IMMUNOLOGIC IDENTITY OF HUMAN SERUM ALBUMIN AND EMBRYO-SPECIFIC α_2-GLOBULIN OF DOGS AND CATS

Yu. S. Tatarinov and A. V. Afanas'eva

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Previous investigations [2] showed that embryo-specific α-globulins of man and certain animals possess an antigenic structure in certain respects similar. A new fact was also discovered—the complete immunologic similarity between bovine fetuin and sheep fetal globulin. On the basis of these findings, attempts have been made to discover immunologically identical antigenic components among adult human serum proteins and the fetal serum proteins of various animals, which are heterogeneous with respect to species.

This paper describes the results of a comparative immunochemical investigation of adult human serum albumin and the embryo-specific α_2-globulin in the serum of dogs and cats.

EXPERIMENTAL METHOD

Four batches of rabbit antisera were used in the experiments: against human serum albumin (HSA antiserum); against dog fetal serum (DFS antiserum); against adult human serum (HS antiserum), and against adult dog serum (DS antiserum). The antigens were purified preparations of human blood albumins, and also of the fetal serum of dogs and cats containing embryo-specific α_2-globulins (ESA_2-globulin). In addition, adult human serum and the sera of adult dogs before and after production of experimental splenitis in the animals, which is accompanied by liberation of ESA_2-globulin into the blood stream [1], were taken for comparison.

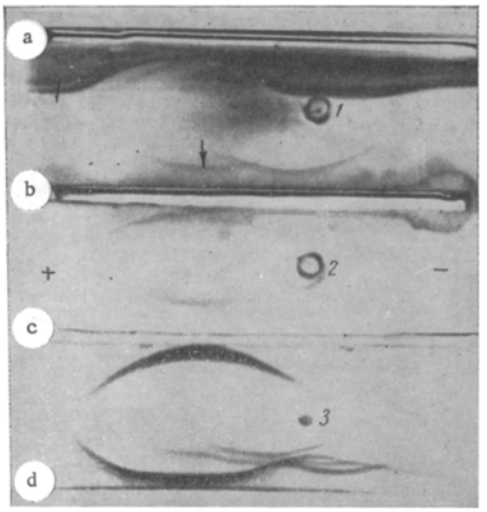

Fig. 1. Comparative immunoelectrophoretic analysis of human serum albumin and dog ESA_2-globulin. 1) Serum of a dog fetus; 2) solution of human albumin; 3) adult human serum. Antisera: a) DS; b) DFS after exhaustion with excess of adult dog serum; c) HSA; d) HS. The dog ESA_2-globulin is indicated by an arrow.

The method of double immunodiffusion in agar as described by Ouchterlony [5] and modified by Khramkova and Abelev [3], and the method of immunoelectrophoresis as described by Grabar and Williams [4], were used for the comparative immunochemical analysis.

EXPERIMENTAL RESULTS

It is clear from Fig. 1 that dog ESA_2-globulin and human serum albumin possess similar but slightly lower electrophoretic mobility than dog serum albumin. DFS antiserum, exhausted by excess of adult dog serum, revealed two embryo-specific globulins in the serum of dog fetuses and gave a positive crossed reaction with human serum albumin. To discover which of the embryo-specific dog globulins contains common antigenic determinants with human serum albumin, special immunoelectrophoretic experiments were carried out using a counter-diffusion technique. After electrophoresis in agar gel, serum from dog fetuses was treated on one side with HSA antiserum and on the other side a solution of human serum albumin was poured into the gutter (Fig. 2). In this way it was possible to identify the cross-reacting component in the serum of the dog fetuses (this

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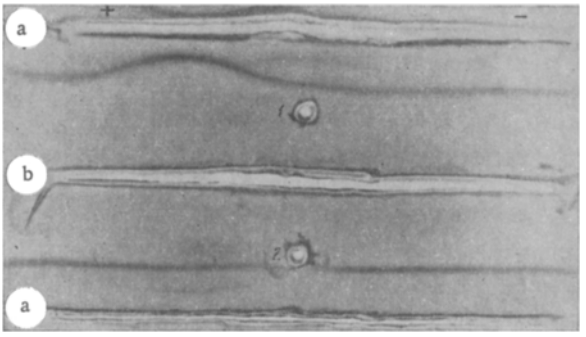

Fig. 2. Demonstration of complete immunologic identity between human serum albumin and dog ESA_2 globulin. Above: serum of dog fetus, below) serum of adult dog. In gutters: a) HSA antiserum; b) solution of human serum albumin.

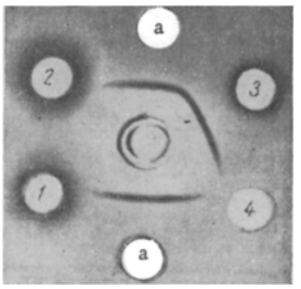

Fig. 3. Detection of an antigenic component immunologically identical with human serum albumin in the serum of an adult dog with experimental splenitis. 1, 3) serum of adult dog before and after production of experimental splenitis; 2, 4) serum of adult healthy dogs; a) antigen of standard test system (human serum albumin); in the center) HSA antiserum.

was found to be the ESA_2-globulin), and the conclusion was drawn that dog ESA_2-globulin is fully immunologically identical with human serum albumin.

Using DFS antiserum it was found that the serum of cat fetuses contains an antigenic component immunologically identical with dog ESA_2-globulin. When a standard test system (human serum albumin–HSA antiserum) was compared with the antigen, the fetal sera of the dog and cat modified the precipitation line of the test system (phenomenon of complete immunologic identity). A similar effect was given by the sera of adult dogs with experimental splenitis (Fig. 3), which may be explained by the liberation of ESA_2-globulin into the blood stream of animals with this experimental disease [1].

The results obtained could be interesting in at least two respects: first, the fact of complete immunologic identity of three heterogeneous proteins contained in adult human serum and the sera of dog and cat fetuses may attract attention to new attempts to discover immunologically identical antigens in the blood serum of man and certain adult animals. The practical value of positive findings in this direction, for the purpose of obtaining native protein preparations from animal serum for human parenteral feeding, is of course perfectly obvious. Second, if it is found that dog and cat ESA_2-globulins possess all the known physicochemical properties of globulins, it may be concluded that immunologically identical albumins and individual globulins may be present in different heterologous blood sera. It is generally considered at the present time [6] that only a partial immunologic identity exists between heterologous serum antigens, and even that is confined to definite groups of proteins (albumins, α-globulins, siderophilin, α_2-macroglobulin, etc.), performing the same function in the organism of man and various animals.

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