

Crystals

- Gout
- CPPD
- CHAD
- Oxalate
- Cholesterol

Gout

- Calcium urate
- >80% have raised serum uric acid
- Characteristic presentation – podagra/
single large joint

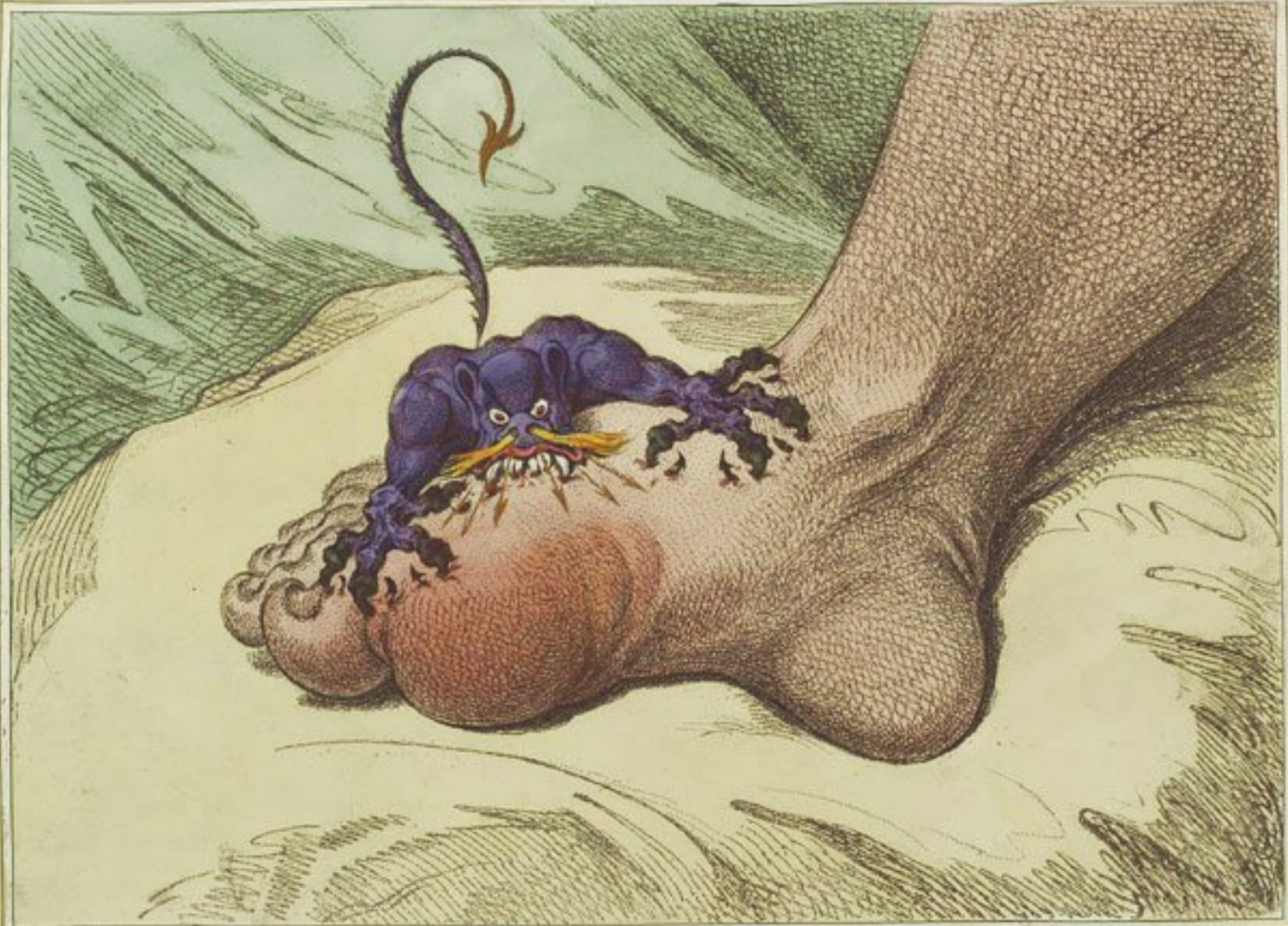
Gout

Risk factors

- Male
- High BMI
- Urate rich diet
- Family history
- Drugs – esp diuretics
- Renal failure
- High cellular breakdown

Gout recognition

- Clinical – joints or tophi
- Blood tests
- Urinary Urate excretion
- Aspiration and crystal identification
- X rays – peri articular erosions



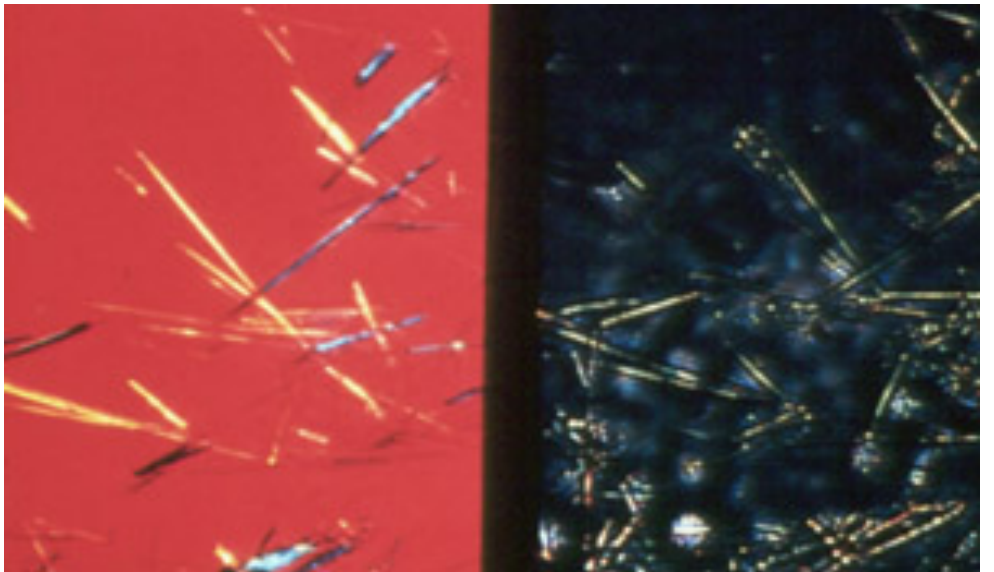
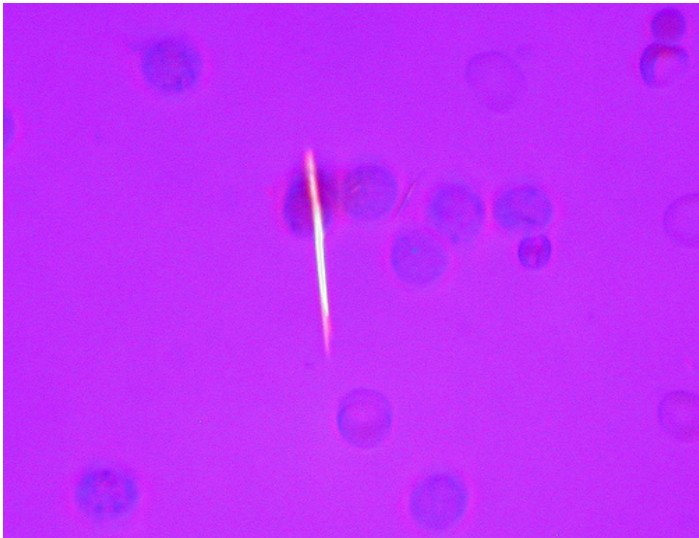
The GOUT.

*Publ. May 11, 1799, by H. Bumpson,
47, St. James's Street.*











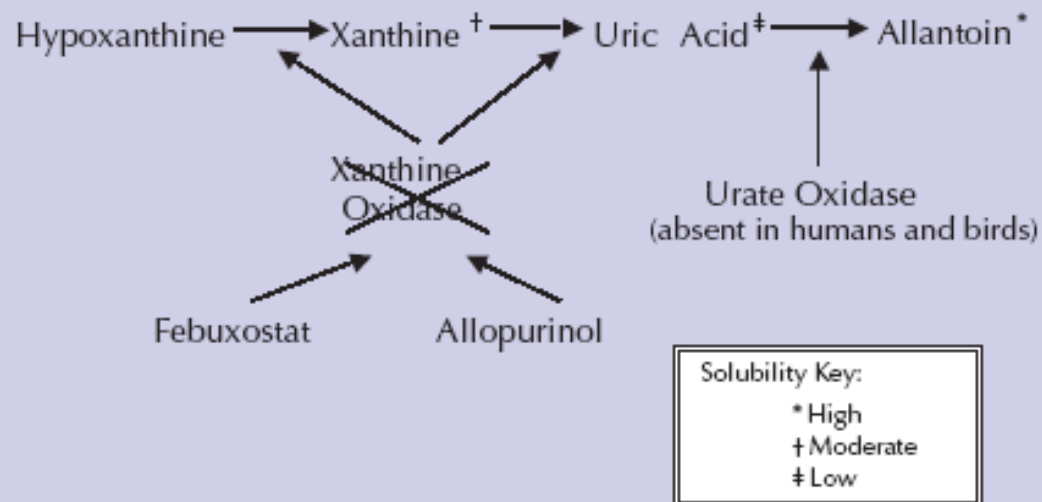
Gout treatment

- NSAID
 - Colchicine
 - Steroids by injection
 - Steroids by mouth
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- Allopurinol
 - Benzbromarone
 - Febuxostat

Febuxostat - adenuric



Figure 1. Uric Acid Metabolism and Sites of Action of Allopurinol and Febuxostat⁹



Adapted from Kim KY, Schumacher H, Hunsche E, et al. A literature review of the epidemiology and treatment of acute gout. *Clin Ther.* 2003;25:1593-1617.

Pseudogout

Pseudogout

- Originally coined by McCarty* and co-workers in 1962 because of similarity to MSU gout

Types

- CPPD deposition disease
- Calcium hydroxyapatite deposition disease
- Calcium oxalate deposition disease
- Cholesterol crystal deposition disease
- Steroid crystal induced arthritis

*MCCARTY J., KOHN, N. N. and FAMES J. S. : The Significance of Calcium Phosphate Crystals in the Synovial Fluid of Arthritic Patients: "Pseudogout Syndrome." I. Clinical Aspects. *Ann. Int. Med.*, **56** : 711-737, 1962.

CPPD

- Common in elderly
- 10 to 15% of 65 to 75 age group
- 30 to 60% in >80 yr

CPPD - pathophysiology

- Biochemical changes in aging cartilage favour crystal deposition
- Increased inorganic phosphate production and decreased metabolism of IP.
- TGF β 1 and EGF activity increased – these increase PP production
- Increased pyrophosphate production could be due to enhanced activity of ATP pyrophosphohydrolase and 5-nucleotidase
- Decreased activity of phosphatases
- iP combines with calcium to form CPPD crystals

CPPD - pathophysiology

- Phagocytosis of CPPD crystals by neutrophils
- Release of inflammatory substances and glycopeptide which recruits further neutrophils

Pathophysiology

- Attacks can be precipitated by trauma, arthroscopy or hyaluronate injections
- Rapid diminution in calcium concentrations

CPPD - etiology

- Minority have metabolic or hereditary abnormalities - should be considered if CPPD seen in younger age group (less than 50)
- “Four H’s”

Conditions associated with CPPD

Aging

Disease associated

- *Primary Hyperparathyroidism*
- *Hypophosphatasia*
- *Hypomagnesemia*
- *Haemachromatosis*

Hereditary

Clinical

- Induction or enhancement of atypical OA
- Can mimic neuropathic arthritis
- Symmetric proliferative arthritis
- Ankylosing spondylitis like presentation
- Spinal stenosis

Clinical

- Knee most common joint
- Polyarticular in at least 2/3rd of patients
- Joint distribution useful in differentiating from OA
- Fever in nearly 50% - raised CRP/ESR

Investigations

- Chondrocalcinosis on X rays
- Positively birefringent rhomboid crystals – definitive diagnosis
- Crystals can sometimes be seen in septic arthritis
- Neutrophilia >25000 in synovial fluid

Chondrocalcinosis

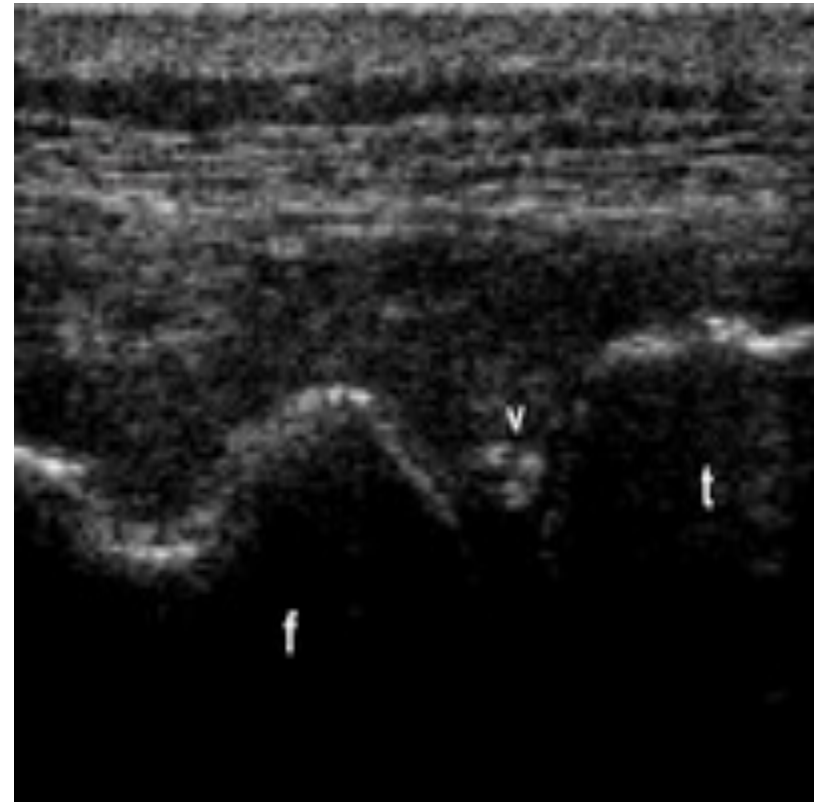


Chondrocalcinosis



US in CPPD

- Calcification of the superficial part of the medial meniscus. f = femur; t = tibia
- Filippou G et al. A "new" technique for the diagnosis of chondrocalcinosis of the knee: sensitivity and specificity of high-frequency ultrasonography. *Ann Rheum Dis.* 2007 Aug;66(8):1126-8



Treatment – acute attacks

- If untreated attacks can last from few days to a month
- NSAIDs
- Colchicine
- Steroids

Recurrent attacks

- Long term Colchicine
- *Low dose steroids*
- Synovectomy
- ? HCQ*

*Prospective 6-month, double-blind trial of hydroxychloroquine treatment of CPDD. *Compr Ther.* 1997 May;23(5):327-31

CHA deposition

- HA is a primary mineral in bone and teeth
- Abnormal deposition in areas of tissue damage and hypercalcemia or hyperparathyroidism

Epidemiology

- Mainly elderly
- 30 to 50% of OA joints have HA crystals

Conditions associated with CHADD

- Aging
- OA
- Milwaukee shoulder
- Tendinitis

Disease associated

- Hyperparathyroidism
- Milk-alkali syndrome
- Renal failure
- Long term dialysis
- CREST

Hereditary

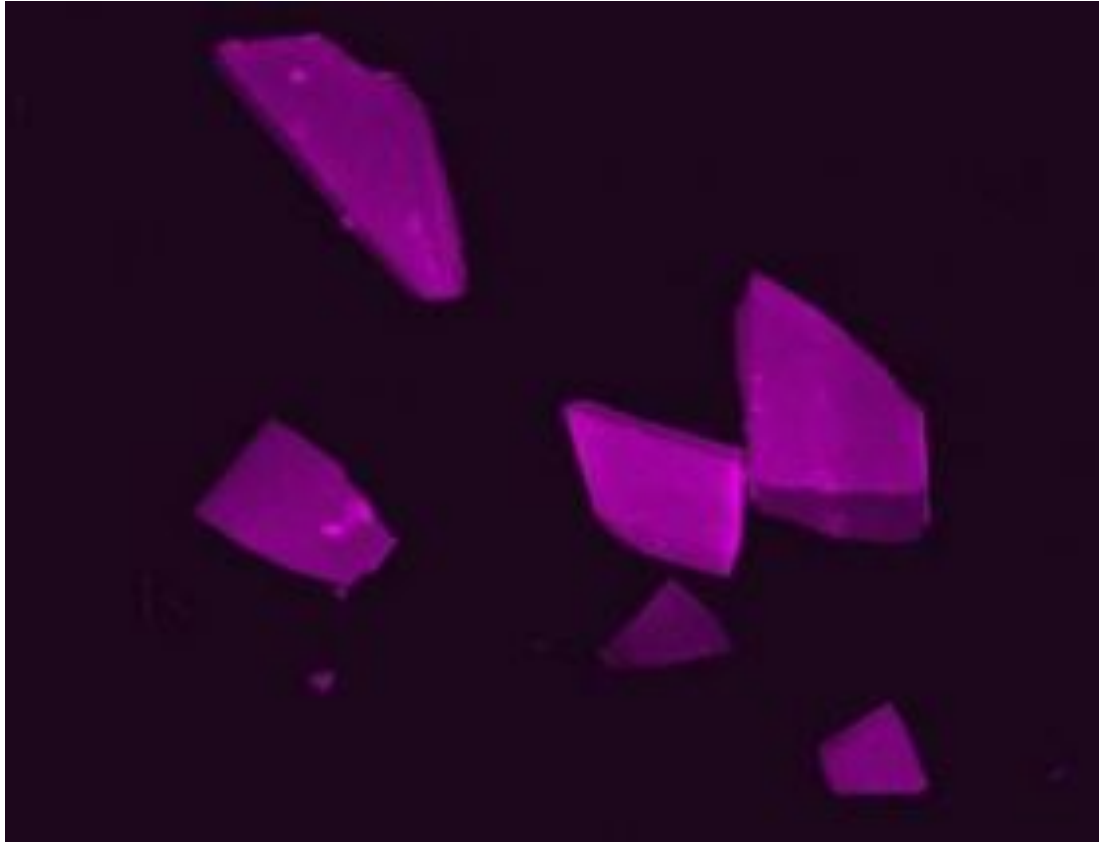
Clinical features

- Common sites – bursae and tendons
- Acute synovitis, bursitis, tendonitis, chronic destructive arthropathy

Investigations

- Radiology not diagnostic
- Non birefringent crystals
- Synovial fluid electron microscopy

HA crystals



Treatment

- NSAIDs
- Colchicine
- Steroids

CaOx deposition disease

- Primary oxalosis rare
- Nephrocalcinosis, renal failure and death usually before 20
- Secondary oxalosis more common
- Seen in ESRF
- Mostly in patients on haemodialysis and who were given Ascorbic acid

Investigations

- Radiology – Chondrocalcinosis
- Synovial fluid – usually non inflammatory
- Variable shape and variable birefringence
- But – ESRF patients can have all types of crystal arthritis

Treatment

- NSAIDs, Steroids, Colchicine – partial relief
- Primary oxalosis – Liver transplantation

TABLE 432-2. SYNOVIAL FLUID CRYSTALS

Crystal	Polarization Microscopy	Other Identification
Monosodium urate	Strong negative birefringence, needle-shaped, long	Uricase digestion X-ray diffraction
Calcium pyrophosphate dihydrate (CPPD)	Weak positive birefringence, rhomboid or small rods, pleomorphic	X-ray diffraction
Calcium phosphate (hydroxyapatite)	Not easily visualized	Electron microscopy X-ray diffraction
Cholesterol	Rhombic or platelike, notched corners, multicolored, occasionally small and needle-like	Chemical determination
Corticosteroids	Pleomorphic; variable birefringence	Follows intra-articular steroid treatment