THE EFFECT OF DEXTRAN SULPHATE INJECTIONS ON SERUM LIPOPROTEINS

BY

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Studies of the effect of heparin injections on the serum lipoproteins of man and animals are in progress in several laboratories. Gofman and his collaborators have shown that heparin injection results in the larger lipoprotein complexes being converted to smaller ones as shown by the changes in ultra-centrifugal flotation patterns; see, for instance, Graham, Lyon, Gofman, Jones, Yankley, Simonton, and White (1951). Such changes are believed to be due to the liberation of a lipolytic enzyme in response to heparin injection (Shore, Nicols, and Freeman, 1953). Incubation of plasma containing this enzyme with lipaemic plasma causes a marked reduction in turbidity, and it seems possible that the lipolytic enzyme is identical with the turbidity "clearing factor." Nikkilä (1953) and others have shown that these changes are accompanied by an accelerated migration of lipoproteins toward the anode during paper electrophoresis of serum. Thus there are two ways of detecting changes in serum lipoproteins: (1) by changes in ultra-centrifugal flotation pattern; (2) by accelerated migration of lipoproteins on paper electrophoresis. The presence of "clearing factor" may be detected (1) by the decreased turbidity of a serum sample taken after injection of heparin, e.g., Oliver and Boyd (1953), or (2) by the incubation of serum taken after heparin injection with lipaemic serum causing a decrease in turbidity. This commu-
tion reports the accelerated electrophoretic migration of serum lipoproteins from patients given dextran sulphate as blood anticoagulant therapy (cf. Donzelot, Kaufmann, and Dauzier (1955), and the presence in their sera of "clearing factor" as demonstrated by the clearing of turbidity on incubation with lipaemic serum.

Serum Electrophoresis after Dextran Sulphate Injection

Fig. 1 shows paper electrophoresis patterns of a patient’s serum before (A) and six hours after (B) the injection of 6 ml. 10.45% dextran sulphate solution of nominal potency 1,000 units per ml. One half of each strip is stained for protein and shows a normal pattern with \( \alpha_1 \) globulin well resolved in both instances. The other half of each strip is stained (Swahn, 1953) for lipid. Lipoprotein is present in the \( \beta \) globulin region. The accelerated migration of lipoprotein is clearly visible in (B). This result was confirmed in another patient.

Incubation of Serum Taken after Dextran Sulphate Injection with Lipaemic Serum

Moderately lipaemic serum, 0.5 ml., was mixed with serum, 0.05 ml., taken before and after the injection of 6 ml. 10.45% dextran sulphate solution. The mixtures were incubated at 37° C. in the presence of a little sodium azide as preservative. No difference in turbidity was visible at one hour, but at 20 hours the mixture containing post-dextran sulphate serum was optically clear. The control remained turbid. Paper electrophoresis showed the normal protein pattern but slightly faster migration of lipid in the mixture containing post-dextran sulphate serum (Fig. 2). This result was confirmed in another patient’s serum, taken 24 hours after the cessation of a three-week course of intravenous injections of dextran sulphate.

Intravenous injection of dextran sulphate was shown by Brown (1952) to clear alimentary lipaemia in rats. Indeed, it seems possible to induce a lipolytic effect by injection of heparin and other sulphated polysaccharides in several animal species. Therefore it was anticipated that similar changes would be observed in man, but it is interesting that the lipolytic enzyme was not exhausted even after a three-week course of dextran sulphate.

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