

From sarcopenia to frailty: a road less traveled

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Received: 24 January 2014 / Accepted: 24 January 2014 / Published online: 14 February 2014
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Abstract The physical frailty phenotype consists of fatigue, weight loss, and loss of muscle power. Sarcopenia has been shown to be a major cause of frailty. Six societies including SCWD published a consensus suggesting that all persons older than 70 years of age should be screened for frailty when seeing health professionals. Simple screening tests such as the FRAIL (fatigue, resistance, aerobic, illness, and loss of weight) scale can be used. It is felt that frailty can be treated by exercise (resistance and aerobic), high quality protein, vitamin D, and treatment of the common causes of fatigue. It is expected that this approach will decrease disability in older persons.

1 Introduction

Health-care professionals are accustomed to seeing frail older persons, but rarely do they recognize the role of sarcopenia in the pathogenesis of frailty. Even more rarely do they institute an aggressive treatment regimen to improve the older person's quality of life. For this reason, six societies, including the SCWD, published a consensus statement that defined frailty as “a medical syndrome with multiple causes and contributors that is characterized by diminished strength, endurance and

reduced physiologic function that increases an individual's vulnerability for developing increased dependency and/or death” [1]. They further agreed that frailty is a treatable condition. For this reason, they agreed that “all persons older than 70 years and all individuals with significant weight loss (5 %) due to chronic disease, should be screened for frailty.”

An objective definition for a physical frailty phenotype was created and validated in 2001 by Fried et al. [2]. Their definition included weight loss, exhaustion, weakness (grip strength), walking speed, and low physical activity. They found that it was present in approximately 7 % of persons in the cardiovascular health study. Based on this schema, a simple five-point questionnaire was developed by the International Association of Nutrition and Aging (Table 1) [3]. Another approach to frailty screening was developed by Rockwood et al. [4]. This consists of adding together all the deficits a person has and then mathematically designating a frailty score. While this is highly predictive of poor outcomes, it is more of a comorbid score than a physical frailty index. It has also been recognized that persons with psychosocial frailty as well as physical frailty tend to have even worse outcomes [5–10].

The FRAIL (fatigue, resistance, aerobic, illness, and loss of weight) scale has been validated by six separate studies and appears to perform as well as the other more complex scales [11–16]. Of the five components of the FRAIL scale, both resistance (climb a flight of stairs) and aerobic (walk one block) are clearly components of sarcopenia as now defined by multiple groups [17–21]. In addition, while there are many causes of fatigue (e.g., anemia, endocrine disorders, sleep apnea, polypharmacy, depression, and vitamin B₁₂ deficiency), it is now well recognized that a major cause of fatigue in conditions such as heart failure is poor muscle function [22, 23]. While weight loss is not universal in sarcopenia, loss of muscle can lead to weight loss in persons who do not develop obese sarcopenia [24], and it is a hallmark of cachexia [25,

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Table 1 The simple FRAIL scale

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| Fatigue |
| Resistance (can you climb a flight of stairs?) |
| Aerobic (can you walk a block?) |
| Illness (>5) |
| Loss of weight (5 % in 6 months) |
| Three or more positive answers, frail; one or two positive answers, prefrail |

26]. Persons with multiple illnesses usually have a loss of muscle mass and function.

The frailty consensus statement recommended that the treatments for frailty should be exercise (resistance and aerobic), protein-calorie supplementation, vitamin D, and reduction of polypharmacy. All of these are key treatments for sarcopenia [27]. The evidence that exercise (particularly resistance exercise) when maintained can have marked effects on frailty and sarcopenia is now very strong [28–33]. The major problem is that this form of exercise therapy needs to be provided in a long term, i.e., for at least a year, where it performs better than conventional physical therapy [34]. It is the time that health-care agencies fund “coaches” to do twice weekly home visits to do resistance exercise for a year or longer. There is increasing evidence for exercise to be coupled with high quality protein to provide optimal muscle performance [35–39]. Persons with low vitamin D have been demonstrated to have decreased strength and increased falls [40, 41]. Replacement of vitamin D in these persons appears to improve strength and decrease hip fractures [42]. Calorie replacement decreases mortality and possibly improves function in persons with malnutrition [43]. For an optimal effect, calorie supplementations should be given between meals [44].

In addition to these basic treatments, there is an increasing interest in developing drugs to treat sarcopenia [45]. Testosterone has been demonstrated to increase muscle mass and strength in older persons with and without frailty [46–51]. Its possible side effects have led to enthusiasm to produce selective androgen receptor molecules, and one of these, enobosarm, has shown some promise [52]. A variety of other drugs are in earlier stages of development for treating sarcopenia and cachexia [53].

This editorial has suggested that sarcopenia is the major cause of frailty. Frailty can be screened for by general practitioners as demonstrated by the Gerontopole Frailty Screening Tool [54, 55]. A simple screening tool, the FRAIL, takes less than 15 s to do and does not require a physician to administer it. Treatments for frailty clearly exist.

For these reasons we suggest that it is time to couple sarcopenia and frailty and increase its community awareness. The German hidden garden provides a new wonderful view around each corner. If physicians begin to recognize sarcopenia and physical frailty and utilize the simple management

strategies available, they will begin to have revealed to them the wonders of watching frail, and sarcopenic persons become more functional and happier in a way similar to how each few steps in a hidden garden reveals yet another wonder.

Acknowledgments The authors of this manuscript certify that they comply with the ethical guidelines for authorship and publishing in the *Journal of Cachexia, Sarcopenia, and Muscle* 2010; 1:7–8 (von Haehling S, Morley JE, Coats AJ, and Anker SD).

Conflict of interest John Morley, Stephan von Haehling, Stefan Anker and Bruno Vellas declare that they have no conflict of interest.

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