X-RAY MICRODIFFRACTION AND URINE: A NEW ANALYSIS METHOD OF CRYSTALLURIA

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The qualitative and quantitative analysis of crystalluria have clinical significance in the diagnosis and prognosis of urolithiasis. Optical methods used on a routine basis can fail the correct identification of crystal materials for several reasons, such as the small grains size of crystals or the morphological convergence of different crystal species. The aim of this research is to provide an new accurate methodology to better analyze the crystalluria in patients with renal stone disease. Subjects for study were selected on the basis of pre-determined criteria: 8 patients with lithiasis disease hospitalized at the San Carlo Hospital (Potenza); 3 healthy subjects with no history of renal calculi. The procedure involves an urine collection, the separation of the solid residual by centrifugation, and its analysis by X-ray diffraction. Since very low amount of solid residual is obtained from each patiet, a microdiffractometer was used instead of a more conventional instrument. The X-ray spectrum obtained from the sample and from a known standard was processed by Rietveld method in order to quantify crystalline species and the amorphous component. The proposed methodology has two main advantages: i) to properly identify the crystalline phases in the urine, according the crystallographic criteria, that are not biased by grain size, morphology or any other optical interferences due to dust, organic coatings or others; ii) accurately quantify both crystalline and amorphous components of the urine. The temperature of urine collection and the solid residual conservation represent critical phases of this methodology.

Keywords: urinary cristals, XRD