Association between the retinal vessel diameter and glaucoma in atomic bomb survivors in Hiroshima and Nagasaki, Japan
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Purpose: Previous studies suggested a relationship between glaucoma and retinal vasculature changes. However, to the best of our knowledge, there have been no epidemiological surveys concerning glaucoma in relation to the retinal vessel caliber. We examined the relationship between glaucoma and the retinal vascular caliber in atomic bomb survivors in Japan.

Methods: This was a cross-sectional study of 1,599 adults who participated in the Adult Health Study (AHS) program at the Radiation Effects Research Foundation (RERF) in Hiroshima and Nagasaki, Japan. Retinal photographs were taken between 2006 and 2008. The glaucoma cases were classified into those with primary open angle glaucoma (POAG), normal tension glaucoma (NTG) and primary angle closure glaucoma (PACG). The retinal arteriolar and venular calibers were measured from digitized retinal images using a computer-assisted program as the central retinal artery and vein equivalents (CRAE and CRVE). The association of the smoking status with the vascular caliber was analyzed using a multiple regression analysis.

Results: After adjusting for confounding factors such as age, gender, systolic blood pressure, body mass index, total cholesterol, the triglyceride level, radiation dose and study site, patients with normal tension glaucoma had lower CRAE and CRVE values; the mean differences in the CRAE and CRVE relative to the participants without glaucoma were 7.66 mm (95% confidence interval [CI]: -9.09 to -6.21; p = 0.001) and 5.72 mm (95% CI: -7.59 to -3.85; p = 0.002), respectively. There were no significant differences in the retinal vessel caliber of the POAG and PACG groups compared to those of the normal participants.

Conclusions: We observed that NTG cases had narrower CRAE and CRVE. Our findings may indicate that vascular factors play a role in the progression of NTG.