ACADEMIA LATINOAMERICANA
DE MEDICINA DEL ADULTO MAYOR
ALMA

# Sarcopenia

## Un problema de cambio en el tiempo

**X Curso ALMA**
**"Sarcopenia"**
**4 al 7 de Julio de 2011**
**Cancun, México**


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# Definición

- Sarcopenia (Sarx= Carne, y Penia= Pérdida), es la pérdida gradual relacionada a la edad de la masa, fuerza y función de los músculos esqueléticos.

- Su denominación fue publicada por primera vez por Rosenberg IH, en un Simposio de composición corporal y status nutricional en Nuevo México en 1988. *Am J Clin Nut 1989; J Nutr 1997*

*Rosenberg IH. Epidemiologic and methodologic problems in determining nutritional status of older persons –proceedings of a conference held in Albuquerque, New Mexico, October 19–21, 1988 – Summary comments.*
*The American Journal of Clinical Nutrition 1989;* ***50(suppl 5):1231–3.***

*Rosenberg IH. Sarcopenia: origins and clinical relevance. The Journal of Nutrition 1997;* ***127(suppl 5):990S–1S.***

# Criterios diagnósticos y categorización

REPORT

## Sarcopenia: European consensus on definition and diagnosis

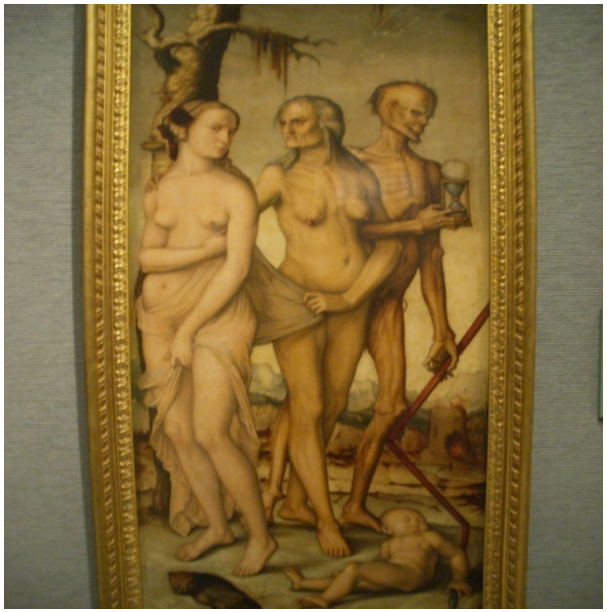
Report of the European Working Group on Sarcopenia in Older People

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

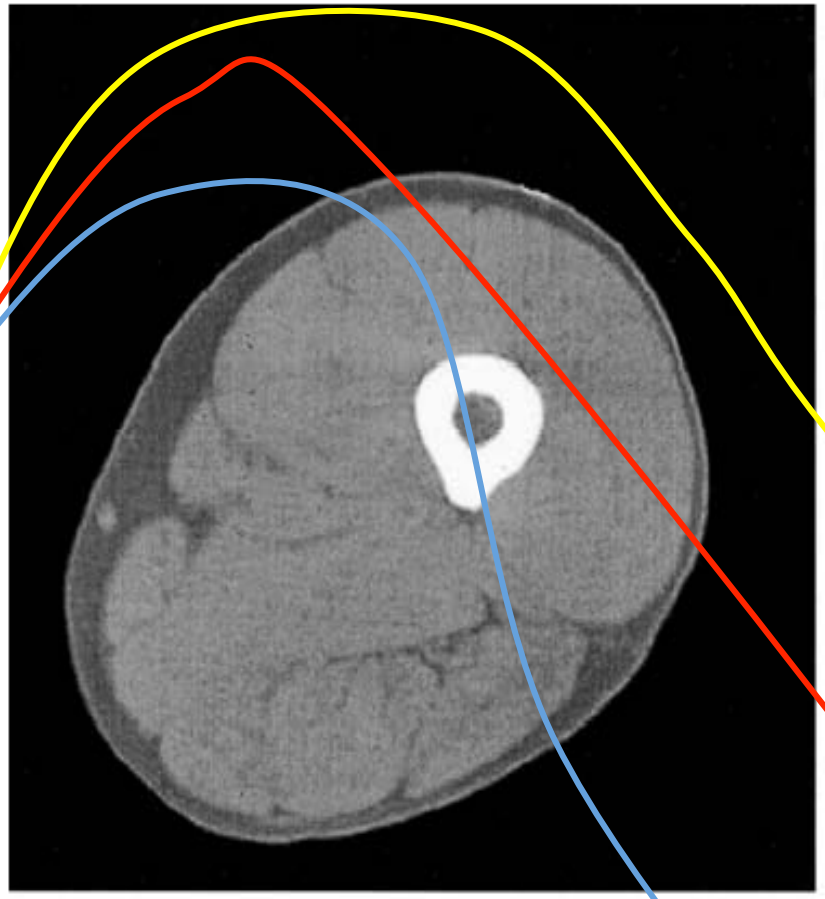
| |
|---|
| Diagnosis is based on documentation of criterion 1 plus (criterion 2 or criterion 3) |
| 1. Low muscle mass |
| 2. Low muscle strength |
| 3. Low physical performance |

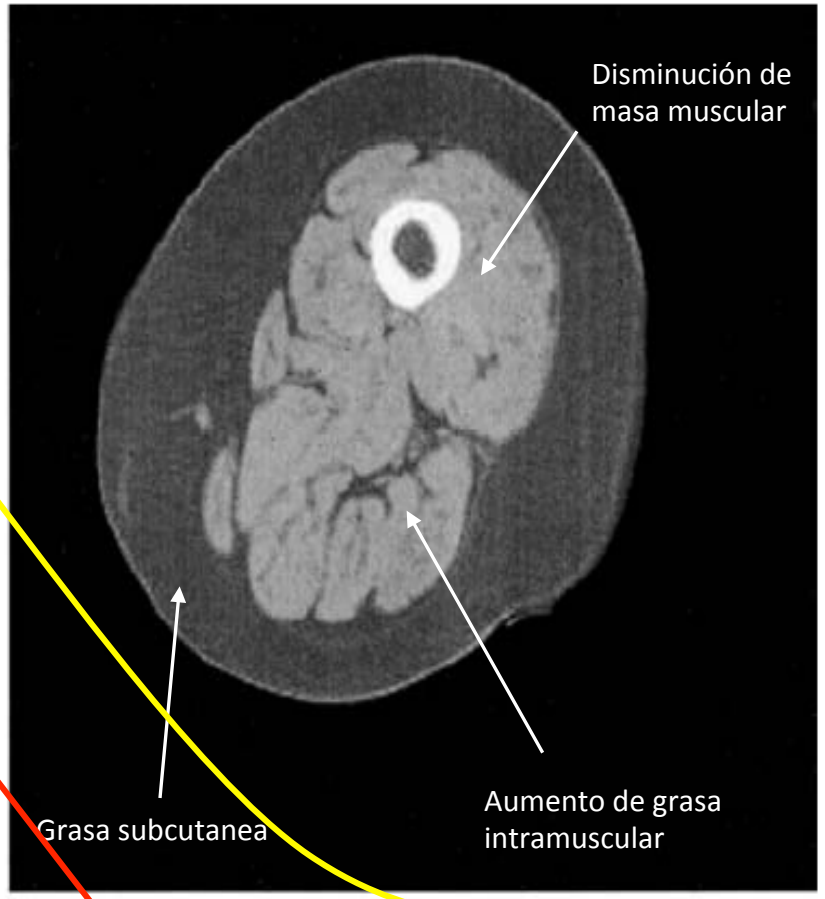
**Table 2.** Sarcopenia categories by cause

| | |
|---|---|
| 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 |



**Van Herman [Las edades y la muerte. Museo del Prado-Madrid]**






Young, active

Old, sedentary

Actividad física

0

*Evans, J Nutr 1997*

90 o más

Edad

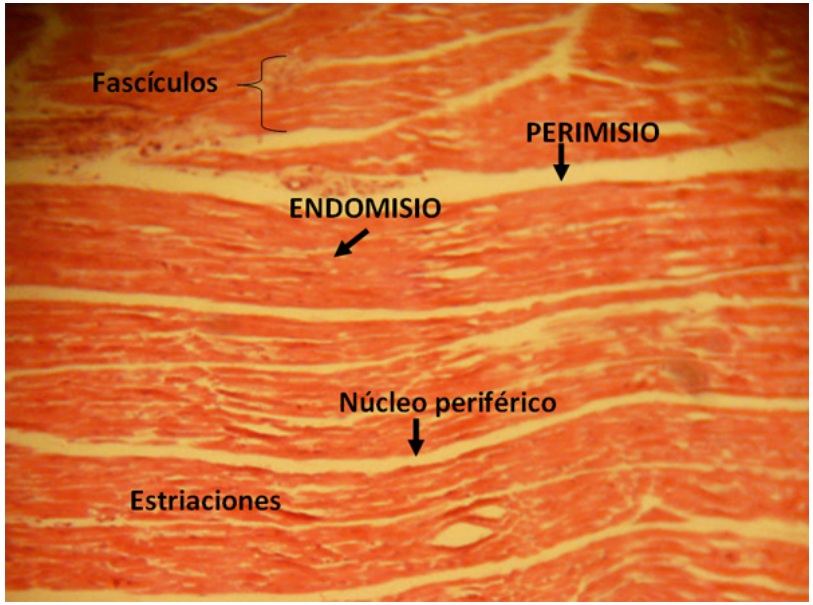
# Cambios fisiológicos producidos por la edad

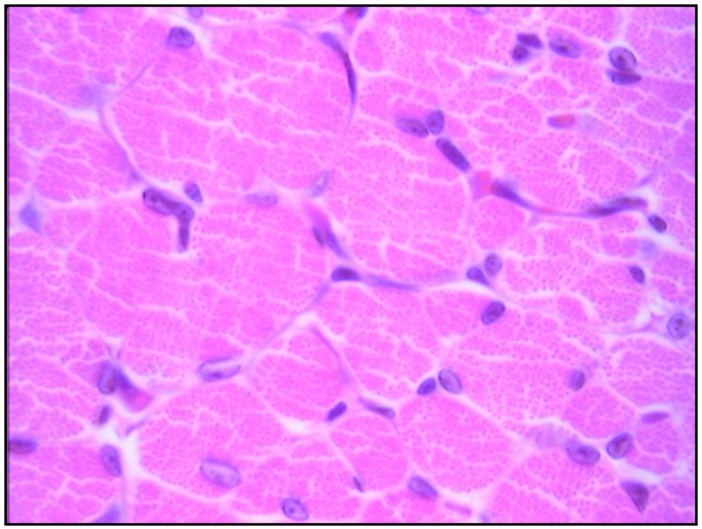
**Tabla 1**
Cambios producidos en el tejido muscular con el envejecimiento

- Reducción en el número de unidades motoras
- Disminución del área muscular total
- Menor densidad de fibras
- Menor porcentaje de fibras tipo II
- Menor disminución de fibras tipo I
- Menor densidad capilar
- Incremento de la duración de la contracción fibrilar
- Cambios estructurales en las cadenas de miosina

# Cambios celulares

Músculo normal adulto jóven



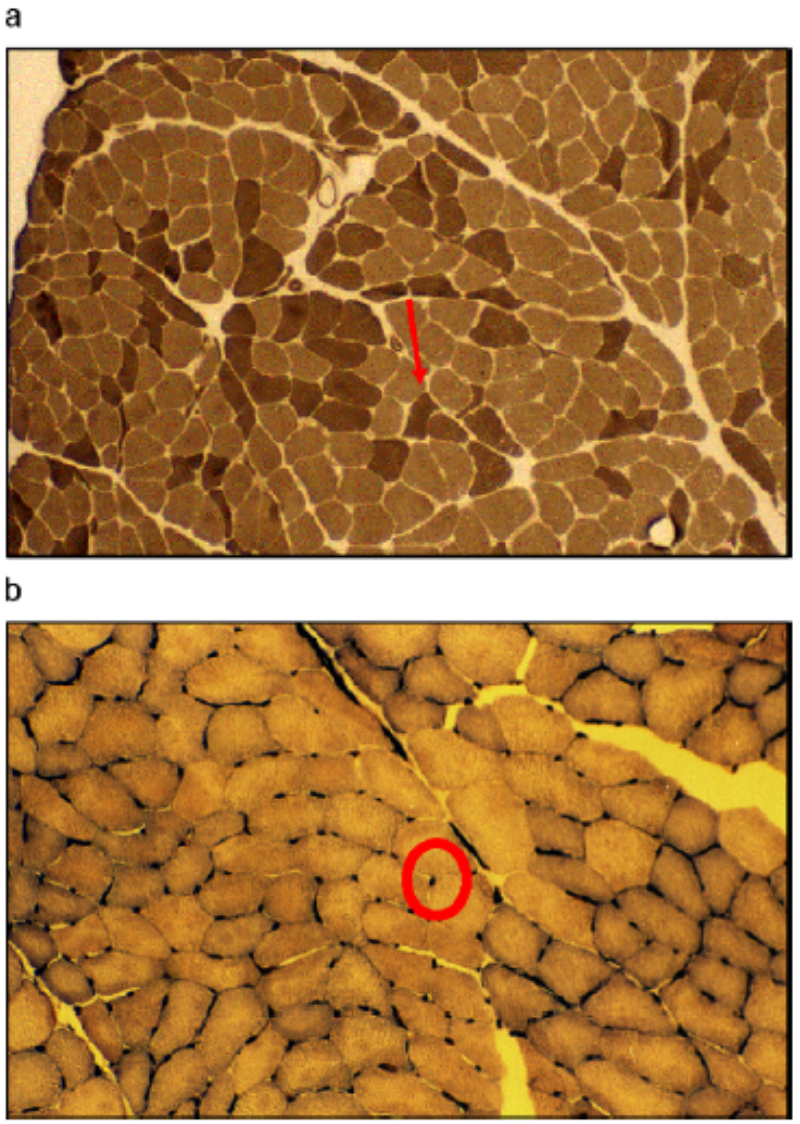



**Figura 2.** Alteraciones microscópicas observadas en la sarcopenia. A) Atrofia de fibras de tipo II (flecha). Tinción: ATPasa 9,4 × 400. B) Disminución del número de capilares. Tinción: Ullex Europeus × 400.

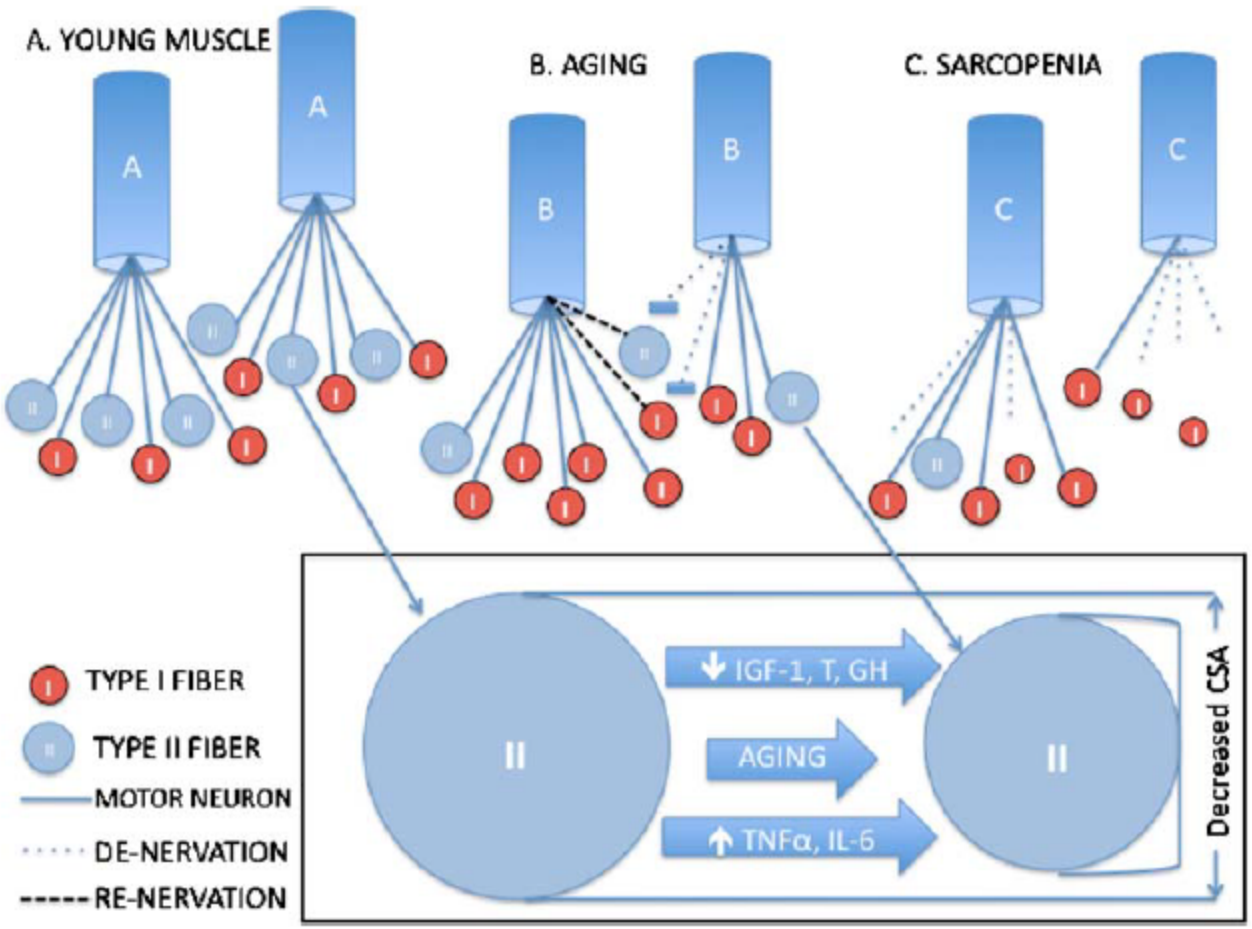



**Fig. 2** Effect of age on the motor unit, depicting, young, aged, and aged sarcopenic fibers. This drawing depicts the pronounced denervation of type II fibers and the recruitment of type I fibers into surviving motor units in older subjects, with impairment of recruitment in sarcopenic subjects

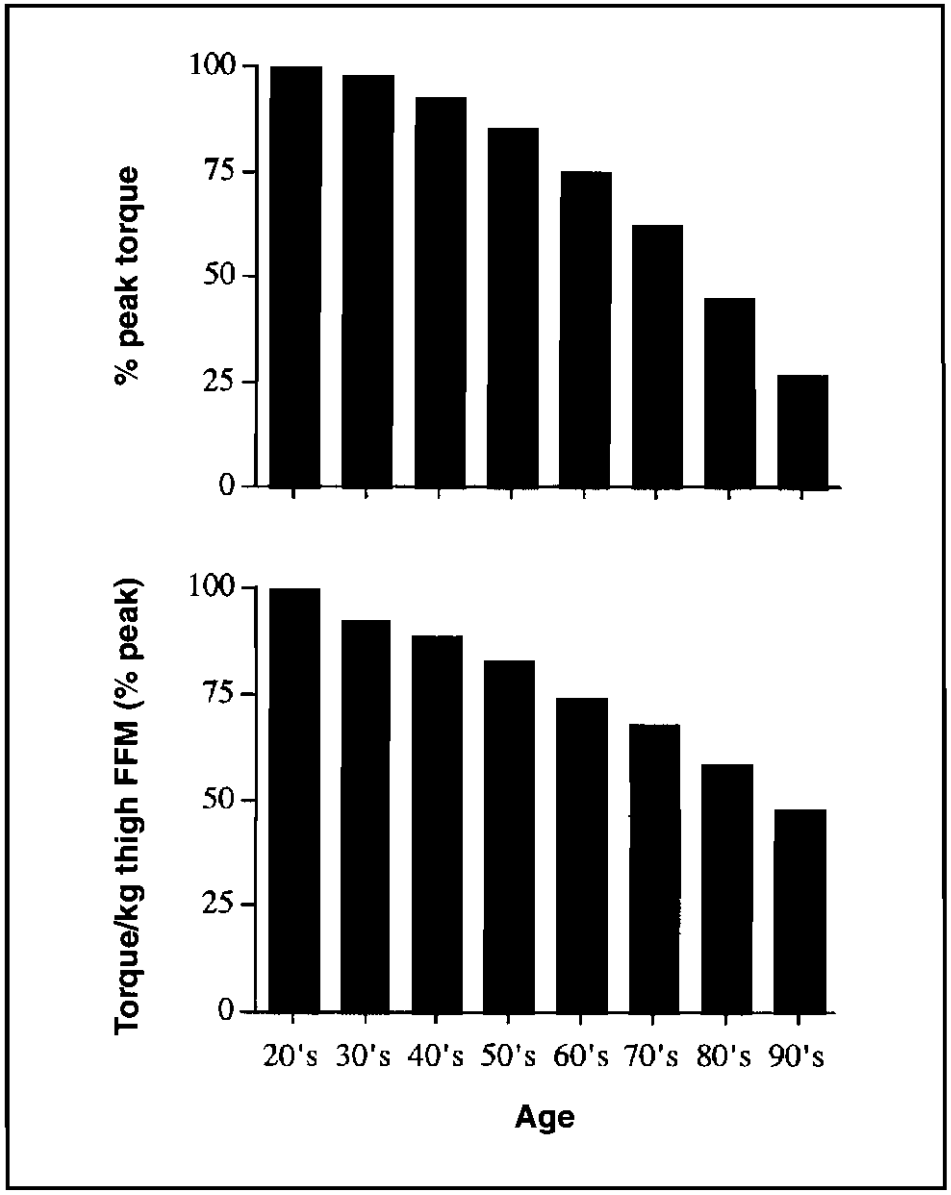



Figure 1. Peak muscle strength. Concentric isokinetic knee extension tests performed in 654 men and women aged 20 to 93 years expressed per unit of fat-free mass (FFM). Adapted from Lindle et al.[4]

# Disminución de la fuerza muscular asociada a la edad

*Mayo Clin Proc.* 2000;75(suppl):S14-S18

Lindle RS, Metter EJ, Lynch NA, et al. Age and gender comparisons of muscle strength in 654 women and men aged 20-93 years. *J Appl Physiol.* 1997;83:1581-1587.

# Cambios producidos por la edad en masa y fuerza muscular



**Table 1** Age-related changes in muscle power and muscle strength

| Study | Gender | Measurement/joint/movement | Age range (years) | Study design | Changes with aging[a] |
|---|---|---|---|---|---|
| Dean et al. 2004 [73] | F | IK/hip/FLX, EXT | 21–82 | CS | ↓22–33% |
| Johnson et al. 2004 [72] | F | IK, IM/hip/AD, AB | 21–91 | CS | ↓24–34% IK, ↓44–56% IM |
| Kubo et al. 2007 [71] | M | IM/ankle/PF | 20–77 | CS | ↓40% |
| Morse et al. 2005 [70] | M | IM/ankle/PF | 25.3±3.5–73.8±3.5 | CS | ↓47% |
| Petrella et al. 2005 [69] | M, F | IT/knee/EXT | 20–75 | CS | ↓41–137% |
| Lanza et al. 2003 [68] | M | IT, IM/knee, ankle/EXT, DF | 20–85 | CS | ↓26–32% |

*K* isokinetic, *IM* isometric, *IT* isotonic, *FLX* flexion, *EXT* extension, *AD* adduction, *AB* abduction, *PF* plantar flexion; *DF* dorsiflexion, *CS* cross-sectional

[a] Expressed as percent change with aging

# Epidemiology of Sarcopenia

*L. Joseph Melton III, MD,[*†] Sundeep Khosla, MD,[†] Cynthia S. Crowson, BS,[*] Michael K. O'Connor, PhD,[‡] W. Michael O'Fallon, PhD,[*] and B. Lawrence Riggs, MD[†]*

**J Am Geriatr Soc 48:625–630, 2000.**



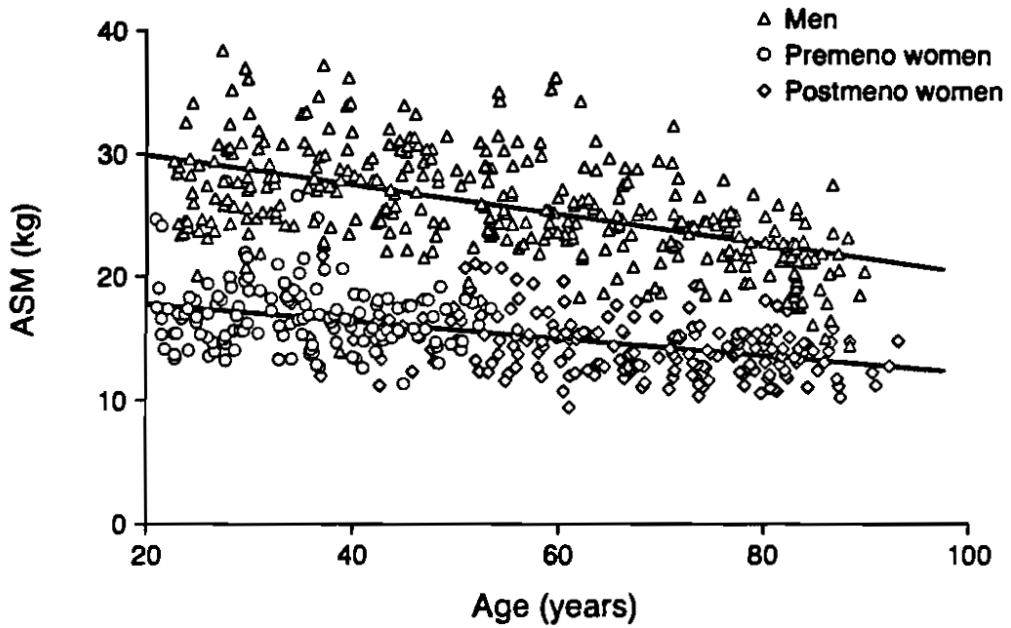



**Figure 1.** Regression on age of appendicular skeletal muscle mass (ASM) among Rochester, Minnesota, men and women. The pattern for total skeletal muscle mass (ASM × 1.33) was identical.

REPORT

# Sarcopenia: European consensus on definition and diagnosis

## Report of the European Working Group on Sarcopenia in Older People

ALFONSO J. CRUZ-JENTOFT[1], JEAN PIERRE BAEYENS[2], JÜRGEN M. BAUER[3], YVES BOIRIE[4], TOMMY CEDERHOLM[5], FRANCESCO LANDI[6], FINBARR C. MARTIN[7], JEAN-PIERRE MICHEL[8], YVES ROLLAND[9], STÉPHANE M. SCHNEIDER[10], EVA TOPINKOVÁ[11], MAURITS VANDEWOUDE[12], MAURO ZAMBONI[13]

**Table 3.** EWGSOP conceptual stages of sarcopenia

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

*Age and Ageing* 2010; **39:** 412–423
doi: 10.1093/ageing/afq034
Published electronically 13 April 2010

# New Mexico Elderly Survey

**TABLE 1. Characteristics of a New Mexico study sample of elderly persons and two reference groups**

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | New Mexico Elder Health Survey (1993–1995) ($n$ = 426) | Reference group | | New Mexico Elder Health Survey (1993–1995) ($n$ = 382) | Reference group | |
| | | Aging Process Study* (elderly persons; 1994) ($n$ = 121) | Rosetta Study† (young adults; 1986–1992) ($n$ = 107) | | Aging Process Study* (elderly persons; 1994) ($n$ = 180) | Rosetta Study† (young adults; 1986–1992) ($n$ = 122) |
| Age (years) | 73.6 (5.8)‡ | 77.2 (5.8) | 28.7 (5.1) | 73.7 (6.1) | 76.4 (6.7) | 29.7 (5.9) |
| Weight (kg) | 76.2 (12.1) | 76.4 (10.7) | 78.3 (12.5) | 64.1 (12.7) | 63.3 (10.9) | 65.0 (15.2) |
| Height (cm) | 171.3 (6.9) | 172.9 (7.3) | 178.4 (6.6) | 156.4 (7.3) | 158.0 (6.1) | 163.5 (6.7) |
| Body mass index§ | 25.9 (3.7) | 25.5 (3.1) | 24.6 (3.8) | 26.2 (4.6) | 25.3 (3.9) | 24.1 (5.4) |
| % body fat | 27.4 (4.5)¶ | 26.7 (7.2) | 18.2 (6.8) | 38.7 (5.8)¶ | 37.1 (7.5) | 26.4 (6.1) |
| Appendicular skeletal muscle mass (kg) | 22.5 (2.6)# | 21.6 (3.0) | 27.3 (3.6) | 14.5 (2.2)# | 14.2 (1.9) | 17.7 (3.7) |
| Appendicular skeletal muscle mass/height² (kg/m²) | 7.7 (0.7) | 7.2 (0.8) | 8.6 (1.1) | 5.9 (0.7) | 5.7 (0.6) | 7.3 (0.9) |

* Baumgartner et al., 1995 (1).
† Gallagher et al., 1997 (11).
‡ Numbers in parentheses, standard deviation.
§ Weight (kg)/height² (m²).
¶ Percentage of body fat was predicted in the Survey using the formula shown in the text. See text for statistics on cross-validation and prediction errors for the % body fat equation.
# Appendicular skeletal muscle mass (ASM) was predicted in the Survey using the formula shown in the text. See text for statistics on cross-validation and prediction errors for the ASM equation.

# Prevalencia

**TABLE 2. Prevalences (%) of sarcopenia* in the New Mexico Elder Health Survey, by age, sex, and ethnicity, 1993–1995**

| Age group (years) | Men | | Women | |
|---|---|---|---|---|
| | Hispanics ($n$ = 221) | Non-Hispanic whites ($n$ = 205) | Hispanics ($n$ = 209) | Non-Hispanic whites ($n$ = 173) |
| <70 | 16.9 | 13.5 | 24.1 | 23.1 |
| 70–74 | 18.3 | 19.8 | 35.1 | 33.3 |
| 75–80 | 36.4 | 26.7 | 35.3 | 35.9 |
| >80 | 57.6 | 52.6 | 60.0 | 43.2 |

* Appendicular skeletal muscle mass/height$^2$ (kg/m$^2$) less than two standard deviations below the mean value for young adults from the Rosetta Study (11).



# Prevalencia con la edad

**Tabla 2**
Prevalencia de sarcopenia

| Estudio | Edades, años | Prevalencia de sarcopenia en hombres, % | Prevalencia de sarcopenia en mujeres, % | Índice utilizado | País | Población de estudio | Observaciones |
|---|---|---|---|---|---|---|---|
| Baumgartner et al, 1998[17] | 61–86 | 13,5–57,6 | 23,1–60 | IMM | EE. UU. | Ancianos en general | Variación según rango de edad y etnia |
| Baumgartner et al, 2000[78] | 60–85 | 13,5–29 | 8,8–13,5 | IMM | EE. UU. | Ancianos en general | Variación según rango de edad |
| Castillo et al, 2003[79] | 55–98 | 4–16 | 3–13 | IMM | EE. UU. | Ancianos en general | Variación según rango de edad |
| Tichet et al, 2008[18] | 60–78 | 3,6 | 2,8 | IMM | Francia | Ancianos en general | |
| Tichet et al, 2008[18] | 60–78 | 12,5 | 23,6 | IME | Francia | Ancianos en general | |
| Chien et al, 2008[19] | 65–90 | 23,6 | 18,6 | IMM | Taiwán | Ancianos en general | |
| Masanés et al, 2009[20] | 70–85 | 10 | 33 | IMM | España | Ancianos sanos | |
| Masanés et al, 2009[22] | 75–95 | 36 | 65 | IMM | España | Ancianos con fractura del fémur | |

IME: índice de masa esquelética; IMM: índice de masa muscular.

# Prevalencia con la edad

**EPIDEMIOLOGY AND CONSEQUENCES OF SARCOPENIA**

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*The Journal of Nutrition, Health & Aging*
*Volume 13, Number 8, 2009*

***Prevalence of sarcopenia: European cohorts***

EPIDOS: Using the SMI a prevalence of sarcopenia of 9.5% was found in the EPIDOS cohort (1458 elderly community-dwelling French women). (29). Whole body composition was estimated using DEXA in 1321 older women of the same cohort. The prevalence of sarcopenia increased with age from 8.9% in the 76-80 age group to 10.9% in the 86-95 age group (30).

InCHIANTI: Sarcopenia was assessed in the InCHIANTI cohort (1030 community-dwelling Italian), using CT-scan (calf muscle cross-sectional area more than 2 SD below the mean of the population). The prevalence was age-related ranging from 20% at 65 years to 70% at 85 and over in men and from 5% at 65 years to 15% at 85 years and over in women (31). Correlation between muscle area (measured by CT-scan) and frailty (defined by Fried's criteria) was also assessed. This cross-sectional analysis of 923 participants showed a statistical significant unadjusted correlation between muscle area and 3 of the 5 Fried's criteria of frailty (exhaustion, low physical activity and low walking speed). Only low physical activity remained correlated after adjustments (32).

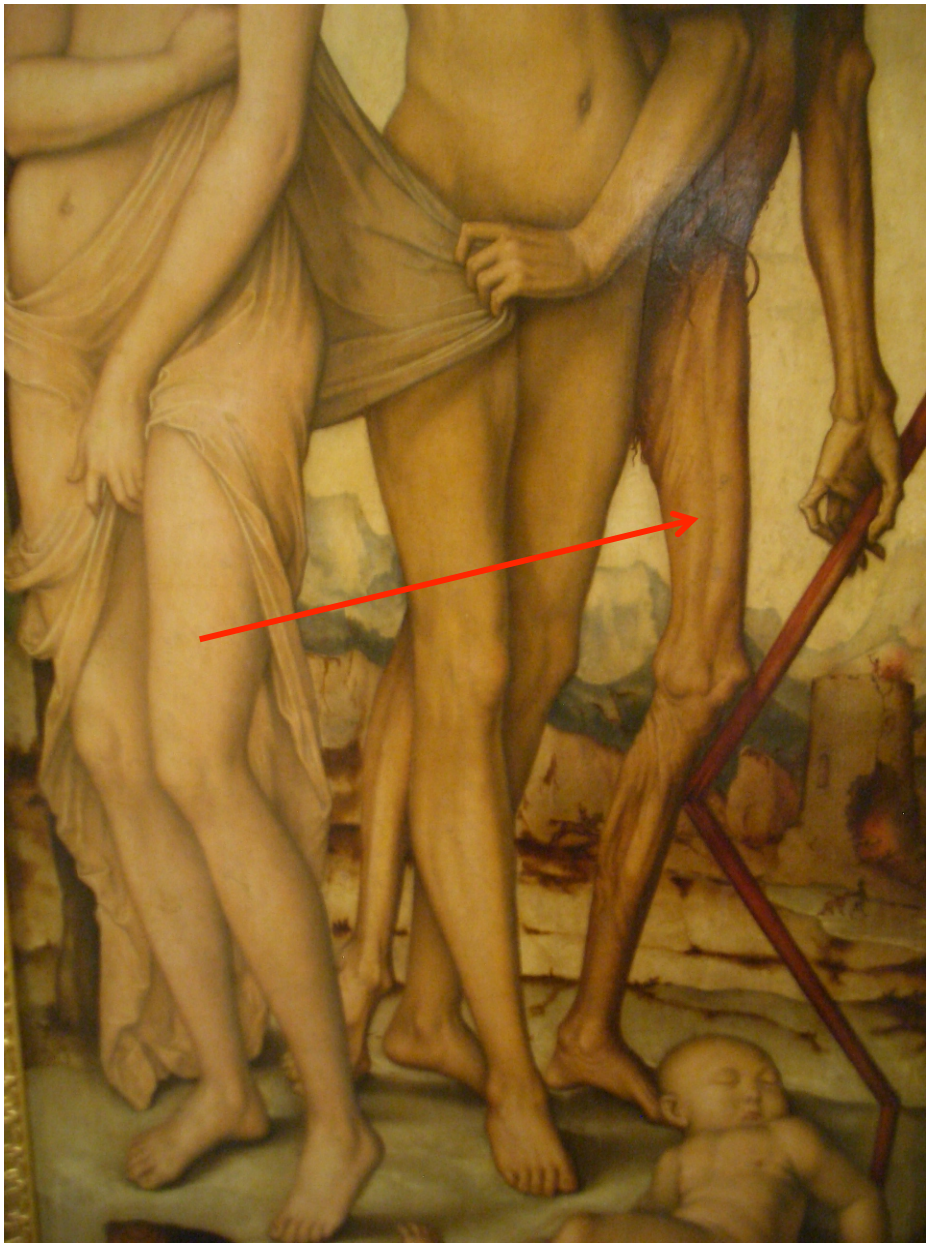
LASA: Assessment of sarcopenia using DXA was performed in the Longitudinal Aging Study Amsterdam after 520 participants. Sarcopenia was defined as >3% of decline in muscle mass during follow-up. A decline in ASM was experienced by 37.5% of the participants, and 52 (15.7%) met the definition of sarcopenia. No differences in baseline characteristics were observed between the groups (33).

# Conclusiones

- La “Sarcopenia” esta relacionada con la edad



- Su prevalencia aumenta desde los 30 años (15%), y prosigue de acuerdo a los hábitos de vida hasta alcanzar 30% o mas en mayores de 80 años.
- Su cuantía es influenciable por la edad y los factores de riesgo o hábitos de vida saludable de los ancianos



- MUCHAS GRACIAS
- RESUMEN:
  - Paso del tiempo
  - Pérdida de masa y fuerza muscular
  - Sarcopenia