Abstracts of the 6th International Symposium on Urolithiasis and Related Clinical Research

Vancouver, Canada, July 24–28, 1988

Conference Co-Chairman: R. A. L. Sutton, D. M., Urolithiasis Symposium, Department of Medicine, 3rd Floor – 910 West 10th Avenue, Vancouver, B.C., Canada, V5Z 1M9

These international symposia are held every 4 years with the objective of bringing together renal and metabolic physicians, physiologists, biochemists, urological surgeons and other physicians and scientists interested in kidney stone disease. Authors of more than 300 abstracts were invited to submit them under one of six categories:

A. Metabolism and Biochemistry
B. Physiology
C. Physical Chemistry – Inhibitors
D. Medical Management
E. Urological and Radiological Management
F. Case Reports

In this volume the abstracts are similarly divided into these six categories, with prefix letters A–F as indicated above. The final programme of the meeting will include eight major symposia and four oral free communicative sessions (the latter selected from these abstracts). The remaining abstracts will be presented either in general poster sessions, or in smaller theme poster sessions which will include discussion of the posters led by a chairman.

As would be expected, in view of recent developments in the prevention and treatment of urolithiasis, there will be major emphasis on the underlying mechanisms of stone formation, the role of inhibitors in pathogenesis and treatment, and the latest developments in urological management including indications, complications and new technological advances in extracorporeal shock wave lithotripsy.

We anticipate an exciting and informative Urolithiasis Symposium in Vancouver in July 1988.

J. H. Dirks, M.D.
Chairman

R. A. L. Sutton, D.M.
Co-Chairman
A. Metabolism and Biochemistry

A1. Microdetermination of Urinary Constituents by Vertical-Lightpath Photometry in Microplates

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Automated photometric measurements in microtiter plates have been used for years in our laboratory in order to determine kinetic parameters of crystal growth in gels. We have now applied vertical-lightpath photometry to quantify various soluble constituents of urine and serum that are relevant with respect to diagnosis and basic research on urinary stone formation.

Method: Reagents and samples were handled by a computer-controlled pipetting station (Tecan 505, Zinsser Analytik, FRG) with IBM PC corresponding to programs specifically established for the methods under consideration (microtiter range). Measurements were carried out in 96-well microtiter plates using the microreader MR 600 (Dynatech) with IBM PC-XT. Measuring wavelength: 340–700 nm (filters). Programs for control of the photometer, acquisition, and evaluation of measuring data were written in BASIC.

Results: The following enzymatic assays (Boehringer, Mannheim, FRG) were adapted to the special conditions of microdetermination: (1) citrate, (2) isocitrate, (3) uric acid, (4) creatinine, and (5) oxalate. In general, measuring volumes were about 300 μl per well for all tests. Mean nonprecision within series was 2–3% in the normal range. The agreement of results obtained from corresponding micro- and macrotests was good (r > 0.980). About 85% of reagents could be used again and manual work was reduced drastically.

Conclusions: The analytical principle described here is characterized by efficiency, flexibility, and economy and may be recommended to laboratories concerned with the diagnosis of urinary stone formation.

A2. Chemical Composition of Renal Stones in Mosul

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One hundred forty-six renal stones were analyzed to identify the chemical structure of the stones. The wet chemical method was used. More than 95% of the stones were of the mixed type, the most common of which was mixed oxalate. Ammonium urate was more common in renal stones than uric acid. Only 4.1% of the stones were composed of pure oxalate; pure phosphate stones were uncommon; apatite (calcium phosphate) stones were by far the most common. Individual types of stones affect certain age groups of patients more than others. In general, the disease affects males more than females. It is concluded that the chemical nature of the stone could be of value in the management of the disease.

A3. Tartaric Acid Ingestion and Urinary Stone Inhibition in Rats

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Studies were undertaken in rats to ascertain whether or not feeding of tartaric acid (L+) inhibits urinary calculi formation. Forty-eight male weaning rats were equally divided into two groups and fed ad libitum a potentially calculogenic diet. This diet provided 10% protein (casein), 80% starch, adequate vitamins and minerals, and contained a high concentration of calcium (9 g/kg). One group served as the control. The rats in the experimental group were fed 50 mg tartaric acid (L+) per day, along with the above diet. After 16 weeks, 24-h urine was collected for two consecutive days from all the rats. Fresh urine samples were examined for crystalluria and pH. Urinary creatinine, phosphorus, calcium, magnesium, citrate, oxalic acid, and tartarate were estimated. In addition, the inhibitory activity of urine towards calcium oxalate crystal growth was measured in an in vitro system. Subsequently, the rats were killed and examined for presence of urinary calculi. All calculi were weighed and analyzed. Urine of the control group of rats contained very dense, large crystals of calcium oxalate (> 20 μm). In contrast, these crystals were very few and much smaller (between 2 and 5 μm) in the urine of rats fed with tartaric acid. Tartaric acid resulted in a significant fall in urinary oxalate and a rise in urinary phosphorus, citrate, and tartarate. The in vitro activity of urine towards calcium oxalate crystal growth was significantly enhanced by tartaric acid feeding. A high incidence (90%) of calcium-oxalate urinary was observed in the control group. Tartaric acid resulted in a drastic reduction in this incidence (40%). Besides, the calculi developed in the experimental group were strikingly smaller (8.0 ± SE 3.8 mg) than those in control rats (76.3 ± SE 2.23 mg). In the tartaric group a significant inverse correlation between the weight of the calculi and urinary phosphorus (r = 0.93) was observed. This study, the first of its kind in animals, demonstrates unequivocally that tartaric acid (L+) helps to reduce both the incidence and size of urinary calculi.

A4. The Effect of Feeding Tamarind to Men on the Lithogenic Properties of Urine

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An investigation was conducted on the effect of feeding tamarind to normal men, i.e., the important lithogenic properties of urine. Tamarind is a fruit rich in tartaric acid. The metabolic study was well controlled and used four normal young adult men on normal vegetarian diets. During the first 7 days of this study (pretamarind period), moderate calcium oxalate crystalluria was induced in these subjects by the inclusion of common dietary ingredients rich in oxalate in the diets. Subsequently, aqueous extract of tamarind (10 g/day) was included in the diets for another week (posttamarind period). Intake of water was equalized for all the subjects and kept constant during the entire study. Throughout the experimental period, morning samples of urine were collected every day. Crystaluria in these samples was immediately examined under a high-power microscope. The sizes of these crystals were determined with the help of millipore filters of different pore sizes. At the end of each period, urine was collected over tolune for 2 consecutive days. Volume and pH of urine were recorded. Creatinine, oxalate, calcium, magnesium, phosphorus, citrate, and tartaric acid were estimated in the urine. The capacity of urine to inhibit the growth of calcium oxalate crystals was tested in an in vitro system. Urine volume was not influenced by tamarind feeding. Inclusion of tamarind extract very promptly brought about the following striking changes in the pattern of calcium-oxalate crystalluria: (1) complete disappearance of massive aggregates of calcium oxalate crystals (within 3 days); (2) a fall in the density of crystalluria (within 5 days); (3) a reduction in crystal size from 15–20 μm to less than 5 μm (within 5 days); (4) the complete absence of crystalluria by the end of 7 days. The post-tamarind period was also associated with a significant rise in urinary citrate, phosphorus, and tartaric acid, and a fall in oxalate. Feeding of tamarind also enhanced the inhibitory activity of urine toward calcium oxalate crystal growth. These changes in urine properties were similar than those observed by us in rats fed tataric acid. This human study offers very convincing evidence of the probable efficacy of tartaric acid as an inhibitor of calcium-oxalate stone formation – even in man. Our results thus confirm the suggestions of earlier investigators.