

Effect on Suckling Young of X-Irradiation of Lactating Mother.* (22805)

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X-irradiation as a general debilitating agent should affect the nursing mouse so that its suckling young would be at least deprived of some nourishment. This study was made to determine the minimum dose level of exposure of the mother which would be reflected in the growth rate of the suckling young.

Materials and method. Adult CF₁ female mice which had had previous litters were used. Only those females with litters of 8 or more were chosen, and each litter in excess of this number was reduced to 8. Two days after delivery the mothers were separated from their litters long enough to be exposed to whole body x-irradiation. The physical facilities consisted of a Quadrocondex constant potential x-ray therapy machine run at 210 KVP and 15 MA, and the filters consisted of 0.5 Al. and 0.28 Cu. The target distance to center of the body of the mouse was 50 cm and output of the machine was 97.7 r/min. in air at that distance. The exposures used ranged from 50 r to 400 r. Immediately following x-irradiation females were returned to their own litters. The simultaneous controls were not exposed to any irradiation. On the

day of x-irradiation of the mother, each litter was weighed as a unit. Each litter was weighed three times each week. A total of 70 females with their litters comprised this study. For each dose level used there were at least 8 litters.

It was soon found that suckling normally continued until after day 15 when those mice which were not receiving adequate nourishment turned to the solid food provided for the mother. Therefore, the direct effect on lactation, as reflected in the growth rate, could be determined accurately only until about day 15.

Results and discussion. Data from two separate experiments are given.

Tables from 2 separate sets of data, indicate some effect on growth of suckling young even after 50 r whole body x-irradiation of the mother. There was pronounced retardation of growth where exposure of the mother was 200 r or more. The dose of 400 r, which is closer to the LD_{50/30} of 625 r for this strain of mouse, did not stop lactation completely although the suckling young continued to grow at a very slow rate. Retardation of

TABLE I. Average Weights of Young Mice Nursed by X-Irradiated Mothers.

Day	Control	50 r	100 r	200 r	300 r	400 r
3	2.5	2.4	2.4	1.9	2.0	2.3
5	3.8 (.7)	3.5 (1.1)	3.2 (.8)	2.6 (.7)	2.8 (.8)	3.5 (1.2)
8	5.4 (1.6)	5.1 (1.6)	5.3 (2.1)	3.5 (.9)	3.9 (1.1)	4.4 (.9)
10	6.4 (1.0)	5.9 (.8)	6.2 (.9)	4.2 (.7)	4.8 (.9)	4.8 (.4)
12	7.2 (.8)	6.9 (1.0)	6.8 (.6)	4.8 (.6)	5.6 (.8)	4.9 (.1)
15	8.2 (1.0)	7.8 (.9)	7.6 (.8)	5.5 (.7)	5.4 (-.2)	5.1 (.2)

TABLE II.

Day	Control	50 r	100 r	200 r	300 r	400 r
3	2.1	2.0	2.5	2.0	2.1	1.9
5	3.1 (1.0)	2.9 (.9)	3.0 (.5)	3.0 (1.0)	3.0 (.9)	2.7 (.8)
8	4.4 (1.3)	4.3 (1.4)	4.2 (1.2)	4.2 (1.2)	3.9 (.9)	3.6 (.9)
10	5.5 (1.1)	5.1 (.8)	4.9 (.7)	4.8 (.6)	3.9 (.0)	4.4 (.8)
12	6.4 (.9)	5.7 (.6)	5.4 (.5)	5.6 (.8)	4.8 (.9)	5.0 (.6)
15	6.6 (.2)	6.2 (.5)	6.1 (.7)	6.4 (.8)	5.1 (.3)	5.7 (.7)

Note: Increments are in parentheses. Only one is decrement.

* This work was performed under Contract AT-30-1-GEN-70 for Atomic Energy Commission.

† The author acknowledges with pleasure the help of Agatha Nadai.

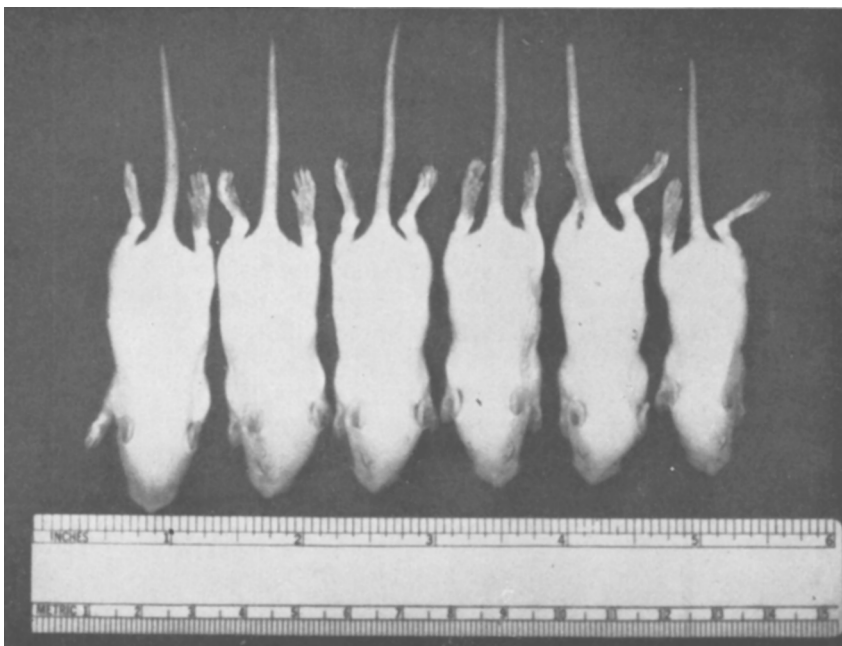


FIG. 1. Suckling mice at 10 days of age, taken from mothers variously treated on the 3rd day as follows: Left to right—Control, 50 r, 100 r, 200 r, 300 r, 400 r. Note slight stunting due to starvation, progressively greater the greater the irradiation of the mother.

growth of the suckling young appeared to be due to simple starvation and not to passage of toxic substances through the milk. This was demonstrated by replacing the irradiated mothers with normal lactating mothers of the same post-delivery age and determining the effect on the young. Invariably they regained their growth momentum almost immediately so that there could not have been any residual toxic effect. Mice which had been suckling to a 400 r mother for 15 days, when given a normal mother, approached the normal control weight by 30 days of age. True, some of these mice were able to feed on the dry food available to the mother, but the initial recovery of growth momentum was due to the abundance of normal milk.

The reciprocal exchange was made. Mice nursing to normal mothers were, at 15 days, given to previously x-irradiated (200 r or more) mothers. The growth of these mice was abruptly retarded. However, after 3 to 5 days they regained growth momentum under the supplemental influence of self-feeding

on dry food. In a few cases young mice from normal mothers were given at 15 days to mothers who had been x-irradiated to 400 r and these were starved to death within 4 to 5 days.

Summary and conclusions. 1. Increasing x-irradiation of nursing female mouse caused increasing retardation of growth of suckling young. There is some effect even after 50 r exposure of the mother on the 3rd day postparturition. There was pronounced effect at 200 r or greater. 2. There is no evidence of any toxic substance passing through the milk to the young. The effect seems to be one of simple starvation, probably through general debilitation of x-irradiated mother. 3. New-born mice starved by an x-irradiated mother will recover rapidly if given to a normal lactating mother at 15 days postparturition, and by 30 days will be essentially like controls with respect to body weight. Recovery from initial starvation appears to be complete.

Received September 27, 1956. P.S.E.B.M., 1956, v93.