

Ethylenedinitrilotetraacetic Acid as a Solvent for Urinary Calculi. (18024)

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Ethylenedinitrilotetraacetic acid is now available commercially from Bersworth Chemical Co., Framingham, Mass. It forms stable chelate complexes with a number of metal ions, including calcium(1). We find that neutral aqueous solutions of this reagent dissolve urinary calculi rapidly. Urinary calculi are composed principally of calcium oxalate, urate, phosphate, and carbonate, with other salts and organic matter(2). The solvent action of ethylenedinitrilotetraacetic acid is undoubtedly due to the formation of soluble chelated calcium complexes. One stone which was composed of cystine, with no calcium present, was unaffected by the acid. Because of its effect on urinary calculi, we propose the short name "calsol" for ethylenedinitrilotetraacetic acid in this application.

A 3% calsol solution was made up by dissolving 30 g of calsol and 10 g of sodium hydroxide in one liter of water and adjusting to pH 7.5 with additional sodium hydroxide. Approximately 2 g was required. For the purpose of comparing calsol with the currently used citrate solution of Suby, 3% sodium citrate was prepared according to his formula "G"(3). The solvent actions of these solutions were compared against 44 pairs of stones

from 44 patients in the Squier Urological Clinic, Presbyterian Hospital, New York. The stones from any one patient were nearly identical in size and composition. They were classified into 3 types according to the principal anion present: oxalate, urate, and soft (phosphate-carbonate). Calcium was present in all stones, including the urates. The stones were individually immersed in the solutions for 24 hours and the percentage losses in weight determined. Care was taken to avoid breaking off small pieces of stones which had been softened by the solution. In each pair of stones the calsol-treated stone lost substantially more weight than the citrate-treated stone. Results are summarized in Table I.

The effects of wide variations in physical and chemical structure of the stones is evident, even when the stones are classified according to chemical type. The citrate solutions show satisfactory solvent action against only the most soluble phosphate-carbonate type, in accordance with the results reported by Suby *et al.*(3). The calsol solutions, however, dissolve substantially all types of stones. We are completing an intensive laboratory and clinical study of calsol solutions.

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TABLE I.
Dissolution of Urinary Calculi in 24 Hr by Calsol and by Citrate Solutions.

Type of stone	No. of specimens	Wt loss in %			
		3% Calsol (pH 7.5)		3% Citrate (pH 4)	
		Avg	Range	Avg	Range
Oxalate	8	27	11-45	2	0-6
Urate	15	16	5-29	3	0-17
Soft	21	34	7-86	17	0-50

1. Pfeiffer, P., and Offermann, W., *Ber.*, 1942, v75B, 1.

2. Scherer, P. C., Claffey, L. W., and Keyser,

L. D., *Bull. Virginia Poly. Inst.*, 1945, v38, No. 12.

3. Suby, H. I., Suby, R. M., and Albright, F., *J. Urol.*, 1942, v48, 549.