THE ONCOLOGICAL CHARACTERISTICS OF THE CC-57 BROWN STRAIN OF MICE

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By way of preliminary remarks to our present paper, dealing with the history of the production of the CC-57 Brown strain of mice and their importance as subjects for biological and medical experiments, we may repeat the facts and arguments which appeared in our paper dealing with the CC-57 White strain of mice [5]. We shall therefore direct attention directly to the table in which are given the principal findings embracing the period of observation from February 12, 1952 to September 1, 1957.

As can be seen from the table in the current five-year period 233 mice were under observation. Some of these died a natural death and some were killed before reaching their maximum age.

Brown mice of the CC-57 strain, like the white, have at the present time passed through 35 generations from interbreeding of brothers and sisters, and have reached the same degree of homozygosis (99.99%) but are slightly less fertile than the White [5]. The duration of life of the brown mice may be judged partly from the data in the table, with, however, the correction that, as mentioned above, some of the mice were killed before reaching their maximum age.

From the oncological point of view the data given in the table merit scrutiny in the first place in respect to tumors of the mammary glands and lungs.

As we know, in mice of strain CC-57 Brown, from the first days of their existence (1943) until the end of 1952 carcinoma of the breast was not found [1-3]. V.I. Gel'shtein and A.M. Diad kova [2] reported that they had found 15 tumors in this situation developing in brown mice during 1953-1954.

Analysis of the papers by these authors [2] on the basis of documentary data [4] showed that tumors in CC-57 Brown mice, described by the authors as being of that strain, in fact had no relation to it and belonged to mice of the so-called "herd" which we cannot dwell on here. In full accord with this are the new findings presented in this paper on brown mice which were and are being kept under observation by us. In fact, of the above-mentioned 233 mice, 112 females over seven months old died or were killed; carcinoma of the breast was not found in a single case. Thus CC-57 Brown mice like White are resistant to spontaneous tumors of the mammary gland, but being almost as susceptible to the milk factor, they are admirably suitable material for experimental investigation of problems of the etiology and pathogenesis of tumors of the breast.

Of no less interest is the problem of tumors of the lungs in CC-57 Brown mice. However, a detailed analysis of this problem is beset with the same difficulties caused by the mishandling of the statistical data in both the previous articles on the subject [1, 2]. As has already been pointed out earlier [4, 5], the statistical data on CC-57

Figures on the Number of Mice of Strain CC-57 Brown Dead or Killed and on Spontaneous Tumors Arising in Them (by age) During 1953-1957

Tumors	Sex of mice	Age of dead or killed mice in months																		Total
		5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
	♀♀	9	15	7	21	3	9	6	7	14	15	2	17	12	—	4	—	1	1	143
	♂♂♂♂	8	8	5	14	5	2	14	6	8	4	1	8	6	1	—	—	—	—	90
	Total	17	23	12	35	8	11	20	13	22	19	3	25	18	1	4	—	1	1	233
		Appearance of tumors (in accordance with age)																		
Of the lungs	♀♀	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	♂♂♂♂	—	—	—	—	—	—	—	—	1 (1)	—	—	—	—	—	—	—	—	—	1 (1)
Carcinoma of the skin	♀♀	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
	♂♂♂♂	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Leukemias	♀♀	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
	♂♂♂♂	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Total	—	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—	—	—	3

Note: The total number of tumors of the lungs is shown in parentheses.

mice in these articles were published in collective form, without subdivision into white and brown. For this reason, it was only possible to see from the published figures that tumors of the lungs do in fact arise in CC-57 mice, and quite impossible to establish what the true incidence of these tumors was in the brown and white mice separately.

In the course of the period under consideration here, when all the observations on the mice of this strain and the results of these observations were once again collected together in our hands, it was established that tumors of the lungs developed exclusively in CC-57 White mice and hardly ever appeared in Brown. The final results of our observations for five years are as follows: out of 182 white mice of an age for carcinoma in this situation, tumors of the lungs – for the most part multiple – developed in 15 (8.3%) [5], while of 107 brown mice of the same age only a single tumor of this organ was found (less than 1%).

When, in the course of observations of this strain, the difference between brown and white CC-57 mice was established with sufficient certainty, a special experiment was performed using urethane, which was injected into CC-57 White, CC-57 Brown and C-57 Black mice by M.B. Shimkin's method [7-9]. Mice of the last of these strains are known to be characterized by very high resistance to tumors of the lungs as indeed to all other tumors, and consequently may act as a safe control in such a series of experiments. The results of this experiment were as follows: the percentage of mice developing tumors after urethane treatment and the average number of tumors per mouse were found to be 100 and 7.18 for white mice, 15.8 and 0.15 for brown and 16.6 and 0.22 for black respectively. In accordance with international usage the brown and white CC-57 mice are given the symbols CC-57 BR and CC-57 W [6].

From these combined observations on mice of the various strains and on experimental CC-57 Brown mice there is every reason to assert that these are far more resistant to tumors of the lungs than mice of the related CC-57 White strain. It is possible also that the brown mice are more resistant to spontaneous tumors of certain other situations, and in particular to leukemia; further observations in this direction are proceeding.

Finally, as regards the incidence of tumors of the lungs in brown mice in the previous period, i.e., from 1943 until the end of 1952, as already pointed out above, this question was not satisfactorily dealt with in the published reports [1, 2] and must therefore be considered unanswered.

SUMMARY

The results of observations of the CC-57 BR strain mice are presented in this paper. They are now in their 36th inbred generation and reached nearly 100% of homozygosity. As in the preceding period of observations the CC-57 BR mice were found to be resistant to spontaneous mammary carcinoma and to spontaneous,as well as to induced tumors of the lung. However, they were sensitive to the milk factor and developed cancer in about 45 to 50% of cases.

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*See English translation.