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ABSTRACT

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EFFECTS OF MICROWAVE RADIATION ON CULTIVATED RAT KANGAROO CELLS

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In order to examine microwave effects on cell growth and on chromosomes, cells derived from the bone marrow and retinal choroid of the rat kangaroo (Potorous tridactylus) were grown in T-30 Falcon plastic flasks. Cultures were exposed to radiation (2450 MHz) from a microwave oven, modified to operate when the door was open, for 5, 10, 15 or 20 minutes at distances of 10, 25 or 50 cm from the open front. At 50 cm a power density of 200 $mW \cdot cm^{-2}$ was read with a "Ramcor" survey meter modified for remote readout. Exposures were made in an anechoic chamber. Cultures were fixed at 24, 48 and 96 hours after irradiation.

Short exposure times at the longer distances resulted in cell growth greater than that of unirradiated controls. Cell proliferation was impaired by the longer exposure times at the shorter distances. Further impairment of proliferation resulted from pretreatment of cultures with actinomycin D (3μg/ml).

Cytological analysis showed chromosome damage in cells that were exposed at a distance of 10 cm for at least 10 minutes. The longer the exposure the higher the percentage of cells having chromosome damage. Most of the chromatid and chromosome breaks occurred in the first, second and third chromosomes, while dicentrics were mostly in the fourth chromosomes and rings in the fourth, X, or Y_1 chromosomes. When the cells were sensitized with 5-bromodeoxyuridine (BUDR) chromosome damage tripled. Twenty-four hours after irradiation, more than 10 percent of the mitotic cells contained dilated, uncoiled, or sticky chromosomes.

The percentage of these abnormal mitotic cells reached 26 percent at 48 hours and decreased to 4 percent at 96 hours after exposure. These results indicate that a large dose of microwave radiation damages chromosomes and delays cell cycles; results also suggest that deoxyribonucleic acid and ribonucleic acid synthesis may be affected by the radiation.