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PLATELET ACCELATOR: IDENTICAL TO PROACCELERIN AND ADSORBED FROM PLASMA?

In 1948 Ware, Fahey & Seegers reported a platelet accelerator (platelet factor 1. Stefanini 1953) acting like *serum* Ac-globulin. Based on centrifugation experiments they stated that this factor and the serum Ac-globulin are "entirely different proteins". McClaughry & Seegers (1950) believe this factor to be "an integral part of the platelets".

We have found that a suspension of normal, washed platelets has a *proaccelerin-* (*plasma* Ac-globulin-) like activity, which is only slightly reduced by 10 washings. This platelet activity accounts for about 6 per cent of the proaccelerin activity of normal, citrated plasma. The proconvertin and prothrombin activity of suspensions of normal, washed platelets are very low.

Accelerin or serum Ac-globulin is defined as the coagulant activity produced by the activation of proaccelerin (plasma Ac-globulin) by thrombin. By adding a small amount of thrombin to a platelet suspension the accelerator activity increased about tenfold, without any reduction in platelet number. The same increase in activitiy was also found for platelet extracts. This effect is of the same order as that produced by adding thrombin to proaccelerin (plasma Ac-globulin). The platelet accelerator therefore behaves like *pro*accelerin.

Platelets from a patient with congenital lack of proaccelerin (parahemophilia, Owren 1947) showed only about 1/50 of the accelerator activity of normal platelets. However, when these platelets were incubated with normal platelet-poor plasma followed by repeated washings, their accelerator activity increased to normal. Parahemophilia platelets therefore do adsorb proaccelerin from normal plasma, and then behave in a manner similar to normal platelets.

Trypsin destroys the proaccelerin in plasma. (Small amounts give a partial activation to accelerin). When a suspension of normal, washed platelets was incubated with trypsin, 90 per cent or more of the accelerator activity was destroyed, without any reduction in platelet count. When these platelets were washed and incubated with normal, platelet-poor plasma and again washed, they also regained a normal accelerator activity by adsorption from the plasma.

The platelet accelerator is labile on storage. During storage a partial activation to accelerin may take place, depending on the conditions of storage. The platelet accelerator is destroyed by heating to 53° C for 20—30 min. Like Ware et al. (1948) we have found that 80 per cent or more of the platelet accelerator activity is sedimented when a platelet extract is centrifuged for 30 min. at 32,000 g. We believe this is due to the platelet accelerator being adsorbed on platelet fragments.

The platelet accelerator plays an important role in the clotting theories of Seegers, Tocantins and Stefanini (cit. Albritton 1952) as a catalyst of the initial formation of thrombin. This role can not be a decisive one, because the thromboplastin time is very little influenced by the presence of platelets.

Based on the evidence given we believe that the platelet accelerator activity is caused by plasma proaccelerin which is adsorbed on the platelets.

REFERENCES

Albritton, E. C.: Standard values in blood. Philad. & London. W. B. Saunders Co. 1952. (Pp. 13—15).

McClaughry, R. I. & Seegers, W. H.: Prothrombin, thromboplastin, Ac-globulin and platelet accelerator: quantitative interrelationships. Blood *5*, 303, 1950.

Owren, P. A.: The coagulation of blood. Oslo. J. Chr. Gundersen. 1947.

Stefanini, M.: Recent advances in the theory of the mechanism of blood coagulation. J. Mt. Sinai Hosp. *19*, 619, 1953.

Ware, A. G., Fahey, J. L. & Seegers, W. H.: Platelet extracts, fibrin formation and interaction of purified prothrombin and thromboplastin. Am. J. Physiol. *154*, 140, 1948.

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