CYANIDE POISONING: Understanding the Facts

What is cyanide?
- Cyanide is a rapidly acting, potentially deadly chemical that can exist as a liquid, gas, or solid, and does not always give off an odor.¹
- The deadliest form of this toxin is hydrogen cyanide, which is a colorless gas with a faint bitter almond odor that not everyone can detect.²,³,⁴

Where can cyanide be found?
- Cyanide can be released from the combustion of common household items such as wool, cotton, plastics, rubber, Styrofoam, and vinyl.³,⁴
- Cyanide is also used as an intermediate in the production of materials that can be found in building construction, transportation vehicle interiors, and residential and commercial interiors and furnishings.⁵
- It is present in 15,000 chemical plants across the United States, and is used in the manufacturing processes of several industries such as cosmetics, computer electronics, and metallurgy.³,⁵

How is someone poisoned by cyanide?
- Cyanide poisoning can occur in a variety of ways: industrial exposures, intentional acts, or smoke inhalation.⁶
- The most common cause of cyanide poisoning is through the inhalation of fire smoke.⁶
- Cyanide can only be transported in solid or liquid form.⁷ It is carried by rail and highway to and from industrial facilities where it is used in manufacturing processes. Accidents involving the transport of cyanide can lead to exposure.⁸
- It also has been used as a terrorist weapon because it is readily available, is versatile with respect to how it can be delivered, and does not require specialized knowledge for effective use.⁹

How does inhaling fire smoke lead to cyanide poisoning?
- Cyanide is a component of fire smoke and is a particular danger to inhabitants of an enclosed structure on fire as well as to firefighters at the scene.⁴,⁶
- Data have shown that cyanide exposure is to be expected in closed-space fires.¹,³,⁴
- Individuals trapped in enclosed spaces on fire can be overcome by smoke through inhalation and pass out due to the presence of carbon monoxide and cyanide, which act in concert with one another.¹,³,⁴

How is cyanide poisoning related to the threat of carbon monoxide poisoning?
- Carbon monoxide and cyanide are considered the “toxic twins.” Where carbon monoxide is produced, cyanide often is as well.¹⁰,¹¹
- In fire smoke, cyanide can be up to 35 times more toxic than carbon monoxide. Cyanide is carried rapidly to the brain by the blood, which can quickly incapacitate a victim and, depending on the concentration, may directly lead to death.¹²
- Exiting an enclosed area on fire rapidly minimizes exposure to the chemicals found within fire smoke, such as cyanide and carbon monoxide, and can be facilitated by smoke and carbon monoxide detectors.¹⁰,¹³

Who should be worried about cyanide poisoning from smoke inhalation?
- As cyanide can be present in the smoke of a house fire, those at risk of cyanide poisoning include people in a structure on fire as well as first responders.¹⁴,¹⁵
- In 2013 there were more than 1 million fires across the country, with the death of approximately 3,000 people attributed to fires.¹⁵
- The leading cause of death in a residential fire is not burn injuries but smoke inhalation. Death certificates show a 2-to-1 ratio of smoke inhalation compared to burns for fire-related deaths.¹⁶
- Even when wearing respirators, firefighters can be exposed to cyanide and fire smoke after running out of oxygen or inadvertently dislodging their masks.¹⁷,¹⁸
How can I tell if someone is suffering from cyanide poisoning?

- Symptoms of cyanide poisoning are similar to those of carbon monoxide poisoning and are therefore sometimes misdiagnosed because of the overlapping signs and symptoms.19
- Emergency responders should suspect cyanide poisoning if the person:1,20
  - Has been exposed to fire or smoke in an enclosed space;
  - Has soot around the mouth, nose, or in the back of the mouth;
  - Appears confused or disoriented.
- When determining whether a patient is suffering from cyanide poisoning, research has shown that a change in blood lactate level may be a biomarker for cyanide exposure.6
- Laboratory test results for cyanide poisoning may not be readily accessible at the time of the incident or during an emergency situation.6

How should I manage someone who appears to be suffering from cyanide poisoning?

- Time is of the essence. Since there is no diagnostic test that quickly confirms cyanide poisoning at the scene of an emergency, rapid recognition of the signs of poisoning and prompt treatment may help save lives, as death can occur within minutes without treatment.16,20
- There are different treatments available for cyanide poisoning, which should be administered as soon as possible directly after exposure to cyanide.21

How can I prepare for the treatment of a potential cyanide poisoning victim?

- It is important that emergency responders work with the medical directors of their local fire/EMS agency, poison control center, and area hospitals to determine in advance how they will manage a potential victim of cyanide poisoning.22
- According to the US National Response Team, developing a comprehensive response system is an important part of planning for the treatment of hazardous materials exposure. Working across jurisdictional and discipline boundaries to create partnerships among fire/EMS agencies, hospitals, and public health officials may help a city, county, or state develop an effective way to respond to incidents involving hazardous materials such as cyanide.23