Apparent Renal Tubular Secretion of Riboflavin in Man

Sir:

The authors recently have shown that riboflavin is absorbed from the gastrointestinal tract of man by a specialized transport process rather than by passive diffusion (1). Data have now become available from the study of Stripp (2) which permit determination of the mechanism of renal excretion of this vitamin. Figure 1 is a plot of riboflavin excretion rate *versus* time during and after administration of 84 mg. riboflavin to a human by slow intravenous infusion. The data were obtained from a photographic enlargement of Fig. 6 of Stripp's paper (2). The postinfusion excretion rate declined exponentially as a function of time, with a half-life of 1.2 hr. This value is in excellent agreement with the 1.1 hr. average value observed after oral administration of riboflavin (1).

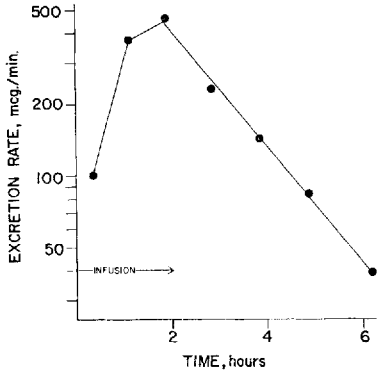

Fig. 1.—Excretion rate of riboflavin as a function of time during and after intravenous infusion of 84 mg. of riboflavin (data from Fig. 6 of *Reference 2*).

Apparent volumes of distribution for riboflavin have been calculated from Stripp's urinary excretion and blood level data (2) by three standard pharmacokinetic methods (see *References 3* and *4*) and are listed in Table I. There was good agreement between the results obtained by these different procedures. Renal clearance values were also calculated by three different methods and are listed in Table II. The calculations are based on riboflavin plasma concentrations which have not been corrected for protein binding (5) and are therefore minimum values which, had the extent of protein binding been known and taken into account, would have been even higher. However, even these minimum values are about twice as large as the glomerular filtration rate of 131 ± 22 ml./min. in normal man (6). This indicates that the renal excretion of riboflavin involves not only glomerular filtration but also renal tubular secretion. It is of interest that at least two other B vitamins, thiamine and pantothenic acid, are actively secreted by the renal tubules (7, 8).

TABLE I.—ESTIMATION OF THE APPARENT VOLUME OF DISTRIBUTION OF RIBOFLAVIN

Method of Calculation[a]	Determinations, No.	Vol. of Distribution, L. Mean	Range
$\frac{A}{C}$	5	31	29–33
$\frac{dU/dt}{kfC}$	6	26	23–30
$\frac{D}{k \text{ area}}$	1	26	...

[a] A = amount in the body; C = plasma concentration; dU/dt = urinary excretion rate; k = apparent first-order elimination rate constant; f = fraction excreted unchanged; D = dose; area = area under the plasma level *vs.* time curve.

TABLE II.—ESTIMATION OF THE MINIMUM RENAL CLEARANCE OF RIBOFLAVIN

Method of Calculation[a]	Determinations, No.	Min. Renal Clearance,[b] ml./min. Mean	Range
$\frac{Akf}{C}$	5	290	270–310
$\frac{dU/dt}{C}$	6	240	220–280
$\frac{Df}{\text{area}}$	1	240	...

[a] Abbreviations as in Table I. [b] Not corrected for plasma protein binding.

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