Protein dosing in the ICU:
How much, when and why?

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Overview of Talk

- Context
  - Levels of Evidence
  - Types of Outcomes
- Guideline Recommendations
- Current Evidence
- New Evidence
- Summary
Editorials, Expert Opinion

Case Series, Case Reports

Editorials, Expert Opinion

Smaller treatment effects

Patient vs. Disease oriented outcomes

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- No measures of ‘nutritional efficacy’ (Nitrogen balance, caloric intake, percent calories from EN, body composition etc) fulfill this FDA requirement.

Guideline recommendations
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ESPEN Guidelines on Parenteral Nutrition: Intensive care

Pierre Singer\textsuperscript{a}, Mette M. Berger\textsuperscript{b}, Greet Van den Berghe\textsuperscript{c}, Gianni Biolo\textsuperscript{d}, Philip Calder\textsuperscript{e}, Alastair Forbes\textsuperscript{f}, Richard Griffiths\textsuperscript{g}, Georg Kreyman\textsuperscript{h}, Xavier Leverve\textsuperscript{i}, Claude Pichard\textsuperscript{j}

Guideline recommendations

1.3–1.5 g/kg ideal body weight per day in conjunction with an adequate energy supply (Grade B)

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1.3–1.5 g/kg ideal body weight per day in conjunction with an adequate energy supply (Grade B)

- Grade B: At least one well-designed controlled trial without randomization, a quasi-experimental study or observational study

Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition: Executive Summary

Robert G. Martindale, MD, PhD; Stephen A. McClave, MD; Vincent W. Vanek, MD; Mary McCarthy, RN, PhD; Pamela Roberts, MD; Beth Taylor, RD; Juan B. Ochoa, MD; Lena Napolitano, MD; Gail Cresci, RD; American College of Critical Care Medicine; and the A.S.P.E.N. Board of Directors
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1.2–2.0 g/kg actual body weight per day (Grade E)
ASPEN guideline recommendations

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- Grade E: supported by nonrandomized, historical controls, case series, uncontrolled studies, and expert opinion

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RCTs
Back to Basics: Estimating Protein Requirements for Adult Hospital Patients. A Systematic Review of Randomised Controlled Trials

Suzie Ferrie¹,², Samantha Rand², Sharon Palmer³

<table>
<thead>
<tr>
<th>Condition</th>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critically ill</td>
<td>1.2 - 1.5</td>
<td>ESPEN [29]</td>
</tr>
<tr>
<td></td>
<td>1.2 - 2.0</td>
<td>ASPEN [31]</td>
</tr>
<tr>
<td></td>
<td>1.1 - 1.3</td>
<td>Mesejo [68]</td>
</tr>
<tr>
<td>Continuous renal replacement therapy</td>
<td>≥2.0</td>
<td>Scheinkestel [69]</td>
</tr>
<tr>
<td>Sepsis</td>
<td>1.2 - 2.3</td>
<td>Greig [70], McCowen [71]</td>
</tr>
<tr>
<td>Obese critically ill (permissive underfeeding: reduced energy intake)</td>
<td>BMI 30 - 40</td>
<td>≥2 g/kgIBW</td>
</tr>
<tr>
<td></td>
<td>BMI &gt; 40</td>
<td>≥2.5 g/kgIBW</td>
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- Mesejo 2003, critically ill, N=50, 25 patients per group.

None reported any positive effects on patient oriented outcomes.

New data

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Most hospital formulas use a fixed ratio of protein to energy.


**Fig. 1** The relationship between increasing calories/day and 60-day mortality by BMI. *BMI* body mass index.
All lines slope down and to the right (decreased mortality as energy increases), we should conclude that **ALL classes of BMI benefit**, however some benefit more than others.

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• A ‘Figure 1’ for protein was not presented, but throughout the paper the ‘protein’ effect mirrors the ‘energy effect’.

Conclusions (Take home message)

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Because logistic regression is conducted in the log-odds scale, the magnitude of effect is not linear over all values of the interacting variables.

To properly interpret a logistic interaction term, we need to look at all levels of both variables in the interaction term.

Fig. 1 The relationship between increasing calories/day and 60-day mortality by BMI. BMI body mass index.

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- Figure 1 presents all levels of Energy Intake.
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Figure 1 presents all levels of Energy Intake and all classes of BMI.

### Table 1

<table>
<thead>
<tr>
<th>BMI group</th>
<th>Unadjusted (n = 2,772)</th>
<th>95% CI LCL</th>
<th>95% CI UCL</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.73</td>
<td>0.62</td>
<td>0.87</td>
<td>0.001</td>
</tr>
<tr>
<td>&lt;20</td>
<td>0.48</td>
<td>0.28</td>
<td>0.83</td>
<td>0.009</td>
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<tr>
<td>20 to &lt;25</td>
<td>0.61</td>
<td>0.45</td>
<td>0.82</td>
<td>0.001</td>
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<tr>
<td>25 to &lt;30</td>
<td>1.01</td>
<td>0.75</td>
<td>1.36</td>
<td>0.960</td>
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<tr>
<td>30 to &lt;35</td>
<td>0.84</td>
<td>0.54</td>
<td>1.30</td>
<td>0.439</td>
</tr>
<tr>
<td>35 to &lt;40</td>
<td>0.47</td>
<td>0.23</td>
<td>0.95</td>
<td>0.036</td>
</tr>
<tr>
<td>≥40</td>
<td>0.78</td>
<td>0.41</td>
<td>1.47</td>
<td>0.442</td>
</tr>
</tbody>
</table>

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Table 5 only presents only one level of Energy Intake.

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