64 CONGRESSO NAZIONALE SIGG

Continuità di affetti, continuità di cure

ROMA, 27/30 NOVEMBRE 2019 - AUDITORIUM DELLA TECNICA

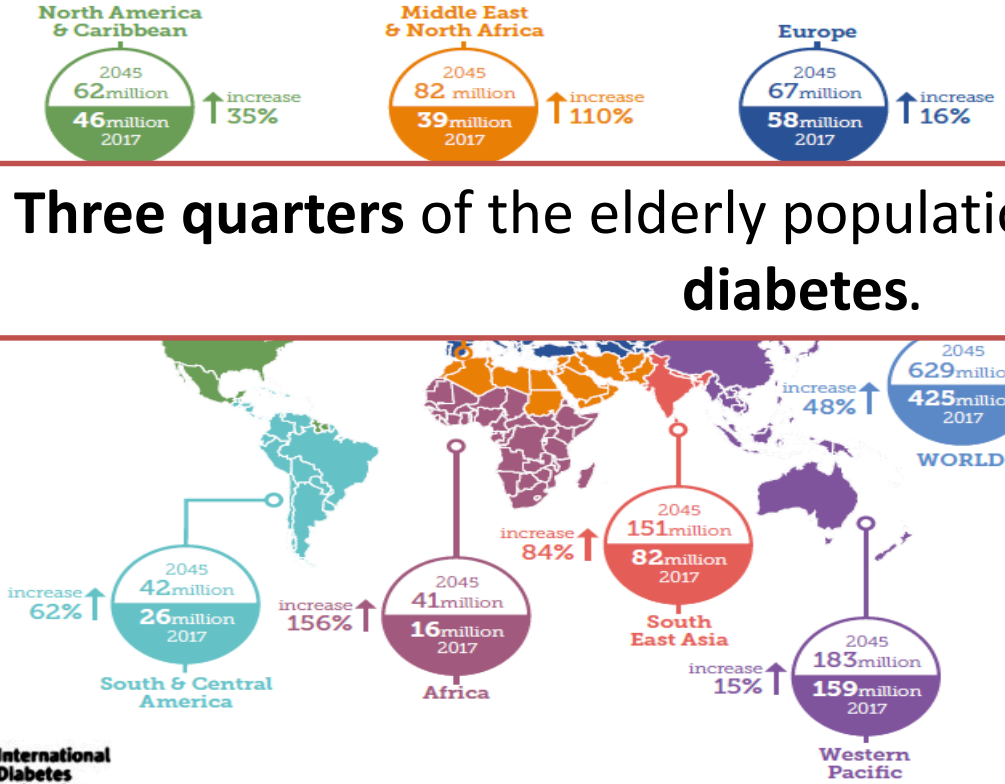
Aspetti nutrizionali nel paziente diabetico

Prof. G. Paolisso

Università degli Studi della Campania *Luigi Vanvitelli*

Diabetes: A global emergency

Number of people with diabetes worldwide and per region in 2017 and 2045 (20-79 years)



425

Three quarters of the elderly population has **pre-diabetes or diabetes.**

629 Million

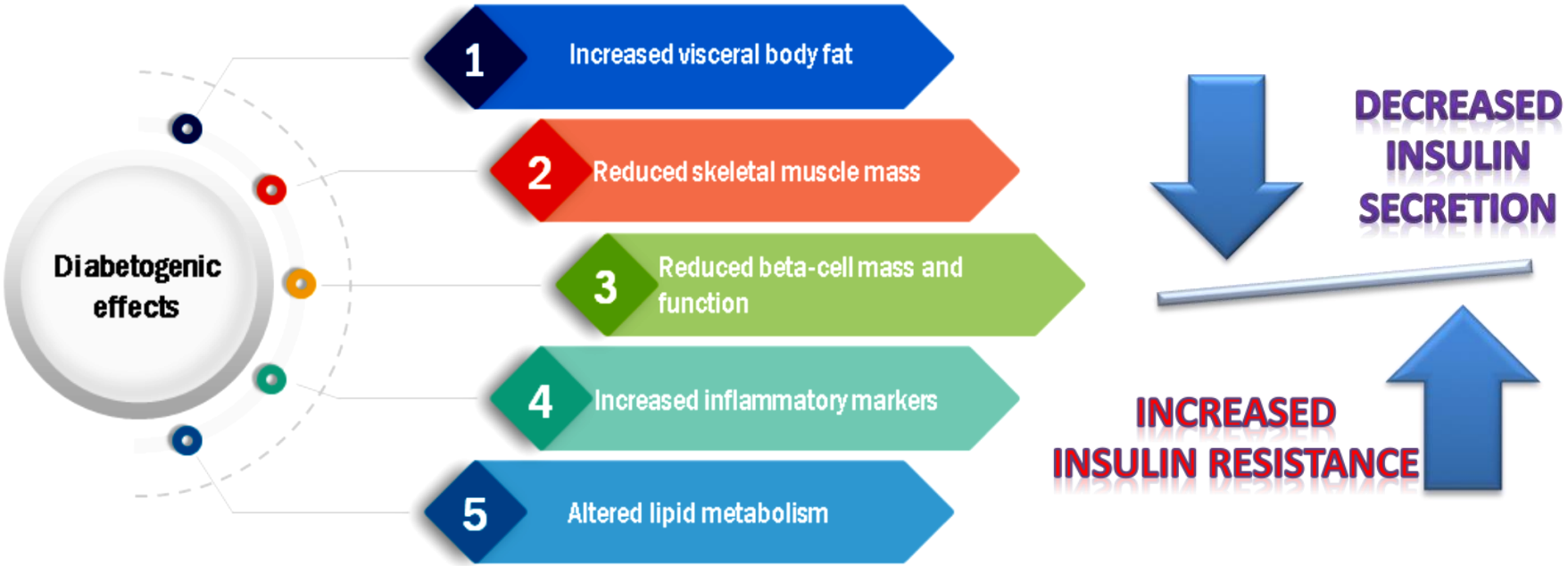
International Diabetes Federation

Physiological Changes in Older Adult

	Changes	Functional Effects
Cardiovascular	- Increased collagen matrix in Tunica Media - Loss of elastin fibers - Cardiac hypertrophy: septum thickening - Decreased cardiomyocytes and increased extracellular matrix	- Heart and vascular stiffness - Mayor endothelial dysfunction - Explosive volume preserved - Increased risk of arrhythmias
Renal	- Thinning renal cortex - Glomerular sclerosis arteries - Glomerular basement membrane Thickening	- Decreased ability to concentrate urine. Lower renin and aldosterone levels - Lower vitamin D hydroxylation
Glucose Metabolism	- Increased visceral fat - Fat tissue infiltration - Less beta cell mass	- Increased production of adipokines and inflammatory factors inflammatory factors - Greater insulin resistance and diabetes
Bones	- Decreased bone mineral content	- Increased fractures and falls - Osteoporosis
Muscular	- Loss of muscle mass - Less type II fibers - Fat infiltration	- Decreased strength and power - Falls - Fragility
Central Nervous System	- Less brain mass - Increased cerebrospinal fluid - Low neuronal loss, focused - Changes in neuronal arborization	- Less targeting neuronal activity - Lower processing speed - Decreased working memory - Less motor skills
Body Composition	- Increased body fat - Increased Body Mass Index (BMI)	- Increased risk of disease.

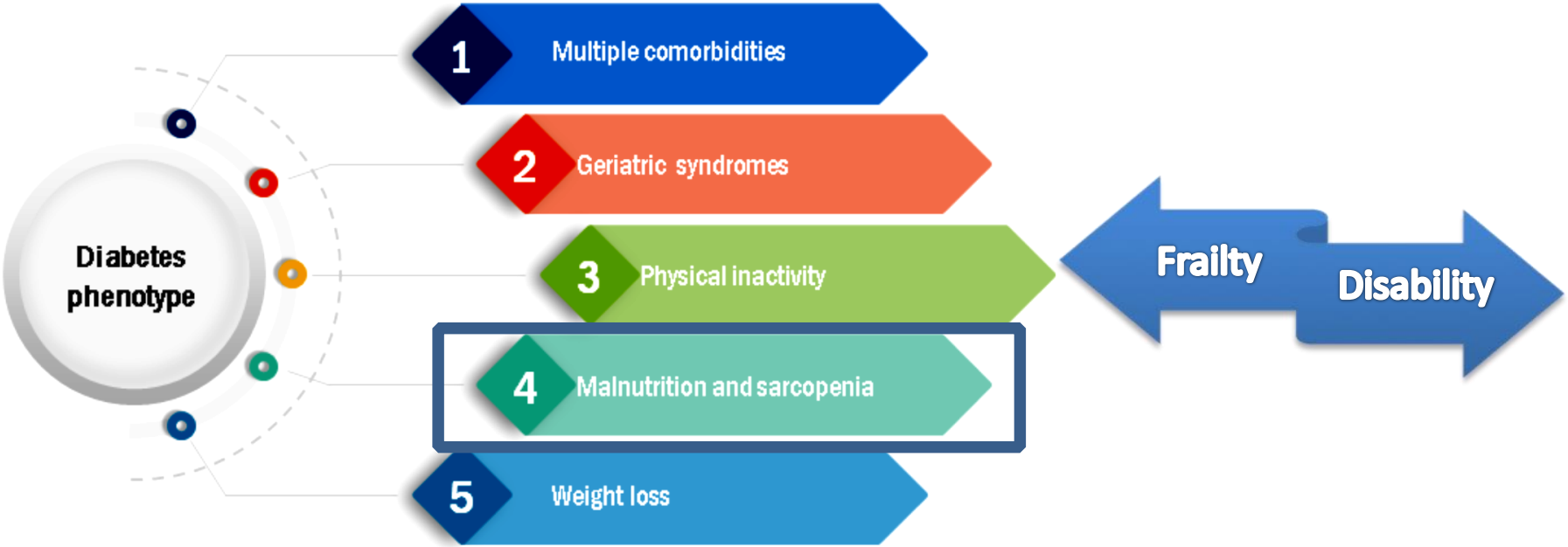
Diabetogenic effects

Diabetogenic effects of ageing



Ahmed H. Abdelhafiz et Al, “Diabetes, Nutrition, and Exercise”, ClinGeriatrMed – (2015)

Diabetes phenotype in old age



Ahmed H. Abdelhafiz et Al, “Diabetes, Nutrition, and Exercise”, ClinGeriatrMed – (2015)

Management and treatment of type 2 diabetes

La valutazione funzionale

Il paziente anziano con diabete tipo 2 dovrebbe ricevere una valutazione multidimensionale geriatrica e una valutazione delle sindromi geriatriche. VI B

La valutazione deve includere la misura delle funzioni globale/fisica, cognitiva e affettiva. VI B

La valutazione funzionale deve essere completata da un accertamento delle comorbilità e dello stato nutrizionale. VI B

Tabella I. Valutazione multidimensionale nel paziente diabetico anziano.

Stato fisico	Valutare la presenza di patologie, con particolare riguardo a: Patologie cardiovascolari (ipertensione, aterosclerosi, SC) Patologie nefrologiche (insufficienza renale) Patologie oftalmologiche (cataratta, retinopatia) Patologie neurologiche e neuromuscolari (demenza, neuropatia) Valutare la terapia farmacologica assunta (polifarmacoterapia)
Stato funzionale	Valutare l'autonomia funzionale e le abitudini di vita mediante ADL, IADL
Stato cognitivo e psichico	Valutare la presenza di depressione, disturbi d'ansia, declino cognitivo, demenza
Stato nutrizionale	Valutare le abitudini alimentari e lo stato nutrizionale mediante MNA
Stato socio-economico	Valutare la situazione familiare (vive da solo, assistito da familiari o caregiver) e la situazione abitativa (vive al proprio domicilio, in comunità)

IADL: *instrumental activities of daily living*; ADL: *activities of daily living*; MNA: *Mini Nutritional Assessment*.

Nutritional status

"Nutritional status is the condition of the body resulting from the intake, absorption and utilization of food, as well as from factors of pathological significance. Nutritional status assessment usually includes anthropometric, dietary and biochemical measurements, clinical history and physical and other data" (World Health Organization, 1973)

Mini Nutritional Assessment
MNA®

Nestlé Nutrition Institute

Last name: First name:

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

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

Screening

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

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

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

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

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

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

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

Assessment

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

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

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

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

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

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

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

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

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

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

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

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

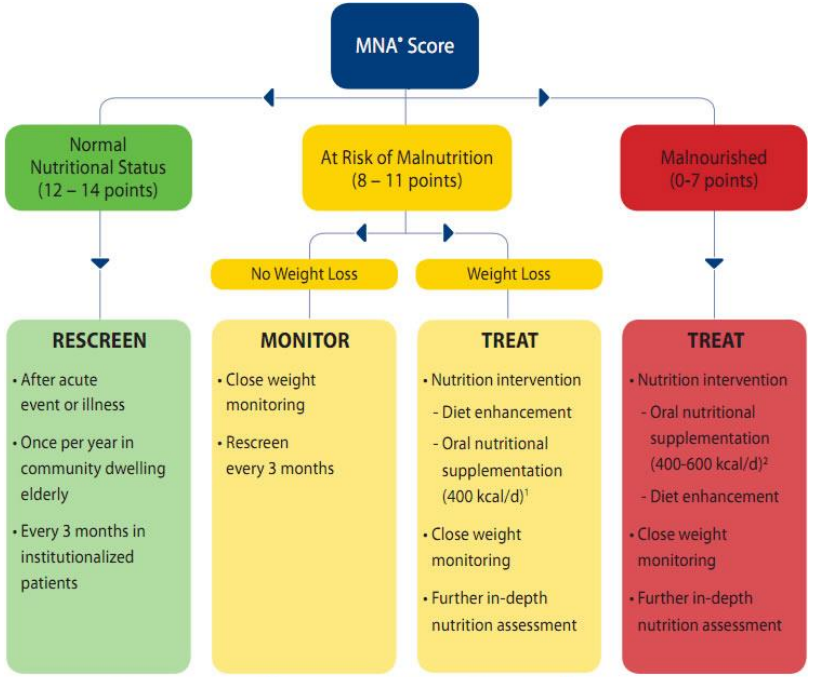
R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater ☐

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

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

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

For more information: www.mna-elderly.com



1. Milne AC, *et al. Cochrane Database Syst Rev.* 2009:2:CD003288 2. Gariballa S, *et al. Am J Med.*2006;119:693-699

Nutritional problems of diabetic elderly

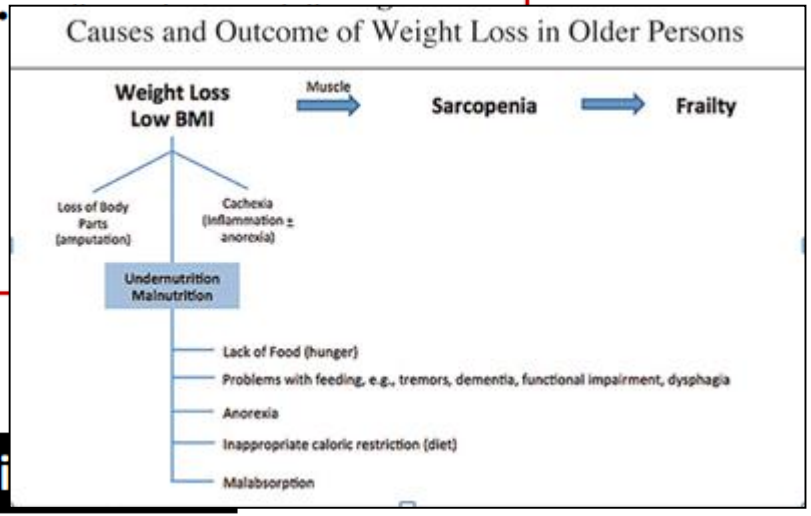
Fattori legati all'invecchiamento

- Cambiamenti fisiologici della composizione corporea
- Problemi dentari
- Ipovisione
- Problemi articolari
- Modifiche apparato gastro-intestinale e urinario
- Demenza
- Condizione sociale
- Altre patologie associate (insufficienza cardiaca, insufficienza respiratoria, patologie tumorali ecc…)

Fattori legati al diabete

Carenze nutrizionali che possono incidere

- sulla malattia diabetica (insorgenza e gestione)



Stato di malnutri

SidItalia « glicemia e senilità 2018»

Undernutrition: Definition and Causes

EFFECTS OF AGING ON NUTRITION	
Change	→ ***Effect***
Sensory Impairment	
• Decreased sense of taste	→ Reduced appetite
• Decreased sense of smell	→ Reduced appetite
• Loss of vision and hearing	→ Decreased ability to purchase and prepare food
• Oral health / dental problems	→ Difficulty chewing, inflammation, poor quality diet
Altered energy need	→ Diet lacking in essential nutrients
Decreased physical activity	→ Progressive depletion of LBM and loss of appetite
Muscle loss (sarcopenia)	→ Decreased functional ability, assistance needed with ADLs
Psychosocial (isolation)	→ Decreased appetite
Environmental (financial)	→ Limited access to food; poor quality diet
Cumulative Effect	→ ***Progressive Undernutrition***

Ahmed H. Abdelhafiz et Al, “Diabetes, Nutrition, and Exercise”, ClinGeriatrMed – (2015)

Malnutrition

"A state of nutrition in which a deficiency, or excess, of energy, protein and micronutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function, and clinical outcome"

Undernutrition

Obesity

Stratton R, Green C, Elia M. Scientific criteria for defining malnutrition. Disease related malnutrition: an evidence-based approach to treatment. UK: CABI Publishing; 2003. p. 1–34

Malnutrition (2)

The diabetes as a risk factor for malnutrition

Author, year	Number of hospitals, countries	Total number of participants, age	Number of elderly diabetic patients	Nutritional assessment scale used	Malnourished patients or at risk of malnutrition
Our series	One hospital; Morocco	N = 300 Age ≥ 65 years old	n = 300; average age:71,77 ± 6,7 years old	MNA	14.33% of participants were malnourished, 47.67% were at risk of malnutrition.

Table 3: Prevalence of malnutrition in elderly diabetic patients according to various studies.

Elderly diabetic patients'malnutrition **increase morbidity and mortality**, so it is important to evaluate their nutritional status in order to detect and treat an early malnutrition state for a better overall management.

The prevalence of malnutrition in elderly diabetic patients in hospital varies from 5.3 to 22.8%.

Hasna Ballaziri, Nassim Essabah Haraj, Siham El Aziz, et al. Nutritional Status Assesment of of The Type 2 Elderly Diabetic Patient. Diabetes Complications. 2019

Sarcopenia: An intermediate step between diabetes and frailty

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

Its diagnosis is based on criterion 1 plus criterion 2 or 3:

1. Reduced muscle mass
2. Reduced muscle strength
3. Reduced physical performance

Association between sarcopenia and diabetes: a systematic review and meta-analysis of observational studies

Nicola Veronese[1] · Damiano Pizzol[2] · Jacopo Demurtas[3] · Pinar Soysal[4] · Lee Smith[5] · Cornel Sieber[6] · Timo Strandberg[7,8] · Isabelle Bourdel-Marchasson[9,10] · Alan Sinclair[11] · Mirko Petrovic[12] · Stefania Maggi[1] · on behalf of the Special Interest Groups of Systematic Reviews and Meta-Analysis for Healthy Ageing, Diabetes, Sarcopenia of European Geriatric Medicine Society (EuGMS)

Received: 10 May 2019 / Accepted: 28 June 2019 / Published online: 5 July 2019

This systematic review and meta-analysis indicated that sarcopenia and diabetes can be bi-directionally associated, even if the findings are mainly based on crossectional and case control studies. People with diabetic complications reported a signifcatly higher presence of sarcopenia compared to diabetic participants without complications.

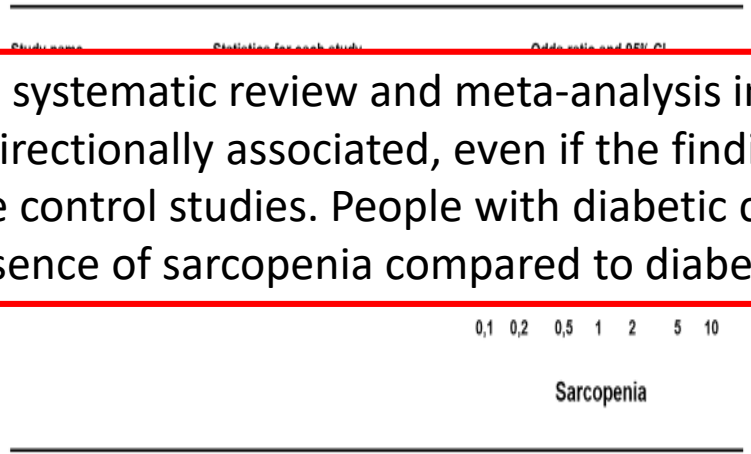


Fig. 2 Adjusted odds ratio of diabetes in sarcopenia vs. healthy controls

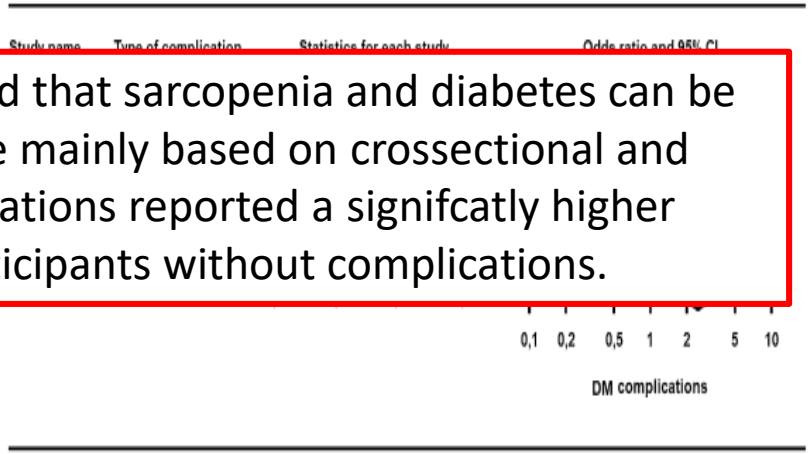
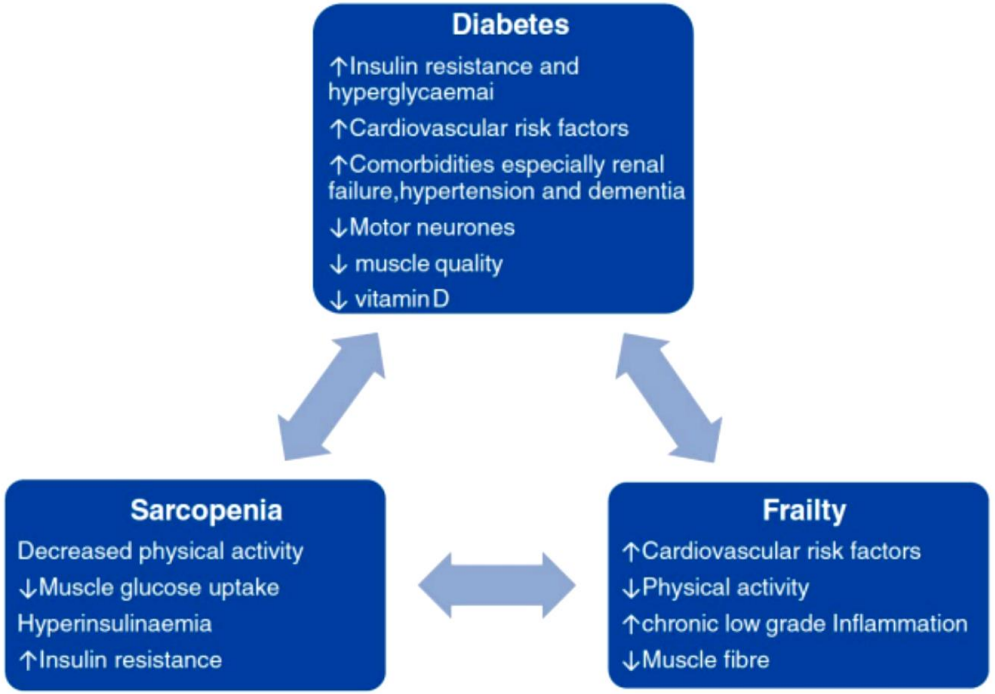


Fig. 3 Odds ratio of sarcopenia in diabetic people with micro or macro-complications vs. diabetics without complications

Triad of interrelationships among sarcopenia, frailty and diabetes



AJ Sinclair, Journal of Diabetes and Its Complications 2017

Prevalence of an interventions for sarcopenia in ageing adults: a systematic review. Report of the International Sar IWGS)

Alfonso J. Cruz-Jentoft, Franc
Hidenori Arai, Yves Boirie, Lia
Jean-Pierre Michel ... Show m

Objective: to examine the
sarcopenia and the effect
using the consensus defin
Working Group on Sarcope

Nutrition intervention

Although nutrition intervention is considered one of the mainstays of intervention in sarcopenia, much of the evidence is based on short-term protein synthesis studies, and large clinical trials are still lacking. Our review has failed to show a consistent effect of protein supplementation, although the number of studies found using our strict selection criteria was very low. EAAs (with ~2.5 g of leucine) and HMB seem to have some effects on muscle mass and muscle function that need to be confirmed in larger trials. Vitamin D studies were evaluated as part of the review process; while some epidemiological studies link vitamin D levels with muscle parameters, there were no intervention studies meeting the criteria for inclusion in

Some benefit is also found with the supplementation of essential amino acids (EAA), including supplements based on leucine and HMB (beta-hydroxy beta-methylbutyric acid). Although, the authors conclude, there are no consistent data to recommend its use for patients with sarcopenia.

further research. However, solid evidence on which to base recommendations for patients with sarcopenia is not available.

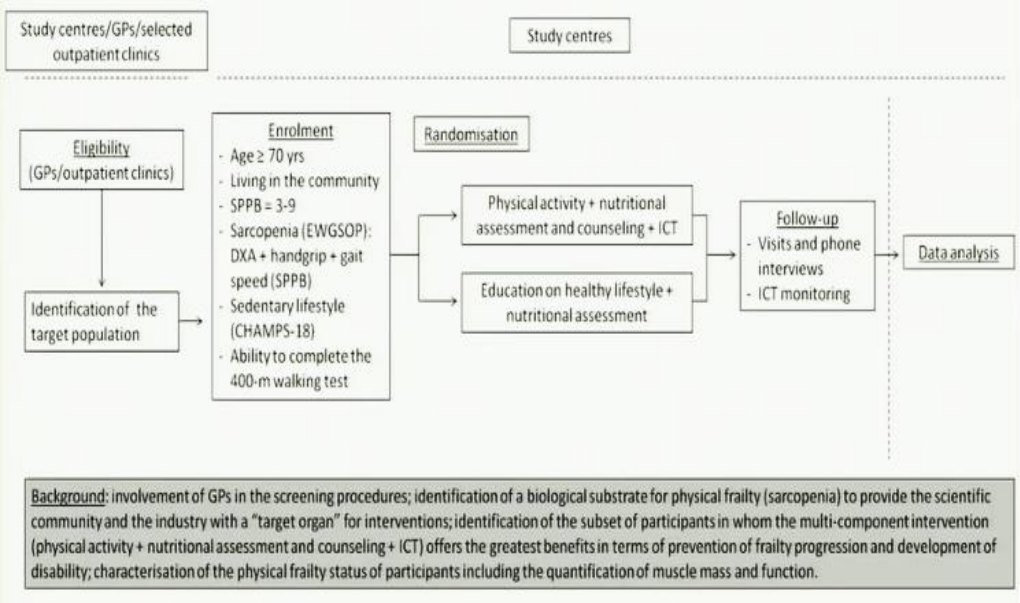
The "Sarcopenia and Physical fRailty IN older people: multi-componenT Treatment strategies" (SPRINTT) randomized controlled trial: design and methods

SPRINTT
Sarcopenia & Physical fRailty IN older people: multi-componenT Treatment strategies

Francesco Landi[1] · Matteo Cesari[2,3] · Riccardo Calvani[1] · Antonio Cherubini[4] · Mauro Di Bari[5,6] · Raphael Bejuit[7] · Jerome Mshid[7] · Sandrine Andrieu[8,9] · Alan J. Sinclair[10] · Cornel C. Sieber[11] · Bruno Vellas[2] · Eva Topinkova[12] · Timo Strandberg[13,14,15] · Leocadio Rodriguez-Manas[16] · Fabrizia Lattanzio[4] · Marco Pahor[17] · Ronenn Roubenoff[18] · Alfonso J. Cruz-Jentoft[19] · Roberto Bernabei[1] · Emanuele Marzetti[1] · on behalf of the SPRINTT Consortium

16 clinical sites
11 European countries

SPRINTT is a phase III, multicenter RCT aimed at comparing the efficacy of a MCI, based on long-term structured physical activity, nutritional counseling/dietary intervention, and an information and communication technology intervention, versus a healthy aging lifestyle education program designed to prevent mobility disability in **1500 older persons** with physical frailty and sarcopenia who will be followed for up to 36 months.



Aging Clin Exp Res (2017) 29:89–100 DOI 10.1007/s40520-016-0715-2

Obesity in the older adults with diabetes

Type 2 diabetes is a worldwide epidemic associated with obesity

In the elderly, is obesity bad? Is losing weight good?

Clinical outcome	High body mass index	High abdominal fat	Increased lean muscle	Intentional weight loss
All-cause mortality	Decrease or neutral	Increase	Decrease	Unknown
Blood pressure	Increase	Increase	Unknown	Decrease
Physical	Decrease but	Decrease	Increase	Increase
Dyslipidema	Increase	Increase	Unknown	Decrease

[a] Myocardial infarction or stroke.
[b] May be different for women.

REPRINTED FROM OREOPOULOS A, KALANTAR-ZADEH K, SHARMA AM, FONAROW GC. THE OBESITY PARADOX IN THE ELDERLY: POTENTIAL MECHANISMS AND CLINICAL IMPLICATIONS. CLIN GERIATR MED 2009; 25:643–659, WITH PERMISSION FROM ELSEVIER. HTTP://WWW.GERIATRIC.THECLINICS.COM.

Because of age-related changes in body composition and reduced energy requirements and expenditure, recommendations for the young and middle-aged should not be applied directly to older adults.

Modest Intentional weight loss should be recommended to high-risk older adults, including those with cardiovascular disease, type 2 diabetes mellitus, and metabolic syndrome, because the absolute risk of death and morbidity is higher in this group.

Obesity in the elderly: More complicated than you think doi:10.3949/ccjm.81a.12165

Sarcobesity

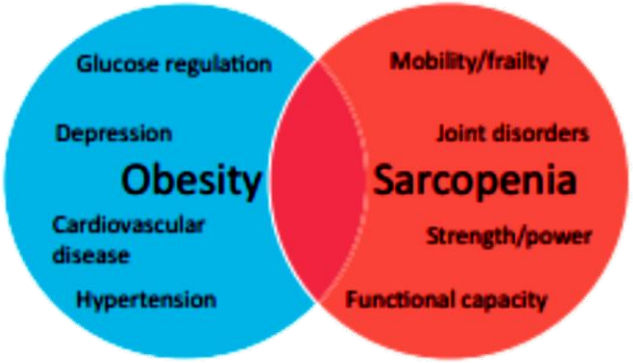
Review

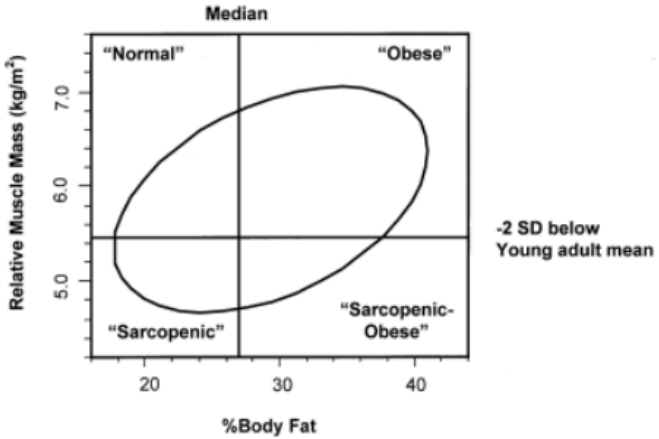
'Sarcobesity': A metabolic conundrum

Evelyn B. Parr, Vernon G. Coffey, John A. Hawley*

Exercise & Nutrition Research Group, School of Medical Sciences, RMIT University, Bundoora, Victoria 3083, Australia

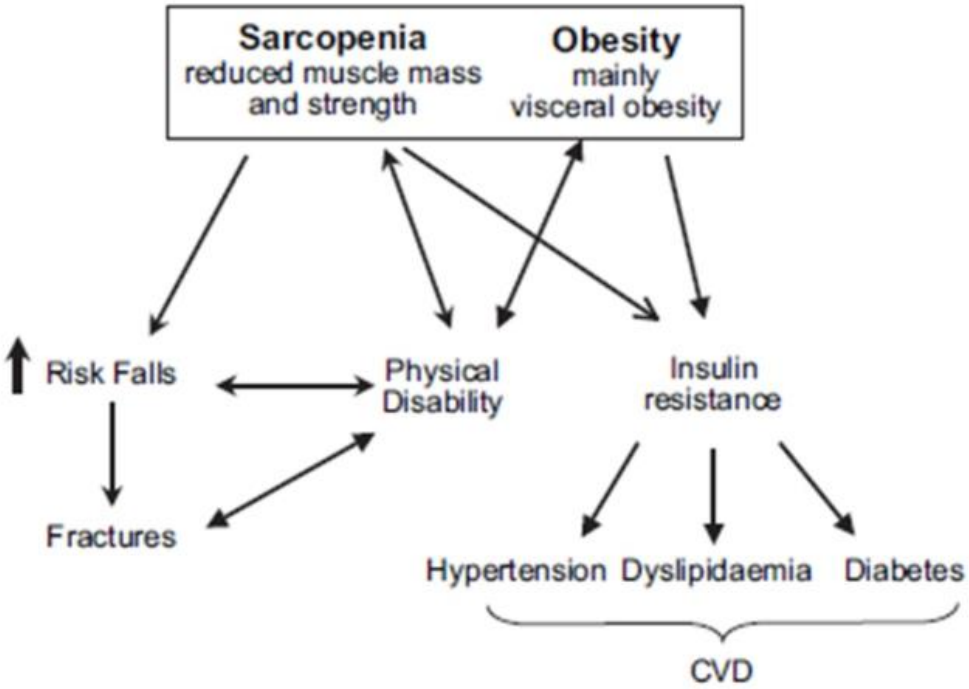
Two independent but inter-related conditions that have a growing impact on healthy life expectancy and health care costs in developed nations are an age-related loss of muscle mass (i.e., sarcopenia) and obesity. Sarcopenia is commonly exacerbated in overweight and obese individuals. Progression towards obesity promotes an increase in fat mass and a concomitant decrease in muscle mass, producing an unfavourable ratio of fat to muscle. The coexistence of diminished muscle mass and increased fat mass (so-called 'sarcobesity') is ultimately manifested by impaired mobility and/or development of life-style-related diseases. Accordingly, the critical health issue for a large proportion of adults in developed nations is how to lose fat mass while preserving muscle mass. Lifestyle interventions to prevent or treat sarcobesity include energy-restricted diets and exercise. The optimal energy deficit to reduce body mass is controversial. While energy restriction in isolation is an effective short-term strategy for rapid and substantial weight loss, it results in a reduction of both fat and muscle mass and therefore ultimately predisposes one to an unfavourable body composition. Aerobic exercise promotes beneficial changes in whole-body metabolism and reduces fat mass, while resistance exercise preserves lean (muscle) mass. Current evidence strongly supports the inclusion of resistance and aerobic exercise to complement mild energy-restricted high-protein diets for healthy weight loss as a primary intervention for sarcobesity.





E.B. Parr et al. / Maturitas 74 (2013) 109–113

Possible Consequence of sarcopenic obesity in the Elderly



Zamboni et al. 2008

Sarcopenic Obesity and Its Temporal Associations With Changes in Bone Mineral Density, Incident Falls, and Fractures in Older Men: The Concord Health and Ageing in Men Project

David Scott,[1,2] Markus Seibel,[3] Robert Cumming,[4,5,6] Vasi Naganathan,[5] Fiona Blyth,[5] David G Le Couteur,[7] David J Handelsman,[8] Louise M Waite,[5] and Vasant Hirani[5,9]

STUDY DESIGN: CHAMP is an epidemiological study

This prospective population-based study demonstrated that sarcopenic obese older men had significantly higher 2-year fracture rates compared with non-sarcopenic non-obese counterparts.

associations between sarcopenic obesity and its components with bone mineral density (BMD) and incident falls and fractures in Australian community-dwelling older men.

Table 5. Hazards Ratios (95% CI) for Any and Non-vertebral Incident Fractures, According to Sarcopenic Obesity Categories in 1486 Men With Complete Baseline Data

	EWGSOP definition			
	Non-sarcopenic, non-obese	Non-sarcopenic obese	Sarcopenic non-obese	Sarcopenic obese

	FNIH definition			
	Non-sarcopenic, non-obese (*n* 797)	Non-sarcopenic obese (*n* 570)	Sarcopenic non-obese (*n* 58)	Sarcopenic obese (*n* 61)
Any fracture (%)	10.0	9.3	12.1	19.7
Unadjusted	Ref.	0.90 (0.64, 1.28)[b]	1.46 (0.67, 3.15)	**2.38 (1.29, 4.36)**
Adjusted[a]	Ref.	0.76 (0.52, 1.10)[b]	0.90 (0.38, 2.11)	1.72 (0.90, 3.27)
Non-vertebral fracture (%)	8.4	8.1	6.9	13.1
Unadjusted	Ref.	0.93 (0.64, 1.36)	0.95 (0.35, 2.61)	1.81 (0.87, 3.78)
Adjusted[a]	Ref.	0.83 (0.56, 1.24)	0.52 (0.16, 1.68)	1.29 (0.60, 2.81)

EWGSOP European Working Group on Sarcopenia; FNIH Foundation for the National Institutes of Health.
[a]Adjusted for age, income, living alone, psychotropic medication use, smoking status, physical activity, 25OHD, and number of comorbidities.
Bold values indicate significant difference to non-sarcopenic non-obese group.
[b]Indicates significant difference to sarcopenic obese group.

Sarcopenic Obesity and Risk of Cardiovascular Disease and Mortality: A Population-Based Cohort Study of Older Men

Janice L. Atkins, MSc, Peter H. Whincup, PhD,† Richard W. Morris, PhD,* Lucy T. Lennon, MSc,* Olia Papacosta, MSc,* and S. Goya Wannamethee, PhD**

DESIGN: Prospective cohort study.
PARTICIPANTS: Men aged 60–79 years (n = 4,252).
MEASUREMENTS: Baseline waist circumference (WC) and midarm

OBJECTIVES: To examine associations between sarcopenia, obesity, and sarcopenic obesity and risk of cardiovascular disease (CVD) and all-causes mortality in older men

Sarcopenia and central adiposity were associated with greater cardiovascular mortality and all causes mortality. Sarcopenic obese men had the highest risk of all-cause mortality but not CVD mortality. Efforts to promote healthy aging should focus on preventing obesity and maintaining muscle mass.

2. obese,
3. sarcopenic obese,
4. or optimal WC and MAMC.

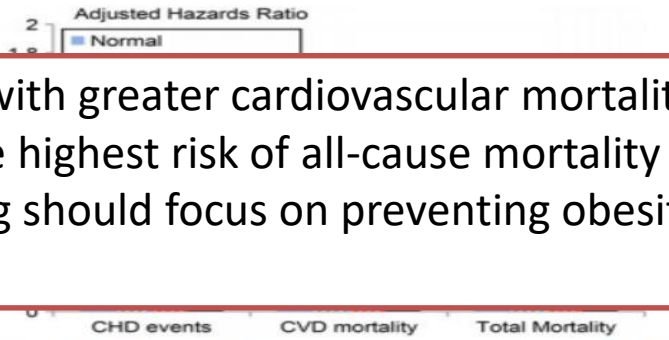


Fig. 2. (Colour online) Adjusted hazards ratio for major CHD events, cardiovascular mortality and total cause mortality according to sarcopenic obesity groups (defined according to waist circumference (>102 cms) and mid-arm muscle circumference (lowest 2 quintiles)). Hazards ratios adjusted for age, smoking status, alcohol intake, physical activity and social class. The British Regional Heart Study. Data extracted from Atkins *et al.*[43].

DOI: 10.1111/jgs.12652

Sarcobesity: Strategy of treatment

J Nutr Health Aging, 2016;20(7):780-8. doi: 10.1007/s12603-015-0631-8.

Sarcopenic Obesity: An Appraisal of the Current Status of Knowledge and Management in Elderly People.

Molino S[1], Dossena M, Buonocore D, Verri M.

Reduce abdominal circumference

Dietary restriction

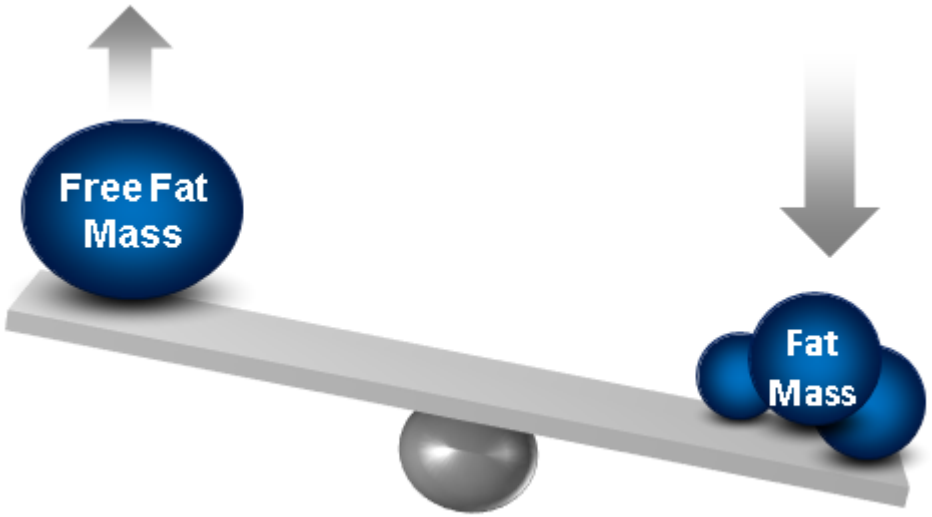
Preserve strength and muscle mass

Supplement protein intake

Exercise

Diabetes, Nutrition and Exercise

The best way to avoid losing lean body mass and to preserve bone density during weight loss is to include a program of resistance-training exercises.



Obesity in the elderly: More complicated than you think
doi:10.3949/ccjm.81a.12165

Exercise in older people with diabetes

Exercise training is an important part of diabetes prevention and management to improve body composition, insulin resistence and glucose control

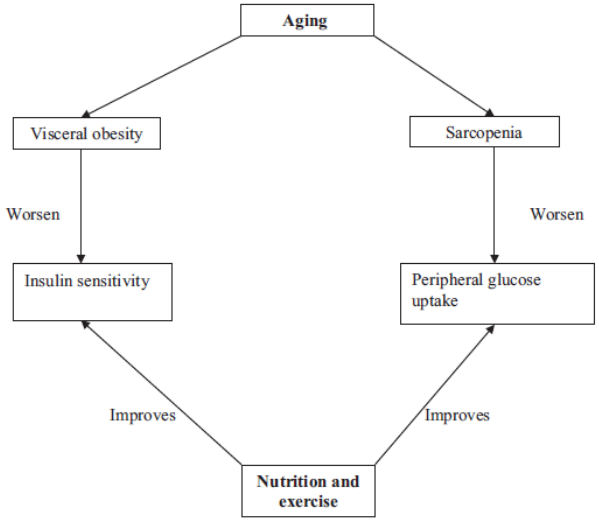
Aerobic exercise	Resistance exercise
Recruitment of large groups of muscles Includes activities such as walking, cycling, swimming, or jogging (may not be suitable for all older people because of the high prevalence of comorbidities such as arthritis, cardiovascular disease, peripheral vascular disease, neuropathy, and poor mobility)	Recruitment of single muscle group (Use of muscular strength to lift a weight or to move a load). **It may be a safer alternative for these patients**

Ahmed H. Abdelhafiz et Al, “Diabetes, Nutrition, and Exercise”, ClinGeriatrMed – (2015)

Nutrition and exercise interaction

	Aerobic	Resistance
Muscles involved	Large groups of muscle contracting continuously	One group of muscle contracting intermittently
Examples	Walking and jogging	Lifting or moving load
Metabolic effects		
Improved insulin sensitivity	++	++
Increase glucose uptake	++	++
Improves lipid profile	++	++
Blood pressure control	++	++
Improves aerobic capacity	+++	+
Body composition effects		
Reduction of body fats	++	+
Increase muscle mass	+	+++
Increase muscle strength	+	+++
Duration	Long	Short
Suitability	Reasonably fit persons	Persons with comorbidities or poor mobility
Overall improvement	Improves stamina	Improves force

The synergistic effects of nutrition and exercise can play an important role in diabetes prevention and glucose control.



Ahmed H. Abdelhafiz et Al, “Diabetes, Nutrition, and Exercise”, ClinGeriatrMed – (2015)

Effectiveness of a multimodal intervention in functionally impaired older people with type 2 diabetes mellitus

MIDFrail

Leocadio Rodriguez-Mañas[1*], Olga Laosa[2], Bruno Vellas[3], Giuseppe Paolisso[4], Eva Topinkova[5], Juan Oliva-Moreno[6], Isabelle Bourdel-Marchasson[7], Mikel Izquierdo[8], Kerry Hood[9], Andrej Zeyfang[10], Giovanni Gambassi[11], Mirko Petrovic[12], Tim C. Hardman[13], Mark J. Kelson[14], Ivan Bautmans[15], Gabor Abellan[3], Michelangela Barbieri[4],

Table 3 Result of analysis of the primary outcome (SPPB) and sensitivity analyses.

After 12 months, IG participants had mean SPPB scores 0.85 points higher than those in the UCG (95% CI, 0.44 to 1.26, **P < 0.0001**). Estimates suggest a mean saving following intervention of 428.02 EUR (2016) per patient per year, with ICER analysis indicating a consistent benefit of the described health care intervention over usual care. No statistically significant differences between groups were detected in any of the other secondary outcomes.

Intervention (n = 451)	8.07 (7.81 to 8.32)	8.69 (8.37 to 9.00)

ICC, interclass correlation coefficient.

We have demonstrated that a 12 month structured multimodal intervention programme across several clinical settings in different European countries leads to a clinically relevant and cost-effective improvement in the functional status of older frail and pre-frail participants with type 2 diabetes mellitus.

Journal of Cachexia, Sarcopenia and Muscle 2019; **10**: 721–733 **DOI:** 10.1002/jcsm.12432
Published online 23 April 2019 in Wiley Online Library (wileyonlinelibrary.com)

Micronutirients: Vitamins

Vitamin D Supplementation and Prevention of Type 2 Diabetes

The NEW ENGLAND JOURNAL of MEDICINE

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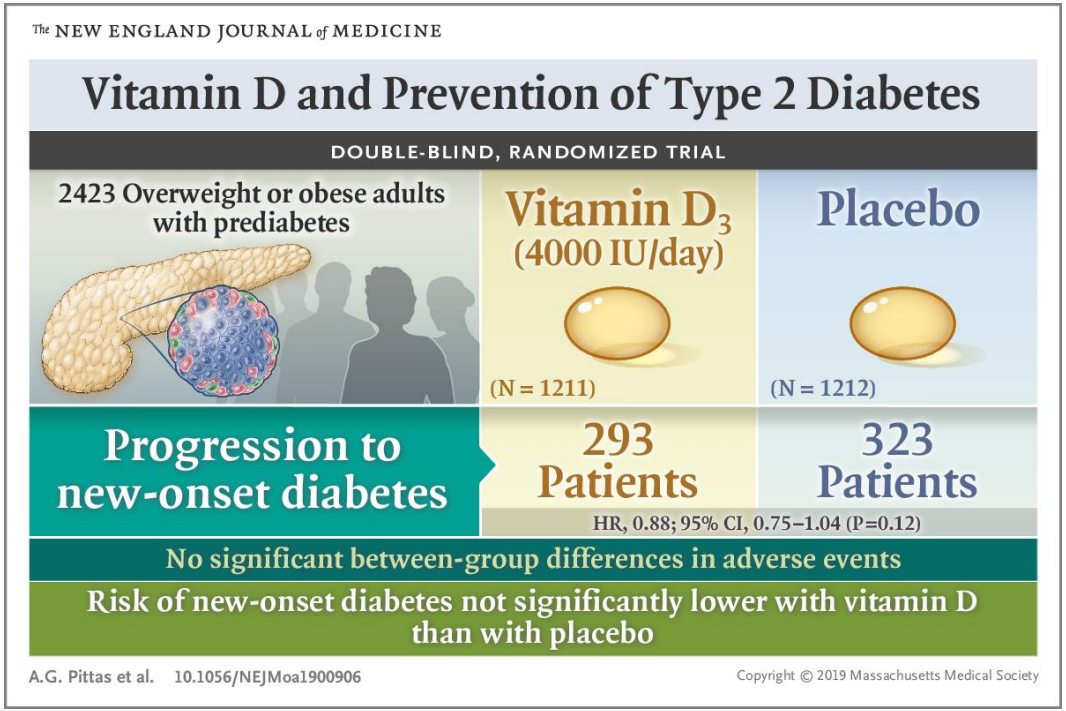

N Engl J Med 2019; 381:520-530
DOI: 10.1056/NEJMoa1900906

Vitamin B_{12} deficiency in patients with type 2 diabetes

Hyperglycemia and Metformin Use Are Associated With B Vitamin Deficiency and Cognitive Dysfunction in Older Adults

Kirsty M. Porter,[1] Mary Ward,[1] Catherine F. Hughes,[1] Maurice O'Kane,[2] Leane Hoey,[1] Adrian McCann,[3] Anne M. Molloy,[4] Conal Cunningham,[5]

Large observational studies (6–8) and systematic reviews (9–11) subsequently concluded that metformin use was associated with significantly lower vitamin B12 status.

Objective: To determine the impact of hyperglycemia and metformin use on relevant B vitamin

The aim of this study therefore was to investigate the impact of hyperglycemia and metformin use on all relevant B vitamin biomarkers and examine their associations with cognitive outcomes in older adults.

measured. Cognitive assessments included the Repeatable Battery for Assessment of Neuro-psychological Status (RBANS) and the Frontal Assessment Battery (FAB).

Fortified foods can provide a bioavailable source of B vitamins and may be beneficial for maintaining better cognitive health in older adults with, or at risk of diabetes, but this benefit must be confirmed in an intervention trial.

MNT: General recommendation

Componenti della dieta	Quantità complessiva consigliata	Quantità consigliata dei singoli nutrienti	Consigli pratici
Carboidrati	45-60% kcal tot (III, B)	• Saccarosio e altri zuccheri aggiunti <10% (I, A)	• Vegetali, legumi, frutta, cereali preferibilmente integrali, alimenti della dieta mediterranea (III, B)
Fibre	>40 g/die (o 20 g/1000 kcal die), soprattutto solubili (I, A)		• 5 porzioni a settimana di vegetali o frutta e 4 porzioni a settimana di legumi (I, A)
Proteine	10-20% kcal tot (VI, B)		
Grassi	35% kcal tot (III, B)	• Saturi <10, <8% se LDL elevato (I, A) • MUFA 10-20% (III, B) • PUFA 5-10% (III, B) • Evitare ac. grassi trans (VI, B) • Colesterolo <300 mg/die, <200 mg/die se colesterolo elevato (III, B)	• Tra i grassi da condimento preferire quelli vegetali (tranne olio di palma e di cocco)
Sale	<6 g/die (I, A)		• Limitare il consumo di sale e di alimenti conservati sotto sale (insaccati, formaggi, scatolame)

Nutritional Strategies to Combat Type 2 Diabetes in Aging Adults: The Importance of Protein

*Kayleigh M. Beaudry and Michaela C. Devries**

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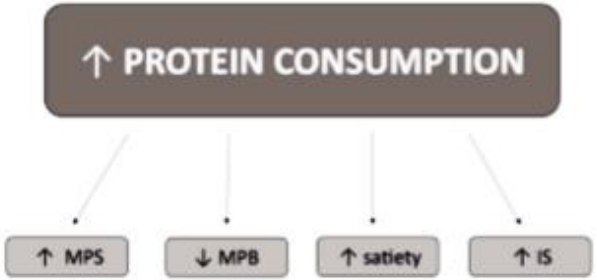
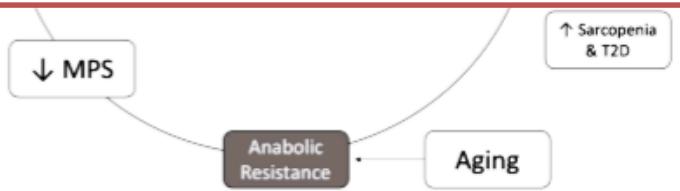


The protein intake recommendations in older adults are currently insufficient at 0.8 g/kg/day, despite many groups advocating for increased requirements of 1.0–1.2 g/kg/day in older adults and 1.2–1.5 g/kg/day in those who are at risk of malnutrition.

The evidence to date does support a role for higher protein intakes to attenuate declines in muscle mass and IS, particularly when combined with resistance exercise.



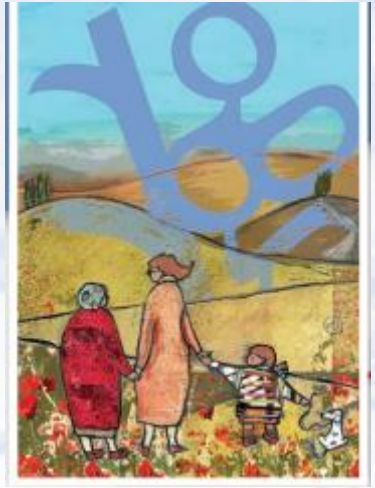
REVIEW published: 28 August 2019
doi: 10.3389/fnut.2019.00138

Take home message

Approximately one-quarter of people over the age of 65 years have diabetes and one-half of older adults have prediabetes, and this proportion is expected to increase rapidly in the coming decades.

Because age-related body composition changes lead to reduced muscle mass and insulin resistance and diabetes phenotype in old age is associated with both malnutrition leading to frailty and physical inactivity leading to disability, older people with diabetes potentially benefit most from lifestyle modifications through nutrition and exercise training interventions.

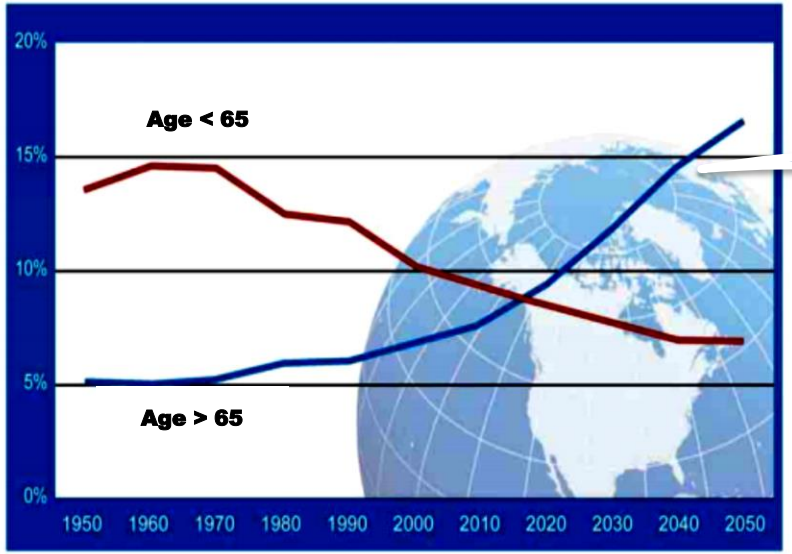
The goal of nutritional therapy is to maintain a good metabolic profile and achieve optimum body weight.

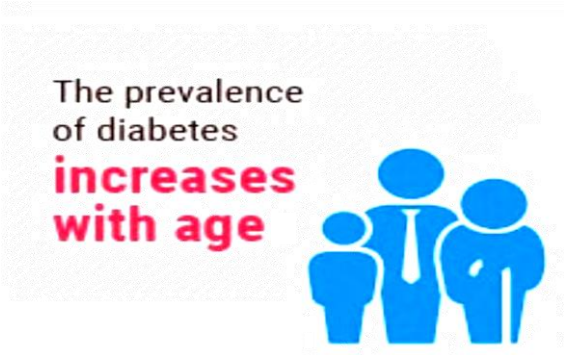


«… *Il solo mangiare non consente di mantenere un uomo in buona salute. Deve anche fare esercizio fisico. Perché sebbene il cibo e l'attività fisica posseggano opposte qualità, lavorano di concerto per produrre la salute*…»

Corpus Hippocraticum (460-377 a.C.)

Humanity's Aging





Global Health and Aging. WHO. October 2011
Eurostat 2018

Management and treatment of type 2 diabetes

- Improving diet

- Exercising regularly

- Medications to control blood sugar

The goal of Nutritional Therapy

The goal of nutritional therapy is to maintain a good metabolic profile and achieve optimum body weight.

Diabetic complications worsen with vit. D deficiency

Serum 25-Hydroxyvitamin D3 Concentrations and Prevalence of Cardiovascular Disease Among Type 2 Diabetic Patients

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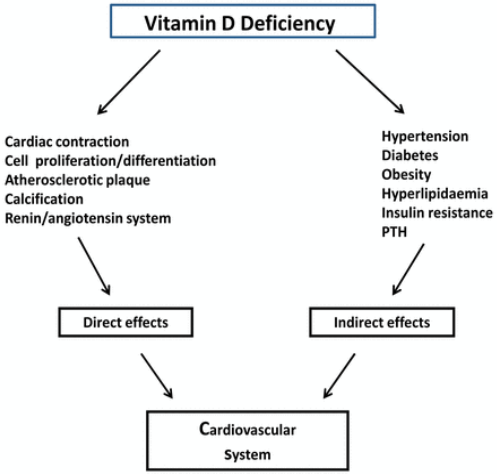

Table 1—*Baseline characteristics of the study participants, grouped according to vitamin D status*

Variables	Without hypovitaminosis D [25(OH)D: 29.0 ± 9 ng/ml]	With hypovitaminosis D [25(OH)D: 13.6 ± 3.3 ng/ml]	*P*
n	180	279	—
Sex (% men)	74	57	0.001
Age (years)	61 ± 7	62 ± 7	NS
BMI (kg/m^2)	29.2 ± 4.5	29.7 ± 5.1	NS
Waist circumference (cm)	106.8 ± 12	107 ± 12	NS
Diabetes duration (years)	11 ± 8	12 ± 8	NS
Diet only (%)	17	14	NS
Oral hypoglycemic agents only (%)	64	57	NS
Insulin treatment (%)	19	29	0.01
Statin users (%)	20.6	31.2	0.01
Aspirin users (%)	20.6	33.7	0.01
Current smokers (%)	16.7	19.7	NS
Systolic blood pressure (mmHg)	144 ± 18	145 ± 17	NS
Diastolic blood pressure (mmHg)	80 ± 7	80 ± 8	NS
A1C (%)	7.0 ± 1.3	7.4 ± 1.3	0.01
(ln)triglycerides (mmol/l)	1.74 ± 0.8	2.02 ± 1.3	0.01
HDL cholesterol (mmol/l)	1.33 ± 0.3	1.36 ± 0.4	NS
LDL cholesterol (mmol/l)	3.49 ± 0.9	3.40 ± 0.9	NS
Creatinine (μmol/l)	74 ± 15	76 ± 18	NS
Calcium (mmol/l)	2.35 ± 0.1	2.38 ± 0.2	NS
Fibrinogen (g/l)	4.02 ± 0.9	4.56 ± 0.9	0.001
(ln)hs-CRP (mg/l)	3.85 ± 5.4	5.10 ± 6.7	0.001
Microalbuminuria (%)	18	18.4	NS
Macroalbuminuria (%)	5.8	6.5	NS
Adult Treatment Panel III: metabolic syndrome (%)	78.7	84.2	NS
Cardiovascular disease (%)			
"Aggregate" end point	24.4	35.5	0.01
Coronary	9.5	22.9	0.001
Cerebrovascular	7.8	13.5	0.06
Peripheral	9.9	8.0	NS

Data are the means ± SD, unless otherwise indicated. Differences were assessed by the unpaired *t* test (for normally distributed variables) and by the χ^2 test (for categorical variables).

DIABETES CARE, VOLUME 29, NUMBER 3, MARCH 2006