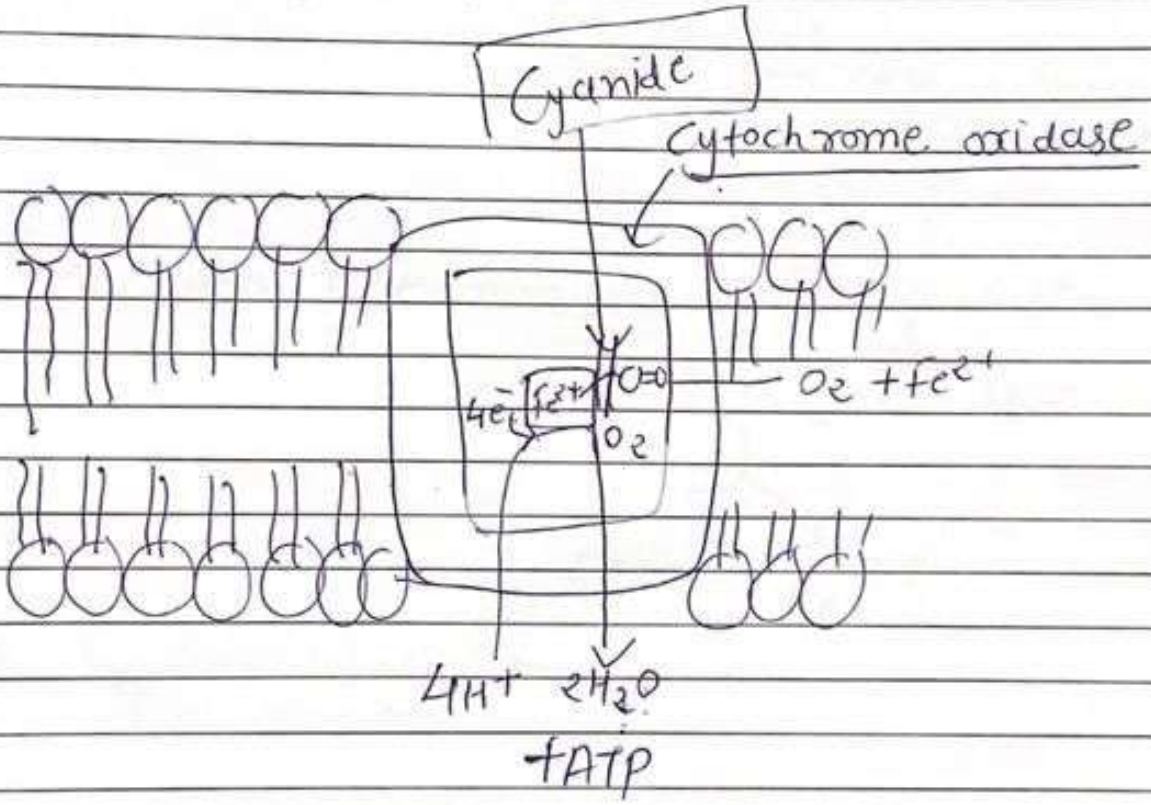
Cyanide Poisoning It's Consequences and Treatment

Biochemical Consequences

Cytochrome Oxidase
(Complex IV ETC)

↓

Co factor Heme



⊖ ETC
NO ATP available
↓ cellular utilization of O₂
↓
Hypoxia
↓
cell death

Biochemical basis of Treatment of Cyanide poisoning.

(1) Nitrites

→ Fe^{2+} —Nitrites→ Fe^{3+}

Hb ⟶ Methemoglobin

↓

(+) Cyanide ⟷ Release from cytochrome oxidase

↓

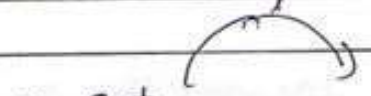
Cyanomethemoglobin

→ for Methemoglobin → Treat with

↓

Methylene blue

↓



Fe^{3+} Fe^{2+}

(2) Hydroxocobalamin

Hydroxocobalamin + Cyanide

↓

Harmless Cyanocobalamin (form of Vit B_{12})

(3) 4-Dimethylaminophenol (4-DMAP)

→ IV ~~bom~~ 3mg/kg 4-DMAP

↓

Produce 35 % Methemoglobin → 1 min

(*) Dicobalt edetate

↓

Chelate Cyanide

↓

As a Cobalticyanide → More toxic

↓

So reserve only for patients with most severe degree of exposure to cyanide

(*) Glucose → Protects against Cobalt toxicity

↓

Associated with dicobalt Edetate

→ Counterreagent to cyanide, reacting with it to form less toxic compounds

↓

that can be eliminated from body

(*) 3- Mercaptopyruvate

Cyanide

Using

Cysteine aminotransferase → 3-Mercaptopyruvate

3-mercaptopyruvate (3-MP) → 3-Mercaptopyruvate Sulfurtransferase

↓

Thiocyanate

(*) Oxygen therapy

(*) Thiosulfate

(Thiosulfate cyanide Sulfurtransferase)

Cyanide → Rhodanese → thiocyanate

(OR)

Thiosulfate (Substrate)

(*) States of Respira