

An Innovative Device For CO₂ Removal Using Membrane Technology Instead Of Chemical Absorbent In Anesthetic Circuits: *Preliminary Clinical Results*

O. Hung^{1,2}, F. M. Wilfart¹, Z. Ford¹, L. Morrison¹, D. C. Roach¹, M. K. Schmidt^{1,2}

¹ Queen Elizabeth II Health Sciences Centre & ² Dalhousie University in Halifax, Nova Scotia (Canada)

Background and Goal of Study:

- Long standing and renewed interest in low fresh gas flow (FGF) anaesthesia in clinical practice because of:
 - (i) economic and environmental advantages
 - (ii) availability of better technology including monitoring
- Application of low FGF anaesthesia and metabolic anaesthesia was limited by the well-known fact that the chemicals, used to absorb carbon dioxide, react with volatile anesthetic agents.
- Chemicals in carbon dioxide (CO₂) absorbers are responsible for the production of:
 - (i) carbon monoxide and
 - (ii) toxic compounds
- A novel CO₂ filtration membrane technology (memsorb™) does not create any of these issues.
- The goal of this study is to evaluate the safety and efficacy of memsorb™ in a clinical setting.

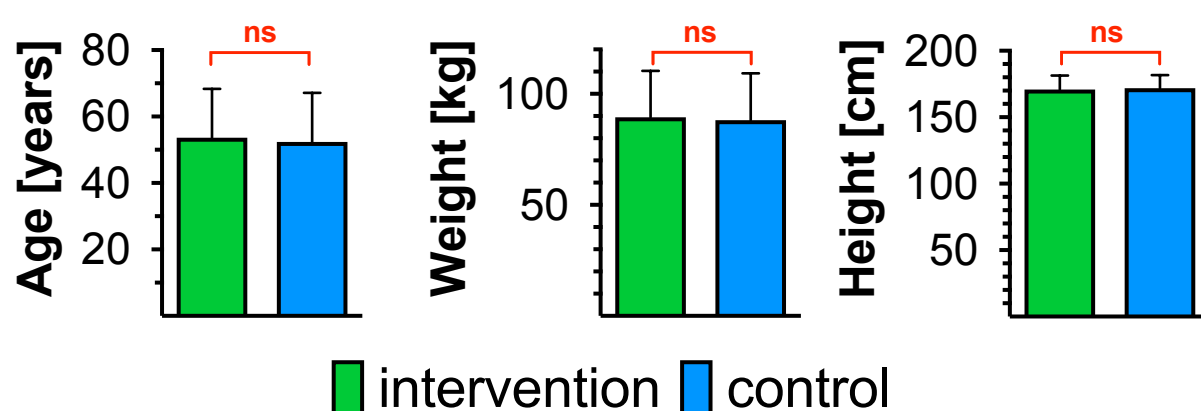
Materials and Methods:

- ClinicalTrials.gov: NCT03014336, NSHA REB ID: 1021828
- Investigational testing authorization by Health Canada
- Recruited 200 ASA I – III elective surgical patients
- n=100 for memsorb™, n=100 for control (Dräger sorb® 800+)
- After obtaining informed consent, patients underwent general anaesthesia for their surgical procedure. Routine general anaesthesia was administered at the discretion of the attending anaesthesiologist and demographic and vital parameters were recorded electronically.
- Fraction of inspired (F_{insp}) and expired (F_{exp}) CO₂ were the primary outcome measures. Where applicable, t-test or ANOVA was used.

Results and Discussion:

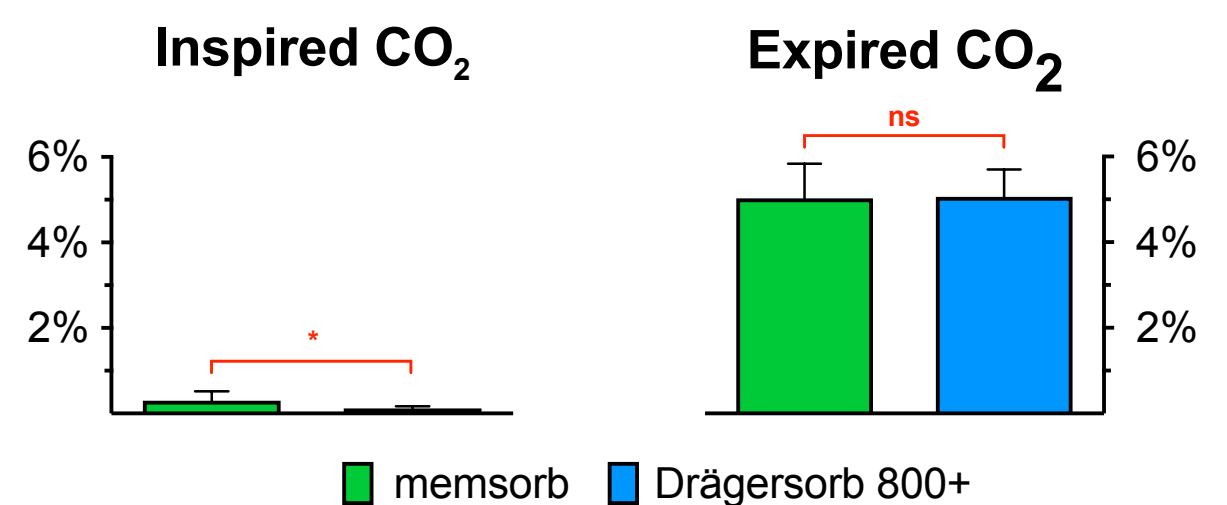
- Preliminary results of 179 patients were evaluated to date.
- We investigated gender, weight, height, intraoperative F_{exp}/F_{insp} CO₂, Sevoflurane/Desflurane consumption and FGF.

There were no statistical differences in the demographics between the two study groups.

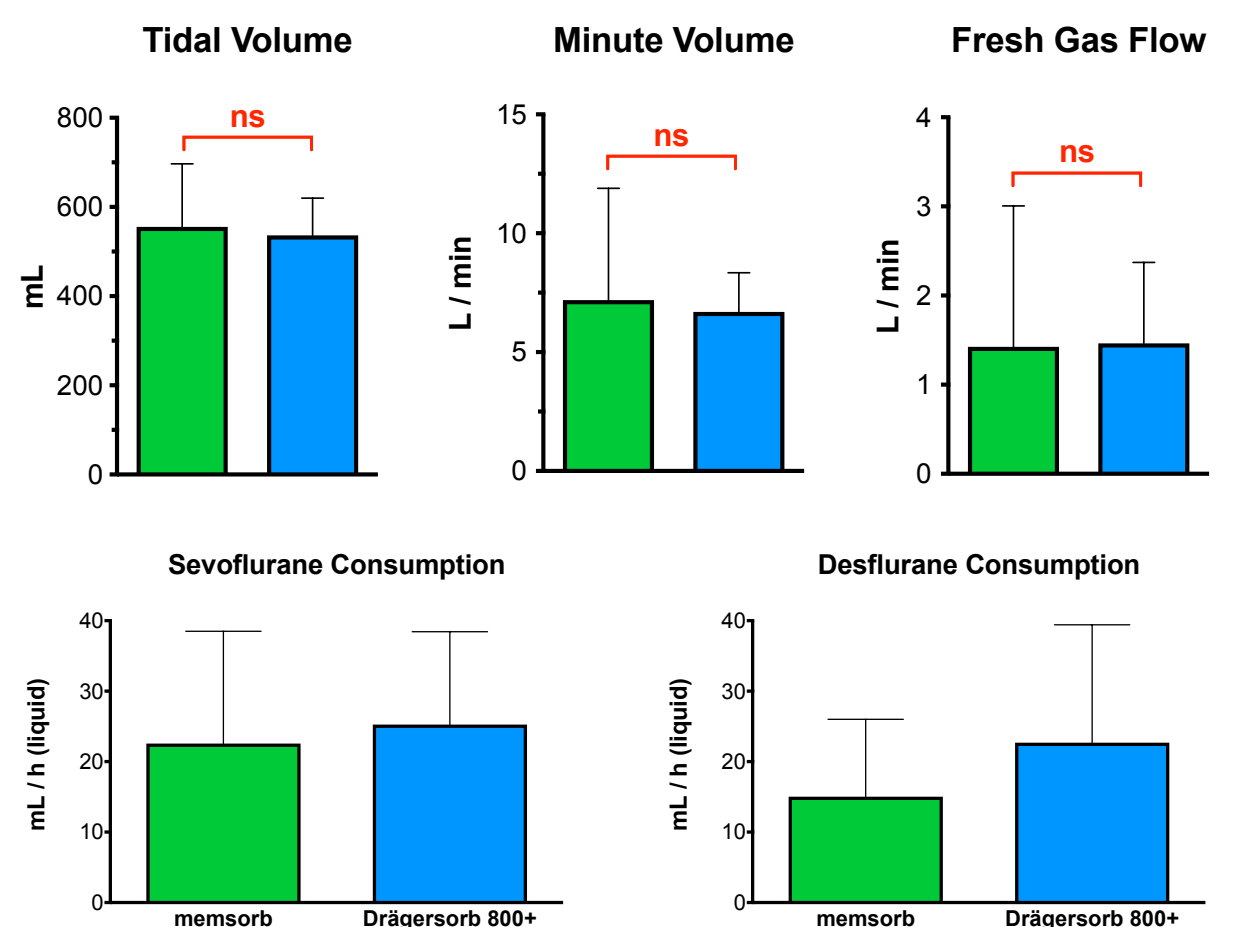


Acknowledgements:

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The median F_{exp} CO₂ between the groups were comparable and stable over 2 hours of anaesthesia (5.1% for memsorb™ and 5.0% for control).



Vapor consumption was also comparable between groups. This study was not designed to influence the FGF used by the attending anaesthesiologist. FGFs were applied the same they would be with Dräger sorb 800+ at their discretion (300 – 2700 mL/min). A follow up study has been designed investigating 50 patients with FGFs less than 500 mL / min.

Conclusion(s):

memsorb™ can remove CO₂ from an anaesthesia circuit safely and efficiently without the known limitations of chemical absorbents. A next study step will evaluate vapor consumption with low FGF.