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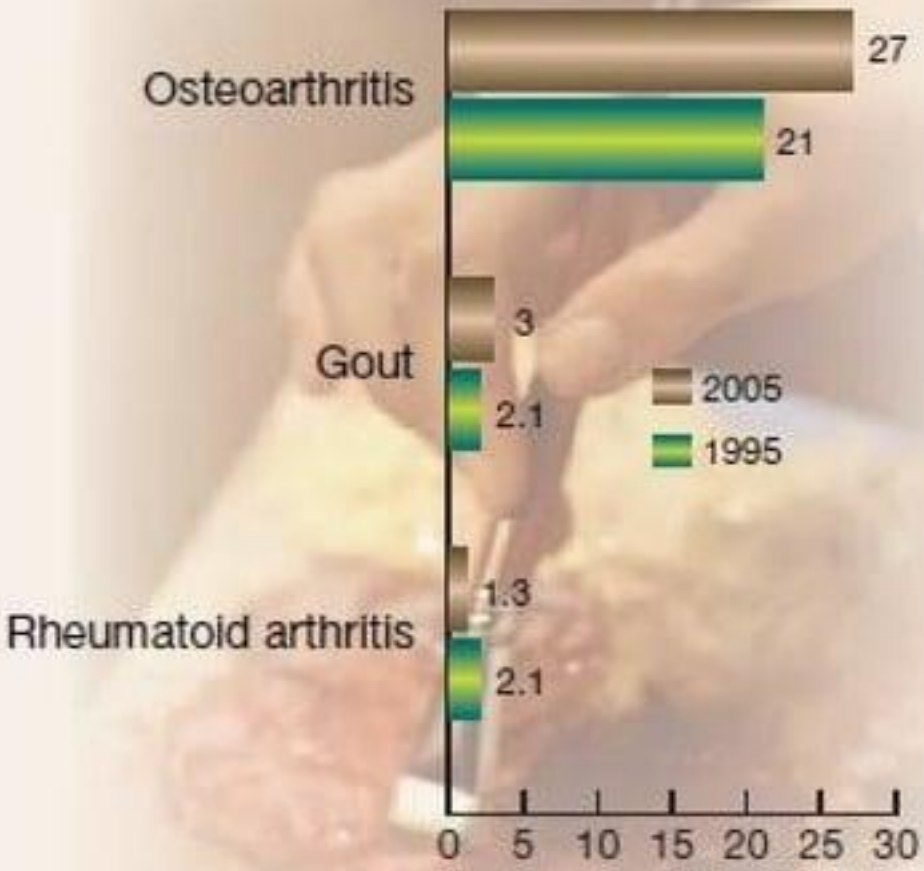
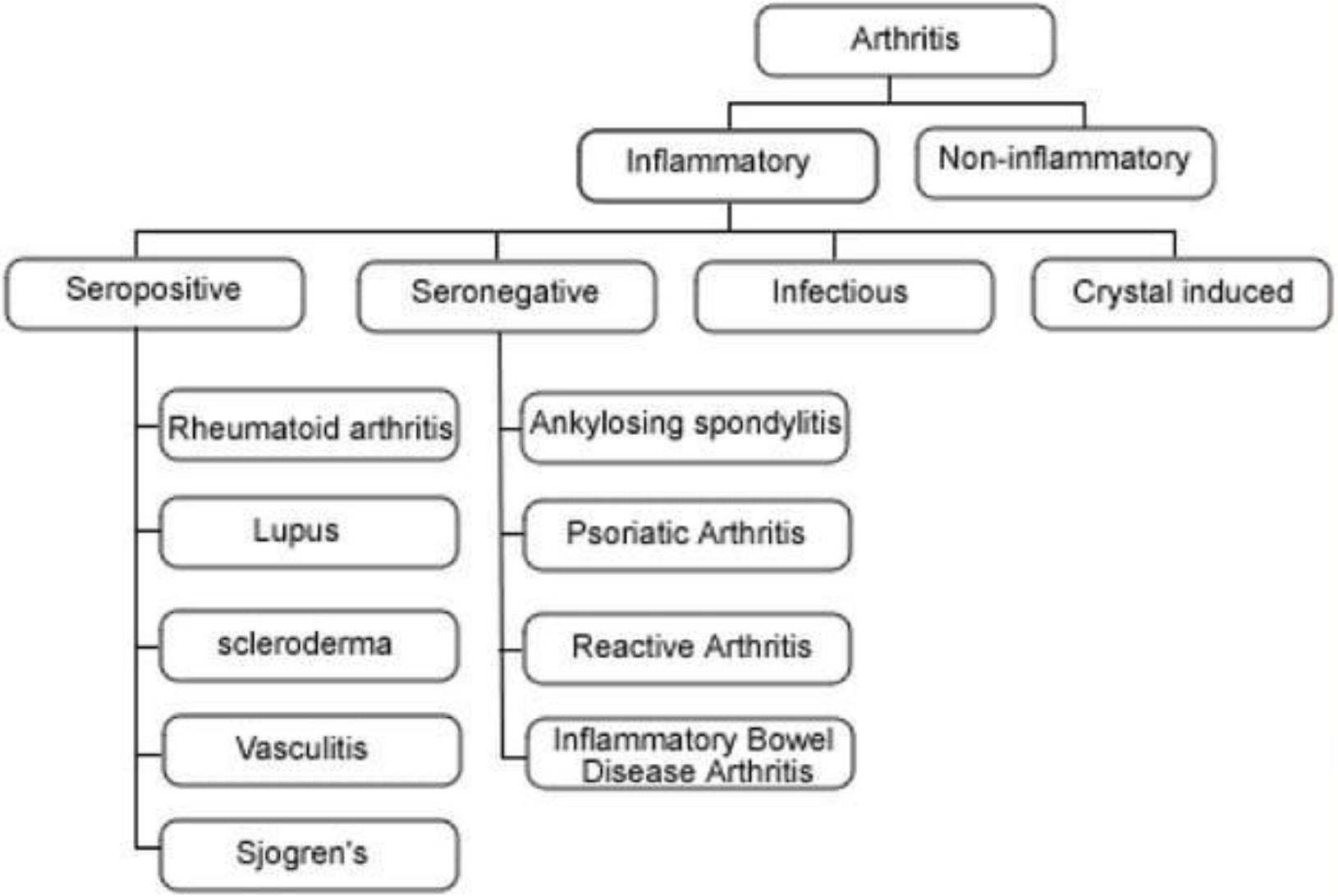
Incidence of Common Forms of Arthritis



Number of Persons Reporting Common Forms of Arthritis in 1995 and 2005, Millions

Classification of Arthritis



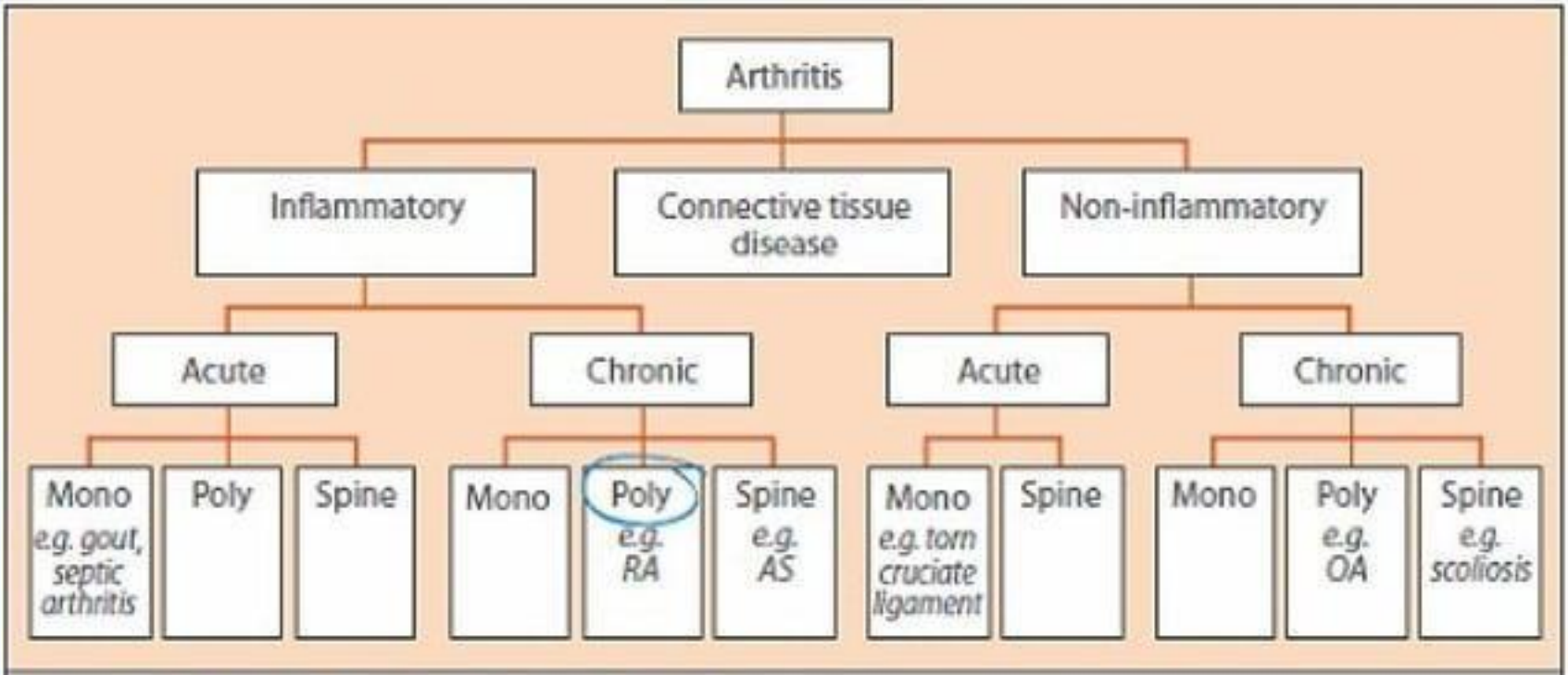
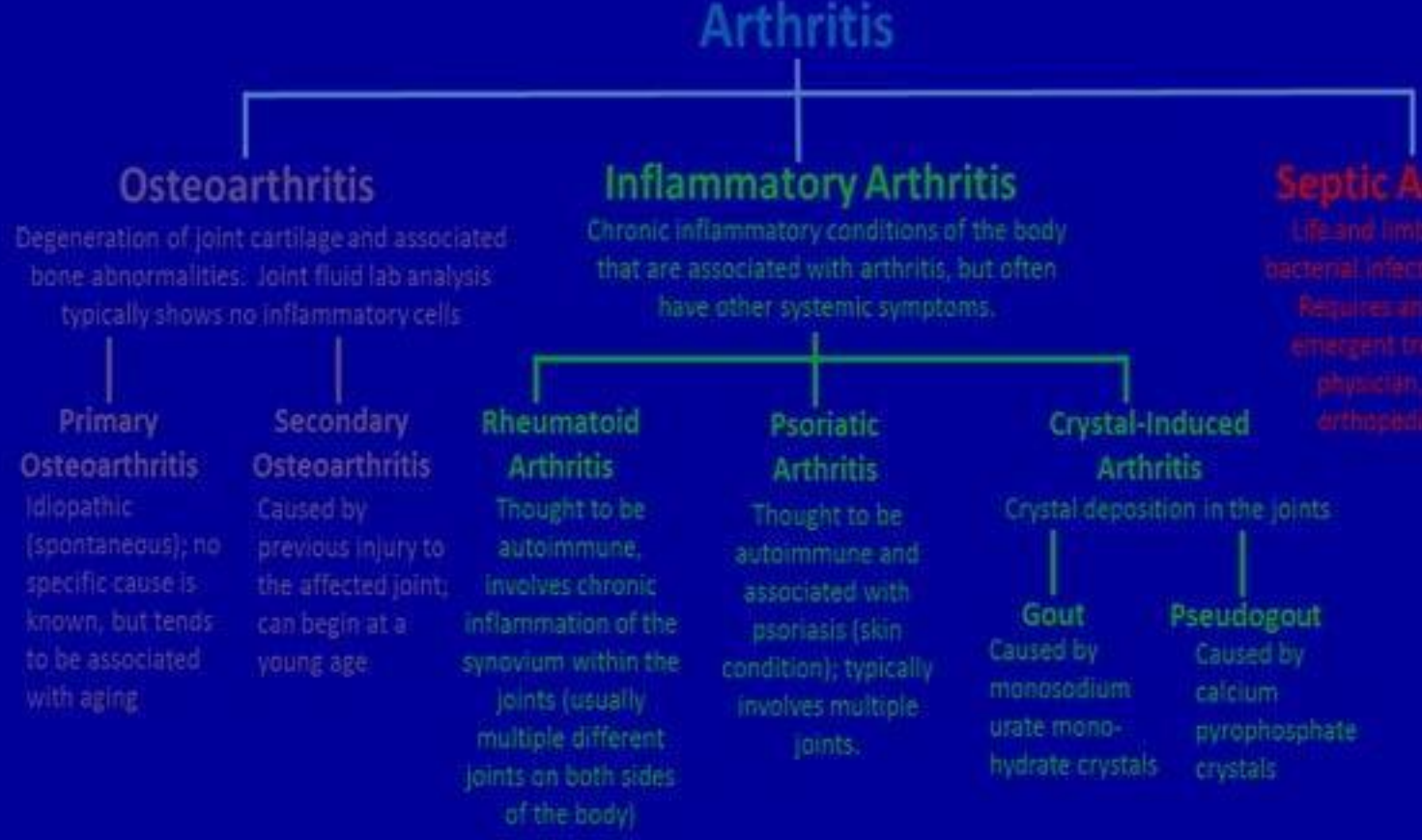


Figure 1. Classification of the arthritides


Arthritis
Osteoarthritis
Degeneration of joint cartilage and associated bone abnormalities. Joint fluid lab analysis typically shows no inflammatory cells
Primary Osteoarthritis
Idiopathic (spontaneous); no specific cause is known, but tends to be associated with aging
Secondary Osteoarthritis
Caused by previous injury to the affected joint; can begin at a young age
Inflammatory Arthritis
Chronic inflammatory conditions of the body that are associated with arthritis, but often have other systemic symptoms.
Rheumatoid Arthritis
Thought to be autoimmune. Involves chronic inflammation of the synovium within the joints (usually multiple different joints on both sides of the body)
Psoriatic Arthritis
Thought to be autoimmune and associated with psoriasis (skin condition); typically involves multiple joints.
Crystal-Induced Arthritis
Crystal deposition in the joints
Gout
Caused by monosodium urate mono-hydrate crystals
Pseudogout
Caused by calcium pyrophosphate crystals
Septic Arthritis
Life and limb-threatening bacterial infection in the joint. Requires antibiotics and emergent treatment by a physician, usually an orthopedic surgeon.

Arthritis Clinical Classification:

Monoarthritis:	Local, asymmetric, secondary.	**Acute:** Bacterial, Trauma, Crystal, Reactive
		Chronic :Tuberculosis, Lyme, Fungal, Trauma, Tumors.
Polyarthritis:	Chronic, symmetric, systemic.	
	Autoimmune, degenerative, Crystal.	
	Rarely infective.	

Acute arthritis	Chronic arthritis
Inflammatory	
Monoarthritis	**Monoarthritis**
Crystal induced arthritis (gout and pseudogout)	Tubercular arthritis
Septic arthritis	Fungal arthritis
Gonococcal arthritis	Other infections (e.g Brucellosis)
Acute onset of inflammatory polyarthritis (like RA, SLE)	Immunoinflammatory arthritis
	Crystal induced arthritis
Polyarthritis (e.g., acute onset of polyarthritis, reactive arthritis)	Polyarthritis (e.g., RA, psoriatic arthritis, spondyloarthritis)
Non-inflammatory	
Monoarthritis	**Monoarthritis**
Hemarthrosis	Single joint osteoarthritis
Trauma	Neuropathic arthropathy
	Osteonecrosis
	Pigmented villo nodular synovitis
Polyarthritis	Polyarthritis (e.g., osteoarthritis)

Classification…Polyarthritis

Autoimmune:	Rheumatic, Rheumatoid, Ankylosing spondylitis, Reiter syndrome etc.
Degenerative:	Osteroarthritis
Crystal Deposition:	Gout – Monosodium urate
	CPPD - Pseudo Gout
Infective –	Septic, TB, Lyme etc. rare.

TABLE 1-1. NONINFLAMMATORY VS INFLAMMATORY DISORDERS

	Noninflammatory disorders (e.g., OA)	Inflammatory disorders (e.g., RA, lupus)
Symptoms		
Morning stiffness	Focal, brief	Significant, prolonged, >1 hr
Constitutional symptoms	Absent	Present
Peak period of discomfort	After prolonged use	After prolonged inactivity
Locking or instability	Implies loose body, internal derangement, or weakness	Uncommon
Symmetry (bilateral)	Occasional	Common
Signs		
Tenderness	Unusual	Over entire exposed joint area
Inflammation (fluid, tenderness, warmth, erythema, synovitis)	Unusual	Common
Multisystem disease	No	Often
Lab abnormalities	No	Often

Adapted from American College of Rheumatology ad hoc Committee on Clinical Guidelines. Guidelines for the initial evaluation of the adult patient with acute musculoskeletal symptoms. *Arthritis Rheum* 1996;39:1.

NON INFLAMMATORY ARTHRITIS

1. Osteoarthritis
2. Neuropathic (Charcot joint)
3. Acute Rheumatic Fever
4. Ochronosis etc.

OSTEOARTHRITIS

DEFINITION

Osteoarthritis (OA) is a non-inflammatory degenerative joint disease characterised by progressive loss of articular cartilage with associated new bone formation and capsular fibrosis.

OSTEOARTHRITIS

CLASSIFICATION

1. **Primary or idiopathic**
2. **Secondary**
   - **Infection**
   - **Congenital -Dysplasia**
     - **Perthes'**
     - **SUFE**
   - **Trauma**
   - **AVN**

OSTEOARTHRITIS

SYMPTOMS

1. **Pain**
2. **Swelling**
3. **Stiffness**
4. **Deformity**
5. **Decreased range of motion, crepitus**
6. **Instability**
7. **Loss of function**

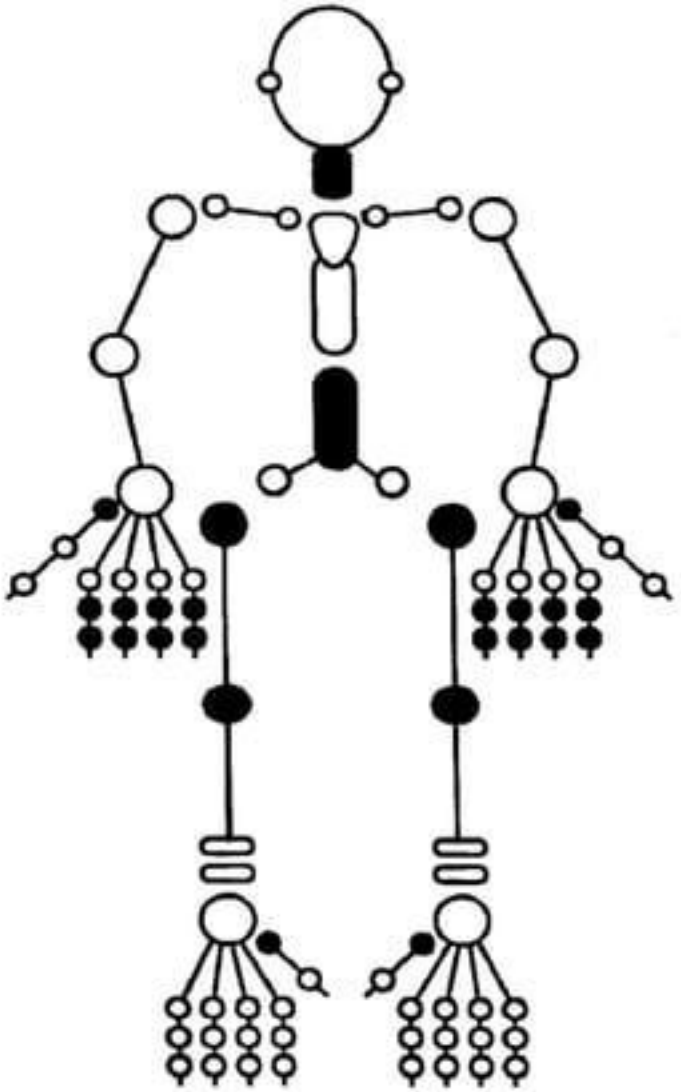
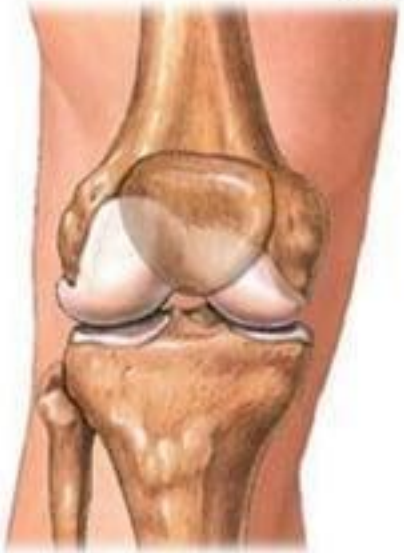
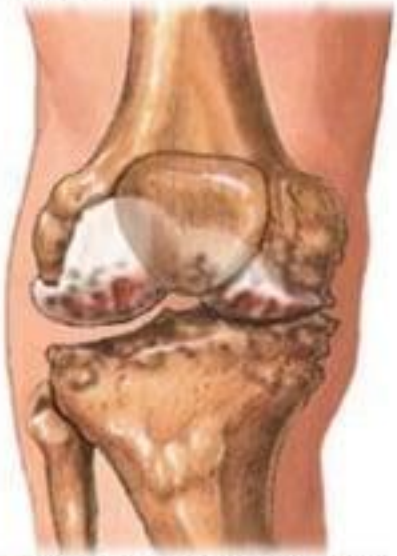


FIG. 11-1. Joint involvement in osteoarthritis.

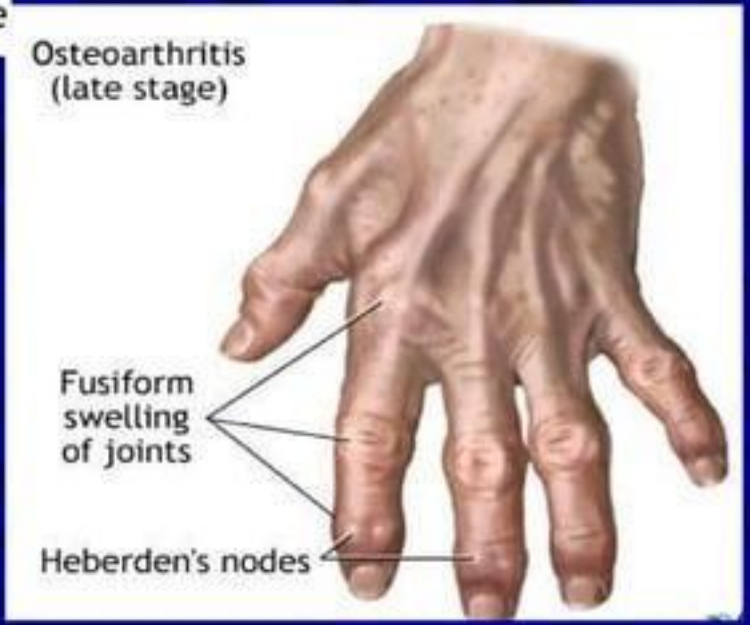
Osteoarthritis



Healthy knee joint

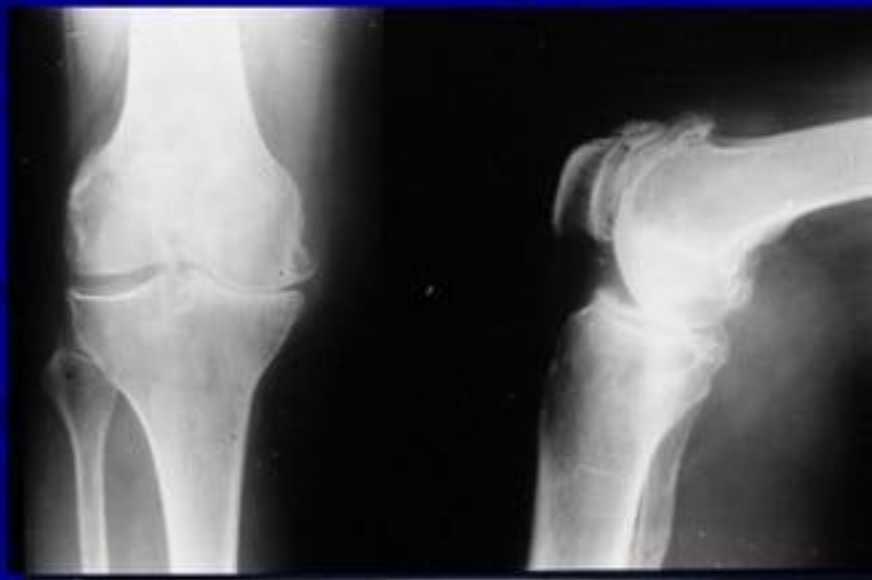


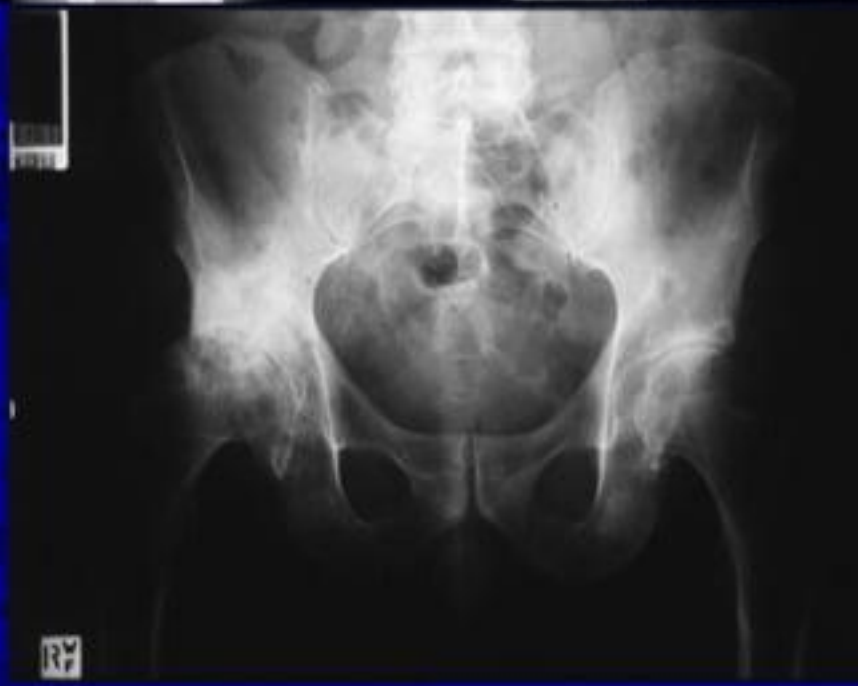
Hypertrophy and spurring
of bone and erosion of cartilage



X-ray changes

1. Joint space narrowing
2. Subchondral sclerosis
3. Osteophytes
4. Cysts



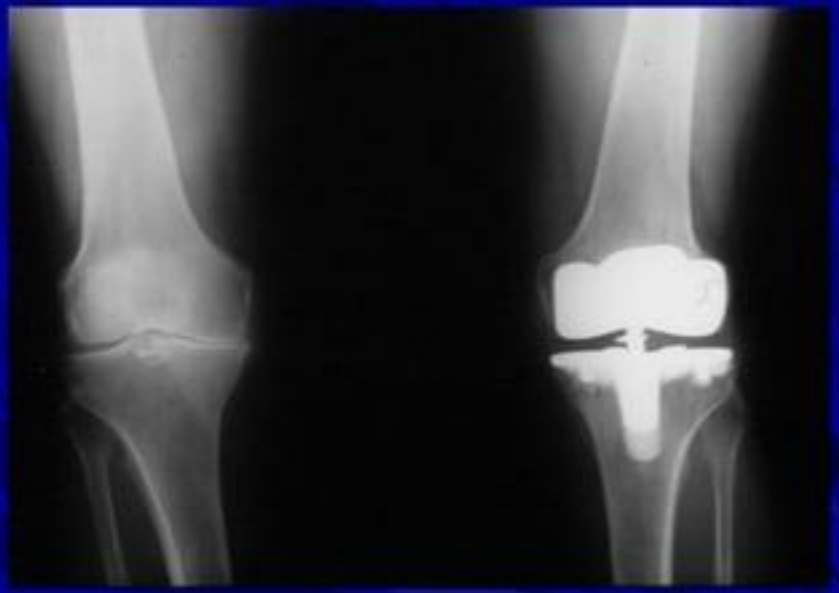


OSTEOARTHRITIS

TREATMENT

1. **Protection of affected joints from overloading**
   Weight loss
   Use of walking stick
2. **Exercise of supporting muscles around joints to avoid wasting.**
3. **Supportive measures such as pain relief by analgesics or NSAIDs.**
4. **Hyaluronic acid injections.**
5. **Glucosamine & chondroitin**
6. **Surgical treatment**

OSTEOARTHRITIS : Surgical treatment



Arthroscopy

Osteotomy

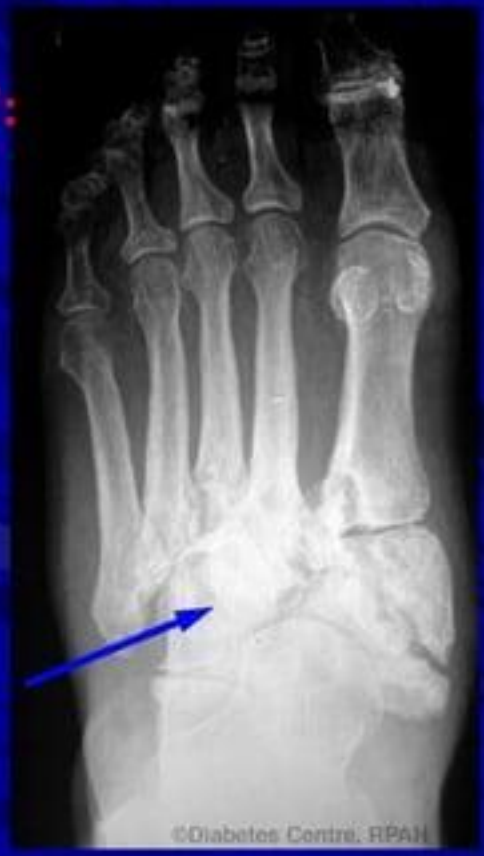
Arthrodesis

Excision arthroplasty

Replacement arthroplasty

NON INFLAMMATORY ARTHRITIS

2. NEUROPATHIC (Charcot joint) JOINT:
Joint destruction secondary to loss of sensory innervation of the joint.



CAUSES:

Diabetes
Tabes dorsalis
Syringomyelia (shoulder & elbow)
Hansen's Disease / Leprosy
Myelomeningocele
Congenital insensitivity to pain (Hereditory Sensory Neuropathy)

NON INFLAMMATORY ARTHRITIS

Clinical:

- Painless, swollen joint
- mimics infection

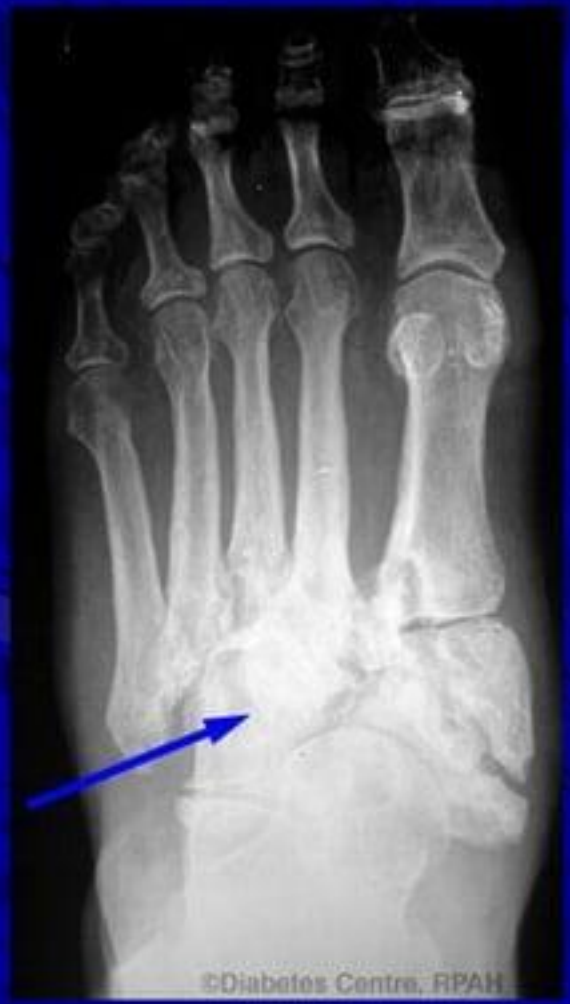
Radiographs:

- Advanced destruction
- Scattered 'chunks' of bone
- Heterotopic ossification

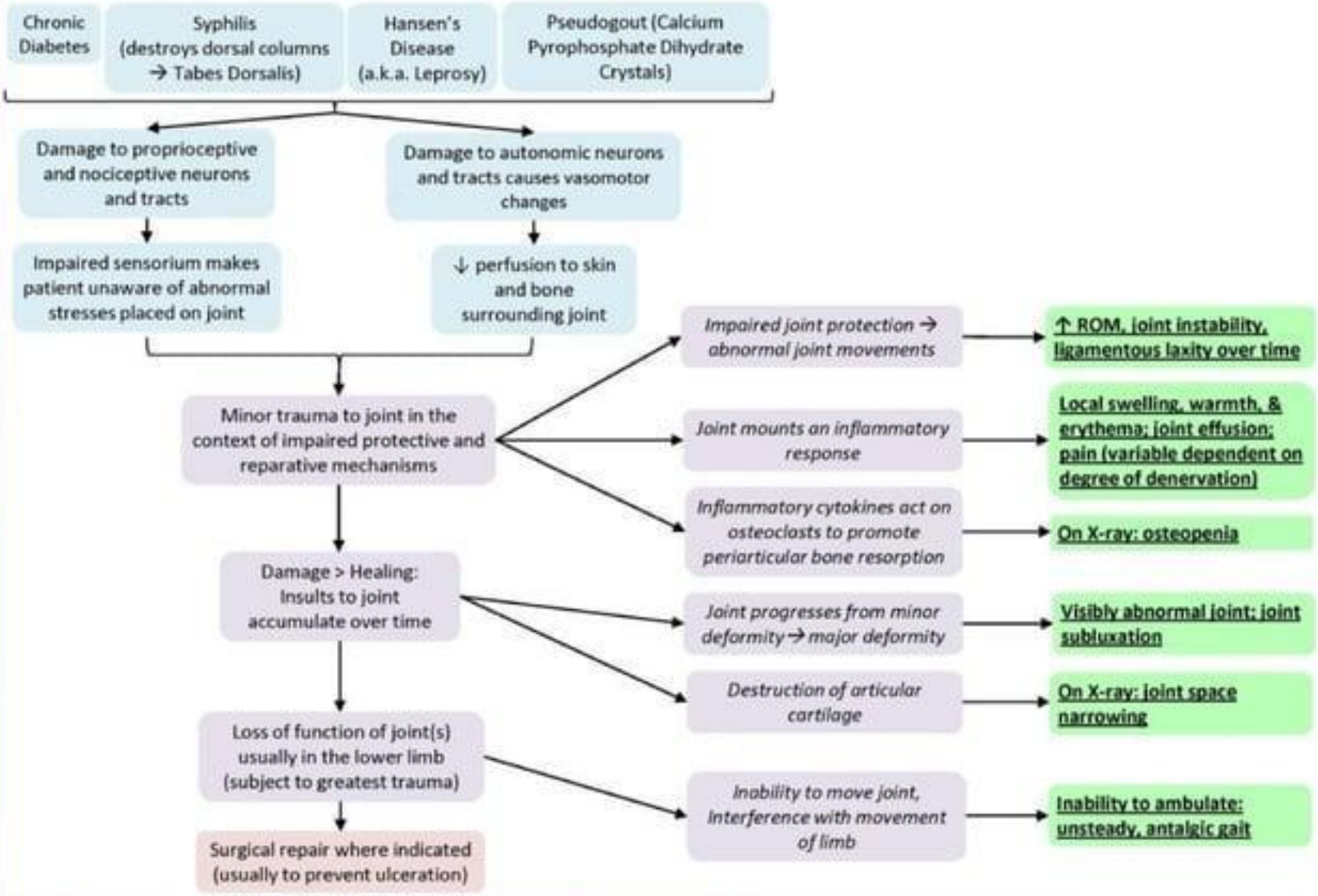
Treatment:

- Bracing & casting for mobility & stability

Charcot Joint is a contraindication for total joint arthroplasty.

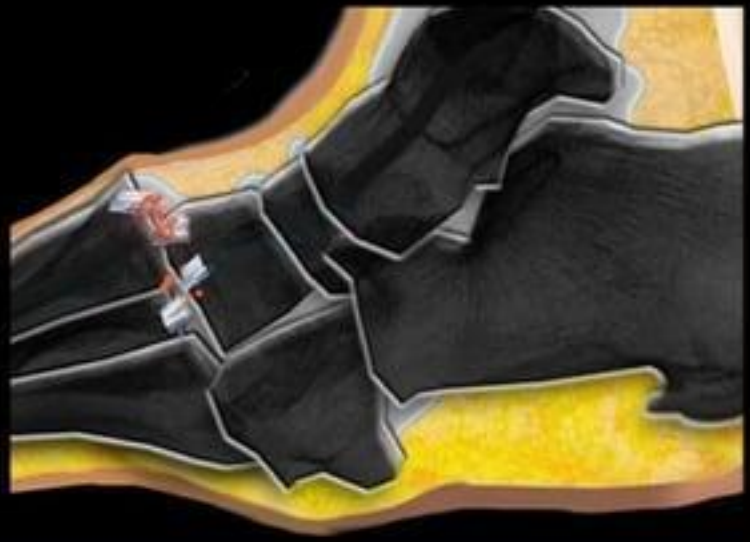


Neuropathic Arthropathy (Charcot Joint): *Pathogenesis and clinical findings*



Pathophysiology | Mechanism | Sign/Symptom/Lab Finding | Complications

Chronic Charcot

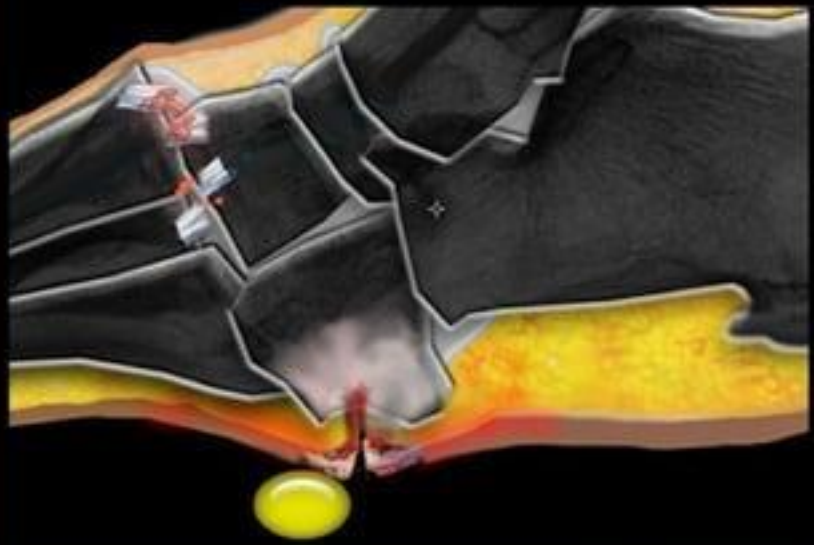


Swollen neuropathic foot
no ulcer

X-ray Joint deformity
dislocation
Rocker-bottom

MRI no marrow edema

Superimposed infection

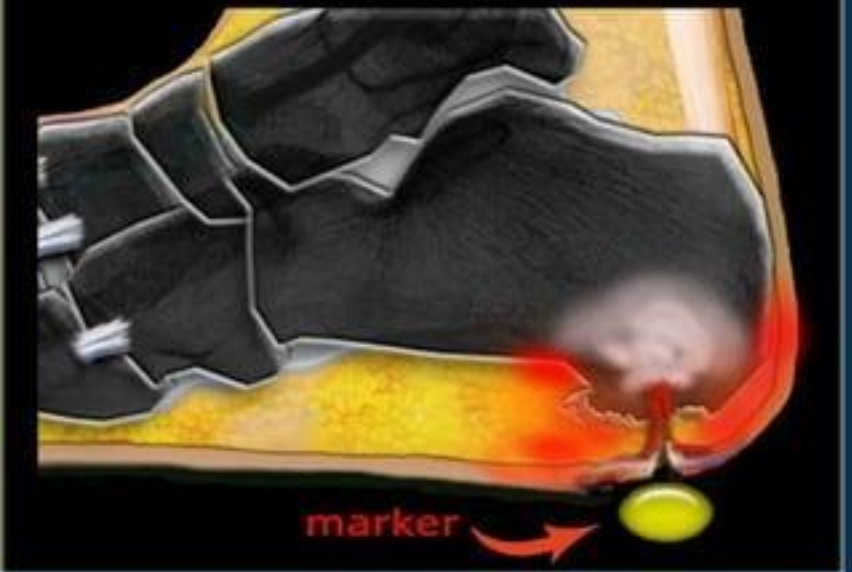


Hot red foot with ulcer
or sinus tract

X-ray Joint deformity
dislocation
Rocker-bottom

MRI marrow edema
in cuboid near ulcer

Osteomyelitis



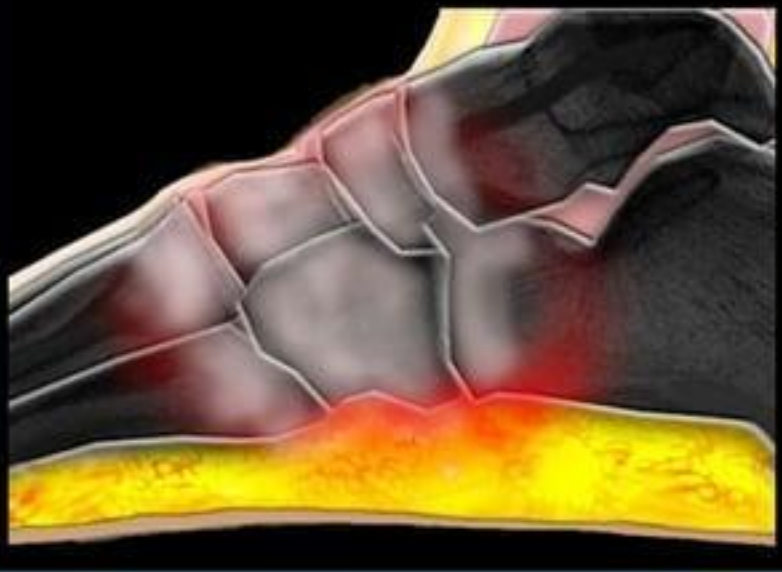
Hot red foot with ulcer

Forefoot: MTP's IP's
Hindfoot: calcaneus

X-ray normal first weeks

MRI marrow edema
in forefoot and hindfoot
near ulcer

Active Charcot



Hot red foot - no ulcer

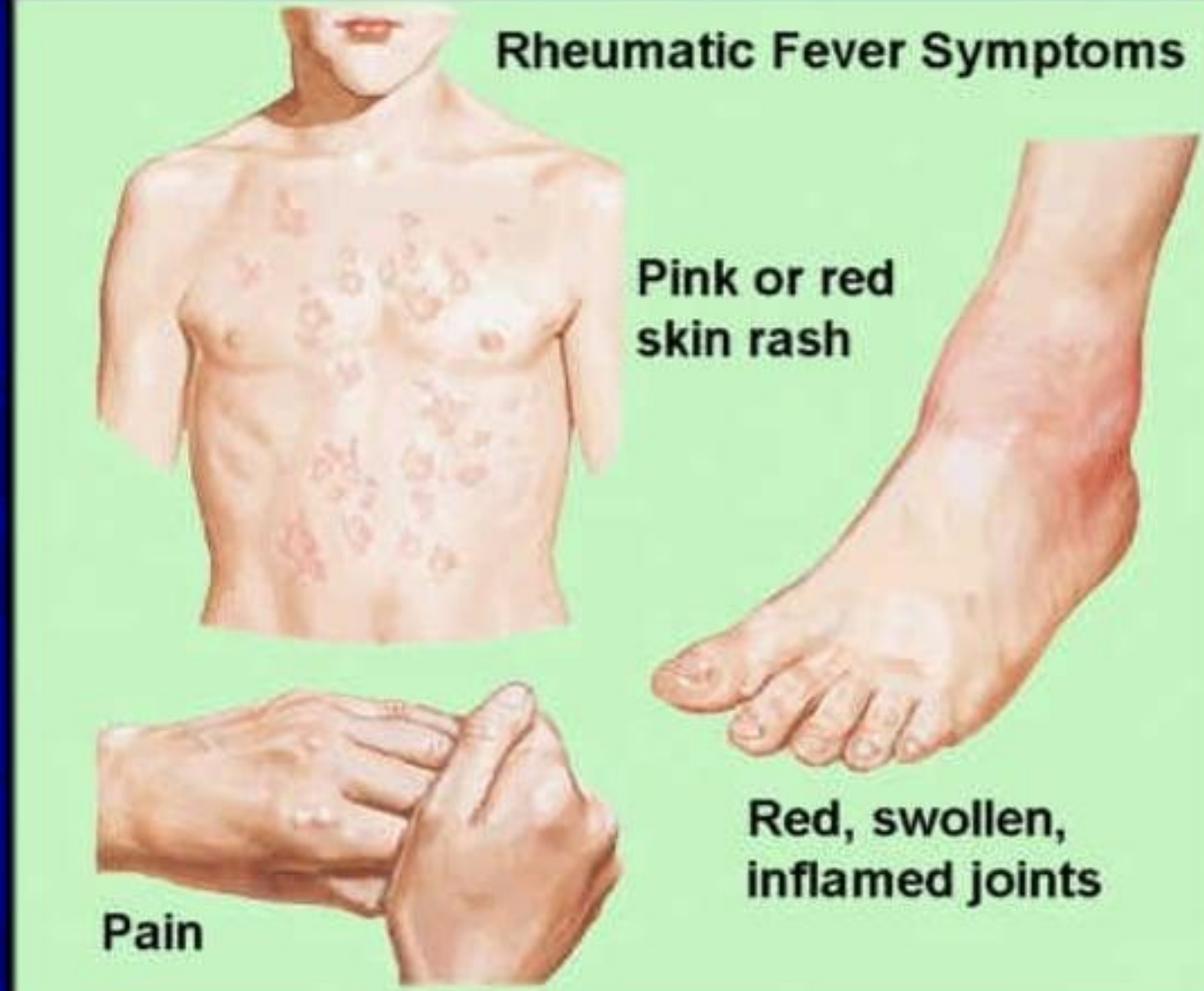
Midfoot
subarticular

X-ray normal first weeks

MRI marrow edema
in midfoot subchondral

ACUTE RHEUMATIC FEVER

- Formerly most common cause of childhood arthritis.
- Sometimes included in inflammatory arthritis.
- Arthritis and arthralgia following untreated group A- Beta hemolytic streptococcus infection.
- Arthritis is migratory, involves multiple joints.
- Diagnosis based on Jones criteria.

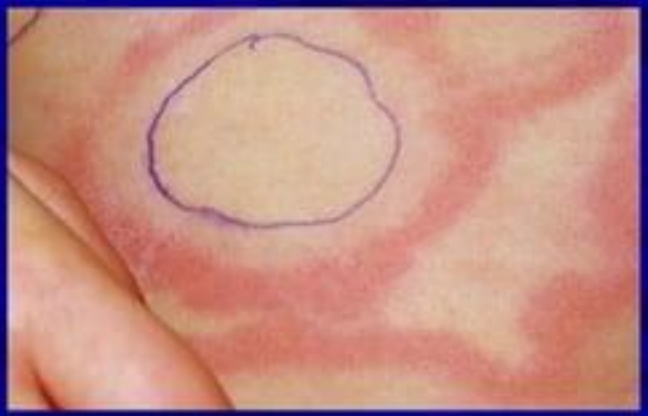

Rheumatic Fever Symptoms
Pink or red skin rash
Red, swollen, inflamed joints
Pain

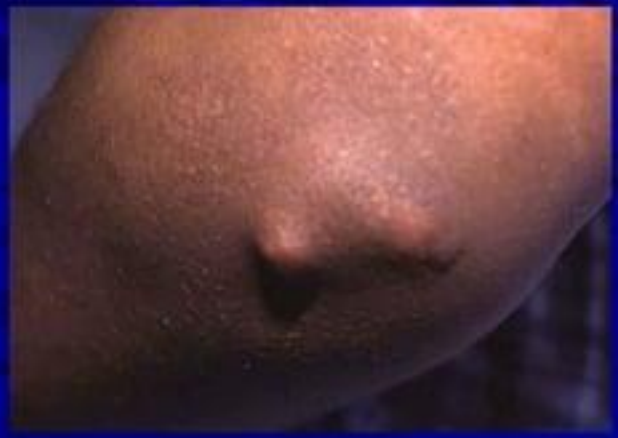
Jones Criteria for Rheumatic Fever

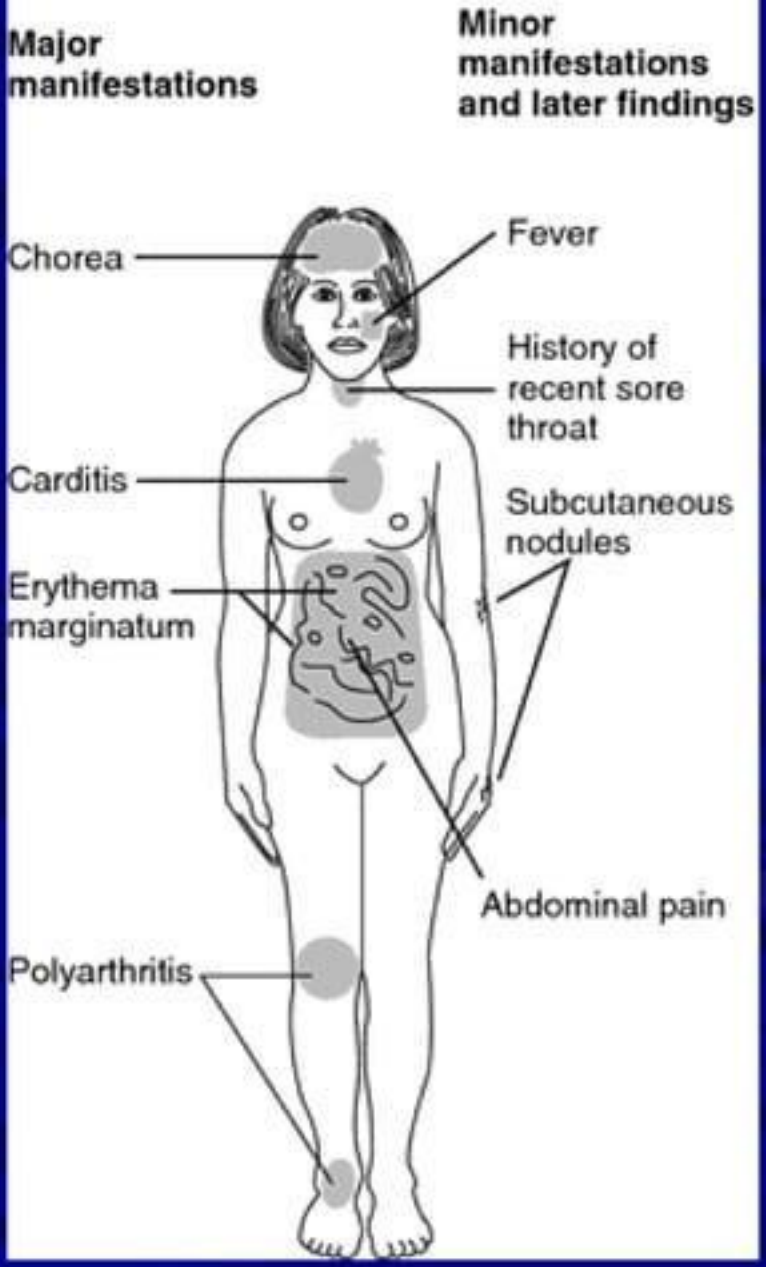
Major Criteria	Minor Criteria
Pancarditis (pericarditis, endocarditis, myocarditis)	Fever
Polyarthritis	Arthralgia
Sydenham Chorea	Prolonged PR interval
Subcutaneous Nodules	Increased ESR or CRP*
Erythema marginatum	Leukocytosis

*Erythrocyte sedimentation rate or c-reactive protein

**Two major or 1 major and 2 minor must be present to diagnose rheumatic fever

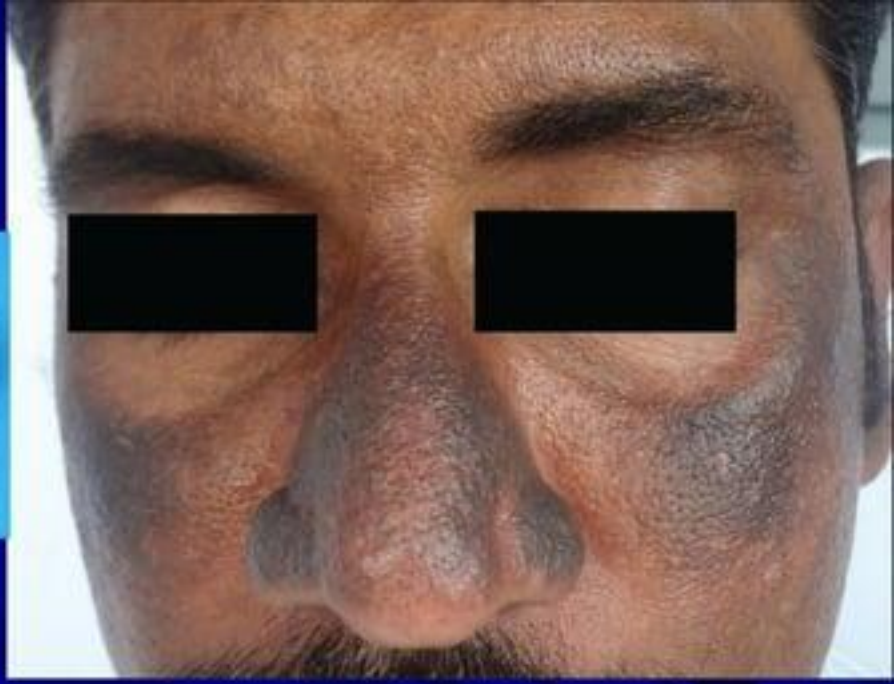


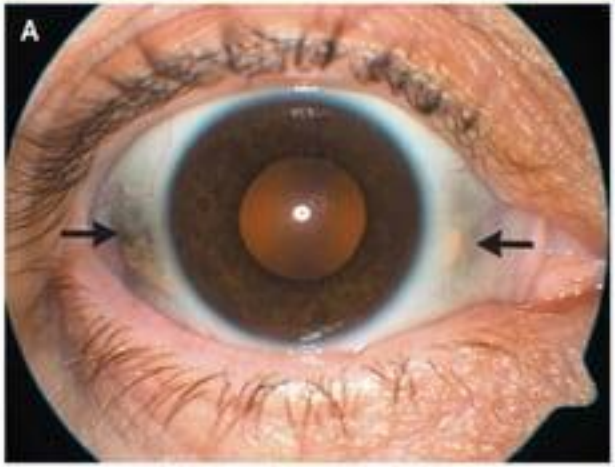



Major manifestations
Minor manifestations and later findings
Chorea
Fever
History of recent sore throat
Carditis
Subcutaneous nodules
Erythema marginatum
Abdominal pain
Polyarthritis

OCHRONOSIS

- Degenerative arthritis resulting from alkaptonuria (genetic defect of the homogentisic acid oxidase system)
- Excess homogentisic acid is deposited in the large joints & polymerises (turns black)
- Ochronotic spondylitis presents in the fourth decade
- Black urine
- Disc space narrowing & calcification
- Homogentisic acid is also deposited in other tissues.
- The extra-articular manifestations
  - ocular & skin pigmentations,
  - genito-urinary calculi &
  - cardiovascular ochronosis, (especially the aortic valve).

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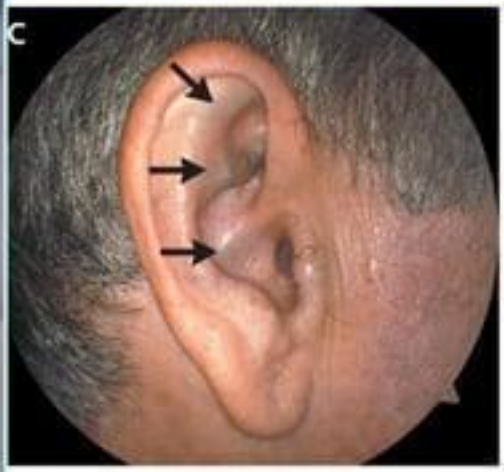
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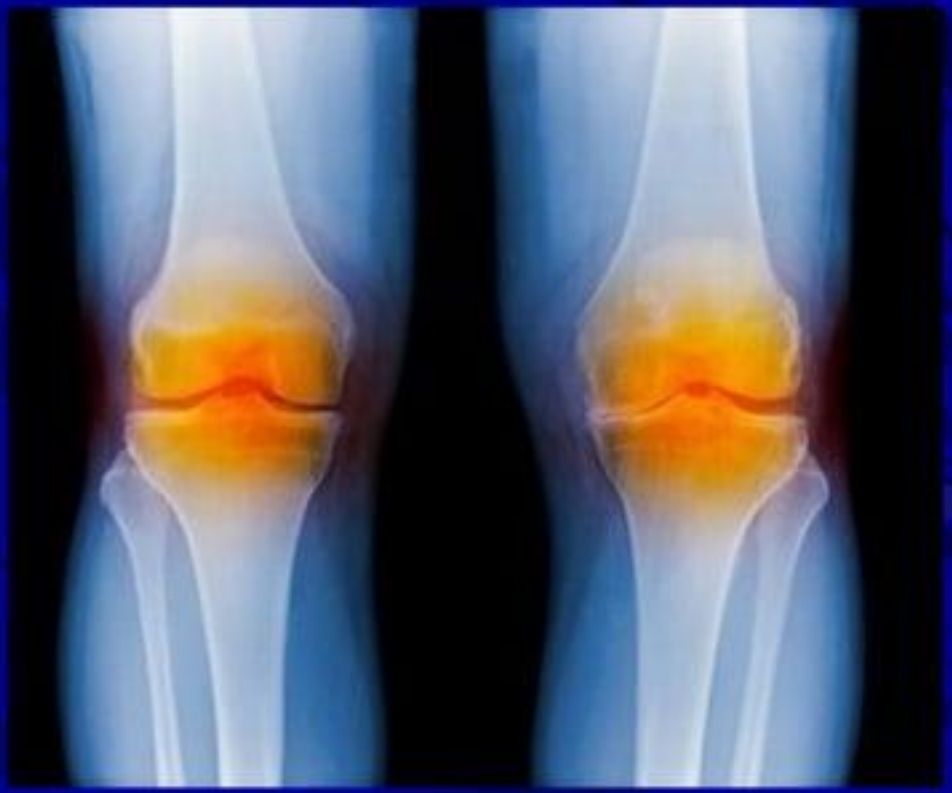
INFLAMMATORY ARTHRITIS



- Rheumatoid arthritis
- Spondyloarthropathies
  -Undifferentiated
  -Ankylosing spondylitis
  -Psoriatic arthritis
  -Reactive arthritis (formerly Reiter's syndrome)
  -Enteropathic arthritis
- SLE, Sjogrens, Scleroderma, Polymyalgia rheumatica, Vasculitis, Infectious (bacterial, viral, other), Undifferentiated connective tissue disease

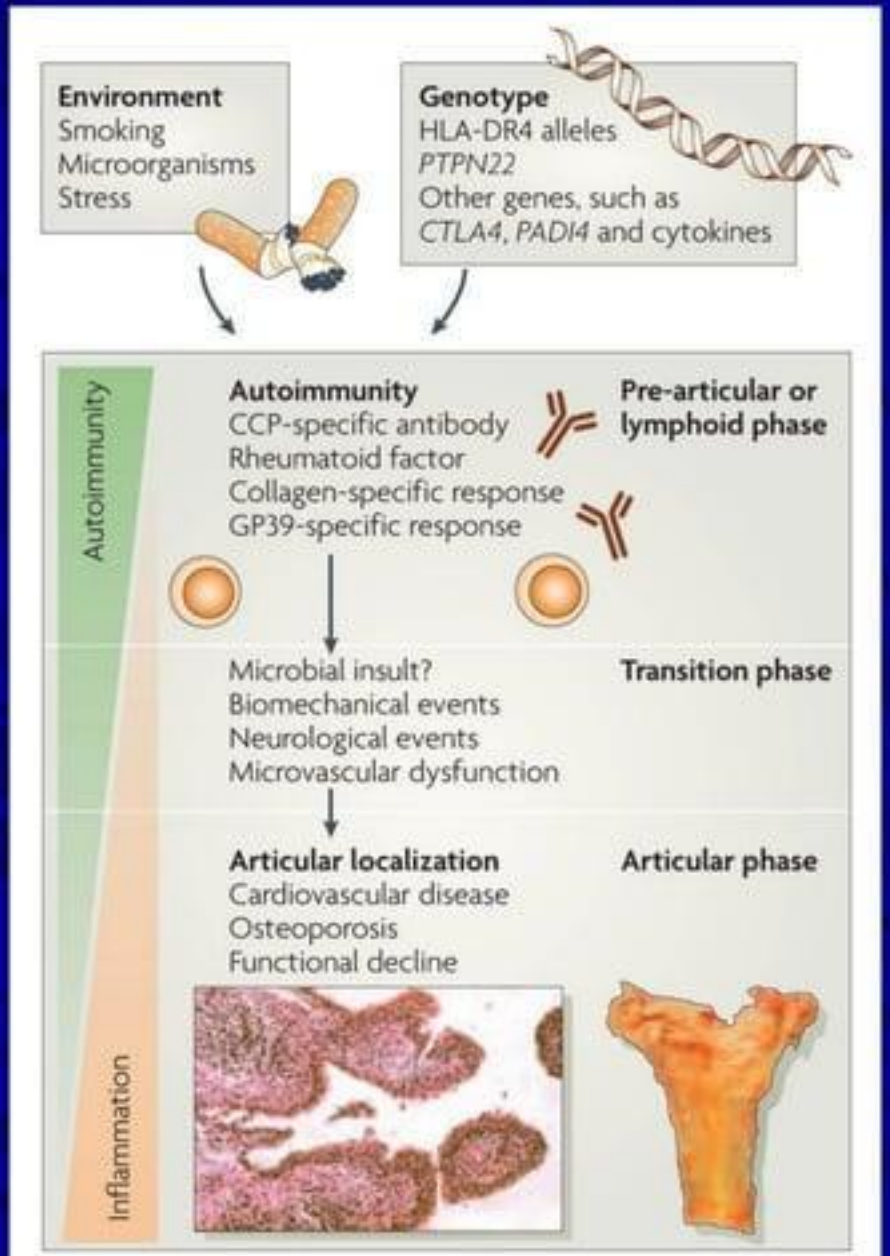
Rheumatoid Arthritis

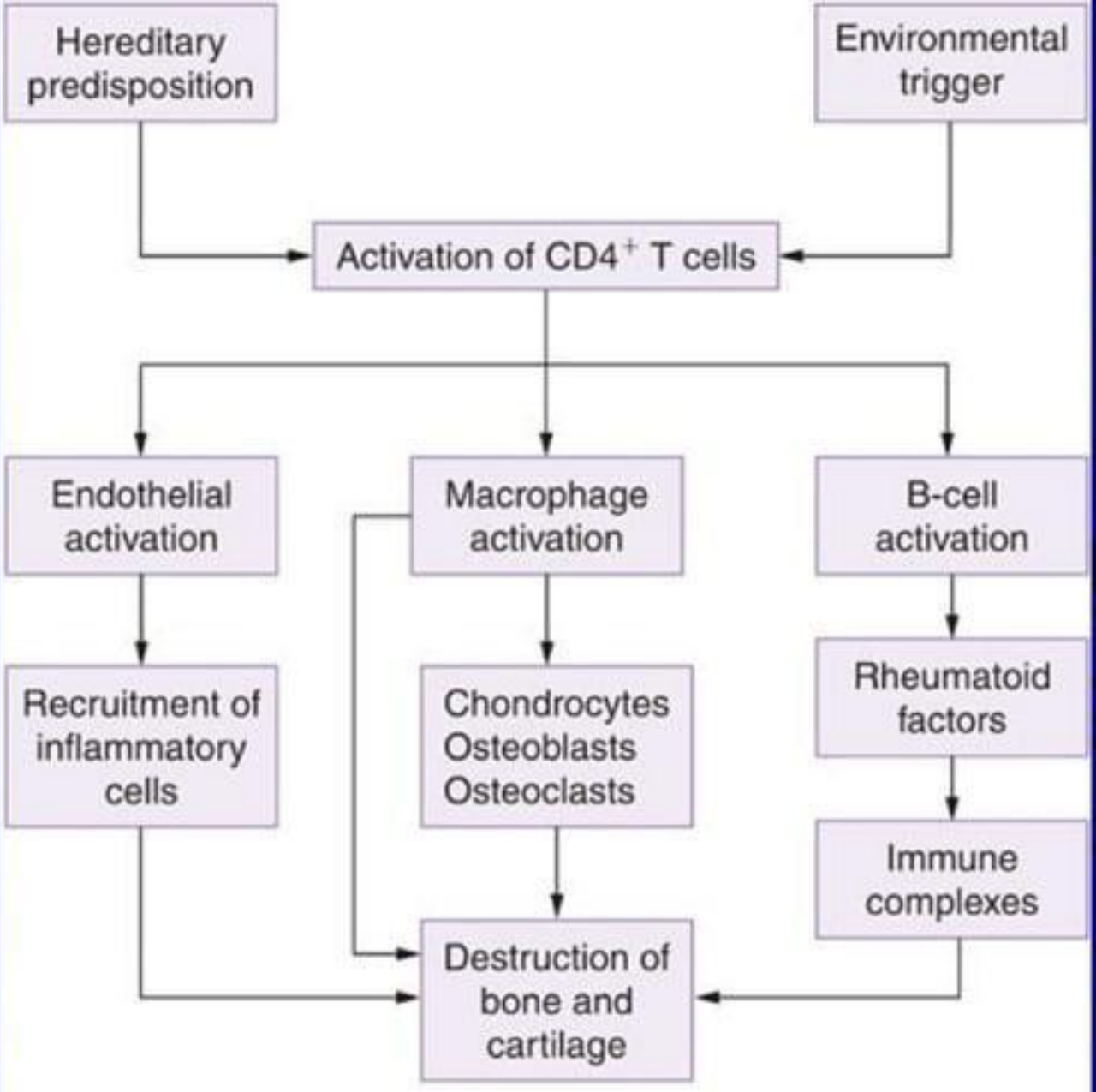
- Definition – symmetric inflammatory joint condition characterized by pannus formation, joint erosion, and systemic inflammation
- Most common inflammatory arthritis, 1% of the population, 2:1 female to male ratio, peak incidence between ages 40 to 60
- Onset usually insidious over months

Predisposition

- Genetic factors clearly important – HLA "shared epitope" is strongest risk factor, but also non-HLA genes such as PTPN22, STAT4, TNFAIP3
- Environmental factors – cigarette smoking increases both risk of disease and severity of disease, also risk in coal miners (Kaplan syndrome)

Longitudinal Course of RA




Hereditary predisposition
Environmental trigger
Activation of CD4+ T cells
Endothelial activation
Macrophage activation
B-cell activation
Recruitment of inflammatory cells
Chondrocytes
Osteoblasts
Osteoclasts
Rheumatoid factors
Immune complexes
Destruction of bone and cartilage

Joints Commonly Involved

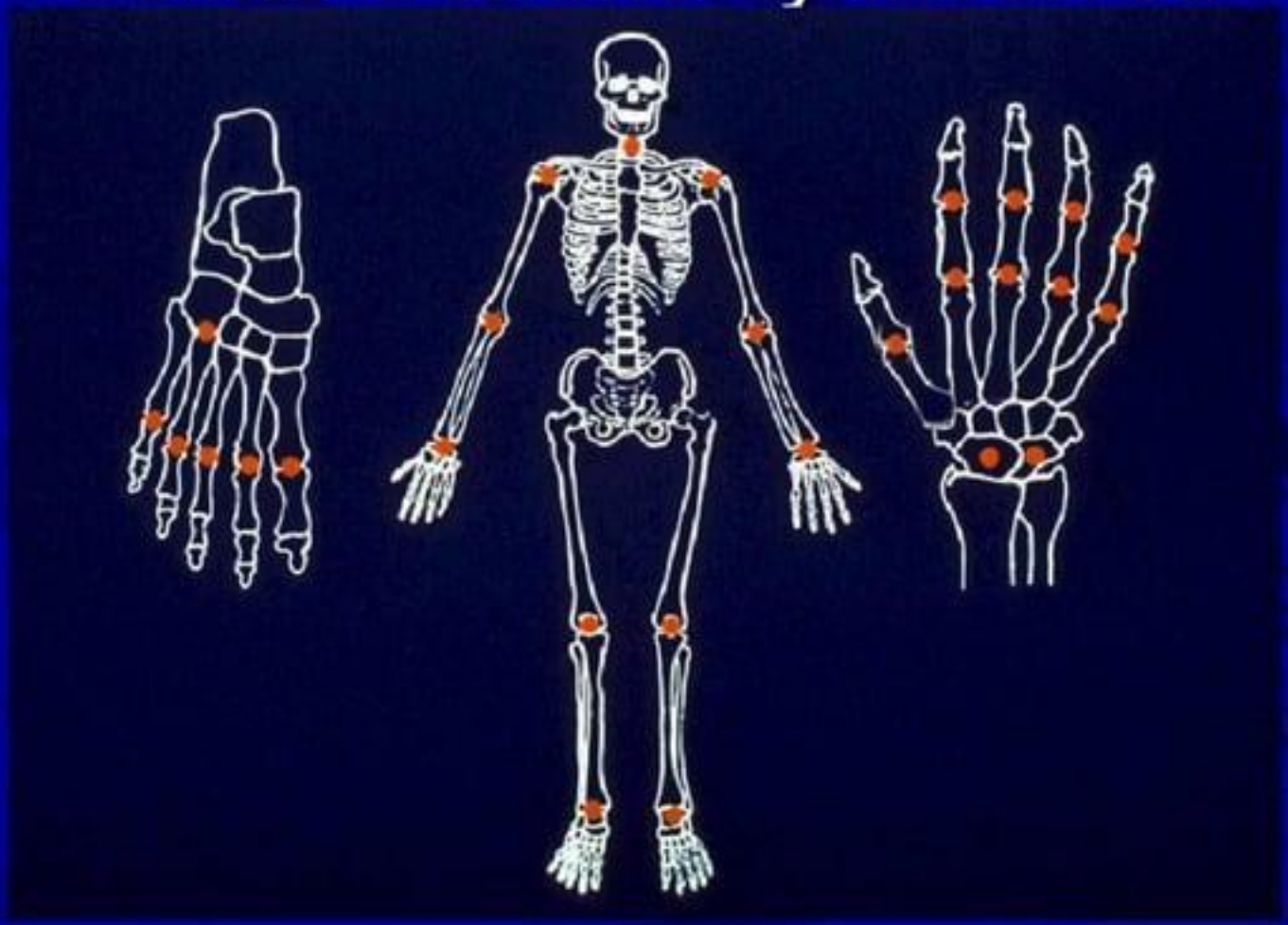
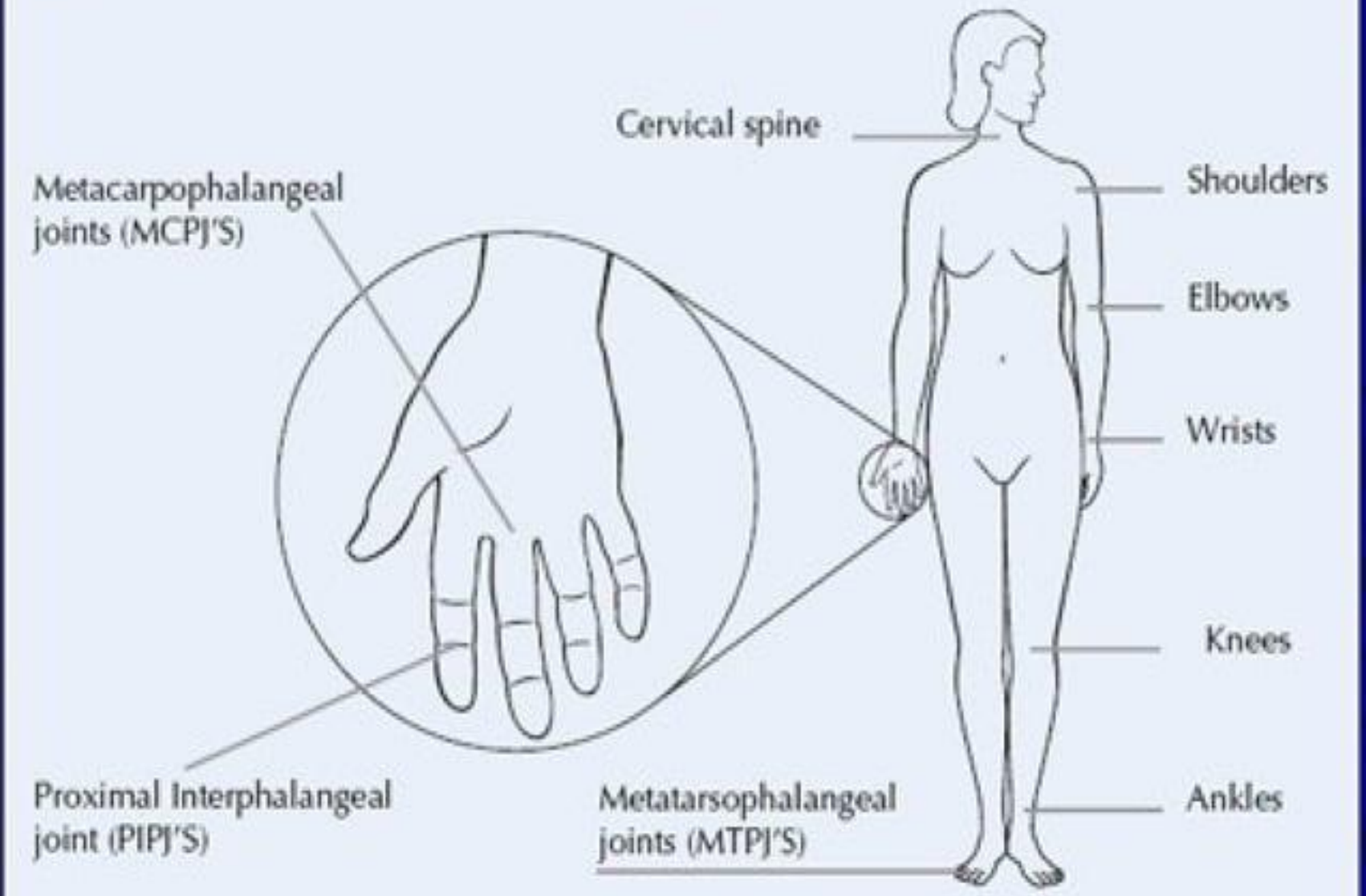
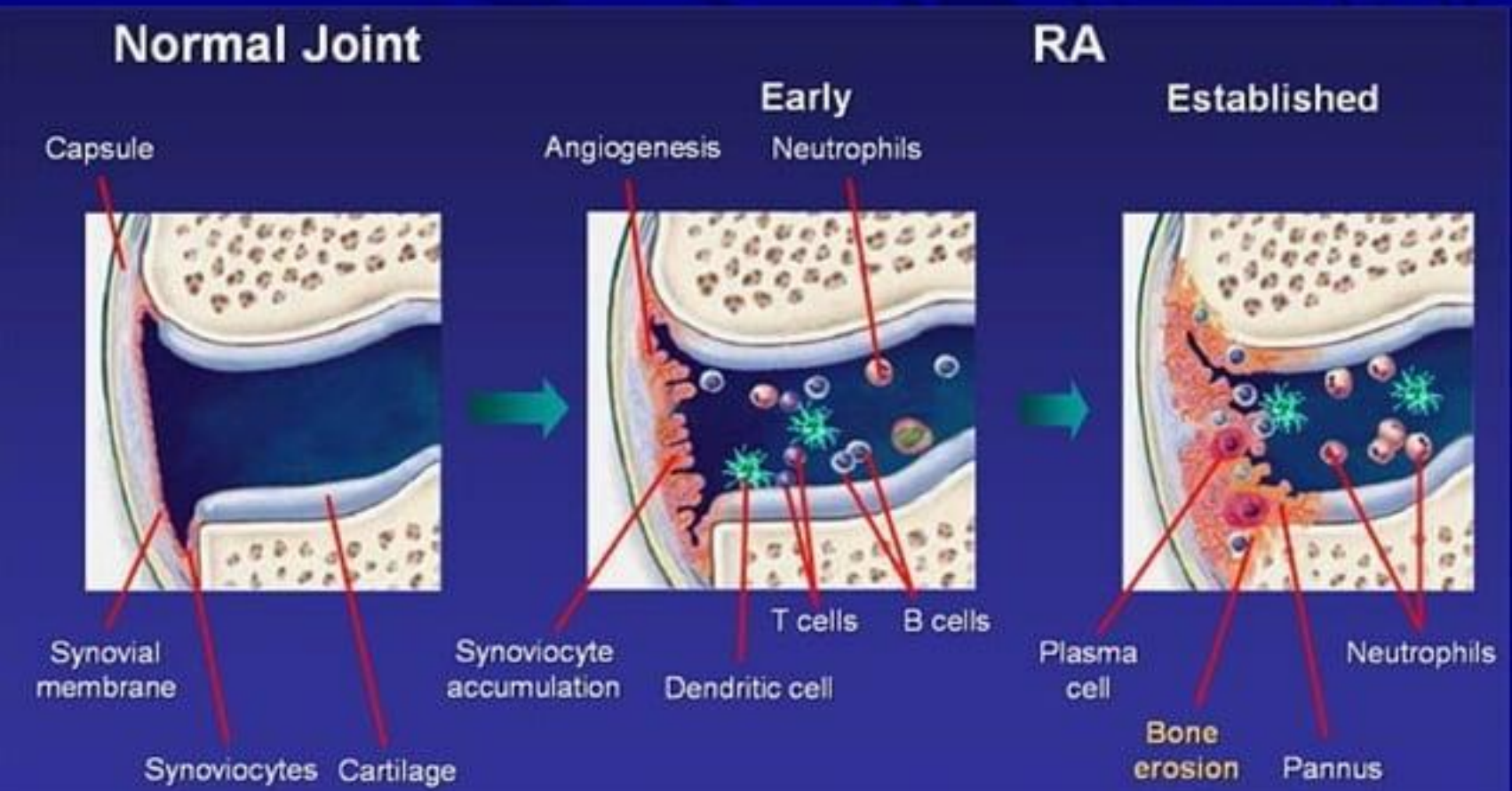


Figure 7. Joints commonly affected by Rheumatoid Arthritis



Pathogenesis



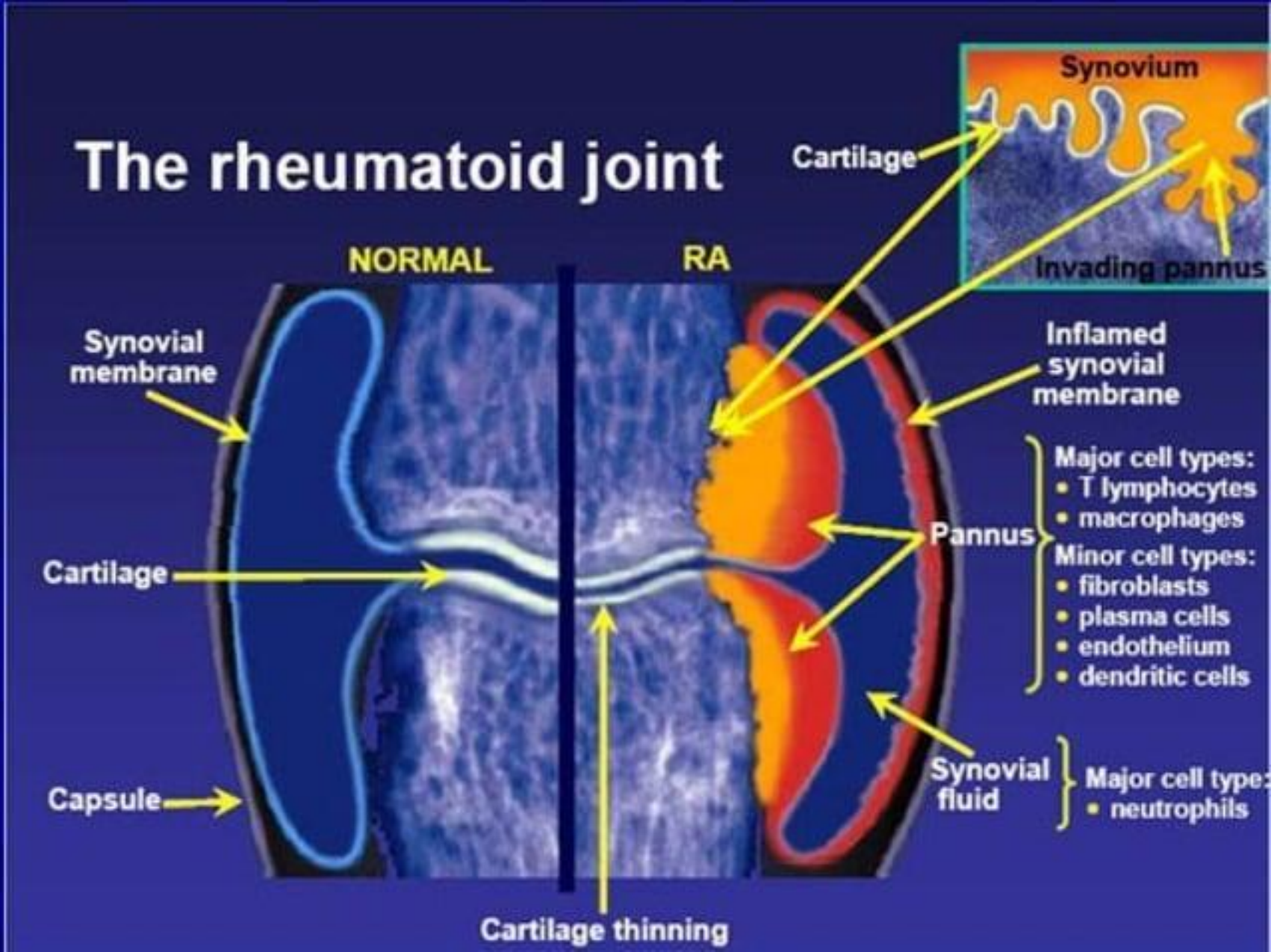
Diagnosis

- History and physical are majority of diagnosis
  - Symmetric pain and swelling in small joints of hands, wrists, feet, ankles most common, followed by knees, elbows, shoulders
  - Morning stiffness – better with activity
  - Constitutional symptoms – fatigue, even weight loss are common, but fever is VERY RARE
  - Steady, progressive, additive onset is by far most common presentation

1987 Classification Criteria for Rheumatoid Arthritis

- **Morning stiffness**
  - Longer than 1 hour
- **Arthritis of 3 or more joints**
  - Accompanied by swelling
- **Arthritis of hand joints**
  - At least 1 joint with swelling
- **Symmetric arthritis**
  - Same joint areas on both sides of body
- **Rheumatoid nodules**
  - Subcutaneous nodules over bone or extensor surfaces
- **Radiographic changes**
  - Erosions
  - Boney decalcification
- **Seropositivity**
  - Rheumatoid factor (RF)

At least 4 out of the 7 criteria must be present to classify patient as having RA

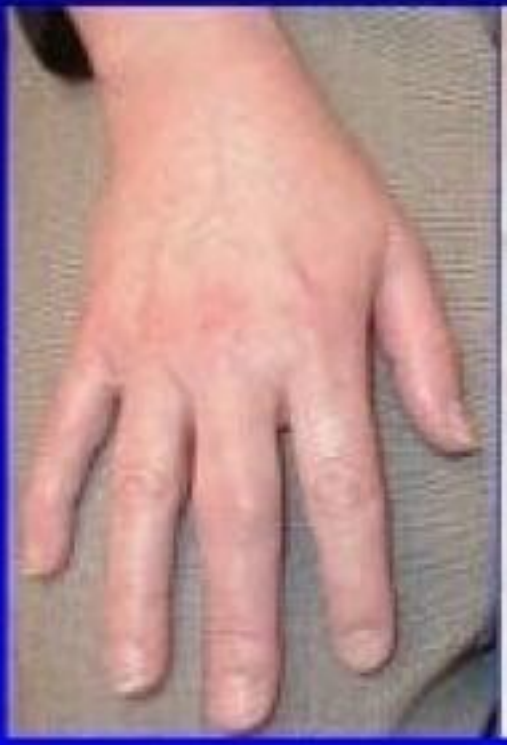

The rheumatoid joint
Synovium
Cartilage
Invading pannus
NORMAL
RA
Synovial membrane
Inflamed synovial membrane
Major cell types:
• T lymphocytes
• macrophages
Pannus
Minor cell types:
• fibroblasts
• plasma cells
• endothelium
• dendritic cells
Cartilage
Capsule
Synovial fluid
Major cell type:
• neutrophils
Cartilage thinning

Patterns of Onset

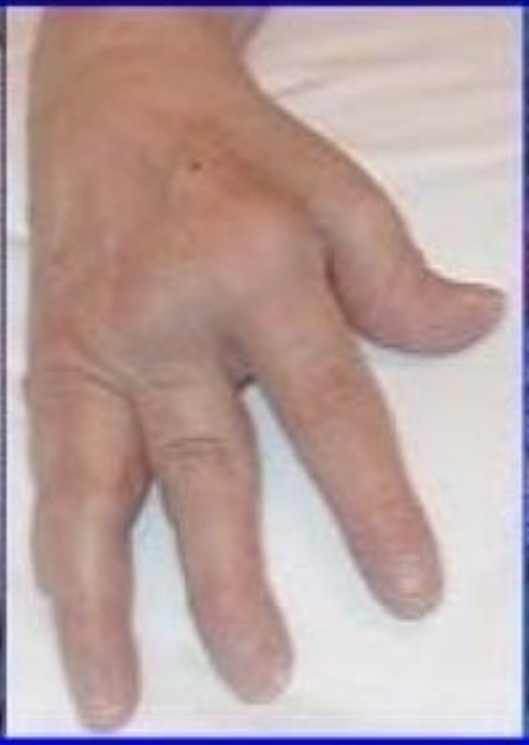
Insidious	55%-65%	Joint stiffness, swelling, pain, fatigue
Acute	8%-15%	Fever, weight loss, fatigue, joint abnormalities present but often not prominent
Intermediate	15%-20%	Systemic complaints more noticeable than insidious onset

Stages of RA

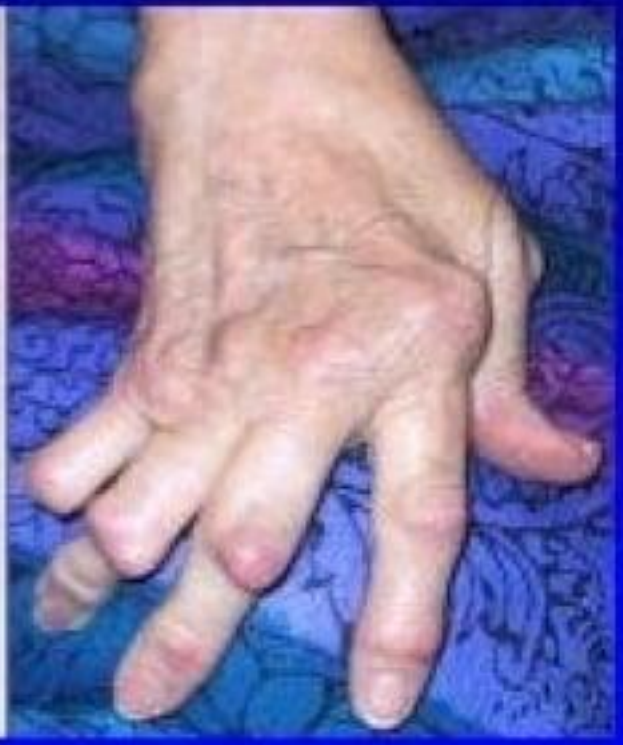
Early RA



Intermediate RA



Late RA



Cycle of Deformity

Prolonged Joint Inflammation

↓

Supporting joint ligaments become loose.

↓

Tendons become misaligned.

↓

Successive joints "buckle".

↓

Zigzag deformity

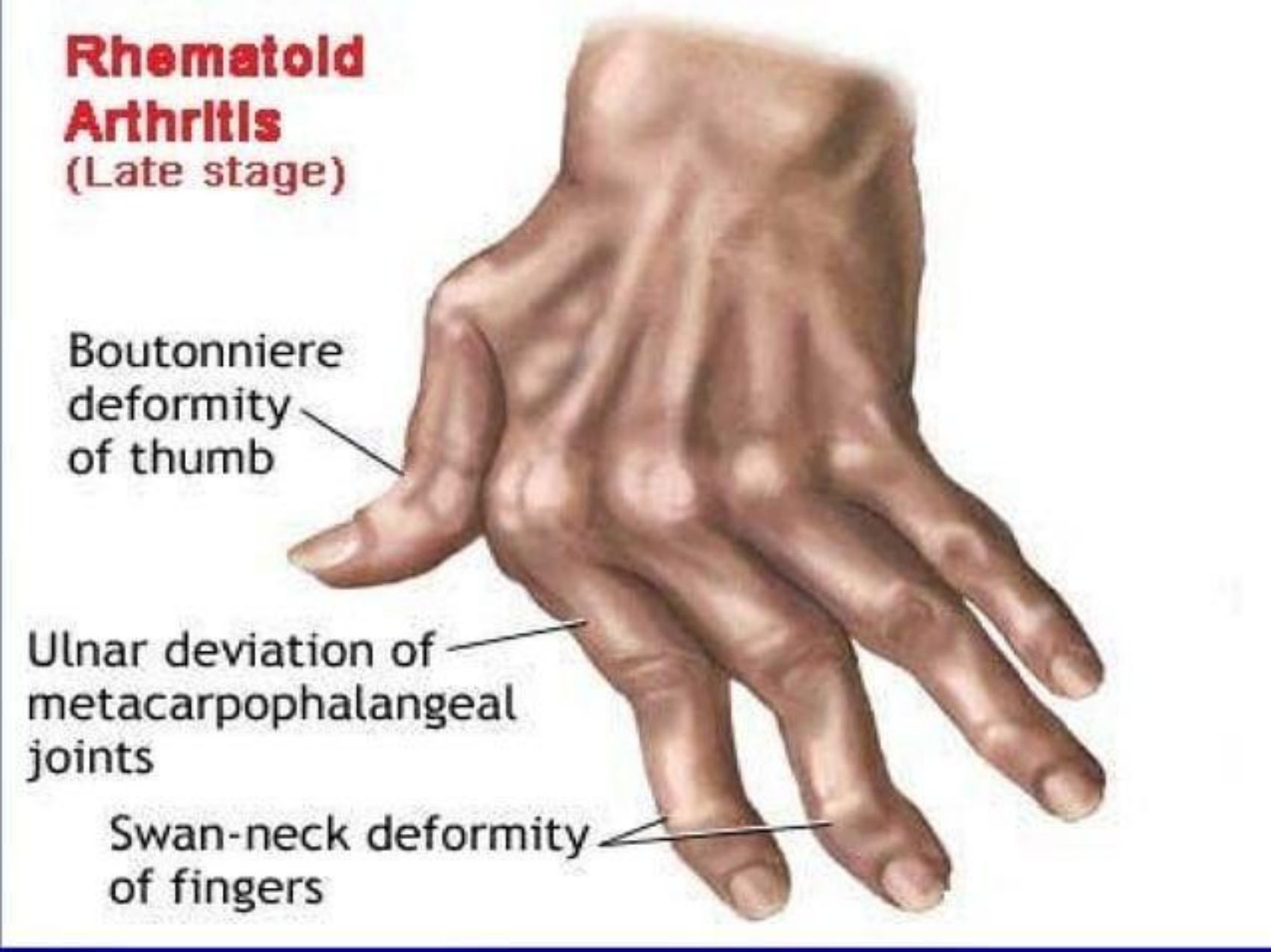
↓

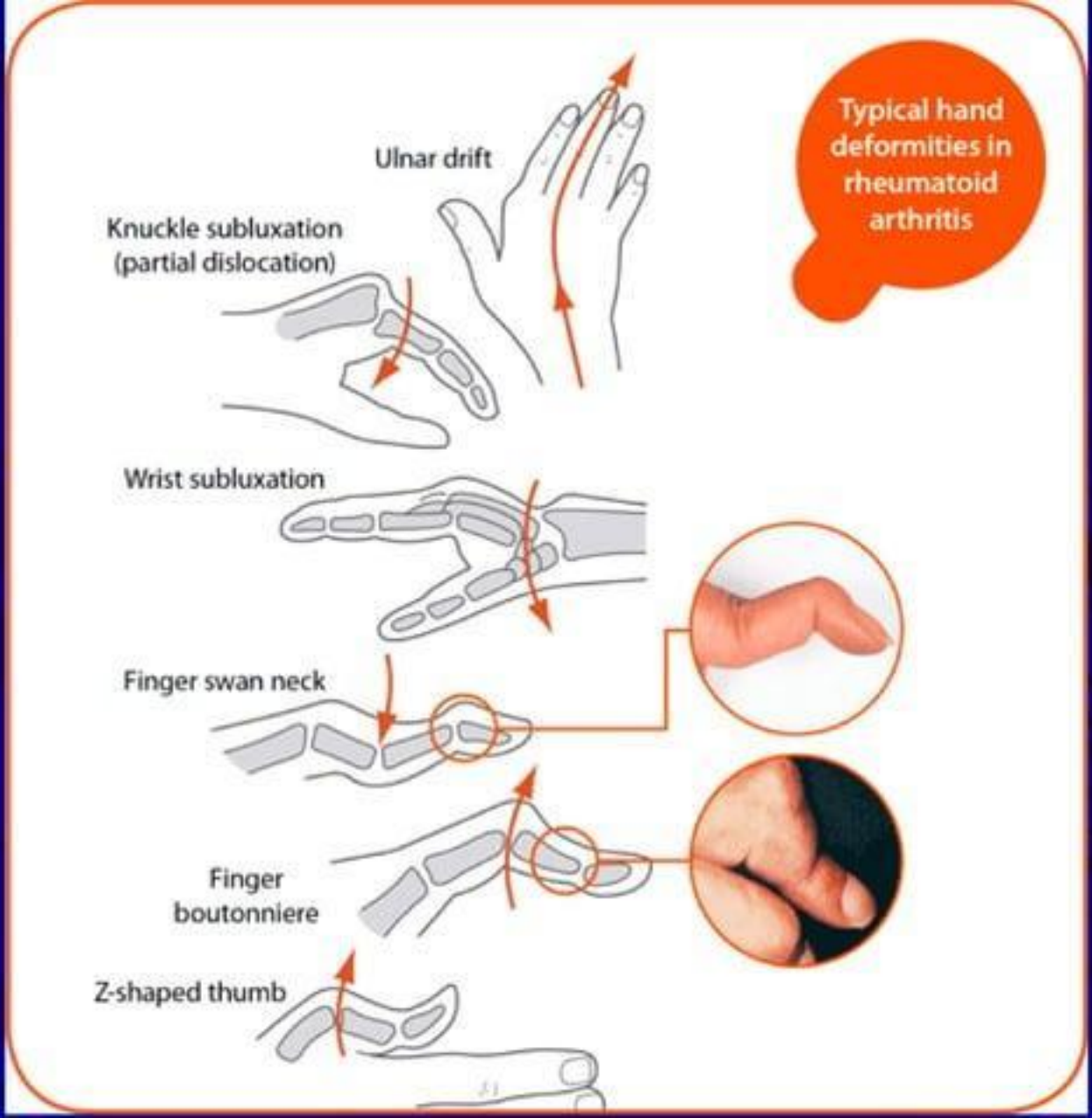
Misaligned tendons pull joints into direction of increased deformity.

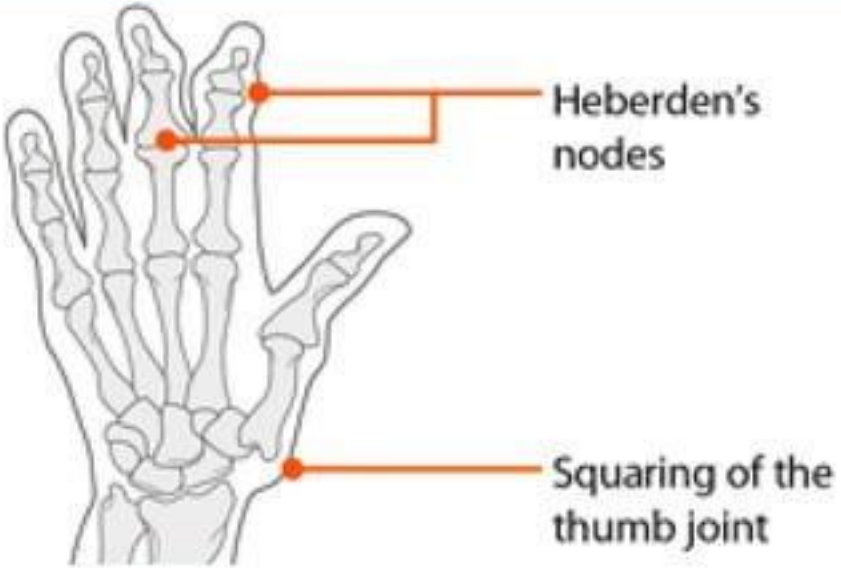
↓

Aggravation of joint deformities due to daily resistive hand use.
(Deforming forces)

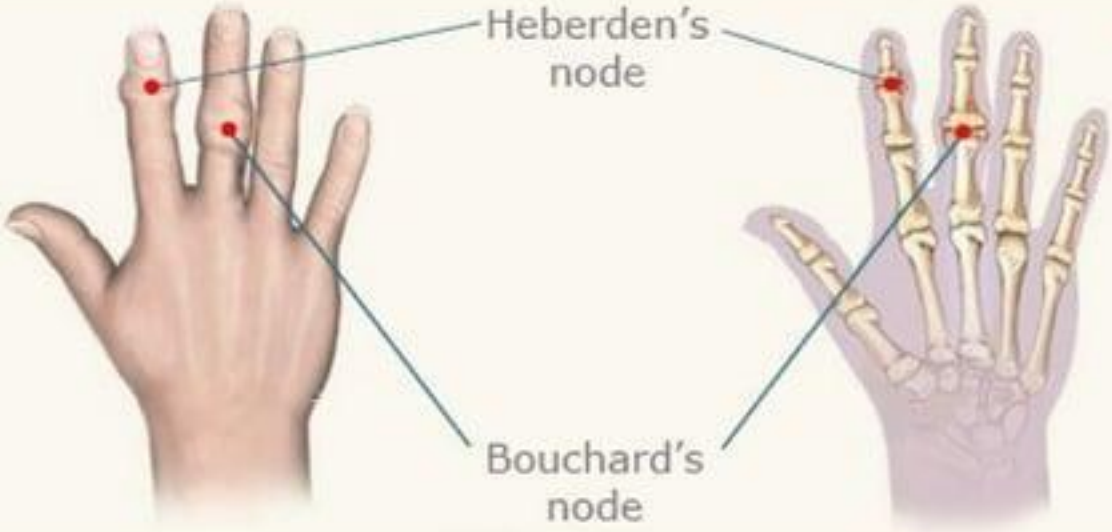
Rhematold Arthritis
(Late stage)

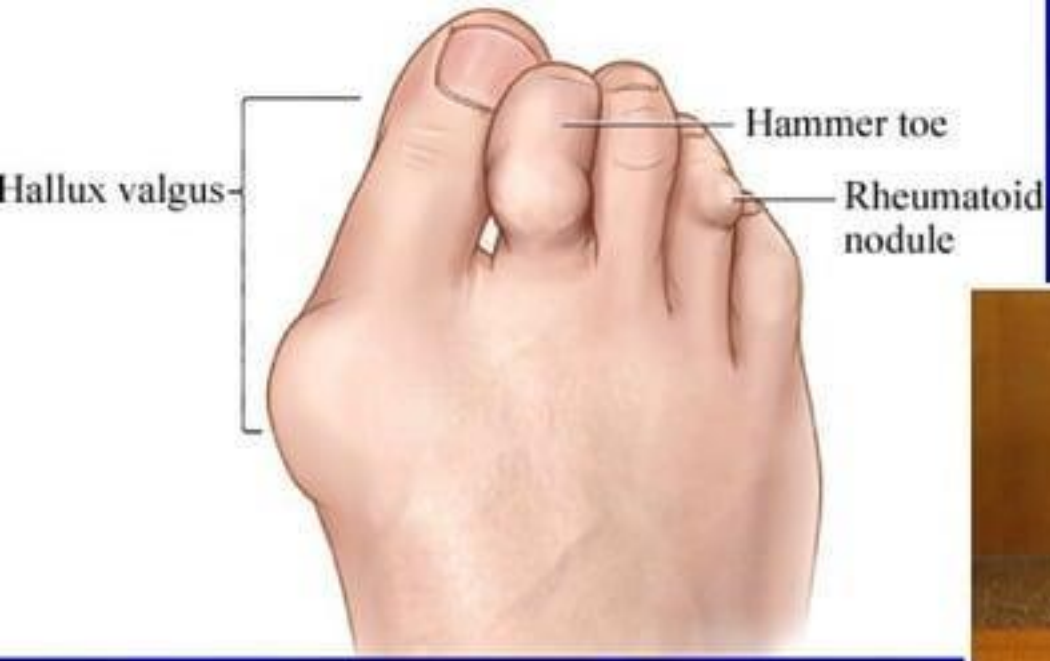


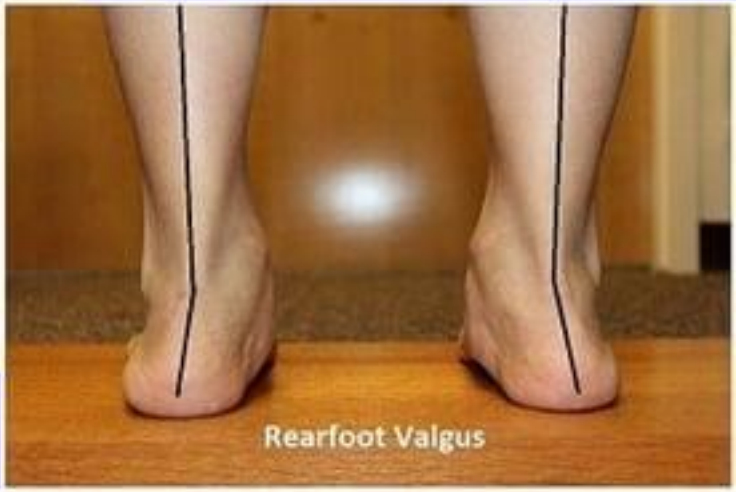

Typical hand deformities in rheumatoid arthritis
Ulnar drift
Knuckle subluxation (partial dislocation)
Wrist subluxation
Finger swan neck
Finger boutonniere
Z-shaped thumb



Typical hand deformities in osteoarthritis







Eighty-five Percent of RA Patients Develop Foot Pain

LIFESTYLE MODIFICATIONS ----> JOINT INFLAMMATION

PAIN, LOSS OF FUNCTION

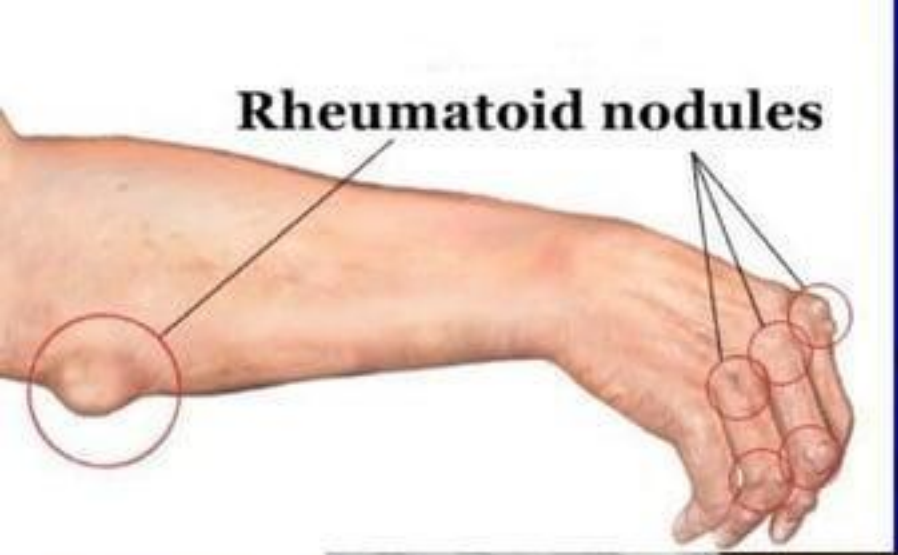
- Rearfoot Valgus
- Arch Flattening
- Splayfoot

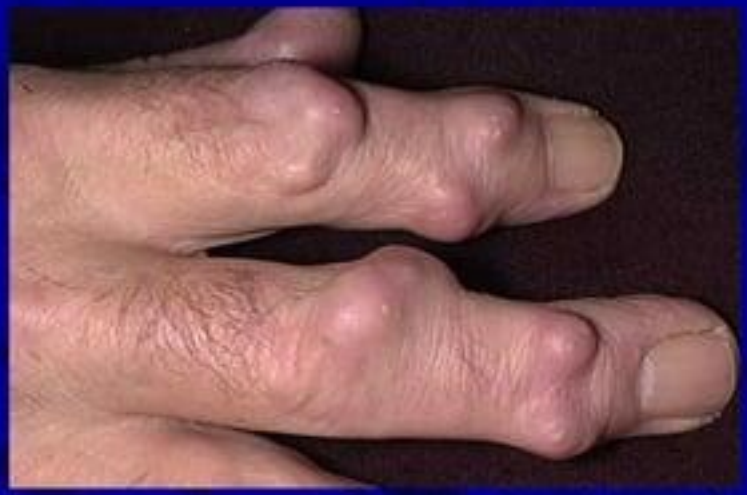
Mechanical intervention with orthotics resists this process.

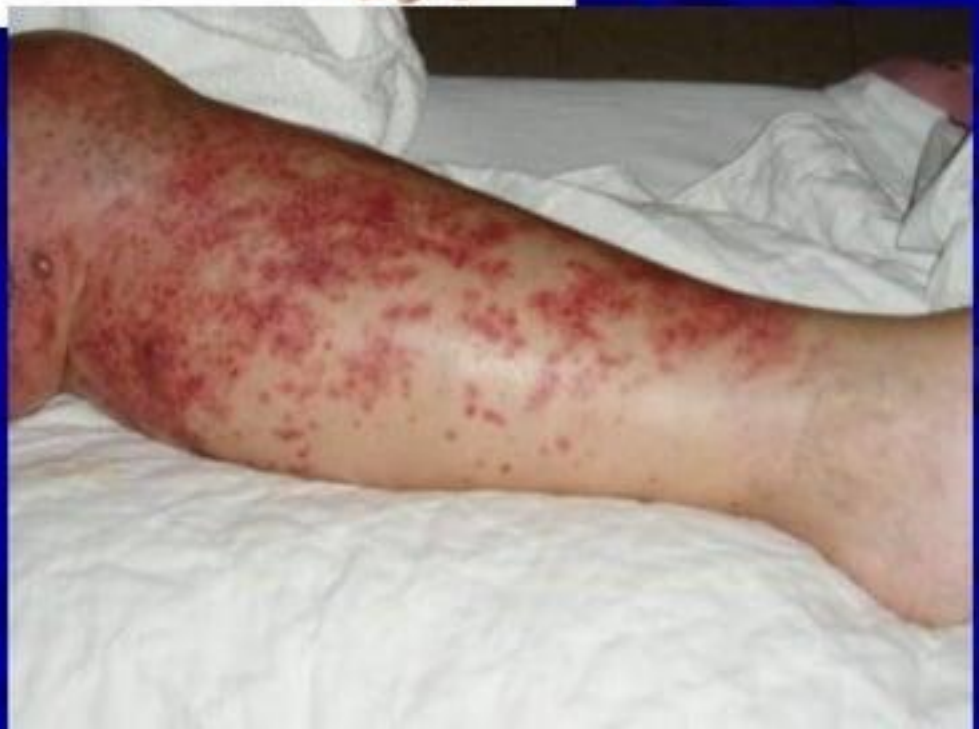
GAIT CHANGE <---- JOINT DESTRUCTION

Extra-articular features

- Rheumatoid nodules
- Pleural effusions
- Atherosclerosis (new, but probably testable)
- Scleritis
- Rheumatoid vasculitis (rare)
- Felty's syndrome (neutropenia, splenomegaly, recurrent infection)


Rheumatoid nodules





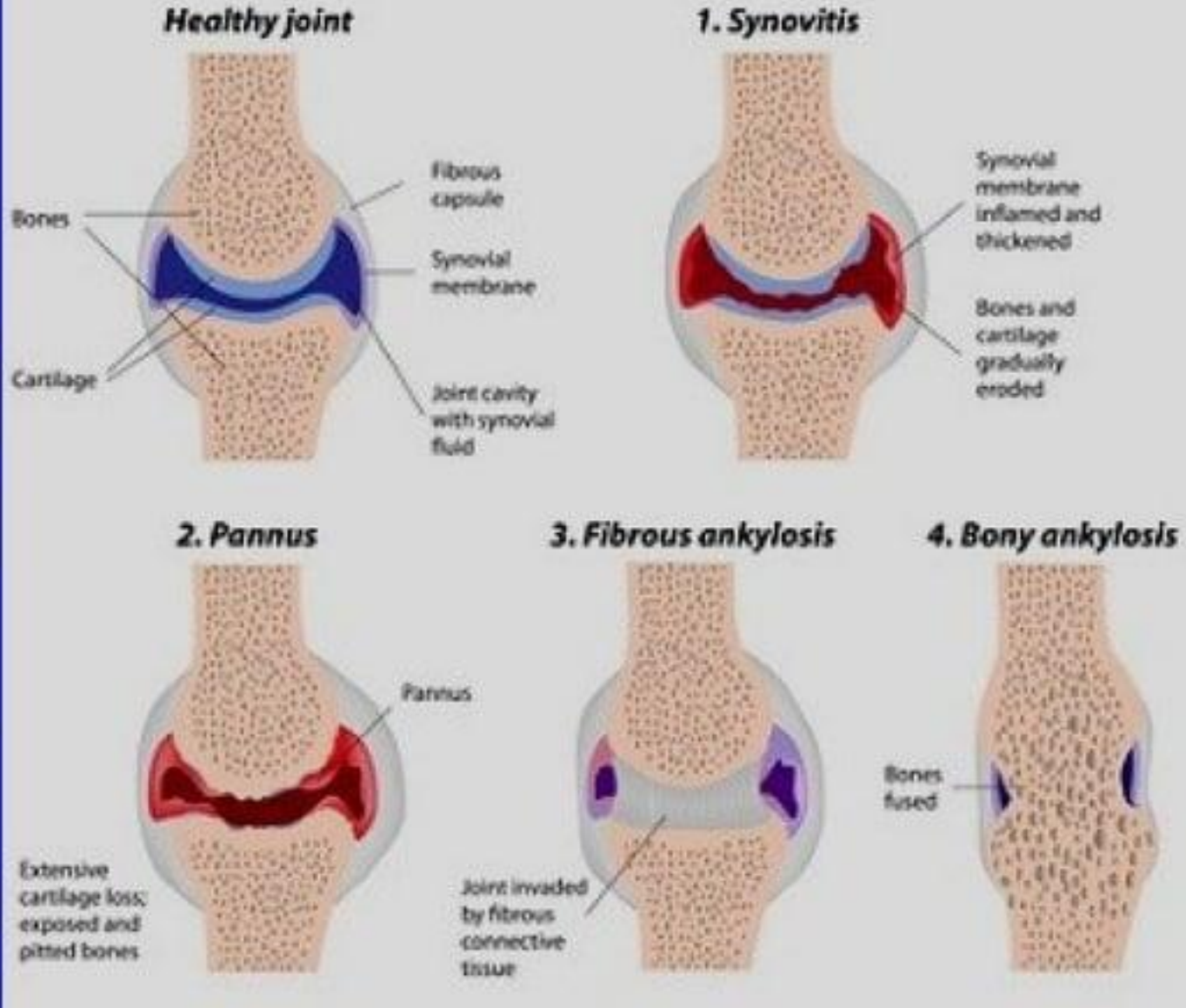
Felty's Syndrome Components

Mnemonic: "SANTA"

S	**S**plenomegaly
A	**A**nemia
N	**N**eutropenia
T	**T**hrombocytopenia
A	**A**rthritis (Rheumatoid)

Felty syndrome is a rare condition that involves rheumatoid arthritis, decreased white blood cell count, and a swollen spleen.

Stages of Rheumatoid Arthritis



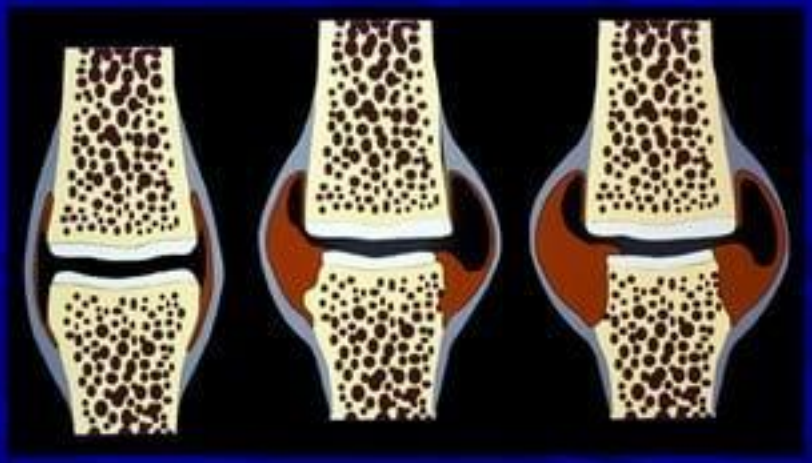
Laboratory

- High ESR or CRP common but not required
- Rheumatoid factor positive in about 50%
  - RF usually indicates more severe disease, greater likelihood of extra-articular manifestations
- Anti-CCP antibodies - relatively new (but very clinically useful and testable!!)
  - Found in about 50% of patients without much overlap with rheumatoid factor
  - Highly sensitive – positive test almost always indicates disease (>90% specificity for RA, even in mixed autoimmune cohorts)

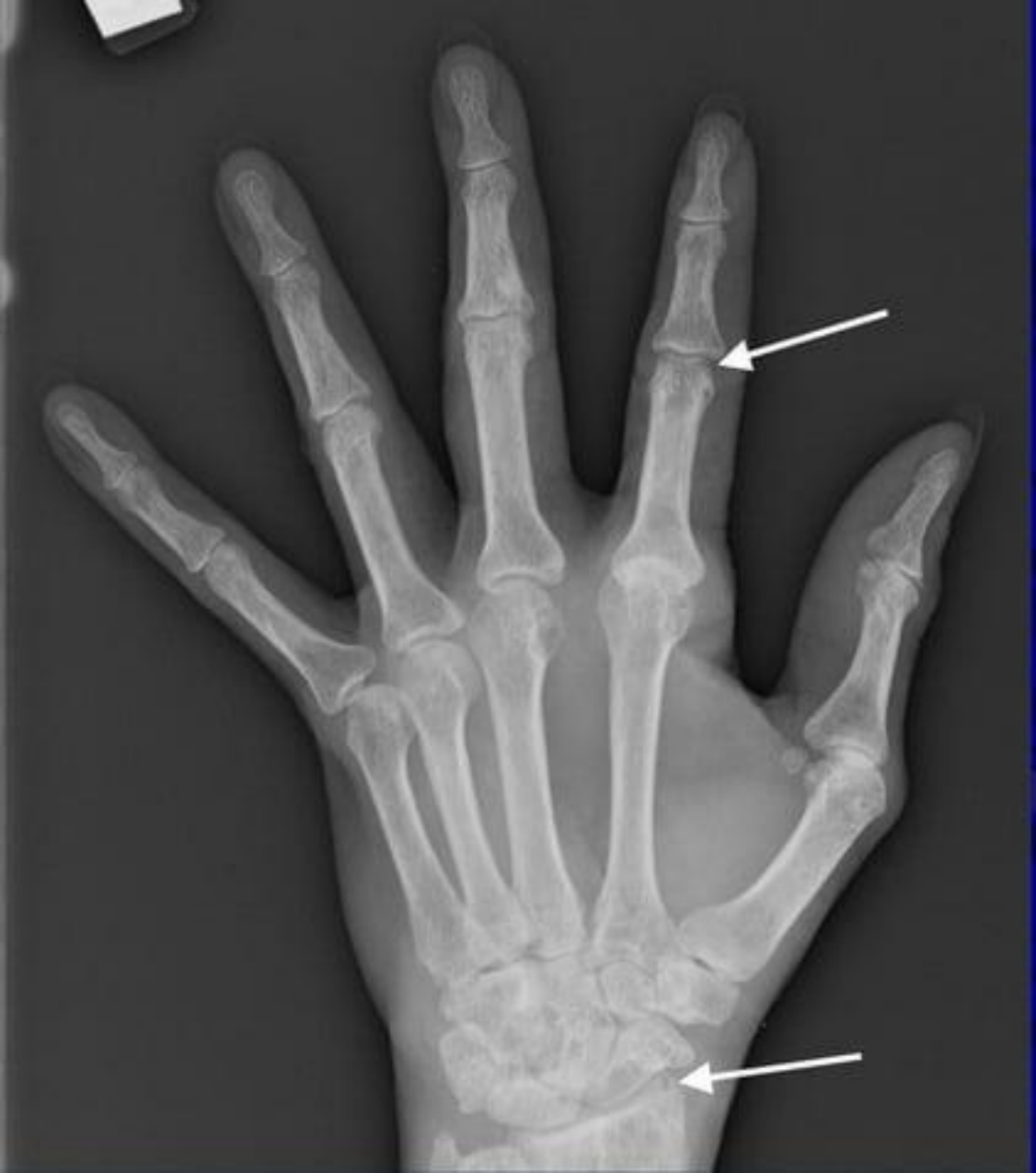
X-ray

- Classical findings of inflammatory arthritis:
  - Periarticular joint erosions
  - Periarticular osteopenia
  - Symmetric joint space narrowing
- Note that each of these is the opposite of OA!!
  - (erosions instead of spurs, osteopenia instead of sclerosis, and symmetric instead of asymmetric joint narrowing)

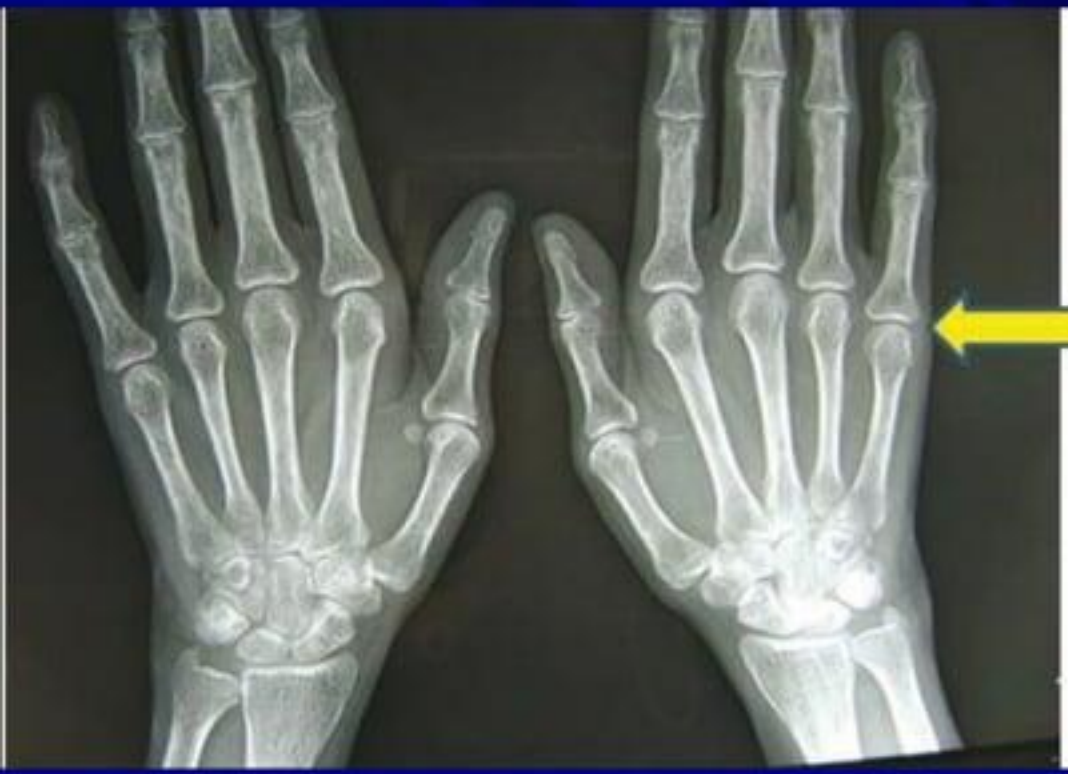
Early Radiographic Progression



Joint-space narrowing and erosion are seen in up to two thirds of patients within the first 2 to 5 years of disease



Rheumatoid arthritis erosions on X-ray

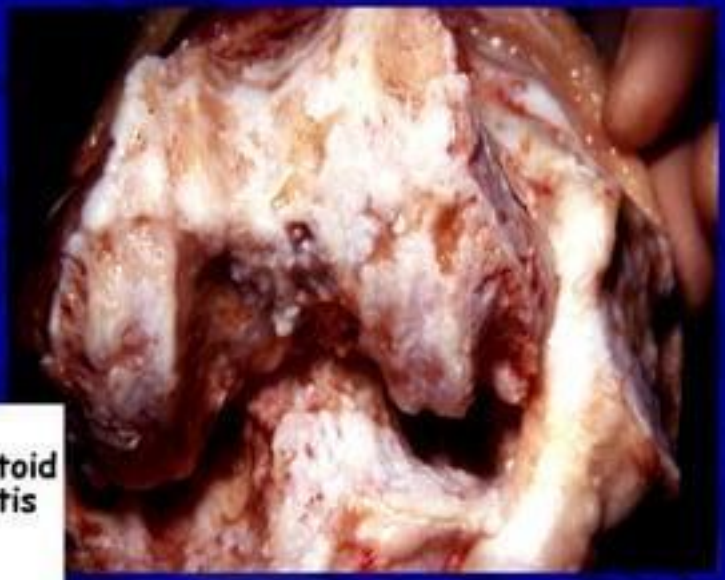


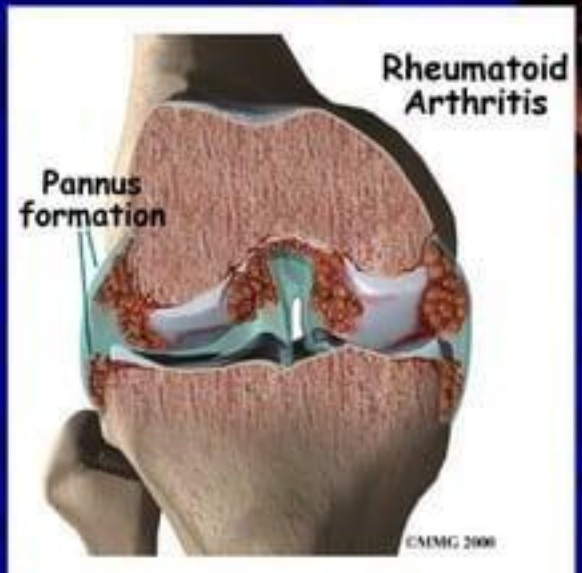
Periarticular osteopenia

RHEUM. ARTHRITIS - Late changes

ADVANCED JOINT CHANGES:

- Joint destruction
- Pain
- Deformity
- Instability





Treatment

- Early treatment with a disease modifying drug is standard of care
- Non-disease modifying
  - NSAIDs
  - Prednisone
- Disease modifying
  - Methotrexate – most common first line, usually around 15-20mg/week with daily folate 1mg/day
  - Sulfasalazine, leflunomide also effective
  - Biological agents such as TNF-alpha blockers, abatacept, rituximab, and tocilizumab are all second or third line

Treatment

- Goal of treatment is clinical remission if possible
- Control of disease prevents bone erosions and subsequent deformity and loss of function
- All disease modifying drugs are immunosuppressive, non-biologics have risk of GI intolerance and hair loss, TNF blockers are associated with re-activation of tuberculosis and rarely an MS-like disease, other biologics are not currently in wide use

SYSTEMIC LUPUS ERYTHEMATOSUS

Definition

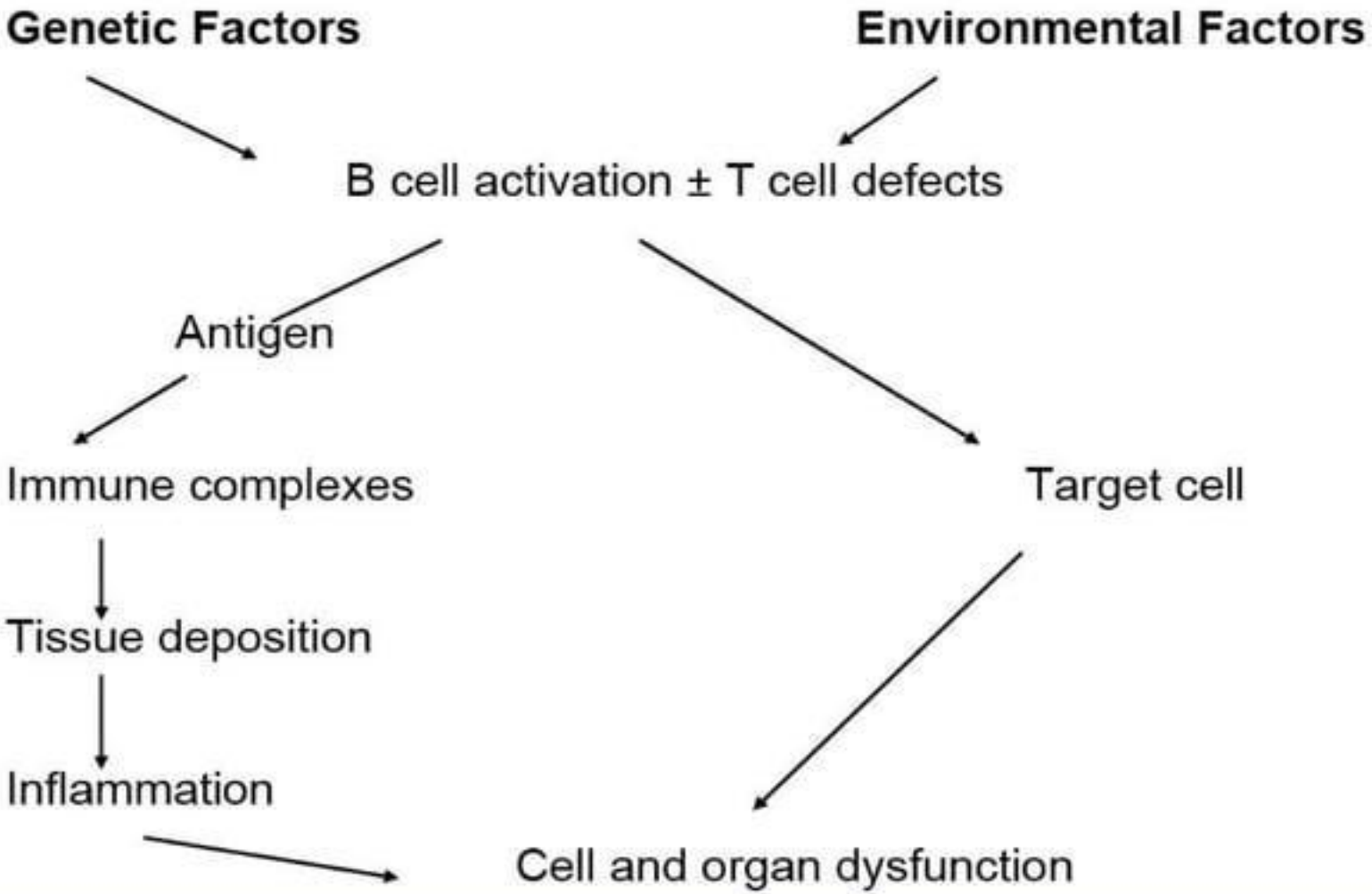
-An inflammatory multisystem disease of unknown etiology with protean clinical and laboratory manifestations and a variable course and prognosis.

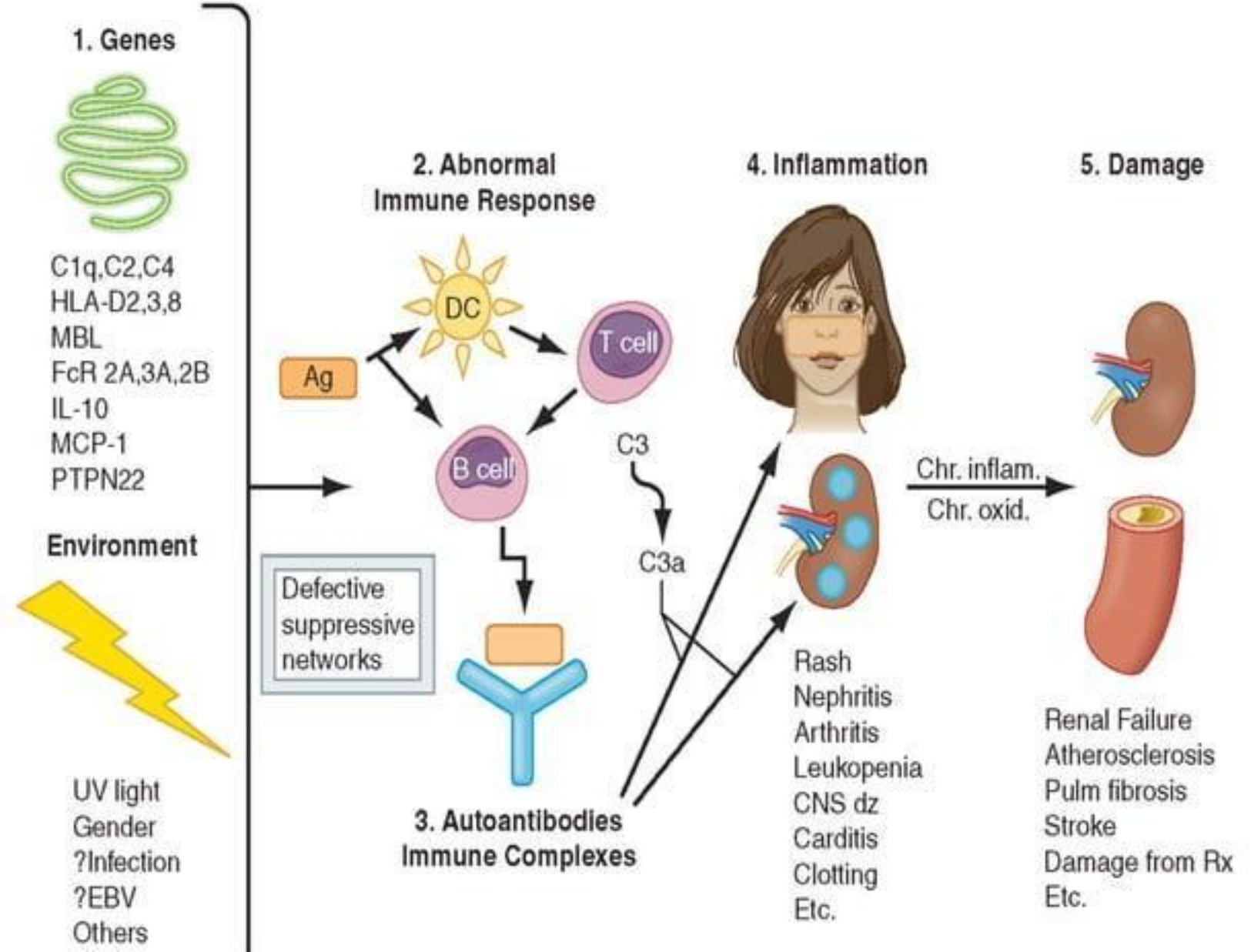
-Immunologic aberrations give rise to excessive autoantibody production, some of which cause cytotoxic damage, while others participate in immune complex formation resulting in immune inflammation.

- **Women more affected (African Americans).**
- **SLE not destructive as RA.**

Systemic Lupus Erythematosus

Pathogenesis

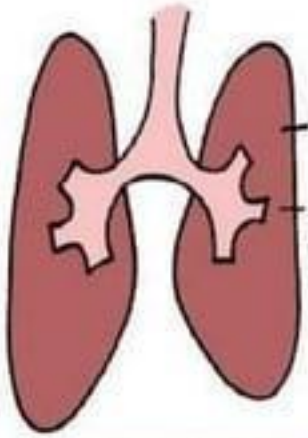



1. Genes
C1q,C2,C4
HLA-D2,3,8
MBL
FcR 2A,3A,2B
IL-10
MCP-1
PTPN22
Environment
UV light
Gender
?Infection
?EBV
Others
2. Abnormal Immune Response
DC
T cell
Ag
B cell
Defective suppressive networks
C3
C3a
3. Autoantibodies Immune Complexes
4. Inflammation
Rash
Nephritis
Arthritis
Leukopenia
CNS dz
Carditis
Clotting
Etc.
Chr. inflam.
Chr. oxid.
5. Damage
Renal Failure
Atherosclerosis
Pulm fibrosis
Stroke
Damage from Rx
Etc.

Clinical:

- Joint involvement is the most common feature (75%) PIP, MCP, Carpus, knees etc.
- Fever, anorexia, weight loss, malaise
- Skin rashes (butterfly malar rash)
- Raynaud's phenomenon
- Splenomegaly
- Nephritis, pericarditis, pleurisy

SYSTEMIC LUPUS ERYTHEMATOSUS (SLE)



- DYSPNEA
- PLEURAL INFLAMMATION

PHOTO-SENSITIVITY

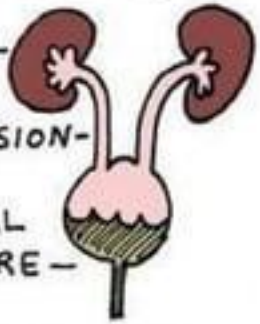
BUTTERFLY RASH OVER FACE

ERYTHEMATOUS RASH TO AREAS EXPOSED TO SUNLIGHT

- WEIGHT LOSS
- FATIGUE
- FEVER
- ARTHRITIS
- EMOTIONAL LABILITY
- HEMATOLOGIC DISORDERS
- NEUROLOGIC DISORDERS

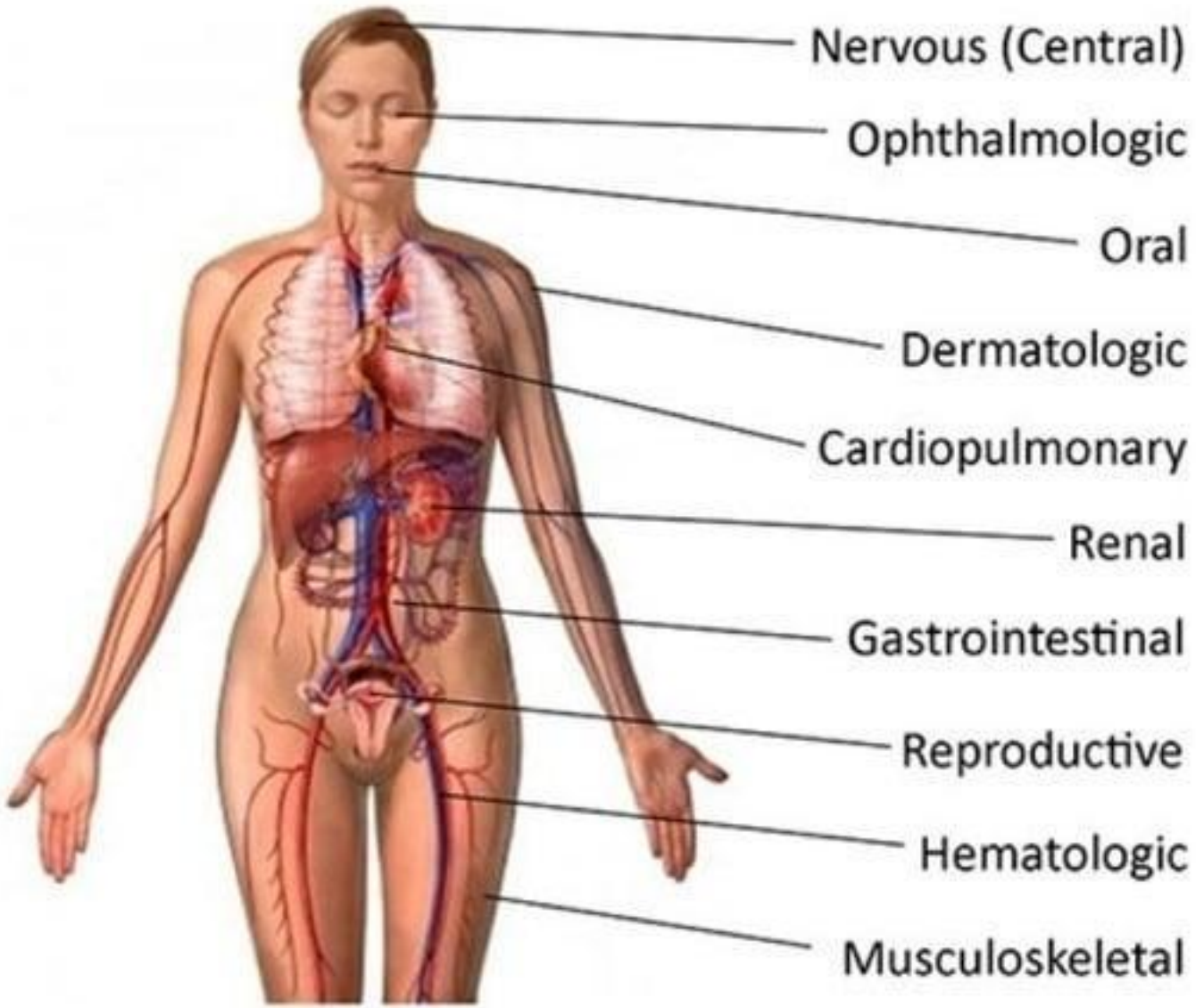
C.J. MILLER

- RAYNAUD'S PHENOMENON
- PERICARDIAL EFFUSION
- VASCULAR INFLAMMATION



- PROTEINURIA
- HYPERTENSION
- RENAL FAILURE

Body System Affected By SLE



Systemic lupus erythematosus classification criteria

(SOAP BRAIN MD)

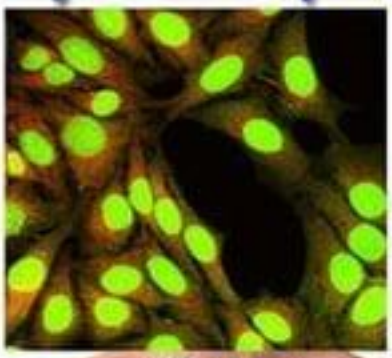
1. **S**erositis:
   (a) pleuritis, or
   (b) pericarditis
2. **O**ral ulcers
3. **A**rthritis
4. **P**hotosensitivity

10. **M**alar rash
11. **D**iscoid rash

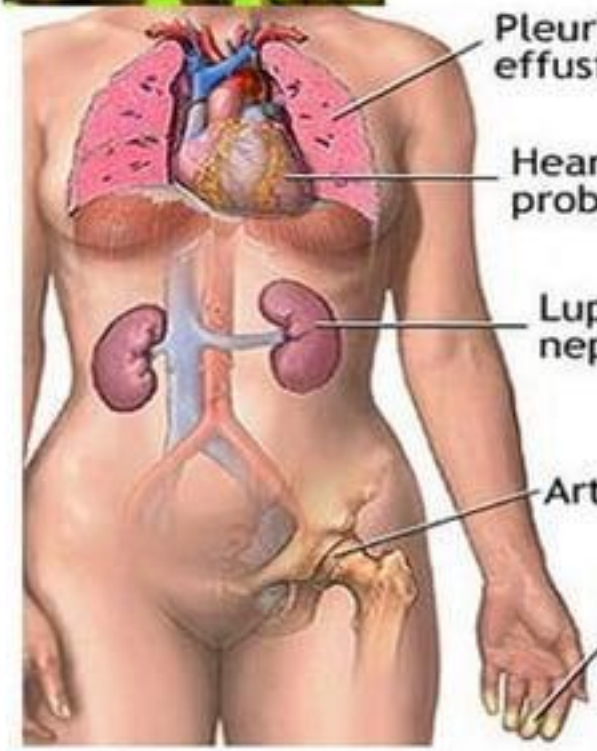
". ..A person shall be said to have SLE if four or more of the 11 criteria are present, serially or simultaneously, during any interval of observation."

5. **B**lood/Hematologic disorder:
   (a) hemolytic anemia or
   (b) leukopenia of < 4.0 x 10^9
   (c) lymphopenia of < 1.5 x 10^9
   (d) thrombocytopenia < 100 X 10^9
6. **R**enal disorder:
   (a) proteinuria > 0.5 gm/24 h or 3+ dipstick or
   (b) cellular casts
7. **A**ntinuclear antibody (positive ANA)
8. **I**mmunologic disorders:
   (a) raised anti-native DNA antibody binding or
   (b) anti-Sm antibody or
   (c) positive anti-phospholipid antibody work-up
9. **N**eurological disorder:
   (a) seizures or
   (b) psychosis

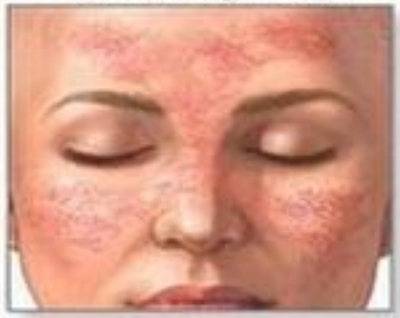
Systemic lupus erythematosus (SLE or lupus)



Anti-nuclear antibodies (ANAs)
present in 80-90% of cases
Sjögren's syndrome (60%), rheumatoid arthritis, autoimmune hepatitis, scleroderma and dermatomyositis(30%).
Type III hypersensitivity



Butterfly rash



Symptoms of systemic lupus erythematosus may vary widely with the individual

Raynaud's Phenomenon

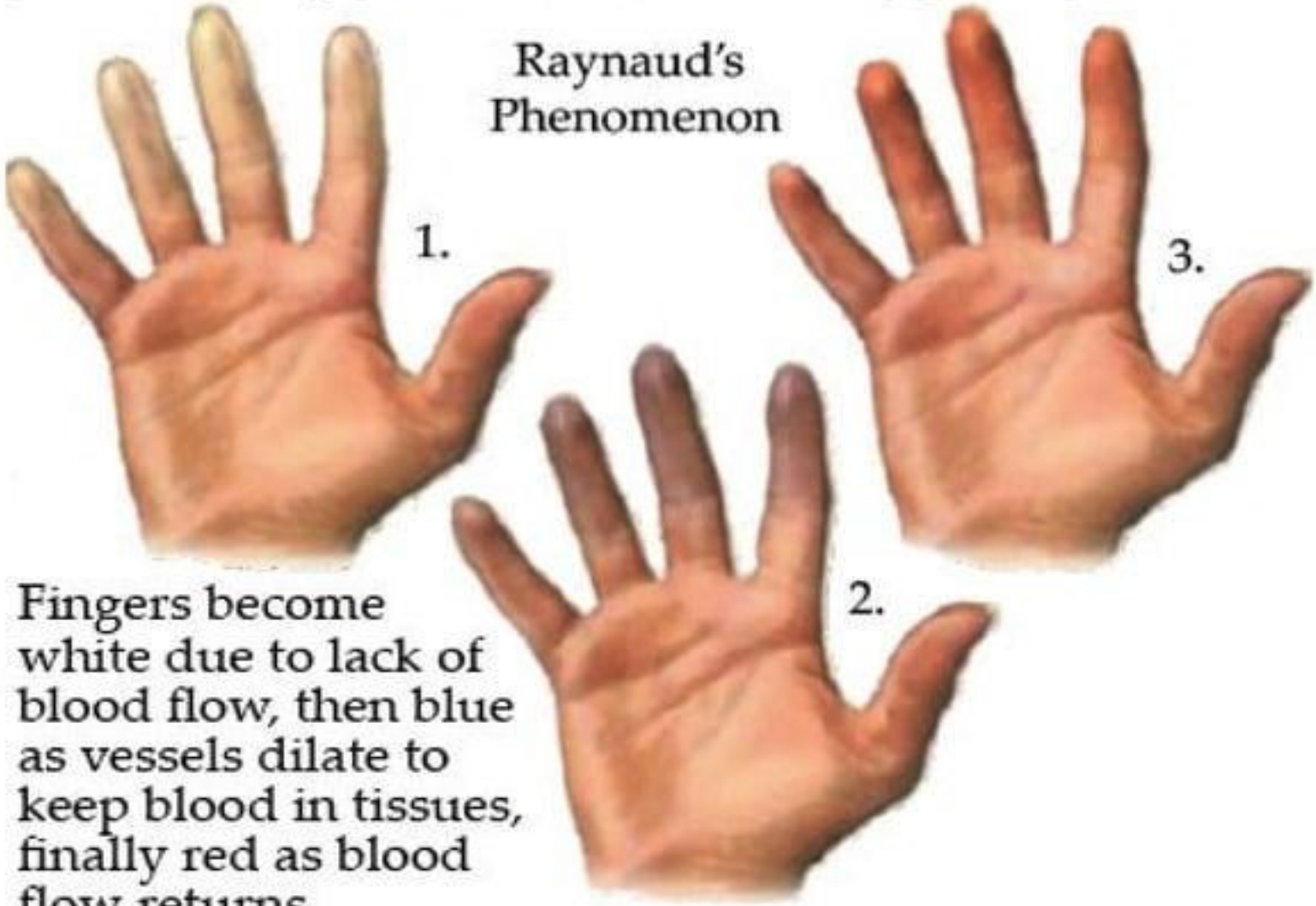


Fig 1 : Triphasic response in RP

Laboratory:

- Anaemia, Leucopenia
- ESR elevated
- ANA positive (RF & HLA-DR3 may be +ve)

Treatment:

- NSAID, Hydroxychloroquine, Cyclphosphomide
- Corticosteroids for severe disease
- Sunblock creams for malar rash.

Complications:

- AVN hip (? from steroids)

Table 2. Indicators of Active SLE Arthritis

History	• Morning stiffness • Involvement of small joints of hands; also involves wrists, elbows, knees, ankles, toes • Pain improves with activity
Physical examination findings	• Joints with swelling (effusion) and tenderness to palpation • Decreased active range of motion of joints • Sometimes mild erythema over involved joints
Laboratory values	• Elevated inflammatory markers (ESR or C-reactive protein) • Leukopenia (WBC <4,000/mm^3), specifically lymphopenia (<1,500/mm^3) • Thrombocytopenia (<100,000/mm^3) • Anemia (male <4.7 million cells/μL; female <4.3 million cells/μL) • Hypocomplementemia (low C3 and C4)

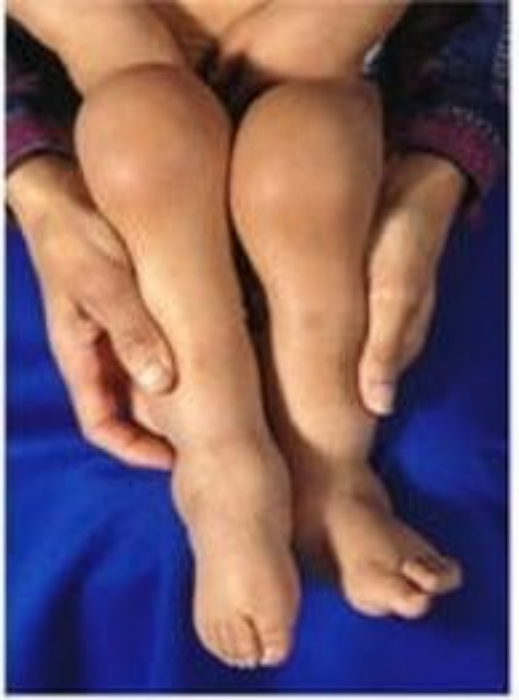
ESR, erythrocyte sedimentation rate; SLE, systemic lupus erythematosus; WBC, white blood cell.

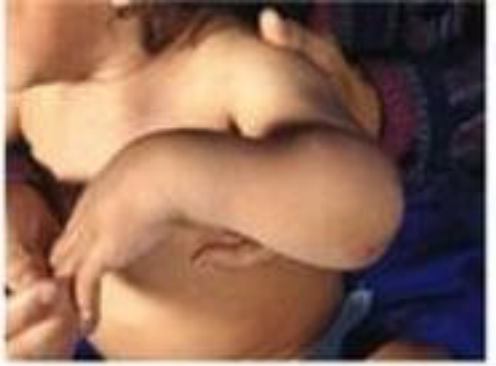
JUVENILE RHEUMATOID ARTHRITIS

- Persistent noninfectious arthritis lasting 6 weeks to 3 months after other causes have been ruled out.
- Juvenile chronic arthritis (JCA) is gradually being used.

Diagnostic Criteria

- Age under 16 at onset
- Rash, RF
- Iridocyclitis
- CSpine involvement
- Pericarditis, Tenosynovitis
- Fever, Morning stiffness





JUVENILE IDIOPATHIC ARTHRITIS

- PAUCIARTICULAR
  - EOPA
    - OLIGOARTHRITIS
    - EXTENDED OLIGOARTHRITIS
  - LOPA
    - ENTHESITIS-RELATED
- POLYARTICULAR
  - SERONEGATIVE
    - POLYARTHRITIS RF-
    - PSORIATIC
  - SEROPOSITIVE
    - POLYARTHRITIS RF+
- SYSTEMIC ONSET

Systemic onset (Still's disease)

- Age: usually under 5years but can be any age, Sex: <5yr female = male; >5yr female > male
- Fever (high with spikes up to 40°C daily) plus one of the following
- Maculopapular rash, Iridocyclitis, RhF +ve, Cervical spine involvement
- Pericarditis, Generalised lymphadenopathy, Hepatomegaly, Splenomegaly
- Sites: knees, wrists, ankle, feet

Presence of 5 or more criteria, of which at least 2 are major (96% sensitivity; 92% specificity) diagnoses Still's disease
Major criteria
Temperature of >39°C for >1 week
Leukocytosis >10,000/mm^3 with >80% PMNs
Typical rash
Arthralgias >2 weeks
Minor criteria
Sore throat
Lymph node enlargement
Splenomegaly
Liver dysfunction (high AST/ALT)
Negative ANA, RF

PMNs: Polymorphonuclear, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, ANA: Antinuclear antibody, RF: Rheumatoid factor

Polyarticular onset

Seronegative (RhFactor -ve), Age: any, even before age 1year!, Sex: female > male

5 or more joints involved in the first 3 months , Sites: knees (60%), wrists, hands

RhFactor +ve, Older children (9-10 years) with persistent activity and rapid joint destruction affecting mainly the hands and feet.

Pauciarticular (most common)

- 4 or less joints involved in the first 3 months
- **Type I,**
- Younger onset <6yr, with females mainly affected. ANA +ve. Danger because of development of iridocyclitis. Presence of ANA related to eye involvement.
- **Type II**
- Older onset 9yr+, with males mainly affected. Association with HLA-B27.

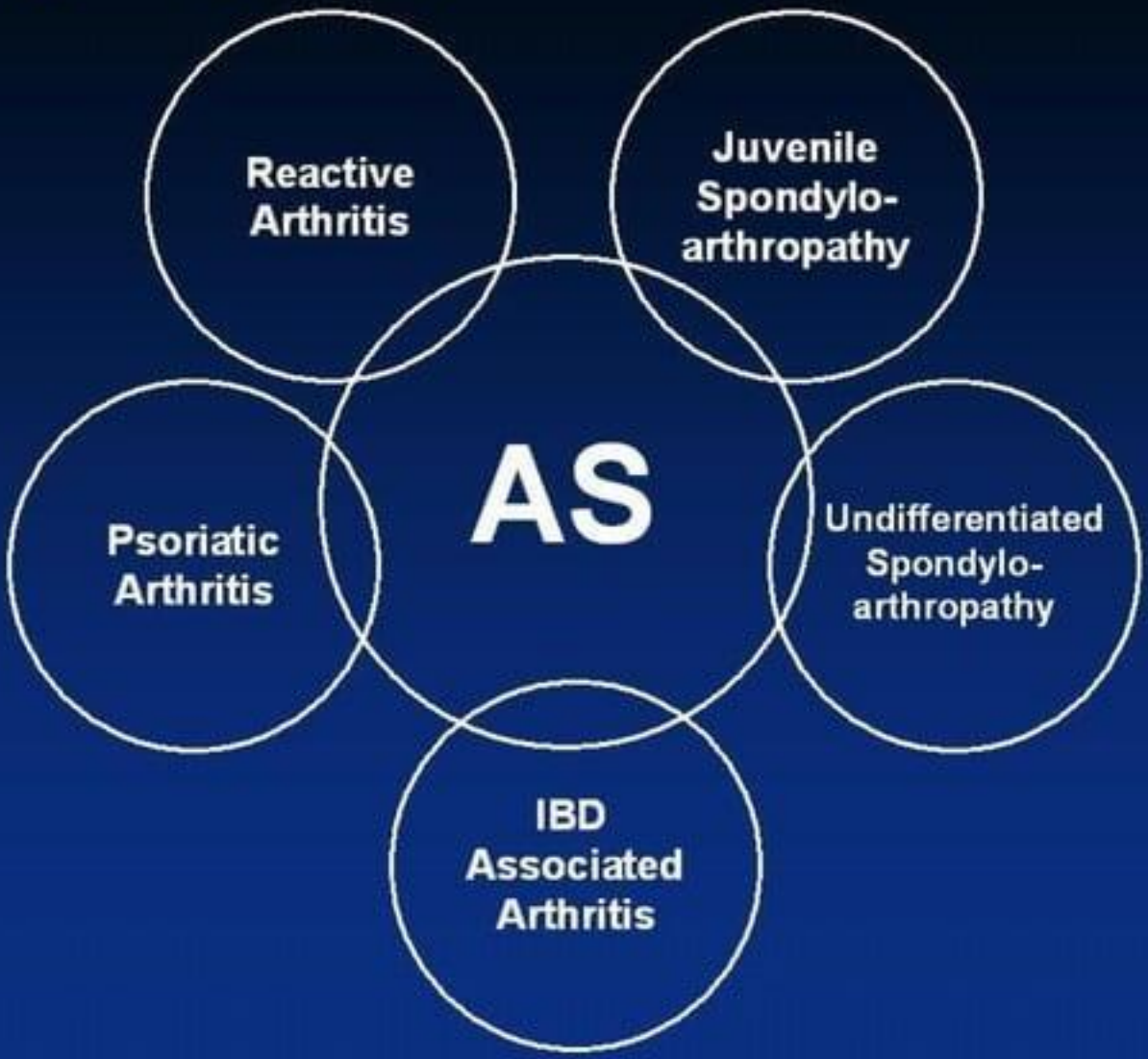
JUVENILE RHEUM. ARTHRITIS

Medical Management

- Aim: to suppress activity and therefore prevent joint deformity
- Multidisciplinary approach .
- PT to help prevent joint contractures.
- Hydrotherapy affective.
- OT for splints and orthoses

Surgical Management when necessary

Family of Spondyloarthropathies



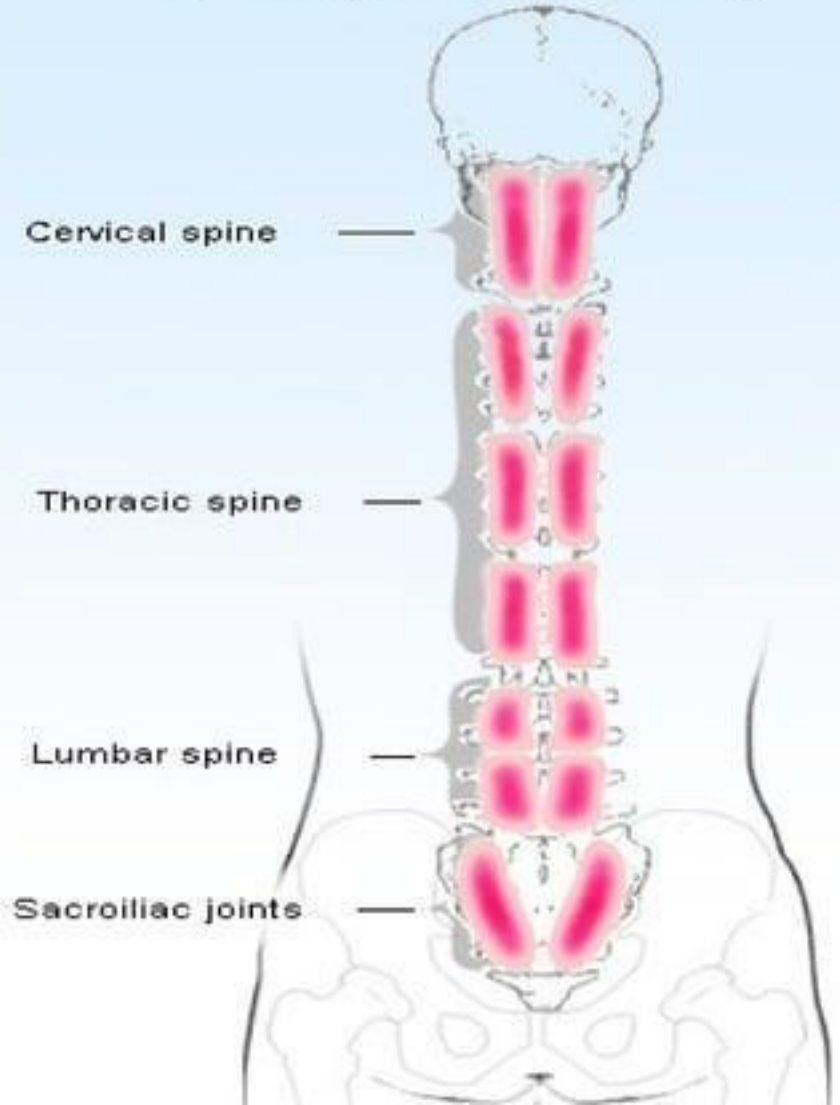
Spondyloarthritis Subtypes

1. Ankylosing spondylitis (AS)
2. Undifferentiated SpA
3. Psoriatic SpA
4. Reactive SpA
5. SpA associated with chronic inflammatory bowel diseases

Spondyloarthritis – main clinical manifestations

1. Axial involvement/spinal inflammation
2. Peripheral arthritis
3. Peripheral enthesitis

Classic Areas of Inflammation of Spondyloarthropathy



Ankylosing Spondylitis

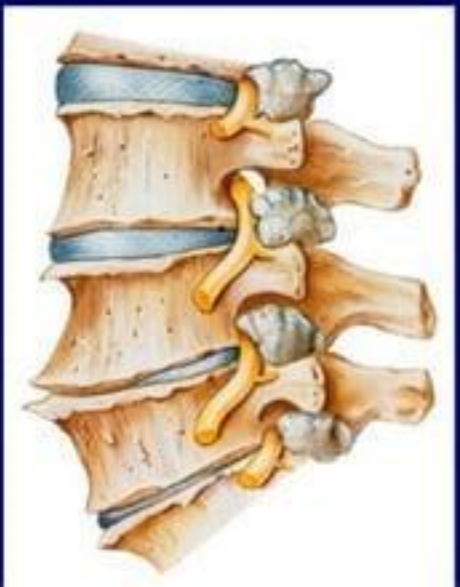
Involvement of the axial skeleton (sacroiliitis, spondylitis), leading to ankylosis

May affect peripheral joints:

- Asymmetric
- Oligo-articular
- Lower limbs
- Enthesitis

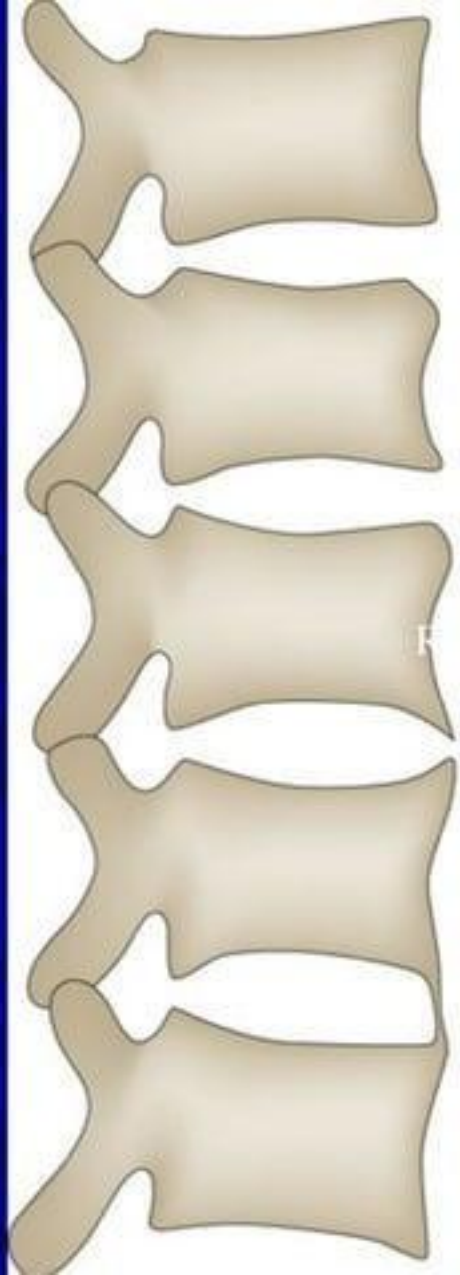
May affect extra-articular sites: Eye, gut, skin ...

Ankylosing Spondylitis



Pathology

- Inflammation & erosive destruction of:
  - Diathrodial joints = sacroiliac, vertebral facet, costovertebral
  - Fibro-osseous junctions - intervertebral discs, sacroiliac ligaments, symphysis pubis
- 3 Stages:
  - **Inflammation** - round cell infiltration, granulation tissue, joint erosion
  - **Fibrosis** - replacement of granulation tissue with fibrous tissue
  - **Ossification** - of fibrous tissue (e.g. syndesmophytes)



0

Normal

0

1 Erosion

1 Sclerosis

1 Squaring

2

2 Obvious syndesmophyte

3

3 Total bony bridge

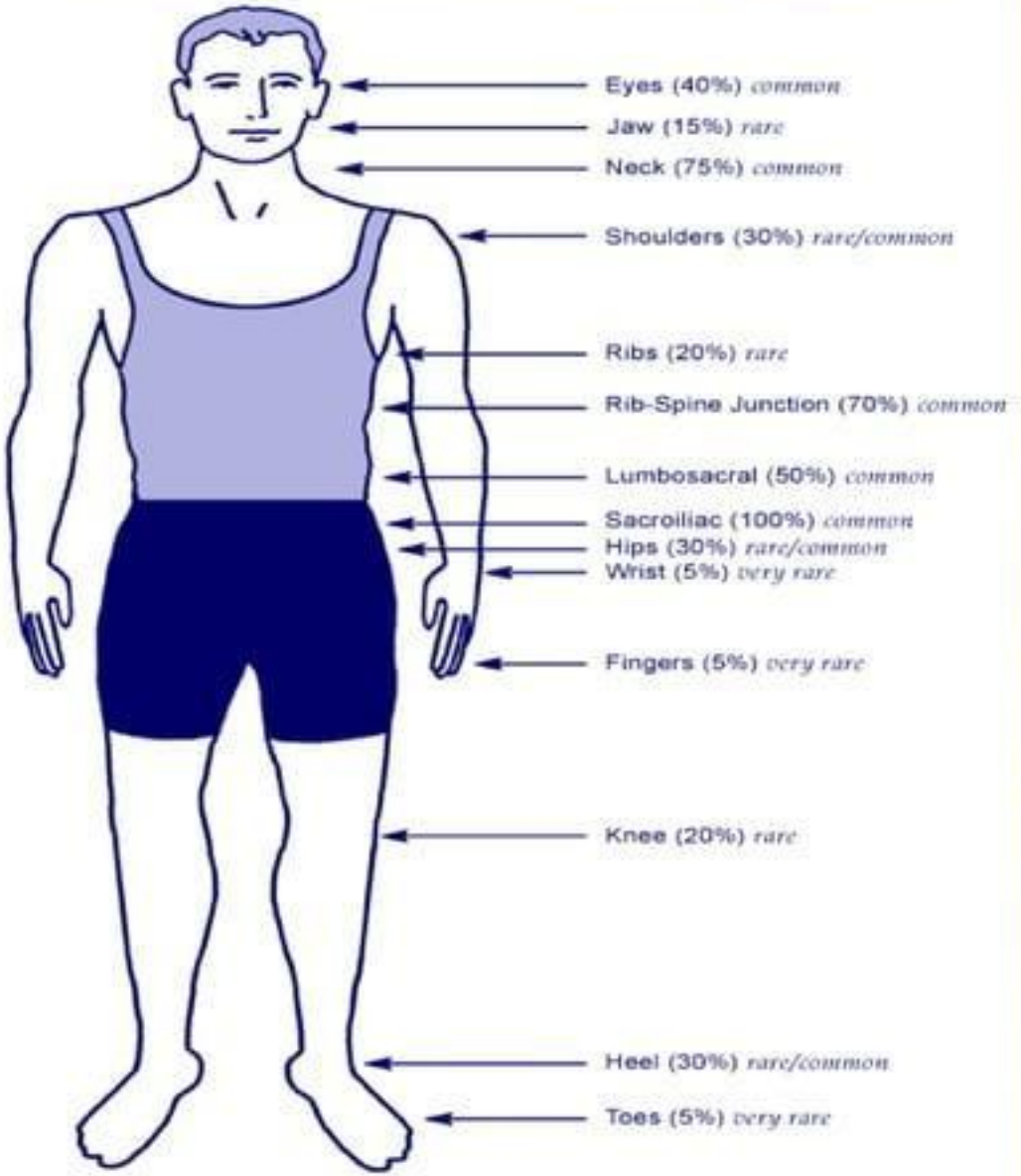
Clinical:

- Spinal stiffness (progressive spinal flexion deformity)
- Wall Test - patient asked to stand with back against wall; should normally be able to touch occiput, scapulae, buttocks & heels to wall.
- Chest expansion < 7cm
- Hip involvement with FFD
- Achilles tendon insertion pain
- Difficult cervical spine fractures with epidural haemorhage

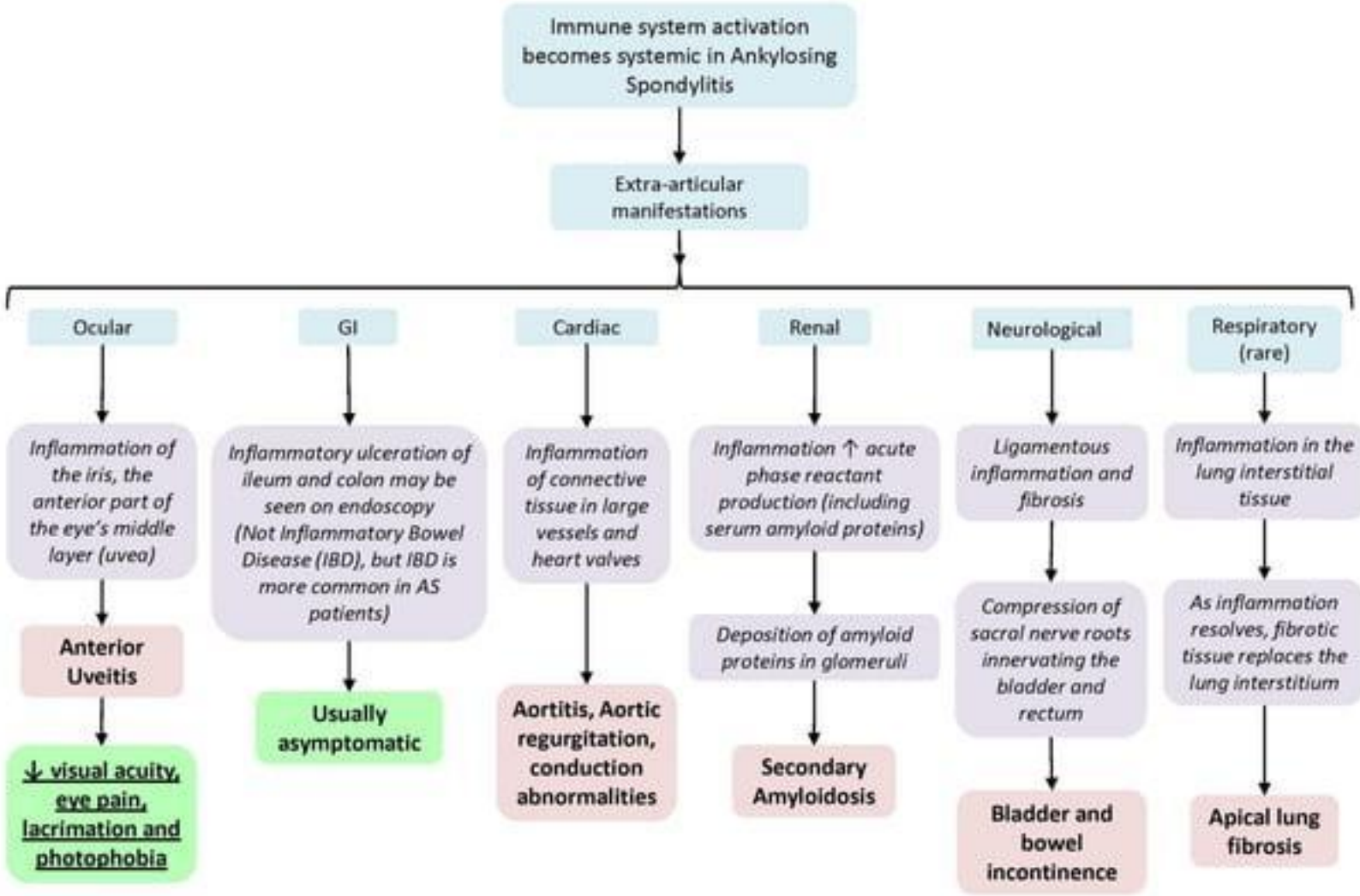
Extraskeletal:

- Prostatitis
- Conjunctivitis & uveitis in 20%
- Carditis, aortic valve disease
- Pulmonary fibrosis

Areas of Inflammation in Ankylosing Spondylitis



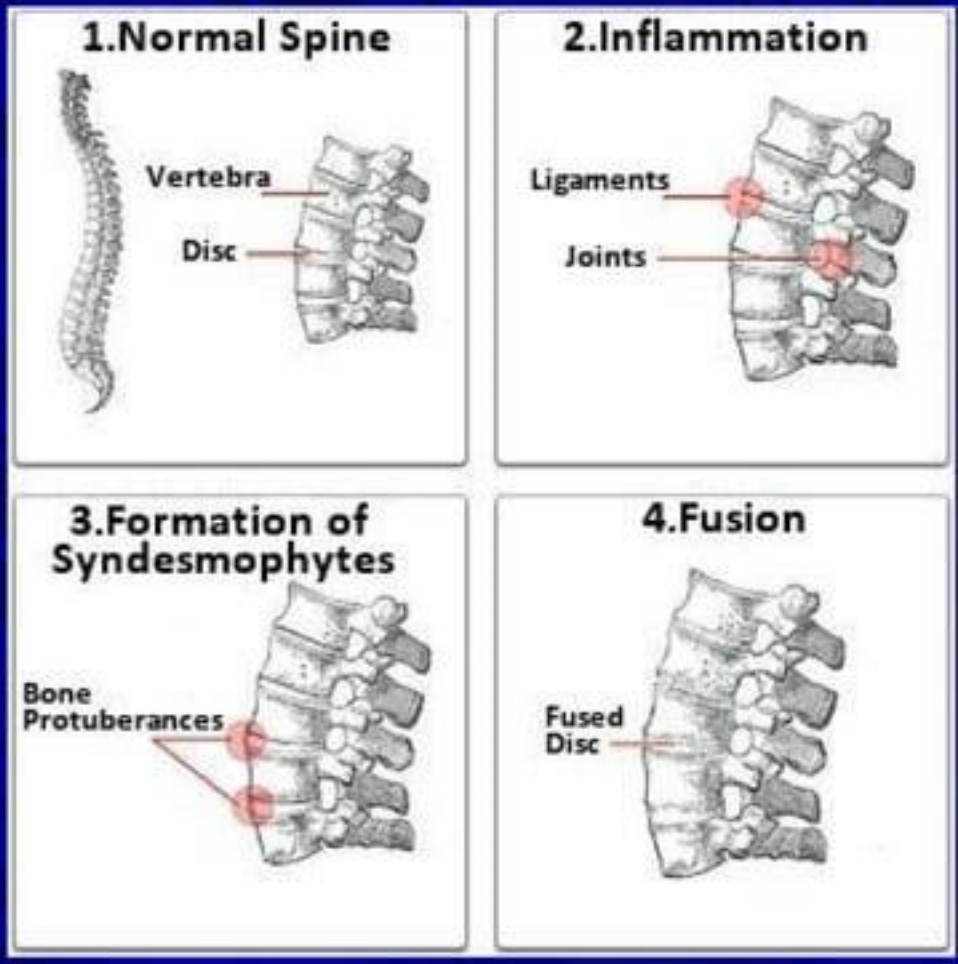
Ankylosing Spondylitis: Extra-articular Manifestations



Pathophysiology	Mechanism	Sign/Symptom/Lab Finding	Complications

Radiology

- Squaring of vertebral bodies
- Syndesmophytes
- Bamboo spine
- Erosive arthritis with progressive ankylosis



Box 1: Modified New York Criterial for the diagnosis of AS

1. **Clinical**

- Low back pain and stiffness >3 months, which improves with exercise and not relieved by rest
- Limitation of lumbar spine in both saggital and frontal planes
- Limitation of chest expansion relative to normal for age and sex

2. **Radiological**

- Bilateral sacroiliitis >grade 2
- Unilateral sacroiliitis >grade 3 or 4

Grade 0 = normal

Grade 1 = suspicious

Grade 2 = sclerosis, some erosions

Grade 3 = severe erosions, widening of the joint space, some ankylosis

Grade 4 = complete ankylosis

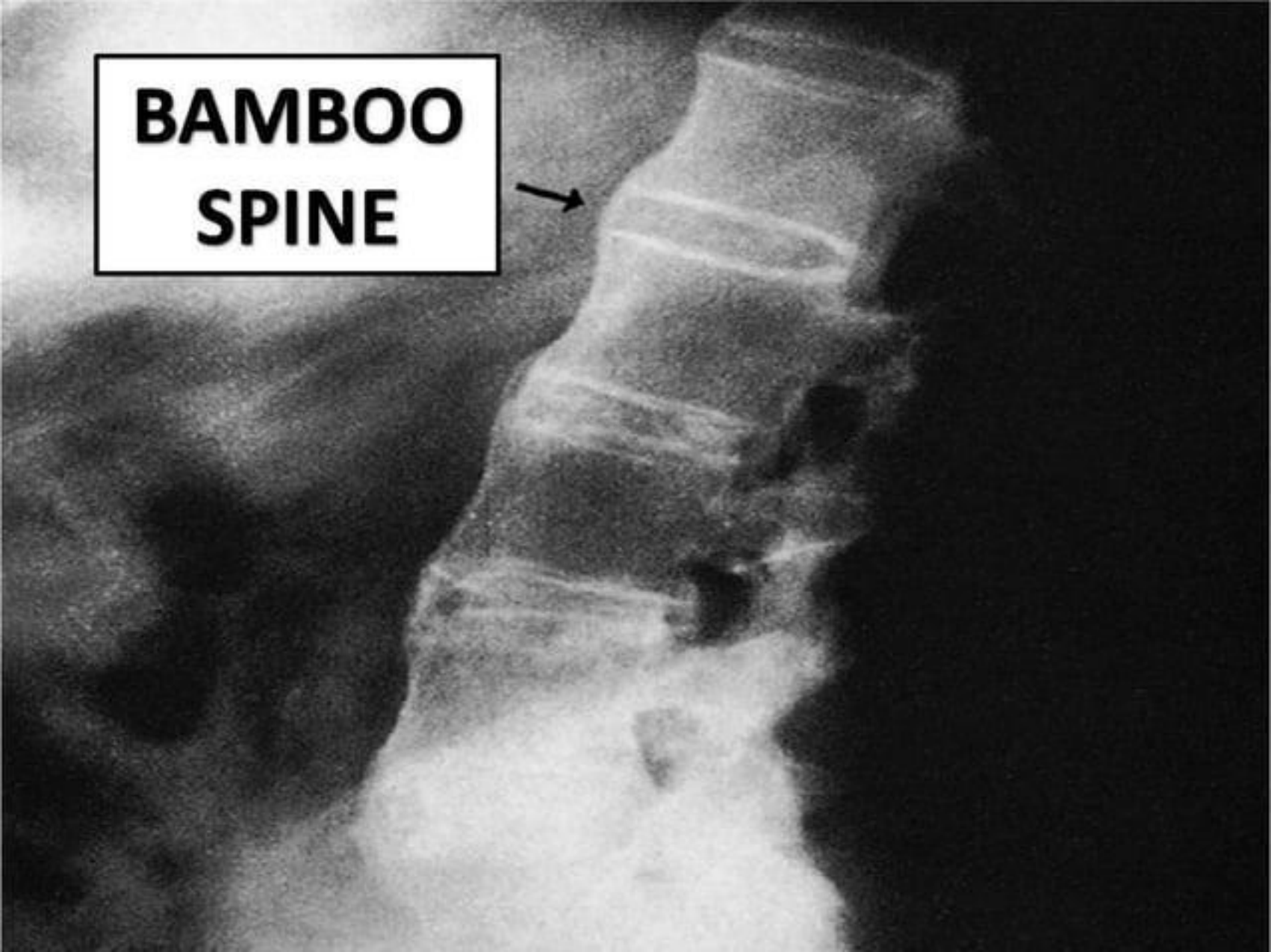
AS is present if the radiological criterion is associated with at least one clinical criterion.

Laboratory:

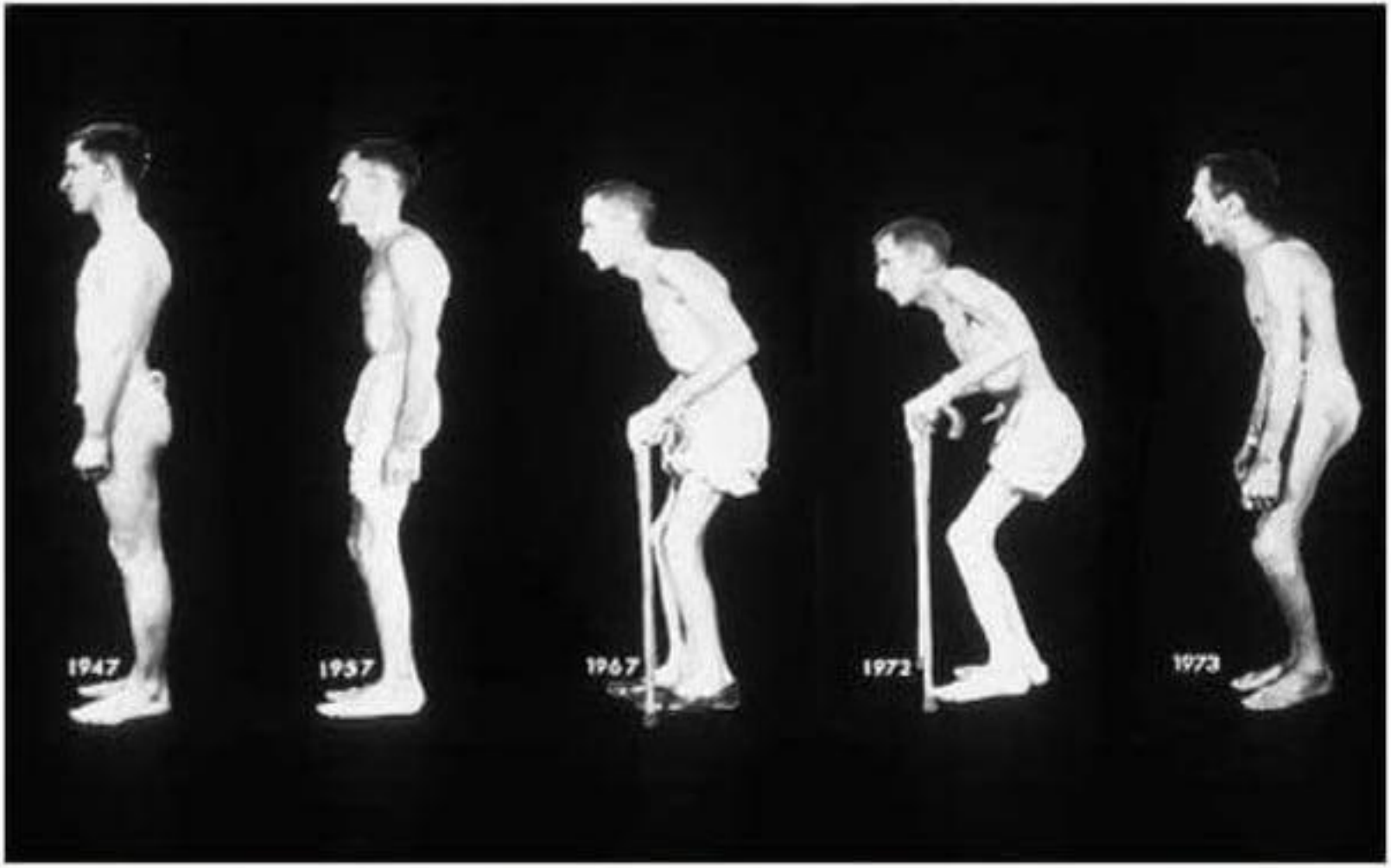
- High ESR
- HLA-B27 in 90%
- RF negative

Management:

- Postural management
- NSAIDs
- Operations to correct deformity & restore mobility
  - Lumbar / cervical spine osteotomies
  - THR


BAMBOO
SPINE

Progressive deformity due to AS over a period of 36 years



REITER'S SYNDROME

Hans Reiter, 1916

- **Triad = Urethritis + Arthritis + Conjunctivitis**
- Causative organisms:
  - Chlamydia trachomatis, shigella, salmonella, campylobacter, Yersinia
  - Lymphogranuloma venereum

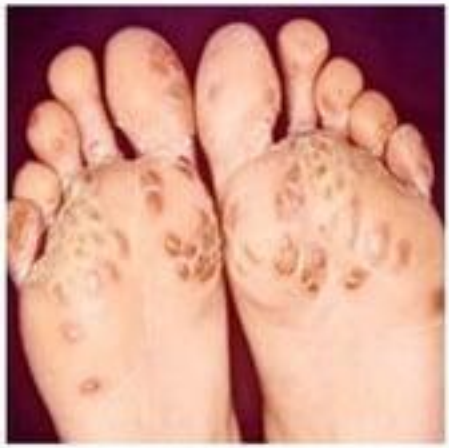
Gut infections:
- salmonella
- food poisoning
- dysentery

Sexually acquired infections:
- gonorrhoea
- chlamydia
- non-specific urethritis (NSU)

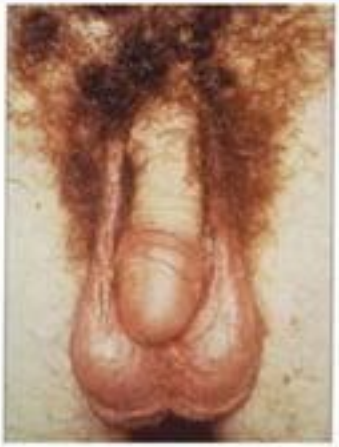
Viruses:
- influenza (flu)
- parvovirus
- hepatitis

Bacteria:
- streptococcus
- sore throat / tonsillitis

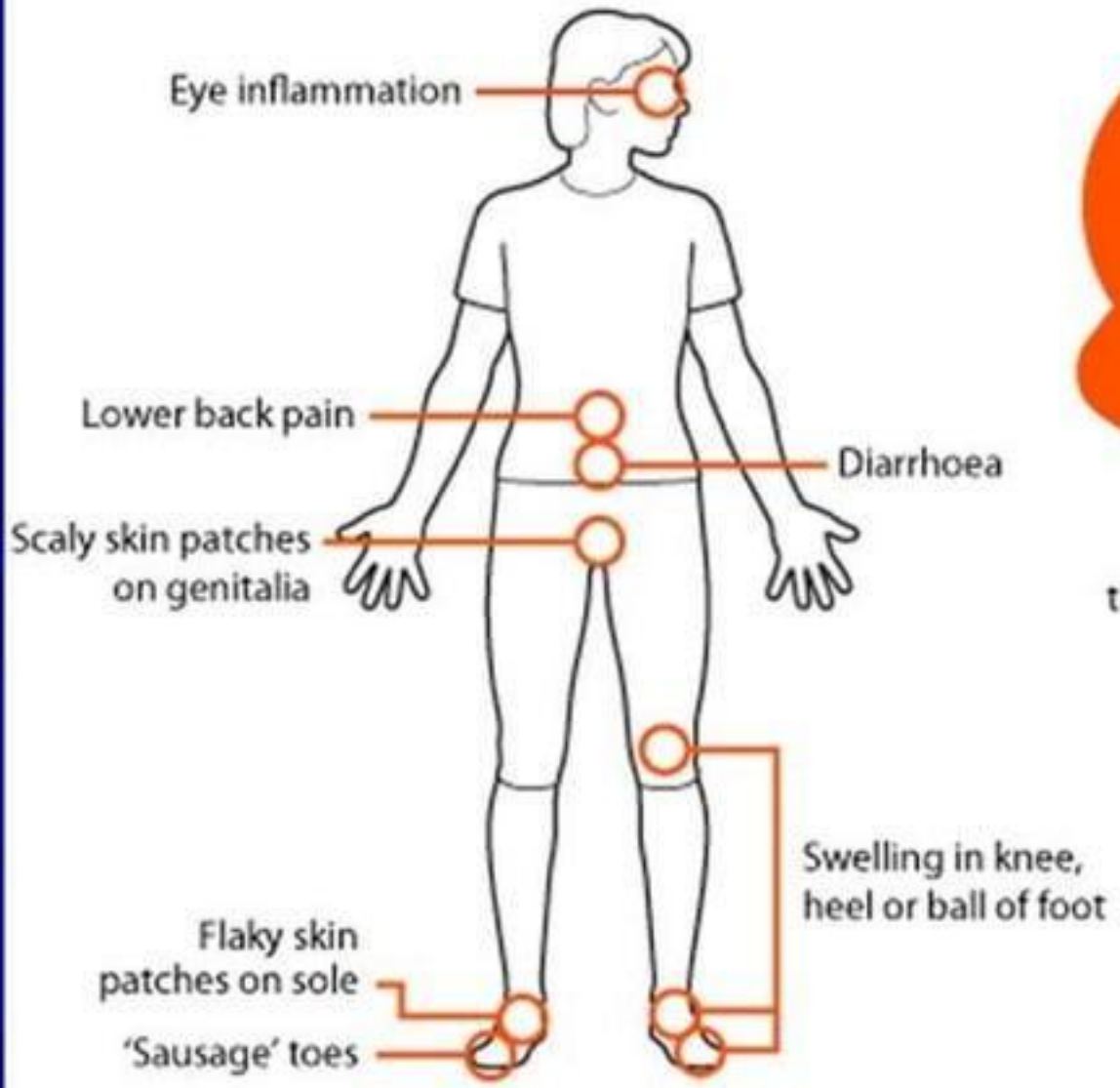
Figure 2. Infections which can trigger reactive arthritis



Keratoderma (rash)
at the bottom of the feet



Painless sore on the
glans of the penis



Signs of reactive arthritis

You may have only some of these symptoms.

Radiology:

- erosive arthropathy similar to AS

Laboratory:

- HLA-B27 in 80%
- ESR high in acute phase
- organism may be isolated from urethral fluids or faeces

Treatment:

- Supportive
- Tetracycline for persistent urethral infection

Differential Diagnoses of Components of Reiter's Syndrome

Dysuria	• Cystitis, urethritis, pyelonephritis, vaginitis, epididymitis, balanitis, prostatitis
Conjunctivitis	• Viral/bacterial infection, allergies, reactive arthritis, dry eyes, chemical irritants, systemic diseases
Arthritis	• **Noninflammatory (0–1,000 WBC/mm^3, < 25% PMNs):** Osteoarthritis, trauma, osteochondritis dissecans, osteochondromatosis • **Inflammatory (1,000–100,000 WBC/mm^3, > 50% PMNs):** Rheumatoid arthritis, pseudogout, reactive arthritis, ankylosing spondylitis, psoriatic arthritis • **Purulent (15,000 ≥ 100,000 WBC/mm^3, > 75% PMNs):** Pyogenic bacterial infection • **Hemorrhagic:** Trauma, hemophilia, neuropathic arthropathy

GOUT

- Disorder of purine metabolism characterised by hyperuricaemia & recurrent attacks of acute synovitis
- M:F = 20:1
- 2 Types:
  - **Primary** (95%): inherited disorder with overproduction or under excretion of uric acid
  - **Secondary** (5%): myeloproliferative disorders, renal disease
- Only a small number of people with hyperuricaemia develop gout.

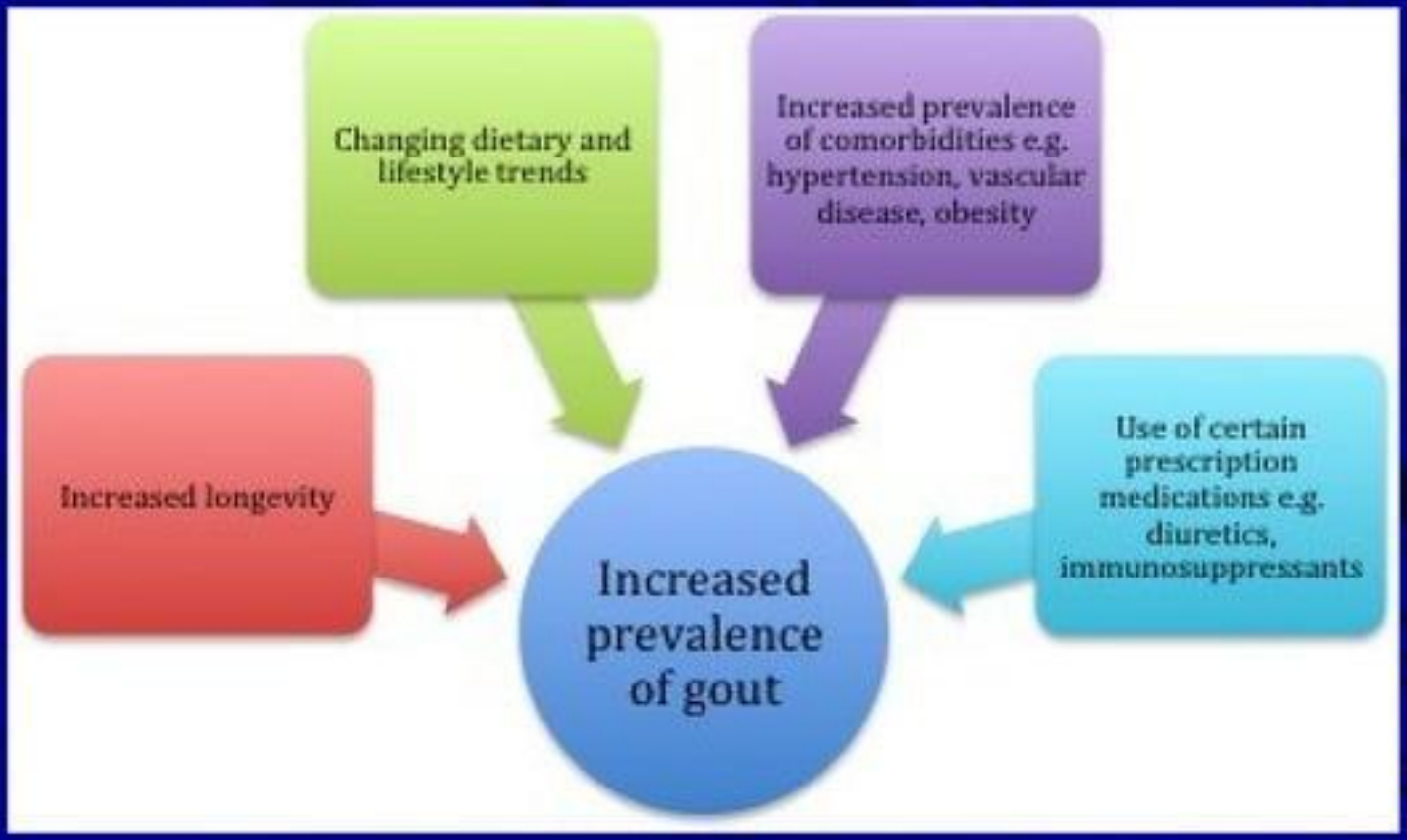

Changing dietary and lifestyle trends
Increased prevalence of comorbidities e.g. hypertension, vascular disease, obesity
Increased longevity
Use of certain prescription medications e.g. diuretics, immunosuppressants
Increased prevalence of gout

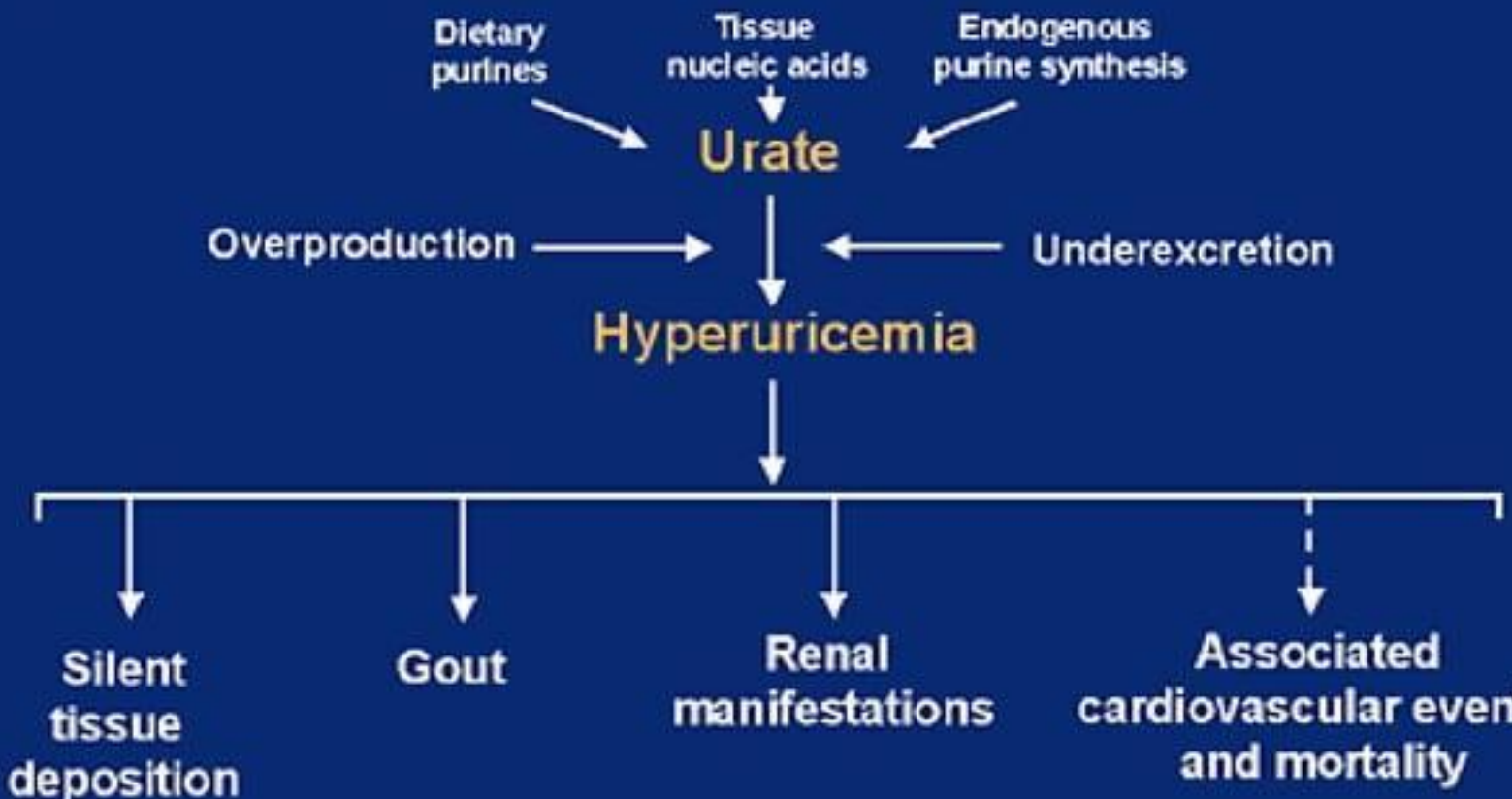
TABLE: DRUGS AND CONDITIONS THAT PREDISPOSE PATIENTS TO GOUT

Drugs That Decrease Serum UA Levels	Drugs That Increase Serum UA Levels	Diseases Associated with Gout
• Allopurinol • Diuretics (thiazide and loop) • Febuxostat • NSAIDs • Probenecid • Sulfinpyrazone	• Cyclosporine • Ethambutol • Ethanol • Niacin • Pyrazinamide • Salicylates	• Alcohol abuse • Chronic kidney disease • Genetic or acquired cause of UA overproduction (eg, inborn error of purine metabolism or psoriasis, myeloproliferative, or lymphoproliferative disease) • Hyperlipidemia • Hypertension • Metabolic syndrome • Obesity • Type 2 diabetes mellitus • Lead intoxication

NSAID = nonsteroidal anti-inflammatory drug; UA = uric acid.

Adapted from references 11, 14-17.

The Hyperuricemia Cascade



Pathology

- Humans lack the enzyme uricase which is involved in elimination of excess nucleic acid purines & nitrogenous waste products thru production and excretion of alantoic acid; hence in humans, uric acid is end product of purines degradation

- Deposition of MSU (monosodium urate) crystals in synovial & periarticular tissue

- **History:**
  - Galen (129-199 AD), an ex-gladiatorial surgeon in the Pergamon arena in Asia Minor who moved to Rome, described gout as a discharge of the four humors of the body in unbalanced amounts into the joints (hence **gout = gutta, a drop**).
  - The first radiological description of gout was made by Huber in 1896, a few months after Röentgen described the x-ray.

Gout

4 Steps in Pathophysiology

1. Hyperuricemia

- Genetic mutations & polymorphisms
- Diet
- Obesity
- Renal Failure
- Alcohol

2. Precipitation occurs at normal/ high uric acid levels, solubility threshold is dependent on

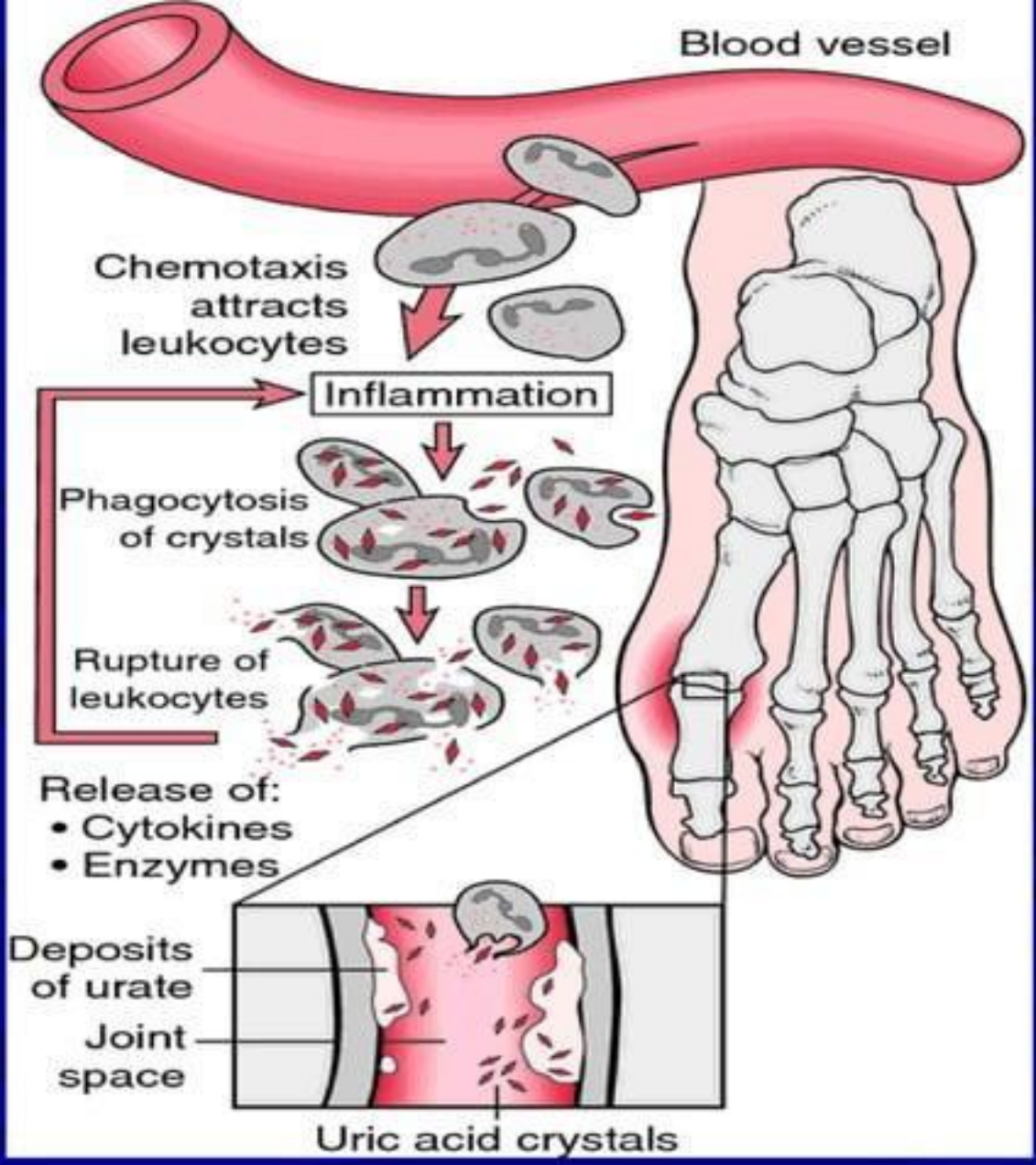
- Cool temperature (predilection for 1st MTP)
- Acidosis
- Articular Hydration (diuretics)
- Extracellular matrix proteins (proteoglycans, chondroitin & glucosamine decreased in injured joints)
- Rapid changes in uric acid levels (trauma, surgery, binge drinking, diuretics, chemotherapy, starting/ stopping allopurinol)

3. Acute Inflammation (Red-Hot-Swollen Joints, Tendons, Ligaments, Skin)

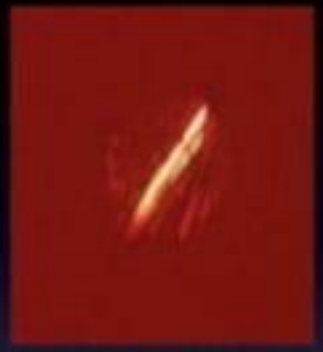
- Recruitment of macrophages that engulf marcophages
- Activation/release of inflammatory cytokines/ cells

4. Chronic Inflammation (Tophi)

- MSU crystals surrounded by granulomatous inflammation


Blood vessel
Chemotaxis attracts leukocytes
Inflammation
Phagocytosis of crystals
Rupture of leukocytes
Release of:
• Cytokines
• Enzymes
Deposits of urate
Joint space
Uric acid crystals

The Spiral of Gout



Attack Starts

Crystals Form

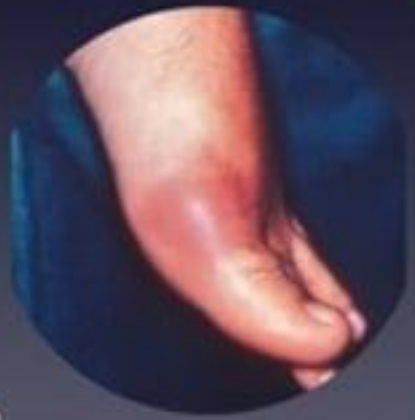
White blood cells attack

Crystals 'pop' the cell

Cell releases proteins

Proteins 'call in' more white blood cells and cause inflammation/pain

Proteins lower pH making it possible for more crystals to form

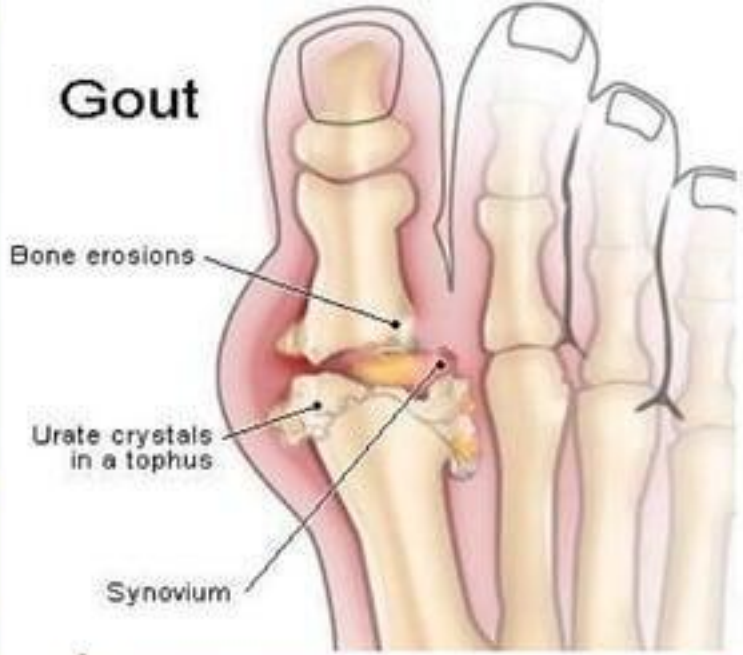


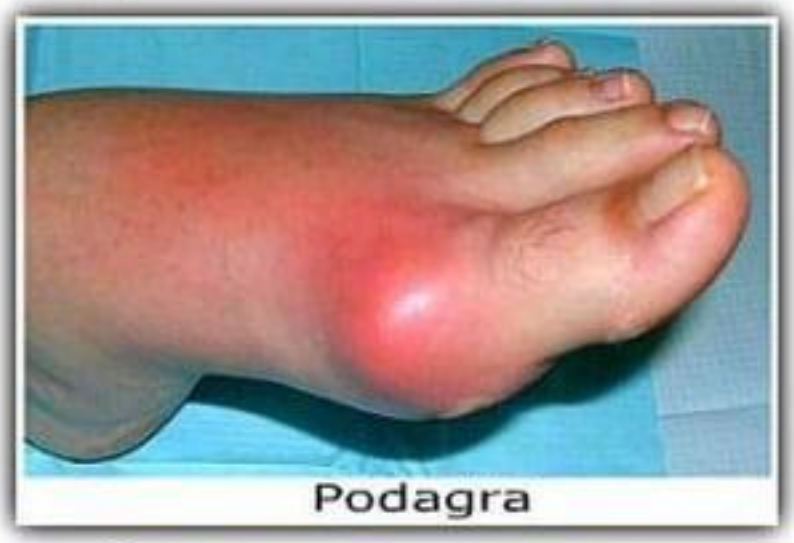
Clinical

The joints most commonly affected by gout are:

- Forefoot
  - **podagara**: - classic presentation of acute attack of first MTP joint Elbows and hands
  - unlike RA hand and wrist joints will have preserved joint spaces and normal mineralization
- The large joints (hips, knees, ankles and shoulders) are infrequently involved
- Spine very rarely affected.

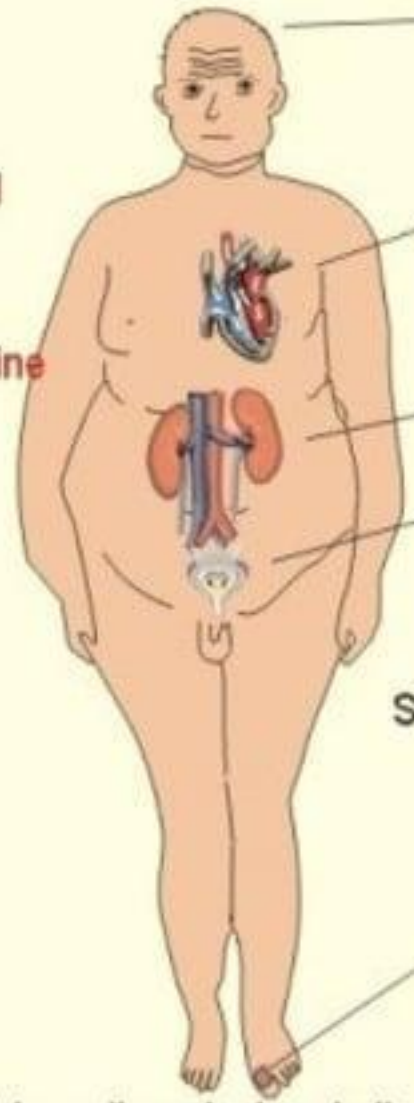
Nephrolithiasis is major extraarticular manifestation; - only small % of pts w/ gout get tophi, but many get renal stones; - pure uric acid stones are found in 80%, & uric acid is probably nidus for Ca-Phos & oxalate calculi in remainder; - in 1/2, sx from renal stones actually precede arthritis


Gout
Bone erosions
Urate crystals in a tophus
Synovium


Podagra


a
b

Patient With Gout And Complications



Stroke

Hypoxanthine

Allopurinol

XO blocked

Xanthine

Alloxanthine

XO blocked

Uric acid

Heart failure
Acute myocardial infarction

Renal damage by hypertension
Hyperuricaemic nephropathy
Urate stones
Urate-Ca^{2+} - stones

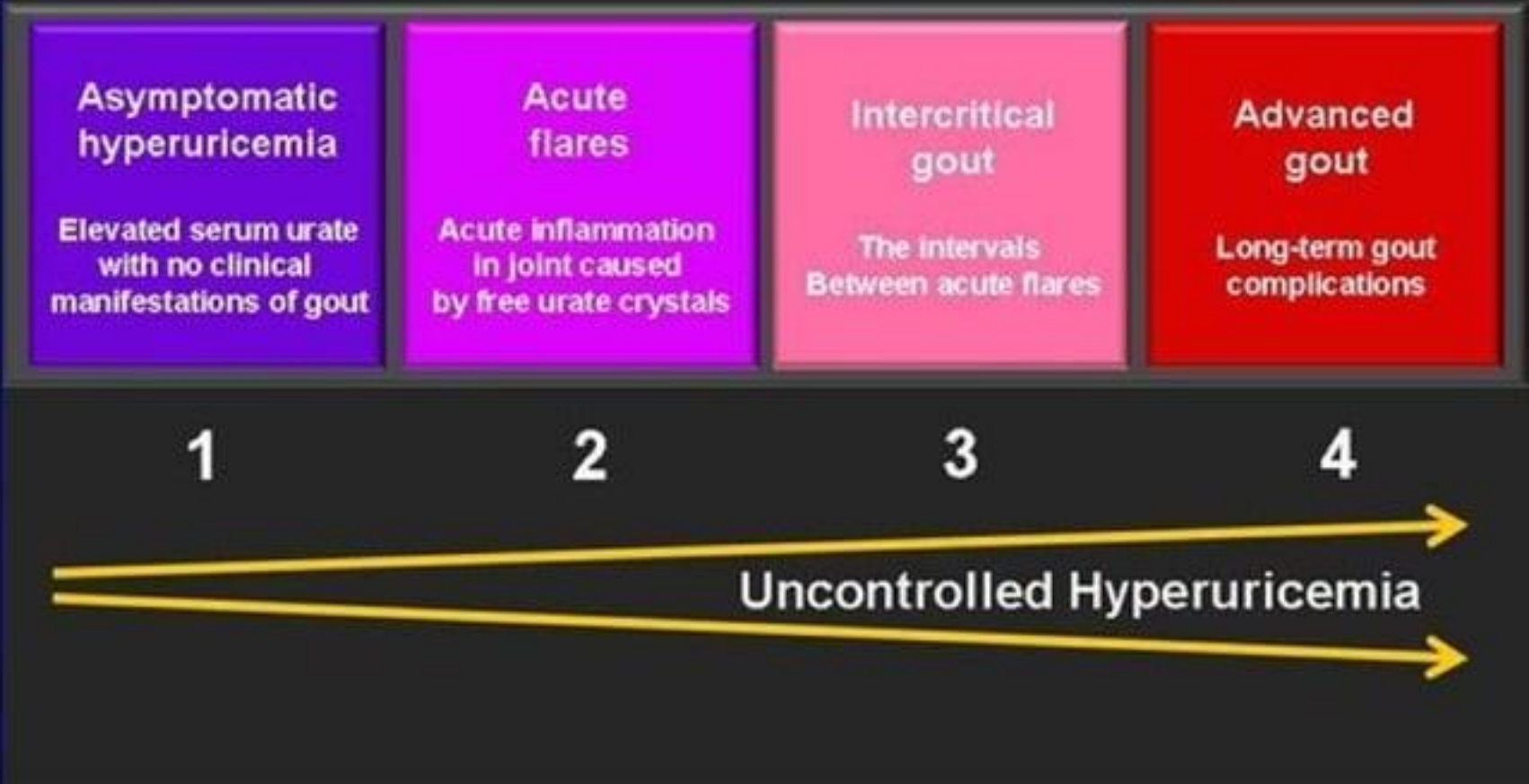
Saturation threshold: 0.42 mM

Podagra (gout): Na^{+}-urate crystals

Hypoxanthine, xanthine, allopurinol and alloxanthine are water soluble

Gout

One chronic disease, 4 stages: Separation may be incomplete between stages 2–4 stage 1 can reflect "disease"



Laboratory

- Hyperuricemia
  - biochemical hallmark of gout, but not by itself diagnostic for gout
- Leukocytosis
- Increased ESR
- Synovial Fluid
  - leukocyte counts = septic arthritis
  - viscosity is < septic or inflammatory arthritis
- MSU needle - like intracellular & extracellular crystals
- Negatively birefringent crystals under polarized light microscopy

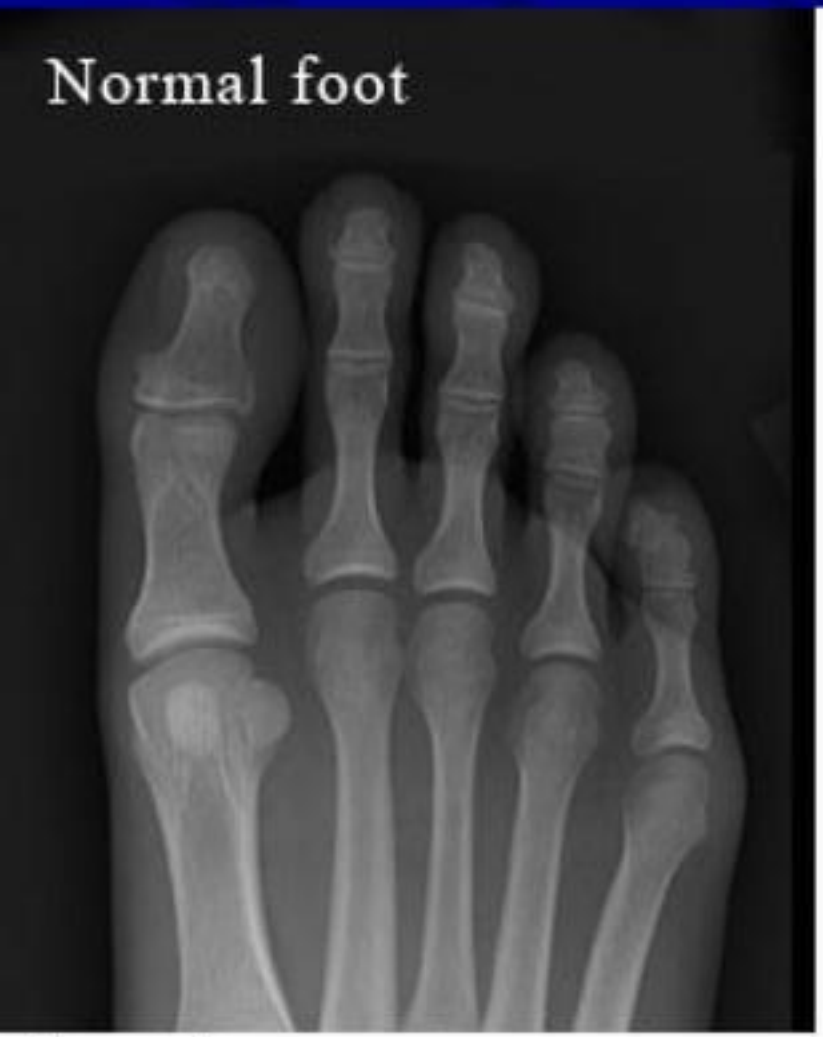


Figure 1

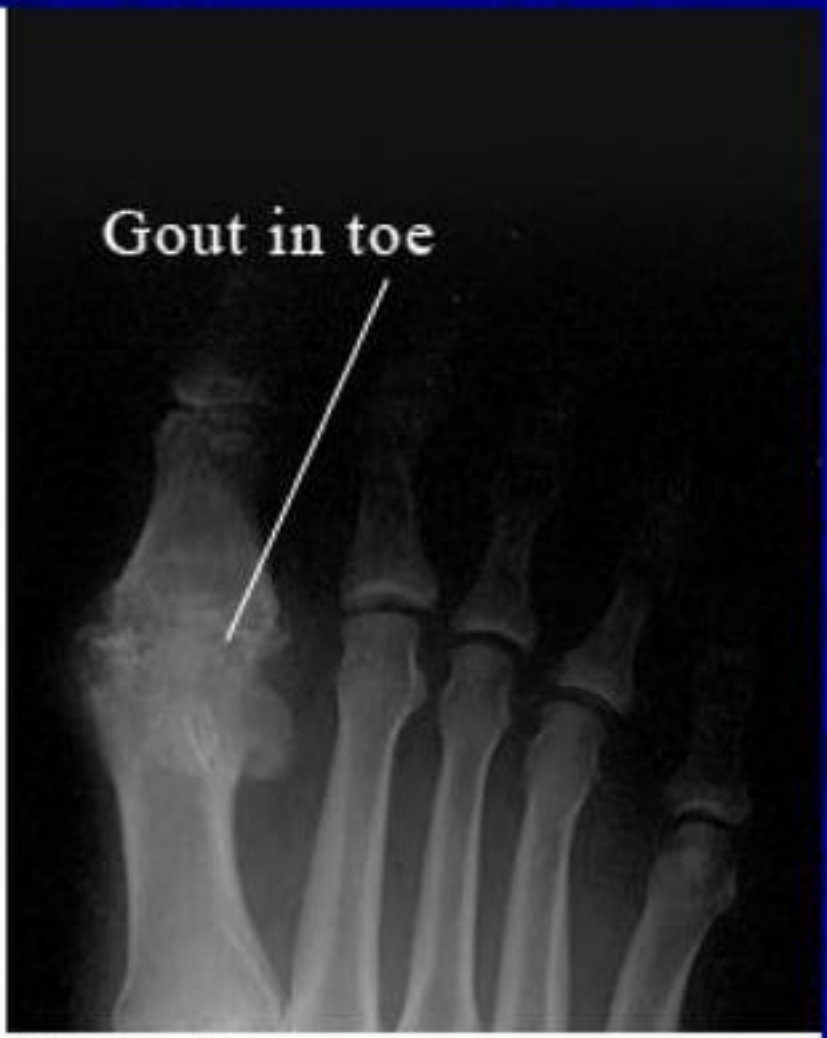


Figure 2

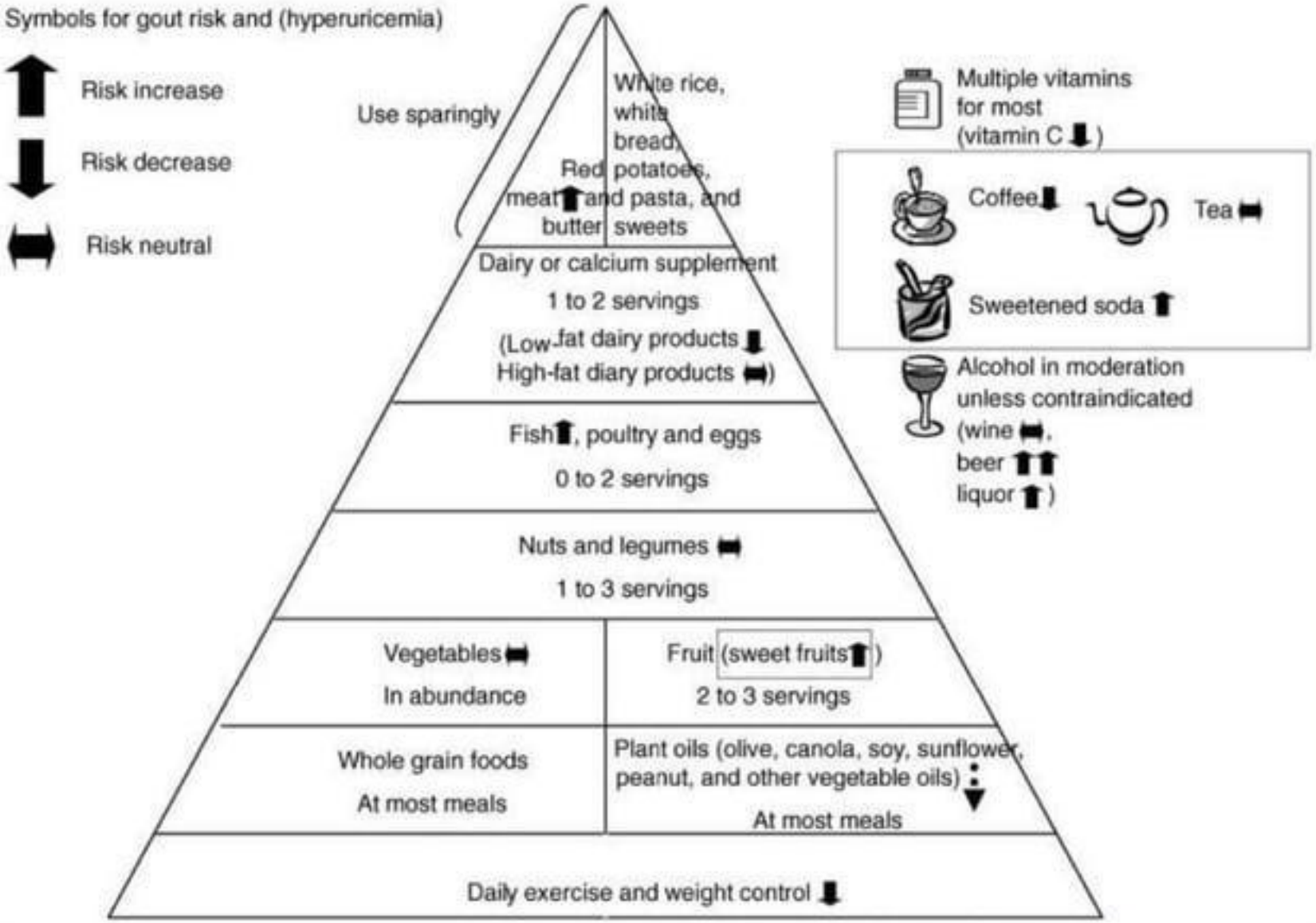
Treatment

Acute Attacks:

- Indomethacin 75mg stat. then 25mg BD
- Colchicine intravenous - 0.6 mg 2 hours until pain decreases

Chronic:

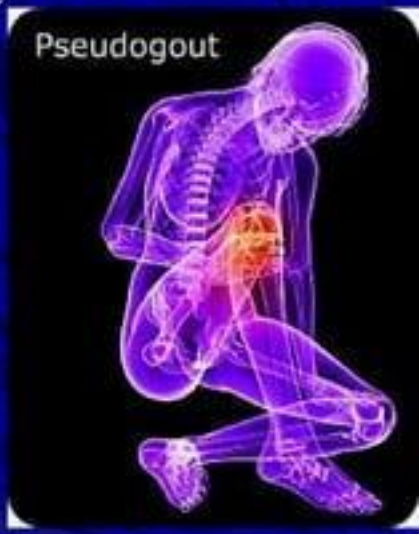
- Allopurinol for hyperuricaemia & tophi
- Colchicine for prophylaxis


Gout risk and a healthy eating pyramid
Symbols for gout risk and (hyperuricemia)
Risk increase
Risk decrease
Risk neutral
Use sparingly
White rice, white bread, potatoes, and pasta, and sweets
Red meat and butter
Dairy or calcium supplement
1 to 2 servings
(Low-fat dairy products
High-fat diary products)
Fish, poultry and eggs
0 to 2 servings
Nuts and legumes
1 to 3 servings
Vegetables
In abundance
Fruit (sweet fruits)
2 to 3 servings
Whole grain foods
At most meals
Plant oils (olive, canola, soy, sunflower, peanut, and other vegetable oils)
At most meals
Daily exercise and weight control
Multiple vitamins for most (vitamin C)
Coffee
Tea
Sweetened soda
Alcohol in moderation unless contraindicated (wine , beer , liquor)

PSEUDOGOUT

CHONDROCALCINOSIS

- Acute arthritis caused by Calcium pyrophosphate dihydrate (CPPD) crystal-induced inflammation
- May perfectly mimic gout during acute flare
- Attacks occurring before age 50 are uncommon

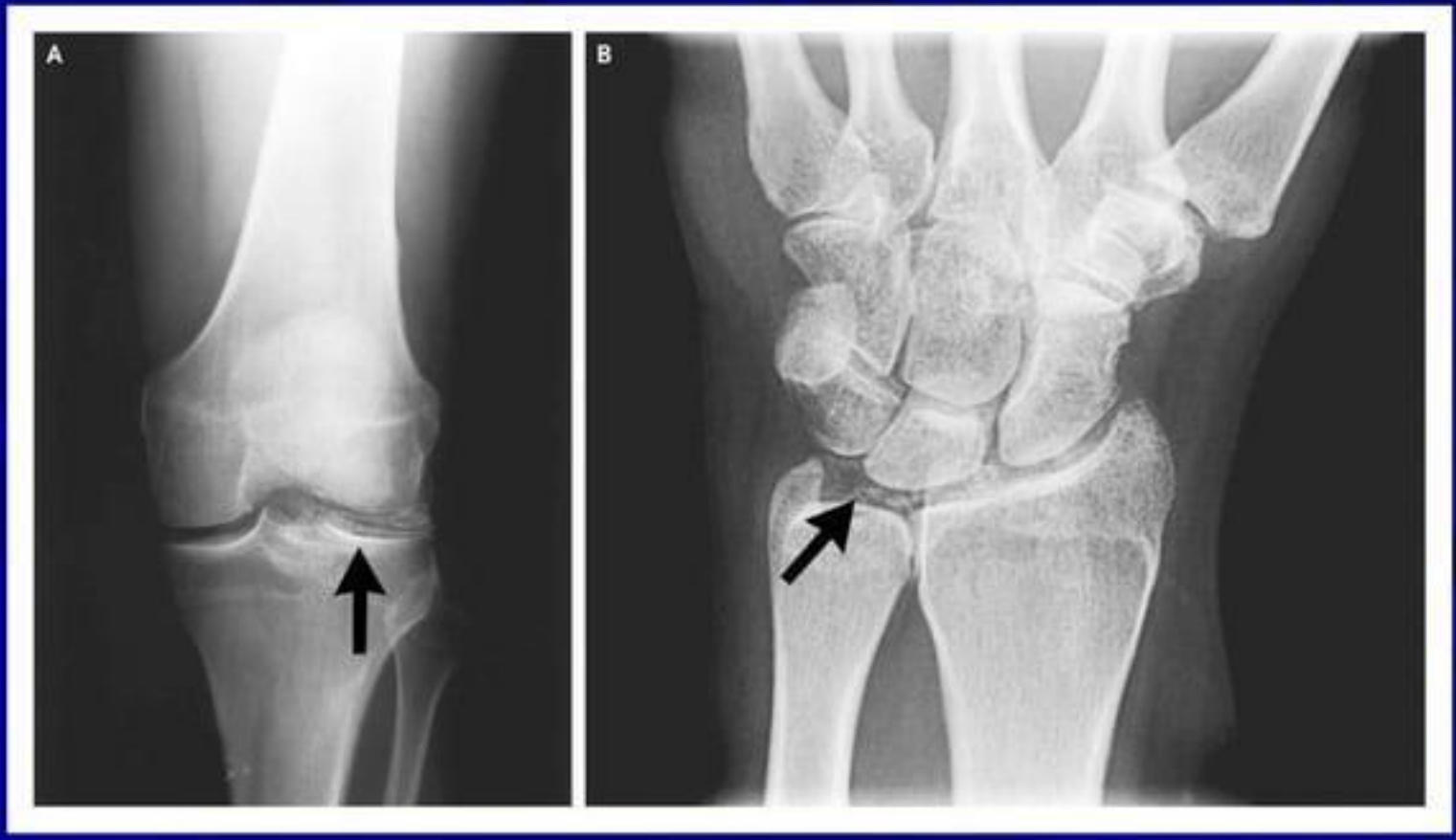


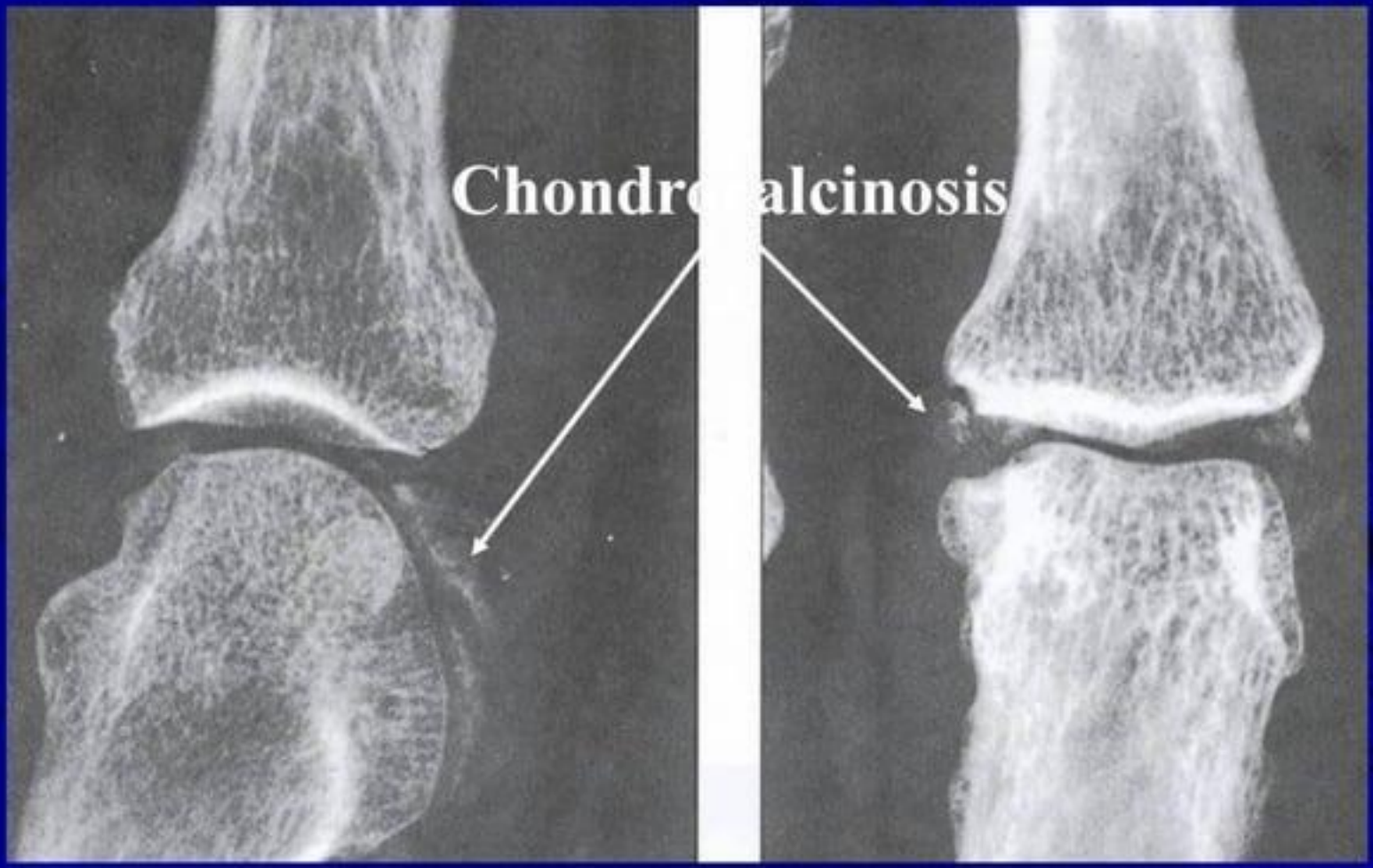
Clinical:

- Most often affects the knee and the wrists

Radiology:

- Calcification densities in hyaline or fibrocartilage, which are found in knee menisci, acetabular labrum, & TFCC


A
B


Chondr alcinosis

Laboratory

- Fluid analysis:
  - CPPD crystals are visualized under compensated polarized light microscopy
  - crystals may be more difficult to detect than MSU crystals because of their smaller size, more intralysosomal location, & less brilliant colors
  - CPPD crystals show weak positive birefringency and have squared or rhomboidal shaped ends
  - alizarin red stain, can confirm that these clumps are masses of calcium crystals

Treatment:

- aspiration of the involved joint and steroid injection, once diagnosis of infection has been excluded, will usually control symptoms