Musculoskeletal System
Osteoarthritis & Rheumatoid Arthritis

Connective Tissue Diseases (CTD)

- Rheumatology – study of rheumatic diseases
- Rheumatic disease – any disease or condition involving the musculoskeletal system
- Connective tissue diseases – usually classified as autoimmune disorders

Arthritis

- Inflammation of a joint
- 1 in every 4 persons in the U.S. has some form of arthritis
- Warning signs are often ignored

- **Classifications:**
  - **Inflammatory**
    - Rheumatoid- like
      - RA, scleroderma, lupus, polymyositis, lyme disease
    - Spondylarthropathy – diseases of the joints of the spine
      - Ankylosing spondylitis
  - **Degenerative**
    - Osteoarthritis
  - **Metabolic**
    - Gout, hyperlipidemia

- **Collagen Diseases**
  - skeletal muscles, bones, & joints

<u>Osteoarthritis</u>

- Degenerative Joint Disease (DJD)
- Symptomatic osteoarthritis appears in the ages of 50-70 yrs
- Before age 50, males > females
- Incidence of OA after 50 is 2x as great in females > estrogen reduction at menopause

- Etiology:
  - Unknown
  - "wear & tear" disease
  - Many contributors = **aging, trauma, obesity, infection, congenital abnormalities, smoking**
  - Genetic predisposition
  - Primary cause → unknown (idiopathic)
  - Secondary cause → trauma, obesity

- **Pathophysiology:**
  - A disease of the articular cartilage; noninflammatory; disorder of the diathrodial (synovial) joints
  - <u>Normal articular cartilage</u>: Smooth, White, Translucent
  - <u>Affected Cartilage</u>:
    - Dull, yellow, granular
    - Softer, less elastic

- Less able to resist wear
  - Areas of cartilage soften & the surface becomes rough, frayed, & cracked → eventually destroyed
    - Metabolic response at level of chondrocytes
    - Body's attempt to repair cannot keep up
  - Fissuring and erosion (cracking & grooves)
  - Central cartilage becomes thinner
  - Spurs or osteophytes appear at the joint surfaces and increase at joint margins
  - Incongruent joint surfaces create:
    - Uneven distribution of stress across the joint
    - Reduction in motion
  - **Secondary synovitis**
    - **Inflammatory changes →** phagocytes ridding the joint of the tiny cartilage pieces torn away from the joint surface **= early pain and stiffness (treat with anti-inflammatories)**
  - Osteoarthritis affects only the joints & their surrounding tissues

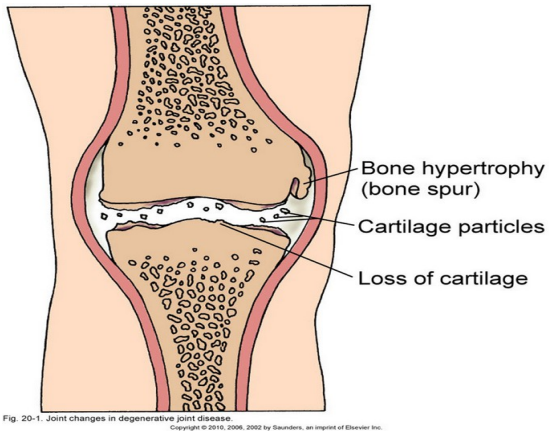
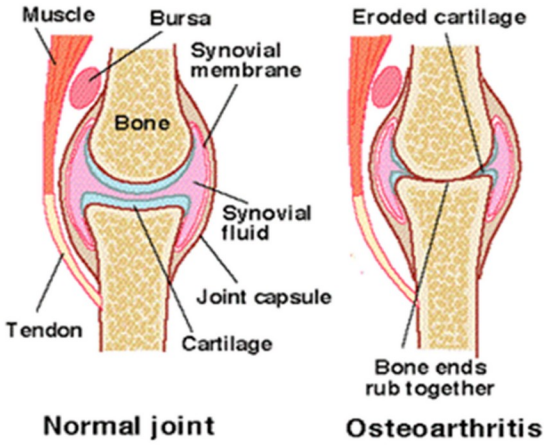


Fig. 20-1. Joint changes in degenerative joint disease.



- **Clinical Manifestations**
  - No systemic manifestations
  - Joint pain
    - Predominant symptom
    - Relieved by rest in early stages
    - Generally worsens with joint use
    - May become worse as barometric pressures fall
    - Affects joints asymmetrically
    - Early morning stiffness
  - Resolves within 30 minutes

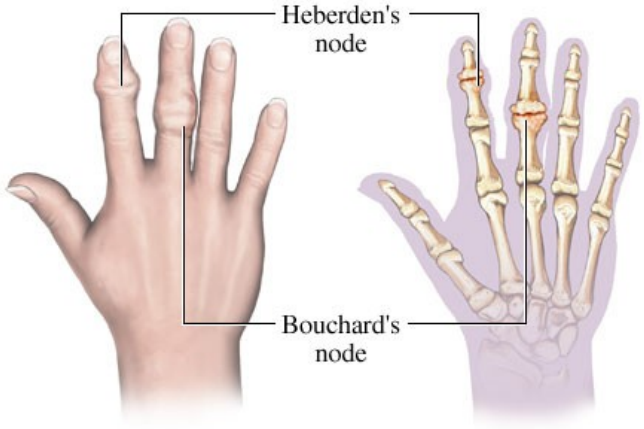
  - May be referred to:
    - Groin
    - Buttock
    - Medial side of thigh or knee
  - Crepitation
    - Grating sensation caused by loose particles of cartilage
    - Coxarthrosis- pain in the hip on weight bearing with pain progressing to indicate groin and medial knee

  - Most Commonly Involved Joints: (**<u>limited ROM or decreased ROM</u>**)

- Distal interphalangeal (DIP)
- Proximal interphalangeal (PIP)
- Carpometacarpal joint of the thumb
- Weight-bearing joints (hips, knees)
- Metatarsophalangeal (MTP)
- Cervical and lower lumbar vertebrae

– Deformity
- Heberden's nodes: bulge or swelling; red swollen tender
– DIP joints- dorsal
– Indication of osteophyte formation
  – Bouchard's nodes: red, swollen, tender
    – PIP joints

*Even though OA is not a symmetrical disease, the node deformities can occur bilaterally



– Deformity
- Knee involvement
– Varus - bowlegged
– Valgus – knock-kneed
– Flexion deformity
– Crepitus
– ↓ ROM

- **Diagnostic Studies**

– X-Ray = narrow joint space & osteophytes; confirmation & stage of damage
– Bone Scan
– CT
– MRI – early dx
– ESR & CRP – r/o RA
– CBC – baseline for tx
– Synovial fluid – OA vs. other inflammatory arthritis

- **Medical Management:**

– Objectives
- Relief of pain
- Restoration function
- Prevention of disability or further progression

– **Drug therapy:**

- Want to ↓ pain & inflammation
- Based on the severity of symptoms

- Acetaminophen (Tylenol)

  - Topical agents (capsaicin cream/Capsin - alkaloid derived from hot peppers; trolamine salicylate/Aspercreme; menthol/Bengay)

- NSAIDS (Celecoxib) – monitor kidneys

- Intra-articular injection of steroids

- Non-opioid & opioid analgesics (oxycontin, oxycodone, hydrocodone)

- Glucosamine & Chondroitin- glucosamine plays a role in synthesis of new cartilage (naturally occurring)

- Hyaluronic acid (viscosity and elasticity of synovial fluid)
  - Synvisc- viscosity; lubricating properties; intra-articular injection; S/fx = knee pain, swelling, rash
  - Hyalgan- 3 weekly injections; anti-inflammatory benefits; short-term lubrication

- Supplements: ginger, fish oil – anti-inflammatory properties

– Physical Therapy- balance rest and activity; avoid immobilization; modify activities to reduce stress

- Heat / Cold:
– May help reduce pain and stiffness
- Ice
– Acute inflammation
- Heat
– Stiffness
- Assistive devices- helps unload painful wt bearing
- Rest- during acute phases
- Exercise
- Joint protection – splinting, immobilization, not to exceed > 1 wk
- Weight loss

– Nutritional therapy and exercise
  - Weight-reduction plan

– Complementary and alternative therapies
  - Acupuncture
  - Yoga
  - Tai Chi

– Surgery – after conservative therapy
  - Remove bits of broken cartilage or bone → arthroscopy

- Realignment → osteotomy
- Fusion → arthrodesis
- Joint replacement → arthroplasty

- **Nursing Management**

– Nursing Assessment:
-Type, location, severity, frequency, and duration of joint pain and stiffness
-Pain relieving practices

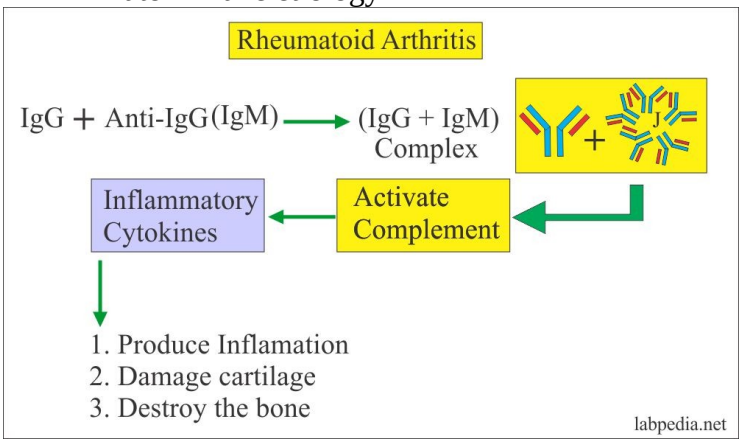
– Nursing Diagnosis:
- Acute / chronic pain
- Disturbed sleep pattern
- Impaired physical mobility
- Self-care deficits
- Imbalanced nutrition: More than body requirements
- Chronic low self-esteem

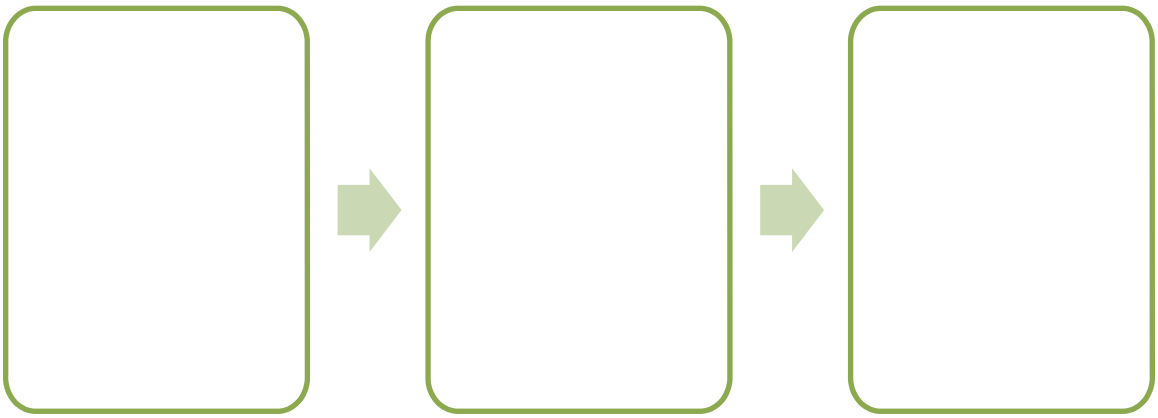
– Acute Intervention:

- Pain management
- Teaching – all related to OA: tx's, devices, exercise programs, balance rest and exercise, weight management
- Health Promotion- eliminate modifiable risk factors- weight loss, decrease hazards, fitness programs
- Ambulatory & Home care: modify environment for safety

Rheumatoid Arthritis

- A chronic, systemic autoimmune disease characterized by inflammation of connective tissue in the diarthrodial (synovial) joints
- **Periods of remission and exacerbation**
- Affects all ethnic groups
- Can occur at any time of life
  - Often during productive years of life
- Incidence increases with age
- Women 2-3x > men
- Smoking
- **Etiology**
  - Cause of RA is unknown (genetic & environmental)
  - No infectious agent
  - Autoimmune etiology





- **Pathophysiology (Autoimmunity)**
  - Changes begin when a susceptible host experiences an initial immune response to an antigen
  - Antigen triggers the formation of an abnormal immunoglobulin G (IgG)
  - RA = + autoantibodies (rheumatoid factor [RF])
  - RF and IgG make immune complexes that initially deposit on synovial membranes or superficial articular cartilage in the joints
  - An inflammatory response
    - Neutrophils are attracted to the site of inflammation and release enzymes that can damage

articular cartilage

– Continued inflammation leads to thickening of the synovium, particularly where it joins the articular cartilage

– Joint changes from chronic inflammation begin when the hypertrophied synovial membrane invades the surrounding *cartilage, ligaments, tendons, & joint capsule*.

– *Pannus* - within the joint

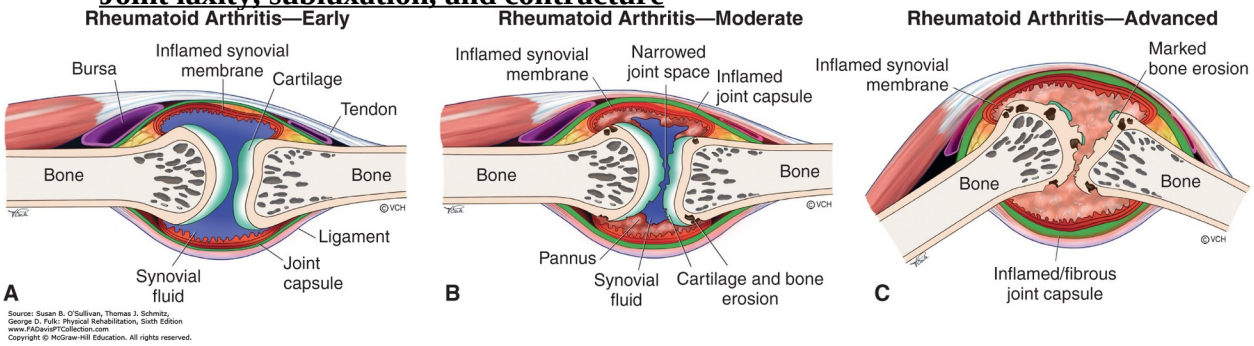
• Highly vascular granulation inflammatory tissue

– Eventually covers and erodes the entire surface of the articular cartilage

– Pannus scars and shortens supporting structures

• Tendons & ligaments

– **<u>Joint laxity, subluxation, and contracture</u>**



– Genetic predisposition

– Strongest evidence for a familial influence is the increased occurrence of certain human leukocyte antigens (HLA)

• **Stages of RA (Progression)**

– Stage 1 - Early

• No destructive changes on x-ray, possible x-ray evidence of osteoporosis, synovitis occurring

– Stage II – Moderate

• X-ray evidence of osteoporosis, with or without slight bone or cartilage destruction

• No joint deformities, some ↓ ROM

• Muscle atrophy

• Possible extra-articular soft tissue lesions

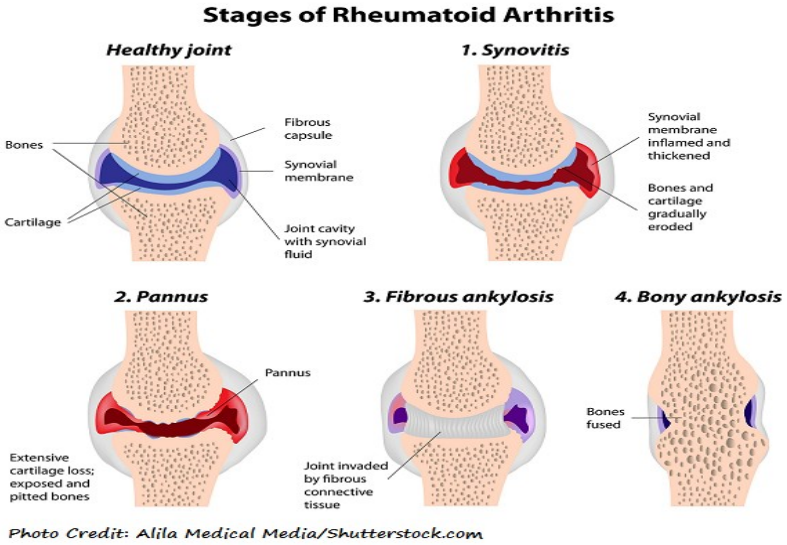
• Pannus formation ➔ into joint capsule

– Stage III – Severe

- X-ray evidence of cartilage and bone destruction in addition to osteoporosis
- Joint deformity
- Extensive muscle atrophy
- Possible extra-articular soft tissue lesions

– Stage IV – Terminal

- Fibrous tissue replaces pannus or bony ankylosis – fibrous tissue calcification
- Criteria of stage III
- **Total joint immobilization**



- **Clinical Manifestations**
- Onset = insidious

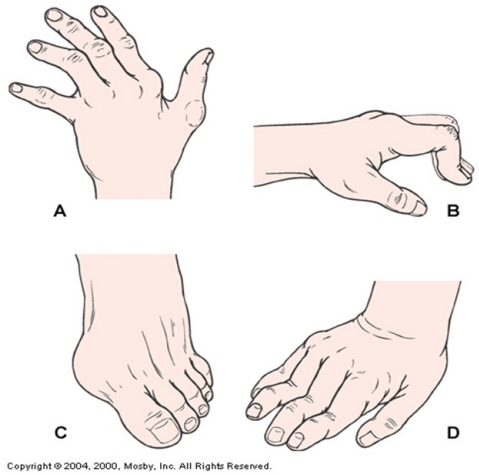
  Classified as: **Early or late disease; articular or extraarticular**
- **Nonspecific manifestations before arthritic complaints**
  - Fatigue
  - Anorexia
  - Weight loss
  - Generalized stiffness
  - Stiffness ➔ localized in weeks to months
- History of precipitating stressful events

- Specific **<u>articular</u>** involvement:
  - Pain
  - Stiffness
  - Limitation of motion
  - Signs of inflammation:

- Joint symptoms- symmetrically
- Small joints - hands and feet
- Larger peripheral joints
- Wrists, elbows, shoulders, knees, hips, ankles, and jaw
- Cervical spine
- Joint stiffness after periods of inactivity
- Morning stiffness - 60 minutes to several hours
- Joints - tender, painful, and warm
- Joint pain:
- Increases with motion
- Varies in intensity
- May not be proportional to the degree of inflammation
- Tenosynovitis – inflammation of the tendon and its sheath
- grasp objects
- Inflammation and fibrosis > deformity and disability

– Subluxation

Joint Manifestations



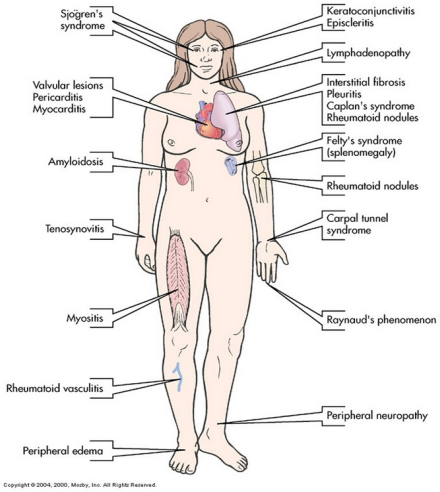
A. Ulnar Drift
B. Boutonniere Deformity
C. Hallux Valgus (bunion)
D. Swan-Neck Deformity

- **Extra-articular Clinical Manifestations**

– every system of the body
– vasculitis

– 3 most common

- Rheumatoid nodules – painless, subcutaneous nodules
- Sjögren syndrome
- Felty syndrome



– <u>Rheumatoid Nodules:</u>
  - Usually have high titers of RF
  - Appear as **firm, nontender, granuloma-type** masses
  - over the extensor surfaces of joints such as **fingers and elbows**
- Nodules at the base of the spine and back of the head are common in older adults
- Develop insidiously
- Can persist or regress spontaneously
- Usually not removed

– Sjögren Syndrome:
• 10% to 15%
• Can occur as a disease by itself or in conjunction
• **Diminished lacrimal and salivary gland secretion**
– Burning, gritty, itchy eyes, decreased tearing, photosensitivity

– Felty Syndrome:
• Occurs most commonly in patients with severe, nodule-forming RA
• Characterized by:
Splenomegaly & ↓ WBC count

• **Complications:**
– Flexion contractures and hand deformities
• Diminished grasp strength
• Affects self-care tasks
– Nodular myositis and muscle fiber degeneration >>> pain similar to that of vascular insufficiency
– Cataract and loss of vision
– Rheumatoid nodules can ulcerate
– Hoarseness
– Bone destruction from nodules in the vertebral bodies
– Cardiopulmonary effects later:
• Pleurisy, pleural effusion, pericarditis, pericardial effusion, cardiomyopathy
– Carpal tunnel syndrome

• **Diagnostic Studies:**
– Accurate diagnosis = essential
• Appropriate treatment
• Prevention of disability

– Positive RF
• abnormal antibodies
– ESR and C-reactive protein (CRP) = active inflammation
– + ANA – antinuclear antibody
– + anti-CCP– anti-citrullinated protein antibody
– Joint Aspiration = cloudy, ↑ WBC, ↑ MMP-3
– X-rays not specifically diagnostic of RA – late dx (misalignment & ankylosis)
– Bone scans - detecting **early joint changes** and confirming a diagnosis
– Arthroscopy → tissue biopsy
• Inflammation

• **Collaborative Care:**
– Care of the patient
• Drug therapy and education
– Physical therapy
– Occupational therapy

Drug Therapy:

Disease-modifying antirheumatic drugs (DMARDs)
–Side Effects: anemia, low WBC, low plt, check CBC, UA- proteinuria, LFT's

- methotrexate- rapid anti-inflammatory effect
  - works within 4-6 weeks
  - frequent monitoring
  - early treatment
  - may use in conjunction if no relief
- leflunomide (Arava)- anti-inflammatory; blocks immune cell overproduction
  - teratogenic

- sulfasalazine (Azulfidine)- for mild to mod, dec inflammation and slows disease process

Antimalarials (subdivision DMARDs)
for persistent arthritis; unknown effect, may suppress antigen formation; decreases inflammation and slows disease process
– hydroxychloroquine/Plaquenil
–Side effects
»retinopathy- rare, irreversible degeneration may occur; drug deposits in pigment layer of retina

–Takes 4-6 months to see effects; requires Eye exams baseline & yearly
Gold Salts (subdivision of DMARDs)
Not in use as much; inflammatory suppressive effect; alters immune responses and decreases prostaglandin synthesis
–Parenteral: deep IM weekly x 5 months
–Po – auranofin/Ridaura
–Side Effects: rash, oral ulcers, indigestion
–Takes 3-6 months to see effects

Biologic Therapy/Biologic Response Modifiers/Immunotherapy (subdivision immunosuppressant's)

– etanercept/Enbrel: give SC, decreases inflammatory and immune responses

  – s/fx: injection site reaction, erythema, pain, swelling, abd pain, dizziness, vomiting, HA

– infliximab/Remicade: given with methotrexate, IV; antibodies - decrease infiltration of inflammatory cells

  – s/fx: abd pain, N/V, dizziness, HA

  – Adalimumab/Humira: decreases inflammation, tenderness swelling of joints, slows or prevents progressive destruction of joints
    – SC injection every other week and may increase to weekly if not on methotrexate
    – Teach how to inject!

- s/fx: injection site, HA, rash, sinusitis; DO NOT receive live vaccines

NSAIDs – nonsteroidal anti-inflammatory drugs inhibit synthesis of prostaglandins

–celecoxib/Celebrex – Cox 2 inhibitors

–Ibuprofen (advil, motrin)

–indomethacin/indocin, naproxen/naprosyn, diclofenac/volteran, tolmetin/tolectin, meloxicam/Mobic

–Side Effects of NSAIDs: **dyspepsia, ulcers, hemorrhage, GI irritation**, HA, dizziness; check RFP & LFT's

Salicylates – Aspirin

- 3-4 g / day
- Takes 2-3 weeks to see effects
- Side Effects: gi irritation, hypersensitivity, prolonged bleeding time
- Teach: take with meals if gi upset, enteric coated to prevent irritation
- » Salicylism – nausea, tinnitus, dizziness

Corticosteroids – anti-inflammatory analgesic

- Helps manage symptoms during flares
- Prednisone, methylprednisolone, solumedrol (IV)
- Intraarticular: temporarily reduce pain and inflammation
- Oral: low dose, limited time
- Not for long-term use
- Complications of use:

–Side Effects of steroids: suppression of local infection, intra articular, cushing's syndrome, fluid retention, gi irritation, OP, HTN, poor wound healing, hyperglycemia, bruising: Teach to TAPER!

Drug therapy- depends on disease activity, level of function, lifestyle

– Nutritional Therapy:
• Balanced nutrition
• Weight loss
– loss of appetite
– Inability to shop for and prepare foods
• Corticosteroids or immobility - unwanted weight gain
• Exercise reduces stress on arthritic joints
• Weight slowly adjusts to normal several months after cessation of therapy

• **Acute Interventions:**
– Goals in the management of RA
• Reduction of inflammation

- Manage pain
- Maintenance of joint function
- Prevention or correction of joint deformity

Ambulatory Care

– Comprehensive program to meet goals
- Drug therapy
- Rest
- Joint protection
- Heat and cold applications
- Exercise
- Patient and family teaching

– Lightweight splints
- Rest inflamed joints and prevent deformity
– Skin care
– Range-of-motion exercises

- **Ambulatory & Home Care**

– Alternate rest and activity
- Relieve fatigue and pain
– Rest before becoming exhausted
– Modify daily activities
– Body alignment
  - Firm mattress
  - Bed board
– Positions of extension
  - **Avoid flexion**
– **Lying prone for half an hour twice daily**

- **Joint Protection**

– Energy conservation
– Work simplification techniques: short periods, rest breaks, spread it out
  - OT – assistive devices for ADL's

- **Heat & Cold Therapy**

– Help relieve stiffness, pain, and muscle spasm
– Cold (<10 to 15 minutes at a time)
  - Beneficial during periods of disease exacerbation
– Moist heat (<20 minutes at a time)
  - Relief of chronic stiffness
  - Topical heat-creams

- **Exercise**

– Gentle ROM - daily
– Usual daily activities do not provide adequate exercise to maintain joint function.
– During acute inflammation, exercise should be limited to 1 to 2 repetitions.

- **Psychological Support**

– Must have a thorough understanding of RA
– The patient is constantly threatened by problems

- Limited function
- Self-esteem
- Body image
- Fear of disability and deformity

– Help the patient recognize fears and concerns
– Evaluation of family support
– Financial planning, Community resources, Self-help groups