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## ***Cyanide Exposure***

### Chemical Agents

1. Agents of Concern Include: Cyanide
  - a. Hydrogen Cyanide
  - b. Potassium / Sodium Cyanide
  - c. Cyanogen Chloride
2. Detection: The presence of these agents can be detected through specialized environmental monitoring equipment available to hazardous materials response teams.
3. Modes of Exposure
  - a. Inhalation (including smoke inhalation)
  - b. Ingestion
  - c. Skin absorption unlikely

### Indications for Antidote Use in patient with suspected cyanide poisoning:

- a. Almond Odor
- b. Cardiac or Respiratory Arrest
- c. Hypotension SBP <90
- d. GCS </=9

### Patient assessment may also demonstrate:

1. Hypotension
2. Shortness of breath
  - a. Possibly accompanied by chest pain
  - b. Generally not associated with cyanosis (blue skin membranes)
  - c. Pulse oximetry levels usually normal
  - d. Usually associated with increased respiratory rate and tidal volume
  - e. Potential for rapid respiratory arrest
3. Confusion, decreased level of consciousness, coma
4. Seizures
5. Headache, dizziness, vertigo (sense of things spinning)
6. Pupils dilate (late)

## **Pre-Medical Control**

### PARAMEDIC

1. Follow the **General HAZMAT Treatment** protocol.
2. Administer oxygen 10-15 L via non-rebreather mask.
3. Transport with good ventilation and appropriate respiratory protection.
  - a. If in respiratory arrest, follow the **Emergency Airway Procedure** and initiate positive pressure ventilation when operationally feasible.
4. If the patient has indications for use, administer Cyanokit®.
5. The starting dose of hydroxocobalamin for adults is 5 g (i.e., two 2.5g vials OR one 5g vial) administered as an intravenous (IV) infusion over 15 minutes

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(approximately 15 ml/min), i.e., 7.5 7.5 minutes/vial. See charts below for pediatric dosing (70 mg/kg).

<b>Broselow (Weight)</b>	<b>Age</b>	<b>Cyanokit® Dose (~70 mg/kg) IV/IO</b>	<b>Cyanokit® Volume to Administer<sup>2</sup> IV/IO</b>
3-5 kg (6-11 lbs)	<b>0-2 months</b>	250 mg	<b>10 mL<sup>3</sup></b>
6-7 kg (13-16 lbs)	<b>3-6 months</b>	500 mg	<b>20 mL<sup>3</sup></b>
8-9 kg (17-20 lbs)	<b>7-10 months</b>	625 mg	<b>25 mL<sup>3</sup></b>
10-11 (21-25 lbs)	<b>11-18 months</b>	750 mg	<b>30 mL<sup>3</sup></b>
12-14 kg (26-31 lbs)	<b>19-35 months</b>	900 mg	<b>36 mL<sup>3</sup></b>
15-18 kg (32-40 lbs)	<b>3-4 years</b>	1100 mg	<b>44 mL<sup>3</sup></b>
19-23 kg (41-51)	<b>5-6 years</b>	1400 mg	<b>56 mL<sup>3</sup></b>
24-29 kg (52-64)	<b>7-9 years</b>	1750 mg	<b>70 mL<sup>3</sup></b>
30-36 kg (65-79 lbs)	<b>10-14 years</b>	2500 mg	<b>100 mL<sup>4</sup> (1/2 bottle)</b>
<b>Adult</b>	<b>&gt;14 years</b>	5000 mg	<b>200 mL<sup>4</sup> (full bottle)</b>

- A. Each vial of hydroxocobalamin for injection is to be reconstituted with diluent (not provided with Cyanokit) using the supplied sterile transfer spike.
1. The recommended diluent is 0.9% Sodium Chloride injection (0.9% NaCl).

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2. The line on each vial label represents the volume of diluent. Following the addition of diluent to the lyophilized powder, each vial should be repeatedly inverted or rocked, not shaken, for at least 30 seconds for the 2.5g bottles prior to infusion, 60 seconds for the 5g bottles.
3. Hydroxocobalamin solutions should be visually inspected for particulate matter and color prior to administration.
  - a. If the reconstituted solution is not dark red or if particulate matter is seen after the solution has been appropriately mixed, the solution should **not be administered to the patient** and should be discarded.
- B. There are a number of drugs and blood products that are incompatible with Cyanokit, thus Cyanokit® requires a separate intravenous line for administration.
- C. Depending upon the severity of the poisoning and the clinical response, a second dose of 5 g may be administered by IV infusion for a total dose of 10g in adults. The rate of infusion for the second dose may range from 15 minutes (for patients in extremis) to two hours, as clinically indicated.  
Contact medical control for second dose instructions for pediatric patients.

**SPECIAL CONSIDERATION FOR SMOKE INHALATION:**

Many, but not all, smoke inhalation victims will have cyanide poisoning and may present with burns, trauma, and exposure to other toxic substances making a diagnosis of cyanide poisoning particularly difficult. Assess for exposure to fire or smoke in an enclosed area as well as the presence of soot around the mouth, nose or oropharynx. While important to note, these alone are not an indication for Cyanokit® treatment.

The Cyanokit® should be considered for all serious smoke inhalation victims, especially those with altered mental status (GCS of 9 or less), hypotension (SBP < 90), cardiac/respiratory arrest without burn criteria for death on scene (incinerated body).