

LETTER TO THE EDITOR

Could a bite trigger the onset of cat allergy?

To the Editor,

The prevalence of cat allergy varies among different countries; in Europe, it has been estimated that about 26% of adults searching care for suspected inhaled allergy are sensitized to cats.¹ The growing prevalence makes cat allergy a significant human health problem; furthermore, it can be serious and debilitating for many patients.^{1,2} The skin may represent a sensitization path to environmental allergens when there is a barrier defect at the epithelial level, as in atopic dermatitis.³ If skin barrier dysfunction is considered a risk factor for sensitization to food allergens, the possibility of developing sensitization to inhaled allergens through the skin is controversial.

Herein, we report the clinical case of a 7-year-old girl who developed cat allergy after being bitten by a cat. She had been followed up from the age of 18 months for frequent respiratory tract infections with rhinitis, nasal mucous secretions, and cough. Clinical history was negative for atopic dermatitis and food allergy. There were no pets at home. At the age of 2 years and 10 months, an allergy examination was performed due to the recurrence of respiratory infections associated with bronchial obstruction. Skin prick tests (SPT) with commercial allergen extracts were performed according to the indications of international guidelines.⁴ In detail, each extract drop was applied to the front surface of the forearm on which SPT was performed with a lancet. The result was read after 15 minutes by measuring the average length between the maximum diameter and its orthogonal. A reaction of 3 mm or greater was considered positive. SPT were performed for inhaled allergens, including pollens, dust mites, molds, and cats (ALK-Abellò, Lainate, Italy), with negative results. The positive control (histamine 10 mg/mL) had an average wheal diameter of 5 mm. Since September 2019, therapy with inhaled steroids (fluticasone 50 mcg/die) has been started on medical advice as long-term treatment of asthma to prevent exacerbations in the course of upper respiratory tract infections. In early September 2021 (at the age of 5 years and 11 months), SPT were repeated with positive results for grasses (5 mm), olive tree (5 mm), *Dermatophagoides farinae* (6 mm), and *Dermatophagoides pteronissinus* (6 mm). Skin test to cat extract was negative.

In November 2021, in a friend's house with a cat, and previously attended, the girl was bitten for the first time by the pet on the back of her right hand. Two erythematous spots immediately occurred on the injured skin with no bleeding. After about 2 months, when she

returned in there, she experienced conjunctival redness, sneezing, and breathing difficulties after about 30–60 min. A further episode of asthma occurred after 1 month in another house with a cat. Since then, the child's parents have avoided to expose her daughter to environments with cats. At the end of March 2022, during an allergy checkup, SPT to cat turned positive (cat dander: 8 mm, negative control negative, histamine: 6 mm). Specific IgE assays showed positive results for cat extract 9.76 KU/L and rFel d 1 (ImmunoCAP, Thermo Fisher) 10.90 KU/L; Fel d 2 and rFel d 4 were negative; and total IgE level was 129.8 IU/ml.

Written informed consent was acquired before each procedure.

Cat allergy can present with a variety of clinical manifestations, up to anaphylaxis,⁵ although the most frequent are rhinoconjunctivitis and asthma. The major cat allergen is Fel d 1, whose exposure can determine an increase in bronchial hyperreactivity not only in children sensitized to Fel d 1 but also in those who are sensitized to other allergens such as dust mites, grasses, and *Cladosporium*.⁶ Fel d 1 is mainly produced by saliva and sebaceous glands. It is for about 60% carried in the air by small particles can remain in the air for long time and is considered ubiquitous.^{6,7}

Although contact with an allergen is a key prerequisite for the development of specific IgE-sensitization, the methods of contact that can promote the above-mentioned development of sensitization rather than tolerance toward the allergen are not currently defined. The clinical report of a case of anaphylaxis after a cat bite consolidates the assumption that a bite could contain enough allergen to trigger symptoms and thus also sensitization.⁵ Furthermore, several cases of anaphylaxis resulting from rodent bites have been described. Notwithstanding sensitization to other allergens has been described to start by a skin injury, such as bee and vespid bites in venom allergy, and tick bites in alpha-Gal allergy and allergy to ticks (e.g., the pigeon tick).

In addition, the potential role of early exposure to pets in subjects with/without eczema has been investigated. Recently, Simpson and colleagues⁸ found that children with altered genotype for filaggrin and the presence of a cat at home as early as 1 year of age had an increased risk of sensitization to Fel d 1 up to the age of 8 years; this risk did not increase in subsequent years. Indeed, in children without alterations of the genotype for filaggrin, the risk of sensitization was increased only at the end of the first year and not in the following years.⁸ In our patient, who did not have eczema, filaggrin genotype

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was not analyzed; however, as the bite is disrupting the skin barrier, our clinical case shows that a preexisting barrier defect is not a prerequisite for sensitization. In another cohort, of over 3700 infants, to have a cat or dog in the first year of life protected against the development of asthma and allergies up to 40%, and this result was not affected if the child attended the buildings where there were farm animals.⁹

These conflicting results regarding the effect of exposure to cats in the early stages of life toward the development of sensitization or tolerance could be explained mainly by the condition of the newborn's microbiome when the contact with the cat begins; in turn, newborn's microbiome is influenced by many factors, such as the manner of delivery, type of feeding, and use of antibiotics.⁷

To the best of our knowledge, this is the first report on sensitization through cat bite. Identifying a new route of allergic sensitization to cats after decades of studies may appear unlikely. However, it must be considered that asking for information on possible cat bites is not included in the anamnesis (we had not done it either).

Herein, we first suggest to implement regularly a specific question about possible cat bites into the medical history. Furthermore, considering that the major cat allergen Fel d 1 is a multifunction conveyor,⁷ we speculate that future studies on the effects of tissue disruption caused by the cat bite could provide data on the potential higher risk of skin barrier defects in sensitization to cat dander. It is also conceivable that transcutaneous sensitization can occur through the bite even in the absence of a skin barrier defect.

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