

**Glaucoma home monitoring with the Toronto Portable Perimeter (TPP):
two-year compliance and repeatability results**

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Introduction: Visual field tests are indispensable in monitoring patients with glaucoma. Theoretical simulations suggest that frequent (fortnightly vs standard six-monthly) testing allows for earlier progression detection. (Anderson 2017) Virtual reality perimeters can make this a reality by allowing frequent testing at home in a relaxed, convenient environment. This study aims to evaluate the compliance and repeatability of home visual field monitoring using the Toronto Portable Perimeter (TPP) by glaucoma patients.

Methods: Patients with field defects on the Humphrey Field Analyzer (HFA) were recruited from Toronto Western Hospital. Each participant was instructed during a 20-minute session on how to use the TPP before taking the device home to perform TPP-Standard 24-2 visual field tests. Participants' preferences between TPP and HFA were evaluated through a questionnaire administered at the first follow-up. The repeatability of TPP and HFA (SITA) tests was assessed by examining the differences between consecutive test-retests with both modalities.

Results: Among the 25 participants (mean age: 67.4 years, range: 48–80 years, female: 48%, mean MD: -5.2 dB, range: -14.8–+1.7 dB), 72% (18/25) successfully conducted unsupervised tests at home. The mean test frequency over 2 years was 1.5 tests per month. 61% (11/18) completed ≥ 1 tests per month; 33% (6/18) participants completed ≥ 2 tests per month. Unfamiliarity with technology and time constraints were the most cited reasons for non-compliance in retired and working participants, respectively. Participants reported that TPP tests produced less anxiety ($p=0.02$) and preferred testing with the TPP at home ($p<0.01$). The TPP's MD and VFI were strongly correlated with the SITA-Standard 24-2 (Pearson $r=0.86$, 0.91 for MD and VFI; $p<0.01$) and SITA-Faster 24-2C ($r=0.80$, 0.91 ; $p<0.01$). The test-retest repeatability for MD was similar among TPP, SITA-Standard and SITA-Faster tests (SD of test-retest differences: 1.4, 1.5, 1.5 dB, respectively; lower SD indicates more repeatable results). TPP's VFI test results were more repeatable than those obtained by SITA-Standard and SITA-Faster (SD: 3.7%, 4.3%, 4.2%, respectively). The test duration for TPP-Standard was on average 16 seconds shorter than SITA-Standard (5 min 24 sec vs 5 min 40 sec; $p=0.004$), but longer than SITA-Faster (3 min; $p<0.01$).

Conclusion: Participants who used TPP at home achieved similar MD repeatability and better VFI repeatability compared to clinical HFA tests. While about half of all recruited participants performed the test at least once a month, others cited complexity of technology and finding time to conduct home visual field tests as impediments to taking up frequent home testing.