

[www.pharmrecord.com](http://www.pharmrecord.com)

# **Disease of bones and joints**

**Presented By;-**

**Mr. Samarpan Mishra (Assistant Professor)**

**Specialization:- Pharmaceutical Chemistry**

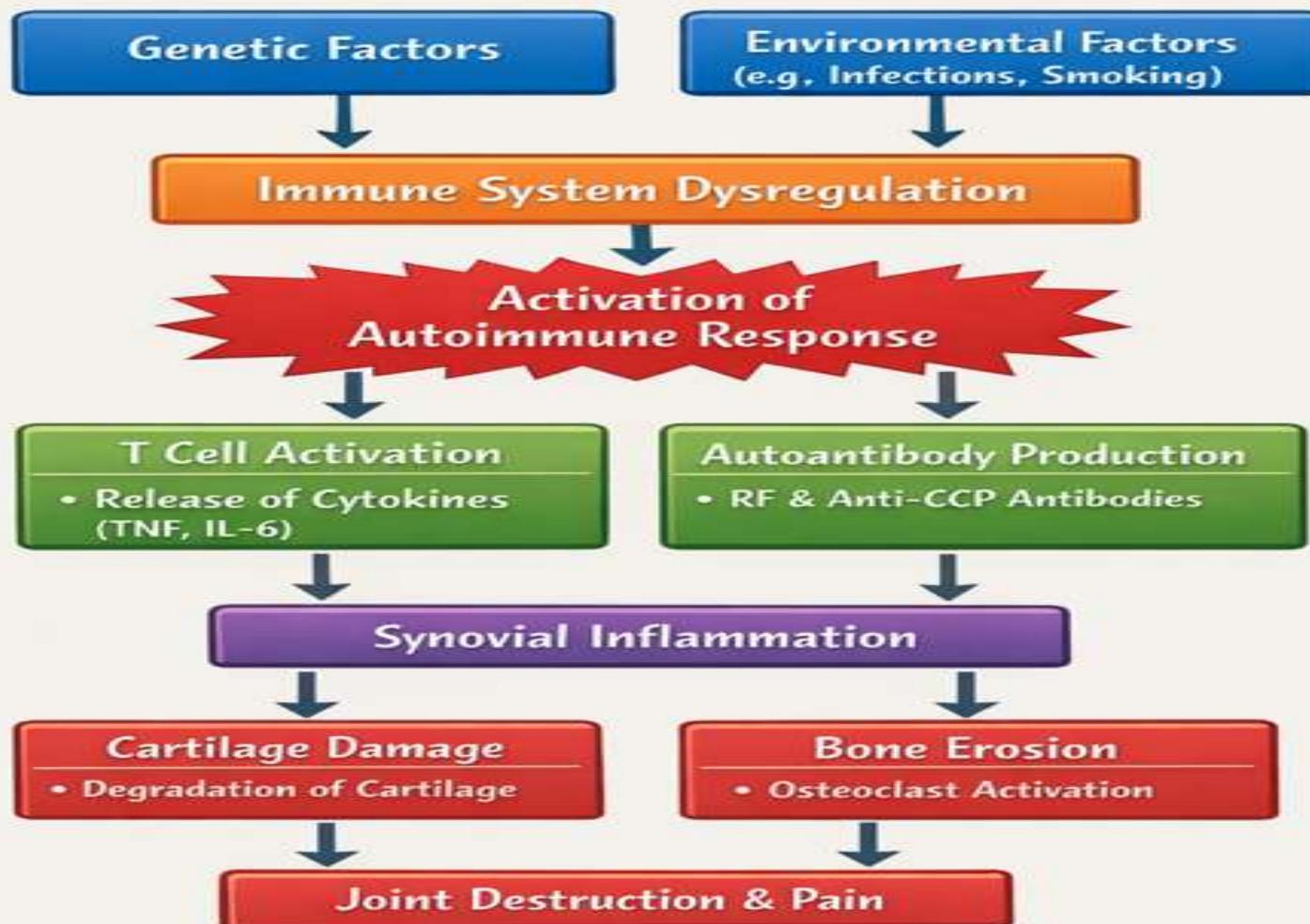
# 1. Rheumatoid Arthritis

S.No	Heading	Description
1	<b>Definition</b>	Rheumatoid arthritis is a chronic, systemic autoimmune inflammatory disease primarily affecting synovial joints.
2	<b>Nature of Disease</b>	Progressive, symmetrical, inflammatory polyarthritis.
3	<b>Commonly Affected Joints</b>	Small joints of hands and feet (MCP, PIP, wrist).
4	<b>Age Group</b>	Most common between 30–50 years.
5	<b>Gender Predilection</b>	Females > Males ( $\approx 3:1$ ).
6	<b>Systemic Involvement</b>	Skin, lungs, heart, eyes, blood vessels.
7	<b>Outcome if Untreated</b>	Joint destruction, deformity, disability.

## I. Etiology of Rheumatoid Arthritis

S.No	Factor	Details
1	<b>Genetic Factors</b>	HLA-DR4 and HLA-DR1 association.
2	<b>Autoimmune Mechanism</b>	Autoantibodies against synovial tissue.
3	<b>Environmental Triggers</b>	Smoking, silica exposure, infections.
4	<b>Hormonal Factors</b>	Estrogen influence (female predominance).
5	<b>Infectious Agents</b>	Epstein-Barr virus, Mycoplasma (proposed).
6	<b>Immunological Factors</b>	T-cell activation, cytokines (TNF- $\alpha$ , IL-1, IL-6).

# Pathogenesis of Rheumatoid Arthritis



### III. Diagnostic Tests for Rheumatoid Arthritis

S.No	Test	Findings / Purpose
1	Rheumatoid Factor (RF)	Positive in ~70–80% patients.
2	Anti-CCP Antibody	Highly specific; predicts severe disease.
3	ESR & CRP	Raised inflammatory markers.
4	Complete Blood Count (CBC)	Normocytic anemia common.
5	X-ray of Joints	Joint space narrowing, erosions.
6	Ultrasound / MRI	Early synovitis and erosions detection.
7	Synovial Fluid Analysis	Inflammatory fluid (↑ WBC).

### IV. Treatment of Rheumatoid Arthritis

S.No	Treatment Category	Examples / Purpose
1	NSAIDs	Ibuprofen, Diclofenac – pain & inflammation control.
2	Corticosteroids	Prednisolone – acute flare management.
3	Conventional DMARDs	Methotrexate (drug of choice), Sulfasalazine, Leflunomide, Hydroxychloroquine.
4	Biologic DMARDs	TNF- $\alpha$ inhibitors (Etanercept, Infliximab), IL-6 inhibitors, Rituximab.
5	Targeted Synthetic DMARDs	JAK inhibitors (Tofacitinib, Baricitinib).
6	Physiotherapy	Maintain joint function and mobility.
8	Lifestyle Measures	Smoking cessation, exercise, balanced diet.

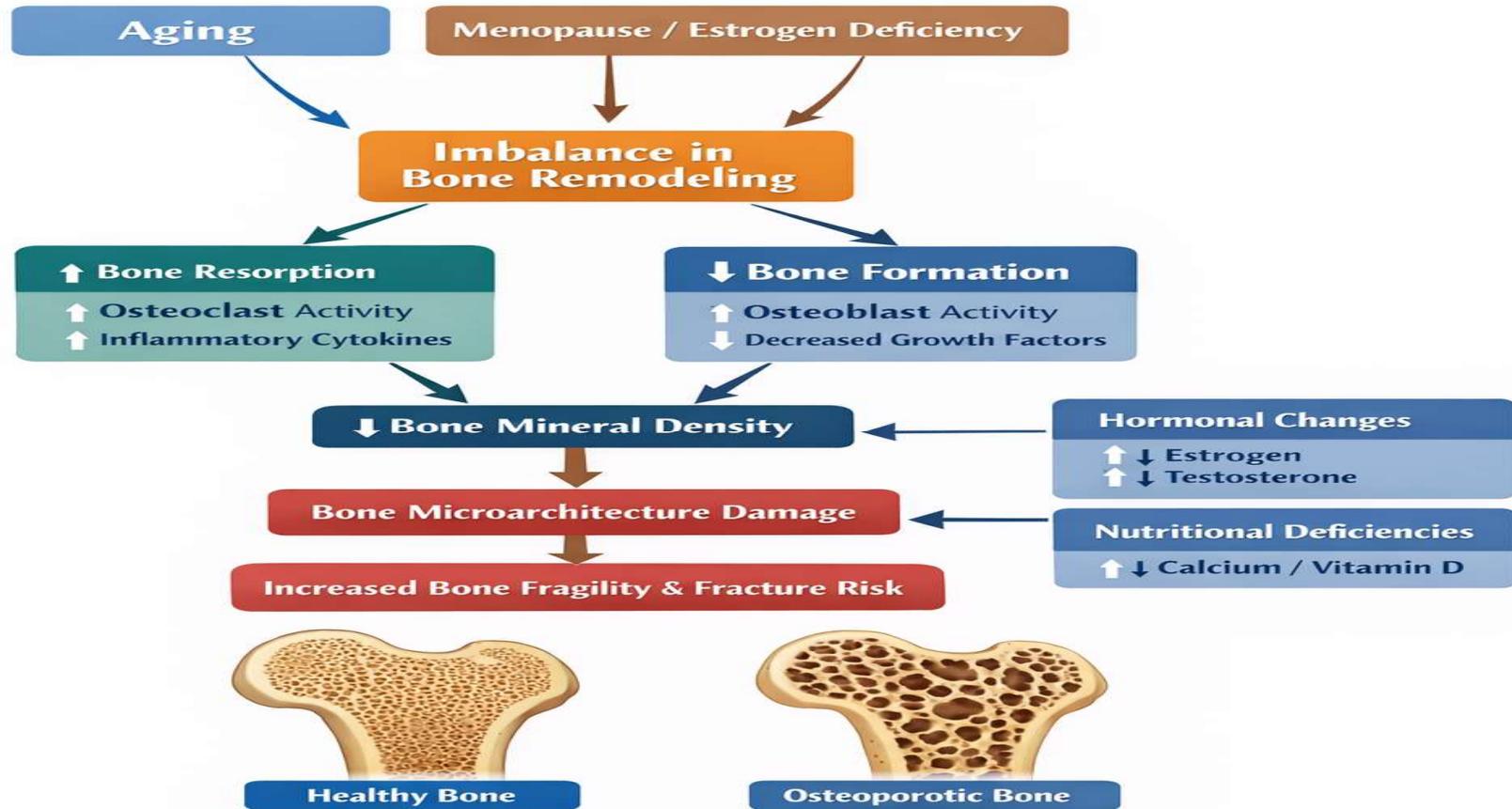
## 2. Osteoporosis

S.No	Heading	Description
1	<b>Definition</b>	Osteoporosis is a systemic skeletal disorder characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to increased fracture risk.
2	<b>Nature of Disease</b>	Silent and progressive; often detected after a fracture.
3	<b>Common Sites Affected</b>	Vertebrae, hip (femoral neck), wrist.
4	<b>Age Group</b>	Elderly population; postmenopausal women are at higher risk.
5	<b>Clinical Importance</b>	Major cause of morbidity, disability, and mortality due to fractures.

### I. Etiology of Osteoporosis

S.No	Category	Causes
1	<b>Hormonal Factors</b>	Estrogen deficiency, low testosterone, hyperthyroidism, hyperparathyroidism.
2	<b>Nutritional Deficiency</b>	Low calcium intake, vitamin D deficiency, malnutrition.
3	<b>Lifestyle Factors</b>	Smoking, alcohol abuse, physical inactivity.
4	<b>Medications</b>	Long-term corticosteroids, heparin, anticonvulsants, chemotherapy drugs.
5	<b>Medical Conditions</b>	Chronic kidney disease, rheumatoid arthritis, malabsorption syndromes.
6	<b>Genetic Factors</b>	Family history of osteoporosis or fractures.

# Pathogenesis of Osteoporosis



### III. Diagnostic Tests for Osteoporosis

S.No	Test	Purpose / Findings
1	<b>DEXA Scan (Gold Standard)</b>	Measures bone mineral density (BMD); T-score $\leq -2.5$ confirms osteoporosis.
2	<b>X-Ray</b>	Shows bone thinning and fractures (late finding).
3	<b>FRAX Score</b>	Estimates 10-year fracture risk.
4	<b>Blood Tests</b>	Calcium, phosphate, vitamin D, ALP, PTH levels.
5	<b>Urine Tests</b>	Calcium excretion, bone turnover markers.

### IV. Treatment of Osteoporosis

S.No	Treatment Type	Examples / Description
1	<b>Lifestyle Modification</b>	Weight-bearing exercise, smoking cessation, reduced alcohol intake.
2	<b>Dietary Management</b>	Adequate calcium and vitamin D intake.
3	<b>Bisphosphonates (First-line)</b>	Alendronate, risedronate, zoledronic acid.
4	<b>Hormonal Therapy</b>	Estrogen replacement (postmenopausal women), testosterone (men).
5	<b>Selective Estrogen Receptor Modulators (SERMs)</b>	Raloxifene.
6	<b>Bone-forming Agents</b>	Teriparatide, abaloparatide.
7	<b>Monoclonal Antibody</b>	Denosumab.
8	<b>Fracture Prevention</b>	Fall prevention strategies, hip protectors.

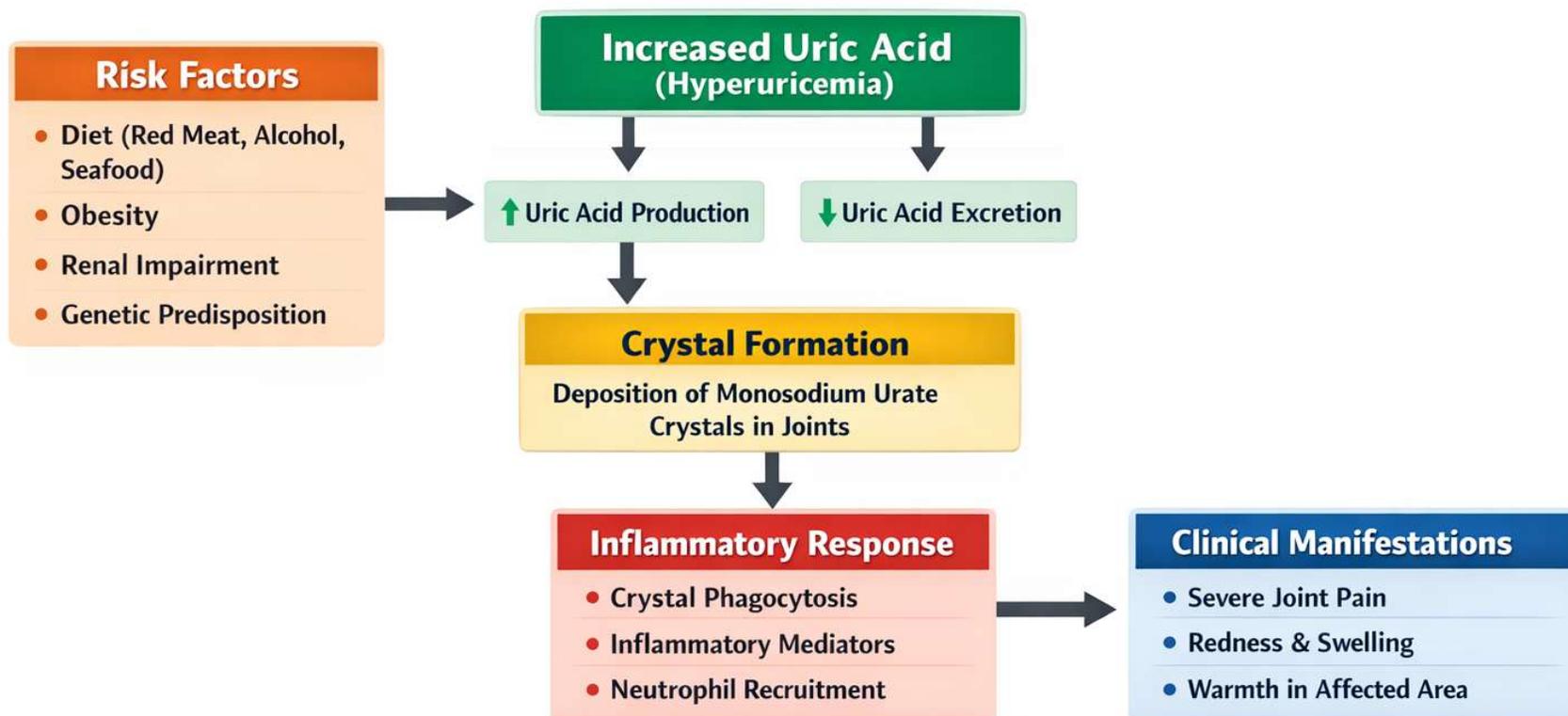
## 3. Gout

S.No	Heading	Details
1	<b>Definition</b>	Gout is a metabolic disorder characterized by hyperuricemia leading to deposition of monosodium urate crystals in joints and tissues.
2	<b>Nature of Disease</b>	Inflammatory arthritis with acute, recurrent attacks.
3	<b>Most Common Joint Affected</b>	First metatarsophalangeal joint (podagra).
4	<b>Course</b>	Acute attacks → intercritical periods → chronic tophaceous gout (if untreated).
5	<b>Clinical Importance</b>	Causes severe pain, joint damage, and disability if unmanaged.

### I. Etiology of Gout

S.No	Category	Causes
1	<b>Overproduction of Uric Acid</b>	High purine diet, genetic enzyme defects, malignancy, chemotherapy.
2	<b>Under-excretion of Uric Acid (most common)</b>	Renal disease, dehydration, aging.
3	<b>Dietary Factors</b>	Red meat, seafood, alcohol (especially beer), fructose-rich drinks.
4	<b>Drugs</b>	Thiazide diuretics, loop diuretics, low-dose aspirin, cyclosporine.
5	<b>Associated Conditions</b>	Obesity, hypertension, diabetes mellitus, metabolic syndrome.

# Pathogenesis of Gout

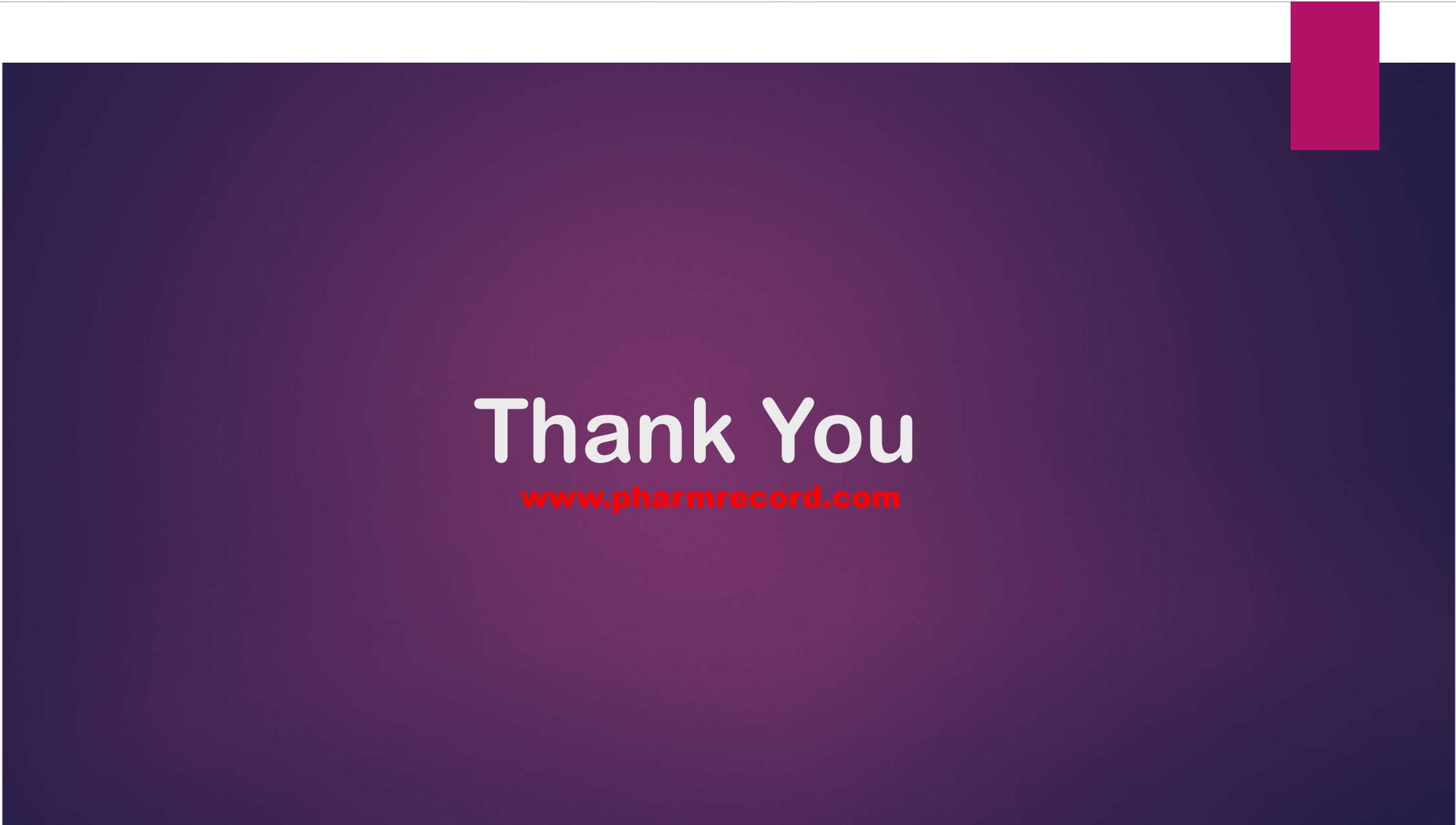


### III. Diagnostic Tests of Gout

S.No	Test	Findings / Purpose
1	Serum Uric Acid	Elevated (>7 mg/dL), but may be normal during acute attack.
2	Synovial Fluid Analysis (Gold Standard)	Needle-shaped, negatively birefringent monosodium urate crystals.
3	ESR / CRP	Elevated during acute inflammation.
4	Complete Blood Count (CBC)	Raised WBC count in acute attacks.
5	X-ray of Joint	Punched-out erosions in chronic gout.
6	Ultrasound / DECT	Detects urate crystal deposits and tophi.
7	Renal Function Tests	Assess kidney involvement.

### IV. Treatment of Gout

S.No	Aspect	Management
1	Acute Attack	NSAIDs (indomethacin), colchicine, corticosteroids.
2	Chronic Management	Xanthine oxidase inhibitors (allopurinol, febuxostat).
3	Uricosuric Drugs	Probenecid (increases uric acid excretion).
4	Lifestyle Modification	Low-purine diet, weight reduction, hydration, avoid alcohol.
5	Management of Comorbidities	Control diabetes, hypertension, obesity.
6	Prevention of Attacks	Long-term urate-lowering therapy + prophylactic colchicine/NSAIDs.



Thank You

[www.pharmrecord.com](http://www.pharmrecord.com)