

## Effect of amino acids and proteins on amylase activities of body fluids\*

SHERMAN<sup>1</sup> reported enhancement of pancreatic and salivary amylase activities in the presence of added amino acids. Observations in this laboratory indicate that serum amylase activity, as measured by VAN LOON'S<sup>2</sup> method, is not significantly increased by added amino acids (glycine, alanine, glutamic acid, leucine, isoleucine, valine, serine, threonine, proline and glycyl-glycine in separate trials added to the reaction flasks in 50 mg quantities). The ratios of measurements with and without added amino acids varied from 1.05–0.95 (mean 1.01), approximately the range of experimental error of the method. Dialyzed serum was likewise not affected by added amino acids and showed no decrease in activity during dialysis except that due to simple dilution.

Salivary amylase (using 1:5000 dilutions of saliva with 0.9% NaCl) activities<sup>2</sup> were enhanced with glycine by about 20%. This is in agreement with SHERMAN'S data but in disagreement with GROLL'S<sup>3</sup> observation that dilute saliva acting on soluble starch was not activated by glycine. A mixture of 0.1 ml of a 1:20 dilution of saliva and 5 ml of serum was analyzed (Table II) and found to have a greater amylase activity than would have been calculated. However, glycine did not further enhance the activity of the mixture. Salivary amylase was also activated ( $138,000/111,000 = 1.24$ ) by addition of 7 mg of bovine plasma albumin (Armour's) (7 mg is approximately the amount of protein that would be present in 1 ml of a 1:10 dilution of serum).

TABLE I

EFFECT OF GLYCINE ON SALIVARY AMYLASE

Amylase activity		Ratio of activities
With added glycine	No added glycine	
119,000*	97,000*	1.22

\* Average of four determinations.

TABLE II

EFFECT OF GLYCINE ON SERUM-SALIVA MIXTURE

Calculated* amylase activity	Observed amylase activity	
	With added glycine	No added glycine
293	342	341

\* Measured separately, the amylase activity of the serum was 140 and the saliva 153,000.

Salivary amylase activated by 7 mg of plasma albumin was not further activated by adding 50 mg of glycine and when activated by glycine was not further activated by plasma albumin.

Reasoning by analogy, apparently the protein in serum is sufficient to provide maximal activation for serum amylase in the dilutions used in VAN LOON'S method and so added amino acids cause no further enhancement of activity.

However, amylase activities of neither fresh nor dialyzed urines were enhanced by added glycine even though the concentration of protein in the urines, as indicated by tests with sulfo-salicylic acid, was less than 0.1 mg/ml (less than 0.01 mg in aliquot of diluted urine). Incidentally, the amylase activity of urine diminished during dialysis perhaps due to adsorption of amylase by the cellulose of the dialysis bag. Since it was shown that salivary amylase activity was still enhanced about 10% by glycine in the presence of as much as 0.1 mg of added plasma albumin, one must assume either that salivary amylase is different from urinary amylase or that urine contains a non-protein, non-dialysable amylase activator.

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<sup>1</sup> H. C. SHERMAN AND F. WALKER, *J. Am. Chem. Soc.*, 43 (1921) 2461.

<sup>2</sup> E. J. VAN LOON, M. R. LIKENS AND A. J. SEGER, *Am. J. Clin. Path.*, 22 (1952) 1134.

<sup>3</sup> J. TEMMINCK GROLL, *Pharm. Weekblad*, 65 (1928) 1315.

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