

Electrooculography

Electrooculography (EOG/E.O.G.) is a technique for measuring the resting potential of the retina. The resulting signal is called the electrooculogram. The main applications are in ophthalmological diagnosis and in recording eye movements. Unlike the electroretinogram, the EOG does not represent the response to individual visual stimuli.

Eye movement measurements: Usually, pairs of electrodes are placed either above and below the eye or to the left and right of the eye. If the eye is moved from the center position towards one electrode, this electrode "sees" the positive side of the retina and the opposite electrode "sees" the negative side of the retina. Consequently, a potential difference occurs between the electrodes. Assuming that the resting potential is constant, the recorded potential is a measure for the eye position.

Principle : Principle of electrooculography. The eye acts as a dipole in which the anterior pole is positive and the posterior pole is negative. 1. Left gaze; the cornea approaches the electrode near the outer canthus resulting in a positive-going change in the potential difference recorded from it. 2. Right gaze; the cornea approaches the electrode near the inner canthus resulting in a positive-going change in the potential difference recorded from it (A, an AC/DC amplifier). Below each diagram is a typical tracing displayed by a pen recorder.

Ophthalmological diagnosis: The EOG is used to assess the function of the pigment epithelium. During dark adaptation, the resting potential decreases slightly and reaches a minimum ("dark trough") after several minutes. When the light is switched on, a substantial increase of the resting potential occurs ("light peak"), which drops off after a few minutes when the retina adapts to the light. The ratio of the voltages (i.e. *light peak* divided by *dark trough*) is known as the *Arden ratio*. In practice, the measurement is similar to the eye movement recordings (see above). The patient is asked to switch the eye position repeatedly between two points (usually to the left and right of the center). Since these positions are constant, a change in the recorded potential originates from a change in the resting potential.

Application in Entertainment

Electrooculography was used by Robert Zemeckis and Jerome Chen, the visual effects supervisor in the movie *Beowulf* during the enhanced performance capture to correctly capture and animate the eye movements of the actors. It was an improvement from *The Polar Express*.

Also use in the Neural Impulse Actuator, from OCZ Technology, a computer device helping gamers to increase their playing speed.

References

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See also

- International Society for Clinical Electrophysiology of Vision
- Orthoptist
- Nystagmus

References

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 - [3] http://dx.doi.org/10.1007/978-3-540-79576-6_2
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