CHAPTER III

INVESTIGATIONS ON THE EFFECTS OF PARTICULATE ANTIGENS ON THE TUMOR GROWTH KINETICS
As per the objective of the thesis it has been emphasized to study the effects of the particulate antigens on the preponderent growth of the tumor in the host concerned. It must be confessed that the influence of these antigens would obviously be reflected through some gross manifestations in the subject bearing the tumor. The principal criteria should be to observe the growth rate of the tumor in the host under the conditions. As per the character of the chosen tumor line namely, chemically induced fibrosarcoma, the development of tumor is indicated clearly by an increase in accumulation of the ascitic fluid together with the tumor cell in the abdominal cavity. Further, this is accompanied by an incredible increase in the total body weight of the subject; and finally shortening of the total life span of the host concerned. In general, the invasive nature of developing malignant tumor is indicated by the alteration in the weight and volume of the tumor and general health status of the subject concerned. As such the present chapter has been devoted in the study of the growth kinetics of the transplanted ascitic fibrosarcoma tumor (AFS) in the mice before and after application of particulate antigens with a view to evaluating the effect of these antigens on (A) Percentile changes in body weight, (B) Changes in Abdominal circumference, (C) Total survival expressed in terms of LD$_{50}$ values in days.

Details of the methods have been discussed in the previous chapter.

(A) Percentile changes in body weight

Effects of SRBC and BCG in tumor bearing animals have been determined by the percentile body weight changes. This has been calculated by increase in body weight on the particular day divided by original body weight on '0' day multiplied by 100. The changes have been observed on every 5 days' intervals in each group of animals.

Results

The results obtained on the percentile changes in body weight of tumor bearing animals treated with SRBC and BCG have been presented in figure 3 and 4 respectively. The lines represent values of individual
EFFECT OF SRBC IN TUMOR BEARING MICE

FIG. 3
EFFECT OF BCG IN TUMOR BEARING MICE

FIG. 4
EFFECT OF SRBC IN TUMOR BEARING MICE

FIG. 5
EFFECT OF BCG IN TUMOR BEARING MICE

![Graph showing abdominal circumference over days](image-url)
animal. In SRBC treated group (T—SRBC), the maximum increase in percentile changes in body weight in most of the animals (more than 70%) were limited within 190%, excepting two, in which the values exceeded 220%. The majority of the animals (6 out of 8) thereafter revealed gradual decrease in body weight covering a period of 35-40 days. There has been a clear downfall of the curves up to a level of 140-130% after SRBC treatment.

Tumor bearing animals receiving BCG (T—BCG) showed the maximum gain of percentile body weight up to the level of 190% in about 60% of the total animal treated. In the rest 40%, however, values even ranging over 220% did not show any further decrease in body weight until death. In 50% of the animals treated with BCG (T—BCG), however, a decrease in percentile body weight covering a period up to 30-45 days has been observed.

(B) Abdominal circumference

Alteration in growth kinetics in tumor (APS) could also be assessed by measuring the abdominal circumference in mice which indicated the extent of accumulation of tumor within the fluid or fluid containing the tumor. As such, considering a central line over the abdomen, the abdominal circumference of different groups of animals has been determined. The results have been expressed in figure 5 and 6, showing the effects of SRBC and BCG respectively on the tumor growth kinetics.

Results

Animals inoculated with tumor and SRBC (T—SRBC) had their first palpable tumor between 13-15 days. The increase in abdominal circumference, thereafter maintained a plateau up to 25-30 days in about 80% of the animals and then further decreased. The maximum increase in circumference has been limited within 12 centimeter.

Animal receiving tumor and BCG (T—BCG) had their initial tumor take (palpability) on day 12 (Fig.6). The circumference did not show any steady rise nor did it show any plateau except one. The maximum increase in circumference, however, did not exceed 12 centimeter.
The effects of the particulate antigens in animals inoculated with tumor have also been assessed in terms of their survival. This has been done by calculating the lethality of 50% animals in days (LD$_{50}$/days$^3$). This has been assessed from figure 2-6 and has been presented in Table IV. The palpability of tumor has also been presented along with. The survival in both SRBC and BCG treated animals (T-SRBC and T-BCG) showed a value of 34 days indicating longevity of the 50% of animals upto 34 days in both the cases. In untreated tumor control (TC), the survival of 50% animal was found to be limited within 24 days.

Comments

The data obtained on percentile body weight, abdominal circumference and total survival of tumor bearing animals before and after administration of particulate antigens, namely, SRBC and BCG respectively, showed some interesting correlations. Both the antigens were found to be a beneficial modulator over that of tumorigenic inhibition. The percentile change in body weight clearly exhibited tumor inhibitory effect of both SRBC and BCG, the effect of former being more prominent. A consequent study of determination of abdominal circumference also revealed much reduction in tumor volume in mice(tumor) following treatment of SRBC and BCG compared to the tumor bearing counterpart. Not only tumor take is delayed but also the growth rate of tumor is kept minimised compared to that in untreated control(TC)(14-16 cm). Considering the overall data as above the effects on the survival of the animals appear to be well consistent as life span of the animal has also been protected by inhibiting the tumorigenic suppression on several systems. SRBC, however, appears to be a little more potent than BCG with respect to tumor growth kinetics although their effects on survival appear to be the same.