TABLE I.
Influence of Vitamin D Deficiency on Concentration of Blood and Tissue Enzymes.
P = Pathological; C = Control.

Enzyme	No. of Groups Studied	Aver. for all groups	
		P	C
Blood Serum Amylase*	17	31.9	32.9
" " Esterase†	18	17.2	18.4
" " Phosphatase*	27	62.0	58.2
Trypsin*	38	50.1	49.0
Erepsin*	38	24.3	24.2
Pancreatic Amylase*	38	280.0	265.0
" Lipase‡	38	158.0	160.0
Hepatic "	38	26.9	27.9
Pancreatic Esterase†	38	13.1	13.6
Hepatic "	38	43.0	44.0

*expressed in units.
†expressed as mg. butyric acid.
‡expressed as mg. oleic acid.

The significant point in this study is the failure to obtain in experimental rickets large increases in concentration of blood serum phosphatase observed in human rickets.[3, 4] As a matter of fact, Bodansky and Jaffe[4] claim that the concentration of this blood enzyme is of even greater diagnostic value than blood phosphorus and calcium. It would appear then that experimental rickets is not the analogue of human rickets as it is generally assumed.

Our results on blood serum phosphatase in experimental rickets are in accordance with the recent findings of Scoz,[5] the report of which appeared during the progress of our own investigations.

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Deficiency of Vitamins A and B Complex in Concentration of Blood and Tissue Enzymes of Albino Rat.* VI.

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We have reported[1] that in vitamin A deficiency there is a marked decrease in the concentration of blood serum esterase, an appreciable

[3] Kay, H. D., *J. Biol. Chem.*, 1930, **89**, 249.

[4] Bodansky, A., and Jaffe, H. L., *Am. J. Dis. Child.*, 1934, **48**, 1268.

[5] Scoz, G., *Boll. Soc. Ital. Sper.*, 1935, **10**, 823.

* Research paper No. 429, Journal series, University of Arkansas.

[1] Sure, B., Kik, M. C., and Buchanan, K. S., *Am. J. Dig. Dis. and Nutr.*, 1936, **3**, 493.

decrease in hepatic esterase, and a marked increase in hepatic lipase. In vitamin B_1 deficiency there is a marked decrease in the digestive efficiency of pancreatic esterase and a moderate decrease in the concentration of pancreatic and hepatic lipase, suggesting a disturbance in the digestion of fats in this avitaminosis. An appreciable increase in the concentration of blood serum phosphatase was found in a deficiency of the vitamin B complex.

In this communication we are submitting summarized data on the influence of multiple avitaminosis (deficiency of vitamins A and the B complex) on the concentration of blood and tissue enzymes of the albino rat. The animals were 6 to 9 weeks old and weighed 106 to 118 gm. at the beginning of the experiments. A total of 304 titrations were carried out in duplicate. The results are given in Table I.

TABLE I.
Influence of Deficiency of Vitamins A and the B Complex on the Concentration of Blood and Tissue Enzymes.

Enzymes	No. of groups studied	Aver. for all groups		% decrease in pathological	% increase in pathological	% animal groups showing decrease	% animal groups showing increase
		P	C				
Blood Serum Amylase*	16	22.5	23.7	5.0	—	62	38
" " Esterase†	6	8.0	13.7	41.6	—	100	0
Trypsin*	19	54.0	62.0	12.9	—	53	47
Erepsin*	19	23.0	24.0	4.1	—	63	37
Pancreatic Amylase*	19	223.0	218.0	0.0	2.1	32	68
" Lipase‡	19	118.0	166.0	28.3	—	90	10
Hepatic "	18	22.7	22.4	—	1.0	47	53
Pancreatic Esterase†	18	8.6	16.0	46.2	—	94	6
Hepatic "	18	21.1	24.6	17.0	—	66	34

*expressed in units.
†expressed as mg. butyric acid.
‡expressed as mg. oleic acid.

We conclude that the multiple avitaminosis of vitamins A and the B complex did not show increased disturbance in enzyme concentrations. The pronounced disturbance in blood serum esterase is due to vitamin A deficiency. The marked decrease in pancreatic esterase and the moderate decrease in hepatic lipase are to be credited to vitamin B_1 deficiency.