

## CPPD DEPOSITION DISEASE: WHAT'S NEW UNDER POLARIZING LIGHT?

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Calcium pyrophosphate dihydrate (CPPD) crystals are commonly found in synovial fluids from patients with typical osteoarthritis. These crystals also define unique subsets of patients with inflammatory arthritis.

**Epidemiology:** The general prevalence of calcium crystal arthropathy is not known and is highly dependent on the definition used to collect cases. A new study from Europe demonstrated a prevalence rate of 0.42% for CPPD deposition disease. This approaches that of gout, which was 0.46% in this population, and supports the concept that CPPD deposition disease is not a rare condition.

CPPD deposition disease can be categorized into sporadic, familial and secondary (metabolic) types. The relative proportion of familial to sporadic cases remains unknown. A new familial form of chondrocalcinosis associated with diffuse idiopathic skeletal hyperostosis (DISH) was described in several families, suggesting the coexistence of factors that promote both these diseases. Metabolic associations of CPPD deposition disease include hyperparathyroidism, hemochromatosis, and hypomagnesemia

**Clinical Presentation:** Clinical CPPD deposition disease typically resembles osteoarthritis, while acute inflammatory arthritis (pseudogout) is also a common presentation. Additional clinical syndromes associated with CPPD crystals mimic other common types of arthritis, such as rheumatoid arthritis. Many cases of CPPD deposition may be asymptomatic.

Despite many case reports, extra-articular CPPD deposits often go unrecognized. Pytel et al. reviewed pathologic findings in 985 unselected extradural specimens obtained at the time of spinal surgery. CPPD crystals were often found in lumbar disc specimens and in spinal ligaments. The eye is another important extra-articular site for CPPD crystal deposition.

**Diagnosis:** The accurate diagnosis of calcium crystal arthritis remains a challenge. CPPD crystals are detectable under polarizing light microscopy, and their presence in synovial fluids remains the gold standard for the diagnosis of CPPD deposition disease. However, in a typical clinical setting, synovial fluid examination may have only about a 12% sensitivity for CPPD crystal detection. CPPD crystals tend to be quite small, and are much less bright than monosodium urate crystals under polarizing light. Some CPPD crystals lack birefringence. Formal training programs to improve crystal identification, and the use of plain light microscopy may increase accurate detection of CPPD crystals.

While synovial fluid examination remains the test of choice for diagnosing CPPD deposition disease, in reality, the diagnosis frequently rests on radiographic findings of chondrocalcinosis. The sensitivity of plain radiographs for chondrocalcinosis may be as low as 39% and a role for other, newer imaging modalities has been sought. CT scanning can detect well-mineralized deposits in joints, but is rarely used to image painful joints. Arthroscopy only visualizes surface crystals or deposits in areas where the cartilage is eroded. Ultrasound may be useful in detecting CPPD crystal deposits, but its use can be limited by the skills and experience of the ultrasonographer. MRI is particularly poor at distinguishing meniscal tears from CPPD crystal deposits, as both appear as signal voids. Further studies of newer imaging modalities are certainly warranted.

**Treatment:** The treatment of CPPD deposition disease remains woefully inadequate. Currently CPPD deposition disease is treated symptomatically. Intra-articular corticosteroids and non-steroidal anti-inflammatory drugs are the mainstays of therapy. Colchicine may have some benefit in patients with pseudogout, and rarely, we resort to systemic corticosteroids. Anecdotally, some patients have responded to magnesium supplementation. Cheung et al. studied the use of a crystal poison known as phosphocitrate in preventing calcifications in spontaneous osteoarthritis in guinea pigs. This work also supports a role for cartilage calcification in the initiation or perpetuation of osteoarthritis.

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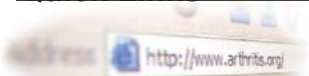
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## About the Author

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Dr. Rosenthal received her MD from Johns Hopkins University School of Medicine and completed a residency in Internal Medicine at Strong Memorial Hospital of the University of Rochester. She received her rheumatology training at the Medical College of Wisconsin in 1990. She received a post-doctoral fellowship from the Arthritis Foundation to begin her research career, and has been active in the field since that time. In 1996, she moved her laboratory to the Zablocki VAMC in Milwaukee and has continued to run an active laboratory at the VA. She is a professor of Medicine in the Division of Rheumatology at the Medical College of Wisconsin, and Chief of the Rheumatology Section at the Zablocki VAMC.

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