New testing software for quantifying discrimination capacity in subjects with ocular pathologies

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Abstract. We develop a new visual test, designed as software for quantifying discrimination capacity under low-illumination conditions. This is an important task in the presence of visual disturbances, such as those perceived by subjects with some ocular pathologies. For this purpose, we propose a visual-disturbance index, checking the test with two groups of observers having different ocular pathologies: a group with unilateral keratitis and another group affected with age-related macular degeneration (ARMD). To compare the test results to objective data, we use a double-pass device to measure the Strehl ratio, a parameter that quantifies the retinal-image quality, taking into account aberrations, retinal reflection, and intraocular scattering working jointly. Diseased eyes present higher disturbance indexes and a lower Strehl ratio compared to their healthy fellow eyes, registering a significant descending correlation between the disturbance index and the Strehl ratio. The lower the Strehl ratio is, the higher the disturbance index for the eyes studied. Therefore, in keratitis and ARMD eyes, our results demonstrate a deterioration in the retinal-image quality and a lower discrimination capacity to peripheral stimuli, reducing visual performance. The test presented here could be useful for the study and time course in different eye diseases, especially those involving an increase in scattered light or alterations in the ocular media, as shown in this work. © 2011 Society of Photo-Optical Instrumentation Engineers (SPIE). [DOI: 10.1117/1.3526702]