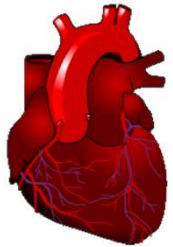


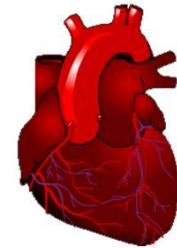


Systematic Anatomy



Locomotor system - Part 4

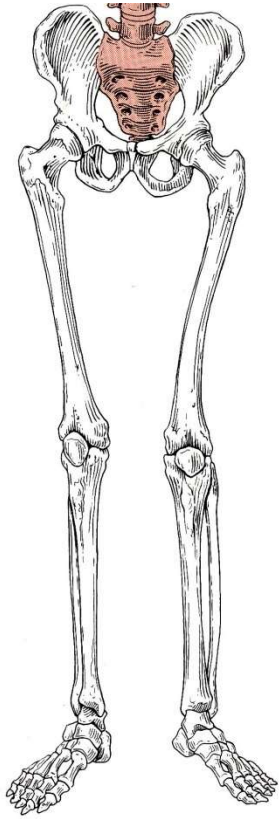
Lower limb bones & their joints



Dr.& Prof. Hongqi Zhang (张红旗)

Dept.of anatomy & histoembryology

Email: zhanghq58@126.com

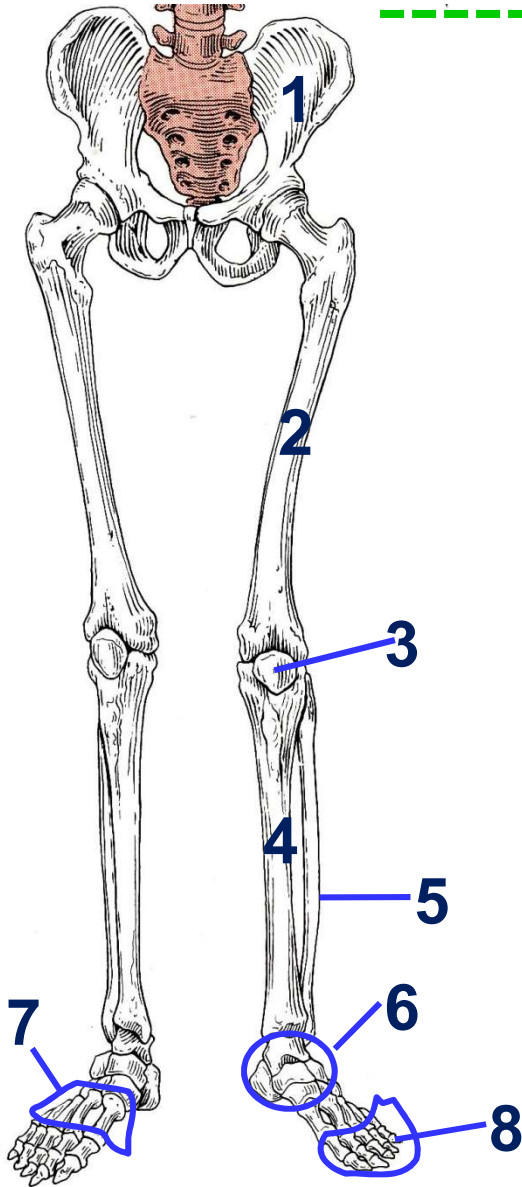


The lower limb bones and their junctions

The lower limb is specialized for locomotion, bearing weight & maintaining equilibrium. so far same reason.the bones of lower limb are more massive than those of the upper limb.



Bones of Lower Limb-62



Pelvic girdle:

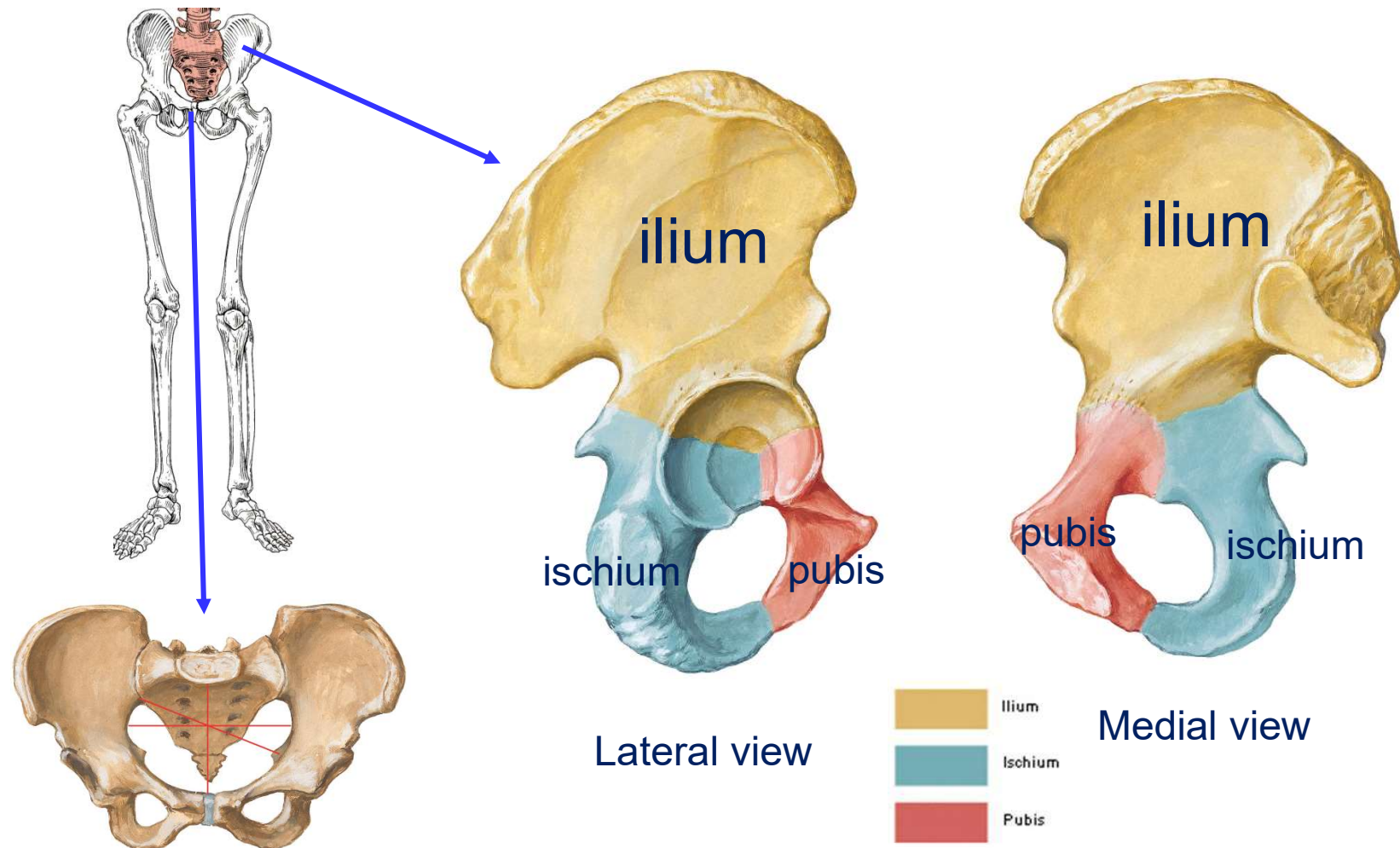
1 -Hip bone	{ Ilium
	{ Pubis
	{ Ischium

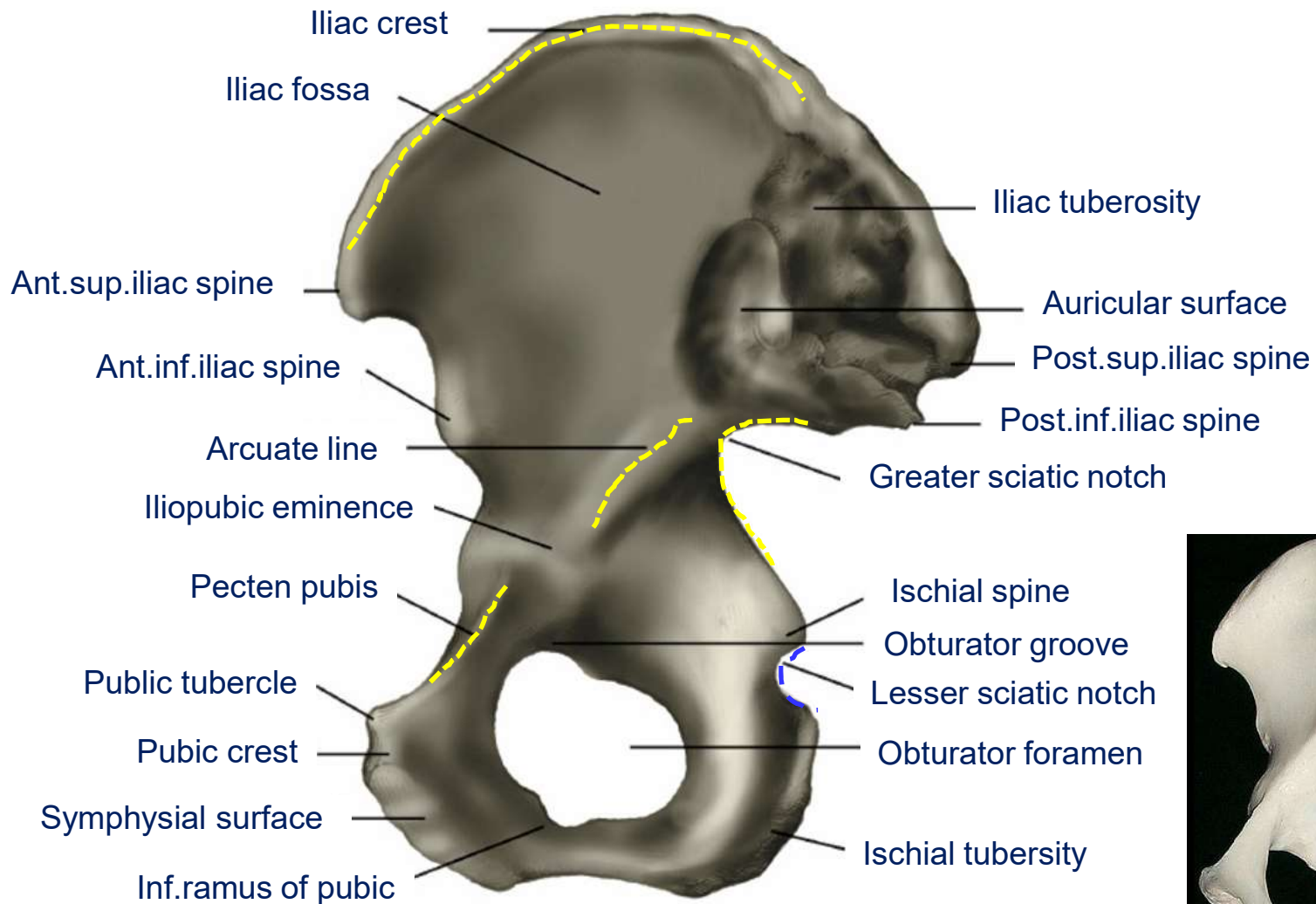
Bones of free lower limb:

- 2 -Femur 1
- 3 -Patella 1
- 4 -Tibia 1
- 5 -Fibula 1
- 6 -Tarsal bone 7
- 7 -Metatarsal bone 5
- 8 -phalanges of toes 14

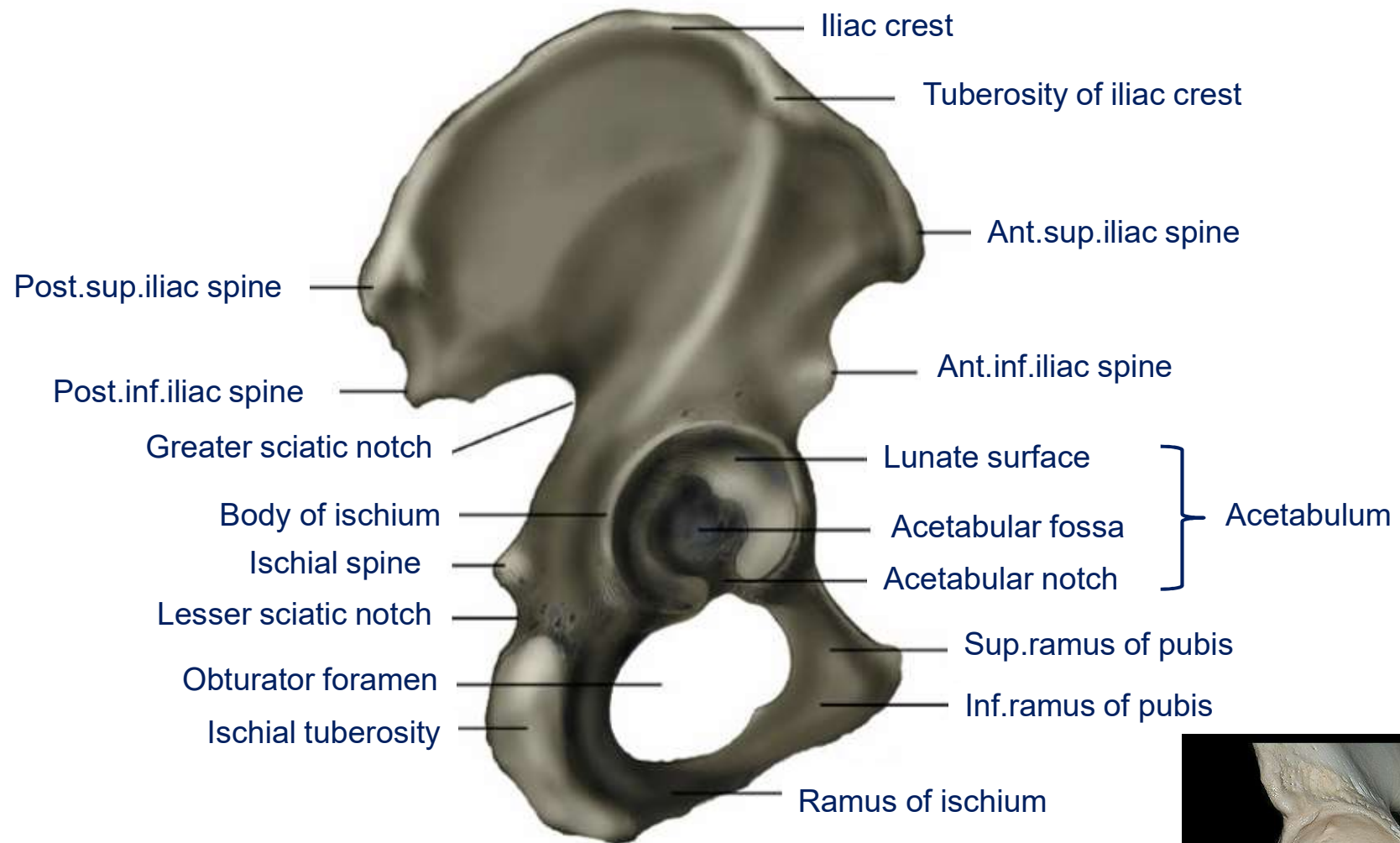
Hip bone

Consist of three fused bones, **ilium**, **ischium**, **pubis**





Hip bone(medial surface)

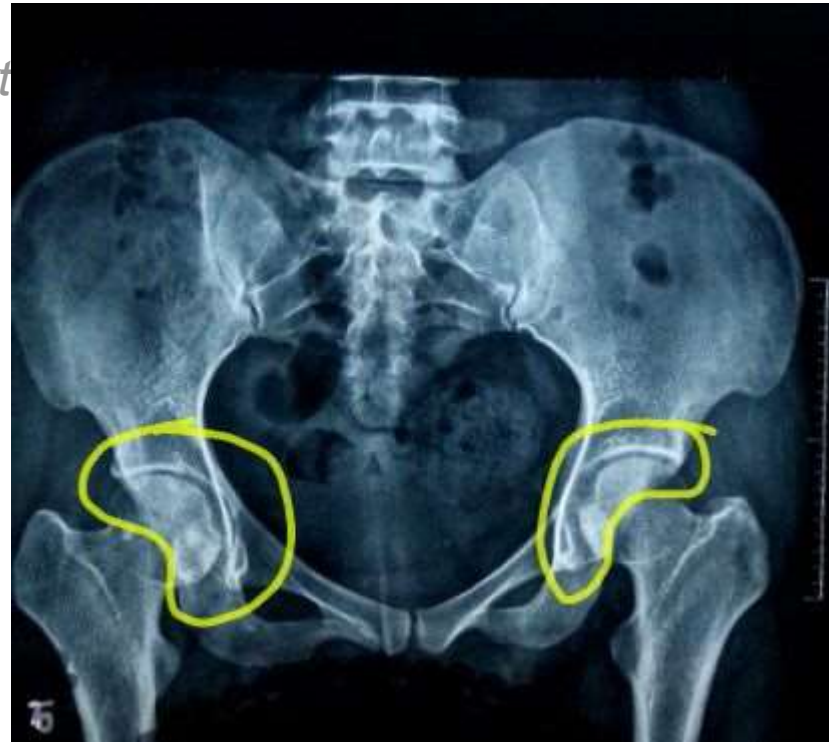


Hip bone (lateral surface)





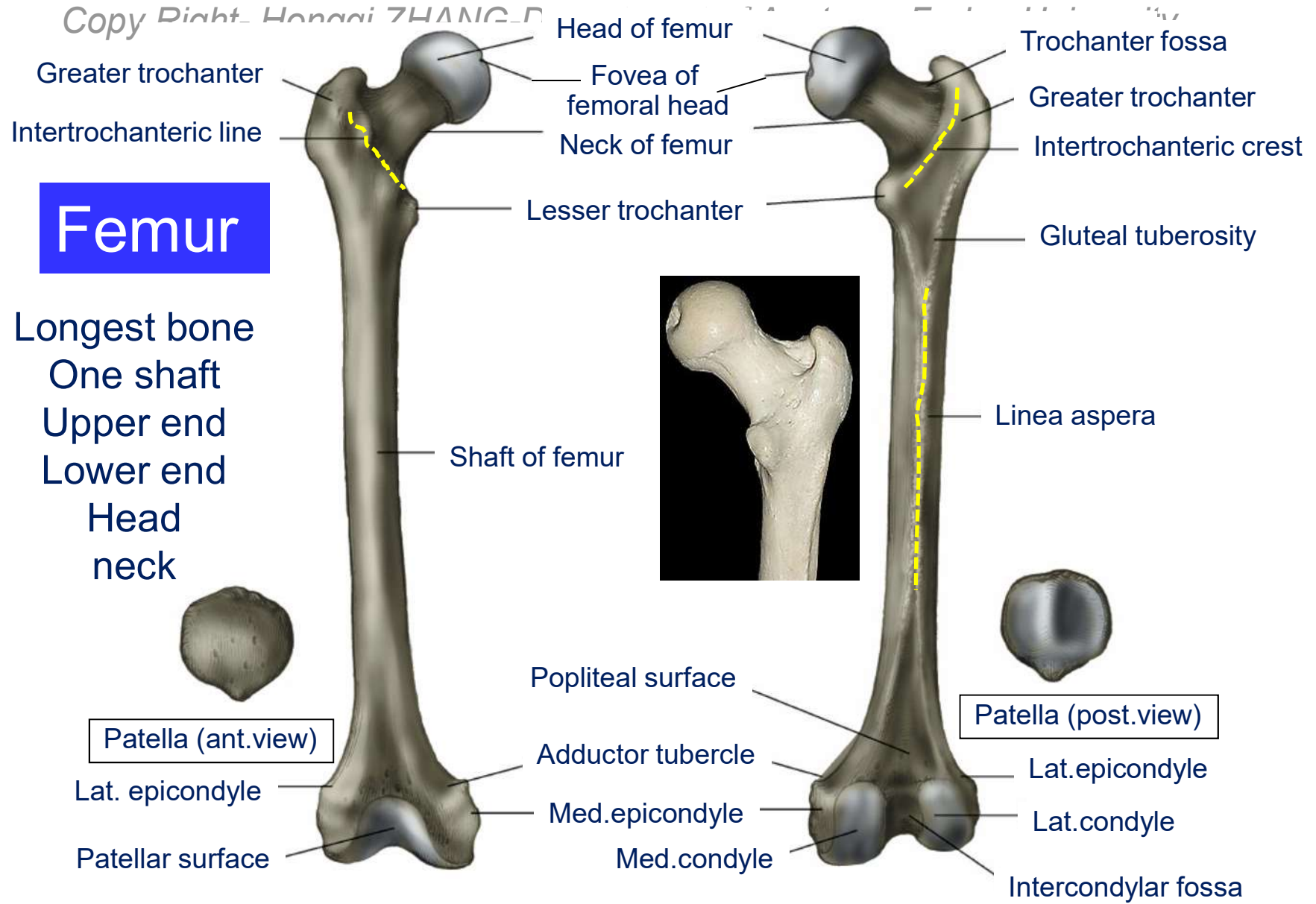
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dan University

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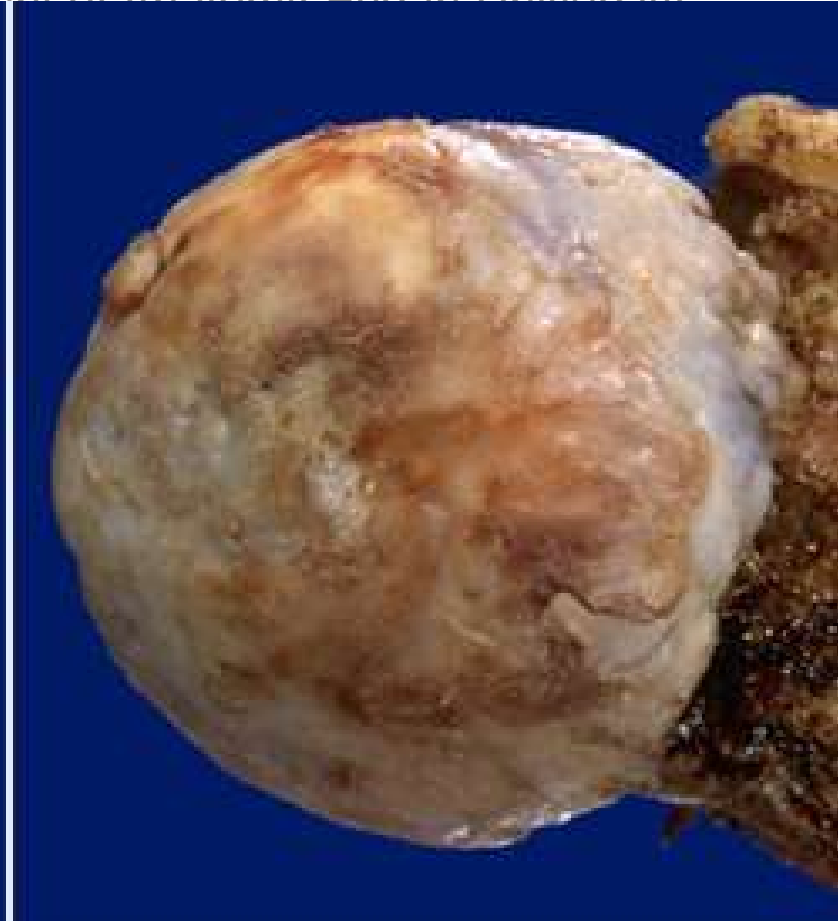
Femur

Longest bone
 One shaft
 Upper end
 Lower end
 Head
 neck

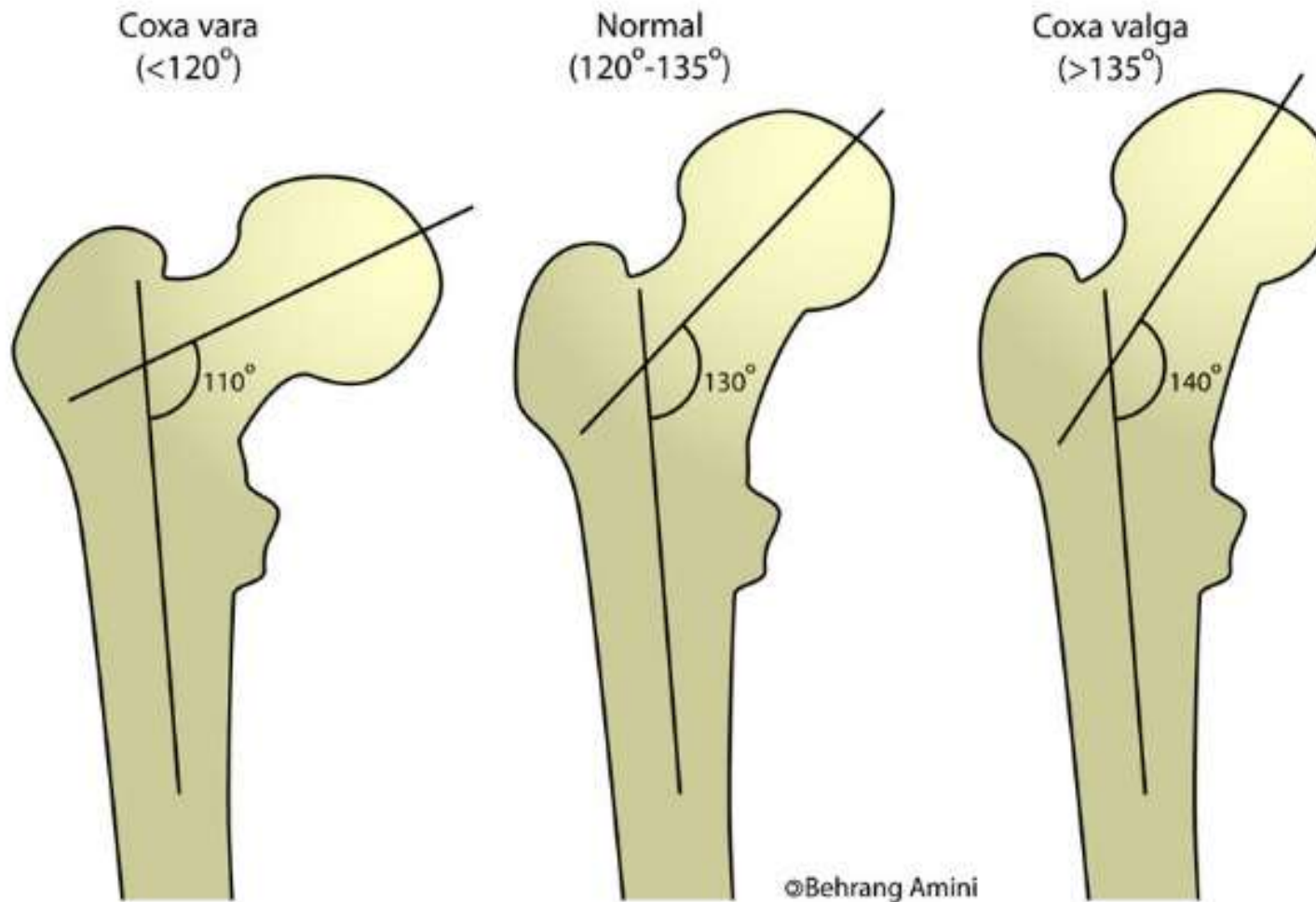
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Normal femoral head
The shiny articular cartilage.



Rough, lobulated head
indicative of osteoarthritis.

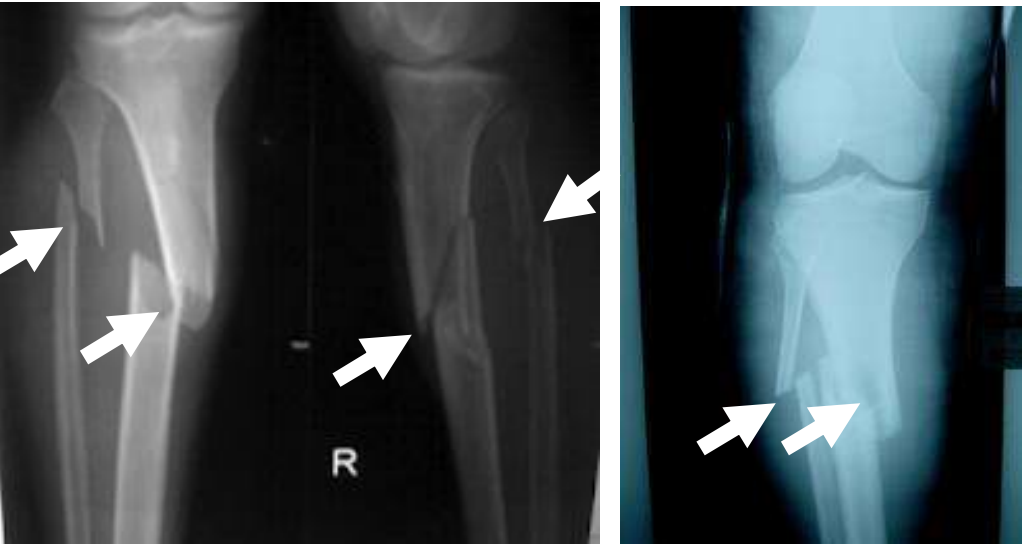


Femur fracture



Femur fracture

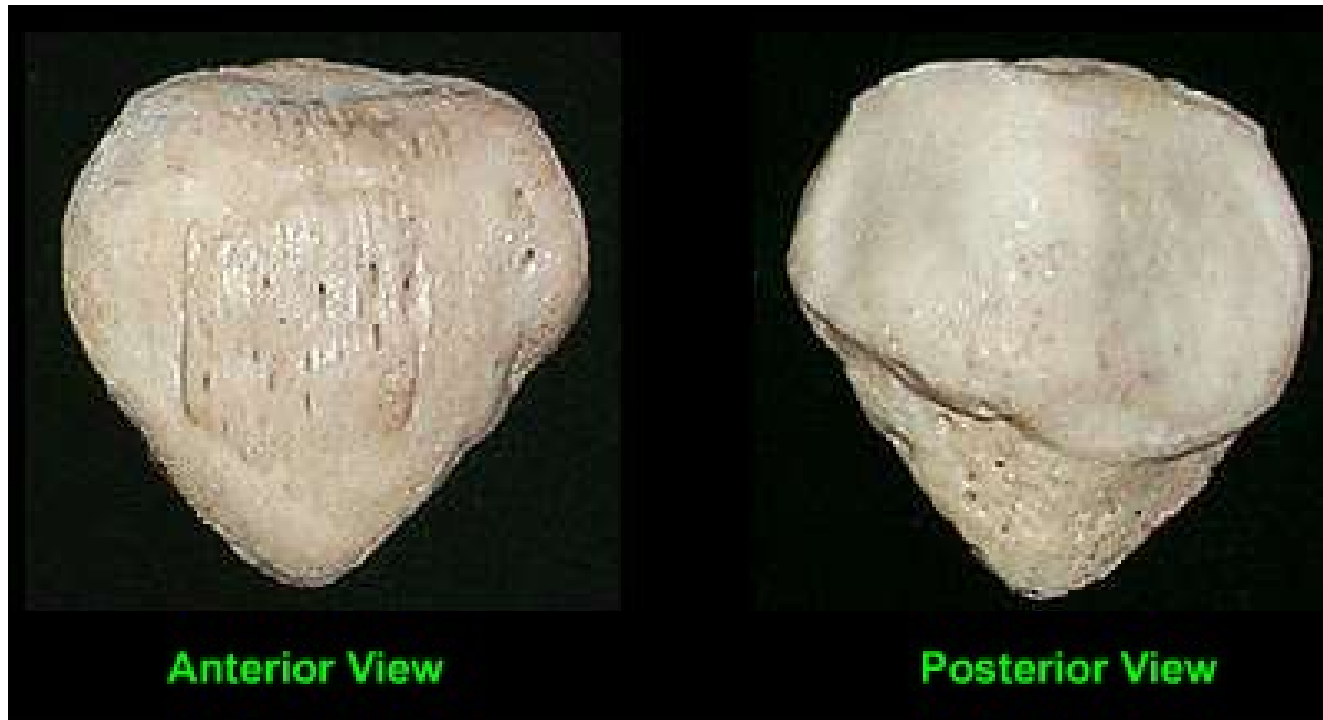
Tibia and fibular fracture



After fixation

The patella - the largest sesamoid

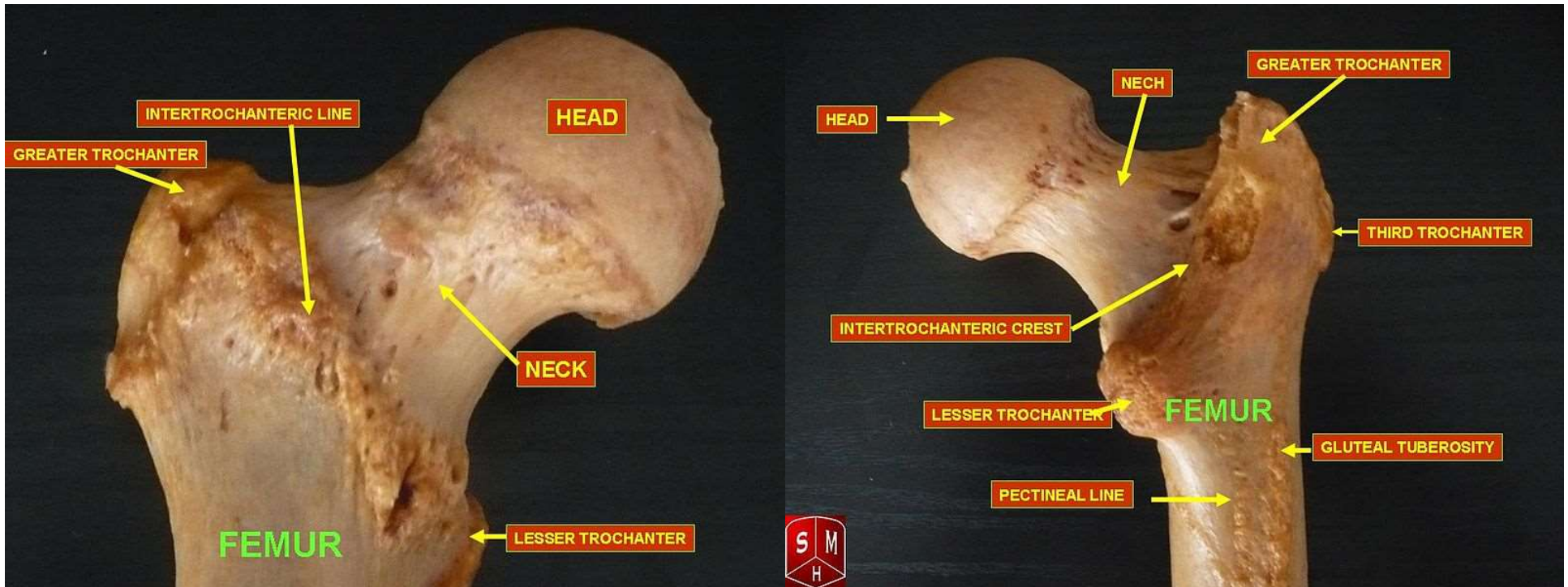
Triangular, largest sesamoid



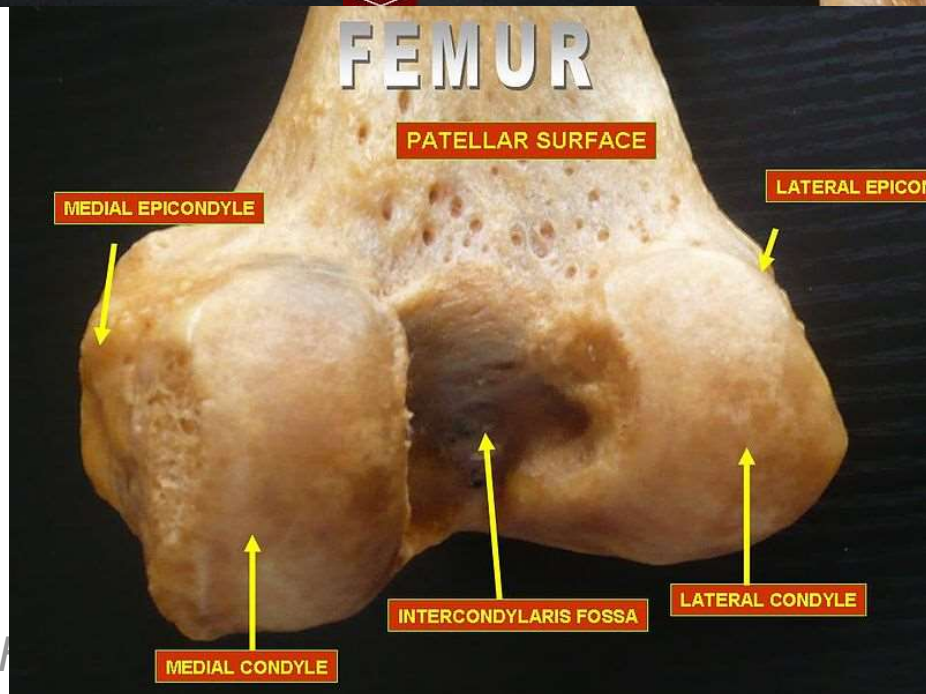
Articular surface

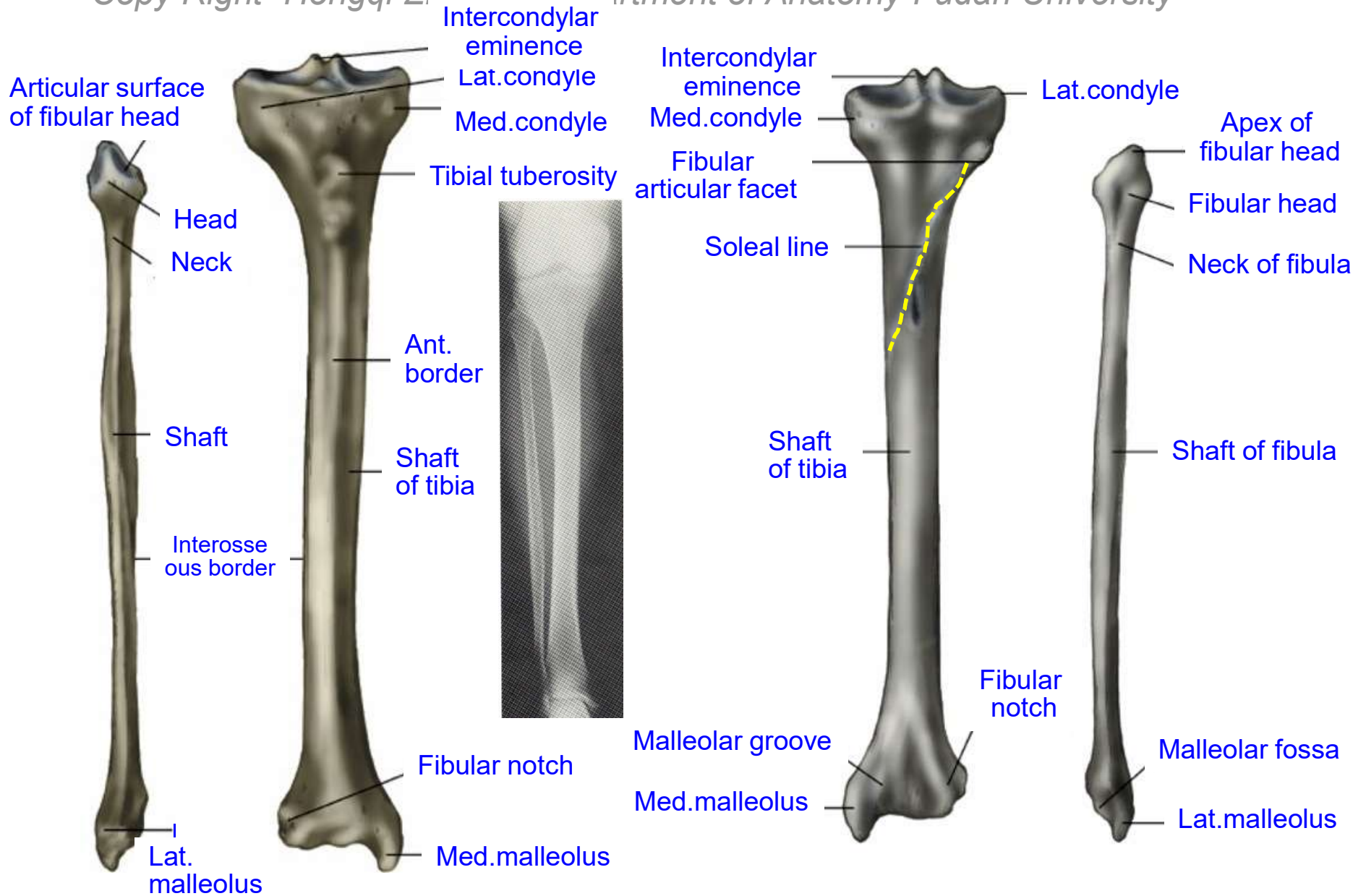
Patellar fracture and surgical fixation





Specimen of femur





Copy Right

The fracture of leg by trauma

ity

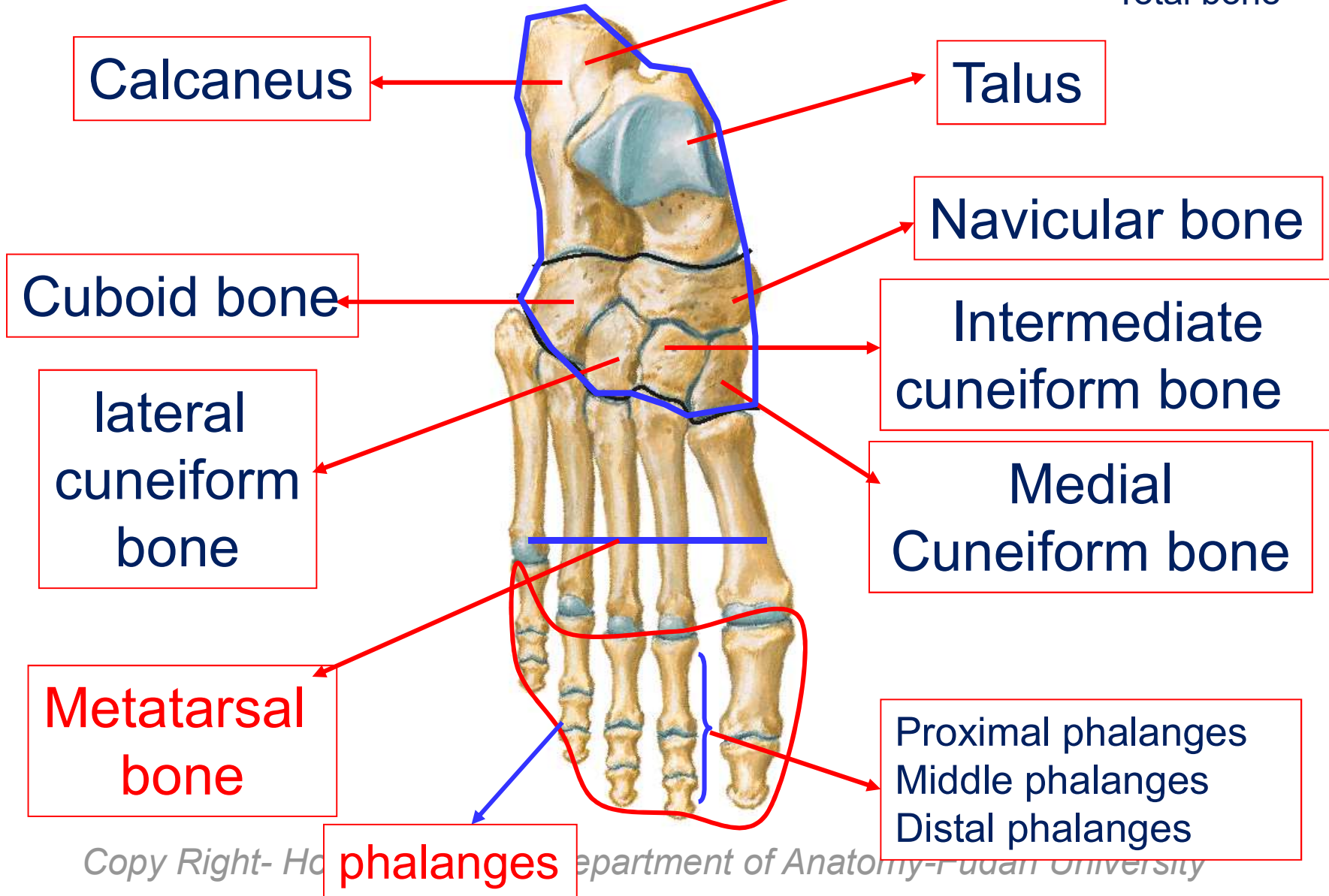


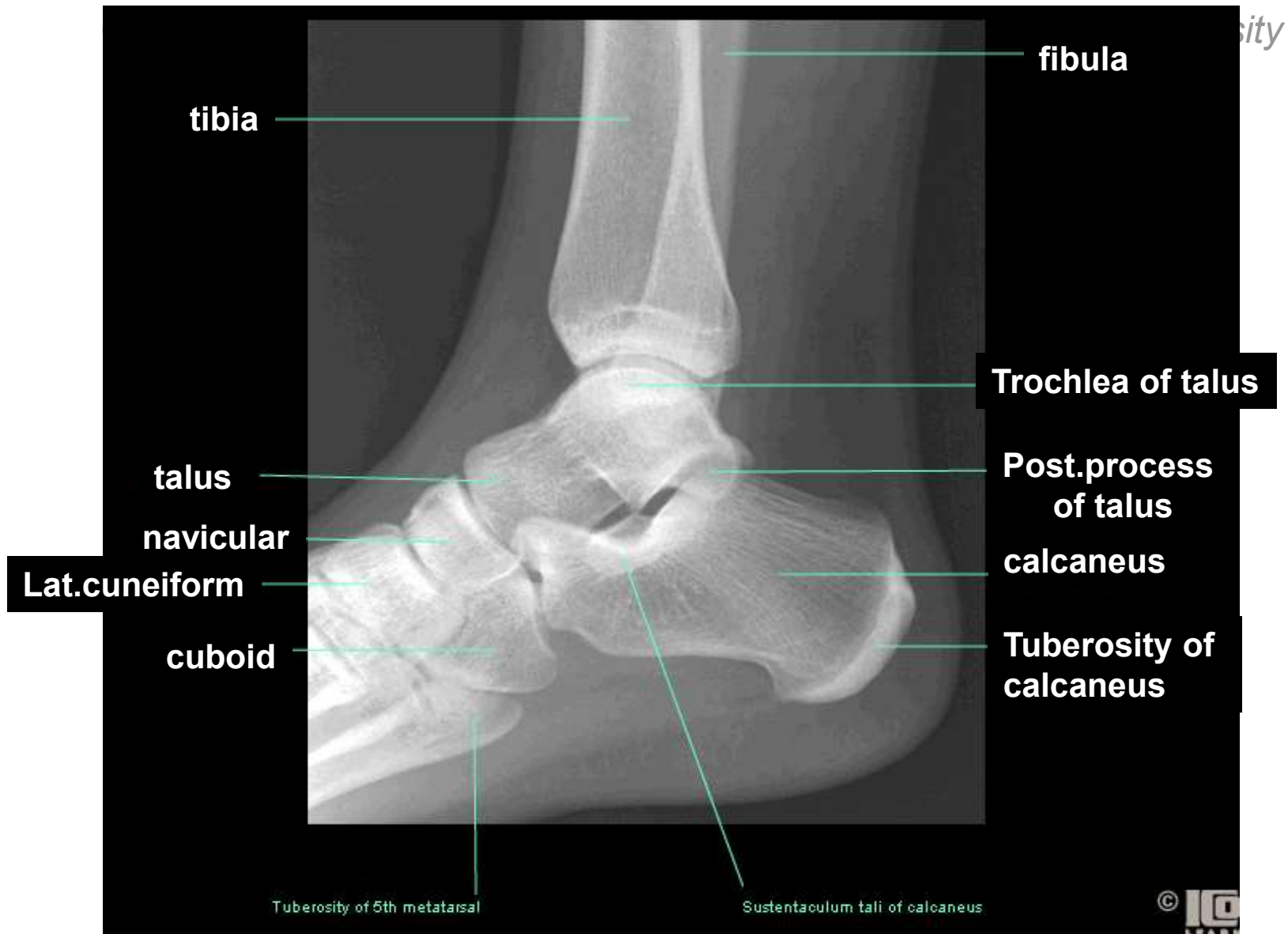
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Foot bones

Tarsus bone

Total bone





Ankle radiograph:lateral view

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Joints of the lower limb bones

Joints of Lower limb

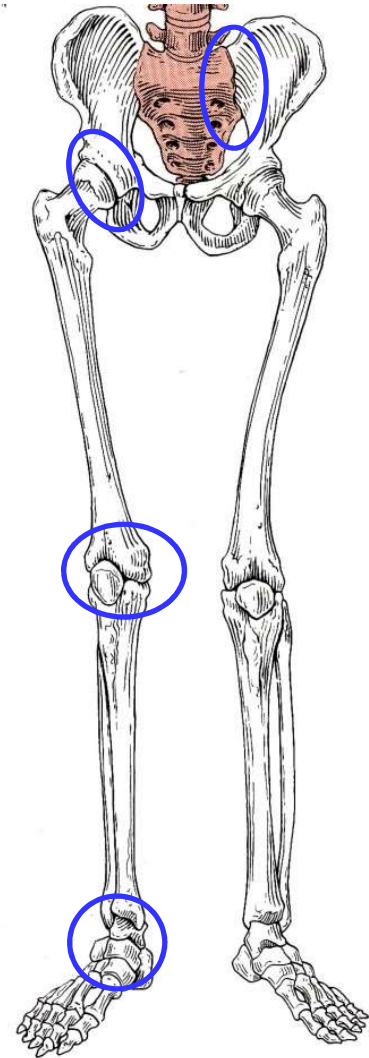
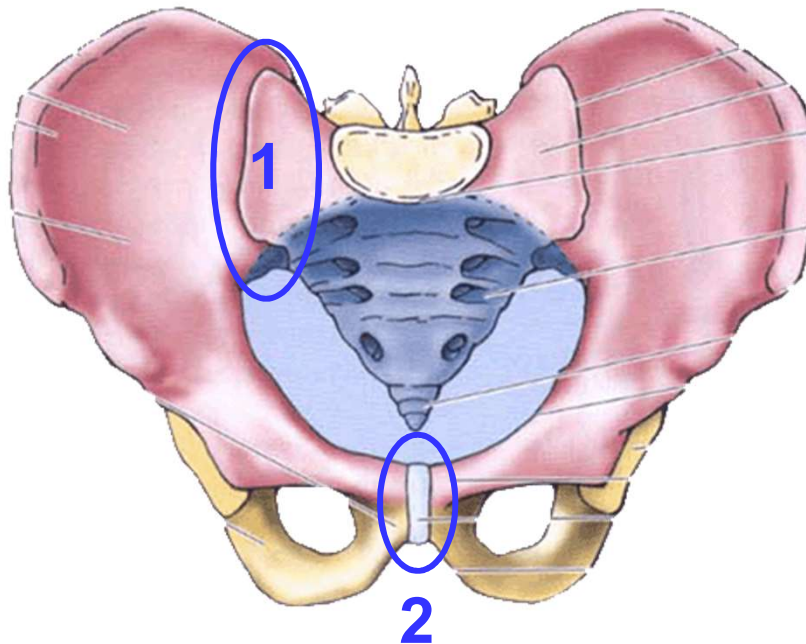
Joints of pelvic girdle

1-Sacroiliac joint

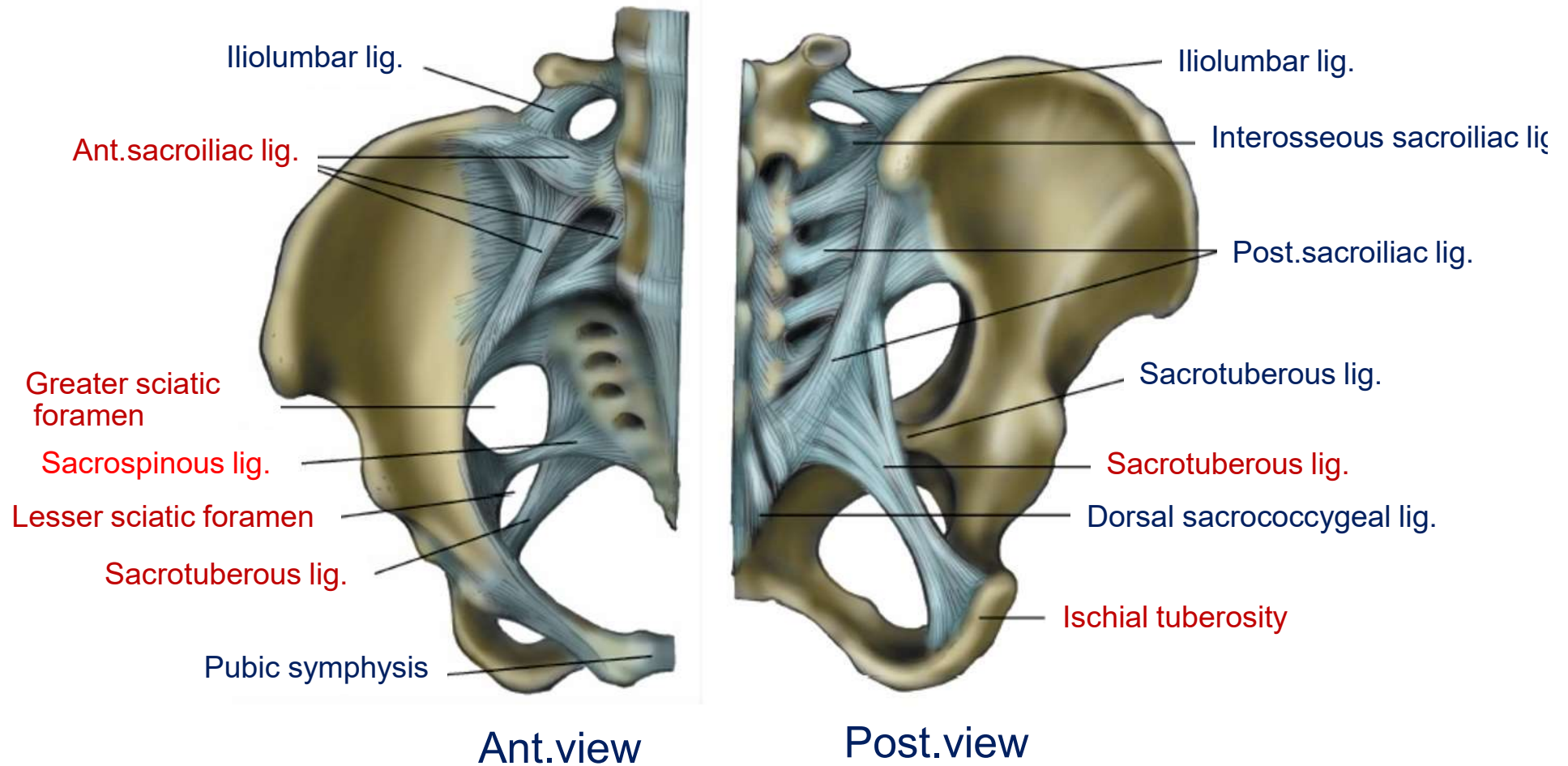
2-Pubis symphysis

Bones: auricular surface of sacrum and ilium

Capsule: very tight and reinforced by ligaments



Iliolumbar joints



Pubis symphysis

Pubis symphysis

Articulation:

Symphysial surface &
Interpubic disc (fibrocartilage)

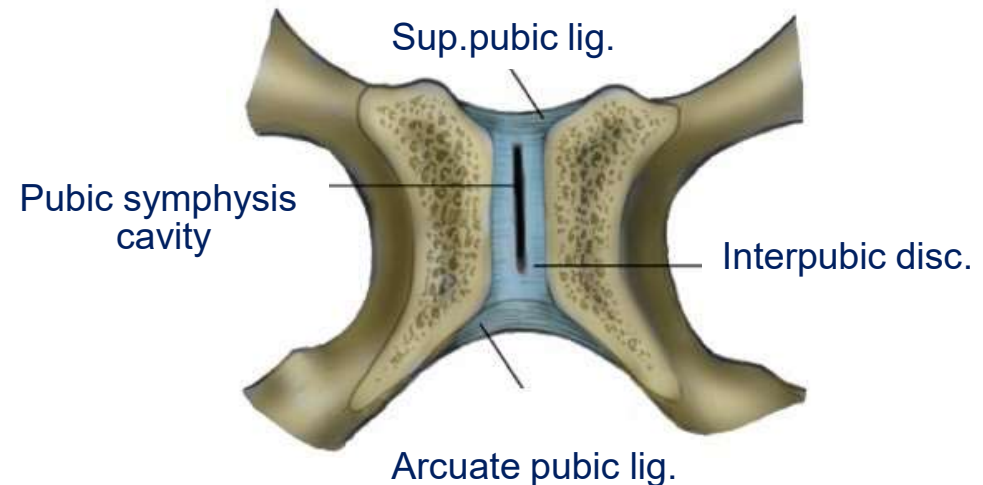
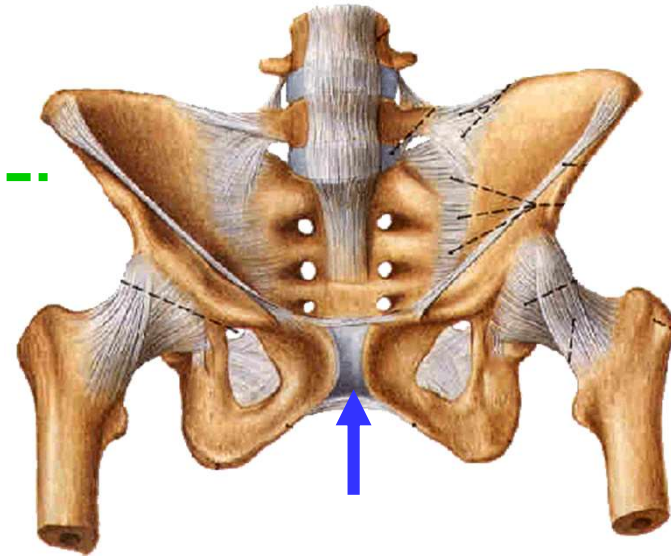
Ligaments:

Superior pubic lig.

Arcuate pubic lig.

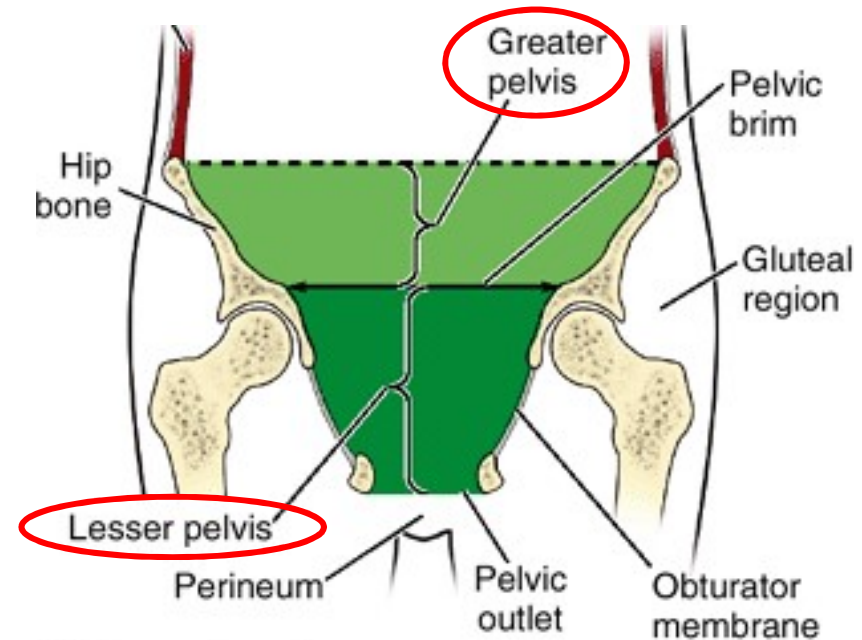
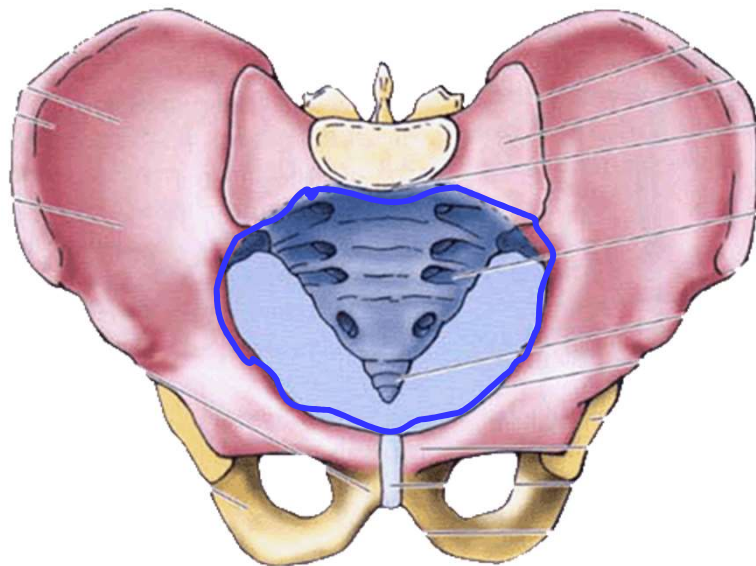
Obturator membrane

Obturator canal



The pelvis

- Composition:** formed by paired hip bones, sacrum, coccyx, and their articulations
- ◆ **Terminal line:** formed by promontory of sacrum, arcuate line, pectin of pubis, pubic tubercle, upper border of pubic symphysis
- ◆ **Two portions:** a greater pelvis and a lesser pelvis



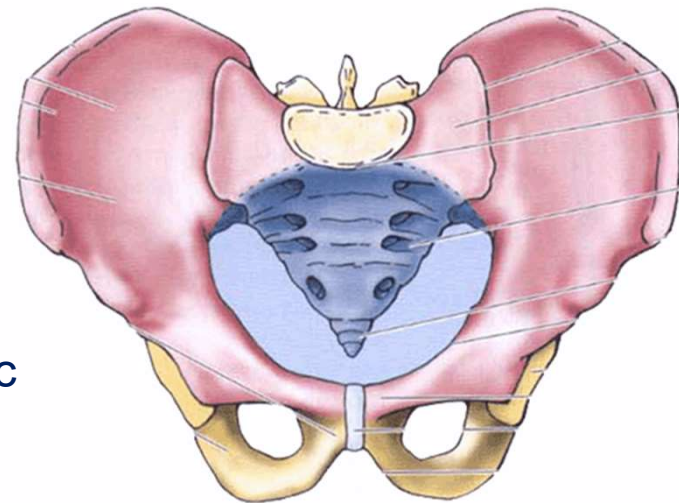
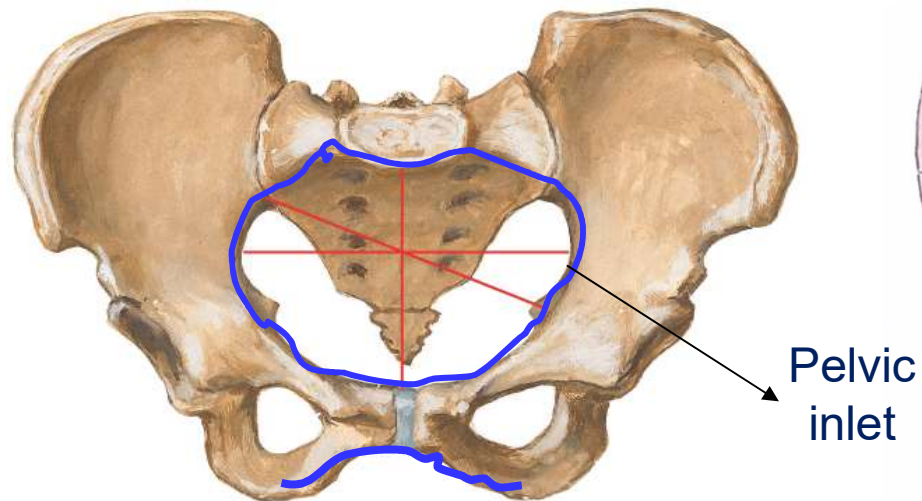
B Coronal section

Lesser pelvis

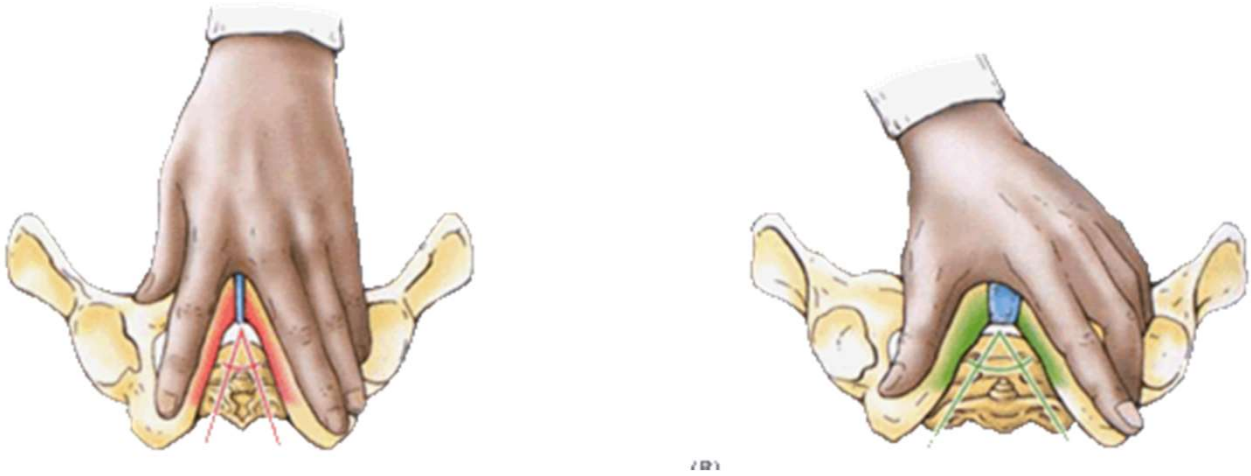
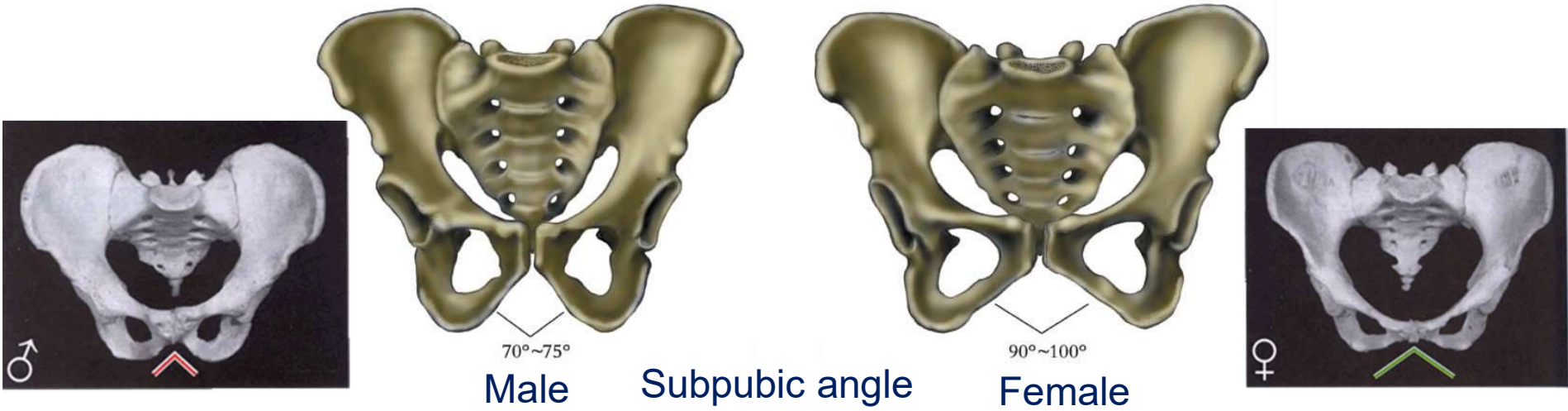
Pelvic inlet (terminal line): formed by promontory of sacrum, arcuate line, pectin of pubis, pubic tubercle, upper border of pubic symphysis

Pelvic outlet formed by tip of coccyx, sacrotuberous lig., ischial tuberosity, ramus of ischium, inf. ramus of pubic, symphysis

Pelvic cavity, pubic arch, subpubic angle



Main difference between male & female pelvis

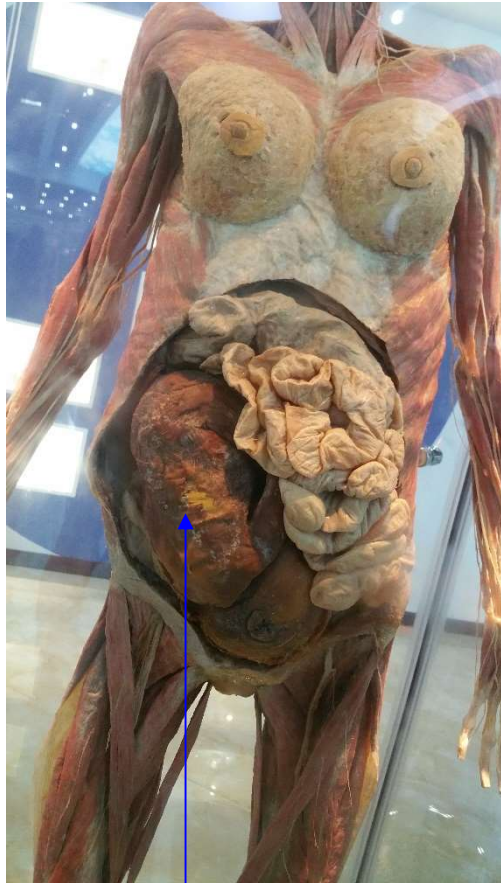


While give a birth and protect the perineum

Comparison between male & female pelvis

	Male	Female
Overall	Narrow and long	Wide and short
Iliac ala	More vertical	More horizontal
Inlet	Oval or heart shaped	Round
Subpubic angle	Acute angle (about 70~75 ⁰)	Right angle (about 90~100 ⁰)
Pelvic cavity	Deep narrow	Shallower, wide
Outlet	Small	Larger

Comparison between male & female pelvis



Fetus

Female



Pelvic inlet



Pelvic outlet



Pelvic cavity

Male



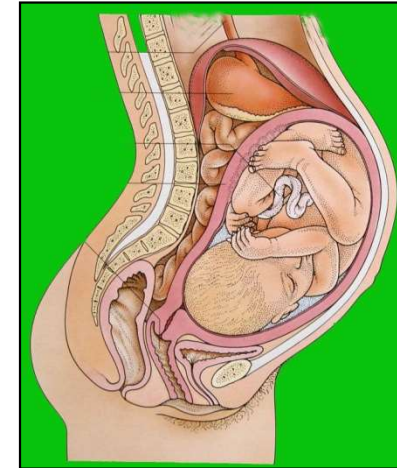
Pelvic inlet



Pelvic outlet

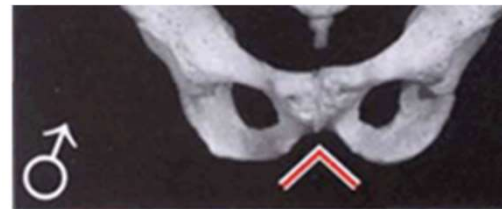


Pelvic cavity



♀

90~100°



♂

Pubic arch 70~75°

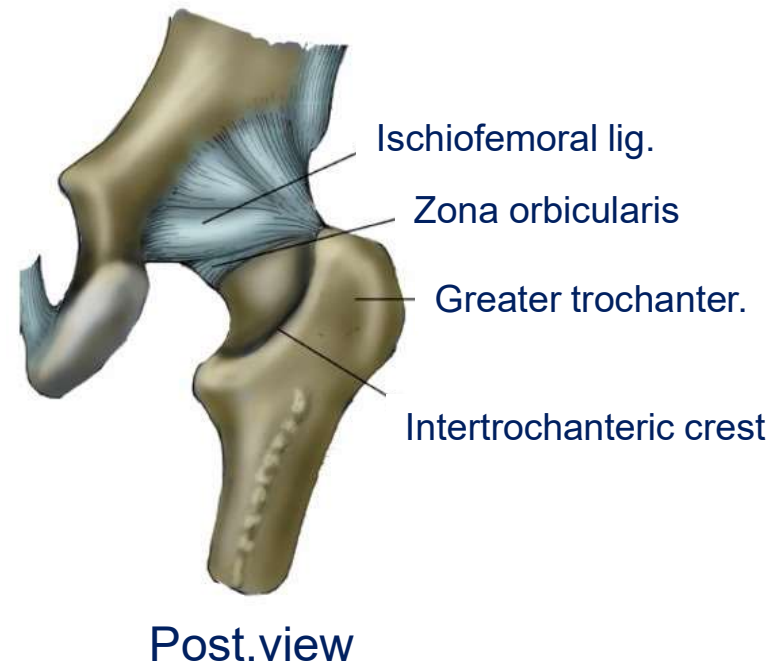
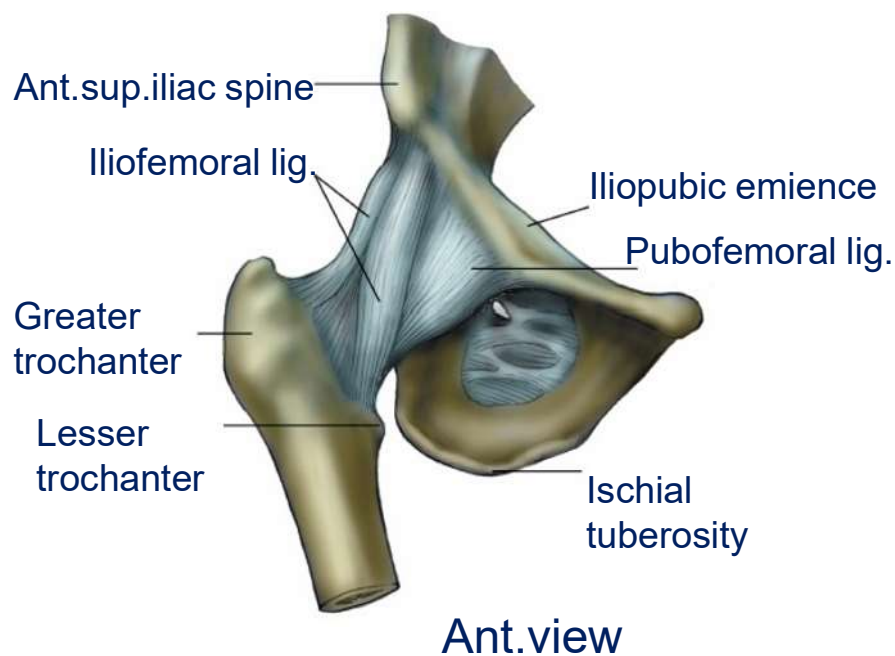
Hip joints

Constitution: acetabulum & femoral head

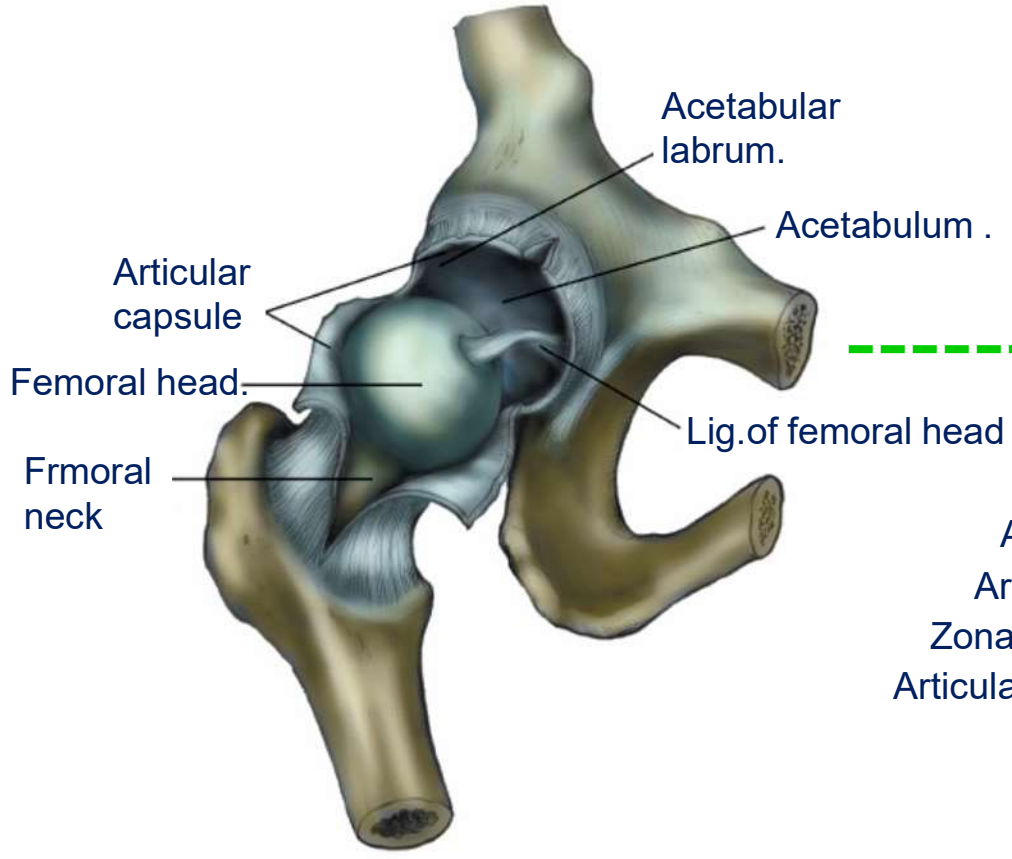
Articular capsule: tense and strong

Above: margins of acetabulum & transverse acetabular lig.

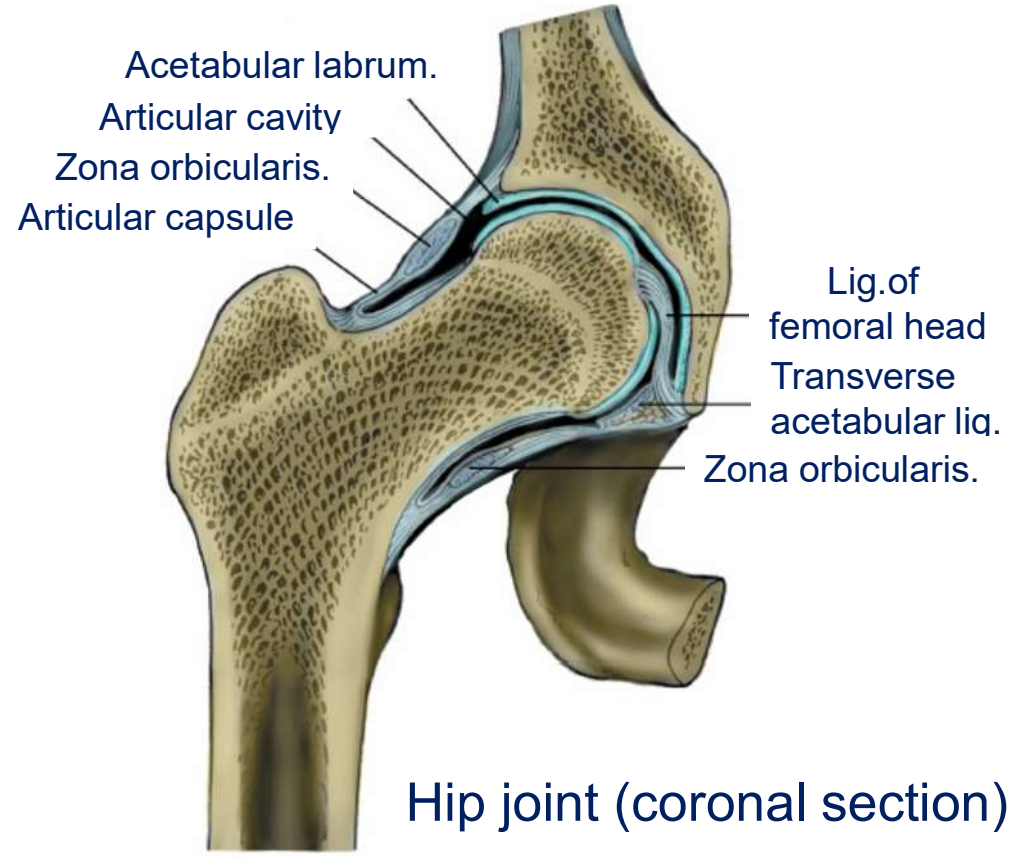
Below: in front to intertrochanteric line; behind, to the neck of femur above 1 cm above the intertrochanteric crest



Accessory structure of the hip joints



Hip joint (opened cavity)

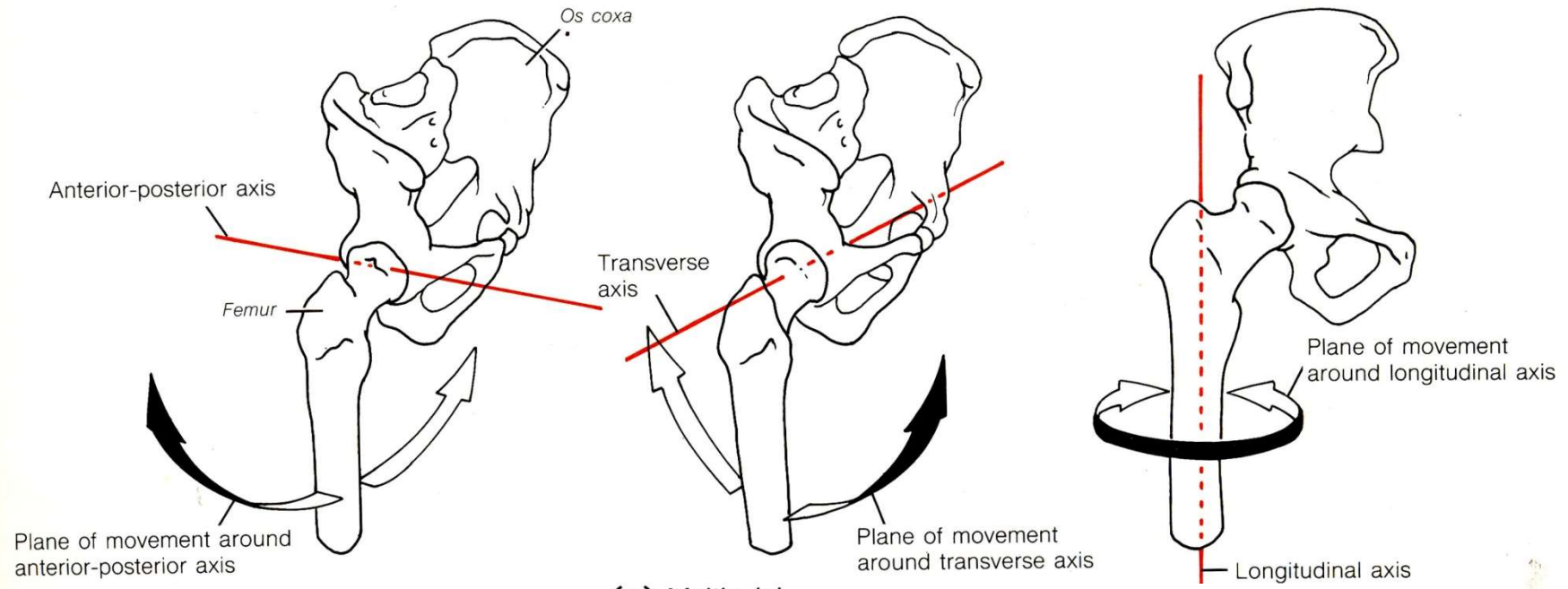


Hip joint (coronal section)

Movement of the hip joints

It's movement are similar to shoulder joint

- ◆ Flexion-extension
- ◆ Adduction-abduction
- ◆ Medial and lateral rotation
- ◆ Circumduction



(Adduction-abduction

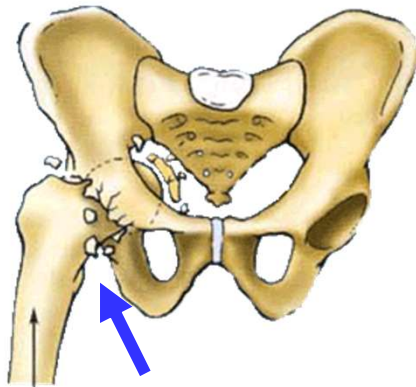
ANG-1

Flexion-extension

omy-Fu

Circumduction

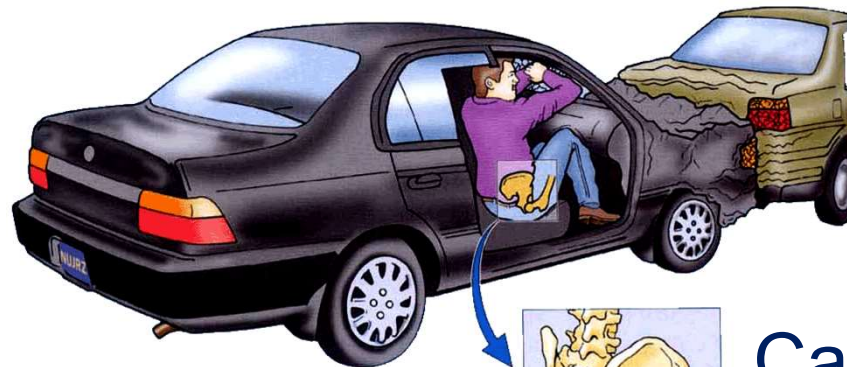
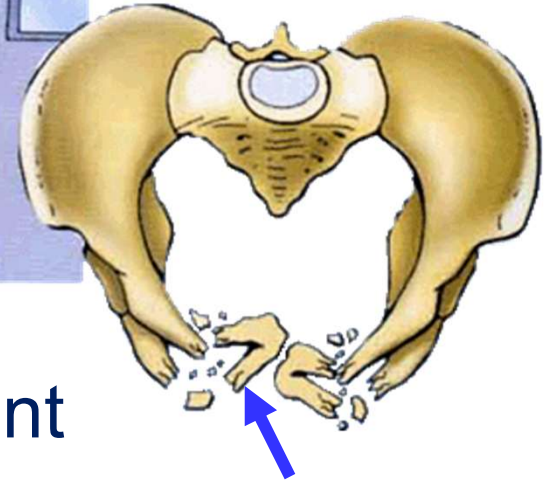
Hip bone and the clinic



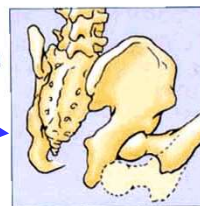
Parachuting



Car accident



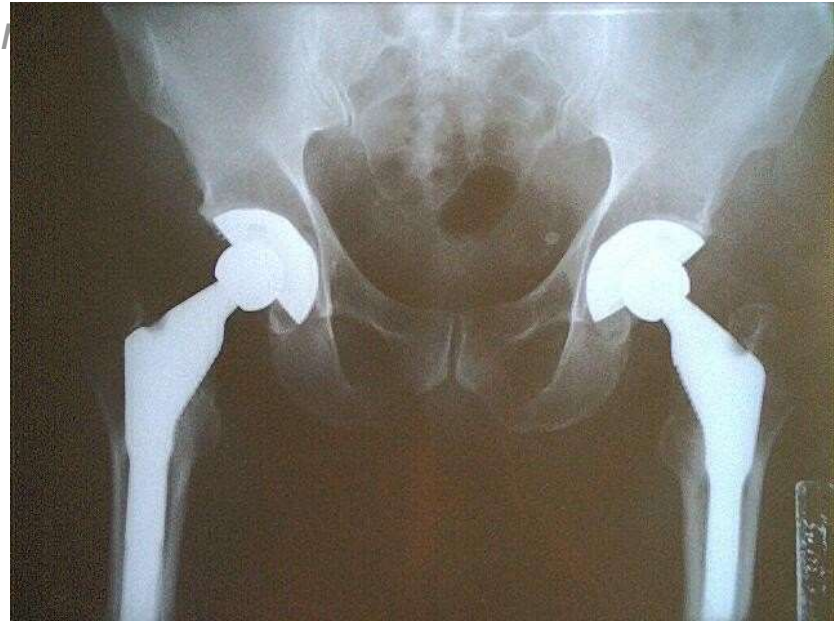
Car accident



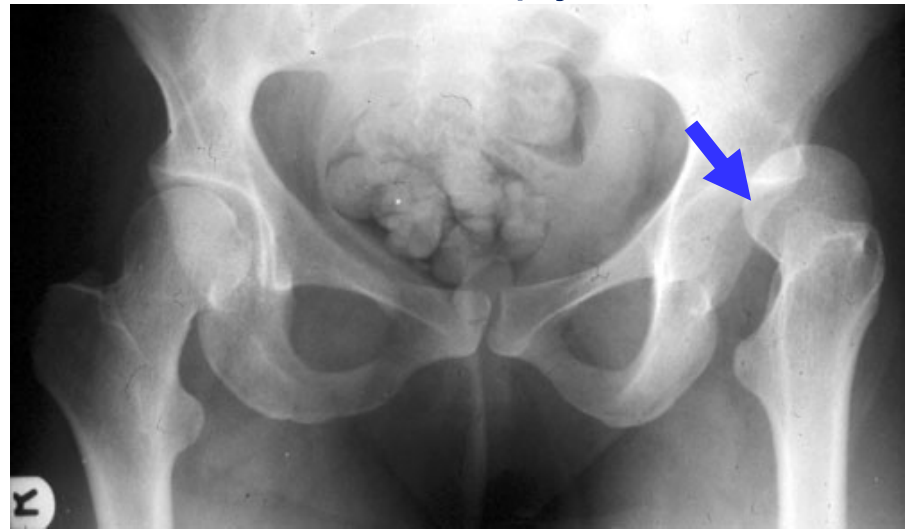
Radiograph of hip joint



Anteroposterior radiograph

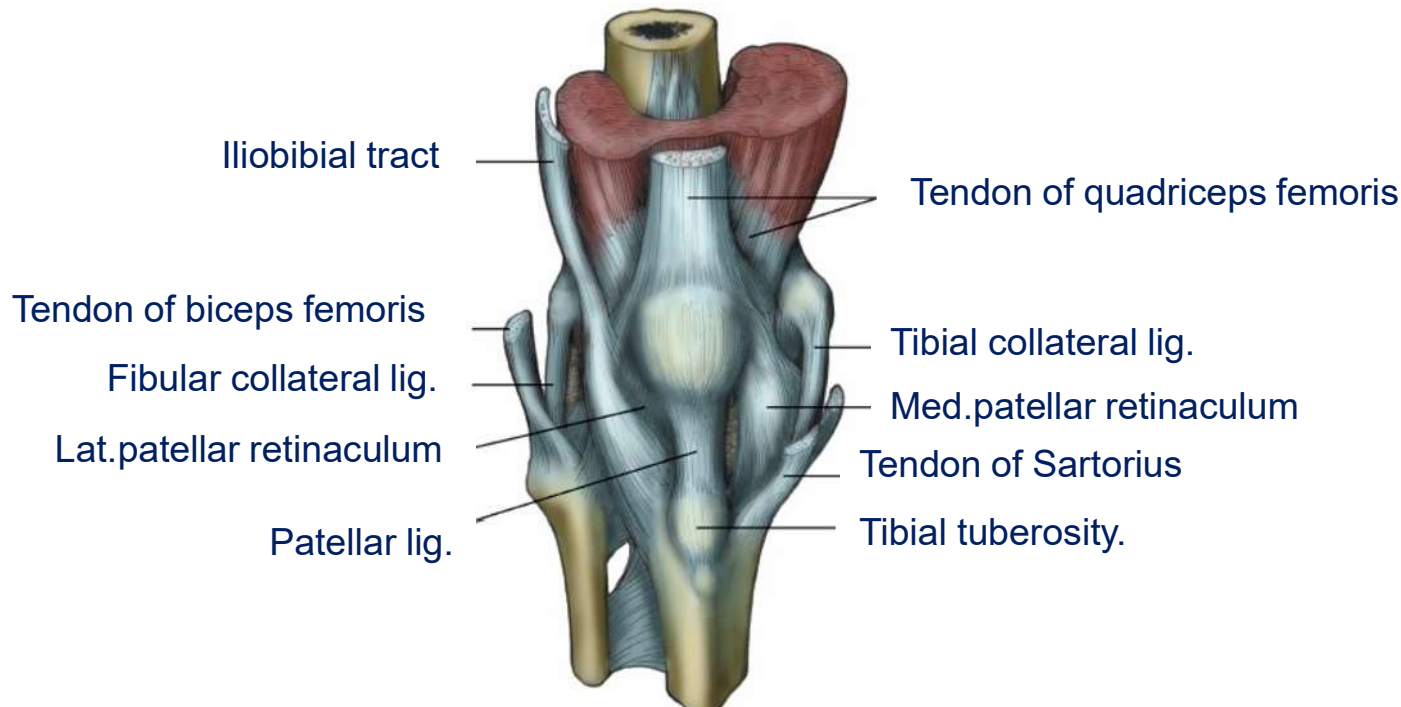


Artificial hip joint

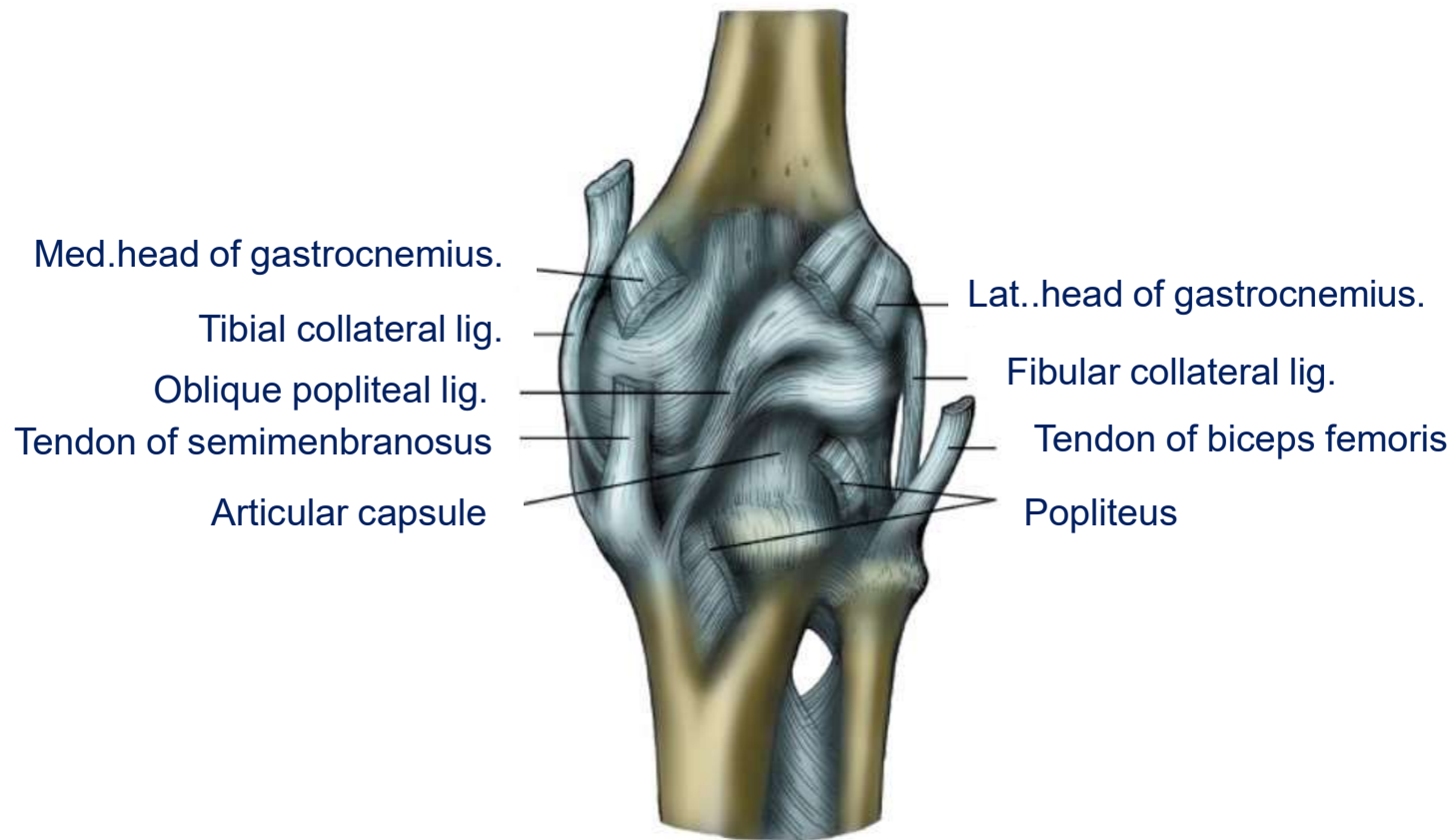


Dislocation of hip joint

- ◆ Largest, most complex, most vulnerable joint
- ◆ **Constitution:** lower end of femur, upper end of tibia & patella
- ◆ With many ligaments and special meniscus
- ◆ Articular capsule - - tense and strong

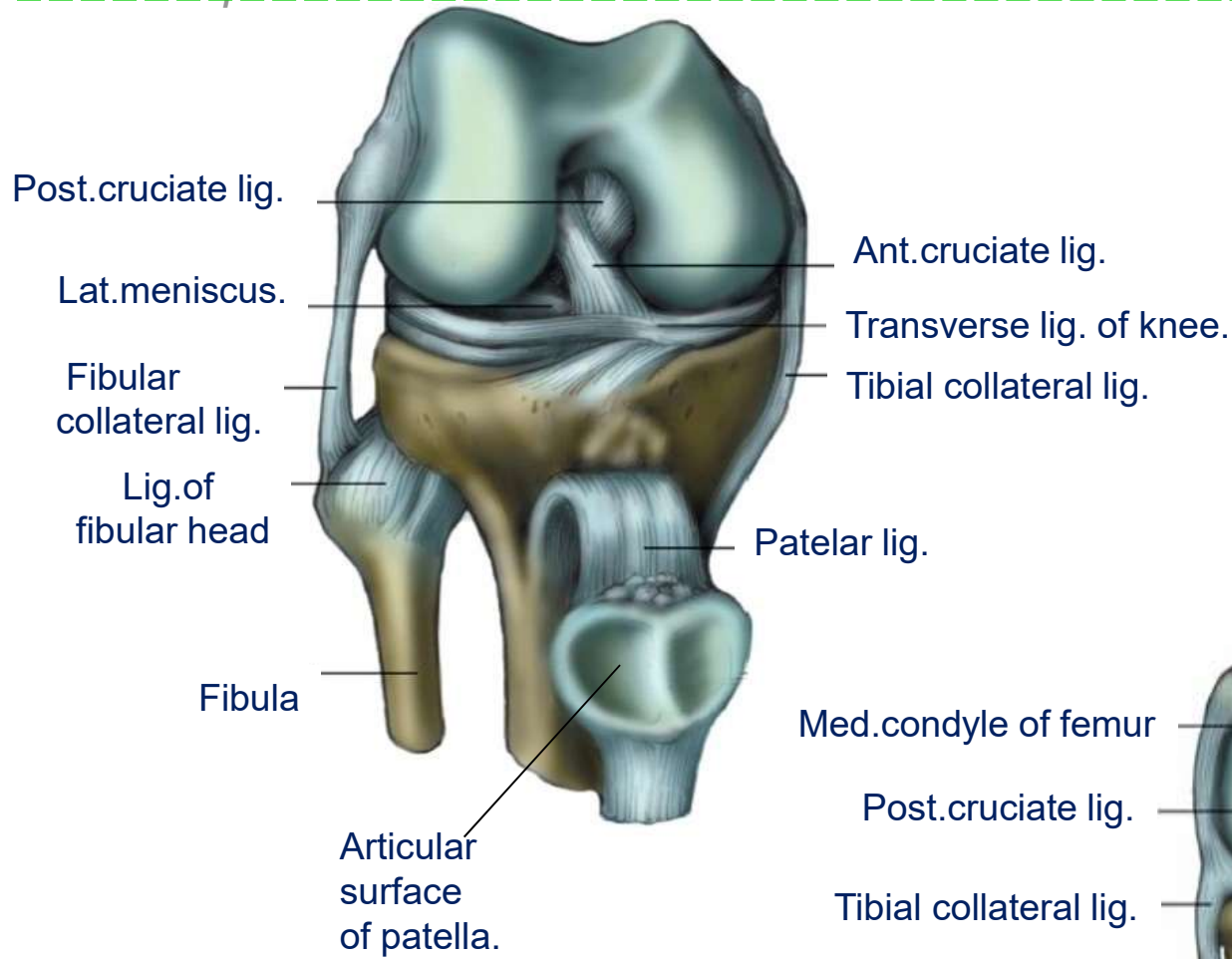


Movements Flexion and extension; Flexed knee joint may be passively rotated through 70°



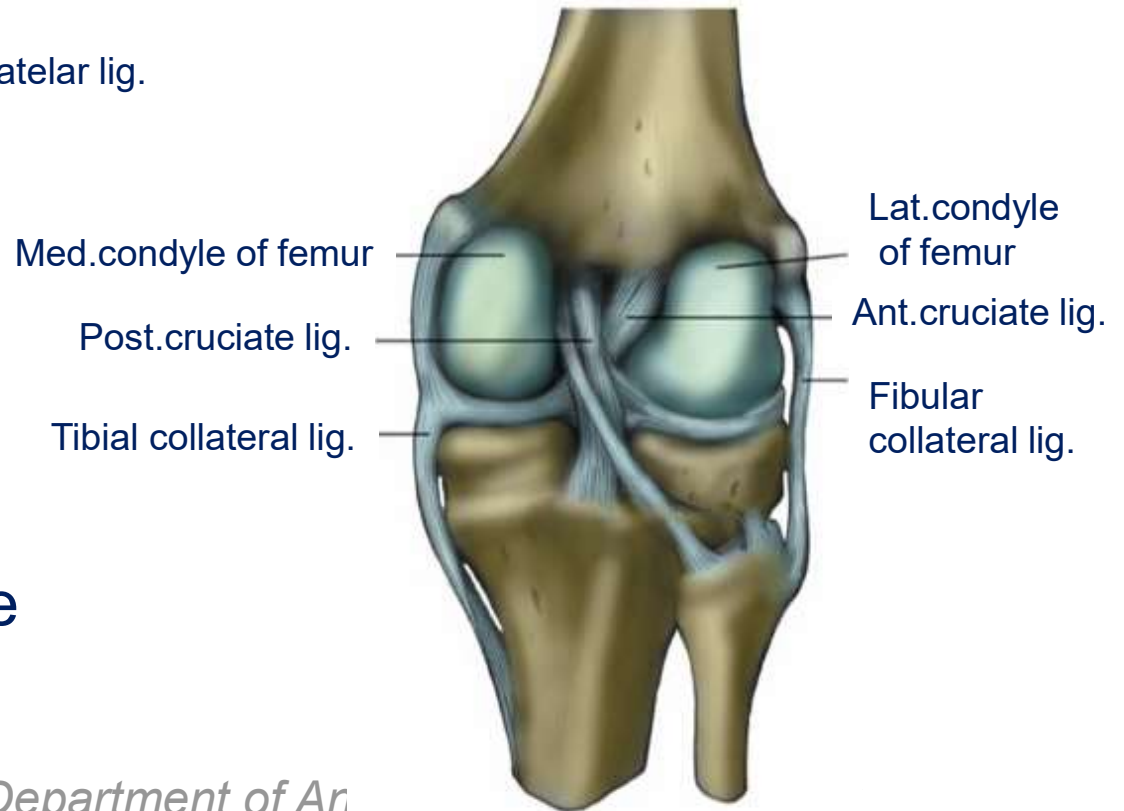
Posterior view of knee joint

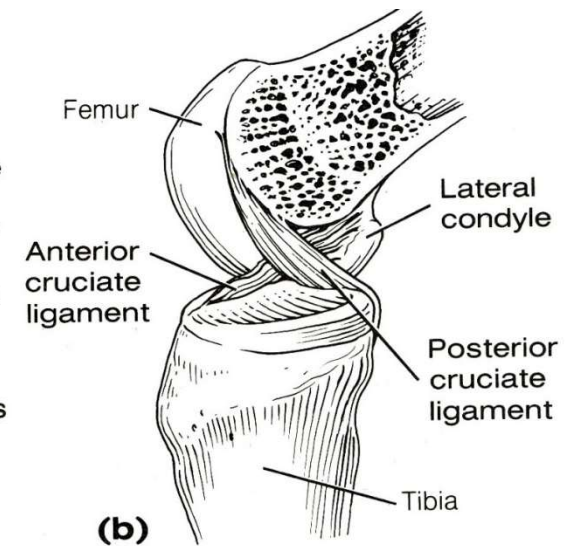
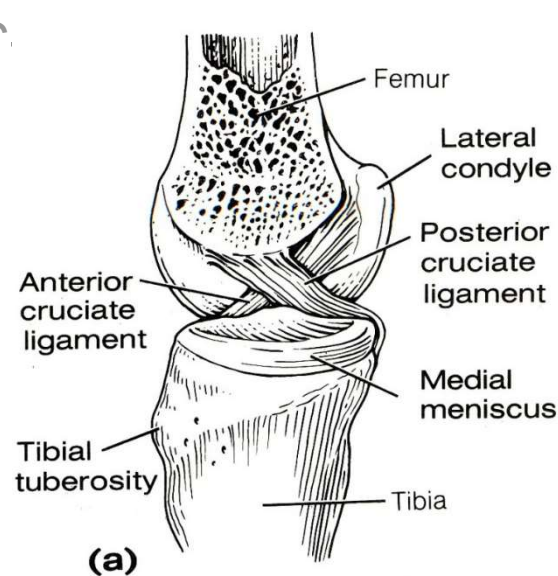
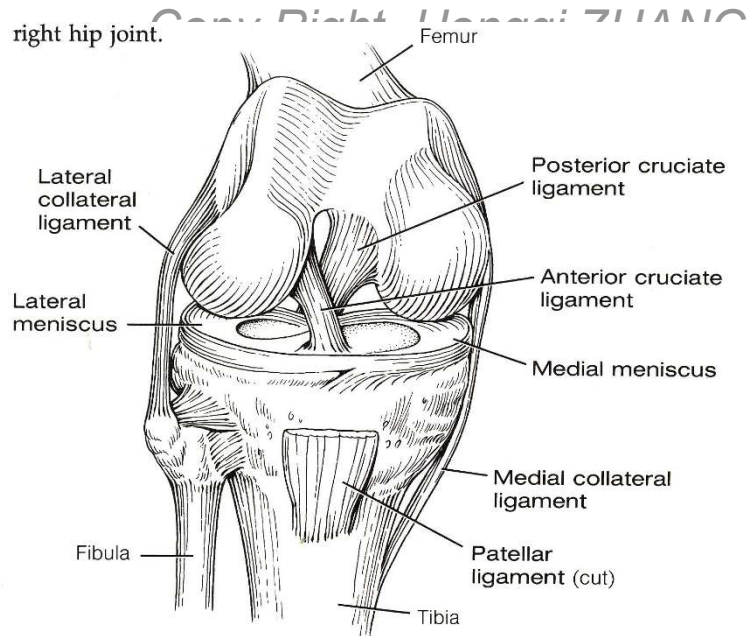
Knee joints



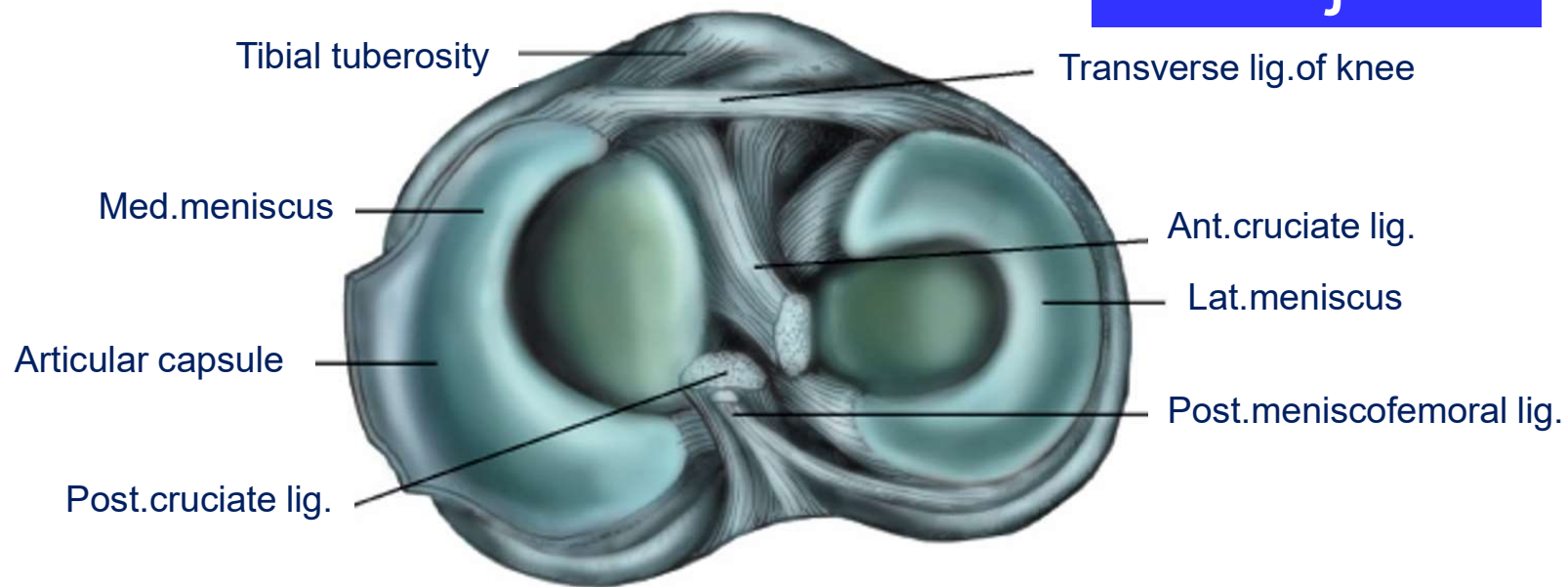
Knee joint (capsule opened. post.aspect)

Knee joint (joint capsule opened anteriorly)





Knee joints



Copy Ri Sup. articular surface of the tibial and meniscus



Artificial knee joint (prosthesis)



Artificial knee joint (prosthesis)



Articulation between the tibia & fibula

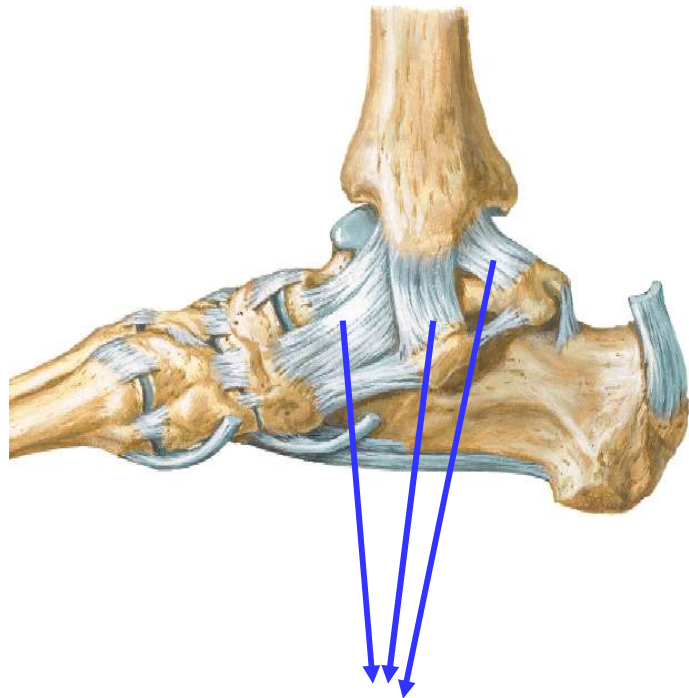


1 - Tibiofibular joint

2 - Tibiofibular syndesmosis

3 - Interosseous membrane of leg

Medial & lateral lig. of the ankle joint

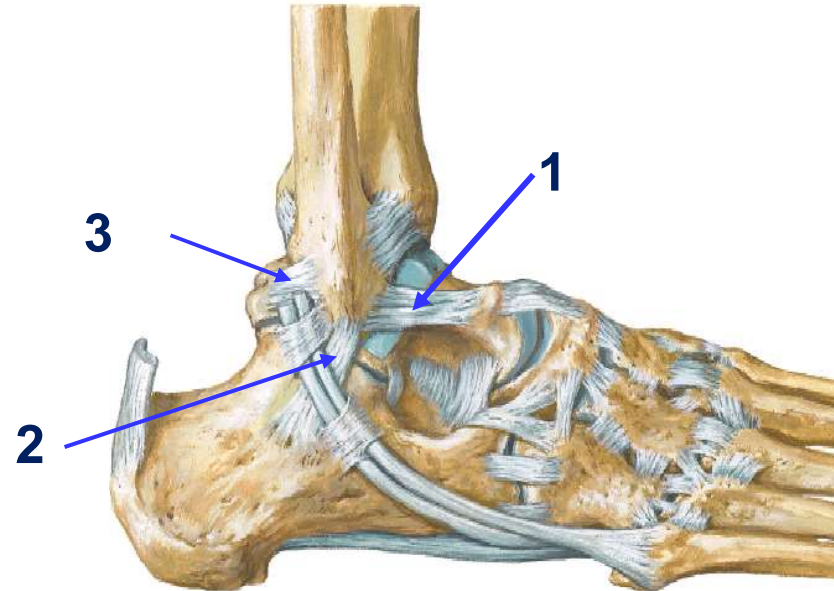


Medial lig. of ankle

Lig. and tendons of right ankle (Medial view)

Lateral lig. of ankle

- 1-Ant. talofibular lig.
- 2-Calcaneofibular lig.
- 3-Post. talofibular lig.



Lig. and tendons of right ankle (lateral view)

Intertarsal joints

Talocalcaneal joint- 距跟关节

Talocalcaneonavicular joint 距跟舟关节

Calcaneocuboid joint 距骰关节

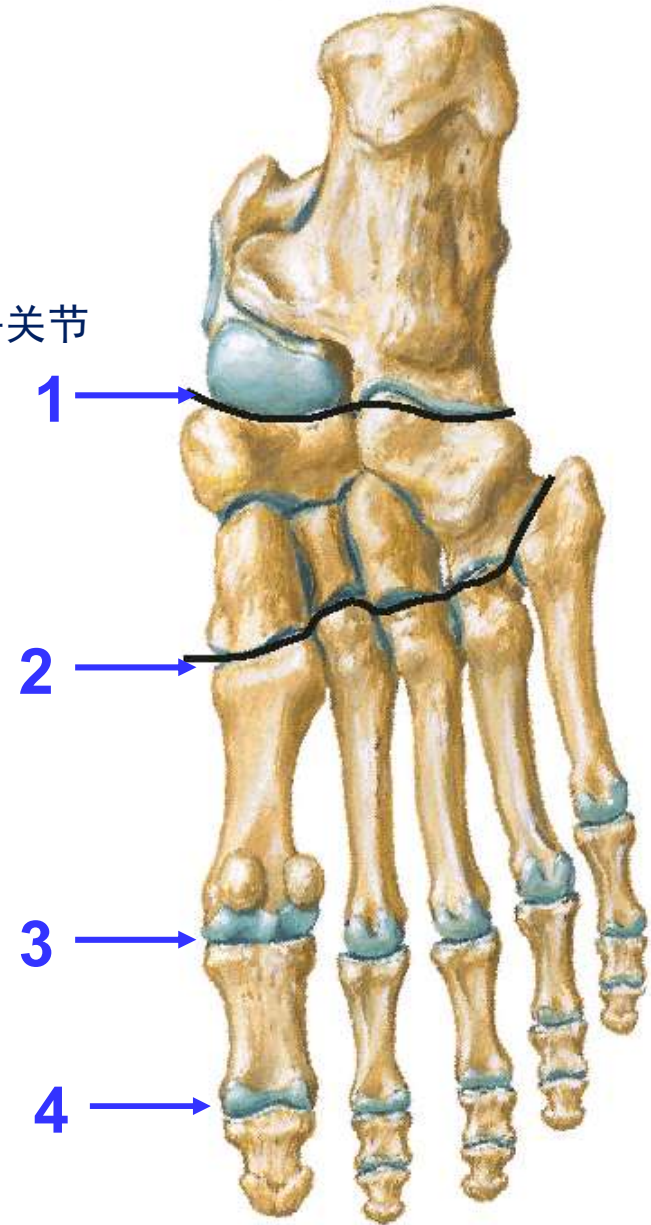
Intermetatarsal joints

1-Transverse tarsal joints

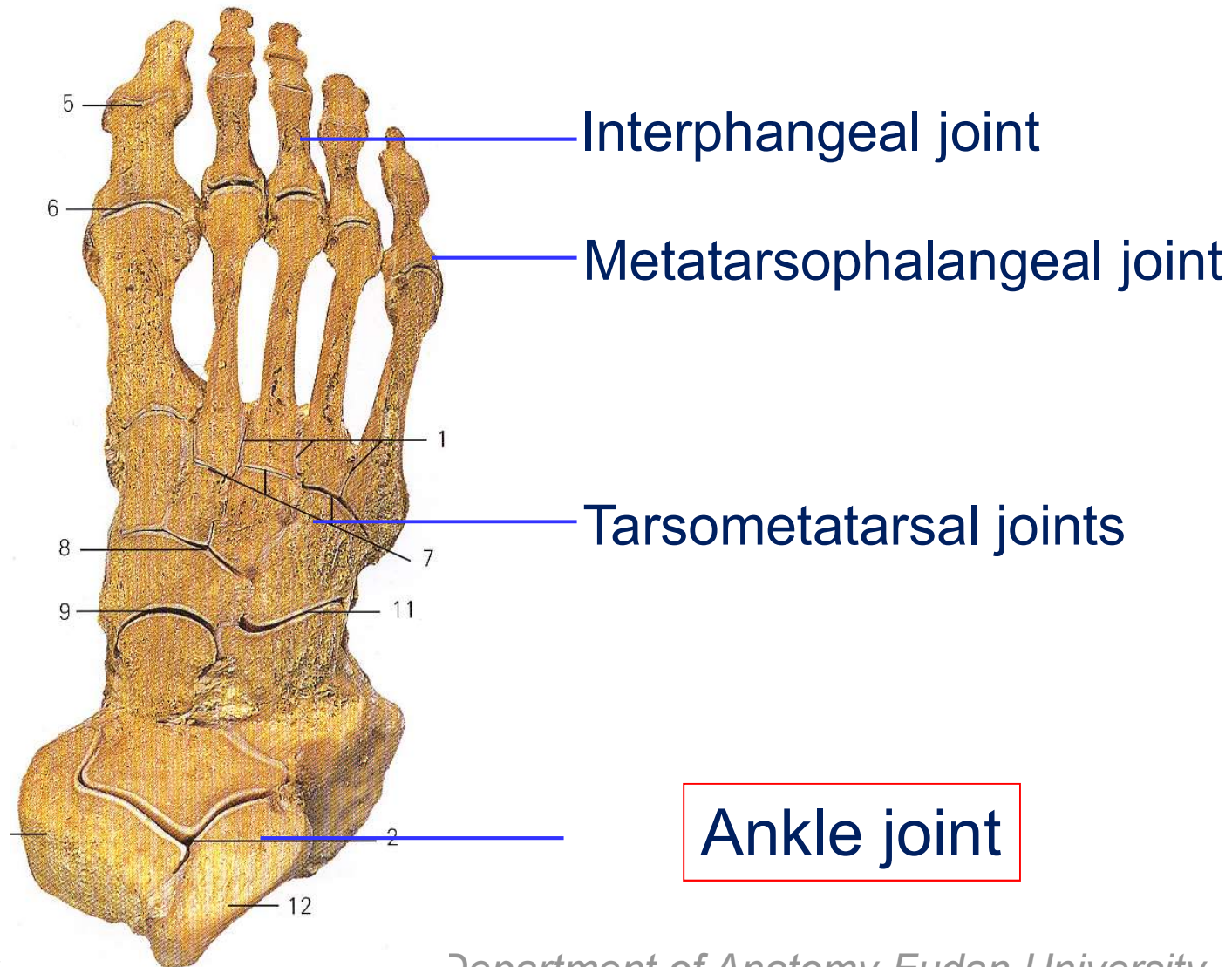
2-Tarsometatarsal joint

3-Metatarsophalangeal joints

4-Interphalangeal joints



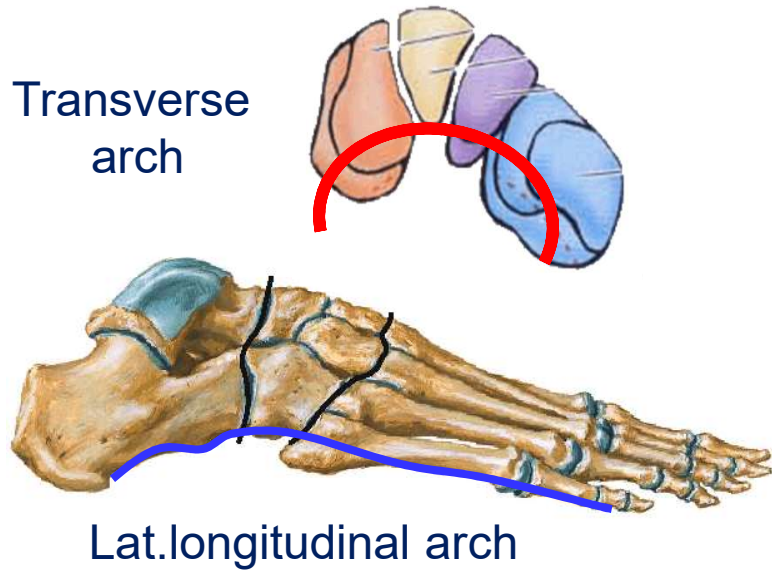
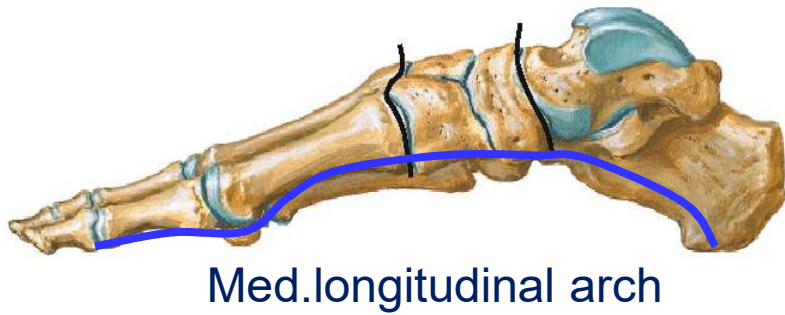
Joint of foot



Foot arch

Medial longitudinal arch:
Lateral longitudinal arch:
Transverse arch

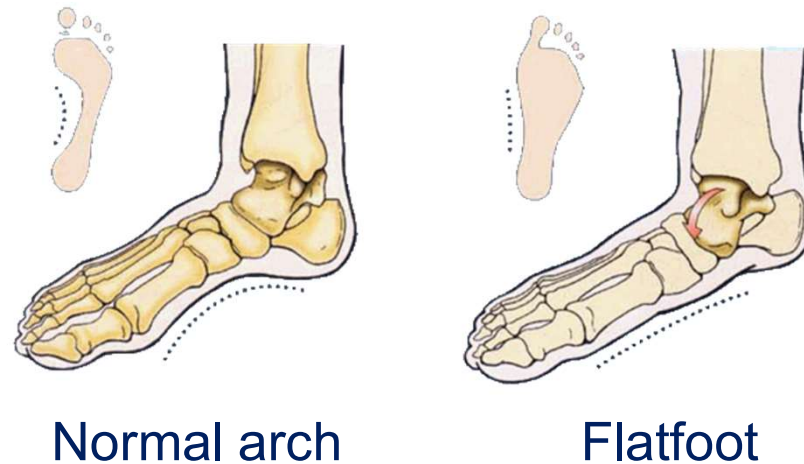
Function: give to foot stability & resilience; protect plantar vessels and nerves



Normal arch



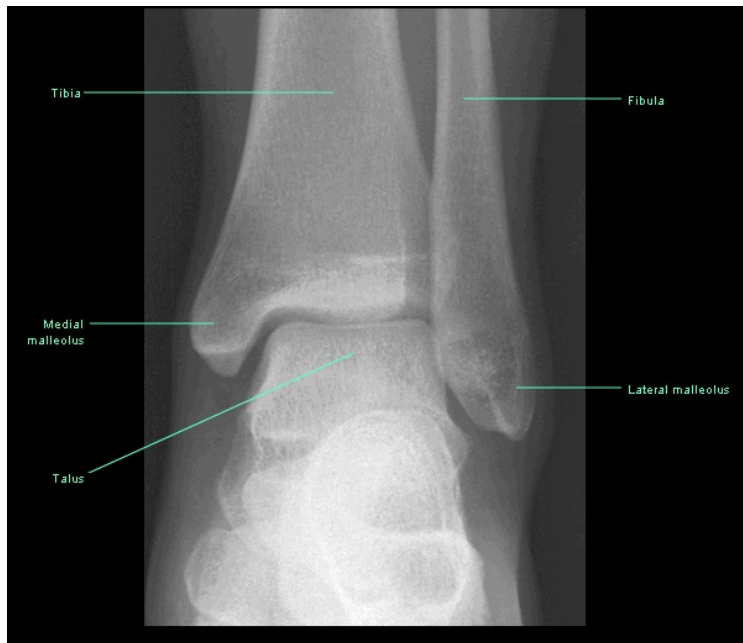
Flat foot



X-ray of the lower limb



Talocrural (ankle) joint



Ankle radiograph
anterior view

Bones:

Lower ends of tibia & fibula, trochlea of talus

Articular capsule

Thin and lax in front and behind, and supported on each side by strong collateral ligaments

Main ligaments

Medial lig.

Lateral lig.

Movements:

Dorsiflexion (extension) and plantar flexion (flexion); when the ankle joint is fully plantar flexed, small amounts of abduction, and adduction are possible

The important contents today

- ◆ Master the name, number and location of the lower limb bones.
- ◆ Master the morphological feature of the hip, femur, tibia and fibula.
- ◆ Master the arrangement of the foot bone
- ◆ Master the structure and movement of the hip joint, knee joint and ankle joint.
- ◆ Master difference of pelvis between the male & the female.

Bone	Part	Description
Pelvic (2 hip bones)	<ul style="list-style-type: none"> • Ilium • Iliac crest • Posterior superior iliac spine • Ischium • Pubis • Pubic symphysis • Acetabulum 	<ul style="list-style-type: none"> • Flared, upper portion • Upper edge of ilium • Posterior continuation of iliac crest • Lower, posterior portion • Anterior, medial portion • Joint between the 2 pubic bones • Deep depression that articulates with femur
Femur	<ul style="list-style-type: none"> • Head • Neck • Greater trochanter • Lesser trochanter • Condyles 	<ul style="list-style-type: none"> • Round process that articulates with hip bone • Constricted portion distal to head • Large lateral process for muscle attachment • Medial process for muscle attachment • Rounded processes that articulate with tibia

Co

Description of Bone of lower limb

Bone	Part	Description
Tibia	<ul style="list-style-type: none"> • Condyles • Tibial tuberosity • Anterior crest • Medial malleolus 	<ul style="list-style-type: none"> • Articulate with the femur • Round process for the patellar ligament • Vertical ridge • Distal process; medial “ankle bone”
Fibula	<ul style="list-style-type: none"> • Head • Lateral malleolus 	<ul style="list-style-type: none"> • Articulates with lat.condyle of tibia Articulates with tibia by ligament.
Tarsals (7)	<ul style="list-style-type: none"> • Calcaneus • Talus • Cuboid, navicular • Cuneiform: 1st, 2nd, 3rd 	<ul style="list-style-type: none"> • Heel bone • Articulates with calcaneus and tibia

The end !

Great wall of Han dynasty

Bye !