

## Effects of some metals in water on the inhibition of calcium oxalate crystallization.

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### Abstract

The aim of this study was to examine the possible effects of some metals on the inhibition of calcium oxalate crystallization. A test of urinary lithogenic risk was used to follow the crystallization of calcium oxalate in vivo in the presence of several metal ions assayed in their physiological concentrations. Interactions of these metal ions with known inhibitors of such crystallization ( Citric acid, Magnesium ions, Ferrous ions and Fluorine ions) were also investigated. Our objective in this part of work was to determine the metals inhibitors there act on the states of crystallization of calcium oxalate efficiently. A survey previous to the laboratory showed the in vitro inhibitory power of the chemical substances that we tested on the calcium oxalate. The inhibition capacity of Fluoride, citrate, ferric and Magnesium ion were important on the aggregation and size of oxalate calcium crystals, but didn't inhibit completely this crystalline species.

At maximal concentrations of 12 mM of fluoride ions inhibition was partial (89%). On the other hand, in the presence of citrate ion, the inhibition of calcium oxalate growth and aggregation increased. In fact at a concentration of 4 mM the inhibition percentage of oxalate calcium crystals was 54%. The addition of a concentration of 4 mM of ion ferric resulted in inhibition of 72% of calcium oxalate. On note that these ions developed an inhibition important enough at the lower concentrations. The same result has been found for Mg<sup>2+</sup> ions, it acts was important on the nucleation phase.

In the comparison, in vitro study showed Fluoride ions acts on the phase of germination and aggregation with a rate of inhibition (73%). The citrate acts on the three phases of crystallization with a rate of inhibition of 96%. The ferric ions act on the phase of growth with a rate of 96%. The Mg<sup>2+</sup> ion acts on the three phases of crystallization with a rate of inhibition of 90%.

The study showed to propose the following classification of the power inhibitory in vivo on the oxalate of calcium: Fluoride ions, Magnesium ions, Ferric ions, citric Acid. In vitro, the classification was reversed practically: Citric acid, Ferric, Magnesium, and Fluoride ions. These results obtained in vivo confirmed the beneficial effect of chemical inhibitors and may justify its use as a preventive agent against the formation of calcium oxalate urinary stones.

**Keys words:** inhibition, oxalate, , substances inhibitors, study