

Anti-Inflammatory Effects of Alpha Linolenic Acid on Human Corneal Epithelial Cells

Abstract

Purpose. Systemic polyunsaturated fatty acids (PUFAs) were shown to improve the symptoms of dry eye syndrome due to their anti-inflammatory effects. This study evaluated the in vitro anti-inflammatory effects of PUFAs on human corneal epithelial (HCE) cells.

Methods. HCE cells were incubated for 2 hours with different concentrations of PUFAs: alpha-linolenic acid (ALA), gamma-linolenic acid (GLA), and linoleic acid (LA). Oleic acid (OA) and dexamethasone (DM) served as negative and positive controls, respectively. Cells were stimulated with either polyinosinic:polycytidylic acid (poly I:C) or lipopolysaccharide (LPS) complex. The protein contents and mRNA expression levels of IL-6, IL-8, IL-1 β , and TNF- α were evaluated with multiplex fluorescent bead immunoassay and real-time PCR, respectively. The expression of inhibitory factor- κ B α (I- κ B α) was evaluated with real-time PCR.

Results. The protein and mRNA levels of IL-6, IL-8, IL-1 β , and TNF- α were significantly increased after stimulation with LPS or poly I:C. Following treatment with ALA, a significant decrease was demonstrated in the protein content of TNF- α to 23.81% ($P < 0.001$), IL-6 to 46.71% ($P < 0.001$), IL-1 β to 20.86% ($P < 0.05$), and IL-8 to 52.21% ($P < 0.001$). Similar results were demonstrated at the mRNA level. The anti-inflammatory effects of ALA were similar to those of DM for all of the pro-inflammatory cytokines. The ALA inhibition of the pro-inflammatory cytokines was associated with a significant reduction of I- κ B α .

Conclusions. ALA may serve as a potent anti-inflammatory agent in ocular surface inflammation. The anti-inflammatory effects of ALA are comparable to those of corticosteroids, and are mediated through NF- κ B signal transduction.

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Footnotes

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