

# Sources of allergens in animals

T. VANTO

Department of Paediatrics, University of Turku, Turku Finland

The common household pets, cats and dogs, are the most usual animals causing hypersensitivity symptoms in our patients (Kjellman & Pettersson 1983, Marks 1984, Rudolph 1983, Vanto 1982). Therefore the present paper is largely confined to the data of the allergenicity of different materials from these animals, and only some remarks are presented about other pets and domestic animals.

In furred animals, hair and dander is commonly regarded as the natural source of allergenic material (Lind 1979, Löwenstein 1983, Mathews 1980), and extracts thereof are mainly used for commercial allergen preparations.

In cat hair and dander, 12 different allergens have been identified by immunochemical analyses (Löwenstein 1983). Only one of these, cat antigen 1 (CAI; Ohman et al. 1974) is considered as a major allergen. CAI has been shown to be present also in saliva. According to Ohman et al (1982) saliva is the actual source of CAI with the pelt acting as a passive reservoir. CAI is not detectable in a cat pelt extract, if the pelts have been scrubbed using a brush and water (Anderson & Baer 1981). On the other hand, CAI has been demonstrated in cells from sebaceous glands and hair roots in addition to mucous salivary glands (glandula sublingualis; Bartholomé et al. 1984). CAI has not been detected in serum or urine (Anderson & Baer 1981, Ohman et al. 1982), although both urine and serum have been shown to be highly allergenic (Anderson & Baer 1981, Brandt et

al. 1973, Bukantz et al. 1979, Hoffman 1980, McElhinney et al. 1982, Stokes & Turner 1975, Viander et al. 1983). Cat serum albumin and another serum-derived protein have been demonstrated to be minor cat allergens; these proteins are also present in pelt and saliva; albumin is also present in urine (Löwenstein 1983). Allergenicity of cat urine is, however, due to other protein(s) than albumin (McElhinney et al. 1982). Although albumin is considered as a minor cat allergen, its clinical relevance may be questionable, since it has not been detected on air-borne particles in a room containing cats (Ohman et al. 1981). In dog hair and dander, 11 to 24 allergens have been identified by immunochemical techniques (Löwenstein 1981, Uhlin et al. 1984). Some controversy exists, if any or up to six of these allergens could be regarded as major allergens (Löwenstein 1981, Vanto et al. 1982, Uhlin et al. 1984). As cat saliva, also dog saliva has been shown to be a potent source of allergens (Spain et al. 1942, Viander et al. 1983). Dog urine has a considerably weaker allergenic activity per total protein amount than saliva or dander (Viander et al. 1983), but urinary allergens are claimed to be more dog-specific than dog dander (Hoffman 1980, Viander et al. 1983), probably because urine may contain less serum-derived proteins, which have been shown to cross-react with cat allergens (Brandt & Yman, 1980, Löwenstein 1981).

In case of horse dander and hair, the most important allergens, including the major al-

lergen, originate from epithelia. Serum albumin is present in horse dander, but it seems to be of minor importance as an allergen (Markussen et al. 1976). Three of the seven most important allergens (including the major one) have also been detected in urine (Löwenstein 1983). In cow dander, 11 IgE-binding antigens have been detected (Löwenstein 1981). Four of these allergens have been shown to be the most important: three epithelial allergens (which are also present in saliva, urine, amniotic fluid and beef) and an immunoglobulin (Prah 1981).

In rodents, which are common laboratory animals and sometimes also used as a pet, like guinea pig, an important source of allergens seems to be urine (Newman Taylor et al. 1977, Longbottom 1983). In rats, mice and guinea pigs, the most important urinary allergens are not detectable in serum. In dust extracts from rat or guinea pig breeding rooms also non-urinary allergens are probably present (Longbottom 1983). In household birds, the chiefly responsible allergens are airborne feathers and epithelium of the skin, saliva and secretions from the uropygial glands (Marks 1984). Also avian serum proteins, droppings (Krause-Hooyman & Fredricks 1983) and external parasites, such as poultry mites (Lutsky et al. 1984) can act as allergens.

At present, systematic investigations are needed to elucidate the clinical importance of various antigenic proteins from numerous different possible sources of allergens in animals.

## REFERENCES

1. Anderson, M. C. & Baer, H.: Allergically active components of cat allergen extracts. *J Immunol* 127, 972–975, 1981.
2. Bartholomé, K., Kissler, W., Baer, H. & Wahn, U.: The origin of cat allergen I. *J Allergy Clin Immunol* 73 (suppl), 160, 1984.
3. Brandt, R., Ponterius, G. & Yman, L.: The allergens of cat epithelia and cat serum. *Int Arch Allergy Appl Immunol* 45, 447–455, 1973.
4. Brandt, R. & Yman, L.: Dog dander allergens. Specificity studies based on the radioallergosorbent technique. *Int Arch Allergy Appl Immunol* 61, 361–370, 1980.
5. Bukantz, S. C., Lockey, R. F. & Baird, I. A.: Studies with cat saliva allergen. *J Allergy Clin Immunol* 63, 206–207, 1979.
6. Hoffman, D. R.: Dog and cat allergens: urinary proteins or dander proteins? *Annals of Allergy* 45(4), 205–206, 1980.
7. Kjellman, B. & Pettersson, R.: The problem of furred pets in childhood atopic disease. *Allergy* 38, 65–73, 1983.
8. Krause-Hooyman, L. & Fredricks, W. W.: The antigens of pigeon breeder's disease. *Int Arch Allergy Appl Immunol* 71, 245–251, 1983.
9. Lind, P.: Commercial extracts of horse, cat and dog dander – characterization of specific allergen content and standardization of extract potency. Abstracts of the Annual Meeting of the European Academy of Allergy and Clinical Immunology, p. 108, Helsinki, May 24–26, 1979.
10. Longbottom, J. L.: Characterization of allergies from the urines of experimental animals. Proceedings of the IX International Congress of Allergy and Clinical Immunology. Kerr, J. W. & Ganderton, M. A. (eds.): pp. 525–529, The Macmillan Press Ltd, London 1983.
11. Löwenstein, H.: Allergene von Katze, Hund, Rind und Pferd. *Allergologie* 4, 265–269, 1981.
12. Löwenstein, H.: Domestic animal allergens. Proceedings of the XI International Congress of Allergy and Clinical Immunology. Kerr, J. W. & Ganderton, M. A. (eds.): pp. 545–548, The Macmillan Press Ltd, London 1983.
13. Lutsky, I., Teichtahl, H. & Bar-Sela, S.: Occupational asthma due to poultry mites. *J Allergy Clin Immunol* 73, 56–60, 1984.
14. Marks, M. B.: Respiratory tract allergy to household pet birds. *Annals of Allergy* 52, 56–57, 1984.
15. Markussen, B., Löwenstein, H. & Weeke, B.: Allergen extract of horse hair and dandruff. Quantitative immunoelectrophoretic characterization of the antigens. *Int Arch Allergy Appl Immunol* 51, 25–37, 1976.
16. Mathews, K. P.: Other common inhalant allergens. Allergic Diseases of infancy, childhood and adolescence. Bierman, C. W. & Pearlman, D. S. (eds.): pp. 252–253, W. B. Saunders Company, Philadelphia 1980.
17. McElhinney, M. E., Findlay, S. R., Leitermann, K. M. & Ohman, J. L.: Cat urinary allergens. *J Allergy Clin Immunol* 69, 144, 1982.
18. Newman Taylor, A. J., Longbottom, J. L. & Pepys, J.: Respiratory allergy to urine protein of rats and mice. *Lancet* 2, 847–849, 1977.
19. Ohman, J. L. Jr., Leitermann, K. & Brown, P.: Studies of the origin and environmental occurrence of cat allergen. *J Allergy Clin Immunol* 69 (suppl), 127, 1982.
20. Ohman, J. L. Jr., Lowell, F. C. & Bloch, K. J.: Allergens of mammalian origin. III. Properties of

- a major feline allergen. *J Immunol* 113, 1668–1677, 1974.
21. Prahl, P.: Allergens in cow hair and dander. Origin of cow allergens in the environment. *Allergy* 36, 561–571, 1981.
  22. Rudolph, R.: Frequency of animal sensitization. Proceedings of the XI International Congress of Allergology and Clinical Immunology. Kerr, J. W. & Ganderton, M. A. (eds.): pp. 437–444, The Macmillan Press Ltd, London 1983.
  23. Spain, W. C., Gillson, R. E. & Strauss, M. B.: Comparative immunologic studies with salivary and epithelial extracts of the dog, cat and rabbit. *J Allergy* 13, 563–573, 1942.
  24. Stokes, C. R. & Turner, M. W.: Isolation and characterization of cat allergens. *Clinical Allergy* 5, 241–254, 1975.
  25. Uhlin, T., Reuterby, J. & Einarsson, R.: Antigenic/allergenic composition of Poodle/Alsatian dandruff extract. *Allergy* 39, 125–133, 1984.
  26. Vanto, T.: Immediate hypersensitivity to dog in asthmatic children. A clinical and immunological study with special reference to diagnostic methods and different allergen preparations. Academic dissertation, Turku 1982.
  27. Vanto, T., Viander, M. & Schwartz, B.: Dog serum albumin as an allergen. IgE, IgG and lymphocyte responses in dog dandersensitive asthmatic children. *Int Arch Allergy Appl Immunol* 69, 311–315, 1982.
  28. Viander, M., Valovirta, E., Vanto, T. & Koivikko, A.: Crossreactivity of cat and dog allergen extracts. RAST inhibition studies with special reference to the allergenic activity in saliva and urine. *Int Arch Allergy Appl Immunol* 71, 252–260, 1983.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.