picture very similar to the one observed in patients with pernicious anemia after the administration of liver (Peabody[2]). Whether chronic infection acts in the same manner as acute infection is being investigated.

5772

Reticulocyte Response to Glutamic Acid in Pernicious Anemia.

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The clinical trial of glutamic acid in cases of pernicious anemia as an antianemic substance was suggested by the following experimental observations. According to Abderhalden[1] glutamic acid may be condensed into pyrrolidonecarboxylic acid. Hemin, the iron porphyrin, synthesized by Hans Fischer[2] is composed of pyrrole rings. West, Howe and Dakin[3] have recently isolated substances from liver tissue which are exceedingly active in pernicious anemia. These substances, identified by them as B-hydroxy-glutamic acid, δ-hydroxyproline, and as a tri-basic acid containing the pyrrolidone ring, are potential pyrrole percursors. More recently, Drabkin[4, 5] and Miller[4] found glutamic acid and certain other amino acids and compounds effective in the treatment of the anemia of rats caused by an exclusive milk diet.

Those substances which produce remissions in the blood picture of pernicious anemia, known to contain potential pyrrole percursors, are probably liberated from certain protein foods by normal gastric digestion[6] and then decomposed so that their products are available after absorption for the synthesis of hemoglobin and erythrocyte stroma. In pernicious anemia the necessary substances and their de-

[2] Peabody, F. W., *Am. J. Path.*, 1927, **3**, 179.

[1] Abderhalden, E., and Kautzsch, K., *Z. f. physiol. Chem.*, 1910, **68**, 487.

[2] Fischer, H., and Zeile, *Ann. d. Chem.*, 1929, **468**, 98.

[3] West, R., and Howe, M., *J. Biol. Chem.*, 1930, **88**, 427; Dakin, H. D., West, R., and Howe, M., PROC. SOC. EXP. BIOL. AND MED., 1930, **28**, 2; Dakin, H. D., and West, R., *J. Biol. Chem.*, 1931, **92**, 117; West, R., and Howe, M., *J. Am. Med. Assn.*, 1931, **97**, 685.

[4] Drabkin, D. L., and Miller, H. K., *J. Biol. Chem.*, 1931, **90**, 531; **92**, 61 sup.

[5] Drabkin, D. L., Discussion, *J. Am. Med. Assn.*, 1931, **97**, 686.

[6] Castle, W. B., Townsend, W. C., and Heath, C. W., *Am. J. Med. Sc.*, 1930, **180**, 305.

composition products are not made available to the organism in adequate amount due to some deficiency in the gastro-intestinal tract.

Ajinomoto (Suzuki) used extensively in Japan as a condiment for giving a meat-like flavor to foods is an exceedingly economical form in which to administer sodium-glutamate. If sodium-glutamate were to prove effective in the treatment of pernicious anemia, Ajinomoto would be a relatively cheap therapeutic agent. Forty grams of Ajinomoto was therefore administered in boiling water

TABLE I.

Hematological Observations Following Sodium Glutamate Feeding in Pernicious Anemia. Comparison with Liver Extract and Hog Stomach.

Case No.	Day of Treatment	Ajinomoto (Suzuki) 40 gm. daily			Day of Treatment	Liver Extract (Wilson)* 3-5 vials daily		
		HGB. %	R.B.C. Millions	Reticulocytes %		HGB. %	R.B.C. Millions	Reticulocytes %
1	Before	41	1.7	<1.0	Before	38	1.3	2.0
	2	—	—	2.0	2	38	1.6	1.0
	5	42	1.6	4.0	5	35	1.7	3.0
	6	—	—	5.0	7	40	1.9	5.0
	7	—	—	6.0	8	—	—	9.0
	9	38	1.3	6.0	10	43	1.9	3.0
	11	—	—	2.0	13	45	2.1	3.0
					15	45	2.0	<1.0
2	Before	39	1.7	1.0	Before	56	1.9	1.5
	1	45	1.6	2.0	2	64	2.0	4.0
	3	54	1.7	5.0	5	66	2.5	17.0
	5	56	2.2	4.0	8	70	2.5	—
	7	51	1.8	2.0	11	68	2.5	5.0
	9	54	1.8	1.0	14	70	2.6	5.5
	11	58	1.9	1.0				
	13	55	2.0	1.0				
	16	60	1.9	<1.0				
	19	60	1.9	2.0				
	25	58	1.9	1.5				
	27	56	—	—				
3	Before	27	0.9	<0.5	Before	42	1.6	2.0
	1	31	—	—	3	44	1.6	3.0
	3	—	—	1.0	7	44	1.9	3.0
	4	32	0.9	—	10	46	2.1	3.0
	5	30	1.0	—	15	52	2.8	5.0
	6	30	1.2	1.0	19	54	3.0	5.0
	9	30	1.4	—	22	58	2.9	2.0
	10	—	—	3.5	25	63	3.0	2.0
	11	34	1.6	—				
	13	—	—	3.0				
	14	40	1.7	2.0				
	17	42	1.6	2.0				
4	Before	32	1.4	0.5	Before	32	1.1	2.0
	2	35	1.3	3.0	1	29	1.7	1.0
	3	30	1.3	3.5	4	30	1.6	3.0
	5	28	1.1	2.0	6	38	1.8	2.4
	7	32	—	—	8	50	2.3	8.0
					21	60	2.7	2.4

* Hog stomach, 3 vials daily was employed in case 4.

in 4 equally divided doses daily to each of 4 patients suffering from pernicious anemia. In these doses the substance was well tolerated and in all instances promptly improved the appetite.

The hematological observations are recorded in Table I. The initial hemoglobin estimations made by the Sahli method on the 4 patients varied between 26 to 41%, the erythrocytes between 0.9 to 1.7 millions. After the treatment was instituted the maximum reticulocyte responses were 6.0, 5.0, 3.5, and 3.5% on the 7th, 3rd, 10th, and 3rd days respectively. The reticulocyte counts were made by Dr. Nathan Rosenthal. There were no rises in hemoglobin or erythrocyte counts except in case 2 where the hemoglobin mounted from 39 to 60% in 20 days without a corresponding increase in red blood cells. Ajinomoto ash contained only negligible traces of iron. Its copper content was not determined. The treatment with Ajinomoto was continued for 11 days, 27 days, 17 days, and 7 days respectively. Liver extract and hog stomach extract therapy was then instituted (Table I) with subsequent prompt rises in hemoglobin and erythrocytes.

Sodium-glutamate in the form of Ajinomoto is not an effective substitute for liver extract in the treatment of pernicious anemia. However, it is not completely devoid of activity, as indicated by minimal but definite reticulocyte response in 4 cases of the disease.

5773

A Recently Described Virus Disease of Parrots and Parrakeets Differing from Psittacosis.

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The widespread outbreak of psittacosis in 1929 and 1930 incited experimental work that quickly resulted in the discovery of the fact that the disease is caused by an agent capable of traversing bacteria-tight filters. Thus the first filterable virus indigenous to parrots was found. Since Amazon parrots were believed to be the chief source of the infection, workers in Brazil sought for evidence of psittacosis in their country. Pacheco, Bier, and Meyer[1-4] encoun-

[1] Pacheco, G., and Bier, O., *Compt. Rend. Soc. Biol.*, 1930, **105**, 109.

[2] Pacheco, G., *Compt. Rend. Soc. Biol.*, 1931, **106**, 372.

[3] Pacheco, G., and Bier, O., *Arch. Inst. Biol., São Paulo*, 1931, **4**, 89.

[4] Meyer, J. R., *Arch. Inst. Biol., São Paulo*, 1931, **4**, 25.