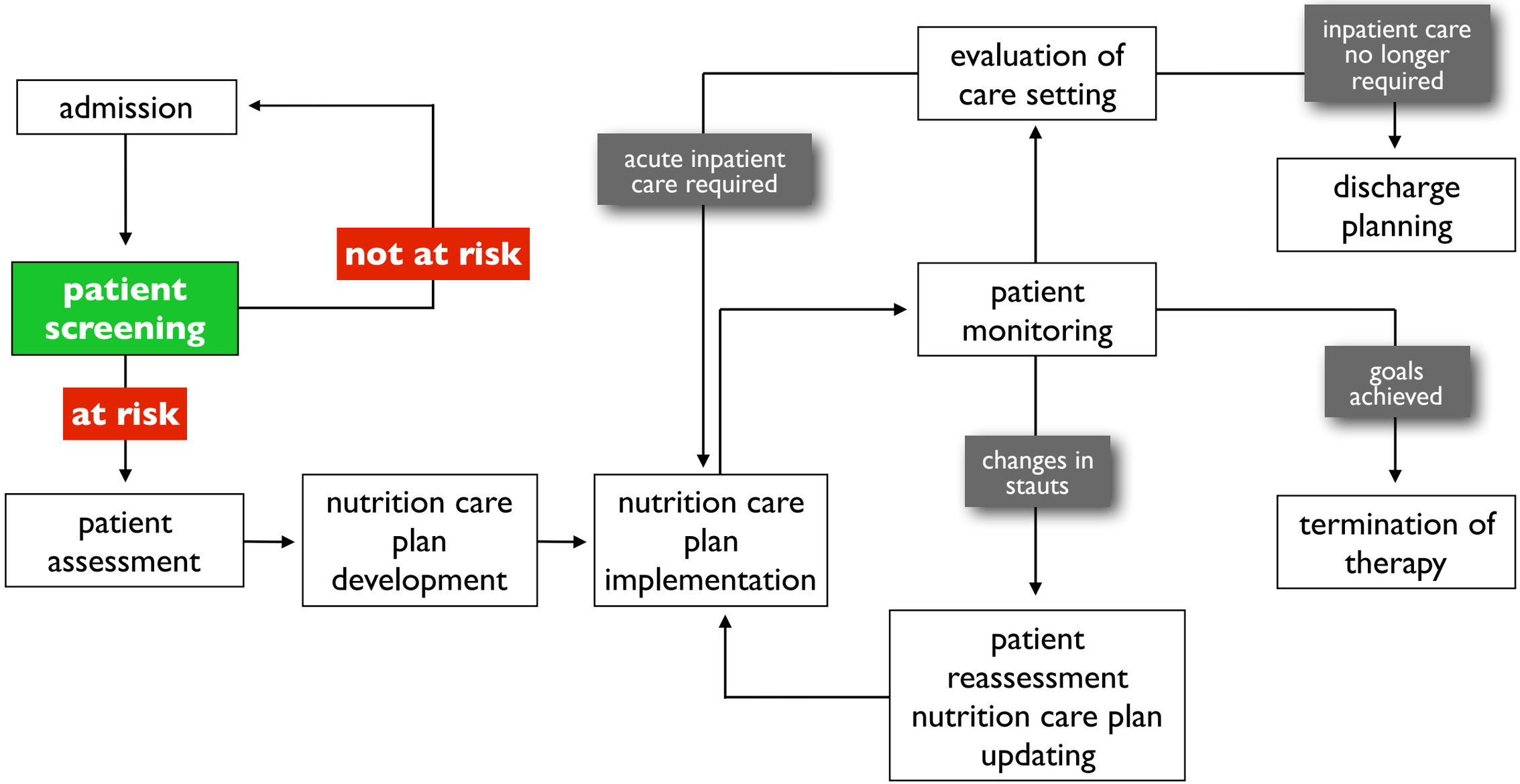
la valutazione dello stato nutrizionale e dei bisogni nutrizionali

beniamino ciocchi
ASUITs
nutrizione clinica e team NAD

nutrition care process

nutrition care process



ASPEN 1995 (modified)

Malnutrition

An acute, subacute or chronic state of nutrition, in which a combination of varying degrees of overnutrition or undernutrition with or without inflammatory activity have led to a change in body composition and diminished function.

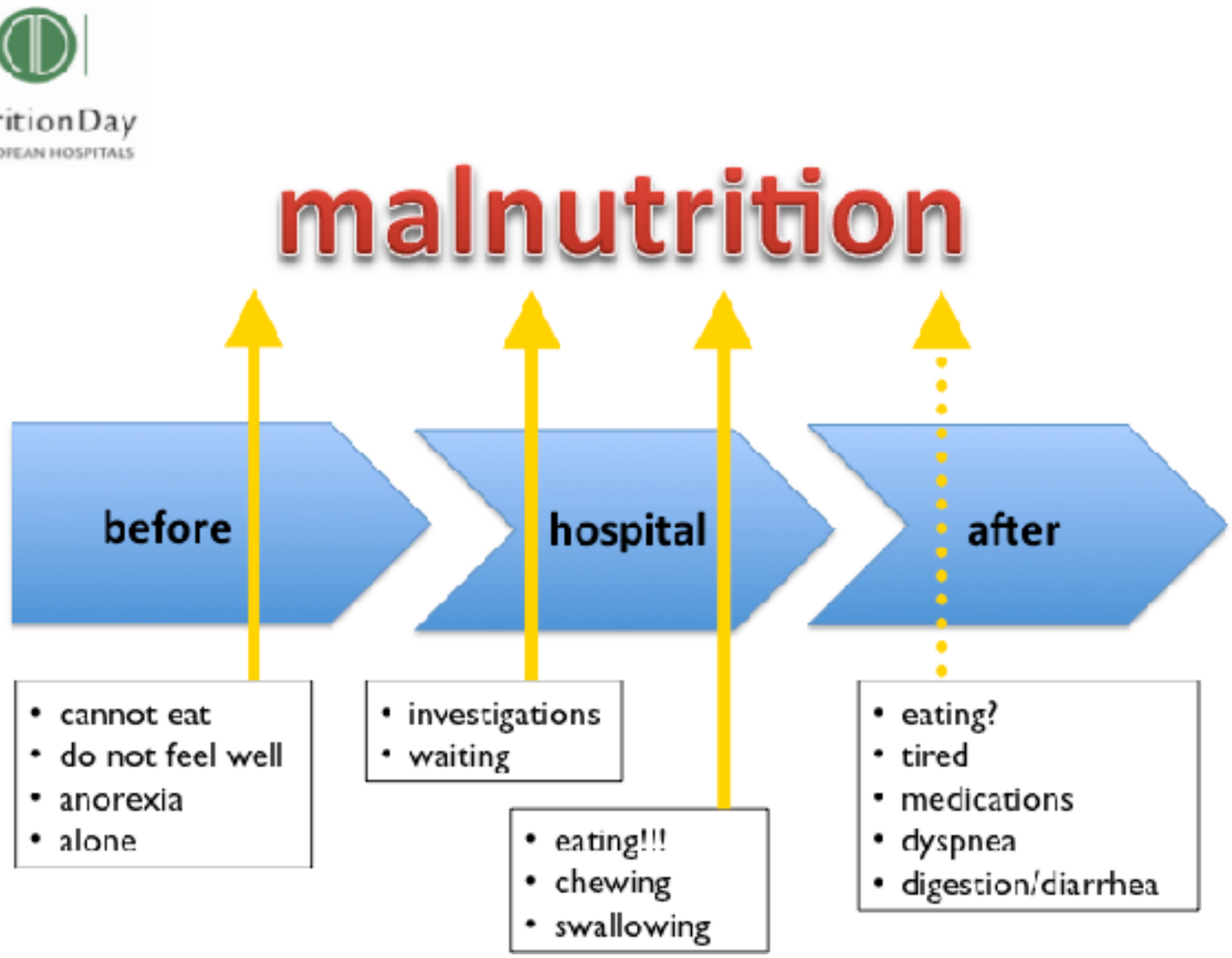
[Soeters PB, Schols AM. Advances in understanding and assessing malnutrition. Curr Opin Clin Nutr Metab Care 2009; 12(5):487–494.]

Nutrition Support in Clinical Practice: Review of Published Data and Recommendations for Future Research Directions

S. Klein et al. (A.S.P.E.N. BOARD OF DIRECTORS) JPEN, 1997

- Malnutrition is a ***continuum*** that starts with inadequate nutrient intake, followed by a progressive series of metabolic, functional, and body compositional changes. (B)

nutritionDay
IN EUROPEAN HOSPITALS



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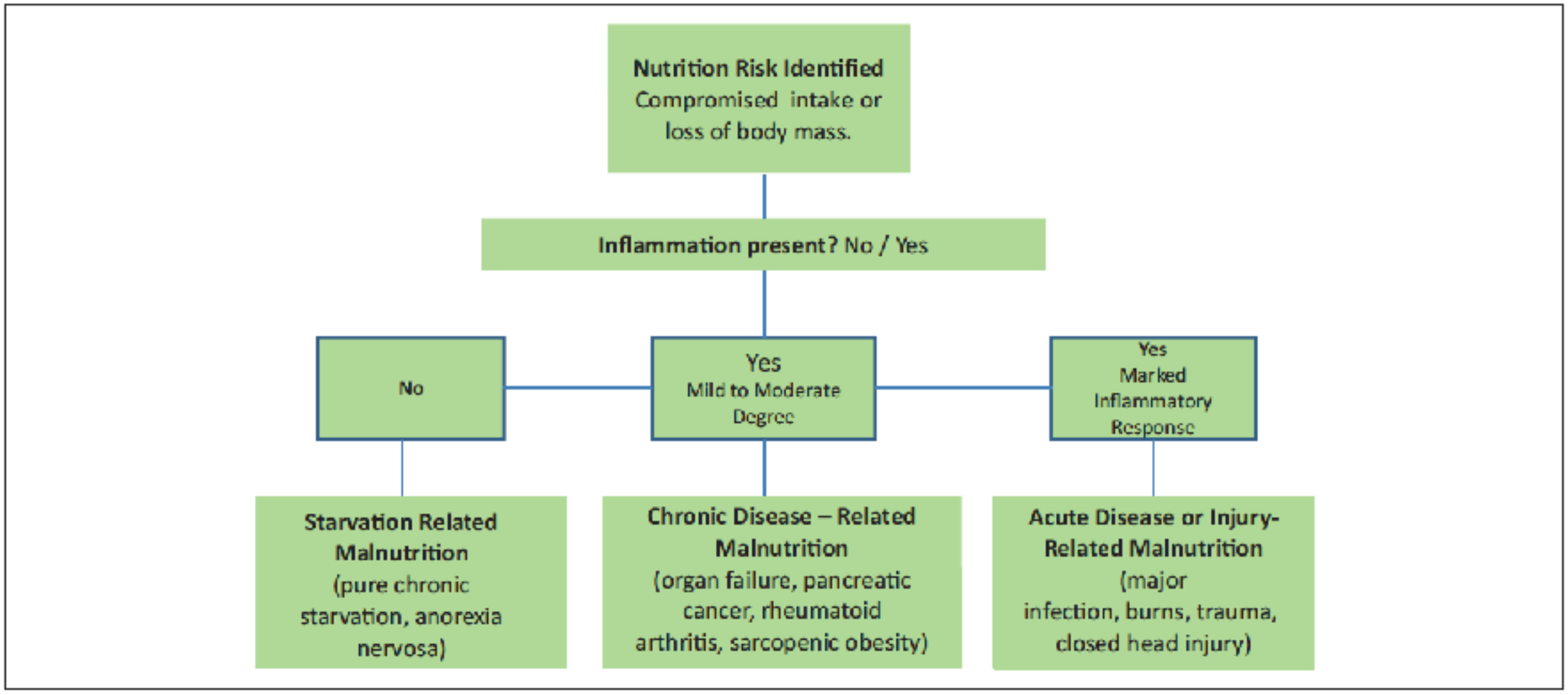
nutritionDay
IN EUROPEAN HOSPITALS

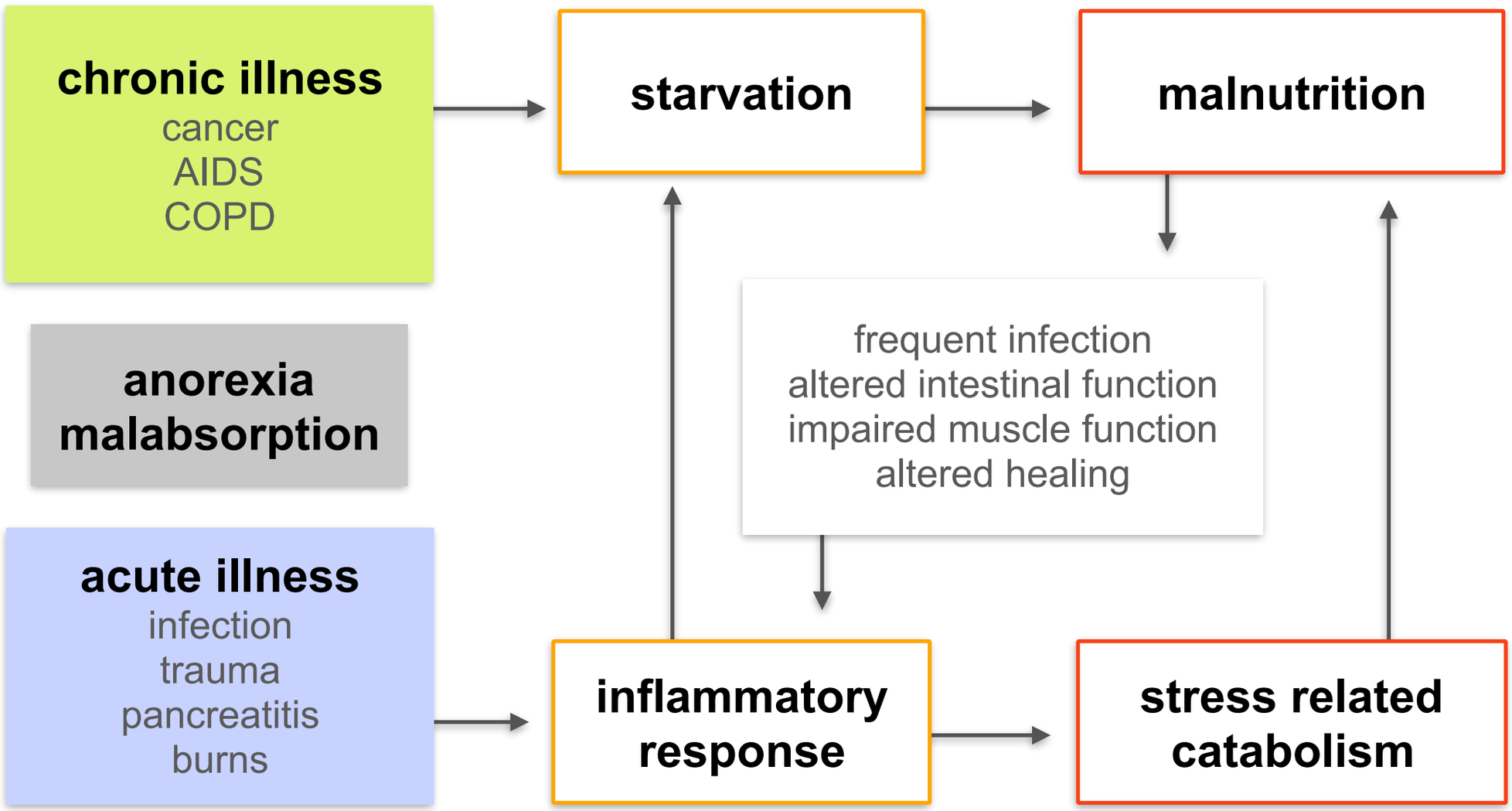
*.. **no single parameter is definitive for adult malnutrition**, the identification of 2 or more of the following 6 characteristics is recommended for diagnosis*

- ***Insufficient energy intake***
- *Weight loss*
- ***Loss of muscle mass***
- *Loss of subcutaneous fat*
- ***Localized or generalized fluid accumulation that may sometimes mask weight loss***
- *Diminished functional status as measured by handgrip strength*

Etiology-based malnutrition definitions

Jensen GL, Bistrian B, Roubenoff R, Heimburger DC. Malnutrition syndromes: a conundrum vs continuum. JPEN 2009;33:710




chronic illness
cancer
AIDS
COPD
starvation
malnutrition
anorexia
malabsorption
frequent infection
altered intestinal function
impaired muscle function
altered healing
acute illness
infection
trauma
pancreatitis
burns
inflammatory response
stress related catabolism

SUPPORTO NUTRIZIONALE

PREVENZIONE PRIMARIA (Territorio)

PREVENZIONE SECONDARIA (Ospedale)

CAUSE

↓ introito di nutrienti

↑ perdite di nutrienti

↑ fabbisogno di nutrienti

specifiche alterazioni metaboliche

MALNUTRIZIONE (acuta o cronica)

deplezione delle riserve tissutali
segni e sintomi clinici

CONSEGUENZE

↑ morbilità

↑ durata della degenza

↑ impiego di farmaci

↑ durata della riabilitazione

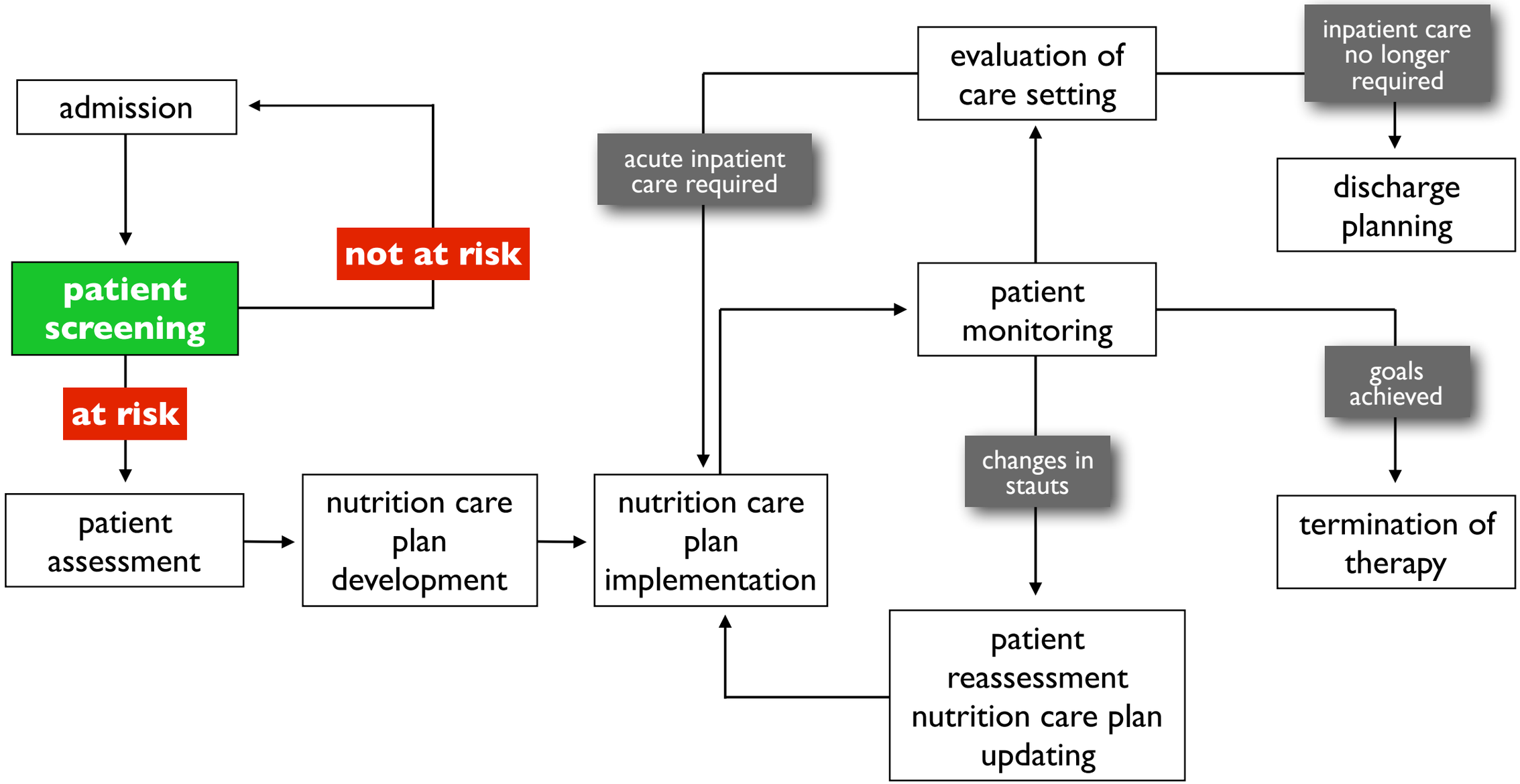
↓ qualità di vita

↑ mortalità

↑ costi sanitari e sociali

nutrition care process

nutrition care process



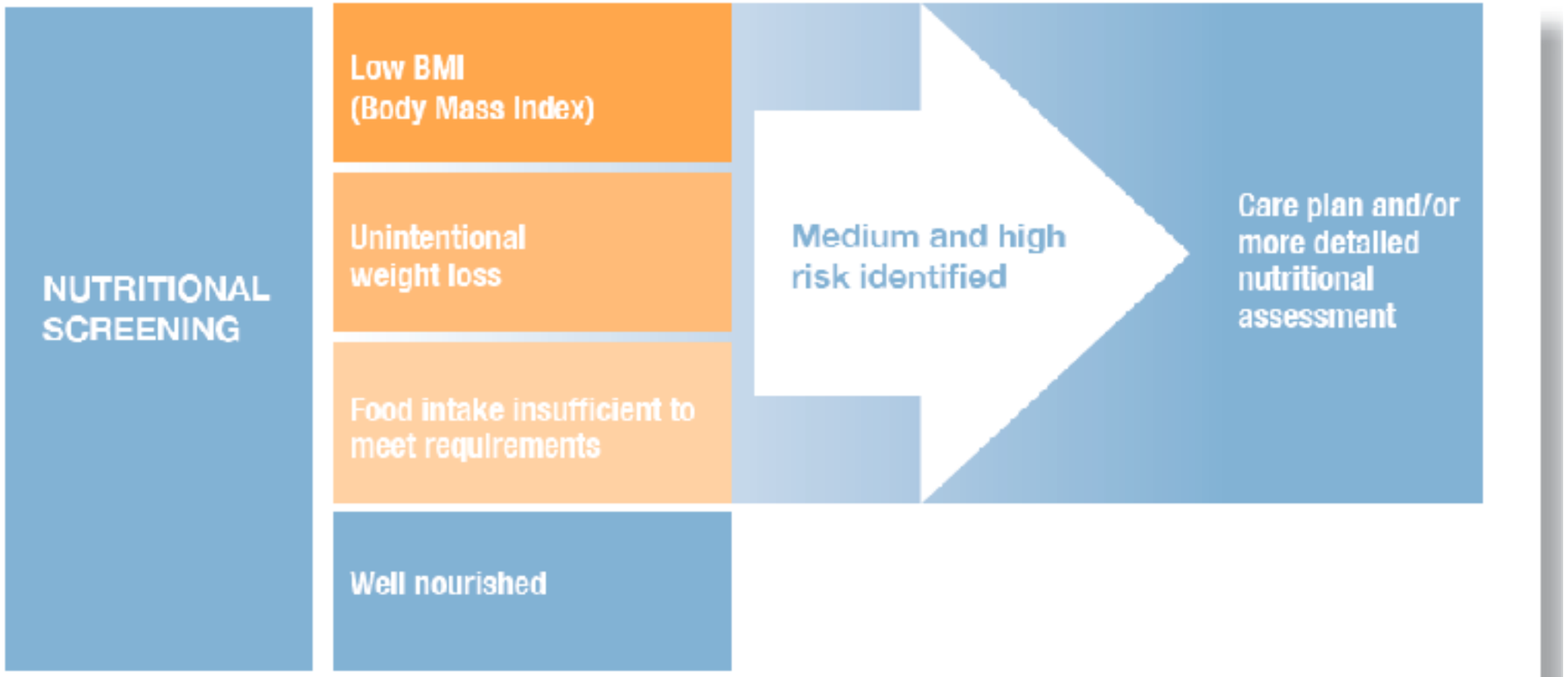
ASPEN 1995 (modified)

THE CONCEPT OF NUTRITION RISK

- Chances of a better or worse outcome from disease or surgery according to actual or potential nutritional and metabolic status (ESPEN 2006).

SCREENING LEADS TO NUTRITIONAL CARE

ESPEN GUIDELINES FOR NUTRITION SCREENING 2002



Nutritional screening identifies individuals who:

- are 'at-risk' across the spectrum of nutritional status
- are at risk of adverse outcome and who
- may benefit clinically from nutritional support

Nutritional status

Undernutrition - screening and assessment

- **Screening** is a simple and a rapid process to select subjects who are malnourished or at risk of malnutrition
  - It should be sensitive enough to detect all or near all the patients at nutrition risk

- **Assessment** is a diagnostic process which characterize degrees of malnutrition and risk of complication related to malnutrition.
  - The process of nutritional assessment is much more complex than screening.

Nutritional status

Undernutrition - screening and assessment

- A **screening test** refers to the **detection** of an otherwise unrecognised condition, which is usually amenable to treatment.

- A **screening programme** refers to the **whole management** pathway, which begins with diagnosis and continues with treatment and follow-up.

- … **identification** of a problem does **not necessarily** result in **improved outcome**s unless there is an effective care pathway to deal with the problems that have been identified.

- … in assessing the clinical effectiveness of a nutritional screening test it is important to consider the **adequacy** of the entire **management pathway** (screening programme)

Nutritional status

Undernutrition - screening and assessment

- **Screening** is a simple and a rapid process to select subjects who are malnourished or at risk of malnutrition
  - It should be sensitive enough to detect all or near all the patients at nutrition risk

- **Assessment** is a diagnostic process which characterize degrees of malnutrition and risk of complication related to malnutrition.
  - The process of nutritional assessment is much more complex than screening.

- Nutrition assessment continues the data gathering process initiated in the screen. Assessment allows the clinician to gather more information and conduct a nutrition-focused physical examination to determine if there truly **is a nutrition problem, to name the problem, and to determine the severity of the problem**.

- The **assessment** should be conducted by "an **expert** clinician, dietitian, or nutrition nurse." (ESPEN 2006)

Nutritional status

Undernutrition - screening and **assessment**

- History and clinical diagnosis
- Physical exam/clinical signs
- Anthropometric data
  - Unintended weight loss is a well-validated indicator of malnutrition. Weight should be measured on admission to any clinical setting and monitored frequently throughout the length of stay… extreme of BMI may be at increased risk of poor nutrition status
- Food/nutrient intake
- Laboratory data
  - Indicators of inflammatory response traditionally used as indicators of malnutrition (ie, serum albumin, prealbumin) should be interpreted with caution… can include elevated C-reactive protein (CRP), white blood cell count, and blood glucose levels and may aid in the determination of an etiologic-based diagnosis. Negative nitrogen balance and elevated resting energy expenditure may sometimes be used to support the presence of systemic inflammatory response and further facilitate identification of the etiologic basis for the diagnosis of malnutrition…

Nutritional status

Undernutrition - screening and **assessment**

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VALUTAZIONE QUOTIDIANA DELLE INGESTA

Paziente	Reparto	Letto
Indicare quanto della porzione ricevuta è stata effettivamente utilizzata		data

	TUTTO	1/2	1/4	NIENTE	Perché ha mangiato di meno o niente: (indichi le ragioni per cui non ha mangiato tutto il pasto)
Esempio					□ non ho fame □ Ho nausea/vomito □ Non devo mangiare □ Non posso mangiare senza aiuto ☒ non mi piaceva l'odore □ non mi piaceva il sapore □ non ho potuto scegliere io il pasto
	☐	☒	☐	☐	
Colazione					□ non ho fame □ Ho nausea/vomito □ Non devo mangiare □ Non posso mangiare senza aiuto □ non mi piaceva l'odore □ non mi piaceva il sapore ☐ non ho potuto scegliere io il pasto
	TUTTO	1/2	1/4	NIENTE	
	☐	☐	☐	☐	
Pranzo					□ non ho fame □ Ho nausea/vomito □ Non devo mangiare □ Non posso mangiare senza aiuto □ non mi piaceva l'odore □ non mi piaceva il sapore □ non ho potuto scegliere io il pasto
	TUTTO	1/2	1/4	NIENTE	
	☐	☐	☐	☐	
Merenda	 biscotti	Frutta fresca 	Yogurt 	Dolci 	niente ○  Altro 
Cena					□ non ho fame □ Ho nausea/vomito □ Non devo mangiare □ Non posso mangiare senza aiuto □ non mi piaceva l'odore □ non mi piaceva il sapore □ non ho potuto scegliere io il pasto
	TUTTO	1/2	1/4	NIENTE	
	☐	☐	☐	☐	

Which individual criteria do best capture the state of malnutrition?	
Anthropometry	BMI and leg and arm anthropometry, e.g. calf circumference, arm muscle circumference and triceps skinfold, are clinically available objective variables with a fairly wide-spread use.
Body composition	Fat free mass (FFM) and fat mass (FM) can objectively be measured by technical devices like bioelectrical bio-impedance analyses (BIA), dual energy x-ray absorptiometry (DXA), computed tomography (CT), ultrasound or magnetic resonance imaging (MRI).
Weight loss	This reflects a dynamic process that requires a negative energy balance; i.e. a reduced food intake or increased energy expenditure.
Anorexia	Loss of appetite is a common complication to disease, medication and ageing. It is one of the most important mechanisms behind weight loss.
Reduced food intake	Self-reported or quantified reduction of the food intake is a feature of most of the screening tools.
Biochemical indicators	Markers of visceral protein status, like serum concentrations of albumin have a tradition of being used as markers of nutritional status. Inflammation, due to disease or ageing, is likely the most common cause underlying the development of malnutrition. Thus, inflammation is an important etiologic factor for malnutrition.

Table 3. Level of Detail of the Nutrition Screen Compared With Nutrition Assessment

	Nutrition Screen	Nutrition Assessment
Intake	Recent changes in intake	Changes in specific nutrient intake Changes in energy intake Impact of changes
Anthropometrics	Weight Change in weight	Body mass index Body composition
Medical tests, laboratory tests, and procedures	Not usually included	Medical diagnosis Impact of medical diagnosis on ability to meet needs
Nutrition-focused physical exam	General appearance	Review of systems Physical examination
Client history	Not usually included	Medical and surgical history Planned therapies Medication history Social history

	MALNUTRIZIONE		
	Lieve	**Moderata**	**Grave**
Calo ponderale	5-10%	11-20%	>20%
BMI (kg/m^2)	17-18,4	16-16,9	<16
Albumina (g/dl)	3-3,5	2,5-2,9	<2,5
Transferrina (mg/dl)	150-200	100-149	<100
Prealbumina (mg/dl)	18-22	10-17	<10
Linfociti ($cell/mm^3$)	1200-1500	800-1199	<800

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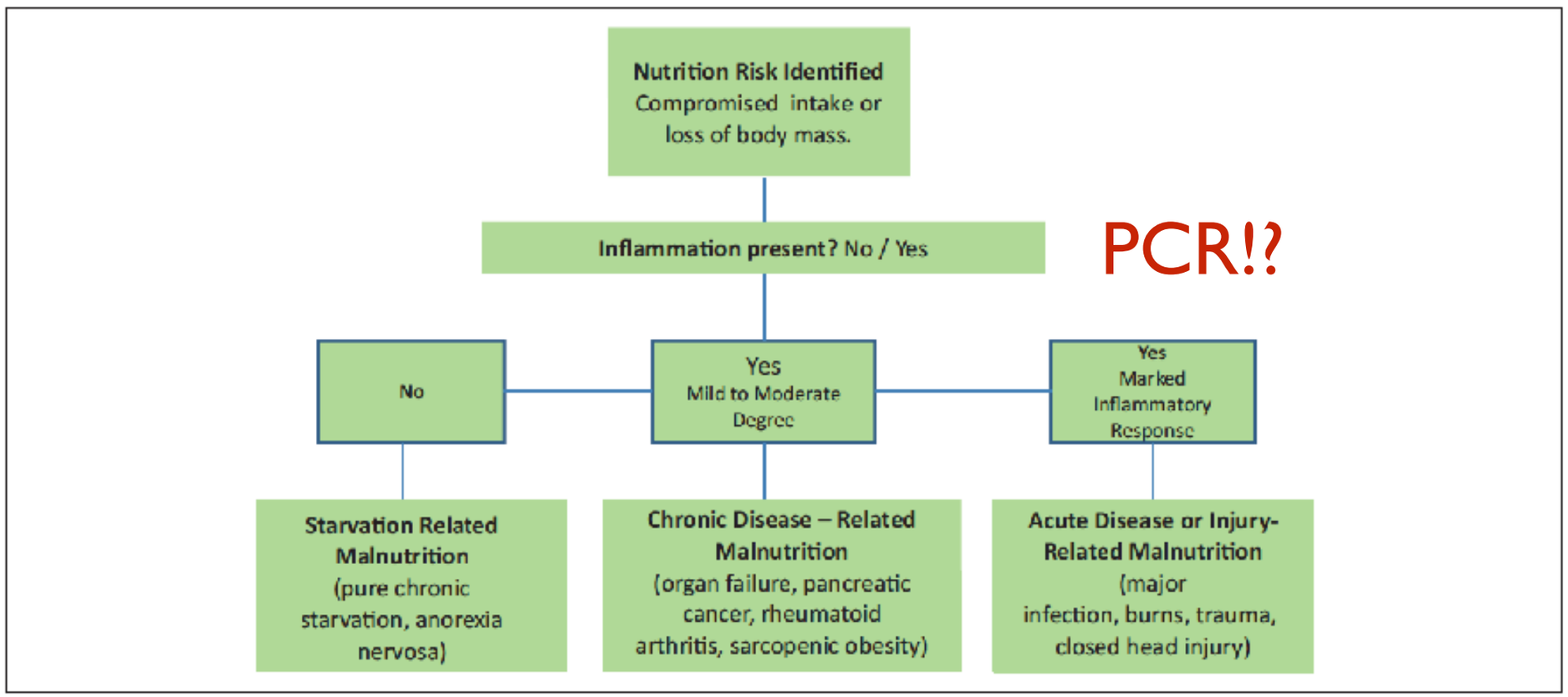
Proteine plasmatiche che si correlano con lo stato nutrizionale

- **albumina** (tournover lento: emivita 20 giorni)
- **transferrina** (tournover medio: emivita 7 giorni)
- **prealbumina** (tournover rapido: emivita 2 giorni)

MALNUTRIZIONE

	Lieve	Moderata	Grave
Calo ponderale	5-10%	11-20%	>20%
			<16
			<2,5
			<100
			<10
			<800



PCR!?

lo stato nutrizionale

emivita 20 giorni)

- **transferrina** (tournover medio: emivita 7 giorni)
- **prealbumina** (tournover rapido: emivita 2 giorni)

Clinical Nutrition 34 (2015) 335–340

Contents lists available at ScienceDirect

Clinical Nutrition

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

ESPEN endorsed recommendation

Diagnostic criteria for malnutrition – An ESPEN Consensus Statement

T. Cederholm [a, *], I. Bosaeus [b], R. Barazzoni [c], J. Bauer [d], A. Van Gossum [e], S. Klek [f], M. Muscaritoli [g], I. Nyulasi [h], J. Ockenga [i], S.M. Schneider [j], M.A.E. de van der Schueren [k, l], P. Singer [m]

Fact box: Two alternative ways to diagnose malnutrition. Before diagnosis of malnutrition is considered it is mandatory to fulfil criteria for being "at risk" of malnutrition by any validated risk screening tool.

Alternative 1:

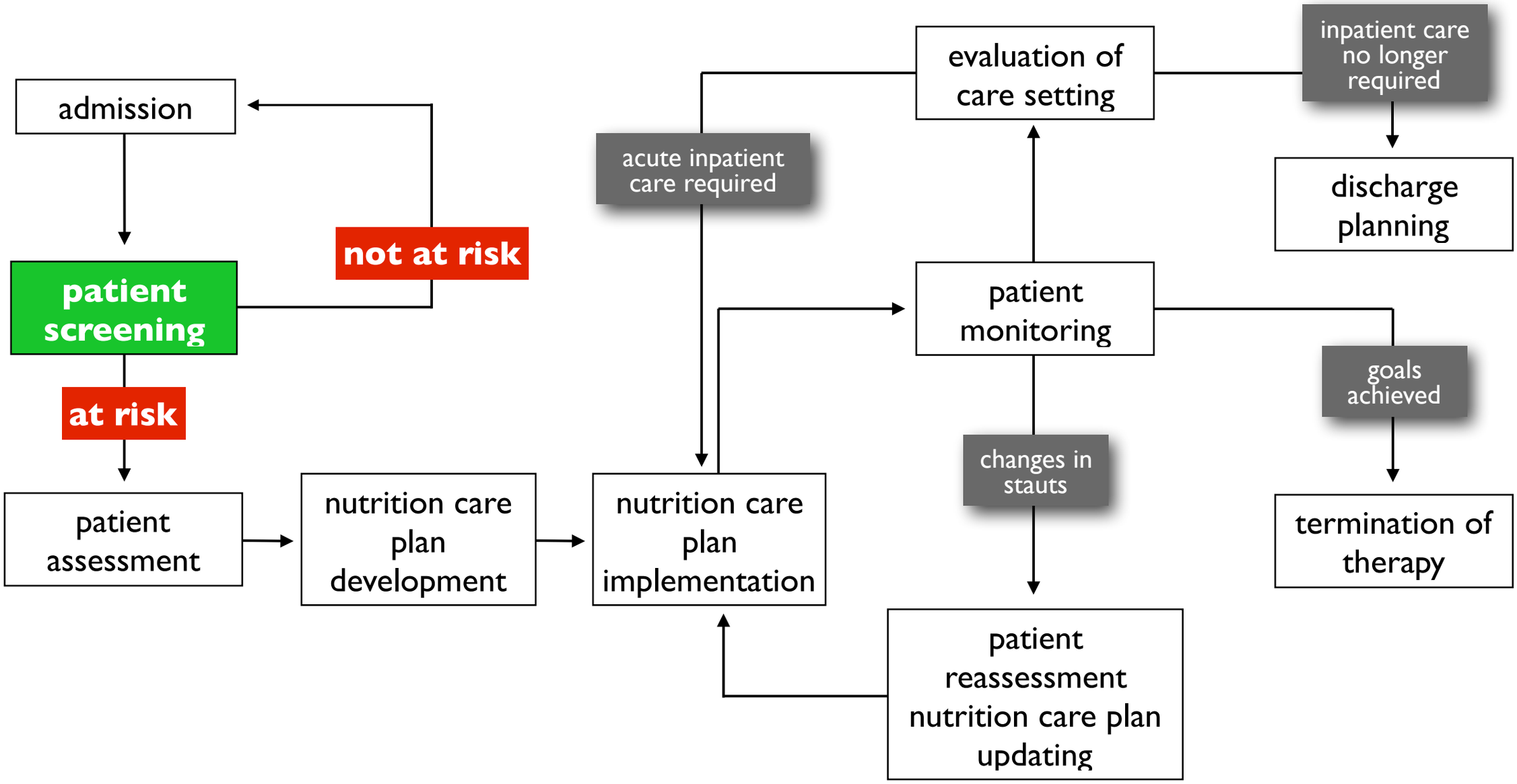
- BMI <18.5 kg/m^2

Alternative 2:

- Weight loss (unintentional) > 10% indefinite of time, or >5% over the last 3 months combined with either
- BMI <20 kg/m^2 if <70 years of age, or <22 kg/m^2 if ≥70 years of age or
- FFMI <15 and 17 kg/m^2 in women and men, respectively.

nutrition care process

nutrition care process



ASPEN 1995 (modified)

- (identificazione dei dati clinici utili all'inquadramento del paziente)
- identificazione dello stato funzionale degli organi/apparati
- indicazioni al trattamento nutrizionale/obiettivo nutrizionale (malnutrizione, catabolismo)
- definizione dei tempi e delle modalità dell'intervento nutrizionale
- **definizione dei fabbisogni e degli apporti**
- elaborazione del piano terapeutico
- scelta della via di accesso
- prescrizione miscela nutrizionale
- complicanze/strategie di prevenzione
- monitoraggio

- nutrition support must provide **all nutrients** (macro- ad micronutrients and electrolytes) **required for the preservation or restoration of lean body mass and/or for growth**

- **macronutrients** are nutrients that provide calories or **energy needed for growth, metabolism, and for other body functions**.

- there are three macronutrients:
  - carbohydrate
  - fat
  - protein

energy (kcal/g)
carbohydrate **4.0**
fat **9.2**
protein **5.2 (4.0)**

cosa e quanto

riconoscere i fabbisogni

fabbisogni nutrizionali

- proteine/azoto
- lipidi
- glucosio
- elettroliti
- vitamine ed oligoelementi
- acqua
- fibra

riconoscere i fabbisogni

fabbisogni nutrizionali

- stato nutrizionale
- grado di catabolismo
- malattia
- insufficienza d’organo

riconoscere i fabbisogni
fabbisogni nutrizionali

- **correzione** della malnutrizione
- **prevenzione** dell'insorgenza di uno stato di malnutrizione secondaria:
- correzione dell'ipercatabolismo
  - contenimento della perdita di azoto e
  - della **perdita di massa magra**

Complications Relative to Loss of Lean Body Mass

Lean body mass (% loss of total)	**Complications** (related to lost lean mass)	**Associated mortality** (%)
10	Impaired immunity Increased infection	10
20	Decreased healing, weakness, infection	30
30	Weakness, pressure sores, pneumonia, no healing	50
40	Death, usually from pneumonia	100

1 g muscolo striato catabolizzato

12 mEq K^+

16 mEq Mg^+

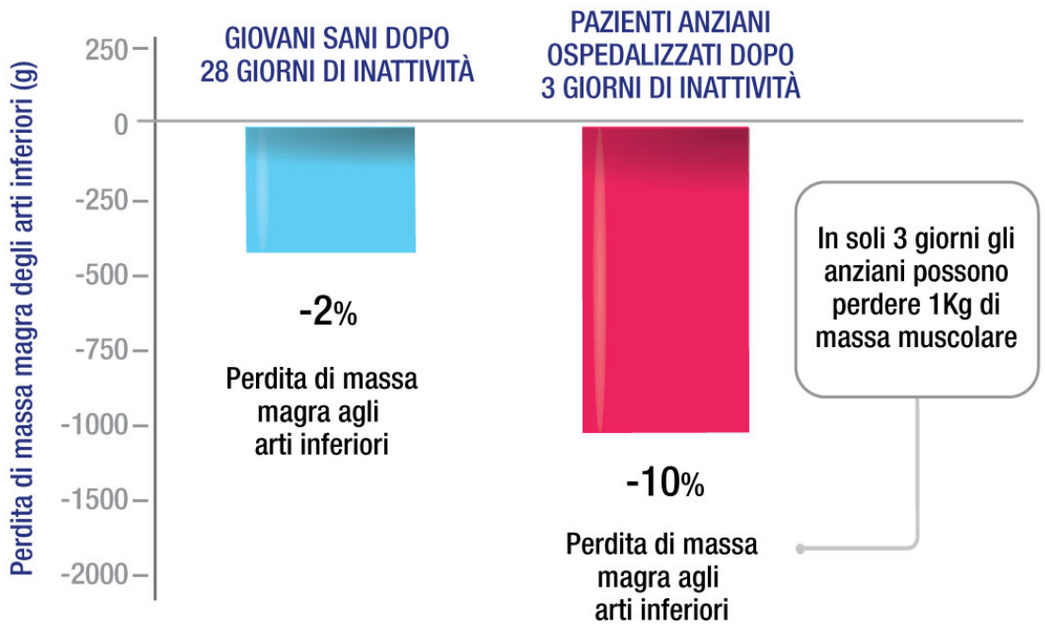
80 mEq PO_4^-

1 g muscolo striato catabolizzato

12 mEq K^+

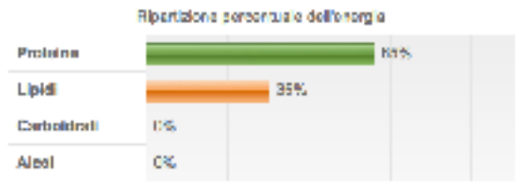
16 mEq Mg^+

80 mEq PO_4^-



Bovino adulto o vitellone - filetto - [tessuto muscolare privato del grasso visibile]

Categoria	Carni Fresche
Codice Alimento	101170
Nome Scientifico	Bos taurus



COMPOSIZIONE CHIMICA E VALORE ENERGETICO PER 100g DI PARTE EDIBILE

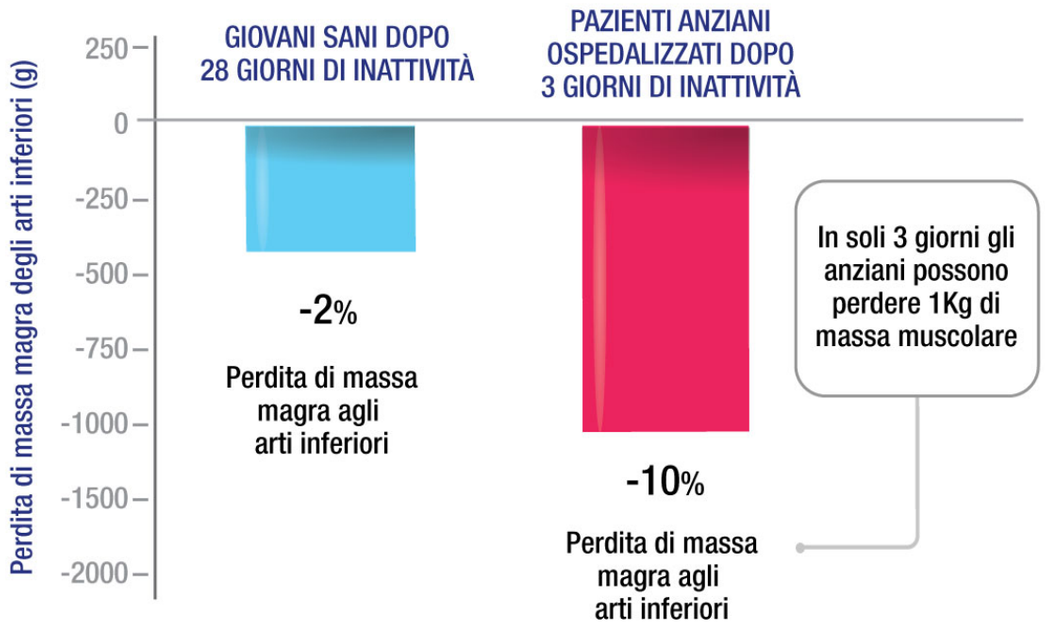
Composizione chimica	valore per 100g	Note
Parte edibile (%):	100	
Acqua (g):	72.7	
Proteine (g):	20.5	
Lipidi(g):	5	

1 g muscolo striato catabolizzato

12 mEq K^+

16 mEq Mg^+

80 mEq PO_4^-



riconoscere i fabbisogni

proteine

- **0.16 – 0.35 g/kg/die** (1-2 g proteine/kg/die) in assenza di insufficienza d'organo
- apporto massimo somministrabile nel paziente ipercatabolico **0.4 g/kg/die** (2,5 g proteine/kg/die)
- il 60% dell' azoto introdotto è utilizzato dal metabolismo, il restante **40% è ossidato**
- **prevenire l'utilizzo delle proteine quale fonte calorica** (rappoto calorie NP:azoto 1:150)

SINPE

riconoscere i fabbisogni

proteine

fabbisogni	**energia** kcal/kg/die	**proteine** gAA/kg/die	**azoto** g/kg/die
normale	20	**1**	16
aumentato	25-30	**1.2-1.8**	0.2-0.3
elevato	30-35	**2-2.5**	0.3-0.4

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SINPE

Evidence-Based Recommendations for Optimal Dietary Protein Intake in Older People: A Position Paper From the PROT-AGE Study Group

PROT-AGE recommendations for protein levels in geriatric patients with specific acute or chronic diseases

- The amount of additional dietary protein or supplemental protein needed depends on the disease, its severity, the patient's nutritional status prior to disease, as well as the disease impact on the patient's nutritional status.
- Most older adults who have an acute or chronic disease need more dietary protein (ie, 1.2–1.5 g/kg BW/d); people with severe illness or injury or with marked malnutrition may need as much as 2.0 g/kg BW/d.
- Older people with severe kidney disease (ie, estimated glomerular filtration rate [GFR] < 30 mL/min/1.73m^2) who are not on dialysis are an exception to

Protein Recommendations in Acute and Chronic Diseases

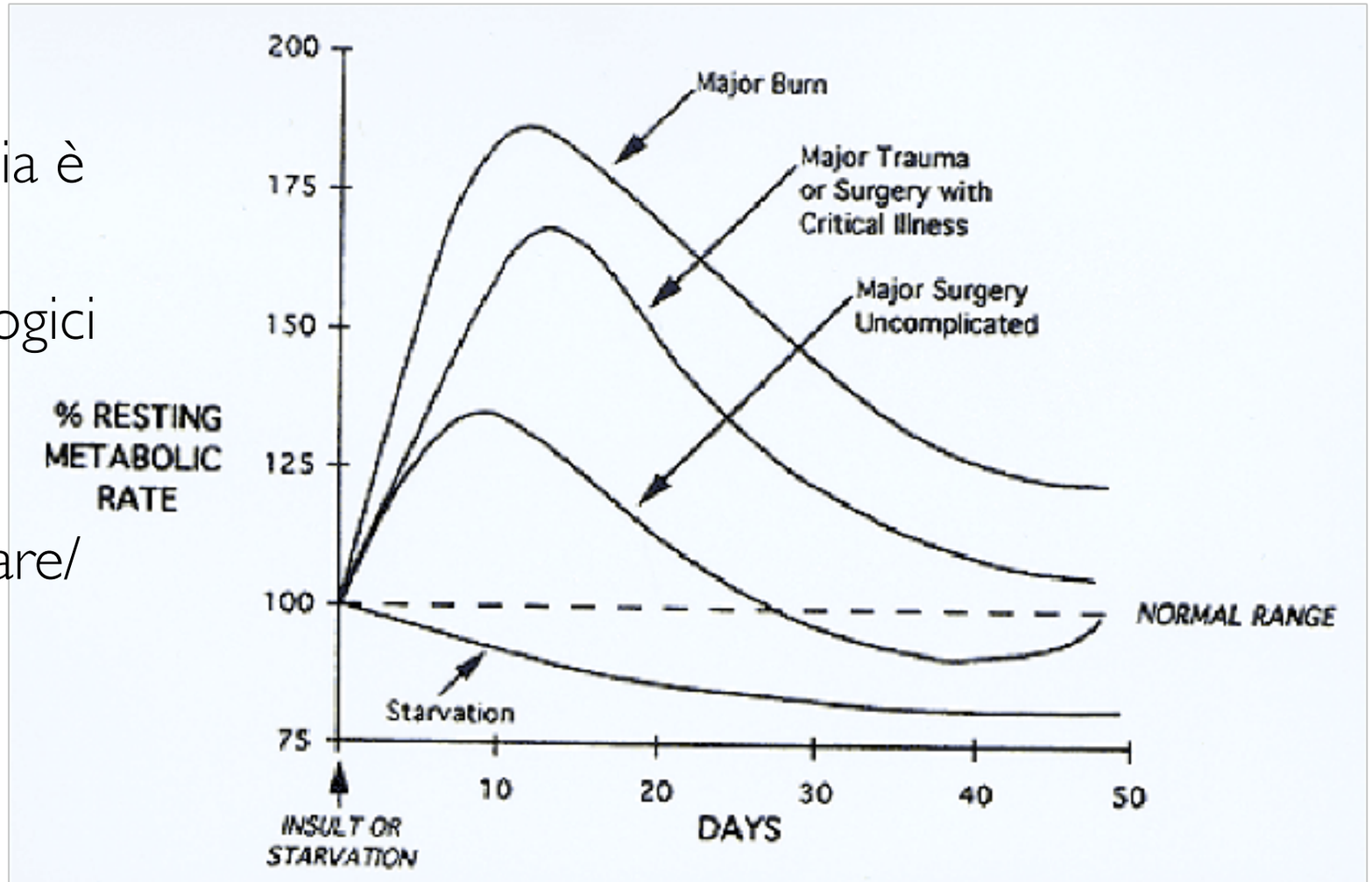
… need more dietary protein (ie, **1.2-1.5 g/kg BW/d**);
people with severe illness or injury or with
marked malnutrition may need as much as **2.0 g/kg BW/d**.

JAMDA 14 (2013) 542-559

riconoscere i fabbisogni
energia

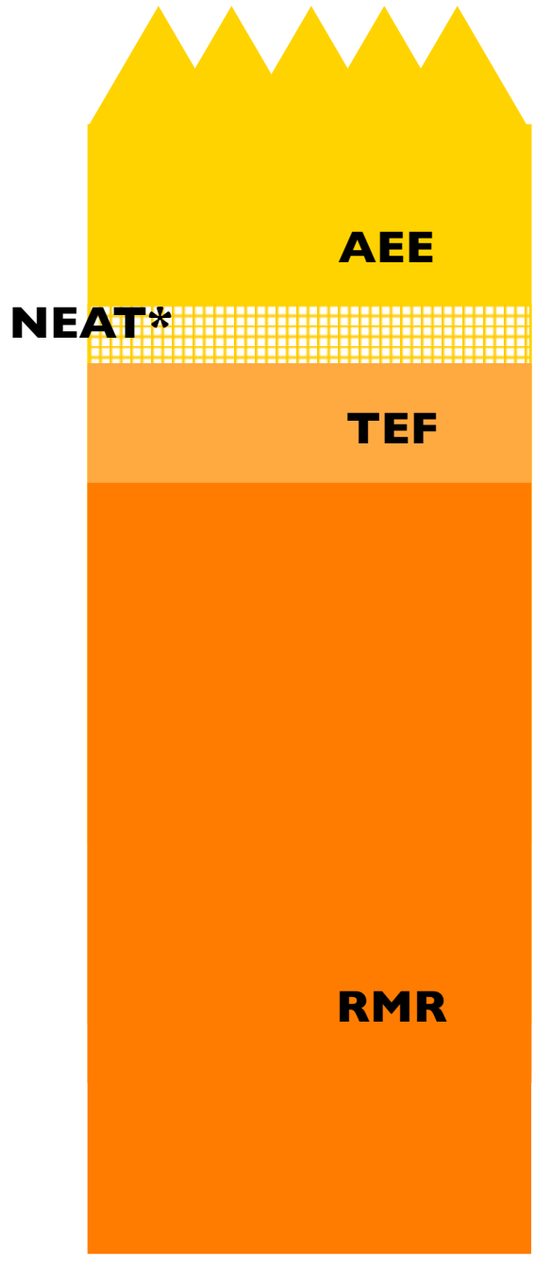
Un'adeguata quantità di energia è necessaria per:

- mantenere i processi fisiologici
- garantire la crescita e riparazione dei tessuti
- sostenere il lavoro muscolare/ attività fisica
- mantenere la temperatura corporea



Components of daily energy expenditure

Components of daily energy expenditure



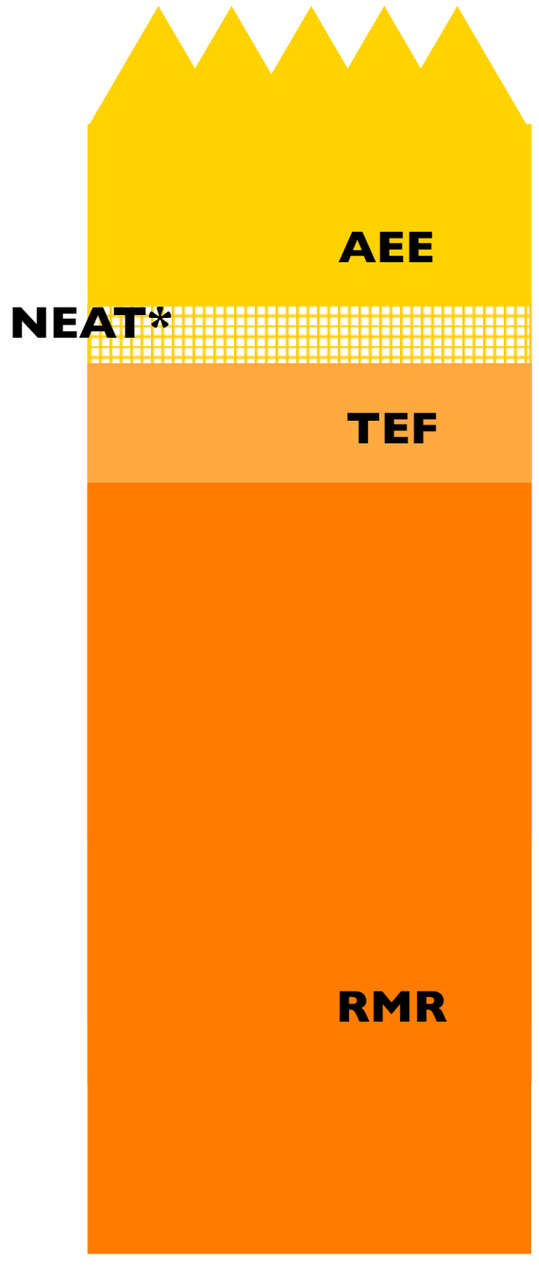
Components of daily energy expenditure

DETERMINANTS

duration
intensity
genes?
SNS?

meal

FFM
FM
age
sex
genes
SNS/hormones



Components of daily energy expenditure

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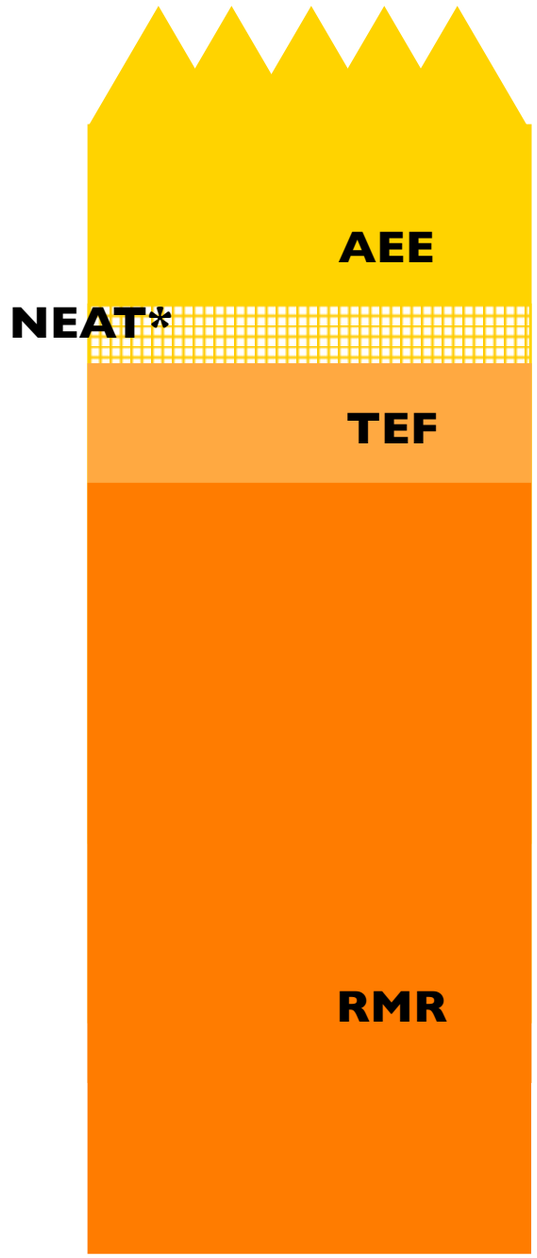


COMPONENTS

- **20-30%**
- physical work

- **≤10%**
- shivering/non-shivering therm. (BAT)
- absorption, handling and storage of nutrients

- **60-70%**
- mechanical work (ventilatory, heart) (10-20%)
- molecule turnover (80-90%)

Components of daily energy expenditure

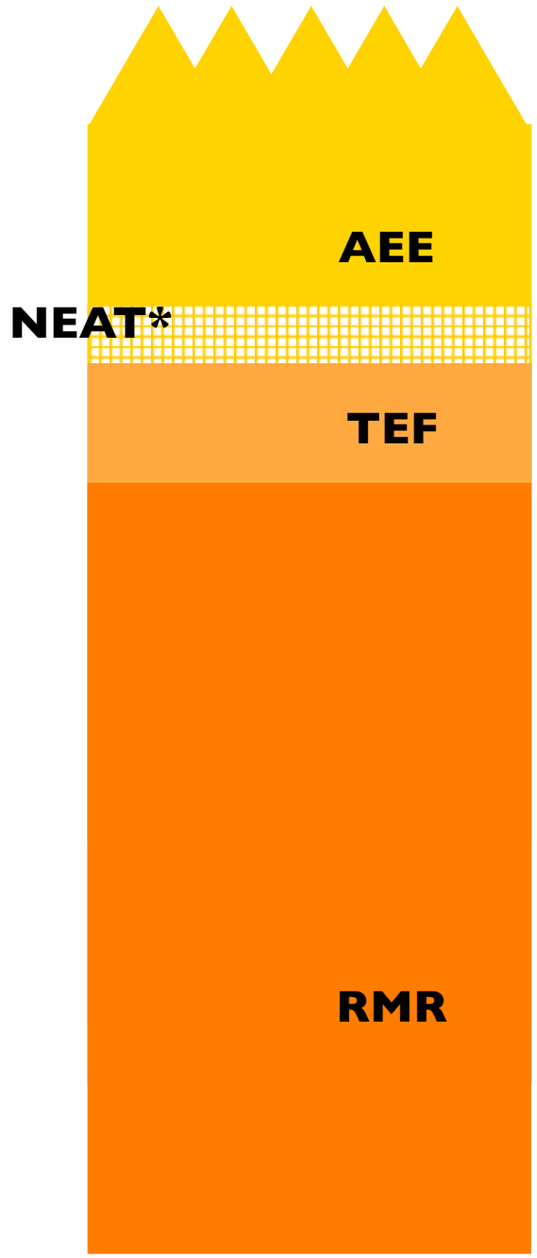
DETERMINANTS

duration
intensity
genes?
SNS?

meal

- Convalescence
- Drugs and anesthesia
- Pain
- Physical therapy
- Sepsis
- Surgery
- Treatment
- Type and severity of injury

FFM
FM
age
sex
genes
SNS/hormones



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riconoscere i fabbisogni

energia

- calorimetria indiretta (**misura**)

- equazioni predittive (**stima**)

REE = BEE x AF x SF

- **25-30 (35) kcal/kg peso corporeo**

riconoscere i fabbisogni

energia

SINPE

riconoscere i fabbisogni

energia

fabbisogni	**energia** kcal/kg/die	**proteine** gAA/kg/die	**azoto** g/kg/die
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riconoscere i fabbisogni

energia

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aumentato	**25-30**	1.2-1.8	0.2-0.3
elevato	**30-35**	2-2.5	0.3-0.4

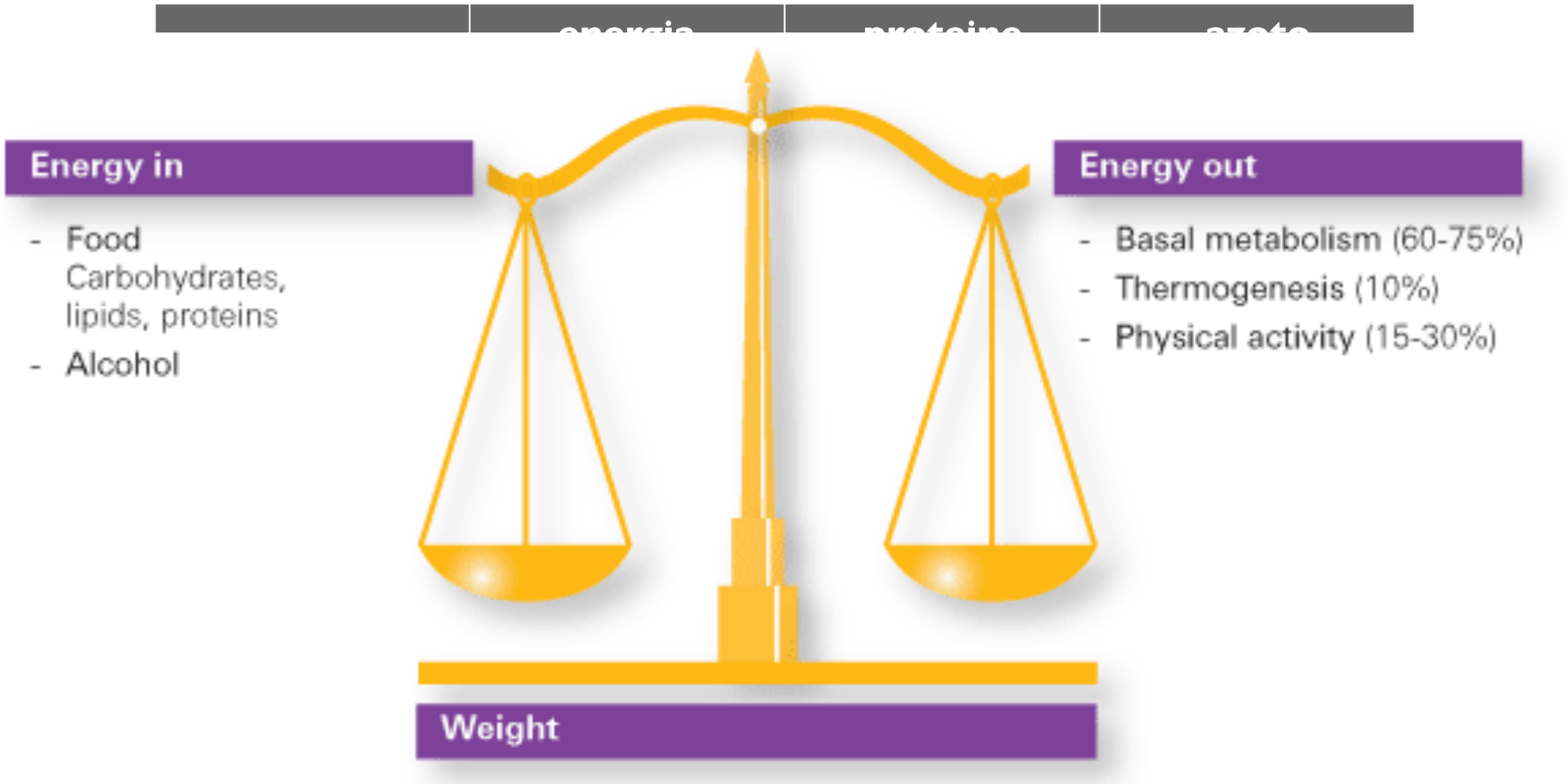
Fattori di correzione per lo stress (SF)	
malnutrizione	0,85 - 1,00
chirurgia elettiva	1,10
chirurgia maggiore o complicata	1,20 - 1,80
sepsi	1,20 - 1,40
politrauma (±corticosteroidi)	1,40 - 1,60
ustioni	1,50 - 1,90
SIRS/MOF	1,50

Fattori di correzione per l'attività fisica (AF)	
riposo assoluto	1,00
allettato sveglio	1,20
deambulante	1,30

SINPE

riconoscere i fabbisogni

energia



SIRS/MOF	1,50

riconoscere i fabbisogni

energia

fabbisogni	**energia** kcal/kg/die	**proteine** gAA/kg/die	**azoto** g/kg/die
normale	**20**	1	16
aumentato	**25-30**	1.2-1.8	0.2-0.3
elevato	**30-35**	2-2.5	0.3-0.4

Fattori di correzione per lo stress (SF)	
malnutrizione	0,85 - 1,00
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Fattori di correzione per l'attività fisica (AF)	
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allettato sveglio	1,20
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SINPE

riconoscere i fabbisogni
lipidi

• Saturated fat	< 7% of total calories
• Polyunsaturated fat	up to 10% of total calories
• Monounsaturated fat	up to 20% of total calories
• Total fat	25% to 35% of total calories
• Carbohydrate	50% to 60% of total calories
• Fiber	20-30 g/day
• Protein approximately	15% of total calories
• Total calories	balance energy intake and expenditure

- **25-30%** dell'apporto calorico
- fabbisogno basale **0,8-1,5 g/kg/die**
- fabbisogno di ac. linoleico (omega-6) 1 - 2 % kcal totali (5 - 6 g/die)
- fabbisogno di ac. alfa-linolenico (omega-3) 0.2 - 0,5 % kcal totali (1 -1.5 g/die)
- rapporto omega-6 : omega-3 5:1

- prevenzione e correzione deficit di acidi grassi essenziali: acido linoleico e acido linolenico
- riduzione della quota calorica glucidica e della loro potenziale tossicità epatica nei trattamenti a lungo termine
- riduzione della osmolarità della miscela

riconoscere i fabbisogni

acqua

riconoscere i fabbisogni

acqua

- Il fabbisogno idrico, specifico per ogni paziente, è influenzato dal grado di attività fisica ed inoltre varia con l'assunzione degli alimenti e con gli stati patologici.

- Il fabbisogno idrico dell'adulto in assenza di perdite patologiche e di insufficienza d'organo (con funzione renale, cardio-respiratoria ed epatica normale) varia tra **30 e 35 ml/kg/die**, o tra **0.8 e 1.0 ml/kcal** somministrate.

- Nell'anziano l'apporto idrico deve essere ridotto a 25 ml/kg/die.

	basale	aumentato*
adulto	30 ml/kg	35-50 ml/kg
>65 anni	20-25 ml/kg	calcolare le perdite (*bilancio*)

riconoscere i fabbisogni

acqua

riconoscere i fabbisogni

acqua

DAILY BALANCE			
INTAKE (ml)		**LOSSES (ml)**	
fluid	1500	**sensible**	
food	500	urine	1400
oxidation	400	feces	200
		insensible	
		lung	600
		sweat	800

riconoscere i fabbisogni

acqua

DAILY BALANCE			
INTAKE (ml)		**LOSSES (ml)**	
fluid	1500	**sensible**	
food	500	urine	1400
oxidation	400	feces	200
		insensible	
		lung	600
		sweat	800

fever
increase H_2O requirement for each 1°C over normal by 15%
hyperventilation
increase H_2O requirement 50% for each doubling of the respiratory rate; if on ventilator cancel sensible loss

riconoscere i fabbisogni

micronutrienti

- **acidi grassi essenziali** (AGE o EFA) forniti con le miscele lipidiche (LCT)
- **vitamine** sec. LARN o RDA per la NE e sec. AMA per la NP
- **oligoelementi** o elementi traccia sec. RDI

riconoscere i fabbisogni

fibra

20 -30 g/die

modulare il transito intestinale e di aumentare il volume fecale (fibre insolubili)

“nutrire” gli enterociti e di riequilibrare la flora batterica intestinale (fibre solubili e FOS)

preservation of lean body mass	proteins, glutamine, BCAA
gut nutrition (enterocytes and coloncytes)	glutamine, SCFA, glucose, lactate, FFA
immunostimulation and immunomodulation	proteins, arginine, glutamine, vitamins, fats
modulation of the inflammatory response	ratio n-6/n-3, MCT
tissue repair	glucose, proteins

MALNUTRITION AWARENESS WEEK™

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ASK ABOUT YOUR NUTRITION

Are you or your loved one experiencing any of these?

UNPLANNED WEIGHT LOSS

LOSS OF APPETITE

NOT ABLE TO EAT OR ONLY ABLE TO EAT SMALL AMOUNTS

FEELING WEAK OR TIRED

SWELLING OR FLUID ACCUMULATION

If you or your loved one have any of these problems, ask about your nutrition! Nutrition is important to your recovery and has been shown to promote positive outcomes. Ask if you can be evaluated by a registered dietitian or nutrition support clinician.

nutritioncare.org/maw

Patients are asked about their bowel habits almost every day and this is diligently recorded. - Why not their food intake?

MacFie1998