

Workshop: Sarcopenia and obesity

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Participants in this workshop discussed the definition, prevalence, and impact of obesity in older persons and its relationship with sarcopenia. Special attention was drawn to the effect of these 2 conditions on disability and mortality. The participants also reviewed potential pathways to muscle impairment in obese individuals. The workshop group spent time discussing the clinical benefits versus risks of weight loss by overweight/obese young people compared to weight loss in overweight/obese older people. The following summary reviews key points from the workshop discussion.

- The World Health Organization uses body mass index (BMI) as a way to define overweight and obesity, where overweight BMI is 25.0-29.9 and obesity is > 30.0. The normal BMI range is 18.5-24.9. To identify people who need weight-lowering interventions, BMI is an imperfect way to define obesity; it is, however, the current standard. With the cutpoint of BMI > 30.0 for obesity, at least 20 percent of adults older than 65 years in the US are obese, as are 29 percent of English citizens 59 to 64 years, and 25 percent of Australians 65 to 74 years.
- Using these BMI cutoffs to determine obesity has some shortfalls. Since visceral fat seems to confer greater health risks than total fat, BMI may not be the best risk predictor. Also, risks of adverse health outcomes seem to be greater when overweight occurs in younger people than in older people. In fact, study results in people older than 75 years show that higher BMI (25.0 to 35.0) can actually lower mortality risk compared to BMI levels indicative of normal weight or underweight. There is consensus among most medical societies active in the field of nutritional medicine that the lower cutoff of the normal weight range has to be adapted for those beyond age 65 to 20 kg/m².
- Higher BMI levels do correlate with increased activities of daily living (ADL) disability in people who are old.
- Weight loss in older people, especially unintended weight loss, will lead to significant loss of fat-free mass with lowered functionality if not combined with physical exercise and finally to increased mortality.
- There seems to be an inverse relationship between fat and muscle mass with aging. When comparing young people, elderly people, and elderly people with type 2 diabetes, the young people have the highest fat-free mass and the lowest fat mass, while elderly people with diabetes have the highest fat mass and the lowest fat-free mass.
- Cytokines released from adipose tissue may play a role in cross-talk between fat mass and fat-free mass leading to functional impairment. For example, inflammatory cytokines like tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6) as well as C-reactive protein (CRP) and plasminogen activator inhibitor-1 (PAI-1) may be involved. Notably, elevated levels of TNF- α are observed in the frail elderly.
- Interesting new clinical study findings suggest that increasing physical activity in older adults reduces not only the risk for functional impairment but it can also help in lowering levels of TNF- α .
- A workshop participant summed up the take-home message from this session as, "It's better to be fat and fit than lean and lazy."

Workshop: Sarcopenia and inflammation

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Participants in this workshop discussed the association between sarcopenia, inflammatory markers, and aging. The following list summarizes take-home messages from the workshop.

- Aging is associated with increased levels of inflammatory cytokines, such as tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6), both of which play roles in hepatic production of C-reactive protein (CRP).¹
- In older people, strong evidence links increased levels of inflammatory markers (IL-6 and CRP) with medical conditions such as diabetes mellitus,² atherosclerosis,³⁻⁴ heart failure,⁵ and cardiovascular disease.⁶ High levels of inflammatory markers are also associated with increased risk for death in older people.⁸
- Findings from a prospective, population-based study among older persons showed that higher levels of IL-6 and CRP increased the risk of loss of muscle strength.¹
- Inflammatory markers may cause a decline of physical functioning through catabolic effects on muscle.⁷
- Taken together, these observations suggest an inflammatory component in the age-related loss of muscle strength and function that can ultimately lead to disability.

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Workshop: Sarcopenia and training

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In this workshop, 2 case studies were used as a basis for discussion. Nutritionists and geriatric physicians freely exchanged opinions regarding interventions for the patients.

Case study #1:

We used specific functional tests (gait speed, stair climb, strength, and sit-to-stand ability) to evaluate Isobel, a 97-year-old woman. Her relative skeletal muscle index (SMI) was estimated by dual-angle X-ray absorptiometry and height measurement ($\text{SMI} = \text{appendicular lean mass} / \text{height}^2$; aLM / h^2). We found that Isobel used a walker to support her slow gait ($< 0.7 \text{ m/sec}$), climbed a few stairs with extreme difficulty, and required assistance with sit-to-stand. We recognized her condition as frail—with limited flexibility. Based on her low relative skeletal muscle index score ($< 5.45 \text{ kg/m}^2$), she met the cutoff criterion for sarcopenia. For discussion, Dr. Stout posed these questions:

- Can physical training improve muscle function in a 97-year-old woman?
- Can physical training reverse sarcopenia?
- What exercise prescription would you recommend, if any?

Isobel represents an actual study participant who underwent training in Dr. Stout's program. His strategy for training older people is similar to what he would use to train an elite athlete—train the weaknesses, and use progressive buildup of exercise intensity as the trainee's body adapts to the initial exercise level. Isobel needed help increasing both strength and endurance.

For strength, Isobel was trained with sit-to-stand exercises, beginning by sitting on a thick telephone book atop a standard chair. Her twice-weekly exercise routine began with 2 to 3 assisted stands per set, and 1 or 2 sets per training. Over time, the telephone book was removed, repetition number was progressively increased, and the number of sets of repeated exercise was also increased. Endurance training was similarly progressive over time. She began by walking 10 minutes, increasing to 30 minutes as her strength and endurance improved. After just 3 weeks of training, Isobel reported that she was able to get herself dressed more quickly and seat herself at the dinner table with ease.

Q: What do you think of muscle electrostimulation?

A: This technique may help postsurgical or otherwise bedridden patients. However, as strength returns, I encourage physical exercise as soon and as much as possible.

Q: How do you get older people to come to your exercise facility?

A: In some cases, we arrange for a pick-up car. For others, we send a home-visit physical therapist to them.

Q: Do you use nutritional supplements?

A: Yes, I use substrate nutrition to complement exercise training. And I advise my trainees about “nutrient timing”; I suggest that protein intake be distributed evenly throughout the day. I advise people to consume “complete” proteins (eg, animal proteins such as whey from milk). Even for sedentary seniors, I recommend more than 0.8 g protein per kilogram body weight. I also prescribe other substrates, such as creatine for muscle energy, beta-hydroxy beta-methylbutyrate (HMB, a natural metabolite of the essential amino acid leucine) to stimulate muscle protein synthesis, and carbohydrates as source of “protein-sparing” energy.

Case study #2:

A second case, Angus, was also discussed briefly. Angus is a 70-year-old man recovering from hip replacement surgery. In the last 3 months before surgery, his lean body mass markedly decreased, and muscle function fell dramatically, likely due to inactivity as a result of hip pain. At 7 days post-surgery, Angus is about to begin the physical rehabilitation phase of his recovery plan.

Dr. Stout proposed the following questions:

- In your practice, what is the usual rehabilitation strategy used for a patient like Angus?
- What other individualized strategies might be considered?

Standard post-surgical rehabilitation protocols have used passive exercising (in-bed muscle movements by a physical therapist). Such therapy was used as a “cookbook” prescription for all patients, despite marked differences in the health and nutritional status of individual patients. Other hospitals are embracing non-traditional strategies of having able patients resume some physical activity (eg, walking) as soon as possible, often within 24 hours of surgery.

Once again, Dr. Stout encouraged individualized therapy for patients with differing levels of physical ability both before and after surgery. Some specific strategies discussed were:

- Use of electrical stimulation of muscles for those who are severely impaired and bedridden after surgery.
- Use of in-bed or in-chair leg extension exercises with bands or machines for nonmobile patients.
- Use of pre-surgical nutrition programs to protect against muscle deterioration during post-surgical wound healing, and physical activity limits during the recovery interval.
- Beginning physical movement, including walking, as soon as possible after hip replacement surgery.