

# Pulse Oximetry: Artifacts

## Anesthetic Pearls: Anesthetic Implications of PulseOx

**Pulse oximetry** uses spectrophotometry to measure changes in light absorption in blood with two different wavelengths (one visible – 660; one invisible – 940 nm).

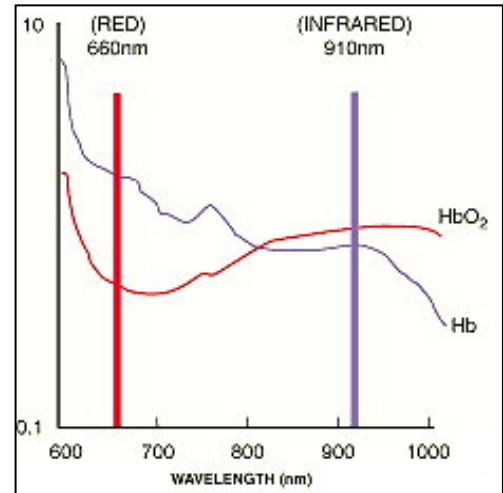
Flows as low as 9% of normal can still generate an oximeter reading

Accurate to within 5% of in vitro oximeters (blood gas machine) in the SpO<sub>2</sub> range of ~70-100%

Saturation of 90% has ~ PaO<sub>2</sub> of 65 mmHg; Saturation of 50% (p50) has ~ PaO<sub>2</sub> of 27 mmHg.

\*\*Remember the “**40 – 50 – 60; 70 – 80 – 90 Rule**”

Delay in change of PaO<sub>2</sub> to pulse-ox reading: 10-30 seconds



<u>Cause</u>	<u>Result</u>
<b>Inadequate perfusion</b> Hypothermia, cold extremities	Underestimate or unreadable
<b>Abnormal Hemoglobins</b> MetHb (Fe <sup>3+</sup> ) Carboxy / sulfhemoglobin	Usually falsely low reading Falsely high reading (smokers, CO poisoning)
<b>Injectable Dyes</b> Methylene Blue Indocyanine green Indigo carmine	Desaturation artifact (esp. methylene blue)
<b>Venous Congestion</b> Tourniquet left on arm	Desaturation
<b>Absence of pulsatile flow</b> Nonpulsatile CPB, cardiac arrest	No reading (requires pulsatile flow)
<b>Patient movement</b>	SpO <sub>2</sub> ~ 85%, HR discrepancy between sat monitor / EKG
<b>Electrical interference</b> Cautery	Decreases SpO <sub>2</sub>
<b>Overhead bright lights</b> Neonate	Falsely elevate SpO <sub>2</sub> (cover probe with towel)
<b>Skin or fingernail pigmentation</b> Blue, black, green	Decrease SpO <sub>2</sub>
<b>Low O<sub>2</sub> saturation</b>	Inaccurate at low O <sub>2</sub> saturations (< 70%)
<b>Saturation Delay (SpO<sub>2</sub> ≠ SaO<sub>2</sub>)</b>	Ear probe tracks changes faster than finger probe

**MetHb:** has same absorption coefficient at both red and infrared wavelengths. The resulting 1:1 absorption ratio corresponds to a saturation reading of 85%. If the patients actual saturation is >85%, MetHb will cause a falsely low reading. If the patients actual saturation <85%, reading will be falsely high.

**COHb:** carboxyhemoglobin & oxyhemoglobin absorb light at 660 nm identically, and the pulse oximeter will register a falsely high reading in patients with carbon monoxide poisoning (need to draw an ABG and do the specimen in a co-oximeter machine to get true SaO<sub>2</sub>).