

# The quick facts about ricin

The deadly toxin has been found in a letter addressed to a US senator.

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Government officials in Washington DC temporarily shut down postal deliveries to the US Senate after ricin was detected in a letter addressed to Roger Wicker, Republican senator for Mississippi, on 16 April. *Nature* explains what ricin is and what it does.

## What is ricin?

Ricin is a poison found in beans from the castor oil plant (*Ricinus communis*). It can be derived from a waste product called mash, which is left over when castor beans are processed to make castor oil.

## How deadly is ricin?

According to the US Centers for Disease Control and Prevention, ricin is “very toxic”. Data from tests in monkeys suggest that just [3 milligrams of inhaled ricin can kill an adult human](#).

## How does it work?

Ricin inactivates ribosomes, cell organelles responsible for manufacturing proteins. The cells stop making proteins essential to life, and die.

## What are the symptoms of ricin poisoning?

That depends on how the ricin enters the body. If inhaled, it can cause breathing difficulties, fever, coughing and nausea. Ingested ricin can cause vomiting and diarrhoea, which lead to dehydration; it also causes seizures. Symptoms can appear as early as 4 hours and as late as 24 hours after exposure. Death can occur between one-and-a-half to three days after exposure.

## How can exposure happen?

It is possible to be poisoned with ricin by eating large quantities of castor beans or by ingesting the poison itself. However, it is a more potent and deadly bioterror agent when inhaled as aerosol particles or injected under the skin. A person is unlikely to die from simply touching ricin, but could ingest it if they get the poison on their hands and then put their hands in their mouths or eat food that they have touched.

## Has ricin been used as an agent of warfare and bioterrorism?

Ricin has a long history as an agent of biological warfare<sup>1</sup>. The US Department of War first considered using ricin in 1918, and worked with British scientists during the Second World War to develop a ricin bomb that seems never to have been used in combat. The US military experimented with inhalable ricin powders in the 1940s.

Ricin was probably used to kill Bulgarian journalist Georgi Markov in London in 1978, and the Iraqi military packed it into artillery shells in the 1980s. In the mid-1990s, members of a militia group, the Minnesota Patriots Council, were convicted of conspiring to kill law-enforcement officials using ricin.

Ricin was detected but caused no illnesses or deaths in 2003 in a South Carolina postal facility and in a letter sent to the White House, and in 2004 in a postal room serving Bill Frist, then Republican senator for Tennessee and majority leader of the US Senate. It has also been found in the possession of people suspected to be members of terrorist groups such as al-Qaeda.

## How is ricin detected?

Sensors at locations around the United States, including mail-sorting facilities, routinely check for the presence of ricin and other toxins and pathogens. If a sample tests positive, it is transferred to a lab that performs follow-up tests using antibodies targeted to ricin proteins, or DNA from the castor oil plant. In the latest instance, [ricin was initially detected](#) at a Washington DC postal facility and its



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Response teams were on the alert after an envelope addressed to a US senator tested positive for ricin on 16 April.

presence was confirmed by a laboratory in Maryland.

### **Can ricin poisoning be treated?**

There is no antidote to ricin. One company, Soligenix of Princeton, New Jersey, is developing a vaccine, but it has only progressed through very early clinical trials and has not been approved by the US Food and Drug Administration. It could theoretically be given to poisoning victims under an 'emergency use authorization' that permits the use of unapproved treatments and vaccines if no alternative exists. However, the vaccine works by stimulating the body to produce protective antibodies in advance of an attack. Ricin poisoning is irreversible four hours after exposure, so the vaccine is not likely to help soon enough to save lives after a ricin release has been discovered. The US National Institute of Allergy and Infectious Diseases is funding research into drugs to treat ricin poisoning.

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### **References**

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