

# Osteoarthritis

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# OA - Definition

- ▶ Heterogeneous group of conditions resulting in common histopathologic and radiologic changes involving
- ▶ Entire joint organ, including:
  - ▶ the articular cartilage
  - ▶ the subchondral bone and
  - ▶ the synovium.

# Epidemiology

- ▶ Internationally, osteoarthritis is the most common articular disease. Estimates of its frequency vary across different populations.
- ▶ 80-90% of individuals older than 65 years have evidence of radiographic osteoarthritis.
- ▶ the prevalence of osteoarthritis is higher among women than among men.
- ▶ Interethnic differences in the prevalence of osteoarthritis have been noted.

# Involved joints

Weight-bearing joints, including:

- the knees

- the hips

- cervical and lumbosacral spine

- feet.

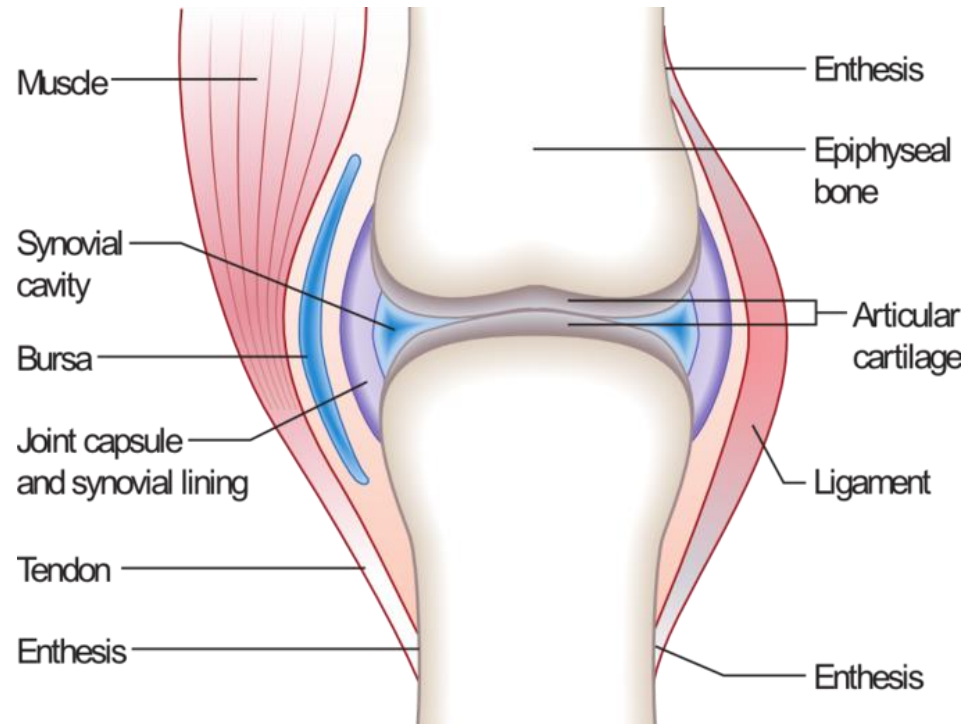
Non weight bearing joints:

- the(DIP), the(PIP), and the(CMC) joints.

# Synovial Joints

- ▶ Articular cartilage
- ▶ Subchondral bone
- ▶ Synovial membrane
- ▶ Synovial fluid
- ▶ Joint capsule

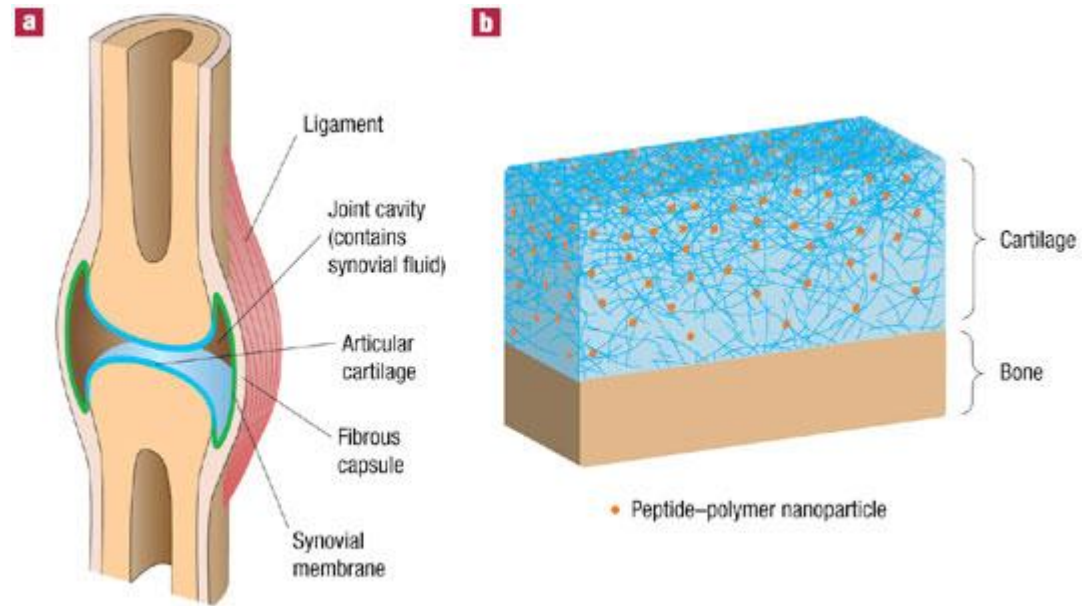
# Synovial joint anatomy



# The normal articular surface of synovial joints

- ▶ articular cartilage ( chondrocytes) surrounded by extracellular matrix includes
- ▶ proteoglycans and collagen. The cartilage facilitates joint function and protects the underlying subchondral bone by
- ▶ distributing large loads,
- ▶ maintaining low contact stresses, and
- ▶ reducing friction at the joint.

# Synovial cartilage





# Synovial Fluid

- ▶ Synovial fluid is formed by (synoviocytes).
- ▶ Synovial cells also manufacture hyaluronic acid (HA, also known as hyaluronate), a glycosaminoglycan that is the major noncellular component of synovial fluid.
- ▶ Synovial fluid supplies nutrients to the avascular articular cartilage; it also
- ▶ provides the viscosity needed to absorb shock from slow movements
- ▶ provides elasticity required to absorb shock from rapid movements.

# Pathogenesis

- ▶ Swelling of the cartilage usually occurs
- ▶ the level of proteoglycans eventually drops very low, the cartilage softens and lose elasticity and compromising joint surface integrity.
- ▶ Flaking and fibrillations (vertical clefts) develop along on the surface of an osteoarthritic joint. Over time, the loss of cartilage results in loss of joint space.
- ▶ a greater loss of joint space occurs at those areas experiencing the highest loads.

# Cartilage changes

## MORPHOLOGY



# Clinical and Radiological



# Bone changes

- ▶ Bone denuded of its protective cartilage continues to articulate with the opposing surface.
- ▶ Eventually, the increasing stresses exceed the biomechanical yield strength of the bone.
- ▶ The subchondral bone responds with vascular invasion and increased cellularity, becoming thickened and dense (a process known as eburnation) at areas of pressure.

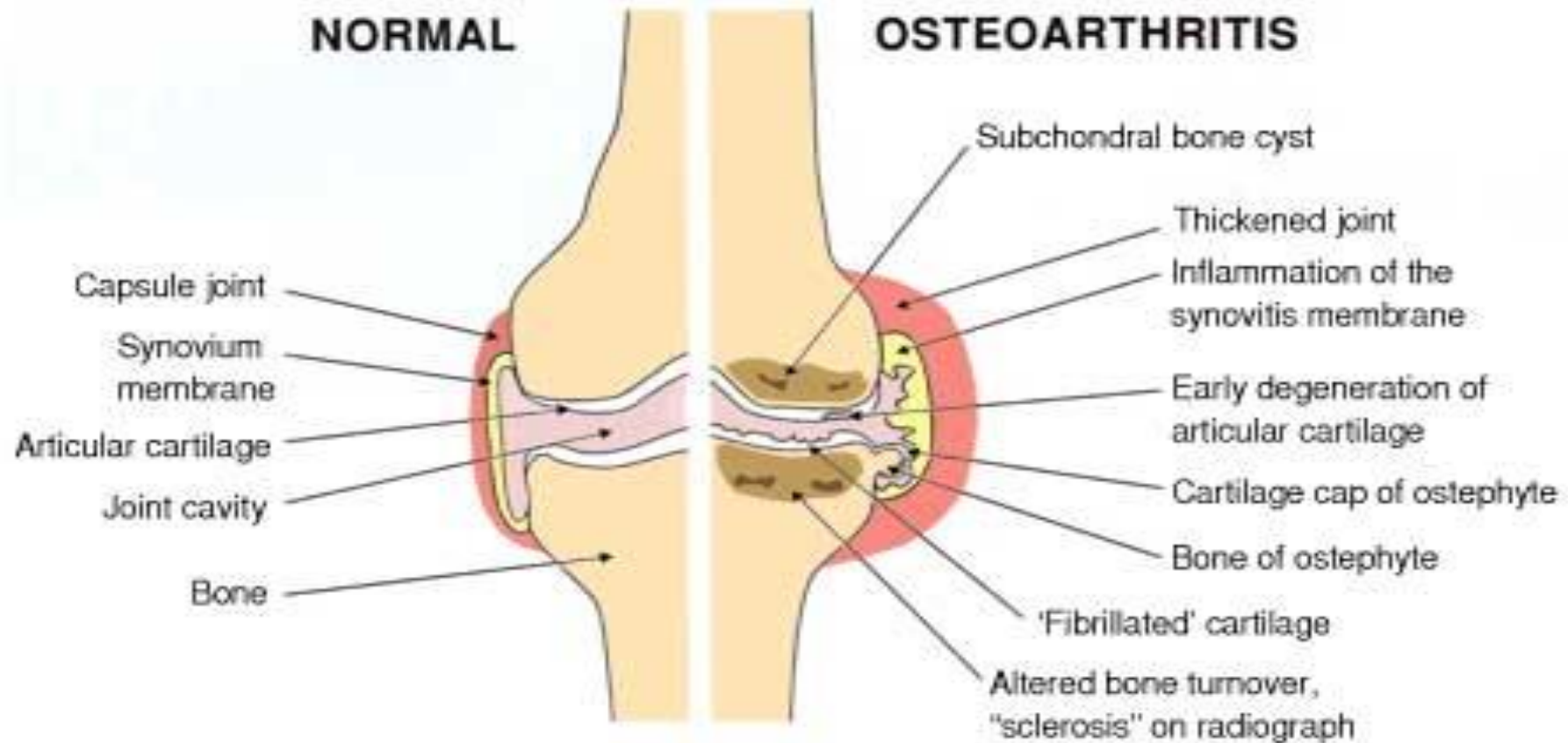
# Bone changes

- ▶ subchondral bone undergo cystic degeneration.
- ▶ Osteoarthritic cysts are also referred to as subchondral cysts, pseudocysts, or geodes and may range from 2 to 20 mm in diameter.
- ▶ Osteoarthritic cysts in the acetabulum are termed Egger cysts.

# Joint changes

- ▶ vascularization of subchondral marrow,
- ▶ osseous metaplasia of synovial connective tissue, and
- ▶ ossifying cartilaginous protrusions lead to irregular outgrowth of new bone (osteophytes).
- ▶ Fragmentation of these osteophytes or of the articular cartilage itself results in the presence of intra-articular loose bodies (joint mice).

# Joint changes





# Etiology

- ▶ Risk factors-
- ▶ Age, obesity, trauma, genetics, hypogonadism, muscle weakness, repetitive use, Infection, crystal deposition, acromegaly, previous inflammatory arthritis (burnt-out rheumatoid arthritis)
- ▶ Heritable metabolic causes (alkaptonuria, hemochromatosis, Wilson disease) Hemoglobinopathies (sickle cell disease and thalassemia) Neuropathic disorders leading to a Charcot joint (syringomyelia, tabes dorsalis, and diabetes) Underlying morphologic risk factors (congenital hip dislocation and slipped femoral capital epiphysis)
- ▶ Disorders of bone (Paget disease and avascular necrosis) Previous surgical procedures (meniscectomy) Diabetes mellitus <sup>[44]</sup>

# Radiographic changes



# Radiological changes

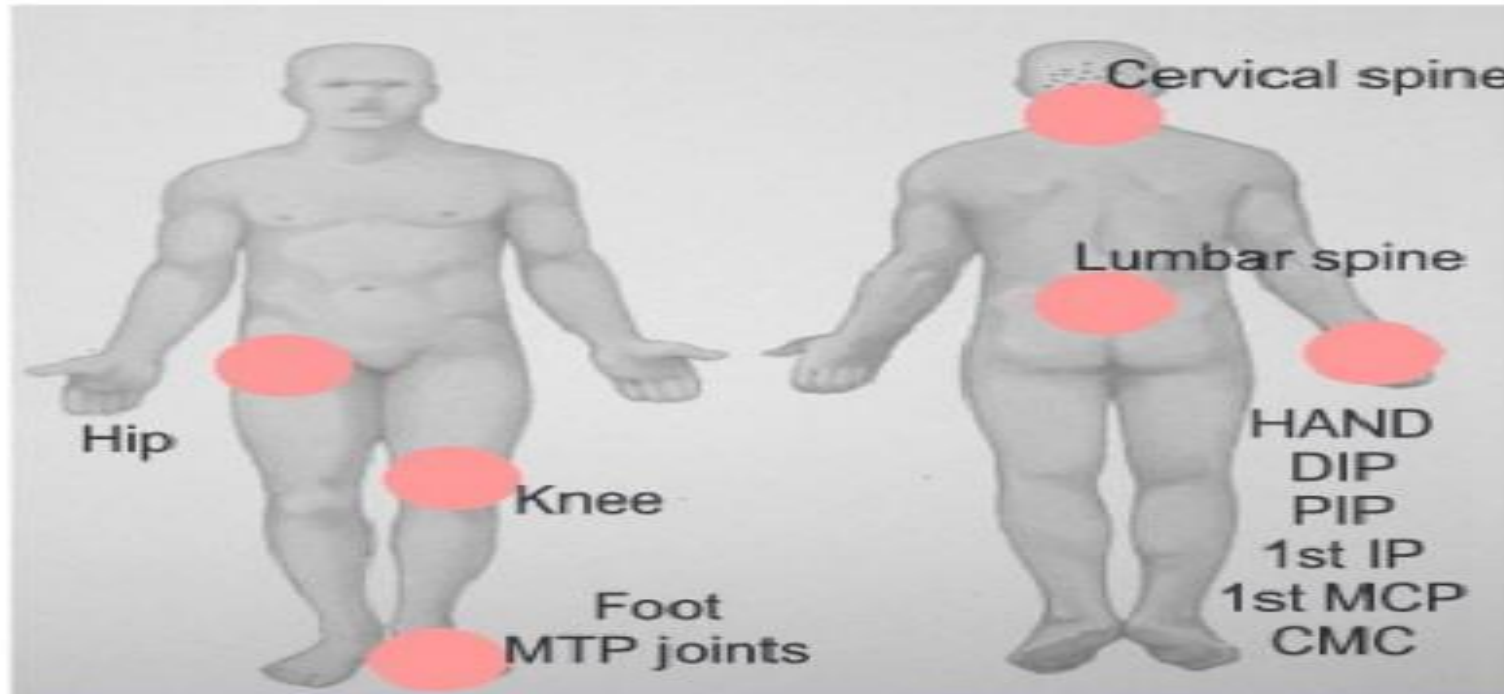


# Osteoarthritis Progression

- ▶ Stage 1- breakdown of the cartilage matrix occurs.
- ▶ Stage 2 - involves the fibrillation and erosion of the cartilage surface
- ▶ Stage 3 - a chronic inflammatory response in the synovium.
- ▶ Further Progression - the above events alter the joint architecture, compensatory bone overgrowth occurs. joint architecture is changed mechanical and inflammatory stress occurs on the articular surfaces, the disease progresses unchecked.

# PGOA

## Osteoarthritis - Anatomical Distribution



# Erosive OA



# Chonromalcia Patellae



# Differential Diagnosis

- ▶ Crystalline arthropathies (ie, gout and pseudogout)
- ▶ Inflammatory arthritis (eg, rheumatoid arthritis)
- ▶ Seronegative spondyloarthropathies (eg, psoriatic arthritis and reactive arthritis)
- ▶ Septic arthritis or postinfectious arthropathy
- ▶ Fibromyalgia
- ▶ Tendonitis



# Work Up

- ▶ Laboratory
- ▶ Plain Radiography
- ▶ CT scan, MRI scan, ultrasonography
- ▶ Bone scintigraphy
- ▶ Arthrocentesis

# Treatment

- ▶ Non pharmacologic-  
Life style modification, physical and rehab therapy
- ▶ Pharmacotherapy
  - Arthroscopy
  - Osteotomy
  - Arthroplasty
  - Fusion and joint Lavage
  - Stem cell therapy

# References

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