REGIONE DEL VENETO

ULSS8 BERICA

VALUTAZIONE DELLO STATO DI NUTRIZIONE

FORMAZIONE PER GLI AMBULATORI NUTRIZIONALI DEI SERVIZI DI IGIENE DEGLI ALIMENTI E NUTRIZIONE (SIAN) - 2017

Lorenzo M Donini

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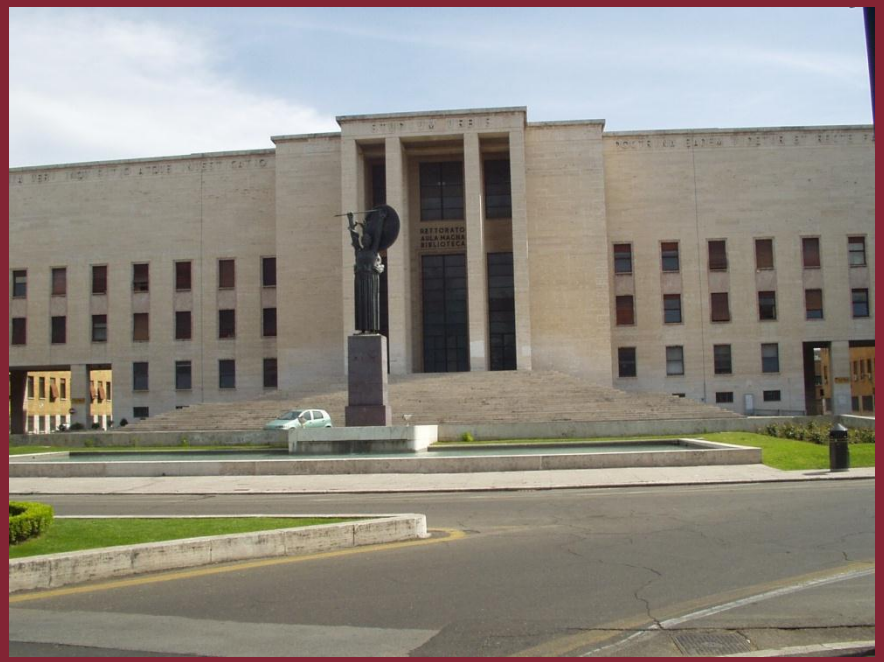
Food Science and Human Nutrition Research Unit



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Il peso ed il BMI

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CRITICAL BODY WEIGHT IN ANOREXIA NERVOSA

ANOREXIA nervosa is a disorder that has been known to physicians for centuries; yet an understanding of its pathophysiology and successful treatment has been elusive. Studies of the hypothalamic-pituitary axis have demonstrated that pituitary responsiveness to hypothalamic releasing factors and hypothalamic responsiveness to feedback stimuli are normal except that gonadotropin release does not result from clomiphene citrate administration. The latter, with other evidence (abnormal thermoregulatory responses, partial diabetes insipidus and insulin insensitivity[1]), implicates hypothalamic dysfunction as an integral part of the disease. It is not clear whether this dysfunction is secondary to the malnutrition that results from the disease, a consequence of psychic stress as in psychosocial dwarfism, or primary and associated with the other symptomatology.

In this issue of the *Journal* Boyar et al. describe other evidence of the hypothalamic disturbance of gonadotropin secretion in young women with anorexia nervosa. The regression to, or arrest of, the immature patterns of gonadotropin secretion of children, so well described now by this group, is an additional manifestation of the prepubertal or early pubertal state of the hypothalamic-pituitary-gonadal axis in these cases.

The initiating events and mechanism of rising gonadotropin secretion that is observed at the onset of normal puberty and results in progression to the adult clinical state of sexual development have been studied extensively in the last few years but remain mysterious. A functional prepubertal gonadal-hypothalamic-pituitary axis exists as evidenced by high follicle-stimulating hormone (FSH) levels in agonadal prepubertal children, presumably because of absence of a gonadal factor responsible for feedback suppression of FSH. The changing (decreasing) sensitivity of the hypothalamus to feedback suppression by this factor (or factors) and gonadal steroids is evidenced in normal adolescents by rising levels of gonadotropins, increased gonadal steroid secretion and adolescent sexual development. Other manifestations of this changing responsiveness and maturation of hypothalamic stimulatory function are as follows: increasing responsiveness of pituitary release of gonadotropins to luteinizing-hormone-releasing factor (LRF); acquisition of hypothalamic responsiveness to clomiphene citrate, an estrogen-androgen competitive inhibitor, with release of gonadotropins; occurence of sleep-induced LH release; acquisition of estrogen induced elicitation of gonadotropin release (positive feedback)[2]; and gradual development of adult cyclic gonadotropin excretion pattern.[3]

The determinants of the initiation and progression of the pubertal process and final establishment of the adult "set" of the hypothalamic-pituitary-gonadal axis remain obscure. Frisch[4] has promulgated her postulation that with the attainment of a mean critical body weight, there is a change in metabolic rate to a level at which the hypothalamus becomes decreasingly sensitive to gonadal signals. This body weight has been constant through de-

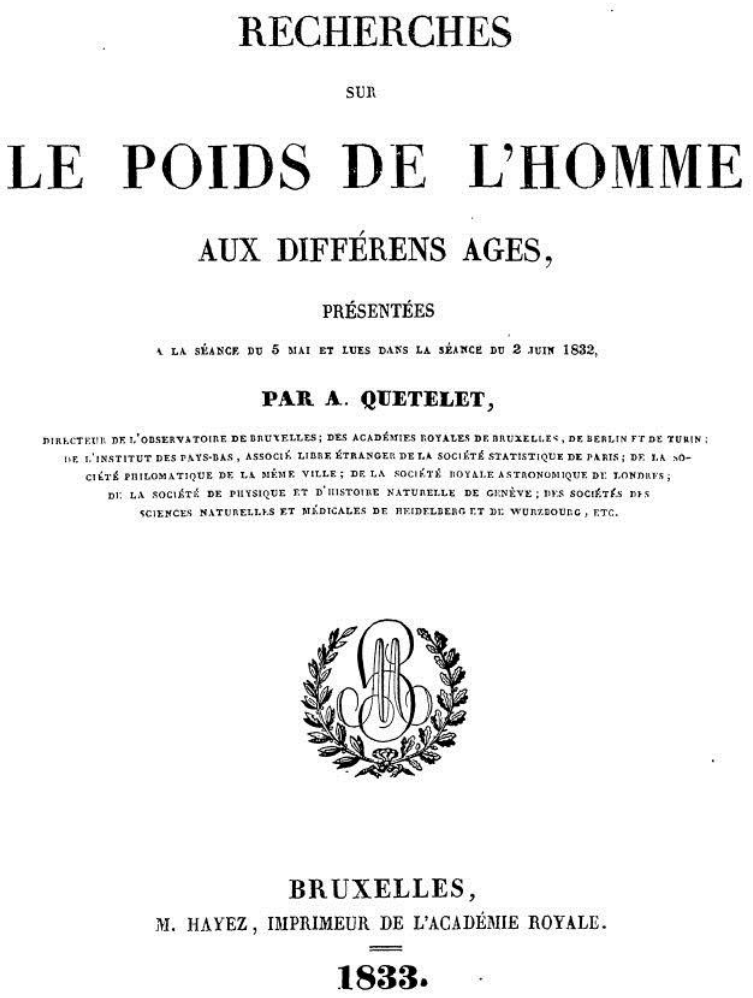
…. Frisch RE (Arch Dis Child, 1971) has promulgated her postulation that with the attainment of a mean critical body weight, there is a change in metabolic rate to a level at which the hypothalamus becomes decreasingly sensitive to gonadal signals. This body weight has been constant through decades of decreasing menarchal age and among populations of differing states of nutrition. **The relation of weight to onset and loss of cyclic menses and related gonadotropin secretion** is once more observed in patients with anorexia nervosa. With weight less than **the critical body weight of 48 kg** that Frisch has determined, they are amenorrheic and have immature gonadotropin secretory patterns …..

Francobollo belga emesso per commemorare il centenario della morte di Adolphe Quetelet (1796–1874), che nel 1832 sviluppò l'Indice di Quetelet (ora meglio noto come Body Mass Index).

L'indice comparve per la prima volta in un articolo pubblicato sui Proceedings of the Academy of Sciences dal titolo '*Recherches sur le poids de l'homme aux différens âges*' nel 1833.

- A. Quetelet devised the equation in 1832 in his quest to define the "normal man" in terms of everything from his average arm strength to the age at which he marries.

- A. Quetelet used the equation to describe the standard proportions of the human build—the ratio of weight to height in the average adult. Using data collected from several hundred countrymen, he found that **weight varied not in direct proportion to height but in proportion to the square of height** (people 10% taller than average tended to be about 21% heavier.)



RECHERCHES

SUR

LE POIDS DE L'HOMME

AUX DIFFÉRENS AGES,

PRÉSENTÉES

A LA SÉANCE DU 5 MAI ET LUES DANS LA SÉANCE DU 2 JUIN 1832,

PAR A. QUETELET,

DIRECTEUR DE L'OBSERVATOIRE DE BRUXELLES; DES ACADÉMIES ROYALES DE BRUXELLES, DE BERLIN ET DE TURIN; DE L'INSTITUT DES PAYS-BAS, ASSOCIÉ LIBRE ÉTRANGER DE LA SOCIÉTÉ STATISTIQUE DE PARIS; DE LA SOCIÉTÉ PHILOMATIQUE DE LA MÊME VILLE; DE LA SOCIÉTÉ ROYALE ASTRONOMIQUE DE LONDRES; DE LA SOCIÉTÉ DE PHYSIQUE ET D'HISTOIRE NATURELLE DE GENÈVE; DES SOCIÉTÉS DES SCIENCES NATURELLES ET MÉDICALES DE HEIDELBERG ET DE WURZBOURG, ETC.

BRUXELLES,

M. HAYEZ, IMPRIMEUR DE L'ACADÉMIE ROYALE.

1833.

Ancel Keys in 1958
Courtesy, University of Minnesota Archives

- In 1972, physiology professor and obesity researcher Ancel Keys published his (*J Chronic Dis.*. 1 25 (6): 329–343) a landmark study of more than 7,400 men in five countries. Keys examined which of the height-weight formulas matched up best with each subject's FM, as measured more directly. It turned out that the best predictor came from Quetelet: weight divided by height squared. Keys renamed this number the *body mass index*.

- **BMI was explicitly cited by Keys as being appropriate for *population* studies, and inappropriate for individual diagnosis. Nevertheless, due to its simplicity, it came to be widely used for individual diagnosis, despite its inappropriateness.**

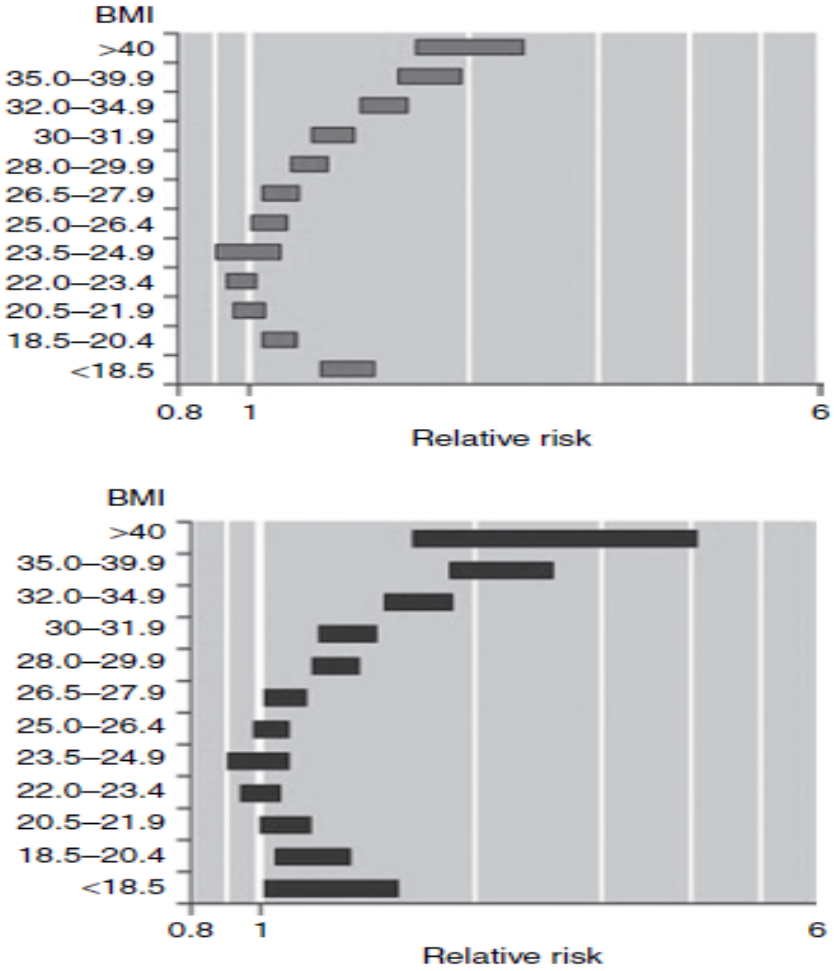
Il Peso e gli indici ad esso correlati sono:

- strumenti epidemiologici

Beyond the BMI: The Search for Better Guidelines for Bariatric Surgery

Walter J. Pories[1], Lynis G. Dohm[2] and Christopher J. Mansfield[3]

Obesity (2010) **18,** 865–871. doi:10.1038/oby.2010.8



The relationship between BMI and all-cause mortality for women and men who never smoked.

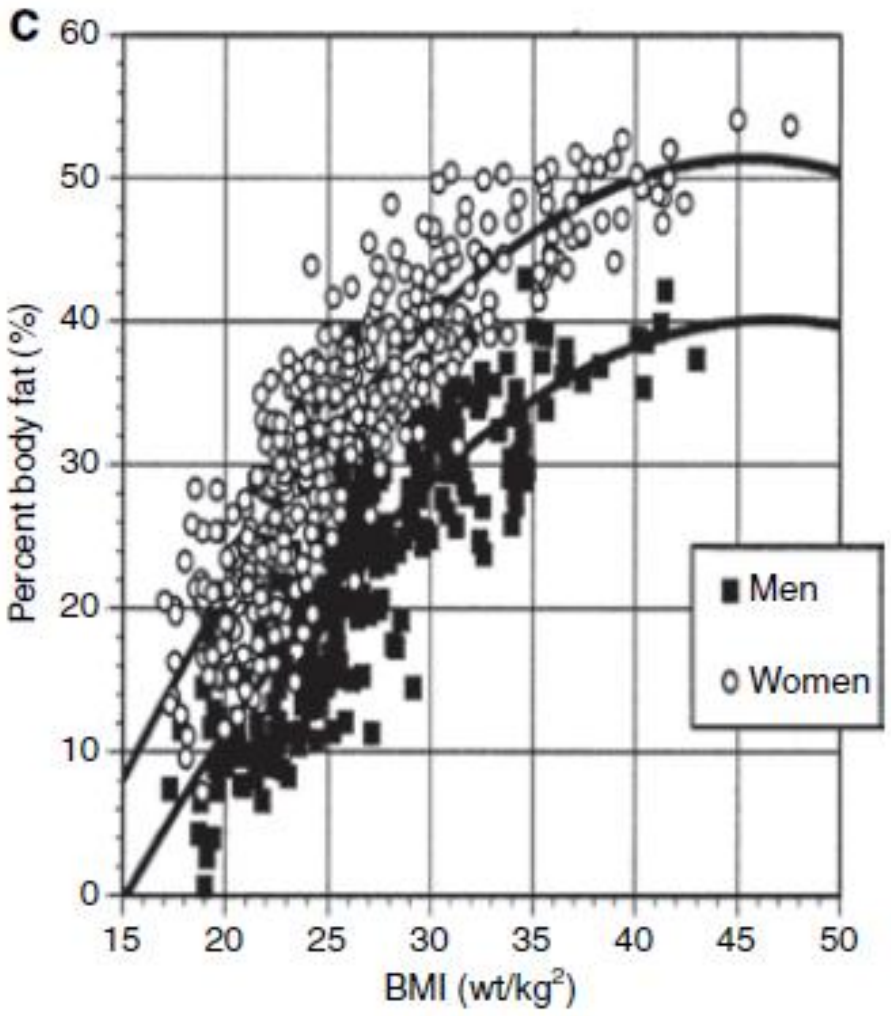
Although the BMI is a critical tool for **population** studies, it is far less useful in the clinic because, in the assessment of an individual patient, it fails to reflect adiposity and body composition, both of greater importance than height and weight.

Beyond the BMI: The Search for Better Guidelines for Bariatric Surgery

Walter J. Pories[1], Lynis G. Dohm[2] and Christopher J. Mansfield[3]

- **Men and women do not have the same percentage of body fat at similar levels of BMI.**

- **BMI of 35 kg/m^2, the percentage of fat in females is 46% compared to 35% in males.**



J Physiol Anthropol, 26: 109–112, 2007

Journal of
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Human Variation and Body Mass Index: A Review of the Universality of BMI Cut-offs, Gender and Urban-rural Differences, and Secular Changes

C. G. Nicholas Mascie-Taylor and Rie Goto

- %FM increases with **aging** and is higher in women than men
- a BMI of 30 kg/m^2 in Dutch men implies a FM of about 30% at 20 years of age and about 40% at 60 years of age.
- in women at these ages, the percentages are 40% and 50%, respectively.

The New England
Journal of Medicine

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VOLUME 338 JANUARY 1, 1998 NUMBER 1

THE EFFECT OF AGE ON THE ASSOCIATION BETWEEN BODY-MASS INDEX AND MORTALITY

JUNE STEVENS, PH.D., JIANWEN CAI, PH.D., ELSIE R. PAMUK, PH.D., DAVID F. WILLIAMSON, PH.D., MICHAEL J. THUN, M.D., AND JOY L. WOOD, M.S.

Age Group (years)	BMI (kg/m²)	
	Men	Women
20–29	21.4	19.5
30–39	21.6	23.4
40–49	22.9	23.2
50–59	25.8	25.2
60–69	26.6	27.3

Stevens J: Nutr Rev 2000, 58, 5, 129-137

Beyond the BMI: The Search for Be- Guidelines for Bariatric Surgery

Walter J. Pories[1], Lynis G. Dohm[2] and Christopher J. Mansfield[3]

Obesity (2010) **18,** 865–871. doi:10.1038/oby.2010.8

- **The BMI also fails to account for fitness (i.e., the proportion of muscle mass to adiposity):**
  - **one of the best running backs at East Carolina University was 1.72m tall and weighed 140.0 kg who could run a 100 yard (91.4 m) dash in just under 10";**
  - **at a BMI of 47.2 kg/m^2, he certainly met the Medicare standards for bariatric surgery but was clearly not a candidate.**

Beyond the BMI: The Search for Better Guidelines for Bariatric Surgery

Walter J. Pories[1], Lynis G. Dohm[2] and Christopher J. Mansfield[3]

Obesity (2010) **18,** 865–871. doi:10.1038/oby.2010.8

- **South Asians, Chinese, and Aboriginal people have similar distributions of glucose and lipid factors related to diabetes at substantially lower (~6 kg/m^2) BMI values compared to Europeans.**
- **Both of these groups, probably due to differences in fat distribution, are burdened by the comorbidities of severe obesity at significantly lower BMI levels.**

Table 1 Derived cut-points (95% confidence region) for obesity (BMI = 30.0 kg/m^2) in South Asians, Chinese, and Aboriginals

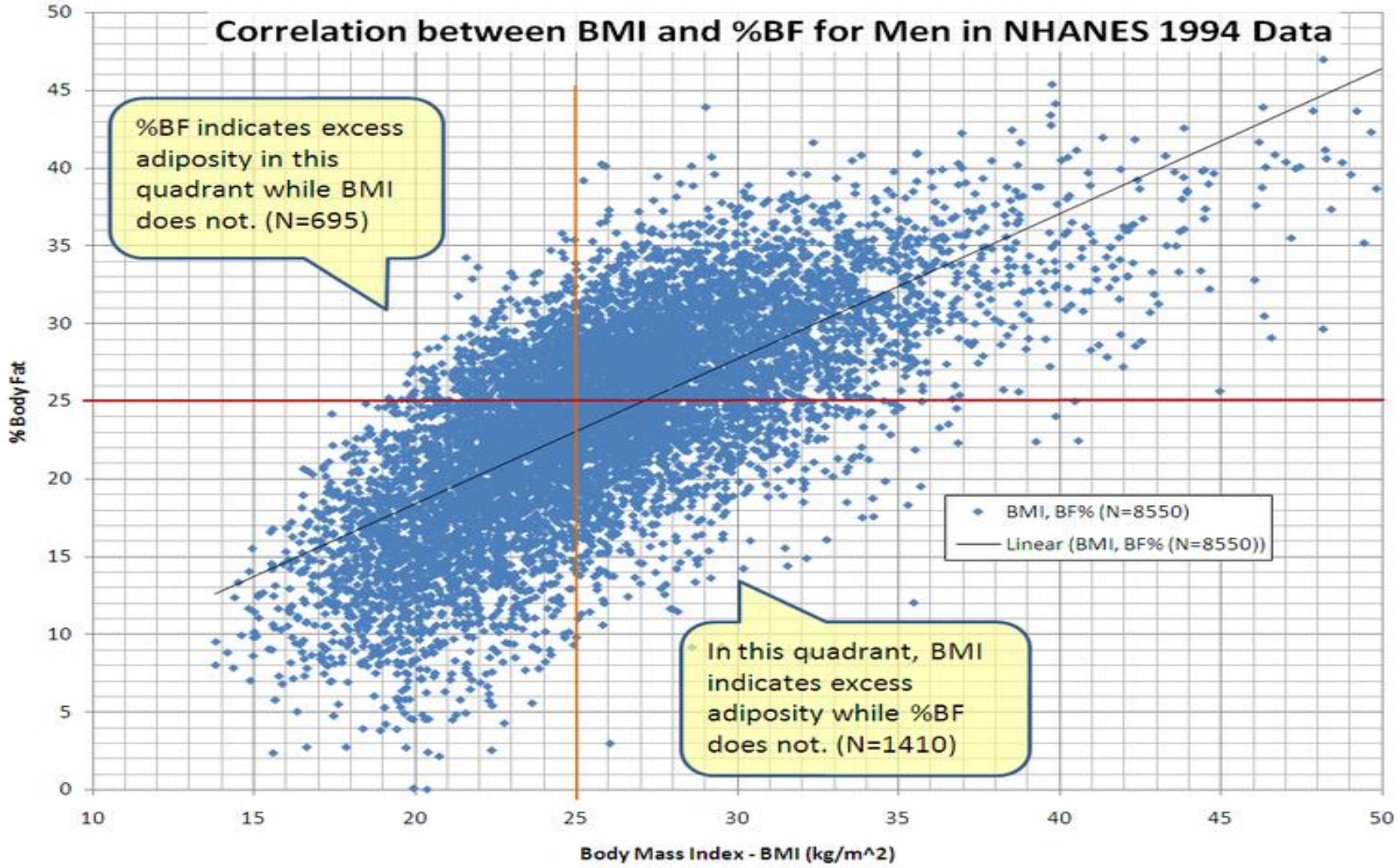
	European	South Asian	Chinese	Aboriginal people
Glucose factor	30.0 (29.0–31.1)	21.0 (20.0–21.9)	20.6 (19.3–21.7)	21.8 (20.5–22.6)
Lipid factor	30.0 (29.4–30.6)	22.5 (20.6–23.9)	25.9 (25.5–26.4)	26.1 (24.4–27.6)
Blood pressure factor	30.0 (29.0–31.2)	28.8 (28.0–29.7)	25.3 (24.5–26.1)	

Cut-points are significantly lower in non-Europeans vs. Europeans for the lipid and glucose factors. Cut-points for the blood pressure factor are significantly lower in Chinese but not South Asians vs. Europeans. The blood pressure factor was markedly lower in Aboriginals vs. the three other ethnic groups at any given BMI, and no cut-points were derived. Within each ethnic group, we calculated the mean level of markers related to glucose and lipid metabolism and blood pressure among individuals who were above each ethnic-specific BMI cut-points (using the new cut-points derived above).

Il Peso e gli indici ad esso correlati sono:

- strumenti epidemiologici
- **surrogati della composizione corporea**

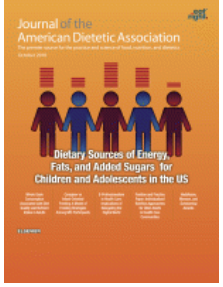
Romero-Corral, A.; Somers, V. K.; Sierra-Johnson, J.; Thomas, R. J.; Collazo-Clavell, M. L.; Korinek, J.; Allison, T. G.; Batsis, J. A. et al. (June 2008). Accuracy of Body Mass Index in diagnosing obesity in the adult general

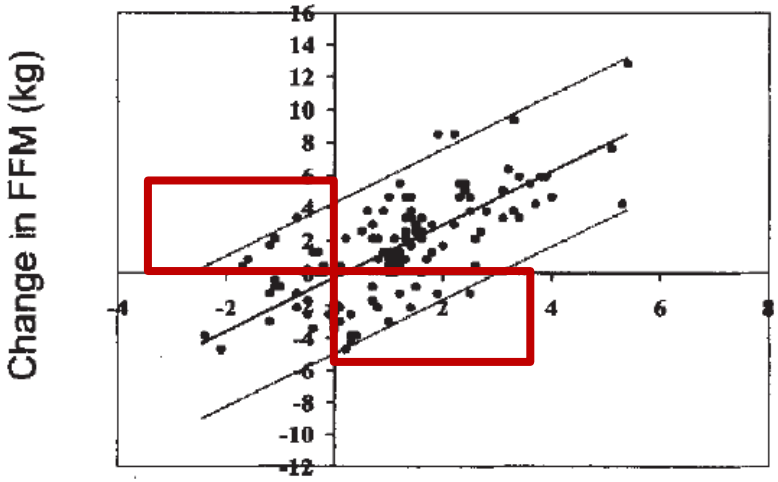


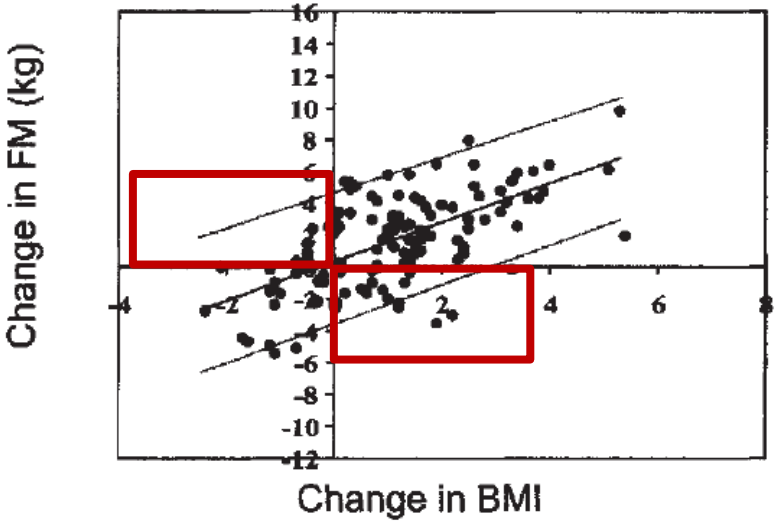
Change in body mass index does not predict change in body composition in adolescent girls with anorexia nervosa

April 2000 Volume 100 Number 4

ORRAWIN TROCKI, PhD, RD; ROSS W. SHEPHERD, MD







The limits of agreement (95%CI) between:

- FFM: measured* and predicted** **= ±4.6 kg**
- FM: calculated*** and predicted** **= ±4.7 kg**

When the change in BMI was 2

- FM might change from **-2.0 to +7.4 kg**
- FFM might change from **-1.9 to +7.5 kg**

* total body K (1 kg FFM = 60 mmol K)
** BMI
*** FM = weight - FFM measured

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Original Communications

Body Mass Index and Agreement Between Bioimpedance and Anthropometry Estimates of Body Compartments in Anorexia Nervosa

Antonio Piccoli, MD, DSc*; Marta Codognotto, MD*; Lorenza Di Pascoli, MD†; Gina Boffo, RD†; and Lorenza Caregaro, MD†

Matrix of correlation coefficients (r values) between estimates of body compartments, in mass units, that were obtained with both anthropometry (aFFM and aFM) and BIA equations (FFM and FM) *

	BMI, kg/m^2	aFFM, kg	aFM, kg	FFM, kg	FM, kg
BMI, kg/m^2	1	.716	.804	.468	.921
aFFM, kg		1	.606	.899	.749
aFM, kg			1	.476	.883
FFM, kg				1	.475
FM, kg					1

BMI, body mass index; FM, fat mass; FFM, fat-free mass.
*All correlation coefficients are statistically significant at a p level $<$ .001.

Underweight patients with anorexia nervosa: Comparison of bioelectrical impedance analysis using five equations to dual X-ray absorptiometry

Lama Mattar [a,b,c,1,2], Nathalie Godart [b,c,2], Jean Claude Melchior [d,e,3], Bruno Falissard [a,c,1], Sami Kolta [c,f], Damien Ringuenet [g], Christine Vindreau [g], Clementine Nordon [h], Corinne Blanchet [i], Claude Pichard [j,*]

Clinical Nutrition xxx (2011) 1–7

- Malnutrition in AN is a serious somatic aspect that deeply affects the psychiatric condition and impacts the body composition of the patient (Pollice C et al: 1997; Meehan KG et al: 2006; Kerruish KP et al: 2002)
- FM, FFM and TBW are not always affected to the same extent due to the variable impact of factors such as physical exercise, vomiting, laxative abuse and diet
- The extreme energy restriction in anorexia causes a severe depletion of fat, which may be associated with muscle mass depletion as the disease proceeds (Dempsey DT et al, 1984)
- **Patients with AN who achieve an extreme weight loss by semistarvation can have a different body composition profile from patients who achieve the weight loss primarily through prolongedintensive exercise (Helba M et al, 2009)**

Energy Metabolism and Body Composition in Long-Term Recovery from Anorexia Nervosa

Jocilyn E. Dellava, PhD[1]
Peggy Policastro, MS, RD[2]
Daniel J. Hoffman, PhD[2]*

(Int J Eat Disord 2009; 42:415–421)

- Low REE may predispose persons in recovery from AN to be at risk for depositing fat as weight restoration continues, There appears to be a **tendency to gain more FM compared with LBM** during weight restoration (Mayer L et al, 2005; Scalfi L et al, 2002)
- 9 months following initial diagnosis, AN patients (at 81% of their IBW) gained 68% of weight as FM, but their %FM was still lower than control participants (Grinspoon S et al, 2001)
- Despite having a FM similar to or less than control women, women with AN reported feeling that fat is gained primarily in the central region of the body, posing important challenges to treatment (Mayer L et al, 2001 & 2007)
- In fact, clinical studies have reported **greater central adiposity** (i.e., %truncal FM), following weight restoration, in persons with AN compared with control participants (De Alvaro MT et al, 2007; Mayer L et al, 2005)

Il Peso e gli indici ad esso correlati sono:

- strumenti epidemiologici
- surrogati della composizione corporea
- **inefficaci nel fare diagnosi**

World Health Organization

- **Malnutrition** essentially means “bad nourishment”. It concerns not enough as well as too much food, the wrong types of food, and the body's response to a wide range of infections that result in malabsorption of nutrients or the inability to use nutrients properly to maintain health. Clinically, malnutrition is characterized by inadequate or excess intake of protein, energy, and micronutrients such as vitamins, and the frequent infections and disorders that result.
- **Obesity** is a condition in which body fat stores are enlarged to an extent which impairs health (Garrow JS).

Diagnosi: giudizio clinico che consiste nel riconoscere una condizione morbosa in base all’esame clinico del malato ed alle ricerche di laboratorio e strumentali.

Beyond the BMI: The Search for Better Guidelines for Bariatric Surgery

Walter J. Pories[1], Lynis G. Dohm[2] and Christopher J. Mansfield[3]

Obesity (2010) **18,** 865–871. doi:10.1038/oby.2010.8

- BMI fails to indicate the **severity of the comorbidities** and to recognize the effects of fat distribution (i.e., the metabolic variations between large visceral fat deposits and individuals where the fat is primarily in subcutaneous deposits).

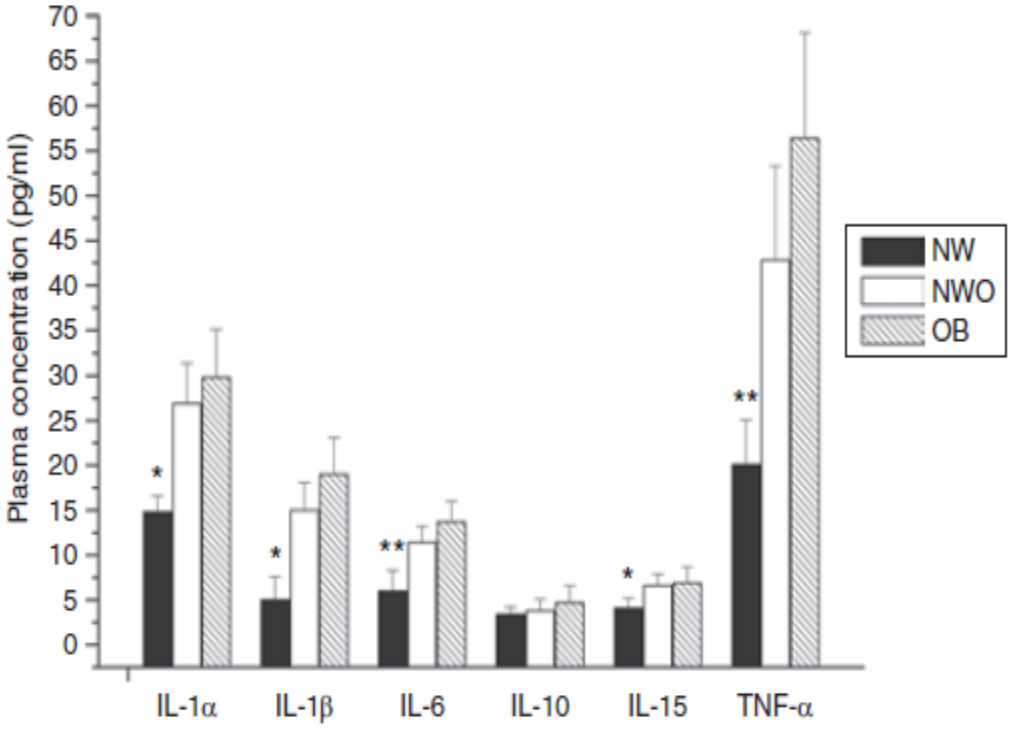
- Aasen G et al (2009) noted that the FM distribution in pre- and postmenopausal women is the major determinant of insulin resistance and dyslipidemia, with only minor roles for menopausal status, such as age-related changes in hormonal factors in the regulation of glucose and lipid metabolism.

Oxidative Stress in Normal-Weight Obese Syndrome

Obesity (2010) **18,** 2125–2130. doi:10.1038/oby.2010.50

Laura Di Renzo[1,2], Fabio Galvano[3], Carmine Orlandi[1], Alessia Bianchi[1], Claudia Di Giacomo[3], Luca La Fauci[3], Rosaria Acquaviva[3] and Antonino De Lorenzo[1,2]

NWO [normal BMI (<25 kg/m^2), but high %FM (>30%)] have significantly higher values of proinflammatory cytokines and oxidative stress parameters than NW subjects and similar to preobese-obese (OB)



Parameters	Groups		
	NW (n = 20)	NWO (n = 20)	OB (n = 20)
GSH (μmol/ml)	0.56 ± 0.05	0.44 ± 0.05*	0.43 ± 0.04*
LOOH (μmol/ml)	38.61 ± 1.94	66.76 ± 4.73*	71.50 ± 6.94*
NO_2^-/NO_3^- (nmol/ml)	91.94 ± 4.60	63.09 ± 4.41*	66.43 ± 3.98*
ANPC (%)	99.25 ± 2.03	75.47 ± 4.11*	54.61 ± 5.52*,**

All values are mean ± s.d.

ANPC, antioxidant non proteic capacity (%); GSH, reduced glutathione; LOOH, lipid hydroperoxide; NO_2^-/NO_3^-, nitrite/nitrate; NW, normal weight; NWO, normal weight obese; OB, preobese-obese.

*Significantly different from NW group, $P < 0.01$ (Mann–Whitney test). **Significantly different from NWO group, $P < 0.01$ (Mann–Whitney test).

Curr Opin Clin Nutr Metab Care. 2008 November ; 11(6): 693–700. doi:10.1097/MCO.0b013e328312c37d.

Sarcopenic obesity - definition, etiology and consequences

Sari Stenholm, PhD[1,2], Tamara B. Harris, MD, MS[3], Taina Rantanen, PhD[4], Marjolein Visser, PhD[5], Stephen B. Kritchevsky, PhD[6], and Luigi Ferrucci, MD, PhD[1]

	Definition of sarcopenic obesity
New Mexico Aging Process Study [1]	- Sarcopenia: skeletal muscle mass -2 SD below mean of young population or < 7.26 kg/m^2 in men and < 5.45 kg/m^2 in women. - Obesity: percentage body fat greater than median or > 27% in men and 38% in women.
NHANES III [28]	- Sarcopenia: two lower quintiles of muscle mass (<9.12 kg/m^2 in men and <6.53 kg/m^2 in women) - Obesity: two highest quintiles of fat mass (>37.16% in men and > 40.01% in women).
[31]	- Sarcopenia: two lower quintiles of muscle mass (<5.7 kg/m^2) - Obesity: two highest quintiles of fat mass (>42.9%)

Invece del peso o degli indici ad esso correlati è necessario fare una **Valutazione dello Stato di Nutrizione** preceduta da una valutazione del **Rischio Nutrizionale**

Strumenti di screening

Strumento di screening nutrizionale

- **Stima della probabilità di essere malnutriti per eccesso o per difetto**
- **Deve essere effettuata da chi ha in cura il paziente ⇒ consulenza nutrizionale**
- **Precede quindi la valutazione dello Stato di Nutrizione (diagnosi) ⇒ intervento nutrizionale**
- **Ha lo scopo di valutare rischio di malnutrizione per eccesso e/o per difetto (elevata efficacia)**
- **Deve avere un'elevata sensibilità (ed eventualmente specificità)**
- **Deve essere di facile utilizzo da parte di personale non necessariamente specializzato in ambito nutrizionale (MMG, geriatra, infermiere, care-giver, …)**

ESPEN Guidelines for Nutrition Screening II

Screening is a rapid and simple process conducted by admitting staff

The outcome of screening must be linked to defined courses of action:

1. **The patient is not at risk, but may need to be re-screened at specified intervals, e.g. weekly during hospital stay**
2. **The patient is at risk and a nutrition plan is worked out by the staff**
3. **The patient is at risk, but metabolic or functional problems prevent a standard plan being carried out**
4. **There is doubt as whether the patient is at-risk**

In the two latter cases, referral should be made to an expert for more detailed assessment.

Nutrition Screening 2002, Clin Nutr 2003

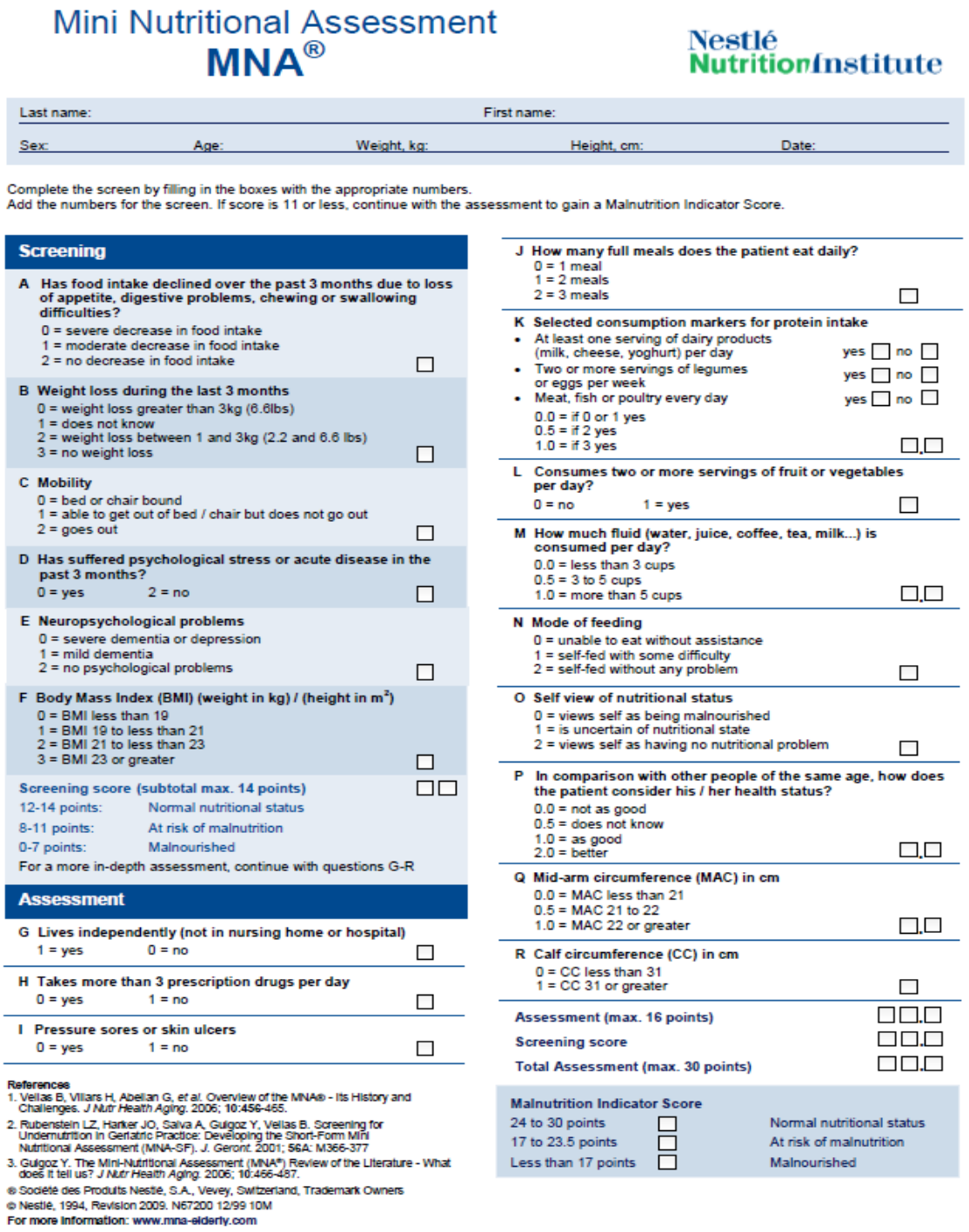
SAPIENZA UNIVERSITÀ DI ROMA

Peso ed indici derivati

- **Indice di Massa Corporea (IMC) = Kg/m²**

< 18.5	sottopeso
18.5-24.9	normale
25-29.9	sovrappeso
30-34.9	obesità 1° grado
35-39.9	2°
> 40	3°

- **% calo ponderale significativo per malnutrizione**
  - 1 mese 5%
  - 3 7.5
  - 6 10



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Nestlé Nutrition Institute

Last name: First name:

Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers.
Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake ☐

B Weight loss during the last 3 months
0 = weight loss greater than 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
3 = no weight loss ☐

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out ☐

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no ☐

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems ☐

F Body Mass Index (BMI) (weight in kg) / (height in m²)
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater ☐

Screening score (subtotal max. 14 points) ☐☐
12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished
For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes 0 = no ☐

H Takes more than 3 prescription drugs per day
0 = yes 1 = no ☐

I Pressure sores or skin ulcers
0 = yes 1 = no ☐

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals ☐

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day yes ☐ no ☐
- Two or more servings of legumes or eggs per week yes ☐ no ☐
- Meat, fish or poultry every day yes ☐ no ☐

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes ☐.☐

L Consumes two or more servings of fruit or vegetables per day?
0 = no 1 = yes ☐

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups ☐.☐

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem ☐

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem ☐

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better ☐.☐

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC 22 or greater ☐.☐

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater ☐

Assessment (max. 16 points) ☐☐.☐
Screening score ☐☐.☐
Total Assessment (max. 30 points) ☐☐.☐

Malnutrition Indicator Score

24 to 30 points	☐	Normal nutritional status
17 to 23.5 points	☐	At risk of malnutrition
Less than 17 points	☐	Malnourished

References
1. Vellas B, Villars H, Abellan G, *et al.* Overview of the MNA® - Its History and Challenges. *J Nutr Health Aging.* 2006; 10:456-465.
2. Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: Developing the Short-Form MINI Nutritional Assessment (MNA-SF). *J. Geront.* 2001; 56A: M366-377
3. Guigoz Y. The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us? *J Nutr Health Aging.* 2006; 10:466-487.

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For more information: www.mna-elderly.com

The MNA test is composed of 18 simple measurements and brief questions

- ***Anthropometric measurements*** (weight, height, and weight loss);
- ***Global assessment*** (lifestyle, medication, and mobility);
- ***Dietary questionnaire*** (number of meals, food and fluid intake, and autonomy of feeding);
- ***Subjective assessment*** (self perception of health and nutrition).

Mini Nutritional Assessment

- **buona capacità predittiva (80.3%) ed eccellente sensibilità (98%) rispetto alla diagnosi di M**
- **correlazione significativa con parametri nutrizionali antropometrici (TSF, CMB, BMI) e biochimici (proteine da trasporto, linfocitemia)**
- **correlazione significativa con le variazioni dei parametri nutrizionali durante il ricovero**
- **buona capacità predittiva dell'evenienza di eventi clinici avversi e di mortalità durante il ricovero**

Donini LM et al: Age & Nutrition 2000, JNHA 2002 e 2003

'MUST' Tool

NHS England

Step 1

BMI kg/m²	Score
>20 (>30 Obese)	= 0
18.5—20	= 1
<18.5	= 2

Step 2

Unplanned weight loss in past 3-6 months

%	Score
<5	= 0
5-10	= 1

Step 3

If patient is acutely ill **and** there has been or is likely to be no nutritional intake for >5 days

Score 2

Step 4

Overall risk of malnutrition

Add scores together to calculate overall risk of malnutrition.

Score 0 Low Risk | Score 1 Medium Risk | Score 2 or more High Risk

0 Low Risk

Routine clinical care

- Ensure appropriate food and drink choices
- Repeat screening every 3-6 months, unless there is clinical concerns.
- Document action taken

1 Medium Risk

Observe

- Follow 'MUST' 1 care pathway on page 10 of Guidelines Booklet

2 or more High Risk

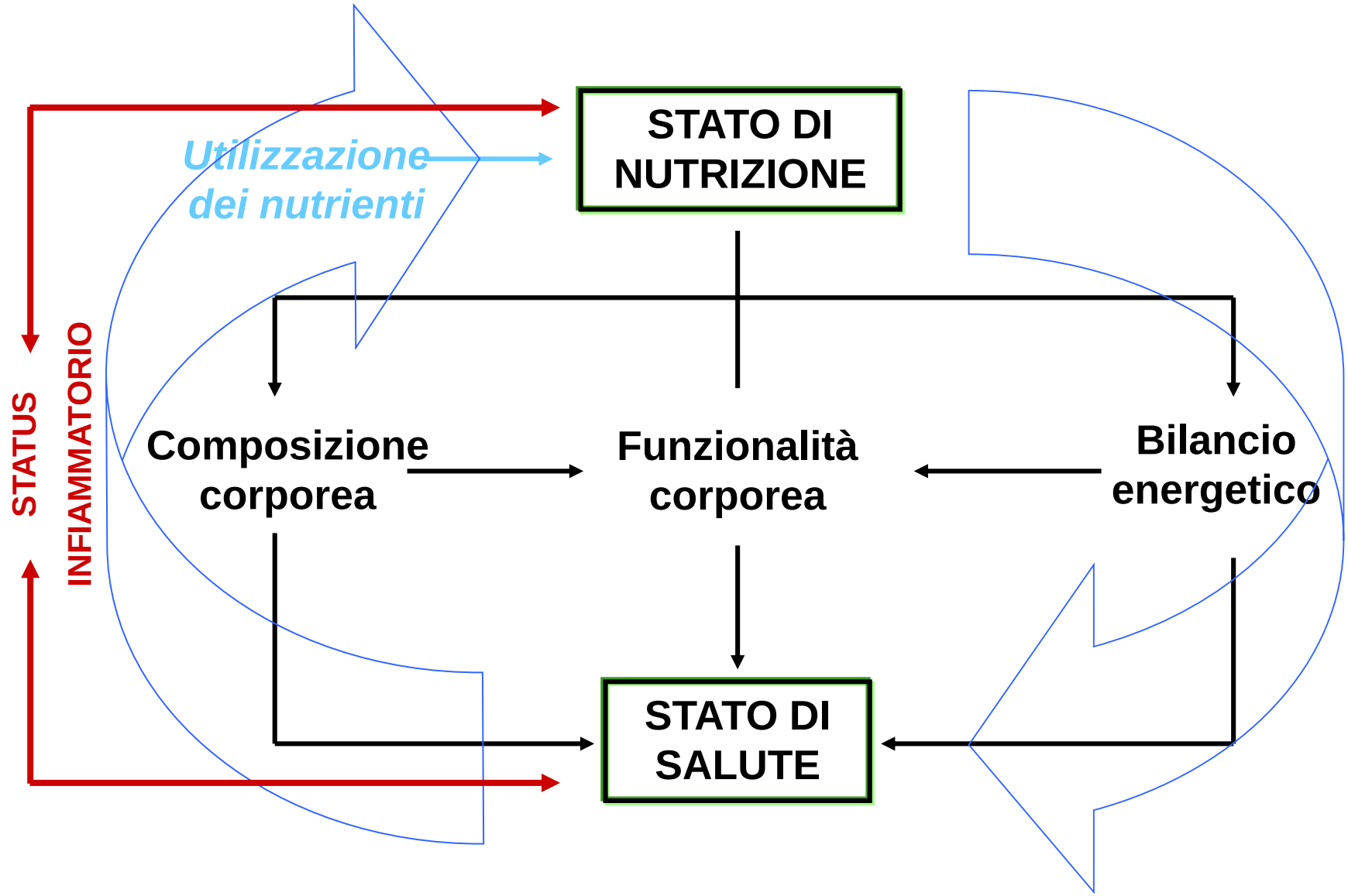
Treat*

- Follow action plan for medium risk
- Refer to Dietitian*
- Re-weigh weekly
- Document action taken

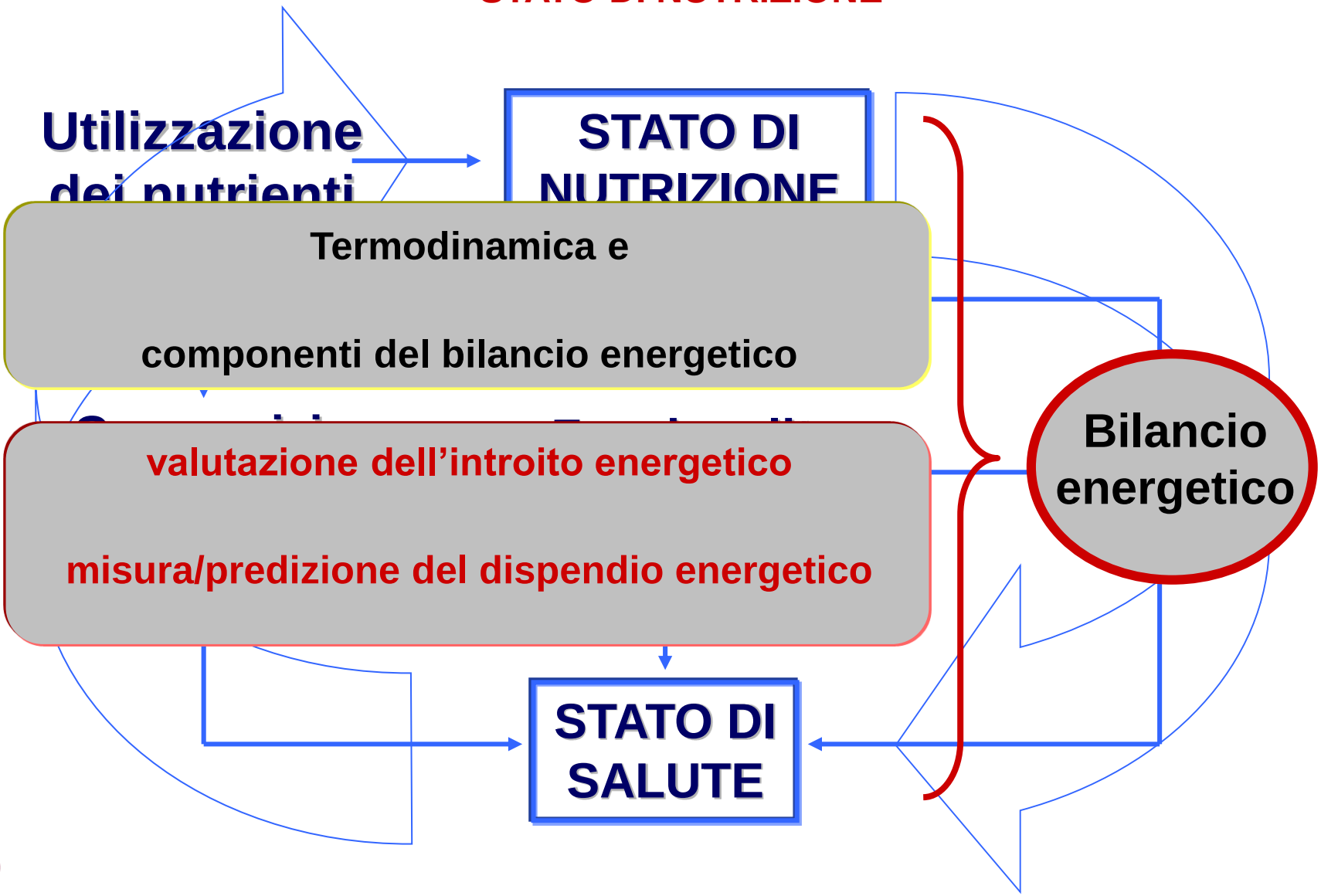
*unless detrimental or no benefit is expected from nutritional support e.g. end of life care pathway

Sapienza Università di Roma

DEFINIZIONE “OPERATIVA” DI STATO DI NUTRIZIONE



DEFINIZIONE “OPERATIVA” DI STATO DI NUTRIZIONE



Introito Alimentare

- **Attuale**
  - Diario alimentare dei 3 gg (con o senza pesata)
  - Recall delle 24h
- **Abituale**
  - Frequenze alimentari (tempo di esposizione ad un dato fattore di rischio)
- **Passato**
  - Intervista (utile se correlato ad un periodo in cui era presente un dato fattore di rischio)

Difficoltà ed errori da:

- complessità alimentazione umana
- collaborazione non sempre “onesta”
- scarsa omogeneità dei comportamenti umani
- distorsione da ricordo

GRIGLIA PORZIONI CONSUMATE GPC

In sintesi, il percorso prevede **3 passaggi** successivi in funzione del rischio nutrizionale:

1° step: "Valutazione del rischio nutrizionale"

1) Procedure

a) Mini Nutritional Assessment (MNA®) (pag. 13). Sulla base del risultato i soggetti saranno classificati in tre gruppi di rischio (basso, medio e alto).

b) GPC (griglia porzioni consumate) (pag. 17) per una valutazione dell'introito alimentare del soggetto anziano.

Nome.....Sesso ..... Età ..... Data inizio controllo.....

		lun	mart	merc	gio	ven	sab	dom	tot
COLAZIONE	Latte o Yogurt								
	Alimenti colazione								
SPUNTINO	frutta								
PRANZO	primo								
	secondo								
	contorno								
	pane								
	frutta								
MERENDA	Latte o yogurt								
CENA	primo								
	secondo								
	contorno								
	pane								
	frutta								

Rischio nutrizionale negli anziani:

Manuale di valutazione e gestione per il CAREGIVER

http://w3.uniroma1.it/scialim

a cura di

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Giuseppe Ugolini
Angiola Vanzo

Concetta Mirisola
Gianfranco Costanzo
Laura Piombo

Principali componenti delle abitudini alimentari di un individuo

Numero di pasti

Con chi si consumano i pasti

Orario dei pasti

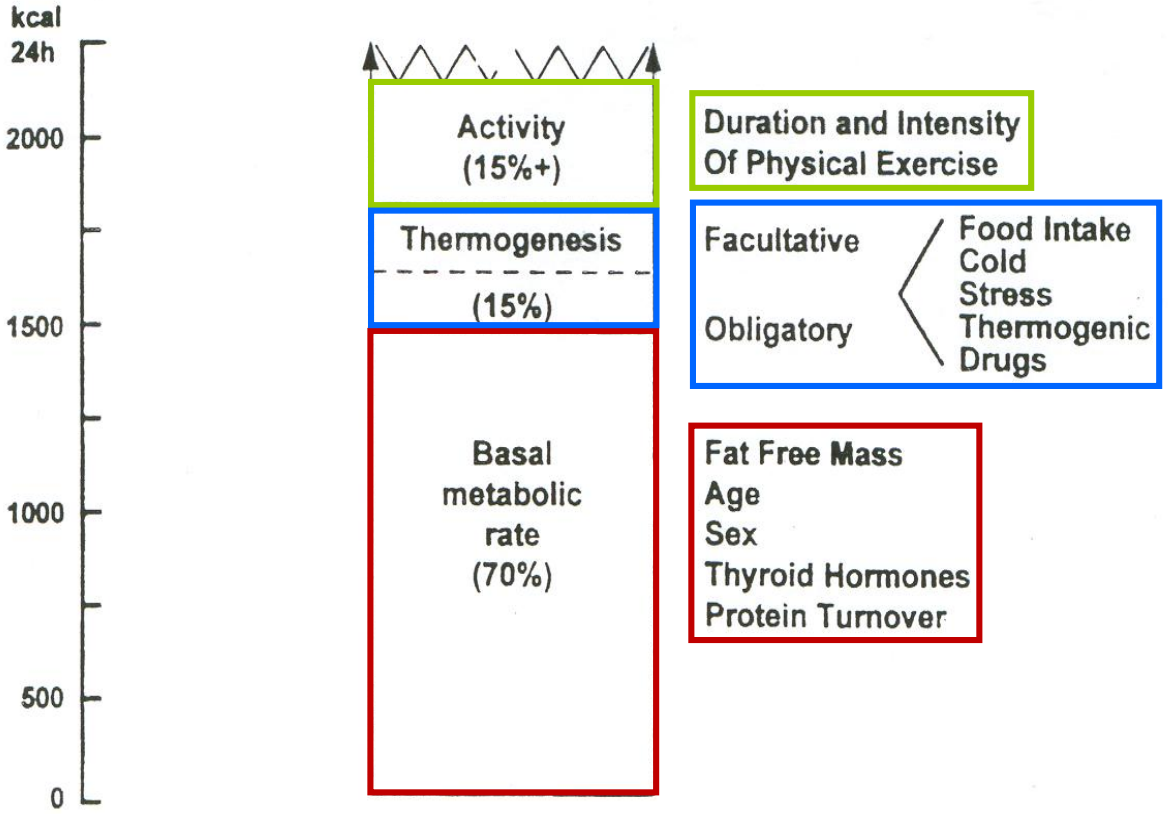
ABITUDINI ALIMENTARI

Come si consumano i pasti

Dimensioni delle porzioni

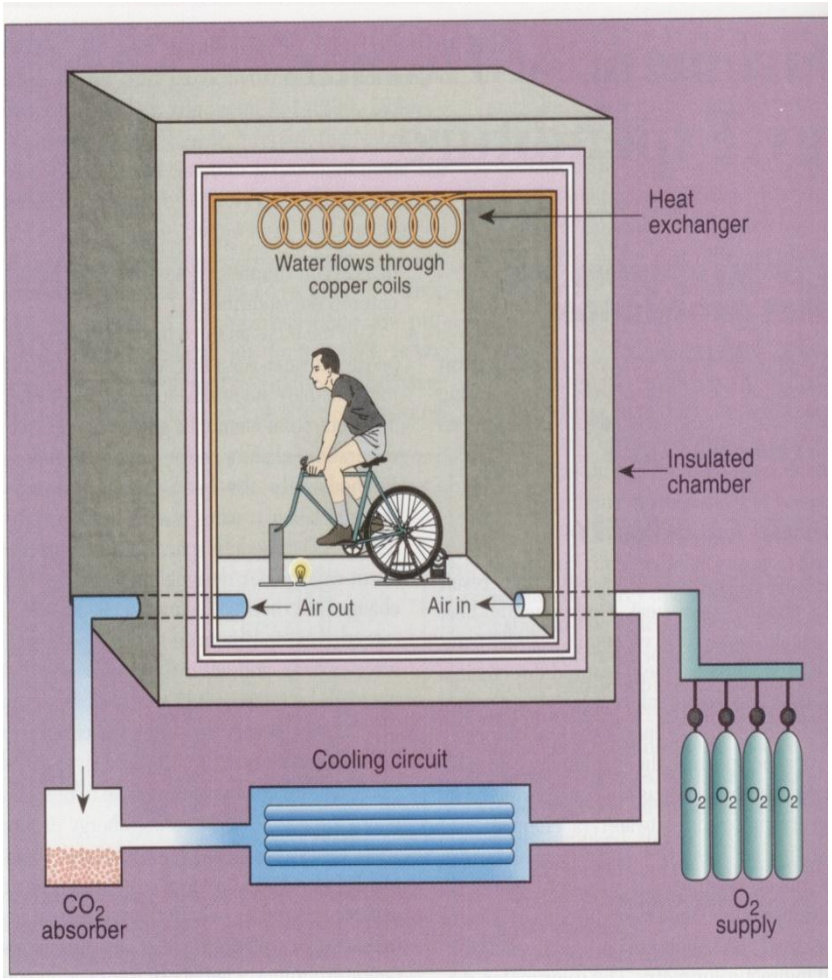
Scelte alimentari

Metodi di preparazione dei cibi



Components of energy expenditure. The energy partition into basal energy needs, thermogenesis, and activity was estimated based on a 2500 kcal/d requirement. The upper end is open, indicating that activity is variable and can be increased for the normal individual. However, this component comprises ≈30% of total daily energy expenditure. (Copyright 1987, George A. Bray. Used with permission.)

Calorimetria Diretta



Calorimetria Indiretta

La Calorimetria indiretta

Principio di Misura

- L'energia utilizzata da un individuo è resa disponibile grazie a processi metabolici che utilizano Ossigeno e producono Anidride Carbonica
- VO2 e VCO2 vengono misurati e convertiti in Kcal attraverso la formula di Weir
- Un litro di ossigeno respirato viene utilizzato per bruciare circa 5 Kcal

Formula di Weir

REE (Kcal/day)= [VO2(3.941) + VCO2(1.11)]*1440 min/day

Dove:
REE = Consumo energetico a riposo (Resting Energy Expenditure)
VO2 = Consumo di ossigeno
VCO2= Prod. di anidride carbonica

Stima del dispendio energetico

Stima del RMR sec. Harris Benedict

Basata su studio del 1920
su 240 soggetti

- U: [66.5 + (13.8 x peso corporeo) + (5.0 x altezza) - (6.8 x età)]

- D: [655.1 + (9.6 x peso corporeo) + (1.8 x altezza) - (4,7 x età)]

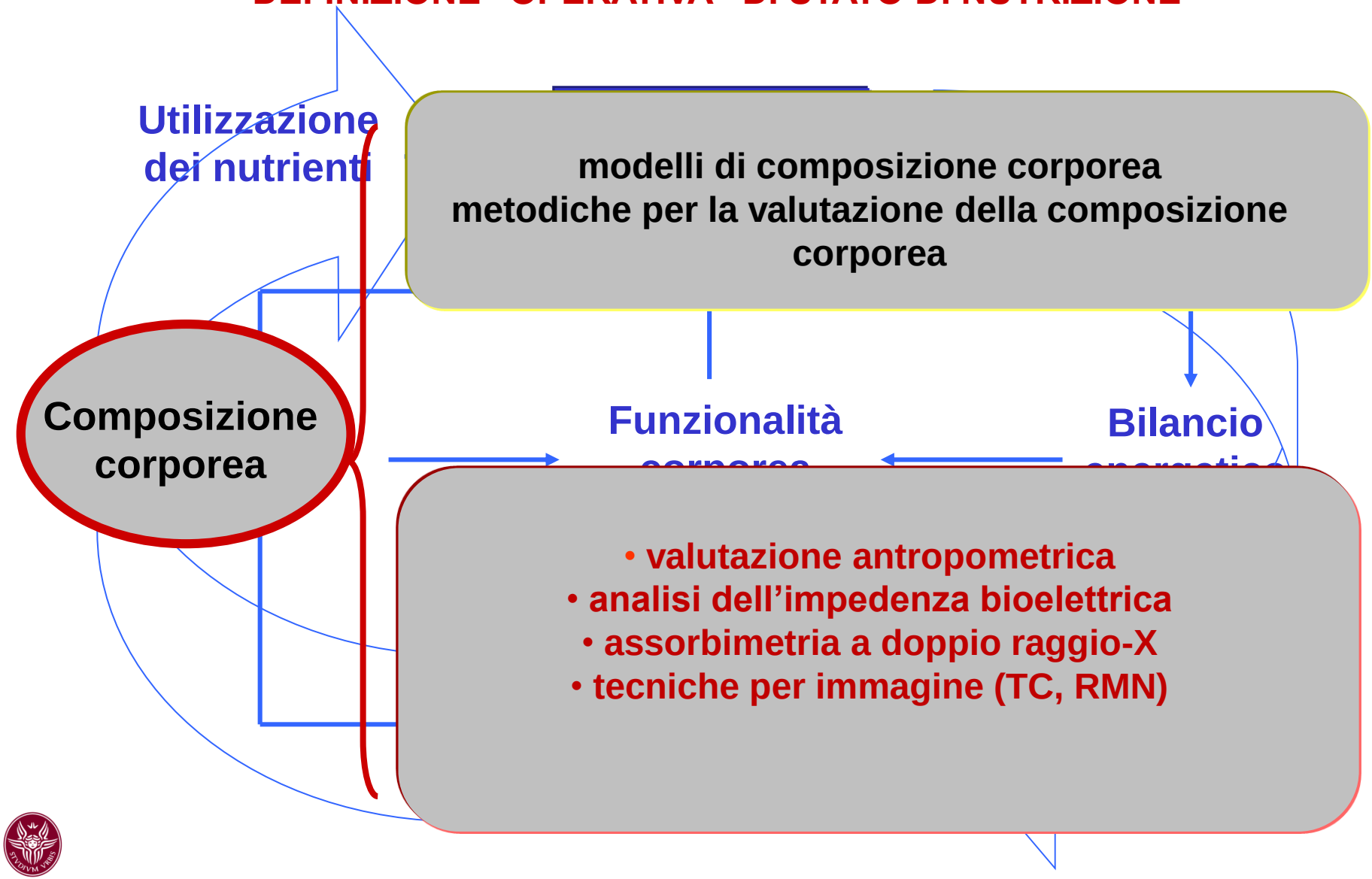
Nonostante accuratezza della stima possa essere aumentata correggendo l'equazioni per la composizione corporea, i valori ottenuti non sono considerati affidabili in molte circostanze (errori possono variare da +/- 500kcal)

Stima dell'attività fisica

Diari
Questionari (IPAQ, …)

Accelerometri

DEFINIZIONE “OPERATIVA” DI STATO DI NUTRIZIONE



UICO UNIONE ITALIANA CONTRO L'OBESITÀ

IL PESO AUMENTA E TI SENTI SEMPRE PIÙ GRASSO

CHE FARE ?

IL DESIDERIO DI FAR SCENDERE LA BILANCIA È FORTISSIMO ED IRRESISTIBILE E SEI DISPOSTO A QUALSIASI SACRIFICIO. LA BILANCIA MISURA PERÒ LA MASSA CORPOREA TOTALE CHE È COSÌ COMPOSTA

MASSA CORPOREA

(valori normali)

SE PERDI PESO ATTENTO A COSA PERDI

DISIDRATAZIONE — DEPERIMENTO

DEMINERALIZZAZIONE

EMACIAZIONE

DIMAGRAMENTO

QUINDI

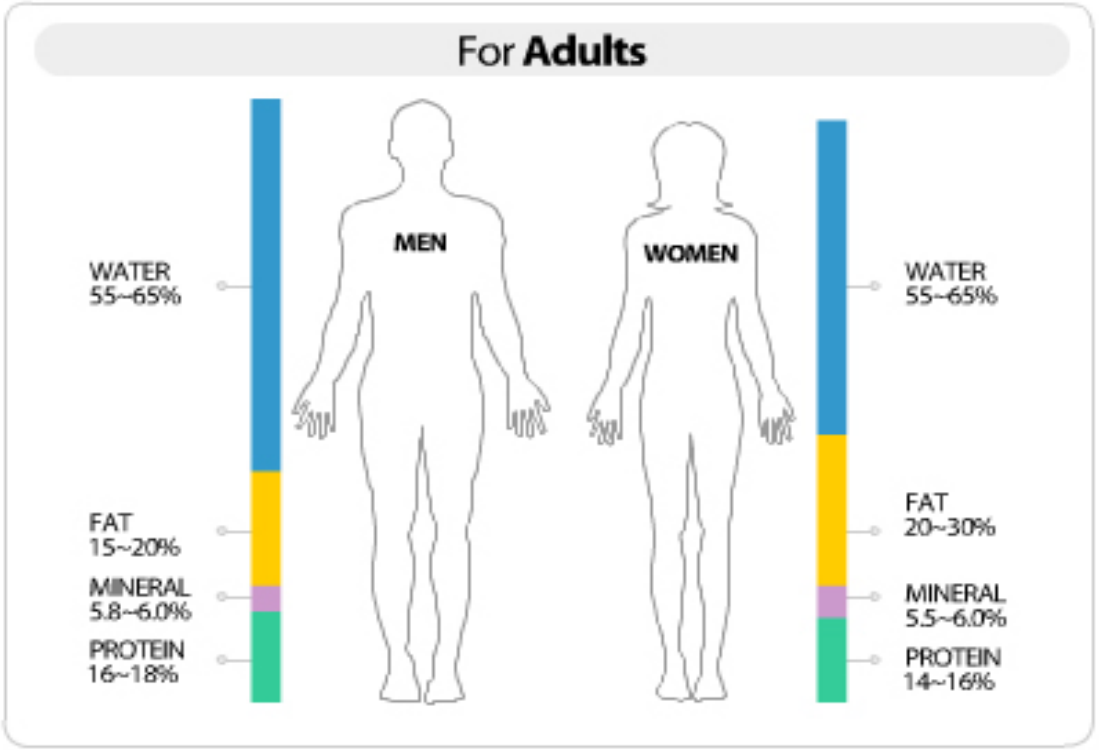
SE C'È UN AUMENTO DEL GRASSO DI DEPOSITO (SOVRAPPESO-OBESITÀ) E VUOI DIMAGRIRE, LA BILANCIA È UNO STRUMENTO DI VERIFICA POCO SELETTIVO ED INADATTO A MONITORIZZARE LA TUA COMPOSIZIONE CORPOREA, CHE PUÒ QUINDI INDURTI A SEGUIRE TERAPIE INADEGUATE E PERICOLOSE O NON SCIENTIFICAMENTE CORRETTE.

PERCIÒ

EVITA IL FAI DA TE, I MIRAGGI E LE CIARLATANERIE.
RIVOLGITI A PROFESSIONISTI QUALIFICATI CHE TI AIUTINO A PRENDERE CURA DEL TUO CORPO.

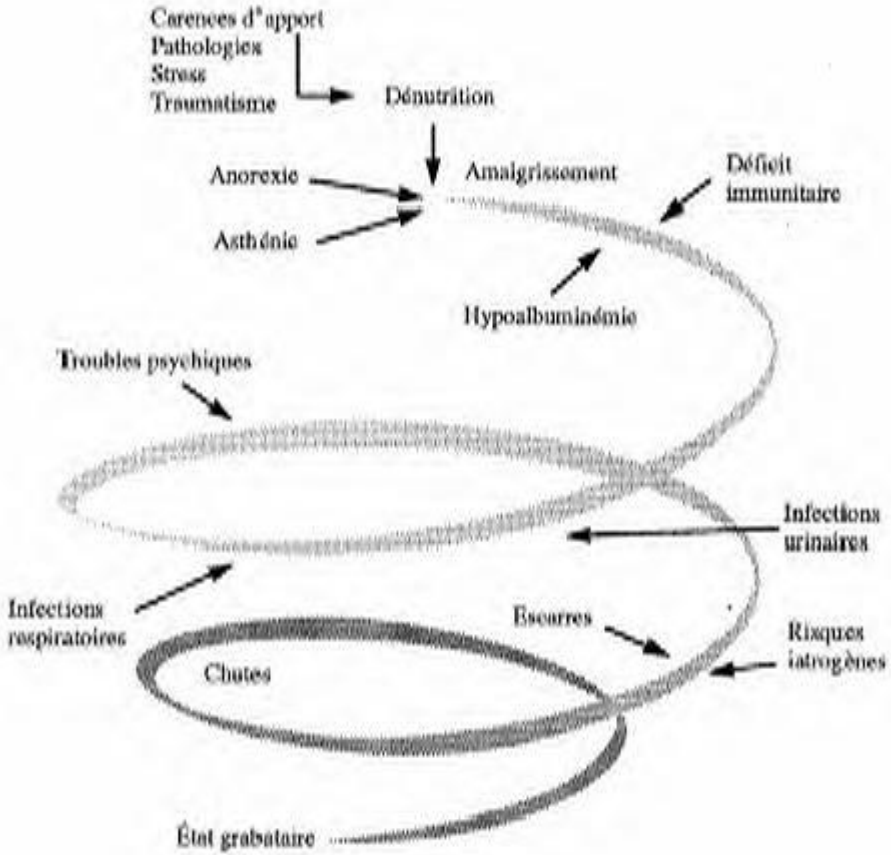
A cura del Dr. Paolo De Cristofaro, direttivo UICO, con la collaborazione della Dr.ssa Jussa Flauzino Dagmar, psicologa, e di Mariano Forti per i disegni.
UICO - Segreteria Nazionale: Istituto di Scienza dell'Alimentazione - Università "La Sapienza", P.le A. Moro, 5 - 00185 Roma

Da De Cristofaro P., 2002



		Low-fat	Normal	Over-fat	Obese	Obese II
% FM	Male	< 15	15 ~ <20	20 ~ <25	25 ~ <30	over 30
	Female	< 20	20 ~ <30	30 ~ <35	35 ~ <40	over 40

Le risque : la spirale de la dénutrition



Medscape® www.medscape.com

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	Too weak to sit, pressure sores, pneumonia, no healing	50
40	Death, usually from pneumonia	100

*Assuming no preexisting loss.

Misure composizione corporea

- **Pesata idrostatica**

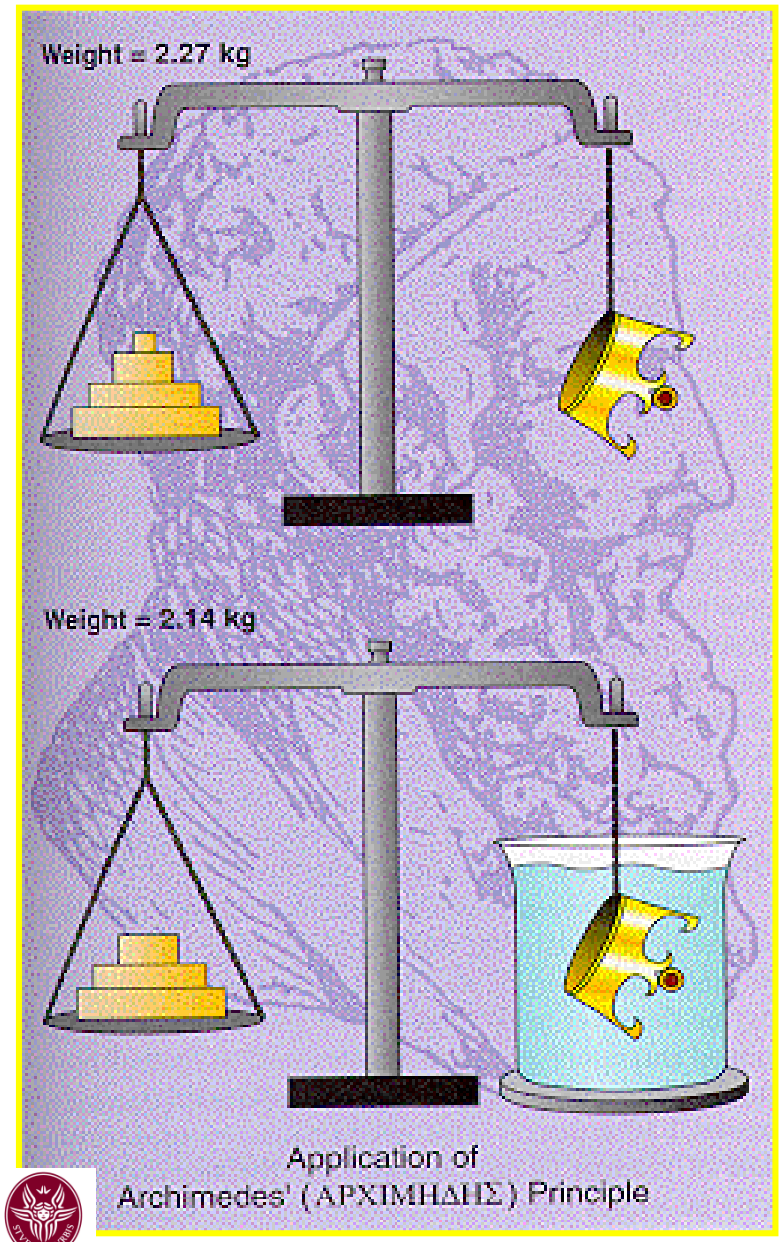
  D = BW/BVolume **BW = FM+FFM**

  D(FM)= 0.9 Kg/l **D(FFM)= 1.1 kg/l**

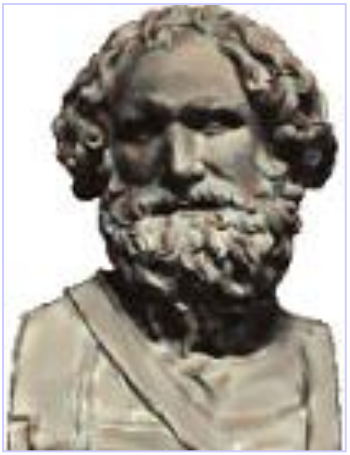
  ⇒ FM%= [(4.95 /D) –4.5]*100

- **Antropometria**
- **DEXA**
- **Bioimpedenzometria**

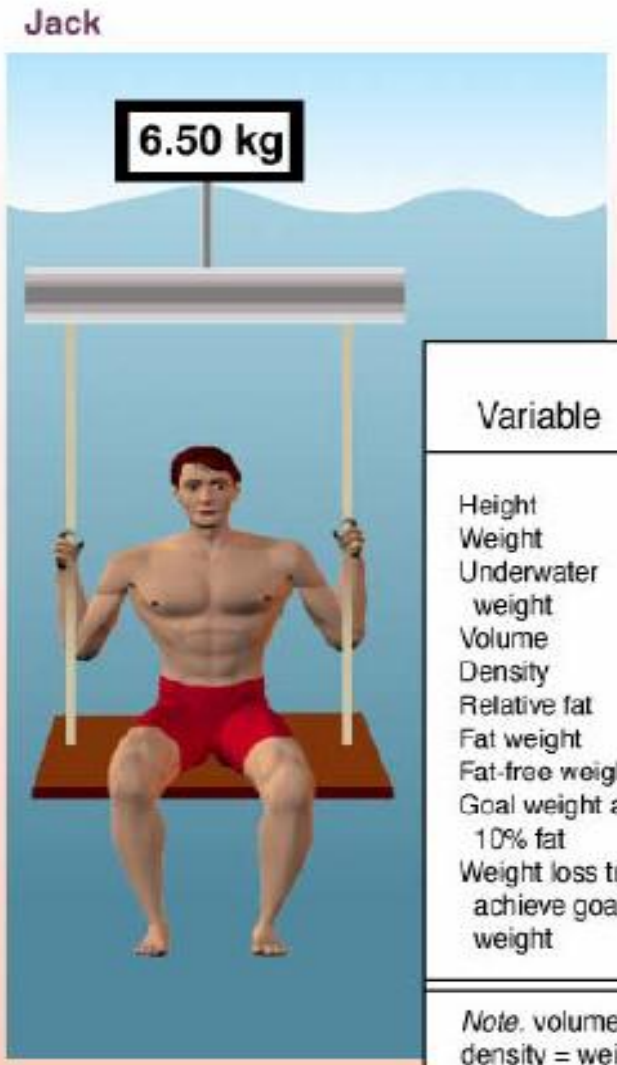
Ogni misura ha un significato diverso (peso – circonferenza braccio …) ed un riferimento temporale diverso (variazione nel tempo veloce per peso, lenta per grasso sottocutaneo)

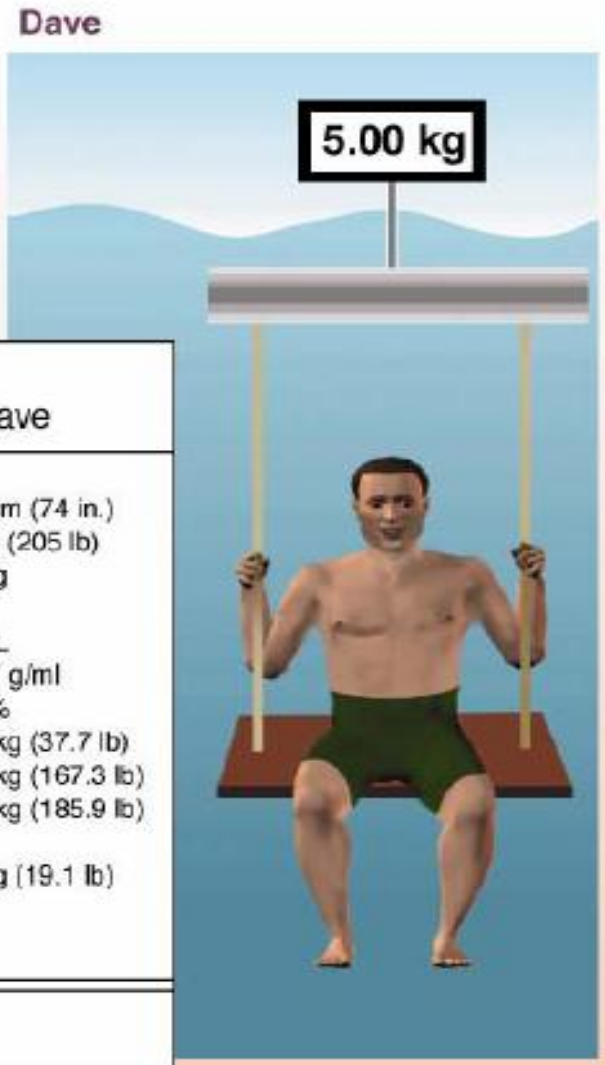


Hydrostatic Weighing Archimedes Principle



- **How much gold in the crown?**
- **Archimedes devised a two-compartment system to determine the content of the crown: gold and silver**





Variable	Jack	Dave
Height	188 cm (74 in.)	188 cm (74 in.)
Weight	93 kg (205 lb)	93 kg (205 lb)
Underwater weight	6.5 kg	5.0 kg
Volume	86.5 L	88.0 L
Density	1.075 g/ml	1.057 g/ml
Relative fat	10.5%	18.4%
Fat weight	9.7 kg (21.4 lb)	17.1 kg (37.7 lb)
Fat-free weight	83.3 kg (183.6 lb)	75.9 kg (167.3 lb)
Goal weight at 10% fat	92.6 kg (204.2 lb)	84.3 kg (185.9 lb)
Weight loss to achieve goal weight	0.4 kg (0.8 lb)	8.7 kg (19.1 lb)

Note. volume = weight – underwater weight
density = weight ÷ volume

ANTROPOMETRIA

- Vantaggi
  - Costi contenuti
  - Ripetibile
  - impiego da campo

- Svantaggi
  - Variabilità intra ed interoperatore
  - Assenza di valori di riferimento (per popolazione, classe di età, sesso, per i sani e per i malati)
  - Risultati spesso definiti come
    - z-score = dato individuo – media o mediana della pop
    - t-score = dato individuo – media o mediana della pop di pari età
  - "mille" misure (diametri, spessori di pliche cutanee, circonferenze, lunghezze, …)
  - arto dominante o no ?
  - necessità di far ricorso ad equazioni di regressione che hanno un errore implicito

BIA - Bioelectric Impedance Analysis

Massa Magra (FFM)

↓

Contiene acqua ed elettroliti

↓

Buon conduttore elettrico

Massa Grassa (FM)

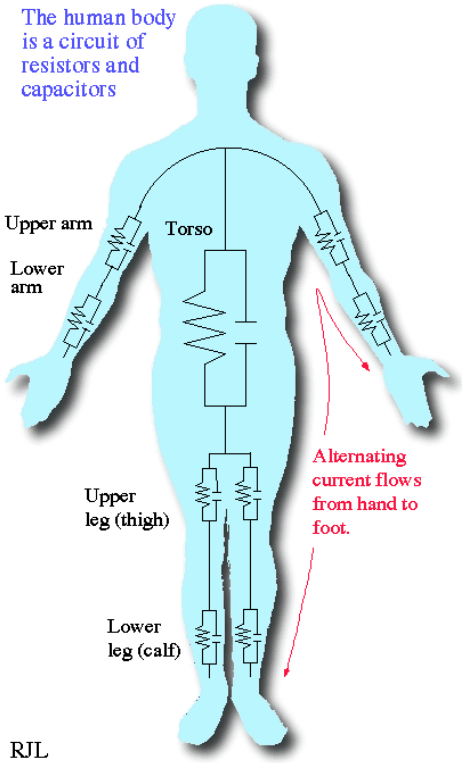
↓

Poveri di acqua ed elettroliti

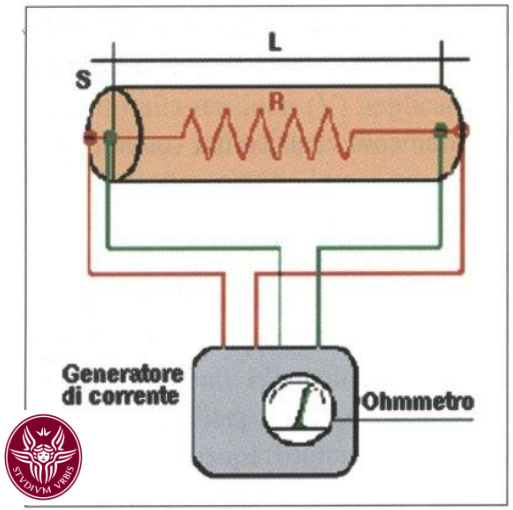
↓

Scarsa conducibilità elettrica

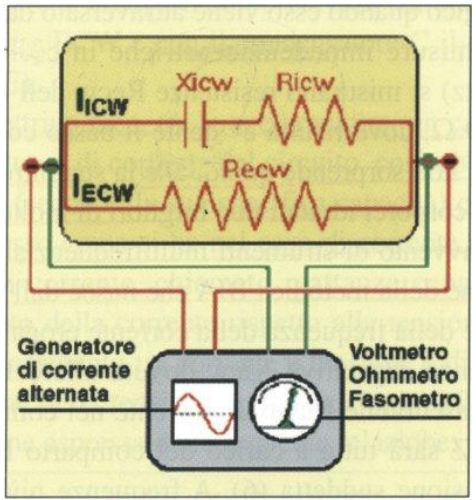
L'opposizione al passaggio della corrente è denominata IMPEDENZA

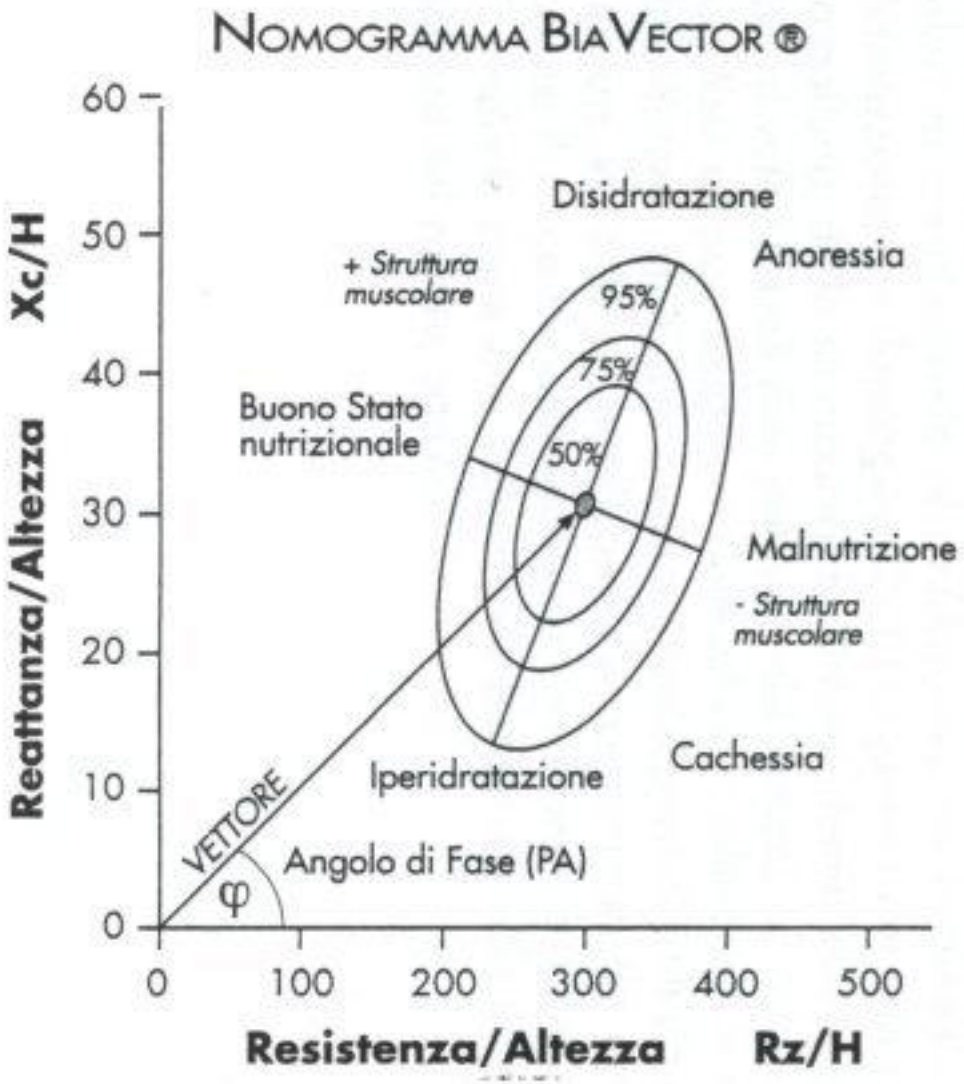


RESISTENZA



REATTANZA





NOMOGRAMMA

L'angolo di fase si riduce quando diminuisce la massa cellulare o quando aumentano i fluidi extracellulari

φ in un giovane ben nutrito e ben idratato va dai 6 agli 8 gradi

Dual Energy X-Ray Absorptiometry - DEXA

- **I tessuti (grasso, massa magra, minerale osseo) possono attenuare un raggio X a doppio livello energetico (70 e 140 kV), in relazione alla massa ed alla densità**
- **Intensità dell'energia (al crescere dell'energia, decrescono le differenze tra i diversi tessuti nell'attenuare il raggio X) è funzione di**
  - **Massa corporea**
  - **Spessore del tessuto assorbente**
  - **Composizione corporea (densità e composizione chimica): coefficiente di attenuazione lineare per ogni singolo tessuto**

Il coefficiente di attenuazione del raggio da parte di una struttura composta da più tessuti è dato dalla media ponderata dei coefficienti di ogni singola componente la struttura

RISONANZA MAGNETICA

- Con la RM è possibile una valutazione quali-quantitativa della composizione del tessuto muscolare
- La RM spettroscopica è stata applicata con successo nella misura dei metaboliti fosforici ad alta energia (CP, ATP) nel muscolo
- La RM, a differenza della TC, non utilizza radiazioni ionizzanti; ma gli alti costi dell'apparecchiatura ne limitano l'uso

Indici che rapportano la quota di massa magra alla statura o al peso corporeo:

- **fat-free mass index (FFMI)**
- **skeletal mass index (SMI)**
- **appendicular lean mass index (ALMI)**

valori inferiori alla media - 2DS del valore riscontrato in un campione di controllo costituito da soggetti con età < 40 aa sono suggetsivi di M per difetto

Valori soglia dei parametri misura/stima massa magra al di sotto dei quali si rientra nella malnutrizione per difetto		
Janssen I et al: JAGS 2002, 50, 889-896	4504 sogg, età >60 aa	Class I sarcopenia: SMI 31-37% U, 22-28% D Class II sarcopenia: SMI < 31% U, < 22% D
Janssen I: JAGS 2006, 54, 56-42 & Am J Epidemiol 2004, 159, 4, 413-421	4499 anziani (> 60 aa) NHANES III	U: ALMI normale > 10.76 Kg/m^2 Sarcopenia lieve: 8.51-10.75 Kg/m^2 Sarcopenia grave ≤ 8.5 Kg/m^2 D: ALMI normale > 6.76 Kg/m^2 Sarcopenia lieve: 5.76-6.75 Kg/m^2 Sarcopenia grave ≤ 5.75 Kg/m^2
Kyle UG et al: Nutrition 2003, 19, 597-604	3549 U e 3184 D, caucasici, app sani, età compresa tra 18 e 98 aa	Corrispondenza tra BMI e FFMI U BMI 18.5 ⇒ FFMI 16.7 kg/m^2 D 14.6
Coin A et al: Clin Nutr 2008, 27, 87-94	1866 sogg italiani età 20-80 aa, senza gravi patologie	25° percentile FFMI U 18.7 kg/m^2 D 14.9 kg/m^2

Indice di massa grassa (FMI)

Alcuni AA suggeriscono di utilizzare come cut-off i valori di FMI corrispondenti a:

- BMI = 20 kg/m^2
- 10-25° percentile di distribuzione di una popolazione di riferimento

Valori di FMI al di sotto dei quali si rientra in una malnutrizione per difetto

		Uomini	Donne
Kyle UG et al: Clin Nutr 2005, 24, 133-142	5635 sogg app sani	2.4 kg/m^2 corrisponde ad un BMI = 20 kg/m^2	4.8 kg/m^2 corrisponde ad un BMI = 20 kg/m^2
Coin A et al: Clin Nutr 2008, 27, 87-94	1866 sogg italiani età 20-80 aa, senza gravi patologie	10° percentile: 3.1 kg/m^2 25° percentile: 4.2 kg/m^2	10° percentile: 5.7 kg/m^2 25° percentile: 6. kg/m^2
Schutz Y et al: Int J Obes 2002, 26, 953-960	5635 sogg app sani e caucasici, 18-98 aa	25° percentile: 3.5 kg/m^2	25° percentile: 4.9 kg/m^2

Valori soglia dei parametri antropometrici indice di massa magra al di sotto dei quali si rientra in una malnutrizione per difetto				
		Classe d'età		
	equazione	18-40 aa	40-60 aa	Età geriatrica
Circonferenza del Braccio (CB) (cm)		28.6 U 25.2 D +	27.8 U 26.1 D +	> 22 ***
Circonferenza dei Muscoli del Braccio (CMB) (cm)	CMB = CB - (TSF * π)			> 22 U > 18.9 D **
Area Muscolare del Braccio (AMB) (mm^2)	AMB = [CB - (TSF * π/10)2]/4π	42.6 U 24.8 D +	40.8 U 23.4 D +	> 44.1 U > 30.2 D*
Circonferenza del Polpaccio (CP) (cm)				> 31 ***

*** Guigoz Y, Vellas B, Garry PJ: Mini nutritional assessment.Facts and Research in Gerontology. Supplement #2. 1994, 15-59

** Media ponderata 10° percentile campioni italiani SENECA (Eur J Clin Nutr 1991, 45, S3, 31-42; Nutr Rev 1992, 50, 7, 185)

* Frisancho AR: New norms of upper limb fat and muscle area for assessment of nutritional status. Am J Clin Nutr 1981, 34, 2540-5

+ Valori di riferimento NCHS. In Bedogni G, Borghi A, Battistini N: Manuale di valutazione antropometrica dello stato di nutrizione. EDRA, Milano 2001

Valori di FM al di sopra dei quali si rientra nell'obesità			
		Uomini	Donne
WHO – Physical Status - 1995 – p327 citando Deurenberg P et al: BJN 1991, 65, 105-114	BMI pari a 30 kg/m^2 in un campione di soggetti danesi	30% all'età di 20 aa 40% all'età di 60 aa	40% all'età di 20 aa 50% all'età di 60 aa
De Lorenzo A et al: Acta Diabetol 2003, 40, S254-7	596 donne e 294 uomini italiani app. sani con età compresa tra 18-83 aa	normale < 25% aumentata > 25% molto aumentata > 30%	normale < 35% aumentata > 35% molto aumentata > 40%
Gallagher D et al: Am J Clin Nutr 2000, 72, 694-701	380 donne e 291 uomini ; 254 afroamericani e 417 caucasici	BMI ≥ 30 kg/m^2 20-39 aa: 25% 40-59 aa: 28% 60-79 aa: 30%	BMI ≥ 30 kg/m^2 20-39 aa: 39% 40-59 aa: 40% 60-79 aa: 42%
Heitmann BL et al: Int J Obesity 2000, 24, 33-7	735 uomini di 60 aa; follow-up di 22 aa	BMI 30.2±2.2 kg/m^2 ⇒ FM kg 33.1±7.9 (35.8%)	
Baumgartner RN et al : Obes Res 2004, 12, 1995-2004	229 sogg app sani, 18-40 aa	FM > 28% (valore al disopra del 60° percentile di distribuzione della popolaz di riferimento)	FM > 40% (valore al disopra del 60° percentile di distribuzione della popolaz di riferimento)
Coin A et al: Clin Nutr 2008, 27, 87-94	1866 sogg italiani età 20-80 aa, senza gravi patologie	75° percentile: 26.5%	75° percentile: 38.4 %

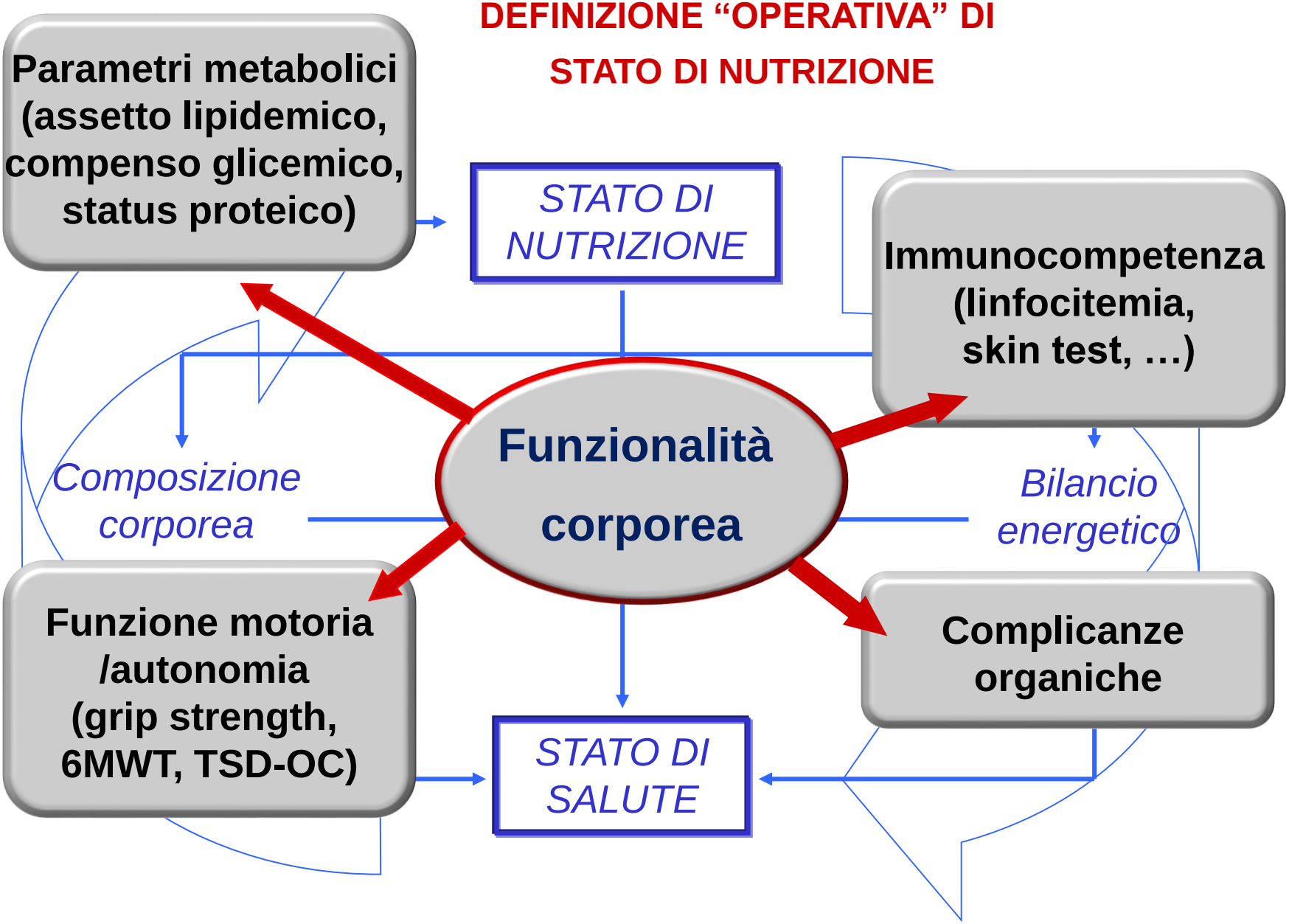
Indice di massa grassa (FMI)

alcuni AA suggeriscono di utilizzare l'indice di massa grassa (FMI) corrispondente a

- BMI = 30 kg/m^2
- al 75% percentile di distribuzione di una popolazione di riferimento

		FMI	
		Uomini	Donne
Kyle UG et al: Clin Nutr 2005, 24, 133-142	5635 sogg app sani	8.3 kg/m^2 corrisponde ad un BMI = 30 kg/m^2	11.8 kg/m^2 corrisponde ad un BMI = 30 kg/m^2
Coin A et al: Clin Nutr 2008, 27, 87-94	1866 sogg italiani età 20-80 aa, senza gravi patologie	75° percentile: 7 kg/m^2	75° percentile: 10.6 kg/m^2
Schutz Y et al: Int J Obes 2002, 26, 953-960	5635 sogg app sani e caucasici, 18-98 aa	75° percentile: 5.9 kg/m^2	75° percentile: 7.8 kg/m^2

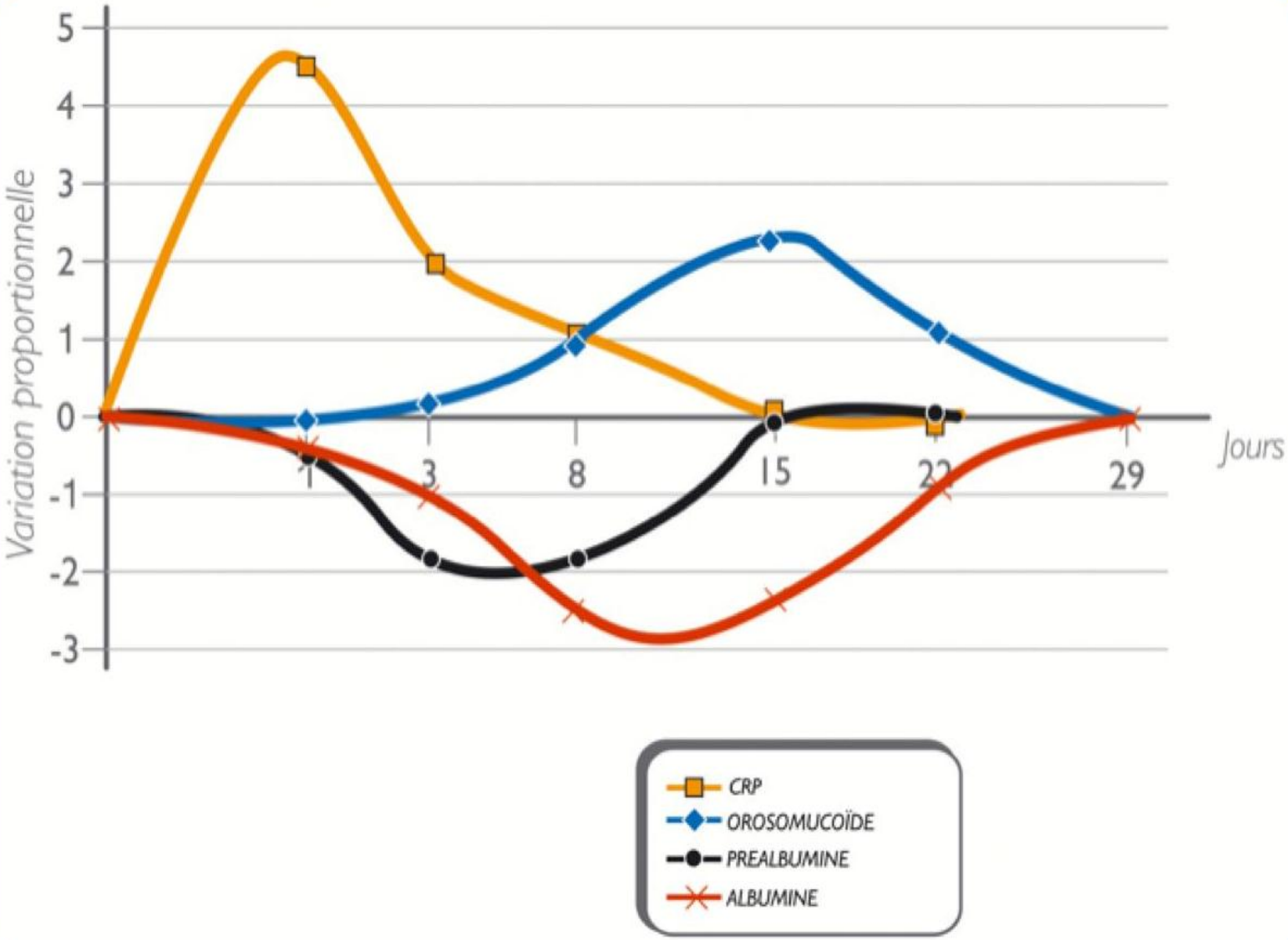
DEFINIZIONE "OPERATIVA" DI STATO DI NUTRIZIONE



- Quasi tutti i nutrienti svolgono la loro azione a livello **intracellulare e il dosaggio plasmatico è correlato solo parzialmente con quello.** Ciò conferma la necessità di integrare, ad esempio, il dato sulla sideremia con la misura di ferritinemia, transferrinemia ed emoglobinemia prima di intraprendere una terapia marziale.

- Il dosaggio ematico di un nutriente può avvenire in condizioni **“statiche”** (glicemia a digiuno, ad esempio) o **“dinamiche”** (curva glicemica da carico) aggiungendo quindi un significato funzionale alla misura.

ÉVOLUTION DES PROTÉINES AU COURS D'UNE INFECTION



Funzione motoria e QdV

- **Funzionalità Motoria e problematiche osteo-articolari**:
  - resistenza [p.e.*6-minute-walk-test*] e percezione dello sforzo [p.e. scala di Borg]
  - forza [p.e. hand-grip dynamometry]
  - flessibilità e mobilità articolare: test di flessione del tronco e dell'anca, mobilità articolare del cingolo scapolo-omerale (flessione, estensione, abduzione)
  - Short Physical Performance Battery (balance, 4m, SitToStand)
  - disabilità [p.e. ADL/IADL, TSD-OC]

- **Qualità di vita** [p.e. SF-36, Obesity Related Well-Being (ORWELL 97), …]

(Villareal DT, Obes Res 2004; Humphreys J, Nutrition 2002; Delmonico MJ, JAGS 2007; Donini LM, Disabil Rehabil. 2011; Use and interpretation of anthropometry in the elderly for the assessment of physical status report to the nutrition unit of the WHO. JNHA 1998; ATS ıtement: guidelines for the 6-minute walk test. Am J Respir Crit Care Med 2002)

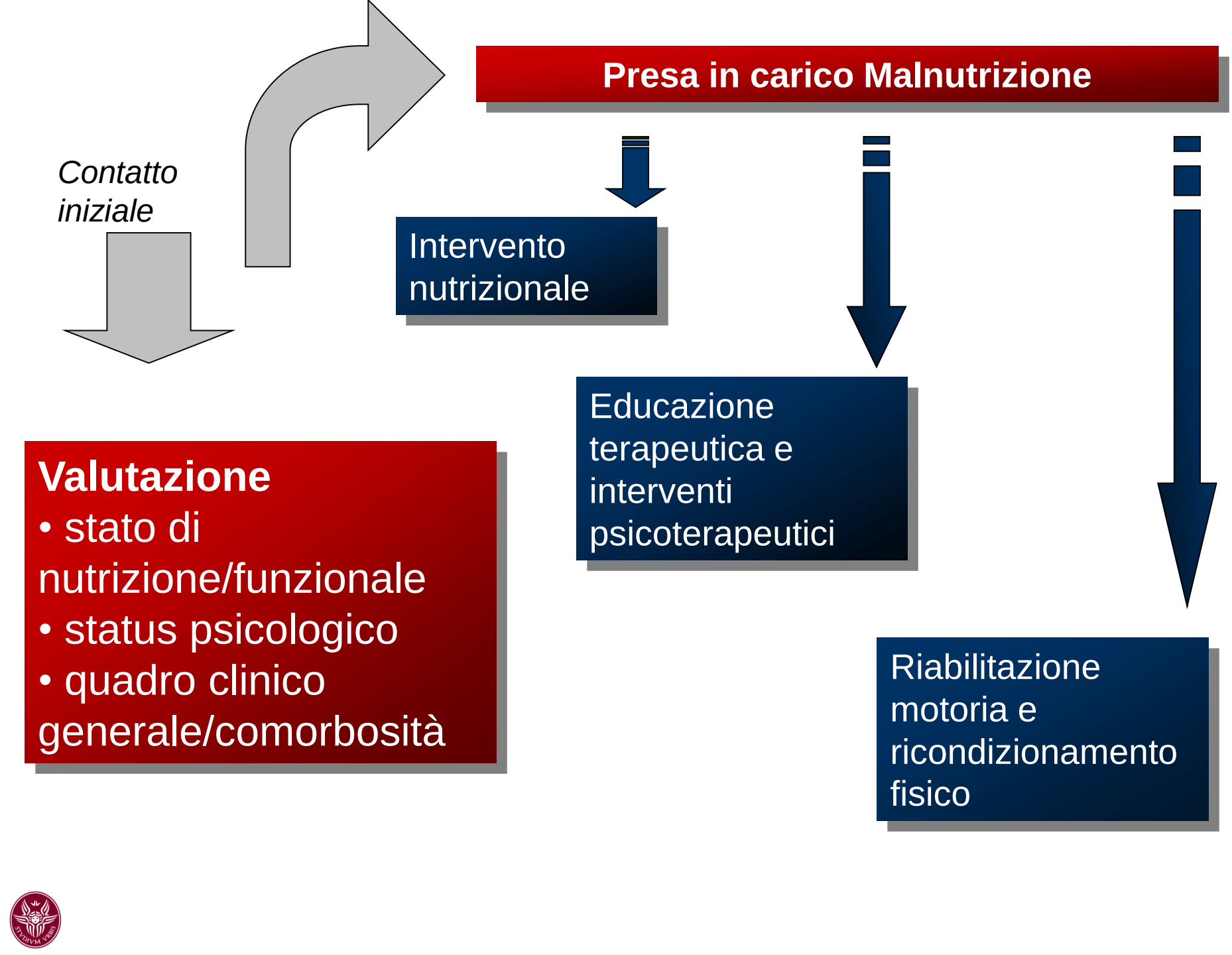
In definitiva

		Malnutrizione	
	Grado	**per difetto**	
Bilancio E e nutrienti	**Rischio**	Introito E < 10% al fabbisogno * e/o proteico < 0.75 g/Kg	* in assenza di regimi dietetici ipocalorici prescritti per motivi clinici 1. un introito E < 10%% al fabbisogno, in un soggetto con un fabbisogno di 2000 Kcal/die, comporta una riduzione di poco meno di 1 Kg di peso corporeo al mese. 2. un apporto proteico < 0.75g/Kg è probabile che, in una quota significativa di soggetti, non sia in grado di assicurare un bilancio azotato in pareggio
Compos. corporea	**1a**	FFMI < 18.7 U, 14.9 D Kg/m^2 **,+ e/o FMI < 4.2 U, 6 D Kg/m^2 +	** in assenza di un'attendibile valutazione della FFM, è possibile utilizzare parametri funzionali (*hand-grip,* velocità di percorrenza di una determinata distanza) o altre misure antropometriche (CB, CMB, AMB, CP) + i valori soglia di FMI e FFMI sono validi per la popolazione italiana Coin A, et al: Clin Nutr 2008
	1b		
Funzione corporea	**2a**	⇓ compart prot viscerale e/o immunocomp e/o funzione motoria	
	2b	Complic organiche (LD, sepsi, …)	

		Malnutrizione		
	Grado	**per difetto**	**per eccesso**	
Bilancio E e nutrienti	**Rischio**	Introito E < 10% al fabbisogno * e/o proteico < 0.75 g/Kg	Introito E > 10% al fabbisogno	in un soggetto con un fabbisogno di 2000 Kcal/die, comporta un aumento di poco meno di 1 Kg di peso corporeo (per l'80%, almeno, costituito da grasso) al mese.
Compos. corporea	**1a**	FFMI < 18.7 U, 14.9 D Kg/m^2 **,+ e/o FMI < 4.2 U, 6 D Kg/m^2 +	FM > 26.5 U, 38.4 D % + o FMI > 7 U, 10.6 D Kg/m^2 +	+ i valori soglia di FMI e FFMI sono validi per la popolazione italiana Coin A, et al: Clin Nutr 2008
	1b		W > 102 cm U, 88 cm D	
Funzione corporea	**2a**	⇓ compart prot viscerale e/o immunocomp e/o funzione motoria	complicanze dismetaboliche e/o ⇓ funzione motoria	
	2b	Complic organiche (LD, sepsi, …)	Complic organiche (ACV, resp, …)	

		Malnutrizione		
	Grado	**per difetto**	**per eccesso**	**mista**
Bilancio E e nutrienti	**Rischio**	Introito E < 10% al fabbisogno * e/o proteico < 0.75 g/Kg	Introito E > 10% al fabbisogno	Introito E < 10% al MB e/o proteico < 0.75 g/Kg in un sogg da tempo obeso
Compos. corporea	**1a**	FFMI < 18.7 U, 14.9 D Kg/m^2 **,+ e/o FMI < 4.2 U, 6 D Kg/m^2 +	FM > 26.5 U, 38.4 D % + o FMI > 7 U, 10.6 D Kg/m^2 +	FFM reale /FFMideale < 0.9++ e FM > 26.5 U, 38.4 D % + o FMI > 7 U, 10.6 D Kg/m^2 +
	1b		W > 102 cm U, 88 cm D	
Funzione corporea	**2a**	⇓ compart prot viscerale e/o immunocomp e/o funzione motoria	complicanze dismetaboliche e/o ⇓ funzione motoria	∑ M difetto + eccesso
	2b	Complic organiche (LD, sepsi, …)	Complic organiche (ACV, resp, …)	∑ M difetto + eccesso

		Malnutrizione			
	Grado	**per difetto**	**per eccesso**	**mista**	
Bilancio E e nutrienti	**Rischio**	Introito E < 10% al fabbisogno * e/o proteico < 0.75 g/Kg	Introito E > 10% al fabbisogno	Introito E < 10% al MB e/o proteico < 0.75 g/Kg in un sogg da tempo obeso	
Compos. corporea	**1a**	FFMI < 18.7 U, 14.9 D Kg/m^2 **,+ e/o FMI < 4.2 U, 6 D Kg/m^2 +	FM > 26.5 U, 38.4 D % + o FMI > 7 U, 10.6 D Kg/m^2 +	FFM reale /FFMideale < 0.9++ e FM > 26.5 U, 38.4 D % + o FMI > 7 U, 10.6 D Kg/m^2 +	**STATUS INFIAMMATORIO** (PCR > 10 mg/l)
	1b		W > U, D		
Funzione corporea	**2a**	⇓ compart prot viscerale e/o immunocomp e/o funzione motoria	complicanze dismetaboliche e/o ⇓ funzione motoria	∑ M difetto + eccesso	
	2b	Complic organiche (LD, sepsi, …)	Complic organiche (ACV, resp, …)	∑ M difetto + eccesso	


Presa in carico Malnutrizione
Contatto iniziale
Intervento nutrizionale
Educazione terapeutica e interventi psicoterapeutici
Riabilitazione motoria e ricondizionamento fisico
Valutazione
• stato di nutrizione/funzionale
• status psicologico
• quadro clinico generale/comorbosità