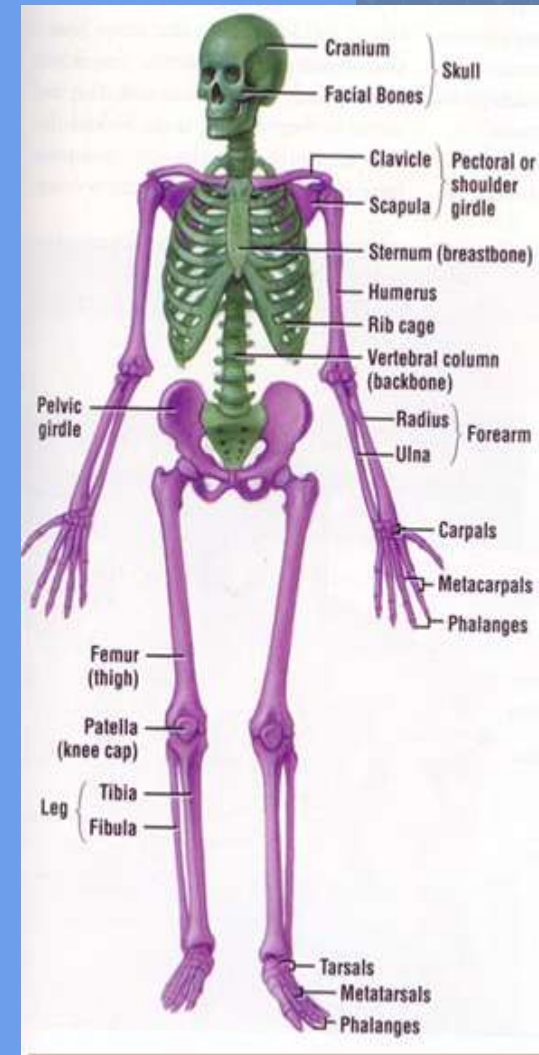


**UNIT 3**  
**CHAPTER 3**

**The Skeletal System**

# FUNCTIONS OF THE SKELETAL SYSTEM

- ⦿ Framework and support of the body
- ⦿ Protection of vital organs
- ⦿ Storage of minerals including calcium
- ⦿ Formation of blood cells



# BONE AND OTHER STRUCTURES

The skeletal system is made of bone, bone marrow, cartilage, joints, ligaments, bursae, synovial membranes and synovial fluid.

- **Bone** (oste/o, oss/e, oss/i, ost/o) is the main organ of the skeletal system. It is the 2<sup>nd</sup> hardest tissue in the body (dental enamel is the hardest)
- **Bone marrow** (myel/o) consists of two types red and yellow.
- **Cartilage** (chondr/o) creates a smooth surface for joint movement at the end of the bone
- **Joints** (arthr/o) are where two or more bones come together, usually to produce movement.
- **Ligaments**: connect bone to bone. When a ligament becomes overstretched or injured it is called a sprain
- **Bursa** (burs/o) A bursa cushions areas inside the joint
- **Synovial membrane and fluid** (synovi/o, synov/o) The membrane lines synovial joints and secrete synovial fluid as a lubricant for the joint.

# BONE (OST/OSTE/OSTEO)

**Osteomalacia**



**Ostealgia**



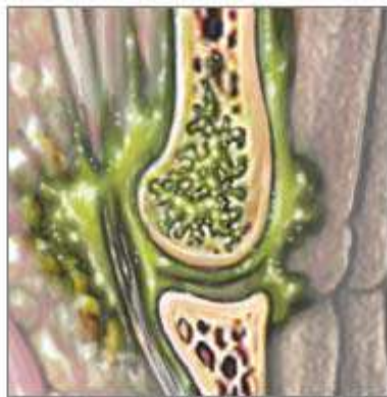
**Exostosis**



**Osteomyelitis**



Bone infection

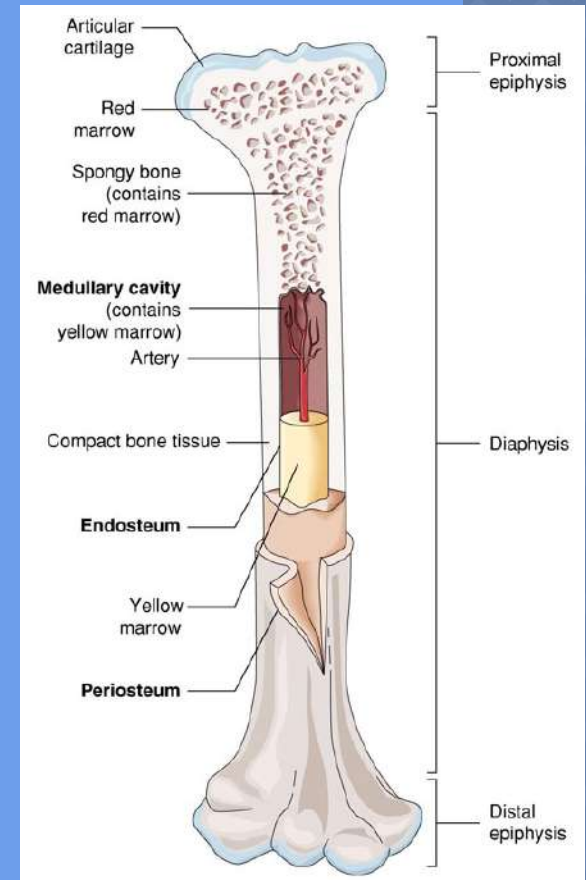


**Osteitis**



# PARTS OF A LONG BONE

- **Diaphysis:** the long shaft
- **Epiphysis:** the end of the long bone. There is a proximal and a distal epiphysis. Can you locate these landmarks using your knowledge of directional terms from unit 2?
- **Periosteum** is the outermost tissue on the bone
- **Compact bone** is the dense, hard strong bone for protection
- **Spongy bone** is lighter. This is where you would find red bone marrow.
- **Medullary cavity** is the inner cavity of the bone
- **Endosteum** is the inner lining of the medullary canal
- **Red bone marrow** is found in the spongy bone and is the site of blood cells. Bone is hematopoietic (pertaining to blood formation)
- **Yellow bone marrow** is located in the medullary canal and is a storage center for fat.
- **Cartilage** is a smooth, flexible connective tissue
- **Articular cartilage** is found at the ends of bones



# THE SKELETON

## 206 BONES

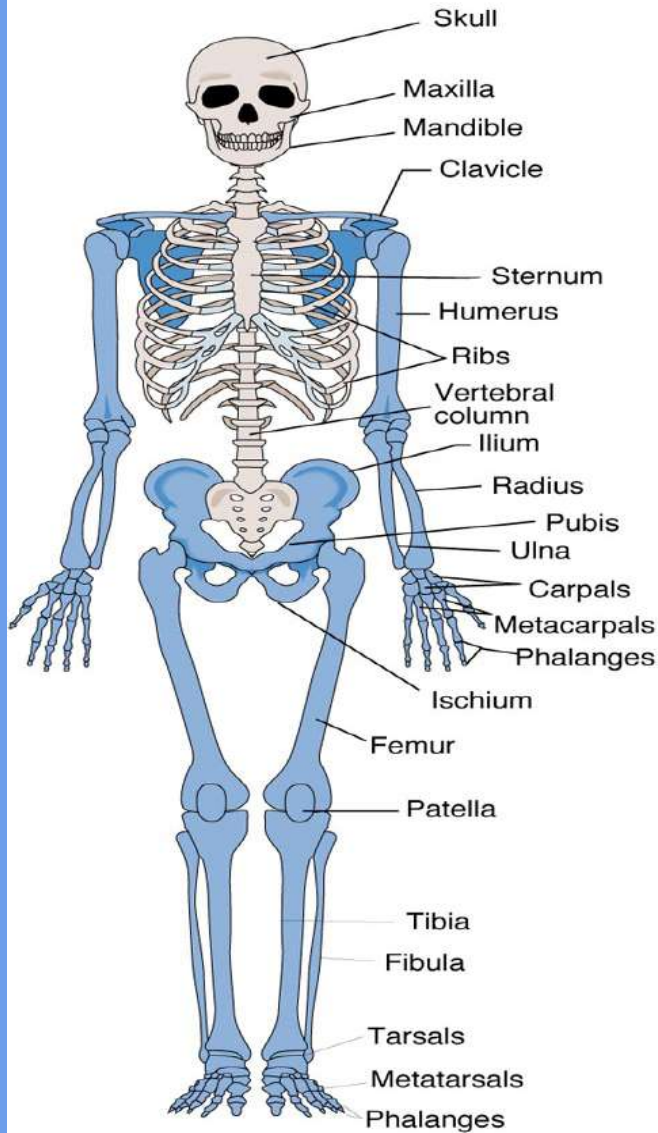
### AXIAL SKELETON

- Contains 80 bones
- Forms the axis or center of the skeleton
- Made up of the skull, vertebral column and bony thorax (rib cage, sternum and thoracic vertebrae)



PRIMARY FUNCTION IS PROTECTION





Appendicular skeleton (blue)  
Axial skeleton (grey)

## APPENDICULAR SKELETON

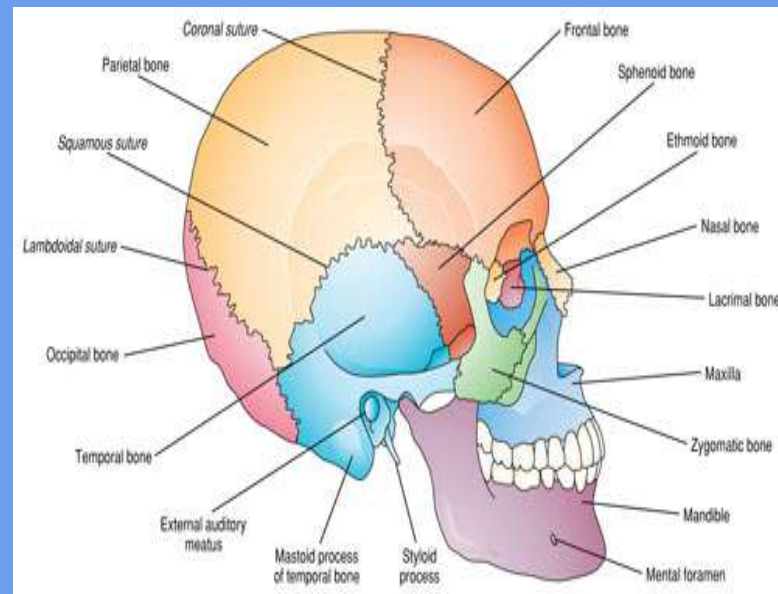
- Contains 126 bones
- Upper extremity(shoulder girdle, arm, forearm, wrist and hand)
- Lower extremity (pelvic girdle, thigh, leg, ankle and foot)

**PRIMARY FUNCTION IS MOVEMENT**

# BONES OF THE CRANIUM (SKULL) AND FACE

You should be able to label the following bones

- Frontal
- Parietal
- Occipital
- Temporal
- Mandible (jaw bone)
- Zygomatic (cheekbones)
- Maxilla (upper jaw)





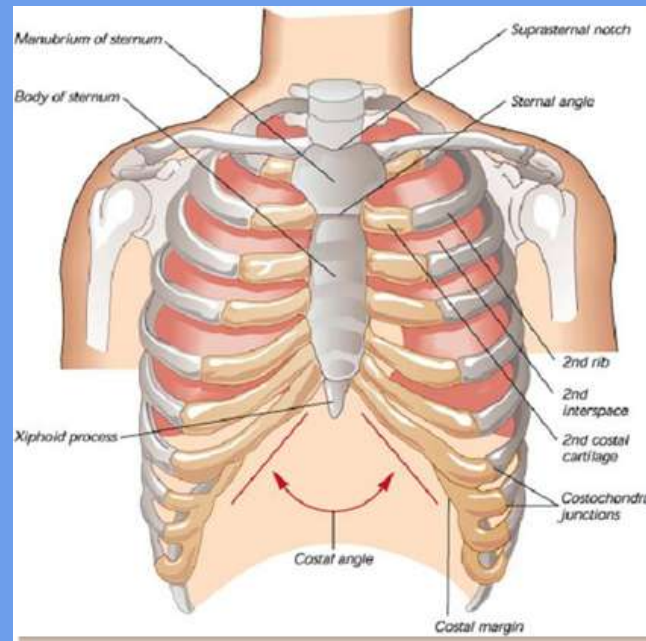
# THE BONY THORAX

The ribs connect posteriorly to the thoracic spine. The difference in the types of ribs is based upon the pair's anterior attachment

- True ribs (first 7 pairs, attach directly to the sternum)
- False ribs (next 3 pairs) attach to cartilage that joins to the sternum
- Floating ribs (final 2 pairs) have no anterior attachment

The sternum (breastbone) has 3 parts

- Manubrium (upper portion)
- Body (middle portion)
- Xiphoid process (cartilagenous lower portion)



# SHOULDER GIRDLE

⦿ Clavicle is the collar bone

⦿ Scapula is the shoulder blade

⦿ Arm (upper extremity)

■ Humerus

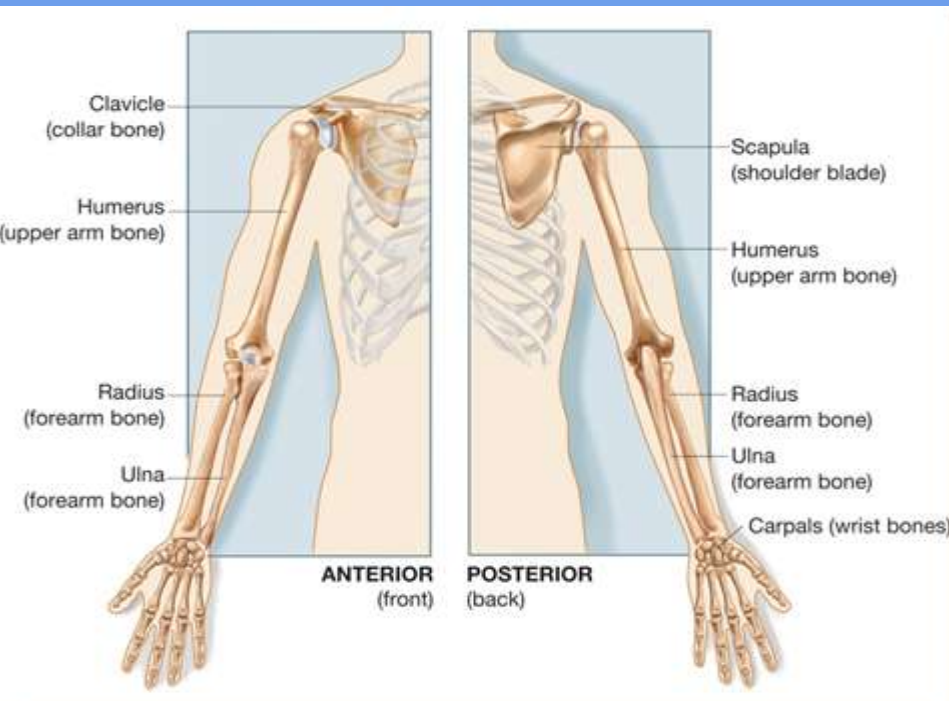
■ Radius (thumb side)

■ Ulna (“pinky” side)

■ Carpals (wrist bones)

■ Metacarpals (palm of hand)

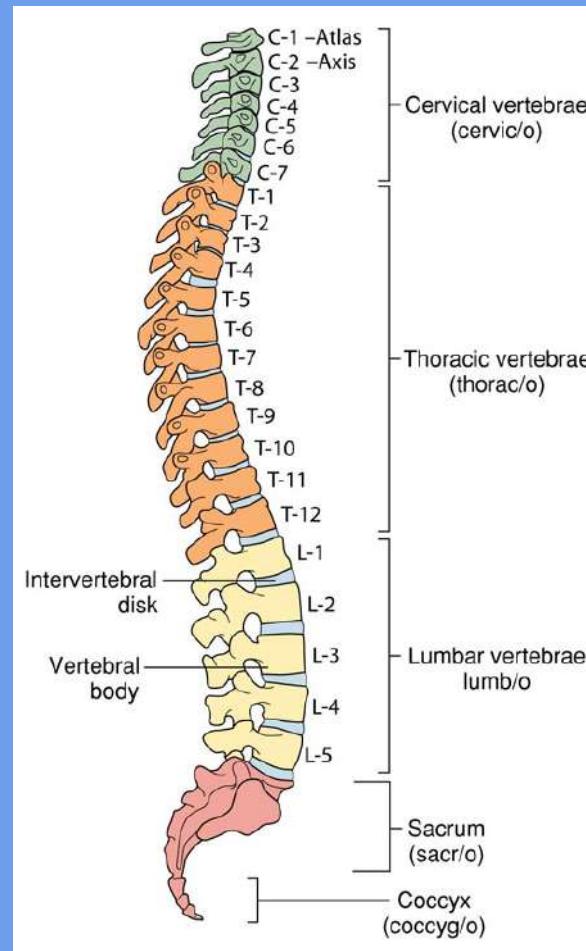
■ Phalanges (fingers)



# VERTEBRAL COLUMN

- Cervical (7 bones) make up the neck region
- Thoracic (12 bones) make up the middle back region
- Lumbar (5 bones) make up the low back region
- Sacrum (5 fused bones) articulate with the os coxae of the pelvis
- Coccyx (4 fused bones) also known as the tailbone

Intervertebral disks, made of cartilage, separate and cushion the vertebrae from each other. Act as shock absorbers and allow for movement.

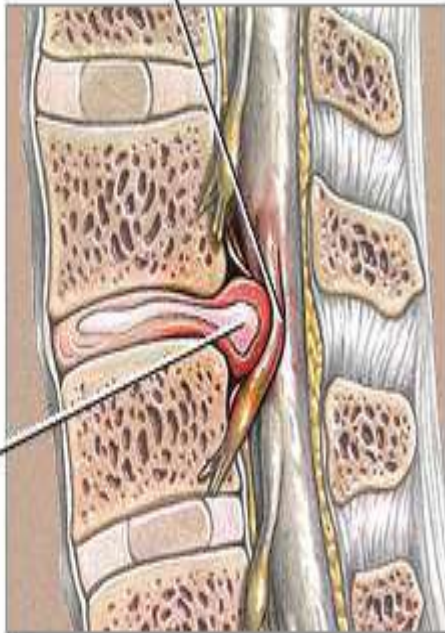


# HERNIATED DISK



Compressed lumbar  
spinal nerve

Herniated disc



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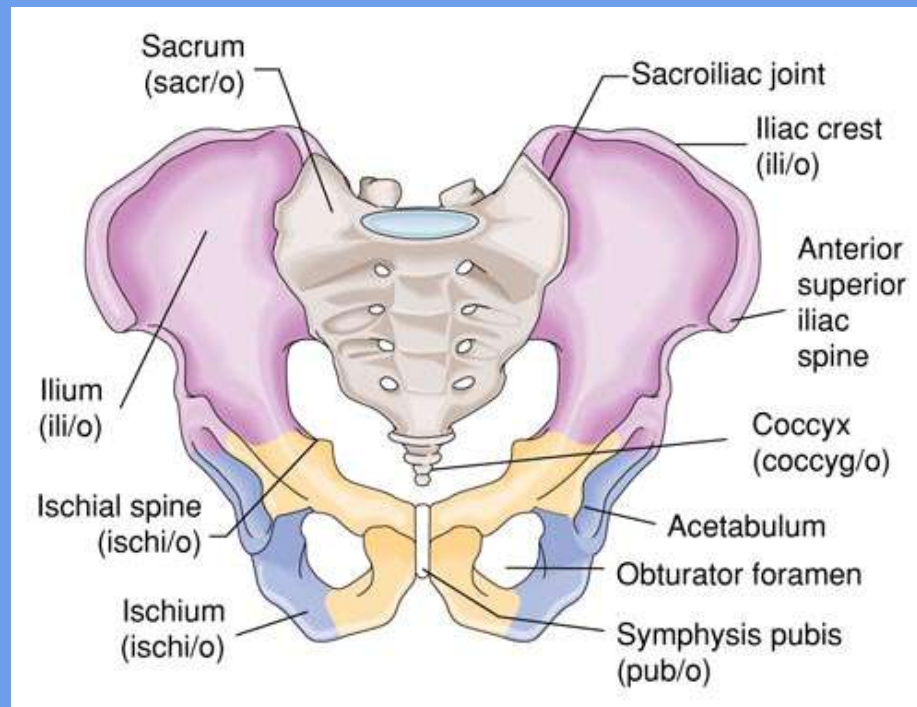
# PELVIC GIRDLE

⊙ Each Os Coxus is made up of 3 bones

■ Ilium

■ Ischium

■ Pubis





# LEG (LOWER EXTREMITY)

- Femur (largest and strongest bone)
- Patella
- Tibia
- Fibula
- Tarsals
- Metatarsals
- Phalanges





# JOINTS (ARTICULATIONS)

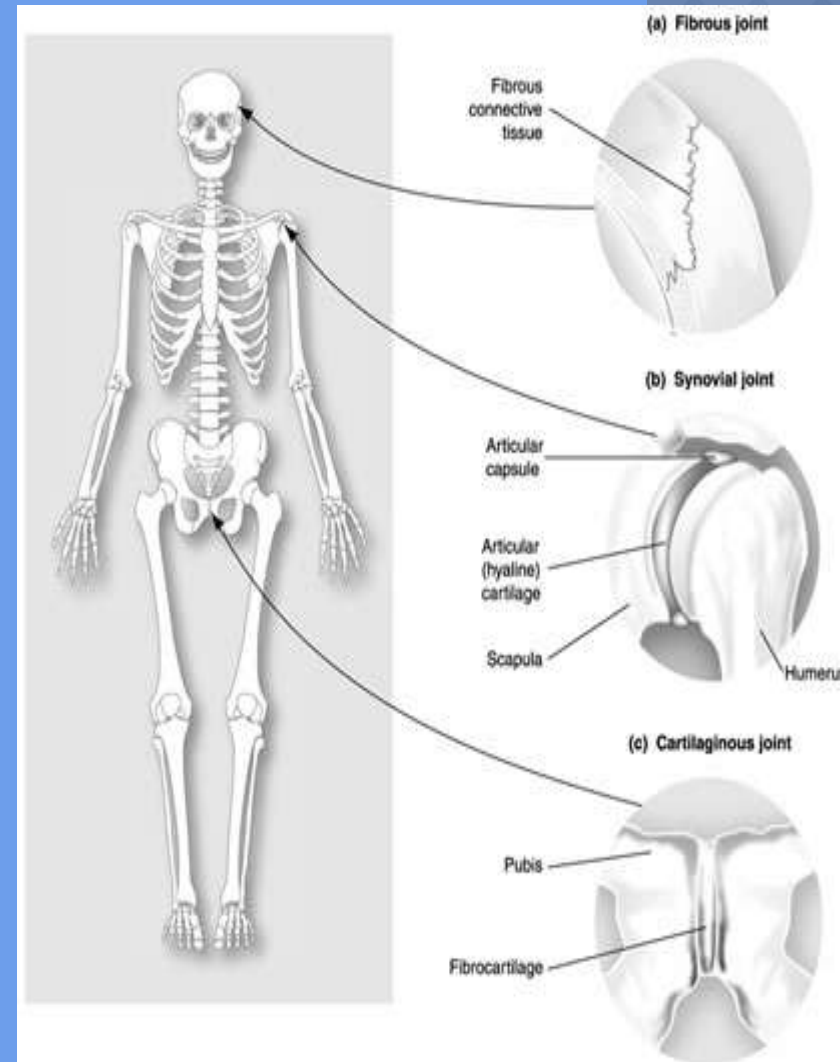
Joints are where two or more bones come together

There are 3 types:

- Fibrous joints (ex: sutures of skull) do not allow any movement in adults
- Cartilaginous joints (ex: pubic symphysis) only allow slight movement
- Synovial joints allow free movement

Two types of synovial joints

- Ball and socket joints (hip and shoulder)
- Hinge joints (elbow and knee)



# MEDICAL SPECIALISTS

- ⦿Chiropractor (DC): Manually adjusts the positions of the bones
- ⦿Orthopedic surgeon(MD): diagnoses and treats diseases, disorders and injuries to the bones, joints, and muscles
- ⦿Osteopath (DO): Treats with traditional medicine and spinal manipulation.
- ⦿Podiatrist (DP or DPM): specialist of the foot

# PATHOLOGY

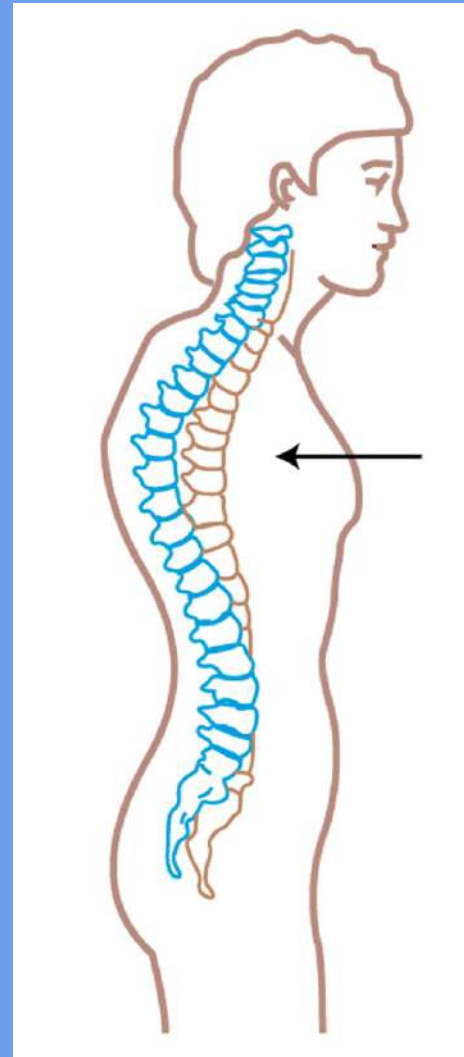
Define these terms made from your word parts

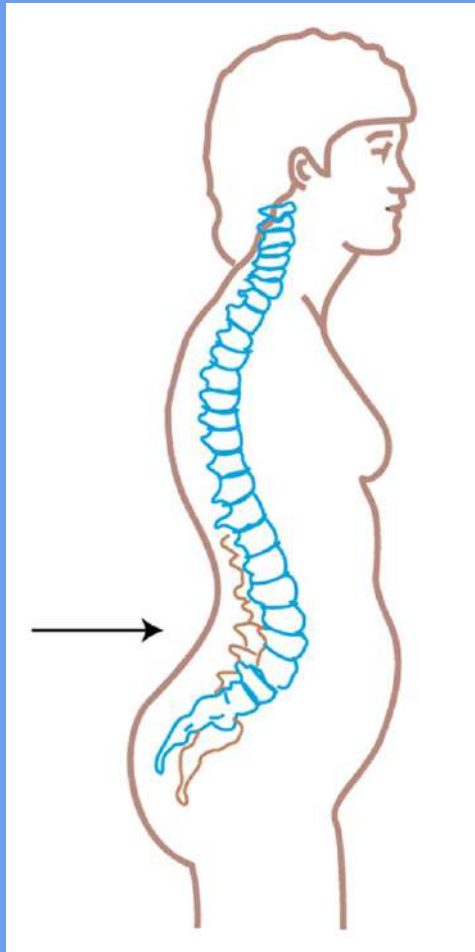
- ⦿ Ankylosis
- ⦿ Arthrosclerosis
- ⦿ Bursitis
- ⦿ Chondromalacia
- ⦿ Chondroma
- ⦿ Hemarthrosis
- ⦿ Synovitis
- ⦿ Osteomyelitis

More examples can be found in the textbook in chapter 3.

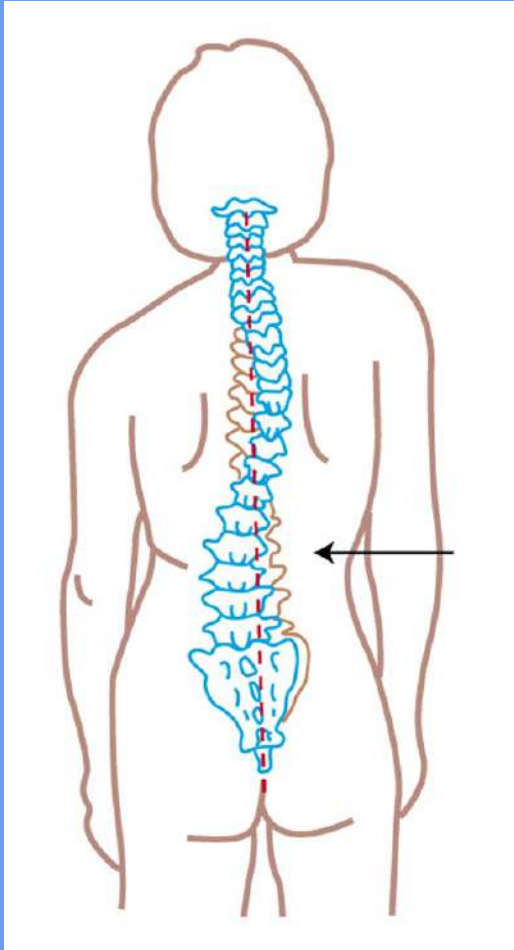
# ABNORMAL CURVATURES OF THE SPINE

- Kyphosis is an abnormal increase in the outward curvature of the thoracic spine





Lordosis is an  
abnormal increase  
in the anterior  
curvature of the  
lumbar spine



Scoliosis is an  
abnormal lateral  
curvature of the  
spine



# INJURIES

- Dislocation (luxation) is the total displacement of a bone from its joint
- Subluxation is the partial displacement of a bone from its joint

## Fracture (broken bone)

- Closed (simple fracture): the bone is broken but has not come through the skin
- Open (compound fracture): the bone has broken through the skin
- Comminuted: the bone is splintered or crushed
- Greenstick: the bone is bent and only partially broken. Common in children.
- Spiral: bone has been twisted apart
- Stress: an overuse injury. Small crack on bone

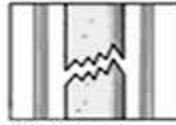
# FRACTURES



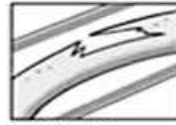
Closed or simple fracture.



Open or compound fracture.



Transverse fracture.



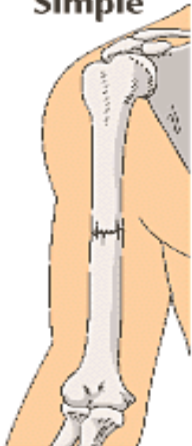
Greenstick fracture.



Comminuted fracture.

## Types of Fractures

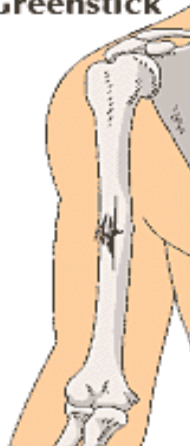
Simple



Compound



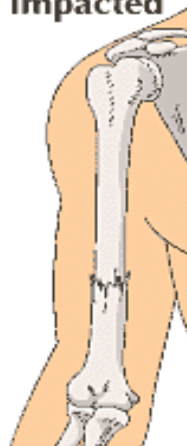
Greenstick



Comminuted

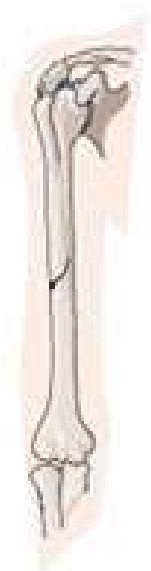


Impacted

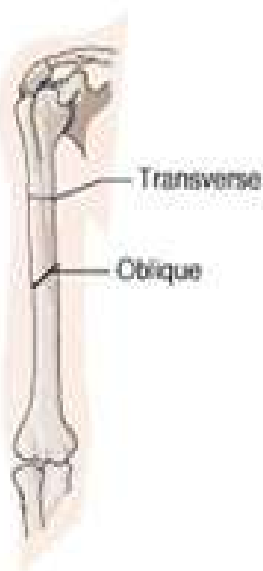


Before





Greenstick  
(incomplete)



Closed  
(simple, complete)



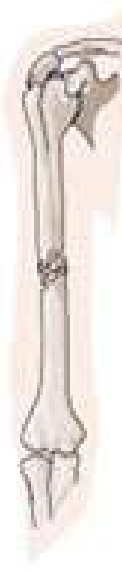
Open  
(compound)



Impacted  
(telescoped)



Spiral



Comminuted



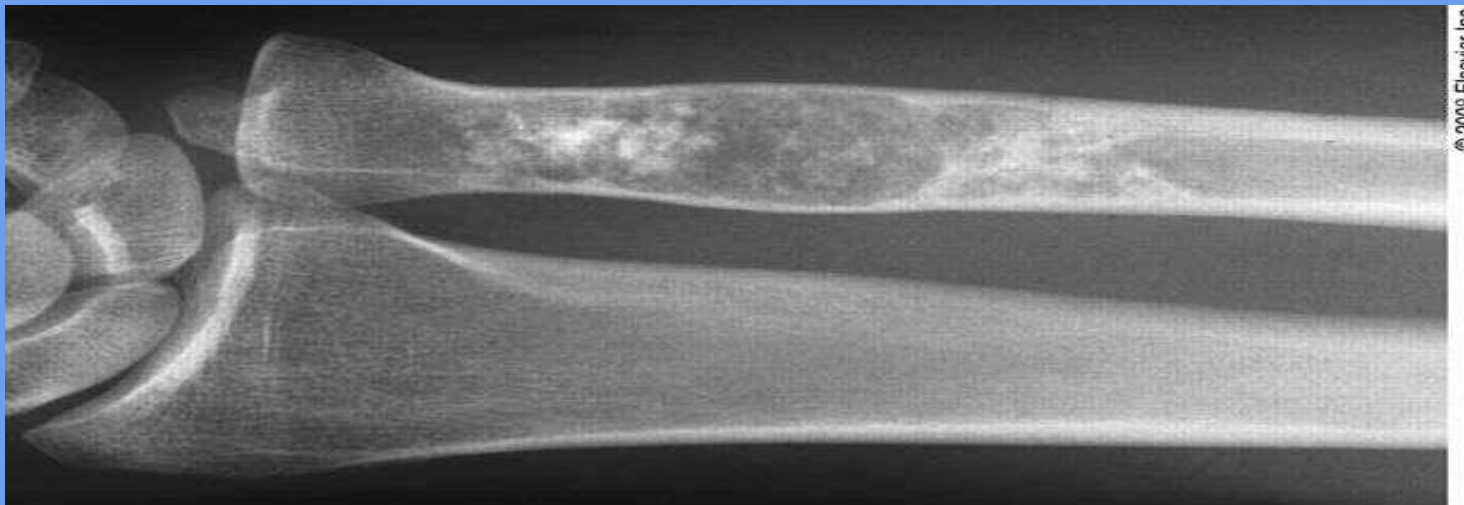
# JOINTS (ARTHR/O)

## ⦿ Bursitis

- Burs *means* bursa
- -itis *means* inflammation

## ⦿ Osteoma

- Oste- *means* bone
- -oma *means* tumor



# JOINTS CONT.

- Hallux valgus (bunion)

- Luxation (dislocation)

  - Subluxation (partial dislocation)

- Synovitis

  - Synov *means* synovial membrane





# WHAT IS THE NAME?



Luxation



Synovitis



# ARTHRITIS AND OSTEOPOROSIS

○ Arthritis is an inflammatory condition of one or more joints. There are many different types

- Osteoarthritis is wear and tear arthritis, commonly associated with aging.
- Rheumatoid arthritis is a chronic autoimmune disorder that attacks the joints.

○ Osteoporosis is a marked loss of bone density associated with aging. Three most common osteoporotic fractures

- Compression fracture (vertebral crush fracture)
- Colles fracture: wrist fracture
- Hip fracture

# ARTHRITIS

- Arthritis

- Osteoarthritis  
(wear and tear arthritis)

  - Osteo means bone

  - Degenerative joint disease

- Gouty arthritis  
(gout)



Gouty Arthritis

# OSTEOPOROSIS

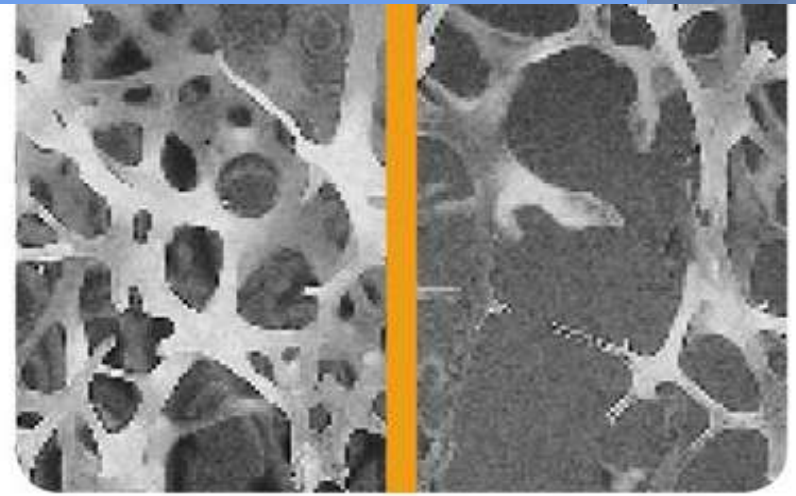
- Vertebral crush fractures

  - Dowager's hump

- Colles' fracture

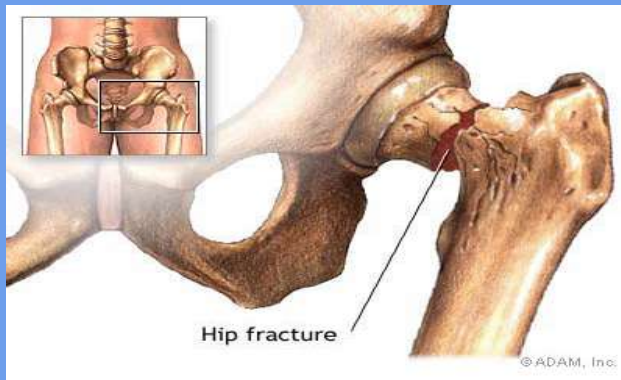
  - Fractured wrist

- Osteoporotic hip fracture



Normal  
Bone

Bone with  
Osteoporosis

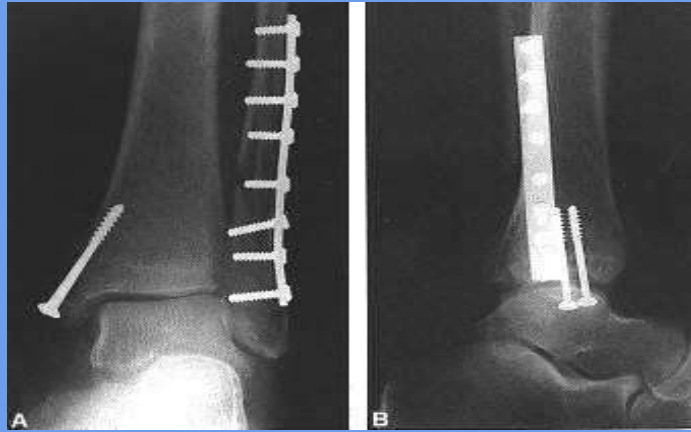


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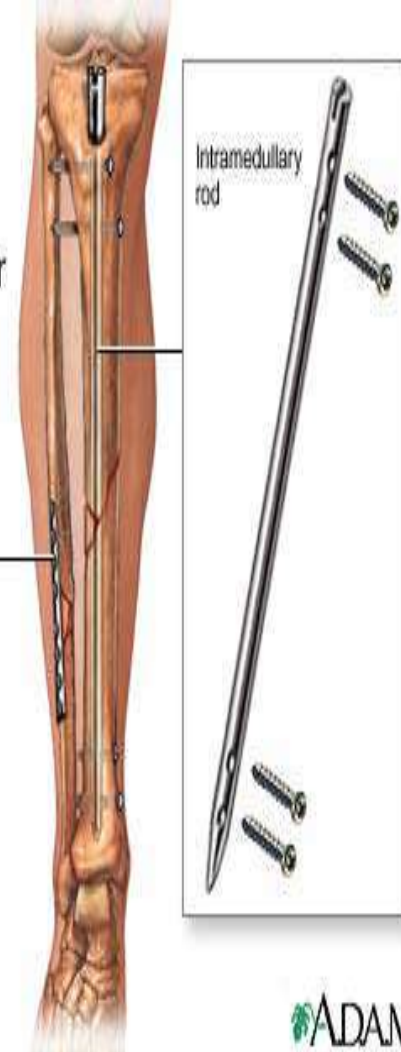
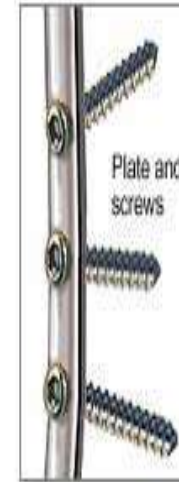


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# INTERNAL FIXATION

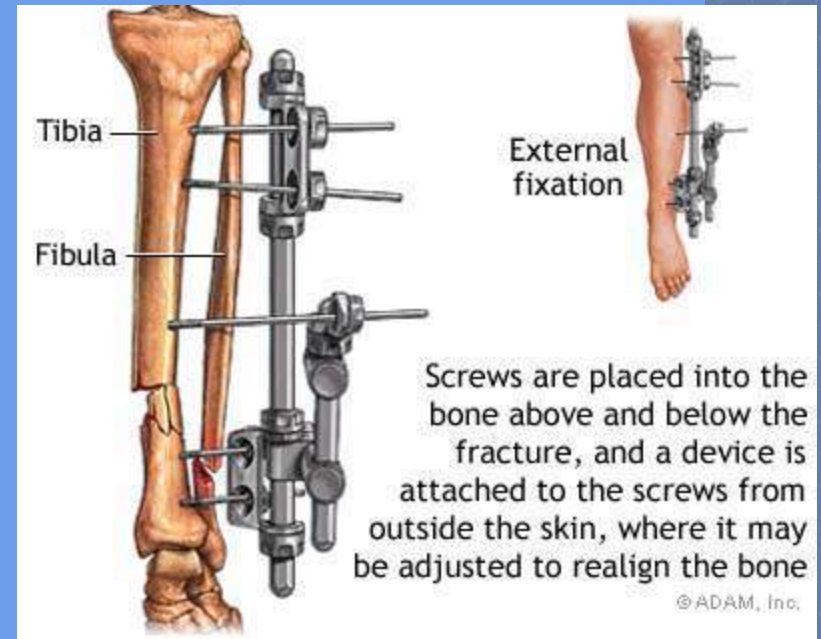
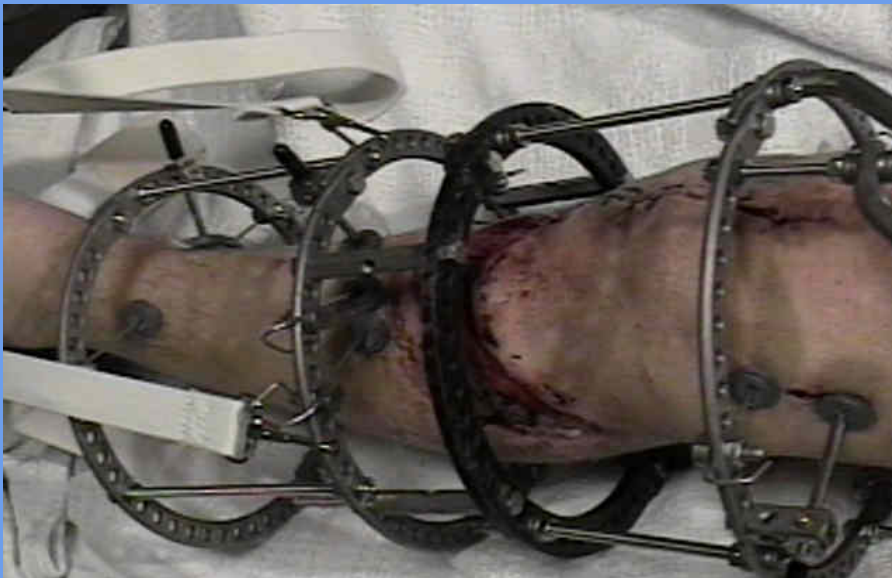


To stabilize a long bone fracture, a plate and screws outside the bone or a rod inside the bone may be used





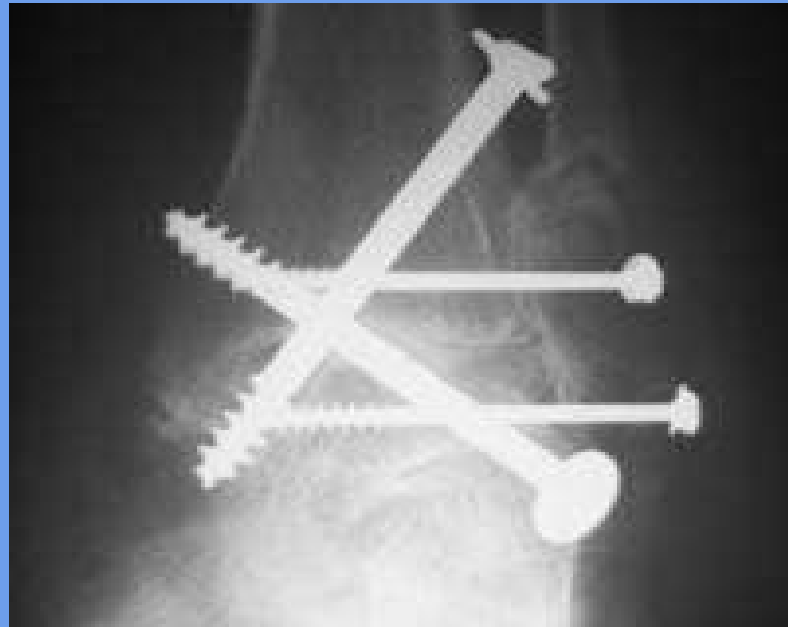
# EXTERNAL FIXATION



# TREATMENT PROCEDURES

## ⊙ Arthrodesis

■ -desis *means*  
surgical fixation  
of bone or joint



## ⊙ Bursectomy



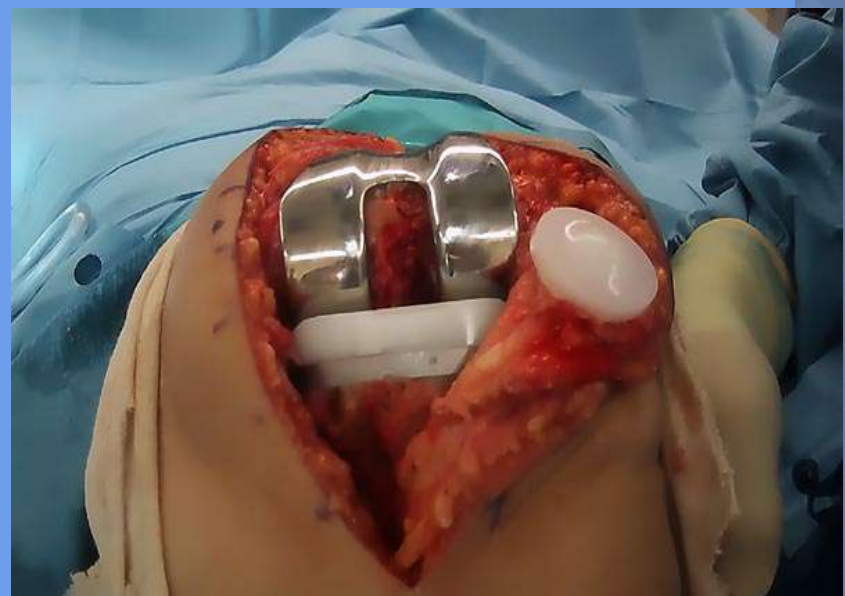




PARTIAL KNEE  
REPLACEMENT



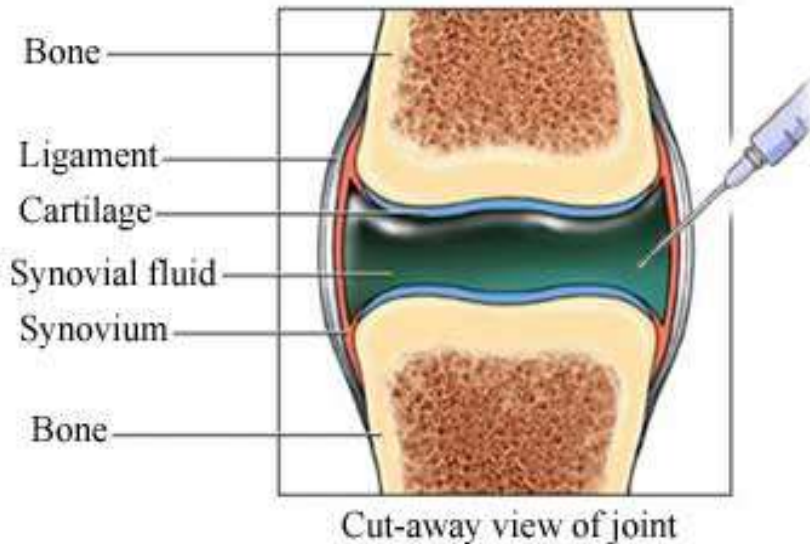
TOTAL KNEE  
REPLACEMENT



# DIAGNOSTIC PROCEDURES

## ⊙ Arthrocentesis

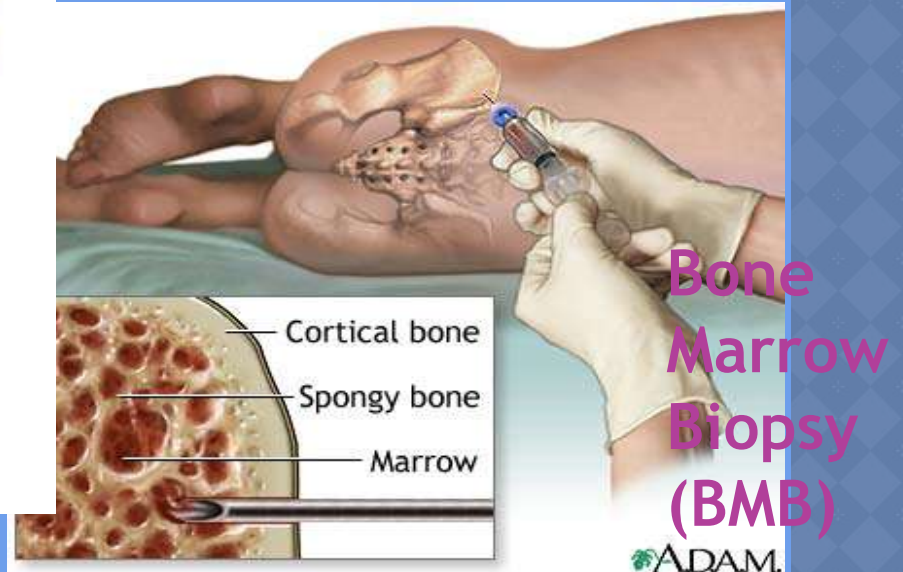
■ -centesis means a surgical puncture to remove fluid



## Bone density testing (BMT)

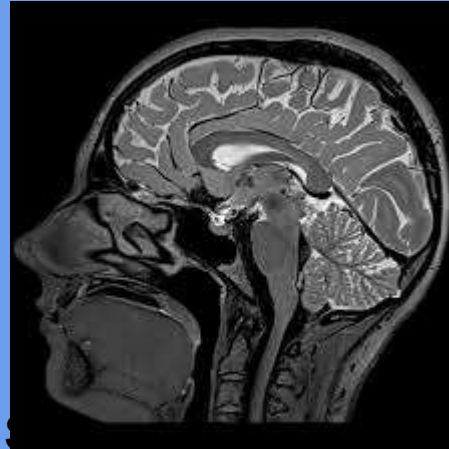


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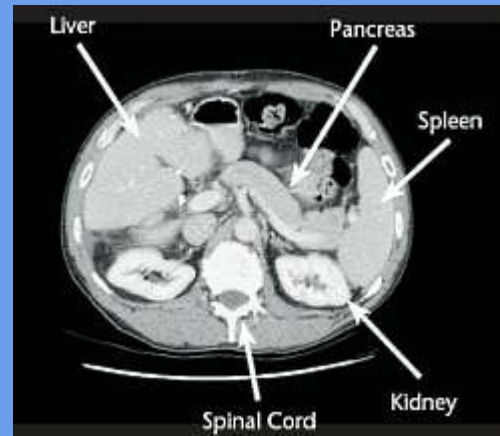


# Diagnostic Procedures continued

MRI - Magnetic Resonance Imaging



CT Scan - computerized tomography



Xray

