Welcome to the COPE Webinar Series for Health Professionals!

October 29th 2014 webinar:
**The Impact of Sarcopenic Obesity on our Aging Population**

Time: 12 noon – 1 PM EDT
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Handouts of the slides are posted at: www.villanova.edu/COPE

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**OBJECTIVES**

1. Explore the rationale behind moderate weight reduction for improved metabolic parameters in obese older adults.

2. Identify key nutrient recommendations for sarcopenic obesity that are feasible and cost effective

3. Describe the role of exercise as an intervention for the prevention and treatment of sarcopenic obesity

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**DISCLOSURE**

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Sarcopenia Definitions

- Sarcopenia is operationally defined as a lean body mass more than 2 standard deviations below the young normal mean
- Reduction of muscle mass and strength that occurs with aging (may be independent of mass)
- Sarcopenia is defined as the loss of muscle protein mass, function and quality that accompanies advancing age.

Loss of Muscle, Gain of Fat

- From ages 30-60
  - Gains ~500 g of fat, loses ~250 g of muscle every yr
- By 70 yrs
  - Muscle accounts for only ~27% of total body wt
- From ages 20-80
  - The cumulative decline in muscle mass reaches 40%

Sarcopenic Obesity

- Obesity was strongly associated w/ self-reported physical functional health, equivalent to being 11 yrs older for men & 16 yrs for women
- Associated w/ poorer functional status & independent predictor of survival
- Sarcopenic obesity was predictive of morbidity & mortality in both malignant & non-malignant disease

Frailty Definition:

- Unintentional wt loss >10 lbs lost in the last year
- Exhaustion, Poor endurance
- Low levels of physical activity
- Low walking speed
- Muscle weakness (grip strength)

Screening for Sarcopenia: Measuring Physical Function

- Decreased grip strength or Chair stand (time to rise from a seated position 5X) or Difficulty walking ¼ mile or Climbing 10 steps without resting

Grip Strength & Mortality

Grip strength is a powerful predictor of future mortality
Effect of Aging on Energy Intake and Expenditure

Decrease in total energy expenditure (TEE)
- RMR = 70% of TEE
- Thermic effect of food = 10%
- Physical activity = 20%
- RMR ↓ 2-3% every decade after 20
- Majority of decline is loss of fat free mass (FFM)
- Thermic effect of food = 20% lower in older men than younger
- Physical activity accounts for 50% of ↓ in TEE

Nurses’ Health Study: BMI & age inversely associated with physical function, pain issues and limitations due to physical problems
-SF-36 noted obesity is associated with health related QOL for older adults- physical functioning and limitations

Quality of Life

Weight Loss Alone

Positive
- Decrease fat mass/lean body mass
- Young adults: 75% loss is fat tissue & 25% FFM, similar in older adults
- 5-10% weight loss can improve metabolic abnormalities including insulin-resistant metabolism

Negative
- Could exacerbate age-related loss of muscle mass & ↓ saropenia

Benefits of Exercise + Diet

- RCT of obese older adults found no substantial difference in loss of FFM following a 10% weight loss diet & exercise vs. control who did not lose wt
- Regular exercise can decrease diet induced only loss of FFM
- Moderate weight loss + exercise improves both physical function and health-related QOL
- Can result in improved insulin sensitivity and decrease in intrahepatic fat

Hormonal Changes

Aging is associated with a decrease in growth hormone secretion, decline in serum testosterone and resistance to leptin leading to:
- Decrease in FFM
- Increase in fat mass
- Decreased ability to down-regulate appetite

**Weight Loss & Bone Mineral Density**

- Women 32-72
- Total BMD of 1-2%/wt. loss of 10%
- Bone loss proportional to amount of wt. loss
- Wt. loss alters plasma concentration of hormones involved in bone metabolism & markers of bone turnover

**Weight Loss + Exercise & BMD**

- RCT - 30 obese older adults of diet vs. diet & exercise = loss of muscle mass & muscle strength
- RCT - 27 obese older adults of diet vs. diet & exercise = bone mineral density but not in spine
- RCT - 107 = improved function but loss of LBM & hip BMD suggesting need for Ca & D or anti-resorptive therapy during wt. loss

**Vit D Deficiency a Major Problem**

- Most prevalent nutritional deficiency for older adults worldwide regardless of race or ethnicity
- Adults > 51 yrs of age only 4% met or exceeded the adequate intake

**Vitamin D**

- Essential for maintaining muscle mass & function in aging people
- Helps preserve the Type II muscle fibers that are prone to atrophy in the elderly

**Vitamin D Supplements**

- Inexpensive
- High margin of safety
- Adjunctive therapy for osteoporosis
- Therapy has positive outcome

**Sarcopenia Recommendations for Vitamin D**

- 25(OH) Vit D levels should be measured in all sarcopenic patients (A)
- Vit D supplementation in doses sufficient to raise levels above 100 nmol/L should be given as an adjunctive therapy (A)
- Either Vit D2 or D3 is an acceptable replacement (A)
- Doses of 50,000 IU of Vit D a wk are safe (A)

**Level A** = minimum of single randomized placebo control trial or meta-analysis
Carefully weigh risk vs benefits of weight loss plans

What are the risks associated with obesity treatment? Will a restricted diet reduce the individual’s ability to consume adequate nutrients to maintain health?

Is weight loss appropriate for all obese individuals with sarcopenia?

Weight Loss Therapy

- Moderate energy deficient diet plan
  - focus on high quality protein
  - consider vitamin/mineral supplements
- Increase physical activity

Weight Loss Therapy

- Behavior & cognitive strategies
  - problem solving
  - goal setting
  - social support
  - self-monitoring
  - stress management
  - relapse prevention

Nutrition Assessment

- Food and Nutrition Related History: food intake, food availability, physical activity, nutrition QOL, meds, herbal supplements, previous diets
- Anthropometric Measurements: weight history, BMI
- Biochemical Values: glucose, electrolytes, any relevant tests
- Nutrition-Focused Physical Findings: physical appearance, chewing, swallowing concerns,
- Client History: age, gender, race, socioeconomic status, support system.

Estimating Energy Requirements

- RMR: Indirect calorimetry (IC) is most accurate
- Mifflin-St.Jeor most accurate when IC not an option
- Use ABW + activity and/or injury factor

- Example: 78 year old male. 5’10” and 360 lbs. BMI 51.65 obese class III, moderate activity level
- 2830 kcalories/day
- Minus 500-700 kcalories to lose 1-2 lbs./week

Academy of Nutrition and Dietetics. AND Evidence Analysis Library.
Gradual loss has been tied to protein deficiency, lack of exercise, & increased frailty among the elderly.

The human body reacts to protein deficiency by taking AA away from muscle tissue & other areas of the body.

The process, in which the body basically metabolizes itself (catabolism) can lead to muscle loss & weakness.

Ensure Adequate Protein Intake

15%–38% of older men eat less than the RDI for protein.

27%–41% of older women eat less than the RDI for protein.


Protein + Exercise => Sarcopenia

Factors Influencing Protein Intake in Older Adults

1. Inadequate intake = appetite loss or GI disturbances
2. Reduced ability to utilize available protein = insulin resistance, protein anabolic resistance, immobility
3. Increased need for protein = inflammatory disease, increased oxidative modification of protein, catabolic conditions ass. / acute & chronic diseases

All Lead to Loss of Functionality

Evidence-Based recommendations for optimal dietary protein intake in older people: a Position Paper from the PROT-AGE Study Group, JAMDA 2013

What Does the Evidence Suggest for Optimal Protein Intake for Older Adults

• Positive association between protein ingestion & muscle mass (PORT-AGE study group JAMDA 2013)
• Protein spread equally between breakfast, lunch, & dinner (Paddon-Jones 2009)
• If needed, additional protein supplementation should given between meals (Wilson MM 2002)

Protein Intake Great than RDA

Improves muscle mass

Bone health

Modulates inflammation

Insulin sensitivity

Health, Aging, and Body Composition Study

• Assessed association between dietary protein intake and changes in LBM over 3 years
• 2056 healthy older adults
• Food frequency questionnaire & measured changes in LBM using DEXA
• Adjusted for potential confounders such as smoking, physical activity
• Participants / highest quintile of protein intake lost approx. 40% less LBM than those in lowest quintile of intake

Houston K et al. Dietary protein intake is associated with lean body mass changes in older, community-dwelling adults: The Health, Aging and Body composition (Health ABC) Am J Clin Nutr 2008;87:150-156.
Ensure Adequate Protein Intake

- It is recommended that the total protein intake should be 1 to 1.5 g/kg/day (B).
- It is suggested that a leucine-enriched balance essential amino acid mix may be added to the diet (B).

Level B: Small trials

Role of Essential Amino Acids

- Primary source of protein stimulus
- Leucine maybe the most effective & a determinant of quality
- Consumption of leucine-rich protein sources may be a key strategy that helps prevent/delay sarcopenia

Level B: Small trials
Source: Combaret et al., 2005

Antioxidants

- Aging is associated with increased levels of oxidative stress leading to damaged cell membranes & proteins responsible for many chronic diseases resulting from an inability of the immune response to initiate an adequate cellular defense.
- Oxidative stress has also been implicated in sarcopenia.
- Antioxidants are effective in combating oxidative damage.

Antioxidants

- Low serum selenium concentrations are associated with poor grip strength among older women living in the community.
- Low serum selenium resulted in increased IL-6 = low physical function & sarcopenia (Berk 2007; Lauretani 2007)
- Dietary carotenoids comprise an important component of the antioxidant defense system that helps keep the inflammatory cytokines in check.
- There is evidence that older adults with low plasma carotenoids levels are more likely to have elevated IL-6 concentrations, poor muscle strength.

Level B: Small trials

Carotenoids

- The 6 major dietary carotenoids (α-carotene, β-carotene, β-cryptoxanthin, lutein, zeaxanthin, and lycopene) comprise an important component of the antioxidant defense system in humans.
- Carotenoids protect against oxidative stress by quenching singlet oxygen, scavenging free radicals, inhibiting lipid peroxidation, & modulate proinflammatory cytokines.

Level B: Small trials

Carotenoids

Studies suggest intake of carotenoids or carotenoid-rich foods may be protective against decline in muscle strength & developing walking disability among older community-dwelling adults.

Level B: Small trials
Source: Yarashesi et al., 2003; Chert et al., 2002; Yarashesi et al., 2007.
Omega-3 fatty acid

- EPA (eicosapentaenoic acid) has been found to preserve muscle mass under various physiological conditions.
- DHA (docosahexaenoic acid) has anti-inflammatory effects, which scientists believe may be of value in managing sarcopenia.

Suggested Diet Plan

- Focus on carbohydrate and high quality protein distributed evenly between meals (1.0-1.5 gr/kg/day)
- Encourage consumption of sources of Ca/vit D
- Consider vitamin D supplement
- Include fruits/veggies ↑ antioxidants

Incorporate Exercise

Four Components of Exercise for Older Adults

- Resistance Training: KEY
- Aerobic activity
- Flexibility
- Balance
- Decrease frailty & improve muscle strength
- Repetitive activity, ↑ heart rate
- Ankle flexibility, maintain lower back strength
- Decrease risk of falls

Interdisciplinary Approach

- Physician – assess physical ability to begin exercise & clears for program
- RD/RDN- monitors diet and weight decline & adjusts as needed
- Physical therapist and/or certified trainer develop exercise program and work with individual

Supervised Exercise Program

- Goal: 2hr 30 min of moderate aerobic activity 3-5 days wk
- Resistance: 2 or more days a wk, work major muscle groups
- Flexibility: improves ability to perform ADL
- Balance: assists in fall prevention
- Aerobic: ↑ endurance, walking, cycling, dancing, swimming
- Resistance: hand held weights, rubber bands, tubes
- Flexibility: stretching, tai chi, yoga
- Balance: ability to rise from chair unassisted, stand on one foot alone or supported
Community Programs

- Silver Sneakers Fitness Program: Medicare health plans and Medicare Supplement carriers
- Local wellness centers or Y programs
- Invest in a step counter: start low 500 steps & increase

Hydration: Important with Exercise

- Drink water before & after exercise
- Vary choices with meals & during the day: low fat milk, vegetable juice, low calorie soft drinks, lemonade, coffee, ice tea, water

Exercise for Frail Older Adult

- 55.6% of patients hospitalized for >12 days had LBM depletion
- 3-4 fold increased likelihood of disability
- Older adults recover much more slowly
- Resistance exercise improves strength & frailty

Summary

- Assess all obese older adults with sarcopenia to determine if weight loss is appropriate
- Initiate exercise for all sarcopenic older adults
- Weight loss programs should include an exercise component (aerobic & resistance training) plus behavior modification, self-monitoring, goal setting and social support

Summary

- Weight loss should be gradual and meals should include high quality protein consumed in equal quantities at each meal
- Consider leucine, antioxidants, vit D, & omega-3 fatty acids

QUESTIONS?
Additional References


Exercise Resources

- https://www.presidentschallenge.org/informed/digest/docs/june2010digest.pdf (Exercise Comes of Age)
- http://www.helplinemanold.org/life/senior_fitness_sports.htm (this guide has information on exercises for those who may chair bound)

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- The email will be sent to the email address that you used to register for the webinar.
- Please complete the evaluation soon after you receive the email. The evaluation does expire after 3 weeks. Once expired, you cannot obtain a certificate.
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Questions and Answers!

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