WELCOME

TO

PATHOPHYSIOLOGY

UNIT 4

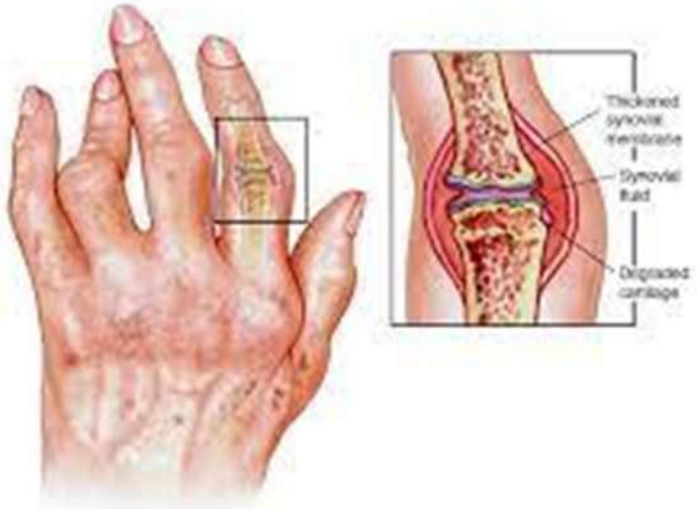
TOPIC :

- **Disease of bones and joints :** Rheumatoid arthritis, osteoporosis and gout

Disease of bones and joints

Rheumatoid Arthritis

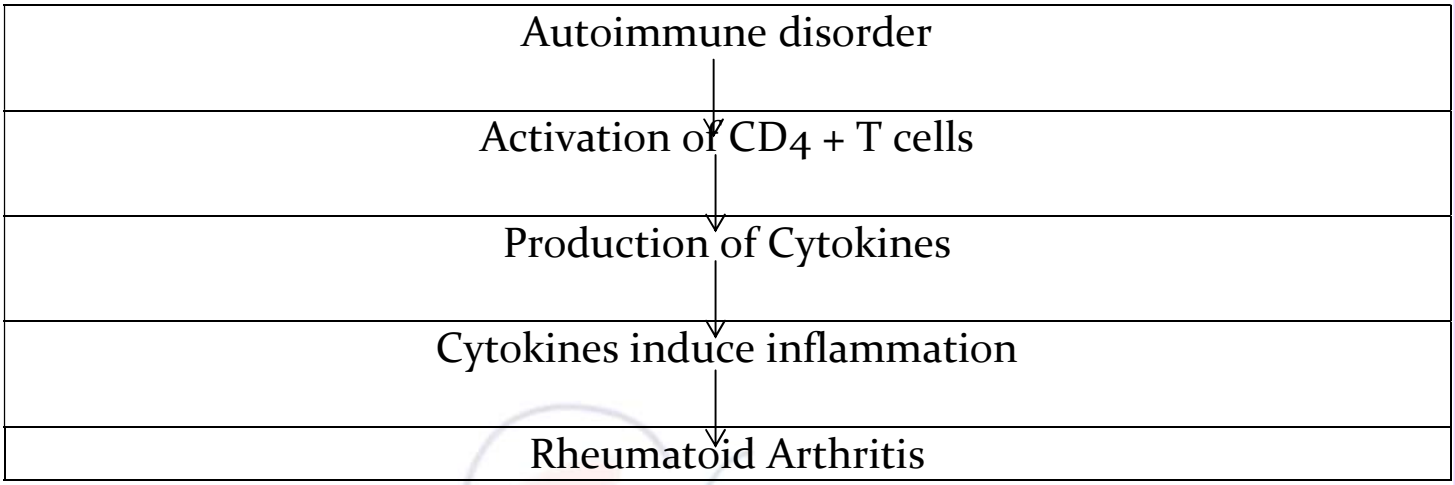
→ RA is a chronic , progressive ,inflammatory musculoskeletal disorder affecting many joints and patient suffers from swelling and pain of joints.



Etiology

- Genetic
- Autoimmune disorder
- Environmental factors
- Hormones

Pathogenesis



Clinical Manifestations

- Joint pain
- Swelling of joint
- Redness of joints
- Joint stiffness particularly in the morning or after sitting continuously

Non Pharmacological Management

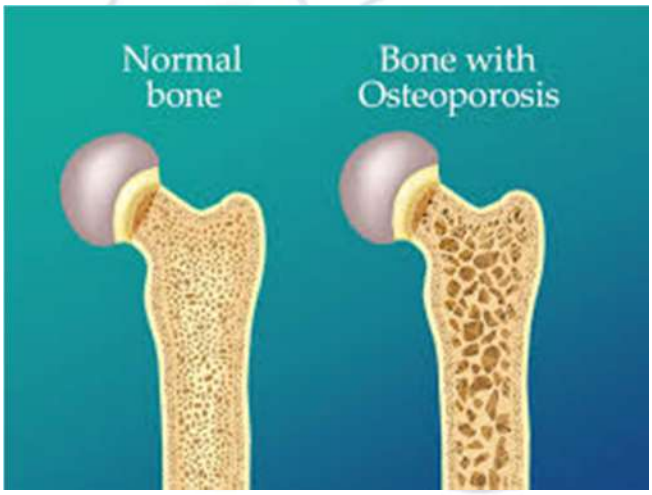
- ❖ Make the diet charts and follow accordingly and avoid the fattier and lipids contents in the diet.
- ❖ Change the lifestyle and apply the home remedies means replace the allopathic medicine with ayurvedic medicine (because of less side effects)
- ❖ Regular practice of yoga exercise and other physical exercise
- ❖ During more pain condition rest is required and follow the heat and cold for managing pain (Both heat and cold can relieve pain in joint. Heat also relieves stiffness, and cold can relieve muscle spasms and pain).
- ❖ Avoid the smoking and alcoholism.

Pharmacological Management

- Rheumatoid arthritis has no known treatment. However clinical trials show that early therapy with Disease Modifying Anti-Rheumatoid Drugs (DMARDs) reduces the symptoms.
- Drug recommendation will be based on the severity of symptoms and the duration of rheumatoid arthritis.
    - **NSAIDs :** Pain and inflammation can treat with NSAIDs . paracetamol , ibuprofen , diclofenac , Meloxicam etc.
    - **Steroids :** Corticosteroids(prednisolone) reduces inflammation , pain and damage of joints.
    - **Conventional DMARDs :** These drugs can reduce the progression of RA , and prevent permanent damage to joints . **examples :** Methotrexate , leflunomide (immunosuppressive) Hydroxychloroquine (immunosuppressive) , Slfasalazine (reduces inflammation) .
    - **Biologic DMARDs :** These are commonly most effective when used with Conventional DMARDs example : Infiliximab.
    - **Targeted synthetic DMARDs :** These are used when Conventional and biologic DMARDs are failed . example : Baricitinib , tofacitinib.

Osteoporosis

- Osteoporosis is a metabolic bone disorder in which bone density decreases, making bones fragile, weak, and prone to fractures.
- It is often called the "silent disease" because it progresses without symptoms until a fracture occurs.
- Osteoporosis is defined as a systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to bone fragility and increased risk of fractures.



Types of Osteoporosis

Type	Description
Primary Osteoporosis	Occurs naturally due to aging or postmenopausal estrogen deficiency
Secondary Osteoporosis	Caused by underlying diseases or medications (e.g. steroids, hyperthyroidism)

Etiology (Causes)

Non-Modifiable Factors

- Aging (especially > 50 years)
- Female gender (especially postmenopausal women)
- Family history of osteoporosis
- Asian or Caucasian ethnicity

Modifiable Factors

- Low calcium or vitamin D intake
- Sedentary lifestyle or physical inactivity
- Smoking
- Excessive alcohol consumption
- Prolonged use of corticosteroids
- Diseases: Hyperthyroidism, diabetes, Cushing's syndrome

Pathogenesis

- Bone remodeling is a continuous process where old bone is resorbed by osteoclasts, and new bone is formed by osteoblasts.
- In osteoporosis, bone resorption exceeds bone formation, leading to loss of bone density.
- Bone becomes porous, brittle, and weak, increasing the risk of fractures — especially in the hip, spine, and wrist.

Clinical Manifestations (Symptoms)

- Often asymptomatic in early stages
- Fractures with minimal trauma (especially hip, spine, wrist)
- Back pain due to compression fractures
- Loss of height over time
- Stooped posture (kyphosis)
- Difficulty standing or walking after a fracture

Non-Pharmacological Management

- Diet rich in calcium and vitamin D (milk, curd, leafy vegetables, fish)
- Weight-bearing exercises (walking, jogging, climbing stairs)
- Quit smoking and avoid alcohol
- Sunlight exposure to increase vitamin D synthesis
- Fall prevention strategies: proper lighting, non-slip floors, handrails, etc.

Pharmacological Management

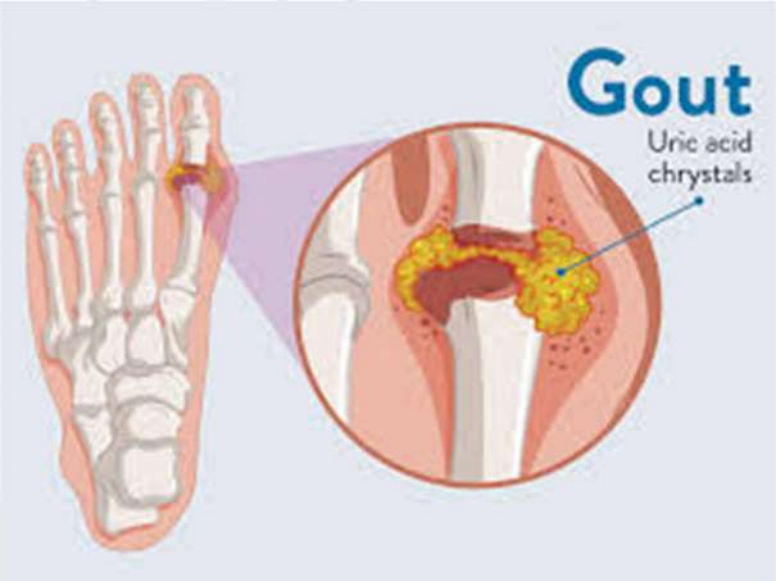
Class	Examples	Action
Calcium supplements	Calcium carbonate, calcium citrate	Supports bone mineralization
Vitamin D analogs	Cholecalciferol (D3), Ergocalciferol (D2)	Enhances calcium absorption
Bisphosphonates	Alendronate, Risedronate, Ibandronate	Inhibit bone resorption (1st-line)
Selective Estrogen Receptor Modulators (SERMs)	Raloxifene	Estrogen-like bone protection
Calcitonin	Salmon calcitonin (nasal spray)	Inhibits osteoclast activity
Parathyroid Hormone Analog	Teriparatide (PTH 1–34)	Stimulates bone formation
Monoclonal antibody	Denosumab	Inhibits RANKL → ↓ osteoclasts
Hormone Replacement Therapy (HRT)	Estrogen + progestin (postmenopausal)	Limited use due to side effects

GOUT

→ Gout is a type of inflammatory arthritis caused by the deposition of monosodium urate crystals in the joints, due to hyperuricemia (increased uric acid in blood).

→ It leads to sudden, severe joint pain, redness, and swelling, commonly affecting the big toe.

→ Gout is a metabolic disorder characterized by elevated serum uric acid levels and recurrent attacks of acute arthritis, most commonly in the lower limbs.



Types of Gout

Type	Description
Acute Gout	Sudden and painful attack, usually in one joint (e.g., big toe)
Chronic Gout	Recurrent attacks, leading to joint damage and tophi (crystal nodules)
Tophaceous Gout	Presence of tophi (urate crystal deposits) in soft tissues

Causes (Etiology)

Primary Causes

- Genetic factors
- Overproduction or under-excretion of uric acid
- Diet rich in purines (e.g., red meat, seafood)

Secondary Causes

- Chronic kidney disease
- Certain medications (e.g., thiazide diuretics, aspirin)
- Excess alcohol intake
- Tumor lysis syndrome (after chemotherapy)

Pathogenesis

- High uric acid levels in blood (> 6.8 mg/dL)
- Uric acid forms crystals that deposit in joints
- These crystals trigger an inflammatory response
- WBCs attack crystals, releasing enzymes → pain, swelling

Clinical Manifestations

- Sudden onset of severe joint pain
- Swelling, redness, and heat in affected joint
- Big toe (1st metatarsophalangeal joint) most commonly involved
- Fever and general discomfort
- Tophi (chalky urate deposits) in chronic gout
- Limited joint movement

Non-Pharmacological Management

- **Low-purine diet** (avoid red meat, liver, seafood)
- Avoid alcohol, especially beer
- Maintain healthy weight

- Drink plenty of water
- Avoid sugary drinks and high-fructose corn syrup

Pharmacological Management

For Acute Attacks

- **NSAIDs**: Indomethacin, Naproxen
- **Colchicine**: Reduces inflammation
- **Corticosteroids**: Prednisolone (if NSAIDs are contraindicated)

For Long-Term Control

- **Allopurinol, Febuxostat** (Xanthine oxidase inhibitors): ↓ uric acid production
- **Probenecid** (Uricosuric): ↑ uric acid excretion
- **Pegloticase**: Converts uric acid to allantoin (used in refractory cases)