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Abstract Title:	**Accommodation Dynamics With Adaptive-Optics- Corrected Ocular Aberrations**
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Purpose: Ocular aberrations are thought to play a role in accommodation (i.e. larger lag in myopes associated to increased ocular aberrations or as cues to focus direction). We studied the role of ocular aberrations on accommodation dynamics (lag, fluctuations, aberration change and focus target tracking) by measuring optical aberrations dynamically, with and without adaptive-optics (AO) correction.

Methods: Experiments were made with a fully-automatic custom AO system provided with a Hartman-Shack wavefront sensor, an electromagnetic deformable mirror (MIRAO, Imagine-Eyes), a motorized Badal system, a minidisplay for stimulus presentation and pupil imaging channel. Aberrations were measured dynamically (6.5 Hz) with natural and AO-corrected aberrations of the relaxed state. The pupil dynamics was recorded simultaneously. Four conditions were tested: (1) Increased accommodation demand (0-6 D) following a stair-case function (3 sec/step) (2) Off-On (4 D) accommodation stimulus (3 cycles, 3 sec/condition) (3) Increased accommodation demand (0-6 D) at 1.28 D/sec; (4) Decreased accommodation demand (6-0 D). Lag was defined as residual defocus (including spherical aberration). Fluctuations were estimated as the RMS standard deviationduring a 3 sec measurement. Five subjects were tested (age: 26.6±4,0; refractive error: -0.2±0,5 D; accommodative range > 6 D from IR dynamic retinoscopy).

Results: 1) In 4 eyes, the accommodative lag increased significantly ($p<0.0002$) with AO correction (by 1.1±0.3 D on average). Lag decreased (by 0.2 D) with AO-correction in the more aberrated eye. 2) Fluctuations of accommodation peaked at intermediate demands both for natural (14.6±7.5% on average) and AO-correction (27.7±4.1% on average). AO-correction decreased the fluctuation range in all eyes and conditions (0.016±0.048 µm on average). 3) Spherical aberration decreased more consistently under AO correction than in the natural condition (by 0.031±0.030 µm and 0.015±0.025 µm, respectively on average, in the 0-6 D range). Coma showed systematic changes (both for natural and AO-corrected conditions) within a subject, but the trends varied across subjects. 4) All subjects followed the moving target without a significant delay and showed a slight accommodative inertia when the target stopped moving.

Conclusions: Aberration dynamics are altered by correction of high order aberrations. Fluctuations of accommodation are reduced when aberrations are corrected. Our lag results indicate that while high amounts of aberrations may compromise accurate fixation, a small amount of aberrations may provide accommodative cues

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