

EFFECT OF PERFUSION FLUID FROM THE LUNGS ON BLOOD CLOTTING AND FIBRINOLYSIS

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Thromboplastic substances, natural anticoagulants, and activators and inhibitors of fibrinolysis enter the blood stream from lung tissue. It is postulated that the lungs participate in the regulation of blood coagulation and its fibrinolytic activity.

The pathogenesis of the afibrinogenemic hemorrhagic disorders is now linked with the liberation of tissue factors, including some from the lungs, into the blood stream [1, 3, 6].

In this investigation the blood-coagulating and fibrinolytic activity of perfusion fluid from the lungs was studied.

EXPERIMENTAL METHOD

Experiments were carried out on 11 albino rats weighing 250-400 g. The animals were killed by intravenous injection of 2 ml 0.5% procaine solution, the thorax was opened quickly, vessels entering and leaving the heart were ligated (except the pulmonary arteries and veins), and glass cannulas were introduced into the right ventricle and left auricle, through which the lungs were perfused with warm Ringer-Locke solution for warm-blooded animals. Altogether 350-400 ml of solution was passed through the lungs. The first portions of perfusion fluid, which contained blood, were discarded. Eight portions of perfusion fluid taken at intervals of 2-3 min were studied. The perfusion fluid was centrifuged at 3000 rpm for 8-10 min. Its blood-coagulating and fibrinolytic activity was studied by the usual methods.

EXPERIMENTAL RESULTS

The addition of 0.5 ml of all samples of the perfusion fluid to the reaction mixture considerably shortened the recalcification time of platelet-free plasma and increased its prothrombin consumption. The perfusion fluid increased the plasma heparin tolerance by 20-30%. These results are evidence that the perfusion fluid from the lungs contained highly active thromboplastic compounds stable on dilution. This evidently explains the decrease in prothrombin time of ordinary plasma. The perfusion fluid shortened the prothrombin time of accelerin-free plasma also, indicating that the lungs contain an enzyme similar to the plasma Ac-globulin. All portions of perfusion fluid lengthened the thrombin time of plasma (by 8-10%) and of a 1% fibrinogen solution (by 9-14%), indicating the liberation of natural anticoagulants from the lungs. The latter were bound to some degree with toluidine blue, a specific inhibitor of heparin.

The results of the study of the fibrinolytic activity of the perfusion fluid by the euglobulin method in the modification for tissues [5] showed that both activators and inhibitors of fibrinolysis enter the blood stream from the lung tissue, although the activity of the inhibitors was somewhat less marked.

The ability of the lungs to liberate blood-coagulating and fibrinolytic compounds into the blood stream is evidence that these organs, together with the kidneys, blood vessels, and gastro-intestinal tract, participate in the regulation of blood clotting and fibrinolysis.

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Data in the literature [2, 4, 7-9] and the results of the writer's own investigations suggest that during operations on the lungs "tissue juices" may enter the blood stream. Under the influence of the more active thromboplastic compounds contained in these "juices" intravascular blood clotting takes place, leading to a deficiency of fibrinogen and of other plasma factors. Disturbances of hemostasis after the liberation of lung tissue "juices" into the blood stream may develop by the mechanism of the thrombo-hemorrhagic syndrome.

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