

# APPEARANCE OF EMBRYONIC SERUM $\alpha$ -GLOBULIN IN ADULT MICE AFTER CARBON TETRACHLORIDE POISONING

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Embryonic serum  $\alpha$ -globulin appears in the blood of adult mice after poisoning with carbon tetrachloride vapor. It was found on the 2nd, 4th, and 6th days after poisoning, disappearing on the 10th day.

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The serum of human and animal embryos contains a specific  $\alpha$ -globulin possessing characteristic antigenic properties ( $\alpha_f$ -globulin). This specific embryonic protein may, under certain conditions, be synthesized by the cells of adult animals and man [2]. Synthesis of  $\alpha_f$ -globulin is also renewed in malignant tumors of the liver [1, 2]. This phenomenon is used at the present time for the clinical diagnosis of carcinoma of the liver [4, 6]. To study the mechanism of regulation of  $\alpha_f$ -globulin synthesis, a model is required in which the synthesis of this protein could be induced in controlled conditions. It has previously been shown that  $\alpha_f$ -globulin is formed in small quantities in adult mice after partial hepatectomy [2]. However, the blood protein level was very low and extremely variable from one animal to another. Taken in conjunction with the complexity of the operation itself, this makes this system unsuitable for experimental study.

In this paper a simple method of induction of  $\alpha_f$ -globulin synthesis in mice by poisoning with  $\text{CCl}_4$  vapor is described.

TABLE 1. Results of Determination of Embryonic  $\alpha_f$ -globulin in Adult Mice after Poisoning with  $\text{CCl}_4$  Vapor

Dose of $\text{CCl}_4$ (in ml/liter air)	Mouse	Days after poisoning				
		2	4	5	6	10
0,03	1	+	+++		+	—
	2	+	+++		++	—
	3	—	—		—	—
	4	+	++		+	—
	5	+	++		+	—
	6	+	+++		++	—
	7	++	+++		+	—
0,003	8	++	+++		++	+
	9	—	+		—	—
	10	++	+++		+++	+
	11	+	+++		++	—
	12	+	++		+	—
	13	—	—		—	—
	14	+	++		+	—
0,0007	15	—		—		
	16	—		—		
	17	—		—		
	18	—		—		
	19	—		—		
	20	—		—		
	21	—		—		

Legend: + weakly positive, ++ positive reaction, +++ strongly positive reaction,  $-\alpha_f$ -globulin found.

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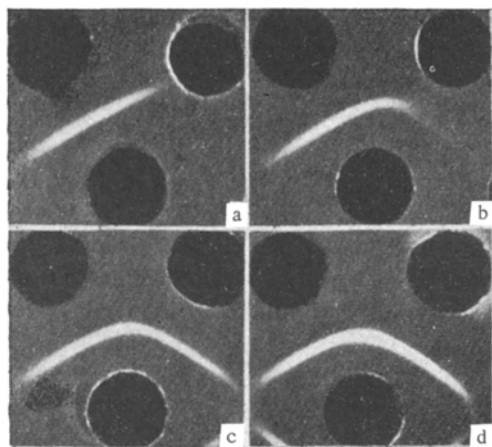


Fig. 1. Determination of embryonic  $\alpha_f$ -globulin in the precipitation reaction in agar. In each section, the bottom line represents immune rabbit serum against the serum of newborn mice, exhausted by serum of adult mice (1 : 2); the top left well contains serum of newborn mice (1 : 128); the top right well contains blood of the experimental mice; a) absence of  $\alpha_f$ -globulin; b) weakly positive reaction; c) positive reaction; d) strongly positive reaction.

protein is easier in young animals. Similar treatment of adult rats did not evoke synthesis of  $\alpha_f$ -globulin, in agreement with data indicating the absence of this protein in rats after partial hepatectomy. Synthesis of  $\alpha_f$ -globulin in mice after exposure to  $\text{CCl}_4$  is the result of regeneration of the liver taking place after poisoning.

So far in our experiments we have used about 200 mice and only in very rare cases was a positive reaction not obtained for embryonic protein. The system described is a simple and reproducible model of the induction of synthesis of embryonic  $\alpha_f$ -globulin which can be used for the experimental study of the conditions of its formation at the level of the whole organism.

## EXPERIMENTAL METHOD

Mice weighing 25-30 g (not more) were placed for 30 min in an exsiccator with a capacity of 3.5 liters. A dish containing  $\text{CCl}_4$  was placed on the floor of the exsiccator, a wire cage containing the mice was placed beside it, and the lid of the exsiccator was tightly closed.

The action of various doses of  $\text{CCl}_4$  (0.1, 0.01, and 0.002 ml) was tested in the exsiccator. The mice tolerated this procedure well and none of the animals died.

To determine  $\alpha_f$ -globulin the method of agar precipitation with a monospecific test system was used, as described previously [2, 3, 5]. Blood was taken from the mouse's tail every 2 days after poisoning.

## EXPERIMENTAL RESULTS

The results of determination of  $\alpha_f$ -globulin during the 10 days after  $\text{CCl}_4$  poisoning are given in Table 1. Gradations in the assessment of the intensity of the reaction are given in Fig. 1. As the results given in Table 1 and Fig. 1 show, synthesis of  $\alpha_f$ -globulin began in nearly all the mice on the 2nd day after poisoning. Its level reached a maximum on the 3rd or 4th day and then gradually fell. By the 10th day the protein had disappeared from the blood. Synthesis could be renewed by further treatment with  $\text{CCl}_4$ . It is important to note that induction of synthesis of this pro-

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