BRAIN AND MALNUTRITION
Chronic Diseases Association Onlus

VI Congresso Nazionale B&M
Nutrizione e Neurodegenerazione

SESSIONE IV: RELATORI

•***Ruolo della Nutrizione nella Riabilitazione***

Dott. Emanuele Cereda
Medico Ricercatore a contratto Fondazione IRCCS Policlinico San Matteo (Pavia)

MILANO | 11-12 MAGGIO | 2017

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Ruolo della nutrizione nella riabilitazione

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MILANO | 11-12 MAGGIO | 2017

Background:

DEFINIZIONE: Il complesso delle misure mediche, fisioterapiche, psicologiche e di addestramento funzionale intese a migliorare o ripristinare l'efficienza psicofisica di soggetti portatori di minorazioni congenite o acquisite ….

Treccani.it
L'ENCICLOPEDIA ITALIANA

Background:

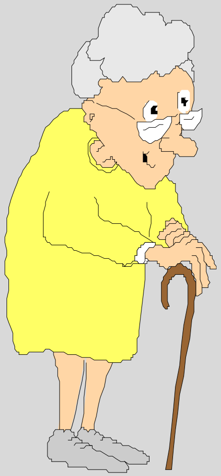
Nei casi di seria menomazione psicofisica, rappresenta essenzialmente una misura ergoterapica ….

Rappresenta la terza fase dell’intervento medico, successiva e complementare a quelle di ordine preventivo e diagnostico-curativo (evento acuto).

Background:

Qual è il paziente candidato ad un trattamento riabilitativo?

Età



Declino strutturale e funzionale

Con l'avanzare dell'età si riscontra un deterioramento strutturale e funzionale in gran parte dei sistemi fisiologici…

Background:

Sarcopenia: European consensus on definition and diagnosis

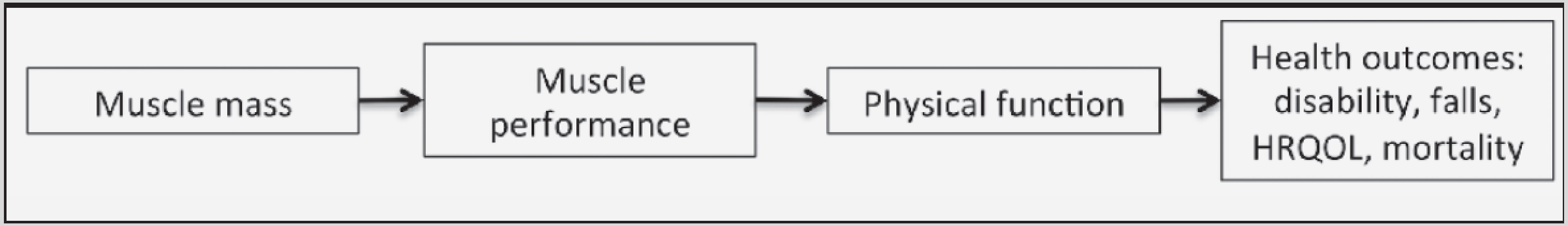
Report of the European Working Group on Sarcopenia in Older People

The presence of both

- low muscle mass
- low muscle function (strength or performance)

SARCOPENIA TRIALS IN SPECIFIC DISEASES: REPORT BY THE INTERNATIONAL CONFERENCE ON FRAILTY AND SARCOPENIA RESEARCH TASK FORCE

B. VELLAS[1,2], R. FIELDING[3], S. BHASIN[4], F. CERRETA[5], B. GOODPASTER[6], J.M. GURALNIK[7], S. KRITCHEVSKY[8], V. LEGRAND[9], C. FORKIN[10], J. MAGAZINER[11], J.E. MORLEY[12], L. RODRIGUEZ-MANAS[13], R. ROUBENOFF[14], S. STUDENSKI[15], D.T. VILLAREAL[16], M. CESARI[1,2],
ON BEHALF OF THE INTERNATIONAL CONFERENCE ON FRAILTY AND SARCOPENIA RESEARCH TASK FORCE



Abstract: Muscle atrophy occurs as a consequence of a number of conditions, including cancer, chronic obstructive pulmonary disease (COPD), diabetes mellitus, heart failure, and other chronic diseases, where it is generally a predictor of poor survival. It also occurs as a consequence of disuse and an age-related loss of muscle mass and strength (sarcopenia). The aims of the 2016, International Conference on Frailty and Sarcopenia Research (ICFSR) Task Force were to examine how these specific chronic conditions have been employed in treatment trials thus far and how future trials using these patient groups might be designed for efficient identification of effective sarcopenia interventions. Functional limitations assessed as gait speed, distance walked over a set time period, or other attributes of physical performance have been suggested as outcome measures in sarcopenia trials. Indeed, such measures have already been used successfully in a number of trials aimed at preventing disability in older adults.

J Frailty Aging. 2016;5(4):194-200

Trattamento:

Components of training

The physical activity program includes aerobic, strength, flexibility, and balance training.

Intensity of training

Participants are introduced to the physical activity program in a structured way such that they begin with lighter intensity and gradually increase intensity over time

Frequency and duration of training

The program consists of physical activity at least 5 times per week (up to 7). Sessions should be of 30-60 minutes each

Volume 330 JUNE 23, 1994 Number 25

EXERCISE TRAINING AND NUTRITIONAL SUPPLEMENTATION FOR PHYSICAL FRAILTY IN VERY ELDERLY PEOPLE

Maria A. Fiatarone, M.D., Evelyn F. O'Neill, C.T.R.S., Nancy Doyle Ryan, D.T., Karen M. Clements, M.P.H., Guido R. Solares, Ph.D., Miriam E. Nelson, Ph.D., Susan B. Roberts, Ph.D., Joseph J. Kehayias, Ph.D., Lewis A. Lipsitz, M.D., and William J. Evans, Ph.D.

Outcome Variable	No. of Subjects†	Study Group				P Value		
		Exercise	Exercise plus supplement	Supplement	Control	Effect of exercise	Effect of supplement	Interaction
		change (percent change)						
Muscle strength and mobility								
Right knee (kg)	89	4.9±0.6	5.0±0.5	−0.8±0.6	0.1±0.6	<0.001	0.45	0.41
		(156.1±29.3)	(215.7±28.3)	(−24.6±32.1)	(18.3±29.1)	(<0.001)	(0.79)	(0.10)
Left knee (kg)	87	5.2±0.6	5.0±0.6	−1.1±0.6	−0.3±0.6	<0.001	0.41	0.69
		(178.8±29.1)	(204.2±28.5)	(−24.4±32.7)	(13.8±28.8)	(<0.001)	(0.84)	(0.31)
Right hip (kg)	48	8.8±1.2	6.3±1.0	0.7±1.0	1.3±1.0	<0.001	0.84	0.63
		(81.4±16.4)	(90.3±14.5)	(4.3±14.3)	(19.6±14.0)	(<0.001)	(0.51)	(0.20)
Left hip (kg)	48	8.1±1.0	6.8±0.9	0.6±0.9	0.7±0.8	<0.001	0.72	0.70
		(75.3±16.2)	(100.2±14.3)	(4.9±14.7)	(14.0±13.7)	(<0.001)	(0.41)	(0.22)
Right leg press (kg)	38	8.3±2.9	14.9±3.0	0.6±3.7	1.8±3.3	0.007	0.40	0.23
		(26.1±14.4)	(82.1±15.0)	(6.3±18.5)	(6.1±16.7)	(0.012)	(0.09)	(0.09)
Left leg press (kg)	39	9.3±2.1	12.9±2.4	1.4±2.9	−1.1±2.6	<0.001	0.24	0.82
		(33.3±9.2)	(67.6±10.3)	(7.2±12.5)	(−3.5±11.2)	(<0.001)	(0.05)	(0.28)
Gait (m/sec)	90	0.04±0.02	0.06±0.02	0.00±0.02	−0.02±0.02	0.009	0.31	0.97
		(8.6±5.5)	(14.9±5.7)	(5.2±5.6)	(−7.2±5.4)	(0.02)	(0.11)	(0.60)
Stair-climbing power (W)	83	11.1±2.5	7.9±2.7	4.2±2.7	−2.5±2.7	0.001	0.53	0.08
		(33.8±9.3)	(23.0±10.0)	(12.5±10.0)	(−5.2±9.8)	(0.01)	(0.74)	(0.17)
Physical activity (counts/day)	45	3412±1700	553±1751	142±1600	−1230±1670	0.12	0.68	0.24
		(51.0±18.4)	(17.6±18.9)	(−6.7±17.3)	(−2.6±18.1)	(0.03)	(0.34)	(0.46)
Body composition								
Weight (kg)	88	0.2±0.4	1.0±0.4	0.8±0.4	−0.5±0.4	0.19	0.01	0.48
		(0.4±0.6)	(1.8±0.6)	(1.5±0.7)	(−0.8±0.6)	(0.21)	(0.01)	(0.48)
Whole-body potassium (g)	75	0.4±1.5	1.5±1.4	1.0±1.6	0.2±1.4	0.79	0.53	0.91
		(0.4±1.9)	(2.2±1.9)	(1.1±2.0)	(0.9±1.9)	(0.86)	(0.62)	(0.71)
Thigh-muscle area (cm^2)	61	0.9±1.7	1.7±1.7	−2.7±2.1	−0.4±1.9	0.14	0.69	0.43
		(2.0±2.5)	(3.4±2.6)	(−2.8±3.1)	(−0.9±2.9)	(0.11)	(0.93)	(0.56)

"Oral nutritional support with or without exercise in the management of malnutrition in nutritionally vulnerable older people: a systematic review and meta-analysis"

Exercise combined with ONS was associated with significantly higher improvements in limb strength

Nutritional support improved fat-free mass but the addition of exercise had no significant effect physical activity level and timed up-and-go test

Conclusion: Combining exercise with ONS may provide additional improvements to muscle strength but had no effect on other measures of physical functioning, nutritional status or morbidity in nutritionally vulnerable older adults.

Quale supporto nutrizionale?

Gli studi suggeriscono che **il supporto nutrizionale è importante nella gestione del soggetto fragile/malnutrito** al fine di migliorare il peso corporeo ma, per quel che concerne il ripristino della massa muscolare e l'impatto che questo può avere sullo stato funzionale, anche **la qualità del supporto** gioca un ruolo altrettanto importante.

Vitamin D and Its Role in Skeletal Muscle

Lisa Ceglia · Susan S. Harris

Calcif Tissue Int (2013) 92:151–162

There is accumulating evidence that 25-hydroxyvitamin D (25-(OH)D) is **not only involved in bone health**, but may also play a role in non-skeletal systems via the vitamin D receptor (VDR).

Vitamin D via intranuclear VDR activates gene transcription which results in the synthesis of specific proteins believed to influence muscle calcium handling, phosphate transport across the cell membrane, and muscle cell differentiation and proliferation.

The Effects of Vitamin D on Skeletal Muscle Strength, Muscle Mass, and Muscle Power: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Objective: The aim was to summarize with a meta-analysis, the effects of vitamin D supplementation on muscle function.

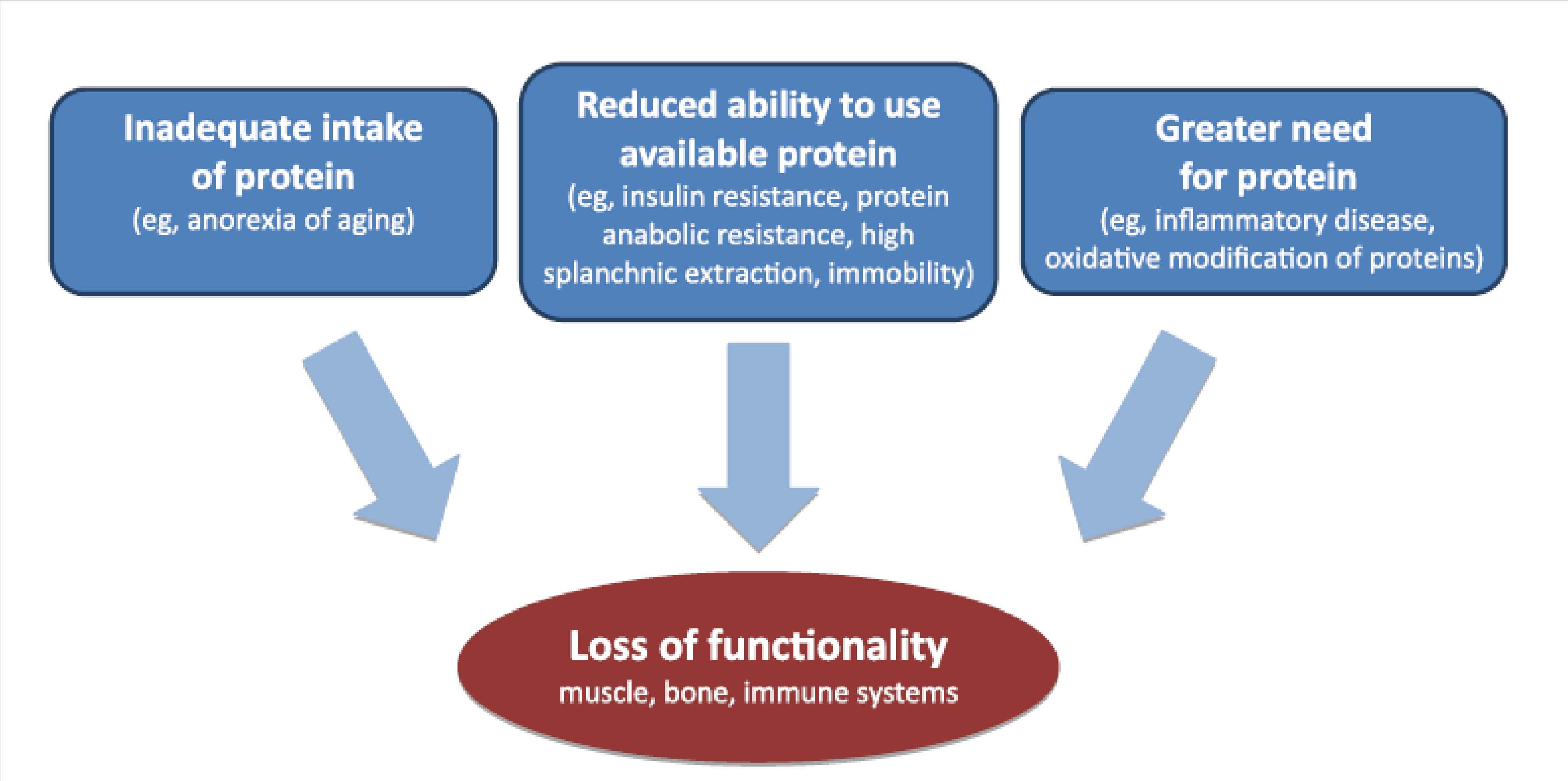
Data Sources: A systematic research of randomized controlled trials, performed between 1966 and January 2014 has been conducted on Medline, Cochrane Database of Systematics Reviews, Cochrane Central Register of Controlled and completed by a manual review of the literature and congressional abstracts.

Data Synthesis: Results revealed a small but significant positive effect of vitamin D supplementation on global muscle strength with a standardized mean difference (SMD) of 0.17 ($P = .02$). No significant effect was found on muscle mass (SMD 0.058; $P = .52$) or muscle power (SMD 0.057; $P = .657$). Results on muscle strength were significantly more important with people who presented a 25-hydroxyvitamin D level <30 nmol/L. Supplementation seems also more effective on people aged 65 years or older compared to younger subjects (SMD 0.25; 95% CI 0.01 to 0.48 vs SMD 0.03; 95% CI −0.08 to 0.14).

[In assenza di attività fisica]

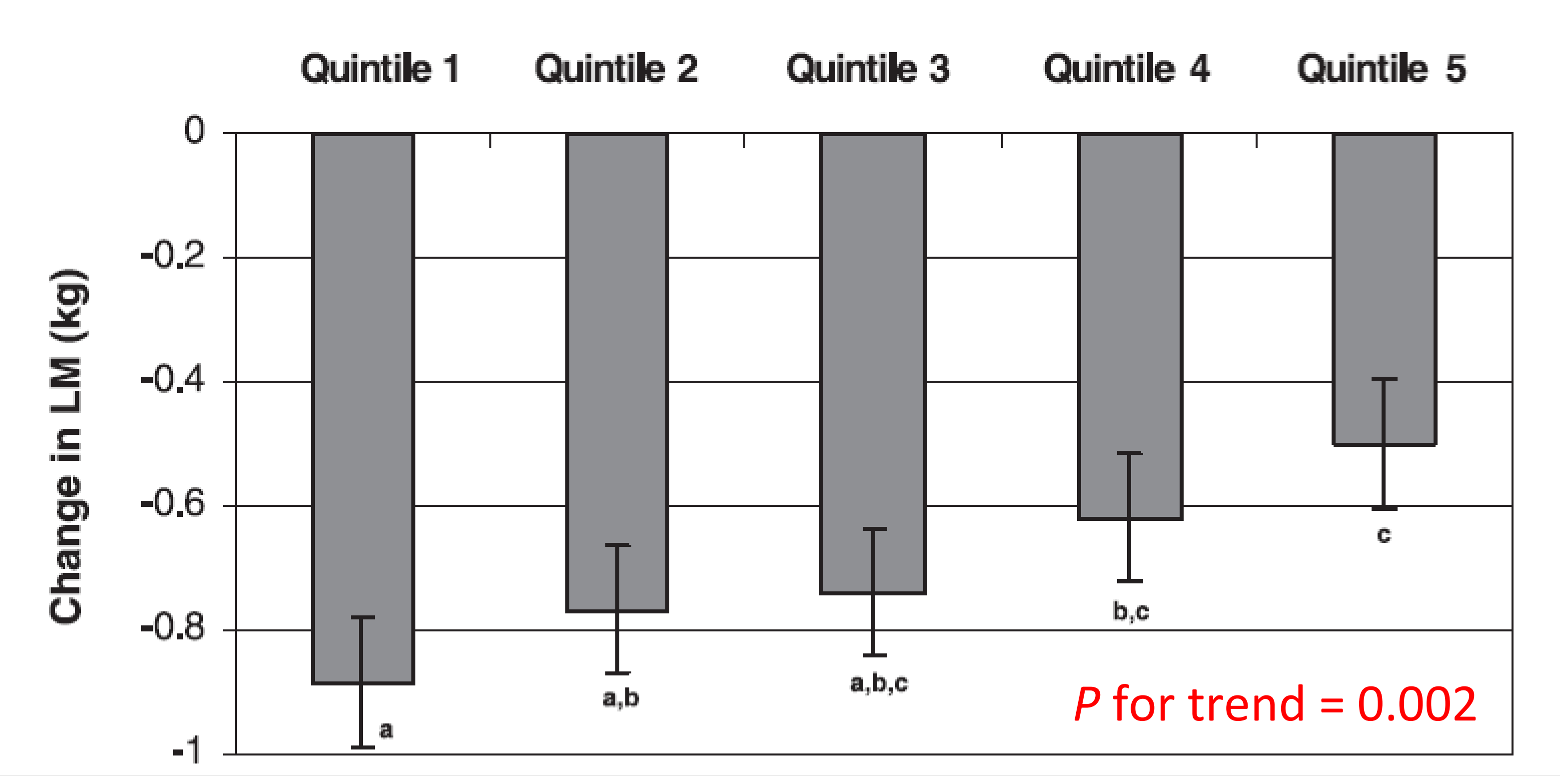
(*J Clin Endocrinol Metab* 99: 4336–4345, 2014)

Optimal muscle protein metabolism, is highly dependent upon an adequate intake of dietary proteins and amino acids



Dietary protein intake is associated with lean mass change in older, community-dwelling adults: the Health, Aging, and Body Composition (Health ABC) Study[1–3]

Am J Clin Nutr 2008;87:150–5.



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.

JAMDA 14 (2013) 542–559

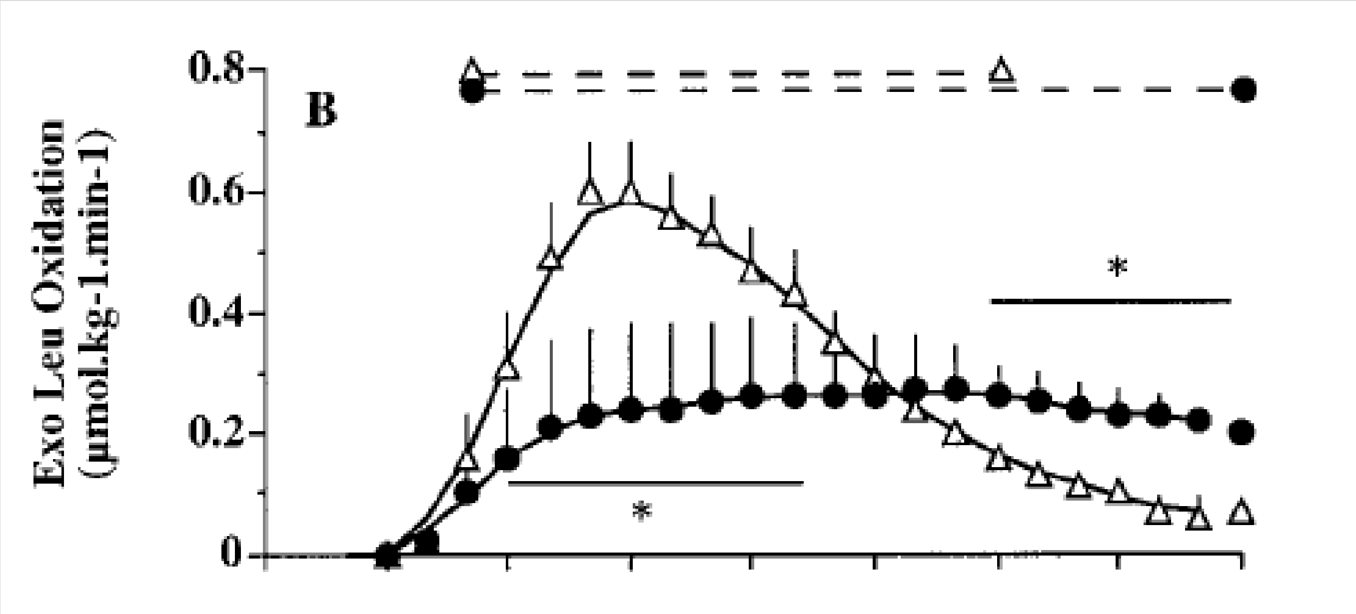
The absorption kinetics and the amino acid composition of dietary proteins are also important factors to be taken into account. Indeed, the speed of absorption of dietary amino acids by the gut affects postprandial protein synthesis, breakdown, and deposition.

Slow and fast dietary proteins differently modulate postprandial protein accretion

Proc. Natl. Acad. Sci. USA 94 (1997)

(amino acid turnover/postprandial protein anabolism/milk protein/stable isotopes)

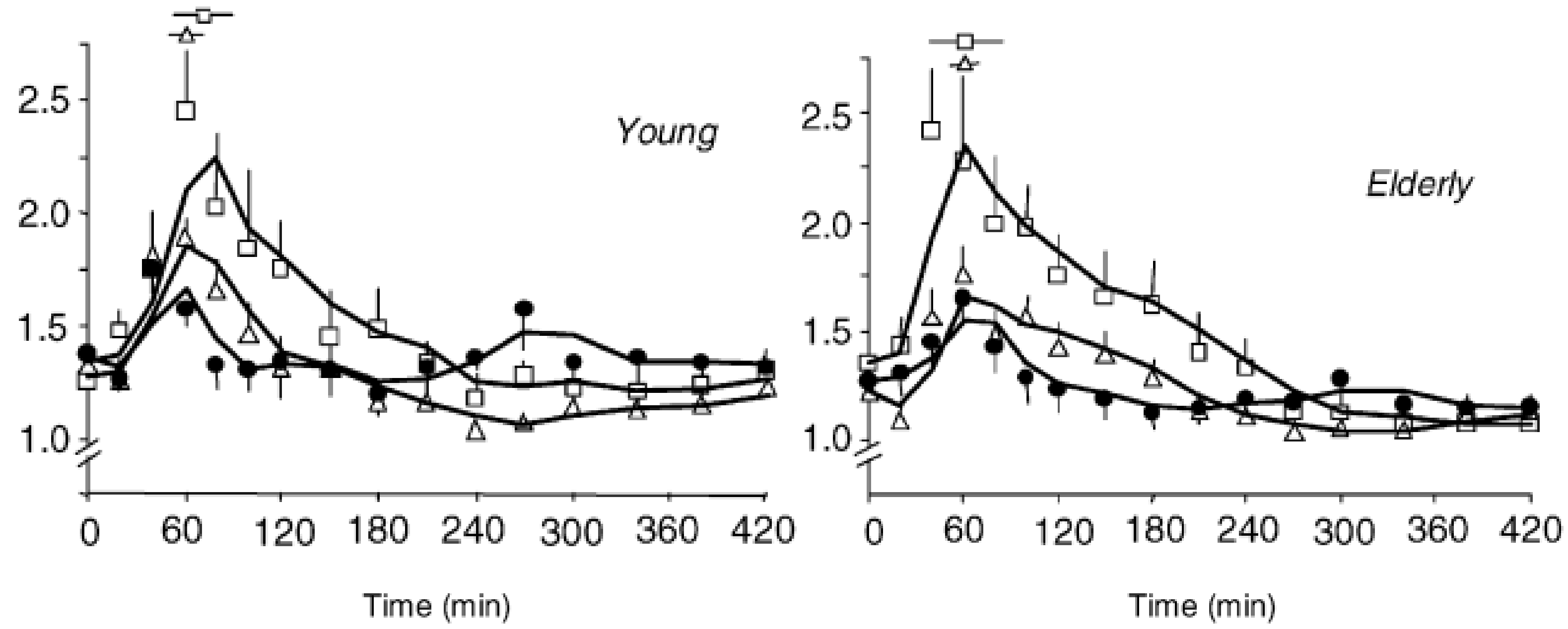
YVES BOIRIE*, MARTIAL DANGIN*†, PIERRE GACHON*, MARIE-PAULE VASSON‡, JEAN-LOUIS MAUBOIS§, AND BERNARD BEAUFRÈRE*¶



In young adults, slowly digested proteins (casein) induce greater protein retention than those that are rapidly digested (e.g., whey). An opposite pattern has been detected in elderly individuals

The rate of protein digestion affects protein gain differently during aging in humans

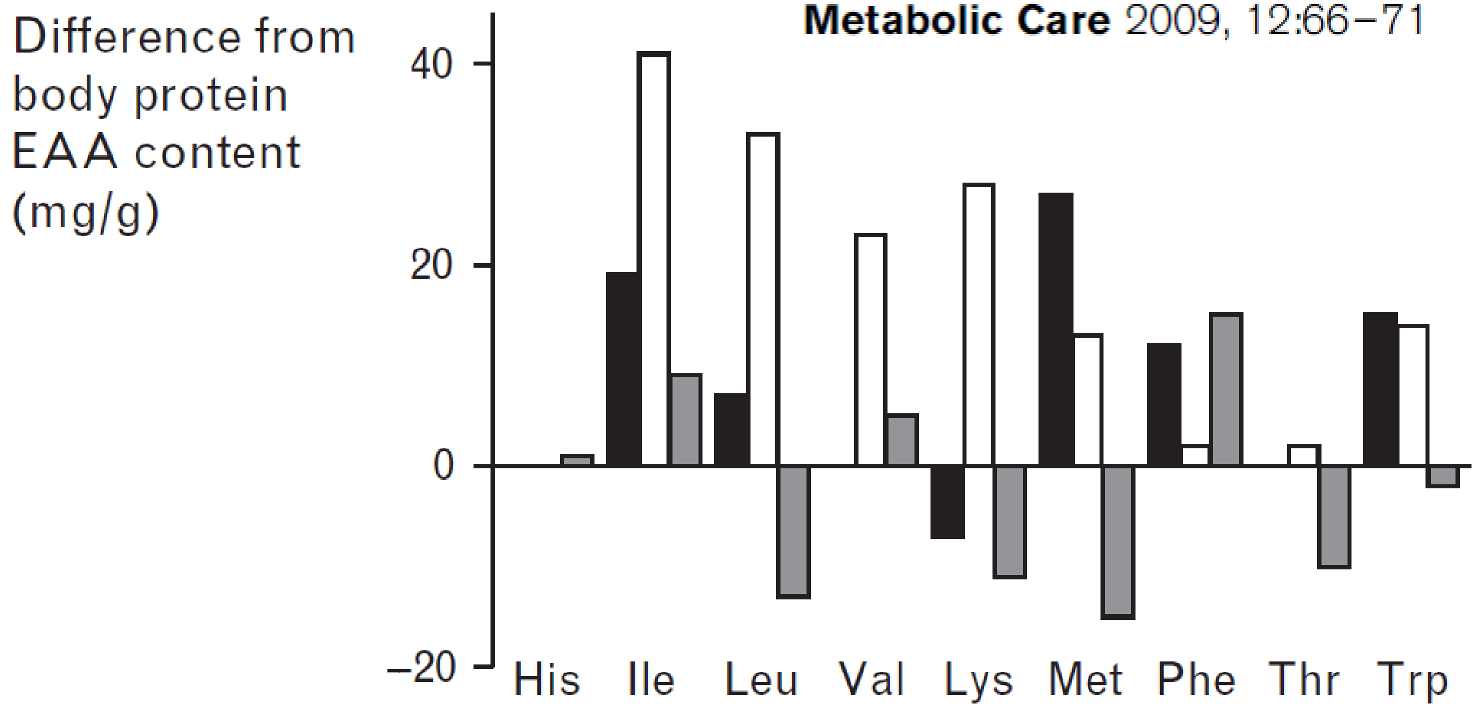
Martial Dangin*†, Christelle Guillet*, Clara Garcia-Rodenas†, Pierre Gachon*, Corinne Bouteloup-Demange*, Kristel Reiffers-Magnani†, Jacques Fauquant‡, Olivier Ballèvre† and Bernard Beaufrère*



The amino acid composition of dietary proteins has a great impact on their muscle anabolic potency. Essential amino acids (EAAs) are the primary stimulus for protein synthesis

Maximizing muscle protein anabolism: the role of protein quality
Jason E. Tang and Stuart M. Phillips

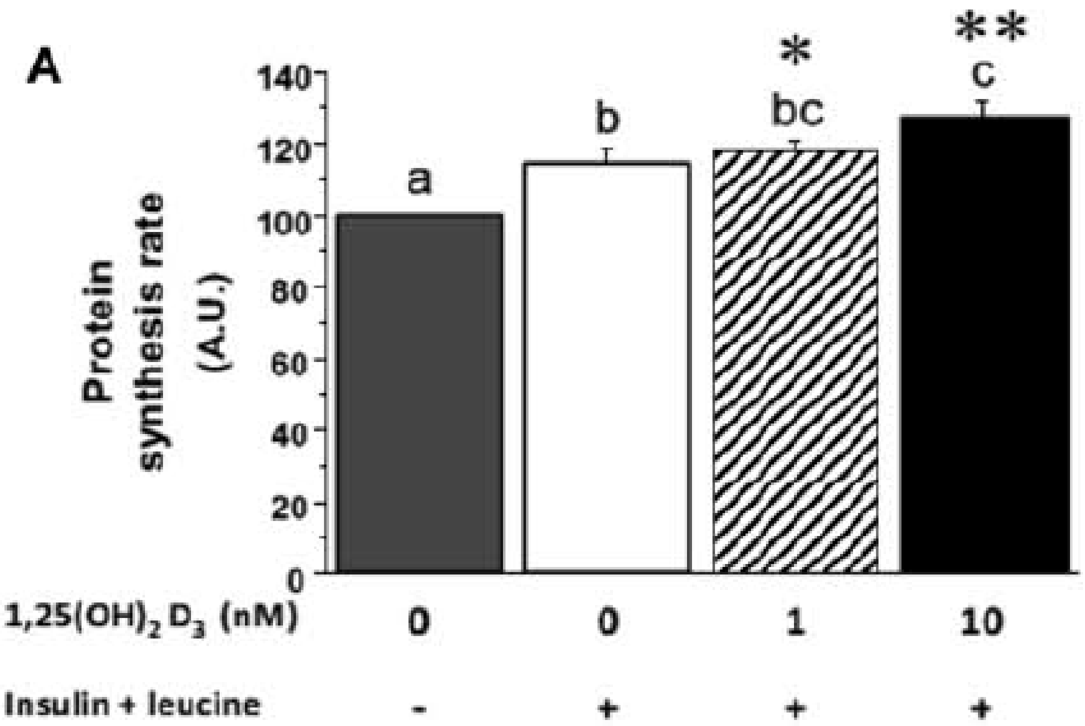
Current Opinion in Clinical Nutrition and Metabolic Care 2009, 12:66–71



1,25(OH)$_2$-vitamin D$_3$ enhances the stimulating effect of leucine and insulin on protein synthesis rate through Akt/PKB and mTOR mediated pathways in murine C2C12 skeletal myotubes

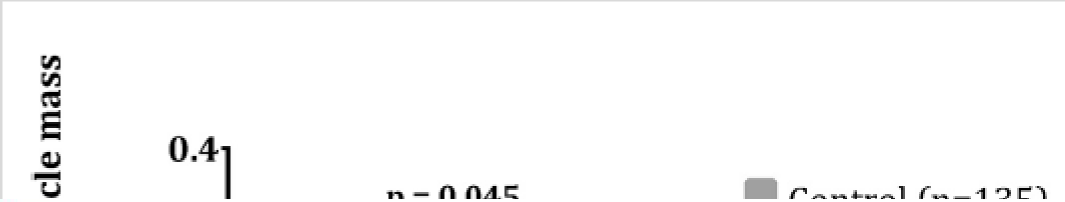
Mol. Nutr. Food Res. 2013, *57*, 2137–2146

Jérôme Salles[1,2], Audrey Chanet[1,2], Christophe Giraudet[1,2], Véronique Patrac[1,2], Philippe Pierre[3,4,5], Marion Jourdan[6], Yvette C. Luiking[6], Sjors Verlaan[6], Carole Migné[1,2], Yves Boirie[1,2,7] and Stéphane Walrand[1,2]



Effects of a Vitamin D and Leucine-Enriched Whey Protein Nutritional Supplement on Measures of Sarcopenia in Older Adults, the PROVIDE Study: A Randomized, Double-Blind, Placebo-Controlled Trial

JAMDA 16 (2015) 740–747



Muscle Strength and Function Outcomes

	Mean (SD)	Change From Baseline, Mean (SD)		Estimated Between-Group DifferenceMean (95% CI)Active − Control	P*
	Baseline	Week 7	Week 13		
Handgrip strength, kg					
Active[†]	20.9 (7.9)	0.20 (3.2)	0.79 (3.6)[‡]	0.30[§] (−0.46–1.05)	.44
Control[‖]	20.6 (7.5)	0.34 (2.8)	0.54 (3.2)		
SPPB					
Active[¶]	7.5 (1.9)	0.50 (1.26)	0.86 (1.38)[**]	0.11[§] (−0.21–0.42)	.51
Control[††]	7.5 (2.0)	0.51 (1.21)	0.77 (1.45)[**]		
Chair-stand time, s[‡‡]					
Active[§§]	17.1 (15.2, 21.2)	−1.4 (−3.3–0.4)	−2.5 (−4.2 to −0.6)[**]	−1.01[§] (−1.77 to −0.19)	.018
Control[‖‖]	17.6 (14.6, 20.6)	−1.0 (−3.0–1.1)	−1.2 (−3.3–0.8)[**]		
Balance test[¶¶]					
Active[¶]	3.0 (2.0, 4.0)	0.0 (0.0–0.0)	0.0 (0.0–1.0)	N.A.	.89
Control[††]	3.0 (2.0, 4.0)	0.0 (0.0–1.0)	0.0 (0.0–1.0)		
Gait speed, m/s					
Active[¶]	0.8 (0.2)	0.03 (0.11)	0.07 (0.12)[**]	0.01[§] (−0.02–0.04)	.46
Control[***]	0.8 (0.2)	0.03 (0.10)	0.05 (0.12)[**]		

Whey protein, amino acids, and vitamin D supplementation with physical activity increases fat-free mass and strength, functionality, and quality of life and decreases inflammation in sarcopenic elderly[1,2]

Mariangela Rondanelli,[3] Catherine Klersy,[6] Gilles Terracol,[7] Jacopo Talluri,[8] Roberto Maugeri,[7] Davide Guido,[4] Milena A Faliva,[3] Bruno S Solerte,[5] Marisa Fioravanti,[5] Henry Lukaski,[9] and Simone Perna[3]*

Effects of supplementation compared with placebo in exercise-trained elderly people[1]

	Dietary supplement group (n = 69)		Placebo group (n = 61)		Treatment effect	
Variable	Mean change (95% CI)	Intragroup P^2	Mean change (95% CI)	Intragroup P^2	Mean difference (95% CI)	P^3
Fat-free mass,[4] g	1382 (847, 1918)	<0.001	−312 (−930, 307)	0.316	1695 (892, 2498)	<0.001
Fat mass, g	−345 (−747, 57.18)	0.092	−484 (−1049, 81.74)	0.092	−114 (−786, 559)	0.689
Gynoid, %	−1.39 (−2.22, −0.56)	0.001	−0.92 (−1.83, −0.02)	0.046	0.54 (−0.67, 1.75)	0.451
Android, %	−2.03 (−2.99, −1.06)	0.001	−0.26 (−1.43, 0.92)	0.66	1.80 (0.30, 3.29)	0.021
RSMM, kg/m^2	0.21 (0.07, 0.35)	0.004	−0.06 (−0.21, 0.90)	0.42	0.27 (0.07, 0.47)	0.009
MNA score	1.76 (1.23, 2.28)	<0.001	0.24 (−0.63, 1.11)	0.585	1.52 (0.51, 2.52)	0.003
Weight, kg	1.12 (0.37, 1.87)	0.004	−0.89 (−1.62, −0.15)	0.019	2.00 (0.97, 3.04)	<0.001
BMI, kg/m^2	0.42 (0.11, 0.72)	0.008	−0.42 (−0.70, −0.14)	0.004	0.84 (0.43, −1.25)	<0.001
Waist circumference, cm	4.93 (−0.86, 10.72)	0.094	2.27 (−1.72, 6.25)	0.259	2.67 (−4.29, 9.62)	0.449
ADL score	0.54 (0.39, 0.68)	<0.001	−0.61 (−0.79, −0.42)	<0.001	1.14 (0.91, 1.38)	<0.001
SF-36 MCS score	4.50 (2.68, 6.32)	<0.001	2.48 (0.21, 4.75)	0.033	2.02 (−0.85, 4.89)	0.166
SF-36 PCS score	1.32 (−0.05, 2.68)	0.059	−0.77 (−2.10, 0.58)	0.249	2.09 (0.21, 3.97)	0.030
CRP, mg/dL	−0.19 (−0.57, 0.19)	0.329	0.44 (−0.02, 0.90)	0.061	0.63 (0.04, 1.22)	0.038
IGF-I, ng/mL	20.7 (11.0, 30.4)	<0.001	1.8 (−4.2, 7.8)	0.541	19.7 (7.1, 32.3)	0.002
Handgrip, kg	3.20 (2.23, 4.18)	<0.001	−0.47 (−1.07, 0.12)	0.117	3.68 (2.55, 4.81)	<0.001

ClinicalTrials.gov Protocol Registration and Results System (PRS) Receipt
Release Date: April 26, 2017

ClinicalTrials.gov PRS
Protocol Registration and Results System

ClinicalTrials.gov ID: NCT03124277

Brief Title: Nutritional Support for Rehabilitation In Parkinsonism

Official Title: A Whey Protein-based Nutritional Supplement Enriched in Vitamin D, Leucine and Calcium for Patients With Parkinsonism Undergoing Rehabilitation Treatment: a Randomized Trial

This randomized, trial will tested the hypothesis that nutritional supplementation with whey protein, essential amino acids - mainly leucine - vitamin D and calcium would increase the efficacy of physical rehabilitation in old adults suffering from Parkinson's disease o parkinsonism

Experimental group:
Best local diet + two servings (40 grams each) of powder containing 20 g whey protein, 3 g total leucine, 800 IU vitamin D, and 500 mg calcium.

Control group:
Best local diet

Study enpoints:

Primary Outcome Measure:

Distance walked during the six minutes walking test

Secondary Outcome Measures:

- Timed up and go test
- Berg balance scale
- Handgrip strength
- Gait speed (4 minutes walking test)
- Self-perceived functional status (SPDDS)
- Body weight
- Muscle mass
- Adverse events
- Treatment continuation

Tale studio potrebbe chiarire in parte anche il ruolo di un supporto nutrizionale specifico nel percorso riabilitativo di pazienti affetti da disabilità ma non sarcopenici.

Sarcopenia and Dynapenia in Patients With Parkinsonism

Michela Barichella MD [a], Giovanna Pinelli MD, PhD [a,b], Laura Iorio MD [a], Erica Cassani MD [a], Angela Valentino BioD [a], Chiara Pusani RD [a], Valentina Ferri MD [a], Carlotta Bolliri BioD [a], Marianna Pasqua BioD [a], Gianni Pezzoli MD [a] Giuseppe Frazzitta MD [b], Emanuele Cereda MD, PhD [c,*]

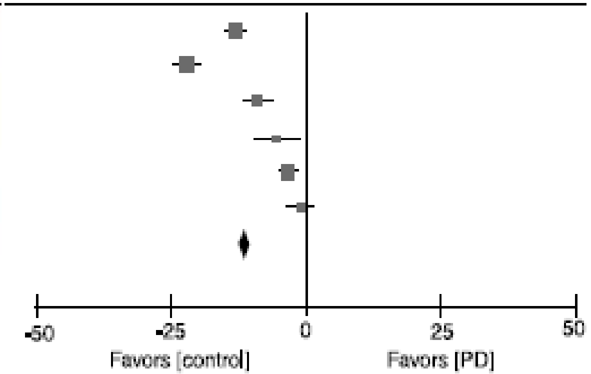
JAMDA 17 (2016) 640–646

Participants: Consecutive patients (n = 364) aged 65 years or older, affected by parkinsonian syndromes.
Measurements: Skeletal muscle mass (SMM), as well as strength and gait speed (GS) were assessed by bioimpedence analysis, handgrip dynamometry, and the 4-meter walking test, respectively. Based on these assessments, sarcopenia was diagnosed using the European Working Group on Sarcopenia in Older People criteria. Dynapenia was defined as handgrip strength less than 30 kg in men and less than 20 kg in women.
Results: In total, 235 patients (64.6%) had a diagnosis of idiopathic PD. Low SMM index was recorded in 27 patients. Due to gait disturbances and postural instability, GS could not be measured in 98 patients and was found to be reduced in 61.3% of those assessed. Prevalence of sarcopenia and dynapenia was 6.6% (95% confidence interval [CI] 4.3–9.7) and 75.5% (95% CI 70.8–79.9), respectively. Sarcopenia tended to be higher in patients unable to perform GS assessment and was unrelated to the type of parkinsonian syndrome. It was associated with older age, longer disease duration, more severe disease, and higher disability in activities of daily living, as assessed by disease-specific clinical rating scale. Dynapenia was directly associated with parkinsonism other than PD, older age, and disability, whereas regular physical therapy appeared to be a preventive factor. However, it was unrelated to disease duration and severity. Finally, the disability score of activities of daily living was inversely correlated with handgrip strength and GS, whereas no association was found with SMM index.

Systematic Review of the Relationship between Vitamin D and Parkinson's Disease

Journal of Parkinson's Disease 6 (2016) 29–37

Study or Subgroup	PD			Control			Mean Difference
	Mean	SD	Total	Mean	SD	Total	IV,Fixed,95% CI
Sato 1997 H&Y 3–5 [9]	8.9	3.2	51	21.6	3.1	33	
Sato 2005 [15]	11.9	6.5	142	33.3	3.1	99	
Abou-Raya 2009 [10]	12.9	9.9	82	21.6	4.8	68	
Evatt 2011 [11]	31.9	13.6	97	37	14.5	99	
Van des Bos 2013 [13]	19.3	8.1	186	22.7	9.2	802	
Peterson 2014 [14]	15.7	9.6	80	16.4	9.9	154	
Total(95% CI)			638			1255	



Test for overall effect: $Z = 33.09 (P < 0.00001)$

–11.55 [–12.23, –10.86] ng/ ml

Dietary habits and neurological features of Parkinson's disease patients: Implications for practice

In press

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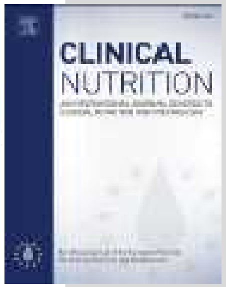
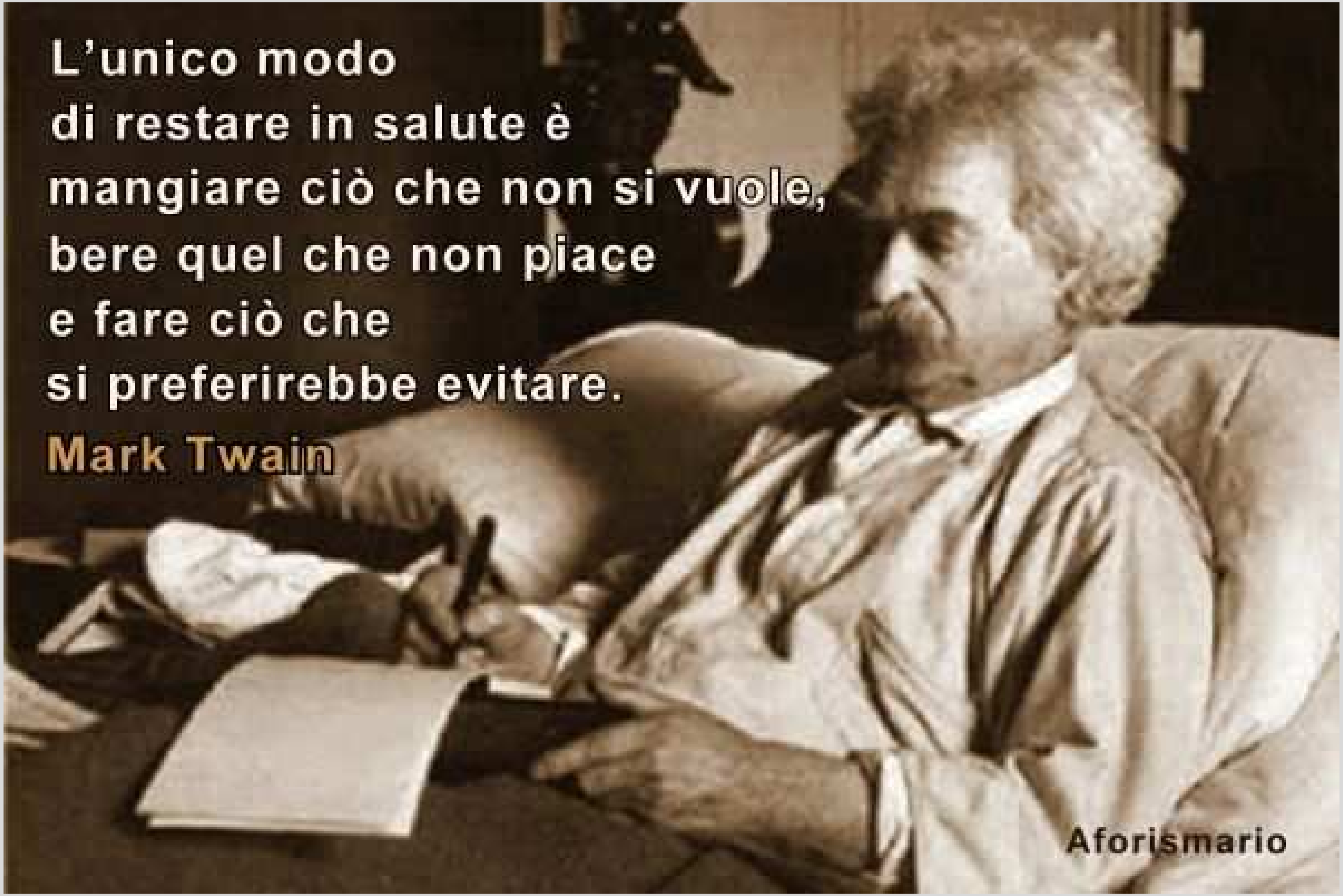


Randomized, double-blind, placebo-controlled trial of vitamin D supplementation in Parkinson disease[1–4]

Masahiko Suzuki, Masayuki Yoshioka, Masaya Hashimoto, Maiko Murakami, Miki Noya, Daisuke Takahashi, and Mitsuyoshi Urashima

Outcome	Vitamin D_3 (n = 55)	Placebo (n = 57)	Difference between groups: RR (95% CI); RD (95% CI)	Difference between groups: P (95% CI) or P
HY stage (stages 1–5)				
Change (after − before)	0.02 ± 0.62[2]	0.33 ± 0.70		0.005 (0.003, 0.006)[3]
Within-group P	0.79	0.0006		
Not worsened or improved [n (%)]	16 (29.1)	7 (12.3)	2.37 (1.06, 5.31); 0.17 (0.02, 0.32)	0.028[4]
UPDRS total (0–195)				
Change (after − before)	−0.87 ± 12.8	4.20 ± 14.5		0.11 (0.10, 0.11)[3]
Within-group P	0.85	0.05		
Not worsened or improved [n (%)]	21 (38.2)	22 (38.6)	0.99 (0.62, 1.58); −0.00 (−0.18, 0.18)	0.96[4]
UPDRS part I (0–16)				
Change (after − before)	0.11 ± 1.30	0.49 ± 1.63		0.28 (0.27, 0.29)[3]
Within-group P	0.66	0.06		
Not worsened or improved [n (%)]	12 (21.8)	12 (21.1)	1.04 (0.51, 2.11); 0.01 (−0.14, 0.16)	0.92[4]
UPDRS part II (0–48)				
Change (after − before)	−0.87 ± 12.8	4.37 ± 14.6		0.004 (0.003, 0.006)[3]
Within-group P	0.32	0.004		
Not worsened or improved [n (%)]	26 (47.3)	16 (28.1)	1.68 (1.02, 2.78); 0.19 (0.02, 0.37)	0.036[4]
UPDRS part III (0–108)				
Change (after − before)	−1.05 ± 10.0	1.05 ± 9.09		0.26 (0.25, 0.27)[3]
Within-group P	0.37	0.58		
Not worsened or improved [n (%)]	27 (49.1)	27 (47.4)	1.04 (0.71, 1.52); 0.02 (−0.17, 0.20)	0.86[4]

Am J Clin Nutr 2013;97:1004–13.


L'unico modo
di restare in salute è
mangiare ciò che non si vuole,
bere quel che non piace
e fare ciò che
si preferirebbe evitare.
Mark Twain
Aforismario