

Eosinophils promote corneal wound healing via the 12/15 - lipoxygenase pathway

Abstract

Lipid mediators play important roles in regulating inflammatory responses and tissue homeostasis. Since 12/15-lipoxygenase (12/15-LOX)-derived lipid mediators such as lipoxin A4 (LXA4) and protectin D1 (PD1) protect against corneal epithelial cell damage, the major cell types that express 12/15-LOX and contribute to the corneal wound healing process are of particular interest. Here, we found that eosinophils were the major cell type expressing 12/15-LOX during the corneal wound healing process. Eosinophils were recruited into the conjunctiva after corneal epithelium wounding, and eosinophil-deficient and/or eosinophil-specific 12/15-LOX knockout mice showed delayed corneal wound healing compared with wild-type mice. Liquid chromatography-tandem mass spectrometry (LC-MS/MS)-based mediator lipidomics revealed that a series of 12/15-LOX-derived mediators were significantly decreased in eosinophil-deficient mice and topical application of 17-hydroxydocosahexaenoic acid (17-HDoHE), a major 12/15-LOX-derived product, restored the phenotype. These results indicate that 12/15-LOX-expressing eosinophils, by locally producing pro-resolving mediators, significantly contribute to the corneal wound healing process in the eye.