

Interventional Radiology Carries Occupational Risk for Cataracts

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Interventional Radiologists are at high risk of radiation-induced eye injury and should consider eye protection to avoid posterior subcapsular (PSC) cataract formation, according to research released at the Society of Interventional Radiology (SIR) annual meeting in March.

We were surprised by these findings," says Ziv J. Haskal, M.D., a professor of radiology and surgery at Columbia University College of Physicians and Surgeons and director of vascular and interventional radiology at the Columbia campus of New York Presbyterian Hospital.

The researchers found that the frequency and severity of PSC cataracts increased with age and years in practice. Dr. Haskal is urging interventional radiologists to more seriously consider wearing high-quality radiation eye protection. He also warns them against being too cavalier about radiation risk because of the long latency between initial exposure and findings. "I've seen evidence of PSC damage in practicing interventional radiologists in their early 30s," he says.

"There are alternatives to protective lead glasses that will block radiation and reduce the dose to the eye," says Dr. Haskal. "The glasses will not make it zero, but it will substantially reduce the dose to the eye. Advances in the technology with procedural modifications to minimize exposure time are also reasonable approaches."

The investigators screened 59 practicing interventional radiologists during a medical conference in New York City in November 2003 to evaluate PSC cataract formation caused by ionizing radiation. The physicians were between the ages of 29 and 62. They were questioned as to years in active practice, work circumstances and potential cataractogenic confounders. A special imaging system, the Nidek EAS1000 Scheimpflug and retroillumination camera, was used to document the subject's eyes and cataract status.

The researchers found that nearly half of the interventional radiologists screened had signs of radiation-related lens changes. PSC cataracts were found in five (8 percent) of the 59 radiologists screened, and an additional 22 subjects (37 percent) showed small paracentral dot-like opacities in the PSC region of the lens, which is consistent with early signs of radiation damage. One interventional radiologist had undergone cataract surgery in one eye before being screened in the study.

Reducing the Radiation Dose

"This study combined with other research shows that people are developing cataracts at much lower radiation doses than permissible limits allow," says Basil V. Worgul, Ph.D., a professor of radiation biology in ophthalmology and radiology at Columbia University College of Physicians and Surgeons in New York City. Some of that other research includes workers who cleaned up after the Chernobyl nuclear power plant disaster in 1986.

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"Currently, radiologists are told they have no risk of cataracts if they stay under 2,000 milligray," says Dr. Worgul. "That reasoning, upon which such a threshold is based, is not biologically sound. We know from animal studies that no radiation dose is completely safe. All of our current limits are based on threshold. The feeling that we are protected if we do not exceed that level is incorrect."

More than a decade ago, Dr. Worgul predicted that astronauts would develop cataracts from their forays into space. Recently, a paper was published reporting that flight path inclination can be correlated to cataract formation in astronauts.

Dr. Worgul says he believes the threshold dose should be reduced to as little as 10 percent of today's current recommendation and that eventually a risk per unit dose will be developed without consideration of a threshold.

The eye lens, along with bone marrow, is highly sensitive to radiation. Because PSC cataracts form in the back of the lens, they decrease contrast sensitivity before they affect visual acuity. This differs from most forms of age-related cataracts, which interfere with visual acuity first.

"One of the most important findings was that the changes observed were found in interventional radiologists in their mid-40s," says Anna Junk, M.D., lead author and ophthalmologist at Albert Einstein College of Medicine. "Even though these small opacities will not yet interfere with the ability to work, they have to be taken seriously because they reflect radiation exposures dating back 10 or more years."

She echoes Dr. Haskal's warning to interventional radiologists. "It is to be expected that more recent exposure will lead to cataract progression and possibly disabling consequences even if work habits are changed immediately," Dr. Junk says. "Interventional radiologists need 20/20 vision in both eyes to have excellent stereopsis and to perform the delicate procedures demanded in their occupation. The treatment, cataract extraction, is a frequent and very successful surgery, but is still associated with risks that can negatively affect outcome and visual rehabilitation. For interventional radiologists even successful cataract surgery could result in less than optimum outcomes and define the end of their career."

Lindsay S. Machan, M.D., along with Drs. Junk, Haskal and Worgul, is organizing a larger study to confirm the findings. The team notes that there are a lot of data from the feasibility study that have yet to be analyzed. "We will be delving deeper into all the information we collected and expect to have additional results in the future," they say.

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