have been made in normal and tourniquet shocked rats using varied mixing times. Red cell volume determinations were significantly reproducible in the normal rat using mixing times of from 5 to 30 minutes. A 15 minute mixing time in the tourniquet shocked rats allowed significantly reproducible determinations of the red cell volume.

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Nephron Reabsorptive Site for Calcium and Magnesium in the Dog.* (24895)

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The technic of stopped flow, introduced by Malvin, Wilde and Sullivan(1), consists in collecting consecutive small volumes of urine discharged from a mannitol-loaded kidney immediately following release of ureteral occlusion of a few minutes' duration. A plot of concentration of any substance in consecutive urine fractions against ordinal number of the fraction, generally shows that the concentration curve passes through a minimum or a maximum according to whether the substance is reabsorbed or secreted by the nephron. Relative locations of maxima and minima of a group of substances in such a plot constitutes a sequence of transport processes which should correspond to the relative order in which these exist anatomically in the nephron. The validity of any sequence established in this way rests upon its agreement with the sequence established by analysis of fluid obtained directly from various segments of the nephron by micropuncture. Moving toward the glomerulus, direct analysis indicates, in the rat at least, that sodium is reabsorbed strongly in first portions of distal tubule(2) while glucose is reabsorbed and dyes secreted in proximal convoluted tubule(3,4) In the stopped flow analysis as described above, the same sequence is observed: concentration minimum for Na (and K), followed by a minimum for glucose and a maximum for p-aminohippurate secretion, the last 2 occurring simultaneously(1). The above substances, whose anatomical site of transport is at least approximately known, can tentatively serve as reference points in stopped flow analyses for other substances which are transported by renal epithelium and which for one reason or another have not been examined by micropuncture. Application of this concept to locate approximate site of transport of calcium and magnesium in the nephron is reported here. The technic was that described by Malvin *et al.* using dogs as experimental animals. The urine reinfusion technic was employed to attain a steady state of renal function and body fluid composition following appropriate priming(5). Methods for measurement of sodium, potassium, p-aminohippurate, inulin, creatinine, calcium and magnesium are those regularly employed in our laboratory(6-9).

Results. Three successful experiments were in complete agreement. Fig. 1 illustrates results of one experiment. Both Ca and Mg are reabsorbed in the same region of the nephron. The area of reabsorption of these cations appears to coincide with the area of K reabsorption and to coincide either with or lie slightly "proximal" to the area of maximal Na reabsorption. On the other hand, the Ca

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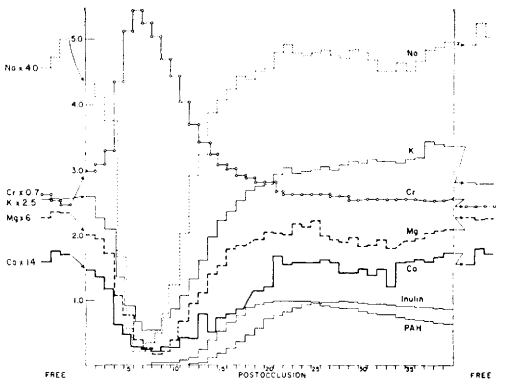

FIG. 1. Electrolyte excretion patterns from a stopped-flow experiment. Creatinine is represented as its U/P ratio, electrolytes (Ca, Mg, Na, K) as clearance ratios to creatinine, and PAH and inulin as fractions of their maximal urinary concentration. U/P and clearance ratios are fitted to arbitrary scale by multiplying by indicated factors. Electrolytes exhibit minima in urine which appear early following release of ureteral occlusion (left) and before appearance of PAH (right), thus relating transport areas to distal segment of nephron. Protocol: Nembutal and chloralose anesthesia; Prime: mannitol 2 g, creatinine 75 mg, KCl 1.5 mM, $CaCl_2$ 0.63 mM, $MgCl_2$ 0.35 mM, dog Ringer-Locke solution 44 ml, all/kilo; equilibration by urine reinfusion 150 min.; 0.6 ml urine samples collected serially following release of 7 min. occlusion; inulin and PAH inj. slowly 2 min. before release.

and Mg minima are "distal" to the region of PAH secretion indicating that these ions are reabsorbed in the "distal" segment of the nephron. The data fail to suggest existence of additional processes of either reabsorption or secretion of Ca or Mg.

A single, distal locus for magnesium transport offers an explanation for the observation of Robinson *et al.*(10) that radioactive Mg appeared only in the "distal" area of a stopped flow graph. Experience with other transport systems, such as sodium and urea in the frog(11,12), indicates that molecules may move opposite to the direction of principal movement while net transport is occurring.

Summary. 1. Stopped flow analysis indicates that calcium and magnesium are reabsorbed strongly in a "distal" region of the nephron approximately coincident with reabsorptive areas for sodium and potassium. 2. The data fail to suggest existence of additional reabsorptive or secretory loci for these ions.

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Homologous and Heterologous Complement Fixing Antibody in Persons Infected with ECHO, Coxsackie and Poliomyelitis Viruses. (24896)

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Although a number of newly recognized viruses recovered from the alimentary tract of man were originally assembled in the ECHO group primarily because they apparently did not belong in already known families of viruses(1), it has become increasingly evident that most of them do share many bio-

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