

# Ricin Toxicity !

## PROTOCOL CHECKLIST

- Enter available information into Merlin upon receipt of initial report ([see page 2](#))
- Review information on the poisoning and its epidemiology ([see page 2](#)), case definition ([see page 4](#)), and laboratory testing ([see page 5](#))
- Contact provider ([see page 5](#))
- Interview patient ([see page 5](#))
  - Complete case report form
  - Provide background on ricin toxicity
  - Ask about activities during exposure period
    - Identify geographic points of interest
    - Potential exposure at geographic points of interest
    - Ingestion or exposure to castor beans
    - Intentional poisoning
      - If exposure is thought to be intentional and criminal, report to local law enforcement immediately
    - Health effects and medical information
  - Other household members experiencing similar symptoms
  - Address patient's questions or concerns
- Environmental evaluation ([see page 6](#))
- Enter additional data obtained from interview into Merlin ([see page 6](#))

## Ricin Toxicity

### 1. DISEASE REPORTING

#### A. Purpose of reporting and surveillance

1. To determine if there is a source of intoxication of public health concern
2. To prevent further/continued exposure
3. To identify potential release of a select agent

#### B. Legal reporting requirements

Laboratories and physicians are required to report ricin poisonings to the county health department (CHD) immediately 24/7 upon initial suspicion or laboratory test order, prior to confirmatory diagnosis. Practitioners are also responsible to supply laboratories with all necessary information for the laboratories to fulfill specified reporting requirements.

#### C. County health department investigation responsibilities

1. Begin investigation on the same day as notification.
2. Immediately notify Chemical Disease Surveillance Program (CDSP) when a case of ricin toxicity is suspected. DOH epidemiologists and toxicologists are available to assist CHDs with investigations as needed.
3. Immediately notify the Florida Department of Law Enforcement (FDLE) when a case of ricin toxicity is suspected and may be the result of an intentional exposure.
4. Enter data into the Merlin reporting system. Create a case in Merlin under disease code **RICIN TOXICITY-98830**. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, and attach all relevant labs and the completed case report form. Attach case report form (CRF) and other related documents (e.g., Medical Examiners report) in Merlin. Please attach **ALL** labs received via electronic laboratory reporting (ELR).
5. Direct the patient to the phone number below for more information.  
1-800-222-1222 (Florida Poison Information Center Network, available 24/7).

### 2. POISONING AND ITS EPIDEMIOLOGY

#### A. Etiologic agent

Ricin is listed as both a biological and chemical agent on the CDC Web site, and ricin is classified as a Category B priority pathogen under the [National Institute of Allergy and Infectious Disease strategic plan](#).<sup>1</sup> Ricin is a poison found naturally in castor beans. If castor beans are chewed and swallowed, the released ricin can cause injury. Ricin can be made from the waste material left over from processing castor beans. Ricin can be in the

form of a powder, mist, pellet, or it can be dissolved in water or weak acid. It is a stable substance under normal conditions, but can be inactivated by heat above 80 degrees [Centigrade](#).<sup>2</sup>

## **B. Description of illness**

The major symptoms of ricin poisoning depend on the route of exposure and the dose received, though many organs may be affected in severe cases. Initial symptoms of ricin poisoning by inhalation may occur within eight hours of exposure. Inhalation of ricin typically leads to cough and respiratory distress followed by pulmonary edema, respiratory failure, and multi-system organ dysfunction. Weakness and influenza-like symptoms of fever, myalgia, and arthralgia might also be reported. Following ingestion of ricin, initial symptoms typically occur in less than six hours. Ingestion of ricin may cause internal bleeding of the stomach and intestines that may lead to vomiting and bloody diarrhea. This may be followed by hypovolemic shock and multisystem organ dysfunction. Weakness and influenza-like symptoms, fever, myalgia, and arthralgia, might also be reported. Death from ricin poisoning could take place within 36 to 72 hours of exposure, whether by inhalation, ingestion, or injection, depending on the dose. If the person lives longer than five days without complications, he or she will probably survive.

## **C. Reservoirs**

Ricin is a poison found naturally in castor beans. If castor beans are chewed and swallowed, the released ricin can cause injury. Ricin can be made from the waste material left over from processing castor beans. Ricin can be in the form of a powder, a mist, a pellet, or it can be dissolved in water or weak acid. It is a stable substance under normal conditions, but can be inactivated by heat above 80 degrees Centigrade.

## **D. Modes of transmission**

Ricin poisoning is not contagious. It cannot be spread from person to person through casual contact. Routes of exposure include inhalation, injection, ingestion, dermal contact (exposure risk is low; absorption through non-intact skin or via a solvent carrier), or ocular contact. It would take a deliberate act to make ricin and use it to poison people. Accidental exposure to ricin is highly unlikely, except through the ingestion of castor beans. If made into a partially purified material or refined into a terrorist or warfare agent, ricin could be used to expose people through the air, food, or water.

## **E. Incubation period**

Initial symptoms of ricin poisoning by inhalation may occur within eight hours of exposure. Following ingestion of ricin, initial symptoms typically occur in less than six hours.

## **F. Period of communicability**

Not communicable person-to-person.

## **G. Treatment**

Because no antidote exists for ricin, the most important factor is avoiding ricin exposure. If exposure cannot be avoided, the ricin needs to be removed or purged from the body as quickly as possible. Symptomatic ricin poisoning is treated by giving victims supportive

medical care to minimize the effects of the poisoning. The types of supportive medical care would depend on several factors, such as the route by which victim was poisoned (that is, whether poisoning was by inhalation, ingestion, or skin or eye exposure). Care could include such measures as helping the victim breathe, providing intravenous fluids, providing medications to treat conditions such as seizure and low blood pressure, flushing the stomach with activated charcoal (if the ricin has been very recently ingested), or washing out the eyes with water if the eyes are irritated.

## H. Prophylaxis

None indicated.

## I. Ricin toxicity in Florida

Zero cases of ricin toxicity have been reported to date in Florida. However, in two separate incidents Florida residents have been arrested for producing or attempting to produce ricin. In 1999, a Tampa resident was found to have materials capable of producing ricin, and in 2005 an Ocala resident was able to create over 500mg of the toxin.

## 3. CASE DEFINITION

### A. Clinical description

- Inhalation: Inhalation of ricin typically leads to cough and respiratory distress followed by pulmonary edema, respiratory failure, and multi-system organ dysfunction. Weakness and influenza-like symptoms of fever, myalgia, and arthralgia might also be reported.
- Ingestion: Ingestion of ricin may cause internal bleeding of the stomach and intestines that would lead to vomiting and bloody diarrhea. This may be followed by hypovolemic shock and multisystem organ dysfunction. Weakness and influenza-like symptoms, fever, myalgia, and arthralgia, might also be reported.
- Injection (data are limited): Low doses of intravenous ricin may result in influenza-like symptoms of fatigue and myalgia. Pain at the injection site. Depending on dose, may progress to multi-organ failure.
- Skin and eye exposure: Ricin is unlikely to be absorbed through skin. Contact with ricin powders or products may cause redness and pain of the skin and eyes.
- Death from ricin poisoning could take place depending on the route of exposure (inhalation, ingestion, or injection) and the dose received.

### B. Laboratory criteria for diagnosis

- Environmental: Detection of ricin in environmental samples  
OR
- Biologic: Detection of ricinine in urine samples

### C. Case classification

Confirmed: A clinically compatible case with laboratory confirmation.

**Probable:** A clinically compatible case with a high index of suspicion (reliable intelligence or patient history) for ricin exposure or with an epidemiological link to a laboratory-confirmed case.

A case can be confirmed in the absence of laboratory testing if either a predominant amount of clinical and nonspecific laboratory evidence that ricin is present or if there is 100% certainty of the etiology of the agent.

#### D. Comment

**Specimens from all cases must be submitted to the Bureau of Public Health Laboratories for confirmation. Ricin has been identified as a potential bioterrorism agent by the [CDC](#).<sup>3</sup>**

## 4. LABORATORY TESTING

Ricin has been identified as a potential bioterrorism agent and it is likely that an incident involving ricin will be the result of a deliberate act and the sample/specimen analysis may be considered as admissible in court. Therefore, it is critical that **chain-of-custody** is carefully followed.

#### A. Specimen collection

- Environmental: For safety reasons, it is important that CHD staff do not attempt to collect environmental samples. HAZMAT assistance should be requested. It is important that first responders work in conjunction with law enforcement officials, as collected samples may become evidence during criminal prosecution.
- Clinical: "[CDC shipping instructions for collecting specimens from people who may have been exposed to chemical-terrorism agents](#)", which includes instructions on specimen collection, can be found on the BPHL intranet site.

#### B. Specimen shipping

- Environmental: The document "[Domestic security environmental sample submission form – Biological](#)" can be found on the BPHL intranet site. This document provides instructions for submitting an environmental sample.
- Clinical: "[CDC shipping instructions for collecting specimens from people who may have been exposed to chemical-terrorism agents](#)" can be found on the BPHL intranet site. Additional forms for specimen submission and shipping can be found in the forms section on the [BPHL intranet site](#).

#### C. Specimen Testing

- Environmental: Time-resolved fluorescence immunoassay and polymerase chain reaction (PCR).
- Clinical: HPLC-ESI-MS can be used to measure ricinine, a marker of ricin exposure, in urine.

Please contact the Jacksonville Laboratory for testing and additional information on sampling and testing.

Mailing addresses for Jacksonville Laboratory

1217 Pearl Street  
Jacksonville, FL. 32202  
P. O. Box 210  
Jacksonville, FL. 32231

Contact by phone or FAX

Telephone: (904)791-1500  
FAX:(904)791-1567

## 5. CASE INVESTIGATION

### A. Contact the physician or hospital

1. Confirm that ricin toxicity has been diagnosed in the reported patient.
2. Obtain the following:
  - a. Date of onset
  - b. Signs and symptoms
  - c. Tests performed
  - d. Treatment
  - e. Other persons with similar case presentation
3. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.
4. Obtain as much demographic information as possible, including contact information (home, cellular, pager and/or work numbers). Ask how and where the patient can be contacted (i.e., at hospital or home).
5. Notify the physician that you will be contacting the patient as DOH follows up on all cases of ricin toxicity to assess exposure and to identify potential means for preventing additional poisonings. It may also be appropriate at this point to determine if the physician has any concerns about the health department contacting the case.

### B. Interview the case

The CHD conducts case follow-up and investigation including the collection of additional situational and risk related information. There is no specific case report form designed for ricin toxicity. However, a case of exposure to ricin toxin shall be reported immediately upon initial suspicion or laboratory test order, 24/7 by phone. A generic case report form can be found at:

[http://www.doh.state.fl.us/disease\\_ctrl/epi/surv/Basic\\_Case\\_Investigation\\_Form.pdf](http://www.doh.state.fl.us/disease_ctrl/epi/surv/Basic_Case_Investigation_Form.pdf)

1. Contact the patient to complete an interview as soon as possible after being reported to optimize recall.
  - a. Make at least three phone call attempts to reach the case.

- b. Calls should be made at different times of the day, with at least one attempt in the evening.
  - c. If the patient can't be reached by phone, consider conducting a face-to-face interview.
2. Items to cover during interview include:
- a. Provide brief background on ricin toxicity, including possible modes of exposure, incubation period, symptoms, etc.
  - b. Activities during exposure period:
    - i. Identify geographic points of interest (i.e., primary residence, place of employment/school, place of worship, hotels, convention centers, shopping malls, postal centers, public transportation, other gatherings)
    - ii. Potential exposures at geographic points of interest
    - iii. Ingestion of castor beans
    - iv. Intentional poisoning
    - v. Health effects and medical information
    - vi. Clinical laboratory test information
  - c. Ask if other household members or co-workers are experiencing similar symptoms.
  - d. Address questions and concerns.

### C. Environmental evaluation

Environmental investigations, when necessary, will generally focus on documenting exposure and any suspected health complaints in order to complete the information on the case report form. Field investigations may also involve gathering information for determining if there is an ongoing public health threat or if additional individuals have been exposed and are ill. CHD staff must try to identify the chemicals involved in the exposure, although confirmation may have to come from an outside source, such as a laboratory. When multiple people are potentially exposed, the CDSP may be able to provide CHDs with incident specific guidance for gathering the necessary information in a more efficient manner. CHD staff should coordinate field activities with the CDSP program.

### D. Merlin data entry:

Enter the data collected into Merlin under **RICIN TOXICITY-98830**, being sure to include all required fields on the Basic Data screen, and attach all relevant labs and the completed case report form. Please attach **ALL** labs received via electronic laboratory reporting (ELR).

## 6. CONTROLLING FURTHER SPREAD

### A. Patient/ household education on prevention recommendations

None indicated

### B. Isolation of cases

None indicated.

### C. Management of contacts

None indicated.

**D. Laboratory testing during outbreaks**

Same as for one case of ricin toxicity.

**E. Food or water is implicated as the source of the outbreak**

Stop consuming food and/ or water that are contaminated with ricin.

## 7. MANAGING SENSITIVE SITUATIONS

If ricin toxicity is thought to be intentional, contact the FDLE immediately.

## 8. IMPORTANT LINKS

**A. Ricin Emergency Preparedness and Response**

<http://www.bt.cdc.gov/agent/ricin/>

**B. Ricin Toxicity Case Definition**

[http://www.doh.state.fl.us/Disease\\_ctrl/epi/surv/CaseDefinitions.html](http://www.doh.state.fl.us/Disease_ctrl/epi/surv/CaseDefinitions.html)

**C. Response to a Ricin Incident: Federal Guidelines**

[http://www.bt.cdc.gov/agent/ricin/pdf/ricin\\_protocol.pdf](http://www.bt.cdc.gov/agent/ricin/pdf/ricin_protocol.pdf)

## 9. REFERENCES

- 1) Office of Public Health Emergency Preparedness, and CNA Corporation. *Response to a Ricin Incident: Guidelines for Federal, State, and Local Public Health and Medical Officials*. Tech. no. IPR11740. U.S. Department of Health and Human Services, June 2006. [http://emergency.cdc.gov/agent/ricin/pdf/ricin\\_protocol.pdf](http://emergency.cdc.gov/agent/ricin/pdf/ricin_protocol.pdf).
- 2) CDC. "CDC Ricin | Emergency Preparedness & Response." *CDC Emergency Preparedness & Response Site*. Centers for Disease Control and Prevention, 5 Mar. 2008. Web. 12 Dec. 2011. <http://www.bt.cdc.gov/agent/ricin/>.
- 3) Florida Department of Health. "Reportable Diseases/Conditions in Florida." Florida Department of Health, 24 Nov. 2008. Web. 12 Dec. 2011. [http://www.doh.state.fl.us/disease\\_ctrl/epi/surv/reportable\\_diseases\\_08.pdf](http://www.doh.state.fl.us/disease_ctrl/epi/surv/reportable_diseases_08.pdf).