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Finding a medical solution to calcium oxalate urolithiasis: Which agents have the best dissolution potential? An integrative review

Samuel P.B.Drawbridge
BVetMed MRCVS, UK

Calcium urolithiasis is a disease of major concern given its high prevalence, welfare and economic implications, and complications associated with current treatment and prevention strategies. A large number of publications were evaluated in this review to determine chemicals most evidential of calcium oxalate dissolution potential, the most prevalent stone component. The relevant literature was sourced through a keyword search of several online databases, and studies included if they showed evidence of an agent exhibiting dissolution activity upon calcium oxalate powder, crystals or stones. A critical analysis of these chemicals was undertaken, to determine those most efficacious, whilst also considering safety of medical use. This evaluation revealed citrates to be the most promising candidates for future research, given *in vivo* and *in vitro* data. Other factors influencing dissolution were also considered, including the ability of the immune system to dissolve calcium oxalate crystals.

Recent Publications:

1. Raheem, O.A., Khandwala, Y.S., Sur, L.R., Ghani, K.R., Denstedt, J.D, 2017. Burden of urolithiasis: trends in prevalence, treatment and costs. Eur. Urol. Focus, 3, 18-26.
2. Chutipongtanate, S., Chaiyarit, S., Thongboonkerd, V., 2012. Citrate, not phosphate, can dissolve calcium oxalate monohydrate crystals and detach these crystals from renal tubular cells. Eur. J. Pharmacol. 689, 219-25
3. Phillips, R., Hanchanale, V.S., Myatt, A., Somani, B., Nabi, G., Biyani, C.S., 2015. Citrate salts for preventing and treating calcium containing kidney stones in adults. Cochrane database of systematic reviews, Issue 10.
4. Cicerello, E., Merlo, F., Gambaro, G., Maccatrozzo, L., Fandella, A, Baggio, B., Anselmo, G., 1994. Effect of alkaline citrate therapy on clearance of residual renal stone fragments after extracorporeal shock wave lithotripsy in sterile calcium and infection nephrolithiasis patients. J. Urol. 151, 5-9.
5. Soygur, T, Akbay, A, Kupeli, S., Effect of potassium citrate therapy on stone recurrence and residual fragments after shockwave lithotripsy in lower caliceal calcium oxalate urolithiasis: a randomised controlled trial. J. Endourol. 16, 149-152.
6. Saso, L, Valentini, G., Leone, M.G., Grippa, E., Silvestrini, B., 1998. Development of an in vitro assay for the screening of substances capable of dissolving calcium oxalate crystals, Urol Int. 61 (1998) 210-214.

Biography

A practitioning veterinarian Samuel Drawbridge is very passionate about medicine, but also has a deep interest in chemistry. Pharmacology allows a combining of these two disciplines. His current research involves exploring medical solutions to calcium oxalate based urolithiasis. He hopes to develop a solution that could be used to dissolve calcium oxalate uroliths by direct irrigation of the urinary tract, as well as discovering those agents best suited for prevention of this disease. This research allowing him to improve the health and welfare of humans and animals, beyond that of working as a general practitioner.