



Fire Ant Anaphylaxis

Arden L. Levy MD , Jeffrey M. Wagner MD & Stanley H. Schuman MD, DrPH

To cite this article: Arden L. Levy MD , Jeffrey M. Wagner MD & Stanley H. Schuman MD, DrPH (1999) Fire Ant Anaphylaxis, Journal of Agromedicine, 5:4, 49-54, DOI: [10.1300/J096v05n04_05](https://doi.org/10.1300/J096v05n04_05)

To link to this article: https://doi.org/10.1300/J096v05n04_05



Published online: 11 Oct 2008.



Submit your article to this journal [↗](#)



Article views: 10



View related articles [↗](#)



Citing articles: 2 View citing articles [↗](#)

Fire Ant Anaphylaxis: Two Critical Cases in South Carolina

Arden L. Levy, MD
Jeffrey M. Wagner, MD
Stanley H. Schuman, MD, DrPH

ABSTRACT. Two clinical cases illustrate near-fatal reactions to fire ant venom encountered by an infant playing in the backyard, and by a pharmacist working indoors in a hospital setting under a ceiling ventilation duct.

KEYWORDS. Fire ant venom anaphylaxis, treatment of fire ant stings, desensitization by allergist

Red imported fire ants (RIFA) first arrived in the United States from South America by cargo ships through Mobile, Alabama in the early 1900's. Since that time, these ants have spread through the southern states infesting over 260 million acres. RIFA are located in areas with warm soil temperatures and adequate moisture, and range from Florida to Delaware. Systemic allergic reactions in the southeast are as common or more common from imported fire ant stings than from other stinging insects such as bees, wasps, yellowjackets, and hornets. These aggressive ants are also responsible for agricultural and live-

Arden L. Levy and Jeffrey M. Wagner are affiliated with the Foothills Allergy and Asthma Associates, Spartanburg, SC.

Stanley H. Schuman is affiliated with the Agromedicine Program, Department of Family Medicine and the Department of Pediatrics, Medical University of South Carolina, Charleston, SC.

Address correspondence to: Arden L. Levy, Foothills Allergy and Asthma Associates, 98 Willow Lane, Spartanburg, SC 29307.

stock damage. In South Carolina, RIFA are endemic and infest all 46 counties. The RIFA is found in both rural and urban settings, often displacing native, less toxic colonies of ants.

Previous studies have documented the increase in morbidity associated with RIFA in South Carolina. Between 1970-1972, a survey of 1,088 physicians reported 544 reactions in patients ranging from anaphylaxis (12.7%) to lesser allergic reactions (60.7%). Other complications were noted in 145 patients (26.7%). In 1986, over only a 12 month period, 513 physicians reported local reactions in 7,969 individuals (65.7%) and allergic reactions in 1,332 (11.0%).¹ This is dramatic increase in the number of reactions reported by physicians in this state, which reflects the impact of RIFA infestation and human exposure. Two cases of allergic reactions to RIFA highlight this medical concern. The following cases resided in the coastal areas of South Carolina.

CASE STUDIES

Patient #1 is a thirty-three year old female without significant past medical history. She has been stung on several occasions by RIFA developing only large local reactions without complications. This patient does have a history of mild seasonal allergic rhinitis in the spring. She is employed as a Pharmacist in a large suburban hospital. While filling a prescription in the hospital, one RIFA dropped from a ventilation unit onto her neck. She was stung several times by this single RIFA. Approximately five to ten minutes after the sting, she developed generalized pruritis followed by urticaria involving her neck and trunk. This further progressed to shortness of breath and she required treatment in the emergency room. This treatment included intramuscular diphenhydramine and subcutaneous epinephrine with good response.

This patient was evaluated for RIFA hypersensitivity two months after her anaphylactic episode. At that time she had significant positive testing to whole body IFA extract at an intradermal concentration of 1:1,000,000 wt/vol. She had already received a prescription for a home epinephrine kit and was placed on immunotherapy. After approximately 6 months of immunotherapy, this patient was accidentally restung by an RIFA developing only a moderate local reaction.

Patient #2 is a twenty-two month old female with a history of

reactive airways disease and perennial allergic rhinitis. On three previous occasions, this toddler had sat on an RIFA mound receiving several stings. These episodes have been unremarkable. Recently, her mother found her crying in the yard after receiving several RIFA stings. Within minutes, the patient developed diffuse angioedema, difficulty breathing and a hoarse cry most likely indicating laryngeal edema. Her mother rushed her to the nearest emergency room. She received epinephrine, nebulized albuterol and parental corticosteroid therapy with good resolution both of her angioedema and wheezing. Due to the severity of her reaction and the possibility of a late phase allergic reaction, she was hospitalized overnight with complete recovery.

Before discharge from the hospital her parents purchased an epinephrine kit. This patient was tested for imported fire ant allergy one month after her reaction. She was noted to have positive percutaneous testing to whole body RIFA extract. This patient also had positive intradermal testing at a concentration of 1:10,000,000 wt/vol. She began immunotherapy to whole body RIFA extract and is tolerating this well. No further stings have been noted since she started immunotherapy.

DISCUSSION

The two patients with RIFA allergy illustrate several interesting points. First, young children certainly may have life-threatening reactions to RIFA stings. Toddlers commonly will come into contact with these insect while playing outdoors. Often toddlers will sit on the large mounds constructed by RIFA, receiving several stings in the process. Secondly, these ants are not only confined to the great outdoors. The pharmacist developed anaphylaxis in the hospital, after a RIFA dropped from the ventilation system. The RIFA moves indoor with environmental changes, such as dry weather. It is not usual for individuals to have to battle these pest indoors with hazardous and sometimes life-threatening results.

There are over 10,000 species of ants in the world; however, only members of the genera *Solenopsis* and *Pogonomyrmex* have caused anaphylaxis in the US.² RIFA are in the same order Hymenoptera as other stinging insects, although there is no cross reactivity between RIFA venom and other stinging insects. The most aggressive and

prolific species of RIFA is *Solenopsis invicta*. This species infest 13 southern states, including South Carolina. A single queen may be with over 100,000 worker ants in a mound extending greater than 40 meters.³ RIFA have been able to extend the northern range of their distribution by traveling under or by the sides of highways, which provide conserved solar heat. The other genera, *Pogonmyrmex*, are known as harvester ants and have also caused human anaphylactic reactions.

Both fire ants and harvester ants attach to the skin with their mandibles and arch their backs injecting venom with their stinger. The average number of stings by a RIFA is eight, injecting on average 0.07 microliters of venom. These ants were named for their painful sting producing reactions ranging from local swelling to frank anaphylaxis. Neurologic reactions such as neuropathies and seizures have also been reported.⁴

The most common local reaction is a sterile pustule on an erythematous base, which develops after 24 hours. Insoluble alkaloids from RIFA venom are responsible for the formation of the sterile pustule. These alkaloids produce hemolytic, bactericidal, insecticidal and cytotoxic effects. The pustule that develops often remains several days and is a useful clinical tool in diagnosing RIFA stings. Large local reactions are common as well with erythema and edema of surrounding soft tissue. Individuals who have been sensitized to RIFA venom may develop anaphylaxis (Figure 1). These reactions may consist of flushing, urticaria, angioedema, laryngeal edema, bronchospasm or vascular collapse. Fatal reactions have occurred and in the United States there have been 83 reported deaths in victims from 16 months to 65 years of age.⁵ This list increases every year. There may also be several unrecognized deaths from RIFA stings annually.

The diagnosis of fire ant allergy is made by careful skin testing to RIFA whole body extract under experienced medically supervised conditions. RIFA whole body extract contains most of the antigens in venom that are associated with an allergic reaction. RAST testing is also available, but is often used only in correlation with skin testing. Certainly, clinical history must be used in determining those individuals warranting testing and treatment. Identification of the species can be helpful, although there is cross reactivity between RIFA species. Skin testing is performed initial by prick tests followed by intradermal tests until positive or a concentration of 10-3 wt/vol is reached.

FIGURE 1. Treatment of Acute Reactions to RIFA Stings

RIFA Sting(s)	
Local Reaction	Anaphylaxis & Systemic Reactions
Pain, erythema and swelling	Urticaria, angioedema, flushing Cardiovascular and Respiratory involvement (hypotension, shock, wheezing and difficulty swallowing)
Cold compresses to site, analgesics, antihistamines and short course of oral corticosteroids for extensive local reactions	Supportive Measures Evaluate checking airway and cardiac status (Therapies to be considered) Epinephrine aqueous solution (subcutaneous or intravenous) Tourniquet if extremity, release for 1 2 minutes q 10 minutes Oxygen, IV fluids Diphenhydramine (antihistamine) Corticosteroids (after acute episode) Essential Evaluation and Prevention Advice* for next RIFA sting

*Patients with systemic reaction must be given an emergency kit for treating anaphylaxis after acute exposure. The ANA Kit® is available containing a preloaded syringe with epinephrine 1:1000, chlorpheniramine tablets, alcohol wipes and tourniquet. Another delivery device is the Epipen® or Epipen Jr.® (for children under 60 lb). This is an automatic, spring-loaded delivery device containing epinephrine. The limited time available to the patient between RIFA sting and unconsciousness must be stressed for epinephrine emergency treatment.

SUMMARY

Once an individual has been determined to be RIFA allergic, immunotherapy is available. RIFA whole body extract is used to desensitize the allergic patient and appears to be effective. Comparison of the effectiveness of using RIFA whole body extract vs. RIFA venom extract is currently being studied. The patients reported in these two case studies illustrate the importance of recognition and treatment of

RIFA allergy. The first patient has been resting without developing any evidence of an allergic reaction. It is certain that the younger patient, who has not been resting yet will encounter RIFA as well.

Precautions to avoid RIFA stings are important. These precautions include closed-toed shoes, protective clothing and environmental use of insecticides and pheromones to decrease RIFA mounds near the home or playground. These patients should also be instructed to carry an emergency kit containing epinephrine in case of a life-threatening reaction. There is still much to be learned regarding the natural history of RIFA allergy and duration of immunotherapy. In development at this time is an improved fire ant venom immunotherapy. The risk of imported fire ant allergy will increase as these RIFA colonies continue to spread.

REFERENCES

1. Schuman SH, Banov CH, Caldwell ST, et al.: Impact of Fire Ant Sting Morbidity in South Carolina. *J S C Med Assoc* 1987; 83:249-252.
2. Lockett RF: Systemic Reactions to Stinging Ants. *J Allergy Clin Immunol* 1974; 54: 132-148.
3. Stafford CT: Hypersensitivity to Fire Ant Venom. *Annals Allergy, Asthma & Immunol* 1996; 77:87-94.
4. Fox RW, Lockett RF: Neurologic Sequelae Following the Imported Fire Ant. *Int Arch Allergy Immunol* 1994; 102:417-420.
5. Rhodes RB, et al.: Survey of Fatal Anaphylactic Reactions to Imported Fire Ant. Report of the Fire Ant Subcommittee of the American Academy of Allergy & Immunol. *J Allergy Clin Immunol* 1989; 84:159-162.