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Identification and Characterization of a Calcium Oxalate Crystal Growth Protein Inhibitor from Human Renal Stone Matrix

Chanderdeep Tandon

Jaypee University of Information Technology, Waknaghat, Solan, India

A relatively small number of well-characterized inhibitors of kidney stone formation have been identified from the previous research involved in its formation. In this study conventional biochemical methods have been combined with recent advances in mass spectrometry (MS) to identify a novel calcium oxalate (CaOx) crystal growth inhibitor in human renal stone matrix. Proteins were isolated from the matrix of human CaOx containing kidney stones. Proteins having MW>10 kDa were subjected to anion exchange and molecular-sieve chromatography. Protein fractions were tested for their effects on CaOx crystal growth. Most potent fraction was excised, in-gel tryptic digested and identified by matrix assisted laser desorption/ionization-time of flight (MALDI-TOF) MS. An anionic protein (MW~42 kDa) with potent inhibitory activity against CaOx crystal growth was purified. Its homogeneity was confirmed by RP-HPLC. It was identified by MALDI-TOF-MS followed by database search on MASCOT server as human phosphate cytidylyltransferase 1, beta. Molecular weight of this novel CaOx crystal growth inhibitor from human renal stone matrix is also the same as that of human phosphate cytidylyltransferase 1, choline, beta.

Human phosphate cytidylyltransferase 1, choline, beta is a novel CaOx crystal growth inhibitor. It is involved in the biosynthesis of phosphatidylcholine which happens to be an important constituent of human renal stones and is also reported to have an antilithiatic effect.