

Gout

- Hyperuricemia, resulting in monosodium urate (MSU) crystal deposition in soft tissues and joints
 - Primary **gout**: results from abnormalities in purine metabolism or from idiopathic ↓ renal excretion of urate
 - Secondary **gout**: ↑ serum uric acid levels from associated disorders or precipitating factors
- Typically occurs in those above 40 years.
- **Strong male** predilection of 20:1, with this predilection more pronounced in younger and middle-aged adults.
- In the elderly, the gender distribution is more equal

- Gout is a crystal-induced inflammatory arthropathy caused by sodium urate deposition in the joints. Excess uric acid may be secondary to under-excretion (more common, typically caused by renal insufficiency) or overproduction (much more rare, typically seen in younger patients).

It takes about 10–20 years of hyperuricemia before the clinical syndrome of gout develops.

Microscopically, gout crystals are **negatively** birefringent needle-like crystals within neutrophils.

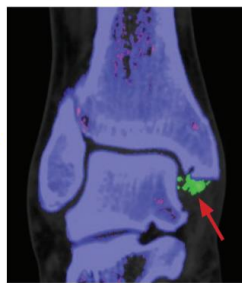
- The great toe is most commonly involved, but gout can occur in any joint.
- Radiographic hallmarks are sharply margined erosions with *overhanging margins*.
- Joint spaces are typically well preserved until late in the disease. Similarly, bony mineralization is preserved until the late phases.
- Ultrasound of gout shows a *double contour sign* representing an irregular hyperechoic line of urate crystals deposited on the hyperechoic cartilage.
- MRI is not a primary modality for evaluation of gout, but erosions and variable signal intensity intra-articular and periarticular gouty tophi are well seen.
- Tophaceous gout refers to deposition of urate crystals, inflammatory cells, and foreign body giant cells in the soft tissues. Gouty tophi may occur anywhere in the body, including within the joint and periarticular locations such as tendons, ligaments, and bursae. In particular, gouty tophi have a propensity to develop in the olecranon bursa of the elbow.
- Dual-energy CT is an excellent modality to identify monosodium urate crystals, which are typically colored green in post-processing. By altering the post-processing parameters, green color coding can also be used to identify CPP crystals.



AP radiograph of the foot shows soft-tissue swelling surrounding the second MTP. An erosion of the head of the second metacarpal head features a characteristic *overhanging margin* (arrow).



Coronal CT



Post-processed dual-energy CT



Volume-rendered dual-energy CT

Gouty arthropathy of the ankle: Coronal CT shows erosions of the medial talus and medial malleolus (yellow arrows) and amorphous mineralization (red arrow) in the deltoid ligament. Color-coded post-processed dual-energy CT shows that the deltoid mineralization is colored green (red arrows) on the gout algorithm, consistent with monosodium urate deposition. There was no green color-coding on the CPP algorithm (not shown).

Xray

- Radiography usually normal first 7-10 years of disease
- Sensitivity for gout detection 30%
- Classic radiographic features: tophaceous gout
 - Normal bone density and joint space preserved
 - Cartilage damage occurs only late in disease
 - Erosions are well circumscribed with sclerotic margins
 - Erosions may have overhanging edge
 - Erosions often intraarticular but classically are juxtaarticular as well
 - Tophi: variable density soft tissue nodules
 - Density is usually cloudy, amorphous
 - Urate deposits intrinsically radiodense; density ↑ with size of tophus and concentration of urate
 - Tophi occasionally contain distinct calcifications
 - Eccentric, not necessarily associated with joint
 - May be intraosseous (usually calcified)

Xray

- Unusual late radiographic features
 - Rare intraosseous calcifications
 - Simulate appearance of enchondroma or infarct
 - Related to intraosseous penetration of crystals
 - Usually longstanding gout with severe renal disease
 - Distal aspect of 1st metatarsal most frequent site; may have adjacent soft tissue calcification
 - Tophus may be so large and bone destruction so severe that tumor is suspected
 - Assess for any sign that process may be articular; destructive articular tumors are rare
 - Assess for other joint involvement
- Intraarticular: effusion; ultimately mimics osteoarthritis (OA)
- Olecranon bursitis: soft tissue swelling over olecranon
 - Gout should be on differential diagnosis list if unilateral olecranon bursitis
 - Gout is presumptive diagnosis if bilateral olecranon bursitis



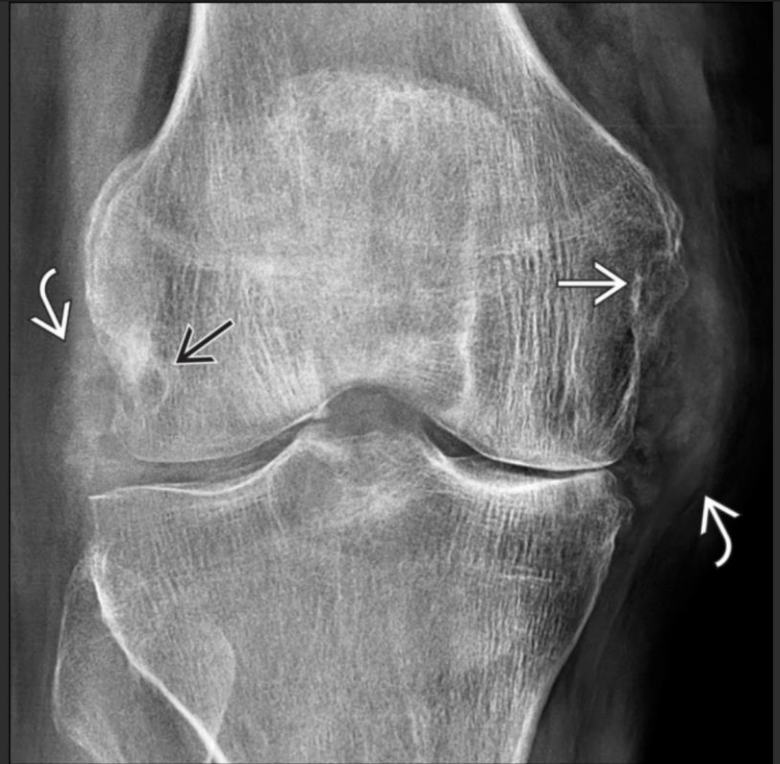
- joints: 1st MTP joint most common (known as podagra when it involves this joint); hands and feet are also common



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Oblique radiograph in a 48-year-old man with **gout** shows numerous, well-defined erosions with sclerotic margins throughout the foot →. Note marked destruction of the navicular ↔. Despite such advanced disease, the joint spaces are preserved.

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AP radiograph in a 67-year-old man shows faintly dense soft tissue masses at the medial and lateral margins of the joint →. The popliteus groove is eroded ↔. A lucency is noted at the medial femoral condyle (MFC) →. There is also chondrocalcinosis.



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PA radiograph shows abnormal calcific density in the region of the triangular fibrocartilage complex (TFCC) → in a 25-year-old man. The pattern is more amorphous than typically seen with CPPD.



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Oblique radiograph of the foot shows well-defined erosions at the tarsometatarsal joints →. Note that most of the joint spaces are preserved ↷, a typical feature of **gout**. The tarsometatarsal joints are not an uncommon location for **gout**.



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Lateral radiograph in a 55-year-old with end-stage renal disease (ESRD) shows an unusually dense effusion → as well as a prepatellar radiodense tophus ⇔. Prominent large and small vessel calcification → is noted as well, typical of ESRD. Gouty deposits are not uncommon in these patients.

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Olecranon bursa most commonly involved bursae

If bilateral olecranon bursitis think gout