OPTIMAL NUTRITIONAL SUPPORT

Standard Enteral Diet

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Background / Conceptual Framework

- The advent of ‘nutrional pharmacology’
- “Immune enhancing” diets
- The concept of conditionally essential nutrients and associated immune function

Question:

- Compared to standard enteral feeds, do "immune-enhancing“ diets result in improved clinical outcomes in critically ill patients?

The Data

- Glutamine
- Fish Oils
- Arginine

Glutamine

- Theoretical mechanism: improved gut barrier function and hepatic protein synthesis through the induction of heat shock proteins
- Observation that glutamine may decrease hospital length of stay and infection rate.

Glutamine

- All trials which include mortality are single center trials
- Largest single trial showed no difference in mortality, LOS, or infections.
- *A prospective randomized trial of enteral glutamine in critical illness* (Hall 2003):

Population	Methods	Diet	Mortality # (%)		Infections # (%)		Hospital Stay days	
			Experimental	Control	Experimental	Control	Experimental	Control
Mixed ICU N = 363 (154 trauma)	Randomized Controlled Double Blind	Isocal + glutamine vs. Isocal	27/179 (15)	30/184 (16)	38/179 (21)	43/184 (23)	25	30

Glutamine

Study	Population	Methods	Diet	Mortality # (%)		Hospital Stay days	
				Experimental	Control	Experimental	Control
Houdijk 1998	Trauma N = 80	Randomized, Controlled, Double Blind	Altira Q (glutamine enriched formula) vs. isonitrogenous control (added amino acids)	4/41 (9.8)	3/39 (7.7)	32.7	33
Jones 1999	Mixed ICU N = 78	Randomized, Controlled, Double Blind	Protina MP + Glutamine vs. Isonitrogenous Control	10/26 (38.5)	9/24 (37.5)	11 (ICU)	16.5 (ICU)
Brantley 2000	Trauma N = 72	Random: ? Not Blinded	Glutamine supplemented Enteral formula vs. standard formula (Isonitrogenous)	0/31 (0.0)	0/41 (0.0)	19.5	20.8

Fish Oil

- Theoretical mechanism:
  - fish oil supplies ω-3 fatty acids which influence lipid-bound second messenger functions and are a source for resolvins.
  - Sepsis increases the relative oxidation of lipids

Fish Oil

Study	Population	Methods	Intervention	Mortality # (%)		Infections # (%)	
				Fish oil	Control	Fish oil	Control
Pontes-Arruda 2006	Septic pts with ALI from 3 ICUs (same hospital) N =165	Randomized, Controlled, Blinded	Oxepa vs standard high fat, low CHO (Pulmocare)	28 day 26/83 (31)	28 day 38/82 (46)	NR	NR
Moran 2006	Septic pts from 20 ICUs N = 198	Not blinded, ? Random	Fish oil, borage oil + antioxidants vs. isocaloric, isonitrogenous, high protein formula	28 day 11/61 (18)	28 day 11/71 (16)	32/61 (53)	34/71 (48)
Galban 2006	Septic pts from 6 ICUs N = 176	Randomized Controlled, Not Blinded	Impact vs Precitene Hiperporteico	17/89 (19.1)	28/87 (32.2)	46/89 (52)	68/87 (78)

Arginine

- Theoretical mechanism:
  - Improving immune function through enhanced responsiveness of T lymphocytes
  - Stimulating growth hormone and insulin secretion

Arginine

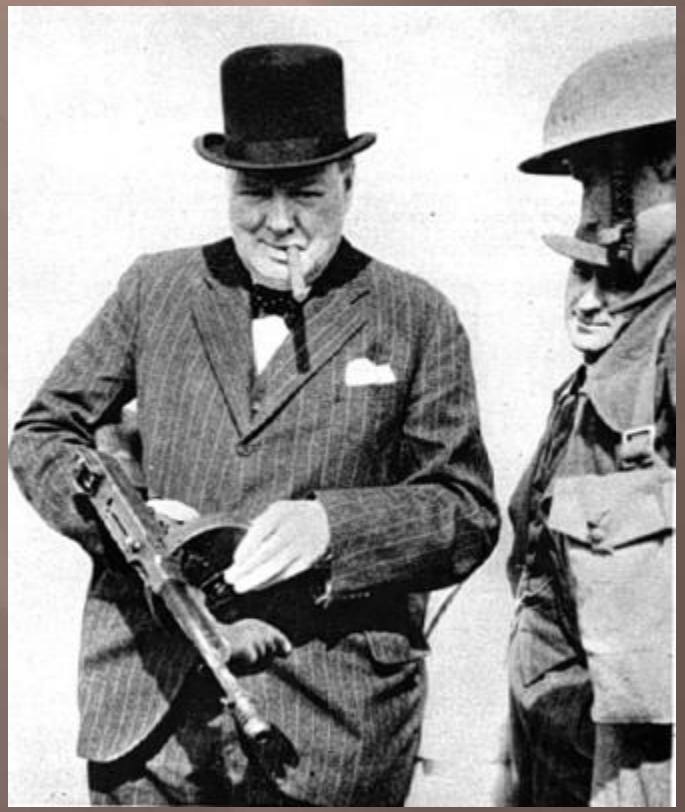
Study	Population	Methods	Intervention	Mortality # (%)		Infections # (%)	
				Exper	Control	Exper	Control
Moore 1994	Trauma pts from 5 ICUs N=98	Random: ? Blinded: No	Immun-Aid vs. Vivonex TEN	1/51 (2)	2/47 (4)	9/51 (18)	10/47 (21)
Bower 1995	Mixed from 8 ICUs N=296	Randomized Controlled Blinded	Impact vs. Osmolite	24/153 (16)	12/143 (8)	86/153 (56)	90/143 (63)
Atkinson 1998	Mixed ICU N=390	Random: no Blinded: Yes	Impact vs. specially prepared	95/197 (48)	85/193 (44)	NR	NR
Capparos 2001	Mixed ICU patients from 15 ICUs N=235	Randomized Controlled Blinded	Specially prepared vs control	27/130 (21)	30/105 (29)	64/130 (49)	37/105 (35)
Conejero 2002	SIRS patients from 11 ICUs N = 84	Randomized Controlled Blinded	Specially prepared vs control	28 day 14/43 (33)	28 day 9/33 (27)	11/43 (26)	17/33 (52)
Dent 2003	N=170 Mixed from 14 ICUs	Randomized Controlled Blinded	Optimental vs. Osmolite HN	20/87 (23)	8/83 (10)	57/87 (66)	52/83 (63)
Kieft 2005	Mixed ICU pts from 2 ICUs N = 597	Randomized Controlled Blinded	Stresson vs.standard	114/302 (38)	106/295 (36)	130/302 (43)	123/295 (42)

A Word on Cost

- *Reducing Costs and Patient Morbidity in the Enterally Fed Intensive Care Unit Patient* (Farber, 2005):
  - Impact 1.5 - $49/day ($686 for 2 weeks)
  - Standard enteral formula - $4.25/day ($60 for 2 weeks)
- ***Preoperative Immunonutrition: Cost-Benefit Analysis*** (Braga, 2005):
  - "the perioperative group had an additional cost of € 209 ($273) per patient because of postoperative immunonutrition, without showing any additional clinical benefit."

Conclusions

"However beautiful the strategy, you should occasionally look at the results."



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Cost:

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