

Presenting Author Name

Harleen Kaur

Presenting Author Category

Undergraduate Student

Research Category

Basic Science

Abstract Title

EpOMEs and DiHOMEs and Airway Epithelium: Impact on Barrier Function and Wound Healing

Background

Oxylipins are oxidized bioactive lipids derived from polyunsaturated fatty acids. While classical oxylipins are well studied, less is known about linoleic acid - derived epoxyoctadecamonoenoic acids (EpOMEs) and dihydroxyoctadecamonoenoic acids (DiHOMEs). Epithelial barrier function and repair are impaired in asthma. Studying the effect of EpOMEs and DiHOMEs on airway epithelium may provide insights into mechanisms of disease progression.

Objective

EpOMEs and DiHOMEs are present in the airway but their effects on epithelial function remain unclear. The objectives of our research were to determine whether these oxylipins disrupt airway epithelial barrier integrity or wound healing capacity.

Methods

Calu-3 human airway epithelial cells were cultured on transwell inserts and serum-deprived for 24 hours prior to treatment. Barrier integrity was monitored using transepithelial electrical resistance (TEER) at 0-, 24-, 48-, and 72-hours following exposure to 10 μ M of 9,10-EpOME/DiHOME, 12,13-EpOME/DiHOME, vehicle (DMSO), and control media. For wound healing, the monolayer was scratched, and cells were treated with lipids. Wound closure was measured using TEER and microscopy images at the same time points as above. Data were analyzed using a one-way ANOVA with Dunnett's post-test in GraphPad Prism, $p < 0.05$.

Results

Barrier integrity increased steadily in all groups, with lipid-treated cells showing a trend similar to vehicle. After wounding, TEER increased over time for all groups, however, there was ~50% reduction in repair in lipid-treated groups at 48-hours compared to vehicle, with both EpOMEs and 12,13-DiHOME showing statistically significant delays. TEER values were comparable across all groups at 72-hours. Microscopy confirmed delayed wound closure at 48 hours for lipid-treated cells versus vehicle with representative images confirming visibly larger gaps at 48 and 72 hours.

Conclusion

EpOMEs and DiHOMEs do not damage intact airway epithelium but delay barrier repair after injury. A delay in repair may increase susceptibility to pathogens and allergens, promoting airway inflammation in asthma.

Authors

Name	Role	Profession
Harleen Kaur	Presenting Author	Undergraduate Student
McKay J.C. Lowry	Co Author	Graduate
John Paul Aguilar	Co Author	Graduate
Dina H.D. Mostafa	Co Author	Lab Technician
Christopher D. Pascoe	Co Author	Associate Professor