KLİNİKTE
KLİNİK BİYOKİMYA

TÜRK KLİNİK BİYOKİMYA DERNEĞİ
BURSA ŞUBESİ SEMPOZYUMU

Montania Special Class Hotel
Mudanya, Bursa

# YOĞUN BAKIMDA NÜTRİSYON

Dr. Remzi İŞÇİMEN

BURSA Uludag Üniversitesi Tıp Fakültesi

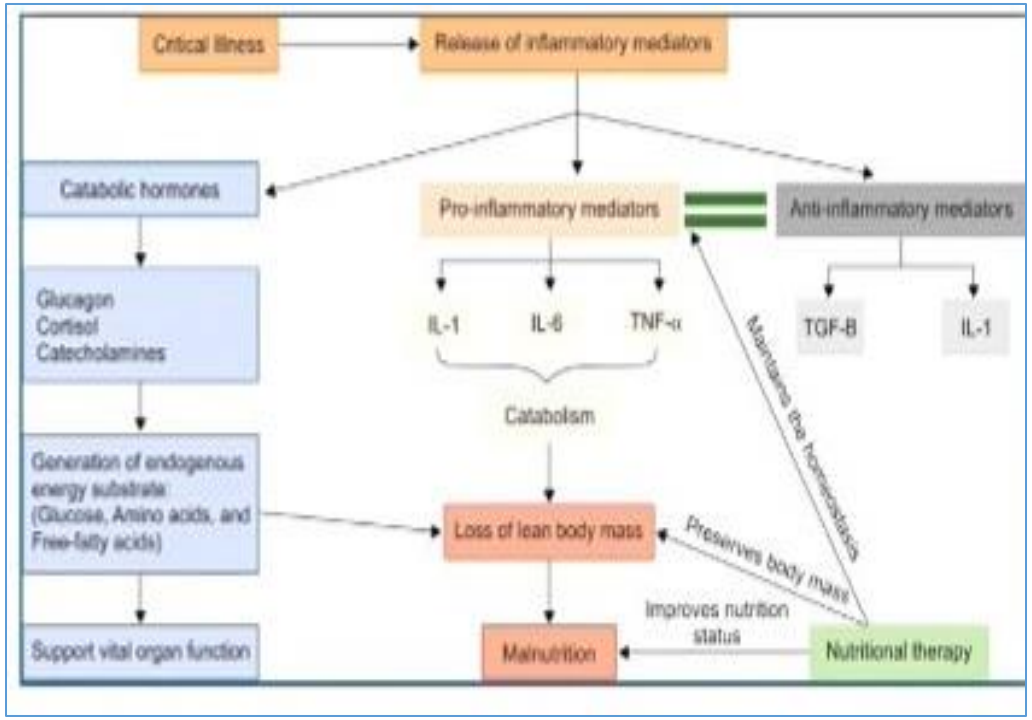
Anesteziyoloji ve Reanimasyon AD, Yoğun Bakım Bilim Dalı

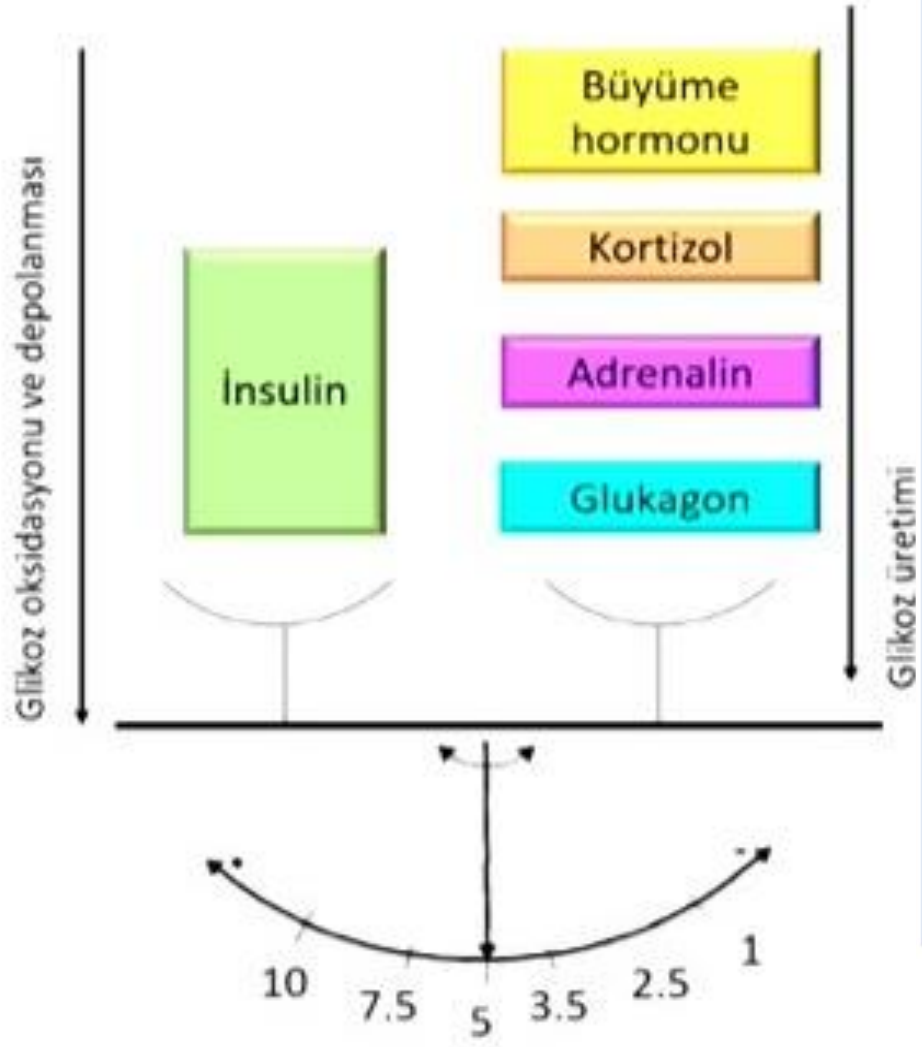

**Webden alınmıştır

# KRİTİK HASTALIK &NÜTRİSYON

- Kritik hastalık, enfeksiyon, travma veya herhangi bir hastalık ile karakterize yaşamı tehdit eden bir durumdur.

- Nütrisyon;
- Konak immün yanıtını modüle etmede,
- Kas kütlesini korumada,
- Katabolizmayı yavaşlatmada ve
- Gastrointestinal mukozal bütünlüğün ve bağışıklığın korunmasında hayati bir rol oynar.






British Journal of Anaesthesia 113 (6): 945–54 (2014)
Advance Access publication 26 June 2014 · doi:10.1093/bja/aeu187

BJA

## Metabolic response to the stress of critical illness

J.-C. Preiser[1*], C. Ichai[2], J.-C. Orban[2] and A. B. J. Groeneveld[3]

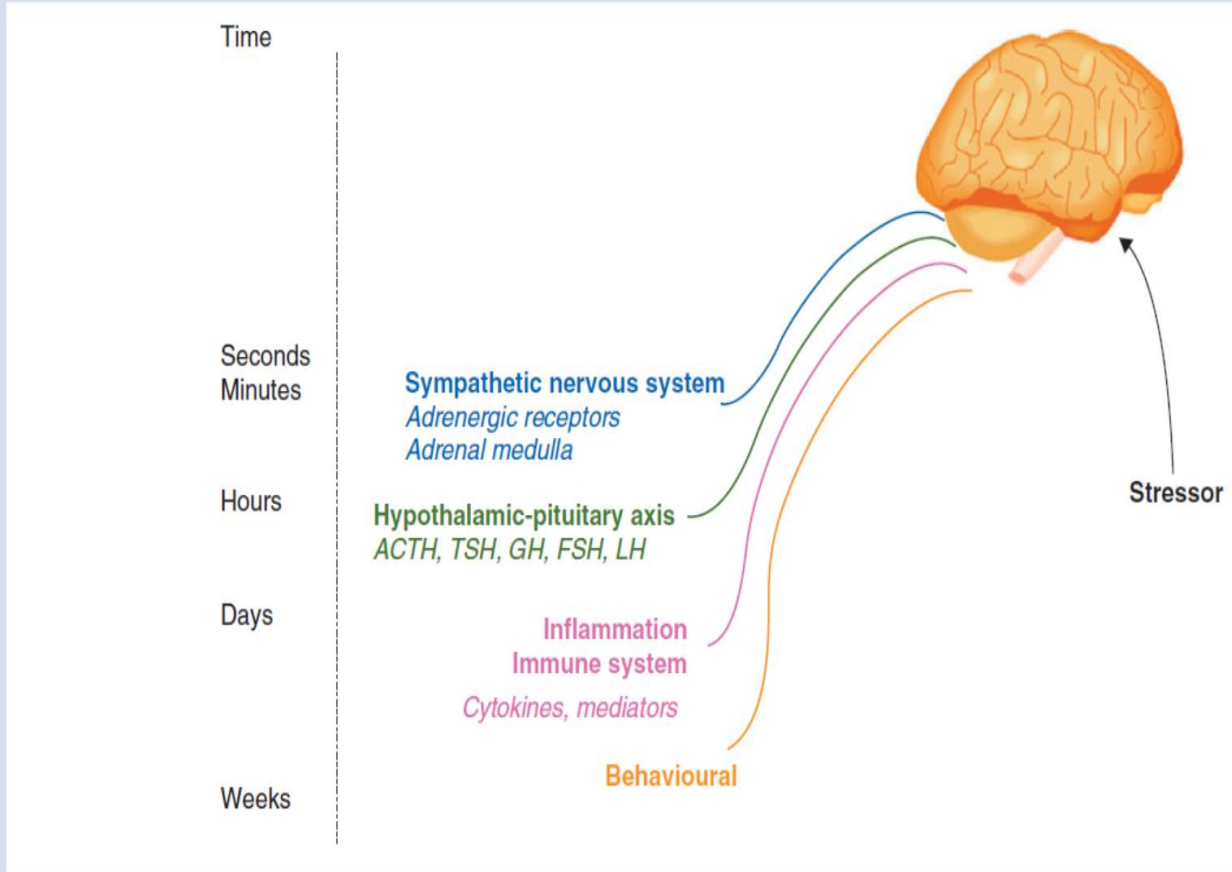



**Fig 1** Typical time course of the metabolic response to stress. ACTH, adrenocorticotropic hormone; TSH, thyroid-stimulating hormone; GH, growth hormone; FSH, follicle-stimulating hormone; LH, luteinizing hormone. Italics stand for the released mediators or phenotypical changes.

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REVIEW

# Metabolism of Proteins and Amino Acids in Critical Illness: From Physiological Alterations to Relevant Clinical Practice

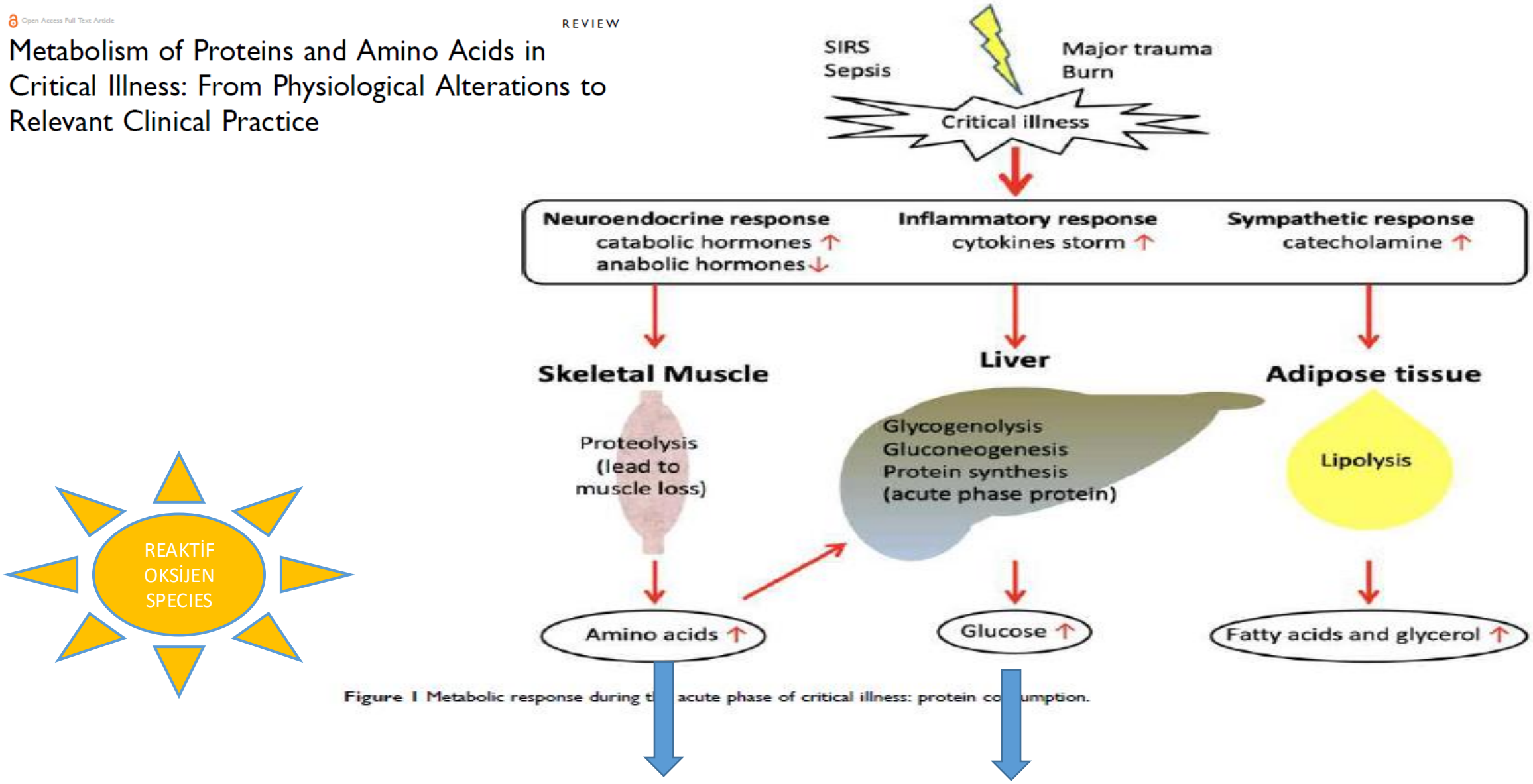



Figure 1 Metabolic response during t acute phase of critical illness: protein co umption.

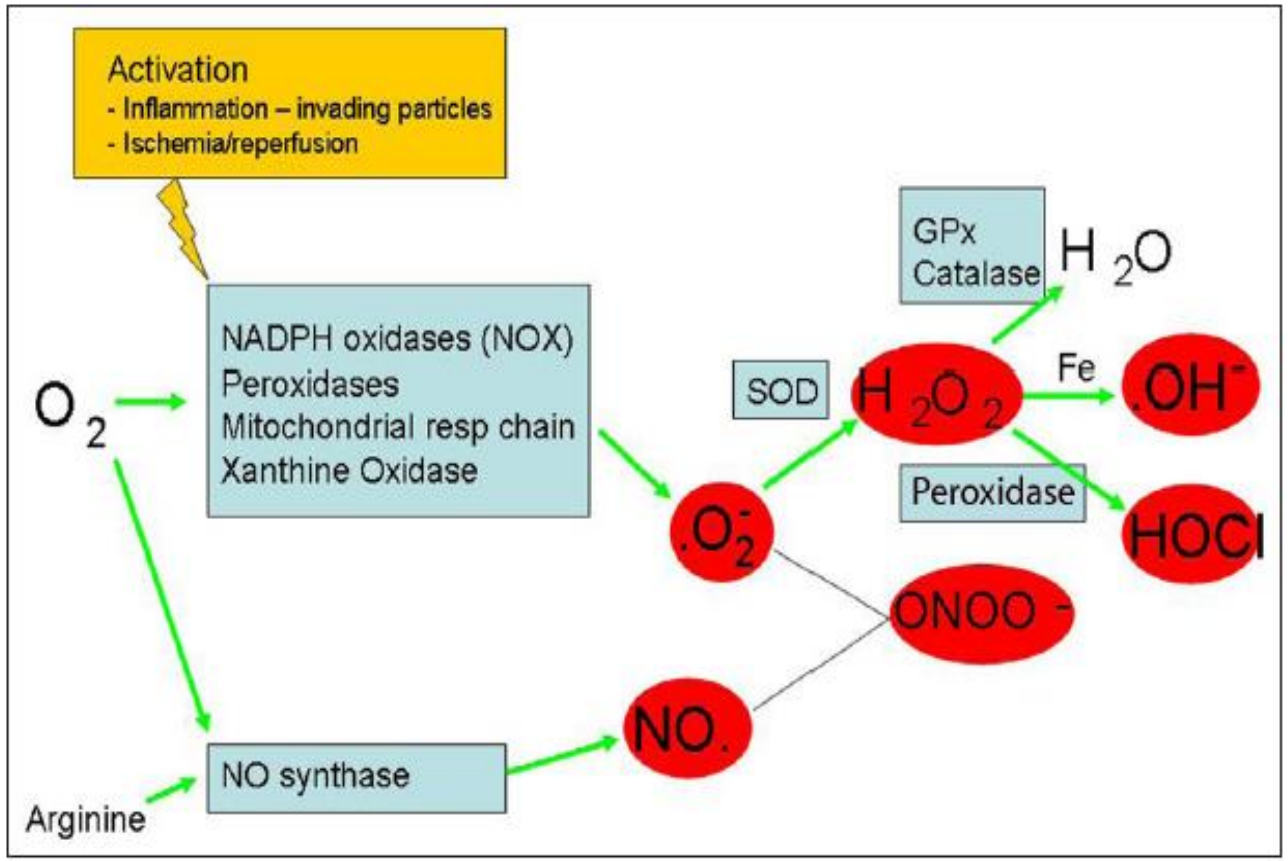
REAKTİF OKSİJEN SPECIES

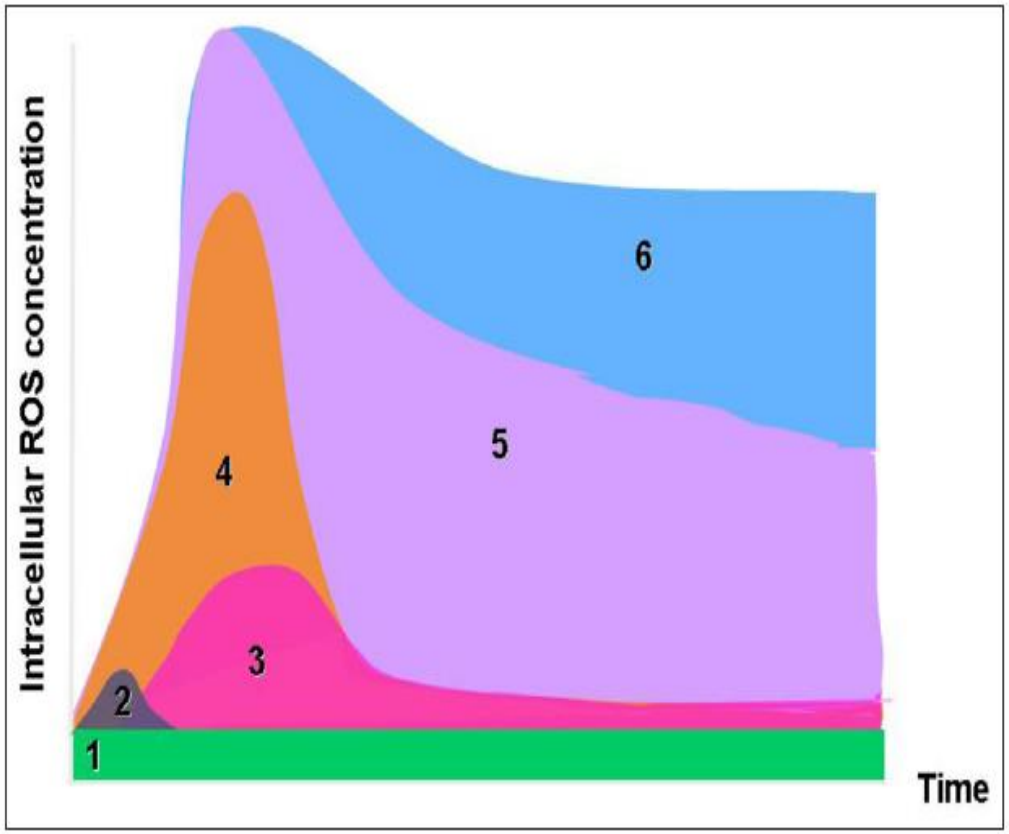
KAS KAYBI

STRES HİPERGLİSEMİSİ

**Oxidative Stress**
Jean-Charles Preiser
*JPEN J Parenter Enteral Nutr* 2012 36: 147 originally published online 1 February 2012
DOI: 10.1177/0148607111434963

The online version of this article can be found at:
http://pen.sagepub.com/content/36/2/147



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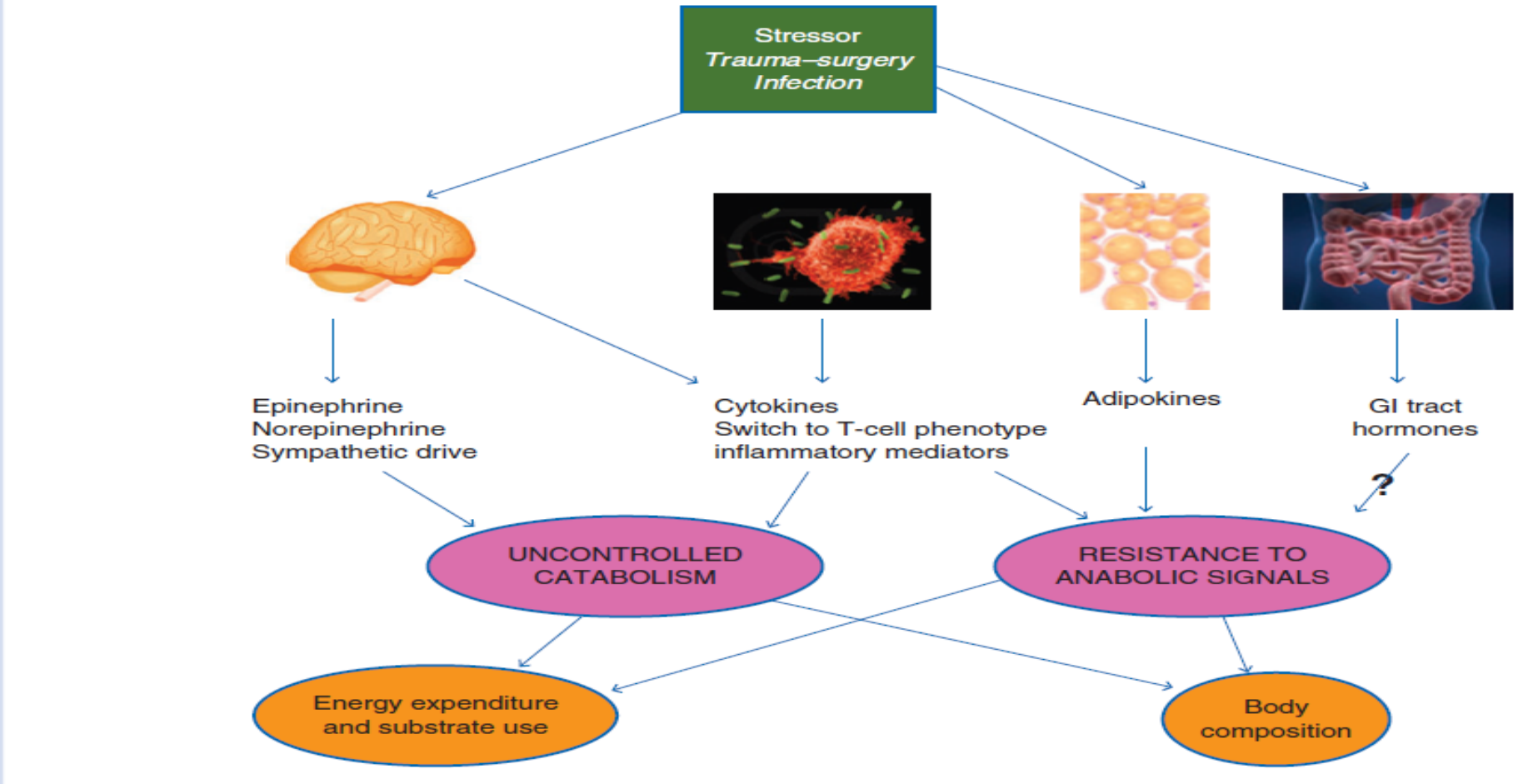


**Fig 2** Different levels of the metabolic response to stress. Once a stressor has been sensed (green rectangle), systems/organs are activated. Mediators are released upon this activation and will increase catabolism and induce a resistance to anabolic factors (pink ovals), resulting in changes in EE, in the type of substrates used and in the body composition (orange ovals).

*British Journal of Anaesthesia* **113** (6): 945–54 (2014)
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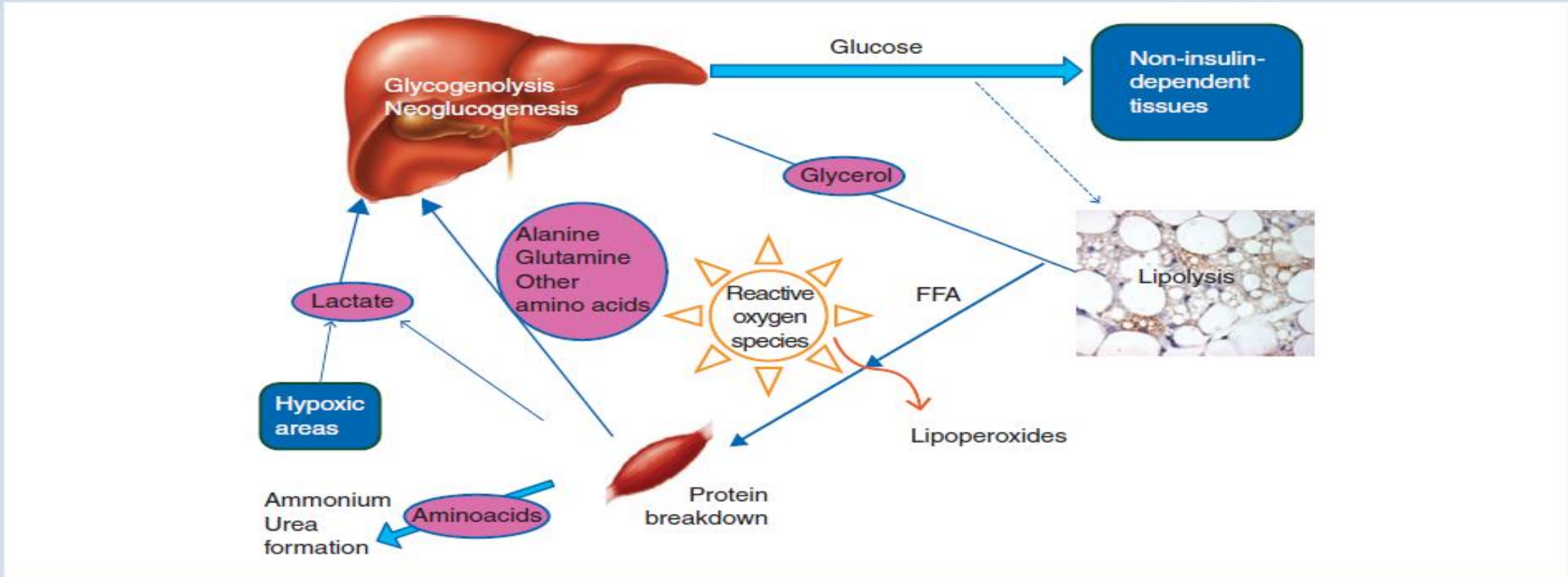



**Fig 3** Metabolic changes during stress. The liver produces large amounts of glucose, from glycogenesis and neoglucogenesis. Glucose will be mainly used by non-insulin-dependent organs, while lipolysis will occur in fat tissue and proteolysis in muscles. FFA released by lipolysis are highly susceptible to peroxidation by the ROS massively released after stress-induced mitochondrial dysfunction. Glycerol released from lipolysis will be regenerated by the liver into glucose. Muscular proteolysis will release amino acids that will be recycled into glucose (mainly alanine and glutamine) or degraded into urea or ammonium. Lactate generated in hypoxic areas will be used by the liver to generate glucose by the Cori cycle.

Wischmeyer *Critical Care* 2017, **21**(Suppl 3):316
DOI 10.1186/s13054-017-1906-8

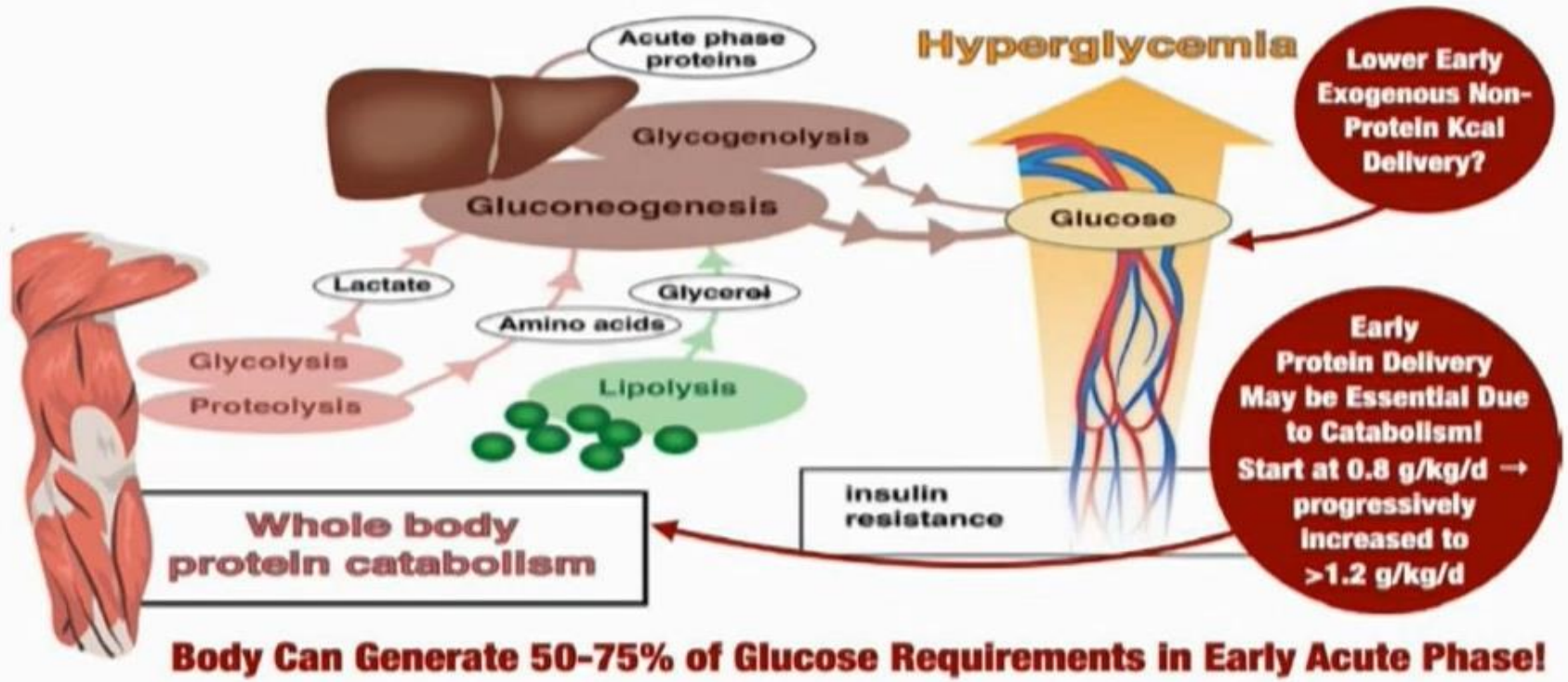
Critical Care

REVIEW Open Access

# Tailoring nutrition therapy to illness and recovery

Paul E. Wischmeyer

## Early Catabolic Response to Critical Illness and Trauma



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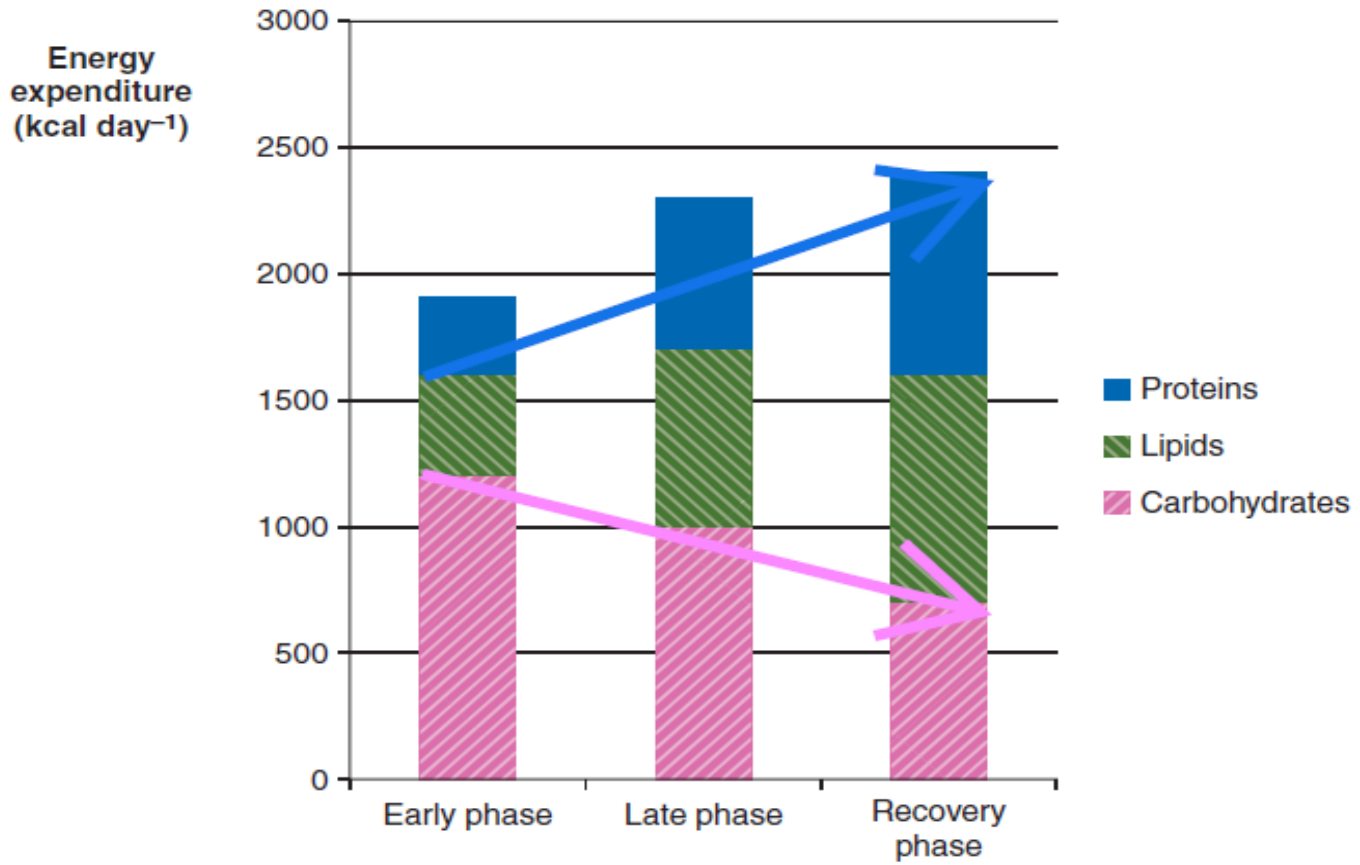


**Fig 4** Illustrative example of the EE and use of the type of energy substrates used during the early, the late, and the recovery phases.

# Nütrisyon Desteğinin Güvenli Sağlanması,

- Nütrisyon durumunun, risklerinin sürekli olarak değerlendirilmesini gerektirir.
- En aza indirilmiş risk,

  -Beslenmenin derhal başlatılması,

  -Uygun besin miktarlarının hedeflenmesi,

  -Gastrointestinal sistem yoluyla motilitenin teşvik edilmesi ve

  -Refeeding sendromu gibi yaşamı tehdit eden ciddi komplikasyonların önlenmesi ile elde edilebilir.

# Yoğun Bakımda Malnütrisyon ve Yetersiz Beslenme

- Yoğun bakım ünitesinde 48 saatten fazla kalan kritik hastalar malnütrisyon riski altında kabül edilir.
- Degerlendirme aracı olarak NUTRIC-Skoru önerilmiştir.
- GLIM: Global Leadership Initiative on Malnutrition (Yetersiz Beslenme Konusunda Küresel Liderlik Girişimi)
- Laboratuvar testleri kritik hastalarda sınırlı değere sahiptir.
- Biyoelektrik impedans, BT taraması veya kas ultrasonu kullanılarak yağsız vücut kütlesinin değerlendirilmesi yararlı araçlardır.

# The APACHE II Score

| Physiologic Variable | High Abnormal Range | | | | | Low Abnormal Range | | | |
|---|---|---|---|---|---|---|---|---|---|
| | +4 | +3 | +2 | +1 | 0 | +1 | +2 | +3 | +4 |
| Rectal Temp (°C) | ≥41 | 39-40.9 | | 38.5-38.9 | 36-38.4 | 34-35.9 | 32-33.9 | 30-31.9 | ≤29.9 |
| Mean Arterial Pressure (mmHg) | ≥160 | 130-159 | 110-129 | | 70-109 | | 50-69 | | ≤49 |
| Heart Rate | ≥100 | 140-179 | 110-139 | | 70-109 | | 50-69 | 40-54 | ≤39 |
| Respiratory Rate | ≥50 | 35-49 | | 25-34 | 12-24 | 10-11 | 6-9 | | ≤5 |
| Oxygenation<br>a) $FIO_2$≥0.5 record A-a$DO_2$<br>b) $FIO_2$<0.5 record $PaO_2$ | ≥500 | 350-499 | 200-349 | | <200<br>$PO_2$>70 | $PO_2$ 61-70 | | $PO_2$ 55-60 | $PO_2$<55 |
| Arterial pH | ≥7.7 | 7.6-7.69 | | 7.5-7.59 | 7.33-7.49 | | 7.25-7.32 | 7.15-7.24 | <7.15 |
| $HCO_3$ (mEq/l) | ≥52 | 41-51.9 | | 32-40.9 | 22-31.9 | | 18-21.9 | 15-17.9 | <15 |
| K (mEq/l) | ≥7 | 6-6.9 | | 5.5-5.9 | 3.5-5.4 | 3-3.4 | 2.5-2.9 | | <2.5 |
| Na (mEq/l) | ≥180 | 160-179 | 155-159 | 150-154 | 130-149 | | 120-129 | 111-119 | ≤110 |
| S. Creat (mgm/dl) | ≥3.5 | 2-3.4 | 1.5-1.9 | | 0.6-1.4 | | <0.6 | | |
| Hematocrit (%) | ≥60 | | 50-59.9 | 46-49.9 | 30-45.9 | | 20-29.9 | | <20 |
| TLC ($10^3$/cc) | ≥40 | | 20-39.9 | 15-19.9 | 3-14.9 | | 1-2.9 | | <1 |
| GCS | | | | | | | | | |

| Age -score |
|---|
| <44 → 0 |
| 45-54 → 2 |
| 55-64 → 3 |
| 65-74 → 5 |
| ≥75 → 6 |

| GCS: | | |
|---|---|---|
| 15 → 0 | 14 → 1 | 13 → 2 |
| 12 → 3 | 11 → 4 | 10 → 5 |
| 9 → 6 | 8 → 7 | 7 → 8 |
| 6 → 9 | 5 → 10 | 4 → 11 |
| 3 → 12 | | |

JAMA 1993;270(24):2957-2963

fppt.com

| SOFA score | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Respiration | | | | | |
| $PaO_2$ / $FIO_2$ (mm Hg) | > 400 | < 400 | < 300 | < 200 | < 100 |
| $SaO_2$ / $FIO_2$ | | 221 - 301 | 142 - 220 | 67 - 141 | < 67 |
| Coagulation | | | | | |
| Platelets ($10^3$ / $mm^3$) | > 150 | < 150 | < 100 | < 50 | < 20 |
| Liver | | | | | |
| Bilirubin (mg / dl) | < 1.2 | 1.2 - 1.9 | 2.0 - 5.9 | 6.0 - 11.9 | > 12.0 |
| Cardiovascular | | | | | |
| Hypotension | No hypoten-sion | MAP < 70 | Dopamine ≤ 5 or dobutamine (any) | Dopamine > 5 or nor-epinephrine ≤ 0.1 | Dopa-mine > 15 or norepi-nephrine > 0.1 |
| CNS | | | | | |
| Glasgow coma score | 15 | 13 - 14 | 10 - 12 | 6 - 9 | < 6 |
| Renal | | | | | |
| Creatinine (mg / dl) or urine output (mg / dl) | < 1.2 | 1.2 - 1.9 | 2.0 - 3.4 | 3.5 - 4.9 or < 500 | > 5.0 or < 200 |

# NUTRIC score

**Table 1: NUTRIC Score variables**

| Variable | Range | Points |
|---|---|---|
| Age | <50 | 0 |
| | 50 - <75 | 1 |
| | ≥75 | 2 |
| APACHE II | <15 | 0 |
| | 15 - <20 | 1 |
| | 20-28 | 2 |
| | ≥28 | 3 |
| SOFA | <6 | 0 |
| | 6 - <10 | 1 |
| | ≥10 | 2 |
| Number of Co-morbidities | 0-1 | 0 |
| | ≥2 | 1 |
| Days from hospital to ICU admission | 0 - <1 | 0 |
| | ≥1 | 1 |
| IL-6 | 0 - <400 | 0 |
| | ≥ 400 | 1 |

NUTRIC Score[1]

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**Table 2: NUTRIC Score scoring system: if IL-6 available**

| Sum of points | Category | Explanation |
|---|---|---|
| 6-10 | High Score | ➢ Associated with worse clinical outcomes (mortality, ventilation).<br>➢ These patients are the most likely to benefit from aggressive nutrition therapy. |
| 0-5 | Low Score | ➢ These patients have a low malnutrition risk. |

**Table 3. NUTRIC Score scoring system: If no IL-6 available[4]**

| Sum of points | Category | Explanation |
|---|---|---|
| 5-9 | High Score | ➢ Associated with worse clinical outcomes (mortality, ventilation).<br>➢ These patients are the most likely to benefit from aggressive nutrition therapy. |
| 0-4 | Low Score | ➢ These patients have a low malnutrition risk. |

ASPEN 2016

# GLIM KRİTERLERİ

- Risk altında durumun tanımlanmasını,
- Malnütrisyon şiddetinin tanı ve derecelendirilmesini içeren iki aşamalı bir yaklaşım içerir.

Clinical Nutrition 36 (2017) 49–64

Contents lists available at ScienceDirect

Clinical Nutrition

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

ESPEN Guideline

# ESPEN guidelines on definitions and terminology of clinical nutrition

T. Cederholm [a, *], R. Barazzoni [b], P. Austin [c, v], P. Ballmer [d], G. Biolo [e], S.C. Bischoff [f], C. Compher [g, i], I. Correia [h, i], T. Higashiguchi [i, i], M. Holst [j], G.L. Jensen [k, i], A. Malone [l, i], M. Muscaritoli [m], I. Nyulasi [n, i], M. Pirlich [o], E. Rothenberg [p], K. Schindler [q], S.M. Schneider [r], M.A.E. de van der Schueren [s, z], C. Sieber [t], L. Valentini [u], J.C. Yu [v, i], A. Van Gossum [w], P. Singer [x]

GLIM'e göre, malnütrisyon tanısı için en az

- 1 fenotipik kriter ve
- 1 etiyolojik kriter gereklidir.

**Table 1**
Phenotypic and etiologic criteria for the diagnosis of malnutrition, adapted from [9].

| Phenotypic Criteria | | Etiologic Criteria | |
|---|---|---|---|
| Weight loss (%) | >5% within past 6 months or >10% beyond 6 months | Reduced food intake or assimilation[b] | 50% of ER > 1 week, or any reduction for >2 weeks, or any chronic GI condition that adversely impacts food assimilation or absorption |
| Low body mass index (kg/m2) | <20 if < 70 years, or <22 if >70 years<br>Asia:<br><18.5 if < 70 years, or <20 if >70 years | Inflammation[c] | Acute disease/ injured, or chronic disease-related |
| Reduced muscle mass | Reduced by validated body composition measuring techniques[a] | | |

aspen

Journal of Parenteral and Enteral Nutrition
Volume 40 Number 2
February 2016 159–211

DOI: 10.1177/0148607115621863
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# Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.)

Stephen A. McClave, MD[1*]; Beth E. Taylor, RD, DCN[2*]; Robert G. Martindale, MD, PhD[3]; ...

## C. Dosing of EN

*Question:* What population of patients in the ICU setting does not require nutrition support therapy over the first week of hospitalization?

**C1. Based on expert consensus, we suggest that patients who are at low nutrition risk with normal baseline nutrition status and low disease severity (eg, NRS 2002 ≤3 or NUTRIC score ≤5) who cannot maintain volitional intake do not require specialized nutrition therapy over the first week of hospitalization in the ICU.**

**> 7 gün**

**C3. Based on expert consensus, we suggest that patients who are at high nutrition risk (eg, NRS 2002 ≥5 or NUTRIC score ≥5, without interleukin 6) or severely malnourished should be advanced toward goal as quickly as tolerated over 24–48 hours while monitoring for refeeding syndrome. Efforts to provide >80% of estimated or calculated goal energy and protein within 48–72 hours should be made to achieve the clinical benefit of EN over the first week of hospitalization.**

**24 – 48 saat**

Clinical Nutrition 38 (2019) 48–79

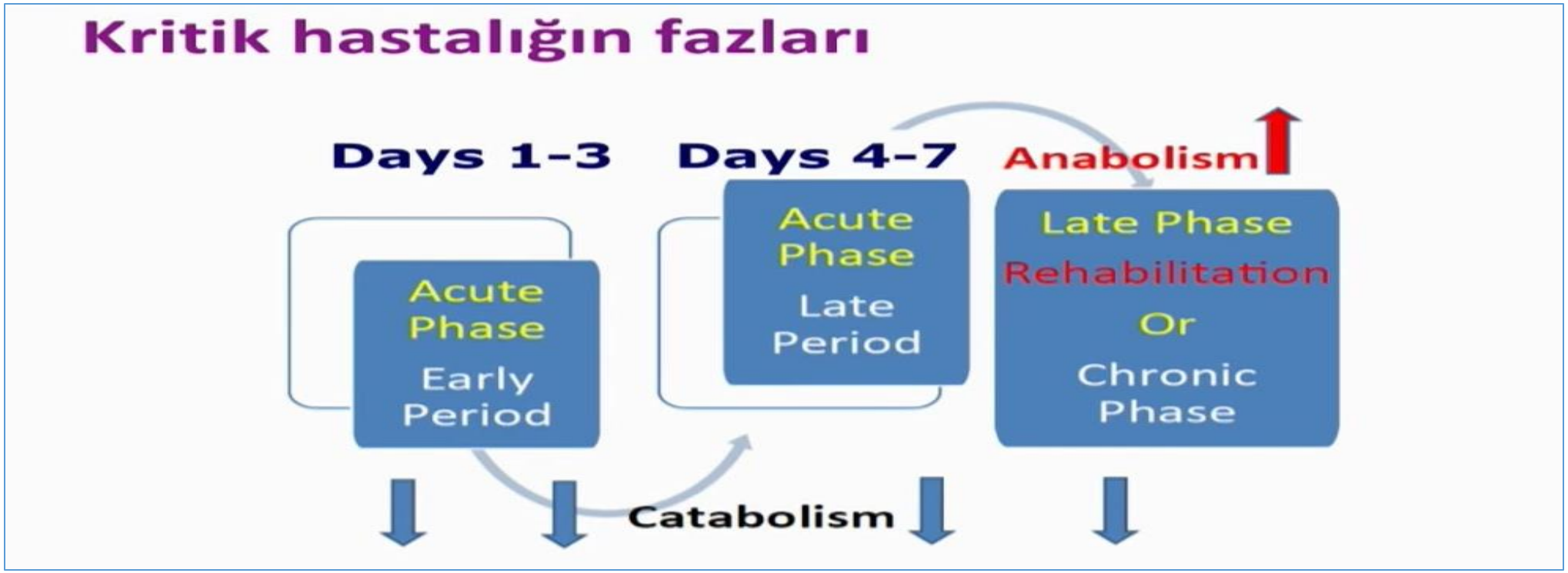
Contents lists available at ScienceDirect

Clinical Nutrition

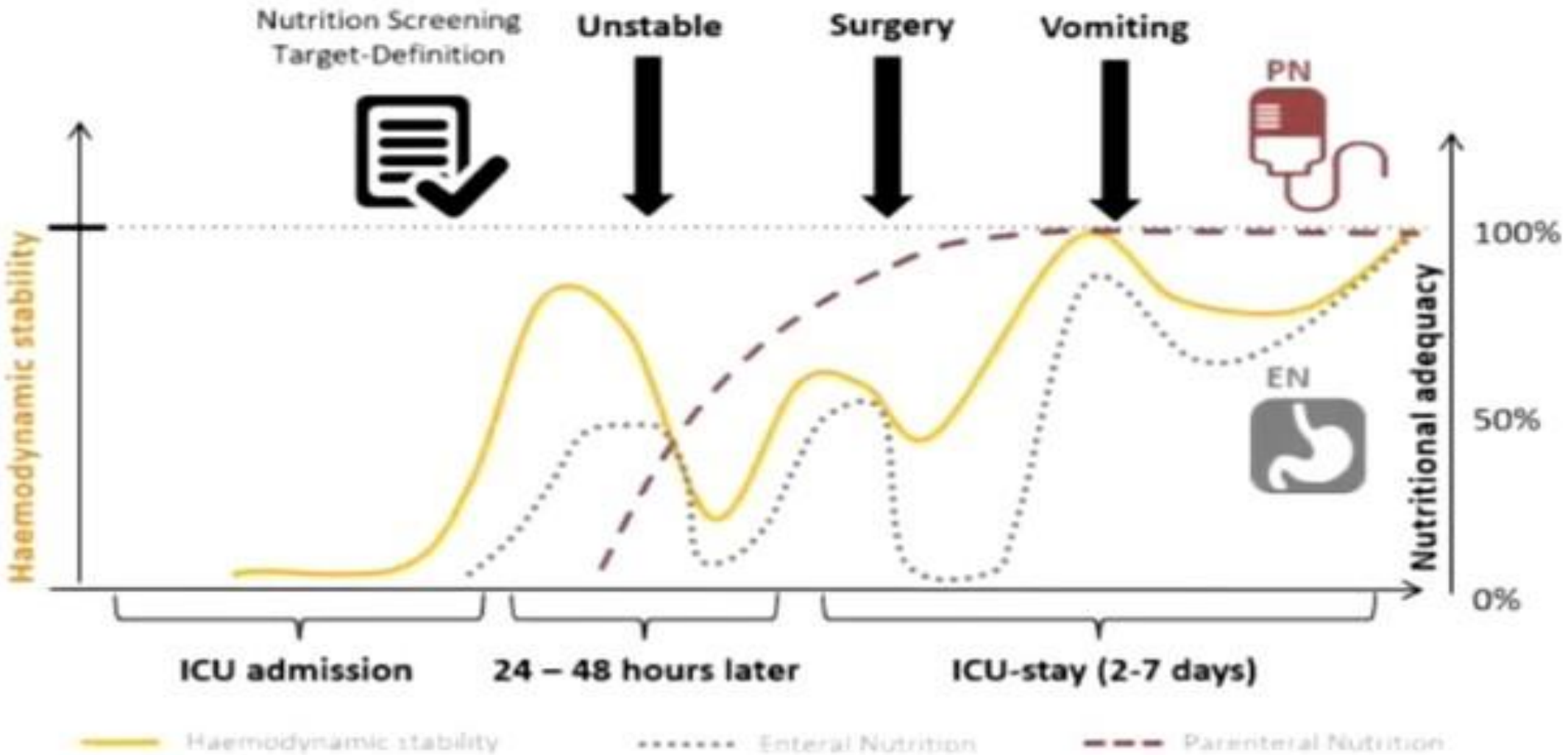
journal homepage: http://www.elsevier.com/locate/clnu

ESPEN Guideline

# ESPEN guideline on clinical nutrition in the intensive care unit



# The concept of nutrition support for critically ill patients



Clinical Nutrition 36 (2017) 651–662

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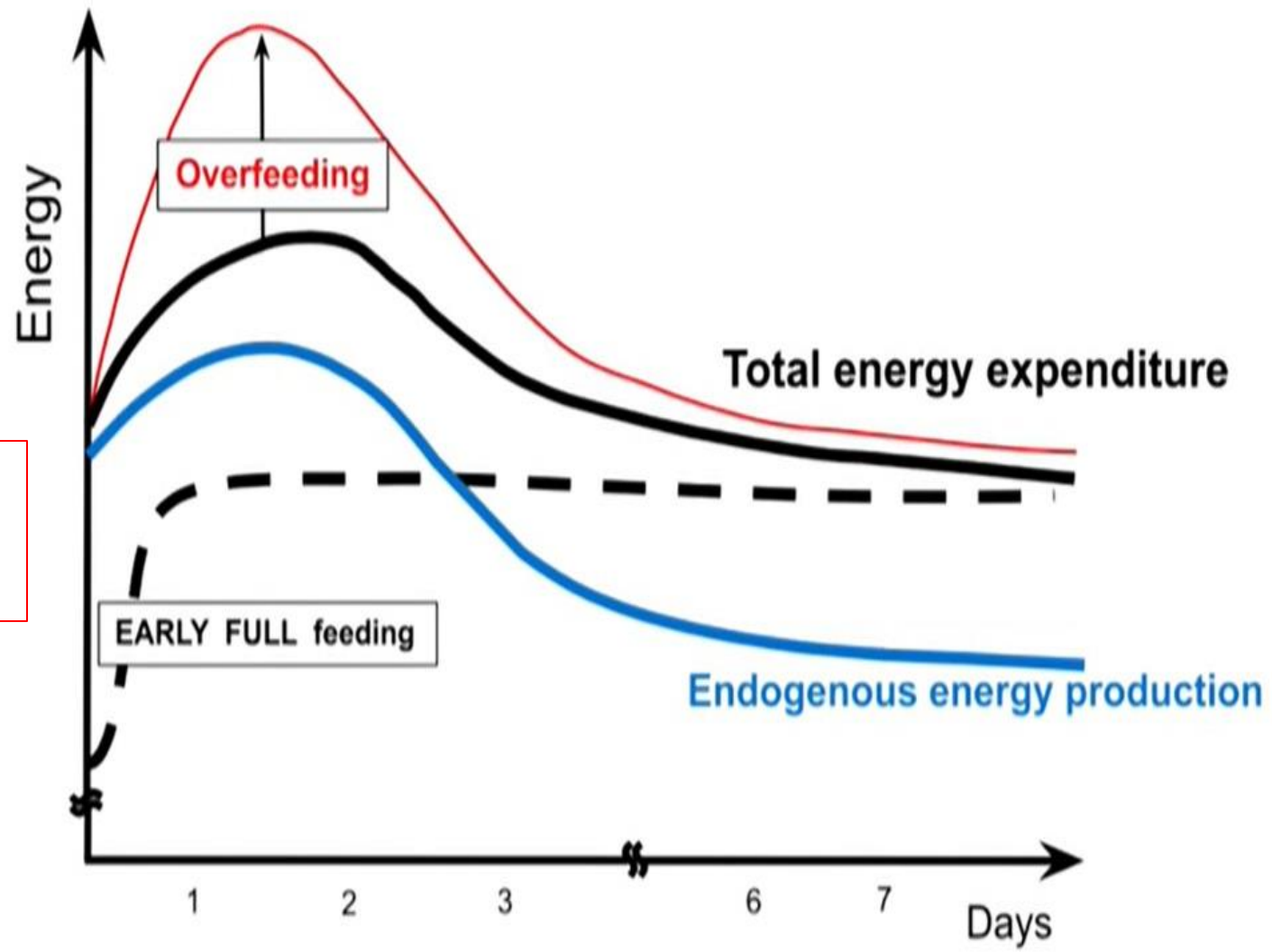
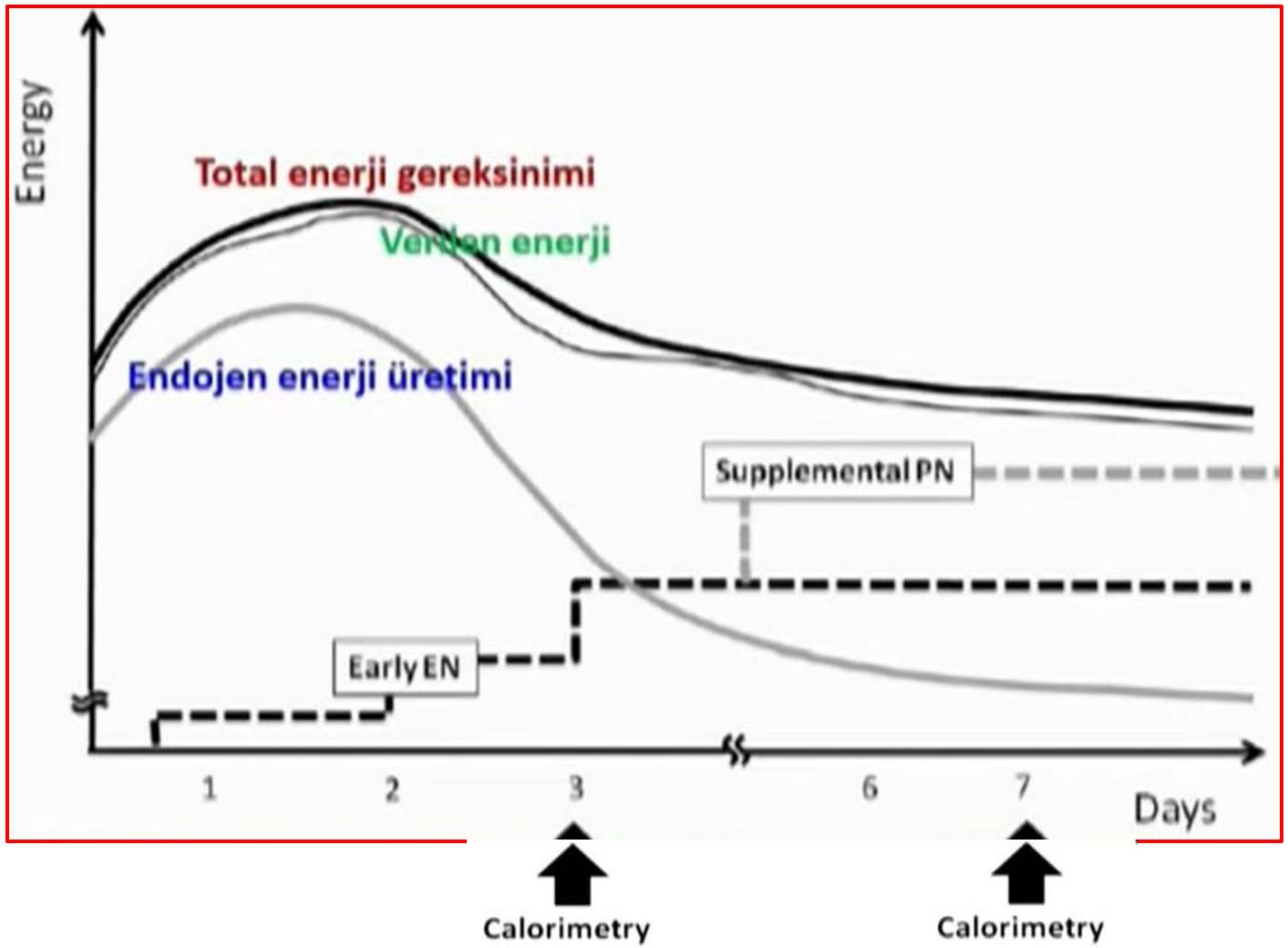
Review

# Indirect calorimetry in nutritional therapy. A position paper by the ICALIC study group

Beslenme hesapları
özellikle ilk 3 gün doğru değil




Oshima et al Clin Nutr 2017


Energy
Total enerji gereksinimi
Verilen enerji
Endojen enerji üretimi
Supplemental PN
Early EN
1
2
3
6
7
Days
Calorimetry
Calorimetry

KRİTİK HASTADA ERKEN DÖNEMDE (özellikle ilk 3 günde) NÜTRİSYONUN TAM HEDEFİ

AŞIRI BESLENME TEHLİKESİ OLUŞTURUR.

Zusman et al. Critical Care (2016) 20:367
DOI 10.1186/s13054-016-1538-4

Critical Care

RESEARCH Open Access

# Resting energy expenditure, calorie and protein consumption in critically ill patients: a retrospective cohort study

Oren Zusman[1*], Miriam Theilla[2,3], Jonathan Cohen[2,4], Ilya Kagan[2], Itai Bendavid[2] and Pierre Singer[2,4]

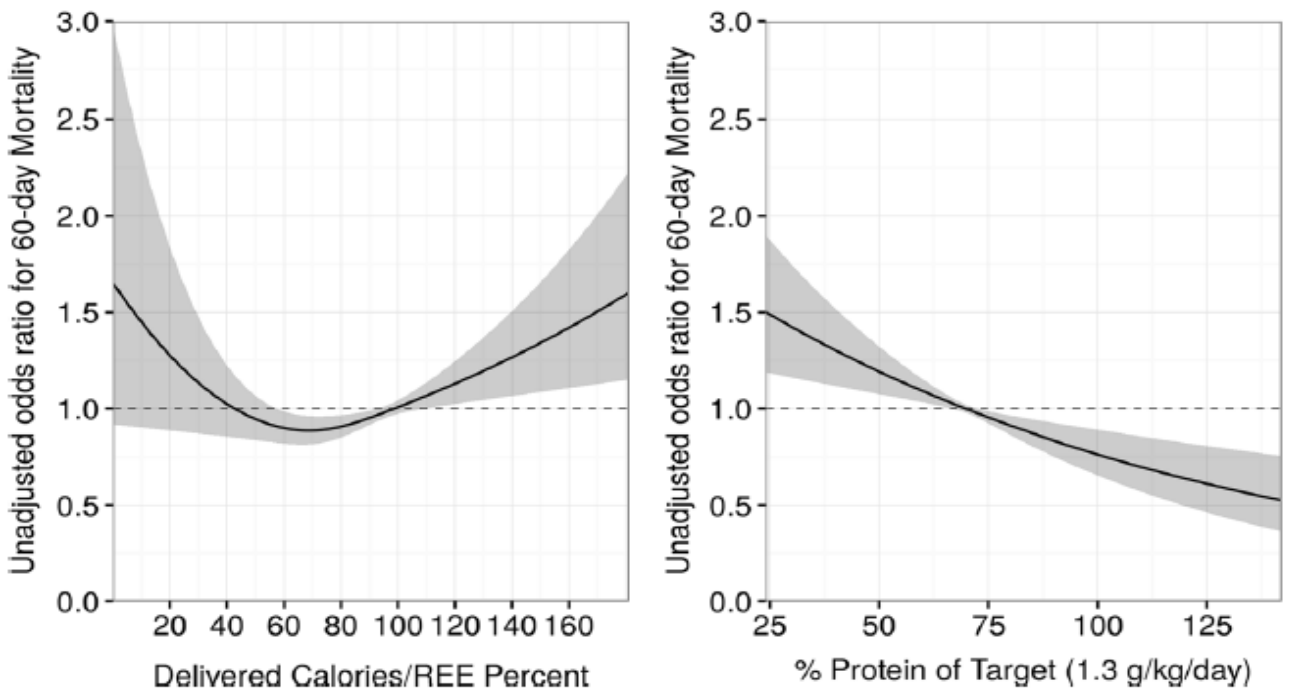



**Fig. 2** Association of administered calories/resting energy expenditure (Adcal/REE) percent with 60-day mortality (*left*), and protein intake by daily requirement (1.3 g/kg/d) with 60-day mortality (*right*) by odds ratio. *REE* resting energy expenditure

Zusman et al. Critical Care (2016) 20:367
DOI 10.1186/s13054-016-1538-4

Critical Care

RESEARCH Open Access

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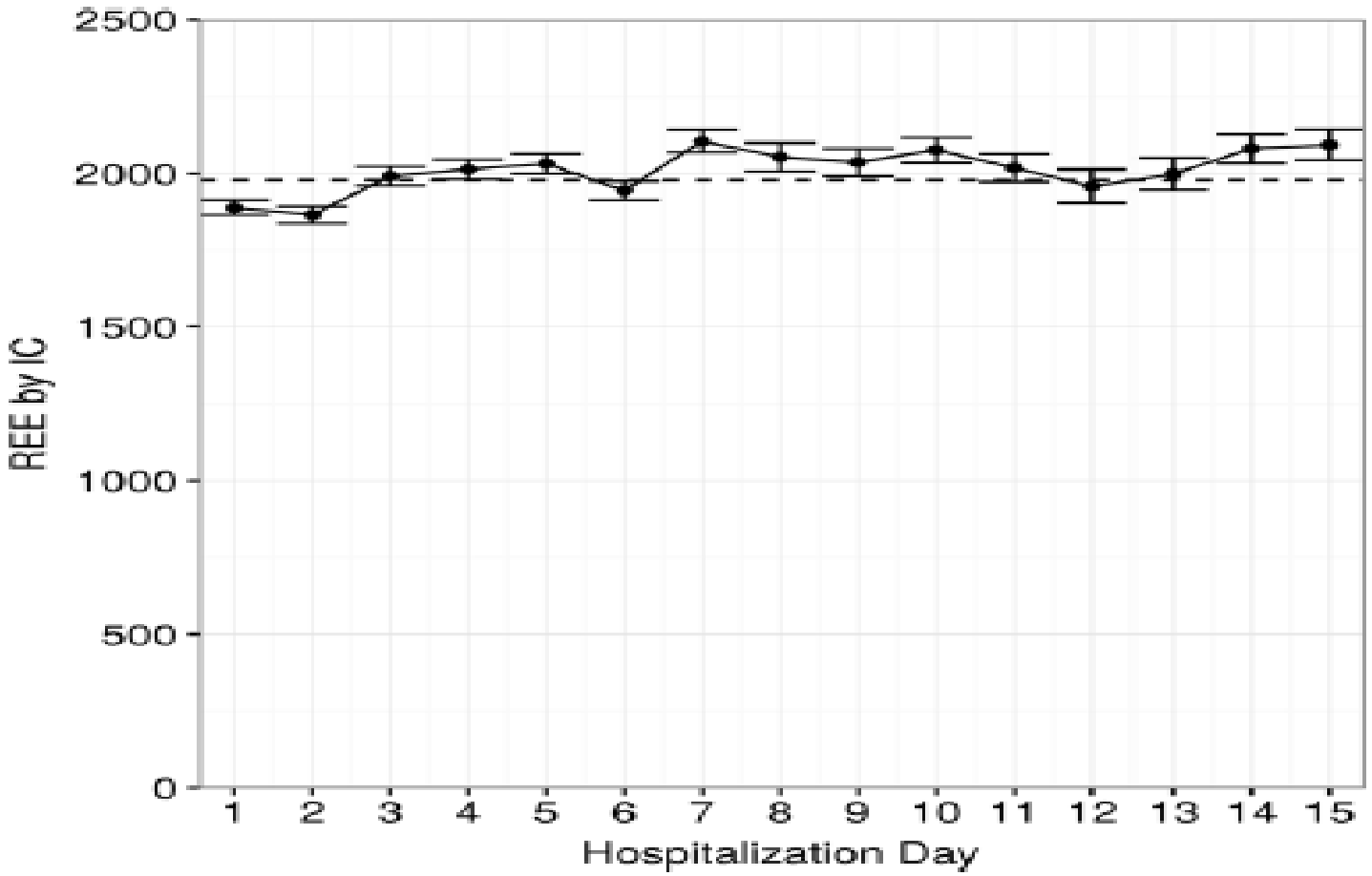

KRİTİK HASTANIN ENERJİ GEREKSİNİMİ GÜNDEN GÜNE DEĞİŞİKLİK GÖSTEREBİLİR.

Clinical Nutrition 38 (2019) 2531–2544

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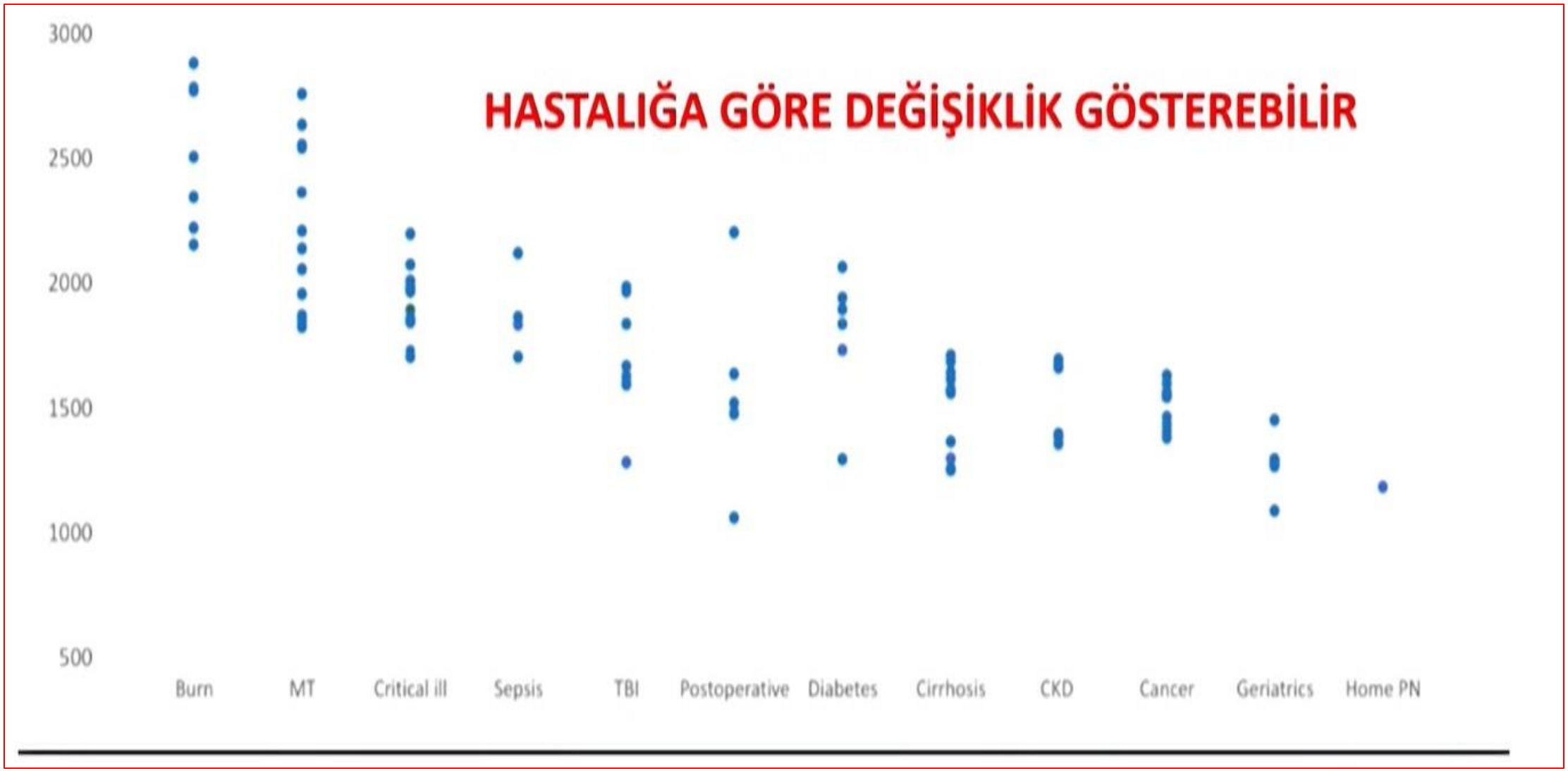
Review

Indirect calorimetry as point of care testing

# ENERJİ HARCANMASI



Whittle et al. Critical Care (2020) 24:581
https://doi.org/10.1186/s13054-020-03286-7

Critical Care

RESEARCH LETTER Open Access

# Persistent hypermetabolism and longitudinal energy expenditure in critically ill patients with COVID-19

John Whittle[1], Jeroen Molinger[1], David MacLeod[1], Krista Haines[2], Paul E. Wischmeyer[1,2*] for the LEEP-COVID Study Group

| (b) Energy expenditure/data | D0–7 | D7–14 | D14–21 | *p* value |
|---|---|---|---|---|
| Measured REE in absolute kCal/day (all patients) (median, IQR) | 1568 (1175–2215) | 1830 (1465–2467) | 2789 (1776–3262) | < 0.05 |
| Measured REE kCal/kg actual BW (non-obese, BMI < 30) (median, IQR) | 19.2 (16.9–20.7) | 26 (24.5–35.5) | 29 (23–34.5) | < 0.05 |
| Measured REE kCal/kg actual BW (obese, BMI > 30) (median, IQR) | 17.5 (12–19.25) | 21 (20–23.5) | 31.5 (24.8–36) | < 0.05 |
| Measured REE kCal/kg adjusted BW (obese, BMI > 30) (median, IQR) | 20 (17–22.5) | 26.3 (24–29) | 32.5 (28.8–35.8) | < 0.05 |
| Measured REE kCal/kg actual BW (all patients) (median, IQR) | 19 (13.7–28.5) | 26 (22–42) | 30.4 (27–35.8) | < 0.05 |
| **(c) Clinical data** | D0–7 | D7–14 | D14–21 | *p* value |
| Use of prone positioning (%) (mean, sd) | 12.3 (8.6) | 7 (2.4) | 12.2 (4.3) | 0.17 |
| Use of paralysis with neuromuscular blocker (%) (mean, sd) | 14.8 (8) | 9.7 (1.7) | 12.3 (3.4) | 0.2 |
| SOFA score (mean, sd) | 9 (3.6) | 9 (3.2) | 9.5 (3.6) | 0.5 |

a, patient characteristics; b, nutritional data for the first 3 weeks post-intubation; c, clinical care and outcomes data
*BW* body weight; *BMI* body mass index; *REE* resting energy expenditure, predicted REE via Harris-Benedict equation; *AdjBW* adjusted bodyweight, *ABW* actual body weight, *obesity* BMI > 30, *non-obese* BMI < 30I, *IQR* interquartile range, *SOFA* Sequential Organ Failure Assessment, *sd* standard deviation
Notes: All obese subjects had BMI measures between 30 and 50. *p* values are for Kruskal-Wallis test
Subjects were withdrawn from this analysis upon extubation or death

# İNDİREKT KALORİMETRE

$$ET = 3.9 \times VO_2 + 1.1 \times VCO_2$$

- ET : Enerji tüketimi (kcal/gün)
- $VO_2$: $O_2$ tüketimi (L/dk)
- $VCO_2$: $CO_2$ üretimi (L/dk)

**VCO2 x8.19**

- Ateş
- Hipotermi
- Titreme
- Ajitasyon
- Sedatif ajanlar, kas gevşeticiler
- Non selektif beta blokerler
- Aktif soğutma
- Yaş,cinsiyet, vücut kitelsi
- Beyin aktivitesi

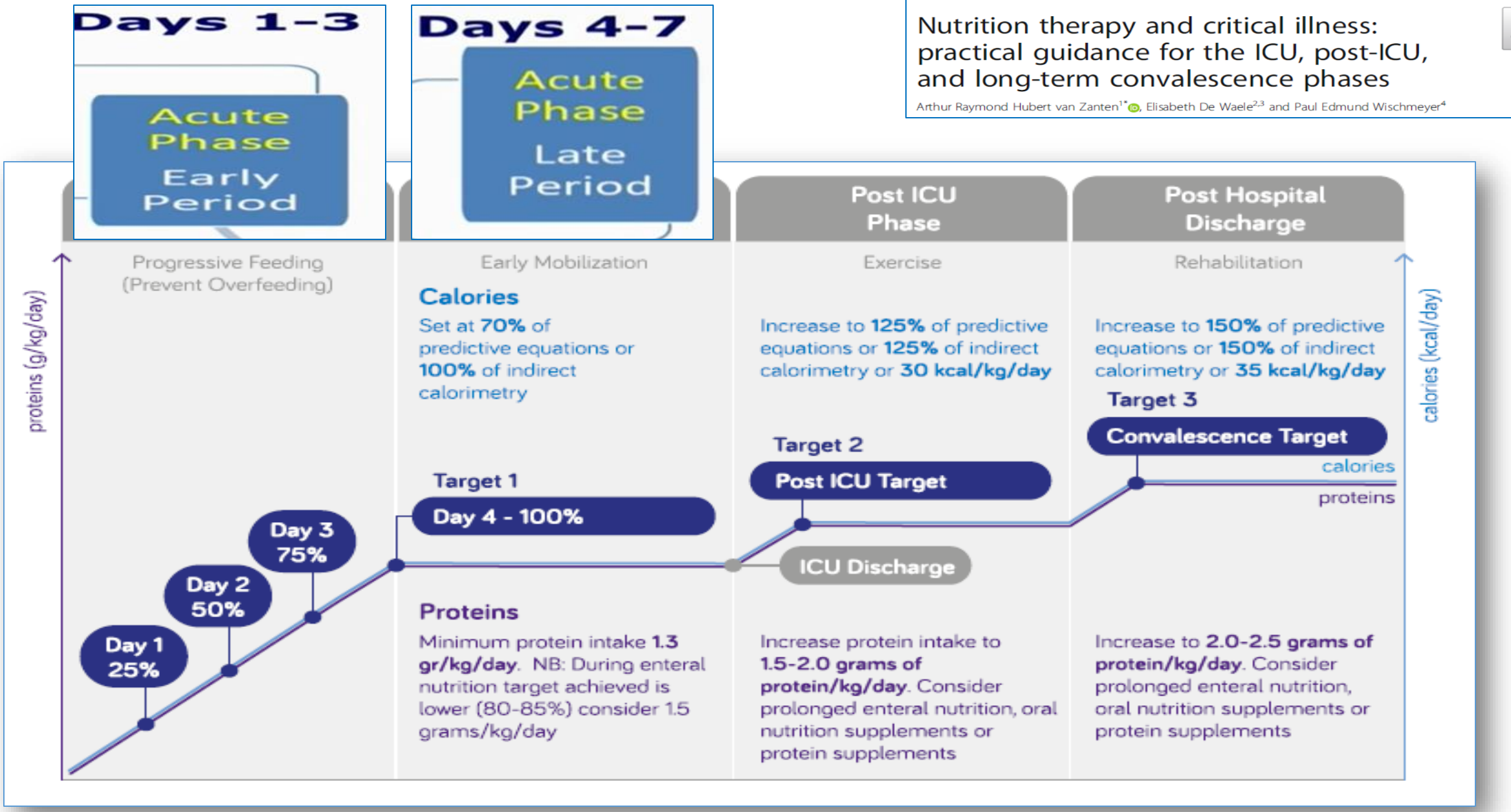
Zanten et al. Critical Care (2019) 23:368
https://doi.org/10.1186/s13054-019-2657-5

Critical Care

REVIEW Open Access

# Nutrition therapy and critical illness: practical guidance for the ICU, post-ICU, and long-term convalescence phases

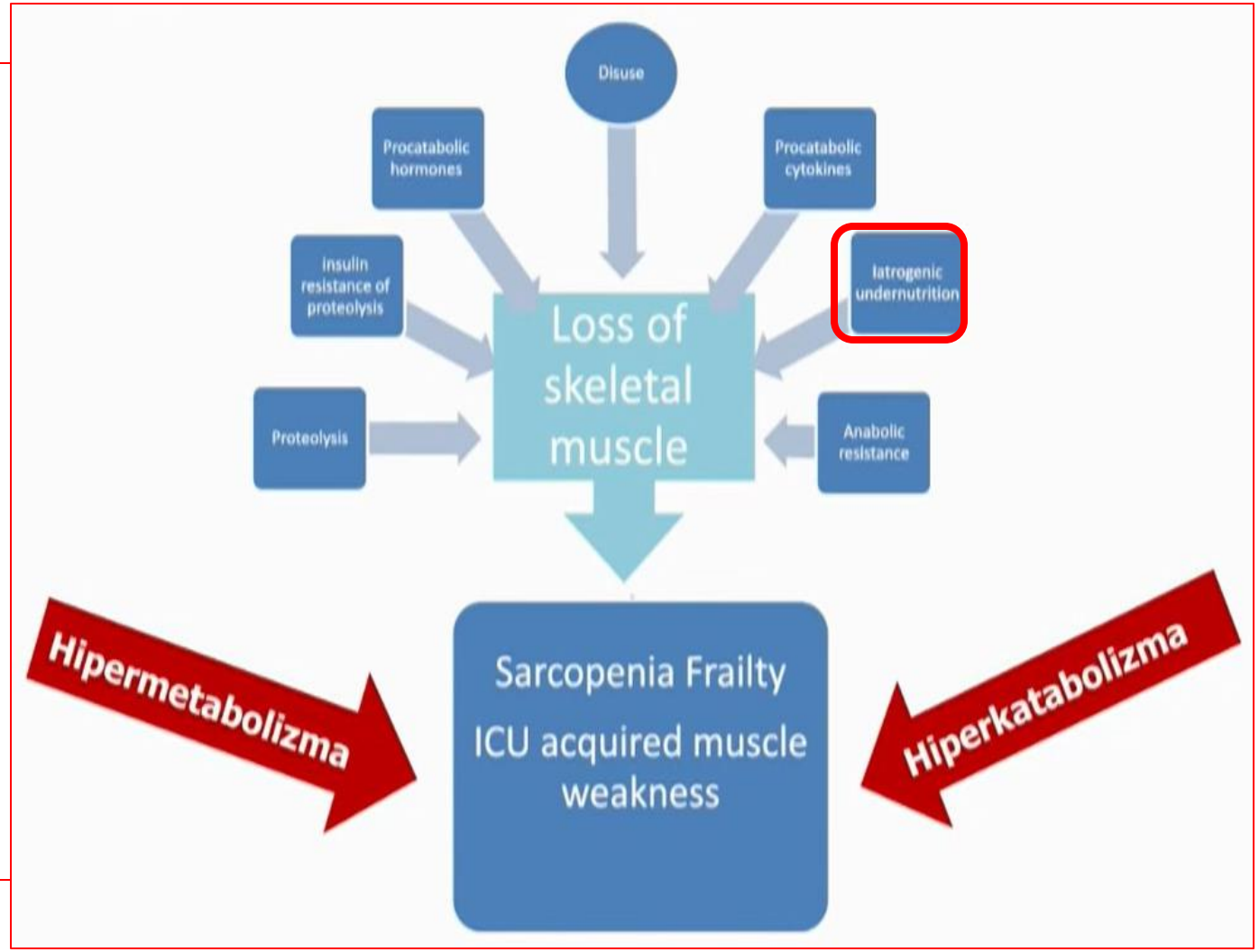
Arthur Raymond Hubert van Zanten[1*], Elisabeth De Waele[2,3] and Paul Edmund Wischmeyer[4]



YOĞUN BAKIM HASTASI AŞIRI BESLENMEDEN KORUMAK İÇİN YA İNDİREKT KALORİMETRİ KULLANILMALI YA DA DENKLEMLERE GÖRE HİPOKALORİK ALANDA KALINMALIDIR.

# Yoğun Bakımda Protein Kaybı Nedenleri

- Endojen substrat üretimi ve glukoneogenez için aminoasitleri sağlamak üzere proteoliz gerçekleşir
- Stress hormonları ve aracılarının katabolik etkisi
- Prokatabolik sitokinler: IL6, IL10 ve CRP



Clinical Nutrition 39 (2020) 2192–2201

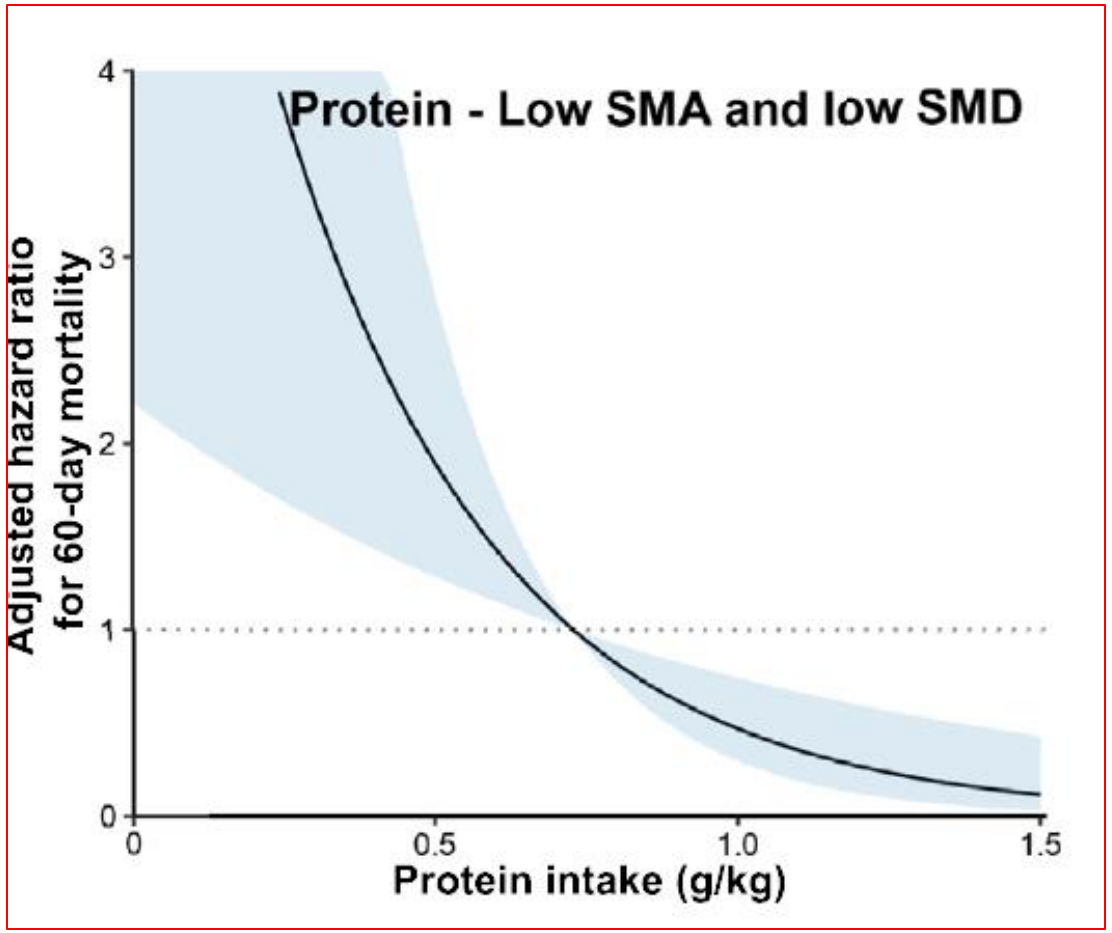
Contents lists available at ScienceDirect

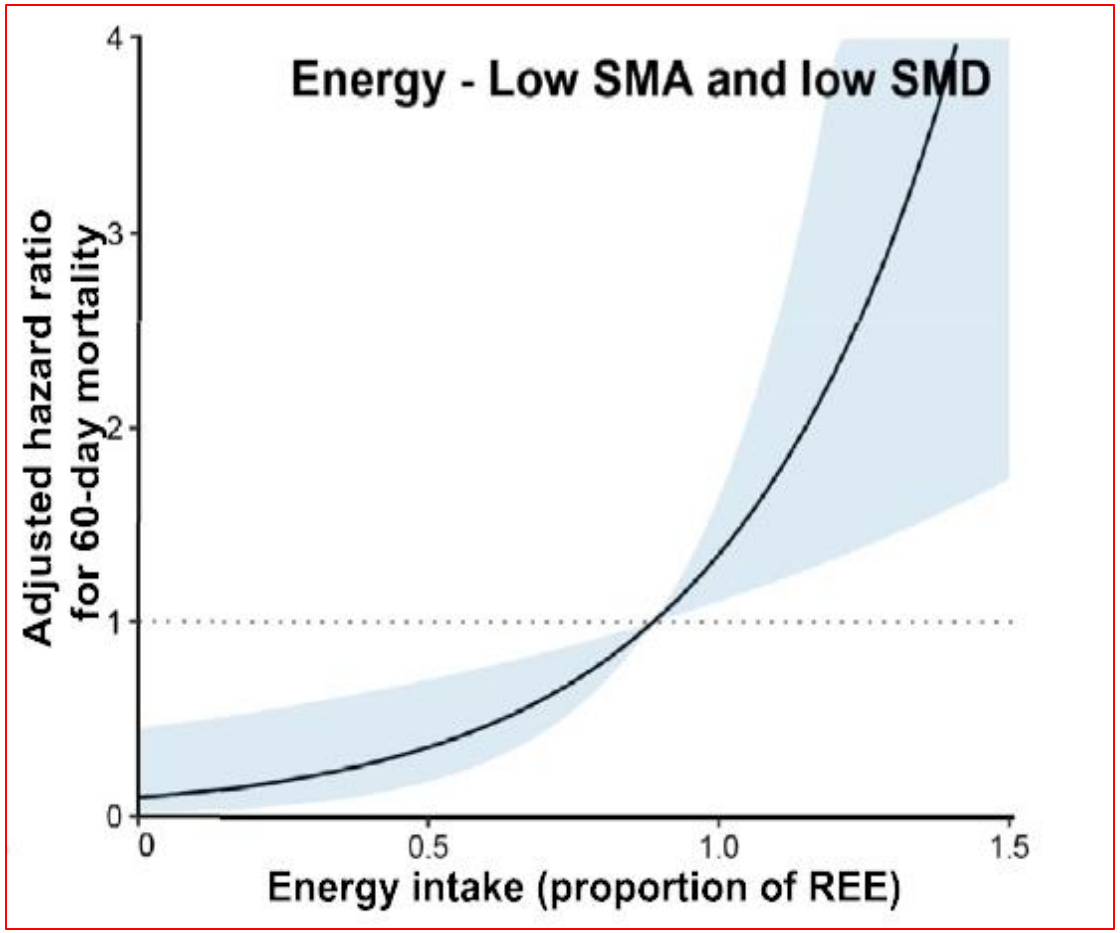
Clinical Nutrition

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

Original article

# Early high protein intake and mortality in critically ill ICU patients with low skeletal muscle area and -density



Weijs et al. Critical Care 2014, 18:701
http://ccforum.com/content/18/6/701

CRITICAL CARE

RESEARCH Open Access

# Early high protein intake is associated with low mortality and energy overfeeding with high mortality in non-septic mechanically ventilated critically ill patients

KALORİ ALIMI

NON SEPTİC PATIENTS

PROTEİN ALIMI

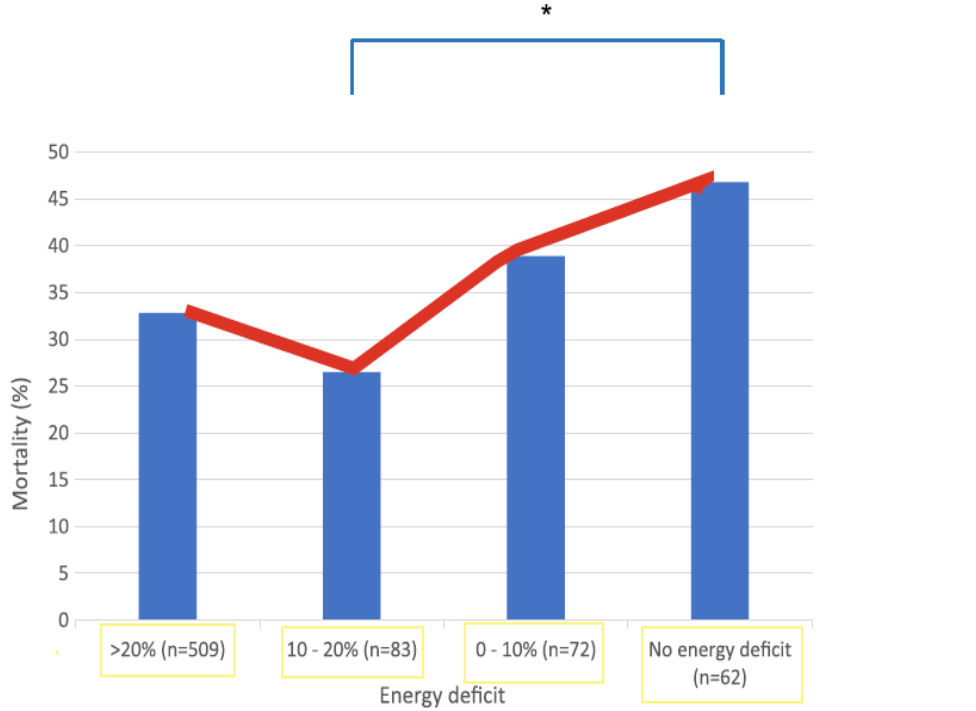



**Figure 3 Hospital mortality for cumulative energy deficit over the first 4 days of ICU stay for non-septic patients (n = 726; *P* = 0.053).** Reference is the measured resting energy expenditure of the patient. *$P = 0.012$.

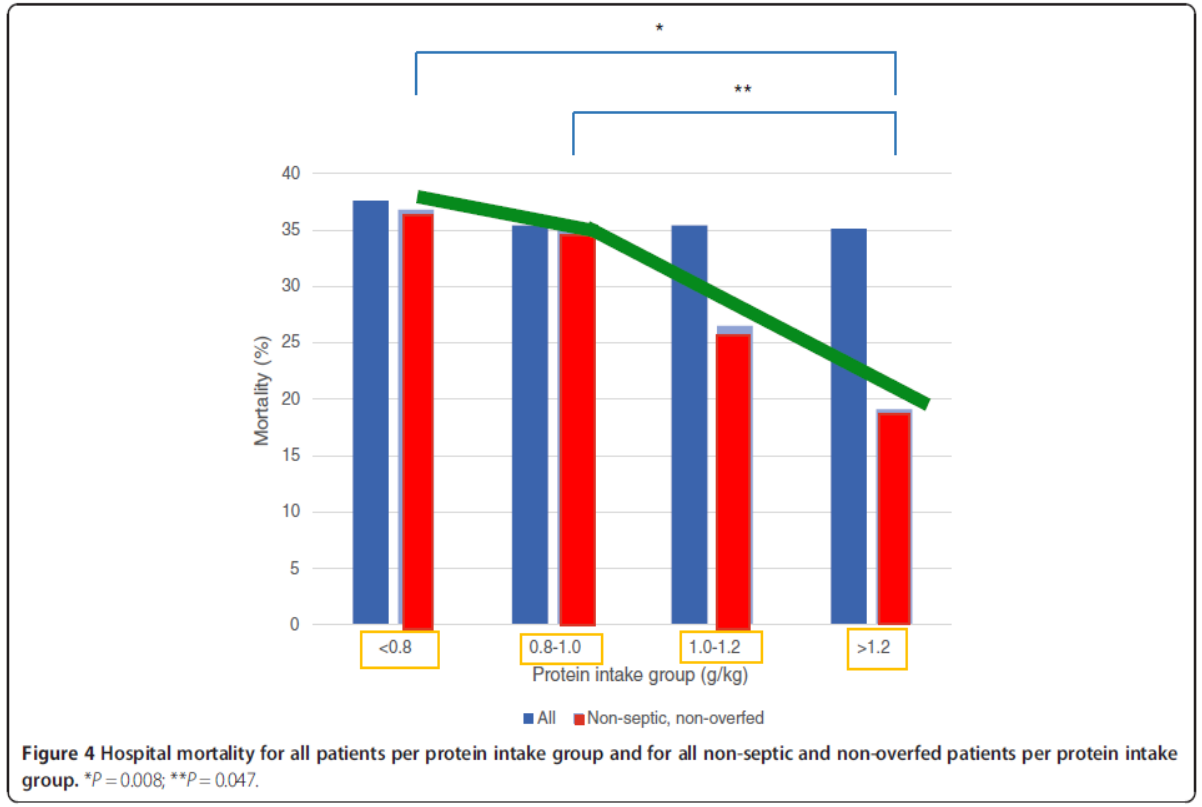



**Figure 4 Hospital mortality for all patients per protein intake group and for all non-septic and non-overfed patients per protein intake group.** *$P = 0.008$; **$P = 0.047$.

ELSEVIER

Clinical Nutrition

Volume 23, Issue 2, April 2004, Pages 273-280


ORIGINAL ARTICLE

# Muscle wasting and energy balance in critical illness ☆

Clare L Reid [a, b, c], Iain T Campbell [b], Rod A Little [c]

- Kritik hastalıklarda katabolik sürecin ilk haftasında kas protein kaybı

- Uzamış kritik hastalıkta ise yaygın olarak ortaya çıkan kas atrofisi oluşur.
- Fiziksel egzersizler önemli

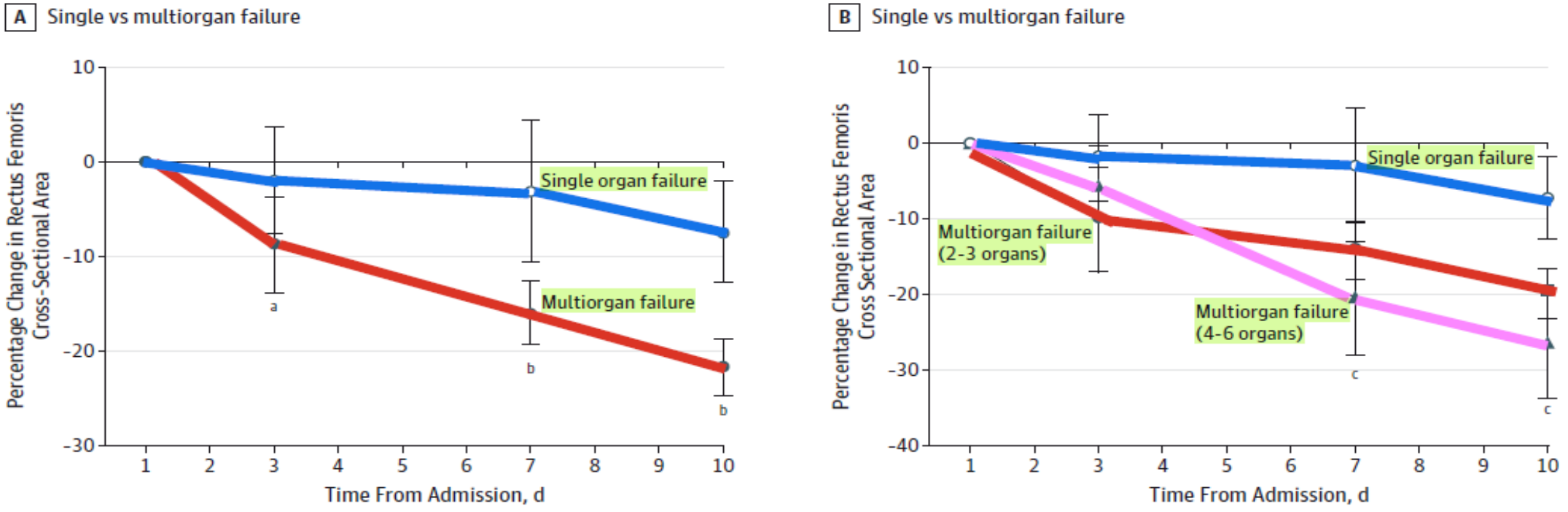
Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

# Acute Skeletal Muscle Wasting in Critical Illness

Zudin A. Puthucheary, MRCP; Jaikitry Rawal, MRCS; Mark McPhail, PhD; Bronwen Connolly, BSc; Gamunu Ratnayake, MRCP; Pearl Chan, MBBS; Nicholas S. Hopkinson, PhD; Rahul Phadke, FRCPath; Tracy Dew, MSc; Paul S. Sidhu, PhD; Cristiana Velloso, PhD; John Seymour, PhD; Chibeza C. Agley, MSc; Anna Selby, PhD; Marie Limb, PhD; Lindsay M. Edwards, PhD; Kenneth Smith, PhD; Anthea Rowlerson, PhD; Michael John Rennie, PhD; John Moxham, PhD; Stephen D. R. Harridge, PhD; Nicholas Hart, PhD; Hugh E. Montgomery, MD

%17 KAS KAYBI /10 GÜN

## Figure 5. Measurements of Muscle Wasting During Critical Illness by Organ Failure




| No. of patients | | | | |
|---|---|---|---|---|
| Single organ failure | 15 | 14 | 15 | 15 |
| Multiorgan failure | 47 | 43 | 45 | 47 |

| No. of patients | | | | |
|---|---|---|---|---|
| Single organ failure | 15 | 14 | 15 | 15 |
| Multiorgan failure | | | | |
| 2-3 Organs | 33 | 31 | 32 | 33 |
| 4-6 Organs | 14 | 12 | 13 | 14 |

JAMA. 2013;310(15):1591-1600. doi:10.1001/jama.2013.278481

Review

# Prognostic value of sarcopenia in adults with solid tumours: A meta-analysis and systematic review

Shlomit Strulov Shachar [a,b,*], Grant R. Williams [a], Hyman B. Muss [a], Tomohiro F. Nishijima [a]

[a] *UNC Lineberger Comprehensive Cancer Center, 450 West Drive, Chapel Hill, NC 27514, USA*
[b] *Division of Oncology, Rambam Health Care Campus, Haifa, Israel*

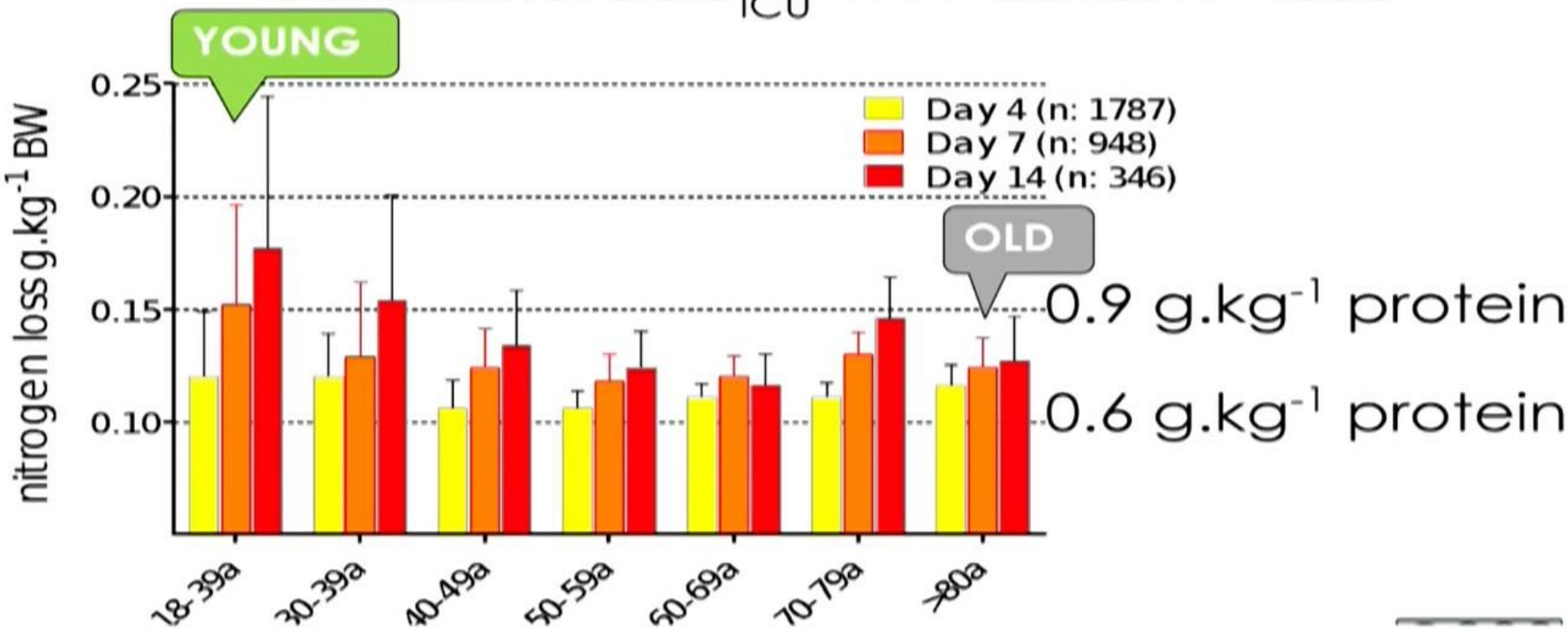
Received 22 December 2015; accepted 29 December 2015
Available online 13 February 2016

## SARKOPENİ

- Kanser pre-sarkopeni prevlansı %10-70 arasındadır (hepatosellüler, pakreatikobilier, gastroözefagial, renal ve kolorektal).
- YBÜ'de hastaların **%60-70**' i pre-sarkopenik olarak tanımlanmıştır.

# Urinary nitrogen loss vs Age & LOS

Cardiothoracic$_{ICU}$ 1997-2016: n=4838



# Kritik Hastada Günlük Protein Gereksinimi

(24 saatlik idrar azotu + 4 gr) x 6.25

ÜRÜNER NİTROJEN KAYBI

YAŞA, CİNSE VE VÜCUT AĞIRLIĞINA GÖRE DEĞİŞKENLİK GÖSTEREBİLMEKTEDİR.

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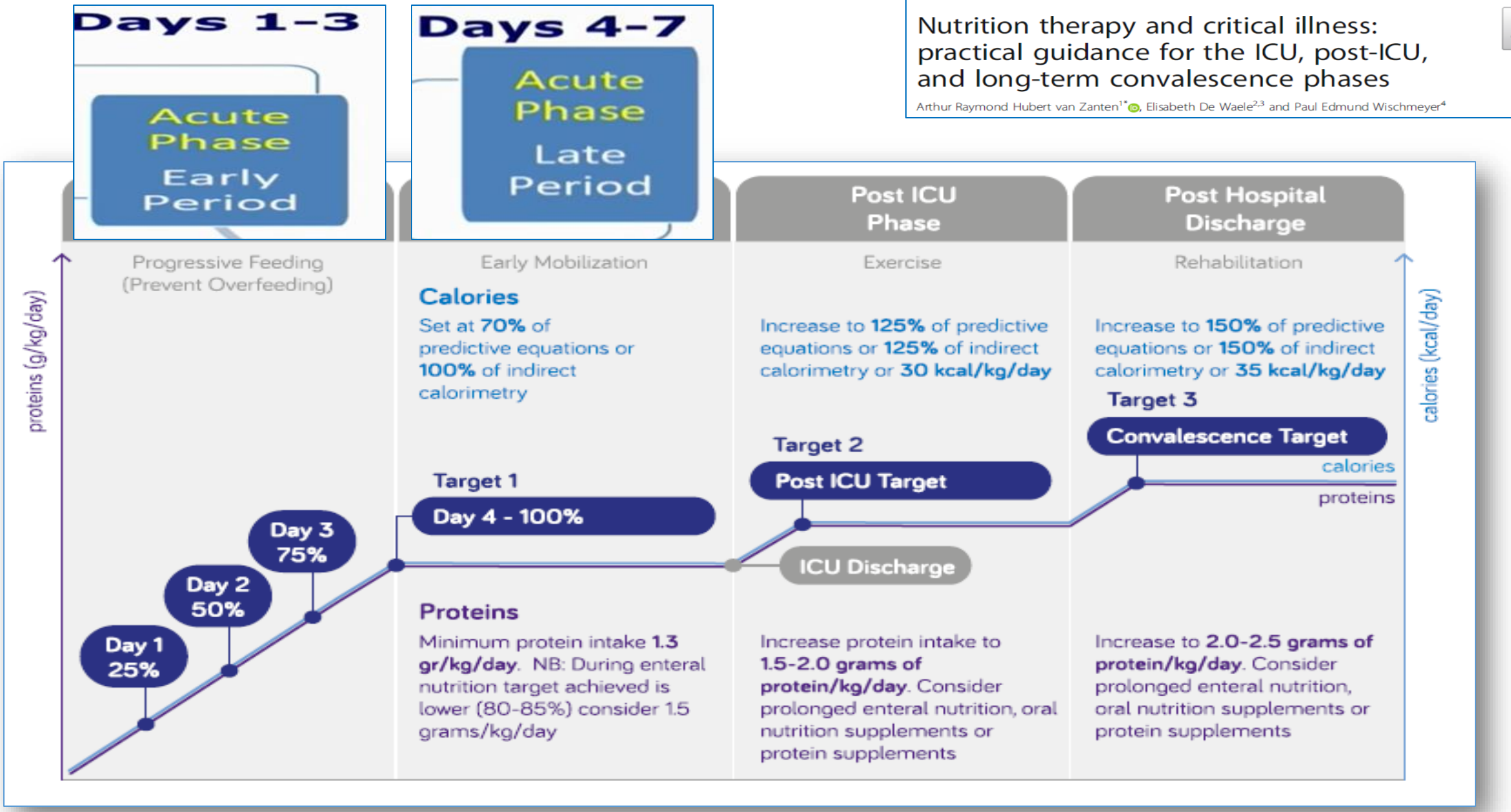

# SONUÇ

- Kritik hastalığın ilk 3 günü kalori basamaklı arttırılır.
- Yoğun bakım hastalarında nütrisyon tedavilerinin bir parçası olmalıdır.
- Nütrisyonu, yaşam desteği önlemleriyle ilişkilendirmek sonuçları iyileştirme potansiyeline sahiptir.
- Protein gereksinimi kritik hastalıkta artar.
- Artmış protein ihtiyacını karşılamak kas kaybını önlemenin en önemli yollarından birisidir.

*İLGİNİZ İÇİN*

*TEŞEKKÜRLER*