Enclosed space fires and the risk of cyanide exposure

Each year there are more than 1.3 million fires in the US

3,390 civilian fire deaths

81% of civilian deaths are from residential fires

Smoke inhalation is a factor in 85% of fire fatalities

Enclosed space fires can lead to smoldering combustion of plastic, vinyl, acrylic, neoprene, rubber, and insulation and the production of cyanide

Hydrogen cyanide is detectable in approximately one-half of people exposed to enclosed space fires

### Suspect cyanide toxicity if

- Altered mental status: lethargy, weakness, drowsiness in conscious patients
- Soot in around the nose or mouth — suspect cyanide poisoning in any unconscious patient removed from a burning building with this feature
- Shortness of breath, rapid, deep breaths (oxygen saturation may be normal)
- Prolonged loss of consciousness which does not improve when patient is free from a burning structure
- Cardiac abnormalities including cardiac arrest
- Seizures (carbon monoxide poisoning rarely causes this)
- Elevated blood lactate levels (prehospital determination often not available)

### Initial management of suspected cyanide exposure

- Remove the individual(s) from the scene
- Assess oxygen level — initial resuscitation priorities are administration of 100% oxygen with a tracheal tube if airway is at risk
- Utilize lung-protective ventilation strategies and consider early bronchoscopic washout
- Careful administration of fluid therapy to avoid over/under-resuscitation
- Administer antidote for patients with suspected cyanide poisoning

### Cyanide antidotes

- **Hydroxocobalamin**
  - **Dose**: 5g IV over 15 minutes. May repeat dose if patient response is inadequate or poisoning is severe (max dose 10g)
  - **Adverse events**:
    - Skin and urine may be colored red for up to 15 days
    - Rare anaphylaxis
    - Cases of acute renal failure reported
  - **Hydroxocobalamin is considered more suitable for prehospital administration**

- **Sodium nitrate + sodium thiosulfate**
  - May be used
  - **Dose**: 300 mg sodium nitrate (IV infusion), immediately followed by 12.5g sodium thiosulfate (IV infusion)
  - **Adverse events**:
    - Risk of excess methemoglobinemia resulting in further decrease in oxygen carrying capability
    - Vasodilation, hypotension, tachycardia, dizziness, nausea, vomiting

### References