

Asian Working Group for Sarcopenia

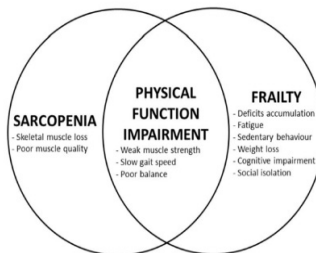
2019 Consensus Update on Sarcopenia Diagnosis and Treatment

서울의대

임재영

근감소증 (Sarcopenia)

- 노화에 따른 골격근육량의 감소로 근력 저하와 함께, 각종 신체기능이 저하되는 현상.
- Physical marker or component of frailty



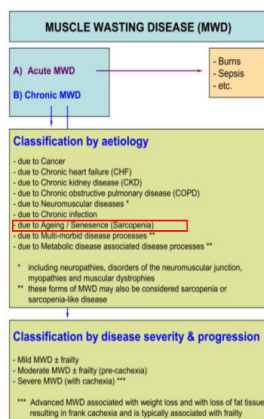
Cesari M, Front Aging Neurosci 2014

MEMO

Muscle Wasting Disease/ Sarcopenia

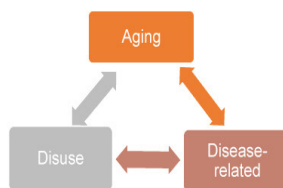
Society on Sarcopenia, Cachexia and Wasting Disorders

European Working Group on Sarcopenia in Older People (EWGSOP)



Primary sarcopenia
Age-related sarcopenia
No other cause evident except ageing

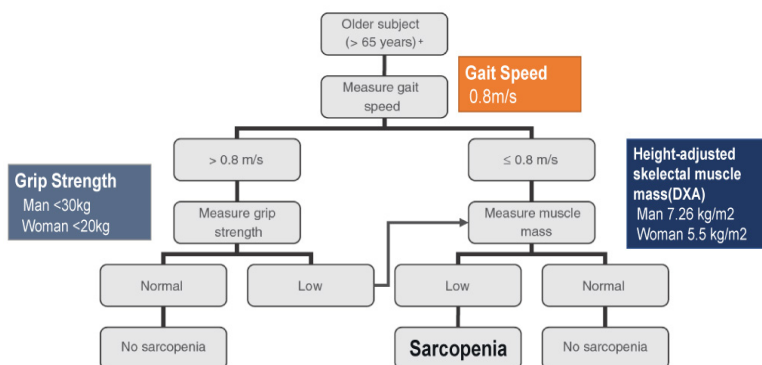
Secondary sarcopenia
Activity-related sarcopenia
Can result from bed rest, sedentary lifestyle, deconditioning or zero-gravity conditions
Disease-related sarcopenia
Associated with advanced organ failure (heart, lung, liver, kidney, brain), inflammatory disease, malignancy or endocrine disease
Nutrition-related sarcopenia
Results from inadequate dietary intake of energy and/or protein, as with malabsorption, gastrointestinal disorders or use of medications that cause anorexia



Sarcopenia : operational definition

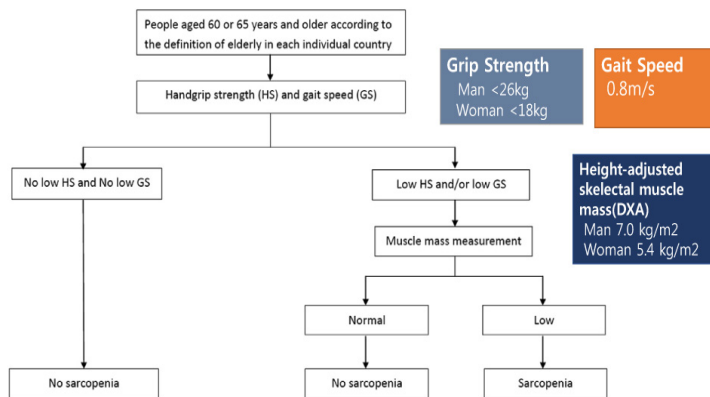
- Baumgartner et al., 1998
 - Using dual X-ray absorptiometry (DXA): Appendicular lean mass (ASM) divided by height squared (kg/m^2)
 - Definition: below 2 SD of young adult mean value
 - Prevalence
 - 13-24% under 70 years of age
 - >50% in persons over 80 years of age
- Janssen et al., 2001
 - Skeletal mass by bioelectric impedance analysis
 - Skeletal muscle mass index (SMI)
 - Skeletal muscle mass/body mass $\times 100$
- Newman et al, 2003
 - Skeletal muscle mass – adjustment for fat mass or body weight

European consensus on definition and diagnosis



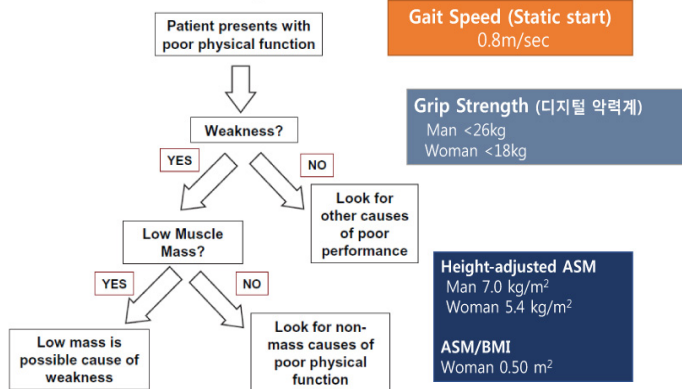
Cruz-Jentoft et al. 2010. Age Ageing

Diagnostic Algorithm Asian Working Group for Sarcopenia (AWGS)



JAMDA 2016, 2014

MEMO

FNIH Clinical Paradigm

Studenski SA et al. J Gerontol Med Sci 2014

그런데, 근감소증이 보건의료적으로 주목받는 새로운 질환임에도 불구하고 진단과정이 복잡하고, 절단값이 통일되어 있지 않으며, 근육량과 질을 측정하는 것이 정확하지 못하기 때문에 계속 연구단계에 머물고 임상 현장에서 진단과 치료로 이어지지 못하고 있다.

Cruz-Jentoft et al. 2018. Age and Ageing

Sarcopenia: EWGSOP update**EWGSOP1**

Diagnosis is based on documentation of criterion 1 plus (criterion 2 or criterion 3)

1. Low muscle mass
2. Low muscle strength
3. Low physical performance

Stage	Muscle mass	Muscle strength	Performance
Presarcopenia	↓		
Sarcopenia	↓	↓	Or ↓
Severe sarcopenia	↓	↓	↓

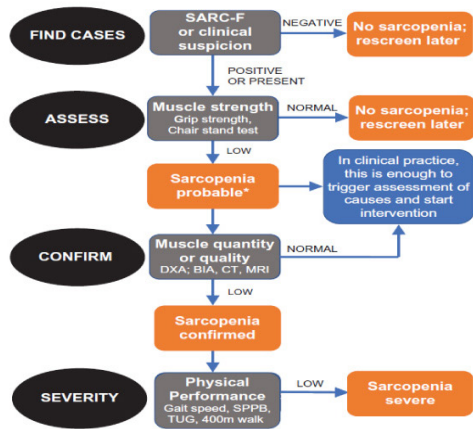
EWGSOP2

Probable sarcopenia is identified by Criterion 1.
Diagnosis is confirmed by additional documentation of Criterion 2.
If Criteria 1, 2 and 3 are all met, sarcopenia is considered severe.

- (1) Low muscle strength
- (2) Low muscle quantity or quality
- (3) Low physical performance

Cruz-Jentoft et al. 2018. Age and Ageing

Sarcopenia: EWGSOP2 algorithm



Cruz-Jentoft et al. 2018. Age and Ageing

Sarcopenia: EWGSOP2 algorithm

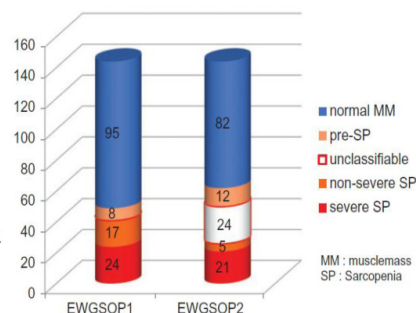
Test	Cut-off points for men	Cut-off points for women	References
EWGSOP2 sarcopenia cut-off points for low strength by chair stand and grip strength			
Grip strength	<27 kg	<16 kg	Dodds (2014) [26]
Chair stand	>15 s for five rises		Cesari (2009) [67]
EWGSOP2 sarcopenia cut-off points for low muscle quantity			
ASM	<20 kg	<15 kg	Studenski (2014) [3]
ASM/height ²	<7.0 kg/m ²	<5.5 kg/m ²	Gould (2014) [125]
EWGSOP2 sarcopenia cut-off points for low performance			
Gait speed	≤0.8 m/s		Cruz-Jentoft (2010) [1]
SPPB	≤8 point score		Studenski (2011) [84]
TUG	≥20 s		Pavasini (2016) [90]
400 m walk test	Non-completion or ≥26 min for completion		Guralnik (1995) [126]
			Bischoff (2003) [127]
			Newman (2006) [128]

Establishing Evidence-Based Cut-points to Define Sarcopenia

Cruz-Jentoft et al. 2018. Age and Ageing

Mismatch in sarcopenia case finding according to EWGSOP1 and EWGSOP2.

- EWGSOP2 algorithm yielded lower sensitivity but more specificity for sarcopenia case finding
- Low concordance rates of individual cases between EWGSOP1 and EWGSOP2.
- Unlike EWGSOP1, EWGSOP2 defined sarcopenia did not show a significant association with malnutrition and disability.
- Unclassifiable cases: low performance, normal strength and low muscle mass



Reiss J et al. Age and Ageing 2019

Asian Working Group for Sarcopenia revised definition and diagnostic criteria

- The revised definition should be applied to **people living in East Asia and Southeastern Asia**.
- Case finding should be done by **calf circumference measurement or SARC-F** before the diagnosis process.
- Diagnosis of **possible sarcopenia** can be made by low calf circumference measurement or SARC-F (4 points or over) + low grip strength or abnormal values of 5 chair stand.
- **Diagnosis of sarcopenia** can be made by low muscle mass+ low grip strength or slow gait speed as in the original definition
- *The cutoff should be determined after systematic review.*

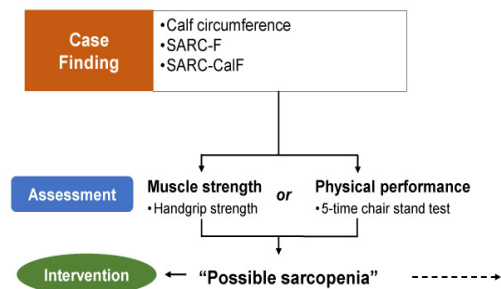
AWGS meeting in Nagoya on Jan 19, 2019

Sarcopenia definition

- *“Age-related loss of skeletal muscle mass plus loss of muscle strength and/or reduced physical performance”.*
- AWGS 2019 does not adopt the EWGSOP2 terms “primary or secondary sarcopenia” and “acute or chronic sarcopenia”
- Sarcopenic obesity, osteosarcopenia, sarco-osteoporosis, or osteosarcopenic obesity
 - Not recommend specific diagnostic criteria or treatments unless/until more convincing evidence becomes available.

AWGS 2019 algorithm for sarcopenia

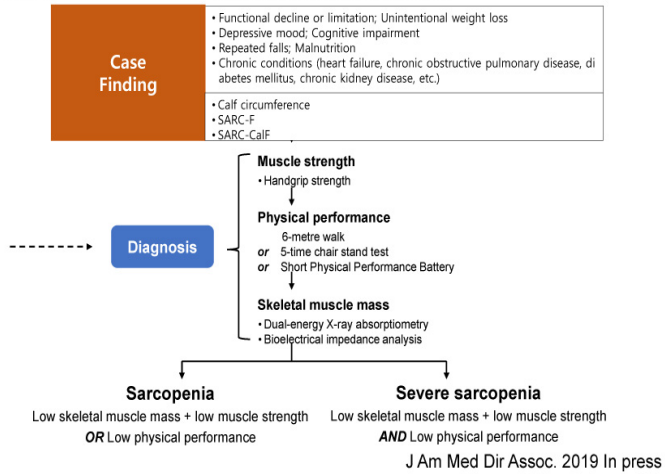
Primary healthcare or community preventive services settings



J Am Med Dir Assoc. 2019 In press

AWGS 2019 algorithm for sarcopenia

Acute to chronic healthcare or clinical research settings



NORMATIVE DATA OF HANDGRIP STRENGTH IN 26344 OLDER ADULTS – A POOLED DATASET FROM EIGHT COHORTS IN ASIA

			Age stratum (years)	Lowest quintile (kg)	Mean (SD) (kg)
Men					
			60 – 69.9	32.7	37.9 (6.5)
			N = 5319		
			70 – 79.9	28.0	33.3 (6.3)
			N = 5317		
			80 or above	23.6	28.4 (6.2)
			N= 1554		
			60 or above	28.9	34.7 (7.1)
			N= 12190		
			65 or above	28.0	33.8 (6.9)
			N = 10273		
Women					
			60 – 69.9	20.0	23.6 (4.6)
			N = 6384		
			70 – 79.9	17.8	21.1 (4.5)
			N = 6009		
			80 or above	14.7	18.3 (4.5)
			N= 1761		
			60 or above	18.0	21.9 (4.8)
			N = 14154		
			65 or above	17.7	21.3 (4.8)
			N = 11711		

SD = Standard deviation

Cohorts	Number of participants	Percentage (%)
Korea	7128	27.1
Japan	4865	18.5
Singapore	195	0.7
Taiwan (ILAS)	783	3.0
Thailand	7128	27.1
China	815	3.1
Taiwan (LAST)	1430	5.4
Hong Kong	4000	15.2
Total	26344	100.0

ILAS = I LAn Longitudinal Aging Study; LAST = Longitudinal Aging Study of Taipei

Auyeung TW et al. JHNA 2019

Muscle strength – grip strength

- Standard measurement recommendation
 - Smedley type dynamometer: standing with full elbow extension or sitting if older people cannot stand unassisted.
 - Jamar dynamometer: sitting with 90° elbow flexion
 - Maximum reading of at least two trials
 - Either both hands or dominant hand
 - Maximum-effort isometric contraction, rather than a fixed acquisition time.

Gait speed cut-off: 2016 Update of AWGS

- Kim H, Suzuki T, Kim M, et al. Incidence and predictors of sarcopenia onset in community-dwelling elderly Japanese women: 4-year follow-up study. J Am Med Dir Assoc 2015;16:85.e1e85.e8.
- Slow gait speed: < 1.0 m/s

J Am Med Dir Assoc. 2016 Aug 1;17(8):767.e1-7.

Gait Speed as a simple predictor of 1-year cognitive decline

- Risk factors for fast cognitive decline in a multivariate logistic regression model in veterans' care homes in Taiwan
- 249 male residents aged 80 years and older
- Usual gait speed of < 1 m/s identifying people who are at high risk of adverse health-related outcomes

	Adjusted [†] aHR (95% CI)	P-value
Slow gait speed Yes vs no (reference: no)	4.58 (1.22-17.2)	0.024*
Age	0.98 (0.89-1.08)	0.675
Polypharmacy	1.19 (0.52-2.74)	0.684
Psychiatric medications	1.50 (0.69-3.24)	0.304
Cigarettes smoking	1.34 (0.58-3.12)	0.497
Charlson's Comorbidity Index	0.90 (0.68-1.19)	0.467
Cognitive function	0.99 (0.92-1.06)	0.741
Physical function	0.99 (0.98-1.01)	0.305
Depressive mood	1.16 (0.51-2.63)	0.716
Handgrip strength	1.36 (0.61-3.03)	0.446
MNA-SF	0.72 (0.30-1.74)	0.465
Fall experience	1.03 (0.40-2.63)	0.950

Hsu CL et al., Geriatr Gerontol Int. 2017 Apr;17 Suppl 1:14-19.

Sarcopenia Is Associated with Cognitive Impairment Mainly Due to Slow Gait Speed: Results from the Korean Frailty and Aging Cohort Study (KFACS)

[Table 1. Demographic characteristics of participants with and without sarcopenia by AWGS criteria.

Variable	Overall (n = 1887)	Without Sarcopenia (n = 1724)	With Sarcopenia (n = 163)
Age (years)	75.8 ± 3.9	75.5 ± 3.8	78.5 ± 3.8
Female sex	912 (48.3)	843 (48.9)	69 (42.3)
Education (≥7 years)	1221 (64.7)	1119 (64.9)	102 (62.6)
Live alone	382 (20.2)	343 (19.9)	39 (23.9)
BMI (kg/m ²)	24.2 ± 2.8	24.4 ± 2.8	22.5 ± 2.9
Appendicular lean mass index (kg/m ²)	6.46 ± 1.00	6.53 ± 1.00	5.6 ± 0.76
Appendicular lean mass to BMI ratio	0.685 ± 0.157	0.690 ± 0.157	0.632 ± 0.148
Current smoker	119 (6.3)	104 (6.0)	15 (9.2)
Alcohol (≥2-3 time/week)	360 (19.1)	326 (18.9)	34 (20.9)
Low physical activity	174 (9.3)	143 (8.4)	31 (19.3)
Number of comorbidities	1.6 ± 1.2	1.6 ± 1.2	1.9 ± 1.3
Fair/poor self-perceived health	453 (24.0)	381 (22.1)	72 (44.2)
Depressive symptoms (GDS score ≥6)	370 (19.6)	312 (18.1)	58 (35.6)
MNA Screening score (≤11)	144 (7.6)	116 (6.7)	28 (17.2)
Physical function			
Handgrip strength (kg)	27.1 ± 7.4	27.7 ± 7.3	21.0 ± 4.9
Usual gait speed (m/s)	1.14 ± 0.25	1.16 ± 0.25	0.96 ± 0.25
Timed get up and go test (s)	10.1 ± 2.4	10.0 ± 2.3	11.8 ± 2.6
Five Times Sit-to-Stand (s)	11.0 ± 3.5	10.8 ± 3.3	13.0 ± 4.6
Short Physical Performance Battery (score)	11.0 ± 1.4	11.1 ± 1.3	10.0 ± 1.8
AWGS-defined sarcopenia			
Low muscle mass	709 (37.6)	546 (31.7)	163 (100.0)
Weakness	281 (14.9)	144 (8.4)	137 (84.0)
Slow gait speed	116 (6.1)	68 (3.9)	48 (29.4)

Kim M, Won CW. Int. J. Environ. Res. Public Health 2019, 16, 1491

Physical performance to diagnose sarcopenia

- Gait speed
 - Walking start with accelerating zone
 - 6 meters walking distance
 - Usual gait speed
 - More than 2 times of test (average time)
 - Cut-offs: 1.0 m/s (as a predictor of the functional outcomes)

Physical performance to diagnose sarcopenia

- Surrogate or complementary test of gait speed
 - Short Physical Performance Battery ≤ 9 points
 - Chair stand time > 12 sec

Screening and case finding in the community

- Systematic review for case finding of sarcopenia diagnosis
- Calf circumference
- SARC-F
- SARC-Calf

MEMO

SARC-F screen for sarcopenia

Component	Question	Score
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None=0 Some=1 A lot or unable=2
Assistance in walking	How much difficulty do you have walking across a room?	None=0 Some=1 A lot, use aids, or unable=2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None=0 Some=1 A lot or unable without help=2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None=0 Some=1 A lot or unable=2
Falls	How many times have you fallen in the past year?	None=0 1-3 falls=1 4 or more falls=2

Malmstrom TK and Morley JE. JAMDA 2013

SARC-F screen for sarcopenia

Korean Version of SARC-F Questionnaire (Korean and English)

항목	질문	점수
근력	무게 4.5 kg (9개들이 배 한 박스)를 들어서 나르는 것이 얼마나 어려운가요?	전혀 어렵지 않다=0 좀 어렵다=1 매우 어렵다/할 수 없다=2
보행 보조	방안 한 쪽 끝에서 다른 쪽 끝까지 걷는 것이 얼마나 어려운가요?	전혀 어렵지 않다=0 좀 어렵다=1 매우 어렵다/보조기(지팡이 등)를 사용해야 가능/할 수 없다=2
의자에서 일어시기	의자(휠체어)에서 일어나 침대(잠자리)로, 혹은 침대(잠자리)에서 일어나 의자(휠체어)로 옮기는 것이 얼마나 어려운가요?	전혀 어렵지 않다=0 좀 어렵다=1 매우 어렵다/도움 없이 할 수 없다=2
계단 오르기	10개의 계단을 쉬지 않고 오르는 것이 얼마나 어려운가요?	전혀 어렵지 않다=0 좀 어렵다=1 매우 어렵다/할 수 없다=2
낙상	지난 1년 동안 몇 번이나 넘어지셨나요?	전혀 없다=0 1-3회 =1 4회 이상 =2

S. Kim et al. JAMDA 19 (2018)
40e45

Calf circumference measurement

Cut-off value of CC for sarcopenia was 32 cm (AUC; male, 0.82 and female, 0.72).



Table 4. Sensitivity and specificity of CC measures for sarcopenia according to AWGS criteria

CC	For sarcopenia according to AWGS criteria					
	Male			Female		
	Sensitivity	Specificity	Youden index	Sensitivity	Specificity	Youden index
31	-	-	-	54%	75%	0.29
32	75%	83%	0.58	85%	57%	0.42
33	79%	78%	0.57	88%	47%	0.36
34	86%	64%	0.50	92%	33%	0.26
35	93%	42%	0.35	-	-	-

Sarcopenia was defined as low muscle function (HGS of < 26 kg for males and < 18 kg for females and/or GS of < 0.8 m/s for both sex) plus low muscle mass (SMI of < 7.0 kg/m² for males and for females < 5.4 kg/m²).

CC = calf circumference, AWGS = Asian Working Group for Sarcopenia, HGS = hand grip strength, GS = gait speed, SMI = skeletal muscle mass index.

Kim S et al. J Korean Med Sci. 2018

SARC-F Combined with Calf Circumference (SARC-CalF)

The SARC-F and SARC-CalF Scales

Components	Questions	SARC-F Score	SARC-CalF Score
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0 Some = 1 A lot or unable = 2	None = 0 Some = 1 A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2	None = 0 Some = 1 A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2	None = 0 Some = 1 A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2	None = 0 Some = 1 A lot or unable = 2
Falls	How many times have you fallen in the past year?	None = 0 1-3 falls = 1 4 or more falls = 2	None = 0 1-3 falls = 1 4 or more falls = 2
Calf circumference		-	Females: >33 cm = 0 ≤33 cm = 10 Males: >34 cm = 0 ≤34 cm = 10

Yang M et al. JAMDA 19 (2018) 277.e1e277.e8

Screening and case finding in the community

- Systematic review for case finding of sarcopenia diagnosis
- Cutoff of calf circumference
 - 32~34 in men and 32~33 in women.
 - **34 cm for men and 33 cm for women** to increase the sensitivity for case finding
- SARC-F ≥ 4
- SARC-CalF ≥ 11

AWGS2 for sarcopenia

- **Low muscle strength**
 - handgrip strength < 28 kg for men and < 18 kg for women
- **Low physical performance**
 - 6-metre walk < 1.0 m/s
 - Short Physical Performance Battery ≤ 9
 - Five-time chair stand test ≥ 12 s
- **Low muscle mass**
 - Height-adjusted muscle mass
 - Dual-energy X-ray absorptiometry < 7.0 kg/m² in men, < 5.4 kg/m² in women
 - Bioimpedance < 7.0 kg/m² in men, < 5.7 kg/m² in women
- **For case finding**
 - Calf circumference (< 34 cm in men, < 33 cm in women)

JAMDA 21 (2020) 306–307

JAMDA
journal homepage: www.jamda.com

Special Article

Asian Working Group for Sarcopenia: 2019 Consensus Update on Sarcopenia Diagnosis and Treatment

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Endorsement

- Asian Association for Frailty and Sarcopenia (AAFS)
- Japan Geriatrics Society (JGS)
- Japanese Association of Sarcopenia and Frailty (JASF)
- National Center for Geriatrics and Gerontology (NCGG)
- Taiwan Association of Integrated Care (TAIC)
- Korean Geriatric Society (KGS)
- Korean Society of Sarcopenia (KSS)
- Hong Kong Geriatrics Society (HKGS)
- Society for Geriatric Medicine China
- Society for Geriatric Medicine Singapore
- Thai Society of Gerontology and Geriatrics (TAGG)

More Asian data are needed

