GROWTH OF MAMMARY TUMORS IN A HIGH AND A LOW MAMMARY TUMOR STRAINS OF MICE ESTABLISHED FROM THE SAME BASAL STOCK OF SWISS ALBINO*1

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The growth of spontaneous mammary tumors and of tumors transplanted into the animals with different hormonal conditions was compared between SHN and SLN strains of female mice established from the same basal stock of Swiss albino as a high and a low mammary tumor strains, respectively. There were little differences between strains in the growth of spontaneous mammary tumors of multiparous mice which appeared first. The growth of transplanted mammary tumors was not affected by the hormonal conditions of the hosts in either strains. However, the tumors became palpable one week after transplantation in SHN, which was 2 weeks earlier than in SLN.

These findings indicate that the selection of animals for mammary tumorigenesis is effective on the time and frequency of malignant transformation of mammary cells and on the “take” of transplanted tumor cells, but not on the growth potentiality of already established tumors. They further suggest autonomy in the growth of mammary tumors in both strains of mice.

We have selected a stock of Swiss albino mice for high and low mammary tumorigenesis and have established two inbred strains, SHN and SLN. SHN was found to be better than SLN in normal and preneoplastic mammary gland development, mammary gland susceptibility to pituitary mammotropins, reproductivity, lactational performance, activity of mammary tumor virus, etc., as well as in mammary tumorigenesis.1)

In the present work, the pattern of growth of spontaneous mammary tumors of multiparous mice and of mammary tumors transplanted into the animals with different hormonal conditions was compared between these two strains.

Materials and Methods

SHN and SLN maintained by brother × sister mating were used. The incidence and the age of mammary tumor appearance in SHN are about 100% and 6.5 months in breeders and 90% and 8.8 months in virgins, and those in SLN are 55% and 10 months in breeders and 10% and 14.5 months in virgins, respectively.

In each strain, one female was placed with one of her brothers at about 70 days of age in a cage (15 × 30 × 12 cm) with wood shavings and was allowed concurrent pregnancies until the 6th lactation or the appearance of mammary tumors. After being retired, females were kept 5–6 each to a cage. Every mouse was checked for palpable mammary tumor every 7 days until she died or became moribund. The size of the first tumor in each mouse was measured and expressed in terms of the geometric mean of the major two diameters, and finally the values until 3 weeks after appearance were used as data, since some

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mammary tumors ulcerated and several mice became apparently weakened after 4 weeks.

In order to examine the growth of transplanted mammary tumors in response to different hormonal conditions, 0.05 ml of minced tumor cells from multiparous mice were subcutaneously transplanted into the following recipient mice of each strain of approximately 2 months of age; intact females, intact males, bilaterally ovariec-
tomized females, and females grafted with two isologous pituitaries under the right kidney caps-
ules. Ovariectomy and pituitary grafting were performed 4 weeks before tumor transplantation. The size of transplanted tumors was checked every 7 days until they ulcerated.

Throughout the experiment, mice were main-
tained in an air-conditioned animal room (24 ±
0.5° and 65~70% in relative humidity) illuminat-
ed artificially (14 hr of light from 5:00 a.m. to
7:00 p.m.) and were provided with a commercial
diet (CLEA Japan Inc., Tokyo) and tap water
freely.

Results

The growth of spontaneous mammary tu-
morels in each strain is shown in Fig. 1. There were no significant differences between strains in the size of tumors at any stages examined,

![Fig. 1. Growth of spontaneous mammary tumors appearing first in multiparous mice of each strain](image1)

Mammary tumor size is expressed in terms of the geometric mean of the major two diameters. Vertical bar indicates the standard error of the mean. Number of tumors examined is in parentheses.

![Fig. 2. Growth curves of mammary tumors in conditioned mice](image2)

Tumors were transplanted into intact females (---○---), intact males (---○---), bilaterally ovariec-
tomized females (---×---), and females grafted with 2 isologous pituitaries under the right kidney caps-
ules (---•----) in both strains. Number of mice was 10 in each group. Mammary tumor size is expressed in terms of the geometric mean of the major two diameters.

although the growth of tumors in SLN seemed a little more marked.

As presented in Fig. 2, only a slight differ-
ence was observed in the growth of trans-
planted mammary tumors among the ani-
mals with different hormonal conditions in either strains. On the other hand, all mam-
mary tumors transplanted in SHN became palpable one week after transplantation, 2 weeks earlier than those in SLN, while the pattern of growth thereafter was quite similar between the two strains.
Discussion

While SHN strain is significantly higher in mammary tumor incidence and earlier in mammary tumor age than SLN, little difference was found in the present study between the strains in the pattern of the growth of mammary tumors. Furthermore, the growth of transplanted mammary tumors in both strains was also quite similar showing no response to any hormonal condition of the host, whereas the tumors in SHN became palpable 2 weeks earlier than those in SLN. These observations indicate that two-way selection of a stock of mice for mammary tumorigenesis was effective on the time and frequency of malignant transformation of mammary cells or on the “take” of transplanted mammary tumor cells, like several characteristics concerning mammary tumorigenesis, but the selection had little effect on the growth potentiality of already established tumors.

The different hormonal conditions of the hosts had little influence on the growth of transplanted mammary tumors in either strains. This strongly suggests that mammary tumors of these strains are autonomous in growth similar to those of most strains of mice. Supporting this view, Yanai and Nagasawa recently reported that the rate of DNA synthesis of mammary tumors of SHN females was not altered at all by their treatment with estrogen, progesterone, and placental lactogen, singly or in combination, and by the grafting of isologous pituitary.

The fact that the size of tumor at the time when the observation was compelled to be stopped owing to the ulceration of tumors or the emaciation of animals is much smaller in the spontaneous tumors than in the transplanted tumors in both strains may reflect some difference in malignancy between these types of tumors.

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REFERENCES