MEETING REPORT

Radiation Cataractogenesis: Epidemiology and Biology

E. A. Blakely, a,1 N. J. Kleiman, b K. Neriishi, c ... 2010 by Radiation Research Society.
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An international workshop on Radiation Cataractogenesis, organized by Dr. Kazuo Neriishi, was held March 9–10, 2009 at the Radiation Effects Research Foundation (RERF) in Hiroshima, Japan and included 34 epidemiologists, ophthalmologists and radiobiologists who reviewed current evidence concerning radiation cataract type, incidence and potential threshold dose in irradiated human cohorts. Laboratory and animal studies that help elucidate underlying pathological mechanisms of cataractogenesis were also reviewed. Current recommendations and guidelines for lens ionizing radiation exposure were discussed in light of the new data. A summary of the presentations, as well as the general discussion and conclusions, is reported here.

In view of recent evidence suggesting that current NCRP and ICRP assumptions of radiation dose–effect thresholds for radiation cataracts may be set too high, Dr. Toshiteru Okubo, Chairman of RERF, charged the workshop participants to freely discuss the published data as well as new reports as they bear on the international dose limits for eye protection. Thirteen presentations were made that reviewed or updated recent data from epidemiological and biological research groups, along with an extended discussion period seeking to characterize the current status of knowledge and further research needs.

1. The NCI Study of U.S. Radiologic Technologists was presented by Dr. Gabriel Chodick (National Cancer Institute and The Maccabi Institute for Health Services Research, Tel Aviv, Israel)

Chodick et al. (1) examined the incidence of self-reported cataract among 35,705 U.S. radiologic technologists over a 20-year period in relation to their history of occupational and non-occupational ionizing radiation exposure. During the study period, 2,382 cataracts and 647 cataract extractions were reported. They evaluated a number of potential confounding variables, such as estimated UV-radiation exposure, obesity, diabetes, hypertension and arthritis. The study results indicated that reporting on having 10 or more diagnostic X rays, and particularly X rays to the face or neck, was significantly associated with increased risk of incident cataract. Protracted occupational exposure to low-dose ionizing radiation was also marginally associated with elevated risk of cataract.

Workers in the highest lens exposure category (mean 60 mGy) had an adjusted hazard ratio of 1.18 (95% CI: 0.99, 1.40) compared to individuals in the lowest category of occupational lens exposure (mean 5 mGy). The mean occupational exposure to the lens for all workers was estimated as 28 mGy. The best-fitting linear model had an ERR/Gy of 2.0 overall and was 3.3 among those diagnosed with cataract before age 50, but neither was statistically significant. No statistically significant associations were reported for cataract extraction incidence. Nevertheless, the positive dose–response slopes suggest that exposure to relatively low doses of ionizing radiation may be associated with the development of lens opacities.

2. Cataracts among Interventional Cardiologists and Allied Personnel was presented by Dr. Norman J. Kleiman (Columbia University, New York)

The potential risk of radiation-associated lens opacities is being investigated among interventional cardiologists, nurses and technicians working in cardiac catheterization laboratories due to the increasing worldwide use of angioplasty and other invasive cardiology procedures performed under X-ray fluoroscopic guidance. Kleiman et al. (2) determined the prevalence of posterior lens changes characteristic of radiation exposure in a cross-sectional sample of 76 individuals attending a regional...