obtained on mice with hemocytoblastosis La [2] and also with carcinoma of the forestomach [1]. Cells of the latter, incidentally, are sensitive to the action of cyclophosphamide when in the G_2 phase also.

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EFFECT OF SINGLE AND REPEATED PREGNANCY ON FREQUENCY OF ORIGIN OF PRIMARY TUMORS INDUCED BY SV_{40} VIRUS IN SYRIAN HAMSTERS

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The effect of single and repeated pregnancy on the frequency of origin of primary tumors induced by SV_{40} virus was investigated in Syrian hamsters. Females developed tumors after 1 to 5 pregnancies significantly less frequently during the latent period of SV_{40} carcinogenesis than females not becoming pregnant in the same experiment. However, these differences are evidently not attributable to immunization of the gravid females by embryonic antigens, for the frequency and times of origin of primary tumors in males were the same as in previously gravid females.

KEY WORDS: pregnancy; SV_{40} virus; embryonic antigens.

The possibility of using embryonic antigens for antitumor immunization has been widely discussed in recent years. The idea is based on somewhat contradictory evidence. For instance, immunization with embryonic cells taken at certain early stages of pregnancy prevented the appearance of primary tumors and growth of transplantable tumors [1, 2]. According to other workers, repeated pregnancy during the latent period of carcinogenesis led to a decrease in the incidence of tumors in previously pregnant females compared with virgins, an effect interpreted as evidence of immunization of the mother by embryonic antigens of the fetus [3]. However, some of the published data has not been confirmed by other workers [4, 5] and, on the whole, the question of whether embryonic antigens can be used for antitumor immunization still remains undecided.

The object of this investigation was to study the effect of single and repeated pregnancy on the incidence of primary tumors induced by SV_{40} virus in Syrian hamsters.

EXPERIMENTAL METHOD

Noninbred Syrian hamsters were obtained from the Stolbovaya Nursery, Academy of Medical Sciences of the USSR. The experiments were so designed that in females infected with SV_{40} virus on the first day of life the latent period of carcinogenesis coincided with the first to fifth pregnancy. The control to this experiment

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TABLE 1. Incidence and Times of Appearance of Primary Tumors in Males, Females Not Becoming Pregnant, and Females with 1-5 Pregnancies

Group of animals	Number of pregnancies during latent period of carcinogenesis	Incidence of tumors		P	Mean latent period, days	Mean life span of animals with tumors, days
		total	%			
Females	—	11/11	100		118,6±4,40	170,0±7,13
	1	42/61	68,9	>0,05	124,5±5,89	177,8±6,07
	2	16/27	59,3	<0,05	118,9±6,73	179,5±10,18
	3	5/11	45,5	<0,05	130,0±10.34	192,5±27,57
	4 and 5	0/5	—			
Males	—	43/65	66,2	>0,05	124,6±4,87	176,4±5,39

Legend. 1) Numerator gives number of animals with tumors, denominator total number of animals. 2) Differences between duration of latent period and life span not statistically significant. 3) Incidence of tumors compared relative to 100% in absence of pregnancy.

TABLE 2. Incidence and Times of Onset of Primary Tumors in Male and Virgin Female Syrian Hamsters Kept Together

Group of animals	Incidence of tumors		Mean latent period, days	Mean life span of animals with tumors, days
	total	%		
Females	26/32	81,2	112,1±3,93	176,0±5,10
Males	40/55	72,7	131,8±3,85	191,0±5,53

Legend. 1) Numerator gives number of animals with tumors, denominator total number of animals. 2) For all indices differences for groups of animals compared are not statistically significant.

consisted of females from the same litters, kept together with males and infected with SV_{40} virus, but not becoming pregnant during the latent period, and also females and males from the same experiment, also infected with SV_{40} virus but kept separately.

The results were subjected to statistical analysis by calculation of the χ^2 and Student's criteria.

EXPERIMENTAL RESULTS

The frequency and times of origin of tumors induced by SV_{40} virus in the males and females kept together are given in Table 1. In this experimental group, consisting of 115 females and 65 males, 11 females never became pregnant, 61 became pregnant once, 27 twice, 11 three times, and 5 four or five times. Tumors appeared in 100% of the females which did not become pregnant (11/11). In females becoming once, twice, and three times pregnant the incidence of tumors was 68.9, 59.3, and 45.5%, respectively. Five females which became pregnant four and five times did not develop tumors. Among the 65 males kept together with the females, 43 (66.2%) developed tumors.

The results of induction of tumors with SV_{40} virus in 32 virgin females and 55 males kept separately are given in Table 2. Females developed tumors in 81.2% and males in 72.7% of cases.

The results thus indicate that the frequency of onset of primary tumors induced by SV_{40} virus in females becoming pregnant once, twice, three, four, or five times was significantly lower than in females of the same experimental group not becoming pregnant. Comparison of the incidence of tumors in virgin females kept separately from males (Table 2) and females becoming pregnant once, twice, and three times (Table 1) shows that the differences are statistically significant only in the case of animals with three pregnancies ($0.1 > P > 0.05$). However, these differences were evidently not due to immunization of the gravid females by embryonic antigens, for the frequency and times of appearance of primary tumors were the same in males, whether kept together

with or separately from females, and in females which became pregnant.

Consequently, immunization with embryonic antigens during pregnancy neither inhibits nor stimulates growth of tumors induced by SV_{40} virus, as shown by comparison of the incidence of tumors in females becoming pregnant and in males (control). In a study by Parmiani and Lembo [3] it was shown that the incidence of primary methylcholanthrene tumors in female mice of various strains which became pregnant was lower than in females not becoming pregnant, although no male control group was present in this investigation. There are two possible explanations of these results. First, cells transformed by SV_{40} virus in the early stages of carcinogenesis may not contain antigens of embryonic type and, consequently, pregnancy during the latent period has no immunological effect on carcinogenesis. Such antigens perhaps appear in tumor cells in the later stages of tumor development and, in particular, in the cells of transplantable tumors. Second, it may be that embryonic antigens do not in general (because of tolerance or other reasons) play the role of transplantation antigens and cannot produce antitumor immunity. Both these possibilities are being studied experimentally.

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EFFECT OF SARCOLYSIN ON GLUTATHIONE PEROXIDASE AND GLUTATHIONE REDUCTASE ACTIVITY IN SARCOMA C-45

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A decrease in glutathione peroxidase and glutathione reductase activity in sarcoma C-45 was discovered during the period of its most rapid growth. Repeated injections of sarcolysin (1.2 mg/kg, intraperitoneally) caused a sharp decrease in the activity of both enzymes and a simultaneous decrease in the ratio between glutathione reductase and glutathione peroxidase activities. It is suggested that the glutathione redox enzyme system plays an important role in the mechanisms of the antitumor action of chemotherapeutic agents.

KEY WORDS: glutathione peroxidase; glutathione reductase; tumor growth; sarcolysin.

Investigation of glutathione peroxidase (GP) and glutathione reductase (GR) in tumor tissue is interesting from at least two aspects. First, by forming the glutathione redox system these enzymes, by their function, maintain a definite relationship between the oxidized and reduced forms of this tripeptide, which is of great importance in the regulation of cell division [5]. Second, it has now been shown conclusively that there is definite correlation between the level of lipid antioxidants and the rate of cell proliferation [1]. The ability of GP to perform its antioxidant function [3] on account of the safe utilization of hydrogen peroxide and of engodenous organic peroxide suggests that the state of the glutathione redox enzyme system can make a significant contribution to the free-radical mechanism of regulation of cell proliferation.

The object of this investigation was to study the dynamics of GP and GR activity in sarcoma C-45 during its growth and after administration of sarcolysin.

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