

A papillary $CaC_2O_4 \cdot H_2O$ stone: A study on the core composition from XPD by Rietveld Method

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The renal calculi are formed as a result of a biological maladjustment of the urine, which are of heterogeneous nature containing mainly oxalate crystals, phosphate crystals and uric acid. Affects approximately 5% of the Brazilian with a recurrence rate of 2.5% (about 2.5 million people) and mainly affecting adults aged 20-60 years. Urinary calculi can be easily removed but it is not possible to prevent the recurrence. Once the nucleation of such calculi starts, growth of stones may continue with the deposition of either original substances or different compositions even after the removal of stones by means of any invasive procedures. A papillary calculi composed by calcium oxalate monohydrate basically consists of a core, a radially striated intermediate layer. There is four different types of renal papillary calculi composed by calcium oxalate monohydrate (COM), and the differences among them is the consequence of various types of core upon which crystal growth occurs. The formation of this core represents the first and the most important step in a papillary COM calculus development. However, a little attention has been paid to the core structure. In this work it was shown that the Rietveld analysis of the X-ray powder diffraction pattern from the COM kidney stones allows us to obtain an identification of nucleation type. Moreover, the study described here can be used to determine the kidney stones characteristics obtained from the Extra-corporeal Shock Wave Lithotripsy (ECSWL) without necessity of a surgical procedure.