

COMPARATIVE ELECTROPHORETIC AND IMMUNOLOGIC ANALYSIS OF  
SOLUBLE LIVER PROTEINS AND SERUM PROTEINS  
IN EXPERIMENTAL HEPATITIS

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After administration of carbon tetrachloride to rats the content of proteins with mobility of  $\alpha_1$ - and  $\alpha_2$ -globulins in the liver is increased and the content of proteins with mobility of  $\beta$ -globulins is decreased. Carbon tetrachloride and cincophen decrease the blood albumin content and increase the content of  $\alpha_2$ - and  $\alpha_2\beta$ -globulins, while cincophen also increases the content of  $\alpha_1$ -globulins.

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It has been shown experimentally that in various liver lesions changes occur in both the qualitative and quantitative characteristics of the soluble liver proteins [3-5, 8].

The object of the present investigation was to compare the content of soluble liver proteins and serum proteins and to make an immunologic analysis of these proteins in experimental hepatitis.

## EXPERIMENTAL METHOD

As liver poisons, cincophen in a dose of 80 mg and a solution of carbon tetrachloride in a dose of 0.2 ml per rat with a mean weight of 250 g were used [6, 7]. These poisons were injected subcutaneously: cincophen daily and carbon tetrachloride three times a week. The liver and blood were investigated after 7-50 injections of cincophen and 6-46 injections of carbon tetrachloride. Soluble liver proteins were obtained by the method of S. Ya. Kaplanskii and co-workers [2]. Electrophoresis was carried out in veronal-medinal buffer, pH 8.6, for 8 h at 400 V. The strips were then stained and examined colorimetrically. The results were subjected to statistical analysis. The investigation was carried on 9 rats receiving cincophen and 15 rats receiving carbon tetrachloride. Nine healthy rats were used as controls.

## EXPERIMENTAL RESULTS

It is clear from Table 1 that the content of individual soluble liver proteins underwent more marked changes after administration of carbon tetrachloride than of cincophen. For instance, after administration of carbon tetrachloride a significant increase in content of liver proteins with mobilities of  $\alpha_1$ - and  $\alpha_2$ -globulins was observed. The content of the second fraction of  $\gamma$ -globulins, with the lowest mobility, was increased with approximately the same degree of significance by carbon tetrachloride and cincophen. The content of liver proteins corresponding in mobility to serum  $\beta$ -globulins was reduced after administration of carbon tetrachloride.

The content of some serum protein fractions showed similar changes after administration of cincophen and carbon tetrachloride. For instance, the decrease in content of albumins and increase in  $\alpha_2$ - and  $\alpha_2\beta$ -globulins was highly significant. Changes in the content of  $\beta$ - and  $\gamma$ -globulins were not significant. Meanwhile administration of cincophen led to a highly significant increase in  $\alpha_1$ -globulins in the serum, but this was not observed after administration of carbon tetrachloride.

Hence, after administration of cincophen or carbon tetrachloride to animals an increase in the contents of individual serum globulins was observed.

We compared conclusions which have been drawn [1, 3] regarding the ratio between serum protein fractions and soluble liver protein fractions with our own findings in an attempt to discover whether a protein immunologically different from serum proteins and close to liver proteins enters the blood stream

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TABLE 1. Content of Proteins in Blood Serum and Liver of Rats Receiving Cincophen and Carbon Tetrachloride

Protein fractions	Animals	Liver			Serum		
		$M \pm m$	$P$		$M \pm m$	$P$	
			K/C	K/CCl <sub>4</sub>		K/C	K/CCl <sub>4</sub>
Albumins	K	—	—	—	42,5±1,4		
	C	—	—	—	28,4±1,4	<0,001	
	CCl <sub>4</sub>	—	—	—	31,1±1,6		<0,001
$\alpha_1$ -Globulins	K	10,2±0,6			13,1±0,5		
	C	11,4±0,7	>0,2		17,1±0,7	<0,001	
	CCl <sub>4</sub>	14,3±1,2		>0,001	12,4±0,9		>0,2
$\alpha_2$ -Globulins	K	14,2±0,5			7,6±0,3		
	C	16,1±0,8	>0,05		11,8±0,8	<0,001	
	CCl <sub>4</sub>	16,8±0,9		>0,01	13,8±1,8		>0,001
$\alpha_2/\beta$	K	22,5±0,6			7,0±0,7		
	C	20,9±1,3	>0,2		10,1±0,7	<0,01	
	CCl <sub>4</sub>	21,8±1,1		>0,5	13,5±1,4		<0,001
$\beta$ -Globulins	K	27,0±2,1			16,2±0,7		
	C	23,0±2,3	>0,2		18,7±1,0	<0,1	
	CCl <sub>4</sub>	19,6±1,3		>0,001	16,1±1,2		>0,5
$\gamma_1$ -Globulins	K	17,2±1,3			13,6±0,8		
	C	16,2±1,2	>0,5		13,9±1,1	>0,5	
	CCl <sub>4</sub>	14,2±1,2		>0,1	13,1±1,2		>0,5
$\gamma_2$ -Globulins	K	9,0±0,9			—		
	C	12,4±1,0	>0,01		—	—	
	CCl <sub>4</sub>	13,3±1,4		>0,02	—		—

\*K denotes healthy animals (control), C animals receiving cincophen, and CCl<sub>4</sub> animals receiving carbon tetrachloride.

from the liver during liver damage produced by injection of cincophen or carbon tetrachloride. For this purpose we obtained an antiserum against the liver of a normal adult rat. Antibodies against serum proteins were removed from the serum by exhaustion with the serum of a normal adult rat. Next, using the double agar diffusion method of Ouchterlony, we carried out a qualitative reaction between the liver antiserum and blood serum of the experimental rats. The result was negative, i.e., no protein immunologically identical with any liver protein could be found in the serum of rats receiving either cincophen or carbon tetrachloride.

Our experiments thus showed that changes in the content of serum protein fractions of rats receiving cincophen or carbon tetrachloride cannot be directly attributed to liberation of liver protein into the blood stream.

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