Ricin, Ricin Intoxification
Biological Weapon

Ricin is a potent protein toxin derived from the beans of the castor plant (Ricinus communis). Castor beans are found everywhere worldwide, and the toxin is fairly easily produced. Ricin is therefore a potentially widely available toxin, which is stable for long periods of time.

When inhaled as a small particle aerosol, this toxin may produce abnormal changes within 8 hours. There is an incubation period of approximately 8 hours. Severe respiratory symptoms are followed by sudden respiratory failure in 36-72 hours. When taken by mouth, ricin causes severe gastrointestinal symptoms followed by vascular collapse and death. This toxin may also cause disseminated intravascular coagulation, microcirculatory failure and multiple organ failure if given intravenously in laboratory animals.

SYMPTOMS

Symptoms will depend on the dose and route of exposure.

- Initial symptoms following inhalation include weakness, fever, cough, difficulty breathing, nausea, chest tightness, and joint pain. These symptoms are usually followed by sweating, *pulmonary edema* (water in the lungs), and cyanosis. The death of tissues lining the airways may be noted in conjunction with runny nose and sore throat. If left untreated, weakness, fever, cough and pulmonary edema occur 18-24 hours after inhalation exposure, followed by severe difficulty breathing and death from hypoxemia (not enough oxygen) in 36-72 hours.
- Ingestion (swallowing the poison) 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

- 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 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 post exposure (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.

SUPPORTIVE TESTING

- 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 (inflammation of the main tube going to the lungs) and bronchitis/bronchiolitis (inflammation of smaller pathways in the lungs).

PREPARATION & TREATMENT

- Use of the protective mask is currently the best protection against inhalation.
- Management of patients is supportive.

- Only take over-the-counter or prescription medicines for pain, discomfort, or fever as directed by your caregiver.
- Hydration is important. For those with pulmonary intoxification, respiratory support may be necessary.
- Pulmonary edema may need to be treated with positive end expiratory pressure ventilation and diuretics. Standard management techniques for oral poisoning should be used if the toxin is ingested.

INFECTION CONTROL/DECONTAMINATION

- Healthcare workers should use standard precautions. Decontaminate exposed skin by washing with soap and water and/or 0.1% sodium hypochlorite (1 part household bleach added to 49 parts water).

Most of this information is courtesy of US Government. In times of an emergency much of this material may not apply when it comes to specialized care and testing. These are some rough guidelines to help you when that care is not available. Some of this information is very technical and difficult to understand, but hopefully someone will be available for help in treatment and understanding.

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