

## **ERG signals driven by magno- and parvocellular pathways. Variable chromatic and luminance stimulus contents**

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**PURPOSE:** The scientific and clinical value of the ERG may profit greatly if their signals can be correlated with activity in the different retino-geniculate pathways. We have recently published data that suggested that the flicker ERG is determined by the magnocellular activity at high temporal frequency and by parvocellular activity at 12 Hz (Kremers and Link, *J. Vision*, 2008). Here, we provide independent data that support this proposal and exclude alternative explanations. **METHODS:** ERGs to stimuli, in which red and green LEDs were modulated in counter-phase, were measured. The modulation depth in the two LEDs was varied so that the luminance content was changed but the chromaticity was constant. The measurements were repeated at different temporal frequencies between 4 and 36 Hz. The experiment was performed in normal trichromats and in a deuteranope. In a control experiment, the same luminance and chromatic stimuli were presented in the absence of rod and S-cone stimulation (achieved by silent substitution with additional modulation in orange and blue LEDs). **RESULTS:** At 36 Hz, the response amplitudes and phases followed the luminance content in the stimulus. At 12 Hz, the response amplitudes and phases were constant and thus are determined by the chromaticity in the stimulus. The responses measured in the deuteranope were mainly determined by the luminance content at all temporal frequencies. The control experiment yielded similar results as the main experiment. **CONCLUSIONS:** The flicker responses at high temporal frequencies (above about 30 Hz) are driven by the magnocellular pathway. At 12 Hz, the responses are driven by the parvocellular pathway. These data exclude an explanation on the basis of a rod- and/or S-cone driven response intrusion. Because the flicker ERG is mainly driven by bipolar cell activity, the data suggest that diffuse and midget bipolar cells already display luminance and chromatic sensitivities respectively.

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