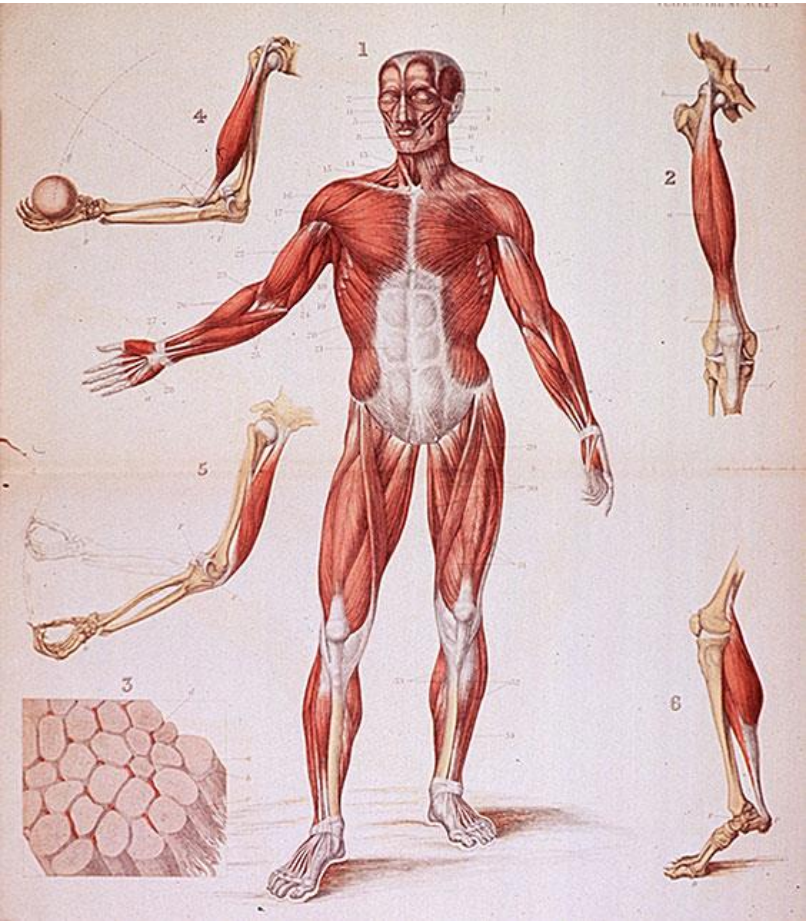
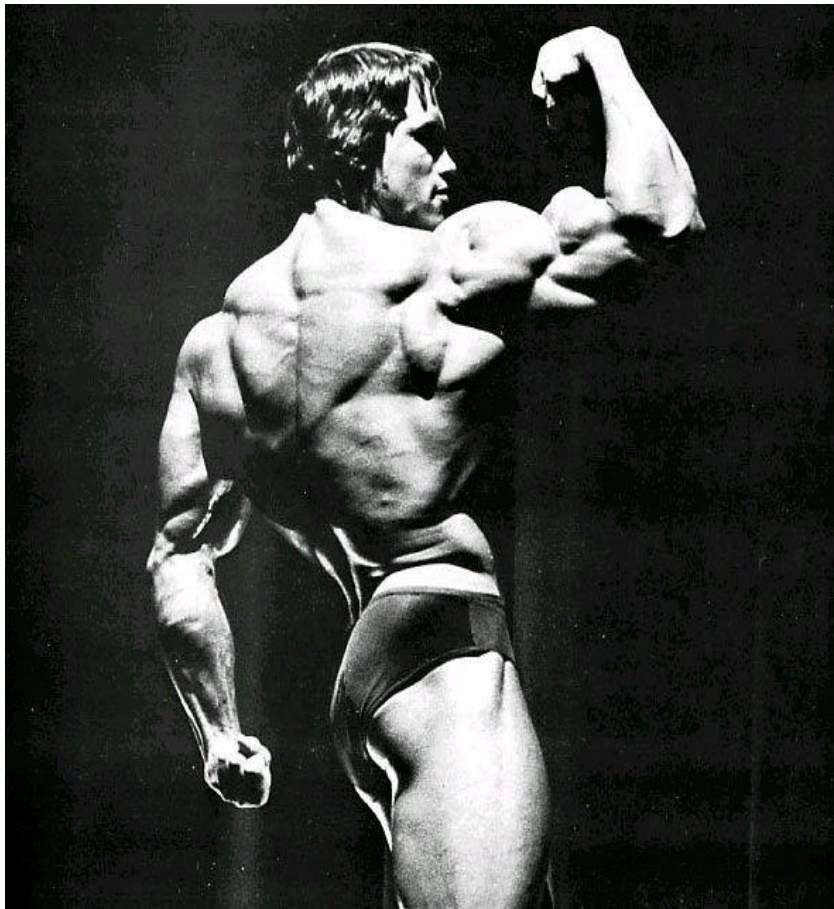
# MUSCLES, NERVES & VESSELS OF THE LIMBS





Department of Anatomy
Second Faculty of Medicine
Charles University

MUDr. Azzat Al-Redouan

# Learning Objectives

- General anatomy of muscles.
- Arrangement of muscles within their compartments enclosed by fasciae.
- Origin and insertion, innervation, and function of muscles.
- Topography of nerves and vessels of the limbs.
- Identifying and drawing structures observed on cross-sections of the limbs.

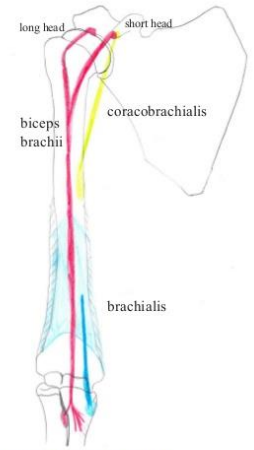
# How to effectively learn origin and insertion, innervation, and function of muscles?!!

C. Riedinger - An easy way to learn muscles

**Muscles of the arm**

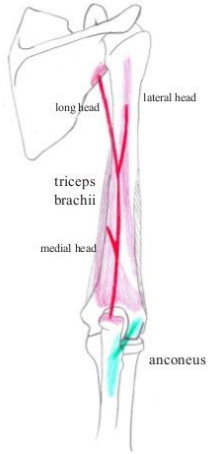
| name | meaning | body part | layer / location | origin | insertion | nerve supply | blood supply | function |
|---|---|---|---|---|---|---|---|---|
| **biceps brachii** | biceps of the arm | arm | anterior, superficial | long head: **supraglenoid tubercle of scapula** (through sleeve of synovial tissue in intertubercular bicipital groove of humerus, short head: **coracoid process**, joins long head midway down arm | via common tendon into the **bicipical tuberosity of radius**. Medial side: via bicipital **aponeurosis** into deep fascia of medial forearm and **subcutaneous border of ulna** | musculocutaneous | brachial artery | supinator of forearm when elbow is flexed, flexes elbow in fully supinated position. Shoulder: stabilises and minor flexion |
| **brachialis** | muscle of the arm | arm | anterior, intermediate | distal half of **anterior humeral shaft** and medial intermuscular septum | via strong tendon into **coronoid process of ulna** | musculocutaneous | radial recurrent artery | flexor of elbow |
| **coracobrachialis** | muscle of the arm and coracoid process | arm | anterior, deep | tip of **coracoid process of scapula** (with short head of biceps) | medial aspect **mid**-shaft of **humerus** | musculocutaneous | brachial artery | adducts shoulder (to hold things under arm), weak flexor of shoulder joint |
| **triceps brachii** | muscle of arm with three heads | arm | posterior, single muscle | long head: **infraglenoid tubercle of scapula**, lateral and medial head: posterior surface of **humerus**, medial head in lateral groove | tendon to **olecranon process of ulna** | radial nerve | deep brachial artery | extends elbow |
| **anconeous** | muscle attached to elbow | forearm / arm | posterior, superficial | posterior aspect of **lateral epicondyle of humerus** | lateral side of **olecranon** | radial nerve | | assists extension of elbow |

**Anterior**



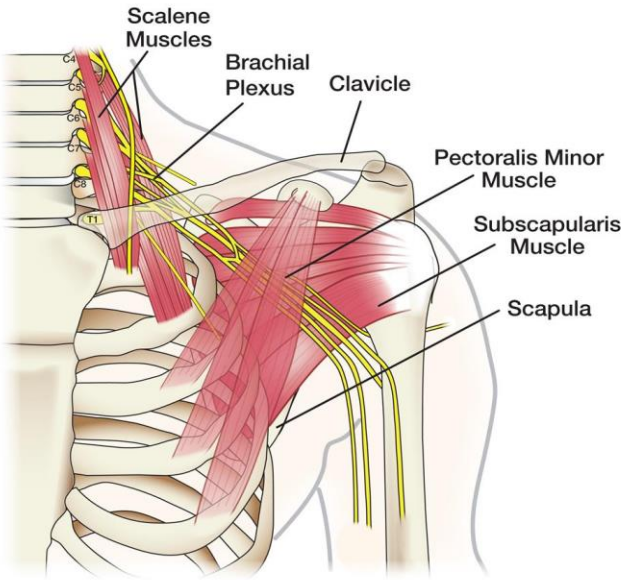

(musculocutaneous nerve)

**Posterior**



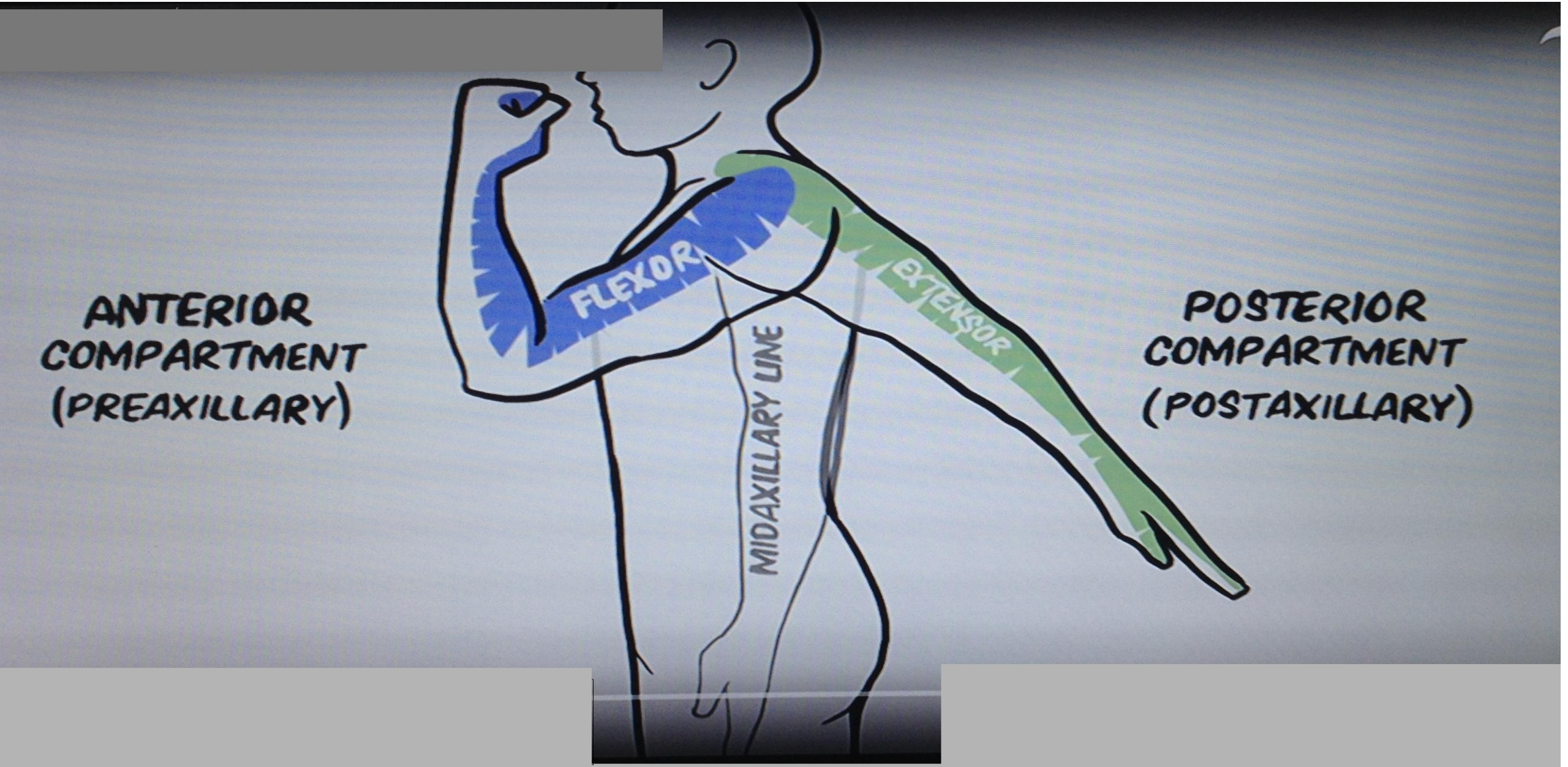

(radial nerve)

# Brachial Plexus *(draw it)

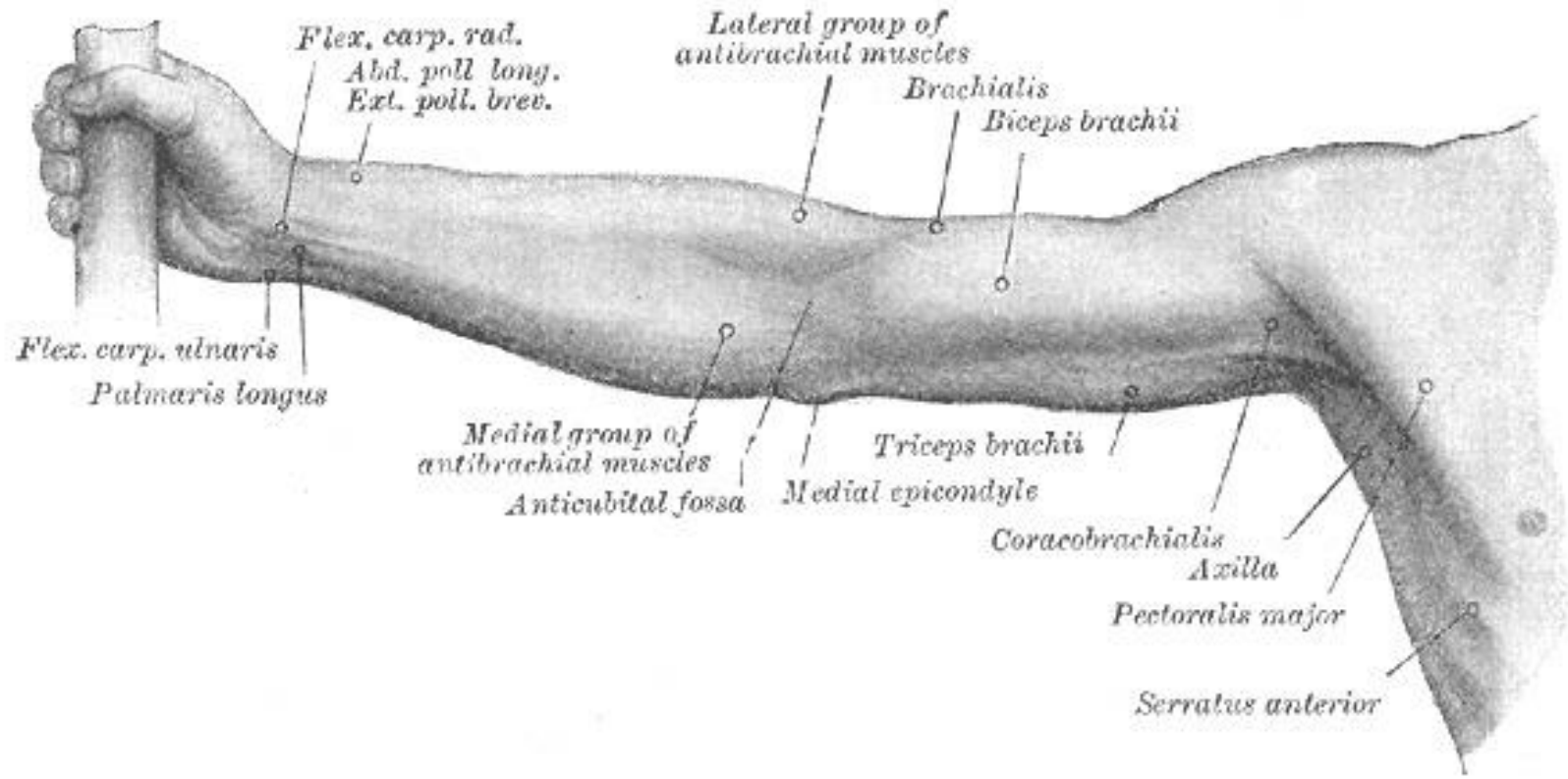


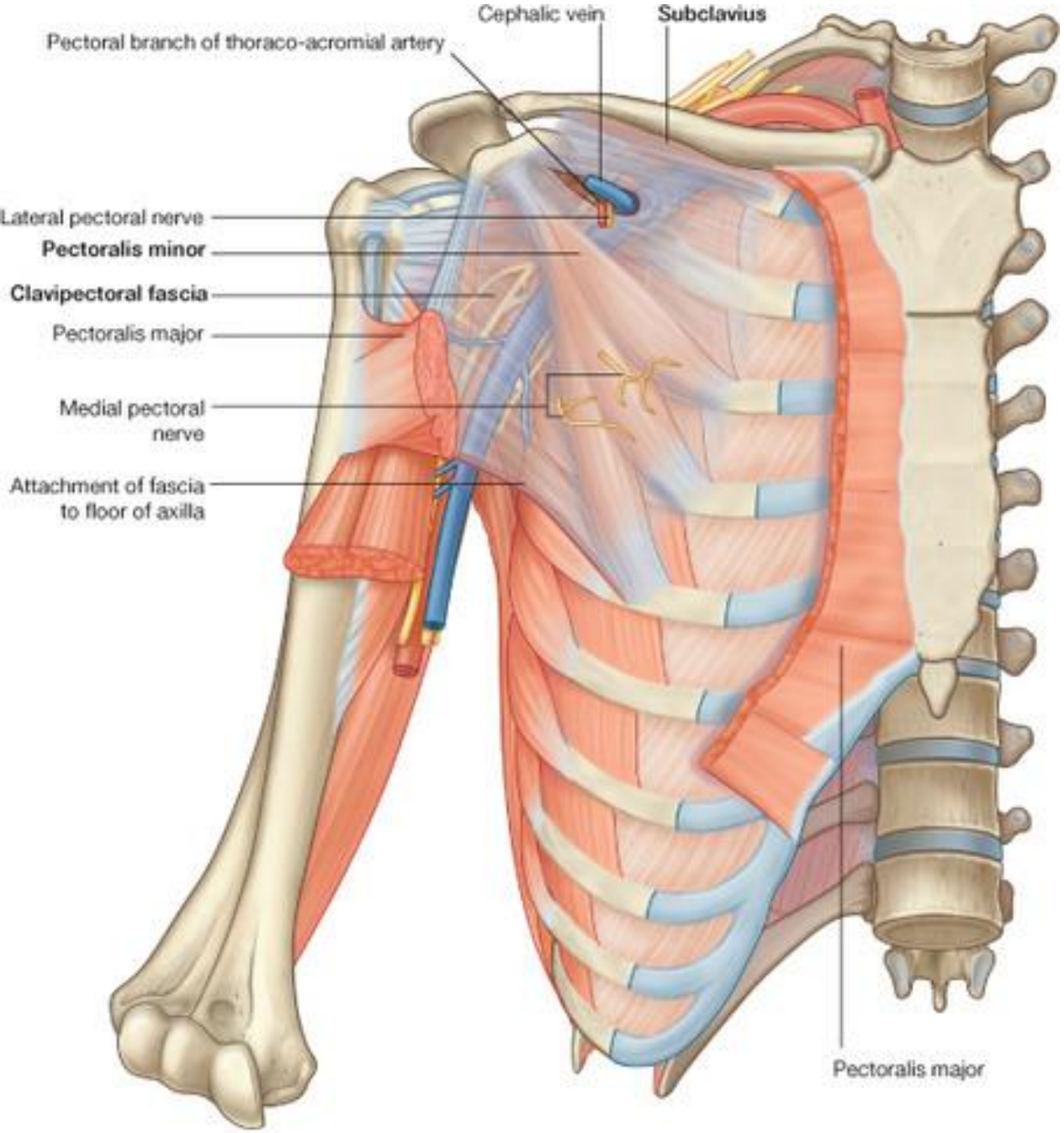

To phrenic nerve
5 roots (ventral rami)
3 trunks
3 anterior divisions
3 posterior divisions
3 cords
Terminal branches
Superior
Middle
Inferior
Lateral
Posterior
Medial
C4
C5
C6
C7
C8
T1
Axillary nerve (C5,C6)
Musculocutaneous nerve (C5,C6,C7)
Radial nerve (C5,C6,C7,C8,T1)
Median nerve (C5,C6,C7,C8,T1)
Ulnar nerve (C7,C8,T1)
Axillary artery
First rib
Middle scalene muscle
Clavicle
Anterior scalene muscle

# General Overview of Function



# UPPER LIMB COMPARTMENTS



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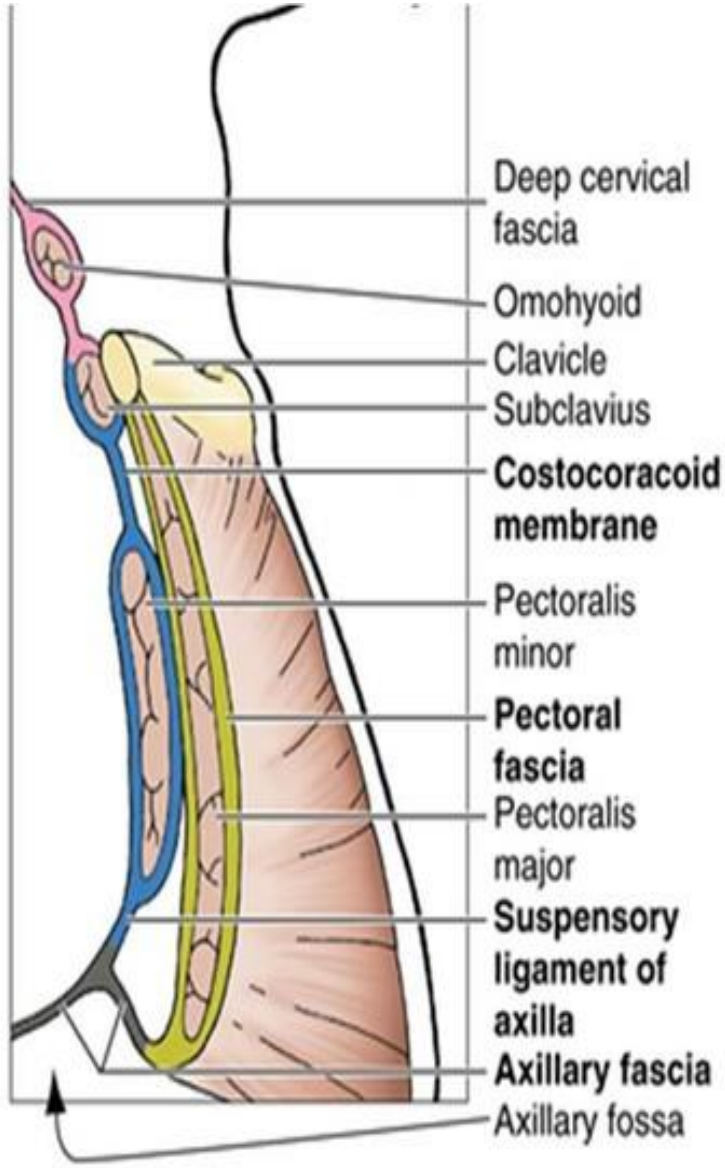
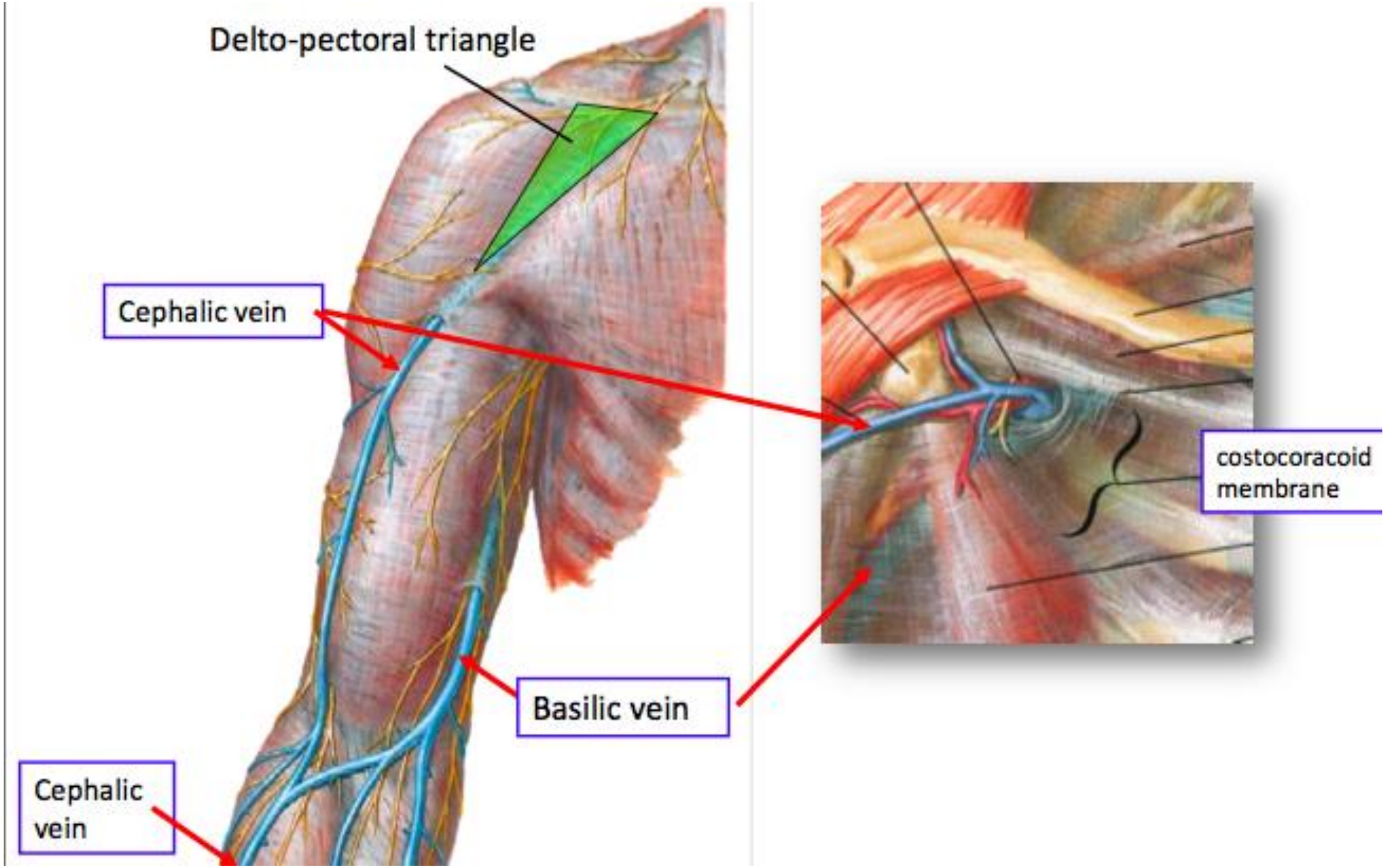
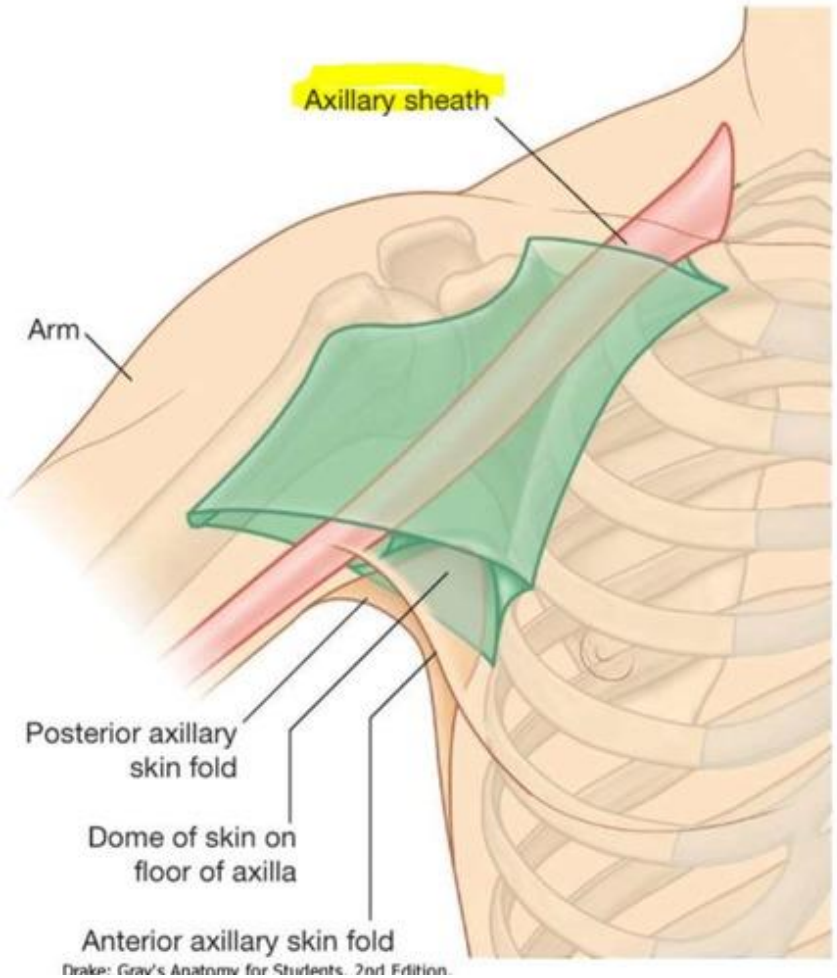


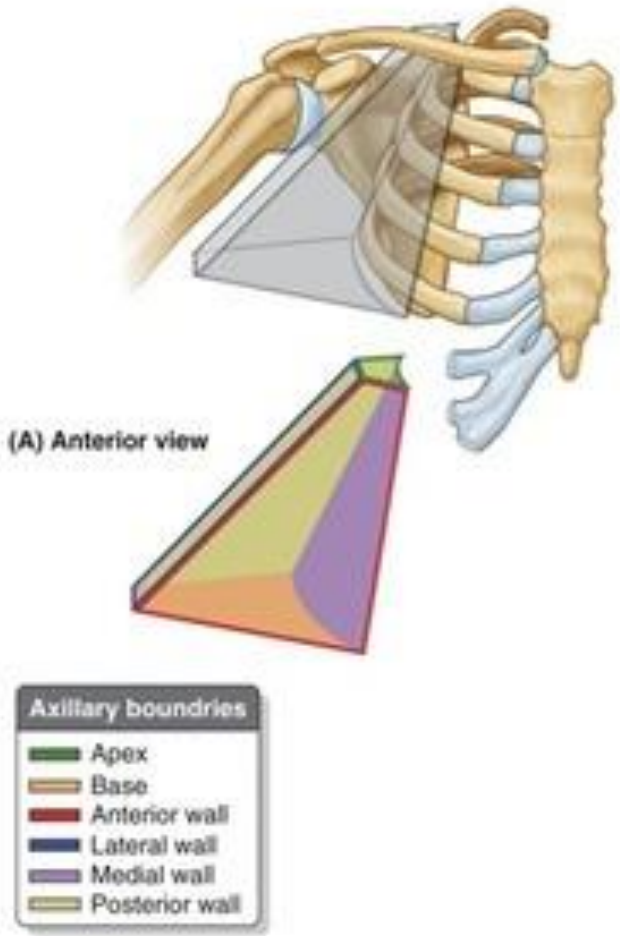

(B) Lateral view of sagittal section

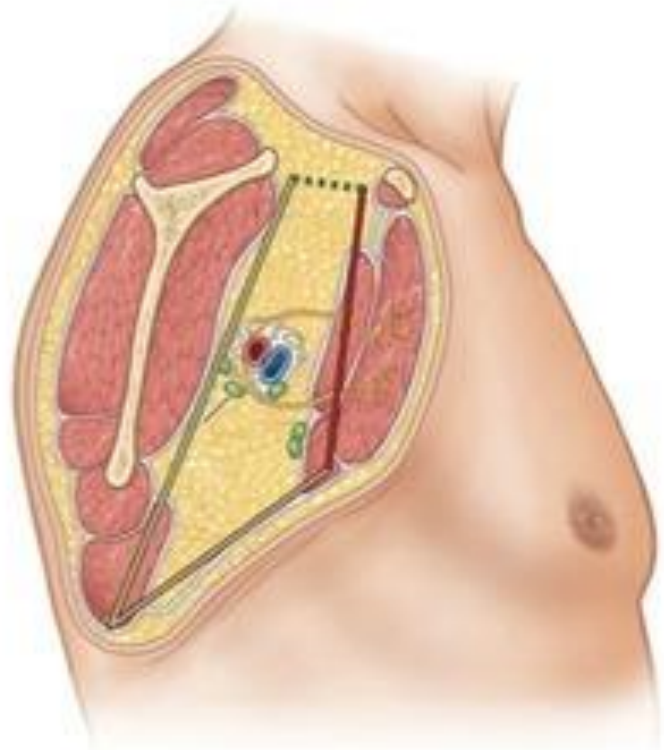

Delto-pectoral triangle
Cephalic vein
Basilic vein
Cephalic vein
costocoracoid membrane

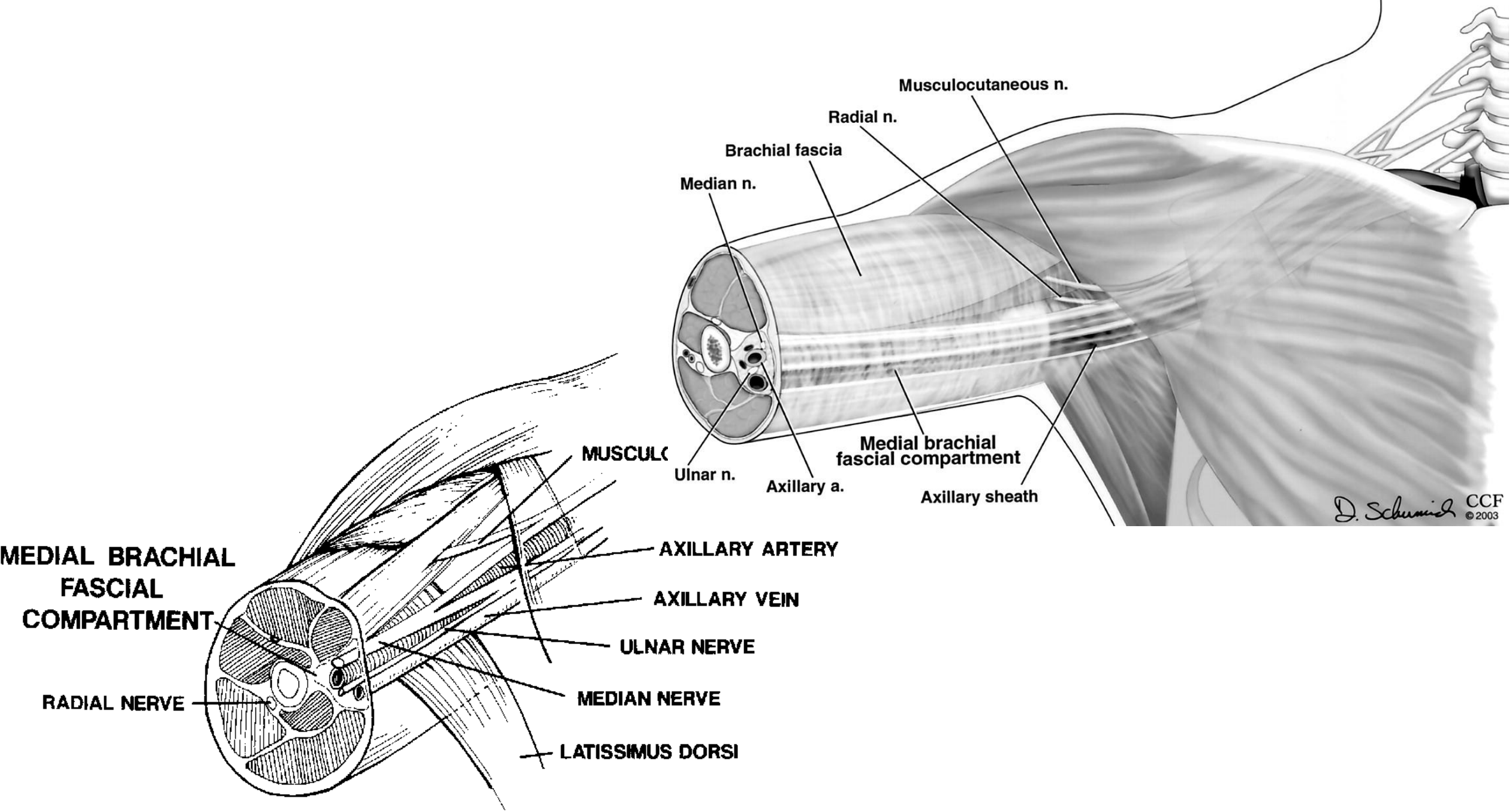
# Boundaries of the axilla




Drake: Gray's Anatomy for Students, 2nd Edition




Musculocutaneous n.
Radial n.
Brachial fascia
Median n.
Ulnar n.
Axillary a.
Medial brachial
fascial compartment
Axillary sheath
D. Schumich
CCF
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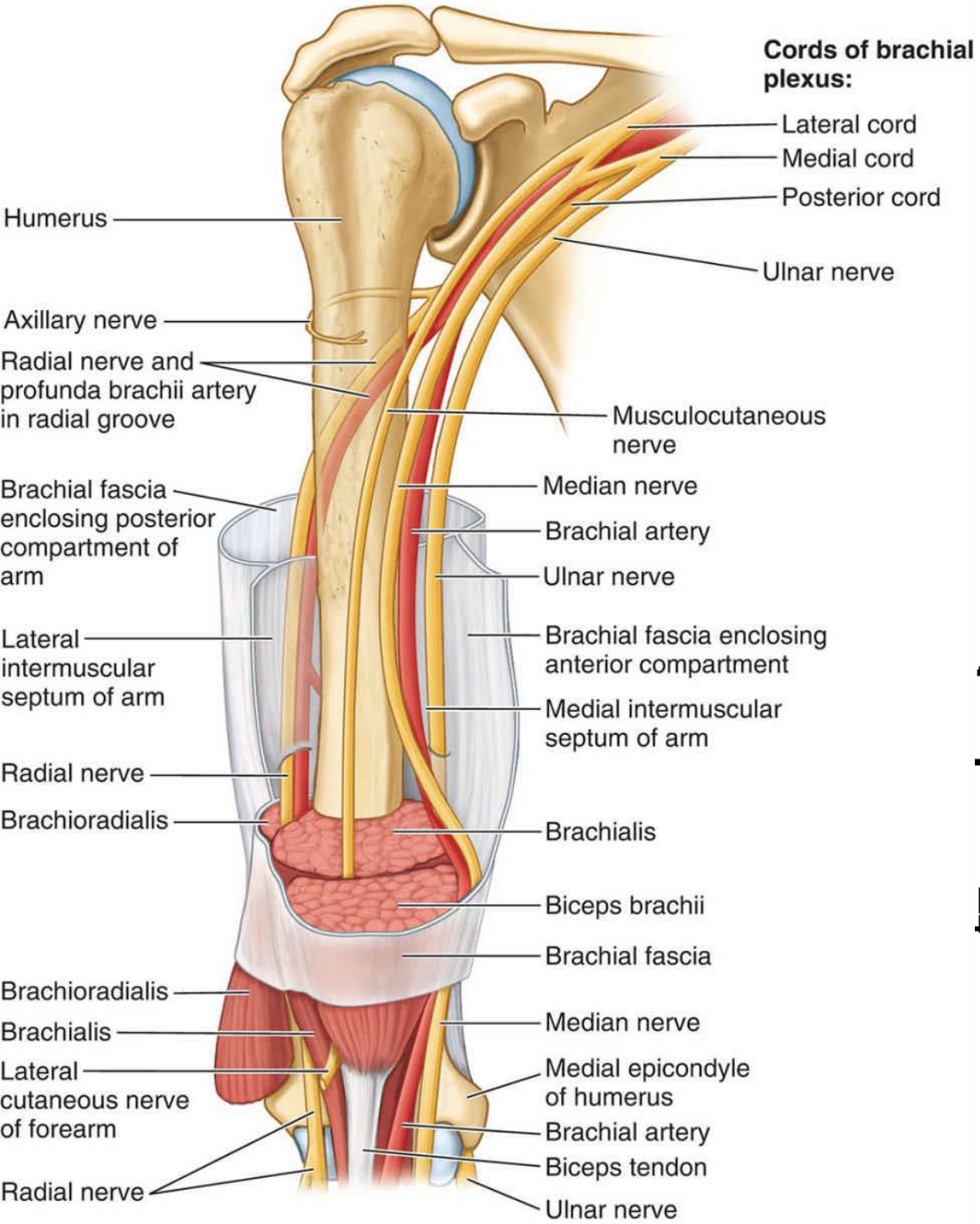
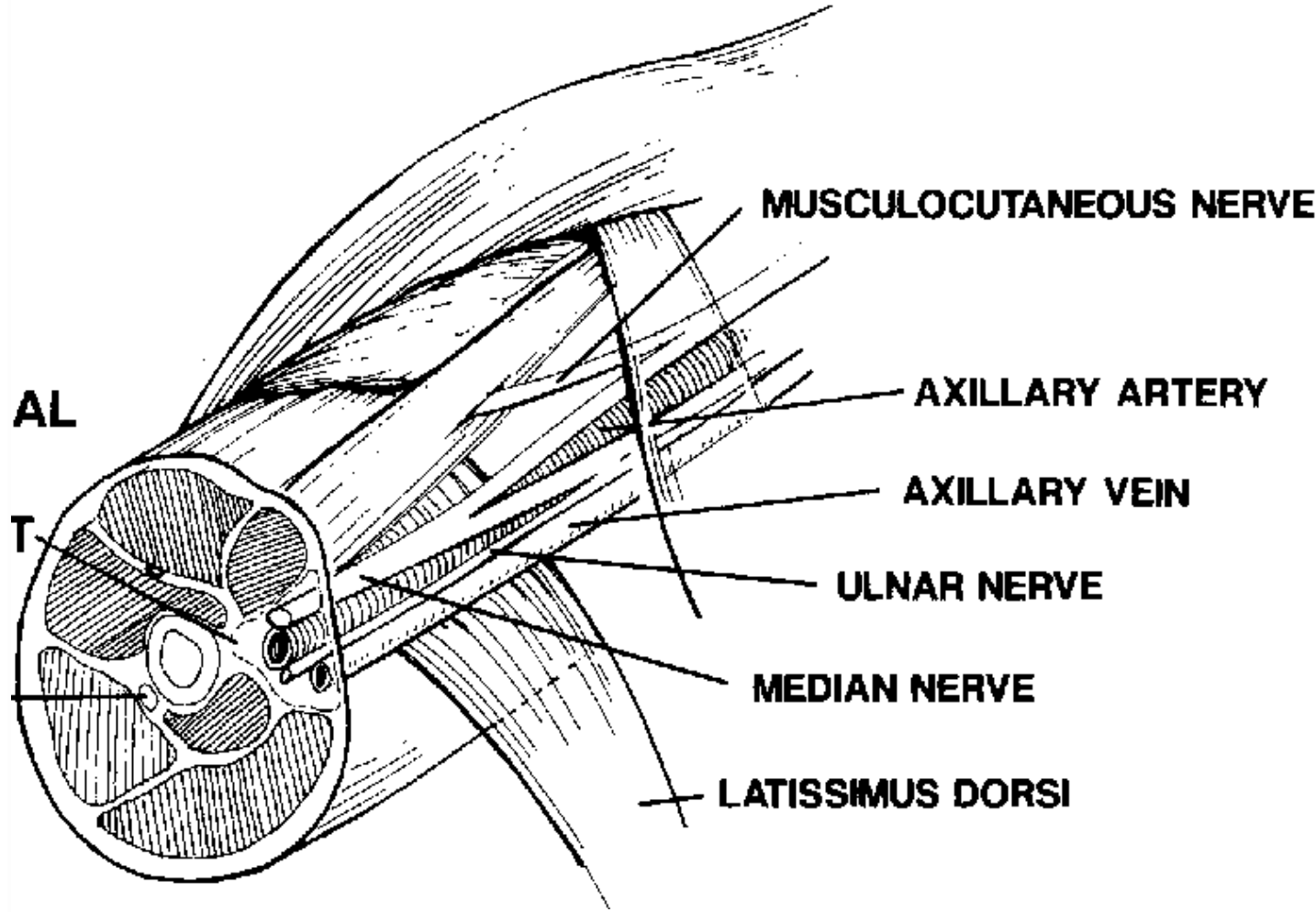
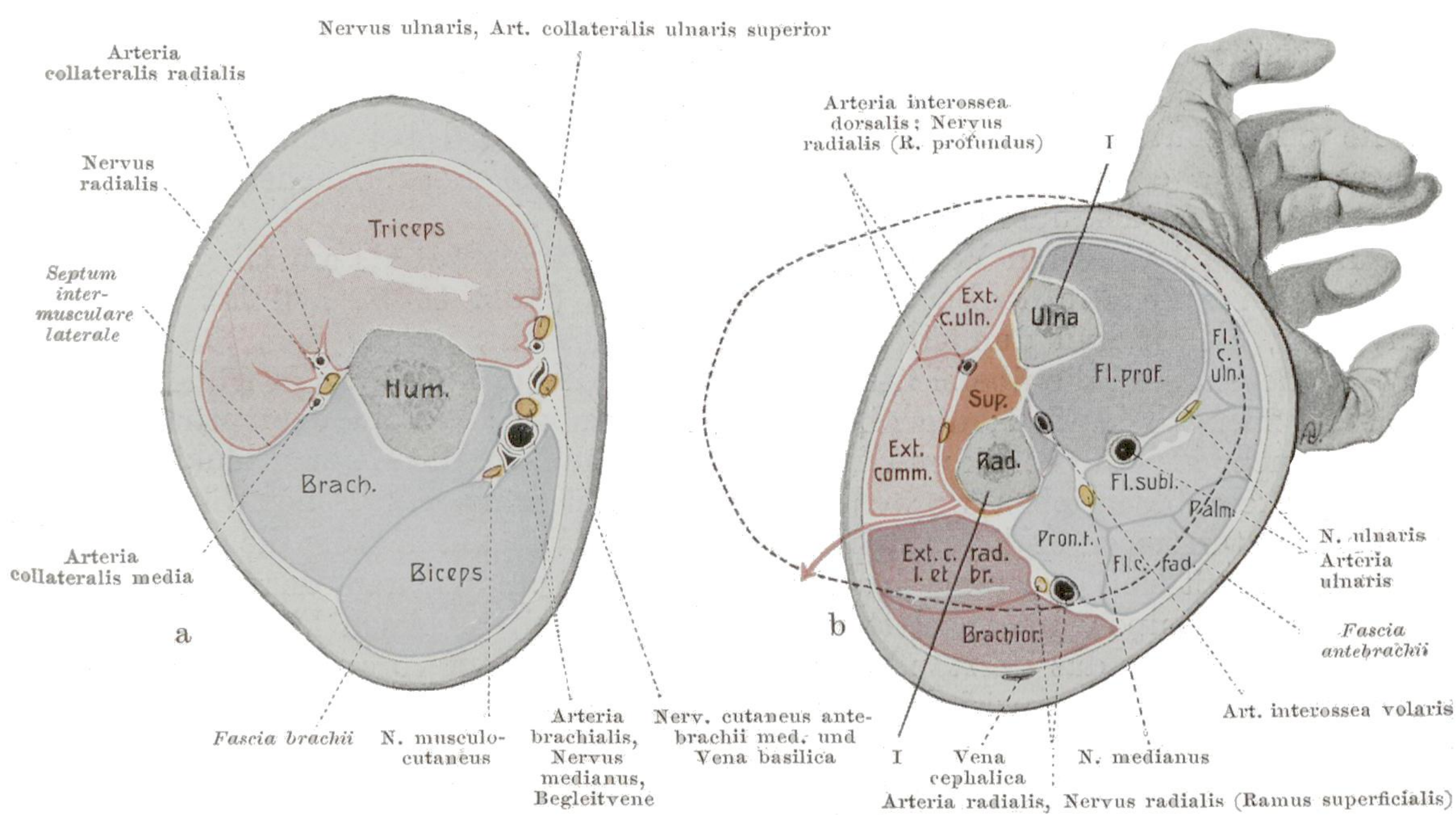
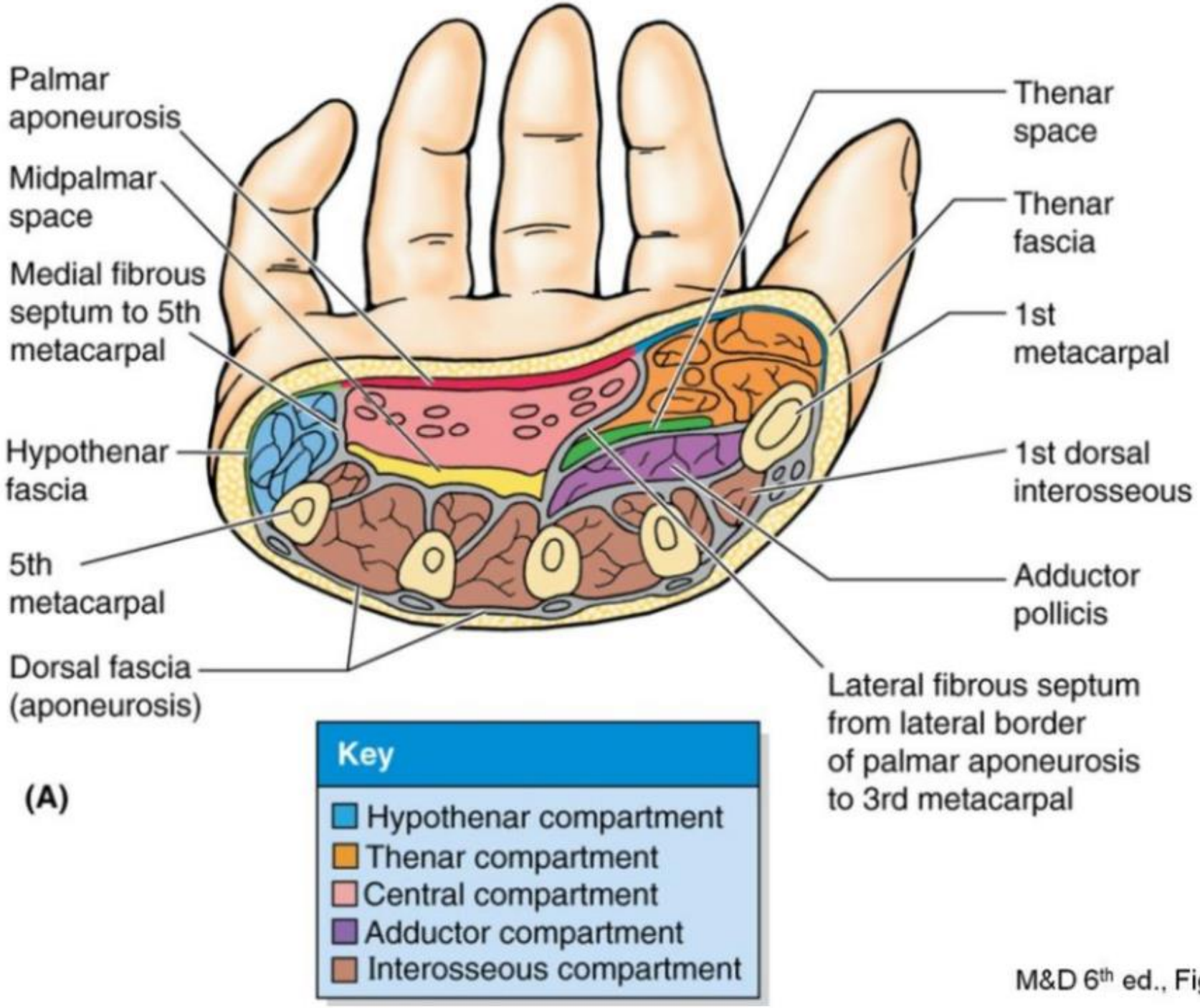
MUSCULO
AXILLARY ARTERY
AXILLARY VEIN
ULNAR NERVE
MEDIAN NERVE
LATISSIMUS DORSI
MEDIAL BRACHIAL
FASCIAL
COMPARTMENT
RADIAL NERVE


Cords of brachial plexus:
Lateral cord
Medial cord
Posterior cord
Ulnar nerve
Humerus
Axillary nerve
Radial nerve and profunda brachii artery in radial groove
Musculocutaneous nerve
Median nerve
Brachial fascia enclosing posterior compartment of arm
Brachial artery
Ulnar nerve
Lateral intermuscular septum of arm
Brachial fascia enclosing anterior compartment
Medial intermuscular septum of arm
Radial nerve
Brachioradialis
Brachialis
Biceps brachii
Brachial fascia
Brachioradialis
Brachialis
Median nerve
Lateral cutaneous nerve of forearm
Medial epicondyle of humerus
Brachial artery
Biceps tendon
Radial nerve
Ulnar nerve

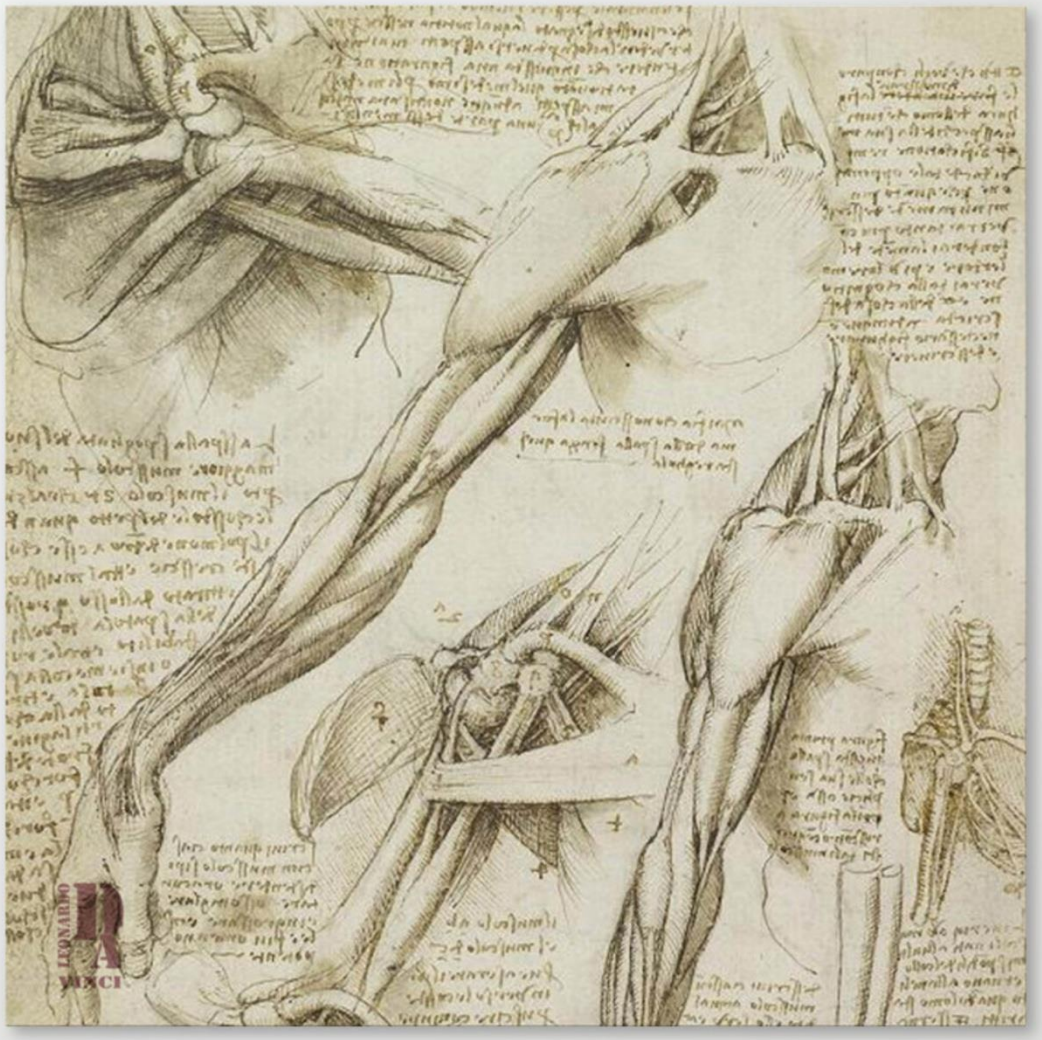

AL
T
MUSCULOCUTANEOUS NERVE
AXILLARY ARTERY
AXILLARY VEIN
ULNAR NERVE
MEDIAN NERVE
LATISSIMUS DORSI

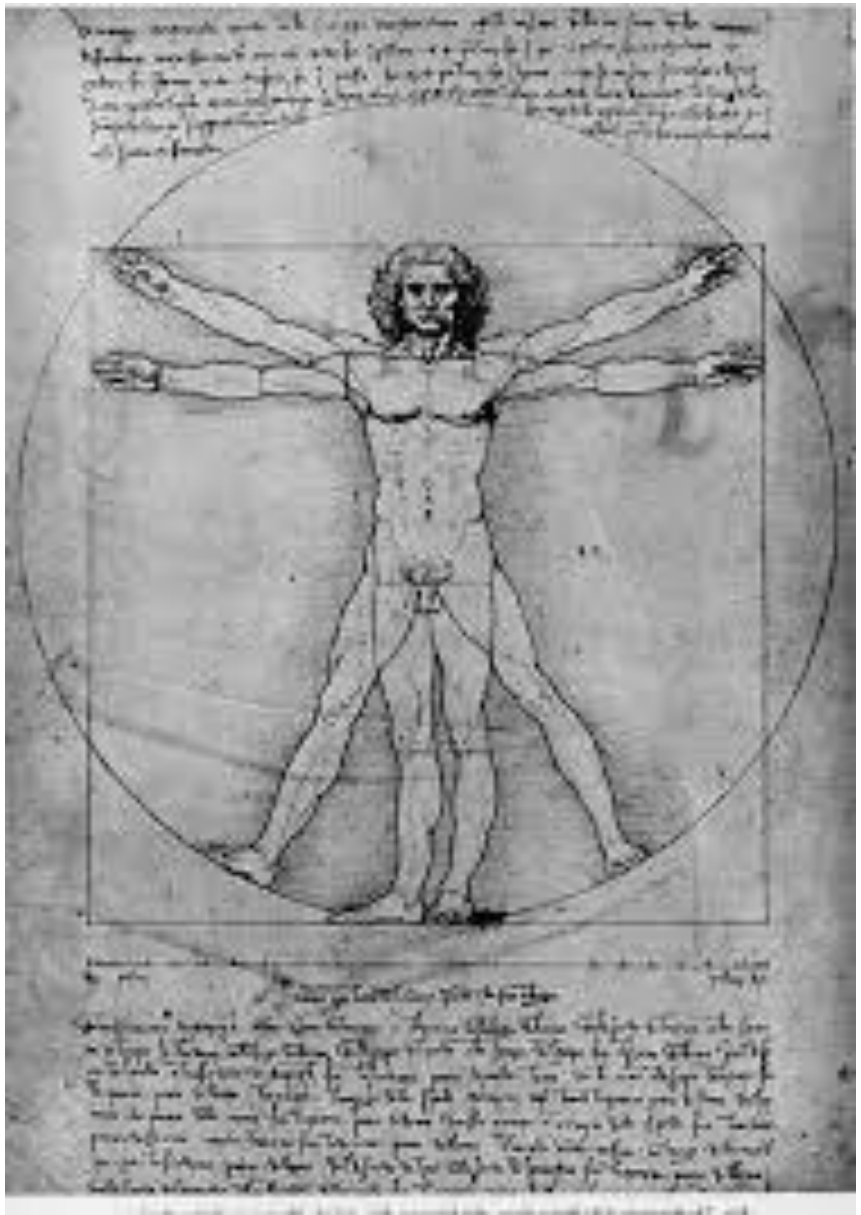

Nervus ulnaris, Art. collateralis ulnaris superior
Arteria collateralis radialis
Nervus radialis
Septum intermusculare laterale
Triceps
Hum.
Brach.
Biceps
Arteria collateralis media
a
Fascia brachii
N. musculocutaneus
Arteria brachialis, Nervus medianus, Begleitvene
Nerv. cutaneus antebrachii med. und Vena basilica
Arteria interossea dorsalis; Nervus radialis (R. profundus)
I
Ext. c.uln.
Ulna
Fl. c. uln.
Fl. prof.
Sup.
Ext. comm.
Rad.
Fl. subl.
Palm.
Pron. t.
Ext. c. rad. l. et br.
Fl. c. rad.
Brachior.
b
N. ulnaris
Arteria ulnaris
Fascia antebrachii
Art. interossea volaris
I
Vena cephalica
N. medianus
Arteria radialis, Nervus radialis (Ramus superficialis)


Palmar aponeurosis
Midpalmar space
Medial fibrous septum to 5th metacarpal
Hypothenar fascia
5th metacarpal
Dorsal fascia (aponeurosis)
Thenar space
Thenar fascia
1st metacarpal
1st dorsal interosseous
Adductor pollicis
Lateral fibrous septum from lateral border of palmar aponeurosis to 3rd metacarpal
Key
Hypothenar compartment
Thenar compartment
Central compartment
Adductor compartment
Interosseous compartment
(A)

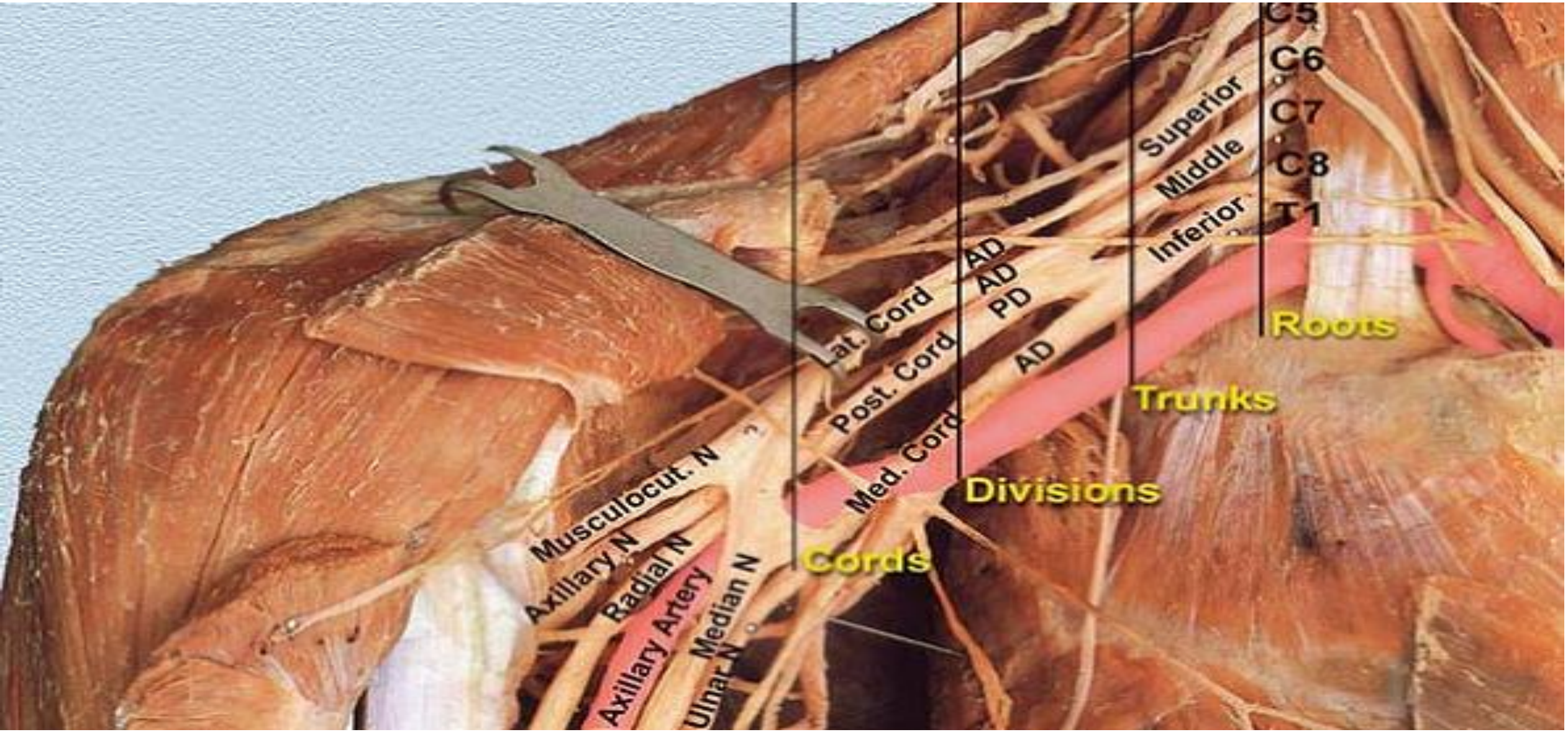
M&D 6th ed., Fig.

# TOPOGRAPHY OF THE UPPER LIMB.



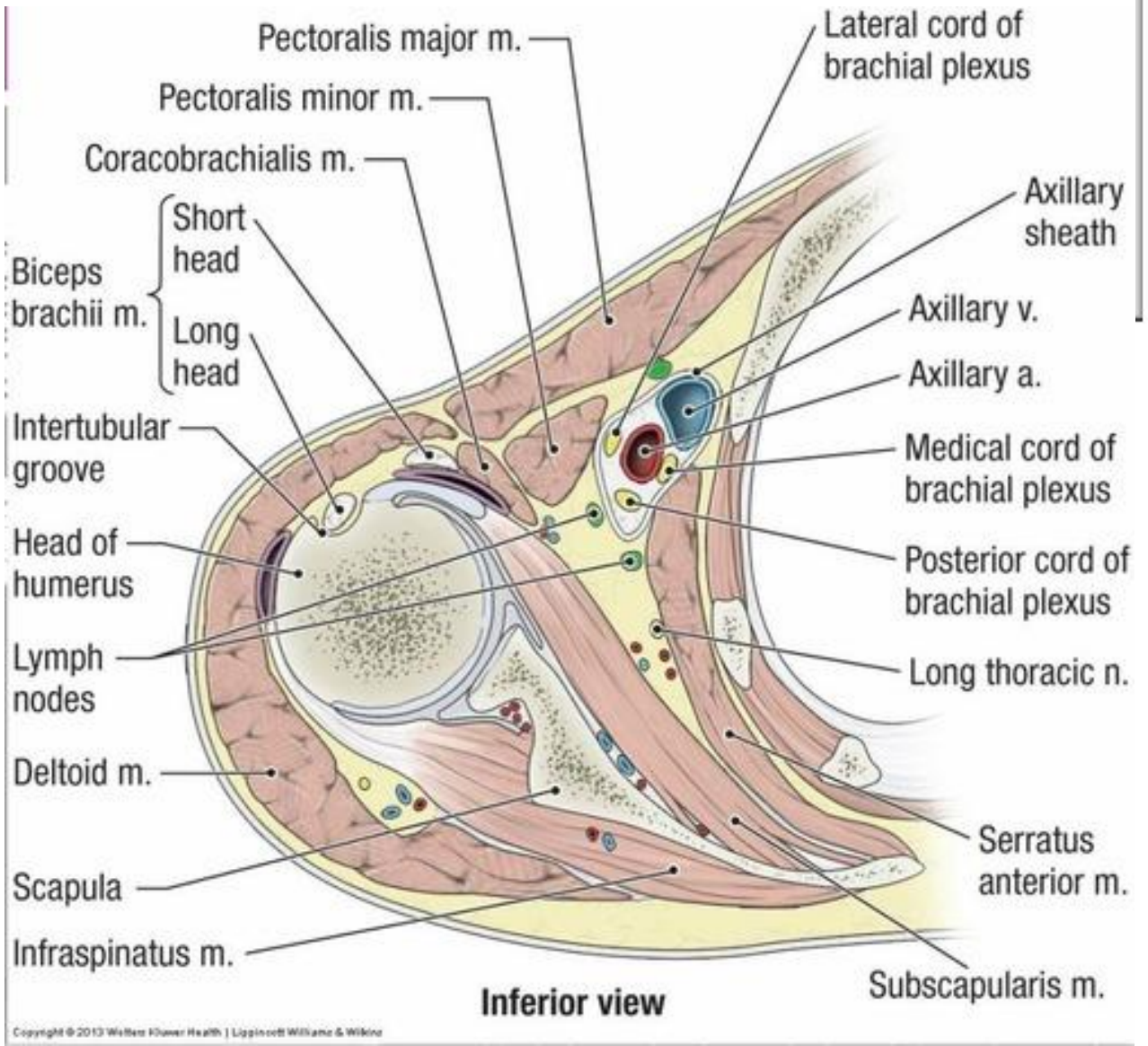



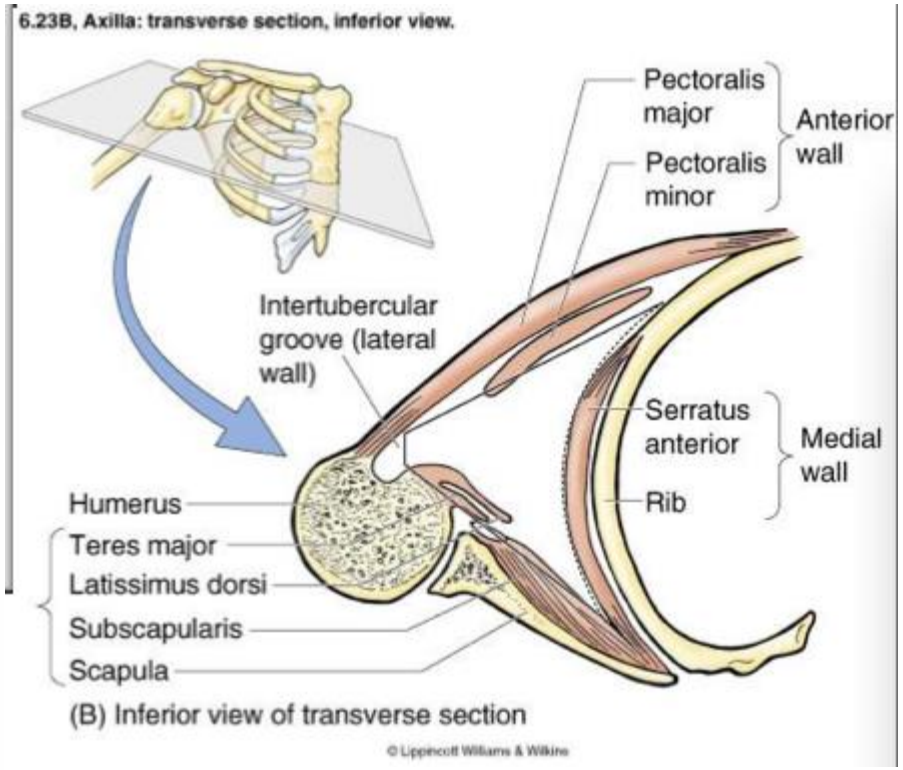
# Brachial Plexus Atlas presentations



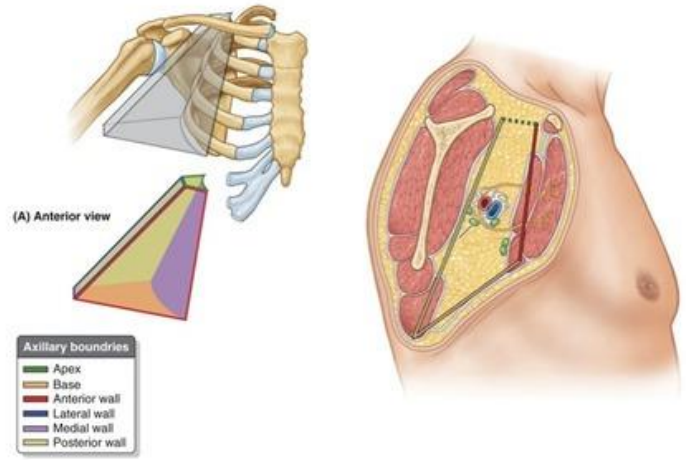
# Brachial Plexus Dissection Appearance

# Axillary Fossa

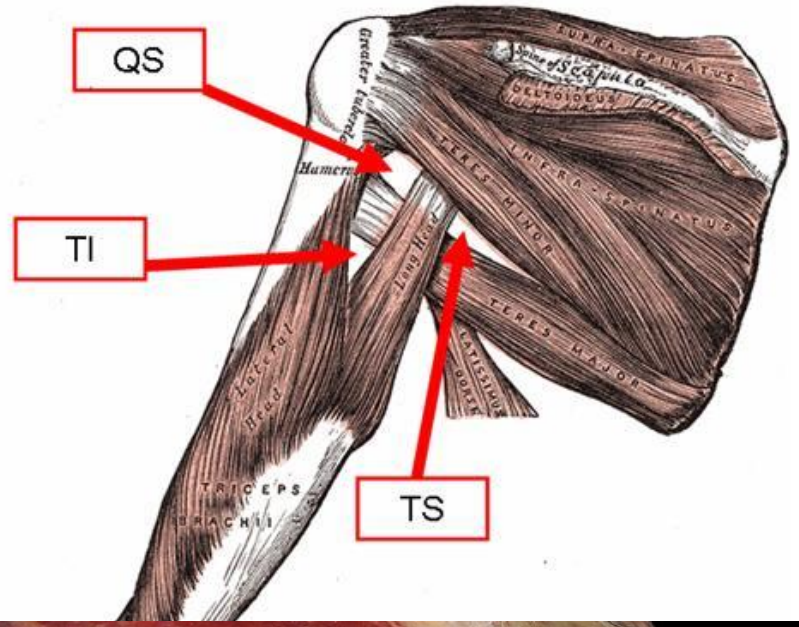


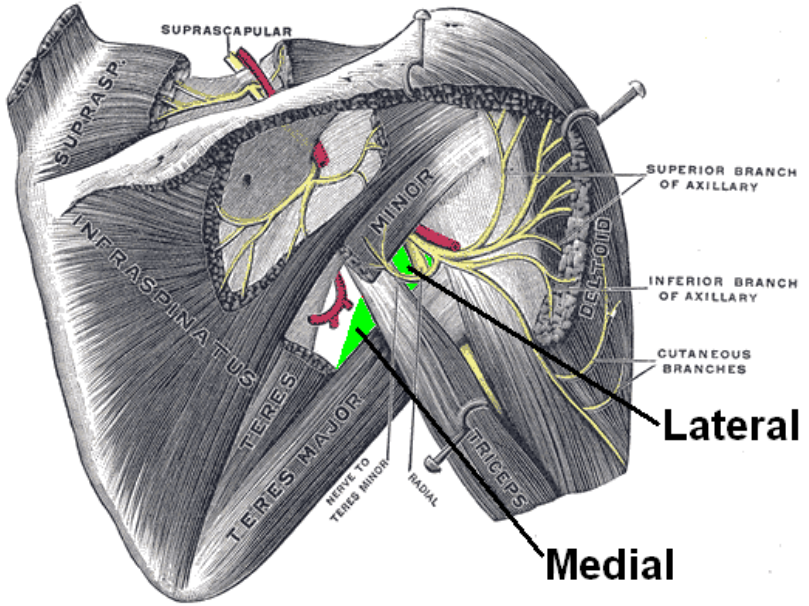




**Boundaries of the axilla**

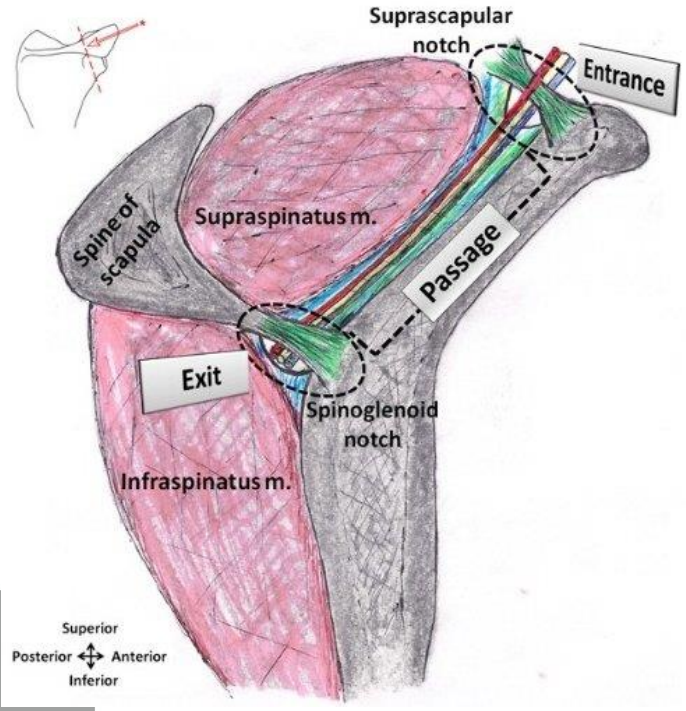


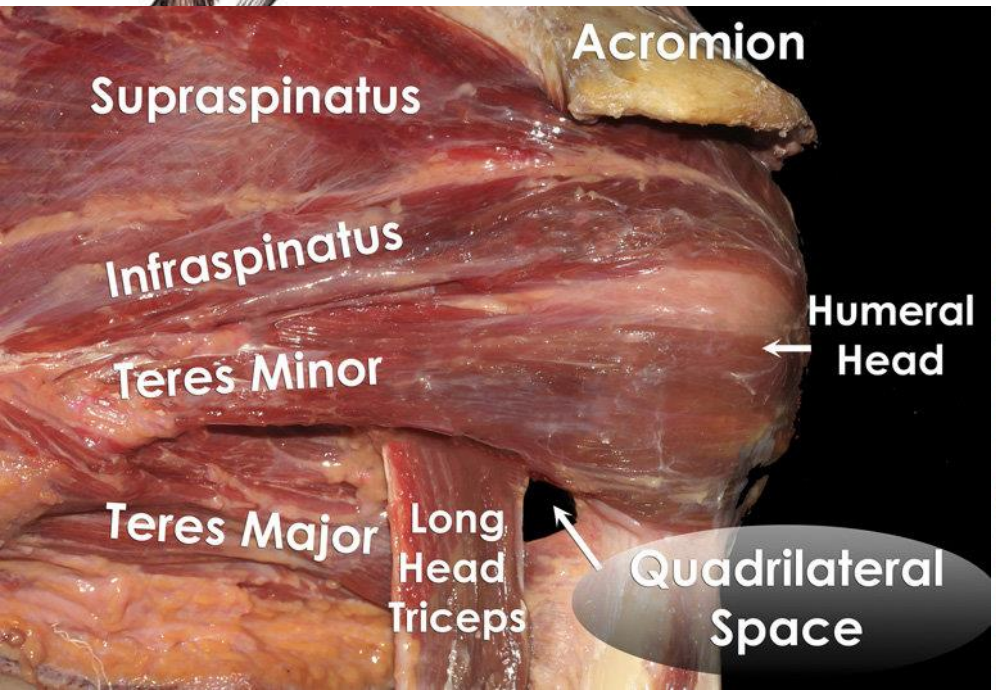
## Foramen humerotricipitale et omotricipitale

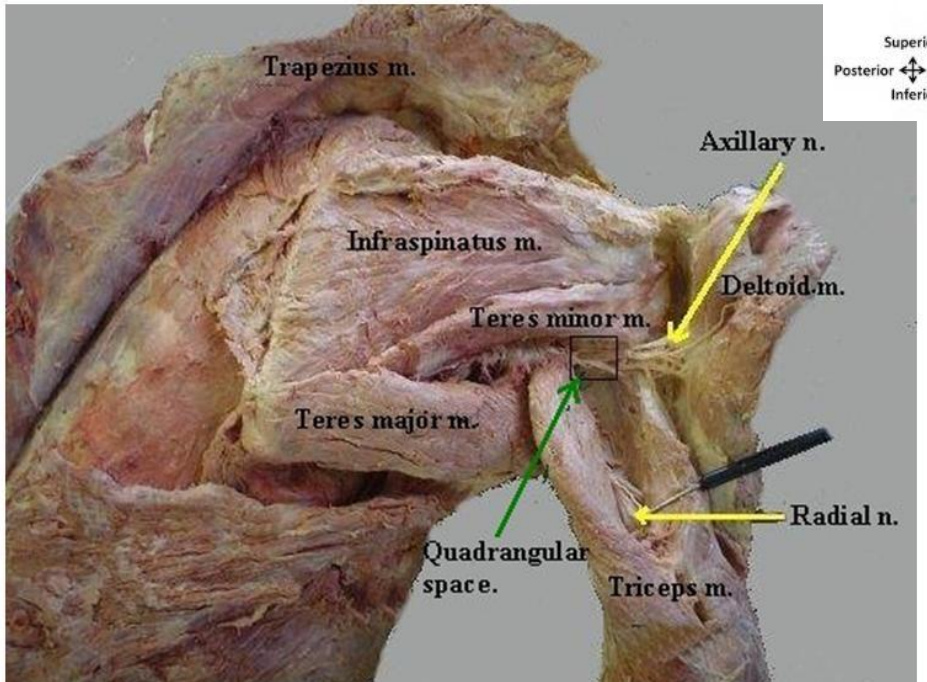


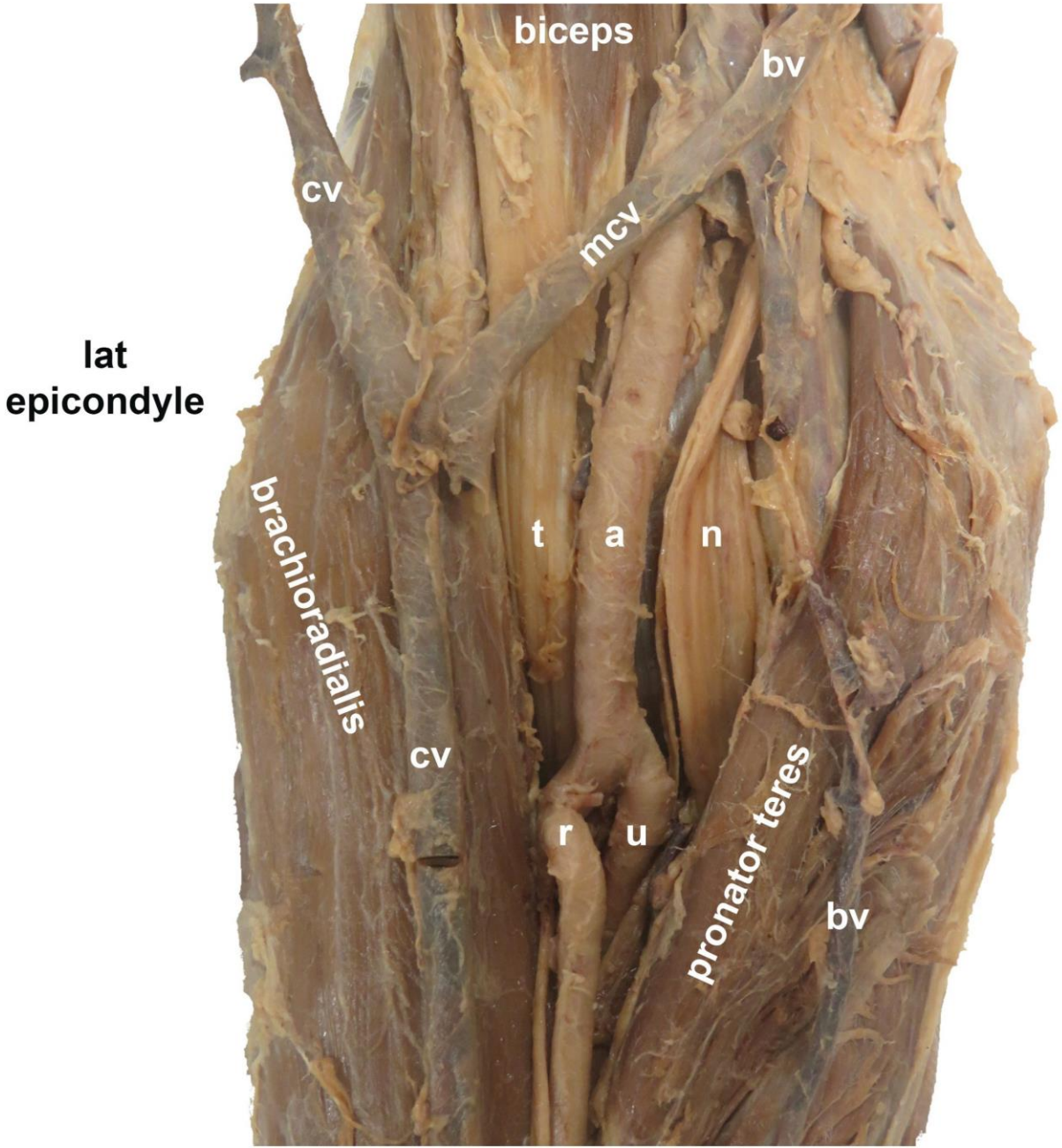

## Canalis Suprascapularis

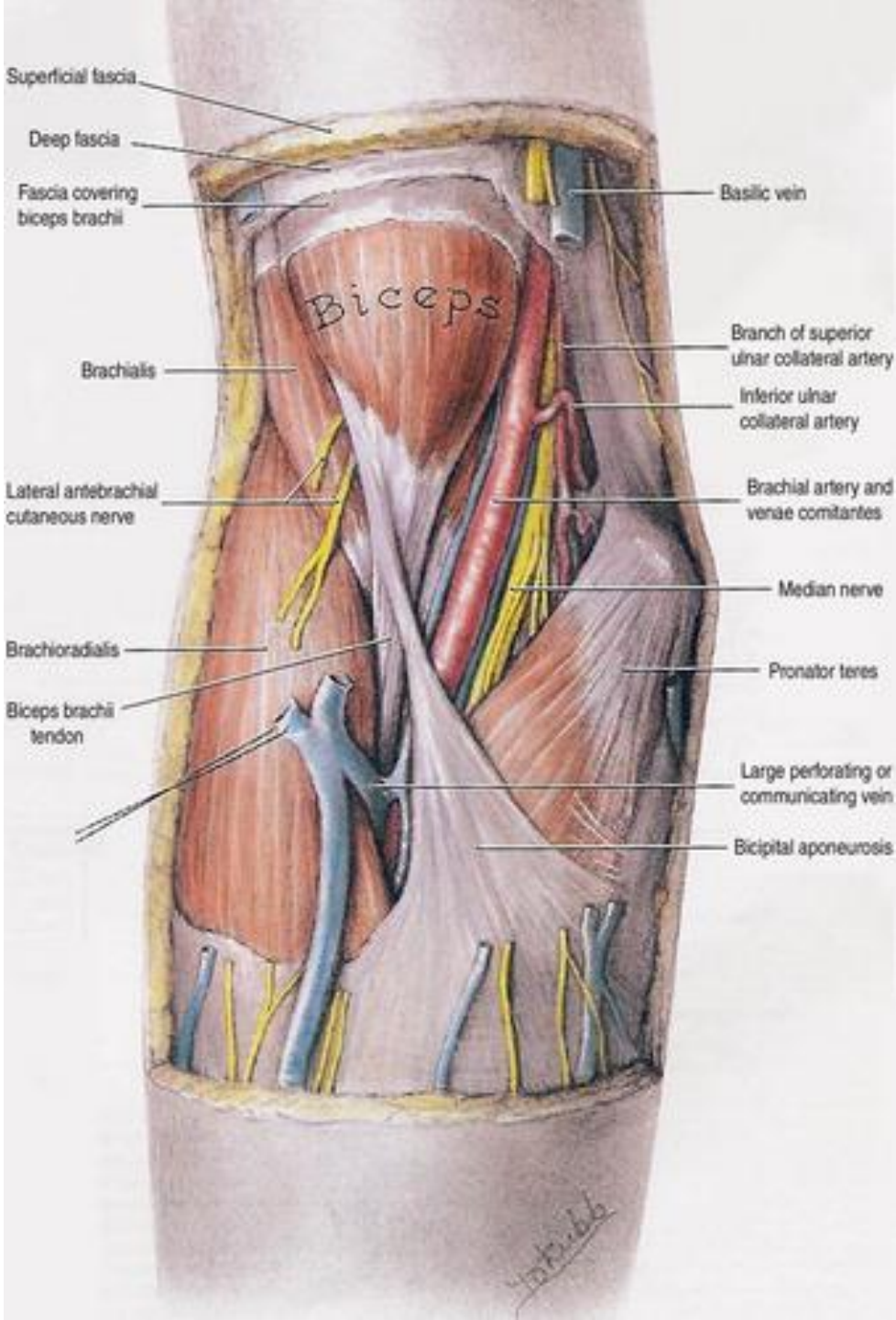


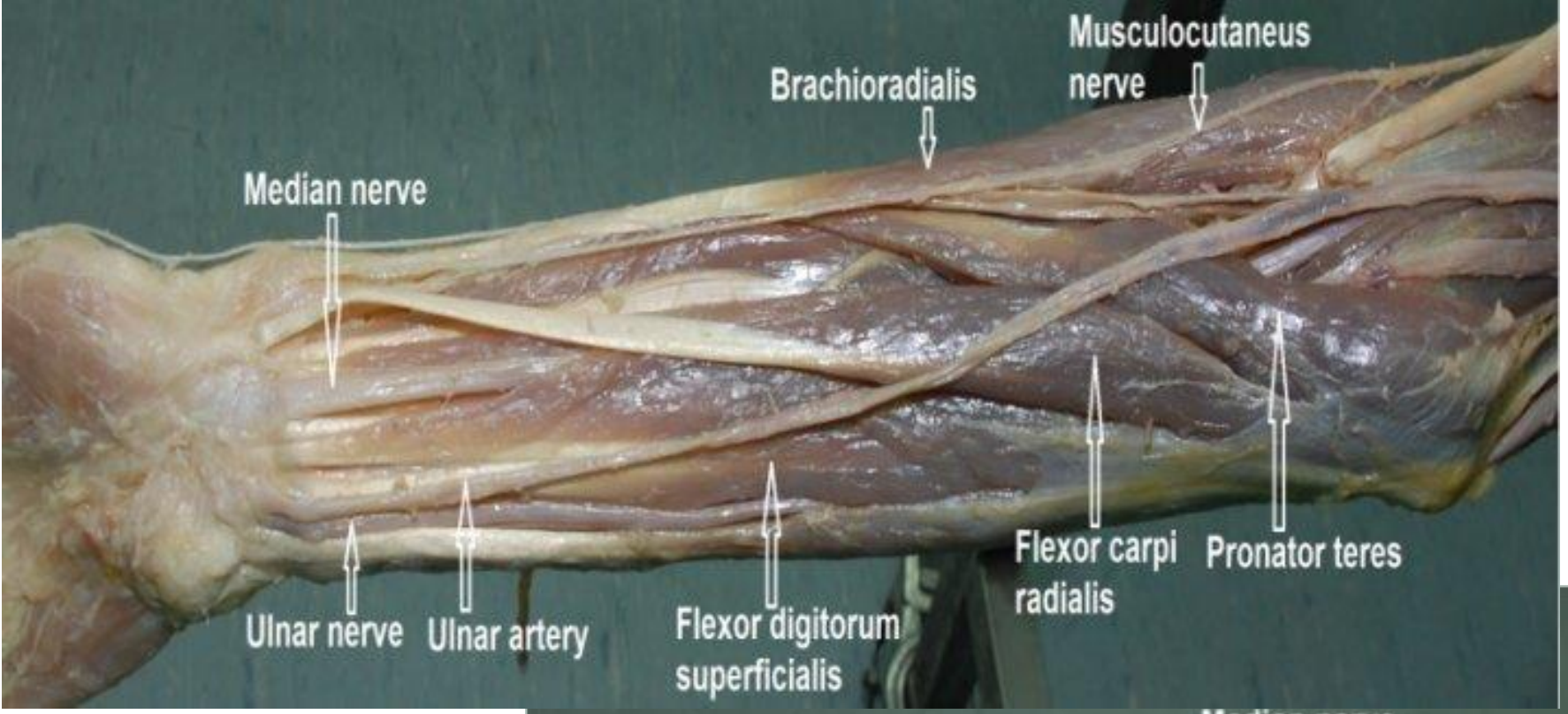



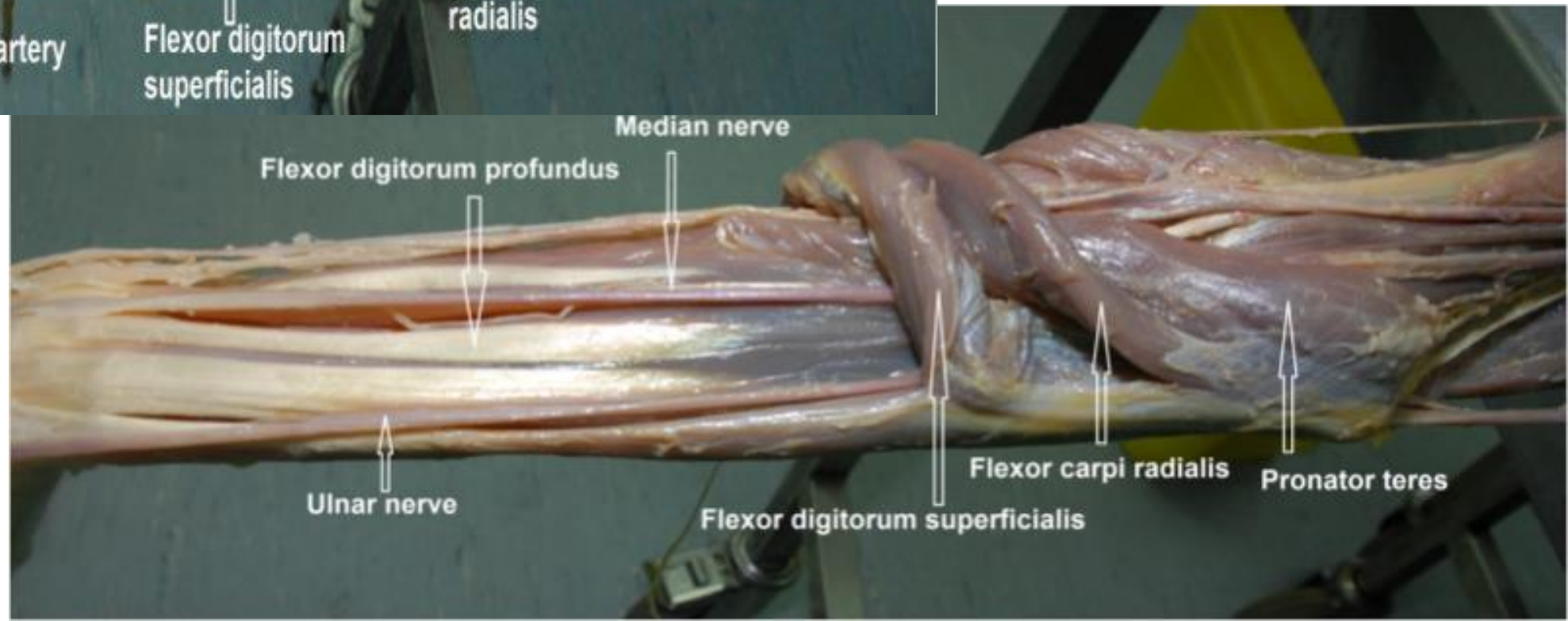



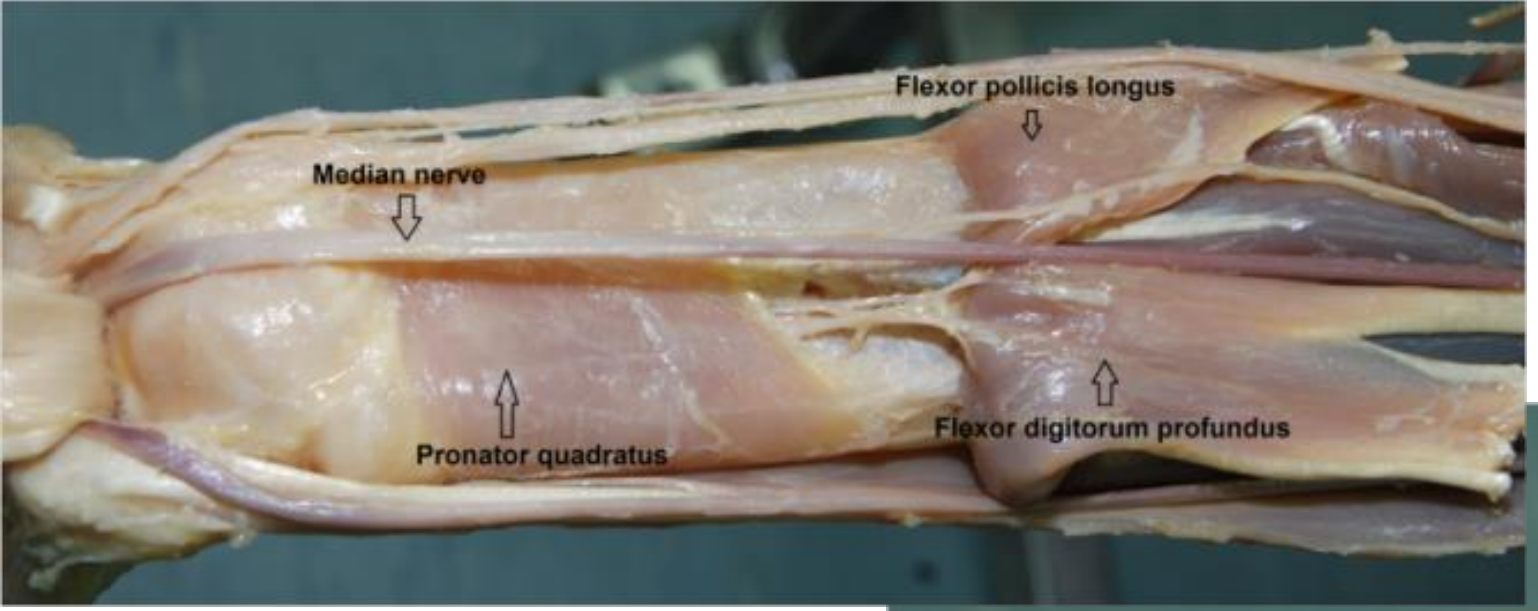
# Fossa cubiti

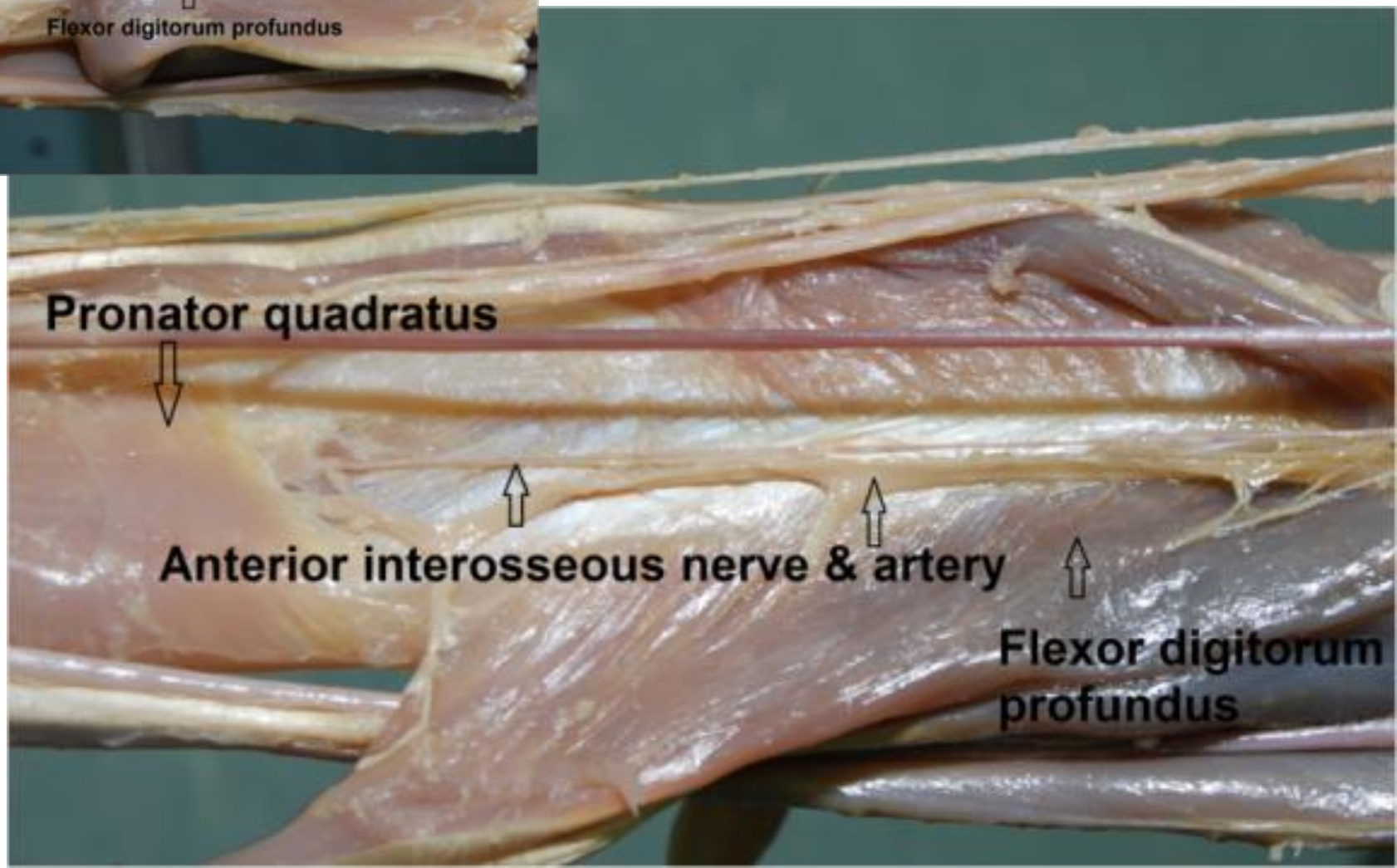


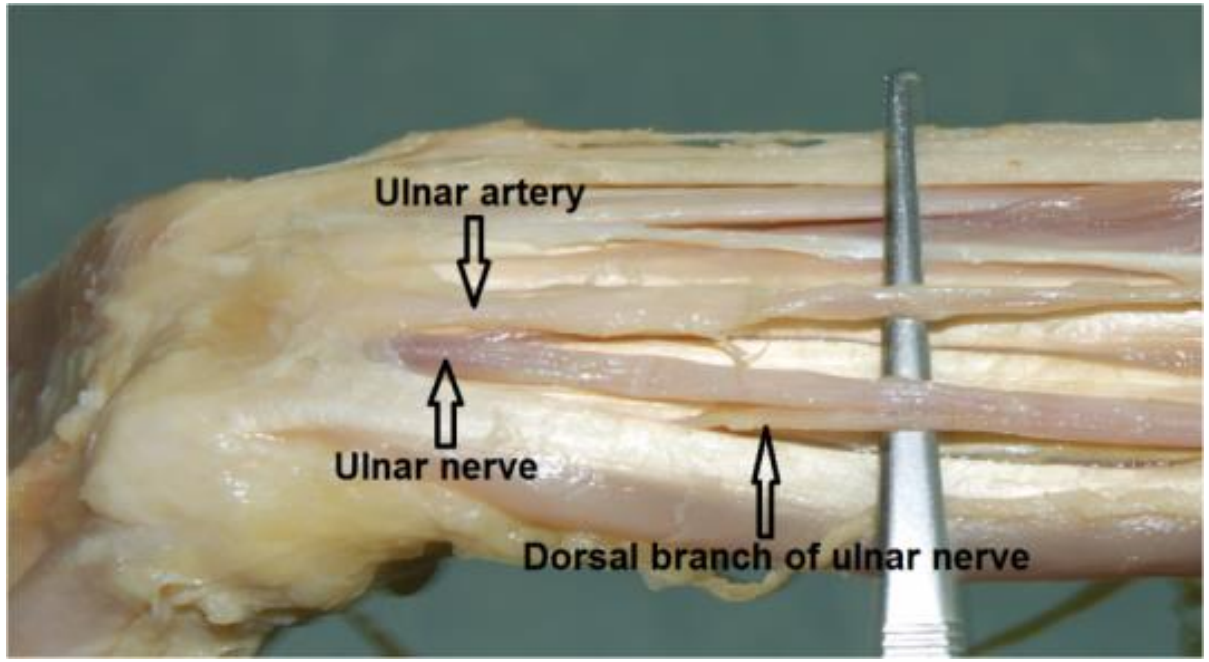



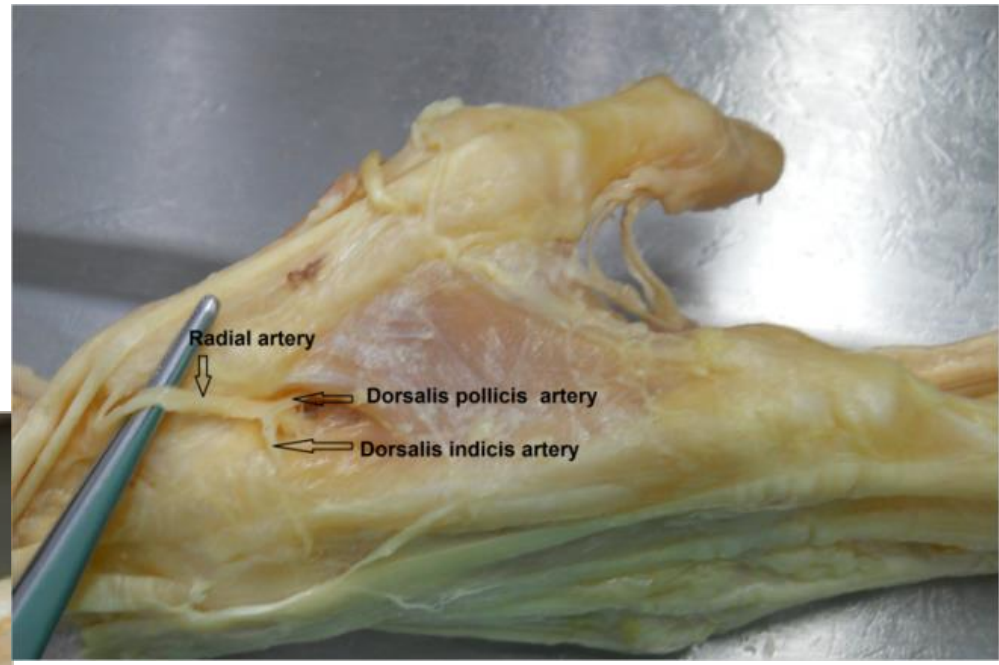

Musculocutaneus nerve
Brachioradialis
Median nerve
Flexor carpi radialis
Pronator teres
Ulnar nerve
Ulnar artery
Flexor digitorum superficialis

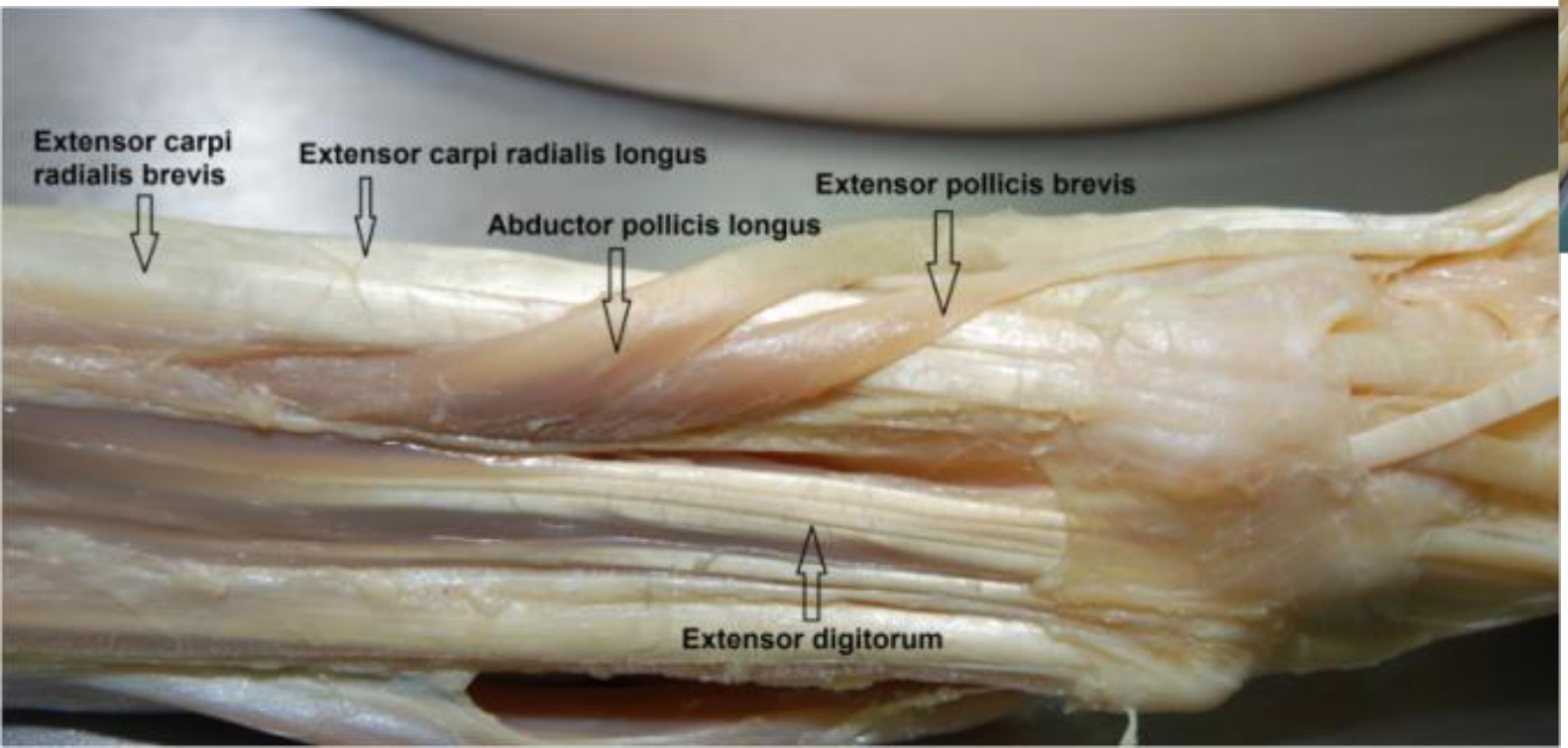

Median nerve
Flexor digitorum profundus
Flexor carpi radialis
Pronator teres
Ulnar nerve
Flexor digitorum superficialis


Flexor pollicis longus
Median nerve
Pronator quadratus
Flexor digitorum profundus

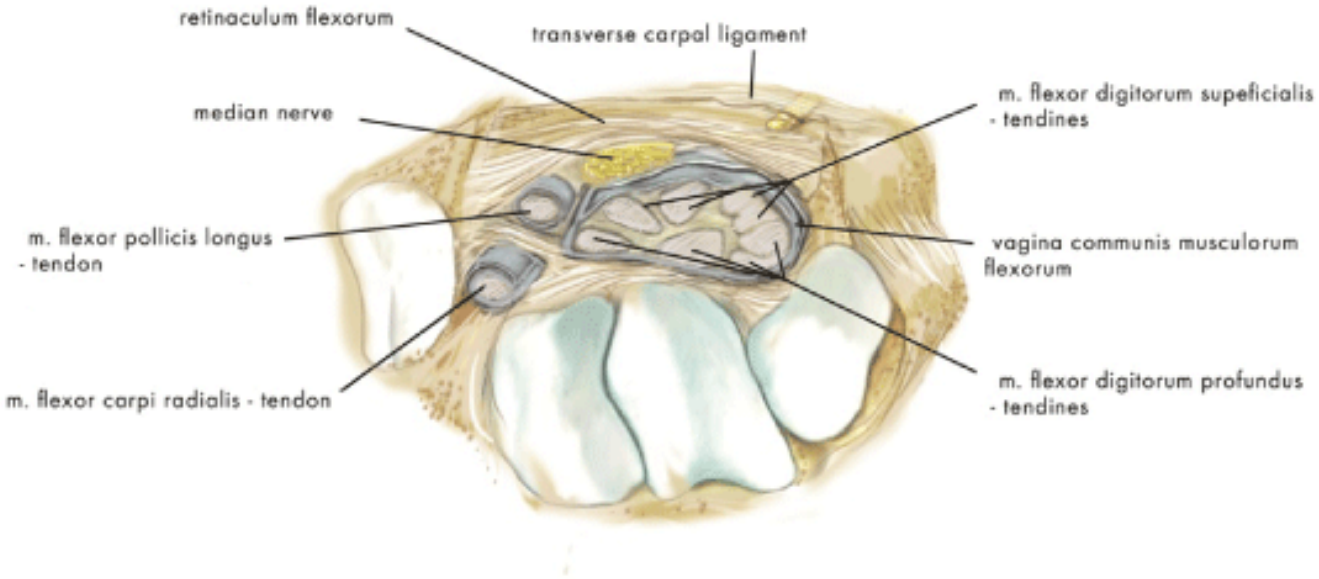

Pronator quadratus
Anterior interosseous nerve & artery
Flexor digitorum profundus

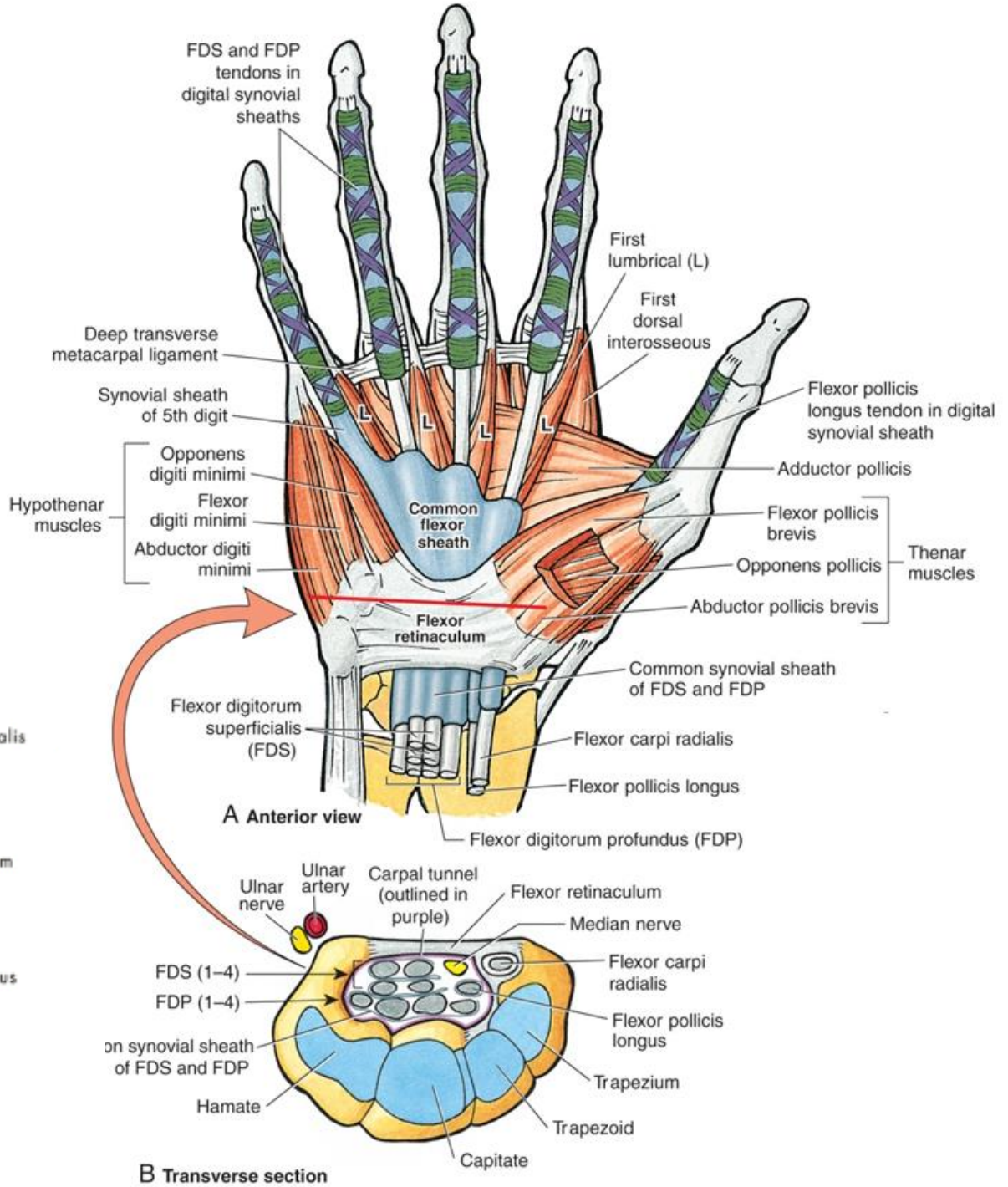

Ulnar artery
Ulnar nerve
Dorsal branch of ulnar nerve

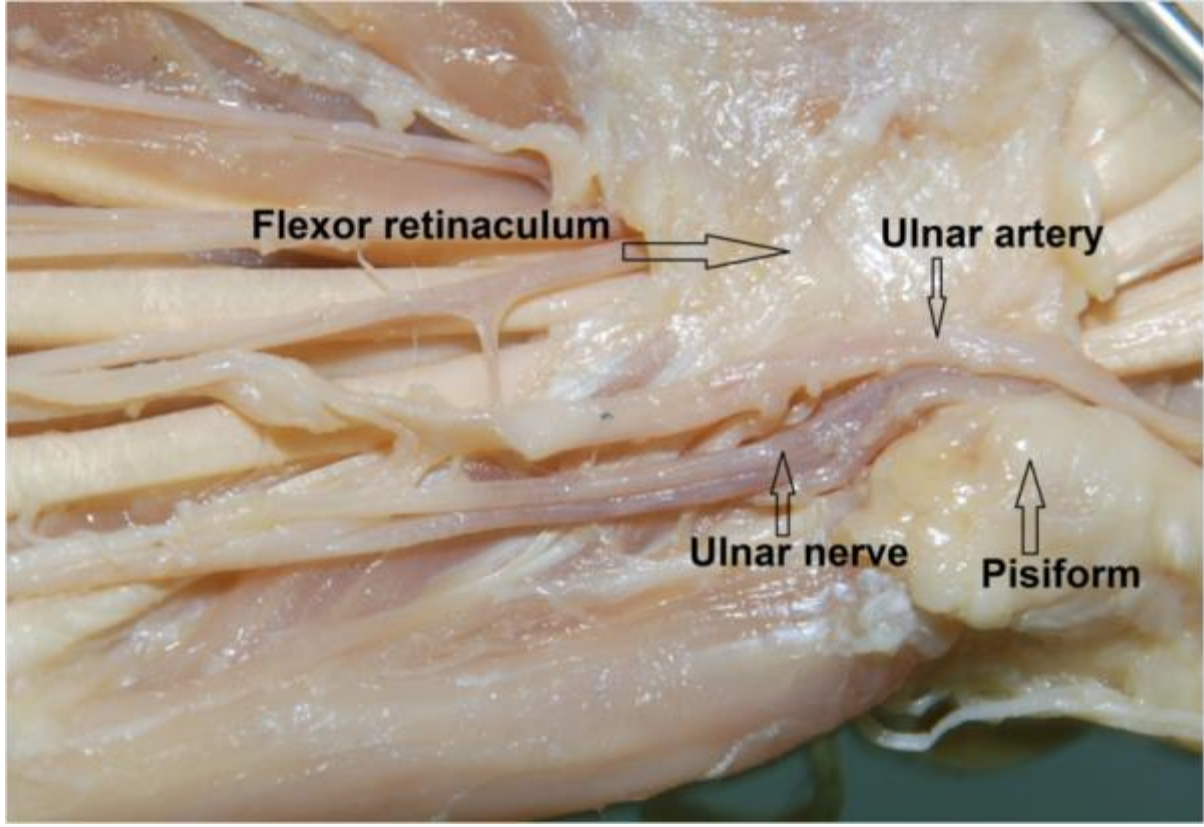

Radial artery
Dorsalis pollicis artery
Dorsalis indicis artery

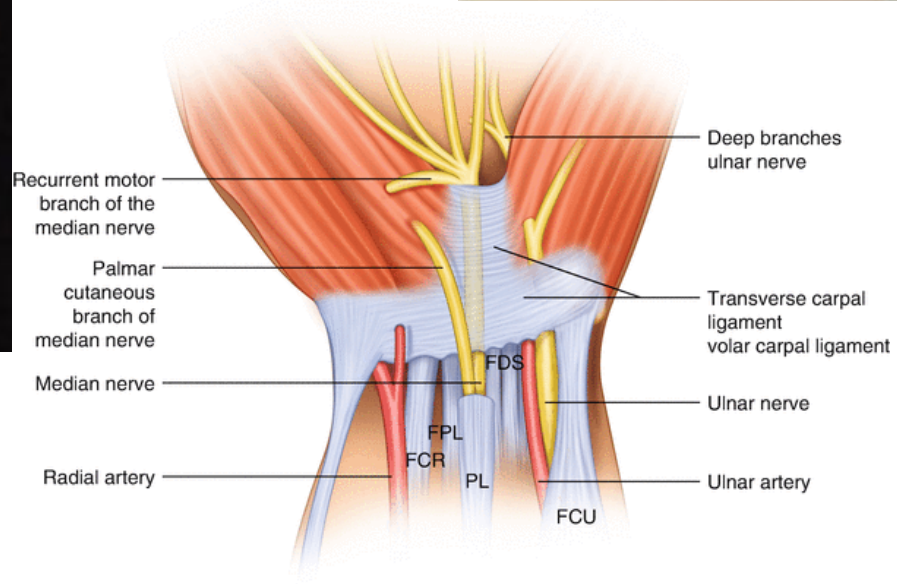

Extensor carpi radialis brevis
Extensor carpi radialis longus
Abductor pollicis longus
Extensor pollicis brevis
Extensor digitorum

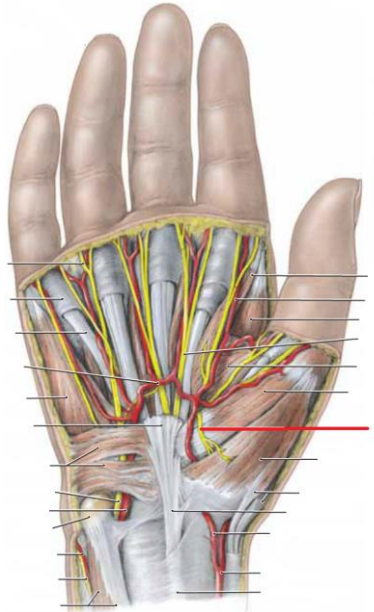
# Regio carpalis, canalis carpi

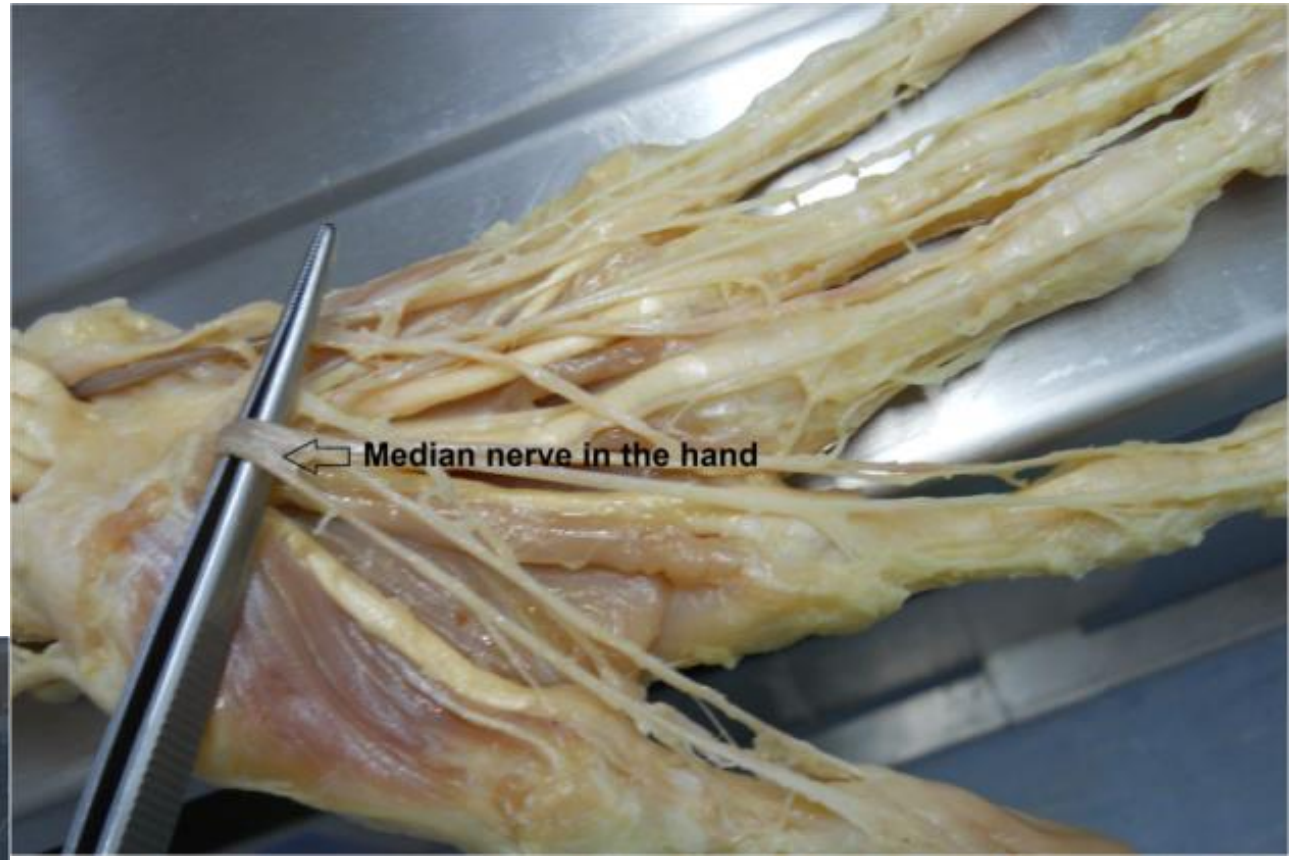


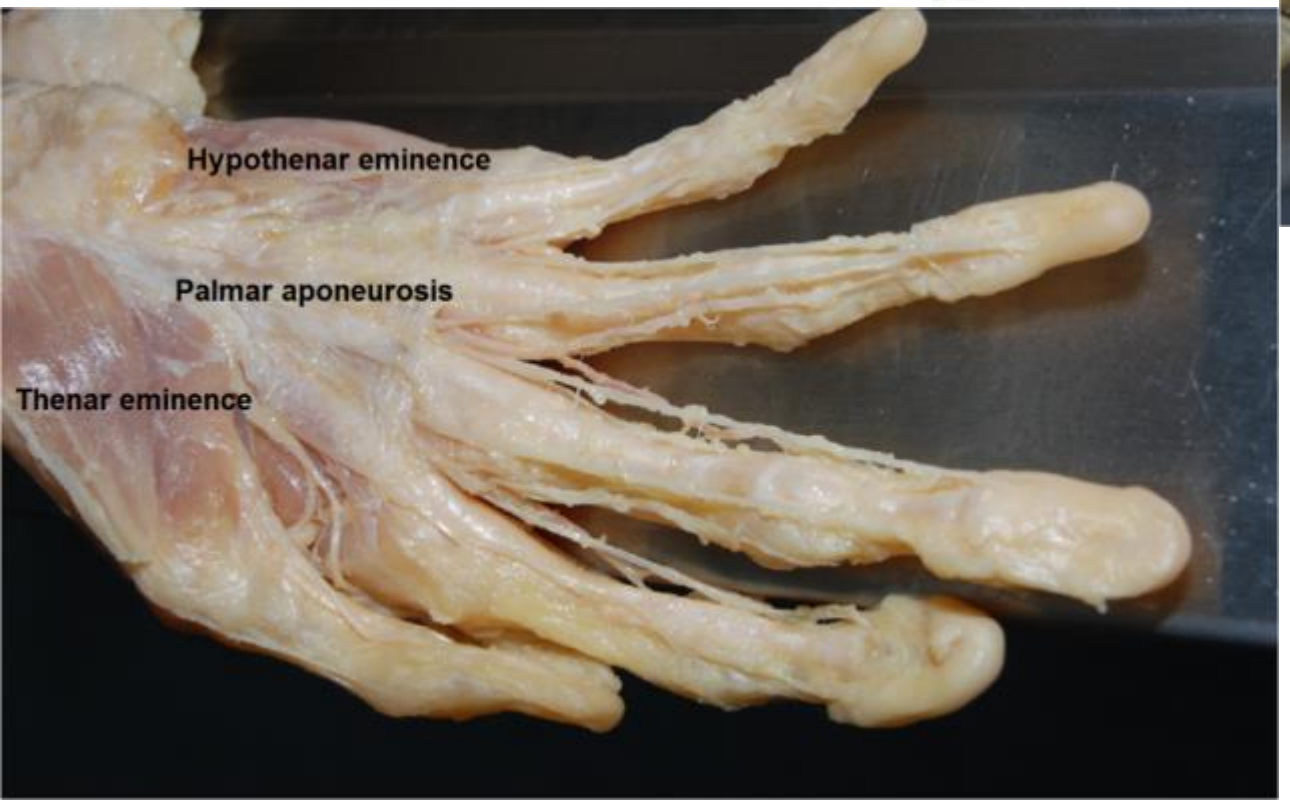



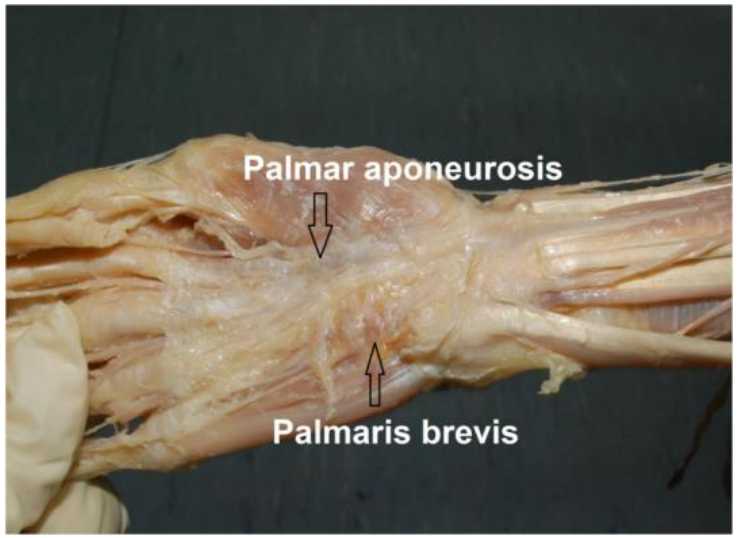

Flexor retinaculum
Ulnar artery
Ulnar nerve
Pisiform


Recurrent motor branch of the median nerve
Palmar cutaneous branch of median nerve
Median nerve
Radial artery
Deep branches ulnar nerve
Transverse carpal ligament
volar carpal ligament
Ulnar nerve
Ulnar artery
FDS
FPL
FCR
PL
FCU

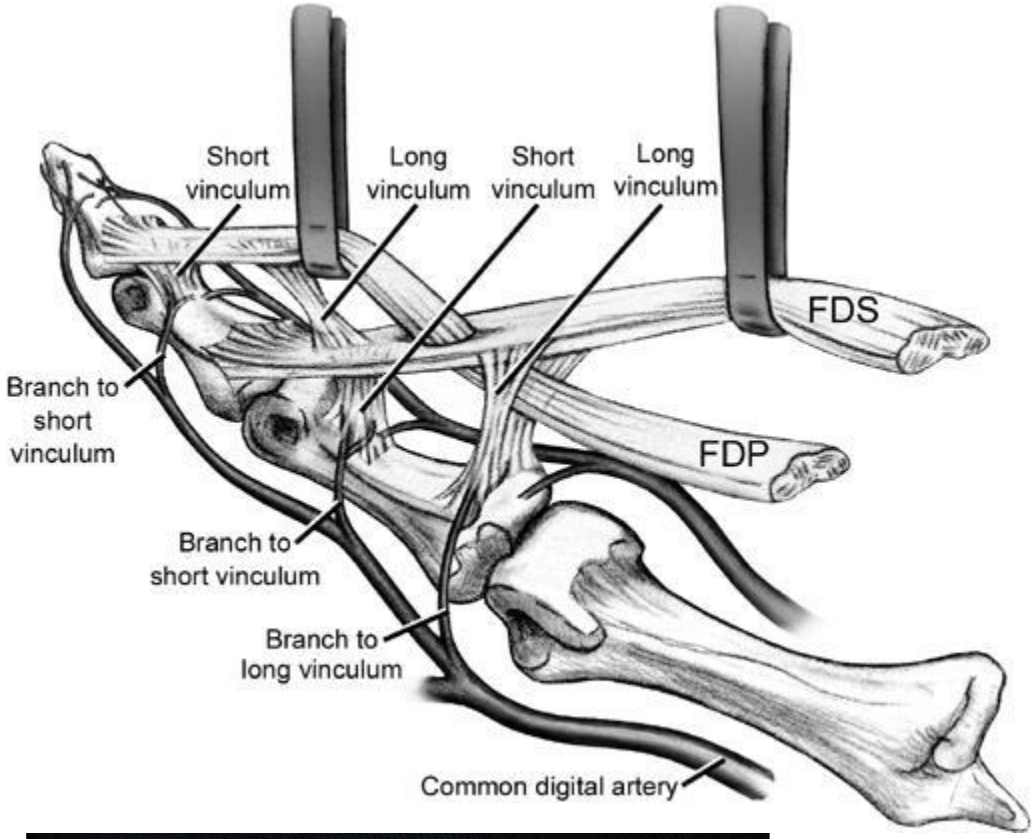


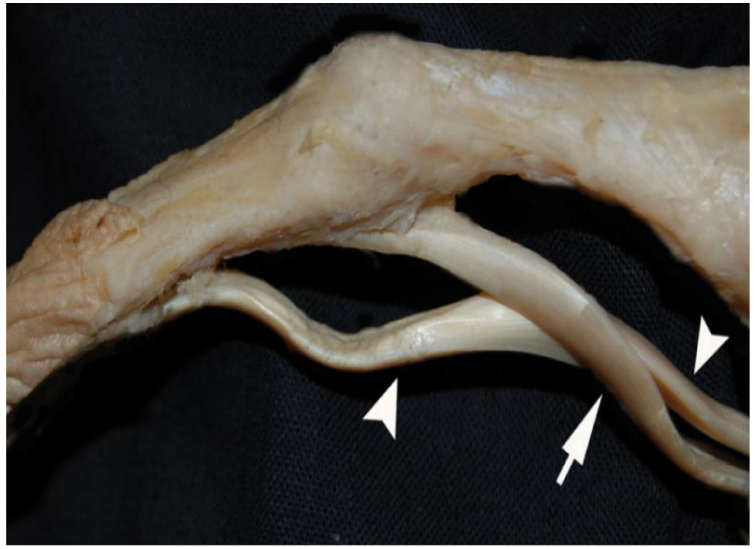

Median nerve in the hand

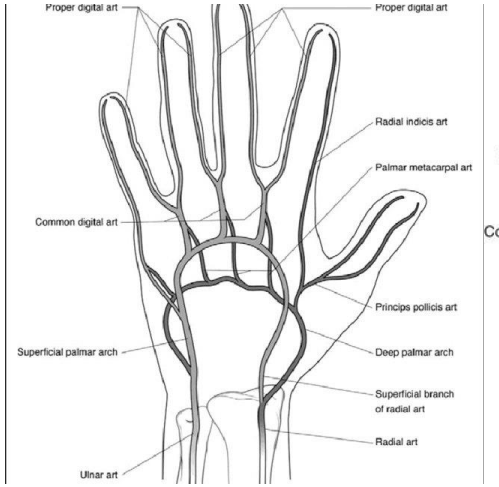

Hypothenar eminence
Palmar aponeurosis
Thenar eminence


Palmar aponeurosis
Palmaris brevis

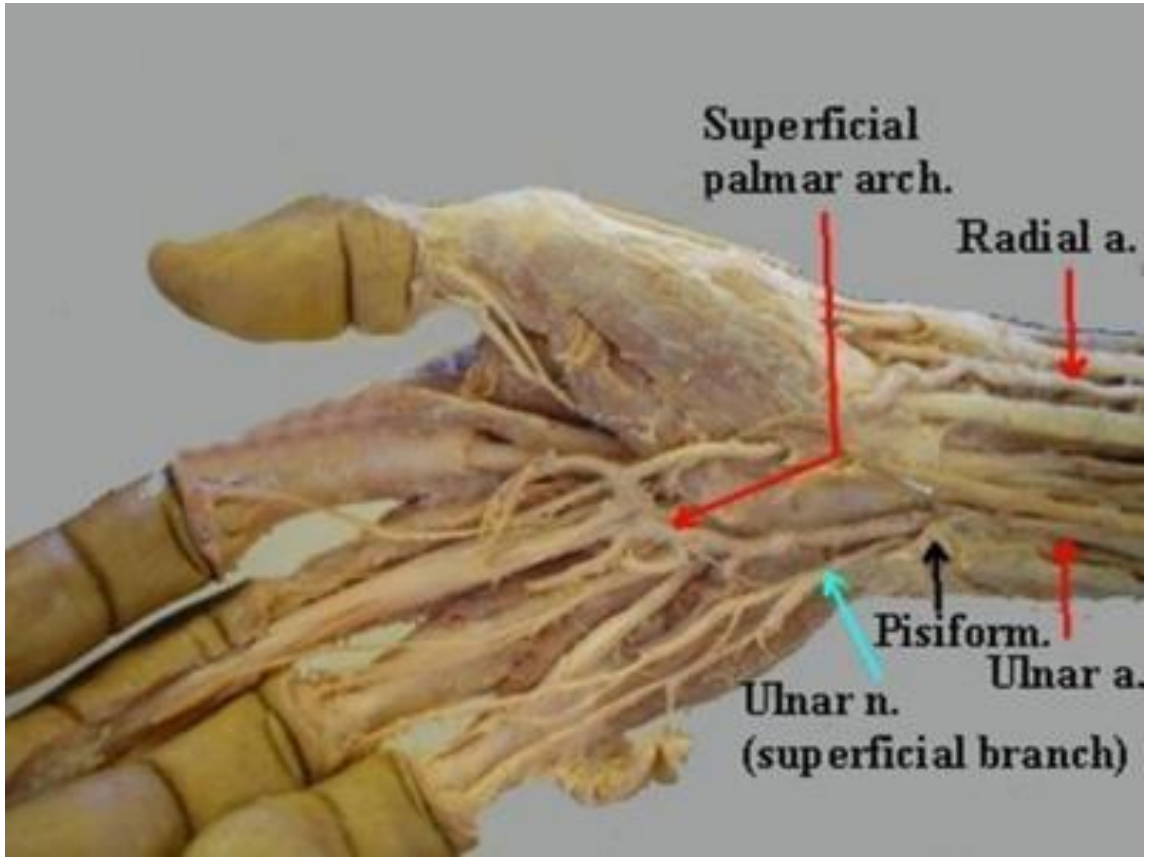
# Chiasmatic Formation

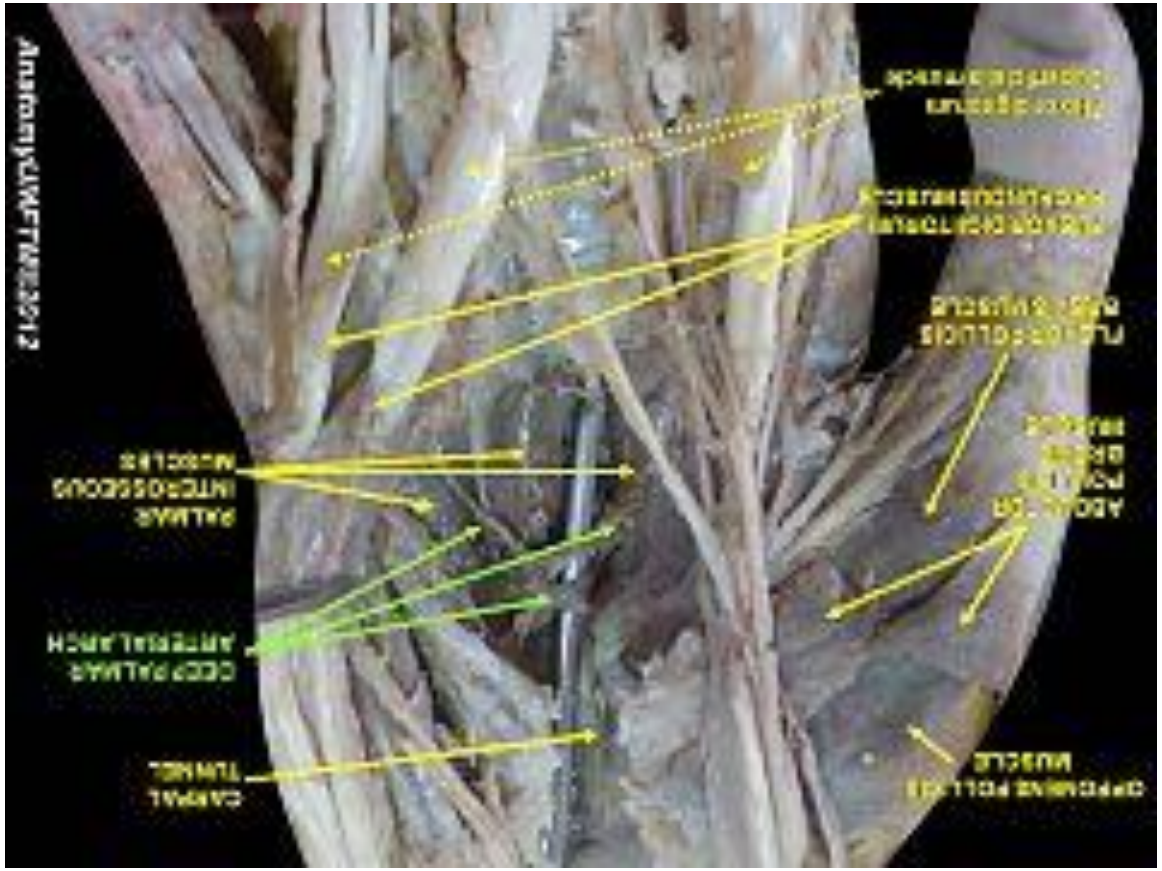


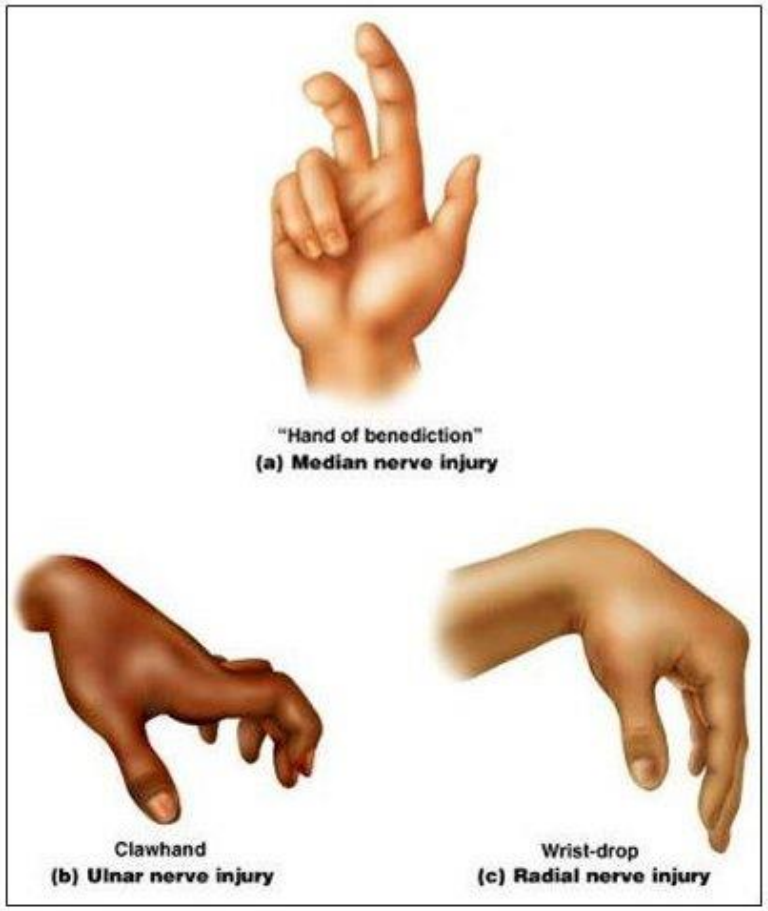

Proper digital art
Proper digital art
Radial indicis art
Palmar metacarpal art
Common digital art
Princips pollicis art
Superficial palmar arch
Deep palmar arch
Superficial branch of radial art
Radial art
Ulnar art


Proper palmar digital artery
Common palmar digital artery
Superficial palmar arch
Deep palmar branch of ulnar artery
Ulnar artery
Princeps pollicis artery
Deep palmar arch
Radial artery


Superficial palmar arch.
Radial a.
Pisiform.
Ulnar a.
Ulnar n. (superficial branch)



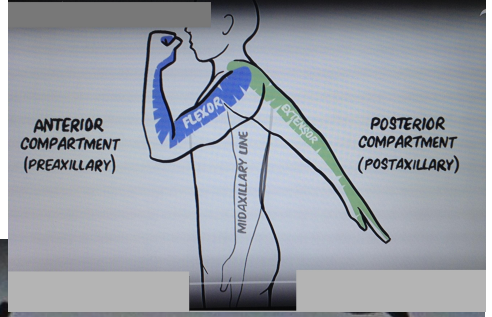
# UPPER LIMB COMMON NERVE INJURIES

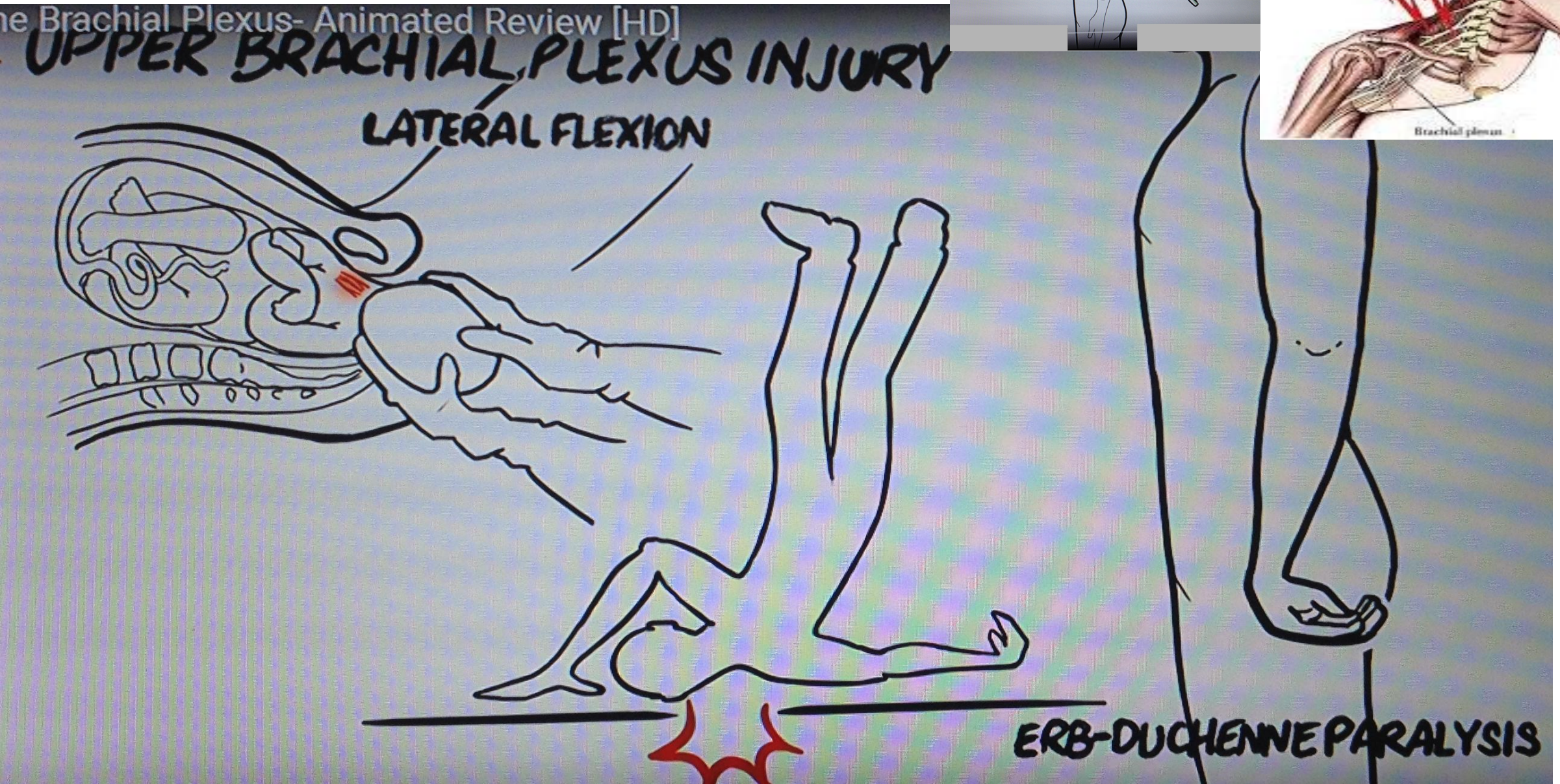



- Ulnar nerve
  - "Claw hand"
    - Inability to extend fingers at interphalangeal joints, results in permanent flexion = claw
- Median nerve
  - "Ape hand"
    - Inability to oppose thumb
- Radial nerve
  - "Wrist drop"
  - Inability to extend the hand, inability to fully extend forearm

# Brachial Plexus – Injuries

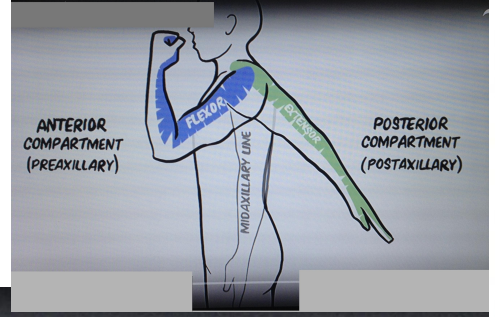
(Upper Roots) *Injury at supraclavicular portion.

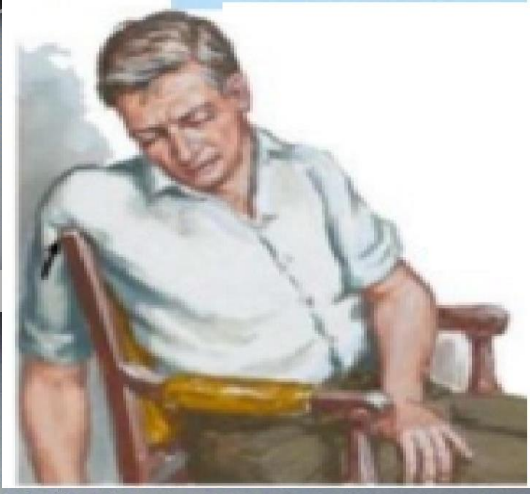


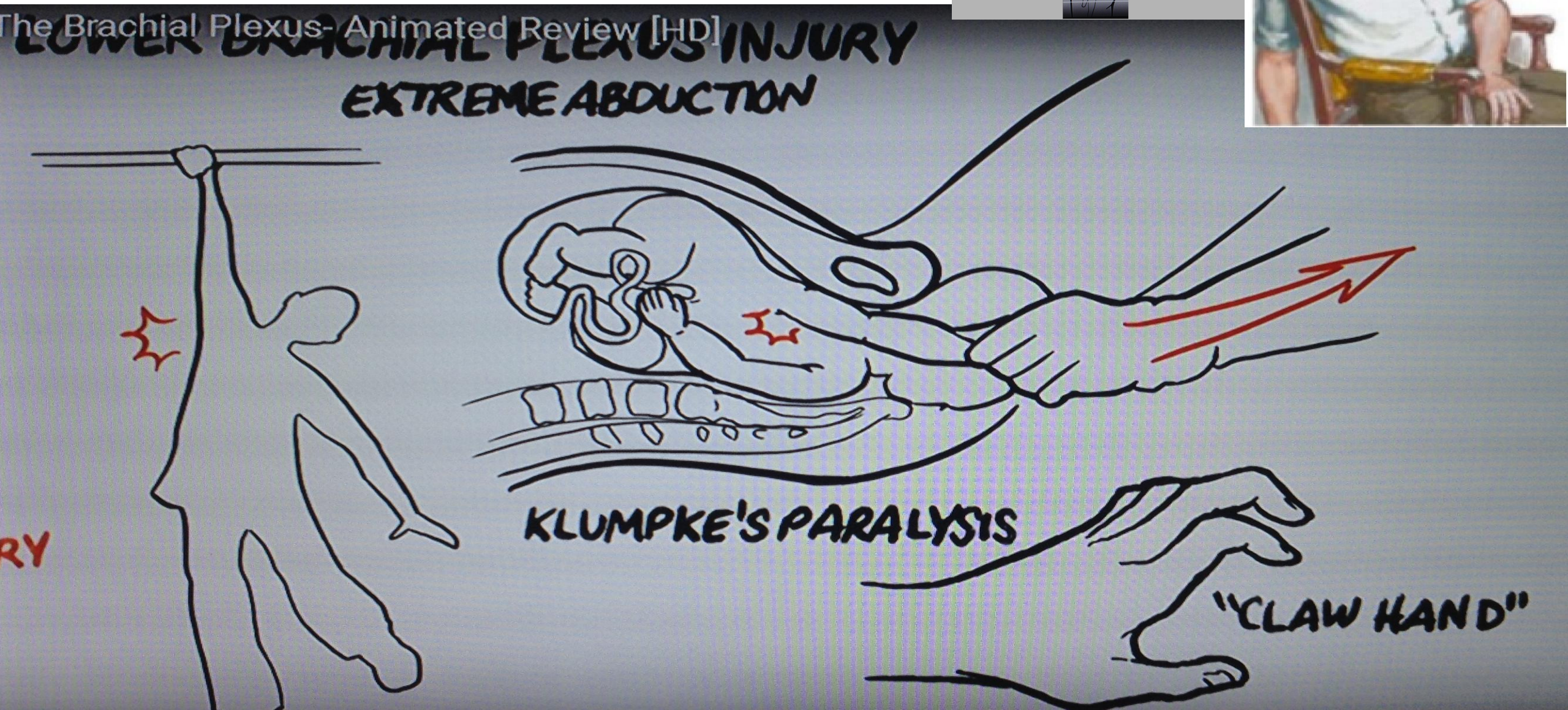



# Brachial Plexus – Injuries

(Lower Roots) *Injury Infraclavicular portion, axillary fossa.





# Brachial Plexus – Injuries

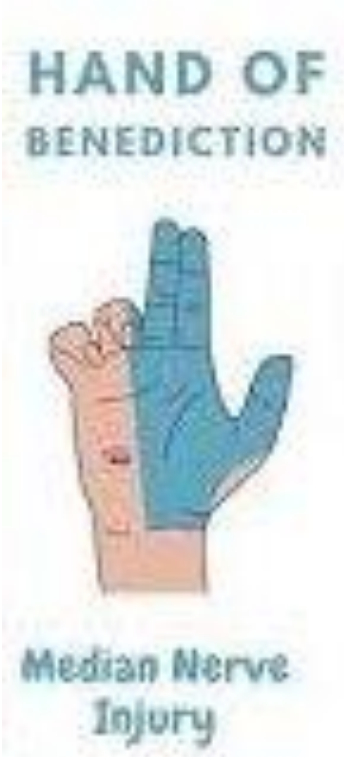
(Upper Roots Injury)

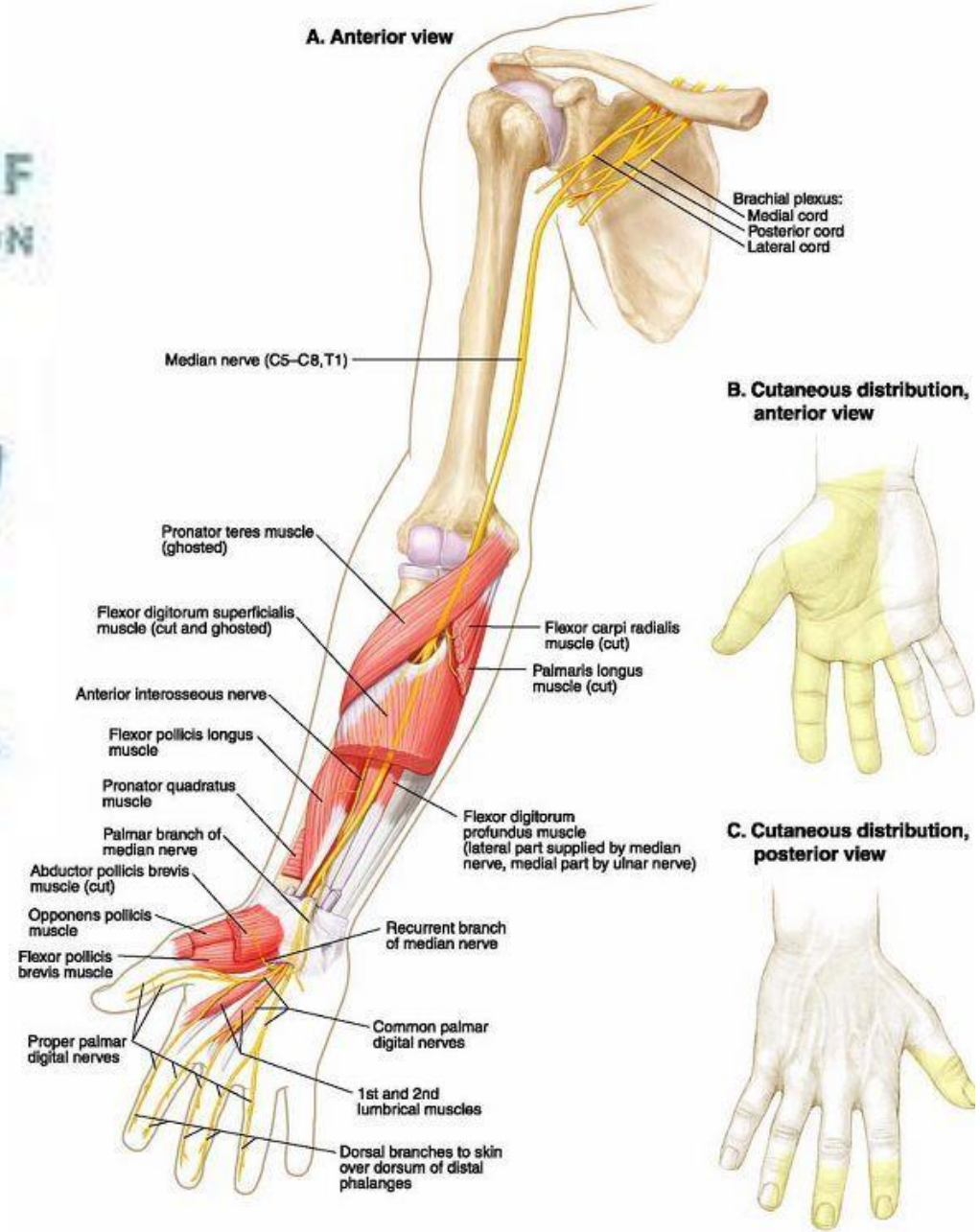

177 Erb's palsy.

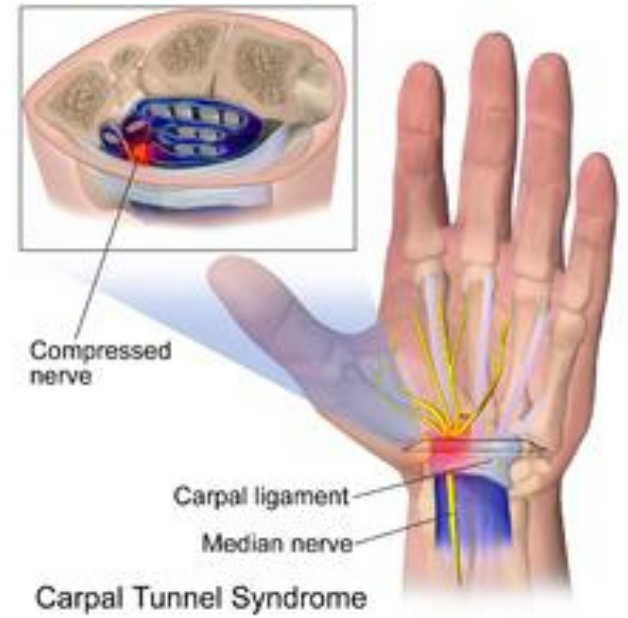
(Lower Roots Injury)

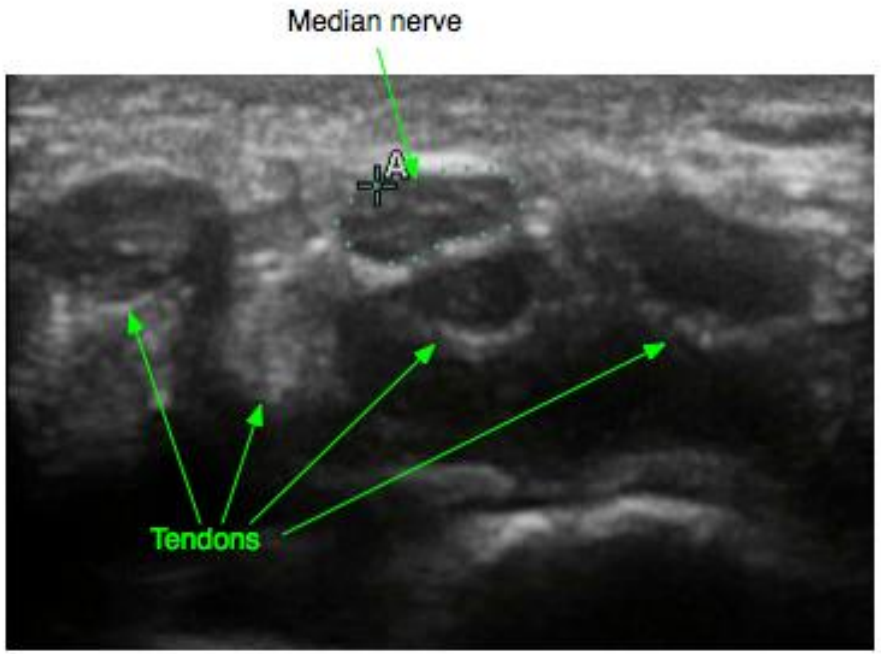

178 Klumpke palsy.

# Median n. & Common Injuries

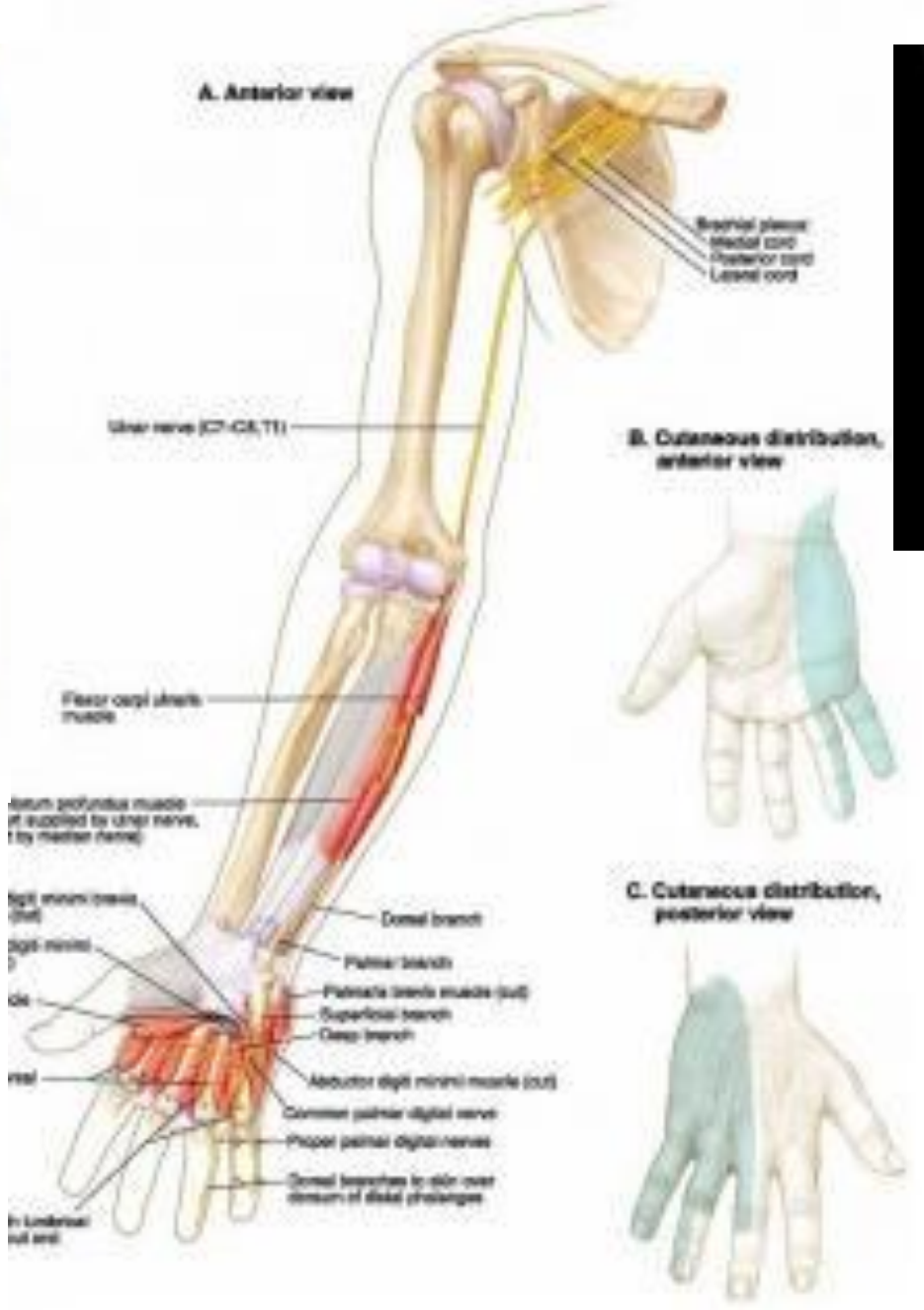


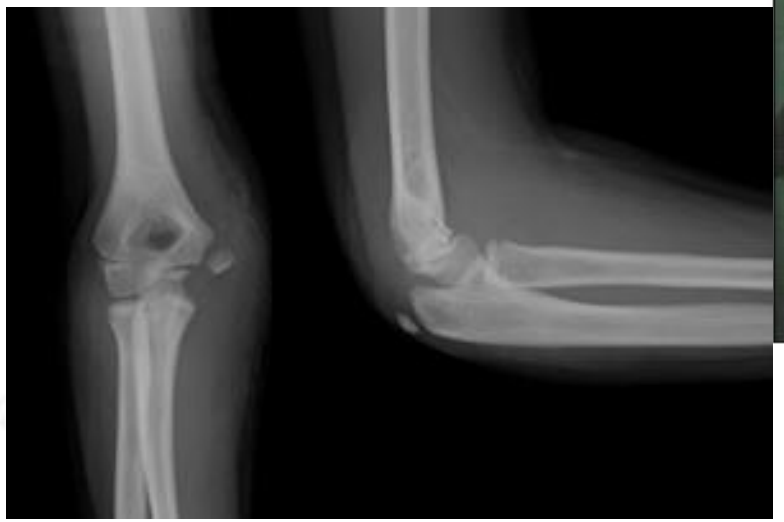



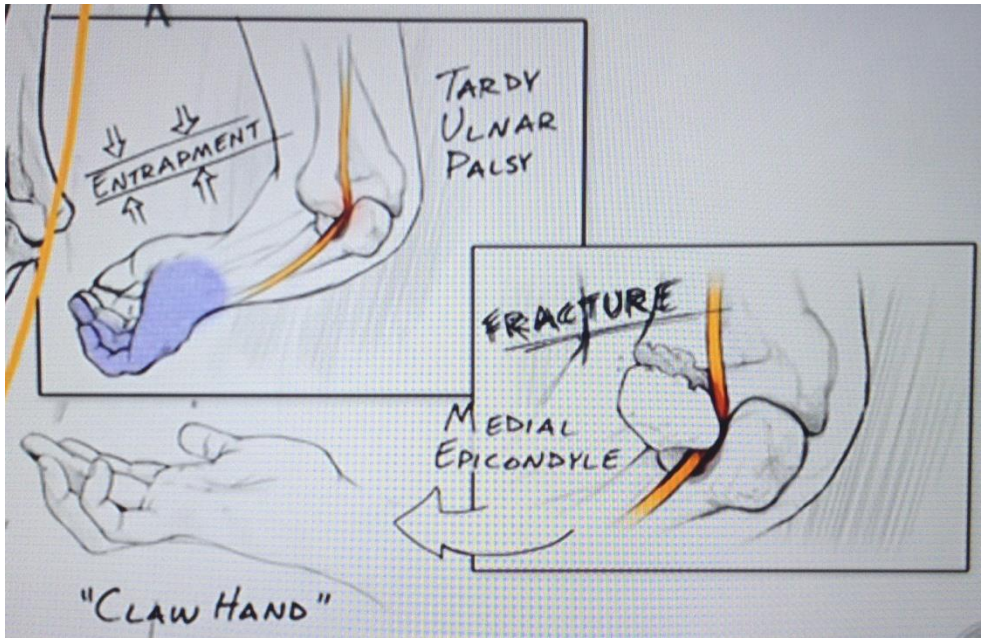



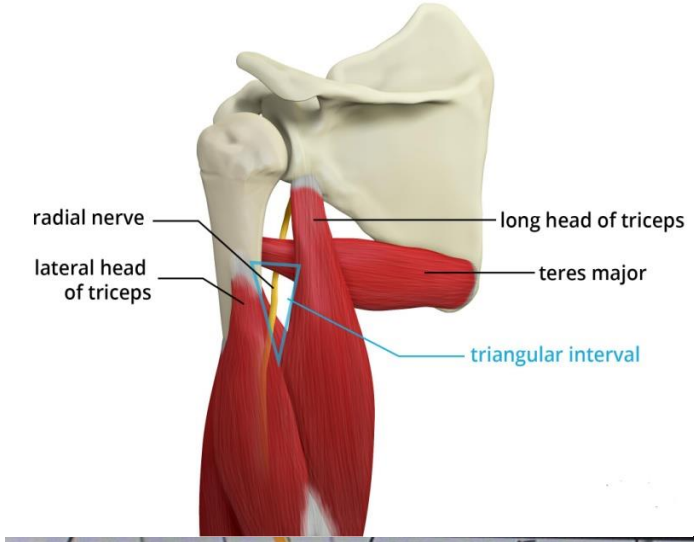
# Ulnar n. & Common Injuries

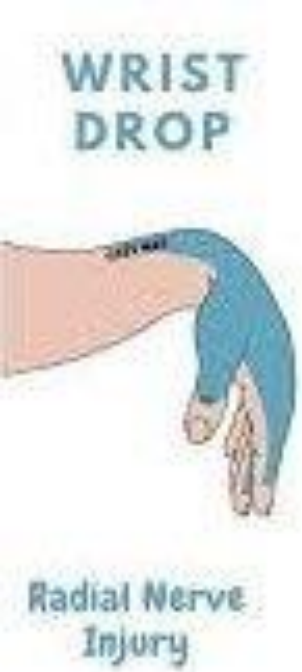



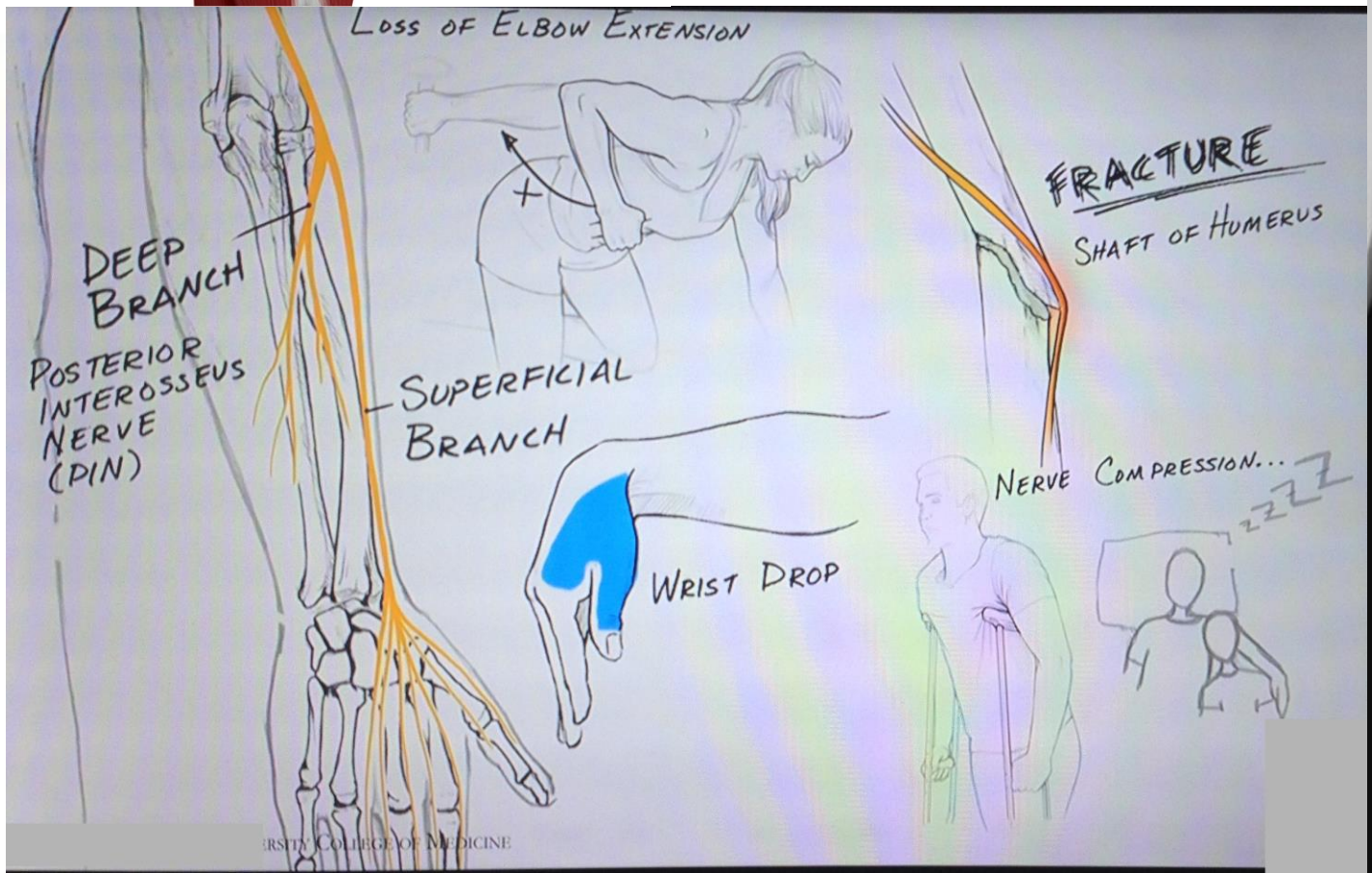





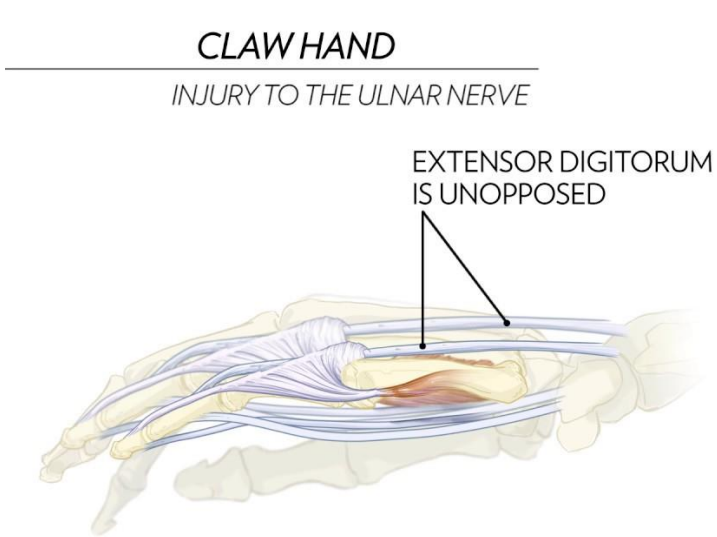
# Radial n.
# & Common Injuries









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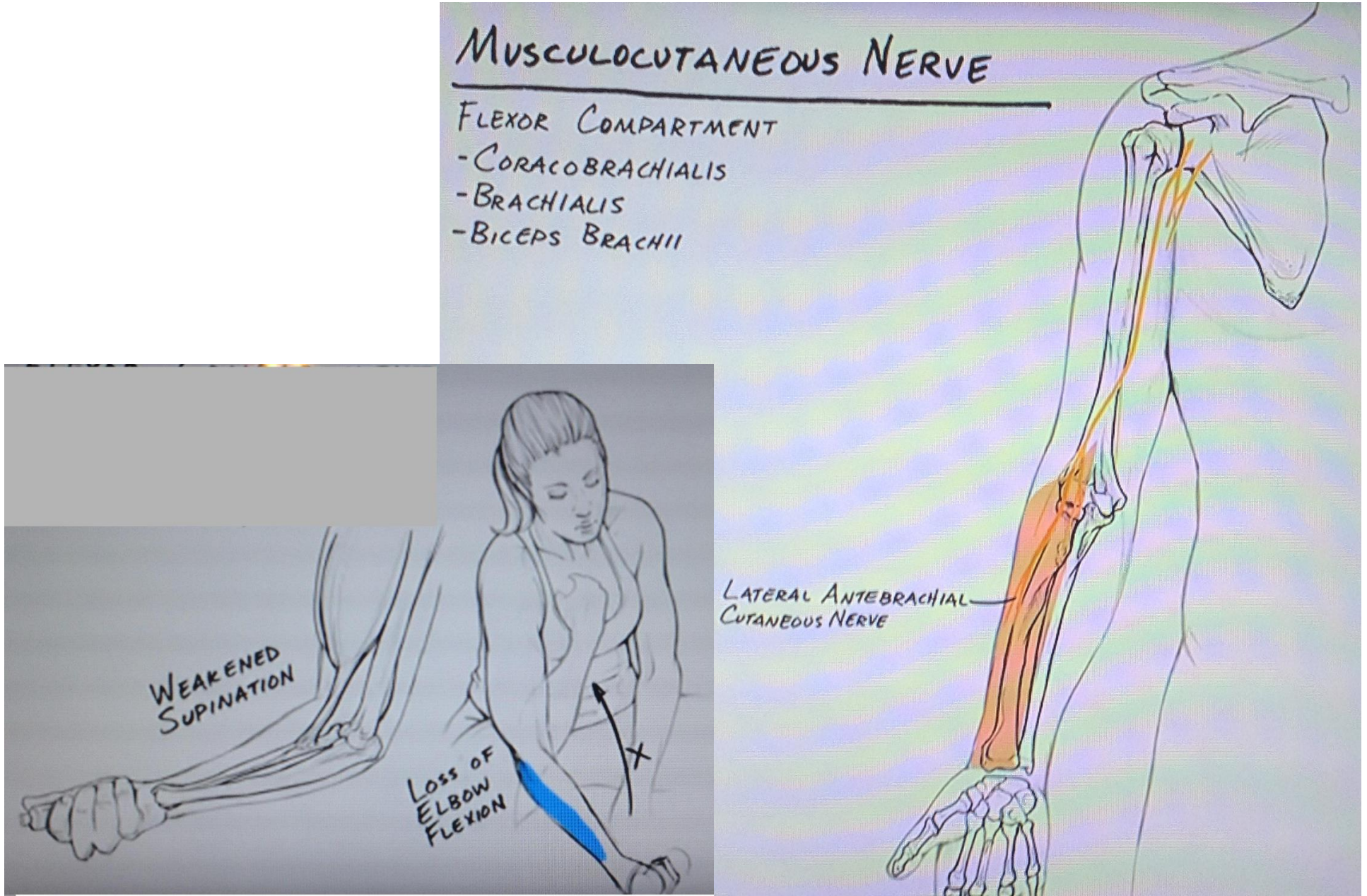
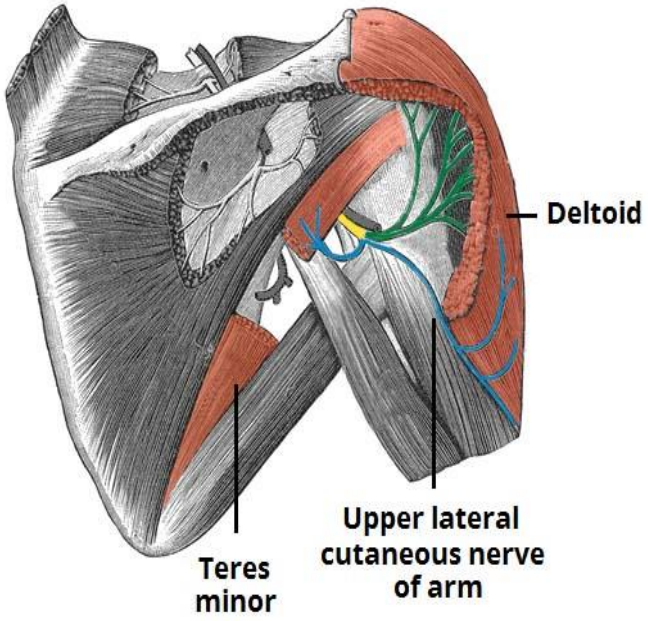
# Musculocutaneus n. & Common Injuries



# Axillary n. & Common Injuries






Anterior terminal division
Posterior terminal division

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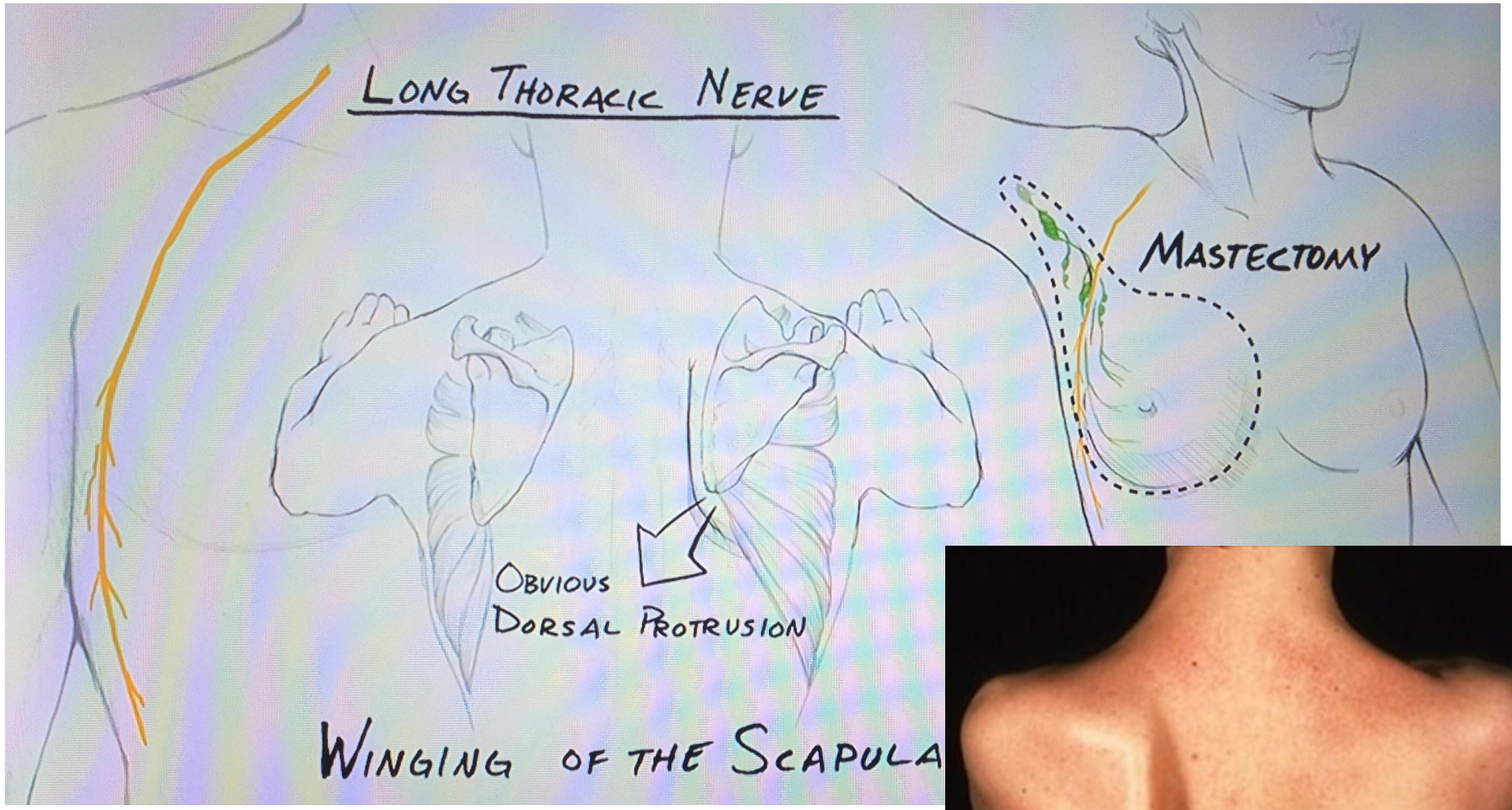
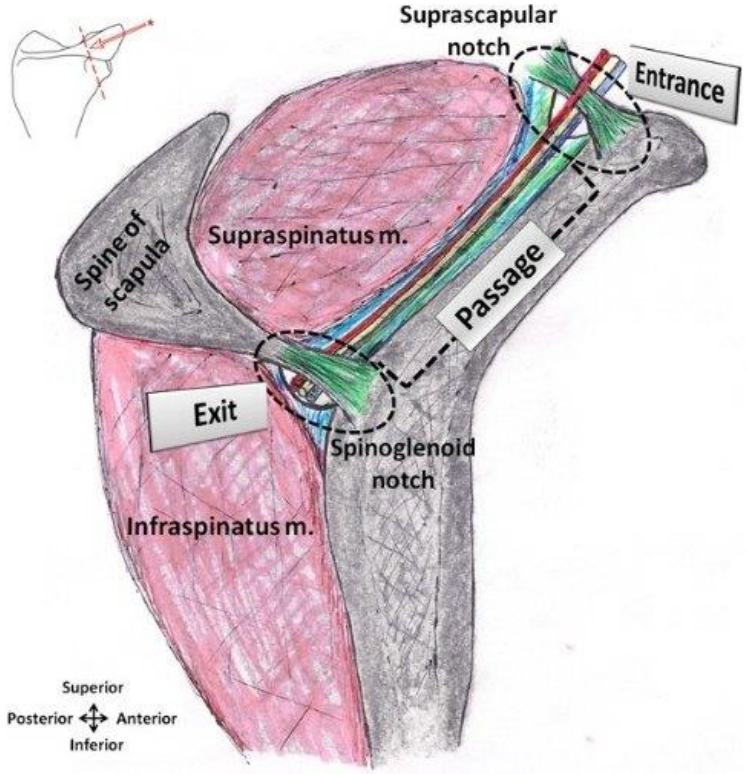
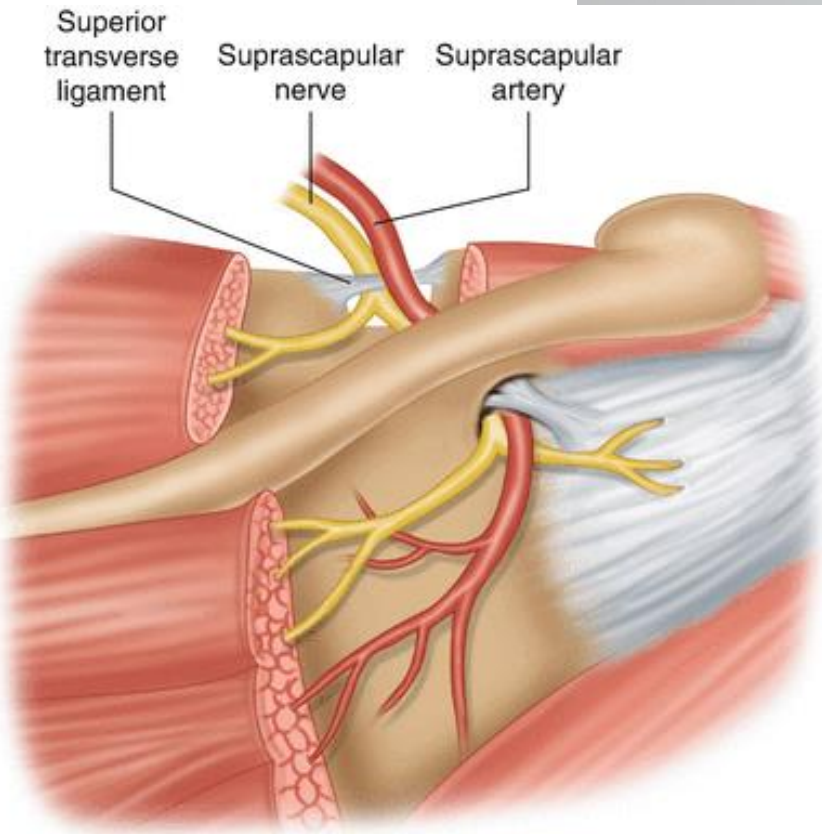
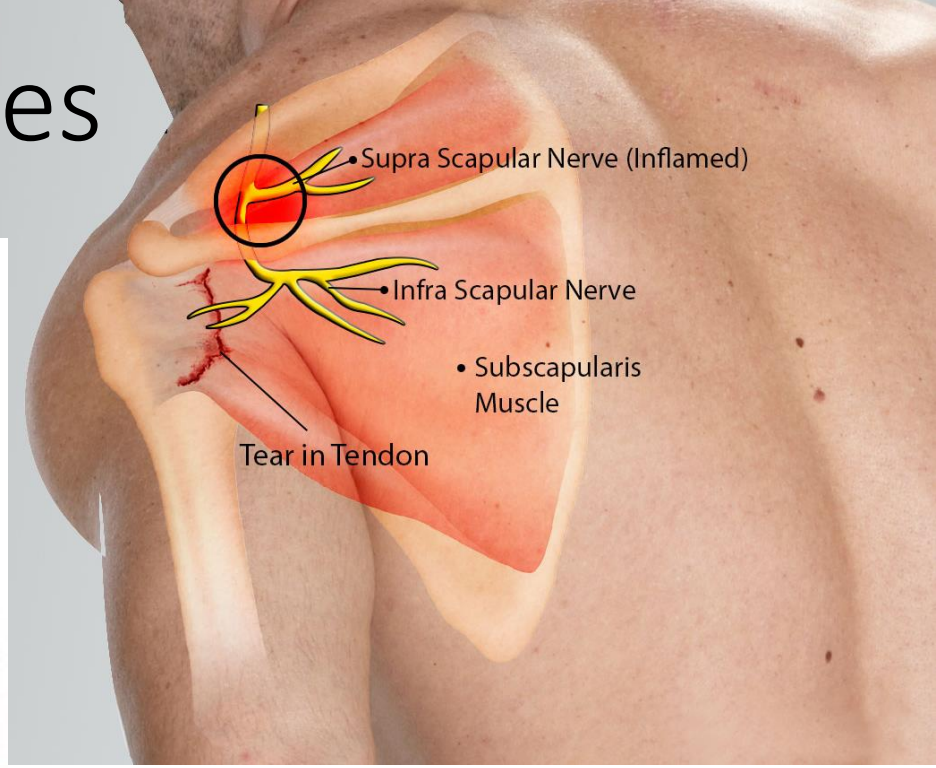
# Long Thoracic n. & Common Injuries



# Suprascapular n. & Common Injuries



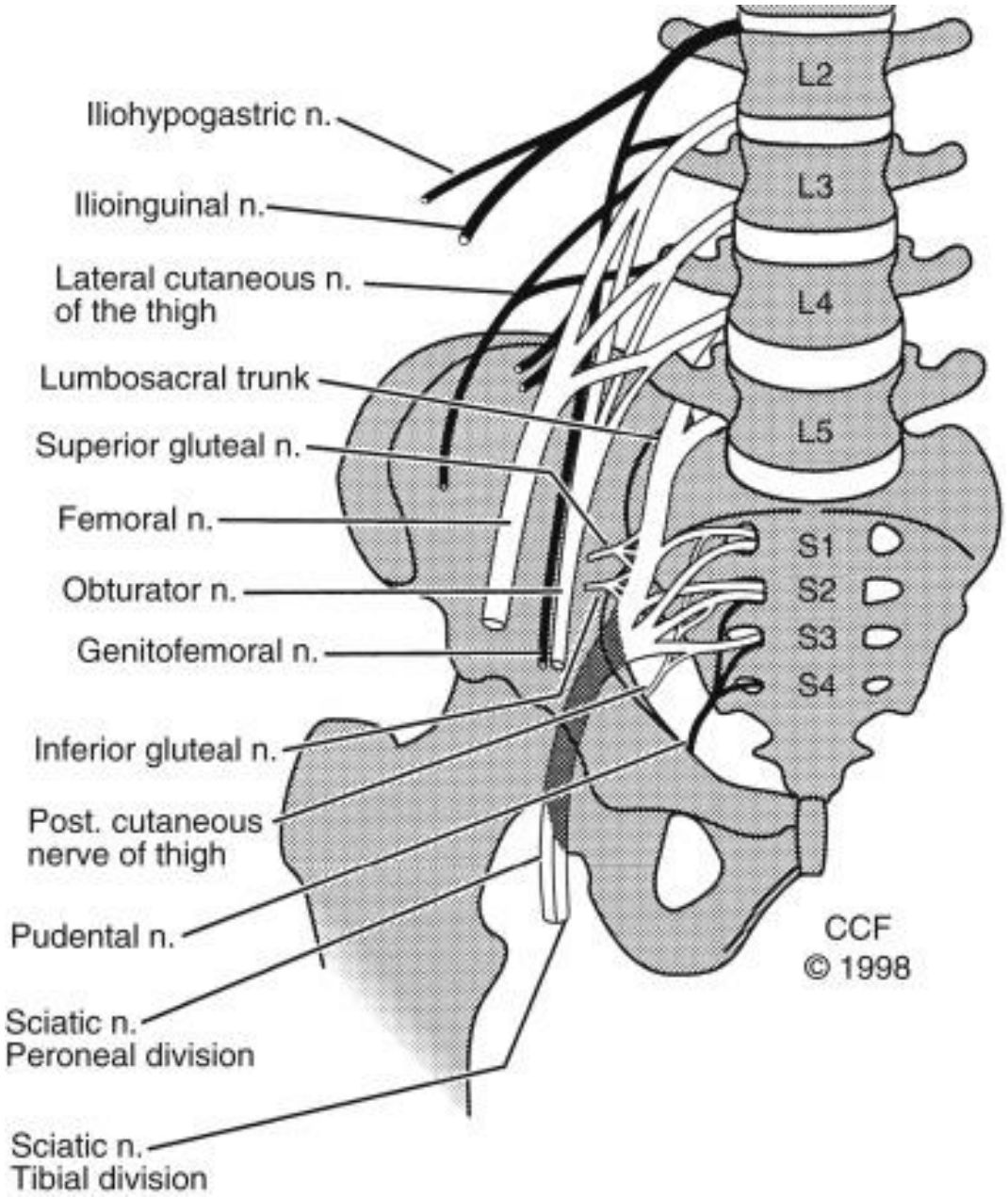



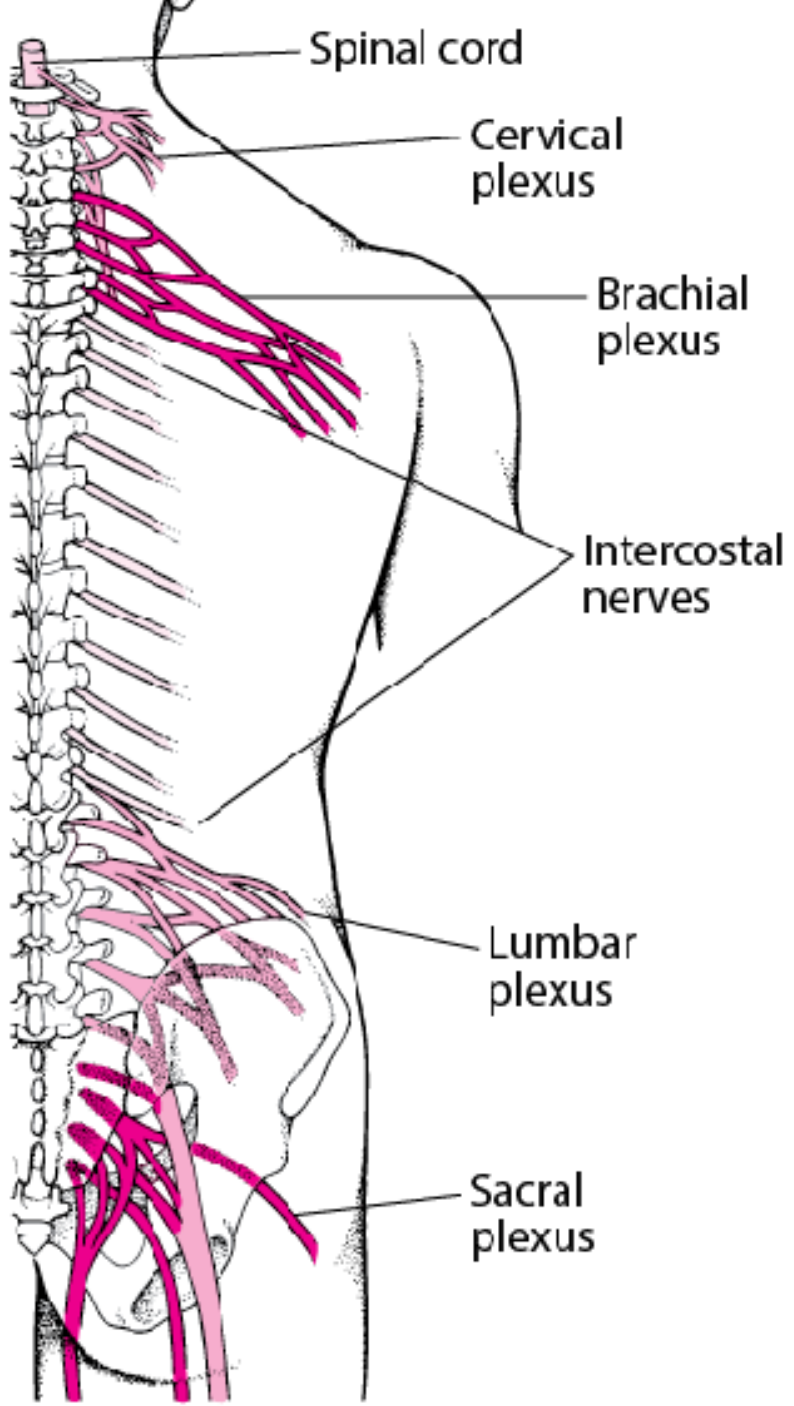




# Learning Objectives ***REMINDER!!!!

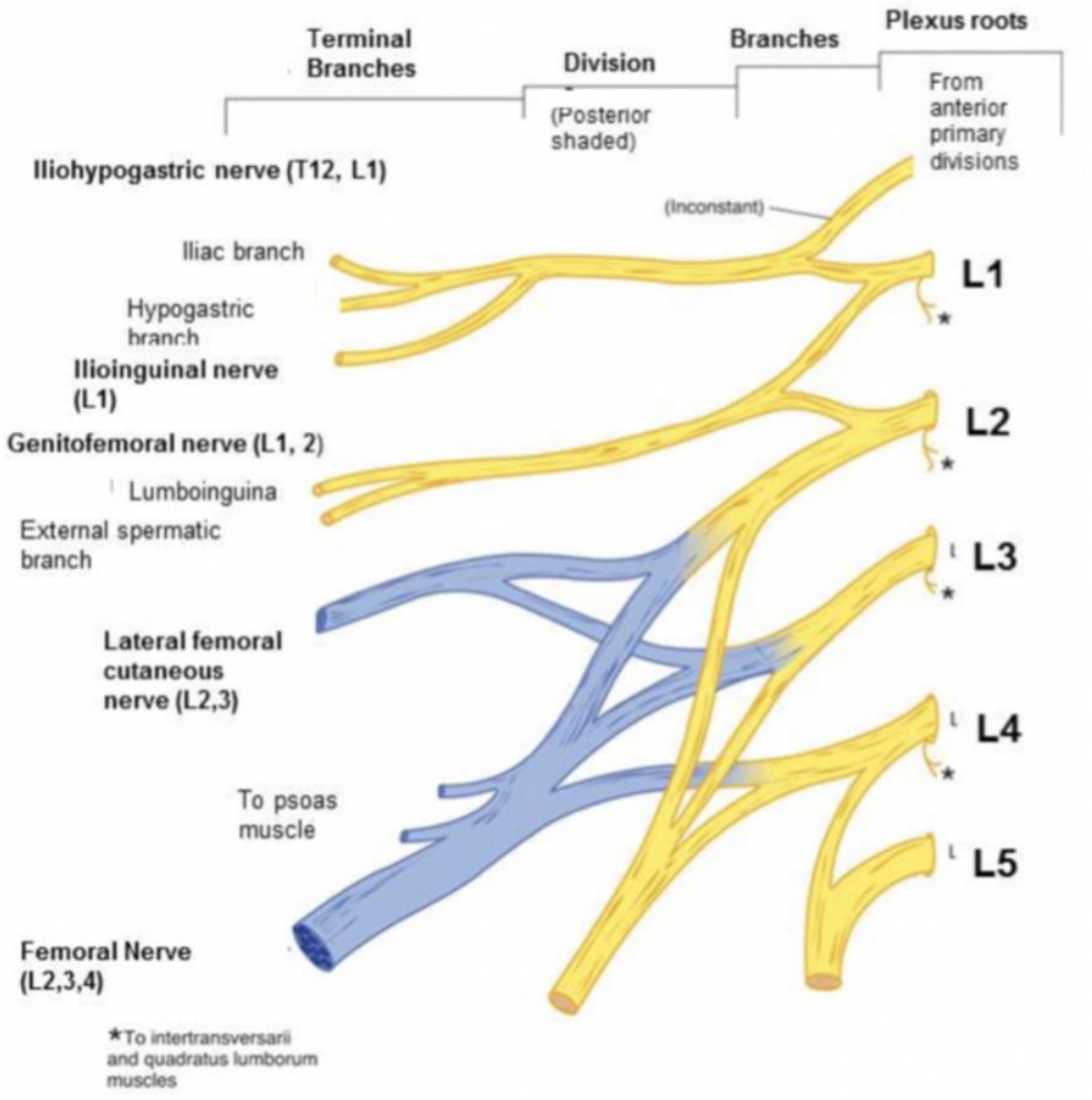
- General anatomy of muscles.
- Arrangement of muscles within their compartments enclosed by fasciae.
- Origin and insertion, innervation, and function of muscles.
- Topography of nerves and vessels of the limbs.
- Identifying and drawing structures observed on cross-sections of the limbs.

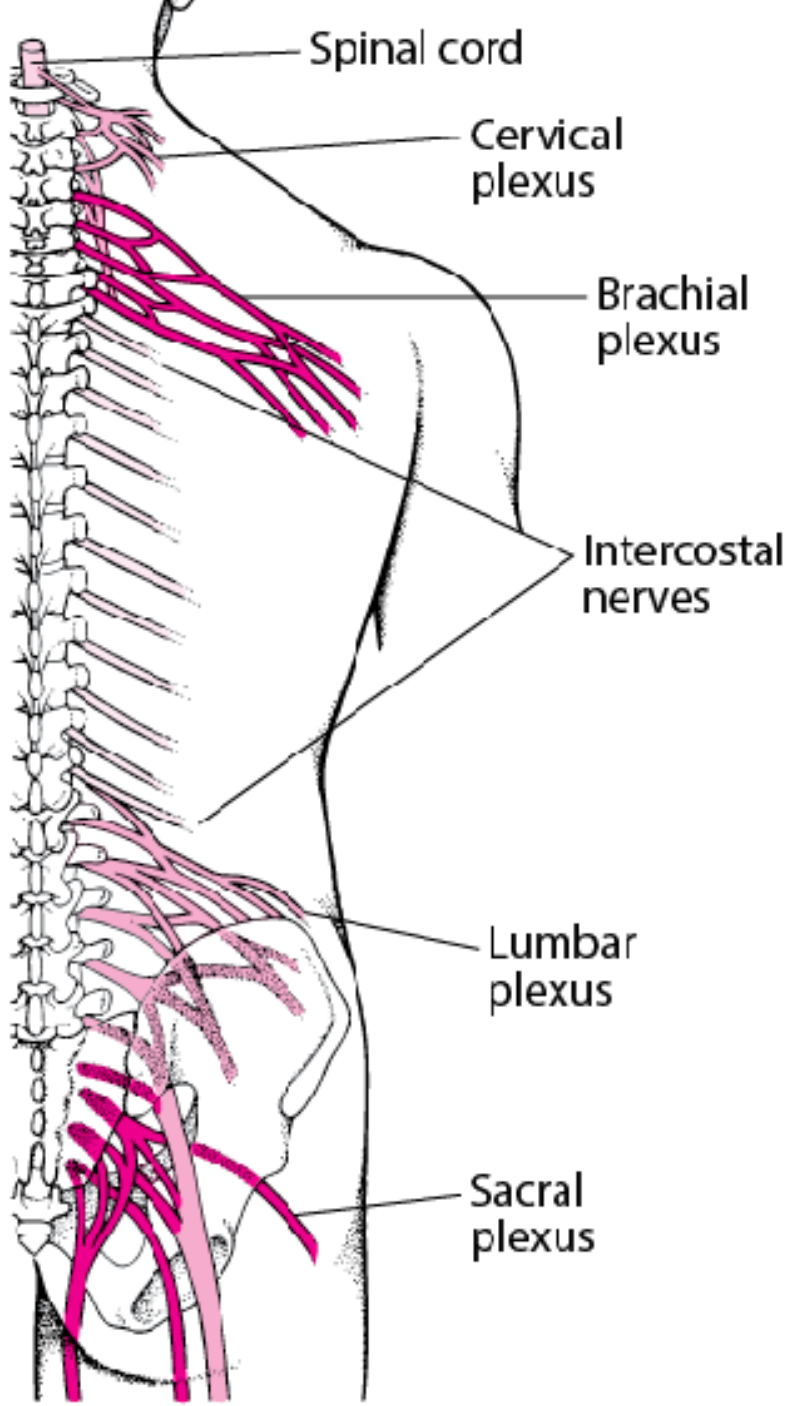
# Lumbosacral Plexus *(draw it)



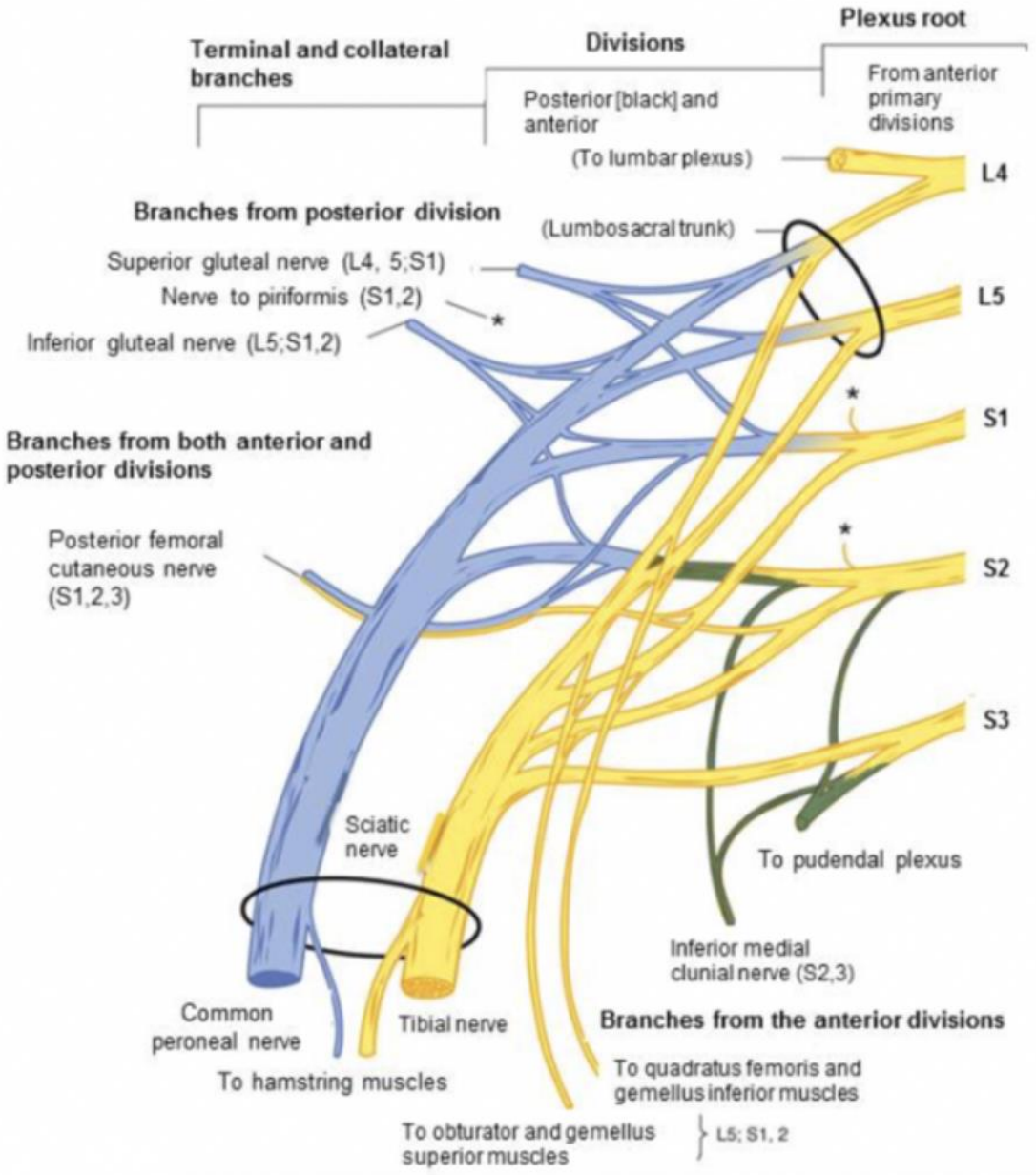



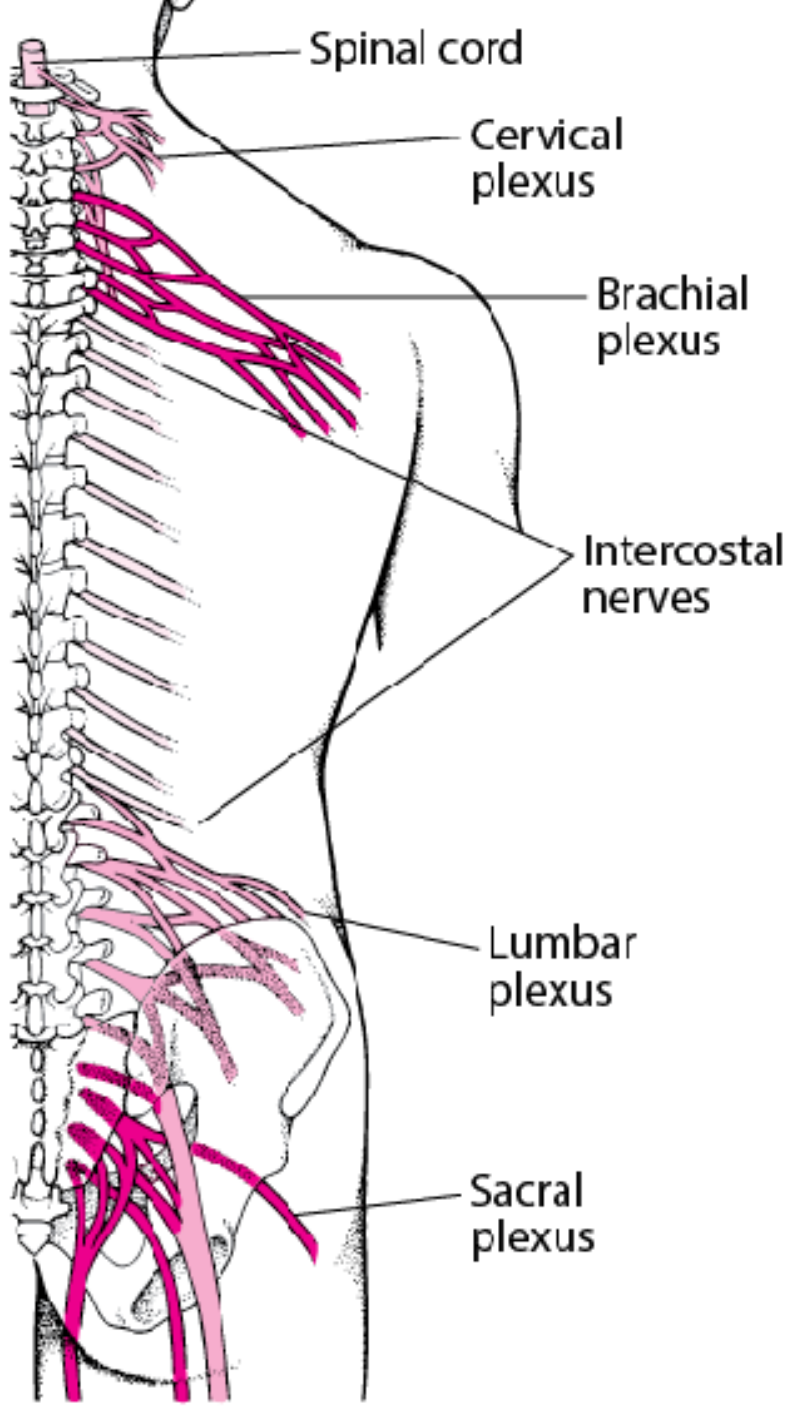
# Lumbar Plexus *(draw it)

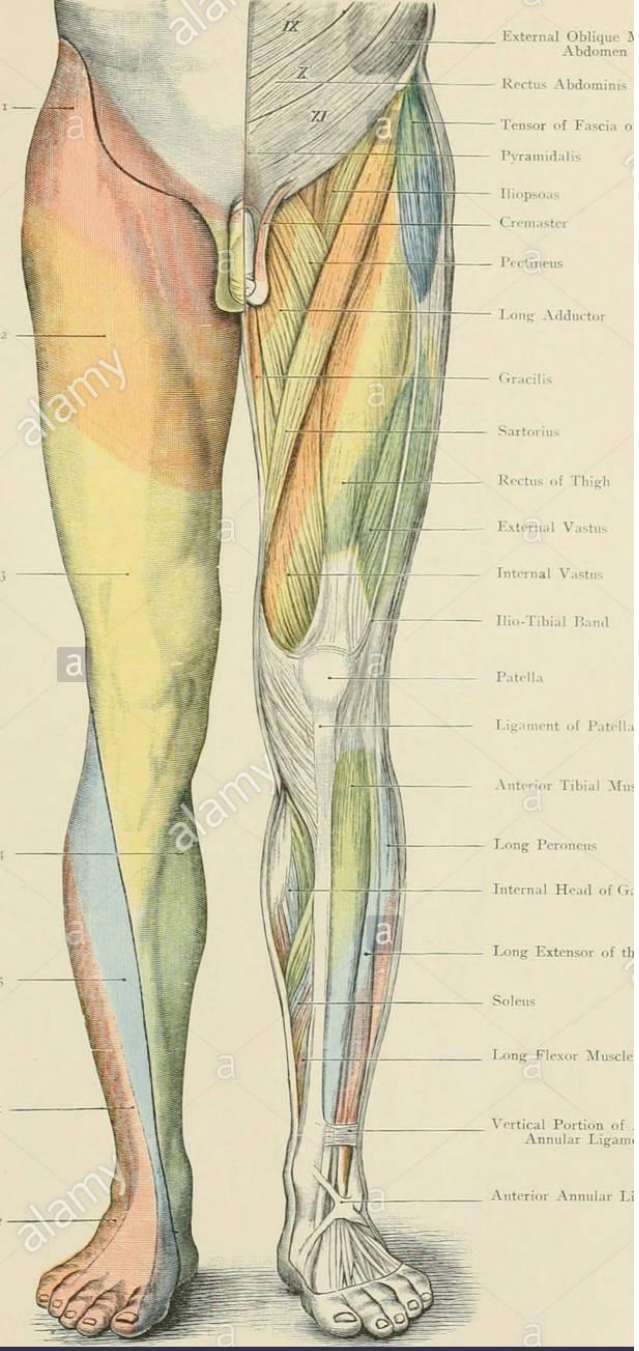


# Sacral Plexus *(draw it)



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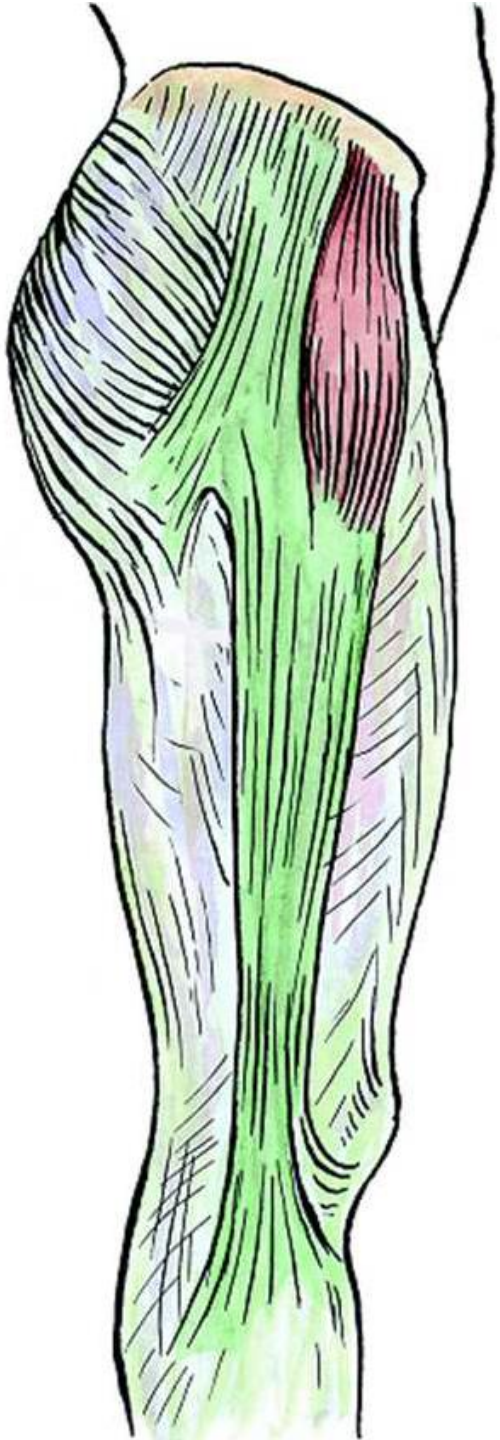
# LOWER LIMB COMPARTMENTS



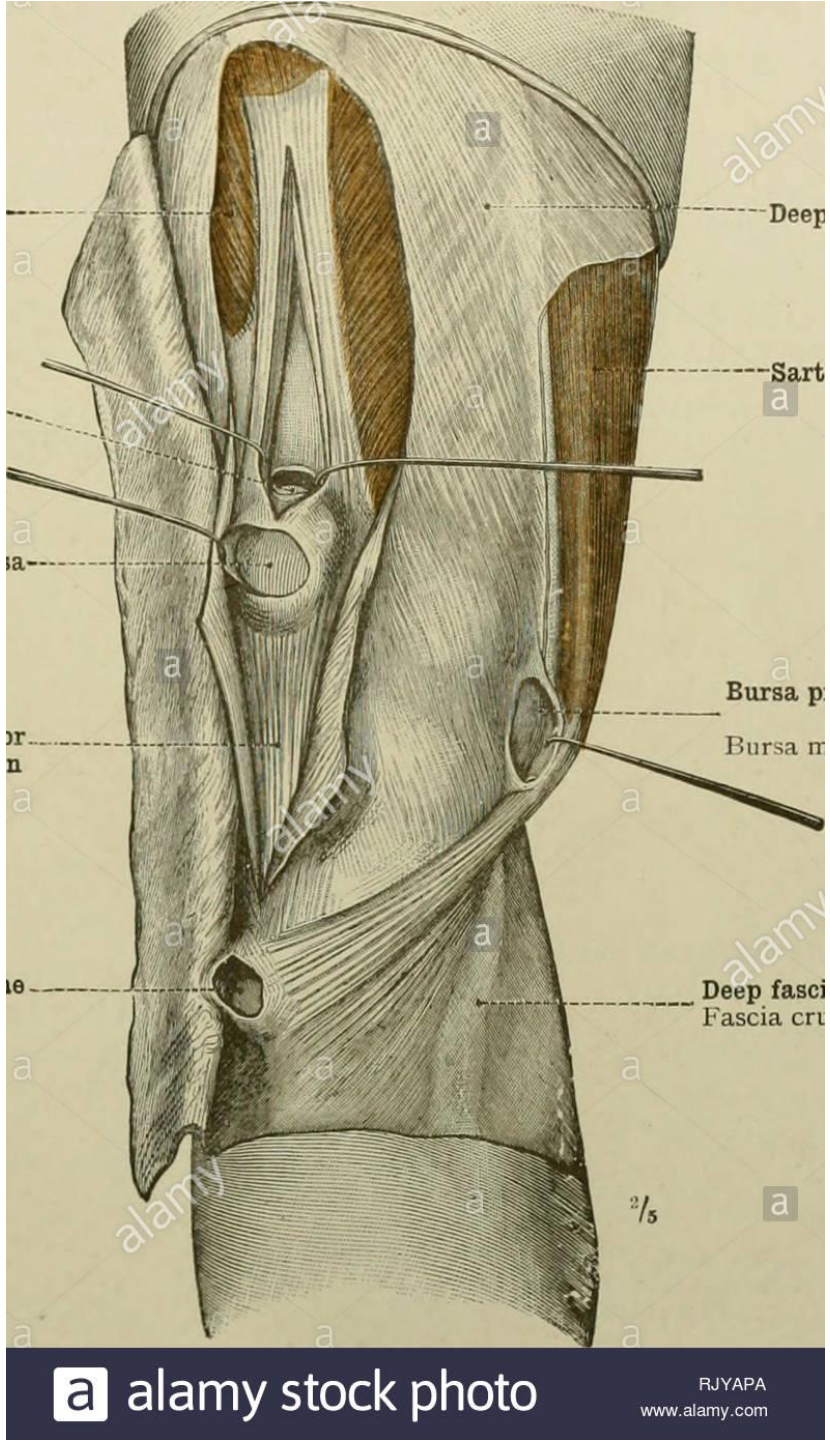



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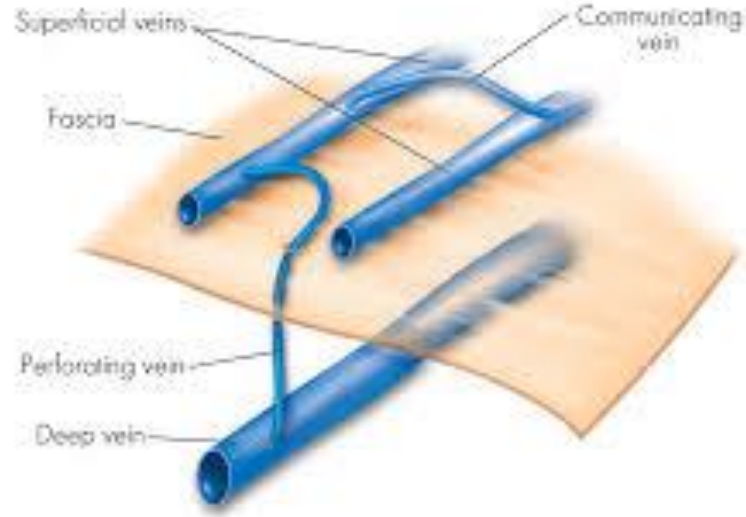
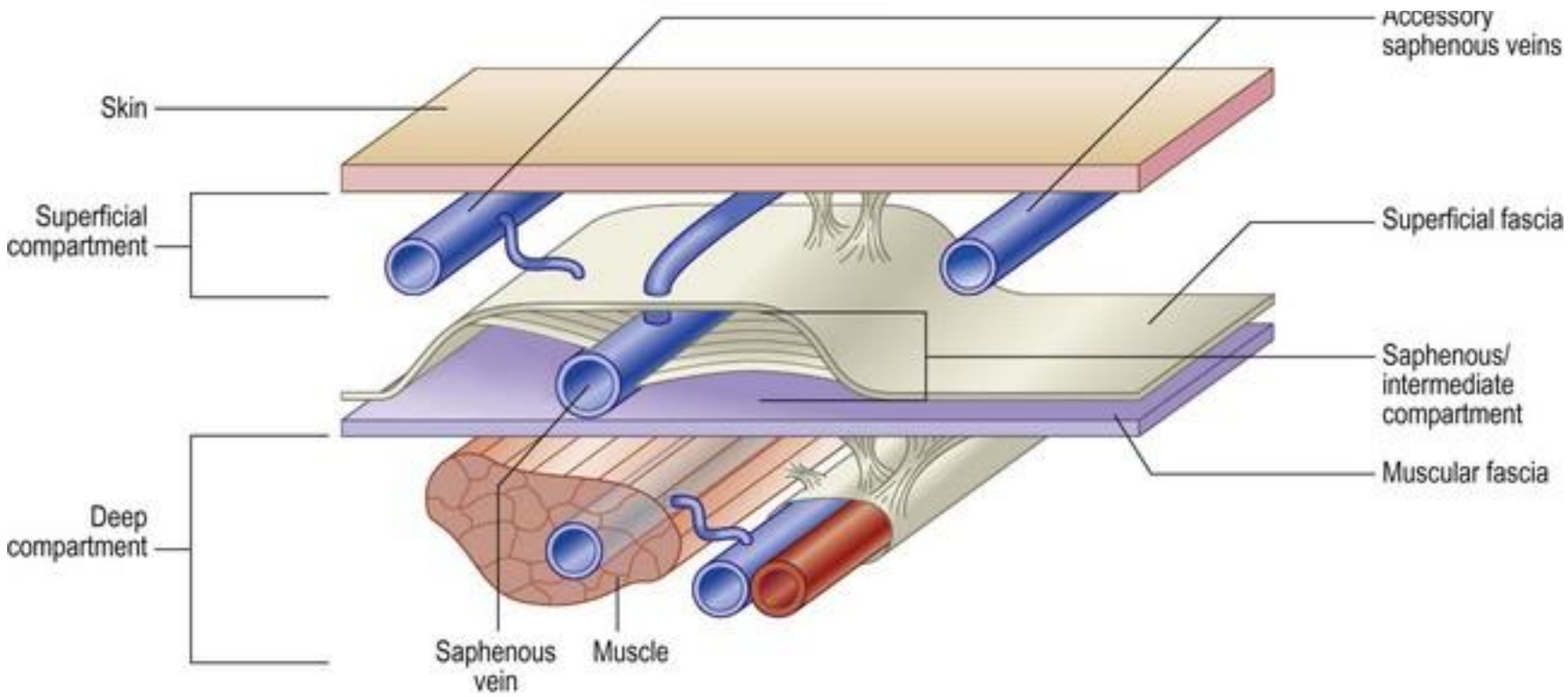
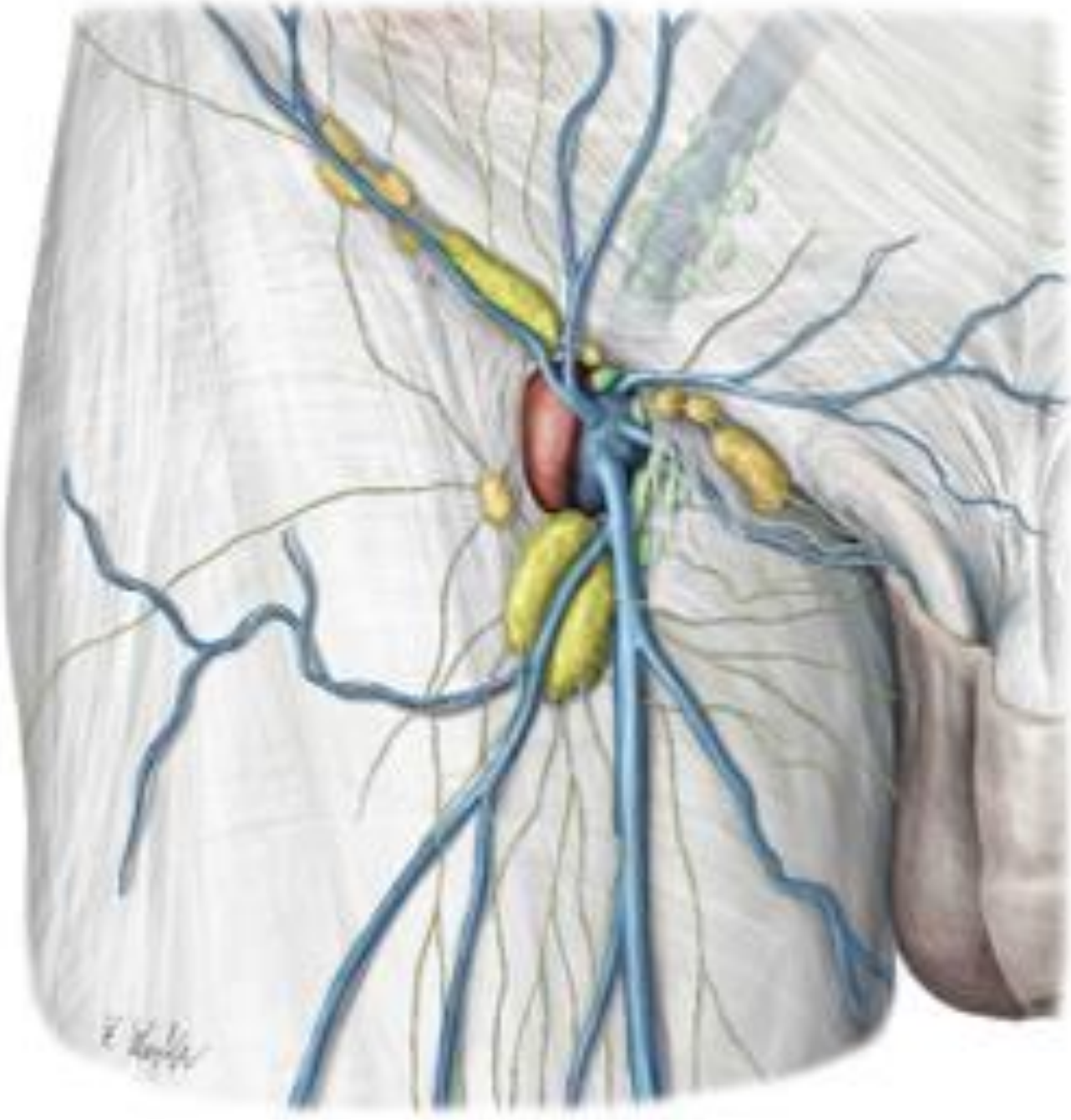
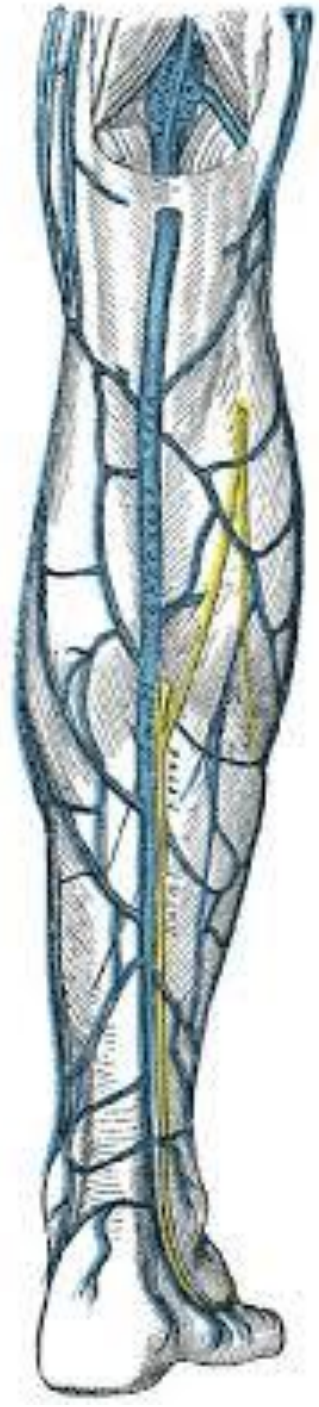
FIGURE 1

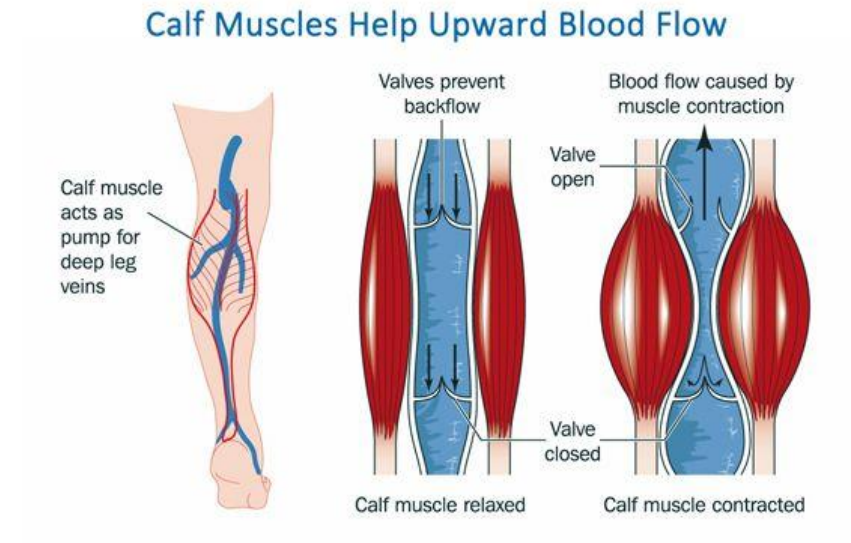


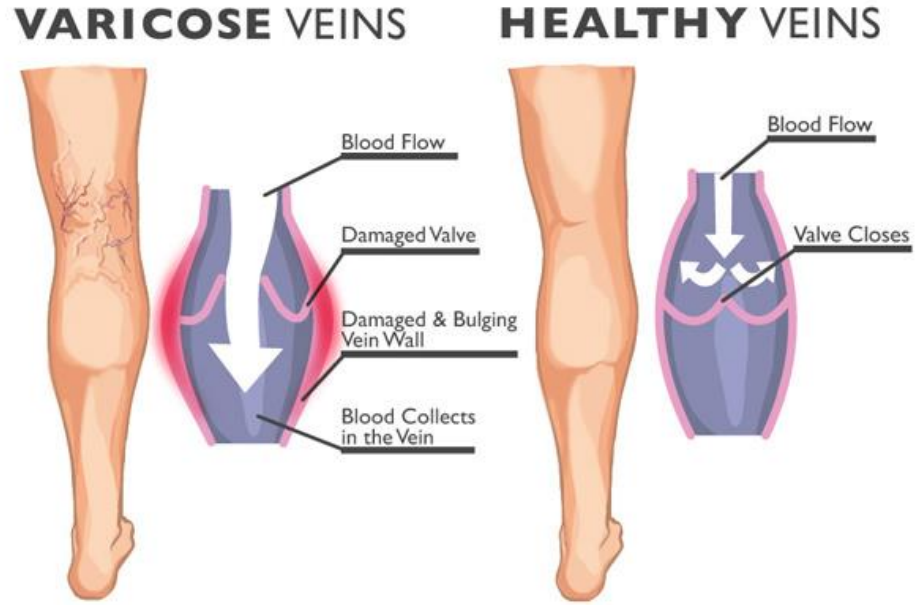

SUPERFICIAL, PERFORATING AND DEEP VEINS

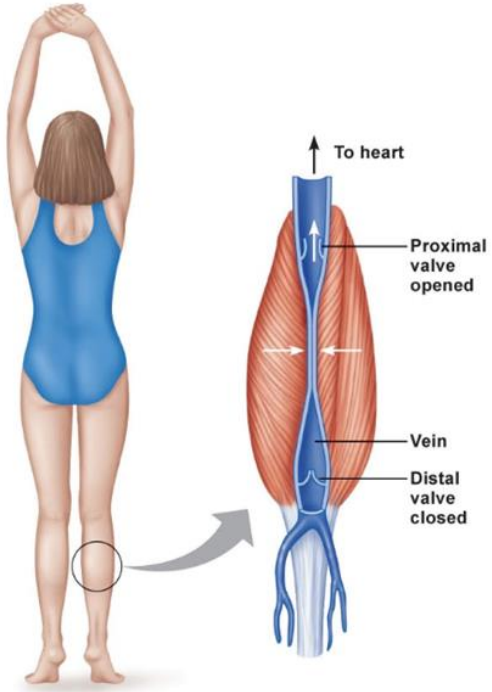




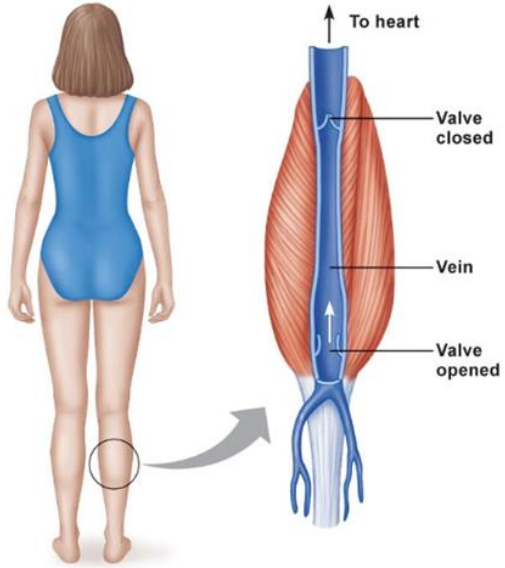




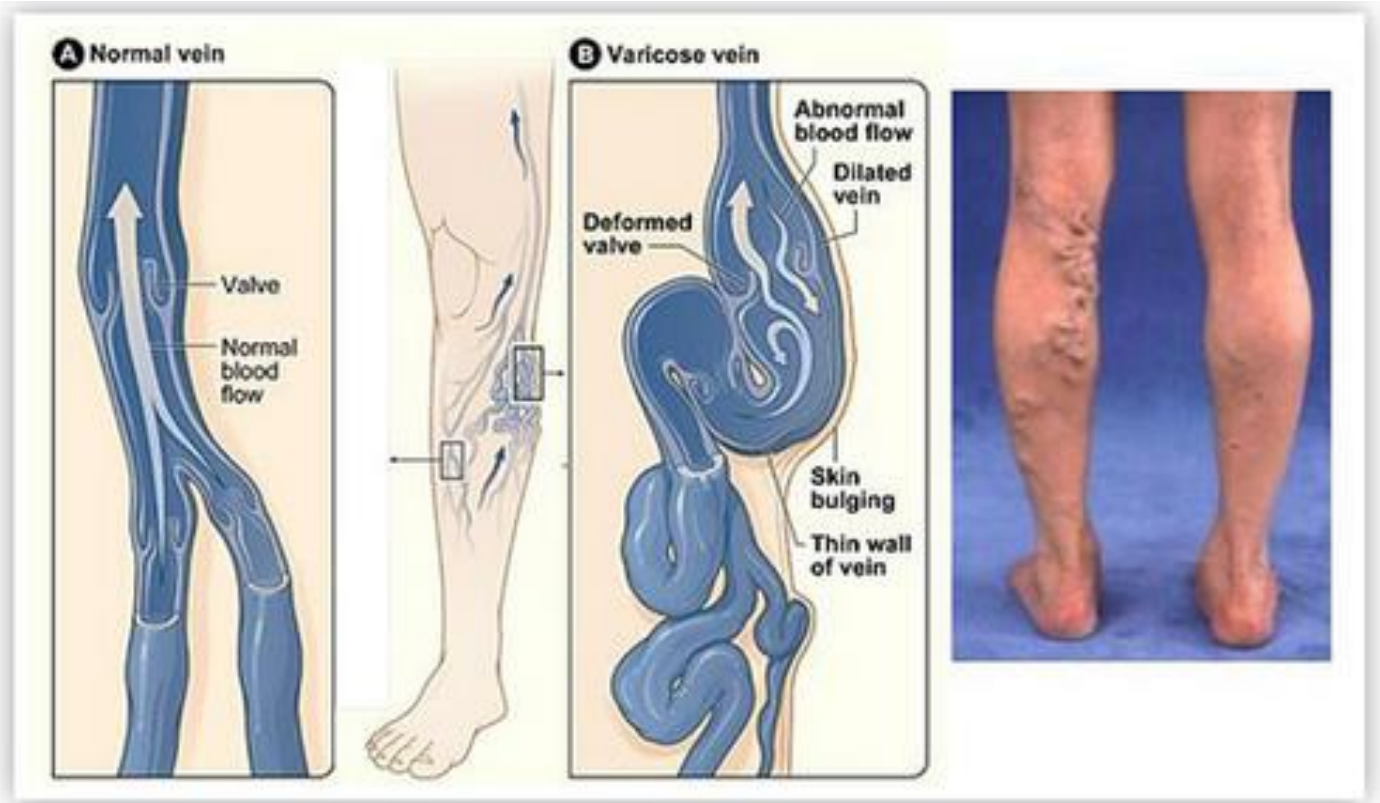



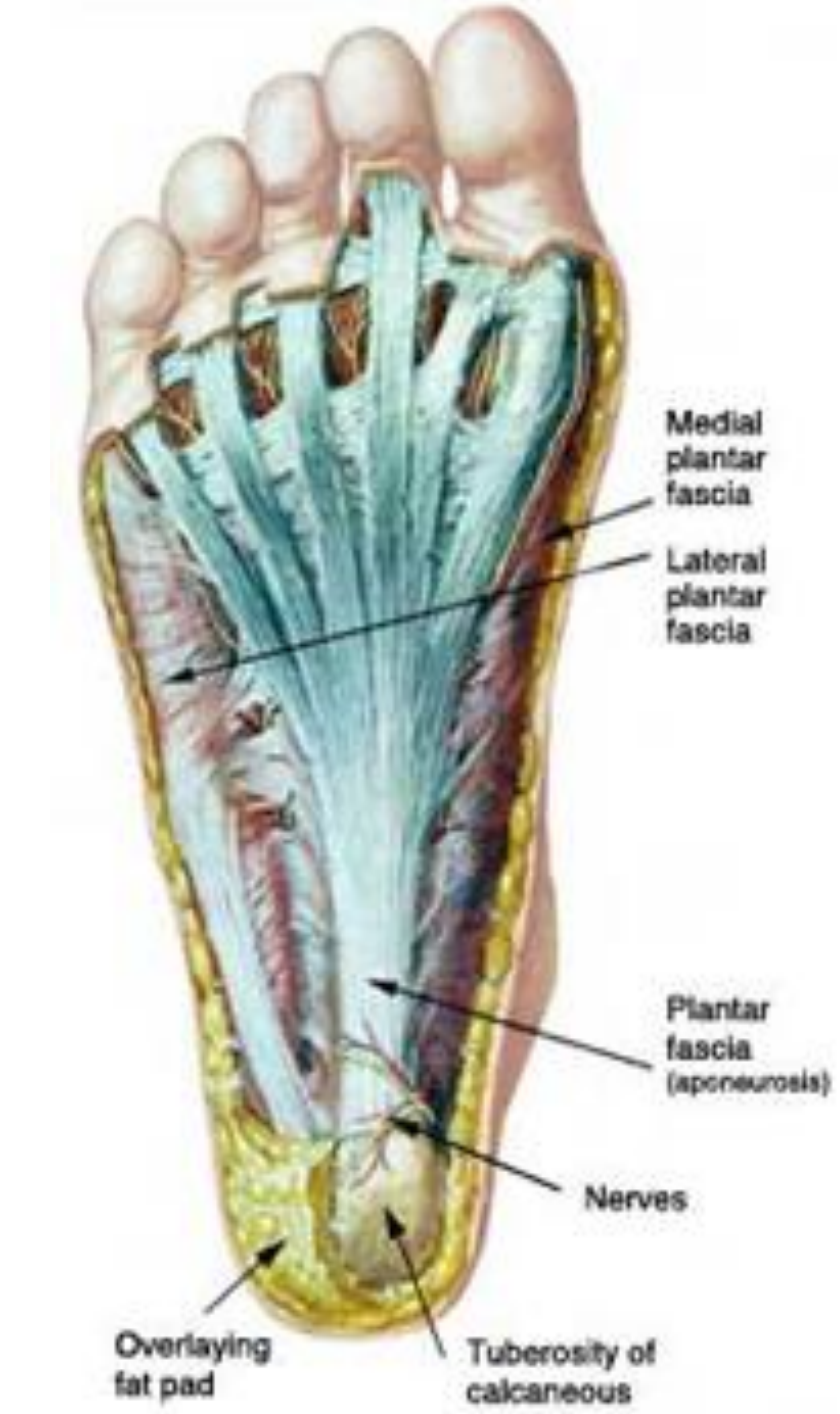



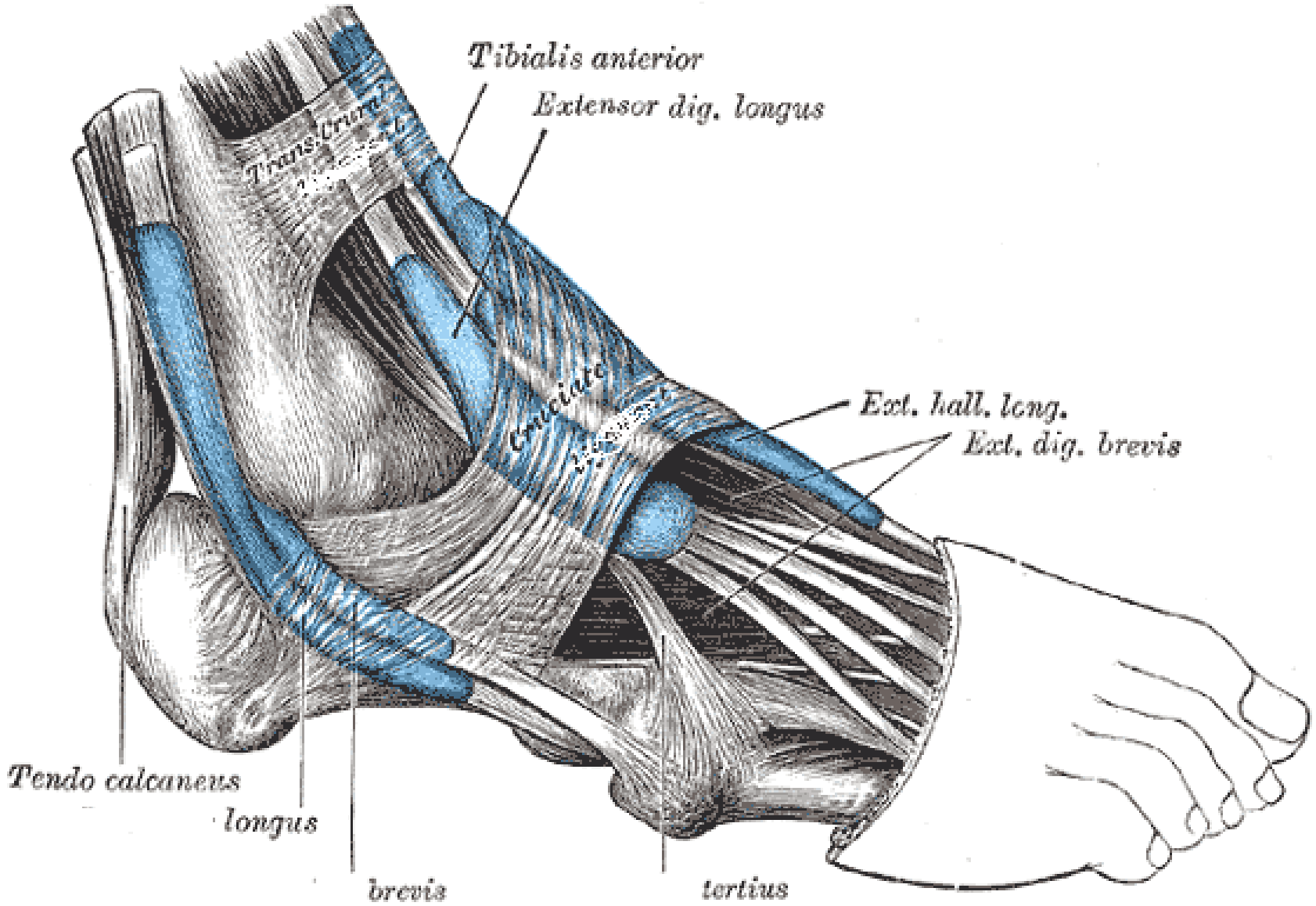

(a) Skeletal muscle contracted

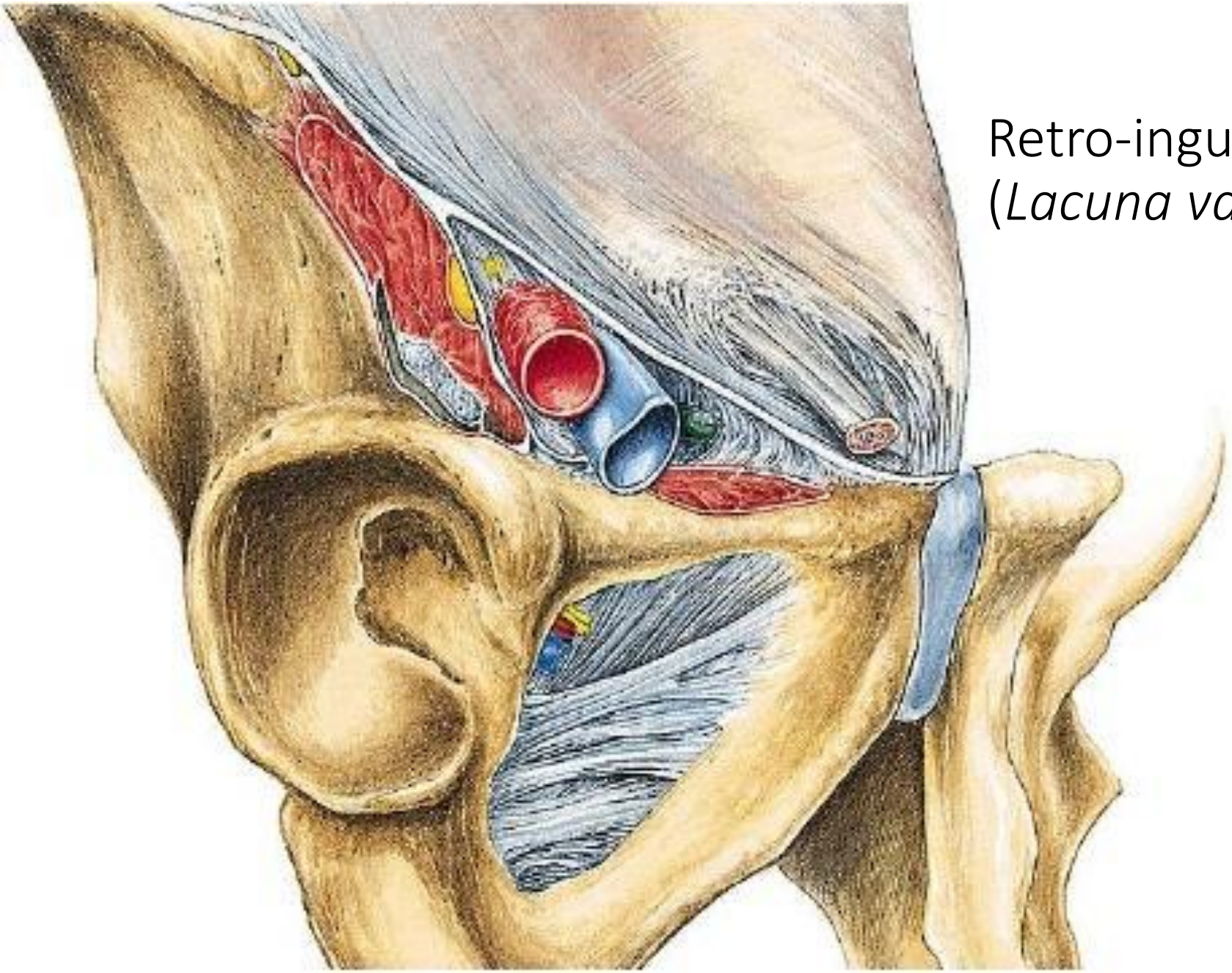



(b) Skeletal muscle relaxed

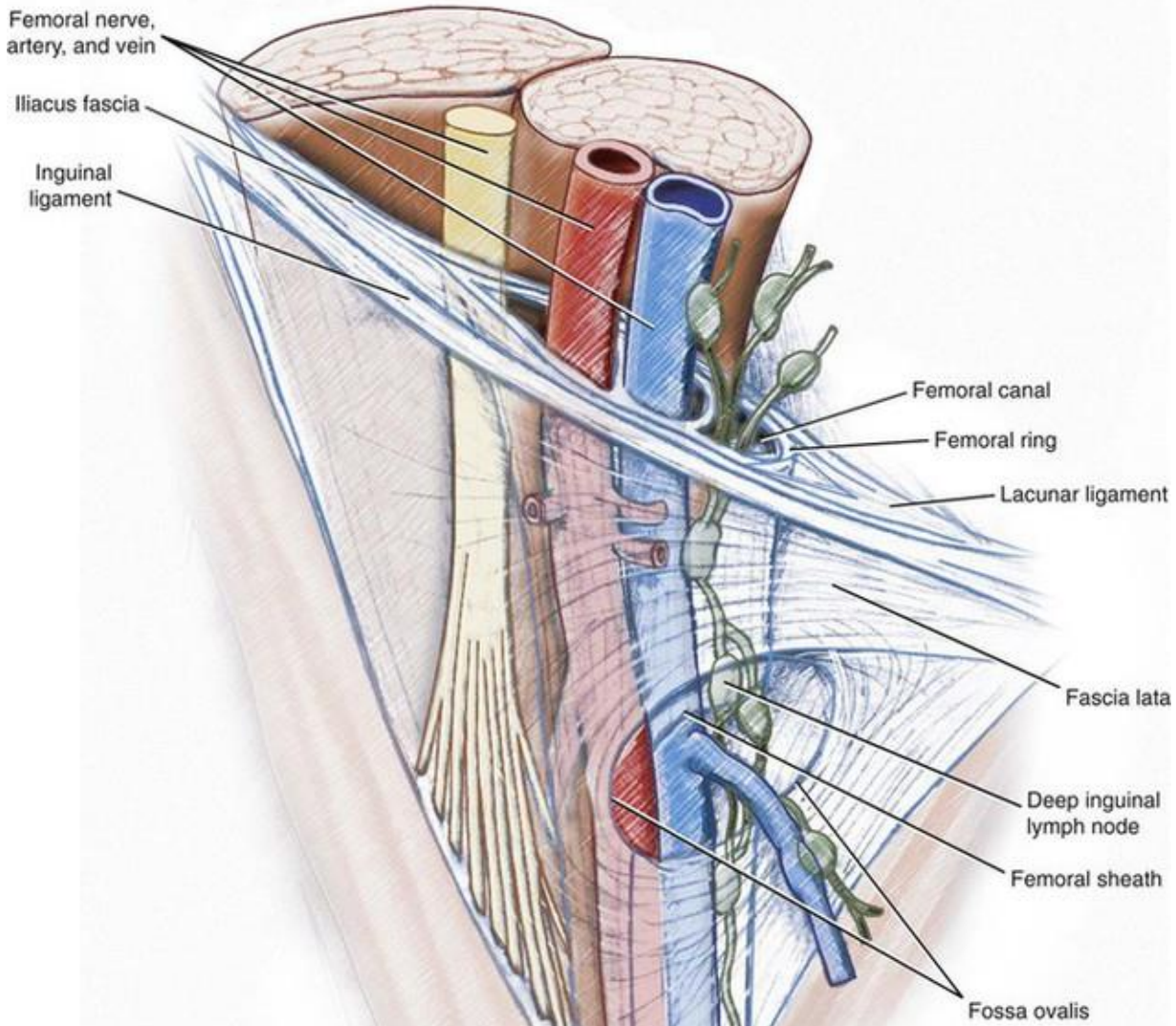



Medial plantar fascia
Lateral plantar fascia
Plantar fascia (aponeurosis)
Nerves
Overlaying fat pad
Tuberosity of calcaneous

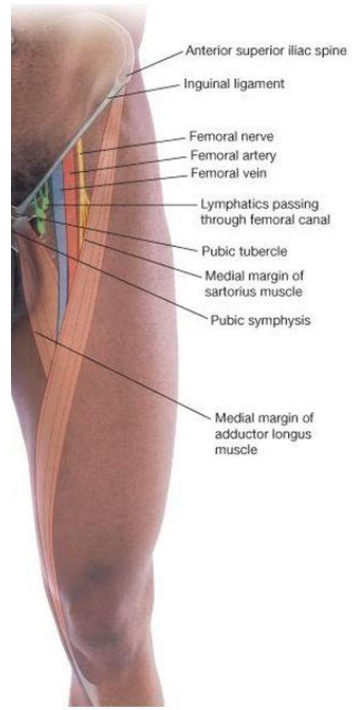

Tibialis anterior
Extensor dig. longus
Ext. hall. long.
Ext. dig. brevis
Tendo calcaneus
longus
brevis
tertius

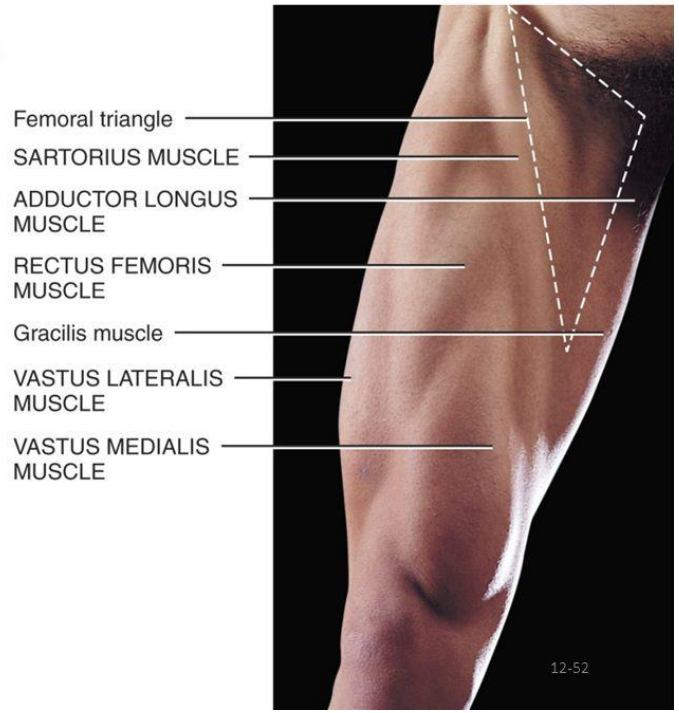


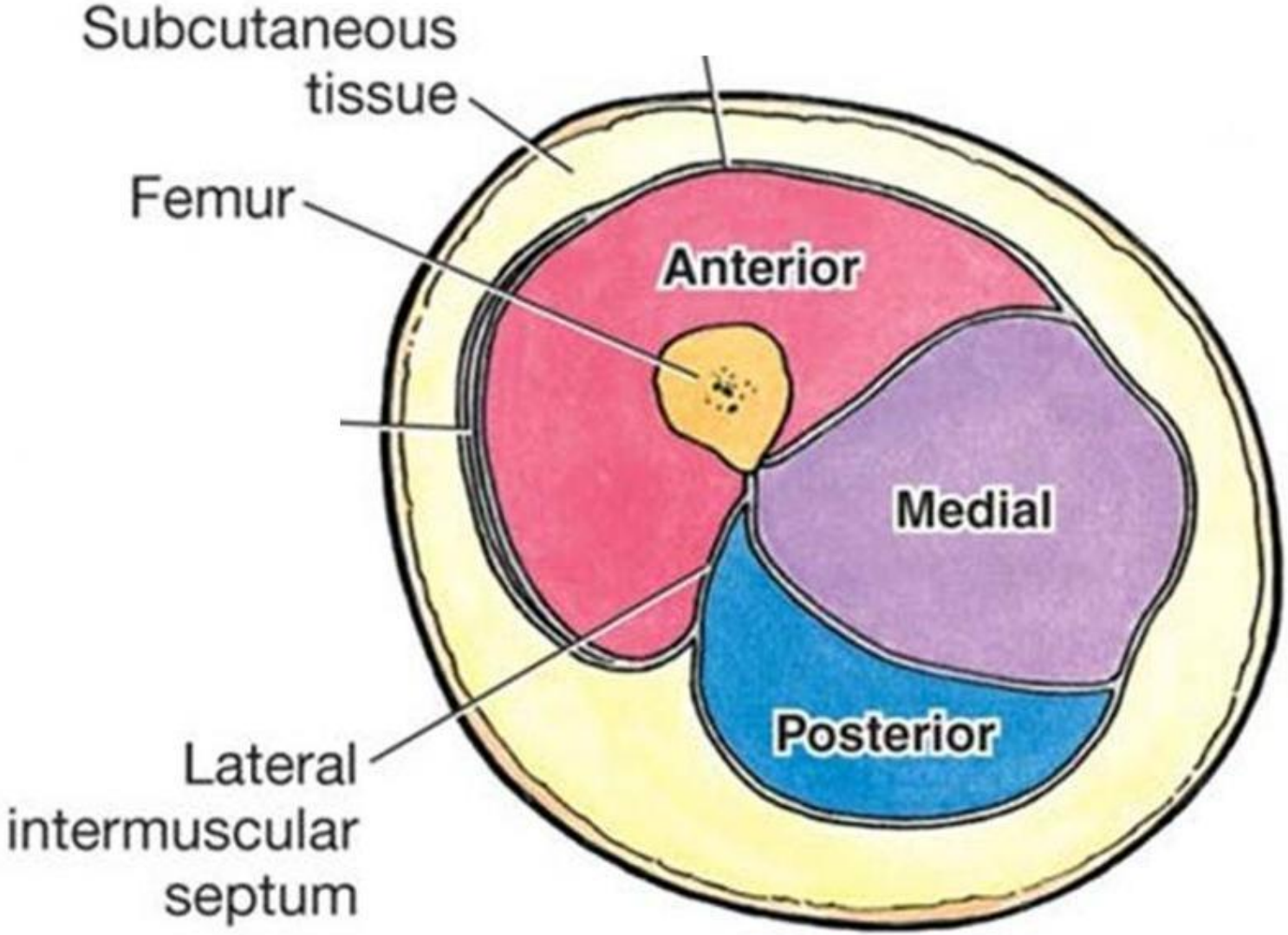
Retro-inguinal space
(*Lacuna vasorum et musculorum*)

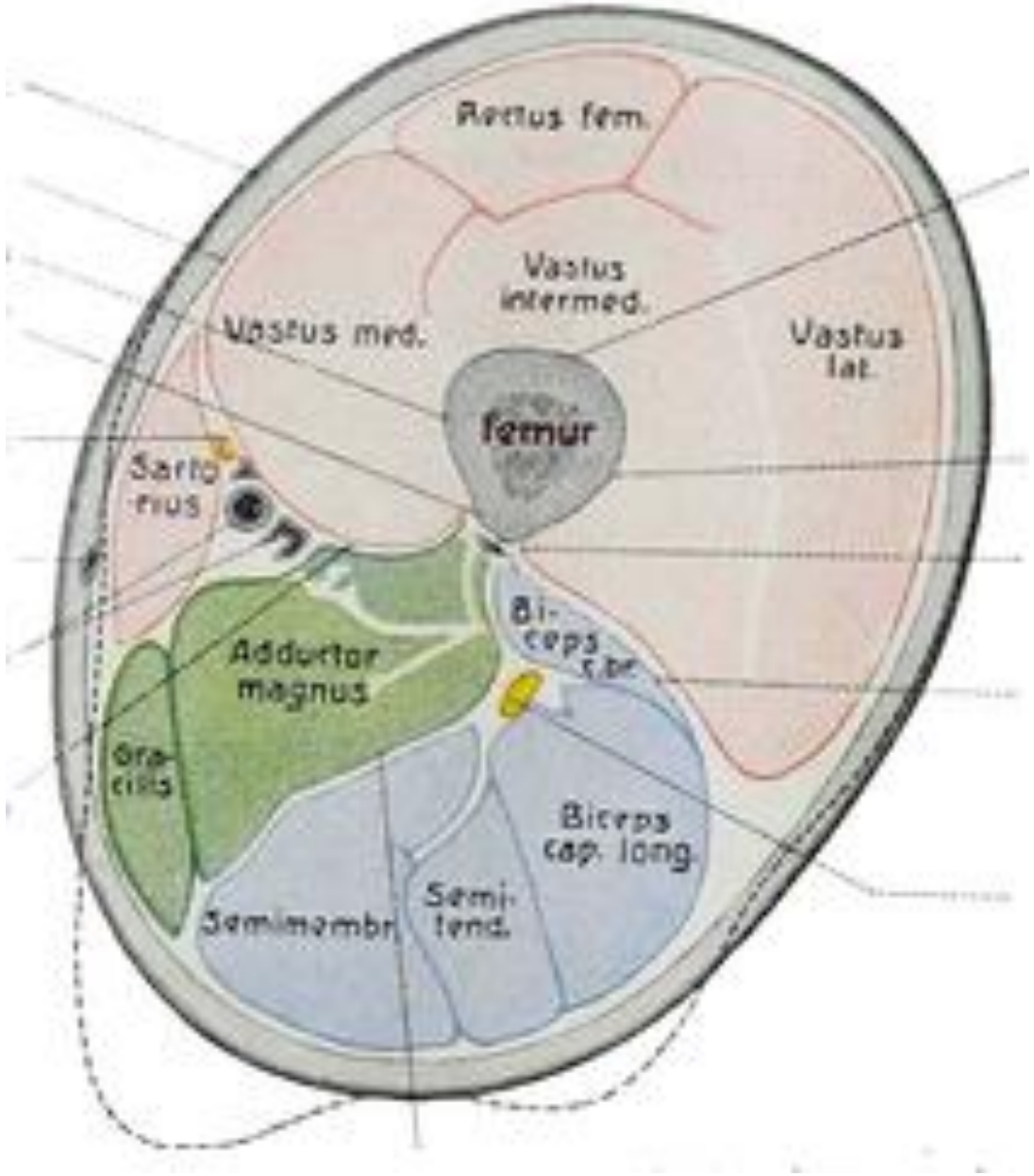


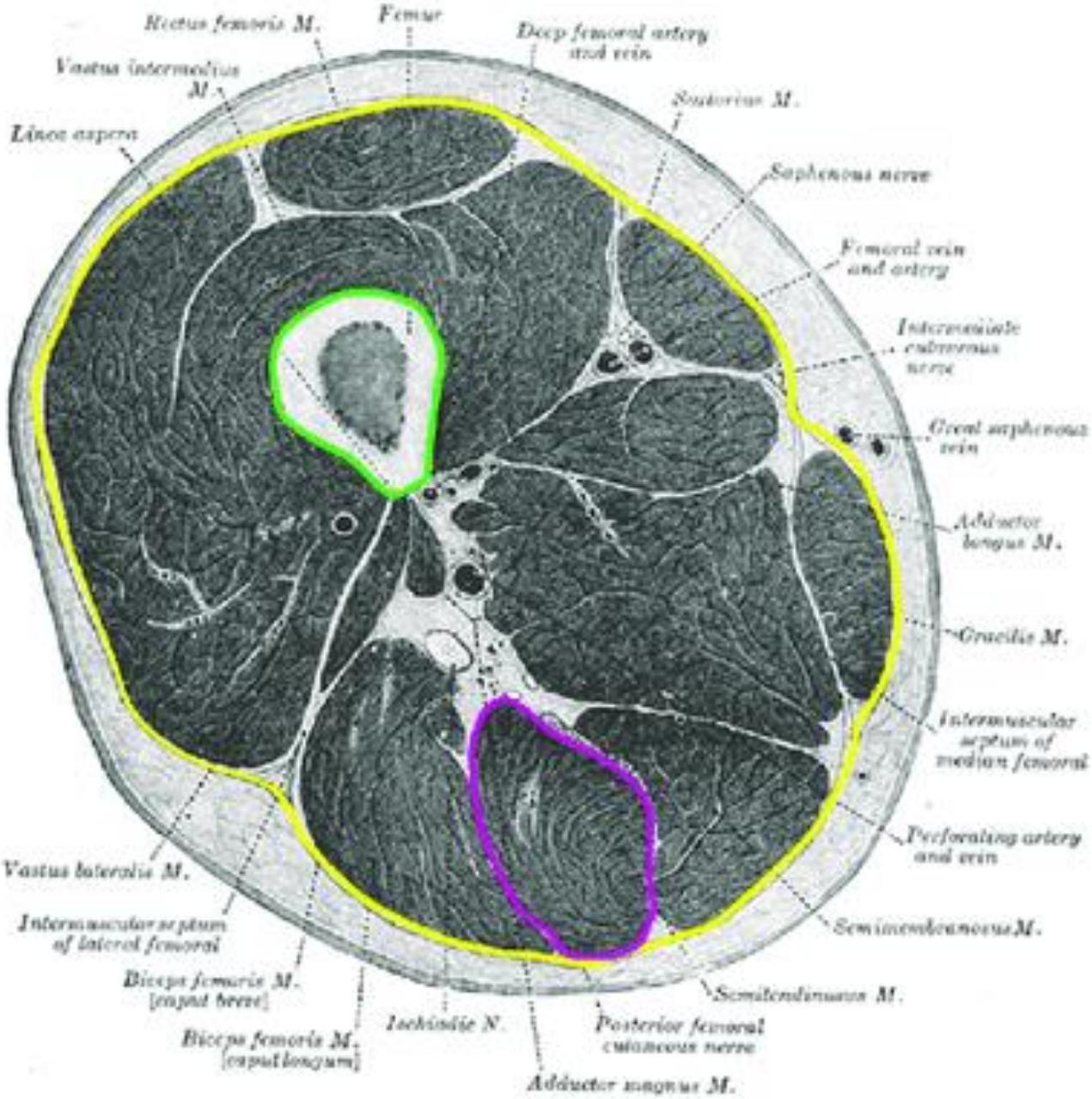

## Surface Anatomy of anterior thigh

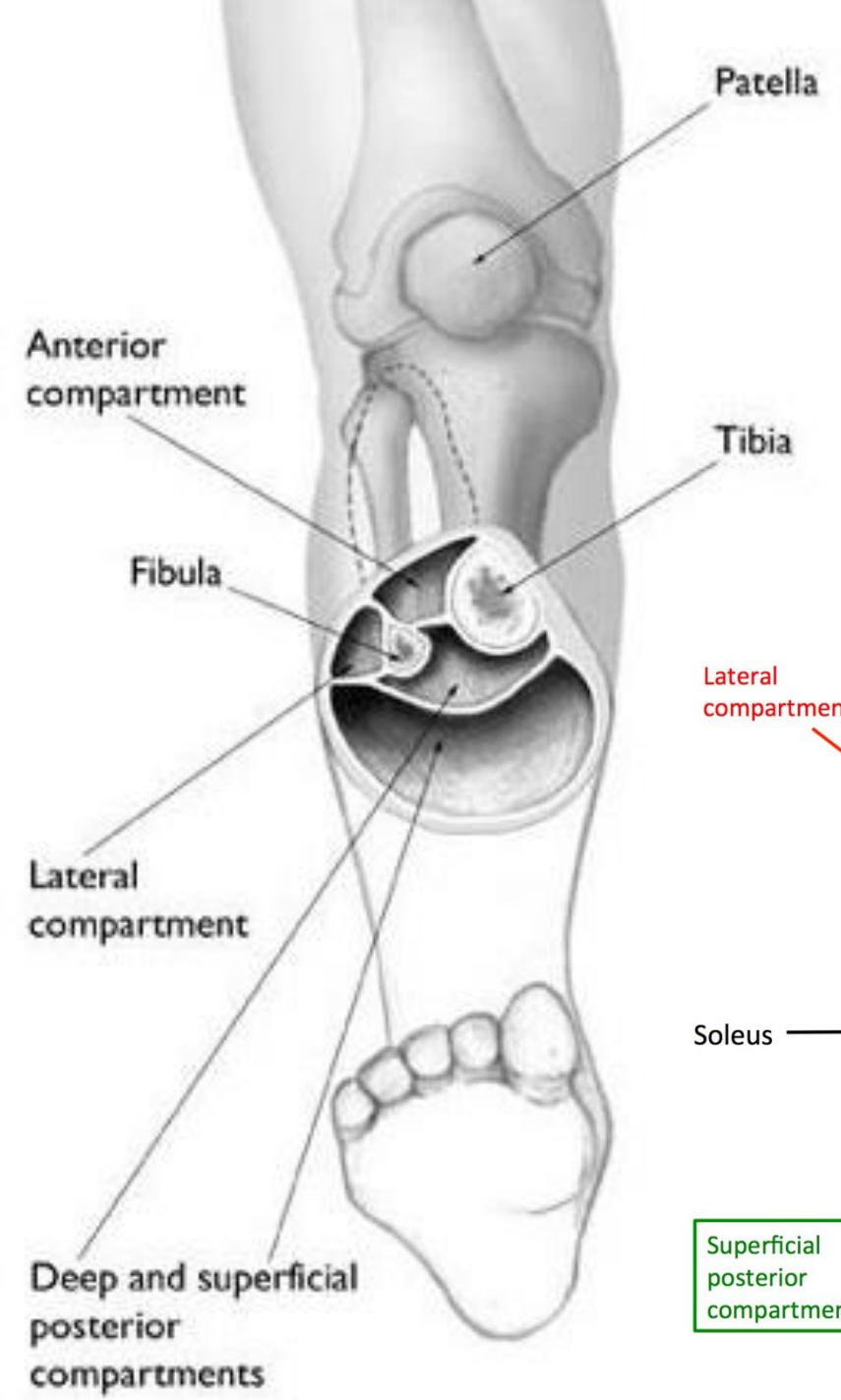


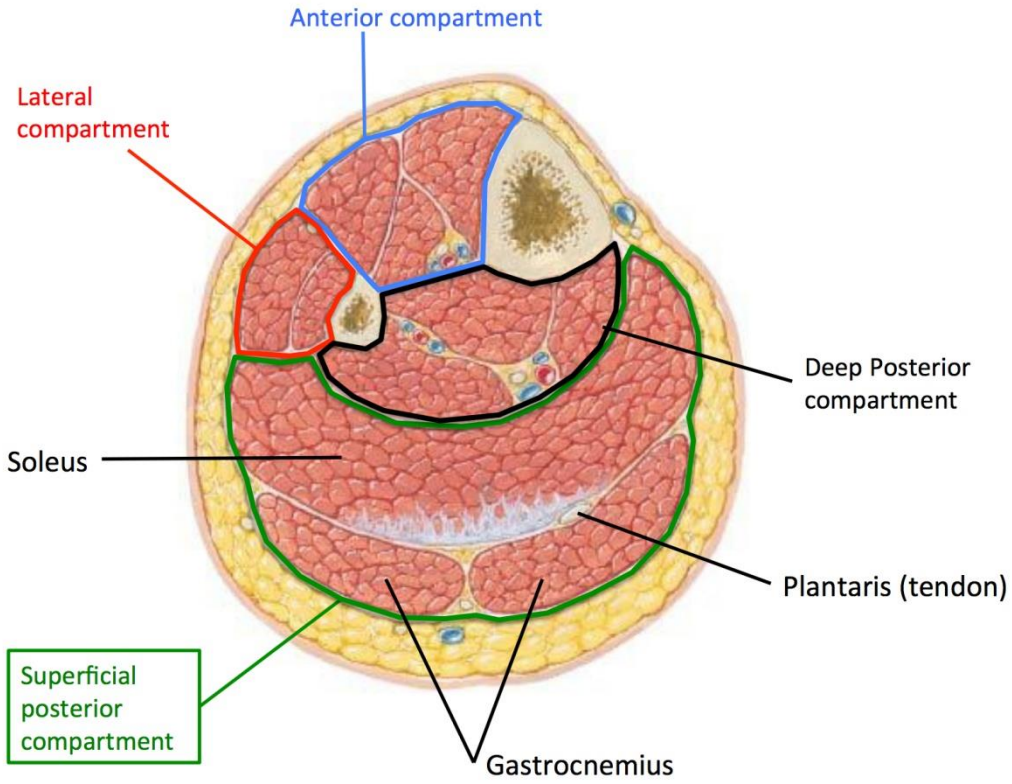



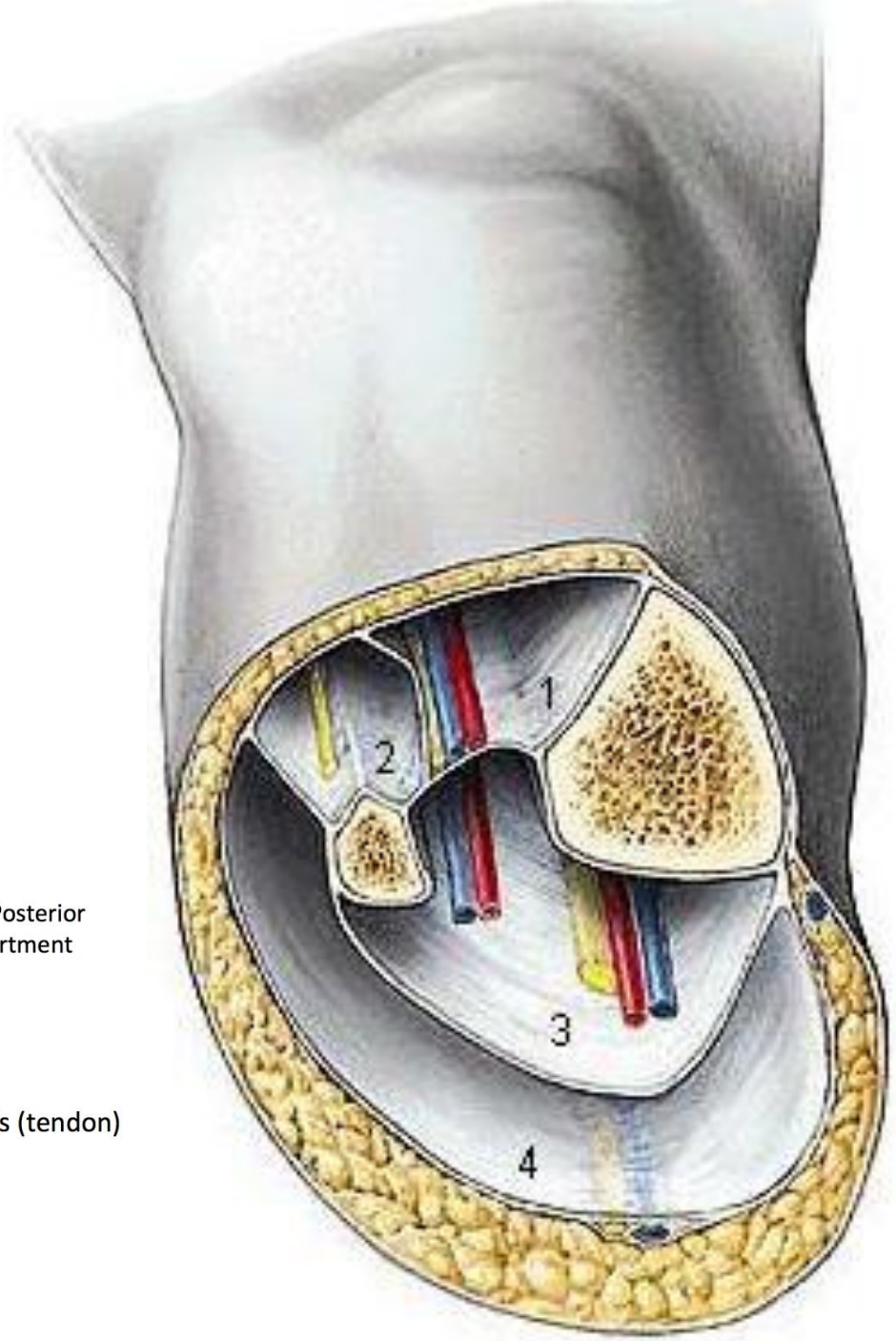

Subcutaneous tissue
Femur
Anterior
Medial
Posterior
Lateral intermuscular septum


Rectus fem.
Vastus intermed.
Vastus med.
Vastus lat.
femur
Sarto rius
Adductor magnus
Gra cilis
Bi- ceps s.br.
Biceps cap. long.
Semimembr.
Semi- tend.


Rectus femoris M.
Femur
Deep femoral artery and vein
Vastus intermedius M.
Sartorius M.
Linea aspera
Saphenous nerve
Femoral vein and artery
Anterior cutaneous nerve
Great saphenous vein
Adductor longus M.
Gracilis M.
Intermuscular septum of median femoral
Perforating artery and vein
Vastus lateralis M.
Intermuscular septum of lateral femoral
Semimembranosus M.
Biceps femoris M. [caput breve]
Semitendinosus M.
Ischiadic N.
Posterior femoral cutaneous nerve
Biceps femoris M. [caput longum]
Adductor magnus M.


Patella
Anterior compartment
Tibia
Fibula
Lateral compartment
Deep and superficial posterior compartments


Anterior compartment
Lateral compartment
Deep Posterior compartment
Soleus
Plantaris (tendon)
Superficial posterior compartment
Gastrocnemius


1
2
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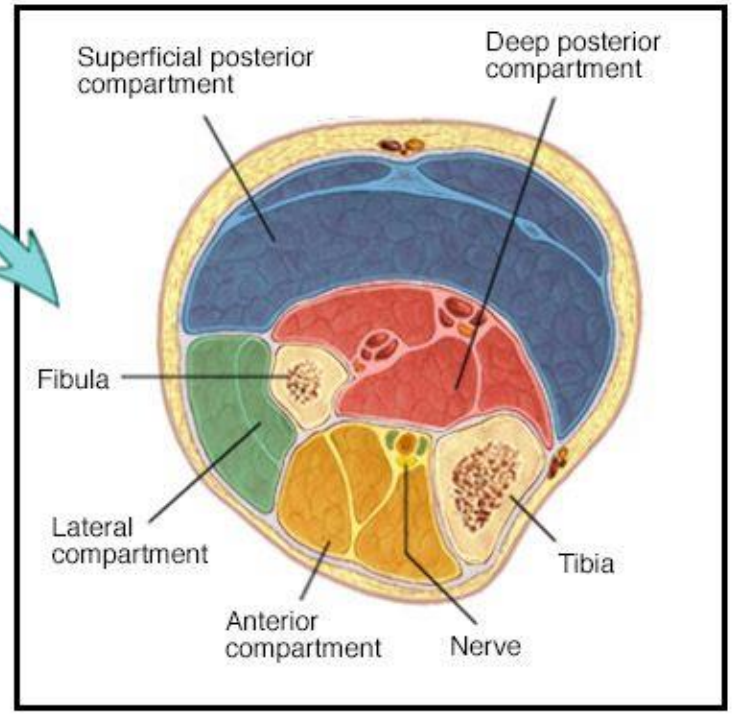
4

Compartments in lower leg

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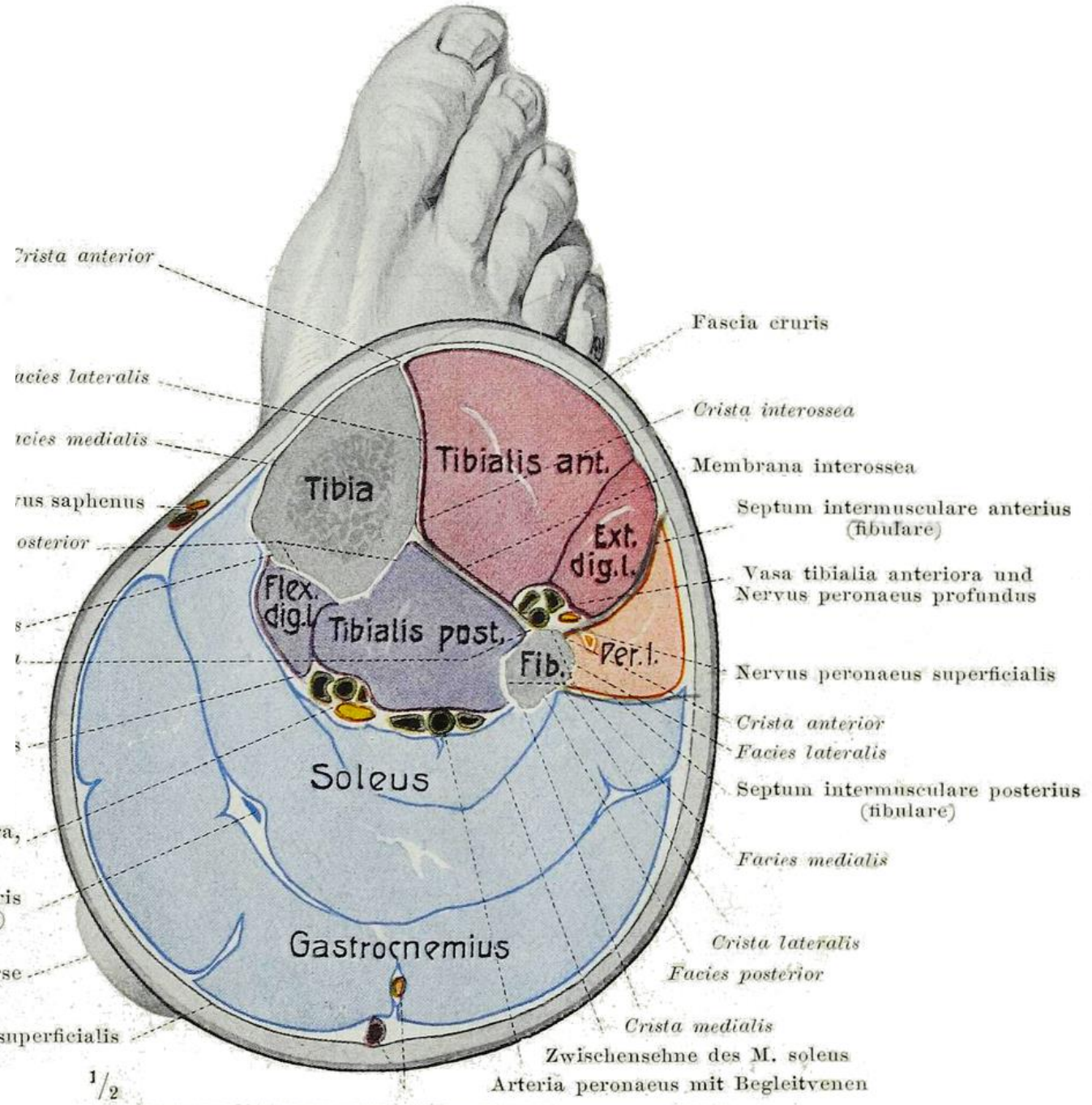


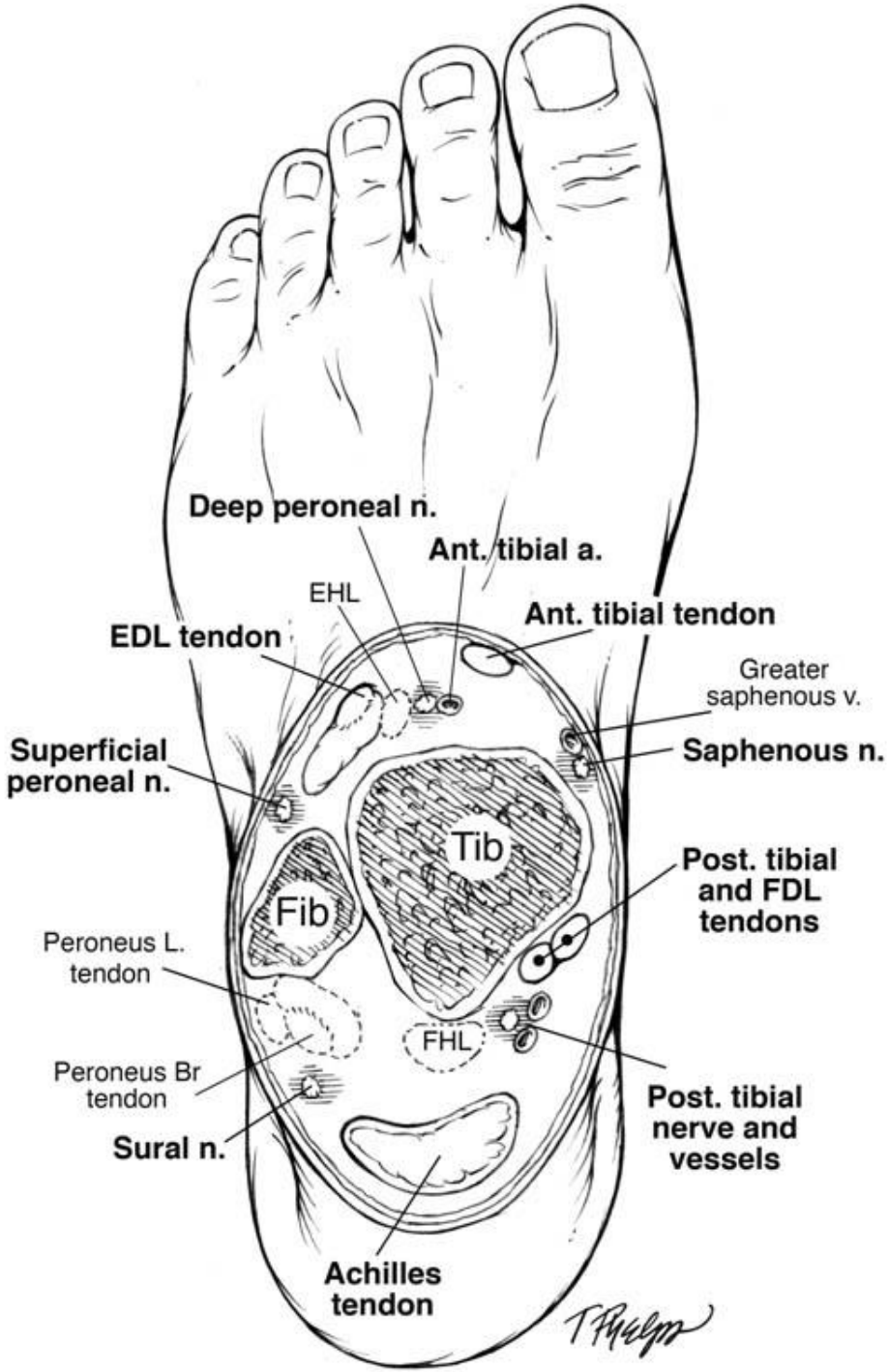
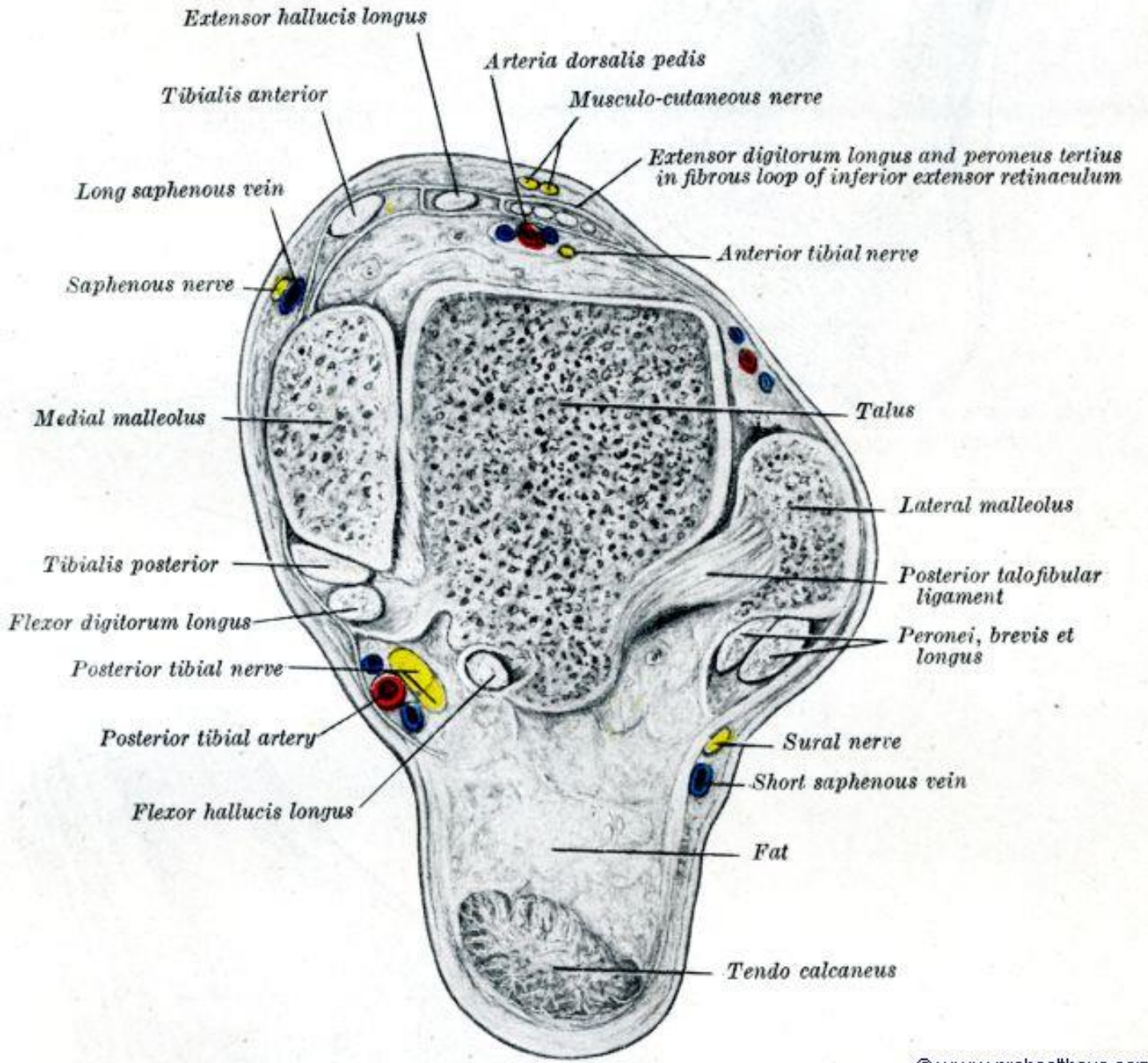



FIG. 661.—Transverse section through the lower part of the ankle-joint.

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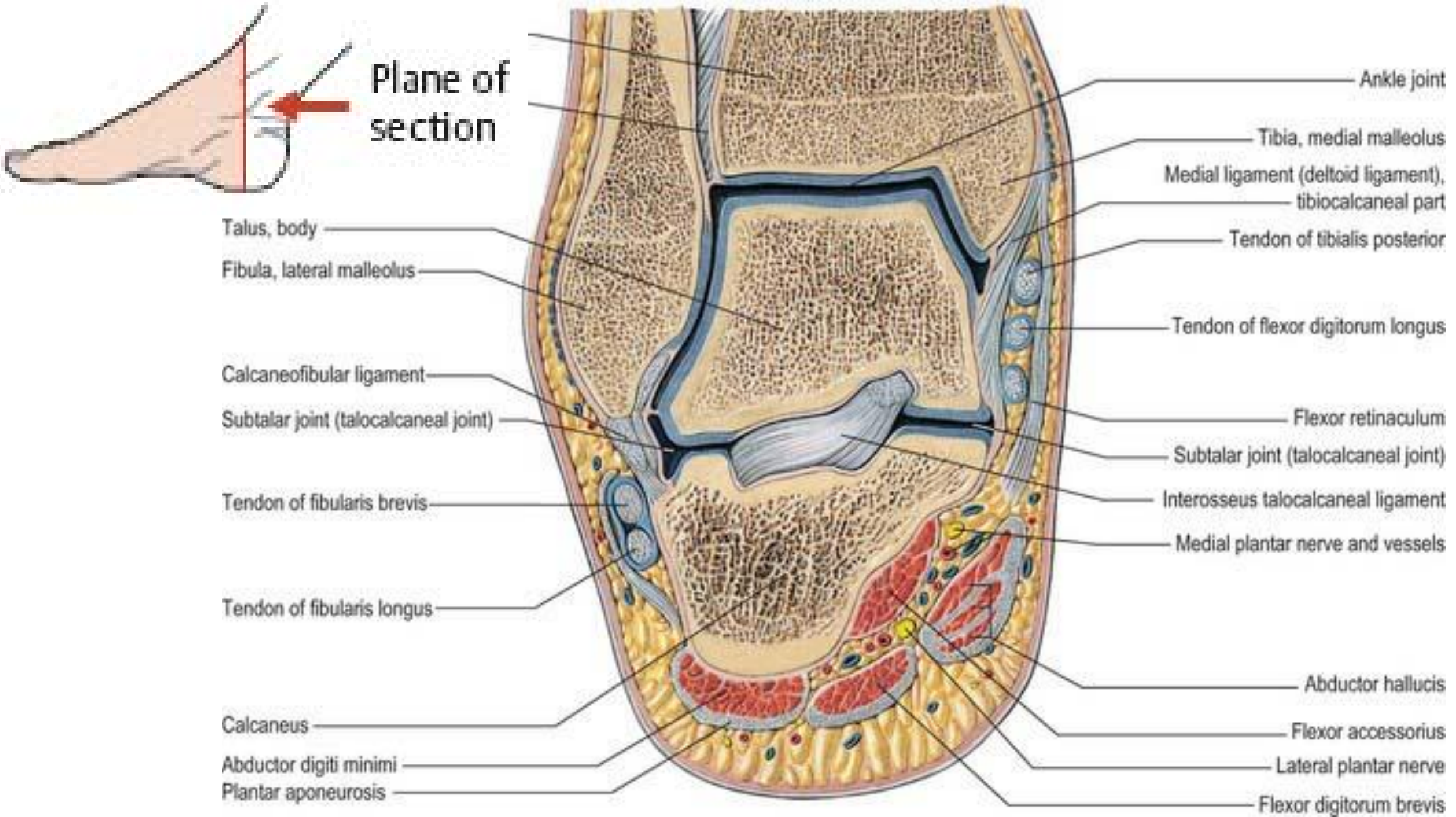
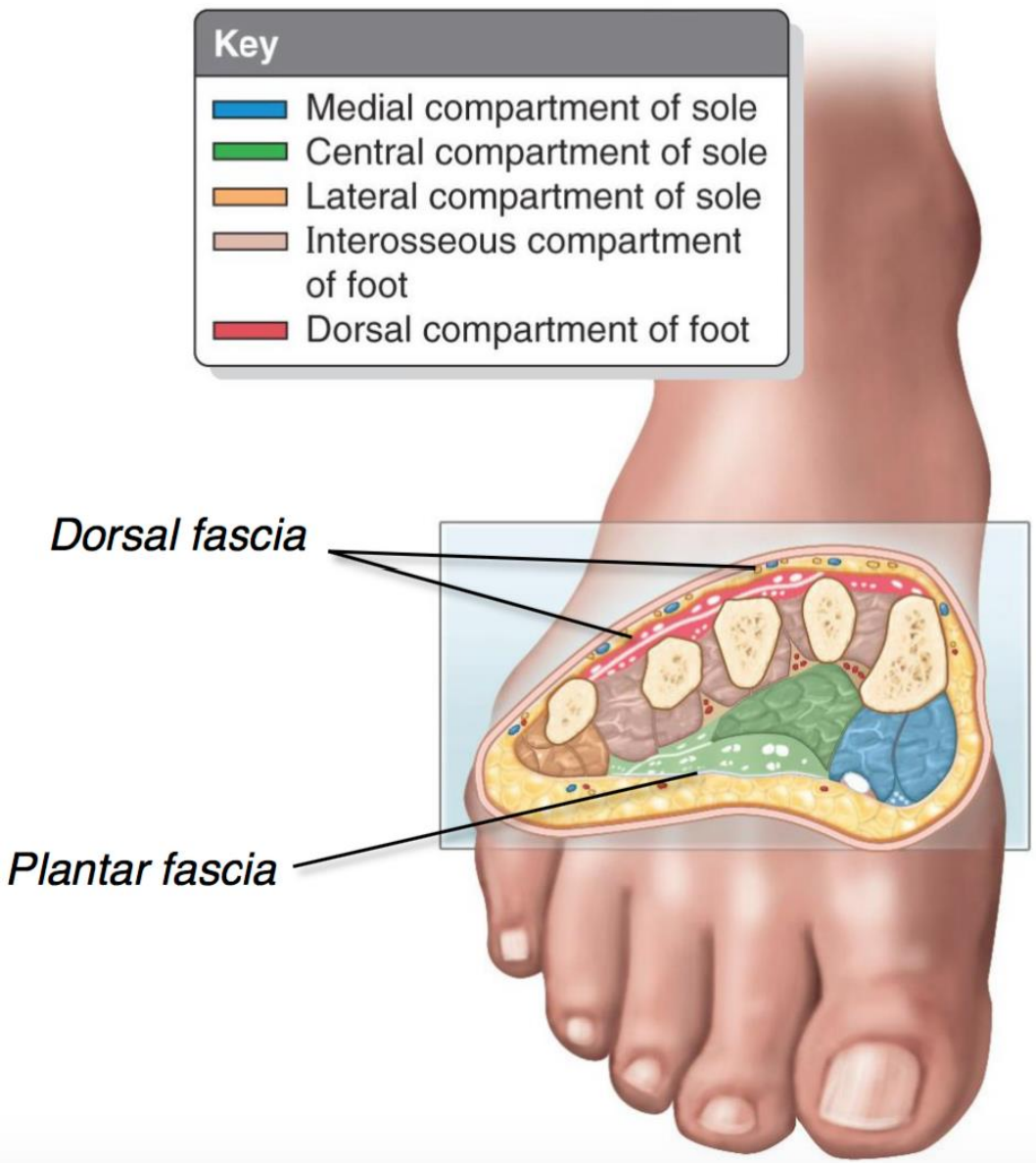

Plane of section
Ankle joint
Tibia, medial malleolus
Medial ligament (deltoid ligament), tibiocalcaneal part
Tendon of tibialis posterior
Tendon of flexor digitorum longus
Flexor retinaculum
Subtalar joint (talocalcaneal joint)
Interosseus talocalcaneal ligament
Medial plantar nerve and vessels
Abductor hallucis
Flexor accessorius
Lateral plantar nerve
Flexor digitorum brevis
Talus, body
Fibula, lateral malleolus
Calcaneofibular ligament
Subtalar joint (talocalcaneal joint)
Tendon of fibularis brevis
Tendon of fibularis longus
Calcaneus
Abductor digiti minimi
Plantar aponeurosis




## Fascial compartments

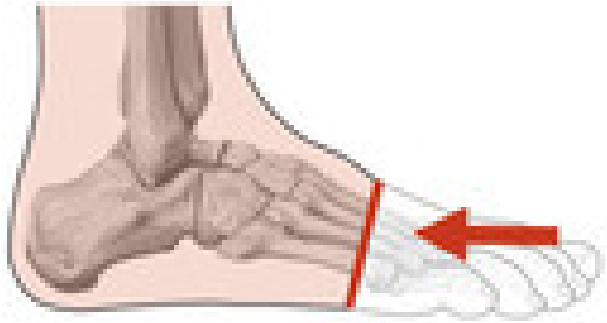
**Medial**: Hallucis (1st digit) muscles, medial plantar a/n

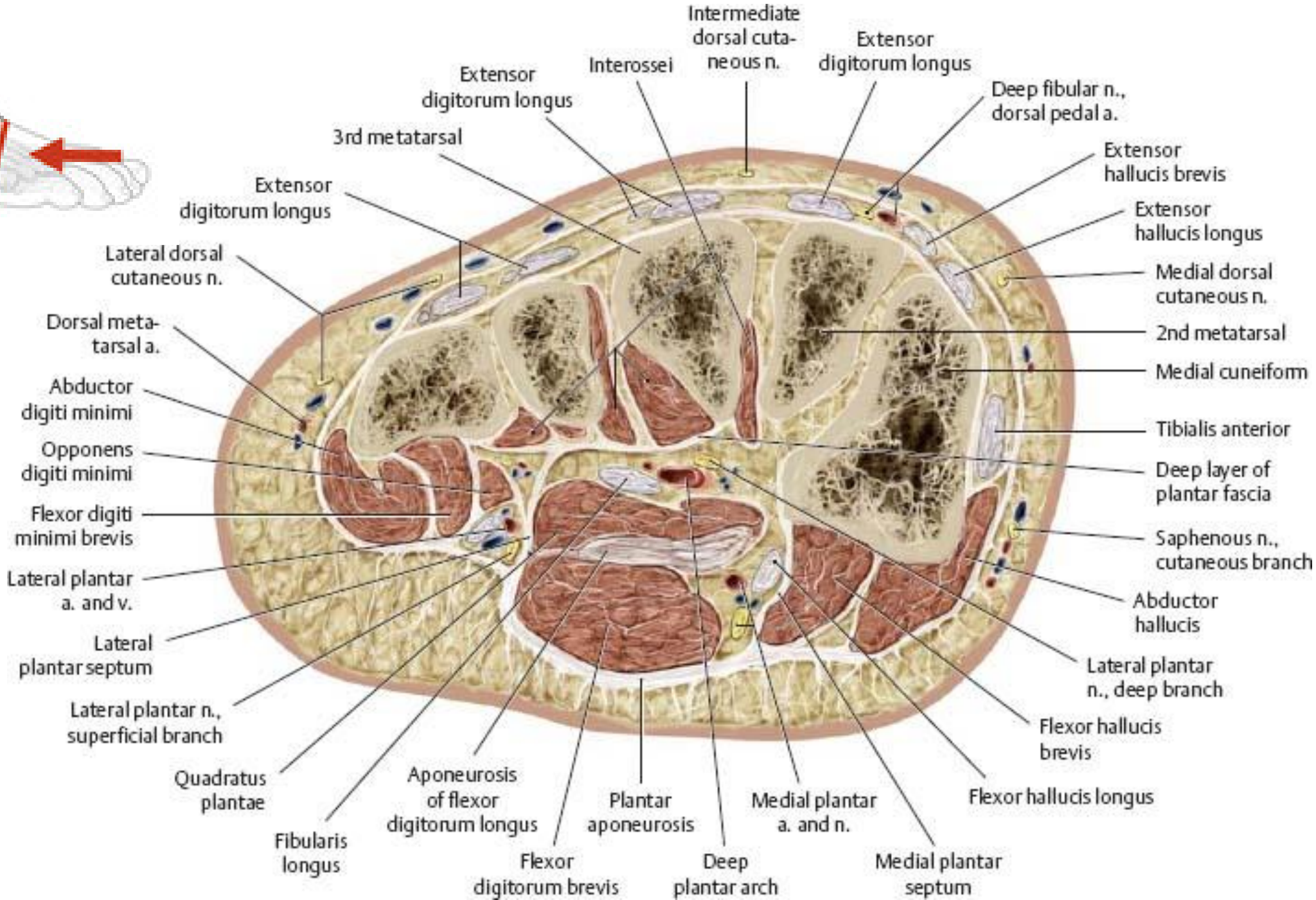
**Central**: Digitorum flexors, lumbricals, quadratus plantae, lateral plantar a/n

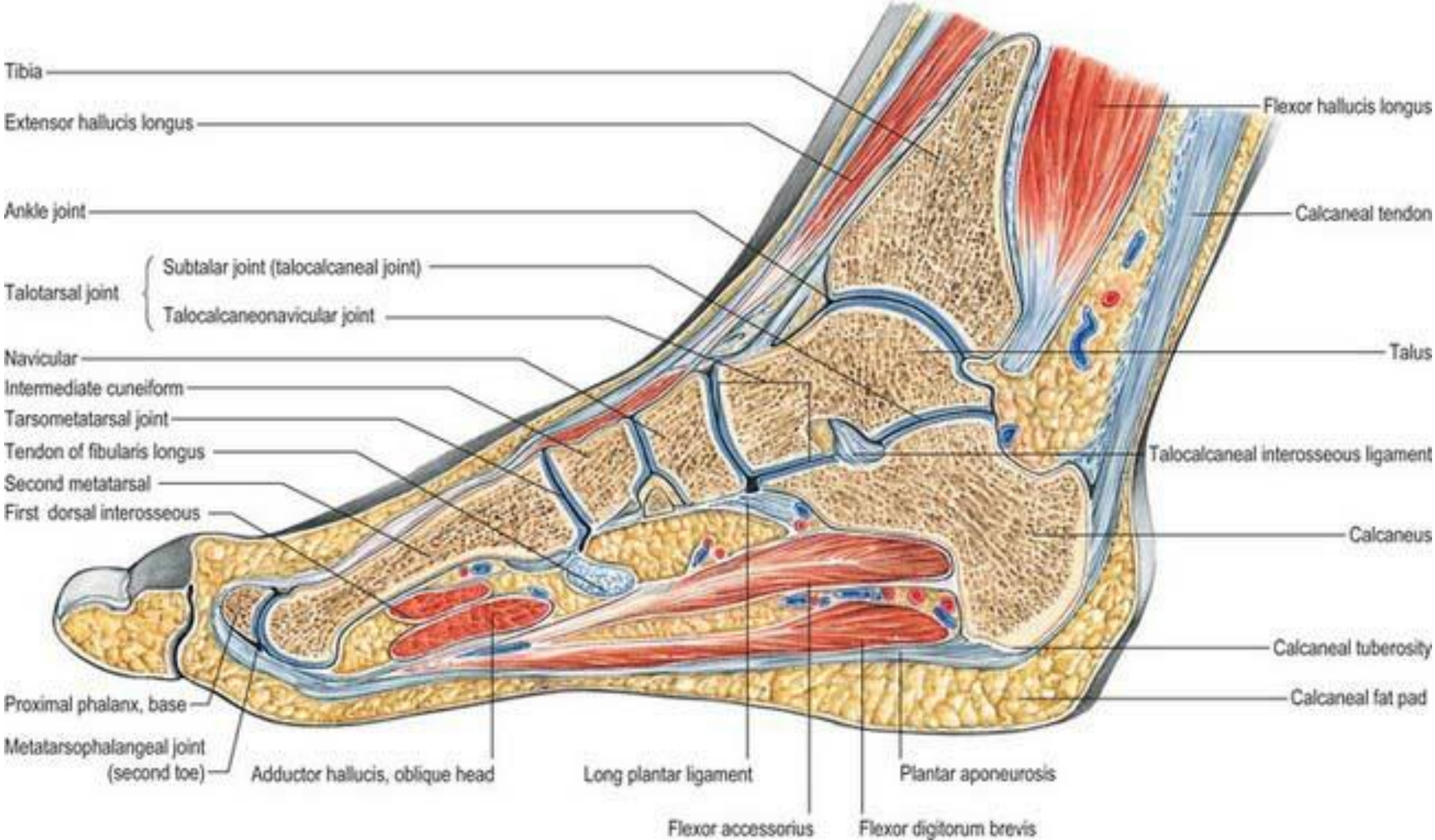
**Lateral**: Digiti minimi (5th digit) muscles

**Interosseus**: Metatarsals, interossei, deep plantar and metatarsal vessels

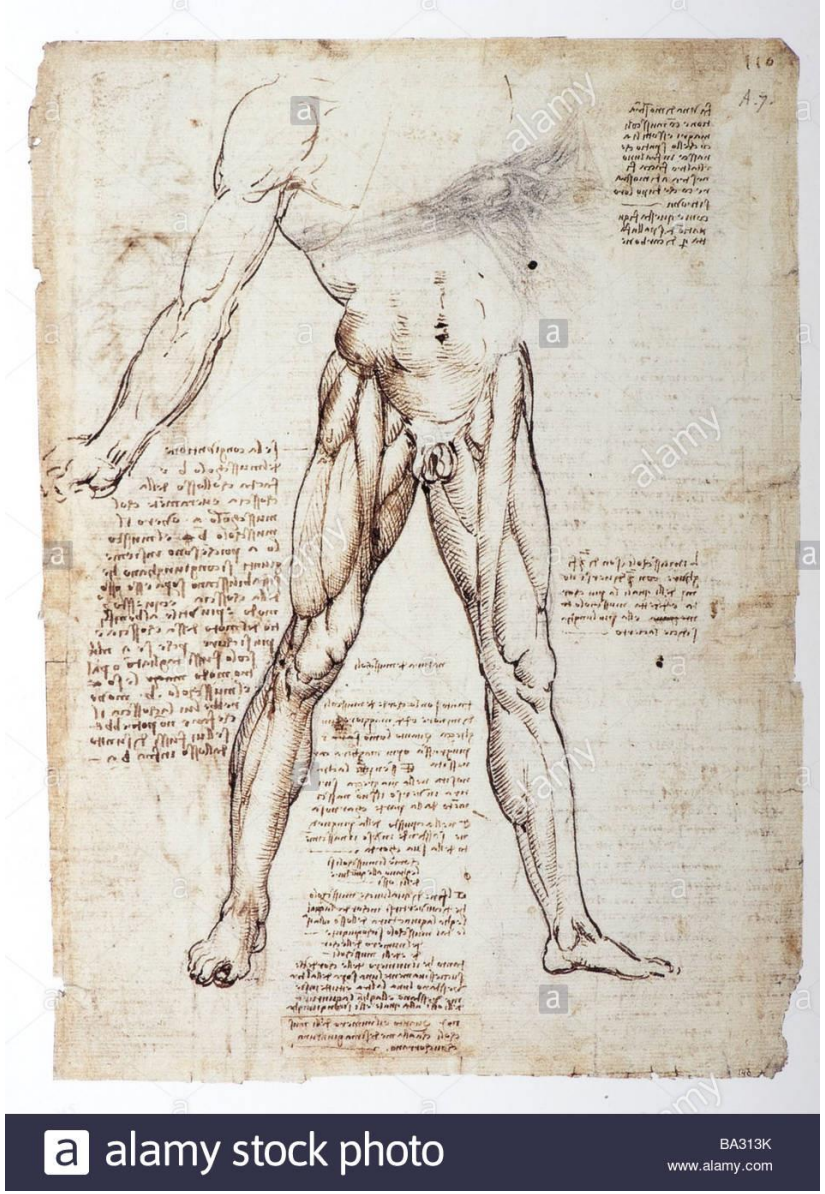
**Dorsal**: Extensors

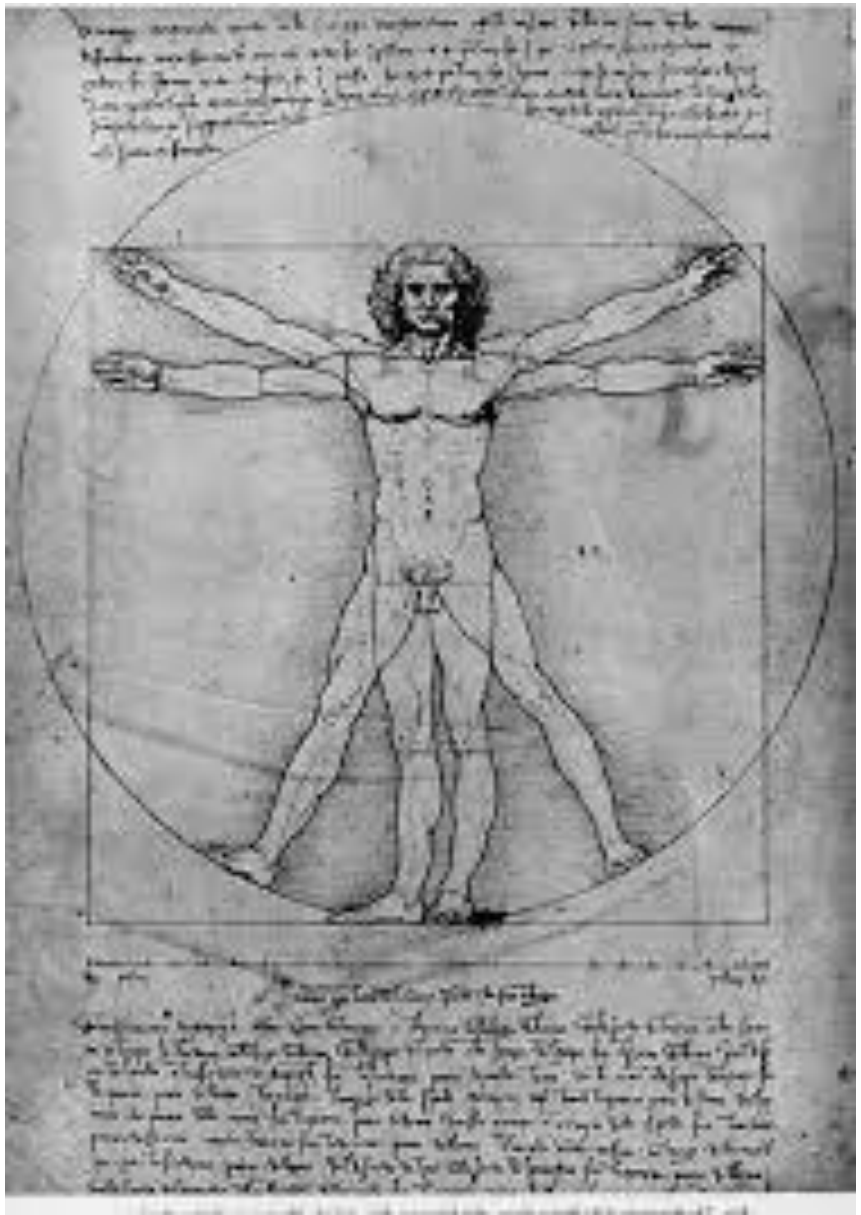


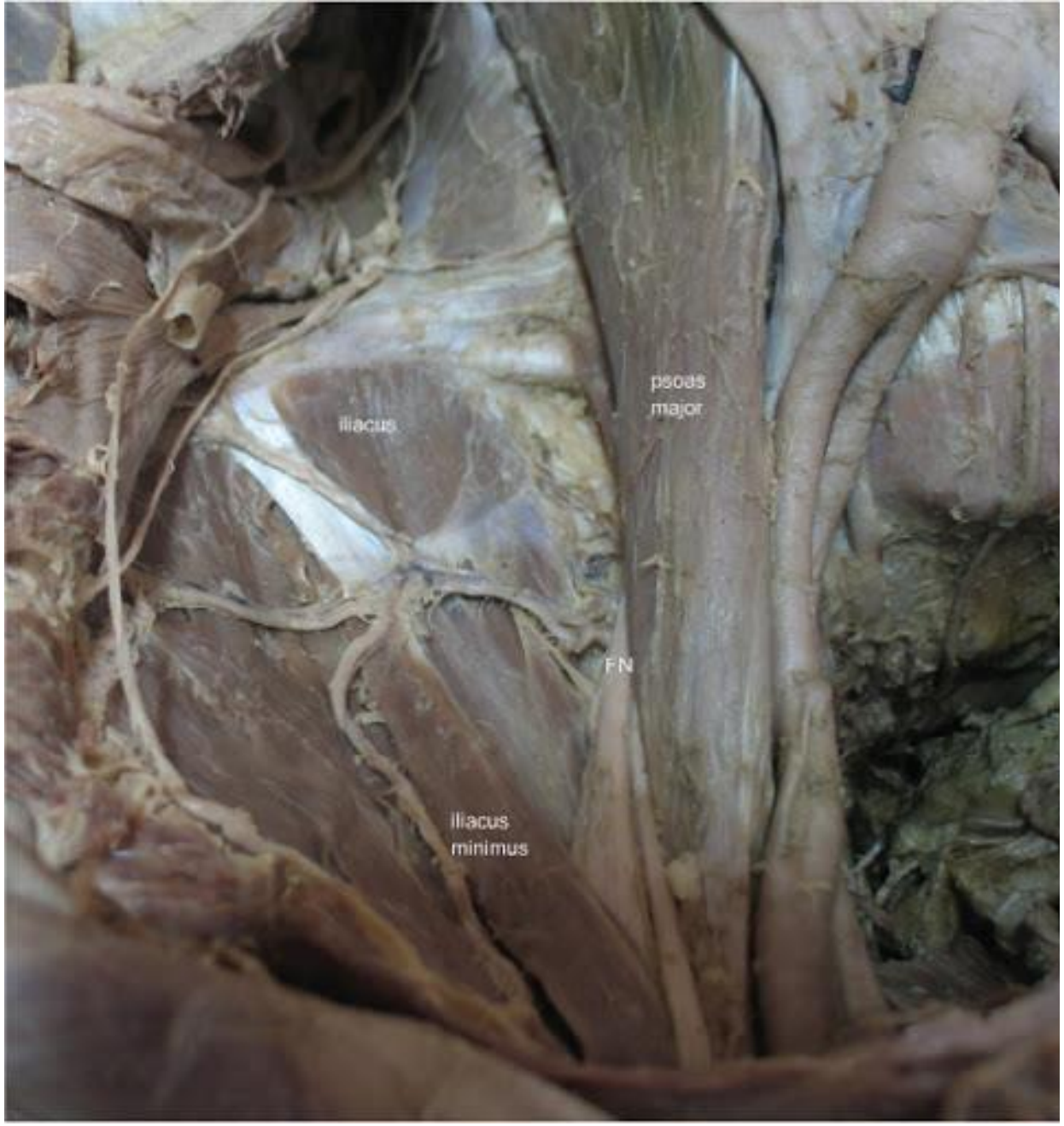

Intermediate dorsal cutaneous n.
Extensor digitorum longus
Interossei
Extensor digitorum longus
Deep fibular n., dorsal pedal a.
3rd metatarsal
Extensor hallucis brevis
Extensor digitorum longus
Extensor hallucis longus
Lateral dorsal cutaneous n.
Medial dorsal cutaneous n.
Dorsal metatarsal a.
2nd metatarsal
Abductor digiti minimi
Medial cuneiform
Opponens digiti minimi
Tibialis anterior
Deep layer of plantar fascia
Flexor digiti minimi brevis
Saphenous n., cutaneous branch
Lateral plantar a. and v.
Abductor hallucis
Lateral plantar septum
Lateral plantar n., deep branch
Lateral plantar n., superficial branch
Flexor hallucis brevis
Quadratus plantae
Flexor hallucis longus
Aponeurosis of flexor digitorum longus
Plantar aponeurosis
Medial plantar a. and n.
Fibularis longus
Flexor digitorum brevis
Deep plantar arch
Medial plantar septum

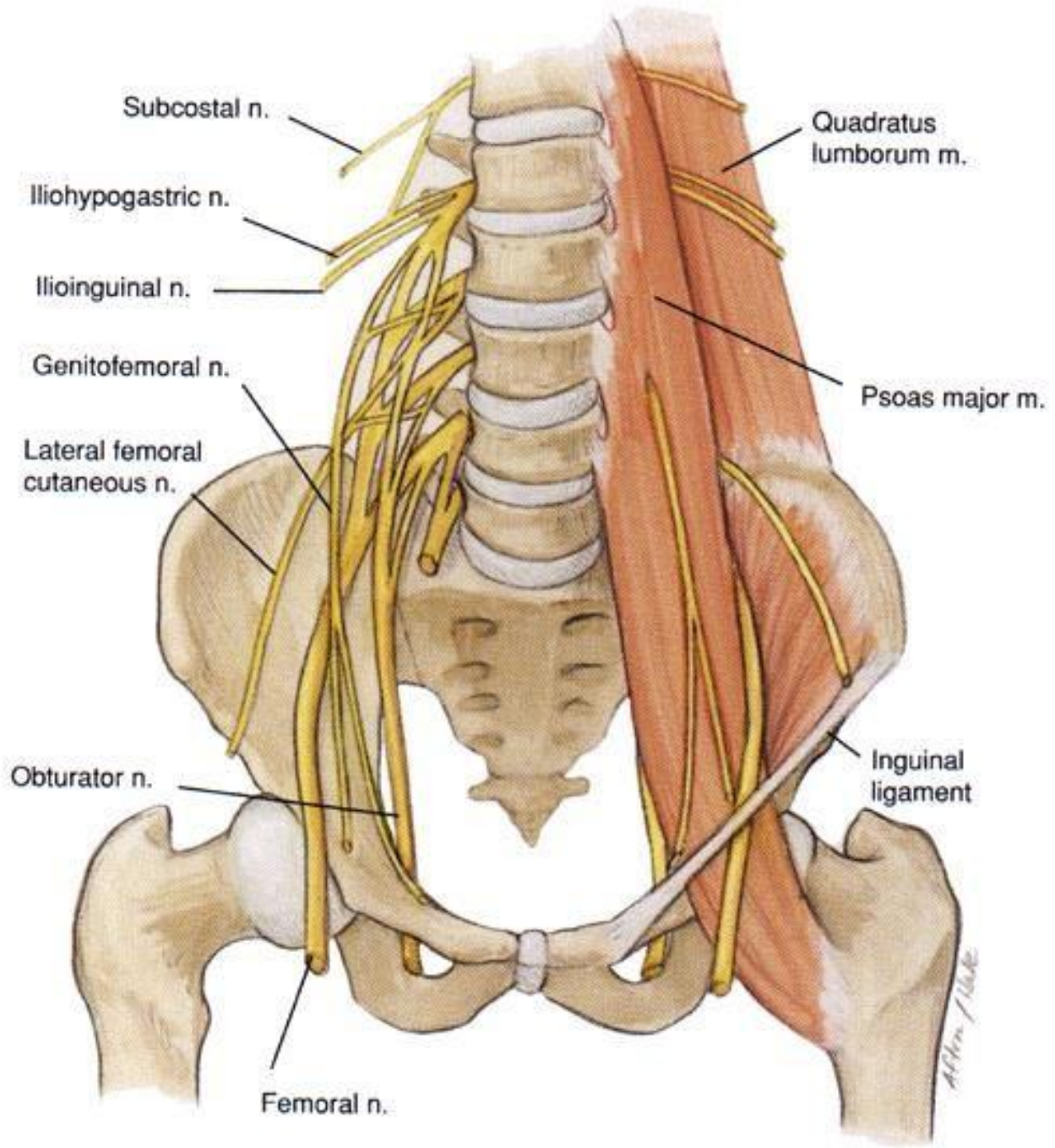

Tibia
Extensor hallucis longus
Ankle joint
Talotarsal joint
Subtalar joint (talocalcaneal joint)
Talocalcaneonavicular joint
Navicular
Intermediate cuneiform
Tarsometatarsal joint
Tendon of fibularis longus
Second metatarsal
First dorsal interosseous
Proximal phalanx, base
Metatarsophalangeal joint (second toe)
Adductor hallucis, oblique head
Long plantar ligament
Flexor accessorius
Flexor digitorum brevis
Plantar aponeurosis
Flexor hallucis longus
Calcaneal tendon
Talus
Talocalcaneal interosseous ligament
Calcaneus
Calcaneal tuberosity
Calcaneal fat pad

# TOPOGRAPHY OF THE LOWER LIMB.

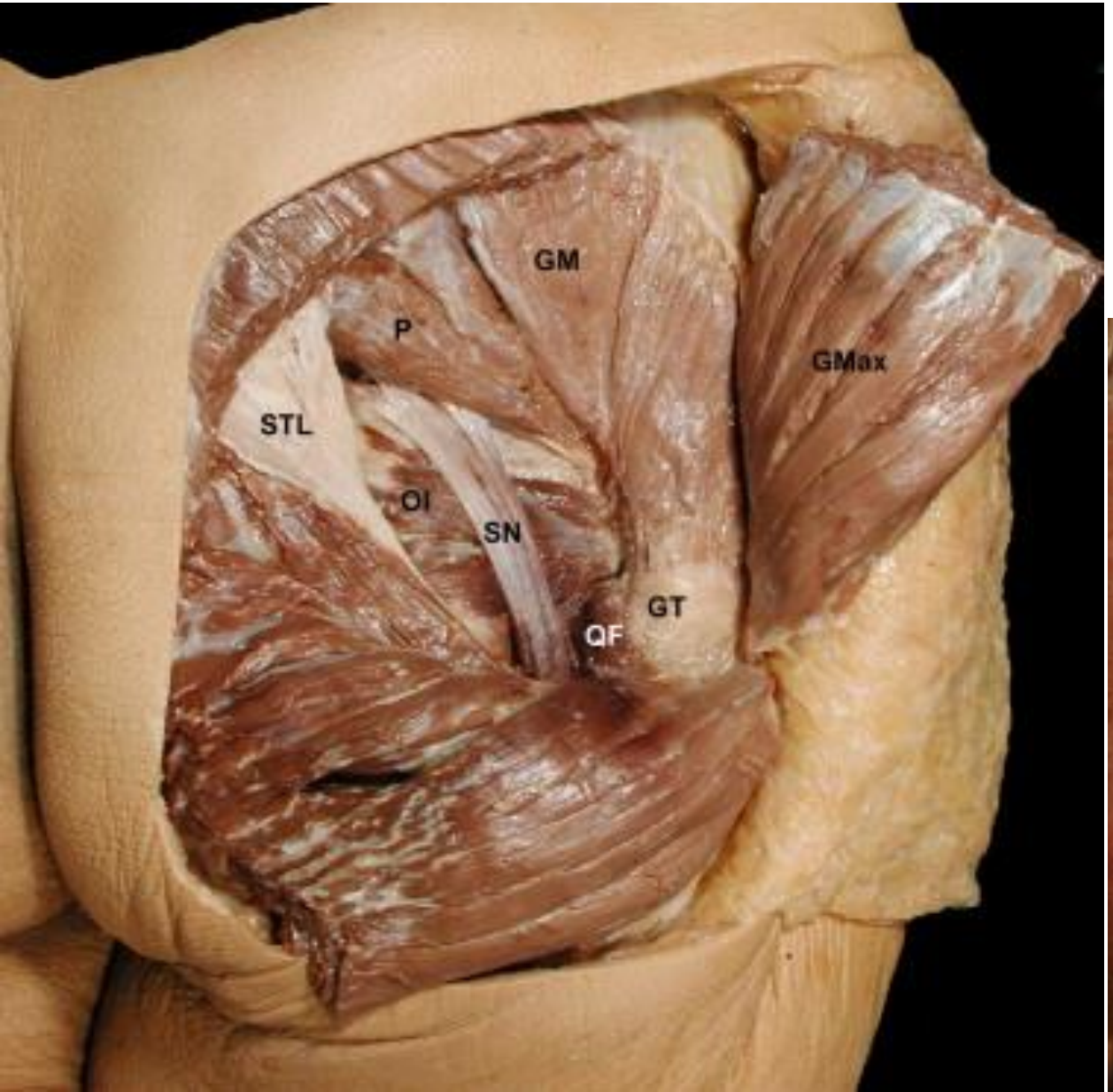


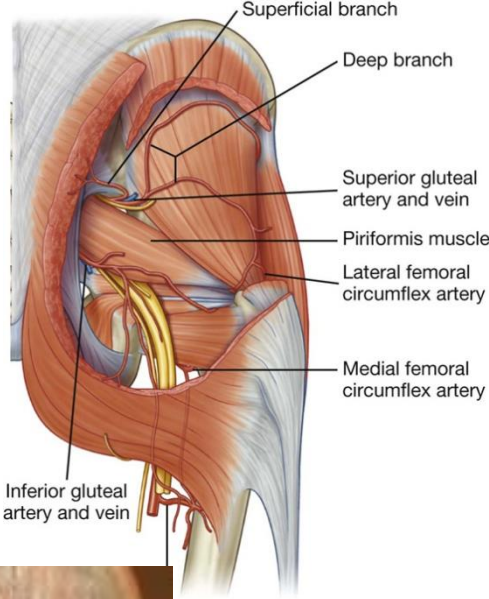



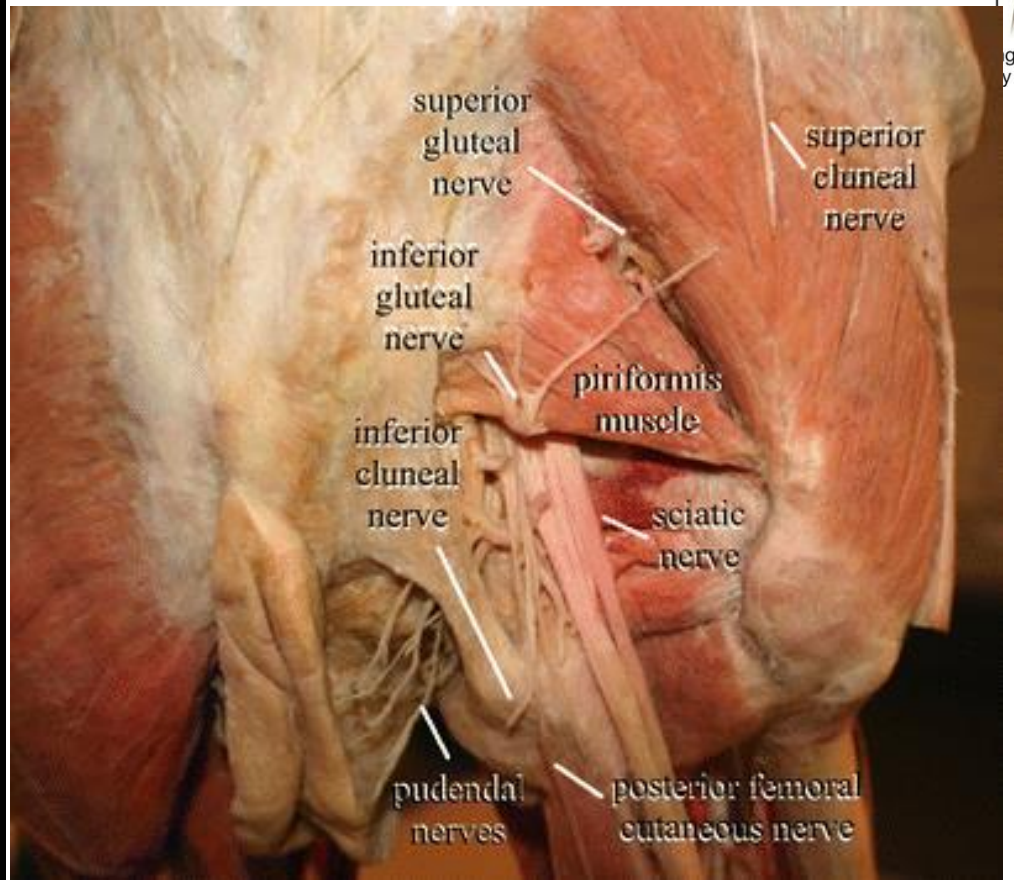

iliacus
psoas
major
FN
iliacus
minimus


Subcostal n.
Iliohypogastric n.
Ilioinguinal n.
Genitofemoral n.
Lateral femoral
cutaneous n.
Obturator n.
Femoral n.
Quadratus
lumborum m.
Psoas major m.
Inguinal
ligament

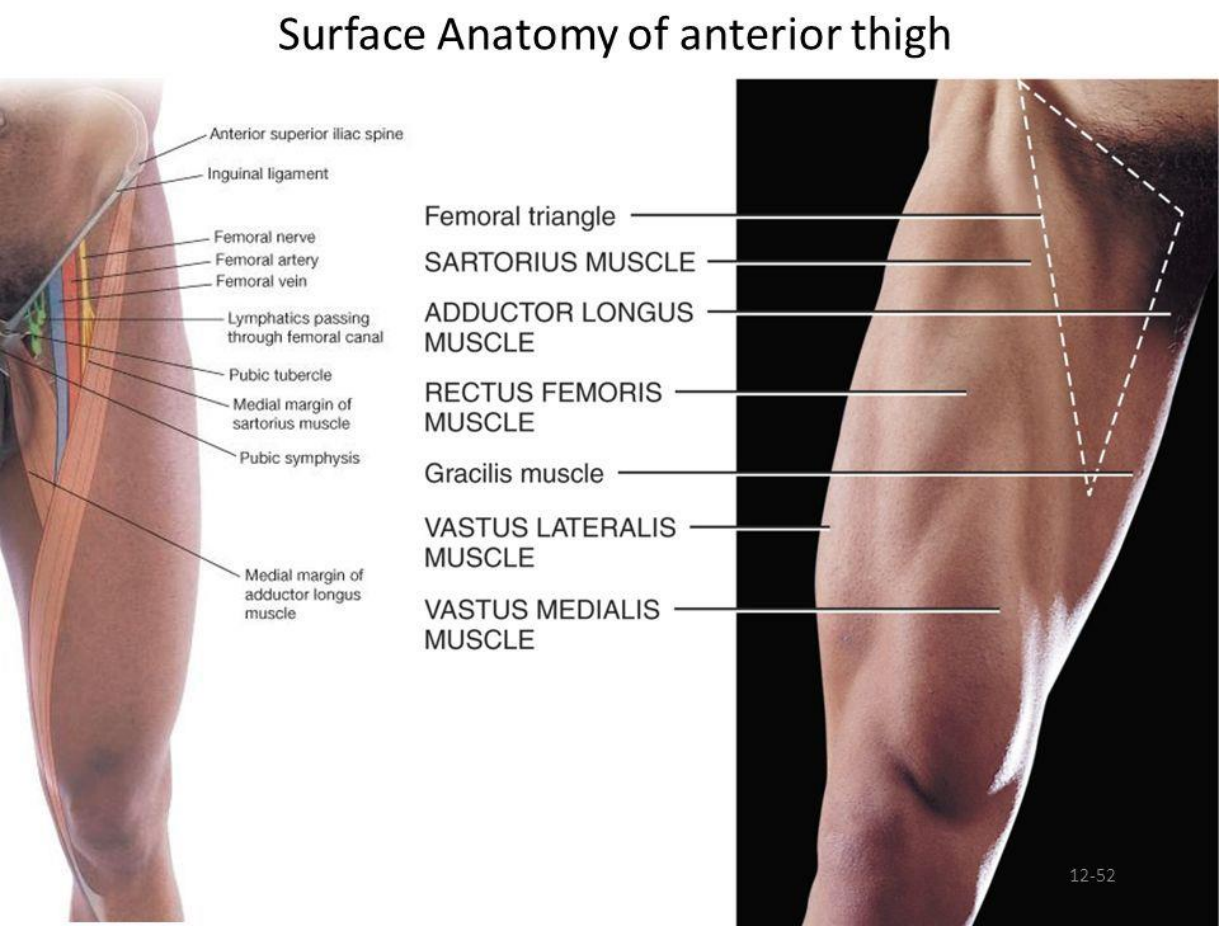
# Piriformis foramina (*Foramen ischiadicum majus et minus*)



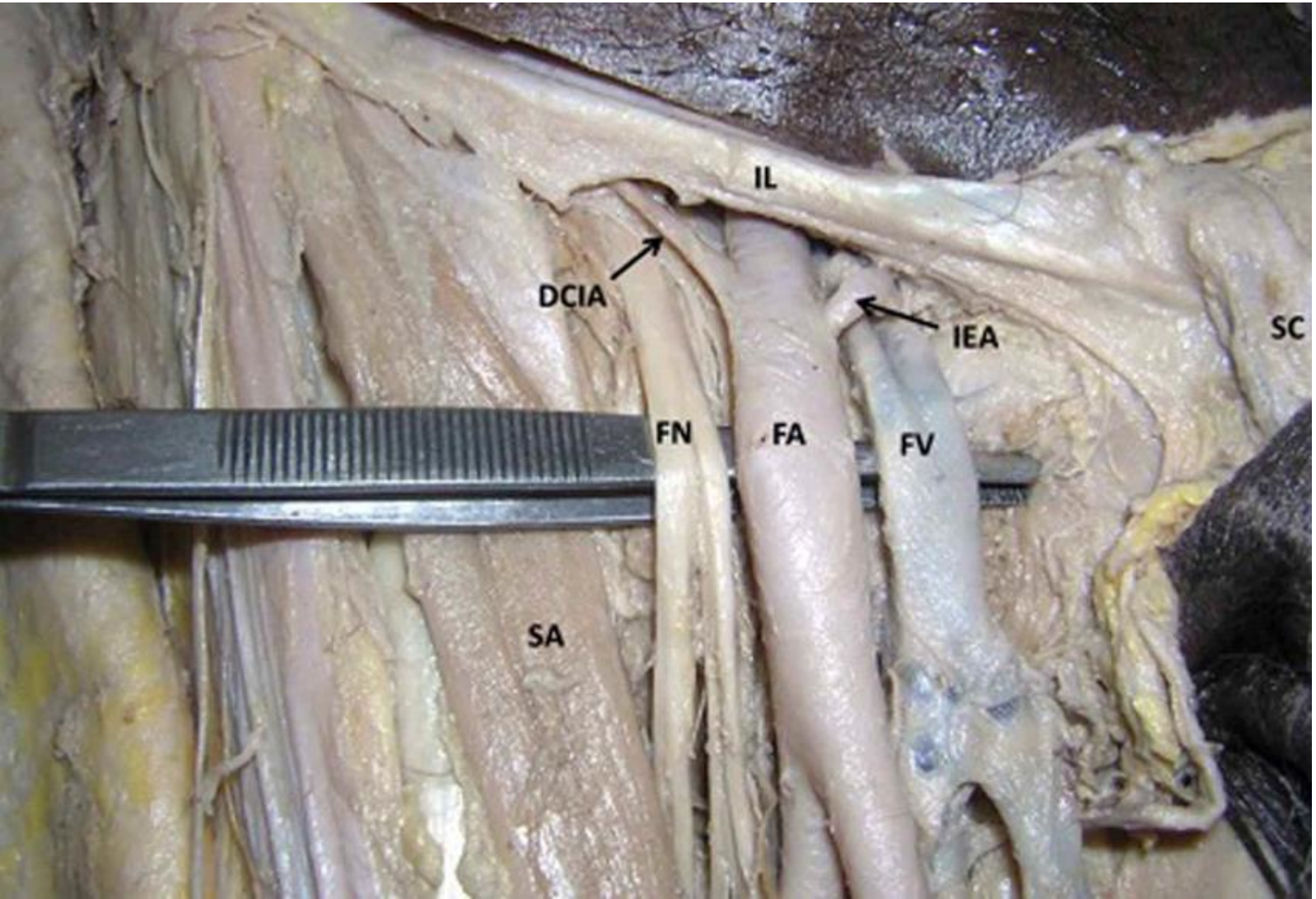



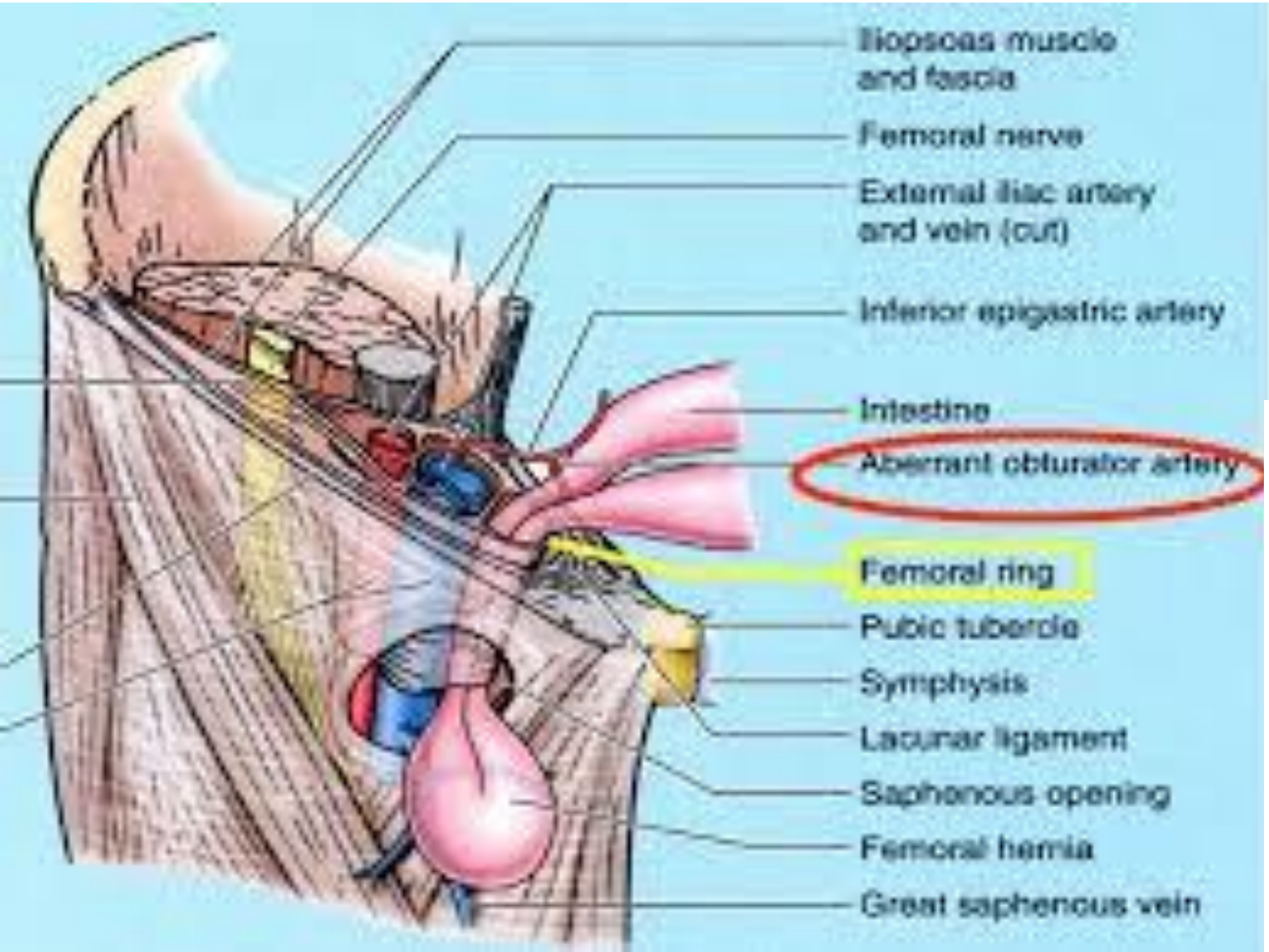
# Femoral Triangle (*Trigonum femorale*)

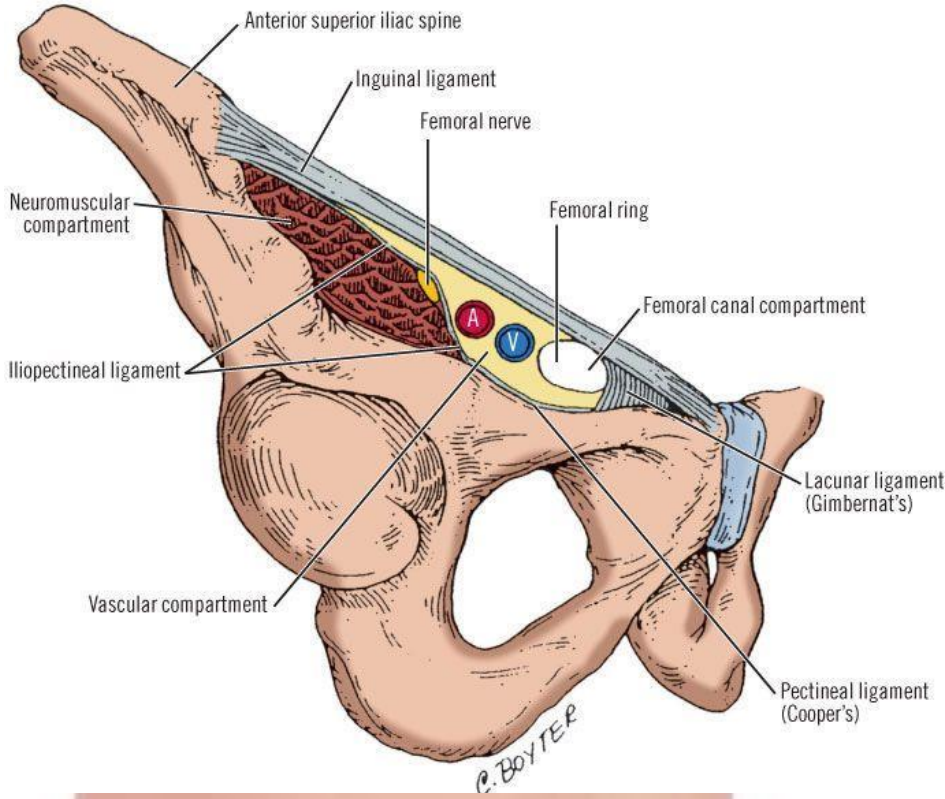



# Femoral Triangle (*Trigonum femorale*)

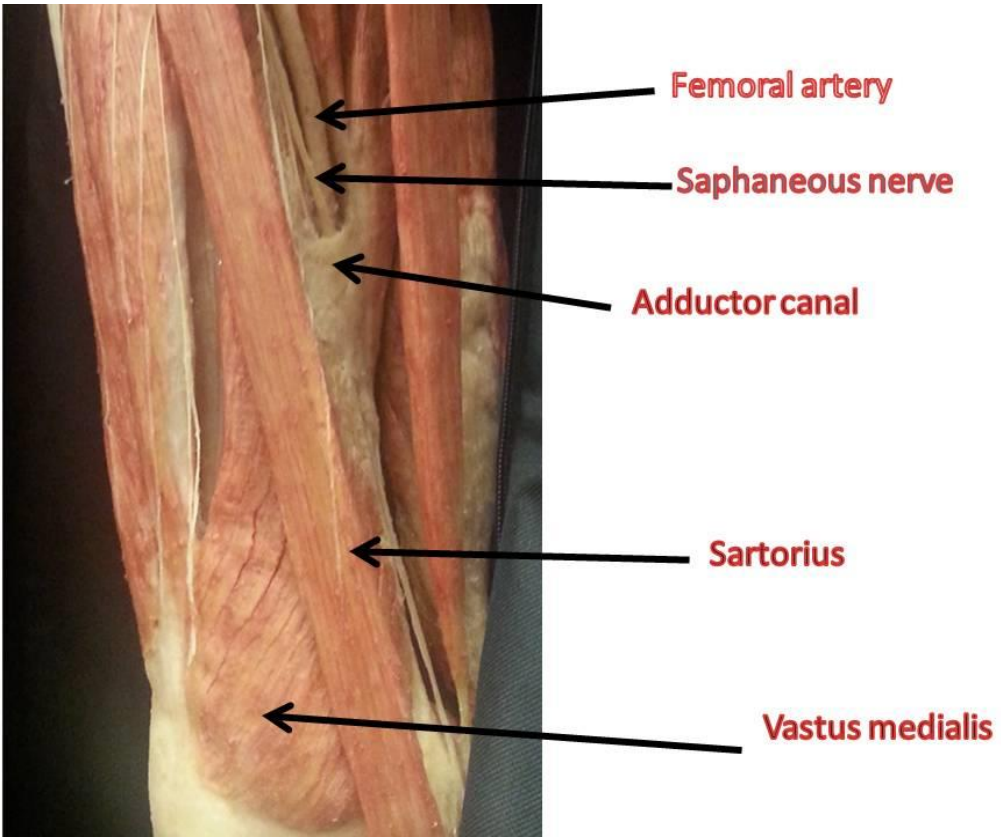


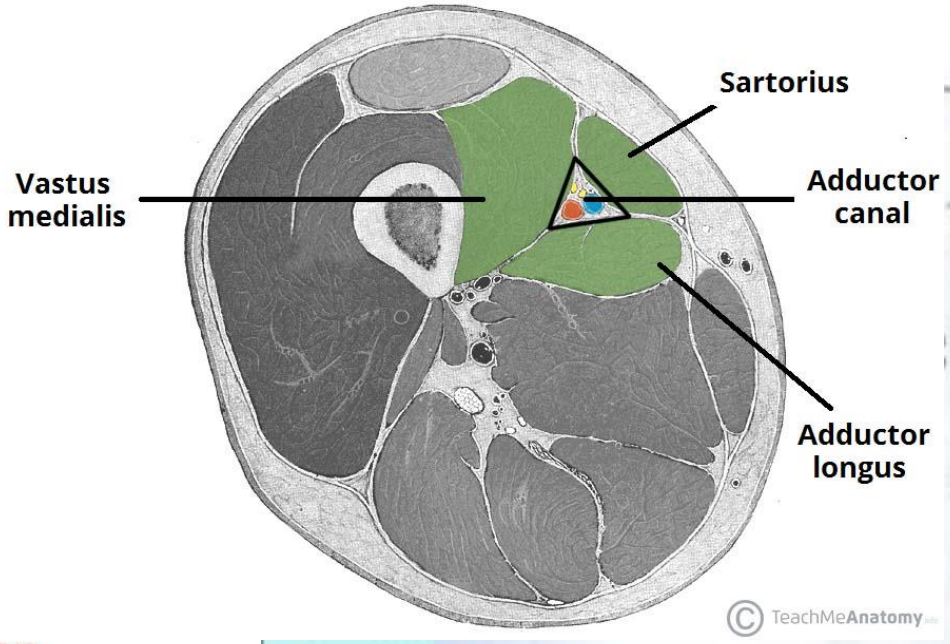

# Femoral Hernias (*hernia femoralis*)

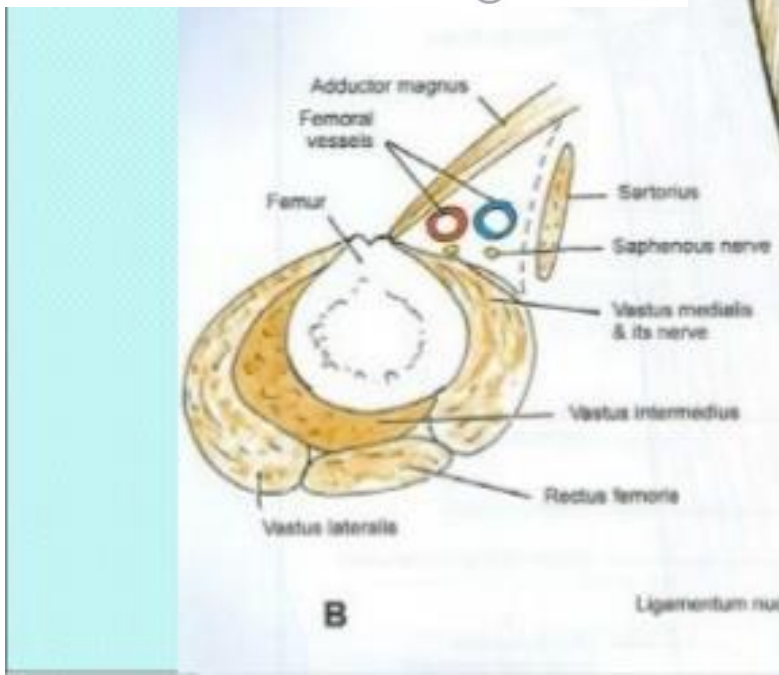


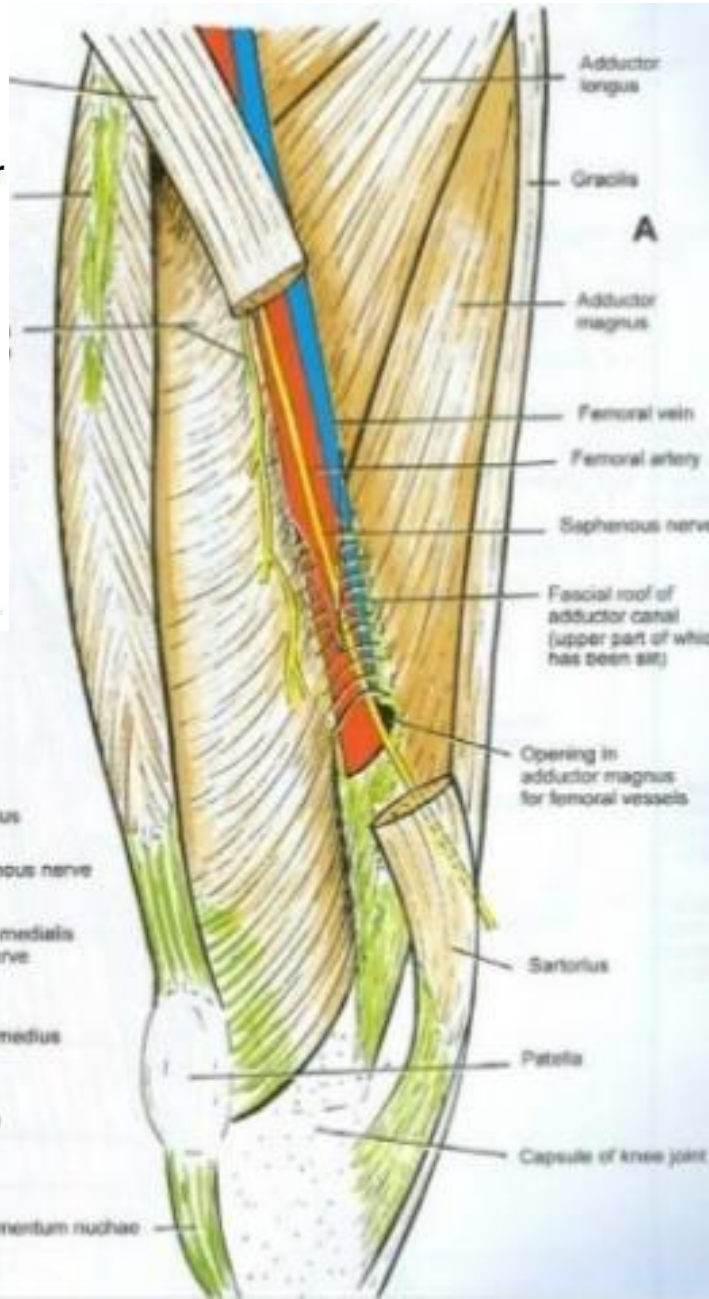




# Adductor canal (*Canalis adductorius*)

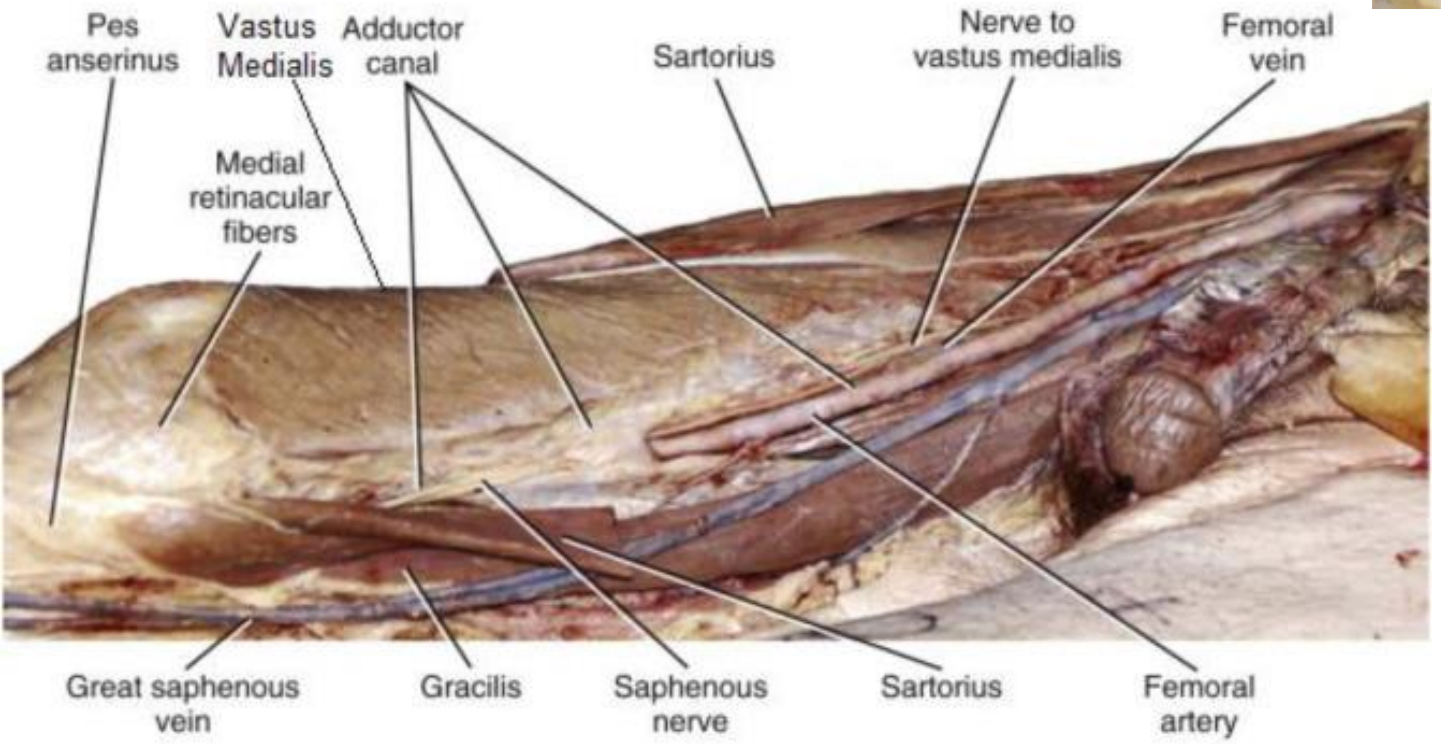


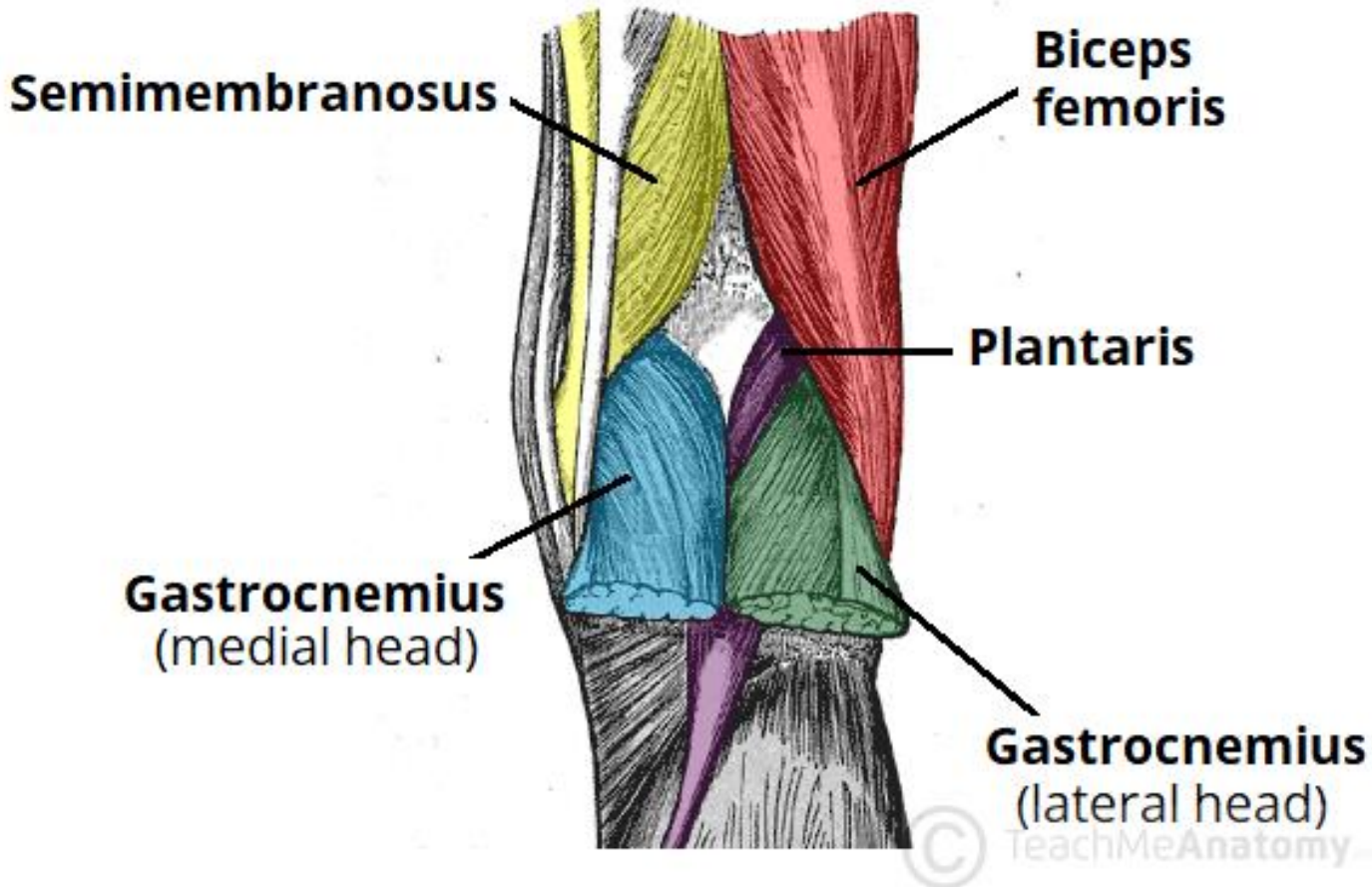



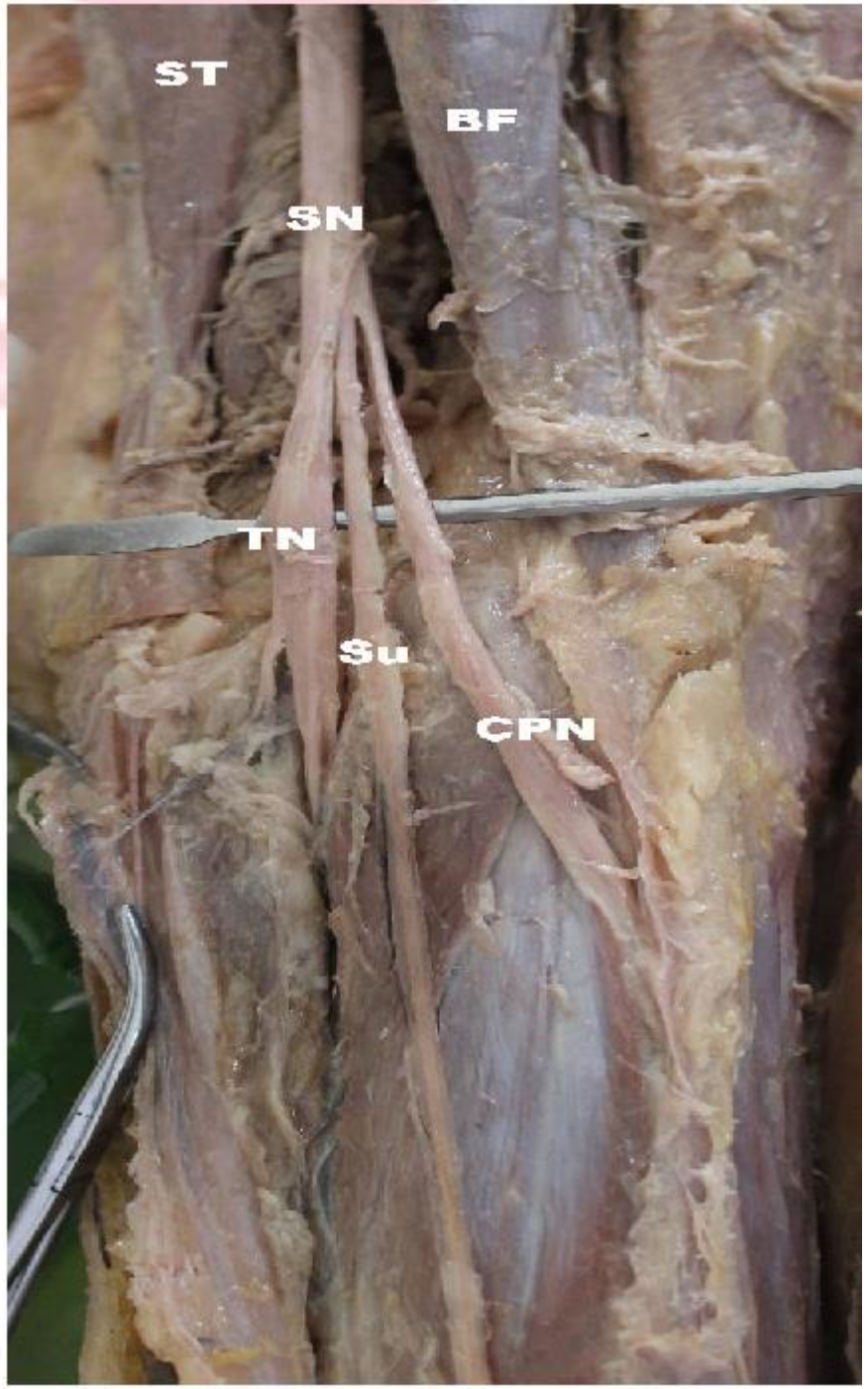



# Adductor canal (*Canalis adductorius*)

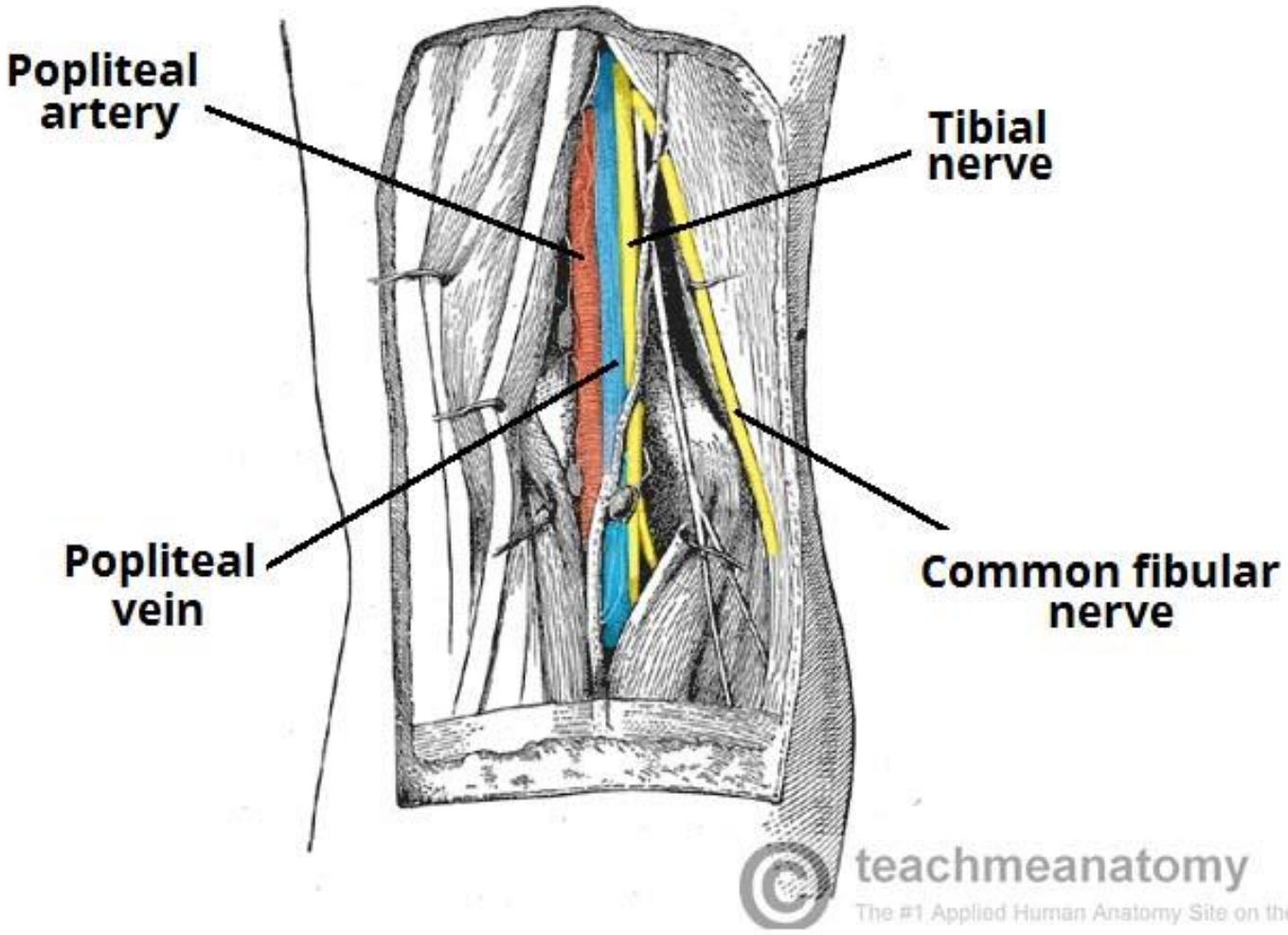


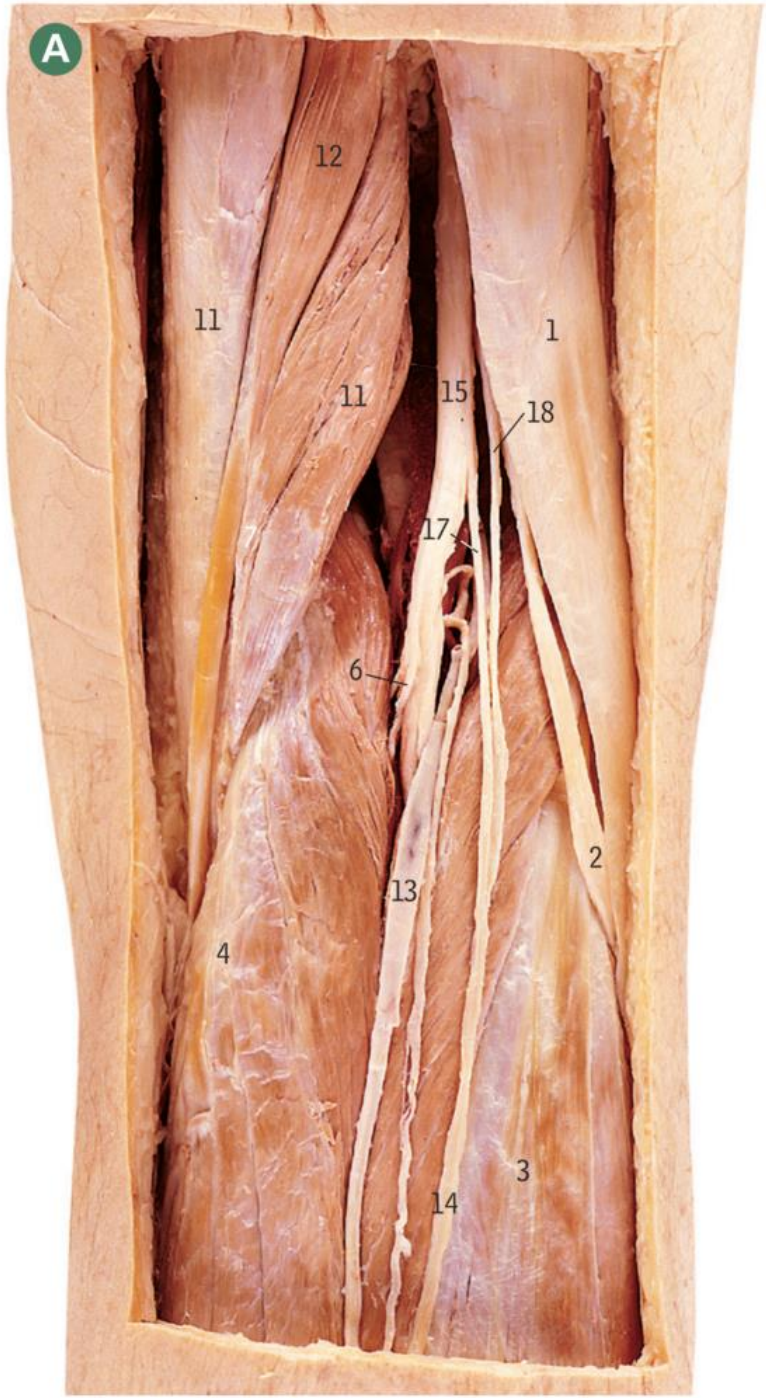
# Popliteal fossa (*Fossa poplitea*)



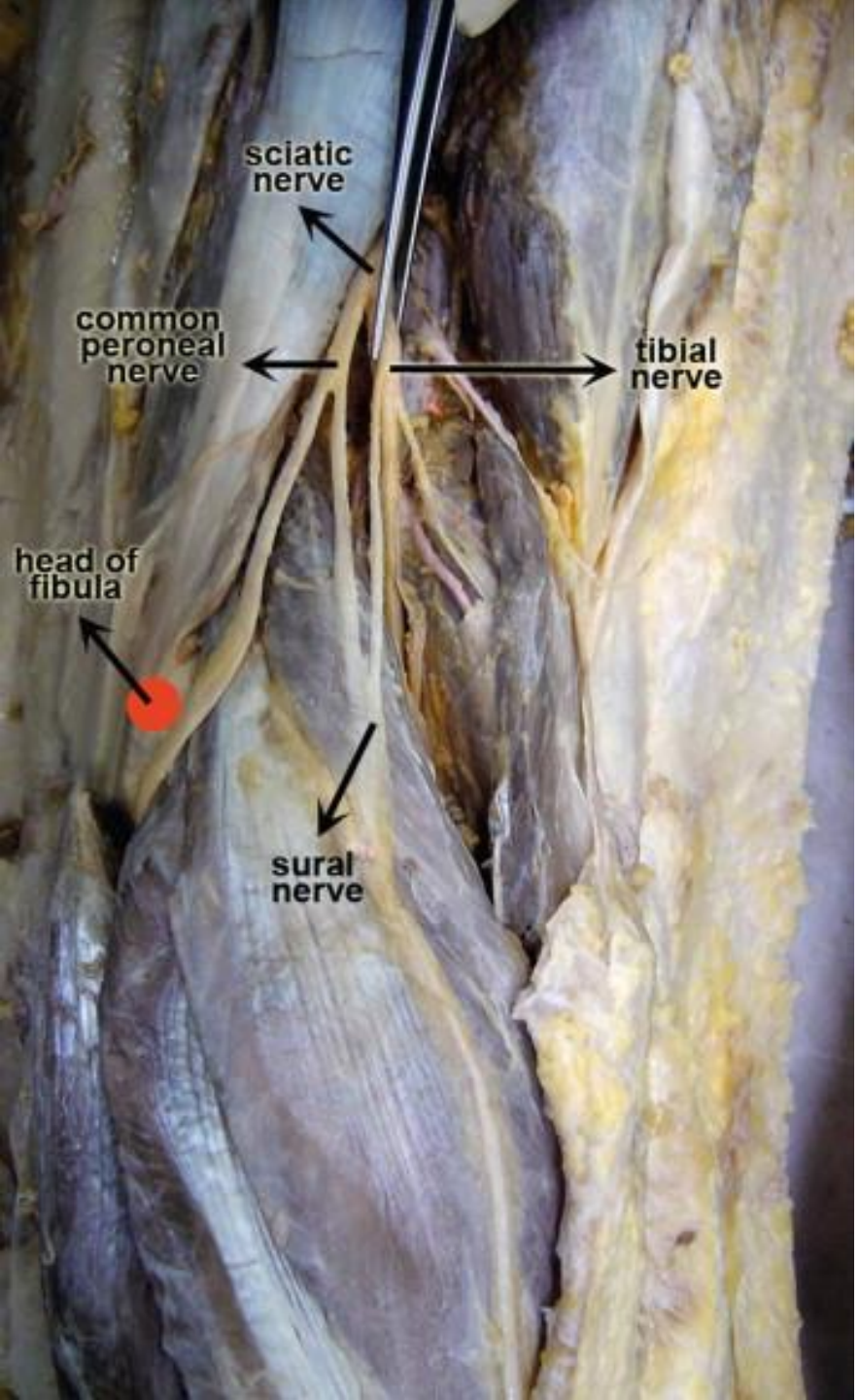



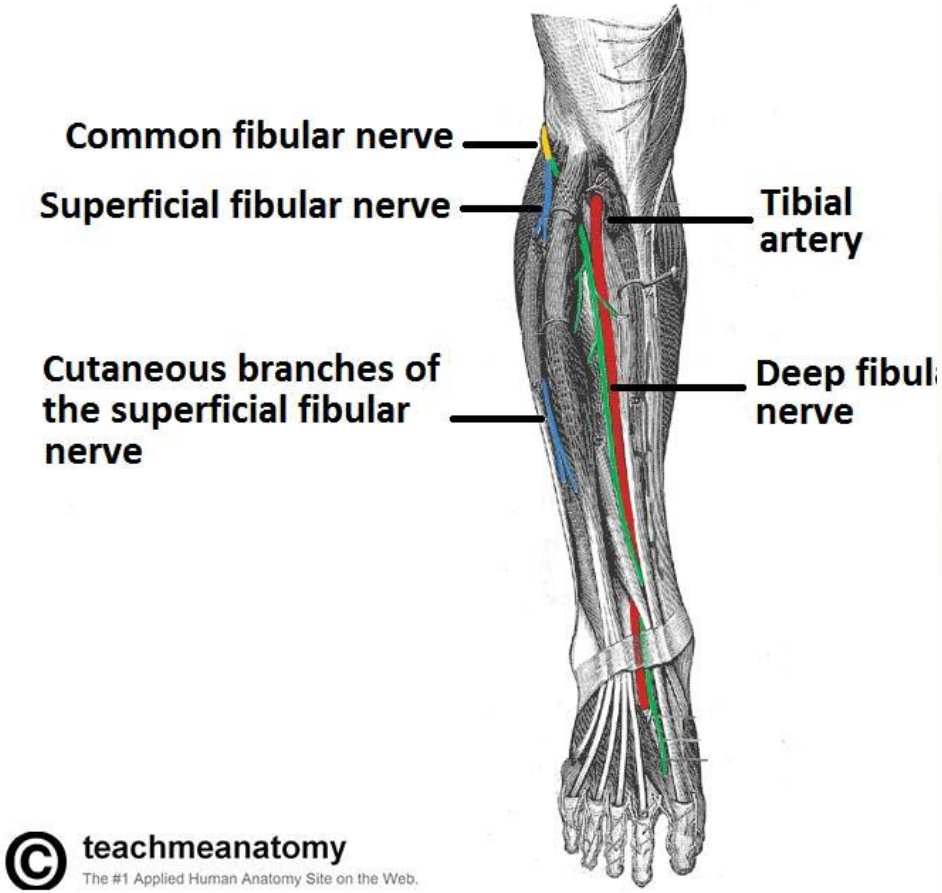
# Popliteal fossa (*Fossa poplitea*)

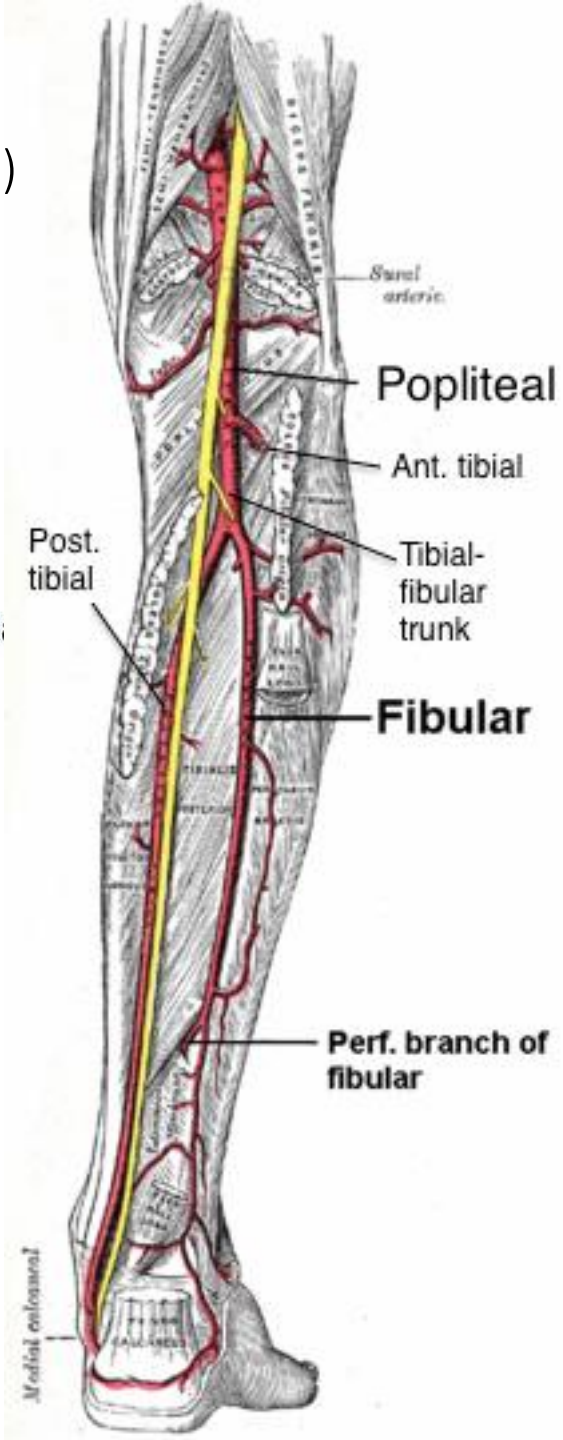


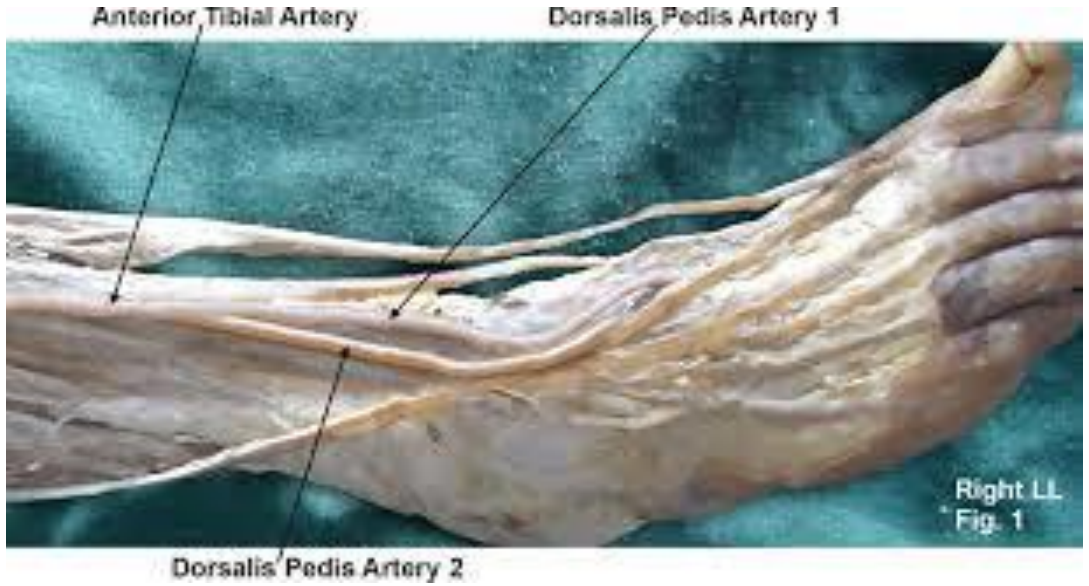
# Fibular canal (*Canalis fibularis*) and Musculofibular canal (Canalis musculofibularis)

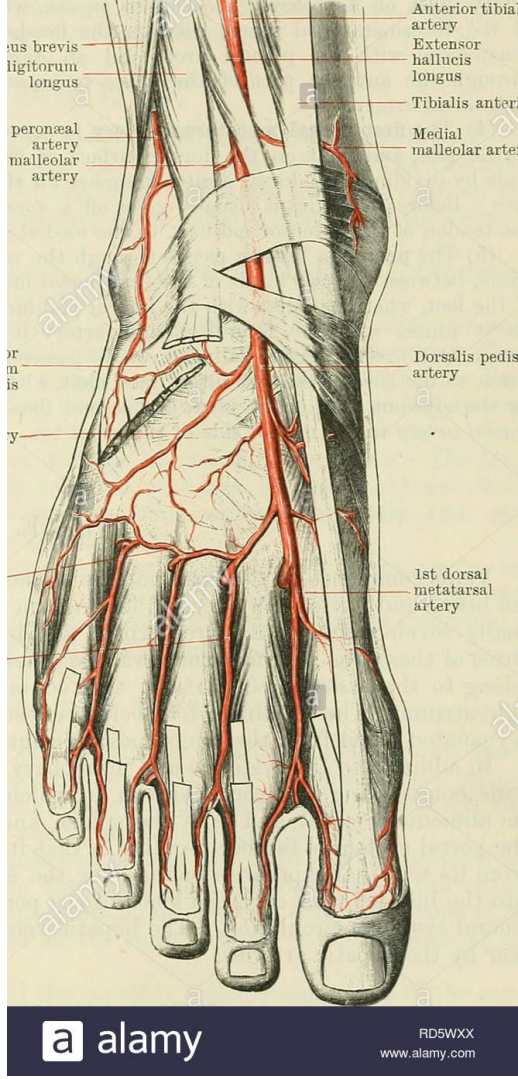


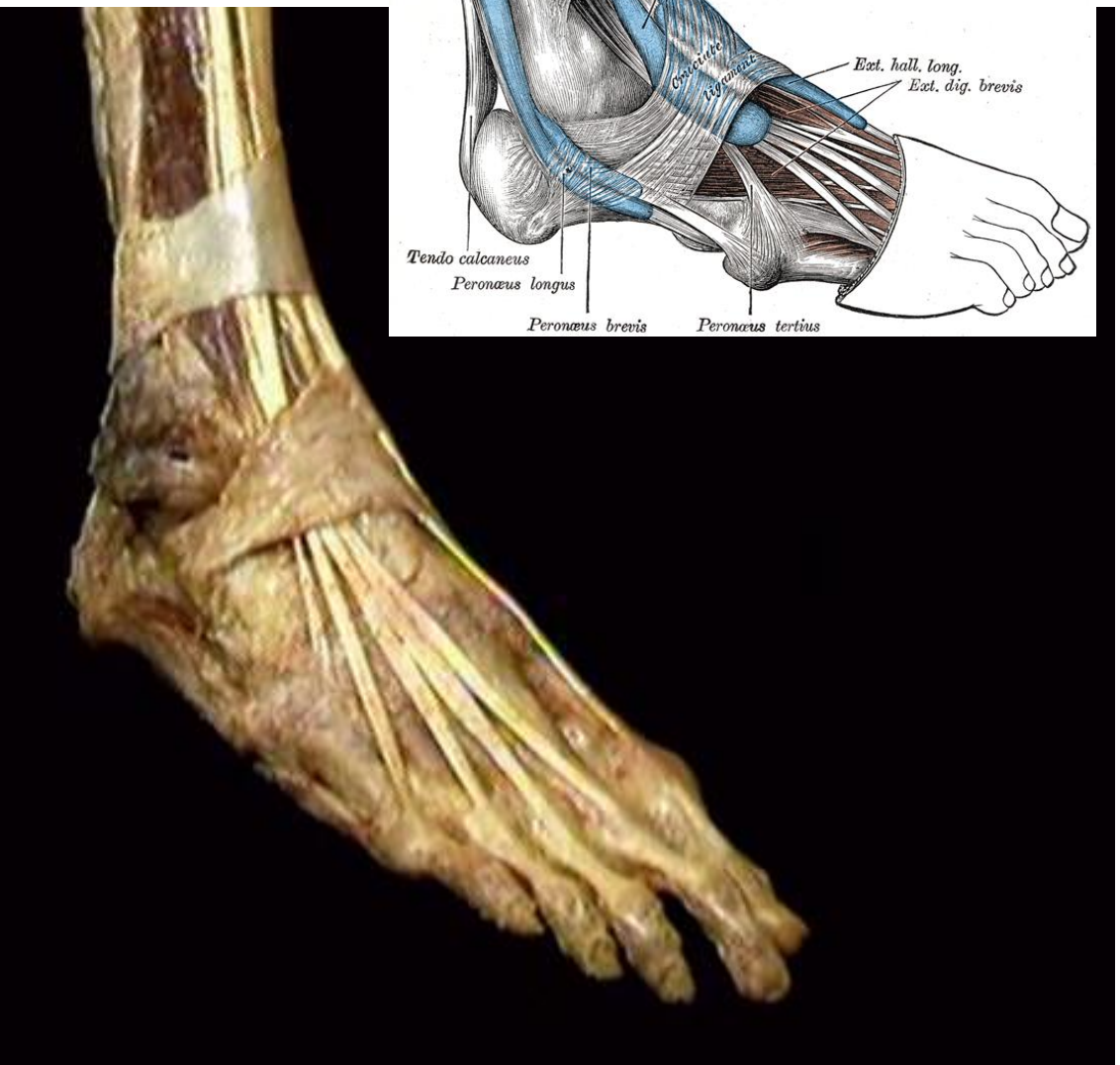



# a. dorsalis pedis
# (important to palpate its pulse)

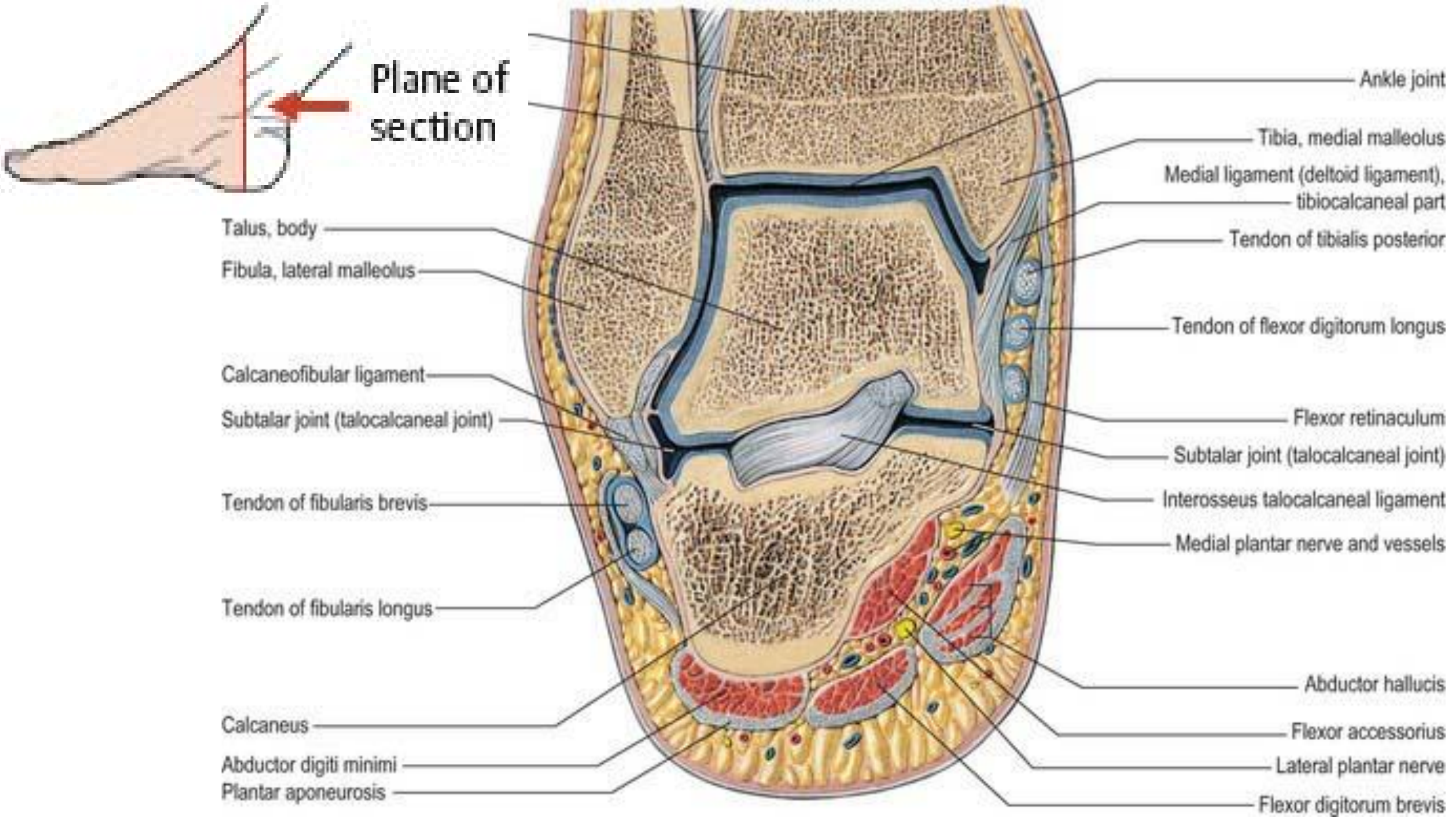


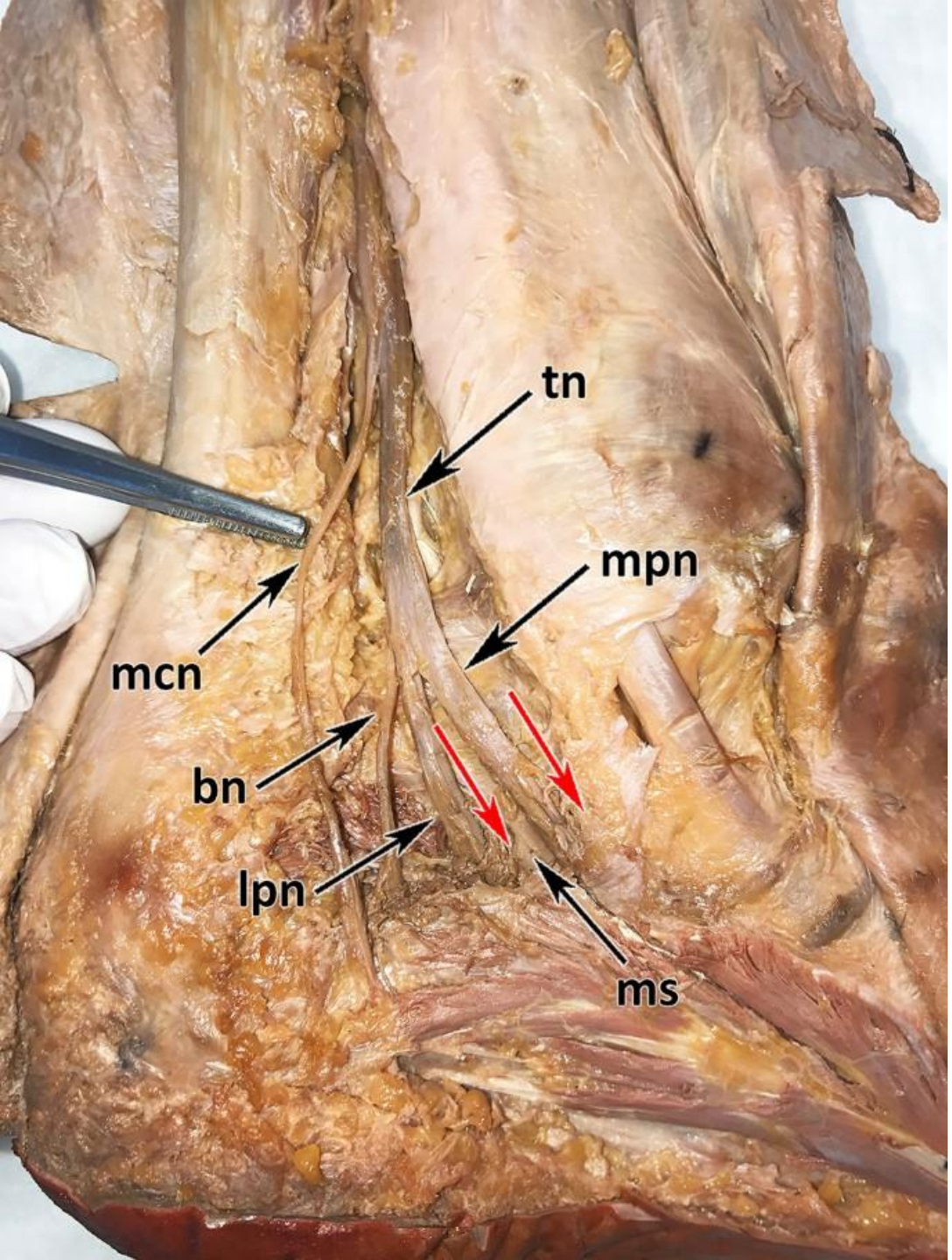
# Retromalleolar spaces (*Spatium retromalleolare laterale et mediale*)

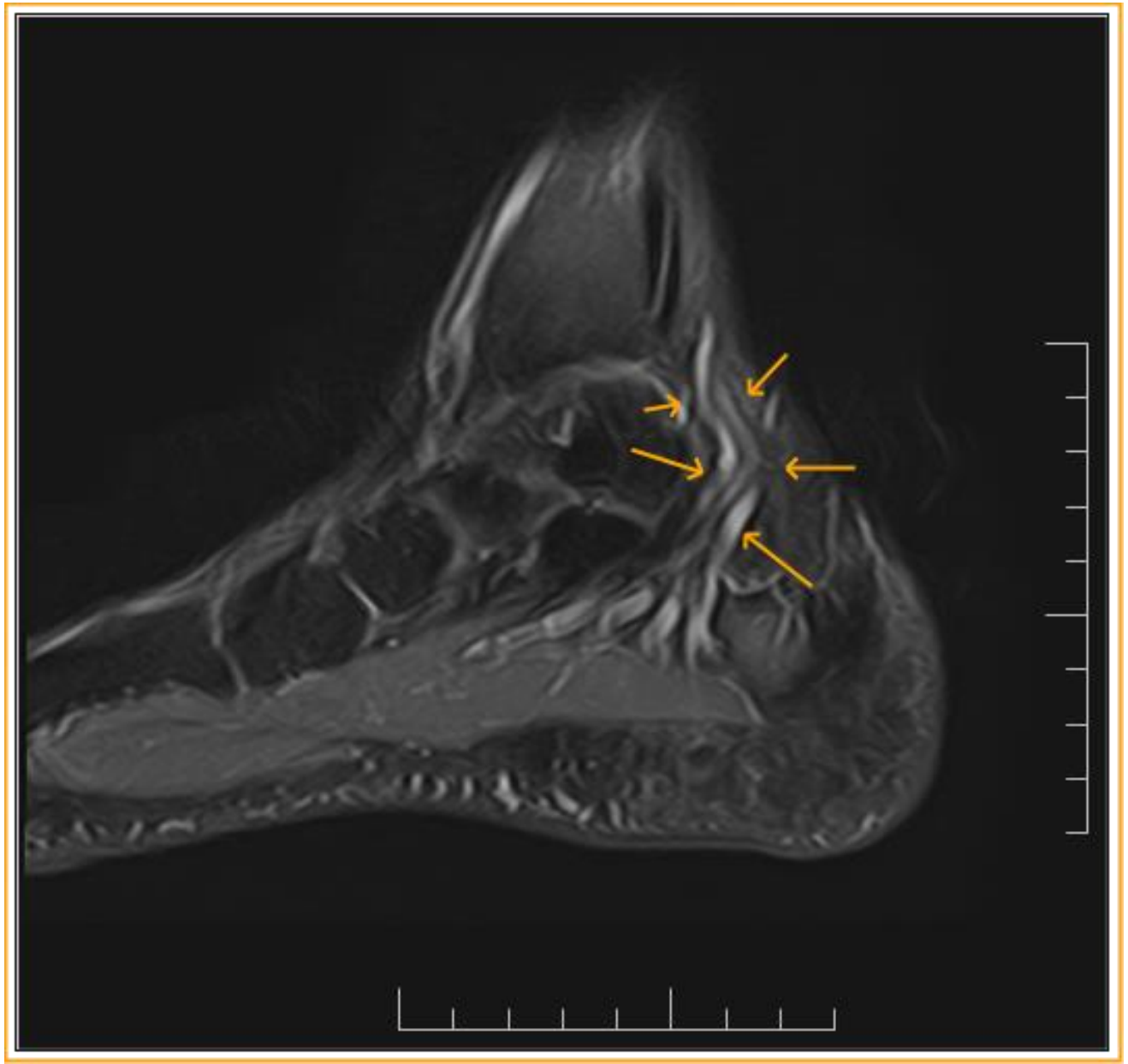




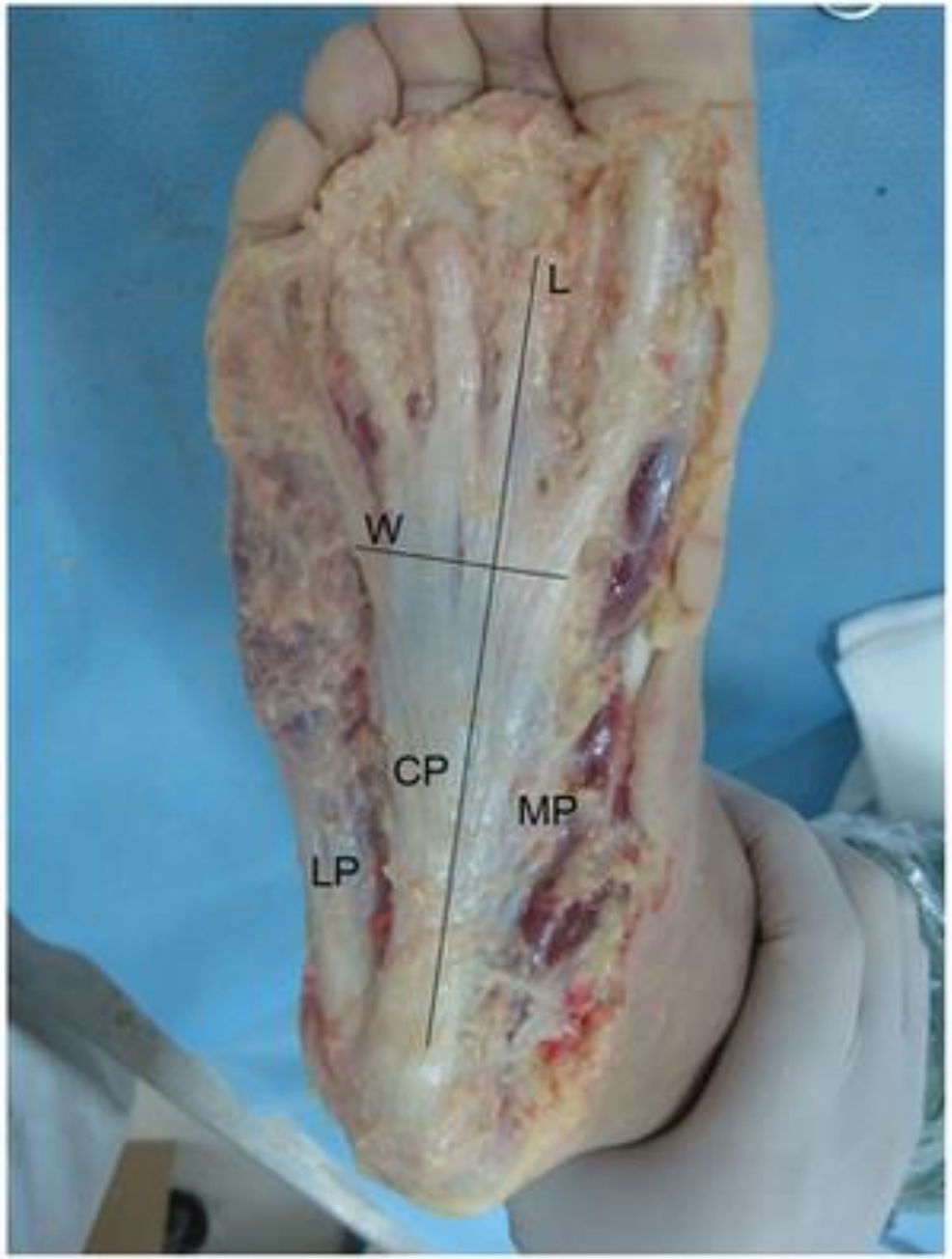


Plane of section
Ankle joint
Tibia, medial malleolus
Medial ligament (deltoid ligament), tibiocalcaneal part
Tendon of tibialis posterior
Tendon of flexor digitorum longus
Flexor retinaculum
Subtalar joint (talocalcaneal joint)
Interosseus talocalcaneal ligament
Medial plantar nerve and vessels
Abductor hallucis
Flexor accessorius
Lateral plantar nerve
Flexor digitorum brevis
Talus, body
Fibula, lateral malleolus
Calcaneofibular ligament
Subtalar joint (talocalcaneal joint)
Tendon of fibularis brevis
Tendon of fibularis longus
Calcaneus
Abductor digiti minimi
Plantar aponeurosis

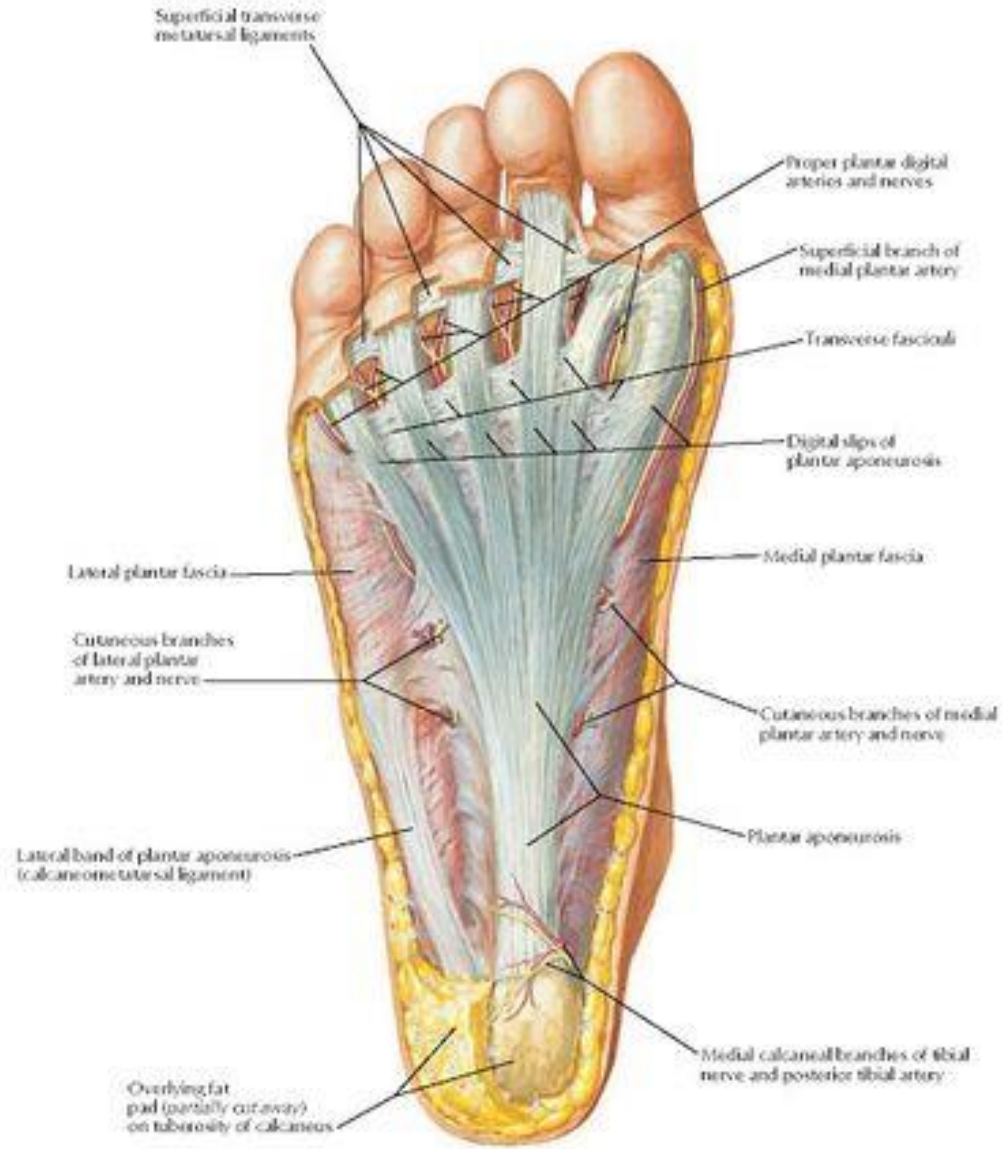
# Tarsal Canal (*Canalis malleolaris*)



# Plantar region (*Planta pedis*)



# Plantar region (*Planta pedis*)



1
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7
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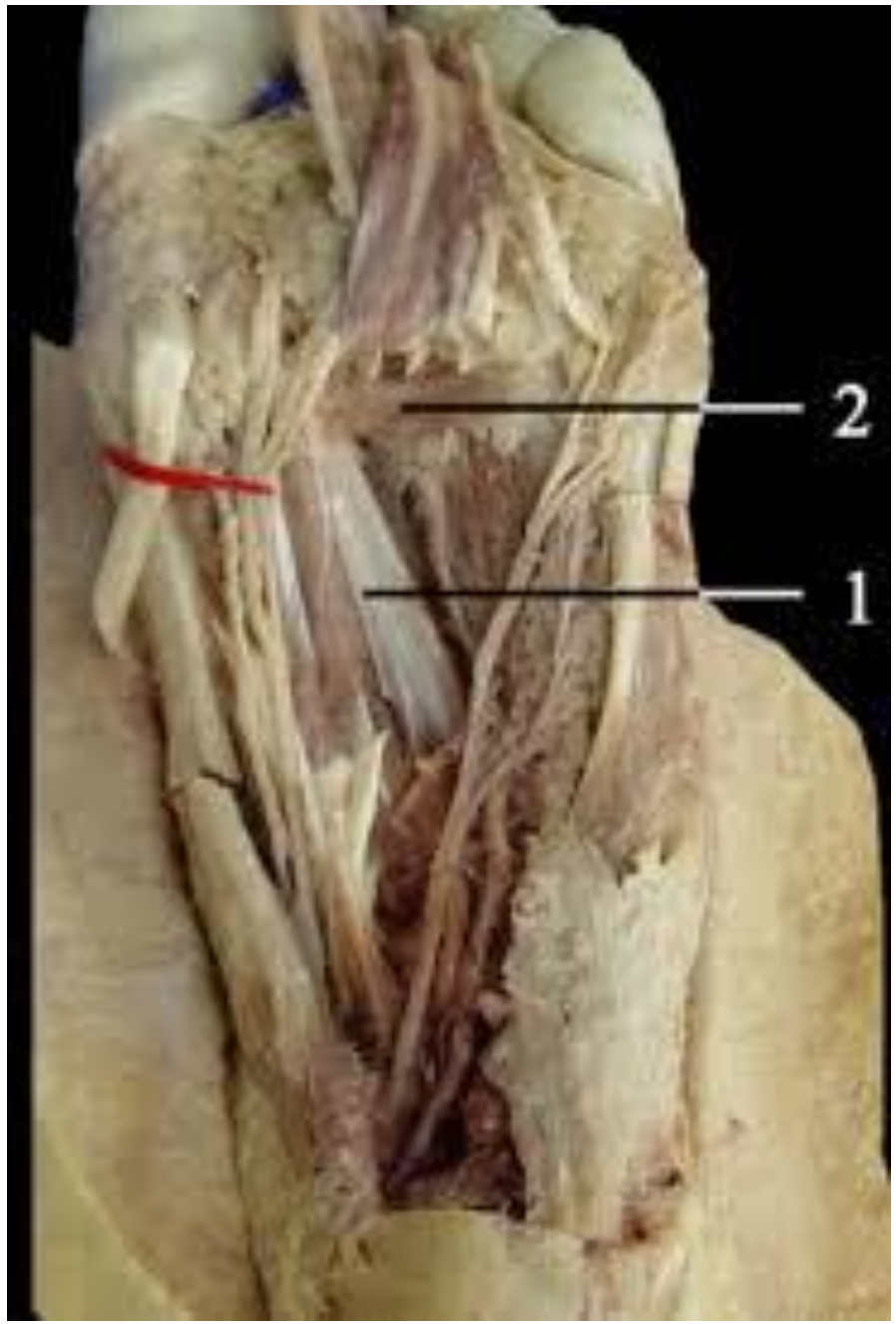
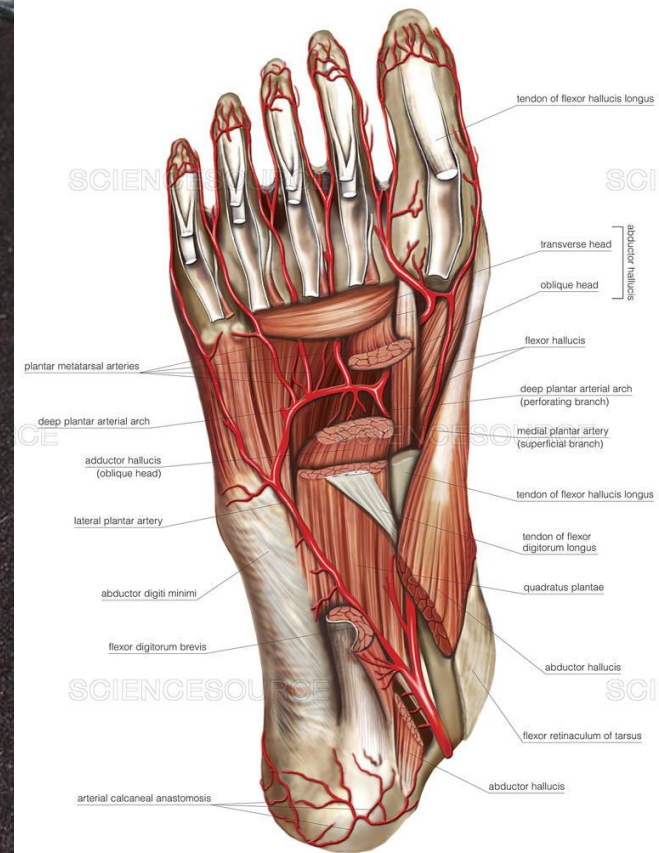
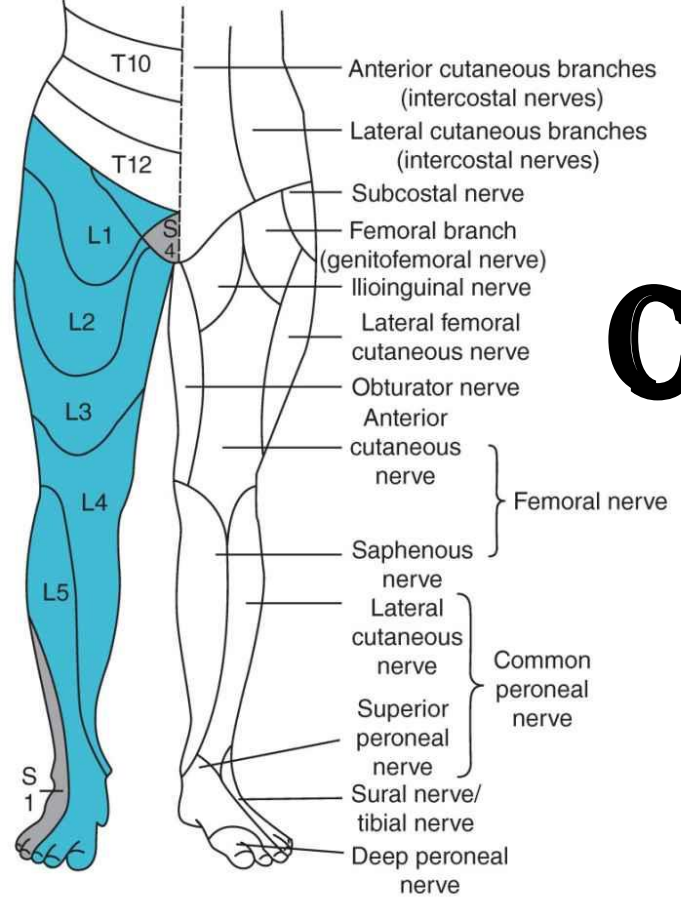
9


2
1

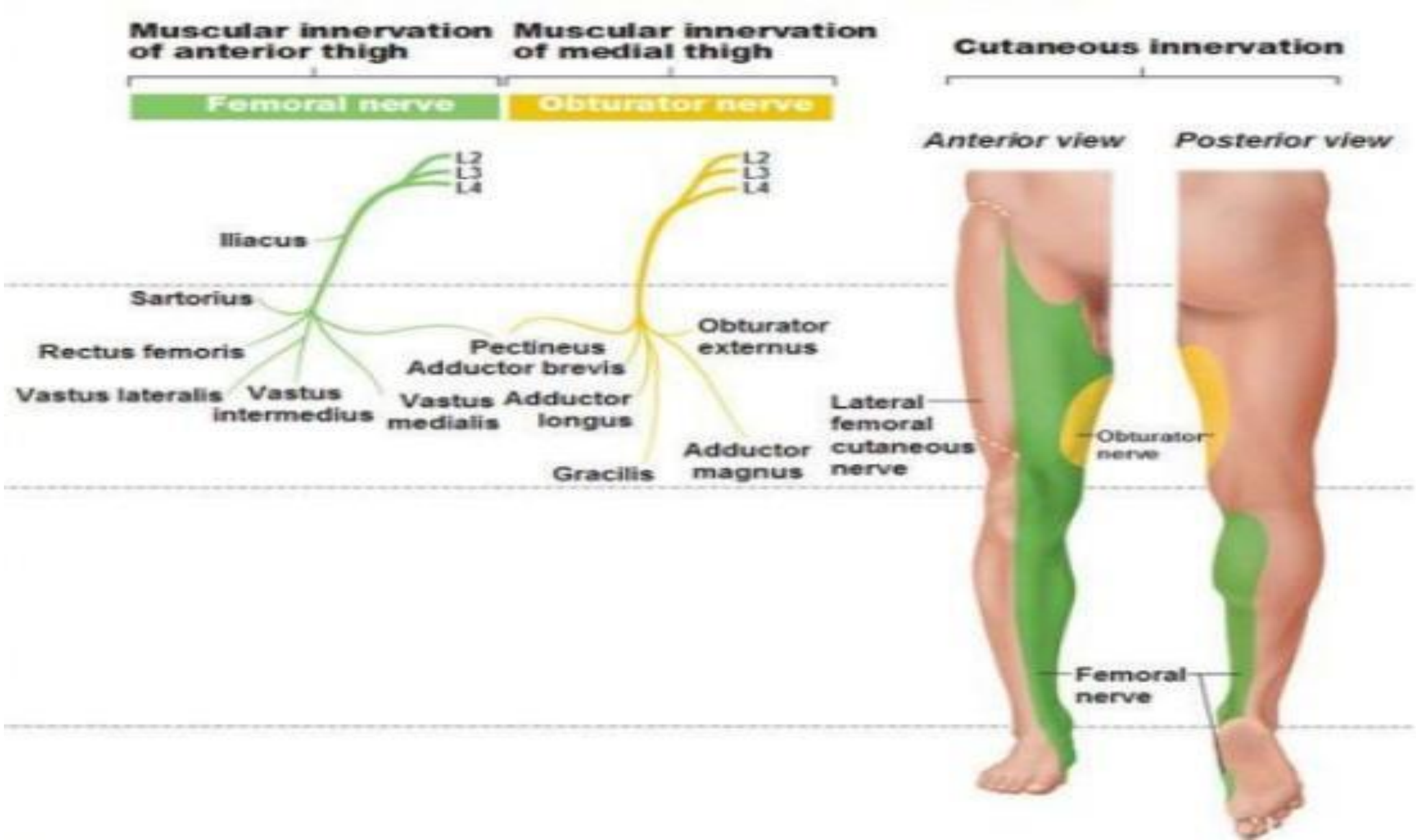

tendon of flexor hallucis longus
transverse head
oblique head
abductor hallucis
flexor hallucis
plantar metatarsal arteries
deep plantar arterial arch (perforating branch)
deep plantar arterial arch
medial plantar artery (superficial branch)
adductor hallucis (oblique head)
tendon of flexor hallucis longus
lateral plantar artery
tendon of flexor digitorum longus
abductor digiti minimi
quadratus plantae
flexor digitorum brevis
abductor hallucis
flexor retinaculum of tarsus
arterial calcaneal anastomosis
abductor hallucis

# LOWER LIMB COMMON NERVE INJURIES

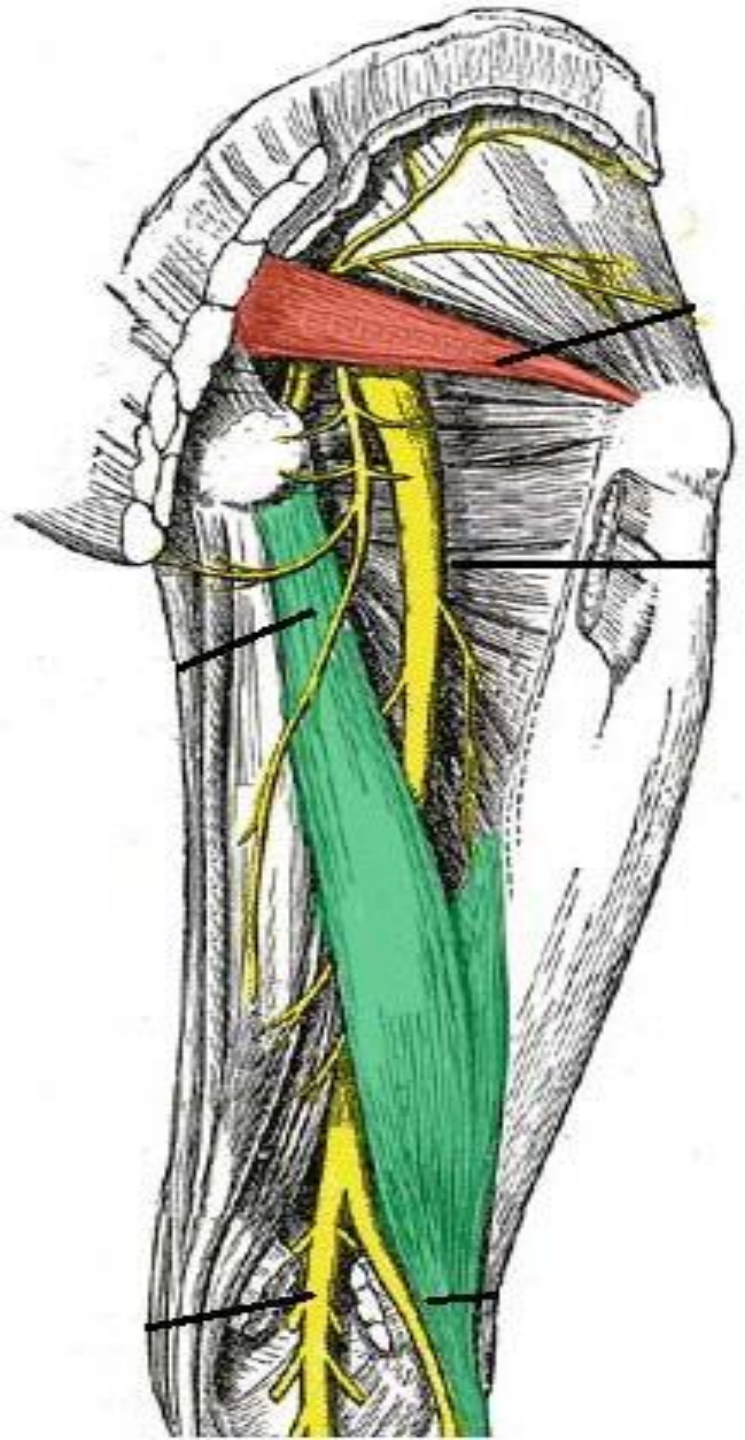


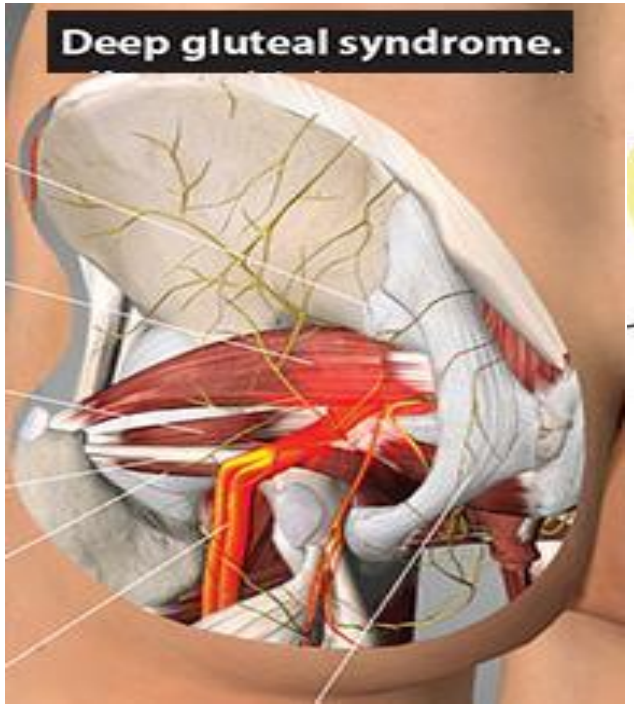

| | | L1 | L2 | L3 | L4 | L5 | S1 | S2 | S3 | S4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Hip | Flexion | ■ | ■ | ■ | ▒ | | | | | |
| | Extension | | | | ■ | ■ | ■ | ■ | | |
| | Abduction | | | | | ■ | ■ | | | |
| | Adduction | | ■ | ■ | ■ | | | | | |
| | Medial rotation | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| | Lateral rotation | | | | | ■ | ■ | ■ | | |
| Knee | Flexion | | ▒ | ▒ | ▒ | ■ | ■ | ■ | | |
| | Extension | | ■ | ■ | ■ | | | | | |
| Ankle | Dorsiflexion | | | | ■ | ■ | | | | |
| | Plantar flexion | | | | | | ■ | ■ | | |
| Big toe dorsiflexion | | | | | ■ | ■ | ■ | | | |
| Levator ani | | | | | | | | ■ | ■ | ■ |
| Coccygeus | | | | | | | | | | ■ |

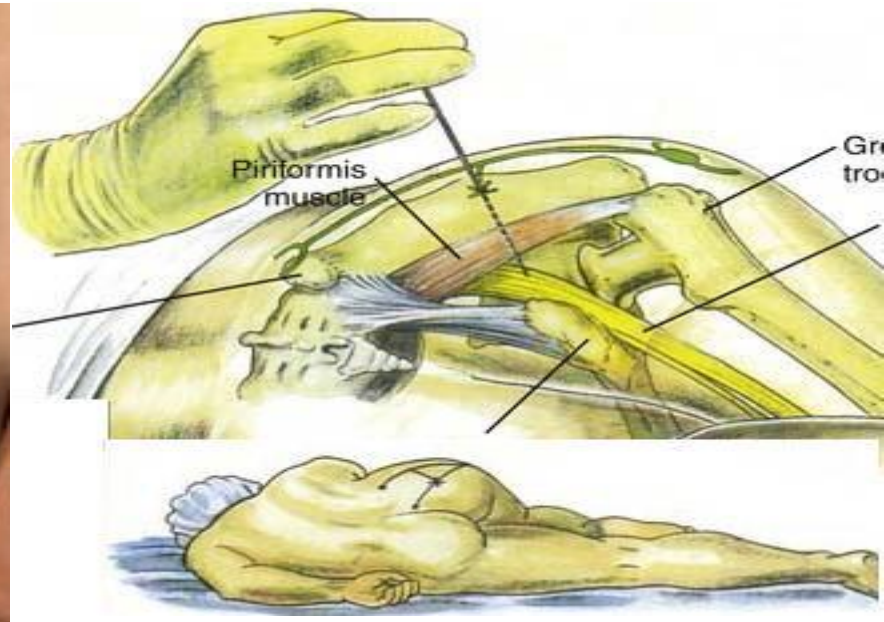
# Lumbar plexus Syndrome

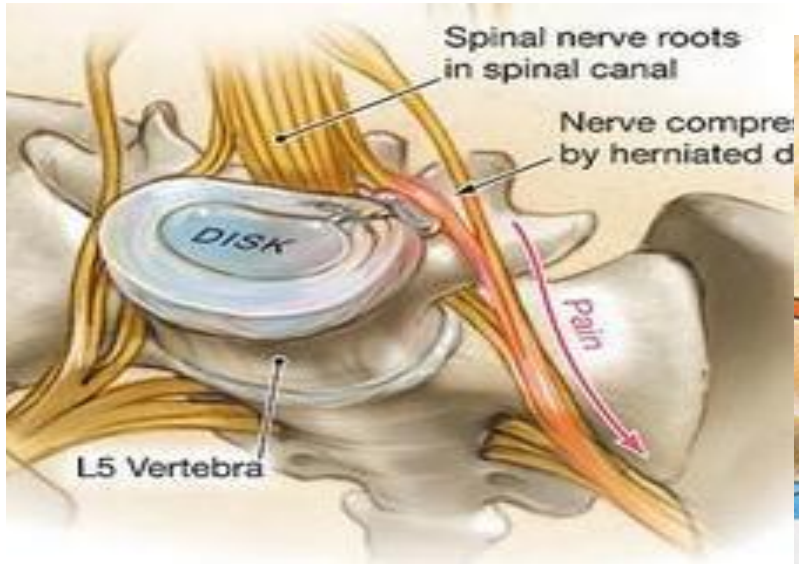


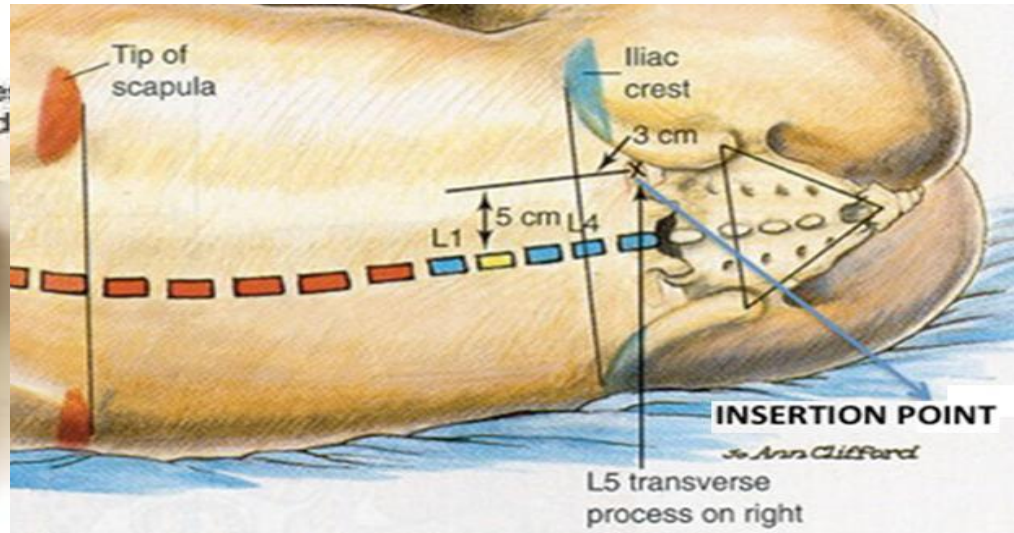
# Sciatic n. & Sciatica



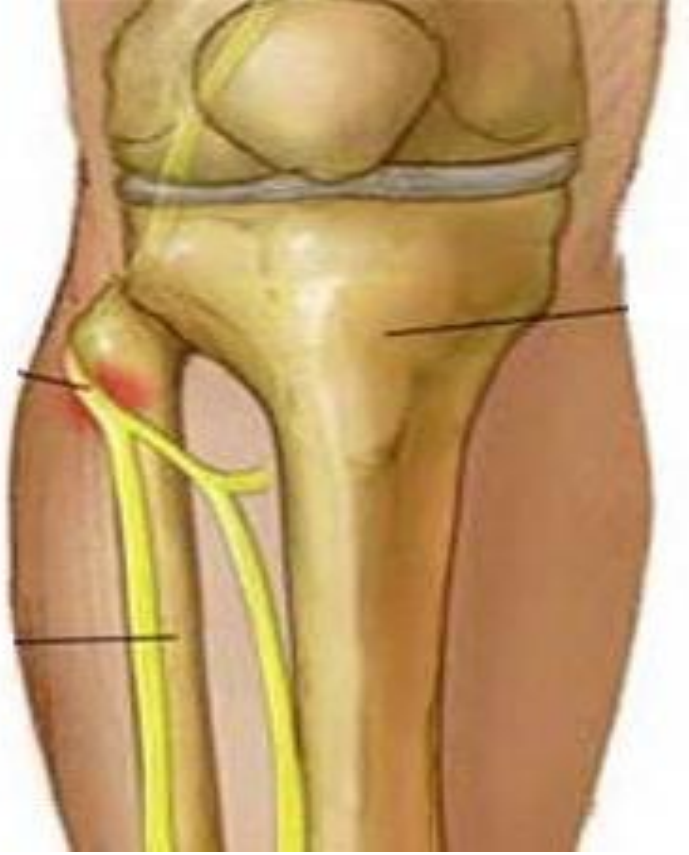


# Common Fibular nerve injuries

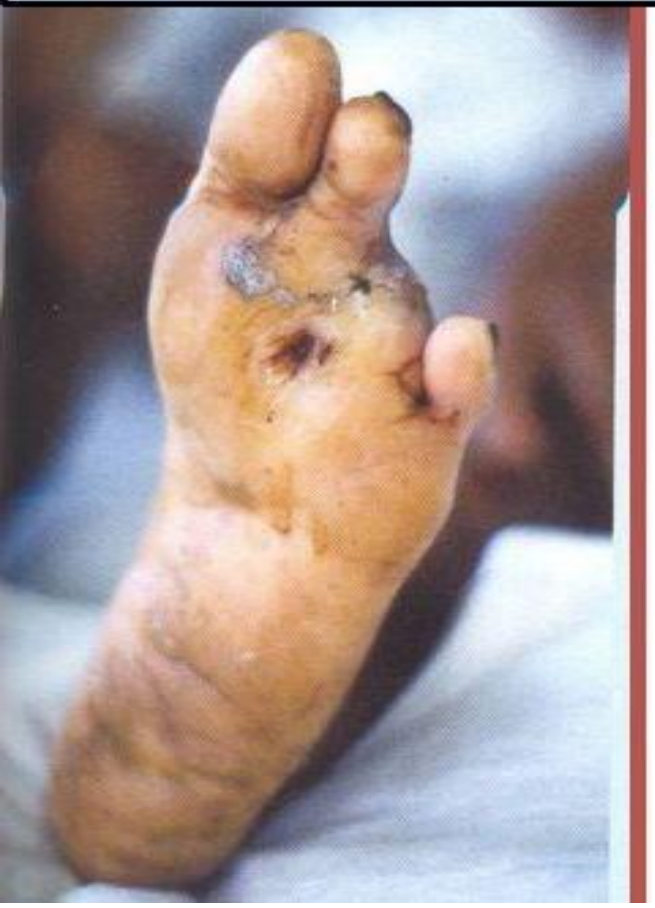



# Tibial n. - Proximal injury

**Sensory:**

**Sensory Loss over:**
Lateral side of the leg and foot (sural nerve).

Trophic **ulcers** in the sole.



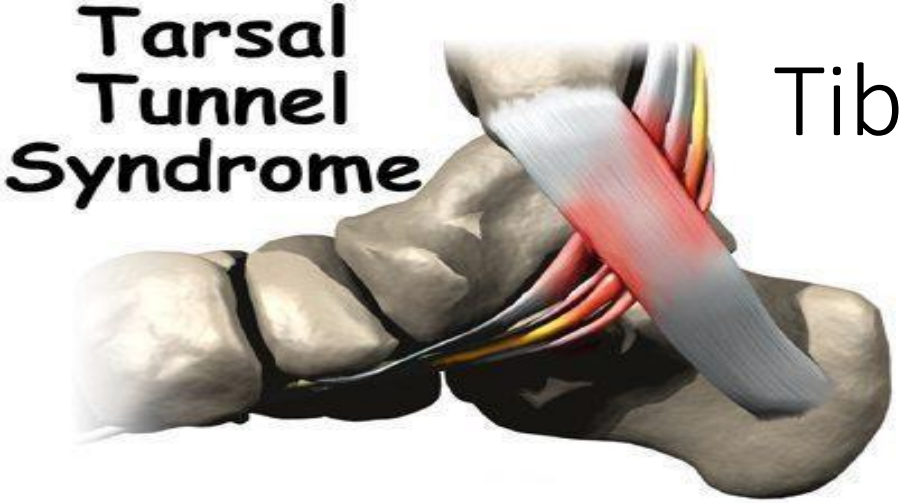
Complete division results in the following clinical features:

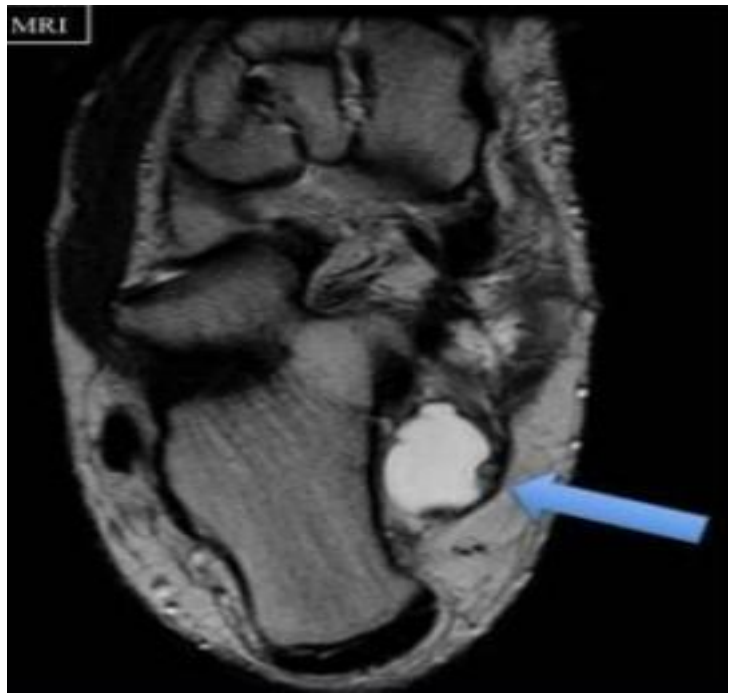
**Motor:**

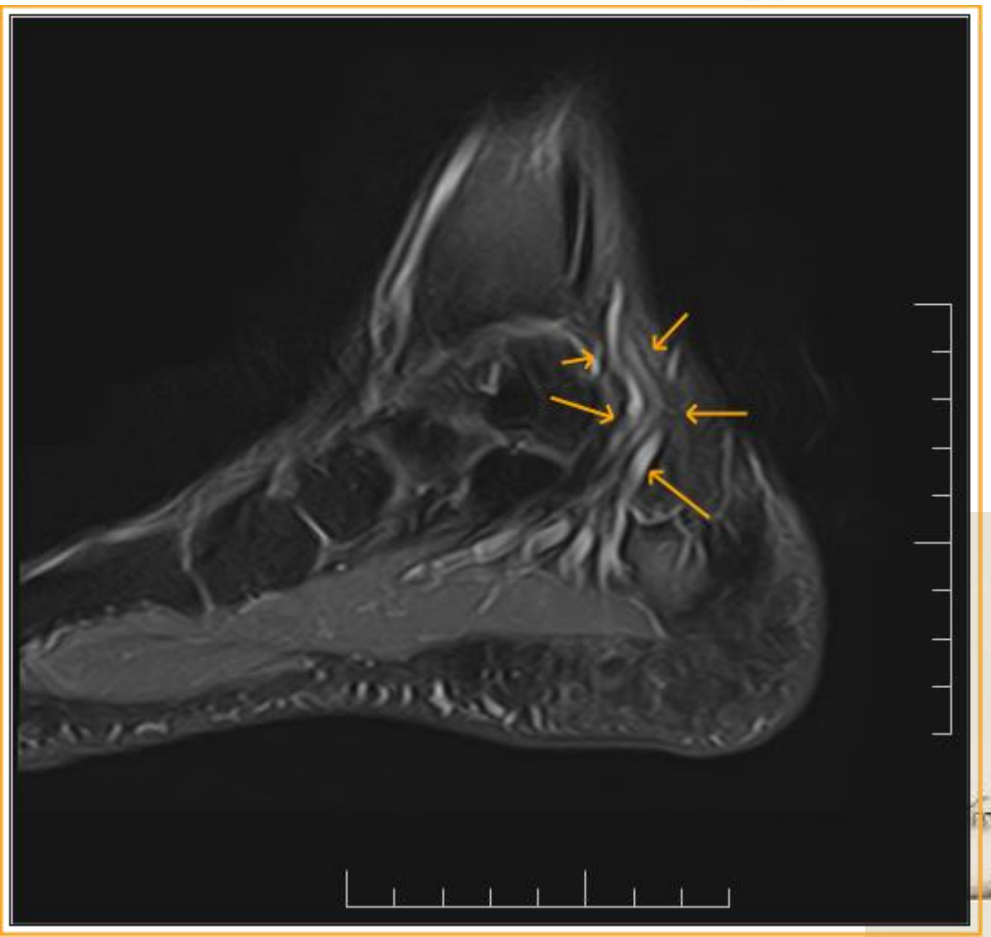
***All the muscles in the back of the leg and the sole of the foot are paralyzed.***

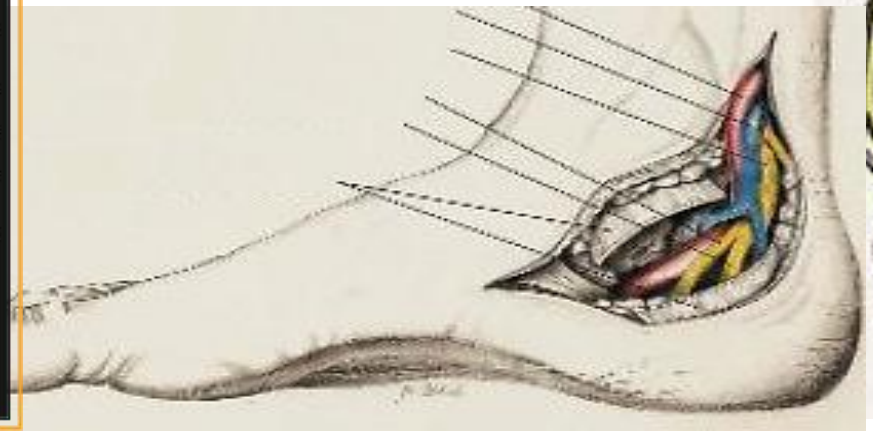
The opposing muscles ***Dorsiflex*** the foot at the ankle joint ***and Evert the foot*** at the subtalar joint, an attitude referred to as Talipes **Calcaneovalgus.**

# Tibial n. - distal injury





| Sensation | | Motor Function | |
|---|---|---|---|
| **Peroneal Nerve**<br><br>Palpate dorsal surface of the foot |  | **Peroneal Nerve**<br><br>The ability to dorsiflex ankle and toes |  |
| **Tibial Nerve**<br><br>Palpate plantar surface of foot |  | **Tibial Nerve**<br><br>The ability to plantar flex ankle and toes |  |

# How to Practically Study this Chapter

- **Navigate a muscle course from origin to insertion by palpation**
  a) on your self
  b) on a colleague
- **Examine the function of all muscles in groups by the innervating nerve.**
  a) on your self in front of a mirror
  b) on a colleague by observing the moving muscle
- **Trace the course of nerves and vessels**
  a) From its originating branch to its terminal end
  b) Navigate by space and surrounding structures
  c) Draw it
- **Draw cross sections projecting proper anatomical relationships between the structures.**
  a) Create your own from your understanding
  b) Correct your own drawing as you revise and compare to references
  c) Discuss your drawings in groups