



Editorial

Indirect Calorimetry–Monitored Nutritional Therapy: Highlights and Challenges

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Adequate nutritional support is a cornerstone in the management of patients with acute neurological injuries admitted to intensive care units (ICUs). Ensuring that these patients receive the appropriate nutrients is vital for their recovery, yet traditional methods of determining nutritional requirements—such as weight-based equations—are often inadequate. These approaches can result in overfeeding or, more commonly, underfeeding, particularly in neuro-ICU patients who tend to have prolonged hospital stays. Malnutrition in this vulnerable population is associated with a host of adverse outcomes, including increased susceptibility to infections, higher morbidity, longer ICU and hospital stays, and, ultimately, higher mortality rates.

The complex nature of neurological injuries adds to the difficulty in managing nutritional needs. Factors like the phase of stroke (acute or recovery), type of stroke (ischemic or hemorrhagic), intracranial pressure fluctuations, and overall neuronal activity can significantly affect a patient's metabolic rate.¹ Resting energy expenditure (REE) in such patients can vary widely, and this variability makes individualized nutritional support not only desirable but also essential. In response to this need, expert guidelines from organizations such as the American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism (ESPEN) have strongly recommended the use of **indirect calorimetry (IC)**.^{2–4} IC is considered the gold standard for determining energy requirements in critically ill patients, as it provides a more accurate and dynamic assessment of metabolic demands than predictive equations.⁵ By using IC, clinicians can avoid the detrimental effects of both overfeeding, which can lead to metabolic complications such as hyperglycemia, and underfeeding, which can result in muscle wasting, immune suppression, and delayed recovery.⁵

In this issue of the *Journal of Neuroanaesthesiology and Critical Care*, Dube et al., present an important study that

compares the impact of IC-guided enteral nutrition with standard weight-based formulae on ICU mortality and outcomes in ischemic stroke patients.⁶ The study is particularly relevant as it addresses a critical gap in the literature regarding the role of IC in the neurocritical care setting. The findings are noteworthy: ischemic stroke patients who received IC-guided nutritional support had a lower incidence of organ failure compared with those whose nutritional intake was determined by a weight-based formula. However, the study also found that ICU length of stay, mortality, and neurological outcomes were comparable between the two groups.

Despite the important contributions of this study, it is crucial to acknowledge its limitations. As the authors have noted, the sample size was small, and no formal power analysis was conducted. These factors limit the generalizability of the results. Nonetheless, the meticulous design and implementation of this study provide valuable preliminary data that could serve as the foundation for future research. The study's rigorous methodology and focus on personalized care underscore its significance in advancing neurocritical care nutrition practices.

The Significance of the Study

The study raises several important questions for future research and clinical practice:

- **Large-scale clinical trials:** This preliminary work should pave the way for larger multicenter trials to further investigate the impact of IC-guided nutrition on diverse neurocritical care populations, including patients with different types of acute neurological injuries.
- **Anabolic and catabolic phases:** What are the specific metabolic changes during the anabolic and catabolic phases of acute neurological injuries? A better

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understanding of these phases could optimize nutritional interventions tailored to each stage of recovery.

- **Hormonal and biomarker effects:** How does IC-guided nutrition impact hormonal changes and neuronal biomarkers during acute neurotrauma? Investigating these aspects could deepen our understanding of the physiological responses to injury and subsequent nutritional requirements.
- **Influence on sarcopenia:** Could IC-guided nutritional therapy mitigate muscle wasting (sarcopenia) in critically ill neurological patients? This could be an area of interest for future ultrasound-guided studies.

This study marks a significant step toward improving the nutritional management of neuro-ICU patients. While further research is necessary to confirm the findings and expand their applicability, the potential benefits of IC in optimizing nutritional support for critically ill neurological patients cannot be overstated. As we continue to refine our approaches to critical care nutrition, the precise energy assessments offered by IC will likely play an increasingly central role in enhancing patient outcomes.

As Hippocrates wisely stated, “Let food be thy medicine and medicine be thy food.” In the context of neurocritical care, this maxim is particularly relevant. Tailored nutritional support, based on individualized energy requirements rather than generalized formulae, is not merely a supplementary

intervention; it is a fundamental component of recovery for critically ill patients. With IC providing the accuracy needed to meet these unique metabolic demands, neurocritical care is poised to enter a new era of personalized nutritional therapy.

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