Optimal Nutritional Support for the Surgical Patient: Specific Amino Acid Enhanced Diet

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Optimal Nutritional Support for the Surgical Patient

• Nutrition in the surgical patient
• Immunosuppression caused by surgery and disease
• Contents of immunonutrition formulas
• Proof of immunonutrition’s superiority
Nutrition in the Surgical Patient

• Hypermetabolic state, increased oxidative stress, increased protein catabolism
• Protein requirements ↑ 15–20% of total calories
• Conditionally essential amino acids
Immunosuppression Caused by Disease States

• Cancer
  – CA cells secrete growth factors and cytokines (VEGF, TGF-β, IL-10) that suppress dendritic cells, APCs, and cytotoxic T-cells

• Trauma
  – Results in altered cytokine secretion (IL-2, interferon-γ, TNF-α, and IL-4) which modulate activation of T-helper cells
Nutrition for the Surgical Patient

• Early enteral nutrition in surgical patients
  – ↓ infectious complications
  – ↓ length of stay

• Improves
  – nitrogen balance
  – host immune function
  – augment cellular antioxidant systems
  – wound healing
Specialized Enteral formulas

• Formulas may include
  – Arginine – urea cycle, nitric oxide, proteins
  – Glutamine – conditionally essential AA, regulates immune cells, production of cytokines, heat shock proteins, fuel source and nitrogen store
  – ω-3 polyunsaturated long-chain fatty acid (fish oil) – cell membranes, reduces inflammation
  – Ribonucleic acids – cell energetics (adenosine triphosphate), improve immune cell function
  – Antioxidants, ie ascorbic acid and selenium
The Proof is in the Meta-Analysis
50 studies, 9 meta-analyses dedicated to Immunonutrition

Immunonutrition in the critically ill: A systematic review of clinical outcome
Beale, Richard J. MB, BS, FRCA; Bryg, David J. PhD; Bihari, David J. MB, BS, FRACP
Critical Care Medicine:
December 1999 - Volume 27 - Issue 12 - pp 2799-2805

Should Immunonutrition Become Routine in Critically Ill Patients?
A Systematic Review of the Evidence
JAMA, August 22/29, 2001—Vol 286, No. 8

Immunonutrition in High-Risk Surgical Patients: A Systematic Review and Analysis of the Literature
Paul E. Marik, MD, FCCM¹; and Gary P. Zaloga, MD, FCCM, FACN
Journal of Parenteral and Enteral Nutrition / Vol. 34, No. 4, July 2010
Beal et al. Crit Care Med. 1999

- **Meta-analysis** of 12 studies
  - included ICU, trauma, and post-operative patients
- Immunonutrition **significantly reduced** the risk of acquired infections (RR=0.6, p=0.005)
- Immunonutrition significantly reduced the length of stay by 2.9 days (p=0.0002)
- “The benefit was most marked in the surgical group, and we recommend that immunonutrition be used in these patients”
Heyland et al. JAMA 2001

- Meta-analysis of 22 studies
  - Assigned quality scores to each study
- Immunonutrition significantly reduced infectious complications (RR=0.66, p<0.001)
- Immunonutrition significantly reduced length of stay (-3.33 days.)
- Sub-analysis revealed
  - Arginine formulas more beneficial
  - High quality studies more beneficial
  - Immunonutrition most beneficial for post-operative patients
Meta-analysis of 22 surgical studies

- 18 studies comparing post-op pts malignancies
  - Immunonutrition significantly reduced the risk of acquired infections (OR=0.49, p<0.0001)
  - Immunonutrition significantly reduced length of stay by 3.03 days (CI -3.4 - -2.6, p<0.0001)

- These three meta-analyses contain every nay-saying study my opponent offers!
### Marik, et al. JPEN 2010
#### Timing of Immunonutrition Supplementation

<table>
<thead>
<tr>
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<th>Pre-operative</th>
<th>Peri-operative</th>
<th>Post-operative</th>
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<tbody>
<tr>
<td><strong>Xu et al. 2006</strong></td>
<td>• 60 randomized patients</td>
<td>• 5 randomized studies including 610 patients</td>
<td>• 12 randomized studies, including 1136 patients</td>
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<tr>
<td></td>
<td>• Fewer post-op complications (7% vs 26%)</td>
<td>• Fewer post-op complications (13% vs 27%)</td>
<td>• Fewer post-op complications (18% vs 29%)</td>
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<tr>
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<td>• Shorter hospital stay by 3.0 days</td>
<td>• Shorter hospital stay by 2.24 days</td>
<td>• Shorter hospital stay by 3.48 days</td>
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Immunonutrition Reduces Post-Op Infections

Marik, et al. JPEN 2010

Post-Operative Infections

Timing of IMN vs Regular Nutrition

- Pre-op
  - Reg: 0.26
  - IMN: 0.07
- Peri-op
  - Reg: 0.27
  - IMN: 0.13
- Post-op
  - Reg: 0.29
  - IMN: 0.18
Immunonutrition Reduces Cost by Reducing Complications

Senkal et al 1999 - 154 pts with GI malignancies randomized to isoenergetic diet or Impact diet pre- and post-operatively. The IMN cut price of treating complications in half. Other studies have since corroborated these findings.
Immunonutrition Reduces Cost by Reducing Complications

• Strickland et al 2005 used results of 3 studies and applied them to cost data from the University Healthcare Consortium

• Breakeven point – when extra cost of formula is equaled by reduced cost elsewhere
  – Breakeven for infectious rates – 0.66%
    • That means if infectious rates overall are higher than 0.66% we’re saving $$!!
  – Breakeven for all complications in well nourished patients – 0.33%
  – Breakeven for all complications in poorly nourished patients – 1.20%
What is the Consensus?

• American Society for Perenteral and Enteral Nutrition, 2009
  – “Immune-modulating enteral formulations should be used for the appropriate patient populations”
  – Level of Recommendation: A

• Journal of Trauma
  – 2004: “Adequate” doses of arginine and glutamine reduce LOS and morbidity
  – 2008: Recommend high-protein polymeric formula, but “left to individual surgeon discretion.”

• European Society For Clinical Nutrition and Metabolism, 2008
  – Pts with nutritional risk, “benefit from the use of immune modulating formulae”
  – Level of Recommendation: A
Conclusions

• Immunonutrition
  – Decreases infectious complications
  – Decreases length of stay
  – Reduces cost of hospitalization
  – Considered the standard of care?
Thank you!

Questions?
References

Immunonutrition May Save Lives

- Pontes-Arruda et al. 2008 – meta-analysis comparing standard to supplemented enteral diets in patients with ALI/ARDS
  - 296 pts, supplemental diets included fish oil and anti-oxidants
- Immunonutrition reduced 28 day all cause mortality by 60% (p=0.001)
- Immunonutrition shortened ventilator dependance by 4.9 days (p<0.0001)
- Immunonutrition reduced new organ dysfunction by 83% (p<0.0001)