

## Pet sensitivities in asthmatic children

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**Sarsfield, J. K., Boyle, A. G., Rowell, E. M., and Moriarty, S. C. (1976).** *Archives of Disease in Childhood*, 51, 186. **Pet sensitivities in asthmatic children.** A history of pet contact and/or apparent clinical sensitivity was obtained in 65 (55%) of 118 unselected asthmatic children. These 65 children were skin tested and their sera examined for specific IgE using the radioallergosorbent test. Those children who had apparent clinical sensitivities had larger skin test reactions and were more likely to have positive specific IgE results than those without apparent sensitivities. Positive skin tests were very common (80%), but the larger the skin test reaction (weal diameter  $\geq 4$  mm diameter) the more likely was there to be a positive history or a positive specific IgE result. Hence a large skin test reaction can provide a helpful pointer to animal allergy of clinical importance. Commercially available animal extracts have limitations for diagnostic tests.

A questionnaire survey of 150 day schools emphasized the potential opportunities for contact with animal allergens at school.

Sensitivity of asthmatic subjects to animal danders has been widely recognized for many years. The close association of many children with pets whose dander is highly allergenic makes it likely that such contacts will be important in the aetiology of perennial asthma of childhood. Several detailed reports have described studies of allergies to individual animal species (Squire, 1950; Snyder and Kahan, 1971; Holford-Strevens, 1973; Ohman, Lowell, and Bloch, 1973), and their overall importance has been suggested from the results of bronchial provocation tests in large series of asthmatic children (Bronsky and Ellis, 1969; Aas, 1970).

This study was designed to assess the clinical significance of pets, using the history, skin tests, and the measurement of specific IgE in serum in an unselected group of children attending a children's asthma clinic in a large urban community. Exposure to potential animal allergens was explored both at home and at school. It is known that specific IgE levels closely correlate with the results of bronchial provocation tests (Wide *et al.*, 1971; Berg, Bennich, and Johansson, 1971).

### Patients and methods

An unselected group of 118 children attending a children's asthma clinic at Seacroft Hospital, Leeds,

formed the main study group. The children's contact with pets and their possible contribution to their symptoms was ascertained. The opportunities for exposure to animals at school were assessed by a survey of 150 randomly selected day schools in Leeds. Skin tests using the prick method (Squire, 1950) were performed, with appropriate commercial extracts (Bencard, Ltd.) on all children exposed to pets or with alleged sensitivities. Weal responses were measured and recorded; a weal diameter of 2 mm or greater was regarded as a positive result.

Blood samples from children exposed to pets or with alleged sensitivity were obtained by venepuncture and allowed to clot at room temperature and the sera sorted at  $-20^{\circ}\text{C}$ . Specific IgE in these sera was detected by a modified radioallergosorbent test (Sarsfield and Gowland, 1973) but using paper discs (Ceska, Eriksson, and Varga, 1972) as the solid-phase. The discs were coupled to freeze-dried extracts of animal dander (Bencard Ltd.). A significant amount of circulating specific IgE was deemed to be present, indicating a positive result, if the final radioactivity count was at least twice that obtained from a non-allergic control (pooled umbilical cord serum) incorporated into each test run. A final radioactivity count below this arbitrary value was taken to indicate a negative result.

### Results

**Asthma clinic survey.** From the clinical histories, the 118 asthmatic children were divided into two main groups.

*Group 1.* 53 children (45%) had neither close contact with animals nor any apparent clinical sensitivities to animals. They were not further investigated.

*Group 2.* 65 children (55%) had close contact with animals and/or apparent clinical sensitivity, and are divided into 2 subgroups. (a) 52 children were in contact with a total of 72 various animals but clinical sensitivity to these was not apparent (37 were in contact with 1 pet, 10 with 2, and 5 with 3). (b) 28 children gave a history of apparent clinical sensitivity to a total of 34 various pets (23 to 1 pet, 4 to 2, and 1 to 3). Pet-child contact continued in 8 instances and in the remaining 26 instances the offending pets were avoided.

Table I shows the type of pet, the skin test reactions, and the presence of specific IgE in the sera for the 52 children in group 2a who had contact with animals but no apparent clinical sensitivity. Positive skin tests were obtained in 70% of this subgroup, but a positive specific IgE value to the particular animal allergen was found in only 8%. Positive specific IgE values were not found in children with negative skin tests. The mean weal diameter of skin tests of the subgroup was 2.4 mm, but was 4.7 mm in the 6 children with positive specific IgE results. It is evident that contact with pets was often associated with positive skin tests, but a history of no apparent clinical sensitivity was usually supported by the finding of a negative specific IgE result.

The results for the 28 children with apparent pet sensitivities, group 2b, are shown in Table II. Skin tests were all positive, but only 52% of the specific IgE results were positive. Approximately three-quarters of this subgroup avoided pets to

which they were thought to be sensitive and, compared to the one-quarter who maintained contact, they had larger skin test reactions (4.5 and 3.5 mm, respectively) and a higher incidence of positive specific IgE results (56% and 38%, respectively). Tables I and II also show that dogs and cats were most commonly encountered and that these were most often responsible for suspected sensitivities.

The overall incidence of positive skin tests was 80%. However, this high incidence was comprised of 73% with negative-specific IgE results and their mean weal diameter was 3.3 mm compared with 4.6 mm in the remaining 27% with positive-specific IgE results.

**School survey.** Information from 150 schools showed that 129 (86%) kept animals in a total of 286 indoor rooms or communal areas. In 28 schools special animal accommodation was provided. The commonest types of pets were of the rodent family, especially gerbils (extracts of this potential allergen are not commercially available), comprising 61% of the total; rabbits formed 8%; and the rest were a variety of nonmammalian species including locusts and goldfish. Dogs and cats were not kept in any of the schools.

**Discussion**

The opportunities for exposure of children to potentially sensitizing animals are great. Close and prolonged contact is more likely to occur in the home than at school, but exposure at school must not be overlooked, as shown by the school survey. Regular contact of an asthmatic child with a pet animal must always raise the suspicion of sensitization and its contribution to the child's symptoms.

TABLE I

*Results of skin tests and presence of specific IgE in sera of children in contact with pets but with no admitted clinical sensitivities*

Animal	Skin test			Specific Ig.E	
	Positive	Negative	Mean weal diameter (mm)*	Positive	Negative
Dog	23/36	11/36	2.3	3/36	33/36
Cat	15/17	2/17	3.1	3/17	14/17
Rabbit	5/5	0/5	3.8	0/5	5/5
Guinea pig	1/4	3/4	0.7	0/4	4/4
Budgerigar	3/8	5/8	1.1	0/8	8/8
Hamster	2/2	0/2	3.0	0/2	2/2
Totals	51/72 (70%)	21/72 (30%)	2.4	6/72 (8%)	66/72 (92%)

\* Mean weal diameters were derived from all reactions including those of <2 mm diameter.

TABLE II

*Results of skin tests and presence of specific IgE in sera of children with alleged animal sensitivities*

Animal	Skin test			Specific IgE	
	Positive	Negative	Mean weal diameter (mm)	Positive	Negative
Dog	13/13	0/13	4.3	7/13	6/13
Cat	12/12	0/12	4.0	5/12	7/12
Rabbit	4/4	0/4	3.8	3/4	1/4
Guinea pig	2/2	0/2	3.5	1/2	1/2
Budgerigar	1/1	0/1	5.0	ND	ND
Hamster	1/1	0/1	5.0	0/1	1/1
Horse	1/1	0/1	8.0	1/1	0/1
Totals	34/34 (100%)	0/34 (0%)	4.2	17/33 (53%)	16/33 (48%)
Subtotals					
With animal contact	8/8 (100%)	0/8 (0%)	3.5	3/8 (38%)	5/8 (62%)
With no animal contact	26/26 (100%)	0/26 (0%)	4.5	14/25 (56%)	11/25 (44%)

The results indicate that the clinical history is a more reliable guide to pet sensitivity, as judged by positive-specific IgE results, than is the skin test reaction. Though there is no definitive method currently being used to identify offending allergens in bronchial asthma, as stated previously specific IgE results closely correlate with the results of bronchial provocation tests. Only 8% of children with negative histories of apparent animal sensitivity had positive-specific IgE results. Hence unsuspected pet allergy appears to be less common than unsuspected house-dust allergy (Sarsfield, 1974). In the 8% of children with suggested occult pet allergy the mean weal diameter of the skin tests was 4.7 mm compared with 2.4 mm of the whole subgroup who denied sensitivities. A large skin test reaction then should alert the physician to the possible contribution of a pet contact to the child's symptoms. The majority of children (76%) in group 2b, in which specific pets were thought to cause symptoms, avoided contact with these pets and had larger skin reactions and a higher incidence of positive-specific IgE results than did those (24%) who maintained contact. These findings may reflect the higher state of clinical sensitivity of this majority and perhaps dictate avoidance. There have been no reports of the effect of attempted avoidance (probably never complete) of offending animal allergens on the serum level of specific IgE. Complete cessation of allergen exposure such as occurs to grass pollen in winter is associated with significant falls in specific IgE levels (Berg and Johansson,

1971). However, avoidance measures taken against the house-dust mite, though symptoms improved, did not reduce specific IgE levels (Sarsfield *et al.*, 1974).

The overall incidence of positive IgE results (52%) in this subgroup with positive histories and positive skin tests was lower than expected. 50 of the children with negative-specific IgE results were in contact with an animal and 11 avoided contact. As stated previously, the effect of such avoidance on specific IgE is unknown, but it is possible that those children with original low levels of positivity may revert to a negative level after avoidance. Some of the histories given by the parents may be incorrect, or more likely the test for specific IgE may be too insensitive to detect lower degrees of clinical hypersensitivity. A further complicating factor is that there is not one single species allergen for dog or for cat (Holford-Strevens, 1973). Pedigree differences are associated with different allergenic components and these different allergens will evoke their own specific IgE responses. Additionally, each sensitive child will have his own individual IgE response to each of the different intraspecies allergens to which he has been exposed (Fagerberg and Wide, 1970). The commercially available animal extracts are usually prepared from mongrel animals and will probably not contain all the possible different allergenic components in a given species, therefore any test using these extracts will never be completely reliable.

### Conclusions

The importance of pet allergy in the aetiology of perennial asthma in childhood is less than that of the commonest known allergen—the house-dust mite. However, the history of symptoms on exposure is more reliable and is a better clinical guide. Positive skin tests to animals with which the child is in contact are very common. They are more likely to be associated with a positive-specific IgE result (and hence an assumed clinical sensitivity) if there is a positive history or if the weal diameter is large (> 4 mm). Unsuspected animal allergy may be suggested by a large skin reaction, and ought to be further investigated by clinical provocation tests or by a search for specific IgE. No tests using commercially available crude animal extracts are likely to be completely reliable and caution is advised in their interpretation.

The advice to remove a family pet is a major decision and may indeed aggravate symptoms by the unhappiness it causes. It should never be based solely on a skin test result. On the other hand, possible latent allergy as shown by positive skin tests may progress to overt clinical sensitivity, and advice against acquisition or replacement of potentially allergenic pets in the homes of asthmatic children is sound clinical practice.

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