**Fraction of Expired Oxygen: A Novel Safety Approach to Monitor Oxygen Delivery to the Heart Lung Machine Oxygenator**

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**Objective:** Monitoring O₂ delivery to the oxygenator of a heart lung machine is typically accomplished with an O₂ analyzer on the gas inflow (FiO₂). It was hypothesized that fraction of expired oxygen (FEO₂) exhaust port monitoring is a more dependable approach. If gas of any FiO₂ greater than 21% entered the inlet of the oxygenator, then the FEO₂ exiting the oxygenator would be greater than 21%. A FEO₂ of 21% or lower would indicate that oxygen was not being delivered to the oxygenator.

**Methods:** The FiO₂ was initiated at 21%, and increased by increments of 5%. The FEO₂ was recorded at each FiO₂. This was completed at sweep rates of 2, 3, and 4L/min. The O₂ line was also disconnected from the oxygenator and the changes in the FEO₂ noted.

**Results:** At every sweep rate, and FiO₂ settings greater than 21%, the FEO₂ was greater than 21% (Figure 1). When the oxygen line was disconnected from the oxygenator, the FEO₂ dropped to 21% within 5 seconds.

![Graph showing FEO₂ vs FiO₂](image)

*Figure 1. The FEO₂ resulting from the FiO₂ at varying sweep rates. The dashed yellow line indicates an FEO₂ of 21%*

**Conclusion:** Monitoring the FEO₂ is a more reliable way to verify O₂ delivery to an oxygenator. If the O₂ line stops functioning or becomes disconnected, the FEO₂ will drop to 21% within seconds. Relying on FiO₂ monitoring alone will never provide evidence of a disconnected O₂ line.