



Ricin

Information for Health Care Providers

Ricin is a potent biological toxin that is derived from castor beans. Its mechanism of action in the body is inhibition of protein synthesis. Clinical manifestations are dependent on the dose and route of exposure. Symptoms generally appear after several hours. Ingestion of ricin typically leads to profuse vomiting and diarrhea followed by multisystem organ failure and possibly death within 36 to 72 hours of exposure. Inhalation of ricin typically leads to respiratory distress, fever, and cough followed by the development of pulmonary edema, hypotension, respiratory failure, and possibly death within 36 to 72 hours.

The dose and route of exposure to ricin and the pre-morbid condition of the person exposed will contribute to the time of onset and the severity of illness. For example, the inhalation of ricin would be expected to lead to a quicker onset of poisoning and to cause a more rapid progression of poisoning compared with the ingestion of ricin, given the same exposure amount.

No commercially available antidote or vaccine exists for ricin. Ricin poisoning is treated by giving the victim 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 the victim was poisoned (inhalation, ingestion, or injection). Care could include such measures as helping the victim breathe, administration of intravenous fluids, administration of medications to treat seizures or low blood pressure, flushing of stomach contents, or irrigation of the eyes.

Exposed patients are not contagious. However, contaminated clothing could potentially expose people in enclosed spaces.

The following is a more comprehensive list of signs and symptoms that may be encountered in a person exposed to ricin. Partial presentations (an absence of some of the following signs/symptoms) do not necessarily imply less severe disease.

General signs and symptoms

- Weakness
- Dehydration
- Fatigue
- Fever
- Muscle Pain

Gastrointestinal signs and symptoms

- Bloody/non-bloody diarrhea
- Vomiting
- Abdominal pain
- Abnormal liver function tests
- Multiple ulcerations/hemorrhages of gastric or small-intestinal mucosa upon endoscopy

Respiratory signs and symptoms

- Cough
- Tightness of the chest
- Hypoxemia
- Dyspnea
- Non-cardiogenic pulmonary edema

Skin and mucous membrane signs and symptoms

- Redness and pain of the eyes and skin

Other organ signs and symptoms

- Seizures (uncommon)
- Cardiovascular collapse (hypovolemic shock)

Laboratory findings

- Non-specific metabolic acidosis
- Increased liver function tests
- Increased renal function tests
- Hematuria
- Leukocytosis (2- to 5-fold higher than normal values)

Note: The actual clinical manifestations of a ricin exposure may be more variable than the syndrome described above.

Differential diagnosis:

Inhalation:

Staphylococcal enterotoxin B

Exposure to pyrolysis by-products of organofluorines (Teflon, Kevlar), or other organohalides

Oxides of nitrogen

Phosgene

Ingestion:

Enteric pathogens

Mushrooms

Caustics

Iron

Arsenic

Colchicine

Decontamination:

- Precautions for health care workers: Ricin is non-volatile, and secondary aerosols are not expected to be a danger to health care providers unless in an enclosed space (such as an ambulance). Decontaminate exposed skin with soap and water. Avoid contact with contaminated clothing.
- Personal Protective Equipment (PPE) for health care workers:
 - For those receiving contaminated patients, it is suggested a powered air-purifying respirator (PAPR) with HEPA filter, full face and eye protection, chemical resistant clothing, and nitrile gloves be used to protect against health care worker contamination.
 - For those receiving decontaminated patients, no PPE beyond Universal Precautions are necessary.
- Environmental Clean-up: Cleanse surfaces with 0.1% or 0.5% solution of sodium hypochlorite solutions (0.1% = 1 part household bleach to 49 parts water; 0.5% = 1 part household bleach to 9 parts water). NIOSH recommends post-remediation surface sampling to determine effectiveness of cleaning. Clean-up methods that generate dust should be avoided, however, HEPA vacuums can be used as part of a clean-up approach.
- It is recommended to double-glove not only when handling samples but when performing environmental clean up as well.

Suspected exposures to ricin should be reported to Michigan Department of Community Health (MDCH) and your local health department. The FBI can approve and coordinate analysis of environmental samples such as liquids, soil, scrapings, and dust collected on swabs at the MDCH laboratory, following established protocols and chain-of-custody procedures. Testing for exposure to ricin can also be performed on clinical urine samples through the MDCH laboratory. More information on collection of samples can be found in the MDCH laboratory “Ricin Toxin Detection” protocol (which can be downloaded at the link provided below).

Information for Healthcare Providers:

MDCH Ricin Fact Sheet – Information for the Public

http://www.michigan.gov/documents/Ricinfactsforthepublic_55144_7.pdf

MDCH Bureau of Laboratories “Ricin Toxin Detection”

http://www.michigan.gov/documents/LSGRicin_54751_7.doc

National Institute for Occupational Safety and Health “Emergency Response Card”

<http://www.bt.cdc.gov/agent/ricin/erc9009-86-3pr.asp>

Centers for Disease Control and Prevention, “Emergency Preparedness & Response Resources for Ricin” <http://www.bt.cdc.gov/agent/ricin/index.asp>

US Department of Labor, Occupational Safety and Health Administration, “Safety and Health Topics: Ricin” <http://www.osha.gov/SLTC/ricin/>

US Army Office of the Surgeon General. Medical Aspects of Chemical and Biological Warfare, Chapter 32: Ricin Toxin. <http://www.nbc-med.org/SiteContent/HomePage/WhatsNew/MedAspects/Ch-32electrv699.pdf>

US Army Medical Research Institute of Infectious Diseases. Medical Management of Biological Casualties Handbook, 4th Edition, February 2001.
<http://www.usamriid.army.mil/education/bluebook.html> (see p. 70)