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Eyelid Motion Monitor

Adi Hanuka; Boaz Blankrot; Leon Karabchevsky; Eli Shoshan; Levi Schächter; Wasseem Hilo; Daniel Briscoe

+ Author Affiliations & Notes

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Abstract

Purpose

To develop a simple to use device that facilitates the monitoring of the upper eyelids motion, acquires the eyelid vertical movement and enables analysis and graphic presentation of the results. It should allow the patient to move freely in his/her natural environment.

Methods

The system consists of three components: (1) glasses for the patient including magneto-sensitive (Hall) probes. (2) hardware - digital and analog cards that select, process, store or transmit the data. (3) A dedicated software allows a user friendly interface for the doctor. It includes portable, “plug and play” system and well defined physician-patient work flow, for measuring amplitude, velocity, rise and fall-time, and time duration between two blinks of each eye separately. Essentially, four Hall-probes monitor the magnetic field generated by a tiny magnets attached to the upper eyelids. They are placed on glasses-like frame which contains a pre-amplifier and attached to them is a digital card consisting of a micro-processor and 2GB of data storage capability. Two modes of operation are conceived, on or off-line. When on-line, the device is connected to PC and the data is displayed instantaneously and stored on the HD. If off-line, the data is stored in the internal memory of the device. At the end of the day, week or month, the data can be downloaded to the PC where the software may store, assist analyzing and presenting the data.

Results

A fully operational prototype is reported. Currently direct and separate monitoring of each eyelid is possible. Based on present performance it is possible to set the time between two blinks, rise and fall time. In the near future, full analysis of each separate eyelid dynamics will be possible.

Conclusions

A novel user-friendly simple to use device has been developed which may provide the medical community with a new methodological asset that enables to trace the eyelid motion. In due course, the system will enable us to examine and monitor many ocular and systemic diseases including ptosis, cranial nerve palsies, myasthenia gravis, thyroid eye disease, degenerative neurological diseases. Moreover, using this tool we will be able to determine the correlation between eyelid movements and stability disorders and various diseases.

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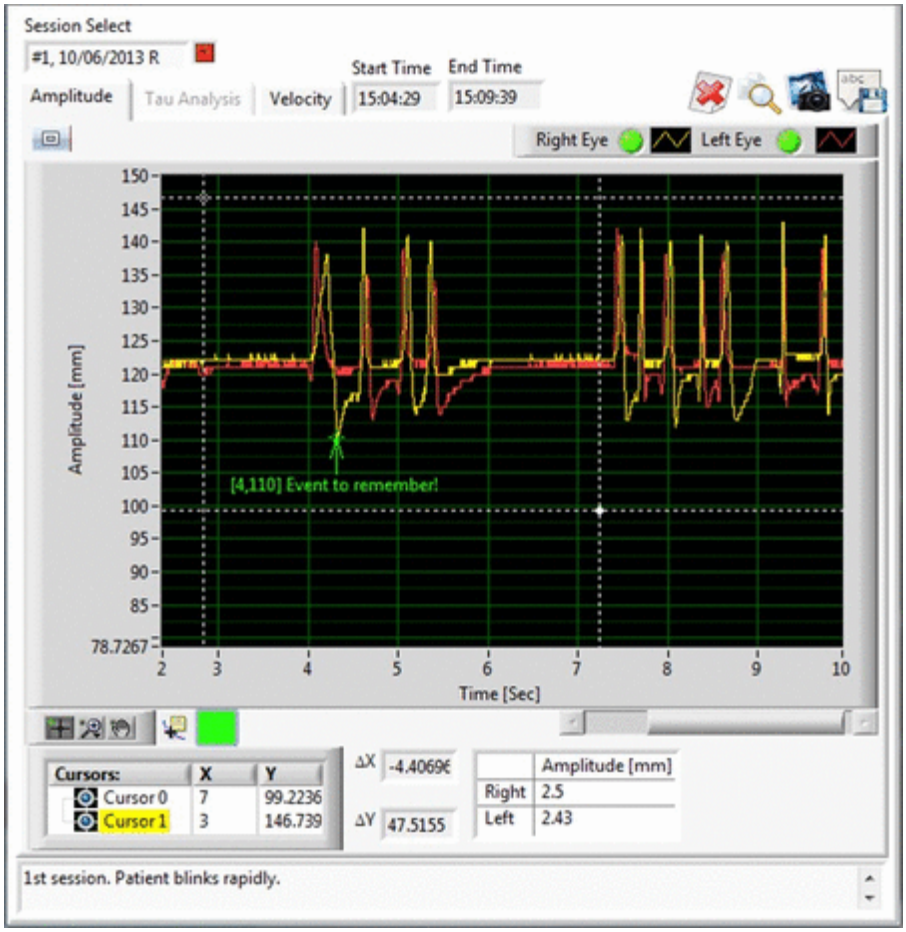

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