Evaluation of correlation between Diopsys® NOVA™ fixed-luminance flicker ERG and Diagnosys® Espion 2™ flicker ERG parameters

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Purpose: Diopsys® NOVA™ is a novel full-field electroretinography (ffERG) device that can make rapid measurements of retinal electrophysiologic function. Diagnosys® Espion 2™ is a clinical gold-standard ERG device. This study aimed to investigate whether light-adapted Diopsys® NOVA™ fixed-luminance flicker ffERG magnitude and implicit time (converted from phase) measurements correlate with light-adapted Diagnosys® Espion 2™ flicker ffERG amplitude and implicit time measurements, respectively.

Methods: Twelve patients (22 eyes) with various retinal and uveitic diseases underwent light-adapted Diagnosys® Espion 2™ and Diopsys® NOVA™ fixed-luminance flicker testing. Diopsys® magnitude and implicit time (converted from phase) measurements were compared to Diagnosys® amplitude and implicit time measurements, and a Pearson correlation was used to evaluate any existing correlation. Groups were also compared using generalized estimating equations. Bland-Altman plots were utilized to determine agreement between the comparison groups.

Results: Age of patients ranged from 14 to 87 years. 58% (n = 7/12) of patients were female. A significant, positive correlation ($r = 0.880$, $P < 0.001$) was observed between magnitude (Diopsys®) and amplitude (Diagnosys®) measurements. Amplitude increases by 6.69 μV for each 1 μV increase in Magnitude (p-value < 0.001). A statistically significant, strong positive correlation was observed between Diopsys® implicit time measurements (converted from phase) and Diagnosys® implicit time measurements ($r = 0.814$, p-value < 0.001). For each 1 ms increase in Diopsys® implicit time, Diagnosys® implicit time increases by 1.13 ms (p-value < 0.001).

Conclusions: There is a statistically significant positive correlation between lightadapted Diopsys® NOVA™ fixed-luminance flicker amplitude and Diagnosys® flicker magnitude values. Additionally, there is a statistically significant positive correlation between Diopsys® NOVA™ fixed-luminance flicker implicit time (converted from phase) and Diagnosys® flicker implicit time values. These results imply that the Diopsys® NOVA™ module, which utilizes the nonstandard shortened International Society for Clinical Electrophysiology of Vision (ISCEV) ERG protocol, can produce reliable lightadapted flicker ffERG measurements.

Keywords: Diagnosys®; Diopsys®; Fixed luminance; Flicker electroretinography; Fullfield electroretinography.

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Introduction

Light-adapted flicker electroretinography (ERG) is an electrophysiologic test of the retina that evaluates cone and bipolar cell function.[1] Diopsys® NOVA is a novel ERG modality that can perform a variety of ERG tests including 30 Hz flicker ERG. Diagnosys® Espion 2 is a gold-standard clinical ERG device. Due to its user-friendly design and affordability, the Diopsys® NOVA device has the potential to improve the accessibility of ERG testing.

Purpose

This study aimed to investigate whether light-adapted Diopsys® NOVA™ fixed-luminance flicker ffERG magnitude and implicit time (converted from phase) measurements correlate with light-adapted Diagnosys® Espion 2™ flicker ffERG amplitude and implicit time measurements, respectively.

Methods

Twelve patients (22 eyes) with various retinal and uveitic diseases underwent light-adapted Diagnosys® Espion 2™ and Diopsys® NOVA™ fixed-luminance flicker testing. Diopsys® magnitude and implicit time (converted from phase) measurements were compared to Diagnosys® amplitude and implicit time measurements, and a Pearson correlation was used to evaluate any existing correlation. Groups were also compared using generalized estimating equations. Bland-Altman plots were utilized to determine agreement between the comparison groups.

Results

Age of patients ranged from 14 to 87 years. 58% (n = 7/12) of patients were female. A significant, positive correlation (r = 0.880, P < 0.001) was observed between magnitude (Diopsys®) and amplitude (Diagnosys®) measurements. Amplitude increases by 6.69 µV for each 1 µV increase in Magnitude (p-value < 0.001). A statistically significant, strong positive correlation was observed between Diopsys® implicit time measurements (converted from phase) and Diagnosys® implicit time measurements (r = 0.814, p-value < 0.001). For each 1 ms increase in Diopsys® implicit time, Diagnosys® implicit time increases by 1.13 ms (p-value < 0.001).

Fig. 1

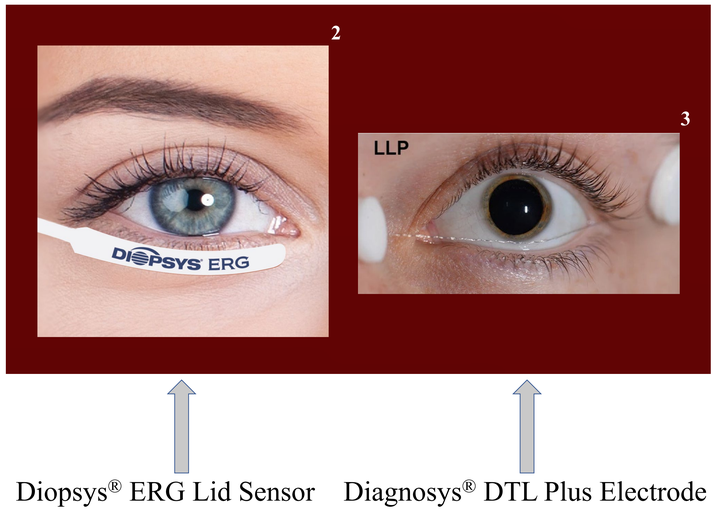

Fig. 1. Comparison between electrodes utilized by the devices, showcasing the patient-friendly design of the Diopsys ® device

Fig. 2

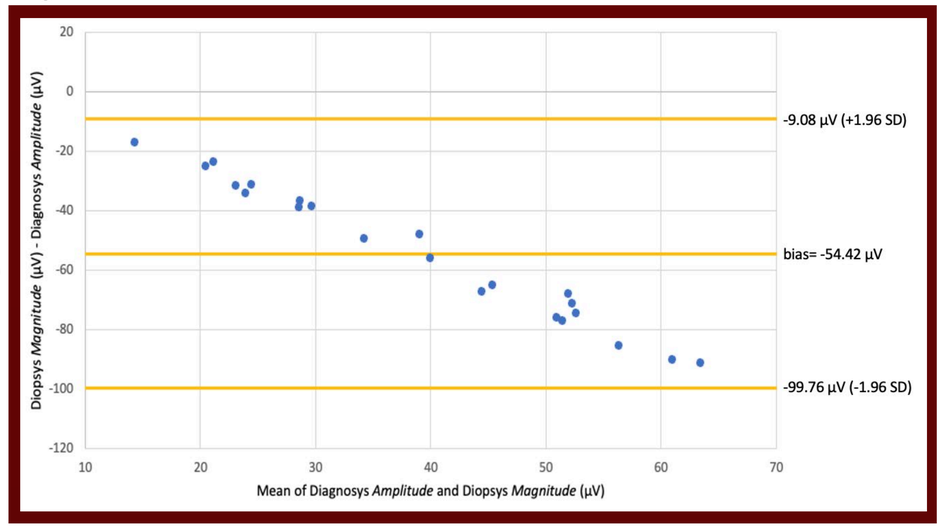

Fig. 2. Bland–Altman plot analyzing agreement between Diopsys® *magnitude* and Diagnosys® *amplitude* measurements. Similar results were shown for time measurements.

Conclusions

There is a statistically significant positive correlation between light-adapted Diopsys® NOVA™ fixed-luminance flicker amplitude and Diagnosys® flicker magnitude values. Additionally, there is a statistically significant positive correlation between Diopsys® NOVA™ fixed-luminance flicker implicit time (converted from phase) and Diagnosys® flicker implicit time values. These results imply that the Diopsys® NOVA™ module, which utilizes the nonstandard shortened International Society for Clinical Electrophysiology of Vision (ISCEV) ERG protocol, can produce reliable light-adapted flicker ffERG measurements.

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