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Mouse (Mus m1) and rat (Rat n1) allergen levels in dust from private and public houses in Strasbourg, France are lower than houses in the U.S.A.

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Key words

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Summary

The aim of our study was to measure the concentration of Mus m1 and Rat n1 in randomly selected dwellings in Strasbourg and the suburbs.

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Introduction

The mouse (Mus m1) and rat (Rat n1) major allergens are well-known allergens in the occupational allergy, being responsible for conjunctivitis, rhinitis and asthma (1). In the domestic environment, Mus m 1 and Rat n 1 were found in respectively 95% (2) and 33% of the houses of inner-city children with asthma in the Unites States. The exposure to Rat n 1 is correlated to an increase in asthma-related morbidity with an increase of hospitalisation and unscheduled visits (3). A recent study found a correlation between mouse allergen levels and the likelihood of having atopic wheeze and/or asthma symptoms among allergic individuals (4). However as far as we know there is only one European study that measured the mouse allergen in the homes of inner-city dwellings.
The aim of our study was to measure the concentration of Mus m1 and Rat n1 in randomly selected dwellings in Strasbourg and the suburbs.

Methods

We randomly selected 30 public dwellings and 30 private apartments or houses. Public houses in Strasbourg are allocated to low-income families (less then 6000 euro/year/person).
The owners agreed to have a home visit by a Medical In-

door Environment Counsellor (MIEC) (5). The MIEC used a standardized questionnaire that documented:

1. Housing-unit information: building's age, how long the household has lived in the home, number of stories, type of heating and air conditioning, type of flooring, presence of dehumidification system, cleaning schedules, presence of pets, presence of rodents within the last year.
2. Household information: household size, number of inhabitants, number of rooms in the home.
3. Occupation or hobbies related to mice or rats.

House-dust samples were collected from the floor of the living rooms of 30 private houses and 30 public dwellings, by the same MIEC, using a standardized method (5). The concentrations of Mus m1 and Rat n1 were measured using an ELISA method (Indoor Biotechnologies, Va, USA) with monoclonal antibodies to Rat n 1 and polyclonal antibodies to Mus m 1. The specificity of the antibodies used in the assay for Mus m 1 was good as demonstrated by non detectable concentrations of Mus m 1 found in six different allergenic extracts: rat, hamster, gerbil, cat, dog and horse. The positive threshold was 0.8 ng/g of dust for Mus m 1 and 7.8 ng/g of dust for Rat n 1.

Results

The amount of dust in the samples collected in the 60 dwellings was sufficient for analysis of Mus m 1 and Rat n 1. The character of houses studied and allergen levels are shown in Table 1.

In 18 private houses and 18 public houses the concentration of Mus m1 was superior to the detection limit (60 % for both groups). The median value of Mus m1 in the 60 houses was 10 ng/g of house-dust. There was no statistical difference between the mouse allergen levels in the private dwellings (Mean 9 ng/g, median 5.24 ng/g; n=30) and in the public dwellings (Mean 21 ng/g, median 3.2 ng/g; n=30).

None of the houses had Rat n1 in the house-dust and none of the inhabitants worked with mice or rats.

Discussion

Our results were in contrast to the results obtained in the United States, where the concentrations of Mus m1 were about 50 times higher. Indeed, in a recent multicenter study performed in 75 different locations throughout the US, 82% of the randomly selected dwellings had measurable mouse

Table 1 - Characteristics of the houses and allergen levels.

Characteristic	Private houses	Public housing dwellings
Building's age:		
<20 years	3	7
20-50 years	16	9
>50 years	4	2
not known	7	12
Type of dwelling		
House	5	2
Low-rise apartment (1-4 floors)	4	7
High-rise apartment (> 4 floors)	21	21
Number of inhabitants/room (mean)	0.7	1.07
Type of flooring		
Plastic	9	7
Wooden	15	4
Tiles	4	6
Carpet *	11	15
Wall-to-wall carpet	2	3
Cleaning method		
Sweeping	5	4
Vacuuming	8	11
Vacuuming + sweeping	17	15
Cleaning schedules		
<1 time/week	6	1
1 time/week	15	8
2 times/week	6	5
>2 times/week	3	16
Presence of pets		
Cat	2	2
Dog	2	2
Presence of rodents		
Mouse	4	3
Rat	0	0
Concentration of Mus m1 ng/g of the house dust (ELISA)		
Mean	9.09	20.84
Median	5.24	3.2
Range	0.4-48.68	0.4-175.5

** associated with plastic, wooden or tiled-floor*

allergen in the house dust. The cut-off value of mouse allergen - MUP (mouse urinary protein) – used to assess the effect of exposure on asthma was 1600 ng/g, more than 100 times that the concentration we found in Strasbourg. Moreover, 29% of the 608 homes had evidence of mice in one of the rooms on inspection (4). We found evidence of mice presence in only 7 homes among 60 (11.66%).

We chose to sample only the living-room floor dust. Recently, Salo et al (6) performed 5 samplings per house: living room floor and upholstery, bed room bed and floor, and kitchen floor. Mouse allergen levels were similar in all these localisations. Moreover, considering the lower number of mice in Strasbourg dwellings, the concentration of Mus m1 would have been equally lower even if multiple locations were selected for sampling.

In Poland (7), mouse allergen was measured in inner-city home environments of asthmatic children and was found in 46% of the homes studied. The levels of allergen detected ranged from 0.09 to 2.34 μg/g of dust, the levels far greater from those in our study. They concluded that mouse allergen is an important factor of sensitivity and should be recognized in the diagnosis of allergic diseases as well as in allergen-reduction.

Our results show that the exposure to mouse allergen was very low in Strasbourg, even in low income housing, as compared to the US and polish results. This suggests that mouse and rat allergens might not be important indoor allergens in Strasbourg.

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