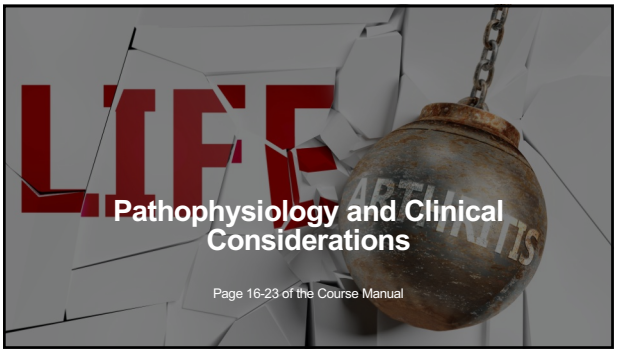

Pathophysiology and Clinical Considerations

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Session Objectives

- By the end of this presentation, you will be able to:
- Describe the pathophysiology of Osteoarthritis, Rheumatoid Arthritis
- Types of Arthritis, Stages, and Related Impairments.
- Understand the disease process and the exercise response for those with these musculoskeletal conditions and disorders

2

Pathophysiology of Arthritis

- Pathophysiology translates to "**the process of disease**".
- OA is "a common joint disease characterised by degeneration of the cartilage that lines the joints or by formation of osteophytes, leading to pain, stiffness, and occasionally loss of function" (BMA, 2018).

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Osteo Arthritis (OA)

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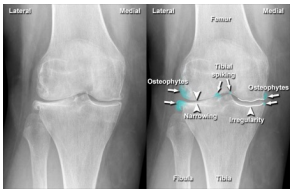
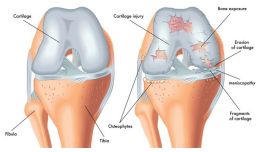
Arthritis of the Knee





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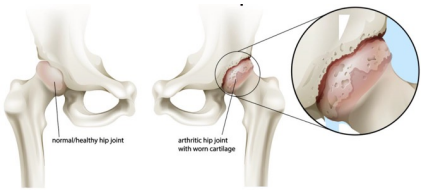
Arthritis of the Hip Joint



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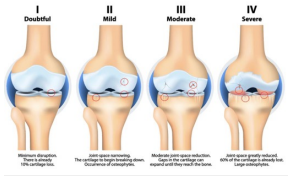
Pathophysiology of Osteoarthritis



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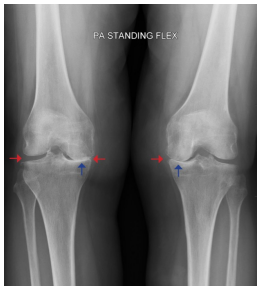

Diagnosis of Osteoarthritis

X-rays demonstrating osteophyte formation (red arrows) and joint space loss in the medial compartments (blue arrows).

8

Diagnostic Testing OA

- The diagnosis of osteoarthritis (OA) is based on gaining patient history and conducting a physical examination.
- Physical examination of the patient's reduced range of motion, joint malalignment and crepitus (a grating sound or sensation produced by friction between bone and cartilage) is required prior to diagnosis.

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Diagnostic Testing OA

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Classification	Measures
	Osteoarthritis
Distinctive characteristics	Joint pain Crepitus Gel occurrence
Appearance	• Affects the hands, hips, knees, and lumbar and cervical spine • Pain worsens throughout the day • Affects any traumatized joint
ACR Criteria	• Knee clinical • Knee pain and three of the following: • Age >50 years • Morning stiffness <30 min • Crepitus • Bony tenderness • Bony enlargement • No warmth
	Knee clinical and radiographic • Knee pain and one of the following: • Clinical criterion [a, b, or c] (see below) • Osteophytes on knee X-ray
	Knee clinical and laboratory • Knee pain and five of the following: • Clinical criteria [a through c] (see below) • ESR <44 mm · h^{-1} • RF <1:40 • Synovial fluid compatible with OA
	Hip combined clinical, laboratory, and radiographic • Hip pain and one of the following: • ESR <20 mm · h^{-1} • Osteophytes on hip X-ray • Joint space narrowing on hip X-ray
	Hand clinical • Hand pain or stiffness and three of the following: • Bony enlargement of two or more DIPs • Bony enlargement of two or more of 2nd and 3rd DIPs, 2nd and 3rd PIPs, 1st CMC • Fewer than three swollen MCPs • Deformity of at least one of 2nd and 3rd DIPs, 2nd and 3rd PIPs, 1st CMC

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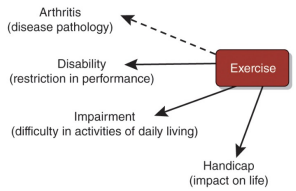
WHO (ICIDH)



Adapted from R.J. Shephard and P.N. Shek, "Autoimmune Disorders, Physical Activity, and Training, with Particular Reference to Rheumatoid Arthritis," Exercise Immunology Review 3 (1997): 53-67.

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Causes of OA

- There is **not** one specific cause of OA.
- Risk factors include:
  - Age
  - Biological sex
  - Obesity
  - Inactivity
  - Joint injury
  - Ageing/retired professional athletes
  - Genetics
  - Co-morbidities

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Nonpharmacologic Treatment for Osteoarthritis of the Knee

Treatment	Comments
Exercise	
Resistance training	Avoid if joint pain worsens. Progressive training is most effective. Exercises in a pool or partial-weight-bearing exercises are often tolerated better than equivalent full-weight-bearing exercises.
Aerobic	
Unloading	
Cane or crutch	A cane should be held contralateral to the affected knee with the hand at the level of the greater trochanter of the hip. The cane and the affected leg should contact the ground at the same time.
Weight loss	
Realignment	
Braces and patellar taping	Indicated when malalignment is noted on examination and pain is unresponsive to other medical treatments. Braces or taping can cause skin irritation and can impede the return of blood flow from the distal leg.
Shoe inserts	
Acupuncture	Reduces pain on average only moderately after several sessions.

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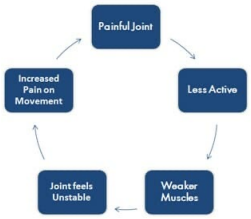
Have a 10 Minute Break



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Rheumatoid Arthritis

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Pathophysiology of Rheumatoid Arthritis

- Rheumatoid arthritis is the most **common auto-immune disease**
- RA typically occurs in people with descendants from Asia or Europe (Helmick et al., 2008) and family history has also been suggested as a risk factor for this disease.
- This disorder manifests more commonly in women (Jahanbin et al., 2014) and in smokers (Wasserman, 2011) affecting 1% globally (Ovayolu, Ovayolu and Karadag, 2011).

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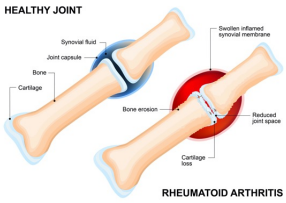
Rheumatoid Arthritis

- Rheumatoid arthritis (RA) is an autoimmune disorder that causes chronic inflammation of the joints of the body (Tuna et al., 2015)
- Normally affects individuals over 40 years of age but can develop earlier
- Results in a continuing decline in physical mobility and QoL and premature death .



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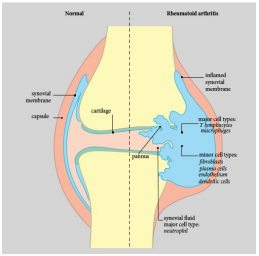
Rheumatoid Arthritis



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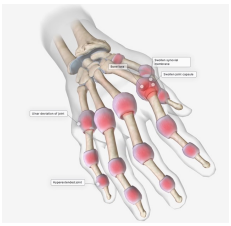
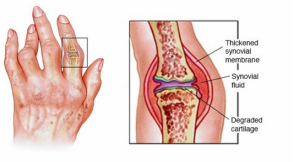
Advanced Rheumatoid Arthritis





The body's protective response against foreign elements is that of inflammation. However, in RA, the body's immune system releases antibodies that cause inflammation that attacks the cartilage and synovial lining of the joints.

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Early Stages of Established Rheumatoid Arthritis

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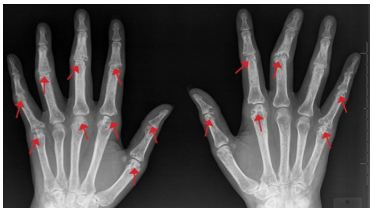

X-rays demonstrating rheumatoid arthritis of the hand, seen in bilateral hand radiographs

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Mid-Rheumatoid Arthritis with Dramatic Synovitis

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Late Rheumatoid Arthritis with Nodules and Deformities

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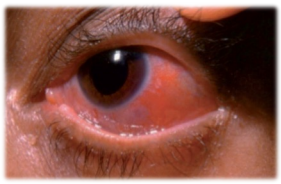
Episcleritis in Rheumatoid Arthritis



inflammation between the conjunctiva and the sclera

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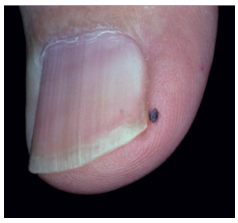
Rheumatoid Vasculitis – Periungual Infarct



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Late-Stage Arteritis in Rheumatoid Arthritis

Late-stage arteritis in rheumatoid arthritis. This patient is presenting with gangrene of the toes as a complication of rheumatoid arthritis-related vasculitis.

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ACR and the ELAR (2010)

The key purpose concentrated on:

- (1) the identification among individuals with newly presented homogenous inflammatory synovitis;
- (2) factors that best categorise between those who were and those who were not at high risk for persistent erosive disease.

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Types of Arthritis, Stages, and Related Impairments

Type of arthritis	Disease stage	Related impairments
Osteoarthritis	Acute joint pain	Often subtle
Chronic radiographic joint disease	Chronic with exacerbation	Increased joint pain and swelling, muscle weakness, and progressively declining functional impairment
Rheumatoid arthritis	Acute disease in multiple joints with pain, limited range of motion, and worsened functional impairment; often symmetrical joint involvement	Joint stiffness, adverse body composition changes (rheumatoid cachexia; muscle loss and fat gain), muscle weakness, fatigue, and increased cardiovascular disease risk

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Clinical Considerations

- The signs and symptoms of arthritis are as follows:
- Pain
- Stiffness
- Joint effusion
- Synovitis
- Deformity
- Crepitus

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Diagnostic Testing RA

- Patient history is important, but a physical examination, laboratory tests (blood tests), and radiographs are frequently helpful in confirming a diagnosis.

Stage 1 is early-stage RA.
Stage 2 is moderate stage RA.
Stage 3 is considered severe.
Stage 4 is end-stage RA when joints no longer work.

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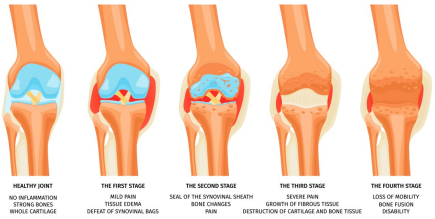
Diagnosis of RA



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Diagnostic Testing RA

Classification	Measures Assessment
	Rheumatoid Arthritis
Distinctive characteristics	• Hand pain • Swelling • Fatigue • Prolonged morning stiffness
Appearance	• Affects wrists, MCPs, and PIPs • Symmetric
ACR Criteria	A score of >6 out of 10 based on the following: • Joint involvement [a] Two to 10 large joints [b]: 1 One to three small joints [c] (with or without the involvement of large joints): 2 Four to 10 small joints (with or without the involvement of large joints): 3 More than 10 joints (at least one small joint): 5 • Serology Low-positive RF or low-positive ACPA: 2 High-positive RF or high-positive ACPA: 3 • Acute-phase reactants, abnormal [d] CRP or ESR: 1 • Duration of symptoms ≥6 weeks: 1

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Causes of RA

- The cause of rheumatoid arthritis (RA) is not known, but a hereditary predisposition and an environmental agent, such as a virus, are suspected.
- RA is an autoimmune condition, whereby the body's immune system attacks itself.
- Genetic factors and immune system abnormalities contribute to disease propagation.
- Triggers might include stress, an infection or virus, or hormonal changes. Also, cigarette smoking, infection, or trauma could be external triggers.

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Symptoms of RA

- Pain is often felt in the small joints of the fingers and toes, although shoulders and knees can be affected early in the disease process.
- Pain can increase as the disease progresses.
- Persistent symmetric polyarthritis (synovitis) of hands and feet (hallmark feature).
- Joints can feel stiff, especially in the mornings (>30mins).
- Joint swelling, heat, tender to touch, and pain.
- Rheumatoid nodules.
- Difficulty performing ADLs.
- Muscle stiffness.
- Lack of appetite.
- Weight loss.
- Muscle tenderness is not specific for RA.

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Pain

- Pain is a common symptom of both OA and RA.
- The experience of pain varies from person to person.
- A person's threshold and tolerance for pain is affected by genetics and experience.
- The source of pain in arthritis is not particularly well understood.
- Note that pain associated with arthritis is different to muscle discomfort experienced during exercise.
- The exercise instructor must assess the client's symptoms of pain before, during and after exercise to make judgements on the benefits and risks of the exercise session.
- It is recommended to gain feedback 24 hours after exercise to explore the potential changes in the client's

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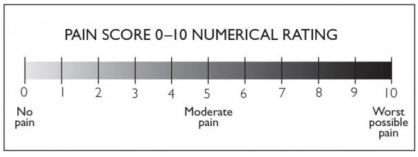
Visual Numeric Pain Scale (Ritter et al., 2006)



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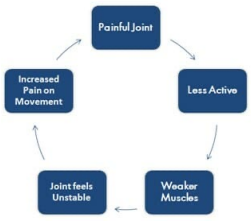
Have a 10 Minute Break



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