Also known as hydrocyanic acid (CAS Registry Number 74-90-8) or HCN, hydrogen cyanide is a rapid-acting lethal agent that inhibits aerobic respiration at the cellular level, preventing cells from utilizing oxygen. HCN, which at atmospheric pressure occurs over the temperature range -14 °C to +26 °C, is colourless gas or bluish-white liquid. On standing, it polymerizes and may explode, though it can be stabilized. Some people can smell HCN at low concentrations, describing an aroma of bitter almonds or marzipan; others cannot detect it.

Exposure

Inhalation is the most likely route of entry, causing hyperventilation initially. HCN vapor does not cross skin. A hydrogen cyanide concentration of 300 mg/m3 in air will kill a human within about 10 minutes. Liquid HCN will penetrate skin or can be absorbed from the lungs, when dispersed as an aerosol.

Latency period and recovery time

Symptoms of poisoning are rapid in onset since it is quickly absorbed from the lungs. Hyperventilation occurs first and increases with the dose inhaled (depends on time of exposure and concentration). This is followed by rapid loss of consciousness at high concentrations.

Main clinical symptoms

At high concentrations

- Hyperventilation
- Loss of consciousness
- Convulsions
- Loss of corneal reflex
- Sensation of throat constriction
- Giddiness
- Confusion
- Impaired vision
- Feeling of constriction around the head
- Pain may occur in the back of the neck and chest

At medium concentration

- Immediate and progressive sense of warmth (due to vasodilation) with visible flushing

- Prostration follows with nausea, vomiting, headache, difficulty in breathing and a feeling of tightness around the chest

- Unconsciousness and asphyxia are inevitable unless exposure ceases

At low concentrations

- Apprehensiveness
- Dyspnea
- Headache
- Vertigo
- Notice a metallic taste in the mouth

Principles of medical management

- Different level of exposure means that those arriving on the scene will find casualties who are: asymptomatic; showing acute symptoms; recovering from them; or dead. The patients should be removed from the source of exposure. Triage should be performed.

- Victims who are asymptomatic several minutes after exposure do not require oxygen or antidotes.

- Where exposure has caused acute effects (convulsions, apnea), oxygen (ideally 100%) and antidotes should be administered immediately.

- Patients recovering from acute exposures (and unconscious, but breathing) will make a faster recovery with antidotes and oxygen.

- Resources permitting, resuscitation should be attempted on subjects with no pulse in case heart stoppage is recent.

- If the exposure was to cyanide gas, decontamination of clothing or equipment is unnecessary in view of its high volatility. Liquid contamination will require decontamination with water and detergent.

Prophylaxis/treatment

Treatment must be prompt. After oxygen has been administered, subsequent treatment is aimed at dissociating the cyanide ion into cytochrome oxidase. Therapies may include (all treatment is to be used under a physician's direction, for symptomatic patient/victims):

- Sodium thiosulfate
- Sodium nitrite or 4-dimethylaminophenol (4 DMAP)
- Dicobalt edetate or hydroxocobalamin.

Stability/neutralization

HCN is unstable and non-persistent, and degrades slowly in the atmosphere. It can travel long distances, and its concentrations will fall as the distance travelled increases. It mixes with water and decomposes slowly.

Protection

Air purifying gas mask with filters treated so as to absorb cyanide can be used.

References

Public health response to biological and chemical weapons—WHO guidance (2004)

Facts about cyanide (CDC)

Monday 29th of April 2024 04:11:44 AM