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**Application of Frequency Doubling Technology Perimetry in a
Chinese Elder Population, Cross-sectional and Longitudinal
Findings of the Beijing Eye Study**

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Purpose: To describe prevalence and causes of visual field loss (VFL) as confirmed by frequency doubling technology (FDT) perimetry in elderly Chinese, and its diagnostic value to glaucoma; to study the cumulative five-year incidence of visual field loss (iVFL) by FDT in this population.

Design: Cross-sectional and longitudinal population-based study.

Participants: The Beijing Eye Study 2001 included 4439 subjects out of 5324 subjects invited to participate (response rate, 83.4%); the eligibility criterion was an age of 40+ years. The study was repeated in 2006, with 3251 subjects (73.1%) participating.

Methods: The participants underwent a detailed eye examination. Visual field was assessed by FDT perimetry. Glaucoma was defined by a glaucomatous optic disc appearance.

Main outcome measure: An abnormal visual field was defined as reduced sensitivity in at least one test location. iVFL was defined as a change in visual field from normal at baseline to abnormal at follow-up.

Results: Of the 4439 persons examined, 4350 (98.0%) subjects (8617 eyes) provided measurement data by frequency doubling perimetry. VFL was found in 905 (11.6%) eyes or in 676 (15.5%) subjects. A glaucomatous appearance of the optic disc was detected in 135 (14.9%) of eyes with VFL. In subjects aged 40 to 49 years, most frequent cause for VFL was degenerative myopia followed by glaucoma, other optic nerve diseases, and cataract. In the subjects aged 60 to 69 years, most frequent cause for VFL was cataract, followed by glaucoma and degenerative myopia. In the subjects aged 70+ years, most frequent cause for VFL was glaucoma, followed by cataract and degenerative myopia. VFL was significantly associated with age ($P<0.001$), myopic refractive error ($P<0.001$), rural region ($P=0.001$), low level of education ($P=0.01$), degree of nuclear cataract ($P<0.001$), and IOP ($P<0.001$). An iVFL was detected in 273 eyes ($4.3 \pm 0.5\%$) / 235 subjects ($7.3 \pm 0.9\%$). It was significantly associated with higher age ($P=0.001$), higher IOP ($P<0.001$), and higher fasting blood glucose concentration ($P=0.019$). Considering only eyes ($n=140$) with a detected cause for VFL, the most frequent causes were cataract (68 (48.6%) eyes) followed by glaucoma (23 (16.4%) eyes), diabetic retinopathy (13 (9.3%) eyes), age-related macular degeneration (10 (7.1%) eyes), and myopic degenerative retinopathy (9 (6.4%) eyes). For 133 (48.7%) eyes with a VFL, the causes remained unclear.

Conclusions: In a population-based study, FDT has a sensitivity of about 63% to detect glaucoma. If FDT is abnormal, probability for glaucoma is about 15%. In case of an abnormal FDT result, a cause for the VFL may not be detectable in 50% of the subjects. In contrast to Western countries, age-related macular degeneration and diabetic retinopathy play a minor role as cause for VFL in China. The 5-year iVFL was $4.3 \pm 0.5\%$ per eye or $7.3 \pm 0.9\%$ per subject. Major causes for the iVFL were cataract, glaucoma and diabetic retinopathy. Still, half of the iVFL had no detectable ocular causes.