Protective Effects of Chitosan oligosaccharide on Blue LED Induced Retinal Pigment Epithelial Cell Damage

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Long-term exposure to blue light from smartphones and LEDs may lead to eye diseases like macular degeneration. However, the possible mechanism of how blue light- induced generation of reactive oxygen species (ROS) affects retina cells lead to cell apoptosis is currently unknown. Chitosan oligosaccharides (COS) have been reported to have antioxidant and anti-apoptosis effect by decreasing free radicals formation and inhibition of transcription factor nuclear factor-?B (NF-?B). The purpose of this study is to investigate whether COS could protect the retinal pigment epithelial (RPE) cells from LED light injury, also to analyze its underlying mechanism. The cell viability, ROS expression and cell apoptosis in ARPE-19 cell line after LED blue light irradiation were analyzed after adding various concentrations of COS. Furthermore, polymerase chain reaction (PCR), Western blot, Mitochondrial Membrane Potential Assay Kit (JC-1) and immunofluorescence staining were used to analyze the mechanism of action. COS inhibited ROS production thus prevented RPE cells from cellular apoptosis and death. Notably, COS could inhibit the expression of inflammatory mediators at RNA or protein levels, such as HO-1, iNOS, Caspase-3, Bcl-2, ERK, iNOS, and MCP-1. The nuclear translocation of NF-kB was inhibited by COS addition detected by Immunofluorescence stain. Taken together, the data demonstrated that COS could prevent RPE cell damage by decreasing cellular oxidative stress and inflammatory reaction to protect cells through inhibiting NF-kB activation. Clinically, COS could be a useful nutritional supplement for preventing blue light LED induced retinal damage.

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