« Besoins énergétiques induits par l’exercice précoce chez le patient critique »
Accepté par le comité d’éthique

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Introduction

• REE determination is of high relevance to avoid both overfeeding and underfeeding.
• Measured REE by indirect calorimetry has been shown to be considerably increased in critically ill when compared with predictive equations.
• Proposed correction factors seem not to be adequate since they do not take into account changes occurring during illness evolution.
• Patients are mobilized early.
• No recommendation exists whether it is necessary to improve nutrition when early mobilization is performed.
Methods

Indirect Calorimetry

- $\text{VO}_2$ and $\text{VCO}_2$
- $\text{kcal/24h}$ (Weir)
Energy expenditure in critically ill performing early physical therapy


Rest

Exercise at 0, 3 or 6 Watts

Rest

15 min

30 min

15 min

Methods
Results

Energy expenditure in critically ill performing early physical therapy


n = 60 included

n = 11 unstable IC in rest

n = 15 Healthy volunteers

n = 49 Analysed at rest
Results

Blant-Altman analyse

Controls (n=15)  Patients (n=49)

No difference between IC measurement & predictive equations

IC REE 29% > Harris-Benedict \((p<0.001)\)
IC REE 23% > Fleisch \((p<0.001)\)
IC REE 16% < Faisy-Fagon \((p<0.05)\) (n=19)

Energy expenditure in critically ill performing early physical therapy

Results

Correlation with C-reactive protein (CRP) a marker of systemic inflammation

\[ \Delta \text{IC-HB/kg} = 2,217 + 0,3182 \times 25 \]
\[ = 10,17 \]
\[ = 10,17 \times 70 \text{ kg} \]
\[ \Delta \text{IC-HB} = 712 \text{ kcal/24h} \]
\[ 1500 + 712 = 2212 \text{ kcal/24h} \]

Patient 70 kg.
CRP = 25 mg/dL
HB = 1500 kcal/24h

Energy expenditure in critically ill performing early physical therapy
Results

- **n = 60 included**
- **n = 49 Analysed at rest**
  - **n = 3 Physical exhaustion**
  - **n = 7 unstable exercise**
  - **n = 11 unstable IC in rest**
- **n = 39 Analysed during Exercise**
- **n = 15 Patients**
  - n = 15 0W
  - n = 5 3W
  - n = 7 6W
- **n = 15 Healthy volunteers**
  - n = 5 0W
  - n = 5 3W
  - n = 5 6W

Energy expenditure in critically ill performing early physical therapy

### Results

<table>
<thead>
<tr>
<th>Characteristics / Groups</th>
<th>Pat-6W (n = 17)</th>
<th>Pat-3W (n = 7)</th>
<th>Pat-0W (n = 15)</th>
<th>Excluded (n = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age a</td>
<td>53 (22-79)</td>
<td>63 (37-80)</td>
<td>65 (38-85)</td>
<td>71 (35-90)</td>
</tr>
<tr>
<td>Male b</td>
<td>17 (100)</td>
<td>5 (71)</td>
<td>10 (67)</td>
<td>9 (90)</td>
</tr>
<tr>
<td>APACHE II score c</td>
<td>15±7</td>
<td>16±4</td>
<td>22±6</td>
<td>22±5</td>
</tr>
<tr>
<td>SOFA score c</td>
<td>5±5</td>
<td>6±2</td>
<td>11±5</td>
<td>8±3</td>
</tr>
<tr>
<td>SAS c</td>
<td>4±0</td>
<td>4±0</td>
<td>3±1</td>
<td>4±0</td>
</tr>
<tr>
<td>Mechanical ventilation b</td>
<td>2 (12)</td>
<td>-</td>
<td>13 (87)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Vasopressor use b</td>
<td>5 (29)</td>
<td>2 (29)</td>
<td>8 (53)</td>
<td>2 (20)</td>
</tr>
<tr>
<td>Sedative drugs use b</td>
<td>5 (29)</td>
<td>2 (29)</td>
<td>9 (60)</td>
<td>3 (30)</td>
</tr>
</tbody>
</table>

Energy expenditure in critically ill performing early physical therapy

Results

Blood lactate was not modified.

Energy expenditure in critically ill performing early physical therapy

Results

Energy expenditure in critically ill performing early physical therapy

Discussion

Very Early Passive Cycling Exercise in Mechanically Ventilated Critically Ill Patients: Physiological and Safety Aspects - A Case Series

Ruy Camargo Pires-Neto¹,², Yurika Maria Fogaça Kawaguchi¹, Adriana Sayuri Hirotan¹, Carolina Fon¹,³, Clarice Tanaka¹,³, Pedro Caruso⁴, Marcelo Park⁵, Carlos Roberto Ribeiro Carvalho¹

• 20 min of passive exercise
• Deeply sedated an MV patients
• Was not associated with significant alterations in hemodynamic, respiratory or metabolic variables even in those requiring vasoactive agents.

We found similar observations together without sedation!!

No data with active exercise.
Conclusion

• Inflammatory response contributes to metabolism alterations.

• This simple inflammation marker could be used to adapt stress factor and help clinician to adjust caloric intake when IC is not accessible or cannot be performed for technical reasons.

$$\Delta I C - H B / k g = 2.217 + 0.3182 [ C R P ]$$
Conclusion

• Increased energy requirement for physical activity was only present for active exercise and seems to differ with healthy population.

• For the tested exercise duration and intensity, nutritional adjustment is not indicated.

• The impact of prolonged active mobilization should be further investigated.