EFFECT OF PARTIAL HEPATECTOMY ON METASTASIZATION OF WALKER-256 CARCINOMA IN PARABIONT RATS

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Investigations have shown [1, 5, 6] that traumatic injury to organs or tissues leads to more intensive metastasization of tumors in them. In other investigations [2, 7], however, no such effect of mechanical trauma was found.

In the present investigation the effect of partial resection of the liver on the metastasization of malignant tumor in that organ was studied in parabiont rats in relation to the time spent in parabiosis and the time elapsing from infliction of the operative trauma until inoculation of a varied number of tumor cells.

EXPERIMENTAL METHOD

Experiments were conducted on 60 female August rats weighing 120-140 g. The rats were joined in parabiosis by peritoneal anastomosis. The technique of the operation of parabiosis was described by one of the authors (L. L. K) previously [4]. The experimental model of the tumor was an ascites variant of Walker-256 carcinoma.

The parabiont rats were subdivided into three groups, with 10 pairs in each groups. Group 1 included parabiont rats in parabiosis for 9 months; groups 2 and 3 consisted of rats in parabiosis for 2 weeks. Partial resection of the liver was carried out on one of the parabiont partners in gorups 1 and 3 soon after inoculation of tumor cells into the portal vein of the other parabiont partner. In group 2 resection of the liver (60-70%) of one of the parabionts was performed 1 month before inoculation of its partner with tumor cells (the time necessary for complete restoration of the original structure and function of the liver [3]). Parabiont rats with an intact liver acted as controls. To study the effect of the number of tumor cells on the process of metastasization, each group of rats was divided into two subgroups, with 5 pairs of parabionts in each (3 parabionts in the experimental series and 2 in the control, except in group 2). Each parabiont partner of one subgroup received an injection of 150 000 cells into the portal vein, and of the other subgroup – 250 000 cells. The parabiont rats receiving tumor cells by injection into the portal vein were conventionally called the A partners, and those undergoing hepatectomy the B partners. To determine the degree of involvement of the liver by metastases, these were counted by the following method: the number of metastases was determined on the surface of the organ and in serial sections of the liver approximately 3 mm thick.

EXPERIMENTAL RESULTS

To count the metastases all the parabiont rats were sacrificed 3 weeks after inoculation with tumor cells. The results obtained are given in the table, which shows that resection of the liver stimulated metastasization of the Walker-256 carcinoma in that organ in parabiotic conditions. In this case the larger number of tumor cells injected favored the more intensive formation of metastases (Figs. 1 and 2).

The metastatic nodes in the liver of the parabiont B partners, undergoing hepatectomy simultaneously with injection of the tumor cells, were larger than in the parabiont A partners. In the former, for instance, the dimensions of the tumor nodes varied from 4×4 to 6×6 mm, and in the latter from 2×2 to 3×3 mm.

The length of time spent in parabiosis had no significant effect on the development of metastases in the liver. The time elapsing between infliction of the trauma to the organ and inoculation of the cells, however, had a considerable effect on metastasization in the liver. In the animals of group 2, undergoing

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Effect of Partial Hepatectomy on Development of Metastases of Walker-256 Carcinoma in the Liver in Parabiont Rats

Group of Rats	Time spent in parabiosis (in days)	Time of resection of liver in parabiont B partners	Number of tumor cells injected into parabiont A partners	Number of parabionts in subgroup	Mean number of metastases in liver of parabiont partners	
					A	B
1	270	Simultaneously with inoculation of tumor cells	150 000	3	33,0	1,7
				2 Control	36,0	0
			250 000	3	56,3	3,7
				2 Control	46,0	0
2	14	1 month before inoculation of tumor cells	150 000	5	38,6	0
			250 000	5	57,8	0
3		Simultaneously with inoculation of tumor cells	150 000	3	38,0	2,0
				2 Control	40,5	0
			250 000	3	54,3	4,6
				2 Control	49,5	0

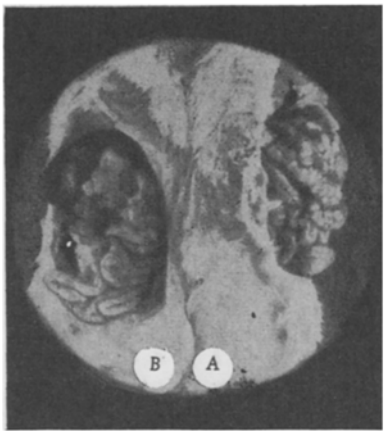

Fig. 1. Development of metastases of a Walker-256 carcinoma in A and B parabiont rats after resection of the liver of the parabiont B partner and simultaneous injection of tumor cells into A partner.

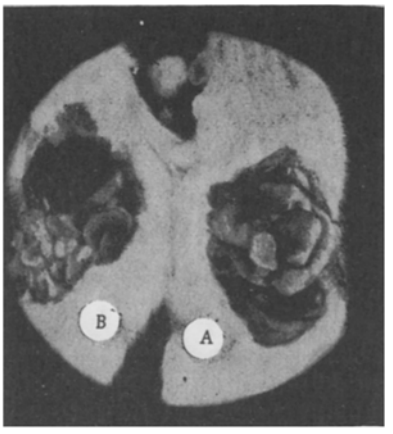

Fig. 2. Development of metastases of a Walker-256 carcinoma in a control parabiont A rat (the liver of the parabiont B partner was not resected).

hepatectomy 1 month before inoculation of the tumor cells, metastases never developed in the resected organ, whereas in the parabiont rats undergoing resection of the liver at the same time as their partners were inoculated with tumor cells, metastases developed in every case.

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