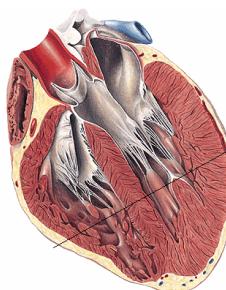


# Mišićni sustav

## ■ Poprečno-prugasti (skeletni) mišići



## ■ Glatki mišići



## ■ Srčani mišić

- **Kontraktilnost**
- **Elastičnost**
- **Provodljivost**



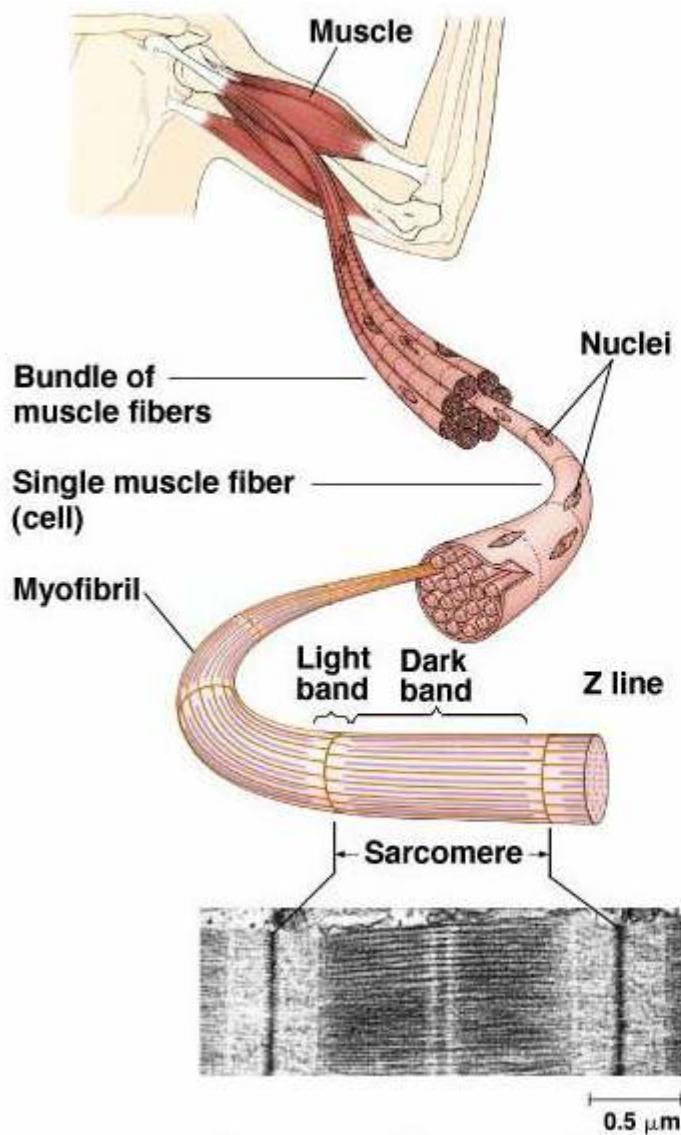
# Skeletni mišići

**Omogućuju gibanje, pod utjecajem volje**

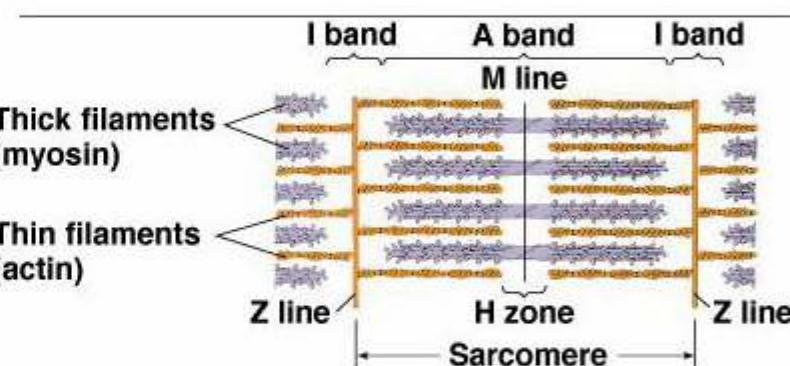
- **42% tjelesne mase ♂**
- **39% tjelesne mase ♀**
  - 327 parnih, 2 neparna
  - jednozglobni, dvozglobni, više zglobni



# Skeletni mišići

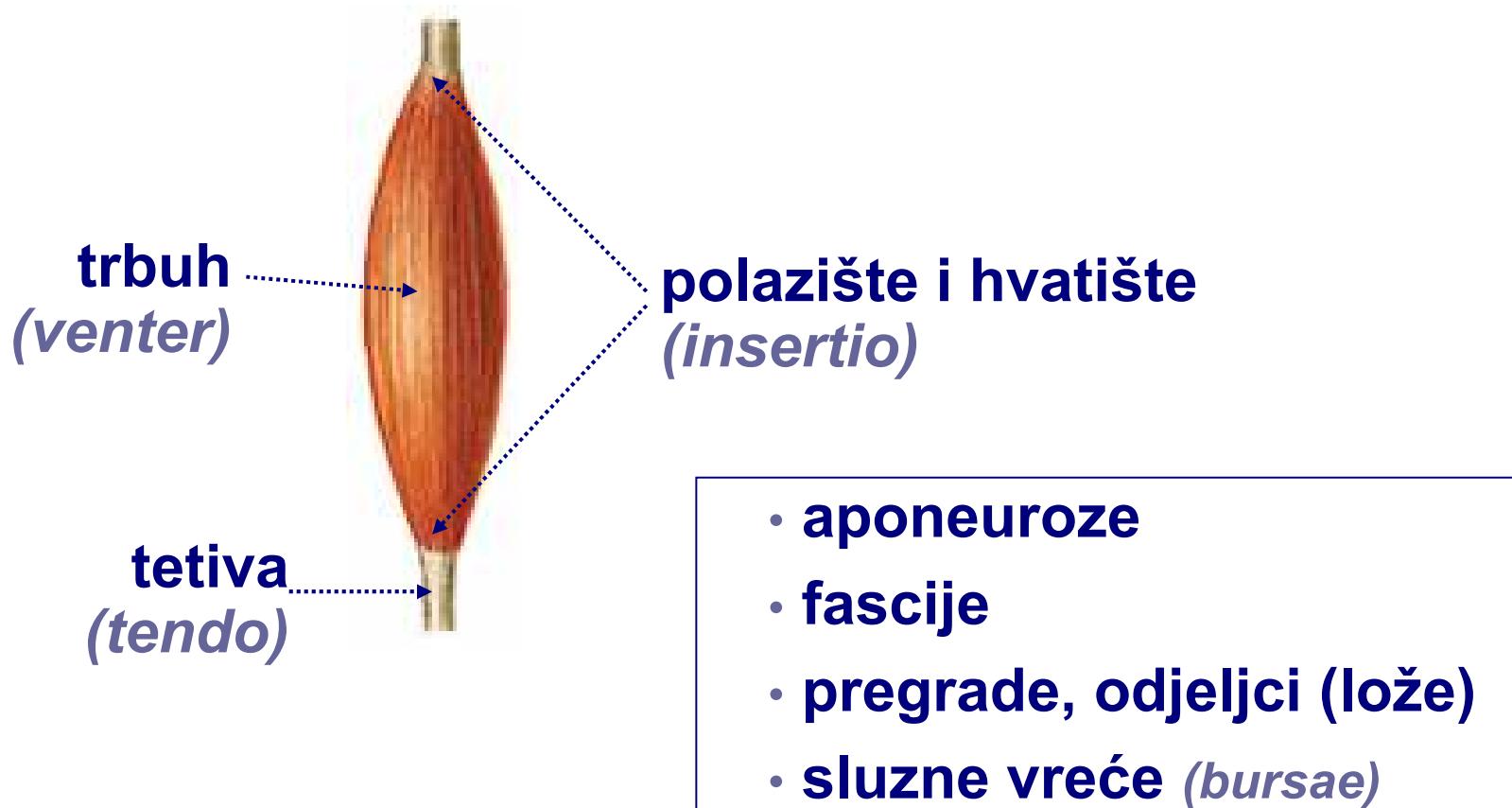


- mišićno vlakno (stanica)
  - mišićna vlakanca
- mišićni snopovi
- ovojnice

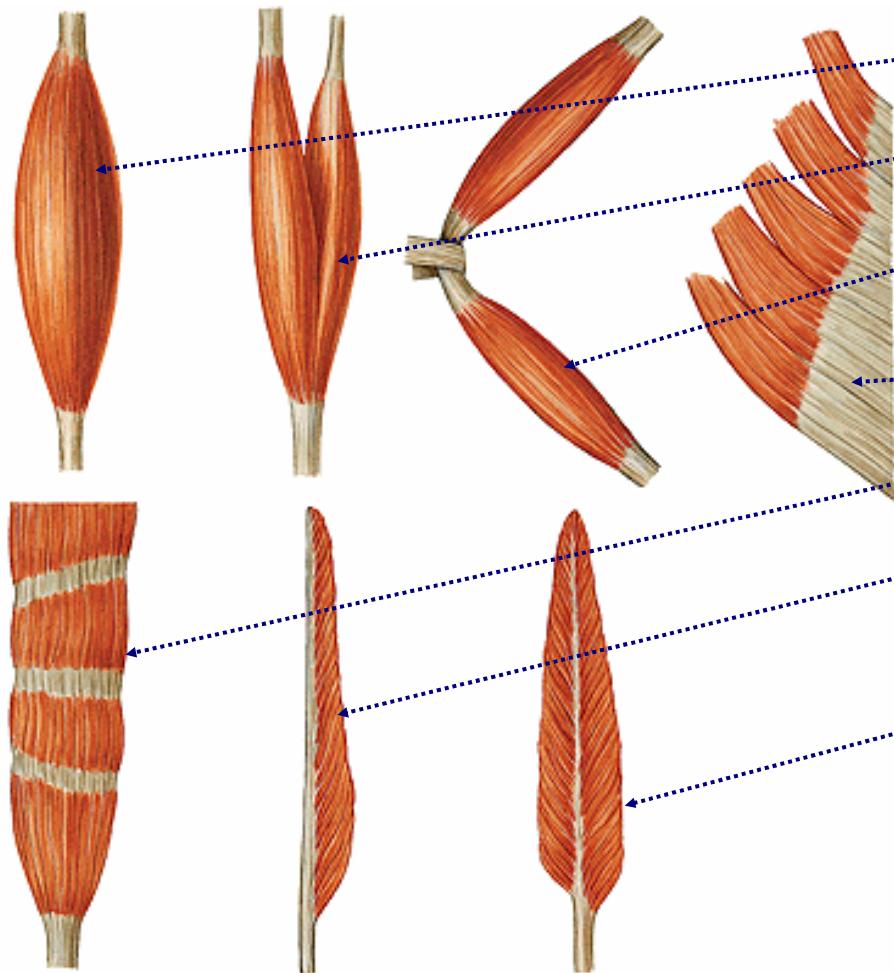


©1999 Addison Wesley Longman, Inc.

# Skeletni mišići



# Skeletni mišići



- **vretenasti** (*m.fusiformis*)
- **dvoglavi** (*m.biceps*)
- **dvotrbušasti**  
(*m.biventer*)
- **ravni** (*m.planus*)
- *m.intersectus*
- **poluperasti**  
(*m.semipennatus*)
- **perasti** (*m.pennatus*)
- **zapirač** (*m.sphincter*)
- **kružni** (*m.orbicularis*)

## Vrste mišićnih vlakana:

Spora oksidativna (*crvena, tip I*)

Brza - oksidativna  
glikolitička  
(*bijela, tip IIa*)

Brza – anaerobna  
glikolitička  
(*bijela, tip IIb*)

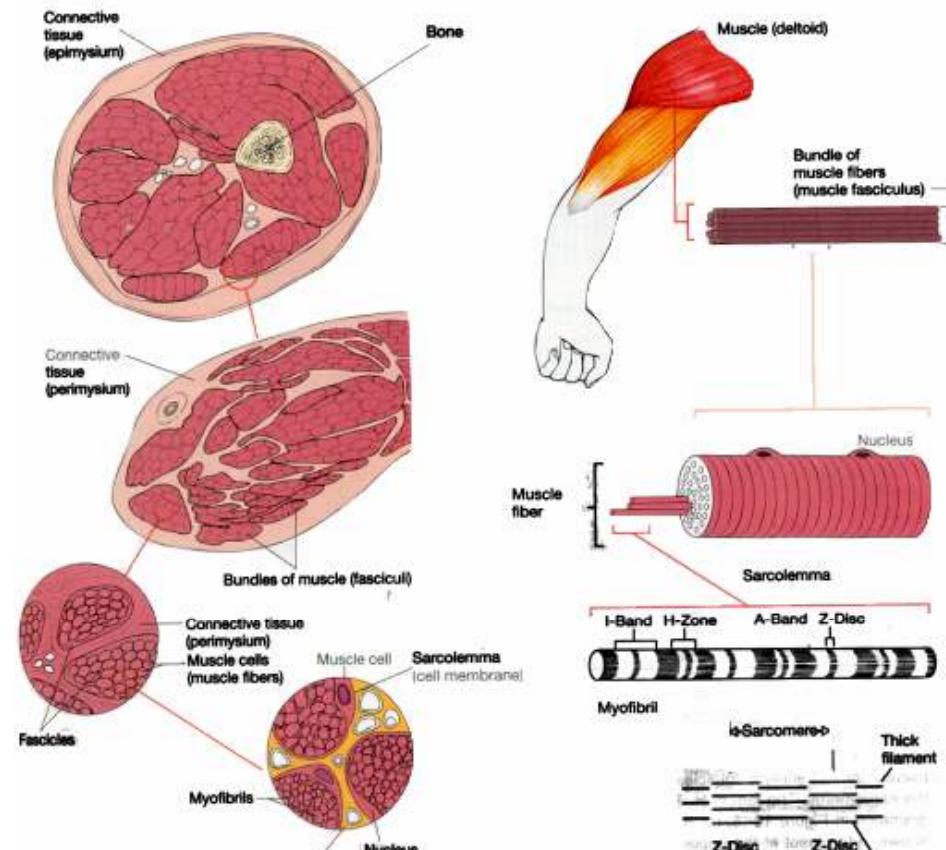
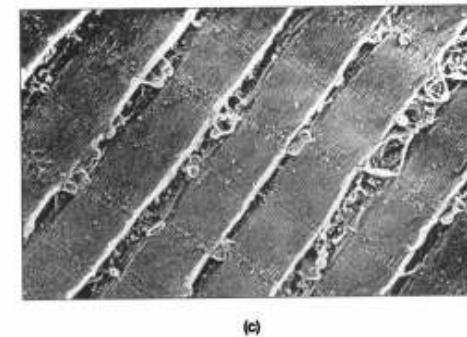


Figure 16–3

The organization of skeletal muscle. (a) Cross-section of the thigh, progressively magnified to show finer details. (b) Longitudinal section of the deltoid muscle, showing the bundles of fibers (fasciculi) that make up a whole muscle. Further magnification shows that the individual muscle fibers, or cells, contain long structures called myofibrils that are made up of myofilaments and are organized into sarcomeres.

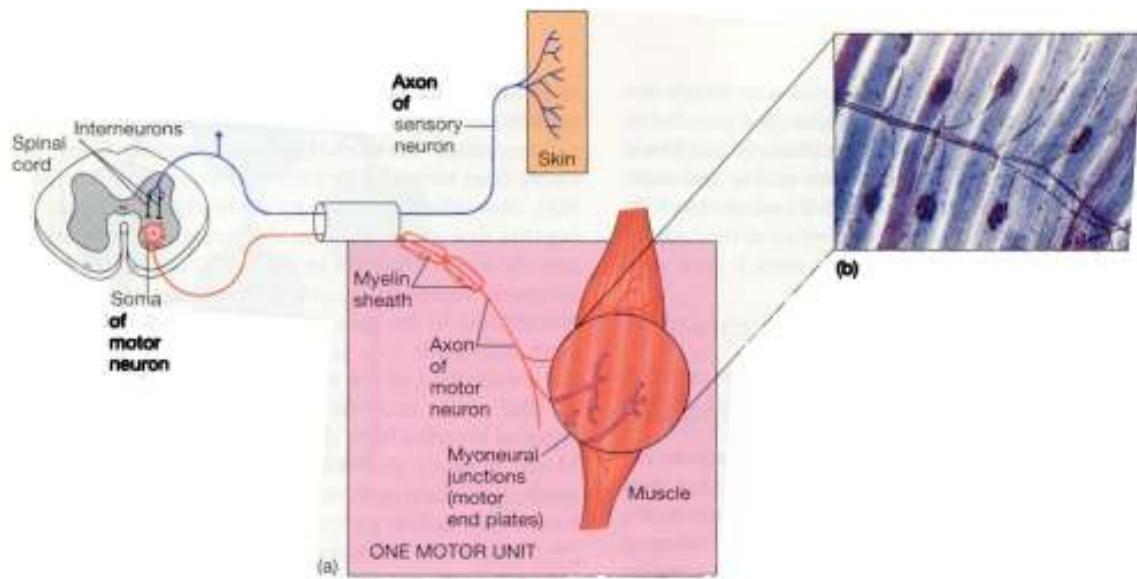


# Aktivacija mišića - neromuskularna veza

- **motorička jedinica**

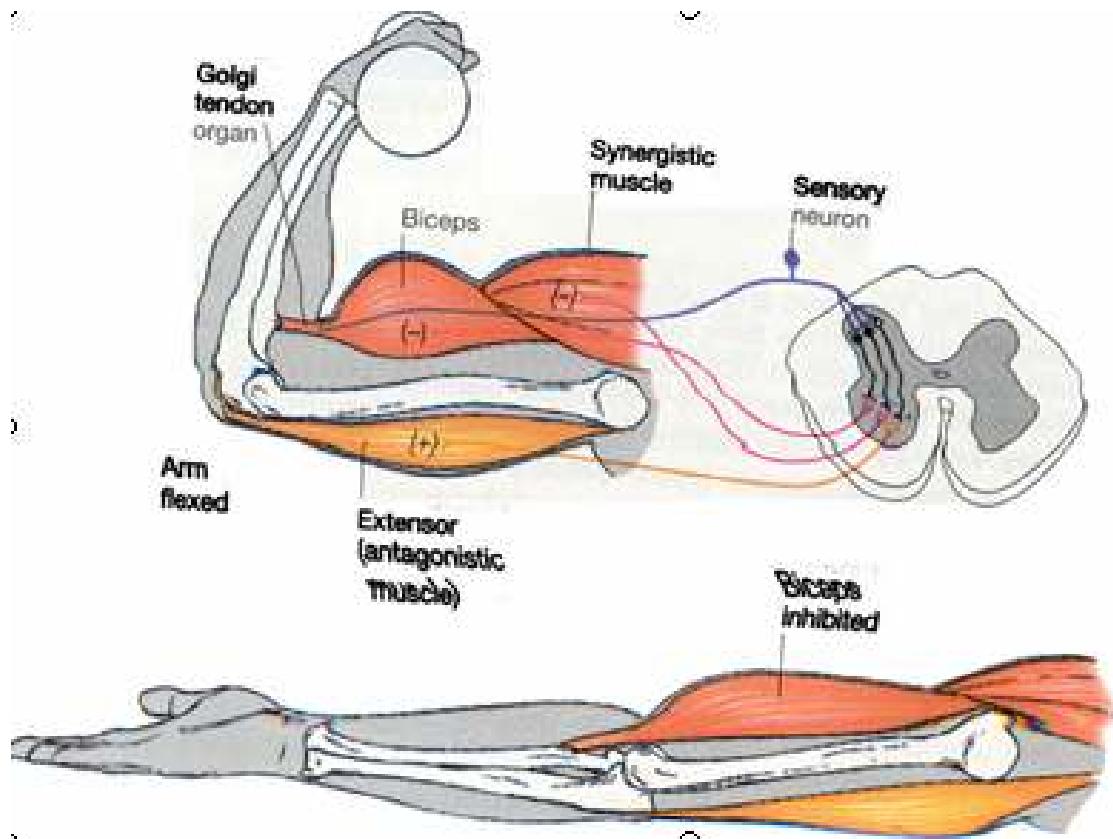
- motorički živac + sva mišićna vlakna koje inervira
- 1 motorički živac može inervirati samo 1 pa do više stotina mišićnih vlakana

- **refleksni luk**



# Podjela mišića

- **Agonisti**  
*(vrše isti pokret)*
- **Antagonisti**  
*(vrše suprotni pokret)*
- **Sinergisti**  
*(sudjeluju pri pokretu,  
ali ga sami ne vrše;  
npr. fiksatori..)*



# Vrste mišićne kontrakcije

- **koncentrična**
  - mišić se skraćuje
- **ekscentrična**
  - mišić se izdužuje
- **izometrička (statička)**
- **Izokinetička**
  - kutna brzina konstantna

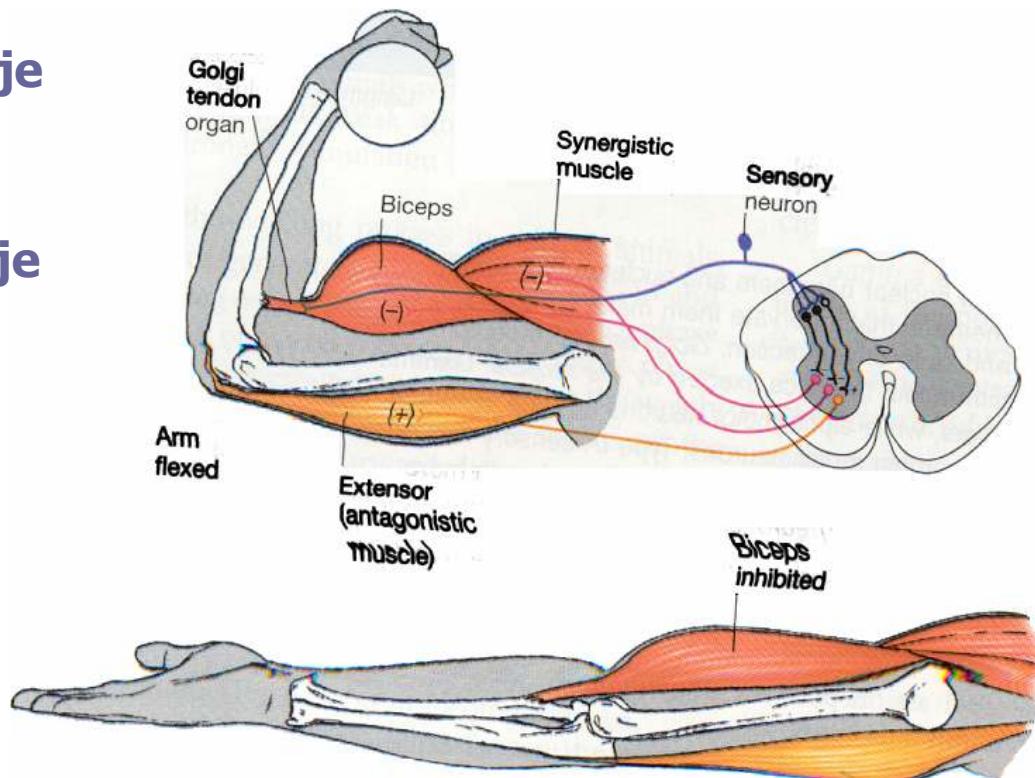


Figure 9-11

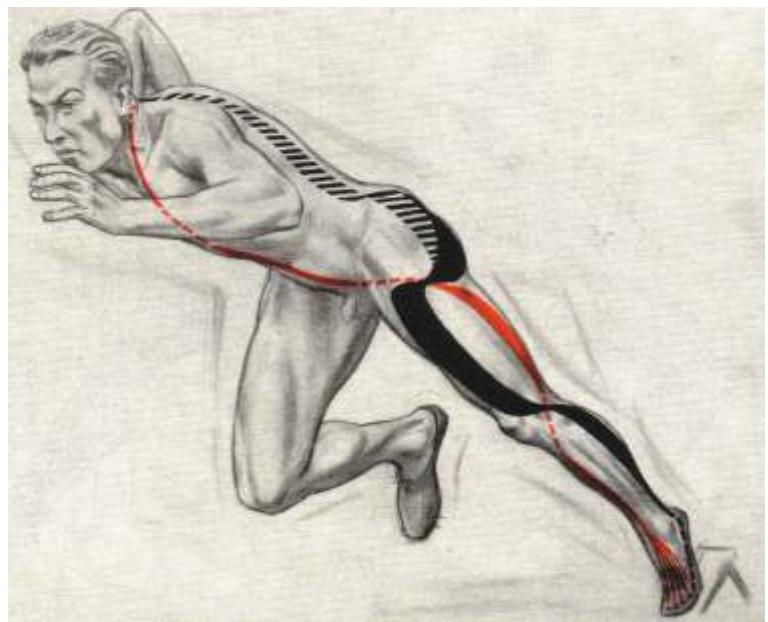
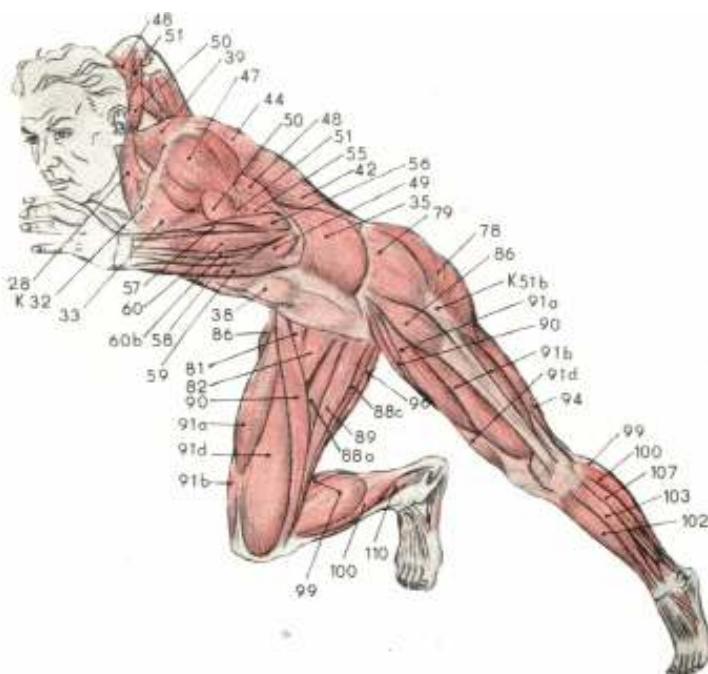
# Kinetički lanac

- **otvoreni**

*distalni segment tijela  
slobodan u prostoru*

- **zatvoreni**

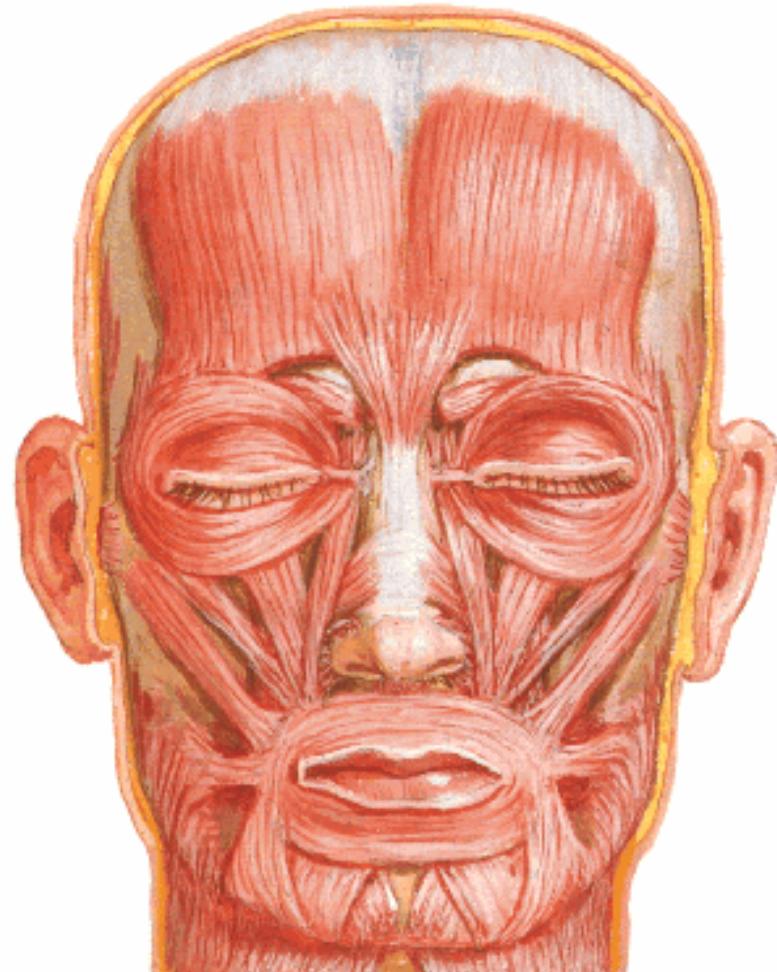
*distalni segment fiksan*



# Mišići glave

## Mimični mišići (potkožni, mišići lica)

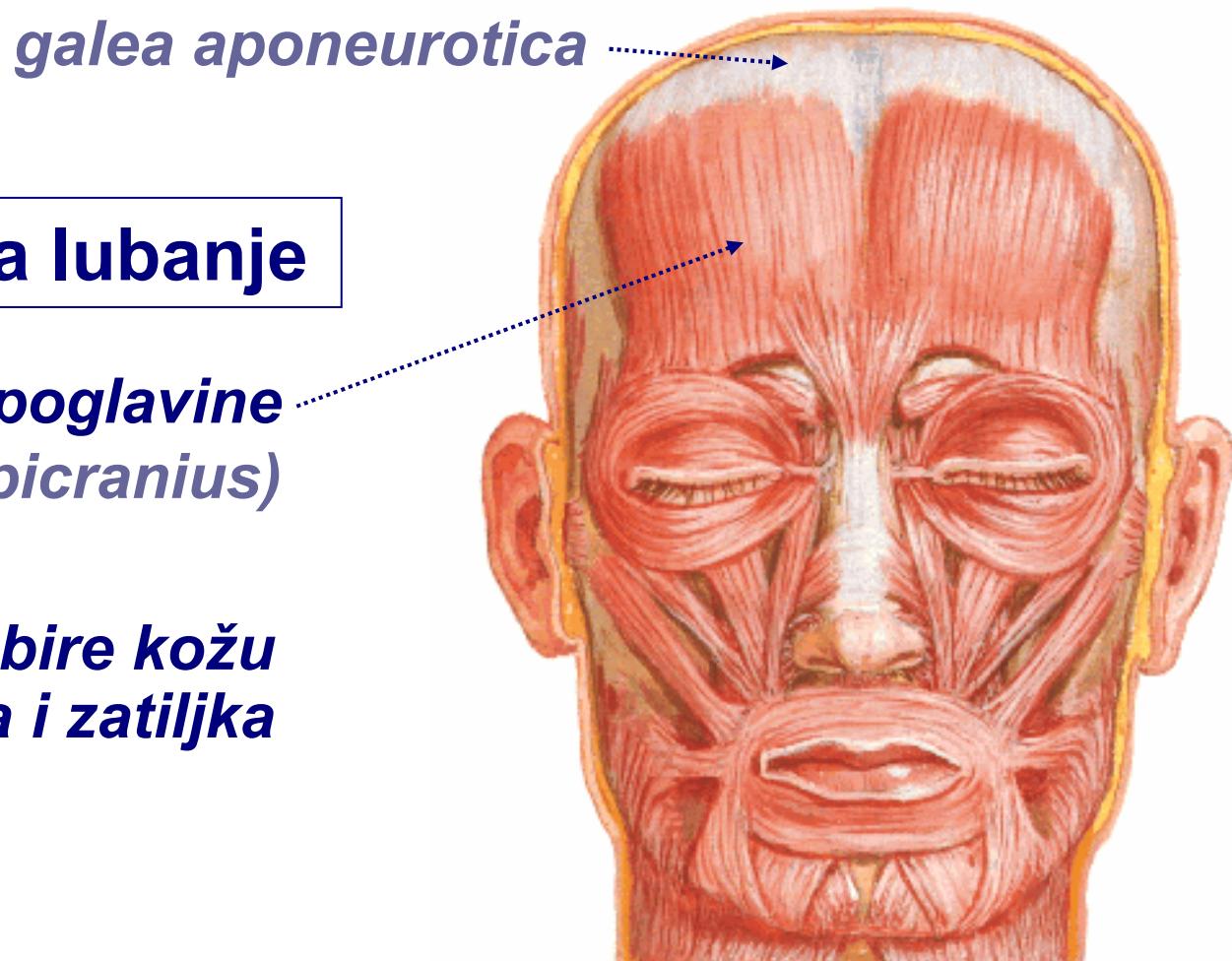
- *svoda lubanje*
  - *vjeđa*
  - *nosa*
  - *usana i obrazu*
  - *vanjskog uha*
- 
- *inervacija: lični živac  
(n. facialis)*



# Mimični mišići

## Mišići svoda lubanje

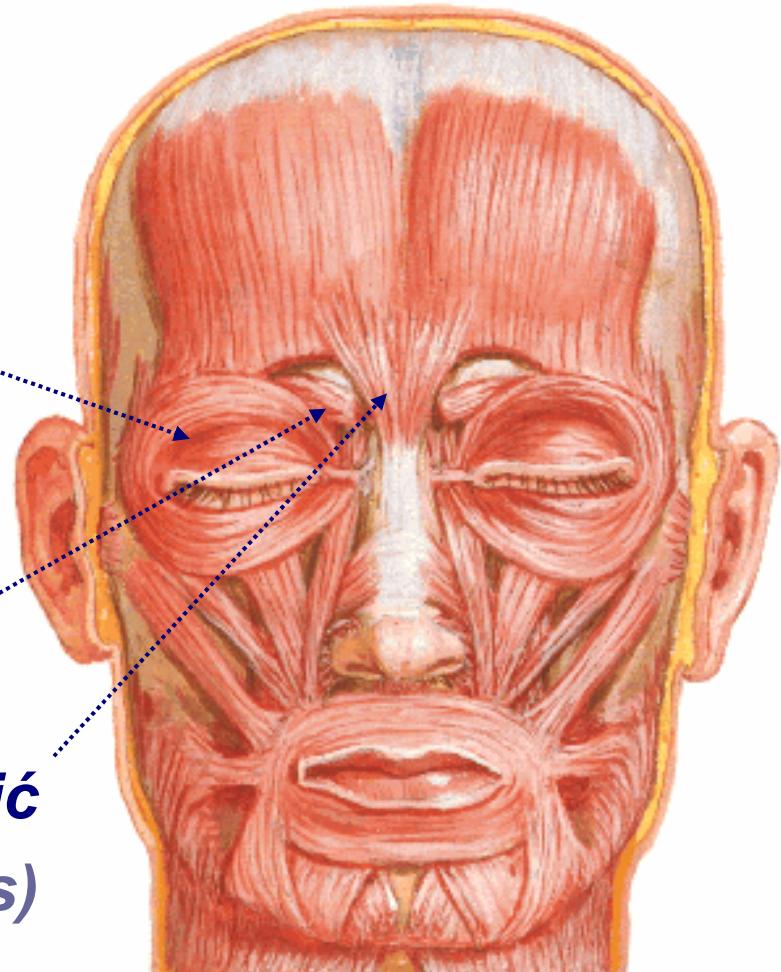
- **mišić poglavine  
(*m. epicranius*)**
- **pomiće, nabire kožu  
čela i zatiljka**



# Mimični mišići

## Mišići vjeda

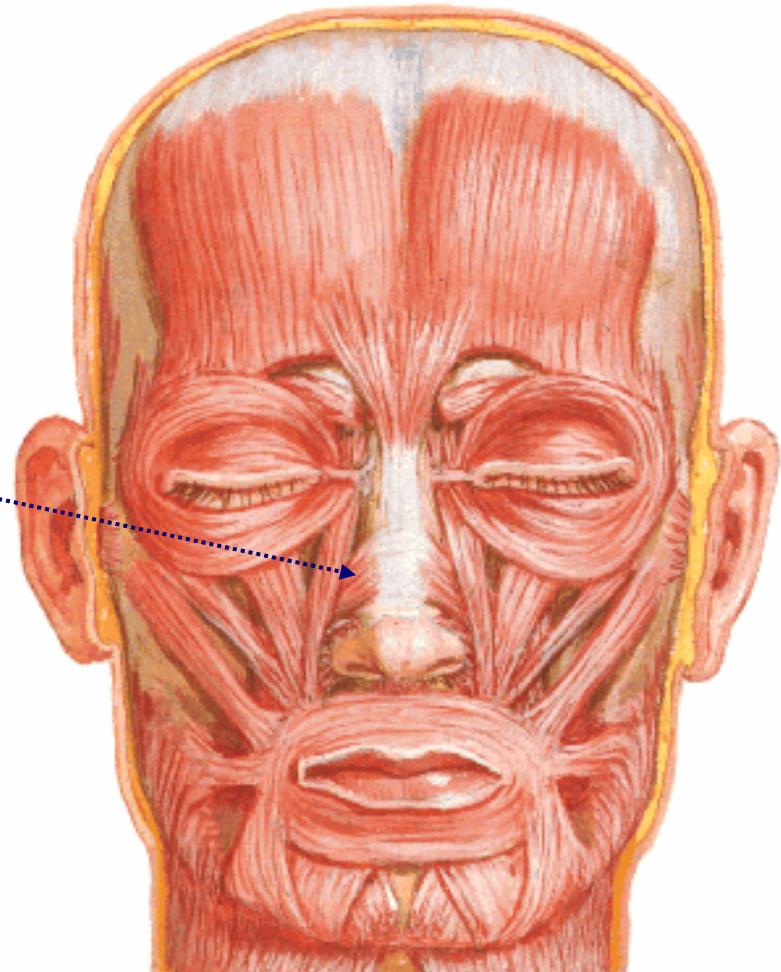
- *kružni mišić oka*  
*(m. orbicularis oculi)*
- *mišić nabirač obrva*  
*(m. corrugator supercilii)*
- *vitki mišić*  
*(m. procerus)*



# Mimični mišići

## Mišići nosa

- *mišić nosa  
(m. nasalis)*
- *suzuje, širi nosnice*
- *spušta vrh nosa*



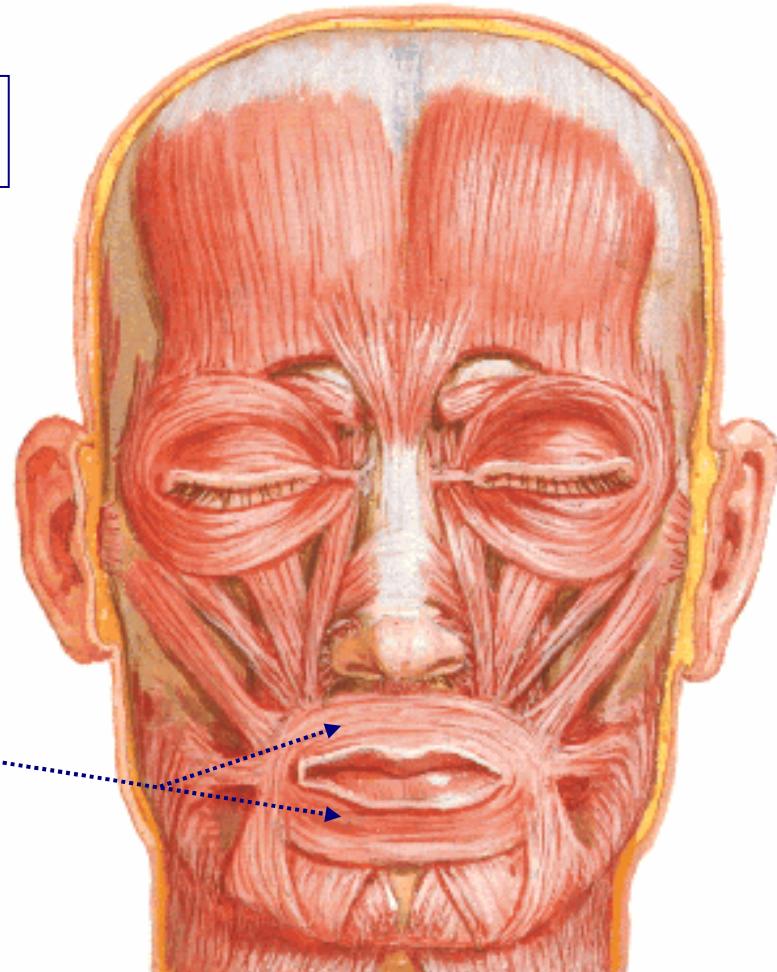
# Mimični mišići

## Mišići usana i obraza

- 11 parnih mišića

i

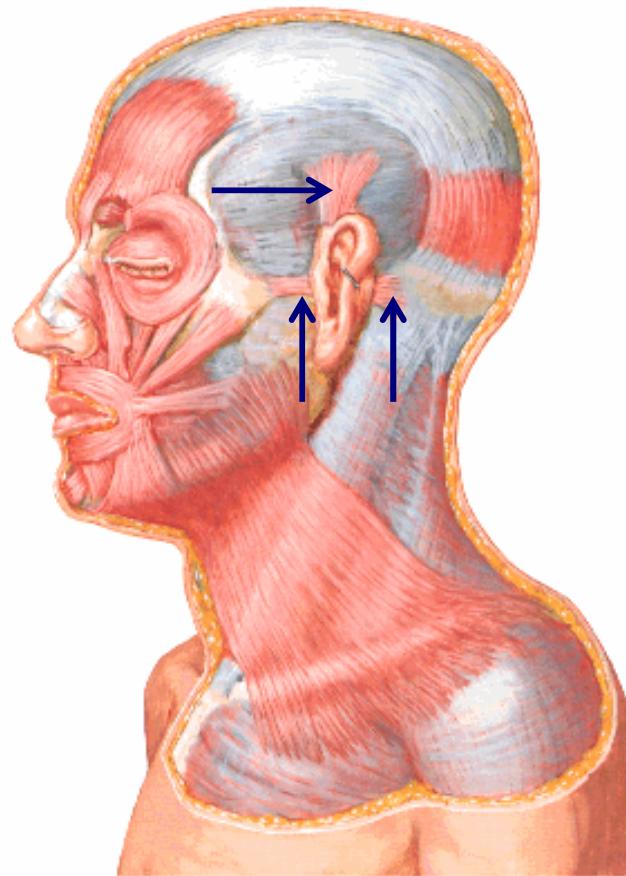
- kružni mišić usana  
*(m. orbicularis oris)*



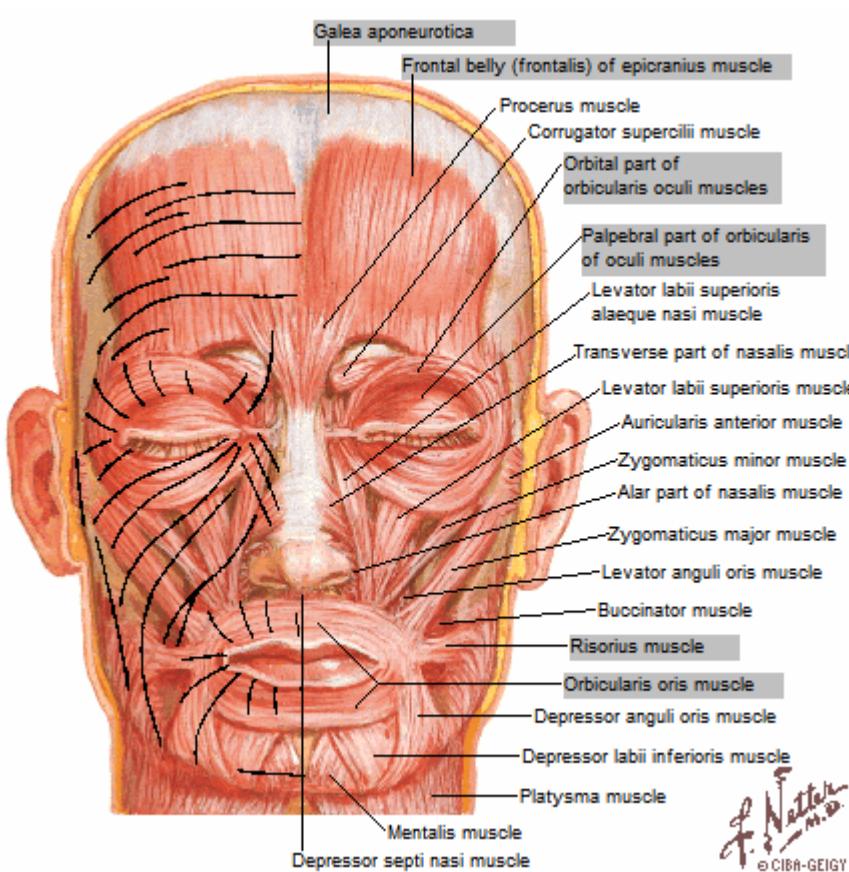
# Mimični mišići

## Mišići uške

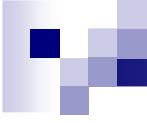
- prednji (*m. auricularis ant.*)
- gornji (*m. auricularis sup.*)
- stražnji (*m. auricularis post.*)



# Mimični mišići



<http://www.artnatomia.net/uk/artnatomy.html>



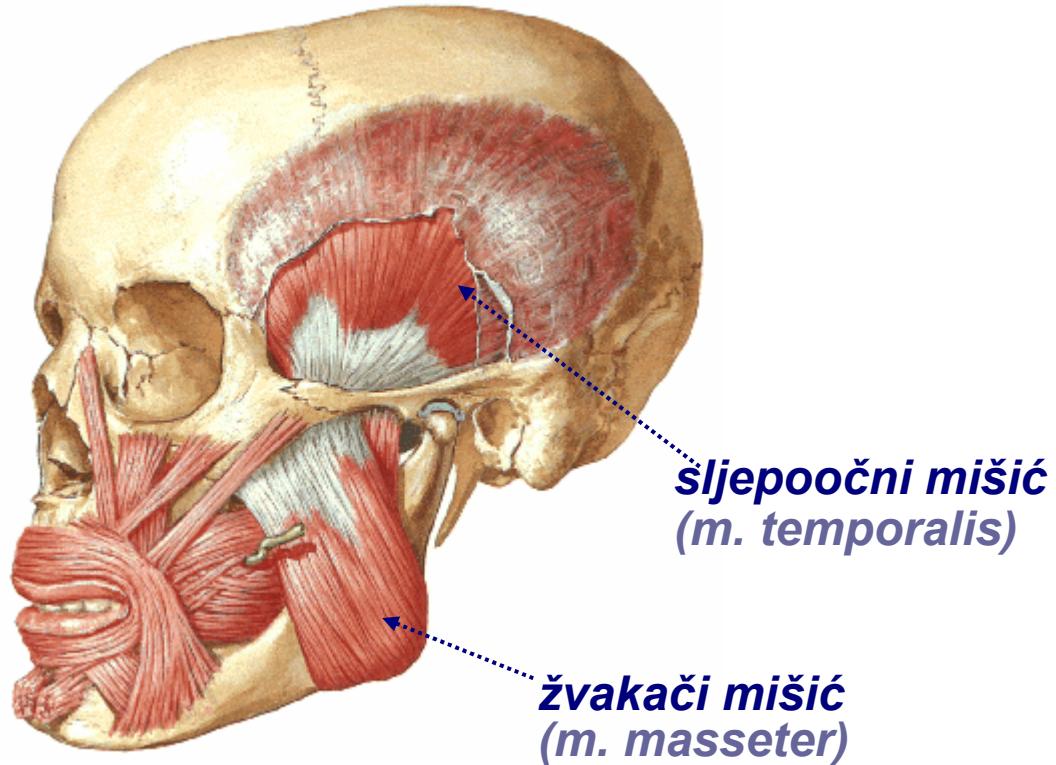
# Mišići glave

*(lateralno)*

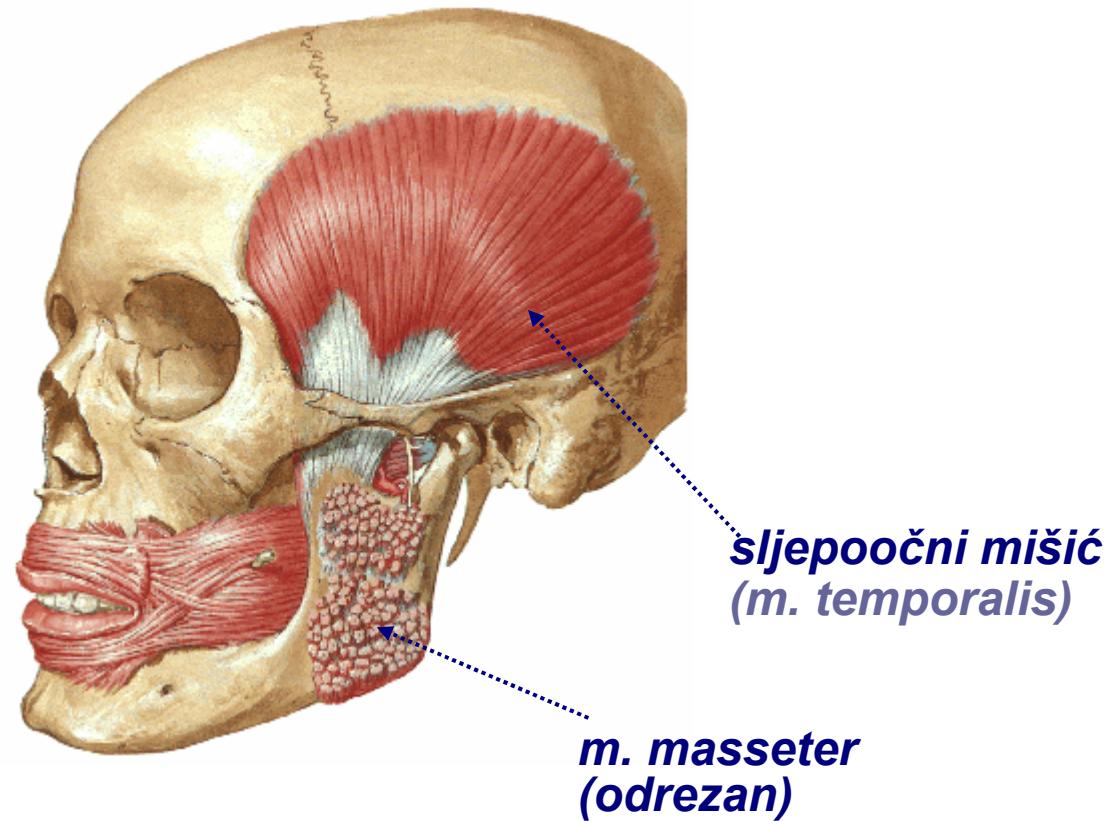


# Mišići glave

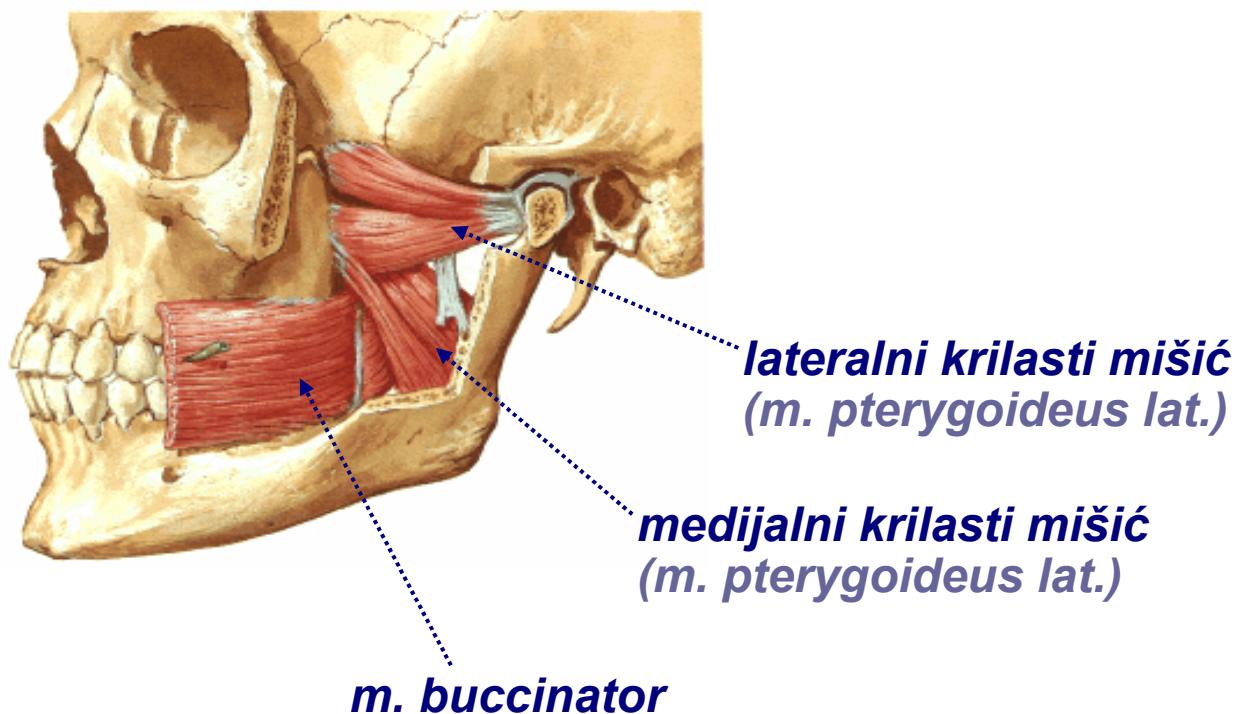
## Žvačni mišići



# Žvačni mišići

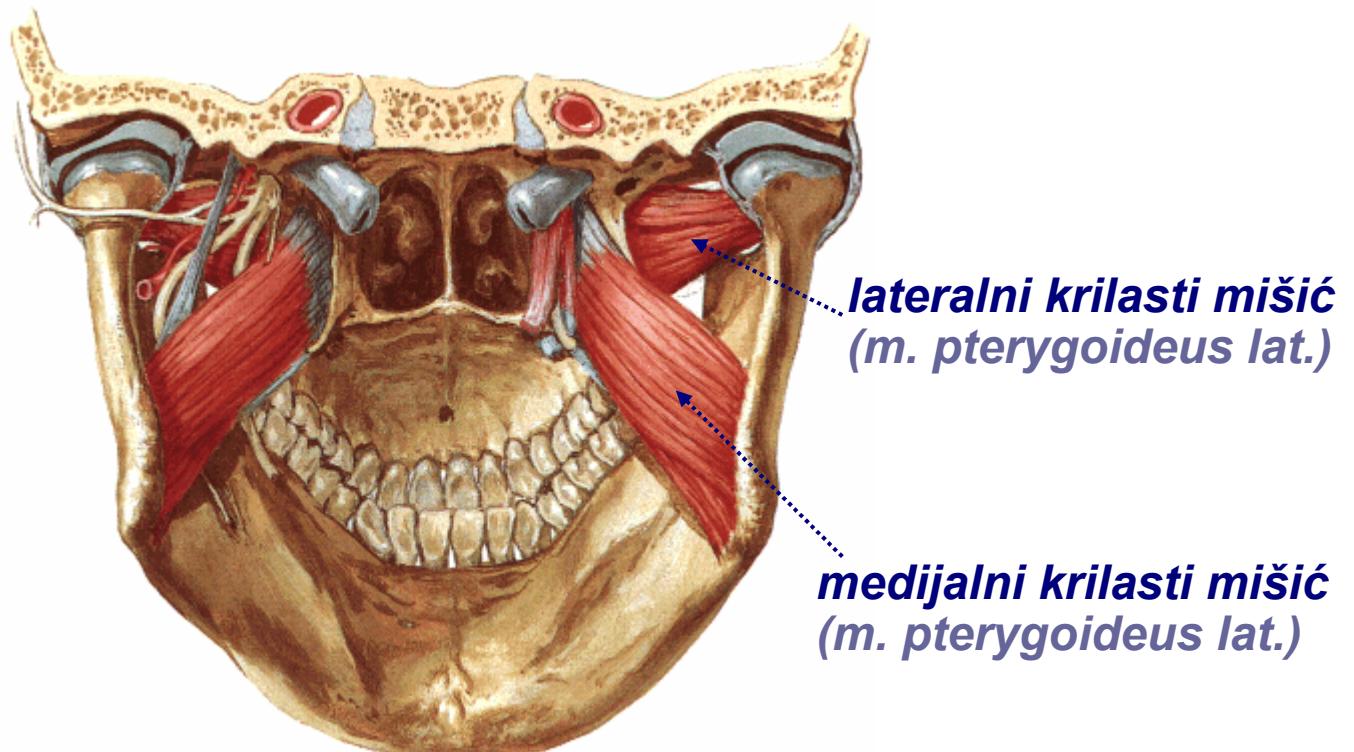


# Žvačni mišići



# Žvačni mišići

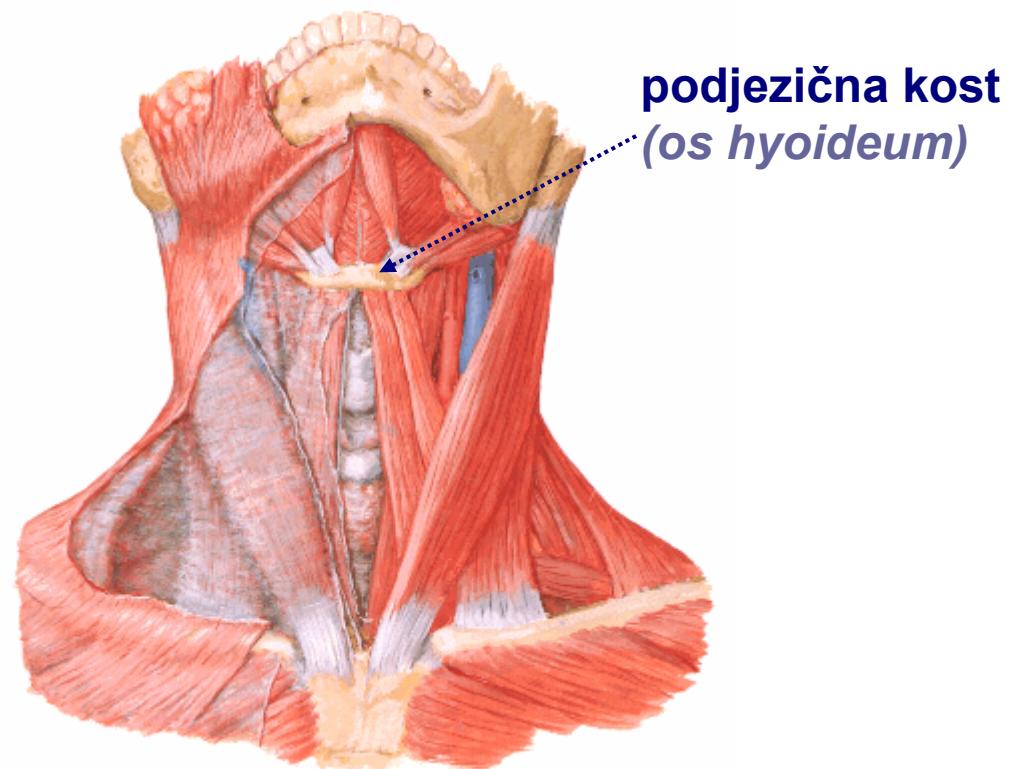
(straga)



# Mišići vrata

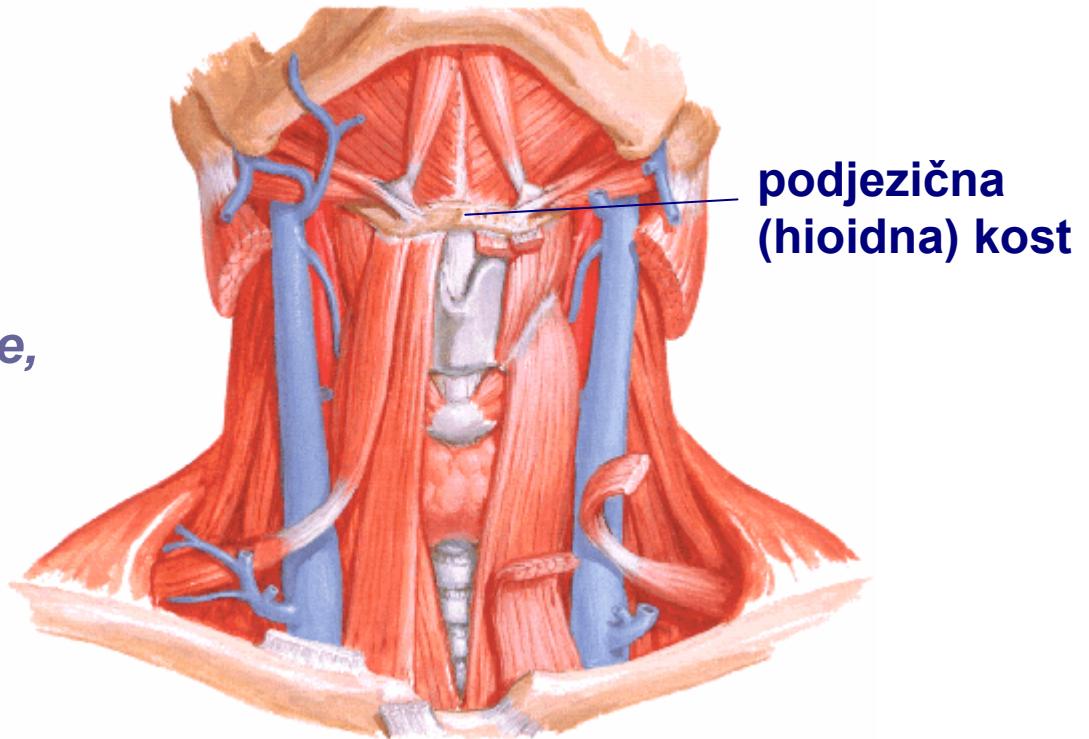
(sprijeda)

- *prednji*
- *lateralni*
- *stražnji*



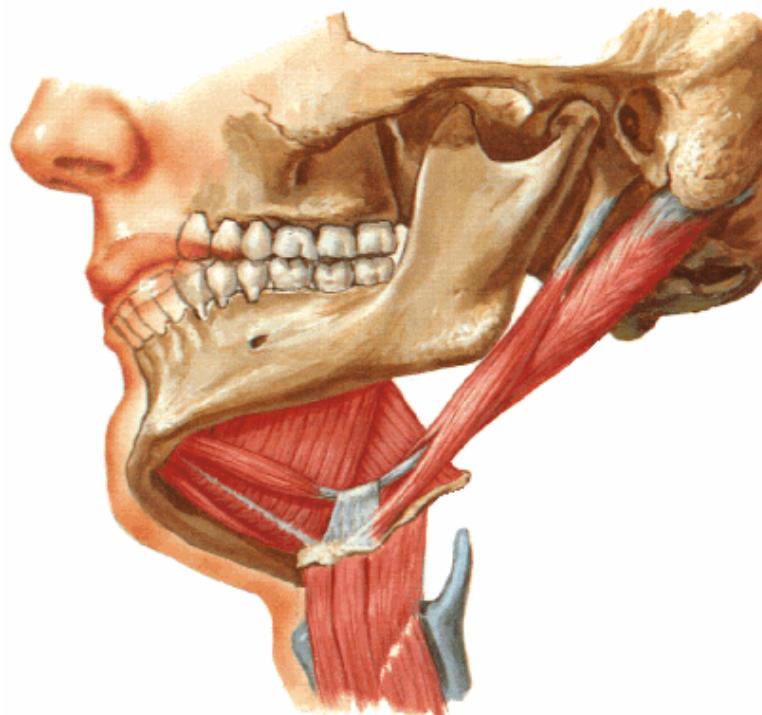
# Mišići vrata – prednja skupina

- ***suprahioidni***
  - oblikuju dno usne šupljine, učvršćuju hioidnu kost (žvakanje, gutanje, govor)
- ***infrahioidni***
  - učvršćuju i spuštaju hioidnu kost i grkljan (gutanje, govor)

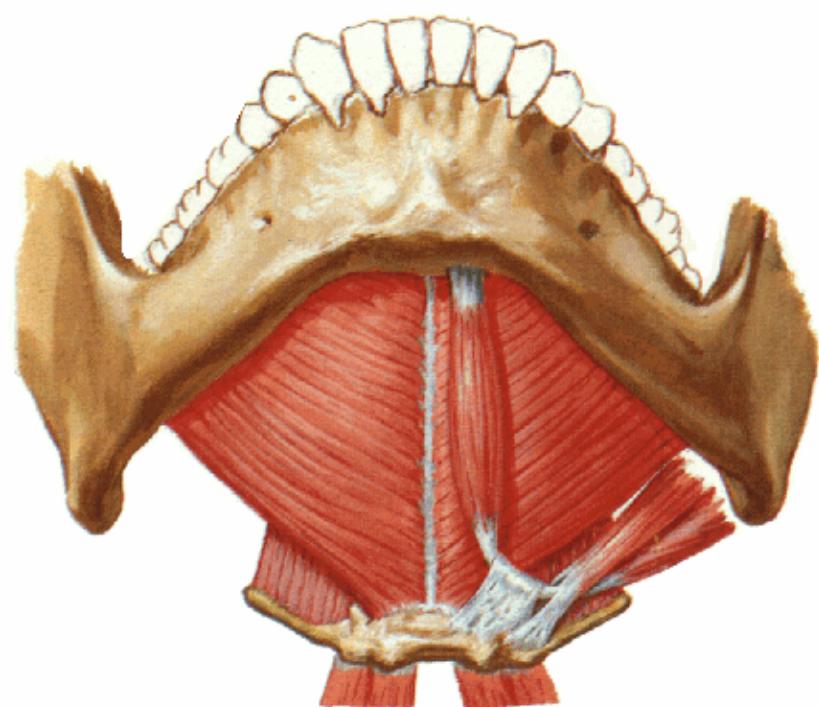


# Mišići dna usne šupljine

*bočno, odozdo*

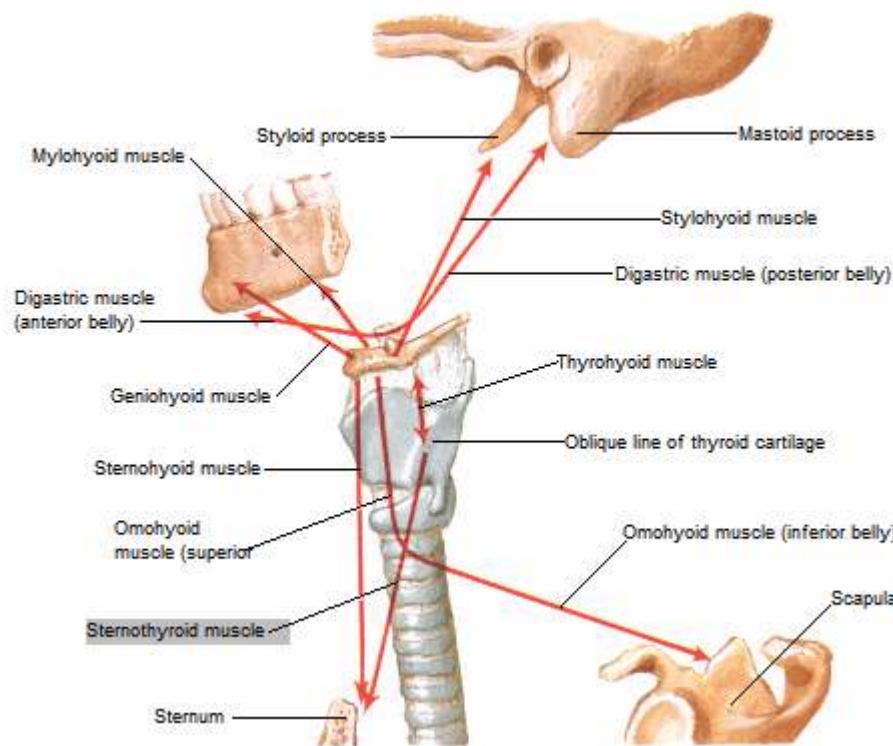


*sprijeda, odozdo*



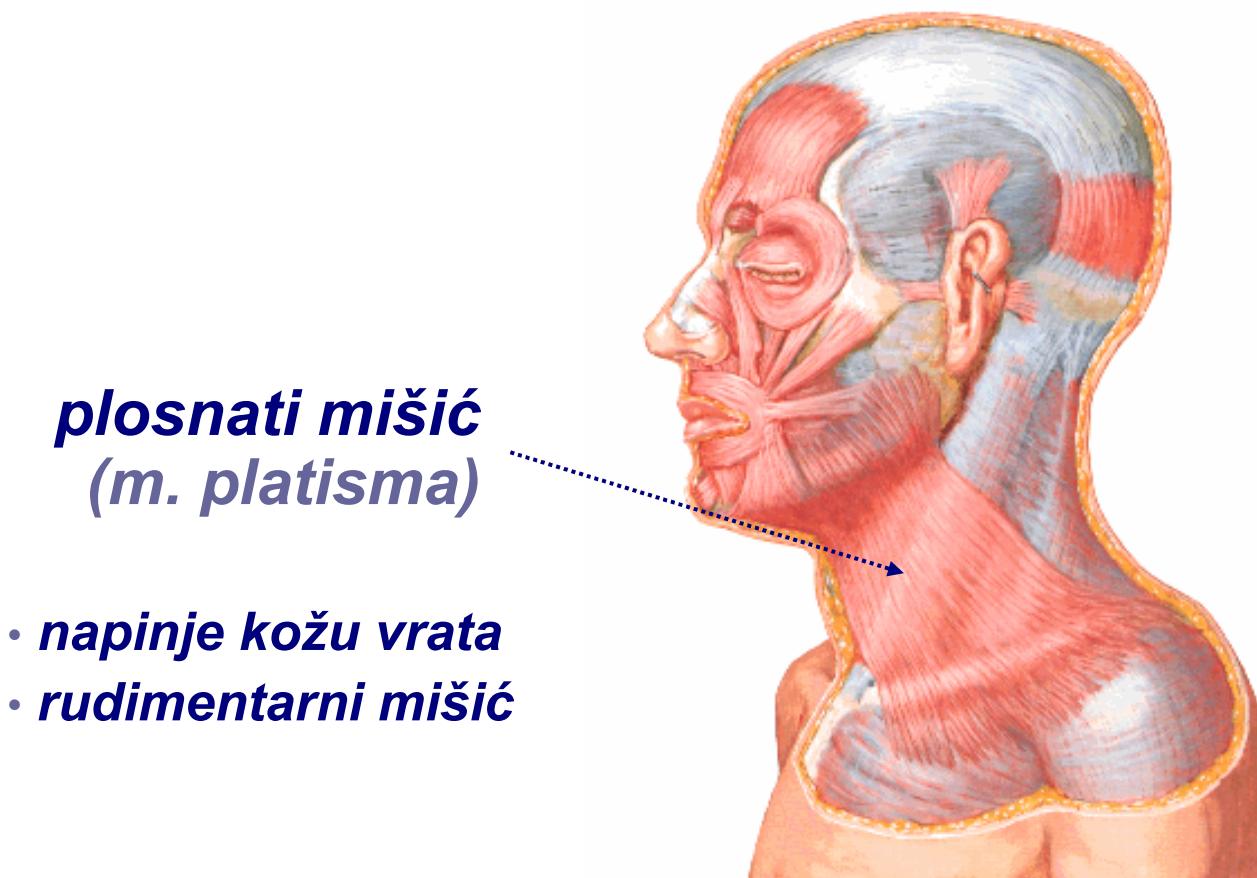
# Mišići vrata – prednja skupina

(suprahioidni i infrahioidni mišići i njihovo djelovanje)



# Mišići vrata – lateralna skupina

(potkožni sloj)

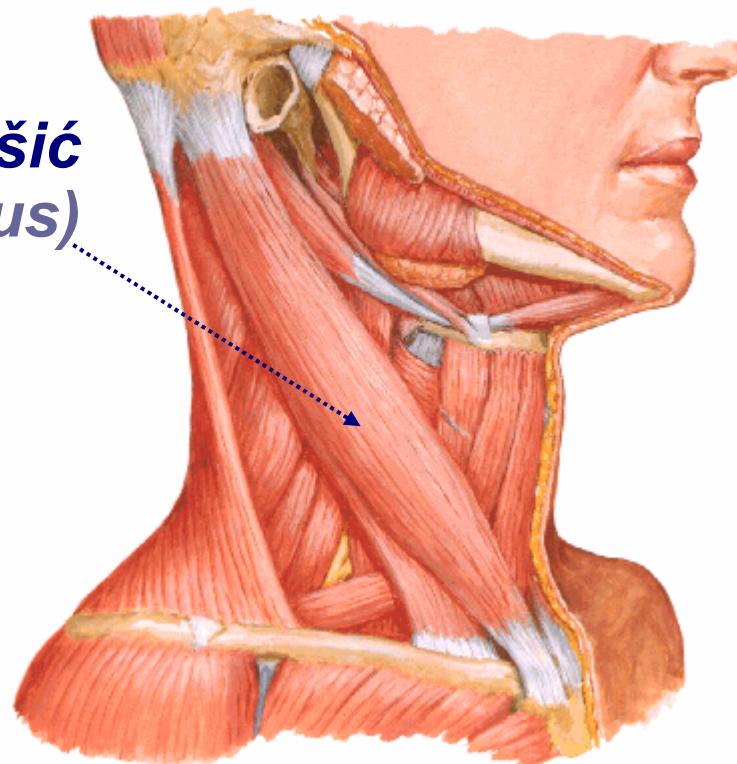


# Mišići vrata – lateralna skupina

(površni sloj)

*prsnoključnosiasti mišić  
(m. sternocleidomastoideus)*

- *glavu nagnje na svoju i rotira na suprotnu stranu*
- *obostrana kontrakcija pregiba glavu*
- *podije prsnu kost (snažno disanje)*



# Mišići vrata

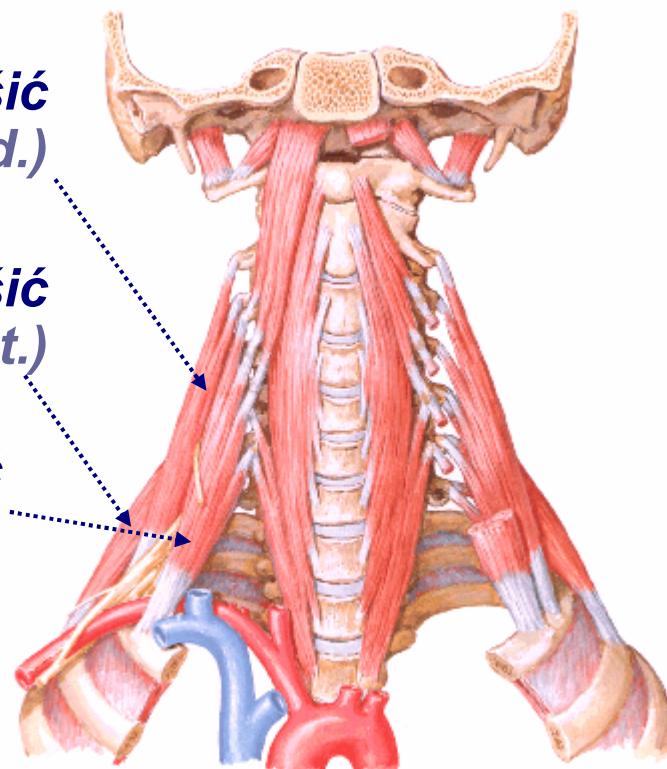
(skalenski i prevertebralni)

**srednji stepeničasti mišić**  
(*m. scalenus med.*)

**stražnji stepeničasti mišić**  
(*m. scalenus post.*)

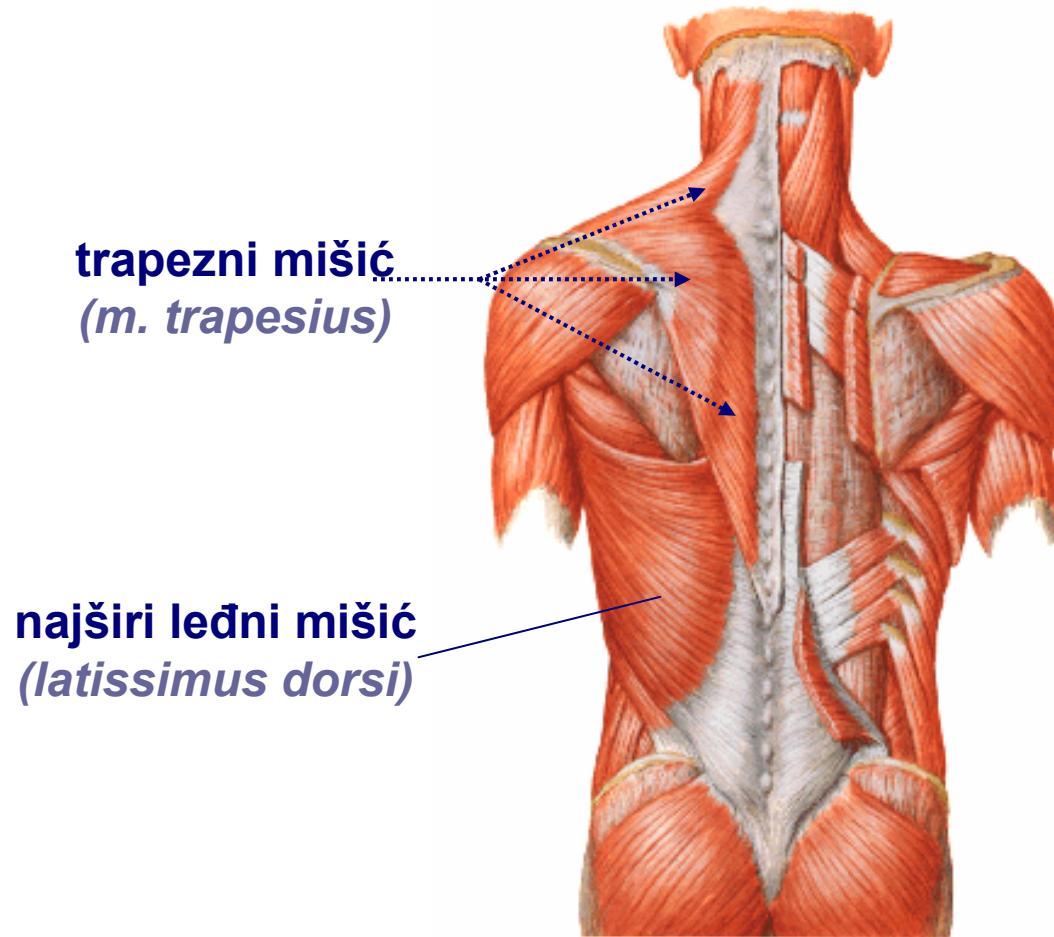
**prednji stepeničasti mišić**  
(*m. scalenus ant.*)

- *glavu naginju na svoju stranu*
- *podizu rebra (pomoćni udisači)*

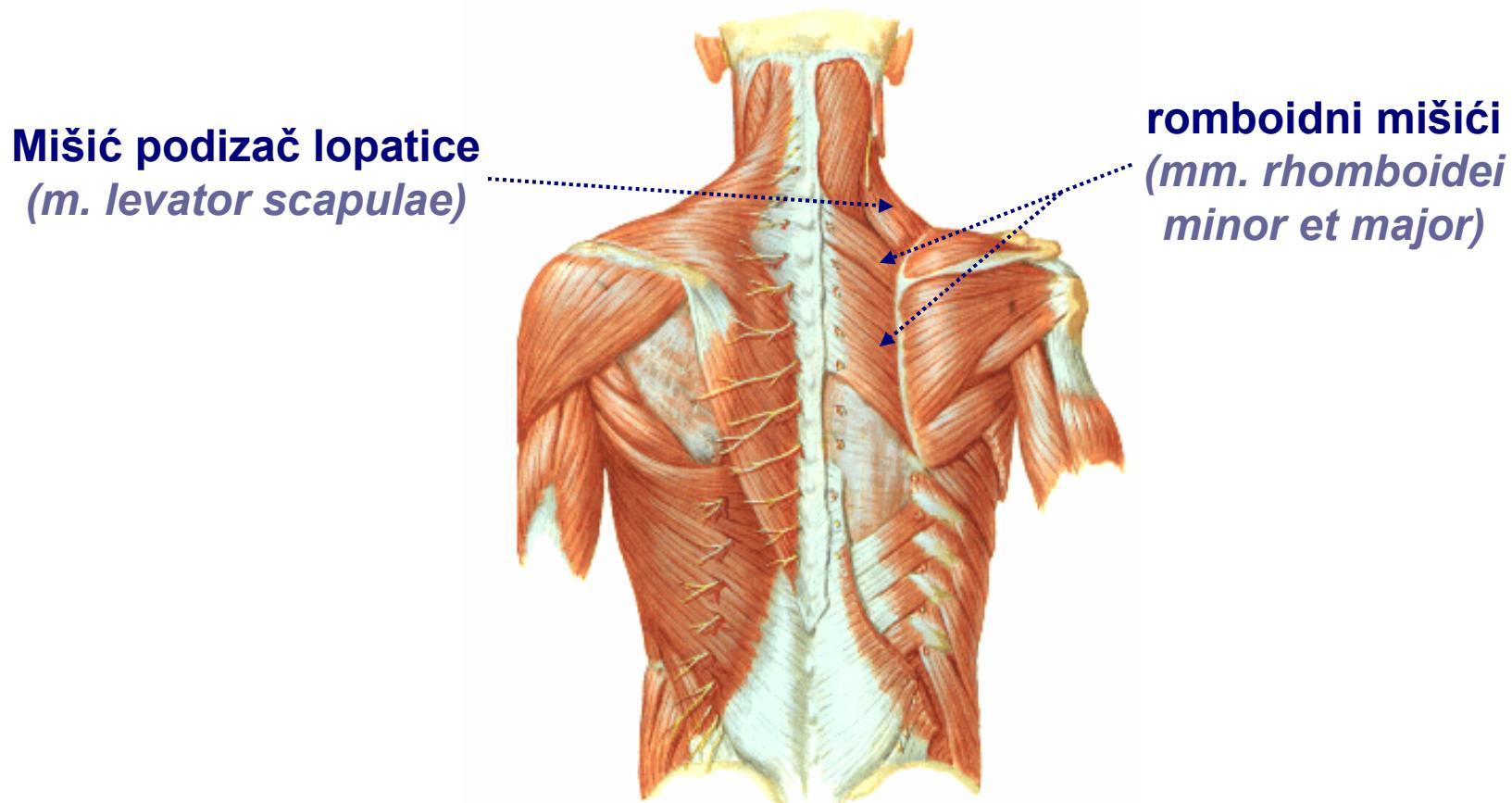


# Mišići leđa

(površni sloj)



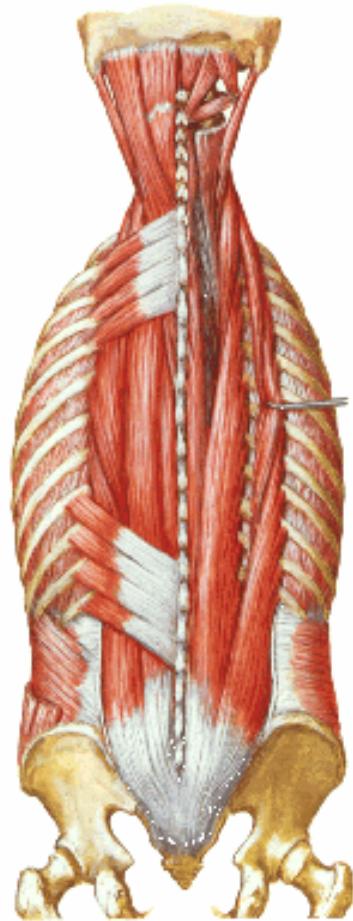
# Mišići leđa i stražnjeg zida grudnog koša



# Mišići leđa

(srednji sloj)

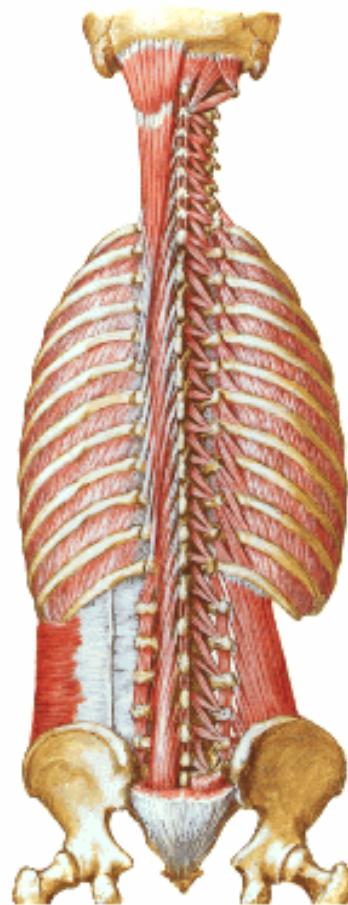
Mišić uspravljač kralježnice  
(*m. erector spinae*)



# Mišići leđa

(*duboki sloj*)

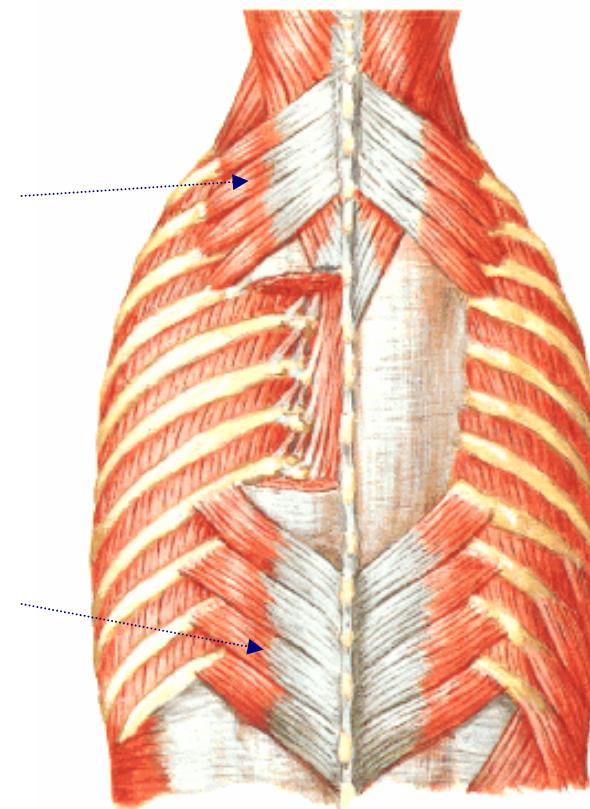
Mišić uspravljač kralježnice  
(*m. erector spinae*)



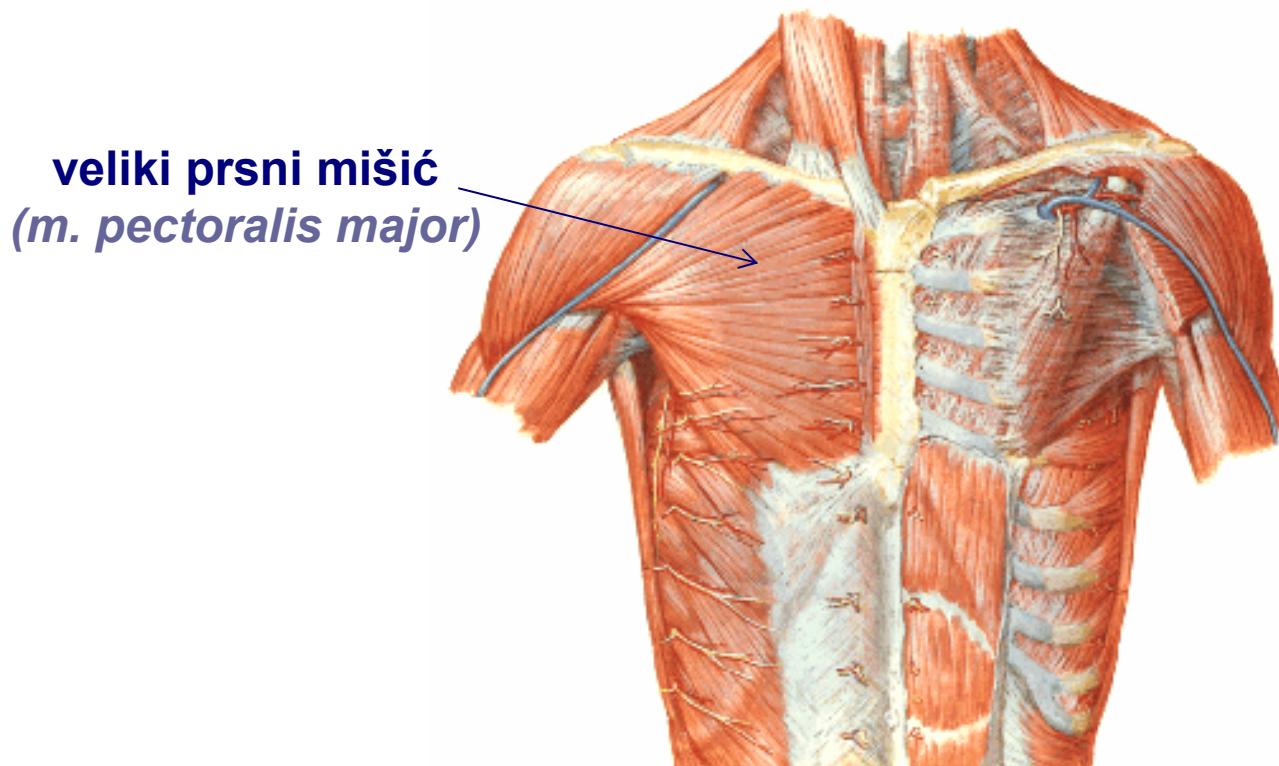
# Mišići stražnjeg zida grudnog koša

Stražnji gornji nazubljeni mišić  
(*m. serratus posterior superior*)

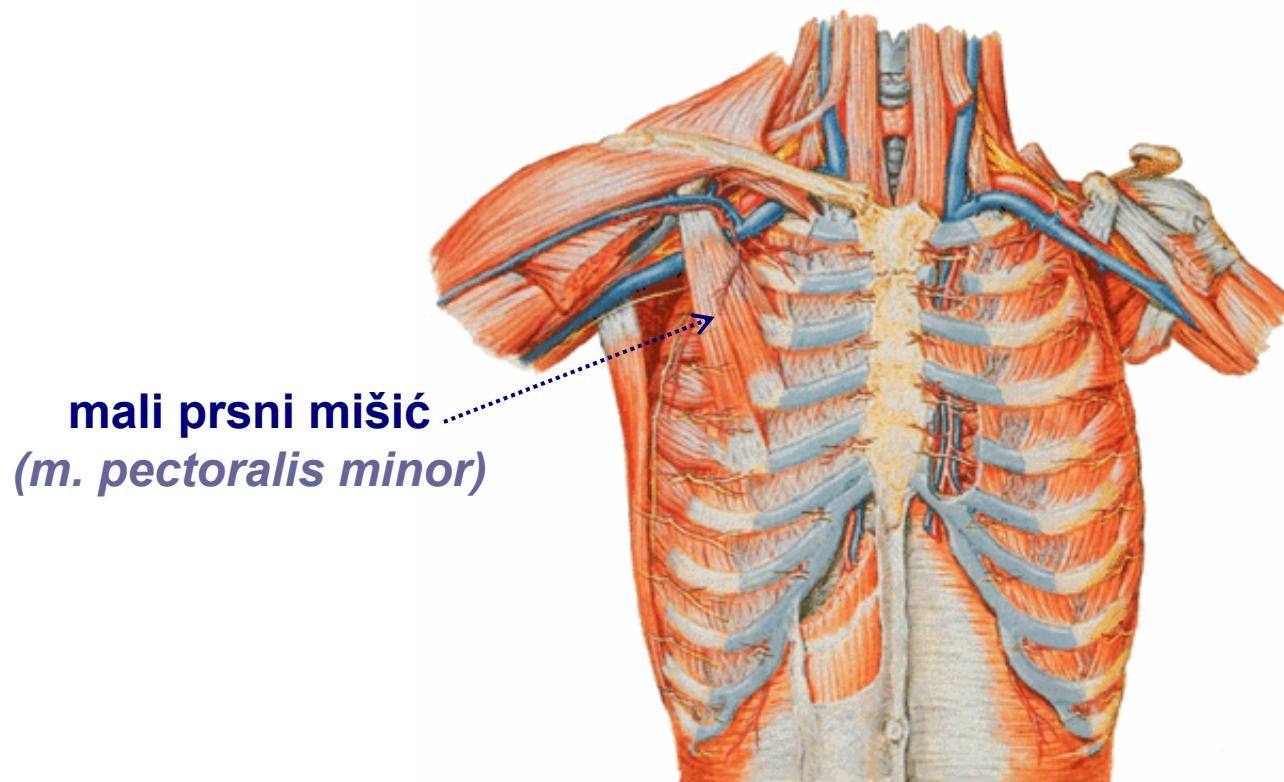
Stražnji donji nazubljeni mišić  
(*m. serratus posterior inferior*)



# Mišići grudnog koša

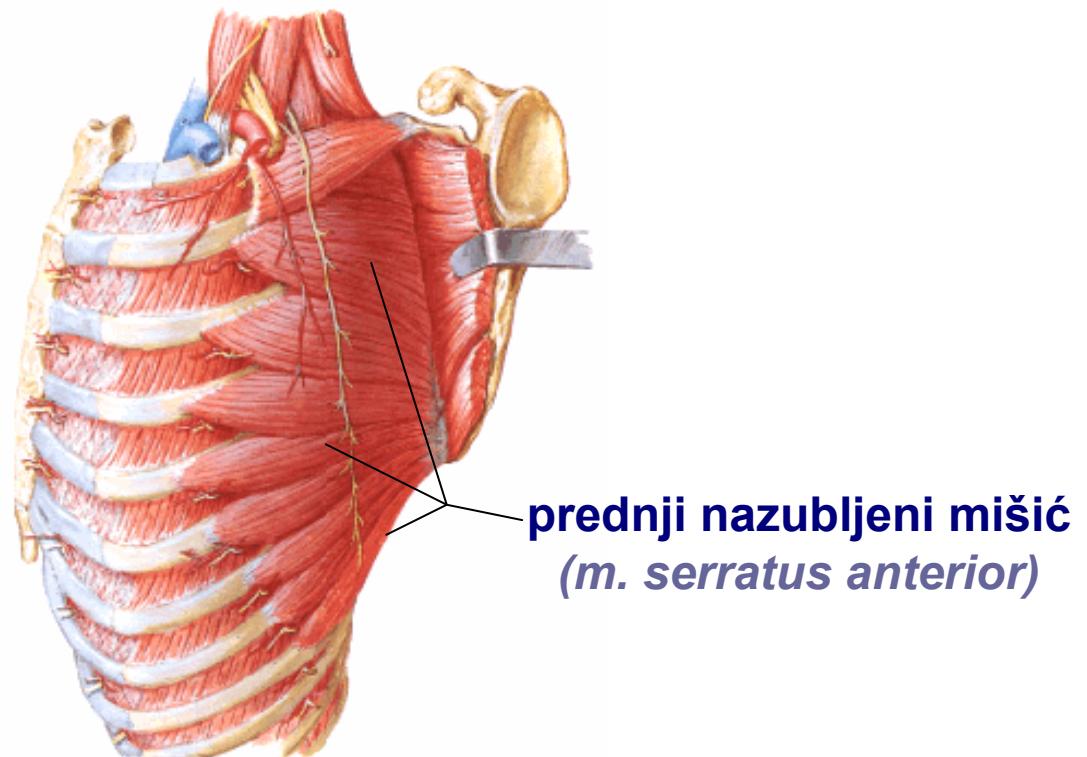


# Mišići grudnog koša



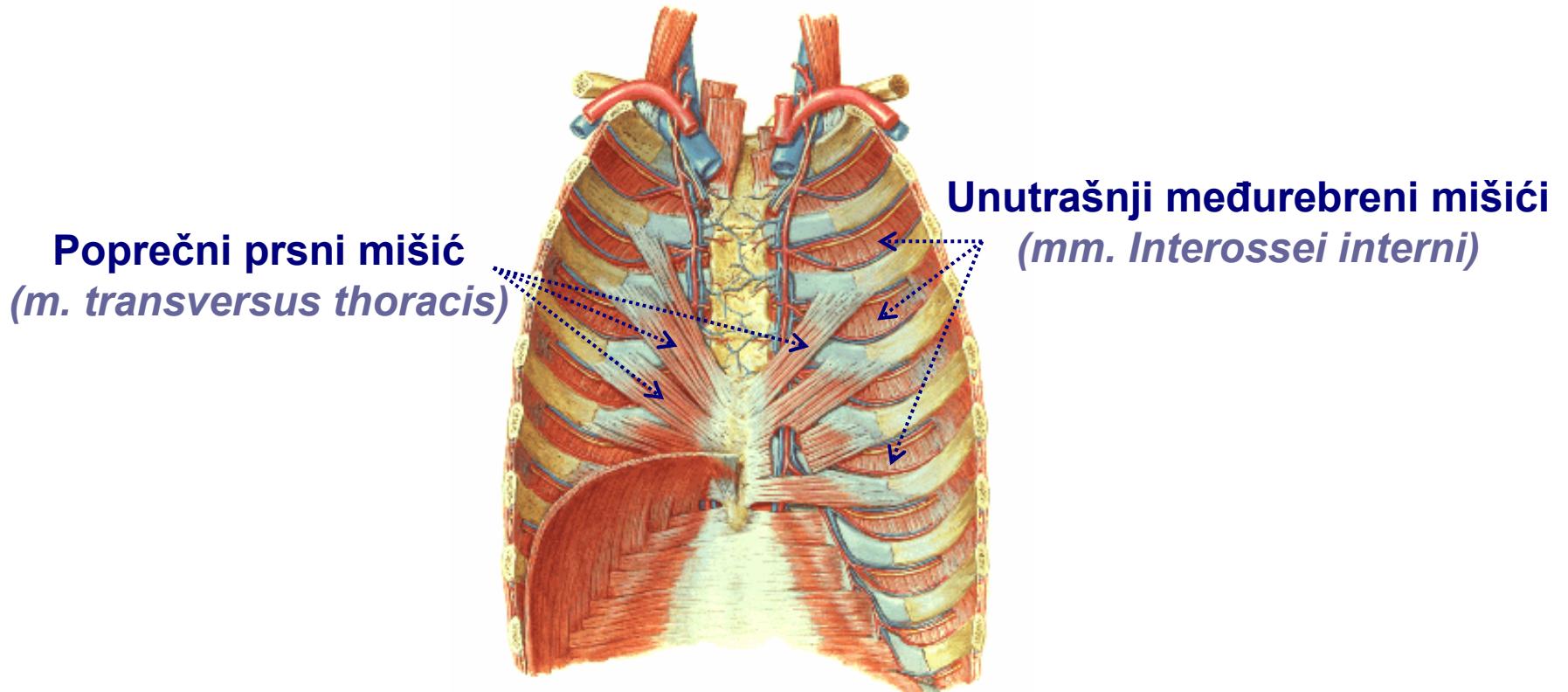
# Mišići grudnog koša

(lateralno)



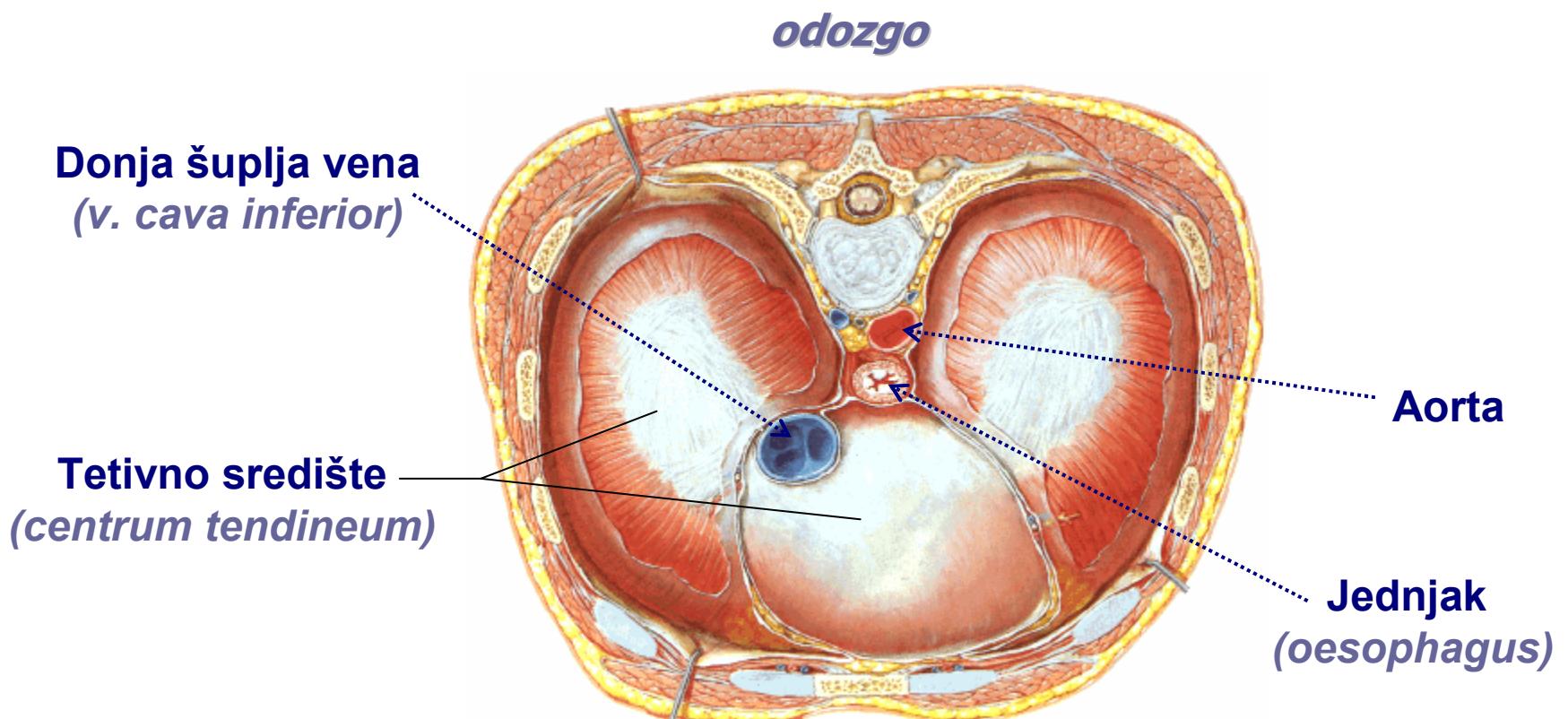
# Mišići grudnog koša

(iznutra)



# Ošit

(*diaphragma*)

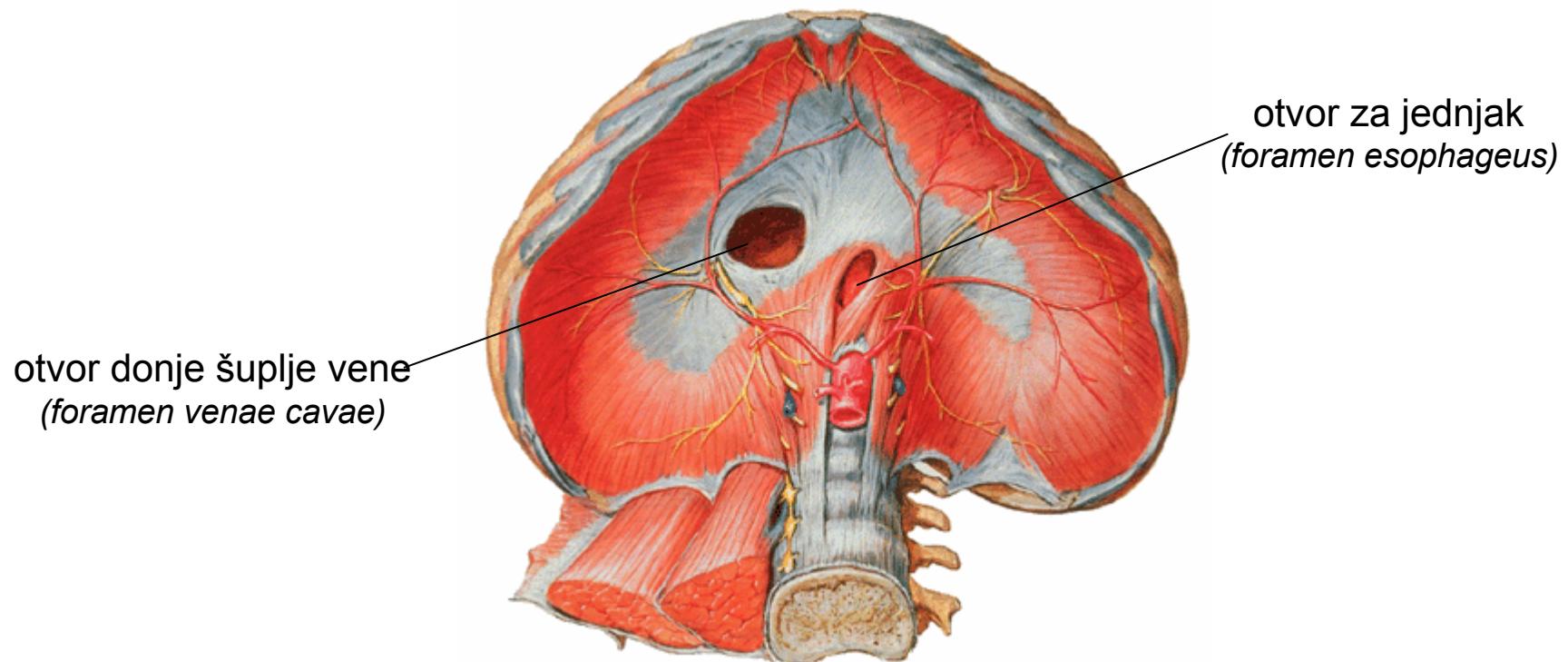


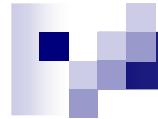


# Ošit

*(diaphragma)*

*trbušna strana*

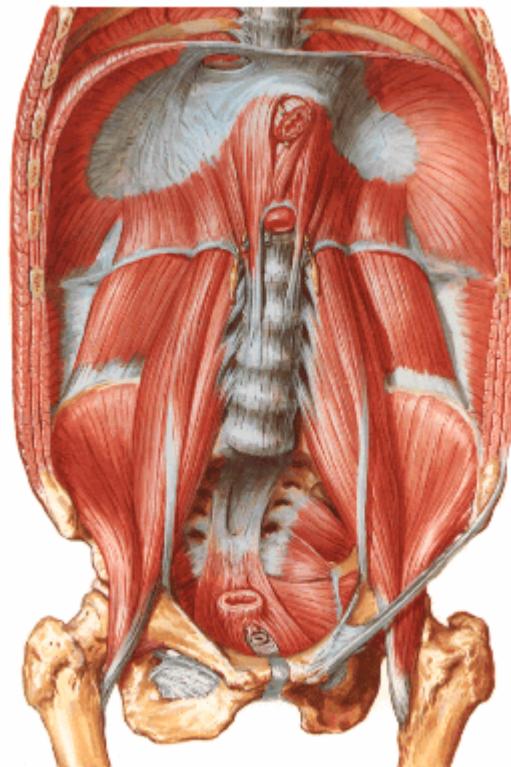




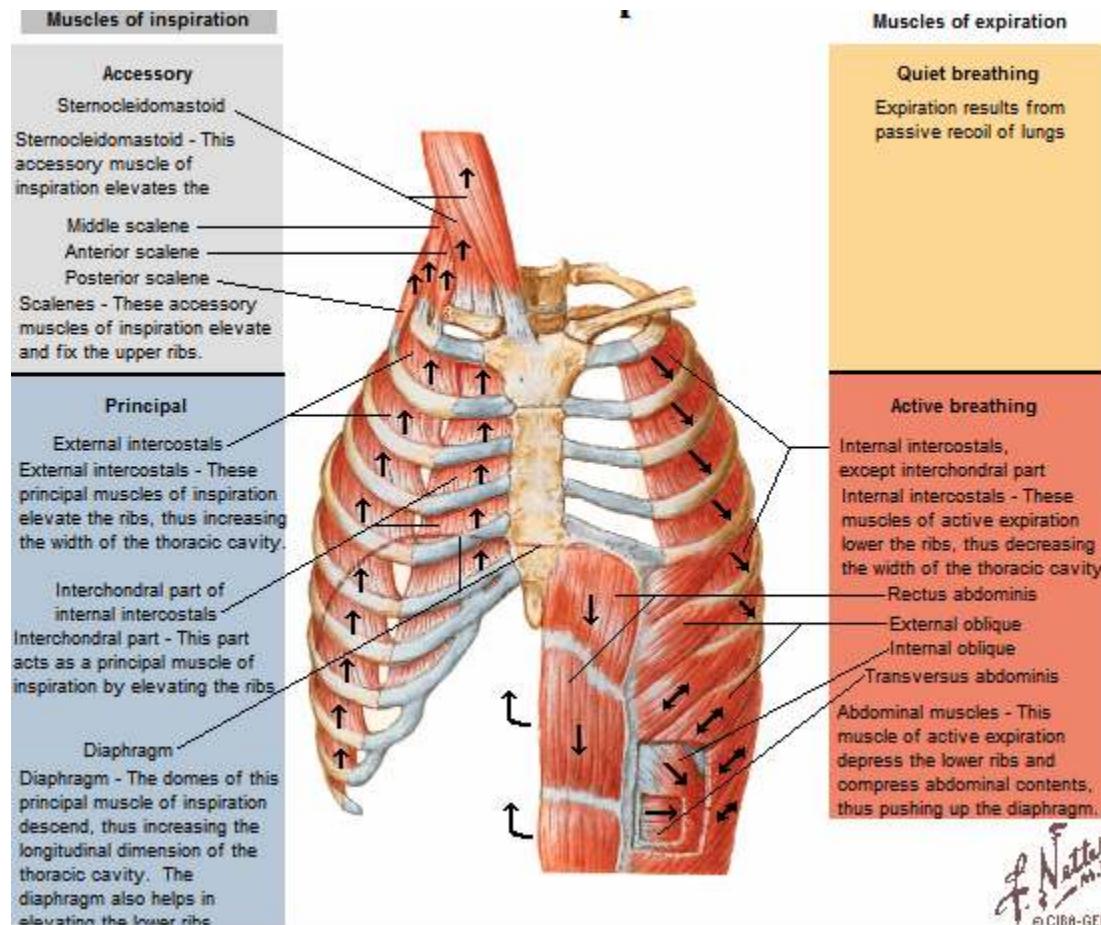
# Ošit

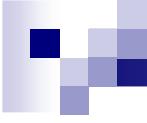
*(diaphragma)*

*ošit i stražnji trbušni zid*

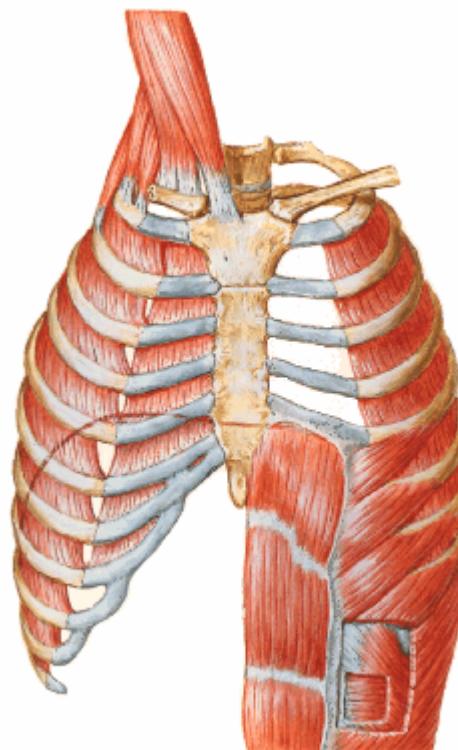


# Dišni mišići

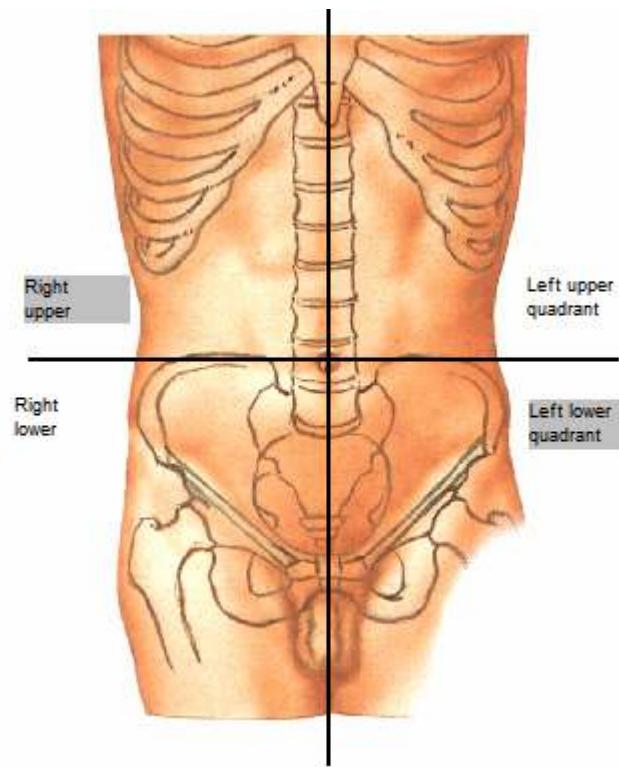




# Dišni mišići

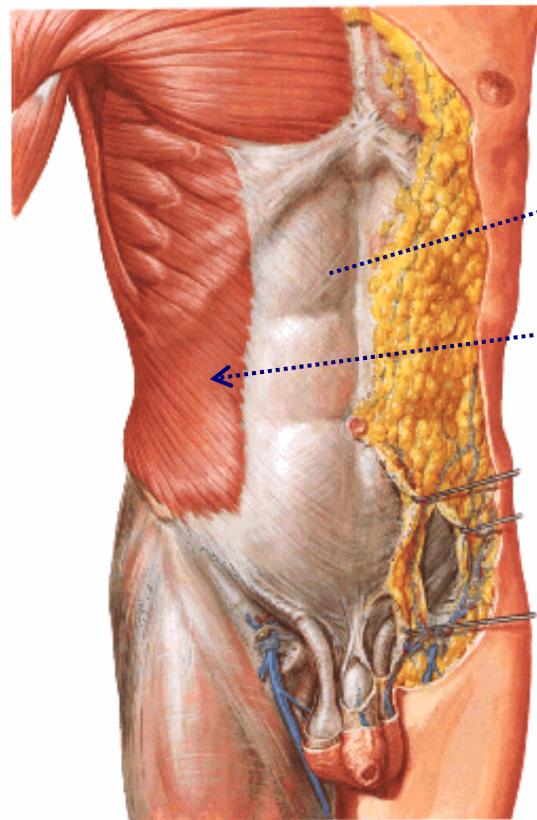


# Kvadranti abdомена



# Prednji trbušni zid

(površna sekcija)

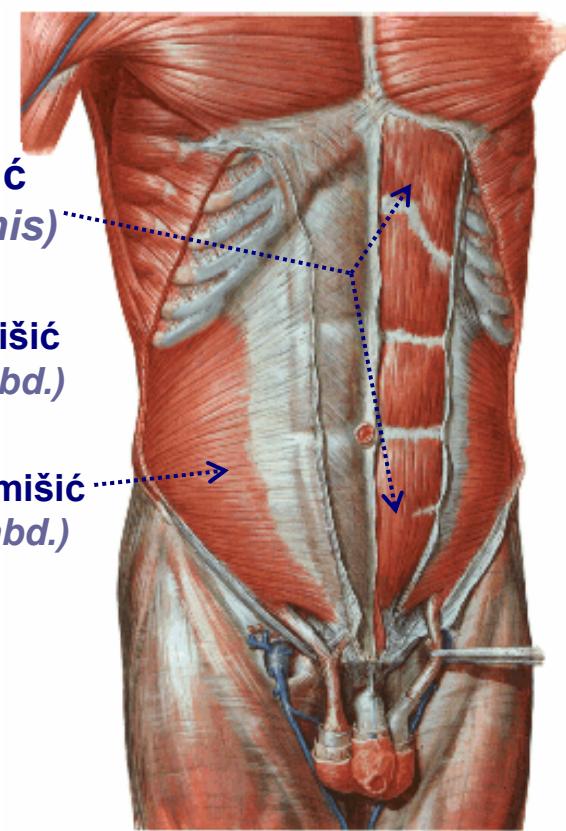


ravni trbušni mišić  
(*m. rectus abdominis*)

vanjski kosi trbušni mišić  
(*m. obliquus externus abd.*)

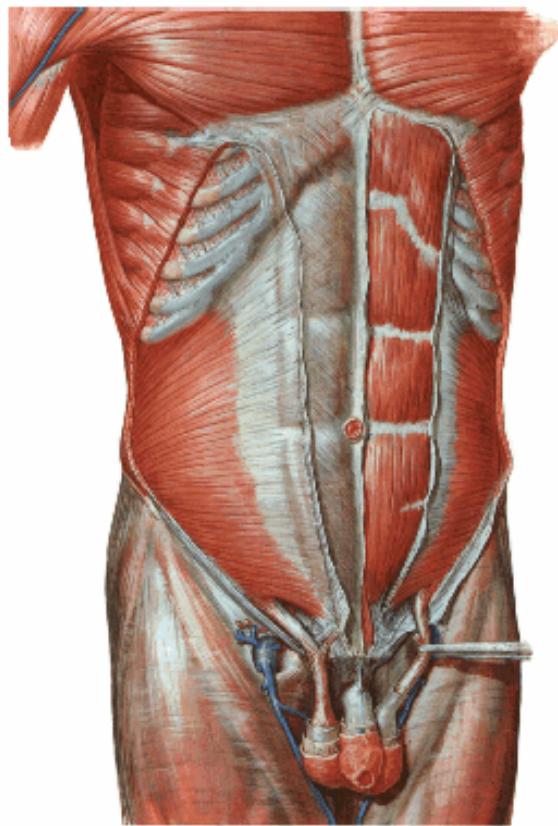
unutarnji kosi trbušni mišić  
(*m. obliquus internus abd.*)

(srednja sekcija)

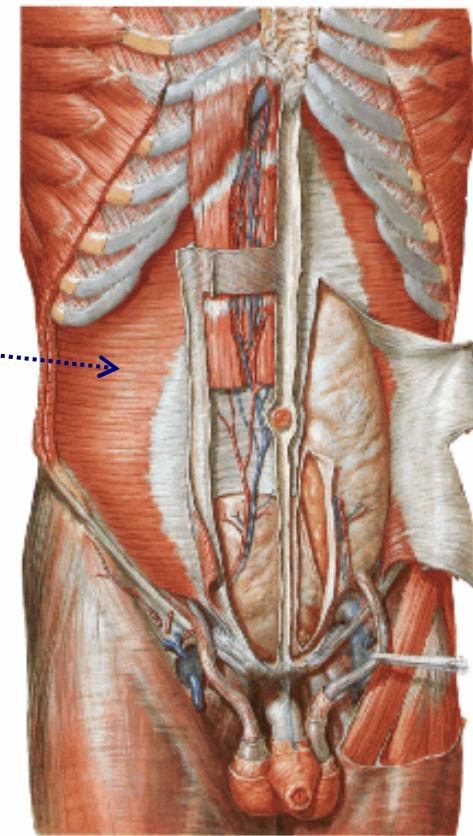


# Prednji trbušni zid

(srednja sekcija)

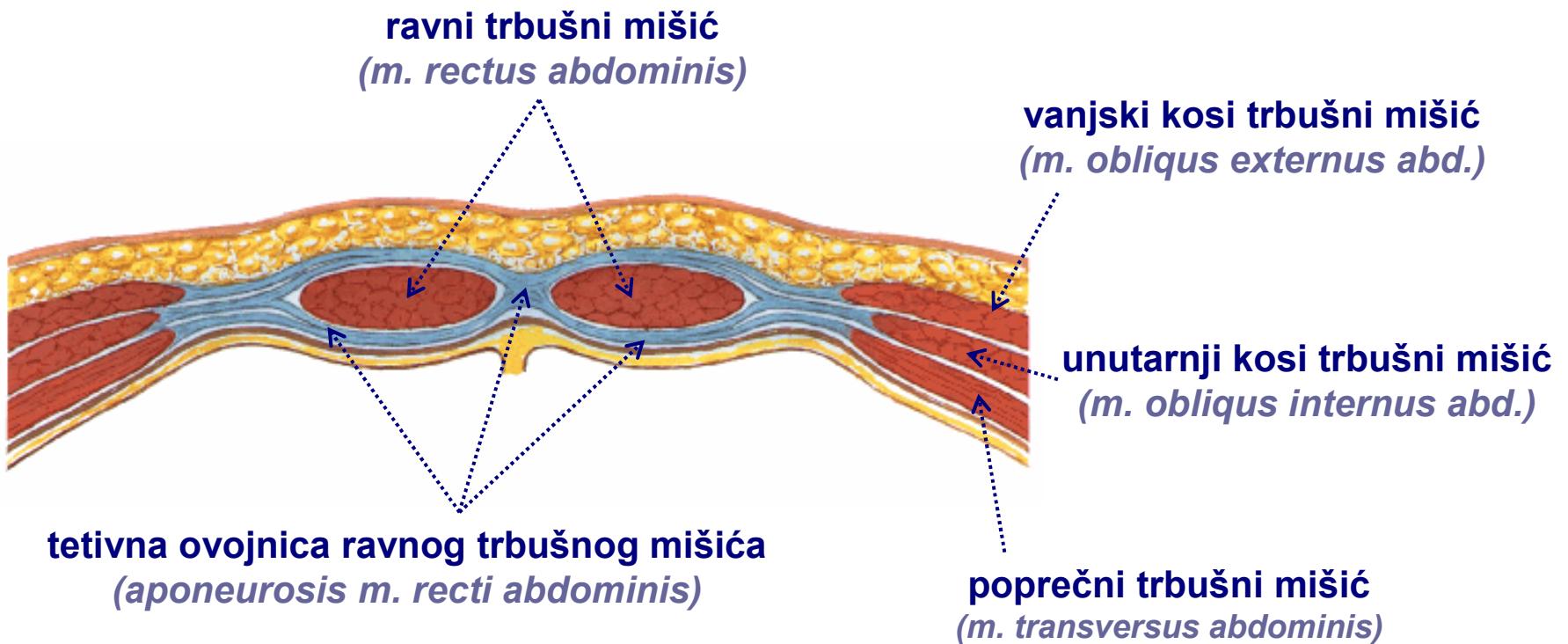


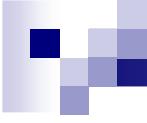
(duboka sekcija)



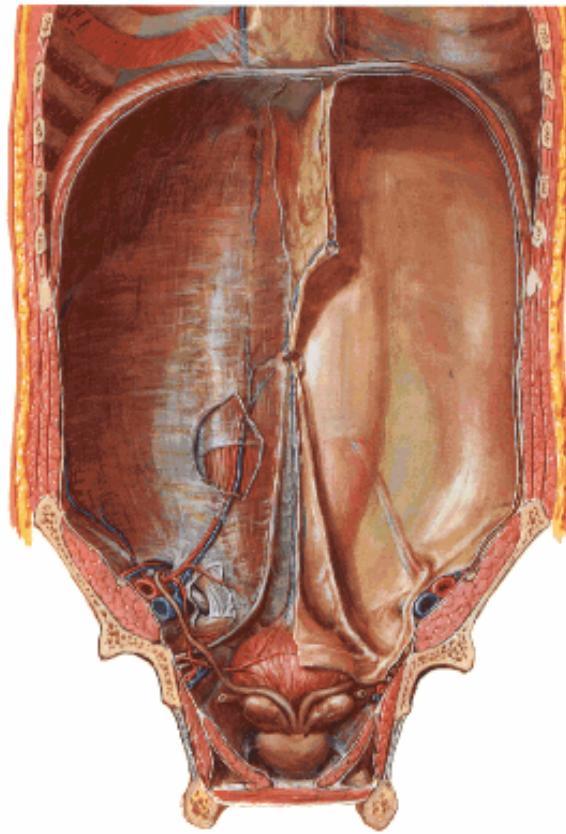
poprečni trbušni mišić .....  
*(m. transversus abdominis)*

# Ovojnica ravnog trbušnog mišića (poprečni presjek)

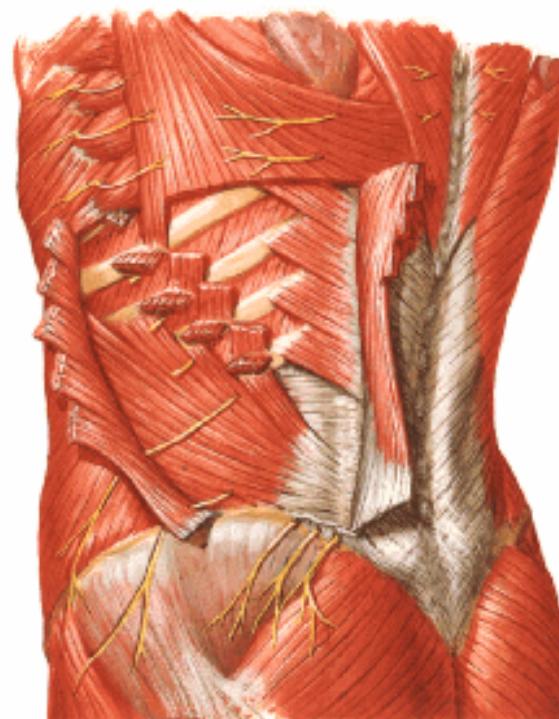
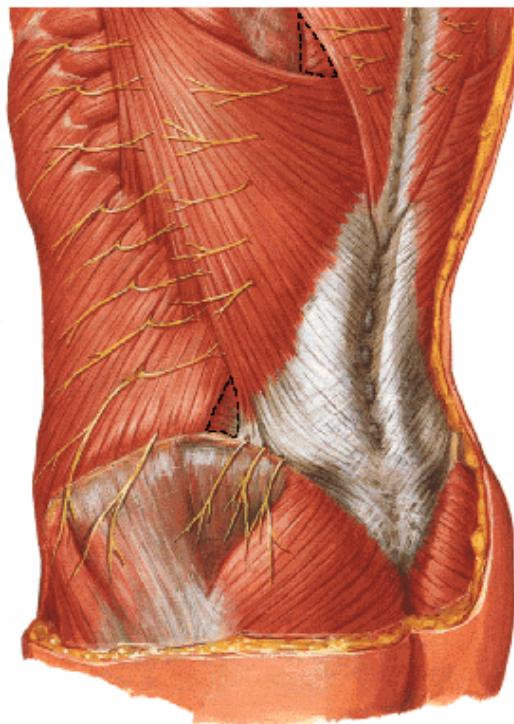




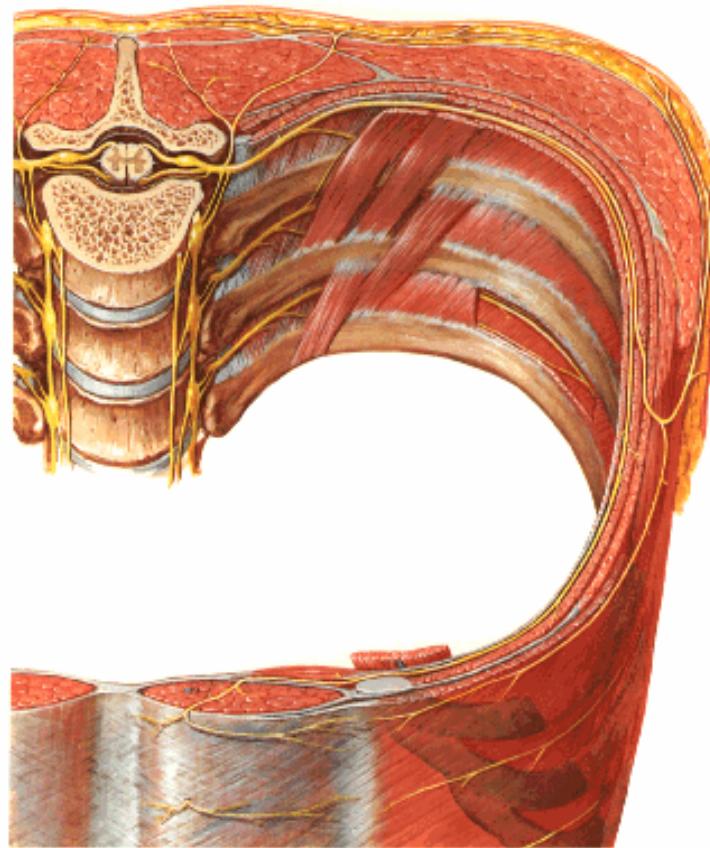
# Prednji trbušni zid (iznutra)

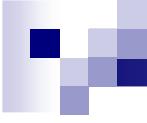


# Posterolateralni trbušni zid

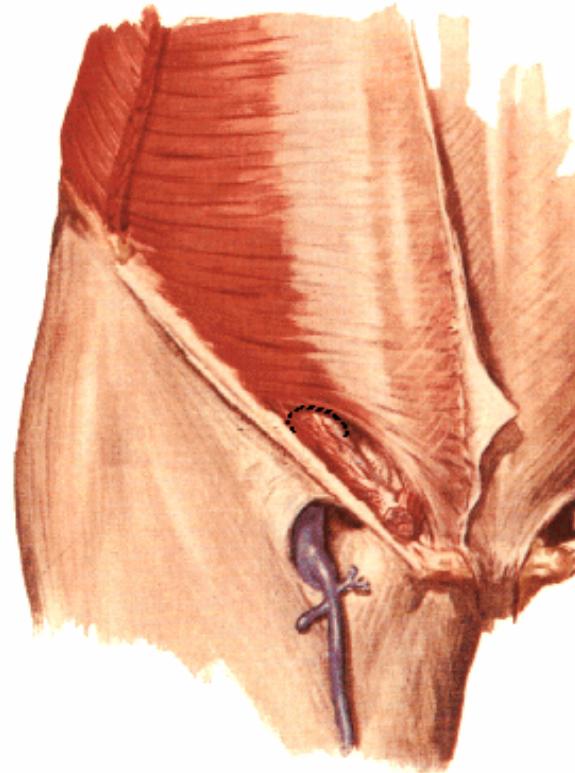
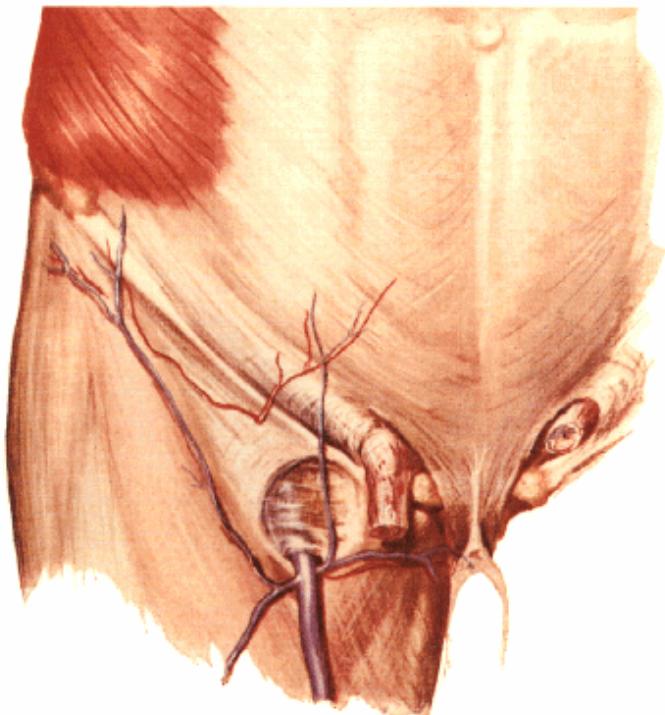


# Prsni i trbušni živci

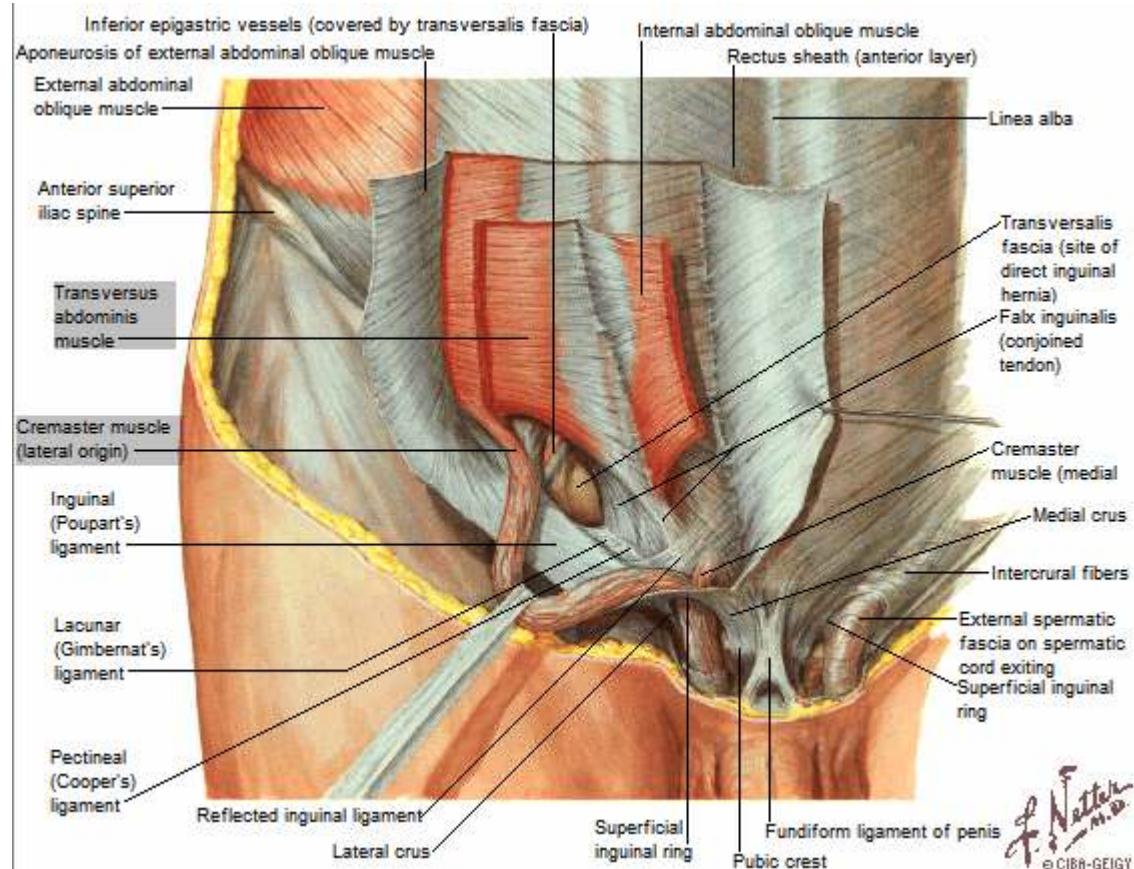


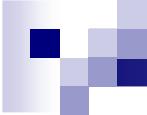


# **Ingvinalna i femoralna regija**

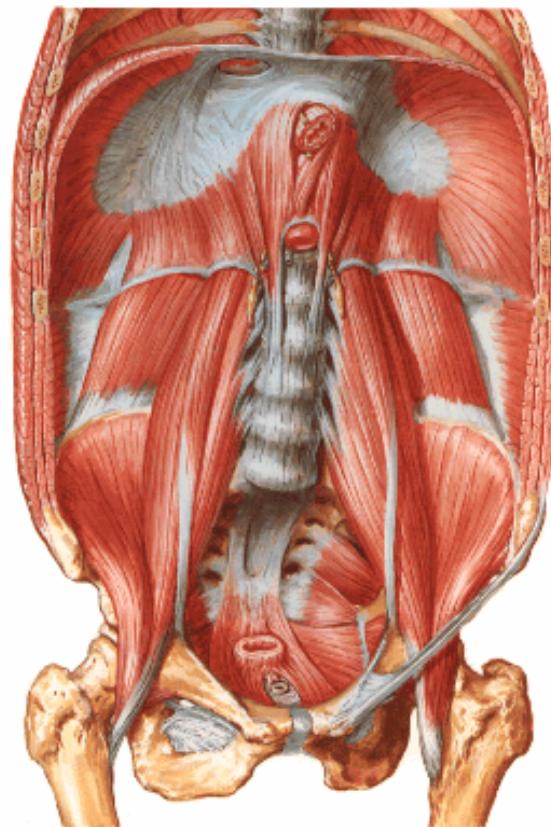


# Ingvinalna regija (sprijeda)



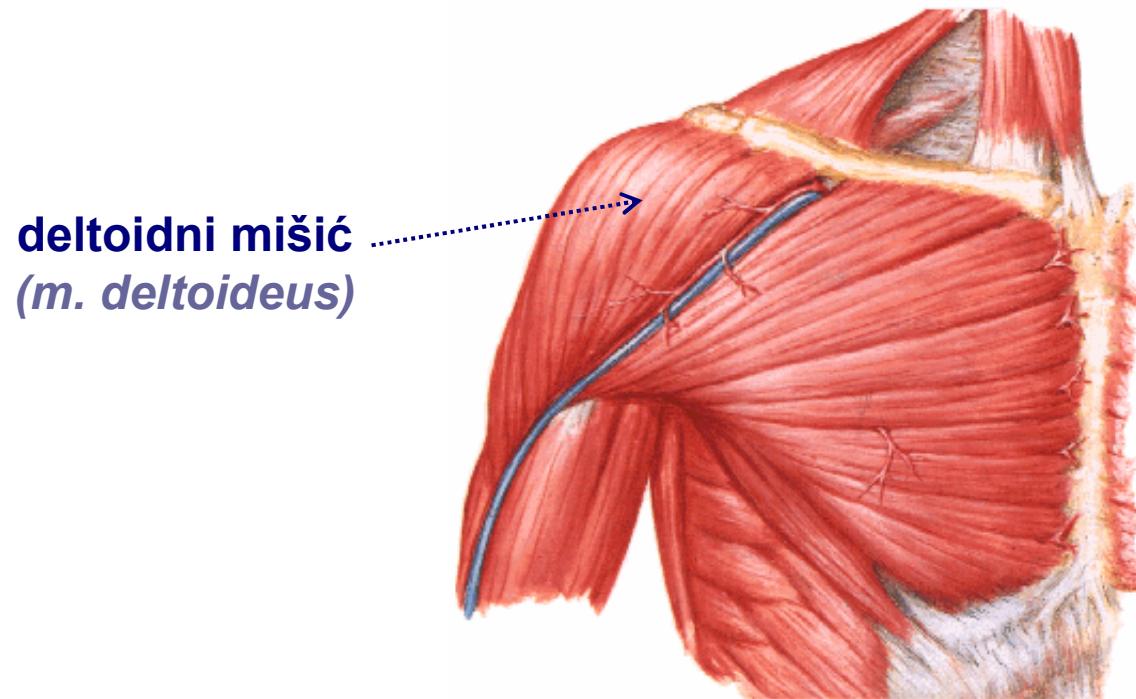


# Stražnji trbušni zid (iznutra)



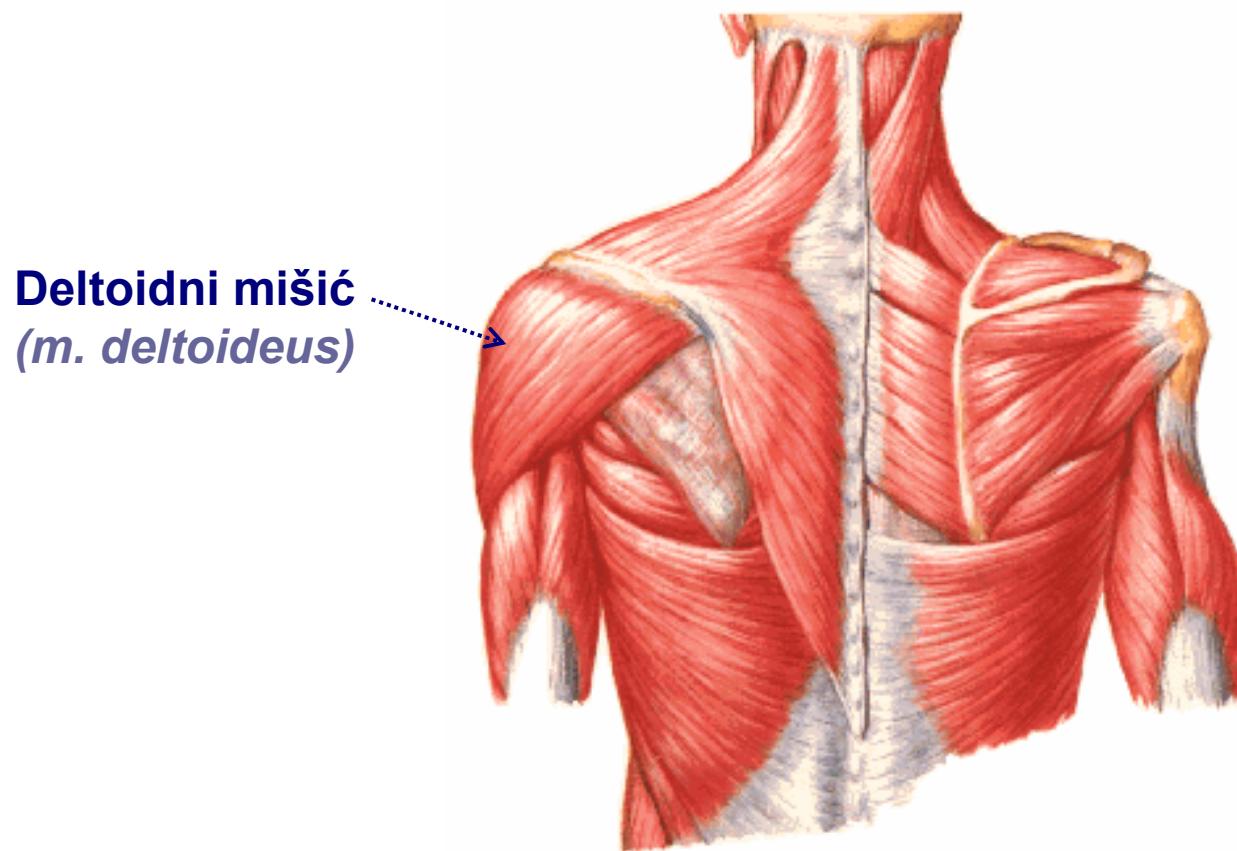
# Mišići ramena

(sprijeda)



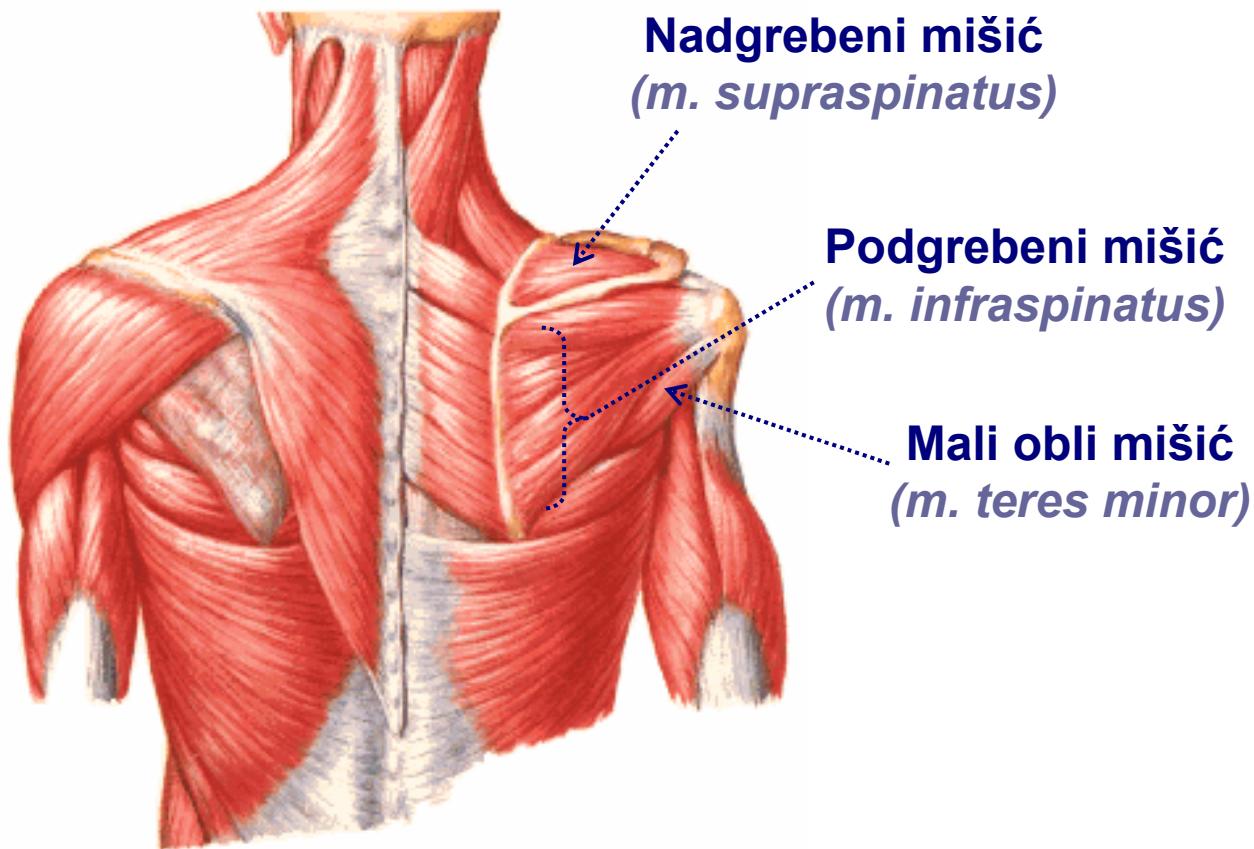
# Mišići ramena

(straga)

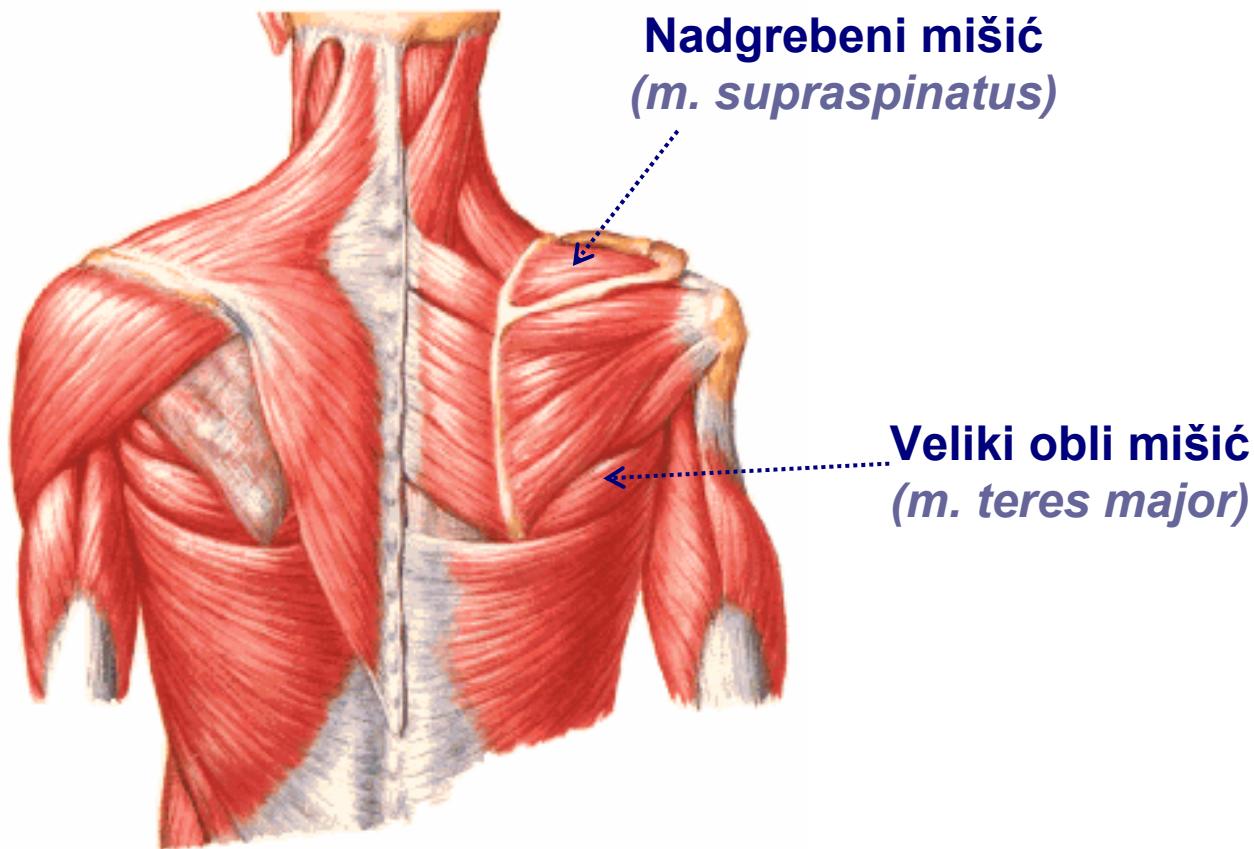


# Mišići ramena

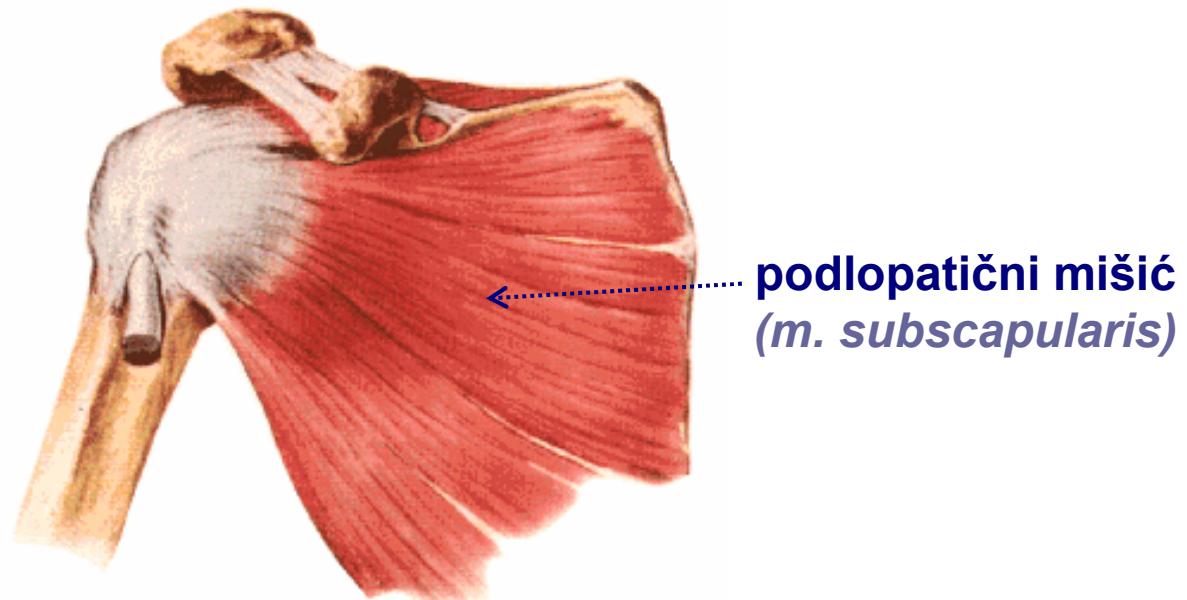
(straga)



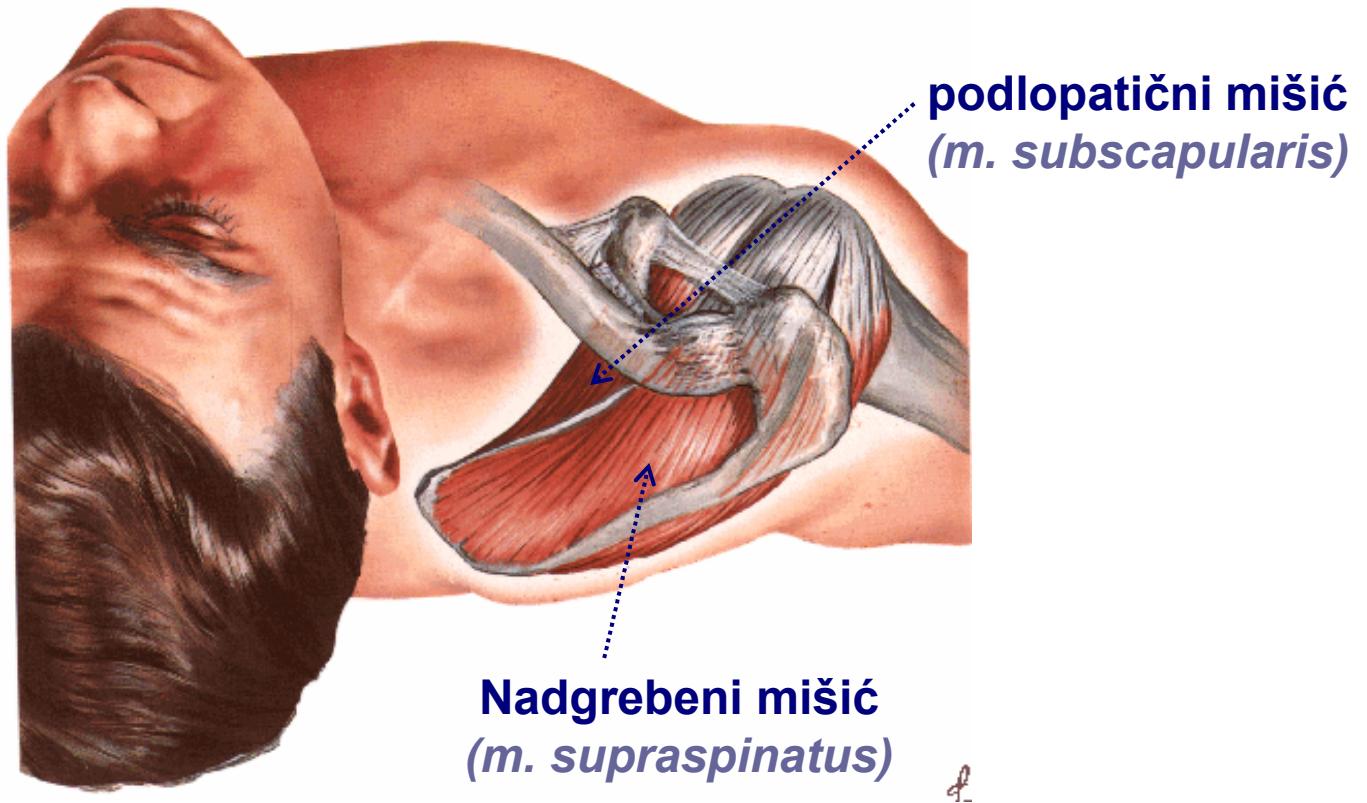
# Mišići ramena (straga)



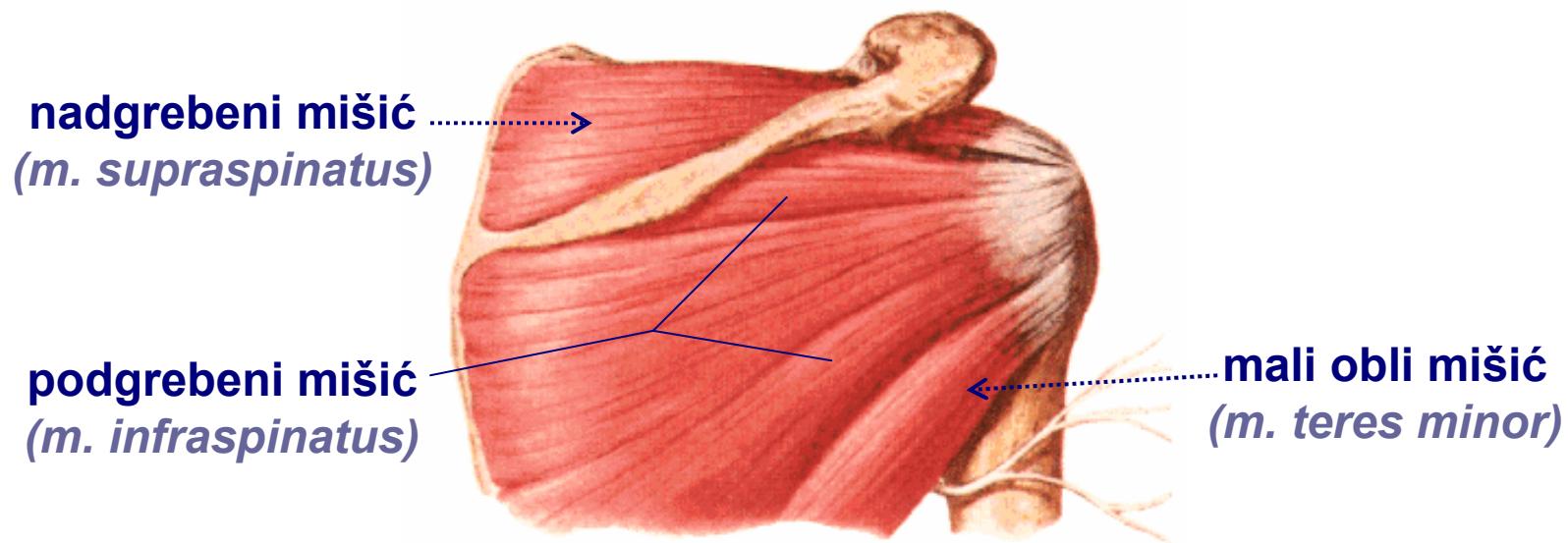
# Mišići rotatorne manšete (sprijeda)



# Mišići rotatorne manšete (odozgo)

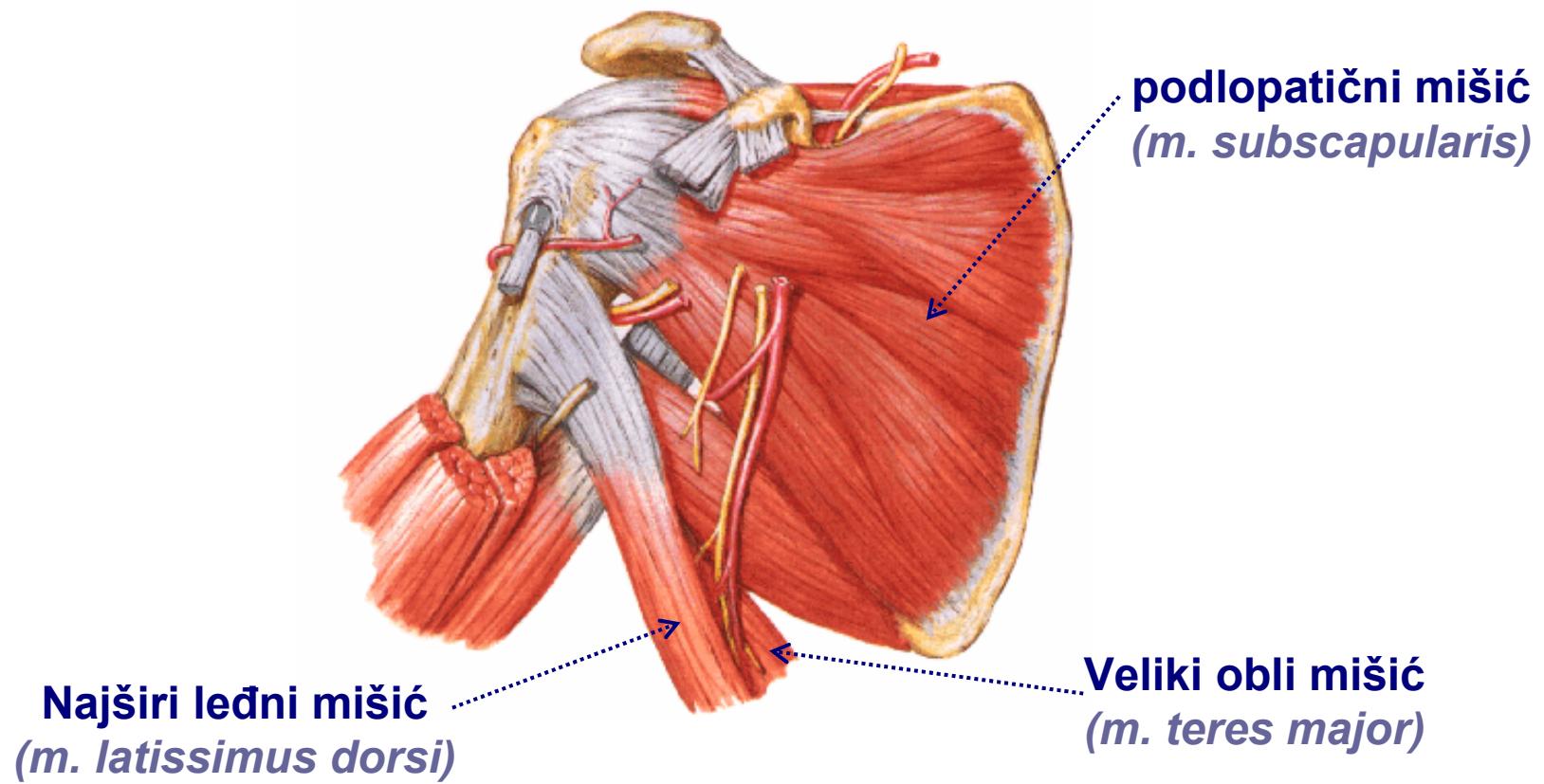


# Mišići rotatorne manšete (straga)

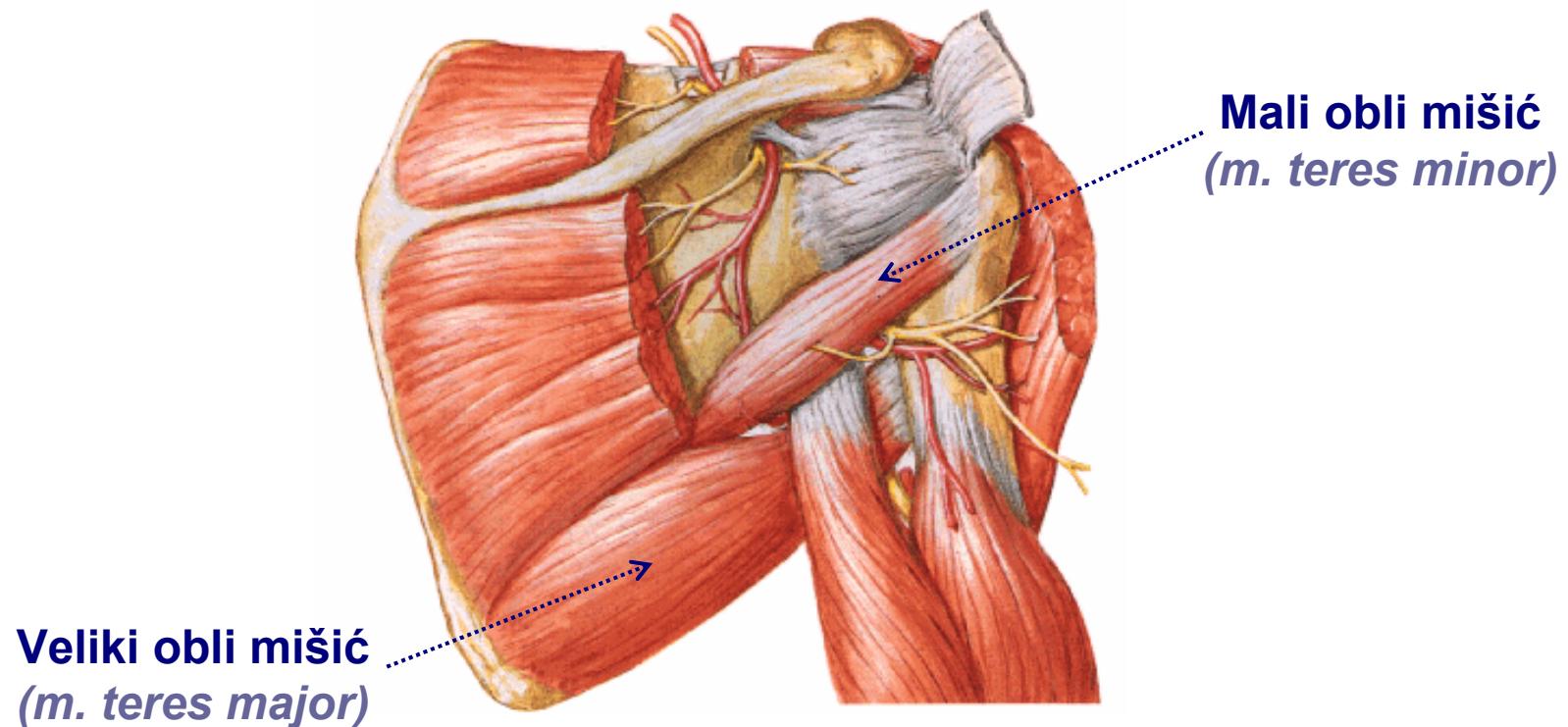


# Skapulohumeralna disekcija

(sprijeda)



# Skapulohumeralna disekcija (straga)

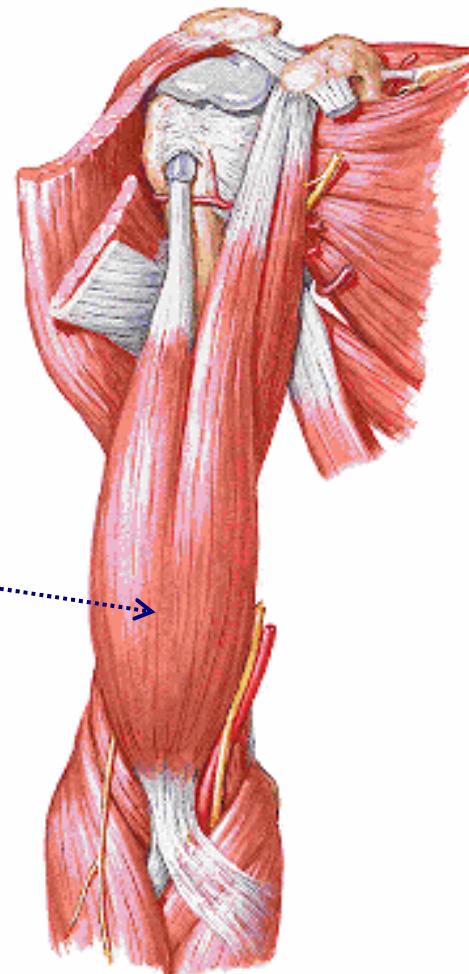


# Mišići nadlaktice

(prednja skupina)

površni sloj

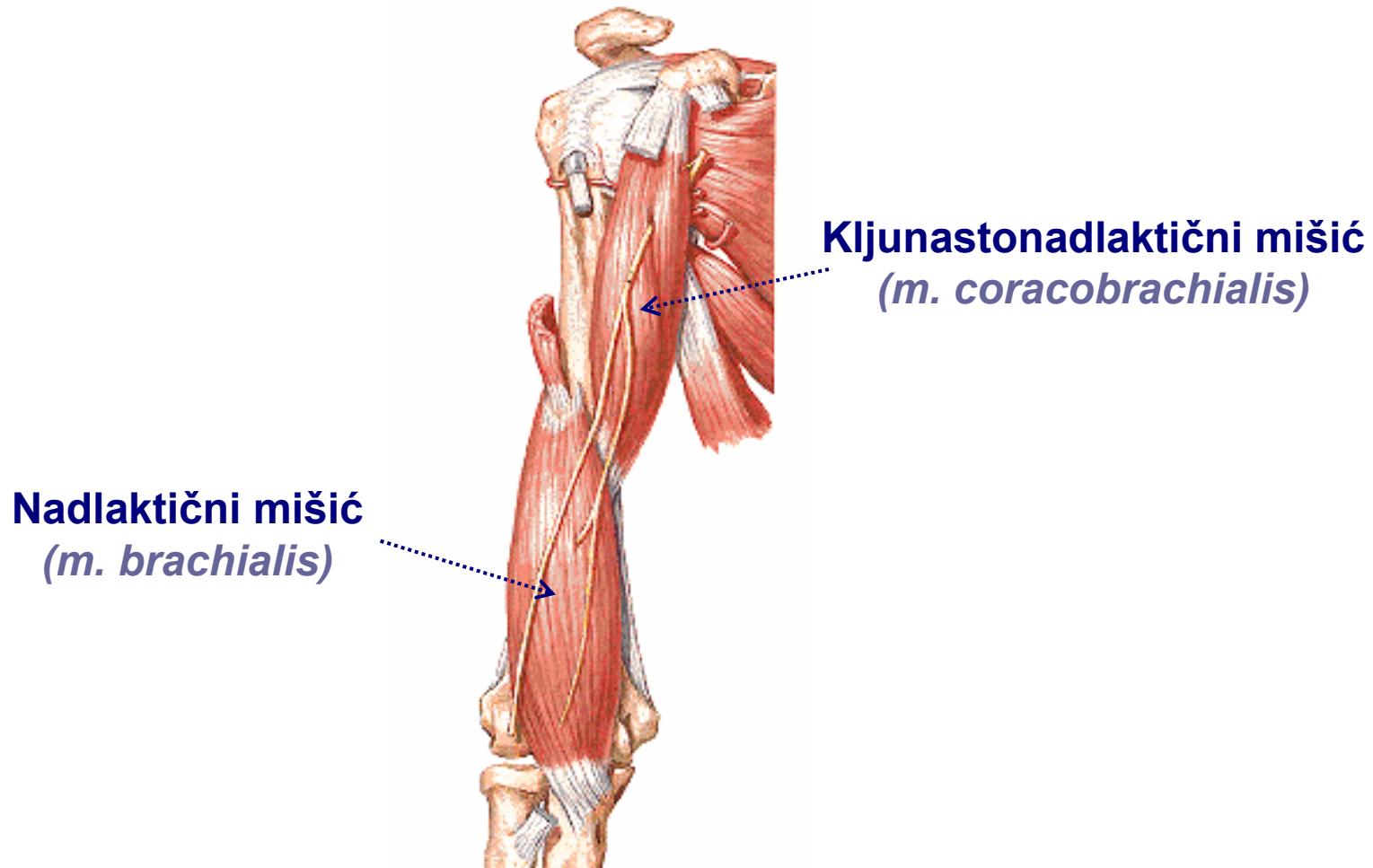
Dvoglavi mišić nadlaktice  
(*m. biceps brachii*)



# Mišići nadlaktice

(prednja skupina)

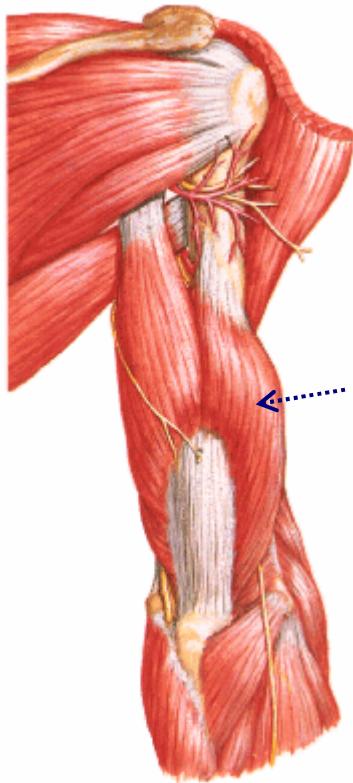
*duboki sloj*



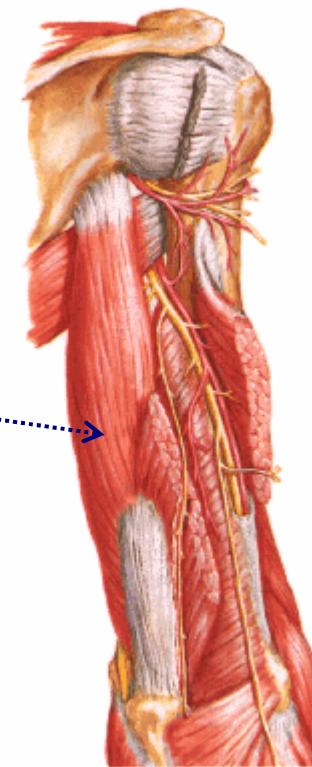
# Mišići nadlaktice

(stražnja skupina)

površni sloj



duboki sloj



Troglavi mišić nadlaktice  
(*m. triceps brachii*)

# Mišići podlaktice

(prednja skupina)

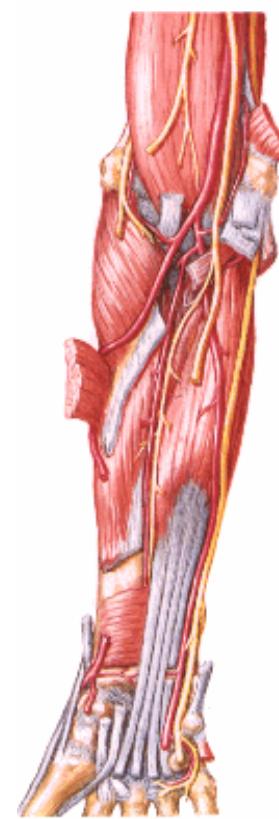
*površni sloj*



*srednji sloj*



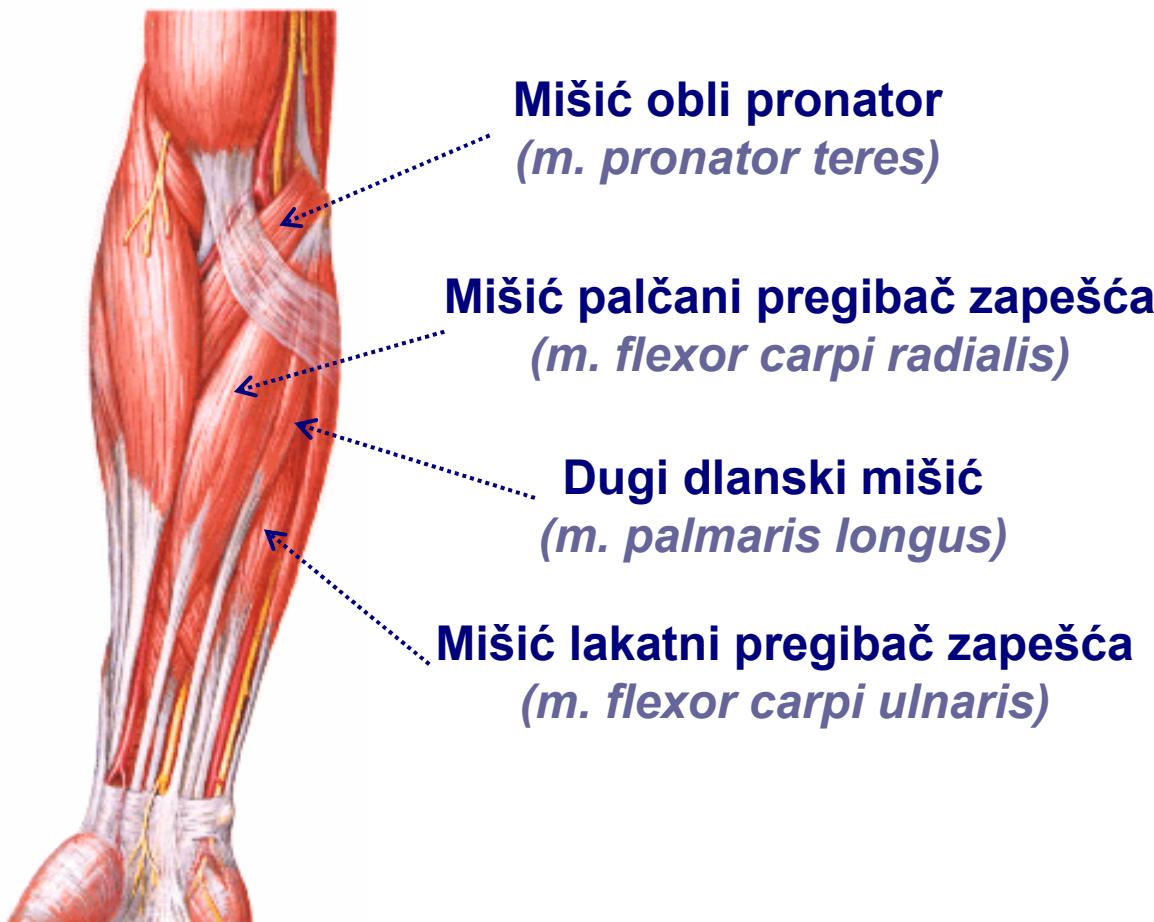
*duboki sloj*



# Mišići podlaktice

(prednja skupina)

*površni sloj*



# Mišići podlaktice

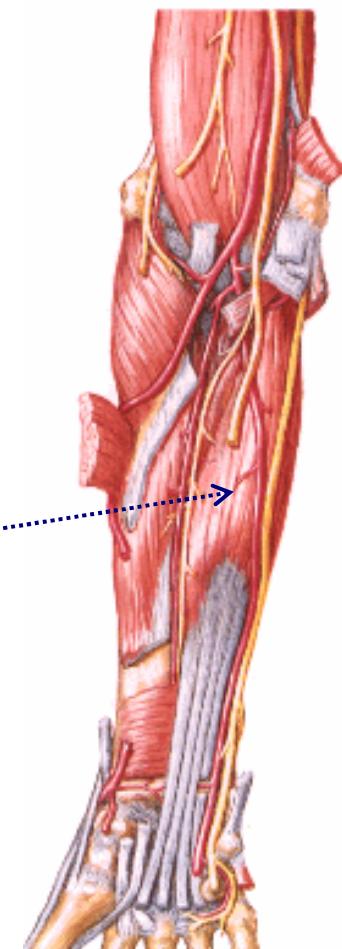
(prednja skupina)

srednji sloj



Mišić površinski pregibač prstiju  
(*m. flexor digitorum superficialis*)

duboki sloj



Mišić duboki pregibač prstiju  
(*m. flexor digitorum profundus*)

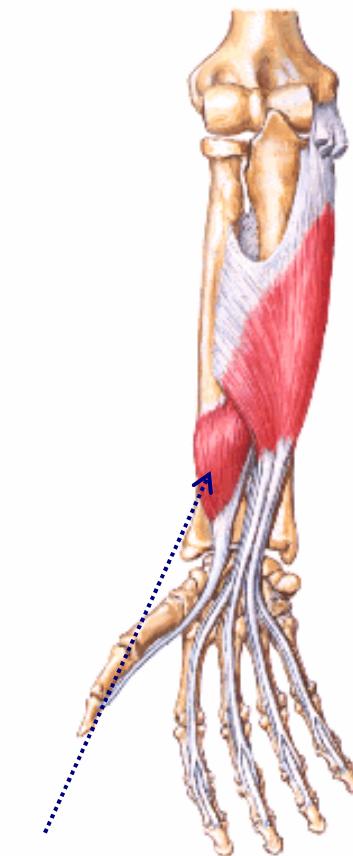
# Mišići podlaktice

(prednja skupina)

*fleksori šake*



*fleksori prstiju  
(površni sloj)*



*fleksori prstiju  
(duboki sloj)*



**Mišić dugi pregibač palca  
(*m. flexor pollicis longus*)**

# Mišići podlaktice

(prednja skupina)

*pronatori podlaktice  
(supinacija)*



**Mišić obli pronator**  
*(m. pronator teres)*

**Mišić četverokutni pronator**  
*(m. pronator quadratus)*

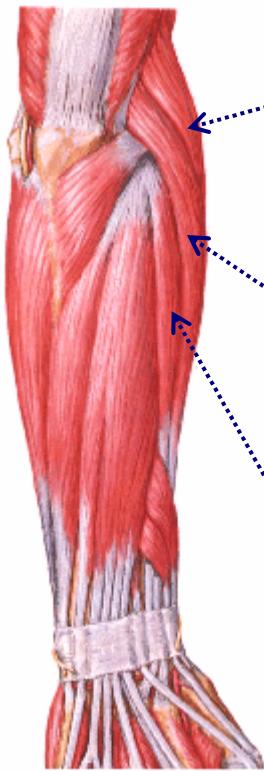
*pronatori podlaktice  
(pronacija)*



# Mišići podlaktice

(lateralna skupina)

površni sloj  
(straga)



Nadlaktičnopalčani mišić  
(*m. brachioradialis*)

Mišić dugi palčani ispružač zapešća  
(*m. extensor carpi radialis longus*)

Mišić kratki palčani ispružač zapešća  
(*m. extensor carpi radialis brevis*)

površni sloj  
(sprijeda)



# Mišići podlaktice

(lateralna skupina, duboki sloj)

*pronatori podlaktice  
(supinacija)*



*pronatori podlaktice  
(pronacija)*

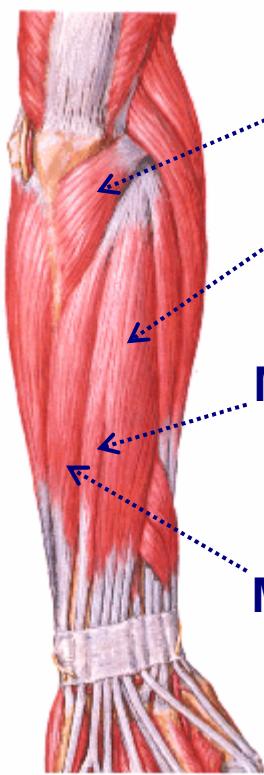


**Mišić supinator  
(*m. supinator*)**

# Mišići podlaktice

(stražnja skupina)

površni sloj  
(straga)



lakatni mišić  
(*m. anconeus*)

Mišić ispružač prstiju  
(*m. extensor digitorum*)

Mišić ispružač malog prsta  
(*m. extensor digiti minimi*)

Mišić lakatni ispružač zapešća  
(*m. extensor carpi ulnaris*)

duboki sloj



# Mišići podlaktice

(stražnja skupina)

površni sloj



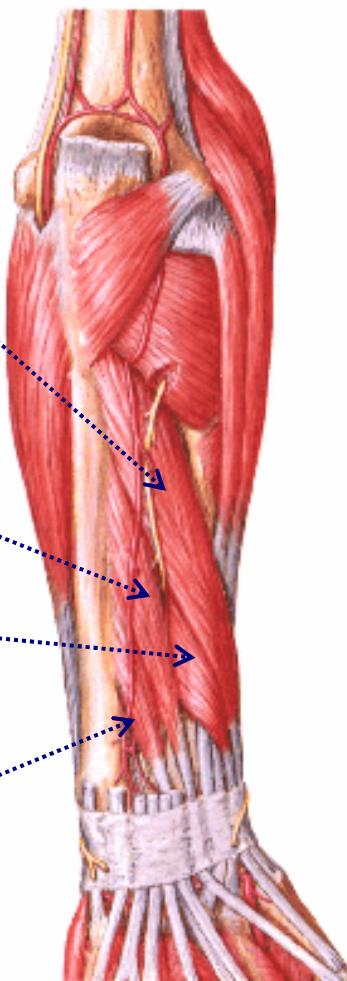
duboki sloj

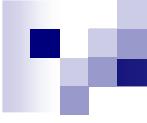
Mišić dugi odmicač palca  
(*m. abductor pollicis longus*)

Mišić dugi ispružač palca  
(*m. extensor pollicis longus*)

Mišić kratki ispružač palca  
(*m. extensor pollicis brevis*)

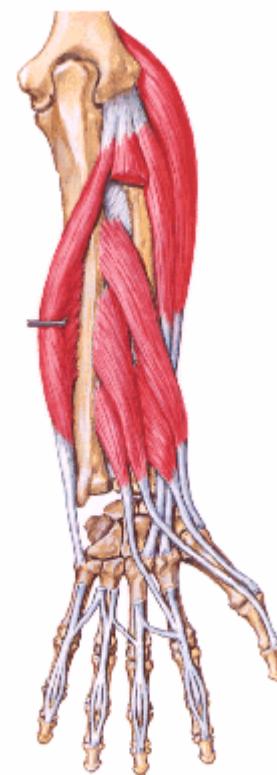
Mišić ispružač kažiprsta  
(*m. extensor indicis*)





# Mišići podlaktice

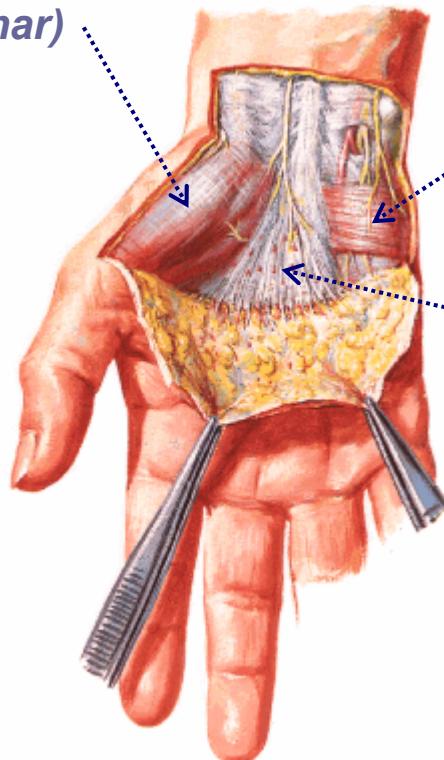
(mišići ispružači šake i prstiju)



# Mišići šake

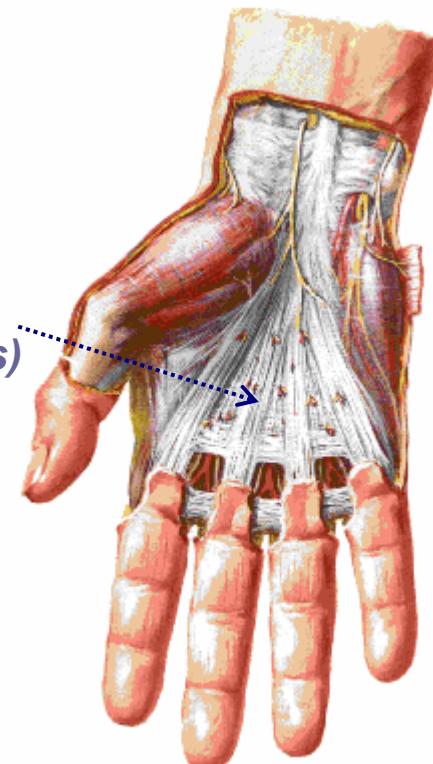
(površna palmarna sekcija)

mišići tenara  
(thenar)



mišići hipotenara  
(hypothenar)

dlanska aponeuroza  
(aponeurosis palmaris)

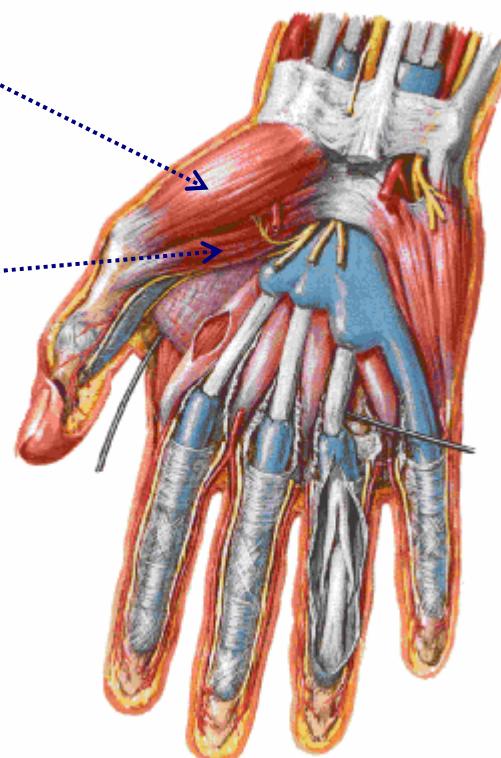


# Mišići šake

(mišići tenara)

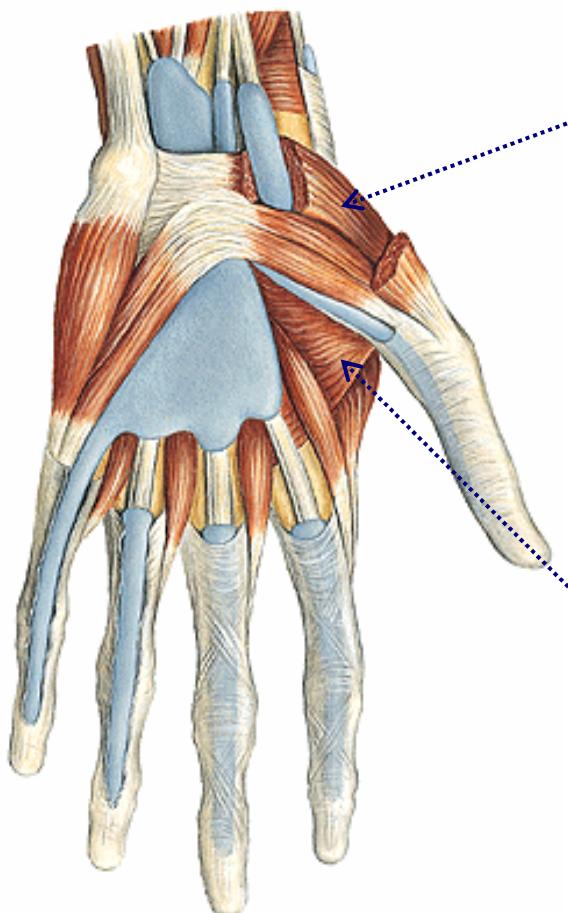
mišić kratki odmicač palca  
(*m. abductor pollicis brevis*)

mišić kratki pregibač palca  
(*m. flexor pollicis brevis*)



# Mišići šake

(mišići tenara)

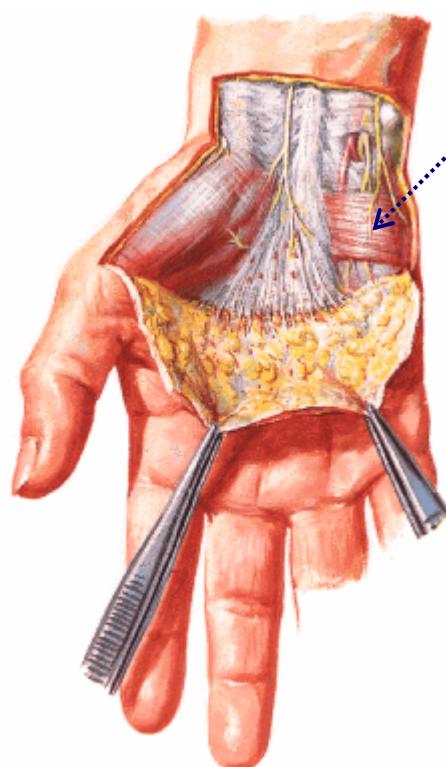


mišić suprotstavljač palca  
(*m. opponens pollicis*)

mišić primicač palca  
(*m. adductor pollicis*)

# Mišići šake

(mišići hipotenara)



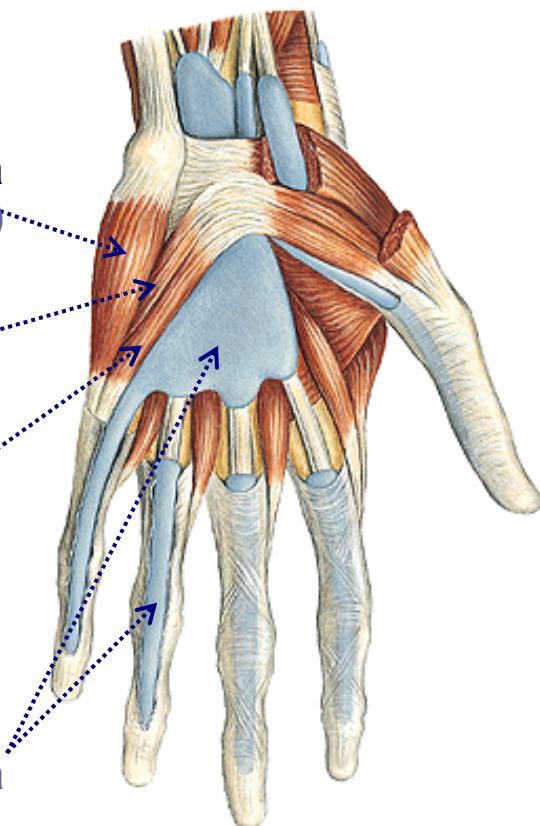
kratki dlanski mišić  
(*m. palmaris brevis*)

mišić kratki odmicač malog prsta  
(*m. abductor digiti minimi brevis*)

mišić pregibač malog prsta  
(*m. flexor digiti minimi*)

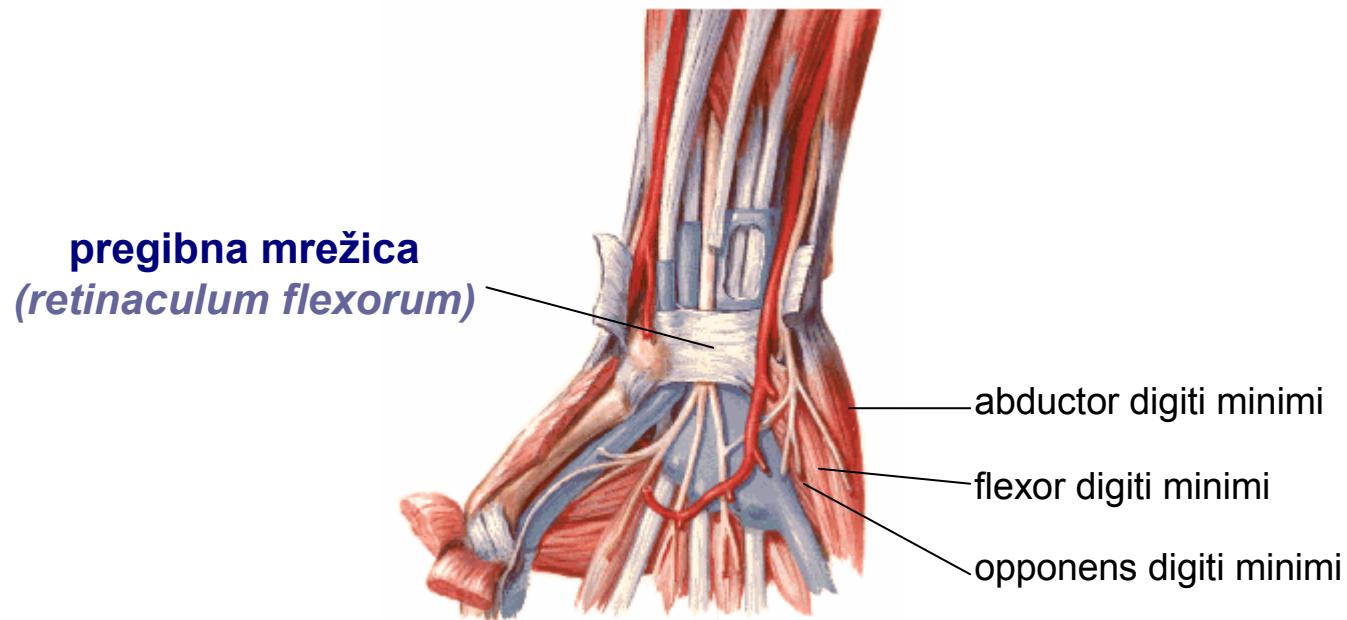
mišić suprotstavljač malog prsta  
(*m. opponens digiti minimi*)

zajednička ovojnica mišića fleksora



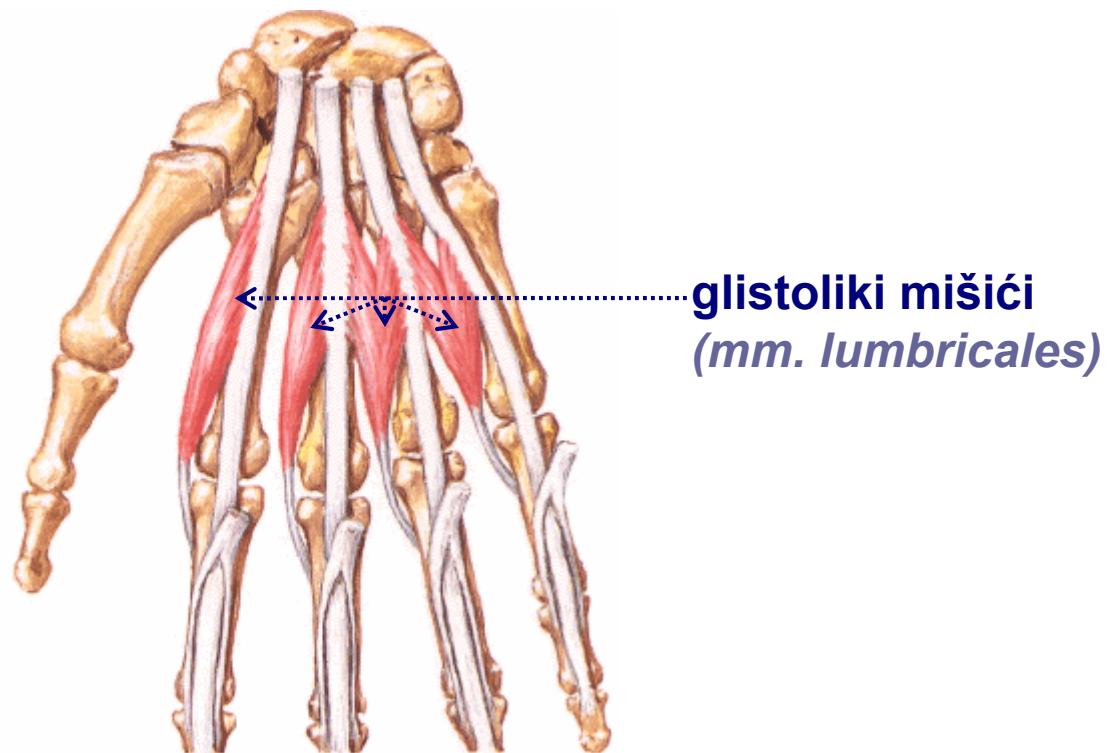
# Mišići šake

(fleksorne tetive, arterije i živci u području zapešća)

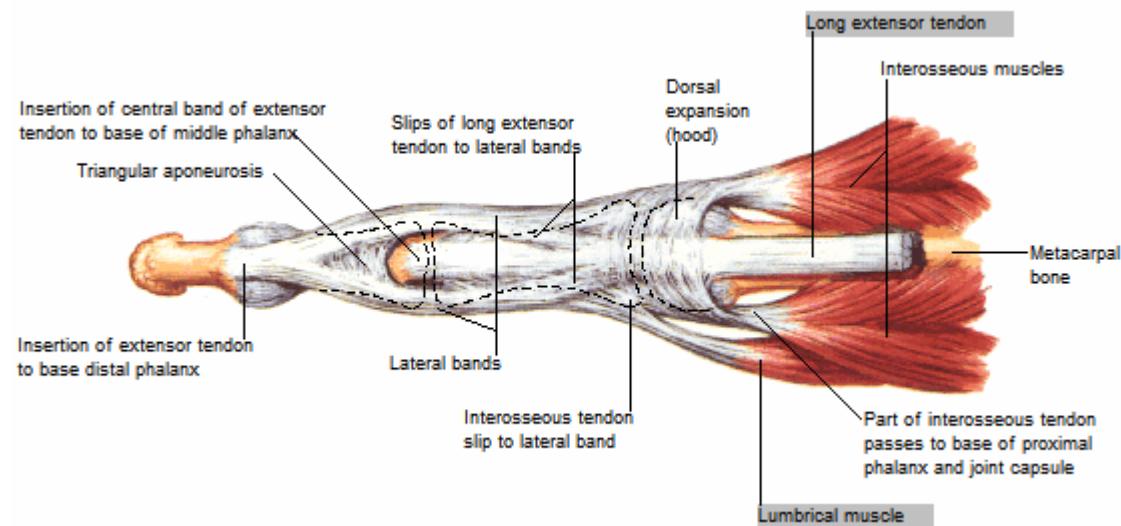


# Mišići šake

(središnja skupina, glistoliki mišići)

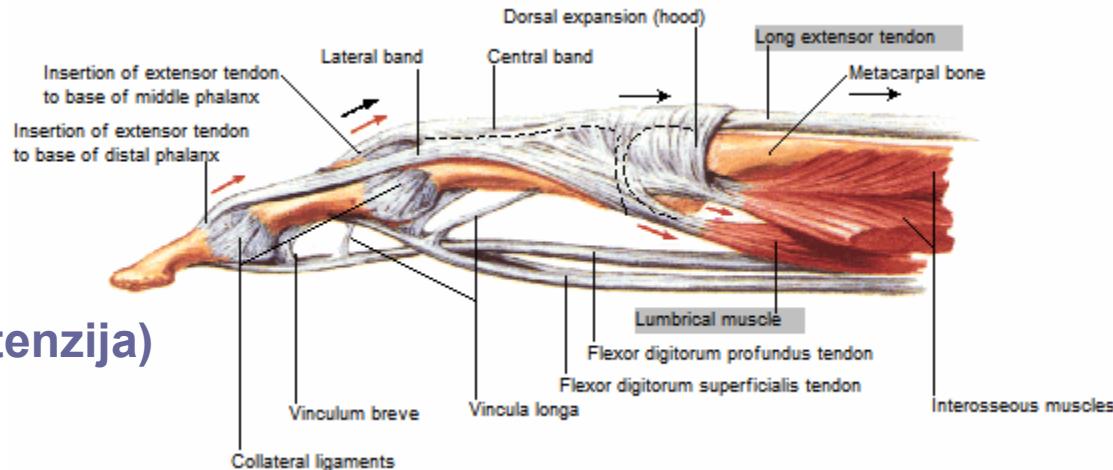


# Fleksorne i ekstenzorne tetine prstiju (dorzanlo)

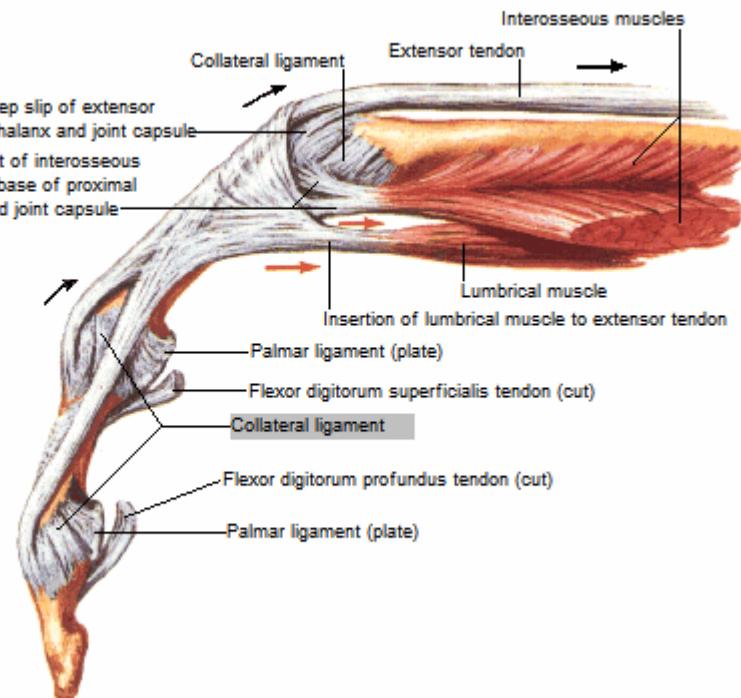


# Fleksorne i ekstenzorne teticne prstiju

lateralno (ekstenzija)

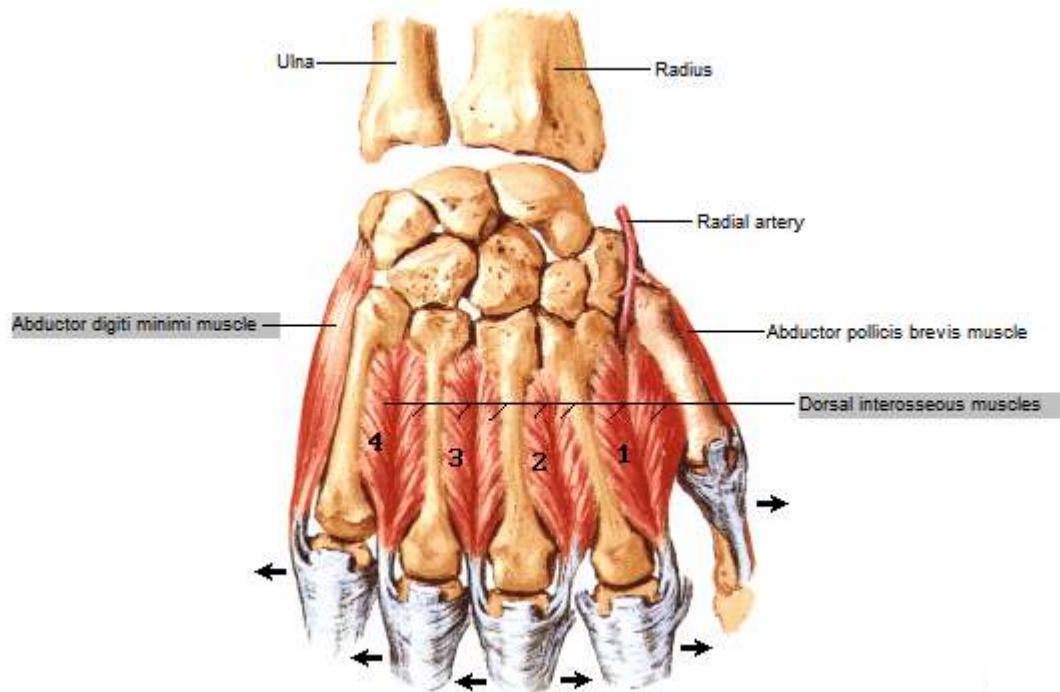


lateralno (fleksija)

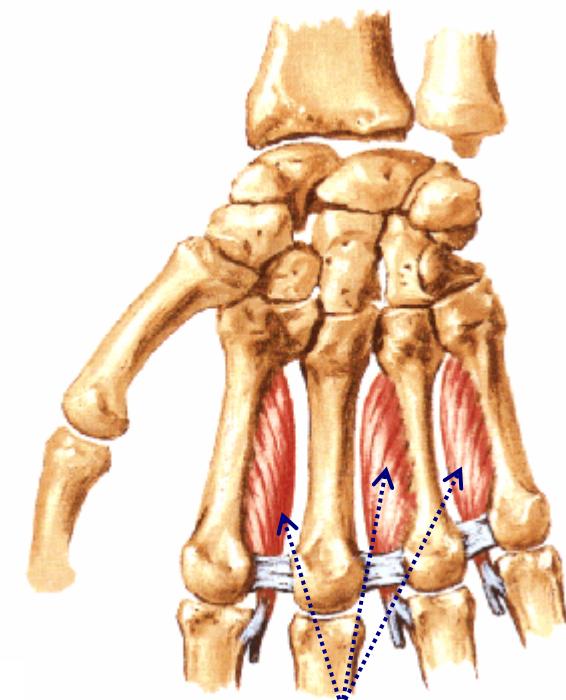


# Mišići šake

(središnja skupina, međukoštani mišići)



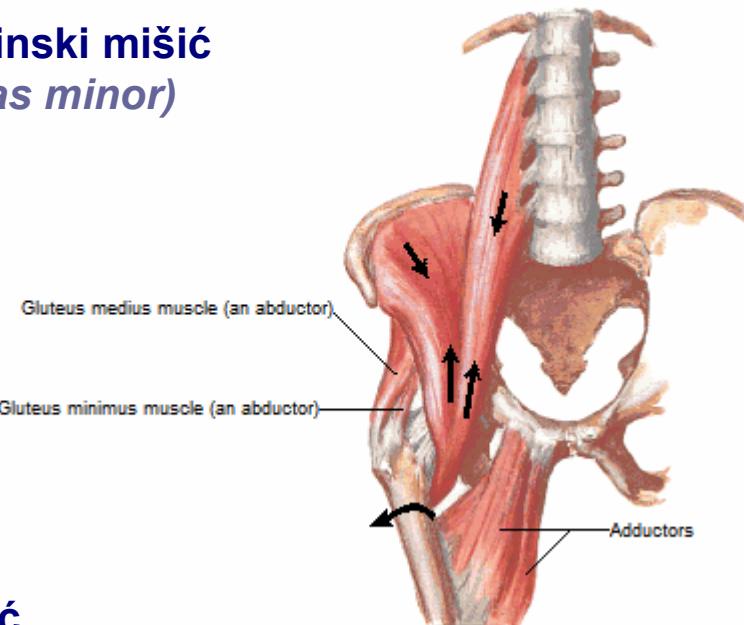
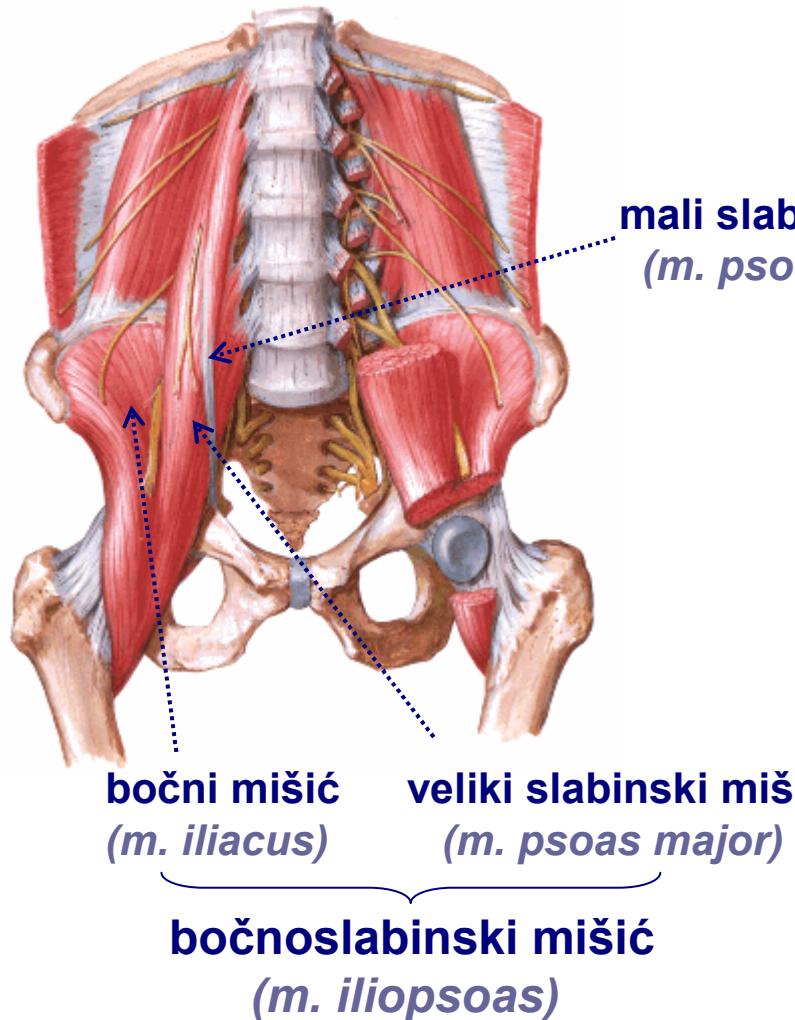
dorzalni međukoštani mišići  
(*mm. interossei dorsales*)



dlanski međukoštani mišići  
(*mm. interossei palmares*)

# Mišići zdjelice

(unutarnja/prednja skupina)



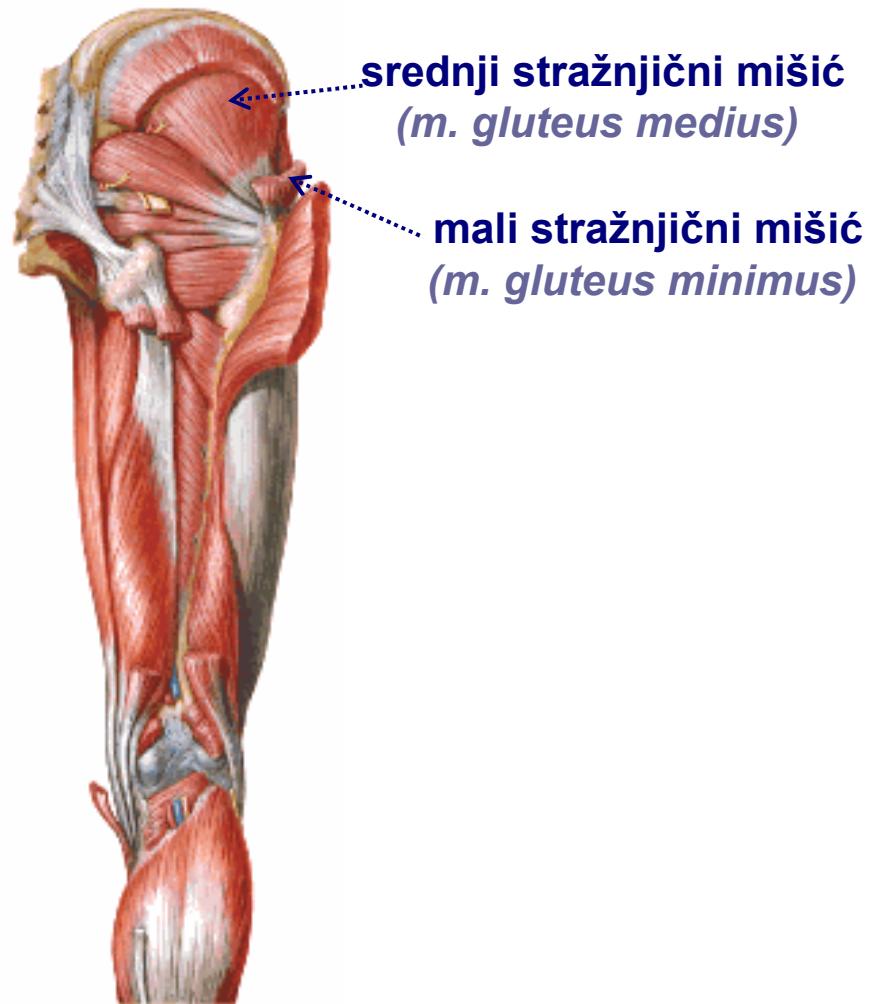
# Mišići zdjelice

(vanjska/stražnja skupina)



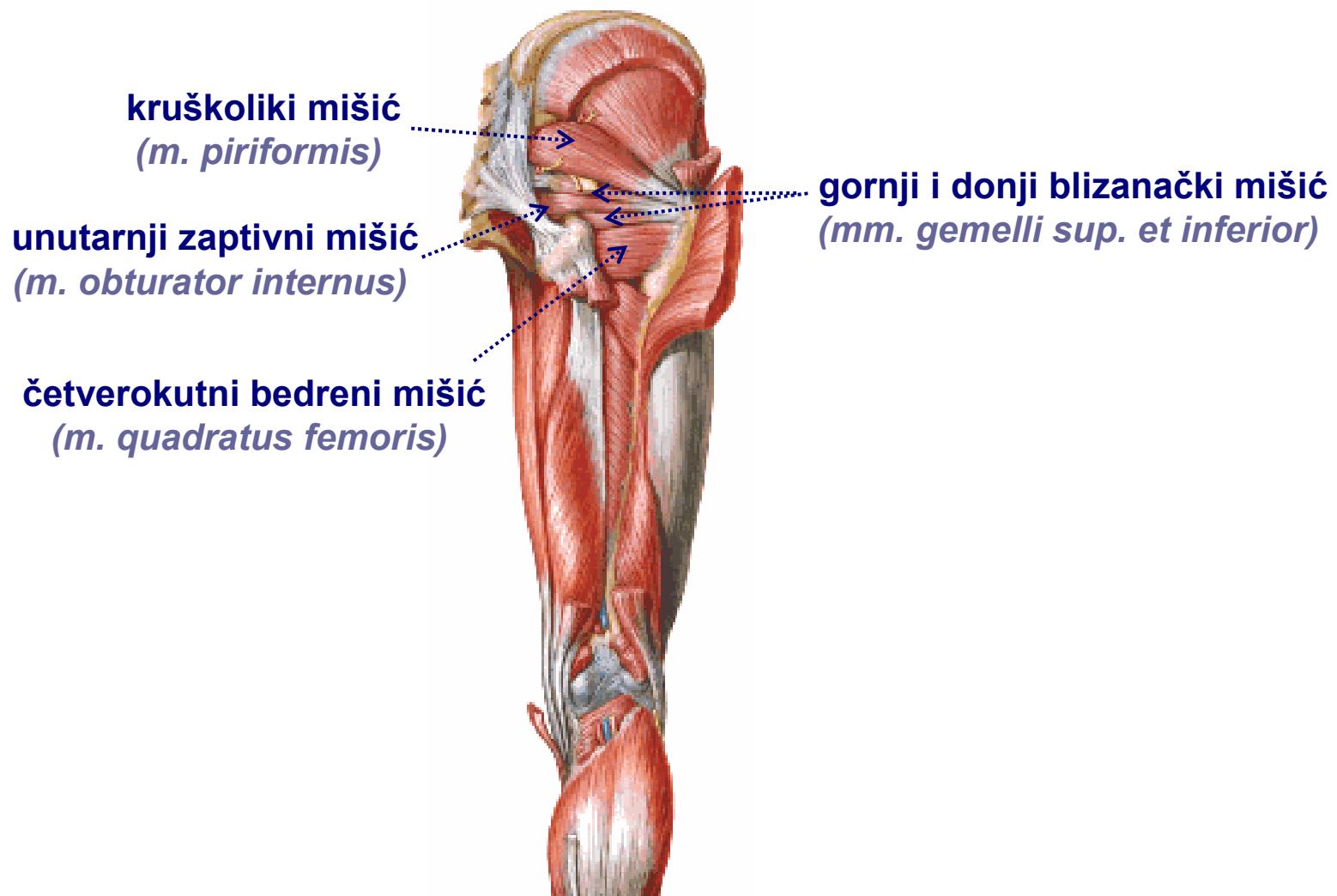
# Mišići zdjelice

(vanjska/stražnja skupina)



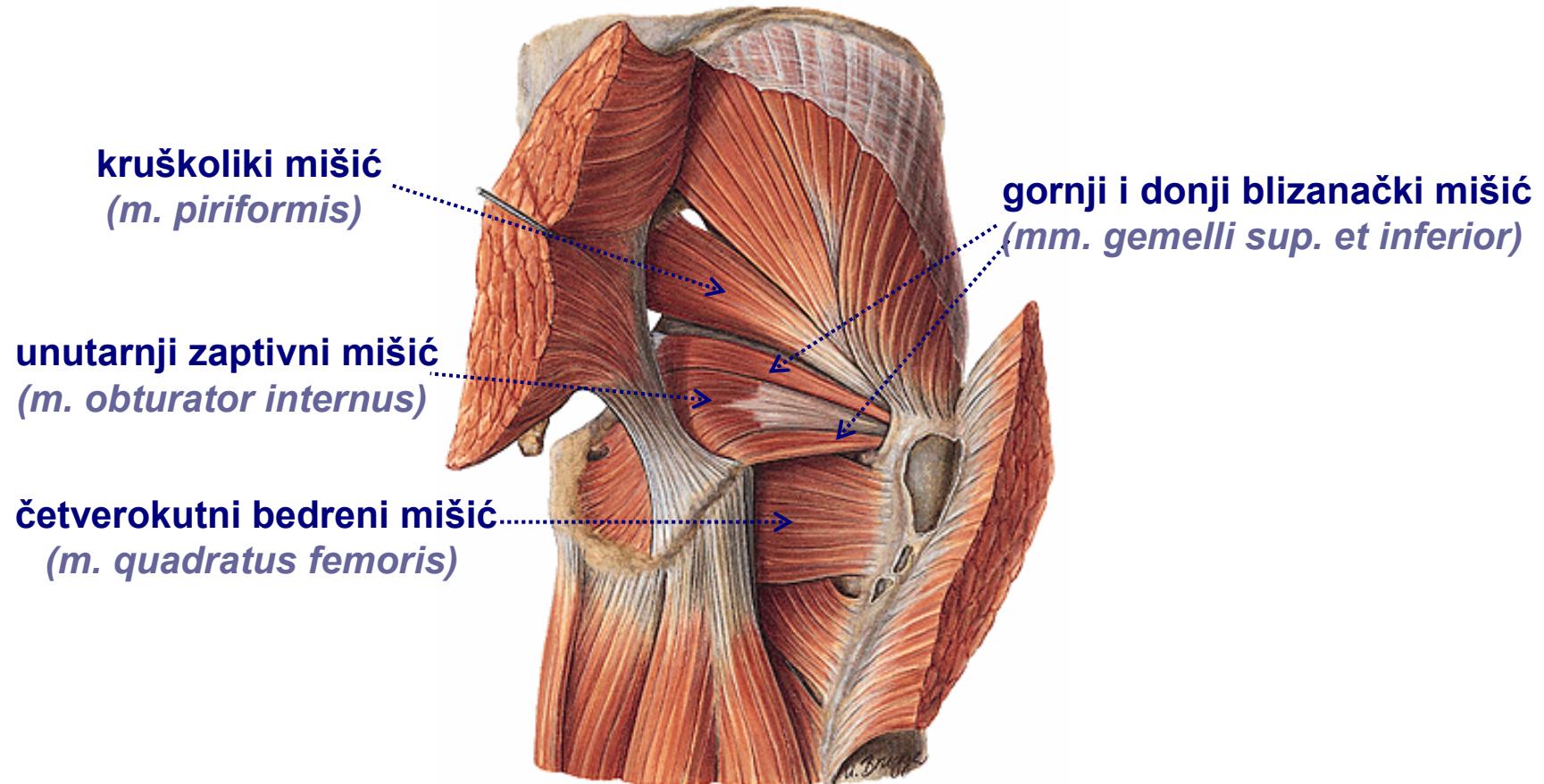
# Mišići zdjelice

(zdjeličnotrohanterična skupina)



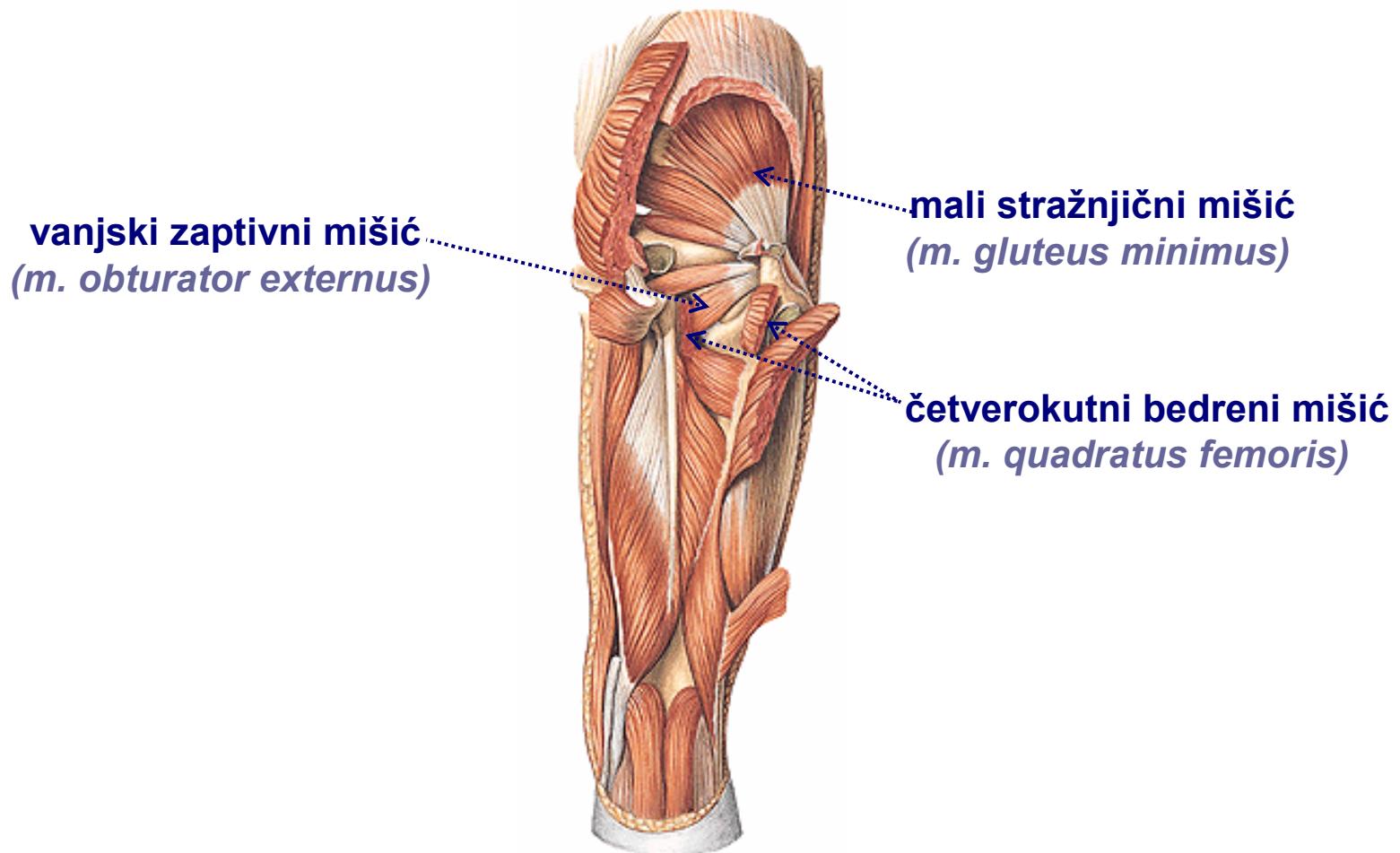
# Mišići zdjelice

(zdjeličnotrohanterična skupina)

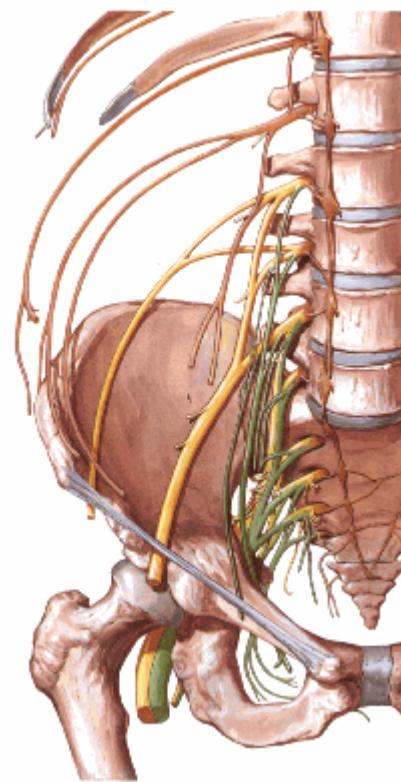


# Mišići zdjelice

(zdjeličnotrohanterična skupina)



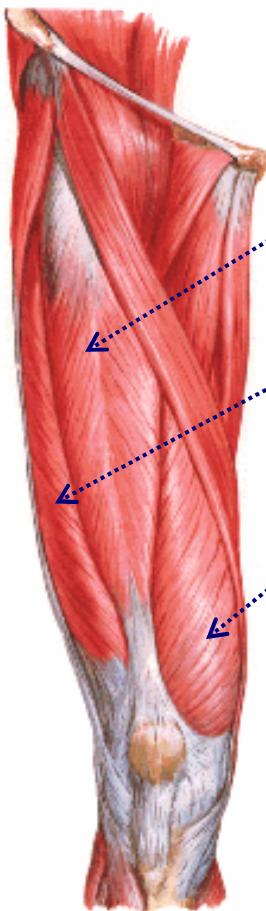
# Slabinskokrižni i trtični živčani pleksusi



# Mišići natkoljenice

(prednja skupina)

površni sloj



ravni bedreni mišić  
(*m. rectus femoris*)

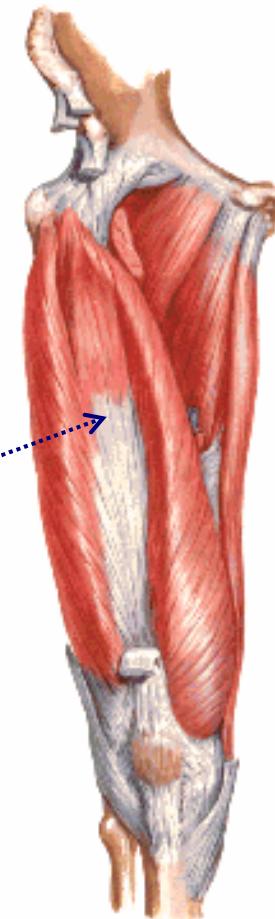
lateralni široki mišić  
(*m. vastus lateralis*)

medijalni široki mišić  
(*m. vastus medialis*)

srednji široki mišić  
(*m. vastus intermedius*)

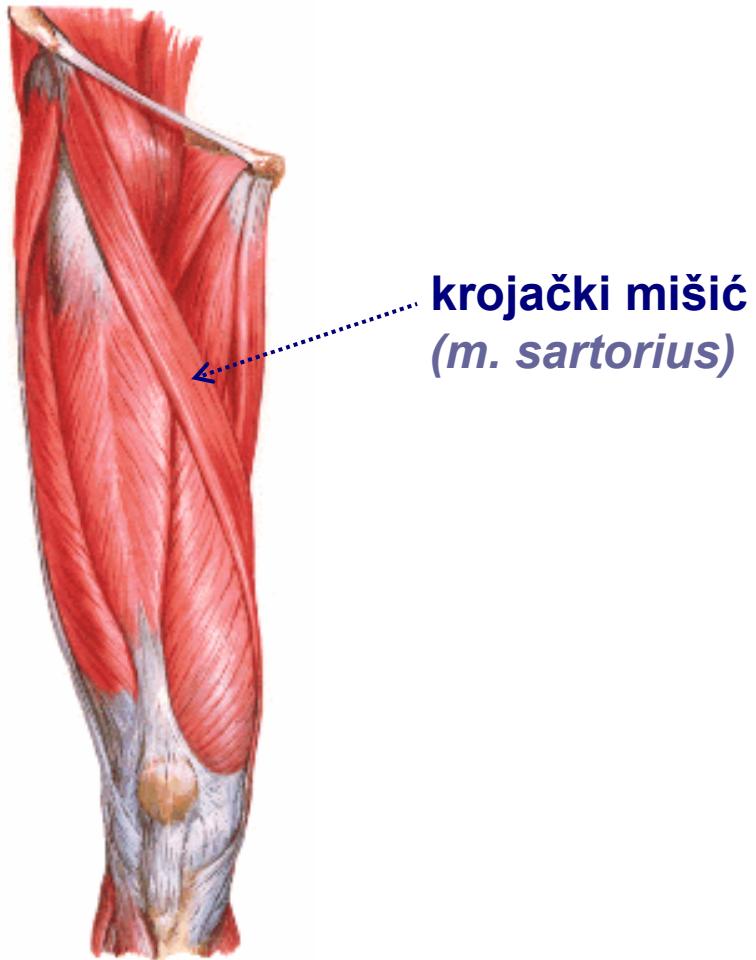
četverogлавi mišić natkoljenice  
(*m. quadriceps femoris*)

dublji sloj



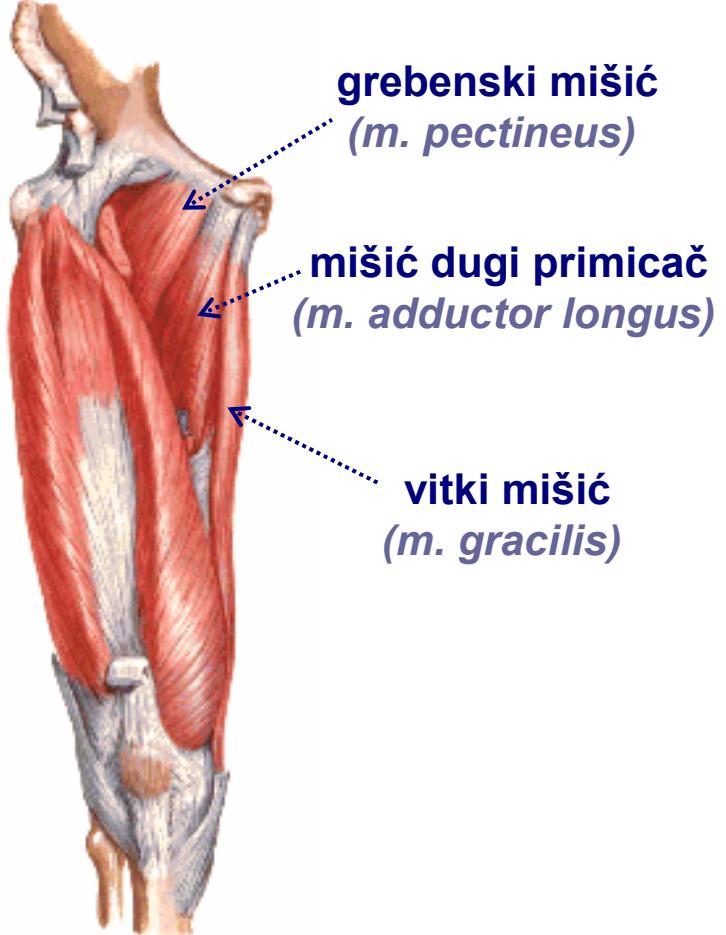
# Mišići natkoljenice

(prednja skupina)

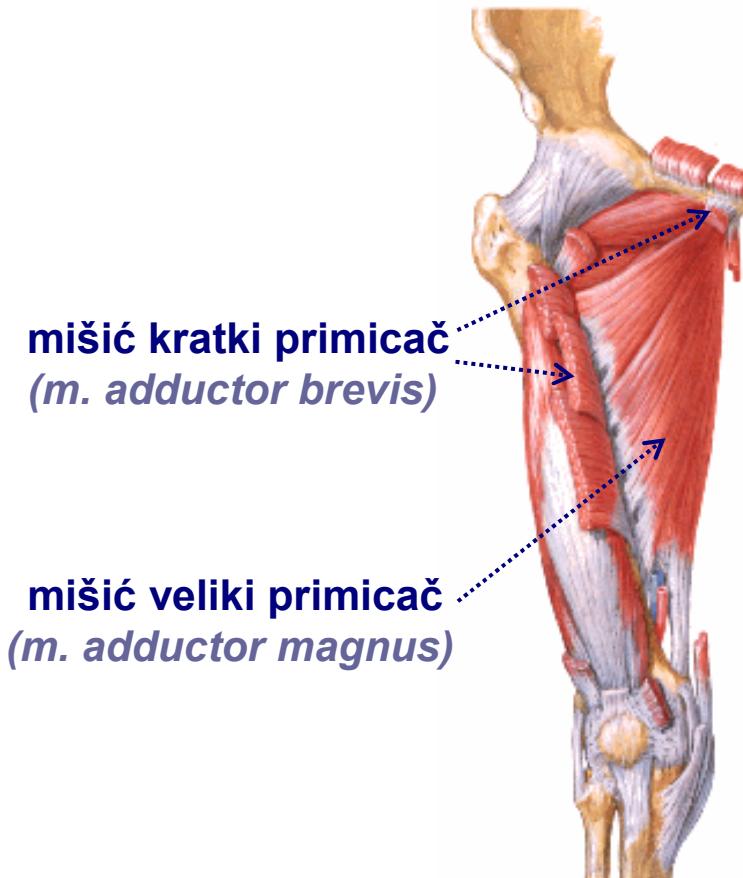


# Mišići natkoljenice

(medijalna skupina)

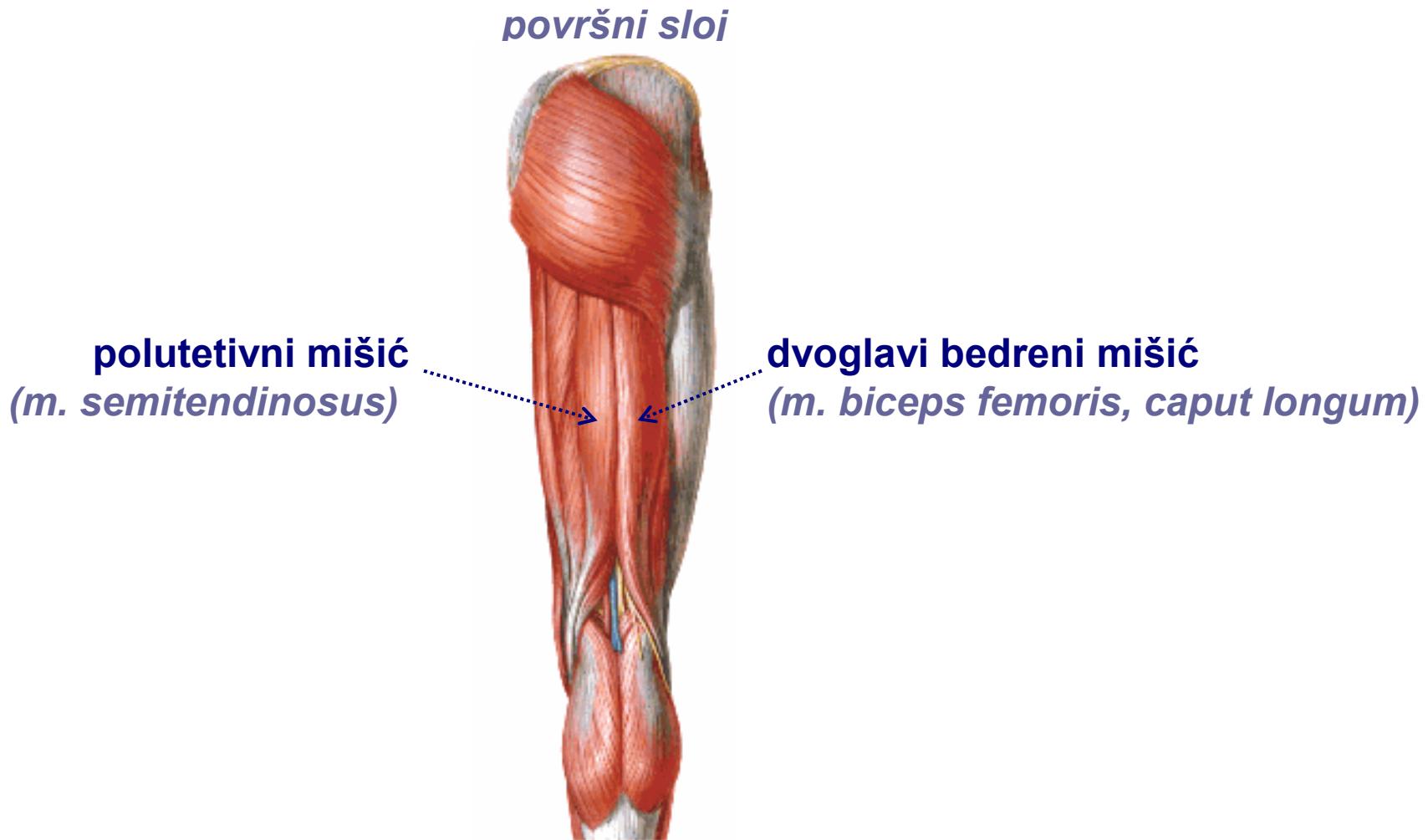


najdublji sloj



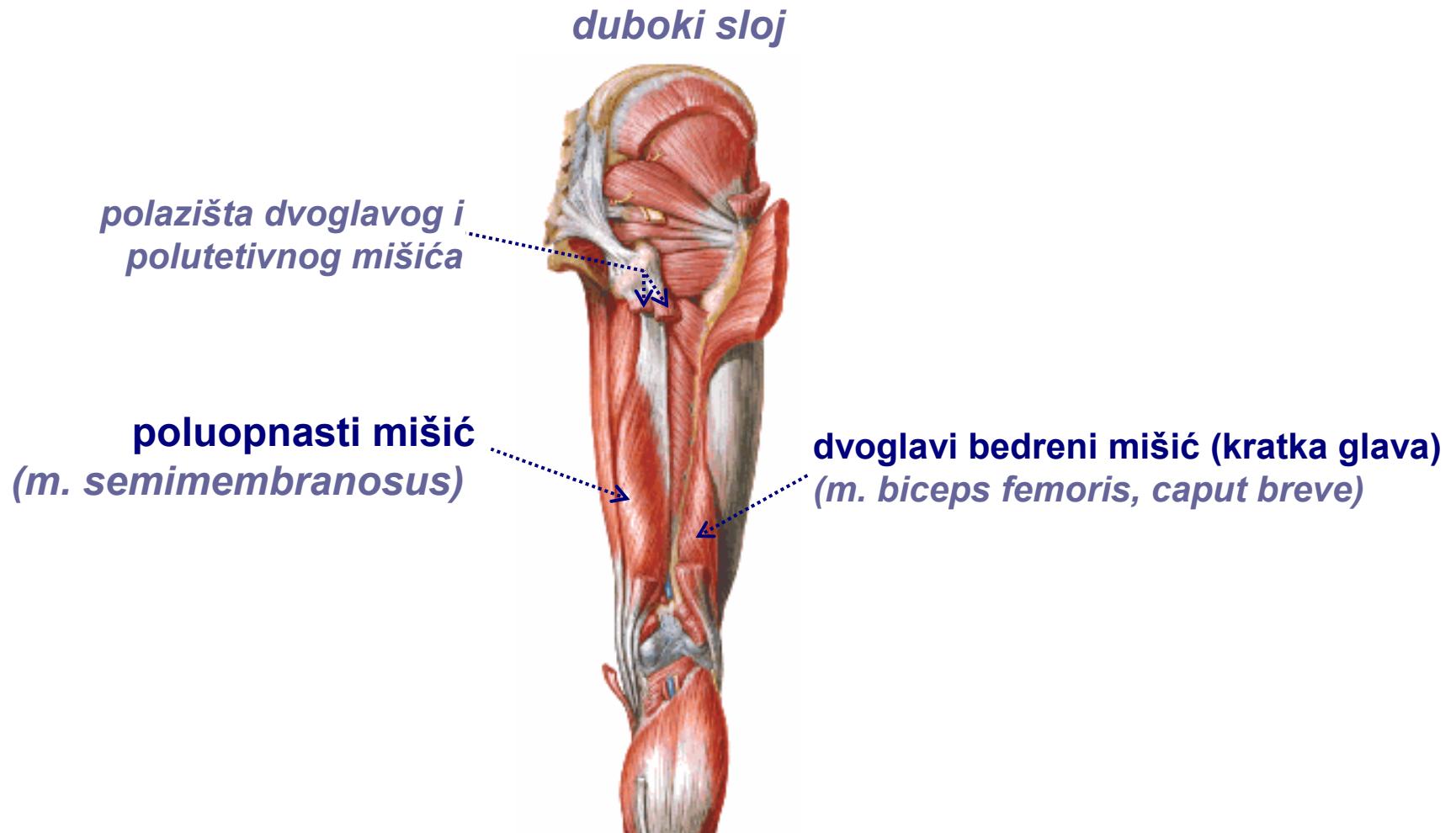
# Mišići natkoljenice

(stražnja skupina)



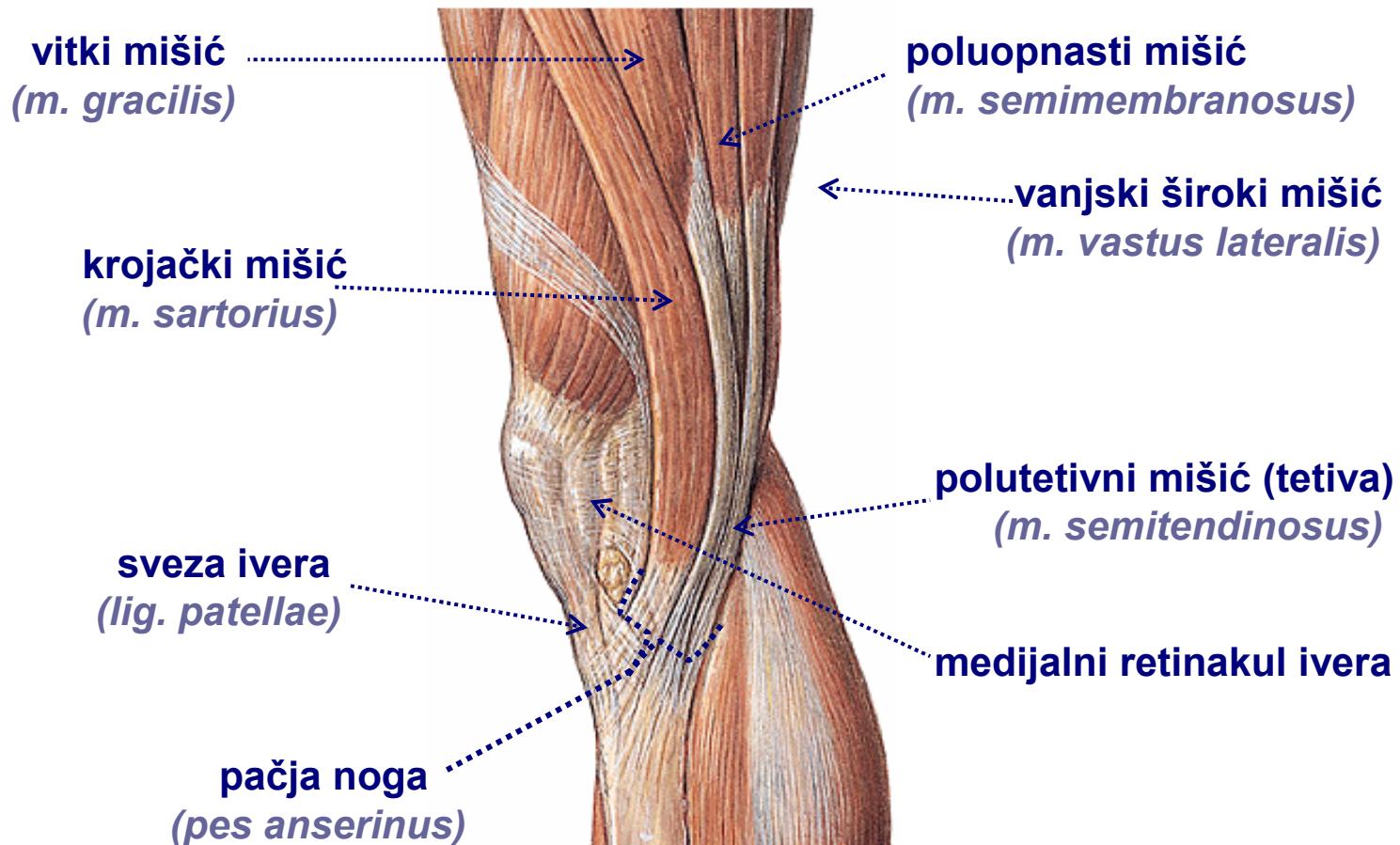
# Mišići natkoljenice

(stražnja skupina)



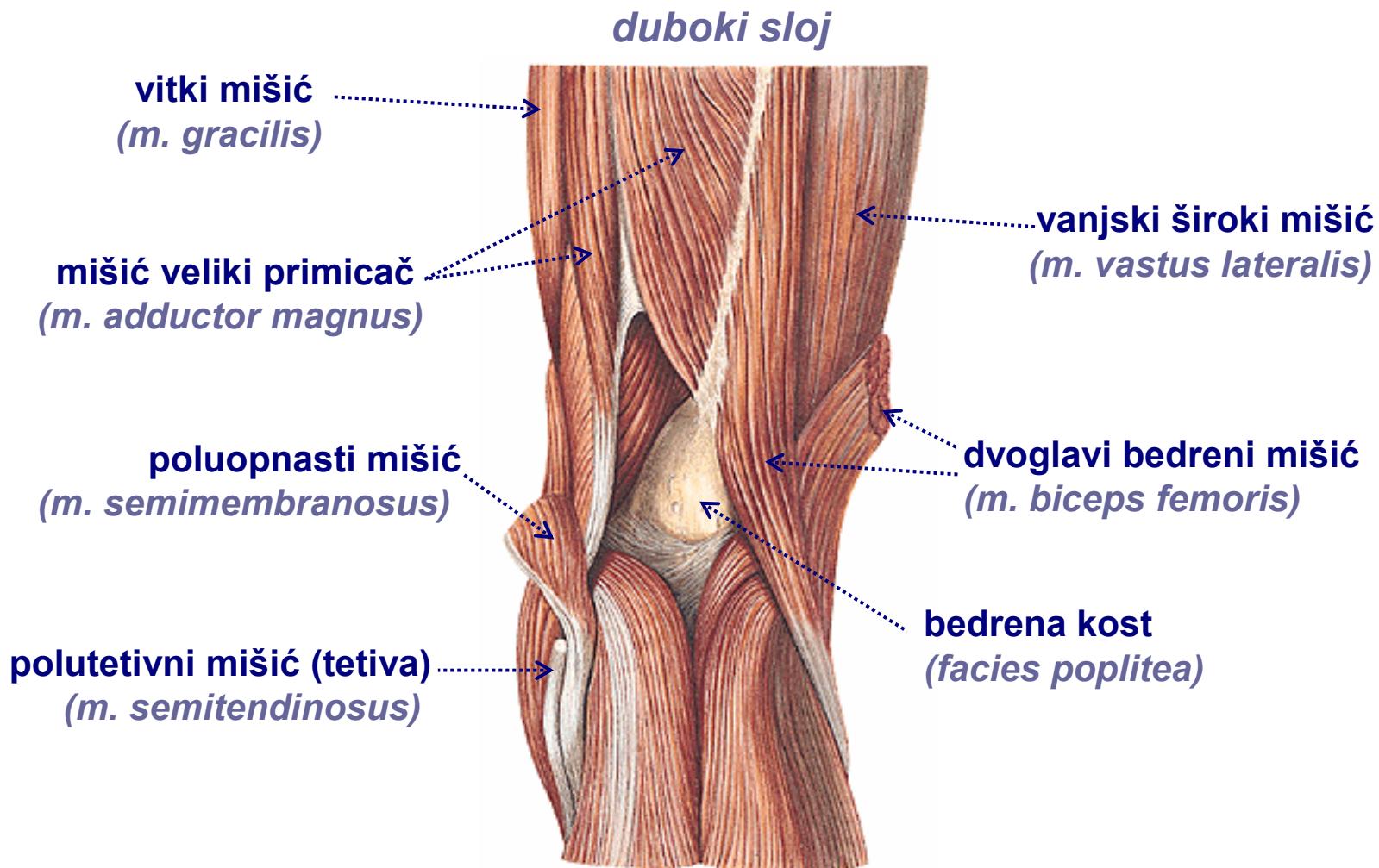
# Mišići natkoljenice

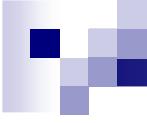
(medijalno, desno)



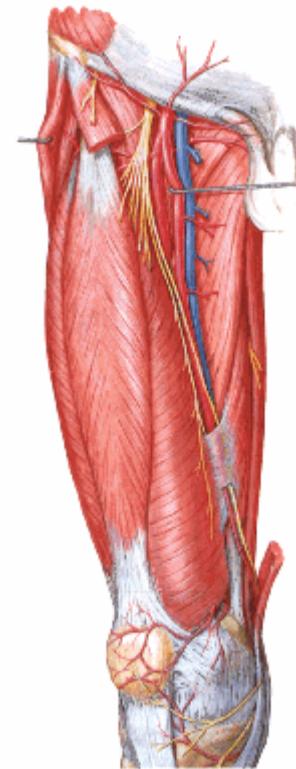
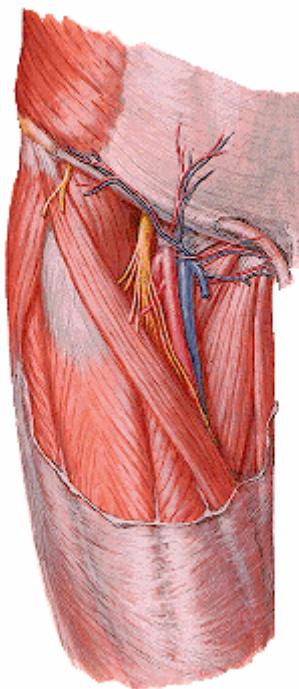
# Mišići natkoljenice

(straga, desno)



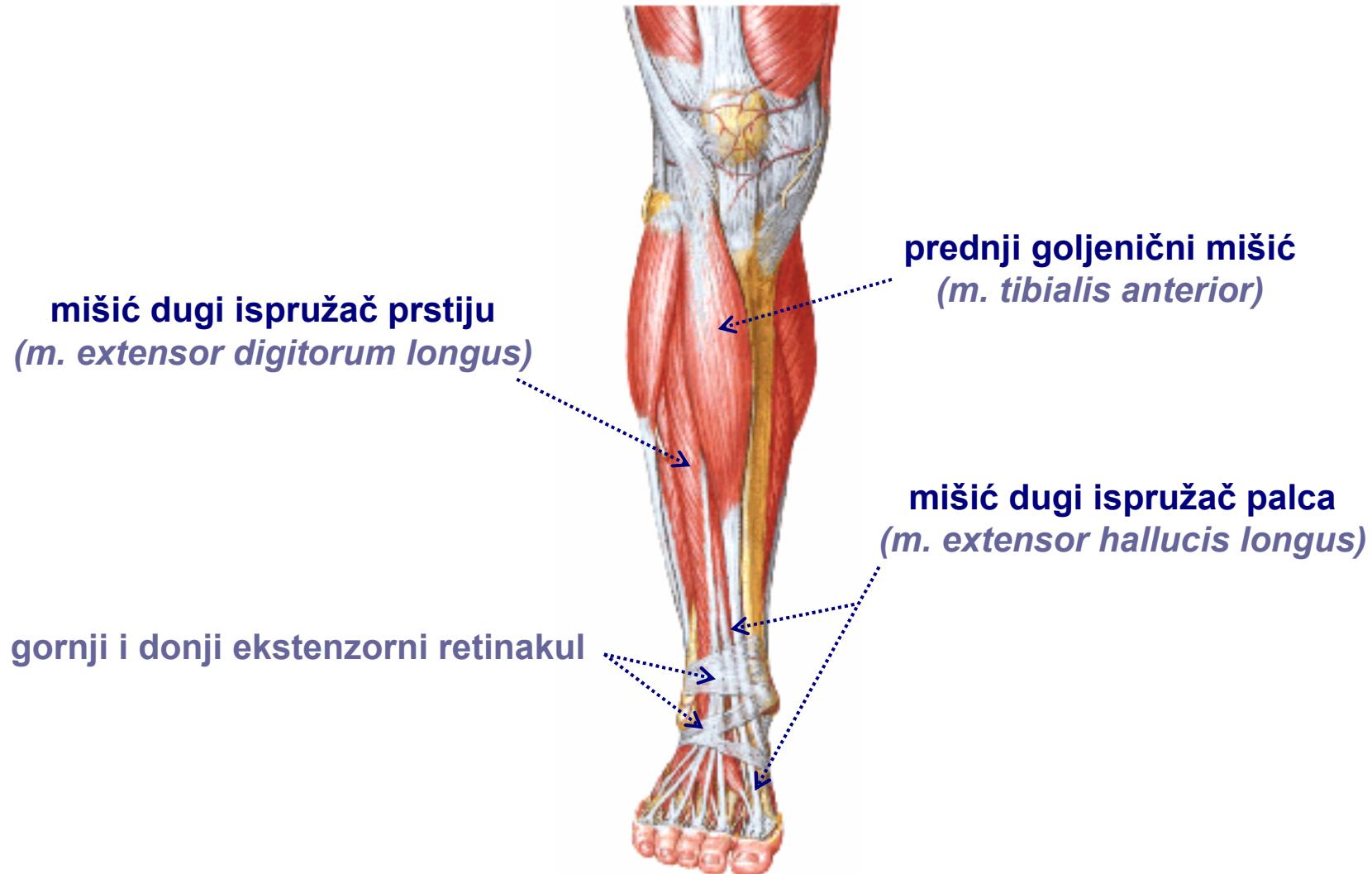


# Arterije i živci bedra (sprijeda)



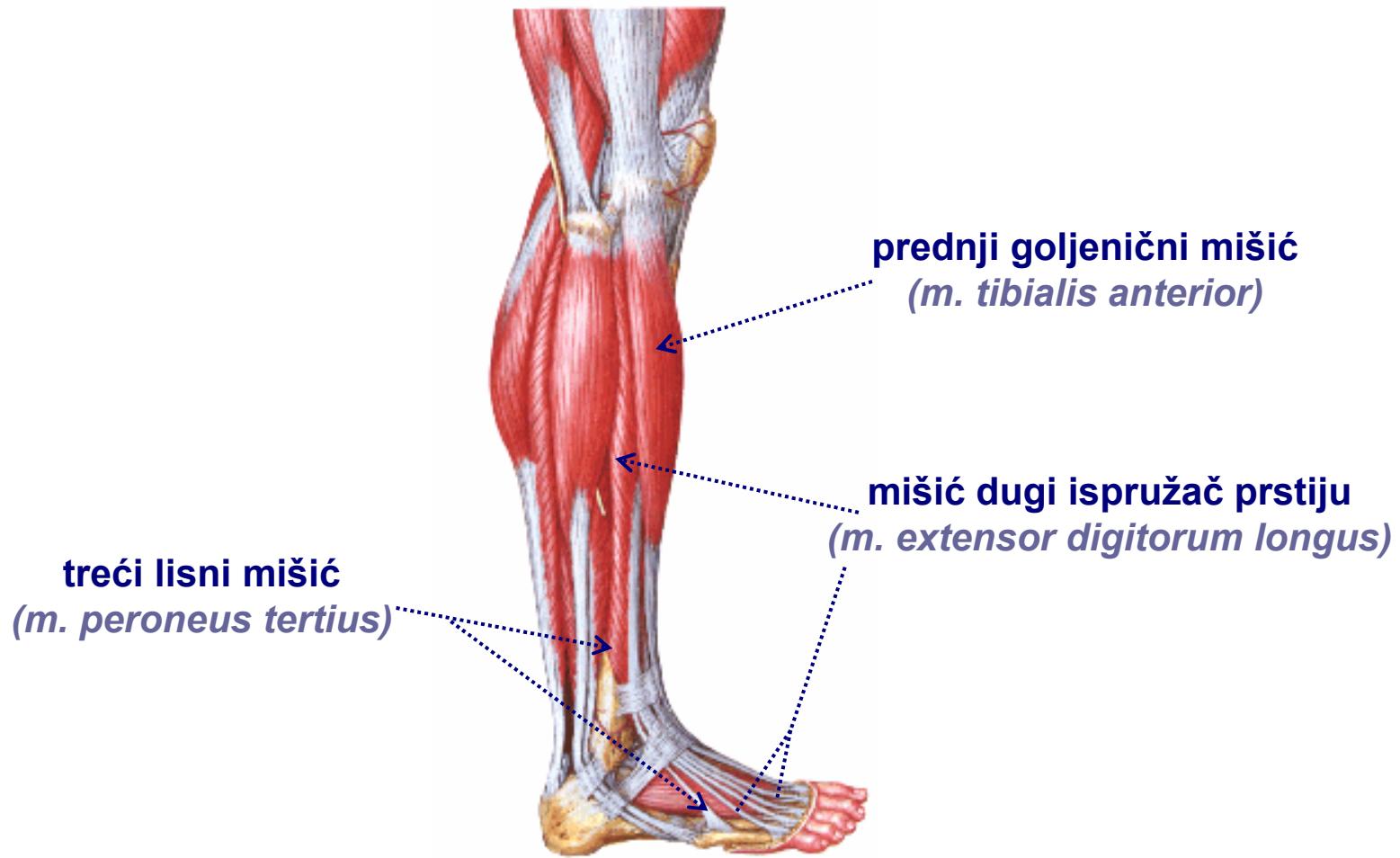
# Mišići potkoljenice

(prednja skupina, površni sloj)



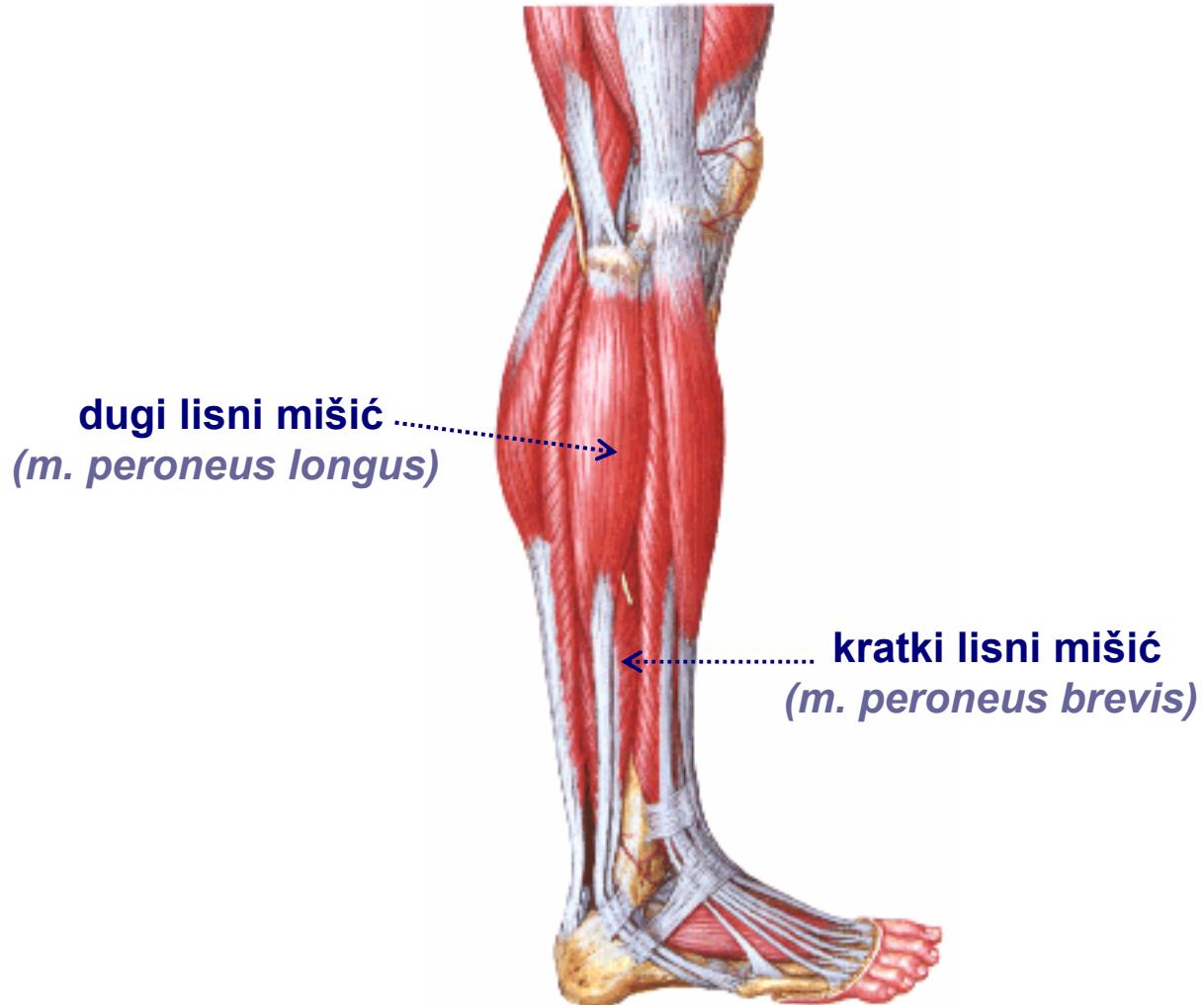
# Mišići potkoljenice

(prednja skupina, lateralno)



# Mišići potkoljenice

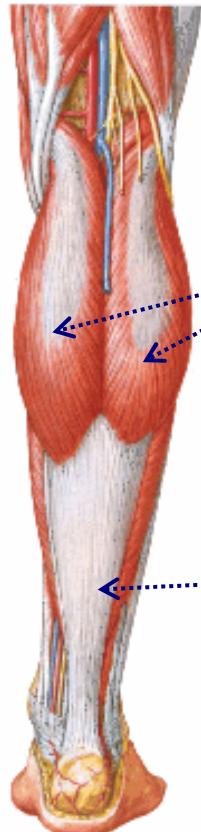
(lateralna skupina)



# Mišići potkoljenice

(stražnja skupina)

površni sloj



troglavi mišić  
(*m. triceps surae*):

- 1) trbušasti mišić lista  
(*m. gastrocnemius*)
- 2) listoliki mišić  
(*m. soleus*)

Ahilova tetiva  
(*tendo calcaneus*)

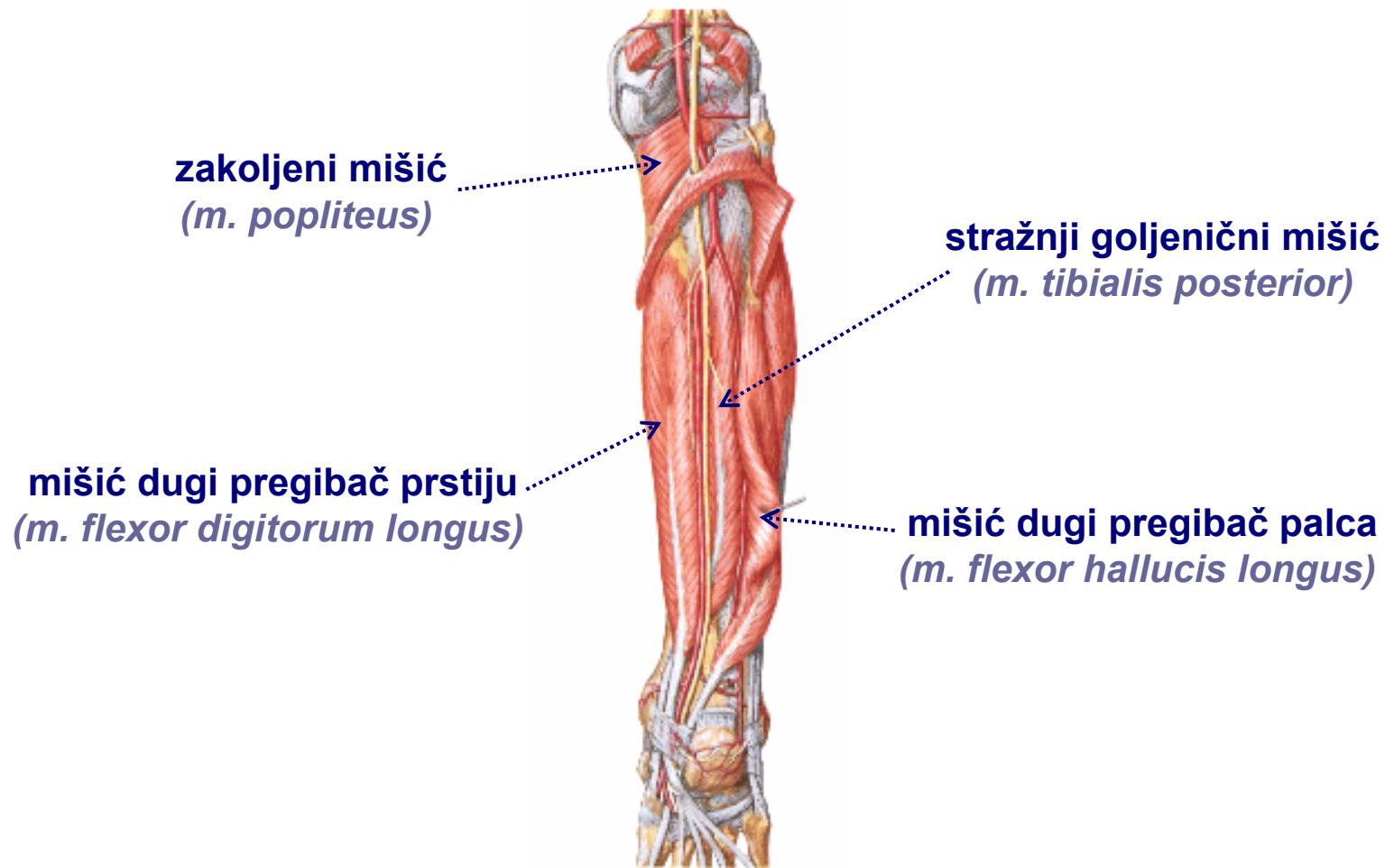
srednji sloj



tabanski mišić  
(*m. plantaris*)

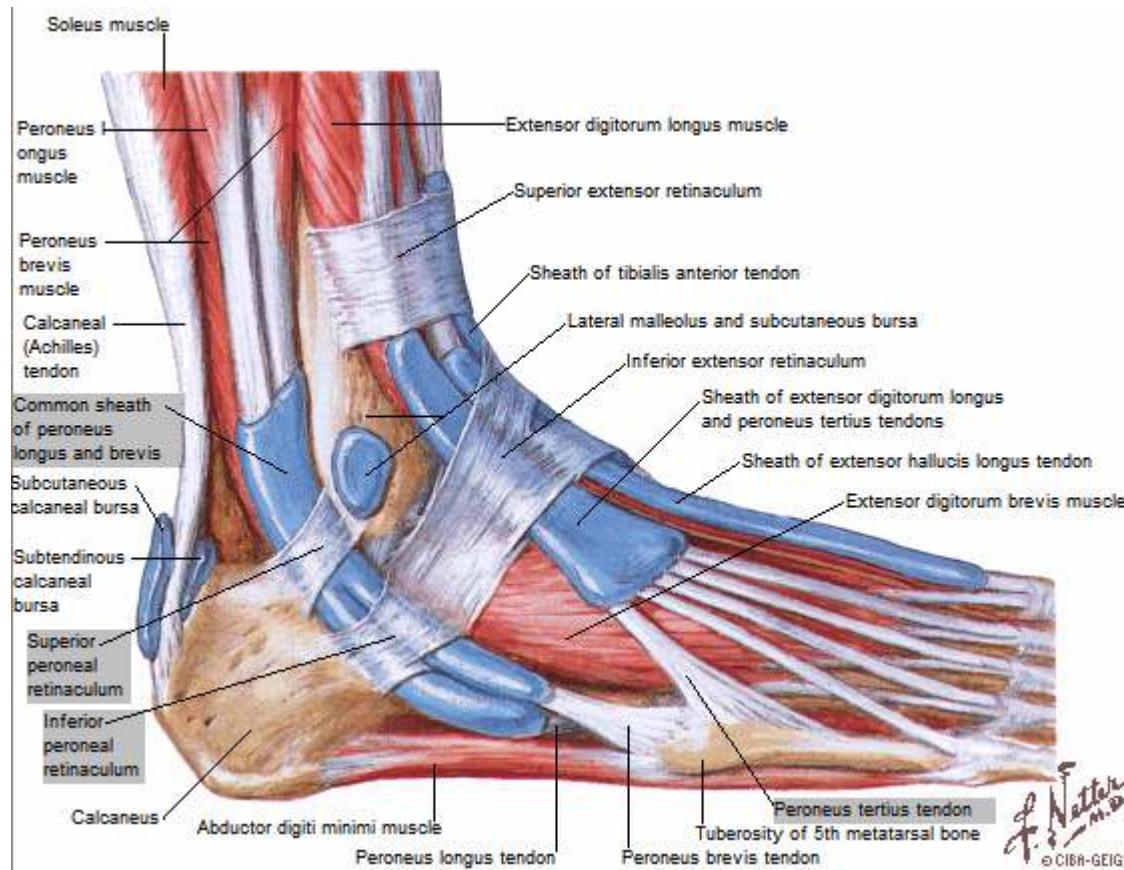
# Mišići potkoljenice

(stražnja skupina, duboki sloj)



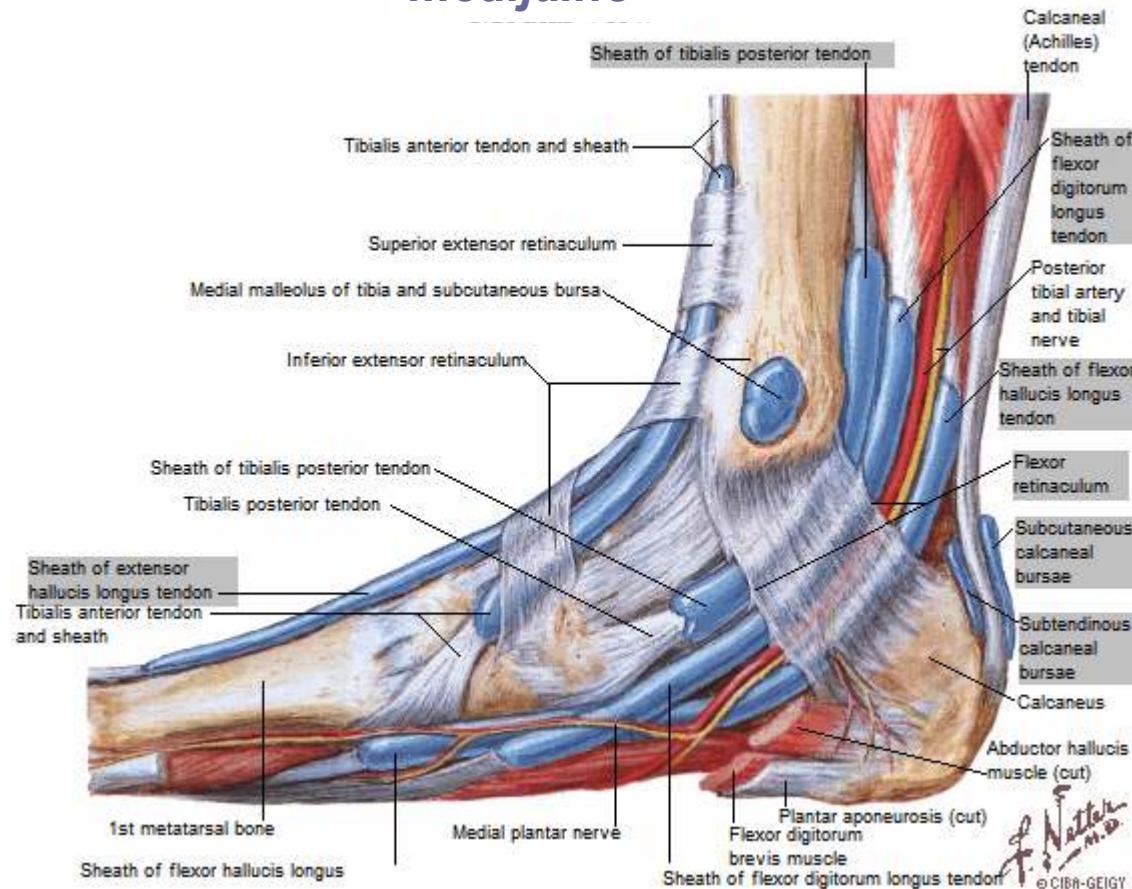
# Tetive i ovojnice u području gležnja

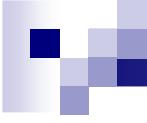
*lateralno*



# Tetive i ovojnice u području gležnja

*medijalno*





# Mišići stopala

(dorzanlno)

*površni sloj*

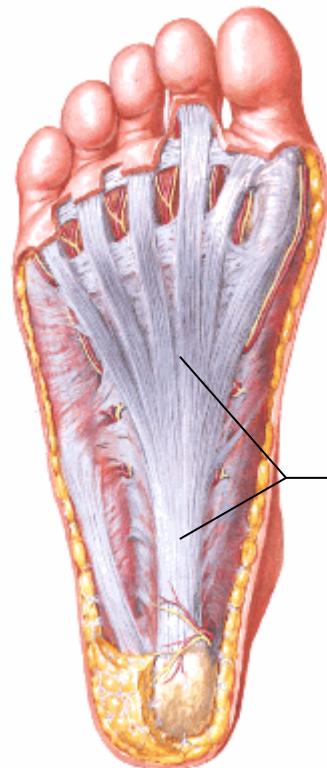


*duboki sloj*



# Mišići stopala (plantarno)

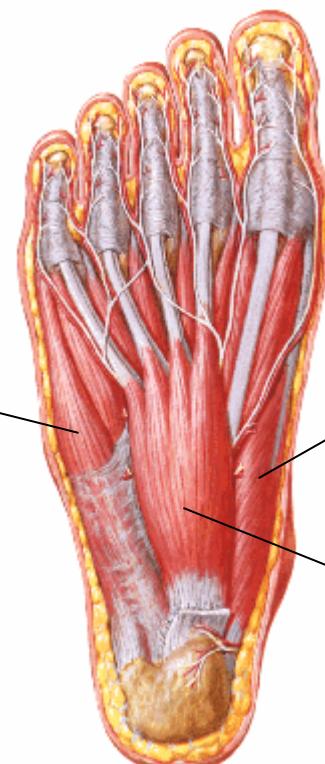
*potkožno*



m. odmicač malog prsta  
(*m. abductor digiti minimi*)

plantarna aponeuroza

*prvi sloj*



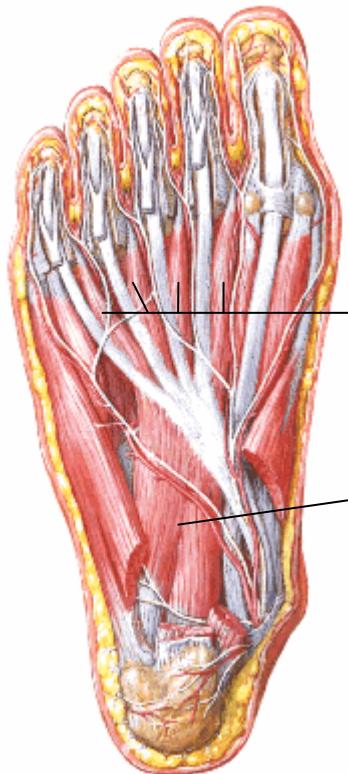
m. odmicač palca  
(*m. abductor hallucis*)

m. kratki pregibač prstiju  
(*m. flexor digitorum brevis*)

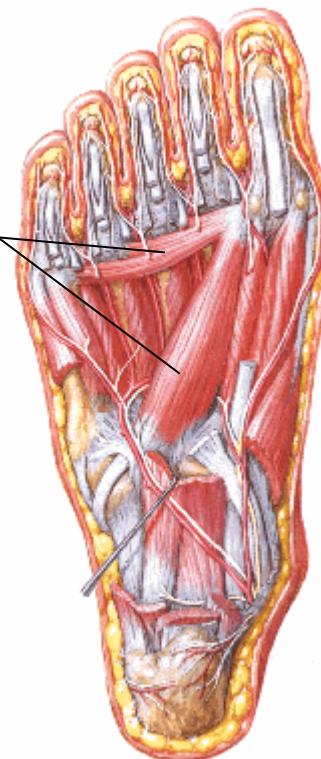
# Mišići stopala

(plantarno)

drugi sloj



treći sloj



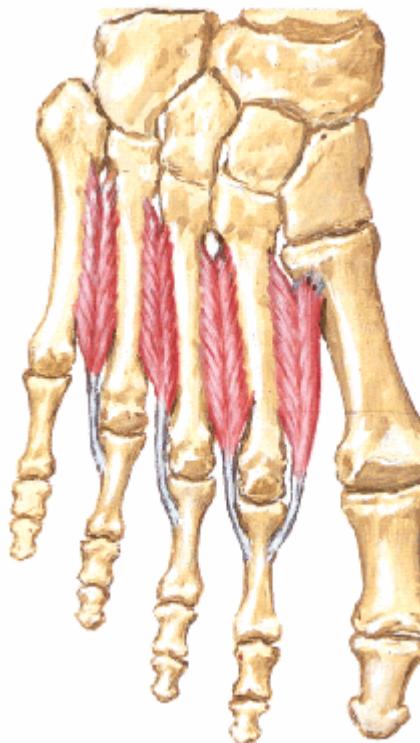
m. primicač palca  
(*m. adductor hallucis*)

glistoliki mišići stopala  
(*mm. lumbricales*)

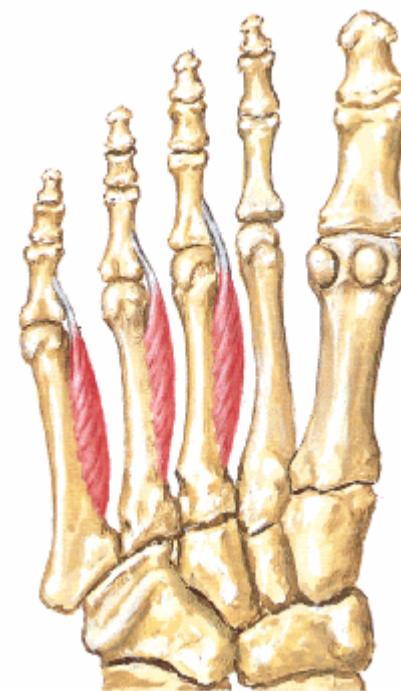
četverokutni tabanski m.  
(*m. quadratus plantae*)

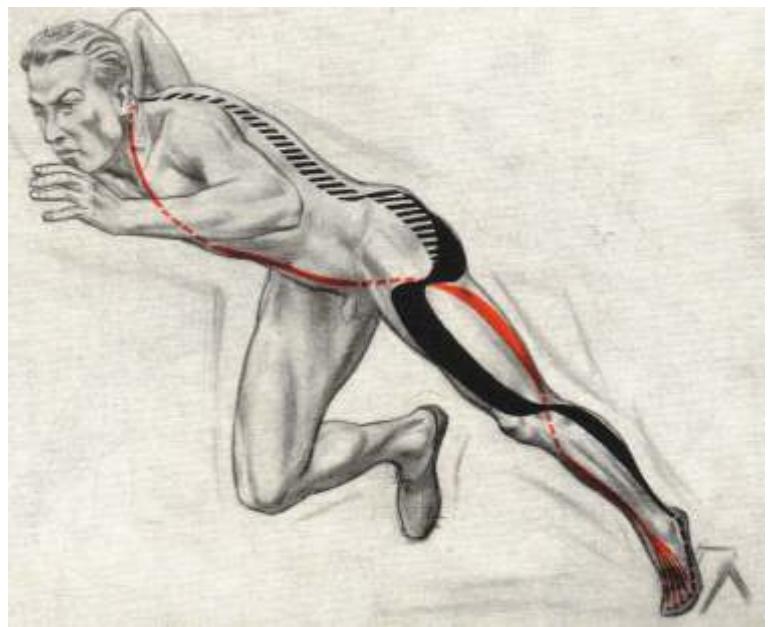
# Međukoštani mišići stopala

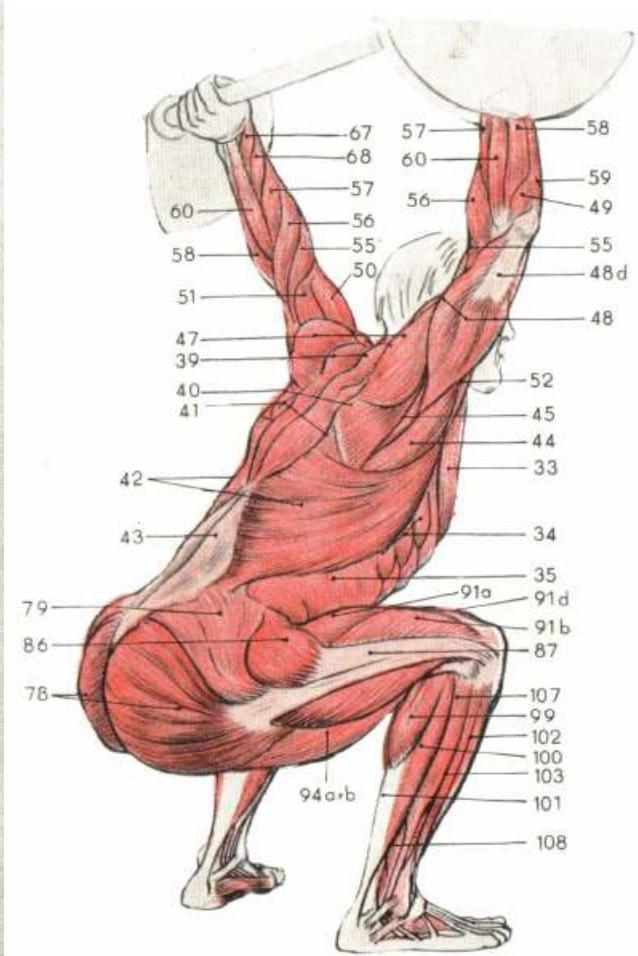
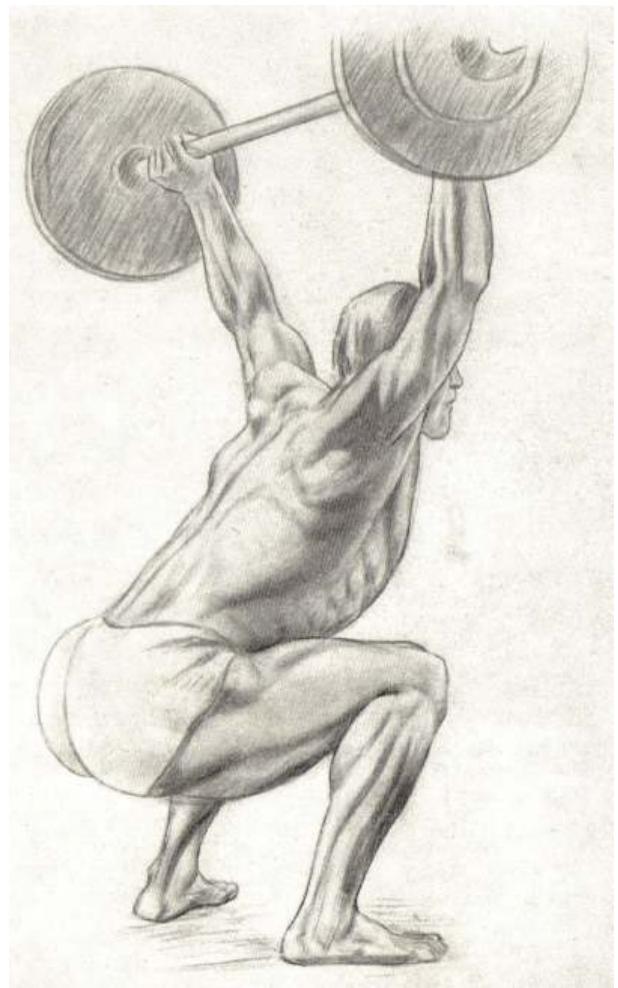
*dorzalni*

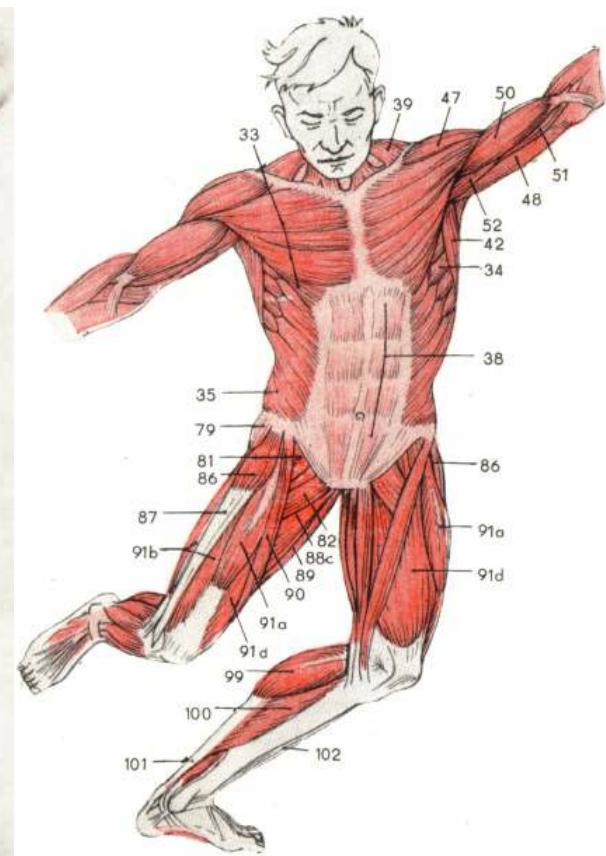
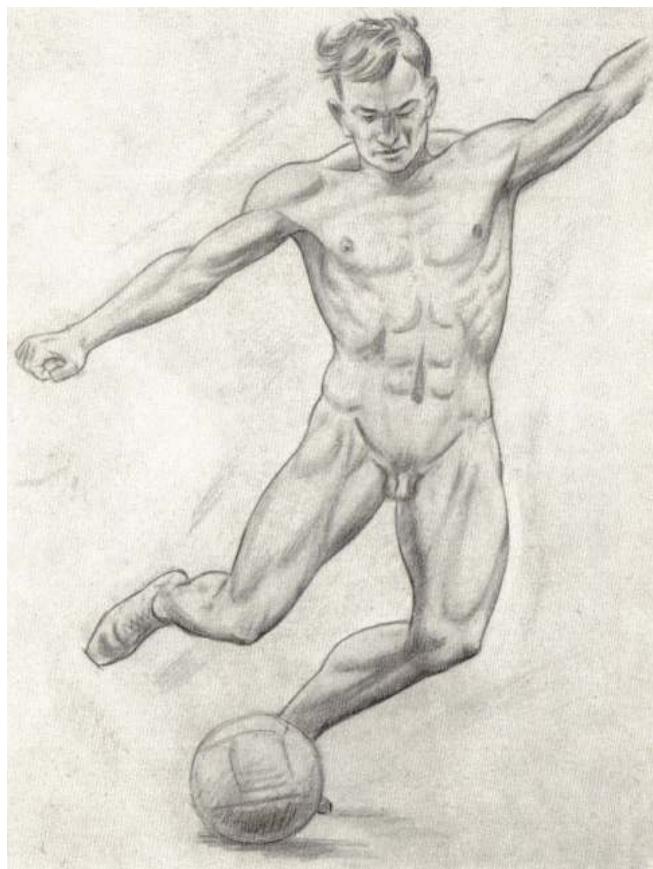


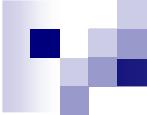
*plantarni*











# Sjedni živac

(*n. ischiadicus*)

