Infrared oculography

Infrared oculography is a non-invasive and accurate method of recording eye movements [1], and has entered clinical practice in expertise centers. Due to the extensive networks involved in the control of eye movements, both focal and more widespread neuronal processes can be investigated using this infrared oculography [2] [3] [4].

Kumar and Krol developed a Binocular infrared oculography, which provides binocular recordings and allows simultaneous measurement of horizontal and vertical eye movements. The sensitivity of the system is 1 minute of arc, and it has a horizontal range of +/- 30 degrees and a vertical range of +/- 20 degrees. Using this system for routine clinical evaluations, it was possible to record divergent spontaneous nystagmus and divergent thermally induced nystagmus. Rotatory nystagmus can also be recorded. The binocular infrared oculographic system (BIRO) satisfies nearly all the requirements of an ideal recording system [5].

Quantitative saccadic testing is a non-invasive method of evaluating the neural networks involved in the control of eye movements. The aim of a study of Nij Bijvank et al., from the Neuro-ophthalmology Expertise Center, Amsterdam and Moorfields Eye Hospital and The National Hospital for Neurology and Neurosurgery, London, is to provide a standardized and reproducible protocol for infrared oculography measurements of eye movements and analysis, which can be applied for various diseases in a multicenter setting.

Development of a protocol to Demonstrate Eye Movement Networks with Saccades (DEMoNS) using infrared oculography. Automated analysis methods were used to calculate parameters describing the characteristics of the saccadic eye movements. The two measurements of the subjects were compared with descriptive and reproducibility statistics.

Infrared oculography measurements of all subjects were performed using the DEMoNS protocol and various saccadic parameters were calculated automatically from 28 subjects. Saccadic parameters such as: peak velocity, latency and saccade pair ratios showed excellent reproducibility (intra-class correlation coefficients > 0.9). Parameters describing performance of more complex tasks showed moderate to good reproducibility (intra-class correlation coefficients 0.63-0.78).

This study provides a standardized and transparent protocol for measuring and analyzing saccadic eye movements in a multicenter setting. The DEMoNS protocol details outcome measures for treatment trial which are of excellent reproducibility. The DEMoNS protocol can be applied to the study of saccadic eye movements in various neurodegenerative and motor diseases [6].

1)
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