Osteoarthritis: non-inflammatory arthritis

- Wearing out of hyaline articular cartilage of diarthrodoial joints
- Leads to joint pain and stiffness and decreased range of motion
- Issue in aging population (> 50 years old)
- Most common cause of chronic arthritis
- Many possible underlying causes: mechanical injury or chronic inflammation of joint
- Predilection for large weight bearing joints
- Can involve hands in DIPs (Hebeden's nodes) & PIPs (Bouchard's nodes); first CMC joint (thumb) protrudes
  → mechanistic & hormonal causes
- Knees: varus = bow-legged knee

OA epidemiological factors

- Age
- Gender (women >> men)
- Race
- Obesity (increased BMI)
- Trauma
- Genetic
- Metabolic factors
  → calcium crystals

Cartilage biochemistry

- Hyaline cartilage
- Chondrocytes (only cells)
  → nests = lacunae
- Matrix: most of volume of cartilage

Cartilage

- Cartilage needs to be hydrated:
  - Weight bearing → releases water out
  - Reduce weight burden → imbibes water in
    → due to hydrophilic proteoglycans (anionic, negatively charged GAG side chains)
- Building blocks of cartilage
  - Type 2 collagen: shape & strength; forms a cage to hold proteoglycans in
  - Proteoglycans: have GAG side chains (chondroitin & keratin sulfate)
    → Proteoglycans in healthy tissue are aggregated: binding to hyaluronic acid (hook region) stabilized by 2 molecules of link proteins

OA disease state

- Lose cartilage in weight-bearing part of joint → bone touching bone
- Osteophytes (hooks of new bones) and subchondral sclerosis (bone harder, thicker, more calcified)
- Fissures/fibrulations: collagen networks/cages broken, therefore proteoglycans can escape

Normal cartilage	OA cartilage
Normal H_2O content	Swelling, then lose H_2O
Normal PG aggregates	Decreased PG aggregates
Normal collagen arcade	Fragmented collagen
Normal metachromatic staining	Loss of metachromasia
Surface smooth, intact	Surface fibrillated
Chondrocytes normal	Chondrocytes increased
MMP enzymes normal	MMP enzymes increased
Normal subchondral bone	Sclerotic subchondral bone
No osteophytes	Osteophytes present

OA Pathophysiology

- Mediators in OA
  - **IL1B, IL8**
  - Plasminogen – PAF → Plasmin
  - Prostaglandins, nitrous oxide
  - Metalloprotease enzymes
    - **Aggecanase:** cleaves PGs off of hyaluronic acid; binds close to hook region
    - **MMP-**1 & **MMP-13**: collagenases = digest collagen
    - **MMP-**3: stromelysin = digets proteoglycans
- Vicious cycle: chondrocytes get an insult (inflammation, bone closer together) → produces more IL-1 → upregulates MMPs → cartilage damage & altered mechanics
  - Compensate & make more PGs and collagen, eventually demand >> supply

Classification of OA:

- Primary/idiopathic: localized, generalized
- Secondary: etiology is known
  - Chronic inflammatory arthritis
  - Identifiable mechanical factors (total menisectomy, ACL tear)
  - Congenital: shallow acetabulum, femoral head tilt, femoral acetabular impingement
  - Metabolic crystals; hemachrom (Pagets)
  - Avascular necrosis (complication of CSTs)

Treatment:

1) Education
2) Exercise: land based aerobic and/or resistance land based exercise; aquatic exercise
3) Weight control
4) Physiotherapy: TENS/acupuncture
5) Conditionally recommend:
    a. Full dose acetaminophen (3-4 g): Tylenol arthritis 650 mg
    b. Oral NSAIDs
    c. Topical NSAIDs
        i. 1.16% diclofenac Emulgel (OTC)
        ii. 10% diclofenac compound
        iii. Capsaicin compound (inhibits substance P)
    d. Tramadol (gentle opioid)
    e. Corticosteroid injection: helps pain control and function (short-term); can only repeat at 3-6 mos
6) Conditionally not recommended: chondroitin sulfate, glucosamine, capsaicin

NOT recommended: hyaluronates (Vicosupplementation – 50/50 effective), duloexetine (Cymbalta) and opiates

NSAIDs:

- Traditional NSAIDs (naproxen, diclofenac, ibuprofen)
    - Risk of GI ulcerations, GI bleeds, perforation
        - Strongly consider PPI to help protect gastric ulcers
        - Vimovo (Naproxen + PPI) and Arthrotec (Diclofenac + misoprostol)
    - Diclofenac upper dose: 100 mg/day; Naproxen upper dose: 1500 mg/day
- COX-2 selective NSAID: celoxicob 100-200 mg OD to BID
    - Lacks risk to upper GI tract but risk to BP control, kidney
- Other risks of all NSAIDs
    - Rise in BP
    - Renal insufficiency (caution when pt has high BP & when pt is diabetic)
    - Lower GI upset (contraindicated w/ inflammatory bowel disease)
    - CV risk
    - Increased AEs in some NSAIDs
        - Flurbiprofen or indocid: seronegative spondyloarthropathy, psoriatic arthritis, reactive arthritis
        - Indocid: gout