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Editorial

The importance of crystallization processes in understanding of stone formation

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Stone removal has made impressive progress over the last few years. Stone incidence and recurrence rates have remained high, however, and urolithiasis is an important factor in the raising cost of health maintenance. Methods of stone prevention and metaphylaxis are often somewhat arbitrary because stone formation is still poorly understood. Intensive research during the last years has demonstrated that urolithiasis is a very complex illness in which many factors are involved. Crystallization processes of stone minerals are becoming increasingly important in understanding stone formation. Birdwell Finlayson from Gainesville, Florida, who deceased on July 22, 1988 put forward and stimulated this view. In this issue containing the report from a workshop and five original papers on the crystallization of stone minerals, we fondly remember this pioneer of stone research.

Urinary supersaturation being the driving force for crystallization processes can now easily be calculated by a computer program. However, simulating urinary conditions by computer programs has limits, which are demonstrated in a paper comparing calculations and measurements of pH in experimental solutions and in urine [1]. The spontaneous nucleation of calcium oxalate requires much higher states of supersaturation than are usually found in urine [2]. Calcium oxalate nephrolithiasis and crystaluria therefore seem to be induced by heterogeneous nucleators, such as hydroxyapatite [3, 4] or uric acid [5]. Crystallization processes are not only modulated by nucleators but also by inhibitors. This issue contains three contributions to the inhibitory effect of citrate [4, 5], pyrophosphate [3, 5] and magnesium and chondroitin sulfate [5] on the heterogeneous nucleation of calcium oxalate.

However, results obtained in artificial solutions are not always conclusive for urine. This is demonstrated by a study showing an influence of zinc and citrate on urease induced crystallization in model solutions, which could not be repeated in urine [6]. Stone formation is probably the result of many more factors than are known today. Therefore, the knowledge of stone pathogenesis may be improved by the study of crystallization phenomena in whole urine, which is a very ambiguous and difficult topic. This issue reports on a special workshop held on problems related to the measurement of crystallization conditions in whole urine.

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