

APPENDIX

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Ricin Safety Considerations

(Source: Safety Data sheet, National Institutes of Health)

A. Background

- Ricin is a toxic glycoprotein found in the beans of the castor plant (*Ricinus communis*).
- The beans, when chewed, are extremely toxic, one bean having been known to produce fatal poisoning.
- Exposure to dust produced during the extraction of castor oil has resulted in toxic effects.
- Ricin is under investigation as a cytostatic drug in the treatment of some malignancies.
- Ricin is a ribosome inactivating protein (RIP) consisting of two chains (A and B) linked by a disulfide bond. The B chain is responsible for binding the ricin molecule to the cell surface, allowing the A chain to penetrate the cell interior and to exert its toxic effect.
- The binding to the cell surface appears to be via a galactose on the cell, since each B chain contains one binding site for galactose and lactose, and the presence of lactose in the cell incubation medium prevents the toxic action of ricin.

B. Biological effects

- The mechanism of toxic action of ricin consists of a potent inhibition of protein synthesis, due to the interference with the incorporation of amino acids at the site of the 60S ribosomal subunit.
- To produce toxicity in cell cultures and animals, the intact ricin molecule is required. Protein synthesis is inhibited by the A chain only if its addition to cell cultures is preceded by that of the B chain by no more than 90 minutes. In cell-free systems, by contrast, the A chain is as fully active as the intact ricin while the B chain does not contribute to the activity.
- Absorption: Ricin is absorbed and produces toxic effects by ingestion, parenteral injection, and inhalation as dust.

C. Symptoms

In man, ricin intoxication is characterized by a long latent period, which may last for hours or days depending on the dose, before onset of symptoms. Ingestion results in severe gastroenteritis. Later symptoms are drowsiness, coma and death.

Exposure of eyes, nose or throat to ricin dust may result in local inflammation.

D. Emergency treatment

- Skin and eye exposure: For skin exposure, remove contaminated clothing and wash skin with soap and hot water. Avoid rubbing of skin or increasing its temperature. For eye exposure, irrigate immediately with copious quantities of warm isotonic saline followed by running water for at least 15 minutes.
- Ingestion: Drink plenty of water or milk. Induce vomiting.
- Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.
- Refer to physician. Consider treatment for pulmonary irritation.

E. Operational procedures

- Storage: Store solid ricin in dark colored, tightly closed containers in a freezer.
- Working quantities of ricin are stored together in clearly labeled microcentrifuge tubes.
- Wear protective clothing, gloves, mask and eye protection. Do not breathe vapor.
- Decontamination: Use absorbent paper to mop up spill. Wipe off surfaces with alkaline permanganate, then wash with copious quantities of water. Glassware should be rinsed in a hood with alkaline permanganate, followed by soap and water.
- Disposal: No waste streams containing ricin shall be disposed of in sinks. Potentially infectious waste containing ricin shall be disinfected by heat using a standard autoclave treatment and disposed of in accordance with the NIH chemical waste disposal system: labeled and collected in containers provided by The NIH Chemical Waste Disposal Service. The Chemical Waste Disposal Service will be called (301-496-4710 or x6-4710) for collection.