

Virginia Department of Health

Ricin: Overview for Healthcare Providers

Agent/ Characteristics	<ul style="list-style-type: none"> Ricin is a naturally occurring protein toxin made from the bean of the castor plant (<i>Ricinus communis</i>), which is found worldwide Beans contain 1–5% ricin by weight, and ricin is easily isolated from the bean Once extracted, ricin can be processed into a powder, mist, or pellet, or dissolved in water or weak acid Ricin acts by disrupting ribosome function, leading to inhibition of protein synthesis Medical uses for ricin have been investigated
Reporting to Public Health	<ul style="list-style-type: none"> All chemical exposures should be reported to the regional poison center at 800-222-1222 Outbreaks and unusual occurrences of disease require <u>immediate</u> reporting to the local health department (LHD). See https://www.vdh.virginia.gov/health-department-locator/
Potential Sources	<ul style="list-style-type: none"> Ricin is generated as a by-product formed when castor oil is extracted from castor beans Ricin intoxications have occurred from consuming castor beans
Route of Exposure	<ul style="list-style-type: none"> Multiple routes of exposure are possible. Injection, inhalation, and ingestion are highly toxic. Ricin is unlikely to be absorbed through intact skin Ricin-associated illness cannot be spread from person to person through casual contact. However, people can become exposed to ricin if they come into contact with someone who has ricin on their body or clothes.
Ricin as a Terrorism Agent	Ricin is a Category B bioterrorism agent and a Schedule number 1 chemical warfare agent. It could be acquired or manufactured for use as a biological/chemical weapon.
Contamination/ Decontamination	<ul style="list-style-type: none"> Contamination: Ricin is not volatile and does not off-gas and form vapor. Patients suspected of being contaminated should be decontaminated before arrival in the medical facility, if possible. Those performing decontamination should wear a full chemical resistant suit with gloves, surgical mask and eye/face protection (e.g., face shield and goggles). Decontamination: People with only skin exposure to liquids or powders should remove clothing, wash skin and hair with soap and water, and rinse with plenty of water. People with only ingestion exposure do not require skin decontamination. For ocular contamination, flush the eyes with large amounts of tepid water for at least 15 minutes. After decontamination, standard precautions are adequate.
Risk Indicators	<ul style="list-style-type: none"> If absorbed systemically, ricin is highly toxic to all people. The extent of injury depends on the concentration, duration, and route of exposure. Children, older people, and those with underlying medical conditions might be more susceptible to ricin poisoning
Cause of Death	<ul style="list-style-type: none"> Injection and Ingestion: multiple organ system failure, vascular collapse, hypovolemic shock Inhalation: pulmonary edema leading to hypoxemia
Latency	<ul style="list-style-type: none"> Based on limited cases in humans and animal studies, symptom onset can occur as early as 4–8 hours after exposure and as late as 24 hours after exposure Death can occur within 3–5 days of exposure
Clinical Manifestations	<ul style="list-style-type: none"> Exposure causes a chemically induced radiation-like syndrome Specific signs and symptoms vary with dose and route of exposure Injection: Pain at injection site and local lymph nodes, sepsis/influenza-like illness (fever, fatigue, weakness, myalgia, nausea, vomiting) progressing to multiple organ system failure

	<p>(liver necrosis, nephritis, splenitis, GI bleeding), vascular collapse, hypovolemic shock</p> <ul style="list-style-type: none"> • Inhalation: Cough/congestion, chest tightness progressing to fibrinopurulent pneumonia; pulmonary edema, necrosis and hemorrhage; respiratory failure • Ingestion: Sore throat, headache, nausea, vomiting, abdominal pain, diarrhea, GI bleeding, multiple organ system failure (liver necrosis, nephritis, splenitis), anuria, vascular collapse, hypovolemic shock • Skin and eye exposure: Contact with ricin powders or products may cause redness and pain of the skin and the eyes. Unlikely to be absorbed through intact skin.
Laboratory Testing	<ul style="list-style-type: none"> • Confirmatory diagnostic testing for ricin is not available • Public health officials can request testing of urine specimens for urinary ricinine, an alkaloid in the castor bean plant. Urinary ricinine testing is available only at CDC or select Laboratory Response Network for Chemical Threats (LRN-C) labs, including Virginia’s Division of Consolidated Laboratory Services (DCLS). • Environmental testing (testing of nonclinical specimens) can be performed for the detection of ricin toxin at DCLS’ Laboratory Response Network for Biological Threats (LRN-B) lab • Monitor clinical effects and complications: complete blood count (CBC), renal function, liver function as indicated • For consultation, call DCLS, available 24/7 at 804-335-4617
Radiography	Obtain x-rays as indicated by clinical presentation
Treatment	<ul style="list-style-type: none"> • See Decontamination (above) • An antidote is not available; supportive care (e.g., mechanical ventilation, fluid and electrolytes, anti-inflammatory agents, analgesics) is the mainstay of therapy • CDC guidance is available at https://emergency.cdc.gov/agent/ricin/clinicians/treatment.asp
Precautions/Disposition	<ul style="list-style-type: none"> • Pitfall: Not considering a chemical exposure as a cause of radiation-like or sepsis-like illness • Disposition: Asymptomatic patients might need to be observed for at least 24–48 hours if they were exposed to large doses