



APPROCCI INTERDISCIPLINARI IN REUMATOLOGIA  
9<sup>a</sup> edizione

## **RIABILITAZIONE E MALATTIE REUMATICHE**

**TORINO, 8-9 ottobre 2021**

Lettura: La sarcopenia: aspetti diagnostici, classificazione e trattamento  
(M.A. Minetto)

**UNIVERSITA' DI TORINO**

***Divisione Universitaria di Medicina  
Fisica e Riabilitazione***



# Sarcopenia: definition

The loss of skeletal muscle **mass** and **function**



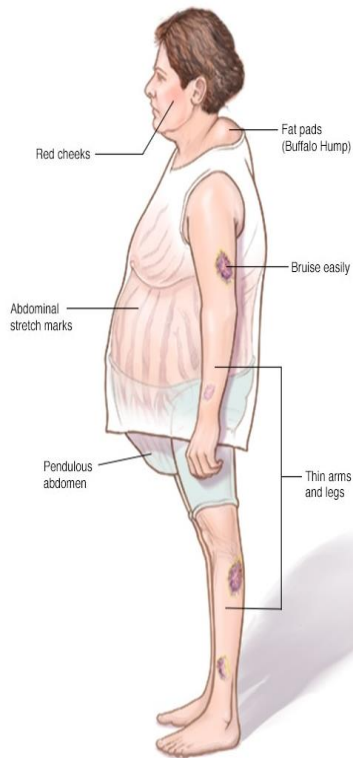
# Sarcopenia: definition

The loss of skeletal muscle mass and function that occurs during the [ageing process](#) (primary sarcopenia)



# Sarcopenia: definition

The loss of skeletal muscle mass and function that occurs due to the presence of an underlying disease or medication (secondary sarcopenia).

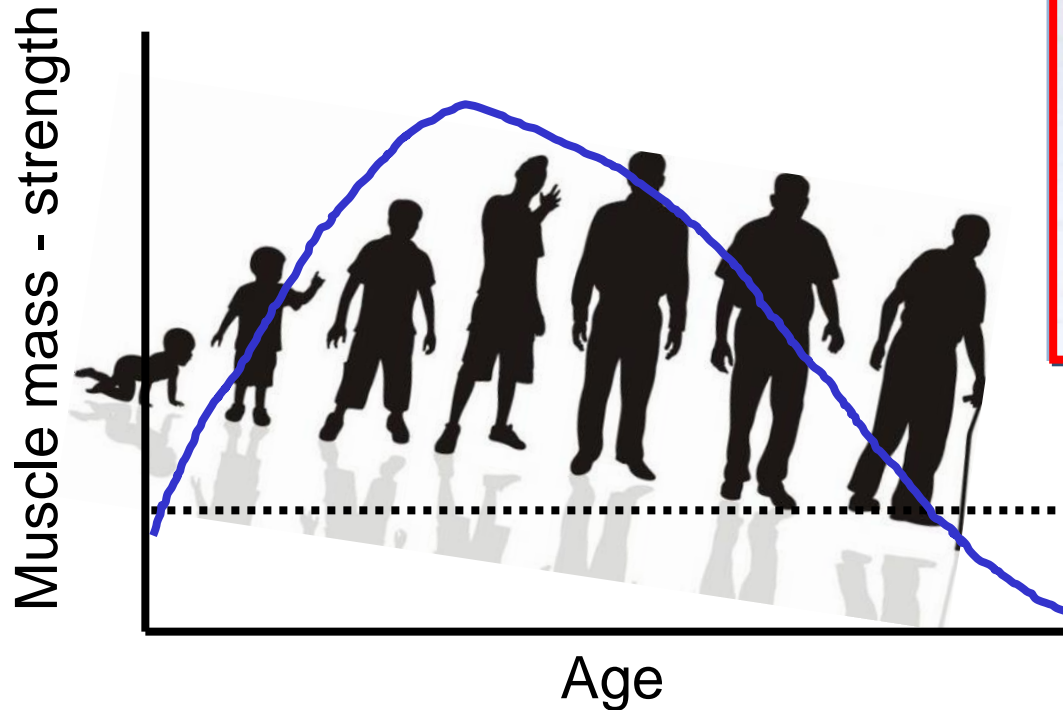


- ✓ *disuse atrophy*
- ✓ *disease-related sarcopenia (endocrine myopathies, cancer cachexia)*
- ✓ *nutrition-related sarcopenia*



- ☐ Age-related
- ☐ Drug-related
- ☐ Diet-related
- ☐ Disuse-related

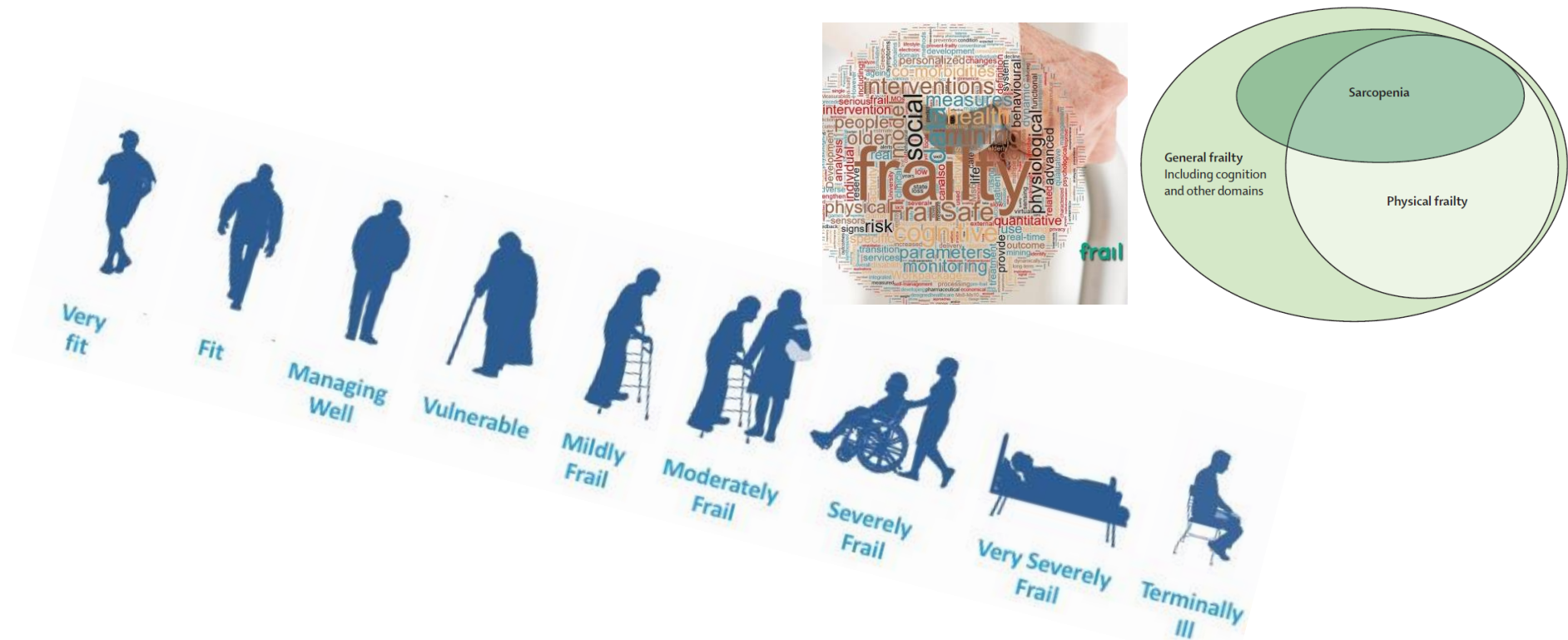
loss of skeletal muscle mass and strength





# Frailty in elderly people

**Sarcopenia** is regarded as a key component of **frailty**



# **Frailty as a syndrome**



*FRIED ET AL.*

*Journal of Gerontology: MEDICAL SCIENCES*  
2001, Vol. 56A, No. 3, M146–M156

## Frailty in Older Adults: Evidence for a Phenotype

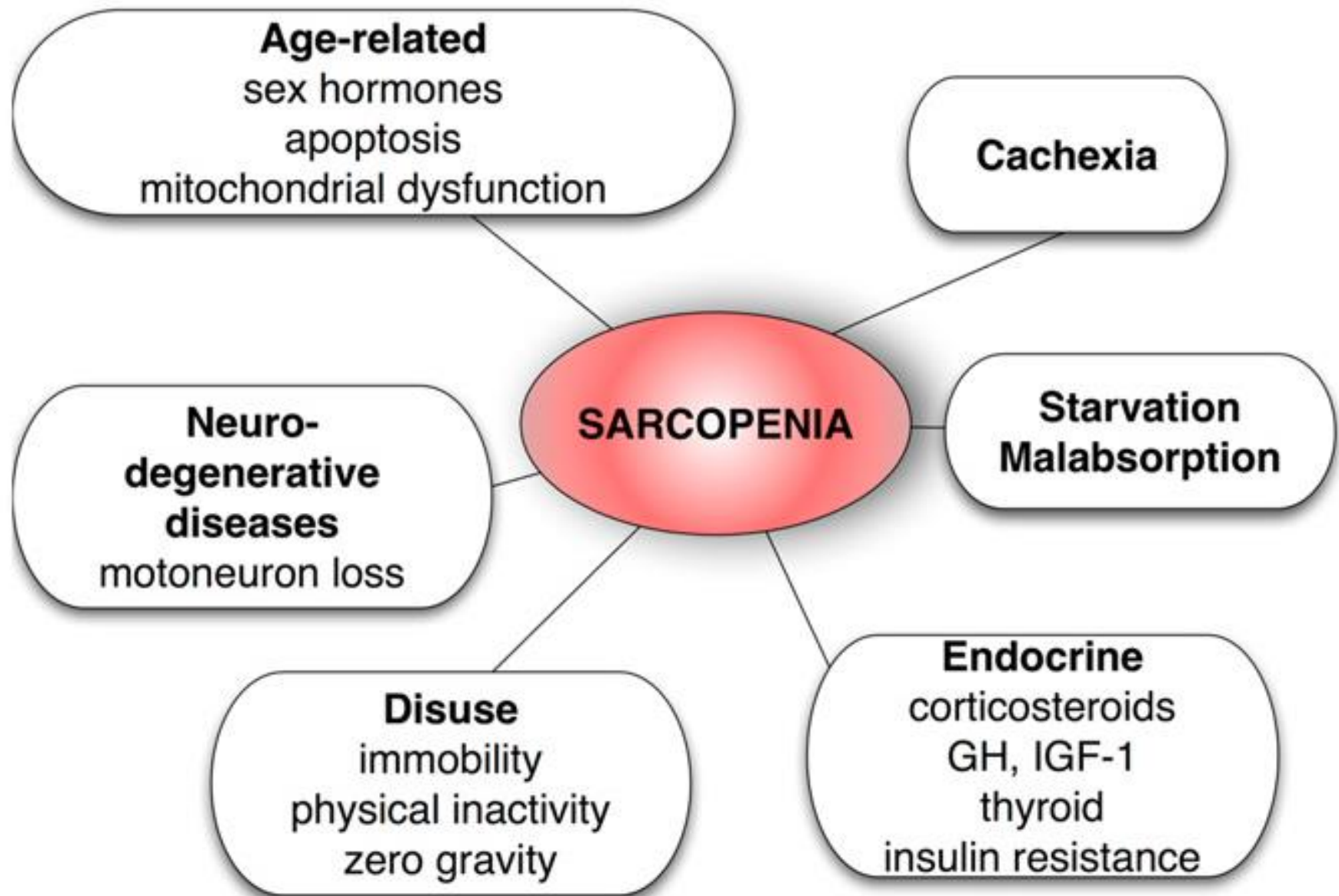
- 1) Unintentional weight loss**
- 2) Self-reported exhaustion**
- 3) Decreased physical activity (low energy expenditure)**
- 4) Slow gait speed**
- 5) Weak handgrip strength**

**Frailty phenotype:**

**FRAIL:  $\geq 3$**

**PRE-FRAIL: 1-2**

**ROBUST: 0**





*Age and Ageing* 2010; **39**: 412–423

## **Sarcopenia: European consensus on definition and diagnosis**

Report of the European Working Group on Sarcopenia in Older People

“A syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with a risk of adverse outcomes such as physical disability, poor quality of life, and death”.

**❑ 2010 EWGSOP**

**European Working Group on Sarcopenia in Older People**

**❑ 2011 IWGS**

**International Working Group on Sarcopenia**

**❑ 2011 SSCWD**

**Society of Sarcopenia; Cachexia and Wasting Disorders**

**❑ 2014 FNIH**

**Foundation for the National Institutes of Health**

**❑ 2014 AWG**

**Sarcopenia Project Asian Working Group for Sarcopenia**

**❑ 2019 AWG**

**Sarcopenia Project Asian Working Group for Sarcopenia**

**❑ 2019 EWGSOP-2**

**European Working Group on Sarcopenia in Older People**

Sarcopenia: European consensus on definition and diagnosis

Age and Ageing 2010; 39: 412–423

Report of the European Working Group on Sarcopenia in Older People

Table 1. Criteria for the diagnosis of sarcopenia

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

Table 3. EWGSOP conceptual stages of sarcopenia

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



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Madrid, Spain



La sarcopenia si definisce in termini di:

- ☐ Riduzione di forza muscolare
- ☐ Riduzione di massa muscolare
- ☐ Riduzione di performance fisica
- ☐ **Riduzione di forza muscolare, massa muscolare, performance fisica**

# Sarcopenia: European consensus on definition and diagnosis *Age and Ageing* 2010; **39**: 412–423

Report of the European Working Group on Sarcopenia in Older People

**Table 1.** Criteria for the diagnosis of sarcopenia

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## Sarcopenia: revised European consensus on definition and diagnosis

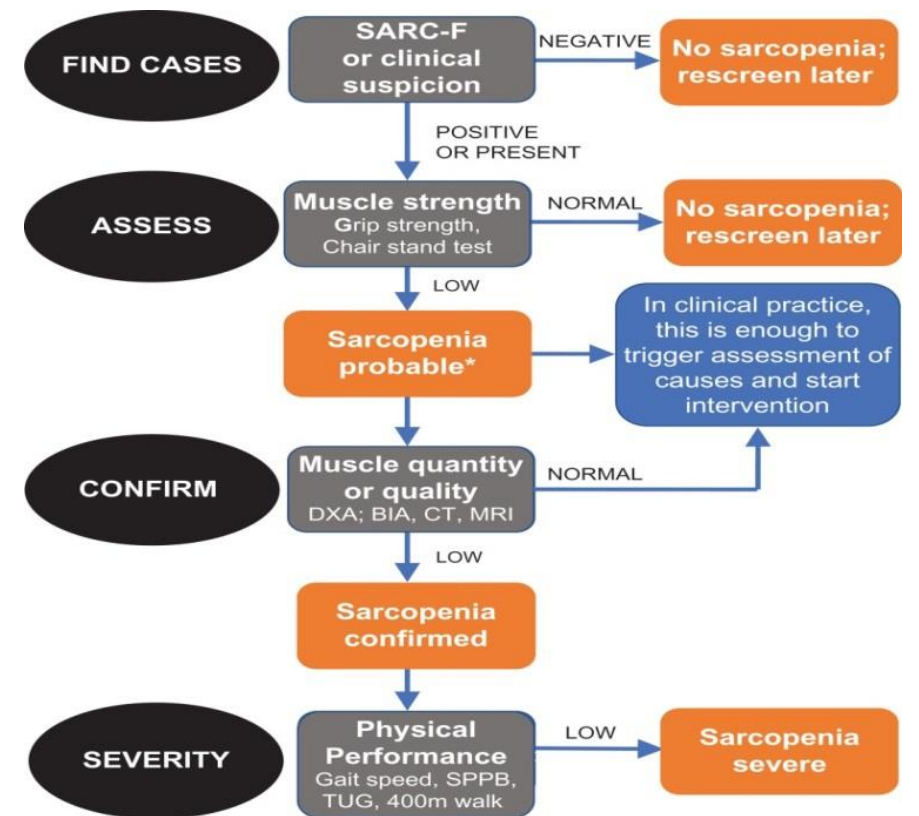
*Age and Ageing* 2019; **48**: 16–31



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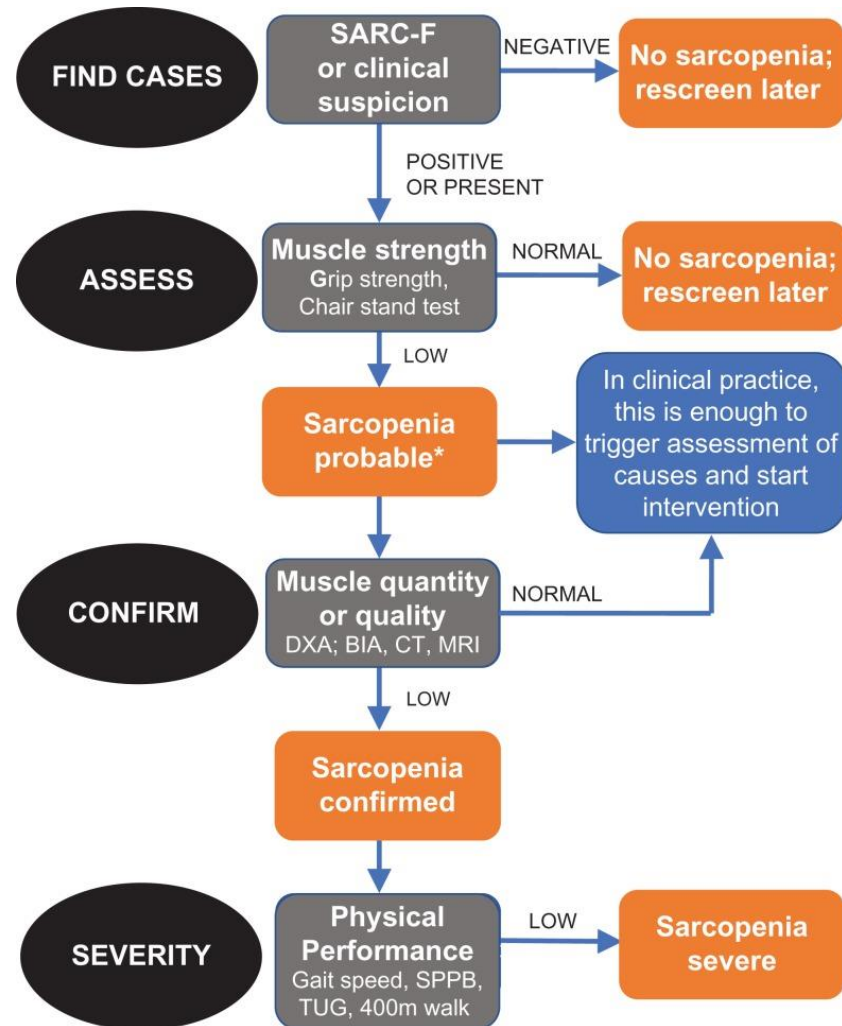
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# Sarcopenia: revised European consensus on definition and diagnosis



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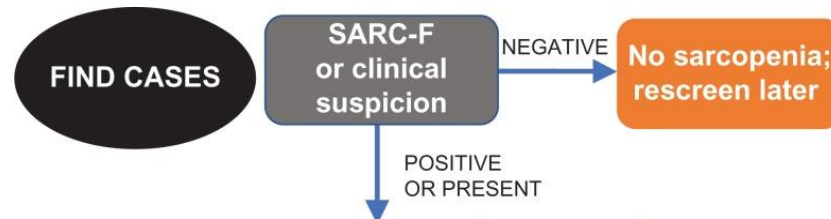
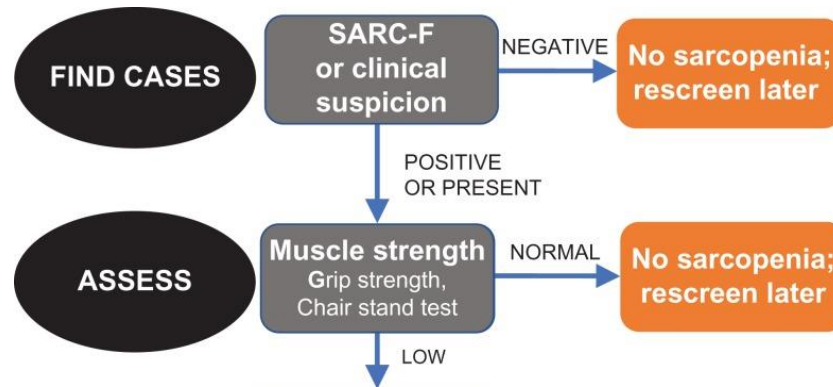


TABLE. The Simple “SARC-F” Sarcopenia Questionnaire (0-10 points)<sup>3</sup>

Component	Question	Scoring
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 last year?	None = 0 1-3 falls = 1 4 or more falls = 2

*SARC-F scores  $\geq 4$  were associated with having more activity of daily living deficits*

# Sarcopenia: revised European consensus on definition and diagnosis



## HANDGRIP STRENGTH TEST



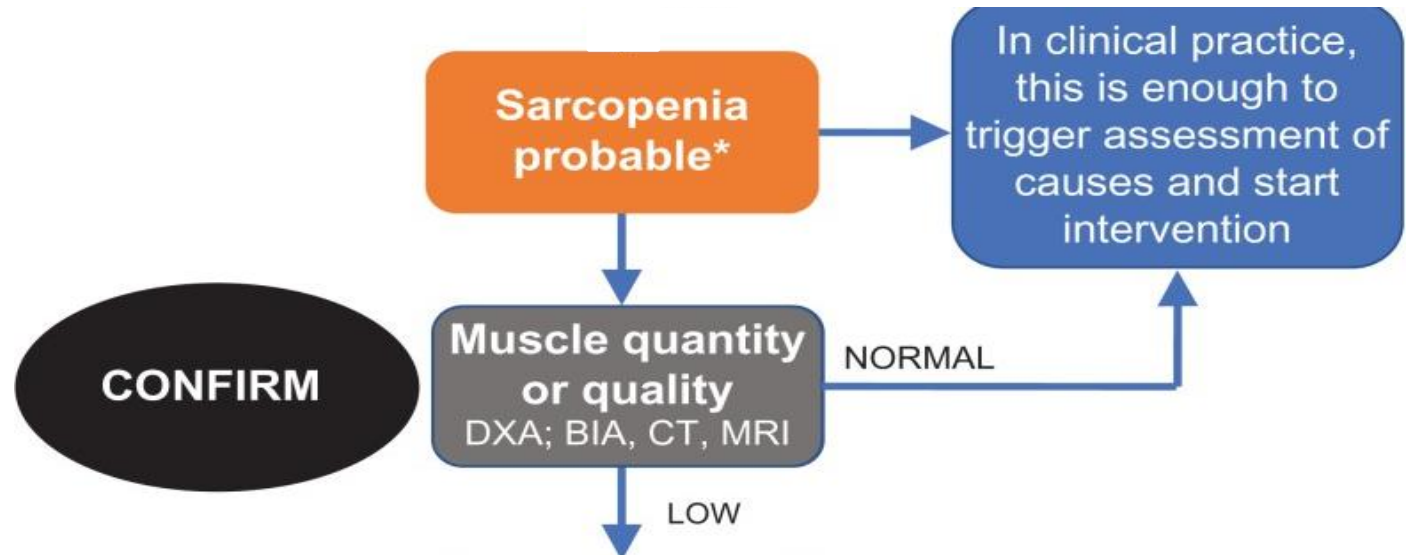
**Males**  
 **$\geq 27$  kg**  
**Females**  
 **$\geq 16$  kg**

## CHAIR STAND TEST (5-TIMES SIT-TO-STAND)

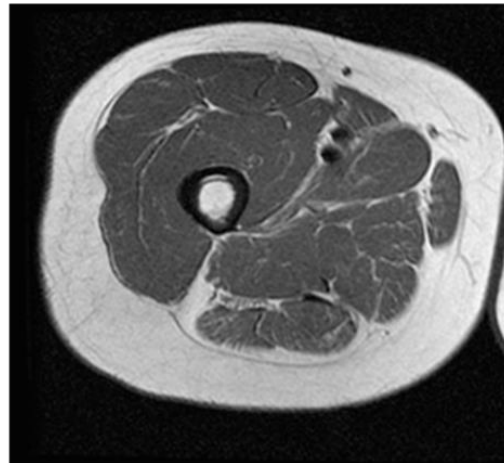
***Time  $\leq 15$  s    normal***  
***Time  $> 15$  s    weak***



# Sarcopenia: revised European consensus on definition and diagnosis



Age 25



Age 63



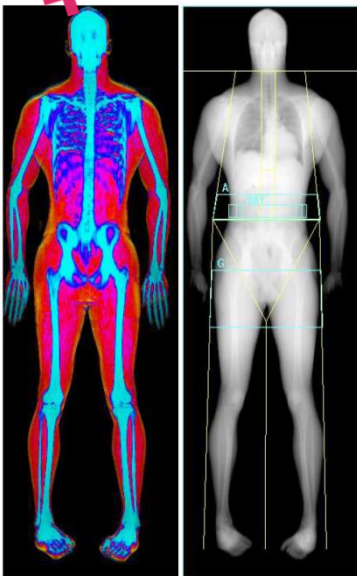
26 yr old female  
CSA = 10.2 cm<sup>2</sup>

67 yr old female  
CSA = 8.7 cm<sup>2</sup>





**ALMI**  
♂ >7.00 kg/m<sup>2</sup>  
♀ >5.50 kg/m<sup>2</sup>



Grasso      Inclinato      Osso

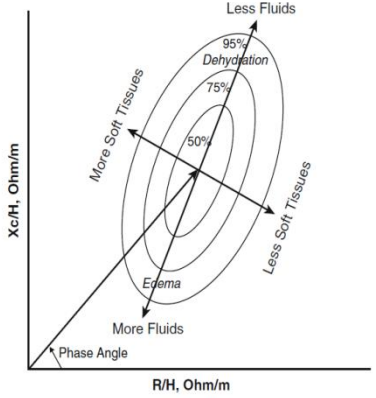
**CONFIRM**

**Sarcopenia probable\***

**Muscle quantity or quality**  
DXA; BIA, CT, MRI

In clinical practice, this is enough to trigger assessment of causes and start intervention

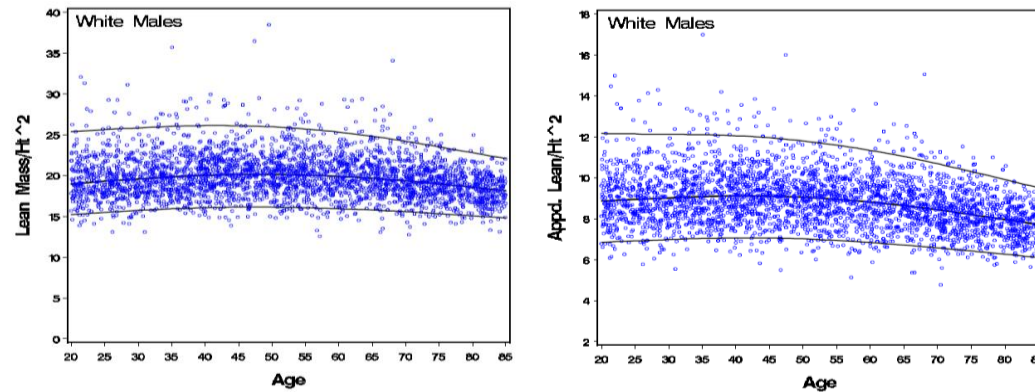
NORMAL





# Dual Energy X-Ray Absorptiometry Body Composition Reference Values from NHANES

Thomas L. Kelly<sup>1\*</sup>, Kevin E. Wilson<sup>1</sup>, Steven B. Heymsfield<sup>2</sup>



**ALMI**

♂  $>7.00 \text{ kg/m}^2$

♀  $>5.50 \text{ kg/m}^2$



**E.C.M.**  
Educazione Continua in Medicina

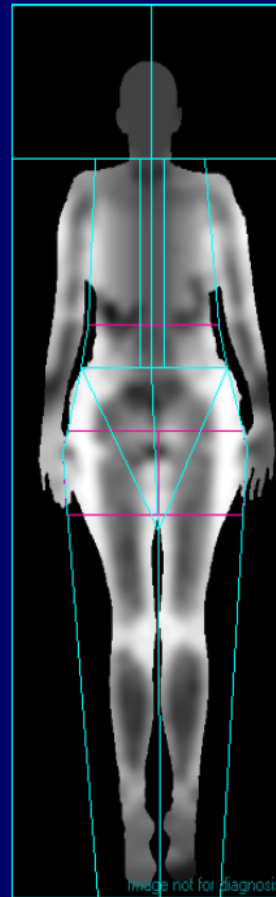


La massa magra appendicolare:

- ☐ E' maggiore nelle donne rispetto agli uomini
- ☐ **Si riduce con l'età**
- ☐ E' la stima combinata di tessuto muscolare, adiposo ed osseo degli arti superiori e inferiori
- ☐ Non è un valido proxy di massa muscolare

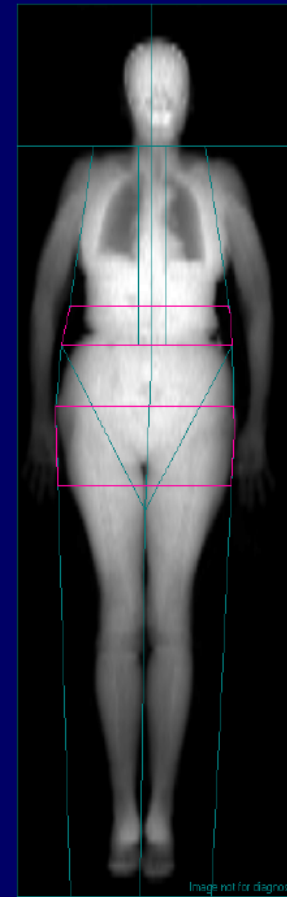
# An Example of Why ALM/ht<sup>2</sup> Should Not Be The Sole Diagnostic Criterion for Sarcopenia

Appendicular Lean Mass/Height<sup>2</sup> cutpoint < 5.45 kg/m<sup>2</sup>



ALM/ht<sup>2</sup>  
4.8 kg/m<sup>2</sup>

51 year-old  
healthy  
competitive  
cyclist



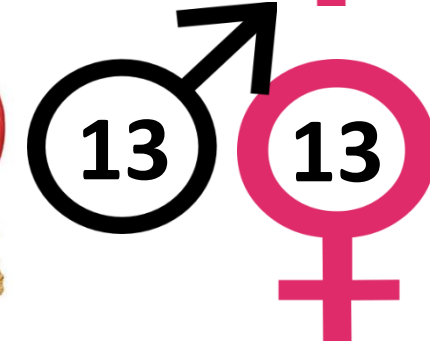
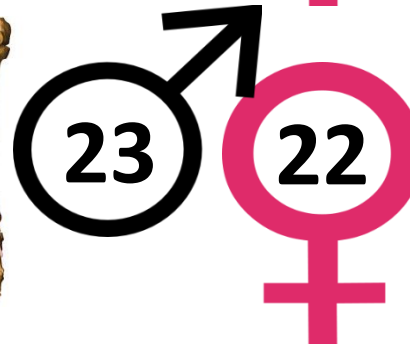
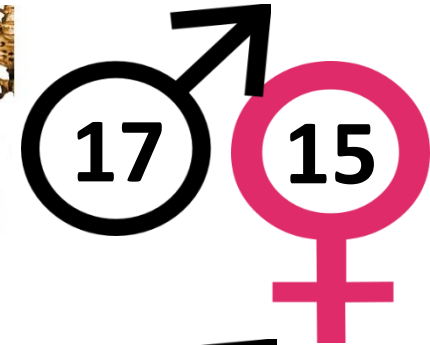
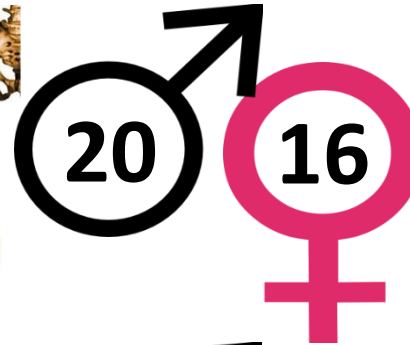
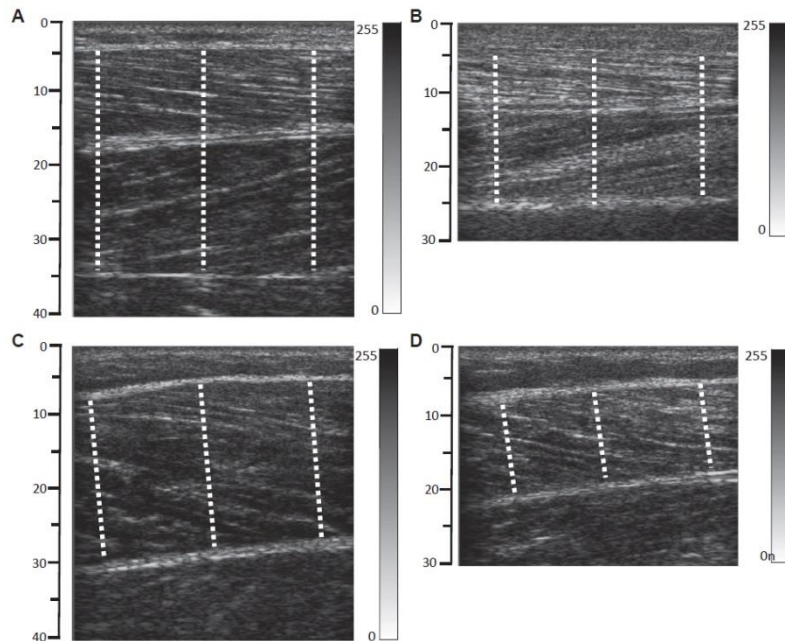
ALM/ht<sup>2</sup>  
4.9 kg/m<sup>2</sup>

86 year-old  
frail nursing  
home  
resident

PM R 8 (2016) 453-462

## Ultrasound-Based Detection of Low Muscle Mass for Diagnosis of Sarcopenia in Older Adults

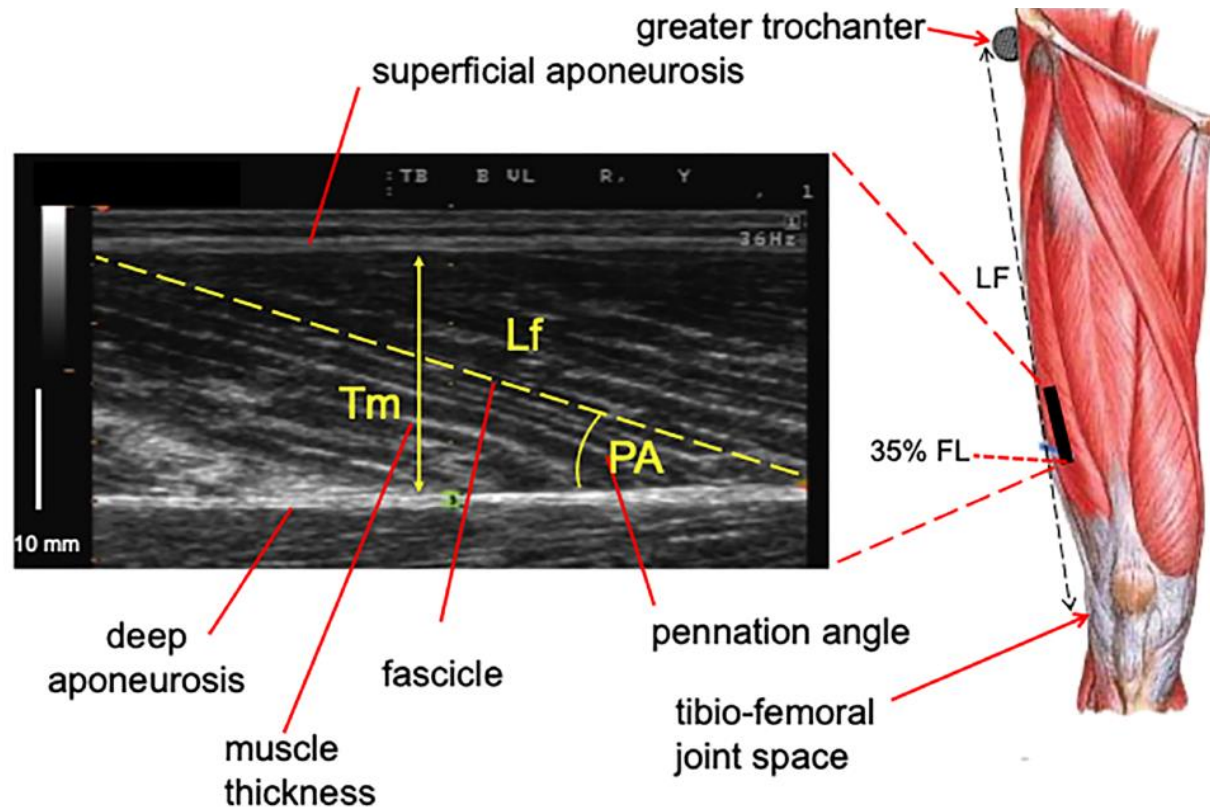
Marco A. Minetto, MD, PhD, Cristina Caresio, MS, Tommaso Menapace, MD, Arnel Hajdarevic, MD, Andrea Marchini, MD, Filippo Molinari, PhD, Nicola A. Maffiuletti, PhD





*Journal of Cachexia, Sarcopenia and Muscle* 2021; **12**: 973–982

## Age-related alterations in muscle architecture are a signature of sarcopenia: the ultrasound sarcopenia index



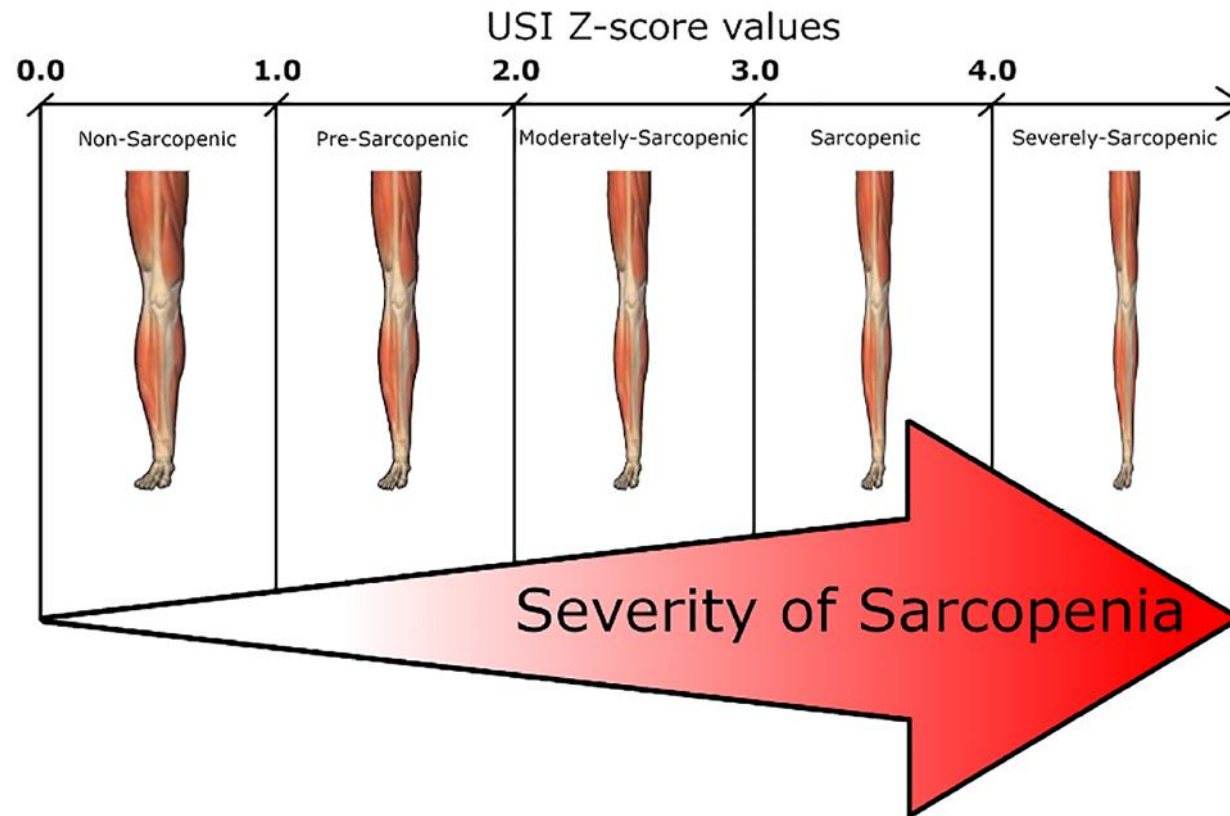
We propose a novel, practical, and inexpensive imaging marker of the loss of muscle mass





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## Age-related alterations in muscle architecture are a signature of sarcopenia: the ultrasound sarcopenia index



We propose a novel, practical, and inexpensive imaging marker of the loss of muscle mass



# Digital Anthropometry: A Critical Review

Steven B. Heymsfield<sup>1</sup>, Brianna Bourgeois<sup>1</sup>, Bennett K. Ng<sup>2,3</sup>, Markus J. Sommer<sup>3</sup>, Xin Li<sup>4</sup>, and John A. Shepherd<sup>2,3</sup>

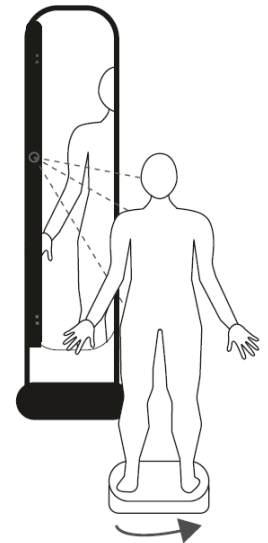
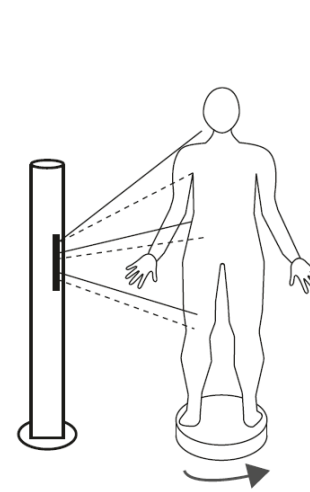
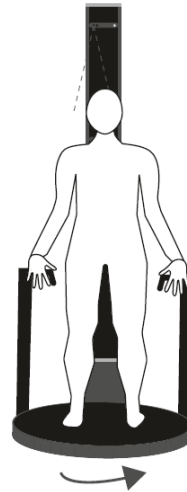
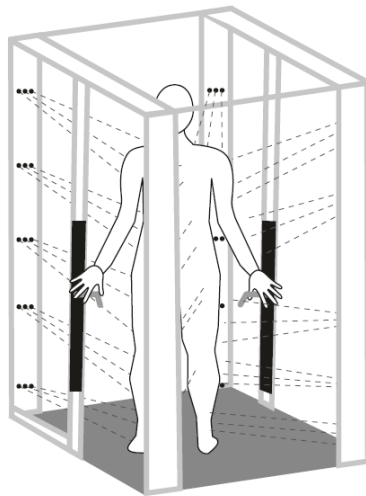
*Eur J Clin Nutr.* 2018 May ; 72(5): 680–687.

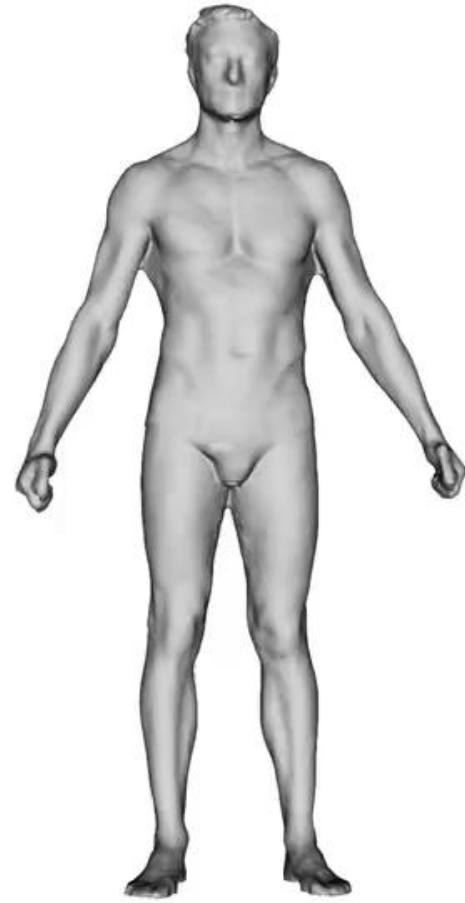


G. M. Tinsley et al.

European Journal of Clinical Nutrition (2020)

## Digital anthropometry via three-dimensional optical scanning: evaluation of four commercially available systems





# COMPOSIZIONE CORPOREA

PERCENTUALE DI GRASSO CORPOREO

14.8 %

PESO

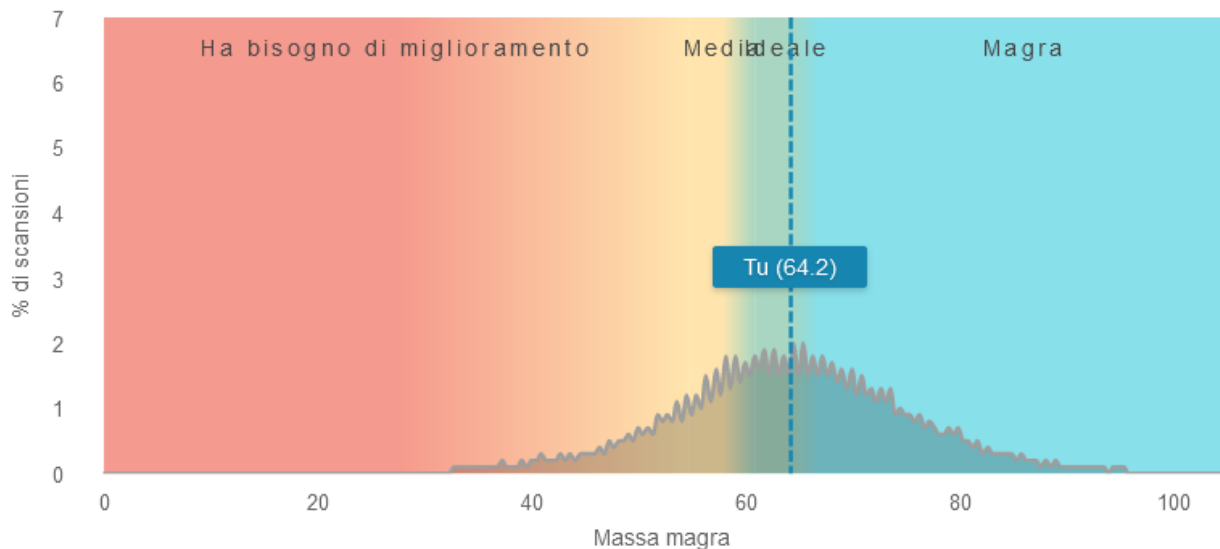
75.4 kg

MASSA GRASSA

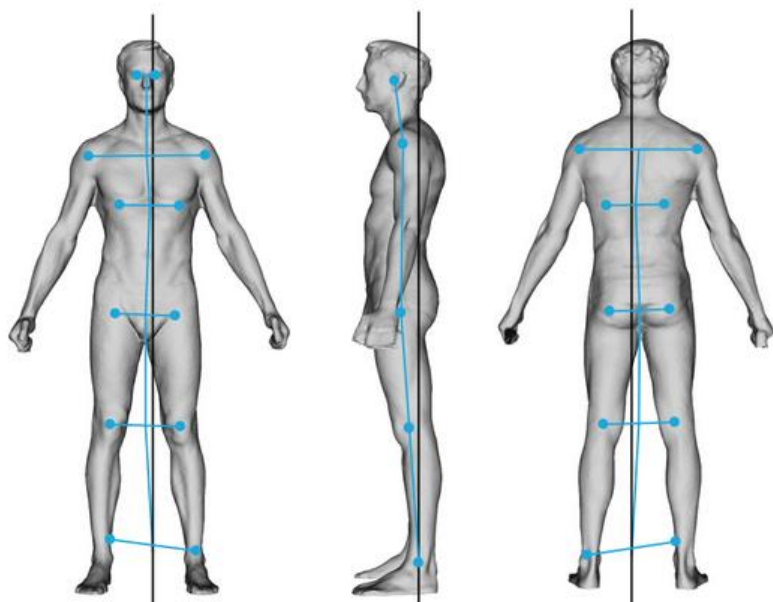
11.2 kg

MASSA MAGRA

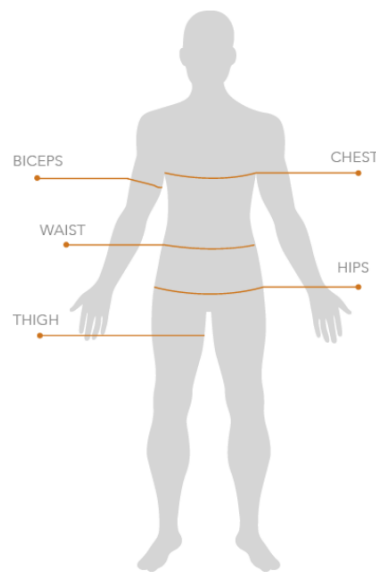
64.2 kg



## POSTURA



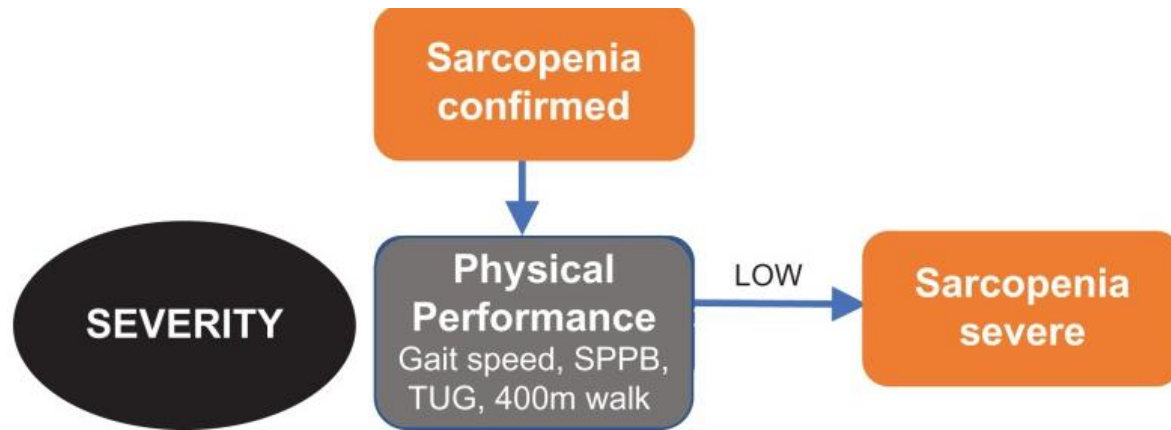
## ANTROPOMETRIA



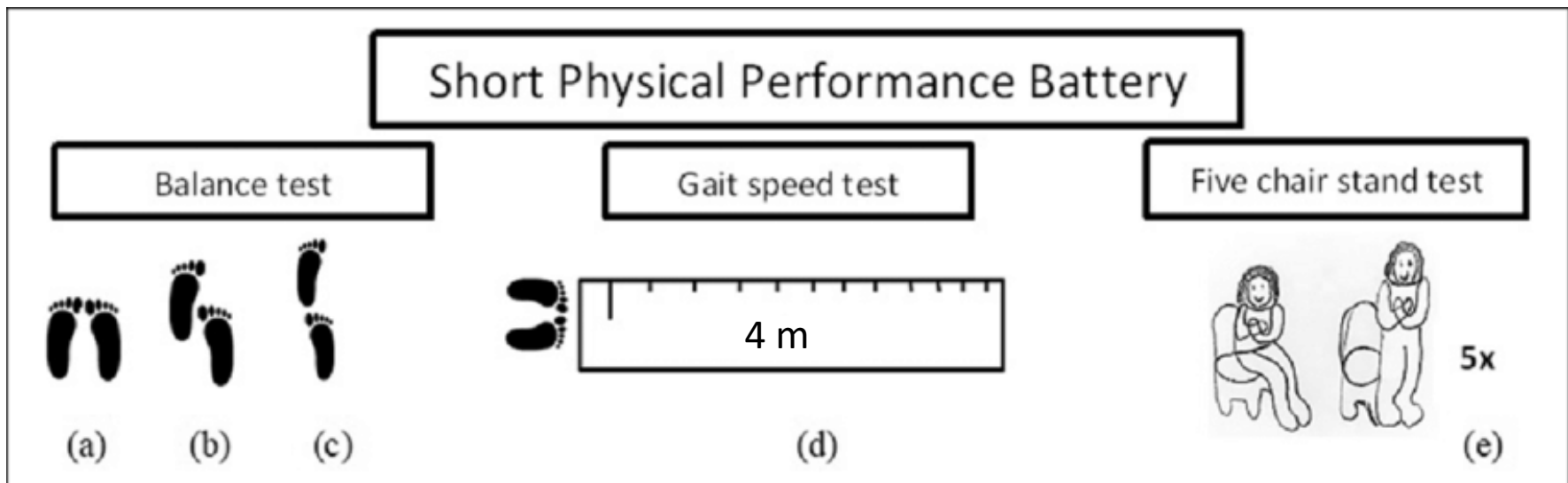
Collo	39.8
Il petto	109.8
Vita	82.7
Fianchi	97.9
Bicipite Sinistro	32.3
Bicipite Destro	32.9
Avambraccio sinistro	27.7
Avambraccio destro	29.1
Coscia sinistra	55.4
Coscia destra	55.8
Polpaccio sinistro	37.8
Polpaccio destro	38

# Sarcopenia: revised European consensus on definition and diagnosis

Walking speed  $\leq 0.8$  m/s



SPPB  $\leq 8$  points





La short physical performance battery combina le seguenti valutazioni:

- ☐ Dolore e forza muscolare
- ☐ **Equilibrio, velocità di deambulazione, sit-to-stand performance**
- ☐ Distanza percorsa e intensità percepita di sforzo
- ☐ Reattività ed affaticabilità neuromuscolare



*Lancet* 2019; 393: 2636–46

# Sarcopenia

*Alfonso J Cruz-Jentoft, Avan A Sayer*

## Treatment: pharmacological approaches

No specific drugs have been approved for the treatment of sarcopenia.

**Vitamin D**, especially in older women, and **testosterone** in older men with low testosterone levels can be justified in daily clinical practice to improve muscle mass and function in sarcopenic patients



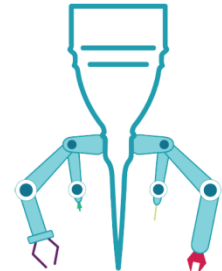


<http://www.surgicalexcellence.unito.it/it/translational-rehabilitation>



[marco.minetto@unito.it](mailto:marco.minetto@unito.it)

<https://unito.webex.com/meet/marco.minetto>





<https://unito.webex.com/meet/marco.minetto>

# Scuola di Specializzazione in Medicina Fisica e Riabilitativa **TORINO**

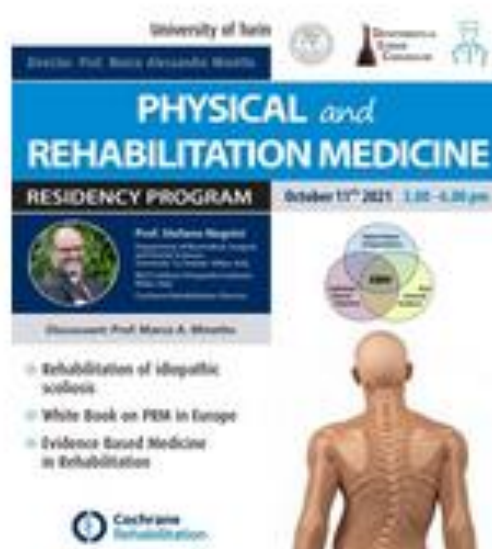
Bologna – Firenze – Novara – Padova – Parma – Pavia – Roma

**4 ottobre**



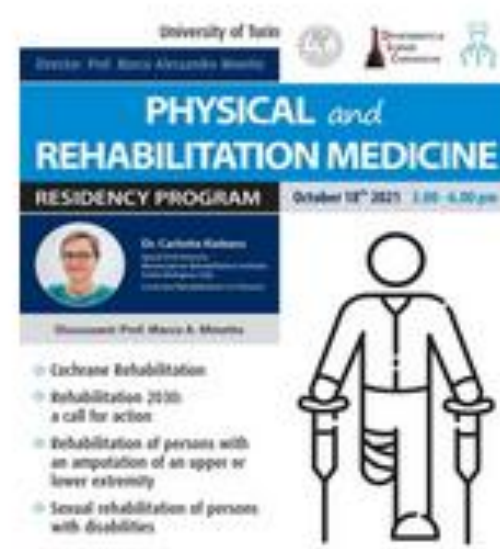
**Prof. Heymsfield**

**11 ottobre**



**Prof. Negrini**

**18 ottobre**



**Dr. Kiekens**