Arch. Inst. Razi 1965, 17, 85 - 88

OCCURRENCE OF PARALBUMINEMIA IN MULE

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Abstract

One case of "double albuminemia" has been found among a total number of 70 mule sera tested. This condition was demonstrable by means of paper, agar gel, starch grain, and starch gel electrophoresis. Double albuminemia was shown to be present at pH's 8.6, 11.3, and 12.2. When tested immunochemically, however, these two albumins were alike, and were similar to normal mule serum albumin.

Introduction

Existence of two albumins has been reported in the serum of human individuals (1-4). Paralbuminemia has also recently been found in the plasma of domestic fowl (5). In both of these species, the condition is reported to be genetically transmitted.

During the paper electrophoretic examination of a number of mule sera, the serum of one of the mules showed a distinct double albumin band. Within the 3 years since this case was first noticed, double albuminemia has persisted in this mule, as revealed by various methods of zone electrophoresis.

In the present report, some of the properties of this double albumin are compared with that of "normal" mule serum albumin.

Experimental Methods

Paper electrophoresis.—Paper electrophoresis was carried out according to the procedure described by Grassmann *et al.* (6). The buffers used were usually one of the following : sodium-veronal, glycine-NaOH, veronal-acetate

* Reprinted from Canadian Journal of Biochemistry and Physiology. Volume 41 (1963).

or-phosphate. The pH values tested were 12.2, 11.3, 8.6, 7.6, and 7.0, all having an ionic strength of 0.1.

Continuous paper electrophoresis (7) was also occasionally performed for the isolation of the albumin fractions of the abnormal mule serum.

Starch grain electrophoresis.—Electrophoresis was performed according to the procedure described by Kunkel (8), using borate buffer of pH 8.6.

Starch gel electrophoresis.—Electrophoresis was performed in a vertical tray (9) using Starch Hydrolysed. *

Agar electrophoresis.—Electrophoresis was done with 1.2% agar in veronal HCl buffer and pH 8.2 (10).

Agar gel diffusion.—Agar gel diffusion was done according to the procedure described by Ouchterlony (11). The antiserum was produced in rabbits agains the mule serum with the double albumin.

Experimental Results

Figure 1 represents the results obtained from the paper electrophoretic

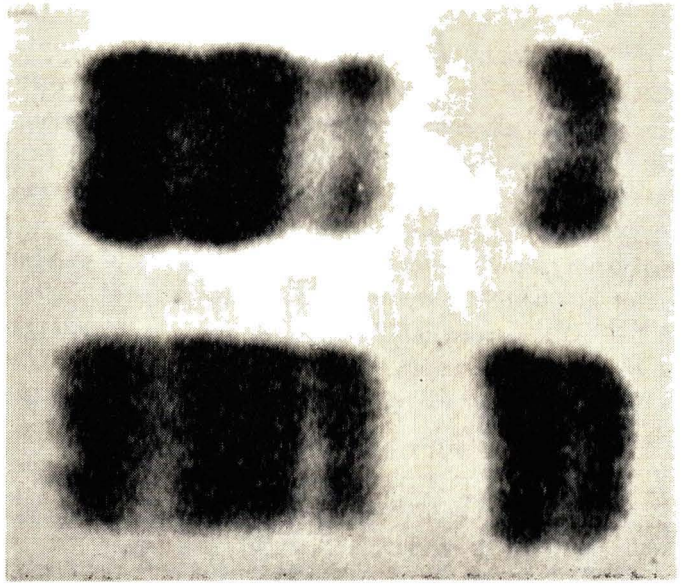

Fig. 1 Paper electrophoretic patterns of the sera of two individual mules, run simultaneously in the same cell, at pH 8.6. The upper one belongs to a normal and the lower one to the abnormal individual.

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patterns of a normal individual mule and the mule with the double albumin, run simultaneously in the same cell, using veronal buffer, pH 8.6. Higher pH's tested were 11.3, with veronal-NaOH, and 12.2, with glycine-NaOH. In both of these cases the double albumin band was still demonstrable. At pH's 7.6 and 7.0, with phosphate buffer, the abnormal serum was indistinguishable from the normal mule serum, at the region of the albumin band. At these two pH values, the albumin bands of both normal and the abnormal sera behaved as broad and diffused bands stretching down into the alpha-globulin region, at the conditions employed in these experiments. The results of electrophoresis on agar gel, at pH 8.2, and starch grain, at pH 8.6, also revealed the double albumin nature of the abnormal serum.

Paralbuminemia was only demonstrable by starch gel electrophoresis when the protein concentration of the abnormal serum was lowered to approximately 1/8 of its initial concentration with physiological saline (Fig. 2).

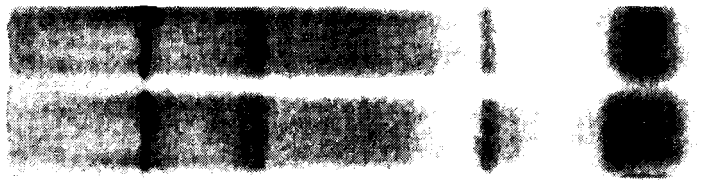

Fig. 2. Starch gel electrophoretic patterns of the sera of two individual mules. The upper one belongs to a normal and the lower one to the abnormal individual. Both sera were diluted eight times with physiological saline.

Agar gel double diffusion (11) of the anti-double-albumin antiserum, produced in rabbits, run agains a normal and the abnormal mule sera, did not reveal any differences between the normal and the abnormal mule sera.

Discussion

Paralbuminemia has been identified in human families and the two albumins have been variously named albumins A 1 and A 2 (1), and albumins A and B (2, 3). Albumin A (or A 1) in human serum had the same mobility as that of normal human serum albumin, at any pH studied. In human serum, when the pH range reaches 11.3, the two albumins would migrate together, as revealed by moving boundary and paper electrophoresis (3), indicating that the two albumins have a net similar charge at this pH range.

Double albuminemia was still present, however, in mule serum at as high a pH as 12.2 Immunochemically, as indicated above, the double albumin was found to be identical to normal mule serum albumin.

The occurrence of two plasma albumins has recently been observed in domestic fowl (5). The author gives some evidence that this condition is genetically transmitted in this species.

Only one case of double albuminemia was noticed among 70 mule sera tested. Since this mule was of unknown origin, no information regarding the incidence of this condition among its ancestry could be made available.

Double albuminemia found in this mule could not be attributed to any disease, and although this mule had been used for production of tetanus antitoxin, the animal seemed to be healthy.

Acknowledgments

The authors wish to thank Dr. A. Rafyi, the Director of the State Razi Institute, for his encouragement throughout this work. We also wish to thank Dr. A. Korour for carrying out electrophoresis on paper.

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