OBJECTIVE EVALUATION OF VISUAL FUNCTION TWELVE MONTHS AFTER BILATERAL IMPLANTATION OF A TRIFOCAL DIFFRACTIVE IOL

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Introduction
The purpose of this study is to objectively evaluate visual function using computerized psychophysical tests 12 months after bilateral implantation of a new aspheric diffractive trifocal intraocular lens (IOL) and to compare these results with those obtained in the first month postoperatively.

Material and methods
Prospective study. Twenty eyes of 10 consecutive patients that underwent cataract surgery and bilateral implantation of a new aspheric diffractive trifocal IOL (Physiol FineVision®) were included in the study. All eyes had a one-week time frame between surgeries. Monocular and binocular, uncorrected and corrected visual acuities (distance, near and intermediate) were measured. Contrast sensitivity was evaluated with a computerized psychophysical software – Metrovision® – that tests different spatial frequencies (0.6-1.1-2.2-3.4-7.1~14.2 cpd) under static (0Hz) and dynamic (10Hz) conditions, both in photopic (90 cd/m²) and low-mesopic (0.08 cd/m²) settings. The same software was used for pupillometry (100cd/m²; 10cd/m² and 1cd/m²) and glare (5cd/m² and 1cd/m²) evaluation. We tested motion, achromatic and chromatic contrast discrimination using two innovative 2AFC (two-alternative forced choice) psychophysical tests that required comparison and discrimination of visual features between two separated moving dots. A complete ophthalmologic examination was performed at 1, 3, 6 and 12 months postoperatively. The psychophysical tests were performed 1 month and 12 months postoperatively. Non-parametric tests were used to compare the results of the psychophysical tests between these two visits. A significance level of 0.05 was used for all statistical tests.

Results
Twelve months postoperatively, distance uncorrected visual acuity (VA) was 0.0±0.08 logMAR and distance corrected VA was 0.0±0.05 logMAR. Distance corrected near VA was 0.2±0.07 logMAR (J1) and distance corrected intermediate VA was 0.0±0.06 logMAR. Under a fixed glare source, patients were able to read 79.84±8.68% of optotypes. Mean mesopic pupillometry was 3.61±0.72 mm. Mean photopic contrast sensitivity for high spatial frequencies (7.1 and 14.2 cpd) was 18.88±1.46dB and 11.50±2.93dB for static conditions and 17.50±1.60 dB and 12.12±1.81 dB for dynamic conditions. There were no statistically significant differences (p>0.05) between the first and last visit in any of the psychophysical tests.

Conclusion
An objective assessment of visual function through quantitative computerized psychophysical approaches allows for a precise and reproducible evaluation that significantly complements a purely subjective analysis. The Physiol FineVision® trifocal IOL provided a satisfactory full range of vision and quality of vision parameters 12 months after surgery. Visual acuity and psychophysical tests did not show statistically significant differences between the 1st and last visit.