

# What is Osteoarthritis?

**Osteoarthritis** is a noninflammatory, slowly progressive, and degenerative joint disease, mainly involving the cartilage.

It is a most common disease characterized by slow progressive destruction of articular cartilage of weight-bearing joints of genetically susceptible older people.

It is characterized by the narrowing of the joint, thickening of subchondral bone, and finally non-functioning and painful joint.

Joint affected area

- Weight-bearing joints such as the knee, hips, and cervical and lumbar segments of the spine in your body.
- Non-weight bearing such as proximal and distal interphalangeal joints of the fingers, first tarsometatarsal joints of the feet, and first carpometacarpal joints.

## Types of osteoarthritis

- Idiopathic or primary **osteoarthritis**
- Secondary **osteoarthritis**

### Primary osteoarthritis

It is also called idiopathic **osteoarthritis** because the cause is unknown but it develops as an aging process and may affect few (oligoarticular) or many joints.

### Secondary osteoarthritis

This osteoarthritis appears in younger aged individuals with predisposing conditions and affects more than one joint.

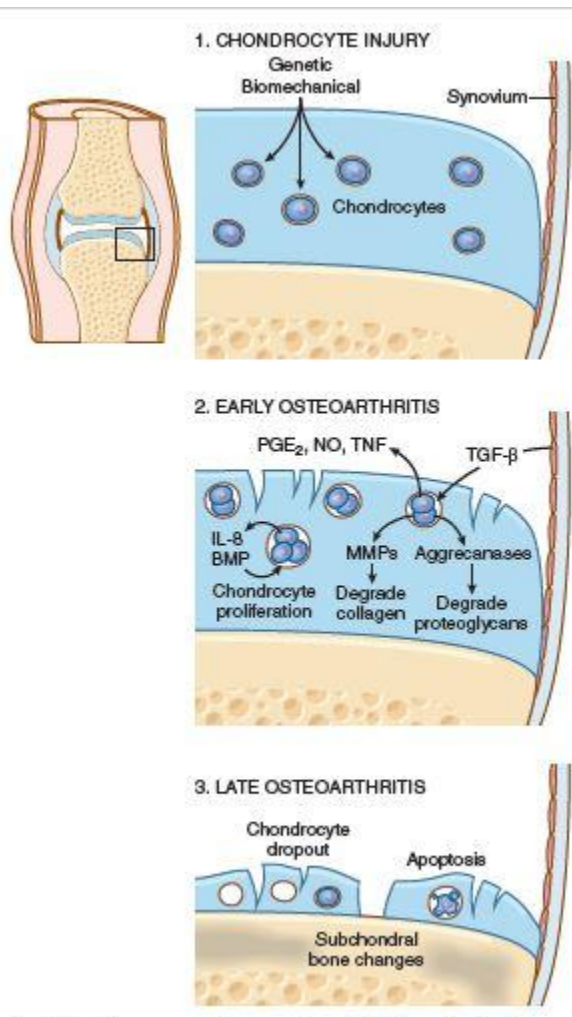
- Previous injuries to a joints
- Congenital bone deformity of a joint(s)
- Secondary to systemic diseases such as diabetes, marked obesity, hemochromatosis, etc.

## Pathogenesis

**Osteoarthritis** is a multifactorial disease having several components involved such as genetic and environmental factors or components.

- Genetic factors: Those genes involved in prostaglandin metabolism and the WNT signaling pathway.
- Environmental components (factors): aging, biochemical or mechanical stress, obesity, diabetes, hemochromatosis, muscle strength, and joint stability.

The collagen and proteoglycans provide elasticity for the articular cartilage for friction-free movement in the joint.



If the chondrocytes degeneration of the articular cartilage takes place due to impaired secretion of collagen and proteoglycans from chondrocytes.

- Mechanical or biochemical stress: it causes delayed development of joints in your body and thereby **osteoarthritis**.
- Genetics factors: genes linked to chromosome 2 and 11 causes increased secretion of estrogen in your body and causes **osteoarthritis**.

- During aging the frequency of the diseases increases such as diabetes, hemochromatosis, obesity, etc that leads to degeneration of articular cartilage of the joints.

## **Morphology (pathological changes)**

### **Gross**

The joint is inflamed and swollen sometimes joint stiffness and deformity and restricted movements may be seen.

### **Microscopy**

#### **Articular cartilages changes**

- Superficial layers of the articular cartilage cracks
- The flow of synovial fluids along the area of the crack.
- Inflammatory reaction
- Loss of cartilaginous material such as proteoglycans
- Destruction of chondrocytes
- The proliferation of healthy chondrocytes led to cluster formation.
- When the disease progresses there is progressive fissuring of cartilage leading to exposure of subchondral bone.
- Breaking of dead pieces of articular cartilage that produce inflammation and foreign-body giant cell reaction in the synovium.
- The broken pieces of cartilage form loose bodies which are called **joint mice** present in the synovial cavity.

#### **Subchondral bone changes**

When subchondral bone is exposed and becomes the new articular surface in the joint.

#### **Bone eburnation**

The subchondral bone appears shiny, thick, smooth that gives it the appearance of polished ivory which is known as bone eburnation (eburnated means ivory-like). New blood vessels grow from epiphysis, and fibrocartilage gets deposited around the joint.

#### **Subchondral bone cyst**

The eburnated(burned) bone may crack in some areas of the bone to form a fracture gap and force synovial fluid from the joint surface into the subchondral bone marrow region but can not exit.

Due to the fact that of this one-way ball valve-like mechanism, a subchondral bone cyst filled with the synovial fluid is formed. This loculated synovial fluid collection increases in size surrounded by a reactive bone wall.

### **Development of osteophytes**

**Osteophytes** are a mushroom-shaped pearly grayish bony outgrowth (spurs) and develop at the periphery of the joint surface.

### **Synovium**

The synovium shows chronic inflammatory cells and mild fibrosis. There is chronic inflammation leading to synovitis.

The proliferation of synoviocytes leading to increased thickening of synovial membrane and infiltration of chronic inflammatory cells like lymphocytes.

Sometimes fluids are accumulated in the synovial cavity that leads to synovial effusion.

## **Clinical features**

- Morning stiffness
- Limitation of movement
- Compression of cervical and lumbar nerves that leads to muscle atrophy, muscle spasm, and neurological defect.
- Deep, aching pain
- Joints may be swollen, tender, and may demonstrate crepitus in the body
- Heberden node: when osteophytes at distal interphalangeal joint seen in women.
- Bouchard node: when osteophytes at the proximal interphalangeal joint in your body.