Editorial

# Full-Field versus Multifocal Electroretinography

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Full field electroretinography (ffERG) or conventional electroretinography represents the summed electrical response of the entire retina evoked by a flash light from an arc bowl (Ganzfeld stimulus bow) scattered in the eye through a dilated pupil.

Clinical applications of ffERG were initiated in the 1940s, therefore clinical and basic studies on ERG date back to several decades. In 1989, the International Society for Clinical Electrophysiology of Vision (ISECV) devised a standard protocol for ffERG. These standards are reviewed every 4 years and revised if necessary.[1] ffERG is relatively insensitive to small defects and cannot localize retinal abnormalities.

In 1992, Sutter et al[2] introduced the technique of multifocal ERG (mfERG). With this modification, many retinal areas are stimulated by multiple sequences at the same time and responses from different regions of the retina are recorded simultaneously. This overcomes the shortcoming of full field ERG which can only record a summed electrical response from the entire retina but cannot detect local responses.

Pattern ERG (PERG) is a specialized version of ERG which can be elicited from the retina by alternating checkerboard stimuli presented to the central retina. Responses to several hundred stimuli are averaged to obtain a measurable signal. PERG has been shown to correlate with optic nerve integrity and thus provides information on ganglion cells and their interaction which cannot be recorded by ffERG. PERG could thus serve as a specific test for recognition of early glaucoma.

In this issue of the *Journal of Ophthalmic and Vision Research,* de Carvalho et al[3] showed that intensive high dose chloroquine for treatment of malaria induced no changes in mfERG. The work by de Carvalho and colleagues in their original article is remarkable; on the other hand, to the best of their knowledge, there have been no reports of chloroquine toxicity with high cumulative daily doses (similar to those employed in their study) in humans. However, a few points need to be considered before the results are applied clinically. To avoid maculopathy the daily dose of chloroquine is calculated not based on actual, but rather ideal body weight and should not exceed 3.5mg/kg/day particularly in the first 5 years of treatment.[4] So, the cumulative dose of chloroquine (1,050 to 27,000mg) reported in their work might have been lower than the total toxic dose.

In addition to high daily and cumulative doses, other risk factors for retinal toxicity include obesity, kidney or liver diseases, older age (over 60 years) and possibly concomitant retinal disorders.[4] Nevertheless, well-documented cases of hydroxychloroquine maculopathy without electrophysiological changes have occurred on "safe" daily doses in the absence of other risk factors.[5]

In summary, although the non-toxic chloroquine dose of 1,050-27,000mg used in this study and mfERG results were comparable to the control group, repeating the mfERG test a few months later may have revealed a different result.

**Conflicts of Interest**

None.

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