# Accuracy and Repeatability of a New Wave Front Aberrometer

**L. Warden, G. Mills, W. Foote, D. Sandler, J. Lemperle, P. Globerson and A. Dreher**

Ophthonix Inc., San Diego, CA

**Commercial Relationships: L. Warden**, Ophthonix, Inc. E; **G. Mills**, Ophthonix, Inc. E; **W. Foote**, Ophthonix, Inc. E; **D. Sandler**, Ophthonix, Inc C; **J. Lemperle**, Ophthonix, Inc. C; **P. Globerson**, Ophthonix, Inc. C; **A. Dreher**, Ophthonix, Inc. E.

**Grant Identification:** none

**Presented at the 2004 Annual Meeting of the Association for Research in Vision and Ophthalmology**

---

## Abstract

**Purpose:** To assess the accuracy and repeatability of measuring low and high order aberrations with a new wavefront aberrometer based on holographic grating technology (Ophthonix Inc., San Diego, CA).

**Methods:** Accuracy of low–order aberration measurements was determined by measuring the optical power of a calibrated model eye with adjustable focal length over a range of –9D to +10D. Accuracy of high–order aberration measurements was determined by measuring waveplates exhibiting known amounts of coma, trefoil, and spherical aberration. Repeatability of the instrument was assessed by repeated measurement (n=5) of low and high order aberrations in 26 eyes of 13 subjects (intra–operator reproducibility).

**Results:** Low order aberration measurements obtained with the new wave front aberrometer were highly linear over the total range of the model eye (–9D to +10D), with a correlation coefficient of $R^2$=0.9991. The average standard deviation of measurements of waveplates exhibiting 3$^{rd}$ and 4$^{th}$ order aberrations was 0.004 μm. Using a ZYGO interferometer as reference, the maximum measurement error of the new aberrometer for any individual high order term was less than 0.014 μm, and better than 0.022 μm for the RMS measurement. Average repeatability (SD) of measurements in patients' eyes was found to be 0.09D, 0.08D, 0.01 μm, 0.01 μm, and 0.02 μm for sphere, cylinder, spherical aberration, trefoil, and coma, respectively.

**Conclusions:** Low and high order measurements obtained with the holographic grating based aberrometer showed excellent agreement with known values of a model eye and various wave plates. Repeated measurements obtained from patients' eyes were found to be highly reproducible.