

compensates for the many intra-patient differences, such as skin pigmentation, hemoglobin concentration, and fingernail polish. Only conditions which preferentially affect only one side of the algorithm (*e.g.*, the light absorption of the pulsatile or non-pulsatile compartments) will affect pulse oximetry readings.

* IL282 CO-Oximeter Manual, p. 1.5, 1981.

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In Reply:—Unger and Scheller suggest that the spurious pulse oximetry desaturation associated with intravenous methylene blue administration, initially described by Kessler and Eide,¹ will return to baseline as the dye distributes into venous capillary blood. It is my understanding that the pulse oximeter measures and compares light transmission at the two selected wavelengths (660 nm and 925 nm), and continuously subtracts the non-pulsatile or reference portion of the transmitted light from the total transmission of the pulsating arterialized blood. Therefore, a varying light transmission through non-pulsatile venous blood, whether caused by a changing concentration of dye or deoxyhemoglobin, would be continuously factored out.

Yelderman and New,² in their evaluation of pulse oximetry, state that “because the detected pulsatile wave form is produced solely from arterial blood, using the amplitude at each wavelength and Beer's Law allows exact beat-to-beat continuous calculation of arterial hemoglobin oxygen saturation with no interference from surrounding venous blood, skin, connective tissue, or bone.”

Intravenous methylene blue pharmacokinetics have been investigated in dogs,³ and have shown a very rapid and extensive uptake of the dye by tissues (30% of the injected dose taken up by lungs, liver, kidneys, and heart by 3 min in the rat model), where it is bound in the reduced leucomethylene blue form. Additionally, a very rapid and significant decrease in whole blood concentration of the dye has been demonstrated to occur within 10 min after intravenous injection.

Renal excretion of methylene blue in humans⁴ has been shown to be present for up to 5 days after oral

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administration, with 78% excreted as stabilized, colorless, leucomethylene blue. However, the pharmacokinetics and renal excretion of intravenous methylene blue in humans, to my knowledge, have not yet been studied.

Therefore, perhaps my original statement concerning the normalization of pulse oximetry values after intravenous methylene blue administration should be modified to state that the return to normal values of oxygen saturation most likely reflects the dilution of the dye, and its rapid and extensive uptake by body tissues.

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