
# Apports protéiques

## Réanimation SRLF 2024

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

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Professeur Jean-Charles Preiser
HUB Hôpital Erasme Bruxelles

# Liens d'intérêt

- Baxter
- DIM 3
- Fresenius
- Nestlé
- Nutricia - Danone

# Agenda

- Constats cliniques
- Physiologie
- Apports protéiques
  - **Précoces : oui/non**
  - **Tardifs : revalidation nutritionnelle**
- Recommandations de pratique clinique
- Futur?

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Fazzini *et al. Critical Care* (2023) 27:2
https://doi.org/10.1186/s13054-022-04253-0



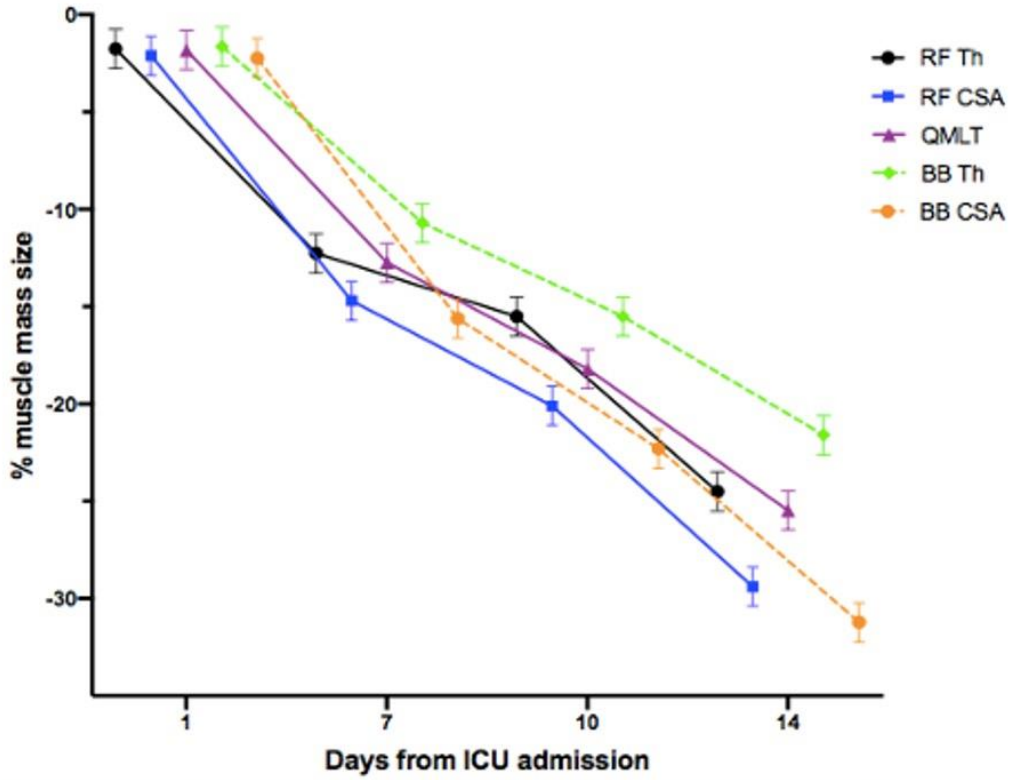


REVIEW Open Access

# The rate and assessment of muscle wasting during critical illness: a systematic review and meta-analysis

Brigitta Fazzini[1*], Tobias Märkl[2], Christos Costas[3], Manfred Blobner[4,5,6], Stefan J. Schaller[4,5], John Prowle[1,3], Zudin Puthucheary[1,3†] and Henning Wackerhage[2*†]






| | | | | |
|---|---|---|---|---|
| % RF th | -1.75 | -12.25 | -15.5 | -24.5 |
| % RF CSA | -2.10 | -14.7 | -20.1 | -29.4 |
| % QMLT | -1.82 | -12.74 | -18.2 | -25.48 |
| % BB Th | -1.64 | -10.7 | -15.5 | -21.6 |
| % BB CSA | -2.23 | -15.61 | -22.30 | -31.22 |

**Loss of muscle in the ICU : 2%/day**

Covid-19

# Evolution of the nutritional status of COVID-19 critically-ill patients: A prospective observational study from ICU admission to three months after ICU discharge

C. Rives-Lange [a, b, c, *], A. Zimmer [a], A. Merazka [a], C. Carette [a, b, d], A. Martins-Bexinga [b, c], C. Hauw-Berlemont [e], E. Guerot [e], A.S. Jannot [b, f], J.L. Diehl [b, e, g], S. Czernichow [a, b, c], B. Hermann [b, e, h]

Clin Nutr 2021;

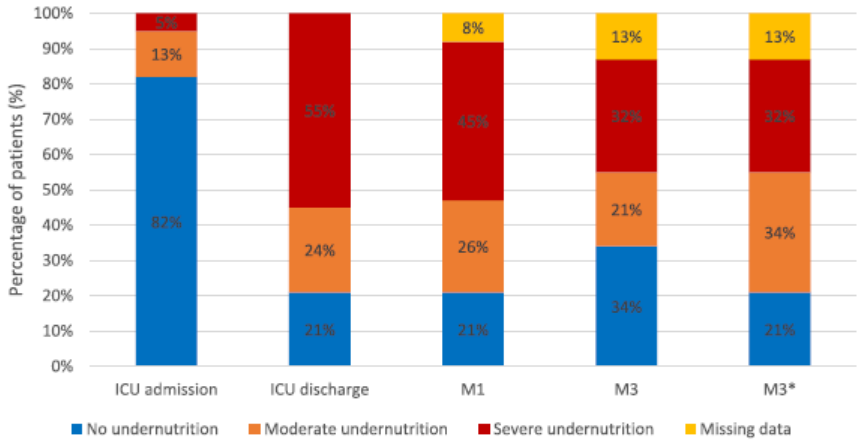



**Fig. 3.** Nutritional status of patients from ICU admission to 3 months post-ICU discharge. Nutritional status was at ICU admission, ICU discharge, one month (M1) and three months (M3) following ICU discharge was determined by body mass index and ($kg/m^2$) and weight loss (%) criteria. At M3, nutritional status was additionally determined by body composition and muscle function criteria for patients with on-site visit (M3*).Abbreviations: ICU: Intensive Care Unit.

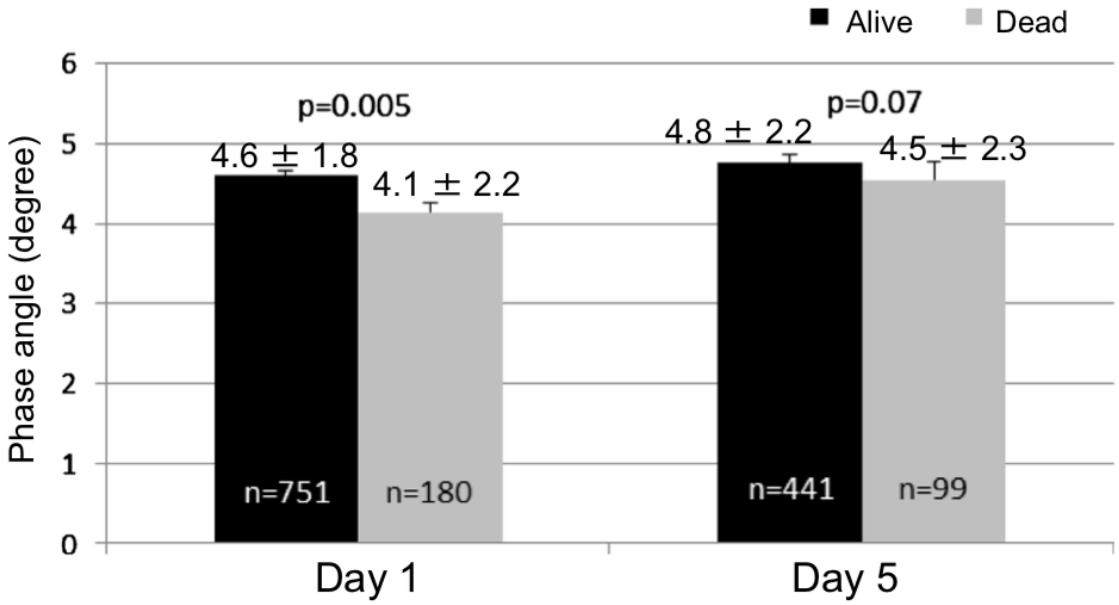
# BIA in ICU patients – Phase angle and mortality

931 Patients

**Table 2 Logistic regression multivariable analysis of factors associated with 28-day mortality ($n = 895$)**

| Variables | aOR[a] | 95 % CI | *P* value |
|---|---|---|---|
| Age | 1.014 | 1.0016–1.0271 | 0.03 |
| Day 1 phase angle | 0.86 | 0.78–0.96 | 0.008 |
| APACHE II | 1.08 | 1.06–1.11 | <0.001 |
| Admission diagnosis: surgery vs. medicine | 0.51 | 0.33–0.79 | 0.002 |
| Other diagnosis | 0.39 | 0.21–0.72 | 0.003 |

[a] For continuous variables (age, day 1 phase angle and APACHE II), the adjusted odds ratio (aOR) is expressed for a 1-point increase




Thibault 2016 ICM: International Phase Angle Project

# The role of nutrition rehabilitation in the recovery of survivors of critical illness: underrecognized and underappreciated

Lesley L. Moisey[1*], Judith L. Merriweather[2] and John W. Drover[3]

Moisey *et al. Critical Care* (2022) 26:270

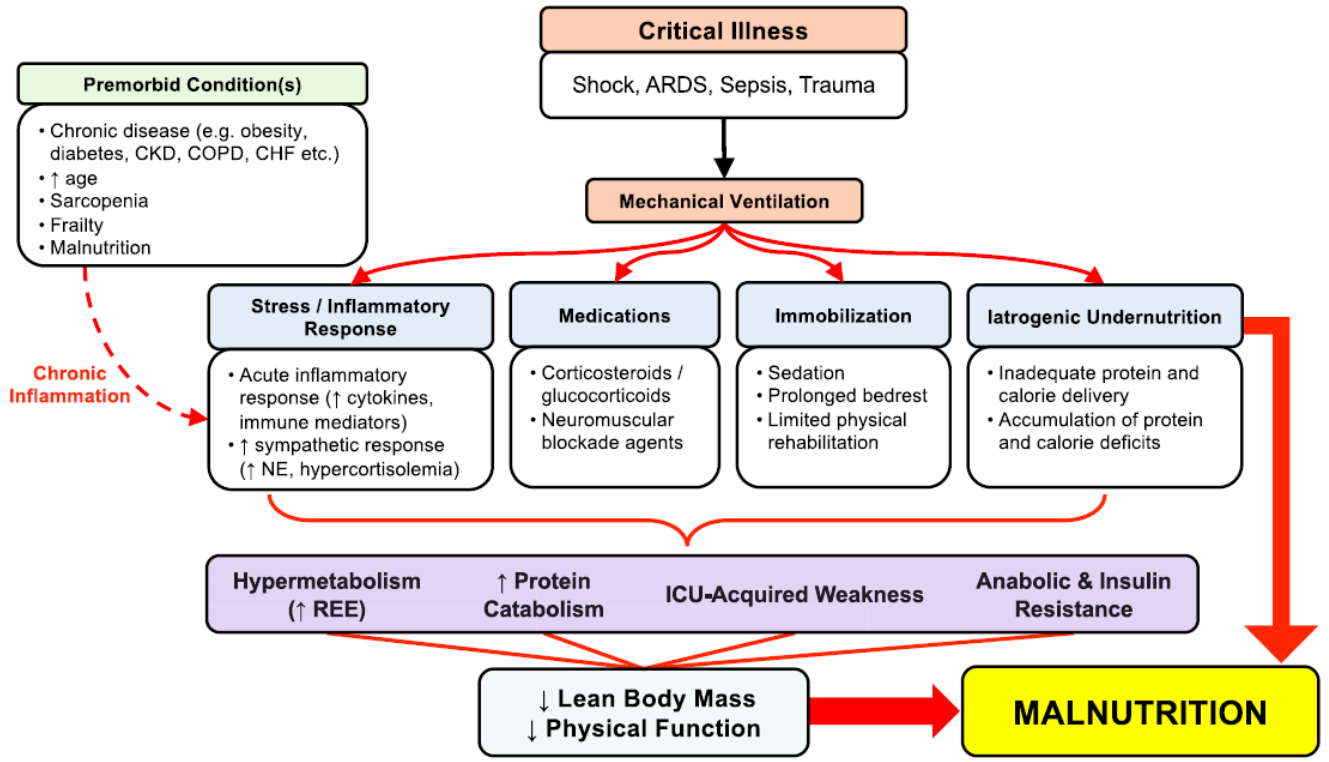



**Fig. 2** Factors influencing the development of disease-related malnutrition following the onset of critical illness. ARDS: acute respiratory distress syndrome; CHF: congestive heart failure; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; ICU: intensive care unit; and NE: norepinephrine

# Metabolic aspects of muscle wasting during critical illness

**van Gassel RJJ**

**Curr Opin Clin Nutr Metab Care 2020 Mar;23(2):96-101**

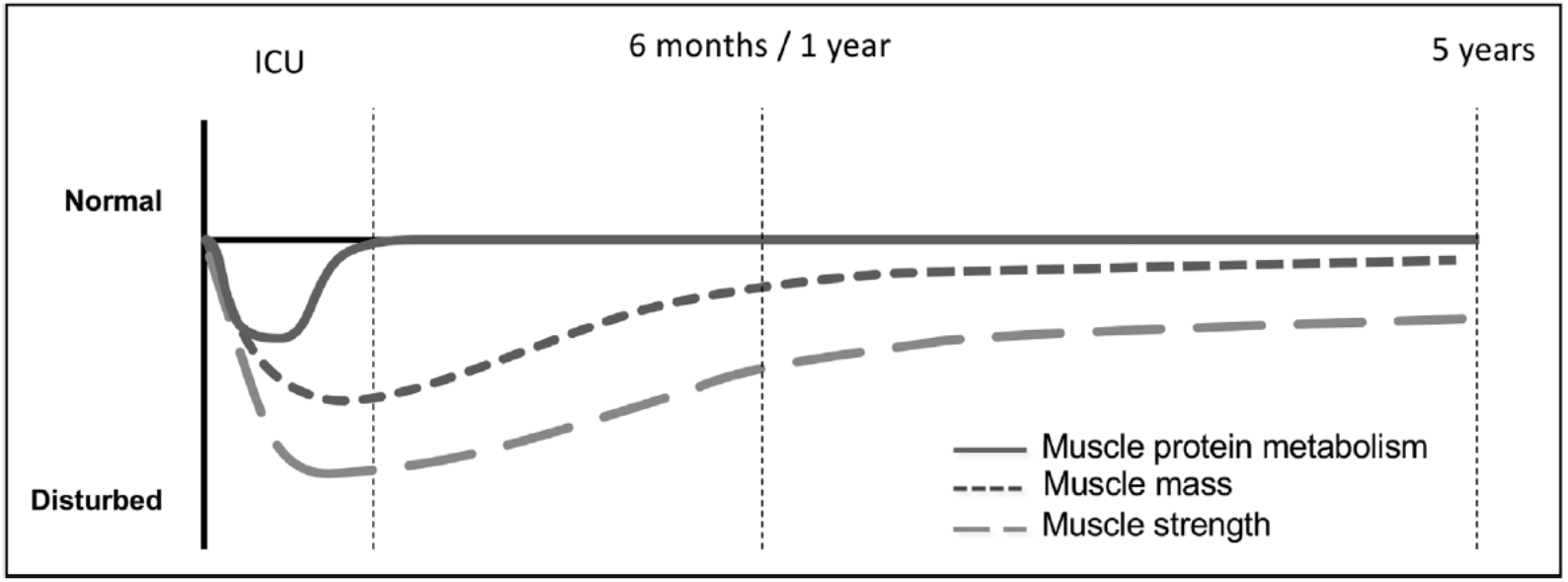



**FIGURE 1.** Protein metabolism in critical illness and impact on muscle mass and function. Changes over time in muscle protein metabolism, mass and function, distinguishes a short catabolic phase during ICU stay with subsequent persistent impact on muscle mass and function. Put together, this timeline further emphasizes the long-lasting impact of the relative short period of disturbed protein metabolism.

# The role of nutrition rehabilitation in the recovery of survivors of critical illness: underrecognized and underappreciated

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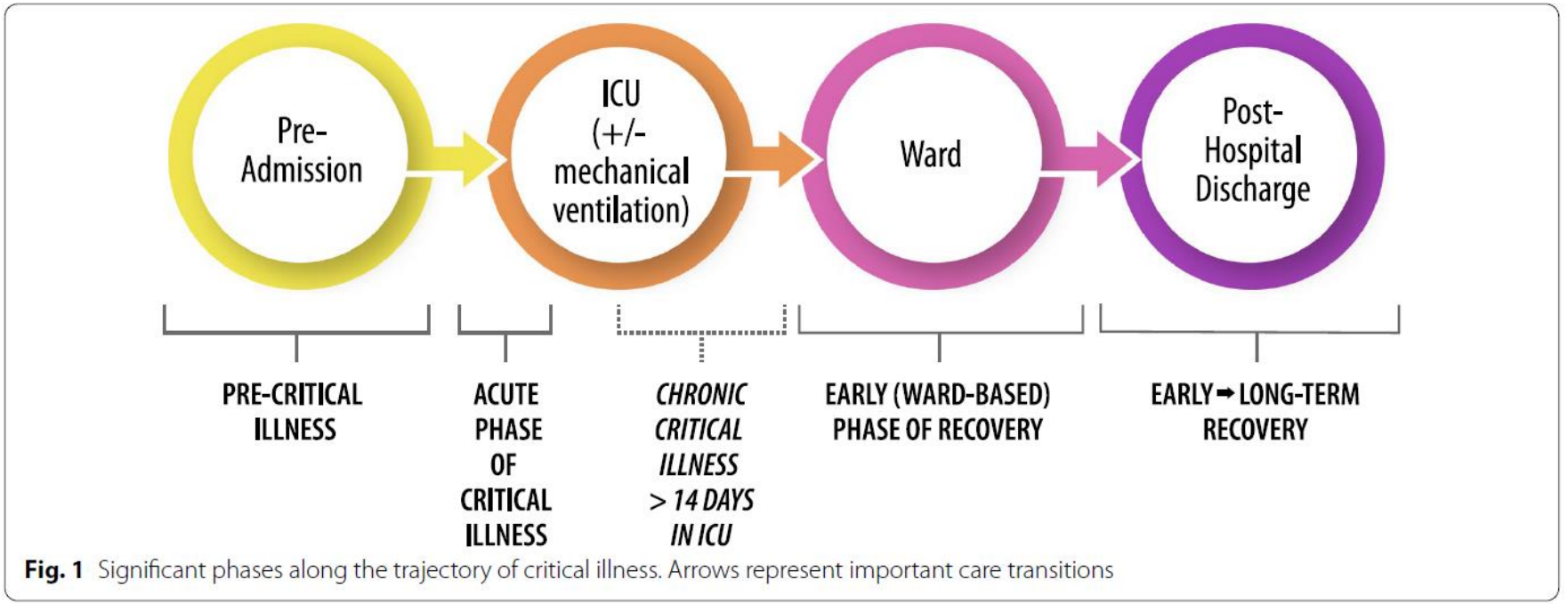
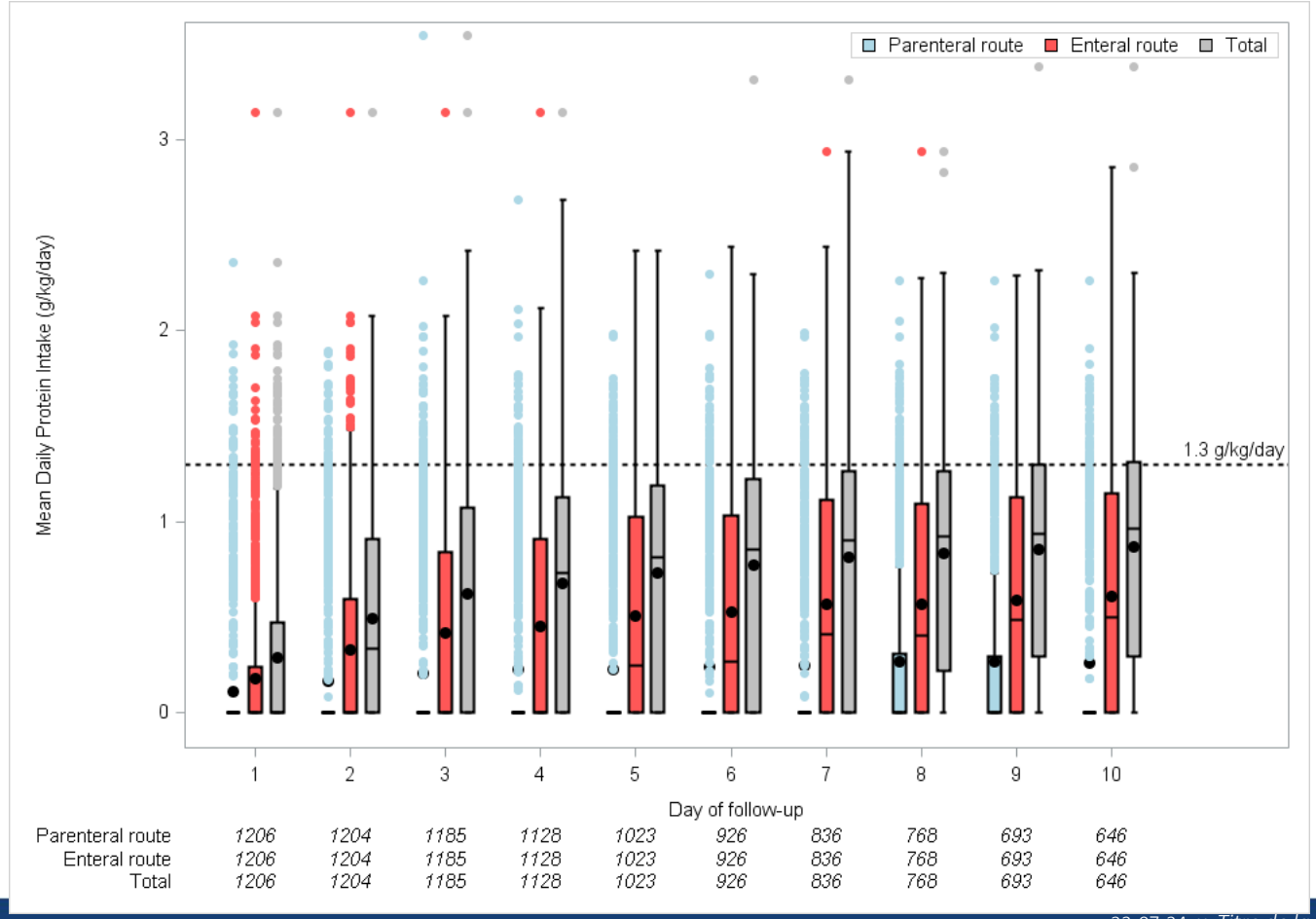



**Fig. 1** Significant phases along the trajectory of critical illness. Arrows represent important care transitions

# Enquête binationale de pratique nutritionnelle lors d'un séjour prolongé en soins intensifs : l'étude FRANS (FRench-speAking intensive care unit Nutritional Survey).

## Apports protéiques



# Per os – première semaine suivant l'admission

*Original Communication*

**Nutrition During Critical Care: An Audit on Actual Energy and Protein Intakes**

Journal of Parenteral and Enteral Nutrition
Volume 0 Number 0
xxxx 2020 1–10
© 2020 American Society for Parenteral and Enteral Nutrition
DOI: 10.1002/jpen.1962
wileyonlinelibrary.com
WILEY

Loïc Rougier, MD[1]; Jean-Charles Preiser, PhD[2]; Marjorie Fadeur, RD[3]; Anne-Marie Verbrugge, RD[3]; Nicolas Paquot, PhD[3,4]; Didier Ledoux, PhD[3,5]; Benoit Misset, MD[5]; and Anne-Françoise Rousseau, PhD[3,5]

- Mixed ICU (LOS ≥ 3 j) N = 289 patients

Apports oraux étaient plus faibles comparés aux autres supports nutritionnels et déficit plus important pour les protéines

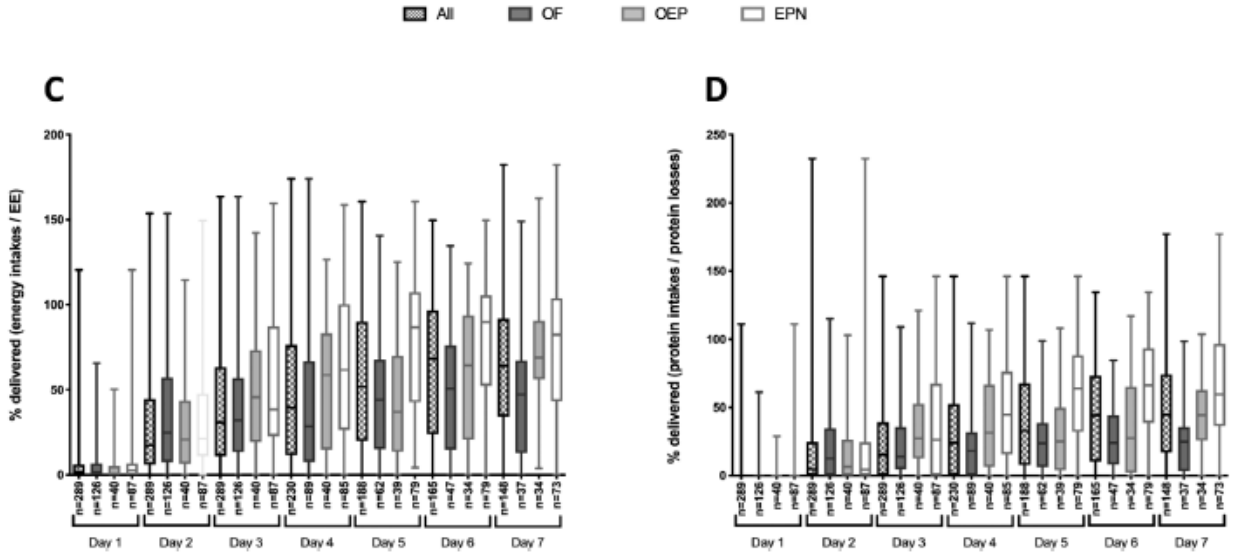



**Figure 2.** Daily energy (A) or protein (B) intakes and daily percentage of delivered energy (C) or protein (D) during the first 7 days, in the whole cohort and in the 3 groups. EPN, enteral/parenteral nutrition; OEP, oral + enteral/parenteral; OF, orally fed.

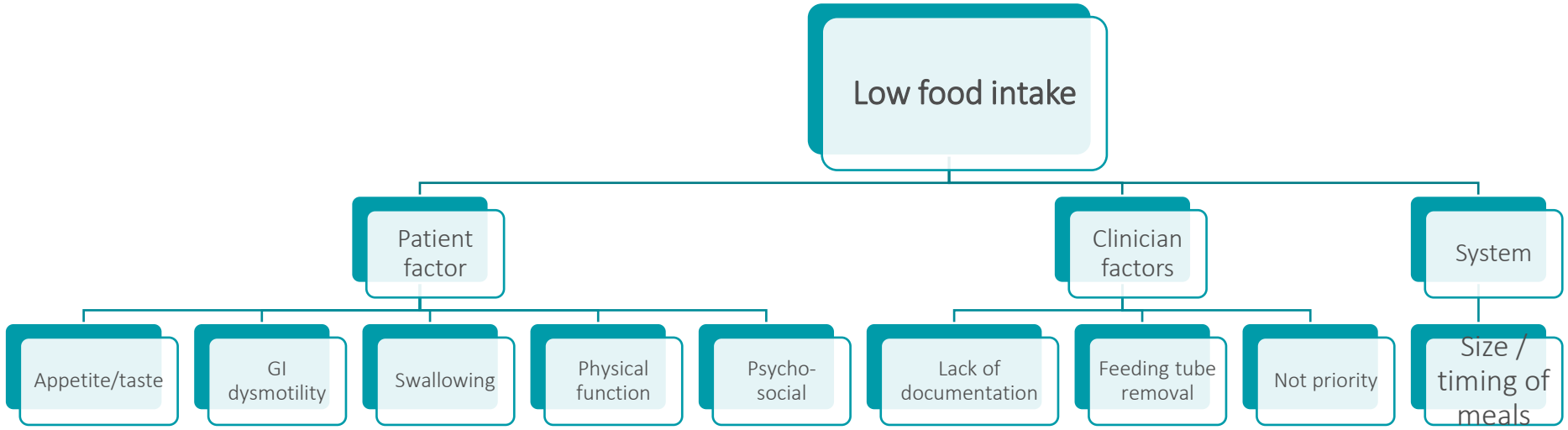
## Apports en Kcalorie/protéines moyens /jour

| | Kcal/kg/j | g/kg/j |
|---|---|---|
| **Per os seul** | **9,7** | **0,35** |
| **Per os+ NE/PN** | 15,1 | 0,57 |
| **NE et/ou PN seul** | 17,60 | 0,81 |

# Nutrition intake in the post-ICU hospitalization period

*Emma J. Ridley*[a,b], *Lee-anne S. Chapple*[c,d], *and Marianne J. Chapman*[c,d]

**Curr Opin Clin Nutr Metab Care** 2020, 23:111–115



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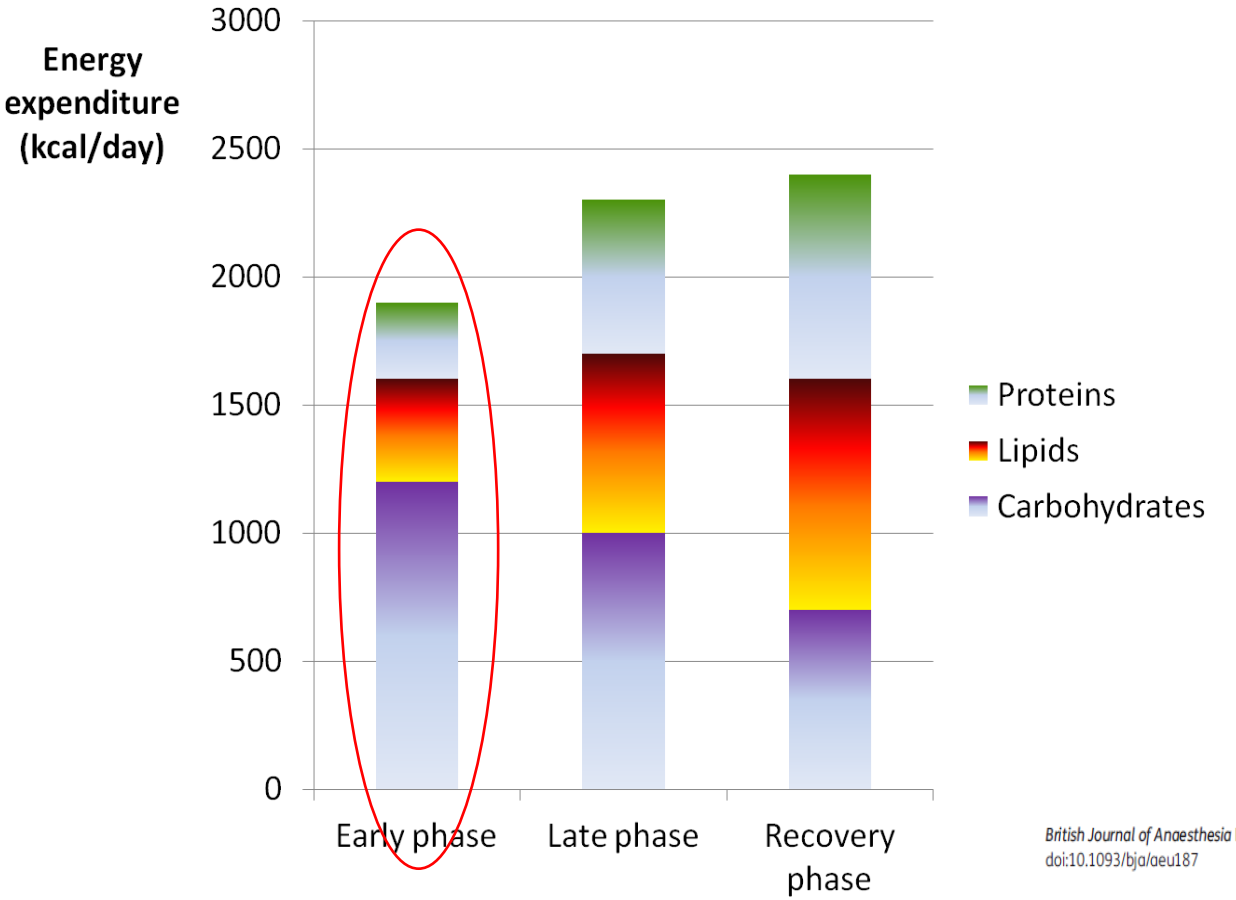
# The 3 post-injury phases




British Journal of Anaesthesia Page 1 of 10
doi:10.1093/bja/aeu187

BJA

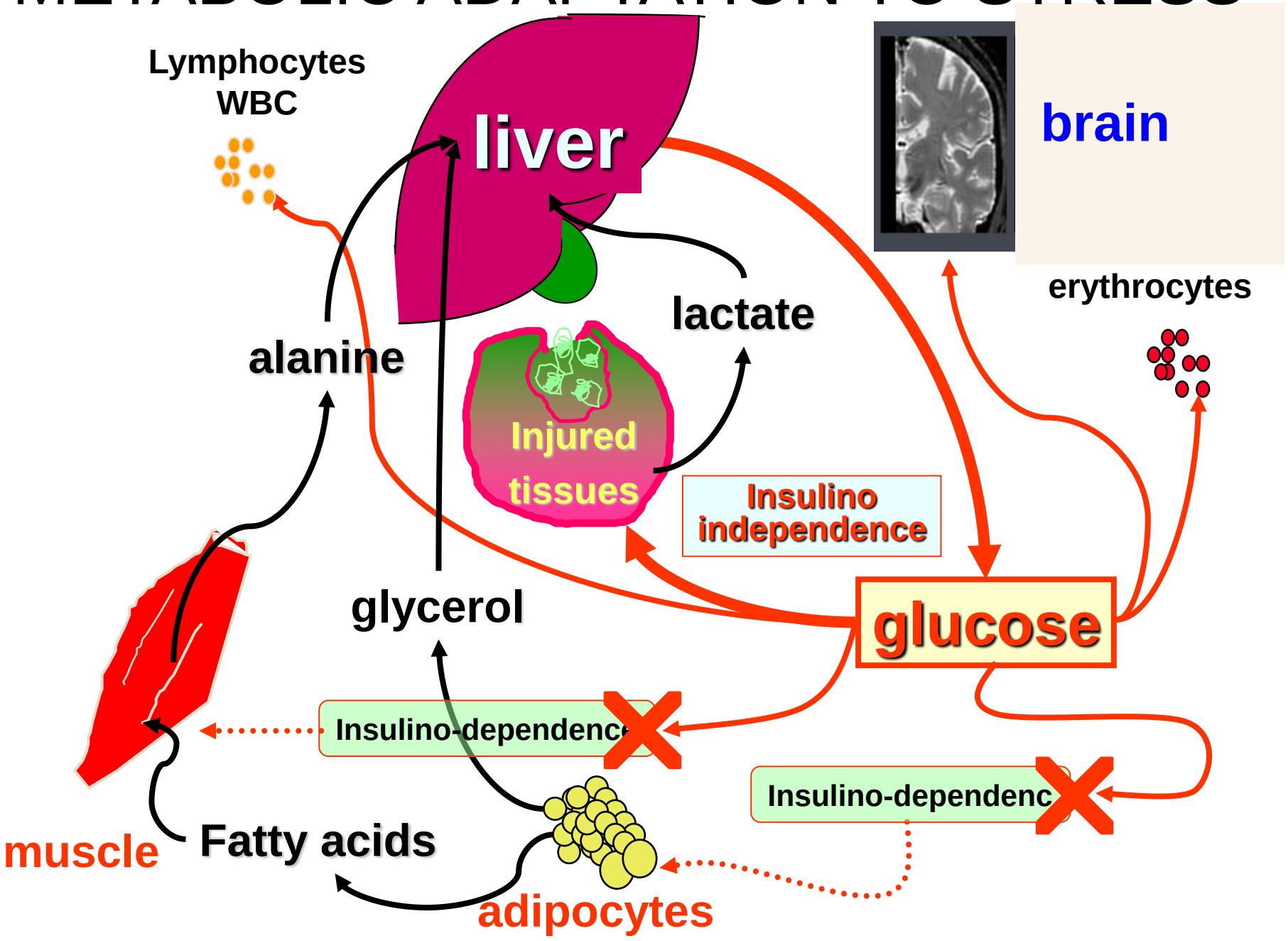
**Metabolic response to the stress of critical illness**

*Preiser, Ichai, Orban, Groeneveld*

## Phase aïgue / précoce
## Quelques heures à 3-7 jours..

- Anorexie
- Dépense énergétique limitée
- Utilisation préférentielle du glucose comme substrat énergétique

# METABOLIC ADAPTATION TO STRESS



| Institution | Localisation du patient | | | | | |
|---|---|---|---|---|---|---|
| Hôpital A | USI | | | USI | Salle | |
| Hôpital B | USI | Middle care | Salle | Salle | Revali/Domicile | |


# Critical Care Is a Concept, Not a Location*

**KEYWORDS:** COVID-19; high-flow nasal oxygen; hypoxemia; resource utilization; respiratory failure

**Vikramjit Mukherjee, MD[1]**
**Ryan C. Maves, MD[2]**

www.ccmjournal.org

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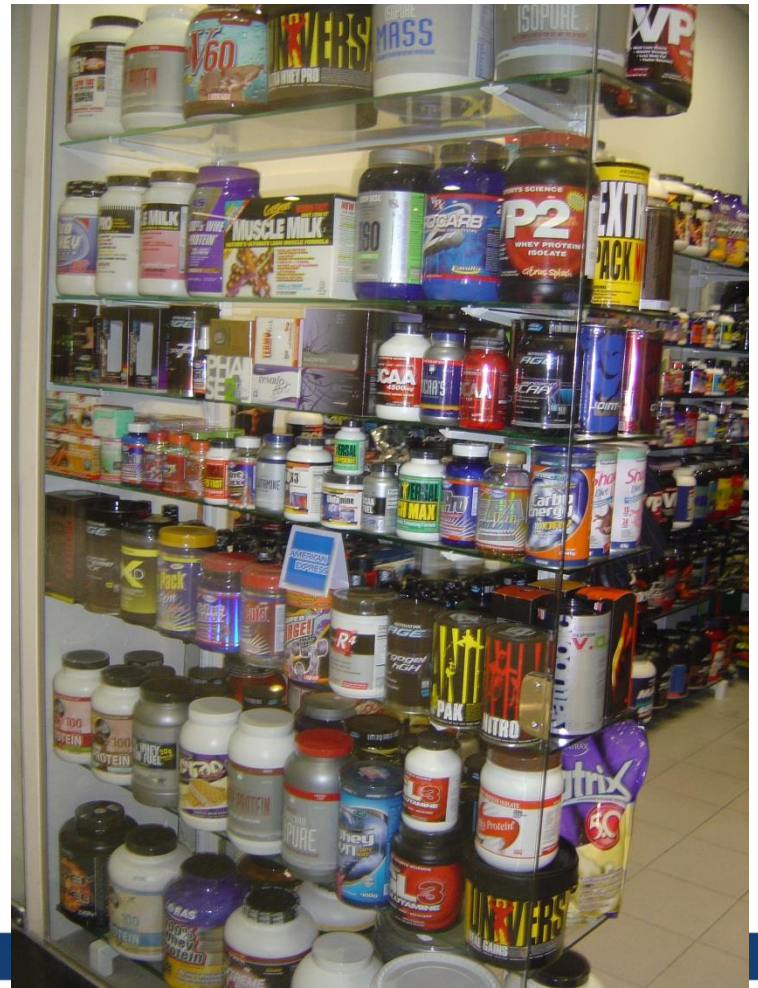
# Combien de protéines ?




# ‘High protein intake during the early phase of critical illness: yes or no?’

**JC Preiser, Crit Care 2018 .**

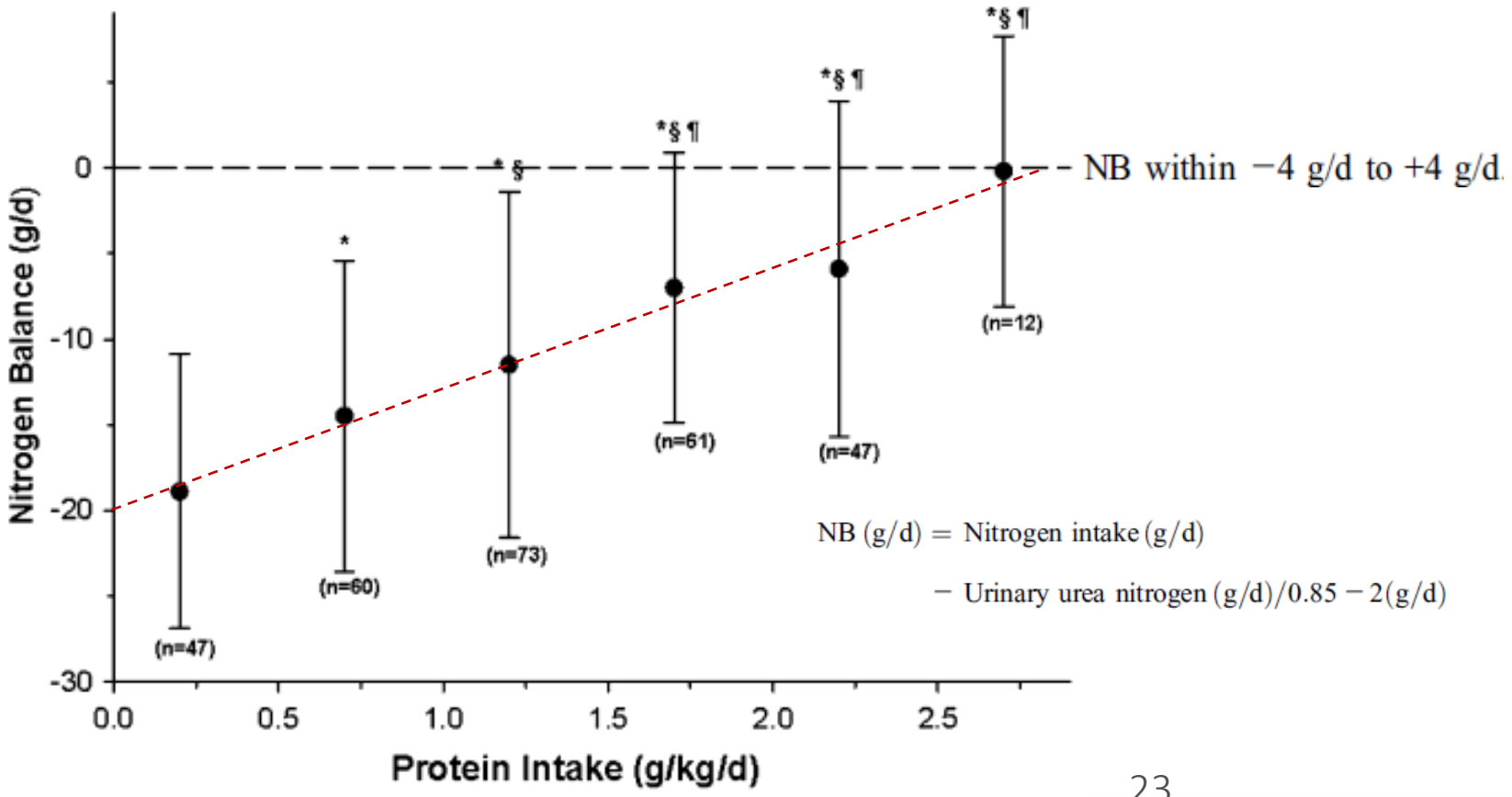
**PRO**

- Increase muscle protein synthesis
- Easily absorbed
- IV infusion safe

**CON**

- Increases ureagenesis and oxidation of AA
- No effect on muscle protein breakdown
- Fuel auto-cannibalism
- Glucagon release

# A reappraisal of nitrogen requirements for patients with critical illness and trauma




Dickerson et al. 2012

# The effect of higher versus lower protein delivery in critically ill patients: a systematic review and meta-analysis of randomized controlled trials

Lee *et al. Crit Care* (2021) 25:260
https://doi.org/10.1186/s13054-021-03693-4

Zheng-Yii Lee[1], Cindy Sing Ling Yap[1], M. Shahnaz Hasan[1], Julia Patrick Engkasan[2], Mohd Yusof Barakatun-Nisak[3,6], Andrew G. Day[4], Jayshil J. Patel[5] and Daren K. Heyland[4*]

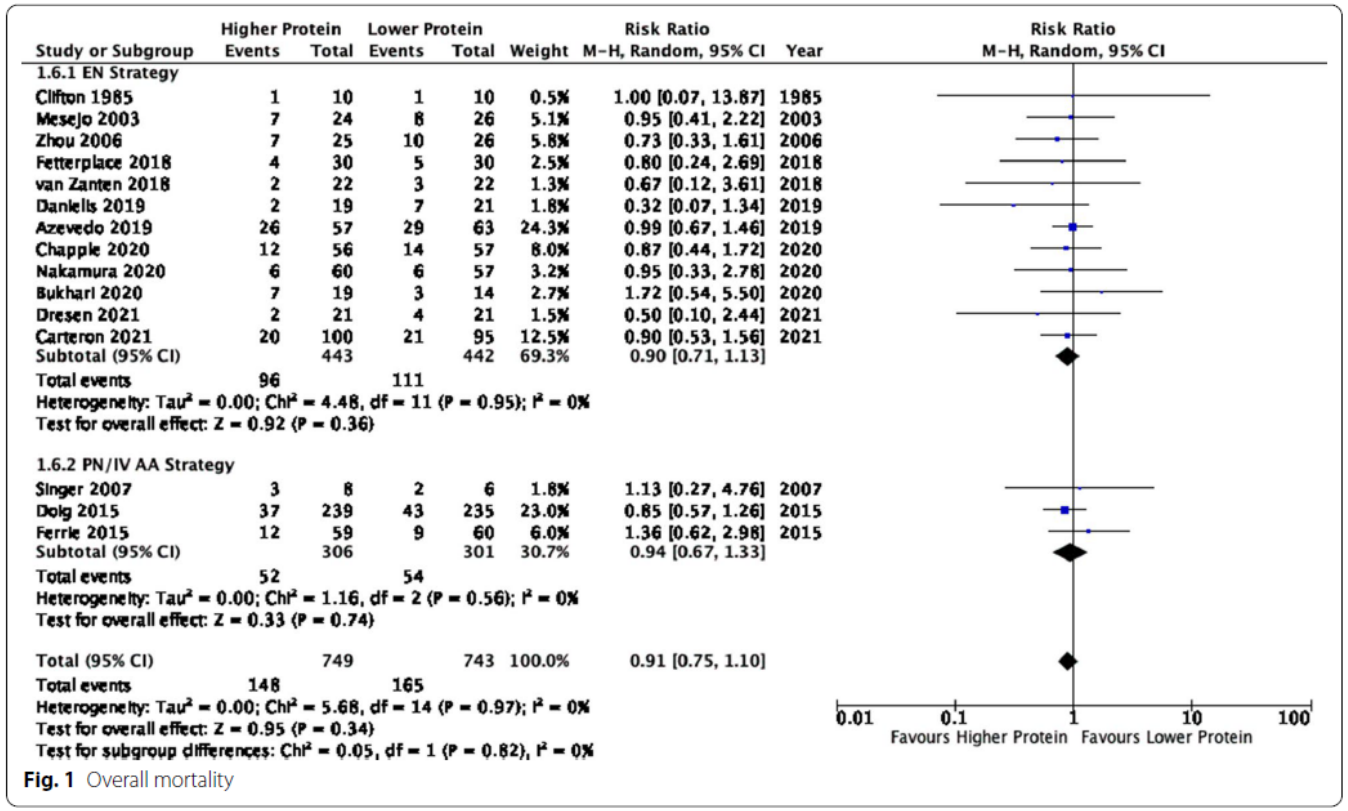


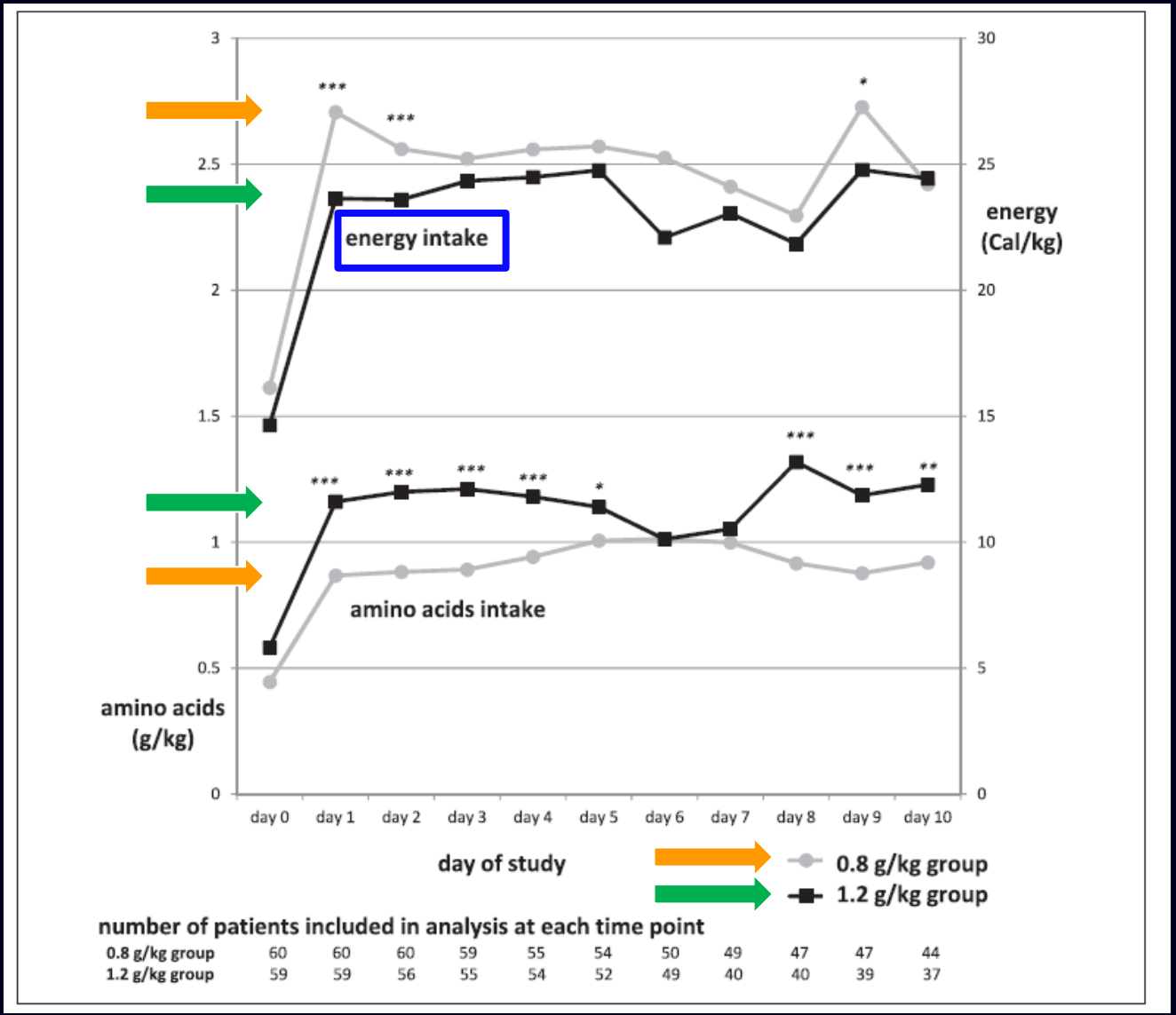

**Fig. 1** Overall mortality

# RCT in 119 critically ill patients Requiring PN (ICU day 1 – 2, mechanically ventilated, Apache 24,…)

**Amino Acid Rich PN (1,2 g/kg) (energy poor)**

**Versus**

**Amino Acid Poor PN (0,8 g/kg)**





*M.P.C., K.U.Leuven*

# RCT in 119 critically ill patients Requiring PN (ICU day 1 – 2, mechanically ventilated, Apache 24,…)

**Table 4.** Intention-to-Treat Analysis Comparing Outcomes (0.8 g/kg vs 1.2 g/kg Amino Acids).

| Outcome Measures | 0.8 g/kg Amino Acids (n = 60) | 1.2 g/kg Amino Acids (n = 59) | *P* Value Between Groups |
|---|---|---|---|
| Handgrip strength on discharge from ICU, mean (SD), kg | 15.8 (10.3) | 18.5 (10.4) | .054 |
| % Expected value | 45 | 51 | |
| Handgrip strength at study day 7, mean (SD), kg | 18.5 (11.8) | 22.1 (10.1) | .025* |
| % Expected value | 52 | 62 | |
| Nitrogen balance at study day 3, mean (SD), g/d | −5.6 (1.8) | −0.5 (3.1) | <.0001*** |
| Nitrogen balance at study day 7, mean (SD), g/d | −4.7 (2.4) | −4.9 (7.9) | .92 |
| ICU length of stay, median (Q1–Q3), d | 6.0 (3.8–10.0) | 5.0 (3.0–8.0) | .16 |
| Hospital length of stay, median (Q1–Q3), d | 27.5 (18.8–55.8) | 25.0 (16.8–41.3) | .41 |
| Dialysis days, median (Q1–Q3) | 6.0 (5.3–7.0) | 7.0 (2.0–8.8) | .87 |
| Ventilator days, median (Q1–Q3) | 2.0 (1.0–5.0) | 2.0 (1.0–3.0) | .22 |
| ICU mortality, No. (%) | 6 (10) | 8 (14) | .55 |
| Hospital mortality, No. (%) | 9 (15) | 12 (20) | .47 |
| 6-month mortality, No. (%) | 9 (15) | 15 (25) | .17 |

ICU, intensive care unit; Q1, quartile 1; Q3, quartile 3; SD, standard deviation.
*$P < .05$. **$P < .01$. ***$P < .001$.



Ferrie S. et al.
JPEN 2016

*M.P.C., K.U.Leuven*

# Early goal-directed nutrition versus standard of care in adult intensive care patients: the single-centre, randomised, outcome assessor-blinded EAT-ICU trial

Matilde Jo Allingstrup[1], Jens Kondrup[2], Jørgen Wiis[1], Casper Claudius[1], Ulf Gøttrup Pedersen[1], Rikke Hein-Rasmussen[1], Mads Rye Bjerregaard[1], Morten Steensen[1], Tom Hartvig Jensen[1], Theis Lange[3,4], Martin Bruun Madsen[1], Morten Hylander Møller[1] and Anders Perner[1*]

*Intensive Care Med (2017) 43:1637–1647*

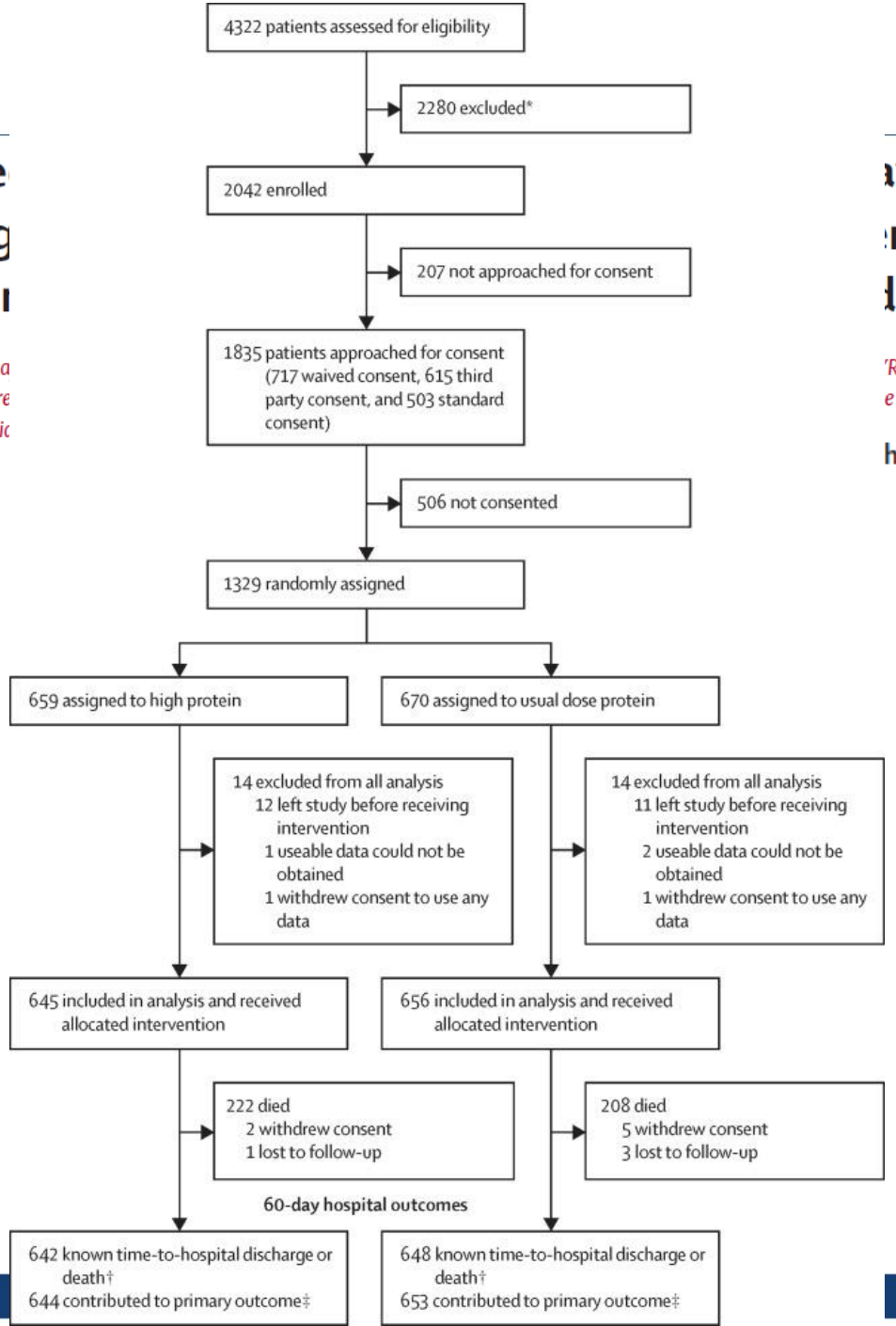
Table 2. Nutrition characteristics in ICU after randomisation [a]

| Variable | Early Goal-directed Nutrition (N=100) | Standard of Care (N=99) |
|---|---|---|
| Measured [b] energy requirement, kcal/day | 2069 (1816 - 2380) | 1887 (1674 - 2244) |
| Calculated [c] energy requirement, kcal/day | 1950 (1750 - 2125) | 1875 (1650 - 2100) |
| Energy intake, kcal/day | 1877 (1567 - 2254) | 1061 (745 - 1470) |
| Energy balance [d], kcal/day | -66 (-157 - -6) | -787 (-1223 - -333) |
| Measured [e] protein requirement, g/kg/day | 1.63 (1.36 - 2.05) | 1.16 ( 0.89 - 1.62) |
| Protein intake, g/kg/day | 1.47 (1.13 - 1.69) | 0.50 (0.29 - 0.69) |
| Protein balance [d], g/kg/day | -0.28 (-0.76 - 0.11) | -0.69 (-1.02 - -0.38) |
| P-urea, mmol/l | 13.5 (8.7 – 21.9) | 9.0 (5.6 – 14.4) |
| 24-hour urinary urea, mmol/day | 516 (368 – 760) | 320 (175 – 482) |

# The effe … with hig … multicer … atients … rnational, … l trial

Daren K Heyland, Ja … Courtney Wedemire … EFFORT Protein Tric … 'Reilly, Racquel Regala, … e

… hed online January 25, 2023



# The effect of higher protein dosing in critically ill patients with high nutritional risk (EFFORT Protein): an international, multicentre, pragmatic, registry-based randomised trial

*Daren K Heyland, Jayshil Patel, Charlene Compher, Todd W Rice, Danielle E Bear, Zheng-Yii Lee, Victoria C González, Kevin O'Reilly, Racquel Regala, Courtney Wedemire, Miguel Ibarra-Estrada, Christian Stoppe, Luis Ortiz-Reyes, Xuran Jiang, Andrew G Day, on behalf of the EFFORT Protein Trial team*

www.thelancet.com **Published online January 25, 2023**

| | High protein (n=645) | Usual dose protein (n=656) |
|---|---|---|
| Age, years | 57 (17 [18–95]) | 57 (17 [18–93]) |
| Sex | | |
| Male | 395 (61%) | 388 (59%) |
| Female | 250 (39%) | 267 (41%) |
| Admission category | | |
| Medical | 548 (85%) | 540 (82%) |
| Surgical elective | 24 (4%) | 19 (3%) |
| Surgical emergency | 73 (11%) | 97 (15%) |

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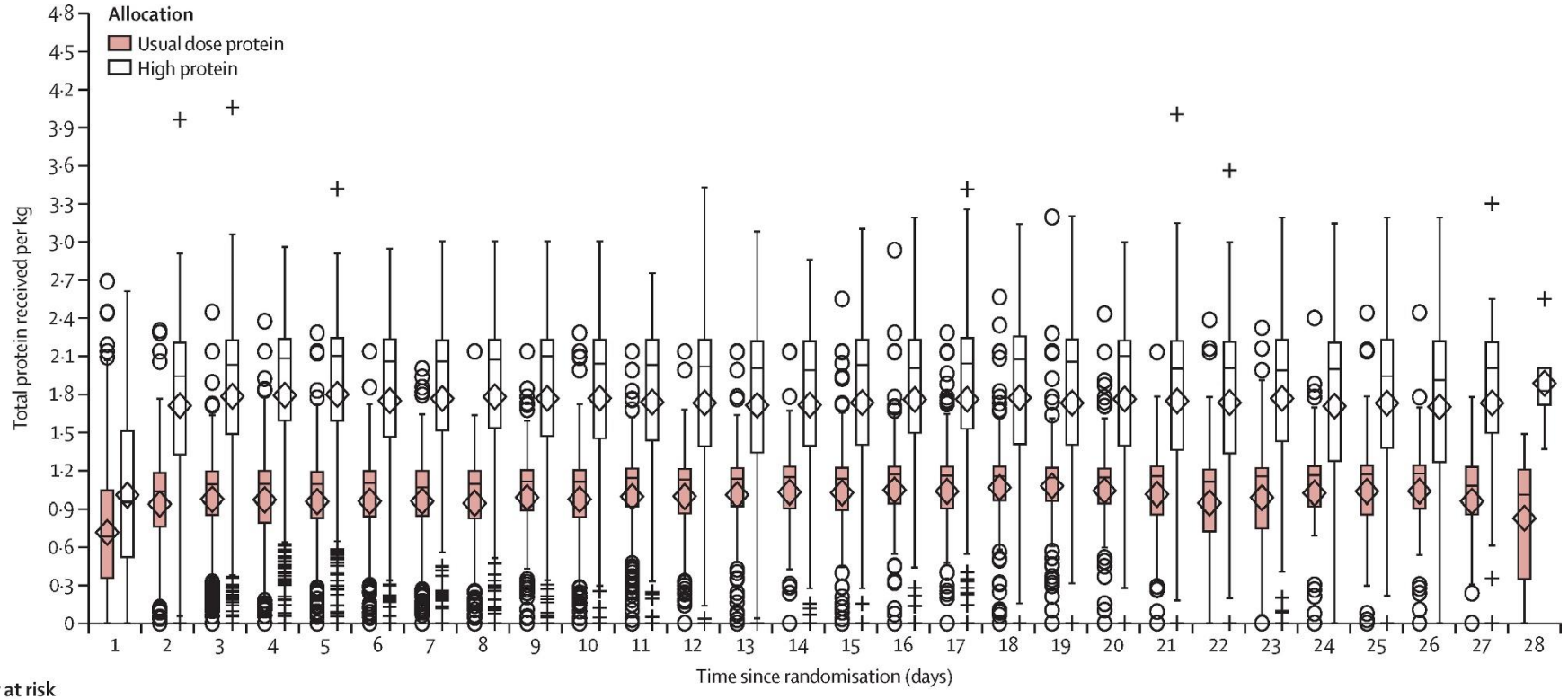


| Number at risk | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Usual dose protein | 651 | 635 | 590 | 552 | 505 | 463 | 421 | 377 | 347 | 314 | 285 | 261 | 242 | 223 | 207 | 196 | 185 | 175 | 163 | 158 | 148 | 136 | 122 | 112 | 95 | 72 | 33 | 8 |
| High protein | 642 | 627 | 603 | 565 | 519 | 475 | 428 | 393 | 363 | 328 | 303 | 273 | 255 | 239 | 219 | 197 | 185 | 168 | 155 | 147 | 136 | 123 | 112 | 105 | 88 | 65 | 37 | 7 |

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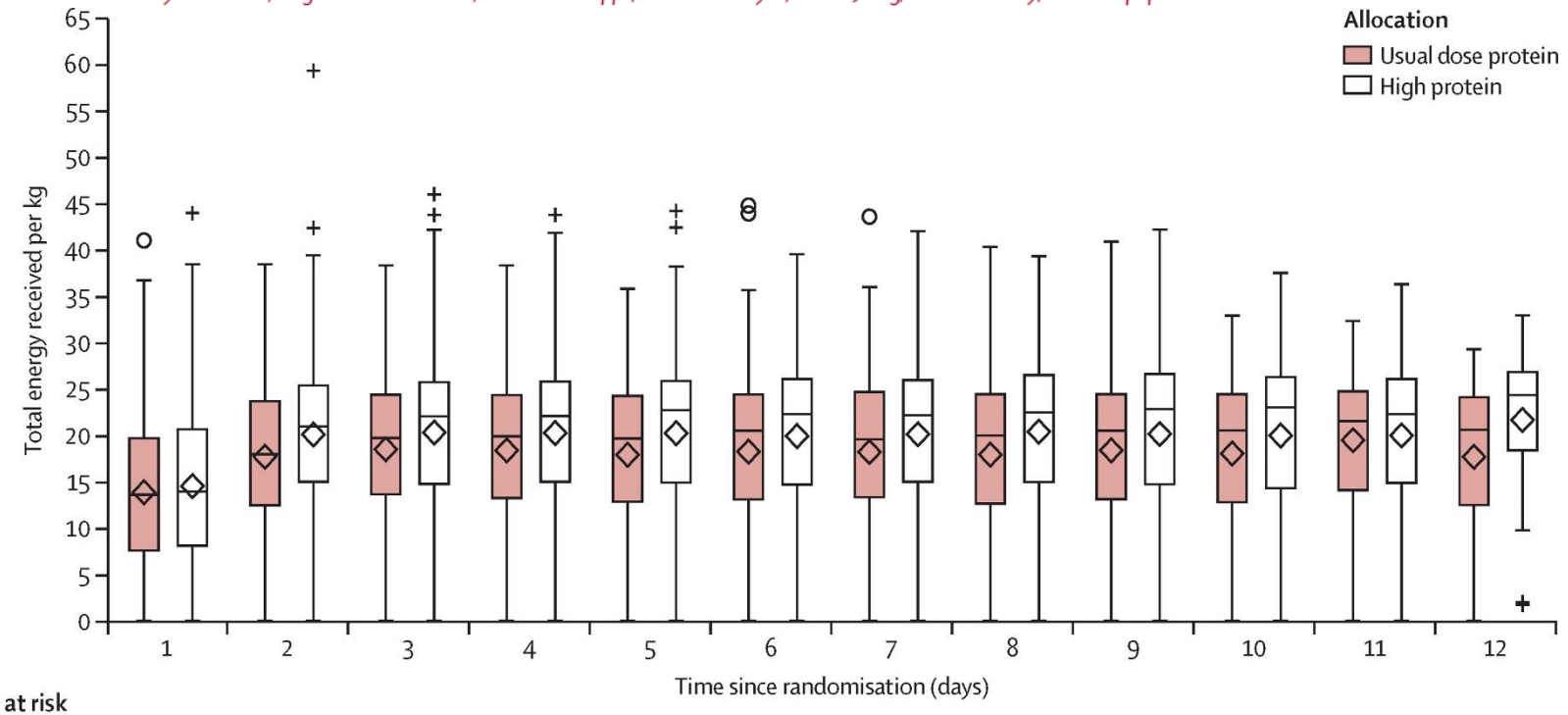


| Number at risk | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Usual dose protein | 647 | 631 | 585 | 547 | 501 | 454 | 409 | 360 | 302 | 218 | 106 | 30 |
| High protein | 641 | 624 | 600 | 562 | 516 | 468 | 419 | 377 | 326 | 245 | 136 | 28 |

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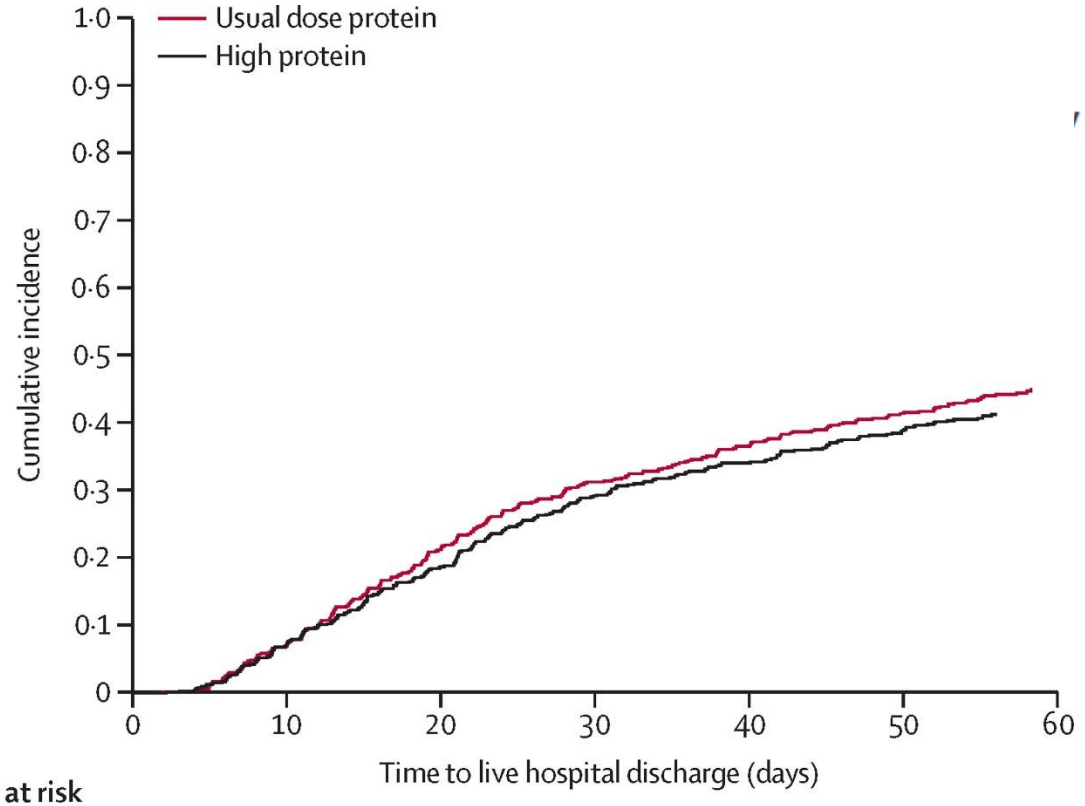


25, 2023

| Number at risk | | | | | | | |
|---|---|---|---|---|---|---|---|
| Deaths (high dose protein) | .. | 95 | 162 | 184 | 207 | 218 | 222 |
| Deaths (usual protein) | .. | 91 | 142 | 175 | 185 | 198 | 208 |
| Hospitalisation (high protein) | 644 | 499 | 353 | 261 | 204 | 165 | 144 |
| Hospitalisation (usual dose protein) | 653 | 513 | 364 | 261 | 216 | 175 | 145 |

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www.thelancet.com **Published online January 25, 2023**

***Table S7 – Metabolic tolerance***

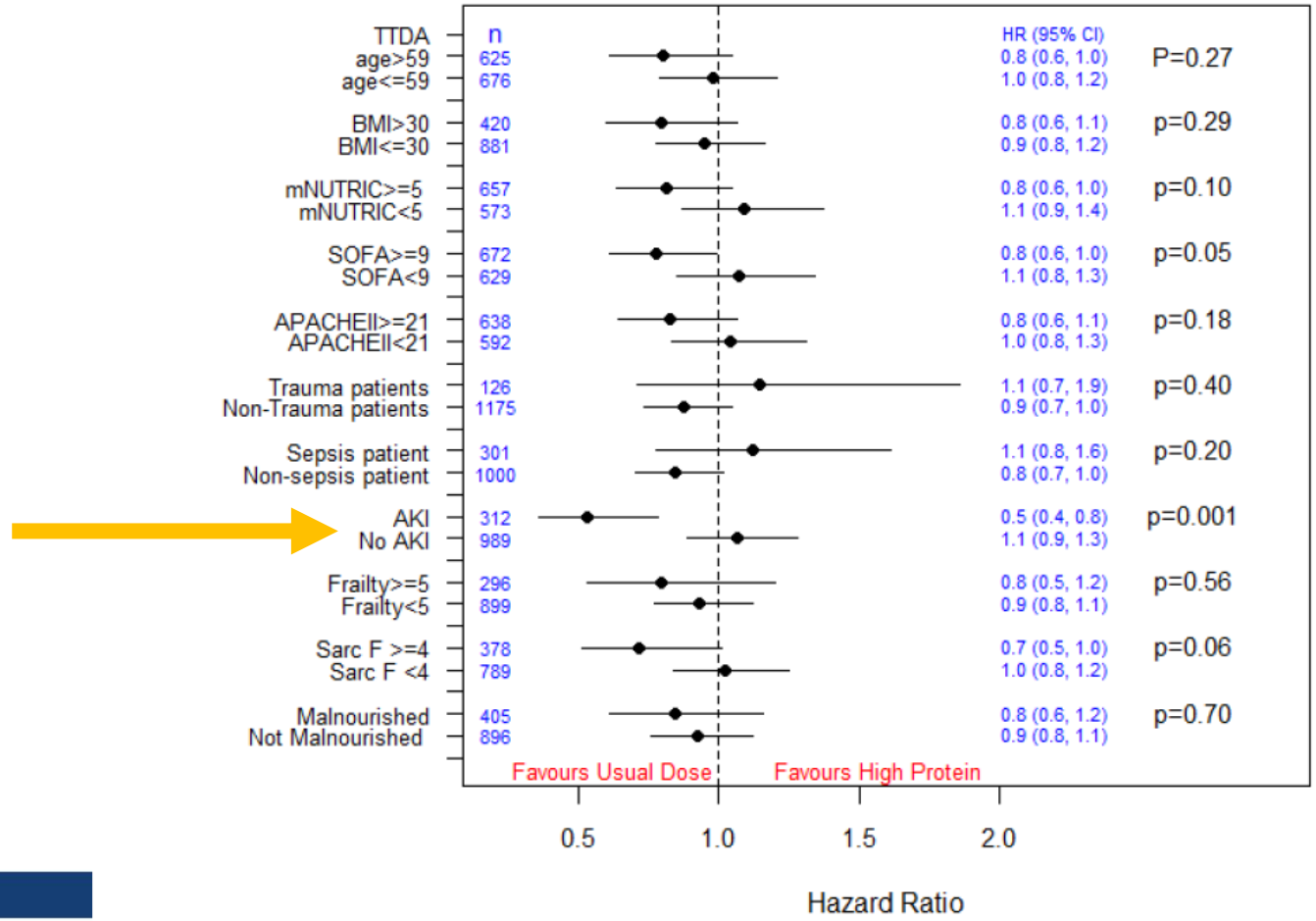
| | High Protein (n=645) | Usual Protein (n=656) | p-value* |
|---|---|---|---|
| Insulin (total units/day) | (N=364) 44·9±48·2 (1·0-379·0) | (N=365) 40·4±41·1 (1·0-265·0) | 0·39 |
| Creatinine (µmol/L) | (N=641) 125·8±121·2 (17·8-1589·2) | (N=654) 117·5±115·5 (17·7-1442·0) | 0·42 |
| Highest Glucose (mmol/L) | (N=598) 10·3±3·0 (5·5-24·4) | (N=597) 10·4±2·9 (3·7-28·7) | 0·39 |
| Lowest Glucose (mmol/L) | (N=598) 7·2±1·5 (3·9-13·7) | (N=597) 7·1±1·3 (3·7-12·8) | 0·07 |
| Highest Urea (mmol/L) | (N=634) 14·0±8·5 (2·4-50·7) | (N=647) 11·9±7·2 (1·8-47·7) | <0·0001 |
| Urea ≥30 mmol/L | 43 (6·7%) | 20 (3·0%) | 0·002 |
| Highest Triglycerides (mmol/L) | (N=160) 2·2±1·4 (0·3-7·9) | (N=175) 2·5±2·0 (0·4-16·8) | 0·28 |

Legend: Values reflect the average ± standard deviation (range) of the within patient averages over the study period.
*All p-values unadjusted and by the Wilcoxon rank-sum test except Urea ≥30 mmol/L by the chi-squared test.

# The effect of higher protein dosing in critically ill patients with high nutritional risk (EFFORT Protein): an international, multicentre, pragmatic, registry-based randomised trial

*Figure S2 – Subgroup Analysis Based on Effect on Time-to-Discharge-Alive from Hospital*

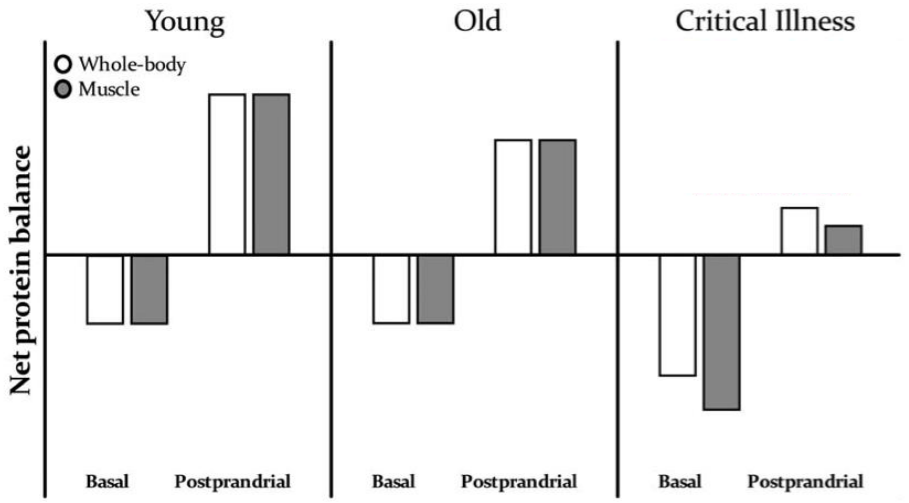
Regala,



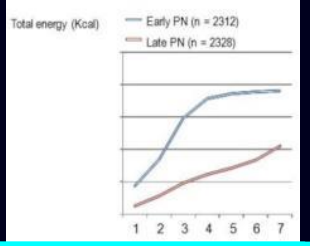

January 25, 2023

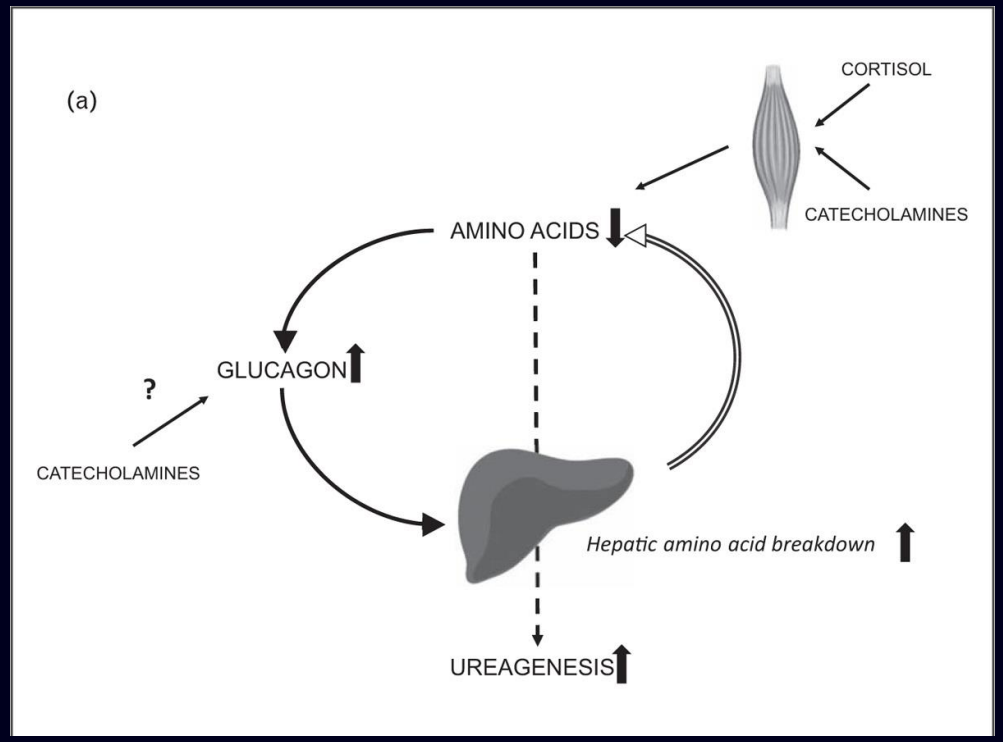
# Critical Illness is Associated With Anabolic Resistance

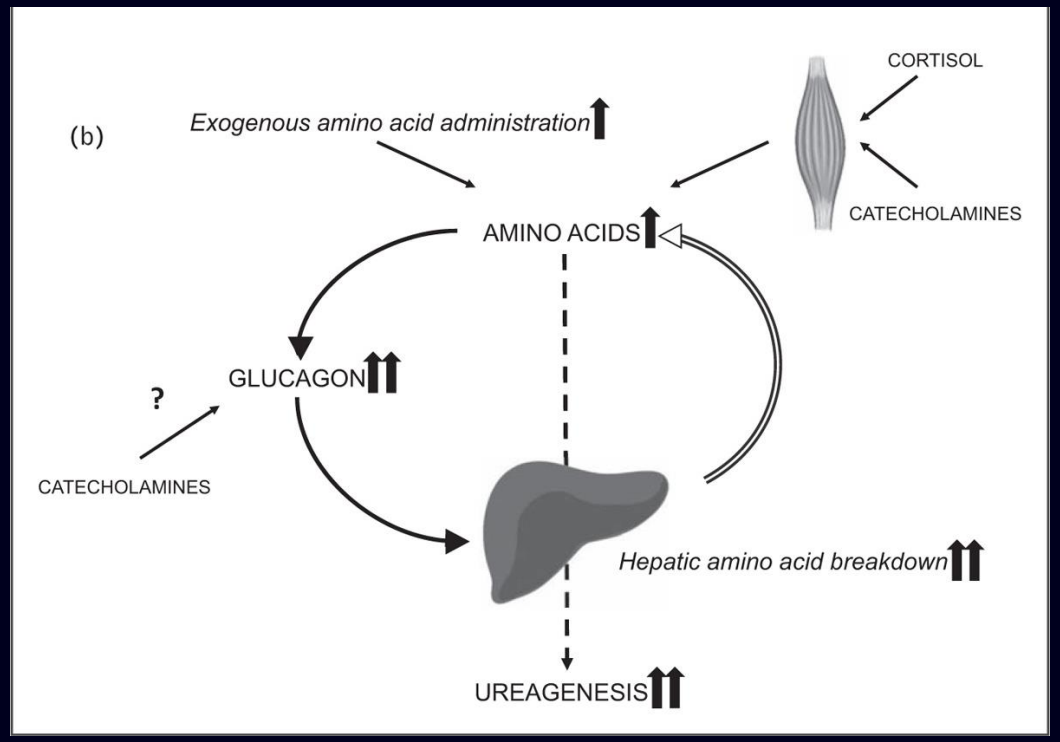
Morton Current Opinion in Critical Care: April 2018 - Volume 24 - Issue 2 - p 124-130



# What drives protein breakdown?



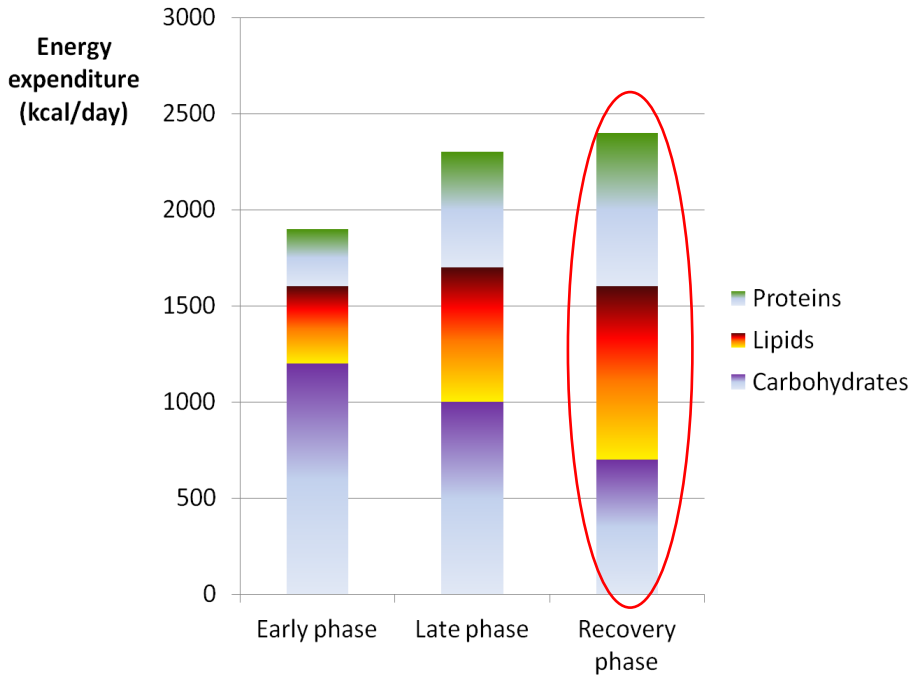




**+/- Amino Acid Infusion**

**+/- Glucagon Immuno-neutralisation**

**Thiessen S. et al AJRCM 2017**
**Thiessen S. & Gunst J. Current Opinion in Critical Care 2018**

# Three metabolic phases after stress




British Journal of Anaesthesia Page 1 of 10
doi:10.1093/bja/aeu187

BJA

**Metabolic response to the stress of critical illness**

*Preiser, Ichai, Orban, Groeneveld*

*Tutorial*

# Nutrition Rehabilitation in the Intensive Care Unit

**Pablo Lucas Massanet, MD[1]; Laurent Petit, MD[2]; Benjamin Louart, MD[1]; Philippe Corne, MD, PhD[3]; Celine Richard, RD[4]; and Jean Charles Preiser, MD, PhD[5]**

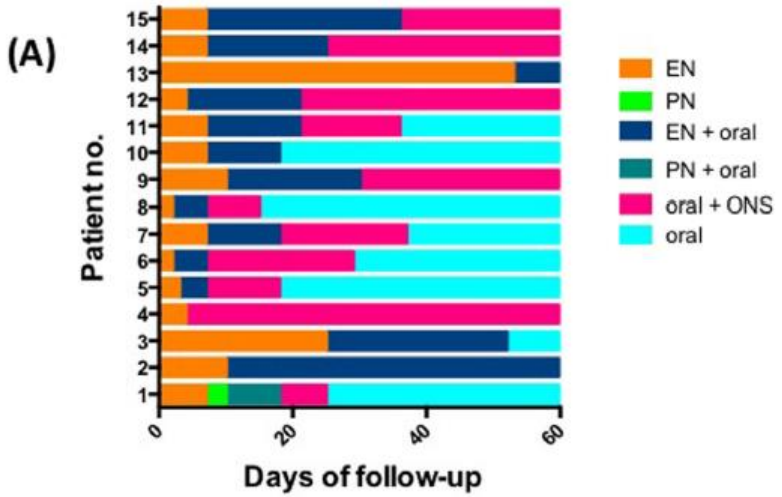

**Figure 1.** Kafka's nightmare illustrates how deep the physical changes are for a patient after a critical illness and an intensive care unit stay.

Journal of Parenteral and Enteral Nutrition
Volume 39 Number 4
May 2015 391–400

# Nutrition evaluation and management of critically ill patients with COVID-19 during post–intensive care rehabilitation

Alice Hoyois[1] | Asuncion Ballarin[2] | Justine Thomas[2] | Olivier Lheureux[3] | Jean-Charles Preiser[3] | Emmanuel Coppens[4] | Silvia Perez-Bogerd[5] | Olivier Taton[5] | Sylvie Farine[6] | Pauline Van Ouytsel[6] | Marianna Arvanitakis[1]

*JPEN J Parenter Enteral Nutr.* 2021;45:1153–1163.



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(B)

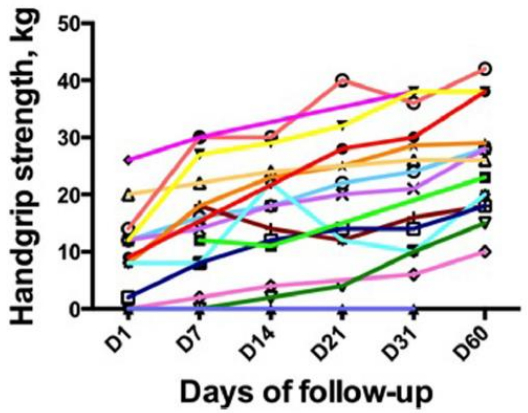



**Figure 4** (A) Correlation between body mass index (BMI) and mid-arm circumference. (B) Individual dominant handgrip strength at the time of intensive care unit discharge and at day (D) 7, 14, 30, and 60 for 13 patients. Each patient is represented with a shade of gray

# The role of nutrition rehabilitation in the recovery of survivors of critical illness: underrecognized and underappreciated

Lesley L. Moisey[1*], Judith L. Merriweather[2] and John W. Drover[3]

Moisey *et al. Critical Care* (2022) 26:270

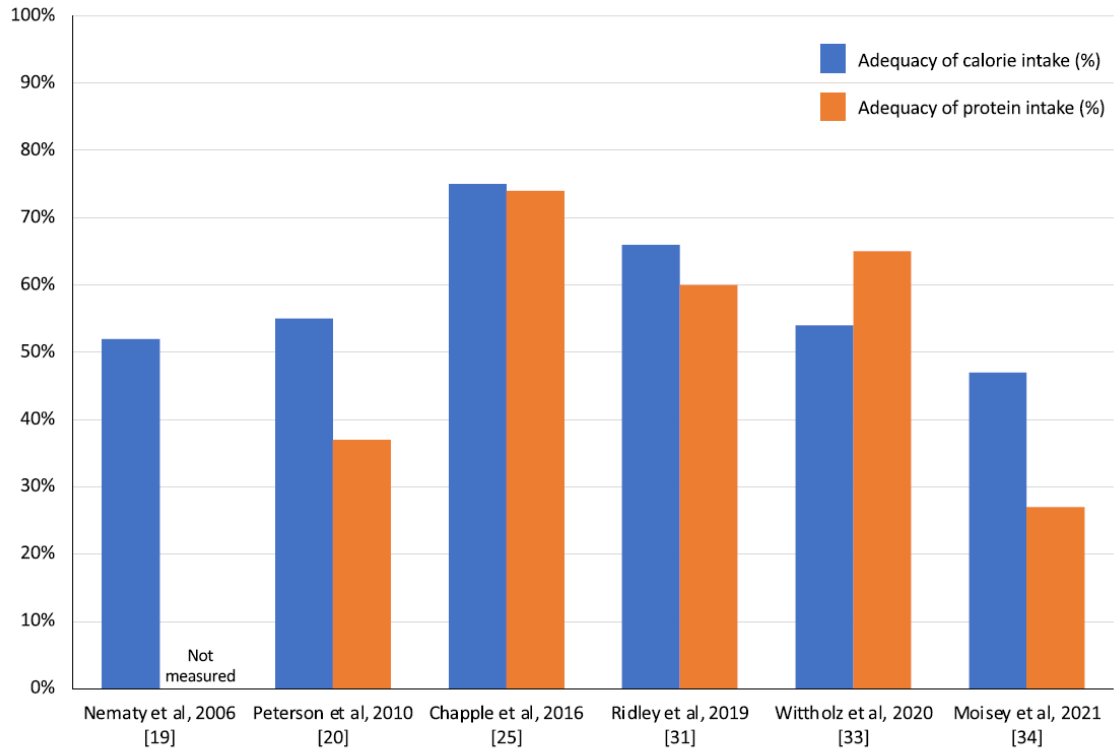


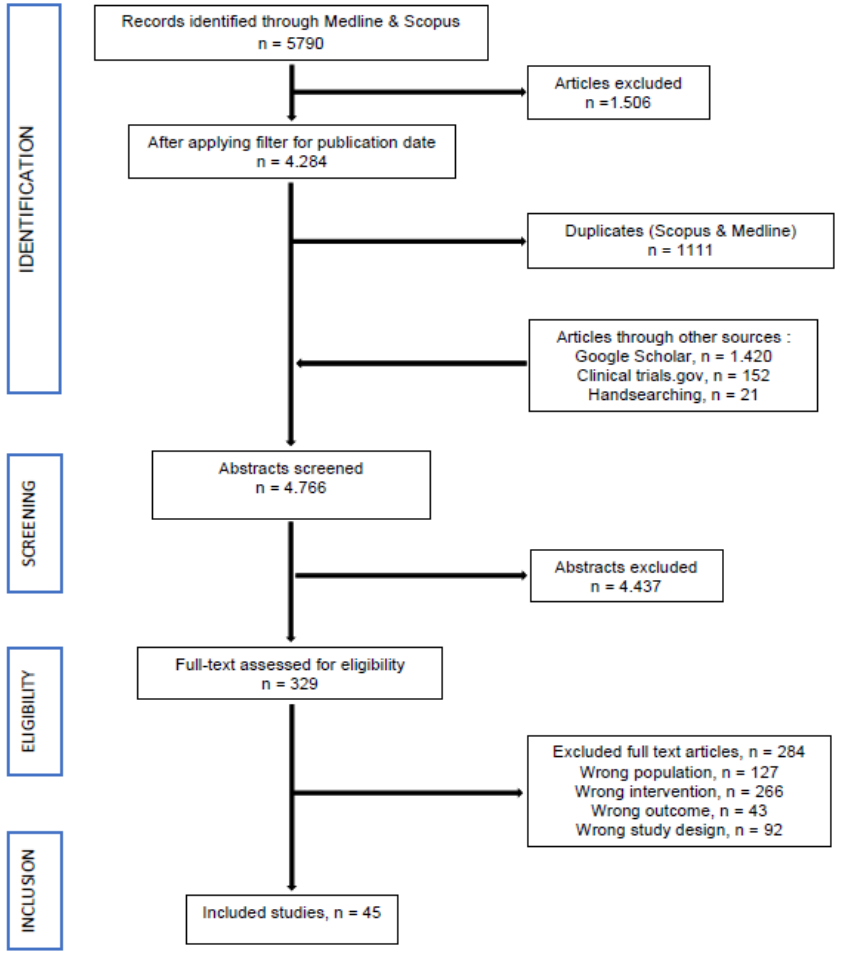

**Fig. 3** Adequacy of calorie and protein intake in relation to estimated or prescribed amounts in patients solely prescribed oral diets in hospital following ICU discharge

Meta-analyses

# Nutritional rehabilitation after acute illness among older patients: A systematic review and meta-analysis

Sylwia Szklarzewska [a, *], Raphael Mottale [b], Edgard Engelman [c], Sandra De Breucker [a], Jean-Charles Preiser [d]

Clinical Nutrition 42 (2023) 309–336



# Non-overlapping data

| Parameters | Hedge's g<br><br>Mean [95% confidence interval] | Percent of non-overlapping data **<br><br>Mean [95% confidence interval] | Odds Ratio ***<br><br>[95% confidence interval] | p-value |
|---|---|---|---|---|
| Function status * | 0.27 [0.08 ; 0.46] | 19.4 [6.2 ; 30.8] | 1.63 [1.15 ; 2.3] | p=0.003 |
| Muscle mass * | 0.53 [0.11 ; 0.94] | 34.6 [8.4 ; 53.1] | 2.61 [1.22 ; 5.5] | p=0.01 |
| Quality of life * | 0.63 [-0.17 ; 1.44] | 39.6 [-14.5 ; 69.2] | 3.13 [0.73 ; 13.6] | p=0.12 |

* A positive value of Hedge's g indicates a better effect of food supplements compared with control

** For all parameters: the higher the percentage the better the effect of food supplements compared with control. A negative value indicates of better effect of control

# Agenda

- Constats cliniques
- Physiologie
- Apports protéiques
  - **Précoces : oui/non**
  - **Tardifs : revalidation nutritionnelle**
- Recommandations de pratique clinique
- Futur?

# How much proteins ?

REVIEW Open Access

## A guide to enteral nutrition in intensive care units: 10 expert tips for the daily practice

Jean-Charles Preiser[1*], Yaseen M. Arabi[2], Mette M. Berger[3], Michael Casaer[4], Stephen McClave[5], Juan C. Montejo-González[6], Sandra Peake[7,8], Annika Reintam Blaser[9,10], Greet Van den Berghe[4], Arthur van Zanten[11], Jan Wernerman[12] and Paul Wischmeyer[13]

*Critical Care* (2021) 25:424

| Suggested answer | ASPEN/SCCM guidelines | ESPEN guidelines |
|---|---|---|
| Low dose (e.g. 0.8 g/kg/day) during the early phase - to be increased to >1.2 g/kg/d later | Suggestion: Administer sufficient (high-dose) protein in the range of 1.2–2.0 g/kg actual body weight per day and may likely be even higher in burn or multitrauma patients<br>[Quality of Evidence: Very Low] | During critical illness, 1.3 g/kg protein equivalents per day can be delivered progressively<br>Grade of recommendation: 0: strong consensus |

# ESPEN ICU guidelines revised (2023)

During critical illness, 1.3 g/kg protein equivalents per day can be delivered progressively.

(R22, updated, Grade 0, strong consensus, 92%)

Commentary

Numerous observational studies showed associations between high-dose protein delivery and improved outcomes (morbidity or mortality).

However, RCTs did not confirm the expected benefit of higher protein intakes alone, or combined with physical activity or energy

In accordance with the Lee et al. meta-analysis, there is no support to recommend higher doses than 1.3 g/kg/d, except for increased muscle mass in individual patients.

The timing of administration has been mainly studied retrospectively or in post hoc analysis [62]. Recent stable isotope studies [63,64] demonstrate that amino acid conversion is improved with time, allowing an increase in whole body protein production only after the early period of the acute phase, even increasing further in the post-acute phase.

This supports the progressive increase of protein intakes.

There is a need for well-conducted RCTs to answer the question of the best timing and dose of protein administration in the ICU.

# ESPEN ICU guidelines revised (2023)

Statement 3: Physical activity may improve the beneficial effects of nutritional therapy.

(S 3, consensus, 86%)

Commentary

Exercise has been suggested in several studies to be effective in preventing anabolic resistance, reducing morbidity and improving the level of activity.

Administration of increased protein intake together with increased physical activity during the late phase of critical illness should be further explored.

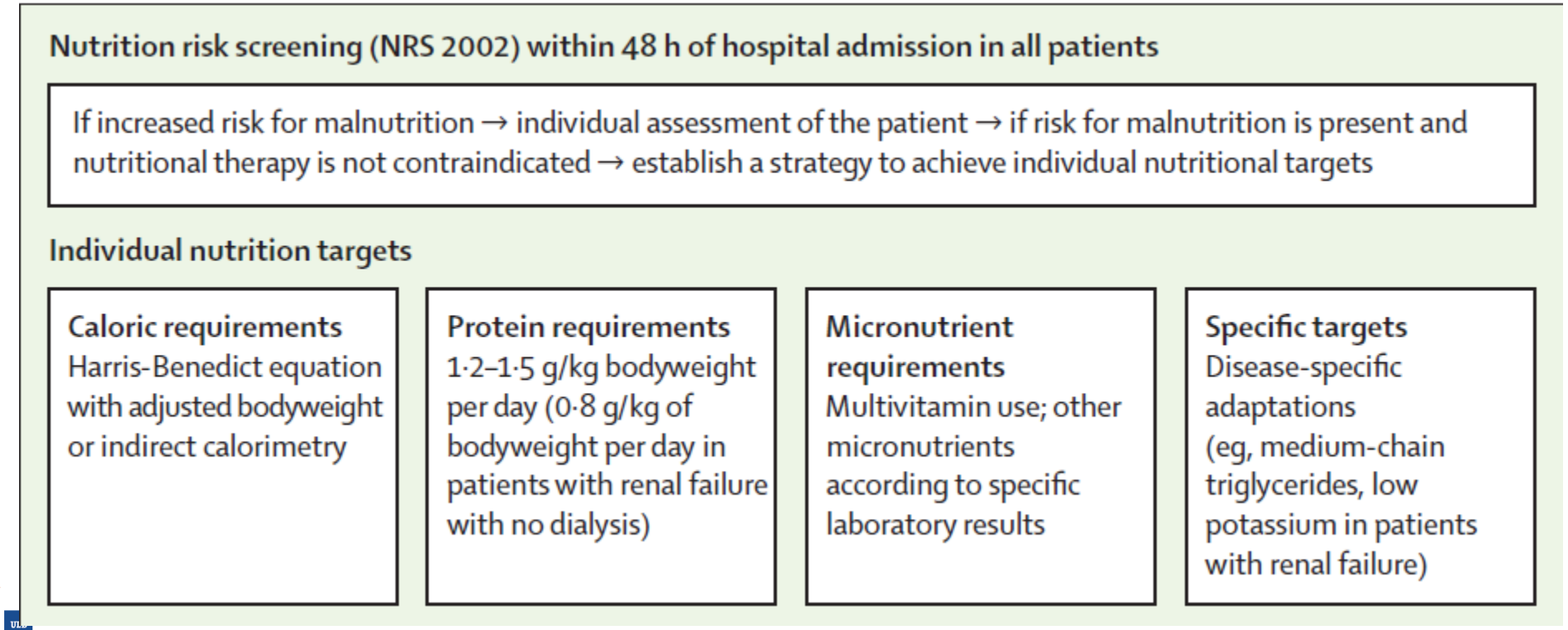
# Agenda

- Constats cliniques
- Physiologie
- Apports protéiques
  - **Précoces : oui/non**
  - **Tardifs : revalidation nutritionnelle**
- Recommandations de pratique clinique
- Futur?

# Individualised nutritional support in medical inpatients at nutritional risk: a randomised clinical trial

*Philipp Schuetz, Rebecca Fehr, Valerie Baechli, Martina Geiser, Manuela Deiss, Filomena Gomes, Alexander Kutz, Pascal Tribolet, Thomas Bregenzer, Nina Braun, Claus Hoess, Vojtech Pavlicek, Sarah Schmid, Stefan Bilz, Sarah Sigrist, Michael Brändle, Carmen Benz, Christoph Henzen, Silvia Mattmann, Robert Thomann, Claudia Brand, Jonas Rutishauser, Drahomir Aujesky, Nicolas Rodondi, Jacques Donzé, Zeno Stanga*, Beat Mueller**

*Lancet* 2019; 393: 2312–21



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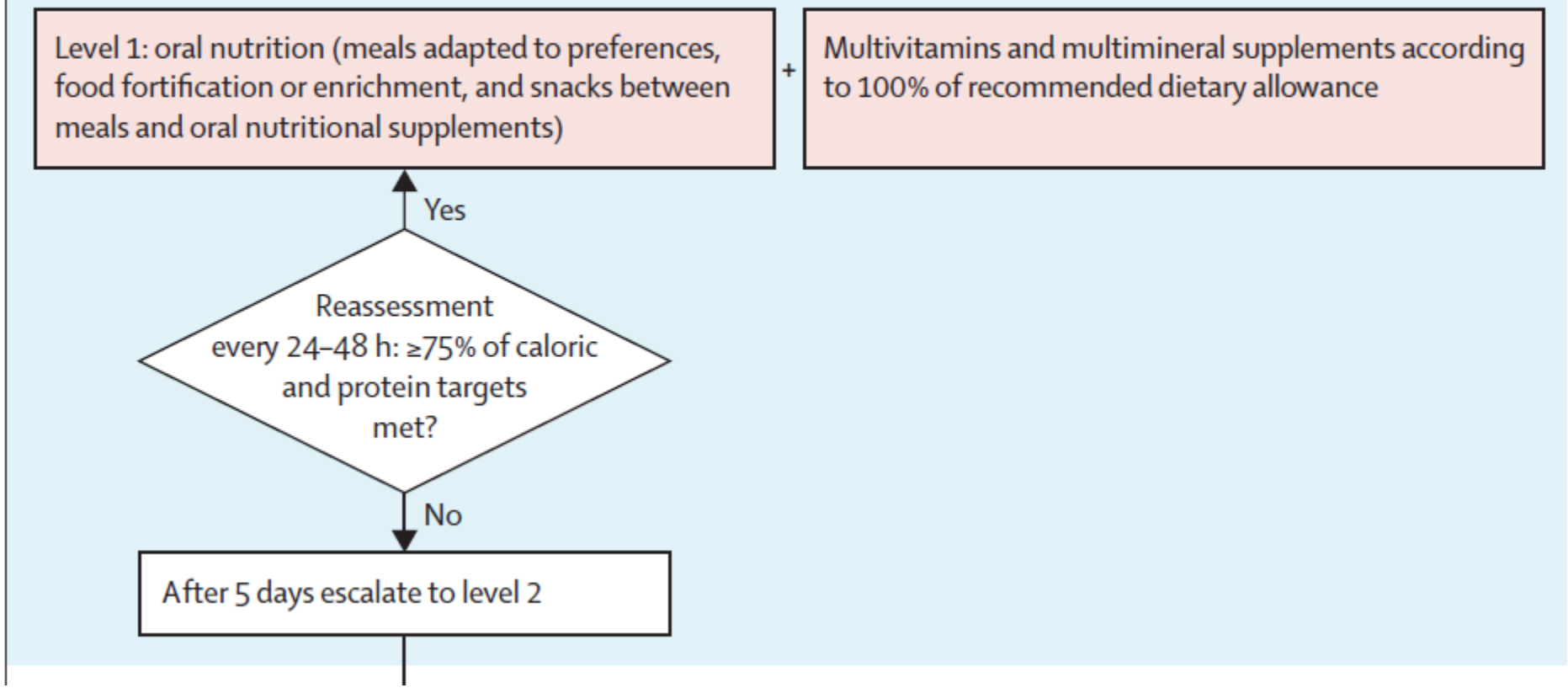
Philipp Schuetz, Rebecca Fehr, Valeria Baechli, Martina Geiser, Manuela Deiss, Filomena Gomes, Alexander Kutz, Pascal Tribolet

## Strategy to reach the nutrition targets



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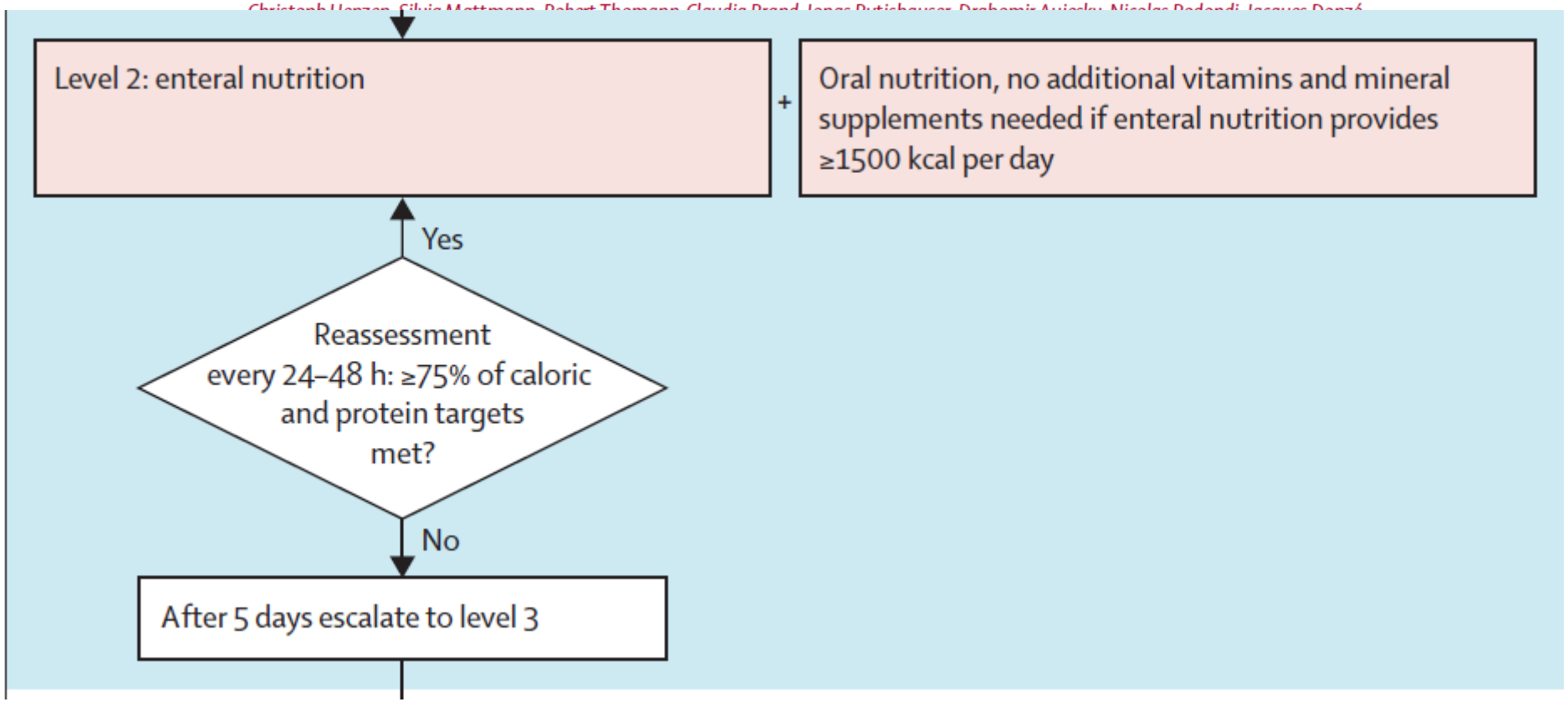

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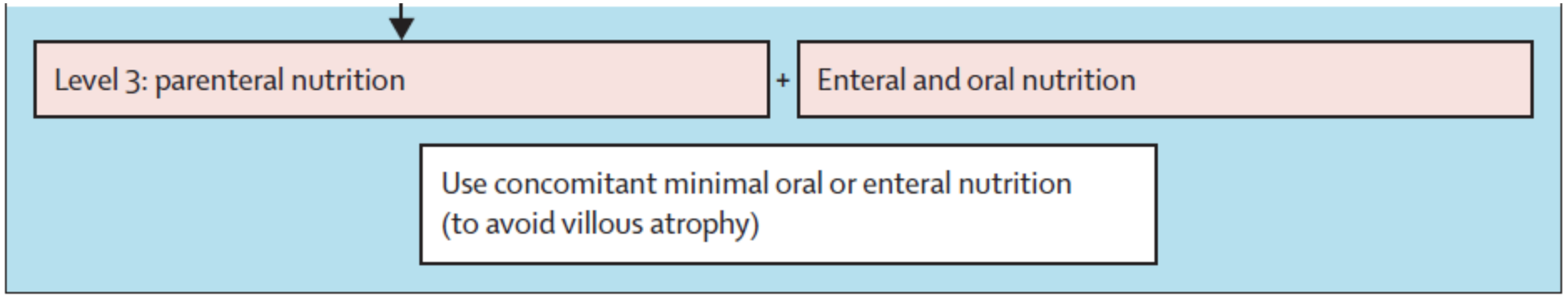

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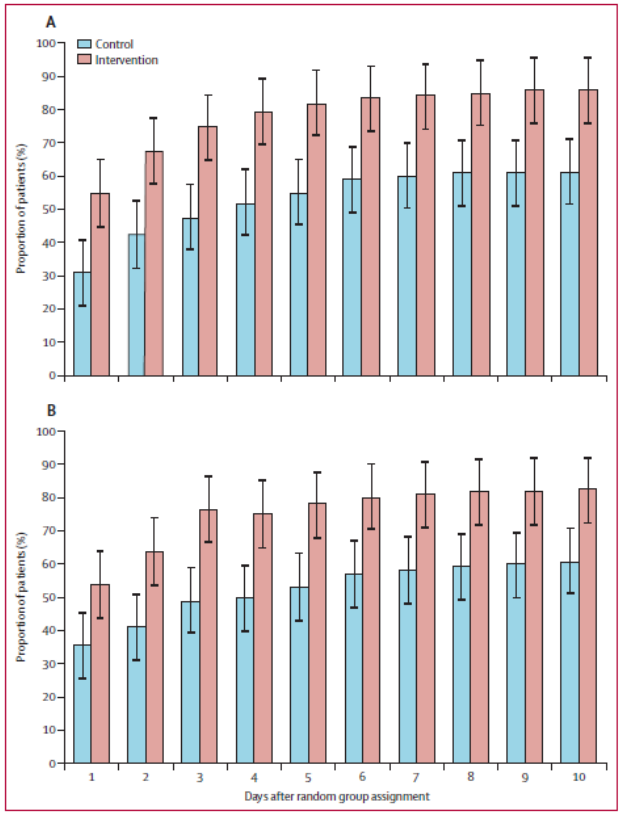


*Figure 3:* Proportion of patients reaching caloric (A) and protein (B) requirements during the first 10 days after random group assignment

*a Gomes, Alexander Kutz, Pascal Tribolet,*
*ilz, Sarah Sigrist, Michael Brändle, Carmen Benz,*
*ser, Drahomir Aujesky, Nicolas Rodondi, Jacques Donzé,*

**Lancet 2019; 393: 2312–21**

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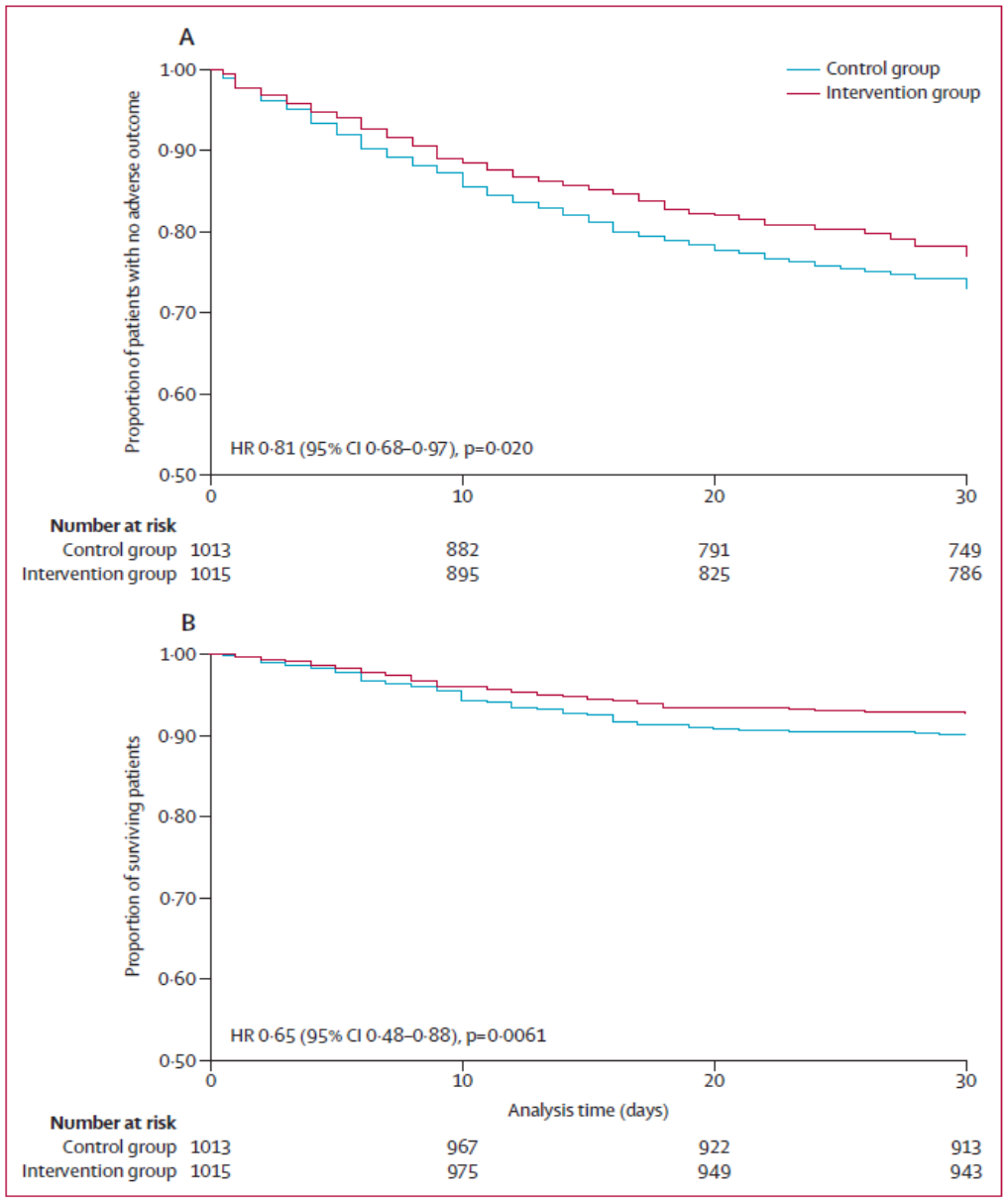


*Review*

# Trial Design in Critical Care Nutrition: The Past, Present and Future

**Lee-anne S. Chapple [1,2,3,*], Emma J. Ridley [4,5] and Marianne J. Chapman [1,2,3]**

*Nutrients* **2020**, *12*, 3694;

**Table 1.** Summary of critical care nutrition study design in the past, present, and future.

| | Past | Present | Future |
|---|---|---|---|
| Study methodology | Small physiological, observational, and single-centre comparative trials; poorly defined and underdeveloped processes | Large phase III trials (usually in the 1000s); a priori defined protocols, outcomes, and interim analyses | Sophisticated statistical techniques; larger sample sizes (tens of thousands); adaptive trial designs |
| Population | Small, specific populations often from specialist centres | General, heterogenic populations | Homogenous; selected based on anticipated response to nutrition intervention (e.g., malnourished); includes non-invasively ventilated cohorts |
| Intervention | Calories; early vs. late initiation; route of delivery e.g., gastric vs. jejunal, EN vs. PN, protein- vs. glucose-based PN, medium- vs. long-chain triglycerides and branched chain amino acids; immunonutrition | General interventions for general questions; focused only on the period in ICU | Synergistic; patient-specific; based on mechanisms; extension of interventions beyond ICU discharge considering illness trajectory |
| Outcomes | Calorie delivery; nitrogen balance; incidence of infection; mortality (but underpowered to show an effect in the latter) | Robust clinical outcomes such as mortality | Patient recovery; functional outcomes; valid surrogate markers |

Abbreviations: EN = enteral nutrition; ICU = intensive care unit; PN = parenteral nutrition.

# Poor physical recovery after critical illness: incidence, features, risk factors, pathophysiology, and evidence-based therapies

www.co-criticalcare.com

Volume 28 • Number 4 • August 2022

*Yente Florine Niké Boelens*[a,b], *Max Melchers*[a,b], *and Arthur Raymond Hubert van Zanten*[a,b]

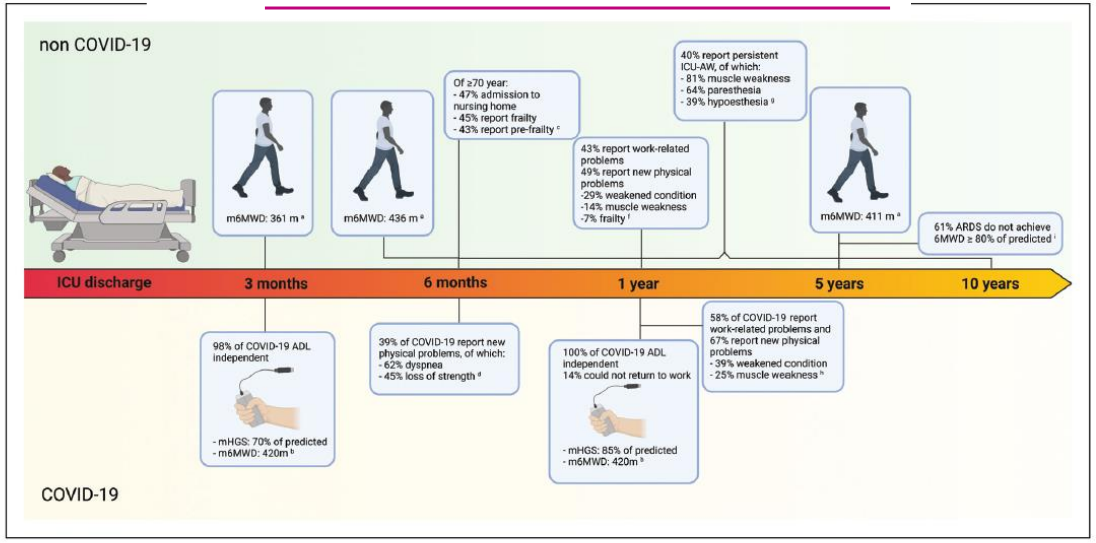



**FIGURE 1.** Visualized summary of study results regarding prevalence and incidence of impaired physical function following ICU-discharge in COVID-19 and non-COVID-19 patients. Legend: [a] Systematic review and meta-analysis including 16 studies and 1755 ICU survivors [12▪▪]; [b] Prospective single-center study including 114 COVID-19 ICU survivors, of which 98 analyzed at 3 months, and 51 analyzed at one year [17▪]; [c] Prospective cohort study including 266 ≥ 70-year-old ICU-survivors [13]; [d] Prospective multicenter cohort study including 212 COVID-19 ICU-survivors [15▪]; [e] Population-based cohort study including 546 ≥ 70-year-old ICU-survivors [33]; [f] Prospective multicenter cohort study including 2345 adult ICU-survivors [4▪▪]; [g] Prospective multicenter cohort study including 301 COVID-19 ICU survivors, of which 246 analyzed at one year [14▪▪]; [h] Single-center cohort study including 149 ICU-survivors [10▪]; [i] Single-center cohort study including 109 ARDS ICU-survivors, of which 94 were analyzed at 5 years [11]. 6MWD, Six Minute Walking Distance; ADL, Activities of Daily Living; COVID-19, Coronavirus Disease 2019; ICU, intensive care unit; ICU-AW, ICU-acquired weakness; m6MWD, Mean Six Minute Walking Distance; mHGS, mean Hand Grip Strength. Created with BioRender.com.

# CONCISE

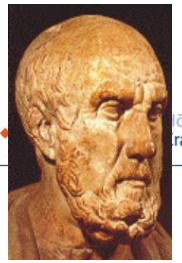
## Core Outcome Measures for Clinical Effectiveness Trials of Nutritional and Metabolic Interventions in Critical Illness: An International Modified Delphi Consensus Study Evaluation (CONCISE)

Thomas William Davies; Rob van Gassel; Marcel van de Poll; Jan Gunst; Michael P Casaer; Kenneth B Christopher; Jean-Charles Preiser; Aileen Hill; Kursat Gundogan; Annika Reintam Blaser; Anne-Françoise Rousseau; Carol Hodgson; Dale M Needham; Melina Castro; Stefan Schaller; Thomas McClelland; James J Pilkington; Carla M Sevin; Paul E Wischmeyer; Zheng Yii Lee; Deepak Govil; Andrew Li; Lee-anne Chapple; Linda Denehy; Juan Carlos Montejo-González; Beth Taylor; Danielle E Bear; Rupert Pearse; John Prowle; Angela McNelly; Zudin A Puthucheary

Crit Care, 2022

*"Standardized methods to assess and report these outcomes should be a priority to enable robust detection of interventions on these outcomes"*

Compher, C, 2021; JPEN



# Hippocrate (470-377 av. JC)
# « Que ta nourriture soit ton médicament! »

***Primum non nocere… avec une nutrition inadéquate: apports excessifs à la phase aïgue, insuffisants en phase tardive***