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**Technical Report Series**

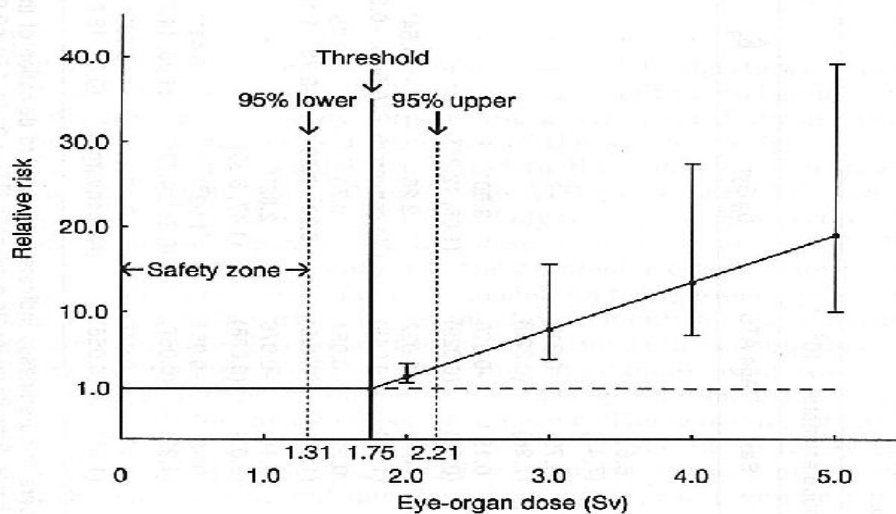

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# Radiation Cataracts among Hiroshima Atomic-bomb Survivors, 1949–64<sup>§</sup>

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## Summary

This report reexamines the quantitative relationship of exposure to ionizing radiation to the occurrence of cataracts (posterior lenticular opacities) seen in the years 1949–64 among 2249 Hiroshima atomic-bomb survivors with known Dosimetry System 1986 (DS86) doses. Among several dose-response relationships with or without two thresholds, the best fit based on binomial odds-regression models is achieved with a linear-linear dose-response relationship that assumes different thresholds for the two types of radiation. The neutron and gamma-ray regression coefficients, 199 Gy (90% CI: 28–473 Gy) and 5.14 Gy (95% CI: 1.38–14.77 Gy), based on this model, are suggestively higher for the neutron dose, and significantly higher for the gamma-ray dose than previously reported. The estimates of the two thresholds also differ significantly from zero: 0.06 Gy with 95% lower and upper bounds of 0.03 and 0.10 Gy for the neutron dose and 1.08 Gy with 95% bounds of 0.51 and 1.45 Gy for the gamma-ray dose. The safety zone for radiation-induced cataracts is estimated to be a 1.75-Sv threshold with 95% lower and upper bounds of 1.31 and 2.21 Sv using DS86 eye-organ-dose equivalents, assuming a neutron relative biological effectiveness of 18, derived from the ratio of the two thresholds, that is, 1.08 Gy for gamma rays and 0.06 Gy for the neutrons.



**Figure 2.** Relative risk of radiation cataracts and a threshold with 95% confidence limits using Dosimetry System 1986 eye-organ-dose equivalents (relative biological effectiveness = 18).