Sarcopenia: Maths and Medicine for the diagnosis

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The bi-dimensional nature of sarcopenia implies that the operative definition should simultaneously capture both quantitative and qualitative declines occurring in skeletal muscle with aging. However, muscle mass is different from muscle strength and/or physical performance. Sarcopenia is a phenomenon that systematically occurs in all-skeletal muscles of an organism (potentially with different extents and velocities).

The methods designed to measure sarcopenia should be validated, standardized, repeatable, reliable, and accurate. All the available techniques are affected by different weaknesses partly related to the instrument (e.g., accuracy, costs, availability) and partly to the examined population (e.g., clinical conditions limiting the assessment and/or biasing the results). Consequently, all efforts should be made to identify a unique “golden standard” to be systematically adopted.

Identifying older adults with sarcopenia in clinical practice is an important task because it may allow for the implementation of therapeutic strategies that can impede the progression towards disability and other adverse outcomes. Regardless of the operational definition, the diagnosis of sarcopenia requires documentation of low muscle mass and low muscle function (strength or performance). The EWGSOP has proposed a population screening of all people 65 years and older. Accordingly, the evaluation should start with the measurement of 4-meter gait speed using a cut-off value of <0.8 m/s to identify those at risk of sarcopenia. Those who test positive should undergo subsequent quantification of muscle mass and muscle strength.

Popular assessment tools include body imaging techniques (e.g., magnetic resonance imaging, computed tomography, dual X-ray absorptiometry, ultrasonography), bioelectric impedance analysis, anthropometric parameters (e.g., calf circumference, mid-arm muscle

circumference), and biochemical markers (total or partial body potassium, serum and urinary creatinine, deuterated creatine dilution method).

Over the last years, sarcopenia has gained its spotlight in bio-gerontology and clinical research. The recent assignment of a specific code for sarcopenia in the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), valid as of October 1st 2016, will likely provide further impetus to the development of standards for the screening, diagnosis and monitoring of the condition. In such a context, the establishment of an international consensus on an accurate, reliable, and cost-effective method to assess muscle mass across research and clinical settings is of utmost importance.

Biomedical research is now progressing towards portability and miniaturization of imaging equipment and the identification of surrogate biomarkers for muscle mass. These advancements, together with a clear operationalization of sarcopenia, will allow clinicians, regulators, and policy- makers to overcome existing obstacles to the development of new treatments for sarcopenia and its negative outcomes.