A MODIFIED METHOD FOR DETERMINING THE SUSCEPTIBILITY OF HAMSTERS TO TUMOR CELL TRANSPLANTS

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The usual method of determining the susceptibility (or resistivity) of laboratory animals to tumor transplants is as follows: 1) preparation of a suspension of tumor cells; 2) count of the number of cells per unit volume of suspension; 3) preparation of a series of dilutions from the suspension having the maximal number of cells; 4) injection of the suspension containing various quantities of cells into groups of animals; 5) calculation of the number of tumors grown separately for each dose of cells and group of animals.

As a rule, in such experiments, the same dose of cells is injected into each of three to ten animals in a group. The experimental results can be analyzed mathematically to determine the dose of tumor cells transplanted in 50% of inoculated animals (log TD_{50}).

The method described above requires the use of numerous animals and permits measuring only the total (for the entire group of animals) and not the individual susceptibility of animals to tumor transplants.

In experiments set up on hamsters, we checked the possibility of determining the individual susceptibility of hamsters to tumor transplants by injecting each experimental animal with four different doses of tumor cells (Tables 1 and 2, experiment No. 3) and also the possibility of reducing the number of animals by injecting each of them with two or four identical doses of tumor cells (see Tables 1 and 2, experiments No. 1 and No. 2).

The susceptibility of hamsters to the transplanted tumor cells was determined in the control by the usual method with the injection of one dose of tumor cells to each of 5 animals in a subgroup. Thus, the control group of hamsters consisted of four subgroups, the animals in each of which received a specified dose of tumor cells. The tumor cells were injected simultaneously into all experimental and control animals and the results of the experiments were calculated two months later. The comparison with the control groups of animals was carried out with respect to three indices: 1) the size of the dose of tumor cells transplanted in 50% of inoculated animals (TD_{50}); log TD_{50} was calculated by the method of Reed and Munch; 2) duration of the latent period before the appearance of palpable tumors; and 3) by the size of the tumor nodules 15 days after their appearance.

To prepare the cell suspension, we used a transplantable tumor induced in a hamster by simian vacuolating virus (SV_{40}, strain No. 128, titer 10^6 TID_{50}). The tumor occurred at the site of injection of the virus $4\frac{1}{2}$ months after infection. In the present work we used the fourth generation of this tumor. The animals were injected with the following quantities of tumor cells: $2.2 \cdot 10^5$, $2.2 \cdot 10^4$, $2.2 \cdot 10^3$, and $2.2 \cdot 10^2$.

Experiment No. 1 (see Tables 1 and 2) was carried out on 12 hamsters (3 hamsters in each subgroup), each of which received two identical doses of tumor cells in two parts of the body subcutaneously (left and right sides). The results of the transplantation were calculated separately for each injected dose of cells.

In experiment No. 2 (see Tables 1 and 2), each experimental animal was injected with four identical doses of cells in four different parts of the body subcutaneously (at the base of the fore- and hindlegs). In the experiment, we used 8 hamsters (2 hamsters in each subgroup). The results were calculated separately for each dose of cells.

TABLE 1. Susceptibility of Hamsters to Tumor Transplants when Injected with 1, 2, or 4 Identical or Different Doses of Tumor Cells

No. of experiment	Number of animals	Number of injected tumor cells			
		$2,2\cdot10^2$	$2,2\cdot10^3$	$2,2\cdot10^4$	$2,2\cdot10^5$
1	12	$\frac{0}{6}$	$\frac{0}{6}$	$\frac{5}{6}$	$\frac{6}{6}$
2	8	$\frac{0}{8}$	$\frac{0}{8}$	$\frac{6}{8}$	$\frac{6}{8}$
3	6	$\frac{0}{6}$	$\frac{0}{6}$	$\frac{4}{6}$	$\frac{5}{6}$
Control	20	$\frac{0}{5}$	$\frac{0}{5}$	$\frac{3}{5}$	$\frac{5}{5}$

Comment: In the numerator is the number of transplanted tumors; in the denominator is the total number of injected doses of tumor cells.

TABLE 2. Duration of Latent Period (in days), Size of Tumors (in mm), and in Value of log TD_{50} When Hamsters Were Injected with 1, 2, or 4 Identical or Different Doses of Tumor Cells

No. of experiment	Latent period		Size of tumor ($M \pm m$)		log TD_{50}
	1	2	1	2	
1	30,0	14,6	$19,6 \pm 4,39$	$21,5 \pm 5,74$	3,93
2	21,1	16,6	$22,5 \pm 4,50$	$16,7 \pm 5,20$	4,17
3	29,0	15,2	$19,5 \pm 4,62$	$25,5 \pm 2,86$	4,19
Control	31,0	17,8	$18,0 \pm 5,90$	$22,5 \pm 3,57$	4,17

Designation: 1) $2.2\cdot10^4$ cells injected; 2) $2.2\cdot10^5$ cells injected.

In experiment No. 3 (see Tables 1 and 2), each of the six experimental hamsters was injected with four different doses of tumor cells in four different parts of the body, subcutaneously. Just as in experiments No. 1 and 2 (see Tables 1 and 2), the results of the transplantation were calculated separately for each cell dose.

As we see from the data shown in Tables 1 and 2, when two doses of tumor cells were injected into each experimental animal, despite the decrease in the number of animals in the groups, the results coincide with the control with respect to all three indices: value of log TD_{50}, duration of latent period, and size of tumor nodules. On injection of four identical doses into each hamster, we observed a certain statistically unreliable shortening of the latent period. With the injection of four different doses of cells into each experimental animal in experiment No. 3, the results coincided in the experiment and in the control with respect to all three indices. Apparently, this modification of the method is most convenient since it permits not only an appreciable reduction (by a factor of 2-3) of the number of experimental animals, but also permits measuring both the total and individual susceptibility of the animals to the transplantation of tumor cells. The proposed modified method can be used when studying the effect of various factors on the growth of tumor transplants in experimental animals.