TABLE I.

Day of treatment	Clotting time (min)	1-stage prothrombin (sec)	Recalcification time of oxalated plasma (sec)	Endogenous heparin in plasma (γ/ml)
Before DCA	137	142	270	23
After 2 days	131			23
3 "	72			17
4 "	14	13.8	90	0

tendency following irradiation(5).

In this patient, the use of desoxycorticosterone acetate, in large doses, reduced the level of heparin or heparinoid substances in the blood. The mechanism of this response is unknown.

Received June 20, 1951. P.S.E.B.M., 1951, v77.

Characteristic Electrophoretic Patterns in Hemophilia and Idiopathic Thrombocytopenia.* (18846)

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Observations on the changes in the composition of plasma proteins in the hemorrhagic diseases as revealed by electrophoresis are practically non-existent. Armstrong(1) failed to find any fundamental electrophoretic difference between normal and hemophilic plasma. No data are available in the literature on the electrophoretic patterns in idiopathic thrombocytopenia.

Routine electrophoretic analyses of plasma, by means of the technic described in a previous communication(2), have been conducted during the past year in a group of cases with various types of hemorrhagic manifestations. This group included 5 cases of hemophilia, 8 of idiopathic thrombocytopenic purpura, 6 of thrombocytopenia secondary to hypoplastic anemia or leukemia, 3 with the "anaphylactoid" type of vascular purpura, and 6 with vascular purpura. A characteristic anomaly of the electrophoretic patterns was observed in 17 of these 28 patients. The anomaly consisted in: (a) the appearance of an unusual peak in the group of the α-globulins, which we have designated as α_x (Fig. 1), with a motility ranging between 4.30 and 4.60 $\times$ 10^{-5} cm^2 $volt^{-1}$ sec^{-1} (in veronal-citrate buffer, pH 8.6, ionic strength 0.1); (b) complete disappearance of the usual α_2- and α_3-globulin peaks with mobility between 3.75 and 4.25 $\times$ 10^{-5} cm^2 $volt^{-1}$ sec^{-1}. These changes were more marked in the ascending than in the descending boundaries.

These anomalies were observed in all the cases of hemophilia and idiopathic thrombocytopenia which were studied; they were also found in 2 of the 6 cases of secondary thrombocytopenia, in 2 of 3 cases of the "anaphylactoid" type of vascular purpura. The characteristic anomaly was also observed in 2 cases of acquired hemolytic anemia, one of which

* This study was supported by grants from the American Cancer Society and the Damon Runyon Memorial Fund for Cancer Research.

† This work was completed during the tenure of a Damon Runyon Senior Clinical Research Fellowship, administered by the American Cancer Society.

1. Armstrong, S. H., Jr., Quoted by Lewis, J. H., *et al., J. Clin. Inv.*, 1946, v25, 870.

2. Bernfeld, P., Bonner, C. D., and Homburger, F., *Proc. Second Clin. ACTH Conf., Blakiston Co.*, 1951, v1, 282.

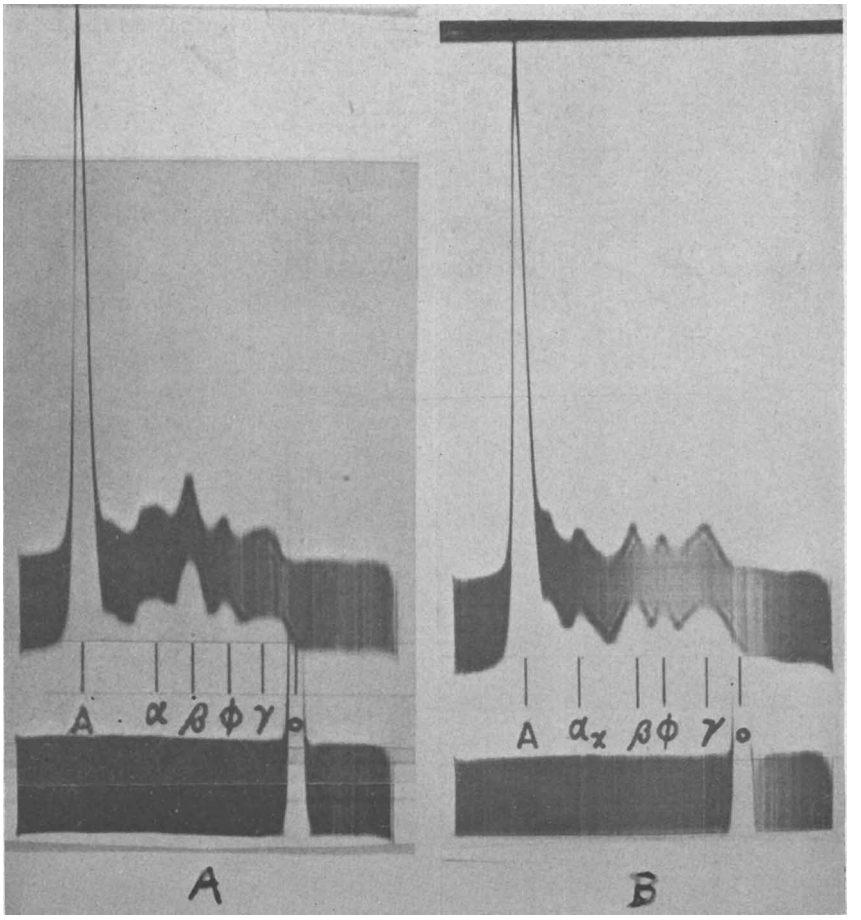

FIG. 1. Characteristic electrophoretic patterns in plasma of patients with hemophilia or idiopathic thrombocytopenic purpura. (A: normal plasma; B: plasma with characteristic anomaly).

presented thrombocytopenia (Case M.G.), and the other one evidence of platelet dysfunction as demonstrated by an elevated prothrombin activity of serum (Case O.K.). On the other hand, the described abnormalities were not evident in numerous other cases (164) studied in our laboratories. These included healthy individuals and patients with a large variety of pathologic conditions. A few of these control cases exhibited a peak with mobility similar to that of the α_x but both α_2- and α_3-globulin peaks were present in normal amounts. Pertinent laboratory findings of all the cases with the characteristic electrophoretic anomaly are collected in Table I.

The interpretation of the findings presented in this paper is difficult, since the characteristic patterns described were found in a variety of hemorrhagic diatheses, which are apparently unrelated in their pathogenetic mechanism. From the technical point of view, it cannot be stated with certainty whether the modifications described here indicate the presence of a particular protein or a mere anomaly. Nevertheless, it appears significant that such characteristic electrophoretic patterns were consistently found in hemophilia and idiopathic thrombocytopenic purpura. In hemophilia, transfusion of fresh plasma (Case D.C.) and the injection of 200 mg of Corti-

3. Ivy, A. C., Shapiro, P. F., and Melnick, P., *Surg., Gynec. and Obst.*, 1935, v60, 781.

TABLE I. Pertinent Laboratory Data in Patients Exhibiting the Characteristic Electrophoretic Anomaly. (A normal case is given as a control).

Name	Age	Sex	Clotting time (Silicone),* min	Bleeding time,† min	Platelets ($\times 10^{-3}$) per mm³	Tourniquet test‡ petechiae	Clot retraction,§ %	Prothrombin activity of serum,‖ %	Fibrinogen, mg/100 ml	Serum accelerator activity, %
				(A) Hemophilia						
D.C.	4	M	1340	5½	560	11	43	95/100	472.4	12
H.N.	39	M	1620	4	529.3	4	51	69/87	407	38
R.S.	43	M	1724	5½	464.8	7	44	89/94	364.7	29
R.So.	9	M	1587	5½	754.2	8	43	90/92	474.9	10
S.F.	1	M	1427	7	551.8	1	24	57/90	229.5	21
				(B) Acute idiopathic thrombocytopenic purpura						
A.R.	42	F	48	18	53.4	19	4	57/90	279.4	35.5
H.F.	16	M	37	>20	26.5	18	15	62/95	471	28.5
T.M.	2	M	28	13	20.9	12	12	80/100	307.2	42
A.W.	15	M	49	>20	13	16	9	75/100	401.9	24.2
E.F.	16	F	32	19	8.2	27	0	89/100	297.2	29.5
H.C.	56	M	35	>20	24.5	15	12	21/41	175.4	27
R.A.	6	M	41	>20	11.1	24	5	40/100	375.8	13.6
V.D.	6	F	33	18	58.3	18	10	62/95	403.6	25.8
				(C) Miscellaneous						
C.B.¶	16	F	29	18	30.9	44	7	75/95	179.4	14.5
J.T.¶	56	M	37	>20	23	65	2	60/80	371.4	27
M.R.**	5	F	28	5½	616.9	2	37	4.7/100	379.2	77
B.W.**	3	M	36	4	800.42	15	32	15/100	456.1	91
O.K.††	34	F	31	5½	424.5	4	21.5	74/79	368.5	59.5
M.G.††	44	F	40	6½	180	9	19.5	32/69	287.4	34
				(D) Normal						
	33	M	37	2½	560.8	2	39.5	8/100	435.7	79.5

* Blood was collected with Silicone-coated syringes and needles and transferred to Silicone-coated test tubes.

† Method of Ivy(3).

‡ Expressed as number of petechiae in an area of 1 inch diameter on the anterior surface of the forearm, 2 fingers below the antecubital fossa, after 10 min of application of mean blood pressure.

§ Expressed as ml of serum obtained from 1 ml of whole blood ($\times$ 100).

‖ Figure at numerator indicates prothrombin activity of serum, figure at denominator gives prothrombin activity of plasma.

¶ Hypoplastic anemia. ** Anaphylactoid purpura. †† Hemolytic anemia.

sone intramuscularly (Case R.S.) failed to modify the described anomaly. This occurred equally in one patient who had never received transfusions previously (Case S.F.) and in 4 others to whom repeated plasma and blood transfusions had been administered. In the latter group no precipitating antibodies against human plasma or antihemophilic globulin could be demonstrated. In the idiopathic thrombocytopenia group, the characteristic electrophoretic patterns were found to be still present 6 months after recovery of the patients, following either spontaneous remission of the disease (Case R.A. and H.F.) or successful splenectomy (Case T.M. and E.F.). Further investigations are in progress.

Summary. Characteristic electrophoretic patterns have been observed in all 5 cases of hemophilia and in all 8 cases of idiopathic thrombocytopenic purpura. These patterns show the following characteristics: (a) appearance of an unusual peak in the group of the α-globulins (α_x), and (b) disappearance of the usual α_2- and α_3-globulin peaks. The same anomaly has been observed in some cases of secondary thrombocytopenia, "anaphylactoid" type of vascular purpura, and hemolytic anemia with evidence of platelet dysfunction.

The authors wish to acknowledge gratefully Dr. William Dameshek's helpful suggestions and comments during the above investigation.

Received June 22, 1951. P.S.E.B.M., 1951, v77.