Enfermedad crónica y sarcopenia

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ALMA 2011

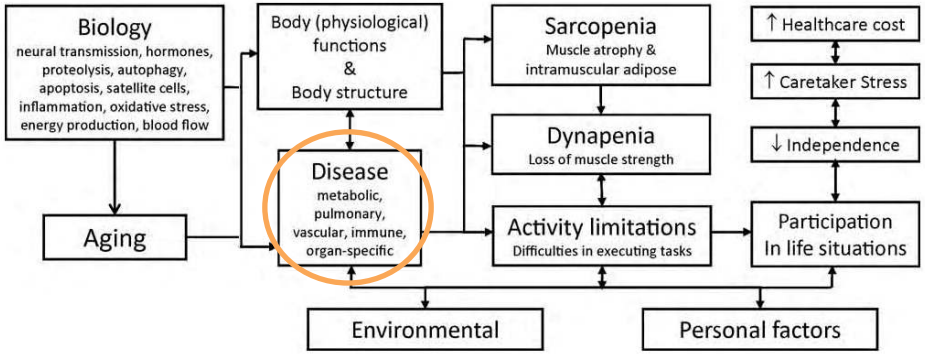
Asesor: Dra. Victoria Arango

Objetivos

- Describir la asociación de sarcopenia con diversas enfermedades crónicas y (someramente) las vías a través de las que se relacionan
  - Diabetes Mellitus
  - Obesidad sarcopénica
  - Insuficiencia renal*
  - Osteoporosis y osteopenia
  - Insuficiencia hepática*
  - Enfermedades que se relacionan con hipoxia*
  - Demencia
  - Cáncer*

Enfermedad crónica y sarcopenia

La **sarcopenia secundaria** del EWGSOP: aquella en la que se identifican uno o más causas además del envejecimiento por si mismo + **sarcopenia asociada a enfermedad**



Ageing Research Reviews 9 (2010) 369–383

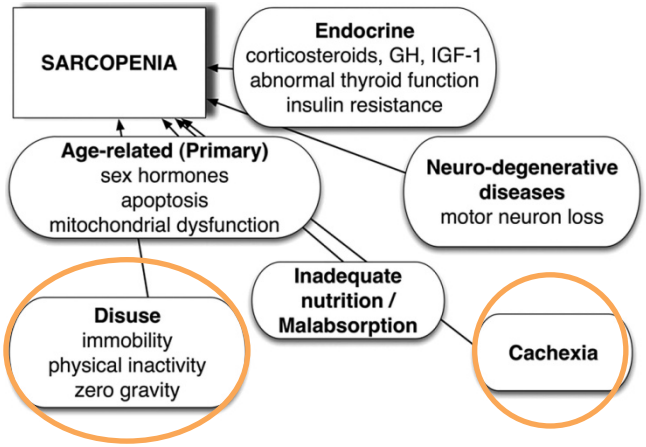
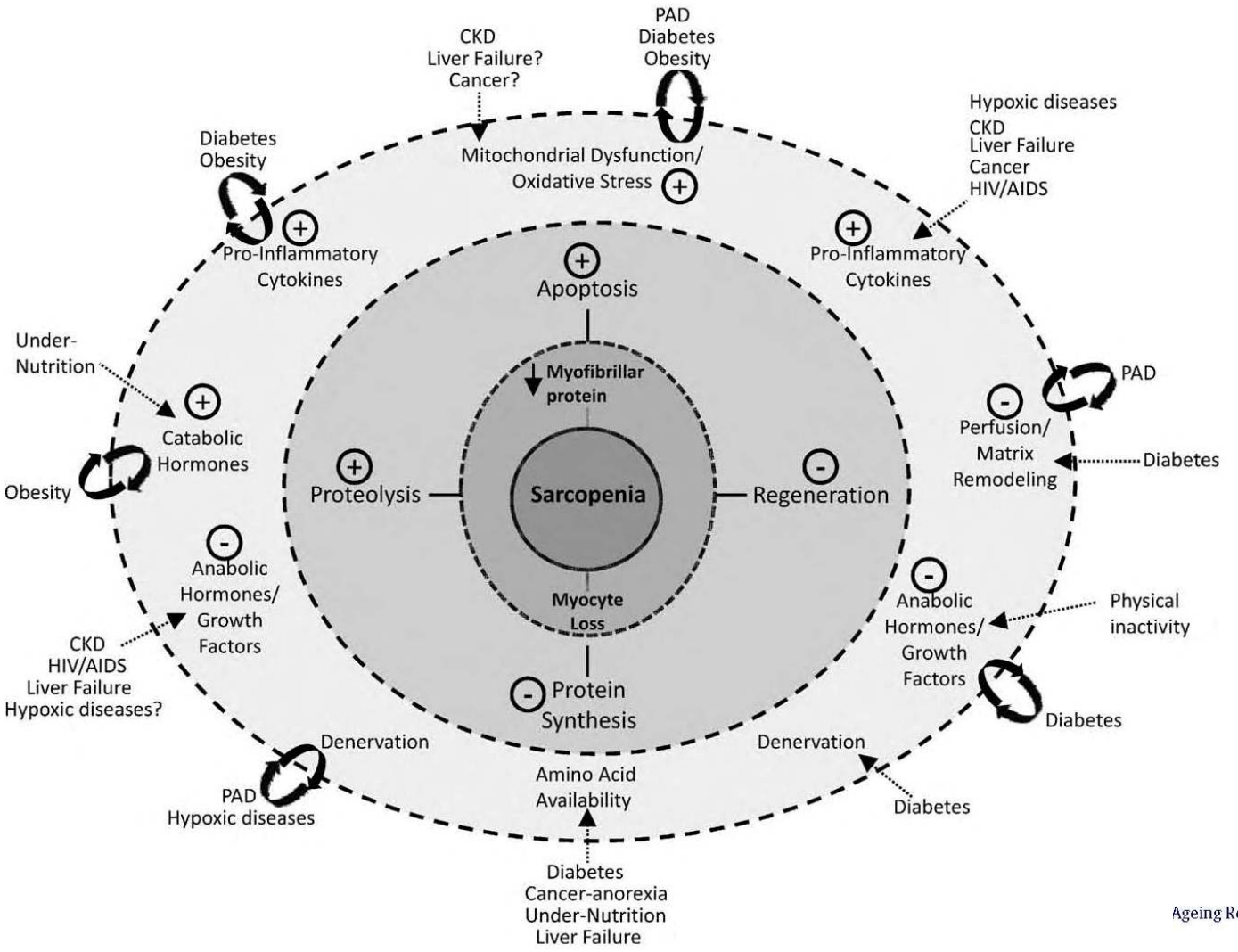


Figure 1. Mechanisms of sarcopenia.

Age and Ageing 2010; **39:** 412–423

Mecanismos de sarcopenia asociada enfermedad crónica



Ageing Research Reviews 9 (2010) 369–383

Diabetes Mellitus y sarcopenia

- La prevalencia de DM aumenta con la edad
  - Casi el 50% de los sujetos con DM tienen>65 años
  - Peor auto-reporte del estado funcional
  - Más Caídas

Table 3. Functional and Frailty Measures in Diabetic and Nondiabetic Subjects

	Diabetic (n = 116)	Not Diabetic (n = 522)	p value
Fair or poor SRH (%)	42.24	29.94	.010
Basic ADL dependencies	0.41 (0.87)	0.31 (0.88)	.102
Instrumental ADL dependencies	2.09 (2.31)	1.58 (2.13)	.020
Modified Rosow-Breslau	1.62 (1.20)	1.17 (1.16)	<.001
Pincus-3	4.20 (1.34)	3.81 (1.17)	.002
No. of falls in past 3 mo.	0.59 (2.90)	0.20 (0.71)	.019
≥1 fall (%)	18.97	12.21	.054
≥1 injurious fall (%)	12.10	6.10	.025
Geriatric Depression Scale	5.60 (5.74)	4.76 (4.53)	.504
Mini-Mental State Exam	24.67 (4.15)	24.28 (5.23)	.828

Note: SRH = self-rated health; ADL = activities of daily living. Unless noted, data are mean and (*SD*).

Afroamericanos
- **70 años**
- **116 diabéticos**
- **522 no diabéticos**
  - **168 examen médico**

¿Peor función muscular?

J Gerontol A Biol Sci Med Sci 1999; 54A (5):M230-M236

Sarcopenia y Diabetes Mellitus

Table 1
Factors involved in the pathogenesis of sarcopenia

Factor	Effect of aging	Effect of diabetes	Major systems altered
Motor end plates	Decrease	Decrease	Coordinated muscle contraction
Insulin growth factor-1	Decrease	Decrease	Protein synthesis
Mechanogrowth factor	Decrease	Unknown	Satellite cell formation
Ghrelin	Uncertain	Decrease	Anorexia and growth hormone
Testosterone	Decrease	Decrease	Protein synthesis and satellite formation
Myostatin	Unknown	None	Inhibits satellite cell formation and proteolysis
Proinflammatory cytokines	Increase	Increase	Proteolysis and apoptosis
Angiotensin	None	Increase	Cleaves actinomycin
Oxidative metabolism	Decrease	Increase	Oxidative damage
Food intake	Decrease	Increase	Muscle and fat
Creatine/branched chain amino acids	Decrease	Decrease	Protein synthesis
Exercise	Decrease	Mostly decrease	Protein synthesis

Clin Geriatr Med 2008; 24: 455-469

Diabetes Mellitus y sarcopenia

- 2618 participantes
  - 485 con DM2 (18.5%)
- **Masa muscular mayor en pacientes con DM / también mayor IMC**
- **Menor calidad muscular**

- Prevalencia 15.7 vs 6.9%
- > 60 años → hombres 19.0% vs 5.1% --- Mujeres 27.0% vs 14%

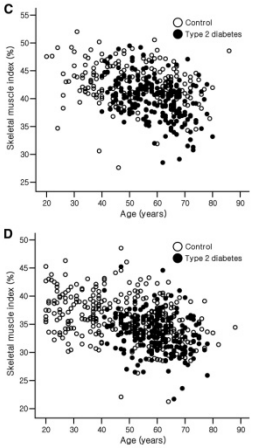


TABLE 3
Multiple regression models showing the effect of diabetes on arm and leg muscle quality, stratified by sex

	Men			Women		
	β for diabetes	SE	*P* value	β for diabetes	SE	*P* value
Arm muscle quality (kg/kg)						
Unadjusted	−0.89	0.16	<0.001	−1.05	0.22	<0.001
Model 1	−0.84	0.16	<0.001	−0.85	0.22	<0.001
Model 2	−0.53	0.16	0.001	−0.43	0.21	0.043
Model 3	−0.50	0.16	0.002	−0.34	0.22	0.111
Leg muscle quality (Nm/kg)						
Unadjusted	−1.10	0.22	<0.001	−0.87	0.24	<0.001
Model 1	−1.01	0.22	<0.001	−0.61	0.24	0.011
Model 2	−0.84	0.22	<0.001	−0.19	0.23	0.404
Model 3	−0.80	0.22	<0.001	−0.15	0.24	0.524

Adjustments of covariates were performed using multiple regression analyses by cumulatively adding the following covariates into the model. Model 1, race, age, clinic site, and physical activity; model 2, model 1 + BMI; model 3, model 2 + smoking, drinking, comorbidity score, impaired vision, and renal insufficiency. Nm, Newton meters.

Diabetes 2006; 55;1813-1818
Diabetes Care 33:1497–1499, 2010

Diabetes Mellitus y sarcopenia

- **DM como modelo de envejecimiento**

Resistencia a la insulina
↓ anabolismo
activación de PI3K
síntesis de proteínas

+

Acumulación de lípidos en miocitos + cambios neuropáticos + ateroesclerosis

Sarcopenia

Discapacidad y mortalidad

Clin Geriatr Med 2008; 24: 455-469
Ageing Res Rev 2010;9:369-383

ERC, DM2 y pérdida muscular

- Pacientes con TSFR y DM →
- **Mayor desnutrición**
- Menor sobrevida y mayor incidencia de hospitalizaciones

167 sujetos (34 diabéticos)
Edad: 52+12 años
Un año después de iniciar TSFR

Table 4. Predictors of lean body mass (LBM) loss by multiple linear regression analysis

	Unstandardized coefficients		Standardized coefficients		95% CI for B	
	B	Standard error	Beta	*P* value	Lower bound	Upper bound
(Constant)	0.127	2.272		0.956	−4.368	4.621
Age *years*	−0.025	0.024	−0.096	0.293	−0.072	0.022
Male gender	−0.678	0.550	−0.103	0.220	−1.766	0.410
Serum albumin *g/L*	0.012	0.050	.021	0.810	−0.087	0.111
RRT modality (hemodialysis vs. peritoneal dialysis)	0.047	0.521	.007	0.928	−0.984	1.077
Inflammation (C-reactive protein ≥*10 mg/L*)	−1.120	0.606	−0.166	0.067	−2.318	0.078
Malnutrition (Subjective Global Assessment ≥2)	1.316	0.585	0.190	0.026	0.158	2.473
Presence of diabetes mellitus	−2.075	0.636	−0.281	0.001	−3.333	−0.817

R	R^2	Adjusted R^2	Standard error of the estimate
0.387	0.150	0.104	2.972

The model included LBM loss as the dependent variable, and the following predictors: age, gender, serum albumin, renal replacement modality (RRT) modality (peritoneal dialysis vs. hemodialysis), presence of malnutrition at baseline by predefined Subjective Global Assessment categories, presence of inflammation at baseline (C-reactive protein ≥10 mg/L), and the presence of diabetes mellitus.

Kidney International, Vol. 68 (2005), pp. 2368–2374

Obesidad

- La obesidad contribuye a múltiples patologías cardiometabólicas y se asocia a múltiples desenlaces negativos para la salud
- ¿Qué tanto masa grasa y qué tanto masa libre de grasa?

Table 2 Longitudinal studies examining mobility disability in obese older individuals

Authors	Duration	N	Patients	Evidence level	Functional assessment	Main outcomes
Al Snih *et al.* (17) (2005)	Longitudinal 2 years	1737	Hispanic EPESE; men Women (>65 years)	3 Prospective cohort	8-foot walk difficulty and time; difficulty with ADL	Weight gain or loss (5%) over 2 years was associated with ↑ risk of walking limitation, OR = 1.24 (0.91–1.70 CI) and 1.28 (0.93–1.76 CI) compared with normal weight.
Atkinson *et al.* (47) (2007)	Longitudinal 3 years	2349	Healthy Aging and Body Composition Study; men, women (75.6 ± 2.9 years)	3 Prospective cohort	20-m walk; self-report (difficulty walking, 10 stairs, basic ADL)	Walking speed was ↓ by 0.006 m s^{-1} when BMI was an influence in nested models of gait speed reduction.
Ferraro *et al.* (48) (2002)	Longitudinal 20 years	6833	NHANES I–III men, women (24–77 years)	3 Cohort	Self-reported SHAQD survey; upper and lower body activities	Lower body disability (chair rise, walking, errands, carrying groceries, toileting) was significantly ↑ at 20 years of follow-up in obese compared with normal weight persons.
Focht *et al.* (2005)	Longitudinal 18 months	316	ADAPT study men, women (≥60 years)	5 large RCT (control, diet, exercise, diet + exercise)	6-min walk test, stair climb time; WOMAC score	Stair climb time and 6-min walk test time and distances were most improved in the diet + exercise group compared with remaining groups; self-efficacy of these tasks predicted changes in these functional scores.
Lang *et al.* (25) (2008)	Longitudinal 5 years	3793	ELSA study; men, women (≥65 years)	3 Population-based study	Physical battery chair stand test balance test; self-reported difficulty with functional tests	The proportions of men and women with measured disability with BMI > 35 were 36.8 (22.8–53.5 CI) and 49.0 (40.9–57.1 CI), respectively; functional impairment ↑ with ↑ BMI by year 5 in men and women.
Mendes de Leon *et al.* (49) (2006)	Longitudinal 6 years	4195	CHAP study men, women (≥65 years)	3 Population-based observation	8-foot walk test; self-reported difficulty with walking, stairs and walking ½ mile	Curvilinear response existed between BMI and self-reported mobility (concave) at baseline; BMI was not related to a ↓ mobility over time.
Messier *et al.* (55) (2000)	Longitudinal 6 months	24	men, women (≥60 years)	4 Small RT (exercise vs. exercise + diet) no control group	6-min walk test, stair climb time, gait analysis self-reported disability	All participants made functional gains in tasks with no difference between groups; the exercise + diet group showed greater improvements in gait-related braking force and loading rate.
Messier *et al.* (56) (2004)	Longitudinal out to 18 months of follow-up	316	ADAPT study men, women (≥60 years)	5 Large RCT (control, diet, exercise, diet + exercise)	6-min walk test stair climb, WOMAC scores	Weight loss was highest in the exercise and exercise + diet groups (4.9–5.7% body weight); greatest change in walk test and stair climb scores occurred in the exercise and exercise + diet groups; 11–15% improvement in walk and 15–23% improvement in stair climb in these groups, respectively.
Miller *et al.* (57)(2006)	Longitudinal 6 months	87	PAIBCT study men, women (≥60 years)	5 RCT Weight stable Weight loss groups	6-min walk test, stair climb time	The weight loss group lost 8.5% weight; walk test distance ↑ by 2.3% and 16.6% in the weight stable and loss groups; stair climb time changed by +7% and −16% in these groups, respectively; moderate correlations existed between functional changes and body weight and fat loss ($r = 0.157$ to -0.528, all $P < 0.05$).
Ortega-Alsonso *et al.* (50) (2009)	Longitudinal 29 years	217	Women, twin study (68.6 ± 3.2 years)	3 Cohort study	6-min walk test	Average BMI ↑ 17% over the 29-year follow-up; BMI gain predicted walking decrements in late life; genes that ↑ predisposition to BMI in midlife related to ↓ mobility in late life.
Sartorio *et al.* (58) (2004)	Longitudinal 3 weeks	1273	Men, women (≥50 years)	3 Prospective study, non-controlled exercise + diet condition	Stair climb test	Body weight ↓ 4.2% over 3 weeks; stair climb time ↓ by 9.42% and leg power ↑ by 9.7%.

Obesidad sarcopénica

- Concurrencia de obesidad y sarcopenia
- 6% en la población de E.E.U.U
- ¿Peor condición en relación al desarrollo de discapacidad o desenlaces CV?

TABLE 2
Associations between purely sarcopenic, purely obese, or sarcopenic-obese subjects and self-reported difficulties with physical function[1]

	Purely sarcopenic[2] (n = 90)		Purely obese[3] (n = 435)		Sarcopenic-obese (n = 36)	
Physical function difficulty	OR	95% CI	OR	95% CI	OR	95% CI
Walking (n = 1252)	1.32	0.73, 2.38	1.38	0.97, 1.98	1.35	0.58, 3.17
Climbing stairs (n = 1258)	1.47	0.86, 2.51	1.79	1.28, 2.50	3.60	1.68, 7.74
Going down stairs (n = 1252)	0.98	0.54, 1.79	1.54	1.09, 2.18	3.35	1.59, 7.08
Rising from a chair or bed (n = 1259)	0.46	0.23, 0.93	1.09	0.76, 1.57	1.32	0.58, 3.01
Picking up object from floor (n = 1259)	1.12	0.63, 2.00	1.44	1.02, 2.02	1.99	0.91, 4.34
Lifting heavy objects or reaching an object (n = 1252)	1.03	0.61, 1.74	1.77	1.27, 2.46	1.92	0.89, 4.10
Moving difficulties (n = 1258)[4]	1.10	0.60, 1.99	1.75	1.22, 2.51	2.54	1.12, 5.75

[1] Healthy body composition served as the referent group [odds ratio (OR): 1.00] for the logistic regression analysis.
[2] Women were classified as sarcopenic if their relative skeletal muscle mass was <2 SD below the mean of a sample of 229 healthy young (18–40 y) adults. For women, this cutoff was 5.45 kg/m^2.
[3] Women were classified as obese if their percentage of body fat was above the 60th percentile of the study sample.
[4] Defined as ≥3 difficulties among the following physical functions: walking, climbing stairs, rising from a chair or a bed, picking up an object from the floor, and lifting heavy objects or reaching an object.

Am J Clin Nutr 2009;89:1895–900.

Table 3
Cardiovascular disease risk according to Obesity x Muscle Mass

	Model 1	Model 2	Model 3
Cardiovascular Disease			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	1.00 (0.84 – 1.20)	0.99 (0.83 – 1.19)	1.03 (0.86 – 1.24)
Sarcopenic	1.14 (0.96 – 1.36)	1.11 (0.93 – 1.34)	0.97 (0.81 – 1.16)
Sarcopenic-obese	1.10 (0.81 – 1.48)	1.04 (0.77 – 1.41)	0.97 (0.72 – 1.31)
Coronary Heart Disease			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	1.05 (0.82 – 1.35)	1.04 (0.81 – 1.34)	1.09 (0.84 – 1.40)
Sarcopenic	1.22 (0.96 – 1.56)	1.20 (0.94 – 1.53)	1.02 (0.79 – 1.31)
Sarcopenic-obese	0.88 (0.56 – 1.40)	0.85 (0.54 – 1.36)	0.79 (0.50 – 1.26)
Congestive Heart Failure			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	0.90 (0.69 – 1.18)	0.89 (0.68 – 1.16)	0.91 (0.69 – 1.19)
Sarcopenic	1.10 (0.85 – 1.43)	1.06 (0.82 – 1.38)	0.97 (0.74 – 1.27)
Sarcopenic-obese	1.22 (0.81 – 1.84)	1.14 (0.75 – 1.72)	1.10 (0.73 – 1.67)
Stroke			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	1.13 (0.84 – 1.51)	1.12 (0.84 – 1.51)	1.18 (0.88 – 1.59)
Sarcopenic	1.21 (0.90 – 1.61)	1.17 (0.88 – 1.57)	0.98 (0.73 – 1.32)
Sarcopenic-obese	0.97 (0.57 – 1.63)	0.92 (0.54 – 1.55)	0.79 (0.47 – 1.34)

Results are reported as hazard ratio (95% confidence interval); Model 1: adjusted for age, sex, race, income, smoking, alcohol, and cognitive function; Model 2: same as Model 1 + physical activity; Model 3: same as Model 2 + cardiovascular risk markers (diabetes, hypertension, HDL-cholesterol, total cholesterol, and triglycerides).

Table 4
Cardiovascular disease risk according to Obesity x Muscle Strength

	Model 1	Model 2	Model 3
Cardiovascular Disease			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	1.04 (0.86 – 1.25)	1.03 (0.85 – 1.24)	1.08 (0.90 – 1.30)
Sarcopenic	1.10 (0.92 – 1.33)	1.08 (0.89 – 1.30)	0.94 (0.78 – 1.14)
Sarcopenic-obese	1.23 (0.99 – 1.54)	1.18 (0.95 – 1.48)	1.06 (0.85 – 1.33)
Coronary Heart Disease			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	1.08 (0.83 – 1.40)	1.06 (0.82 – 1.38)	1.13 (0.86 – 1.47)
Sarcopenic	1.10 (0.85 – 1.42)	1.08 (0.84 – 1.39)	0.92 (0.71 – 1.19)
Sarcopenic-obese	1.29 (0.95 – 1.76)	1.25 (0.92 – 1.71)	1.11 (0.81 – 1.52)
Congestive Heart Failure			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	0.87 (0.65 – 1.15)	0.87 (0.66 – 1.15)	0.92 (0.70 – 1.22)
Sarcopenic	0.95 (0.72 – 1.26)	0.93 (0.70 – 1.23)	0.86 (0.64 – 1.15)
Sarcopenic-obese	1.42 (1.05 – 1.91)*	1.35 (0.99 – 1.82)	1.28 (0.94 – 1.74)
Stroke			
Normal	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Obese	1.04 (0.77 – 1.41)	1.03 (0.76 – 1.39)	1.10 (0.81 – 1.49)
Sarcopenic	1.09 (0.80 – 1.48)	1.06 (0.78 – 1.44)	0.88 (0.64 – 1.21)
Sarcopenic-obese	1.16 (0.80 – 1.67)	1.10 (0.76 – 1.59)	0.95 (0.65 – 1.37)

Results are reported as hazard ratio (95% confidence interval). * P<.05 versus referent group; Model 1: adjusted for age, sex, race, income, smoking, alcohol, and cognitive function; Model 2: same as Model 1 + physical activity; Model 3: same as Model 2 + cardiometabolic risk markers (diabetes, hypertension, HDL-cholesterol, total cholesterol, and triglycerides).

The Journal of Nutrition, Health & Aging©
Volume 13, Number 5, 2009

Obesidad, dislipidemia, resistencia a insulina y el metabolismo muscular

- Incapacidad de los tejidos para responder a la acción de la insulina

- Músculo → mayor tejido en relación al metabolismo de la glucosa

  - Acumulación de grasa en los miocitos
  - Desbalance entre disponibilidad de ácidos grasos, recaptura celular y oxidación
  - Peroxidación y falla mitocondrial
  - Estimulación defectuosa de fosfoquinasas
  - Inflamación subaguda de bajo grado
    - TNF-a e IL-6

Am J Clin Nutr 2007;85:662–77.

Osteopenia/ osteoporosis y sarcopenia

Más frecuentes en el envejecimiento
Asociados con funcionalidad, caídas / fracturas

Table 5 Multiple regression models for predicting bone mineral density in premenopausal and postmenopausal women (*RSMI* relative skeletal muscle index)

Model	Intercept	R^2	Slope	β	*p*
Model 1					
Constant	1.044	0.292	-	-	0.000
Age	-	-	−0.003	−0.419	0.000
Weight	-	-	0.002	0.250	0.001
RSMI	-	-	0.016	0.139	0.074
Model 2					
Constant	0.987	0.308	-	-	0.000
Age	-	-	−0.003	−0.401	0.000
Weight	-	-	0.002	0.322	0.000
RSMI	-	-	0.010	0.083	0.301
Physical activity	-	-	0.007	0.155	0.191

Osteoporos Int (2006) 17: 61 67

Table 3
Binary logistic regression analysis: factors associated with the presence of osteoporosis.

	B	OR (95% CI)	*p*
Age	0.047	1.048 (1.013–1.085)	0.008
Presence of sarcopenia	0.588	1.8 (1.073–3.018)	0.026
Interval fracture–DXA scan	−0.027	0.973 (0.943–1.005)	0.097

Notes: The dependent variable was the presence of osteoporosis (conventionally attributed a value of 1, whereas the absence of osteoporosis was conventionally attributed a value of 0). The independent variables included in the regression model are listed in the Table. The presence of sarcopenia was conventionally attributed a value of 1 (the absence of sarcopenia was attributed a value of 0).

Archives of Gerontology and Geriatrics 52 (2011) 71–74

Falla hepática y sarcopenia

- El nivel de **caquexia** se asocia de forma inversa con sobrevida
- Masa de células corporales más que tejido no graso

- Proceso inflamatorio hepático
  - Aumento de producción de TNF en ganglios mesentéricos
    - Traslocación bacteriana?
    - Endotoxemia
  - Reducción de IGF-1

- Sarcopenia como predictor de desenlaces en trasplante hepático

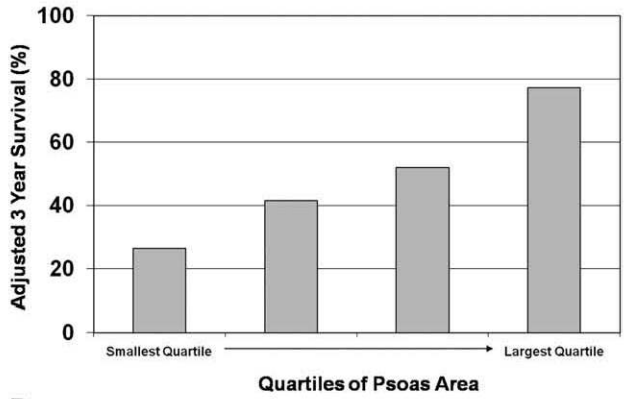


Figure 5. This figure shows the adjusted survival of liver transplant recipients, stratified by quartiles of total psoas area (TPA). Holding all other covariates equal among the quartiles of TPA, (A) the 1-year survival ranged from 49.7% among the group with the smallest TPA compared with 87.0% among the group with the largest TPA. (B) Similarly, the 3-year survival ranges from 26.4% among the group with the smallest TPA compared with 77.2% among the group with the largest TPA.

Hepatology 2000; 32:1208-1215

J Am Coll Surg 2010;211:271–278

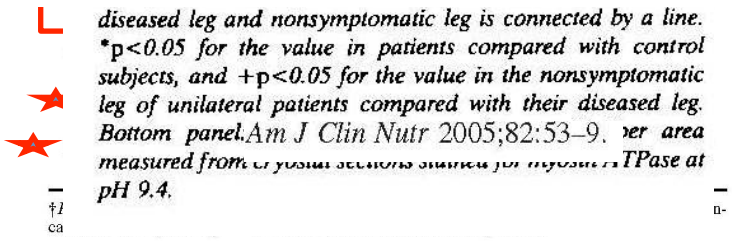
Enfermedades asociadas a hipoxia (ICC, IVP, EPOC)

- Mayc
- Pérdi rapartes sanas

TABLE 3
Univariate and multivariate analysis of predictors of mortality[1]

	Univariate			Multivariate					
				Model 1[2]			Model 2[3]		
Covariate	RR	95% CI	P	RR	95% CI	P	RR	95% CI	P
Age	1.04	1.02, 1.06	0.001	1.04	1.02, 1.06	0.001	1.04	1.02, 1.06	0.001
Sex	0.72	0.50, 1.03	0.071	0.72	0.49, 1.06	0.100	0.84	0.56, 1.25	0.385
BMI	0.94	0.90, 0.97	0.001	—[4]	—	—	—	—	—
FFMI	0.88	0.83, 0.94	0.001	0.88	0.82, 0.94	0.001	0.90	0.84, 0.96	0.003
FMI	0.93	0.88, 0.99	0.009	1.01	0.94, 1.08	0.843	1.02	0.95, 1.09	0.680
FEV_1	0.98	0.97, 0.99	0.001	—	—	—	0.98	0.97, 0.99	0.037
IVC	0.99	0.98, [illegible]	0.016	—	—	—	1.00	0.99, 1.01	0.760
$PaCO_2$	1.17	1.01, 1.38	0.047	—	—	—	0.98	0.81, 1.20	0.860
PaO_2	0.84	0.77, 0.92	0.001	—	—	—	0.92	0.82, 1.02	0.120

[1] RR, relative risk; FFMI, fat-free mass index; FMI, fat mass index; FEV_1, forced expiratory volume in 1 s; IVC, inspiratory vital capacity; $PaCO_2$, arterial carbon dioxide tension; PaO_2, arterial oxygen tension.
[2] FFMI, FMI, age, and sex (0 = women, 1 = men).
[3] FFMI, FMI, age, sex (0 = women, 1 = men), FEV_1, IVC, $PaCO_2$, and PaO_2.
[4] Variable not included in the model.



*diseased leg and nonsymptomatic leg is connected by a line. *p<0.05 for the value in patients compared with control subjects, and +p<0.05 for the value in the nonsymptomatic leg of unilateral patients compared with their diseased leg. Bottom panel.*Am J Clin Nutr 2005;82:53–9. [illegible]er area measured from [illegible] pH 9.4.*

Enfermedad de Alzheimer y sarcopenia

- La EA se asocia con pérdida de peso (previo a su diagnóstico)
- La pérdida de peso→ severidad y progresión de EA
- Composición corporal a lo largo de la vida y riesgo de EA

Table 3. Standardized Coefficients (β) Predicting Lean Mass After Controlling for Age and Sex[a]

Variable	β	*P* Value
Whole-brain volume, normalized	.20	<.001
Gray matter volume, normalized	.06	.27
White matter volume, normalized	.19	<.001
Global cognitive performance	.12	.007
Mini-Mental State Examination	.11	.009
Insulin, AUC	.11	.02
Glucose, AUC	.09	.05
C-reactive protein	.003	.94
Physical activity (PASE)	.14	.001
Activities of daily living	.07	.09
Physical performance task	.07	.16
Depression	−.05	.21
Apolipoprotein E4 carrier	−.05	.24

Abbreviations: AUC, area under the curve; PASE, Physical Activity Scale in the Elderly.
[a]Age and sex included in all analyses as covariates.

Arch Neurol. 2010;67(4):428-433

Cáncer y sarcopenia

- Una necesidad no cumplida
- > cáncer de páncreas y pulmón

Panel: **Diagnosis of cancer cachexia**

- Weight loss >5% over past 6 months (in absence of simple starvation); or
- BMI <20 and any degree of weight loss >2%; or
- Appendicular skeletal muscle index consistent with sarcopenia (males <7·26 kg/m²; females <5·45 kg/m²)* and any degree of weight loss >2%†

*Defined reference values (sex-specific) and standardised body composition measurements are essential to undertake assessment of skeletal muscle depletion. Although there is a paucity of reference values related to cancer-specific outcomes,[29,30] a generally accepted rule is an absolute muscularity below the 5th percentile. This can be assessed as follows: mid upper-arm muscle area by anthropometry (men <32 cm², women <18 cm²);[31] appendicular skeletal muscle index determined by dual energy x-ray absorptiometry (men <7·26 kg/m²; women <5·45 kg/m²);[32] lumbar skeletal muscle index determined by CT imaging (men <55 cm²/m²; women <39 cm²/m²);[33] whole body fat-free mass index without bone determined by bioelectrical impedance (men <14·6 kg/m²; women <11·4 kg/m²).[34] †A direct measure of muscularity is recommended in the presence of fluid retention, a large tumour mass, or obesity (overweight).

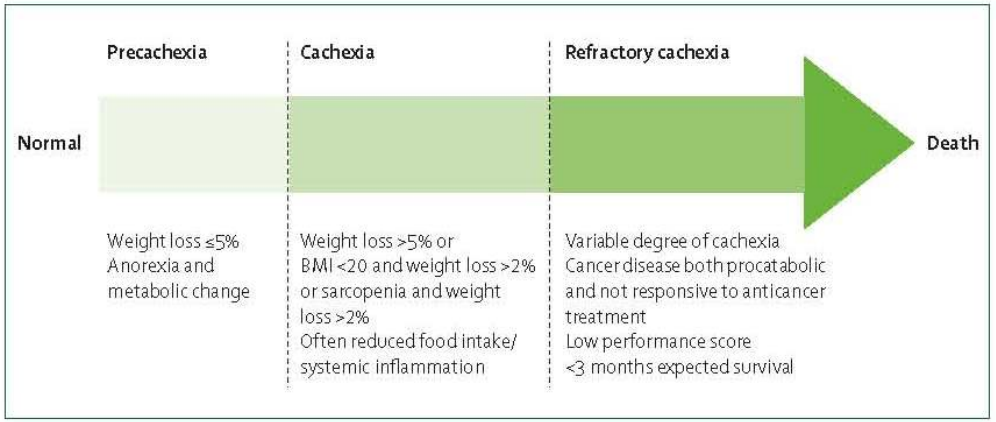


Figure 2: **Stages of cancer cachexia**
Cachexia represents a spectrum through which not all patients will progress. At present there are no robust biomarkers to identify those precachectic patients who are likely to progress further or the rate at which they will do so. Refractory cachexia is defined essentially on the basis of the patient's clinical characteristics and circumstances. BMI=body-mass index.

Lancet Oncol 2011; 12: 489–95

Cáncer y sarcopenia

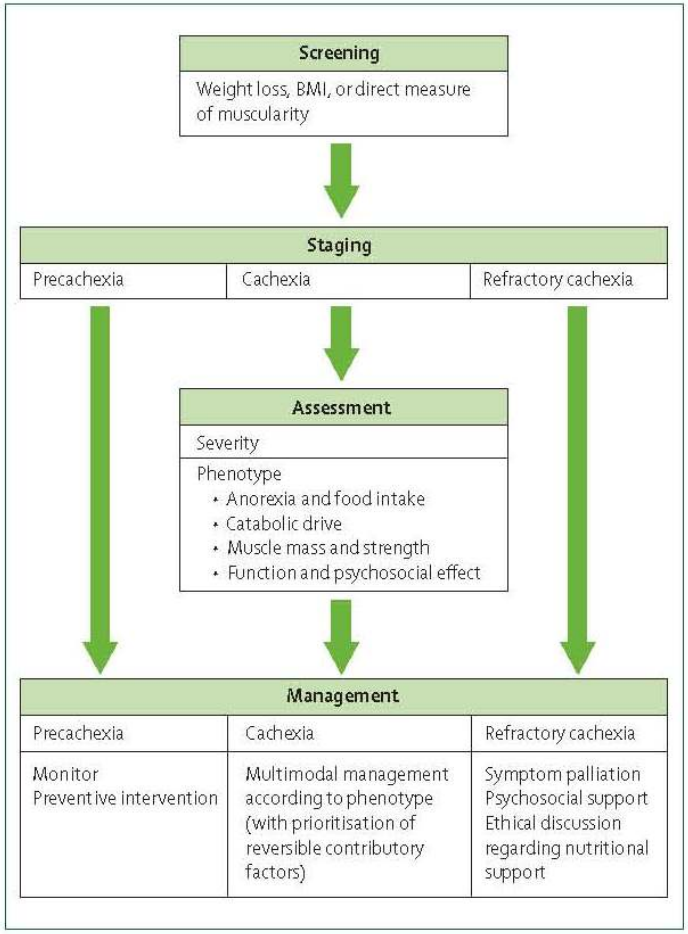


Figure 3: **Management algorithm for cancer cachexia**
Patients should be screened for cachexia, then undergo detailed assessment. All patients require optimum oncological and general medical management. Once patients with cachexia have been phenotyped, a detailed multimodal management plan (including nutrition, exercise, anti-inflammatory strategies, and other adjuncts) can be established. BMI=body-mass index.

Lancet Oncol 2011; 12: 489–95

Conclusiones

- La sarcopenia está presente en múltiples entidades patológicas
- Sus mecanismos son multifactoriales e incluyen inflamación crónica, disfunción mitocondrial, desbalance oxidativo, entre otros.
- Peores desenlaces de salud → inclusión en la evaluación de estas patologías?
- Modelos de investigación?

