

The background of the slide is an abstract, textured composition. It features a mix of vibrant colors including shades of red, pink, purple, and light blue. The textures appear fibrous and organic, resembling marbled paper or a microscopic view of biological tissue. The colors are layered and blended, creating a complex, multi-toned effect.

SKELETAL SYSTEM
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The Skeletal System

- Parts of the skeletal system
 - Bones (skeleton)
 - Joints
 - Cartilages
 - Ligaments (**bone to bone**)(tendon=**bone to muscle**)
- Divided into two divisions
 - Axial skeleton
 - Appendicular skeleton – limbs and girdle

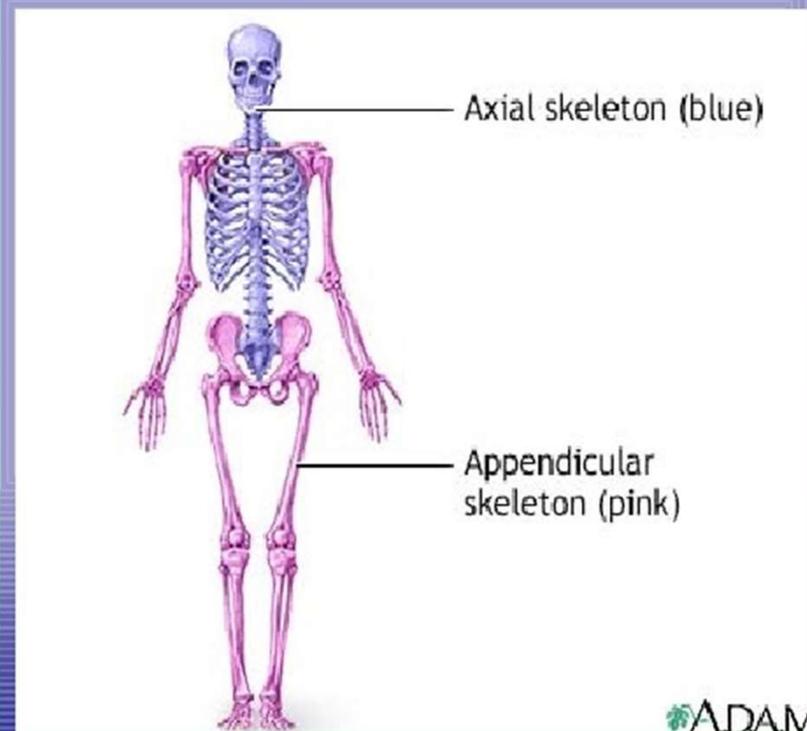
FUNCTIONS OF SKELETAL SYSTEM

- ▶ • **SUPPORT:** Hard framework that supports and anchors the soft organs of the body.
- ▶ • **PROTECTION:** Surrounds organs such as the brain and spinal cord.
- ▶ • **MOVEMENT:** Allows for muscle attachment therefore the bones are used as levers.
- ▶ • **STORAGE:** Minerals and lipids are stored within bone material.
- ▶ • **BLOOD CELL FORMATION:** The bone marrow is responsible for blood cell production.

DIVISIONS OF THE SKELETAL SYSTEM

- ▶ Babies have 300 Bones.
- ▶ Adults have 206 Bones.

Two parts make One



DIVISIONS OF THE SKELETAL SYSTEM

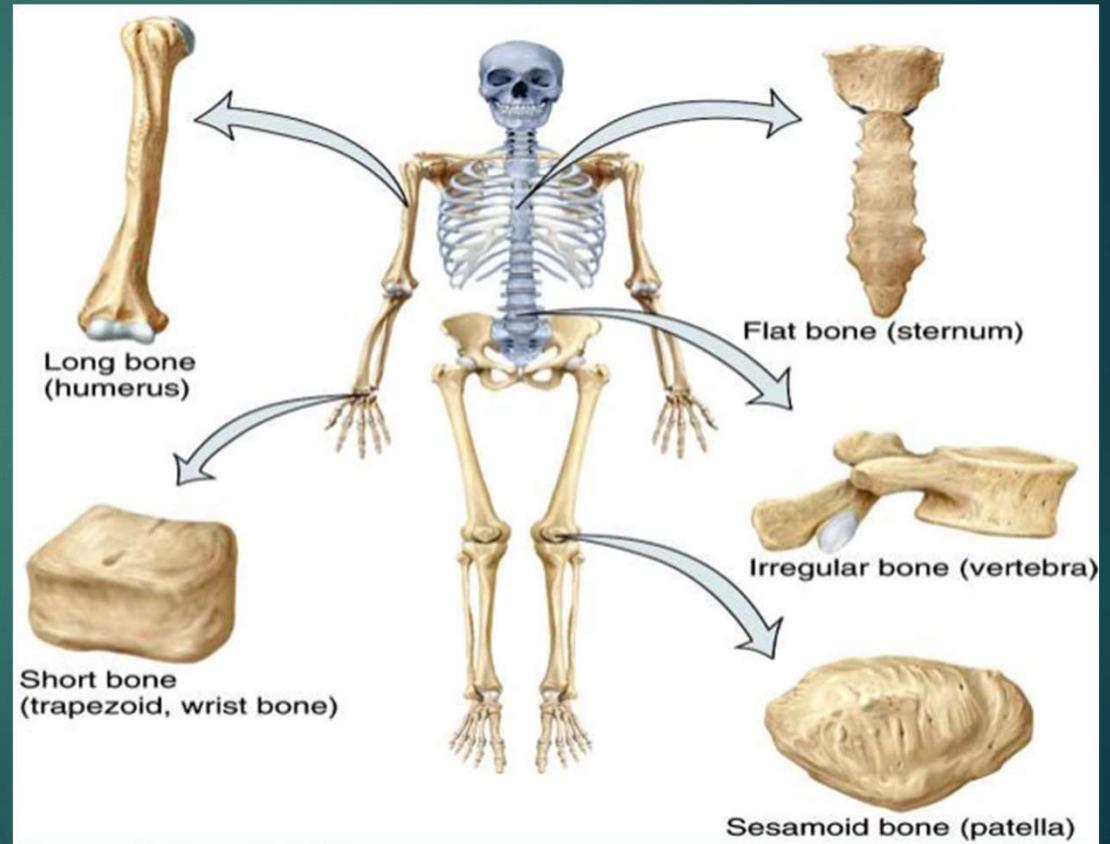
The Bones of the Adult Skeletal System

DIVISION OF THE SKELETON	STRUCTURE	NUMBER OF BONES
Axial Skeleton		
	Skull	
	Cranium	8
	Face	14
	Hyoid	1
	Auditory ossicles	6
	Vertebral column	26
	Thorax	
	Sternum	1
	Ribs	<u>24</u>
		Subtotal = 80

DIVISION OF THE SKELETON	STRUCTURE	NUMBER OF BONES
Appendicular Skeleton		
	Pectoral (shoulder) girdles	
	Clavicle	2
	Scapula	2
	Upper limbs	
	Humerus	2
	Ulna	2
	Radius	2
	Carpals	16
	Metacarpals	10
	Phalanges	28
	Pelvic (hip) girdle	
	Hip, pelvic, or coxal bone	2
	Lower limbs	
	Femur	2
	Patella	2
	Fibula	2
	Tibia	2
	Tarsals	14
	Metatarsals	10
	Phalanges	<u>28</u>
	Subtotal = 126	
	Total in an adult skeleton = 206	

Classification of Bones on the Basis of Shape – 5 types.

- Long
- Short
- Flat
- Irregular
- Sesamoid



- ❑ **Long Bones** – Greater length than width and are slightly curved for strength - **Femur, tibia, fibula, humerus, ulna, radius, phalanges.**
- ❑ **Short bones** – Cube-shaped and are nearly equal in length and width – **Carpal, tarsal.**
- ❑ **Flat bones** – Thin and composed of two nearly parallel plates of compact bone tissue enclosing a layer of spongy bone tissue – **Cranial, sternum, ribs, scapulae .**
- ❑ **Irregular bones** – Complex shapes and cannot be grouped into any of the previous categories – **Vertebrae, hip bones, some facial bones, calcaneus .**
- ❑ **Sesamoid bones** – Protect tendons from excessive wear and tear – **Patellae, foot, hand.**

Types of Bone Cells

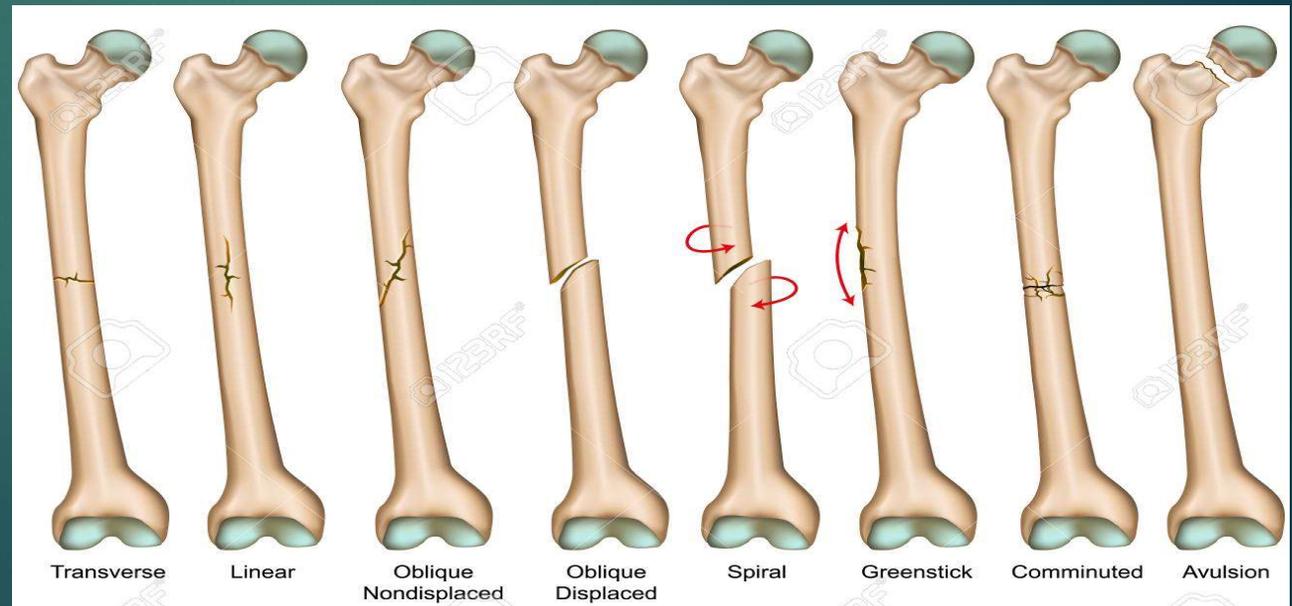
- ✓ Osteocytes - Mature bone cells.
- ✓ Osteoblasts - Bone-forming cells.
- ✓ Osteoclasts - Bone-destroying cells.
 - Break down bone matrix for remodelling and release of calcium.
- ✓ Bone remodelling is a process by both osteoblasts and osteoclasts.

Diseases and Conditions of the Skeletal System

- ❖ Fractures.
- ❖ Osteomyelitis.
- ❖ Osteoporosis.
- ❖ Osteoarthritis.
- ❖ Rheumatoid arthritis.
- ❖ Acromegaly.
- ❖ Club foot.
- ❖ Tumours.
- ❖ Leukaemia

Fractures

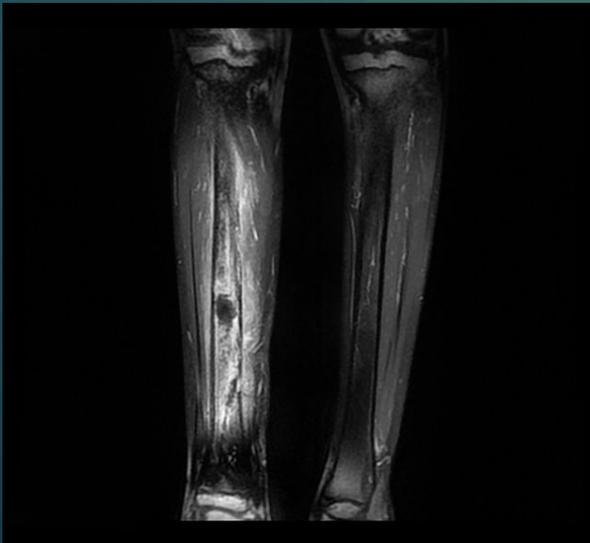
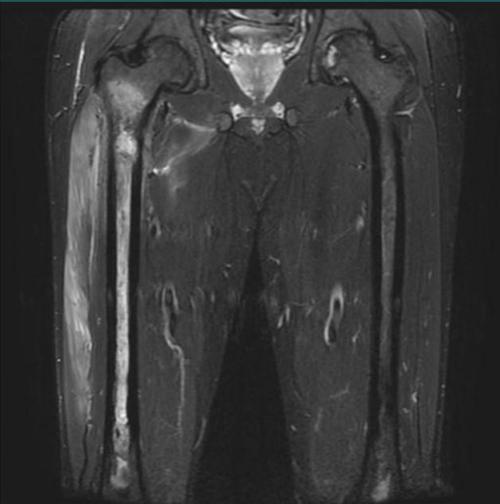
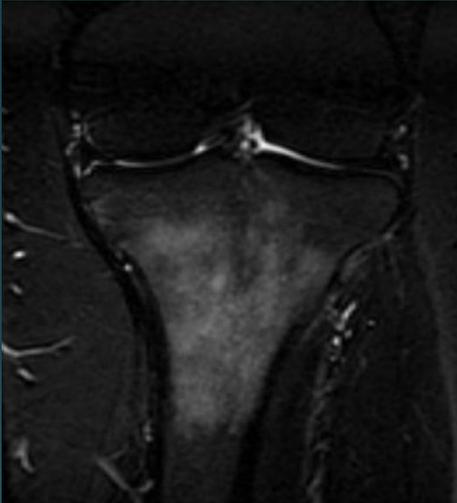
- ▶ A **bone fracture** is a medical condition in which there is a partial or complete break in the continuity of the bone.
- ▶ In more severe cases, the bone may be broken into several pieces.
- ▶ A bone fracture may be the result of high force impact or stress, or a minimal trauma injury as a result of certain medical conditions that weaken the bones, such as osteoporosis, osteopenia, bone cancer, where the fracture is then properly termed a pathologic fracture.



Osteomyelitis

- ▶ Osteomyelitis (OM) is an infection of the bone characterized by inflammation and bony destruction.
- ▶ The most common pathogens causing OM in adults are Staphylococcus aureus, Enterobacter, and Streptococcus species.
- ▶ Escherichia coli and fungal infections are less common causes of OM.
- ▶ **Laboratory tests:**
 - CBC (**complete blood count**) - leukocytosis in acute cases.
 - microbiology (blood cultures to check for bacteremia).
 - A bone biopsy is the most accurate method of determining the causative pathogen.
 - other serology (ESR) may be elevated in acute and chronic OM and helpful for monitoring response to treatment.
 - CRP may be elevated in OM. **C-reactive protein (CRP)** is a blood **test** marker for inflammation in the body.

► Imaging : X ray, CT and MRI.



Osteoporosis

- ❖ Osteoporosis is a skeletal disease characterized by low bone mass and abnormal bone microarchitecture leading to an increased risk of fracture.
- ❖ Osteoporosis is often asymptomatic. Patients may notice loss of height due to vertebral compression fractures or other fragility fractures.
- ❖ Risk factors include
 - ✓ Age (>65 years), previous osteopenia on imaging,
 - ✓ Prolonged glucocorticoid use (at least 3 months in the last year at a dose of at least 7.5 mg/d),
 - ✓ Low body weight (<60 kg).
 - ✓ Family history of osteoporotic fracture.
 - ✓ Smoking.
 - ✓ Excess alcohol intake.
 - ✓ Medical comorbidities associated with osteoporosis include **early menopause**, intestinal malabsorption, hyperparathyroidism, and eating disorders.

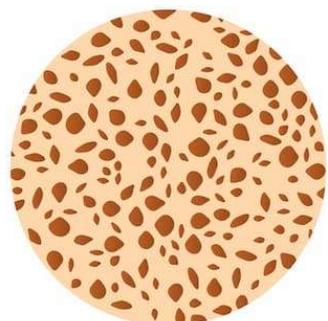
Laboratory tests:

- ❑ CBC (anemia).
- ❑ Metabolic panel (hyper- or hypocalcaemia, phosphate, albumin, PTH, liver enzymes and function,
- ❑ Cr [metabolic bone disease may be associated with chronic kidney disease such as renal osteodystrophy.
- ❑ ALP [elevated in fracture or lytic bone lesion],
- ❑ TSH, T3 and T4
- ❑ Vitamin D levels should be reassessed 3-4 months after supplementation.
- ❑ Luteinizing hormone [LH], follicle-stimulating hormone [FSH], and testosterone may be considered
- ❑ urine studies (24-hour urine collection for calcium and Cr excretion).

IMAGING :

- X ray, DEXA (Dual energy x-ray absorptiometry), CT and MRI.

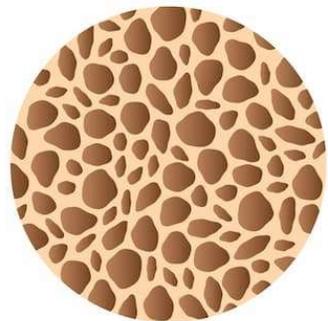
STAGES OF OSTEOPOROSIS



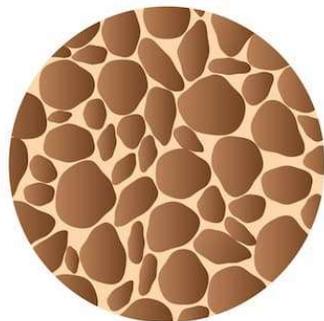
Normal bone



Osteopenia

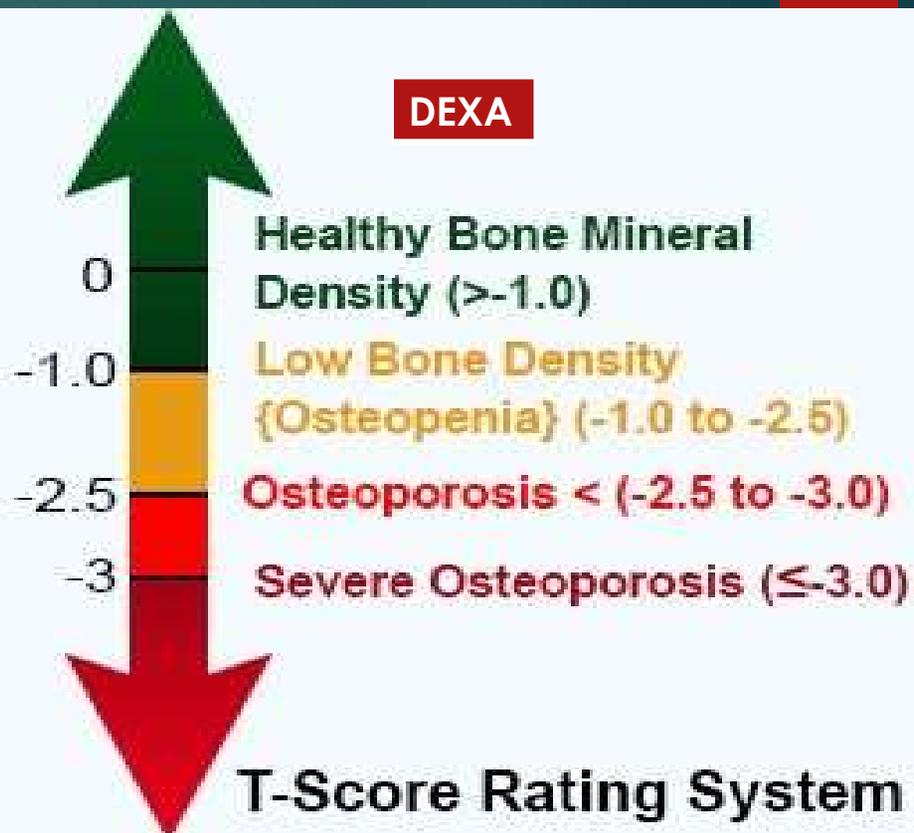


Osteoporosis



Severe Osteoporosis

DEXA



Osteoarthritis.

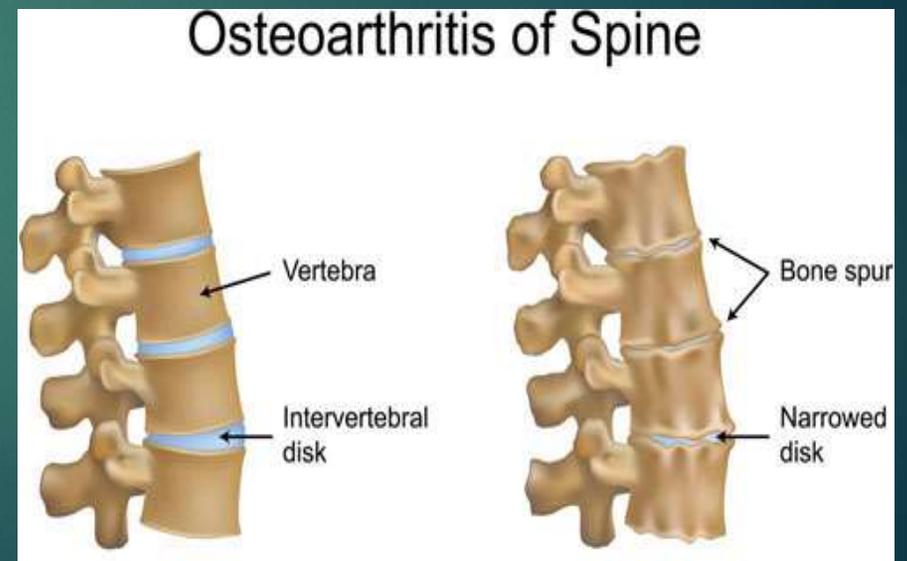
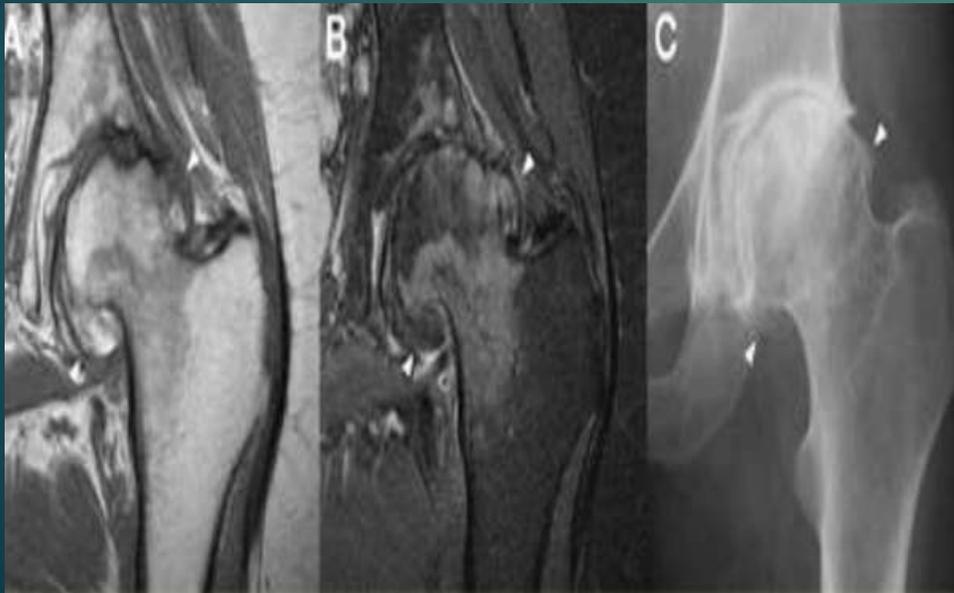
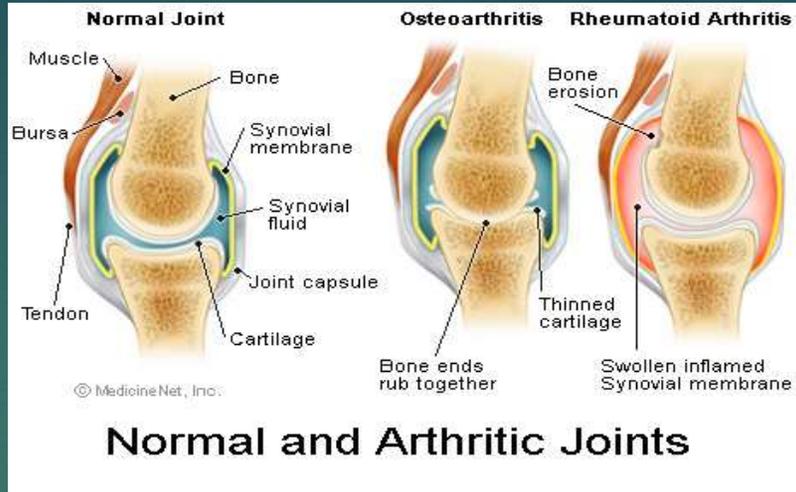
- ▶ Idiopathic OA is a progressive degenerative joint disease resulting in a loss of articular cartilage and chronic reactive bone changes resulting in bone destruction and the formation of new bone at the margins called **osteophytes**.
- ▶ The most common symptoms are joint pain and stiffness.

Blood tests

- Although there's no blood test for osteoarthritis, certain tests can help rule out other causes of joint pain, such as rheumatoid arthritis.
- Joint fluid analysis : Your doctor might use a needle to draw fluid from an affected joint. The fluid is then tested for inflammation and to determine whether your pain is caused by gout or an infection rather than osteoarthritis.

Imaging tests

- **X-rays** : Cartilage loss is revealed by a narrowing of the space between the bones in your joint. An X-ray can also show **bone spurs around a joint**.
- **Magnetic resonance imaging (MRI)**: An MRI uses radio waves and a strong magnetic field to produce detailed images of bone and soft tissues, including cartilage..



Rheumatoid arthritis

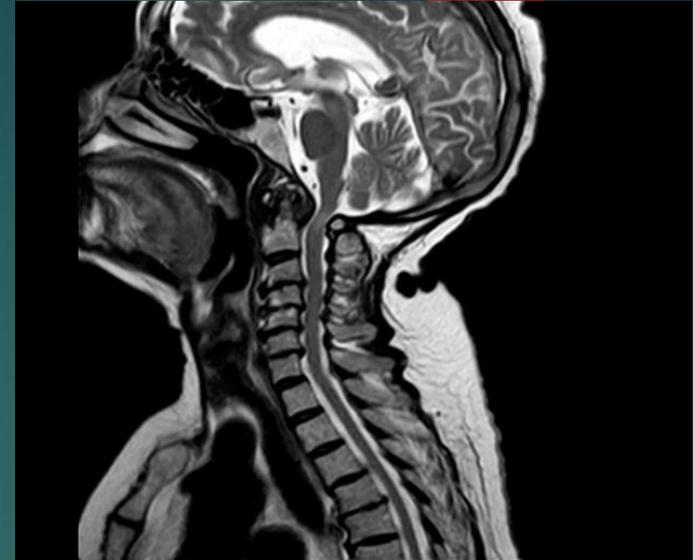
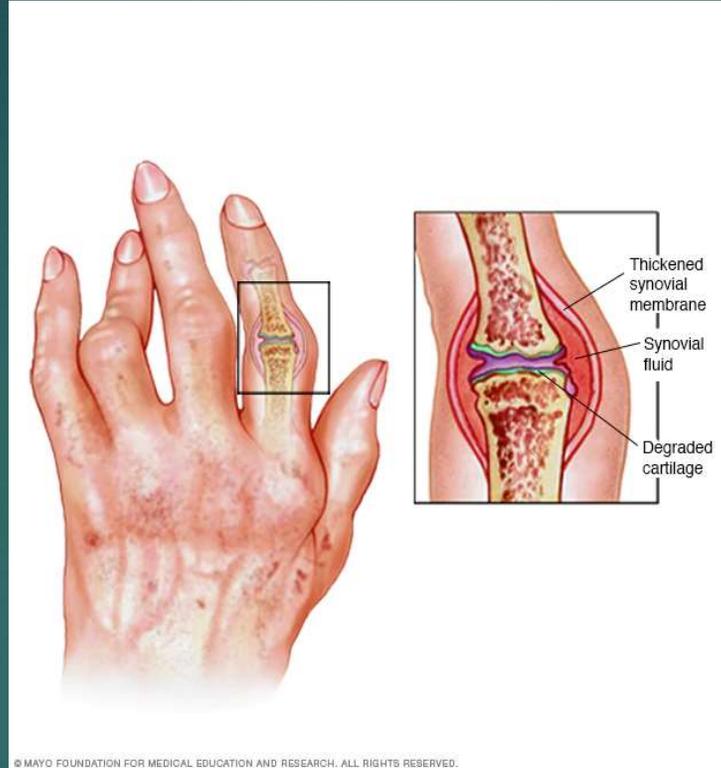
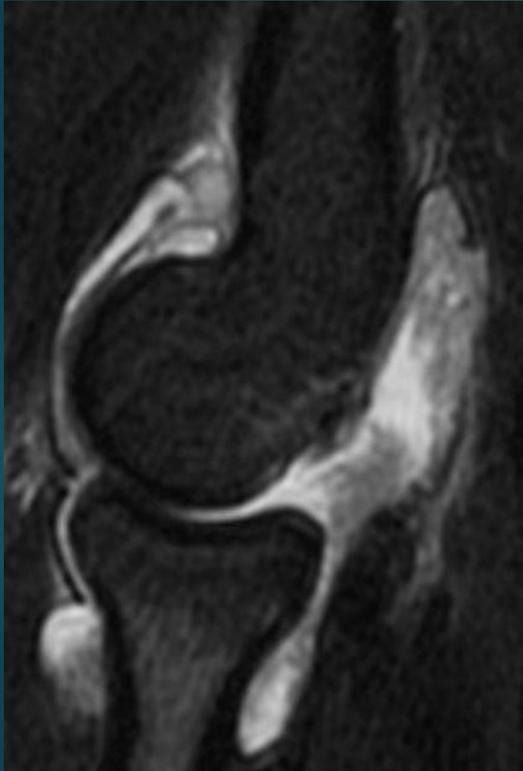
- ▶ **Rheumatoid arthritis (RA)** is a chronic autoimmune multisystemic inflammatory disease which affects many organs but predominantly attacks the synovial tissues and joints.
- ▶ Symptoms of RA include pain and swelling particularly of small joints, morning joint stiffness lasting more than 1-hour, constitutional symptoms such as fatigue and anorexia, and joint deformities.

BLOOD TESTS :

People with rheumatoid arthritis often have an elevated **erythrocyte sedimentation rate (ESR, or sed rate) or C-reactive protein (CRP)**, which may indicate the presence of an inflammatory process in the body. Other common blood tests look for **rheumatoid factor and anti-cyclic citrullinated peptide (anti-CCP) antibodies**.

IMAGING TESTS :

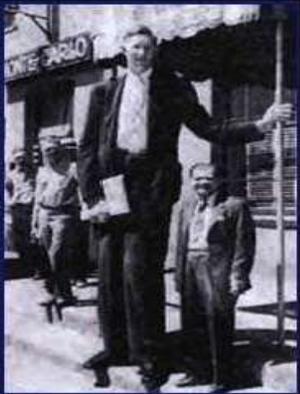
X-rays to help track the progression of rheumatoid arthritis in your joints over time. **MRI and ultrasound** tests can help your doctor judge the severity of the disease in your body.



Acromegaly

- ▶ occurs when the body produces too much of the hormones that control growth.
- ▶ tissues grow larger than normal.
- ▶ excessive growth can cause serious disease and even premature death.

Acromegaly



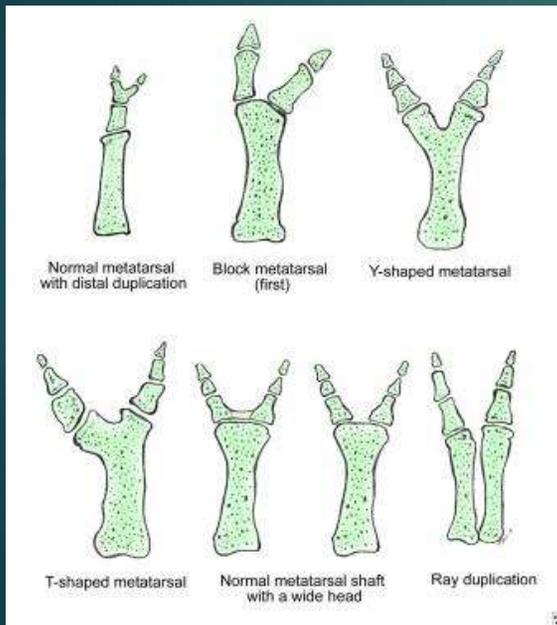
X-ray demonstrates an enlarged sella Turcica and changes in the skull

Obliterates diploe found between inner & outer tables of the cortical bone

8



Club foot : A condition in which a newborn's foot or feet appear to be rotated internally at the ankle. The foot points down and inwards, and the soles of the feet face each other.



Leukaemia

- ▶ Leukemia is a cancer of the blood or bone marrow. Bone marrow produces blood cells. Leukemia can develop due to a problem with blood cell production. It usually affects the leukocytes, or white blood cells.

