Exposure to cat allergen, maternal history of asthma, and wheezing in first 5 years of life

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We looked for an association between early exposure to pets and asthma and wheezing in children whose mothers or fathers did or did not have a history of asthma. We followed up 448 children, who had at least one parent with a history of atopy, from birth to 5 years. Among children whose mothers had no history of asthma, exposure to a cat or a Fel d 1 concentration of at least 8 μg/g at the age of 2–3 months was associated with a reduced risk of wheezing between the ages of 1 and 5 years. However, among children whose mothers did have a history of asthma, such exposures were associated with an increased risk of wheezing at or after the age of 3 years. There was no association between wheezing and exposure to dog or dog allergen, and the father’s allergy status had no effect on the relation between childhood wheezing and cat exposure.

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Parental history can affect the relation between exposure to pets and wheezing.1 We examined the association between exposure to pets and wheezing in a birth cohort study of children whose mothers or fathers had a history of atopy.

The characteristics of the 498 study participants have already been described.1 104 (20.9%) had been exposed to a cat and 79 (15.9%) to a dog in their household at age 2–3 months. There was no significant difference in exposure to a cat or a dog between children with and without maternal history of asthma. Of the 498 children, 448 were followed up to age 5 years. There was no significant difference in exposure to pets between children with and without 5-year follow-up.

We found no significant association between exposure to a dog or dog allergen and wheezing. Maternal, but not paternal, history of asthma modified the relation between exposure to a cat and wheezing. In a multivariate model, there was an inverse association between exposure to a cat and wheezing in the first 5 years of life (relative risk 0.7 [95% CI 0.5–1.0], p=0.08) and a significant interaction between exposure to a cat and maternal history of asthma (p=0.004). The figure shows the relation between exposure to a cat and wheezing after stratification by maternal history. Among children without maternal history of asthma, exposure to a cat and to a Fel d 1 concentration of at least 8 μg/g in early life were associated with a decreased risk of wheezing (0.6 [0.4–0.9]) that did not change significantly between the ages of 1 and 5 years. Among children with maternal history of asthma, the risk of wheezing associated with exposure to a cat increased with age. By the age of 3 years, exposures to a cat and to a Fel d 1 concentration of at least 8 μg/g in early life were significantly associated with wheezing (2.4 [1.3–4.5]).

The table shows the relation between exposure to a cat and cat allergen and total serum IgE after stratification by maternal history. Among children without maternal history of asthma, children exposed to at least 8 μg/g of Fel d 1 in early life had a lower total serum IgE concentration at age 2 years than those exposed to less than 1 μg/g of Fel d 1.

The inverse association between exposure to high concentrations of cat allergen and total serum IgE and wheezing among children without maternal history of asthma might be due to the development of a modified T-helper-2 cell response or to specific effects of inhalation.
maternal history of asthma exposed to high concentrations of cat allergen suggests that these children become sensitised to cat allergen in early life and wheeze afterwards when re-exposed.

There are limitations to our study. First, we had no information on sensitisation to cats. Second, our findings are generalisable only to children with a parental history of atopy. Third, wheezing in early childhood might not represent asthma. However, a substantial proportion of children at risk of atopy and wheezing at age 5 years is likely to have asthma. Fourth, only 12.6% of the children exposed to a cat in early life were no longer exposed to a cat at age 3 years. Thus, our findings probably reflect the combined effects of exposure to a cat in early life and ongoing exposure to cat allergen in early childhood.

Our findings suggest that maternal history affects the relation between exposure to cat allergen and wheezing among children with a parental history of atopy. Whereas exposure to a cat in early life was protective against wheezing in the first 5 years of life in children without a maternal history of asthma, such exposure was a risk factor for wheezing at or after the age of 3 years in children whose mothers did have a history of asthma.

Relation between exposure to a cat and cat allergen at age 2–3 months and total serum IgE concentration at 2 years, stratified by maternal history of asthma

<table>
<thead>
<tr>
<th>Maternal history of asthma</th>
<th>No maternal history of asthma*</th>
<th>Geometric mean serum IgE (IU/mL)</th>
<th>Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat exposure?</td>
<td></td>
<td>Geometric mean serum IgE (IU/mL)</td>
<td>Difference (95% CI)</td>
</tr>
<tr>
<td>No</td>
<td>26-3</td>
<td>10-2</td>
<td>-6.0 (–15.5 to 1.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>17-3</td>
<td>17-4</td>
<td>7-2 (–1.3 to 23.7)</td>
</tr>
<tr>
<td>Fel d1 concentration (µg/g)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>32-6</td>
<td>10-4</td>
<td>–</td>
</tr>
<tr>
<td>1-8</td>
<td>22-6</td>
<td>9-4</td>
<td>–</td>
</tr>
<tr>
<td>≥8</td>
<td>18-4</td>
<td>16-1</td>
<td>5-7</td>
</tr>
</tbody>
</table>

*Adjusted for sex and day-care attendance in the first year of life. †Adjusted for sex and household income. (Fel d1 concentration >1 µg/g).

Conflict of interest statement
S T Weiss has been involved as a consultant or has received grants from GlaxoWellcome, Roche Pharmaceuticals, Millennium Pharmaceuticals, Genetech, Pfizer, and Schering-Plough.

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3 Therneau TM, Grambsch P. In: Modeling survival data: extending the Cox model. New York: Springer-Verlag, 2000: 185–86.

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