

## DETECTION OF SPECIFIC IGE AS A SCREENING TOOL FOR COW AND SWINE BREEDERS' OCCUPATIONAL ALLERGIC DERMATOSES

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Śpiewak R, Dutkiewicz J, Skórska C: Detection of specific IgE as a screening tool for cow and swine breeders' occupational allergic dermatoses. *Ann Agric Environ Med* 2000, 7, 145–147.

**Abstract:** The study aimed at assessing whether detection of IgE specific to cow and swine allergens can be used as a screening tool for farmers' occupational eczema. Serum samples were taken from 51 farmers. The farmers were questioned about work-related skin symptoms using a nurse-administered questionnaire, verified by a dermatologist. Sera of 29 cow breeders were tested for IgE antibodies specific to cow dander and bovine serum albumin. Sera of 22 swine breeders were tested for IgE specific to swine epithelium, swine serum albumin, and swine urine proteins. Among cow breeders, IgE specific to cow dander was found in one farmer. Among swine breeders, IgE specific to swine epithelium was found also in one subject. On first examination, the cow breeder complained of slight itching of the conjunctivae while working in a cow barn and had no other allergic symptoms. One year later, however, he noticed episodes of hand eczema after contact with cows. In the IgE-positive swine breeder, only mild stationary psoriasis, and no work-related symptoms were found. Among the remaining 28 IgE-negative cow breeders, 11 complained of skin symptoms, but these were not related to working with cows; among 21 IgE-negative swine breeders, 7 subjects had skin diseases, none of which were related to working with swine. We conclude that detection of animal antigen-specific IgE may be an useful screening tool, although an exact assessment of sensitivity and specificity of the method in a larger population of exposed farmers will be required.

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**Key words:** farmers, occupational dermatoses, animal allergens, cow dander, pig epithelium, specific IgE antibodies, screening, serological methods.

Each working day, farmers are exposed to a great variety of allergens, such as substances of animal and plant origin, bacteria, moulds, mites, animal feeds, fertilisers, pesticides, etc [7]. In Finland, cow dander is the most important cause of occupational urticaria and protein contact dermatitis in farmers [6]. Also from other countries there are sporadic descriptions of cow dander-related contact urticaria or dermatitis in farmers [17, 18] and veterinarians [5, 11]. Four of 20 farmers with occupational dermatitis or urticaria diagnosed at our department in the year 2000 were allergic to cow dander (unpublished data). There was also a case report of occupational contact dermatitis caused by pig epithelia

[9]. As the problem had never been studied previously in Poland, the present study was undertaken, aimed at assessing the frequency of cow- and swine-specific IgE in farmers. Another question to be answered was whether detection of specific antibodies against cow allergens could be used as a screening tool for farmers' occupational eczema.

### STUDY GROUP AND METHOD

In total, 51 farmers of randomly selected animal farms were tested. They were subject to another research program and agreed to participate also in this study. The

farmers were divided into two groups. The first group comprised 29 cow breeders (16 males and 13 females) aged 17–66 (mean 40) years, with regular exposure to cows lasting 1–59 (mean 25) years. The second group consisted of 22 swine breeders (12 males, 10 females) aged 14–68 (mean 41) years, with regular contact to swine lasting 4–58 (mean 28) years. Sera of cow breeders were tested for IgE antibodies specific to cow dander and bovine serum albumin, and sera of swine breeders were tested for IgE specific to swine epithelium, swine serum albumin, and swine urine proteins. Specific IgE antibodies were determined with UniCAP® System (Pharmacia & Upjohn Diagnostics AB, Sweden) using the following antigens: e4 (cow dander), Re204 (bovine serum albumin), e83 (swine epithelium), Re222 (swine serum albumin), and Re212 (swine urine proteins). The results were expressed in CAP classes 0–6. Parallel to taking blood samples, the farmers were questioned about work-related skin symptoms using the nurse-administered questionnaire described previously [15]. The completed questionnaires were later analysed by dermatologist, who invited for examination every subject suspected of having any skin disease, whether work-related or not.

## RESULTS

Among cow breeders, one farmer with IgE specific to cow dander was identified (F.J., male, aged 25 years, duration of exposure 15 years, CAP class 2), and among swine breeders also one farmer was found to have swine epithelium-specific IgE (D.J., male, aged 63 years, duration of exposure 58 years, CAP class 2). Both farmers were examined by dermatologist. The cow breeder reported itching of conjunctivae while working in a barn but no other allergic symptoms from any other organ. However, one year after the study, he presented spontaneously at our outpatient department and reported episodes of hand eczema after contact with cows. These symptoms started approximately one year after the cow-specific IgE was detected in the patient's serum. In the IgE-positive swine breeder, only mild stationary psoriasis, and no work-related symptoms were found.

Among the remaining 28 IgE-negative cow breeders, 10 had skin symptoms – 4 complained of episodic eczema, 3 of fungal infections, 2 of acne vulgaris, and 1 of psoriasis. Among them, two persons complained of eczema provoked by working with grain dust, and another one of eczema caused by grain dust and cucumber plants. From the 21 IgE-negative swine breeders, 9 persons complained of skin diseases, among them 4 of eczema, 2 of psoriasis, 2 of acne vulgaris, and 1 of coexisting psoriasis and rosacea. Three of four eczema patients indicated exposure to grain dust as the factor provoking or precipitating their dermatosis. No IgE antibodies against bovine serum albumin, swine serum albumin and swine urine proteins were found in the studied group of farmers.

## DISCUSSION

Occupational dermatitis caused by allergy to cow dander was described in 1948 by Epstein [1]. This publication was followed by descriptions of other cases among farmers [8, 13, 17, 18] and veterinarians [5, 14]. When analysing the published cases, the relatively young age of the onset of cow dander allergy is apparent. Data on subject's age at the onset of the disease reported in 6 publications [6, 8, 13, 14, 17, 18] show that in described subjects dermatoses appeared between 24<sup>th</sup> and 50<sup>th</sup> year of life with the mean of 33.5 years. The IgE-positive cow breeder found in our study was aged 25 and had already slight symptoms of conjunctivitis related to working with cows, which was soon followed by hand eczema. On the other hand, in the only described case of contact dermatitis to swine epithelia we are aware of, contact dermatitis started at the 60<sup>th</sup> year of life, after an exposure lasting 25 years [9]. In our study, we found swine epithelium-specific IgE in a farmer aged 63, who had regular contact with pigs for over 58 years, and until the study had not perceived any health problems related to working with pigs. Based on these facts, it could be suggested that in contrast to cow dander, swine epithelium is probably not a potent allergen. This is in accordance with the results of earlier authors [3, 4, 10], who found a low incidence of IgE-mediated reactions to swine proteins among swine breeders.

More systematic studies on cow allergy in farmers were carried out in Finland, where out of 93 skin prick tested healthy Finnish dairy farmers, 14.0% had positive reactions to cow epithelium and 2.2% to pig epithelium [12]. Among 620 cases of occupational contact urticaria and protein contact dermatitis registered from 1990–1993, cow dander was the most common cause, found in 276 cases. This relatively high incidence of allergy to cow proteins in Finland is attributed to keeping cows through most of the year in cowsheds, where the accumulation of allergen takes place [6]. In another Finnish study, cow dander elicited positive reaction at skin prick testing in 22 of 111 farmers with hand dermatoses, thus being the most common allergen [16]. Moreover, two cases of contact urticaria to cow and swine blood and plasma among Swedish slaughtermen were published [2]. In our group of farmers, no IgE antibodies specific to bovine serum albumin, swine serum albumin or swine urine proteins were found.

In our study, 1 of 29 cow breeders, and 1 of 22 swine breeders had proven IgE-positive to cow and swine allergens respectively. These data do not differ significantly from those published by Iversen and Pedersen [4], who using RAST technique detected swine epithelium-specific IgE in 1 of 127 Danish pig breeders, and detectable cow dander-specific IgE in 1 of 60 dairy farmers.

The present study was the first attempt to assess the problem of cow and swine allergy in Polish farmers, and the preliminary results encourage us to continue this

research on a greater number of farmers. We conclude that the detection of animal antigen-specific IgE may be useful screening tool; however, the exact assessment of sensitivity and specificity of the method in a larger population of exposed farmers will be required.

### REFERENCES

1. Epstein S: Milker's eczema. *J Allergy* 1948, **19**, 333–341.
2. Göransson K: Occupational contact urticaria to fresh cow and pig blood in slaughtermen. *Contact Dermatitis* 1981, **7**, 281–282.
3. Iversen M, Dahl R: Specific antigens in dust from swine confinement buildings. *Am J Ind Med* 1994, **25**, 49–51.
4. Iversen M, Pedersen B: The prevalence of allergy in Danish farmers. *Allergy* 1990, **45**, 347–353.
5. Kalveram KJ, Kastner H, Forck G: Nachweis von spezifischen IgE-Antikörpern bei Tierärzten mit Kontakturtikaria. *Z Hautkr* 1986, **61**, 75–81.
6. Kanerva L, Susitaval P: Cow hair: the most common cause of occupational contact urticaria in Finland. *Contact Dermatitis* 1996, **35**, 309–310.
7. Kroidl RF, Schwichtenberg U: Allergien vom Typ I in der Landwirtschaft. *Allergologie* 1999, **22**, 230–236.
8. Mahler V, Diepgen TL, Heese A, Peters KP: Protein contact dermatitis due to cow dander. *Contact Dermatitis* 1998, **38**, 47–48.
9. Malanin G, Kalimo K: Occupational contact dermatitis due to delayed allergy to pig epithelia. *Contact Dermatitis* 1992, **26**, 134–135.
10. Matson SC, Swanson MC, Reed CE, Yunginger JW: IgE and IgG-immune mechanisms do not mediate occupation-related respiratory or systemic symptoms in hog farmers. *J Allergy Clin Immunol* 1983, **72**, 299–304.
11. Prahl P, Roed-Petersen J: Type I allergy from cows in veterinary surgeons. *Contact Dermatitis* 1979, **5**, 33–38.
12. Rautalahti M, Terho EO, Vohlonen I, Husman K: Atopic sensitization of dairy farmers to work-related and common allergens. *Eur J Respir Dis* 1987, **152(Suppl)**, 155–164.
13. Roth WG: Ekzem und Asthma durch Rinder- und Pferdehaare. *Berufsdermatosen* 1968, **16**, 278–282.
14. Schneider W, Coppenrath R, Ruther H: Über Tierhaar-Allergie. *Berufsdermatosen* 1960, **8**, 1–13.
15. Śpiewak R: Occupational dermatoses in farmers – a proposal for a diagnostic procedure. *Ann Agric Environ Med* 1999, **6**, 63–72.
16. Susitaval P, Husman L, Hollmen A, Horsmanheimo M, Husman K, Hannuksela M: Hand eczema in Finnish farmers. A questionnaire-based clinical study. *Contact Dermatitis* 1995, **32**, 150–155.
17. Timmer C, Coenraads PJ: Allergic contact dermatitis from cow hair and dander. *Contact Dermatitis* 1996, **34**, 292–293.
18. Van Ketel WG, van Diggelen MW: A farmer with allergy to cows. *Contact Dermatitis* 1982, **8**, 279.