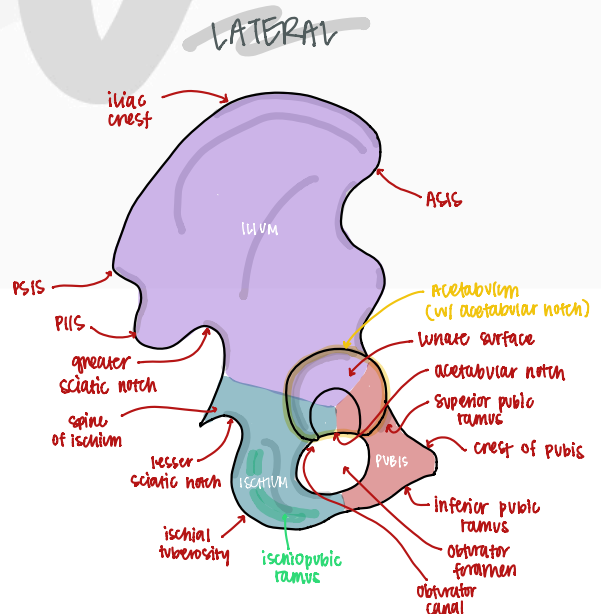
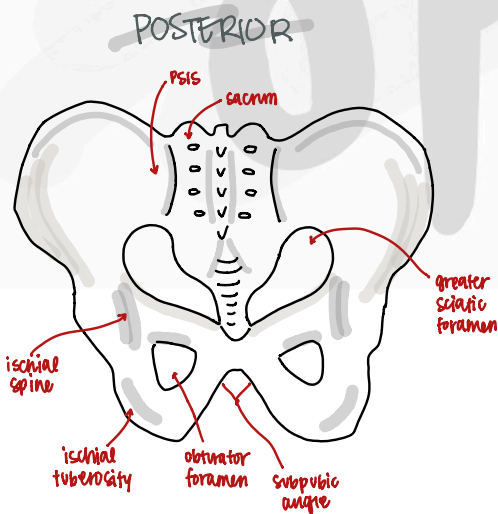
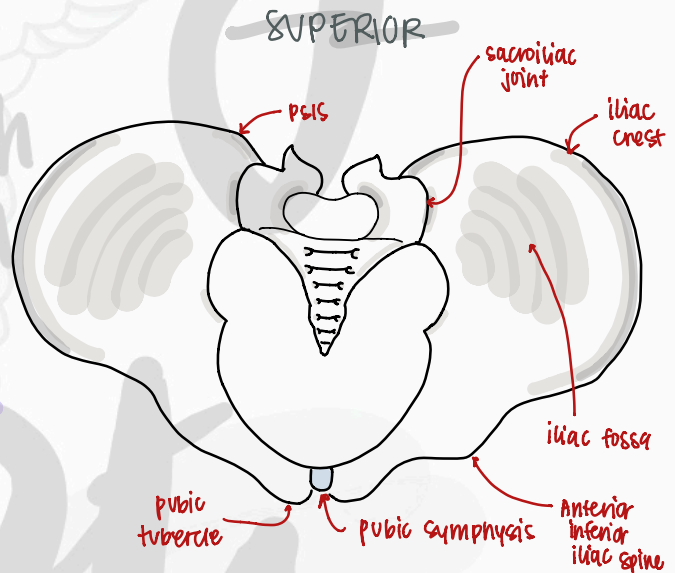
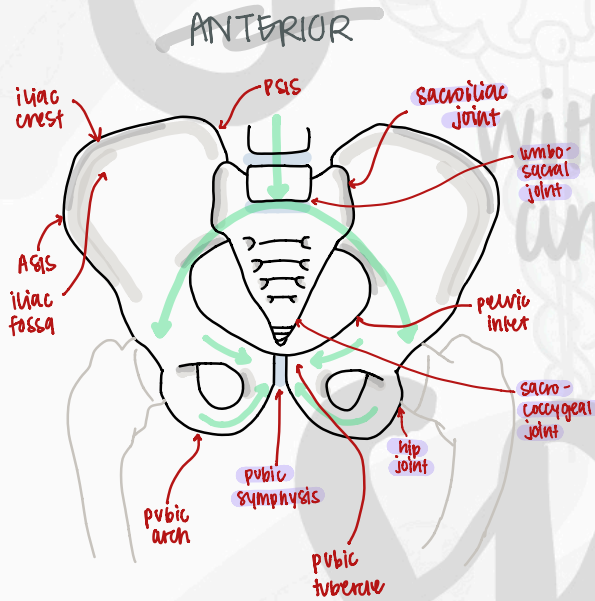


PELVIC GIRDLE & HIP

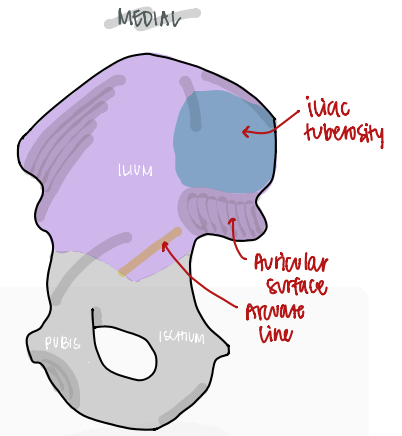
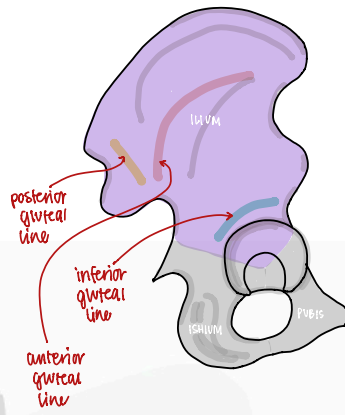
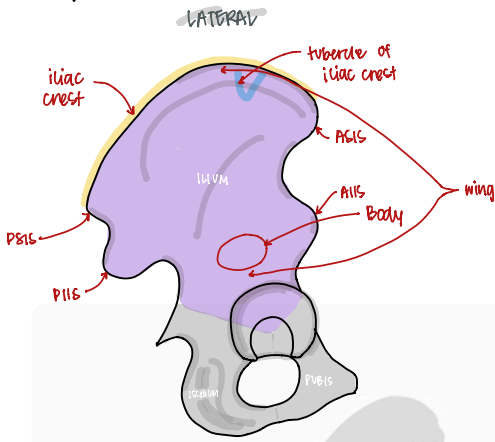
PELVIC

OSTEOLOGY

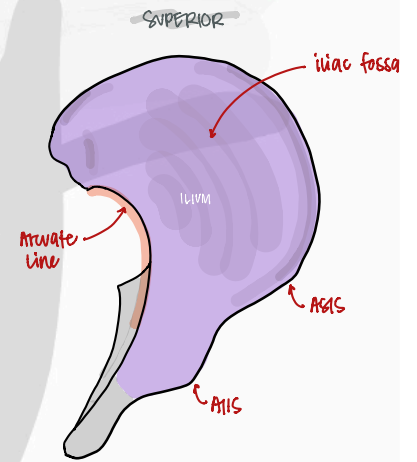
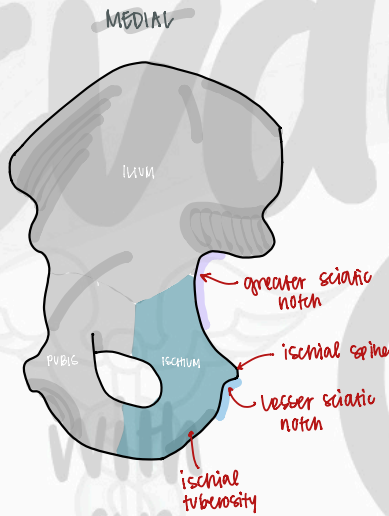
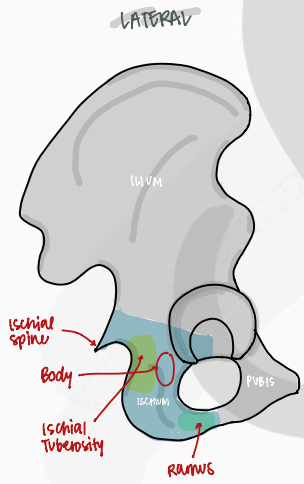
- ↳ sacrum, coccyx, innominate bones
- ↳ 7 joints: (1) lombo-sacral, (2) sacroiliac, sacro-coccygeal, symphysis pubis, (2) hip joints
- ↳ functions:
 - supports the abdomen
 - links vertebral column to lower limbs
 - transmits forces from lb to vertebral column through trabecular systems



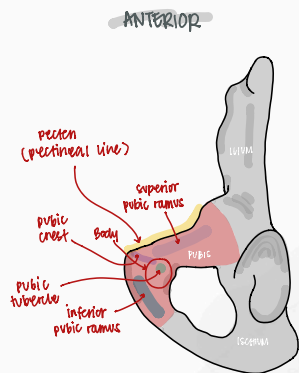
↳ **ILIUM:**



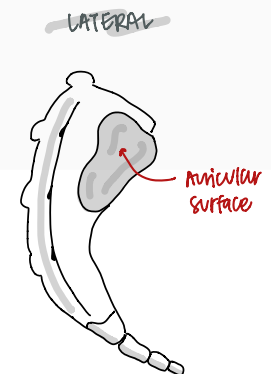
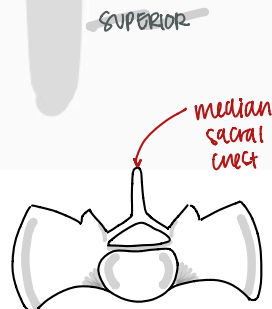
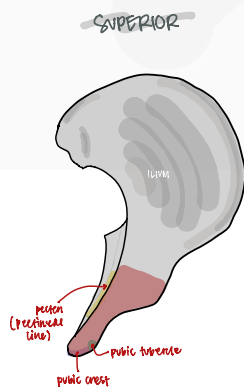
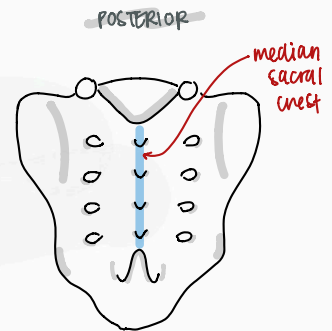
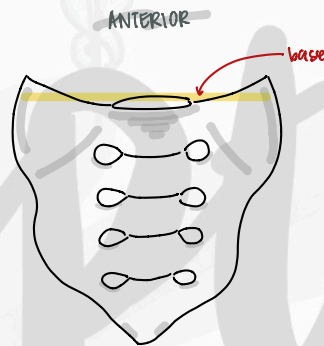
↳ **ISCHIUM:**



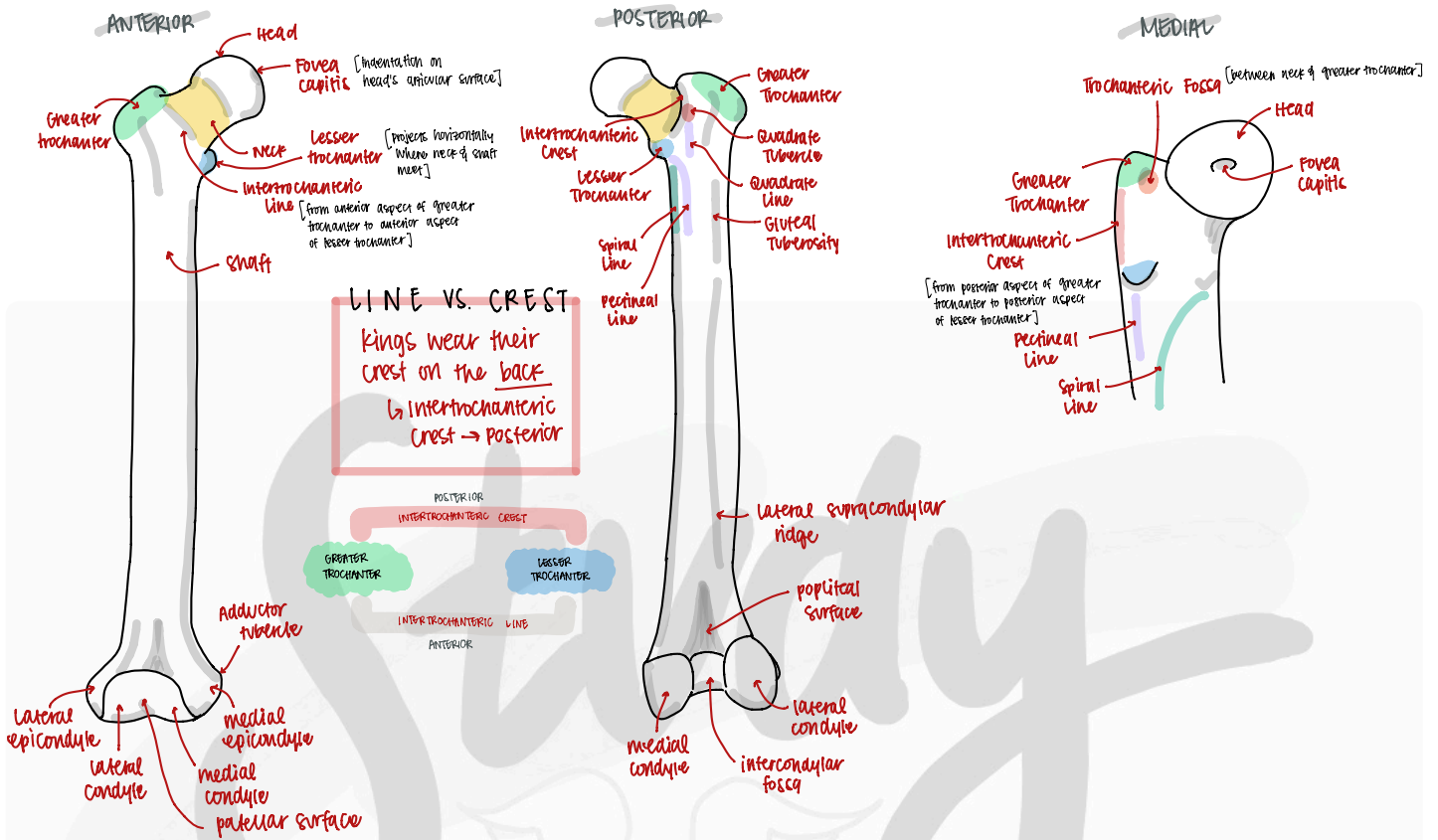
↳ **PUBIS:**



↳ **SACRUM:**



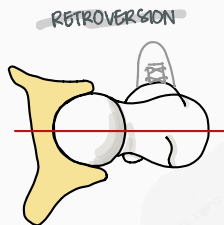
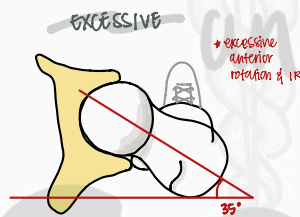
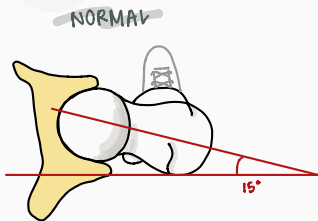
↳ Femur:



ROTATION

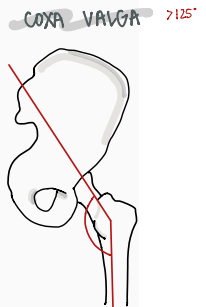
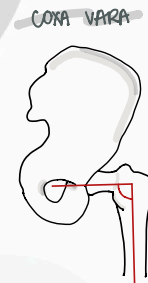
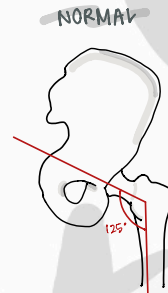
↳ **Femoral anteversion**: intrinsic rotation of the femur over its length from the hip to the knee

↳ **angle of inclination**:



* decreased anterior rotation of IR

Females: 30-40° at birth, 0-14° as adults
Males: slightly less than females



JOINTS

↳ **Femur — Acetabulum**

• Flex/Ext, IR/ER, Abd/Add

Flex: 100-120°
Ext: 20-30°
Abd: 40°

IR: 40-45°
ER: 45-50°
Add: 20°

Changes w/ age

↳ **Acetabulum (ilium, ischium, pubis)**

- Labrum — fibrocartilage
- Acetabula notch bridged by Transverse Acetabular Ligament

↳ **Round Lig (lig teres) — of head of femur**

- Arises from transverse acet lig.
- Inserts into fovea capitis of femur
- Carries blood vessels to head of femur

← can have damage, causing avascular necrosis

↳ ↓ arterial blood to femoral head & subsequent bone death

↳ can require THR

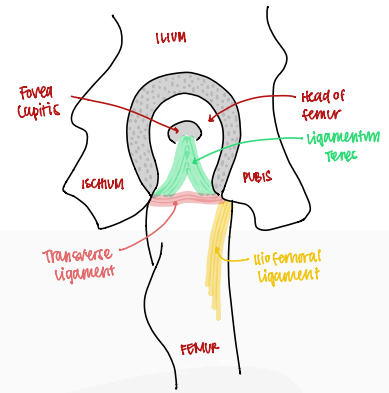
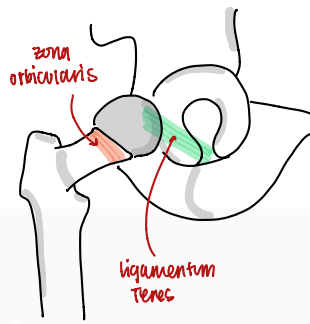
↳ in kids: Legg-Calve-Perthes' Disease



LIGAMENTS

↳ Ligamentum Teres of Femur

- triangular
- from acetabular notch to fovea capitis
- limited stability role
- conduit for blood & nerve supply



↳ hip joint capsule

- by 3 ligaments

↳ Iliofemoral ligament: STRONGEST

- AKA "Y" ligament
- anterior part of capsule
- attaches to AHS & ilium (intertrochanteric line)
- splits into thick upper & lower bands
 - ↳ attach to greater trochanter & intertrochanteric line
- limits excessive extension, adduction, & abduction

Taut in: ext, ER

↳ pubofemoral ligament:

- thin
- lower anterior part of capsule
- attaches to body & superior ramus of pubic bone to intertrochanteric fossa
- blends w/ lower band of iliofemoral ligament
 - attaches to femoral neck
- limits excessive extension & abduction

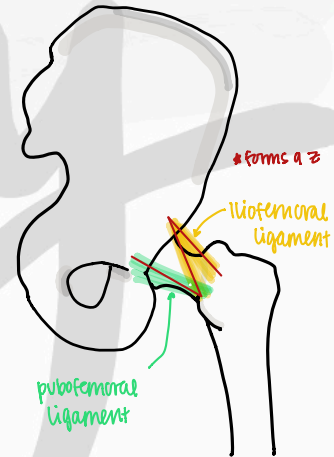
Taut in: abd, ext, ER

↳ ischiofemoral ligament:

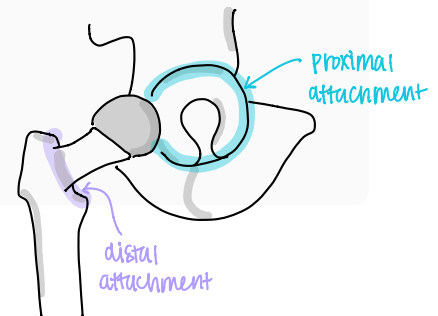
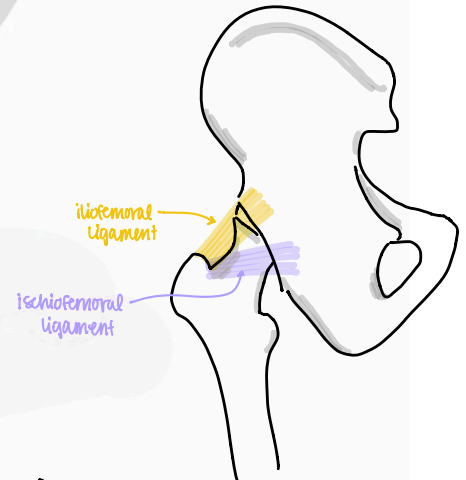
- very thin
- posterior part of capsule
- attaches to ischial body & greater trochanter
- limits excessive extension & adduction
- strong/dense: contributes to stability
- femoral neck intracapsular
- greater & lesser trochanters extracapsular
- 2 sets of fibers
 - ↳ longitudinal fibers: superficial
 - ↳ circular fibers: zona orbicularis (band that encircles femoral neck)
- thickened anterosuperior
- proximal attachment:
 - ↳ acetabular labrum & transverse acetabular ligament
- distal attachment:
 - ↳ anteriorly: intertrochanteric line
 - ↳ laterally: medial surface of greater trochanter
 - ↳ medially: neck of the femur, just superior to the lesser trochanter
 - ↳ posteriorly: lower neck of the femur above the intertrochanteric crest

Taut in: IR, ER

ANTERIOR



POSTERIOR



* All ligaments tighten w/ extension & all relax with flexion

PELVIC ARTERIES

↳ External Iliac A.

↳ Internal Iliac A.

Posterior division

↳ Iliolumbar A.

↳ Superior gluteal A.

↳ Lateral sacral A.

Anterior division

↳ differs by gender

↳ common:

- Umbilical
- **Obturator**
- middle rectal
- internal pudendal
- **inferior gluteal**
- median sacral

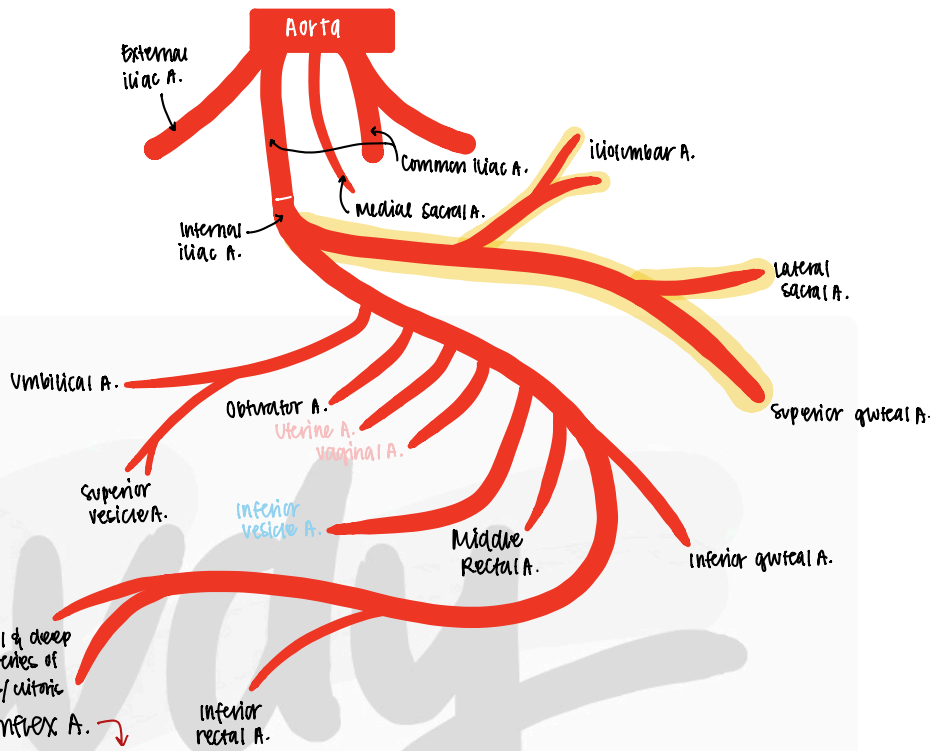
↳ Blood to hip joint:

- medial & lateral femoral circumflex A.
- Obturator A.
- superior gluteal A.
- inferior gluteal A.

Branches of internal iliac A.

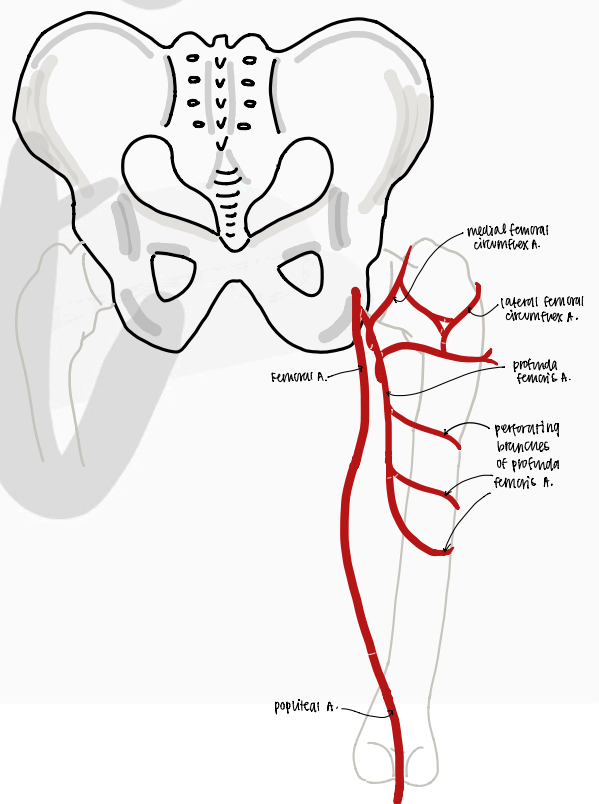
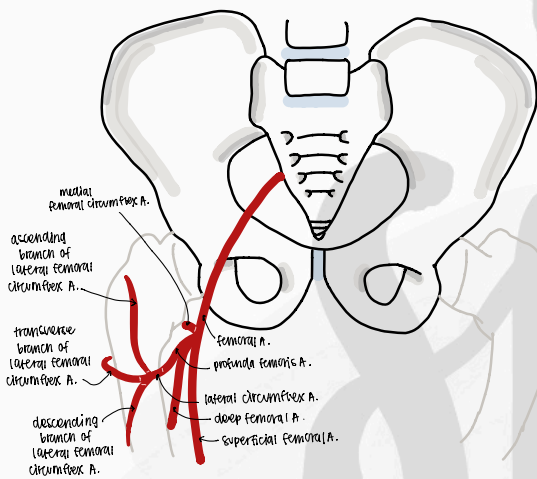
from profunda femoral A.

Dorsal & deep arteries of penis/vagina

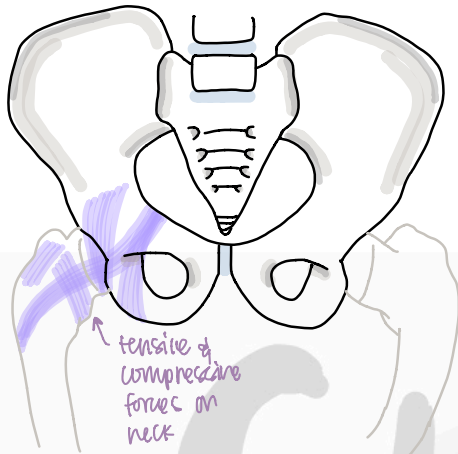


ANTERIOR

POSTERIOR



TRABECULAR PATTERNS

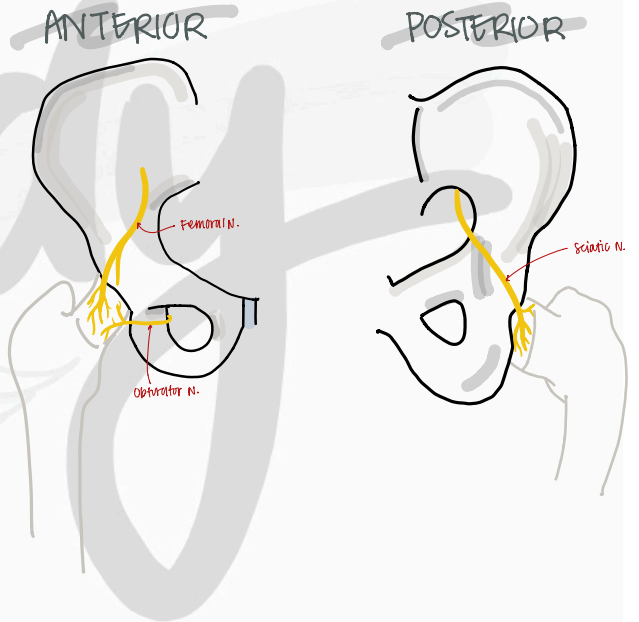


INTRACAPSULAR HIP FRACTURE

- ↳ If obturator A. isn't there, head will necrose
 - supplies blood to head of femur
 - by ligamentum teres
- ↳ blood flow goes from distal to proximal

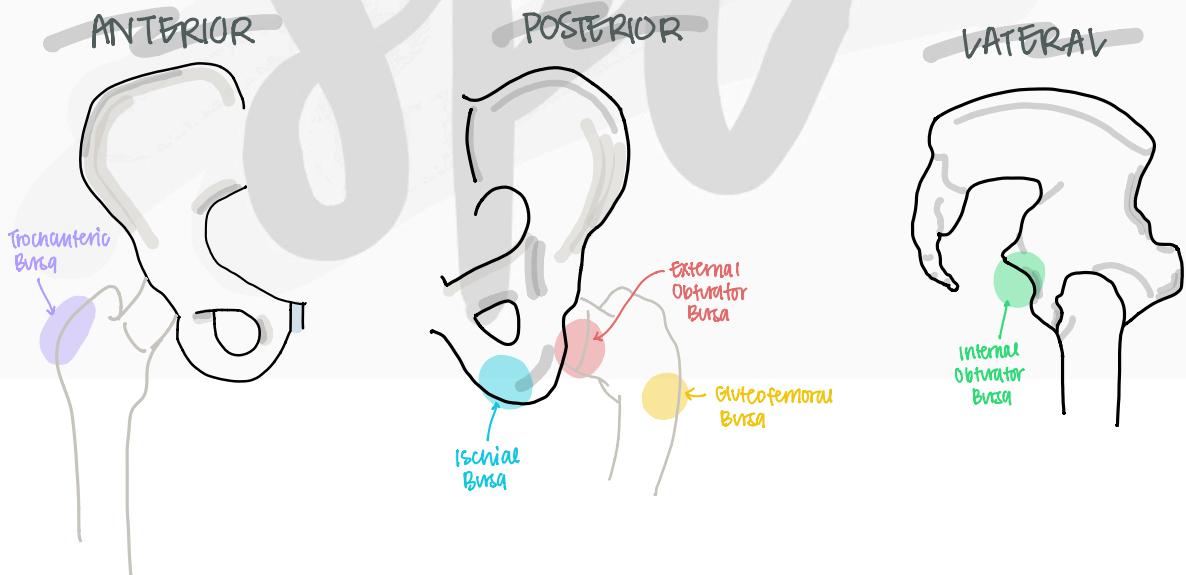
SENSORY INNERVATION

- ↳ Femoral N.] from Lumbar plexus
- ↳ Obturator N.]
- ↳ Sciatic N. (through N. to quadratus femoris)] from sacral plexus
- ↳ occasionally superior & inferior gluteal N.] from sacral plexus



BURSAE

- ↳ **Obturator Internus Bursa**: between obturator internus T. & ischial tuberosities & ischial spine
- ↳ **Obturator Externus Bursa**: between obturator externus T. & posterior femoral neck
- ↳ **Trochanteric Bursa**: between gluteus maximus & greater trochanter ← inflammation here is common
- ↳ **Gluteofemoral Bursa**: between gluteus maximus & vascus lateralis
- ↳ **Ischial Bursa**: between gluteus maximus & ischial tuberosity ← 2nd most common (sitting)



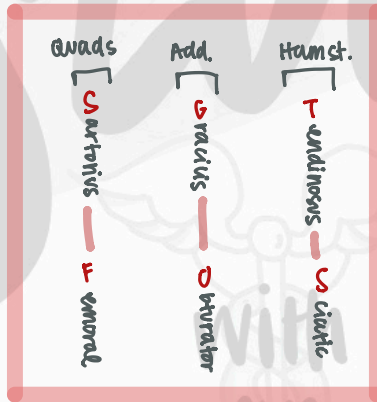
GLUTEAL REGION

BOUNDARIES

- ↳ Superior: iliac crest
- ↳ inferior: gluteal fold
- ↳ medial: midline of body
- ↳ superficial fascia: thick with fat
- ↳ deep fascia: thin, on the surface of the gluteus maximus m.
 - attaches to iliac crest of sacrum
 - continuous laterally w/ the fascia lata of the thigh
 - curves under the gluteus maximus to attach to the sacrotuberous ligament

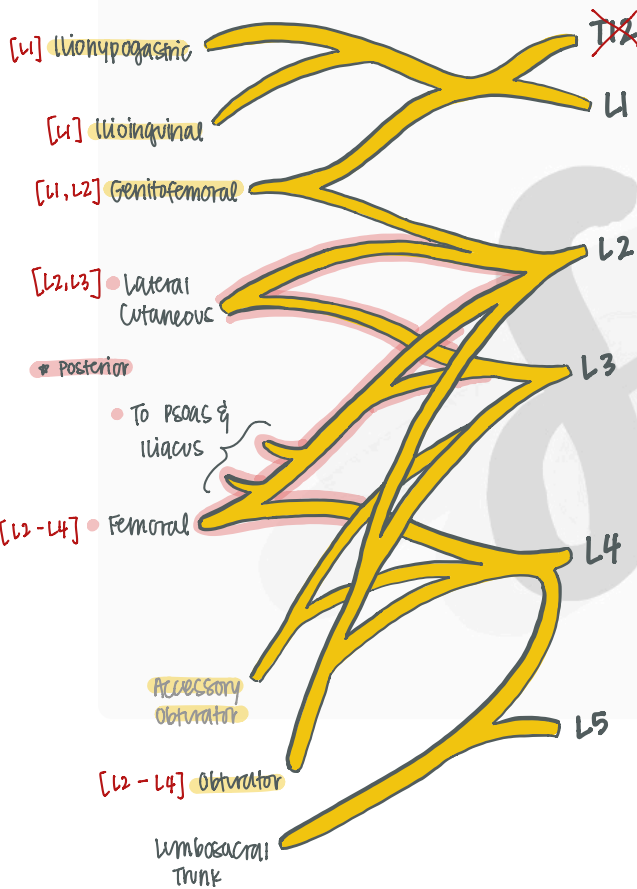
CONTENTS

- ↳ iliohypogastric & cutaneous N.
- ↳ Superior gluteal N., A., V.] named in relation to piriformis
- ↳ inferior gluteal N., A., V.
- ↳ sciatic N.
- ↳ N. to obturator internus
- ↳ N. to piriformis
- ↳ N. to quadratus femoris
- ↳ obturator N., A., V.
- ↳ 10 muscles

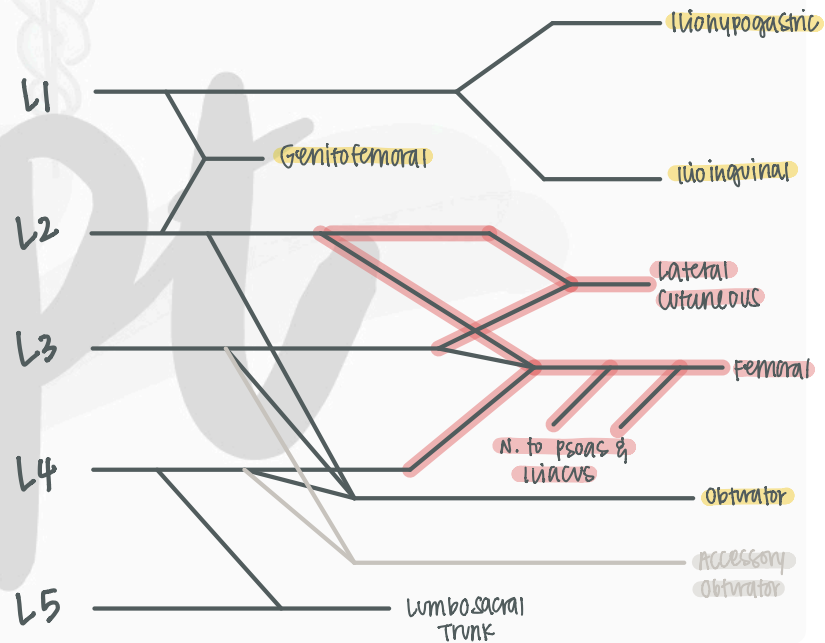


INNERVATION

LUMBAR PLEXUS

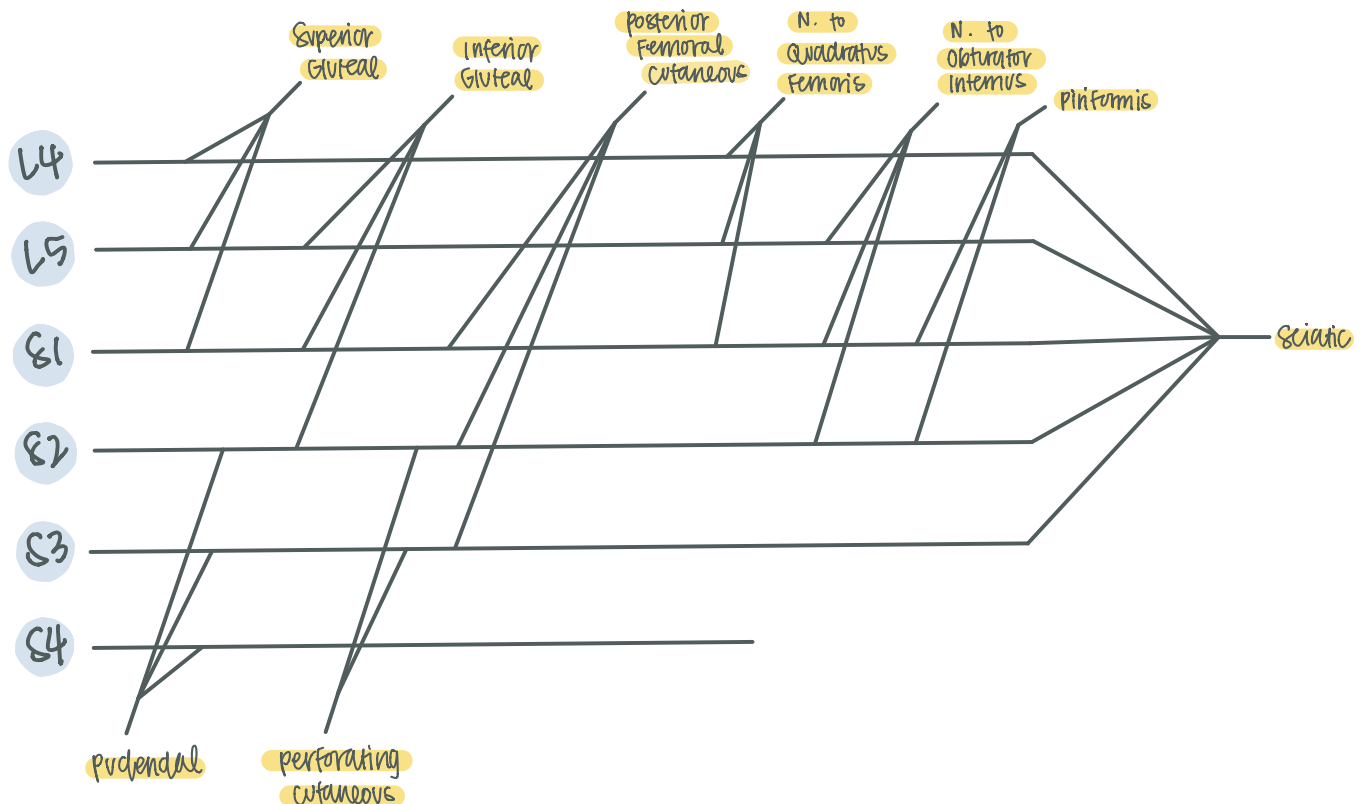
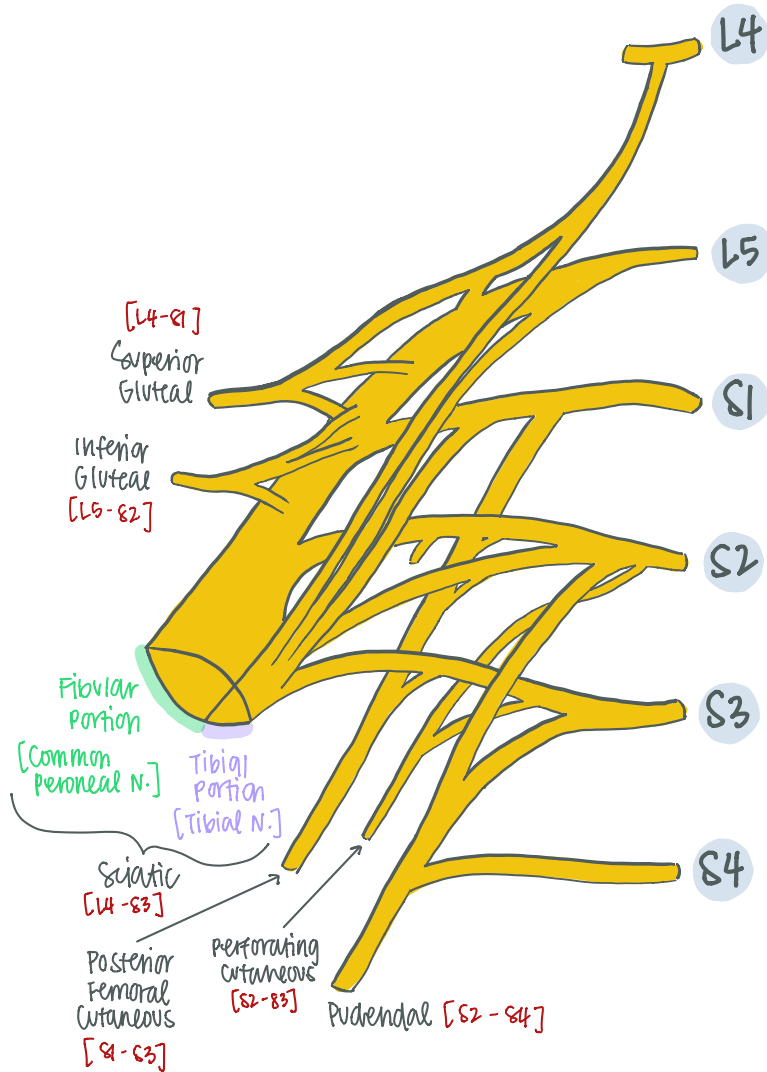


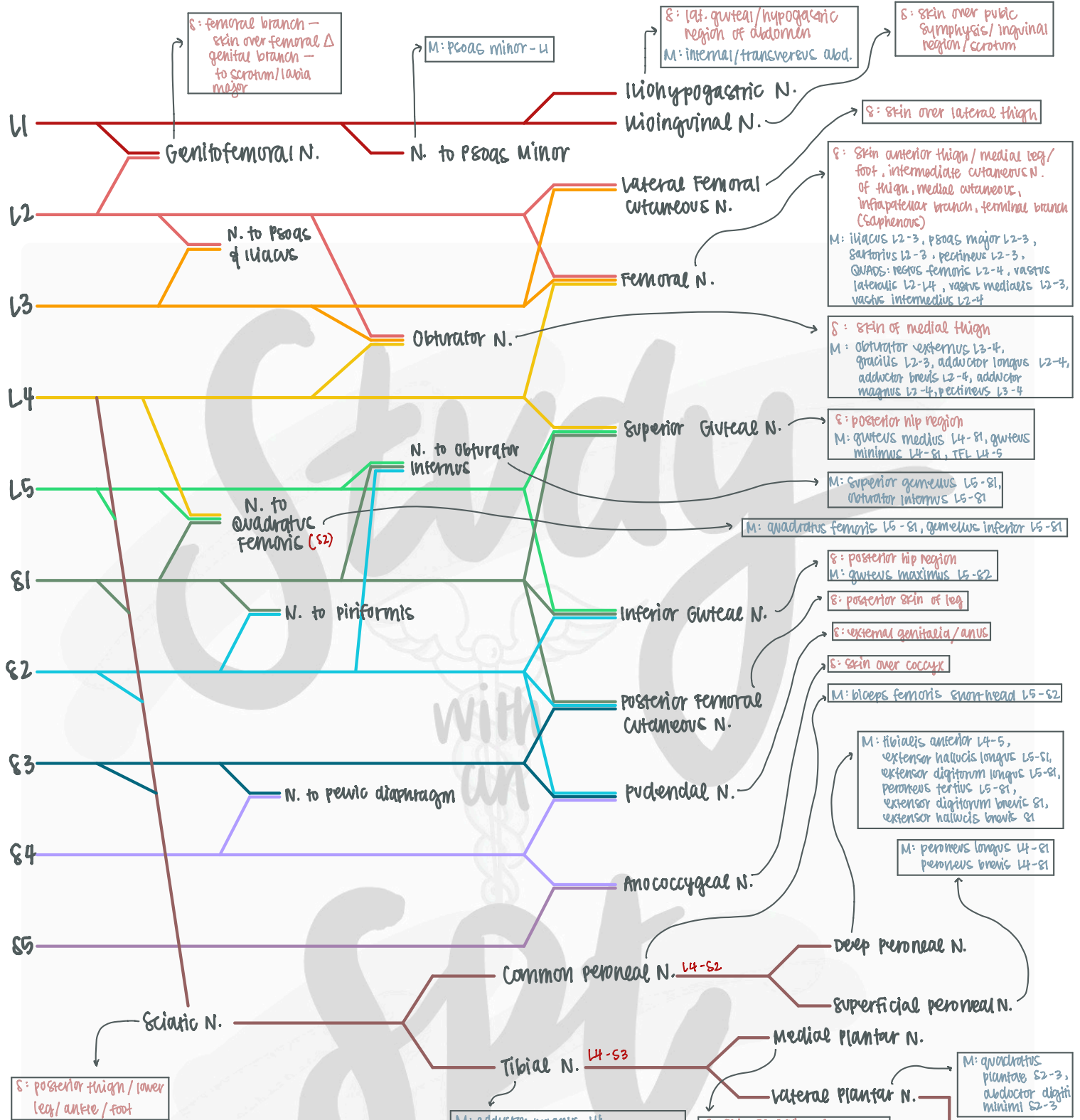
	L1	L2	L3	L4	L5	S1	S2	S3	S4
Iliohypogastric N. S= lat glut region, hypogastric region of abdomen M= external & internal abd obliques transverse abdominis	X								
Ilioinguinal N. S= skin over pubic symph, inguinal region, scrotum M= internal abd oblique, transverse abdominis	X								
Genitofemoral N. S= femoral br. to skin over femoral triangle; genital br. to scrotum/labia major	X	X							
Lateral femoral cutaneous N. S= skin over lateral thigh		X	X						
Femoral N. S= skin of ant thigh & med leg and foot M= quadr fem, psoas major, iliacus, pectineus, sartorius		X	X	X					
Obturator N. S= skin of med thigh M= adductors of hip		X	X	X					
Lumbosacral trunk				X	X				
Sciatic N. Post thigh, lower leg, ankle, foot				X	X	X	X	X	
Superior gluteal N. S= post hip region M= gluteus med & min TFL				X	X	X			
Inferior gluteal N. S= post hip region M= gluteus max				X	X	X			
N. to quadratus fem				X	X	X			
N. Obturator internus				X	X	X			
Pudendal N. S= external genitalia M= muscles of the perineum, ext anal sphincter							X	X	X
N. to piriformis						X	X		
N. to pelvic diaphragm M= levator ani, coccygeus								X	X



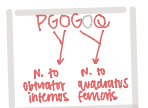
* Gluteal region innervation is from sacral plexus, except for obturator N.

SACRAL PLEXUS





- OBTURATOR N.** → OH GEE, ADD ME (Obturator → gracilis, adductors)
- FEMORAL N.** → QUADS & SIP (all quads, sartorius, iliopsoas, pectineus)
- COMMON PERONEAL N.** → SHORT PEOPLE ARE COMMON (biceps femoris short head)
- SUPERFICIAL PERONEAL N.** → MAIN PERONEALS (peroneus longus & brevis)
- DEEP PERONEAL N.** → EXTEND THE TA (extensors, tertius, fib ant)
- TIBIAL N.** → HAMSTRINGS, POST. LEG, FLEX LONG (all hamstrings, posterior leg muscles, flexors (longus only))
- MEDIAL PLANTAR N.** → BRIEF LAPS (flexors (brevis only), 1st lumbrical, abductor hallucis, plantar - sensory)



- LATERAL PLANTAR N.** → 4 MINI PLANTS (quadratus plantae, abductor digiti minimi)
- SUPERFICIAL LATERAL PLANTAR N.** → SUPER SHORT FLEX (sensory to toes 4&5, flexor DM brevis)
- DEEP LATERAL PLANTAR N.** → DIP LAD (dorsal & plantar interossei, lumbricals 2-4, abductor hallucis)

S: skin sensation of plantar surface/toes 1-3 & 1/2 of 4th
M: flexor digitorum brevis L4-5, abductor hallucis L4-5, flexor hallucis brevis L5-S1, first lumbrical L4-5

M: quadratus plantae S2-3, abductor digiti minimi S2-3

S: proper plantar digital N. → skin of toes 4-5
M: flexor digiti minimi brevis S2-3

M: dorsal/plantar interossei S2-3, lumbricals of toes 2-4 S2-3, abductor hallucis S2-3

MUSCLES

• GLUTEAL REGION

→ when hip is extended

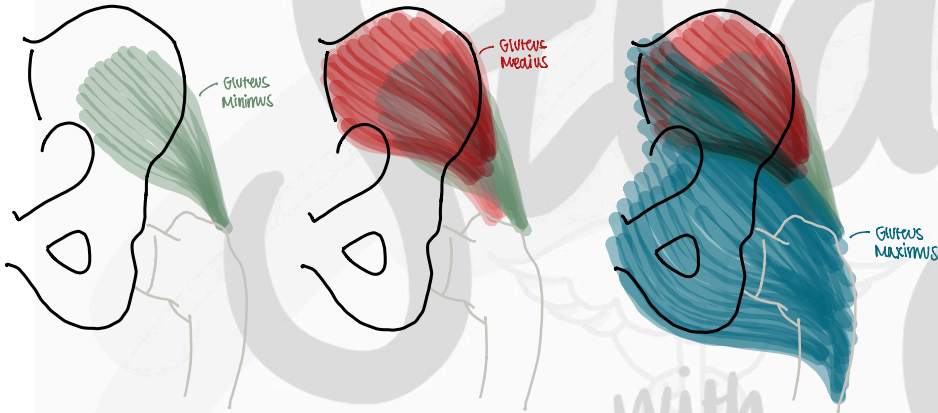
main abductors

- ↳ Glut Max - ext/ER femur, ext trunk - inferior gluteal N. → upper & lower fibers assist w/ add & abd
- ↳ Glut Med - abd/IR femur, ext femur when hip flexed, helps stabilize pelvis - superior gluteal N.
- ↳ Glut Min - abd/IR femur - superior gluteal N.
- ↳ Piriformis - ER - hip ext, IR - hip flex $>90^\circ$ - N. to piriformis
- ↳ Quadratus Femoris - ER femur - N. to Quadratus Femoris
- ↳ Sup Gemellus - ER femur - N. to Obturator Internus
- ↳ Inf Gemellus - ER femur - N. to Quadratus Femoris
- ↳ Obturator Internus - ER femur - N. to Obturator Internus
- ↳ Obturator Externus - ER femur - Obturator N.
- ↳ Tensor Fascia Lata - abd/flex/IR femur - Superior Gluteal N.

P G O G O Q

External Rotators:

- Piriformis
- Gemellus Superior
- Obturator Internus
- Gemellus Inferior
- Obturator Externus
- Quadratus Femoris

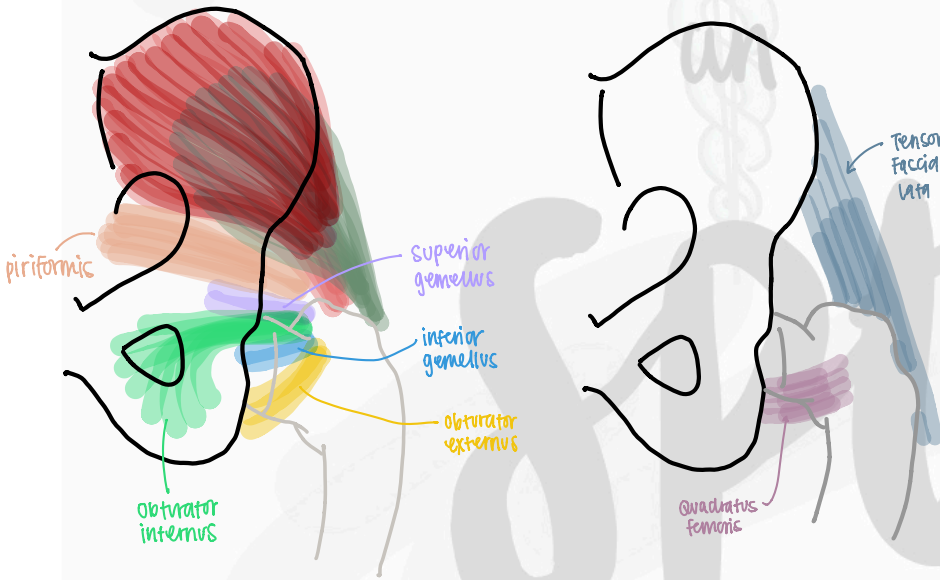


Medial Rotators:

- ↳ No muscles dedicated for solely IR
- ↳ Glut Max: may assist in extreme hip flex
- ↳ Piriformis: in hip flexion
- ↳ Glut med & min: anterior portions when hip is flexed
- ↳ TFL

Abductors:

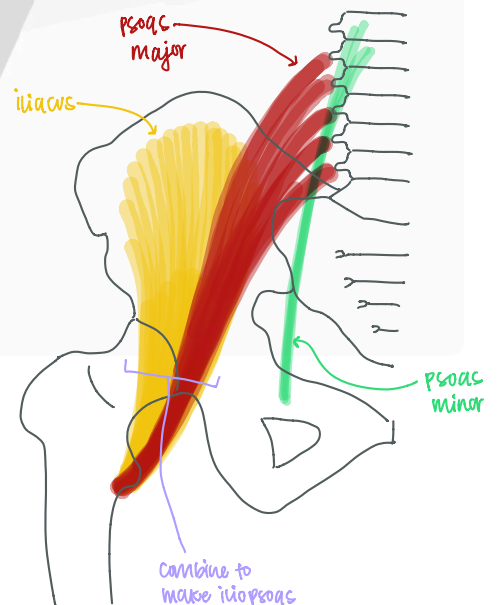
- ↳ Gluteus med & min
- ↳ open kinetic chain:
 - abduct
 - anterior fibers IR & flex post. fibers ER (medius)
- ↳ close kinetic chain:
 - stabilize pelvis
- ↳ Nerve: superior gluteal - L4-S1



• ILIAC REGION

- ↳ Psoas Major - flex femur, lat. flex L-spine, assists in maintaining lumbar lordosis - femoral N.
- ↳ Psoas Minor - weak flex L-spine - U
- ↳ Iliacus - flex femur - Femoral N.

* Psoas major & Iliacus combine to make Iliopsoas
↳ attaches to lesser trochanter



• HIP FLEXORS

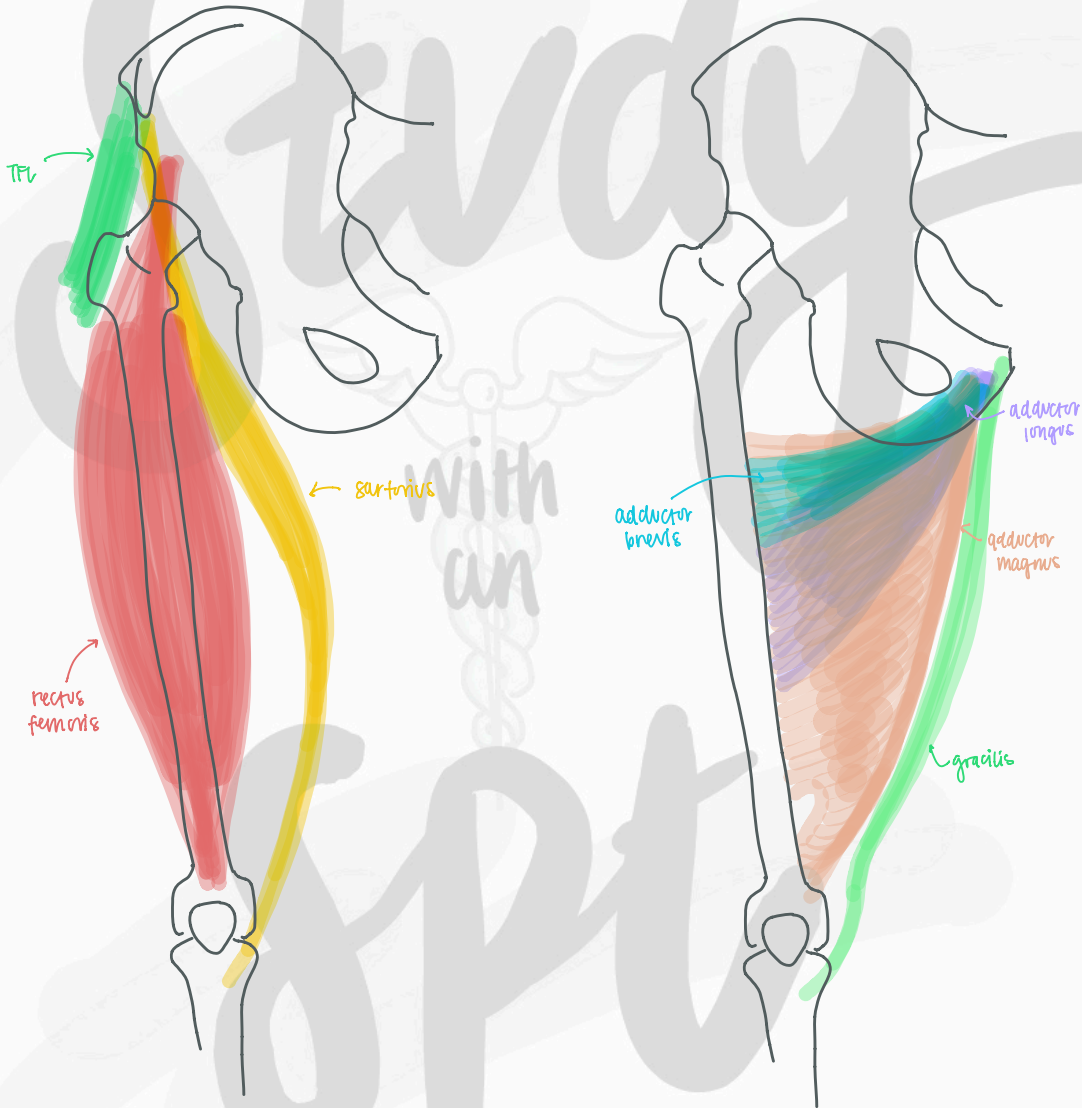
* abductors are secondary flexors

- ↳ iliopsoas — small rotatory component, affects lumbar lordosis, only flexor that flexes hip past 90° — femoral N.
- ↳ rectus femoris — flex hip, ext knee — femoral N.
- ↳ sartorius — flex hip, flex knee, IR tibia on femur — femoral N.
- ↳ tensor fascia lata — flex, abduct, IR hip, decreases tensile stress on lateral femur — superior gluteal N.

assess tightness using the Thomas Test

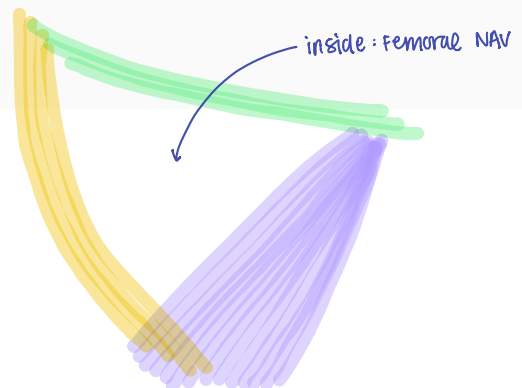
• HIP ADDUCTORS

- ↳ Adductor brevis — add & weak flexion hip — obturator N.
- ↳ Adductor longus — add & flex hip, ext & ER femur, pelvic stabilization — obturator N.
- ↳ Adductor magnus — add, ext, ER, & weak flex hip, pelvic stabilization — obturator N. (L2-4), Tibial N (L4)
- ↳ Gracilis — add hip, flex & IR knee — obturator N.



femoral triangle

- inguinal ligament
- sartorius
- adductor longus



*extensors control forward inclination of trunk,
is an important closed chain function, can substitute for weak quads

• HIP EXTENSORS

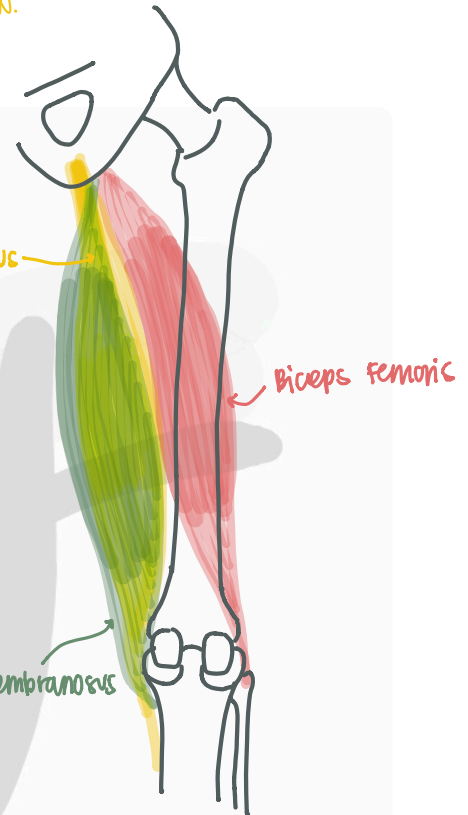
↳ Gluteus maximus: hip ext esp. with resistance & weight of limb → does ext w/ knee flexed

↳ Hamstrings: two joint muscles

- semitendinosus — ext hip, flex & IR knee, pelvic stabilization — tibial N.
- semimembranosus — ext hip, flex & IR knee, pelvic stabilization — tibial N.
- biceps femoris

↳ long head — ext hip, flex & ER knee — tibial N.

↳ short head — ext hip, flex & ER knee — common peroneal N.



HIP MOTION

↳ sagittal plane

- flexion: 120-135°
- extension: 10-30°

↳ frontal plane

- abduction: 30-50°
- adduction: 10-30°

↳ transverse plane

- IR: 30-45°
- ER: 45-60°



gait

- 30° flexion
- 10° extension
- 5° abduction/adduction
- 5° ER & IR

MYOLOGY

TWO JOINT MUSCLES

- ↳ active insufficiency
- ↳ passive insufficiency
- ↳ greatest force when NOT shortening over 2 joints simultaneously
- ↳ allow power transfer from the hip to the knee
 - RF transfers hip ext. power to knee ext.

PORTIONS OF MUSCLE MAY HAVE DIFFERENT ACTIONS

- ↳ gluteus maximus
 - upper part → abducts
 - lower part → adducts
- ↳ gluteus medius
 - may also IR & ER

ACTION DEPENDENT ON JOINT ANGLE

- ↳ gluteus medius & TFL
 - better IR when hip flexed to 90°
- ↳ adductors
 - flex hip when hip extended
 - ext hip when hip flexed

THIGH & KNEE

OSTEOLOGY

PATELLA

↳ largest sesamoid bone → anterior to femoral condyles & superior to joint line

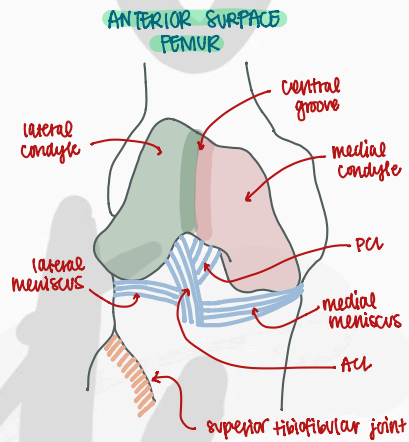
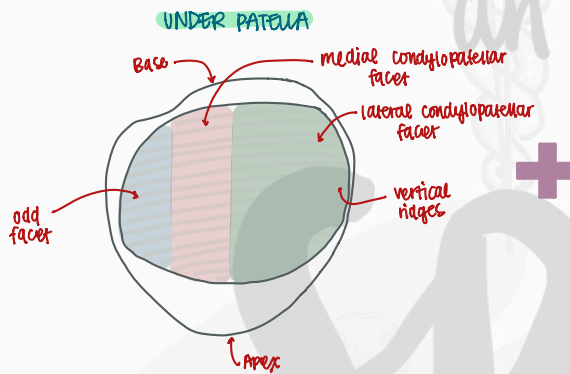
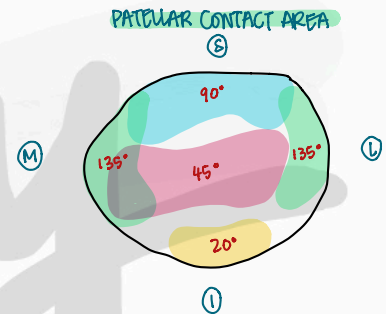
↳ function: helps to spread out forces

- w/o patella, there is more femur/tibia compression and less knee extension
- increase motion from joint axis so we can have knee ext.

↳ anterior side: embedded in quads tendon

↳ posterior side:

- vertical patellar ridge — traces on intercondylar groove of femur
- medial & lateral condylopatellar facets
- odd facet
 - ↳ medial to medial facet
 - ↳ articulates with medial femoral condyle AFTER 90° knee flexion
- **patellofemoral joint**: articulation between patella & femur



↳ Q angle: ASIS and tibial tubercle to center of patella

- normal = 12-15°
- females > males
- Q angle > 20° → genu valgus (knock knee)
- Q angle < 10° → genu varum (bowlegged)
- larger Q angle → more lateral patella



JOINTS & LIGAMENTS

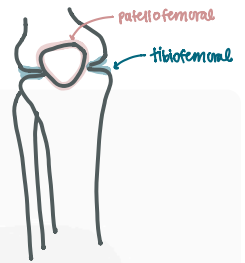
TIBIOFEMORAL JOINT

- ↳ medial & lateral femoral condyles with medial & lateral tibial condyles
- ↳ flex/ext, IR/ER (greatest at 90° flexion, none at full extension)

- active flexion: 135 - 150° ← newborns lack 15-20° flexion until age 2
 - ↳ femoral condyles rotate posteriorly & glide anteriorly (anteromedial ACL tightening)
- hyperextension: 10°
 - ↳ femoral condyles rotate anteriorly & glide posteriorly (posterolateral ACL tightening)

- ↳ slight abduction / adduction: 11° (greatest at 30° flexion, none at full extension, slight at > 30°)

- ↳ compression forces on the tibiofemoral joint are greatest as the heel of the foot raises off the ground - heel off of stance phase



PATELLOFEMORAL JOINT

- ↳ medial & lateral femoral condyles with condylopatellar facets

- superior & inferior translation
- medial & lateral tilting

- ↳ patella moves about 1 cm inferiorly from full knee extension to full knee flexion

- ↳ with increased flexion, compressive forces increase

- ↳ B Bursa: 4 front, 4 back

- ↳ **patellofemoral dysfunction:**

- common
- possibly @ angle > 20 degrees
- tightness of ITB
 - ↳ pulls patella laterally
 - ↳ creates lateral tilt
- weakness of VMO ← leads to lateral movement
- result: increased compressive forces on lateral condylopatellar facet during knee flexion
- management: lateral release surgery & post op rehab

- ↳ **patellar movement:**

- tilt, glide, A/P, rotation

KNEE ROM:	
walking:	70° flex
stairs:	105°
in & out of chair:	100°

TILT



GLIDE



A/P



ROTATION



* chondromalacia patella → wear of articular cartilage facets

EXTRA-ARTICULAR LIGAMENTS/STRUCTURES

- ↳ quad tendon & patellar ligament:

- reinforces anterior knee ← quad tendon: superiorly, patellar ligament: inferiorly

- ↳ **lateral patellar retinaculum:**

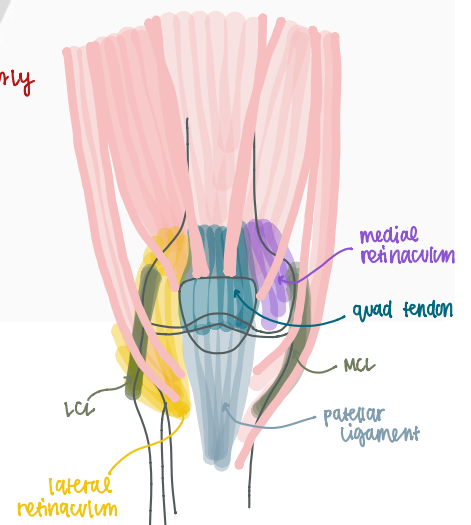
- fibrous expansion of vastus lateralis & ITB
 - ↳ reinforces anterolateral joint capsule
- lateral patellofemoral ligament: thick band from ITB → lat. patella
- lateral patellotibial ligament: thick fibrous band running longitudinally

- ↳ **medial patellar retinaculum:**

- fibrous expansion of vastus medialis
 - ↳ reinforces anteromedial joint capsule
- medial patellofemoral ligament: transverse thickening from adductor tubercle to vastus medialis → to superior medial aspect of patella
- medial patellotibial ligament: thick fibrous band running longitudinally

- ↳ **medial (tibial) collateral ligament (MCL):**

- medial epicondyle of femur to medial tibial condyle



• attaches to medial meniscus ← reinforces medial joint capsule

↳ **lateral (fibular) collateral ligament (LCL):**

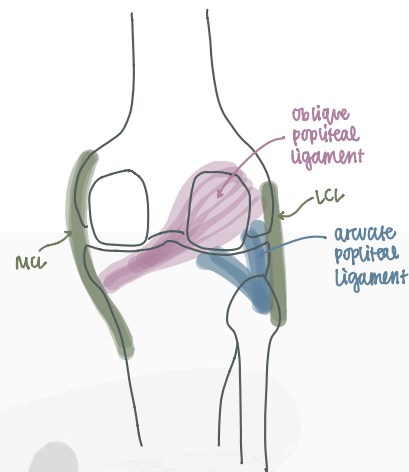
- lateral epicondyle of femur to head of fibula
- does NOT attach to lateral meniscus ← because popliteus t.
- cord-like ↳ but reinforces lateral joint capsule w/ biceps fem. t.

↳ **oblique popliteal ligament:**

- fibrous expansion of semimembranosus tendon
- runs along posterior capsule of knee from medial tibial condyle to the upper posterior fibular aspect of capsule
- reinforces posterior capsule

↳ **arcuate popliteal ligament:**

- arches over popliteus muscle
- begins at fibular head → attaches to posterior intercondylar area of tibia & posterior aspect of lateral femoral epicondyle
- stabilizes knee posteriorly



INTRA-ARTICULAR LIGAMENTS/STRUCTURES

↳ **Anterior Cruciate Ligament (ACL):**

- runs posterolaterally from anterior horn of meniscus to intercondylar fossa side of lat. fem. condyle

↳ **Posterior Cruciate Ligament (PCL):**

- runs anteromedially from posterior to posterior horn of medial meniscus intercondylar fossa side of medial femoral condyle

↳ **Menisci:**

- fibrocartilage
- wedge-shaped to hold femur in place
- adapt bones to each other
- rotation & flexion → adapting changing curvatures to each other
- spreading synovial fluid
- outer 1/3 has good blood supply → can repair itself
- inner 1/3 doesn't have good blood supply

* Most common meniscal tear: torn horn

↳ **Medial Meniscus:**

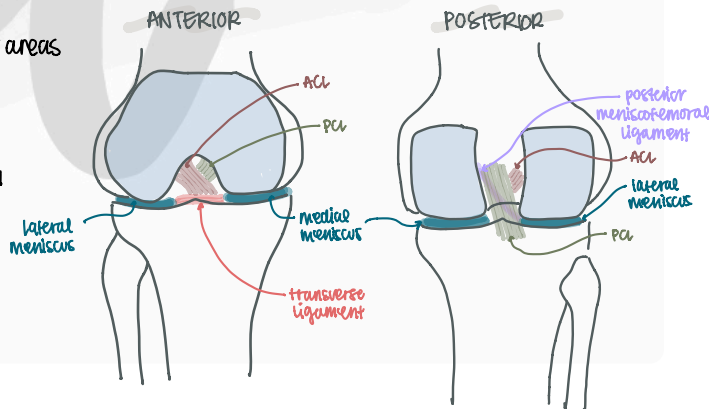
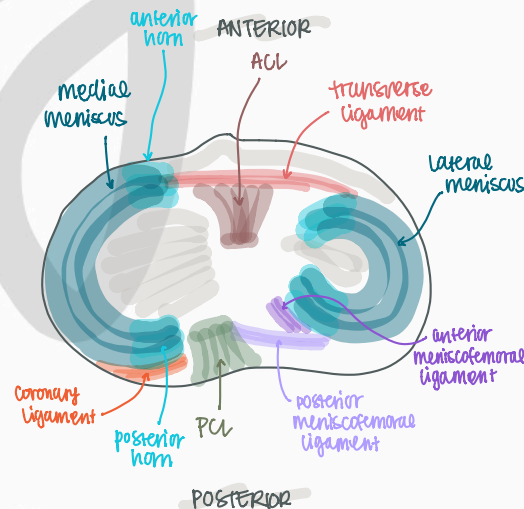
- ↳ C-shaped → & semimembranosus?
- ↳ attaches to MCL & anterior / posterior tibial intercondylar areas

↳ **Lateral Meniscus:**

- ↳ Ring shaped
- ↳ attaches to anterior / posterior tibial intercondylar areas & meniscofemoral lig. ↳ and popliteus?

↳ **Coronary Ligaments:**

- extends from the joint capsule
- attaches to the outer edge of the medial & lateral menisci to tibial condyles
- holds meniscus down to tibial plateau → stabilization



↳ **posterior meniscofemoral ligament:**

- in posterior knee
- is posterior to PCL
- from lateral meniscus to femur

connects PCL & medial femoral condyle to the lateral meniscus

↳ **anterior meniscofemoral ligament:**

- in posterior knee
- is anterior to PCL

May be absent

ATTACHMENTS OF BOTH MEDIAL & LATERAL MENISCUS

- ↳ capsule
- ↳ coronary ligaments
- ↳ horns
- ↳ transverse ligaments

- from lateral meniscus to femur

↳ transverse ligament:

- connects anterior horns of medial - lateral meniscus
- small, only in front of knee



UNHAPPY TRIAD

- MCL
- Medial meniscus
- ACL

CLINICAL POINT

↳ ACL & PCL:

- anteromedial band: tight w/ knee flex, lax w/ ext
- posterolateral band: tight w/ knee ext, lax w/ flex
- tighter w/ IR → more stability
- looser w/ ER

↳ meniscal tears:

- outer peripheral tears repair well ← bic blood supply
- inner 1/3 avascular → does NOT repair well
- seldom removed

↳ ACL tears:

- partial: debridement of fibers due to inflammation
- complete: effusion due to blood vessel rupture
 - ↳ instability: Anterior Drawer Test, Lachmans

↳ Plica syndrome:

- fold of capsule gets thickened & tight (3 o'clock position → irritated w/ flex/ext)

* gastroc supports ACL by stabilizing tibia on femur

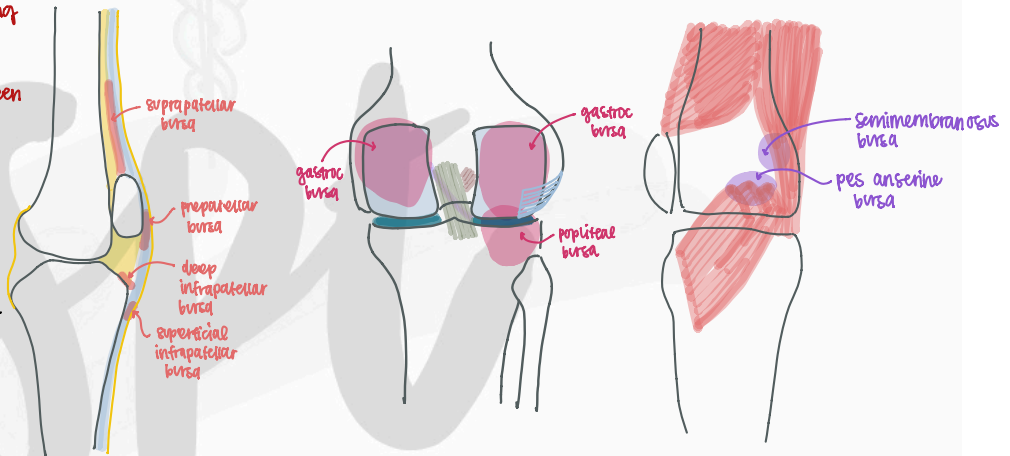
BURSAE

↳ 4 anterior: associated w/ patella & patellar ligament

- suprapatellar (quad) ← deep to quad tendon, kept in position by articularis genu
- prepatellar ← between skin covering patella & anterior surface of patella
- superficial infrapatellar ← between skin & tibial tuberosity
- deep infrapatellar ← between patellar ligament & fat pad / superior margin of tibia

↳ 4 posterior: associated w/ tendons

- gastrocnemius
- popliteus
- semimembranosus
- pes anserine

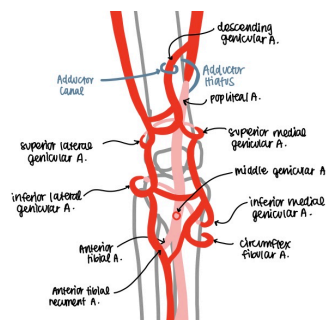


INNERVATION & VASCULATURE

BLOOD SUPPLY

↳ popliteal A

- superior medial genicular A.
- superior lateral genicular A.
- inferior medial genicular A.
- inferior lateral genicular A.



SENSORY INNERVATION

- ↳ obturator N.
- ↳ femoral N.
- ↳ common peroneal N.
- ↳ tibial N.

* all cross knee joint

COMPARTMENTS OF THIGH

ANTERIOR COMPARTMENT

↳ boundaries: inguinal ligament to anterior knee

↳ femoral triangle:

- boundaries: inguinal ligament, sartorius, adductor magnus
- contents: femoral NAV
- floor: iliopsoas

↳ adductor canal:

- AKA Hunter's canal / subcutaneous canal
- borders: sartorius & fascia from VM to add magnus & longus → VM → Add longus & magnus
- contains: Femoral A, femoral V, saphenous N.

* adductor hiatus: in adductor magnus

↳ femoral A & V → popliteal A & V

↳ cutaneous innervation:

- femoral branch of genitofemoral
- ilioinguinal
- lateral femoral cutaneous
- intermediate femoral cutaneous
- medial femoral cutaneous
- obturator

↳ muscles:

- iliopsoas: iliacus & psoas major

Superficial • sartorius - flex, ABD, ER femur at hip - femoral N.

• pectineus - flex, ADD femur at hip, assist in IR - femoral N.

• quadriceps femoris - femoral N. L2,3,4

Superficial ↳ rectus femoris - ext knee, flex hip ← only quad that crosses the hip

Superficial ↳ vastus lateralis - ext knee, pulls patella laterally

Superficial ↳ vastus medialis - ext knee, pulls patella med

↳ vastus intermedius - ext knee

↳ articularis genu: attaches to capsule to prevent pinching

↳ nerves:

• femoral N. - L2-4 ← passes through psoas major & goes in between

↳ motor to anterior thigh gracilis & sartorius

↳ sensation to skin of ant. thigh & medial thigh

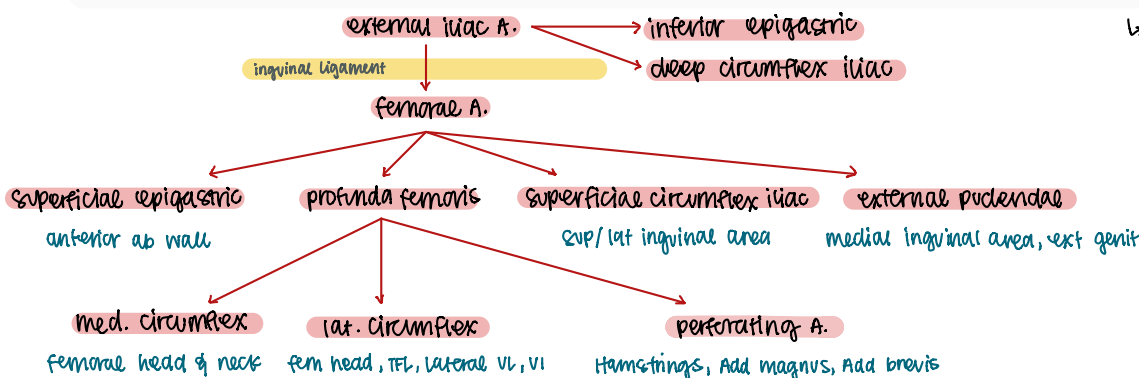
• intermediate & medial femoral cutaneous N.

• saphenous N. ← rms in adductor canal

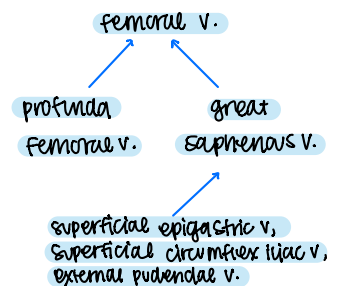
↳ terminal branch innervates skin of medial lower leg & medial heel

• Infrapatellar branch to skin of ant & med knee

↳ arteries:



↳ veins:



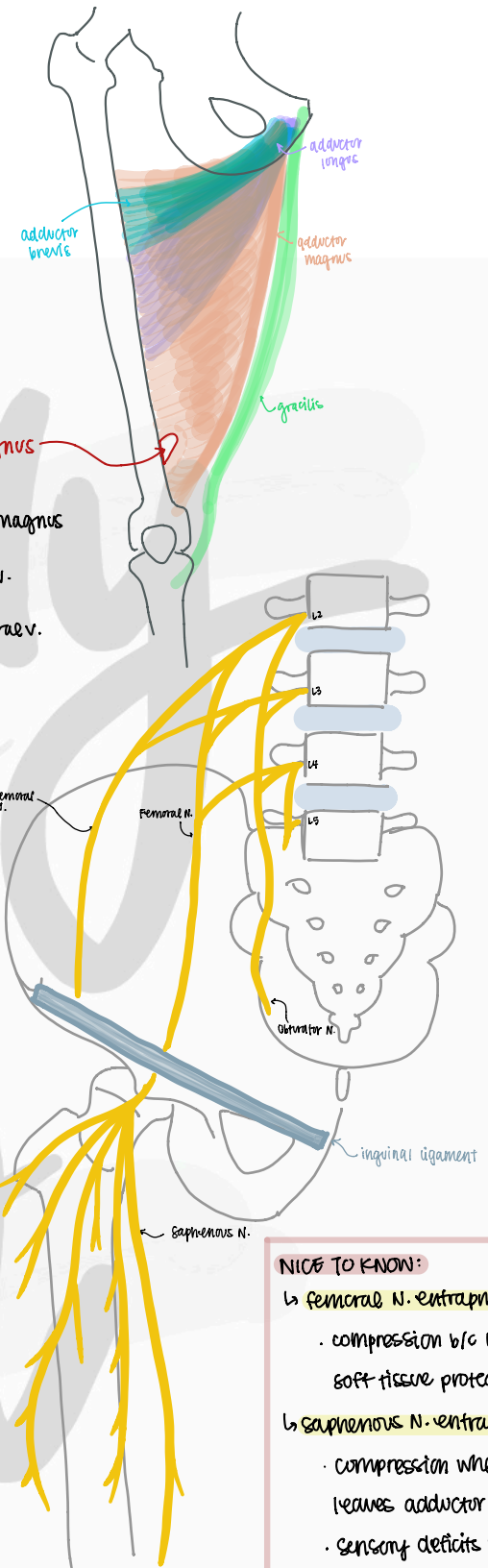
NICE TO KNOW:

↳ femoral N. entrapment:

- compression b/c no soft tissue protecting

↳ saphenous N. entrapment:

- compression where it leaves adductor canal
- sensory deficits & pain
- usually adults > 40



MEDIAL COMPARTMENT

- ↳ Obturator N
 - ↳ Obturator A
 - ↳ Obturator V
- pass through obturator canal

↳ adductors:

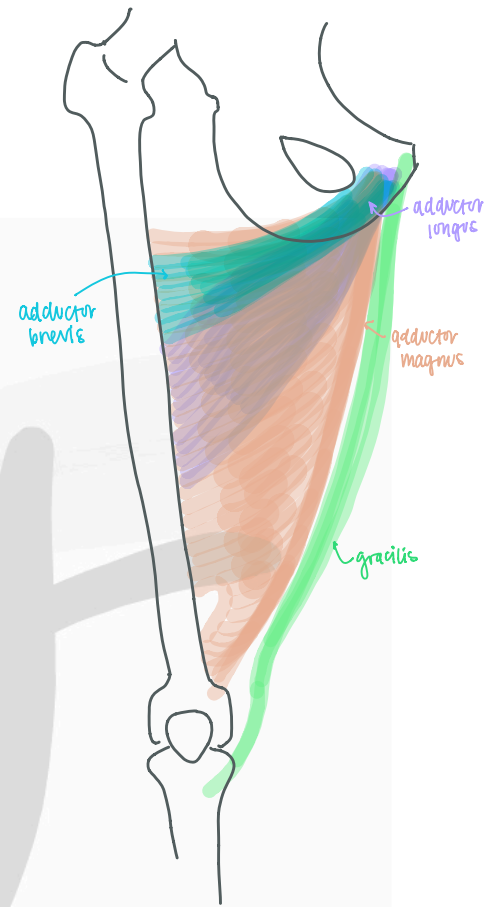
- Gracilis — adducts hip, assist flex knee, IR tibia — obturator N.
- adductor longus — adducts hip, assist flex, IR femur at hip — obturator N.
- adductor brevis — adducts hip, assist flex, IR femur at hip — obturator N.
- adductor magnus — adducts hip, assist ext, IR femur at hip — obturator N.
- pectineus — flexes hip, adducts hip — femoral N.

↳ nerves:

- obturator N. → adductors, gracilis, iliopsoas
- femoral N. → pectineus
- tibial N. → adductor magnus (L4)

↳ blood supply:

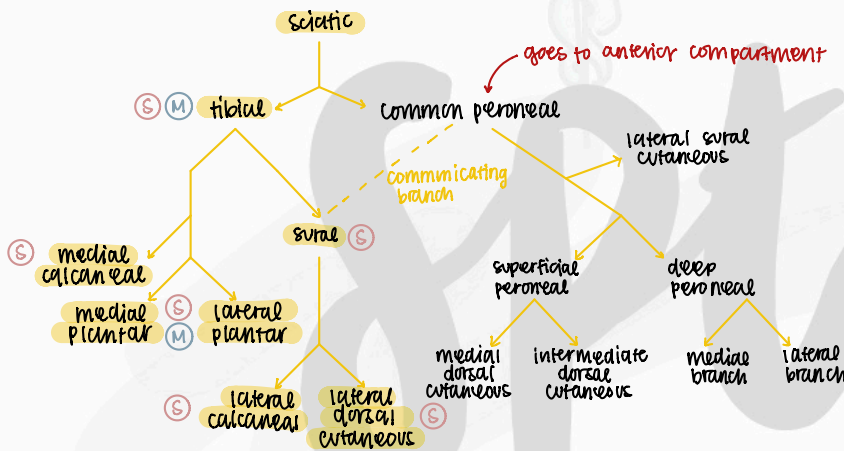
- obturator A.
- medial femoral circumflex A.
- profunda femoris A.



POSTERIOR COMPARTMENT

↳ nerves:

- tibial N.
 - common peroneal N.
- divisions of sciatic N.



↳ clinical point:

↳ damage to common peroneal N.:

- weakness in:
 - ↳ tib ant., ext. dig. longus, ext. hallucis longus, peroneus tertius

deep peroneal N. → ankle dorsiflexion (drop foot) & inversion

↳ toe extension

superficial peroneal N. → foot eversion & plantar flexion

↳ damage to deep peroneal N.:

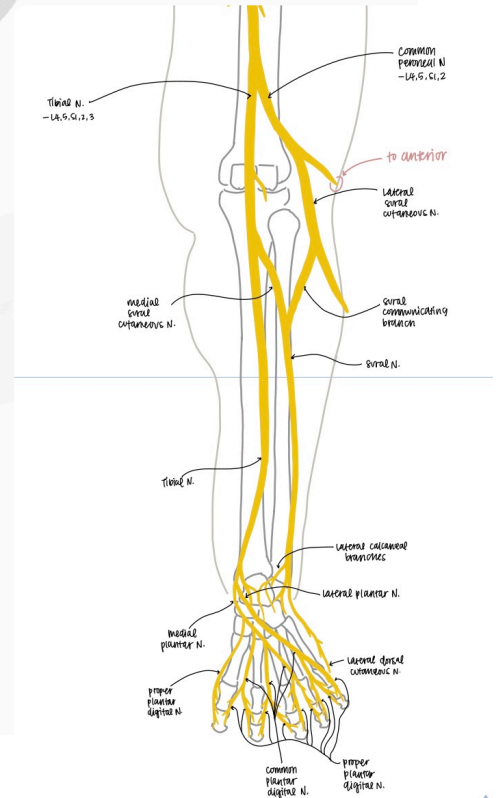
- weakness in:
 - ↳ ankle DF (drop foot) & inversion
 - ↳ toe extension

↳ damage to superficial peroneal N.:

- weakness in:

* deep peroneal } Anterior compartment
↳ DF & I

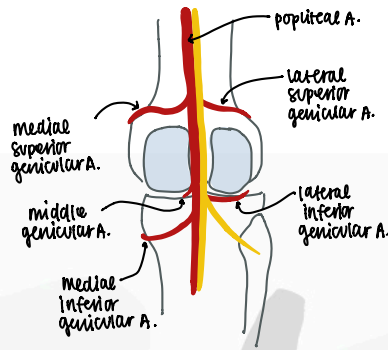
* superficial peroneal } Lateral compartment
↳ PF & E



↳ foot eversion & PF/eversion

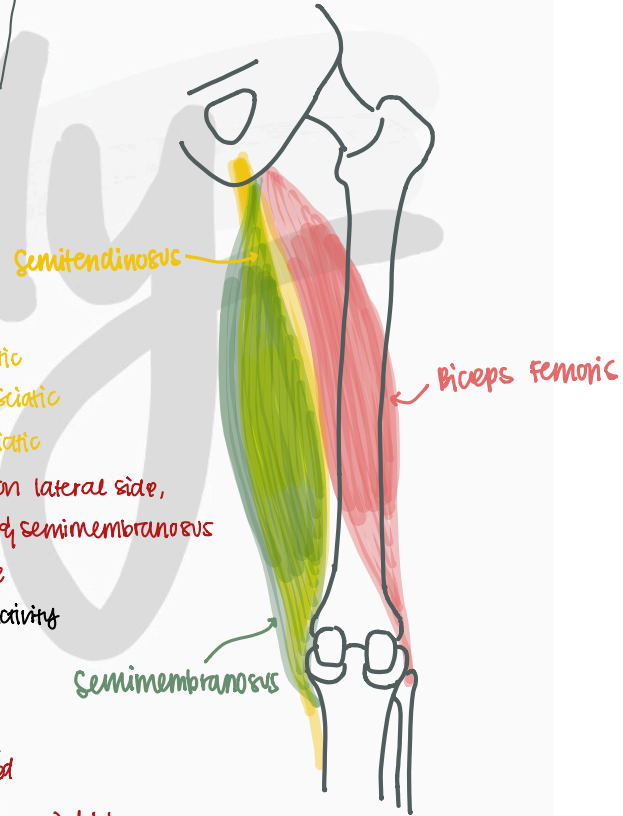
↳ **blood supply:**

- profunda femoral A & V
- inferior genitcal NAVI
- popliteal NAVI
 - ↳ lateral superior genicular A.
 - ↳ medial superior genicular A.
 - ↳ lateral inferior genicular A.
 - ↳ medial inferior genicular A.
 - ↳ middle genicular A.



↳ **MUSCLES:**

- ischial part of adductor magnus — obturator N. & Sciatic N.
- hamstrings:
 - ↳ biceps femoris
 - short head — flex knee, ER tibia — common peroneal N.
 - long head — flex knee, ext hip, ER tibia — tibial division of Sciatic
 - ↳ semimembranosus — flex knee, ext hip, IR tibia — tibial division of Sciatic
 - ↳ semitendinosus — flex knee, ext hip, IR tibia — tibial division of Sciatic

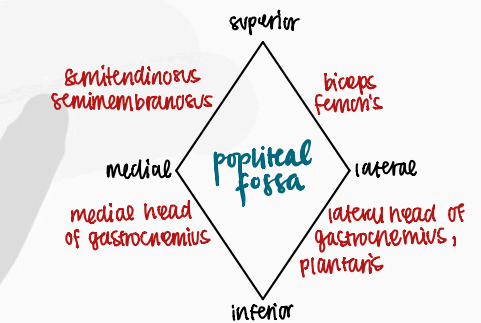
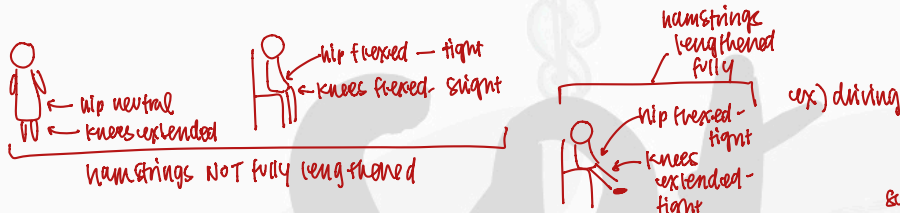


• **clinical point:**

↳ **hamstring tightness:**

- decreases lumbar lordosis
- can lead to strains of muscle group, usually during eccentric activity
- posterior rotation of pelvis ← possible but not guaranteed
 - ↳ because hip ext = 10° & we are at neutral when standing

* biceps femoris on lateral side, semitendinosus & semimembranosus on medial side

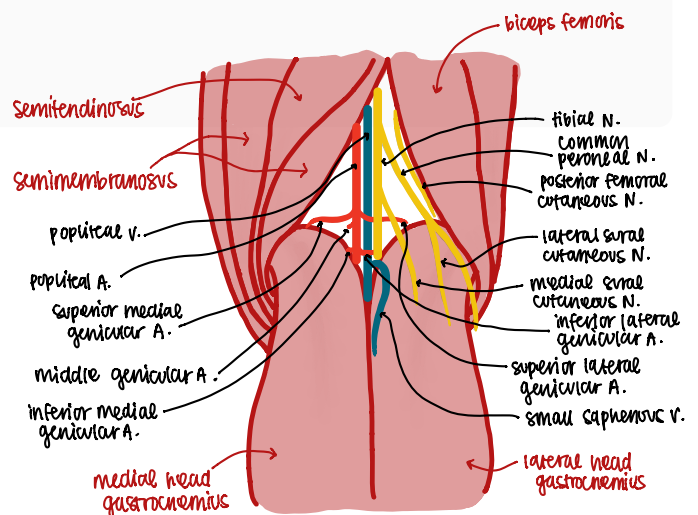


↳ **popliteal fossa:**

• **boundaries:** biceps femoris, semimembranosus, semitendinosus, gastrocnemius, plantaris

• **contents:**

- ↳ posterior femoral cutaneous nerve
- ↳ small saphenous vein
- ↳ tibial nerve:
 - medial sural cutaneous nerve
 - muscular branches
 - superior med, inferior med, & middle genicular N.
- ↳ common peroneal nerve:
 - lateral sural cutaneous nerve
 - superior lat, inferior lat, & recurrent genicular N.
- ↳ popliteal v. ← superficial to popliteal A.
- ↳ popliteal A.:
 - anterior & posterior A.
 - superior medial & lateral, inferior medial & lateral, middle genicular A.

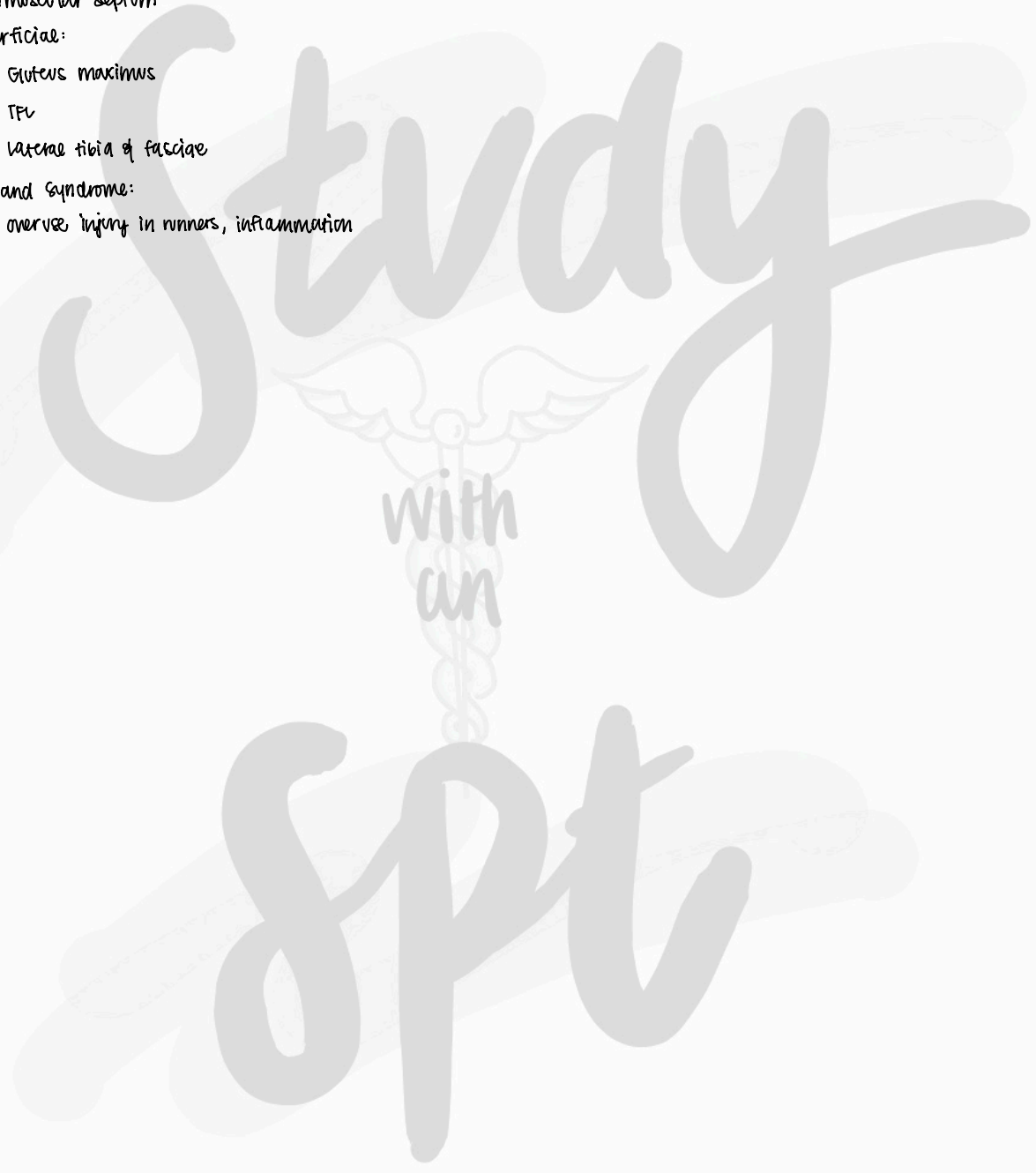


↳ muscles:

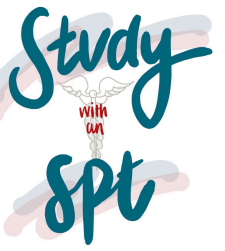
- popliteus — IR tibia, ER femur, flex knee — tibial N.
- semitendinosus
- semimembranosus
- biceps femoris
- gastrocnemius

↳ Iliotibial Band:

- Intermuscular septum
- Superficial:
 - ↳ Gluteus maximus
 - ↳ TFL
 - ↳ lateral tibia of fasciae
- IT Band Syndrome:
 - ↳ overuse injury in runners, inflammation

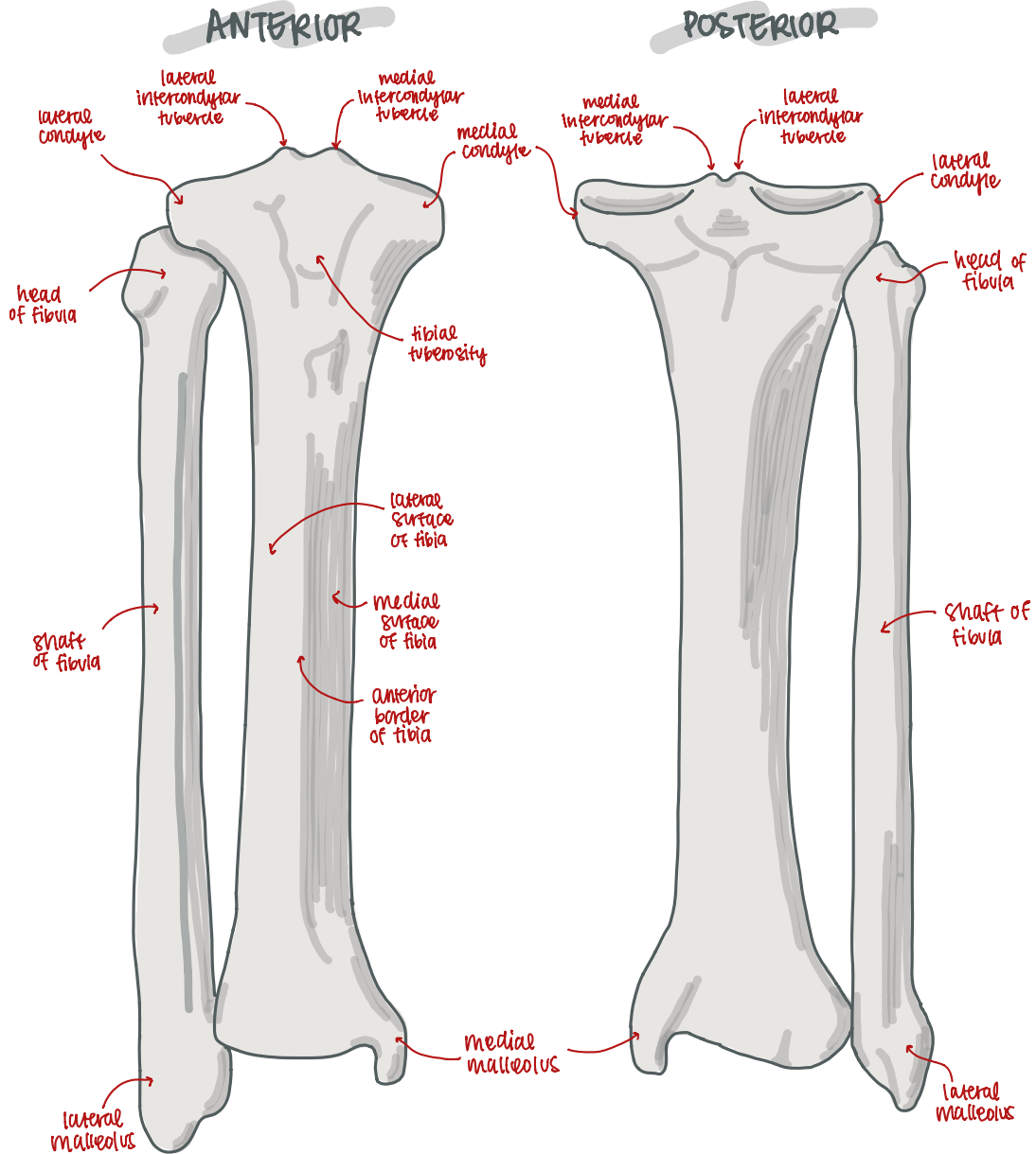


LEG, ANKLE, FOOT

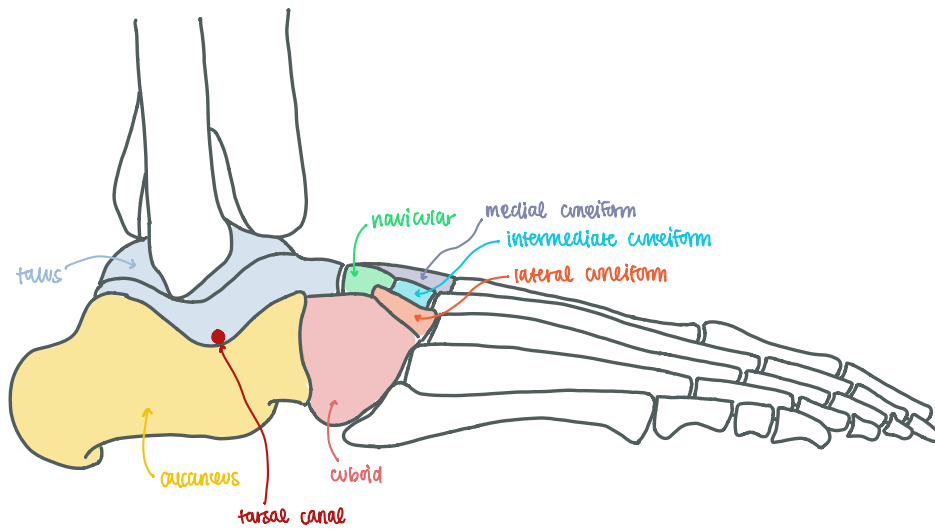


OSTEOLOGY

LOWER LEG



FOOT



Tarsals:

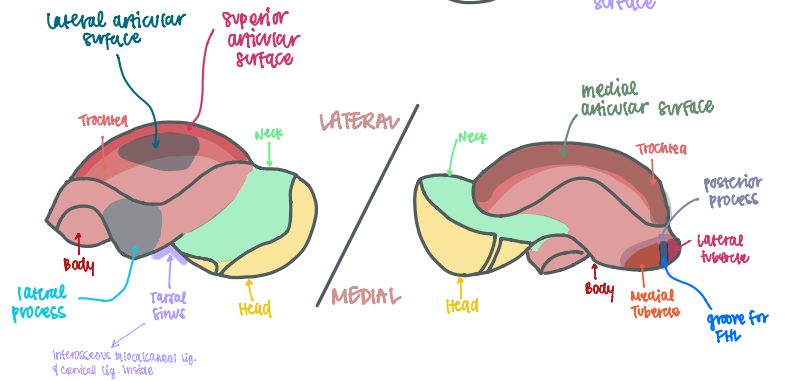
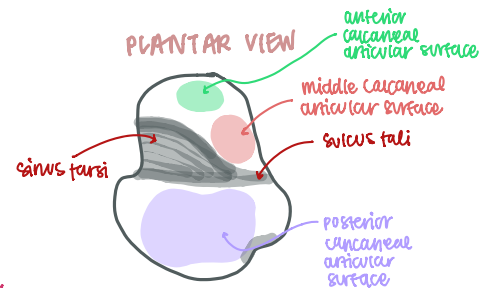
Talus:

↳ has neck & head ← convex over concave

↳ articulates w/ fibula

↳ landmarks to know:

- body
 - ↳ lateral process
 - ↳ posterior process
 - ↳ medial tubercle
 - ↳ lateral tubercle
 - ↳ groove for PHL: inbetween medial & lateral tubercle
- trochlea tali
 - ↳ medial articular surface
 - ↳ lateral articular surface
 - ↳ superior articular surface
- head
- neck
- posterior calcaneal articular surface
- middle calcaneal articular surface
- anterior calcaneal articular surface
- sulcus tali
- sinus tarsi: on top of calcaneus

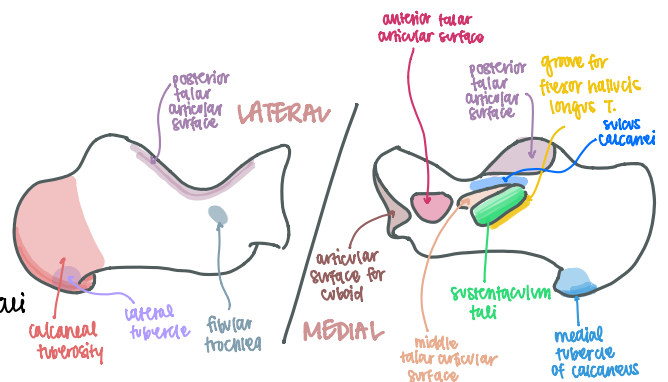


Calcaneus:

↳ articulates with cuboid

↳ landmarks to know:

- posterior talar articular surface: articulates w/ talus
- middle talar articular surface: next to sustentaculum tali
- anterior talar articular surface
- sulcus calcanei
- sustentaculum tali
- groove for PHL: under sustentaculum tali
- fibular trochlea: small bump, pulley system for peroneus longus & brevis
- articular surface for cuboid
- calcaneal tuberosity
 - ↳ medial tubercle process



Tarsal canal: sulcus tali + sulcus calcanei

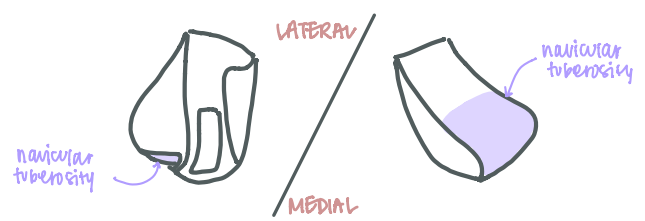
↳ lateral tubercle process

• **navicular:**

↳ has 5 articulations

↳ landmarks to know:

- proximal articular surface
- distal articular surface: convex, articulates w/ 3 cuneiforms
- navicular tuberosity: where posterior tibialis attaches

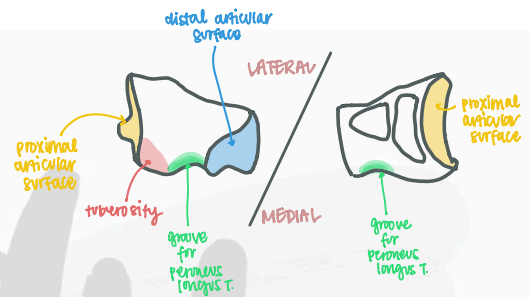


• **cuboid:**

↳ has 5 articulations

↳ landmarks to know:

- proximal articular surface: saddle shape
- distal articular surface:
- cuboid tuberosity: lateral side
- groove for peroneus longus: distal to tuberosity



• **medial cuneiform**

• **intermediate cuneiform**

• **lateral cuneiform**

↳ **Metatarsals:**

• landmarks to know:

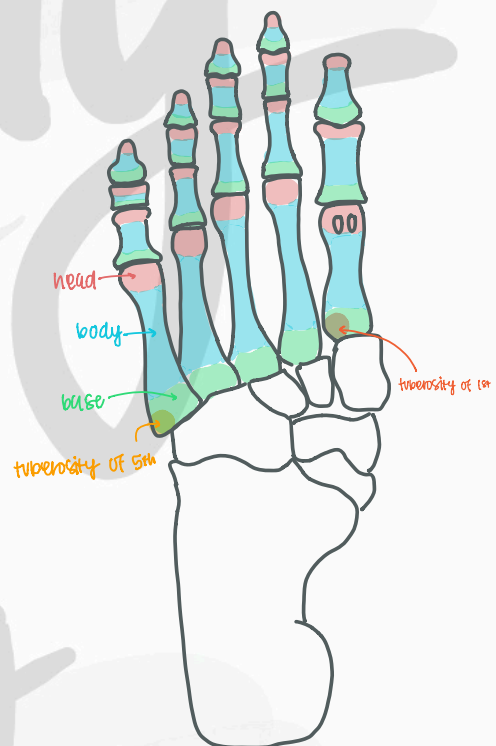
↳ base

↳ body

↳ head

↳ tuberosity of 5th: peroneus brevis attaches here

↳ tuberosity of 1st: peroneus longus attaches here



↳ **Phalanges:**

• **Proximal phalanx:**

↳ landmarks to know:

- base: concave
- body
- head: biconvex

• **middle phalanx:**

↳ landmarks to know:

- base: biconcave
- body: biconvex
- head

ARCHES

↳ **medial longitudinal arch:**

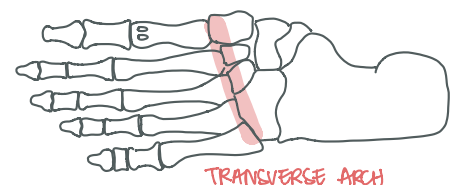
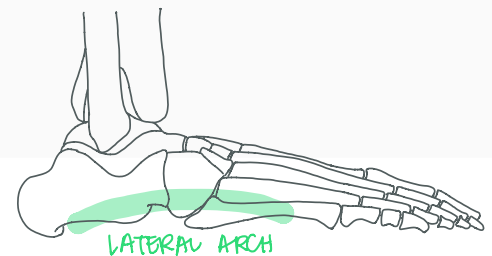
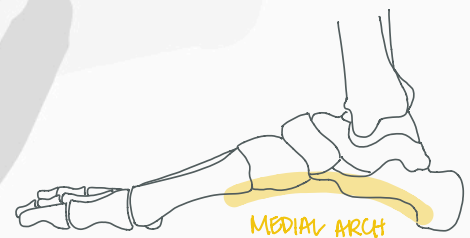
- calcaneus through navicular, cuneiform bones, & medial 3 metatarsals
- post fib supports arch

↳ **lateral longitudinal arch:**

- calcaneus through cuboid & 4th & 5th metatarsals

↳ **transverse arch:**

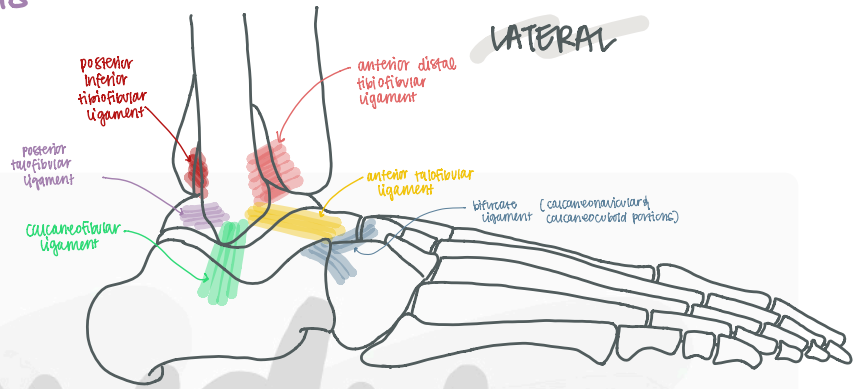
- crosses the cuboid, 3 cuneiform bones & bases of 5 metatarsals



JOINTS, LIGAMENTS, & BURSAE

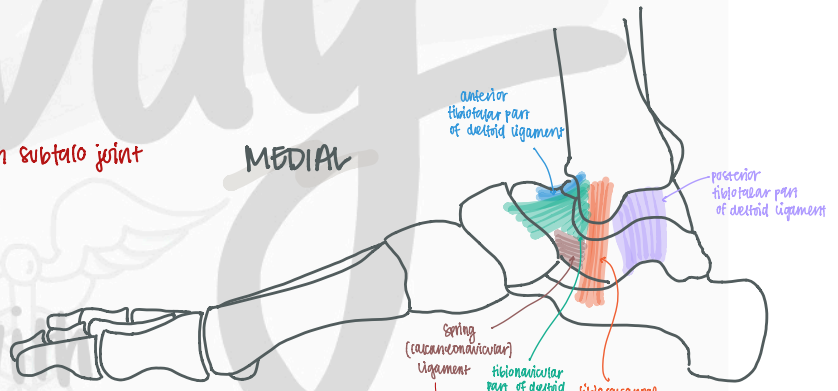
TIBIOFIBULAR JOINTS & LIGAMENTS

- ↳ proximal tibiofibular joint: proximal end
- ↳ middle tibiofibular joint: interosseous membrane
- ↳ distal tibiofibular joint:
 - syndesmosis: fibrous union, no cavity
 - ligaments:
 - ↳ anterior tibiofibular ligament
 - ↳ posterior tibiofibular ligament
 - ↳ interosseous tibiofibular ligament
 - goes through tarsal sinus



TALOCRURAL JOINT

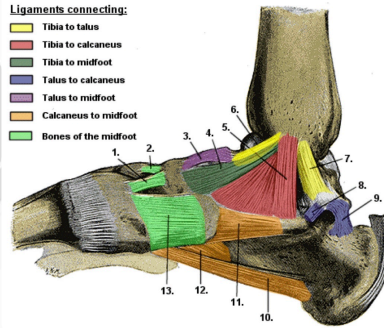
- ↳ tibia & fibula with body & trochlea of talus
- ↳ DF & PF movements, slight rotation
- pronation:
 - ↳ DF w/ slight ER (ABD) & eversion
- supination:
 - ↳ PF w/ slight IR (ADD) & inversion



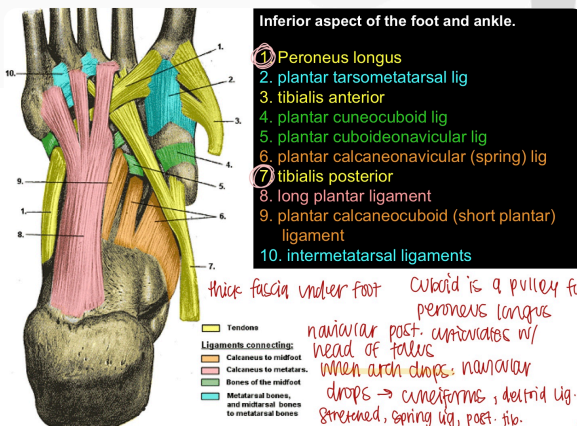
- ↳ stability:
 - medial (tibio-talar) - **Deltoid ligament**
 - ↳ anterior: fibionavicular
 - ↳ anterior: tibiotalar
 - ↳ middle: tibiocalcaneal
 - ↳ posterior: fibiotalar
 - lateral (talofibular) - **Lateral collateral ligament**
 - ↳ anterior talofibular ligament ← most commonly torn
 - ↳ posterior talofibular ligament [high ankle sprain]
 - ↳ calcaneofibular ligament
- ↳ malleoli
- ↳ tendon: trochlea tali
- ↳ sprains:
 - lateral (inversion): most common - LC's
 - ↳ calcaneofibular, APL
 - medial (eversion): deltoid ligament

Foot and ankle ligaments: Medial aspect of foot and ankle.

- Ligaments connecting:
- Tibia to talus
 - Tibia to calcaneus
 - Tibia to midfoot
 - Talus to calcaneus
 - Talus to midfoot
 - Calcaneus to midfoot
 - Bones of the midfoot



- 1st dorsal cuneonavicular ligament
- 2nd dorsal cuneonavicular ligament
- talonavicular ligament
- tibionavicular ligament
- tibiocalcaneal ligament
- anterior tibiotalar ligament
- posterior tibiotalar ligament
- medial talocalcaneal Lig
- posterior talocalcaneal Lig
- long plantar lig
- plantar calcaneonavicular (spring) ligament
- calcaneocuboid ligament (short plantar)
- cuneonavicular lig

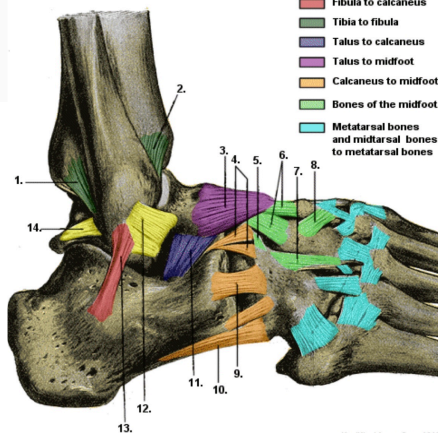


Inferior aspect of the foot and ankle.

1. Peroneus longus
2. plantar tarsometatarsal lig
3. tibialis anterior
4. plantar cuneocuboid lig
5. plantar cuboideonavicular lig
6. plantar calcaneonavicular (spring) lig
7. tibialis posterior
8. long plantar ligament
9. plantar calcaneocuboid (short plantar) ligament
10. intermetatarsal ligaments

thick fascia under foot
Cuboid is a pulley for peroneus longus
navicular post. articulates w/ head of talus
when arch drops: navicular drops → cuneiforms, deltoid lig. stretched, spring lig, post. fib.

- Ligaments connecting:



Foot and Ankle Ligaments: Lateral aspect of foot and ankle.

1. Posterior tibiofibular lig
2. anterior tibiofibular lig
3. dorsal talonavicular lig
4. bifurcate ligament
5. dorsal cuboideonavic I
6. dorsal cuneonav lig
7. dorsal calcaneocuboid
8. dorsal intercuneiform lig
9. dorsal calcaneocuboid lig
10. long plantar
11. interosseous talocalcaneal
12. anterior talofibular
13. calcaneofibular
14. posterior talofibular

Skin splits: pain in leg, 3 different possible locations

SUBTALAR JOINT

↳ inferior talus w/ superior calcaneus

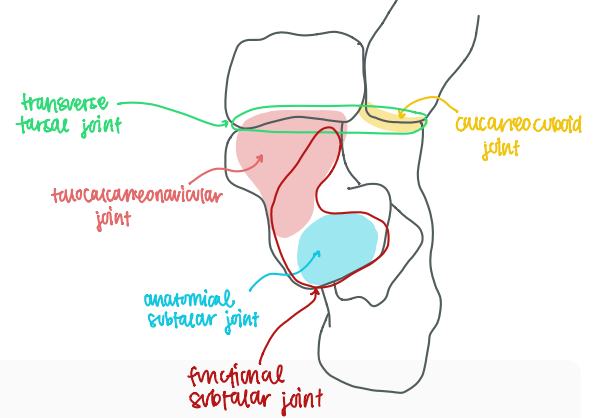
↳ motion: inversion & eversion of foot

↳ **stability:**

- interosseous talocalcaneal : in sulcus tali
- cenicul ligament: in sulcus tali
- anterior/medial & posterior talocalcaneal ligaments
- deltoid & lateral ankle ligaments

↳ functional subtalar joint:

- anatomical subtalar joint + talocalcaneal part of TCN



TALOCALCANEONAVICULAR JOINT

↳ anterior subtalar joint: talus w/ calcaneus

↳ talonavicular joint: head of talus w/ navicular

• ball of socket

↳ ball: head of talus

↳ socket: concave posterior navicular, superior sustentaculum tali, spring ligament, anteromedial calcaneus

↳ **stability:**

- spring (plantar calcaneonavicular) ligament
- tibialis posterior tendon
- deltoid ligament
- calcaneonavicular ligament of bifurcate ligament laterally
- dorsal talonavicular ligament superiorly

↳ 3 separate joint capsules but works as a unit functionally

↳ **bones:**

- talus w/ calcaneus: middle & anterior articular surfaces
- talus w/ navicular: articular surface of head of talus for navicular & proximal articular surface of navicular

↳ **ligaments:**

- dorsal talonavicular
- spring
- bifurcate: calcaneonavicular & calcaneocuboid parts
- interosseous talocalcaneal
- fiblonavicular part of deltoid

CALCANEOCUBOID JOINT

↳ anterior calcaneus w/ posterior cuboid

↳ part of transverse tarsal joint

↳ highest part of lateral longitudinal arch

↳ **stability:**

- long plantar lig.
- calcaneocuboid lig. of bifurcate
- plantar calcaneocuboid lig (short plantar)
- dorsal calcaneocuboid
- peroneus longus tendon

TRANSVERSE TARSAL JOINT

↳ talonavicular joint & calcaneocuboid joint

↳ movement: Inversion & eversion

↳ stability: ligaments & tendons that reinforce the respective joints

↳ function:

- adapting anterior & posterior foot
- aids eversion & inversion

* Bursa: tendo calcaneae bursa

RETINACULUM

- ↳ superior extensor retinaculum
- ↳ inferior extensor retinaculum
- ↳ flexor retinaculum
- ↳ superior peroneal retinaculum
- ↳ inferior peroneal retinaculum

Cutaneous innervation

with an

