

Fatal Anaphylaxis to Indoor Native Fire Ant Stings in an Infant

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Abstract: The red (*Solenopsis invicta*) and black (*Solenopsis richteri*) imported fire ants (IFA) are a common cause of venom allergy in the southeastern United States. Hypersensitivity to stings of native fire ants is less common, although anaphylaxis has been reported to various native *Solenopsis* species. There have been numerous reports of indoor stings caused by IFA, including in nursing homes and private residences. The following is a report of fatal anaphylaxis to a native fire ant sting in an infant that occurred indoors at a daycare facility. A 3-month-old female was left unattended on a bed. The caregiver had heard the child crying, but attributed this to colic. A short time later, the caregiver found the child apneic and covered with ants. Emergency medical services were summoned, and resuscitation attempts were unsuccessful. Postmortem examination revealed approximately 40 erythematous lesions without pustules. Examination of the respiratory system was notable for congested parenchyma and mild laryngeal edema. Laboratory studies revealed an elevated tryptase of 23.9 ng/mL and radioallergosorbent test (RAST) of 1.4% specific IgE antibody binding to *Solenopsis richteri* venom. RAST for specific IgE antibody binding to *Solenopsis invicta* venom was negative. Ants recovered from the scene were identified by an entomologist as *Solenopsis xyloni*, a native fire ant endemic to the southwestern United States. Native fire ants have features that distinguish them from IFA. Some native species do not build mounds, and stings may not result in pustules characteristic of IFA. There is significant cross-reactivity among the venoms of *Solenopsis* species, although some species' specificity exists for the Sol 2 allergen. Testing and treatment with IFA whole-body extract is likely to be effective for native fire ant allergy. A mixture of *S. invicta* and *S. richteri* extracts should be considered when native fire ant species are presumed to cause the primary sensitization to reduce the chance that species-specific reactivity is missed.

Key Words: anaphylaxis, native fire ant, *Solenopsis*, indoor

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The red imported fire ant (IFA), *Solenopsis invicta*, is a frequent cause of venom allergy in the southeastern United States.¹ In addition to the imported red and black (*S. richteri*) fire ants, there are 3 native species of fire ants found in North America that have been reported to cause anaphylaxis.² The southern fire ant, *Solenopsis xyloni*, is most commonly found in the southwestern United States and Mexico. The rare desert fire ant, *Solenopsis aurea*, is found in the deserts of the southwest, mainly in Southern California. The tropical fire ant, *S. geminata*, has been displaced from the Gulf Coast by IFA, and now inhabits parts of Florida, Hawaii and other Pacific islands, and the Caribbean.²

There have been numerous reports of indoor stings caused by IFA, including in nursing homes and private residences.^{1,3,4} Adults with cognitive dysfunction and infants have been reported victims of massive indoor sting attacks by IFA. We report a case of fatal anaphylaxis to multiple native fire ant stings in an infant occurring indoors at a daycare facility.

A 3-month-old female was left unattended on a bed. The caregiver had heard the child crying, but attributed this to colic. A short time later, the caregiver found the child apneic and covered with ants. Emergency medical services were summoned, and resuscitation attempts were unsuccessful. Postmortem examination revealed approximately 40 erythematous lesions without pustules. Examination of the respiratory system was notable for congested parenchyma and mild laryngeal edema. Laboratory studies revealed an elevated tryptase of 23.9 ng/mL (normal <11.4 ng/mL; IBT Reference Laboratory, Lenexa, Kansas) and radioallergosorbent test (RAST) of 1.4% specific IgE antibody binding to *Solenopsis richteri* venom (courtesy of Donald Hoffman, PhD, East Carolina University, Greenville, North Carolina). RAST for specific IgE antibody binding to *Solenopsis invicta* venom was negative.

Ants recovered from the scene were identified by an entomologist as *Solenopsis xyloni*. The patient had no known history of atopic disease, and no known prior stings by fire ants, although she had attended the daycare facility since 6 weeks of age.

Native fire ants have features that distinguish them from IFA. *S. xyloni* and *S. aurea* do not build mounds, and *S.*

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geminata builds very low mounds.² The stings of *S. xyloni* and *S. aurea* do not typically result in pustule formation, which is characteristic of IFA. Stings by *S. geminata* may result in pustule formation.² Piperidine alkaloids, the nonallergenic toxins present in fire ant venom, are responsible for the formation of pustules.¹ Since the venom of native and imported *Solenopsis* species contains similar amounts of piperidine alkaloids, the ability of a sting of a particular species of fire ant to result in the formation of a pustule is probably a function of the structure of the alkaloids.⁵

There seems to be significant cross-reactivity among the venoms of native and imported *Solenopsis* species. Previous studies by Hoffman et al^{2,6} show that Sol 1 and Sol 3 allergens are highly cross-reactive among *Solenopsis* species, whereas there is some species' specificity for Sol 2 allergens. Furthermore, patients primarily sensitized to native fire ant venoms react mainly to the Sol 1 and Sol 3 allergens, whereas patients sensitized to IFA also react to Sol 2 and Sol 4 allergens.² This patient showed IgE reactivity to *S. richteri* venom, although she lacked reactivity to *S. invicta* venom. We would therefore speculate that the primary sensitization was to the Sol 2 allergen, with the lack of sensitization to Sol 1 and Sol 3 allergens.

Testing and treatment with IFA whole-body extract is likely to be effective for native fire ant allergy.² However, we propose that a mixture of *S. invicta* and *S. richteri* extracts be

used when native fire ant species are presumed to cause the primary sensitization to reduce the chance that species-specific reactivity is missed. Our patient was probably sensitized to native fire ants at the daycare facility shortly after starting attendance there, and experienced fatal anaphylaxis with subsequent stings. Native *Solenopsis* species should be considered a potential threat to cause anaphylactic reactions, both indoors and outdoors, in regions outside of those areas endemic for IFA.

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