

# DYNAMICS OF ANTIBODY FORMATION DURING CHEMICAL CARCINOGENESIS IN RATS

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The number of investigations attempting to discover the role of cellular and humoral antibodies in the process of carcinogenesis has recently shown a steady increase. However, the data concerning the appearance of antibodies in association with malignant neoplasms, whether in clinical or in experimental conditions, are highly contradictory [1-7].

It was interesting to find out whether the presence or absence of antibodies in the blood stream of animals with malignant neoplasms is connected with a certain stage of carcinogenesis.

In the present investigation, the object was to study the dynamics of the formation of humoral antibodies during chemical carcinogenesis in rats.

## EXPERIMENTAL METHOD AND RESULTS

Experiments were carried out on 150 rats of the Wistar line and 70 rats of the August line, of both sexes, and weighing 150-200 g. The carcinogen chosen was 9,10-dimethyl-1,2-benzanthracene, which was injected intramuscularly in a dose of 6 mg per animal, made up in 0.5 ml peach oil. The study of antibody formation was undertaken by means of the passive hemagglutination reaction as developed by Boyden and modified by Stavitsky [8].

Blood was taken every 2 weeks in the course of 5 months of carcinogenesis. The control for each animal consisted of sera taken before injection of the carcinogen. The antigens used were saline extracts of the tumor and of normal muscle and liver.

Typical results indicating the detection of antibodies in the course of chemical carcinogenesis by means of Boyden's reaction are given in the table. It follows from the table that antibody formation began in individual animals on the 15th-20th day after injection of the carcinogen, and the antibodies gave a reaction only with the antigen from muscle tissue in a titer of 1:64.

By the 30th day the sera gave a more distinct reaction with muscle antigen in approximately 30% of the animals. Most tumors appeared by the 60th day, and at this time a positive Boyden's reaction was observed in 90% of cases with antigen from both muscle and tumor. However, the intensity of the reaction was almost the same, and in some cases the sera at this time gave a stronger reaction with the antigen from muscle. By the 3rd or 4th month of carcinogenesis, 80% of the sera continued to react equally strongly with antigens from muscle and tumor. In 20% of the animals, however, antibodies had begun to appear in the sera which gave a reaction with antigen from the tumor in titers of 1:512 (++), whereas with antigen from muscle a reaction of ++ was obtained only in a dilution of 1:16.

Starting from the 5th month, when the tumors had attained a considerable size, a marked depression of antibody formation was observed in the rats and the sera no longer reacted with all the antigens.

Hardly any reaction was observed with the antigen from normal liver, so that this antigen is not included in the table.

The results obtained thus demonstrate that antibody formation during chemical carcinogenesis is largely dependent on the stage of the process. However, a further study of the nature and specificity of the detected antibodies is required.

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Dynamics of Antibody Formation in Rats during Chemical Carcinogenesis as Shown  
by the Passive Hemagglutination Reaction

Dilution of serum	Back- ground		Period of carcinogenesis											
			15 days		1 month		2 months		3 months		4 months		5 months	
	antigens from													
	tumor	muscle	tumor	muscle	tumor	muscle	tumor	muscle	tumor	muscle	tumor	muscle	tumor	muscle
1:16	++	++	—	+	++	++	++	++	+++	+++	++	++	++	+
1:32	—	—	—	+	++	++	++	++	++	+++	++	++	++	++
1:64	—	—	—	+	—	+	+	++	++	++	+	++	—	—
1:128	—	—	—	—	—	+	+	++	+	++	+	+	—	—
1:256	—	—	—	—	—	+	+	+	+	+	+	+	—	—
1:512	—	—	—	—	—	+	+	+	+	+	+	+	—	—
1:1024	—	—	—	—	—	—	—	+	—	—	+	+	—	—

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