

CORRESPONDENCE

Clinical and Experimental Allergy

Dog ownership might exert a protective effect on wheezing and atopy independently by endotoxin exposure

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We have read with interest the article by Bufford et al. [1] on the protective effects of dog ownership in children with increased risk of wheezing and atopy. They suggested that the exposure to dogs during infancy could influence the immune system development and reduce wheezing and atopic diseases, even though this effect could not be explained by their starting hypothesis of an increased exposure to endotoxins.

We think that besides endotoxin exposure, dog ownership can exert a positive effect on atopic disease and wheezing through other mechanisms such as psychological factors and physical activity.

It has been observed that parental stress is an important predictor of wheezing in infancy and it may contribute significantly to the population burden of preventable childhood respiratory illness [2]. Furthermore, it has been shown that caregiver stress is associated with increased production of TNF- α and with a reduced production of IFN- γ in young children [3]. In this regard, dog ownership has been shown to reduce anxiety in adults [4] and this should reduce the effect of stress on the immune system of their children. Moreover, it has been reported that dog ownership might offer some protection from overweight among adults and children [5] in relation to dog-walking and increased physical activity. As parental obesity is a predictor of weight status in their children [6], non-obese parents should be more likely associated to non-obese children and this might be a preventive factor on wheezing because excessive postnatal weight gain is associated with early transient asthma symptoms via an influence on lung growth during infancy [7]. In conclusion, dog ownership may exert its protective effect independently by endotoxin exposure.

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Response by J. E. Gern, on behalf of the authors

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We appreciate the comments by Dr Rigotti and co-workers, who have suggested a number of interesting hypotheses to explain the relationship between dogs, immune development and atopic outcomes in early childhood. In our study, exposure to a dog beginning at the time of birth was associated with differences in immune development

(cytokine responses in peripheral blood cells), and atopic outcomes beginning at the age of 1 year and continuing through age 3 years. Although endotoxin levels in bedroom dust at age 3 years were also associated with altered cytokine responses, these associations were distinct from those with Can f 1, and did not account for the dog-related reduction in atopic dermatitis and wheezing. Dr Rigotti et al suggest that families with dogs might get more exercise and therefore the children could be less likely to be overweight. In our population, dog ownership was not related to overweight status through age 3 years. Perhaps this association is more likely to occur in older children, who might be more likely to participate in walking the dog. The theory that dog ownership could moderate stress and lead to beneficial changes in immune development is interesting, but may prove difficult to test. Might families with high stress be less inclined to get pets?

Although endotoxin levels do not by themselves explain the relationship between dog ownership and atopic

outcomes, it seems likely that the effect is mediated through stimulation of innate immune responses. For example, we previously reported a gene-environment interaction relating dog ownership with a polymorphism in CD14, which participates in several toll-like receptor (TLR) pathways [1]. Clearly, there is much to be learned about dog exposure in early life and the microbial environment of the child. New tools to characterize microbial exposure are being developed, and are likely to provide new information about changes in gut, skin and respiratory flora that are associated with dog ownership. Given that dog exposure is associated with up to a 50% reduction in the risk of subsequent atopy, defining the operative mechanisms is certainly a worthy goal.

Reference

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