CHEMICAL TERRORISM

NEW YORK STATE DEPARTMENT OF HEALTH

THE FACTS ABOUT CYANIDES

GENERAL INFORMATION

Note to reader: This fact sheet is intended to provide general awareness and education on a specific chemical agent. For information on preparedness and response (e.g., for first responders and emergency medical personnel), please refer to the following Department resources:

Chemical Terrorism Preparedness and Response Card
(**http://www.health.state.ny.us/nysdoh/bt/chemical_terrorism/pdf/chemical.pdf**)
Chemical Terrorism Wall Chart
(**http://www.health.state.ny.us/nysdoh/bt/chemical_terrorism/pdf/poster.pdf**)

What are cyanides?

Cyanides are fast-acting poisons that can be lethal. They were used as chemical weapons for the first time in World War I. Low levels of cyanides are found in nature and in products we commonly eat and use. Cyanides can be produced by certain bacteria, fungi and algae. Cyanides are also found in cigarette smoke, in vehicle exhaust, and in foods such as spinach, bamboo shoots, almonds, lima beans, fruit pits and tapioca.

What are the properties of cyanide?

There are several chemical forms of cyanide. Hydrogen cyanide is a pale blue or colorless liquid at room temperature and is a colorless gas at higher temperatures. It has a bitter almond odor. Sodium cyanide and potassium cyanide are white powders which may have a bitter almond-like odor. Other chemicals called cyanogens can generate cyanides. Cyanogen chloride is a colorless liquefied gas that is heavier than air and has a pungent odor. While some cyanide compounds have a characteristic odor, odor is not a good way to tell if cyanide is present. Some people are unable to smell cyanide. Other people can smell it at first, but then get used to the odor.

How are cyanides used?

Historically, hydrogen cyanide has been used as a chemical weapon. Cyanide and cyanide-containing compounds are used in pesticides and fumigants, plastics, electroplating, photodeveloping and mining. Dye and drug companies also use cyanides. Some industrial processes, such as iron and steel production, chemical industries and wastewater treatment can create cyanides. During water chlorination, cyanogen chloride may be produced at low levels.

How can people be exposed to cyanides?

People may be exposed to low levels of cyanides in their daily lives from foods, smoking and other sources. Eating or drinking cyanide-containing foods may cause health effects. Breathing cyanide gas, especially in a poorly ventilated space, has the greatest potential for harm. Lethal exposures to cyanides result only from accidents or intentional acts. Because of their quick-acting nature, cyanides may be used as agents of terrorism.

How does cyanide act in the body?
After exposure, cyanide quickly enters the bloodstream. The body handles small amounts of cyanide differently than large amounts. In small doses, cyanide in the body can be changed into thiocyanate, which is less harmful and is excreted in urine. In the body, cyanide in small amounts can also combine with another chemical to form vitamin B_{12}, which helps maintain healthy nerve and red blood cells. In large doses, the body's ability to change cyanide into thiocyanate is overwhelmed. Large doses of cyanide prevent cells from using oxygen and eventually these cells die. The heart, respiratory system and central nervous system are most susceptible to cyanide poisoning.

What are the specific signs and symptoms of cyanide poisoning?
The health effects from high levels of cyanide exposure can begin in seconds to minutes. Some signs and symptoms of such exposures are:

- Weakness and confusion
- Headache
- Nausea/feeling "sick to your stomach"
- Gasping for air and difficulty breathing
- Loss of consciousness/"passing out"
- Seizures
- Cardiac arrest

The severity of health effects depends upon the route and duration of exposure, the dose, and the form of cyanide.

What can you do if you think you may have been exposed to a release of cyanide?
If you have been exposed to a release of cyanide, take the following steps:

- Quickly move away from the area where you think you were exposed. If the release was indoors, go outdoors.
    - If you are near a release of cyanide, emergency coordinators may tell you to either evacuate the area or to "shelter in place." To "shelter in place" means to remain indoors to avoid being exposed to the chemical. While indoors, shut and lock all doors and windows, turn off air conditioners, fans and heaters, and close fireplace dampers.
    - For more information on evacuation during a chemical emergency, see *Facts About Evacuation* (**http://www.bt.cdc.gov/planning/evacuationfacts.asp**). For more information on sheltering in place during a chemical emergency, see *Facts About Sheltering in Place* (**http://www.bt.cdc.gov/planning/Shelteringfacts.asp**).
- Quickly remove any clothing that may have cyanide on it. If possible, clothing that is normally removed over the head (like t-shirts and sweaters) should be cut off the body to prevent additional contact with the agent.
    - Place your clothing inside a plastic bag and seal the bag tightly.
    - Do not handle the plastic bag, and wait for instructions on proper disposal.
    - Disposing of your clothing in a sealed bag helps protect you and other people from additional exposure.
    - Store the bagged clothing in a secure location away from people, especially children.
- Quickly wash any cyanide from your skin with large amounts of soap and water, and flush your eyes with large amounts of water.
    - Remove and dispose of contact lenses.

  - Wash eyeglasses with soap and water before wearing.
  - Do not use bleach to remove cyanide from your skin.
- If needed, seek medical attention right away.

How is cyanide exposure treated?

Moving away from the point of exposure to fresh air is an important first step in treating cyanide exposure. Cyanide poisoning can be further treated by medical professionals. Often patients are given oxygen. Two antidotes (sodium nitrite and sodium thiosulfate) are usually used to stop the effects of serious cyanide poisoning. Other drugs may be necessary to control additional health effects of cyanide such as seizures. People who experience serious signs and symptoms will need immediate hospital care, especially individuals who have "passed out" or are unconscious. Any delay could result in death.

Will laboratory testing assist in making treatment decisions if someone has been exposed to cyanide?

While an elevated blood cyanide concentration may indicate that someone has been exposed to cyanide, laboratory testing for cyanide exposure will not be useful in making emergency treatment decisions. A patient exposed to cyanide should not expect medical personnel to do these tests before treatment. Treatment should not be delayed if signs and symptoms are present and exposure is believed to have occurred.

How can I get more information about cyanide?

Call the following numbers, or visit the websites listed among the "Sources."

- Centers for Disease Control and Prevention Public Response Hotline (1-888-246-2675)
- Agency for Toxic Substances and Disease Registry (1-888-422-8737)
- Regional Poison Control Center (1-800-222-1222)

Sources:

Agency for Toxic Substances and Disease Registry. 1997. Toxicological Profile for Cyanide. Division of Toxicology, U.S. Department of Health and Human Services. Public Health Service: Atlanta, GA.
http://www.atsdr.cdc.gov/toxprofiles/tp8.html

Agency for Toxic Substances and Disease Registry. 2004. Medical Management Guidelines for Hydrogen Cyanide. Division of Toxicology, U.S. Department of Health and Human Services. Public Health Service: Atlanta, GA.
http://www.atsdr.cdc.gov/MHMI/mmg8.html

Centers for Disease Control and Prevention. 2004. Cyanide. Emergency Preparedness and Response. U.S. Department of Health and Human Services. Public Health Service: Atlanta, GA.
http://www.bt.cdc.gov/agent/cyanide/index.asp

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U.S. Army Medical Research Institute of Chemical Defense (USAMRICD). 2000. Medical Management of Chemical Casualties Handbook, Third Edition. Chemical Casualty Care Division. Aberdeen Proving Grounds: Aberdeen, MD.
https://ccc.apgea.army.mil/sarea/products/handbooks/MMCC/mmccthirdeditionjul2000.pdf

This fact sheet is based on the most current information. It may be updated as new information becomes available.

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