

CYANIDE

CYANIDE TOXICITY

INGESTION

LETHAL DOSES

60- 90 mg

Hydrogen Cyanide (HCN)

200 mg

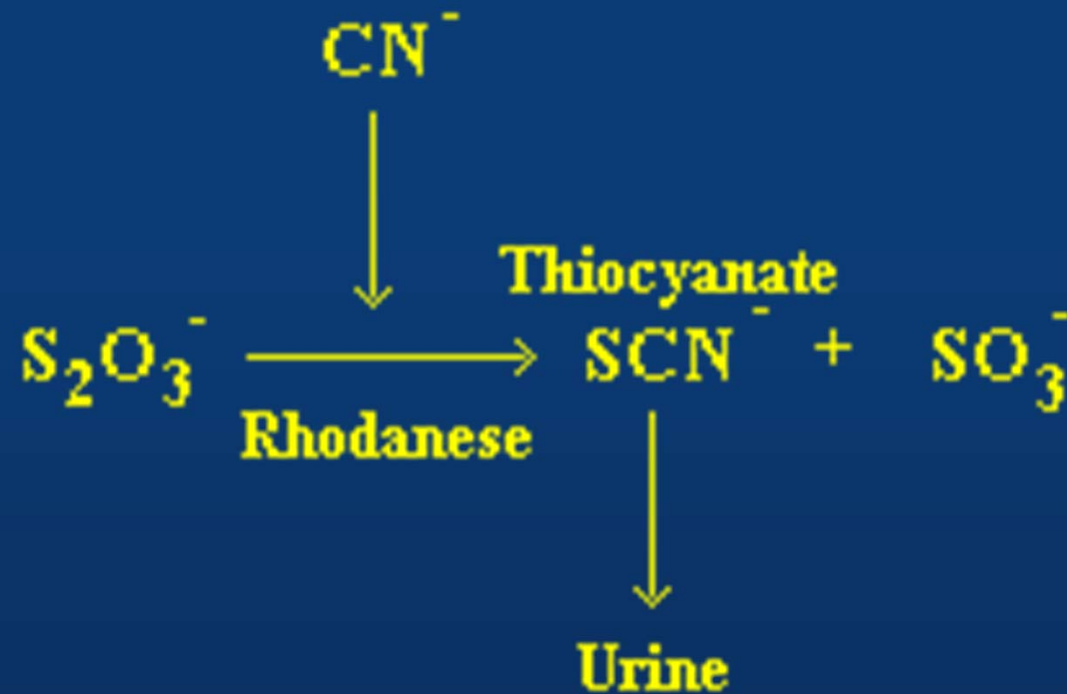
Potassium Cyanide (KCN)

CYANIDE TOXICITY

INHALATION

Concentration (mg.m ⁻³)	Effect
300	immediately lethal
200	lethal after 10 minutes
150	lethal after 30 minutes
120-150	lethal after 30-60 minutes
50-60	20 minutes to 1 hour without effect
20-40	light symptoms after several hours

CYANIDE METABOLISM



CYANIDE

SMOKERS
INHALE
CYANIDE

By inhaling cyanide, a product from poisonous blue almond trees, the whole cigarette is dead.



CYANIDE PLANTS

Almonds



250 mg CN/100g plant tissue

Cassava



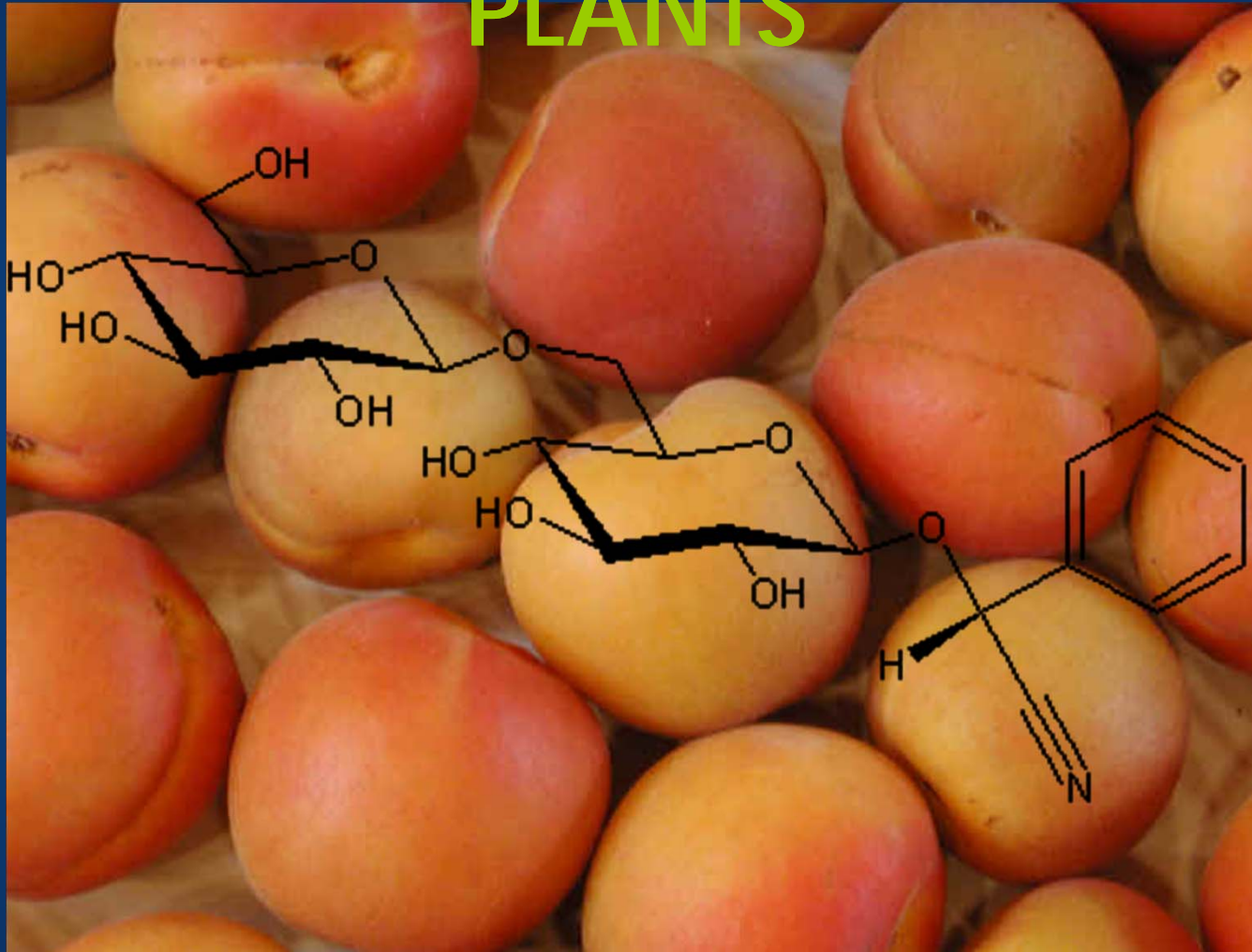
104 mg CN/ 100 g plant tissue

Wild Cherries



140-370 mg CN/ 100 g plant material

CYANIDE PLANTS



AMYGDALIN

CYANIDE "DRUGS"

Laetrile
THE POLITICAL SUCCESS OF
A SCIENTIFIC FAILURE

LAETRILE
Controversial results
of tests on surface

Approval of Laetrile as an anticancer drug... would open the door to the legitimization of quackery.

LAETRILE
The Sloan-Kettering Trials of an Apricot Pit—1973

LAETRILE
The Laetrile Nightmare
Trapped between fear of death, law

The history of Laetrile is a history of changing theories, changing therapies, and, finally, changing claims.

Laetrile Toxicity Studies in Dogs

Laetrile at Sloan-Kettering: A Question of Ambiguity

LAETRILE
A cancer cure? Prove it, the medical establishment demands

DR. STEWART HARRIS
Many patients feel

Amygdalin
Toxicity Studies in Rats Predict Chronic Cyanide Poisoning in Humans

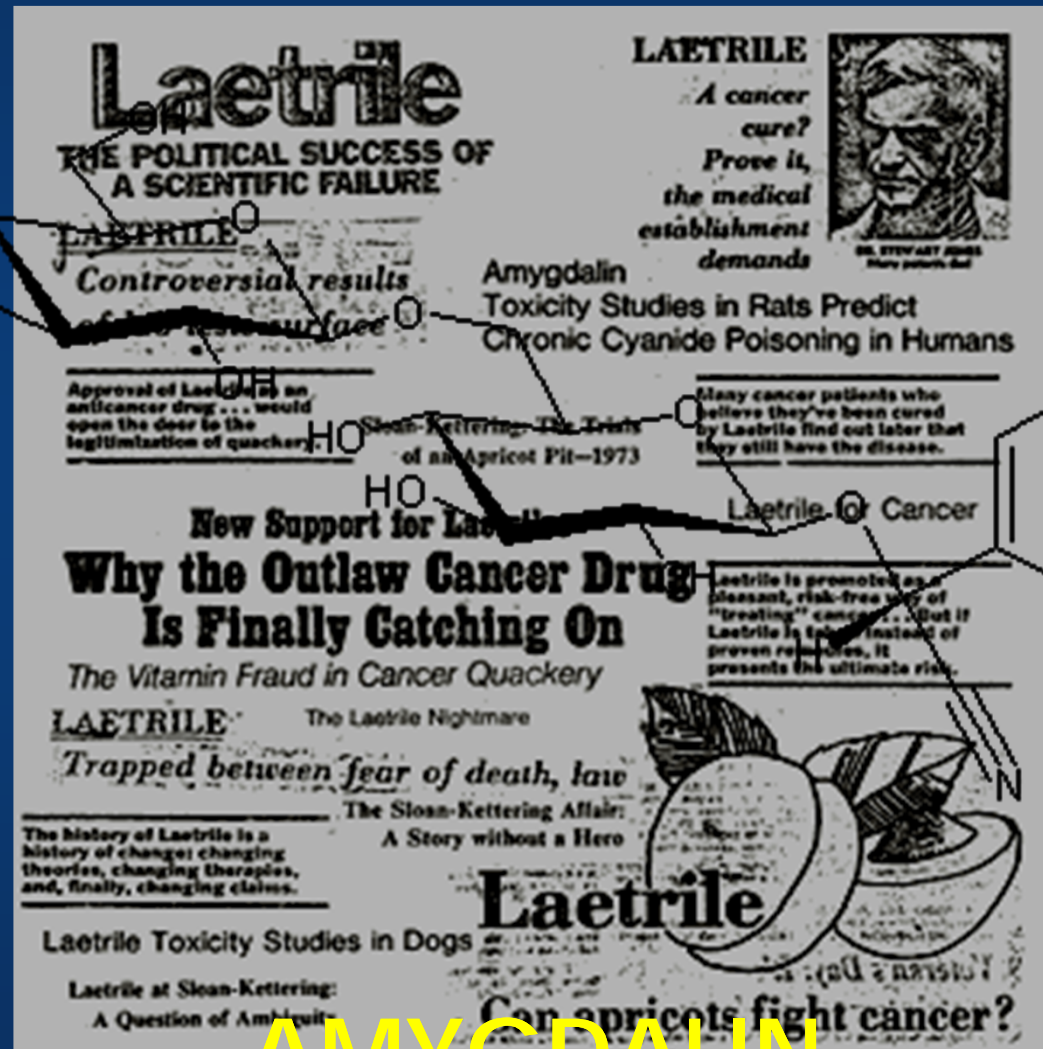
Many cancer patients who believe they've been cured by Laetrile find out later that they still have the disease.

Laetrile for Cancer

Laetrile is promoted as a pleasant, risk-free way of "treating" cancer... But if Laetrile is toxic instead of proven remedies, it presents the ultimate risk.

Laetrile

Can apricots fight cancer?



AMYGDALIN

CYANIDE INDUSTRY



**ELECTROPLATING
HARDENING METALS
GOLD EXTRACTION
LABORATORIES**

CYANIDE FIRE



CYANIDE/CARBON MONOXIDE

CYANIDE RODENTICIDE/FUMIGANT



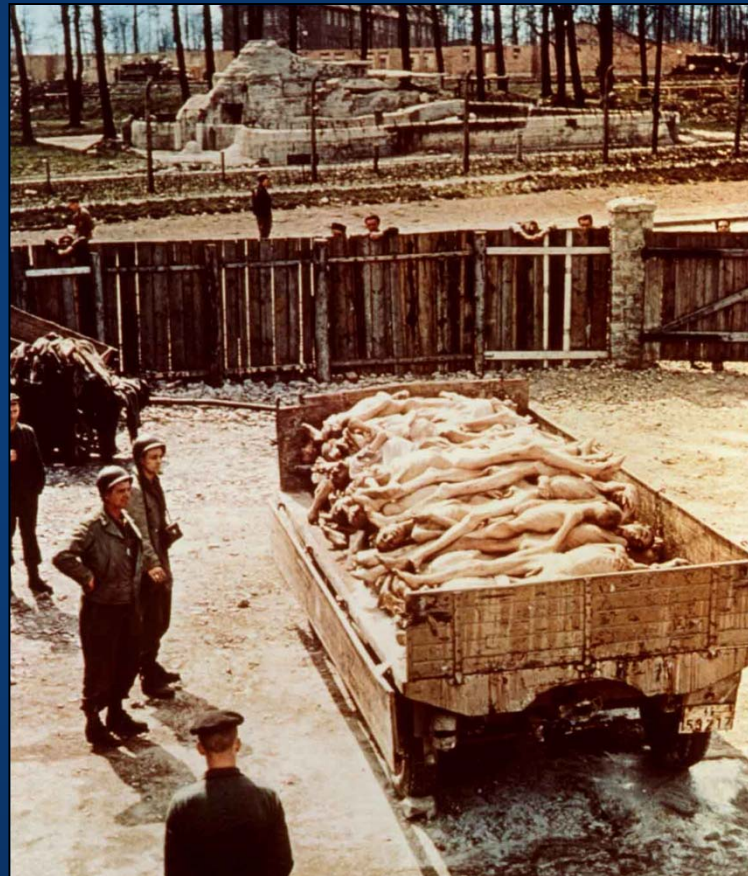
FERATOX/CYANIDE PASTE

CYANIDE RODENTICIDE/FUMIGANT



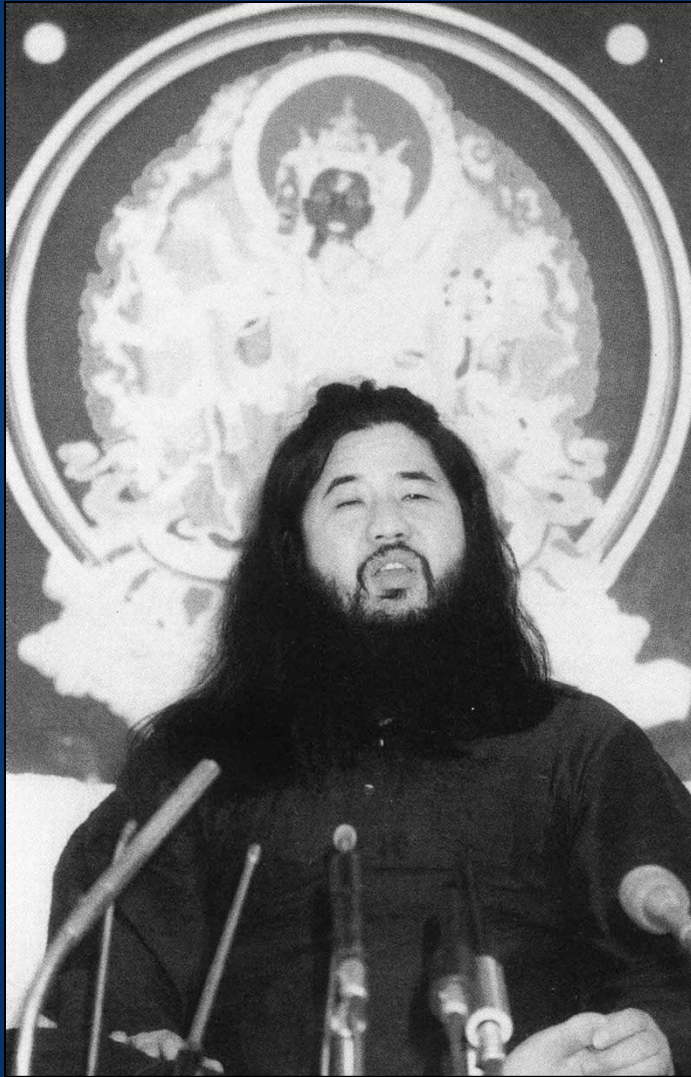
ZYCLON B

CYANIDE RODENTICIDE/FUMIGANT



ZYCLON B

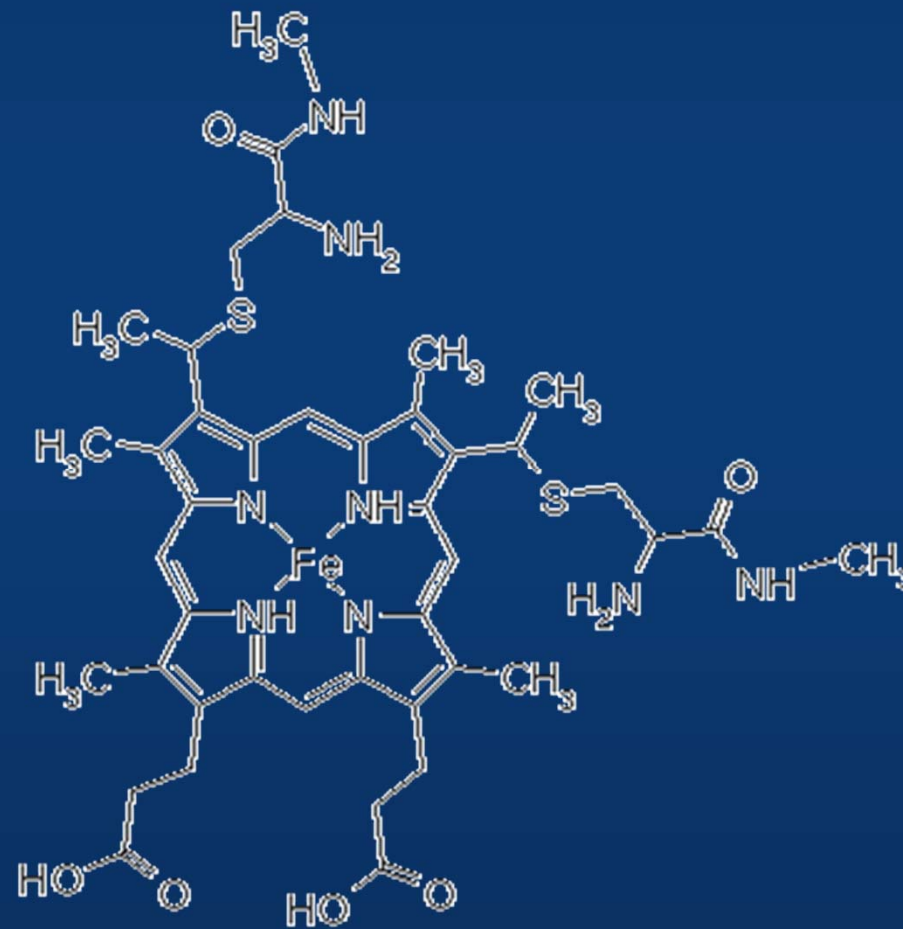
CYANIDE CHEMICAL WEAPON



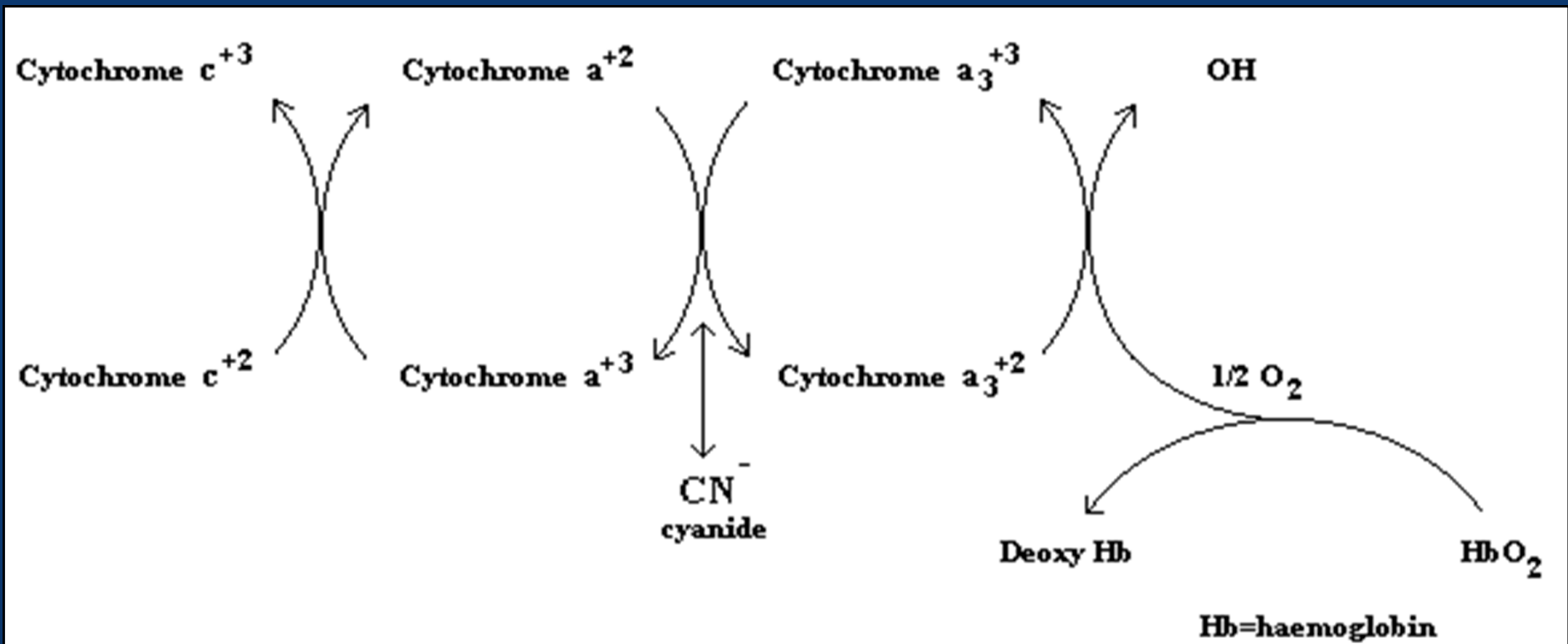
CYANIDE SUICIDE

CYANIDE TOXIC MECHANISM

Heme group of mitochondrial cytochrome

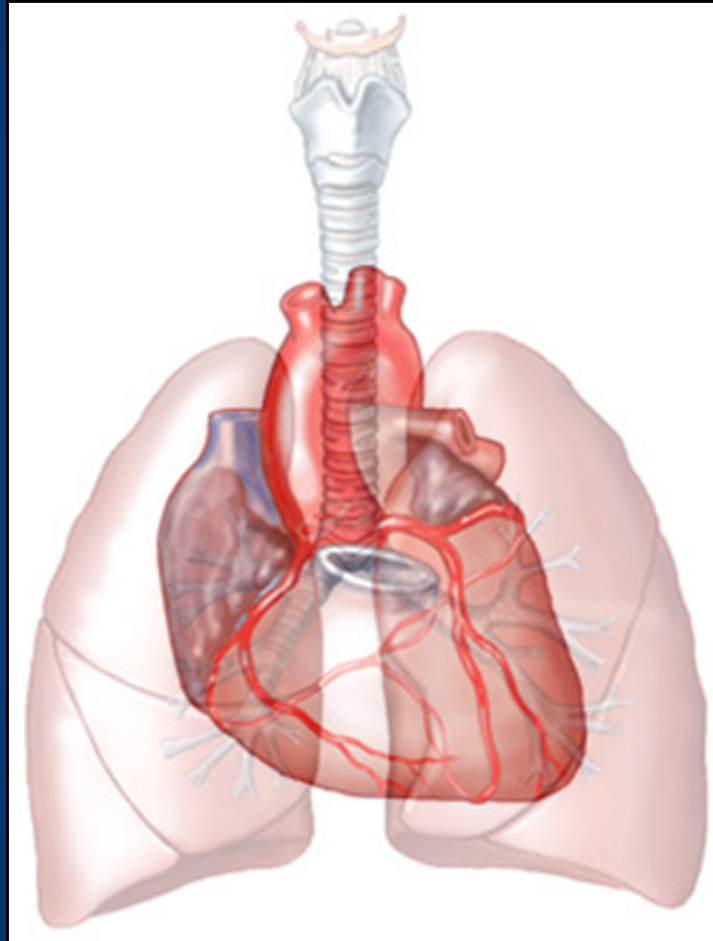


CYANIDE TOXIC MECHANISM



“HISTIOTOXIC ANOXIA”

CYANIDE TOXIC MECHANISM



VASOSPASM

CYANIDE

SIGNS AND SYMPTOMS

Mild Toxicity

Nausea

Dizziness

Drowsiness

Moderate Toxicity

Loss of consciousness for a short period

Convulsion

Vomiting

Cyanosis

Severe Toxicity

Deep coma

Dilated non-reactive pupils

Deteriorating cardio-respiratory function

CYANIDE

INVESTIGATIONS

History

Occupation, access to cyanide

Smell

Bitter almonds

ECG

**Sinus tachycardia/bradycardia
Ischaemic changes**

Pulse oximetry

Normal

CYANIDE INVESTIGATIONS

ABG

Metabolic acidosis, normal oxygen

Anion gap ($\text{Na}^+ - [\text{Cl}^- + \text{HCO}_3^-]$)

Elevated

Serum lactate

Elevated

Blood cyanide level

Elevated – difficult to rapidly determine

CYANIDE MANAGEMENT

HAZARD ASSESSMENT

ABC's

TOXICOKINETICS

ABSORPTION

DISTRIBUTION

METABOLISM

ELIMINATION

TOXICODYNAMICS

SUPPORTIVE CARE

CYANIDE MANAGEMENT

HAZARD ASSESSMENT

Cyanide is hazardous by:

Ingestion

Respiratory exposure

Dermal exposure

CYANIDE MANAGEMENT

ABC's

Avoid:

**mouth to mouth, or
mouth to nose artificial ventilation**

CYANIDE MANAGEMENT

DECONTAMINATION (absorption)

Nasogastric aspiration

Activated charcoal

Gastric lavage

Emesis

CYANIDE MANAGEMENT

ANTIDOTES (distribution/metabolism)

Enhanced cyanide metabolism

Cyanide ion binding

CYANIDE ANTIDOTES

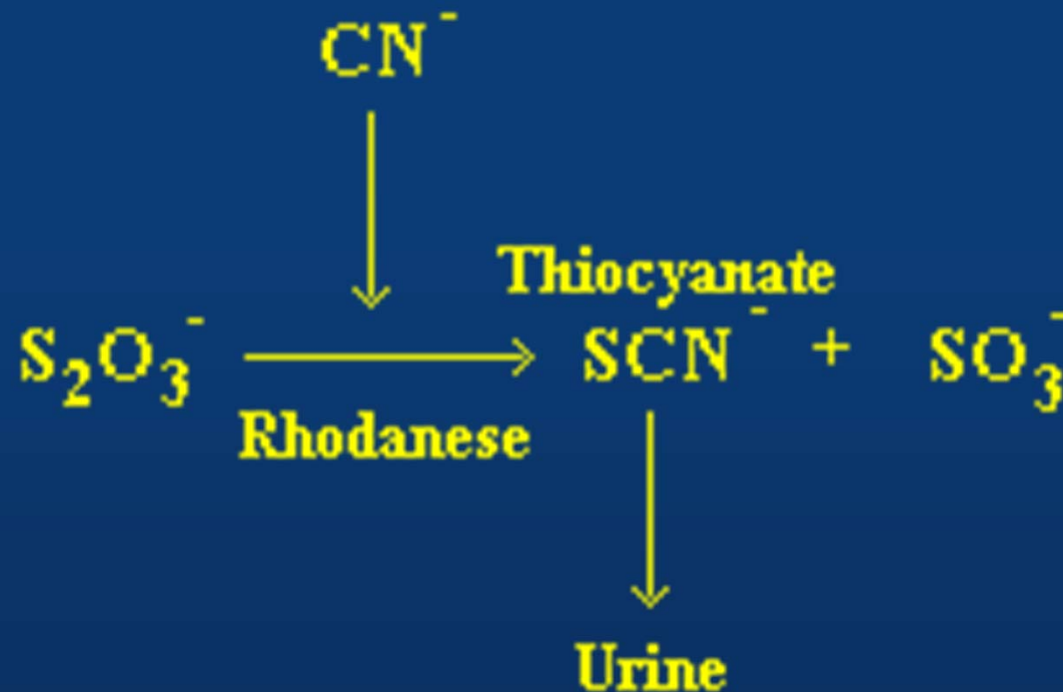
Enhanced cyanide metabolism

Enhancement of body's natural mechanisms for dealing with cyanide:

- i. oxygen
- ii. Sodium thiosulphate

CYANIDE ANTIDOTES

Enhanced cyanide metabolism



CYANIDE ANTIDOTES

Cyanide ion binding

Cobalt containing drugs

Methaemoglobin forming drugs

CYANIDE ANTIDOTES

Cyanide ion binding

Cobalt containing drugs:

Cyanide ions will bind to cobalt which can be supplied in the form of either;

- i. Hydroxocobalamin, or
- ii. Dicobalt edetate.

CYANIDE ANTIDOTES

Cyanide ion binding

Methaemoglobin forming drugs:

Cyanide will also bind to methaemoglobin formed after administration of:

- i. Amyl nitrite;
- ii. Sodium nitrite, or;
- iii. 4-dimethylaminophenol
(4-DMAP)

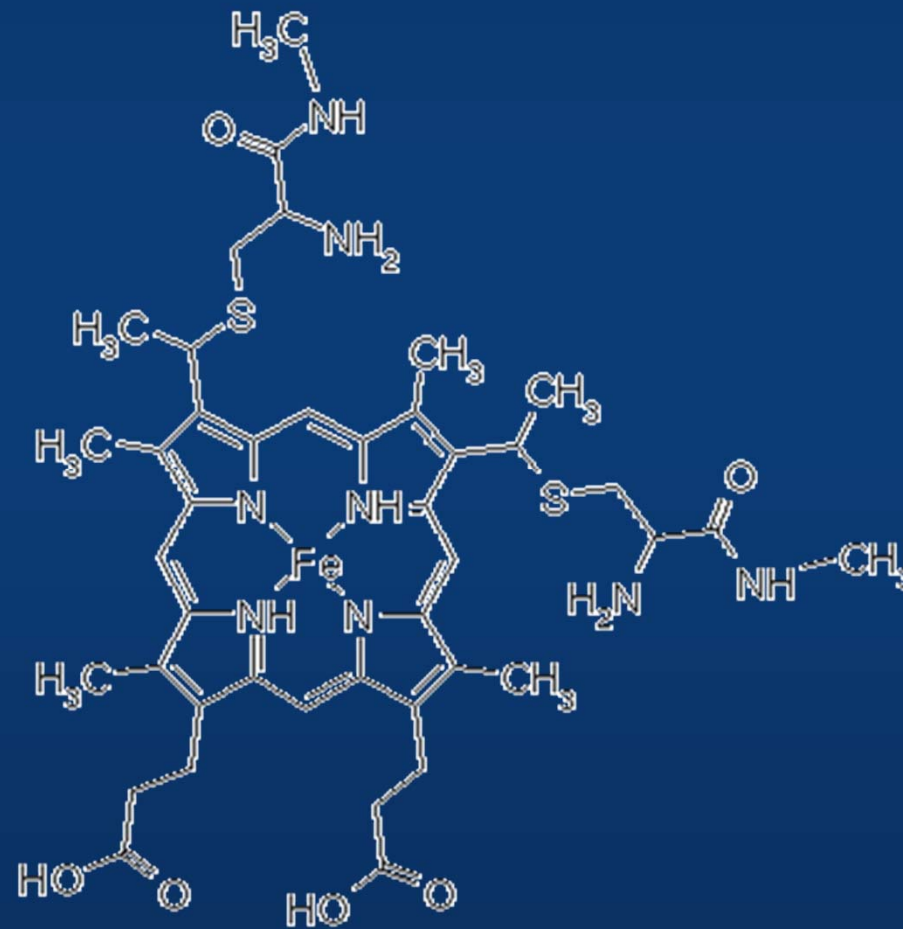
CYANIDE ANTIDOTES

Cyanide ion binding

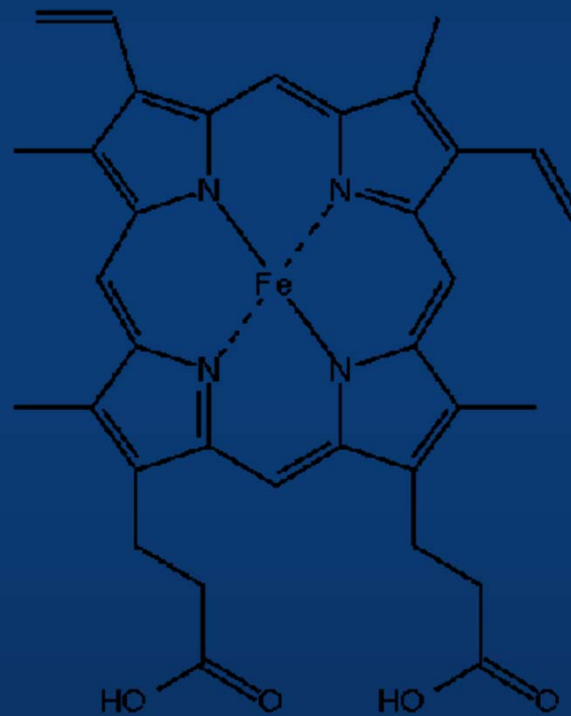


CYANIDE TOXIC MECHANISM

Heme group of mitochondrial cytochrome



CYANIDE TOXIC MECHANISM



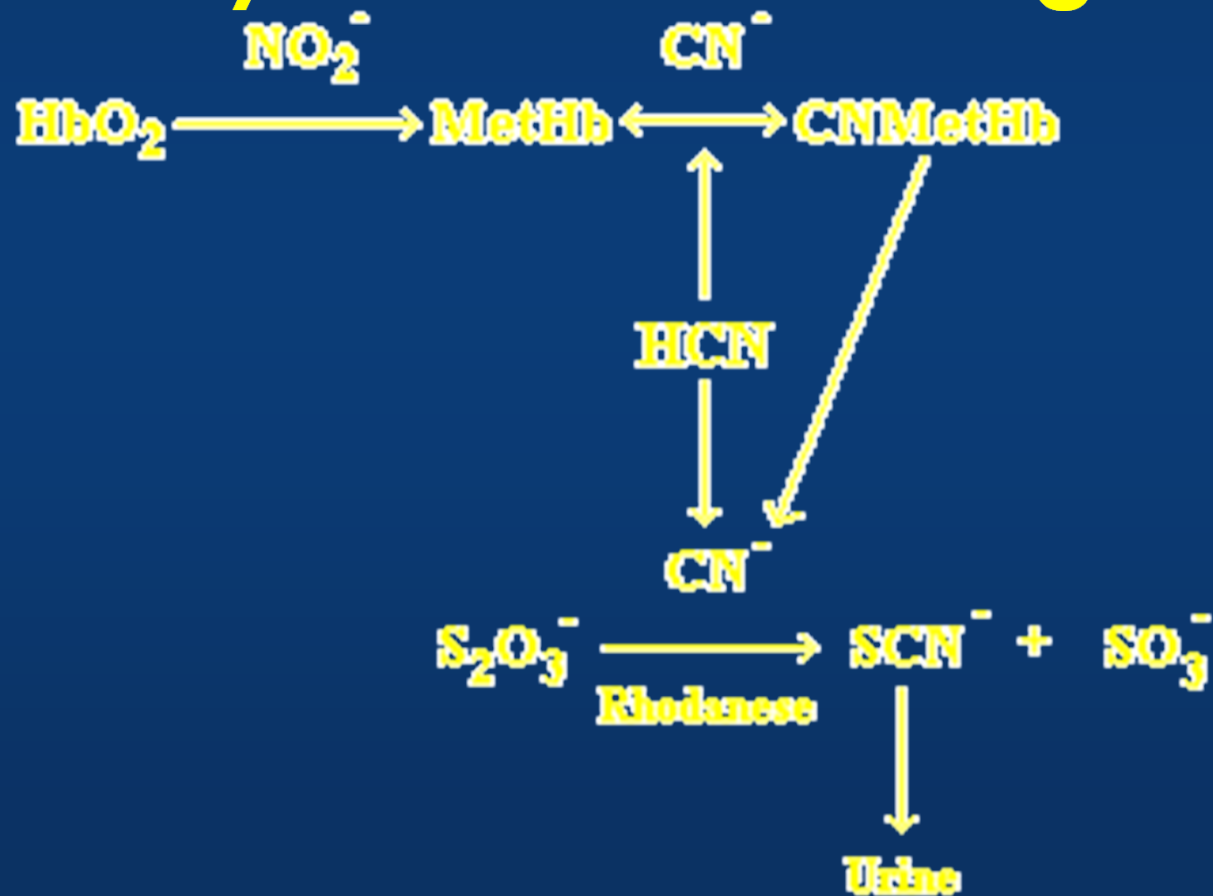
CYANIDE ANTIDOTES

Cyanide ion binding



CYANIDE ANTIDOTES

Cyanide ion binding



CYANIDE

FIRST AID

If the patient is unconscious:

Commence forced artificial ventilation with 100% oxygen using a mask and bag with a “non-return” valve (to prevent inspiration of inhaled gases)

Amyl nitrite may be administered via the ambu bag 0.2 - 0.4 mL for adults and 0.1 mL for children

NOTE:

Amyl nitrite forms a flammable mixture when combined with oxygen. It must therefore not be used in situations where it may be ignited.

CYANIDE

MILD POISONING

In those circumstances where an individual exposed to hydrogen cyanide by inhalation is conscious five minutes after exposure has ceased, and complains only of nausea, dizziness, drowsiness or other mild symptoms:

Oxygen

Reassurance

Bed rest

CYANIDE

MODERATE POISONING

Those patients who have been observed to have lost consciousness for a short period, or are suffering convulsions, vomiting and/or cyanosis:

CYANIDE

MODERATE POISONING

Oxygen 100%: but for no longer than 12-24 hours

Amyl nitrite: 0.2 - 0.4 mL for adults and 0.1 mL for children via “ambu bag” (if there is delay in administering sodium thiosulphate)

CYANIDE

MODERATE POISONING

Then

Sodium thiosulphate: 50 mL of 25% solution (12.5g) IV over 10 minutes. In children the dose is 300 to 500 mg/kg

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MODERATE POISONING

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CYANIDE

SEVERE POISONING

And either

Hydroxocobalamin: 5 g (70 mg/kg for children) by rapid IV infusion. This dose may be repeated once or twice, depending upon response, with IV infusions over 30 minutes to 2 hours

Sodium nitrite: 10 ml of 3% solution (300mg) IV for 5 - 20 minutes. May be repeated at half initial dose

Dicobalt edetate: 20 ml of 1.5% solution (300mg) IV over 1 minute followed immediately by 50 ml of hypertonic glucose solution. May be repeated twice

CYANIDE

SEVERE POISONING

Then

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(12.5g) IV over 10 minutes. In children the dose
is 300 to 500 mg/kg

CYANIDE