SARCOPENIA: WHAT TO EXPECT FROM CONCEPTUAL CHANGES IN THE LAST DECADE

Sarcopenia: o que esperar das mudanças conceituais da última década?

In 1988, Irwin Rosenberg proposed that the term *sarcopenia* be used to describe the major changes in body composition and function associated with aging. In so doing, he intended primarily to draw the attention of the scientific community to loss of lean body mass (LBM). At the time, isolated LBM reduction was already regarded as the most striking phenomenon among the various functional and organic declines that accompany aging, affecting mobility, ambulation, nutritional status, nutrient and energy intake, independence, and even breathing.

Throughout the 1990s and 2000s, several strategies for assessment of body composition were proposed, with particular interest in direct and indirect methods of measuring and estimating muscle mass. In 1998, Baumgartner et al.[2] defined sarcopenia as the reduction in appendicular lean mass (ALM; kg/m^2) of more than 2.5 standard deviations. The authors used the ALM values of a young-adult population, assessed by dual-energy x-ray absorptiometry (DEXA), as a reference. Subsequently, Janssen et al.[3] developed and validated an equation to estimate muscle mass using electrical bioimpedance, suggesting sex-specific cutoff points for the diagnosis of sarcopenia.[4,5] In 2007, with the same diagnostic concern, Delmonico et al.[6] proposed two different methods for classifying LBM reduction as measured by DEXA. Clearly, muscle mass was the conceptual and operational cornerstone for the diagnosis of sarcopenia over these two decades.

In parallel, however, mounting evidence showed that muscle strength and functional status, in isolation, are more strongly associated with adverse health outcomes — mortality, disability, falls, among others — than muscle mass. These findings led the international scientific community to the impression that muscle strength and functional performance should be core domains for definitions of sarcopenia, both as factors underlying the concept of sarcopenia as a condition and as component indicators of instruments for sarcopenia screening and diagnosis.

Operating under this impression, in 2010, the International Working Group (IWG),[7] the European Working Group on Sarcopenia in Older Persons (EWGSOP),[8,9] the Foundation for the NIH Sarcopenia Project (FNIH Sarcopenia Project),[10] and the Asian Working Group for Sarcopenia (AWGS)[11] proposed a series of definitions of sarcopenia which had massive international impact among the geriatrics and gerontology community.

In summary, these proposals included indicators of muscle strength and functional performance, with the aim of increasing the accuracy of existing instruments and enhancing identification of patients with sarcopenia. Thus, for example, in 2010, the EWGSOP[8] suggested that individuals at high risk be screened for measurement of muscle mass — a high-cost procedure. To this end, the authors suggested that individuals performing poorly on a functional test (such as gait speed) be selected first. Then, individuals with functional performance within normal limits but below the expected level would also have their muscle mass measured.

In 2018, Cruz-Jentoft et al.[9] published a review of the 2010 recommendations which reorganized the screening algorithm. According to the authors, an altered test of muscle strength should be sufficient to indicate muscle mass measurement in high-risk individuals. Sarcopenia was redefined on the basis of changes in muscle strength and mass, with functional performance relegated to the role of severity classifier. Subsequent proposals hewed very closely to this concept,[7,10,11] varying only in terms of cutoff points for each of these variables and the order in which strength and performance assessments are prescribed.

Despite the enormous academic popularity of such proposals to include muscle strength and functional performance in the conceptual and operational definition of sarcopenia, this gave rise to a series of questions about the evidence to support these suggested screening strategies, diagnostic methods, and severity classifications.

In 2015, we reviewed data on three cohorts[12] — Fragilidade em Idosos Brasileiros (Fibra-RJ), Rio de Janeiro, Brazil;[13] Coyoacán, Mexico City, Mexico;[14] and the Toledo Study, Toledo, Spain[15] — to assess the performance of the new screening algorithm for individuals with suspected sarcopenia, i.e., strata of the older population which should undergo muscle mass

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measurement. The authors concluded that the algorithm had little clinical utility, as it would select a very high proportion of individuals for measurement (mean, 83.4%, ranging from 67.8 to 94.4% across cohorts).

Simultaneously, Bischoff-Ferrari et al.[16] compared the ability of nine definitions of sarcopenia to predict falls. The definitions proposed by Baumgartner et al.[2] and Cruz-Jentoft et al.[8] had the best predictive capacity among patients with sarcopenia. However, after a subsequent sensitivity analysis which adjusted the ALM cutoff point of the Cruz-Jentoft et al. proposal[8] and approximated its prevalence to that found by Baumgartner et al.[2], the Cruz-Jentoft definition lost significance.[17] Dawson-Hughes and Bischoff-Ferrari[17] thus concluded that, in addition to providing no advantages over the previous concept, definitions of sarcopenia that include muscle strength and functional performance have major additional limitations. According to the authors, apart from the issues described in their study, functional and strength assessments are difficult to standardize and the prevalence estimated by definitions that include them is low, greatly limiting the opportunity for early identification of sarcopenia and implementation of prevention strategies. For these reasons, they recommend that operational definitions of sarcopenia be based exclusively on loss of lean body mass.

In our opinion, the requirement of dynapenia — i.e., low muscle strength — as a precondition for measurement of muscle mass and diagnosis of sarcopenia excludes the possibility of identifying those individuals who have decreased muscle mass as the sole manifestation of sarcopenia. This will deprive such individuals of the opportunity to benefit from measures which could recover lost strength and prevent further losses, functional impairments, and adverse outcomes associated with sarcopenia.

Perhaps what we can expect today is a return to the past — one in which our research models consider skeletal muscle mass as the sole essential element for the diagnosis of sarcopenia, shifting muscle strength and functional performance to the more than relevant role of classifying different stages of this condition.

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