

## NUMBER OF ANTIBODY-FORMING CELLS IN SPLEEN AND LYMPH GLANDS OF WISTAR RATS WITH HORMONE-DEPENDENT TUMORS

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The method of local hemolysis in gel shows that the number of antibody-forming cells in the spleen and lymph glands after immunization with sheep's erythrocytes is smaller in female Wistar rats with developing hormone-dependent tumors (Biskind's model) than in normal rats.

For a number of years immunologic interaction between tumor and host organism has been studied in the writers' laboratory. Hormone-dependent tumors, first obtained by transplantation of a piece of ovary into the spleen of a castrated rat [6], are used as the model.

Antonyuk [1-3] has shown that plasma-cell function is depressed in Wistar rats with tumors induced in this manner.

Stjernsward [14] has shown that the number and activity of cells in the mouse spleen producing hemolysins in response to injection of sheep's erythrocytes is reduced under the influence of methylcholanthrene, benzpyrene, and dimethylbenzanthracene, and also under the influence of blastomas induced by these carcinogens.

The object of this investigation was to study the effect of a developing hormone-dependent tumor on the number of antibody-forming cells in the spleen and in various groups of lymph glands.

### EXPERIMENTAL

Experiments were carried out on female Wistar rats castrated at the age of 1.5-2 months and having a piece of ovary transplanted into the spleen. The rats developed tumors derived from the theca of the follicle, with the formation of lutein cells in some cases, 10-12 months after the operation. The number of antibody-forming cells on the 4th day after intraperitoneal immunization of the animals with sheep's erythrocytes by Jerne's method [10, 11], with slight modifications [4],\* was determined in the spleen, regional (para-aortic and abdominal) and distant (axillary and inguinal) lymph glands.

### EXPERIMENTAL RESULTS

The first results showed that antibody-forming cells producing normal hemolysins are present in non-immunized Wistar rats (Table 1). Cells of this type, capable of producing normal hemolysins, have also been found by other workers [5, 7, 8, 12, 13], and this was attributed to spontaneous immunization with antigens from the surrounding medium related to sheep's erythrocytes. Four days after immunization of the control

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TABLE 1. Number of Antibody-Forming Cells in Spleen and in Various Groups of Lymph Glands of Female Wistar Rats with Hormone-Dependent Tumors on 4th Day after Intraperitoneal Injection of  $5 \times 10^9$  Sheep's Erythrocytes

Group of rats	Number of rats in group	Number of antibody-forming cells/ $10^6$ nucleated cells		
		in spleen	in regional lymph glands	in distant lymph glands
Rats without tumors:				
nonimmunized	5	$2,3 \pm 0,3$	$1,1 \pm 0,1$	$1,4 \pm 0,3$
immunized	6	$741,8 \pm 29,6$	$27,3 \pm 4,6$	$30,6 \pm 12,2$
Rats with tumors, immunized:				
total	5	$562,2 \pm 39,6$ $P < 0,01$	$9,2 \pm 3,1$ $P < 0,01$	$27,0 \pm 8$ $P > 0,05$
with tumor weighing 0.9-1.6 g	2	$638,5 \pm 58,5$ $P > 0,05$	$16,0 \pm 1$ $P > 0,05$	$27,0 \pm 8$ $P > 0,05$
" " " 10-25 g	3	$511,3 \pm 29,4$ $P < 0,001$	$4,67 \pm 2,34$ $P < 0,01$	—

rats with sheep's erythrocytes, a fairly high content of antibody-forming cells was detected in the spleen and lymph glands. These results were in good agreement with those obtained by other workers [4, 5, 8, 12].

A statistically significant decrease (by 24.2%,  $P < 0.01$ ) in the number of antibody-forming cells was found in the spleen of the rats with a developing hormone-dependent tumor. In rats with large tumors (weighing from 10 to 25 g), this decrease actually reached 31.1% ( $P < 0.001$ ). In two experimental rats with very small tumors (weighing 0.9 and 1.6 g) the number of these cells was reduced by only 14% ( $P > 0.05$ ).

The number of antibody-forming cells in the regional (para-aortic and abdominal) lymph glands of the experimental rats showed a statistically significant decrease ( $P < 0.01$ ) compared with their number in the control animals. In rats with small tumors the decrease reached 41.4% ( $P > 0.05$ ), while in rats with large tumors the number of antibody-forming cells was 5.84 times less ( $P < 0.01$ ), while no cells of this type whatever could be found in the regional lymph glands of one rat. In the distant (axillary and inguinal) lymph glands, antibody-forming cells were detected only in rats with small tumors, and none were present in rats with large tumors.

The decrease in number of antibody-forming cells in the spleen and regional lymph glands of rats with tumors, in the writers' opinion, can be attributed to the entry of a large quantity of foreign antigen into immunocompetent cells, resulting in their depression. Humphrey and co-workers [9], for example, showed that prolonged retention of a large quantity of antigen in a plasma cell, resulting from the use of dextrorotatory synthetic polypeptides which cannot be dissolved by cell enzymes and which therefore accumulate in the cell, inhibits its antibody-forming function.

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