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Web-accessible Visual Field Test and Analysis System for Multi-Center Studies and Touchpad Device Access

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Purpose

To provide a validated visual field test and analysis system that is worldwide accessible via the Web, to allow for multi-center clinical studies performed on touchscreen-equipped computers and touchpad devices, such as iOS-based handhelds (i.e., iPad, iPhone, iPod).

Methods

The Web-based visual field test and analysis system employs the *3D Computer-automated Threshold Amsler Grid (3D-CTAG; Fink & Sadun, J Biomed Opt 2004)* as its testing method: While positioned on a head-chin rest, patients trace areas on a touchscreen simulating an Amsler grid at varying levels of contrast. This plots the boundaries of areas missing from their field of vision. The result is a 3D data set that represents the (central) visual field and occurring scotomas within at each contrast level.

Results

A centralized, Webserver-based integrated visual field test and analysis system allows for multi-center clinical studies. Furnished with a Web-portal, administrative access is provided to physicians to manage their respective patients, and subsequent patient access is granted to undergo testing with 3D-CTAG. Following each visual field test, the patient-ID-tagged but otherwise anonymous examination data are transmitted to the server for database storage and processing. Several graphical depictions of the visual field (i.e., hill-of-vision) and objective visual field analysis data (i.e., characterization indices; *You & Fink, ARVO 2010*) are generated on the server and subsequently displayed on the computer or touchpad device where the test was administered (i.e., client). Both the patient and the assigned physician can access the stored patient data at a later time to regenerate the graphical output and analysis data on demand. The visual field test and analysis system can be hosted both *locally* (i.e., standalone) and *centrally* (i.e., server-based global access), and is accessible to touchpad devices affording mobility and deployment in the field.

Conclusions

The validated visual field test and analysis system enables worldwide subject screening and examination via the Web, provides an objective analysis of visual fields and scotomas within, and offers a promising perspective towards modern computer-assisted diagnosis in both medicine and telemedicine. As opposed to conventional visual field tests, 3D-CTAG, which is at the core of the Web-based system, is capable of monitoring central visual field loss due to macular degeneration. Its clinically demonstrated capability of early detection of glaucoma and macular degeneration allows for timely countermeasures to help prevent irreversible blindness. As such it may have the potential to change the standard of visual field examinations.