SUPPORT NUTRITIONNEL EN REANIMATION
DE LA LITTÉRATURE AUX RFE
SRLF- SFAR-SFNEP
2014
CE QU'IL FAUT RETENIR

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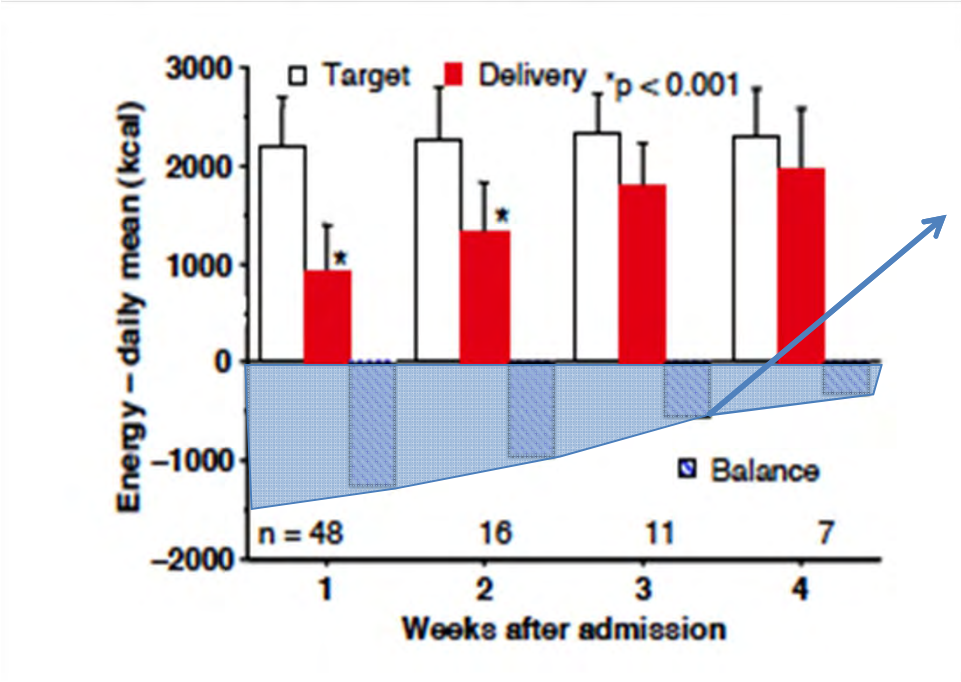
Recommandation 1
Pourquoi débuter un support nutritionnel chez l'agressé ?

Negative impact of hypocaloric feeding and energy balance on clinical outcome in ICU patients

Stéphane Villet[a], René L. Chiolero[b], Marc D. Bollmann[b], Jean-Pierre Revelly[b], Marie-Christine Cayeux RN[b], Jacques Delarue[c], Mette M. Berger[b,*]

Clinical Nutrition

Clinical Nutrition (2005) 24, 502–509



Le déficit énergétique est délétère après une agression

Déficit calorique cumulé
12 000 kcal

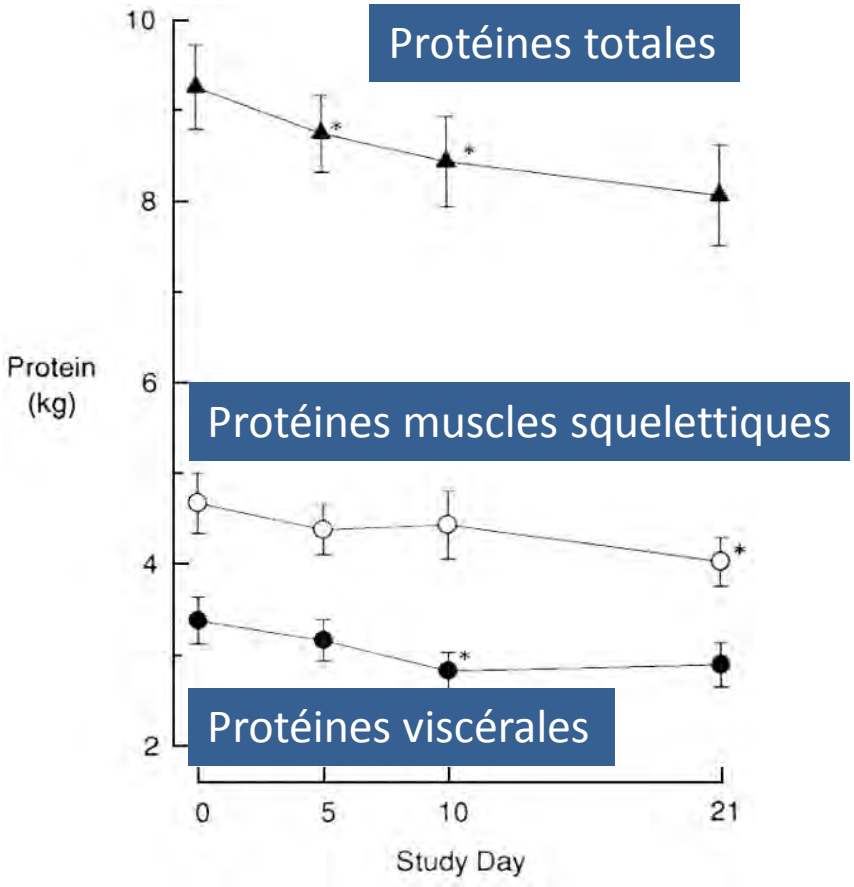
Table 4 Relationship between complications and cumulated energy deficit by regression analysis.

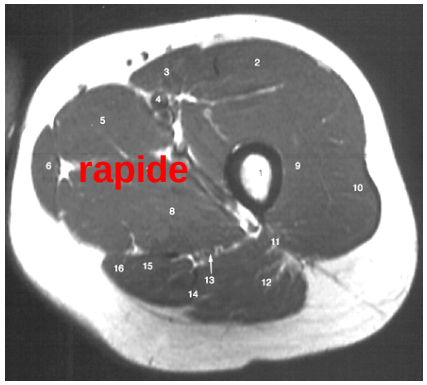
Variables	F	P
Length of stay	25.18	0.0001
Complications	15.15	0.0003
Infections	9.14	0.0042
Days on antibiotics	17.48	0.0003
Start of nutrition	17.17	0.0002
Days of mechanical ventilation	17.12	0.0002

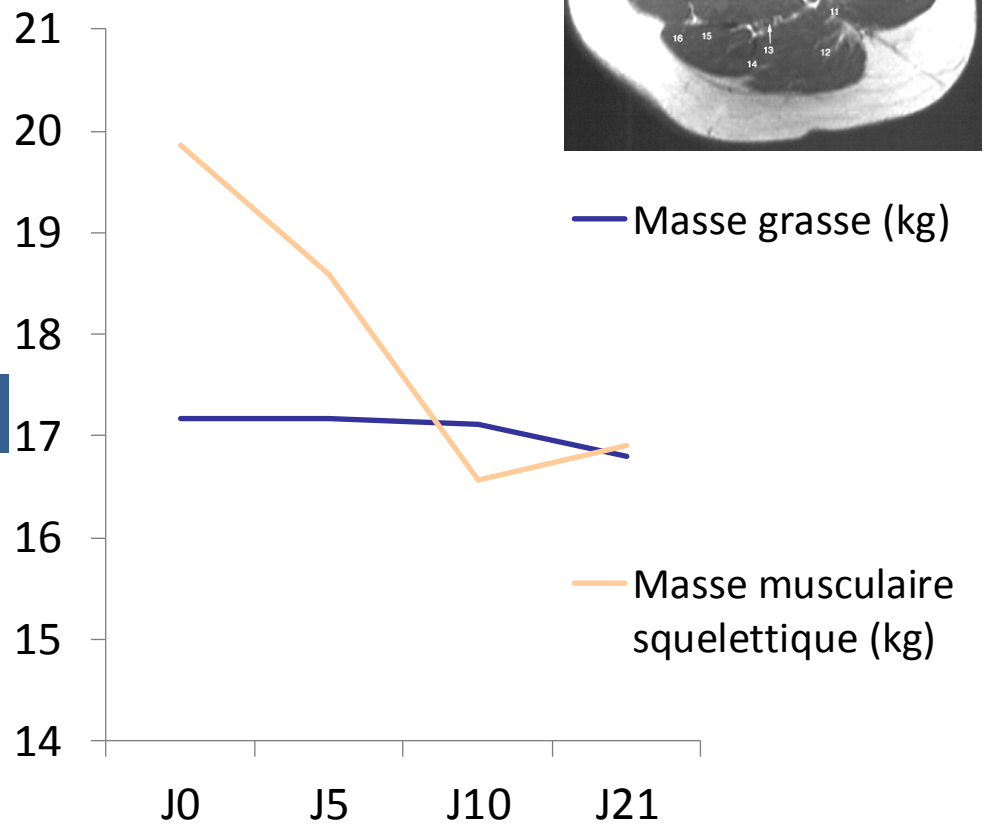
Sequential Changes in the Metabolic Response in Severely Septic Patients During the First 23 Days After the Onset of Peritonitis.

Plank, Lindsay; Connolly, Andrew; Hill, Graham

Annals of Surgery. 228(2):146-158, August 1998.







L'agression entraine un hypercatabolisme protéique = perte de masse maigre musculaire

Le support « métabolique » va limiter la dette énergétique

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 20, 2003 VOL. 348 NO. 8

One-Year Outcomes in Survivors of the Acute Respiratory Distress Syndrome

Margaret S. Herridge, M.D., M.P.H., Angela M. Cheung, M.D., Ph.D., Catherine M. Tansey, M.Sc., Andrea Matte-Martyn, B.Sc., Natalia Diaz-Granados, B.Sc., Fatma Al-Saidi, M.D., Andrew B. Cooper, M.D., Cameron B. Guest, M.D., C. David Mazer, M.D., Sangeeta Mehta, M.D., Thomas E. Stewart, M.D., Aiala Barr, Ph.D., Deborah Cook, M.D., and Arthur S. Slutsky, M.D., for the Canadian Critical Care Trials Group

BACKGROUND

As more patients survive the acute respiratory distress syndrome, an understanding of the long-term outcomes of this condition is needed.

METHODS

We evaluated 109 survivors of the acute respiratory distress syndrome 3, 6, and 12 months after discharge from the intensive care unit. At each visit, patients were interviewed and underwent a physical examination, pulmonary-function testing, a six-minute–walk test, and a quality-of-life evaluation.

RESULTS

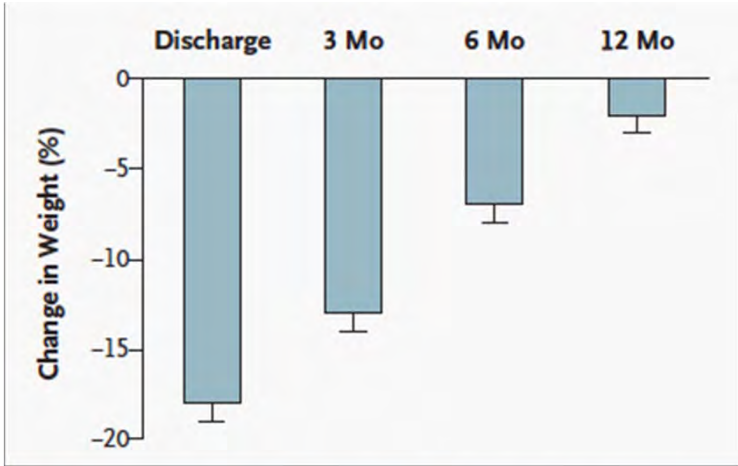


Figure 2. Mean (+SE) Change in Weight from Base Line among Patients with the Acute Respiratory Distress Syndrome at the Time of Discharge from the ICU and at 3, 6, and 12 Months.

GLOBAL ASSESSMENT

At the time of discharge from the ICU, patients who survived the acute respiratory distress syndrome were severely wasted and had lost 18 percent of their base-line body weight (Fig. 2). Seventy-one percent of patients (59 of 83) returned to their base-line weight by one year. All patients reported poor function and attributed this to the loss of muscle bulk, proximal weakness, and fatigue. Most patients had alopecia, which resolved by six months. Ten patients (12 percent) had marked and persistent pain at the sites of insertion of chest tubes at one year. Six patients (7 percent) had entrapment neuropathies.

RFE 2014

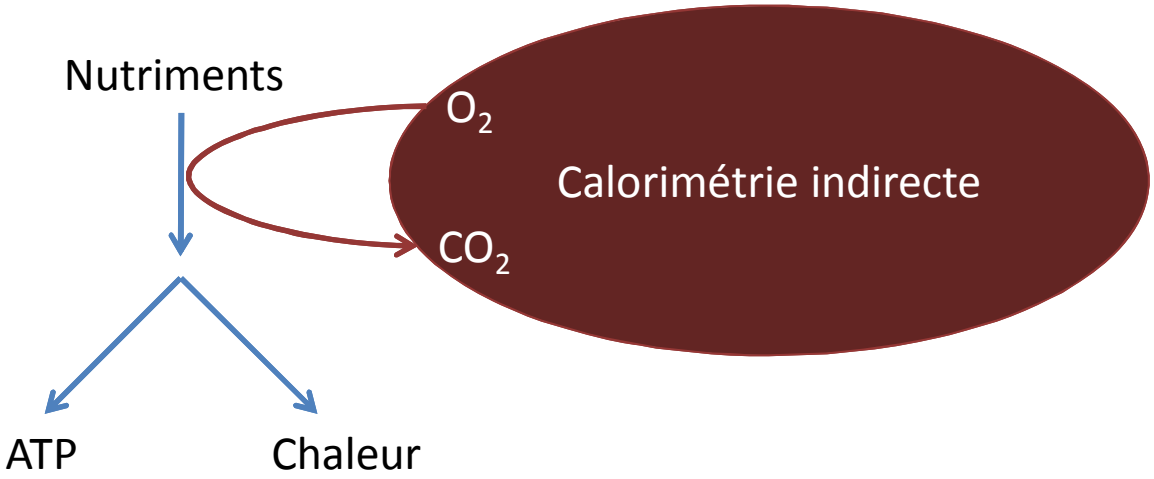
Tout patient admis en réanimation pour une durée présumée supérieure à 3 jours est à risque de dénutrition.
Cette dernière augmente la morbi-mortalité (infection en particulier) et les durées de ventilation, de séjour et d'hospitalisation (Accord Fort)

Il faut administrer **dans les 24 premières heures,** un support nutritionnel entéral aux patients dénutris ou jugés incapables de s'alimenter suffisamment dans les 3 jours après l'admission (Accord Fort)

Recommandation 2
Comment déterminer les apports ?

Calorimétrie indirecte

Technique de référence de mesure de la dépense énergétique
Permet l'adaptation des apports nutritionnels



Limitations

- Temps
- Cout
- FiO_2 < 60%, pas de fuites sur le circuit
- Mesure instantanée
- En condition stable

Faible diffusion de la technique en pratique clinique

Faut-il monitorer la DE ?

Station de soins Engström

Insuffler la vie en réanimation

Intégration de la ventilation et du monitorage

- Ventilation avancée
- Suite INview™ : SpiroDynamics® et CRF INview
- Modules Plug-and-play
- Patient Spirometry™ (spirométrie proximale)
- Monitorage des gaz avec métabolisme et dépense d'énergie
- Ventilation néonatale avec le capteur de débit proximal dédié

Caractéristiques

- Interface utilisateur simplifiée
- Cellule O_2 paramagnétique
- Ventilation non invasive
- Accès sécurisé aux stations centrales
- Contrôle de gestion d'alimentation sophistiqué avec batterie de secours
- Prise de pression auxiliaire
- Compensation de la résistance des voies aériennes

Concept exceptionnel

- Adaptable à votre environnement
- Affichage flexible et mobile
- Accueil de module transférable
- Valve expiratoire à libération rapide
- Configurations de chariot multiples

Aeroneb® Pro d'Aerogen

- Système de nébulisation avancé intégré
- Pilotage via le ventilateur ou indépendant pour les nouveau-nés comme pour les adultes

L'adaptation (précoce des apports énergétiques permet t elle d'améliorer le devenir des patients de réanimation ?

La surnutrition n’est pas la solution…

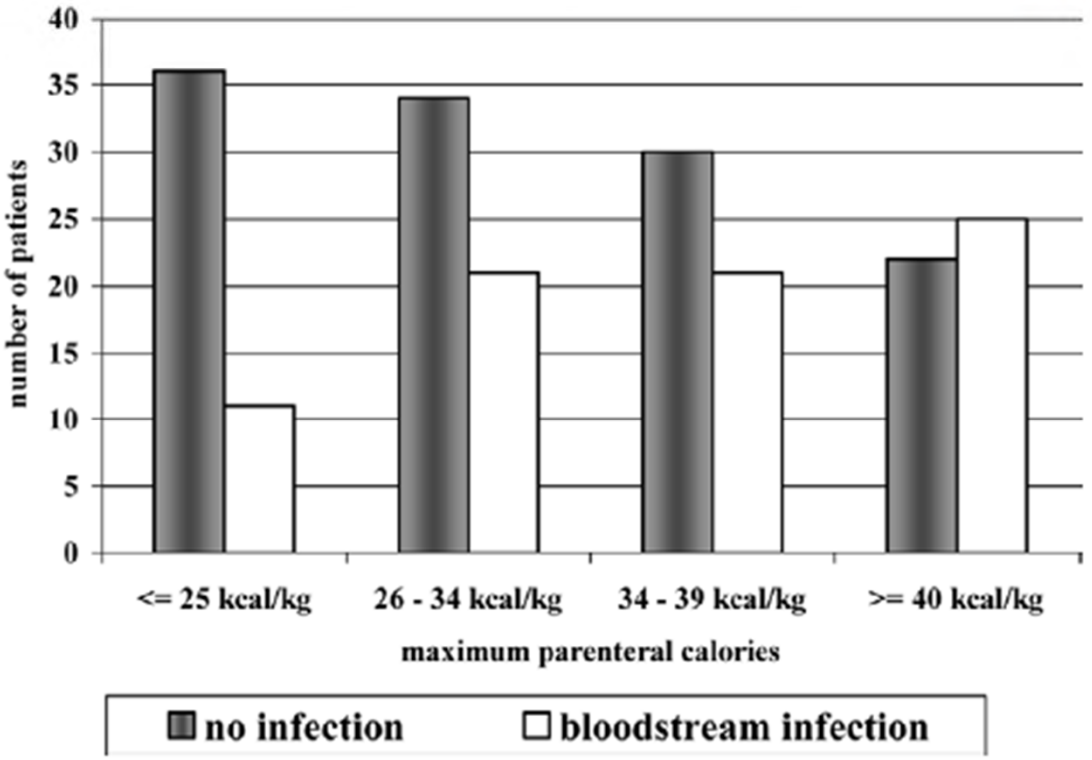
Research

Open Access

The risk for bloodstream infections is associated with increased parenteral caloric intake in patients receiving parenteral nutrition

Sharmila Dissanaike[1], Marilyn Shelton[2], Keir Warner[2] and Grant E O'Keefe[2]

Critical Care Vol 11 No 5



Augmentation de la fréquence des infections

Intensive Care Med
DOI 10.1007/s00134-011-2146-z

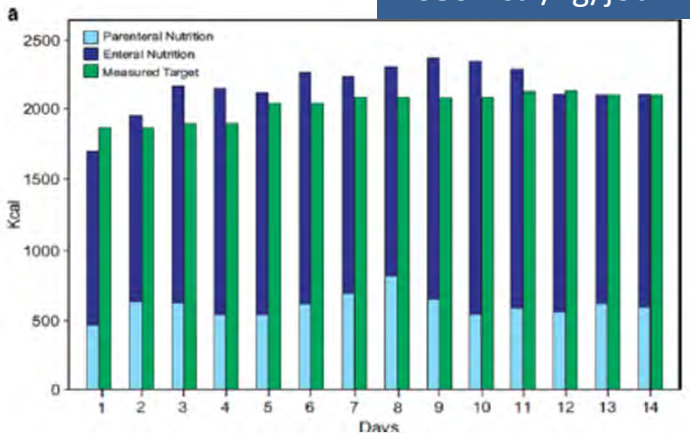
ORIGINAL

Pierre Singer
Ronit Anbar
Jonathan Cohen
Haim Shapiro
Michal Shalita-Chesner
Shaul Lev
Elad Grozovski
Miryam Theilla
Sigal Frishman
Zecharia Madar

The tight calorie control study (TICACOS): a prospective, randomized, controlled pilot study of nutritional support in critically ill patients

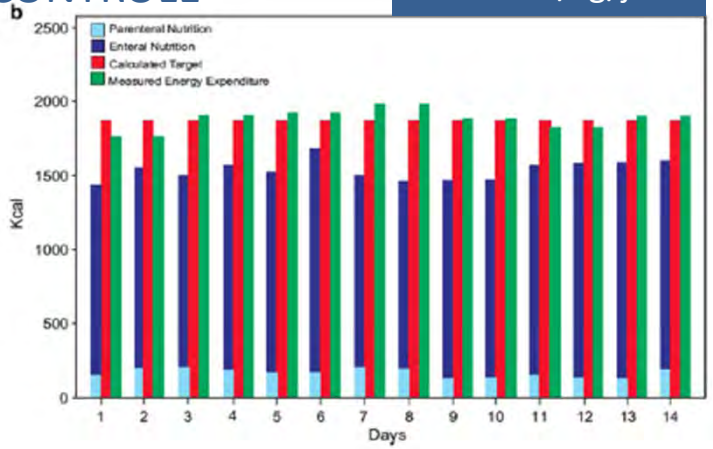
CALORIMETRIE

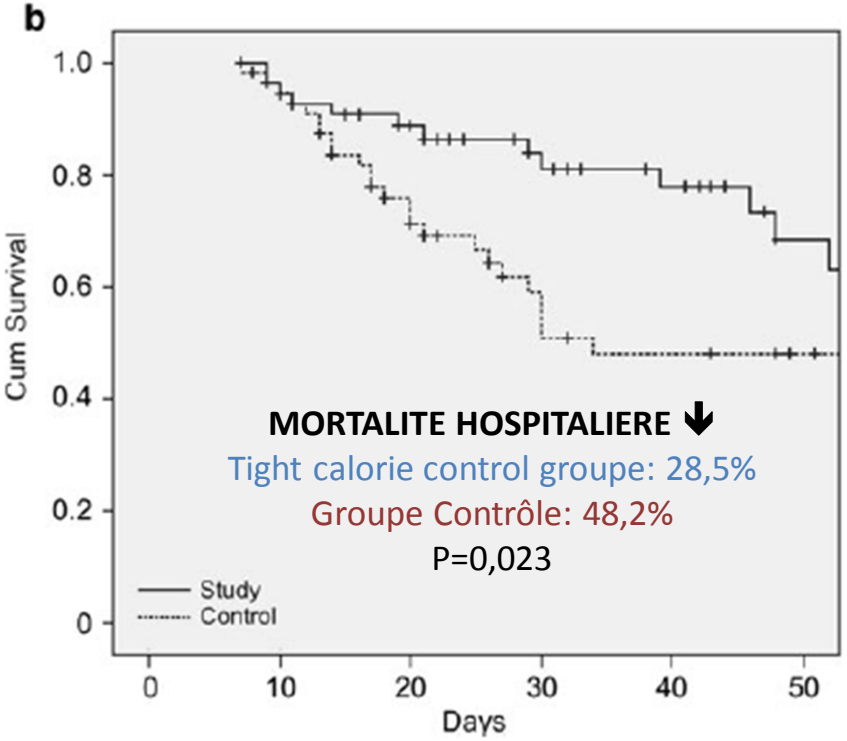
2086 Kcal/kg/jour



CONTROLE

1480 Kcal/kg/jour





MORTALITE HOSPITALIERE ↓

Tight calorie control groupe: 28,5%

Groupe Contrôle: 48,2%

P=0,023

LIMITES DE ETUDE ++++++

Faible effectif

Protocoles nutritionnels différents entre les deux groupes

RFE 2014

Pour évaluer précisément la dépense énergétique d'un patient de réanimation, il faut utiliser la calorimétrie indirecte plutôt que les équations prédictives (**Accord faible)**

En cas d'utilisation de calorimétrie indirecte, il ne faut probablement pas dépasser la dépense énergétique mesurée (**Accord faible).**

En l'absence de calorimétrie indirecte, il faut probablement avoir un objectif calorique total de **20-25** kcal/kg/j à la phase aiguë et **25-30** kcal/kg/j après stabilisation (Accord faible).

Recommandation 3
Comment débuter la nutrition ?

Association between illness severity and timing of initial enteral feeding in critically ill patients: a retrospective observational study

Hsiu-Hua Huang[1,2], Chien-Wei Hsu[3,4], Shiu-Ping Kang[5], Ming-Yi Liu[1,6] and Sue-Joan Chang[1*]

Table 2 Differences in measured outcomes between early and late feeding groups and break down by illness severity

Measured outcomes	Early (n = 40)	Late (n = 68)	APACHE II <20 (n = 47)		APACHE II ≥20 (n = 61)	
			Early (n = 14)	Late (n = 33)	Early (n = 26)	Late (n = 35)
Clinical outcomes						
Frequency of feeding complications (times/d)	0.11 ± 0.18†	0.08 ± 0.18	0.05 ± 0.12	0.10 ± 0.24	0.14 ± 0.20	0.05 ± 0.11**
VAP (%, n)	32.5 (13/40)	13.8 (9/65)*	28.6 (4/14)	9.1 (3/33)	34.6 (9/26)	18.8 (6/32)
Length of ICU stay (d)	21.1 ± 14.3	15.0 ± 7.7*	16.4 ± 13.3	15.9 ± 9.1	23.6 ± 14.4	14.2 ± 6.0**
Length of hospital stay (d)	37.0 ± 26.2	33.07 ± 23.1	24.1 ± 17.4	34.8 ± 27.3	43.9 ± 27.8	31.4 ± 18.5
Hospital mortality (%, n)	45.0 (18/40)	36.8 (25/68)	35.7 (5/14)	18.2 (6/33)	50.0 (13/26)	54.3 (19/35)

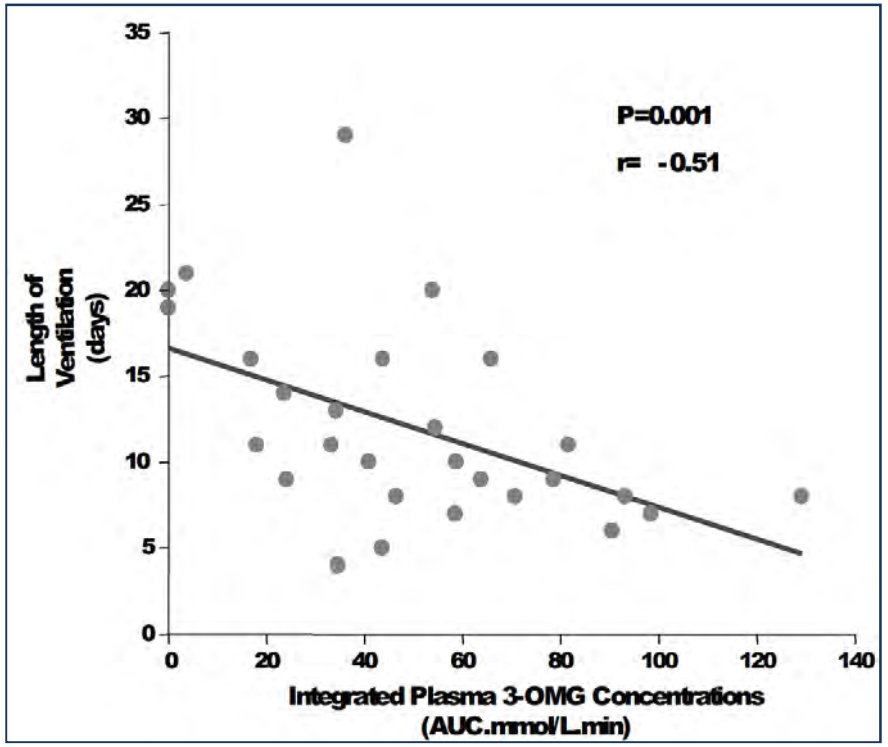
Early feeding shows to be a more beneficial nutritional intervention option than late feeding in patients with more severe illness (APACHE > 20)

Huang HH et al, Nutrition Journal 2012, 11:30

Delayed enteral feeding impairs intestinal carbohydrate absorption in critically ill patients*

Nam Q. Nguyen, MBBS (Hons), PhD, FRACP; Laura K. Besanko, BHSc; Carly Burgstad, BHSc (Hons); Max Bellon, BHSc; Richard H. Holloway, MBBS, FRACP, MD; Marianne Chapman, BMBS, PhD, FCICM; Michael Horowitz, MBBS, FRACP, PhD; Robert J. L. Fraser, MBBS, FRACP, PhD

Delaying enteral feeding is associated with a reduction in small intestinal glucose absorption, consistent with the reduction in mucosal integrity



There was an inverse correlation between integrated plasma concentrations of 3-O-methyl-glucose and the duration of ventilation

Crit Care Med. 2012 ,40:50-4

RFE 2014

Il faut utiliser **la Nutrition Entérale (NE) plutôt que la Nutrition Parentérale (NP**), en l'absence de contre-indication formelle (Accord Fort)

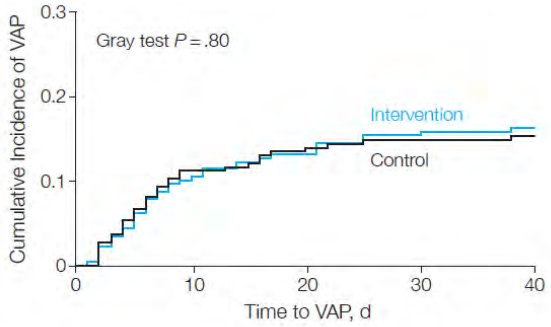
Il ne faut probablement pas utiliser la NE en amont d'une fistule digestive de haut débit, en cas d'occlusion intestinale, d'ischémie du grêle ou d'hémorragie digestive active (Accord Fort)

Il faut probablement adapter le débit d'administration **en vue d'atteindre la cible nutritionnelle en moins de 48 heures (Accord fort)**, en utilisant des mélanges polymériques pour débuter une NE (Accord fort).

Effect of Not Monitoring Residual Gastric Volume on Risk of Ventilator Associated Pneumonia in Adults Receiving Mechanical Ventilation and Early Enteral Feeding

Régnier J et al, JAMA 2013

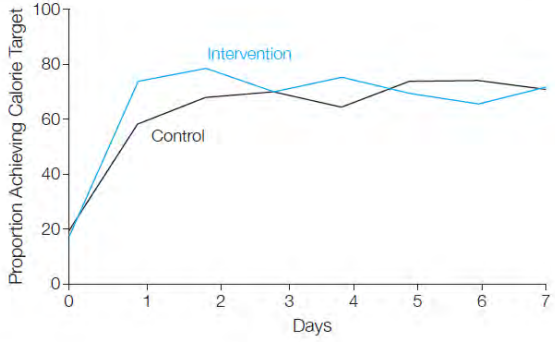
Figure 2. Development of Ventilator-Associated Pneumonia in the Groups With (Control) and Without (Intervention) Residual Gastric Volume Measurement



No. at risk					
Intervention	227	73	20	7	2
Control	222	80	21	8	5

The absence of gastric volume monitoring was not inferior to routine residual gastric volume monitoring in terms of development of VAP.

Figure 3. Proportions of Patients Who Achieved Their Calorie Target During the First Week in the Groups With (Control) and Without (Intervention) Residual Gastric Volume Monitoring



No. of patients								
Intervention	227	222	206	184	153	141	119	103
Control	222	220	212	193	166	142	132	113

RFE 2014

Il faut utiliser la Nutrition Entérale (NE) plutôt que la Nutrition Parentérale (NP), en l'absence de contre-indication formelle (Accord Fort)

Il ne faut pas mesurer le volume résiduel gastrique (Accord faible).

Il faut **envisager l'administration de prokinétiques** (méto- clopramide et/ou érythromycine) pour permettre une amélioration de l'apport calorique global en cas de trouble de la vidange gastrique (Accord fort).

Recommandation 4
Echec de la voie entérale, déficit énergétique, quelle place pour la voie parentérale ?

Early versus Late Parenteral Nutrition in Critically Ill Adults

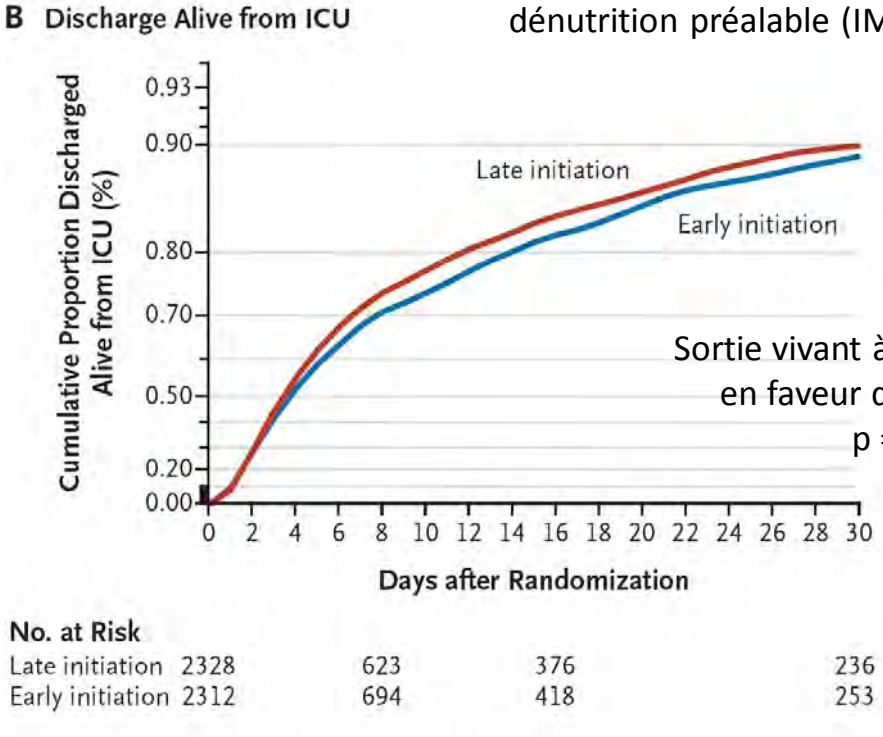
Michael P. Casaer, M.D., Dieter Mesotten, M.D., Ph.D., Greet Hermans, M.D., Ph.D., Pieter J. Wouters, R.N., M.Sc., Miet Schetz, M.D., Ph.D., Geert Meyfroidt, M.D., Ph.D., Sophie Van Cromphaut, M.D., Ph.D., Catherine Ingels, M.D., Philippe Meersseman, M.D., Jan Muller, M.D., Dirk Vlasselaers, M.D., Ph.D., Yves Debaveye, M.D., Ph.D., Lars Desmet, M.D., Jasperina Dubois, M.D., Aime Van Assche, M.D., Simon Vanderheyden, B.Sc., Alexander Wilmer, M.D., Ph.D., and Greet Van den Berghe, M.D., Ph.D.*

Les auteurs ont comparé les effets d'une nutrition parentérale complémentaire pour couvrir 100% des besoins énergétiques

- Tardive (= recommandations ASPEN et Canada) = J8
- Précoce (= recommandations ESPEN) = J2

sur la mortalité et la survenue de complications chez des patients de réanimation à risque de dénutrition mais sans dénutrition préalable (IMC ≥17).

4640 patients randomisés



Sortie vivant à J8 de réanimation en faveur du groupe tardif, p = 0,007

<u>CONCLUSION</u> : L'instauration précoce d'une nutrition parentérale complémentaire (J3) d'une nutrition entérale insuffisante chez des patients à risque de dénutrition apparaît inférieur comparativement à une nutrition parentérale complémentaire tardive (J8) en terme de survenue d'infections, de pronostic et de coûts.

EPaNIC – EN Contre-indiqué

517 patients (complications pulmonaires, œsophagiennes, abdominales avec APACHE II score : 27±11) avec apport entéral contre-indiqué

Groupe tardif : apport calorique = 0 Kcal (0-136 Kcal/J) jusqu'à J8

Analyses des résultats :

- Taux d'infection dans le groupe tardif (29.9 %) comparativement à 40.2; p = 0.01 dans le groupe précoce

- Dans le groupe tardif, il y une augmentation relative de 20% de sortir vivant de réanimation comparativement au groupe précoce (OR de1.20; 95 % CI, p = 0.05)

Effet bénéfique de l'activation des mécanismes d'autophagie pourrait expliquer ces résultats bénéfique de l'absence d'apport nutritif

Impact of Early Parenteral Nutrition on Muscle and Adipose Tissue Compartments During Critical Illness

Michael P. Casaer, MD, PhD[1]; Lies Langouche, PhD[1]; Walter Coudyzer, MSc[2]; Dirk Vanbeckevoort, MD[2]; Bart De Dobbelaer, Ing[2]; Fabian G. Güiza, PhD[1]; Pieter J. Wouters, MSc[1]; Dieter Mesotten, MD, PhD[1]; Greet Van den Berghe, MD, PhD

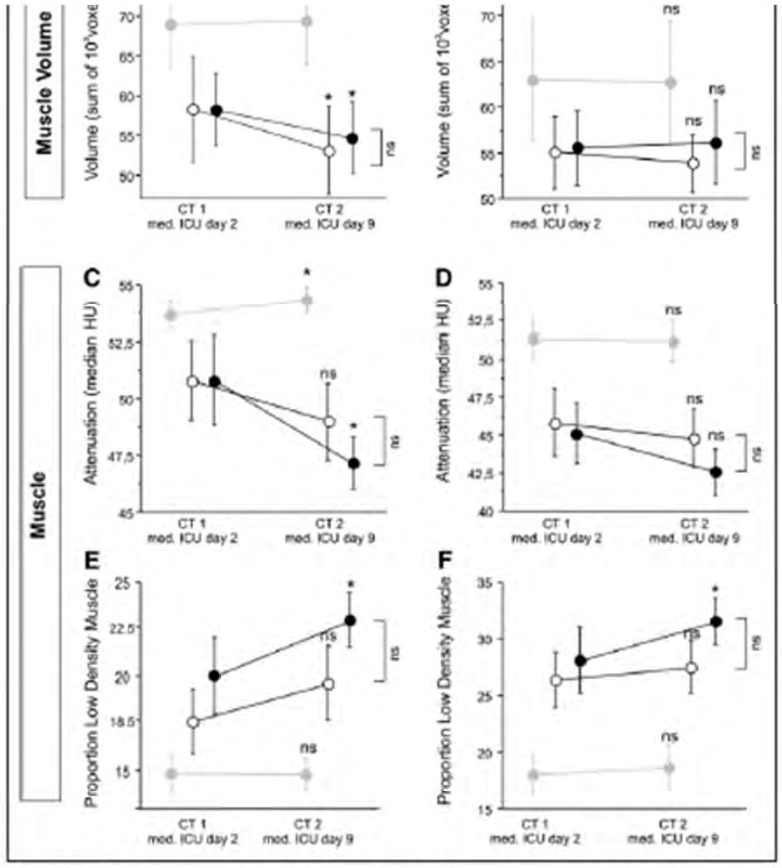
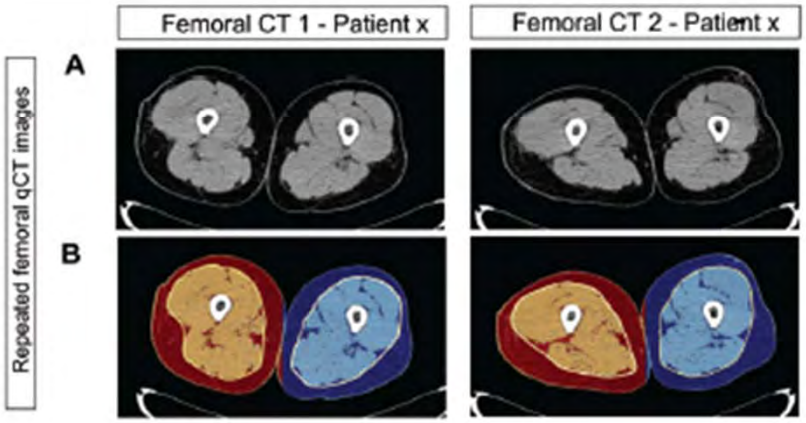


Figure 4. Effect of early and late parenteral nutrition (PN) on volume and composition of femoral and

- Pas de différence de volume musculaire
- Plus d'infiltration graisseuse musculaire dans le groupe PN précoce



Mais

15 patients…. (10 versus 5 patients)

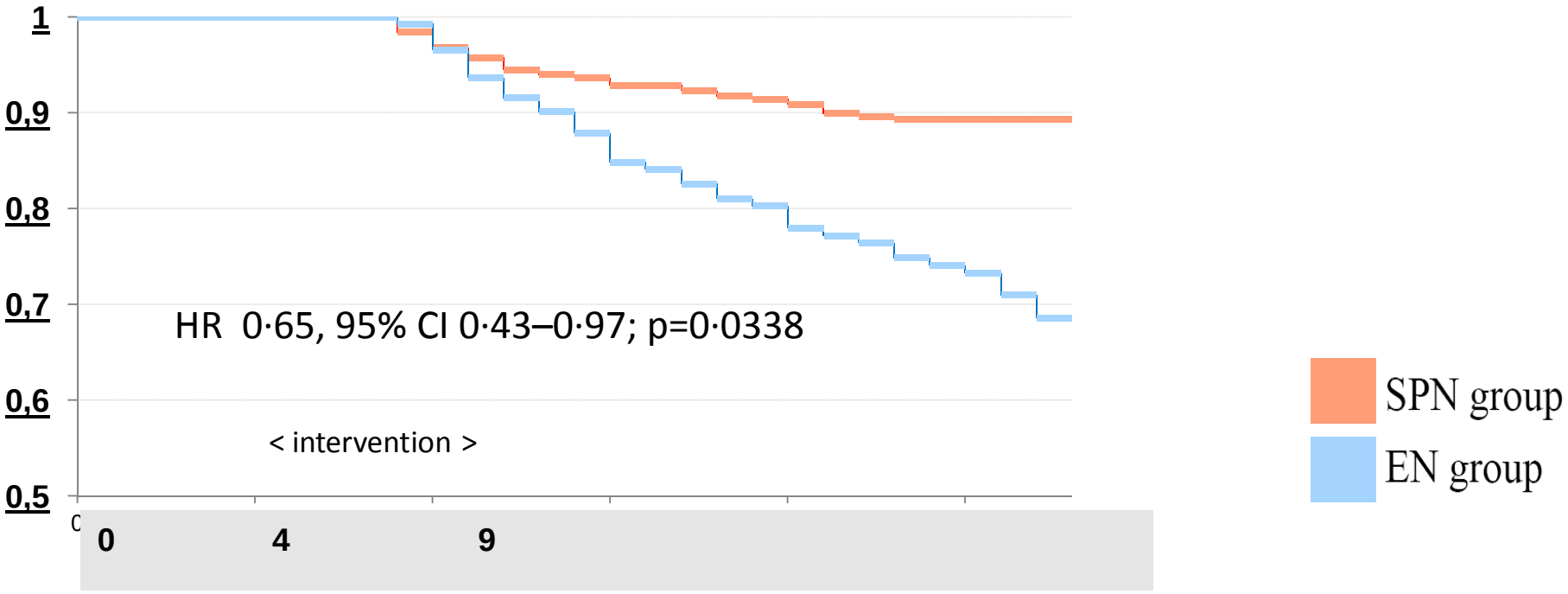
-Détermination de la cible énergétique par équation (≠ calorimétrie)

- Patients traumatisés crâniens
- Patients non dénutris
- **<u>Immobiles +++++</u>**

-Délais très d'étude court (J2 – J9)…

- Quantité de protéines non définie ?

SPN - Infections acquises



CONCLUSION Une nutrition artificielle individualisée et optimisée par NP complémentaire débutée au 4ème jour après admission en USI, en cas d'échec de la NE, améliore le devenir Clinique

- infections nosocomiales ↓
- prescription antibiotiques ↓
- ventilation mécanique ↓
- durée de séjour (réanimation, hôpital) NS

C. P. Heidegger et al, *The Lancet, Dec. 3. 2012*

ONLINE FIRST

Early Parenteral Nutrition in Critically Ill Patients With Short-term Relative Contraindications to Early Enteral Nutrition

A Randomized Controlled Trial

JAMA, May 22/29, 2013—Vol 309, No. 20

Gordon S. Doig, PhD
Fiona Simpson, MND
Elizabeth A. Sweetman, MHM
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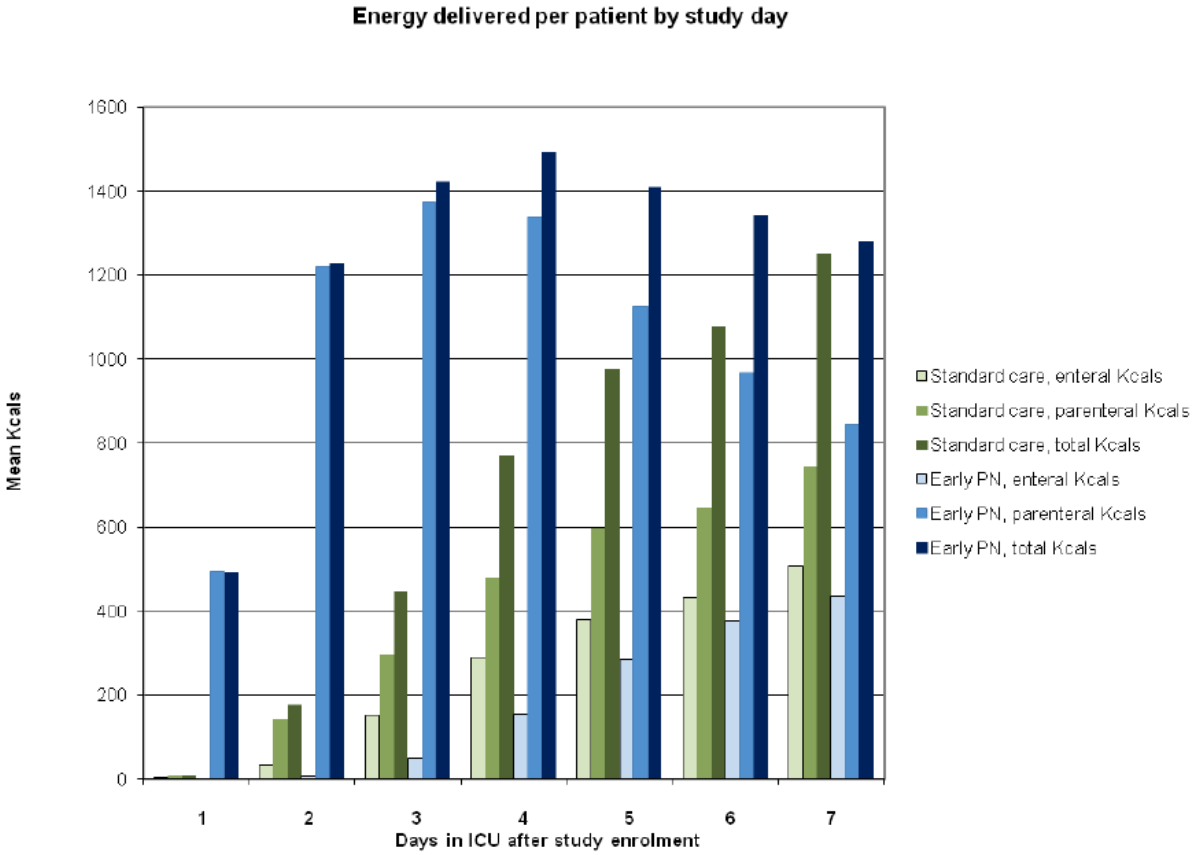
Michael O'Leary, FCICM
Tom Solano, FCICM
Sandra Peake, FCICM
for the Early PN Investigators of the ANZICS Clinical Trials Group

1372 patients randomisés
SI pas de NE possible dans les 48 heures après admission
Survie à 60 jours

681 pts « EARLY PN »
Parentérale à partir de J1

682 pts « STANDART »
Protocole de service



ONLINE FIRST

Early Parenteral Nutrition in Critically Ill Patients With Short-term Relative Contraindications to Early Enteral Nutrition

A Randomized Controlled Trial

JAMA, May 22/29, 2013—Vol 309, No. 20

[redacted], PhD

Table 3. Clinically Significant Organ Failure and Concomitant Interventions, Adjusted for Time at Risk (ICU Stay)[a]

	Mean (95% CI), Days per 10 Patient × ICU Days		Mean Difference (95% CI), Days per 10 Patient × ICU Days	*P* Value[b]
	Standard Care (n = 682)	Early PN (n = 681)		
Organ system failures[c]				
Renal	1.66 (1.51 to 1.82)	1.65 (1.51 to 1.81)	−0.01 (−0.28 to 0.33)	.98
Pulmonary	8.51 (8.34 to 8.69)	8.54 (8.37 to 8.71)	0.03 (−0.31 to 0.37)	.88
Hepatic	1.14 (1.09 to 1.20)	1.08 (1.03 to 1.14)	−0.06 (−0.16 to 0.06)	.15
Coagulation	2.23 (2.09 to 2.38)	1.89 (1.78 to 2.02)	−0.34 (−0.57 to −0.08)	.01
Cardiovascular	1.16 (1.05 to 1.27)	0.99 (0.89 to 1.09)	−0.17 (−0.34 to 0.04)	.11
MODs	4.04 (3.85 to 4.25)	3.93 (3.74 to 4.13)	−0.11 (−0.48 to 0.29)	.59
No. of organ failures[d]	1.47 (1.44 to 1.51)	1.42 (1.39 to 1.46)	−0.05 (−0.12 to 0.02)	.12
Concomitant therapies and tertiary outcomes				
Renal replacement therapy	0.99 (0.82 to 1.81)	0.80 (0.67 to 0.96)	−0.19 (−0.42 to 0.16)	.25
Invasive mechanical ventilation	7.73 (7.55 to 7.92)	7.26 (7.09 to 7.44)	−0.47 (−0.82 to −0.11)	.01
Pressure ulcer treatment[e]	0.87 (0.74 to 1.02)	0.78 (0.67 to 0.92)	−0.09 (−0.30 to 0.22)	.54
Low serum albumin (<2.5 g/dL)	5.47 (5.28 to 5.67)	5.76 (5.56 to 5.97)	0.29 (−0.10 to 0.71)	.15
Systemic antibiotic use	7.95 (7.78 to 8.12)	8.05 (7.88 to 8.22)	0.10 (−0.23 to 0.45)	.55
Witnessed aspiration[f]	1.59 (0.98 to 2.54)	1.96 (1.21 to 3.13)	0.37 (−0.80 to 3.45)	.66
With new pulmonary infiltrates[f]	0.48 (0.20 to 1.15)	0.71 (0.30 to 1.72)	0.23 (−0.36 to 0.37)	.65

NP PRECOCE

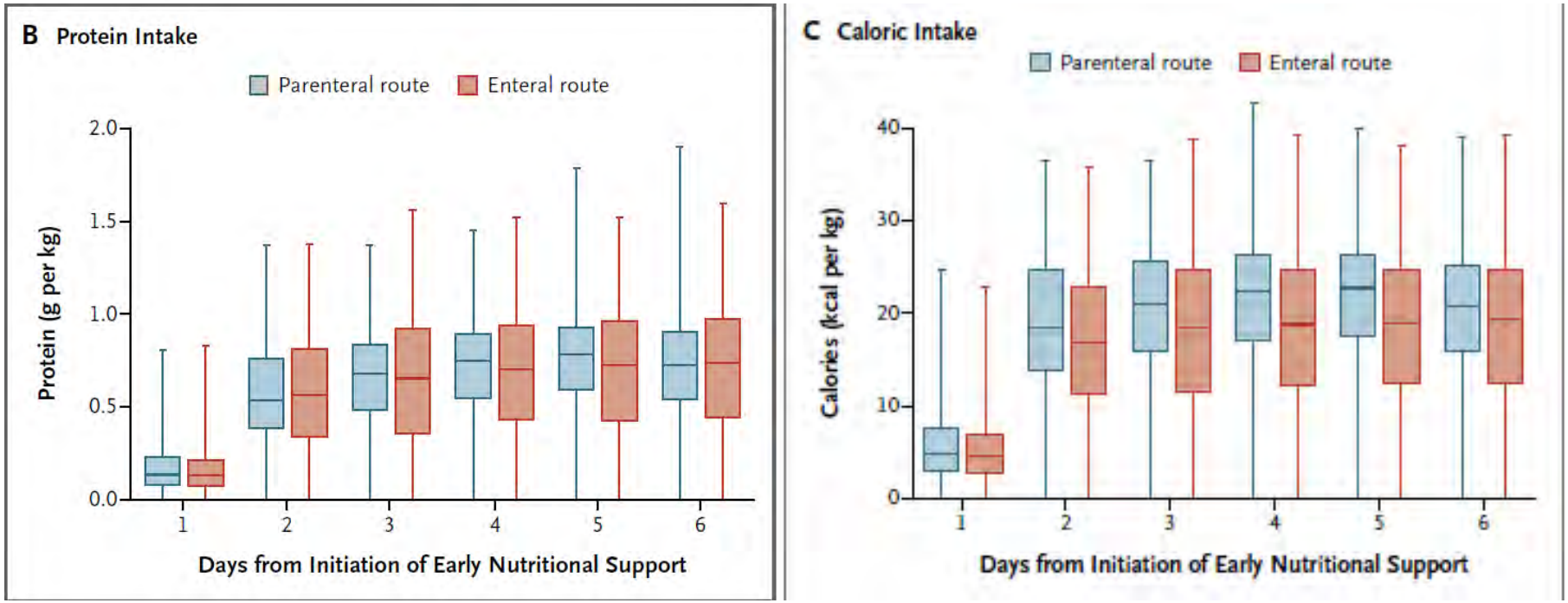
↓ durée de ventilation de 1 journée
Pas de différence de l'incidence des infections
Amélioration de la qualité de vie (RAND-36)
Pas de différence de mortalité à J60
MAIS : problème méthodologique ds groupe standard

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Trial of the Route of Early Nutritional Support in Critically Ill Adults

Sheila E. Harvey, Ph.D., Francesca Parrott, M.Sci., David A. Harrison, Ph.D., Danielle E. Bear, M.Res., Ella Segaran, M.Sc., Richard Beale, M.B., B.S., Geoff Bellingan, M.D., Richard Leonard, M.B., B.Chir., Michael G. Mythen, M.D., and Kathryn M. Rowan, Ph.D., for the CALORIES Trial Investigators*



2388 patients inclus : apport calorique idem ds les 2 groupes,
objectif énergétique : 25Kcal/Kg/J , < aux objectifs ds les 2 groupes
Initiation : dans les 36 heures post admission et > 5 jours
Patients non dénutris

The NEW ENGLAND JOURNAL of MEDICINE

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Table 3. Primary and Secondary Outcomes.*

Outcome	Parenteral Group (N=1191)	Enteral Group (N=1197)	Absolute Difference between Groups (95% CI)	Relative Risk (95% CI)	P Value
Primary outcome: death within 30 days — no./total no. (%)	393/1188 (33.1)	409/1195 (34.2)	1.15 (–2.65 to 4.94)†	0.97 (0.86 to 1.08)‡	0.57§

We found no significant difference in 30-day mortality associated with the route of delivery of early nutritional support in critically ill adults (caloric intake was similar in two groups , with target intake not achieved in most patients +++++)

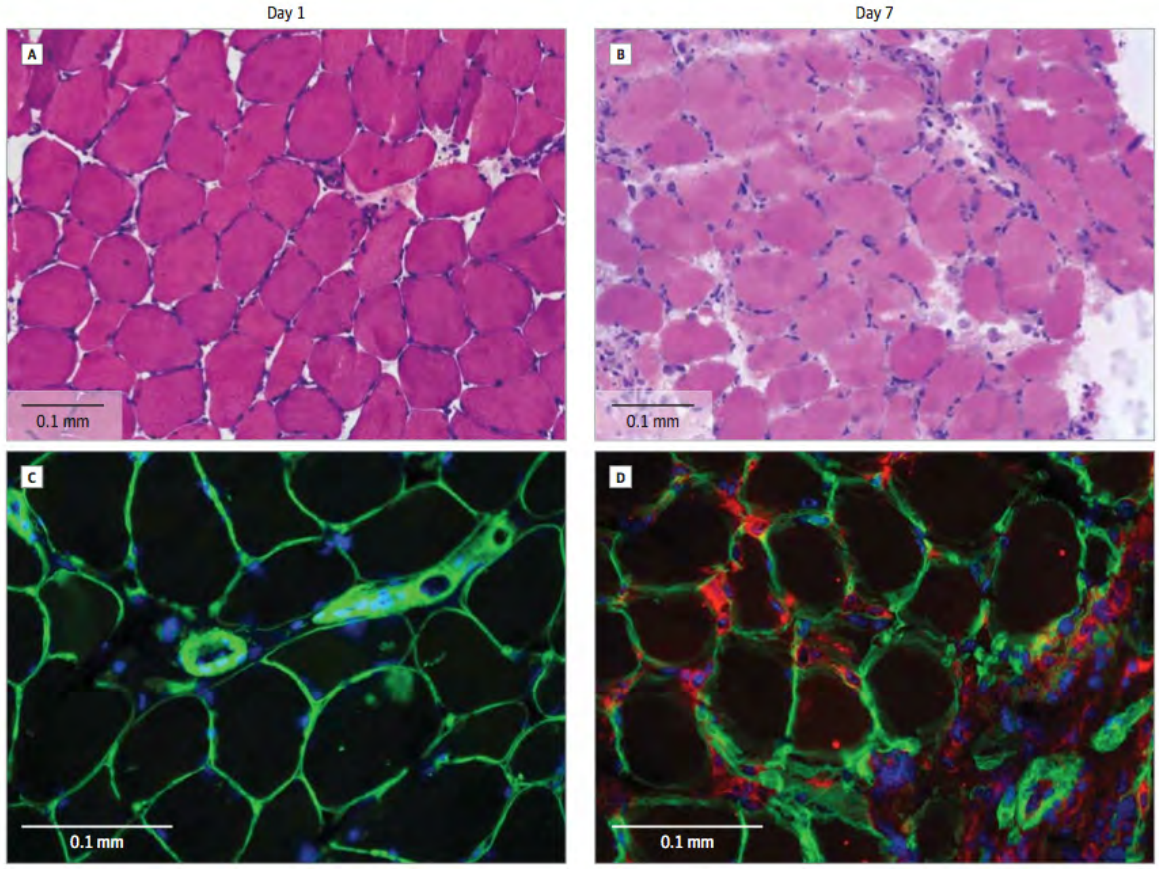
RFE 2014

Il faut instaurer une NP de complément lorsque la NE n'atteint pas la cible calorique choisie au plus tard après 1 semaine de séjour en réanimation (Accord Fort)

Recommandation 5
Quelle cible protéique ?

Perd-on du muscle en réanimation?

Healthy muscle



Muscle Wasting with necrosis and a cellular infiltrate on day 7

Muscle Biopsy Specimens From a Representative Patient on Day 1 and Day 7

Perte musculaire et agression : 1.5 à 3Kg / semaine

Puthucheary ZA et al , JAMA. 2013;310(15):1591-1600

Optimal Protein and Energy Nutrition Decreases Mortality in Mechanically Ventilated, Critically Ill Patients: A Prospective Observational Cohort Study

Peter J. M. Weijs, PhD[1,2,3]; Sandra N. Stapel, MD[3]; Sabine D. W. de Groot, RD[1]; Ronald H. Driessen, BSc[3]; Evelien de Jong, MD[3]; Armand R. J. Girbes, MD, PhD[3]; Rob J. M. Strack van Schijndel, MD[3,†]; and Albertus Beishuizen, MD, PhD[3]

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Table 3. Relationship Between Nutrition Therapy and Intensive Care Unit, 28-Day, and Hospital Mortality[a]

	Protein and Energy Target	Energy Target
Model 0[b]		
Intensive care unit	0.91 (0.64–1.31), $P = .626$	1.03 (0.86–1.25), $P = .733$
28 d	**0.59 (0.40–0.88), $P = .010$**	0.90 (0.74–1.09), $P = .291$
Hospital	**0.76 (0.58–0.99), $P = .041$**	0.93 (0.81–1.08), $P = .339$
Model 1[c]		
Intensive care unit	0.79 (0.54–1.17), $P = .242$	0.99 (0.81–1.20), $P = .886$
28 d	**0.51 (0.33–0.78), $P = .002$**	0.84 (0.68–1.03), $P = .085$
Hospital	**0.70 (0.53–0.94), $P = .017$**	0.91 (0.79–1.06), $P = .233$
Model 2[d]		
Intensive care unit	0.72 (0.48–1.09), $P = .116$	0.98 (0.80–1.19), $P = .834$
28 d	**0.40 (0.26–0.64), $P < .001$**	**0.79 (0.64–0.97), $P = .024$**
Hospital	**0.62 (0.46–0.84), $P = .002$**	0.89 (0.77–1.04), $P = .137$

[a]Presented as hazard ratio (95% confidence interval). Bold font indicates significance ($P < .05$).
[b]Unadjusted.
[c]Adjusted for sex, age, body mass index, diagnosis, hyperglycemic index, and Acute Physiology and Chronic Health Evaluation II score.
[d]Additionally adjusted for time to energy target and use of parenteral nutrition.

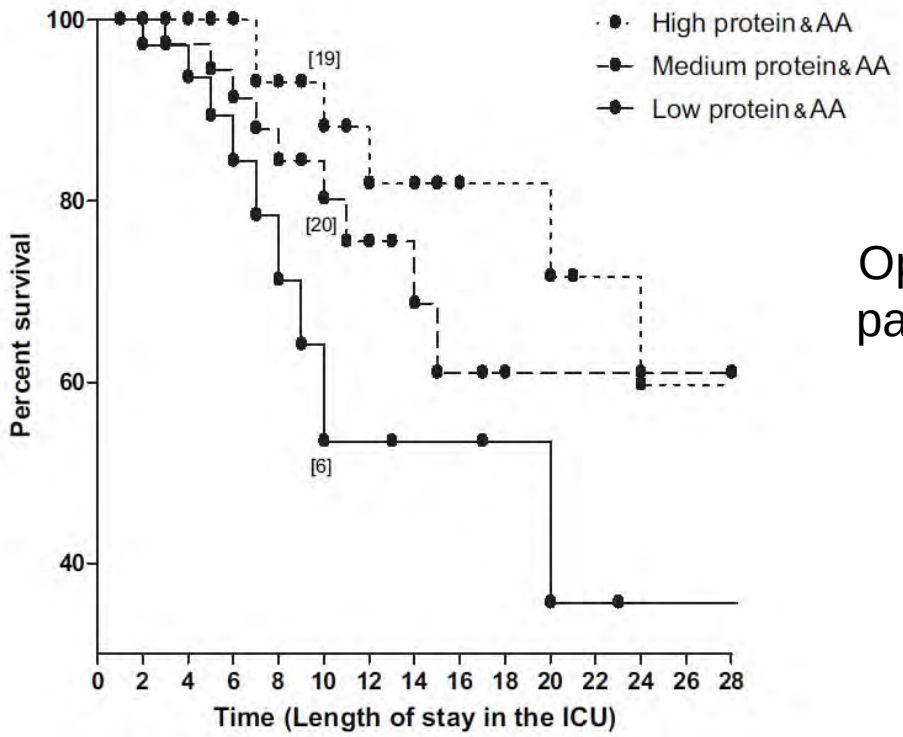
Optimal nutritional therapy in critically ill patients, defined as protein and energy targets reached, is associated with a decrease in 28-day mortality by 50%, whereas only reaching energy targets is not associated with a reduction in mortality.

JPEN J Parenter Enteral Nutr 2012; 36:60–68.

Original article

Provision of protein and energy in relation to measured requirements in intensive care patients

Matilde Jo Allingstrup [a,*], Negar Esmailzadeh [a], Anne Wilkens Knudsen [a], Kurt Espersen [a], Tom Hartvig Jensen [a], Jørgen Wiis [a], Anders Perner [a], Jens Kondrup [b]



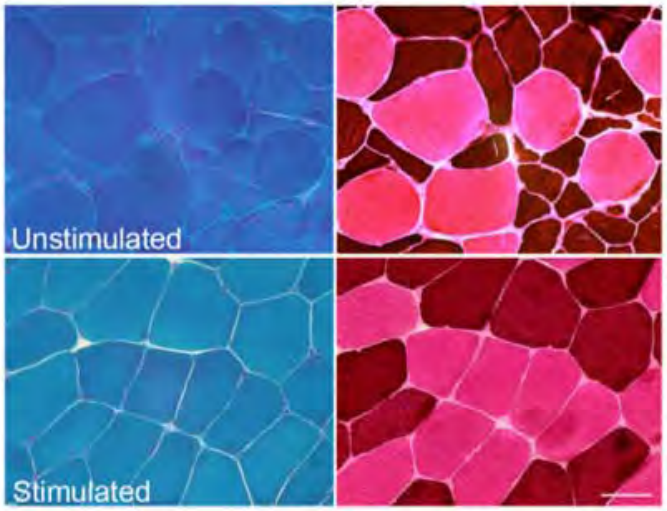
0.8, 1.0, and 1.4 g protein/kg per day

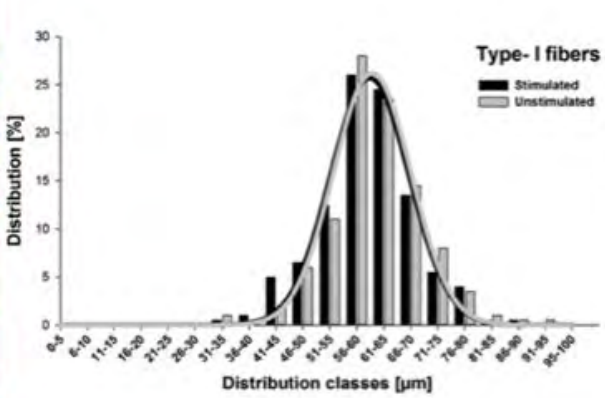
Optimization of protein balance in ICU patients as well as energy balance will improve outcome

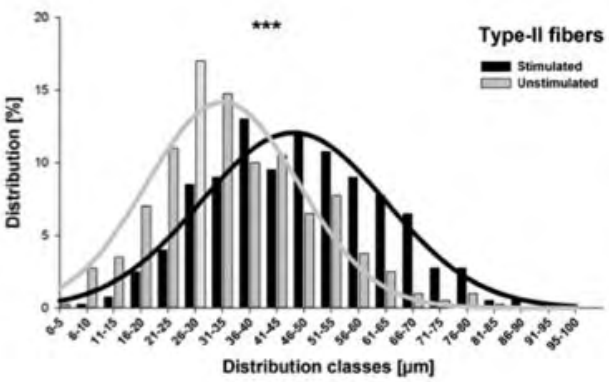
Trials which have achieved a protein delivery of approximately > 1.0 g/kg per day or greater have shown a benefit of increased nutrition delivery on ICU outcome in well nourished patients

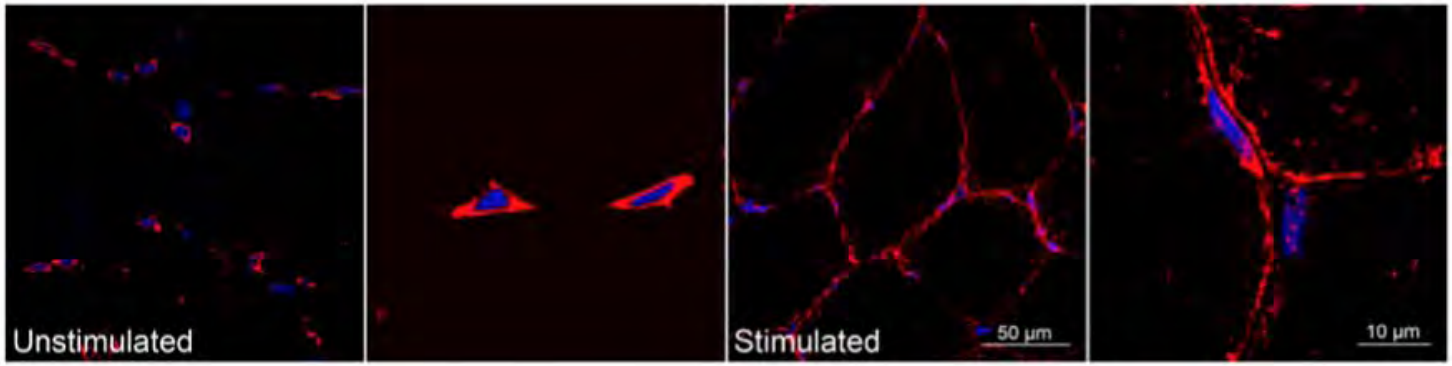
Clinical Nutrition 2012;31:462-468

Effet de la stimulation électrique









On fait des fibres musculaires si on reçoit des protéines et on « bouge »

Weber, Am J Respir Crit Care Med, 2013

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Il faut apporter **1,2 à 1,5 g/kg/j de protéines** (0,2-0,25 gr azote/Kg/J) (Accord Fort)

Il faut probablement majorer l'apport protéique quotidien du patient sous épuration extra rénale continue pour atteindre un niveau de 1,7 à 2 g/kg/j (Accord faible)

Recommandation 6
Comment gérer les pharmaconutriments : la glutamine

Compared to standard parenteral nutrition (PN) does glutamine-supplemented PN result in improved clinical outcomes in critically ill patients ?

D Heyland - Canadian Critical Care Nutrition Clinical Guidelines 2009.

Review: glutamine New review (Version 01)
Comparison: 02 Parenteral Glutamine vs Control
Outcome: 03 Mortality

Overall mortality

Study or sub-category	PN glutamine n/N	Control n/N	RR (random) 95% CI	Weight %	RR (random) 95% CI	Year
Griffiths	18/42	25/42		35.43	0.72 [0.47, 1.11]	1997
Powell-Tuck	14/83	20/85		17.40	0.72 [0.39, 1.32]	1999
Wischmeyer	2/15	5/16		2.98	0.43 [0.10, 1.88]	2001
Fuentes-Orozco	2/17	3/16		2.39	0.63 [0.12, 3.28]	2004
Xian-Li	0/20	3/21		0.77	0.15 [0.01, 2.73]	2004
Dechelotte 2006	2/58	2/56		1.76	0.97 [0.14, 6.62]	2006
Palmese	6/42	8/42		6.96	0.75 [0.28, 1.97]	2006
Sahin	2/20	6/20		3.00	0.33 [0.08, 1.46]	2007
Cai	17/55	20/55		23.44	0.85 [0.50, 1.44]	2008
Duska	2/10	0/10		0.77	5.00 [0.27, 92.62]	2008
Estivariz	1/32	6/31		1.54	0.16 [0.02, 1.27]	2008
Fuentes-Orozco 2008	2/22	5/22		2.79	0.40 [0.09, 1.85]	2008
Luo 2008	0/11	0/9			Not estimable	2008
Perez-Barcena	3/15	0/15		0.79	7.00 [0.39, 124.83]	2008
Total (95% CI)	442	440		100.00	0.71 [0.55, 0.92]	

Total events: 71 (PN glutamine), 103 (Control)
Test for heterogeneity: Chi² = 9.84, df = 12 (P = 0.63), I² = 0%
Test for overall effect: Z = 2.63 (P = 0.008)

Glutamine supplemented PN is associated with a significant reduction in mortality (D28) in critically ill patients (p =0.008)

Daren Heyland and al, NEJM 2013

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ORIGINAL ARTICLE

A Randomized Trial of Glutamine and Antioxidants in Critically Ill Patients

Protocol :

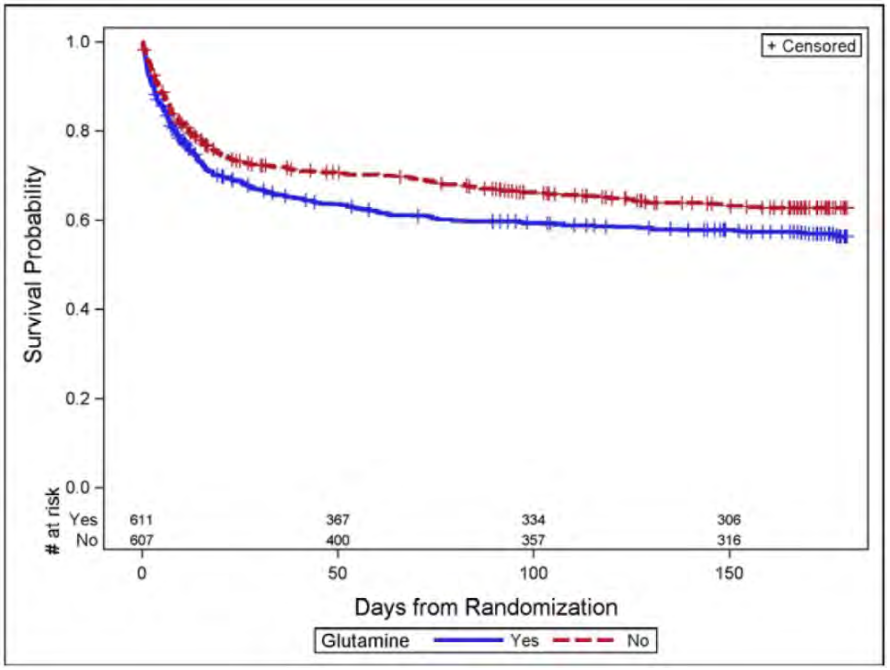
* glutamine supplementation = parenteral and enteral

0.50 g of the dipeptide alanyl-glutamine] /Kg/J and 30 g / J enteral = > 0.5gr/Kg/J

* Antioxidants

-500 µg of selenium IV plus the following vitamins and minerals enterally : 300 µg of selenium, 20 mg of zinc, 10 mg of beta carotene, 500 mg of vitamin E, and 1500 mg of vitamin C.

* **The control group** received placebo intravenously plus placebo enterally



Early provision of glutamine or antioxidants did not improve clinical outcomes, and glutamine was associated with an increase in mortality among critically ill patients with multiorgan failure.

RFE 2014

Il faut probablement associer à la nutrition parentérale exclusive de la glutamine intraveineuse à la posologie d'au moins 0,35 g.kg/j (sous forme de dipeptide à la posologie d'au moins 0,5 g.kg/j), pendant une période minimale de 10 jours (Accord faible)

Epuration extra-rénale : Si une supplémentation en glutamine est indiquée, il faut probablement la majorer (Accord faible).

Canadian Clinical Practice Guidelines 2013

we strongly recommend that high dose combined parenteral and enteral glutamine supplementation NOT be used in critically ill patients with multi-organ failure.

Recommandation 7
Comment gérer les pharmaconutriments, vitamines, traces éléments ?

Original Communication

Safety and Efficacy of Fish Oil–Enriched Parenteral Nutrition Regimen on Postoperative Patients Undergoing Major Abdominal Surgery: A Meta-Analysis of Randomized Controlled Trials

Bo Chen, MM; Yong Zhou, MD; Ping Yang, MM; Hong-wei Wan, MM; and Xiao-ting Wu, MD

Financial disclosure: none declared.

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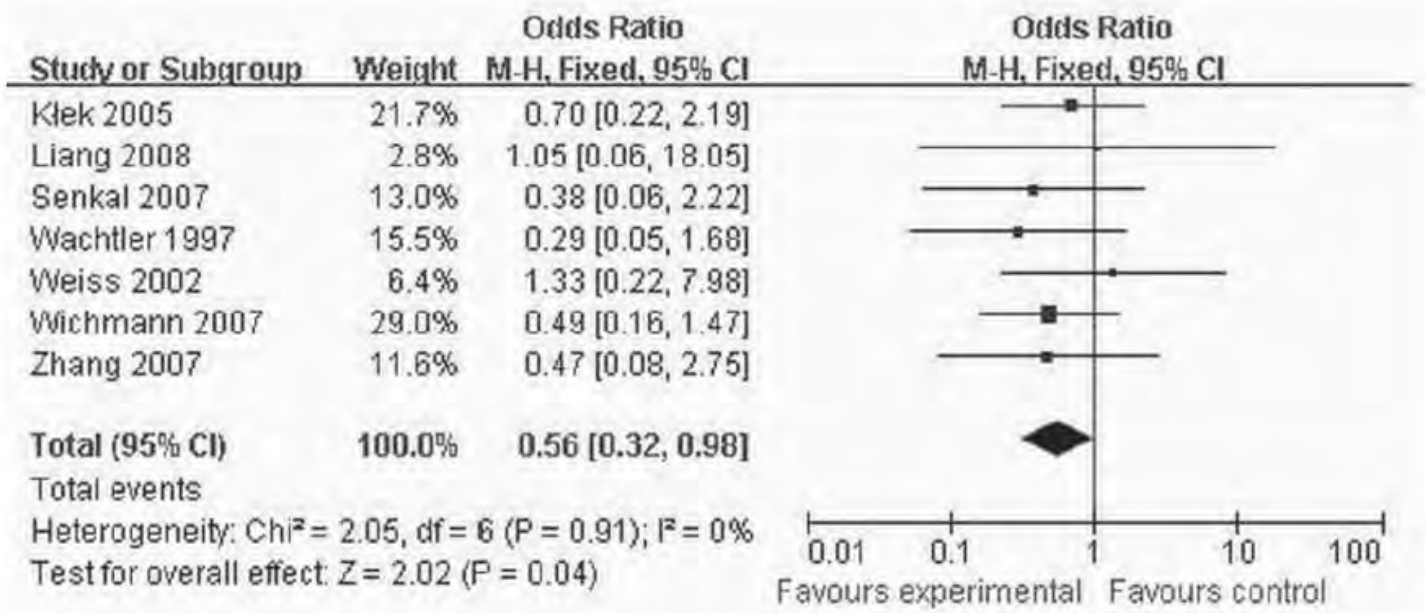


postoperative infection rate

Figure 1. Forest plot for effect of fish oil on the postoperative infection rate in patients with major abdominal surgery. Abbreviation: CI, confidence interval; M-H, Mantel–Haenszel (statistical method).

a fish oil-enriched parenteral nutrition regimen was safe, altered the fatty acid pattern as well as leukotriene synthesis and had a positive treatment effect infection rate (odds ratio = 0.56, P = .04),

n-3 Polyunsaturated Fatty Acids Enriched Lipid Emulsions and Clinical Outcomes in Critically Ill Patients
Littérature récente

Influence of n-3 Polyunsaturated Fatty Acids Enriched Lipid Emulsions on Nosocomial Infections and Clinical Outcomes in Critically Ill Patients: ICU Lipids Study. Grau-Carmona T[1] et al, Crit Care 2014

The results show that administration of n-3 polyunsaturated fatty acids reduces the risk of nosocomial infections and increases the predicted time free of infections in critically ill medical and surgical patients. The administration of n-3 polyunsaturated fatty acids was safe and well tolerated

Is Omega-3 Fatty Acids Enriched Nutrition Support Safe for Critical Ill Patients? A Systematic Review and Meta-Analysis; Wei Chen et al, Crit Care 2014

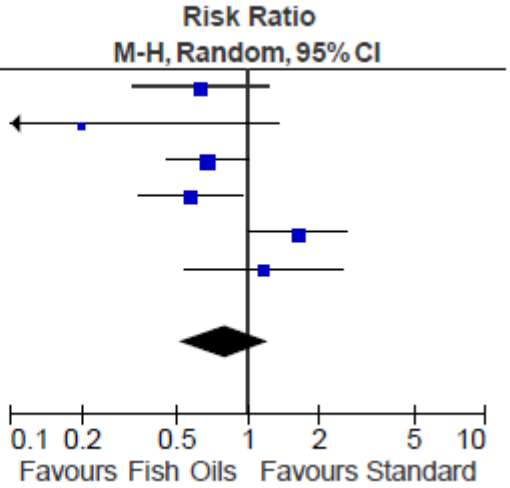
Pooled results indicated that omega-3 FA had no significant effect on mortality

Effect of Fish Oils, Borage Oils and Antioxidants in ARDS (enteral feeding)

No difference, p=0,31

Study or Subgroup	Fish Oils Events	Total	Standard Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Gadek	11	70	19	76	16.8%	0.63 [0.32, 1.23]	1999
Miller	1	8	5	8	4.3%	0.20 [0.03, 1.35]	2005
Pontes-Arruda 2006	26	83	38	82	22.8%	0.68 [0.46, 1.00]	2006
Singer	14	46	26	49	20.2%	0.57 [0.34, 0.96]	2006
Rice	38	143	21	129	21.0%	1.63 [1.01, 2.63]	2011
Grau-Carmona	11	61	11	71	14.9%	1.16 [0.54, 2.49]	2011
Total (95% CI)		**411**		**415**	**100.0%**	**0.80 [0.52, 1.23]**	
Total events	101		120				

Heterogeneity: Tau² = 0.17; Chi² = 14.39, df = 5 (P = 0.01); I² = 65%
Test for overall effect: Z = 1.02 (P = 0.31)



Canadian Clinical Practice Guidelines 2012

The use of an enteral formula with fish oils, borage oils and antioxidants in patients with Acute Lung Injury (ALI) and Acute Respiratory Distress Syndrome (ARDS) should be considered

(= recommanded in 2009)

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• Il faut poursuivre l'administration de EPA and DHA en post–opératoire chez le patient dénutri de chirurgie digestive carcinologique ou avec complication chirurgicale (accord fort)

• Pour le patient septique, l'administration IV de EPA and DHA pourrait être bénéfique (preuves faibles , études hétérogènes, pas de recommendation)

• Pas de preuve démontrée en entérale dans le SDRA à ce jour - pas de recommandation en entérale

Il ne faut pas administrer de solution entérale enrichie en arginine chez le patient en sepsis sévère (Accord fort).

Nutrition artificielle en réanimation

Guidelines for nutrition support in critically ill patient

SFAR-SRLF-SFNEP

- L’assistance métabolique doit être une évidence de prise en charge de tout patient agressé

- L'une des principales difficultés de l'optimisation du support métabolique consiste à distinguer les changements métaboliques bénéfiques de ceux qui sont délétères pour l'organisme

- Le support protéino-énergétique et ces modalités sont des éléments clés dans la prise en charge nutritionnelle et le pronostic des patients

Effect of Parenteral Selenium Supplementation in Critically Ill Patients: A Systematic Review and Meta-Analysis
Ting-Shuo Huang et al, PLoS One. 2013; 8(1): e54431

Mortalité

Study or Subgroup	Selenium Events	Selenium Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Zimmermann et al [30]	3	20	8	20	2.2%	0.38 [0.12, 1.21]	1997
Angstwurm et al [31]	7	21	11	21	5.7%	0.64 [0.31, 1.32]	1999
Forceville et al [35]	14	31	13	29	9.7%	1.01 [0.58, 1.76]	2007
Angstwurm et al [34]	46	122	61	124	36.1%	0.77 [0.57, 1.02]	2007
Mishra et al [36]	8	18	11	22	6.9%	0.89 [0.46, 1.73]	2007
Montoya et al [38]	6	34	8	34	3.4%	0.75 [0.29, 1.93]	2009
Manzanares et al [18]	3	16	6	19	2.1%	0.59 [0.18, 2.00]	2011
Valenta et al [17]	19	93	24	89	10.9%	0.76 [0.45, 1.28]	2011
Andrews et al [19]	42	127	38	125	23.1%	1.09 [0.76, 1.56]	2011
Total (95% CI)		**482**		**483**	**100.0%**	**0.83 [0.70, 0.99]**	
Total events	148		180				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 5.65$, df = 8 (P = 0.69); $I^2 = 0\%$
Test for overall effect: Z = 2.05 (P = 0.04)

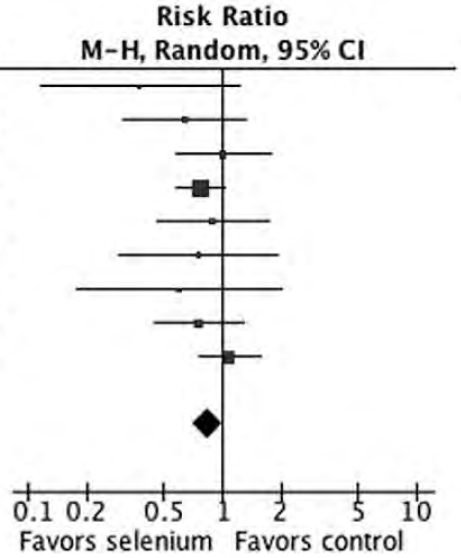

Figure 2. Forest plot comparing mortality among selenium-treated patients to that of controls among critically ill patients with systemic inflammatory response syndrome (SIRS) or sepsis.

Parenteral selenium supplementation reduces risk of mortality among critically ill patients with sepsis.
Owing to the varied methodological quality of the studies, future high-quality randomized trials are needed to confirm these results.