

A focus shift from sarcopenia to muscle health in the Asian Working Group for Sarcopenia 2025 Consensus Update

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The Asian Working Group for Sarcopenia (AWGS) presents an updated 2025 consensus reframing sarcopenia management through a life-course approach to muscle health promotion. While aligning with the Global Leadership Initiative in Sarcopenia (GLIS), this update provides healthcare providers with Asia-specific guidance. The consensus introduces three key refinements: first, expanding sarcopenia diagnosis to middle-aged adults (50–64 years) with validated diagnostic thresholds; second, simplifying the diagnostic algorithm to require only concurrent low muscle mass and strength, with physical performance as an outcome measure; and third, introducing an enhanced muscle health framework recognizing skeletal muscle as vital for healthy longevity, emphasizing cross-talk with brain, bone, adipose tissue and immune systems. This framework leverages the World Health Organization's Integrated Care for Older People (ICOPE) implementation for enhanced case-finding through natural overlap between muscle health and ICOPE's intrinsic capacity domains. The consensus provides evidence-based recommendations for multimodal interventions that combine resistance exercise with nutritional supplementation, representing advancement toward proactive muscle health promotion and establishing a framework for reducing age-related decline in Asian populations.

Sarcopenia is defined as age-associated loss of skeletal muscle mass and function and is strongly associated with adverse health outcomes, including increased risk of falls, functional disability, hospital admission, cardiometabolic disease, dementia and all-cause mortality¹. Formal recognition of sarcopenia with a designated International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) code (M62.84) was a milestone in promulgating its clinical relevance². The convergence of huge populations with rapid aging rates

across Asia has intensified the epidemiological impact of age-related conditions, including sarcopenia, on the healthcare system³. In 2014, the AWGS introduced the first diagnostic consensus³, which largely adopted the algorithm of the European Working Group for Sarcopenia in Older Adults⁴ but defined region-specific cutoffs based on Asian cohort data (Table 1). Establishing the first AWGS consensus stimulated a notable surge in Asian research in this field⁵. The 2019 AWGS consensus update refined diagnostic criteria for sarcopenia, including

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adjusted thresholds and an alternative methodology appropriate for resource-limited settings⁶; it also introduced the category of ‘possible sarcopenia’ to facilitate early intervention, especially in primary healthcare or community settings. Nevertheless, the core diagnostic algorithm remained consistent, requiring assessments of muscle mass via dual-energy X-ray absorptiometry (DXA) or multifrequency bioelectrical impedance analysis (BIA), muscle strength via handgrip strength and physical performance measurements including gait speed, five-times chair stand test and the Short Physical Performance Battery (SPPB) (Table 2).

As a catalyst for Asian sarcopenia research, the AWGS has inspired region-wide endeavors to establish clinical guidelines, as well as country-specific initiatives. Through its multidisciplinary consortium of 32 experts from 9 Asian countries and regions (Supplementary Table 1), representing diverse expertise in geriatrics, rehabilitation medicine, physiotherapy, clinical pharmacy, epidemiology, endocrinology and orthopedic surgery, the AWGS continues to drive collaborative efforts to advance sarcopenia research and clinical practice across Asia. The working group’s iterative consensus process, from the foundational 2014 guidelines through the 2019 refinements to the current 2025 updates, demonstrates the organization’s commitment to evidence-based advancement of diagnostic criteria that reflect the unique demographic and clinical characteristics of Asian populations.

Following the AWGS 2019 consensus, the South Asian Working Action Group for Sarcopenia (SWAG-SARCO) formulated evidence-based guidelines in 2022 (ref. 7); these guidelines specifically addressed the challenges of diagnosis and treatment in resource-limited healthcare settings. Their approach equated the diagnostic relevance of muscle function, strength and mass—allowing diagnosis based on any two components—a practical adaptation for places with limited access to advanced measurement techniques. Notably, SWAG-SARCO guidelines pay special attention to secondary sarcopenia and sarcopenic obesity⁷. Building upon the AWGS consensus, the Korean Working Group for Sarcopenia developed country-specific guidelines^{8,9}, which introduced the concept of ‘functional sarcopenia’ to characterize individuals with preserved muscle mass but diminished muscle strength and physical performance. Functional sarcopenia was found to be prevalent in older community-dwelling Korean adults and was associated with mobility limitation and mortality¹⁰. Likewise, the Taiwan Advisory Panel for Sarcopenia guidelines, while aligned with the AWGS 2019 consensus, also emphasize early identification and intervention for individuals at risk of sarcopenia¹¹.

Overall, the AWGS 2019 consensus established a comprehensive approach to sarcopenia management, intended to incorporate preventive strategies and therapeutic interventions within existing chronic disease frameworks. In this 2025 consensus update, the AWGS has further developed this person-centered approach, which aligns with GLIS diagnostic algorithms¹², while retaining evidence-based modifications for Asian populations including adjusted muscle mass cutoffs based on Asian cohort data (DXA $<7.0 \text{ kg m}^{-2}$ for men, $<5.4 \text{ kg m}^{-2}$ for women in older adults; $<7.2 \text{ kg m}^{-2}$ for men, $<5.5 \text{ kg m}^{-2}$ for women in middle-aged adults), handgrip strength thresholds (28 kg for men, 18 kg for women in older adults; 34 kg for men, 20 kg for women in middle-aged adults) and inclusion of culturally appropriate screening tools such as the Yubi-wakka (finger-ring) test (Table 1). Furthermore, the 2025 AWGS consensus calls upon healthcare providers, researchers and health systems, to expand their focus beyond diagnosing and managing sarcopenia in older adults, and to emphasize the need to promote muscle health from middle age onward. By leveraging the global implementation of the World Health Organization (WHO) ICOPE framework for enhanced case-finding opportunities¹³ (Fig. 1), the AWGS 2025 consensus aims to enhance healthy aging and improve lifestyle modification and chronic disease management through a more integrated, population-level preventive approach across the life course (Box 1).

Notably, The AWGS 2025 consensus harmonizes closely with GLIS criteria while retaining region-specific guidance for Asian populations. Key alignments include: (1) simplified diagnostic algorithm requiring only concurrent low muscle mass and low muscle strength; (2) elimination of sarcopenia severity levels, moving away from categories such as ‘severe sarcopenia’; (3) categorization of physical performance as outcome indicators; (4) emphasis on muscle health promotion rather than solely disease diagnosis and treatment; and (5) focus on functional outcomes for monitoring intervention effectiveness.

Consensus process

The AWGS meets regularly to review recent advances in sarcopenia research and clinical practice across Asia. From February 2023, AWGS members convened seven times to determine the scope and conceptual framework for an updated consensus, and initiated research on key topics needed to inform the work. A meta-analysis of sarcopenia epidemiology in Asia, applying the AWGS 2019 diagnostic criteria, provided new data on sarcopenia prevalence, incidence, risk factors and trends¹⁴, while a healthcare practitioner survey of current sarcopenia awareness and diagnosis and management approaches identified barriers to screening and treatment implementation¹⁵. A pooled analysis of Asian cohort studies showed that muscle strength is a more important predictor of adverse outcomes than muscle mass in terms of prognostic value for mortality and functional decline; however, both parameters remain essential for diagnostic specificity¹⁶. Additional age-stratified analyses of muscle health metrics across multiple Asian cohorts provided insights into the natural history of sarcopenia and yielded age-specific reference values for Asian populations¹⁷. The AWGS finalized this 2025 consensus in January 2025, based on the evidence generated and their collective expertise. This AWGS update aims to refine diagnostic approaches, enhance early identification strategies, guide appropriate interventions for sarcopenia and promote muscle health in Asian populations.

Muscle health promotion

The evidence review conducted for this consensus update revealed that the understanding of muscle health has progressed significantly beyond the conventional realms of strength and mobility, to become pivotal to concepts of healthy aging and overall well-being across the lifespan. Besides roles in mobility, exercise and posture, skeletal muscle functions as both an energy reservoir and an endocrine organ, secreting myokines that influence systemic metabolism¹⁸. These insights are particularly crucial considering that skeletal muscle mass peaks around 25 years of age then declines, gradually at first but more quickly after age 50. Given strong associations between muscle health and age-related conditions including frailty, chronic diseases, cognitive decline and multimorbidity, a broader perspective is needed¹⁹. Recognizing skeletal muscle as a vital organ for healthy longevity, the AWGS 2025 consensus encompasses a comprehensive muscle health framework (Table 1 and Box 1) focusing on optimizing muscle function and systemic interactions from middle age onward.

Muscle health encompasses multiple physiological characteristics^{20,21}: optimal muscle mass and strength for age and sex²², efficient metabolic function²³, appropriate fiber-type distribution and plasticity²⁴, robust regenerative capacity including nuclear migration mechanisms^{25–27}, efficient neuromuscular junction communication²⁸, healthy mitochondrial function²⁹ and balanced protein turnover^{23,30}. The expanded AWGS 2025 muscle health framework necessitates regular assessments throughout the life course, at both clinical and population levels, with evidence-based interventions aimed at optimizing muscle functionality. Pertinently, the Taiwan Integrated Geriatric Care (TIGER) study demonstrated that enhancing intrinsic capacity through multidomain interventions concurrently improved muscle strength, physical performance and metabolic biomarkers³¹.

Table 1 | The AWGS Consensus: evolution of criteria through 2019 and 2025 updates to the 2014 criteria

	AWGS 2014	AWGS 2019	AWGS 2025
Definition of sarcopenia	Age-related loss of skeletal muscle mass PLUS low muscle strength AND/OR low physical performance	No change from original 2014 definition	Age-related loss of skeletal muscle mass PLUS low muscle strength
Age cutoff	60 or 65 years (country-dependent)	60 or 65 years (country-dependent)	60 or 65 years for sarcopenia diagnosis, but introduces specific criteria for middle-aged adults (50–64 years)
Diagnostic algorithm	Linear algorithm: assess muscle mass and muscle function (grip strength, physical performance)	- Two separate algorithms: 1) Community settings 2) Hospital or research settings - Introduced ‘possible sarcopenia’ for primary care	- Enhanced two-track algorithm: 1) Community settings 2) Hospital or research settings - Emphasizes early identification and intervention
Case-finding	Not specifically addressed	1. Calf circumference: M <34 cm, F <33 cm 2. SARC-F: ≥ 4 3. SARC-CalF: ≥ 11	Add Yubi-wakka (finger-ring) test
Muscle mass measurement	DXA: M <7.0 kg m ⁻² , F <5.4 kg m ⁻² BIA: M <7.0 kg m ⁻² , F <5.7 kg m ⁻²	Same as 2014	≥ 65 years: Same as 2014 and 2019 but add BMI-adjusted cutoffs: DXA: M <0.73, F <0.52; BIA: M <0.83, F <0.57
			50–64 years: DXA: M <7.2 kg m ⁻² , F <5.5 kg m ⁻² BIA: M <7.6 kg m ⁻² , F <5.7 kg m ⁻² Add BMI-adjusted cutoffs DXA: M <0.80, F <0.55 BIA: M <0.90, F <0.63
Muscle strength (handgrip strength)	M <26 kg, F <18 kg	M <28 kg, F <18 kg	≥ 65 years: Same as 2019 50–64 years: M <34 kg, F <20 kg
Physical performance	Gait speed: <0.8 m s ⁻¹	- Gait speed: <1.0 m s⁻¹ - Five-time chair stand test: ≥ 12 s - SPPB: ≤ 9	Same as 2019, but physical performance is the outcome measure rather than the diagnostic criterion
Clinical categorization	1. Normal 2. Sarcopenia	1. Normal 2. Possible sarcopenia (low muscle strength or low physical performance) 3. Sarcopenia 4. Severe sarcopenia	1. At risk for sarcopenia 2. Possible sarcopenia 3. Sarcopenia
Conceptual framework	Focus on sarcopenia diagnosis	Focus on both diagnosis and early identification of at-risk individuals	Life-course approach to muscle health, integrated within the WHO ICOPE framework, extensive focus on muscle–organ cross-talk
Recommendations for middle-aged adults	Not addressed	Not specifically addressed	Specific diagnostic criteria for ages 50–64 years to enable early intervention
Intervention approach	Basic recommendations for exercise and nutrition	Evidence-based recommendations for exercise, nutrition and combined interventions	Multimodal interventions emphasizing resistance exercise, nutritional supplementation (protein, essential amino acids, HMB) and integration with existing care pathways
Research recommendations	Basic recommendations	Call for more intervention studies	Detailed focus areas: 1) sarcopenic obesity; 2) biomarker development; 3) muscle–organ cross-talk; 4) longitudinal outcome studies; 5) digital interventions

F, female; M, male.

To fully implement this comprehensive muscle health framework, the consensus also identified several research priorities, including developing new biomarkers for the timely detection of deteriorating muscle health, elucidating muscle–organ cross-talk mechanisms, optimizing intervention strategies across different life courses, and investigating the role of muscle health in resilience to stressors³². The consensus also emphasized that understanding the modifiable factors that affect muscle health is crucial³³. These include nutrition, structured exercise programs (particularly resistance training tailored for frequency, intensity and specific objectives)³⁴, hormonal balance, chronic disease management, lifestyle habits such as tobacco and alcohol use, and social networking.

Building on these identified research needs, proactive muscle health promotion represents an important development that supports an integrated and preventive life-course approach, with a strong emphasis on early interventions to optimize health outcomes

and reduce the burden of age-related morbidity during later life. This approach leverages the WHO ICOPE framework for enhanced case-finding and coordinated healthy longevity strategies (Fig. 1). While the AWGS/GLIS and ICOPE frameworks use different assessment methods, substantial conceptual overlap exists between muscle health and ICOPE domains, particularly vitality and locomotion. Supporting this integration, our empirical evidence from multiple Taiwanese cohorts demonstrates significant associations between muscle health parameters and other intrinsic capacity domains, including vitality, cognition and psychological well-being¹⁹. Additionally, our longitudinal data reveal that social isolation synergistically amplifies mortality risk when combined with sarcopenia, supporting the integration of social and environmental assessments³⁵. Furthermore, our vitality studies show strong interconnections between muscle attributes and ICOPE domains, with nutritional status assessment bridging muscle health and vitality measurements³⁶. The substantial interconnections between

Table 2 | Measurements of muscle strength, muscle mass and physical performance in the AWGS 2025 consensus

Measurement		Cutoff values			
		Age 50–64 years		Age ≥ 65 years	
		Men	Women	Men	Women
Adjustment					
Muscle strength					
Handgrip (kg)		<34.0	<20.0	<28.0	<18.0
Muscle mass					
DXA	ASM/height ²	<7.2	<5.5	<7.0	<5.4
BIA	ASM/height ²	<7.6	<5.7	<7.0	<5.7
DXA	ASM/BMI	<0.80	<0.55	<0.73	<0.52
BIA	ASM/BMI	<0.90	<0.63	<0.83	<0.57
Physical performance (outcomes)					
Five-times chair stand test (seconds)		≥10.0	≥10.0	≥12.0	≥12.0
Gait speed, 6-m walk test (m s ⁻¹)		<1.2	<1.2	<1.0	<1.0

ASM, appendicular skeletal muscle.

muscle health and multiple ICOPE domains—particularly vitality, locomotion, cognition, and psychosocial factors—provide robust empirical justification for their integrated assessment and intervention.

Epidemiology and challenges in management of sarcopenia in Asia before the AWGS 2025 consensus

To inform the AWGS 2025 consensus development, translating diagnostic criteria into population-level understanding requires rigorous epidemiological investigation across diverse demographic groups. To this end, the AWGS applied its 2019 diagnostic criteria in a systematic review and meta-analysis of 140 studies involving 156,325 older adults across Asia, providing important insights¹⁴. This analysis revealed considerable methodological diversity in sarcopenia assessment approaches, with 52.1% of studies using BIA-based methods, only 10.0% utilizing the gold-standard DXA approach and the remainder using various alternative methodologies. The choice of assessment method can be influenced by multiple factors including equipment availability, cost considerations and technical expertise requirements (Supplementary Table 2). These regional variations underscore the need for healthcare systems to adopt standardized, tiered diagnostic approaches that ensure feasibility across diverse healthcare settings while maintaining diagnostic accuracy.

Sarcopenia, as defined by the AWGS 2019 criteria, was prevalent, affecting 16.5% of community-dwelling adults aged 60 years and older¹⁴; notably, the prevalence of ‘possible sarcopenia’ was 28.7%, and severe sarcopenia showed a lower, but still significant, prevalence of 4.4%. The incidence of sarcopenia was 11.5% over an average follow-up of 3 years¹⁴. Subgroups at increased risk, such as older adults with diabetes mellitus, had a higher prevalence of sarcopenia of 20.5%, highlighting the association between sarcopenia and metabolic disorders¹⁴. Subgroup analyses also revealed variations in prevalence between countries; Korea had the highest pooled prevalence at 19.9%, followed by 18.4% in China, 17.6% in Taiwan and 13.2% in Japan¹⁴. Moreover, there is a significant association between severity and increased risk of mortality across the spectrum, from no sarcopenia to possible sarcopenia to confirmed sarcopenia³⁷.

Despite the substantial burden of sarcopenia among older Asians, an AWGS online survey of Asian healthcare professionals revealed gaps between knowledge and practice, with high awareness of sarcopenia but variable rates of conducting a diagnosis (42.9%) and providing active treatment (58.8% overall, 82.7% among geriatricians)¹⁵.

These diagnosis and treatment gaps may be attributable to various factors, such as insufficient time and manpower for measurements, local lack of appropriate diagnostic equipment and limited access to therapeutic interventions (for example, exercise and nutritional interventions).

Sarcopenia diagnosis update

Concordant with the GLIS criteria¹², the AWGS 2025 consensus has revised its diagnostic algorithm to define sarcopenia as concurrent low muscle mass and low muscle strength, while retaining the AWGS 2019 diagnostic cutoffs (Fig. 2). This approach aligns with GLIS in prioritizing muscle-specific parameters (mass and strength) for diagnosis, enabling identification of muscle health decline at its earliest stages before functional decline becomes apparent. This dual requirement for both muscle mass and strength ensure diagnostic specificity, as muscle weakness can be multifactorial. Requiring concurrent low muscle mass confirms that weakness stems from underlying muscle pathology rather than other causes, maintaining the precision of sarcopenia as a distinct clinical entity. Similarly to GLIS, physical performance measures (including gait speed, five-times chair stand test and SPPB) are now categorized as outcome measures rather than diagnostic criteria. However, with the intention of promoting muscle health assessment in middle age, the AWGS 2025 consensus also suggests cutoffs for people aged 50–64 years (Fig. 2 and Table 2), which are based on pooled analyses of multiple Asian cohorts that used standardized methodologies consistent with those applied to adults aged ≥65 years¹⁷. These validated cutoffs provide diagnostic criteria for sarcopenia in middle-aged adults.

Diagnostic algorithm

The AWGS 2025 consensus recommends measuring handgrip strength to identify possible sarcopenia in community-dwelling middle-aged and older adults if muscle mass measurement is not feasible, to encourage the implementation of necessary lifestyle modifications. Furthermore, the AWGS 2025 consensus categorizes physical performance measures such as the five-times chair stand test as outcomes rather than diagnostic criteria, aligning with GLIS recommendations and our core emphasis on muscle health promotion. This approach recognizes that physical performance represents the downstream consequence of muscle health deterioration rather than the underlying pathophysiology. For early identification and intervention—which is central to our muscle health promotion framework—assessment of muscle mass and strength provides more direct targets for intervention before functional decline becomes apparent. By the time physical performance is impaired, opportunities for early intervention may already be compromised. Our framework prioritizes identifying muscle health decline at its earliest stages through muscle-specific parameters, enabling timely interventions to prevent the progression to functional limitations. Importantly, the AWGS 2025 consensus eliminates severity classifications, aligning with GLIS recommendations. However, our retention of ‘possible sarcopenia’ serves as a screening category for early intervention rather than a severity indicator. This approach reflects our broader transition toward comprehensive muscle health promotion that begins before formal diagnosis becomes necessary. However, anyone with possible sarcopenia is advised to have muscle mass measured for a definitive diagnosis (Fig. 2). In summary, the AWGS 2025 consensus recommends comprehensive sarcopenia risk assessment for people aged ≥65 years through either of two main pathways; the first entails evaluating predisposing medical conditions and geriatric syndromes, while the second uses validated self-assessment instruments. People with findings consistent with increased risk for sarcopenia are recommended to have a confirmatory diagnostic evaluation. Validated methods for sarcopenia screening in 50–64-year-olds are insufficiently established in existing literature³⁸; therefore, the 2025 AWGS consensus recommends direct quantification of muscle strength and mass for people whose muscle health status is a concern.

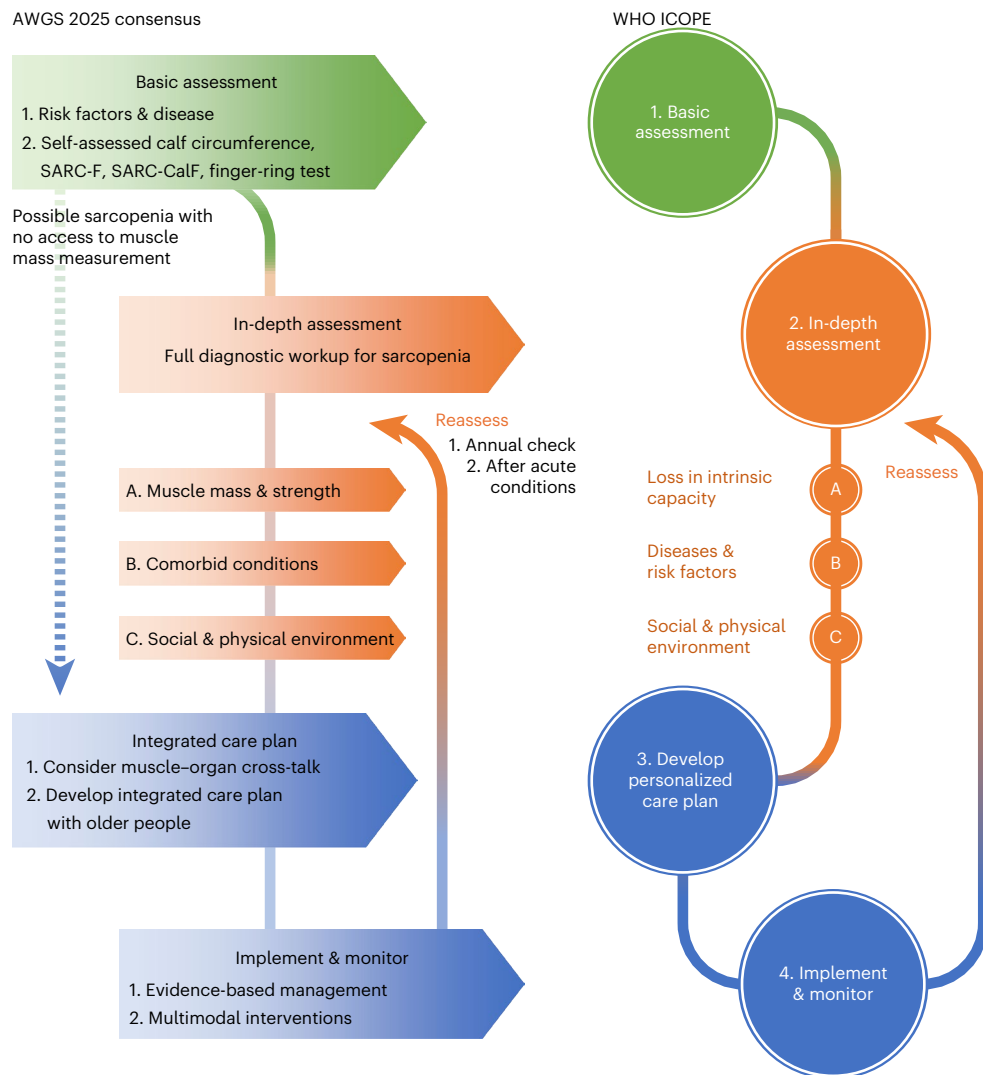


Fig. 1 | Integration of muscle health promotion into the WHO ICOPE framework in the AWGS 2025 consensus. This conceptual framework illustrates the convergence between muscle health assessment and the WHO ICOPE domains. The figure demonstrates how muscle health parameters naturally overlap with ICOPE's intrinsic capacity domains, particularly vitality (through nutritional status and energy metabolism), locomotion (through physical performance and mobility) and cognition (through muscle–brain cross-talk). The interconnected circles represent the synergistic relationships between

muscle health promotion and comprehensive geriatric assessment, enabling healthcare providers to implement coordinated interventions that address multiple aspects of healthy aging simultaneously. The bidirectional arrows indicate that improvements in muscle health can enhance overall intrinsic capacity, while addressing other ICOPE domains can reciprocally benefit muscle function, supporting the life-course approach to healthy longevity advocated in the AWGS 2025 consensus.

Case-finding and assessment

To facilitate early identification, the AWGS 2025 consensus recommends reviewing preexisting medical conditions, including, but not limited to, heart failure, chronic obstructive pulmonary disease, diabetes mellitus, chronic kidney disease and geriatric syndromes such as recurrent falls and unintended weight loss (Fig. 2). People with such conditions should be assessed for sarcopenia using handgrip strength. Furthermore, the AWGS 2025 consensus case-finding process recommends that all older adults should do self-assessments, including measuring calf circumference³⁹, SARC-F⁴⁰, SARC-CalF⁴¹ or the Yubi-wakka test⁴². The Yubi-wakka test involves individuals forming a ring with both their thumbs and index fingers around the largest part of their calf; inability to encircle the calf completely indicates preserved muscle mass, while the ability to form a gap suggests possible muscle mass loss. This test was included owing to its simplicity, cultural acceptability across Asian populations and validation as a predictor of disability and mortality among Japanese community-dwelling older

adults. ‘Possible sarcopenia’ is defined as low handgrip strength in the absence of muscle mass measurement, primarily serving as an indicator for initiating muscle health interventions rather than representing a diagnostic category. Importantly, the AWGS 2025 consensus update has removed the concept of ‘severity of sarcopenia’ (including severe sarcopenia classifications), aligning with GLIS recommendations and our paradigm shift toward muscle health promotion rather than disease severity stratification. Middle-aged or older people with normal muscle strength but who have preexisting medical conditions or positive self-assessment results are considered ‘at risk for sarcopenia’. The AWGS 2025 consensus recommends that ‘at-risk’ individuals should have muscle strength assessed annually and receive appropriate interventions to improve muscle health, with a full diagnostic workup for sarcopenia if clinically indicated. Additionally, reassessment of muscle health status should be conducted following acute conditions such as hospitalization, illness or significant health events that may accelerate muscle loss. These dual reassessment recommendations—annual

BOX 1

Conceptual evolution of the AWGS 2025 consensus

1. Expanding scope: from diagnosis in older adults (2014) to early identification (2019) to a life-course approach including middle-aged adults (2025).
2. Diagnostic precision: refinement of cutoff values on the basis of accruing Asian data (especially for muscle strength in 2019).
3. Conceptual shift: from viewing sarcopenia as a geriatric condition to conceptualizing muscle health as vital for healthy longevity.
4. Implementation strategy: increasingly pragmatic algorithms, with differentiated approaches for different healthcare settings.
5. Physiological understanding: growing emphasis on muscle–organ cross-talk and the systemic role of muscle beyond mobility.
6. Integration with care systems: the 2025 update specifically focuses on integrating muscle health promotion within existing frameworks (notably WHO ICOPE)

screening for at-risk individuals and post-acute condition evaluation—provide essential guidance for longitudinal management and ensure timely identification of muscle health deterioration across different clinical scenarios.

Muscle mass measurement

The AWGS 2025 consensus mandates muscle mass measurement as a critical component of sarcopenia diagnosis; acceptable methods include magnetic resonance imaging, computed tomography, DXA and multifrequency BIA. It is important to clarify that DXA does not directly measure muscle mass but provides an estimate of lean mass, which includes non-muscle components such as organs, connective tissue and body water. Magnetic resonance imaging and computed tomography remain the gold standards for muscle mass assessment, offering greater specificity and direct muscle tissue quantification. However, their widespread use is limited by lower accessibility, higher costs and the lack of established normative values for Asian populations.

The AWGS 2025 consensus recommends specific height-adjusted diagnostic cutoffs for sarcopenia in older adults based on DXA— $<7.0 \text{ kg m}^{-2}$ in men and $<5.4 \text{ kg m}^{-2}$ in women—and BIA— $<7.0 \text{ kg m}^{-2}$ in men and $<5.7 \text{ kg m}^{-2}$ in women (Table 2). For people aged 50–64 years, the AWGS suggests cutoffs for low muscle mass derived using the same methodology of the lowest quintile from pooled Asian cohorts¹⁷, which are: DXA, $<7.2 \text{ kg m}^{-2}$ for men and $<5.5 \text{ kg m}^{-2}$ for women; BIA, $<7.6 \text{ kg m}^{-2}$ for men and $<5.7 \text{ kg m}^{-2}$ for women (Table 2). Notably, the cutoff values for lean mass in middle-aged females are essentially the same as those for older women, which reflects the empirical findings from our comprehensive pooled analysis of Asian cohorts¹⁷. This observation suggests that the 20th percentile threshold for identifying low muscle mass in Asian women remains relatively stable across these age groups, probably reflecting population-specific characteristics in muscle mass distribution and the natural trajectory of muscle loss in Asian women.

The AWGS 2025 consensus also recommends body mass index (BMI) adjustment for muscle mass, as studies have shown that this performs comparably to height adjustment in predicting adverse outcomes of sarcopenia^{43–45}. The BMI-adjusted cutoffs are: age ≥ 65 years: DXA, <0.73 in men, <0.52 in women; BIA, <0.83 in men, <0.57 in women; 50–64 years: DXA, <0.80 in men, <0.55 in women; BIA <0.90 in men, <0.63 in women (Table 2).

Muscle strength

The GLIS recommends assessing either muscle strength or muscle-specific strength for sarcopenia diagnosis¹²; however, the operational definition of muscle-specific strength remains under development⁴⁶. Given limited research in Asian populations that has measured muscle strength based on quadriceps strength, the AWGS 2025 consensus continues to recommend handgrip strength for this purpose⁴⁷. Handgrip strength assessment uses the maximum value from two or three trials with both hands, measured using either a mechanical spring dynamometer (for example, Smedley) or a hydraulic type (for example, Jamar)⁶. For people aged ≥ 65 years, the recommended cutoffs for low muscle strength are 28 kg for men and 18 kg for women⁴⁸; the cutoffs for ages 50–64 years are 34 kg for men and 20 kg for women (Table 2), which were derived using a consistent methodology on the basis of pooled data from Asian cohorts¹⁷.

Outcomes

The AWGS 2025 consensus endorses assessing therapeutic efficacy and clinical outcomes following the GLIS recommendations^{12,46}, including impaired physical performance; mobility limitations (that is, walking ability and transfer capability from chair/bed); falls; fractures; hospitalization; nursing home admission; inability to perform instrumental and basic activities of daily living; poor quality of life; and mortality¹².

Sarcopenia management and muscle health promotion

Effective sarcopenia management requires a comprehensive approach that integrates targeted interventions to preserve muscle mass and enhance its functionality. The AWGS 2025 consensus formally endorses multimodal exercise interventions (combined aerobic and resistance training) with nutritional optimization (adequate protein intake supplemented with branched-chain amino acids or β -hydroxy- β -methylbutyrate (HMB) when needed). Other interventions discussed represent emerging research, not formal AWGS recommendations; these include current muscle-targeted pharmaceutical development evaluating receptor modulators, therapeutic antibodies, gene therapy approaches and other novel mechanisms, none of which have yet met clinical efficacy thresholds.

While our diagnostic criteria are specifically tailored to Asian populations, the following management recommendations are based on global evidence and align with international best practices, although predominantly derived from non-Asian populations. Despite this limitation, effective interventions for sarcopenia demonstrate consistent benefits across diverse populations, while highlighting the need for future Asia-specific research to optimize treatment protocols for regional populations.

It should be noted that core evidence-based interventions—resistance training and nutritional support—remain the cornerstone of sarcopenia management as established in previous AWGS consensus updates. The enhanced framework primarily systematizes early identification and prevention strategies rather than fundamentally altering treatment approaches.

AWGS 2025 recommendations: exercise and nutrition

A robust body of evidence supports the efficacy of exercise in sarcopenia management. A network meta-analysis of 46 randomized controlled trials (RCTs) identified mixed exercise as the superior intervention for increasing muscle mass, and further established the efficacy of combined physical activity with nutritional supplementation for improving both muscle strength and functional performance⁴⁹. In another network meta-analysis (30 RCTs), resistance exercise significantly increased grip strength, while exercise combined with nutritional supplementation improved five-times chair stand test performance⁵⁰; furthermore, resistance training increased appendicular muscle mass and, combined

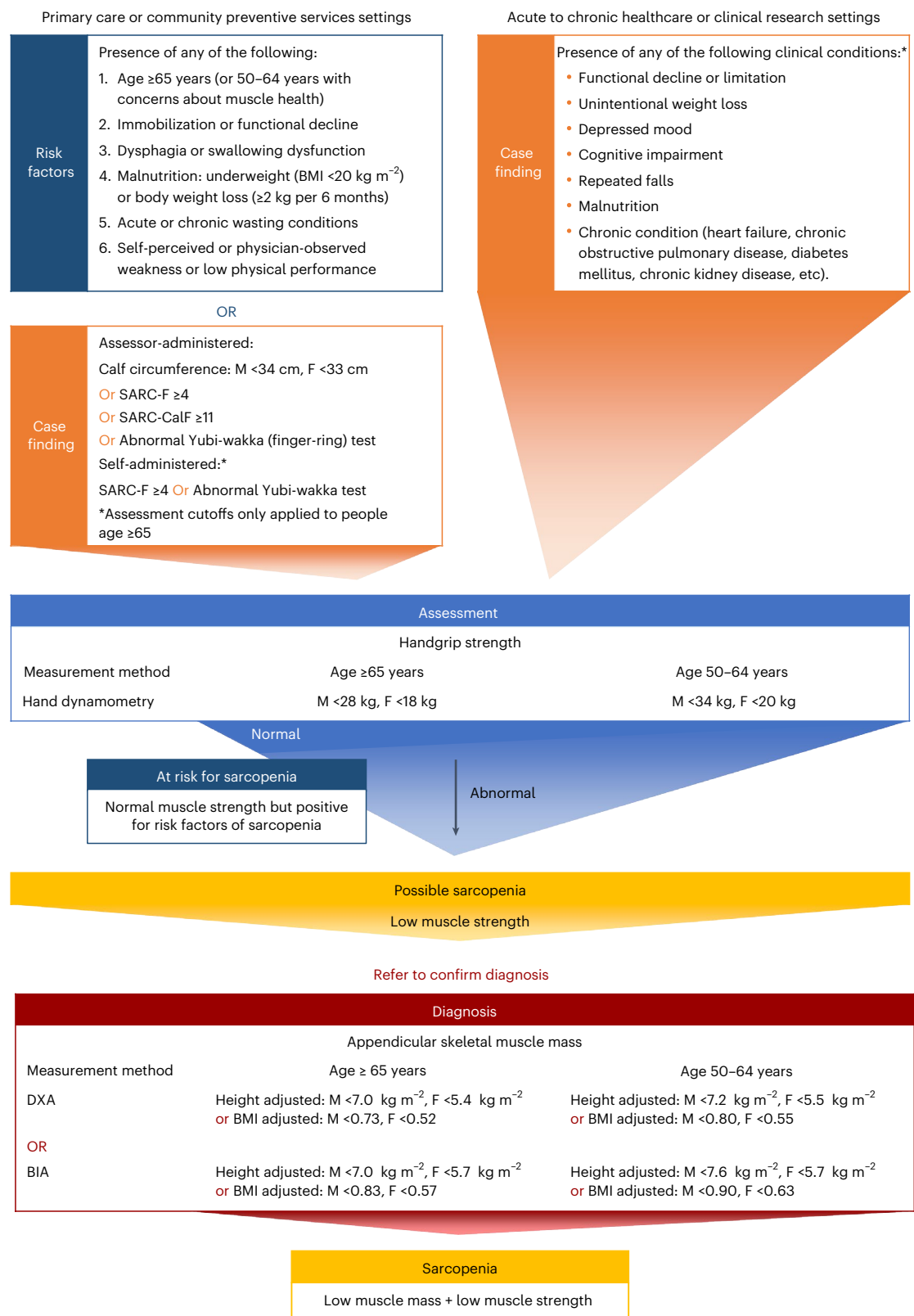


Fig. 2 | The AWGS 2025 algorithm for diagnosing sarcopenia. This diagnostic flowchart presents the step-by-step algorithm for identifying and confirming sarcopenia in both middle-aged (50–64 years) and older (≥ 65 years) adults. The algorithm begins with case-finding through two parallel pathways: assessment of predisposing conditions (left pathway) and self-assessment screening tools (right pathway). Individuals who meet the initial criteria proceed to muscle strength evaluation using handgrip strength measurements with age-specific cutoffs. Those with low muscle strength advance to muscle mass

assessment via DXA or BIA, with distinct thresholds for each age group and measurement method. The algorithm culminates in three diagnostic categories: ‘at risk for sarcopenia’ (normal strength with risk factors), ‘possible sarcopenia’ (low strength without muscle mass measurement) and confirmed ‘sarcopenia’ (concurrent low muscle strength and muscle mass). Physical performance measures are positioned as outcome indicators rather than diagnostic criteria, reflecting the AWGS 2025 consensus shift toward early identification and intervention before functional decline becomes apparent.

with nutrition, significantly increased fat-free mass. Functionally, resistance training improved gait speed, and combined resistance exercise and nutrition achieved the best timed up-and-go performance⁵⁰. In a patient-centered outcomes network meta-analysis of 42 RCTs, resistance exercise, both independently and combined with nutrition or aerobic or balance training, significantly enhanced quality of life⁵¹. Combining resistance and balance exercise with enhanced nutrition improved handgrip strength, while resistance and balance training, with or without nutritional supplementation, increased gait speed⁵¹. In a 12-week RCT, resistance exercise, with or without a twice-daily supplement containing HMB, vitamin D and omega-3 fatty acids, improved muscle strength and five-times chair stand test performance in older Chinese adults with sarcopenia⁵². An investigation of specific exercise modalities found that resistance and mixed exercising significantly increased knee extension strength and gait speed, while whole-body vibration training improved timed up-and-go performance⁵³.

Compelling evidence supports moderate-to-vigorous resistance training for older adults to improve muscle mass, lower-body strength and physical performance⁵⁴. While specific exercise prescription parameters require individualization, healthcare professionals are referred to established evidence-based guidelines for comprehensive exercise recommendations including modality, frequency, intensity and volume parameters. Notwithstanding the undoubted benefits and cost-effectiveness of exercise for enhancing healthy aging, its application as a core component of geriatric care remains limited³⁴. Key challenges to implementing large-scale pragmatic interventions include a lack of trained healthcare professionals, insufficient health system resourcing, and widely varying health status, physical capabilities, mobility, self-motivation and compliance among older individuals, necessitating tailored approaches³⁴. Multifaceted, individualized strategies that include social support, education and empowerment are needed to overcome these barriers³⁴.

AWGS 2025 recommendations: nutritional supplementation

Good-quality nutrition is crucial to sarcopenia management, complementing exercise-based approaches through multiple pathways. A meta-analysis found that increased daily protein intake enhanced gains in lean body mass, particularly when combined with resistance exercise⁵⁵; the optimal protein intake ranges during resistance training were 1.2–1.59 g per kg body weight per day for adults ≥ 65 years old and ≥ 1.6 g per kg body weight per day for adults aged < 65 years⁵⁵. In one RCT, a protein-enriched diet (25% of daily calories) improved walking distance and decreased intramuscular adipose tissue (IMAT)⁵⁶. Another RCT showed that daily supplementation with protein-enriched lacto-vegetarian soups improved both physical performance and functional status among ≥ 65 -year-olds at risk of malnutrition, despite having no significant effect on body composition compared to a normal diet⁵⁷. Studies of branched-chain amino acids have also shown promising results; a meta-analysis of 35 RCTs found positive effects on muscle strength, mass and physical performance in older adults⁵⁸. In a 12-week RCT, branched-chain amino acid supplementation combined with exercise training significantly increased muscle mass⁵⁹. Leucine has been particularly associated with higher muscle protein synthesis rates⁶⁰.

HMB has also shown benefits in persons with sarcopenia, with significant improvements in skeletal muscle mass and handgrip strength, although with no apparent benefit on physical performance (gait speed)⁶¹. In a 12-week RCT in Taiwan, HMB supplementation (3 g per day) improved muscle mass, physical performance and reduced intramuscular adiposity in pre-frail older people⁶². However, an umbrella review of systematic reviews showed inconclusive support for HMB supplementation, with minor, inconsistent evidence for increased muscle mass and no evidence of improved physical function in older people or clinical populations⁶³.

Other nutritional supplements have also demonstrated potential efficacy. Positive effects of omega-3 long-chain polyunsaturated fatty acid supplementation on overall muscle mass and strength in older adults have been reported⁶⁴, with >2.5 g per day producing the greatest improvements in arm strength and lower extremity physical function⁶⁵. Probiotic supplementation likewise improved muscle mass and global muscle strength⁶⁶. However, evidence from studies of vitamin D remains equivocal. Although vitamin D supplementation decreased SPPB scores in community-dwelling older adults, there were no significant beneficial effects on general muscle strength or physical performance⁶⁷. Another meta-analysis found no effect on appendicular skeletal muscle mass, handgrip strength or physical performance, concluding that further investigation of the potential of vitamin D in preventing sarcopenia progression is needed⁶⁸.

This growing body of evidence supports implementing a comprehensive nutritional approach in sarcopenia management, with a particular emphasis on adequate protein intake and strategic supplementation as appropriate, especially combined with exercise programs.

Emerging therapeutic approaches: pharmacotherapies

Despite extensive research, no pharmaceutical interventions are currently approved for treating sarcopenia. The International Conference on Frailty and Sarcopenia Research Task Force has highlighted ongoing challenges in drug development, which include the complexity of operationalizing clinical phenotypes, selecting appropriate functional outcomes and managing comorbidities in older participants⁶⁹.

Angiotensin-converting enzyme inhibitors have shown early promise for treating sarcopenia⁷⁰. The angiotensin II receptor blocker losartan demonstrated potential in preclinical studies by reducing muscle fibrosis and enhancing the recovery of atrophied muscle tissue^{71,72}. Selective androgen receptor modulators increased lean muscle mass in women with sarcopenia, but not muscle strength or physical performance⁷³. The follistatin–activin–myostatin pathway has emerged as another therapeutic target. Myostatin-neutralizing antibodies⁷⁴ and activin IIb receptor blockade⁷⁵ increased muscle mass, but there were no superior functional improvements compared to exercise alone. Developing therapeutic antibodies targeting activin A and myostatin has proven challenging, with several early trials discontinued and others still ongoing⁷⁶.

Active drug development research includes investigations of ghrelin receptor agonists⁷⁷, fast skeletal muscle troponin activators⁷⁸, synthetic tobacco alkaloid derivatives⁷⁹ and approaches targeting bone–muscle cross-talk⁸⁰. Other promising areas for future development include cell-based therapies⁸¹ and genetic interventions, such as follistatin overexpression⁸². Other promising therapeutic targets under preliminary investigation include tumor necrosis factor modulation, which has shown potential in addressing inflammation-mediated muscle wasting⁸³; fibroblast growth factor-21, which demonstrates metabolic benefits that may translate to muscle health improvements⁸⁴; irisin, a myokine that promotes muscle regeneration and may enhance exercise-induced adaptations⁸⁵; and apelin, which has shown promise in promoting muscle regeneration and function in preclinical studies⁸⁶.

Emerging therapeutic approaches: digital-based technologies

In one RCT of participants aged ≥ 55 years, a digital somatosensory dance game was found to be significantly associated with improved muscle health and cognitive performance⁸⁷. Such results highlight the potential of digital gamification for enhancing engagement in exercise activities and reducing sedentary time. In a recent systematic review examining the effects of participatory digital-based interventions (for example, exergames) on sarcopenia-related measures, handgrip strength, usual walking speed, five-times chair stand test and 30-s

chair stand test performance were significantly improved, although with low overall evidence certainty⁸⁸.

Beyond intervention applications, digital technologies also show promise for assisting in sarcopenia diagnosis and monitoring. These technological approaches may enhance accessibility and standardization of assessments, particularly in resource-limited settings or for longitudinal tracking of muscle health parameters⁸⁹.

Future research

Advancing the understanding and management of sarcopenia in Asian populations requires research in several critical areas. Methodological standardization represents an important priority, as despite widespread BIA adoption, methodological variability in muscle assessment approaches can create challenges for cross-population comparisons and research generalizability. This necessitates developing population-specific BIA equations for diverse Asian ethnic groups, establishing standardized training protocols, and creating quality assurance frameworks for equipment calibration. Other key research priorities include developing biomarkers for early detection, promoting standardized epidemiological reporting to enable data stratification by age, sex, ethnicity, comorbidities and patient setting, investigating complex phenotypes such as sarcopenic obesity (for which the AWGS has established a special interest group), advancing personalized interventions and exploring digital health technologies.

Among these priorities, sarcopenic obesity represents a particularly complex phenotype requiring dedicated investigation. Sarcopenic obesity, defined as concurrent diminished muscle mass, impaired muscle function and excessive adiposity⁹⁰, is a particularly complex phenotype requiring dedicated studies. Theoretically, the concerted effects of these conditions may establish a cyclical process in which inflammation resulting from excess adipose tissue exacerbates muscle degradation, while reduced muscle mass diminishes the metabolic rate, thereby promoting further adipogenesis^{91,92}. However, analogous to the ‘obesity paradox’ in older adults, the operational definition of sarcopenic obesity and its clinical implications need further exploration^{90,93,94}. Given that IMAT deposition constitutes a critical physiological characteristic of muscle aging, negatively impacting both muscle mass and function, the primary pathological consequences of sarcopenic obesity may stem from IMAT accumulation, rather than the conventionally assumed effects of visceral adiposity⁹⁵. To refine the operational definition of sarcopenic obesity and elucidate its clinical impacts in Asian populations, the AWGS has established a special interest group to focus on the underlying pathophysiology and formulate recommendations for its diagnosis and management.

Although current pharmacotherapeutic options remain limited, several promising approaches warrant further investigation. These include developing new drugs targeting specific pathways involved in muscle protein synthesis and degradation and investigating the potential of existing medications for metabolic disorders in treating sarcopenia. Other important areas for future research are exploring combination therapies that might synergistically improve muscle health and developing biomarkers for early detection and to monitor treatment responses.

The AWGS 2025 consensus for sarcopenia management, which strongly emphasizes the promotion of muscle health from middle age, opens critical avenues for further research⁹⁶. Pertinently, the AWGS has published comprehensive normative data for muscle metrics across broadened age strata, focusing on the transition from middle to older adulthood¹⁷. Further research is required to identify biomarkers and indicators of declining muscle health that precede clinically manifest sarcopenia, thus enabling more timely interventions^{97–99}. Developing personalized interventions to promote healthy aging is a significant research need. Integrating muscle health promotion into the WHO ICOPE framework necessitates identifying effective incorporation strategies within existing care pathways. Furthermore, research should

explore the role of digital health technologies in facilitating regular assessment of muscle health parameters within ICOPE⁸⁸, especially in resource-constrained environments. Elucidating the interrelationships between muscle health trajectories and other components of intrinsic capacity, such as cognitive function and vitality¹⁹, will be essential to developing more effective, integrated interventions that promote healthy longevity from middle age onward.

Conclusions

This AWGS 2025 consensus update builds upon previous work to enhance the approach to sarcopenia, expanding beyond conventional diagnostic criteria to integrate muscle health promotion within the WHO ICOPE framework, thereby facilitating an integrated approach to healthy aging across the life course. This update harmonizes with the GLIS, while retaining region-specific guidance for Asian populations. Expanding the AWGS diagnostic criteria to include middle-aged people (50–64 years) would enable earlier intervention and prevention. The substantial prevalence of sarcopenia in Asia, coupled with its significant impact on health outcomes, underscores the importance of early identification and intervention. Exercise and nutritional interventions remain the cornerstone of sarcopenia management, while ongoing research into innovative therapeutic approaches holds promise for more targeted interventions in the future. This AWGS 2025 update provides a framework for healthcare professionals to address sarcopenia while promoting overall muscle health, ultimately contributing to healthy longevity.

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Author contributions

L.-K.C. wrote the first draft and was a major contributor in writing the manuscript. L.-K.C., J.W. and H.A. contributed to conception of the consensus update. L.-K.C. and F.-Y.H. performed systematic evidence review and prepared the figures/tables. L.-K.C., F.-Y.H. and H.A. revised subsequent drafts to address reviewer comments. All authors participated in consensus discussions, contributed to critical review of the manuscript for important intellectual content and approved the final version. All authors agree to be accountable for the accuracy and integrity of this work.

Competing interests

The authors declare no competing interests.

Additional information

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