Effect of Bias Flow and Mean Airway Pressure on CO₂ Elimination During High Frequency Oscillatory Ventilation in a Neonatal Piglet (*Sus scrofa*) Model

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ABSTRACT

**Background:** High frequency oscillatory ventilation (HFOV) is commonly used in neonatal intensive care units for infants with respiratory disease. The bias flow is the amount of fresh gas delivered to the circuit to provide oxygen and remove carbon dioxide (CO₂). This flow is rarely adjusted in clinical use, but set during initial ventilator calibration and then left alone. Literature from the 1980s suggests that increasing bias flow may improve CO₂ elimination (VCO₂), but a more recent article suggests that it has no effect in a pediatric swine model.

**Objective:** We aim to determine whether changes in bias flow affect VCO₂ in a healthy neonatal piglet model. As a secondary objective, we are looking at differences in VCO₂ as the mean airway pressure (Paw) changes.

**Methods:** VCO₂ was measured in 12 healthy, anesthetized, paralyzed neonatal *Sus scrofa* piglets (2.5-4.0 kg). They were stabilized on CMV to end-tidal CO₂ (ET-CO₂) of 40 before each measurement, then HFOV (Sensormedics® 3100A) was initiated. CO₂ concentration was measured via continuous sidestream sample from the circuit outflow limb (Qubit Systems® Infrared CO₂ Analyzer) and multiplied by circuit gas flow rate (TSI® Mass Flowmeter) to give VCO₂. Measurements were obtained at various Bias Flow (15-30 LPM), Frequency (6-10 Hz), Paw (12-24 cm), and Tidal Volume (1-3 mL/kg) combinations using a Florian® hotwire anemometer.

**Results:** Full statistical analysis has not been completed as the lab experiments were only recently completed. Preliminary observations demonstrate variable changes in VCO₂ with changes in bias flow, and decreased VCO₂ with increased Paw.

**Conclusion:** At the time of this abstract, we cannot yet make definite conclusions since our statistical analysis is pending completion. We anticipate completing statistical analysis and having conclusions available at the time of the conference.