ISTITUTO CLINICO S.ANNA

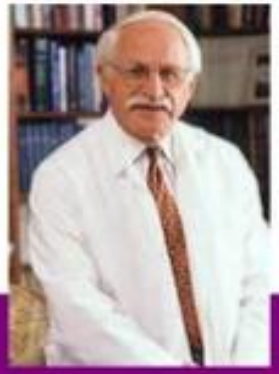
Gruppo di ricerca geriatrica

La prevenzione della sarcopenia nelle residenze per anziani

Angelo Bianchetti

Dipartimento Medicina e Riabilitazione - Istituto Clinico S.Anna – Brescia

Gruppo di Ricerca Geriatrica - Brescia



Irwin Rosenberg (1989)

Sarcopenia : the observed age-related decline in muscle mass

	Age-related loss of muscle mass
	Age-related loss of muscle strength
	Low muscle mass in old age
Since 1989	Loss of muscle mass
	Loss of muscle strength
	Low muscle strength in old age
	Low muscle mass, muscle strength and function in old age

Sarcopenia an old concept

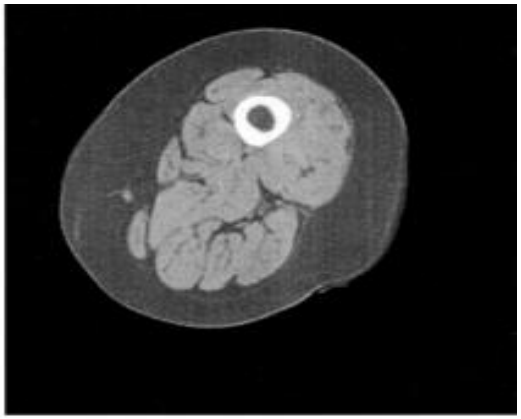
- Ippocrate (460-370 A.C.) così descrive la cachessia: *“La carne si consuma e si trasforma in acqua… le spalle, le clavicole, il torace e le cosce si squagliano. Questa malattia è fatale“*

Sarcopenia

- Massa muscolare più ridotta del previsto in un soggetto di età, sesso,e razza specificati.

- Perdita età associata della massa muscolare e della forza muscolare

Giovane, attivo



Anziano, Sedentario

Roubenoff R, J Gerontol Med Sci 2003; 58: 1012 - 1017

Geriatricians: The Super Specialists

John E. Morley, MB, BCh

Table 1. The Modern Giants of Geriatrics

1. Frailty
2. Sarcopenia
3. Anorexia of aging
4. Mild cognitive impairment
5. Delirium
6. Falls
7. Depression
8. Dementia
9. Polypharmacy
10. Fatigue

JAGS 2017

SPECIAL ARTICLE

JAGS 55:780–791, 2007

Geriatric Syndromes: Clinical, Research, and Policy Implications of a Core Geriatric Concept

Sharon K. Inouye, MD, MPH,[*†] *Stephanie Studenski, MD,*[‡§] *Mary E. Tinetti, MD,*[‖] *and George A. Kuchel, MD*[¶]

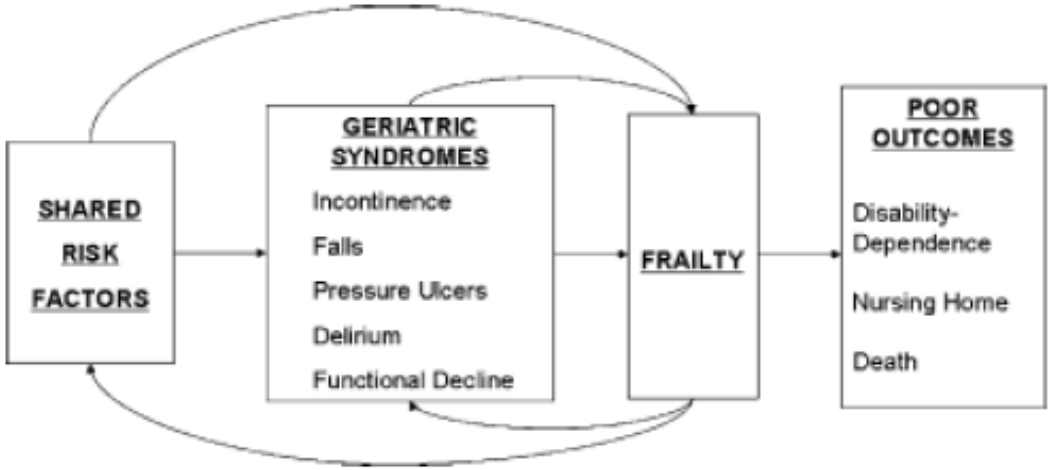
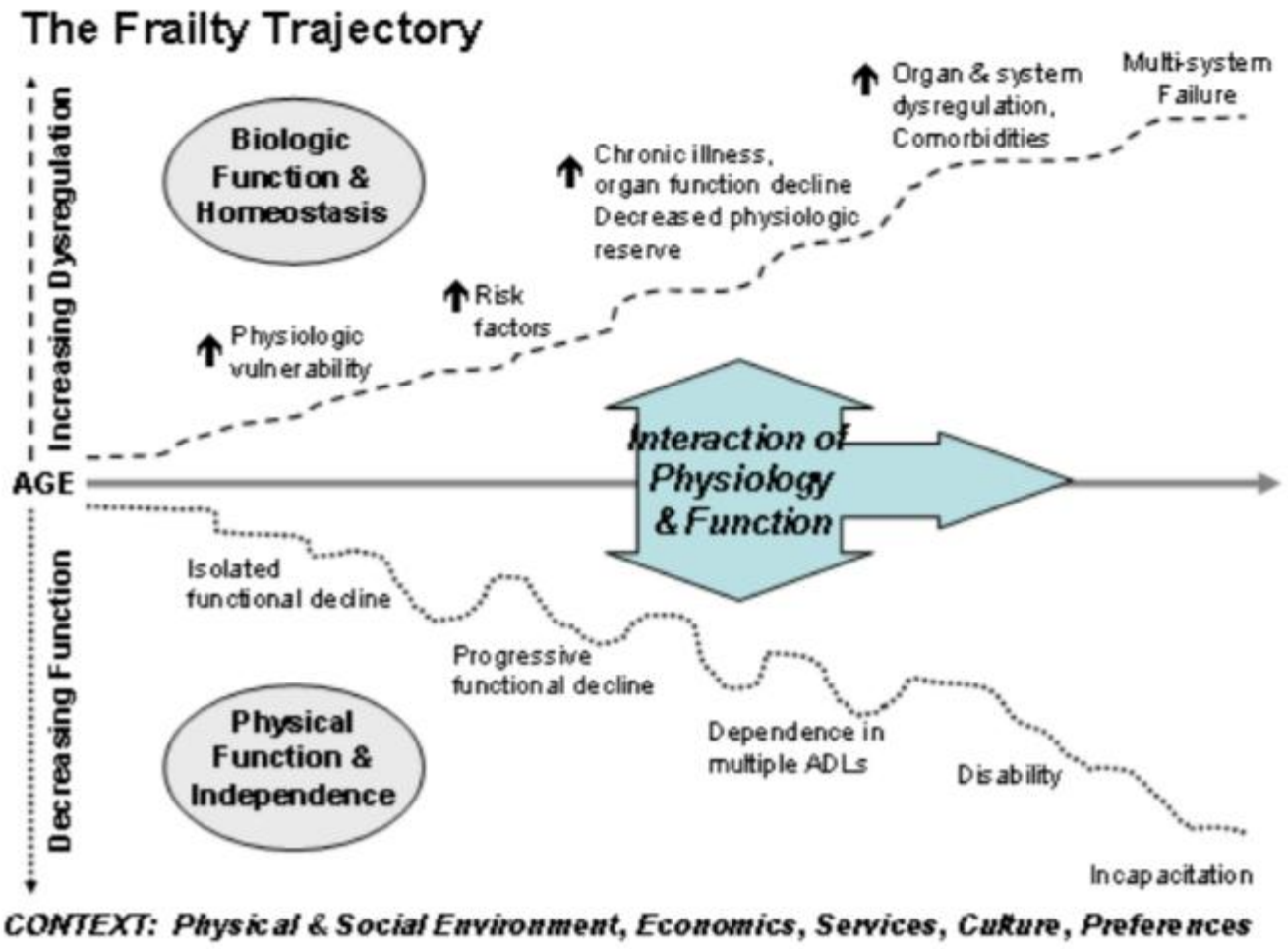
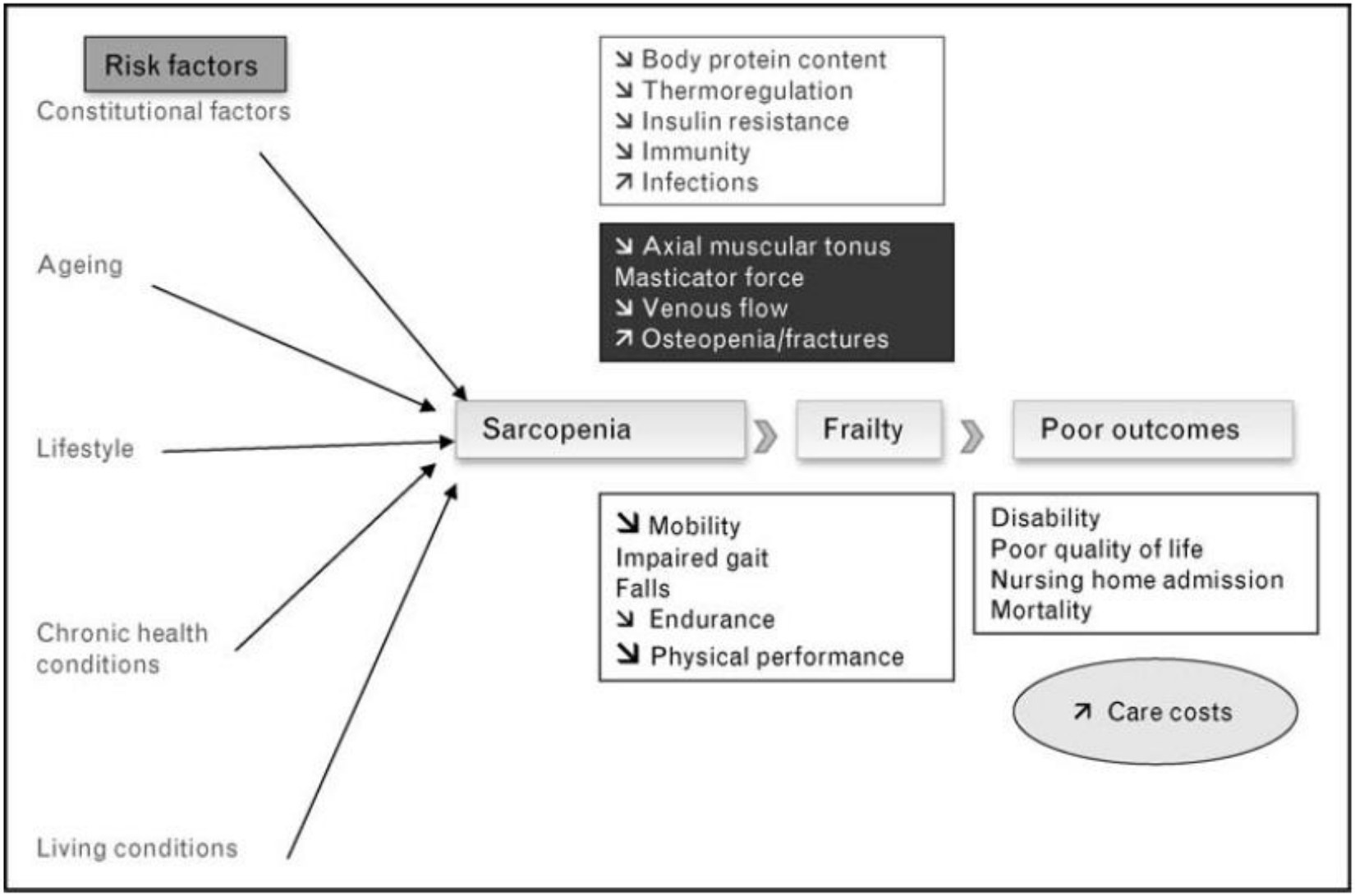


Figure 2. A unifying conceptual model demonstrates that shared risk factors may lead to geriatric syndromes, which may in turn lead to frailty, with feedback mechanisms enhancing the presence of shared risk factors and geriatric syndromes. Such self-sustaining pathways may result in poor outcomes involving disability dependence, nursing home placement, and ultimately death, thus holding important implications for elucidating pathophysiological mechanisms and designing effective intervention strategies.

The frailty trajectory



Understanding sarcopenia as a geriatric syndrome

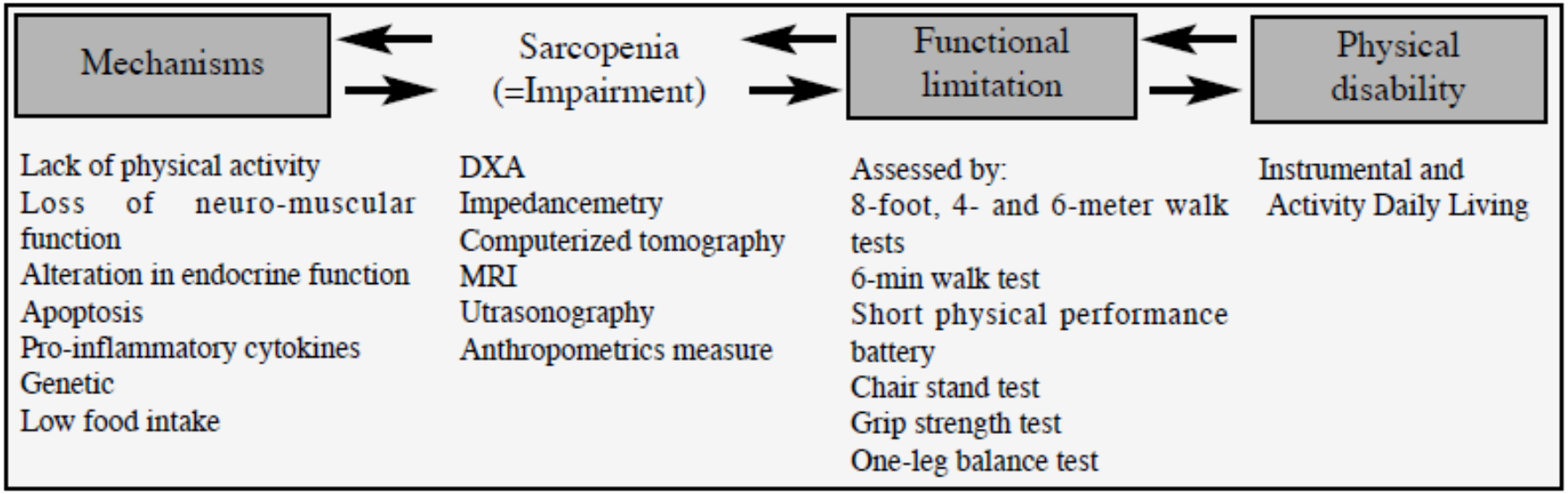


Current Opinion in Clinical Nutrition and Metabolic Care 2010, 13:1–7

Cruz-Jentoft *et al.*

From sarcopenia to disability

Sarcopenia and the disability process



The Journal of Nutrition, Health & Aging©
Volume 12, Number 7, 2008

A life course model of sarcopenia

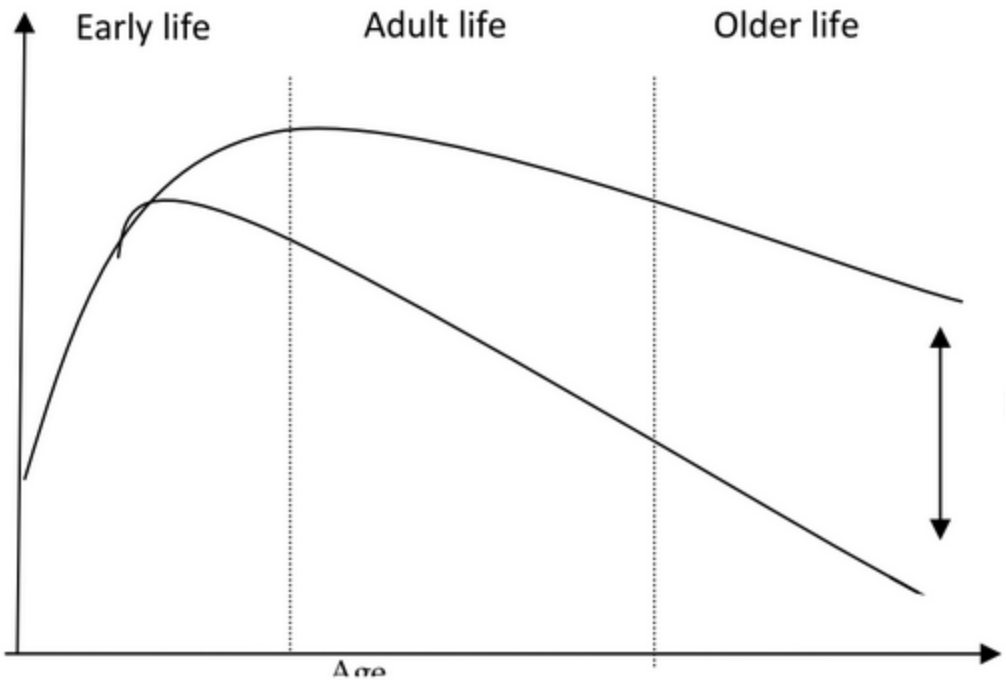


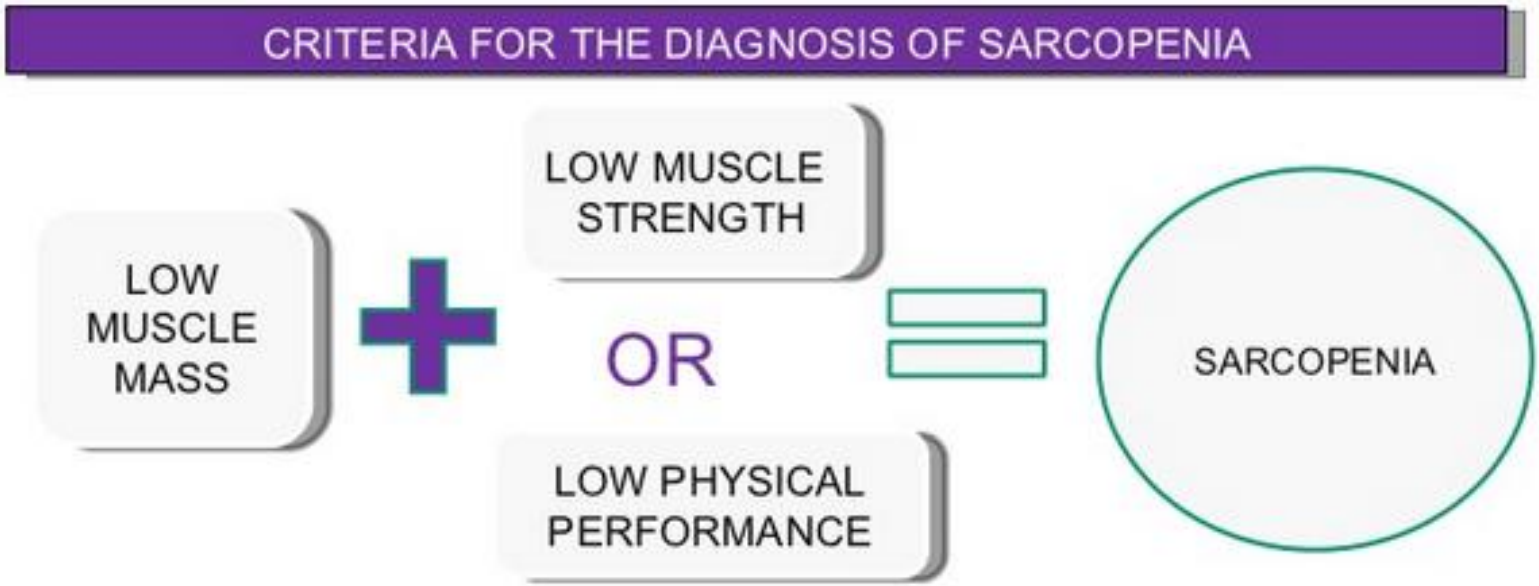
Fig. 1. A life course model of sarcopenia.

People lose 3% to 5% of muscle mass each decade after age 30; the rate increases to 15% after 70 *(Curr Opin Clin Nutr Metab Care. 2010)*

Noran N. Hairi, Awang Bulgiba, Tee Guat Hiong and Izzuna Mudla (2012). Sarcopenia in Older People, Geriatrics, Prof. Craig Atwood (Ed.), ISBN: 978-953-51-0080-5, InTech, Available from: http://www.intechopen.com/books/geriatrics/sarcopenia-in-older-people

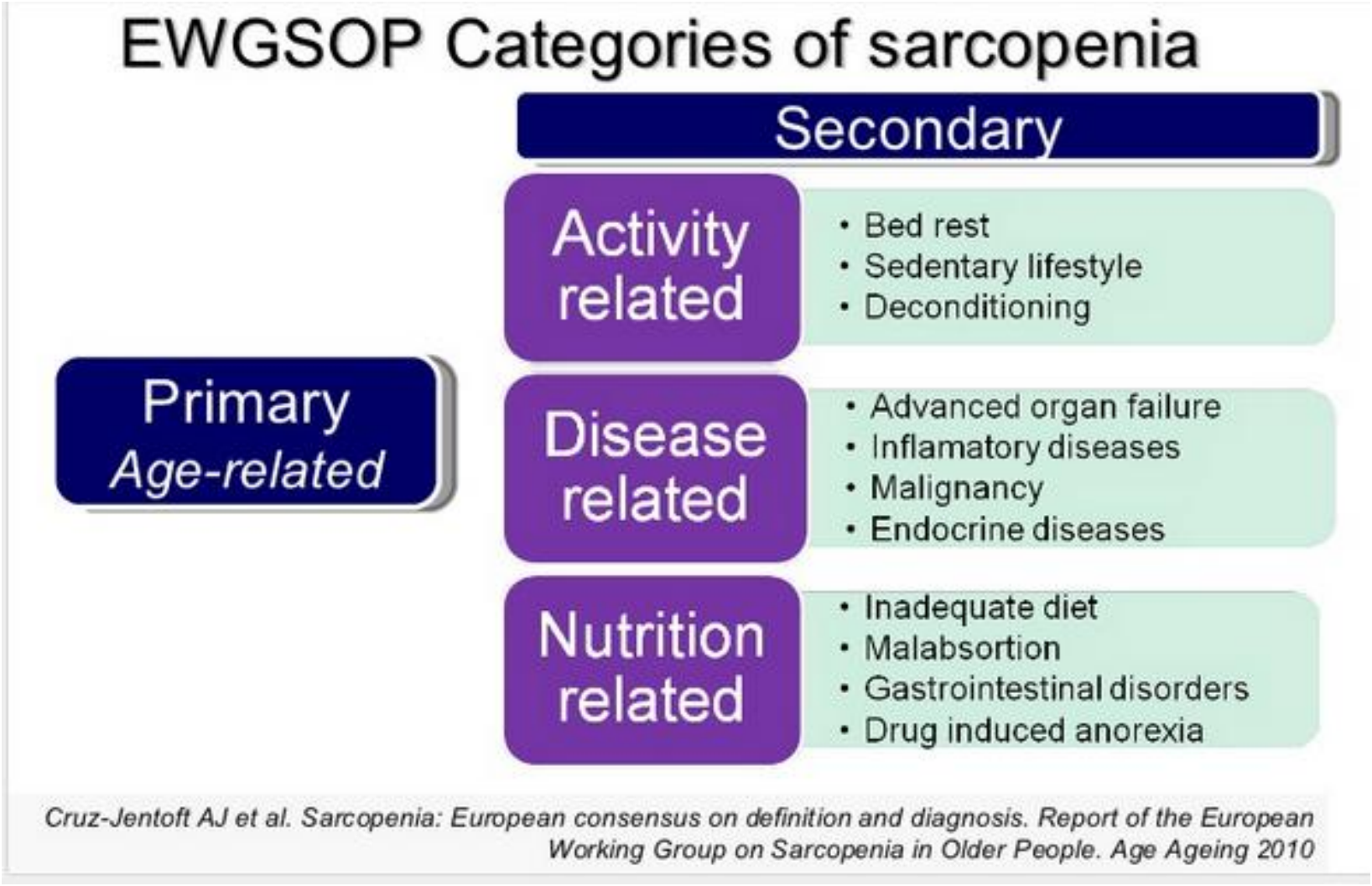
EWGSOP working definition of sarcopenia

Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with a risk of adverse outcomes such as physical disability, poor quality of life and death.



Cruz-Jentoft AJ et al. Sarcopenia: European consensus on definition and diagnosis. Report of the European Working Group on Sarcopenia in Older People. Age Ageing 2010

EWGSOP working definition of sarcopenia



Sarcopenia: definition

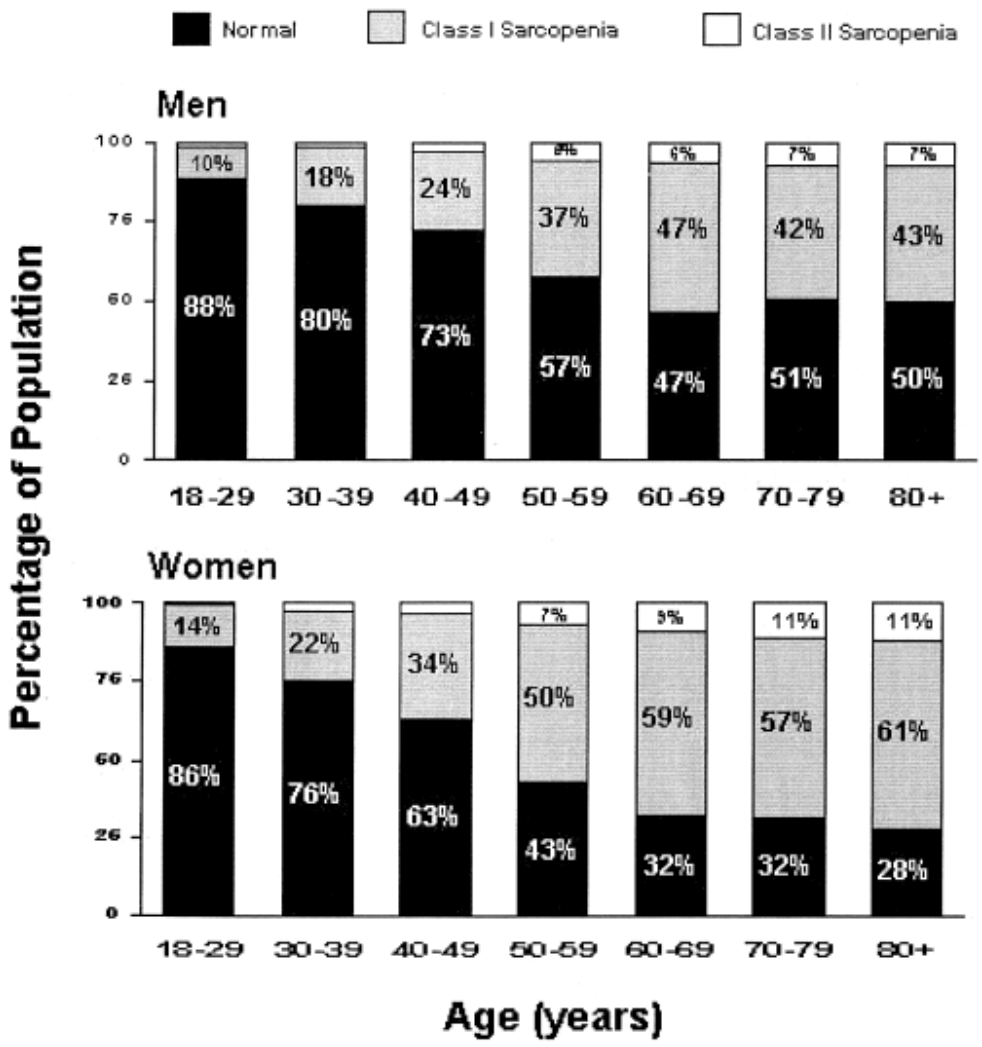
- Definition:

EWGSOP conceptual stages of sarcopenia

Stage	Muscle mass	Muscle strength		Performance
Presarcopenia	↓			
Sarcopenia	↓	↓	Or	↓
Severe sarcopenia	↓	↓		↓

Cruz-Jentoft et al. *Age & Ageing*. 2010;1-12.doi:10.1093/ageing/afq034

Prevalenza della sarcopenia



Janssen I et al, J Am Geriatr Soc 2002; 50: 889 - 89

Journal of Gerontology: MEDICAL SCIENCES
Cite journal as: J Gerontol A Biol Sci Med Sci. 2012 January;67A(1):48–55
doi:10.1093/gerona/glr035

Advance Access published on March 10, 2011

Translational Article

Special Issue on Muscle Function and Sarcopenia

Prevalence and Risk Factors of Sarcopenia Among Nursing Home Older Residents

Francesco Landi,[1] Rosa Liperoti,[1] Domenico Fusco,[2] Simona Mastropaolo,[1] Davide Quattrociocchi,[1] Anna Proia,[2] Andrea Russo,[2] Roberto Bernabei,[1] and Graziano Onder[1]

[1]Department of Gerontology and Geriatrics, Catholic University of Sacred Heart, Roma, Italy.
[2]Teaching Nursing Home, Opera Santa Maria della Pace, Fontecchio-Celano, L'Aquila, Italy.

Address correspondence to Francesco Landi, MD, PhD, Centro Medicina dell'Invecchiamento (CEMI), Istituto di Medicina Interna e Geriatria, Università Cattolica del Sacro Cuore, Largo Agostino Gemelli 8, 00168 Roma, Italy. Email: landi@rm.unicatt.it

Results. Forty residents (32.8%) were identified as affected by sarcopenia. The multivariate logistic regression analysis showed a high increase in risk of sarcopenia for male residents (odds ratio [OR] 13.39; 95% confidence interval [CI] 3.51–50.63) and for residents affected by cerebrovascular disease (OR 5.16; 95% CI 1.03–25.87) or osteoarthritis (OR 7.24; 95% CI 2.02–25.95). Residents who had a body mass index higher than 21 kg/m^2 had a lower risk to be sarcopenic (OR 0.76; 95% CI 0.64–0.90) relative to those with body mass index less than 21 kg/m^2. Similarly, sarcopenia was less likely to be present among participants involved in leisure physical activity for 1 hour or more per day (OR 0.40; 95% CI 0.12–0.98).

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Conclusions. The present study suggests that among participants living in nursing homes, sarcopenia is highly prevalent and it is more represented among male residents (68%) than among female residents (21%). Our findings support the hypothesis that muscle mass is strongly associated with nutritional status and physical activity in nursing homes, too.

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/maturitas

Prevalence and risk factors of sarcopenia among adults living in nursing homes

Hugh E. Senior[a,*], Tim R. Henwood[b], Elaine M. Beller[c], Geoffrey K. Mitchell[b], Justin W.L. Keogh[c]

[a] Discipline of General Practice, School of Medicine, The University of Queensland, 11 Salisbury Road, Queensland 4305, Australia
[b] The University of Queensland and Blue Care Research and Practice Development Centre, School of Nursing and Midwifery, University of Queensland, 56 Sylvan Road, Toowong, Queensland 4066, Australia

Results: Forty one (40.2%) participants were diagnosed as sarcopenic, 38 (95%) of whom were categorized as having severe sarcopenia. Univariate logistic regression found that body mass index (BMI) (Odds ratio (OR) = 0.86; 95% confidence interval (CI) 0.78–0.94), low physical performance (OR = 0.83; 95% CI 0.69–1.00), nutritional status (OR = 0.19; 95% CI 0.05–0.68) and sitting time (OR = 1.18; 95% CI 1.00–1.39) were predictive of sarcopenia. With multivariate logistic regression, only low BMI (OR = 0.80; 95% CI 0.65–0.97) remained predictive.

Conclusions: The prevalence of sarcopenia among older residential aged care adults is very high. In addition, low BMI is a predictive of sarcopenia.

Prevalence
Residential care
Nursing home
Risk factors

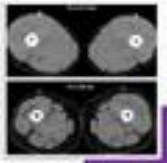
bioelectrical impedance analysis, muscle strength by handheld dynamometer, and physical performance by the 2.4 m habitual walking speed test. Secondary variables where collected to inform a risk factor analysis.

Results: Forty one (40.2%) participants were diagnosed as sarcopenic, 38 (95%) of whom were categorized as having severe sarcopenia. Univariate logistic regression found that body mass index (BMI) (Odds ratio (OR) = 0.86; 95% confidence interval (CI) 0.78–0.94), low physical performance (OR = 0.83; 95% CI 0.69–1.00), nutritional status (OR = 0.19; 95% CI 0.05–0.68) and sitting time (OR = 1.18; 95% CI 1.00–1.39) were predictive of sarcopenia. With multivariate logistic regression, only low BMI (OR = 0.80; 95% CI 0.65–0.97) remained predictive.

Conclusions: The prevalence of sarcopenia among older residential aged care adults is very high. In addition, low BMI is a predictive of sarcopenia.

EWGSOP working definition of sarcopenia

Suggested measures to diagnose sarcopenia



MUSCLE MASS

- BIA
- DEXA
- CT
- MRI

MUSCLE STRENGTH

- Handgrip strength
- Knee flexion-extension
- PEF

PHYSICAL PERFORMANCE

- SPPB
- Gait speed
- Get up&Go
- Stair climbing

Cruz-Jentoft AJ et al. Sarcopenia: European consensus on definition and diagnosis. Report of the European Working Group on Sarcopenia in Older People. Age Ageing 2010

Table 2 The Red Flag method

	Red flags
Clinician's observation	General weakness of the subject
	Visual identification of loss of muscle mass
	Low walking speed
Subject's presenting features	Loss of weight
	Loss of muscle strength, in arms or in legs
	General weakness
	Fatigue
	Falls
	Mobility impairment
	Loss of energy
	Difficulties in physical activities or activities of daily living
Clinician's assessment	Nutrition
	Body weight
	Physical activity

Table 1 Applicability of the existing tools for the assessment of muscle mass, muscle strength and physical performance in research and clinical settings

	Applicable in research settings	Applicable in specialist clinical settings	Applicable in primary care settings
Assessment of muscle mass			
DXA	+++	+++	+
Anthropometric measurements	+	++	++
CT-scan	+++	++	+
MRI	+++	++	+
BIA	++	++	+
Assessment of muscle strength			
Handgrip strength	+++	+++	+++
Lower limb muscle strength	+++	++	+
Repeated chair stands test	+	+	++
Assessment of physical performance			
Gait speed	+++	+++	+++
Timed Up and Go test	++	+	+
Balance test	+	+	+
6-min walk test	++	+	+
400 m walk test	++	+	+
Stair climb test	++	+	+
SPPB test	+++	++	+

SPPB Short Physical Performance Battery
Nb. The group has chosen to attribute to each tool +++ (best recommended tool) or ++ (best alternative tool) or + (less recommended tool) based on the availability and the costs of the tool, the required time for the examination and the availability of robust cut-off points

SPPB (SHOTR PHYSICAL PERFORMANCE BATTERY)

La scala SPPB è una breve batteria di Test nata per valutare la funzionalità degli arti inferiori. Questa batteria è costituita da 3 sezioni diverse:

1. valutazione dell'equilibrio in 3 prove :

a) il mantenimento della posizione a piedi uniti per 10"
b) la posizione di semi-tandem per 10" (alluce di lato al calcagno)
c) la posizione tandem sempre per 10" (alluce dietro al tallone)

il punteggio di questa sezione varia da un minimo di 0 se il paziente non riesce a mantenere la posizione a piedi uniti per almeno 10" ad un massimo di 4 se riesce a compiere tutte e tre le prove

2. la seconda delle prove è diretta a valutare il cammino (gait) su 4 metri lineari ed a seconda del tempo della performance il punteggio della sezione varia da 0 se incapace, ad 1 punto se la performance ha una durata maggiore di 8,7 secondi, ad un massimo di 4 se riesce ad assolvere il compito in meno di 4,8 secondi
3. la terza sezione della batteria indaga la capacità di eseguire,per 5 volte consecutive, il sit to stand da una sedia senza utilizzare gli arti superiori che atale proposito devono essere incrociati davanti al petto. Anche in questo caso il punteggio varia da 0 se incapaca oppure la performance ha una durata maggiore di 60 secondi, ad un massimo di 4 se tale performance è svolta a meno di 11,2 secondi

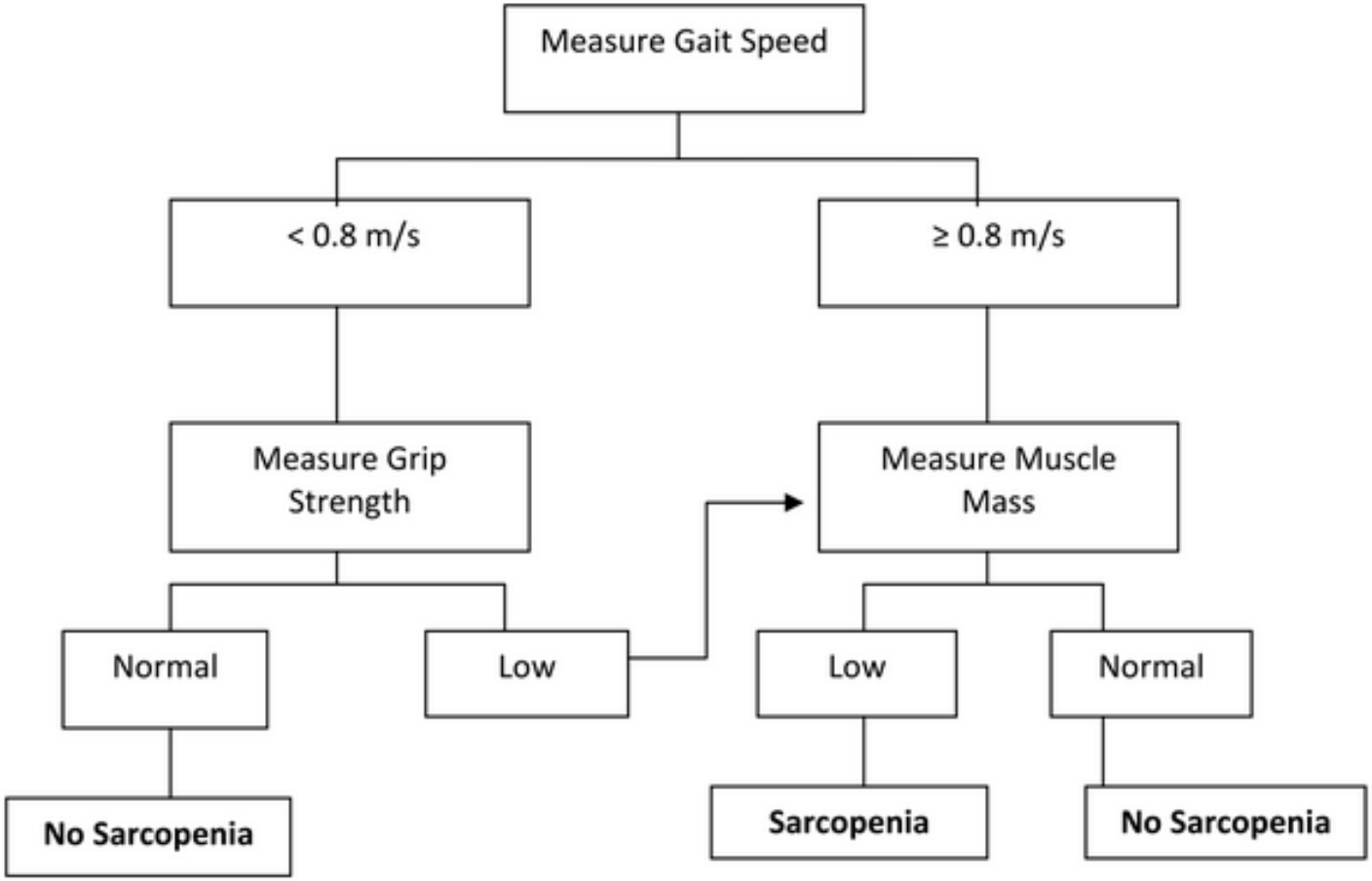
Il punteggio totale della scala ha quindi un range da 0 a 12

SPPB (SHORT PHYSICAL PERFORMANCE BATTERY)

	0	1	2	3	4
EQUILIBRIO					
prova	piedi paralleli	semitandem 0-9"	tandem 0-2"	tandem 3-9"	tandem 10"
CAMMINO					
tempo 4 mt	incapace	> 7,5"	5,4-7,4"	4,1-5,3"	< 4,1"
SIT to STAND					
tempo	incapace	> 16,6"	13,7-16,6"	11,2-13,6"	< 11,2"

Punteggio totale SPPB / 12

EWGSOP suggested algorithm for screening and case finding of sarcopenia



Source: Report of the EWGSOP. Sarcopenia: European consensus on definition and diagnosis. Age and Ageing, 2010: 39: 412-423.

Conseguenze della sarcopenia

Rischio per l'impairment funzionale e la disabilità

- 2 volte più alto in soggetti sarcopenici di sesso maschile
- 3 volte più alto in soggetti sarcopenici di sesso femminile

Janssen I et al, J Am Geriatr Soc 2002; 50: 889 – 896

Aumentato rischio di outcome negativi (mortalità e disabilità) in corso di ricovero ospedaliero

Cerri AP, Bellelli G et al Clin Nutr. 2015;34:745-51

Ridotta forza muscolare scheletrica predice la mortalità da tutte le cause

Metter EJ et al, J Gerontol Series A 2002; 57: B359 - 365

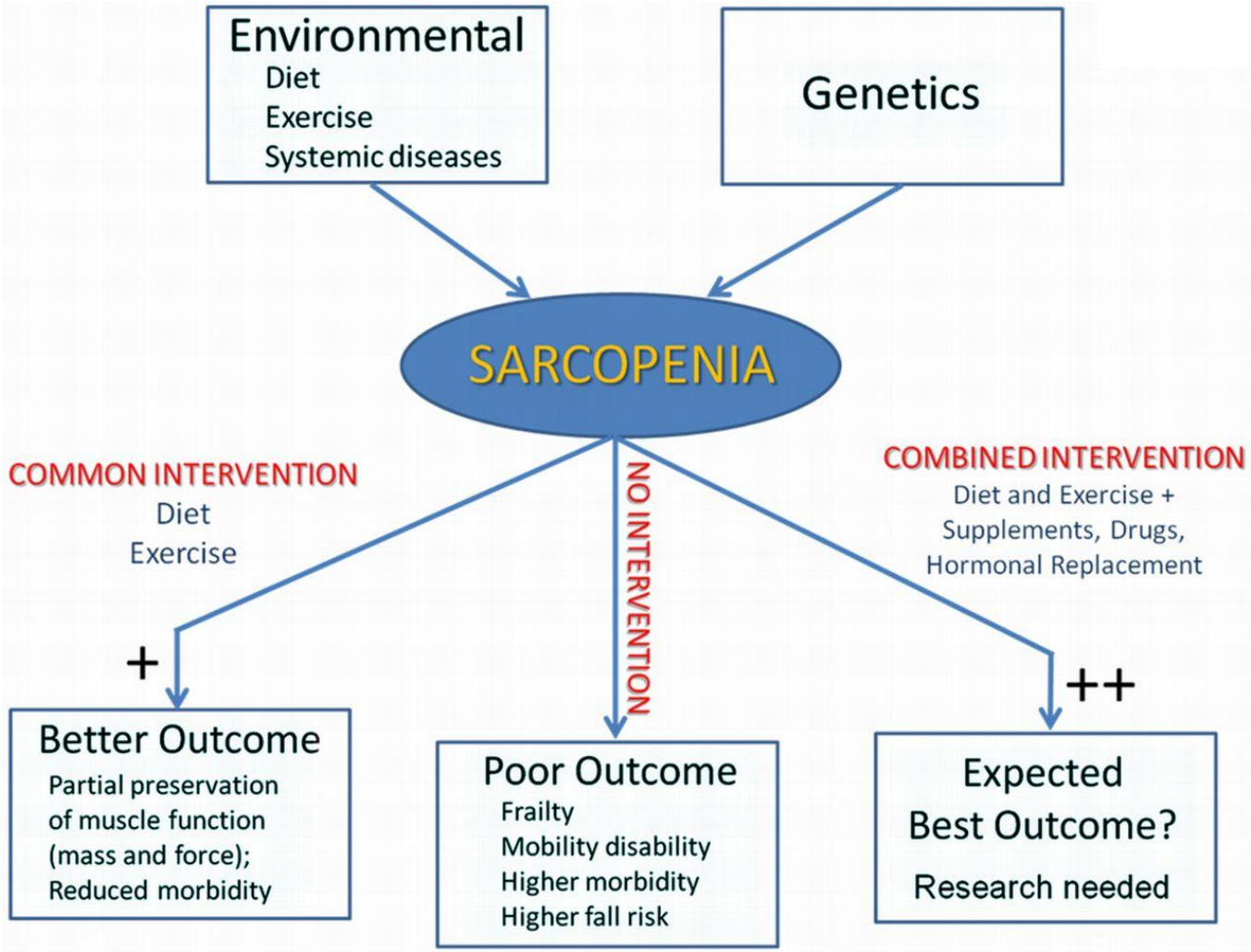
Costi diretti stimati in termini di spesa sanitaria negli USA: 18.5 miliardi

Janssen I et al, J Am Geriatr Soc 2004; 52: 80 - 85

Sarcopenia and pscychogeriatric syndromes

- In cross sectional studies sarcopenia is more frequent in AD, then in MCI and in controls (23.3%, 12.5%, 8.6%) *(Sugimoto T, Curr Alzheimer Res. 2016);* in severe dementia about 70% of patients have sarcopenia *(Sarabia Cobo CM; JARCP 2012)*
- In cross sectional studies sarcopenia is associated with depressive symptoms (OR 2.2) and cognitive impairment (OR 3) *(Hsu GH; Geriatr Gerontol Int 2014);* about 60% of sarcopenic subjects present disability and cognitive impairment *(Tolea MI, Clinical Interventions in Aging 2015)*
- In longitudinal studies sarcopenia is a predictor of cognitive decline (OR 2.2) *(Moon JO; JNHA 2015)*
- Loss of weight, motoric dysfunction, eating behavior are early sign of cognitive impairment *(Joi T, JAMDA 2015)*

Model illustrating the known influences on the development of sarcopenia and the consequences of treating and not treating.



Marco Brotto, and Eduardo L. Abreu J Pharmacol Exp Ther 2012;343:540-546

ASPET | The Journal of Pharmacology and Experimental Therapeutics

Risk factors for sarcopenia

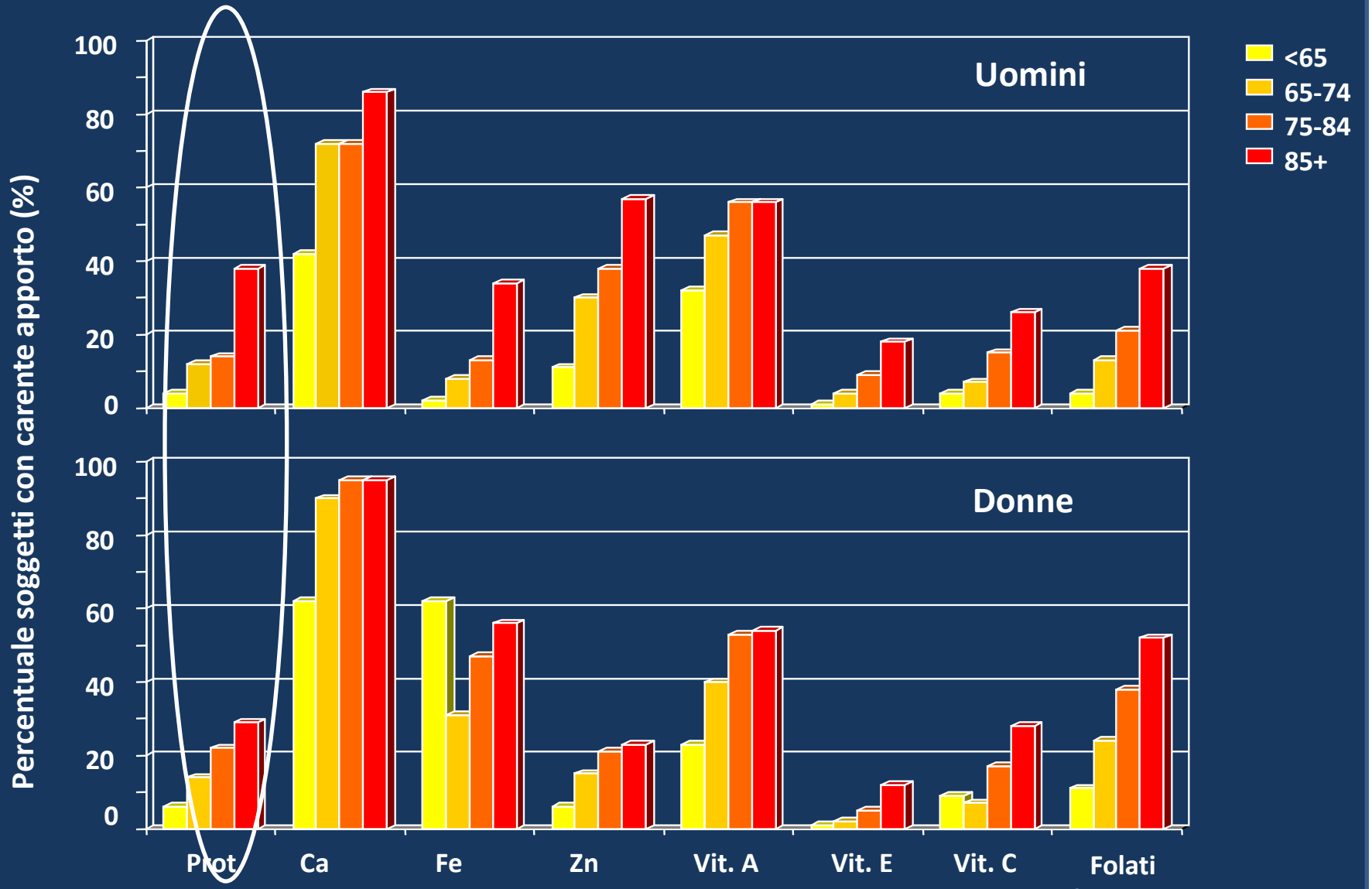
Factors	Ageing process	Chronic health conditions
Constitutional Female sex Low birth weight Genetic susceptibility	Increased muscle turnover ↑ Catabolic stimuli ↑ Protein degradation Low-grade inflammation ↓ Anabolic stimuli ↓ Protein synthesis	Cognitive impairment Mood disturbances Diabetes mellitus Heart failure Liver failure Renal failure Respiratory failure Osteoarthritis Chronic pain
Lifestyle Malnutrition Low protein intake Alcohol abuse Smoking Physical inactivity	Reduced number of muscle cells ↑ Myostatin (↓ recruitment) ↑ Apoptosis	Obesity
Living conditions Starvation Bed rest, immobility, deconditioning Weightlessness	Hormonal deregulation ↓ Testosterone, DHEA production ↓ Oestrogen production ↓ 1–25 (OH)2 vitamin D ↑ Thyroid function ↓ Growth hormone, IGF-1 ↑ Insulin resistance	Catabolic effects of drugs
	Changes in neuromuscular system ↓ CNS input (loss of α-motor neurons) Neuromuscular disjunction ↓ Ciliary neurotrophic factor (CNTF) ↓ Motor unit firing rate	*Cancer?* *Chronic inflammatory disease?*
	Mitochondrial dysfunction ↓ Peripheral vascular flow	

CNS, central nervous system; DHEA, dehydroepiandrosterone; IGF-1, insulin-like growth factor-1.

Current Opinion in Clinical Nutrition and Metabolic Care 2010, 13:1–7

Cruz-Jentoft *et al.*

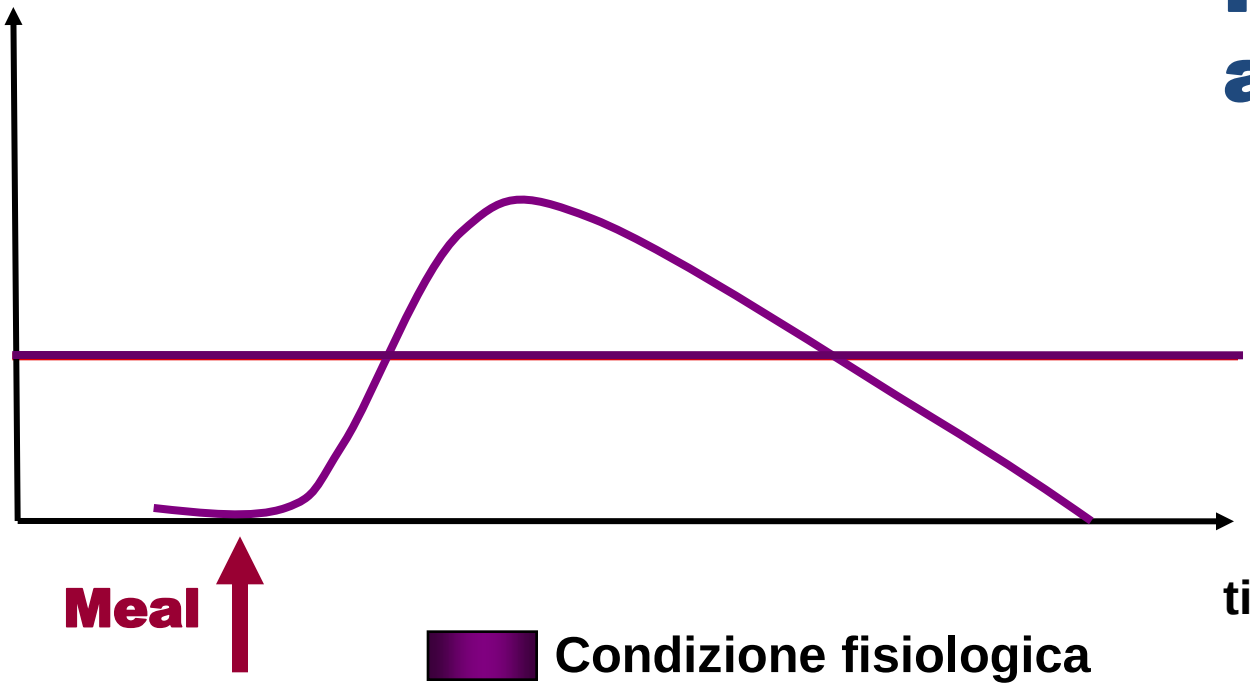
Percentuale di soggetti con un carente apporto rispetto ai LARN



Bartali 2003 J nutr, 2003

Resistenza anabolica muscolare

Stimolatori dell'anabolismo

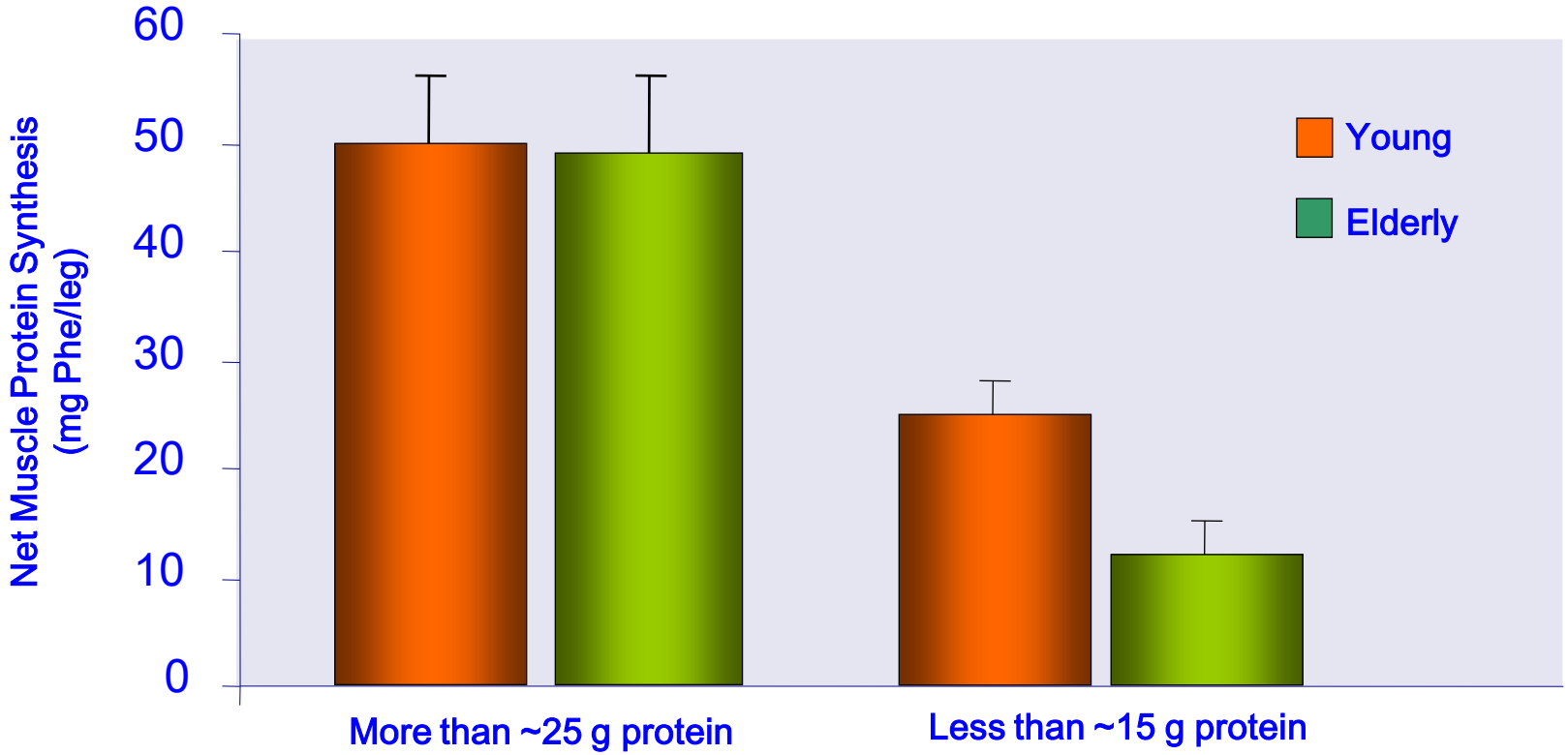


Condizione fisiologica

Invecchiamento, condizioni catabolica, allettamento

Aging is associated with diminished accretion of muscle proteins after the ingestion of a small bolus of essential amino acids[1–3]

Christos S Katsanos, Hisamine Kobayashi, Melinda Sheffield-Moore, Asle Aarsland, and Robert R Wolfe



Katsanos et. al. Am J Clin Nutr 2005;82:1065–73

JAMDA

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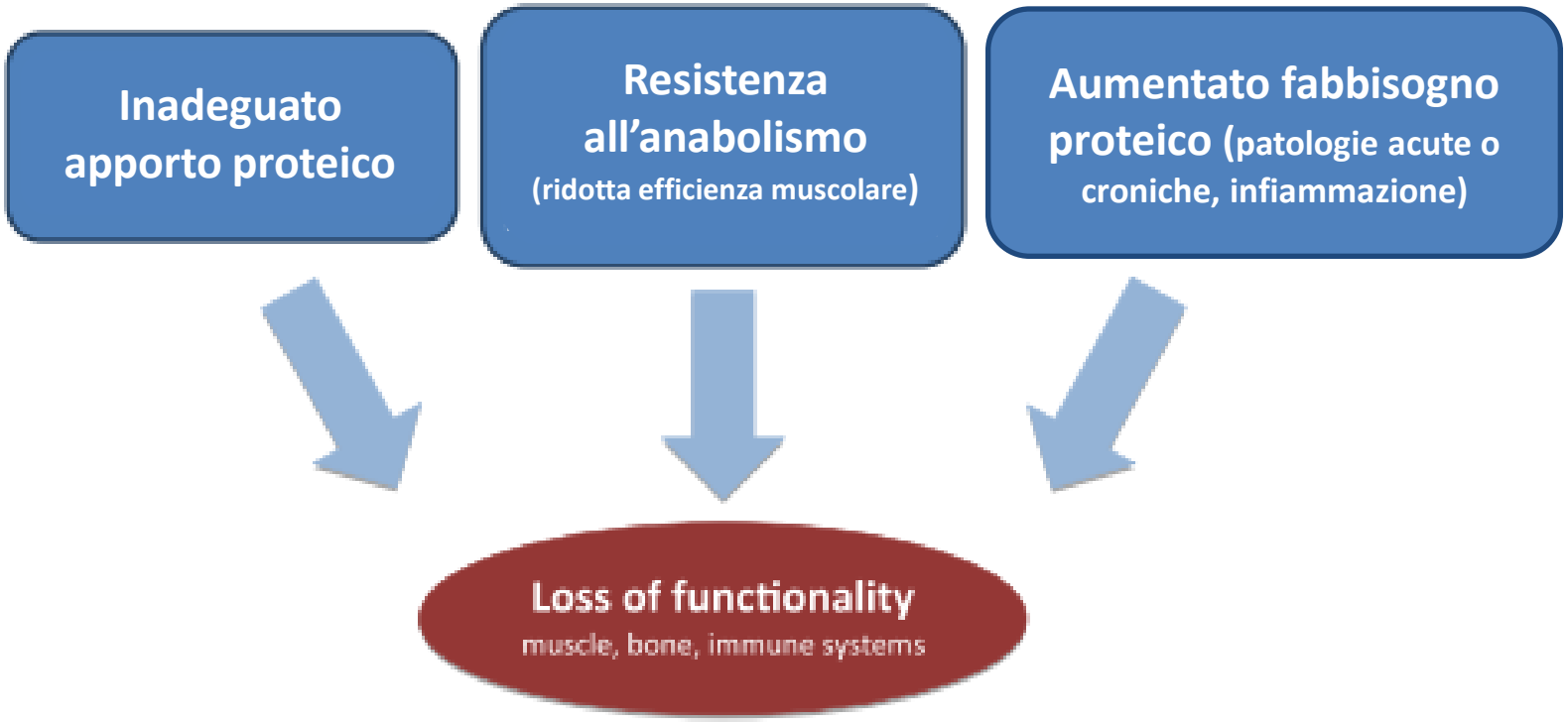
Special Article

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



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Special Article

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

Jürgen Bauer MD[a,*], Gianni Biolo MD, PhD[b], Tommy Cederholm MD, PhD[c], Matteo Cesari MD, PhD[d], Alfonso J. Cruz-Jentoft MD[e], John E. Morley MB, BCh[f], Stuart Phillips PhD[g], Cornel Sieber MD, PhD[h], Peter Stehle MD, PhD[i], Daniel Teta MD, PhD[j], Renuka Visvanathan MBBS, PhD[k], Elena Volpi MD, PhD[l], Yves Boirie MD, PhD[m]

PROT-AGE recommendations for dietary protein intake in *healthy* older adults

- To maintain and regain muscle, older people need more dietary protein than do younger people; older people should consume an average daily intake in the range of 1.0 to 1.2 g/kg BW/d.
- The per-meal anabolic threshold of dietary protein/amino acid intake is higher in older individuals (ie, 25 to 30 g protein per meal, containing about 2.5 to 2.8 g leucine) in comparison with young adults.
- Protein source, timing of intake, and amino acid supplementation may be considered when making recommendations for dietary protein intake by older adults.
- More research studies with better methodologies are desired to fine tune protein needs in older adults.

Fabbisogni proteici nell'anziano :

1,0-1,2 g / Kg / die

25-30 g di proteine per pasto

2,8 g di leucina per pasto

Timing di assunzione

Fonte proteica

Fino a 1,2 -1,5 g / Kg / die durante malattie acute o croniche

JAMDA 14 (2013) 542e559

Sarcopenia and vitamin D

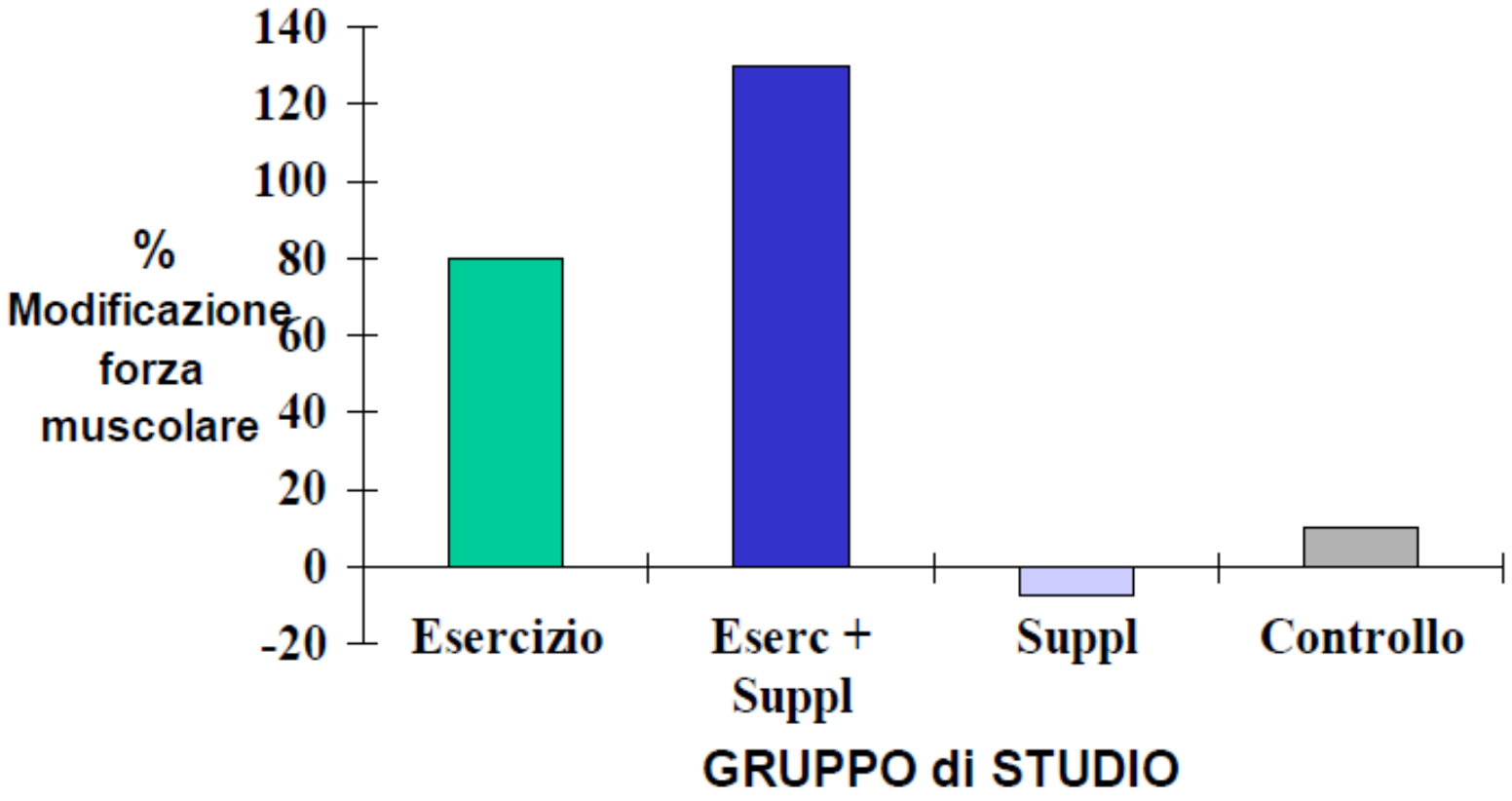
- High prevalence of vitamin D deficiency/insufficiency (25OHD<75nmol/L): 30 to 90 % of elderly
  - decreased skin production, dietary deficiency, increased covering of the skin, use of sunscreen, decreased sun exposure, metabolic alterations
- Low vitamin D levels are associated with:
  - reduced muscle mass and strength
  - gait impairments
  - decreased balance
  - increased risk of falls
- Those with low vitamin D levels are at greater risk of long term decline in physical performance when 25OHD levels are <50nmol/l, and especially when <25 nmol/l

Visser et al., J Clin Endocrinol Metab. 2003; Rolland et al,. J Nutr Health Aging 2008; Bischoff-Ferrari, Best Pract Res Cl Rh. 2009; Visvanathan and Chapman, Maturitas 2010; Ceglia, Curr Opin Clin Nutr Metab Care. 2009; Wicherts et al., J Clin Endocrinol Metab 2007

Approccio nutrizionale per ottimizzare l'azione anabolizzante delle proteine.

- Adeguato apporto proteico, in grado di soddisfare i bisogni specifici per l’età
- Incrementare la biodisponibilità degli aminoacidi (digeribilità, distribuzione della quota proteica, proteine a digestione rapida)
- Utilizzo di specifici substrati (leucina, vitamina D)

Esercizio fisico e supplementazione nutrizionale



Fiatarone et al, NEJM 1994

Table 4: Effect of nutrients or dietary supplementations on metabolic correlates of sarcopenia.

Nutrients or dietary supplementations	Recommendations	Specific effect
Proteins: average daily intake	It is recommended that the total protein intake should be 1–1.2 g/kg/day [16]	
Proteins: timing of intake	It is recommended to have 30 grams of protein of high biological value for each meal [25]	The elderly, compared with younger subjects, would require a larger amount of protein to obtain the same maximization of protein synthesis
Proteins: fast and slow	It is recommended to have whey protein ingestion because whey protein ingestion results in greater postprandial protein retention than does casein ingestion [31]	The greater anabolic properties of whey than of casein are mainly attributed to the faster digestion and absorption kinetics of whey, which results in a greater increase in postprandial plasma amino acid availability and thereby further stimulates muscle protein synthesis. Moreover, whey has a considerably higher leucine content
Proteins: animal and vegetal sources	When the total protein intake is adequate, the source of protein consumed (vegetal or animal) does not influence muscle strength and size [36]	Increases in muscle strength and size were not influenced by the predominant source of protein consumed by older men with adequate total protein intake
Branched chain amino acids (BCAAs),	It is recommended to have an adequate daily leucine supplementation (3 g/day)	A high proportion of leucine is required for optimal stimulation of the rate of muscle protein synthesis by essential amino acids in the elderly

Beta-hydroxy-methylbutyrate (HMB)	It is recommended to have a daily intake of beta-hydroxy butyrate (HMB-b, 2 g/day) because it can attenuate the loss of muscle mass and increase muscle mass and strength [50]	Beta-hydroxy-beta-methylbutyrate is a product of leucine metabolism that has been shown to slow protein breakdown in muscle tissue
Creatine	It is recommended to have an adequate creatine supplementation because it could represent an intriguing intervention to counteract sarcopenia and in particular fatigue associated with sarcopenia; the timing of creatine ingestion (i.e., 0.03–0.5 g/kg before and after the sessions of resistance training) can be more relevant than the amount of creatine [73, 76]	The ingestion of an adequate creatine supplementation determines the increase in muscle phosphocreatine (PCr) and the energy provided for the phosphorylation of adenosine diphosphate (ADP) to adenosine triphosphate (ATP) during and after intense exercise largely depends on the amount of PCr stored in the muscle
Vitamin D	It is recommended to have a dietary vitamin D supplementation (800–1000 UI ergo-calciferol/day) in vitamin D deficient sarcopenic subjects [127]	Dietary vitamin D supplementation determines an increase of the expression of the receptors VDR (vitamin D receptor) in skeletal muscle
Antioxidants. vitamin E, vitamin C, carotenoids, and resveratrol	It is recommended to have a diet with high intake of fruits, vegetables whole grains, which is rich in antioxidant, and lower consumption of red meat and saturated fats, because it is associated with a reduced risk of inflammation correlated to oxidative damage [83]	Adherence to the diet rich in antioxidants is associated with lower circulating IL-6
Long-chain omega-3 polyunsaturated fatty acids (LC*n*-3PUFA)	It is recommended to have dietary long-chain omega-3 polyunsaturated fatty acids (1.86 g eicosapentaenoic acid and 1.50 g docosahexaenoic acid/day) supplementation [131]	Long-chain omega-3 polyunsaturated fatty acids (LC*n*-3PUFA) supplementation improves insulin-mediated glucose metabolism in insulin-resistant states and increases the activation (phosphorylation) of anabolic signaling proteins in muscle during administration of insulin and amino acids and increases the nonoxidative whole-body disposal of amino acids, an index of increased whole-body protein synthesis

ESPEN endorsed recommendation

Protein intake and exercise for optimal muscle function with aging: Recommendations from the ESPEN Expert Group

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Dietary protein intake

- Older adults have greater protein needs to compensate for anabolic resistance and hypermetabolic disease.
- Older adults may also have decreased intake due to age-related appetite loss, medical conditions, financial limits.
- Optimal intake of at least 1.0 to 1.5 g protein/kg BW/day is recommended; individual needs depend upon the severity of malnutrition risk.

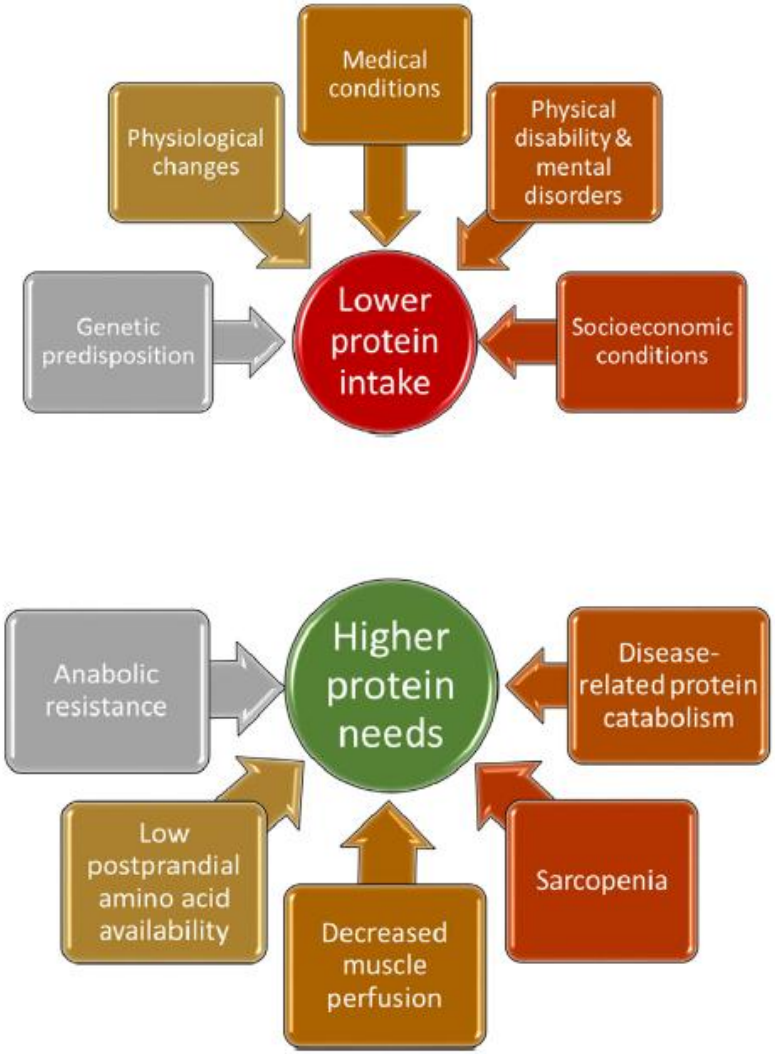
Exercise

- Regular exercise helps maintain skeletal muscle strength and function in older adults.
- Resistance training has limited but positive effects on recovery of muscle in older people.
- A combination of resistance training and adequate dietary protein/amino acid intake for healthy muscle aging is recommended.

Fig. 3. Recommendations for maintaining healthy muscle with aging.

Quando utilizzare gli integratori?

- Nelle situazioni in cui l'apporto alimentare è insoddisfacente
- Nelle situazioni in cui la richiesta proteica è aumentata (recupero da malattie acute, riparazione di ferite, riabilitazione)



Conclusioni

- La sarcopenia è una sindrome geriatrica frequente caratterizzata da una serie di outcomes negativi.
- Una valutazione clinica attenta e l'uso di semplici strumenti di valutazione permette di identificare le condizioni di (pre)sarcopenia e di intervenire
- Modificazioni dello stile di vita (soprattutto incremento dell'attività fisica) e della dieta sono in grado di ridurre l'impatto della sarcopenia sullo stato funzionale e la progressione verso la disabilità
- L'uso di specifici supplementi può essere utile nel recupero della massa muscolare del soggetto anziano in condizioni di scarso o inadeguato apporto nutrizionale o di aumentata richiesta.

ALIMENTAZIONE: PIACERE E NUTRIMENTO