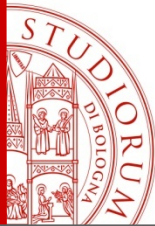


# Trattamento nutrizionale in geriatria

Giulio Marchesini

“Alma Mater” Università di Bologna  
SSD Malattie del Metabolismo  
e Dietetica Clinica



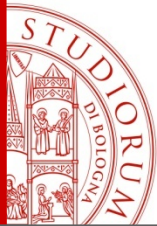


# Disclosures

## Giulio Marchesini

- **Advisory Board:** Sanofi, Roche
- **Honoraria:** Sanofi, Merck Sharp & Dohme, Novartis
- **Clinical Studies:** Boehringer Ingelheim, Sanofi, Lilly, Novo Nordisk, GILEAD, GENFIT, Jannsen

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# Sommario

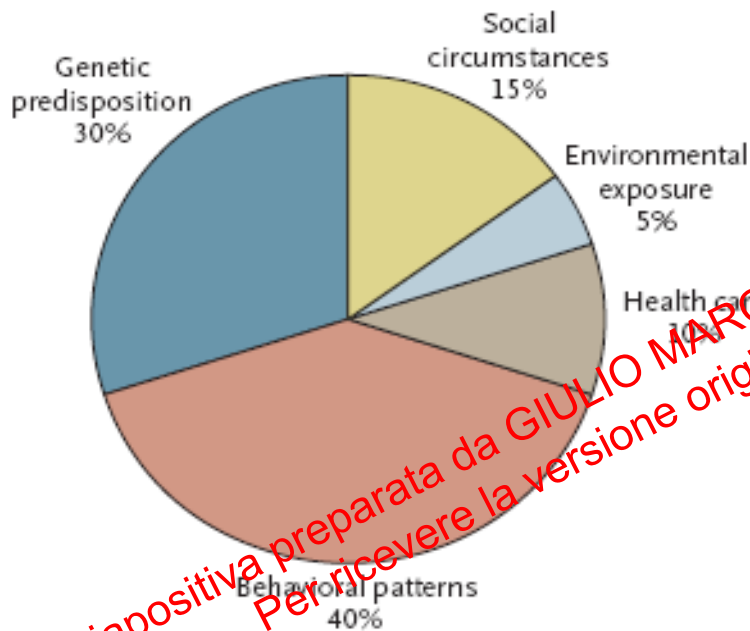
- Stile di vita e malattia nell'anziano
- Fattori nutrizionali e fragilità
- La dieta nell'anziano : apporto proteico e di altri componenti
- Dieta e funzione cognitiva
- Conclusioni

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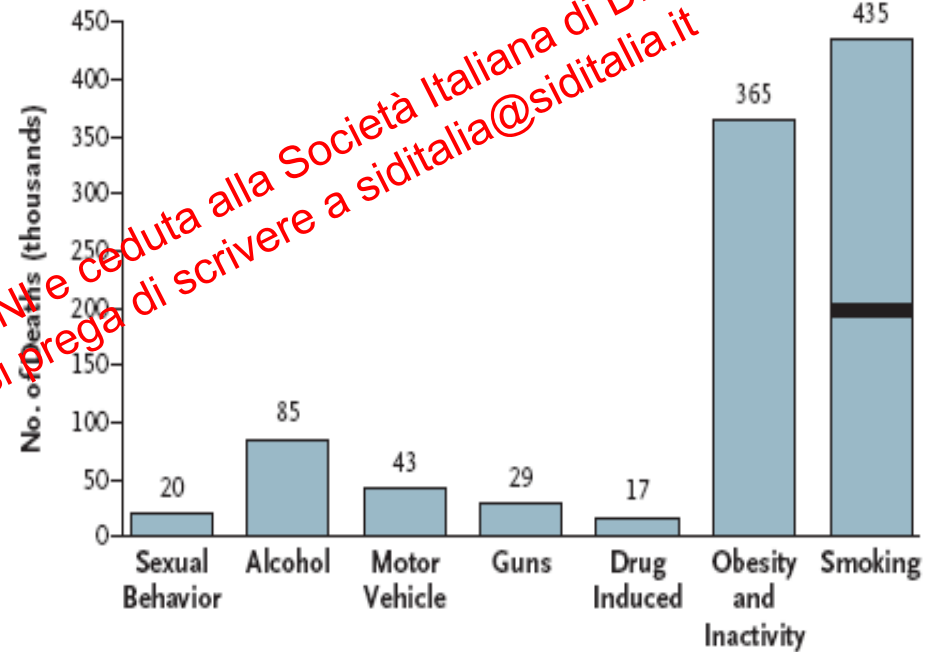
# We Can Do Better — Improving the Health of the American People

Proportional Contribution to Premature Death



**Figure 1. Determinants of Health and Their Contribution to Premature Death.**

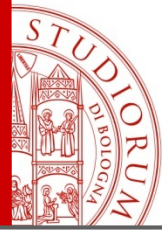
Adapted from McGinnis et al.<sup>10</sup>



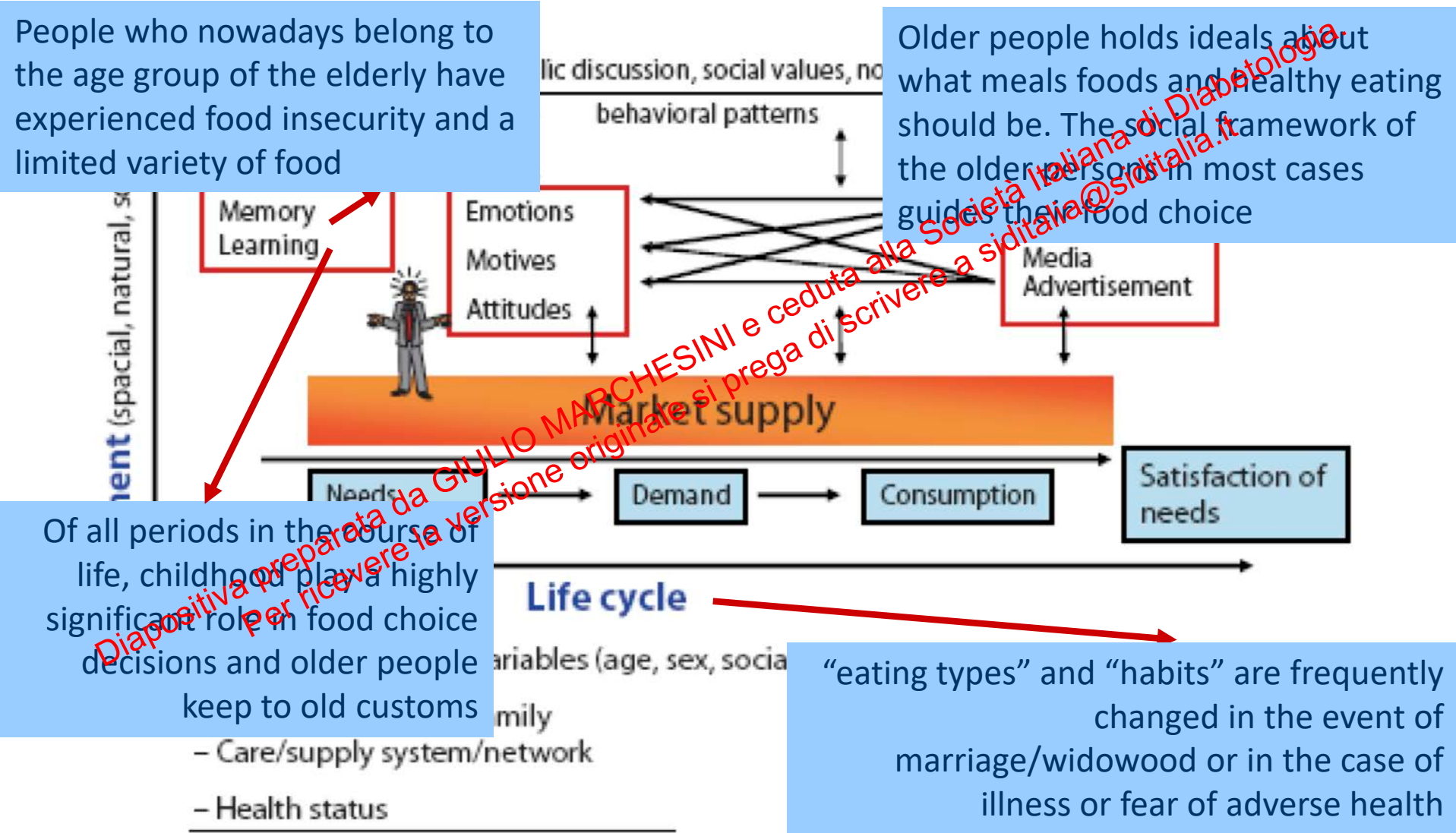
**Figure 2. Numbers of U.S. Deaths from Behavioral Causes, 2000.**

Among the deaths from smoking, the horizontal bar indicates the approximately 200,000 people who had mental illness or a problem with substance abuse. Adapted from Mokdad et al.<sup>12</sup>





# Determinants of nutrition and consumer behavior



# Ageing and eating



High sugar diet



High fat diet



Cigarette smoke

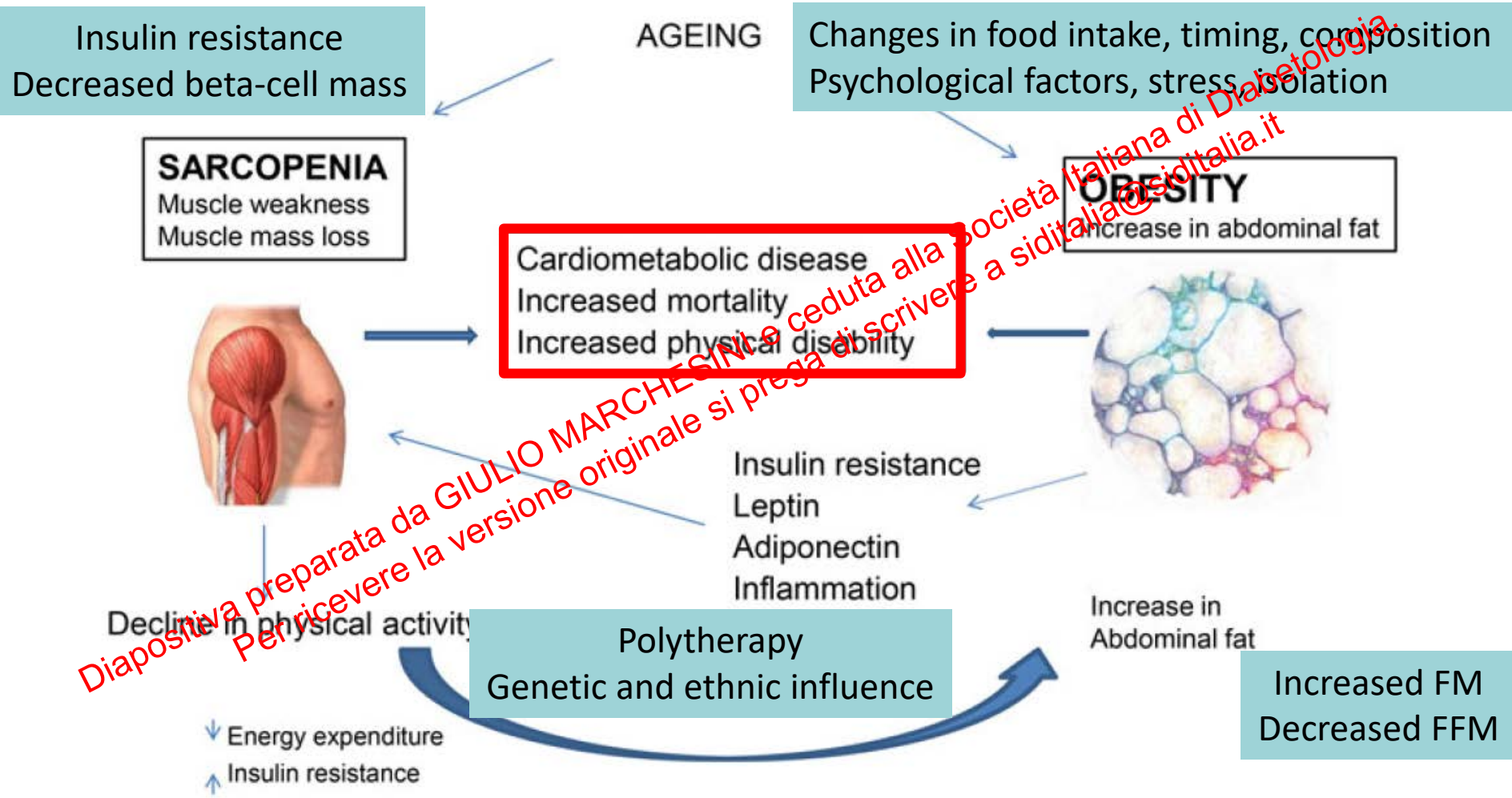
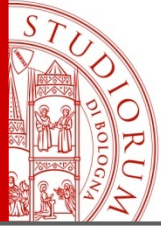


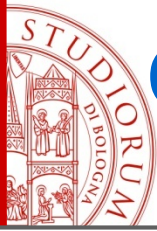
High alcohol consumption

Deficit in physical exercise

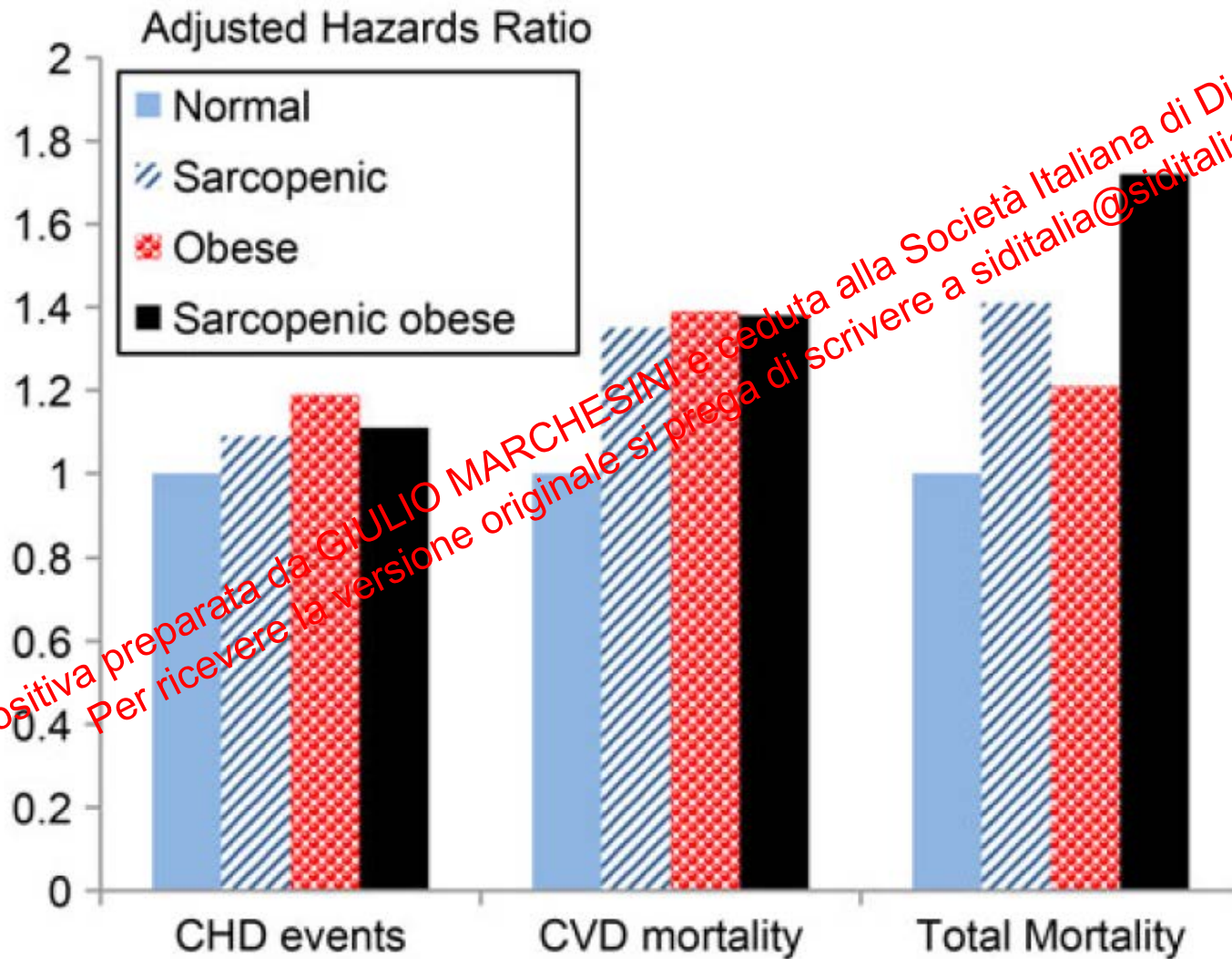
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# Factors affecting glucose metabolism with age



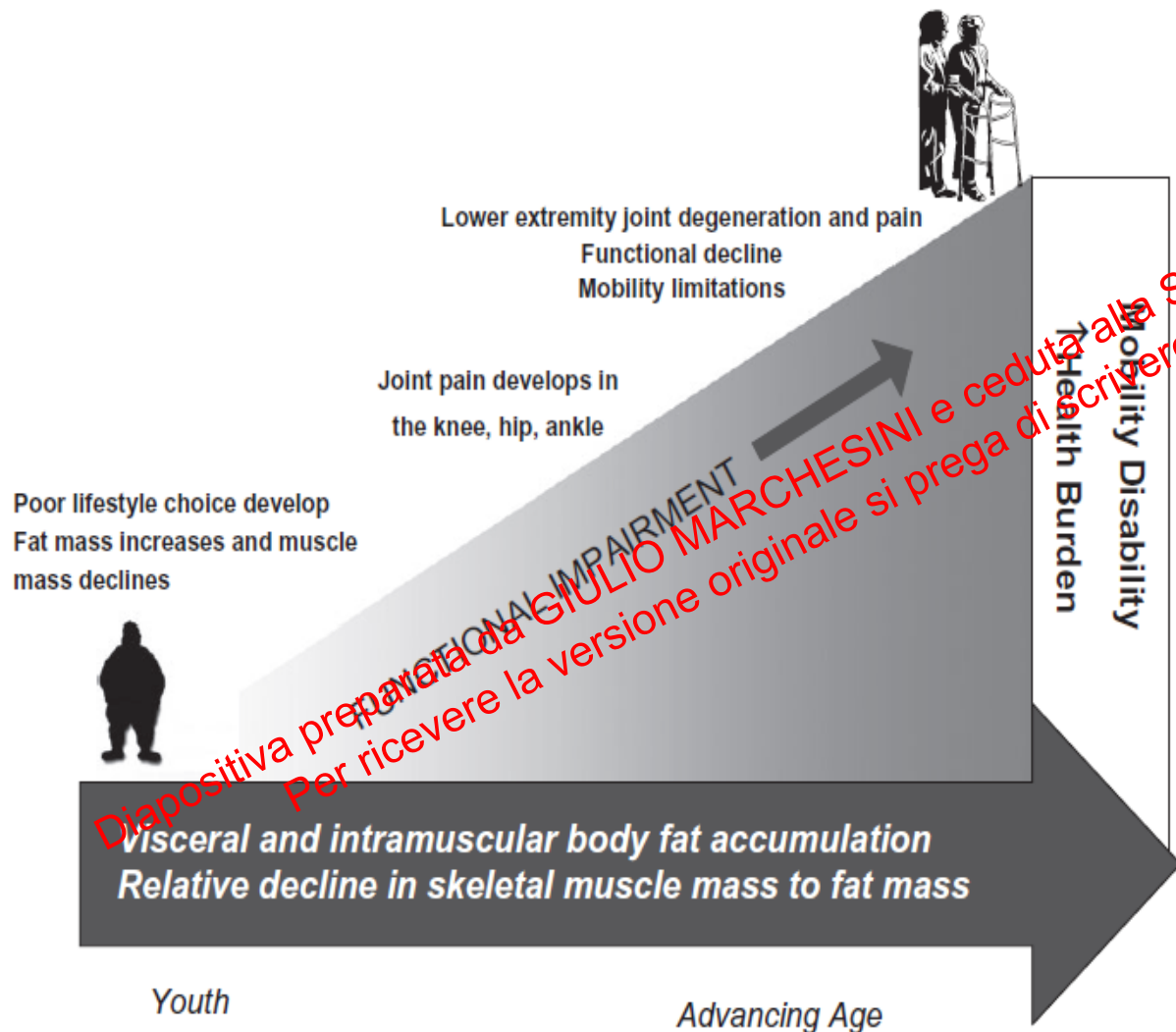


# Obesity- and sarcopenia-associated risks



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# Obesity and mobility disability in older adults



Obesity and sarcopenia can independently contribute to clinical and functional deterioration.

Their combined effects are multiplicative

Clinical and functional consequences are tightly linked in SO subjects.

Although most frequent in the elderly, SO is not only related to the geriatric age.

## POSITION STATEMENT

### A. Caratteristiche della Fragilità

Perdita di peso (inintenzionale)

Sarcopenia (perdita di massa muscolare)

Debolezza

Scarsa resistenza; stanchezza

Scarsa attività

### B. Parametri del Cardiovascular Health Study

>4.5 Kg perduti non intenzionalmente nell'anno precedente

Forza di prensione: più bassa del 20% (per sesso, body mass index)

"Stanchezza" (auto-riferita)

Kcal/settimana: più basse del 20%

M: <383 Kcal/settimana

F: <270 Kcal/settimana

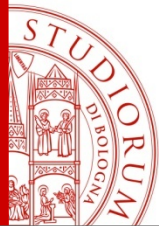
### C. Presenza di Fragilità

Fenotipo fragile: ≥3 criteri presenti

Dinapenia

BIA

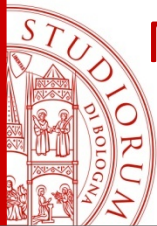
DXA: Massa appendicolare



# Recommended cut-points for weakness and low muscle mass for men and women

| Cut-point                                                       | Men       | Women     |
|-----------------------------------------------------------------|-----------|-----------|
| Grip strength adjusted for BMI ( $GS_{BMI}$ )(3)                | $< 1.00$  | $< 0.56$  |
| Appendicular lean body mass adjusted for BMI ( $ALM_{BMI}$ )(4) | $< 0.789$ | $< 0.512$ |
| Skeletal muscle index adjusted for weight ( $SMI_{weight}$ )(9) | $< 29.0$  | $< 22.9$  |

$GS_{BMI}$  and  $ALM_{BMI}$  cutpoints were identified by the NHI Sarcopenia Project.  $SMI_{weight}$  cutpoints have been defined by BIA as SMI values below 2 standard deviation of a normal healthy population, where  $SMI\% = \text{total appendicular skeletal muscle mass (kg)} / \text{body weight (kg)} \times 100$ .



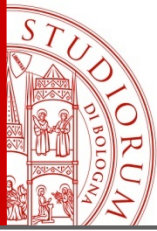
## Malattie in grado di alterare lo stato di nutrizione

- Interferenza con l'assunzione di alimenti (disabilità, deterioramento cognitivo, malattie psichiatriche, ...)
- Malattie gastroenteriche (disfagia, dispepsia, alterazione flora batterica, sindromi malassorbitive)
- Interferenza con la funzione metabolica (diabete mellito, ...)
- Malattie caratterizzate da ipermetabolismo e/o ipercatabolismo (neoplasie, infezioni, traumi, ...)
- Perdite patologiche (ins renale cronica, BCOP, enteropatie, ..)

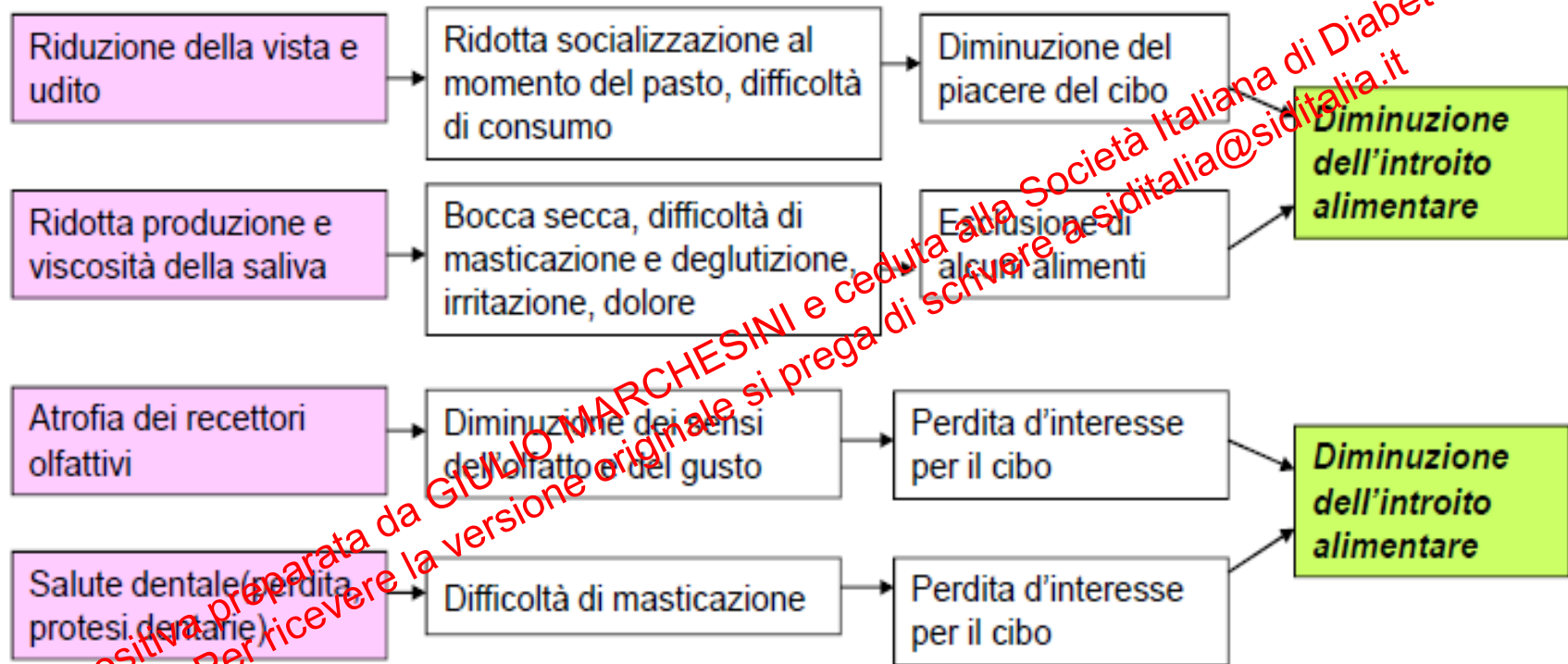
## Malattie in grado di alterare le funzioni sensoriali

- Metabolico-nutrizionali (neoplasie, insufficienza renale cronica, carenze di Zn, vit B12, niacina, ...)
- SNC (M. Alzheimer, epilessia, sclerosi multipla, M. Parkinson, ...)
- Endocrine (diabete mellito, ipotiroidismo, ...)
- Respiratorie (rinite allergica, asma bronchiale, sinusiti, ...)
- Infezioni Virali (epatite virale, influenza, ...)

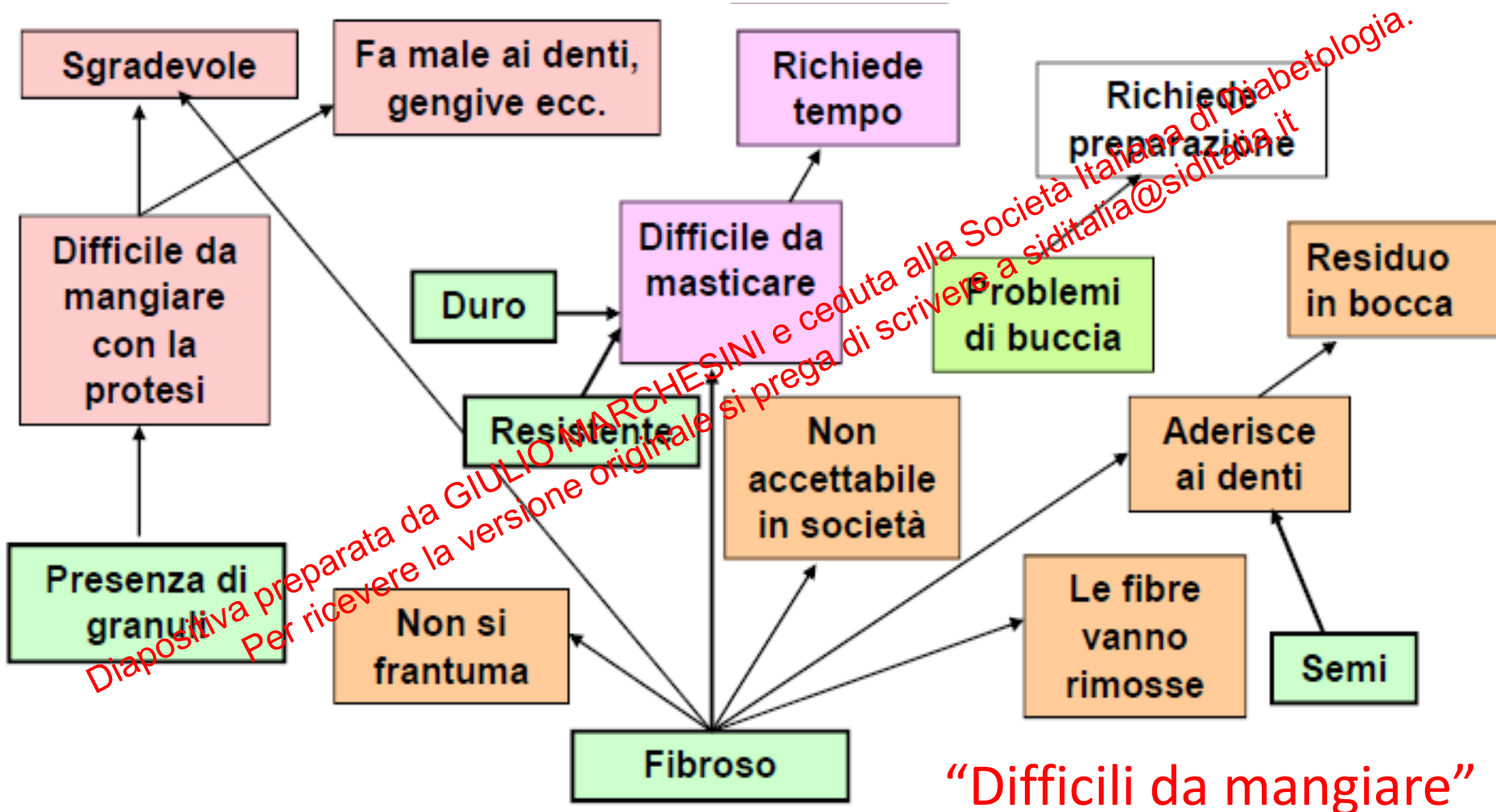
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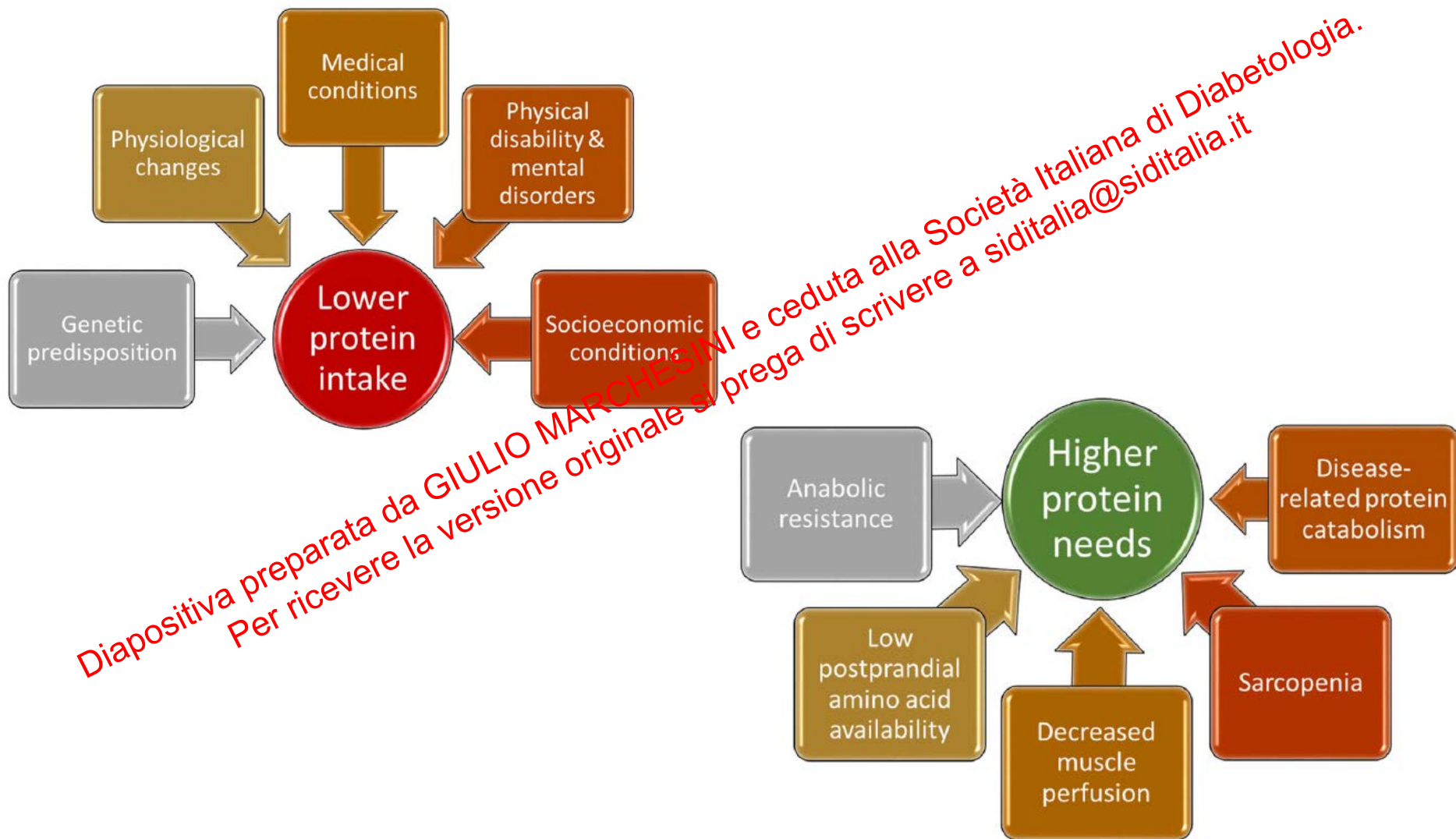
# Cambiamenti fisiologici ed impatto sui consumi alimentari negli anziani <sup>to</sup>



# Mappa del valore gerarchico percepito da anziani per vegetali e frutta <sup>to</sup>

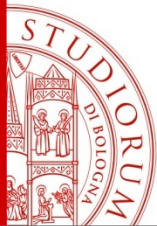


# Fabbisogno proteico



## Assessment Tools & Procedures

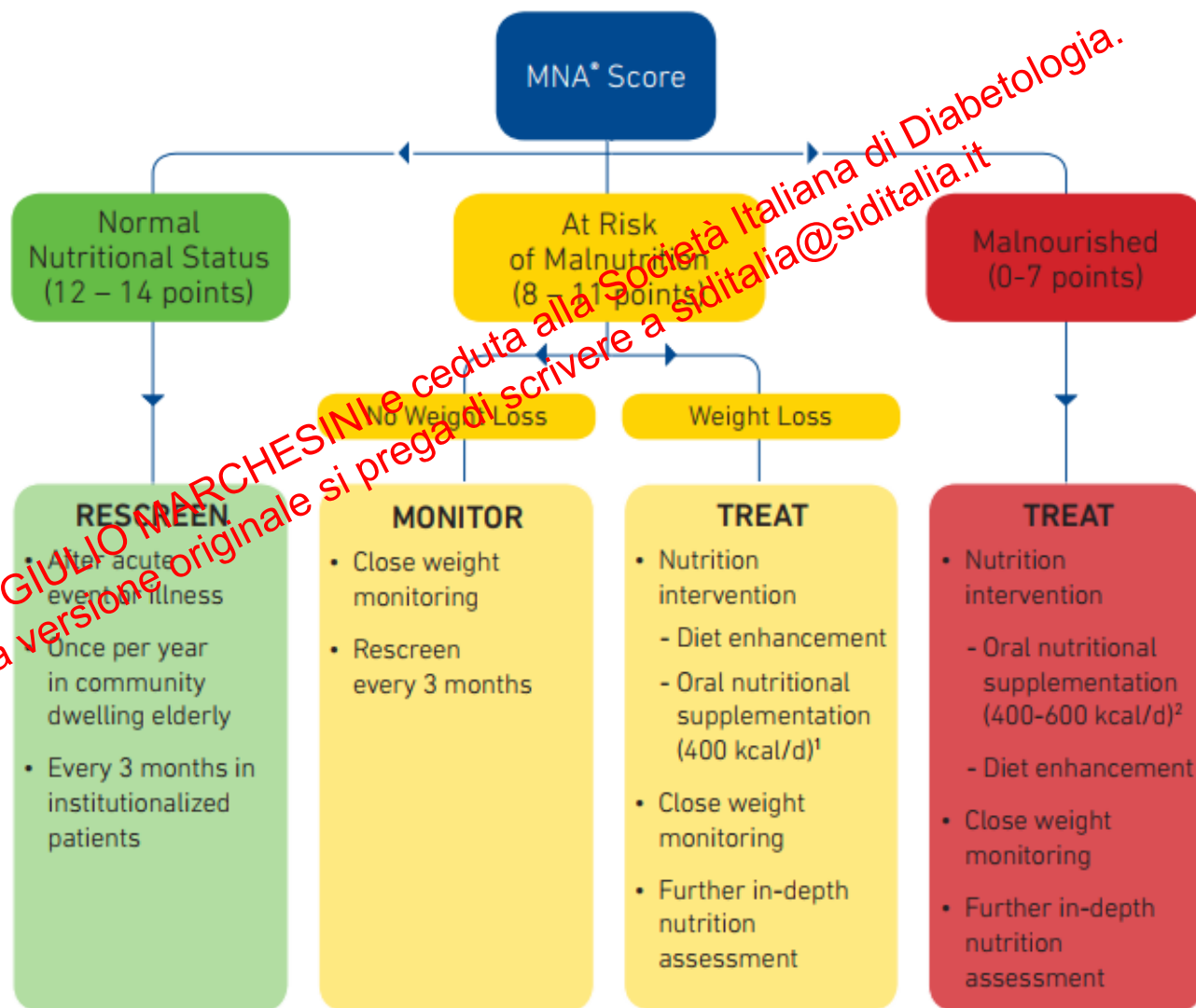
| Assessment domain           | Examples of assessment tools and procedures                                           | Comments                                                                                                                                                        |
|-----------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gait, balance, and mobility | IDOP 3-steps package <sup>21</sup>                                                    | Easily adapted to guideline resource; contains information on assessing gait speed and balance ability                                                          |
| ADL and IADL                | Barthel ADL and IADL                                                                  | Universally used; minimal training required                                                                                                                     |
| Cognition                   | MiniCog or Montreal Cognitive Assessment Tool                                         | Easy to use; good evidence as screening tools for cognitive impairment                                                                                          |
| Mood level                  | Geriatric Depression Score                                                            | Widespread use; little training required                                                                                                                        |
| Frailty measures            | Clinical Frailty Scale or CHS 9-point Scale                                           | Can be used as a quick assessment for features of frailty                                                                                                       |
| Hypoglycaemia risk          | A comprehensive history to identify risk factors<br>(See Chapter 20-3: Hypoglycaemia) | Requires a positive commitment to consider risk factors by the clinician                                                                                        |
| Self-care abilities         | SCI-R                                                                                 | A 13-15 item self-completed questionnaire suitable for type 1 and type 2 diabetes                                                                               |
| Nutritional assessment      | MNA-SF tool or MUST Tool                                                              | Well validated tools in widespread use; minimal training required                                                                                               |
| Pain                        | Pain thermometer <sup>22</sup><br>M-RVBPI <sup>23</sup>                               | For people with diabetes who have moderate to severe cognitive/communication disorder; easy to use but full validity has not yet been established <sup>22</sup> |

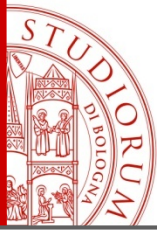


# MNA – Mini Nutritional Assessment

## Recommendation for intervention

| Screening                                                                                          |                                                |
|----------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>A</b> Presenta una perdita dell' appetito? Ha ma problemi digestivi, difficoltà di masticazione | 0 = Grave riduzione dell'assunzione di cibo    |
|                                                                                                    | 1 = Moderata riduzione dell'assunzione di cibo |
|                                                                                                    | 2 = Nessuna riduzione dell'assunzione di cibo  |
|                                                                                                    |                                                |
| <b>B</b> Perdita di peso recente (<3 mesi)                                                         | 0 = perdita di peso > 3 kg                     |
|                                                                                                    | 1 = non sa                                     |
|                                                                                                    | 2 = perdita di peso tra 1 e 3 kg               |
|                                                                                                    | 3 = nessuna perdita di peso                    |
| <b>C</b> Motricità                                                                                 | 0 = dal letto alla poltrona                    |
|                                                                                                    | 1 = autonomo a domicilio                       |
|                                                                                                    | 2 = esce di casa                               |
| <b>D</b> Nell' arco degli ultimi 3 mesi: malattie acute                                            | 0 = sì      2 = no                             |
|                                                                                                    |                                                |
| <b>E</b> Problemi neuropsicologici                                                                 | 0 = demenza o depressione grave                |
|                                                                                                    | 1 = demenza moderata                           |
|                                                                                                    | 2 = nessun problema psicologico                |
|                                                                                                    |                                                |
| <b>F1</b> Indice di massa corporea (IMC) = peso in kg / altezza in m <sup>2</sup>                  | 0 = IMC <19                                    |
|                                                                                                    | 1 = 19 ≤ IMC <21                               |
|                                                                                                    | 2 = 21 ≤ IMC <23                               |
|                                                                                                    | 3 = IMC ≥ 23                                   |
|                                                                                                    |                                                |
| SE L' IMC NON È DISPONIBILE, SE NON RISPONDERE ALLA DOMANDA                                        |                                                |
| <b>F2</b> Circonferenza del polpaccio (CP in cm)                                                   | 0 = CP inferiore a 31                          |
|                                                                                                    | 3 = CP 31 o superiore                          |
|                                                                                                    |                                                |





# 'MUST' Calculator (Malnutrition Universal Screening Tool)

## 'MUST' Calculator

[www.bapen.org.uk/screening-and-must/must-calculator](http://www.bapen.org.uk/screening-and-must/must-calculator)

Object

Completion

Based on the information you entered, body mass index (BMI) is 22.5 kg/m<sup>2</sup> and weight loss % is 14.5%. This suggests a **HIGH** risk of being malnourished.

### High risk: Treat\*

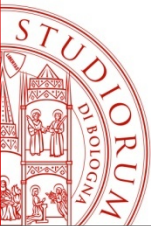
- Refer to dietitian, Nutritional Support Team or implement local policy
- Set goals, improve and increase overall nutritional intake
- Monitor and review care plan
  - Hospital – weekly Care
  - Home – monthly
  - Community – monthly

\* Unless detrimental or no benefit is expected from nutritional support e.g. imminent death.

### All risk categories:

- Treat underlying condition and provide help and advice on food choices, eating and drinking when necessary.
- Record malnutrition risk category.
- Record need for special diets and follow local policy.

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# Fabbisogno energetico medio in età geriatrica

| LARN PER L'ENERGIA |               |            |                                                 |      |      |      |
|--------------------|---------------|------------|-------------------------------------------------|------|------|------|
| Statura            | Peso corporeo | MB         | FABBISOGNO ENERGETICO (kcal/die) PER UN LAF DI: |      |      |      |
| (m)                | (kg)          | (kcal/die) | 1,40                                            | 1,50 | 1,60 | 1,75 |
| Maschi 60-74 anni  |               |            |                                                 |      |      |      |
| 1,50               | 50,6          | 1300       | 1820                                            | 1950 | 2080 | 2280 |
| 1,60               | 57,6          | 1380       | 1940                                            | 2080 | 2220 | 2420 |
| 1,70               | 65,0          | 1470       | 2060                                            | 2210 | 2360 | 2580 |
| 1,80               | 72,9          | 1570       | 2190                                            | 2350 | 2510 | 2740 |
| Maschi ≥75 anni    |               |            |                                                 |      |      |      |
| 1,50               | 50,6          | 1240       | 1740                                            | 1870 | 1990 | 2180 |
| 1,60               | 57,6          | 1300       | 1820                                            | 1950 | 2080 | 2280 |
| 1,70               | 65,0          | 1360       | 1910                                            | 2040 | 2160 | 2390 |
| 1,80               | 72,9          | 1430       | 2000                                            | 2150 | 2290 | 2500 |
| Femmine 60-74 anni |               |            |                                                 |      |      |      |
| 1,50               | 50,6          | 1150       | 1610                                            | 1730 | 1850 | 2020 |
| 1,60               | 57,6          | 1230       | 1700                                            | 1830 | 1950 | 2130 |
| 1,70               | 65,0          | 1290       | 1800                                            | 1930 | 2060 | 2250 |
| 1,80               | 72,9          | 1360       | 1900                                            | 2040 | 2170 | 2380 |
| Femmine ≥75 anni   |               |            |                                                 |      |      |      |
| 1,50               | 50,6          | 1120       | 1570                                            | 1680 | 1790 | 1960 |
| 1,60               | 57,6          | 1190       | 1660                                            | 1780 | 1900 | 2080 |
| 1,70               | 65,0          | 1260       | 1760                                            | 1890 | 2020 | 2210 |
| 1,80               | 72,9          | 1340       | 1870                                            | 2010 | 2140 | 2340 |

Formule per il calcolo del fabbisogno energetico

Uomini

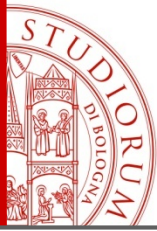
- 60-74 anni:  $0,1,9 \times \text{Peso} + 700$
- ≥75 anni:  $8,4 \times \text{Peso} + 819$

Donne

- 60-74 anni:  $9,2 \times \text{Peso} + 688$
- ≥75 anni:  $9,8 \times \text{Peso} + 624$

Il fabbisogno energetico a riposo si riduce con l'età di circa:

- 100 kcal/decade a partire dalla quinta decade di vita

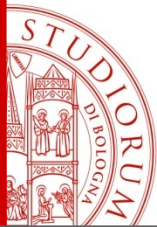


# Body Composition, Changing Physiological Functions and Nutrient Requirements of the Elderly

Getting Older, Facts about a Biological Process

- Nutrition offers the means to improve health and well-being when chosen carefully
- **Food-based dietary guidelines** for elderly are basically the same as for young adults, propagating a balanced varied nutrition that is rich in:
  - complex carbohydrate sources such as whole-grain cereals
  - vegetables and fruits
  - fish providing vitamin D and essential fatty acids
  - adequate water supply in view of their potentially impaired thirst perception and reduced renal functions

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# Raccomandazioni per l'apporto di proteine e esercizio fisico (adulti > 65 anni)

## Recommendations

For healthy older adults, we recommend a diet that includes at least 1.0 to 1.2 g protein/kg body weight/day.

For certain older adults who have acute or chronic illnesses, 1.2 to 1.5 g protein/kg body weight is indicated, with even higher intake for individuals with severe illness or injury.

Consider  
renal  
function!

We recommend daily physical activity for all older adults, as long as activity is possible. We also suggest resistance training, when possible, as part of an overall fitness regimen.



## GENERAL

- All older people should have a nutritional and biochemical assessment at diagnosis, on admission to an aged care home, and as part of the annual review.
- The nutrition plan should be individualized and consider the person's food preferences, eating routines, religion and culture, and physical and cognitive health status.
- The meal plan should include a variety of foods to ensure essential vitamins, minerals, protein, and fibre are consumed in adequate amounts.
- Medicine administration times must coincide with meal times if the individual is on insulin or sulfonylureas to reduce the risk of hypoglycaemia.
- People with swallowing difficulties should be identified and referred to a speech therapist if available.
- All older people with diabetes should be considered for an annual seasonal influenza vaccination.

La **nutrizione artificiale** (NA) è indicata in geriatria:

- quando il calo ponderale sia stato  $>10\%$  in 6 mesi, con apporto alimentare insufficiente



INTERNATIONAL DIABETES FEDERATION

# MANAGING OLDER PEOPLE WITH TYPE 2 DIABETES

GLOBAL GUIDELINE

# RECOMMENDATIONS: NUTRITION

## RATIONALE AND EVIDENCE BASE: NUTRITION

Nutrition is an important part of diabetes care for all age groups. However, there are important additional concerns for older adults with diabetes<sup>46</sup>. Malnutrition is common in older people, especially in aged care homes<sup>47</sup>. Malnutrition is associated with longer length of stay in hospital and increased mortality<sup>48</sup>, is a strong predictor of readmission and is associated with pressure ulcers, delirium, and depression<sup>49</sup>.

Concomitant diseases that increase the risk of malnutrition in older people with diabetes include:

- Gastroparesis, which is present in up to 25-55% of people with type 1 and 30% with type 2 diabetes<sup>50</sup> and may affect glucose stability and orally administered medicines absorption and may cause significant discomfort
- Parkinson's disease
- Psychiatric disorders and depression.
- Chronic obstructive pulmonary disease.
- Renal failure
- Neurological dysfunction.
- Dental disease.

IDF Global Guideline for **Managing Older People with Type 2 Diabetes**



## POTENTIAL INDICATOR

| Indicator                                                                                                                     | Denominator                                                                                                           | Calculation of indicator                                                                                                                                                | Data to be collected for calculation of indicator               |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Percentage of older people with type 2 diabetes who have had a comprehensive annual nutritional assessment                    | Total number of older people with type 2 diabetes who are eligible for an annual comprehensive nutritional assessment | Number of older people with type 2 diabetes having an annual comprehensive nutritional as a percentage of the total number of people eligible for such an assessment    | Documentation and date of the assessment                        |
| Percentage of older people with type 2 diabetes who have an exercise/dietary plan that is appropriate for their health status | Total number of older people with type 2 diabetes who are eligible to have an exercise/dietary plan                   | Number of older people with type 2 diabetes who have an exercise/dietary plan appropriate to their health status as a percentage of the total number of eligible people | Documentation and date of the most recent exercise/dietary plan |

## POSITION STATEMENT

### *B. Pazienti con Demenza*

- Il personale sanitario e i caregivers devono essere in grado di identificare difficoltà reali o potenziali di nutrirsi in questi pazienti.

*(Livello della prova VI, forza della raccomandazione A)*

- I caregivers dovrebbero fornire l'assistenza necessaria durante i pasti, ed assicurarsi che il pasto venga consumato.

*(Livello della prova VI, forza della raccomandazione A)*

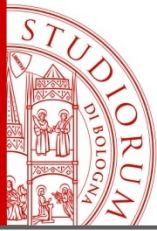
### *C. Pazienti terminali*

- La nutrizione parenterale o enterale con sondino può essere indicata per fornire il necessario apporto nutrizionale.

*(Livello della prova VI, forza della raccomandazione B)*

- I pazienti, la famiglia e i caregivers dovrebbero essere coinvolti nelle decisioni riguardanti il supporto nutrizionale nel fine vita.

*(Livello della prova VI, forza della raccomandazione A)*

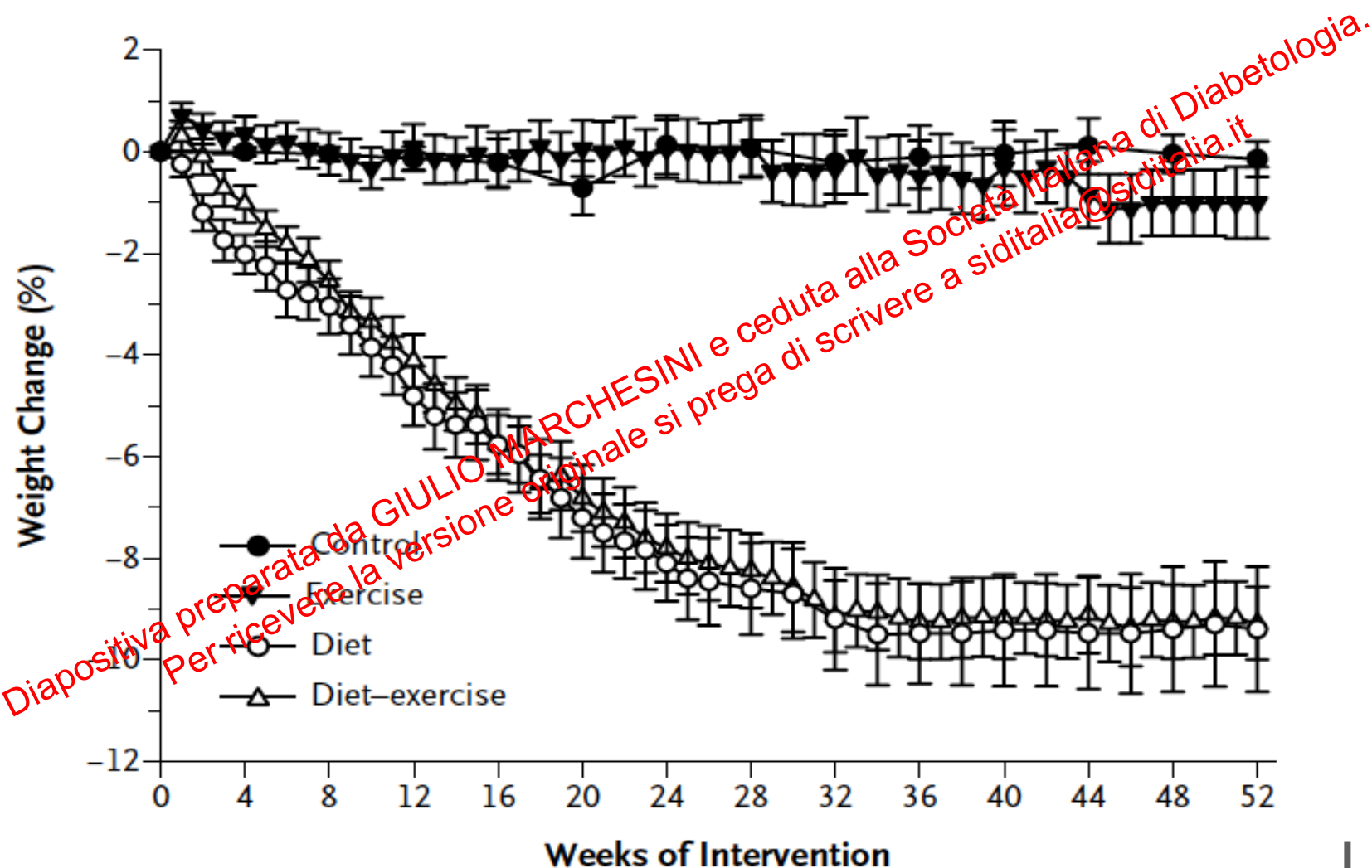


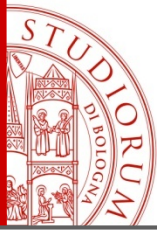
# Gender and food in later life: shifting roles and relationships

- Older women defer personal food preferences to men and regard preparing food on behalf of others as their central incentive for preparing food and meals. Therefore, following widowhood, motivation to prepare main meals is reduced.
- For men, changes in social roles and relationships present new domestic challenges:
  - for those who have always lived alone, food preparation is a continued role integrated into their sense of identity, whereas for 'newly alone' men, food preparation represents a new task which must be incorporated into their identity.
  - some men build on intrinsically masculine notions of expertise, proficiency and economy to present their food preparation as a proficient employment rather than a domestic chore. For other men, getting someone else to prepare food indicated maintenance of traditional domestic food roles.

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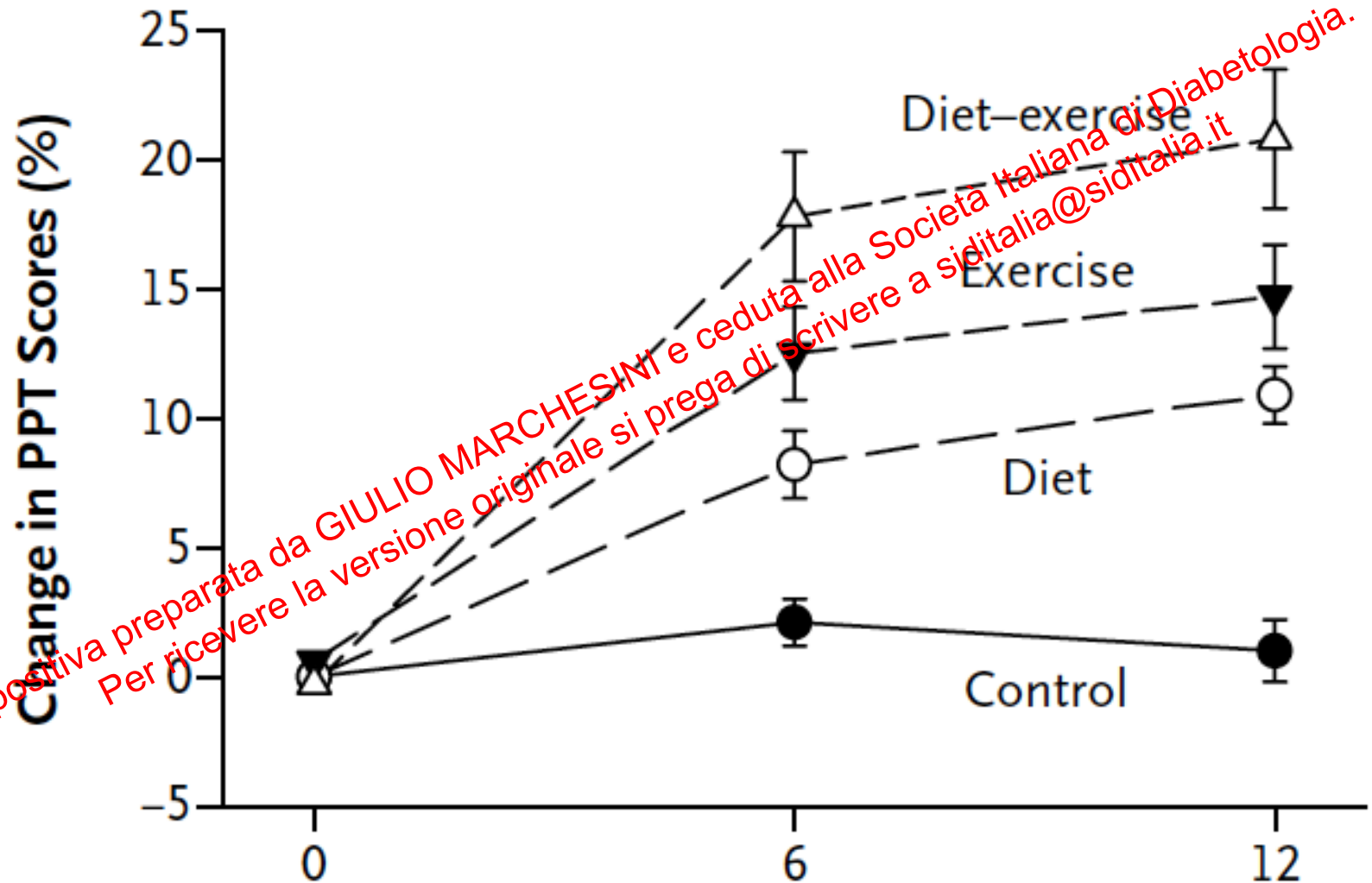
# Diet, exercise or both in older adults





# Diet, exercise or both in older adults

## Effects on Physical Performance Test (PPT) score

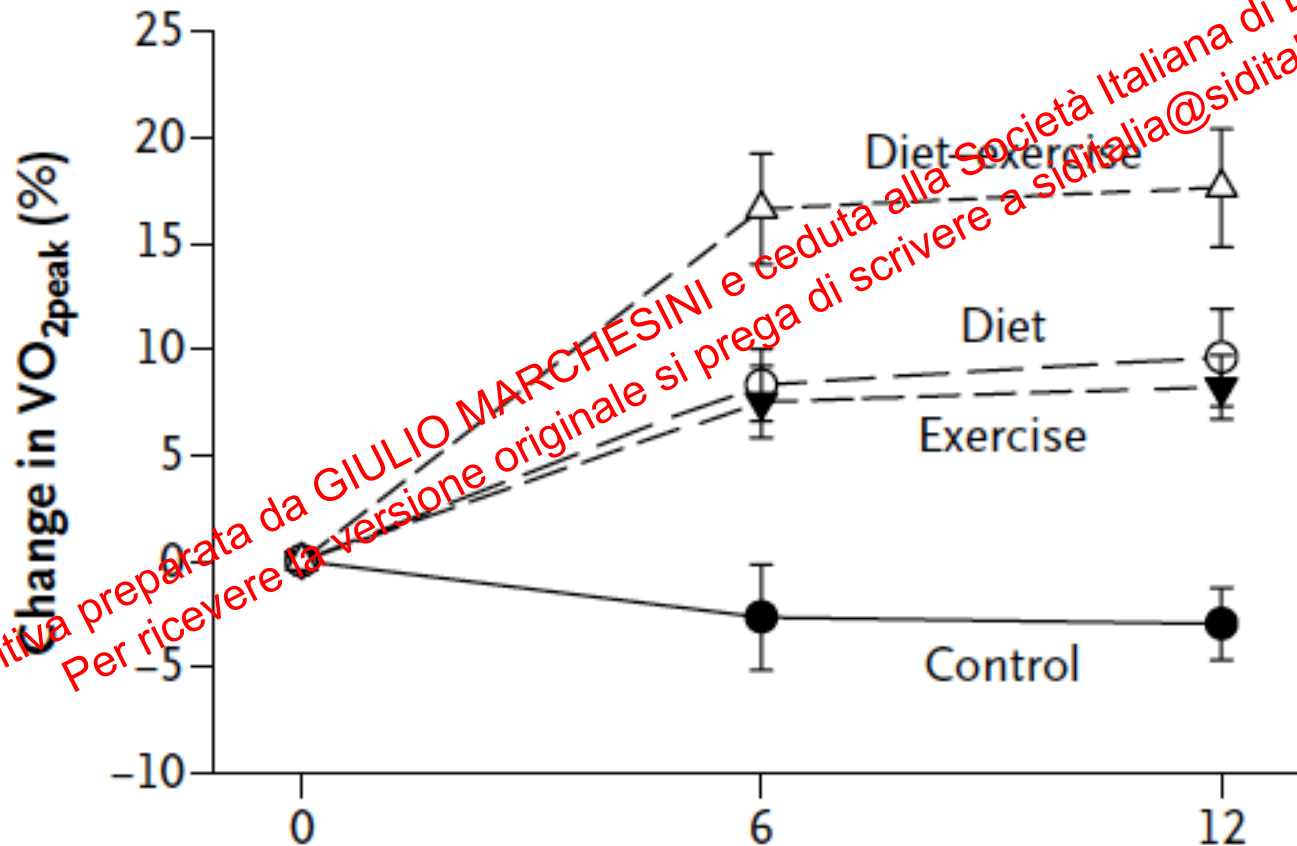


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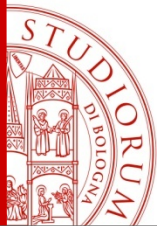
# Diet, exercise or both in older adults

## Effects on physical fitness

**B**

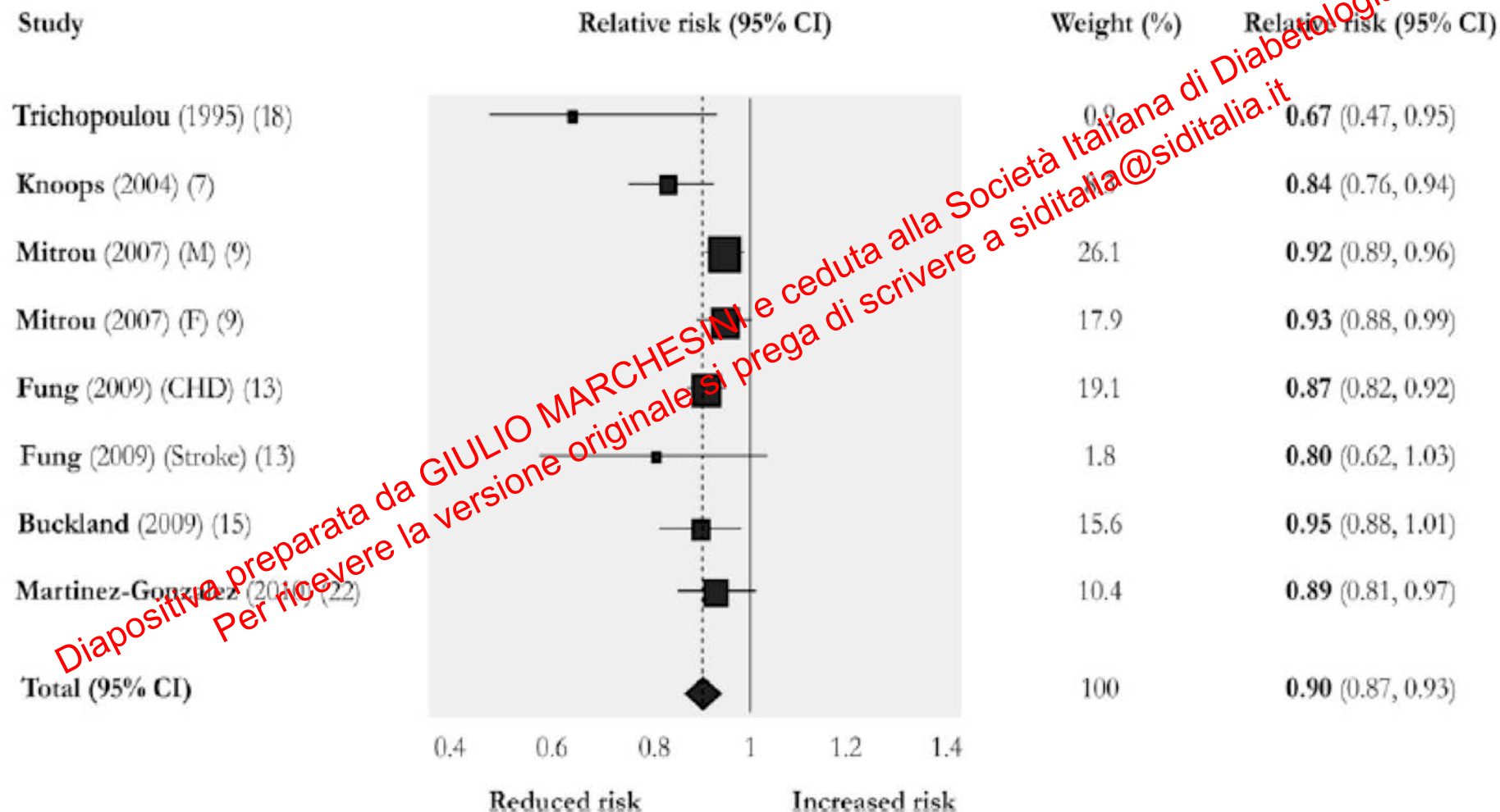


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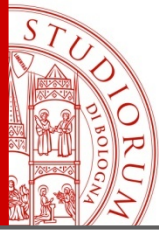


# Mediterranean diet – Metanalysis

## Risk of death from or incidence of CVD

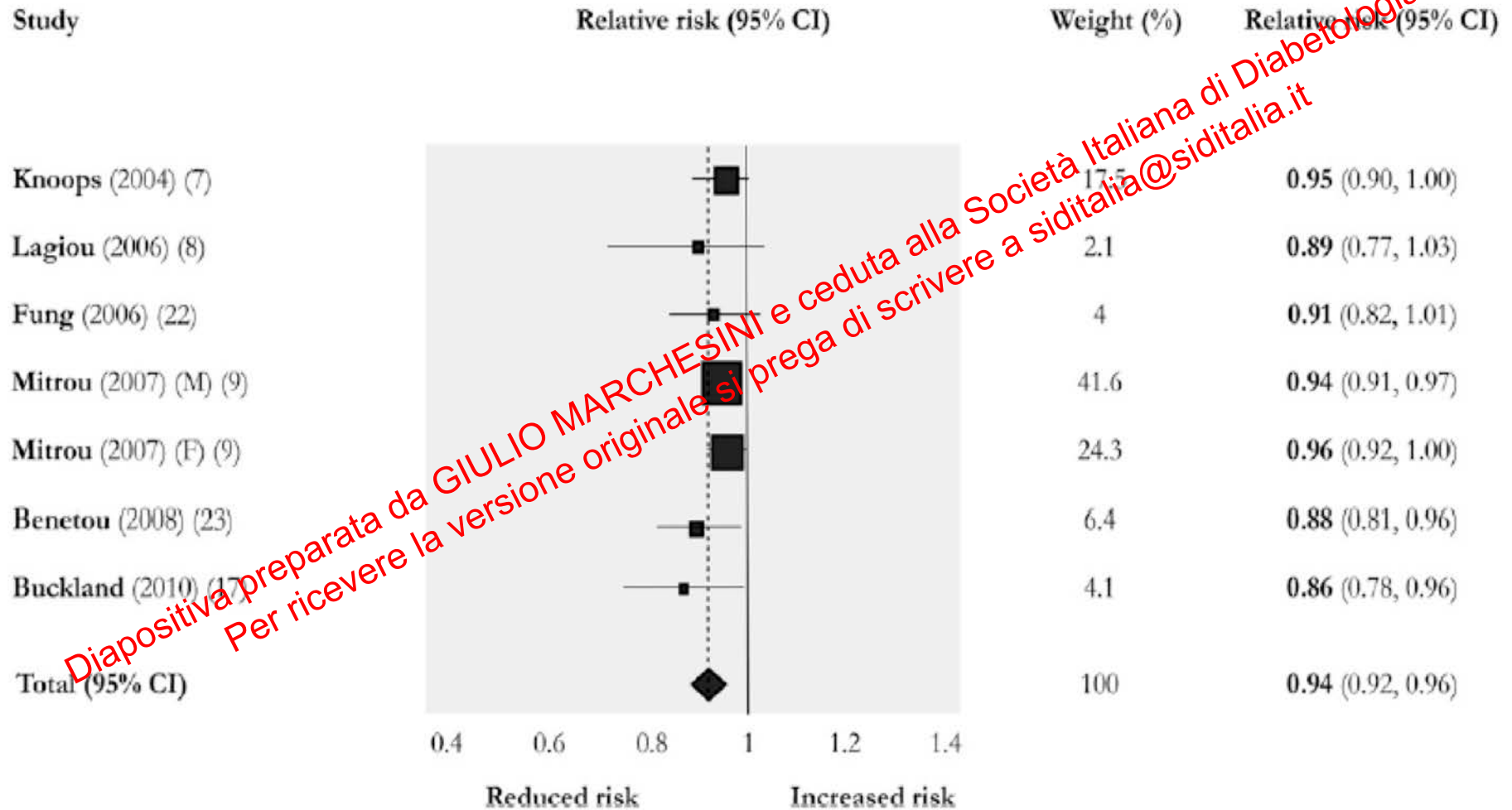


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# Mediterranean diet – Metanalysis

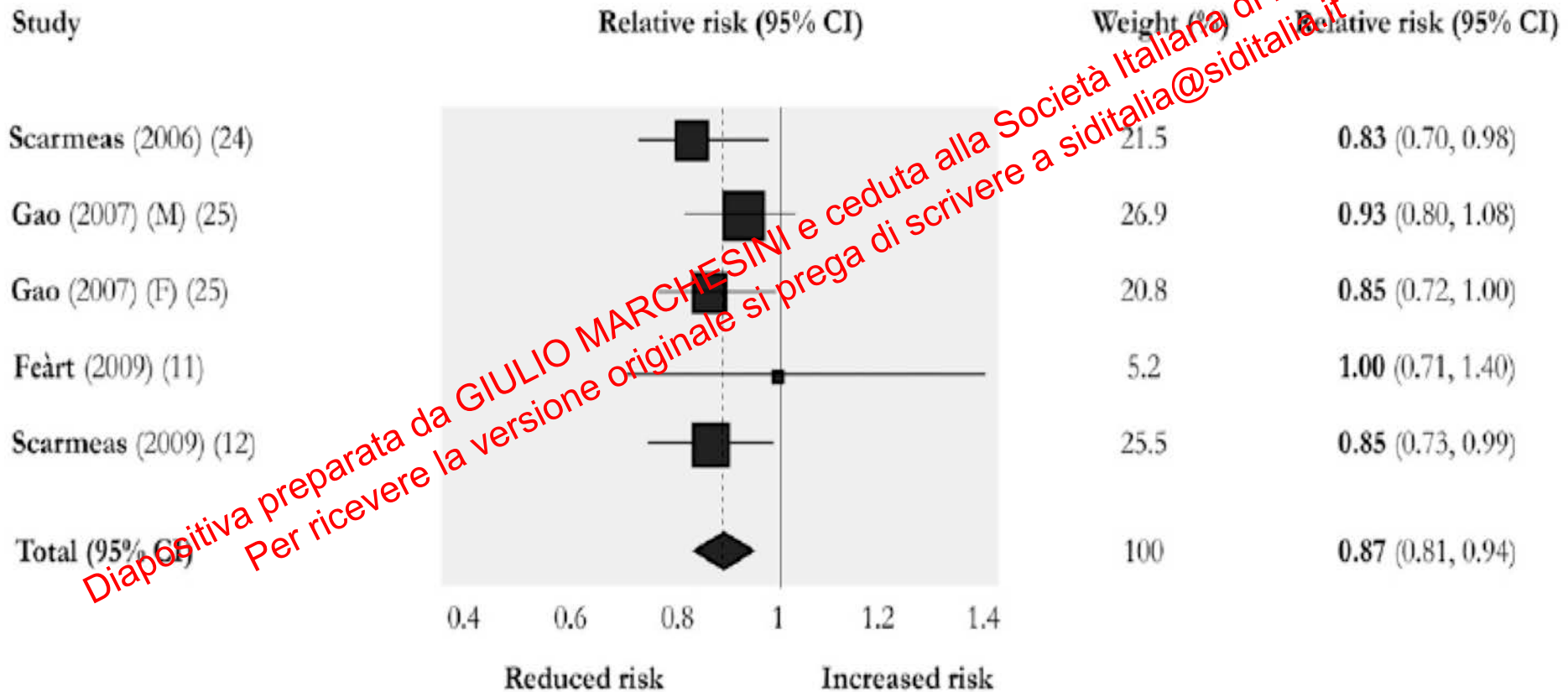
## Risk of death from or incidence of neoplasia



# Mediterranean diet – Metanalysis

Risk of death from or incidence of neurodegenerative disease

## UPDATED META-ANALYSIS ON MEDITERRANEAN DIET

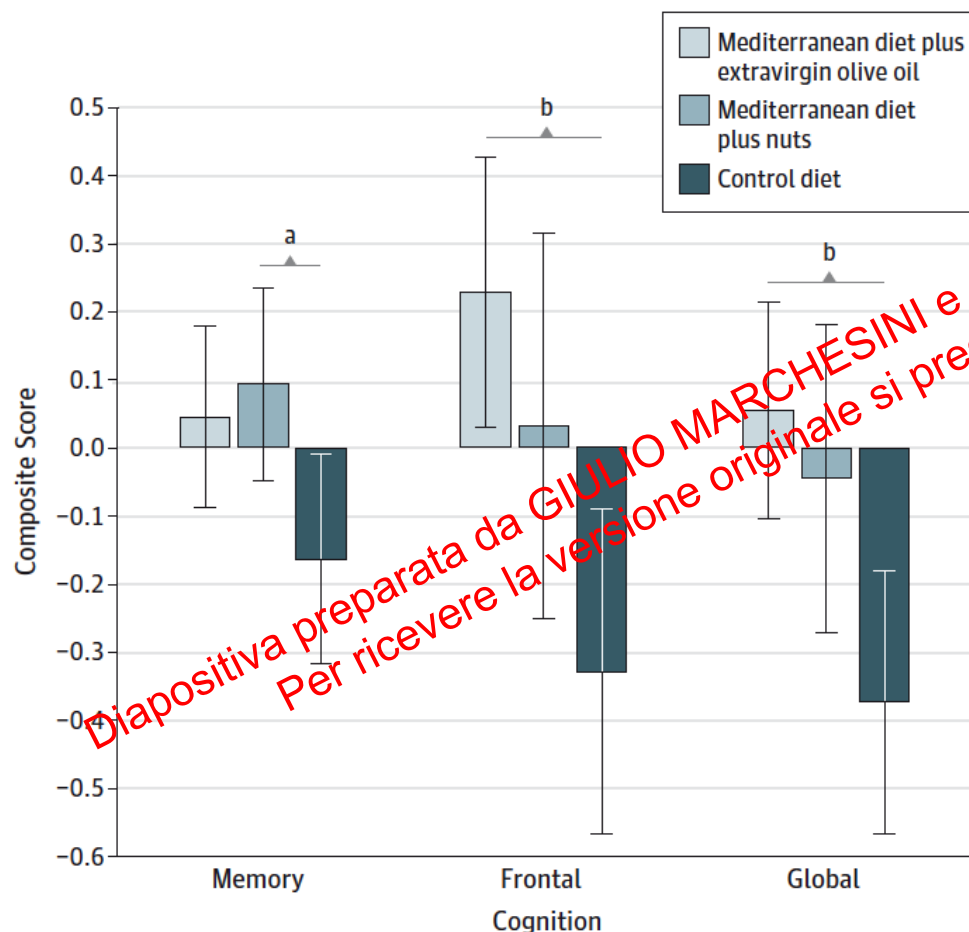


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# Mediterranean Diet and Age-Related Cognitive Decline

## A Randomized Clinical Trial

Figure 2. Changes in Cognitive Function Measured With Composites by Intervention Group

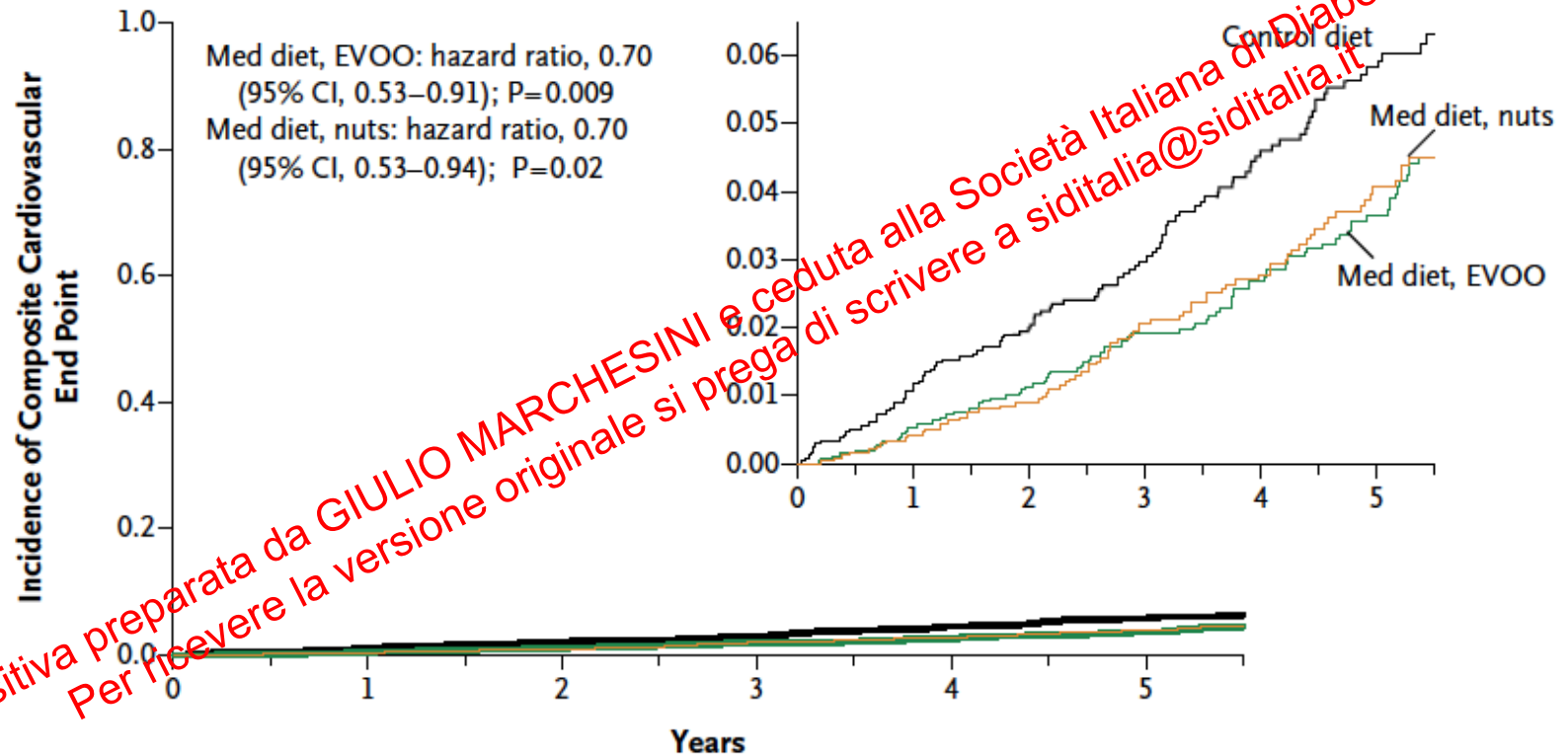


JAMA Intern Med. doi:10.1001/jamainternmed.2015.1668  
Published online May 11, 2015.

- RESULTS Follow-up cognitive tests were available in 334 participants after intervention (median; 4.1 years). Changes from baseline of the global cognition composite were 0.05 (−0.11 to 0.21;  $P = .005$  vs controls) for the Mediterranean diet plus olive oil, −0.05 (−0.27 to 0.18) for the Mediterranean diet plus nuts, and −0.38 (−0.57 to −0.18) for the control diet. All cognitive composites significantly ( $P < .05$ ) decreased from baseline in controls.

# Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

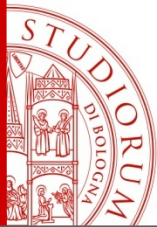
## A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)



### No. at Risk

|                |      |      |      |      |      |      |
|----------------|------|------|------|------|------|------|
| Control diet   | 2450 | 2268 | 2020 | 1583 | 1268 | 946  |
| Med diet, EVOO | 2543 | 2486 | 2320 | 1987 | 1687 | 1310 |
| Med diet, nuts | 2454 | 2343 | 2093 | 1657 | 1389 | 1031 |

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# Lo Score della Dieta Mediterranea

| Quanto spesso consumi                                                         | mai       | 1 porz   | 2 porz   | 3 porz   | 4 porz   | >5 porz            | Punti |
|-------------------------------------------------------------------------------|-----------|----------|----------|----------|----------|--------------------|-------|
| Cereali integrali (pasta, riso, pane,...)                                     | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Patate                                                                        | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Frutta                                                                        | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Verdure                                                                       | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Legumi                                                                        | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Pesce                                                                         | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Carne rossa e derivati (salumi)                                               | 5         | 4        | 3        | 2        | 1        | 0                  |       |
| Pollame                                                                       | 5         | 4        | 3        | 2        | 1        | 0                  |       |
| Latticini 'interi': formaggio, yogurt, latte                                  | 5         | 4        | 3        | 2        | 1        | 0                  |       |
|                                                                               | mai       | Di rado  | <1       | 1-3      | 3-5      | >5                 |       |
| Olio d'oliva per cucinare (a settimana)                                       | 0         | 1        | 2        | 3        | 4        | 5                  |       |
| Alcolici (bicchiere vino o birra,<br>bicchierino superalcolici) (giornaliero) | ≤2 bicch. | 3 bicch. | 4 bicch. | 5 bicch. | 6 bicch. | >6 bicch.<br>o mai |       |
|                                                                               | 5         | 4        | 3        | 2        | 1        | 0                  |       |
| Totale                                                                        |           |          |          |          |          |                    |       |



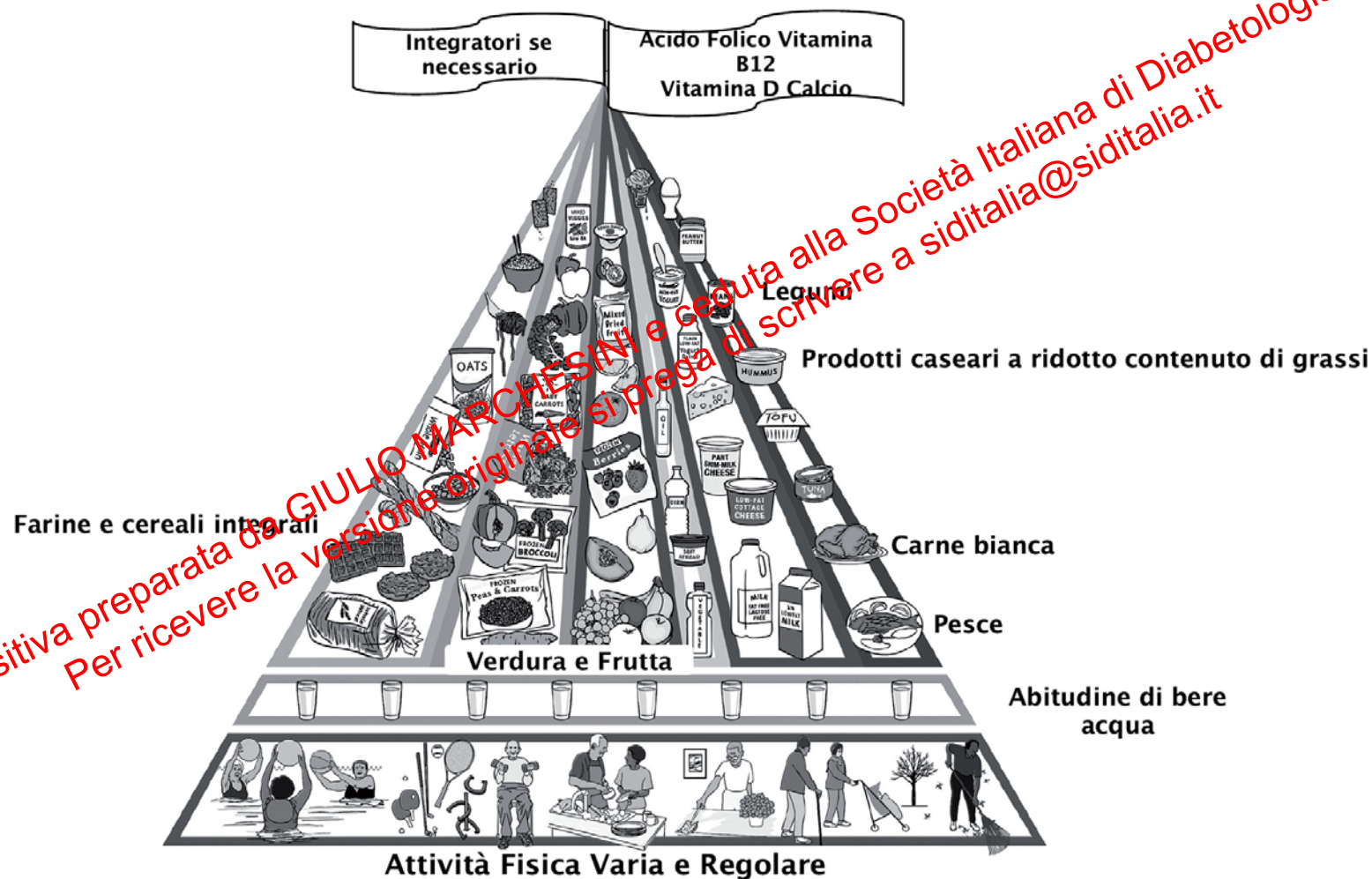
# Health-Care Costs, Glycemic Control and Nutritional Status in Malnourished Older Diabetics Treated with a Hypercaloric Diabetes-Specific Enteral Nutritional Formula



The administration of an oral enteral nutrition with a hypercaloric diabetes-specific formula (HDSF) for one year was significantly associated with a reduced use of health-care resources, fewer hospital admissions, days spent at hospital and emergency visits. Health-care costs were reduced by 65.6% during the intervention.

Glycemic control (short- and long-term) and the need of pharmacological treatment did not change, while some nutritional parameters were improved at one year. In conclusion, using HDSF in malnourished older type-2 diabetic patients may allow increasing energy intake while maintaining glucose control and improving nutritional parameters.

# Piramide alimentare dell'anziano



# La piramide alimentare della dieta mediterranea

## Mediterranean Diet Pyramid: a lifestyle for today Guidelines for Adult population

Serving size based on frugality and local habits



Wine in moderation and respecting social beliefs



© 2010 Fundación Dieta Mediterránea  
The use and promotion of this pyramid is recommended without any restriction

2010 edition

s = Serving



Fundación  
Dieta Mediterránea

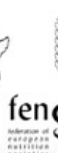
ICAF  
International Commission on the  
Anthropology of Food and Nutrition



Predimed  
Prevención con Dieta Mediterránea



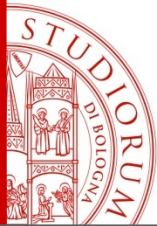
Hebrew University - Herta and Paul Amirson School of Public Health & Community Medicine



# What next: eat less & move more



A. Carracci – Il mangiafagioli (1583-4) – The beans eater



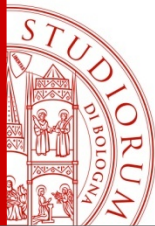
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# Nutritional status and frailty in different geriatric settings

| Author                                 | Design                           | Evidence and Recommendation | Age (mean)           | Nutritional characteristics | Frailty screening tool                          | Main results                                                                                                                                                                                  |
|----------------------------------------|----------------------------------|-----------------------------|----------------------|-----------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Origin                                 | n                                |                             | Settings             |                             |                                                 |                                                                                                                                                                                               |
| Publication year                       | Women (%)                        |                             |                      |                             |                                                 |                                                                                                                                                                                               |
| Slee A.<br>UK<br>2015 [15]             | Cross-sectional<br>n 78<br>37%   | IIID                        | 82 y<br>Hospitalized | MNA-SF<br>91% < 12 points   | Not available                                   | Body composition by BIA:<br>100% of MN or RMN men have low FFMI<br>66% of MN and 33% of normal nourished women have low FFMI                                                                  |
| Dorner T.E.<br>Austria<br>2014 [16]    | Cross-sectional<br>n 133<br>61%  | IIIC                        | 74 y<br>Hospitalized | MNA-SF<br>77% < 12 points   | SHARE-FI<br>54% frail<br>22% pre-frail          | Frail were older ( $p < 0.001$ ) (83% of frail patients are over 85).<br>76% of malnourished were frail.                                                                                      |
| Martinez-Reig M.<br>Spain<br>2014 [17] | Prospective<br>n 678<br>58%      | IIIC                        | 78 y<br>Community    | MNA-SF<br>26% < 12 points   | Fried's phenotype<br>5% frail<br>56% pre-frail  | 54% of MN or with RMN were frail.                                                                                                                                                             |
| Lilamand M.<br>France<br>2015 [18]     | Cross-sectional<br>n 267<br>67%  | IIIC                        | 81 y<br>Outpatients  | MNA-SF<br>25% < 12 points   | Fried's phenotype<br>37% frail<br>52% pre-frail | 97% of robust has good nutritional status<br>Frailty: 38% has RMN, 5% were MN                                                                                                                 |
| Bollwein J.<br>Germany<br>2013 [20]    | Cross-sectional<br>n 206<br>66%  | IIIC                        | 83 y<br>Community    | MNA<br>0% MN<br>15% RMN     | Fried's phenotype<br>15% frail<br>40% pre-frail | 47% of frailty, 12% of pre-frail and 2% on non-frail were MN ( $p < 0.001$ ).<br>Frail were older, more often women, lived alone, had lower education, higher depression and lower ADL score. |
| Boulos C.<br>Lebanon<br>2016 [22]      | Cross-sectional<br>n 1200<br>59% | IIIC                        | 75.7 y<br>Community  | MNA<br>8% MN<br>29% RMN     | SOF frailty index<br>36% frail<br>30% pre-frail | 18% of frail were MN, 86% of robust were well-nourished<br>MN were related to higher risk of frailty: OR 3.72 (95%CI-1.40-9.94)                                                               |

ADL: activities of daily living; BIA: bio-impedance analysis; FFMI: fat free mass index; MNA: mini-nutritional assessment; MNA-SF: mini-nutritional assessment-short form; MN: malnourished; RMN: risk of malnutrition; SHARE-FI: survey of health, ageing and retirement in europe-frailty index; SOF: study of osteoporotic fractures.



# Diet, exercise or both in older adults

- Study on 107 adults (65 yrs or older and obese)
- Randomly assigned to a control group, a weight management (diet) group, an exercise group, or a combined management (diet–exercise) group.
- Primary outcome: change in score on the modified Physical Performance Test (PPT)
  - 7 standardized tasks (walking 50 ft, putting on and removing a coat, picking up a penny, standing up from a chair, lifting a book, climbing one flight of stairs, and performing a progressive Romberg test)
  - 2 additional tasks (climbing up and down four flights of stairs and performing a 360-degree turn)
- A total of 93 participants (87%) completed the study.