DOSE-SPLITTING EFFECTS OF X-RAYS ON LUNG TUMOR INDUCTION IN C3H MICE

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The effects of localized thoracic doses of X-rays delivered as two 7.5 Gy doses, at 4 to 24 hour intervals, on lung tumor induction in C3H/He male mice were examined. In this study, the phenomenon of recovery related to the effects of dose-splitting on tumor induction is discussed. To obtain a high induction rate of lung tumors using a strain of mouse, C3H/He, with a low rate of spontaneous tumors, localized thoracic doses of X-rays delivered as four equal doses of 2.5 to 7.5 Gy were given at 1 week intervals. Whole body X-irradiation, at 3 Gy every 3 months, followed by a single 7.5 Gy dose to the thorax was also performed. The dose-splitting effects of X-rays on lung tumor diameter and the relationship between histological patterns and the size of induced tumors are also discussed.

The incidence of lung tumors after two doses of 7.5 Gy was higher than that after a single 15 Gy dose. A change in the incidence with the change in time interval was not observed, although the highest incidence was 41% with 12-hour intervals. The incidence after 4 irradiation times was 36% with the total dose of 20 Gy. Therefore, the tumor incidence may not be greatly increased by fractionation in C3H mice. However, combined whole body irradiation was effective in increasing tumor incidence, the incidence being 47%.

The diameters of induced lung tumors were determined in terms of the competition between cell killing and the phenomenon of recovery related to tumor induction. There was a correlation between the histological patterns and the diameters of X-ray induced lung tumors. As tumors increased in size, they made the progression from benign to malignant.