

ELECTRICAL STIMULATION OF THE RABBIT RETINA WITH VARIOUS PULSE SHAPES¹

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We propose that smooth biphasic pulse shapes with charge density balance extend the number of separately accessible retinal ganglion cells with epiretinal electrical stimulation.

A programmable stimulus pattern generator (PSPG) was developed for generation of current pulses with variable biphasic shapes, pulse train durations and repetition rates. Electrically evoked potentials (EEPs) were recorded from the occipital cortex of anesthetized rabbits during electrical stimulation of the retina with implanted epiretinal microcontacts (FhG, Duisburg and St. Ingbert).

Evaluation of EEP amplitudes showed that its threshold for trains of 5 to 10 pulses is lower than for single pulses in the case of sinusoidal shapes, as well as in the case of rectangular shapes. An analysis of EEP form and latency in response to rectangular versus sinusoidal waves showed that it is possible to determine optimal sets of stimulus parameters for the elicitation of EEPs.

Response variation by means of various pulse shapes indicated that the controllability of the stimulated region in retinal implants can be improved.

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