peaks in the patterns of the sera from patients with kala azar were more diffuse than those in multiple myeloma, and more discrete than those in other hypergammaglobulinemias. The 3 bands in the fast gamma region were found in the 3 samples showing the concentration at the origin on filter paper electrophoresis, and probably represent the same protein. Analysis of the filter paper and starch gel patterns revealed nothing that could be interpreted as the "X fraction" described by Benhamou.

We believe that the band in the slow gamma region reflects a protein abnormality in kala azar not found in several other pathologic conditions also characterized by hypergammaglobulinemia. It is conceivable that these bands represent a particular antibody response to one or another antigen derived from *L. donovani*. We should like to emphasize that with the technics used in this study, it is not possible to state whether the protein abnormality results from an increase of normal gamma globulins or from the appearance of abnormal proteins.

The observation that in kala azar a precipitation occurs when serum is added to water (Sia water test), together with the finding of cryoglobulinemia(15,16) suggested that increased concentrations of macroglobulins might also be present. This was found to be so in our study. Analysis in the ultracentrifuge was not performed to verify this, since results with this technic are generally unsatisfactory when frozen sera are used. Moreover, gel diffusion and immuno-electrophoresis are equally satisfactory for the detection of elevated macroglobulins.

Summary. Study of sera from 5 patients with kala azar revealed an abnormality in the starch gel electrophoretic pattern not seen in other diseases associated with generalized hypergammaglobulinemia. This abnormality consisted of a definite protein concentration in the region of slow gamma globulin. An elevation of macroglobulins was also found.

1. Veronesi, R., de Souza e Silva, O. R., Jamra, M., Cruz, O., Fiorillo, A., *Rev. Hosp. Cl. S. Paulo,* 1954, v9, 13.

2. Prata, A., *Arq. Bras. Med. Naval,* 1957, #65.

3. Kumar, S., Kumar, A., Agarwal, K. L., Mangalik, V. S., *J. Ind. Med. Assn.,* 1958, v31, 14.

4. Shanker, A., *Brit. Med. Med. J.* 1959, v1, 1221.

5. Jenkins, A. R., Robertson, D. H., Manson-Bahr, P. E. C., *Ann. Trop. M. Parasit, Liverp.,* 1959, v53, 93.

6. Benhamou, E., Albou, A., Destaing, F., Pugliese, J., *Bull. Mem. Soc. Med. Hop. Paris,* 1949, v65, 1091.

7. Cooper, G. R., Rein, C. R., Beard, J. W., PROC. SOC. EXP. BIOL. AND MED., 1946, v61, 179.

8. Sen Gupta, P. C., Rao, S. S., Lahiri, D. C., Bhattacharyya, B, *J. Ind. Med. Assn.,* 1953, v22, 433.

9. Hawk, P. B., Oser, B. L., Summerson, W. H., *Practical Physiological Chemistry,* 12th Ed., Philadelphia, 1947, The Blakiston Co., p. 550.

10. Smithies, O., *Biochem. J.,* 1955, v61, 629.

11. Korngold, L., Lipari, R., *Cancer Research,* 1955, v15, 159.

12. Scheidegger, J. J., *Int. Arch. Allergy,* 1955, v7, 103.

13. Ouchterlony, O., *Progr. Allergy,* 1958, v5, 1.

14. Korngold, L., Lipari, R., *Cancer,* 1956, v9, 183.

15. Wertheimer, E., Stein, L., *J. Lab. Clin. Med.,* 1944, v29, 1082.

16. Most, H., Lavietes, P. H., *Medicine,* 1947, v26, 221.

Received December 9, 1960. P.S.E.B.M., 1961, v106.

Thiocyanate Secretion in Sweat in Cystic Fibrosis.* (26341)

G. E. GIBBS AND R. H. HUTCHINGS
Department of Pediatrics, University of Nebraska College of Medicine, Omaha

Cystic fibrosis is a disease of various exocrine glands, particularly the pancreas, bronchial mucus glands, and sweat glands. Sodium and chloride concentrations in the sweat in cystic fibrosis are approximately 5 times as high as in normal individuals(1).

* Supported in part by a grant from Nat. Cystic Fibrosis Research Foundation.

TABLE I. Sweat and Serum Thiocyanate.

Cystic fibrosis patients				Control subjects			
Patient	Sweat (mg %)	Serum (mg %)	Sweat / Serum	Patient	Sweat (mg %)	Serum (mg %)	Sweat / Serum
B.B.	3.7	5.3	.68	J.B.	.2	4.0	.05
B.B.	1.6	5.0	.32	D.B.	.2	4.3	.05
P.B.	.7	3.0	.23	J.C.	.6	6.5	.09
B.G.	3.4	4.7	.72	A.C.	.8	6.6	.12
M.A.	3.5	7.5	.46	D.C.	1.4	7.0	.20
R.B.	1.9	8.8	.22	C.A.	.6	7.0	.09
L.B.	2.4	9.9	.24	B.M.	1.2	6.5	.19
D.L.	1.4	7.9	.18	J.Z.	.7	6.8	.11
B.G.	3.0	8.8	.34				
Mean	2.40	6.77	.377		.713	6.08	.110

The defect appears similarly with respect to iodide as shown by sweat collection following ingestion of radioactive iodide(2). Only a slight (50%) elevation occurs in potassium (1,3). Unpublished data indicate that there is little or no elevation of sweat calcium in cystic fibrosis.

The present study concerns observations with thiocyanate, which has been considered to act as an halide physiologically.

Method. The subjects were given a 4% solution of sodium thiocyanate USP, in a dosage of 10 ml per square meter body surface, as estimated from height and weight. Two hours later, sweating was induced by wrapping the subjects in plastic sheeting, wool blankets and one or two 30-Watt electric heating pads for 20 to 30 minutes. The sweat was collected from the chest or upper back in 2 x 2″ gauze squares opened to size 4 x 6″. The sweat was then removed from the gauze by centrifugation with use of plastic golf tees to hold up the gauze in the centrifuge tubes. At the end of the sweating period, venous blood was drawn and allowed to clot. Colorimetric determinations of thiocyanate were then made in sweat and serum, by addition of ferric nitrate to a portion of the supernatant solution following deproteinization with trichloracetic acid(4).

Results. Serum and sweat concentrations of thiocyanate in infants and children are shown in Table I. The 2 tests on patient B.B. in the cystic fibrosis group were done 3 days apart. The 2 tests on B.G. were done 3 years apart.

The mean sweat/serum thiocyanate ratio for the cystic fibrosis patients is 0.377 ± 0.229.† The mean for control patients is 0.110 ± 0.056. The difference between the means (0.267) is 3.4 times the standard error of the difference between the 2 means (0.079).

The cystic fibrosis patients had sweat chloride levels ranging from 68 to 195 meq/liter with a mean of 122, as compared with the usual non-cystic fibrosis levels of approximately 20 meq/liter.

Summary. The mean sweat/serum ratio of thiocyanate in cystic fibrosis was 3.4 times the ratio in controls. This indicates that like sodium chloride and iodide, thiocyanate is involved in the defect of sweat electrolyte secretion in cystic fibrosis.

† Standard deviation.

1. di Sant'Agnese, P. A., Darling, R. C., Perera, G. A., Shea, E., *Pediat.* 1953, v12, 549.

2. Brodkey, J. S., Gibbs, G. E., *J. Applied Physiol.,* 1960, v15, 501.

3. Gochberg, S. H., Cooke, R. E., *Pediat.,* 1956, v18, 701.

4. Eder, H. A., in Visscher, M. B., *Methods of Medical Research,* 1951, v4, 48, Yearbook Publishers, Chicago.

Received September 27, 1960. P.S.E.B.M., 1961, v106.