Easy and Reliable Solution for assessing Energy Requirements of Mechanically Assisted Patients

**Application**

- Mechanically assisted patients (Intensive Care Unit)
- Burn Units
- Academic and Medical Research

**Related Products**

- Quark RMR
- Ethanol Burning Kit

**Indirect calorimetry**

- (continuous VO$_2$, VCO$_2$)
- Substrate of metabolism
  - (RQ, %FAT, %CHO, %PRO)
- Automatic Bias Flow detection
- Compatible with many ventilators in the market (connection through the exhalation port)
- Accuracy and reliability validated against Deltatrac

The ICU option allows Quark RMR to accurately measure resting energy expenditure (REE), respiratory quotient and metabolism substrates on a breath by breath basis in ICU settings by connecting the system directly to the ventilator.

O$_2$ and CO$_2$ fractions (expired and inspired) are gathered real time at patient’s airway level, connecting a disposable sterile sampling line to the patient’s circuit output.

Ventilatory parameters (Flow, Vt, RF…) are measured through a digital turbine flowmeter, positioned at the outlet of the ventilator.

The ventilator’s Bias Flow is automatically detected by the system, allowing the software to compensate the corresponding dilution effect thanks to COSMED’s proprietary algorithm.

The system allows measurements of up to 50% FiO$_2$, according to AARC Guidelines.

The use of indirect calorimetry with mechanically ventilated patients is important to guide appropriate nutritional support assessment and reduce the incidence of overfeeding and underfeeding in intubated patients connected to a ventilator.
Bias Flow can be checked and recalibrated before or during the test

Scheme for the connection between Quark RMR and the ventilator

Technical Specification

Main Measured Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
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<tbody>
<tr>
<td>REE</td>
<td>Kcal/day</td>
</tr>
<tr>
<td>RQ</td>
<td>---</td>
</tr>
<tr>
<td>VO₂</td>
<td>ml/min</td>
</tr>
<tr>
<td>VCO₂</td>
<td>ml/min</td>
</tr>
<tr>
<td>FAT%</td>
<td>%</td>
</tr>
<tr>
<td>CHO%</td>
<td>%</td>
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<tr>
<td>PRO%</td>
<td>%</td>
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<tr>
<td>npRQ</td>
<td>---</td>
</tr>
<tr>
<td>VE</td>
<td>l/min</td>
</tr>
<tr>
<td>Vt</td>
<td>l</td>
</tr>
<tr>
<td>RF</td>
<td>1/min</td>
</tr>
<tr>
<td>SpO₂</td>
<td>%</td>
</tr>
<tr>
<td>FiO₂</td>
<td>%</td>
</tr>
<tr>
<td>BiasFlow</td>
<td>ml/min</td>
</tr>
</tbody>
</table>

Standard Packaging includes:

- Adapter with luer connection (20 pcs)
- Sterile PVC extension line (20 pcs)
- Permapure line with antisaliva filter (5 pcs)
- Flowmeter adapter (2 pcs)
- ICU wrinkled tube (2 pcs 1.5 cm each)

Validation studies

- Martine Laville et al. “A new indirect calorimeter is accurate and reliable for measuring basal energy expenditure, thermic effect of food and substrate oxidation in obese and healthy subjects”. e-SPEN European Journal of Clinical Nutrition and Metabolism 6(2011) e7-e15
- E. Schena et al. “Influence of Ventilatory Settings on Indirect Calorimetry in Mechanically Ventilated Patients” 33rd Annual International Conference of the IEEE EMBS Boston, Massachusetts USA, August 30 - September 3, 2011

Bibliography

- AARC Clinical Practice Guideline "Metabolic Measurement Using Indirect Calorimetry During Mechanical Ventilation", 2004 Revision & Update. RESPIRATORY CARE • SEPTEMBER 2004 VOL 49 NO 9

Bias Flow can be checked and recalibrated before or during the test.