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## Cataracts induced by microwave and ionizing radiation.

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Microwaves most commonly cause anterior and/or posterior subcapsular lenticular opacities in experimental animals and, as shown in epidemiologic studies and case reports, in human subjects. The formation of cataracts seems to be related directly to the power of the microwave and the duration of exposure. The mechanism of cataractogenesis includes deformation of heat-labile enzymes, such as glutathione peroxidase, that ordinarily protect lens cell proteins and membrane lipids from oxidative damage. Oxidation of protein sulfhydryl groups and the formation of high-molecular-weight aggregates cause local variations in the orderly structure of the lens cells. An alternative mechanism is thermoelastic expansion through which pressure waves in the aqueous humor cause direct physical damage to the lens cells. Cataracts induced by ionizing radiation (e.g., X-rays and gamma rays) usually are observed in the posterior region of the lens, often in the form of a posterior subcapsular cataract. Increasing the dose of ionizing radiation causes increasing opacification of the lens, which appears after a decreasing latency period. Like cataract formation by microwaves, cataractogenesis induced by ionizing radiation is associated with damage to the lens cell membrane. Another possible mechanism is damage to lens cell DNA, with decreases in the production of protective enzymes and in sulfur-sulfur bond formation, and with altered protein concentrations. Until further definitive conclusions about the mechanisms of microwaves and ionizing radiation induced cataracts are reached, and alternative protective measures are found, one can only recommend mechanical shielding from these radiations to minimize the possibility of development of radiation-induced cataracts.

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