



# Nutrition Support of a Traumatic Brain Injury Patient with Atlanto-Occipital Dislocation Complicated by Mental Illness

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## Introduction

Determination of energy requirements in the traumatic brain injury (TBI) patient can be challenging. Although energy needs are typically increased in these patients, other factors such as sedation, mechanical ventilation, spinal cord injury, and obesity may complicate the use of predictive equations.

### Atlanto-Occipital Dislocation (AOD)<sup>1</sup>

- Dislocation of the occipital bone and 1<sup>st</sup> cervical vertebra
- 1% C-spine injuries, 15% of all fatal spine injuries
- Can lead to swelling in the neck and/or head, cranial nerve failure, or permanent neurological problems



## Calculating Energy Requirements

### AND Guidelines for use of Predictive Equations<sup>2</sup>:

- Critically ill, mechanically ventilated patients
  - Non-obese – Penn State [2003b] Equation
  - Obese, < 60 yrs – Penn State [2003b] Equation
  - Obese, ≥ 60 yrs – Penn State [2010] Equation

### Traumatic Brain Injury:

- Increased calorie needs
- Basal Energy Expenditure (BEE) x 1.4-1.7
- Sedation decreases energy needs: BEE x 1.2-1.4

### Spinal Cord Injury:

- Decreased calorie needs
- BEE x 1.1 – 1.2

### Obesity:

- Typically requires use of an adjusted body weight
- Practices vary by institution

## Case Description

22 year old male  
Unwitnessed pedestrian vs. motor vehicle

Height: 178 cm      Admit Weight: 109 kg

BMI: 34.4      Ideal Body Weight: 70 kg

Adjusted Body Weight: 90 kg

PMH: Bipolar schizophrenia (dx 2005)

**Injuries:** R ear amputation, R scalp degloving, L rib fx, Possible AOD, L subarachnoid hemorrhage

### Medical Course:

Day 0: Halo with manual reduction  
Day 1: Surgery: occipital to C2 PSIF  
Day 4: Residuals noted, Reglan and psych meds started  
Day 5: Extubated, psych meds stopped  
Day 7: Transfer to psych floor  
Day 12: Continued psych issues  
Day 20: Discharged

### Nutritional Course:

#### Day 2:

- Needs assessed using HBEx1.2-1.4 and ABW
- Energy: 2450-2860kcal, Protein: 135-180g
- TF: Osmolite1.5 @ 75 ml/hr = 2700 kcal, 113 g protein
- Adjust TF to 60 ml/hr for Propofol ≥ 20 ml/hr
- Metabolic card ordered

#### Day 3:

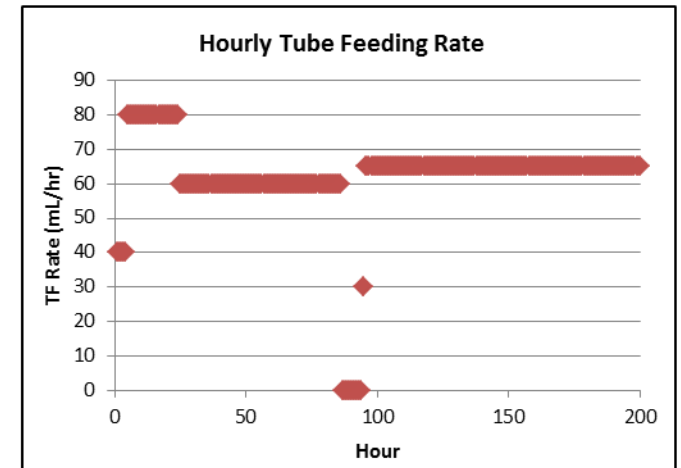
- Metabolic cart: AMEE 2339 kcal

#### Day 4:

- TF adjustment: Osmolite1.5 @ 65 ml/hr
- Adjust TF to 40 ml/hr if Propofol ≥ 20 ml/hr
- Additional: Prostat, 60 mL BID
- Provides 2580 kcal, 158 g protein

#### Day 5-11: Tolerating TF well

#### Day 12: Advanced to dysphagia diet



## Discussion

Assessing energy requirements in an obese, critically ill patient can be challenging. When possible, indirect calorimetry should be used to determine energy needs, otherwise predictive equations can be used. However, these equations can sometimes be misleading and the clinician must use his or her best judgment. In this case, indirect calorimetry confirmed that this patient's needs were overestimated using predictive equations, likely due to the patient's obesity status.

Furthermore, spinal cord injuries and sedation can further reduced energy needs. Although traumatic brain injury is usually associated with the hyper-metabolic state, energy and protein needs should be determined in the context of the complete patient picture.

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1. Kaji A, and Hockberger, RS. Spinal column injuries in adults. In: UpToDate, Marx, JA (Ed), UpToDate, Waltham, MA, 2012.  
2. Academy of Nutrition and Dietetics. *Critical Illness Guidelines*. Evidence Analysis Library, April 2012