

ANALYSES METHODS OF CRYSTALLURIA

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Urine is an extremely complicated solution with variable composition. Various crystals are seen in human urine. Oxalate, phosphate, uric acid and urate crystals are generally seen in urinary calculi. The qualitative and quantitative analysis of these crystals have clinical significance in the diagnosis and prognosis of urinary calculi formation (urolithiasis). Unfortunately little has been done for the analysis of crystals in urine.

Currently, the study of urinary crystals is performed by referring to the European Guidelines for examining urine, where the centrifugation of urine is recommended. The procedure is completed by the resuspension of sediment for analysis at the phase-contrast microscope with polarizer. The study of Gai and Lanfranco [2007] show that the major nephrology centers have a variety of methods of preparation of urine for analysis, especially in terms of time and spin speed. In order to perform a correct qualitative and quantitative analysis of the sediment, different alternative methods have been developed: chemical analysis, infrared spectroscopy and Xray diffraction.

The X-ray method has many advantages which can be summarized in an easy sample preparation, automation of the measure, the semi-automatic evaluation of the diffractometric reflection through simple software, the exact differentiation of all crystalline phases and the possibility of obtain quantitative estimates of abundance of the phases (see the review edited by Bish & Post [1989]). Conversely, it has some disadvantages, mainly due to the amount of sample needed (tenshundreds of milligrams, that quite often are not available) and to the possible orientation of the crystals. However these problems can, be overcome by using the microdiffraction analysis.

Microdiffractometers have an X-ray beam of very small diameter (tens of micron) and a sample holder that rotate around 2 axes during the measure, in order to get a random orientations of the crystals respect to the incident beam.

Such an arrangement of the instrument give the additional advantage of single crystal analysis (as well as bulk dust), and not requirement of pre-treatment, such as grinding or complex positioning of the specimens.

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