On the recovery of the electroretinogram after removal of intravitreal zinc particles

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Abstract. The influence of intravitreal zinc particles (1.3 mm²) in the eyes of rats caused the amplitudes of the electroretinogram to decrease to about 50% of the initial values within 24 hours, whereas the prolongation of the peak times began only on the third day after particle implantation. The removal of the zinc particles after 30 days led to only partial recovery of the amplitudes, whereas the peak times reached normal values. Dissociated behaviour of the amplitudes and peak times as described here was not found in earlier experiments with intravitreal iron, copper or lead particles of the same size.

The extraction of intravitreal zinc particles (1.3 mm²) one day after implantation resulted in a recovery of the amplitudes up to 85%.

Introduction

The importance of zinc in biological systems has been known for about a century. It is a constituent of more than 160 metalloenzymes. Zinc was first proven to be present in the eye in 1941 by Leiner and Leiner and since then it has been established that mammalian ocular tissues contain high concentrations of this element (Karcioglu and Sarper, 1980; Eckert, 1985). Zinc ions are able to influence the transformation of retinol into retinal by means of zinc-dependent metabolic processes (Smith, 1982). Various investigations evaluating zinc and copper metabolism in retinitis pigmentosa (Bastek et al., 1977; Marmor, 1985) and other types of retinal disorders (Figueroa et al., 1971; Silverstone et al., 1985) have been performed.

In the following we report on the effect of intravitreal zinc particles on the electroretinogram (ERG) of rats and the recovery of these electrical potentials after removal of the particles after one or 30 days of retention in the vitreous body. In addition to this, the ophthalmoscopic findings are also described.
Fig. 1. Effects of intravitreal zinc particles on ERG amplitudes and the recovery after particle extraction on the first or 30th day. Mean values of 15 eyes (bottom) in relation to the uninjured fellow eyes (top). ○ = implantation. — Stimulus intensity 1600 lux.