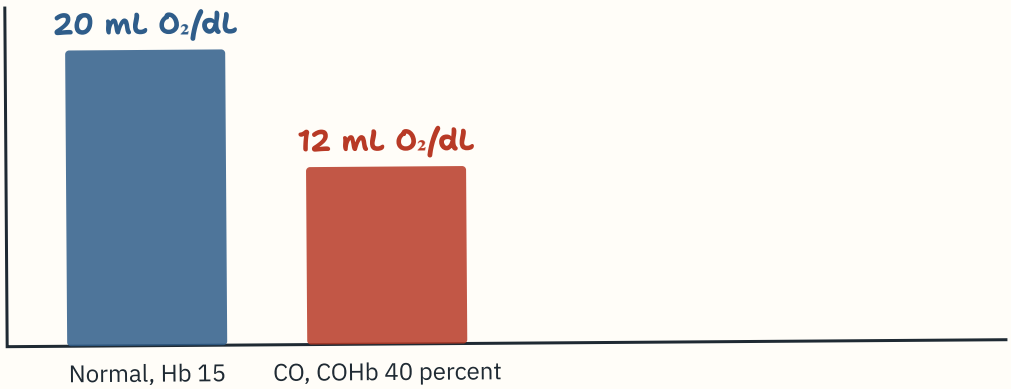
CO, cyanide and methaemoglobin

Why SpO_2 and PaO_2 fool you



Step by step

1. Carbon monoxide: confirm with a co-oximeter; 100 percent oxygen
2. Methaemoglobin: Fe^{2+} to Fe^{3+}; methylene blue
3. Cyanide: blocks cytochrome oxidase; hydroxocobalamin

OXYGEN CONTENT

$$CaO_2 = 1.34 \times Hb \times SaO_2 + 0.003 \times PaO_2$$

mL O_2/dL; usable haemoglobin, its saturation and a little dissolved oxygen

Poison	PaO_2	SpO_2	Arterial content
Carbon monoxide	Normal	Falsely normal	Low
Methaemoglobin	Normal	Mid-80s, about 85 percent	Low
Cyanide	Normal	Normal	Normal; venous O_2 high

Three fingerprints

Three things to keep

Carbon monoxide: falsely normal oximeter, low content

Methaemoglobin: oximeter in the mid-80s, low content

Cyanide: normal arterial content, high venous oxygen

Exam traps

- A normal SpO_2 and PaO_2 do not exclude carbon monoxide poisoning.
- Supplemental oxygen does not fix the mid-80s reading of methaemoglobin.
- Methylene blue: caution or avoid in G6PD deficiency.
- In smoke inhalation, hydroxocobalamin is preferred for cyanide.

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Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/respiratory-physiology/co-cyanide-methaemoglobin-spo2-pao2

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