

Sepsis Lotgenotendag 2019

Lange termijn consequenties van sepsis: Is herstel mogelijk?

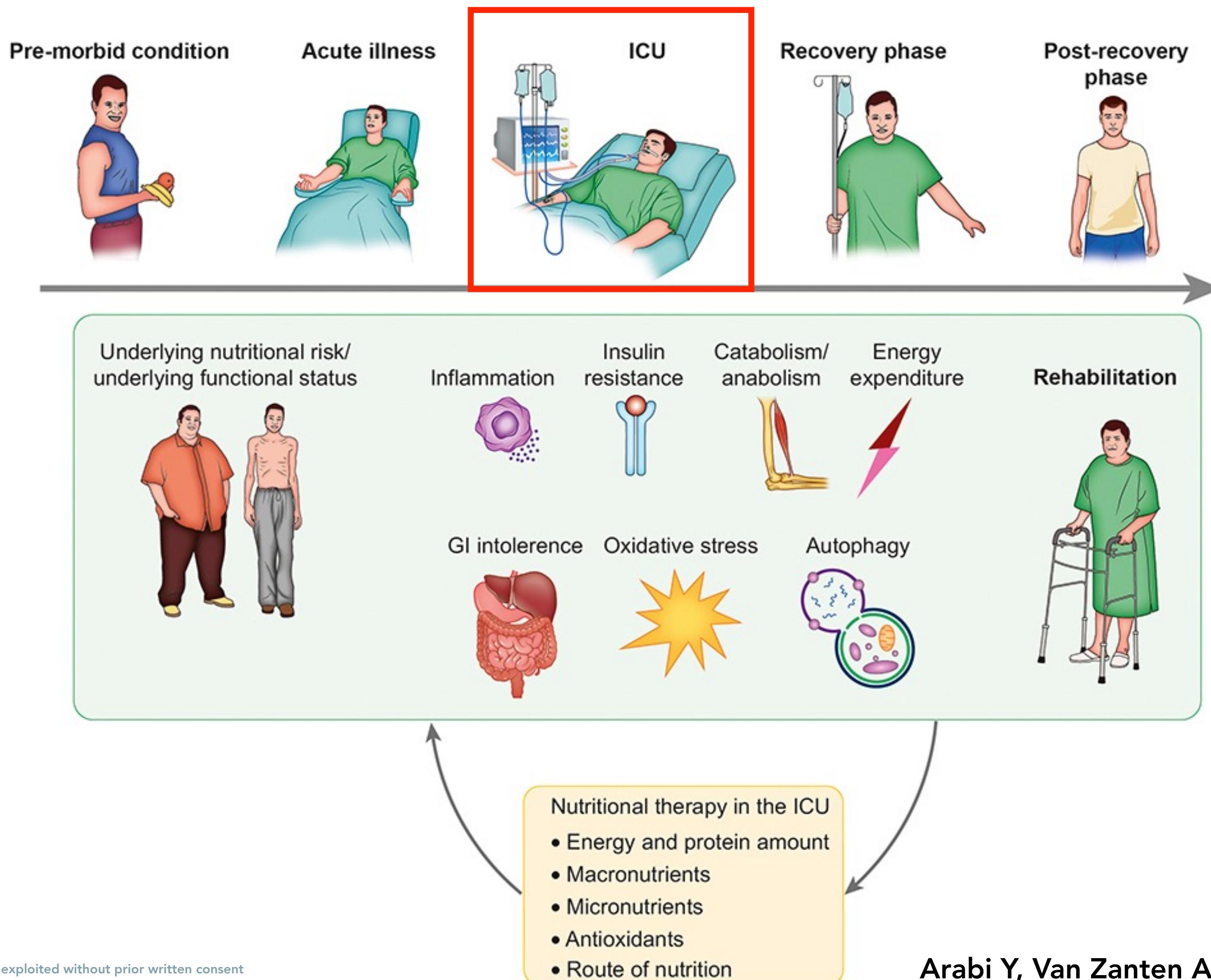
Arthur R.H. van Zanten, MD PhD, Internist-intensivist



**Head of ICU and Research
Gelderse Vallei Hospital,
Ede,
The Netherlands**

E-mail: zantena@zgv.nl

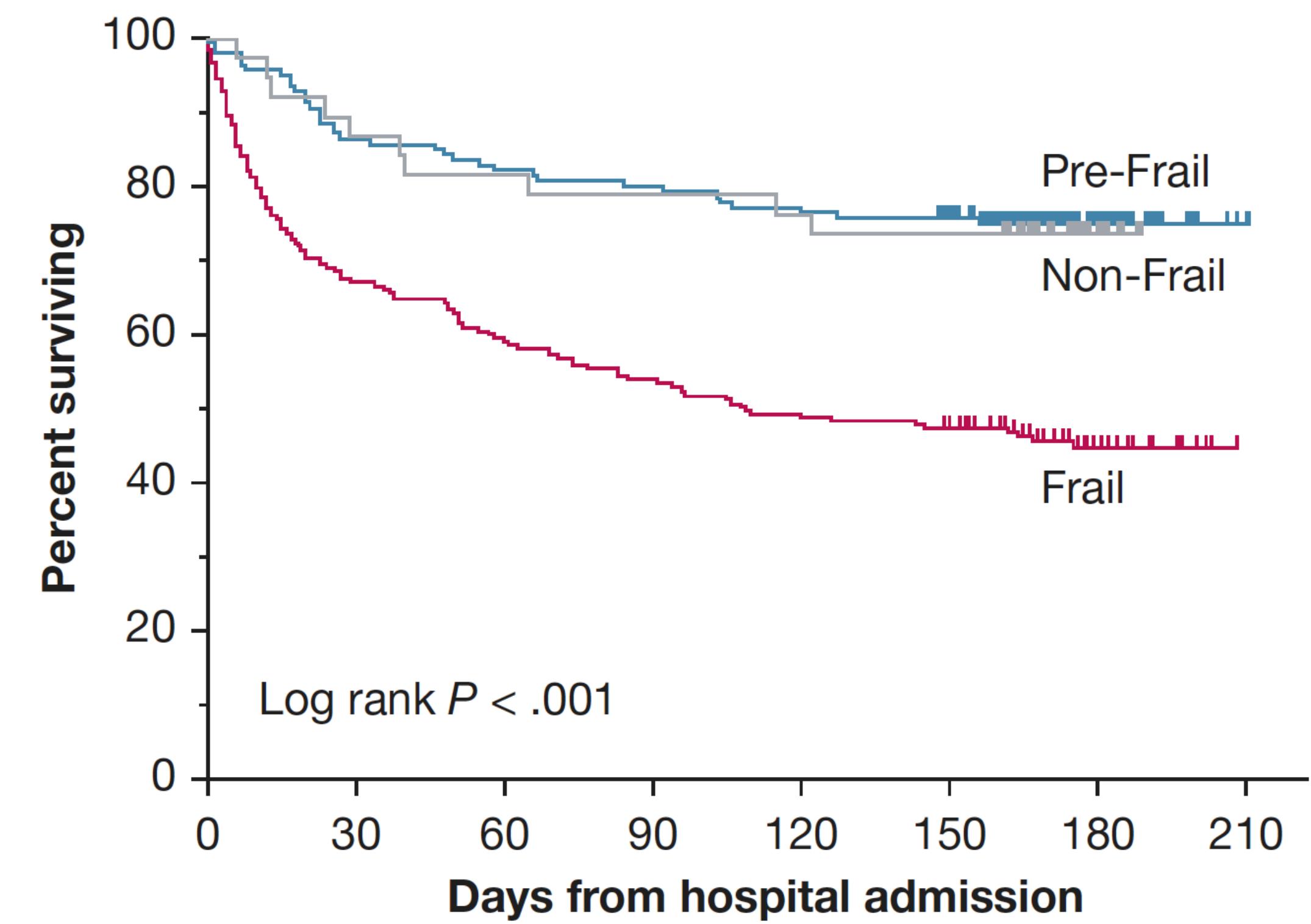
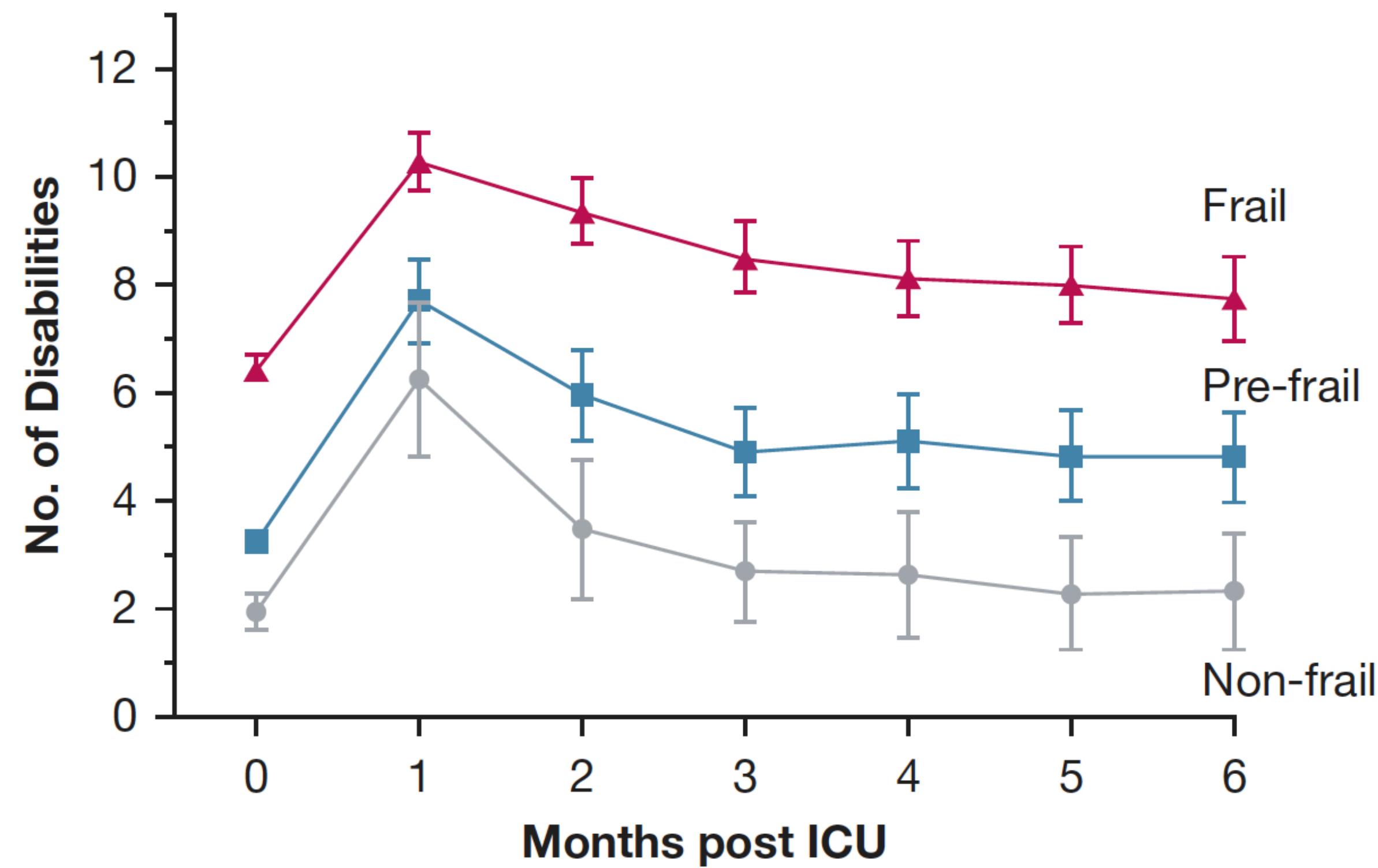
De reis van de IC patient



Wat vinden (oudere) IC patiënten belangrijk?

- **Functionele onafhankelijkheid nr #1 prioriteit voor ouderen**
- **Risico op slechte functionele uitkomst afhankelijk van kwetsbaarheid en niet van leeftijd**
- **Zwakte “frailty” verhoogt risico op blijvende beperkingen met factor 3-4, met ook verhoogde sterftekans in 9 maanden na IC ontslag**
- **Patient wordt nooit beter dan baseline functie**

Hoe belangrijk is conditie voor IC-opname?





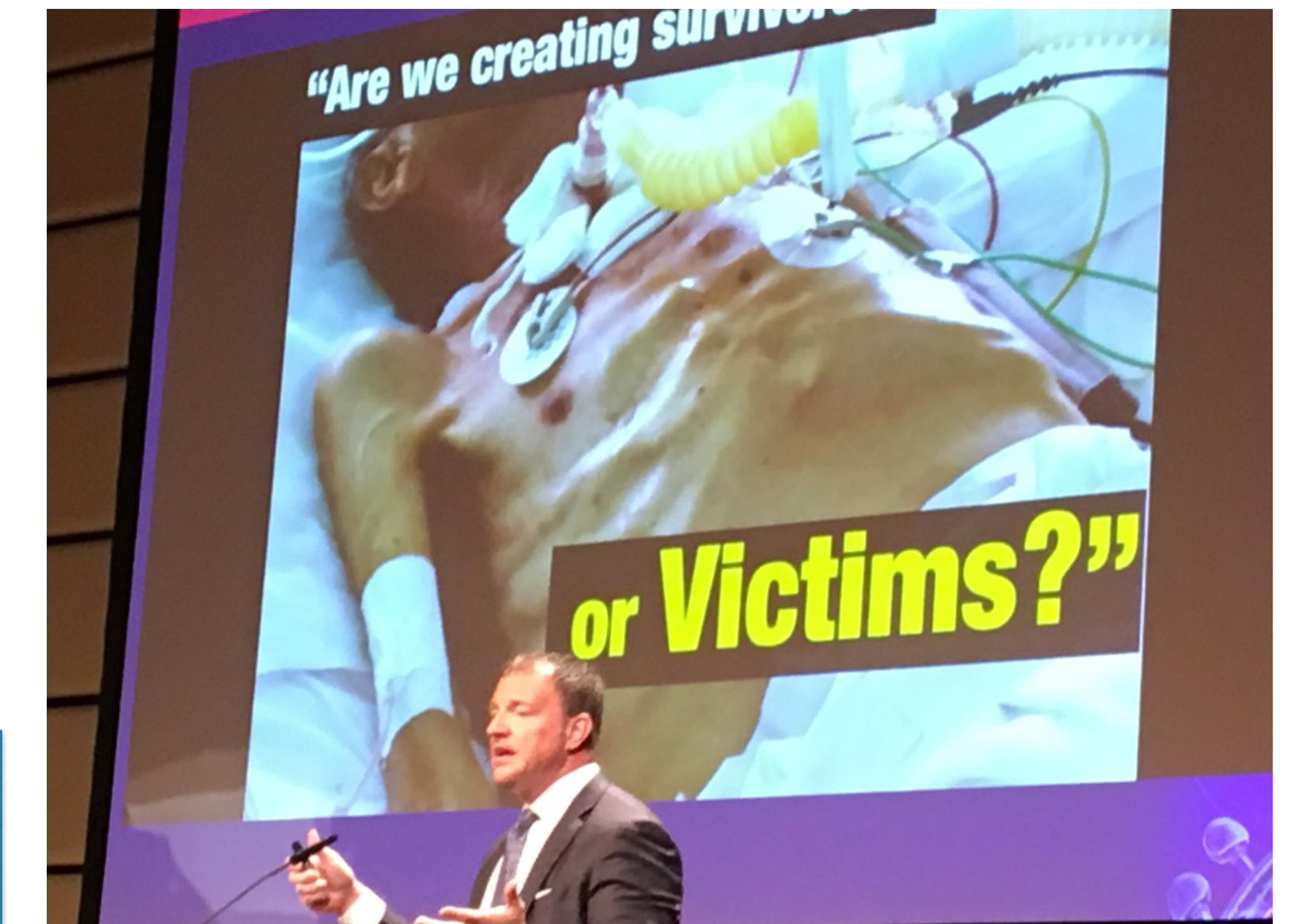
Sepsis: “Survivors or Victims”

33% overlijden in eerste jaar

50% herstel

17% blijvende beperkingen

1 tot 2 nieuwe functionele beperkingen
(bv. niet zelfstandig aankleden of in bad)

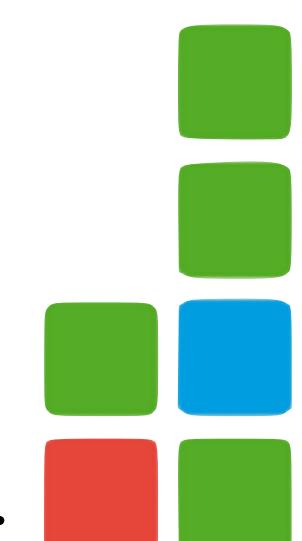




Sepsis: lange termijn consequenties



**40% heropname in
het ZH binnen 90
dagen na ontslag**

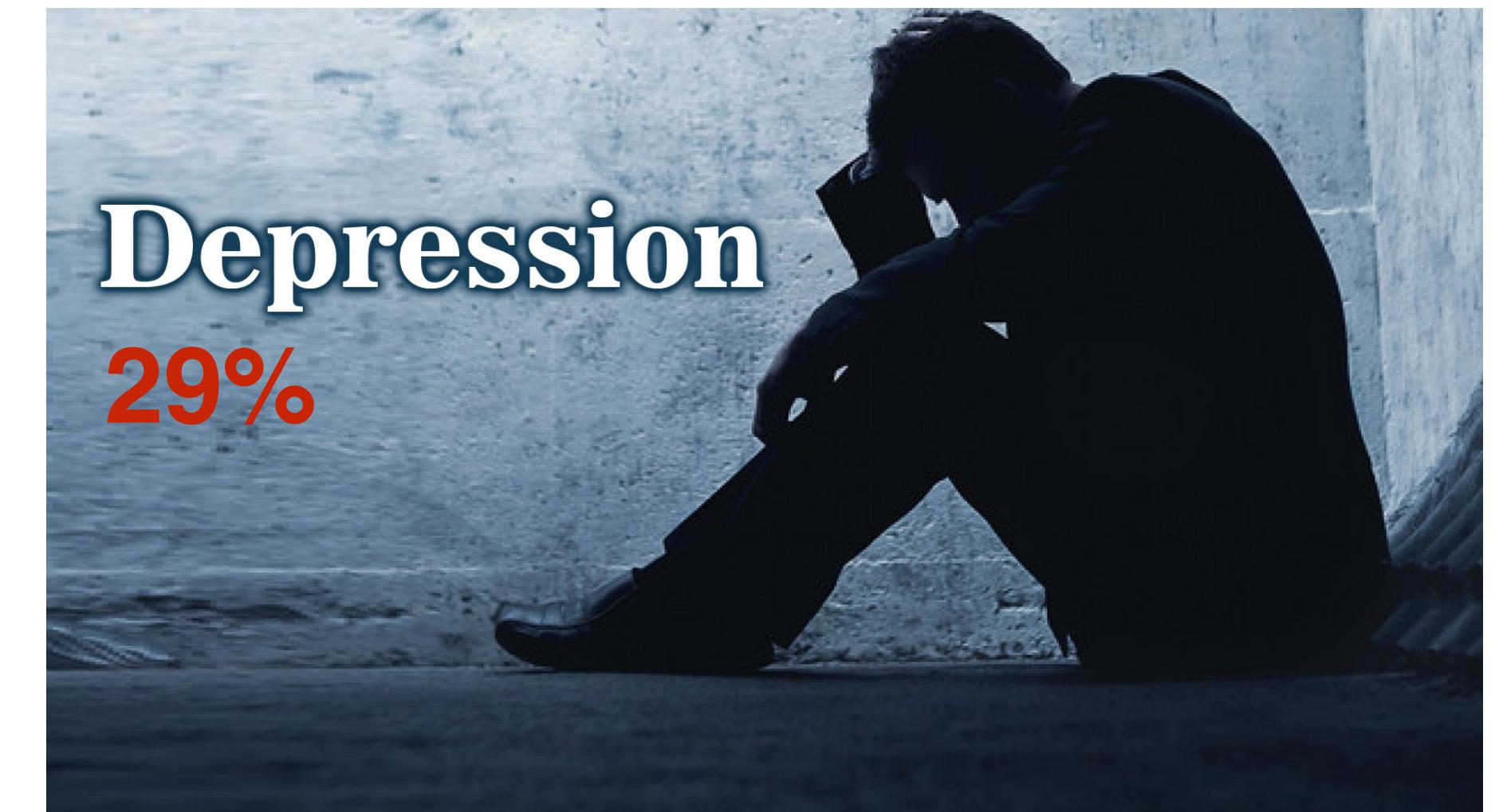


Sepsis: lange termijn consequenties



a 3-fold increase in prevalence of moderate to severe cognitive impairment (from 6.1% before hospitalization to 16.7% after hospitalization)

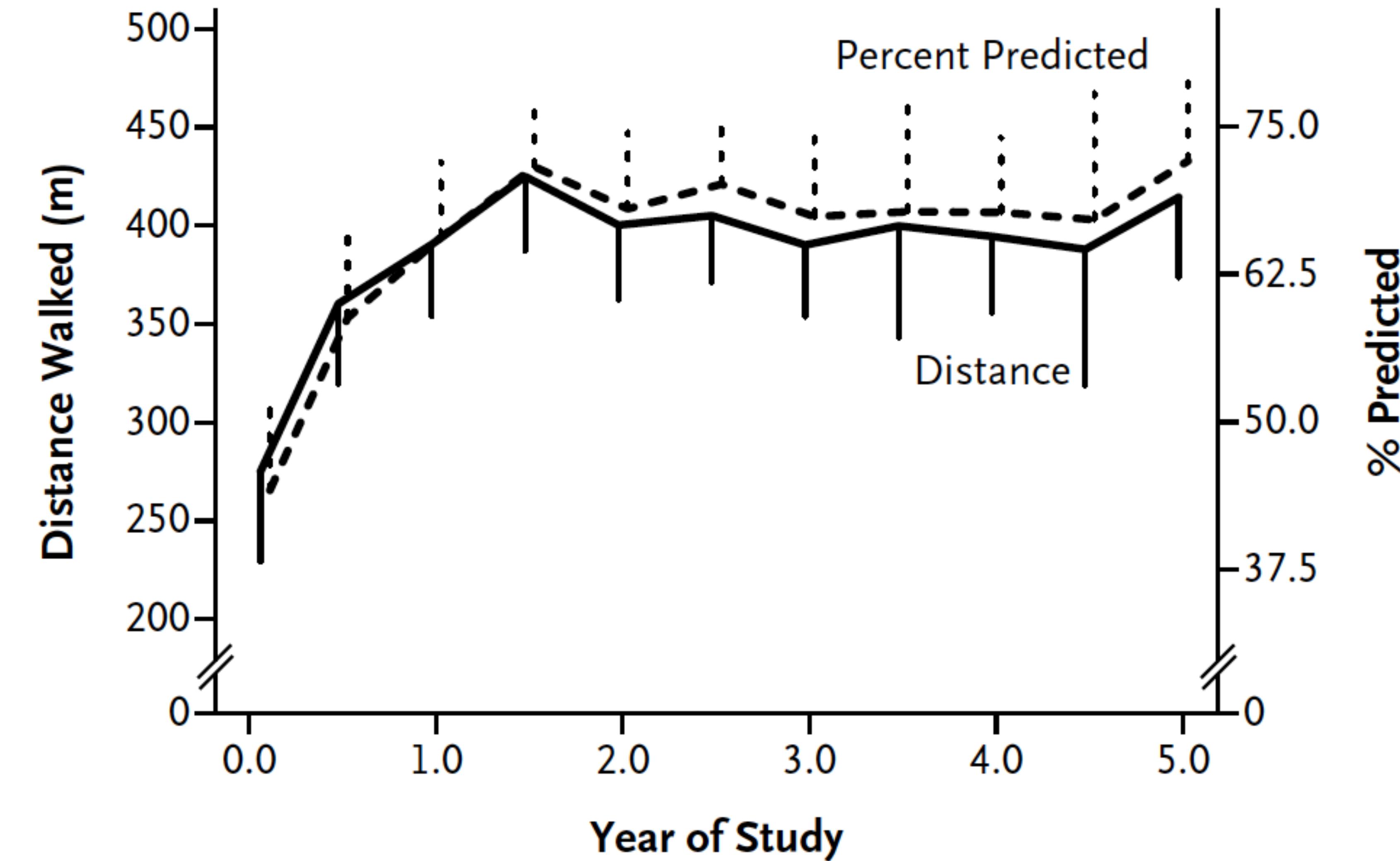
Denken en
geheugen
achteruit
gegaan



POST-
TRAUMATIC
STRESS
DISORDER

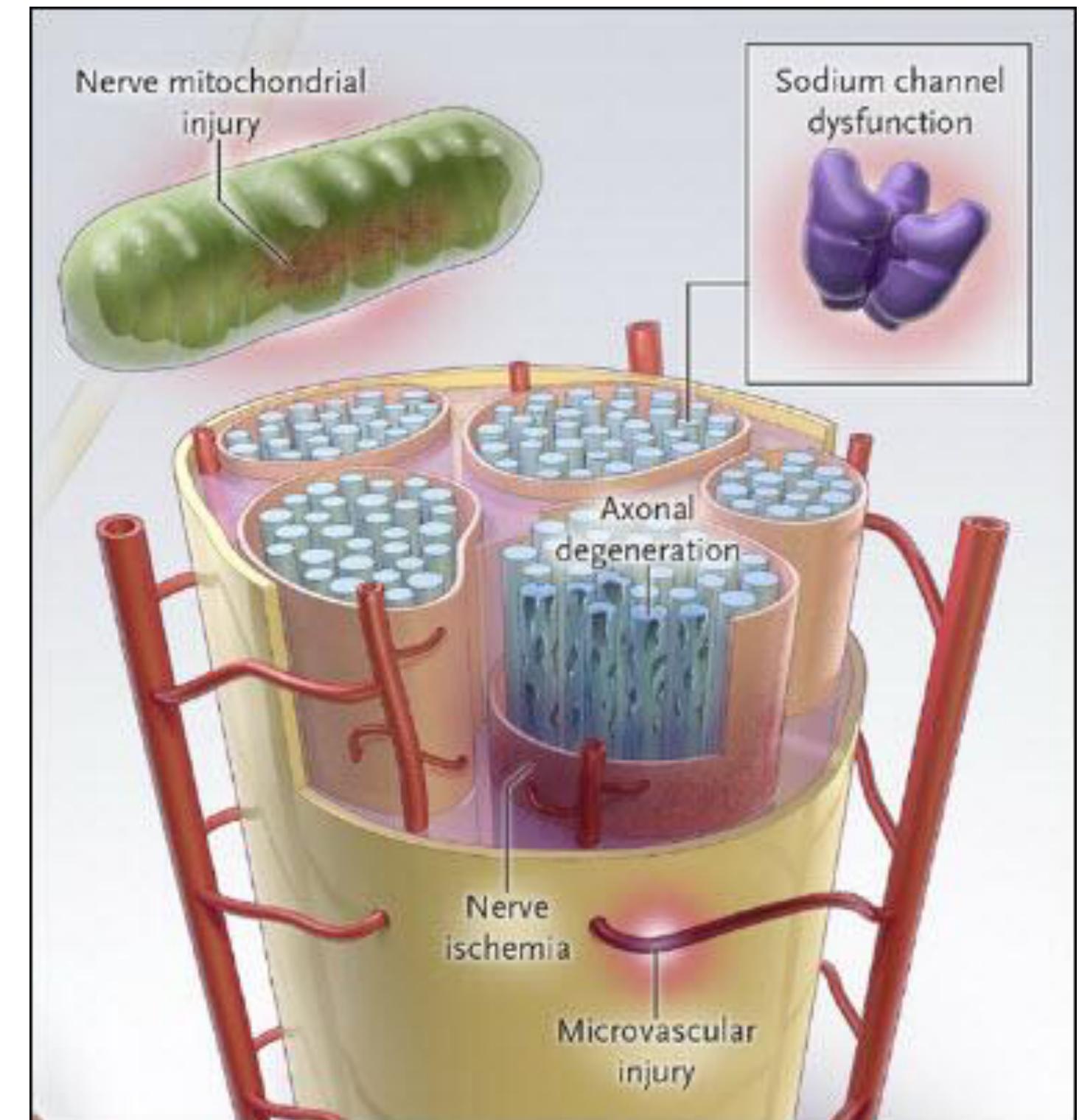
44%

5 jaar na ARDS/sepsis IC behandeling: ICU acquired weakness duurt jaren.....



Sepsis: lange termijn consequenties, wat gaat er mis?

1. Gewichtsverlies
2. Spiermassaverlies
3. Spierkwaliteitverlies
4. Verminderde spierfunctie
5. Vetinfiltratie in spieren
6. Verminderde VO₂ max
7. Sneller lactaatproductie
8. Veranderde mitochondriële functie
9. Verminderde vetverbranding capaciteit
10. Lagere overleving



RESEARCH

Open Access



Mitochondrial function in skeletal muscle of patients with protracted critical illness and ICU-acquired weakness

Kateřina Jiroutková^{1*}, Adéla Krajčová^{1,2}, Jakub Ziak¹, Michal Fric⁴, Petr Waldauf⁴, Valér Džupa³, Jan Gojda², Vlasta Němcova-Fürstová⁵, Jan Kovář⁵, Moustafa Elkalaf¹, Jan Trnka¹ and František Duška^{1,6}

50% minder ATP-productie: mitochondriale dysfunctie

EDITORIAL

Open Access



CrossMark

Electrophysiological investigations of peripheral nerves and muscles: a method for looking at cell dysfunction in the critically ill patients

Nicola Latronico^{1,2*} and Oliver Friedrich^{3,4,5}

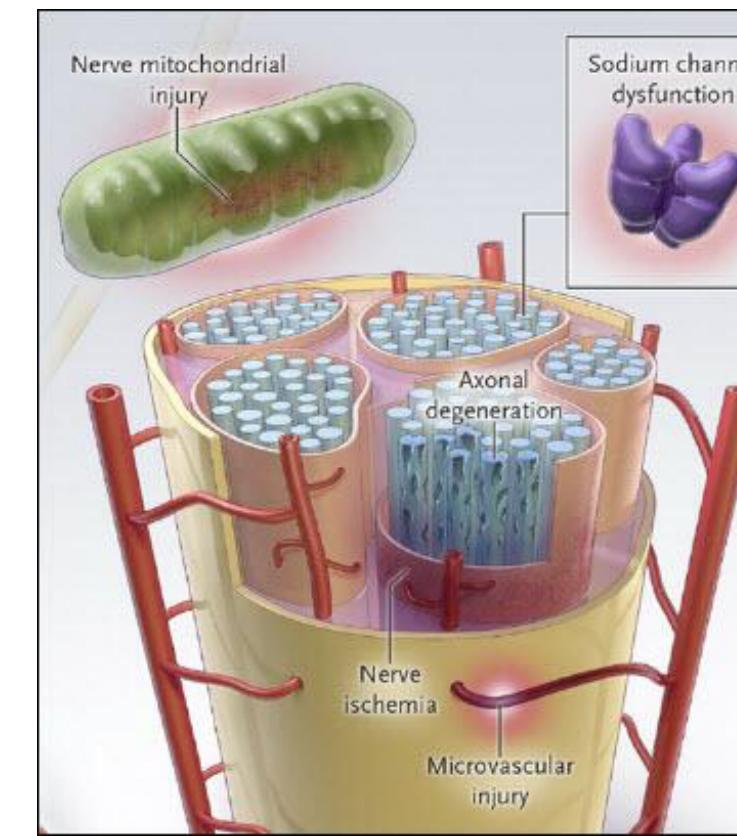
Keywords: Muscle weakness, Polyneuropathy, Myopathy, Organ dysfunction, Mitochondrial dysfunction, Energy metabolism

in axonen minder ATP productie

ICU-acquired weakness: post-IC zwakte

Risico factoren en mogelijke therapie

- Hyperglycemie
- Te vroege parenterale voeding
- Sepsis
- MODS
- Steroids?
- spierverslappers?
- Leeftijd



Axonal neuropathy

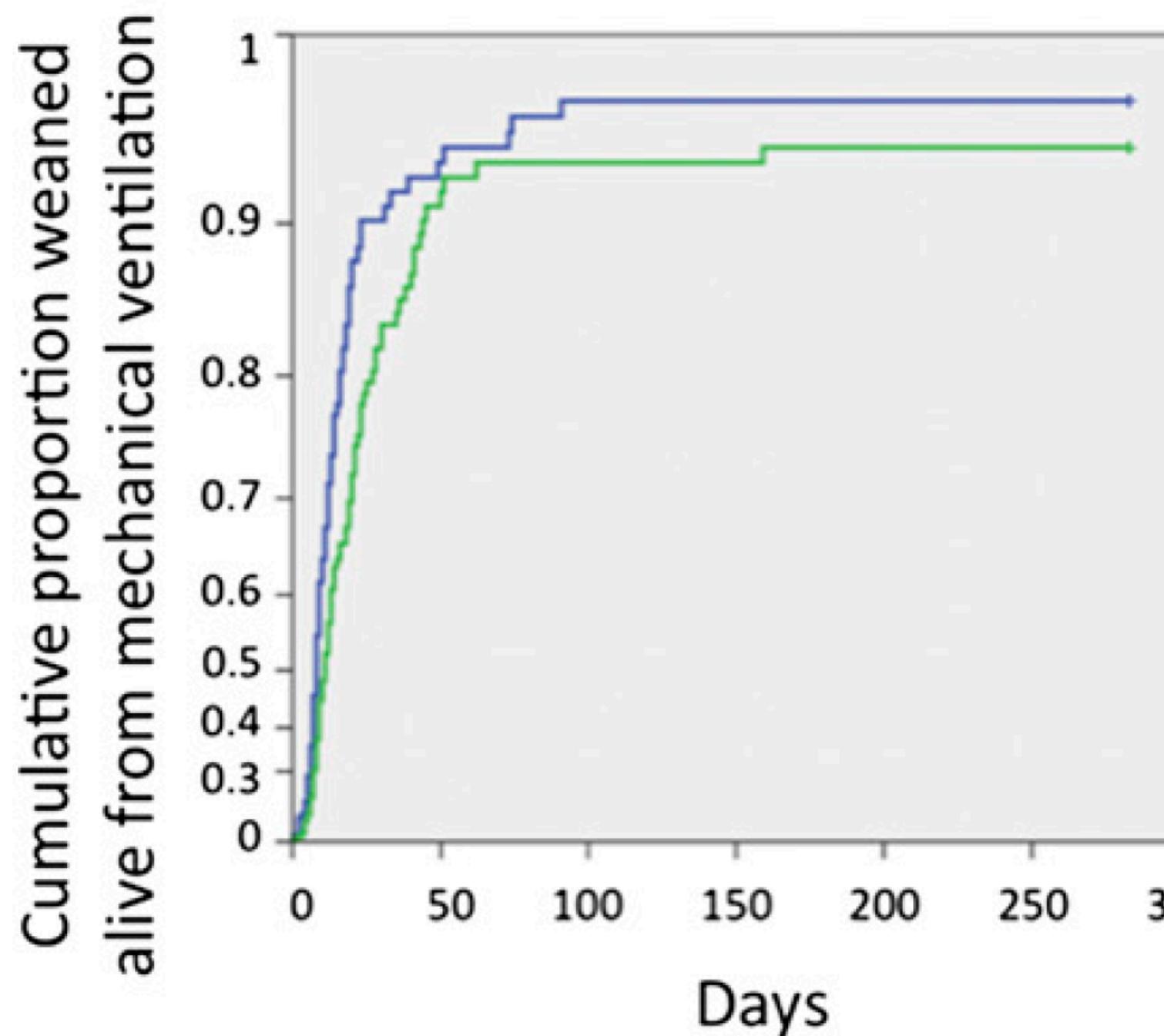


Myopathy

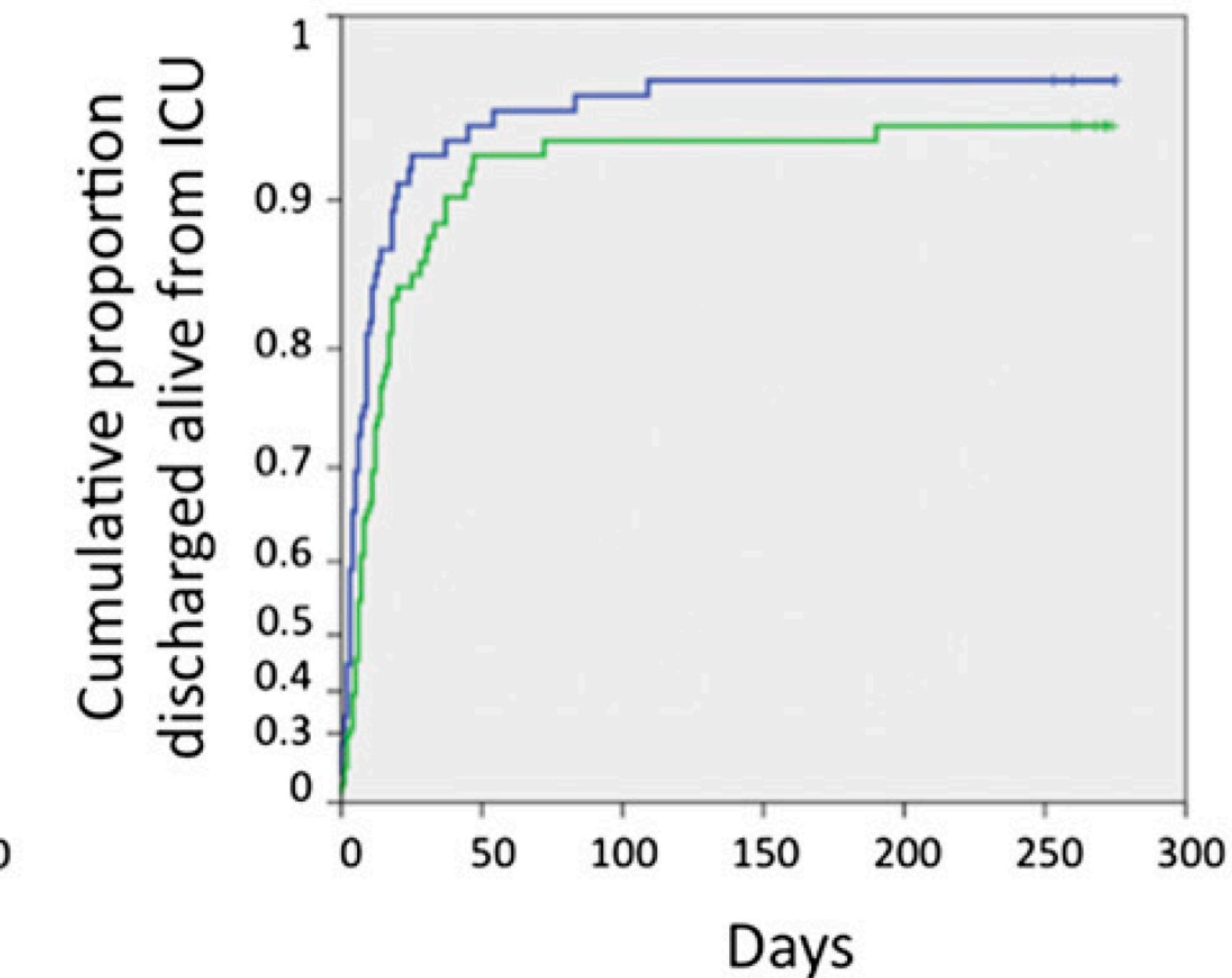
- Post-ICU voeding
- Post-ICU bewegen
- Electrostimulatie
- Beta-blockers
- Anabole steroiden
- Groei hormoon

Consequenties ICU Acquired Weakness ja/nee

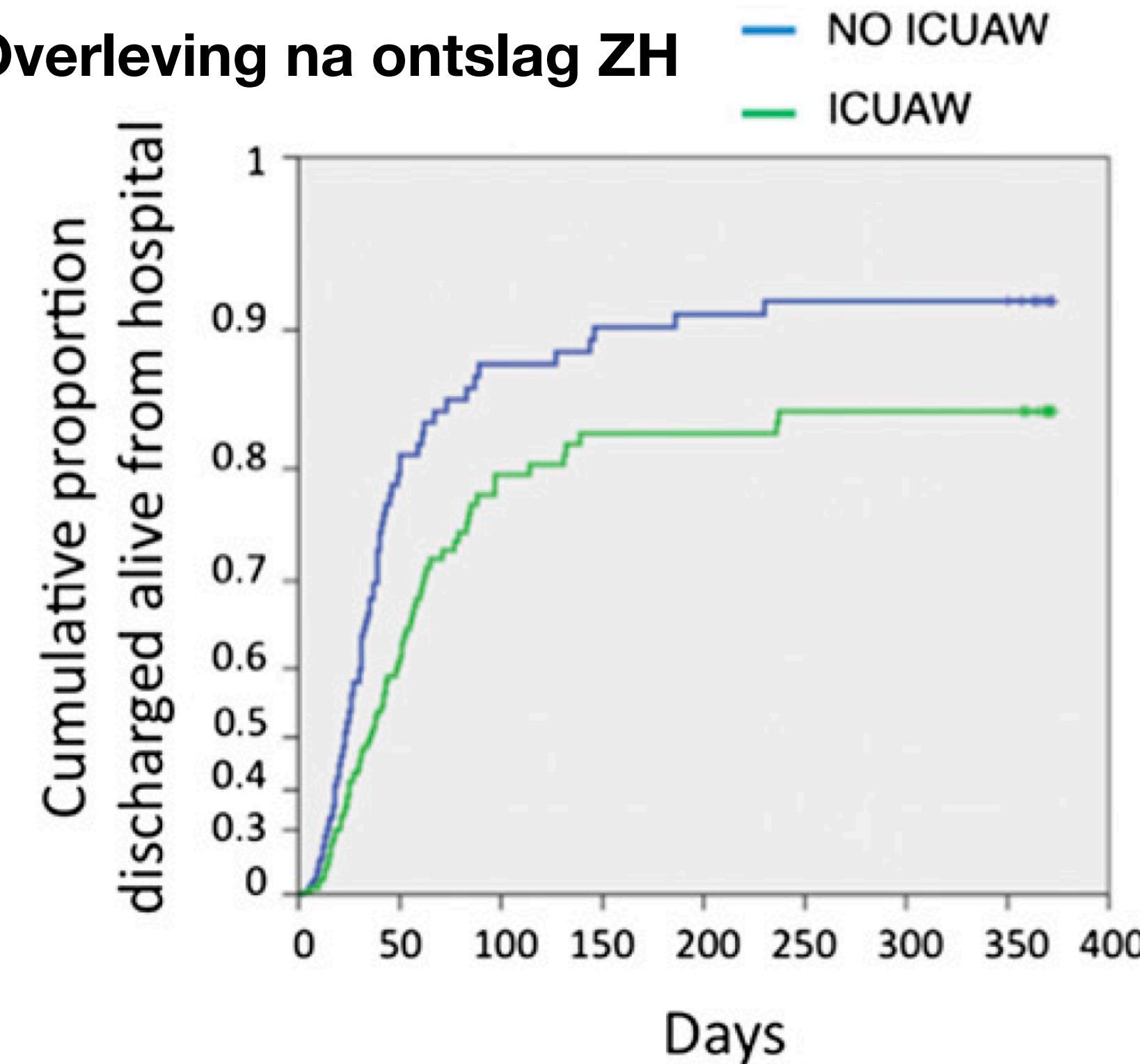
Weaning fvan beademing



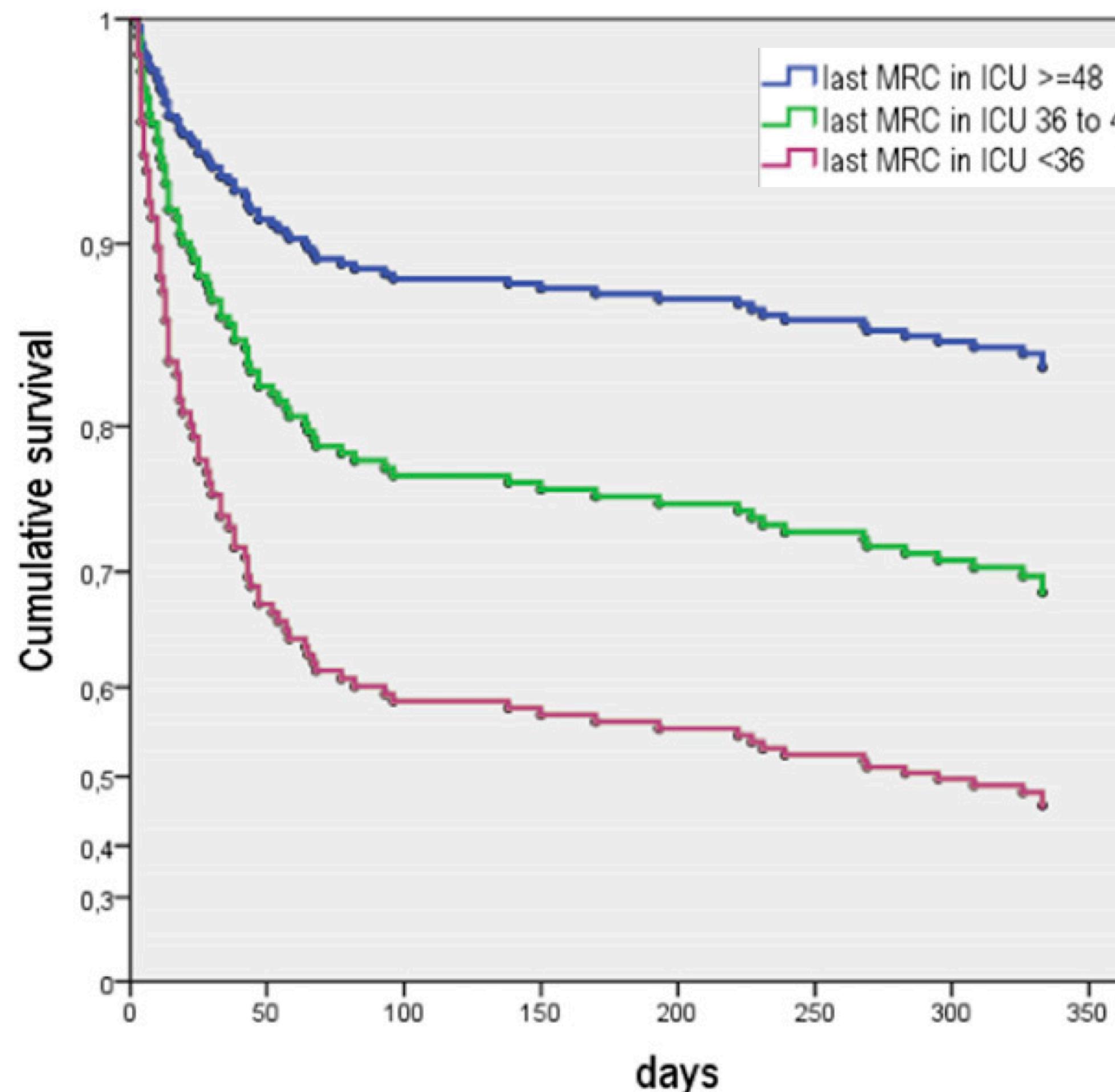
Overleving na ontslag IC



Overleving na ontslag ZH



Consequenties ICU Acquired Weakness ja/nee



Last MRC sum score recorded in the ICU

MRC sum score

- Involves the assessment of muscle power from 3 movements of each limb:
 - Shoulder abduction
 - Elbow flexion
 - Wrist extension
 - Hip flexion
 - Knee extension and
 - Ankle dorsiflexion.
 - Maximal power graded according to MRC scale.
 - Total score =60
- Deltoid
 - Biceps
 - Wrist extensor
 - Ileopsoas
 - Quadriceps femoris
 - Tibialis anterior

Strong association of ICU discharge weakness and 1 year mortality



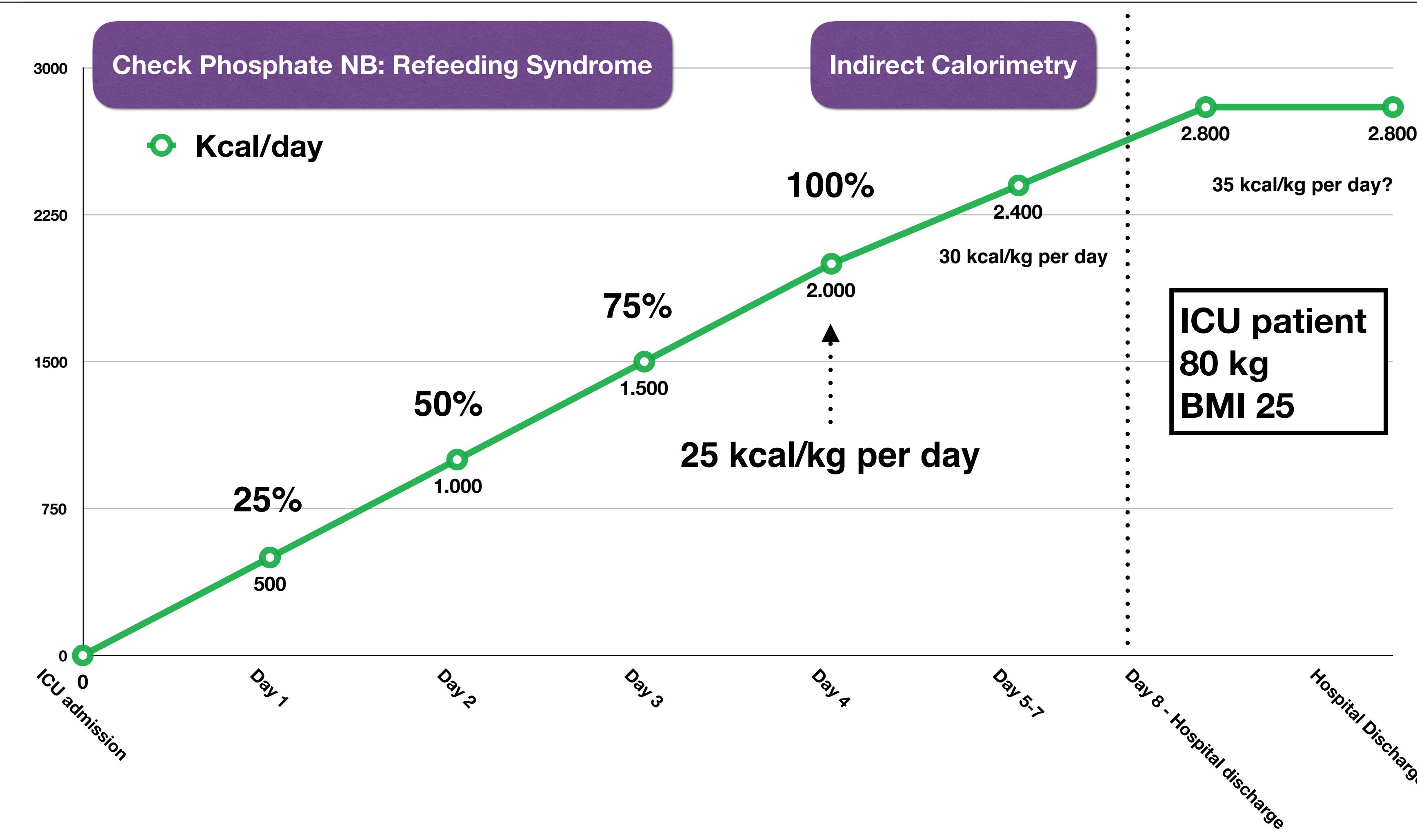
REVIEW



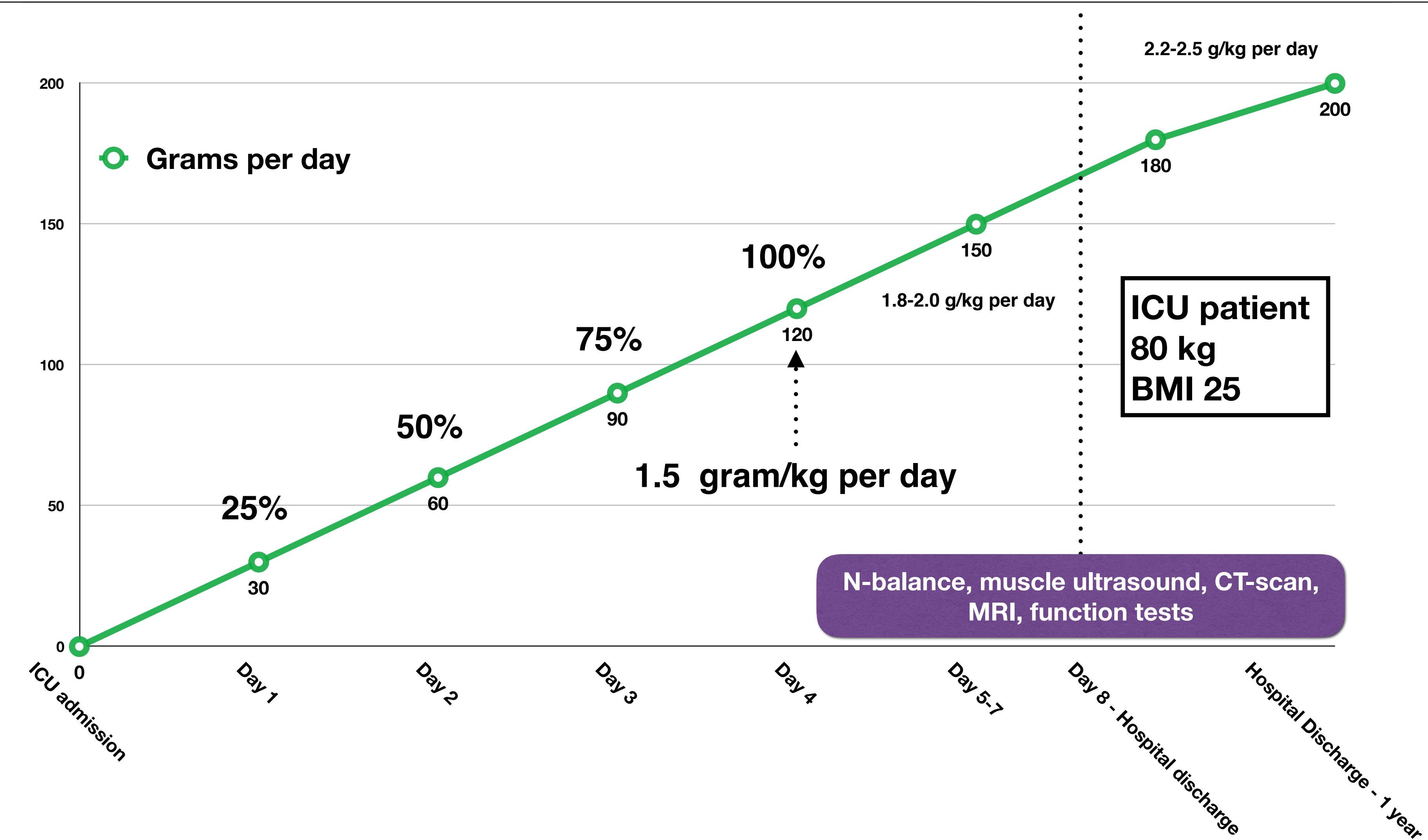
Nutrition in the ICU: new trends versus old-fashioned standard enteral feeding?

Kristine W.A.C. Koekkoek and Arthur R.H. van Zanten

Calorieën langzaam opbouwen bij sepsis



Eiwitten langzaam opbouwen bij sepsis

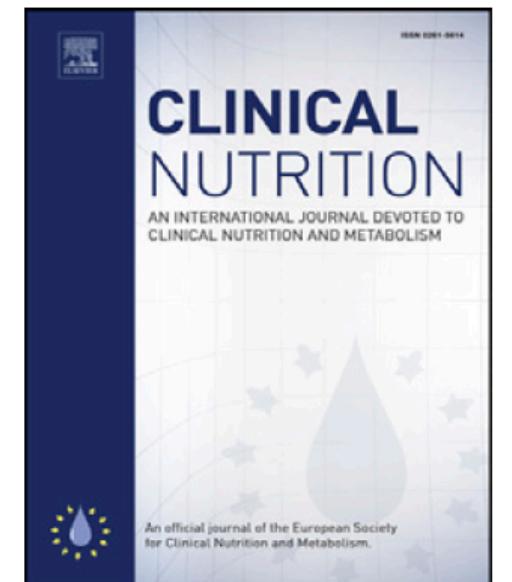




Contents lists available at [ScienceDirect](#)

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>



Review

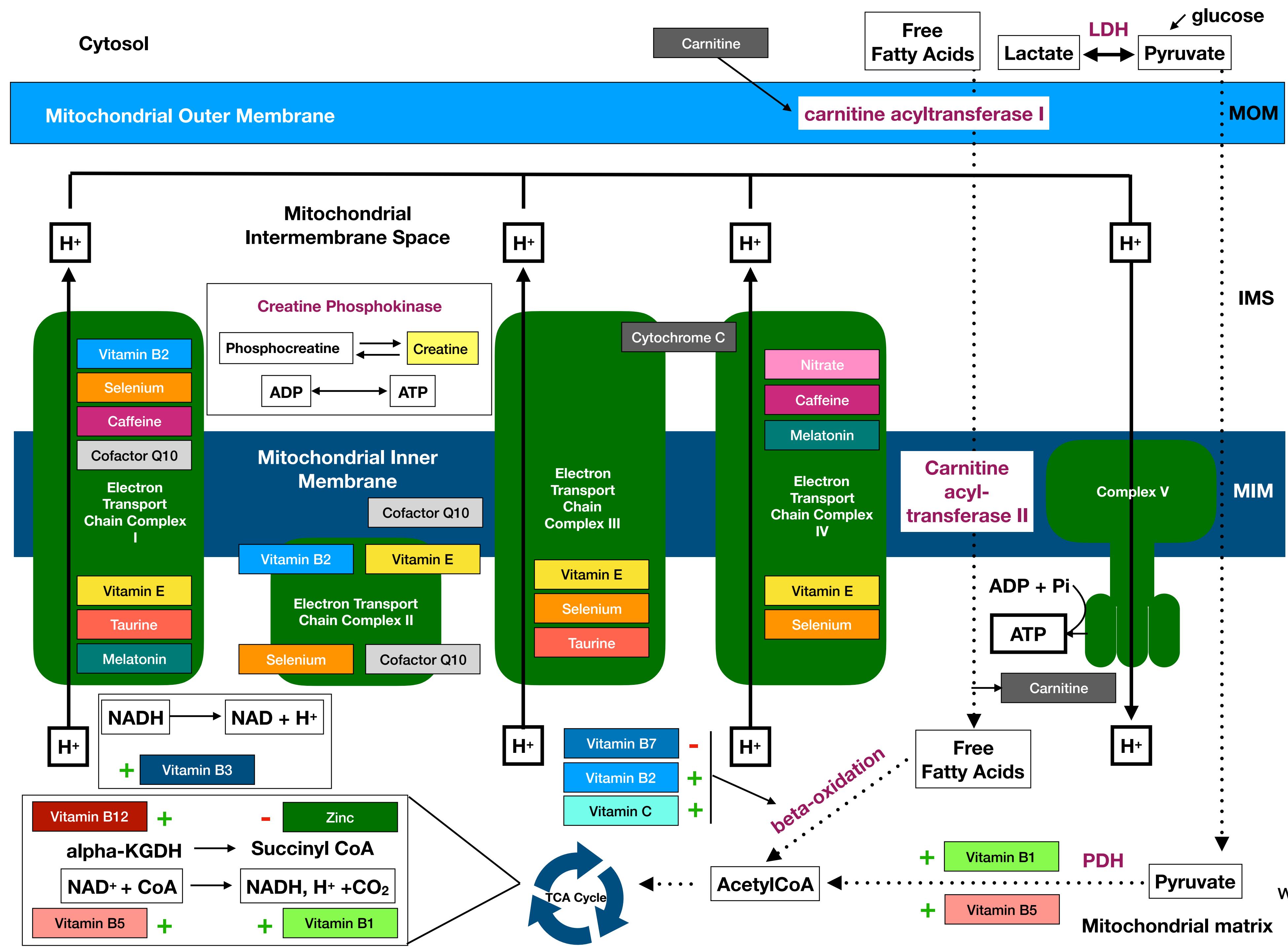
Feeding mitochondria: Potential role of nutritional components to improve critical illness convalescence

E. Wesselink ^a, W.A.C. Koekkoek ^b, S. Grefte ^c, R.F. Witkamp ^a, A.R.H. van Zanten ^{b,*}

^a Division of Human Nutrition and Health, Wageningen University, Stippeneng 4, 6708 WE, Wageningen, The Netherlands

^b Department of Intensive Care Medicine, Gelderse Vallei Hospital, Willy Brandtlaan 10, 6716, Ede, The Netherlands

^c Human and Animal Physiology, Wageningen University, De Elst 1, 6708 DW, Wageningen, The Netherlands



Voeding voor mitochondriën: potentiële kandidaten

Mitochondrial function

- B vitamins
- ascorbic acid
- α-tocopherol
- Selenium
- Zinc
- Coenzyme Q10
- Caffeine
- Melatonin
- Carnitine
- Nitrate
- Lipoic acid
- Taurine
- Resveratrol



Tricarboxylic acid (TCA) cycle

- Vitamin B1
- Vitamin B5
- Vitamin B12
- Lipoic acid
- Zinc



Boost the electron transport chain function

- Vitamin B1
- selenium
- α-tocopherol
- Coenzyme Q10
- Caffeine
- Melatonin



Lipids beta-oxidation

- Carnitine



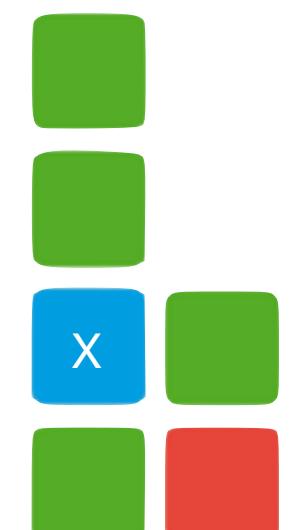
Mitochondrial biogenesis

- Resveratrol
- Selenium



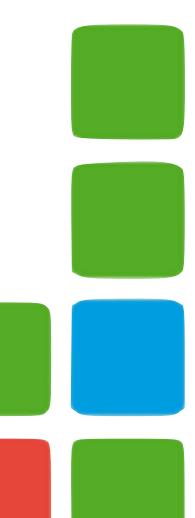


Spiereiwitsynthese en beweging





Vroegmobiliseren op de IC



Journal of Cachexia, Sarcopenia and Muscle (2016)

Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/jcsm.12146

Exercise rehabilitation following intensive care unit discharge for recovery from critical illness: executive summary of a Cochrane Collaboration systematic review

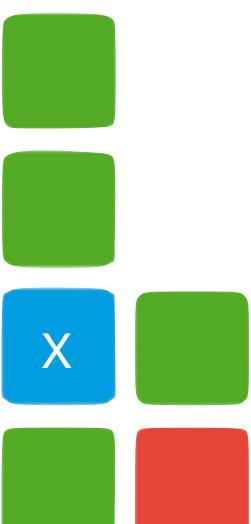
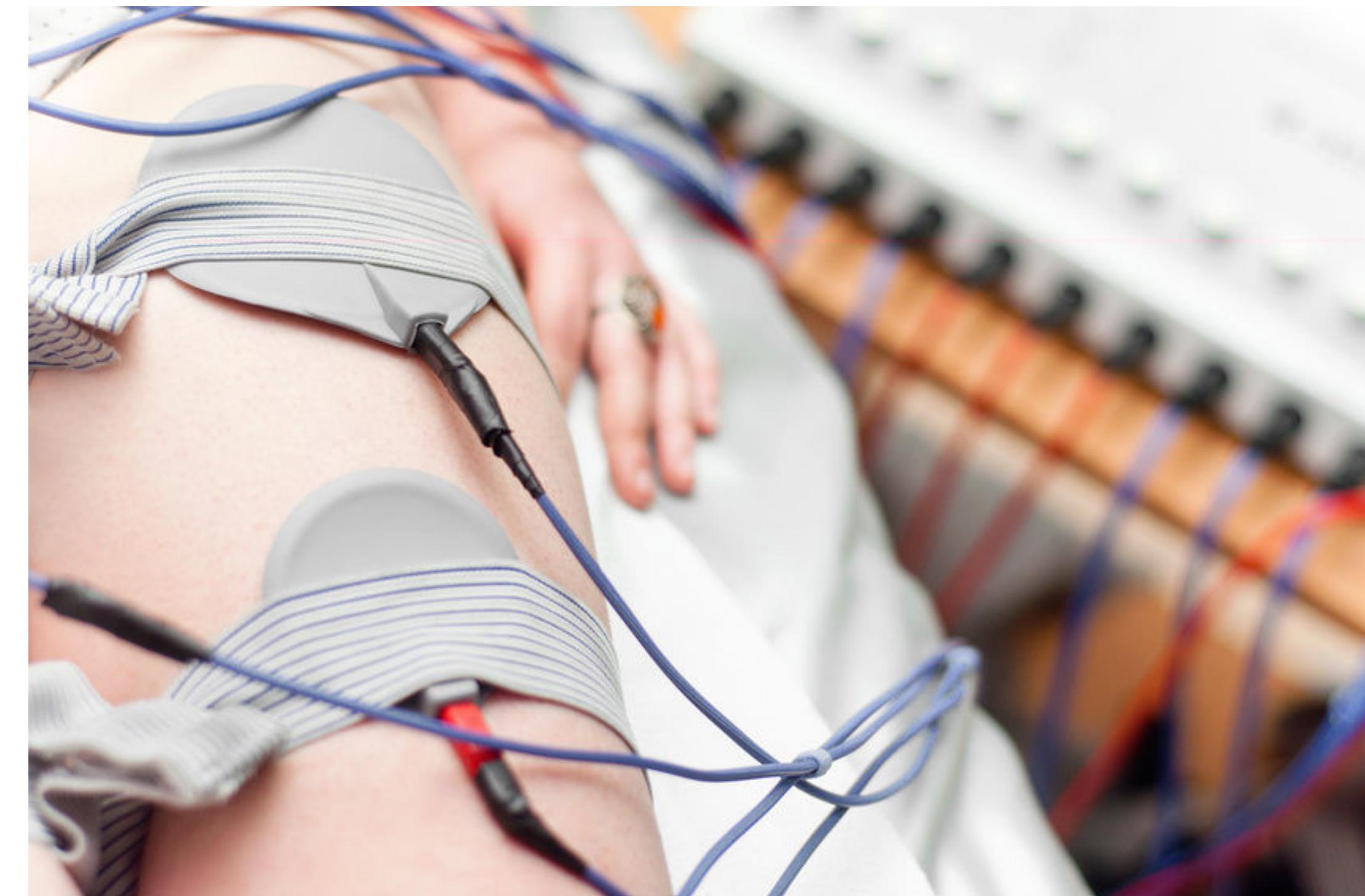
Bronwen Connolly^{1,2,3*}, Lisa Salisbury⁴, Brenda O'Neill⁵, Louise Geneen⁶, Abdel Douiri^{3,7}, Michael P. W. Grocott^{8,9,10}, Nicholas Hart^{1,2,3}, Timothy S. Walsh¹¹ & Bronagh Blackwood¹²

Geen functie verbetering en kwaliteit van leven door bewegingsrevalidatie na ontslag IC.

HOE KAN DAT?



Oefenen in bed met fiets en electrostimulatie





ELSEVIER

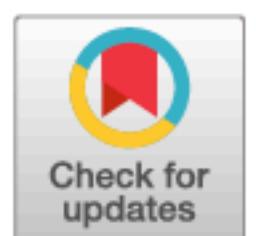
Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.journals.elsevier.com/journal-of-critical-care



Interventions for the management and prevention of sarcopenia in the critically ill: A systematic review



Samuel P. Trethewey ^a, Nicholas Brown ^b, Fang Gao ^{a,c}, Alice M. Turner ^{a,d,*}

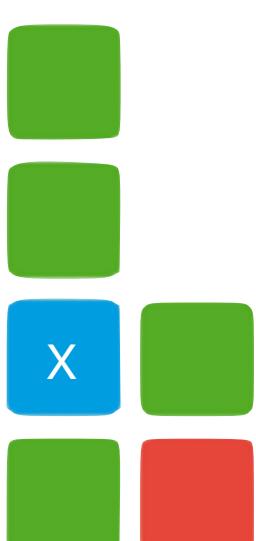
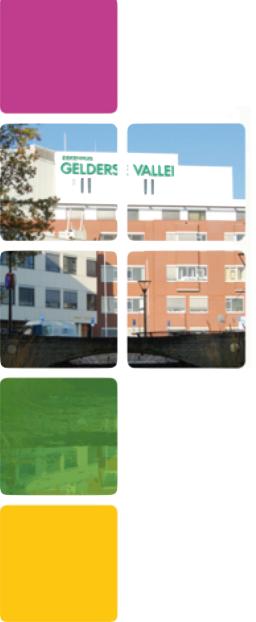
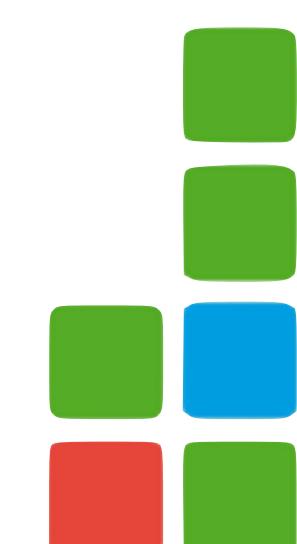
^a University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK

^b University of Birmingham, Birmingham, UK

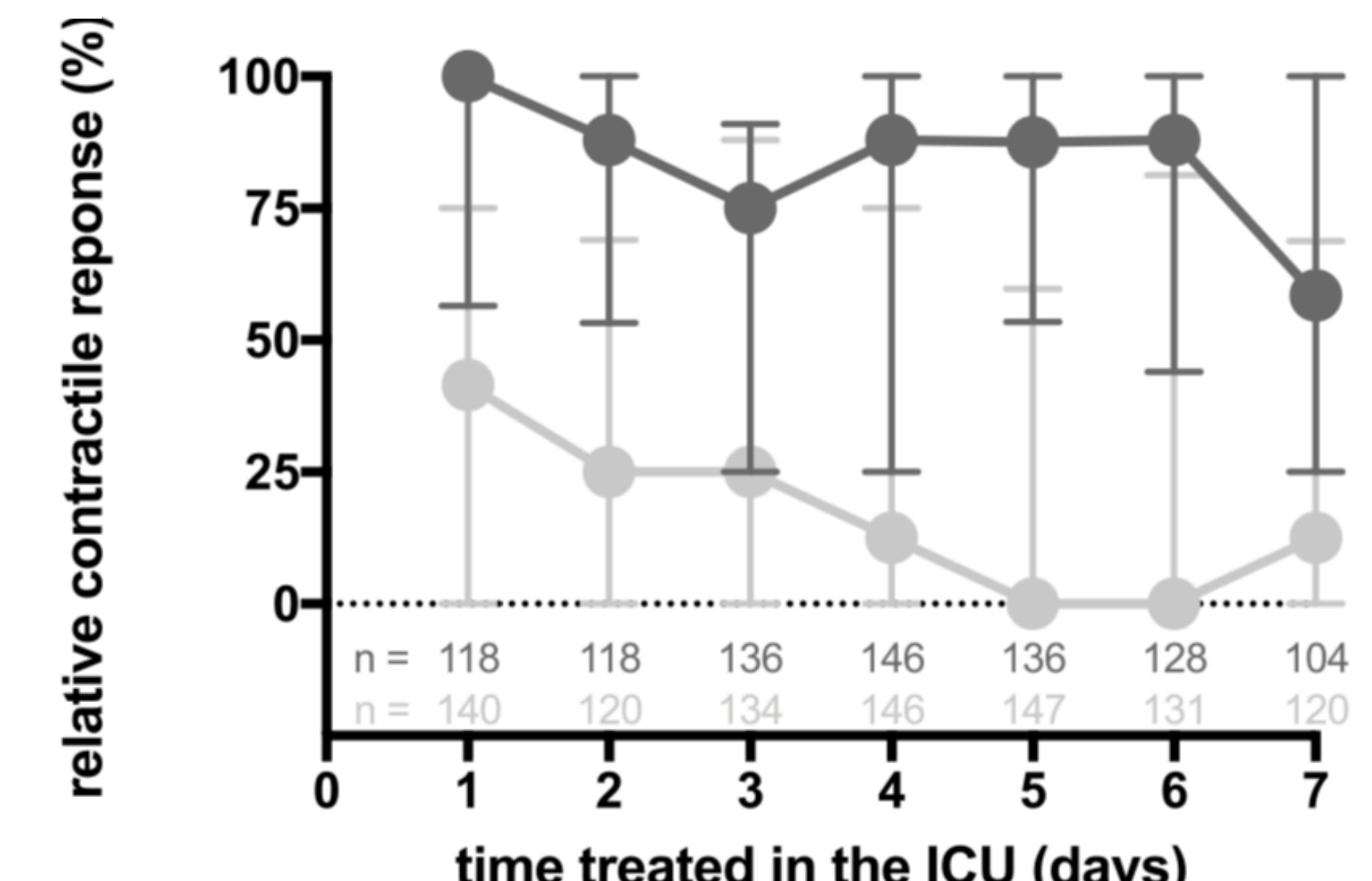
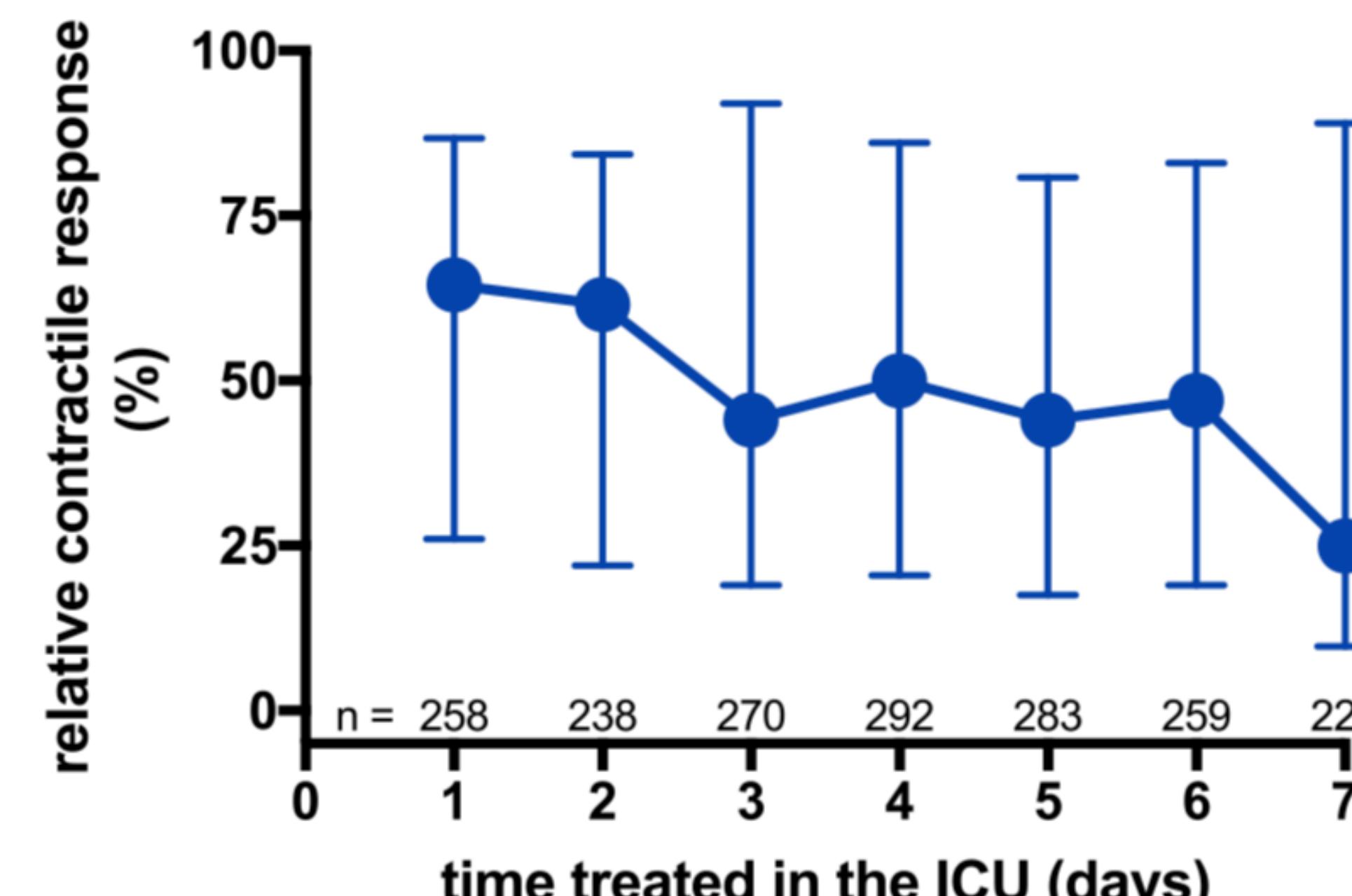
^c Birmingham Acute Care Research Group, University of Birmingham, Birmingham, UK

^d Institute of Applied Health Research, University of Birmingham, Birmingham, UK.

**Electrostimulatie en bewegen kan effect hebben op spiermassa. Maar geen consistente bevindingen.
HOE KAN DAT?**

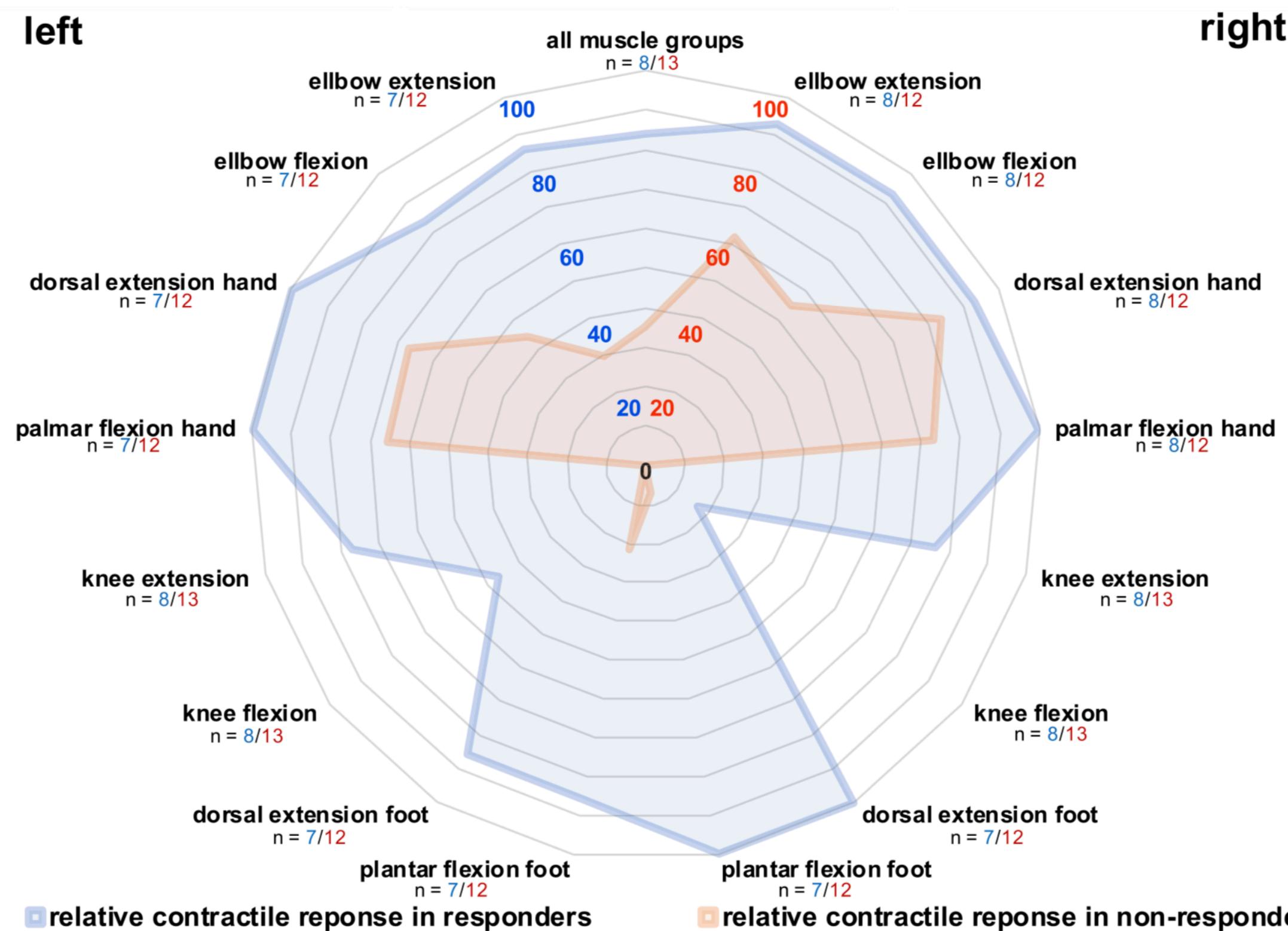


Differential contractile response to NMES in ICU patients

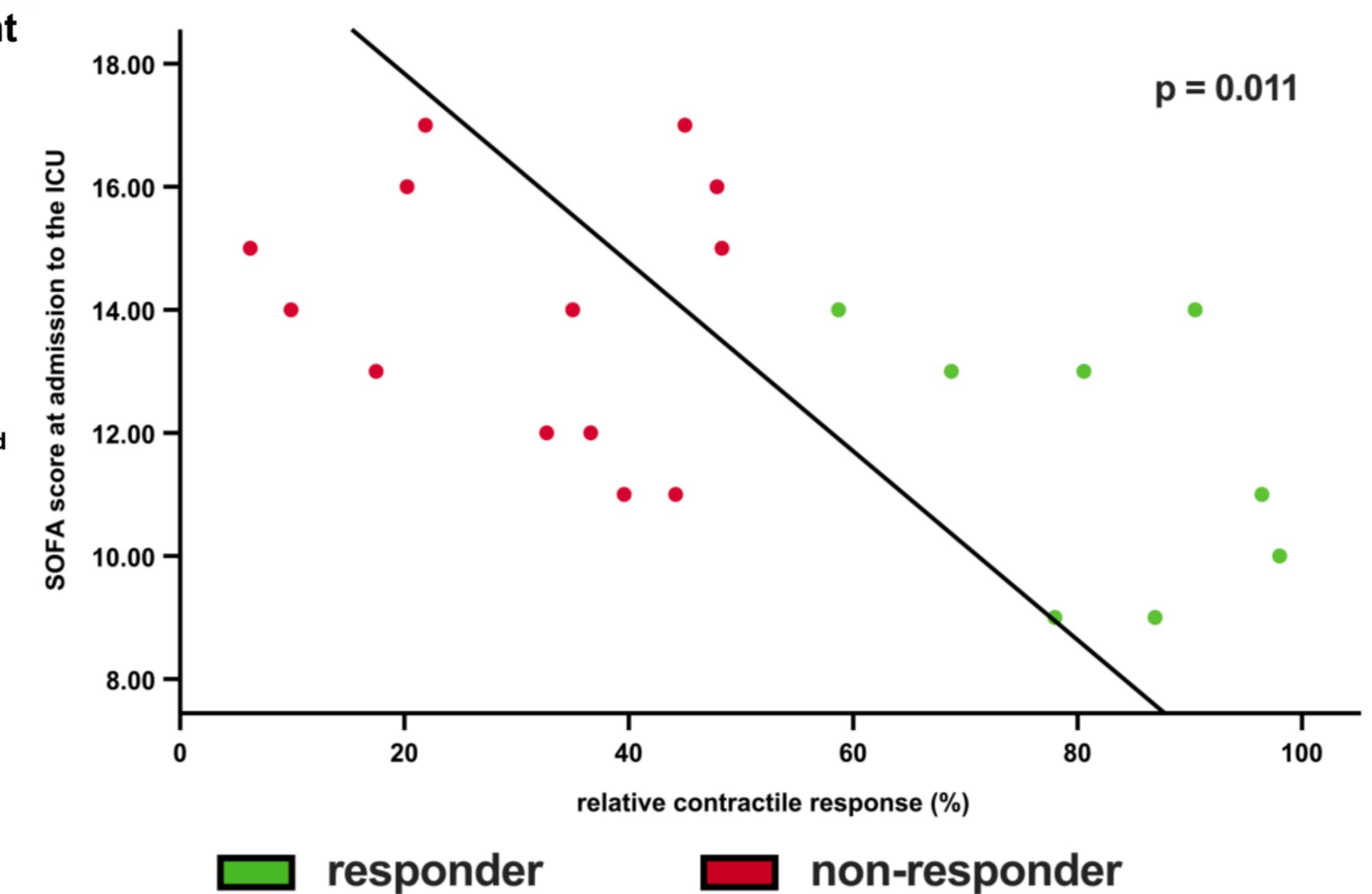


Differential contractile response to NMES in ICU patients

Not all muscles are equal



Higher SOFA lower contractile response



Niet eiwitten of calorieën zijn het belangrijkst, energie in de cel daar gaat het om.



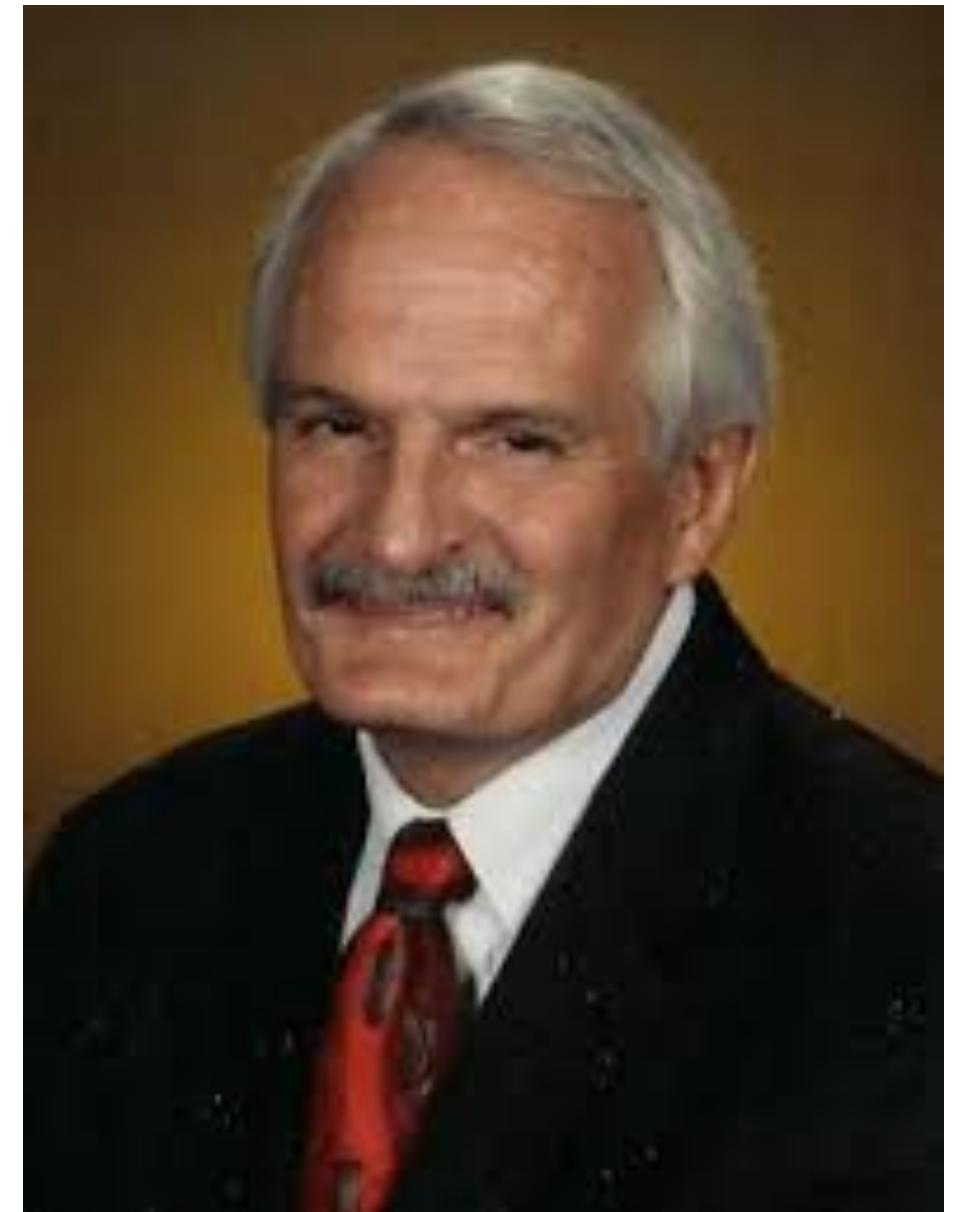
Zudin Puthucheary



Arthur van Zanten



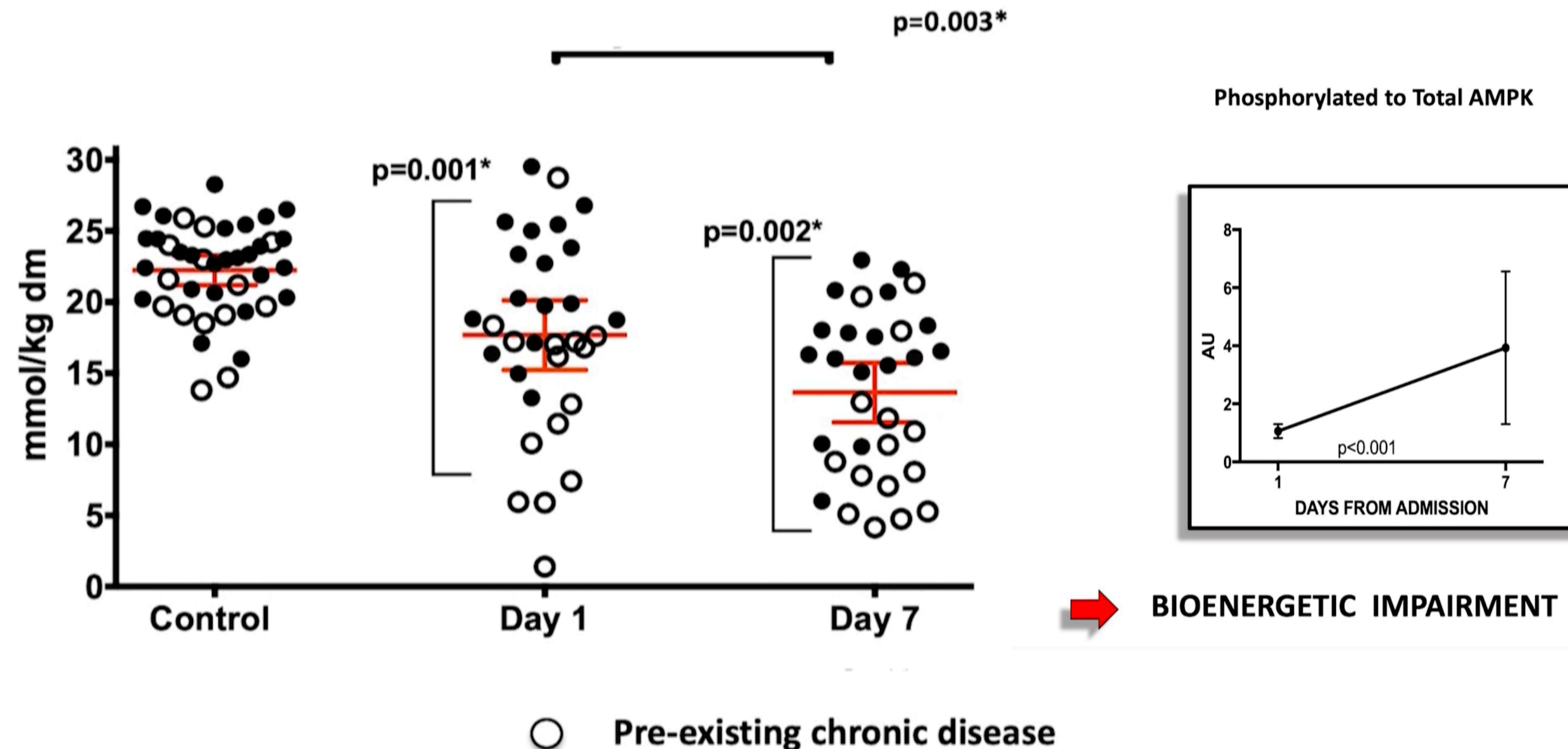
Bob Martindale

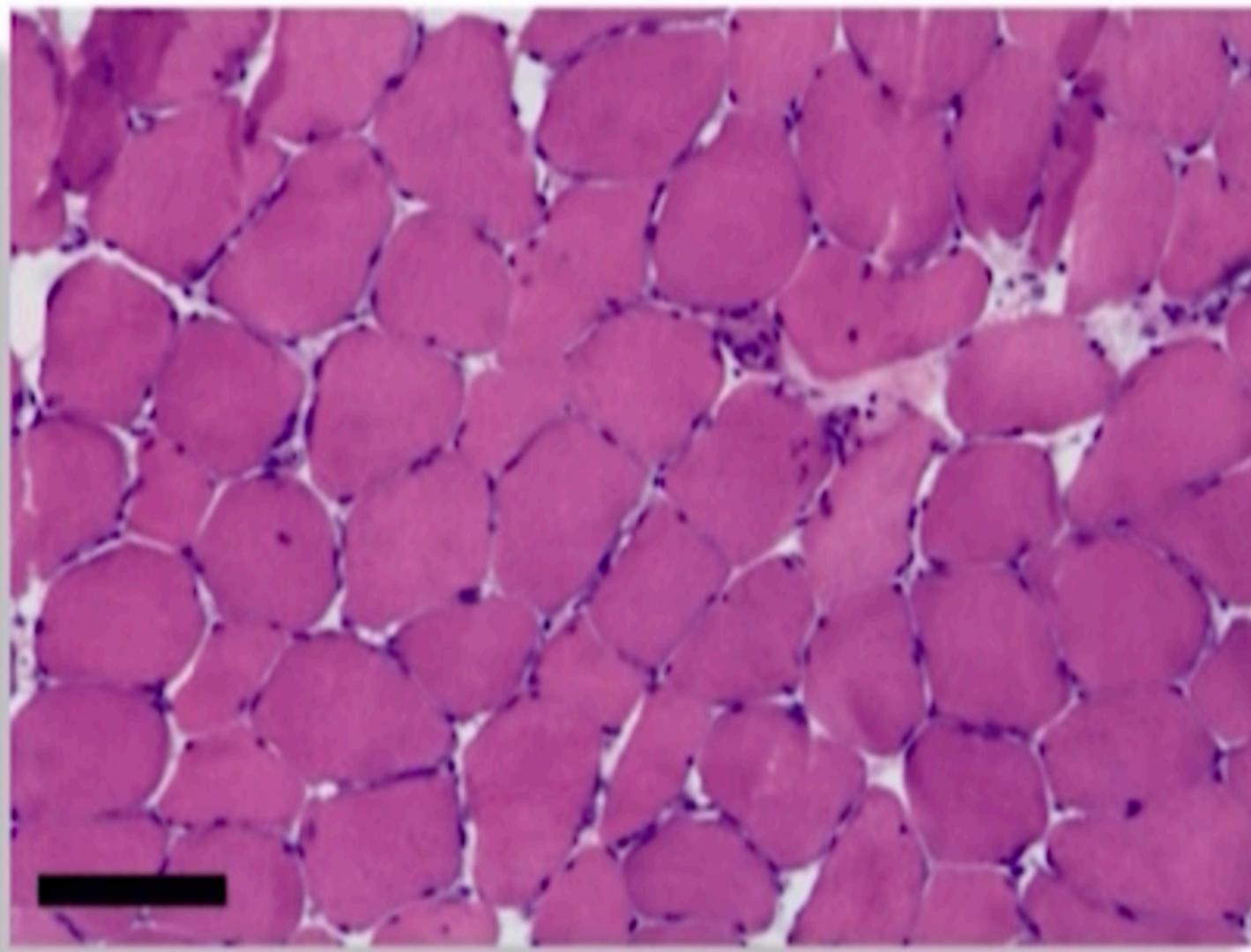


Steve McClave

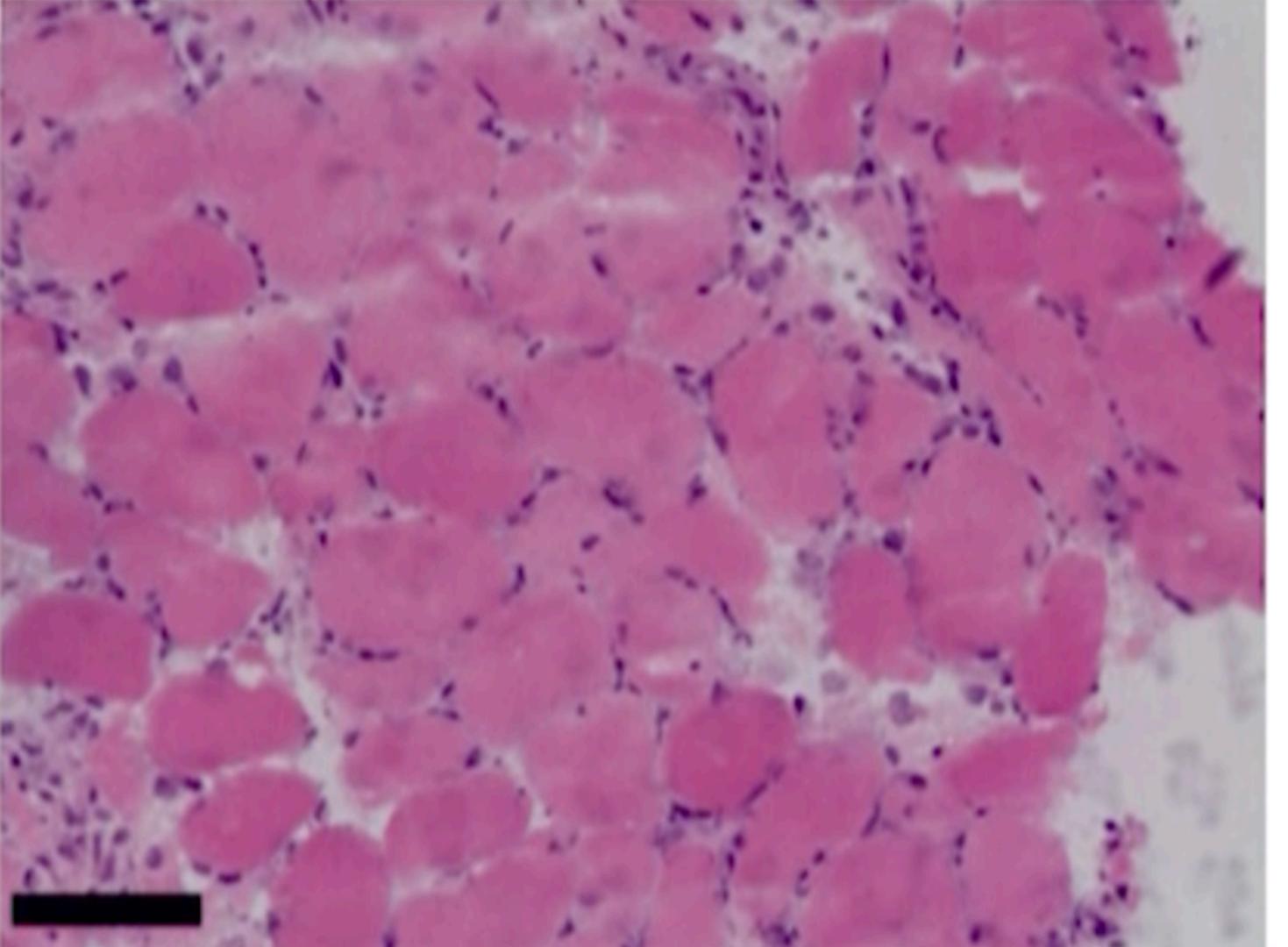
Als spieren geen ATP meer hebben kan bewegen leiden to afsterven van spiercellen

Afname van ATP in spiercellen met name bij patient met chronische aandoeningen

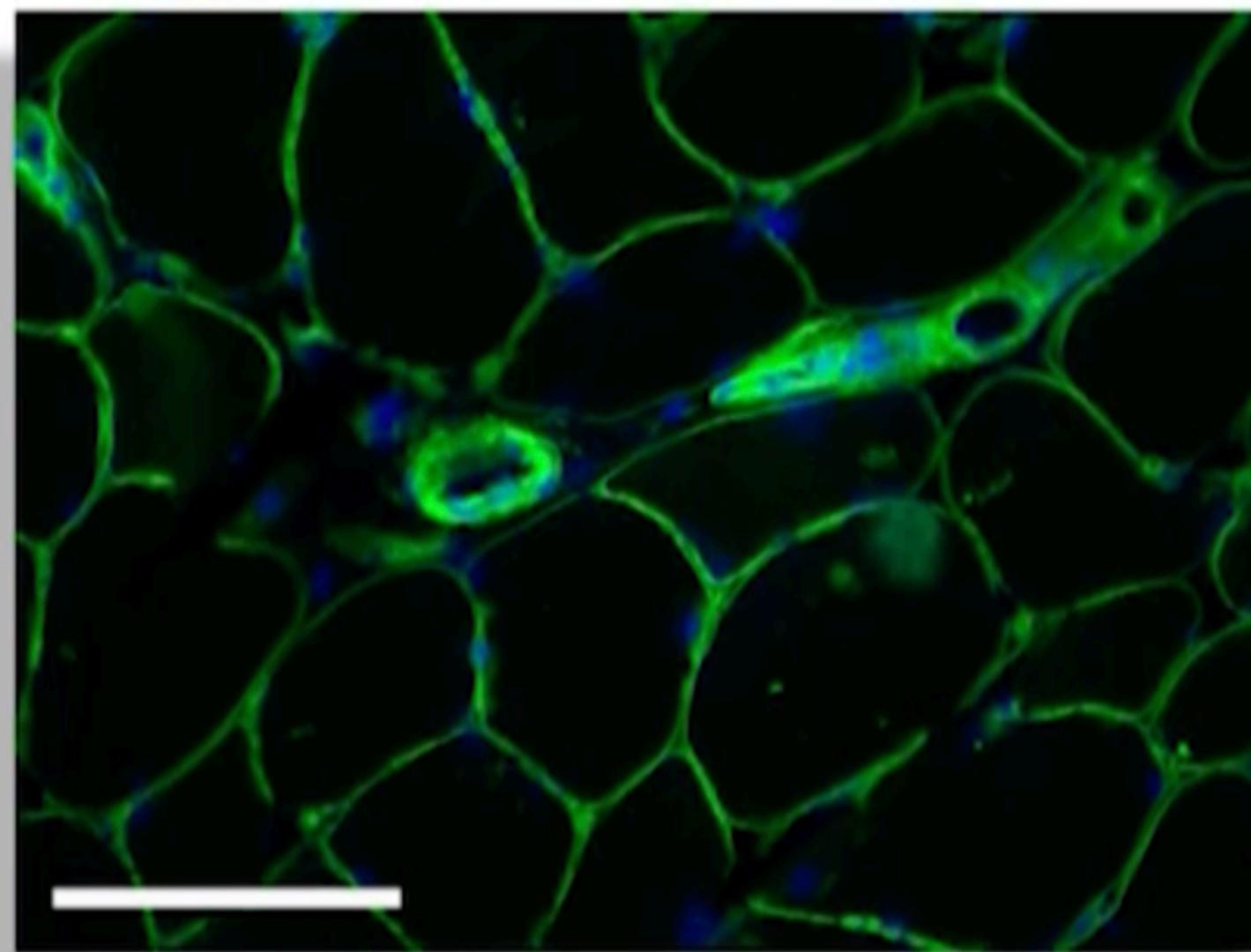




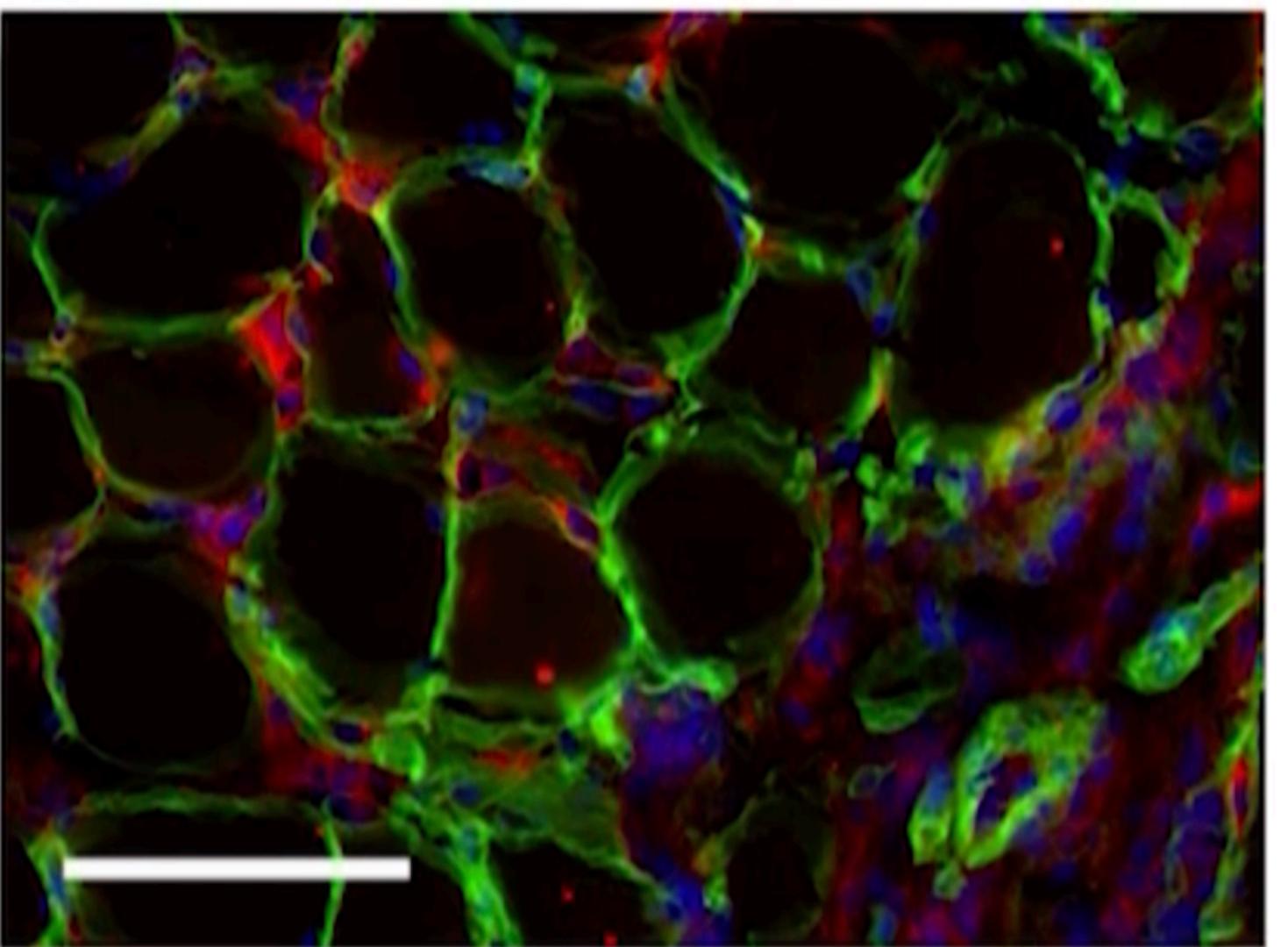
d1-d7



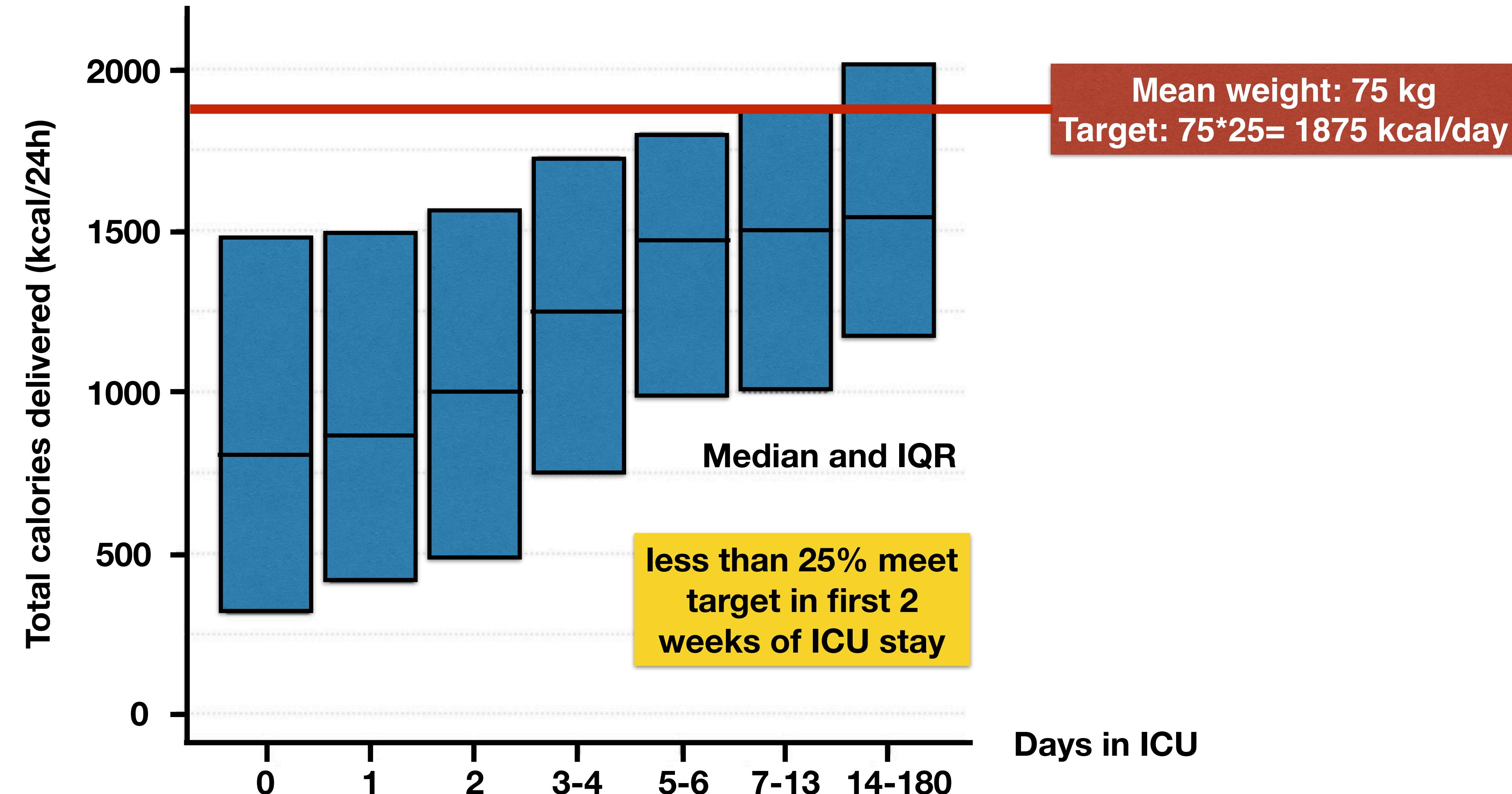
Myonecrose en ontsteking: Spierontsteking



d1-d7



NutritionDay ICU: A 7 year worldwide prevalence study of nutrition practice in intensive care



What Happens to Nutrition Intake in the Post–Intensive Care Unit Hospitalization Period? An Observational Cohort Study in Critically Ill Adults

Journal of Parenteral and Enteral Nutrition
Volume 00 Number 0
May 2018 1–8
© 2018 American Society for
Parenteral and Enteral Nutrition
DOI: 10.1002/jpen.1196
wileyonlinelibrary.com

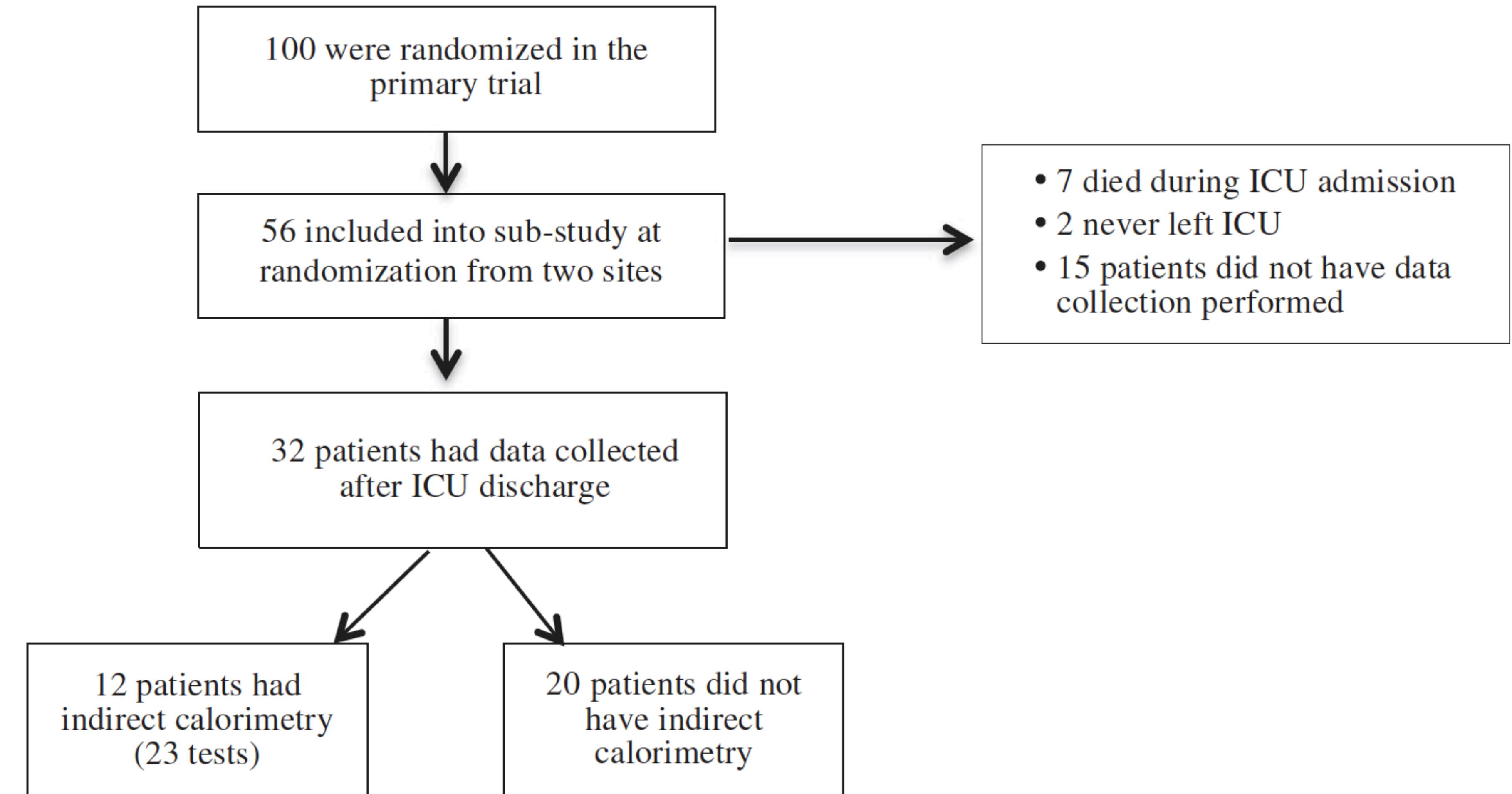
WILEY

Emma J. Ridley, BNutDiet, MPH, APD^{1,2} ; Rachael L. Parke, PhD, MHSc, RN^{1,3,4,5}; Andrew R. Davies, MBBS, FRACP¹; Michael Bailey, PhD, MSc, BSc(Hons)¹; Carol Hodgson, PhD, MPhil, BAppSc(PT), PGDip(Cardio), FACP^{1,6}; Adam M. Deane, PhD, MBBS⁷ ; Shay McGuinness, MB, ChB, FRCA, FANZCA^{1,3,5}; and D. James Cooper, MD, FRACP, FJFICM, FCICM^{1,8}

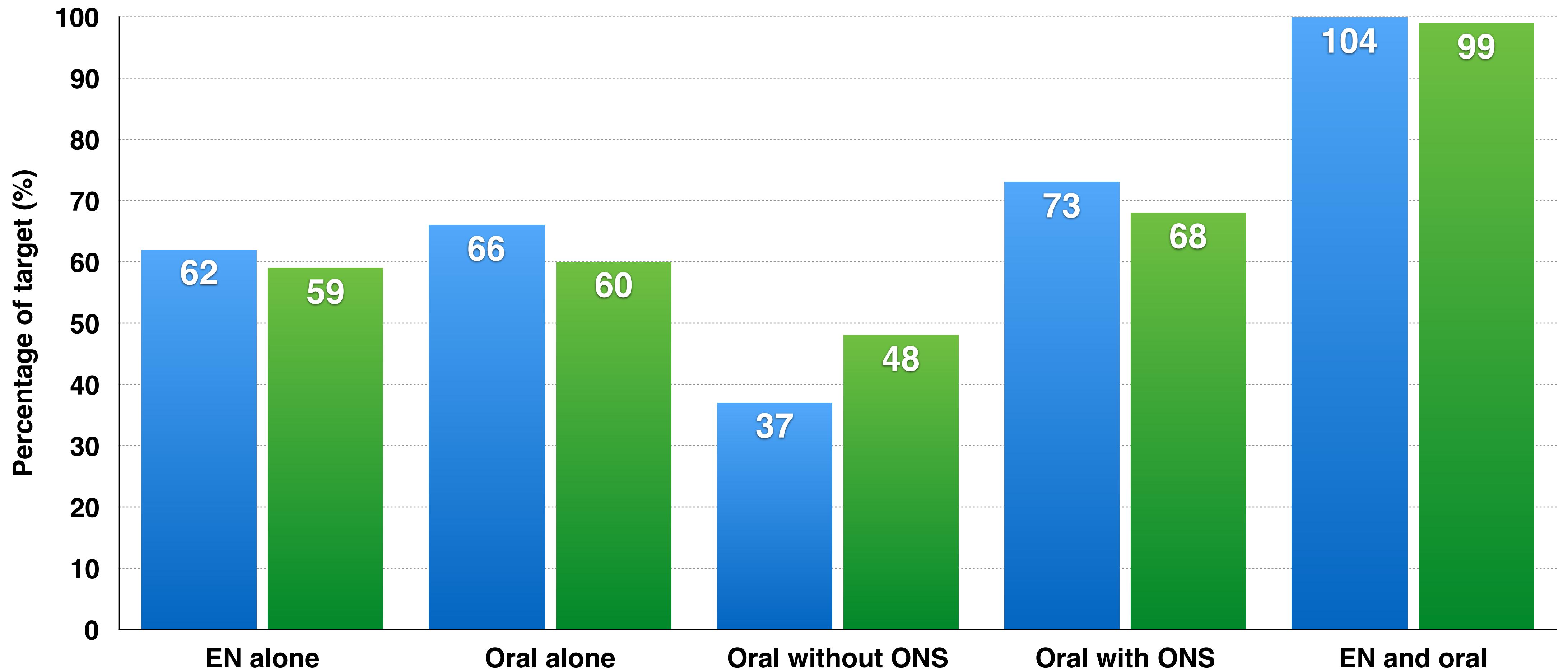


After discharge from ICU, energy and protein intake was quantified periodically and indirect calorimetry attempted.

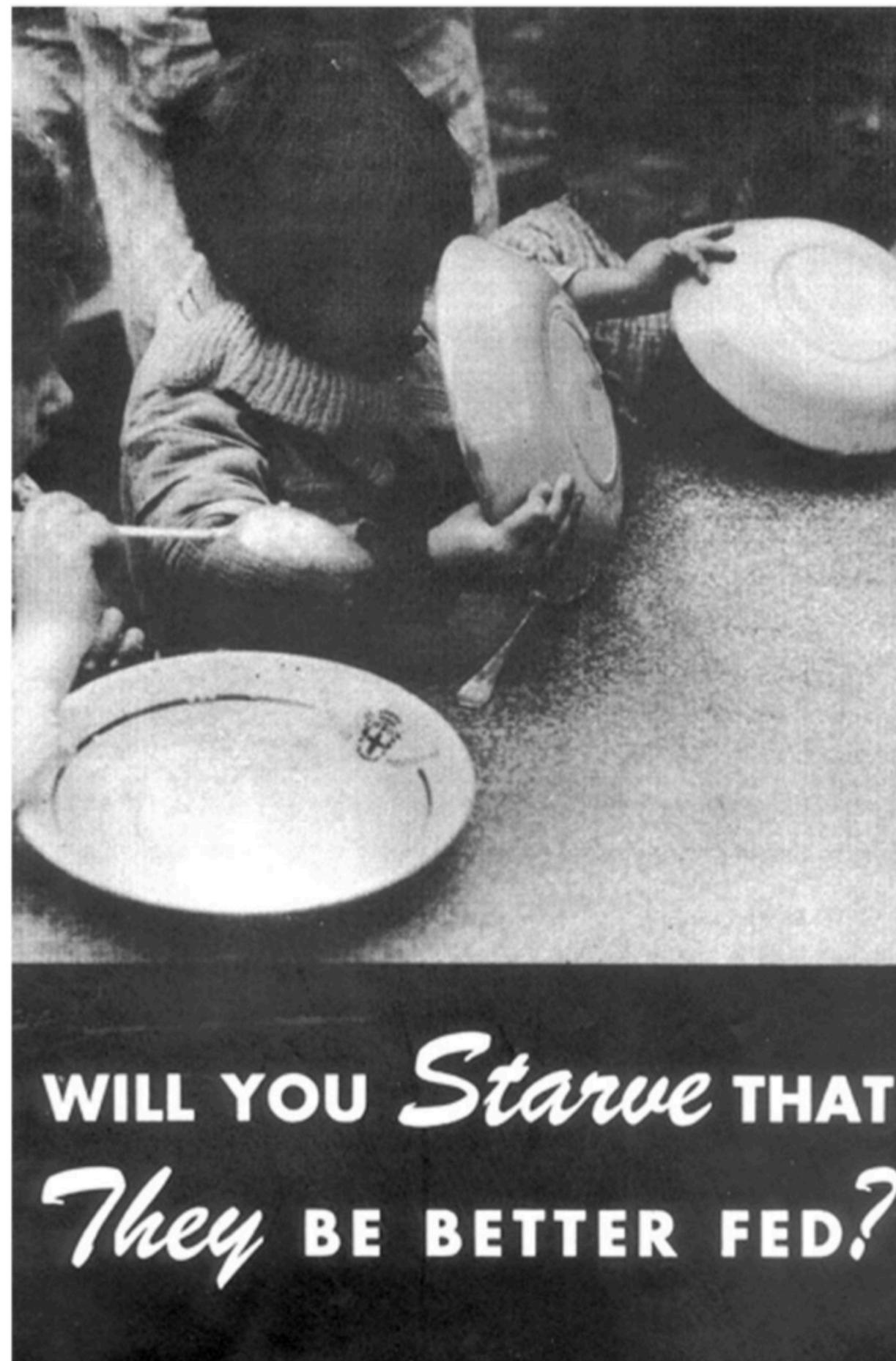
Post-ICU voeding



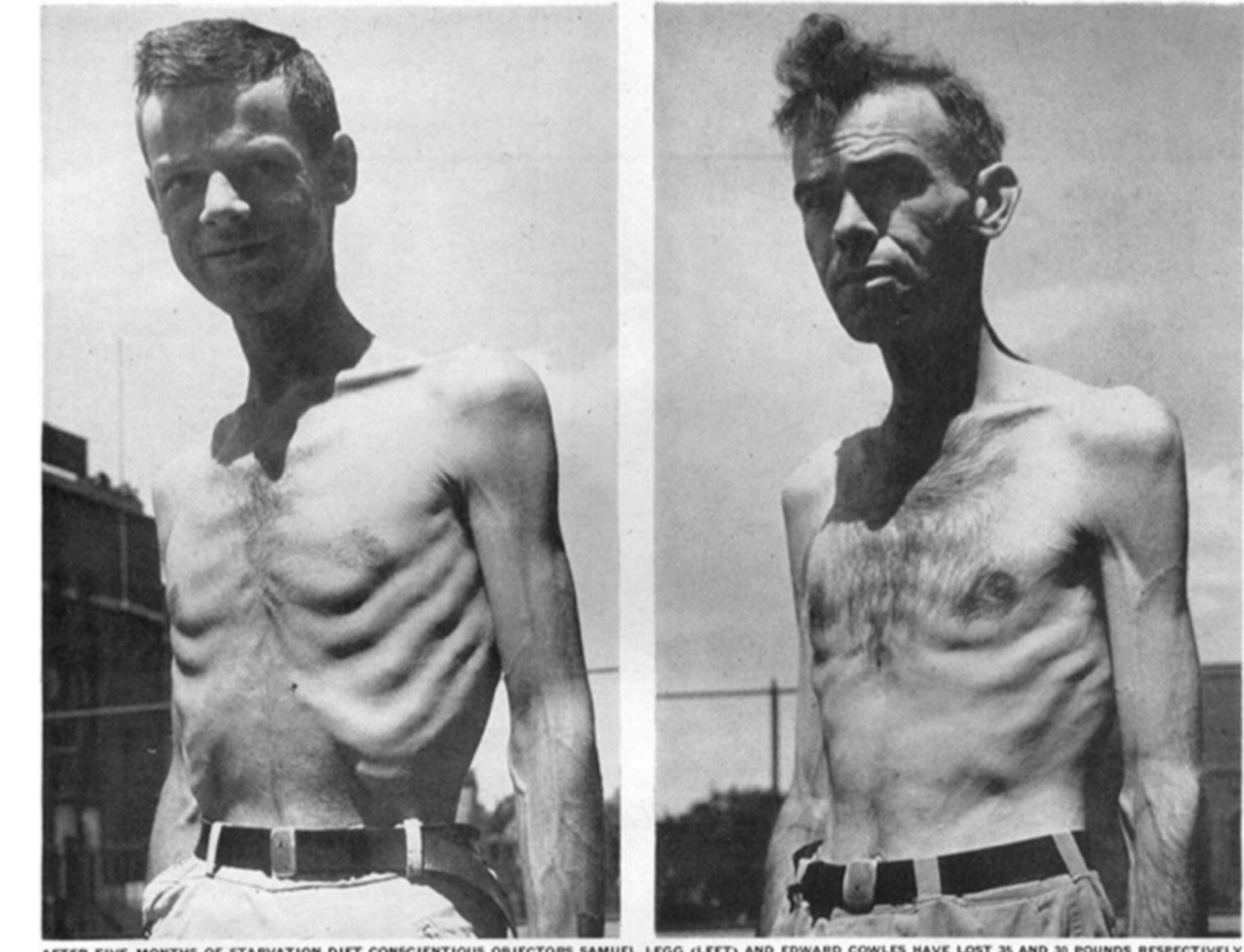
Post-ICU voeding: percentage van doel behaald



Hoeveel moet je eten na IC ontslag?



Afval periode:
1800 kcal/dag



MEN STARVE IN MINNESOTA
CONSCIENTIOUS OBJECTORS VOLUNTEER FOR STRICT HUNGER TESTS TO STUDY EUROPE'S FOOD PROBLEM

Minnesota starvation project

Gedurende 1 jaar:

2-2.5 g/kg/dag (3x normaal)

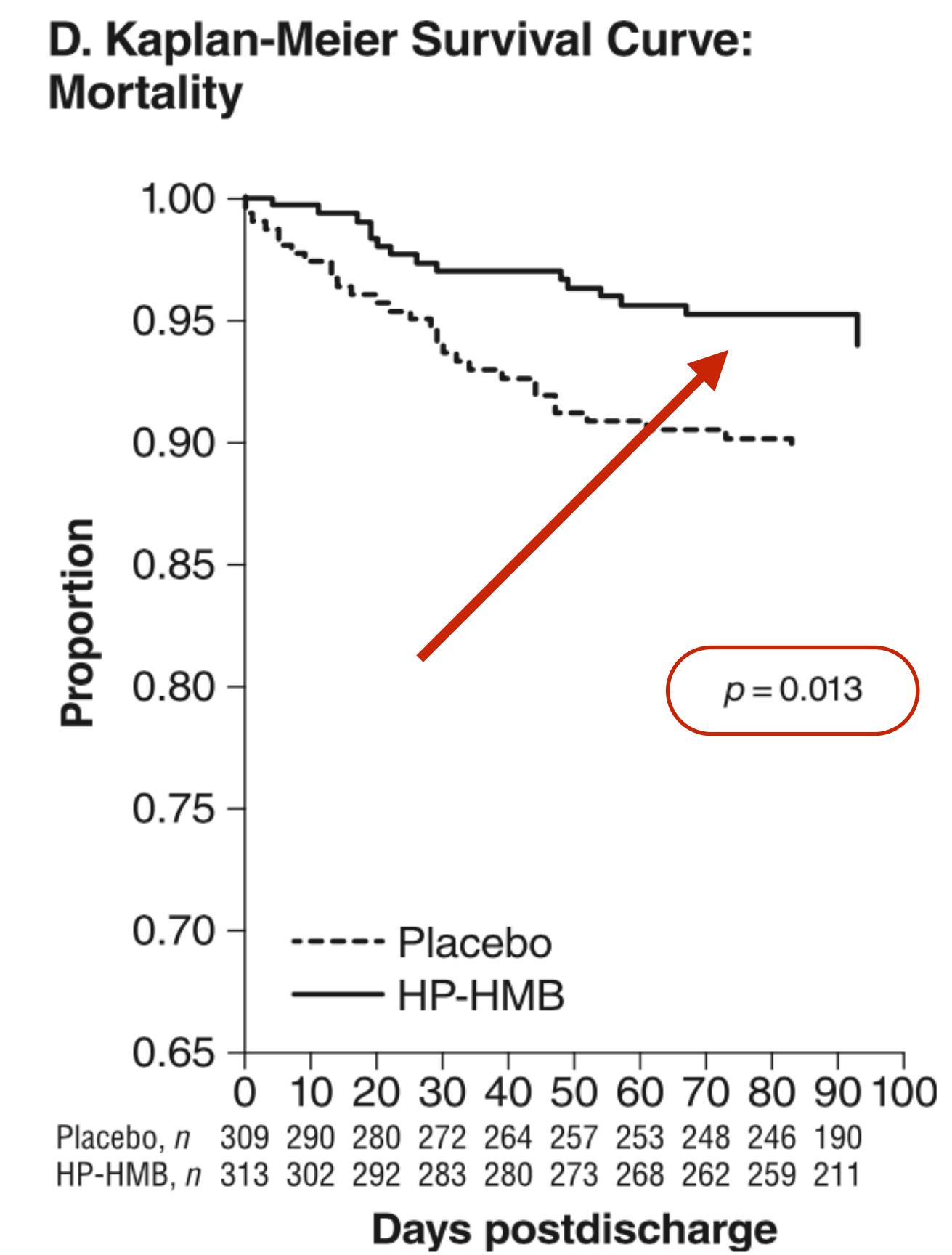
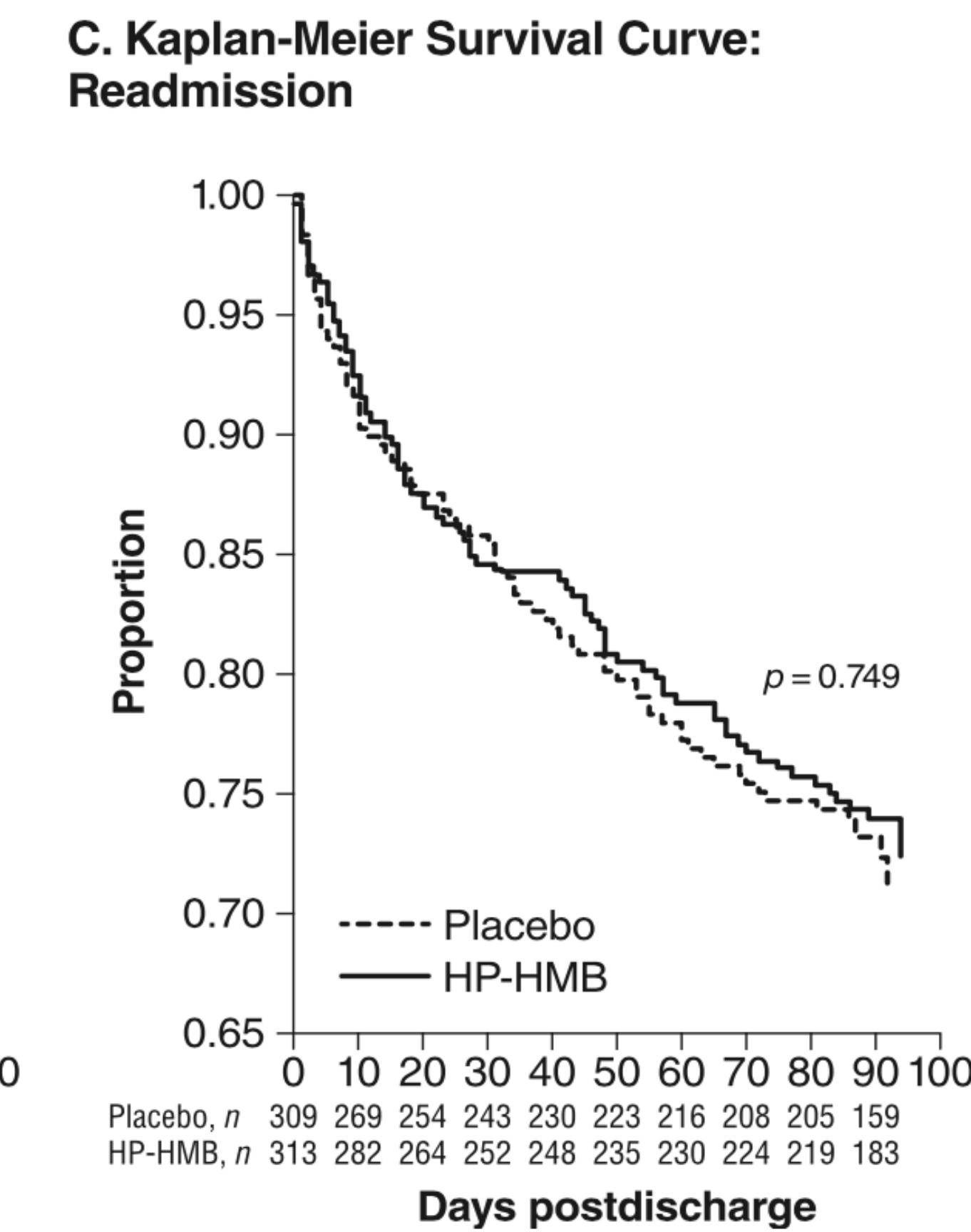
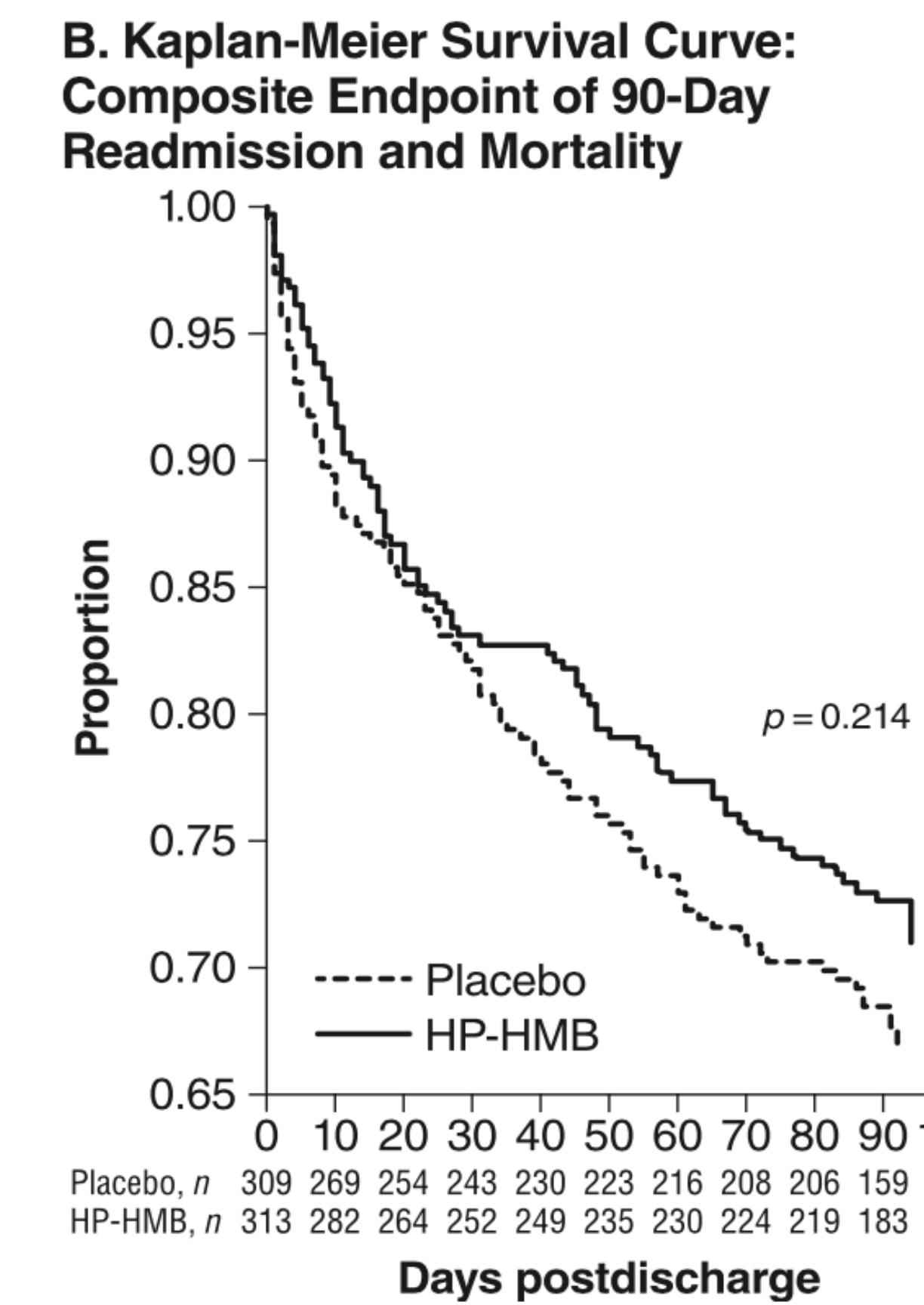
4000-4500 kcal/dag (2-3x normaal)

Starvation period:
1800 kcal/day



Nourish studie: eiwitdrankjes na ontslag kunnen helpen (geen sepsis)

Older (≥ 65 years), malnourished (Subjective Global Assessment [SGA] class B or C) adults hospitalized for congestive heart failure, acute myocardial infarction, pneumonia, or chronic obstructive pulmonary disease. Standard-of-care plus HP-HMB ($n = 328$) or a placebo supplement ($n = 324$), 2 servings/day.



ARTICLE IN PRESS

Clinical Nutrition xxx (2018) 1–32

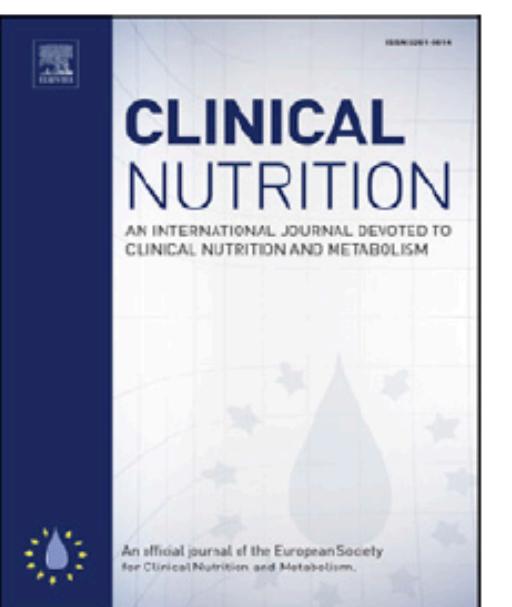


ELSEVIER

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/cnru>



ESPEN Guideline

ESPEN guideline on clinical nutrition in the intensive care unit

Pierre Singer ^{a,*}, Annika Reintam Blaser ^{b,c}, Mette M. Berger ^d, Waleed Alhazzani ^e,
Philip C. Calder ^f, Michael P. Casaer ^g, Michael Hiesmayr ^h, Konstantin Mayer ⁱ,
Juan Carlos Montejo ^j, Claude Pichard ^k, Jean-Charles Preiser ^l, Arthur R.H. van Zanten ^m,
Simon Oczkowski ^e, Wojciech Szczeklik ⁿ, Stephan C. Bischoff ^o



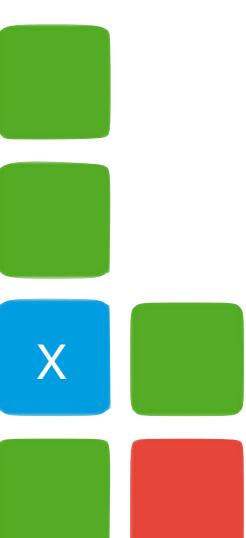
ESPEN ICU richtlijn eiwit

Recommendation 22

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

Grade of recommendation: 0 – strong consensus (91% agreement)

Bij sondevoeding 1.5 g/kg/dag als doel,
na ontslag IC meer

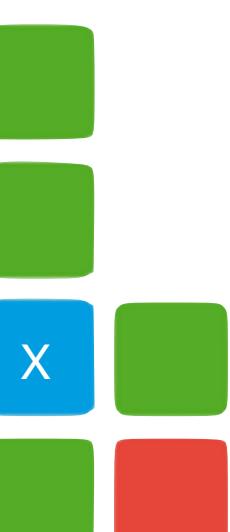


ESPEN ICU richtlijn bewegen

Physical activity may improve the beneficial effects of nutritional therapy.

Consensus (86% agreement)

Nog veel te weinig aandacht voor

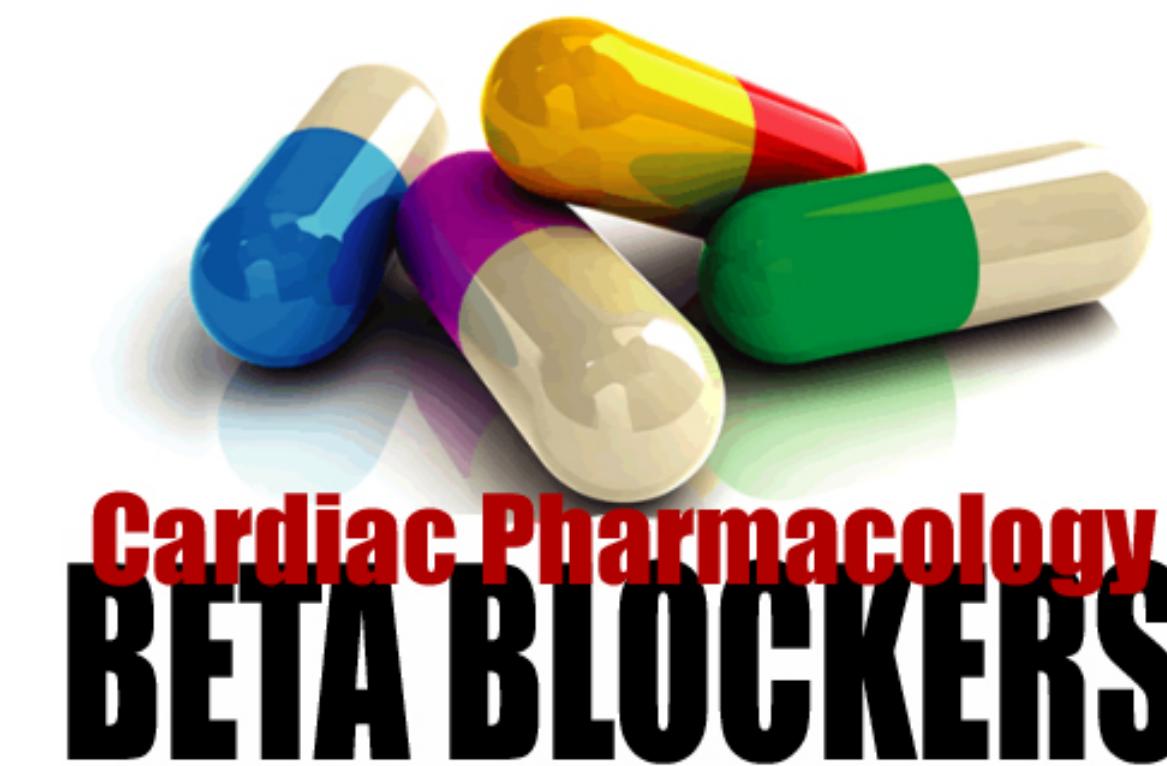


Multimodale Interventie

Voeding



Anticatabole/anti-inflammatoire therapie



Bewegen



Metabole Mitochondriële Spier Herstelprogramma

Conclusions

- **ICU-acquired weakness (IC zwakte) enorme impact op lange termijn functioneren en kwaliteit van leven**
- **Niet agressief voeden op de IC in begin, vanaf dag 3-4 wel**
- **Eiwit >1.3 g/kg/dag essentieel, na ontslag meer**
- **Bewegen combineren, mogelijk nog niet in de spierontstekingsfase**
- **Er is iets mis met de mitochondriën, meer onderzoek nodig, mogelijk voedingsmiddelen die helpen**
- **Energietekort in cellen bij sepsis lijkt een belangrijke rol te spelen voor de lange termijn uitkomsten.**

Sepsis Lotgenotendag 2019

Lange termijn consequenties van sepsis: Is herstel mogelijk? Zeker, maar we komen maar met kleine stapjes vooruit: Voorkom schade op IC, aandacht voor voeding en bewegen bij herstel

Arthur R.H. van Zanten, MD PhD, Internist-intensivist



**Head of ICU and Research
Gelderse Vallei Hospital,
Ede,
The Netherlands**

E-mail: zantena@zgv.nl