

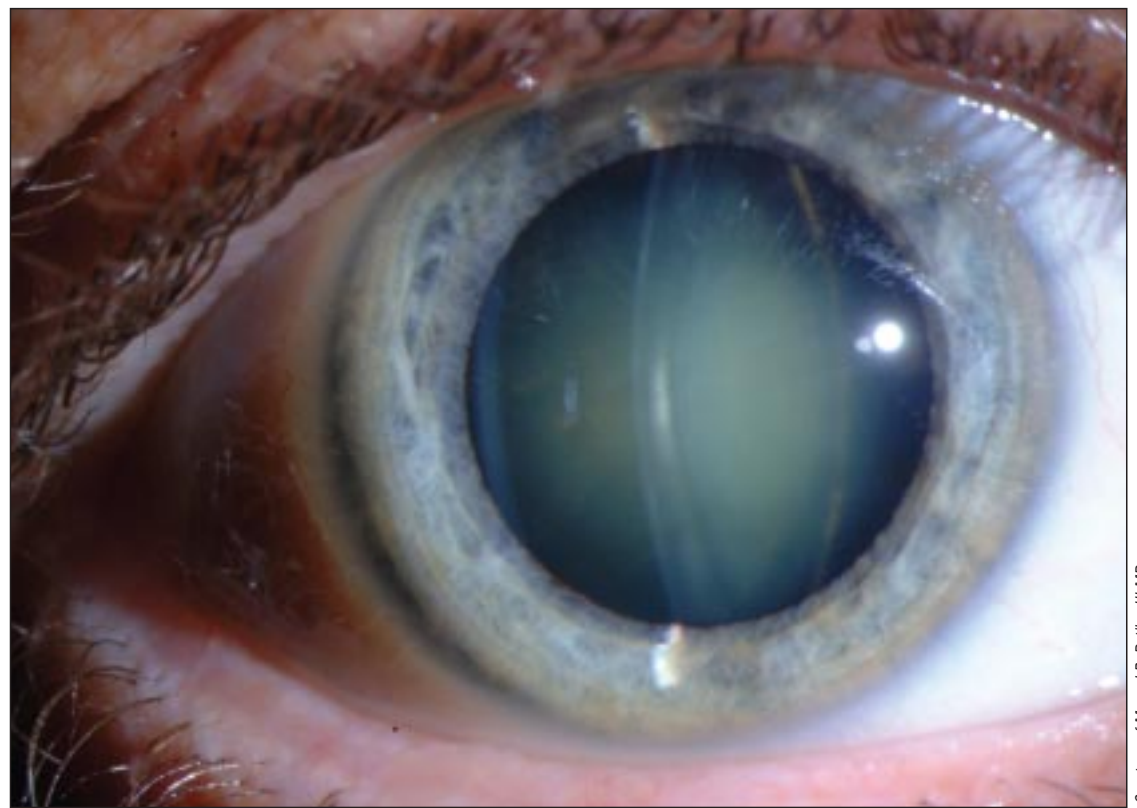
Airline pilots have sky-high risk of cataracts



Manuel Datiles



Vilhjalmur Rafnsson



Slit Lamp photograph of a nuclear cataract seen through the dilated pupil.

Courtesy of Manuel B. Datiles III MD

Nadja Geipert

AIRLINE pilots face an increased risk of developing nuclear cataracts because of their exposure to cosmic radiation, a population-based case-control study from Iceland has shown.

The study, which appeared in the August 2005 issue of *Archives of Ophthalmology*, indicated that the risk of nuclear cataracts could be as much as three times higher among airline pilots than in the general population and that the risk increased in proportion to a pilot's exposure to cosmic radiation, which is a complex mix of ionising radiation.

"What's new is that for the first time we have a study involving pilots where they have an increased risk of a special type of cataract," said lead author Vilhjalmur Rafnsson, MD, PhD a professor at the Department of Preventive Medicine at the University of Iceland in Reykjavik.

The findings add to the growing body of evidence that chronic cosmic radiation exposure creates a variety of health problems and emphasize the need for early cataract detection, non-surgical treatment options and the decrease of other cataract-risk factors like smoking, UV- exposure and diabetes, he added.

Reykjavik Eye Study

To investigate airline pilots' cataract risk in a case-control study, Icelandic researchers selected 79 male commercial airline pilots and 366 men who had never been pilots from the Reykjavik Eye study, all age 50 or older.

The Reykjavik Eye Study was a population-based epidemiological study done to determine the influence of race and environmental factors on the prevalence and characteristics of lens opacities by comparing a

population from Iceland to a Japanese group. All participants underwent thorough eye examinations and filled out questionnaires on life-style factors like prior illness, medications, smoking and sunbathing habits.

To determine radiation exposure, the researchers evaluated information they received from the airlines on the pilots' employment years, annual number of hours flown, timetables and aircraft type. A computer software program calculated the annual radiation dose to which individual pilots were exposed.

"The cosmic radiation pilots are exposed to is fifty percent neutrons, which is a special type of radiation usually not found in medical diagnostic and treatment devices or in nuclear power stations,"

Vilhjalmur Rafnsson MD

Risk increases with years flying

Overall, 71 study participants were diagnosed with nuclear cataracts, 15 of which belonged to the pilot group. A statistical analysis revealed that airline pilots were three times more likely to develop nuclear cataracts than non-pilots. This increased risk was found after adjusting for age, smoking status and sunbathing habits.

In addition, the risk continued to grow the longer the pilots had flown. Yet, the findings are a little surprising because the radiation dose the pilots were exposed to is considered low evaluated in the traditional way, according to Dr Rafnsson.

"The only way to explain this association is that this type of ionised radiation behaves differently from what we've expected," he said.

radiation treatments. In addition, research by the National Aeronautics and Space Administration (NASA) found that astronauts who had spent the most time in space faced the highest nuclear cataract risk and that astronauts exposed to the highest amounts of space radiation developed cataracts at a younger age (*Radiation Research* November 2001; 156: 460).

The findings of different types of cataracts suggest that acute exposure has a different effect on the lens than long-term exposure and confirm that cosmic radiation has different properties.

"The cosmic radiation pilots are exposed to is fifty percent neutrons, which is a special type of radiation usually not found in medical diagnostic and treatment devices or in nuclear power stations," noted Dr Rafnsson.

Pilots cannot protect themselves from cosmic radiation and should therefore be diligent about minimising other known risk factors for cataracts by stopping smoking and wearing good sunglasses to reduce exposure to UV radiation, said Dr Datiles.

Dr Rafnsson and his associates are planning a new study that will investigate the cataract risk of other cabin-crew members such as flight attendants.

"Nuclear cataracts are typically caused by oxidative damage. It is possible that chronic radiation causes oxidative damage in the same way. Chronic radiation produces free radicals that damage the lens fibres leading to nuclear cataracts," Manuel Datiles MD, Chief, Cataract Section, OGVFB, National Eye Institute, US National Institutes of Health in Bethesda, Maryland, told *EuroTimes*.

Previous studies showed increased cataract risk in astronauts

Previous studies have already demonstrated an association between posterior subcapsular cataracts and exposure to radiation from X-rays or

New cataract prevention and treatment strategies

In addition, NASA and the National Eye Institute (NEI) are working on an early-detection device and a non-surgical treatment for cataracts. In the fall of 2004, NASA announced that a device developed by NASA physicists, Dr Rafat Ansari and Dr Datiles, using light-scattering technology was able to perform non-invasive eye examinations that detected cataract problems long before symptoms appeared. The prototype has already been tested in 250 patients, and the results will be published early next year.

"If this device becomes available, you could detect cataracts before regular ophthalmologists could detect them, and then you could modify your behaviour and lower your risk," said Dr Datiles.

And Othera Pharmaceuticals, Inc. has finished a phase I trial for the cataract medication OT-551, based on the compound Tempol-H discovered at NEI. A phase II trial testing the drug's efficacy will start soon. A drug that can be administered by eye drops would be particularly helpful for astronauts who are travelling for long periods of time and don't have access to surgery.

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