

CHRD 2024: Abstract Submission Form

Presenter Name

Sujata Basu

Presenter Status

Non-Trainee

Role in the project

Design
Perform Experiments
Analyze Data
Write Abstract

Research Category

Basic Science

Title

Assessment of Albuterol Response Reveals Sex Dependent Bronchodilation in a Murine Model of Allergic Asthma

Background

Inhaled bronchodilators are the most common reliever therapy for asthma in children. Optimal clinical control is not always attained due to β_2 adrenergic receptor insensitivity. A limited number of bronchodilator response protocols are validated in animal models of lung disease.

Objective

We tested the hypothesis that nebulized albuterol in a murine model of allergic asthma exhibits dose and sex dependent responses.

Methods

Female and male BALB/c mice (8 weeks) were challenged with intranasal house dust mite (HDM) (25 μ g/35 μ L) 5 days/week for 2 weeks. Lung wash was collected to assess total and differential cell counts. Study One: To test effectiveness of albuterol, mice N=5, each sex underwent lung function testing (flexiVENT, Scireq) to assess response to nebulized methacholine (Mch) (25, 50 and 100mg/mL) alone or after albuterol (1mg/mL). Study Two: A cumulative albuterol dose-response study in male and female mice N=5 received increasing concentrations of albuterol (0.1, 0.3, 1 and 3 mg/mL) during repeated Mch challenge (25mg/mL). Data were analyzed using multiple t tests.

Results

Allergen challenge induced similar total and differential cell counts in lung lavage from male and female mice. Study One: Total lung resistance (Rrs) was significantly higher in females compared to males (9.95 \pm 0.7 vs 3.2 \pm 0.2 cmH₂O.s/mL, p<0.001). Inhibition of bronchoconstriction by 1mg/mL albuterol was greater in females (-64 \pm 1.2% vs -13 \pm 3.5%, p<0.001). Study Two: Repeated 25mg/mL Mch challenge increased Rrs in males significantly (5.5 \pm 0.6 vs 2.9 \pm 0.3 cmH₂O.s/mL, p<0.05). In female mice maximum reversal of Mch-induced Rrs was achieved with 0.3 mg/mL albuterol, whereas 3mg/mL albuterol was needed for maximum suppression of Rrs in male mice.

Conclusion

We developed a reliable protocol to assess airway responsiveness to clinically-relevant concentrations of nebulized albuterol in a murine model of allergic airways inflammation. Furthermore, we reveal sex-related differences in bronchodilator responses in the context of allergic asthma.

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No

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