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ISCEV Standard for full-field clinical electroretinography (2015 update) [1]

ISCEV Norma para eletrorretinografia clínica de campo total (atualização 2015)

ISCEV Estándar electroretinografía clínica de campo completo (actualización 2015)

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RESUMO

Este artigo descreve as atualizações propostas pela ISCEV para aquisição e análise do eletrorretinograma de campo total.

ABSTRACT

This article describes the update proposed by ISCEV for the acquisition and analysis of full-field electroretinography.

RESUMEN

Este artículo describe los cambios propuestos por ISCEV para la adquisición y análisis de campo completo electroretinografía.

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The International Society for Clinical Electrophysiology of Vision (ISCEV), which aims to promote and disseminate knowledge in their area of expertise, is responsible for publishing protocols for electrophysiological tests in daily practice in order to standardize the results obtained by different laboratories throughout the world. The protocols for tests that assess the optic route, such as full-field electroretinography (ERG), multifocal ERG, pattern-reversal ERG, electrooculography, and visual evoked potential, are available on the website: www.iscev.org. Furthermore, with the advancement of technology, these protocols are periodically reviewed and published. The last update of the full-field ERG technique was published online in December 2014. This article aims to comment on the main changes to the 2008 version and its advances.

In this update, six responses obtained with variable flash strength levels are described. In addition to the five responses recommended in the previous protocol—three dark-adapted (rod-driven response, combined maximum response, and oscillatory potentials) and two light-adapted (cone responses and flicker)—another dark-adapted response was included in the protocol: the response obtained with a dark-adapted patient after light stimulus with a strong flash (10 cd.s.m-2). This stronger flash is represented by a larger a-wave, with better definition of the peak time, further differentiation of the negative component (to recognize diseases with relative b-wave reductions), and enhanced oscillatory potential amplitudes. Also, this type of stimulus can provide more reliable answers in patients with opaque media and immature retinae. It is important to note that even stronger flashes do not saturate the full-field ERG and can be used for eyes with extremely attenuated amplitude or poorly defined a-waves.

The protocols recommended by ISCEV in its last update are described as follows:

1. Dark-adapted response with 0.01 cd.s.m-2 stimulus (rod-driven response)
2. Dark-adapted response with 3 cd.s.m-2 stimulus (maximum combined response)
3. Dark-adapted response with 10 cd.s.m-2 stimulus (combined response with emphasis on the a-wave)
4. Dark-adapted response: oscillatory potentials (responses from amacrine cells).
5. Light-adapted response with 3 cd.s.m-2 stimulus (cone-driven response)
6. Light-adapted response: 30 Hz flicker (cone-driven response)

The update also provides additional detailed data about the flash-type stimulus used for obtaining the responses. This has become important with the advent of new technologies used as the stimulus source in this method, such as light emitting diode (LED), which has been replacing xenon stimulus. The ISCEV guideline for full-field ERG had always recommended using xenon arc lamps as a source of light stimulus. By using this type of technology, it is possible to precisely define the light spectrum of the flash. This factor becomes relevant, because the retinal sensitivity of the photoreceptors varies not only with brightness but also with the different wavelengths of emitted radiation. That is to say, rods and cones respond more sensitively to different wavelengths, regardless of luminance.

LED bulbs present many advantages when compared to their xenon arc counterparts, including more uniform flash strength, less energy consumption for light emission, lack of ultraviolet or infrared output, and increased long-term stability and durability. However, unlike xenon bulbs, LED bulbs produce light with a wide spectral distribution. This means that LED and xenon bulbs of equal strength that stimulate cones similarly may stimulate rods very differently. This difference is due to the fact that the emission spectrum of LED bulbs is broad, while that of the xenon bulbs is narrow; the latter does not interfere in scotopic visual acuity.

Therefore, it was also necessary to specify a stimulation energy range. The names of responses to stimuli were described according the state of light adaptation and the strength of the flash in a photopic state (in cd.s.m-2), understanding that the energy in a scotopic state will be 2.5 times higher.

Therefore, the main changes defined in this full-field ERG protocol update were definition of the flash stimulus strength throughout its entire range, and creation of a fourth protocol in the dark-adapted state with strong flash.

REFERÊNCIAS

1 ⬆ McCulloch DL, Marmor MF, Brigell MG, Hamilton R, Holder GE, Tzekov R, Bach M. ISCEV Standard for full-field clinical electroretinography (2015 update). Doc Ophthalmol. 2015 Feb;130(1):1-12. http://dx.doi.org/10.1007/s10633-014-9473-7.

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