

Ionizing radiation and the eye: epidemiological studies and new approaches to correlating functional and morphological damage

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Objectives. Medical assistance to victims of ionizing radiation influence, first of all in relatively low doses, should be based on a clear understanding of the mutual relationship of organic and functional changes that are formed as a result of radiation exposure. We studied the peculiarities of the appearance of morphological and functional changes in the eye caused by radiation exposure, using the data of previously conducted examinations.

Materials and methods. The results of long-term follow-up cohorts of participants of emergency work in the Chornobyl zone (1170 people) in 1993–1998 and results of ophthalmologic examinations of 112 participants of emergency work in the Chornobyl zone conducted in 1992 were re-analyzed.

Results. The initial signs of macular degeneration in radiation-exposed individuals were manifested by minimal changes in the morphology of the retina and choroid (6 years after radiation exposure – in 20.5% of the examined) and absence a decrease in central vision. A decrease in visual functions was observed later. Clouding of the lens, mainly on the periphery, is initially detected only during examination (6 years after radiation exposure – in 29.5% of the examined) and does not cause changes in visual functions. Changes in the retinal vessels were also initially detected only during an ophthalmological examination.

Conclusions. The results of the reanalysis of previously conducted ophthalmological studies of radiation-exposed persons showed that in the presence of pronounced morphological changes in the structures of the eye, but visual functions are preserved for a long time. There is every reason to believe that the development of such pathological processes as cataracts, age-related macular degeneration, small vessel disease occurs as a result of the appearance of morphological changes already in the early period after radiation exposure, and functional changes are a relatively remote consequence of organic disorders.