High Correlation Between Responses to Juniperus ashei (Mountain Cedar) Pollen in a Pollen Challenge Chamber versus Seasonal Exposure

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ABSTRACT

BACKGROUND: The level of concordance between allergic symptoms induced upon exposure to pollen in a pollen challenge chamber (PCC) versus the natural season has not been well studied.

OBJECTIVE: We hypothesized that the symptom levels of allergic rhinoconjunctivitis elicited following off-season exposure to Juniperus ashei (mountain cedar) pollen in a PCC are highly correlated with those experienced during the natural season for mountain cedar.

METHODS: Twenty-two and 11 participants positive and negative, respectively, for skin test and allergy to mountain cedar were challenged in a PCC for 3 hours daily for 2 days. Seventeen of the twenty-two mountain cedar positive participants and seven of the mountain cedar negative participant recorded symptoms for the 30 day challenge with the natural mountain cedar season in San Antonio, Texas. Total symptom scores (TSS) for the chamber and natural season were calculated based on the sum of the total ocular symptom scores and the total nasal symptom scores.

RESULTS: The maximum TSS recorded in PCC and natural season were calculated for the twenty-four participants that took part in both PCC and natural season study. The maximum TSS for Natural vs. PCC-chamber was plotted, and the overall correlation r2 was 0.67. Using residuals for the Y = X line were considered as concordant, and the intercept was not significantly different from 0 (intercept = 1.47; P = 0.254).

CONCLUSIONS: Our findings affirm our hypothesis that individuals will react similarly to mountain cedar pollen in an PCC as they do in the natural season, and highlight the utility of the PCC as a model system to explore novel therapeutics and the pathogenesis of allergic rhinoconjunctivitis.

INTRODUCTION

The mountain cedar tree is native to the United States that pollinates in the winter. That heavy pollen season is the only plant in the United States that pollinates in the winter. That heavy pollen season is utilized as a natural model for the study of seasonal allergic rhinoconjunctivitis.

Because of distinct advantages of controlling confounding factors, pollen challenge chambers (PCC) are being utilized more frequently to investigate the pathogenic and novel therapeutics for seasonal allergic rhinoconjunctivitis.

This study compares allergic rhinoconjunctivitis elicited in PCC vs. the natural season in response to the same antigen.

RESULTS

Study Subjects:

- 22 mountain cedar positive subjects and eleven mountain cedar negative subjects (controls) were challenged during the off-season for mountain cedar in the Biogenics PCC for 3 hours a day for 2 consecutive days.
- Average mountain cedar pollen counts in the PCC were 12,000 grains/mm3 (3 to 4 times the average in the natural season).
- During exposure, total nasal (TNS) and total ocular (TOSS) symptom scores were recorded every 30 minutes and summed for total scores during symptoms in the chamber.

Inclusion Criteria for PCC:

- A positive skin test to mountain cedar
- No history of respiratory diseases (perennial allergic rhinitis, asthma, COPD)
- No disease, non-allergic rhinoconjunctivitis symptoms

CONCLUSIONS:

- The hypothesis was confirmed that individuals will react similarly to mountain cedar pollen in a pollen challenge chamber as they do in the natural season.
- These results are in agreement with our recent study wherein we found high concordance of symptomology to Ragweed in both environments as well (JACI, 2012).
- We are investigating the mechanisms underpinning allergic rhinoconjunctivitis using the PCC model system.