Two other anticoagulants had an antithrombin action similar to that of heparin. Studies on same have not progressed, but in the case where they appeared during lupus erythematosus there was high hypergammaglobulinemia. Finally, we have detected an anticoagulant to anticonvertin type during a case of Waldenstrom macroglobulinemia, and it was localized in the macroglobulins. Comparison of our observations and those gathered from the literature, allows us to reach certain conclusions regarding the protein support of spontaneous anticoagulants.

Bibliographie


Studies on Coagulation Factors in Stored Blood

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The choice between fresh blood and stored blood for the achievement of haemostasis depends mainly on the views on the haemostatic activity of the material, held by clinicians and transfusionists. A rejection of stored blood will bring about radical changes in the organization of blood banks in hospitals, where major surgery is performed. On a former occasion, we have reported on modifications in the behaviour of coagulation factors in stored blood. Since then we have compared the thromboplastic activity of blood stored in ACD-solution, liquid ACD-plasma and lyophilized plasma, which are suspensions with essential differences (tables I and II).

1. In stored blood the contact between red cells and platelets lasts for the duration of the experiment. A constant liberation of the red cell lipoid factor takes place into the supernatant plasma. There is no qualitative difference in the thromboplastic activity of platelet factor 3 and lipoid factor from haemolyzed red cells. The influence of the acid anticoagulant in in vitro experiments does not seem to play a part.

2. In liquid plasma which has been separated from the red cells 24 hours after the withdrawal of blood, a permanent contact with erythrocytes is lacking. Therefore
there is less “lipoid factor activity”.

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Table I

Table II

Thromboplastin Generation Test

3. Lyophilized plasma is manufactured by complicated processes of centrifuging on a high speed, drying and freezing. Their influence on coagulation factors is insufficiently known.

No essential differences have been noted between the material collected in siliconized and non-siliconized containers. As this study is still in progress, we will just give some preliminary results.

Discussion

In stored blood thromboplastic activity (i.e. the incubation mixture in the T.G.T. consists of normal serum, but both plasma and washed platelets are prepared from the content of the transfusion bottle at regular intervals) amounts to 80 per cent on the 9th day of storage. After the 9th day a sharp reduction in thromboplastic activity was noted. The addition of normal bariumsulfate treated oxalated plasma has a stimulating effect on thromboplastic activity, whereas substitution by normal washed platelets (SNN) results in the generation of a still more active thromboplastin.

The different activity of SSN, SNN and NSN may be explained as follows:
In the first place the preparation of a suspension of platelets from stored blood may be attended with a loss of platelet factor 1, which is identical with factor V. Secondly, the content of factor V is reduced during storage. Therefore in SSN the generation of thromboplastin is not so active. Thromboplastin activity remains fairly constant in SNN for about 16 days. This might be explained by the fact that substitution by normal platelets will supply both platelet factor 1 and platelet factor 3.

As compared with stored blood (SSN), an excess of platelet factors exists, giving rise to their retarded consumption.

The decrease of the thromboplastic activity of NSN is slower in stored blood than in liquid plasma. The reason for it is still unknown.
Lyophilized plasma is a platelet-free material. It shows an enormous increase in thromboplastic activity which has reached its maximum one hour after addition of sterile water. In three different samples a lack of uniformity was noted in the reduction of the thromboplastic activity. The presence of an active antithromboplastin as a possible cause of the reduction of thromboplastin activity could be excluded. We rather feel that inhibitors may become inactivated during storage. Therefore the generation of thromboplastin decreases by a reduction of activators only. This could be demonstrated by mixing experiments (fig. 1 and 2). Stored blood, stored liquid plasma and lyophilized plasma, respectively, will correct both factor V-free and haemophilia A plasma so far that their content in factor V or factor VIII is reduced to a degree where a correction is no longer possible.

We thus arrive at the following provisional conclusions:

The generation of thromboplastin of stored blood, liquid plasma and lyophilized plasma has been determined at regular intervals, and their activity compared. We hold the opinion that an optimum of coagulation factors will be needed for the process of normal haemostasis.

For conditions such as thrombocytopenia, various disorders in which labile clotting factors are deficient, and major surgery with the possibility of considerable blood loss, only substitution therapy with fresh whole blood warrant an optimum concentration of clotting factors as well as a maximum of functional activity. Freshly withdrawn blood is therefore indicated.

The presence of platelet factor 3 seems to be independent of intact platelets, at least in vitro, but for haemostasis we need more than factor 3 only. With other workers in this field we agree that only the viable platelet will guarantee optimal haemostasis in life threatening conditions. The results of in vitro experiments cannot be compared with physiological circumstances. These results may seriously reflect on blood bank policy.