

## Title

### Clinical Validation of the VAO Adaptive Optics Visual Simulator

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#### Abstract

**Purpose (100 words):** To validate in the clinic the Adaptive Optics Visual Simulator VAO (Voptica SL, Murcia, Spain) for fast and accurate refraction estimates.

**Setting (50 words):** Laboratory of Clinical Optics, University of Murcia, Spain.

**Methods (100 words):** VAO combines optical measurements and visual testing within the same compact instrument. It incorporates a Hartmann-Shack wave-front sensor to measure objective refraction and aberrations, together with a spatial light modulator capable of correcting or inducing any optical profile while performing visual testing. In seventy-four eyes of 37 subjects, subjective refraction (SR) was measured using VAO. The agreement of spherical equivalent (M) and cross cylinders (J0 and J45) with a standard refraction technique was estimated using different statistic parameters: 95% confidence limits (CL), Student's t- test or Wilcoxon Rank Sum and Pearson correlation coefficient ( $r$ ).

**Results (100 words):** There is a high correlation between the elements of SR (M, J0 and J45) measured with VAO and the standard technique ( $r \geq 0.92$ ) and the differences are not significant different ( $p > 0.05$ ). The 95% CL of M, J0 and J45 were  $\pm 0.38$ ,  $\pm 0.07$  and  $\pm 0.07$  D respectively. The reproducibility of SR measurements between two examiners had an excellent correlation ( $r \geq 0.93$ ) and there were not significant differences between them ( $p > 0.05$ ). The 95% CL of M, J0 and J45 were  $\pm 0.29$ ,  $\pm 0.08$  and  $\pm 0.07$  D respectively.

#### Conclusions (100 words):

Refraction results using the VAO adaptive optics visual simulator were in agreement with those obtained in a standard technique while offering significant advantages in terms of time and clinic space. VAO is a new instrument that offers significant advantages in the optical and visual assessment of cataract and refractive surgery patients.