INFLUENCE OF NON-THERMAL MICROWAVE RADIATION ON THE SURVIVABILITY OF GAMMA-IRRADIATED ANIMALS

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In recent years an intensive search has been in progress for a prophylaxis against the detrimental effects of ionizing radiations. One of the main purposes of such investigations is the dosage increase in roentgeno- and radiotherapy.

Lately, it was ascertained that a constant irradiation of people with microwaves of a non-thermal intensity range results in most cases in an increase of the number of leukocytes ([1], [2]) -- an effect opposite to that produced by ionizing radiations -- and also in an increase of the blood histamine content ([3]), which increases the resistance to ionizing radiations ([4]). In view of these and of other data concerning the non-thermal action of microwaves ([5]) it appeared of interest to investigate the possibility of enhancing the resistance to ionizing radiations by a prior exposure to microwaves of a low, non-thermal intensity. Such investigations are also of interest for the purpose of studying the mechanism of the non-thermal action of microwaves.

We have carried out preliminary studies on the irradiation of rats (not line-bred, weighing 125-130 g) with continuous microwaves (CM) and pulse microwaves (PM) of a non-thermal intensity, followed by an irradiation with gamma-rays. The experiments were conducted on three groups of 12 animals each. One group was irradiated with CM (λ = 12 cm) at an intensity of 10-15 mw/cm^2, another with PM (λ = 10 cm, 1 mc-sec, 700 pulses/second) at an average intensity of 10-15 mw/cm^2, and the group--of controls (C)--was not subjected to microwave irradiation. In each group of experiment animals 25 daily irradiations of 30 minutes were

performed. Upon completion of the microwave irradiations all three groups of animals were subjected to a single irradiation with gamma-rays in a dose of 600 r (LD 50/30). During subsequent observations of the rats only the general condition and lethal outcome were recorded.

The results of experiments on the survivability of the animals are shown in the table.

Survivability of Rats; Previously Irradiated with Continuous Microwaves (CM), with Pulse Microwaves (PM), and Not Subjected to Previous Irradiation (C); After an Irradiation with Gamma-Rays at a Dose of 600 r.

Time following gamma-irradiation, days	Survivability of rats			Time following gamma-irradiation, days	Survivability of rats		
	CM	PM	C		CM	PM	C
1	12	12	12	16	11	7	9
9	12	11	12	17	11	6	9
11	12	10	12	19	10	6	8
12	11	9	12	25	10	6	7
13	11	9	11	28	10	6	6
14	11	9	9	30	10	6	6

In rats previously irradiated with CM we noted a tendency toward increased survivability in comparison with the controls.

Irradiation with PM did not alter the resultant per cent of mortality, in comparison with the controls. It should be noted that in animals irradiated with CM the hemorrhages (nasal) were observed later, and in a greater number of cases, than in the PM-irradiated and in the controls.

The interrelation between the non-thermal effect of microwaves and the gamma-ray effect observed by us requires a more detailed study, since only preliminary results have been secured. For an elucidation of this interrelation it is necessary, first of all, to investigate the effect of microwaves on the composition of the blood and hematopoietic functions. We wish to point out that the above-stated detrimental effect of PM is in accord with data showing some lowering of the total amount of leukocytes in rats chronically irradiated with PM of a non-thermal intensity[1].

[1]These data, recently obtained by L. A. Kitsovskaya (Institute of Industrial Hygiene and Occupational Diseases, Academy of Medical Sciences USSR) are mentioned with the kind permission of the author.

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