

514 Seasonal changes of mite allergen (Der 1) levels in houses with different architectural styles and ventilation systems



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RATIONALE: Research on the influence of different architectural styles and ventilation systems on mite allergen levels is crucial to decrease mite allergen exposures in houses. The purpose of this study was to examine the seasonal changes in mite allergen (Der 1) levels on the floors and mattresses of houses with different architectural styles and ventilation systems.

METHODS: Thirty-one families, without considering the families' histories of allergies, participated in this study. Written consent was obtained from all the families. All 31 families lived in Hamamatsu-city, Japan. Dust samples were monthly collected from the floors of the living rooms and mattresses in the bedrooms from March 2019 to February 2020. Mite allergen Der 1 (Der f 1 and Der p 1) levels were measured using sandwich ELISA. The air temperature and relative humidity in each house were measured using hygrothermography.

RESULTS: Ten families lived in detached houses with balanced ventilation (group A), 10 families lived in detached houses with exhaust-only ventilation (group B), and 11 families lived in concrete apartment buildings with exhaust-only ventilation (group C). All groups showed significant seasonal changes in mean monthly temperature and relative humidity. Group A showed significantly lower mean monthly relative humidity than other groups. Group A showed significantly lower levels of Der 1 in mattress dust than other groups.

CONCLUSIONS: Different architectural styles and ventilation systems may have some influence on mite allergen levels and could possibly be modified to decrease mite allergen exposure in houses.

515 Commissioning of a Larger Naturalistic Exposure Chamber for Cat Dander



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RATIONALE: We previously developed a 2-person capacity (14.4 m³) Naturalistic Exposure Chamber (NEC) providing naturalistic and controlled exposure to cat allergen. We scaled this model to a larger 8-person capacity room (36.7 m³). Fel-d-1 was measured throughout the room and over time for 2-hour aerosolization tests. Target Fel-d-1 was 40-100 ng/m³ to mimic home environments.

METHODS: Robot vacuum cleaners were modified to bypass the filter and have variable suction control. Two carpets in the NEC naturally accumulated dander shed by 2 resident cats. Carpet allergen levels were monitored and supplemented by shaking cat bedding ahead of testing and by evenly distributing 10 or 20g of milled cat hair (Stallergenes, Greer). Throughout the tests, a vacuum moved about each carpet aerosolizing the aspirated dander, which was circulated by fans. Air samples (5L/min for 30-min) were collected by sampling pumps (Gilian 5000) at 4 locations across the room and 4 time-intervals. Collected Fel-d-1 was quantified by ELISA to determine air concentration in ng/m³. Repeatability was demonstrated on separate days under optimized settings (N=5).

RESULTS: Mean Fel-d-1 (N=5) under optimized settings was 79 (±12 SD) ng/m³. Excellent temporal stability and spatial homogeneity were observed with 19% and 11% maximum deviations from the mean, respectively.

CONCLUSIONS: The NEC method of cat allergen exposure has demonstrated superior control and repeatability of allergen levels compared to standard bedding shaking methods, while maintaining the naturalistic advantages of a field exposure-type setting. The validation of

the larger NEC room presents a valuable new tool for the study of cat allergies.

516 Association Of Dog Exposure and Early-Life IgE Production In The Microbes, Asthma, Allergy and Pets (MAAP) Birth Cohort



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RATIONALE: Early-life dog exposure has been associated with decreased IgE levels.

METHODS: Pregnant women living with indoor dog(s) (n=81) and those with no pets (n=60) were recruited. Total IgE trajectories were constructed using serum samples collected at cord, 6 months and 18 months of age. Using mixed effects models, the trajectories were compared between infants from pet-free and dog-keeping households, and between dog-free, 1 dog only, and 2 or more dog households. Demographic variables were assessed as potential effect modifiers.

RESULTS: Prenatal indoor dog exposure and the number of dogs was not associated with early life IgE (p=0.12 and 0.71, respectively). Infant sex was a significant modifier for both the binary dog and number of dogs outcomes (p=0.013 and p=0.024, respectively).

For males, total IgE trajectory was 44.3% lower with prenatal indoor dog exposure (p=0.013), versus 39.3% higher for females (p=0.206).

Compared to males without prenatal indoor dog exposure, total IgE trajectory was 34.7% lower when exposed to one dog (p=0.084), and 60.6% lower when exposed to 2 or more dogs (p=0.003). This effect was not observed in females (p=0.205).

CONCLUSIONS: Infant sex was a significant modifier in the relationship between prenatal dog exposure and early life IgE. Specifically, males with prenatal indoor dog exposure have lower early life total IgE trajectories than males without indoor pet exposure.