

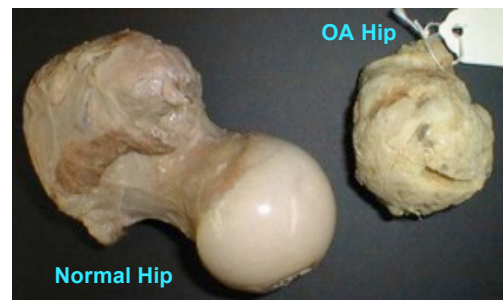
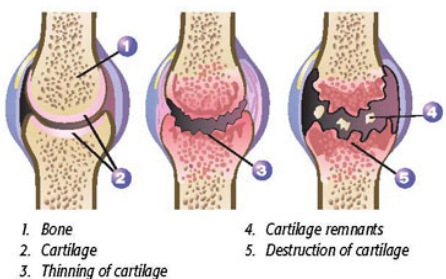
## JOINTS

### OSTEOARTHRITIS (OA) – Degenerative Joint Disease (DJD)

- Degeneration of **cartilage** outpaces repair
- **Primary/Idiopathic DJD** due to **aging** (by age 65)
  - o Men: **HIPS**
  - o Women: **KNEES & HANDS (DIP)**
- **Secondary DJD** from **Repeated injuries to a joint, Hemochromatosis, Obesity**
- **PHASES:** Chondrocyte injury, Chondrocytes proliferate, Chondrocytes drop out w/ loss of cartilage
- Superficial **roughened & cracked cartilage**, **Bone eburnation** (exposed bone on surface looks like **polished ivory** w/ underlying bone sclerosis), **Joint Mice** (loose bodies of cartilage), **Subchondral cysts** of synovial fluid, **Osteophytes** (bone spurs)
- Involves **1 or few joints** – **deep achy pain, morning stiffness, worse with use, crepitus of joint** – “roughness” that can be felt with movement, **limited ROM, vertebral osteophytes** can impinge on nerve roots, **narrow joint space**, **Heberden Nodes** (osteophytes at **DIP**, especially in Women)
  - o **\*All things underlined** at differentials from RA
- There is **NO fusion** of the joint (ankylosis) in OA!

**SPARES wrists, elbows, shoulders –**  
All of these places are affected by RA

#### Evolution of Osteoarthritis



#### Cartilage is gone

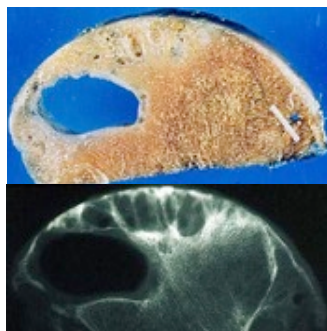


Figure 1



Figure 2

#### At the DIP!



#### HEBERDEN'S NODES

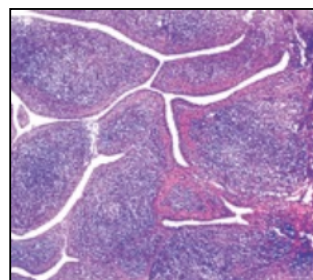
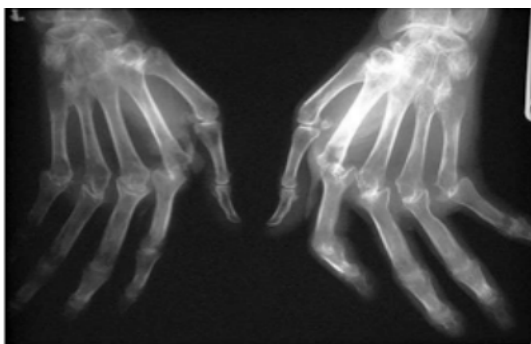
## RHEUMATOID ARTHRITIS

- Systemic, autoimmune **chronic inflammatory** disease affecting **more than 2 joints**
- Destruction of cartilage + **Ankylosing** of the joint
- More common in **FEMALE Adults**
- **PANNUS**: Chronic inflammation (CD4<sup>+</sup> T cells, B cells, plasma cells, macrophages), **Granulation tissue w/ hemosiderin** → Erosion of articular cartilage → **EROSION OF BONE** [from outside to inside] → **Juxta-articular cysts, Subchondral cysts, Osteoporosis**
- **\*\*Rheumatoid Factor** – autoAbs against Fc portion (heavy chain) of IgG); **non-specific**
  - o *Likely to be questions about RF, but they probably won't say "rheumatoid factor." They will say "autoantibody against heavy chain of Ig"*
- **Anti-cyclic Citrullinated Peptides (CCP Ab)** – Ab to citrullin-modified peptides is **more specific**
  - o *Even though switching toward the anti-citrullin antibody, RF is still in the list of criteria & you still need to know for Step*
- Synovial Fluid: high protein content, low mucin content; inflammation
- **Insidious, Symmetric Arthritis** affecting **small joints** before large joints
  - o **PIP\*, MCP, MTP**
  - o Then later... **Wrists, Ankles, Elbows, Knees**
    - *"Something involving wrist or elbow is NOT osteoarthritis!!!"*
- Joints will be **swollen, warm, painful, & stiff with inactivity\***
  - o *(Activity exacerbates OA joint pain)*
- **X-RAY**: Juxta-articular osteopenia, Bone erosions w/ narrowing of joint space, Joint effusions
- **CLASSIC SIGNS** – *"You must know these"*
  - o **Radial deviation of wrist, Ulnar deviation of fingers**
  - o **Flexion-Hyperextension of fingers (swan neck of fingers & boutonniere of thumb)**
  - o **Synovial cysts (Baker cyst in popliteal region)**
- **Rheumatoid Nodules** most common cutaneous manifestation – found in areas subject to pressure: ulnar aspect of forearm, elbows, occiput, lumbosacral; **Fibrinoid necrosis surrounded by macrophages**
  - o *"There was a question where "fibrinoid necrosis" was the answer."*
- **Vasculitis** – *"Pretty much anything that can occur in Lupus can occur in RA. But RA doesn't involve the kidneys."*
  - o Obliterative endarteritis of vaso nervorum & digital arteries → neuropathies, ulcers, gangrene
  - o Leukocytoclastic vasculitis → purpura, skin ulcers, nail bed infarction

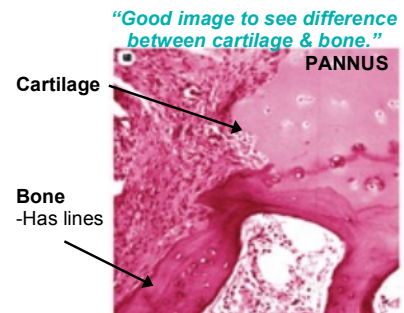
**SPARES Hips & Notice – NO DIP!**

*Note: OA JOINTS ARE NOT WARM OR SWOLLEN, typically*

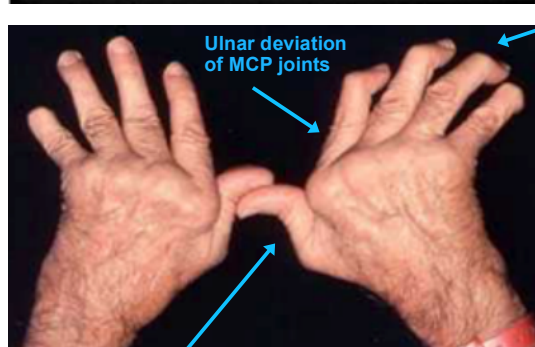
*"You've got to be able to recognize this picture!"*



**BLUE = INFLAMMATION**

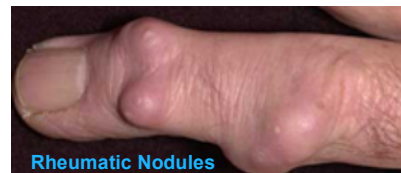


*"Good image to see difference between cartilage & bone."*



**Boutonniere deformity of thumb**

**Swan-neck finger deformity**



**Rheumatic Nodules**



**FIBRINOID NECROSIS** surrounded by macrophages



**JUXTA-ARTICULAR OSTEOPENIA**

## JUVENILE IDIOPATHIC ARTHRITIS

- Onset **BEFORE AGE 16** & present 6 weeks
- Variety of presentations: Oligoarticular (<5 joints), polyarticular, systemic
- Affects **Large Joints – Knees, Wrists, Elbows, Ankles**
- Extra-articular manifestations: Pericarditis, myocarditis, pulmonary fibrosis, uveitis, **glomerulonephritis**, growth retardation
  - o “Again... Just like Lupus.”
- DIFFERENCES FROM RA
  - o Oligoarthritis more common
  - o Systemic onset more common
  - o LARGE JOINTS
  - o **ABSENCE OF RHEUMATOID FACTOR, ABSENCE OF RHEUMATIC NODULES**
  - o **May be ANA positive – autoimmune**
- SAME AS RA
  - o Pannus formation
  - o Morphology of involved joints

## SERONEGATIVE SPONDYLOARTHROPATHIES

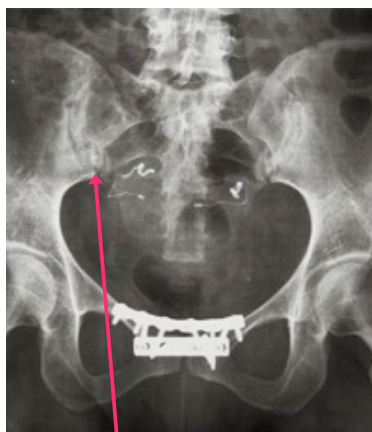
- Pathology of ligamentous attachments, NOT synovium
- Immune-mediated; no specific autoantibody – Many are **+HLA B27** – “An important fact!”
- *Ankylosing spondyloarthritis, Enteritis-associated arthritis, Reactive arthritis, Psoriatic arthritis*

## ANKYLOSING SPONDYLOARTHRITIS – “Rheumatoid Spondylitis”

- Affects **axial joints (SPINE) – Sacroiliac Joint, Apophyseal Joints of vertebrae**
- **HLA B27 (90%)**
- Presents in **Young men (3<sup>rd</sup> or 4<sup>th</sup> decade)** c/o **low back pain**
- Inflammation of **tendon/ligament** insertion – ossification of inflammation, fibrous to bony ankylosis
  - o **BAMBOO SPINE**
- Complications: hip-knee-shoulder arthritis, uveitis, aortitis, amyloidosis, spine fractures
  - o *Autoimmune so all different things can occur*

### **BAMBOO SPINE**

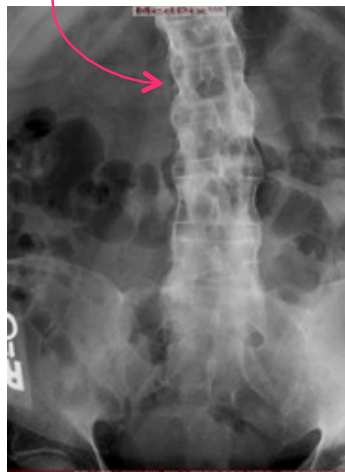
- There is bone crossing.
- You shouldn't be able to see the disc!



**NORMAL Sacroiliac Joint**



**SI joint is basically GONE**  
-You can't see the line!





## **REACTIVE ARTHRITIS – Reiter Syndrome**

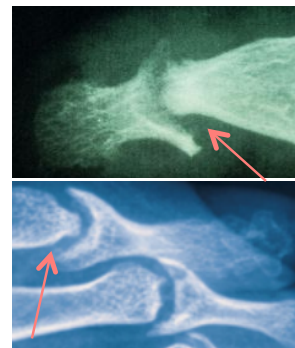
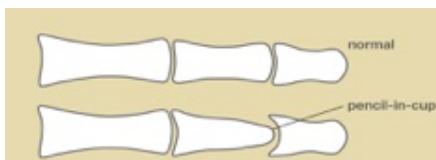
- Appendicular Non-infectious arthritis in **20-30 year olds**
- Presents **< 1 month** after primary GU or GI infection (*Chlamydia, Shigella, Salmonella*)
- **CLASSIC TRIAD (AUC):** Arthritis, Urethritis or cervicitis, Conjunctivitis
  - o **Can't see, can't pee, can't climb a tree!**
  - o Story about the Navy ship with diarrhea breakout – few weeks later a group of men all came in with arthritis, urethritis, & conjunctivitis – All tested positive for HLA B27!
- **HLA B27** Association, some HIV
- **Asymmetric arthritis** in lower extremities – **Ankles, Knees, Feet**
- Sausage toe or finger from digital tendon sheath synovitis
- Extra-articular: balanitis (*inflammation of distal penis*), conjunctivitis, heart conduction defects, aortic regurgitation
- Symptoms wax & wane with high recurrence rate

## **ENTERITIS-ASSOCIATED ARTHRITIS**

- Abrupt onset arthritis of the **Knees & Ankles** follow GI infection – *Yersinia, Salmonella, Shigella, Campylobacter* are all **GRAM NEGATIVE BACILLI – LPS** stimulates immune response
- Clears in **<1 year**
- *These people do not get conjunctivitis or urethritis*

## **PSORATIC ARTHRITIS**

- Presents in 10% of Psoriasis patients (**HLA B27 & HLA Cw6**) between **30-50 y/o**
- Insidious onset of asymmetrical arthritis in **DIP** of **Hands & Feet** – **PENCIL IN CUP DEFORMITY**
  - o *"This is a classic question – DIP with pencil in cup deformity. Could also present w/ rash."*
- Can also affect large joints & cause sacroiliac/spine disease
- Histologically similar to RA, less severe than other seronegative arthropathies
- Limited complications: **conjunctivitis**, iritis



## **INFECTIOUS ARTHRITIS**

### **BACTERIAL/SUPPURATIVE ARTHRITIS – Most Common Infectious Arthritis**

- Hematogenous spread
- Under 2 y/o – ***H. influenza* (gram negative rod)**
- Adolescent/Young adult (F>M) – **Gonococcus (gram negative diplococci)** – Symptoms often sub-acute
- Elderly, Adults, Children older than 2 – ***Staph aureus* (gram positive cocci, grape-like clusters)**
- Sickle Cell Disease – ***Salmonella* (gram negative rod, black colonies on HEK)**
- **Predisposing Conditions** – Immunodeficiency, abnormal joint, debilitation, **IV DRUG ABUSERS**, arthritis
- **Swollen, hot joint, +/- fever**
- Usually affects **one joint** – **Knee** > Hip > Shoulder > Elbow; **IV Drug Abusers:** **Axial joints**

### **TUBERCULOSIS ARTHRITIS**

- **Monoarticular**, typically from adjacent **Osteomyelitis** or hematogenous spread
- **Vertebrae, Hips, Knees, Ankles**

### **VIRAL ARTHRITIS** – Parovirus B19; HCV, HBV; HIV

### **LYME DISEASE ARTHRITIS**

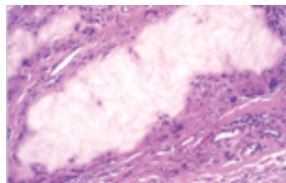
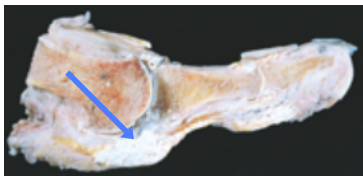
- Onset 2wks-2yrs after Ixode bite (tick bite – ***Borrellia burgdorferi*, spirochete**) from untreated Lyme Disease
- Remitting/**Migratory arthritis** in **Large Joints: KNEES** > Shoulders > Elbows > Ankles
- **Chronic** synovitis with **organisms near vessels**

## GOUT – “Very testable item!”



- End point of **Hyperuricemia**
- **Primary Gout:** Unknown cause (90%), known enzyme defect (**HGPRT**)
  - **RF:** Over 30 y/o, **OBESE, HEAVY DRINKING**, Thiazides (HTN Rx), Pb toxicity
    - “Such as, a 40 y/o heavy drinker, obese patient who is on medication for HTN or ‘medicine that makes him pee a lot’”
- **Secondary Gout:** Increased nucleic acid turnover due to AML or chronic renal disease
  - **FYI:** When you treat AML patients with chemoRx, all of those cells will die releasing uric acid & cause acute gout. So, we treat them up front to avoid this.
- **Monosodium Urate precipitation in joint from supersaturated synovial fluid**
  - **Uric acid from purine metabolism** → Crystals are **NEGATIVE BIREFRINGENT\*\***
  - Precipitates better at lower temperatures: Seen in **Hands & Feet – 1<sup>st</sup> MTP joint of Foot (Big toe)\*\***
    - “Presents with hot, swollen MTP joint. First thought should be GOUT, but Ddx is infection. What would separate these? – **FEVER!** Consider Osteomyelitis if fever present. **NO FEVER IN GOUT!**”
  - **Crystals** initiate acute & chronic inflammation
    - Macrophages + neutrophils release LTB<sub>4</sub>, PGs, free radicals, IL-1β + Lysis of neutrophils releases lysosomal enzymes & joints release proteases → Tissue injury & inflammation
- **TOPHI:** Pathognomonic of gout – If you have tophi, you have gout!
  - **Large deposits of Urate + macrophages, lymphocytes, & giant cells** found in joints & periarticular tissue – inflammation destroys synovium, joint, & adjacent bone
- **GROSS EXAMINATION:** **chalky, white deposits**
- **HISTOLOGY:** crystals are water-soluble & will wash out, leaving **clear, empty spaces** on slide
- **4 PHASES OF GOUT**
  1. Asymptomatic Hyperuricemia
  2. Acute Arthritis – Initial tissue injury & inflammation; 50% in 1<sup>st</sup> MTP joint of foot (big toe)
    - Acute arthritis joint aspiration samples needed for diagnosis – **numerous neutrophils, needle-shaped crystals, and will be negative for cultured organism** (ruling out infection ddx)
  3. Intercritical Gout – No symptoms
  4. **Chronic Tophaceous Arthritis** – Urate nephropathy (calcium oxalate renal stones)

Letter ‘U’ in **U**ric & p**U**rine  
+ Letter ‘n’ is an ‘upside down U’  
for **negative birefringence**  
\*In contrast to CPPD

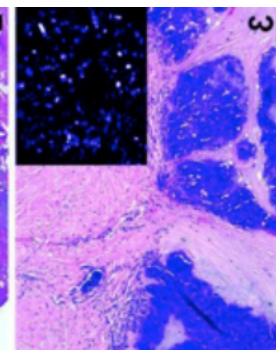
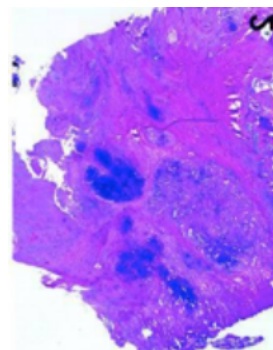
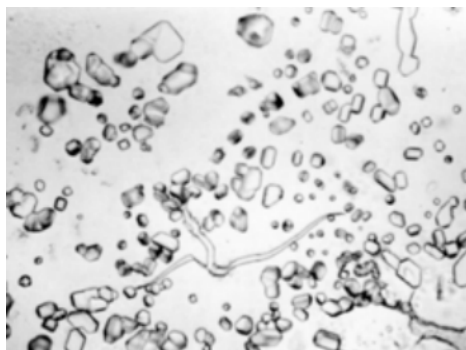


**Negative Birefringence**  
Color pattern under polarized light – may be yellow or blue!

## CALCIUM PYROPHOSPHATE CRYSTAL DEPOSITION DISEASE – Pseudogout, Chondrocalcinosis

- Typically seen in the **KNEE** of **Older people** – If you live long enough, eventually you will have this
- Usually asymptomatic – mimics other forms of arthritis
- Crystals 1<sup>st</sup> seen in articular matrix, **menisci**, & IVD; released into joint → acute & chronic inflammation → fibrosis
- **POSITIVE BIREFRINGENCE\*\*\***, **white chalky deposits** on gross examination
- Hereditary, Idiopathic (sporadic), **Secondary-due to prior joint damage**, hyperparathyroidism, hypothyroidism, hemochromatosis, diabetes

Letter ‘P’ in **CPPD** for **Positive Birefringence**  
\*In contrast to Gout



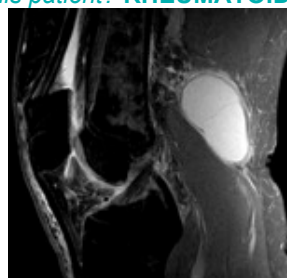
## GANGLION CYST

- < 2 cm cyst near joint or tendon sheath – Has NO communication with joint space
- **Classically found on the Back of the Wrist!**
  - o “Everyone should be able to recognize this! Lump on the back of wrist... You should **automatically** think **GANGLION CYST!**”
- Cystic or myxoid degeneration of tissue



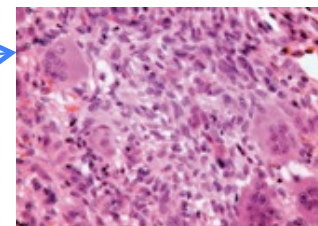
## SYNOVIAL CYST

- Cyst **connected to a joint capsule or bursa**
- **BAKER'S CYST**: Popliteal synovial cyst, often in setting of **Rheumatoid Arthritis**
  - o “Well demarcated, cystic fluid in the back of the knee. Baker's cyst or synovial cyst – Both could be answer choices.”
  - o There will be this long story – they have arthritis & they have this big thing on the back of their knee. They will describe a Baker's Cyst & then ask... What is the most likely diagnosis? **RHEUMATOID ARTHRITIS**
  - o OR they will ask, what else could be seen on this patient? **RHEUMATOID NODULES**



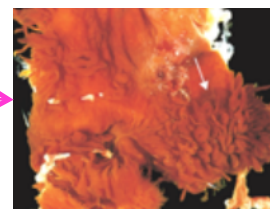
## TENOSYNOVIAL GIANT-CELL TUMOR

- **Benign cyst** in the **synovial lining** of joints, tendon sheaths & bursae
- **t(1;2)**: overexpression of **M-CSF-1** → proliferation of macrophages
- 2 Classic Types – **Diffuse & Localized** – Histologically Identical!
  - o **Macrophages & Giant Cells – hemosiderin & lipid vacuoles**
  - o Looks almost identical to Giant Cell Tumor in bone, but they behave differently!



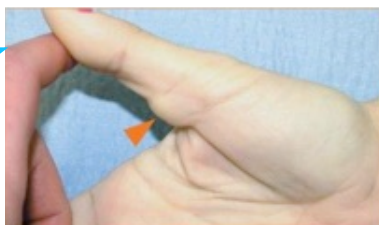
## DIFFUSE TENOSYNOVIAL GIANT CELL TUMOR – Pigmented Villonodular Synovitis (PVNS)

- Mostly affects the **KNEE** – *pt often c/o locking or swelling + decreased ROM*
- Can erode bone & form a mass
- Often reoccurs after excision
- **Red/brown to yellow from hemosiderin w/ Lush Villous Surface\*\***



## LOCALIZED TENOSYNOVIAL GIANT-CELL TUMOR

- **Most Common soft tissue tumor of Hand/Finger**
  - o *If you have a soft tissue mass on the finger, tenosynovial giant cell tumor until proven otherwise*
  - o *\*You will see these & you will have to recognize them!*
- Slow growing, well-circumscribed cyst often attached to synovium or tendon
- **Painless**



*If you see this & the XR doesn't show anything, you should think: **Localized Tenosynovial Giant-Cell Tumor!***