

# Severe Pepper Allergy in a Young Child

Leslie Gimenez, MD; Michael Zacharisen, MD

## ABSTRACT

**Introduction:** Spices are ingredients to confer improved taste to foods. As they are derived from plants, they have the potential for inducing allergic reactions. There is a lack of studies to accurately determine the rate of pepper allergy in children. Allergic reactions to pepper in children are rare. This case illustrates such a reaction.

**Methods:** Patient is a 17-month-old boy with mild eczema who developed urticaria, conjunctivitis, facial swelling, and severe cough immediately after ingesting venison prepared in a Southwest/mesquite marinade containing a variety of spices including black and cayenne pepper. His food was not routinely peppered. A similar but less severe reaction with facial urticaria and conjunctivitis occurred after eating roast beef in the same marinade while reintroduction of venison without marinade did not result in recurrence of symptoms.

**Results:** Skin tests to cayenne and black pepper extracts were positive. Skin testing to crude extracts of the food marinades was negative as well as commercial extracts of onion, garlic, paprika, thyme, and tomato. IgE radioallergosorbent results showed undetectable levels to black pepper, chili pepper, lemon, tomato, garlic, onion, green pepper, and white pepper. Specific IgE to cayenne pepper was detected at 0.11 kU/L.

**Conclusions:** Pepper allergy is an unusual but potentially severe food allergy in children.

His past medical history is significant for mild eczema not requiring topical steroids and egg allergy that caused hives. He has recurrent otitis media. He has no known drug allergies and takes diphenhydramine as needed. He does not have chronic rhinitis or asthma. He has urticaria with dog contact. Family history is remarkable for his 4-year-old brother with asthma and gastroesophageal reflux. On physical examination at baseline, conjunctivae were noninjected. Nasal mucosa was pink without turbinate edema. He had mucoid nasal discharge. Oropharynx was clear without postnasal drainage or exudate. Lungs were clear to auscultation. His skin revealed no rash. The rest of his physical examination was normal.

## INTRODUCTION

### Case Report

A 17-month-old white boy had severe urticaria, conjunctivitis, facial swelling, and severe cough within minutes of eating venison prepared with a spicy Southwest/mesquite marinade. He did not have vomiting, diarrhea, shortness of breath, or wheezing. He was treated with intramuscular epinephrine and oral diphenhydramine in the emergency department and improved. The parents were concerned that he had venison allergy and thus avoided venison. Two months later, he developed facial urticaria and conjunctivitis after eating roast beef also prepared with the Southwest/mesquite marinade. This marinade contained a variety of spices including black and cayenne pepper. Since this episode, he has eaten venison meat without marinade without symptoms. His food is typically not peppered.

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**Author Affiliation:** Department of Pediatrics, Medical College of Wisconsin.

**Corresponding Author:** Leslie Gimenez, MD, 9000 W. Wisconsin Ave. Suite 411, Milwaukee, WI 53226; phone 414.266.6840; fax 414.266.6437; e-mail lgimenez@mcw.edu.

## METHODS

Percutaneous skin tests were performed with the Quintip device (Hollister-Stier Laboratories; Spokane, Washington) using commercial allergenic extracts of onion, garlic, paprika, thyme, black pepper, cayenne pepper, tomato, and crude extracts of mesquite, Southwest, Montreal and chipotle marinades. In the presence of a negative saline control, a wheal and erythema similar to the histamine control was considered positive. IgE Radioallergosorbent (RAST) tests were performed by Quest Diagnostics Incorporated (Wood Dale, Illinois) for black pepper, chili pepper, lemon, tomato, garlic, onion, green pepper, white pepper, cayenne pepper, paprika, thyme, and tomato. Allergy testing for inhalant allergens was not performed.

## RESULTS

Percutaneous allergy skin tests to cayenne and black pepper extracts (1:20 W/V Greer; Lenoir, North Carolina) were positive, (2 mm wheal × 9mm flare and 3 mm wheal × 14 mm flare respectively) compared to histamine (5 mm wheal × 25 mm flare) and saline controls. Skin testing to crude extracts of the food marinades was negative as was testing of commercial extracts of onion, garlic, paprika, thyme, and tomato. IgE RAST results showed undetectable levels to black pepper, chili

pepper, lemon, tomato, garlic, onion, green pepper, and white pepper. Specific IgE to cayenne pepper was 0.11 kU/L.

## DISCUSSION

This report illustrates a case of severe pepper allergy presenting in early childhood.

Spice is often used to describe a variety of flavoring agents derived from a dried seed, fruit, root, bark, or vegetable. Spice allergy is rare, ranging from 2% to 6.4% of all food allergies and usually has its onset in adulthood, affecting primarily women.<sup>1</sup> Most spice allergies are related to the family Apiaceae (celery, fennel, caraway, coriander, chervil, dill), followed closely by Liliaceae (garlic, onion, chive) with a low incidence of sensitization to nutmeg, pepper, and ginger.<sup>2</sup> In a study evaluating 22 patients with pepper and paprika allergy, the mean age was 37 years old, and the youngest patient was 15 years old.<sup>3</sup> Sensitization occurs in the occupational setting such as butchers, bakers, and spice factory workers where there is frequent and prolonged spice exposure.

Spice allergy is believed to be a secondary effect after primary sensitization with inhalant allergens. Because spices are derived from plants, they harbor allergenic potency and can induce mild local to severe systemic reactions.<sup>1</sup> Profilin and Bet v 1 homologues found in different plants are cross reactive between inhalant allergens and spices. The mugwort-birch-celery-spice syndrome illustrates a classic example where mugwort and birch pollen allergy are frequently associated with IgE-mediated hypersensitivity to celery and spices in the Apiaceae family as well as paprika, pepper, garlic, leek, and onion.<sup>3</sup> Therefore, patients at risk for a spice allergy are those sensitized to mugwort and birch. Reported symptoms through inhalation exposure include asthma and rhinitis.<sup>4</sup> Sensitization to spices may occur through skin contact.<sup>1</sup> One case describes a butcher who developed contact dermatitis from a spice mix used to marinate meat.<sup>5</sup> He also was skin-test positive to mugwort. Because our patient did not exhibit seasonal or perennial rhinitis, testing for such aeroallergens was deferred.

Our case describes a very young child allergic to black pepper and cayenne pepper. Black pepper, *Piper nigrum*, is a flowering vine in the family Piperaceae. The fruit is known as a peppercorn when dried. Peppercorns are ground to a powdered form and described as black, white, or green pepper, or just pepper. Reported allergic symptoms include asthma, shortness of breath, rhinitis, and contact dermatitis.<sup>1,3</sup> Cayenne pepper, *Capiscum annuum*, is from the fruit red hot chili pepper. It is a pungent fruit grown for condiments, spices, ornamentals, and pharmaceutical preparations.<sup>6</sup> Chili pepper also is ground to make paprika. Reported allergic symptoms have been reported only for adults and include respiratory symptoms including asthma, generalized eczema, and urticaria.<sup>1,7,8</sup>

Although spice allergy is believed to be a secondary effect after primary sensitization with inhalant allergens, it is unclear how pepper allergy developed in our patient. A hypothesis for our patient could include being (1) a “susceptible host” having eczema and other food allergy (egg); (2) an immature gastrointestinal tract with absorption and transport of an “immunologically intact” pepper allergen crossing a multi-layered barrier; (3) a failure to develop oral tolerance or a breakdown in tolerance to a specific or intact pepper antigen; and/or (4) a specific biological action of a pepper component on the intestinal epithelial cells and immune cells affecting absorption and sensitization. Specifically, when cayenne pepper, which contains capsaicin, is directly placed on intact intestinal epithelial mucosa, there is a significant but transient decrease in transepithelial electrical resistance and increased permeability for 10-, 20-, and 40-kDa dextrans but not for 70-kDa dextrans. This observation might be of pathophysiological importance with respect to food allergy and intolerance;<sup>9</sup> the hotter the spices, the more likely they could act as adjuvants for sensitization by promoting transport of molecules below a molecular mass of 70-kDa.<sup>1</sup> To date, there is insufficient research studying the mechanism of spice allergy in young children.

## CONCLUSION

Pepper allergy is an unusual but potentially severe food allergy in childhood.

**Funding/Support:** None declared.

**Financial Disclosures:** None declared.

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