



INVESTIGATION OF RHEUMATOLOGICAL DISORDERS

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ROLL NO :14***

- ***Deals with diagnosis and management of disorders affecting the joint, muscle, bone, connective tissue and also include autoimmune disease like RA, SLE, vasculitis***
- ***Rheumatology is concerned with disorders of the musculoskeletal system and systemic autoimmune diseases.***

HISTORY & CLINICAL EXAMINATION

- *Joint pain and swelling*
- *Joint tenderness*
- *Muscle weakness*
- *Joint stiffness*
- *Limited range of motion*
- *Joint deformity*

- **Systemic symptoms** - *fatigue, fever, weight loss*
 - *skin manifestation (rash, photosensitivity
Ulcer, discoloration)*
 - *Raynaud's phenomenon*
 - *Respiratory involvement*
 - *Cardiac manifestation*
 - *Renal involvement*
 - *Neurological manifestation (peripheral
neuropathy, cognitive dysfunction, seizure)*
 - *Gastrointestinal symptoms*

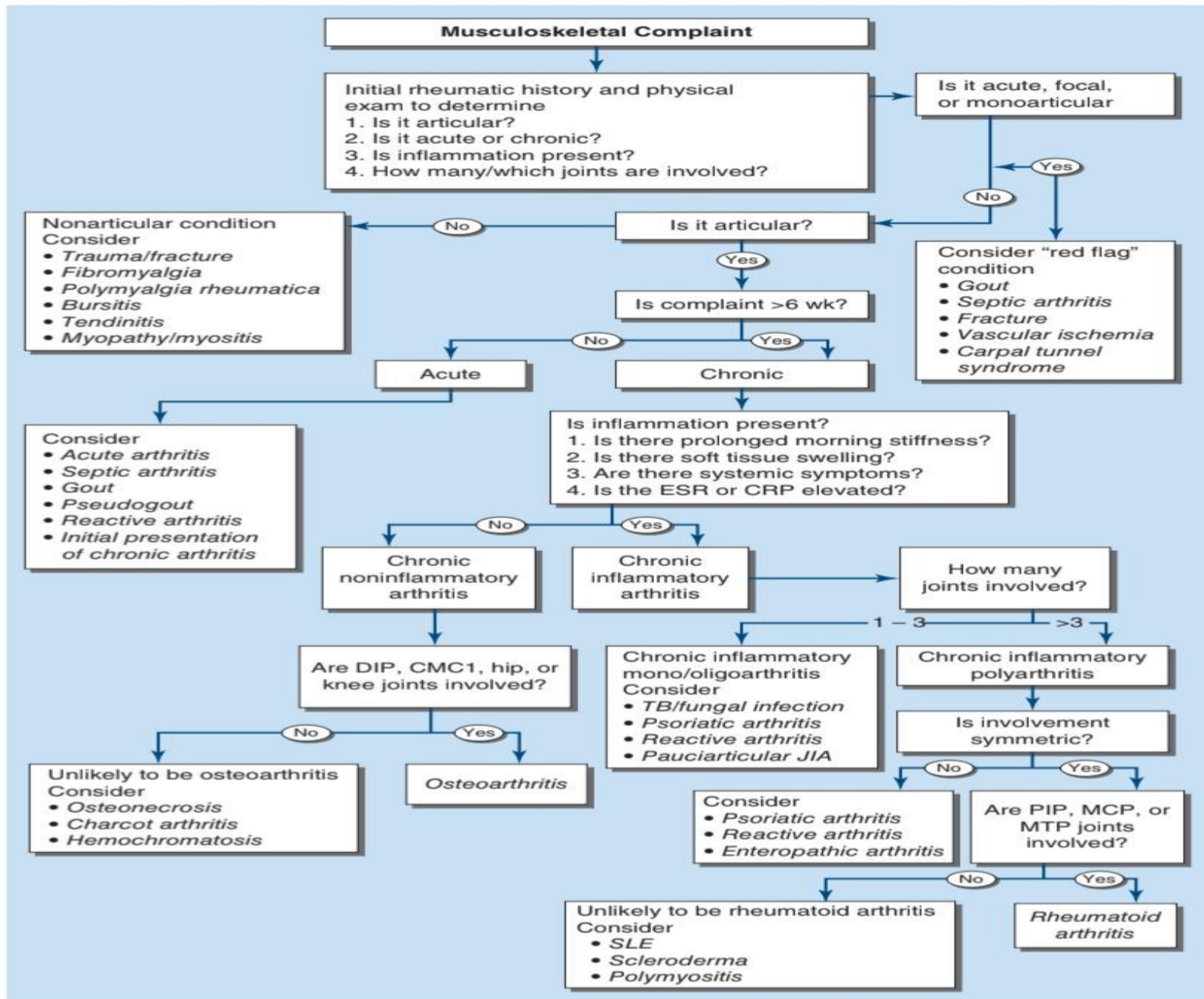


FIGURE 382-1 Algorithm for the diagnosis of musculoskeletal complaints. An approach to formulating a differential diagnosis (shown in italics). CMC, carpometacarpal; CRP, C-reactive protein; DIP, distal interphalangeal; ESR, erythrocyte sedimentation rate; JIA, juvenile idiopathic arthritis; MCP, metacarpophalangeal; MTP, metatarsophalangeal; PIP, proximal interphalangeal; PMR, polymyalgia rheumatica; SLE, systemic lupus erythematosus; TB, tuberculosis.

| Duration | Examples |
|---------------------|--|
| Acute < 6 weeks | <ul style="list-style-type: none">• Gout• Acute CPPD (pseudogout), Septic arthritis |
| Subacute 6–12 weeks | <ul style="list-style-type: none">• Gonococcal arthritis• Drug-induced arthritis• Osteoarthritis |
| Chronic > 12 weeks | <ul style="list-style-type: none">• Rheumatoid arthritis• Psoriatic arthritis• SLE |

| Features | Articular | Periarticular |
|----------------------|--|---------------------------------|
| Anatomical structure | Bone, synovium, cartilage, and capsule | Tendon, bursa, ligament, muscle |
| Pain site | Diffuse | Localized |
| Pain on movement | Active/passive in all planes | Active in few planes |
| Swelling | Common | Uncommon |

Differentiating inflammatory from non-inflammatory pain

| | Inflammatory | Noninflammatory |
|---------------------------------|---------------------|------------------------|
| Early morning stiffness | > 1 hr (usually) | < 30 min |
| Rest | Worsens the pain | Improves the pain |
| Activity | Improves the pain | Worsens the pain |
| Systemic signs and symptoms | Present | Absent |
| Inflammatory markers (ESR, CRP) | Elevated | No effect |
| Corticosteroids | Relieves the pain | No effect |
| Examples | RA, SLE, PsA | OA |

| Number of Joints | Examples |
|----------------------------|---|
| Monoarthritis (1) | <ul style="list-style-type: none">• Gout• Septic arthritis• Reactive arthritis |
| Oligoarthritis (2–4) | <ul style="list-style-type: none">• Reactive arthritis• Psoriatic arthritis (common)• Osteoarthritis |
| Polyarthritis (≥ 5) | <ul style="list-style-type: none">• Rheumatoid arthritis• Psoriatic arthritis (less common)• Osteoarthritis• SLE |

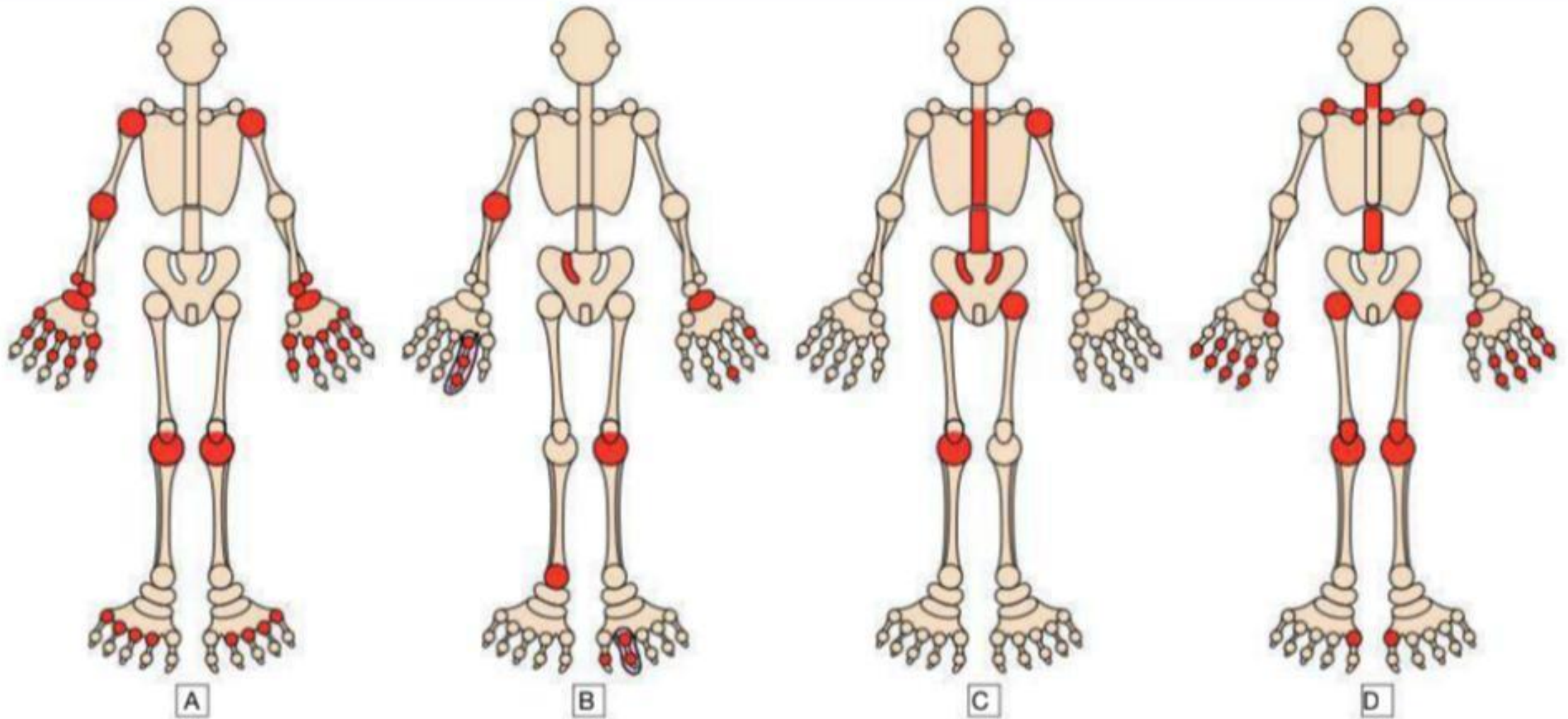


Fig. 26.10 Patterns of joint involvement in different forms of polyarthritis. **A** Rheumatoid arthritis typically targets the metacarpophalangeal and proximal interphalangeal joints of the hands and metatarsophalangeal joints of the feet, as well as other joints, in a symmetrical pattern. **B** Psoriatic arthritis targets proximal and distal interphalangeal joints of the hands, entheses and larger joints in an asymmetrical pattern. Sacroiliitis (often asymmetrical) may occur. **C** Axial spondyloarthritis/ankylosing spondylitis targets the spine, sacroiliac joints, entheses and large peripheral joints in an asymmetrical pattern. **D** Osteoarthritis targets the proximal and distal interphalangeal joints of the hands, first carpometacarpal joint at the base of the thumb, knees, hips, lumbar and cervical spine.

INVESTIGATION

Hematology

- **Anemia** – Inflammatory disease
eg: SLE, RA
- **Neutrophilia** – Crystal arthritis
Septic arthritis
- **Neutropenia** – SLE
- **Lymphopenia** – RA, Connective tissue disease
- **Leukopenia** – SLE, RA, Sjogren's syndrome
- **Leucocytosis** – RA, Vasculitis, Reactive arthritis,
Infection
- **Eosinophilia** – SLE, RA, IBD, Sarcoidosis
- **Thrombocytopenia** – Parvovirus B19 infection
- **Thrombocytosis** – Vasculitis, Infection

BIOCHEMISTRY

- ***Uric acid level raised in gout***
- ***CRP- marker of infection and inflammation***
 - ***more specific than ESR***
 - ***CRP normal in SLE/Systemic sclerosis***
- ***Creatine phosphokinase- myopathy myositis***

Imaging

A. Plain x-ray

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26.3 Radiographic abnormalities in selected rheumatic diseases

Rheumatoid arthritis

- Periarticular osteoporosis
- Marginal joint erosions
- Joint subluxation
- Joint space narrowing

Osteoporosis

- Osteopenia
- Vertebral fractures
- Non-vertebral fractures
- Cortical thinning

Paget's disease

- Bone expansion
- Abnormal trabecular pattern
- Osteosclerosis and lysis
- Pseudofractures

Psoriatic arthritis

- Sacroiliitis
- Syndesmophytes
- Bone sclerosis
- Proliferative entheses erosions
- Enthesophytes
- Juxta-articular new bone

Osteoarthritis

- Joint space narrowing
- Osteophytes
- Subchondral sclerosis
- Joint deformity
- Subchondral cysts

- ***Spondyloarthritis :# Erosion and sclerosis of sacroiliac joint***
syndesmophytes in spine
- ***Gout :# punched out erosion***
urate crystals
- ***SLE :# periarticular soft tissue swelling***
joint erosion



Figure 1



Figure 2



B. MRI

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26.4 Conditions detected by magnetic resonance imaging

- Osteonecrosis
- Intervertebral disc disease
- Nerve root entrapment
- Spinal cord compression
- Spinal stenosis
- Infection
- Complex regional pain syndrome
- Malignancy
- Fractures
- Meniscal disease
- Synovitis
- Sacroiliitis and enthesitides
- Inflammatory myositis
- Rotator cuff tears, bursitis and tenosynovitis

C. USG

- ***For detection of tendinitis, tenosynovitis, synovitis, bursitis, entrapment neuropathy***

D. CT

- ***for calcified lesion***

E. Radionuclide bone scintigraphy

- ***Nuclear imaging technique using IV 99mTc-labelled bisphosphonate to detect areas of increased bone turnover.***
- ***Useful in Metastatic bone disease, Paget's disease, Occult fractures, Osteomyelitis, Complex regional pain syndrome, inflammatory arthritis***

F. Dual X-ray absorptiometry

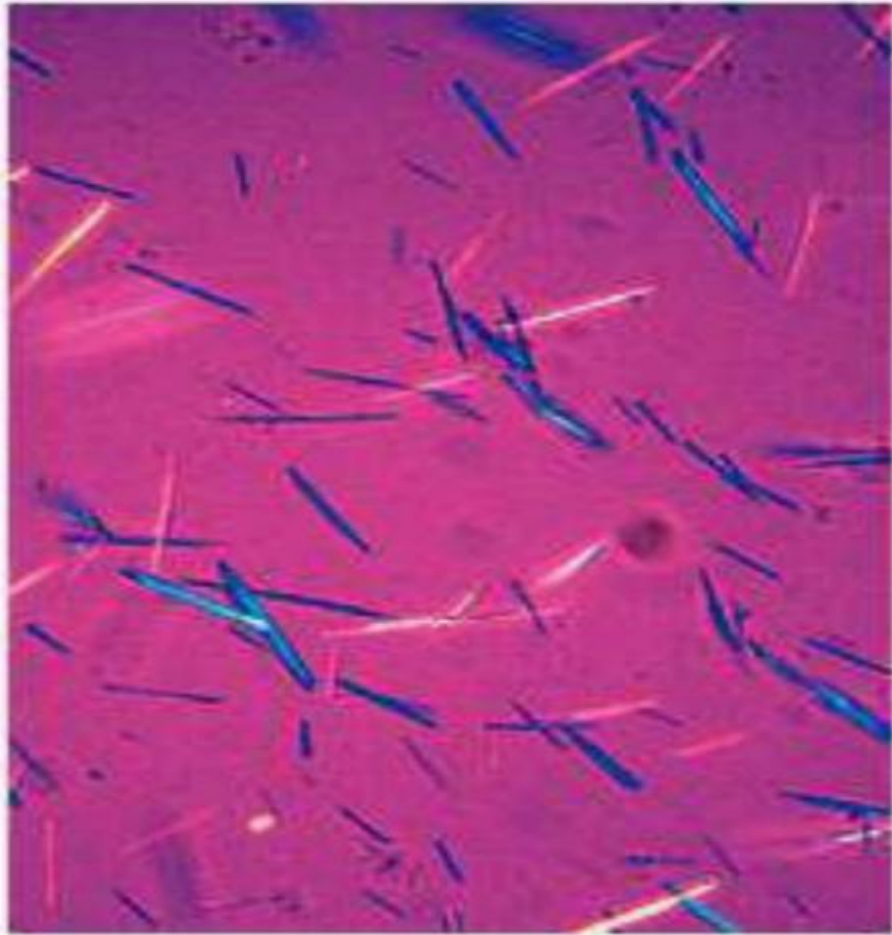
- ***Used to measure Bone Mineral Density (BMD)***
- ***Useful in Osteoporosis***

Joint Aspiration

- **Indication : septic arthritis, crystal arthritis, intra articular bleeding**
- **Normal sf : small volume, clear, high viscosity, few cells**
- **Inflammation : volume increases, cell count increases viscosity decreases,**
- **Septic arthritis : sf will be turbid with high neutrophil count**
- **Sf white : urate crystal or cholesterol**
- **Blood staining :# Non uniform : needle trauma**
 - # Uniform : bleeding diathesis, trauma, severe Inflammation**
 - #lipid layer : intra articular fracture**

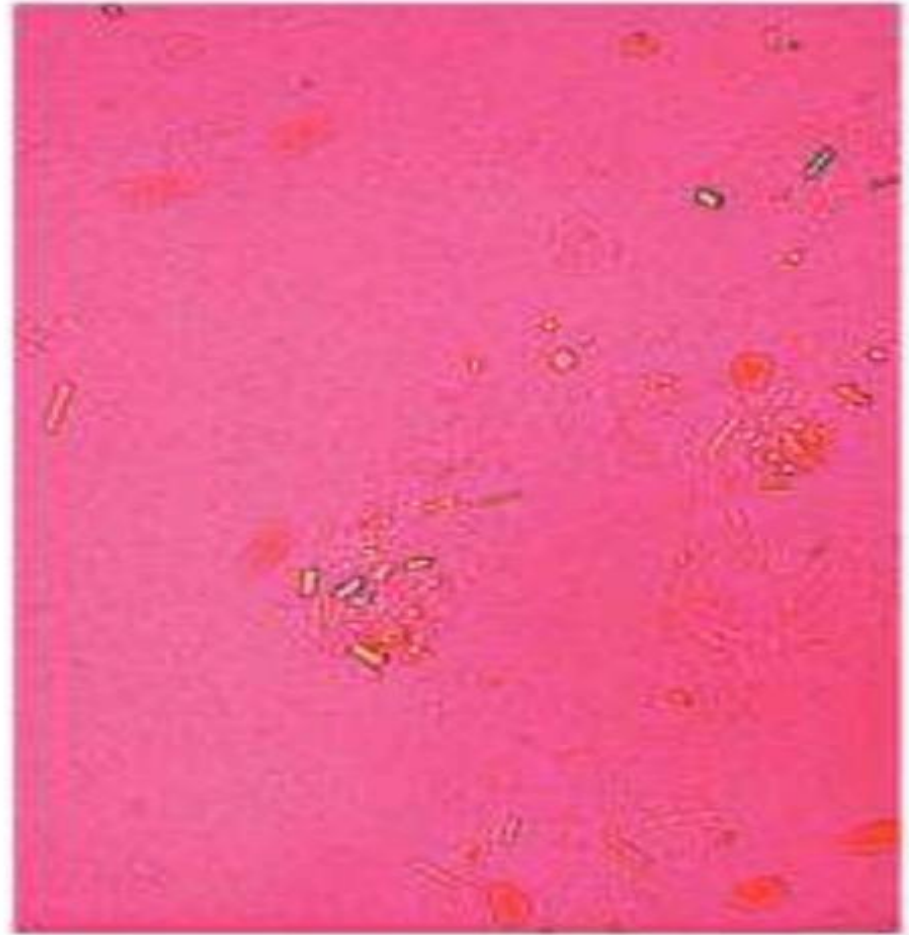
- ***Crystal can be identified by polarised light microscopy***

A



Urate crystal

B



***Calcium pyrophosphate
Crystal***

Immunology

A. Rheumatoid Factor

- *Antibody against Fc fragments of human immunoglobulin*
- *About 70% of people with RA will test positive for Rf*
- *High titre is associated with more severe disease and extra articular features*

i**26.7 Conditions associated with a positive rheumatoid factor***

| Condition | Approximate frequency (%) |
|---|----------------------------------|
| Rheumatoid arthritis with nodules and extra-articular manifestations | 100 |
| Rheumatoid arthritis (overall) | 70 |
| Primary Sjögren syndrome | 90 |
| Mixed essential cryoglobulinaemia | 90 |
| Primary biliary cholangitis | 50 |
| Infective endocarditis | 40 |
| Systemic lupus erythematosus | 30 |
| Tuberculosis | 15 |
| Age > 65 years | 20 |

*Normal healthy people can be positive for rheumatoid factor.

B. Anti citrullinated peptide antibodies (ACPA)

- ***Recognize peptides in which the AA arginine are converted to citrulline by enzyme peptidylarginine deiminase(collagen, alpha enolase, vimentin)***
- ***ACPA Positive in 70% of RA***
- ***High specificity (>95%)***
- ***Positive result seen in SLE, sjogren, tb, lung disorder***

C. Anti Nuclear Antibody

- ***Directed against component of cell nucleus (NA, protein)***
- ***Done in patient suspecting SLE, connective tissue disorder***

i**26.8 Conditions associated with a positive antinuclear antibody***

| Condition | Approximate frequency (%) |
|--|----------------------------------|
| Systemic lupus erythematosus | 100 |
| Systemic sclerosis | 90–95 |
| Sjögren syndrome | 40–70 |
| Dermatomyositis or polymyositis | 30–80 |
| Mixed connective tissue disease | 100 |
| Autoimmune hepatitis | 100 |
| Rheumatoid arthritis | 30–50 |
| Autoimmune thyroid disease | 30–50 |
| Malignancy | Varies widely |
| Infectious diseases | Varies widely |

*Low-titre positive antinuclear antibody can occur in people without autoimmune disease, without obvious clinical consequences, particularly in older adults.

i**26.9 Conditions associated with antibodies to extractable nuclear antigens**

| Antibody (target/other name) | Disease association |
|--|---|
| Anti-centromere antibody | Localised cutaneous systemic sclerosis (sensitivity 60%, specificity 98%) |
| Anti-histone antibody | Drug-induced lupus (80%) |
| Anti-Jo-1 (anti-histidyl-tRNA synthetase) | Polymyositis, dermatomyositis or polymyositis–systemic sclerosis overlap (20%–30%) Particularly associated with interstitial lung disease |
| Anti-La antibody (anti-SS-B) | Sjögren syndrome (60%) SLE (20%–60%) |
| Anti-ribonucleoprotein antibody (anti-RNP) | Mixed connective tissue disease (100%) SLE (25%–50%), usually in conjunction with anti-Sm antibodies |
| Anti-Ro antibody (anti-SS-A) | SLE (35%–60%): associated with photosensitivity, thrombocytopenia and subacute cutaneous lupus Maternal anti-Ro antibodies associated with neonatal lupus and congenital heart block Sjögren syndrome (40%–80%) |
| Anti-RNA polymerase | Diffuse systemic sclerosis (15%) |
| Anti Sm (anti-Smith antibody) | SLE (15%–30%); associated with renal disease |
| Anti-Scl-70 (anti-topoisomerase I antibody) | Diffuse systemic sclerosis (15%); associated with more severe organ involvement, including pulmonary fibrosis |

(SLE = systemic lupus erythematosus)

D. Antiphospholipid Antibodies

- ***Seen in patient's with SLE, antiphospholipid syndrome***

E. Antineutrophil cytoplasmic Antibodies

- ***IgG antibodies against cytoplasmic constituents of neutrophil***
- ***Based on target antigen and pattern of immunofluorescence staining two pattern of ANCA are present***
 - 1. PR3 ANCA/cANCA***
 - 2. MPO ANCA/ pANCA***

PR3 ANCA/ cANCA

- ***PR3 (proteinase 3) is a constituent of neutrophil azurophilic granule***
- ***Anti bodies against these PR3 are PR3 ANCA***
- ***They produce cytoplasmic fluorescence (cANCA)***
- ***Associated with wegeners granulomatosis/
granulomatosis with polyangitis***

MPO – ANCA/ p ANCA

- ***MPO(myeloperoxidase) is a lysosomal enzyme***
- ***Anti bodies against this MPO re MPO ANCA***
- ***They produce peri nuclear fluorescence***
- ***Associated with microscopic polyangitis, churg-strauss syndrome, propylthiouracil***

- ***Useful in diagnosis and monitoring of systemic vasculitis***
- ***Positive result seen in autoimmune liver disease, malignancy, IBD, RA, SLE, pulmonary fibrosis***

F. Complement and complement component Antibodies

- ***Low C3 – SLE, Vasculitis***
- ***High C3 and functional measures of complement activation are non specific features of inflammation***
- ***Anti C1 q antibodies are associated with SLE***

Tissue Biopsy

- ***Synovial biopsy – chronic inflammatory monoarthritis, tenosynovitis***
- ***Temporal artery biopsy- giant cell arteritis***
- ***Biopsy of affected tissue in systemic vasculitis***
- ***Muscle biopsy – myopathy, inflammatory myositis***
- ***Bone biopsy – infiltrative disease of bone, malignancy***

Electromyography

- ***Suspected myopathy, inflammatory myositis***
- ***Diagnostic triad***
 - # ***Spontaneous fibrillation***
 - # ***Short duration action potential***
 - # ***Repetitive bout of high voltage oscillation on needle contact with diseased muscle***

REFERENCE

- Davidson's Principles and Practice of Medicine
- Archith Bloor
- Harrison's Principles of Internal Medicine

Thank
you