Removal of sodium from the solvent reduces retinal pigment epithelium toxicity caused by indocyanine green: implications for macular hole surgery

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摘要

Abstract

Backgrounds/aims: Staining of internal limiting membrane with indocyanine green (ICG) has been reported to be associated with postoperative atrophic retinal pigment epithelium (RPE) change. Here the authors examined whether removing sodium from the solvent reduces ICG induced RPE cytotoxicity.

Methods: Human RPE cells were exposed to ICG (0.25 and 0.025 mg/ml) reconstituted with balanced salt solution (BSS) or Na+ free BSS. Light microscopy, trypan blue dye exclusion, acridine orange/ethidium bromide staining, and DNA electrophoresis were used to evaluate the cytotoxic effects of ICG. ICG uptake was measured by optical absorption at 790 nm.

Results: Sodium removal reduced the ICG induced changes in cell morphology and improved the RPE cell viability. When RPE cells were incubated for 4 hours in 0.25 mg/ml ICG dissolved in BSS and sodium free BSS, 86.3% (SD 6.7%) and 2.4% (1.1%) of the cells were stained with trypan blue, respectively. After ICG treatment, RPE dies mainly through a necrotic mechanism. ICG uptake by RPE was also reduced with sodium removal.

Conclusions: ICG induced cytotoxicity in cultured human RPE was reduced with removal of sodium from the solvent. This reconstitution method may provide a safer intravitreal use of ICG in macular hole surgery