

vesicles. All of these preparations specifically bind IT with the membrane vesicles prepared by the floatation technique exhibiting the highest specific activity. The binding of IT to this preparation is strongly affected by the concentration of  $K^+$  in the incubation medium. Maximal binding is obtained in the presence of 20 mM  $K^+$ . Addition of  $Ca^{+2}$  to the incubation medium enhances binding but, unlike  $K^+$ , there is no optimal concentration to induce maximal binding.

The kinetics of IT binding to these preparations was found to be complex. A biphasic kinetics of association was observed. Initially the amount of IT bound increases with time and reaches a maximum 1.5 minutes after initiation of incubation. Then the amount of IT bound decreases rapidly reaching a minimum 2-3 min later. Finally a slow and monotoneous increase of the amount bound is observed and it reaches a plateau 15 min after the incubation is started.

The mechanism responsible for this complex behavior and the influence of various ionophores on the binding of IT are now being investigated.

#### REFERENCES:

1. Zlotkin, E., Miranda, F., Kupeyan, C. and Lissitzky, S. *Toxicon*, 9, 9 (1971)
2. Zlotkin, E., Rochat, H., Kupeyan, C., Miranda, F. and Lissitzky, S. *Biochimie*, 53, 1073 (1971)
3. Zlotkin, E., Teitelbaum, Z., Lester, D., and Lazarovici, P., in *Natural Toxins*, edited by D. Eaker and T. Wadstrom, Pergamon, Oxford, 1980, pp. 637-646.
4. Walther, C., Zlotkin, E. and Rathmayer, W., *J. Insect Physiol.* 22, 1187 (1976)
5. Pelhate, M. and Zlotkin, E., *J. Exp. Biol.*, in press.
6. Teitelbaum, Z., Lazarovici, P. and Zlotkin, E., *Insect Biochem.*, 9, 343 (1979)
7. Gray, E. G. and Whittaker, V. P., *J. Anat.* 96, 79 (1962)
8. Breer, M. and Jeserich., G., *Insect Biochem.*, 10, 457 (1980)

#### THE EFFECTS OF VERY LOW GAMMA RADIATION DOSES ON THE REPRODUCTIVE SYSTEM OF MALE RATS

A. Canfi and E. Bedrak\*

Ionizing radiation is harmful to mammals, even in very small doses<sup>(1)</sup>. In this work we irradiated male rats of several age groups,

---

\* Ben Gurion University of the Negev, Beer-Sheva

Table 2

Analysis of the blood of  $\gamma$ -irradiated male rats that received a single, total-body dose of between 0.1 and 10 roentgens. The numbers in brackets indicate the number of animals tested.

rad dose	leukocytes	thrombocytes	testosterone (ng/ml)	FSH (ng/ml)	LH (ng/ml)	prolactin age<11m (ng/ml)	prolactin age>11m (ng/ml)
0	8800 $\pm$ 2100 (21)	(282 $\pm$ 88) $\times 10^3$ (23)	5.9 $\pm$ 2.7 (15)	990 $\pm$ 135 (28)	42.5 $\pm$ 10 (17)	49.2 $\pm$ 12 (13)	135.6 $\pm$ 36 (11)
0.1	8900 $\pm$ 3000 (17)	(284 $\pm$ 98) $\times 10^3$ (17)	3.7 $\pm$ 1.2 (6)	752 $\pm$ 315 (12)	21.6 $\pm$ 10 (17)	71.2 $\pm$ 26 (10)	141.8 $\pm$ 12 (5)
1 a*	10000 $\pm$ 3600 (11)	(346 $\pm$ 180) $\times 10^3$ (13)	6.0 $\pm$ 2 (7)	913 $\pm$ 420 (15)	24.9 $\pm$ 10 (15)	69.5 $\pm$ 29 (7)	103.8 $\pm$ 32 (3)
1 y*	12000 $\pm$ 8700 (26)	(369 $\pm$ 163) $\times 10^3$ (26)	-	902 $\pm$ 454 (12)	26.8 $\pm$ 8 (11)	128.6 $\pm$ 19 (8)	175.8 $\pm$ 9 (3)
5 i*	10200 $\pm$ 5800 (23)	(287 $\pm$ 105) $\times 10^3$ (21)	-	-	-	-	-
10	11950 $\pm$ 4300 (17)	(462 $\pm$ 164) $\times 10^3$ (17)	6.0 $\pm$ 1.7 (8)	645 $\pm$ 214 (12)	25.0 $\pm$ 14 (10)	150.6 $\pm$ 47 (3)	54.5 $\pm$ 15 (2)

\* a = adult, y = youth, i = infant

with a  $\gamma$  source ( $^{192}\text{Ir}$ , 10 Ci). Each animal was given a single, total-body dose of 0.1 to 10 reentgens. The animals were sacrificed 4 hours to 6 months after the irradiation and blood samples were checked to detect ill-effects due to radiation. Damages to the reproductive system were detected by determining the hypophysial and gonadal hormones in the blood plasma, and by histological changes in the testes.

Some of the results are given in Table 2. Both leukocyte and thrombocyte numberis higher in the irradiated animals, which indicates a damage to the hematopoietic system. The hormone analysis discloses that plasma concentration of TSH, LH and prolactin are affected by the radiation, whereas testosterone is not. This is in agreement with findings in men who received abdominal therapeutic  $\gamma$  radiation<sup>(2)</sup>. Other parameters that might indicate radiation effects were also tested: weights of organs and glands of the animals, death within 30 days and histological preparations. Analysis of these parameters showed that the most significant effects are found in animals receiving 10 roentgens after sexual maturity and examined 20-30 days after irradiation.

Experiments now being conducted are designed to give a better insight into the mechanism through which the reproductive system is harmed by ionizing radiation.

REFERENCES:

1. Gold, M., Science 80, 78 (1979)
2. Shalet, S. M., Jacobs, C. G. and Pearson, D., Clin. Endocrinol. 9, 483 (1978)

GAMMA IRRADIATION INDUCED EFFECTS ON THE REPRODUCTIVE SYSTEM OF FEMALE RATS

A. Freud and E. Bedrak\*

It is now accepted that high doses of ionizing radiation cause damage to the reproductive system of female rats which is reflected in infertility. On the other hand very little is known about the effects of very low levels of  $\gamma$ -irradiation (single rads).

---

\* Ben Gurion University of the Negev, Beer-Sheva