

Letter to the Editor

Become a farmer and avoid new allergic sensitization: Adult farming exposures protect against new-onset atopic sensitization

To the Editor:

Exposure to a farm environment in early life has become widely accepted as protective against atopic disease in childhood.^{1,2} In addition, cross-sectional studies of farmers and other agricultural workers suggest that current farm work and its associated microbial exposures protect against sensitization in adulthood,^{3,4} although healthy worker selection has been proposed to partially explain such findings.⁵

This study has examined the longitudinal effect of adult farming exposure on the development of atopic sensitization, taking childhood farming exposure into consideration. The cohort consisted of 994 young farmers and 172 rural controls, with a mean age of 19 years at baseline.⁶ Sensitization to 4 specific aero-allergens—birch pollen, grass pollen, cat dander, and house dust mite—was measured by both skin prick tests and specific IgE blood tests. We used a wheal size of 3 mm or more as a positive response to skin prick tests. For specific IgE, we used 0.35 and 0.70 kU/L as cutoff points. Here, we report the IgE results using only 0.35 kU/L because we saw similar results for 0.70 kU/L.

Data were collected at baseline and 14 years later at follow-up. Farm exposure was investigated as farm work and animal husbandry during follow-up time. Working as a farmer was classified as never, ex-, and current farmer during the follow-up period; participants leaving the farming trade during the follow-up period were all classified as ex-farmers. Animal husbandry was subdivided into 4 groups of no animal, swine, cattle, and mixed swine and cattle exposures. Changes in sensitization were

analyzed by using logistic regression models investigating the effect of farm work and specific farm animal exposures after adjusting for confounding by pet keeping during childhood and smoking. Subsequently, the analyses were stratified by farm childhood.

We found that being a farmer during the follow-up period was significantly negatively associated with new-onset sensitization, in line with a protective effect of farm exposure (Table I). Current farm work at follow-up showed a stronger association with decreased risk of new-onset sensitization than did being an ex-farmer, although a beneficial effect was seen in the latter group. The protective effect of adult farm exposure was seen for both participants with and without a farm childhood, though the effect was most pronounced for participants without a farm childhood.

Farm work can involve a wide range of exposures. To investigate the effect of farm animal exposure on changes in specific sensitization, the effect of exposure to different types of farm animals was analyzed (Table II).

Thus, being exposed to farm animals as an adult was associated with a decreased risk of new-onset sensitization, and this was seen for exposure to swine, cattle, and the combination compared with participants without livestock exposure. The protective effect of farm animal exposure was seen for all participants, though it was most pronounced for those without a farm childhood.

This is the first longitudinal study to follow changes in allergic sensitization in young adults, while taking current farm-related exposures and childhood farm exposures into account. Adult occupational farm exposures demonstrated a significant protective effect against new-onset sensitization independent of farm exposure in early life.

Almost half of the original cohort was lost to follow-up. However, dropout analysis showed minimal differences with

TABLE I. OR for new-onset sensitization depending on adult farm work stratified by farm childhood

Sensitization	(-) Farm childhood, farm work			(+) Farm childhood, farm work		
	Never farmer	Ex-farmer	Current farmer	Never farmer	Ex-farmer	Current farmer
IgE						
n* (N)† Any allergen	11 (100)	12 (213)	3 (110)	0 (17)	13 (184)	19 (260)
Any allergen	1	0.47 (0.19-1.14)	0.19 (0.05-0.74)	1	‡	
Any pollen	1	0.31 (0.14-0.68)	0.09 (0.02-0.42)	1	1.49 (0.18-12.05)	0.84 (0.10-6.87)
Grass	1	0.31 (0.11-0.91)	†	1	1.01 (0.12-8.36)	0.28 (0.03-2.64)
Birch	1	0.34 (0.13-0.87)	0.14 (0.03-0.65)	1	‡	
Cat	1	0.69 (0.11-4.31)	†	1	0.19 (0.02-2.34)	0.07 (0.003-1.24)
HDM	1	1.07 (0.31-3.65)	0.48 (0.09-2.69)	1	0.61 (0.07-5.40)	0.80 (0.09-6.61)
SPT						
n* (N)† Any allergen	17 (109)	33 (247)	12 (120)	4 (18)	19 (203)	27 (275)
Any allergen	1	0.83 (0.44-1.57)	0.57 (0.26-1.26)	1	0.36 (0.11-1.22)	0.38 (0.12-1.25)
Any pollen	1	0.44 (0.22-0.91)	0.37 (0.15-0.91)	1	0.49 (0.13-1.85)	0.44 (0.12-1.63)
Grass	1	0.49 (0.22-1.13)	0.41 (0.15-1.15)	1	0.55 (0.11-2.65)	0.37 (0.08-1.82)
Birch	1	0.54 (0.19-1.53)	0.22 (0.04-1.12)	1	0.56 (0.06-4.96)	0.86 (0.11-7.00)
Cat	1	0.83 (0.19-3.58)	0.32 (0.03-3.15)	1	0.18 (0.03-1.06)	0.07 (0.009-0.52)
HDM	1	1.42 (0.58-3.46)	1.14 (0.39-3.25)	1	0.47 (0.12-1.78)	0.41 (0.11-1.52)

Logistic regression analyses stratified for farm childhood and adjusted for pets during childhood and smoking. Results given as ORs with 95% CIs and boldface values indicate a *P* value less than .05. Any allergen refers to grass, birch, cat, and/or HDM sensitization; the variable consists of participants who were not sensitized to any of the 4 allergens at baseline, and who gained sensitization to 1 or more of the 4 allergens at follow-up. Any pollen refers to grass and birch sensitization.

HDM, House dust mite; OR, odds ratio; SPT, skin prick test.

*n is the number of participants gaining sensitization to 1 or more of the 4 allergens during follow-up in the specified group.

†N is the total number of participants not sensitized to any of the 4 allergens at baseline in the specified group.

‡No participants sensitized in the control group, making the analysis unstable.

TABLE II. OR for new-onset sensitization depending on adult farm animal exposure stratified by farm childhood

Sensitization	(-) Farm childhood, adult farm animal exposure				(+) Farm childhood, adult farm animal exposure			
	None	Swine	Cattle	Swine + cattle	None	Swine	Cattle	Swine + cattle
IgE								
n* (N)† Any allergen	11 (104)	2 (72)	4 (76)	9 (171)	0 (21)	8 (118)	9 (83)	15 (239)
Any allergen	1	0.24 (0.05-1.13)	0.42 (0.12-1.39)	0.43 (0.12-1.39)	1	‡		
Any pollen	1	0.15 (0.03-0.68)	0.20 (0.06-0.72)	0.25 (0.10-0.59)	1	1.21 (0.14-10.65)	2.06 (0.24-17.78)	1.35 (0.17-10.83)
Grass	1	†	0.13 (0.02-1.01)	0.24 (0.07-0.79)	1	0.81 (0.09-7.64)	1.14 (0.12-10.78)	0.58 (0.07-5.01)
Birch	1	0.23 (0.05-1.07)	0.19 (0.04-0.93)	0.26 (0.09-0.74)	1	‡		
Cat	1	1.68 (0.23-12.39)	0.69 (0.06-7.91)	§	1	0.21 (0.01-3.68)	0.28 (0.12-5.06)	0.09 (0.005-1.64)
HDM	1	0.85 (0.15-4.81)	0.75 (0.13-4.22)	0.96 (0.26-3.50)	1	0.39 (0.07-2.32)	0.43 (0.07-2.79)	0.43 (0.09-2.13)
SPT								
n* (N)† Any allergen	18 (118)	11 (87)	11 (83)	21 (192)	5 (24)	9 (120)	14 (91)	22 (261)
Any allergen	1	0.79 (0.35-1.78)	0.79 (0.35-1.79)	0.63 (0.32-1.25)	1	0.31 (0.09-1.03)	0.70 (0.22-2.20)	0.35 (0.12-1.04)
Any pollen	1	0.38 (0.13-1.07)	0.35 (0.12-1.00)	0.44 (0.21-0.92)	1	0.27 (0.07-1.09)	0.68 (0.19-2.44)	0.44 (0.14-1.41)
Grass	1	0.43 (0.13-1.38)	0.39 (0.12-1.24)	0.46 (0.19-1.07)	1	0.22 (0.04-1.17)	0.61 (0.14-2.63)	0.36 (0.09-1.39)
Birch	1	0.21 (0.02-1.73)	0.19 (0.02-1.59)	0.68 (0.24-1.93)	1	0.44 (0.04-5.07)	1.50 (0.17-13.55)	1.07 (0.13-8.70)
Cat	1	1.09 (0.18-6.74)	1.53 (0.30-7.82)	0.20 (0.02-1.99)	1	0.14 (0.02-0.88)	0.09 (0.009-0.90)	0.06 (0.009-0.38)
HDM	1	1.43 (0.48-4.25)	1.04 (0.32-3.40)	1.46 (0.59-3.69)	1	0.21 (0.05-0.89)	0.62 (0.17-2.22)	0.41 (0.13-1.32)

Logistic regression analyses stratified for farm childhood and adjusted for pets during childhood and smoking. Results given as ORs with 95% CIs and boldface values indicate a *P* value less than .05. Any allergen refers to grass, birch, cat, and/or HDM sensitization; the variable consists of participants who were not sensitized to any of the 4 allergens at baseline, and who gained sensitization to 1 or more of the 4 allergens at follow-up. Any pollen refers to grass and birch sensitization.

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‡No participants sensitized in the control group, making the analysis unstable.

§No participants sensitized to this allergen at follow-up.

regard to atopy and general demographics at baseline (not shown). Therefore, selection bias seems unlikely to have had a substantial effect on the reported results.

New onset of allergic sensitization in childhood can be attributed to both the host constitution and environmental exposures.⁷ Because there are few published longitudinal studies on changes in sensitization in adult populations, specific determinants for persistent or new-onset sensitization in adulthood have not yet been carefully studied. However, we know from studies of farm children that environmental factors such as microbial diversity and diet are associated with the protective effect of farming.^{1,8} This study demonstrated that current adult farming exposure is associated with a decreased risk of new-onset sensitization.

In conclusion, our study has shown that exposure to a farm environment protects against the development of atopy not only in childhood but also in young adulthood. Working on a farm has a protective effect against ongoing or newly developing sensitization to common allergens, independent of childhood farm exposure. This study does not determine which factors are responsible for the beneficial effect of farming; however, a clear association is seen with farm work and farm animal exposure.

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