Reduction of indocyanine green-associated photosensitizing toxicity in retinal pigment epithelium

何昭德

Ho JD;Chen Hc;Chen SN;Tsai RJF

摘要

Abstract

Objective: To determine if eliminating sodium affects indocyanine green (ICG) photosensitizing toxicity and uptake in cultured human retinal pigment epithelial (RPE) cells. Methods: Cultured human RPE cells were exposed to ICG (2.5 mg/mL) in balanced salt solution and sodium-free balanced salt solution for 2 minutes. Afterwards, ICG was removed, and the cells were irradiated with a light beam (4 X 104 lux) for 40 minutes. Toxicity was monitored using light microscopy, calcein AM-ethidium homodimer 1 staining, trypan blue exclusion test, and 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium viability assay. Indocyanine green uptake was measured by optical absorption at 790 nm. Results: Photoreactive changes occurred in RPE cells exposed to ICG and light. These changes included cell shrinkage, cell death, pyknotic nuclei, reduced viability, and reduced mitochondrial dehydrogenase activity. These changes were less severe when ICG was dissolved in sodium-free balanced salt solution. In addition, ICG uptake was reduced when the solvent was sodium-free balanced salt solution. Conclusion: Indocyanine green and intense light exposure in RPE cells caused photosensitizing toxicity that was reduced when sodium in the solvent was eliminated and replaced with other cations. Clinical Relevance: Eliminating sodium from the solvent reduced ICG uptake into RPE and its associated photosensitizing toxicity. This reconstitution method of ICG may be helpful for safer intravitreal ICG use in macular hole surgery.