

Sarcopenia
Integrative Considerations for Prevention and Management

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Nothing to Disclose:
I have no relevant financial relationships that would represent a conflict of interest for this presentation.

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What is Sarcopenia?

Sarcopenia affects more than 10 percent of adults over 50 and as many as 50 percent of adults 80 and older.

- Sarcopenia is the age-related loss of muscle mass and strength. It is a major contributor to disability in older adults.
- In 2010, the definition was adjusted to remove the direct criteria of age/elderly
- It now stands as: **low muscle mass together with low muscle function**

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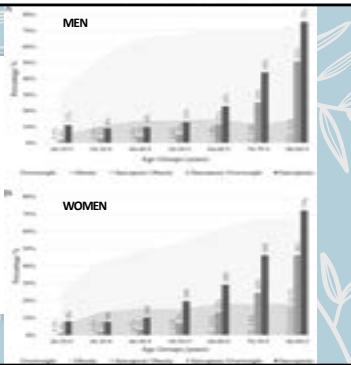
What is Sarcopenia Obesity?

- Sarcopenic obesity is an alternate model of obesity characterized by loss of muscle and a concomitant increase in fat.
- Often seen in sedentary individuals, whether obese or not or in those who've experienced deconditioning for other reasons
- This can also be what we call "skinny fat" – individuals who appear lean but have high %body fat.

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A disease of the elderly?

- By age 30, most people are losing lean mass (muscle and bone)
- By age 50 – 1-2%/yearly
- More than 60 percent of U.S. adults do not engage in the recommended amount of activity.
- Approximately 25 percent of U.S. adults are not active at all.
- LBM is a use it or lose it proposition



DOI: 10.1016/j.cdn.2021.01.005

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Risk Factors

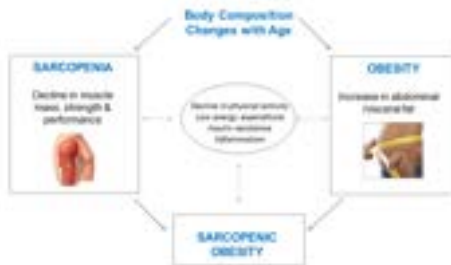
Age-Related Changes	Lifestyle Factors	Chronic Diseases
Lower hormone levels	Inactivity and lack of exercise	Bone and joint diseases
Cellular changes	Prolonged bed rest	Metabolic disorders
Decline in ability to convert protein to muscle	Loss of mobility	Endocrine diseases
	Low protein and calorie intake	Liver and kidney disorders
	Dental and oral problems	Cancer
		Malnutrition
		Cardiovascular disease
		Dementia

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Etiology

- Neuromuscular degeneration
- Changes in muscle protein turnover
- Changes in hormone levels and sensitivity
- Chronic inflammation and oxidative stress
- Behavior and lifestyle factors

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doi:10.1017/S0007114520002172

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Diagnosis

- Whole Body DEXA
 - Bioimpedance, Ultrasound
- Grip Strength, Chair Stand Test, Gait Speed Test
 - SCARF Score (Strength, Assistance, Rising, Climbing, Falls)
- 24-hr urine creatinine excretion
- Increased fat mass % (>29% in men, >37% in women)
- High BMI
- Other: low testosterone, DHEA, IGF-1, insulin resistance
- Potential: Irisin, Cathepsin D, BCAAs, microbiome, AI



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Related Health Conditions

DEATH: The overall mortality rate of older adults with sarcopenia is 41 percent higher than those without
 • (Koon Yee-Lee et al. 2021).

doi: 10.3904/kjm.2016.193

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Accepted Medical Treatments

- Exercise is the primary recommendation
- Weight loss if obesity is part of the Dx
- No approved Rx – at least 12 in development mostly targeting myostatin, but also exercise mimetics
- Metformin
- HRT (estrogen, test, DHEA, GH, SARMs, etc)

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Prevention and Management

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Mediterranean-Type Diet

September 10, 2022

There Is No Magic Pill to Prevent Frailty—You Still Have to Eat Your Vegetables

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1 Author affiliation: 1 [Article Information](#)

DOI: [10.1016/j.jamcp.2022.100000](#)

The Mediterranean diet has been repeatedly shown to reduce incident frailty, fractures, hospitalizations, and deaths, and more.

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Weight Loss

- For Sarcopenia Obesity – YES
- But... Caution to preserve LMB!
 - On average 20% of weight lost is LBM
- This usually means slow & steady loss vs rapid

News TODAY

Food industry looks to new alternatives amid Ozempic craze

By [Name] on [Date]


Introduction: Some major food companies are considering entering battle on protein-based alternatives as consumers and prescribers weigh alternatives.

Executive Summary: Last spring, the market for Ozempic and other GLP-1 agonists was exploding. The craze is expected to continue as the drug's popularity grows. The food industry is looking for alternatives to help consumers avoid gaining all the weight back soon after going off the drug. The most likely alternative is plant-based protein, but others are also looking at whey protein. There are many concerns and risks of supplements for consumers who are using these drugs. It is essential that the science is sound.

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Protein Intake

- At risk individuals should consume high-quality protein in the range of 1-1.2 g/kg/d
- Higher intake of 1.2-1.5 g/kg/d recommended for a known dx of sarcopenia
- This is in the range of 70-100 grams of protein/day for an average adult
- A lot of people do not achieve this with diet
- The most data and the best data on protein supplementation is with whey protein



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BCAAs & Leucine

- They're considered the most anabolic of the nine essential amino acids
- Leucine is probably most responsible for this effect
 - Reminder that whey protein is ~10% Leucine...
- The standard leucine dosage is 2–10 grams – though doses as low as 1 g as part of a mixed BCAA supplement have shown benefit (doi: 10.18632/sjme-101576)
- Over 20 RCTs with mixed results. The best evidence is as part of a more comprehensive program with exercise and other supplements (whey, vitamin D) (https://doi.org/10.3389/fnut.2022.925893)
 - Combo of Omega-3 fa (500 mg), leucine (2.5 grams), and L. paracasei showed sig improvement in physical function, inflammation (CRP) and visceral fat (https://doi.org/10.3389/fnut.2022.925893)
 - Combo with whey (20-22 grams), leucine (2.8 - 4 grams) and D (100 to 800 IU) significantly improved strength and exercise performance

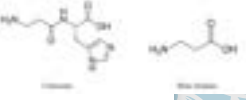
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Hydroxymethylbutyrate (HMB)


- An active metabolite of leucine and a popular dietary supplement
 - ~ 5% of dietary leucine is converted to HMB
- Stops breakdown of muscle, does not increase muscle mass
- Also stimulates mTOR and promotes IGF-1
- 2022 Meta-Analysis showed improved muscle quality and function in both hospitalized and healthy elderly (doi: 10.3389/fnut.2022.914866)
- Studied both with and without vitamin D
- Typical dose is 1-3 grams
- Addition of Vit D at 2000 IU (50mcg) appears to add the benefit of increasing LMB (doi: 10.1093/gerona/glaa218)

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Carnosine & Beta-Alanine




- Carnosine is a protein made up of Beta-alanine and L-histidine
- The body can also utilize beta-alanine to increase synthesis of carnosine
- Beef is far and away the best source
- Around 14 clinical trials have looked at C or BA for muscle development/exercise capacity (doi: 10.3390/antiox10071037)
- Target doses:
 - Beta-Alanine: 800mg to 6.4 g
 - Carnosine: 1-2.5 g (35mg/ounce of beef)



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Collagen

- Might seem counter-intuitive because it's low in BCAAs
- However, it does constitute 25-30% of the protein content of the human body...
- A placebo-controlled study of 15 g of collagen peptides/d in older adults found:
 - Increased FFM
 - Improved muscle strength
 - Reduced body fat
 - Subjects also reported being able to exercise with less pain
 - (doi: 10.1017/S0007114515002810)
- May also benefit bone density



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Vitamin D



- Low in both sarcopenia and sarcopenic obesity
- Correlated to bone health and density
- May reduce the risk of falling by 22% compared with calcium alone or a placebo (doi: 10.1016/j.archger.2009.02.011)
- A systematic review of 29 studies found vitamin D supplementation significantly increased muscle strength (doi: 10.1210/jc.2014-1742)
- Additionally acts via FOXO1 and FOXO3 to suppress atrophy and via mTORC1 to promote muscle synthesis and hypertrophy. (doi: 10.3390/nr12103189)
- How much...get over 32ng/mL

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Omega 3

- Next to protein and vitamin D – O3 has the most evidence
- EPA and DHA reduce the production of inflammatory eicosanoids (prostaglandins, thromboxanes, leukotrienes)
- DHA alone may inhibit muscle degradation of aging (https://doi.org/10.3390/nr12092597)
- Recent DO-HEALTH study found synergy between 2,000 IU/day of vitamin D3, 1 g/day of marine omega-3s and at home exercise (doi: 10.14283/jfa.2022.48)

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Antioxidant Nutrients (E,C,Carotenoids,etc)

- Chronic inflammation and oxidative stress are primary contributors to the development of sarcopenia
- Strongest evidence is for an anti-oxidant rich diet.
- 2022 systematic review and meta-analysis looked at antioxidant-rich foods and antioxidant supplements relative to sarcopenia outcomes in ≥50 adults
 - Strong association found with muscle mass and strength

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Antioxidant Nutrients - 2

- Based on the results of their meta-analysis, the researchers gave the following dietary recommendations to improve muscle strength and physical function:
 - Combined supplementation with vitamin E (218 mg/day), vitamin D (1,404 IU/day), and protein (44 g/day)
 - Supplementation with magnesium oxide (900 mg/day)
 - Consumption of tea catechins (540 mg/day)
 - Consumption of fruits and vegetables (5 portions/day)

doi: 10.1016/j.clnu.2022.07.035.

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Turmeric

- Anti-inflammatory and anti-oxidant properties
- 500 mg/d/3 months improved hand strength, walking distance, and lifting strength
- 1 G/d/3 months improved grip strength, weightlifting capacity, time and distance before feeling tired after cycling, walking and climbing stairs, overall general fitness, proteinuria, & oxidative stress
 - <http://doi.org/10.1002/jcsm.13057>

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There is emerging research on many other botanicals and plant-derived ingredients including:

- Resveratrol
- Green Tea
- Ginkgo Biloba
- Panax Ginseng
- Oligonol
- Ginger
- Coco Flavanols
- Quercetin
- Ursolic acid
- Tomatidine
- Urolithin A


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Take Homes:

- Not a condition of the elderly: we need to look for and prevent sarcopenia in adults of all ages
- Movement and exercise + Mediterranean-Type Diet
- Protein and protein derivatives are the most important nutrients
- Promoting healthy weight/Body composition is also important
- Newer data indicates that balancing inflammation in the body is also critical

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Thank you!
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