

Interaction Between 2450-MHz Microwaves and Ionizing Radiation in Tribolium Confusum

P.-K. Lai, C.A. Cain and H.S. Ducoff. "Interaction Between 2450-MHz Microwaves and Ionizing Radiation in Tribolium Confusum." 1978 Transactions on Microwave Theory and Techniques 26.8 (Aug. 1978 [T-MTT] (Special Issue on Microwaves in Medicine, with Accent on the Application of Electromagnetics to Cancer Treatment)): 530-534.

The combined effect of single or fractionated ^{137}Cs gamma radiation and 2 h of 2450-MHz microwave radiation at two different power levels, resulting in specific absorption rates of 680 or 760 W/kg in distilled H_2O , was investigated in the flour beetle, *Tribolium confusum*. The potentiating effect of microwave treatment after single gamma irradiations was observed only if applied within 60 min; in contrast, the potentiating effect of microwave treatment given before gamma-irradiation lasted at least 8 h. Microwave treatment also altered the kinetics of split-dose recovery. At the higher power level, split-dose recovery was abolished for at least 36 h; at the lower power level, split-dose repair of ionizing radiation damage was delayed for 8-10 h, and then, with longer interfraction intervals, survival increased. All of the foregoing observations essentially mimic those previously reported for appropriate hyperthermic treatment by means of immersion in hot water. These findings are in keeping with the hypothesis that heating, whether by microwaves or by water immersion, affects the repair capabilities of the beetle, either by damaging some of the enzymes that repair radiation-damaged DNA or by altering the cytostructural integrity of the DNA-chromatin membrane complex, rendering the DNA lesions less amenable to repair.

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