



Hemifield Pattern Electroretinogram in Normal and Glaucoma Patients

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Abstract

Glaucoma is a disease which is the third leading cause of blindness in North America, affecting all races - including the Chinese. The purpose of our study was to use the pattern electroretinogram to identify patients with glaucoma and without glaucoma. The pattern electroretinogram (PERG) is an electrical potential derived from retinal ganglion cells. Much interest has been shown in using the PERG to diagnose patients with suspected early glaucoma, since decreased amplitude of PERGs in glaucoma is believed to be due to loss of ganglion cells. Often in glaucoma, a visual field defect will appear in one hemifield more than the other. With this in mind, we measured the ratio of the PERG amplitudes between the upper and lower hemifields in normal subjects. Once this baseline ratio was established, we could then determine whether this upper:lower ratio in glaucoma patients was significantly different from that in normals.

25 normal subjects (21-68 years old) had PERGs recorded from one eye. A standard gold foil electrode was placed in the lower fornix of the eye for measuring electrical activity. A UTAS-132000 computer recorded the PERGs. The patients fixated on the center of a T.V. monitor which showed a checkerboard pattern stimulus, with squares alternating black and white at a frequency of 3.7 and 15 Hz. Full, upper and lower field screens were each shown; full, upper and lower field amplitudes were recorded, respectively. The same procedure was performed on seven glaucoma patients with superior arcuate scotomas. Ratios of upper:lower amplitudes were then obtained.

Results showed that for 3.7 Hz recordings, the normal upper:lower (U:L) ratio was 0.95 ± 0.03 . For patients with superior arcuate defects, the ratio was 0.74 ± 0.05 . Patients with inferior arcuate defects had a U:L ratio of 1.05 ± 0.08 . At the higher frequency 15 Hz recording, the normal U:L ratio was 0.93 ± 0.02 . In patients with superior defects, the ratio was 0.76 ± 0.08 , whereas those with inferior arcuate defects had a mean ratio of 1.03 ± 0.04 .

In conclusion, hemifield ratios in PERG recordings may become a useful means of detecting glaucomatous visual field loss. In subjects with normal visual fields, the ratio (U:L) approached 1.0, as expected for patients with no visual field loss. There was a significant difference in ratios between normals and patients with upper hemifield defects. No significant difference was found between normals and patients with lower hemifield defects. A larger sample size may more clearly define the relationship of the latter ratios between normals and glaucoma patients.