RADIOLOGY TEAM436

MEDICINE
KING SAUD UNIVERSITY

Radiology

Content:

- Introduction to the different methods used in Radiology
- The vertebrae
- Upper limbs
- Lower limbs
- Vessels and arteries of the upper& lower limbs

كل جزئية تم إعدادها و مراجعتها من قبل عضوين من الفريق تجدون أسماءهم أسفل الصحفات اللاتي قاموا بإعدادها.

Team leaders:

- Jumana Alghtani
- Abdulaziz Alangari

In the vertebral part the

MRI&CT-scan images found only in female slide

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Introduction (Extra)

Diagnostic imaging techniques

- **Plain Radiography (x-ray):**

X-ray are photons generated from complex x-ray tube and then they are condensed and directed into the appropriate area (as determined by radiographic technician). As the X-ray pass through the body into the tissues interact with radiology film (located under 1 m away from the X-ray tube, and the object –hand or foot- is placed upon the film).

The air attenuates (**reduces**) X-ray a little, then fat, then water and bone the most.

* الأشعة رح تخترق الهواء أكثر شي، فراح يبين في الصورة أغمق شي (أسود) بعدين تخترق الدهون شوي (تصير أفتح من الأسود بشوي)، بعدين الموية وأكثر الشي العظام رح تعكس الأشعة فراح تبين أفتح شي (أبيض).

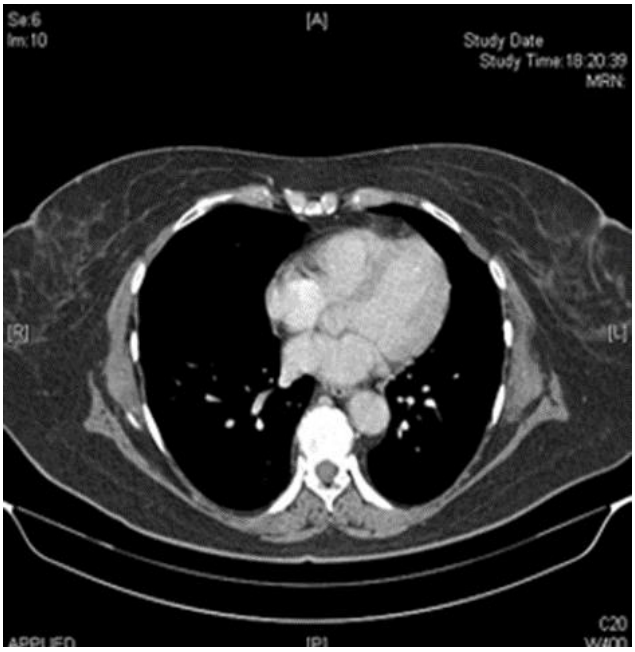
- **Computed tomography (CT Scan):**

A CT Scanner obtains a series of images of the body (slices) in the axial plane.

While most images are acquired in the axial plane and viewed such that the observer looks from below and upward toward the head. By implication:

- The right of the patient is on the left side of the image.

- The upper most border of image is anterior.



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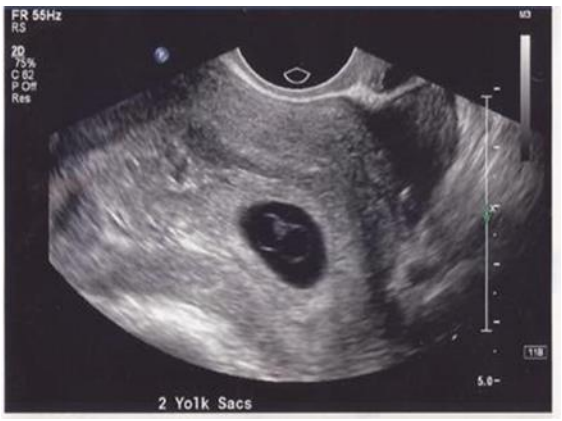
Cont. Introduction (Extra)

- **Ultrasound (U/S):**

Widely used for all aspects of medicine.

It is high frequency sound wave (not electromagnetic radiation) which make it safer even for a pregnant women and it is a real-time image.

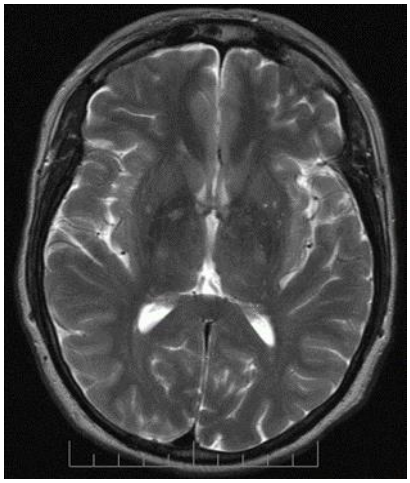


This cute image shows identical twins, 6 weeks and 5 days ♡

- **Magnetic resonance imaging:**

Used to determine the structure of complex molecule and the patient is placed in a high magnetic field.

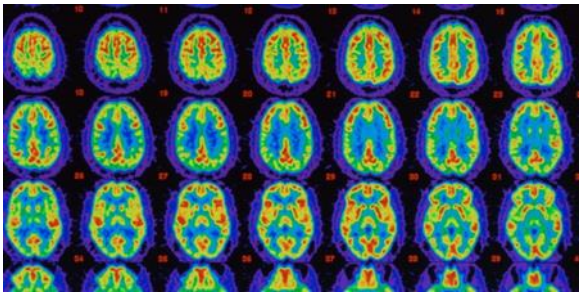
It can also used to assess the flow within vessels, it has significantly altered the practice of musculoskeletal medicine and surgery. Images can be taken in any plain and follow the same principles of CT scan.



- **Nuclear medicine imaging:**

Involves images using gamma rays, which are another types of electromagnetics radiation.

Most nuclear medicine images are usually interpreted directly from a computer, and a series of representative films are obtained for clinical use.



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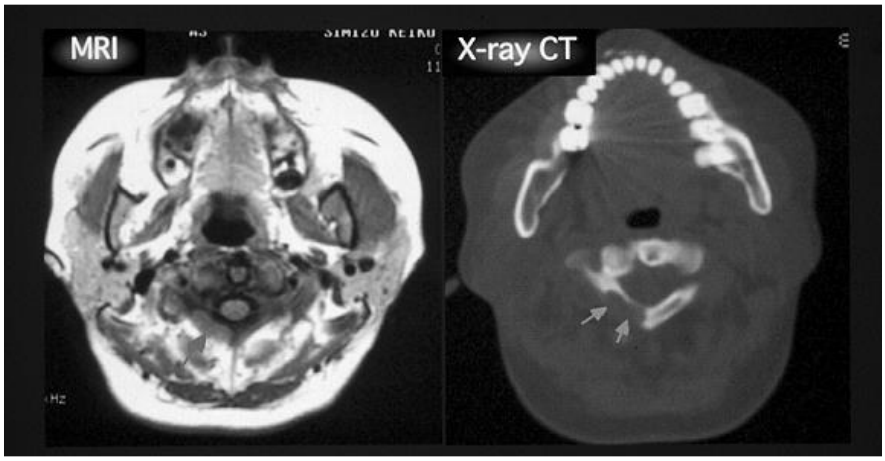
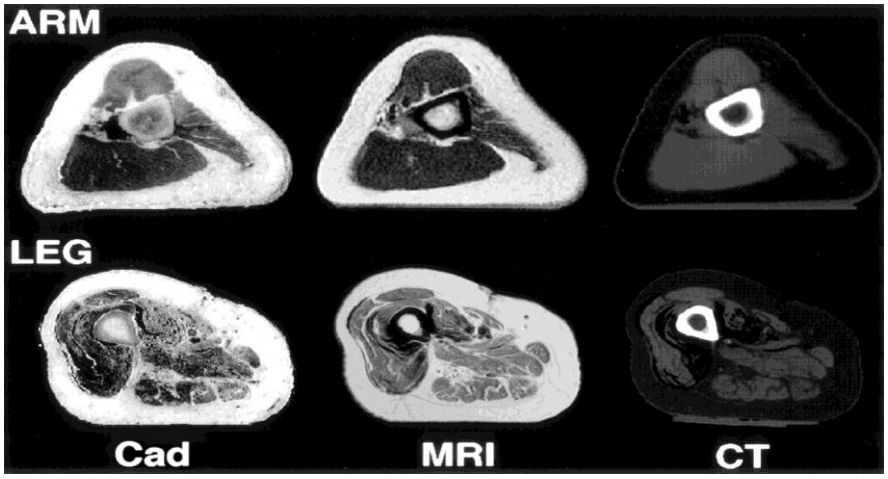
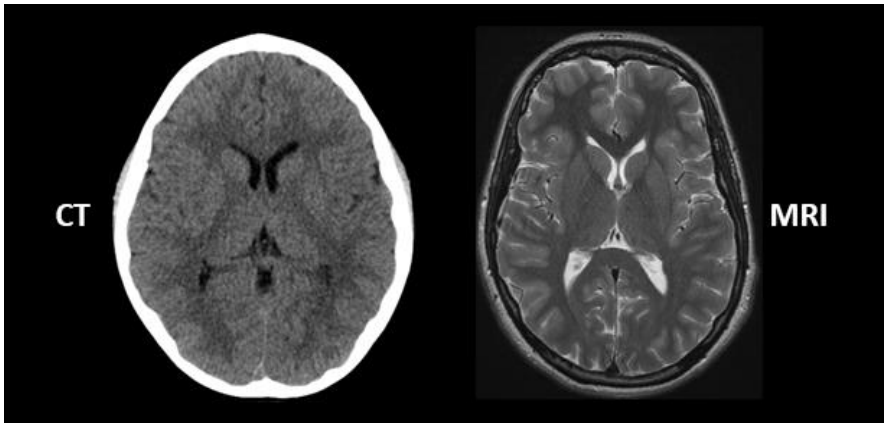
Cont. Introduction (Extra)







كثير نتلخبط بين صور ال MRI
وال CT scan

و عشان نفرق:

- صور MRI تكون موضحة جدا ال soft tissues
- بينما CT scan موضحة العظام (زي عظم الجمجمة والأسنان)، لأنها فعليًا عبارة عن x-ray ياخذ الصورة من كل الجهات مو جهة وحدة بس فبالتالي يبين العظم.

Imaging techniques	Advantages	Disadvantages
X-ray	- Initial study usually done for bones and vertebrae. - Short test duration.	- We can't see the soft tissues. - Can't be used for pregnant women. - Risk for future cancers after prolonged exposure.
Ultrasound (U/S)	- Usually use for neonatal bones (cartilaginous bones). - Can be used for spinal cord and soft tissues (internal body structures).	- Can't be used for adult's bones. - Low image quality. - Special preparations may be required before it (fasting or full bladder).
Computed tomography (CT)	- Shows internal body structures. - Can have the results quickly.	- Spinal cord almost can't be seen. - Uses more radiations than x-ray. - Some procedures require anaesthesia.
Magnetic resonance image (MRI)	- Provide very detailed diagnostic pictures of most of the important organs and tissues in your body - Suitable for use in children and pregnant women.	- Can be a long lengthy and noisy procedure - Slight movement can ruin the image, requiring retesting. - Expensive. -Don't show bones clearly . * can't be used for patients with cardiac pacemakers, tattoos and metal implants *
Nuclear medicine imaging	- Can help diagnose, treat, or predict the outcome for a wide range of conditions.	- Involves exposure to ionising radiation (gamma-rays). - Radioactive material may cause allergic or injection-site reactions in some people.

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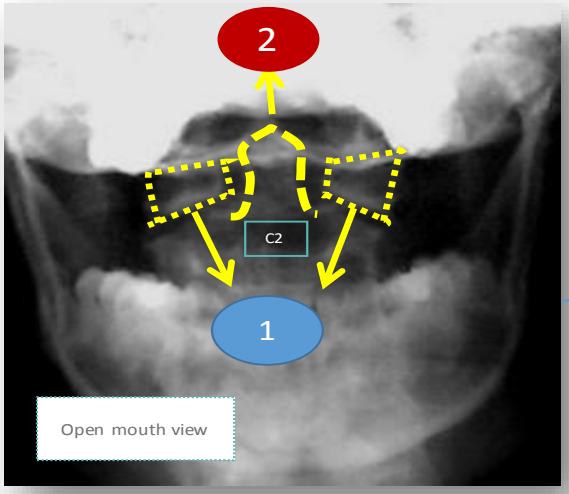
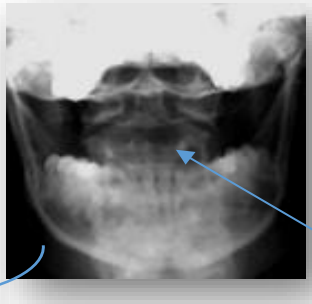
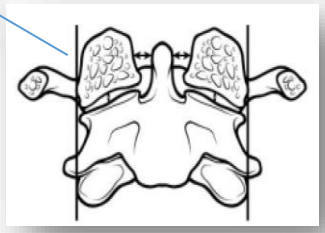
The vertebrae

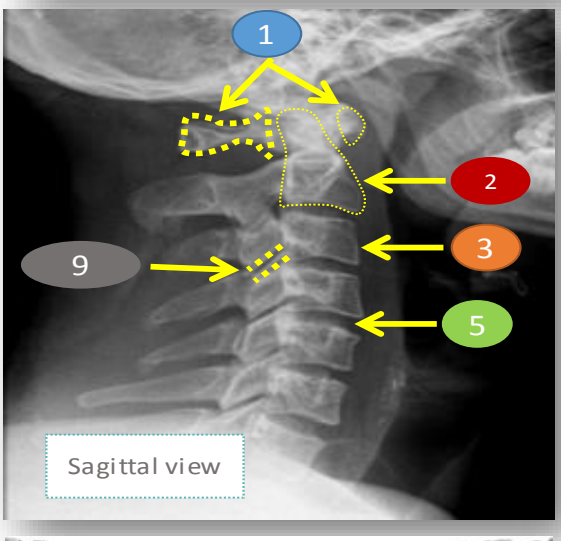
Cervical spine

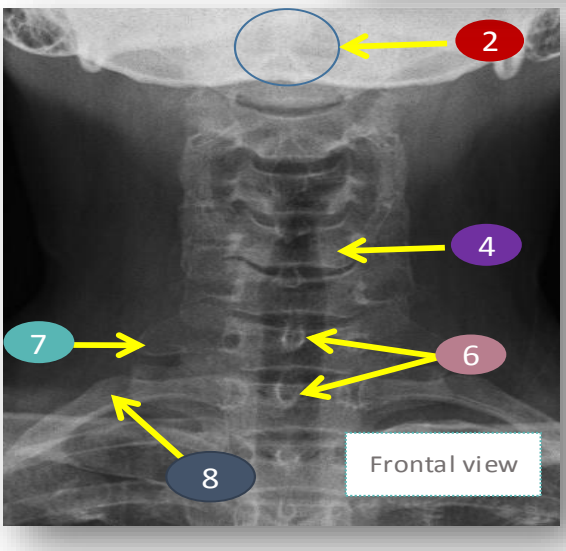
X-ray

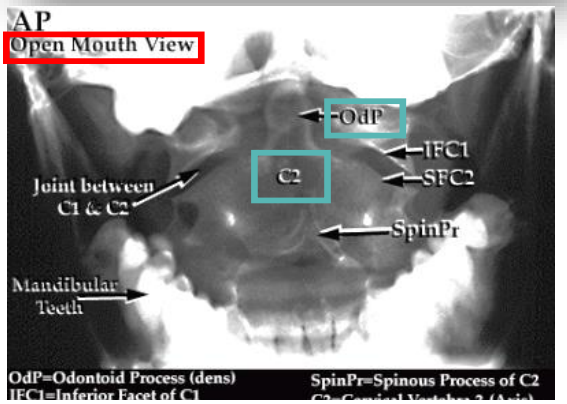












1. C1
2. C2
3. C3
4. Vertebral body of C5
5. Intervertebral disc
6. Spinous process
7. Transverse process
8. First rib
9. Facet joint

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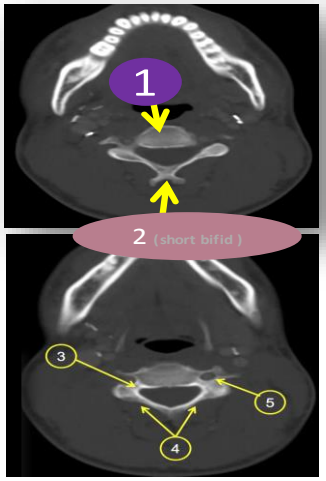
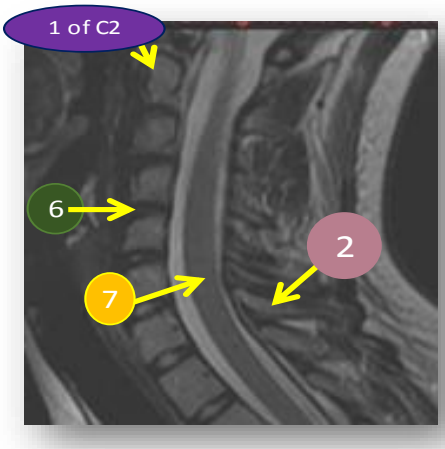
Cervical spine

CT-Scan



1. Vertebral body
2. Spinous process
3. Pedicle
4. Lamina
5. Transverse foramen
6. Disc
7. Spinal cord

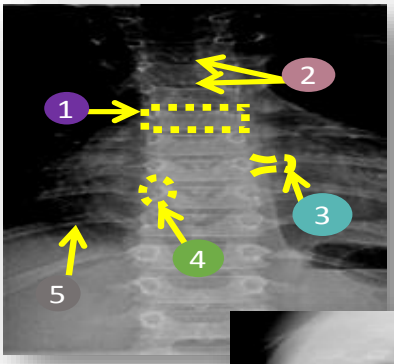
MRI

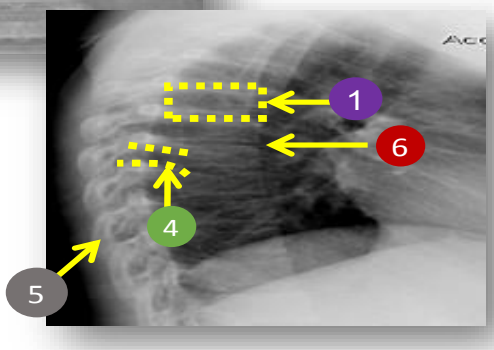


Thoracic spine

No MRI image

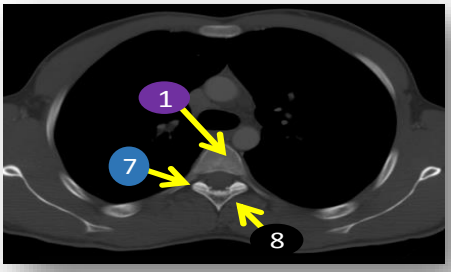
X-ray

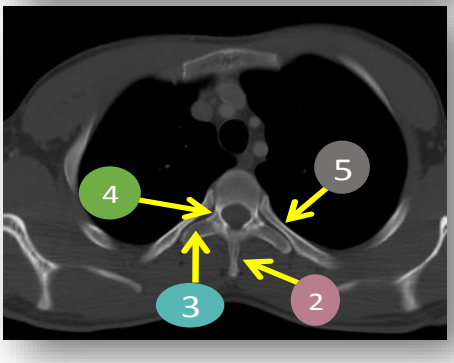




1. Vertebral body
2. Spinous process
3. Transverse process
4. Pedicle
5. Rib
6. Intrvertebral disc
7. Neural foramen
8. Lamina

CT-Scan





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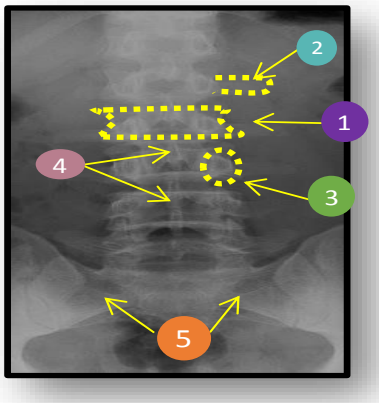
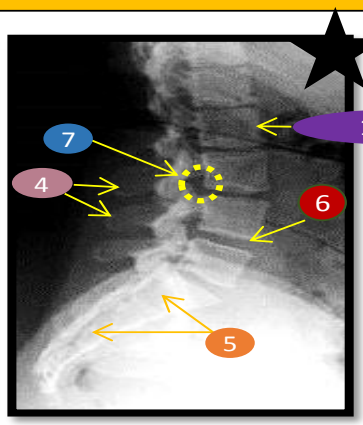
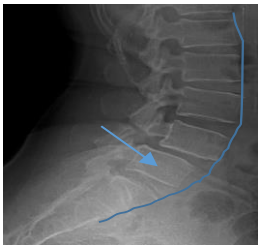
Lumber spine

X-ray

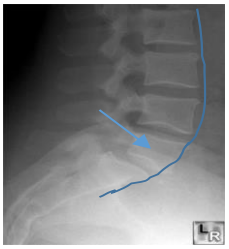






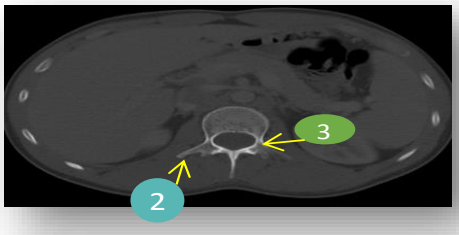
Dislocation of L5 by X-ray's image

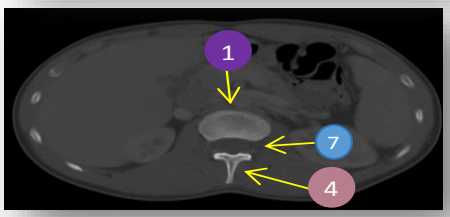
We draw an imaginary line to see where is the dislocation



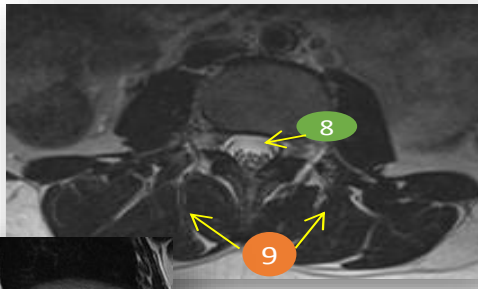
CT-Scan

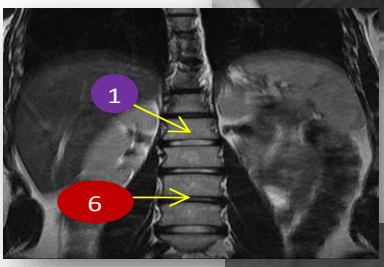
In CT we can see some white that we never see in MRI . It usually gray & black in MRI

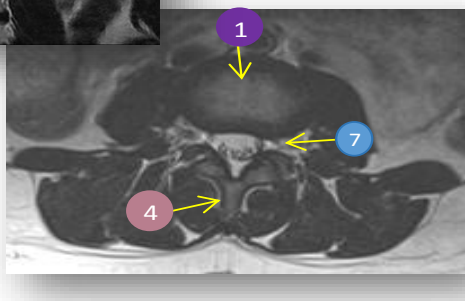




MRI







1. Vertebral body
2. Transverse process
3. Pedicle
4. Spinous process
5. Sacrum
6. Intrvertebral disc
7. Neural foramen
8. Thecal sac
9. Para-spinal muscles

Thecal sac
membranous sheath that surrounds the spinal cord and the cauda equina & it contains the cerebrospinal fluid

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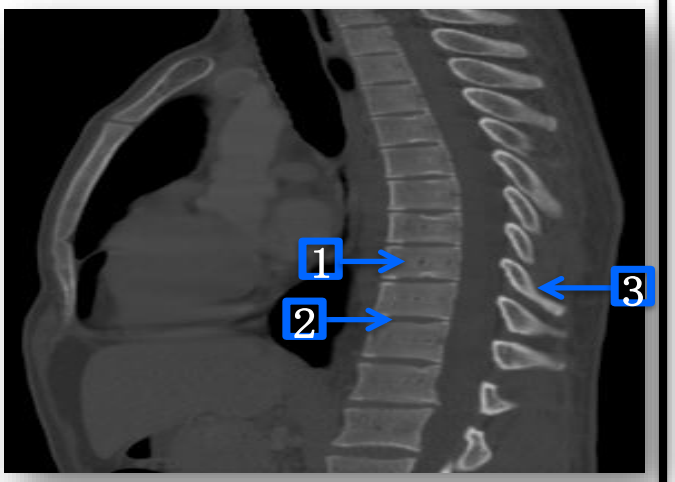
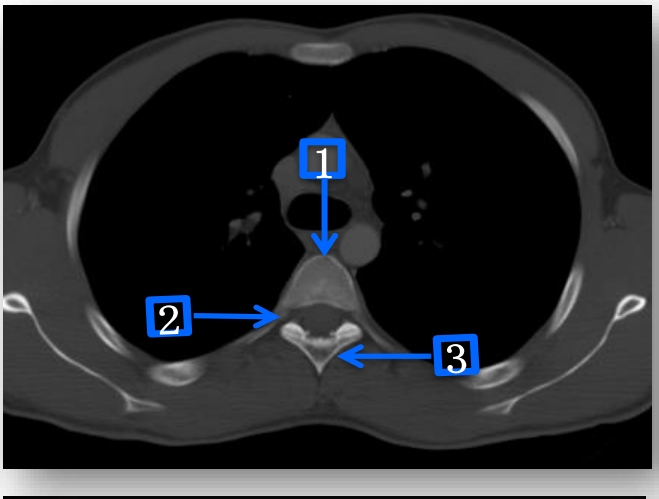
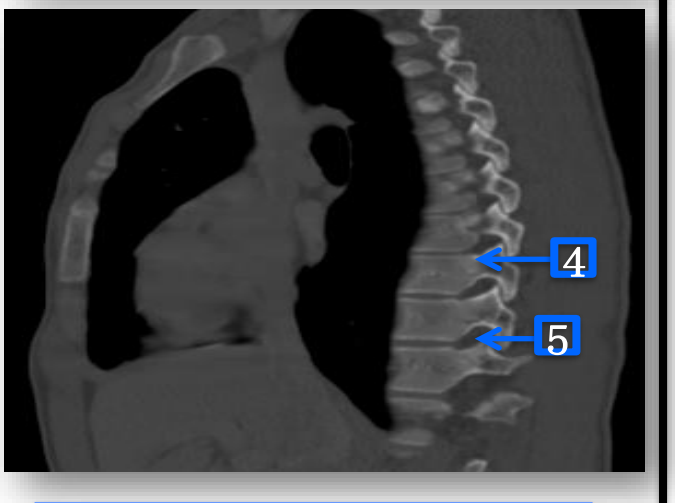
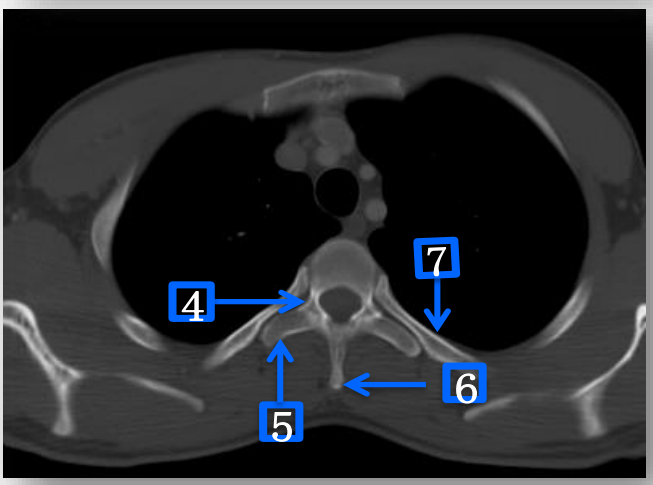
Dorsal Spine









1. Vertebral Body
2. Intervertebral Disc
3. Spinous Process
4. Pedicle
5. Neural Foramen

1. Vertebral Body
2. Neural Foramen
3. Lamina
4. Pedicle
5. Transverse Process
6. Spinous Process
7. Rib

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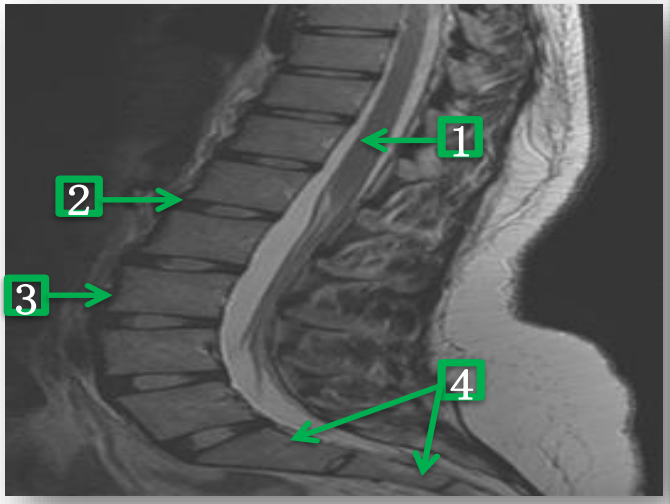
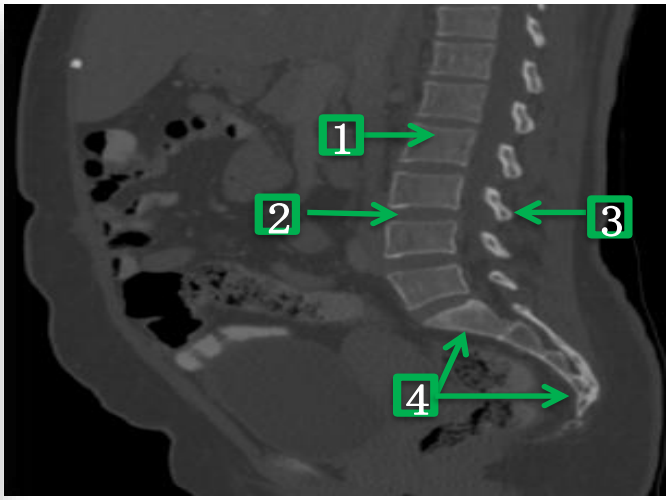
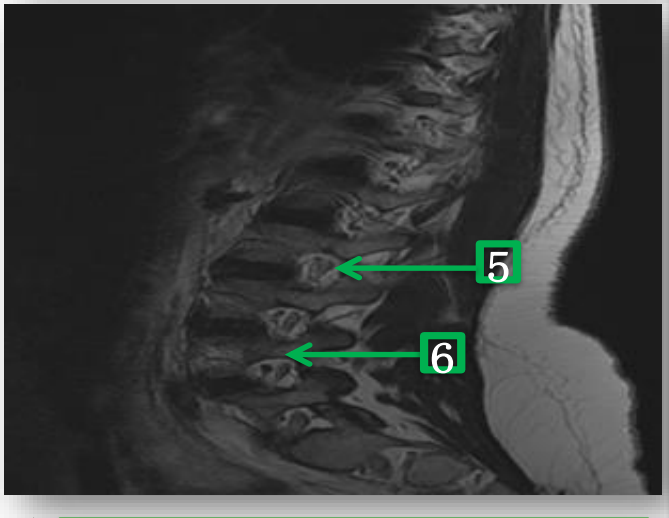
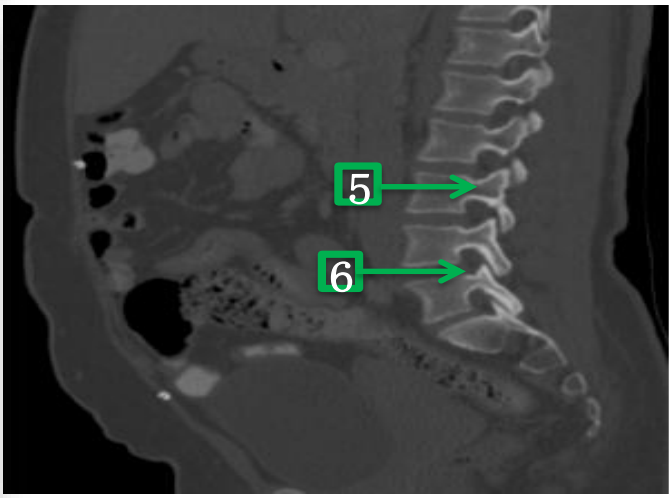
Lumbosacral Spine









MRI

1. Spinal Cord
2. Disc
3. Vertebral Body
4. Sacrum
5. Neural Foramen
6. Pedicle

1. Vertebral Body
2. Intervertebral Disc
3. Spinous Process
4. Sacrum
5. Pedicle
6. Neural Foramen

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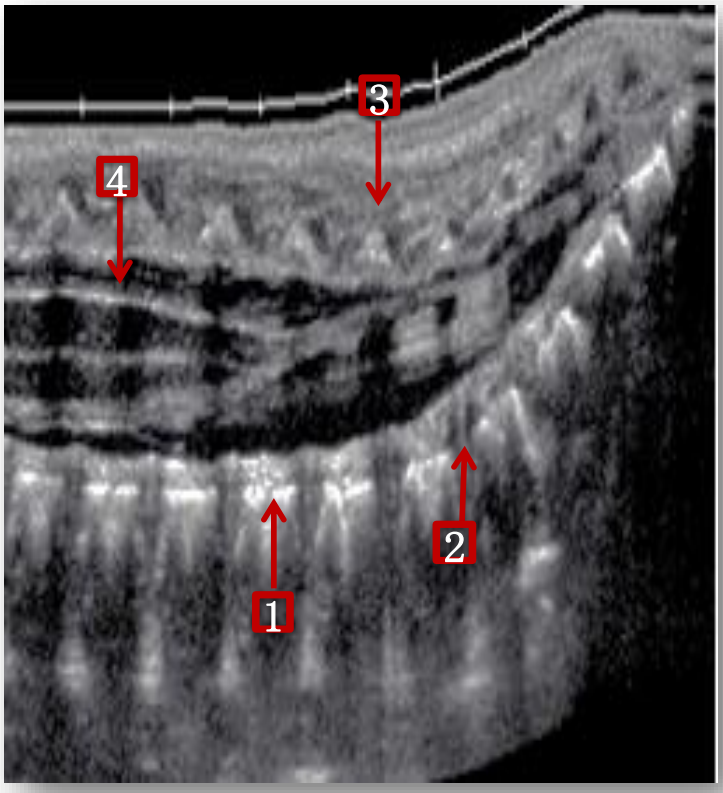
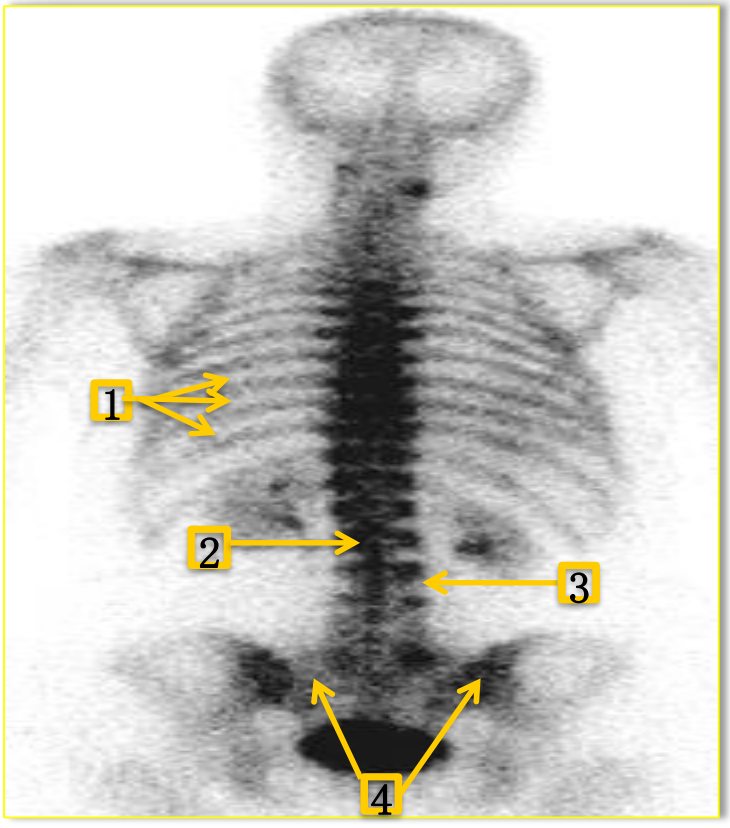


(Ultrasound)

1. Vertebral Body
2. Disc
3. Spinous Process
4. Spinal Cord



(Nuclear Scan)

1. Ribs
2. Vertebral Body
3. Disc
4. Sacrum

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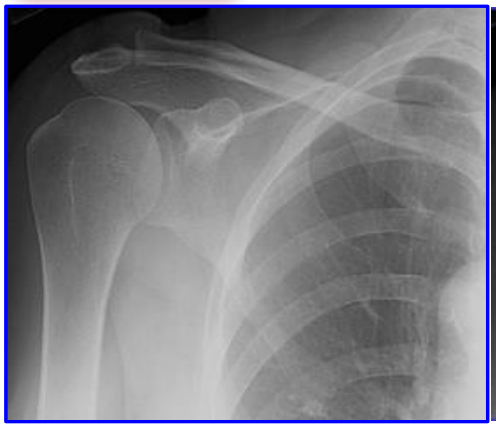
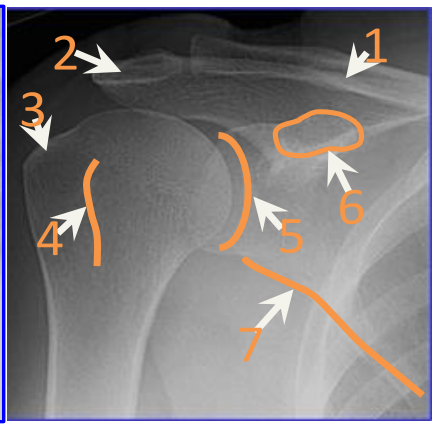
Upper limbs

مقتبس من تيم 435

ANATOMY OF UPPER LIMB (shoulder region)

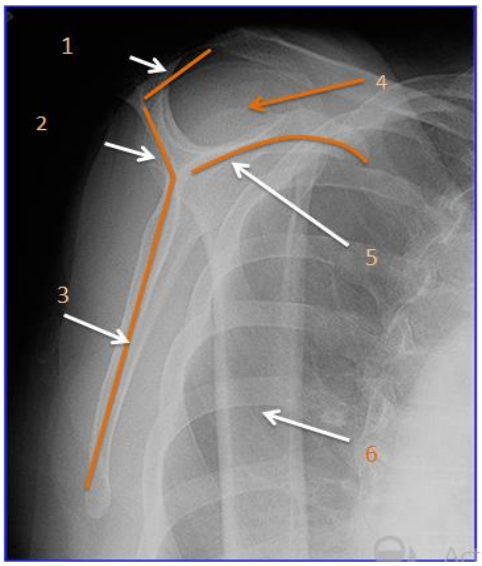
X-ray





1- Clavicle
2- Acromion
3- Greater Tuberosity
4- Lesser Tuberosity
5- Glenoid Cavity
6- Coracoid Process
7- Scapula

Y view



1- Acromion
2- Spine
3- Scapula
4- Humeral head
5- Coracoid Process
6- Humors shaft

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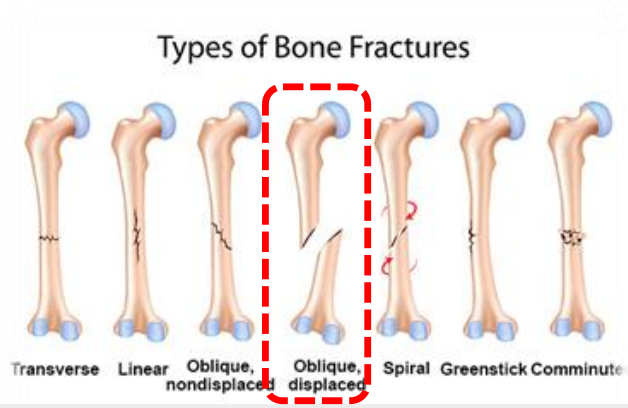
X-ray

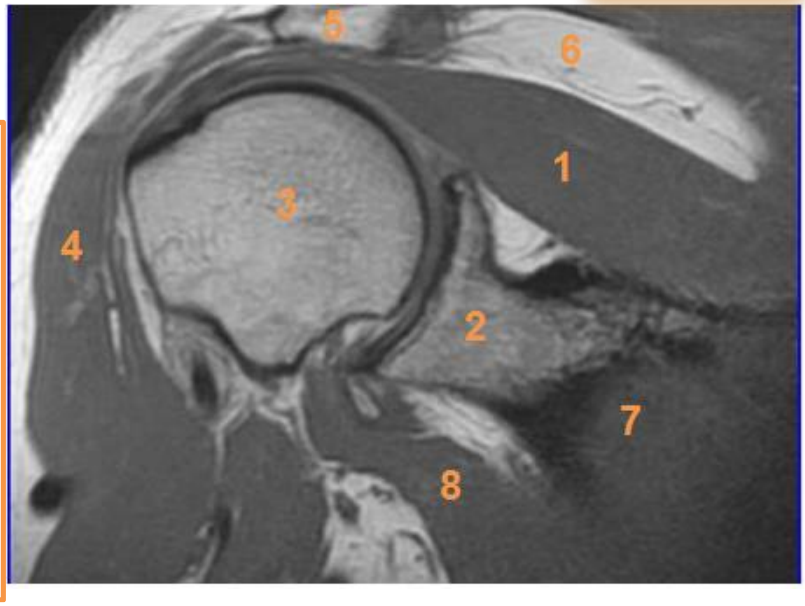
Humerus fracture



- *Humerus - Shaft fracture*
- *Oblique fracture of the humerus shaft.*
- *As with many long-bone fractures the distal component is markedly displaced.*

MRI

Shoulder region



1-supraspinatus muscle
2- glenoid cavity
3-humeral head
4-deltoid muscle
5-acromion
6-clavicle
7-subscapularis muscle
8-teres minor

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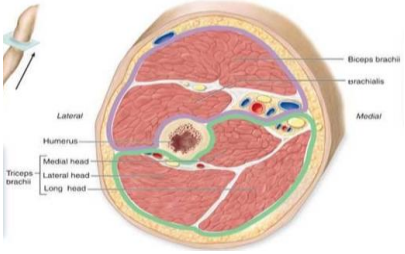
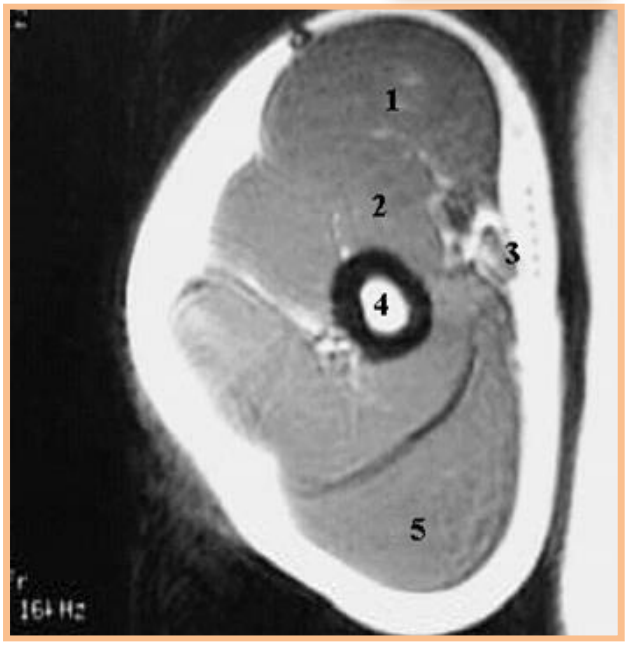
Arm

MRI

1 Biceps brachii muscle
2-Brachialis muscle
3-Brachial artery
4 Humerus
5-Triceps muscle

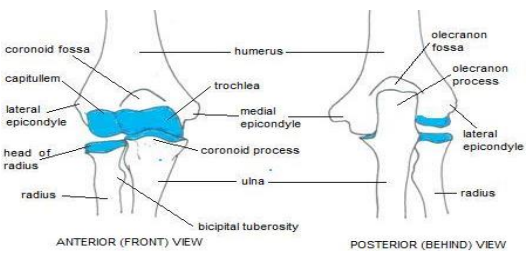


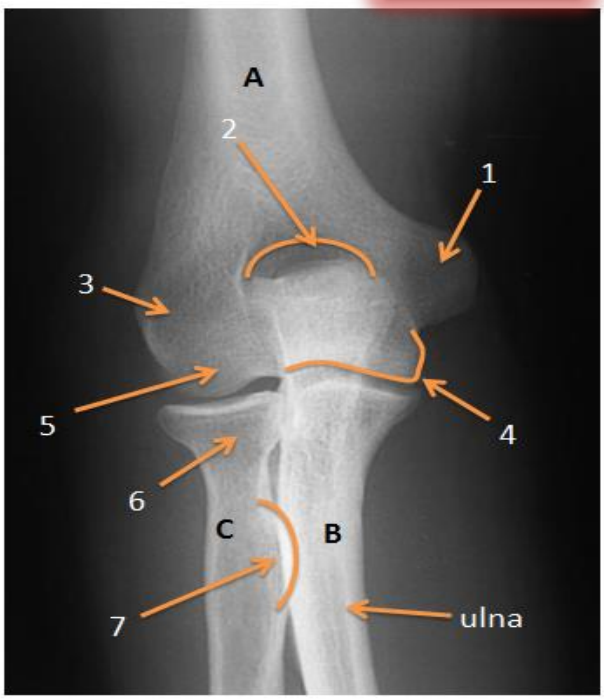


Elbow joint

X-ray

A- Humerus.	1-Medial epicondyle. 2-Olecranon fossa. 3-Lateral epicondyle. 4-Trochlea. 5-Capitulum.
B- Ulna.	----------
C- Radius.	6-Radial. 7-Radial tuberosity.





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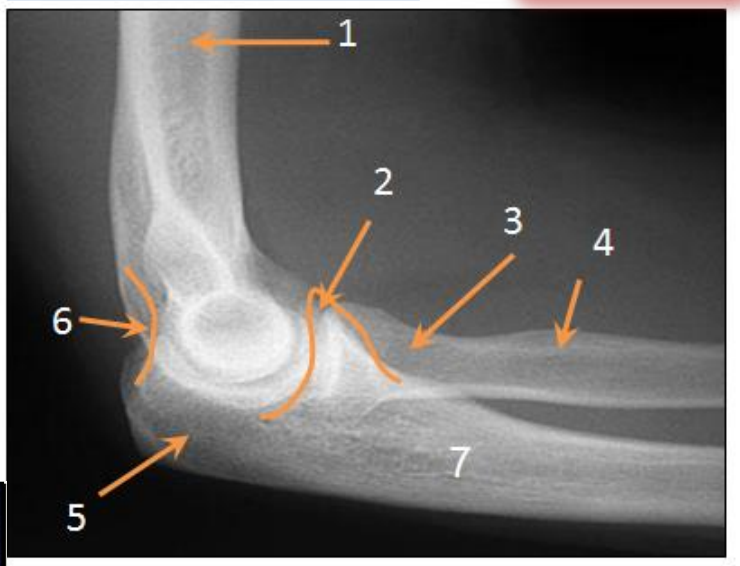
RADIOLOGY
TEAM436

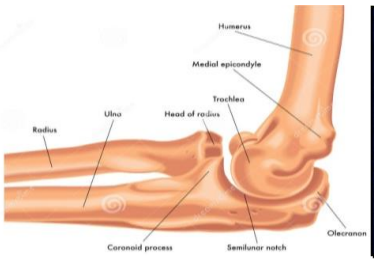
X-ray

Elbow joint

1- Humerus
2- Coronoid Process
3- Radial Head
4- Radial Tuberosity
5- Olecranon
6- Olecranon Fossa
7- Ulna

Lateral view of joint





Radial will appear bigger than ulna in x-ray

Child Elbow Joint

In children you can find Cartilage more than in adult And the joint is not fused yet

Adult Elbow Joint

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RADIOLOGY TEAM436

Hand

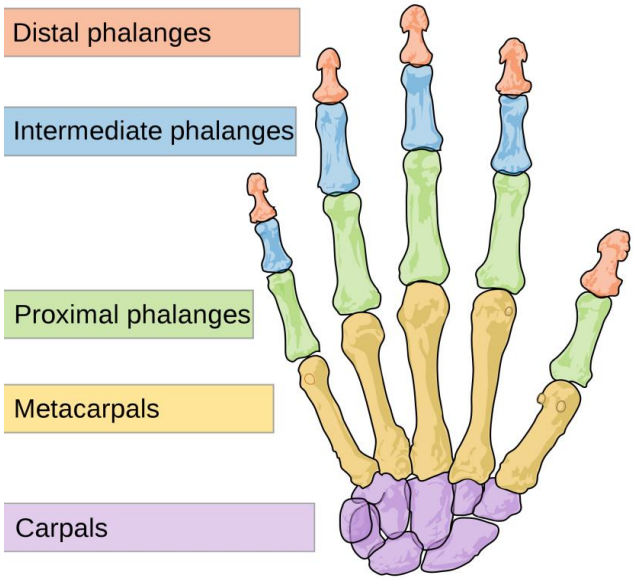
We have 8 carpal bones
(from lateral to medial & proximal to distal)

- Scaphoid
- Lunate
- Triquetral
- Pisiform
- Trapezium
- Trapezoid
- Capitate
- Hamate

To help u memorize them :
"She Looks Too Pretty Try To Catch Her"

طريقة أخرى للحفظ باللغة العربية:
السكاكر مفضلة بالنسبة لونا خصوصًا لو كان لونها تركواز و معها بيتفور !

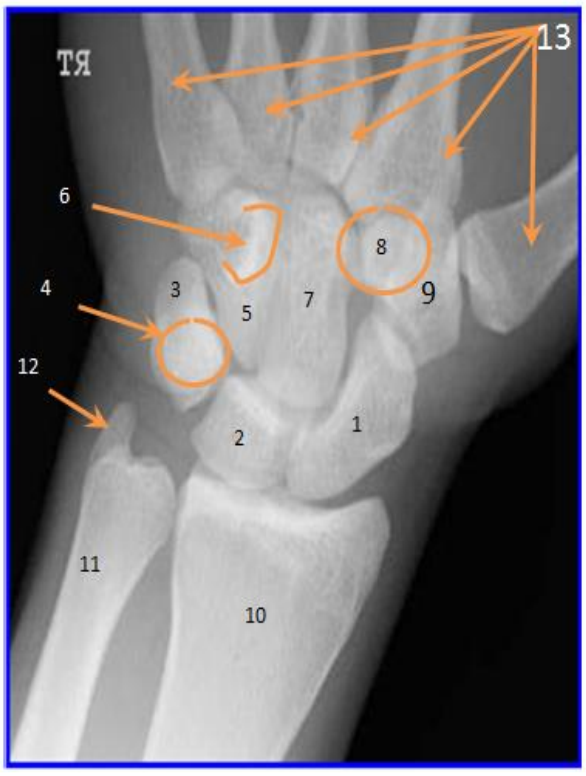
For naming & counting the metacarpal and phalanges:
1st through 5th goes from "thumb" to "pinkie"
(from lateral to medial)



Hand

X-ray

1- Scaphoid. (navicular)
2- Lunate.
3- Triquetrum.
4- Pisiform.
5- Hamate.
6- Hook of Hamate.
7- Capitate.
8- Trapezoid.
9- Trapezium.
10- Radius.
11- Ulna.
12- Ulnar styloid process.
13- 1st metacarpal.
2nd metacarpal (and so on from lateral to medial)



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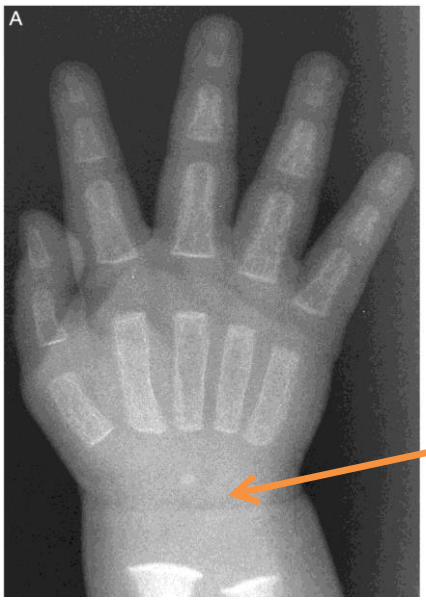
Hand

X-ray

1. Distal phalanx
2. Middle phalanx
3. Proximal phalanx
4. Distal interphalangeal joint
5. Proximal interphalangeal joint
6. Metacarpophalangeal joint

Child hand



as you can see there is no carpal bones they're still cartilage(not ossified) by the age 15 years it will fuse

Adult hand

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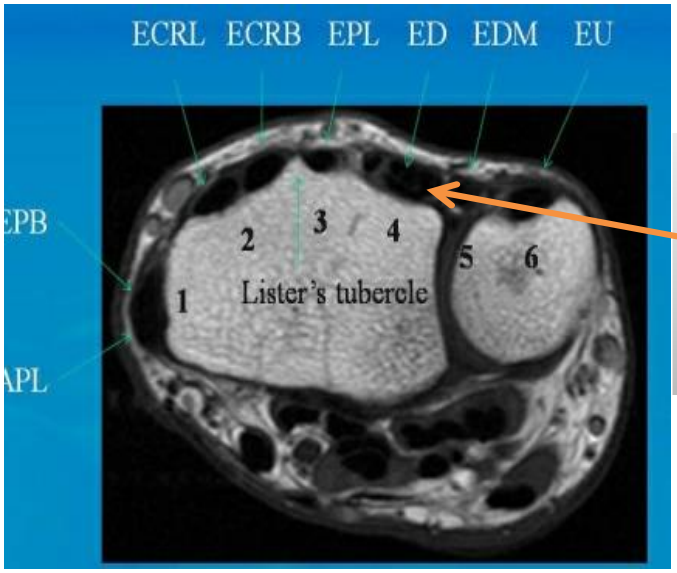
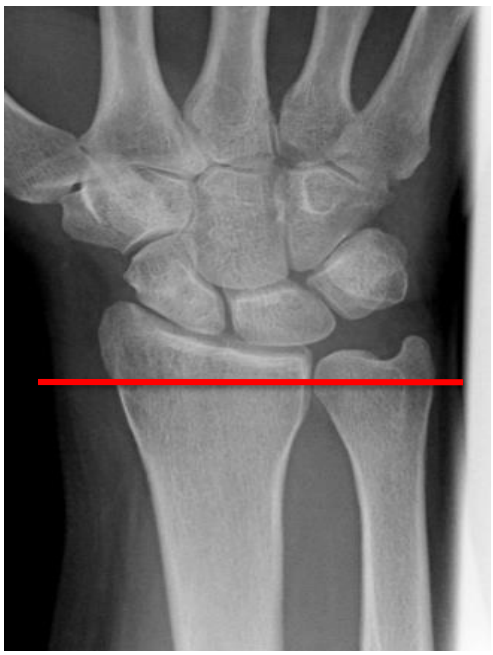
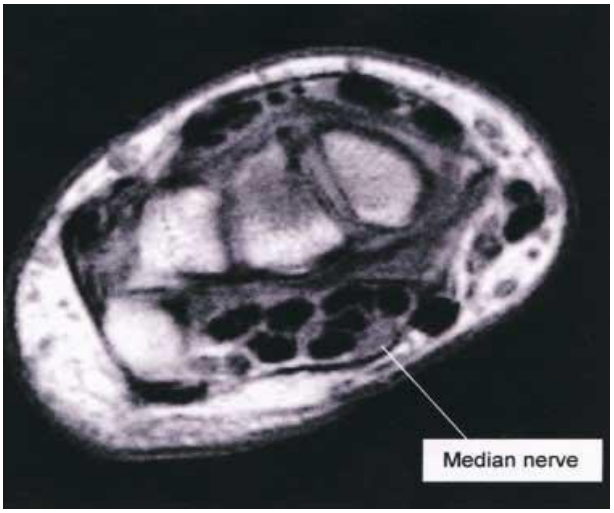


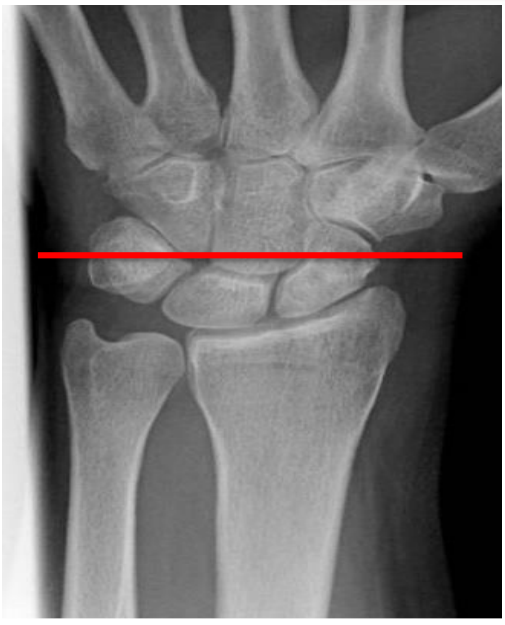
MRI

In MRI imaging tendons are black & fats are white



MRI



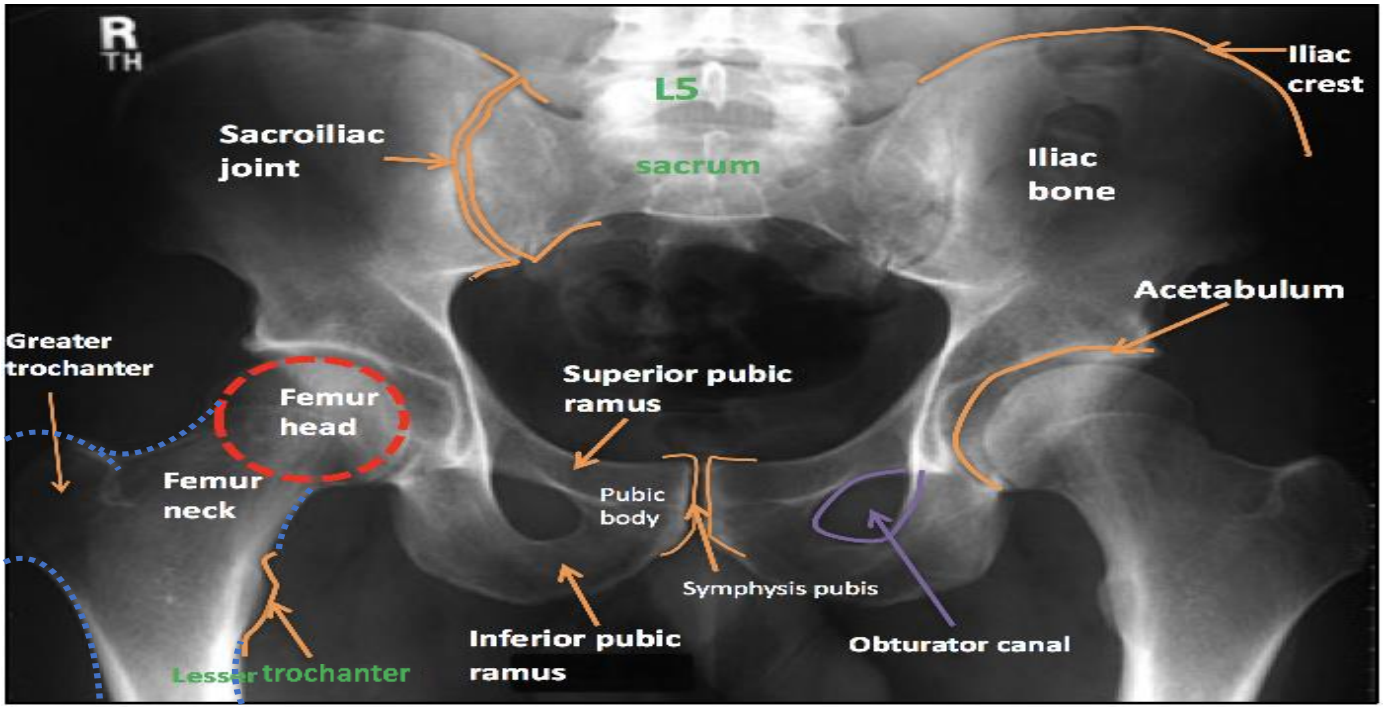


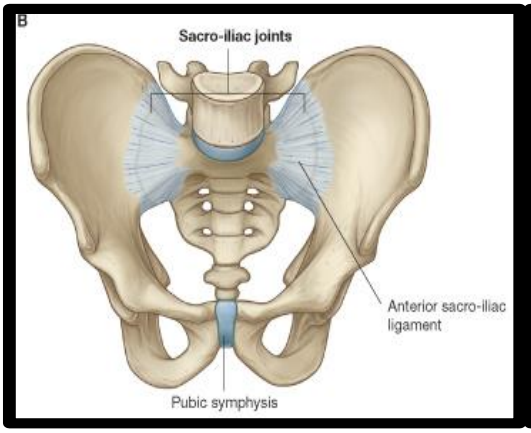
RADIOLOGY TEAM436

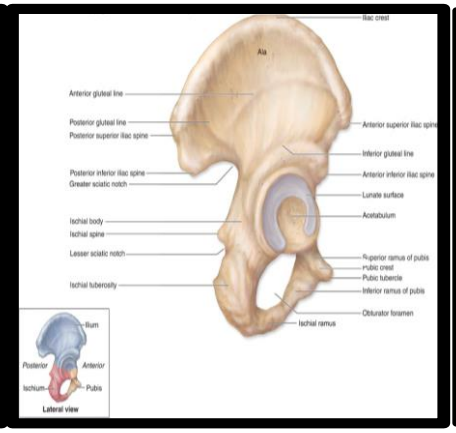
Lower limbs

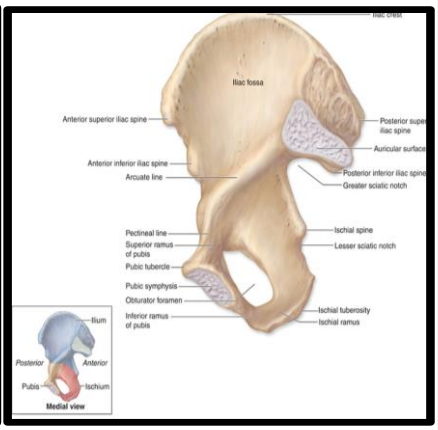
Pelvis

X-ray









The lesser trochanter and the greater trochanter with the head of the femur looks like a gun.

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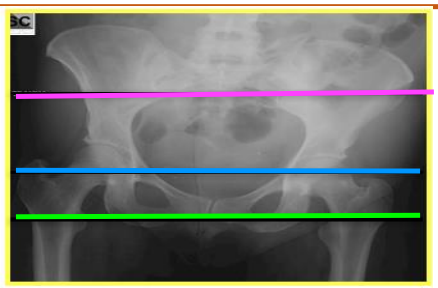
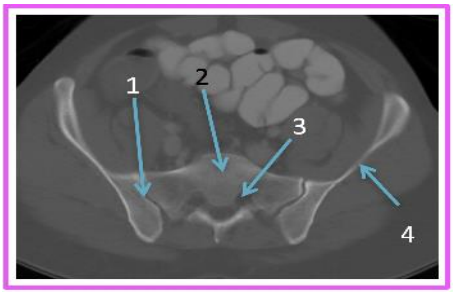
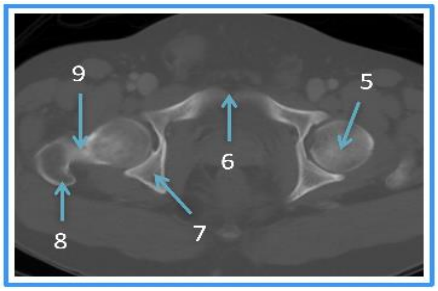
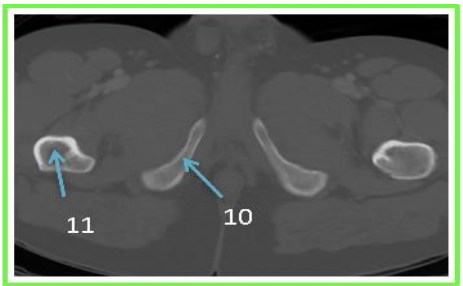
MRI







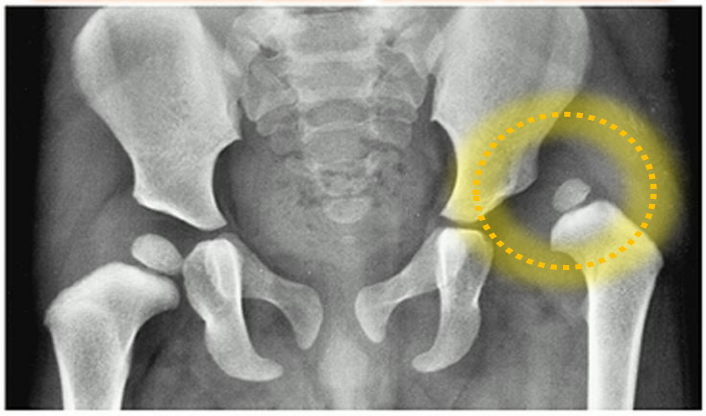


1- Sacroiliac joint
2- Sacrum
3- Sacral neural foramen
4- Iliac bone

5- Femur head
6- Symphysis pubis
7- Ischium
8- Greater trochanter
9- Femur neck

10- Pubic bone (inferior ramus)
11-Femur shaft

CONGENITAL HIP DISLOCATION:



This X-ray picture shows a child because the femurs neck is still cartilage .

Extra

- abnormal formation of the hip joint during early stages of fetal development
- unstable hip
- instability worsens as the child grows
- dislocation in the ball-and-socket joint in their hip
- the ball will slip out of the socket with movement

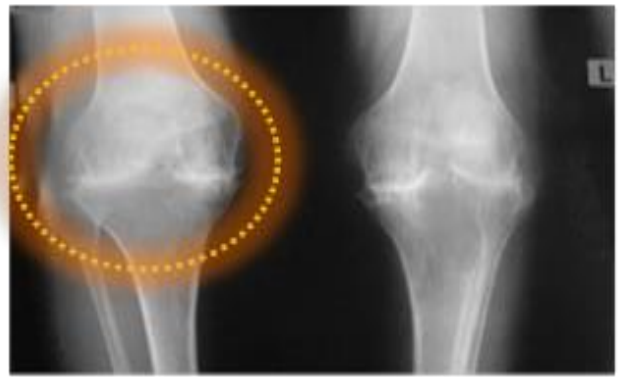
Knee

X-ray

1- Femur
2- Lateral condyle
3- Medial condyle
4- Patella
5- Tibia
6- Fibula
7- Lateral tibial spine
8- Medial tibial spine
9- Intercondyle notch

1-Femur
2- Femur condoyle
3- Patella
4- Tibia
5- Fibula
6- Tibial tuberosity
7- Tibial spine

SEVERE OSTEOARTHRITIS:



Extra

osteoarthritis patients

↓

protective cartilage is fading away

↓

the articular surfaces of the femur and the tibia are closer to each other

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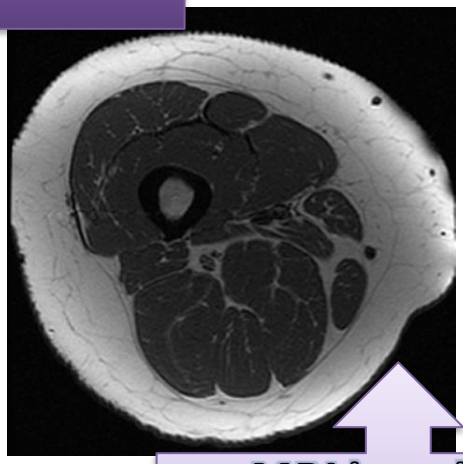
RADIOLOGY
TEAM436

THIGH

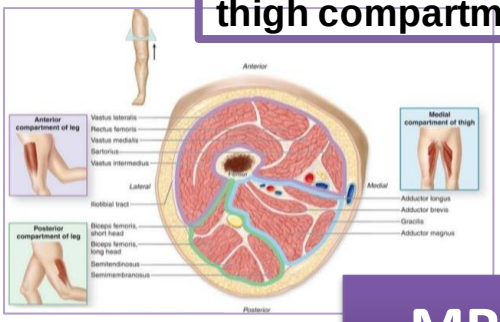
MRI



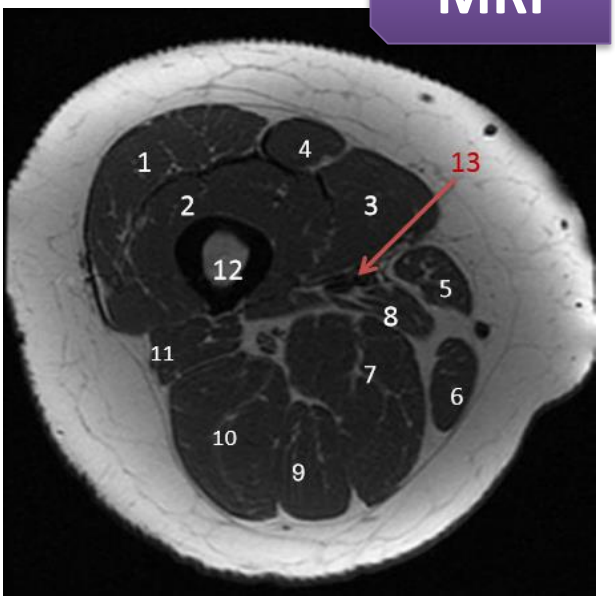
In MRI imaging We can see muscles and tendons clearly

CTscan

thigh compartment



MRI



1- Vastus lateralis muscle
2- Vastus intermedius muscle
3- Vastus medialis muscle
4- Rectus femoris muscle
5- Sartorius muscle
6- Gracilie muscle
7- Adductor magnus muscle
8- Adductor longus muscle
9- Semimembranosus muscle
10- Semitendinosus Muscle
11- Biceps femoris muscle
12- Femur
13- Femoral artery

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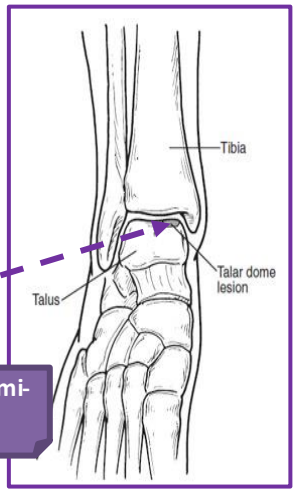
RADIOLOGY
TEAM436

ANKLE

X-ray

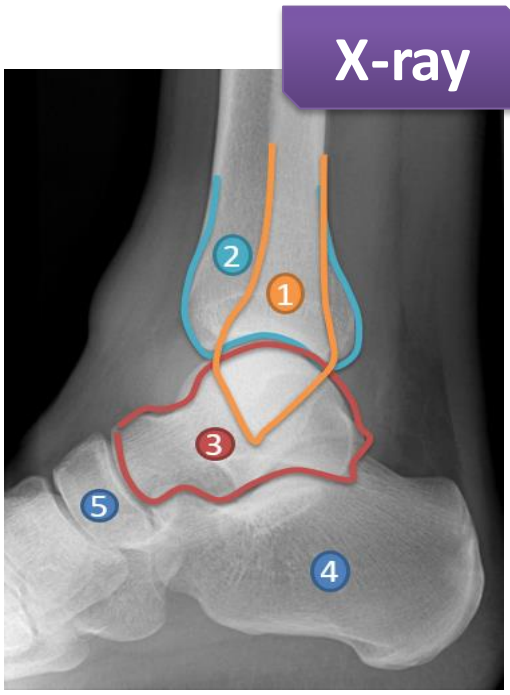
1- Tibia
2- Medial malleolus
3- Fibula
4- Lateral malleolus
5- Dome of talus



The top of talus has dome (semi-circular or balloon) shaped

X-ray

1- Fibula
2- Tibia
3- Talus
4- Calcaneus
5- Navicular



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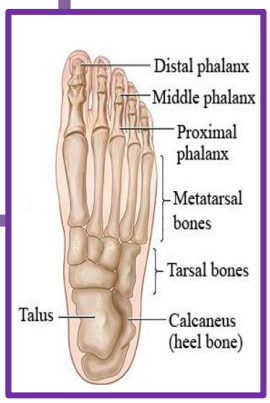
RADIOLOGY TEAM436

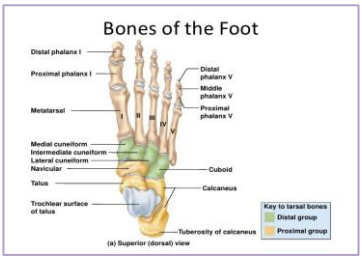
FOOT

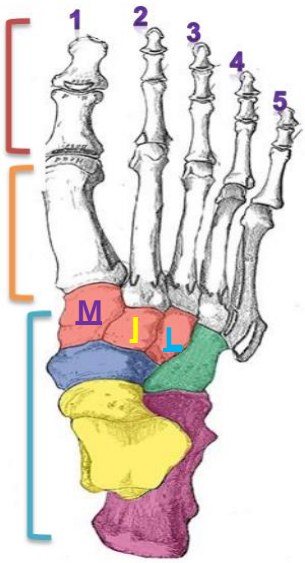
X-ray

1-Medial cuneiform bone
2- Intermediate cuneiform bone
3- Lateral cuneiform bone
4- Cuboid bone
5- Navicular bone
6- Calceneal bone
7- Talus
8- Metatarsal bone (1st toe)
9- Proximal phalanx (1st toe)
10- Distal phalanx (1st toe)



EXTRA INFORMATION
team435





We have 7 tarsal bones
(from lateral to medial & proximal to distal)

- Calcaneus
- Talus
- Cuboid
- Navicular

- 3 cuneiform bones
  - Lateral Cuneiform
  - Intermediate Cuneiform
  - Medial Cuneiform

- For naming & counting the metatarsal and phalanges:
  1st through 5th goes from "big toe" to "little toe"
  (from medial to lateral)

To help u memorize them :
"The Circus Needs More Interesting Little Clowns"

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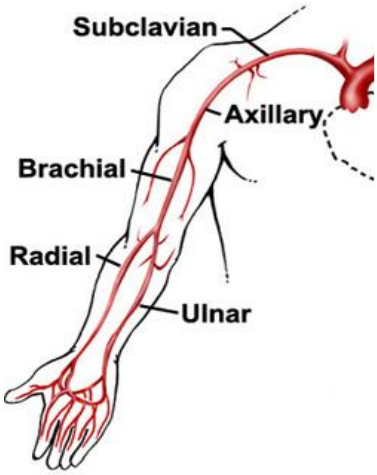
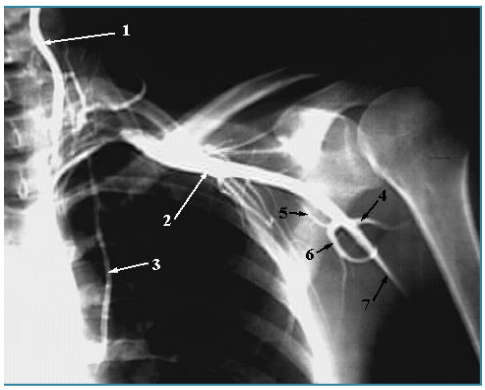
RADIOLOGY TEAM436

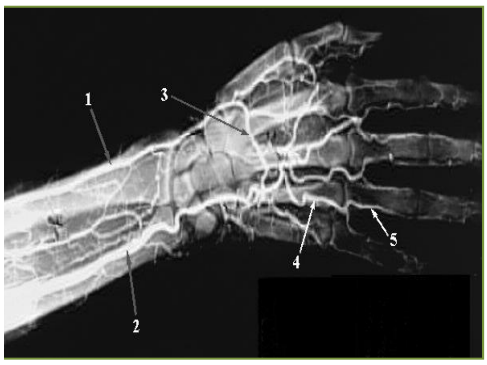
Vessels and arteries of the upper & lower limbs



UPPER LIMB VESSELS

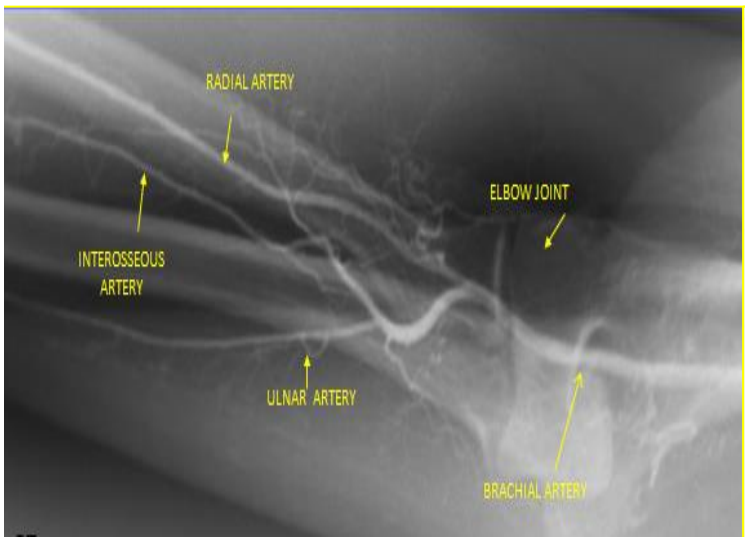


1-Vertebral Artery.
2-Axillary Artery.
3-Internal Thoracic Artery.
4-Posterior Humeral Circumflex Artery.
5-Circumflex Scapular Artery.
6-Subscapular Artery
7-brachial artery



1-Radial Artery.
2-Ulnar Artery.
3-Deep Palmar Arch.
4-Common Palmar Digital Artery.
5-Proper Palmar Digital Artery

RT. UPPER EXTREMITY ANGIOGRAM



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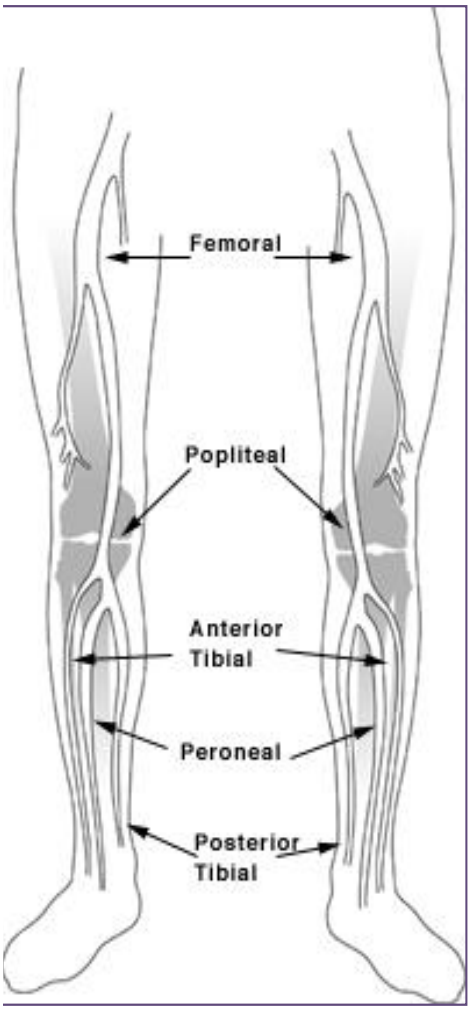
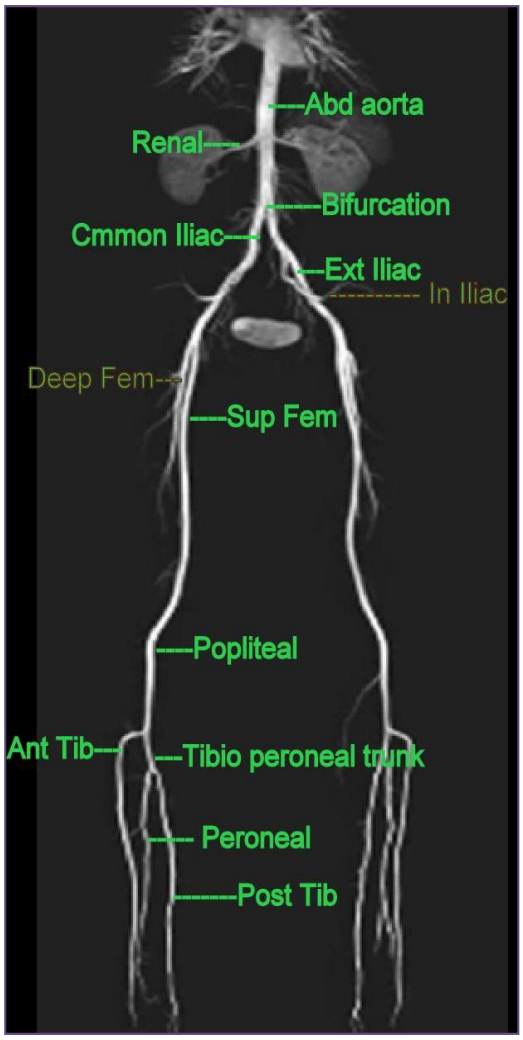
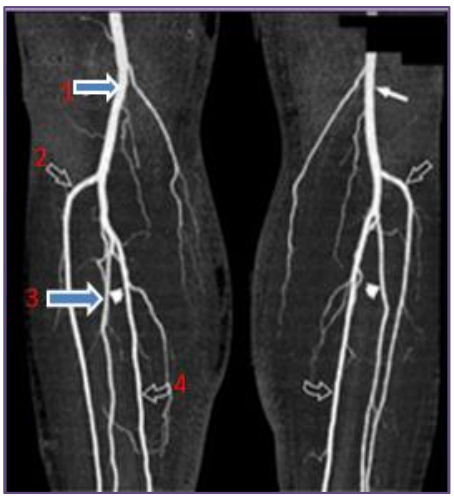
RADIOLOGY
TEAM436

LOWER LIMB ARTERIES





1- Popliteal artery
2- Anterior tibial artery
3- Peroneal artery
4- Posterior tibial artery



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