The VQm PHM™ Pulmonary Health Monitor estimates Functional Residual Capacity with good trending and Physiological Dead Space with good agreement and good trending compared to gold standards.

Non-invasive Monitoring of Cardiopulmonary Function Parameters in Mechanically Ventilated Adults

AUTHORS

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INTRODUCTION

- Functional Residual Capacity (FRC) and Physiological Dead Space (VD) measurements are invasive and time-consuming, yet crucial for understanding ventilation-perfusion matching and guiding patient care.
- Using sequential gas delivery, The VQm Pulmonary Health Monitor (PHM)™ non-invasively measures FRC and VD.

OBJECTIVE

- Compare the VQm PHM™ cardiopulmonary function parameters to current gold standard methods in mechanically ventilated patients.

METHODS

- All study procedures approved by UC Davis Medical Center IRB. Written, informed consent was obtained from 42 patients scheduled for an elective surgical procedure with radial arterial monitoring.

Gold Standard Methods

- FRC: Nitrogen Washout
- VD: volumetric capnography and blood-gas measurements

VQm PHM™ Methods

- FRC: 3-breath CO2 ventilatory bolus using sequential gas delivery and a modified differential Fick equation
- VD: estimated by coupling volumetric capnography and arterial blood gas values

Agreement evaluated with Bland-Altman analysis

Concordance evaluated using four-quadrant plot analysis.

ACKNOWLEDGEMENTS

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REFERENCE

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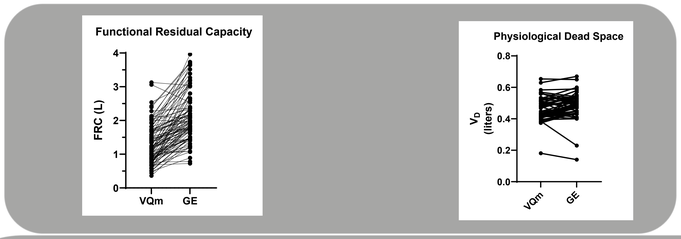
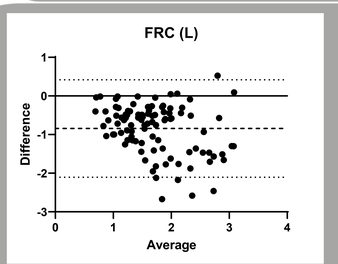
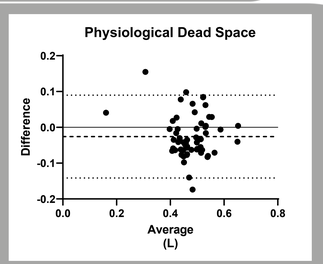
RESULTS

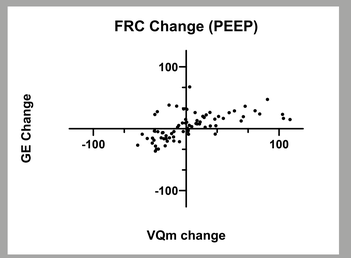




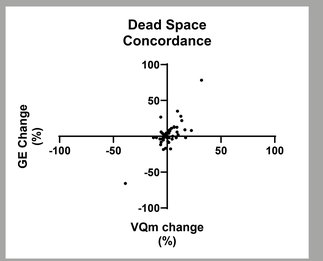
Agreement between reference FRC VQm PHM™.



Agreement reference VD and VQm PHM™.



Concordance: 85% (2.5% exclusion zone); r^2 - 0.35



Concordance: 77% (2.5% exclusion zone); r^2 - 0.91

NEXT STEPS

- The VQm PHM™ sequential gas technology also has capabilities to measure pulmonary blood flow and shunt fraction.
- Future studies will explore the use of the VQm PHM™ in ventilated patients in the ICU.