Influence of Total-Body X-Irradiation upon Tissue Mast Cell Number. (20862)

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We have previously reported(1) that total-body X-irradiation elicits marked changes (vacuolation, granule clumping and cell disruption) in the tissue mast cells of the cheek pouch of the hamster. In addition we noted our impression of a decrease in the total number of mast cells during the time when large numbers of atypical cells were present. Similar mast cell changes have been claimed in aged tissue cultures(2), edematous tissue and urticaria pigmentosa lesions(3), and treatment with toluidine blue(4), ACTH(5), and cortisone(5,6). More recent reports strongly indicate that mast cell changes must be evaluated quantitatively (*i.e.* by cell counts) in order to be meaningful, since no changes in mast cell number were found after ACTH, cortisone, or cold(7) or after cortisone or thyroxine(8). Moreover, it is claimed(7,8) that atypical mast cells occur as frequently in control as in experimental animals. The positive conclusions of the previous reports (1-6) were in no instance based upon mast cell counts. The present paper is concerned with results obtained from counting both normal and atypical mast cells in tissues of animals exposed to X-irradiation.

Methods. Young adult, male Syrian hamsters were used. Tissues (cheek pouch) were taken immediately upon sacrifice at various intervals after single total-body X-irradiations and were fixed in alcohol and stained in toluidine blue as previously described(1). The radiation factors were 250 kv, 15 ma, 0.5 mm Cu, and 3.0 mm Bakelite filters, 26.7 cm target distance, 1.5 mm Cu half-value layer and 215-225 r per minute. Tissues from non-irradiated hamsters kept under the same conditions as the experimental animals were simultaneously studied. Mast cell counts were carried out on the fixed tissues, separate account being taken of normal cells and atypical cells (cells with vacuoles and clumped granules(1)). Tissues were taken from the same region of the cheek pouch in all instances. On a single slide from each animal thirty contiguous fields, 0.0676 mm^2 each, were covered using a magnification factor of 264.

Results. The results are presented in Table I. X-irradiation causes a marked increase in the number of atypical mast cells and this is accompanied by a considerable decrease in the total number of mast cells. We find similar increases in the number of abnormal cells in the skin of rats given total-body exposures of 600 r(9). Thus our prior claim(1) that such changes follow exposure to X-rays is substantiated. That the occurrence of atypical cells is not a consequence of fixation, staining or manipulation is assured by the fact that we encounter such cells in large numbers in the intact mesentery of living anaesthetized animals previously exposed to X-rays(9). Abnormal mast cells of this kind are rarely seen in living preparations of non-irradiated controls.

The present data also support our previous claims(1) as to the times of disappearance of damaged cells and of repopulation of the pouch with mast cells. The counts indicate, however, that repopulation is slower than previously supposed and is not complete even at the end of 33 days.

It is of interest to note that nitrogen mustard is reported(7) to produce similar atypical mast cells in subcutaneous tissues in the rat, thus indicating another radiomimetic

TABLE I. Influence of X-Irradiation (600 r) upon Number of Mast Cells in the Hamster Cheek Pouch.

Day after exposure	Irradiated		Control	
	Total No. cells*	% abnormal cells*	Total No. cells	% abnormal cells
3	1177†	2.8†	1096	1.6
10	759	45.4		
17	363	5.5	1395	1.0
26	530	6.2		
33	776	3.9	1240	1.5

* Per 2.028 mm^3 of tissue.
† Avg of 3 animals.

action of these compounds.

Summary. 1. Mast cell counts were made on the cheek pouches of hamsters subjected to total-body X-irradiation. 2. Following irradiation there is a marked increase in the number of atypical mast cells accompanied by a reduction in the total number of mast cells. 3. Repopulation of the cheek pouch with mast cells is relatively slow, being incomplete even at the end of 33 days.

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Vitamin B_{12} and Transmethylation in the Baby Pig.* (20863)

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It has been stated by Schaefer *et al.*(1,2) that vit. B_{12} is required by the chick and the rat for the synthesis of choline from methionine. Stekol *et al.*(3) have stated, however, that "vit. B_{12} deficiency had no effect on the extent of transmethylation to choline or creatine". Johnson *et al.*(4,5) have shown that baby pigs raised on a synthetic milk diet containing adequate vit. B_{12} and 0.8% methionine require 0.1% choline in the diet and that this choline requirement can be eliminated by increasing the methionine level to 1.6%(6) as is true for the rat(7). Since a severe vit. B_{12} deficiency can readily be produced in the baby pig(8,9), the effect of this deficiency on choline synthesis by transmethylation from methionine was studied in this species.

In the previous work in which a high

TABLE I.

Basal diet	
Alpha-protein	29.4
DL-methionine	1.3
Cerelose	30.5
Lard	30.5
Minerals	8.3

The above materials were made into a synthetic milk containing 13% solids according to a modification of the W. M. Clark method(10).

Vitamins added/liter synthetic milk	mg
Thiamine	.65
Riboflavin	1.30
Pyridoxine HCl	1.30
Nicotinic acid	2.60
Ca pantothenate	7.80
Folic acid	.052
Biotin	.010
2 methyl-1,4-napthoquinone	.26
Vit. A	2000 I.U.
Vit. D	200 I.U.

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