

Ricin as a Bioterrorist Agent

Agent: Ricin, a glycoprotein toxin derived from castor plant beans, has great potential as a biological agent due to its wide availability. The toxin is quite stable over long periods of time. Ricin produces its damage by inhibiting cellular protein synthesis.

Disease: Ricin poisoning

Incubation Period: 4-8 hours

Signs/Symptoms: Symptoms will depend on the dose and route of exposure. Initial symptoms following **inhalation** include weakness, fever, cough, dyspnea, nausea, chest tightness, and arthralgia. These are usually followed by sweating, pulmonary edema, and cyanosis. Necrotizing, suppurative airway lesions may be noted in conjunction with rhinitis and laryngitis. If left untreated, respiratory failure and cardiovascular collapse due to inhalation of the agent can lead to death after 36-72 hours. **Ingestion** will be followed by rapid onset of nausea, vomiting, abdominal cramps, and severe diarrhea. Other symptoms include fever, thirst, headache, sore throat, and dilation of the pupils. Death may occur on the third day or later and is usually due to vascular collapse.

Diagnosis:

Differential Diagnosis: For inhalational exposure, similar symptoms in large numbers of patients might suggest several respiratory pathogens. Influenza, Q fever, tularemia, plague, and respiratory illnesses due to exposure to staphylococcal enterotoxin B (SEB) and chemical agents such as phosgene should be included in the differential diagnosis. SEB intoxication would likely have a more rapid onset and lower mortality. Acute lung injury induced by phosgene would progress much faster than that caused by ricin. Nerve agent intoxication would be characterized by acute onset of cholinergic crisis with dyspnea and profuse secretions.

The differential diagnosis for patients who have ingested ricin would include disease due to all the major enteric pathogens. These should be ruled out with culture.

Diagnostic Tests: Early postexposure (0-24 hours) nasal or throat swabs and induced respiratory secretions may be collected for toxin assay. Blood for serum may be collected in a tiger-top (SST) or red-top tube. Toxin assays and

measurement of antibody response can be performed on serum.

Send specimens for laboratory confirmation in a triple container to the Oregon State Public Health Laboratory, 1717 SW Tenth Avenue, Portland, OR 97201. Prior notification is requested by calling the laboratory at (503) 229-5882 and Acute and Communicable Disease Prevention at (503) 731-4024.

Supportive Tests: Patients with aerosol exposure to ricin may have bilateral infiltrates on chest x-ray, arterial hypoxemia, and neutrophilic leukocytosis. A bronchial aspirate rich in protein (compared to plasma) is characteristic of high-permeability pulmonary edema. Endoscopic evaluation may reveal necrotizing, suppurative lesions in conjunction with tracheitis and bronchitis/bronchiolitis.

Treatment: Management of patients is supportive. Acetaminophen for fever, and cough suppressants may make the patient more comfortable. Management of ricin-intoxicated patients again depends on the route of exposure. Patients with pulmonary intoxication are managed by appropriate treatment for pulmonary edema and respiratory support as indicated. Gastrointestinal intoxication is best managed by vigorous gastric decontamination with super-activated charcoal, followed by use of cathartics such as magnesium citrate. Volume replacement of GI fluid losses is important. In percutaneous exposures, treatment would be primarily supportive.

Infection Control/Decontamination: Standard precautions should be used by healthcare workers. Decontaminate exposed skin by washing with soap and water and/or 0.1% sodium hypochlorite (1 part household bleach added to 49 parts water).

Report: Immediately report any suspect cases to your local health department or the Oregon Health Division at (503) 731-4024 during working hours (8:00 am to 5:00 pm Monday through Friday) or (503) 731-4030 nights, weekends and holidays.

Adapted with permission from the Texas Department of Health