The Difference between the Electoretinographic and the Sensory Threshold Values

G.H.M.

van Lith

Rotterdam

Author's address: Dr. G. H. M. van Lith, Oogziekenhuis, Rotterdam (The Netherlands)

(Will be published in extenso elsewhere.)

The difference between the light stimulus necessary to give a positive response of a given magnitude in the electoretinogram and a just perceptible light stimulus is not constant under all conditions. In the literature, values for this difference are given, varying from 2 logarithms (Echte and Papst, 1962) to 6 logarithms (Crampton, 1956). In many cases, values between these limits are given (Karpe and Tansley, 1948; Riggs, Berry and Wagner, 1949; Johnson and Riggs, 1951; Best, 1953). This large variation is partly due to the fact that the determination of the sensory threshold and the electoretinographic examination are not carried out under the same conditions. Another factor is the magnitude of the positive response in the electoretinogram which is taken as the criterion.

If the sensory and electoretinographic examinations are performed one after the other under the same conditions, and if an amplitude of 0.035 mV in the electoretinogram (b-wave, x-wave) is taken as the arbitrary threshold value, it is found that the difference between the thresholds is still not constant.

In dark adaptation, on total illumination of the retina, the electoretinographic 0.035 mV threshold is found to lie 3 logarithms above the sensory threshold. This difference is constant for the whole spectrum, but becomes smaller on light adaptation. With an adaptive illumination of 70 cd/m² the difference is 1.5 to 2 logarithms, in the mesopic area (0.01-1 cd/m²) it is only 1 logarithm. Varying the duration of the stimulus causes no appreciable change in the difference between the two thresholds. Reducing the area of stimulation (from 100° to 5°), on the other hand, produced, in dark adaptation, a greater rise in the electoretinographic 0.035 mV threshold than in the sensory threshold. Under

Van Lith

79

these conditions, the difference between the two thresholds increases to 3.5-5.5 logarithms.

Differences varying from 1 to 5.5 logarithms can thus be found, depending upon the size of the stimulation area and the adaptive state of the eye.

References

Best, W.: Das menschliche Elektoretinogramm während der Dunkeladaptation. Acta Ophthalm. 31: 95-116 (1953).

Crampton, G. H.: Effect of a glaring light source on the human electro-retinogram. J. comp. physiol. psychol. 49: 534-538 (1956).

Echte, K. und Papst, W.: Vorteile der Linsen-Haftschele für die Registrierung des Electoretinogramms. Iscerg I, 1961: 176 (1962).

Johnson, E. P. and Riggs, L. A.: Electroretinal and psychophysical dark adaptation curves. J. exp. Psychol. 41: 139-147 (1951).

Karpe, G. and Tansley, K.: The relationship between the change in the electro-retinogram and the subjective dark-adaptation curve. J. Physiol. 107: 272-279 (1948).

Riggs, L. A.; Berry, R. N. and Wayner, M.: A comparison of electrical and psychophysical determinations of the spectral sensitivity of the human eye. J. opt. soc. Amer. 39: 427-436 (1949).

Discussion

Schweitzer: In the experiment in which you plotted the amplitude of the ERG against the wavelength of the stimulus, you are in danger of comparing dissimilar things with each other, e.g. the amplitude of the b ~ waves against that of the b ~ waves.