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Is there any relationship between allergic sensitization to milk and animal allergens in atopic adults?

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SUMMARY

No data on the relationship between allergic sensitization to animal dander and milk allergens are available in literature in adults. Considering the high rate of allergic sensitization to mammals in atopic adults living in Naples area, we aimed to evaluate if sensitization to milk allergens could be a risk factor for these subjects. From 755 consecutive outpatients examined between May 1 2009 and December 31 2010, we selected those with an immediate skin reaction to animal dander and milk. A clinical history including evaluation of pet exposure, the results of skin-prick tests (SPTs) and specific IgE antibodies for milk allergens were recorded. Among three hundred sixty SPT- positive patients, 140 were sensitized to animal dander (38.9%) and 9 to milk allergens (6.4%). Among one hundred forty patients sensitized to animals only one was sensitized also to milk allergens; among 9 milk- sensitized individuals 5 were allergic also to animal allergens (only one to cow dander) while 4 were not sensitized to mammals. Our results suggest that relationship between allergic sensitization to milk and animal allergens is negligible in adult atopic individuals living in urban area of Naples and that high rate of sensitization to animals is likely to be due to other mechanisms such as direct / indirect exposure, and allergen cross-reactions.

Serum albumin (SA) is involved in allergic sensitization from various sources and induces different clinical manifestations because of its presence in mammalian tissues and fluids as well as its complex interactions and cross-reactivity (1, 2).

Recently, we reported an unusual case of a young woman suffering from respiratory allergy and showing allergic symptoms induced by sensitization exclusively to mammalian dander from cat, dog, rabbit, horse, rat, mouse, guinea pig, cow, hamster and mammalian products (rabbit meat and cow milk). Immunoblot analysis revealed

IgE - reactivity to cow's, rabbit's and horse's serum albumins suggesting that the high number of IgE-mediated sensitizations to different epithelia could be due to cross-reactivity between SAs from different mammals (3).

It has been also demonstrated that after a first contact with SA through cow's milk, children may develop sensitization to epithelium-derived albumin even in the absence of direct contact with animals (4). This mechanism could explain the odd phenomenon in which some atopic patients develop allergic sensitization to mammalian allergens in the absence of contact with the animals.

Since the rate of allergic sensitization to mammals is high in atopic adults living in Naples area (5), we aimed to evaluate if sensitization to milk allergens could be a risk factor.

Seven hundred fifty five subjects aged between 17 and 76 years (mean age 35.2) living in Naples area and consecutively evaluated in our Allergy Unit from 1 May 2009 to 31 December 2010 for respiratory symptoms of a suspected IgE-mediated aetiology were examined.

A case report form (CRF) specifically designed for this study was completed during the screening consultation of each patient. The standardized form reported: demographic data, type and duration of respiratory symptoms, pets ownership, results of the skin prick tests (SPTs), results of specific IgE evaluation for milk allergens. The forms were filled by the allergist, who also verified the consistency of clinical history and SPTs results. Then, the same physician confirmed the diagnosis of respiratory allergy according to the International Guidelines (6,7).

The commercial allergen extracts used for screening SPTs were provided by ALK Group, Milan Italy. We used a standard panel of allergens including: *Dermatophagoides pteronyssinus* and *D. farinae*, *Alternaria alternata*, *Cladosporium herbarum*, cat, dog, Parietaria, Grass mix, *Artemisia vulgaris*, *Olea europaea*, *Betula pendula*, *Cupressus sempervirens* and *Corylus avellana*. These allergens cover the majority of causative agents of respiratory allergy in Italy. In addition allergenic extracts (Lofarma Laboratories Milan, Italy) of milk (milk, casein, β -lactoglobulin and α -lactalbumin) and of other furry animals (horse, rabbit, guinea pig, hamster, cow hair) were used.

Positive (10 mg/ml histamine HCl) and negative (saline solution in glycerine-phenol solution) controls were used as well. SPTs were carried out and interpreted according to international guidelines (8). The result was read after 15 minutes and expressed as mean of the major wheal diameter plus its orthogonal. A skin reaction of 3 mm or greater was considered positive.

The wheals profile were outlined using a fine-point marking pen and transferred by adhesive tape onto patient's form.

Approximately 4 ml of serum were collected from each milk-sensitized patient and stored at -20°C . Specific IgE for milk (f2), casein (f78), α -lactalbumin (f76) and β -lactoglobulin (f77) were determined by the CAP System FEIA (Phadia Diagnostics, Uppsala, Sweden).

A total of 755 patients were examined. Out of them 360 (50.3%) had a SPTs positivity for at least one allergen and were diagnosed as having respiratory allergy. The 360

SPT-positive subjects had a mean age of 31.2 years (range 17-73). One hundred forty individuals (38.9%) were sensitized to animals (27.8% to dog, 20.8% to cat, 6.7% to cow, 4.7% to rabbit, 3.6% to horse, 2.8% to mouse, 1.4% to hamster, 1.1 % to guinea pig and 0.6% to rat) and nine (6.4%) to milk allergens (four to milk, two to casein, one to α -lactalbumin, one to milk and α -lactalbumin and one to α -lactalbumin and β -lactoglobulin). Our results show high percentage of individuals sensitized to animal dander if compared to low percentage and low level of sensitization to milk allergens as assessed by SPTs because no patients exhibited serological sensitization to milk allergens. Among 140 patients positive to animals only one was sensitized also to milk allergens, among 9 milk-sensitized individuals 5 were allergic also to animal allergens (only one to cow dander) while 4 were not sensitized to mammals.

The results of our study suggest that role of milk allergens, particularly albumin, as risk factor for inducing allergic sensitization to animal allergens is negligible in atopic adults living in Naples area.

A possible explanation for high prevalence of sensitization to furry animals in our geographical area also in subjects without known contact with animals could be an indirect exposure or a cross-allergic reaction induced by lipocalins (9-14). Furthermore, we recently suggested a possible predisposition (allergic phenotype?) to develop multiple sensitization to animal allergens. In our study allergic patients sensitized to cat/dog had a fourteen time risk to develop sensitization to different furry animals in comparison to allergic patients not sensitized to common pets (15).

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