Washoe County Health District

EPI - NEWS

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Ricin – A Category B Bioterrorism Agent

On April 16 and April 17, 2013, two letters containing granular substances that preliminarily tested positive for ricin were received in federal government buildings in Washing D.C. Investigations are ongoing by FBI. The purpose of this Epi-News is to provide an overview of Ricin for all clinicians on the agent, transmission modes, clinical descriptions, diagnosis, and treatment.

AGENT

Ricin is one of the most toxic biological agents known—a Category B bioterrorism agent and a Schedule number 1 chemical warfare agent. Ricin toxin can be extracted from castor beans, purified and treated to form a pellet, a white powder, or dissolved in water or weak acid to be released as a liquid. Ricin is stable under ambient conditions. Ricin particles of <5 μ have been used for aerosol dispersion in animal studies. Ricin particles can remain suspended in undisturbed air for several hours. Resuspension of settled ricin from disturbed surfaces also may occur.

TRASMISSION

Ricin is transmitted: 1) Through skin contact; 2) By the airborne route through release of ricin in the form of a powder, or a mist, or reaerosolization of ricin into the air from disturbed surfaces. Ricin would need to be dispersed in particles smaller than 5μ to be used as an effective weapon by the airborne route. It is very difficult to prepare particles of this size.

Routes of exposure include inhalation, parenteral (injection), ingestion, dermal contact (exposure risk is low; absorption through non-intact skin or via a solvent carrier), or ocular contact. Although ricin may adhere to skin, person-to-person transmission through casual contact has not been reported. Although ricin may adhere to clothing or be present on surfaces, there is low potential for transmission via contact with contaminated clothing or contaminated surfaces.

CLINICAL DESCRIPTIONS

Following inhalation or ingestion of ricin, initial manifestation of symptoms is likely to occur within 4 to 12 hours, it is very unlikely that symptom onset would begin more than 24 hours after exposure. After ingestion of ricin it is extremely unlikely that symptom onset would begin more than 10 hours after exposure.

Systemic effects of ricin poisoning depend upon route of exposure and exposure dosage. Dermal and ocular exposure by ricin in powder or mist from can cause erythema and pain of the skin and eyes.

Some of following symptoms can be manifest depending on routes of exposure:

Gastrointestinal system: abdominal pain, vomiting, diarrhea (bloody or nonbloody), abnormal liver function tests, multiple ulcerations and hemorrhages of gastric and small-intestinal mucosa on endoscopy.

Respiratory system: cough, bronchoconstriction (chest tightness), dyspnea, hypoxemia, noncardiogenic pulmonary edema.

General system: fever, fatigue, weakness, muscle pain, dehygration.

Other organ system: seizures (uncommon), hypovolemic shock.

However, manifestation of above signs and symptoms does not necessarily mean that a person has been exposed to ricin. Fatal systemic effects from ricin poisoning can occur within 36 to 72 hours of exposure; if death has not occurred in 3 to 5 days, the victim usually recovers.

DIAGNOSIS

No methods are available for the detection or ricin in biologic fluids. Testing for ricin in environmental samples will most likely not be immediately

available to assist in clinical decision making. Nonspecific laboratory findings in ricin poisoning include metabolic acidosis; increased liver function tests; increased renal function tests; hematuria; Leukocytosis (two- to five-fold higher than normal value). Call Washoe County Health District at 775-328-2447 to coordinate laboratory testing for ricin in environmental sample when needed.

Clinical differential diagnoses include but are not limited to agents of inhalation such as *staphylococcal* enterotoxin B, Teflon, Kevlar, oxides of nitrogen, phosgene; agents of ingestion such as enteric pathogens, mushrooms, caustics, iron, arsenic, colchicine.

TREATMENT

General information regarding treatment for ricin poisoning include the following:

- Maintain high suspicion for ricin poisoning.
- Get ricin off or out of the body as quickly as possible, there is no antidote.
- Treatment consists of supportive measures.
- If an incident (e.g., ricin exposure) affects a large population and large quantities of pharmaceuticals and/or medical supplies are required, these may be provided through the Strategic National Stockpile.
- Transfer immediately to health care facility for additional medical attention.
- For healthcare facilities, follow Incident Site Emergency Treatment guidance. Contact regional poison control center, immediately upon suspicion of a case of ricin exposure, for guidance and further individualized management. Perform skin decontamination in a designated area outside the emergency department if ricin powder or similar substance is found on the patient and when there is known dermal exposure to ricin.

Incident Site Emergency Treatment (ISET) include following:

- Get fresh air by leaving the area of ricin release. If outside, move away from the area where the ricin was released, if indoors, get out of the building.
- Provide supportive treatment to minimize the effects of ricin poisoning, based on exposure and symptom factors.
  - Inhalation
    - Place in half-upright position.
    - Perform pulmonary toilet (hygiene), if needed.
    - Provide oxygen, and/or mechanical ventilation with positive end expiratory pressure to maintain oxygenation, if needed.
    - Perform cardiopulmonary resuscitation if necessary.
  - Ingestion
    - Do not induce vomiting.
    - Administer a single dose of activated charcoal as soon as possible if the patient has suspected/known ricin ingestion, if vomiting has not begun and airway is secure.
    - Do not give anything by mouth.
    - Gastric lavage may be considered if ingestion has occurred in ≤1 hour.
    - If vomiting, lean victim forward or place on left side, head-down position, if possible, to maintain open airway and prevent aspiration.
    - Provide early and aggressive intravenous fluid and electrolyte replacement.
    - Administer blood pressure support through the use of intravenous vasopressors, if needed.
  - Ocular Exposure
    - Flush eyes with large amounts of tepid water for at least 15 minutes.
  - Dermal Exposure
    - Remove clothing
    - Decontaminate skin by showering or washing, using soap and water, and rinsing skin with plenty of water.
  - Systemic Symptoms
    - Give medication for control of seizure activity, if necessary.
    - Administer medication for treatment of hypotension, if necessary.

When you suspect a ricin poisoning, please always notify Washoe County Health District immediately at 775-328-2447 (phone).

For more information regarding ricin, please visit CDC's website at *http://emergency.cdc.gov/agent/ricin/* .