Abstract

Purpose: The current study was performed to compare the difference in binocular visual function depending on variable background colors at near work. Method: Fifty four adults (18 males, 34 females) who consented to the present study and had no ocular disease, ocular surgery history, strabismus and amblyopia with normal binocular vision were participated into this study. The subjects were asked to read the novels with black letter printed on white, red, green and blue background for 15 min. Then, their heterophoria, AC/A ratio, near point of convergence, accommodation facility, relative accommodation and vergence were measured before and after reading. The difference of measurements were compared. Result: Overall heterophoria was tended to decrease with regardless of background color. AC/A ratio showed a tendency of increase after reading the novels with all backgrounds except white background. Near point of convergence was significantly increased compared to before reading at all background color. Accommodative facility of dominant and non-dominant eyes were also significantly increased after reading however, binocular accommodative facility showed a tendency of decrease. Negative relative accommodation also decreased at all background colors however, the change of positive relative accommodation was not significantly different. In case of vergence, there was significant difference in break point of far BO and recovery point of far BI by the wavelength of background color. Conclusions: From the results, it was known there is convergence change depending on the wavelength of light even though same amount of accommodation and convergence is required when doing near work for certain period. Thus, it can be suggested that the adjustment of the near working environment which perception of various color was required, should be conducted according to the main wavelength.

Keywords

Longitudinal chromatic aberration; Binocular vision; Convergence; Accommodation; Asthenopia
References


Several researchers have studied the longitudinal chromatic aberration (LCA) of eyes implanted with an intraocular lens (IOL). We investigated the LCA of eyes implanted with yellow-colored IOLs from three different manufacturers: Alcon Inc., HOYA Corp., and AMO Inc. The number of subjects was 11, 16, and 16, respectively. The refraction and zero-chromatic aberration of the apparatus were calibrated using a reflective artificial eye. In the near-infrared region, the errors of reflectivity were so large that we did not use the results; the SD of the calculated refractive index was about 0.002. Download: PPT.

The impact of chromatic aberration in binocular visual acuity has also been studied recently (Schwarz et al. 2014). Although correction of SA had a greater impact monocularly than binocularly in monochromatic light, bilateral correction of both SA and LCA may further improve binocular spatial visual acuity.

To assess the performance and optical limitations of intraocular lenses (IOLs) correcting both longitudinal spherical aberration (LSA) and longitudinal chromatic aberration (LCA) compared to standard spherical and aspheric IOLs.