

ables in psychiatric patients. Most studies, however, have indicated that significant findings depend on the use of repeated examinations of the individual, in different situations (18-21). Our incomplete series of multiple testings indicate that this finding applies to blood catechol amines, and warrant further exploration with this method.

Summary. The concentrations of catechol amines with fluorescent absorption spectral characteristics similar to epinephrine and norepinephrine were determined in patients and hospital personnel in a psychiatric hospital. No significant differences were found in blood levels of catechol amines in these two groups. There were also no significant differences observed in the catechol amine levels among the various diagnostic categories within the patient group. L dihydroxyphenylalanine, tyramine, and 5 hydroxytryptamine do not appreciably interfere with the ethylenediamine method. 3 hydroxytyramine had a fluorescent potential equivalent to that of epinephrine and norepinephrine when these compounds were compared in the ethylenediamine method.

1. Lund, A., *Acta Pharmacol. et Toxicol.*, 1950, v6, 137.
2. Weil-Malherbe, H., and Bone, A., *Biochem. J.*, 1952, v51, 311.
3. Weil-Malherbe, H., *J. Ment. Sci.*, 1955, v101, 733.
4. Burger, M., *Helv. Physiol. Acta*, 1956, v14, C 13-14.
5. Manger, W. M., Baldes, E. J., Flock, E. V., Bollman, J. L., Berkson, J., and Jacobs, M., *Circulation*, 1954, v10, 641.
6. Aronow, L., and Howard, F. A., *Fed. Proc.*, 1955, v14, 315.
7. Hammond, W. G., Aronow, L., and Moore, F. D., *Ann. Surg.*, 1956, v144, 715.
8. Richardson, A. D., and Woods, E. F., *Fed. Proc.*, 1956, v15, 473.
9. Miller, J. W., and Elliott, H. W., *Proc. Soc. Exp. Biol. and Med.*, 1954, v87, 487.
10. Luderman, H. H., Filbert, M. S., and Cornblatt, M., *J. Appl. Physiol.*, 1955, v8, 59.
11. Aronow, L., Howard, F. A., and Wolff, D., *J. Pharmacol. Exp. Therap.*, 1956, v116, 1.
12. Millar, R. A., *ibid.*, 1956, v118, 435.
13. Valk, A. de T., and Price, H. L., *J. Clin. Invest.*, 1956, v35, 837.
14. Holton, P., *Nature*, 1949, v163, 217.
15. Engel, A., and Euler, U. S. von, *Lancet*, 1950, v259, 387.
16. Goldenberg, M., and Rapport, M. M., *Meet. Soc. Clin. Invest.*, May, 1951.
17. Euler, U. S. von, Lund, A., Olsson, A., and Sandblom, P., *Scandinav. J. Clin. and Lab. Invest.*, 1953, v5, 122.
18. Basowitz, H., Persky, H., Korchin, S. J., and Grinker, R. R., *Anxiety and Stress*, McGraw-Hill Book Co., New York, 1955.
19. Diethelm, O., Doty, E. J., Milhorat, A. J., *Arch. Neurol. and Psychiat.*, 1945, v54, 110.
20. Euler, U. S. von, and Lundberg, U., *J. Appl. Physiol.*, 1954, v6, 551.
21. Milhorat, A. T., Small, S. M., and Diethelm, O., *Arch. Neurol. and Psychiat.*, 1942, v47, 779.

Received April 17, 1957. P.S.E.B.M., 1957, v95.

Electrophoretic Patterns in Acute Acquired Hemolytic Anemia.* (23229)

LEON N. SUSSMAN AND JAMES B. SANG

Laboratory of Beth Israel Hospital, N. Y. City.

In the study of the immunohematology of acute acquired hemolytic anemia, the nature and behavior of the serum proteins attracted attention. An abnormal distribution of the protein fractions was suggested by the greatly accelerated sedimentation rate, autoagglu-

tionation, and high antibody titer. The only reference to this subject in man is a short note by Hansen(1) in which 3 of 4 cases of acquired hemolytic anemia are reported to have had elevated gamma globulins. Boyd has summarized the results in excess antibody production in animals(2).

Material and methods. Eight cases of ac-

* This study supported by J. and H. Yeamans Levy Foundation.

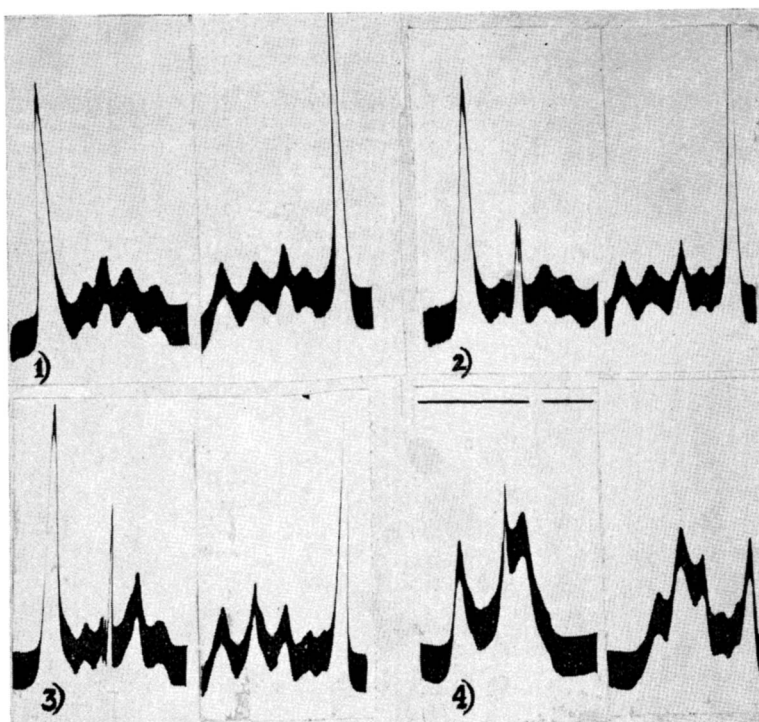


FIG. 1. Electrophoretic patterns in illustrative cases.

quired hemolytic anemia in adults with positive anti-human globulin tests were studied. This group consisted of 4 cases of primary hemolytic anemia, 2 cases of acquired hemolytic anemia secondary to lymphomas (one of lymphatic leukemia and one of lymphosarcoma) and 2 cases secondary to metastatic carcinoma with liver involvement and jaundice (Table I). The serums of these patients were examined electrophoretically by the Tiselius(3) technic in the following manner: 1 ml of clear serum was diluted with 2 ml of veronal buffer (pH 8.6) and ionic strength 0.1 u. The diluted serum was dialyzed for 30 hours against 450 ml of the buffer at 4°C. Analyses were made in the Perkins-Elmer electrophoresis apparatus model 38. The length of the run was 4200 seconds and the patterns were enlarged and calculated from the areas under curves with planimetry. The chemical analysis was performed by using 1 ml of clear serum for determination of total protein by the method of Looney and Walsh (4).

Results. Table I presents the findings ob-

tained by both electrophoretic and chemical analyses. Fig. 1 demonstrates the pattern obtained in 1) normal; 2) patient AS (case #4) demonstrating an extreme beta globulin peak; 3) patient DS (case #6a) demonstrating an extreme gamma globulin peak; 4) patient AL (case #7) demonstrating an extreme beta and gamma globulin peak with low albumin.

Discussion. The major variations from normal appear in the increased combined beta globulin and gamma globulin fractions, as well as in low total albumin (expressed as g%). As shown in the table the increase in either fraction did not relate to the etiology, specificity of the antibody, or the titer. It has been shown that the components which migrate as a unit with the beta or gamma globulin consist of several distinct substances, separable by sedimentation constants and immunological technics(5). The exact component that varied in each case has not been determined. In fact, Vaughn(6) has recently presented evidence that some auto-antibodies were gamma globulins, but others were of

TABLE I. Composition of Serum Proteins Expressed in % of Total Protein (upper figures) and in g/100 ml (lower figures).

Diagnosis			g %	Antibody & titer	Albu- min	Alpha 1	Alpha 2	Beta	Gamma
Normal				None	55-65% 4-5 g %	4-7% .3-.5	8-10% .5-.7	11-14% .8-1.0	11-16% .8-1.2
1.	Y.F.	Idio.		Panagglutinin	60.8	5.	5.8	14.6	13.8
		Total	5.48		3.31	.27	.32	.80	.75
2.	S.D.	Idio.		Cold 4000	53.3	6.3	8.5	12.8	19.1
		Total	6.24		3.33	.39	.53	.80	1.19
3.	S.K.	Idio.		Anti rh' & K	43.4	8.1	11.3	17.2	20.
		Total	7.27		3.16	.59	.82	1.25	1.45
4.	A.S.	Idio.		Pan	56.3	6.0	6.2	17.4	14.1
		Total	6.95		3.91	.42	.43	1.22	9.7
5.	H.K.	Lymph. leuk.		Pan	58.4	8.8	11.1	17.8	3.9
		Total	6.28		3.67	.55	.70	1.12	.24
6. a)	D.S.	Lymph. Sa.		Cold 200	53.6	5.5	6.1	12.2	22.6
		Total	7.12		3.82	.39	.43	.87	1.61
b)	D.S.	Post-splenectomy		Cold 800	49.2	8.2	14.6	13.5	14.5
		Total	6.75		3.32	.55	.99	.91	.98
7.	A.L.	Meta-Ca.		Cold	20.9	5.2	7.8	24.1	42.0
		Total	6.20		1.30	.32	.48	1.49	2.61
8.	J.C.	Meta-Ca.		Cold 32	22.2	7.5	13.7	24.7	31.9
		Total	3.86		.86	.29	.53	.95	1.23

non-gamma globulin material and that some actually appeared to be of 2 components.

The very profound variations from normal found in Cases 7 and 8 were probably caused by the disturbance in the major protein fraction due to the severe liver involvement. Both of these patients, as can be seen, had reversal of the albumin-globulin fractions which completely masked the relatively minor influence of the auto-antibody present.

The mobility of iso- and hetero-agglutinin between beta and gamma globulin has been reported by others(7). The findings presented here would seem to verify that a true quantitative increase in these fractions does occur in the presence of excess unusual antibodies.

Summary. Electrophoretic and chemical study indicate that auto-antibodies, as found in acquired hemolytic anemia, produce a measurable quantitative increase in beta and gamma globulin fractions.

1. Hansen, K. B., *Lancet*, 1952, v262, 419.
2. Boyd, Wm. C., *Fundamentals of Immunology* (3 ed.) New York, Interscience Publishers, 1956, pp53-58.
3. Tiselius, A., *Tr. Faraday Soc.*, 1937, v33, 524.
4. Looney, J. M., and Walsh, A. J., *J. Biol. Chem.*, 1939, v130, 635.
5. Fisher, B., *Am. J. Clin. Path.*, 1953, v23, 246.
6. Vaughn, J. H., *Blood*, 1956, v11, 1085.
7. Williams, C. A., Jr., and Grabar, P., *J. Immunol.*, 1952, v74, 397.

Received April 17, 1957. P.S.E.B.M., 1957, v95.