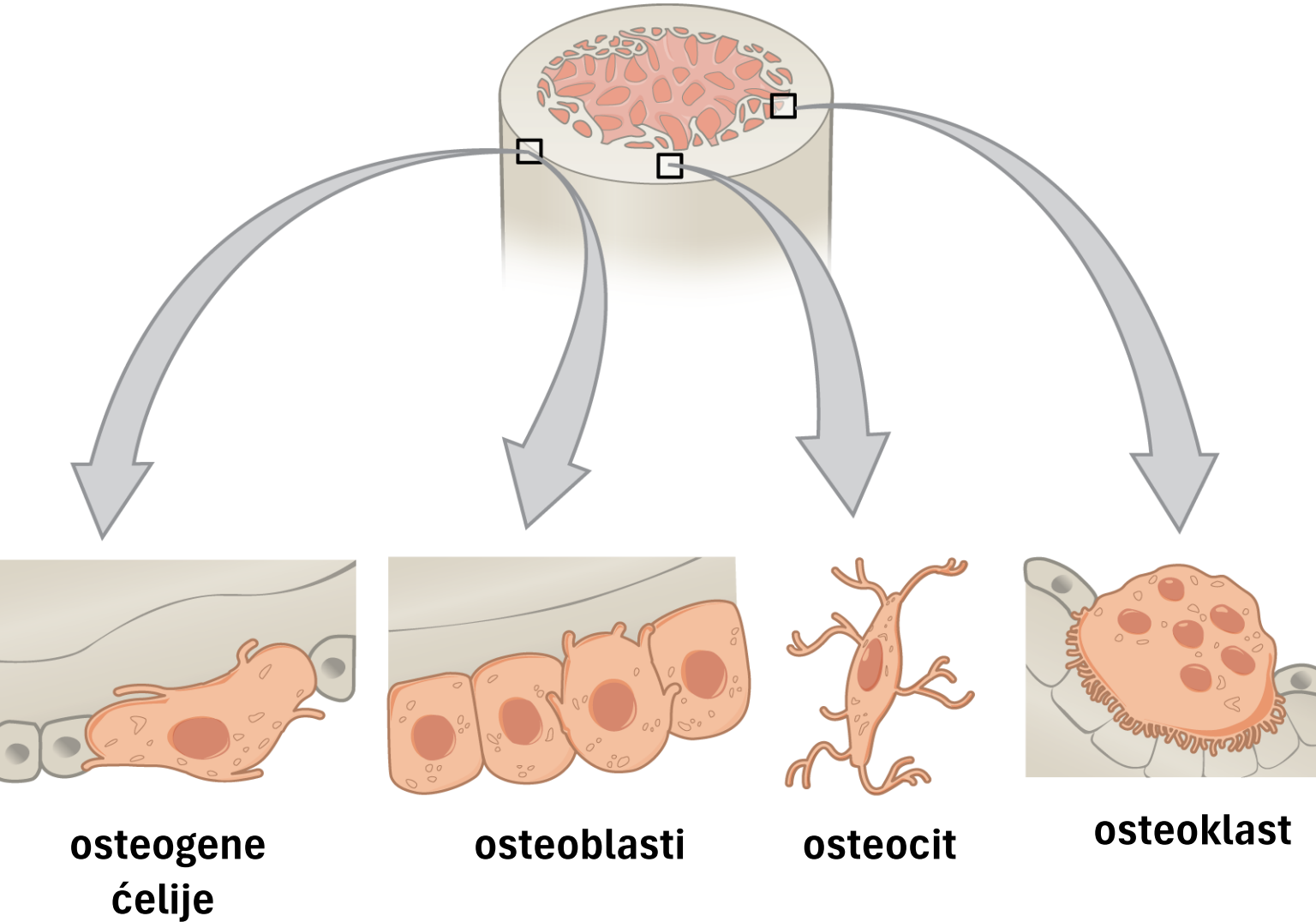
Medulla ossium



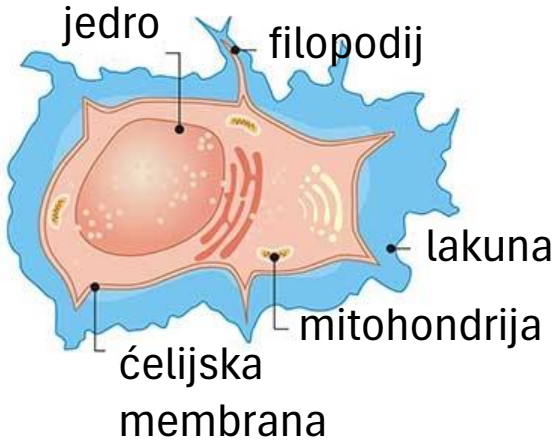
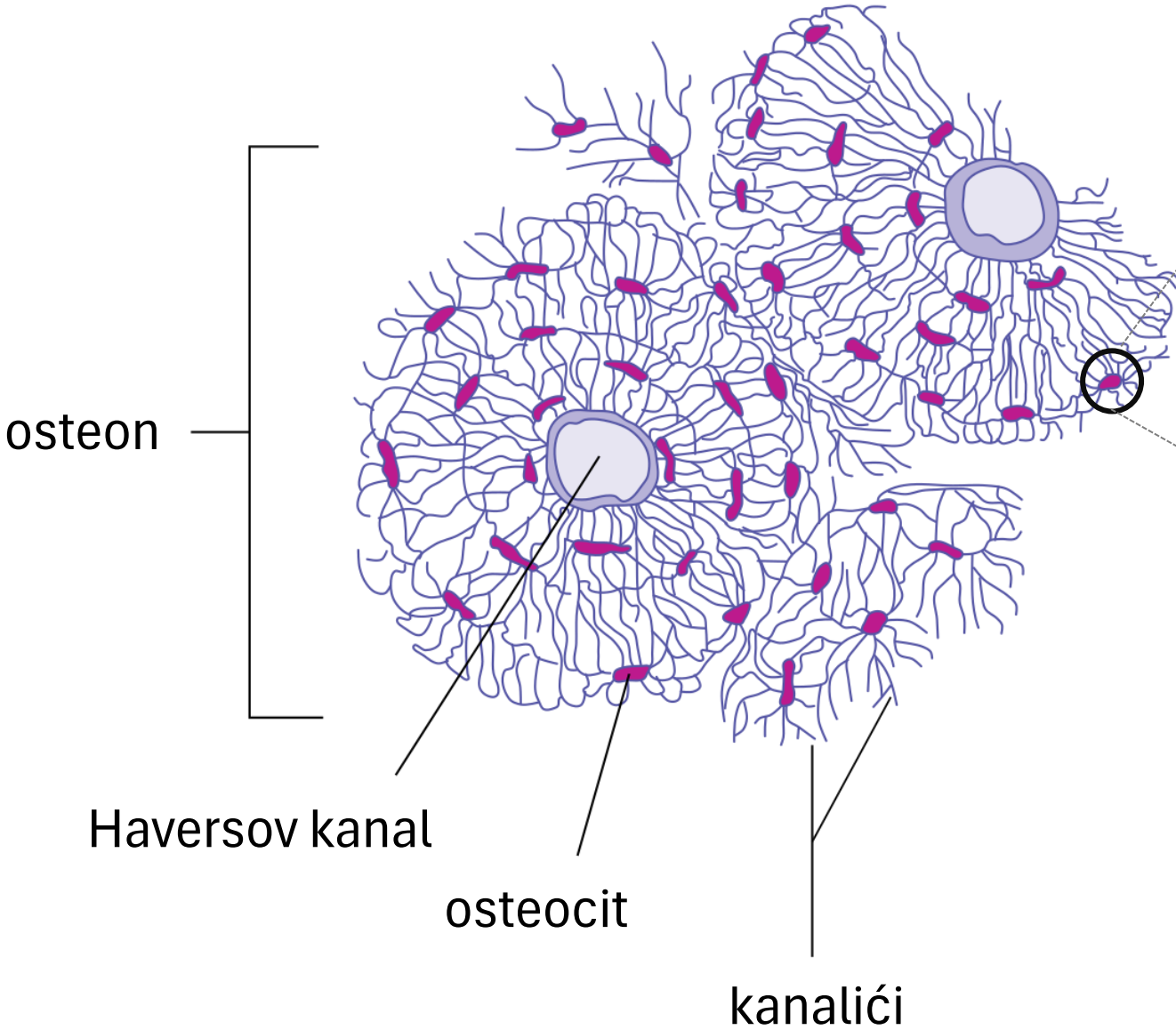
Periost i endost



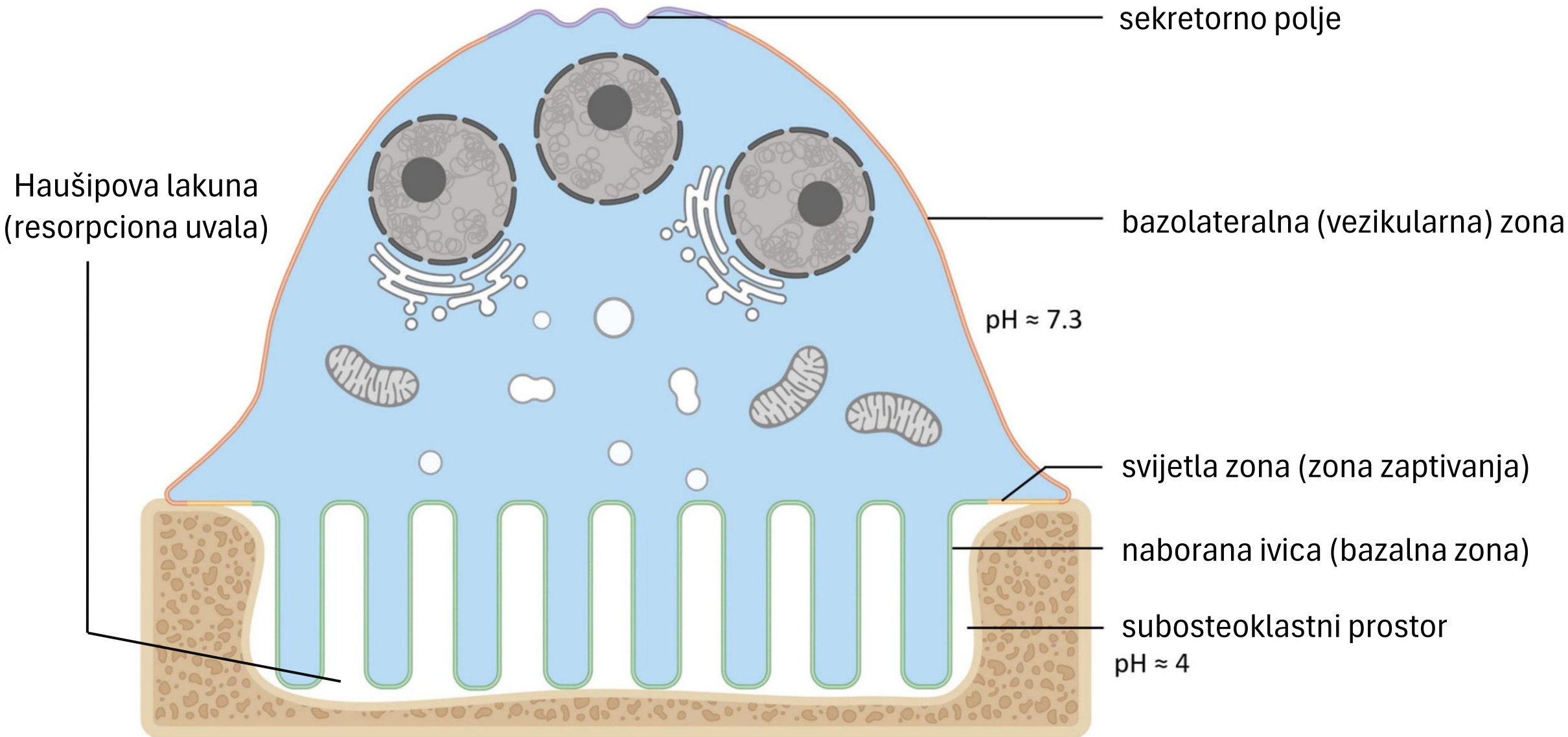
Ćelije koštanog tkiva



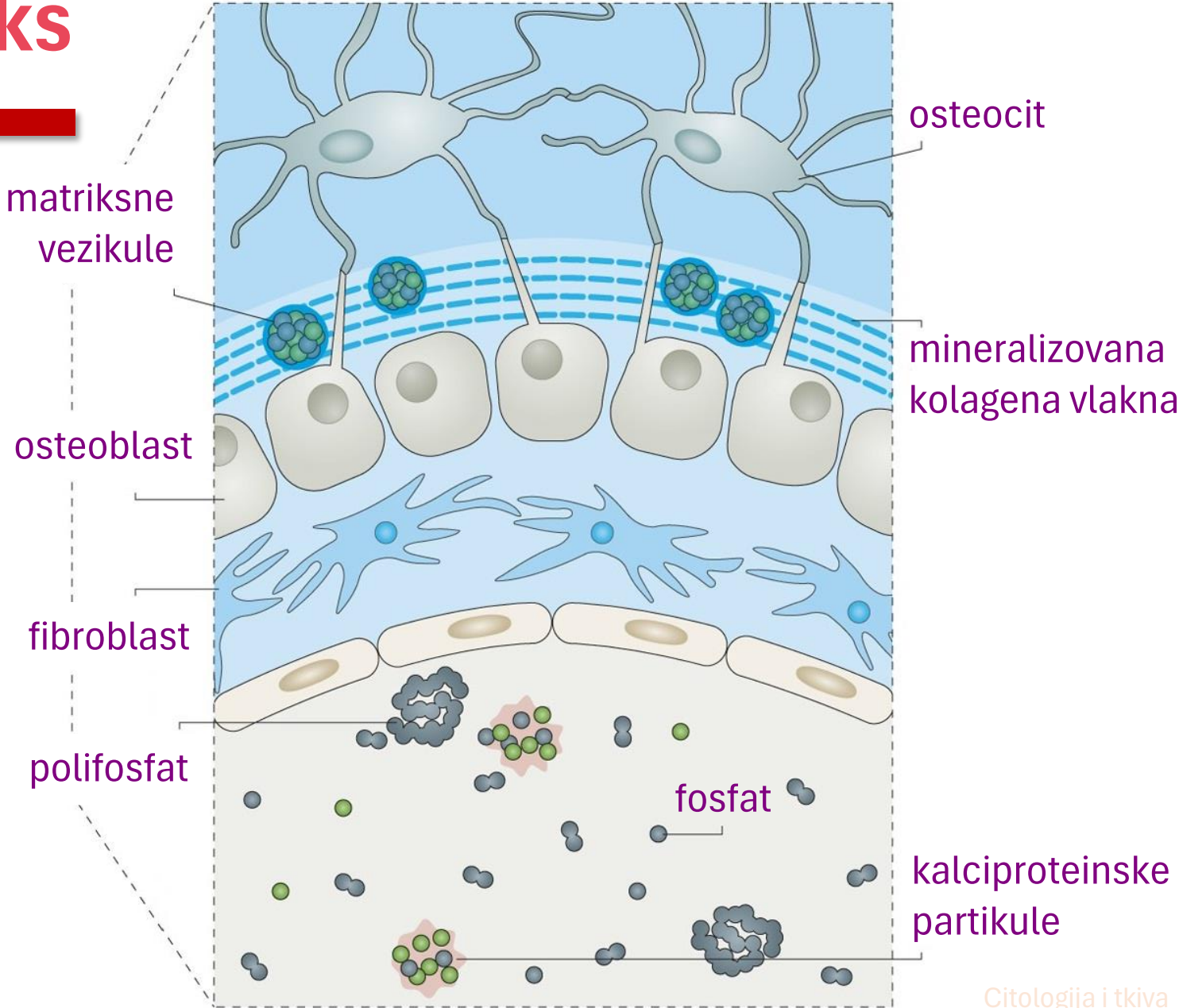
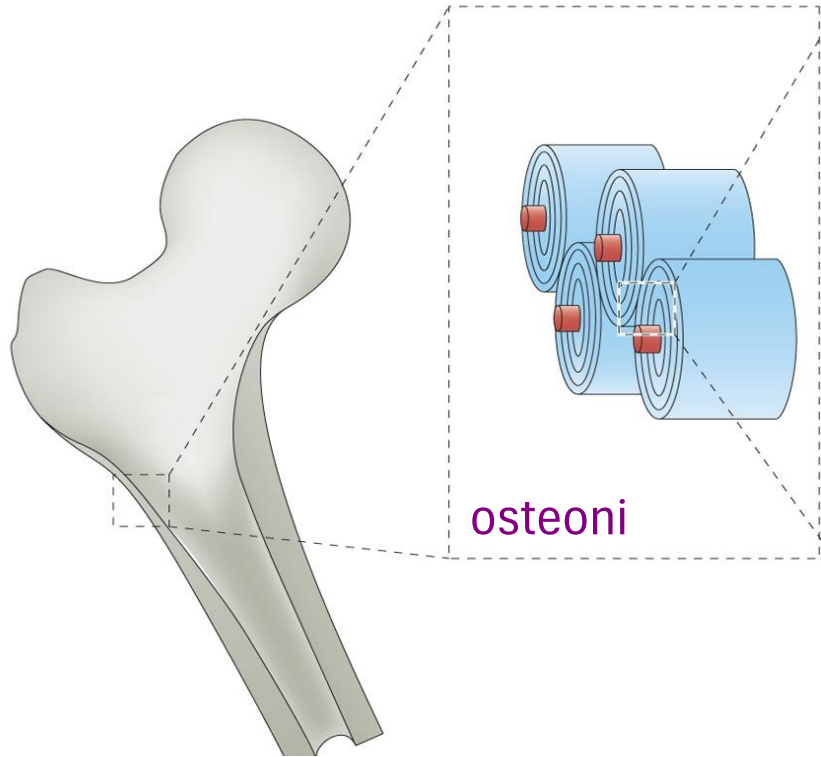
Osteocit



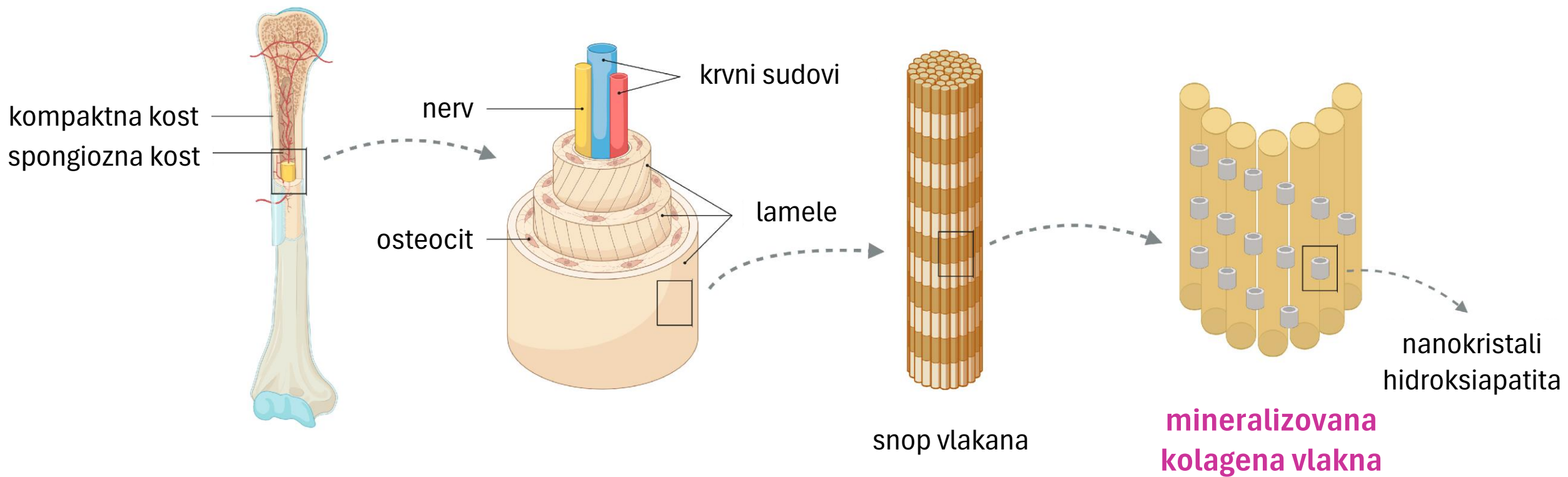
Osteoklast



Ekstracelularni matriks



Mineralizovana kolagena vlakna



Apozicija kosti

1

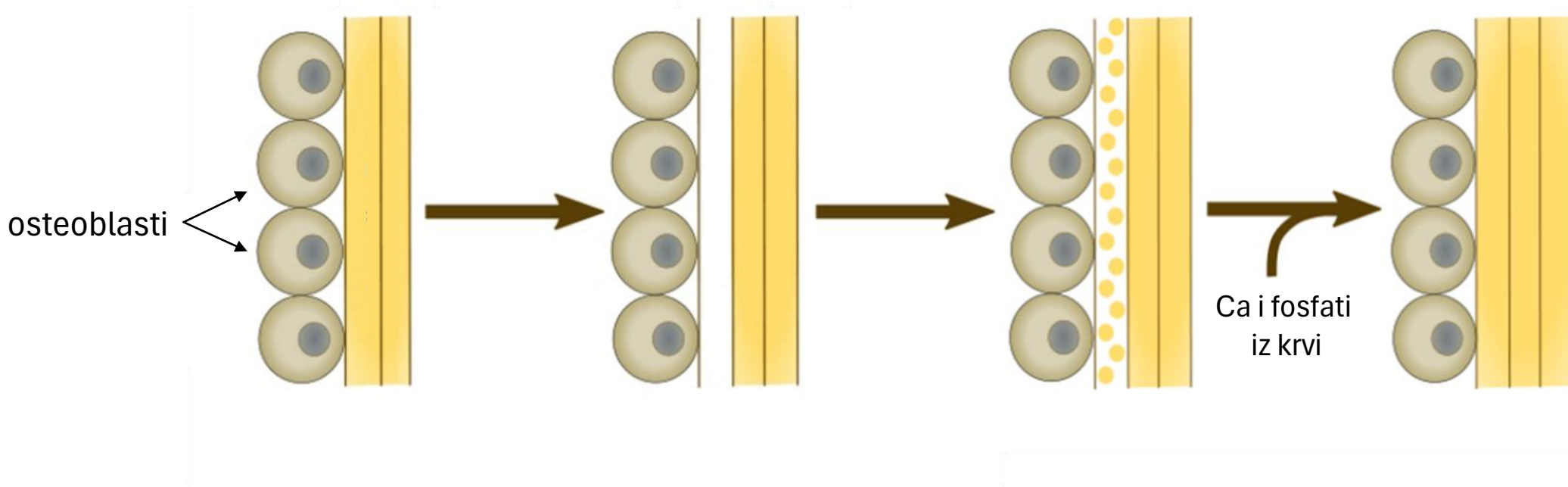
osteoblasti sekretuju sloj osteoida koji nije mineralizovan (30% kolagena i 70% vode)

2

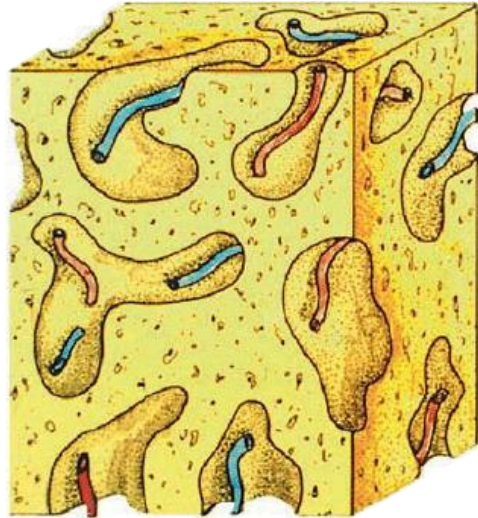
osteoblasti kalcifikuju osteoid izbacujući i matriksne vezikule u čijim membranama su Ca-pumpe

3

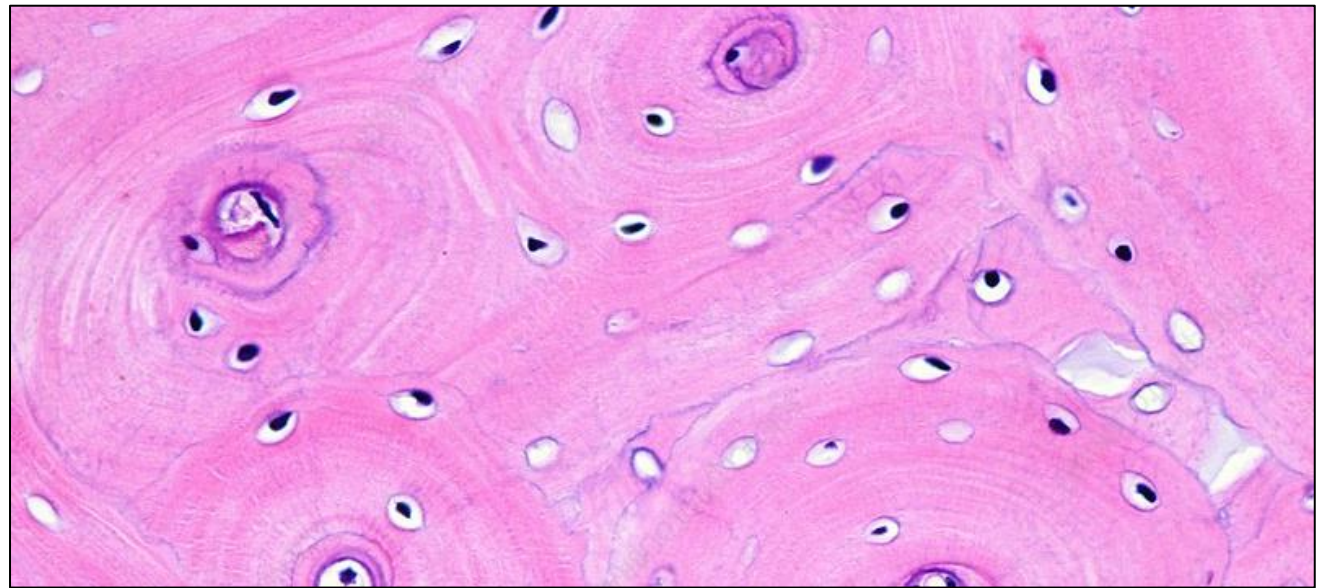
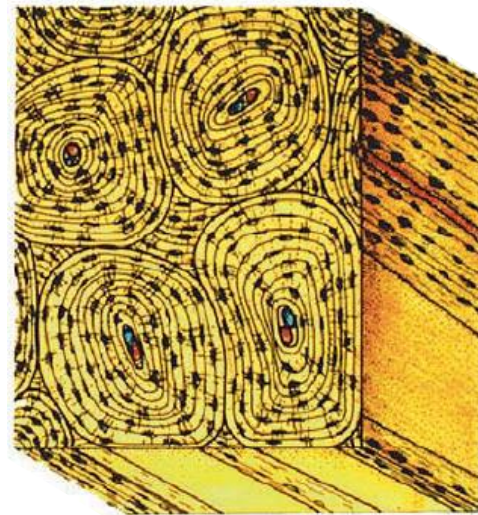
mineralizacija se završava dodavanjem novih količina Ca i P soli porijeklom iz krvi



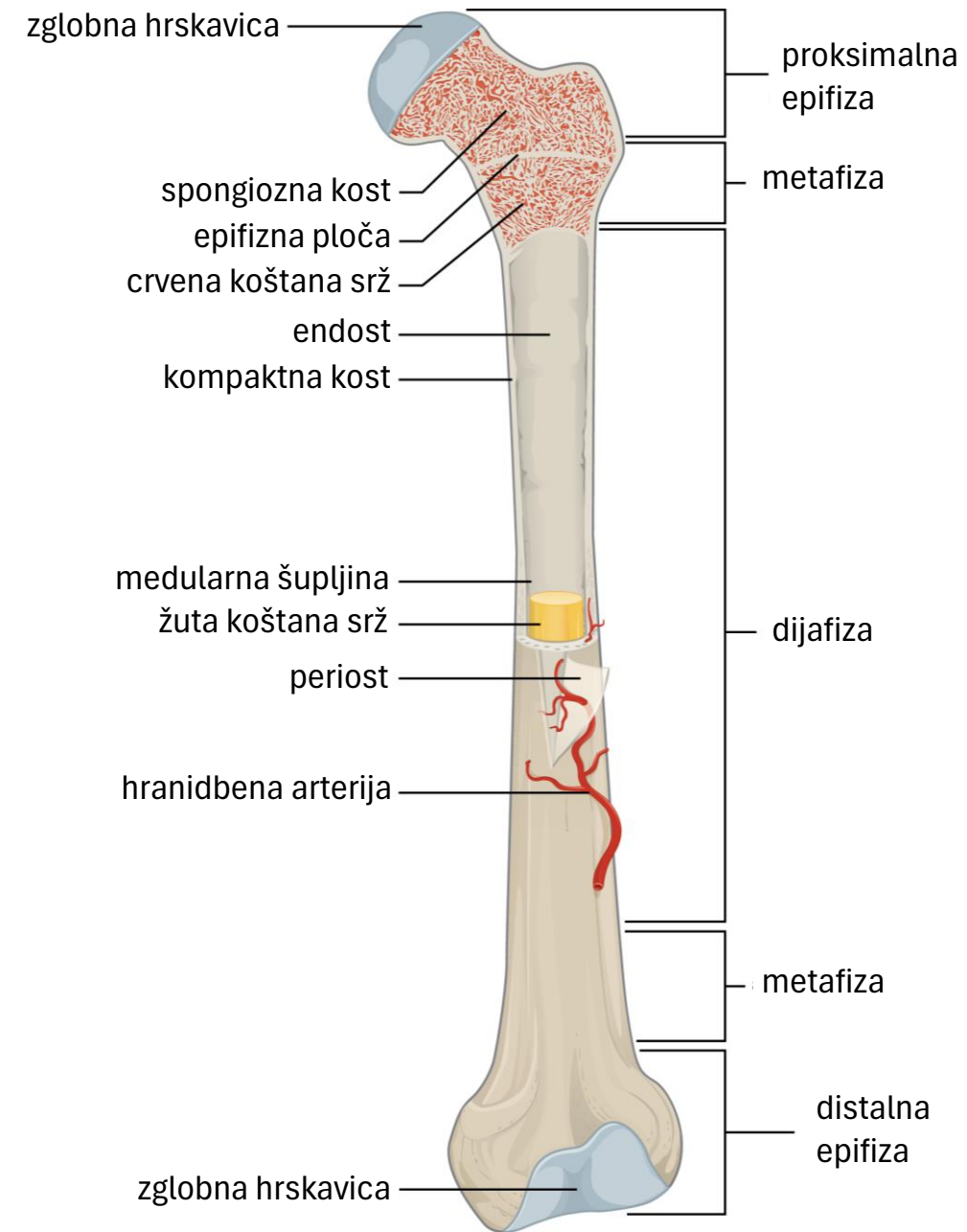
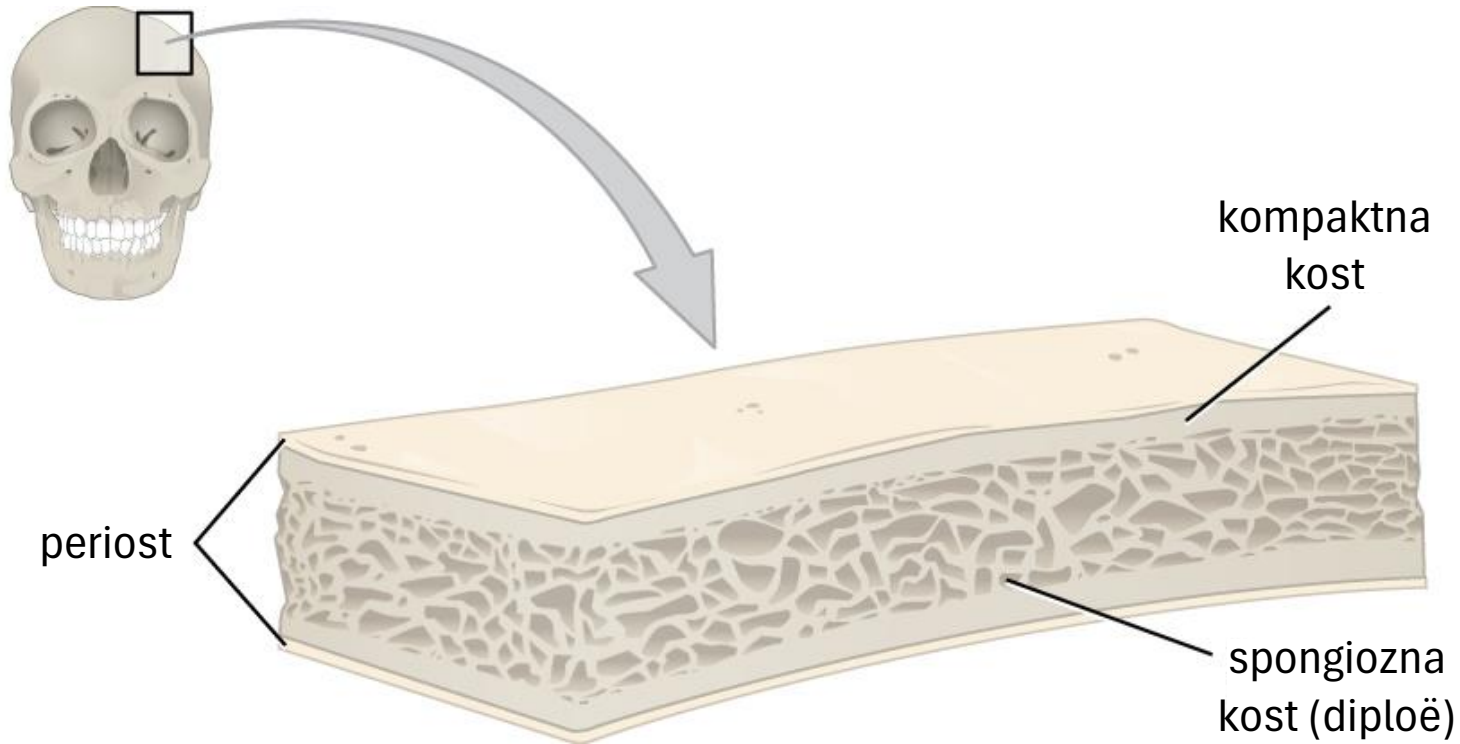
primarna kost
(vlaknasta/fibrozna
ili nezrela kost)



sekundarna kost
(lamelarna ili zrela
kost)

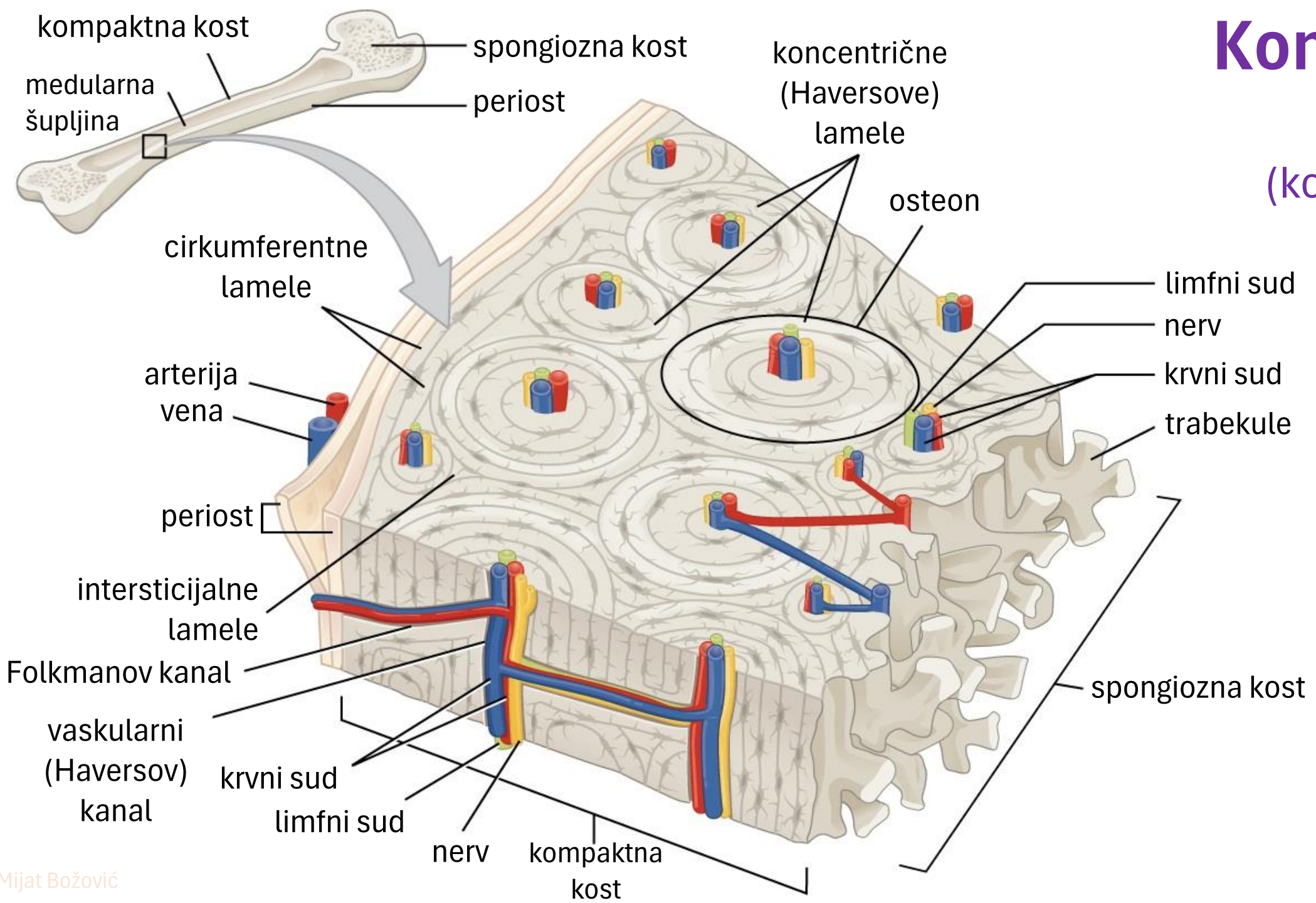


Kompaktna i spongiozna kost

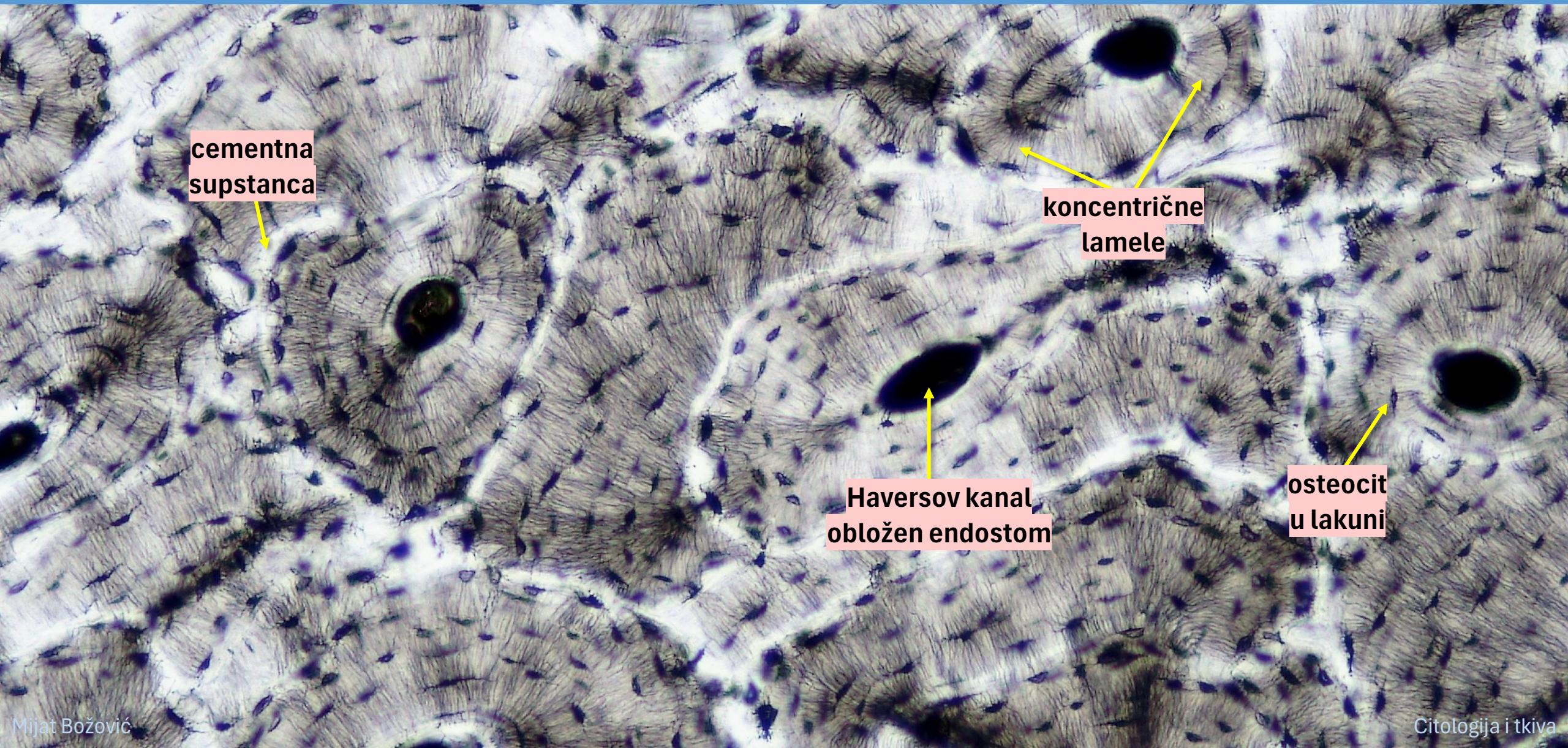


Kompaktna kost

(kortikalna kost)



Haversov sistem



cementna
supstanca

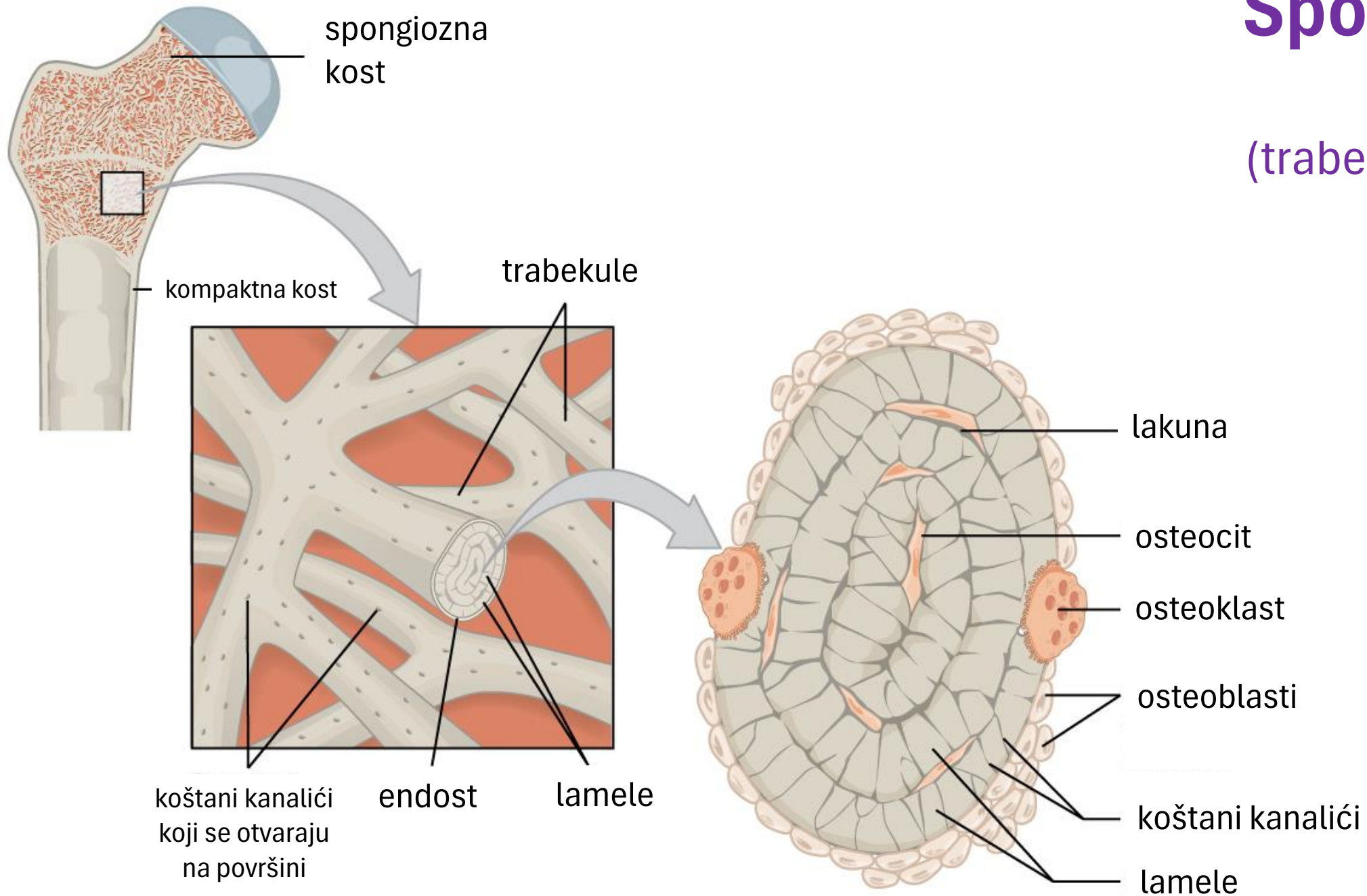
koncentrične
lemele

Haversov kanal
obložen endostom

osteocit
u lakuni

Spongiozna kost

(trabekularna kost)



Osteogeneza

01

Intramembransko okoštavanje

direktno od mezenhima
(mineralizacijom matriksa)



manji dio skeleta:
kosti krova lobanje, kosti lica,
kosti vilica, kratke kosti



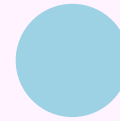
02

Enhondralno okoštavanje

posredstvom prethodnog
hrskavičavog modela

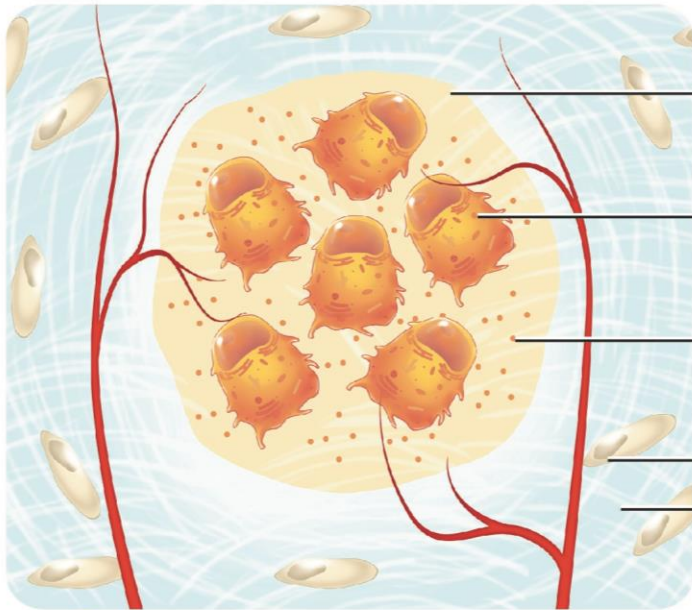


najveći dio skeleta:
kosti baze lobanje, kičmenog stuba,
karlice i ekstremiteta, sternum i rebra



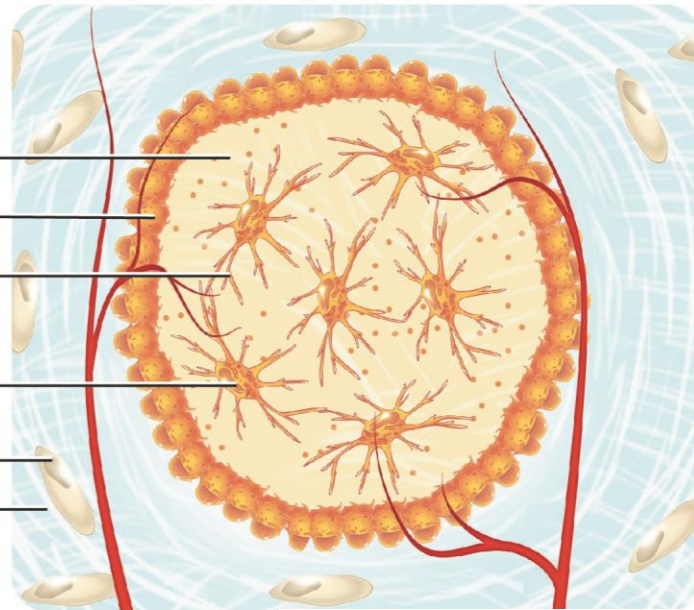
direktno

Intramembranska osifikacija

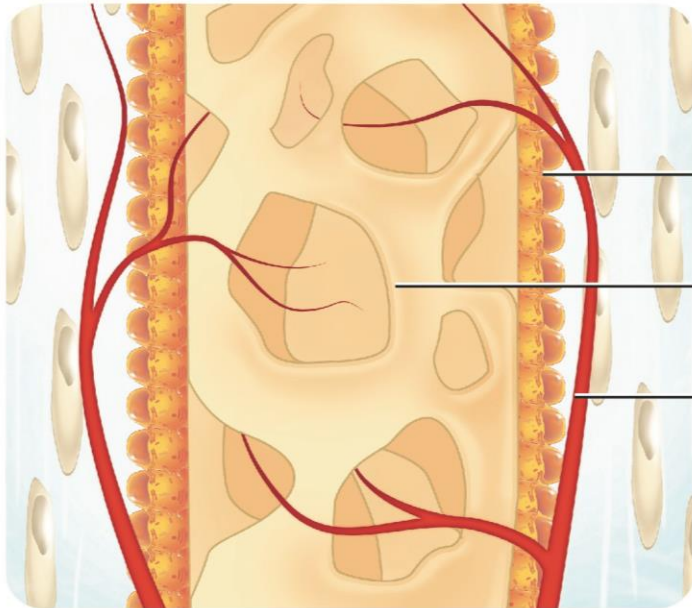


1 Formiranje osifikacionog centra

- osifikacioni centar
- novi matriks
- osteoblast
- kanikuli
- osteoid
- osteocit
- mezenhimske ćelije
- kolagena vlakna

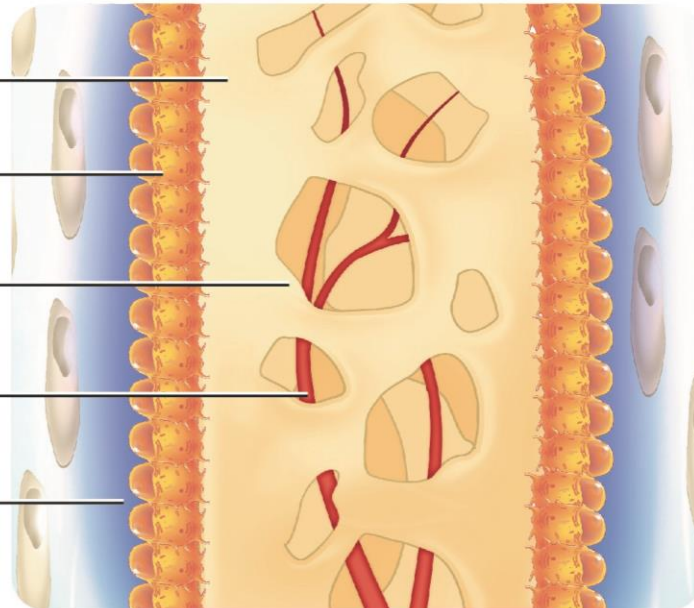


2 Kalcifikacija



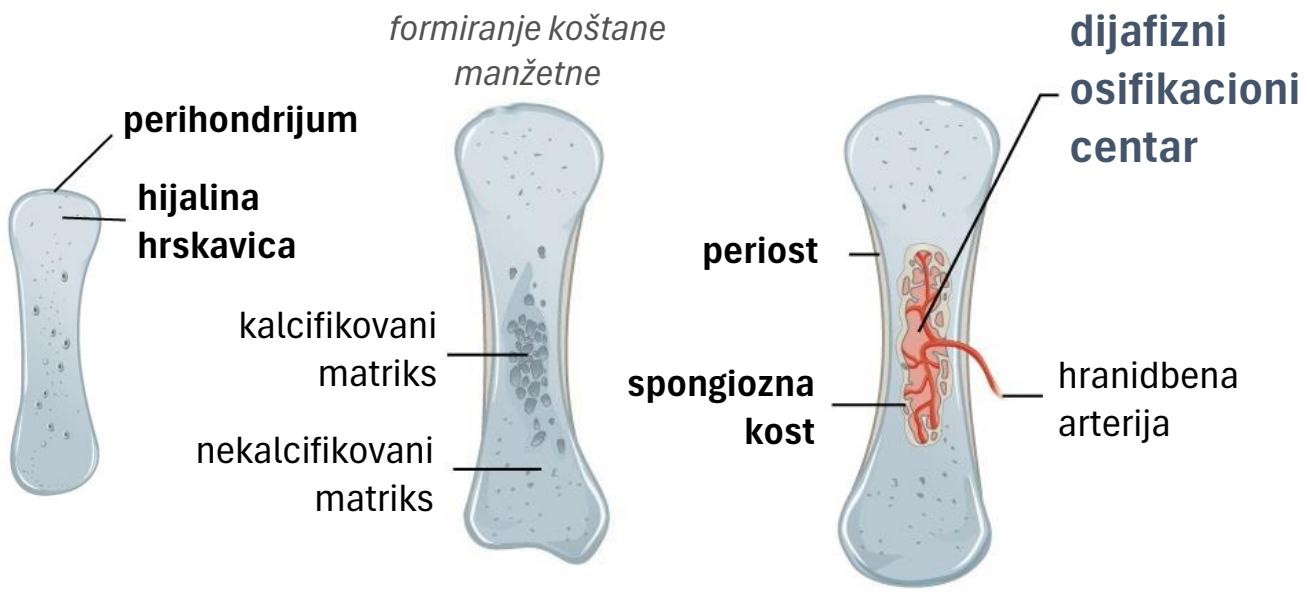
3 Formiranje trabekula

- kompaktna kost
- osteoblast
- spongiozna kost
- krvni sud
- periost



4 Formiranje periosta

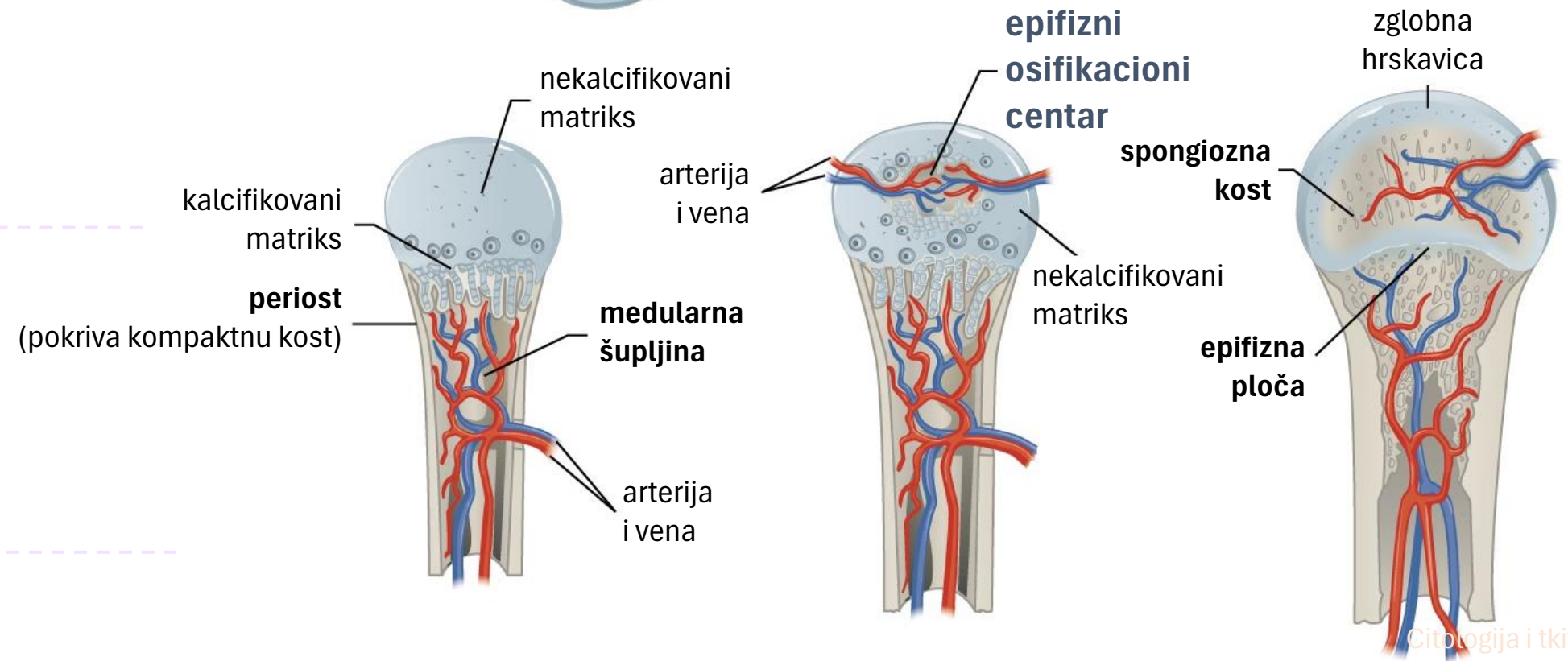
formiranje primarnog osifikacionog centra



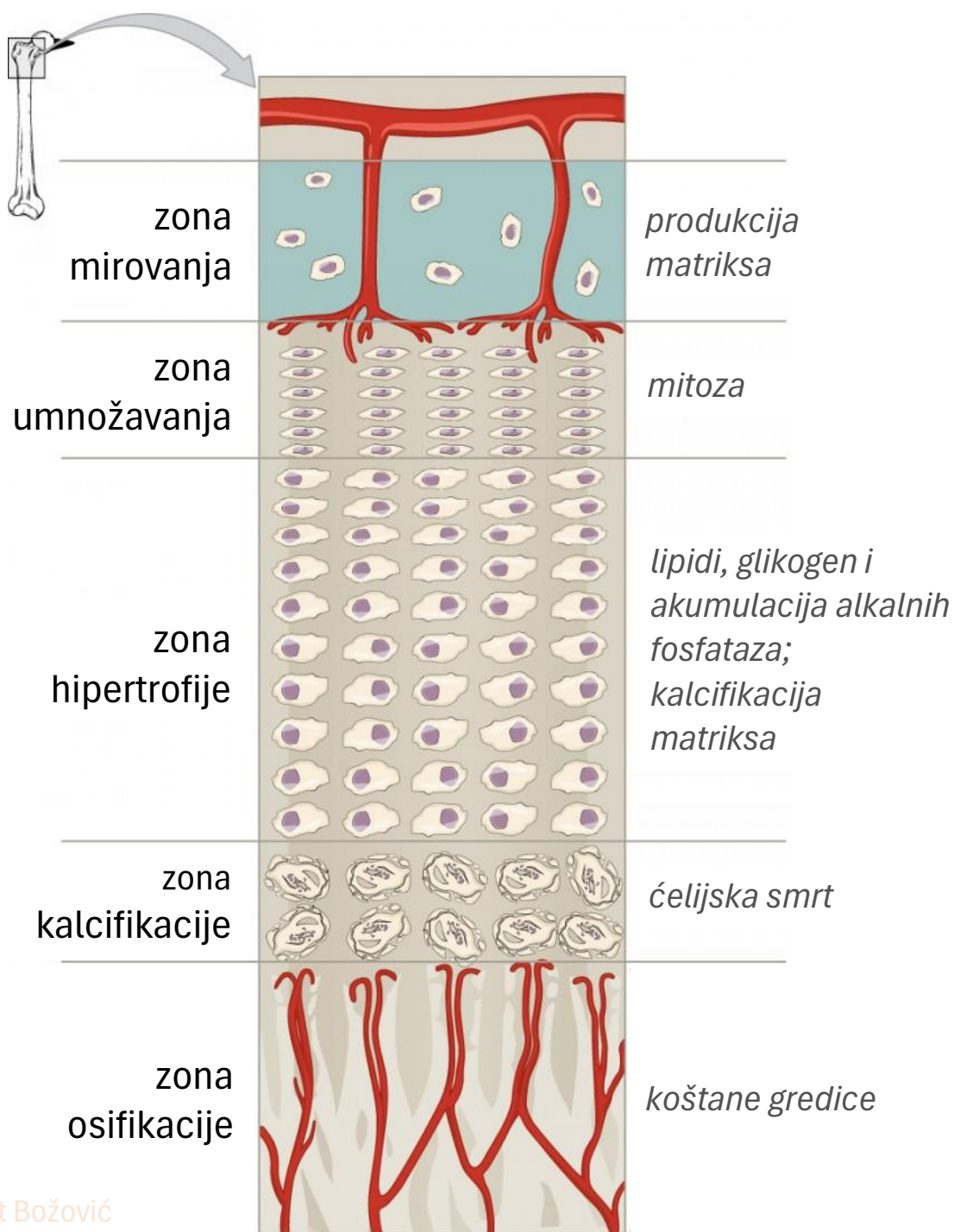
indirektno

Enhondralna osifikacija

formiranje sekundarnog osifikacionog centra



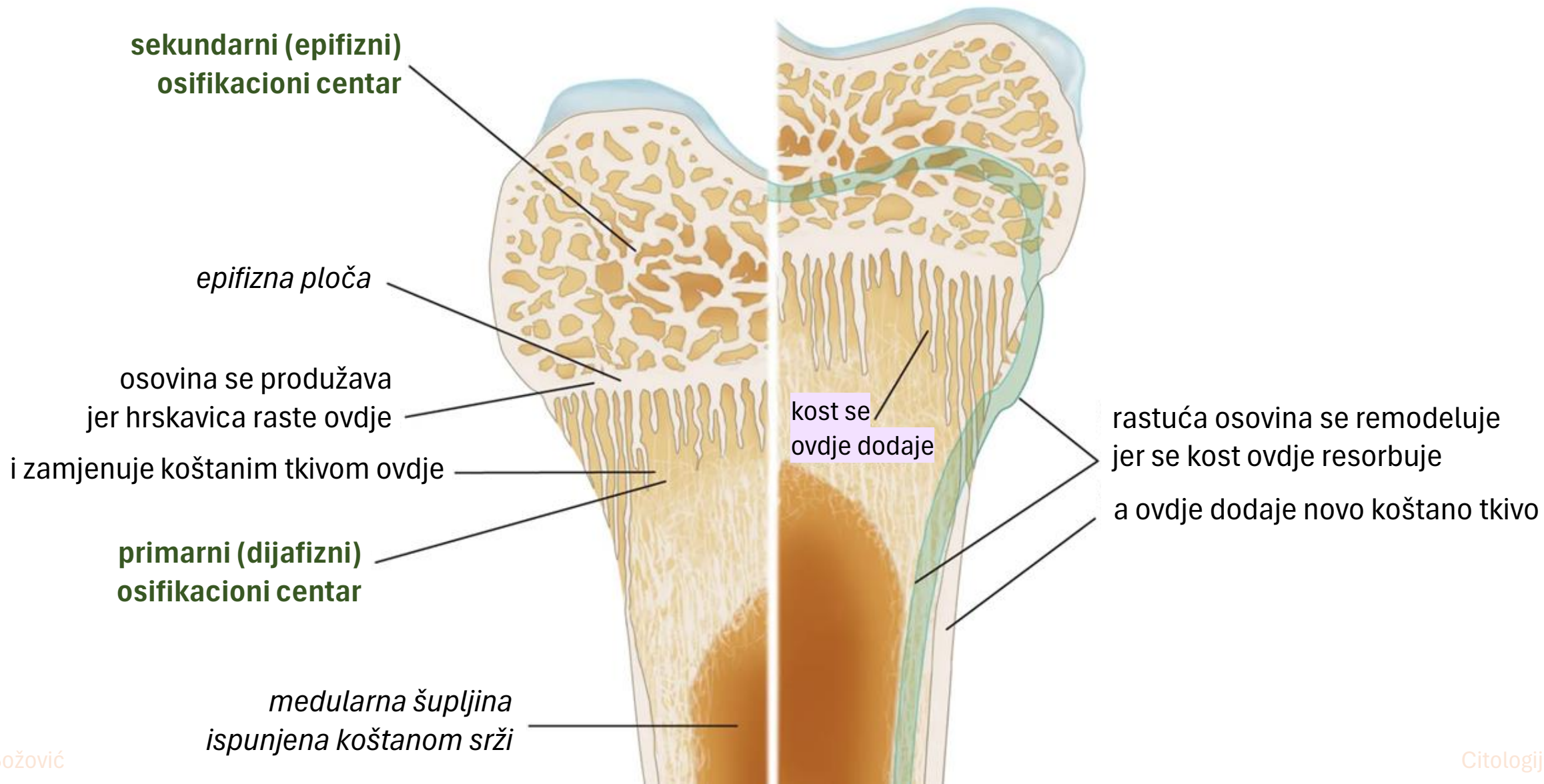
Epifizna ploča



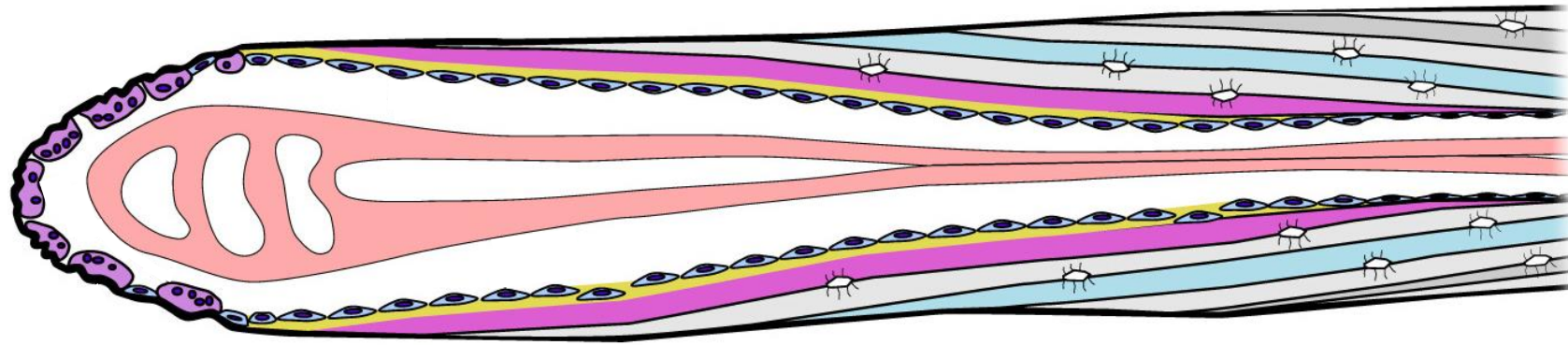
5 zona:



- ✓ pojedinačni hondrociti koji rijetko proliferišu
- ✓ proliferacija hondrocita i formiranje izogenih grupa
- ✓ veoma uvećani hondrociti sa uzanim ECM
- ✓ degeneracija hondrocita i kalcifikacija ECM
- ✓ osteoklasti razaraju kalcifikovani ECM hrskavice a osteoblasti stvaraju osteoid

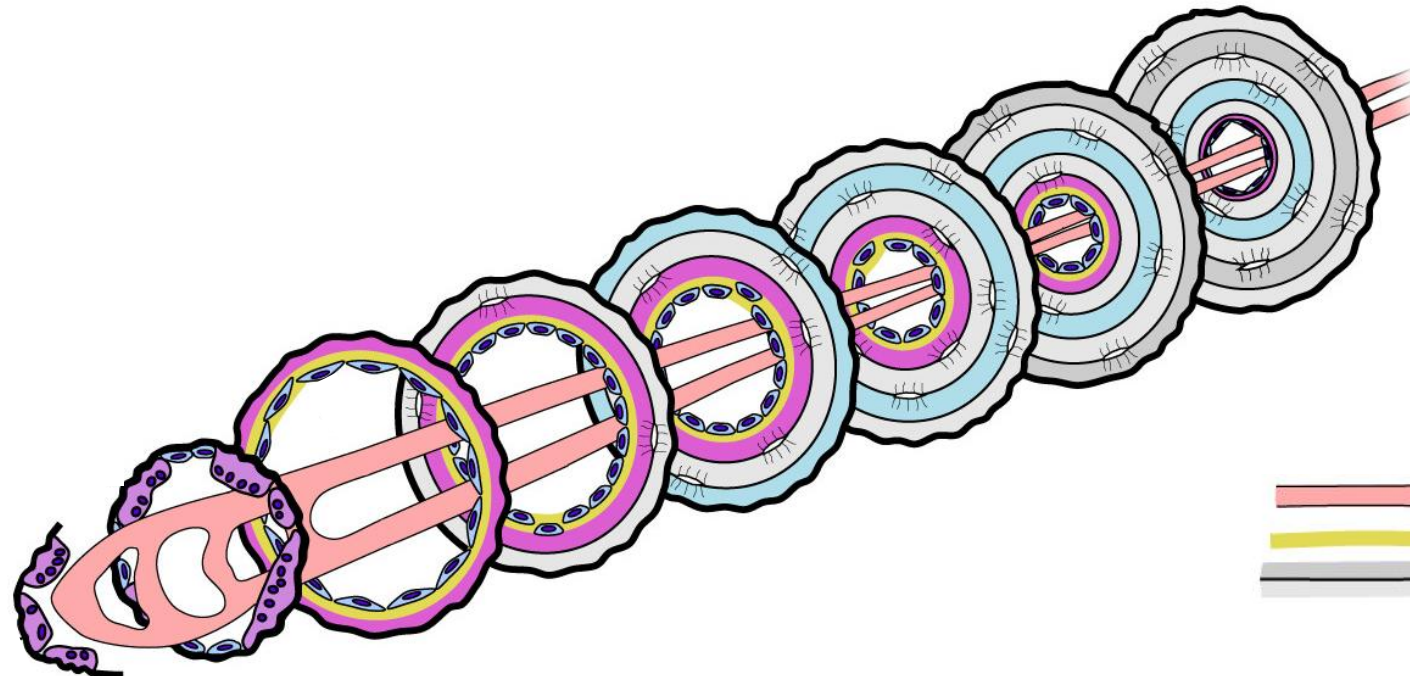
Rast kosti






Stvaranje osteona

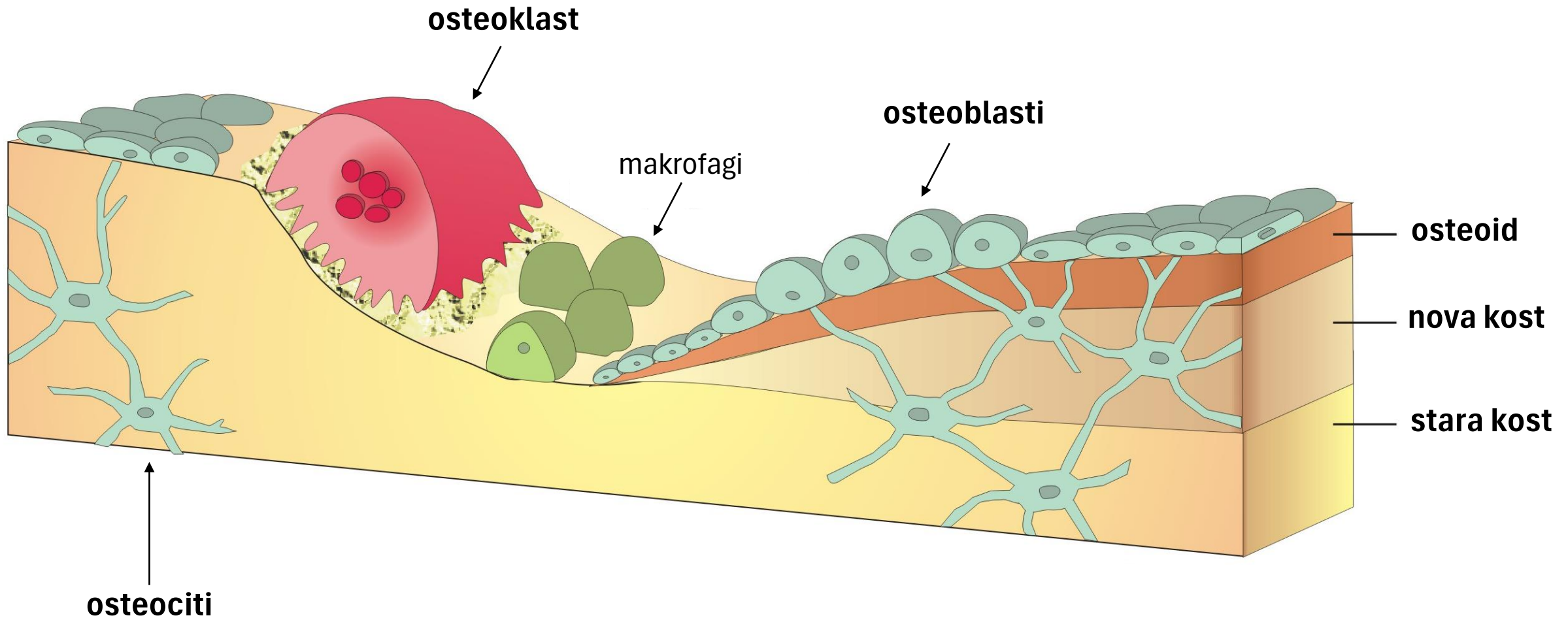


-  osteoblast
-  osteocit
-  osteoklast



-  krvni sud
-  osteoid
-  lamele

Remodelovanje kosti



Zglobovi

strukturalna klasifikacija

vezivni

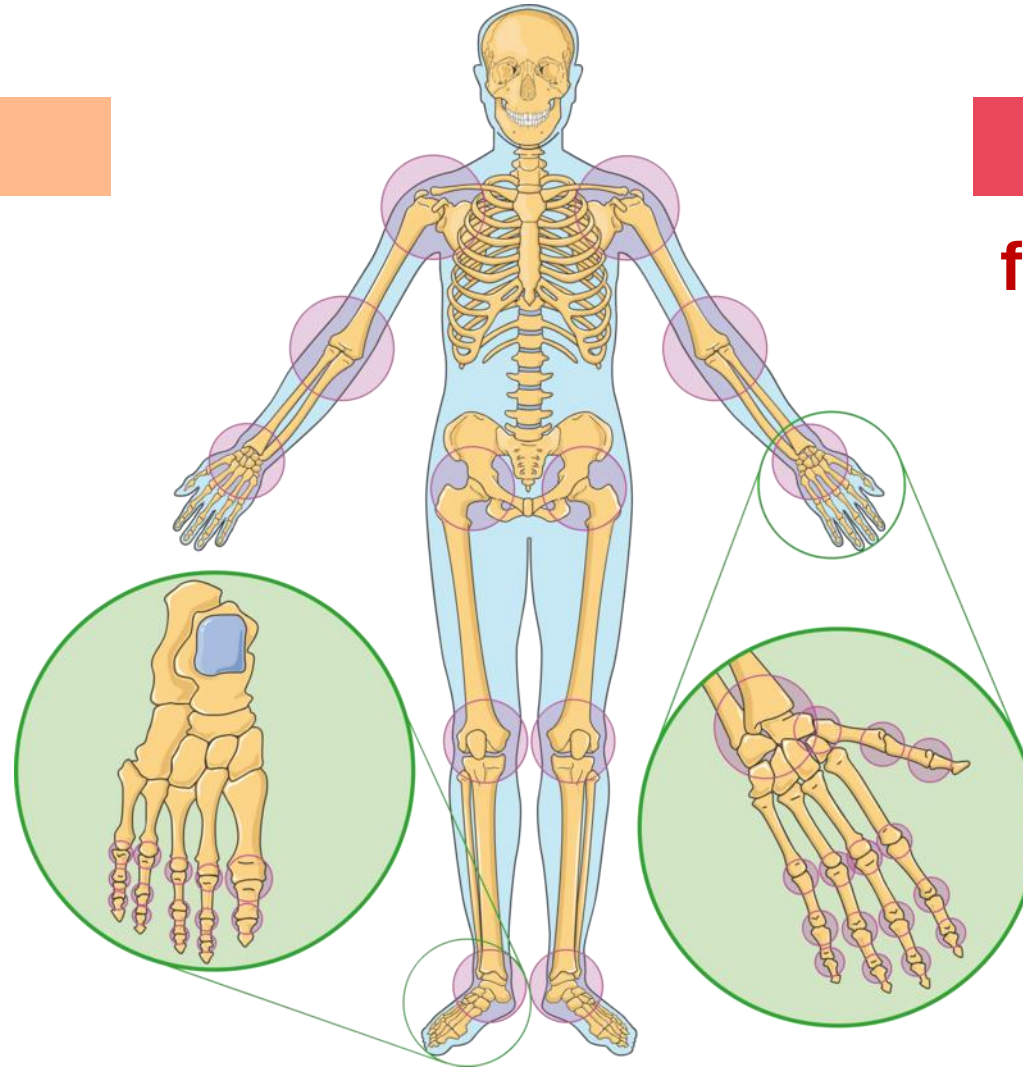
šav, klinasti zglob, sindesmoza

hrskavičavi

sinhydroza, simfiza

sinovijalni

(kosti nijesu direktno spojene)



funkcionalna klasifikacija

sinartroza

nepokretni

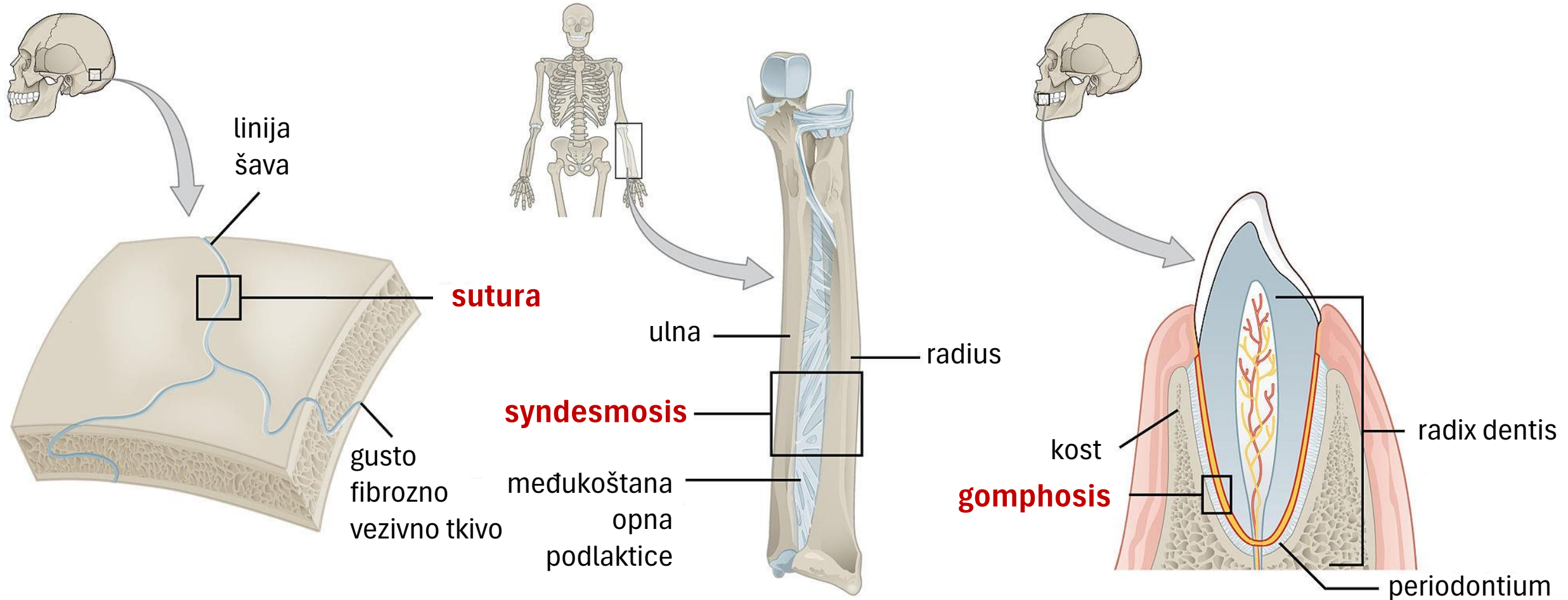
amfiartroza

minimalno pokretni

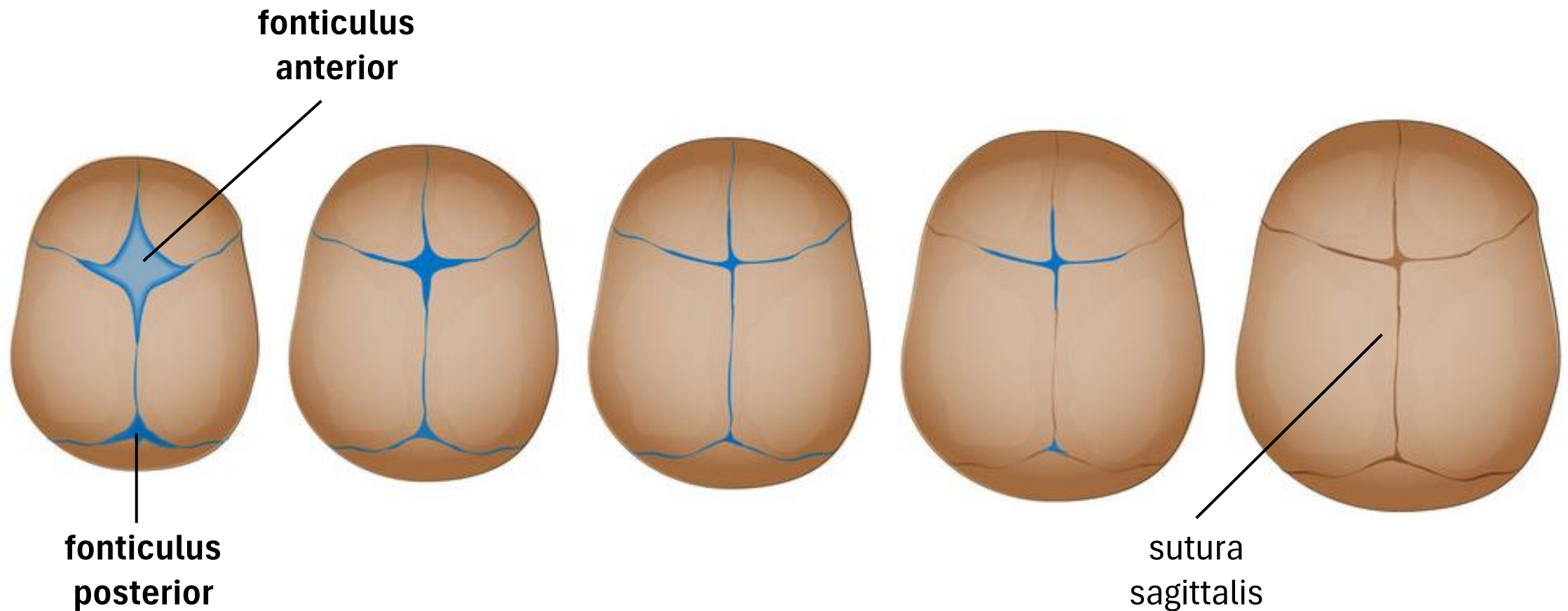
diartroza

potpuno pokretni

Articulatio fibrosa



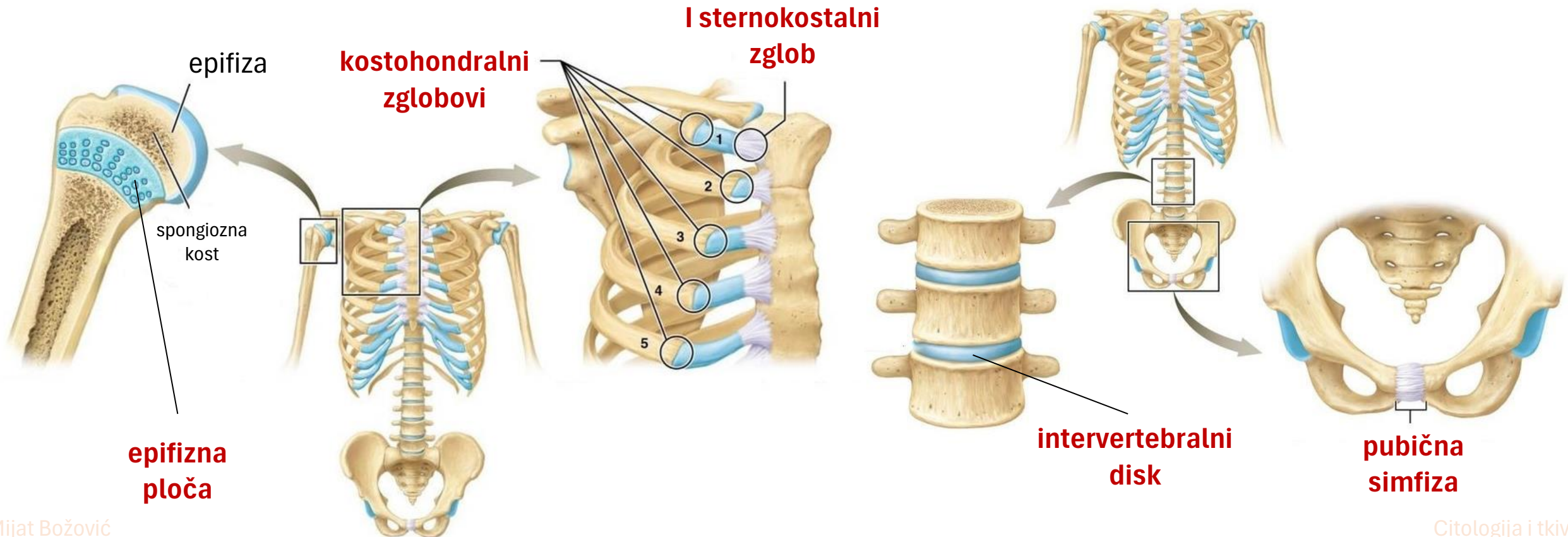
Fontanele, šavovi i sinostoze



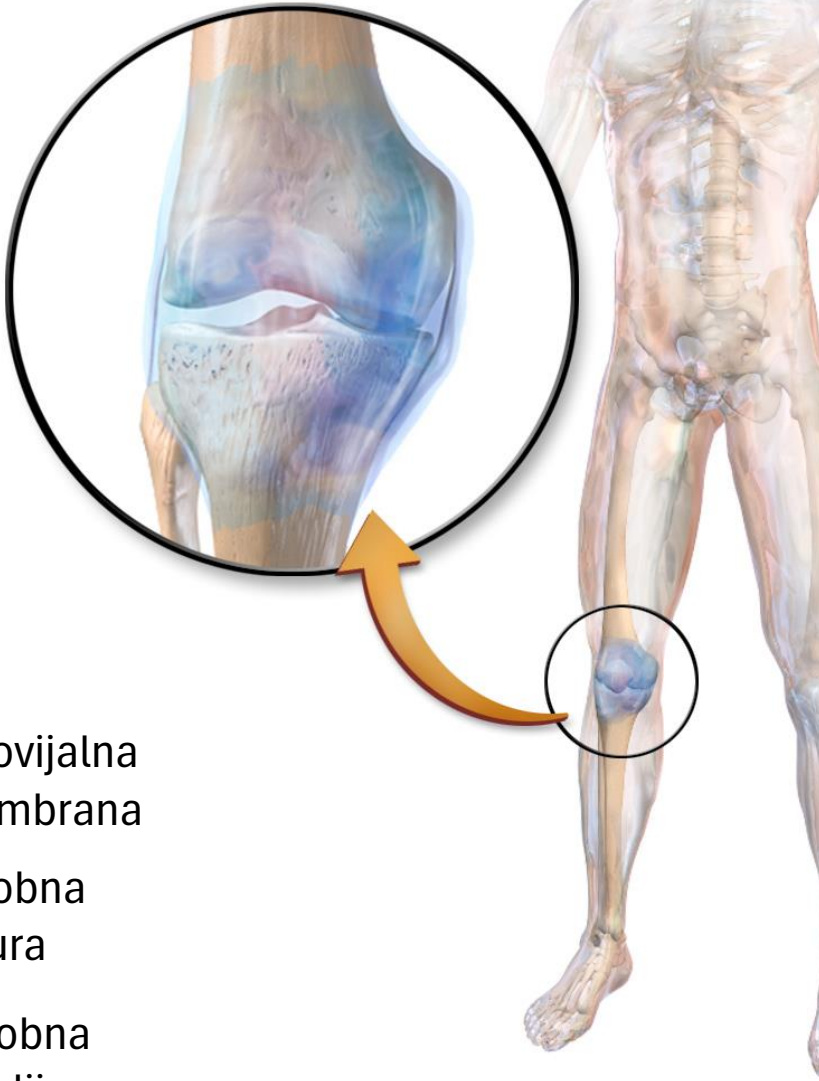
Articulatio cartilaginea

primarni (sinhydroze)
od hijaline hrskavice

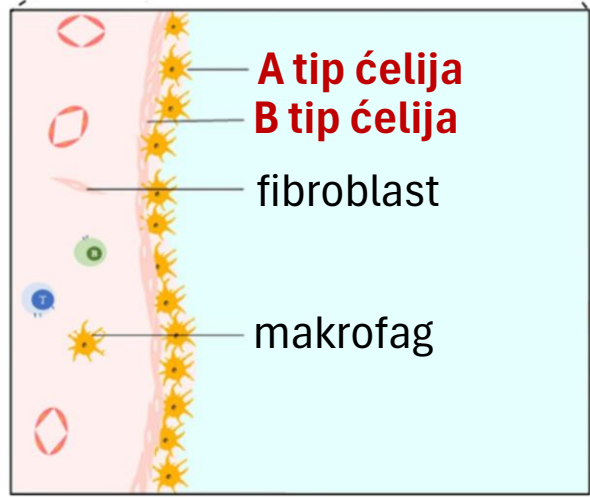
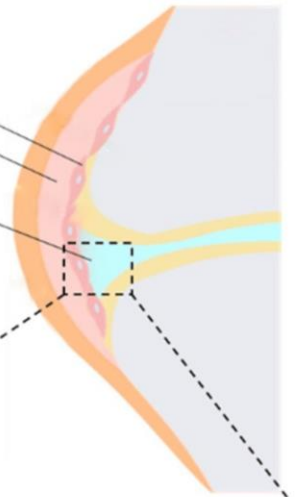
sekundarni (simfize)
od fibrozne hrskavice



Articulatio synovialis

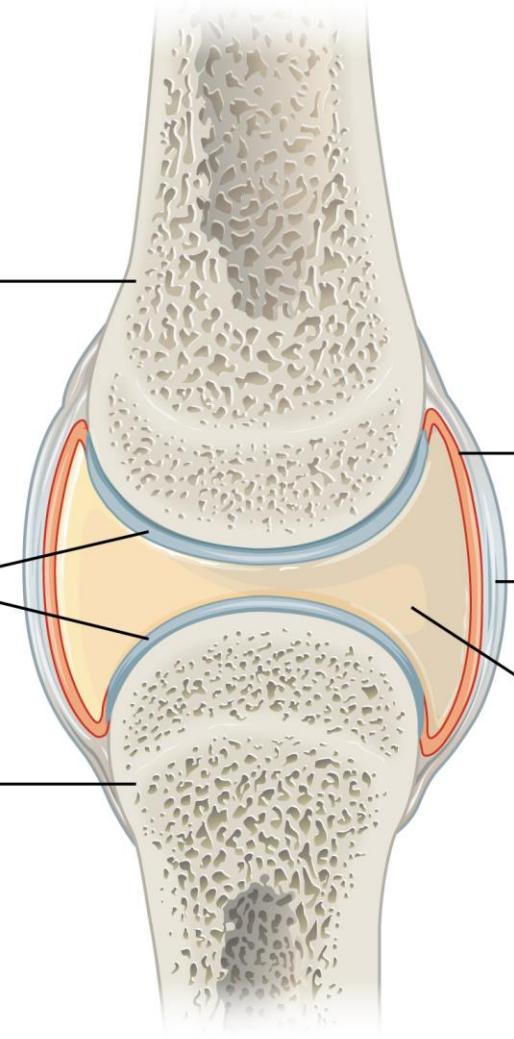


sinoviociti
spoljašnji sloj
sinovijalna
tečnost



A tip ćelija
B tip ćelija
fibroblast
makrofag

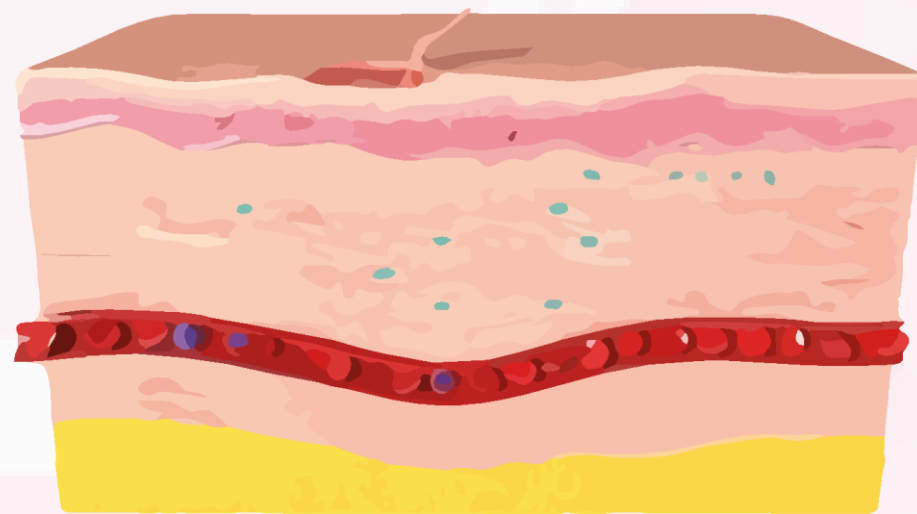
kost
zglobna
(hijalina)
hrskavica
kost



sinovijalna
membrana
zglobna
čaura
zglobna
šupljina
ispunjenja
sinovijalnom
tečnošću

Citologija i tkiva

Mijat BOŽOVIĆ



PITANJA?

