

## **TRACE ELEMENT INVESTIGATIONS IN KIDNEY STONES: A PILOT CASE IN BASILICATA (SOUTHERN ITALY)**

MARIA LUGIA GIANNOSSI\*, VITO SUMMA

*Laboratory of Environmental and Medical Geology, IMAA-CNR, Tito Scalo (PZ), 85050, Italy  
giannossi@imaa.cnr.it*

Trace elements have been found in kidney stones. Their role in lithogenesis is debated. They may be involved in crystal induction depending on the particular relations between metals and solutes able to crystallize in urine. It is common knowledge that kidney stone is one of the most common health problems in the world and that it is strictly connected with environmental factors. It is important to highlight that kidney stones containing trace elements could be considered as environmental pollution markers. Our study aimed at assessing the content of trace elements in kidney stones collected among the Basilicata (southern Italy) inhabitants. 48 kidney stones composed of calcium oxalate, calcium phosphates, uric acid, cystine and a mixture of these were analyzed for the content of specific chemical elements either involved in the kidney stone crystallization process (Ca, Mg, K, Zn, Fe, Cu, Mn) or potentially toxic (Pb, Cr) by AAS, ICP, and a SEM microanalysis was carried out on petrographic thin sections. This study confirms the presence of some foreign elements in the kidney stone structure. Three main findings emerge from the results: 1) most kidney stones collected have high concentrations of elements such as K, Cu and Mg and a low content of Fe when compared to the results obtained from other researches; 2) appreciable amounts are found in inorganic phases (calcium oxalate e phosphates), whereas only Zn content is higher in organic phases (uric acid and cystine); 3) among calcium-containing stones (more abundant), the calcium-phosphate ones contain greater amounts of trace elements than the calcium-oxalate ones, and among the calciumoxalate ones weddellite retains more trace elements than whewellite. Furthermore, the results show that the concentration of Zn, Cu, Fe, Pb and Cr is greater than that of a standard diet ingestion, therefore varying amounts of these elements may be attributed to their enrichment in the diet of the inhabitants of polluted areas.

Keywords: trace elements, kidney stones