

Sarin

What is it?

Sarin is a human-made chemical warfare agent classified as a nerve agent. Nerve agents are the most toxic and rapidly acting of the known chemical warfare agents. They are similar to certain kinds of pesticides (insect killers) called organophosphates in terms of how they work and what kind of harmful effects they cause. However, nerve agents are much more potent than organophosphate pesticides. It originally was developed in 1938 in Germany as a pesticide. Sarin is a clear, colorless, and tasteless liquid that has no odor in its pure form. However, it can evaporate into a vapor (gas) and spread into the environment. It is also known as GB.

Its use

- Sarin and other nerve agents may have been used in chemical warfare during the Iran-Iraq War in the 1980s.
- Sarin was used in two terrorist attacks in Japan in 1994 and 1995.
- Sarin is not found naturally in the environment.

Exposure

- Following release of sarin into the air, people can be exposed through skin contact or eye contact. They can also be exposed by breathing air that contains sarin.
- Sarin mixes easily with water, so it could be used to poison water. Following release of sarin into water, people can be exposed by touching or drinking water that contains sarin.
- Following contamination of food with sarin, people can be exposed by eating the contaminated food.

A person's clothing can release sarin for about 30 minutes after it has come in contact with sarin vapor, which can lead to exposure of other people.

Because sarin breaks down slowly in the body, people who are repeatedly exposed to sarin may suffer more harmful health effects.

Because sarin vapor is heavier than air, it will sink to low-lying areas and create a greater exposure hazard there.

How does sarin work?

The extent of poisoning caused by sarin depends on the amount of sarin to which a person was exposed, how the person was exposed, and the length of time of the exposure. Symptoms will appear within a few seconds after exposure to the vapor form of sarin and within a few minutes up to 18 hours after exposure to the liquid form.

All the nerve agents cause their toxic effects by preventing the proper operation of the chemical that acts as the body's "off switch" for glands and muscles. Without an "off

switch,” the glands and muscles are constantly being stimulated. They may tire and no longer be able to sustain breathing function.

Sarin is the most volatile of the nerve agents, which means that it can easily and quickly evaporate from a liquid into a vapor and spread into the environment. People can be exposed to the vapor even if they do not come in contact with the liquid form of sarin. Because it evaporates so quickly, sarin presents an immediate but short-lived threat.

Immediate signs and symptoms

People may not know that they were exposed because sarin has no odor. People exposed to a low or moderate dose of sarin by breathing contaminated air, eating contaminated food, drinking contaminated water, or touching contaminated surfaces may experience some or all of the following symptoms within seconds to hours of exposure:

- Runny nose
- Watery eyes
- Small, pinpoint pupils
- Eye pain
- Blurred vision
- Drooling and excessive sweating
- Cough
- Chest tightness
- Rapid breathing
- Diarrhea
- Increased urination
- Confusion
- Drowsiness
- Weakness
- Headache
- Nausea, vomiting, and/or abdominal pain
- Slow or fast heart rate
- Low or high blood pressure

Even a small drop of sarin on the skin can cause sweating and muscle twitching where sarin touched the skin.

Exposure to large doses of sarin by any route may result in the following harmful health effects:

- Loss of consciousness
- Convulsions
- Paralysis
- Respiratory failure possibly leading to death
- Showing these signs and symptoms does not necessarily mean that a person has been exposed to sarin.

Long-term health effects

Mild or moderately exposed people usually recover completely. Severely exposed people are not likely to survive. Unlike some organophosphate pesticides, nerve agents have not been associated with neurological problems lasting more than 1 to 2 weeks after the exposure.

Protection

Recovery from sarin exposure is possible with treatment, but the antidotes available must be used quickly to be effective. Therefore, the best thing to do is avoid exposure:

Leave the area where the sarin was released and get to fresh air. Quickly moving to an area where fresh air is available is highly effective in reducing the possibility of death from exposure to sarin vapor.

If the sarin release was outdoors, move away from the area where the sarin was released. Go to the highest ground possible, because sarin is heavier than air and will sink to low-lying areas.

If the sarin release was indoors, get out of the building.

If people think they may have been exposed, they should remove their clothing, rapidly wash their entire body with soap and water, and get medical care as quickly as possible.

1. *Removing and disposing of clothing:*

Quickly take off clothing that has liquid sarin on it. Any clothing that has to be pulled over the head should be cut off the body instead of pulled over the head. If possible, seal the clothing in a plastic bag. Then seal the first plastic bag in a second plastic bag. Removing and sealing the clothing in this way will help protect people from any chemicals that might be on their clothes.

If clothes were placed in plastic bags, inform either the local or state health department or emergency personnel upon their arrival. Do not handle the plastic bags.

If helping other people remove their clothing, try to avoid touching any contaminated areas, and remove the clothing as quickly as possible.

2. *Washing the body:*

As quickly as possible, wash any liquid sarin from the skin with large amounts of soap and water. Washing with soap and water will help protect people from any chemicals on their bodies.

Rinse the eyes with plain water for 10 to 15 minutes if they are burning or if vision is blurred.

If sarin has been swallowed, do not induce vomiting or give fluids to drink.

Seek medical attention immediately. Dial 911 and explain what has happened.

Treatment

Treatment consists of removing sarin from the body as soon as possible and providing supportive medical care in a hospital setting. Antidotes are available for sarin. They are most useful if given as soon as possible after exposure.