

## Introduction

We compared the usage of oxygen between internal and external oxygen concentrators. The VOCSN ventilator (Ventec Life Systems, Bothell, WA) provides both pulse dose internal concentrator (PDIC) and external concentrator (EC). We compared the VOCSN-PDIC vs the VOCSN-EC and the Trilogy 100 EC ventilator (Philips Respironics, Murrysville, PA) by gauging the amount of delivered flow required to achieve a specified FiO<sub>2</sub>. We hypothesized the flow necessary to achieve a specified FIO<sub>2</sub> would be lower when using the pulse dose internal concentrator.

## Methods

The VOCSN and Trilogy 100 were compared using passive and active circuits connected to a TTL test lung (Michigan Instruments, Grand Rapids, MI).

Three simulated lung models using different TTL test lung parameters included: normal – Cst 60 mL/cm H<sub>2</sub>O and Raw 5 cm H<sub>2</sub>O/L/s, restrictive – Cst 30 mL/cm H<sub>2</sub>O and Raw 5 cm H<sub>2</sub>O/L/s, and obstructive – Cst 60 mL/cm H<sub>2</sub>O, Raw 20 cm H<sub>2</sub>O/L/s.

Using pressure ventilation, the peak pressure and rise time were titrated to achieve V<sub>T</sub> of 500mL as measured by a Certifier FA Plus (TSI Inc, Shoreview MN). Additional settings include: 12 breaths/min, PEEP 5 cm H<sub>2</sub>O, and IT 1.0 second.

VOCSN PDIC and a Millennium M10 (Respironics, Murrysville, PA) EC flow were adjusted to achieve a measured FIO<sub>2</sub> of approximately 0.40. Flow from the EC was measured by the Certifier FA Plus and FIO<sub>2</sub> was measured by the Handi + oxygen analyzer (Maxtec, Salt Lake City, UT) at the inlet of the test lung.

At least three measurements were done for each ventilator, circuit type, lung model, and oxygen concentrator combination. Data for the three lung models were averaged for each test configuration and reported as the mean ± SD for each circuit type

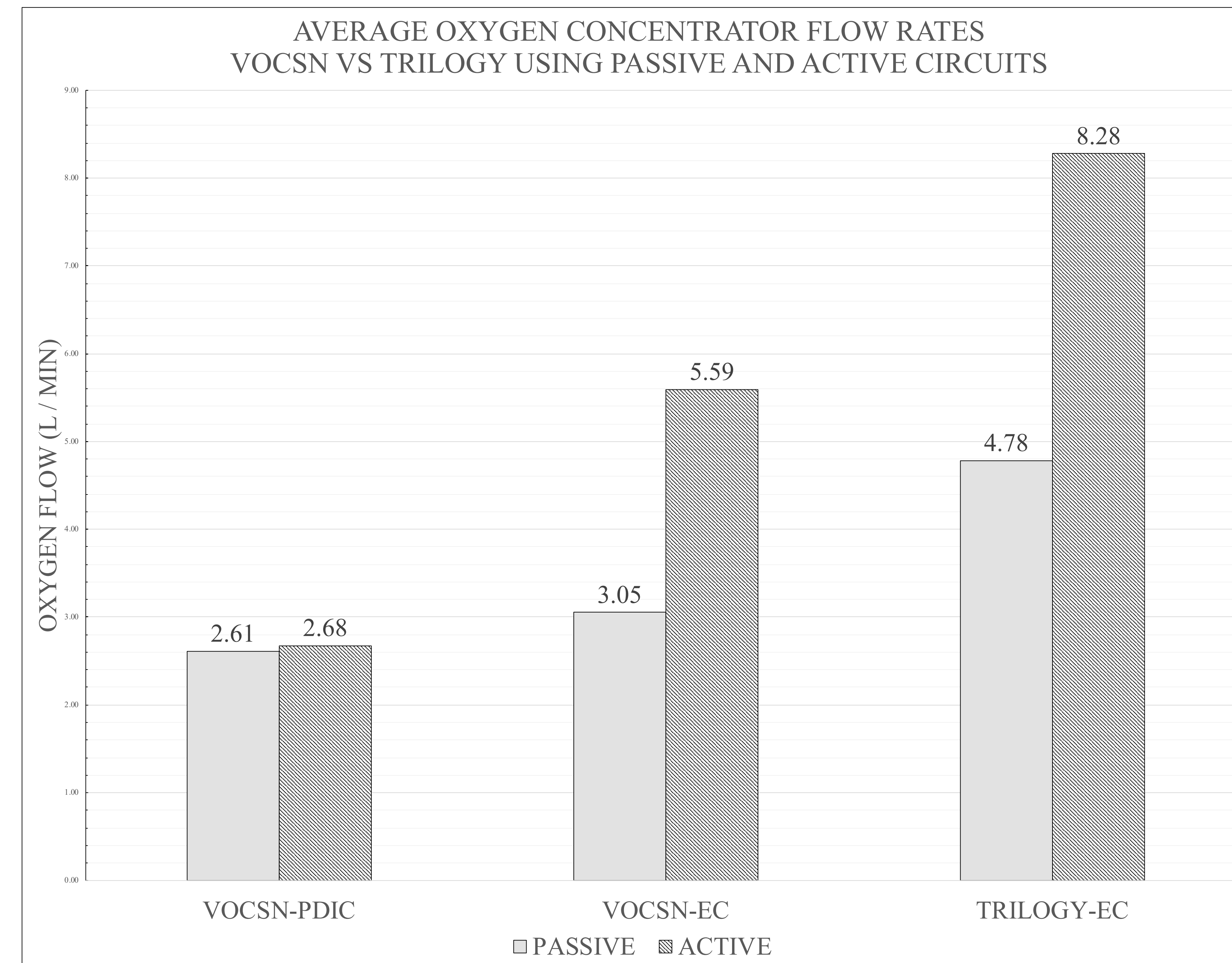


Figure 3. Average Liter Flow (L/min) to maintain an FiO<sub>2</sub> to equal forty-percent (0.40).



Figure 2. Certifier FA Plus (TSI Inc, Shoreview MN).

## Results

The oxygen flow in L/min required to maintain a FIO<sub>2</sub> of 0.40 (mean ± SD) with passive and active circuits respectively was: VOCSN-PDIC 2.61 ± 0.02 and 2.68 ± 0.12, VOCSN-EC 3.05 ± 0.16 and 5.59 ± 0.36, Trilogy-EC 4.78 ± 0.70 and 8.28 ± 1.31. Measured VT and FIO<sub>2</sub> for all lung models, test configurations, and circuit types averaged 502 ± 8 mL and 0.397 ± 0.006 respectively

## Conclusions

Oxygen flow requirement was lowest with the VOCSN ventilator using pulse dose internal oxygen concentrator with both the passive and active circuits, and with VOCSN using an external oxygen concentrator with the passive circuit compared to the Trilogy 100 ventilator.



Figure 1. The VOCSN ventilator (Ventec Life Systems, Bothell, WA) provides both pulse dose internal concentrator (PDIC) and external concentrator (EC).

**Disclosures:** Equipment was provided by Ventec Life Systems. Mr. Siobal has affiliations with both Aerogen and Origin Medical.