Oxyhemoglobin Dissociation Curve

REFERENCE

WHAT THE CURVE SHOWS

- It plots oxygen partial pressure (PaO2) against hemoglobin saturation (SaO2 / SpO2)
- The S shape: a flat top, where saturation holds while PaO2 falls, and a steep middle, where small pressure drops unload much oxygen
- Landmark: SpO2 of about 90% corresponds to a PaO2 near 60 mmHg — the shoulder of the steep part
- P50 (about 26–27 mmHg): the PaO2 where hemoglobin is 50% saturated — the curve's position marker

SHIFTS

- Right shift — hemoglobin lets go of oxygen: acidosis, fever, raised CO2, raised 2,3-BPG. Good for working tissue
- Left shift — hemoglobin holds on: alkalosis, hypothermia, low CO2, carbon monoxide, fetal hemoglobin. Loads well, unloads poorly
- Remember it as: right = release, left = locked on

READING THE PATIENT

- On the flat top, big PaO2 changes barely move the SpO2 — a 'normal' saturation can hide a falling PaO2
- On the steep part, tiny PaO2 changes swing the saturation — small problems look dramatic, and small fixes help fast
- Pulse oximetry reads saturation, not content: an anemic patient can show 100% and still carry little oxygen
- In shock or acidosis the curve shifts right — tissues extract more, and the same SpO2 means a lower PaO2

PEARLS

- Treat the patient, not the number: pair every SpO2 with work of breathing, mentation, and perfusion
- Cold, poorly perfused fingers lie to the probe — warm the hand or move the sensor before treating the reading

Take Home Message:

The curve explains the number: flat on top, steep in the middle, right shift releases oxygen and left shift locks it on.