

CHRD 2024: Abstract Submission Form

Presenter Name

McKay Lowry

Presenter Status

Masters Student

Role in the project

Perform Experiments

Analyze Data

Write Abstract

Research Category

Basic Science

Title

EpOMEs and DiHOMEs mobilize calcium in Airway Smooth Muscle.

Background

Oxylipins are lipid mediators found within child and adult lungs. Oxylipin profiles can differ between individuals with asthma and following exposure to environmental irritants. Oxylipins regulate key aspects of airway physiology. For instance, some prostaglandins and leukotrienes mediate Airway Smooth Muscle (ASM) contraction or relaxation. This is important in asthma pathophysiology such that contraction of the ASM leads to airway narrowing, a known culprit for difficulty in breathing. Most oxylipins in the context of ASM physiology are completely unexplored. For example, epoxy-12-octadecenoic acids (EpOMEs) and dihydroxy-12-octadecenoic acids (DiHOMEs) are elevated in asthmatic lungs following exposure to pollen, but how they regulate ASM contractility is entirely unknown. Recent data suggests that EpOMEs and DiHOMEs activate calcium permeant channels TRPA1 and TRPV1 in neuronal tissue. These channels that are abundant in ASM are capable of increasing intracellular calcium, a crucial step for ASM contraction.

Objective

Our objective is to determine whether EpOMEs and DiHOMEs cause intracellular calcium release in ASM.

Methods

hTERT immortalized human ASM were loaded with calcium indicator dye (Fura-2). Changes in intracellular calcium concentration was measured after addition of 9,10-EpOME, 12,13-EpOME, 9,10-DiHOME, and 12,13-DiHOME. Data was analyzed via One-Way ANOVA and GraphPad.

Results

Intracellular calcium concentration was increased in ASM (Figure 1.) by exposure to 9,10 EpOME ($319\eta\text{M}\pm 157$), 12,13 EpOME ($437\eta\text{M}\pm 116$), 9,10 DiHOME ($60\eta\text{M}\pm 49$), 12,13 DiHOME ($472\eta\text{M}\pm 293$). Peak calcium occurs within 40 seconds of oxylipin addition excluding 9,10 EpOME which elicited a later response.

Conclusion

EpOMEs and DiHOMEs all caused calcium release with varying efficacy. This suggests that EpOMEs and DiHOMEs are possible ASM contractile agents. It is uncertain how these oxylipins mobilize calcium, and therefore more research is required. Understanding the contractile effects of non-classical oxylipins will help to discover whether they favor airway narrowing. This will indicate whether these oxylipins are detrimental or benign in lung diseases like Asthma.

Do you have a table/figure to upload?

Yes

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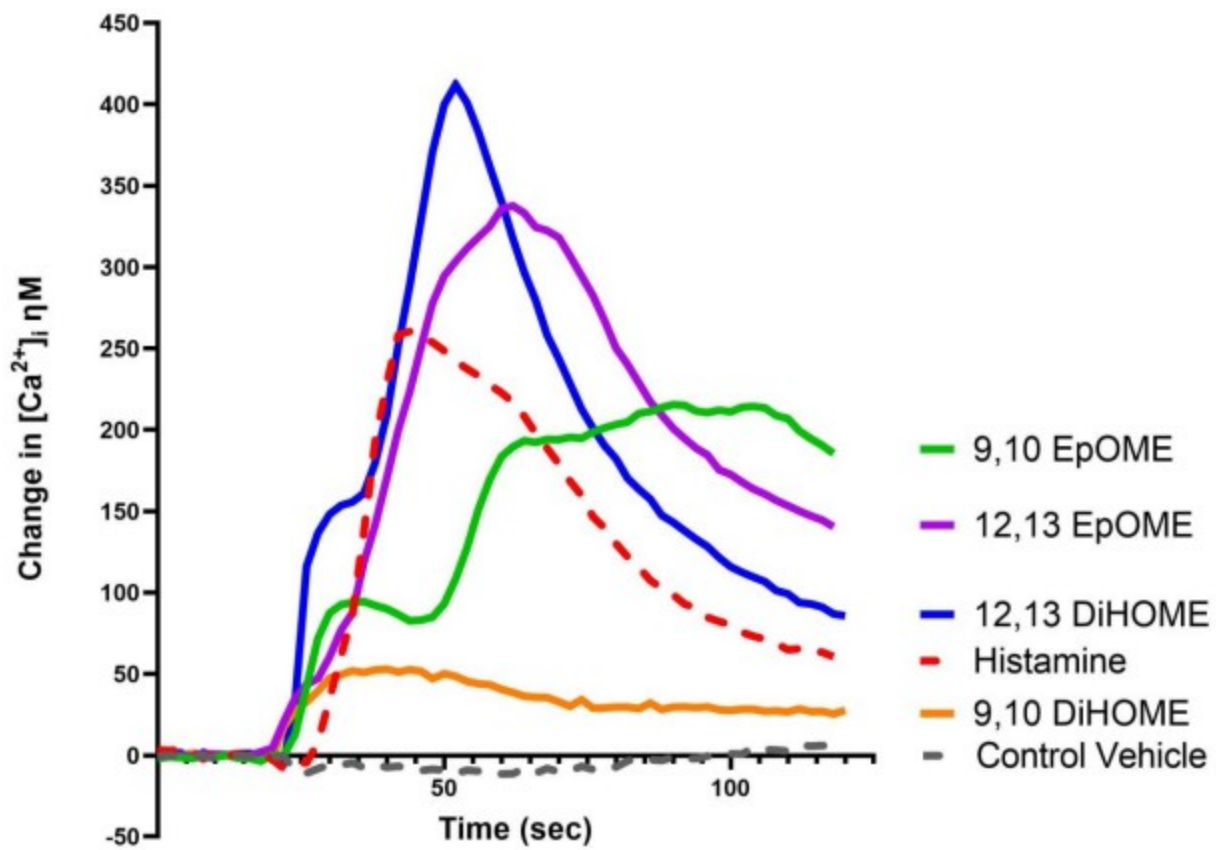


Figure 1. Calcium Graph showing the change in intracellular calcium after addition of Oxylipin.