



Figure 1



Figure 2



Figure 3

Fire Ants: *An EMS perspective*

By Bryan E. Bledsoe, DO, FACEP





Introduction

As a kid growing up in Fort Worth in the late 50s and early 60s I don't remember getting stung by fire ants. But today, my three-year-old grandson can readily identify a fire ant mound and stay some distance away. Like many, he learned by experience.

Fire ants have become a major agricultural problem and a major nuisance in Texas. The sting of the fire ant is painful and has sent many people to hospital emergency departments. While a resident at Scott and White Memorial Hospital in the late 80s, I assisted a plastic surgeon in performing a skin graft to the dorsum of a 16-year-old girl's foot. She sloughed so much skin from multiple fire ant stings that skin grafting was required. Although this was a severe case, it provides evidence as to just how bad fire ants can be.

History

Native to South America, the red fire ant was imported into the United States through the Port of Mobile, Alabama, in the 1930s. They were believed to have been transported in soil that was used as ballast for a ship traveling from South America to Alabama. Over the last 70 or so years they have spread across the southeastern United States and into Texas (figures 6 and 7). It is estimated that fire ants cause in excess of \$2 billion per year in damages in the United States alone. Fire ants have sub-

sequently been transported to Australia through the Port of Brisbane, Queensland, evidently from both South America and the United States. The Australian government is mounting an aggressive campaign to eradicate these pests at a cost in excess of \$100 million.¹

Biology

The red fire ant is a native of South America (along the Paraguay and Paraná rivers). The scientific name is *Solenopsis invicta* (invicta is Latin for "invincible," a term that well describes the fire ant). They are a member of the Hymenoptera order. There are three families in this order: fire ants (Formicoidea); wasps, yellow jackets, and hornets (Vespidae); and honey bees (Apoidea). They are typically 2-6 millimeters (1/16-1/4 inch) long and reddish-brown to black in color. Their behavior is very aggressive, especially when compared to native Texas ants.

Fire ants are easily aroused and can attack in massive numbers. Vibration is usually the stimulus for attack. When they attack, fire ants first attach themselves to their prey with their mandibles (jaws). Then, they draw their tail under their abdomen and force the stinger into the victim's tissue and inject their venom. The venom is produced in a poison gland and stored in a venom reservoir. This reservoir opens into a poison bulb located at the base of the stinger (figure 4).

Fire ant venom causes immediate

It is estimated that fire ants cause in excess of \$2 billion dollars per year in damages in the United States alone.



Figure 4



ILLUSTRATION PHOTOS, FIGURES 1, 2, AND 3, ON FACING PAGE: Upper left photo, shows reaction to imported red fire ant stings on the arm of a teenager—*Courtesy U.S. Department of Agriculture.*

The other two photos of fire ant stings—*Courtesy of Bryan Bledsoe, DO.*



When disturbed, usually through vibration, the ants aggressively leave the mound and sting immediately. In contrast, most native ant species will leave the mound and run away when disturbed.



pain, followed by the formation of a pustule at the site of the sting (figures 1, 2 and 3). The venom is a mixture of alkaloids (95 percent) and proteins and other small molecules (5 percent). The alkaloid component causes tissue necrosis and the formation of the pustule. One of the proteins in the protein component can cause severe allergic reactions and anaphylaxis in patients allergic to bee and wasp venoms.

Fire ant mounds can be readily distinguished from the mounds of native ant species (figure 5). First, fire ant mounds are rarely larger than 18 inches in diameter. When disturbed, the ants aggressively leave the mound and sting immediately. In contrast, most native ant species will leave the mound and run away when disturbed.

Fire ants are somewhat unique in that they can have either single-queen

or multiple-queen mounds. With single-queen (monogyne form) mounds, there is only one queen per mound and there are usually more mounds per acre (but fewer ants per acre). The single-queen mounds usually have slightly larger worker ants and the ants tend to be territorial. Multiple-queen (polygyne form) mounds can have dozens of queens per colony. But there are fewer colonies per acre and these colonies are usually interconnected, resulting in more ants per acre. The worker ants in multiple-queen colonies tend to be somewhat smaller. In Texas, multiple-queen mounds are more common than single-queen mounds.

From an economic and ecological standpoint, fire ants are a major burden for Texas and the other southern states where they have spread. They cause increased agricultural production costs and require the use of increased pesticides. They have been known to short out electrical equipment and damage mowers and agricultural equipment. Fire ants are a particular problem for native wildlife. They kill and eat ground-nesting birds and mammals, such as deer, quail, lizards and song birds. They can maim deer fawns by attacking the eyes, rendering the fawn blind and unable to nurse or escape predators. Some endangered species, such as the horned lizard ("horny toad"), are extremely vulnerable to fire ants.

Most entomologists feel that it is impossible to eliminate fire ants from North America. For control, they recommend a two-step program whereby poison baits (i.e., Amdro™) are spread once or twice by broadcast

Objectives:

On completion of this article the EMS professional will be able to:

1. Describe the red fire ant and discuss how it became a problem in Texas.
2. Discuss the pathophysiology of fire ant stings.
3. Describe the signs and symptoms of fire ant stings.
4. Detail signs and symptoms of fire ant stings that should alert the EMT as to possible severe reaction.
5. Discuss the prehospital treatment of fire ant stings.



spreader. This is followed a short time later with direct application of a pesticide to remaining mounds. These programs will control fire ant populations but will not eliminate them. Researchers are investigating the use of natural fire ant enemies (found in South America) for control of fire ants in North America. These include such things as decapitating flies and a fungus that appears to weaken fire ant colonies. At this time, these biological controls are not yet available.

Pathophysiology

We know that fire ants can hurt, but they also can kill. In a recent report, a 30-year-old woman in Dallas died from an anaphylactic reaction to multiple fire ant stings.² In a 1989 survey, there were 32 reported fatal anaphylactic reactions from fire ant stings in Texas (14), Florida (10), Alabama (4), Georgia (2) and Louisiana (2).³ In fact, in areas where fire ants are present (southeastern US), fire ants are a more common cause of Hymenoptera allergic reactions than bees and wasps!⁴ A similar increase in anaphylactic reactions from fire ant stings has also been reported in Australia.⁵ Children appear particularly at risk for problems related to fire ant stings.^{6,7}

Fire ants have been known to invade residences and health care facilities. Two nursing homes in Mississippi were invaded by fire ants resulting in ten patients being stung, two of whom died from the stings (both had neurological impairments).⁸ In some cases, fire ant stings have resulted in grand mal seizures and other neurological complications.^{9,10}

EMS Care

From an EMS standpoint, management of fire ant stings involves identifying the cause and applying the appropriate treatment. Because fire ants are so small, people may not be aware that the stings may be the source of their problem. Generally, there are two types of care provided to victims of fire ant stings—local and generalized care. Generalized care is required if the patient is exhibiting symptoms of a severe allergic or anaphylactic reaction. In one study, approximately two percent of patients with fire ant stings develop life-threatening anaphylaxis.¹¹

Local Care

Once fire ants sting and the venom injected, the damage has already been done, so treatment is supportive. If you encounter a victim of suspected fire ant stings, first assure that all of the ants have been removed from the patient. While wearing medical gloves, brush the ants away, being careful not to get stung yourself. If there are a large number of ants, consider using a vacuum cleaner to remove the ants from and around the patient.

Stings can be treated with any number of over-the-counter anti-itch or topical pain relief preparations. If there are multiple stings over a large area, consider the use of cool soaks. Most importantly, monitor the patient for any signs and symptoms of a more serious reaction. Be alert for excessive local swelling, dyspnea, facial and/or tongue swelling (angioedema), stridor or similar findings. If these develop, the patient is developing a generalized reaction to the fire ant venom. An old

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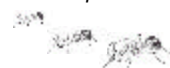





Figure 5
 Typical imported red
 fire ant mound.


In certain patients, one of the proteins in fire ant venom can cause a severe allergic reaction or even anaphylaxis.



treatment recommended for fire ant stings, the application of meat tenderizer to the sting sites, has been found to be ineffective.¹²

Generalized Care

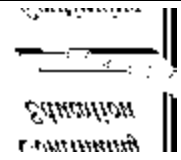
In certain patients, one of the proteins in fire ant venom can cause a severe allergic reaction or even anaphylaxis. Anaphylaxis results from exposure to a particular substance called an allergen (in this case a protein) that sets off a biochemical chain of events that can ultimately lead to shock and death.

Following exposure to a particular allergen, large quantities of IgE antibodies are released. These antibodies attach to the membranes of basophiles and mast cells, specialized cells of the

immune system that contain chemicals that assist in the immune response. When the allergen binds to IgE attached to the basophiles and mast cells, these cells release histamine, heparin and other substances into the surrounding tissues. Histamine and other substances are stored in granules found within the basophiles and mast cells; because of this feature, basophiles and mast cells are often called granulocytes. The process of releasing these substances from the cells is called degranulation. This release results in an allergic reaction which can range from very mild to very severe.

The principal chemical mediator of an allergic reaction is histamine. Histamine is a potent substance that causes bronchoconstriction, increased intestinal motility, vasodilation and increased vascular permeability. Increased vascular permeability causes the leakage of fluid from the circulatory system into the surrounding tissues. A common manifestation of severe allergic reactions and anaphylaxis is angioneurotic edema. Angioneurotic edema, also called angioedema, is marked edema of the skin and usually involves the head, neck, face and upper airway.

Histamine activates specialized histamine receptors present throughout the body. There are two classes of histamine receptors. H1 receptors, when stimulated, cause bronchoconstriction and contraction of the intestines. H2 receptors cause peripheral vasodilation and secretion of gastric acids. The goal of histamine release is to minimize the body's exposure to the antigen. Bronchoconstriction de-



creases the possibility of the antigen entering through the respiratory tract. Increased gastric acid production helps destroy an ingested antigen. Increased intestinal motility serves to move the antigen quickly through the gastrointestinal system with minimal absorption of the antigen into the body. Vasodilation and capillary permeability help remove the allergen from the circulation, where it has the potential to do the most harm.

Anaphylaxis usually occurs when a specific allergen is injected directly into the circulation. This is the reason anaphylaxis is more common following injections of drugs, diagnostic agents and bee stings. When the allergen enters the circulation, it is distributed widely throughout the body. The allergen interacts with both basophiles and mast cells, resulting in the massive dumping of histamine and other substances associated with anaphylaxis. The principal body systems affected by anaphylaxis are the cardiovascular system, the respiratory system, the gastrointestinal system and the skin. Histamine causes widespread peripheral vasodilation as well as increased permeability of the capillaries. Increased capillary permeability results in marked loss of plasma from the circulation. People sustaining anaphylaxis can actually die from circulatory shock.

Also released from the basophiles and mast cells is a substance called slow-reacting substance of anaphylaxis (SRS-A). This causes spasm of the bronchial smooth muscle, resulting in an asthma-like attack and occasionally asphyxia. SRS-A potentiates the effects of histamine, especially on the respiratory system.


The signs and symptoms of anaphylaxis usually begin within 30–60 seconds following exposure to the offending allergen. In a small percentage of patients the onset of signs and symptoms may be delayed by more than an hour. The signs and symptoms of anaphylaxis can vary significantly. The severity of the reaction is often related to the speed of onset. Reactions that develop very quickly tend to be much more severe.

A rapid and focused assessment is crucial to the early detection and treatment of anaphylaxis. Patients suffering an anaphylactic reaction often have a sense of impending doom. This sense of impending doom is often followed by development of additional signs and symptoms.


If the patient's condition permits, a brief history should be gathered, including previous allergen exposures and reactions. If possible, try to determine how quickly symptoms started and how severe they were.

Next, quickly evaluate the patient's level of consciousness. Upper airway problems, including laryngeal edema, may result in the patient being unable to speak. As the emergency progresses, the patient will become restless. As cardiovascular collapse continues, the patient will exhibit a decreased level of consciousness. If untreated, this may continue to unresponsiveness.

As noted earlier, a common manifestation of anaphylaxis is angioneurotic edema, involving the face and neck. Laryngeal edema is also a frequent complication and can threaten the airway. Initially, laryngeal edema will cause a hoarse voice. As the ede-



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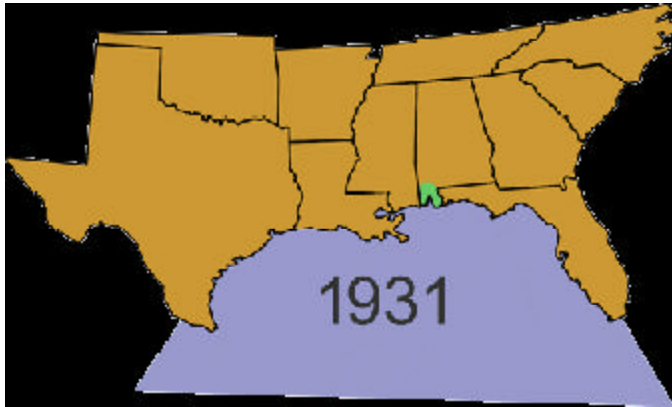


Figure 6
The red fire ant is native to South America and was imported into the United States through the Port of Mobile, Alabama, in the 1930s. They were believed to have been transported in soil that was used as ballast for a ship traveling from South America to Alabama.

ma worsens, the patient may develop stridor. Finally, this all may lead to complete airway obstruction from either massive laryngeal edema, laryngospasm, pharyngeal edema, or a combination of any of these.

The respiratory system is significantly involved in an anaphylactic reaction. Initially, the patient will become tachypneic. Later, as lower airway edema and bronchospasm develop, respirations will become labored as evidenced by retractions, accessory muscle usage and prolonged expirations. Wheezing, resulting from bronchospasm and edema of the smaller airways, is a common manifestation and may be so pronounced that it can be heard without the aid of a stethoscope. Ultimately, anaphylaxis can result in markedly diminished lung sounds, which reflect decreased air movement and hypoventilation.

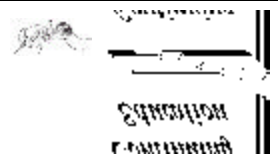
The skin is typically involved early in severe allergic reactions and anaphylaxis. Pustules that result from the alkaloid component of fire ant venom generally do not develop for 24 hours. Generally, a fine red rash will appear diffusely on the body. As histamine is released, fluid will diffuse from leaky capillaries, resulting in urticaria. Urticaria, also called "hives," is a wheal

and flare reaction characterized by red, raised bumps which may appear and disappear across the body. As cardiovascular collapse and dyspnea progresses, the patient will become diaphoretic. This may, if untreated, progress to cyanosis and pallor.

The effect of histamine on the gastrointestinal system is pronounced. Initially, the patient may note a rumbling sensation in the abdomen as gastrointestinal motility increases. On physical examination, this may be evident as hyperactive bowel sounds. Later, nausea, vomiting and diarrhea develop as the body tries to rid itself of the offending allergen.

The vital signs will vary depending on the severity and stage of the severe allergic or anaphylactic reaction. Initially there will be an increase in both the heart and respiratory rate. As airway edema and dyspnea occurs, the respiratory rate can fall. The blood pressure will fall when significant capillary leakage and peripheral vasodilation occurs. This will often result in a reflex tachycardia as the body attempts to compensate for the fall in blood pressure. Very late in anaphylaxis the heart rate will fall. This too should be considered a very ominous sign.

State of the art advanced prehospital care of anaphylaxis includes use of all available monitoring devices. These include the cardiac monitor, the pulse oximeter and, if the patient is intubated, end-tidal carbon dioxide monitoring. As anaphylaxis progresses, the end-tidal carbon dioxide level may climb due to the development of both respiratory and metabolic acidosis, which results in increased carbon di-



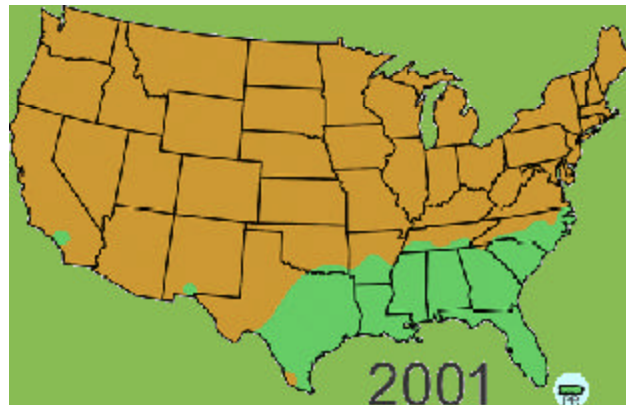
oxide elimination.

When responding to a patient with an anaphylactic reaction, first assure that the scene is safe to approach. The presence of fire ants can pose a risk to EMS personnel as well as to the patient and bystanders. If the patient is still in contact with the ants, he or she should be moved a safe distance away.

Always consider the possibility of trauma in anaphylaxis. If there is any suspicion of coincidental trauma, stabilize the cervical spine. It is not uncommon for people to fall or otherwise injure themselves as they try to escape. Signs and symptoms of trauma may be masked by those of anaphylaxis.

Position the patient and protect the airway. Administer oxygen via a nonrebreather mask. If the patient is hypoventilating or apneic, initiate ventilatory assistance. If an airway problem is detected, first apply basic airway maneuvers such as head positioning or the modified jaw-thrust maneuver. Use oropharyngeal and nasopharyngeal airways with caution as they can cause laryngospasm. If the patient is having severe airway problems, consider early endotracheal intubation to prevent complete occlusion of the airway. It is important to remember that the glottic opening may be smaller than expected due to laryngeal edema. Also, the larynx will be very irritable and any manipulation of the airway may lead to laryngospasm. Ideally, the most experienced member of the crew should perform endotracheal intubation, as only one attempt may be possible. Have available equipment for placement of a surgical airway, such as a needle cricothyrotomy, in case it is needed.

Establish an IV as soon as possible



with a crystalloid solution such as lactated Ringer's or normal saline. Remember that patients suffering anaphylaxis are volume-depleted due to histamine-mediated third spacing of fluid. If the patient is hypotensive, administer fluids wide-open. If time allows, place a second IV line.

The primary treatment for anaphylaxis is pharmacological. If the necessary drugs cannot be administered in the field, then the patient should be transported to the emergency department immediately. Emergency medications used in the treatment of anaphylaxis include oxygen, epinephrine, antihistamines, corticosteroids and vasopressors. Occasionally, inhaled beta agonists, such as albuterol, may be required.

Oxygen Oxygen is always the first drug to administer to a patient with an anaphylactic reaction. Administer high-concentration oxygen with a nonrebreather mask or similar device. If mechanical ventilation is required, attach supplemental oxygen to assure as high an oxygen delivery as possible.

Epinephrine The primary drug for use in treatment of severe allergic reactions and anaphylaxis is epinephrine. Epinephrine is a sympathetic agonist. It causes an increase in heart rate, strength of the cardiac contractile

Figure 7

Over the last 70 or so years fire ants have spread from Alabama across the southeastern United States and into Texas.

Fire ants have been transported to Australia through the Port of Brisbane, Queensland, evidently from both South America and the United States. The Australian government is planning an aggressive campaign to eradicate these pests at a cost in excess of \$100 million.¹



In Texas, fire ants now account for more allergic reactions than wasps and bees.

force and peripheral vasoconstriction. It can also reverse some of the bronchospasm associated with anaphylaxis. Epinephrine also reverses much of the capillary permeability caused by histamine. It acts within minutes of administration. In severe anaphylaxis, characterized by hypotension and/or severe airway obstruction, administer epinephrine 1:10,000 intravenously. In less severe cases, epinephrine 1:1,000 can be administered subcutaneously. Epinephrine 1:10,000 contains 1 milligram of epinephrine in 10 milliliters of solvent. The standard adult dose is 0.3–0.5 mg; child dose is 0.01 mg/kg. The effects of intravenous epinephrine wear off in 3–5 minutes, so repeat boluses may be required. In severe cases of sustained anaphylaxis, medical direction may order the preparation and administration of an epinephrine drip.

Antihistamines Antihistamines are second-line agents in the treatment of anaphylaxis. They should only be given following the administration of epinephrine. Antihistamines block the effects of histamine by blocking histamine receptors. They do not displace histamine from the receptors. They only block additional histamine from binding. They also help reduce histamine release from mast cells and basophils. Most antihistamines are non-selective and block both H1 and H2 receptors. Others are more selective for either H1 or H2 receptors. Diphenhydramine (Benadryl) is probably the most frequently used antihistamine in the treatment of allergic reactions and anaphylaxis. It is non-selective and acts on both H1 and H2 receptors. The standard dose of diphenhydramine is 25–50 milligrams

intravenously or intramuscularly. It should be administered slowly when given intravenously. The pediatric dose of diphenhydramine is 1–2 milligrams per kilogram of body weight. Other non-selective antihistamines frequently used are hydroxyzine (Atarax, Vistaril) and promethazine (Phenergan). Hydroxyzine is a potent antihistamine, but it can only be administered intramuscularly. Promethazine can be administered intravenously or intramuscularly, but does not appear to be as potent as diphenhydramine.

Corticosteroids Corticosteroids are important in the treatment and prevention of anaphylaxis. Although they are of little benefit in the initial stages of treatment they help suppress the inflammatory response associated with these emergencies. Commonly used corticosteroids include methylprednisolone (Solu-Medrol), hydrocortisone (Solu-Cortef), and dexamethasone (Decadron).

Vasopressors Severe and prolonged anaphylactic reactions may require the use of potent vasopressors to support blood pressure. Use these medications in conjunction with first-line therapy and adequate fluid resuscitation. Commonly used agents include dopamine, norepinephrine and epinephrine. These medications are prepared as infusions and are continuously administered to support blood pressure and cardiac output.

Beta Agonists Many patients with severe allergic reactions and anaphylaxis will develop bronchospasm, laryngeal edema or both. In these cases, an inhaled beta agonist can be useful. The most frequently used beta agonist in prehospital care is albuterol (Vento-



lin, Proventil). Although usually used in the treatment of asthma, these agents will help reverse some of the bronchospasm and laryngeal edema associated with anaphylaxis. Give the adult patient 0.5 milliliters of albuterol in 3 milliliters of normal saline via a hand-held nebulizer. Children should receive 0.2–0.5 milliliters of albuterol based on their weight. Other beta agonists may be used instead of albuterol.

A severe allergic or anaphylactic reaction is a harrowing experience for the patient. Although it is essential to work fast, prehospital crews should provide the patient emotional support and explain the treatment regimen. Caution patients about the potential side effects of administered medications. For example, epinephrine will often cause a rapid heart rate, anxiety and tremulousness. Likewise, the antihistamines may cause a dry mouth, thirst and sedation. Careful explanation and emotional support will help allay patient anxiety and apprehension.¹³

Summary

Fire ants are here to stay (see figure 7). As they spread across Texas and surrounding states, they will continue to cause problems for humans and other species. Although EMS calls for fire ant stings are relatively uncommon, it is important to recognize that fire ant stings can cause severe allergic reactions and anaphylaxis—sometimes leading to death. In Texas, fire ants now account for more allergic reactions than wasps and bees. Always consider fire ant stings when you encounter patients with allergic or anaphylactic reactions when the cause may not readily be apparent.

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Bryan Bledsoe entered EMS in 1974 as an EMT and attended one of the first paramedic programs in north Texas. Dr. Bledsoe has a B.S. from the University of Texas and a D.O. from the University of North Texas.

CE questions—Medical

BLS must answer questions 1-10; ALS must answer all questions.

BLS

1. Fire ants first entered the United States through which of the following ports?
A. Port of Galveston
B. Port of New Orleans
C. Port of Mobile
D. Port of Memphis
2. The fire ant is native to which of the following continents?
A. Africa
B. South America
C. Asia
D. Australia
3. Fire ants belong to which of the following taxonomic orders?
A. Toxicodendron
B. Hymenoptera
C. Cetacea
D. Crotalus
4. Which of the following stimulates fire ants to attack?
A. Vibration
B. Sound
C. Light
D. Aroma
5. Fire ant stings have resulted in deaths from which of the following causes?
A. Asphyxiation
B. Cardiomyopathy
C. Neurotoxicity
D. Anaphylaxis
6. Marked facial and tongue swelling that can occur following fire ant stings is called which of the following?
A. Angioma
B. Angioneurotic edema
C. Angiogenesis
D. Angiospasm
7. The principle chemical substance responsible for anaphylaxis is which of the following?
A. Heparin
B. Aspirin
C. Histamine
D. Antihistamine
8. Simple fire ant stings can be distinguished from an anaphylactic reaction by the presence of which of the following?
A. Rash
B. Pustules
C. Psoriasis
D. Urticaria
9. During severe anaphylaxis, the blood pressure typically exhibits which of the following characteristics?
A. Falls dramatically
B. Elevates dramatically
C. Remains unchanged
D. Rises then returns to normal
10. Which of the following account for more allergic reactions in Texas?
A. Bees
B. Wasps
C. Fire ants
D. Killer bees
11. Which of the following drugs would not be used in treating a severe allergic reaction following fire ant stings?
A. Epinephrine
B. Diphenhydramine
C. Dopamine
D. Labetalol
12. The principle compounds in fire ant venom include which of the following?
A. Aromatic hydrocarbons and synthetic polymers
B. Alkaloids and proteins
C. Acids and organic flurocarbons
D. Large-chain carbohydrates and cholesterol
13. The severe allergic reaction sometimes seen following fire ant stings is mediated by which of the following compounds?
A. IgE
B. IgA
C. IgM
D. IgG
14. Which of the following would not be classified as an antihistamine?
A. Diphenhydramine
B. Hydroxyzine
C. Promethazine
D. Dexamethasone
15. Which of the following is not a sign or symptom of anaphylaxis?
A. Anhydrosis
B. Tachycardia
C. Diaphoresis
D. Wheezing

ALS

This answer sheet must be postmarked by April 20, 2004.

CE Answer Sheet Texas EMS Magazine

Name _____ SSN _____

Certification Level _____ Expiration Date _____

Organization _____ Work Phone _____
area code

Address _____ City _____
street

State _____ Zip _____ Home Phone _____
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Note: Due to the cost of processing CE, each answer sheet must be accompanied by a check or money order for \$5, made out to UT Southwestern.

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You will receive your certificate for 1.5 hours of CE about six weeks after the closing date. A grade of 70 percent is required to receive CE credit.

Answer Form

Check the appropriate box for each question. All questions must be answered. BLS must answer 1-10; ALS must answer all questions.

- | | | | | | | | |
|--------------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------|-----------------------------|-----------------------------|
| 1. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 9. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
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| 3. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 11. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 4. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 12. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 5. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 13. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 6. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 14. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 7. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 15. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 8. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | | | | |

Did you enclose your \$5 check or money order?