Rapid Objective Assessment of Contrast Sensitivity and Visual Acuity With Sweep Visual Evoked Potentials and an Extended Electrode Array

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Résumé

Purpose: Sweep visual evoked potentials (sVEPs) provide an implicit, objective, and sensitive evaluation of low-level visual functions such as visual acuity and contrast sensitivity. For practical and traditional reasons, sVEPs in ophthalmologic examinations have usually been recorded over a single or a limited number of electrodes over the medial occipital region. Here we examined whether a higher density of recording electrodes improves the estimation of individual low-level visual thresholds with sVEPS, and to which extent such testing could be streamlined for clinical application.
Methods: To this end, we tested contrast sensitivity and visual acuity in 26 healthy adult volunteers with a 68-electrode electroencephalogram (EEG) system.

Results: While the most sensitive electrophysiologic response was found at the traditional medial occipital electrode Oz in a small majority of individuals, it was found at neighboring electrodes for the remaining participants. At the group level, lower spatial frequencies were also associated with right lateralized responses. More generally, visual function was evaluated more sensitively based on EEG recorded at the most sensitive electrode defined individually for each participant. Our data suggest that recording over seven posterior electrodes while limiting the testing session to less than 15 minutes ensures a sensitive and consistent estimation of acuity and contrast sensitivity threshold estimates in every individual.
Conclusions: The present study shows that sampling from a larger number of posterior scalp electrodes is relevant to optimize visual function assessment and could be achieved efficiently in the time-constrained clinical setting.

Mots-Clés: Visual acuity, Contrast sensitivity, Electroencephalography, Evoked Potentials, Electrodes, Amblyopia

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