

IgE response to *Ascaris lumbricoides* in Russian children indicates IgE responses to common environmental allergens

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The ultimate causes for geographic variation in atopy prevalence remain unknown.

There is evidence of cross reactivity between *Ascaris lumbricoides* and inhalant and food allergens (1). Intestinal parasites have been proposed

to reduce the risk of atopy especially in low socioeconomic status environments (2). The prevalence of atopy is significantly lower in Russian compared to Finnish Karelia, but the reasons for this contrast are largely unidentified (3). Our aim was to explore whether *A. lumbricoides*, which still is quite prevalent in Russian Karelia but virtually non-existent in Finland, has an effect on the expression of atopy.

The population survey in Russian and Finnish Karelia was carried out in 2003. The study areas and methods have

been described in detail elsewhere (3, 4). The study was based on a random sample of 6–16 year old school children and their mothers. In Russia, 550 child–mother pairs were enrolled in the survey. Data was obtained using questionnaires, skin prick tests (SPT) and IgE measurements. For the purpose of this study, we analyzed 419 children and their 315 mothers who had SPT and measurements of allergen-specific as well as *Ascaris*-specific IgE. For SPT, a wheal diameter of 3 mm or larger, and for IgE measurements, concentrations of 0.35 IU/ml or greater were defined as positive. Out of the 419 children and 315 mothers, 88 (21%) and 56 (17.9%) showed *Ascaris*-specific IgE, respectively.

The prevalence of at least one positive IgE response to common allergens was higher in *Ascaris*-IgE positive vs. *Ascaris*-IgE negative children (Table 1). The unadjusted odds ratio for *Ascaris*-IgE positive children to have a positive IgE for one more common allergen was 4.023 (95% CI; 2.423–6.679). The difference in SPT results was not significantly different in *Ascaris*-IgE positive and negative children. For mothers the differences in

IgE responses or SPT to common allergens were not different between *Ascaris* negative and positive groups.

The IgE response to *Ascaris* was associated with IgE responses to common allergens in children living in Russian Karelia, where *A. lumbricoides* infection is still quite prevalent. However, *Ascaris* IgE is not specific for ongoing *Ascaris* infection because other helminths affect it as well (5). The intensity of the helminth infection has been reported to affect the risk of atopic sensitization and clinical symptoms. The *Ascaris* specific IgE values for Russian children and mothers ranged from 0 to 19.8 and 0–30.8 IU/ml, respectively. Mild *Ascaris* infections have been reported to increase allergic reactivity whereas severe infections might be suppressive (5). The attenuating effect of *Ascaris* on atopy has been reported in areas where helminth infections are endemic and the exacerbating effect from areas where *Ascaris* is not that common (6). In Russian Karelia *Ascaris* is not endemic and its prevalence is much lower than in some tropical areas. Continuous, and especially early childhood exposure, to

***Ascaris* infection among Russian children enhances sensitization to common allergens and does not confer protection against atopy.**

Table 1 The percentage (*n*) of those having at least one positive skin prick tests (SPT) (birch, timothy grass, mugwort, cat, dog, horse, cow, *Dermatophagoides pteronyssinus*, fish (cod), egg, wheat, cow's milk, peanut or hazelnut) and one positive IgE measurement (birch, timothy grass, mugwort, cat, dog, horse, *D. pteronyssinus*, *D. farinae*, *Cladosporium herbarum*, cow's milk, hen's egg, fish (cod), soy, wheat or peanut) in *Ascaris* negative and positive children and mothers

	<i>Ascaris</i> -IgE negative (<i>n</i> = 331)	<i>Ascaris</i> -IgE positive (<i>n</i> = 88)	<i>P</i> -value (χ^2 -test)
Children			
IgE positive (one or more)	16.9 (56)	45.5 (40)	<0.0001
SPT positive (one or more)	14.8 (49)	22.7 (20)	0.0729
Mothers	<i>Ascaris</i> – (<i>n</i> = 259)	<i>Ascaris</i> + (<i>n</i> = 56)	<i>P</i> -value (χ^2 -test)
IgE positive	15.1 (39)	25.0 (14)	0.0713
SPT positive	18.9 (49)	19.6 (11)	0.9270

helminth infections may be needed for a possible atopy protective effect.

We have reported earlier that *A. lumbricoides* infection, surveyed by a questionnaire, was not associated with atopy in Russian Karelia (3). This is probably due to the poor ability of a questionnaire to detect intestinal parasite infections which can be latent. In Russian Karelia only 15% of *Ascaris*-IgE positive children and 2% of *Ascaris*-IgE positive mothers confirmed the parasite infection in the questionnaire.

We found that in children, *Ascaris* infection is associated with enhanced IgE reactivity to common allergens. The cross-sectional nature of this study does not allow any conclusions of the cause and effect to be drawn. Atopic predisposition might enhance an IgE response to *Ascaris*. In addition, the cross-reactive antigen, tropomyosin, of *Ascaris* and mite could partly explain the parallel increase of IgE to both *Ascaris* and inhalant allergens. We consider, however, these factors unlikely to play any major role here, as in mothers, no

significant effect of *Ascaris* infection on allergen-specific IgE levels was seen. In conclusion, *Ascaris* appears neither to confer protection against atopy in Russia, nor to explain the observed disparity in the prevalence of atopy between Finland and Russia.

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