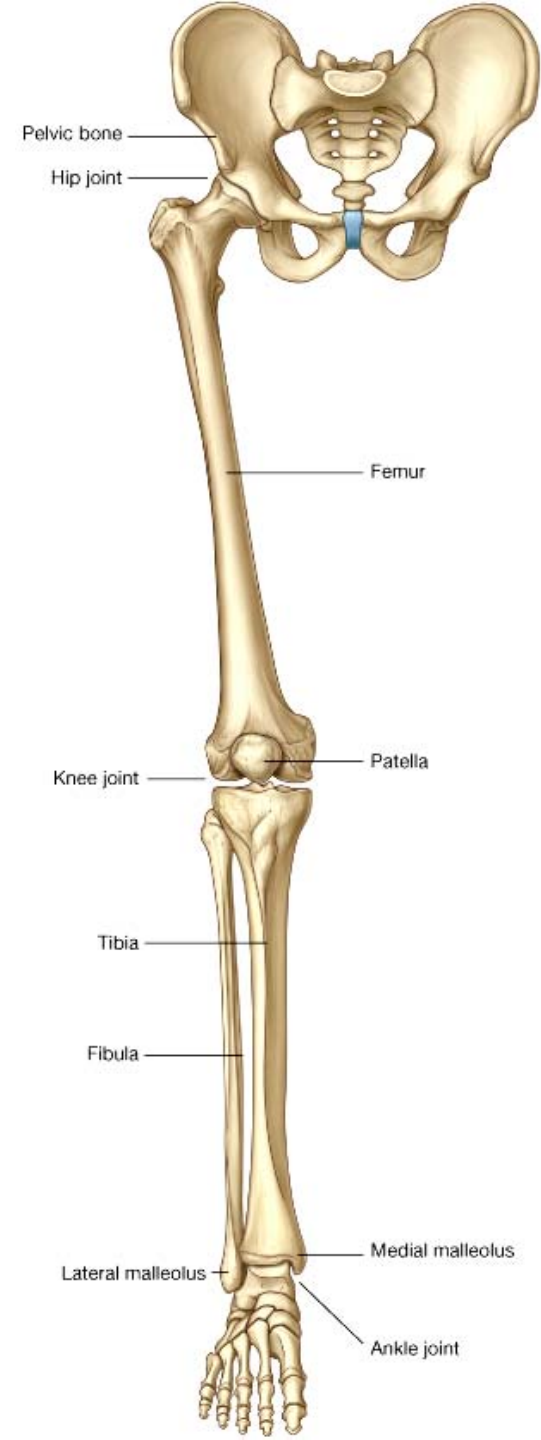


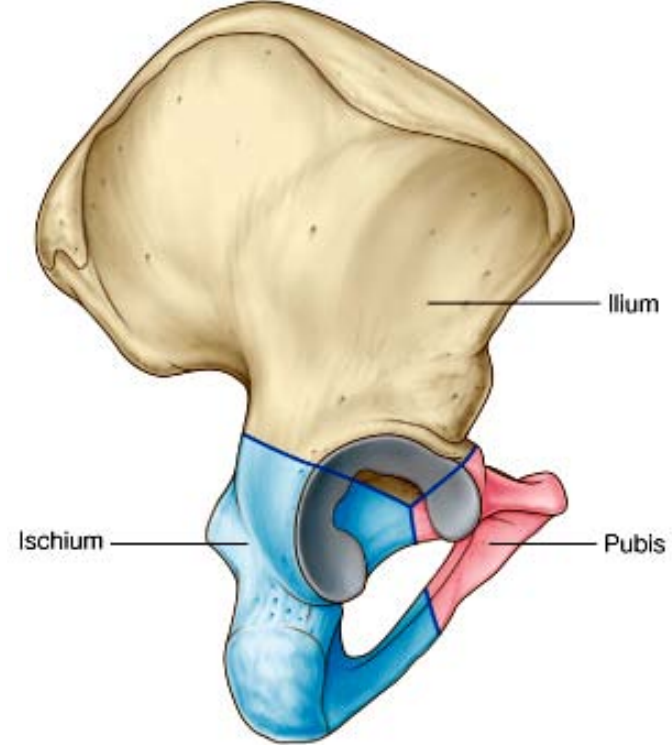
Bones of lower limbs

- Including bones of pelvic girdle (hip bones) and lower limb
- compared with upper limb
 - no equivalent movements to pronation and supination in upper limb;
 - more stable in lower limb, for weight-bearing

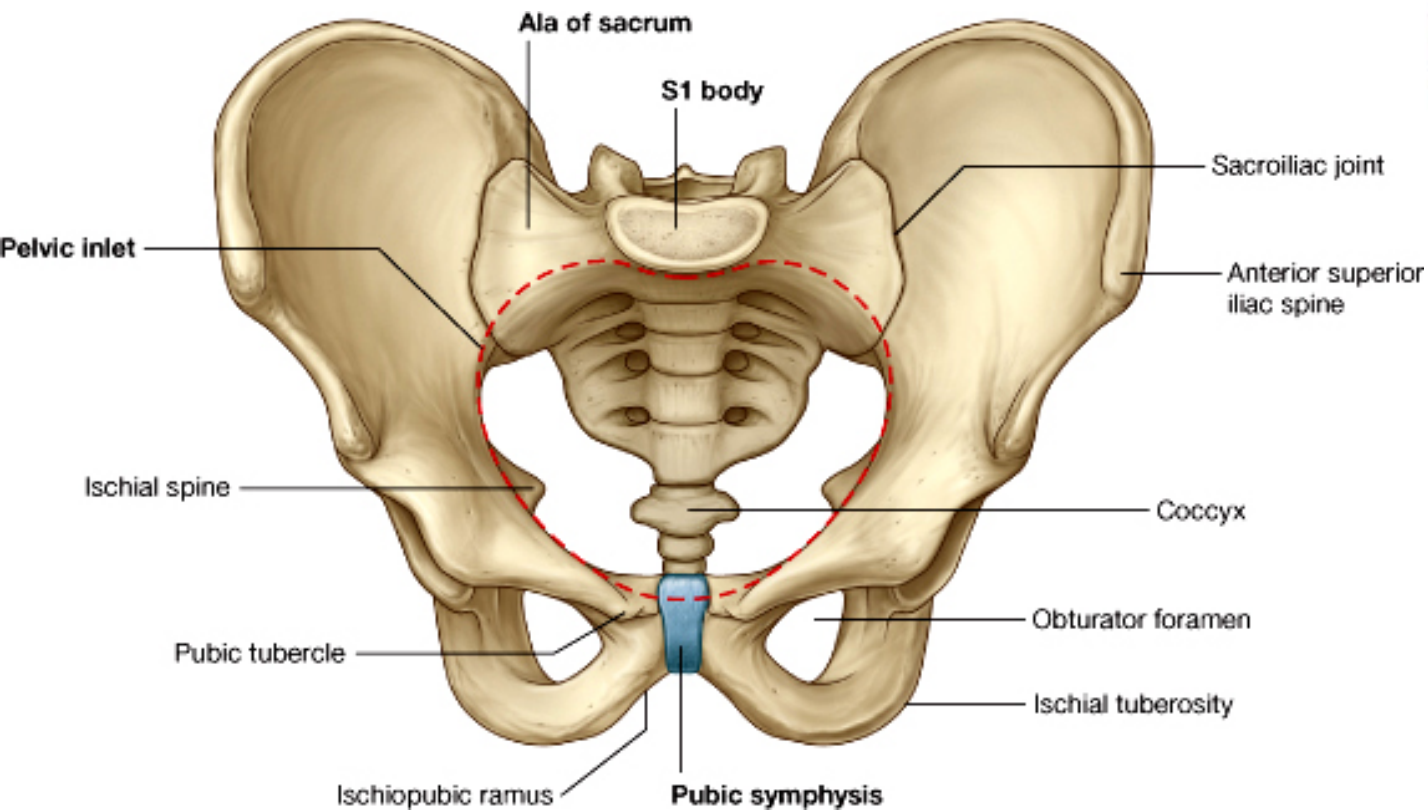


Bony pelvis

- Ilium
- ischium
- pubis

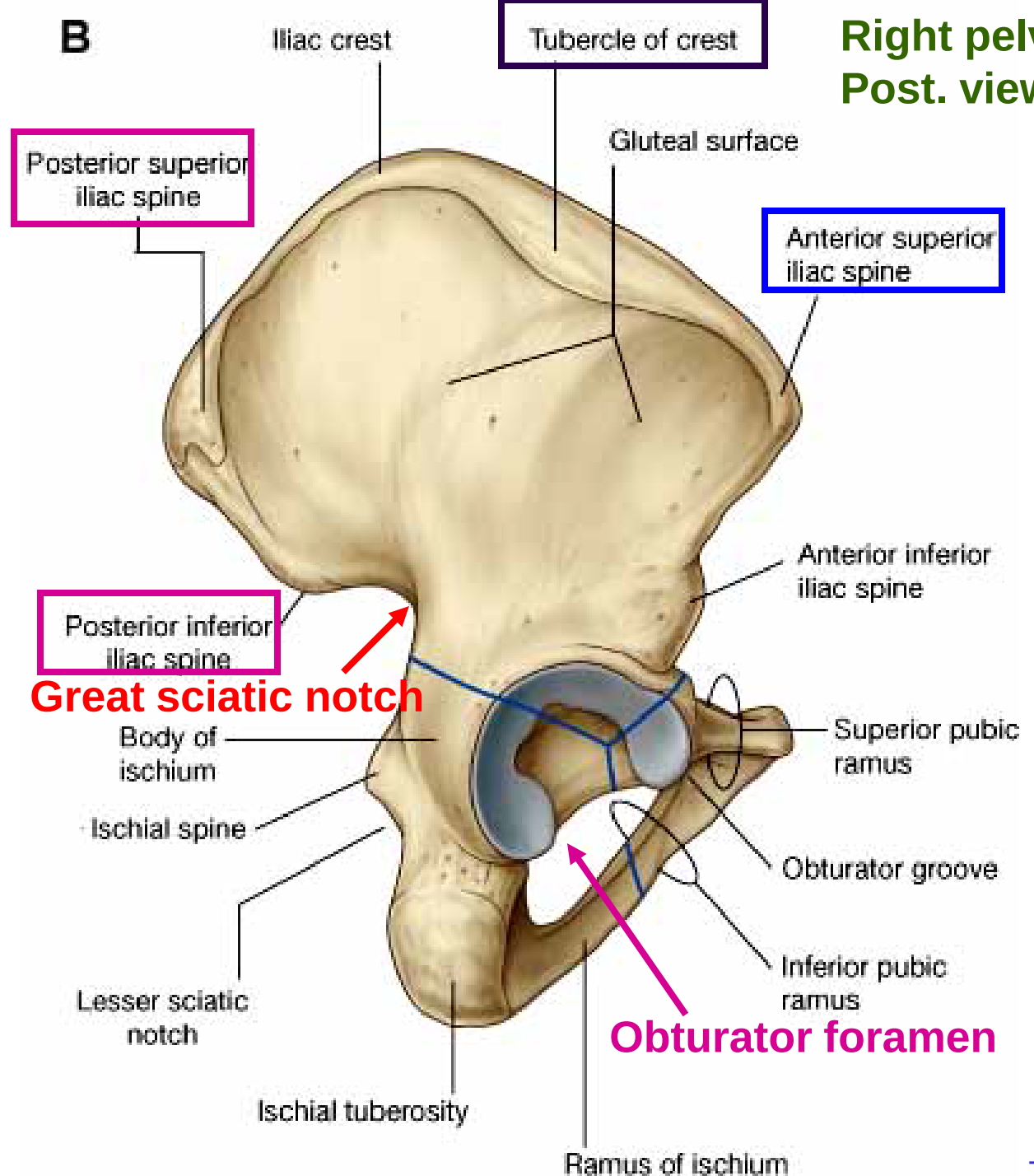


**Right pelvis
Post. view**



Ilium (lateral surface)

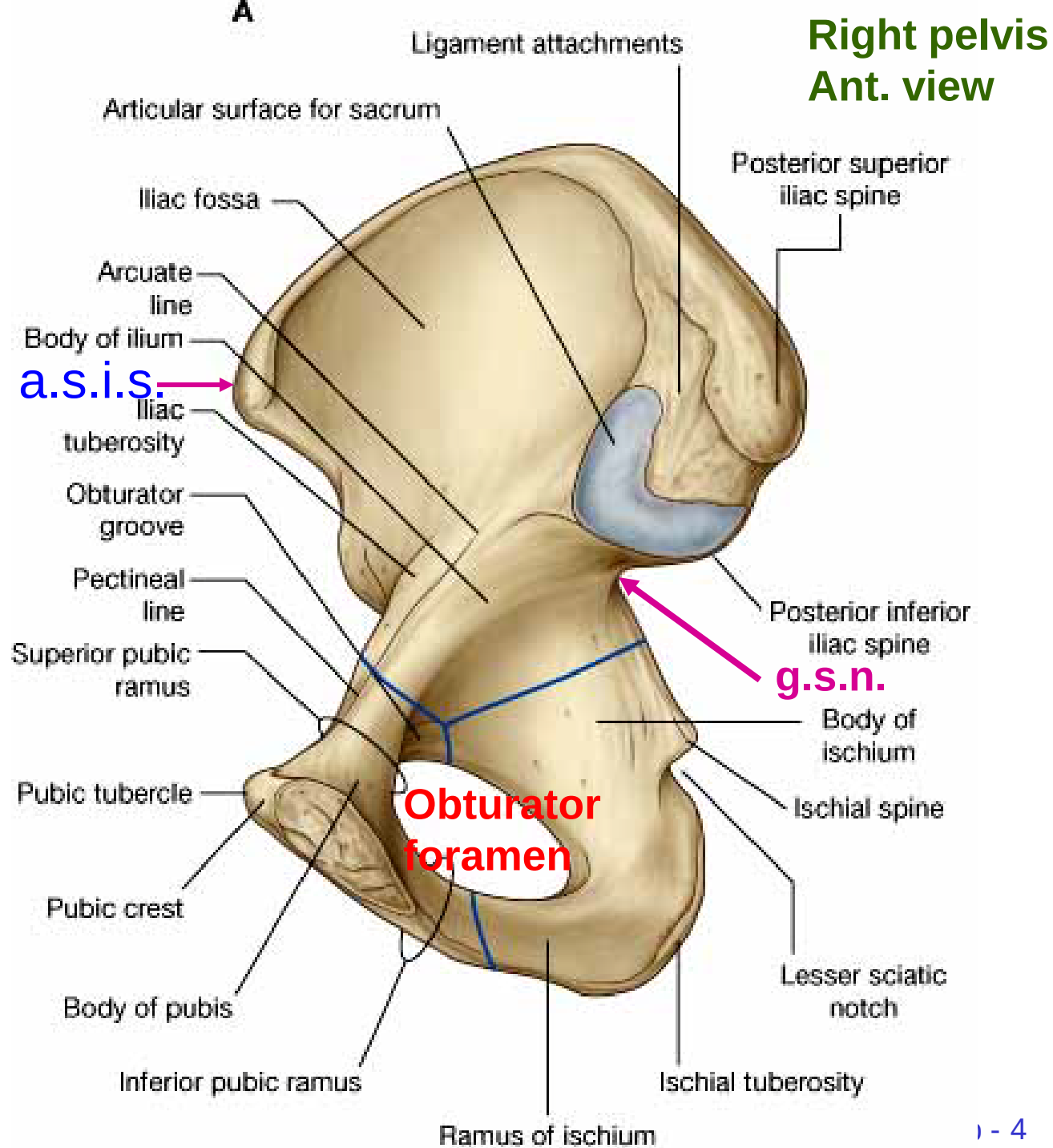
Right pelvis
Post. view



- ant. sup. iliac spine: a.s.i.s.
- post. sup. iliac spine: p.s.i.s.
- Iliac crest: a.s.i.s. – p.s.i.s.
- tubercle of crest
- ant. inf. iliac spine: a.i.i.s.
- post. inf. iliac spine: p.i.i.s.
- greater sciatic notch
- gluteal surface

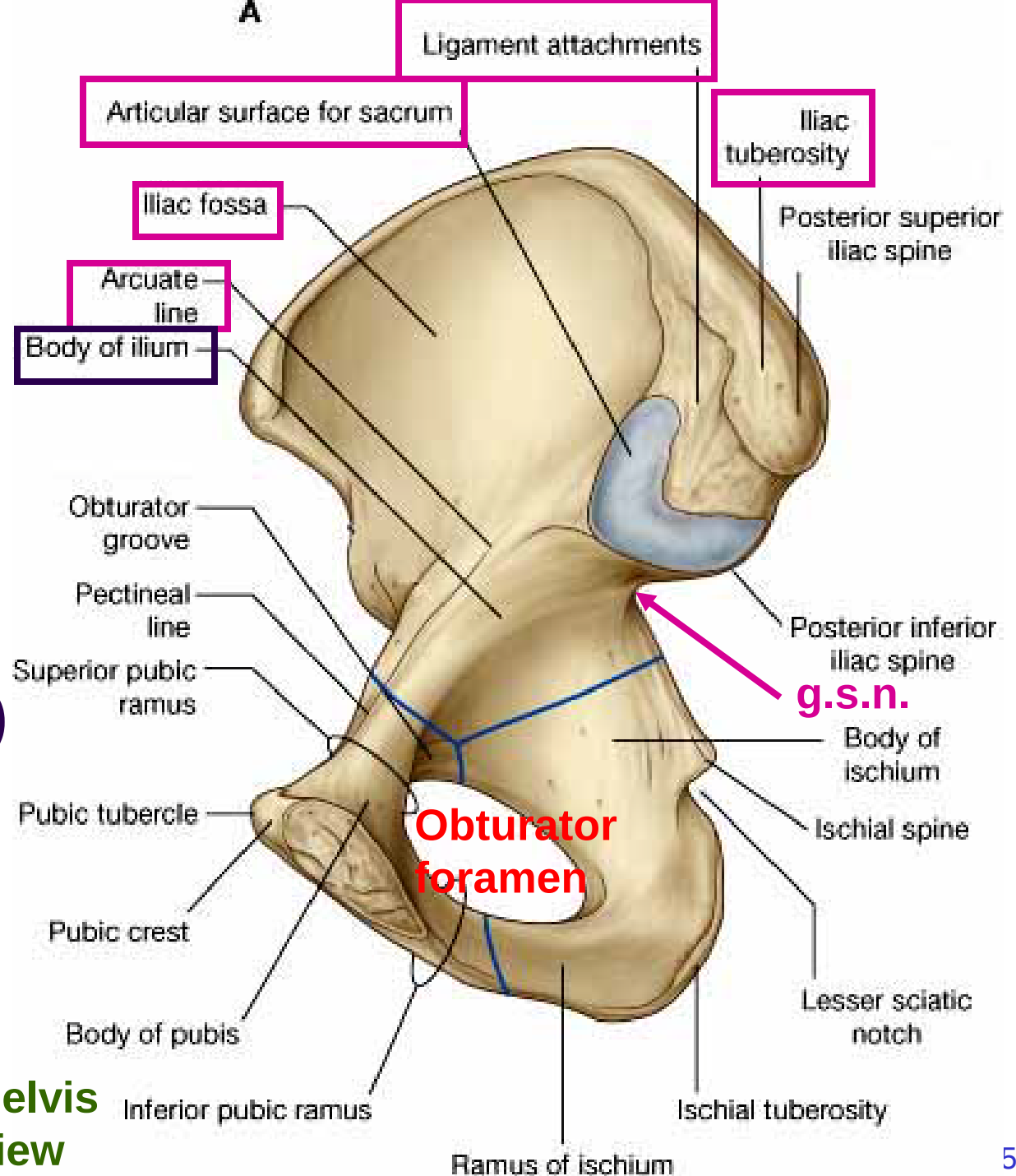
Ilium (medial surface)-1

- obturator foramen
- iliac fossa
- a.s.i.s.; p.s.i.s.
- iliac crest: a.s.i.s. – p.s.i.s.
- greater sciatic notch (g.s.n.)

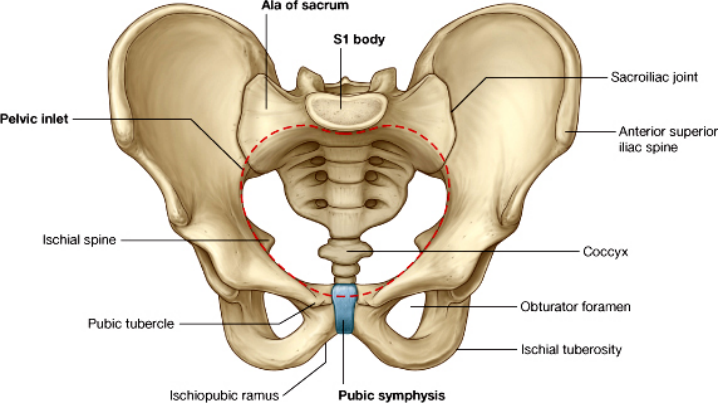


Ilium (medial surface)-2

- ala (iliac fossa)
- Body of ilium
- ridge between upper and lower part of iliac
 - arcuate line
- articular surface for sacrum (auricular face)
- attachment for ligaments (sacroiliac joint)
- iliac tuberosity

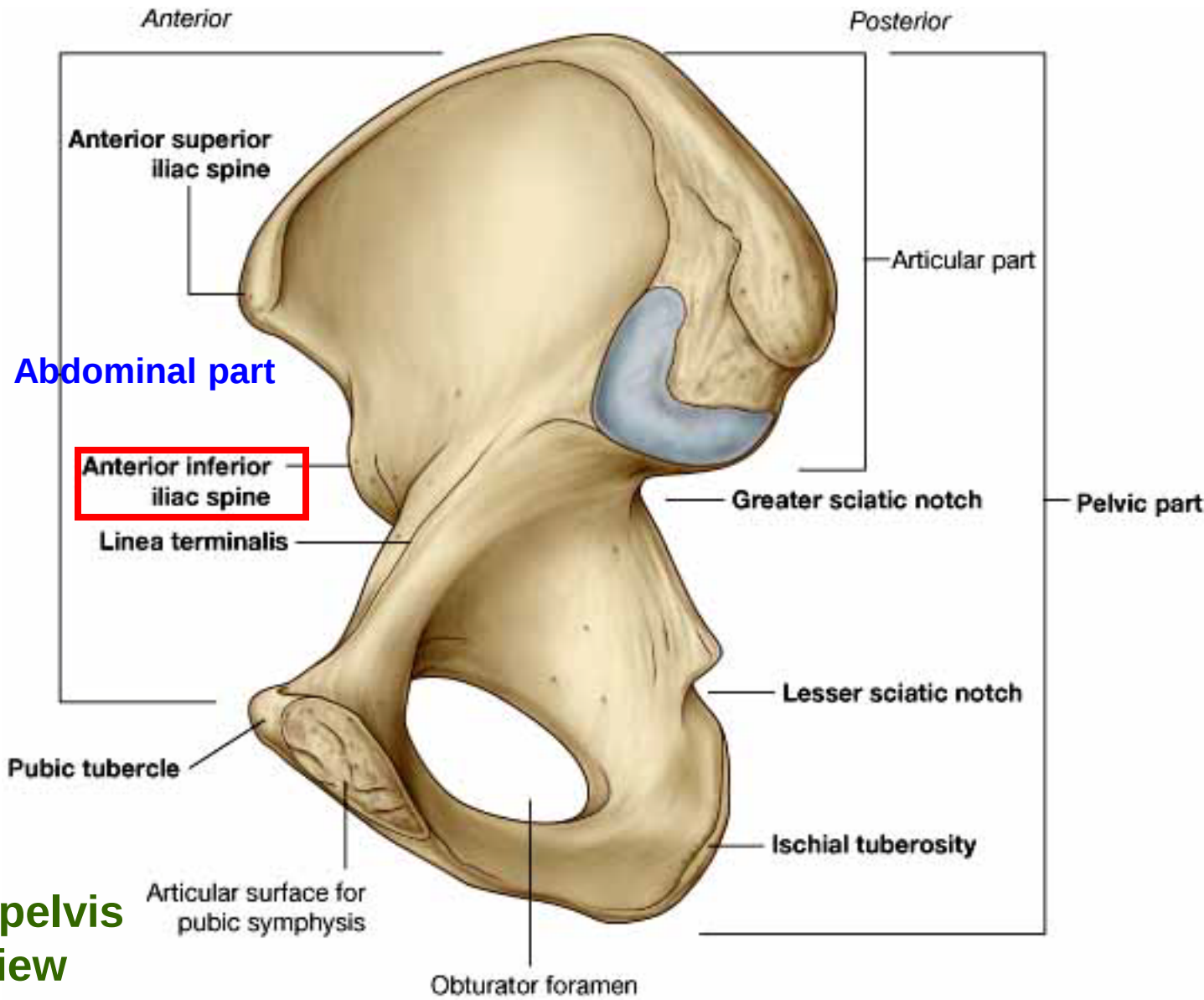


Right pelvis
Post. view

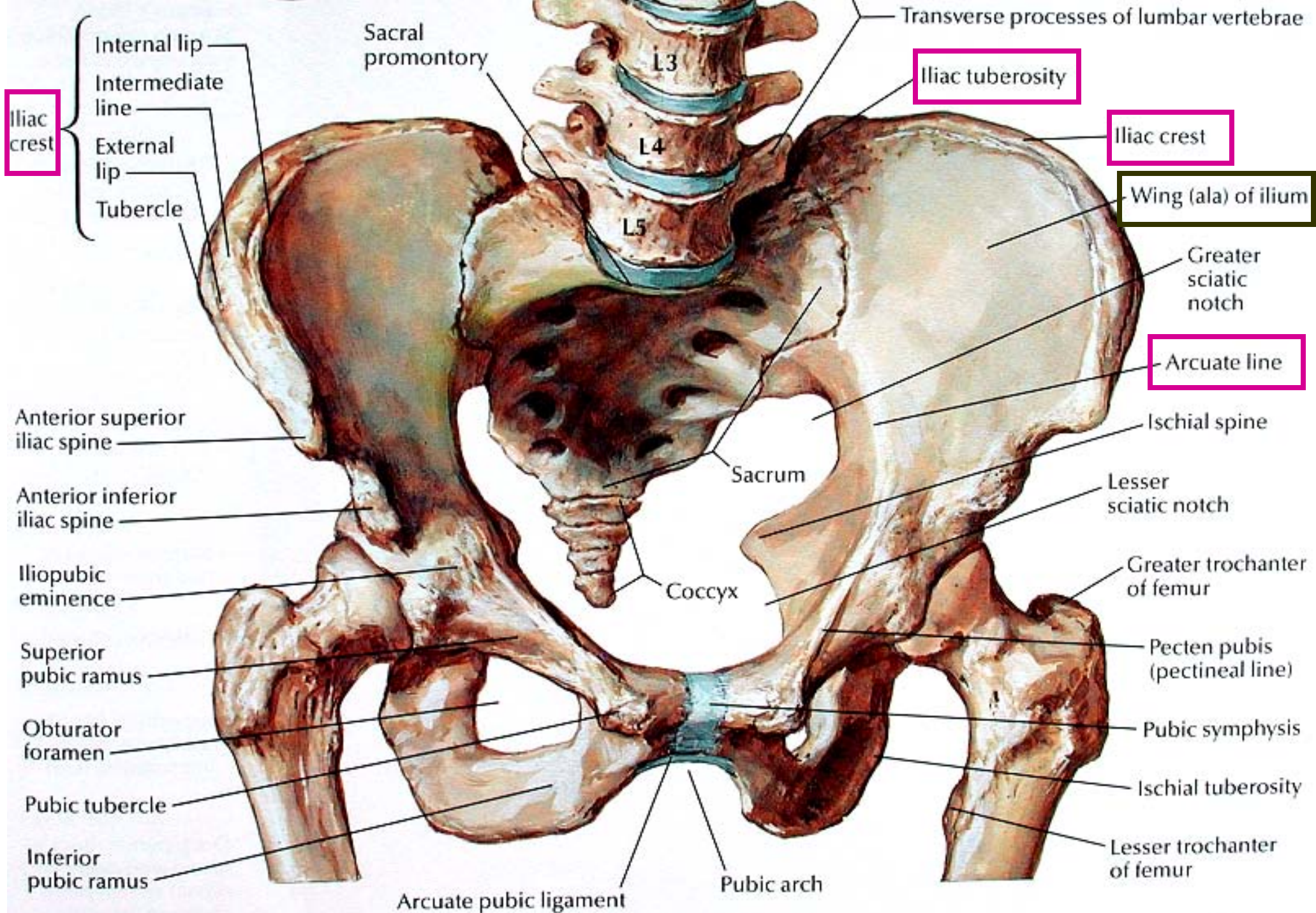


Ilium (medial surface)-3

- **arcuate line:**
linea terminalis
of pelvic brim
- **below:** pelvic
part; lesser/true
pelvis
- **above:**
abdominal part;
greater/false
pelvis

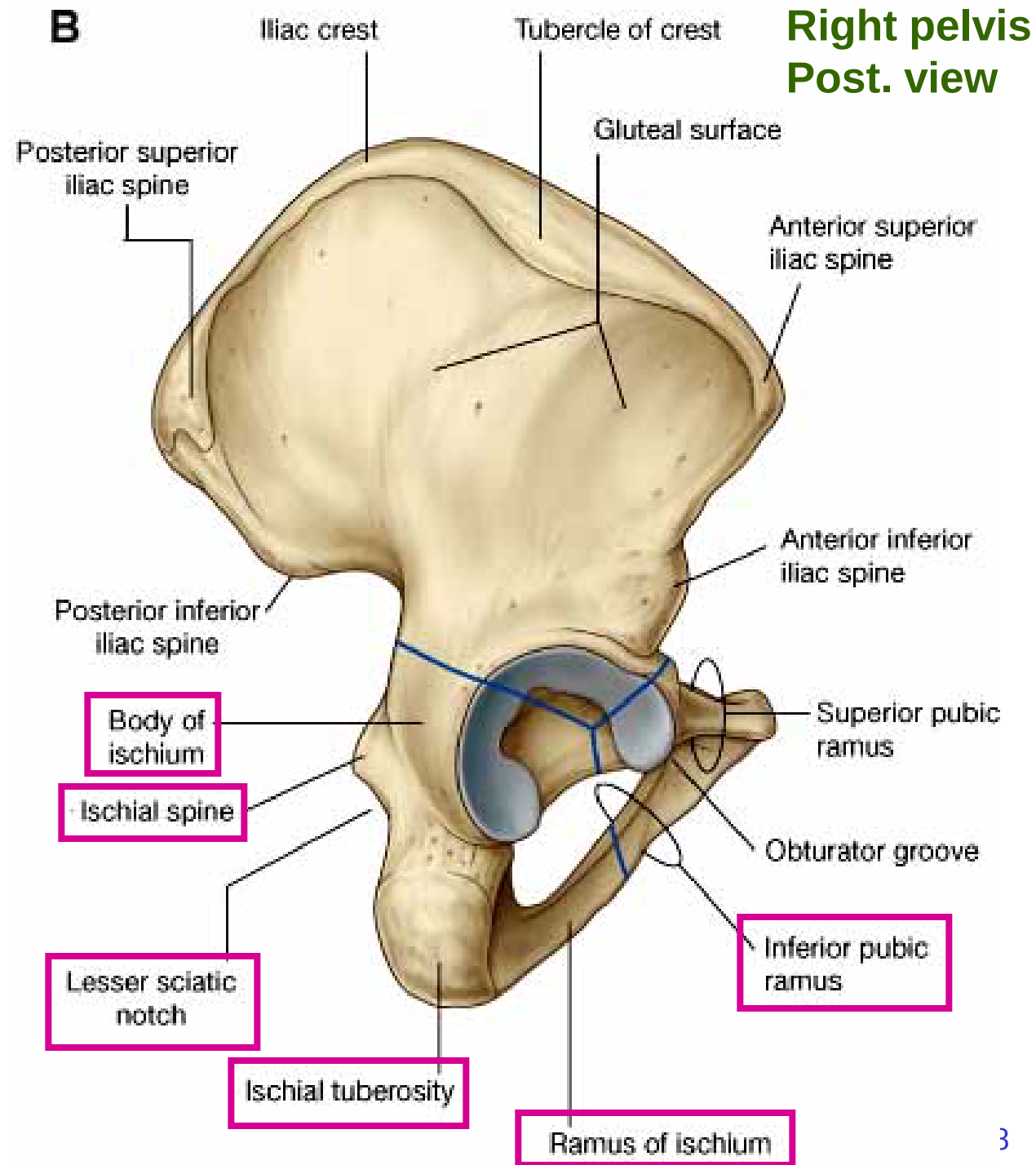


Right pelvis
Ant. view



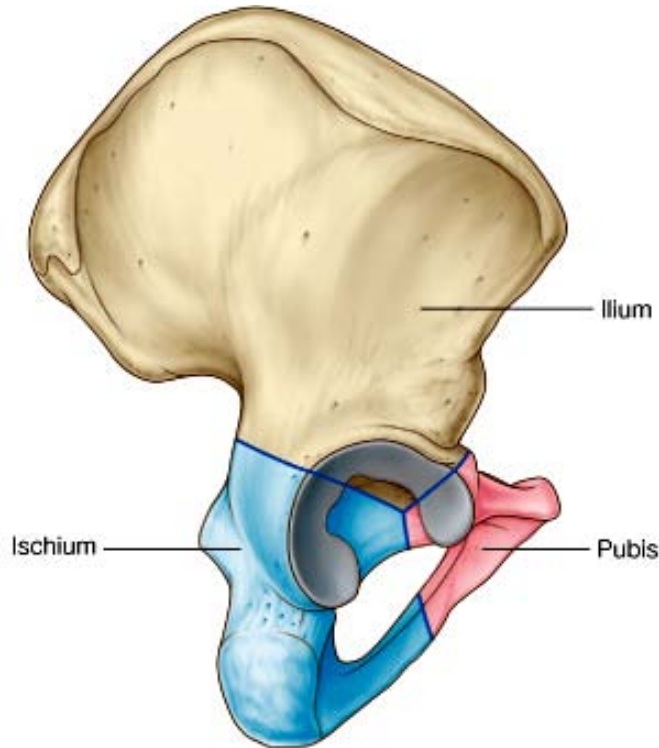
Ischium

- body of ischium
- lesser sciatic notch
- ischial tuberosity
- ischial spine
- ischial ramus: with inf. ramus of pubis → ischiopubic ramus

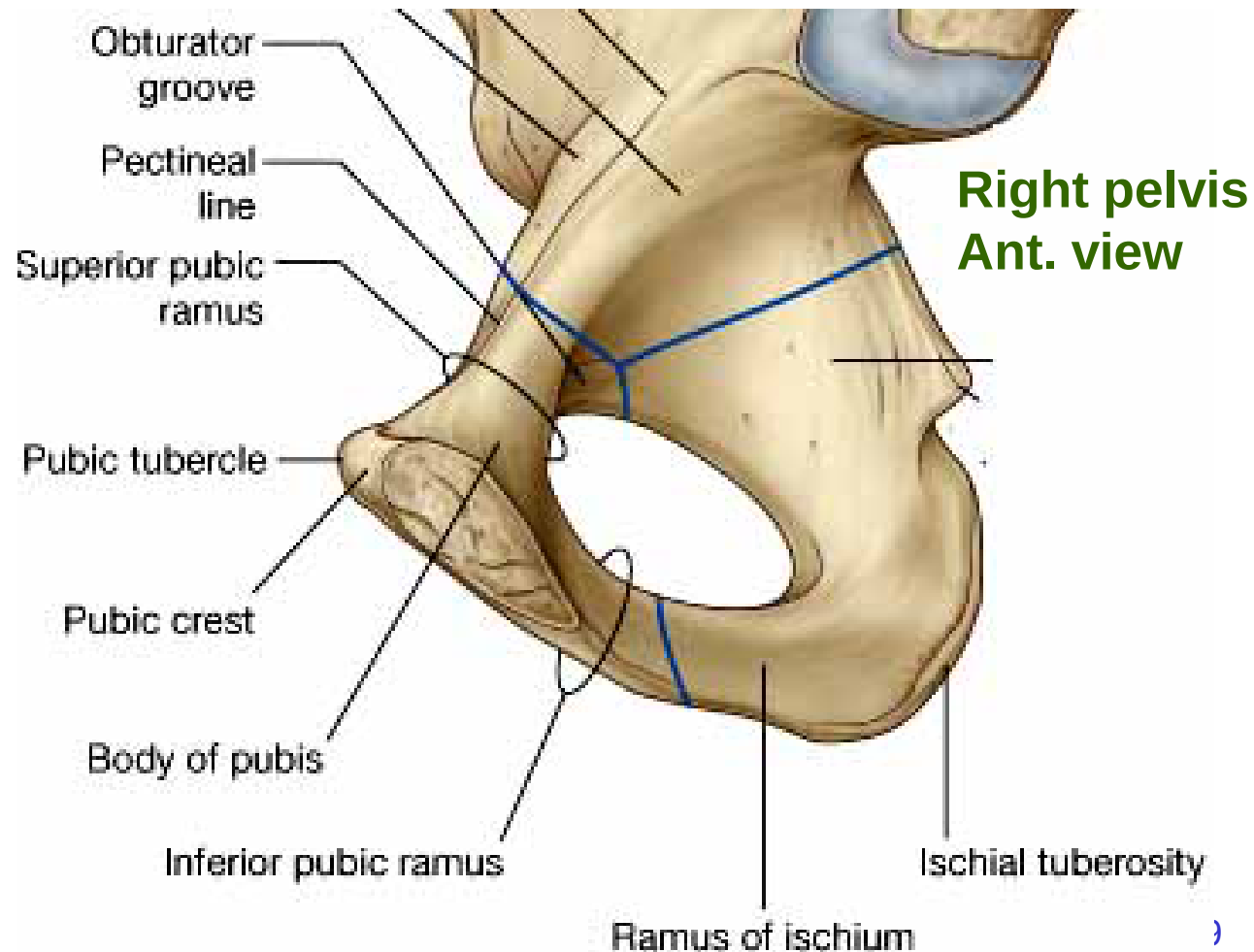


Pubis: rami

- **sup. ramus** → contribute to acetabulum
- **inf. ramus** → join ischium (ischial ramus)



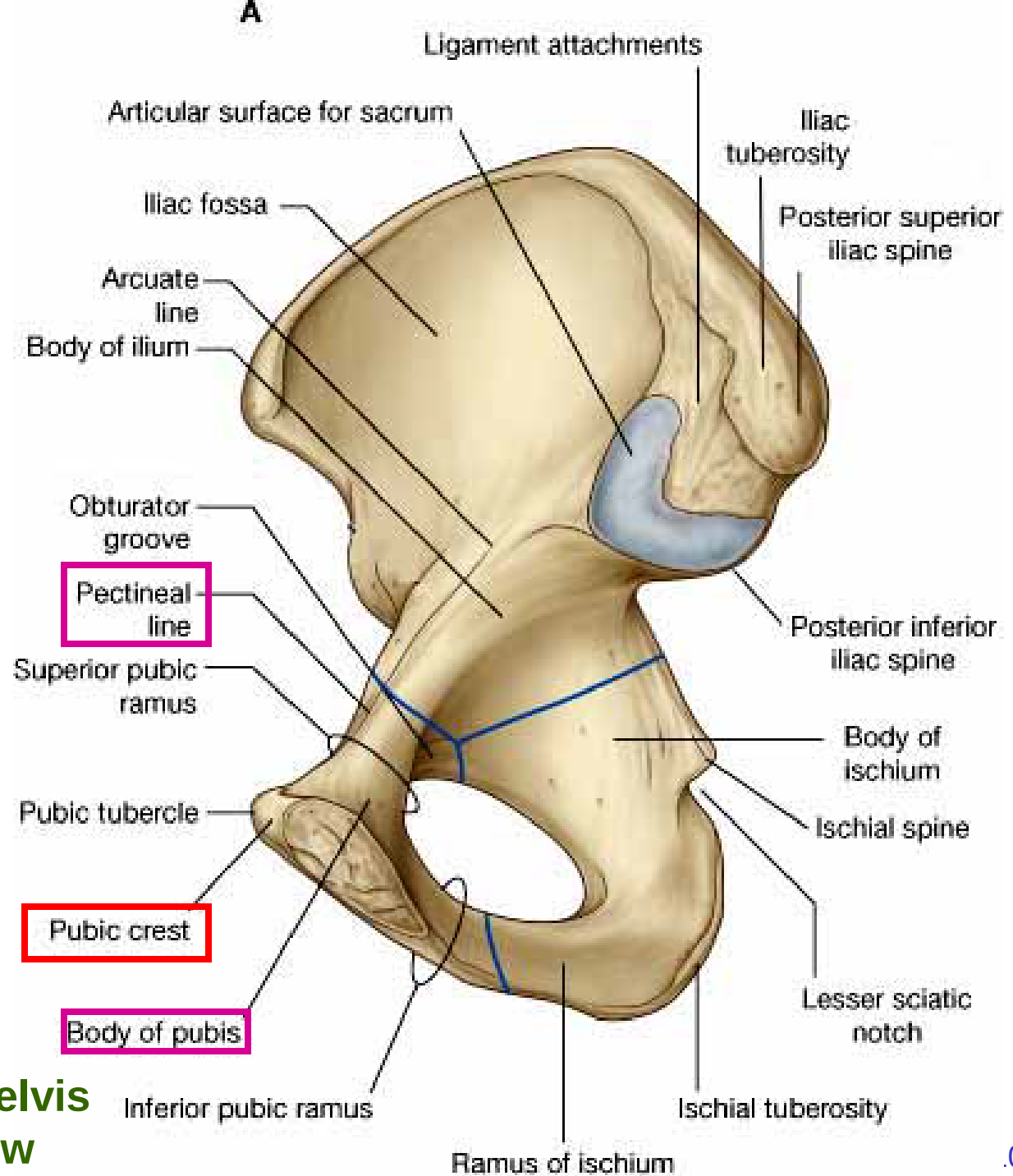
**Right pelvis
Post. view**



**Right pelvis
Ant. view**

Pubis:1

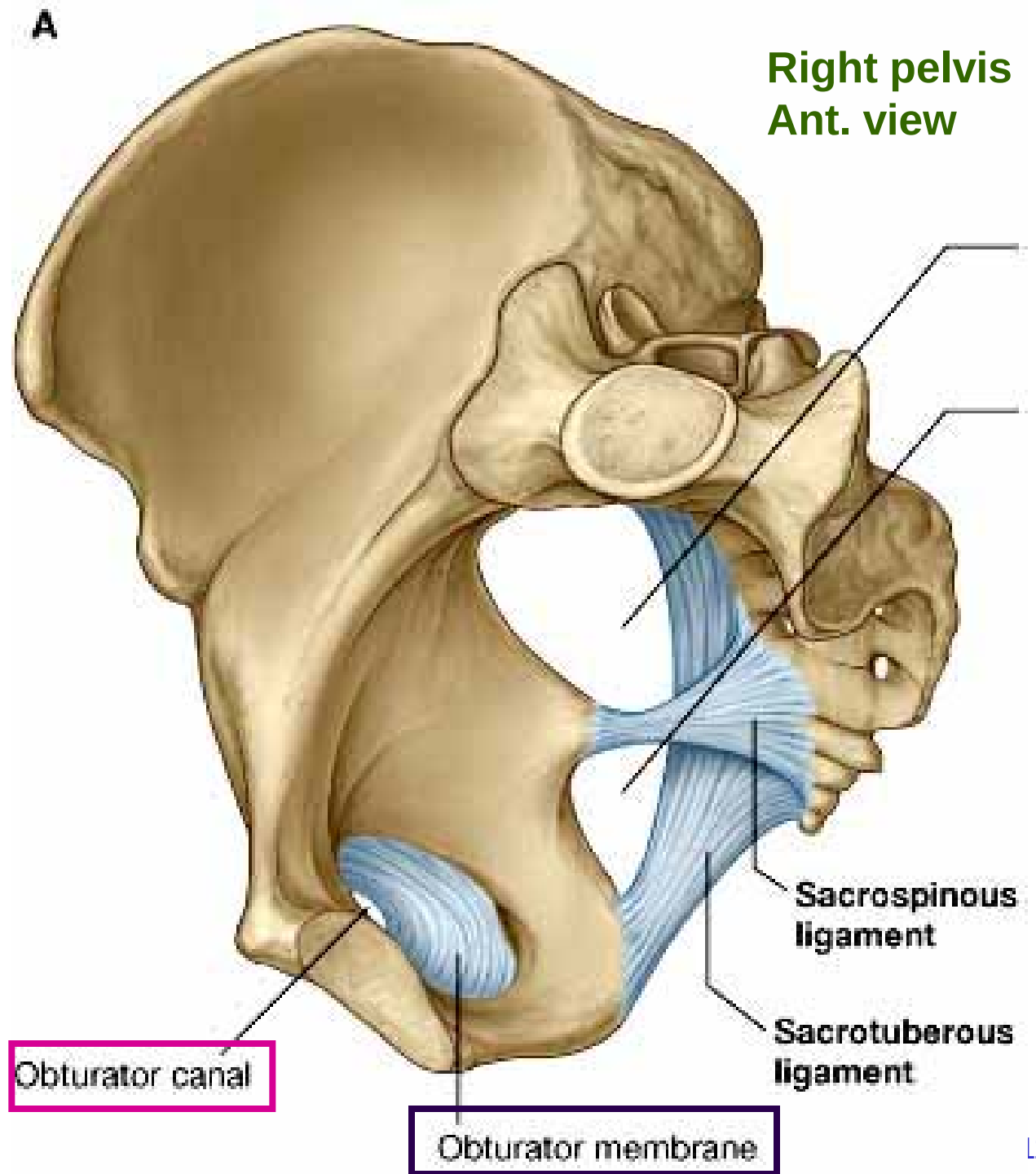
- body of pubis
- pubic crest
- public tubercle
- sup. pubic ramus:
pectineal line on its
sup. border, continues
into **arcuate line**
- inf. pubic ramus
- obturator foramen



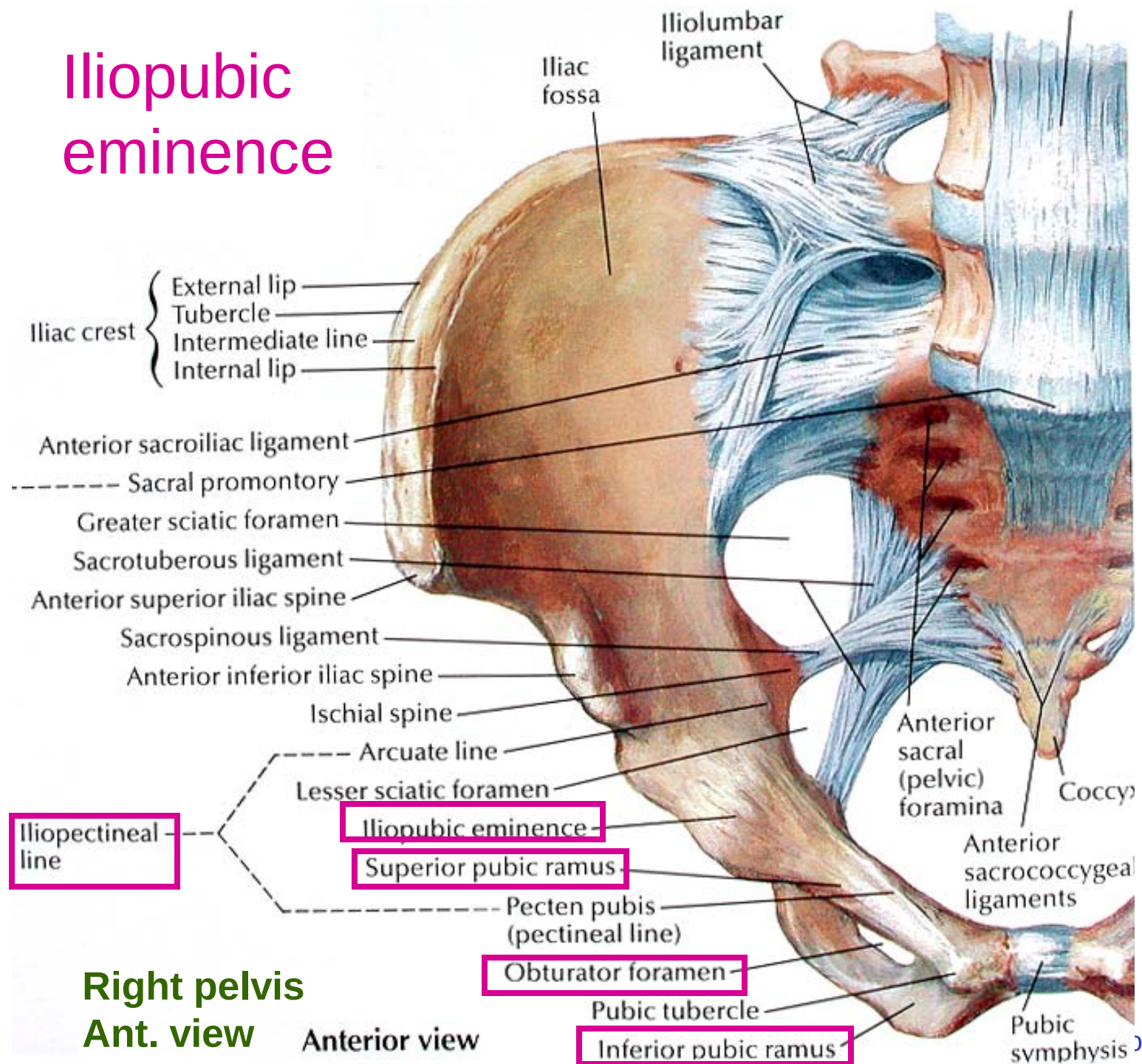
Right pelvis
Ant. view

Obturator canal

- **obturator canal:**
at the upper,
posterior angle of
obturator foramen
(obturator n.,a.,v.)

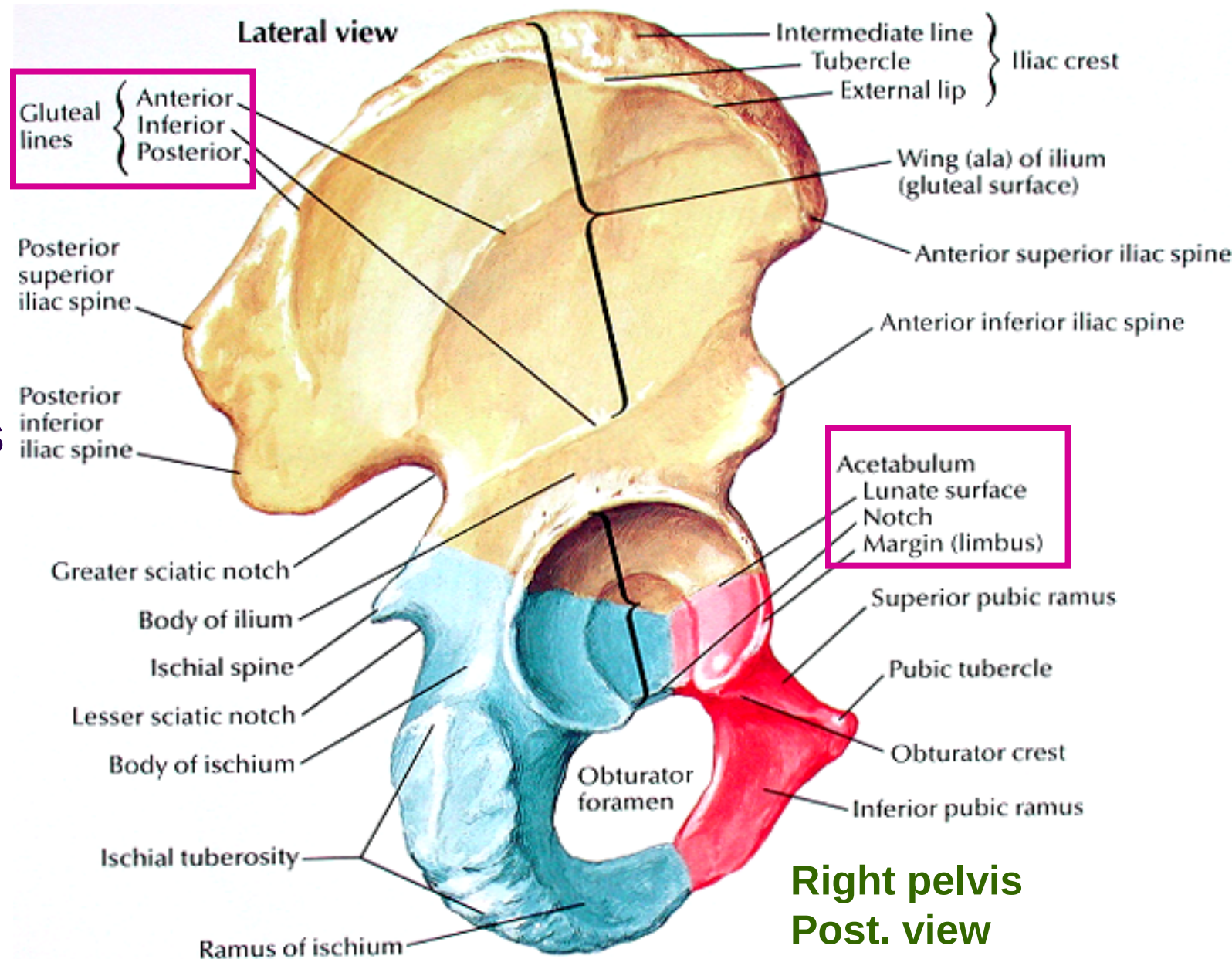


Iliopubic eminence



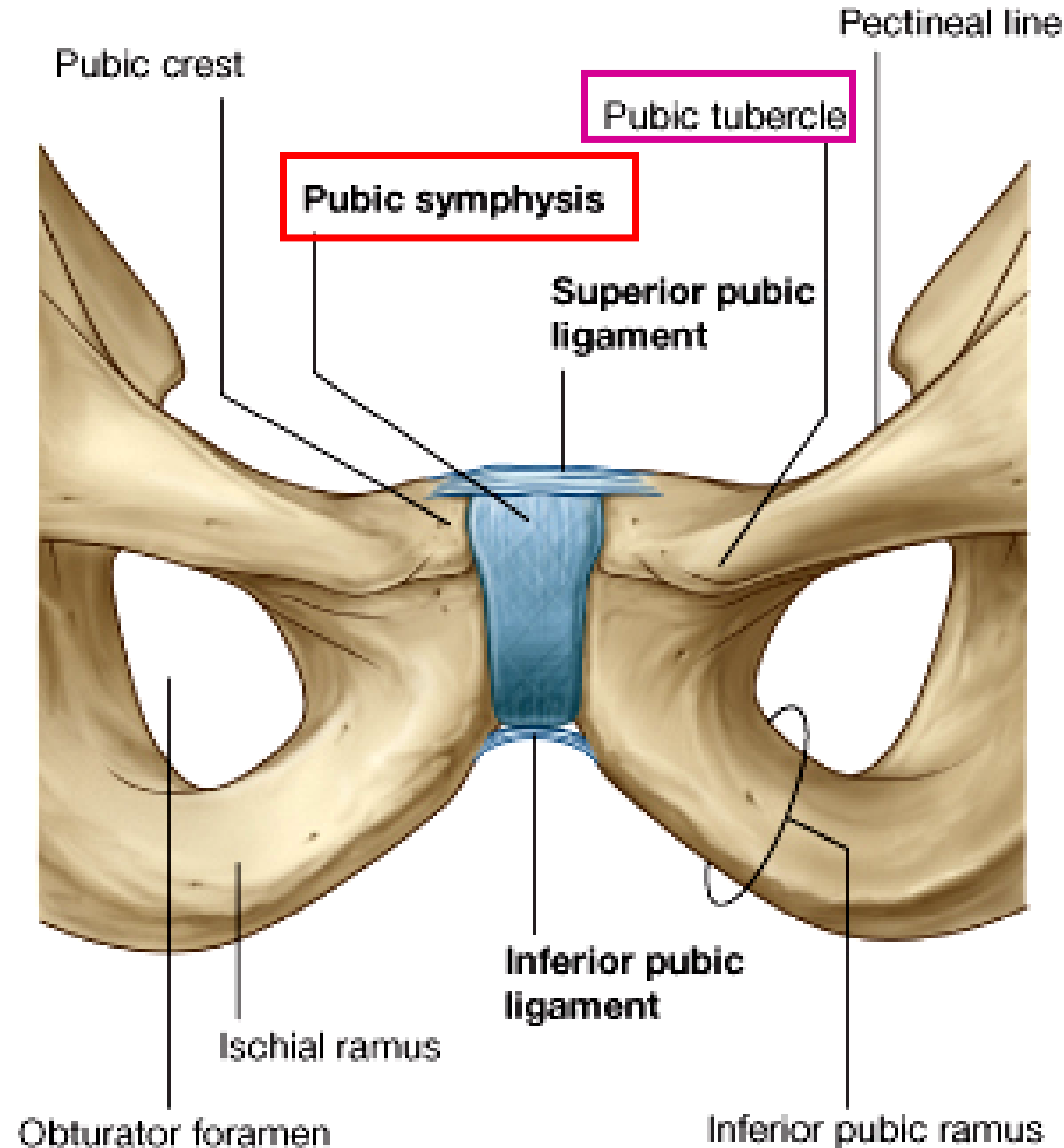
Pubis: external

- acetabulum:
acetabular
notch, limbus
- Gluteal line
 - Anterior
 - Posterior
 - Inferior



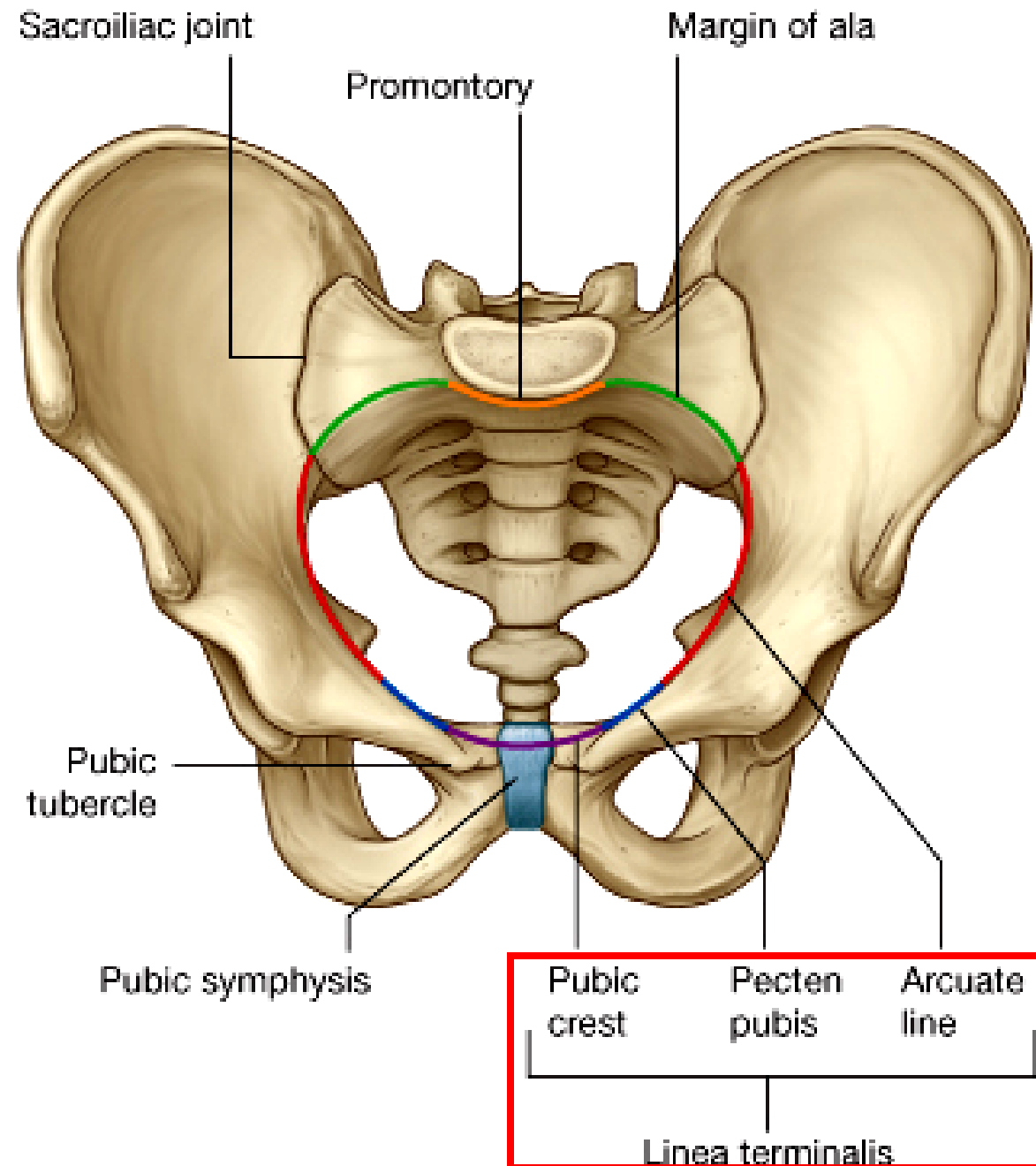
Pubic symphysis

- cartilaginous joint (fibrous cartilage)
- as a landmark of pelvic cavity



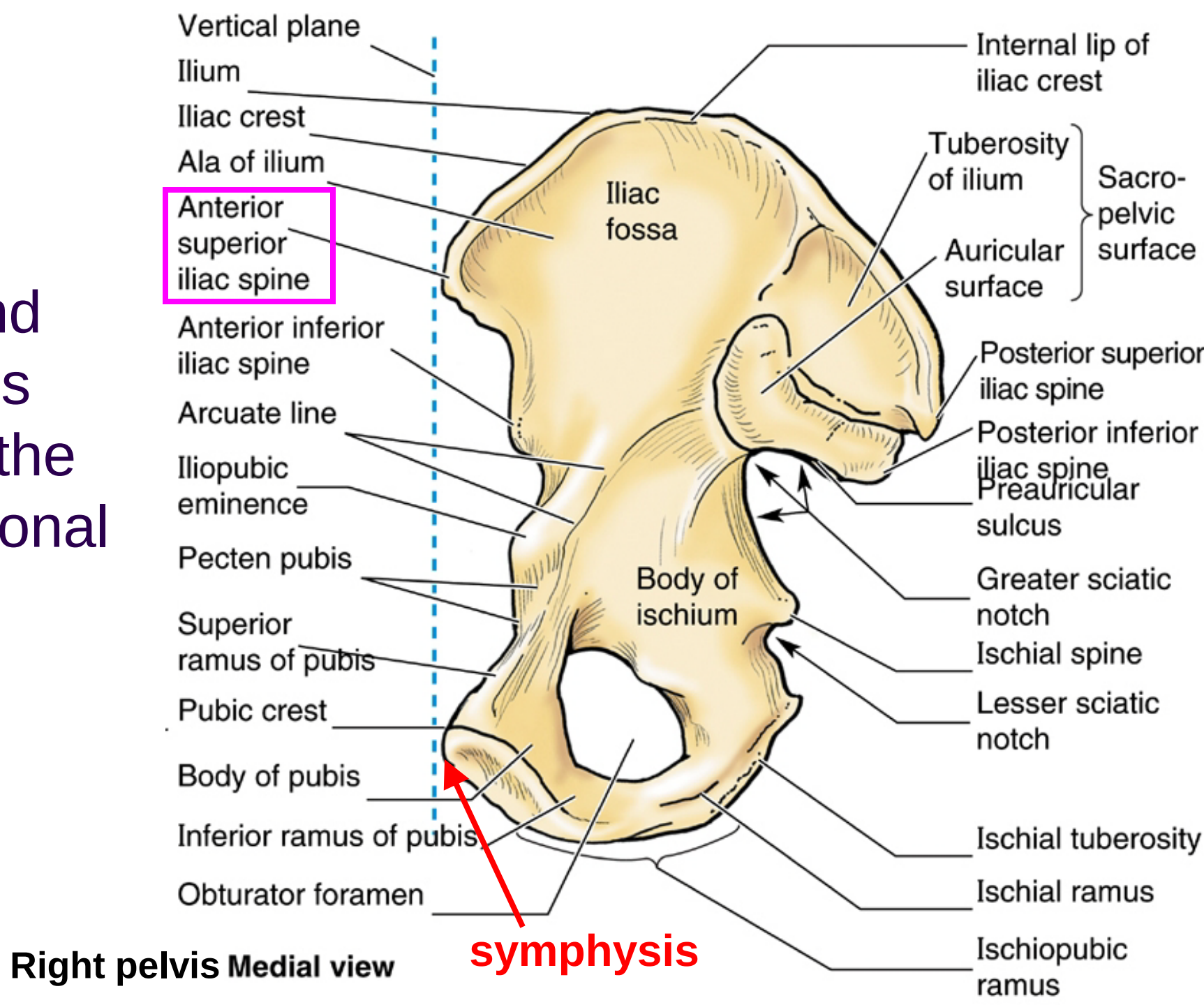
Pelvis

- The complete pelvis:
- the line (pelvic inlet) from **promontory of sacrum** -- arcuate line -
- pectineal line -- pubic crest separates
- **false pelvis** and **true pelvis**
- **sacrum + linea terminalis + pubis symphysis**



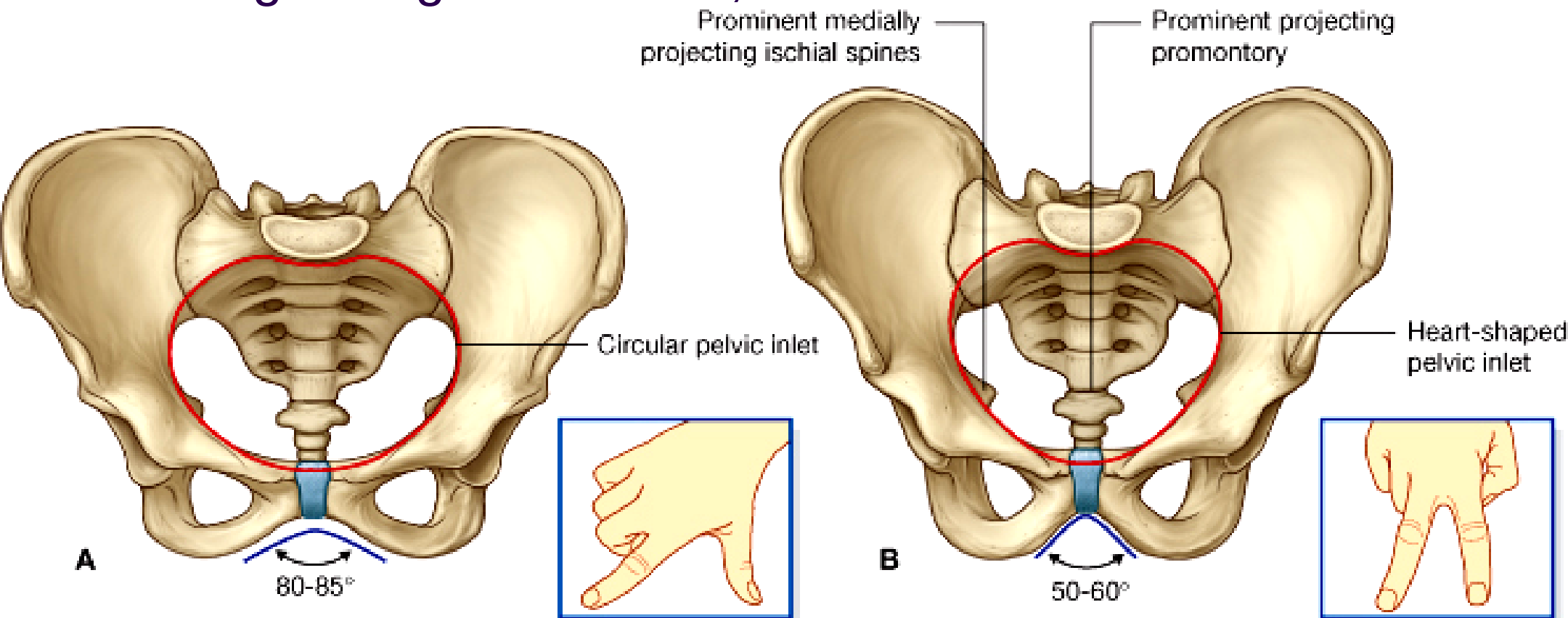
Pelvis: anatomical position

- a.s.i.s. and symphysis pubis on the same coronal plane



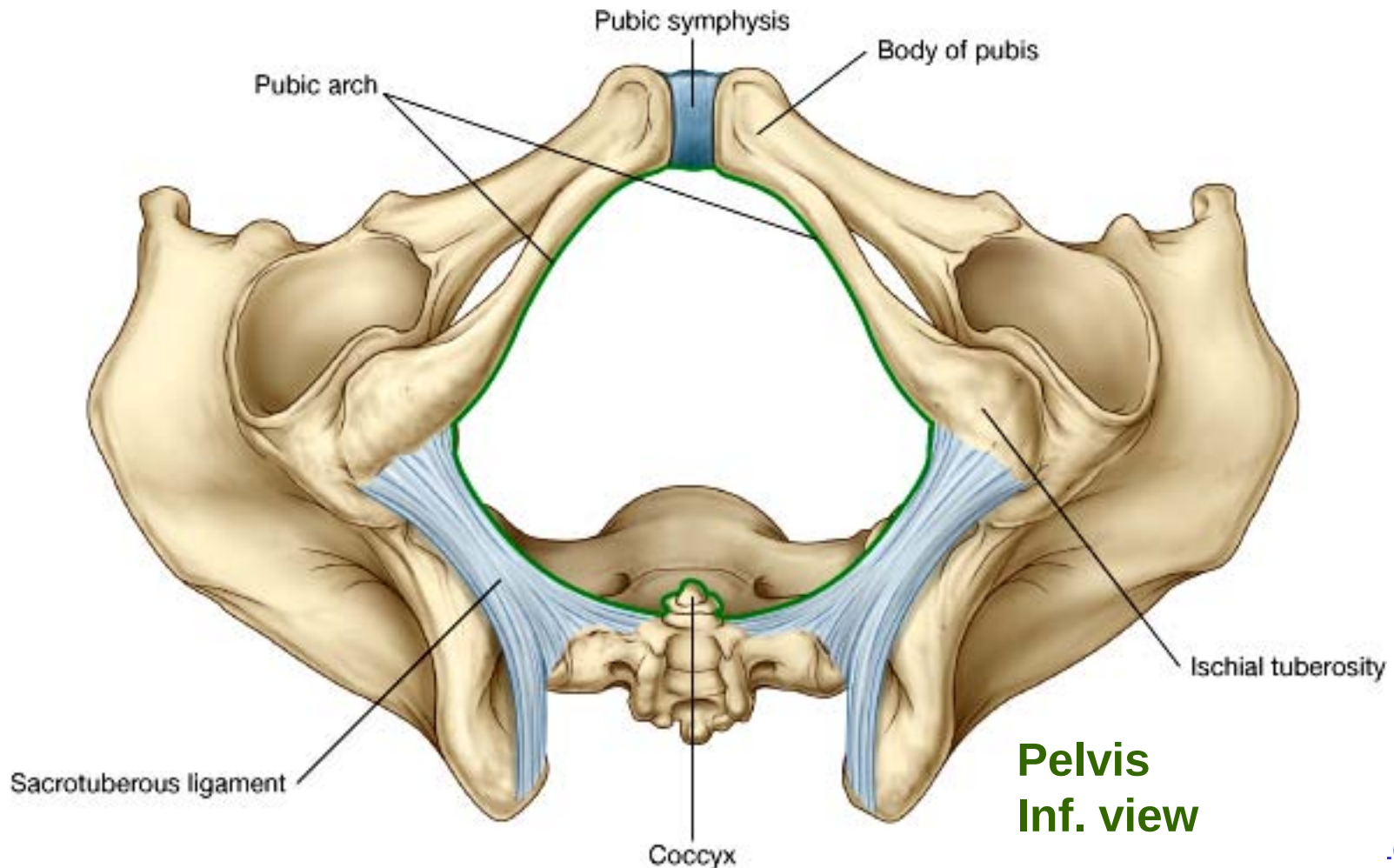
Pelvis: female vs. male

- Shape: circular in female (less distinct promontory, broader alae); heart-shaped in male
- Angle: larger in female; smaller in male



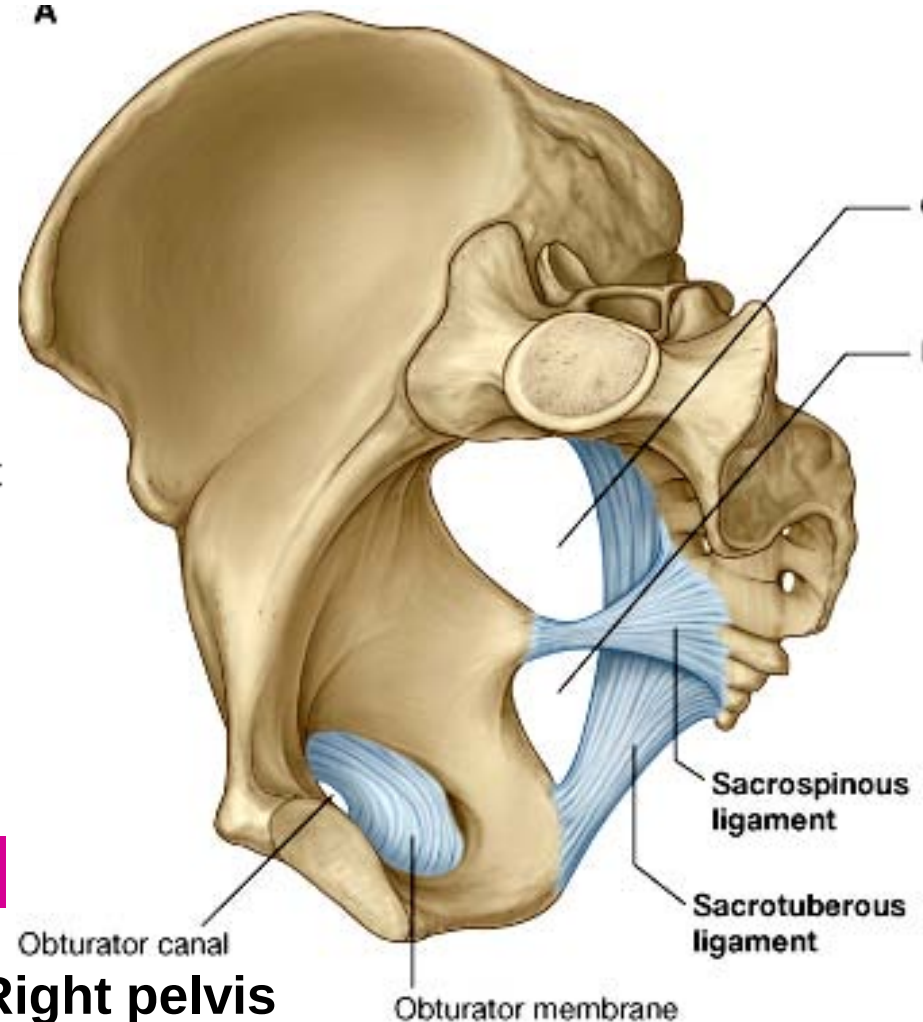
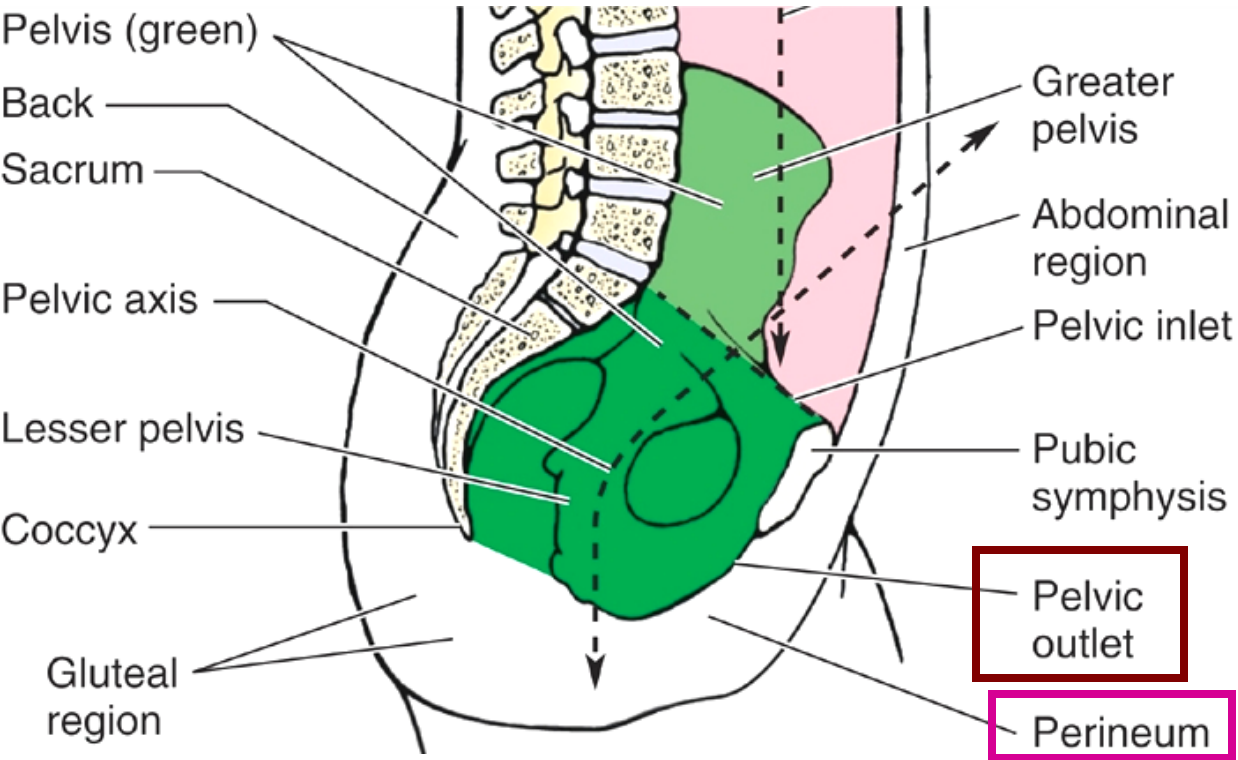
Pelvis: pelvic outlet

- bounded by symphysis pubis - ischiopubic rami - ischial tuberosity - sacrotuberous lig. - coccyx



Pelvic outlet

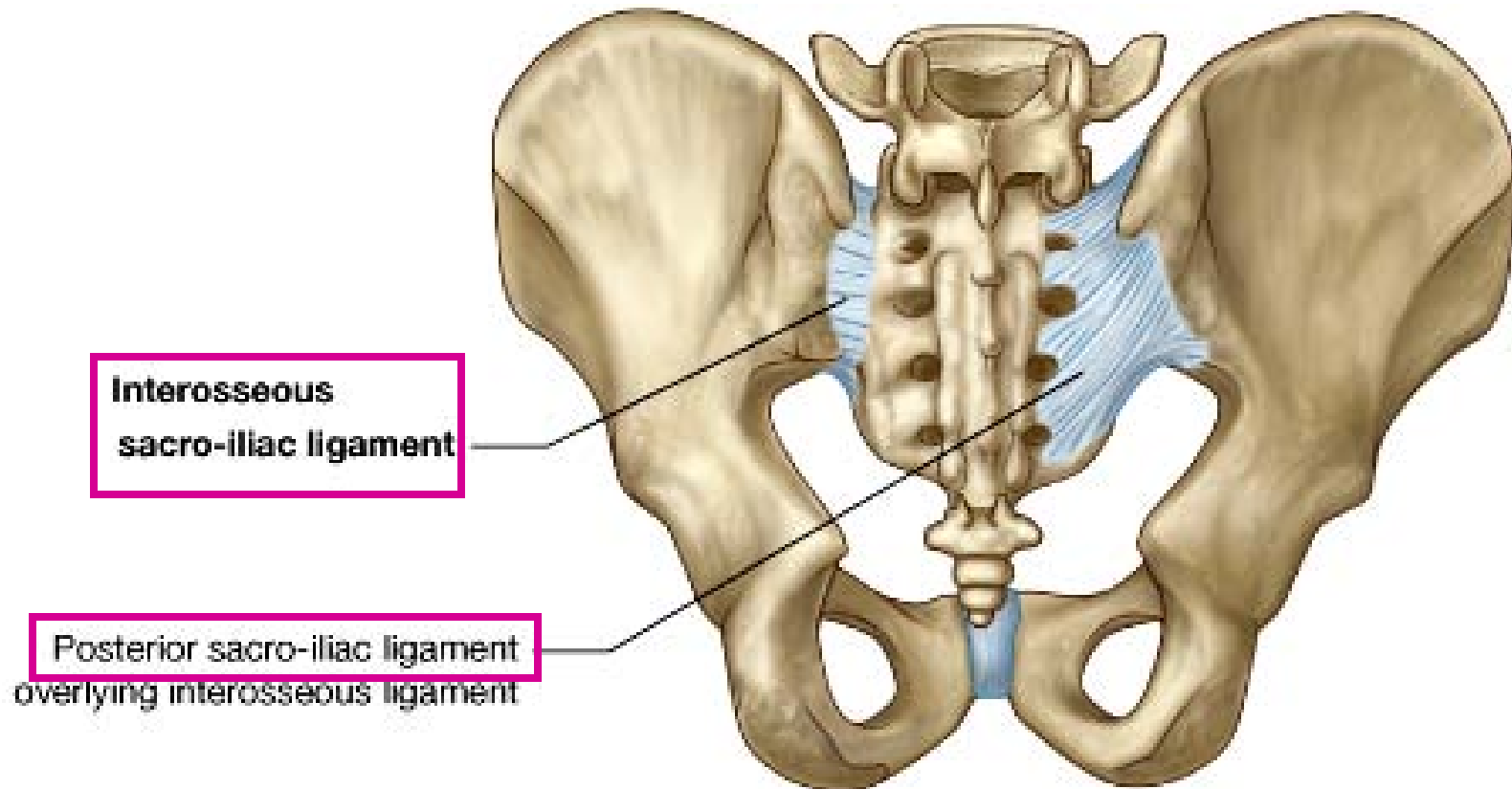
- not on the same plane; line joining the ischial tuberosities of both sides divides it into two parts



Right pelvis
Ant. view

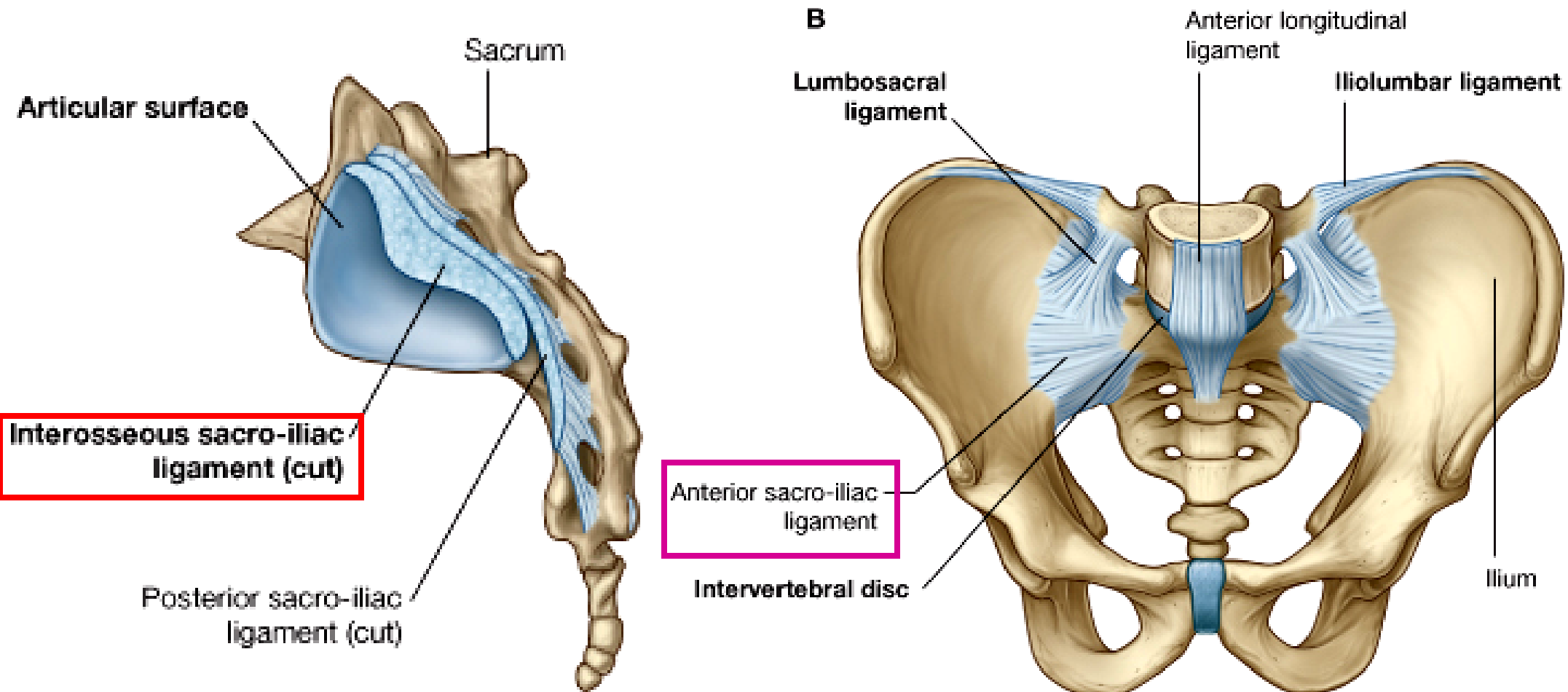
The sacro-iliac joint-1

- synovial joint in childhood; fibrous bands in joints of adult;
- > 50 years old, completely fibrous
- supported by many tough ligaments including:
- interosseous lig., ant.& post. sacroiliac lig., **sacrospinous lig.** , **sacrospinous lig.** , **sacrospinous lig.** , **sacrospinous lig.**



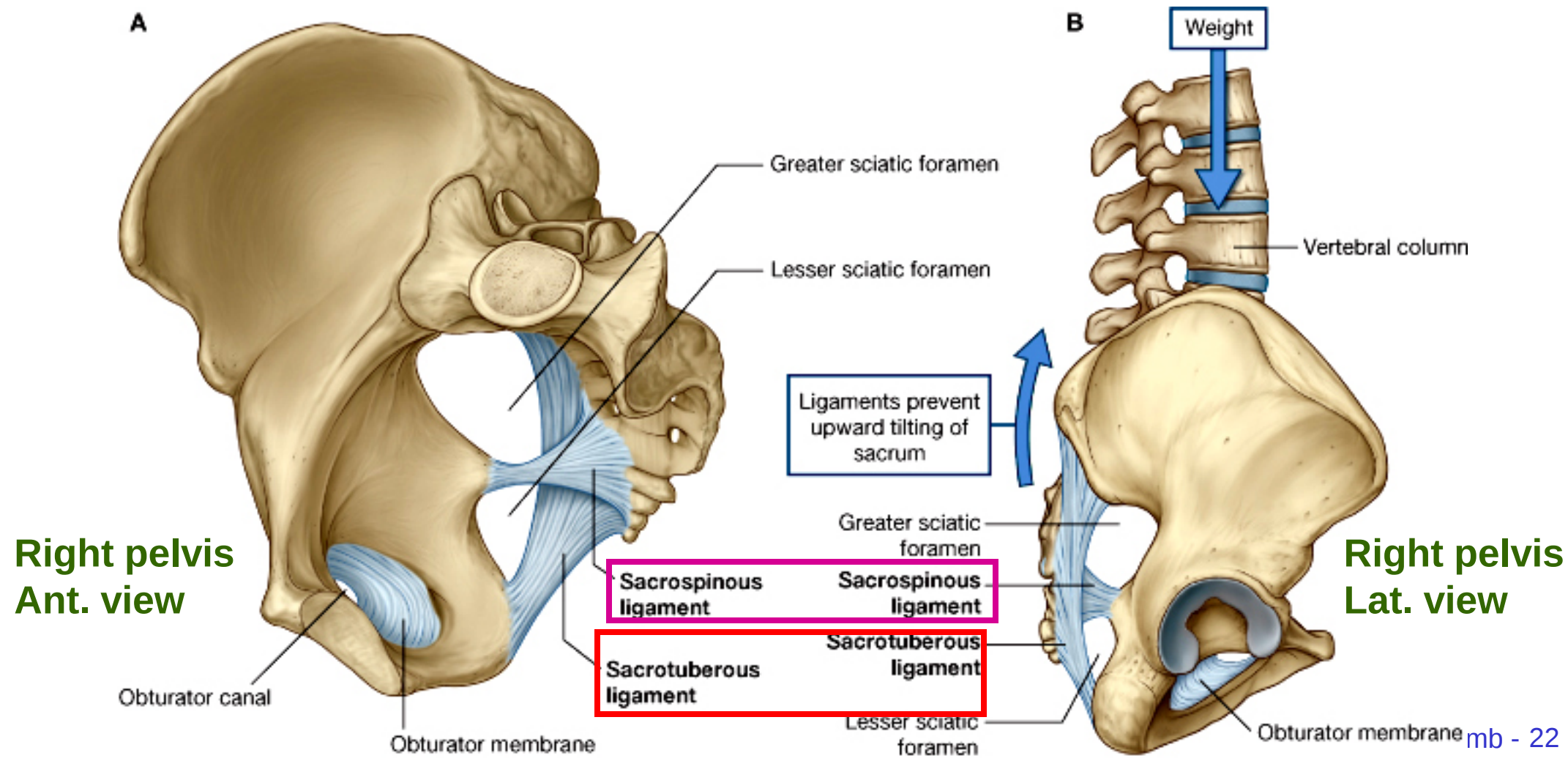
Sacro-iliac joints-2

- interosseous lig., ant. and post. sacroiliac lig.

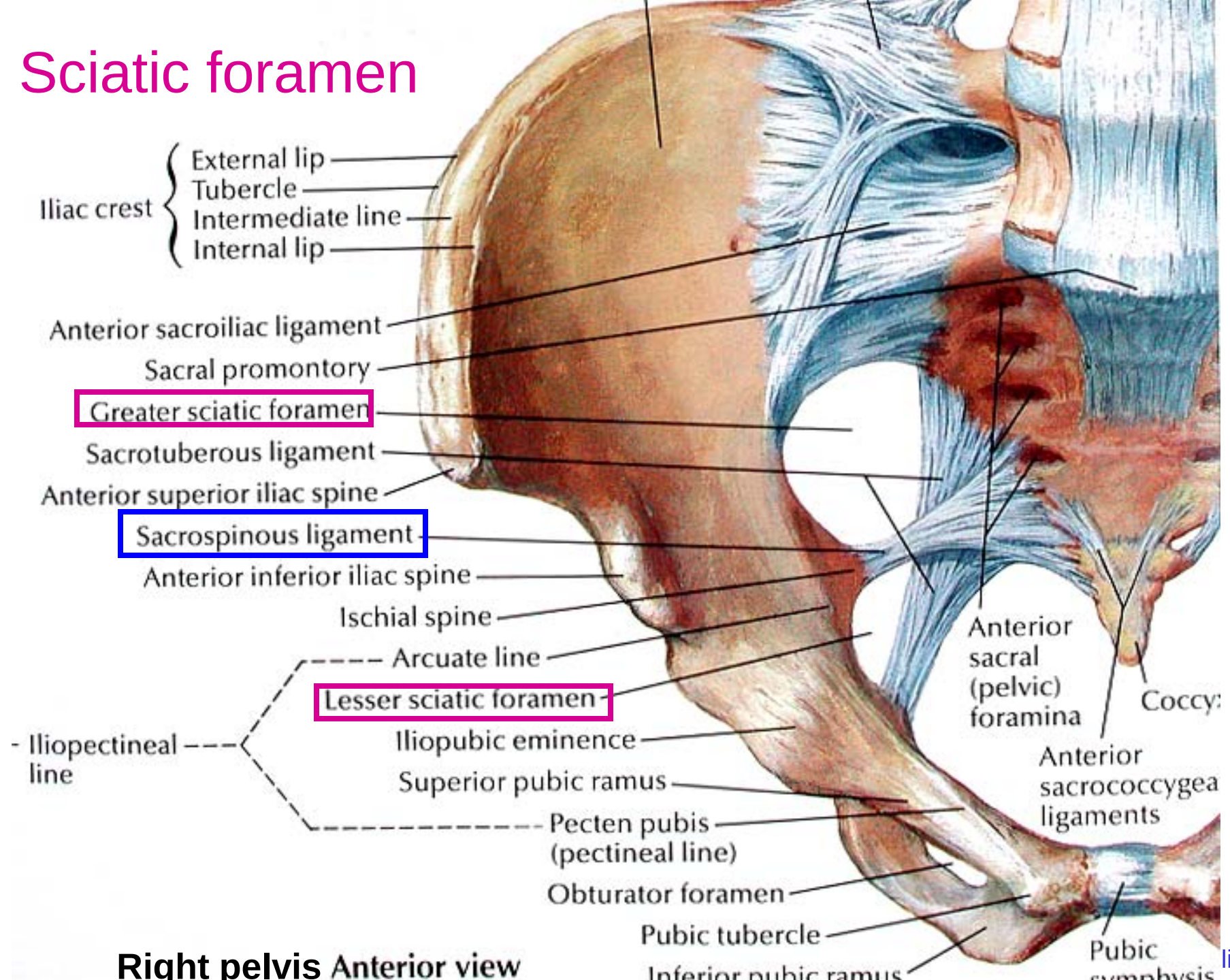


Sacroiliac joints and Sciatic foramens

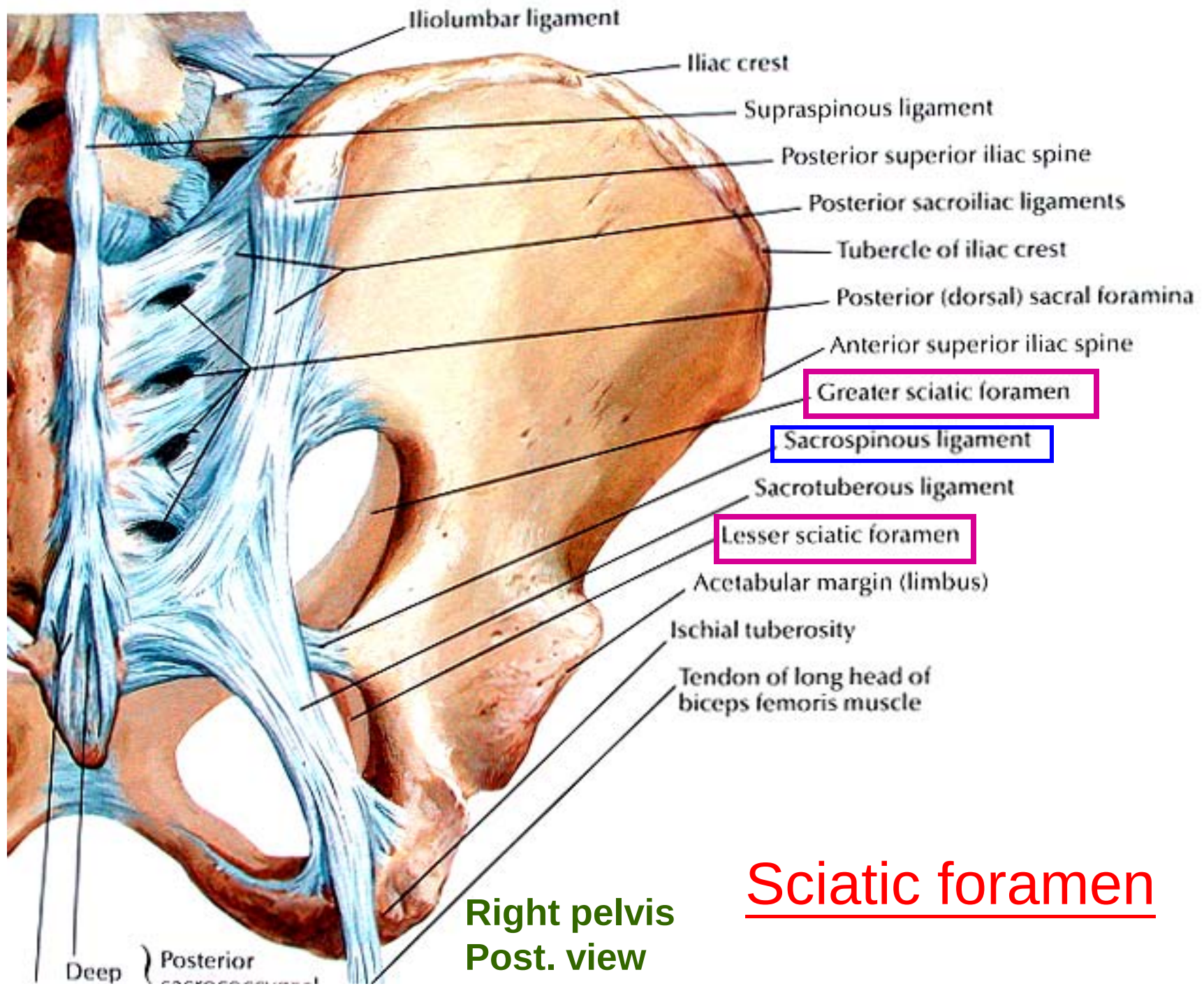
- **greater sciatic foramen; lesser sciatic foramen**
- ***posterior aspect of joint heavily armed with ligaments (to counter body weight)**



Sciatic foramen



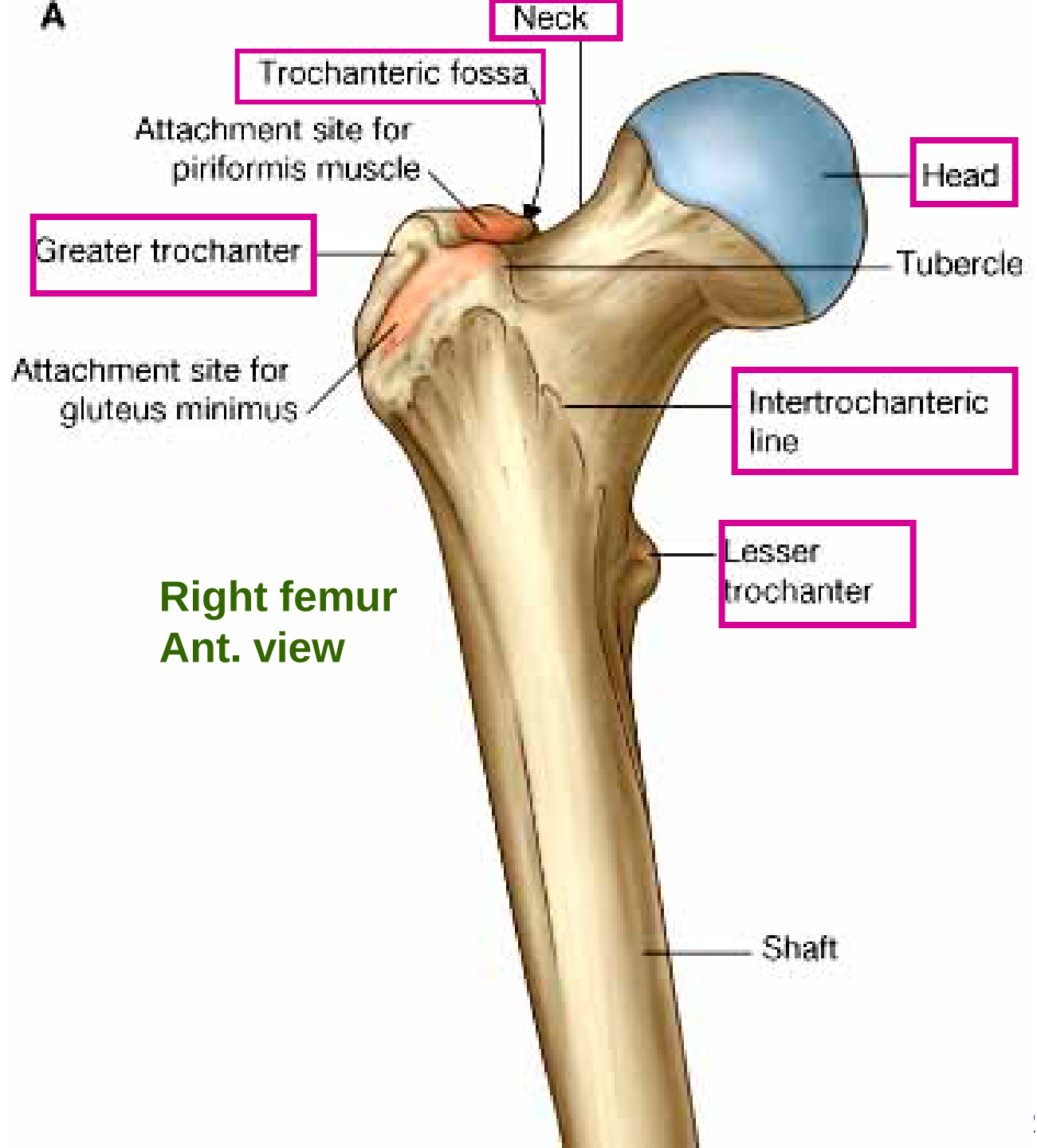
Right pelvis Anterior view



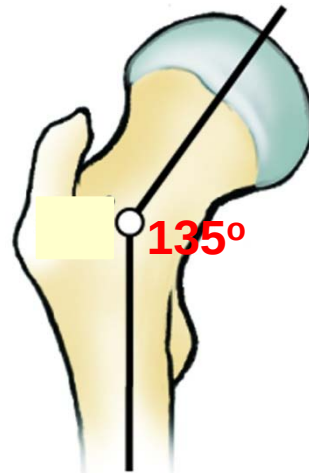
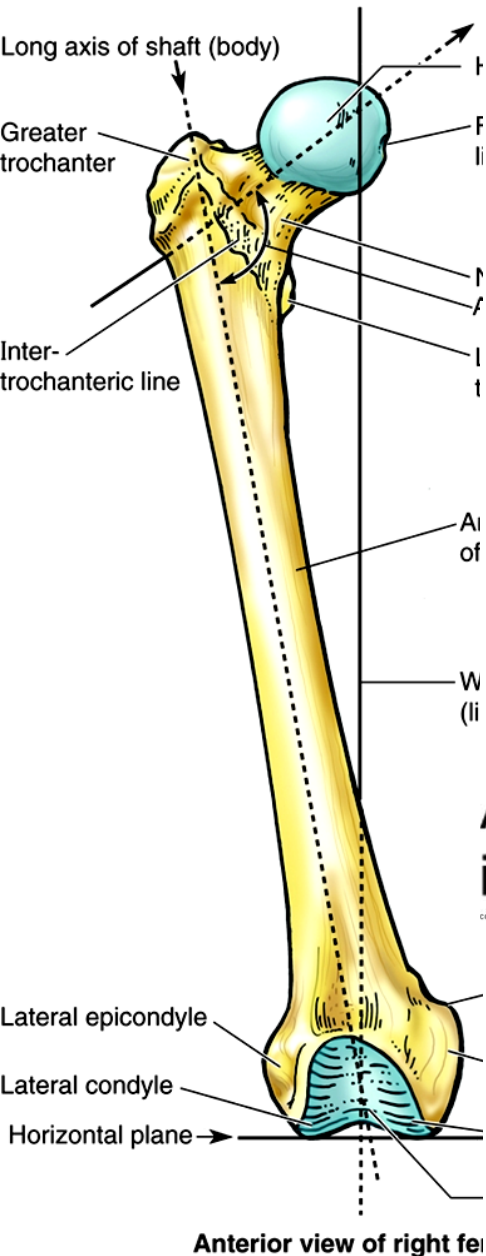
Sciatic foramen

Femur: proximal end (anterior Surface)

- head: faces upward, medially, slightly forward; **fovea**; neck:
- **greater trochanter**; **trochanteric fossa** (obturator internus attachment)
- intertrochanteric line
- lesser trochanter



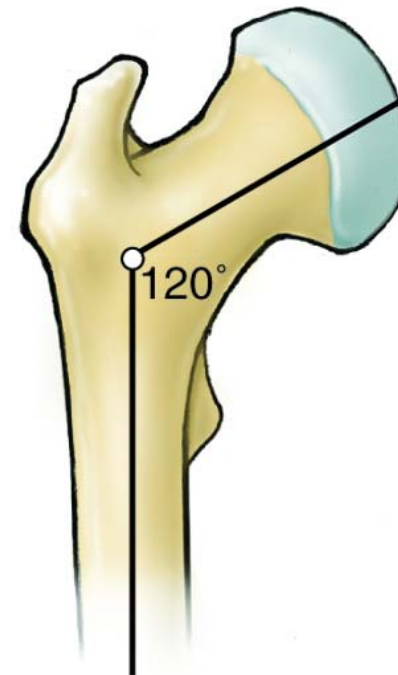
Femur: angle of inclination



Angle of inclination in 3-year-old child



Angle of inclination in adult

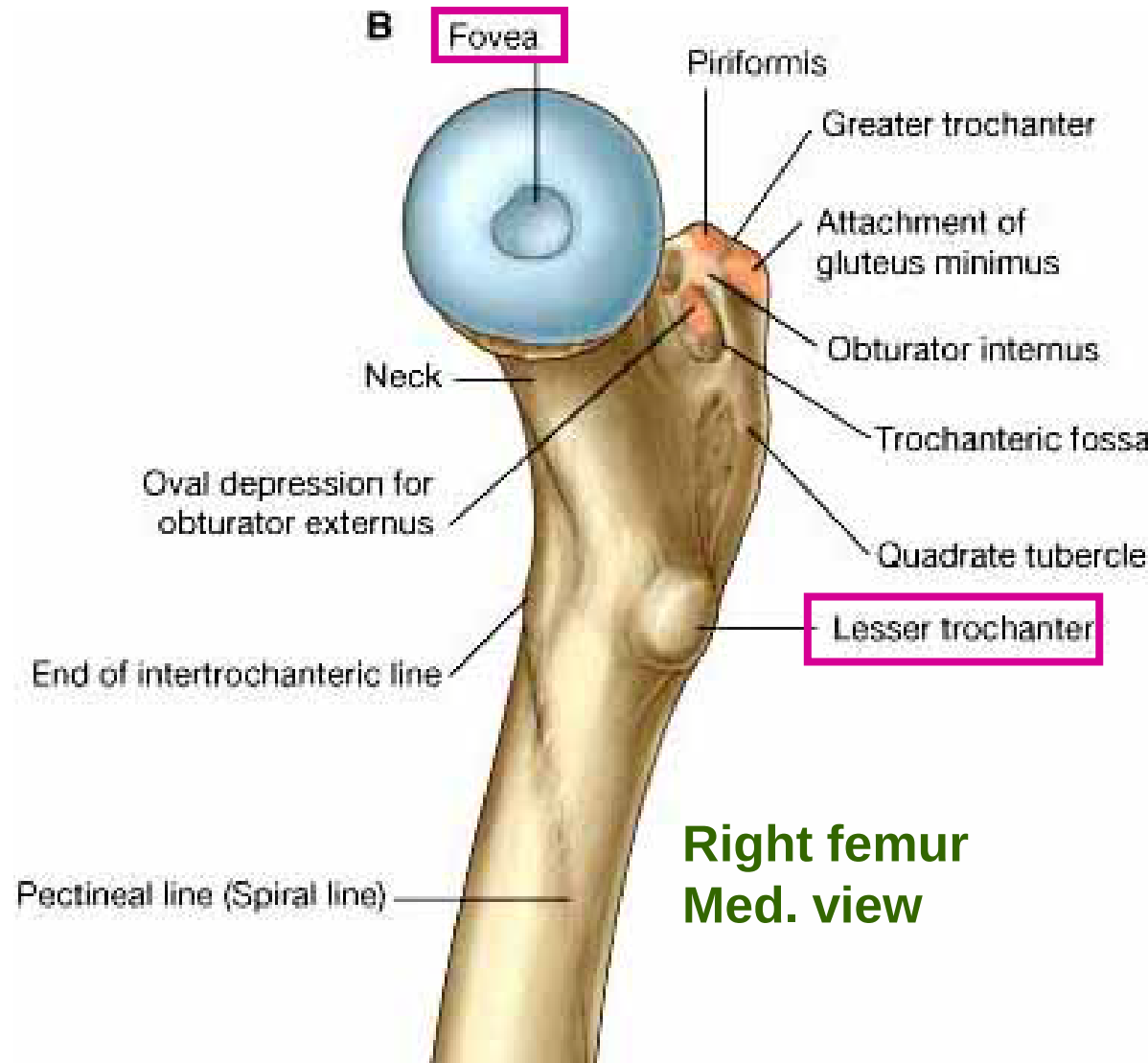


Angle of inclination in old age

Right femur
Ant. view

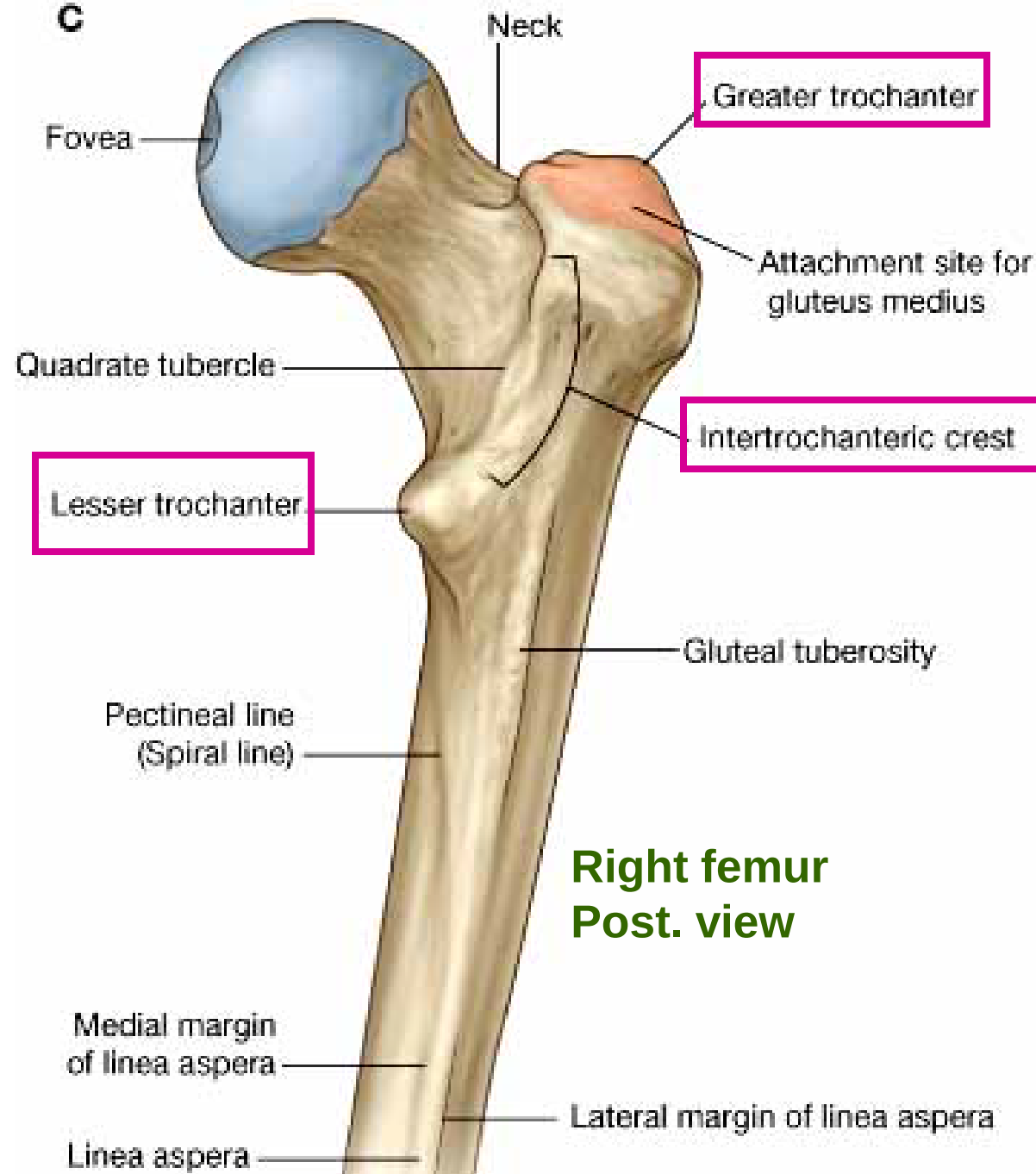
Femur: proximal end (medial surface)

- head; **fovea**; neck:
- **greater trochanter**; trochanteric fossa
- **lesser trochanter**: (iliopsoas inserts here): on posterior aspect of femur;
- **intertrochanteric crest**: posterior surface
- **intertrochanteric line**: anterior surface



Femur: proximal end (posterior surface)

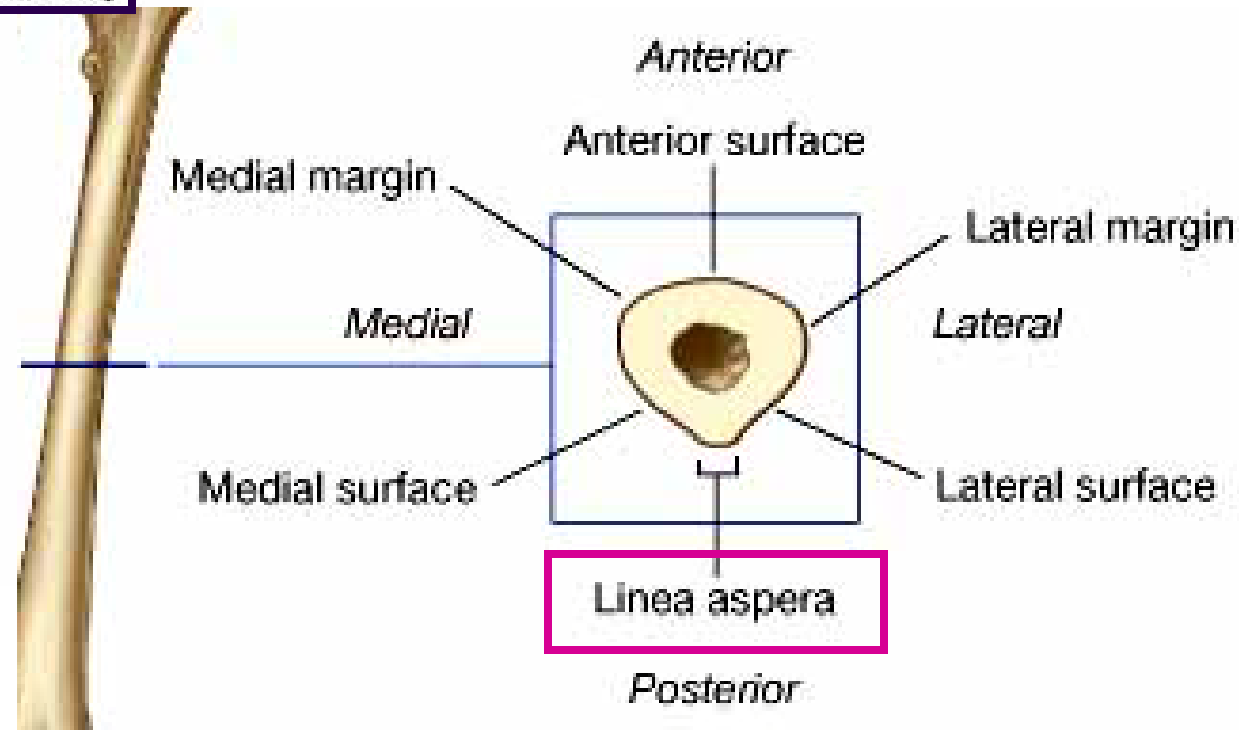
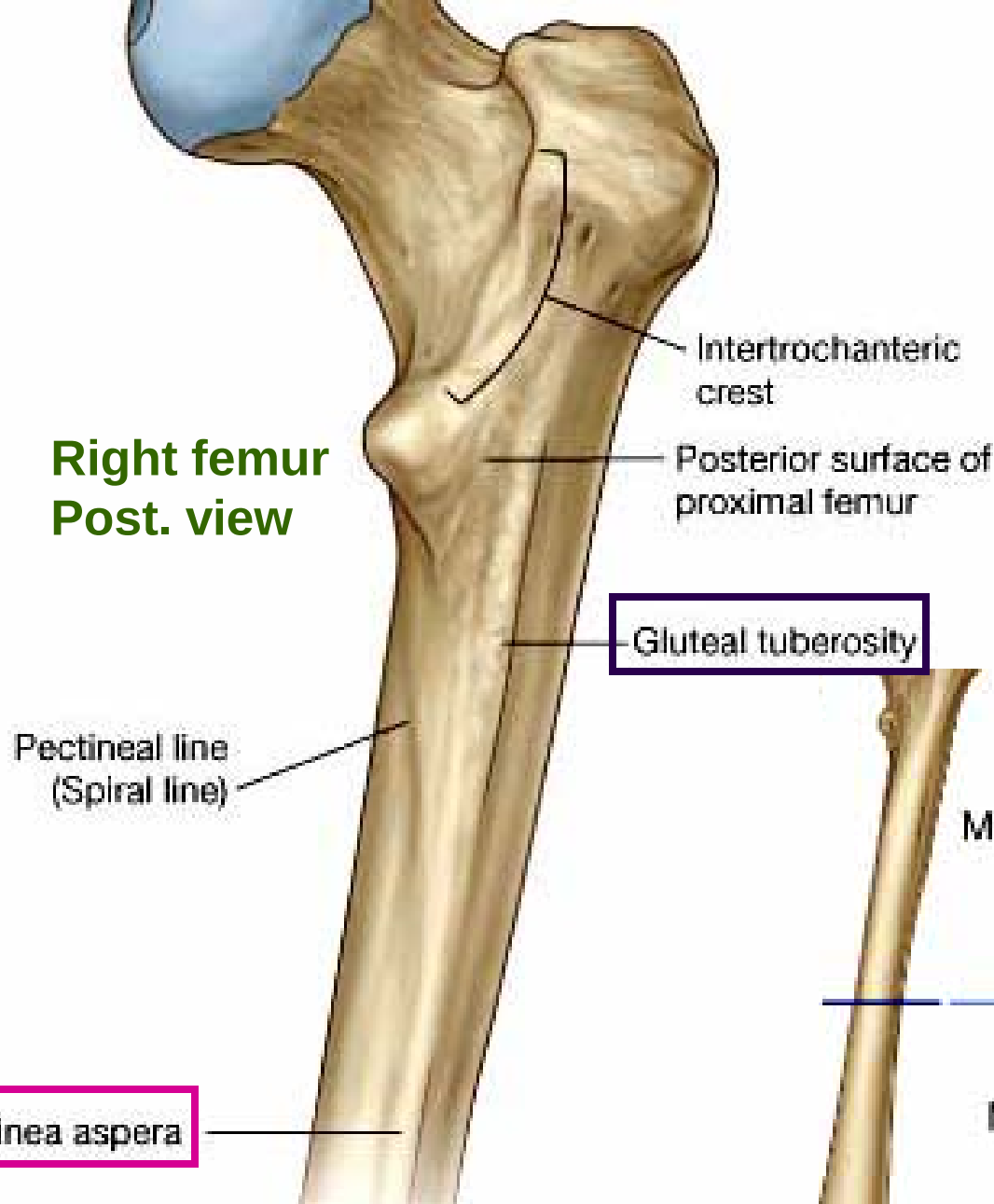
- head; **fovea**; neck:
- **greater trochanter**
- **lesser trochanter**:
(iliopsoas inserts here):
on posterior aspect of femur
- **intertrochanteric crest**:
posterior surface



Femur: shaft

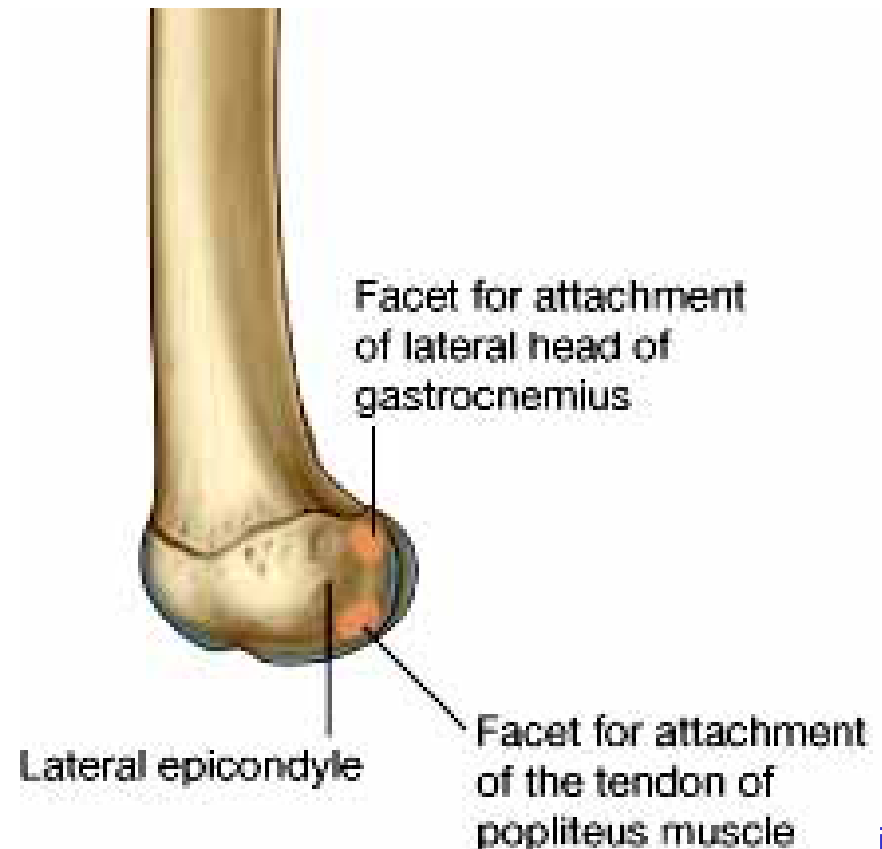
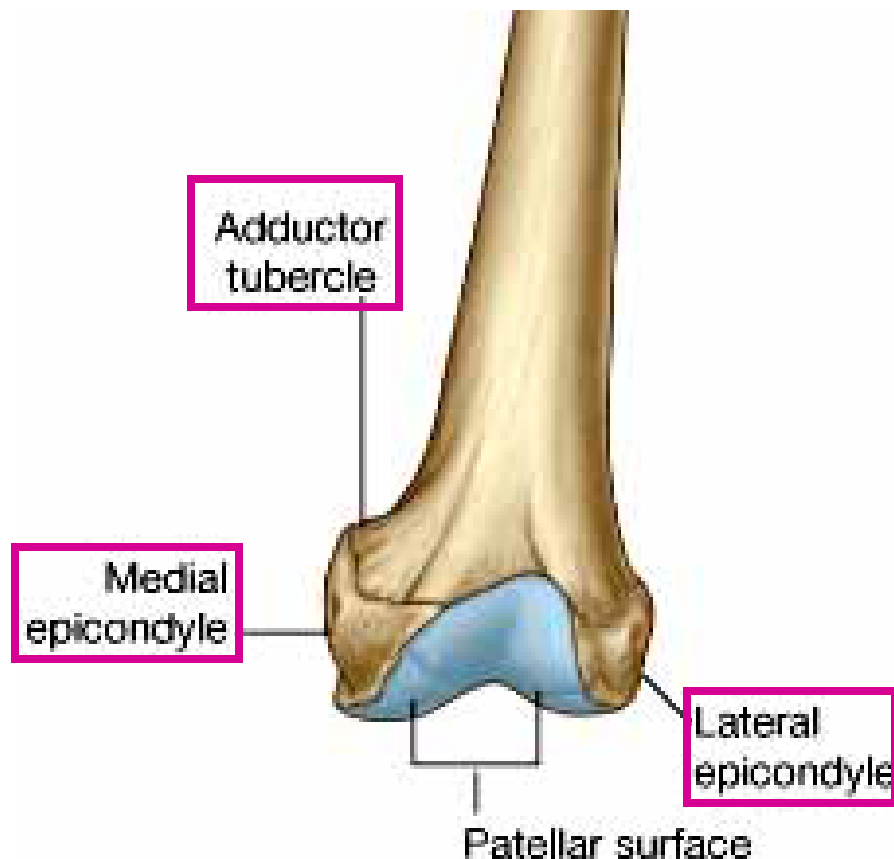
- gluteal tuberosity
- linea aspera (post. surface)

Right femur
Post. view



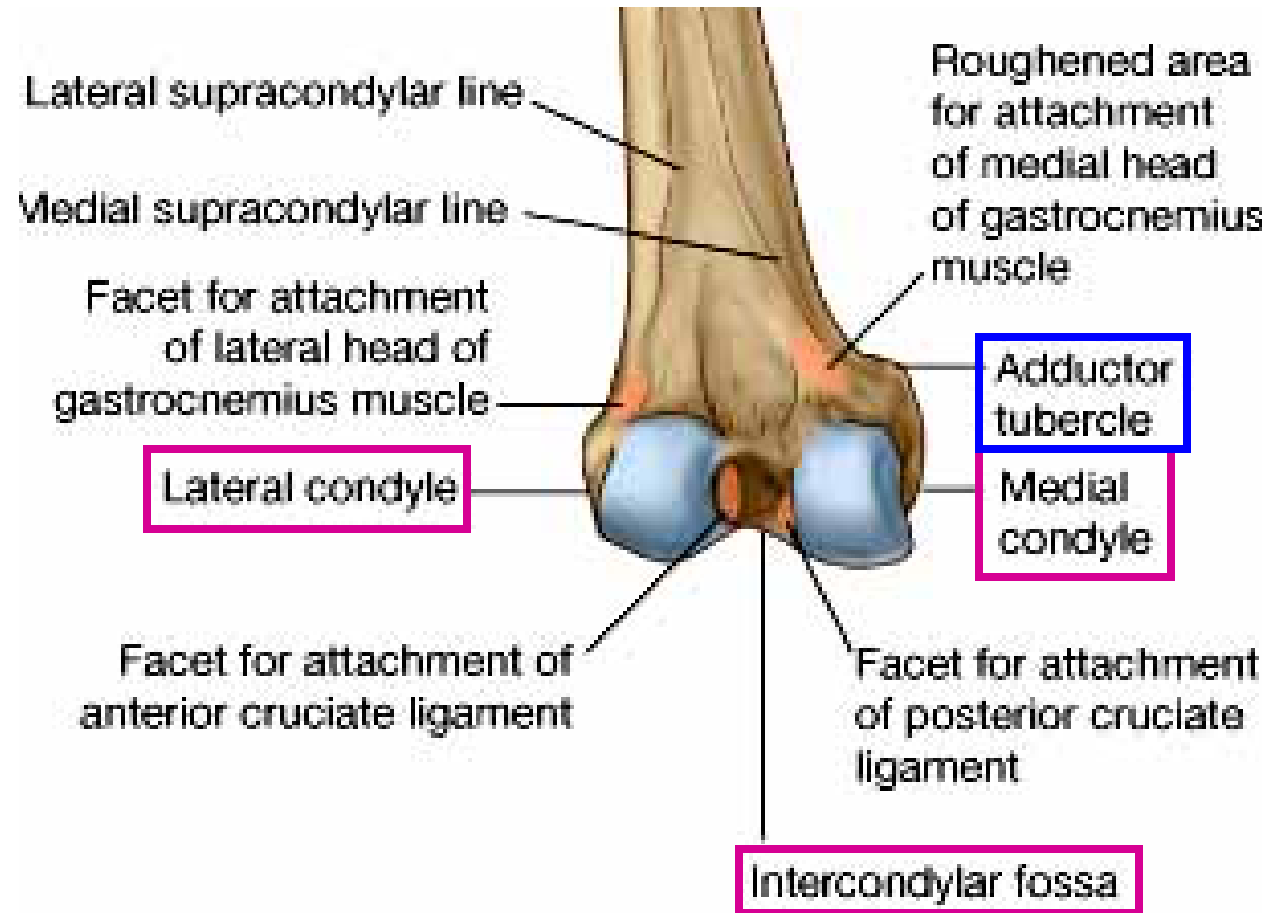
Femur: distal end-1

- **medial epicondyle; adductor tubercle** (adductor magnus m.)
- **lateral epicondyle**
- intercondylar notch (fossa): deep, posteriorly located
- articular cartilage: tibial surface; patellar surface



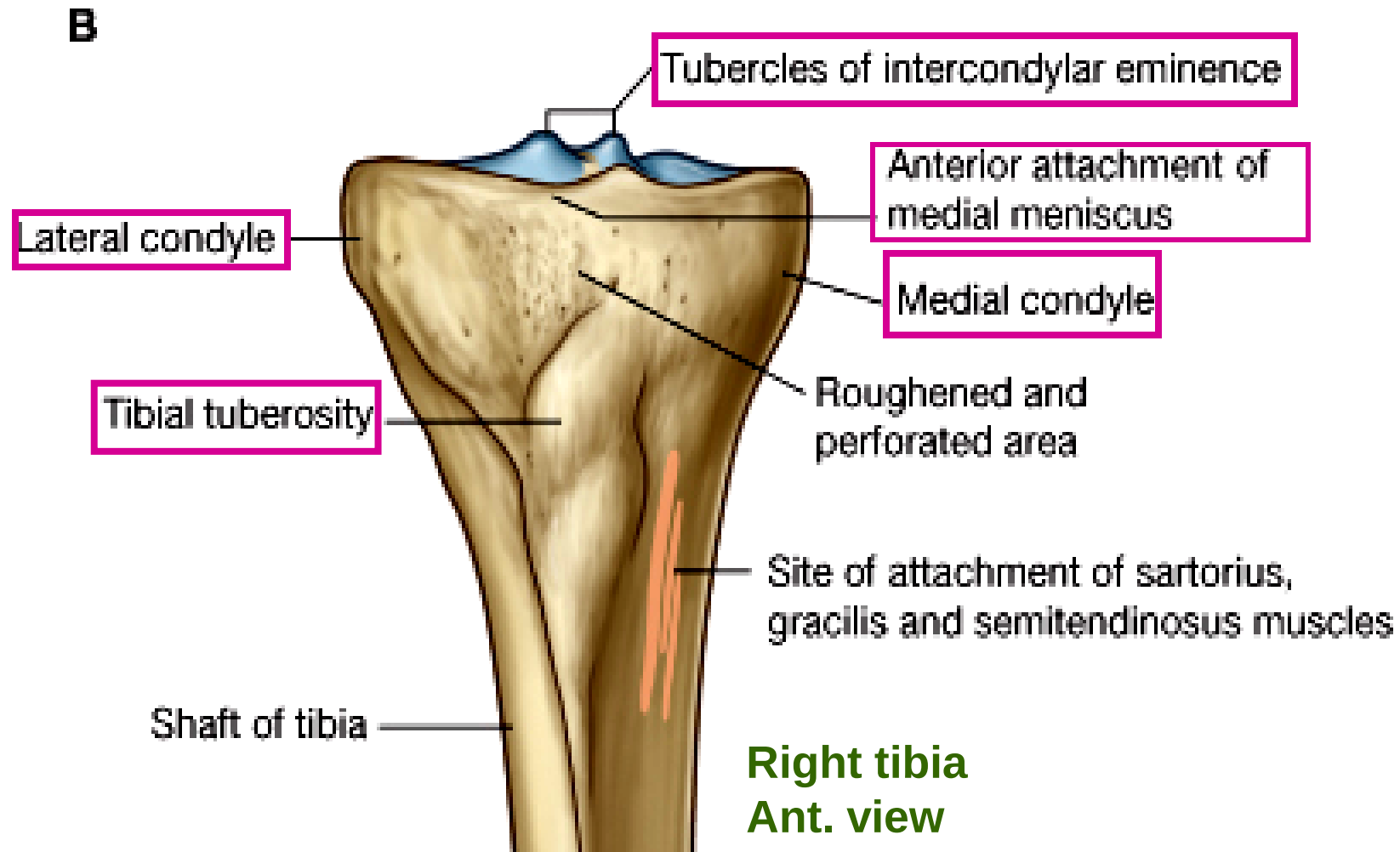
Femur: distal end-2

- **medial condyle**
- **adductor tubercle**
(adductor magnus m.)
- **lateral condyle**
- **intercondylar notch**
(fossa): deep,
posteriorly located
- **articular cartilage**: tibial
surface; patellar
surface



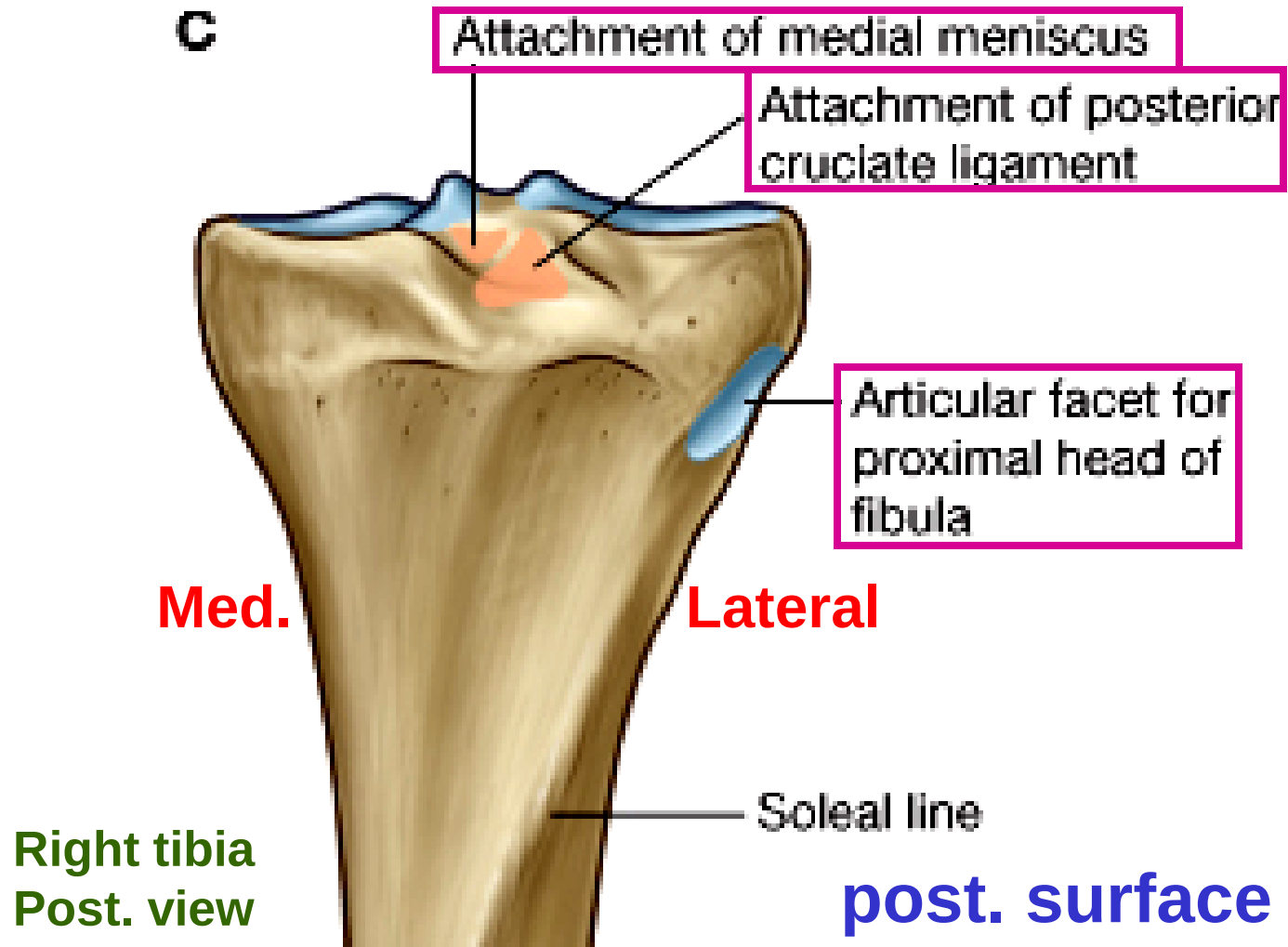
Tibia: proximal end-1

- medial condyle, lateral condyle; intercondylar area (intercondylar tubercles) for meniscus and lig.
- tibial tuberosity (tubercle): ligamentum patellae attachment



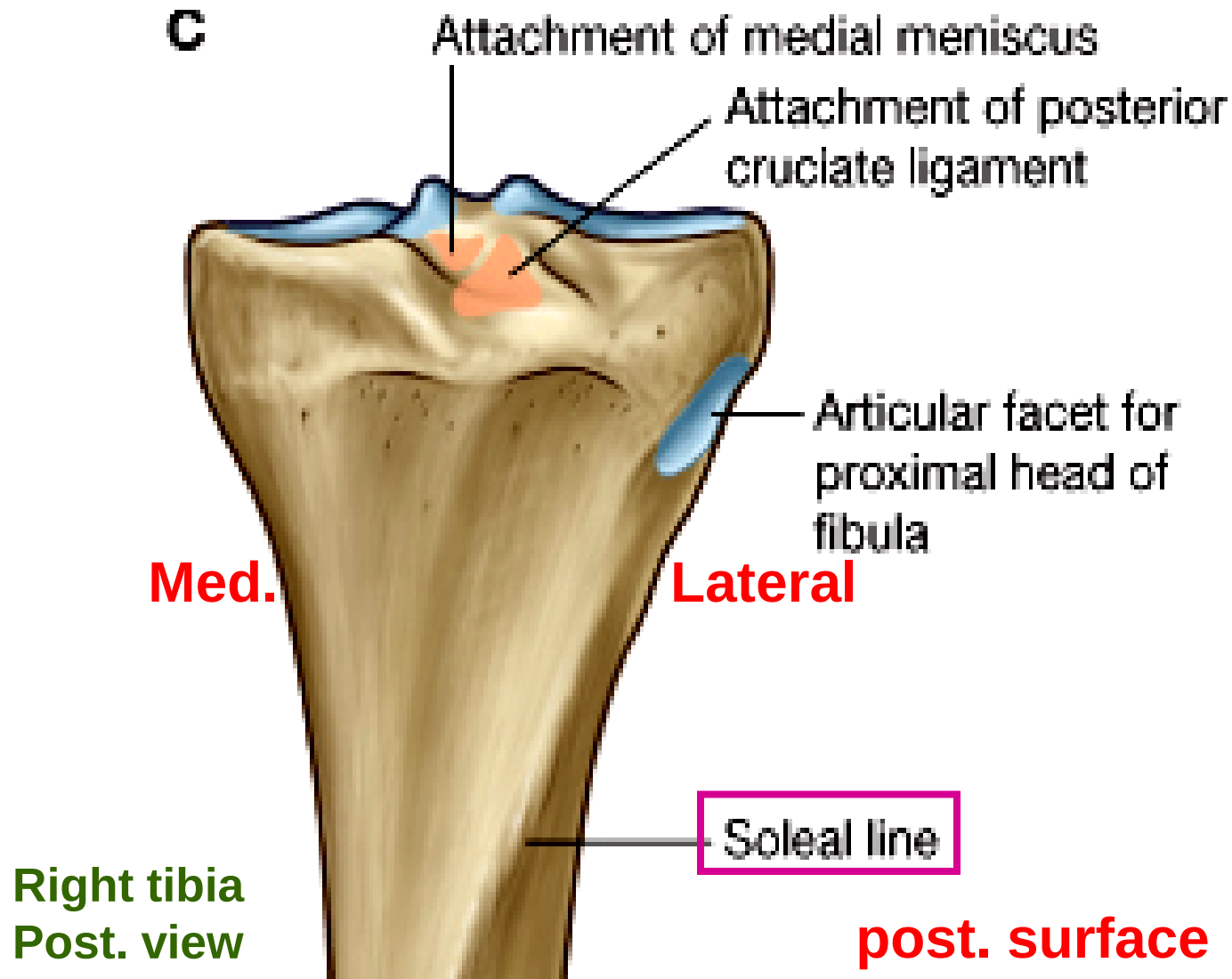
Tibia: proximal end-2

- intercondylar area (intercondylar tubercles): medial and lateral attachment of cruciate lig. & horns of med. and lat. menisci
- articular surface for head of fibula



Tibia: shaft

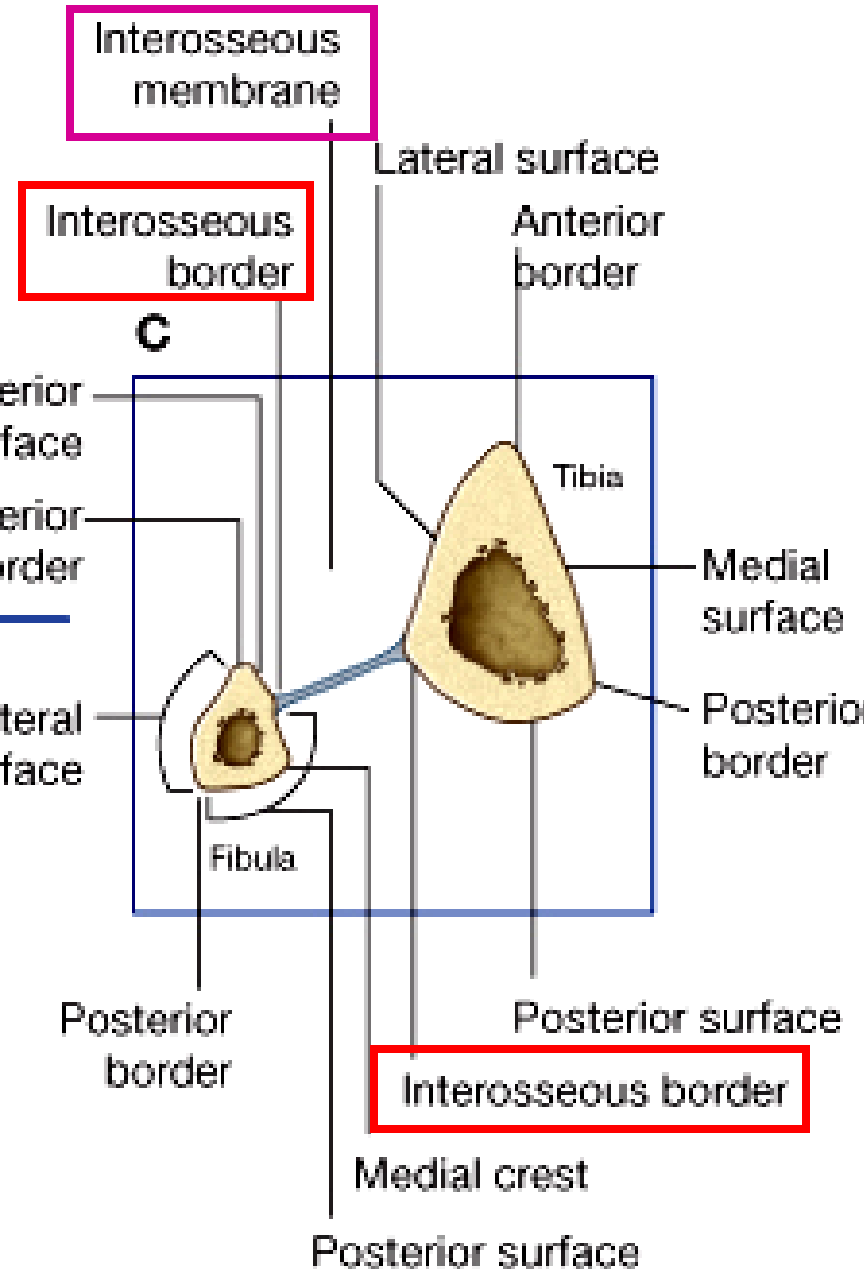
- **soleal line** (oblique line): on upper 1/3 of post. surface



- quadrangular in cross section
- med., lat., post. surfaces
- ant. (subcutaneous) interosseous, posteromedial borders

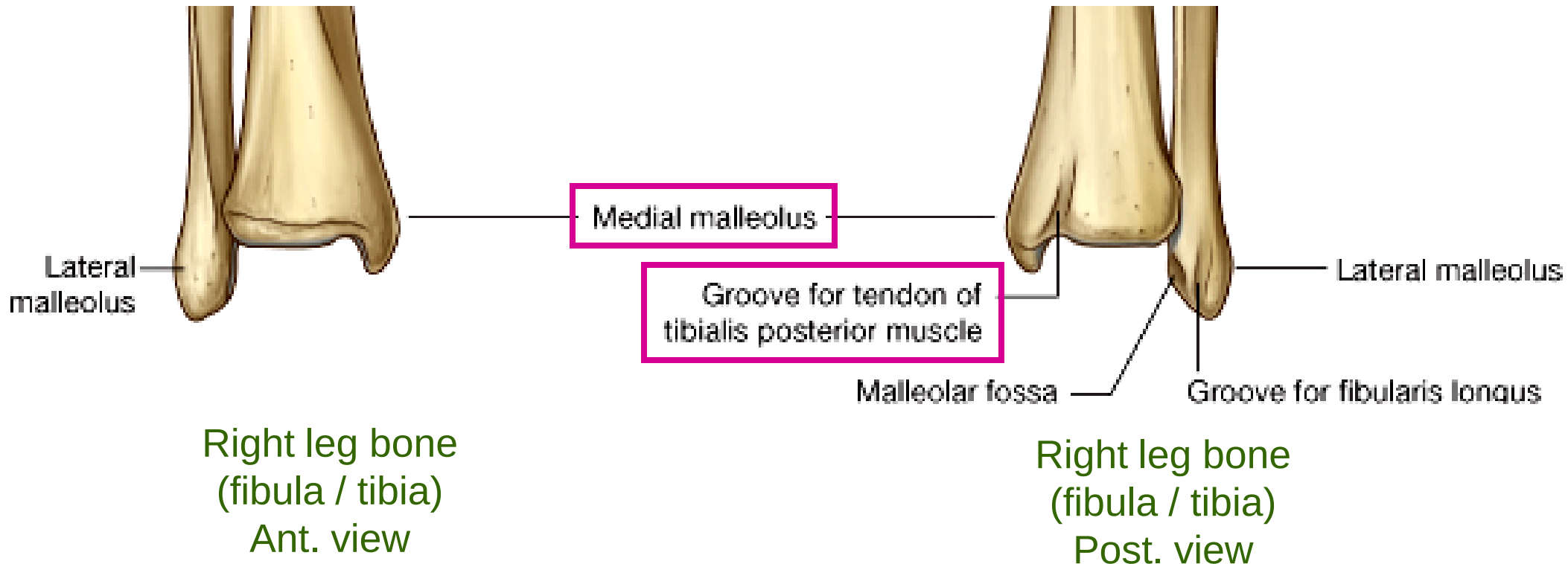
Anterior-
border

Interosseous-
border



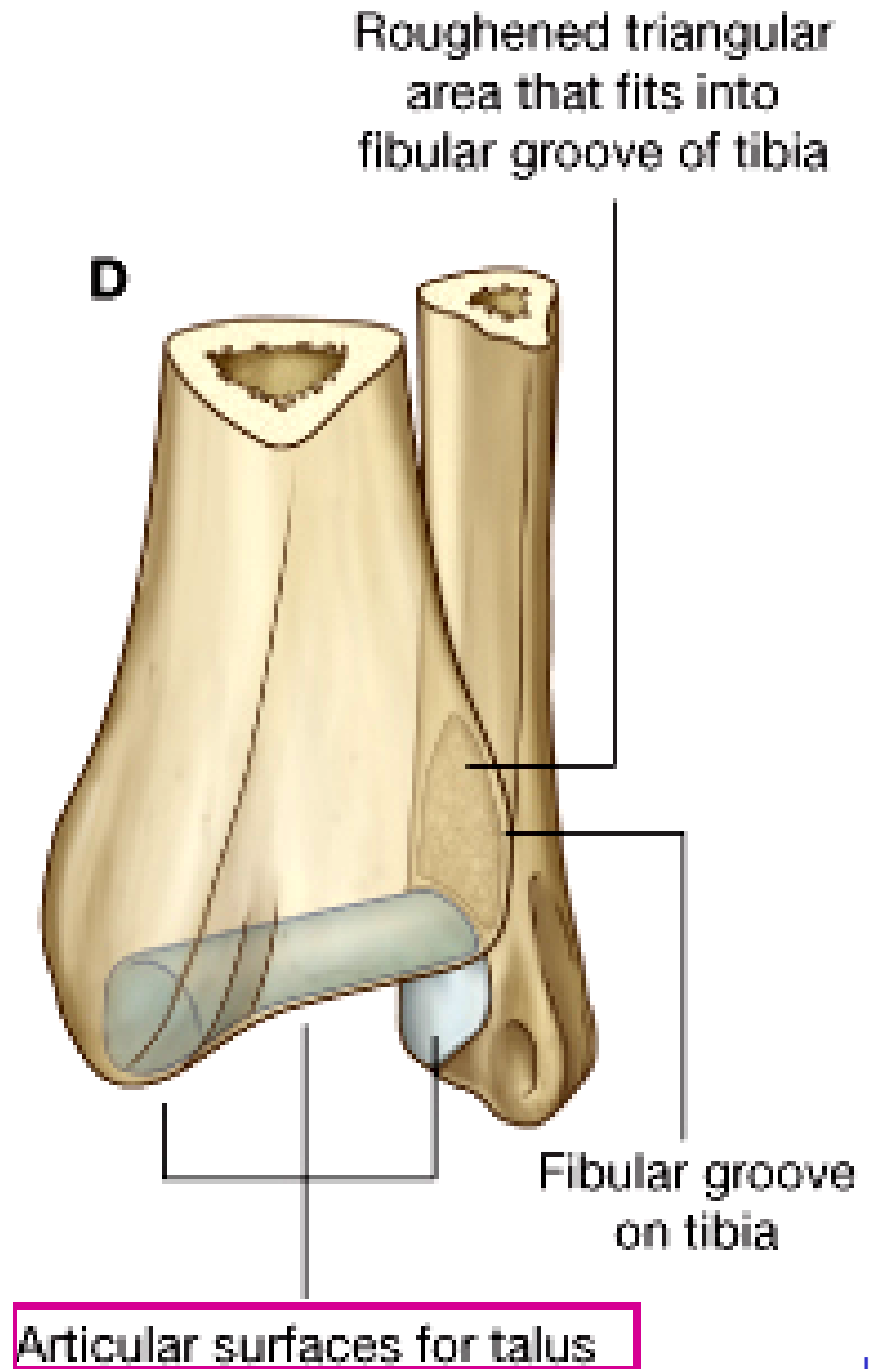
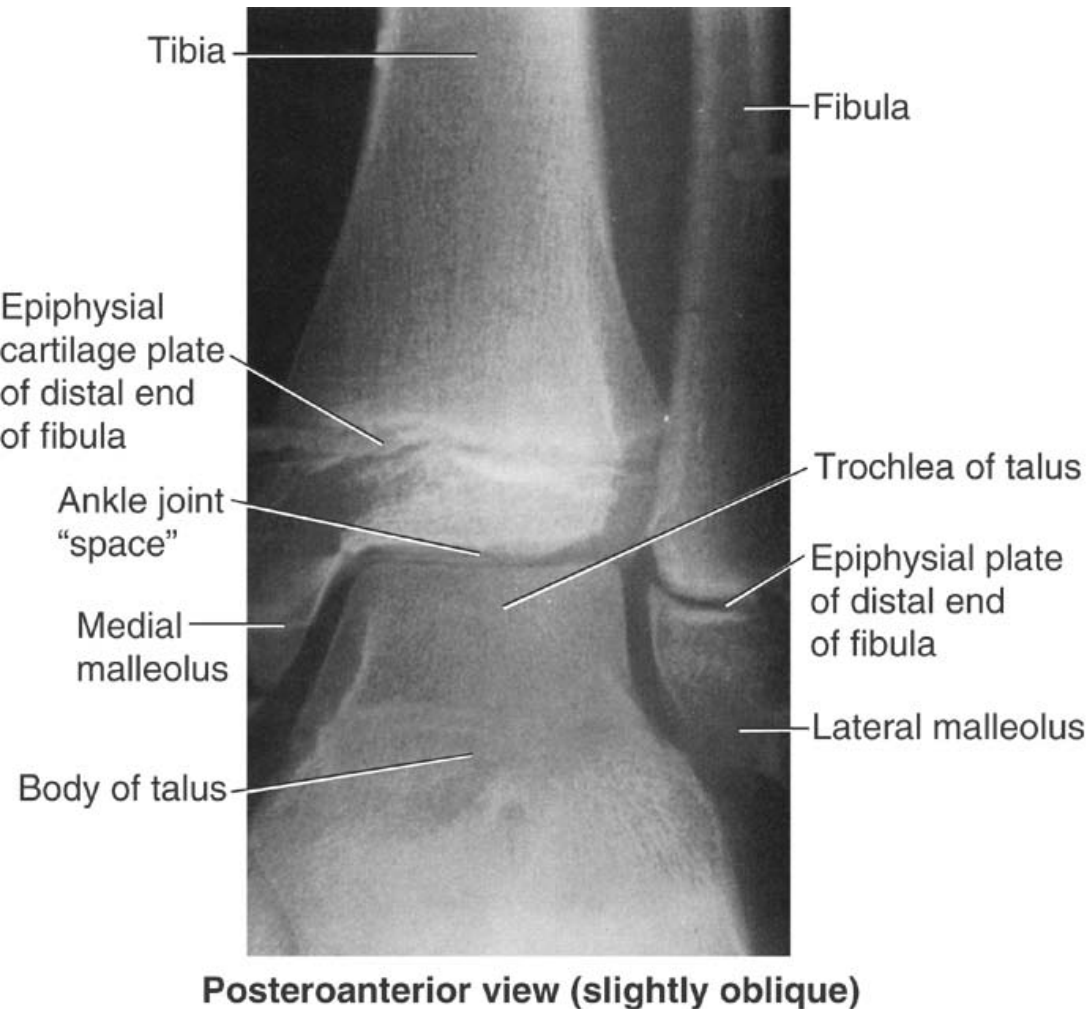
Tibia: distal end

- **medial malleolus**: groove for tibialis posterior



Tibia: with Talus

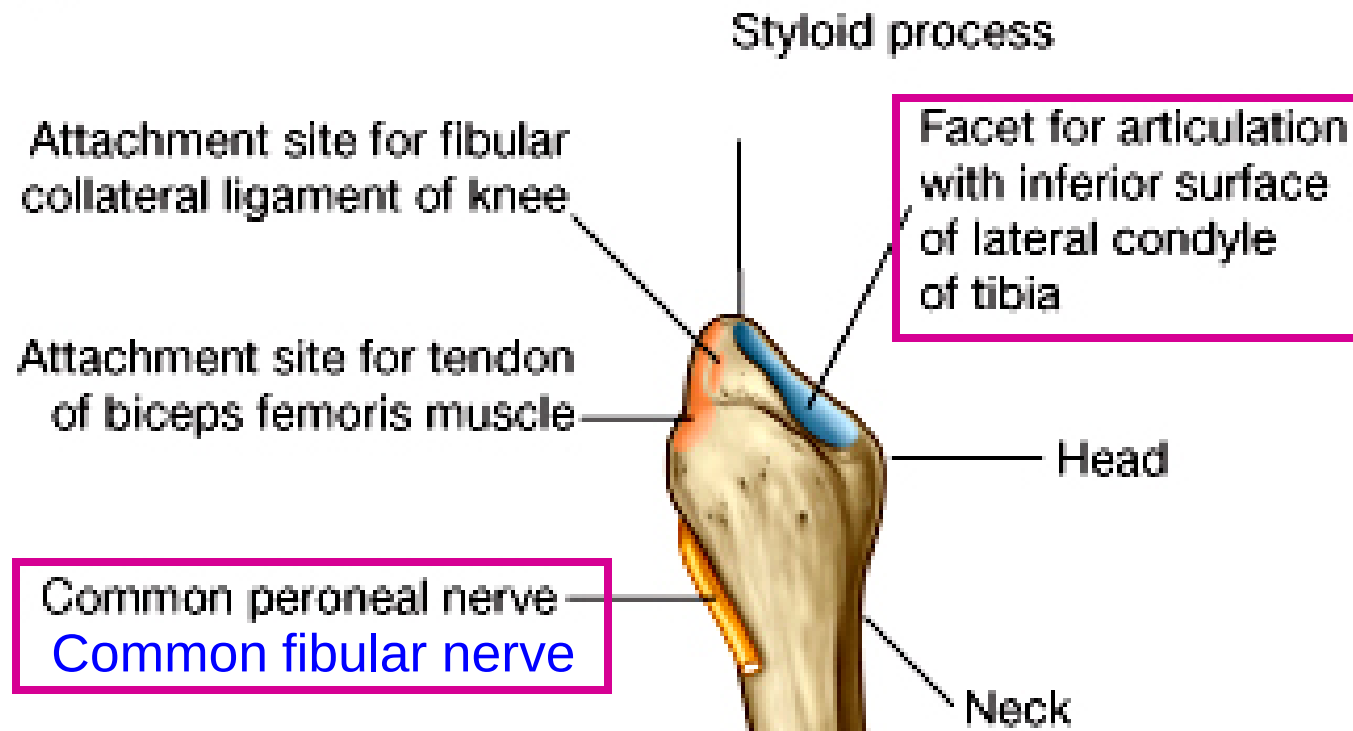
- inferior articular facet for talus (trochlea)



Fibula: head

- Surface anatomy of fibular head
- Articular surface with tibia
- apex of head (styloid process)

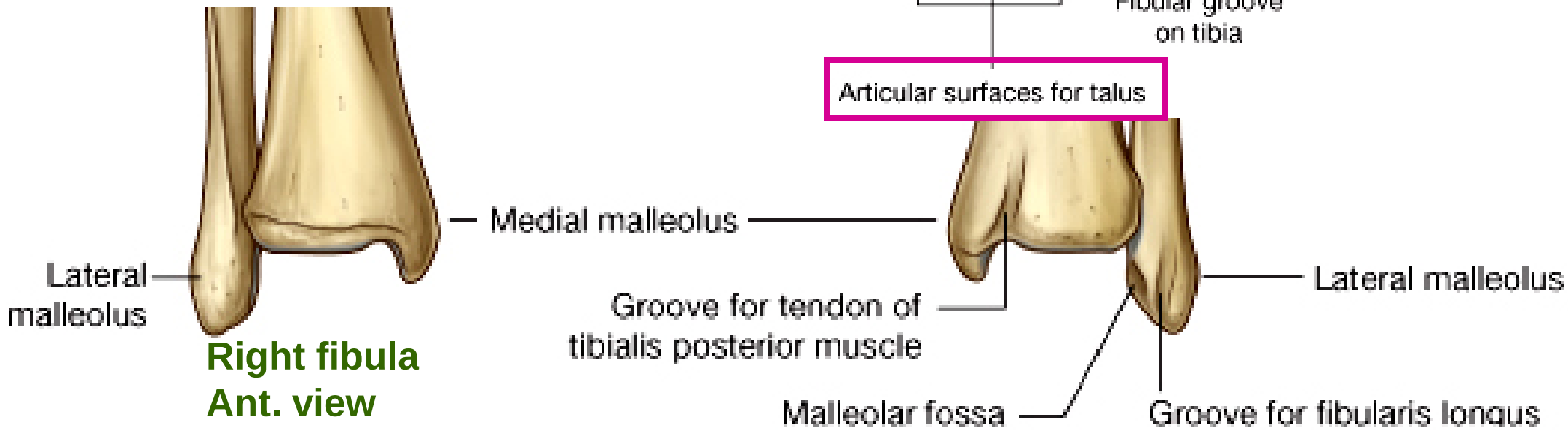
A



**Right fibula
Ant. view**

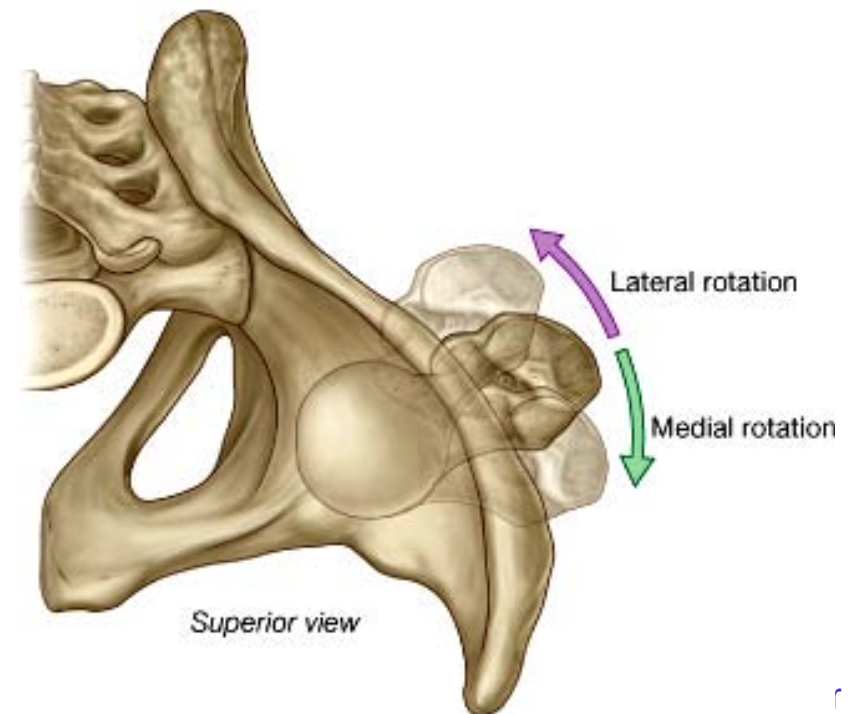
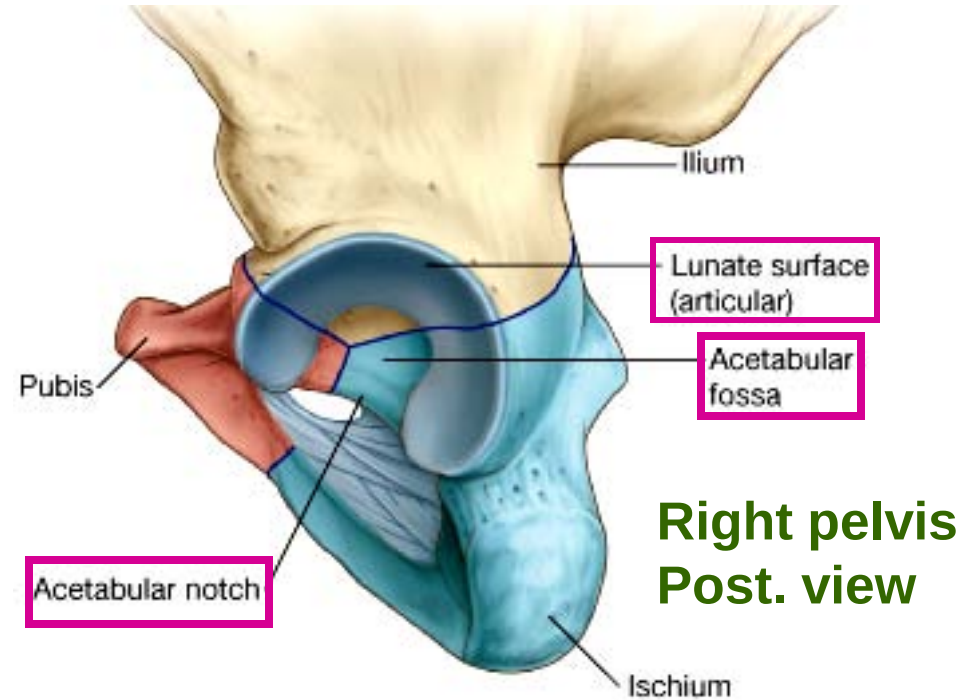
Fibula: distal end

- lateral malleolus
- articular facet for talus



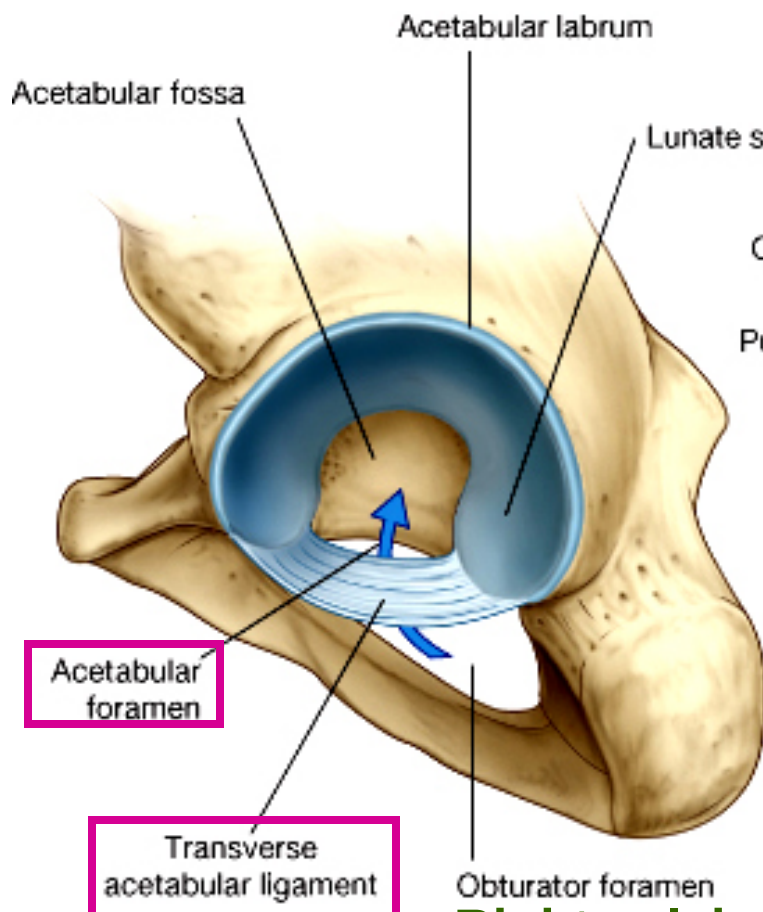
Acetabulum

- Acetabular fossa
- Acetabular notch
- Articular (lunate) surface
- Ligaments
 - Transverse acetabular ligament
 - Ligament of femoral head
 - Iliofemoral ligament
 - Ischiofemoral ligament
 - Pubofemoral ligament

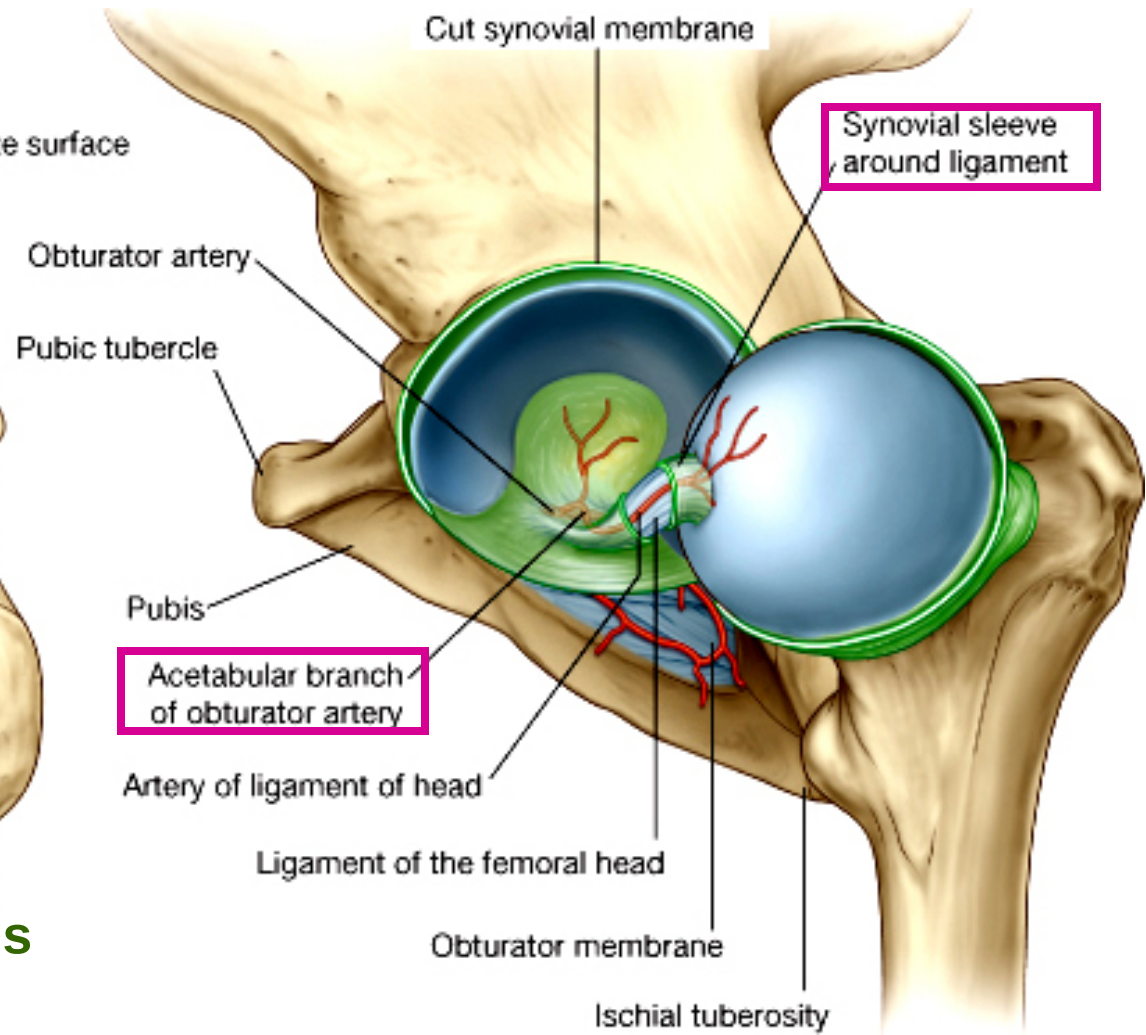


Transverse acetabular ligament

- **transverse acetabular lig.:** connecting the ant.& post. ends of the articular cartilage
- vessels, n. to head run deep to this lig.

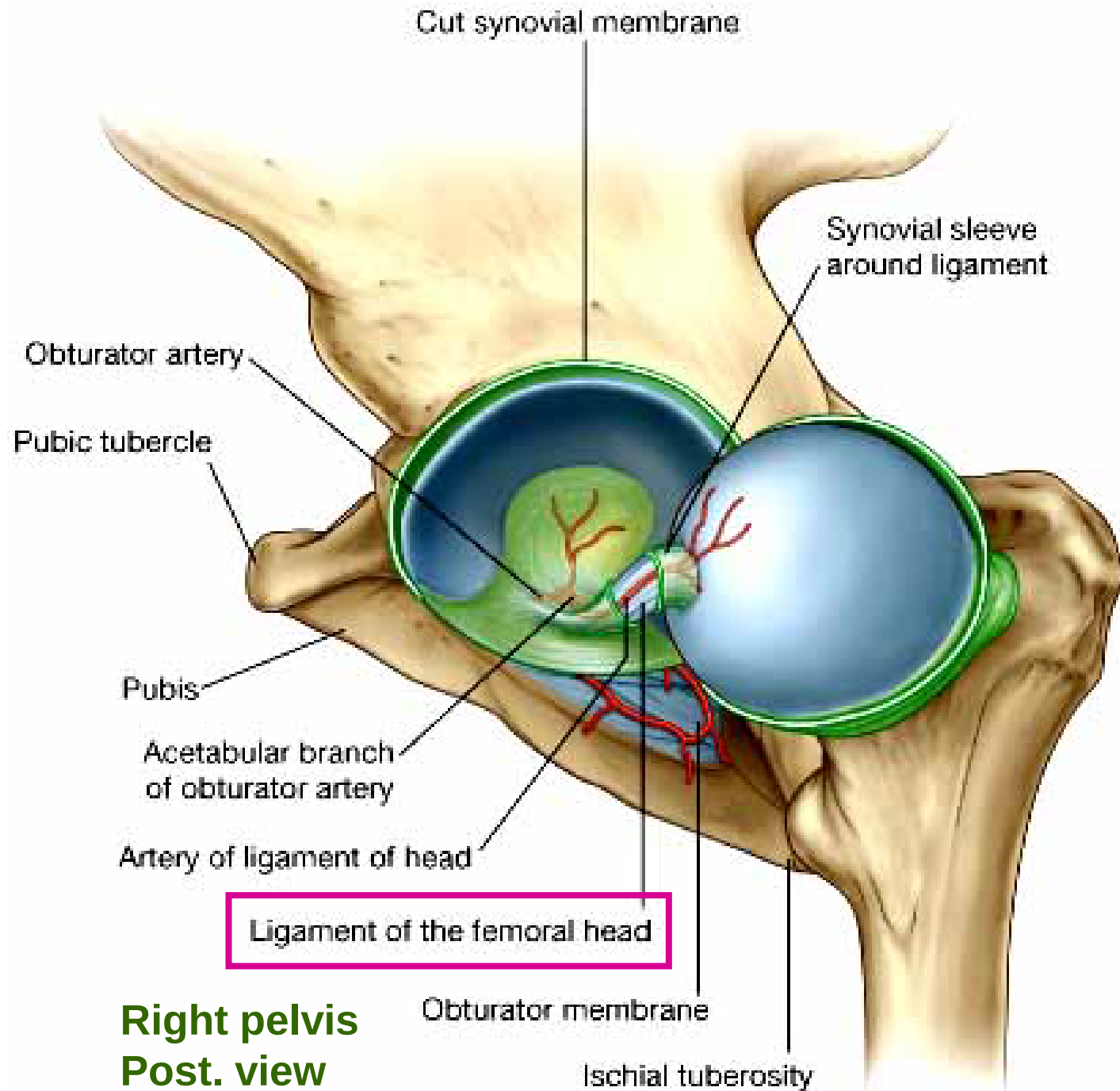


Right pelvis
Post. view



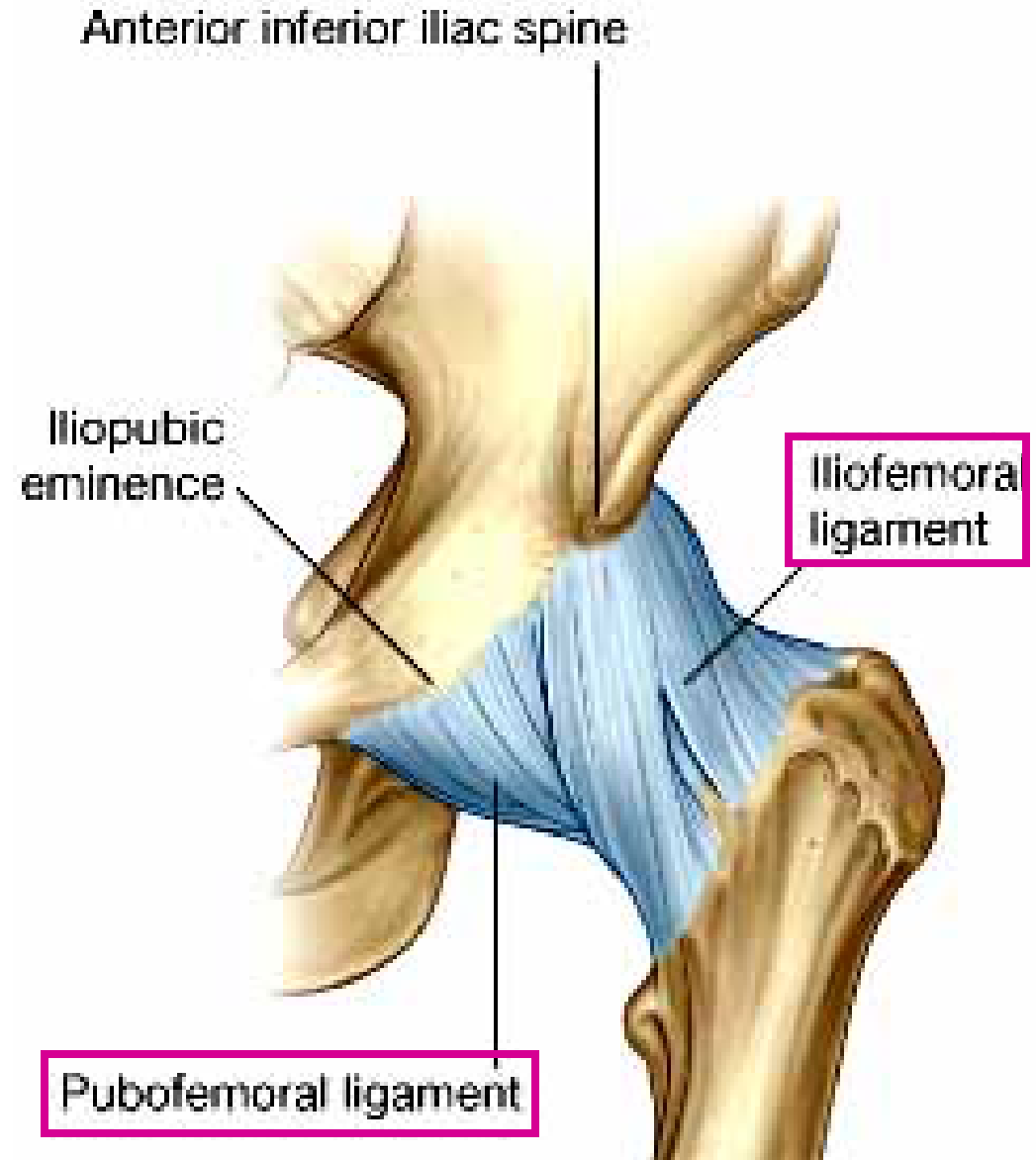
Ligament of femoral head

- **lig. of the head of the femur:**
acetabular notch → fovea of the head of femur
- surrounded by synovial sheath; conveys vessels in childhood
- minimal effect for strength



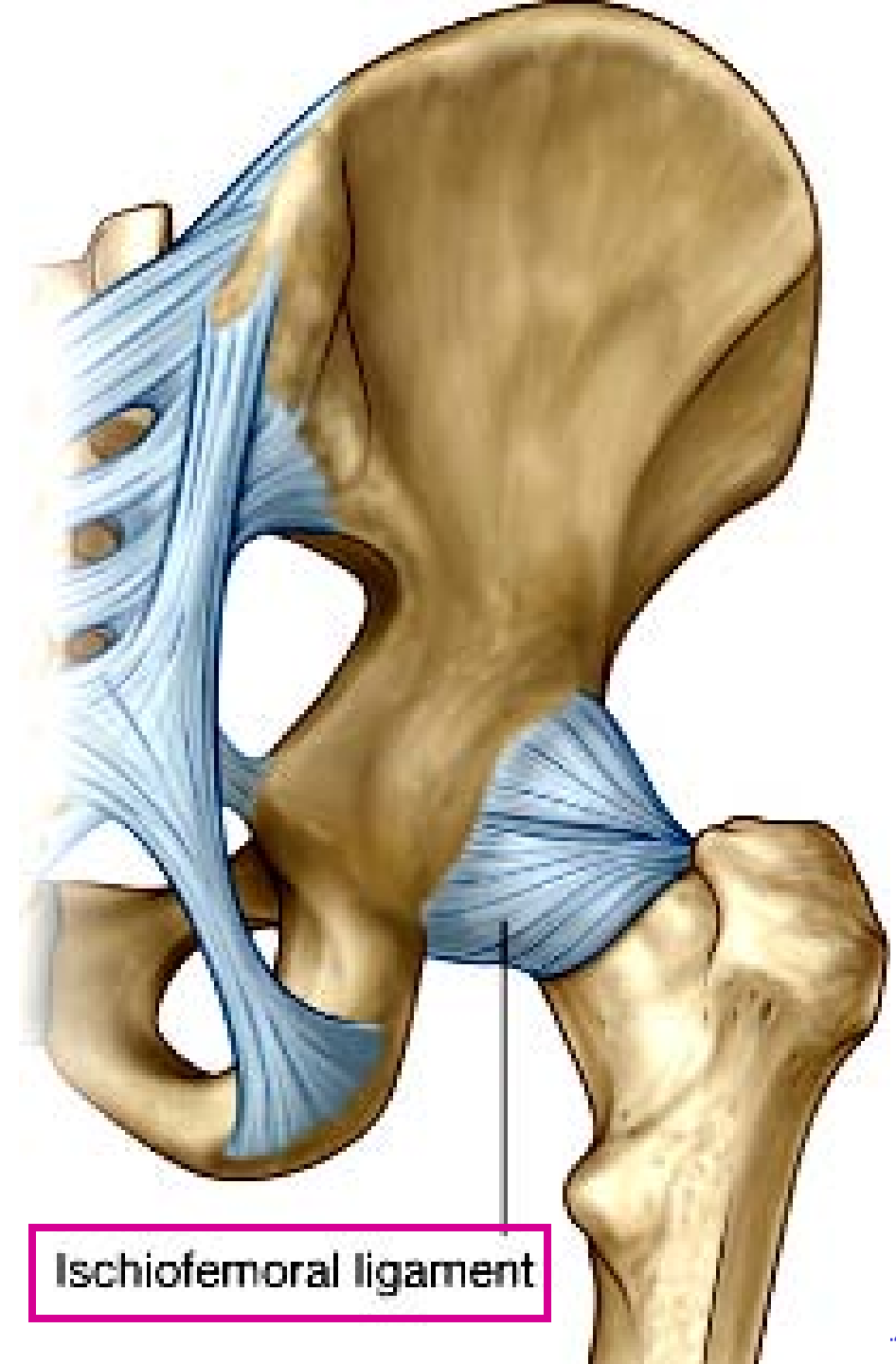
Acetabulum: Ligaments-1

- **Iliofemoral lig.**
 - inverted Y; aiis, ilium → intertrochanteric line
- **Pubofemoral lig.**
 - Iliopubic eminence → iliofemoral lig.



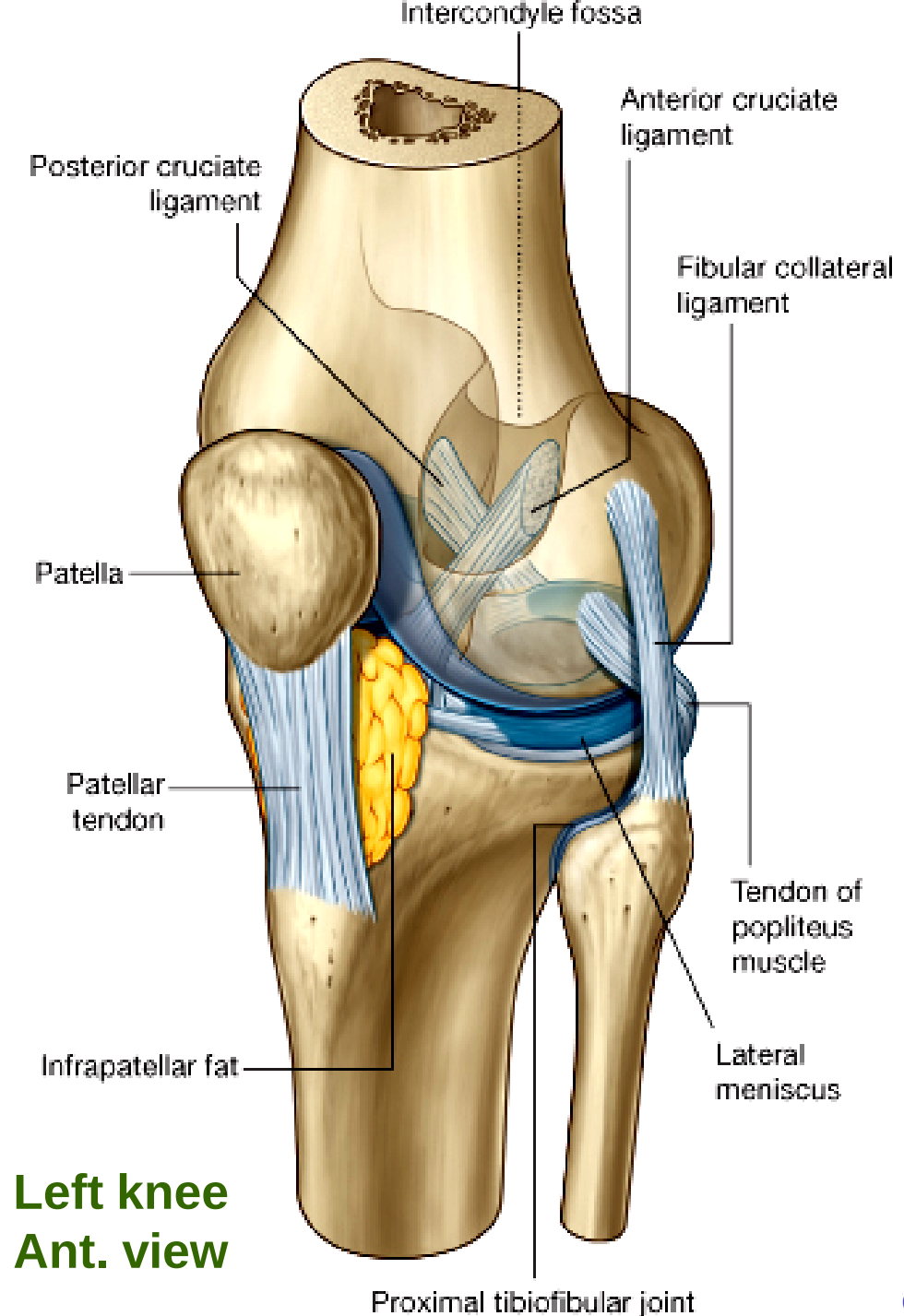
Acetabulum: ligaments-2

- **Ischiofemoral lig.**
 - ischium of acetabulum rim → med. aspect of greater trochanter



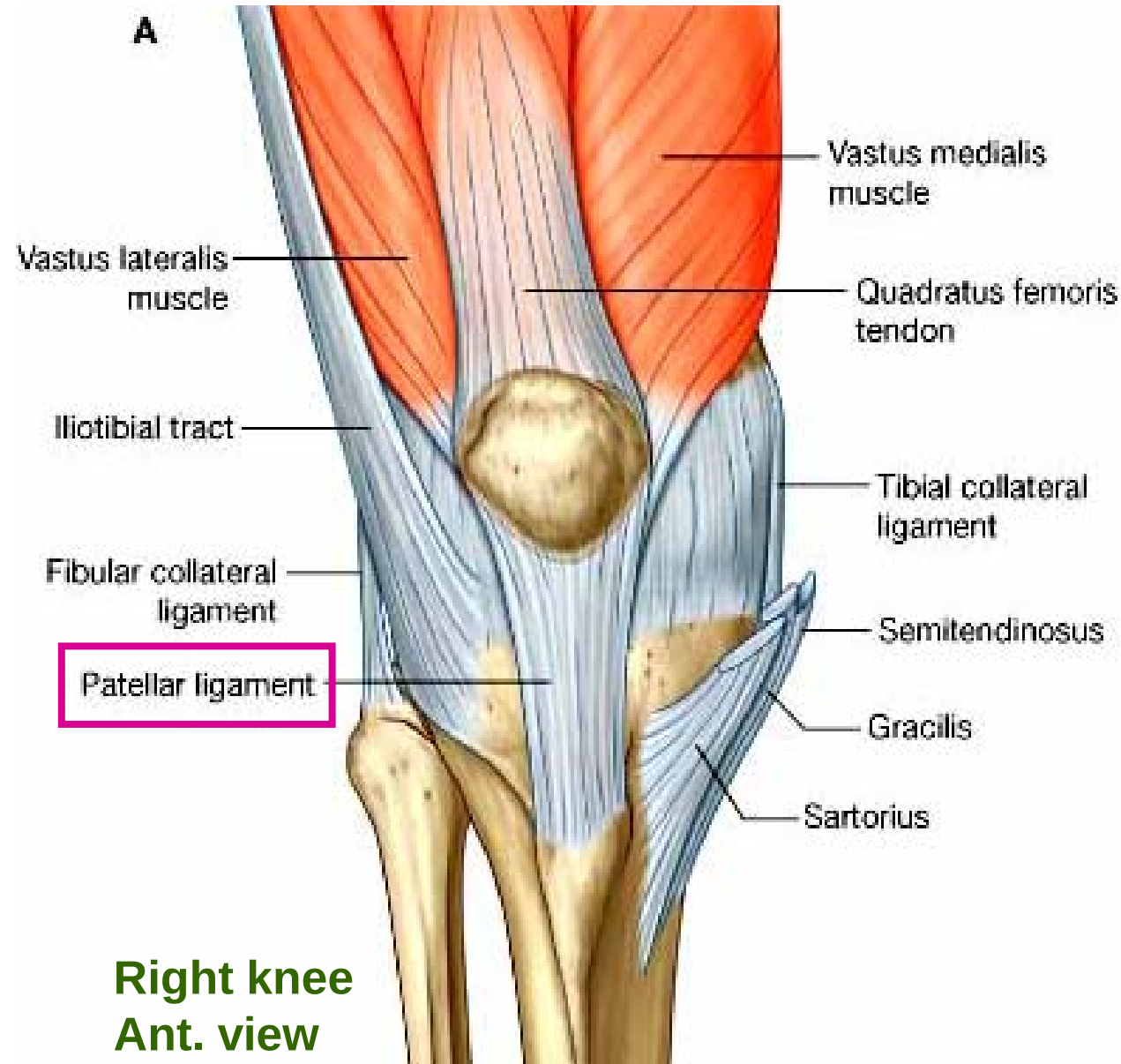
Knee Joint

- Weight-bearing
- 3 joint compartments:
- 1) medial compartment: medial condyle (femur) + tibia
- 2) lateral compartment: lateral condyle (femur) + tibia
- 3) patella + femur



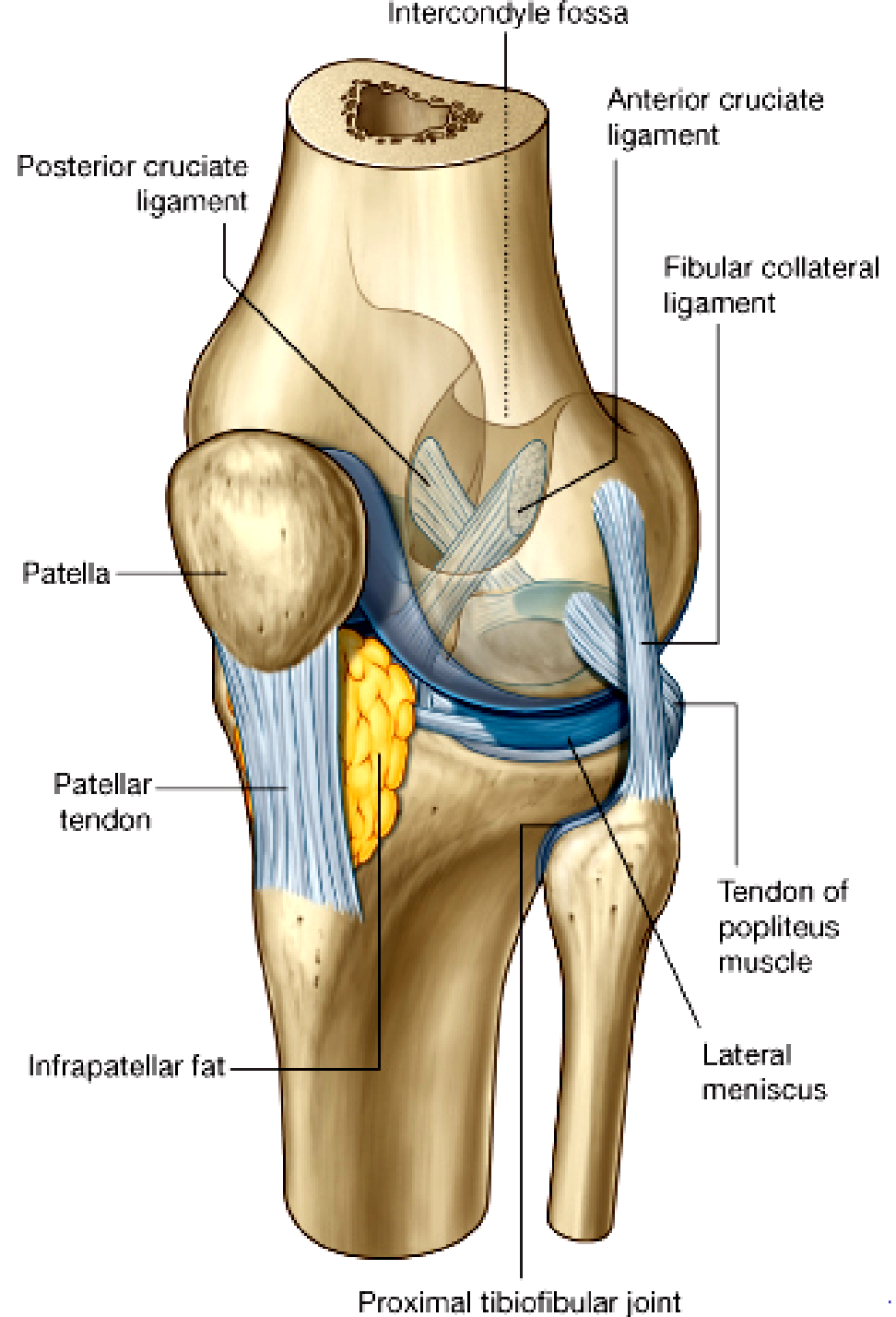
Patella

- ligamentum patellae (patellar lig.)
- Continuation of quadriceps femoris tendon above to apex of patella, below to tibia tuberosity



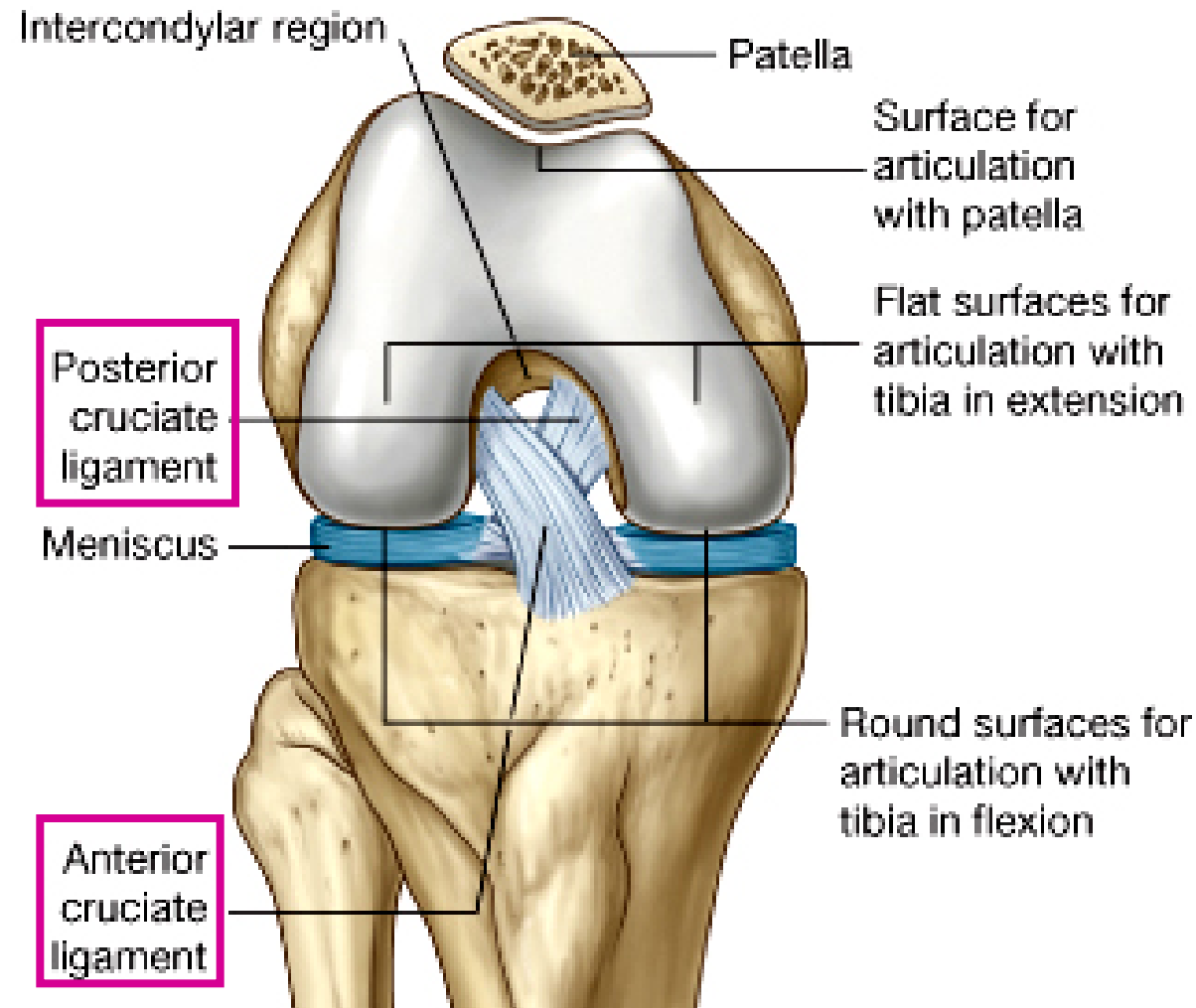
Tibio-femoral joint compartment

- 4 ligaments:
- 1) **medial (tibial) collateral lig.**
- 2) **lateral (fibular) collateral lig.**
- 3) **ant. cruciate lig.**
- 4) **post. cruciate lig.**



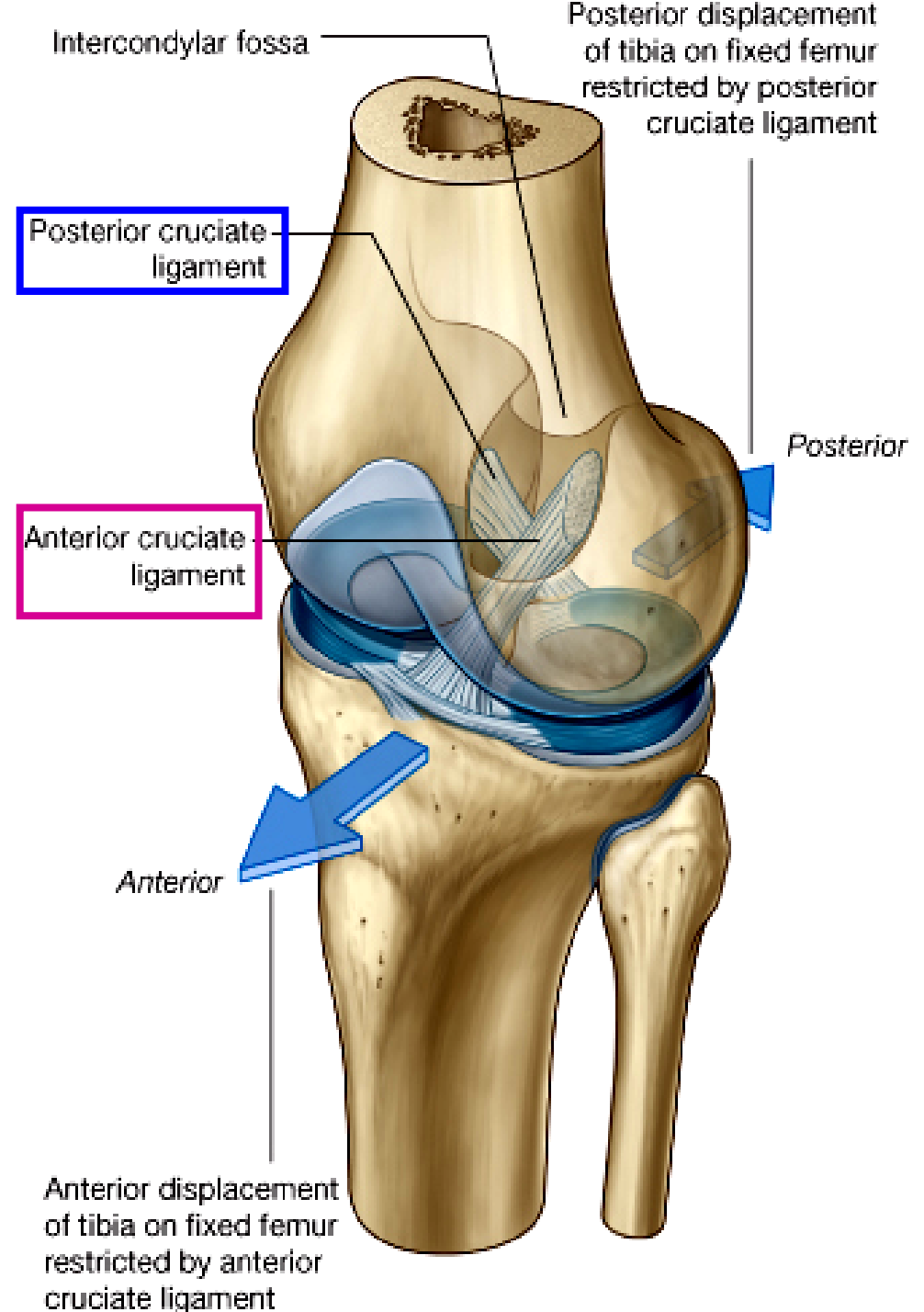
Cruciate ligaments (anterior view)

- ant. cruciate: ant. intercondylar area of tibia to lateral wall of intercondylar fossa of femur
- post. intercondylar area of tibia to medial wall of intercondylar fossa of femur
- (前外後内)

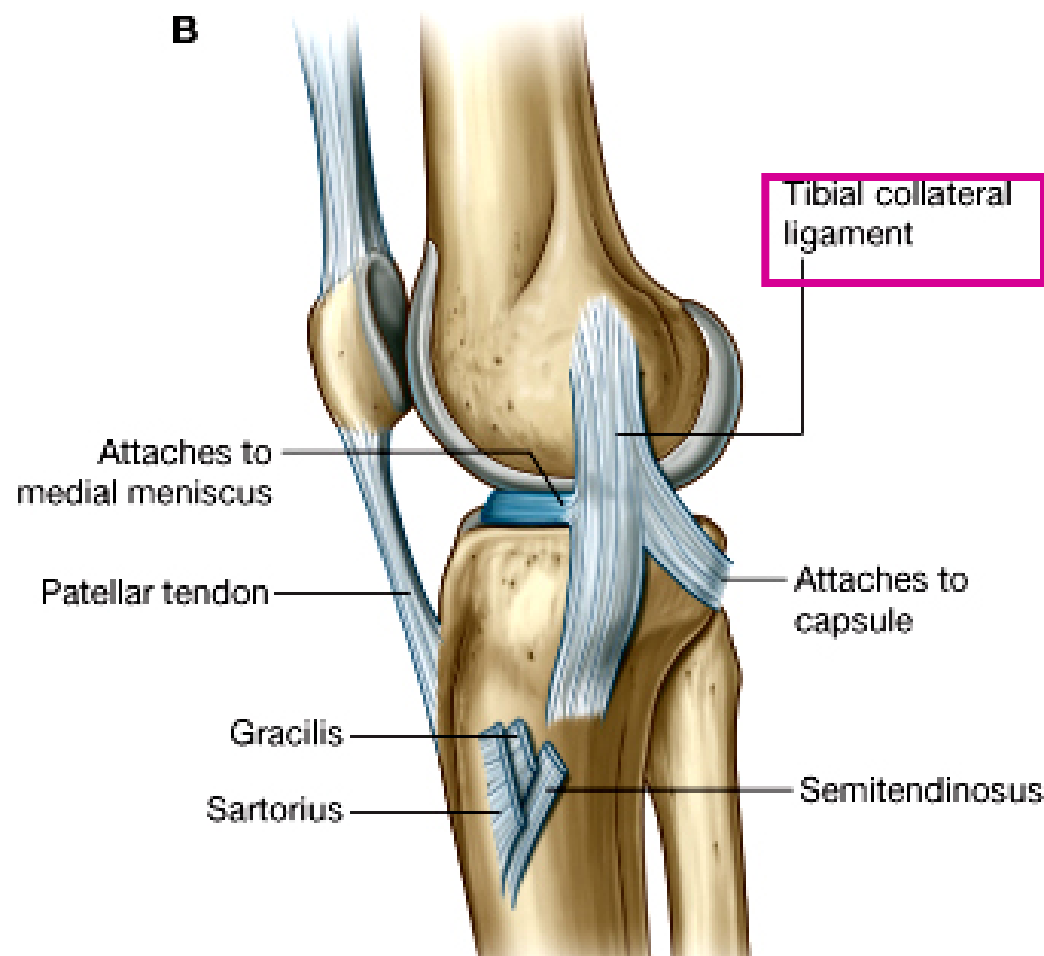
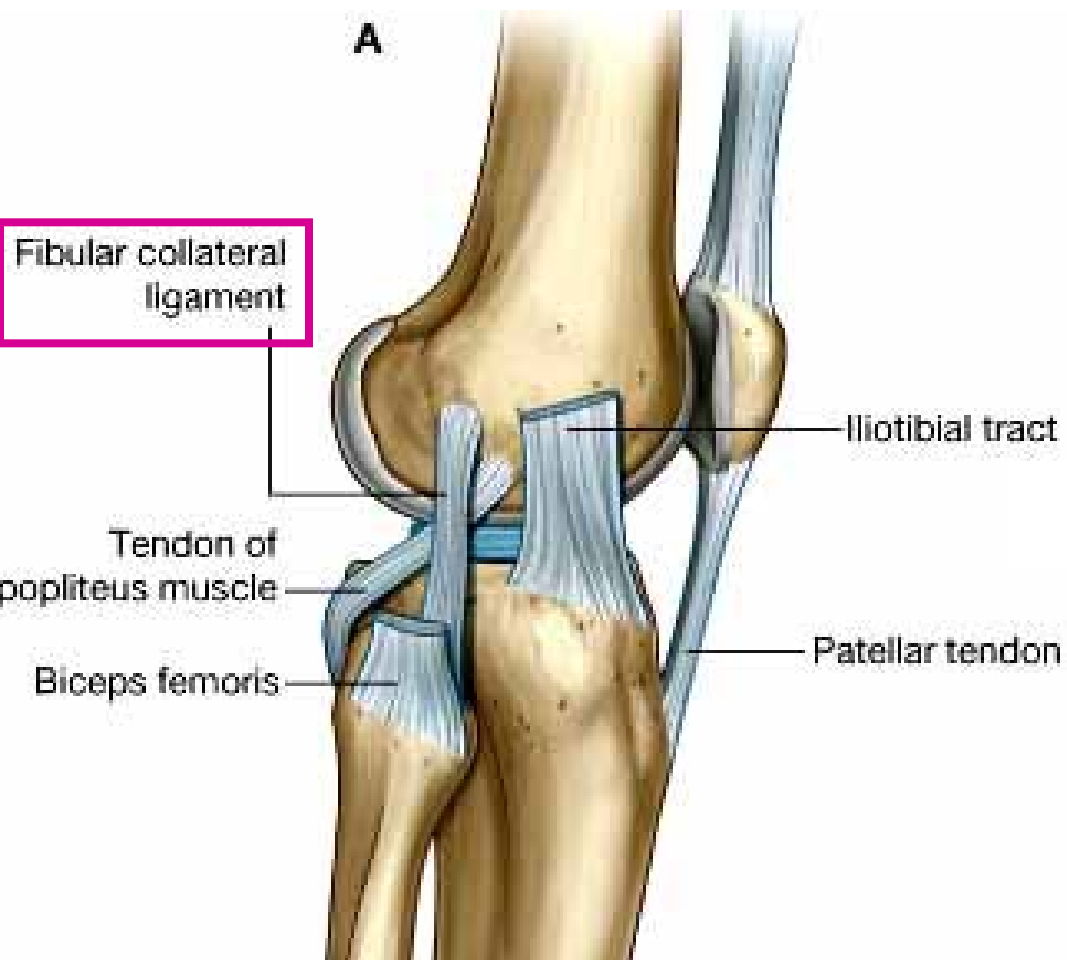


Knee: cruciate ligaments

- interconnect femur and tibia
- ant. cruciate: ant. intercondylar area of tibia to lateral wall of intercondylar fossa of femur
- post. intercondylar area of tibia to medial wall of intercondylar fossa of femur
- limitations of extreme anterior and posterior displacements of tibia on fixed femur

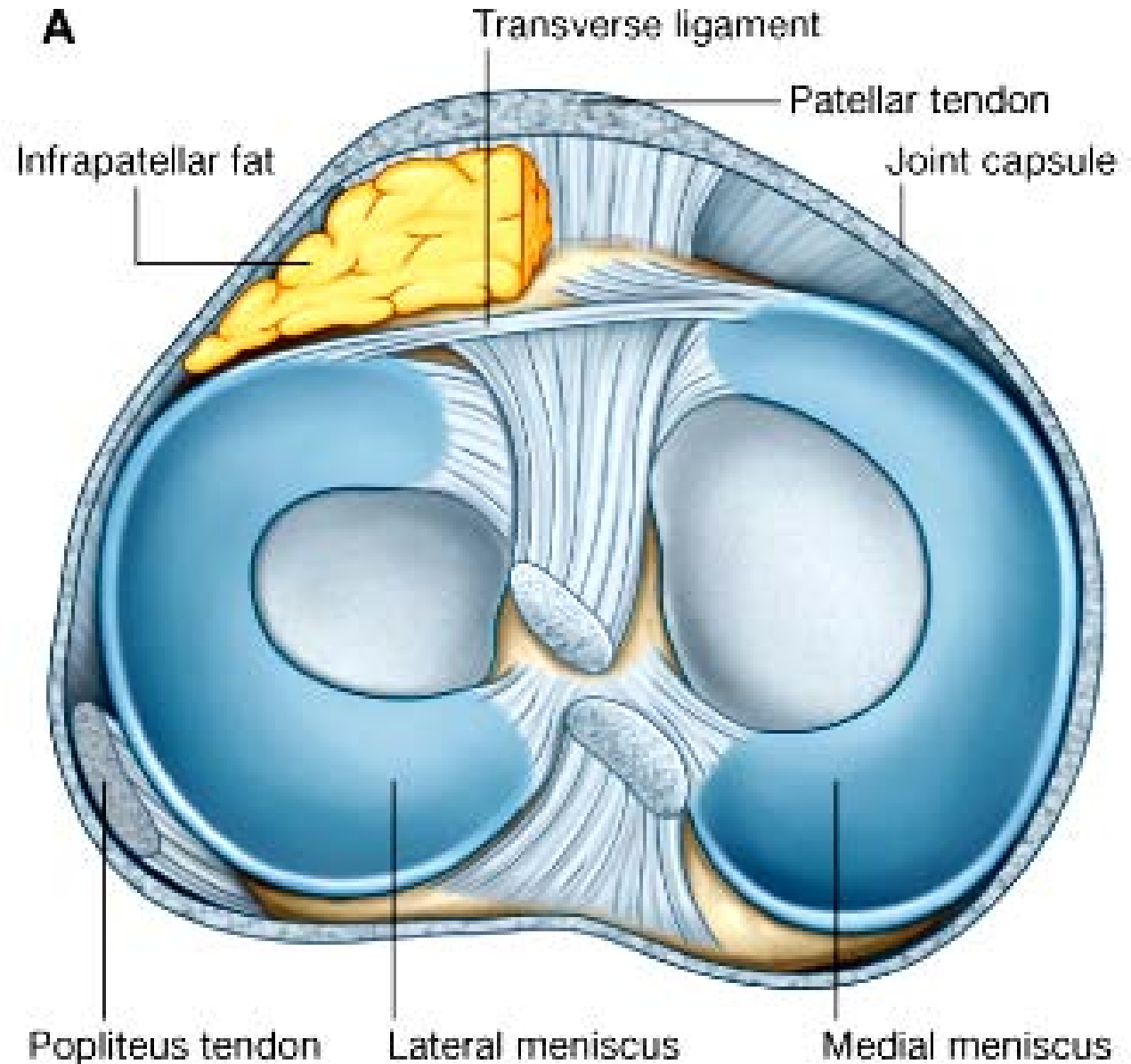


Knee: collateral ligaments



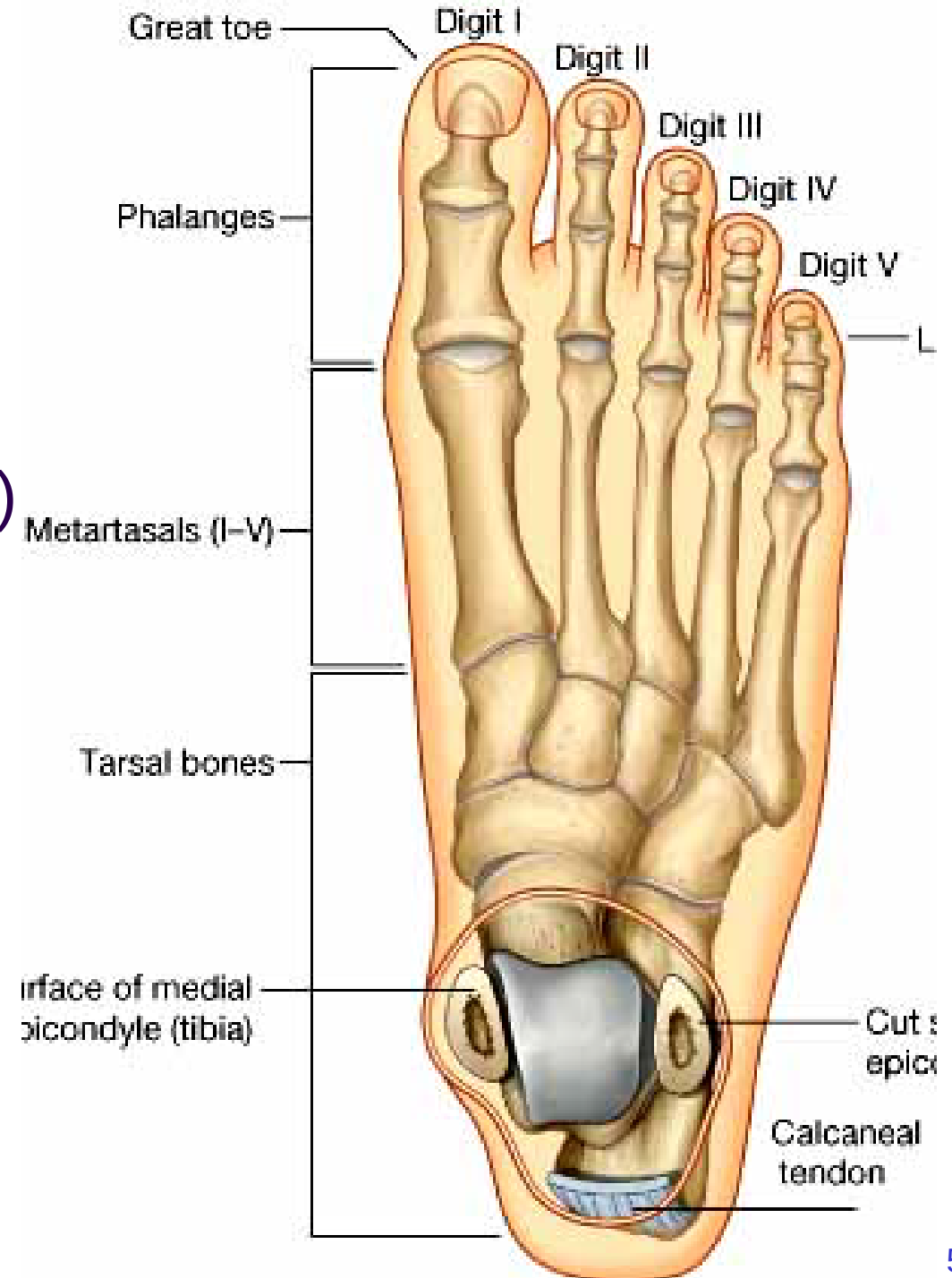
Meniscus

- **Medial meniscus:**
fibrocartilage; wide-C shaped;
periphery attaches
to joint capsule
- **Lateral meniscus:**
more circular in
shape



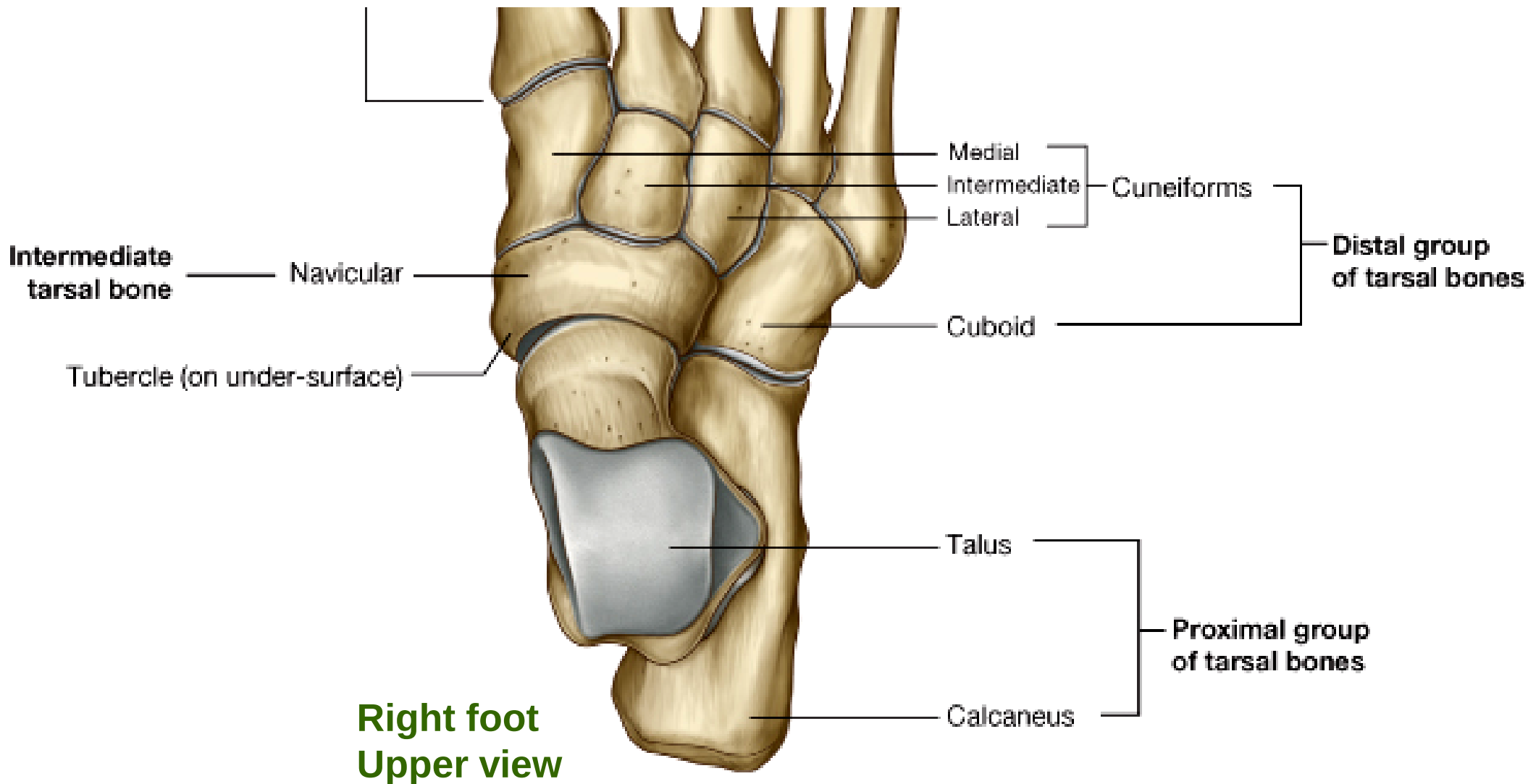
Bones of the foot

- Tarsal bones
- Metatarsal bones
- Phalanges (pl. of phalax)



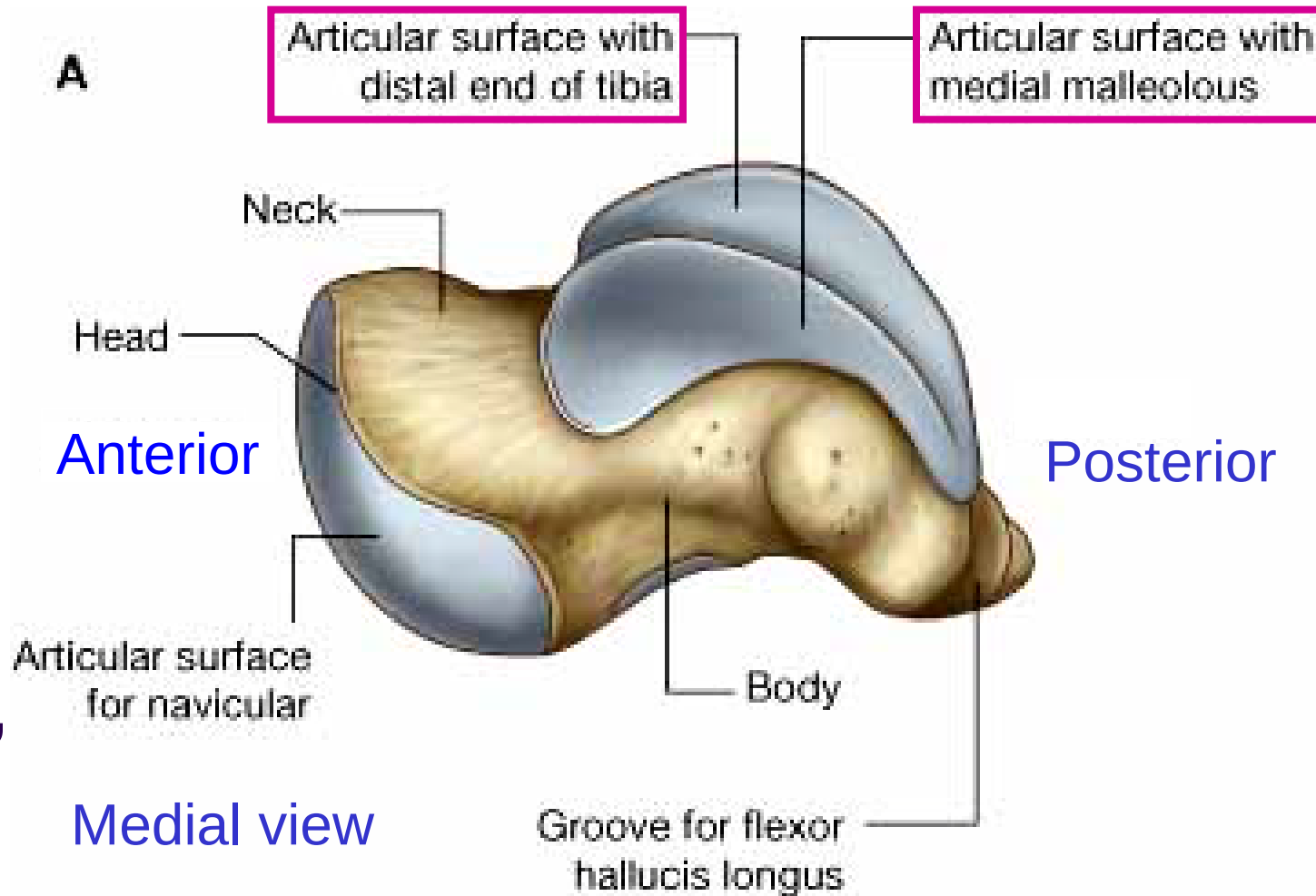
Tarsal bones: proximal row

- Proximal row: Talus, Calcaneus (Calcaneum), Navicular



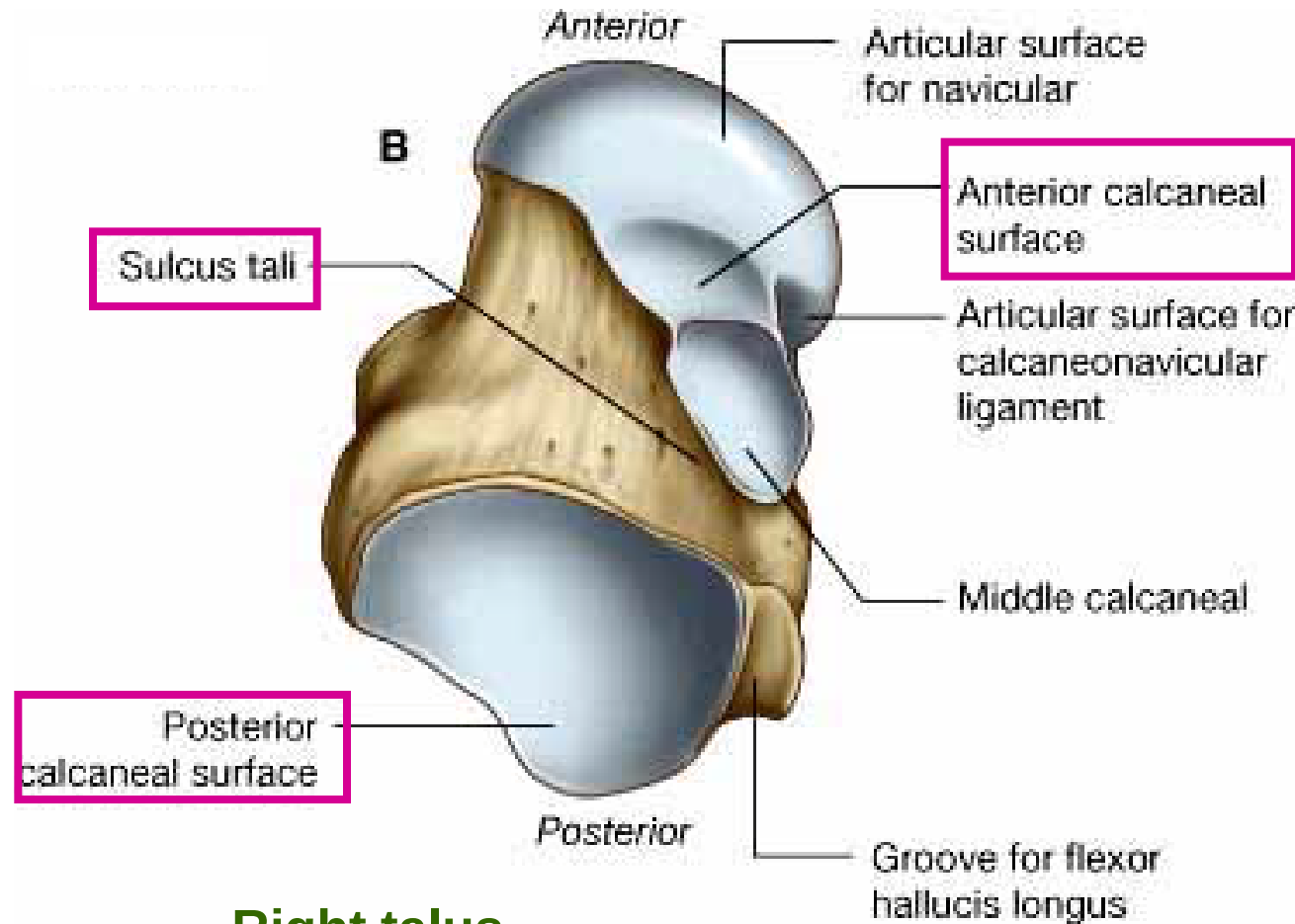
Talus-1

- Head: articulate with Navicular
- Body
 - superior articular facet (trochlear) ↔ tibia
 - medial facet: smaller, comma-shaped ↔ medial malleolus
 - lateral facet: larger, triangular shape ↔ lateral malleolus



Talus-2

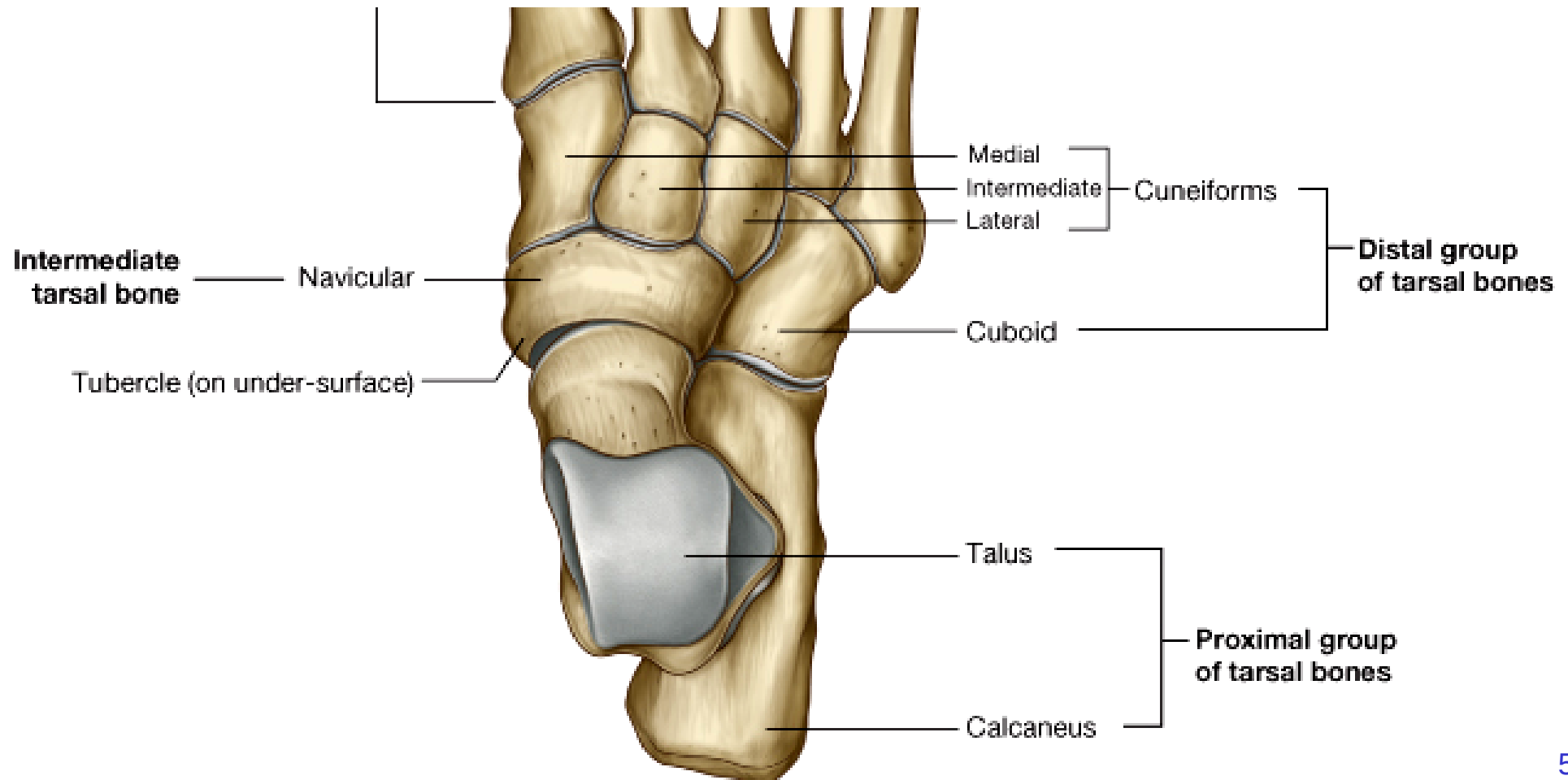
- Inferior surface: divided by **sulcus tali** (for interosseous lig.) into ant. & post. parts
- anterior part: 2 smaller facet $\leftrightarrow$ Calcaneum
- posterior part: 1 large facet $\leftrightarrow$ Calcaneus (**post. talocalcaneal joint**)



Right talus
Inf. view

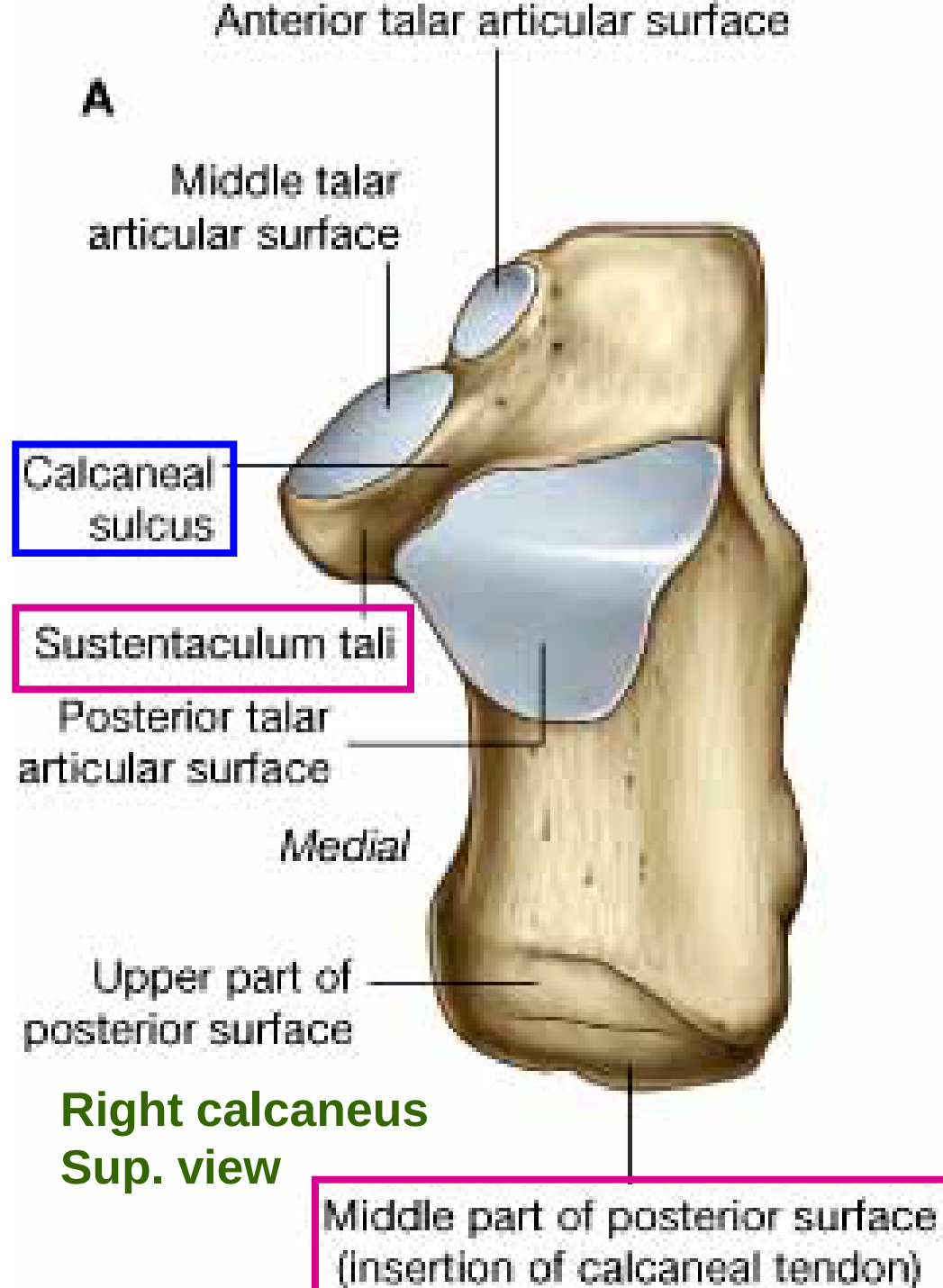
Talus-3

- transfers body weight
- postero-inferiorly to calcaneum which relays it to ground
- antero-inferiorly to calcaneum and navicular, through which to distal row of tarsus and metatarsus



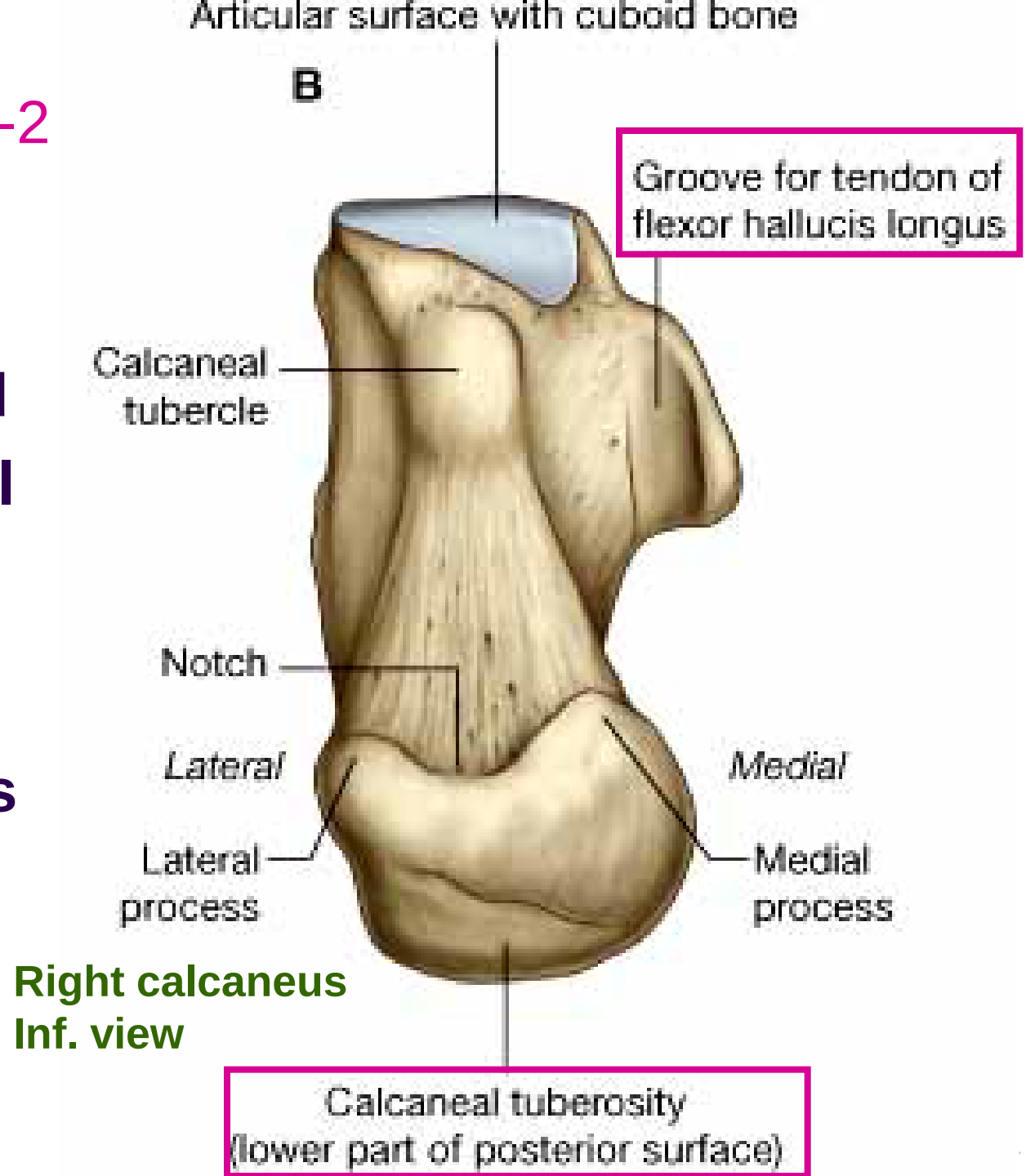
Calcaneus (Calcaneum)-1

- heel of foot, transfer weight to ground
- **Talar shelf (sustentaculum tali):** projection on medial side
- superior surface:
 - **posteriorly: large facet for post. talocalcaneal joint**
 - **middle and anterior facets for talus (in front of sulcus calcanei)**
- ant. surface for Cuboid
- **insertion of calcaneal tendon (Achilles tendon)**
- **groove for tendon of flexor hallucis longus** on its undersurface



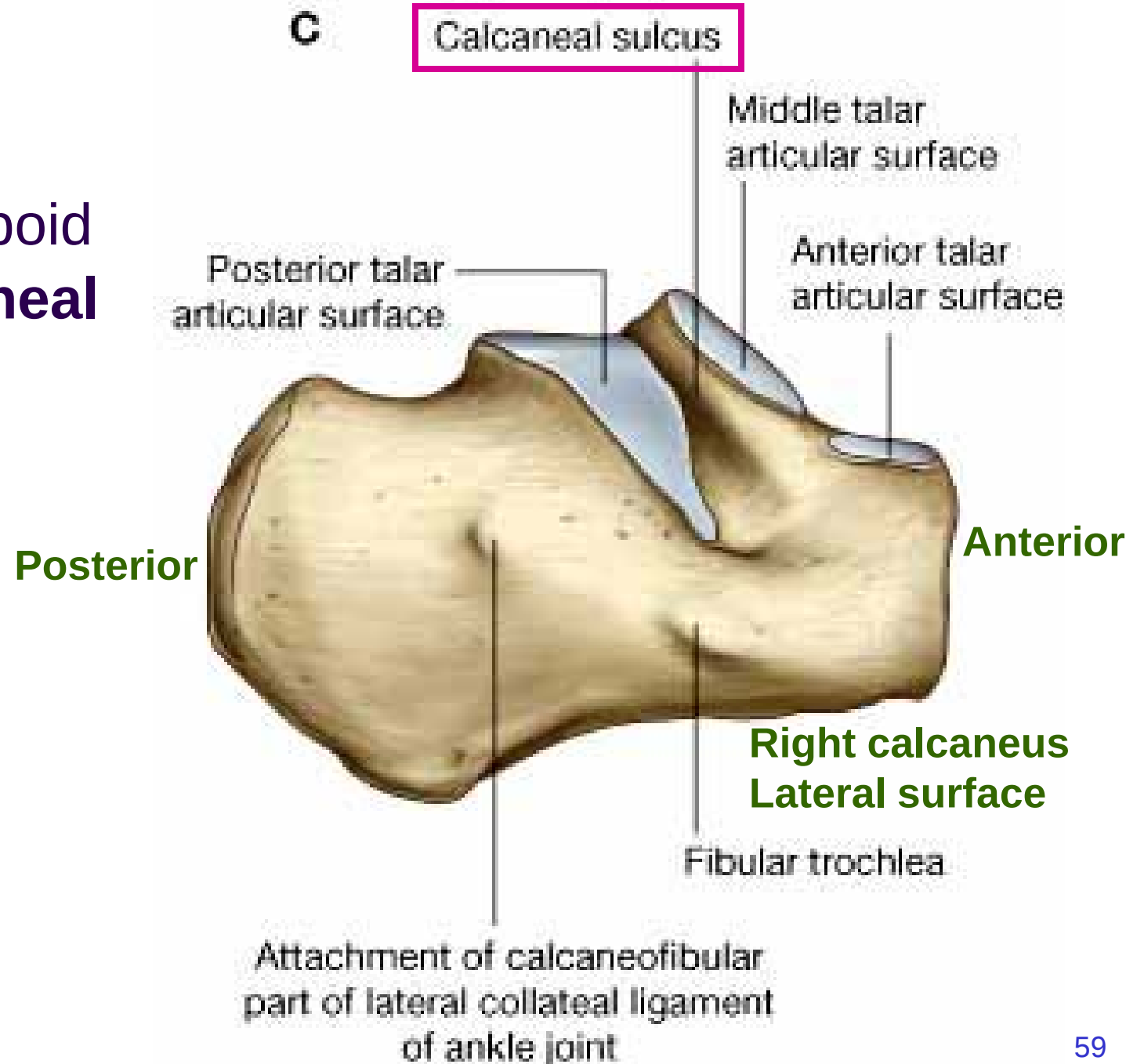
Calcaneus (Calcaneum)-2

- **calcaneal tuberosity**
- ant. surface for Cuboid
- **insertion of calcaneal tendon (Achilles tendon)**
- **groove for tendon of flexor hallucis longus on its undersurface**



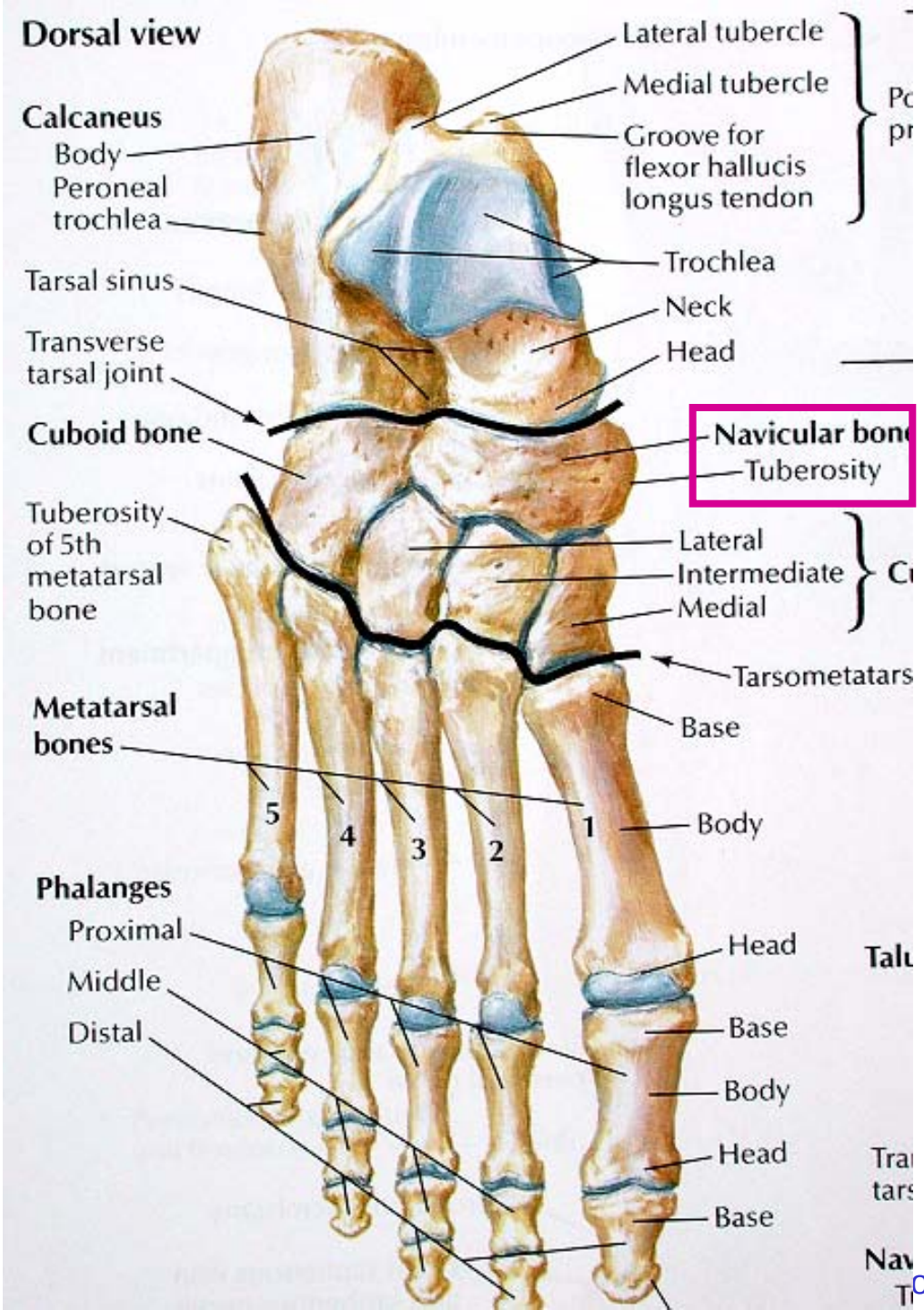
Calcaneus-3

- Calcaneal sulcus
- ant. surface for Cuboid
- **insertion of calcaneal tendon (Achilles tendon)**



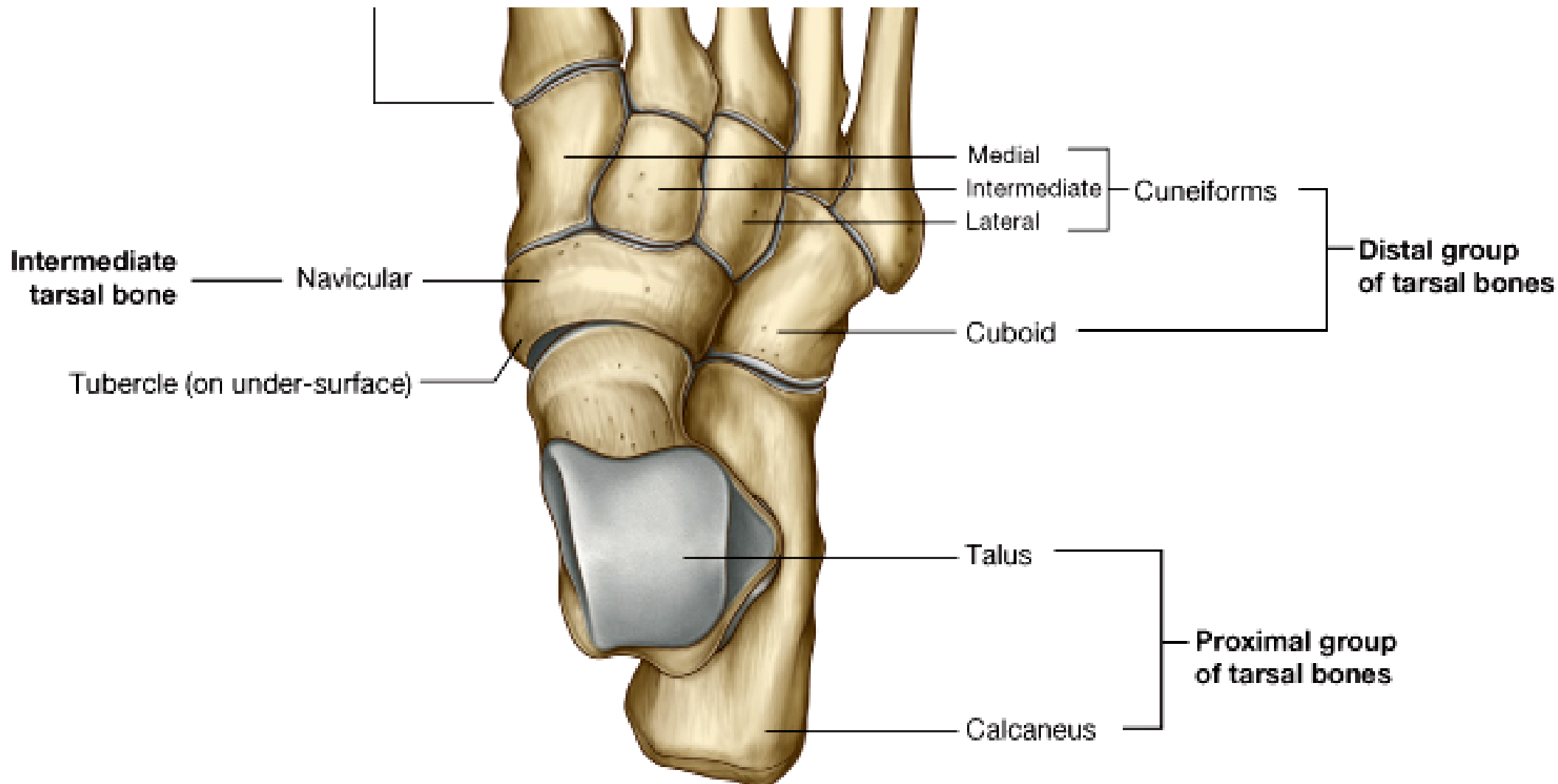
Navicular bone

- between head of talus and distal row of 3 cuneiform bones
- **tuberosity:** attachment of Tibialis posterior



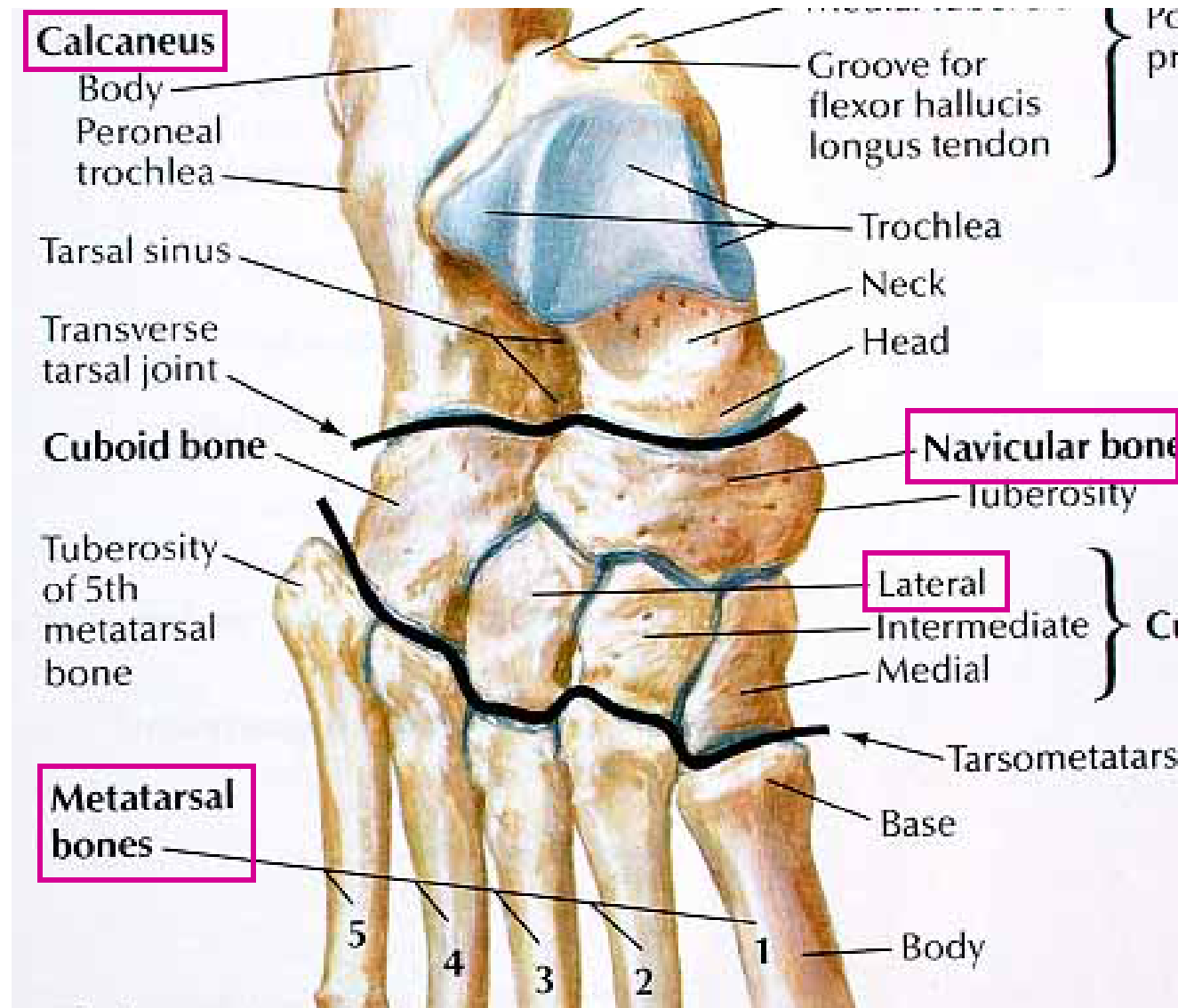
Tarsal bones: distal row-1

- Distal row: Cuboid + 3 Cuneiform bones



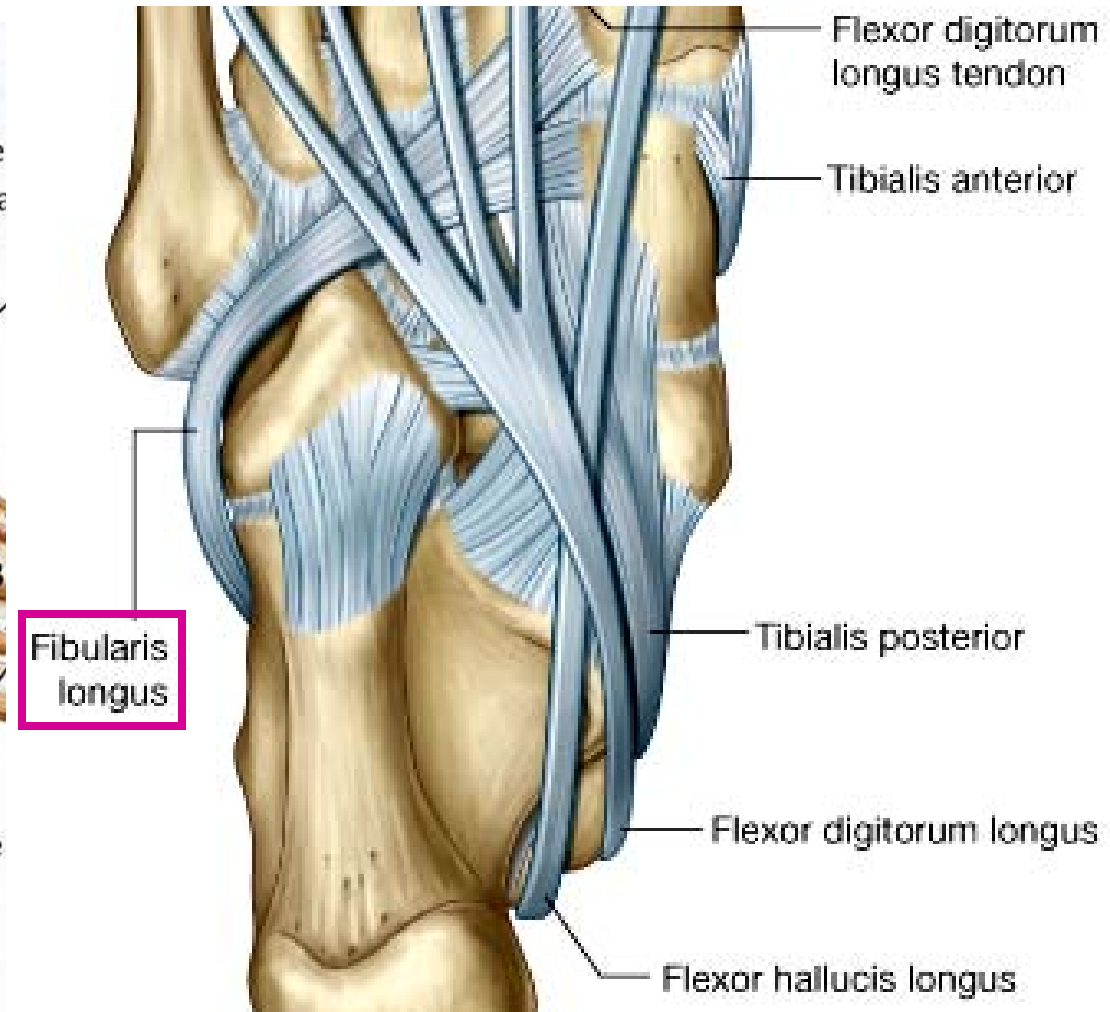
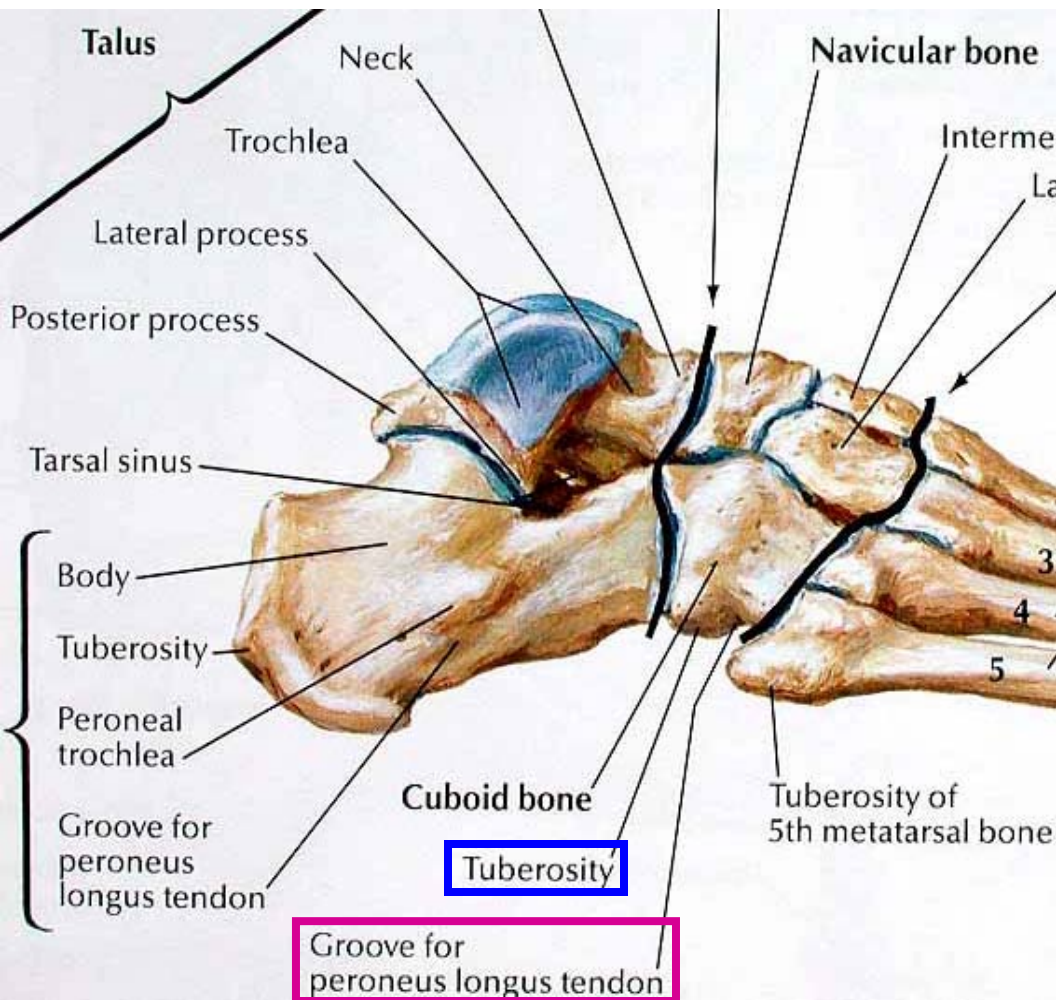
Cuboid

- ant. surface: for 4th, 5th metatarsals
- proximal: articulate with calcaneum
- medial: with navicular & lateral cuneiform



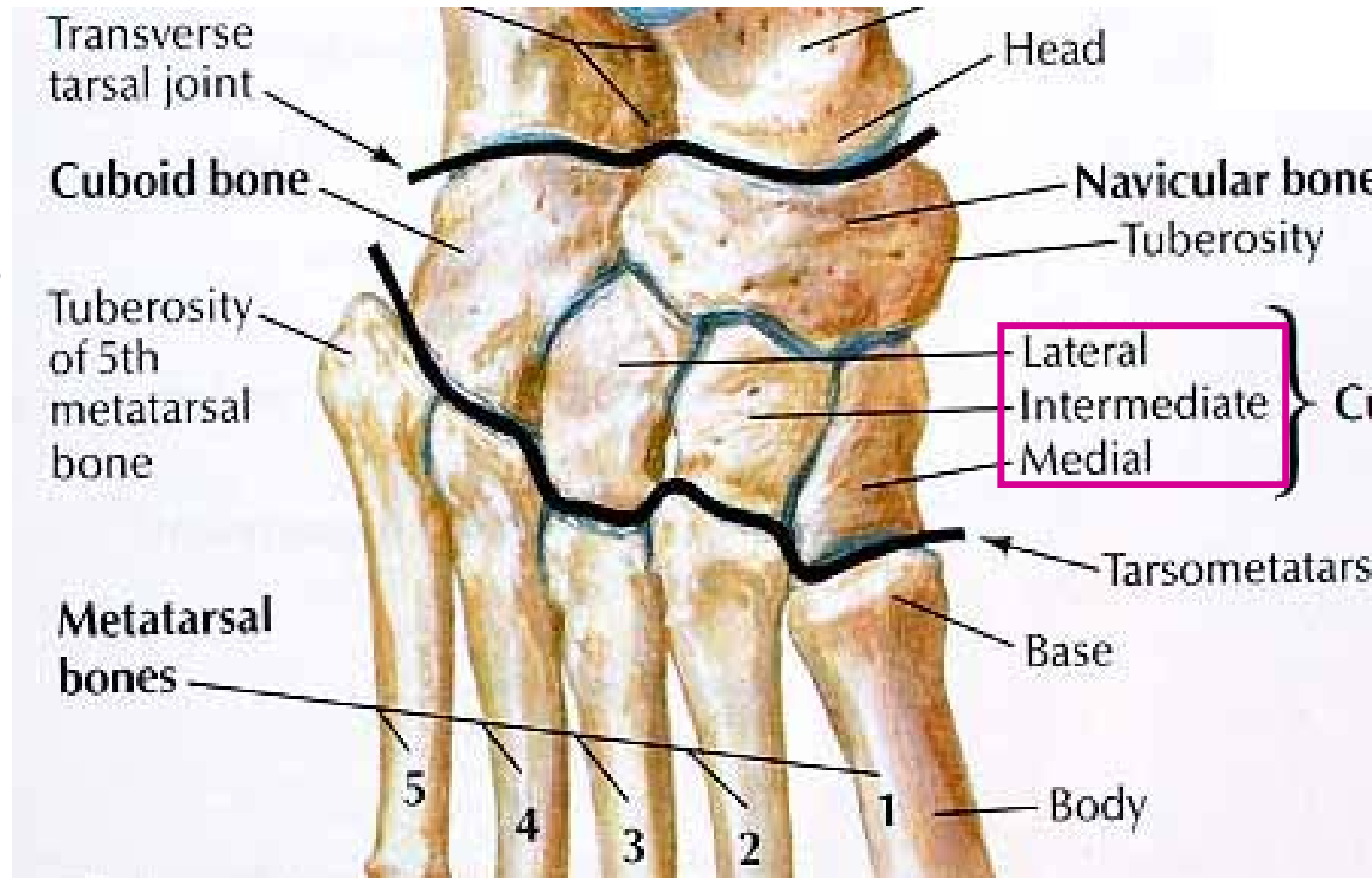
Cuboid-2

- Lateral surface: tuberosity
- **groove for fibularis (peroneus) longus tendon on underside**



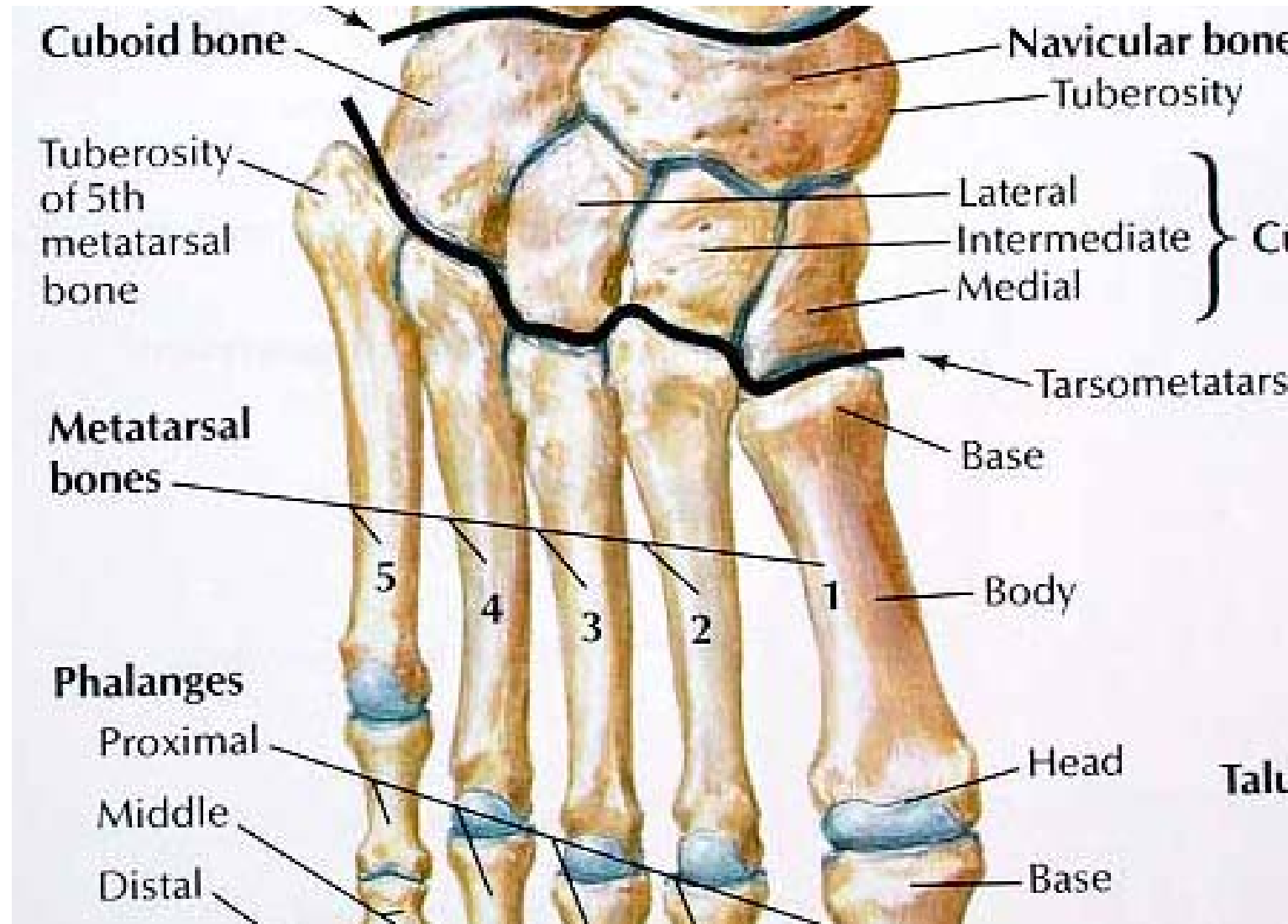
Cuneiforms (Latin: wedge)

- cuneiforms:
 - med.
 - Intermediate
 - lat.
- medial: largest
- proximal: navicular bone
- distal: metatarsus 1-3



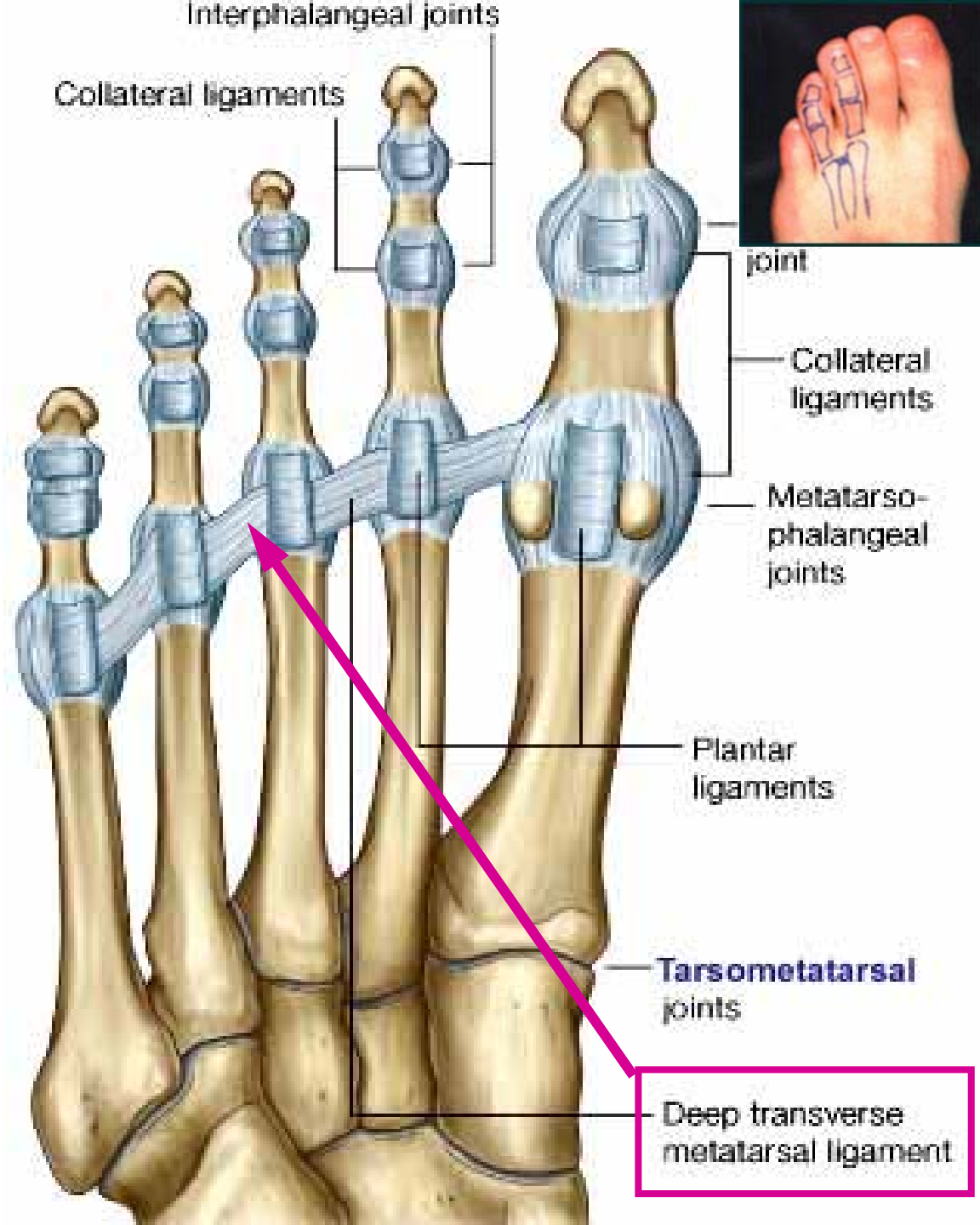
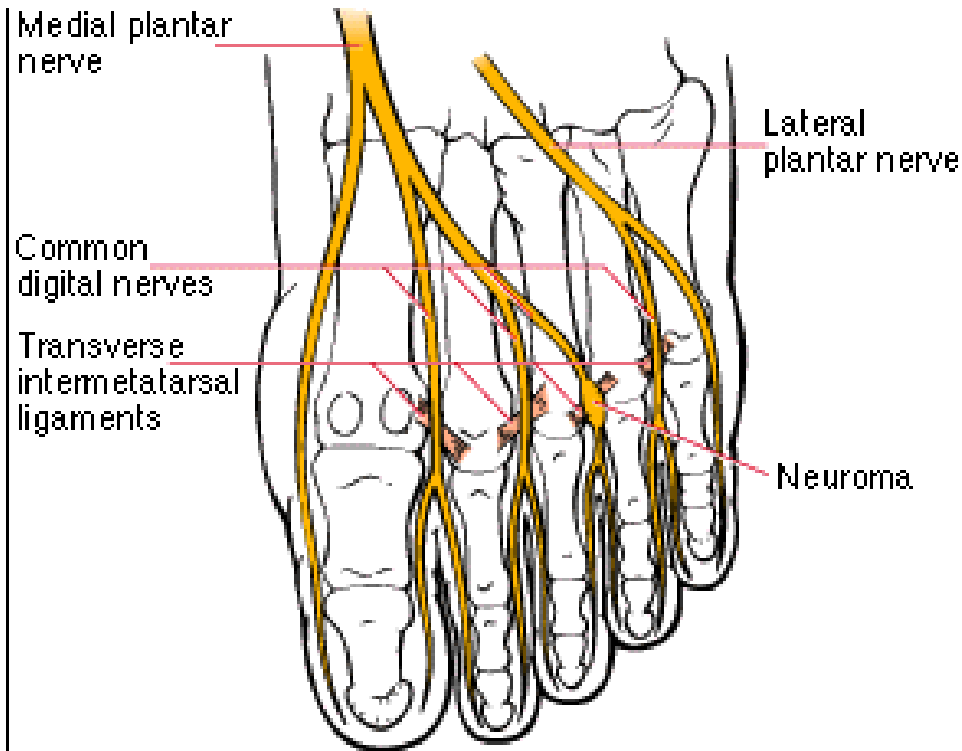
Metatarsus-1

- all metatarsals in the same plane (different from hand)?
- Base
- Body
- Head (distal end)



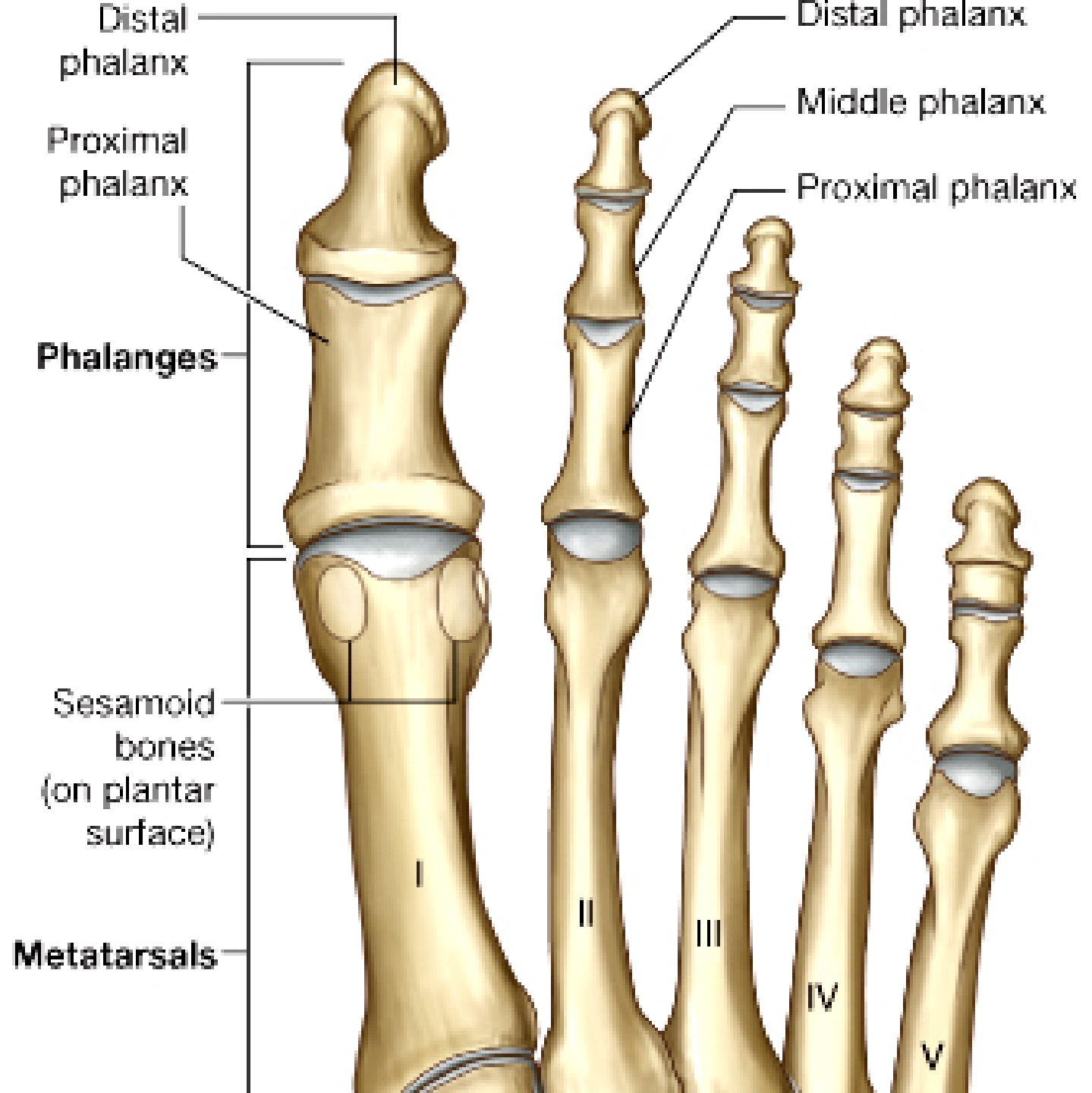
Metatarsus-2

- (deep) transverse (inter)metatarsal lig. links heads (distal end) of metatarsals



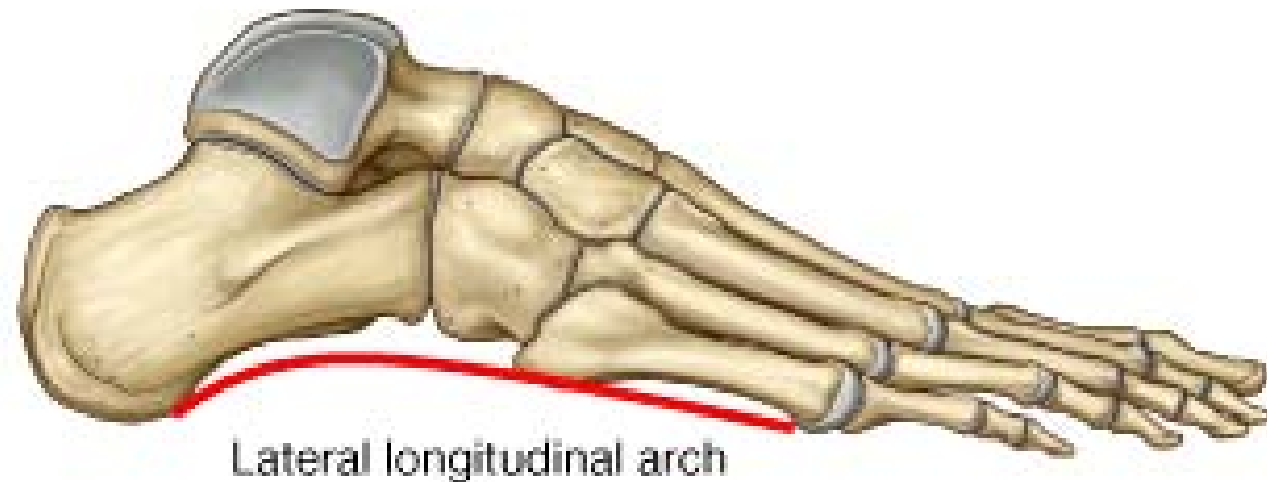
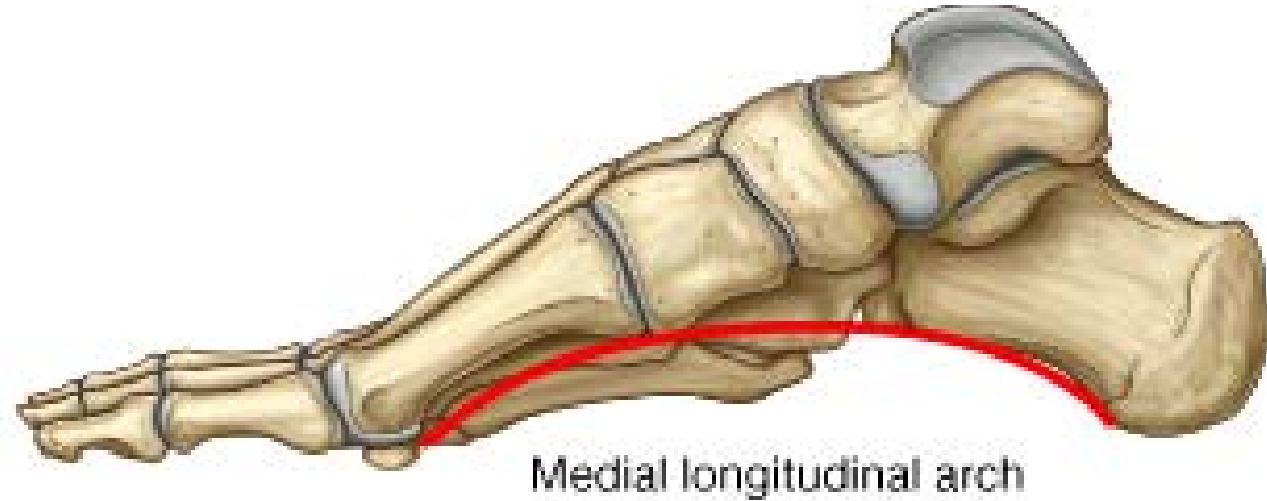
Phalanges

- Big toe: proximal and distal phalanx
- 2nd-5th toe: proximal, middle, distal phalanx



The arches of the foot: longitudinal arch

- medial view:
 - ant.: head of metatarsals on the ground
 - post.: calcaneal tuberosity (tuber calcanei) on the ground
- lateral view: lower longitudinal arch; apex at the ant. part of calcaneum



The arches of the foot: transverse arch

- obvious at the distal row of tarsal bones,
- cuboid (laterally) close to ground; medially, medial cuneiform off the ground
- movement (of foot at ankle): dorsiflexion/plantar flexion; inversion/eversion



Transverse arch

