

OSC 12
Ohio Safety Congress & Expo

WELL AT HOME. SAFE AT WORK.

214 What We Can't See Will Kill Us!

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Wednesday, March 28, 1:15 to 2:15 p.m.

Ohio Bureau of Workers' Compensation

Continuing Nursing Education Disclosures

- o **Goal:** To educate conference attendees on specific aspects of accident prevention and Ohio's workers' compensation system
- o **Learning objectives for session # 214 What We Can't See Will Kill Us!:**
 - Identify the top "hidden" gasses that can be in a hostile environment
 - List the devices available for detection of these gasses
 - Describe global awareness of the dangers of the routine response
- o **Criteria for Successful Completion:** Attend the entire event and complete a session evaluation.
- o **Conflict of Interest:** The planners and faculty have **no** conflict of interest.
- o **Commercial Support:** There is no commercial support for this event.
- o **Continuing Education:** Awarded 0.1 IACET general CEUs and 1.0 RN* contact hour.

*The Ohio BWC (OH-188/01-01-2013) is an approved provider of continuing nursing education by the Ohio Nurses Association (ONA-001-91), an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation.

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What You Can't See Can and Will Kill You!

By
Captain Robert Lantman
Clearcreek Fire District

May 7, 2012

- Middletown, Ohio
 - o 1 City Service Worker Dead
 - o 3 Firefighters injured – 1 in Critical Condition
- "Routine" Sewer Check
- Fire Department dispatched for an injury from a fall
- Nothing smelled funny....nothing seemed wrong

February 3, 2011

- Germantown, Ohio
- An Ohio State Trooper failed to report to work at the Lebanon, Ohio Post 83 for the first time in 25 years
- Post Lieutenant sent a trooper check on him and found Trooper Timothy Hall and his wife Molly Hall dead in their garage
- Nothing seemed out of place... Nothing seen wrong

August 13, 2010

- White Oak, Texas
- One EMT dead, two EMTs in critical condition
- Found at shift change, unconscious by on coming crew
- Nothing seen in the building ...Nothing seemed wrong

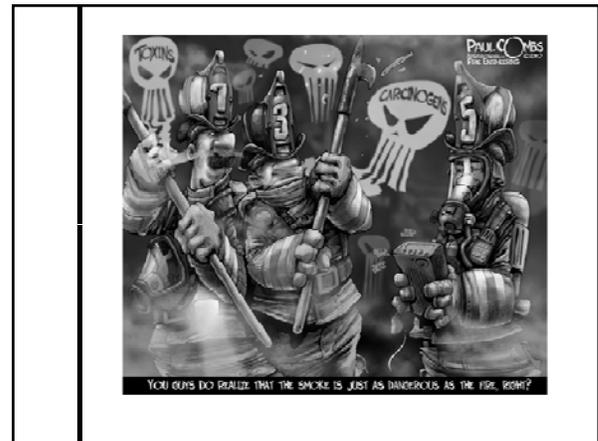
March 24, 2006

- Providence, Rhode Island
- Firefighter Kenneth Baker suffers a cardiac event on a fire scene and goes into cardiac arrest
- Was at second fire of the evening
- Firefighter Baker was in good shape .. Nothing seemed wrong.....

Nothing Seen Wrong!

But....

- There was a lot wrong.....
- Nobody could see, or even detect what was wrong...
- Nobody knew until it was too late!



Odorless, colorless, tasteless DEADLY

- What could possibly be the issues?
- Middletown, Ohio
 - Nitrogen Leak at a local compressed air plant
 - Nitrogen exists in our atmosphere at a 78% level
 - Why did it kill?????

Odorless, colorless, tasteless DEADLY

- Nitrogen replaced all of the oxygen in a confined space
- Worker was simply checking the hole and was not making entry!

Other gasses replacing Oxygen

- Atmosphere replacement of oxygen
- Brain suffocates
 - 4 minutes to damage
 - 5 minutes to permanent
- Anoxia starts and body shuts down

Detection

- Multi-gas meter to determine oxygen levels
- Most of the time, such as Middletown incident, there is no clue that a multi gas meter is needed
- SCENE SURVEY!



Treatment

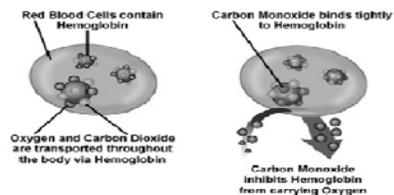
1. Oxygen
2. Oxygen
3. Oxygen



Odorless, colorless, tasteless DEADLY

- Germantown, Ohio and White Oak, Texas
- Carbon monoxide from generators
- Carbon Monoxide has an affinity to hemoglobin that is 230 times stronger than oxygen

Odorless, colorless, tasteless DEADLY



- Carbon Monoxide binds with hemoglobin
- No Oxygen Allowed!

Carbon Monoxide

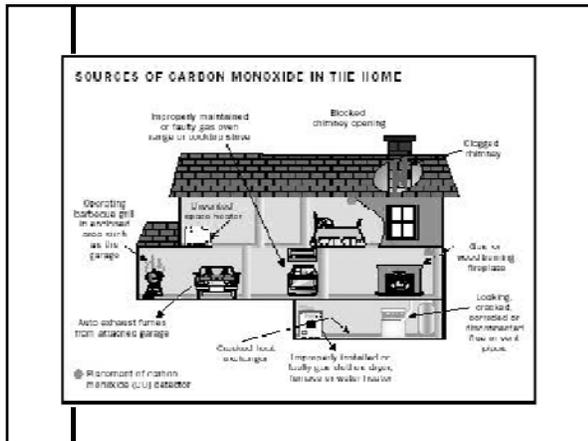
- Where does it come from???
- Naturally in the air and produced by the body
 - Incredibly low levels
- From the incomplete combustion
 - Hydrocarbon based fuels and natural fuels





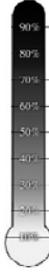
Carbon Monoxide

- Where can it be found in a home?
- Gas appliances
- Garage
- Fireplace



Symptoms

- Cherry red skin?
- Yes, but usually a vary late, often lethal sign
- Sometimes....
- None!
- Headaches
- Visual disturbances
- Fainting



90% Weak pulse and slowed respiration; respiratory failure and death

80% Cases with intermittent convulsions; depressed respiration and cardiac function; possible death

70% Fainting; increased respiration and pulse; coma with intermittent convulsions

60% Same as below with greater risk of collapse or fainting; increased respiration and pulse

50% Severe headache; weakness, dizziness; dim vision; nausea and vomiting; collapse

40% Headache; doubling in temples

30% Tightness across forehead; possible headache

20% No symptoms

COHb	Severity	Signs & Symptoms
< 15-20%	Mild	Headache, nausea, vomiting, dizziness, blurred vision
21-40%	Moderate	Confusion, syncope, chest pain, dyspnea, tachycardia, tachypnea, weakness
41-59%	Severe	Dysrhythmias, hypotension, cardiac ischemia, palpitations, respiratory arrest, pulmonary edema, seizures, coma, cardiac arrest
> 60%	Fatal	Death

Detection



- Pulse ox?
- Not reliable



- Beam of light will pick up carbon monoxide like oxygen

Detection

- Only way was suspicion and a blood gas test at the hospital
- Then the patient would be treated
- A blood gas test could take some time and precious minutes could be lost

Detection

- Carbon Monoxide detection
- RAD-57
- LP-15



- Looks like Pulse Ox
- Acts Like Pulse Ox
- Not a Pulse Ox!

Masimo

- Allows real time detection of the Carbon Monoxide levels
- Earlier detection
- Earlier treatment
- Less damage to the patient!

Treatment

- Oxygen therapy
 - CO half life in blood is about 240 minutes
 - Natural removal of the CO in the blood
- 100% O₂ by NRB would cut the half life
 - 60-90 minutes to remove
- Hyperbaric chamber
 - 20-25 minutes

Odorless, colorless, tasteless DEADLY

- Providence, Rhode Island
- Firefighter was suffering from cyanide poisoning
- He apparently received it at the first fire of the evening... a few hours prior to his cardiac arrest

Odorless, colorless, tasteless DEADLY

- Firefighter was found to have high levels of Cyanide in his system
- After the cardiac event, other firefighters were found with the same high levels

Odorless, colorless, tasteless DEADLY

- Can have a bitter almond smell - - -
- But
- It is easily hidden in the odors of a structure fire.
- Overhaul is one of the main areas of exposure

Odorless, colorless, tasteless DEADLY

- Cyanide is now found in many households
- Natural by-product of wool, silk and leather
- Polyurethane, nylon, insulation, carpet, furnishings, pillows, and just about all plastic products in the house



Odorless, colorless, tasteless DEADLY

- National Institute of Standards and Technology (NIST) Investigation
- Station Nightclub – West Warwick, RI
- Findings showed that the burning polyurethane, emitted so much cyanide, that it was the likely cause of death for most of the 100 casualties

Odorless, colorless, tasteless DEADLY

- Symptoms:
 - Weakness
 - Eye irritation
 - Perspiration
 - Rapid Heart Rate
 - Increased breathing
- And he just finished one fire – he had symptoms of exhaustion--- or so it seemed

Odorless, colorless, tasteless DEADLY

- Treatment
- Arterial blood gas sample, lengthy test process and conditions
- Diagnoses is missed and dismissed as Carbon Monoxide poisoning

**Odorless, colorless, tasteless
DEADLY**

- Most firefighters are able to process the Cyanide due to short half life and distance from exposure



**Odorless, colorless, tasteless
DEADLY**

- Oxygen alone may not be the best solution
- Cyanide will disable the body's ability to utilize oxygen
- Medications are very helpful in the ability to treat those that are affected by Cyanide poisoning

**Odorless, colorless, tasteless
DEADLY**

- Newer treatments and anti-dote
- Amyl Nitrate
- Sodium Thiosulfate

Amyl Nitrate

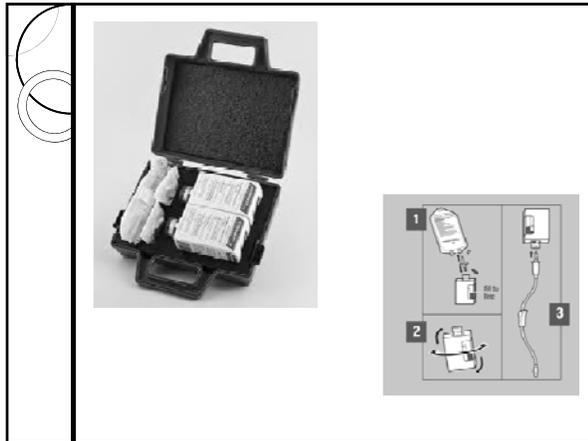
- Used as an inhalant from a small glass vial covered in a cloth
- Crushed and inhaled (like an ammonia inhalant capsule)
- The Nitrate assist in the transforming of hemoglobin to methemoglobin
- Cyanide readily bonds to methemoglobin

Sodium Thiosulfate

- 12.5 mg IV over 10 minutes
 - 50 mL of a 25% solution
- Converts the bonded cyanide to thiocyanate, which is easily excreted in the urine

CYANOKIT

- 5 grams of hydroxocobalmin
- Hydroxocobalmin binds to the Cyanide in the body allowing the Oxygen to be used again
- Approved in the US since 2007
- Given as an infusion and is well tolerated



Odorless, colorless, tasteless DEADLY

- Summary
- We face incidents everyday
- Safety!!!
- Scene Safety!

Odorless, colorless, tasteless DEADLY

- Remember, we do not want to become a victim as well!

The illustration depicts a person in a full-body hazmat suit and helmet, holding a detector. They are standing next to several hazardous waste containers, some with warning labels like 'CORROSIVE' and 'DANGEROUS'. The text 'ODORLESS, COLORLESS, TASTELESS DEADLY' is written in a stylized font above the person.

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