

# TOP Nutrition Newsletter

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### [Prebiotics, Probiotics, and Synbiotics Affect Mineral Absorption, Bone Mineral Content, and Bone Structure.](#)

[J Nutr.](#) 2007 Mar;137(3):838S-846S.

Several studies in animals and humans have shown positive effects of nondigestible oligosaccharides (NDO) on mineral absorption and metabolism and bone composition and architecture. These include inulin, oligofructose, fructooligosaccharides, galactooligosaccharides, soybean oligosaccharide, and also resistant starches, sugar alcohols, and difructose anhydride. A positive outcome of dietary prebiotics is promoted by a high dietary calcium content up to a threshold level and an optimum amount and composition of supplemented prebiotics. There might be an optimum composition of fructooligosaccharides with different chain lengths (synergy products). The efficacy of dietary prebiotics depends on chronological age, physiological age, menopausal status, and calcium absorption capacity. There is evidence for an independent probiotic effect on facilitating mineral absorption. Synbiotics, i.e., a combination of probiotics and prebiotics, can induce additional effects. Whether a low content of habitual NDO would augment the effect of dietary prebiotics or synbiotics remains to be studied. The underlying mechanisms are manifold: increased solubility of minerals because of increased bacterial production of short-chain fatty acids, which is promoted by the greater supply of substrate; an enlargement of the absorption surface by promoting proliferation of enterocytes mediated by bacterial fermentation products, predominantly lactate and butyrate; increased expression of calcium-binding proteins; improvement of gut health; degradation of mineral complexing phytic acid; release of bone-modulating factors such as phytoestrogens from foods; stabilization of the intestinal flora and ecology, also in the presence of antibiotics; stabilization of the intestinal mucus; and impact of modulating growth factors such as polyamines. In conclusion, prebiotics are the most promising but also best investigated substances with respect to a bone-health-promoting potential, compared with probiotics and synbiotics. The results are more prominent in animal models, where more studies have been performed, than in human studies, where experimental conditions are more difficult to control.

### [Effect of preoperative immunonutrition on body composition in patients undergoing abdominal cancer surgery](#)

[Surg Today.](#) 2007;37(2):118-21

**PURPOSE:** Preoperative immunonutrition may induce changes that modulate stress responses and improve the outcome of patients undergoing abdominal cancer surgery. We evaluated the effectiveness of preoperative immunonutrition using an immune-enhancing diet product called Impact. **METHODS:** Forty patients aged 20-75 years, who were scheduled to undergo abdominal cancer surgery, were given Impact for 5 days preoperatively, at 1000 ml/day, in addition to a regular diet. We took various measurements before and after Impact administration. **RESULTS:** All but two patients tolerated a daily intake >900 ml (mean: 924 ml). The serum retinol-binding protein level increased from 3.21 to 3.76 mg/dl and the arginine level increased from 91.9 to 112.0 mmol/ml after Impact intake. The urinary excretion of uracil increased significantly, from 57.6 to 88.9 mmol/g creatinine, as did the content of n-3 fatty acids and the n-3/n-6 ratio in membrane phospholipids from the white blood cells. These changes were not observed in the two patients who did not tolerate Impact. There was no significant improvement in clinical outcome. **CONCLUSIONS:** Preoperative immunonutrition was well tolerated by cancer patients. It induced structural changes in the white blood cell membranes and increased the body store of arginine and nucleotides. These effects may modulate the response to surgical stress.

### [Effect of a fish oil and arginine-fortified diet in thermally injured patients.](#)

[J Burn Care Res.](#) 2006 Sep-Oct;27(5):694-702

Burn injury induces a hypercatabolic inflammatory state, predisposing burn patients to malnutrition, poor wound healing, and infectious complications. We conducted this study to determine what effect a diet fortified with fish oil and arginine (FAD) would have on wound healing in a thermally injured population. Twenty-three thermally injured patients were enrolled

in this randomized double blind enteral feeding study from July 2002 to August 2004. All study patients received isonitrogenous enteral intragastric feeding within 48 hours of admission. Patients were randomized to our standard diet (STD, ProBalance with Promix, Probalance from Nestle, Glendale, CA; ProMix R.D., Navaco Laboratories, Phoenix, AZ) or a diet fortified with fish oil and arginine (FAD, Crucial, Nestle Nutrition Glendale, CA) Diets were advanced as tolerated to meet 100% of estimated needs. The primary endpoint of the study was time to heal the first donor site. There were no statistical differences between the study groups with respect to baseline characteristics. Both diets were well tolerated, and there were no differences in the daily total kilocalories or protein intake per kilogram between the two diet groups throughout the study. Although nonsignificant, the patients in the FAD group showed a slightly faster healing time than those in the STD group (10.8 +/- 2.7 days vs 12.3 +/- 5.2 days, respectively). This trend was further accelerated when those with body surface area burns less than 30% were examined (patients with body surface area burns <30% in the FAD healed in 9.0 +/- 1.7 vs corresponding patients in the standard group who healed in 12.2 +/- 6.2, P = .63). Patients in the FAD group trended to more infections and more adverse complications. The adverse complications were predominantly associated with inhalation injuries. The role of fortified enteral diets in the outcomes of thermally injured patients deserves further study. Such a future study should be conducted in a multicenter trial and involve inhalation injury stratification systems to accurately score and randomize patients for inhalation injury. Finally, the frequency and pattern of infections in patients receiving fortified enteral diets deserves further evaluation.

### Effect of ornithine alpha-ketoglutarate on glutamine pools in burn injury: evidence of component interaction.

*Intensive Care Med.* 2007 Mar;33(3):538-541

**BACKGROUND:** Ornithine alpha-ketoglutarate (OKG) has proved to be efficient in restoring glutamine (Gln) pools which are strongly depleted in hypercatabolic patients. Since its two components, alpha-ketoglutarate (alphaKG) and ornithine (Orn), give rise to glutamate (Glu), they are both considered as Gln precursors. The aim of this study was to assess the relative contributions of Orn and alphaKG to Gln generation in a rat model of burn injury. **METHODS:** Forty-eight young Wistar rats were scalded to give a 20% burn surface area. They were fasted for 24[Symbol: see text]h and then refeed by enteral nutrition for 48[Symbol: see text]h by gavages with Osmolite (Abbott-Ross, 210[Symbol: see text]kcal/kg day(-1), 1.18[Symbol: see text]N/kg day(-1)) supplemented with either 5[Symbol: see text]g[Symbol: see text]OKG/kg day(-1) (B-OKG), Orn (isomolar to OKG; B-Orn), alphaKG (isomolar to OKG; B-KG) or glycine (as an isonitrogenous control; B-Gly). Rats in the B-KG group also received glycine to make all the groups isonitrogenous. Amino acid concentrations were determined in plasma, muscles, jejunal mucosa and liver. **RESULTS:** The alpha-KG-enriched diet had no effect on plasma Glu content or plasma and muscle Gln content compared with the burn-injured controls. The Orn-enriched diet significantly increased (p[Symbol: see text]<[Symbol: see text]0.01) muscle Glu and Gln contents but not plasma Gln content. In OKG-treated animals, plasma Gln as well as muscle Glu and Gln were significantly higher than in the control (p[Symbol: see text]<[Symbol: see text]0.01), alpha-KG-treated (p[Symbol: see text]<[Symbol: see text]0.01) and Orn-treated (p[Symbol: see text]<[Symbol: see text]0.05 for muscle Gln and p[Symbol: see text]<[Symbol: see text]0.01 for plasma Gln) animals. **CONCLUSION:** OKG was more efficient than Orn or alphaKG alone in restoring Gln pools in plasma and muscle, which is evidence of metabolic interaction between the two components of this molecule.

### Liver dysfunction associated with artificial nutrition in critically ill patients.

*Crit Care.* 2007 Jan 25;11(1):R10

**ABSTRACT: INTRODUCTION:** Liver dysfunction associated with artificial nutrition in critically ill patients is a complication that seems to be frequent, but it has not been assessed previously in a large cohort of critically ill patients. **METHODS:** We conducted a prospective cohort study of incidence in 40 intensive care units. Different liver dysfunction patterns were defined: (a) cholestasis: alkaline phosphatase of more than 280 IU/l, gamma-glutamyl-transferase of more than 50 IU/l, or bilirubin of more than 1.2 mg/dl; (b) liver necrosis: aspartate aminotransferase of more than 40 IU/l or alanine aminotransferase of more than 42 IU/l, plus bilirubin of more than 1.2 mg/dl or international normalized ratio of more than 1.4; and (c) mixed pattern: alkaline phosphatase of more than 280 IU/l or gamma-glutamyl-transferase of more than 50 IU/l, plus aspartate aminotransferase of more than 40 IU/l or alanine aminotransferase of more than 42 IU/l. **RESULTS:** Seven hundred and twenty-five of 3,409 patients received artificial nutrition: 303 received total parenteral nutrition (TPN) and 422 received enteral nutrition (EN). Twenty-three percent of patients developed liver dysfunction: 30% in the TPN group and 18% in the EN group. The univariate analysis showed an association between liver dysfunction and TPN (p < 0.001),

Multiple Organ Dysfunction Score on admission ( $p < 0.001$ ), sepsis ( $p < 0.001$ ), early use of artificial nutrition ( $p < 0.03$ ), and malnutrition ( $p < 0.01$ ). In the multivariate analysis, liver dysfunction was associated with TPN ( $p < 0.001$ ), sepsis ( $p < 0.02$ ), early use of artificial nutrition ( $p < 0.03$ ), and calculated energy requirements of more than 25 kcal/kg per day ( $p < 0.05$ ). CONCLUSION: TPN, sepsis, and excessive calculated energy requirements appear as risk factors for developing liver dysfunction. Septic critically ill patients should not be fed with excessive caloric amounts, particularly when TPN is employed. Administering artificial nutrition in the first 24 hours after admission seems to have a protective effect.

## Feeding practices of severely ill intensive care unit patients: an evaluation of energy sources and clinical outcomes.

*J Am Diet Assoc.* 2007 Mar;107(3):458-65

**OBJECTIVE:** The quantity of nutrition that is provided to intensive care unit (ICU) patients has recently come under more scrutiny in relation to clinical outcomes. The primary objective of this study was to assess energy intake in severely ill ICU patients and to evaluate the relationship of energy intake with clinical outcomes. **DESIGN:** Prospective cohort study. **SUBJECTS/SETTINGS:** Seventy-seven adult surgery and medical ICU patients with length of ICU stay of at least 5 days. **STATISTICAL ANALYSES PERFORMED:** Student's t test and chi(2) tests were used to examine ICU populations. To determine the relationship of patient variables to hospital length of stay and ICU, length of stay regression trees were calculated. **RESULTS:** Both groups were underfed with 50% of goal met in surgical ICU and 56% of goal met in medical ICU. Medical ICU patients received less propofol and significantly less dextrose-containing intravenous fluids when compared to surgical ICU patients ( $P=0.013$ ). From regression analysis, approaching full nutrient requirements during ICU stay was associated with greater hospital length of stay and ICU length of stay. For combined groups, if % goal was  $\geq 82\%$ , the estimated average value for ICU length of stay was 24 days; whereas, if the % goal was  $< 82\%$ , the average ICU length of stay was 12 days. This relationship held true for hospital length of stay. **CONCLUSIONS:** Medical and surgical ICU patients were insufficiently fed during their ICU stay when compared with registered dietitian recommendations. Medical ICU patients received earlier nutrition support, on average more enteral nutrition, with fewer kilocalories supplied from lipid-based sedatives and intravenous fluid relative to surgical ICU patients. Based upon length of stay, the data suggest that the most severely ill patient may not benefit from delivery of full nutrient needs in the ICU.

## Management of severe acute pancreatitis: it's all about timing.

*Curr Opin Crit Care.* 2007 Apr;13(2):200-6.

**PURPOSE OF REVIEW:** This study provides an update on the treatment of severe acute pancreatitis (SAP) with emphasis on nutrition, infection-prophylaxis, biliary pancreatitis, surgical intervention and new randomized controlled trials. **RECENT FINDINGS:** The most relevant new insights are: (i) early enteral nutrition in SAP is not only capable of reducing infectious complications but may also reduce mortality; (ii) there is increasing evidence that antibiotic-prophylaxis is not capable of preventing infectious complications in SAP; (iii) probiotic-prophylaxis is being considered as an alternative with promising experimental results; (iv) in biliary pancreatitis, early endoscopic retrograde cholangiography with sphincterotomy (within 48 h) is beneficial in case of ampullary obstruction, although it may be withheld in the event of negative endoscopic ultrasound; (v) surgical intervention for infected (peri-)pancreatic necrosis is increasingly being postponed; (vi) minimally invasive strategies are being considered as a full alternative for necrosectomy by laparotomy in infected (peri-)pancreatic necrosis; (vii) the Atlanta classification should no longer be used to describe computed tomography findings in acute pancreatitis; and (viii) only five randomized controlled trials of patients with acute pancreatitis are currently registered in the international trial registries. **SUMMARY:** Timing of intervention is becoming increasingly important in SAP management.

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