Sarcopenia and sarcopenic obesity – one old and one new ageing problem

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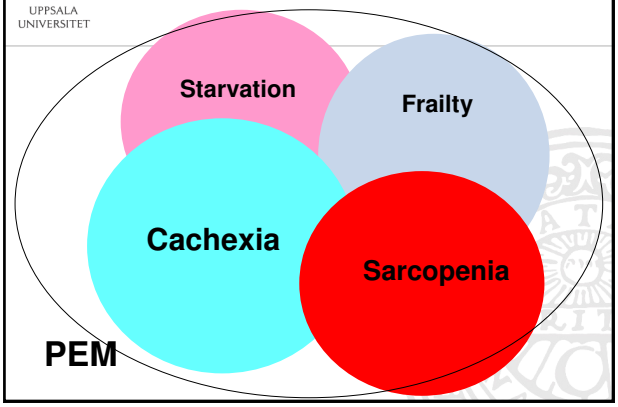
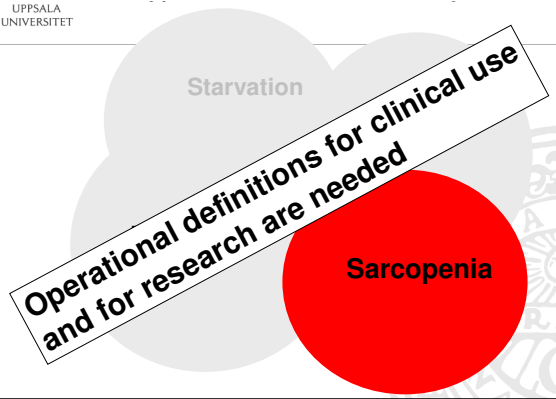
Overlapping catabolic conditions in ill and old adults



Overlapping catabolic conditions in ill and old adults



Sarcopenia – a novel concept for an old problem

Loss of muscle – I Rosenberg 1989

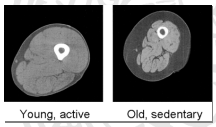
"Muscle loss steals the freedom of the old"

- starts at 30 y
- muscle mass decrease by
  - ~50% from 20 to 90 y
  - 1-2%/y after 50 y
- selective typ II fibre atrophy
- muscle strength↓ by
  - 15% / 10 y between 50 and 70 y
  - 30% / 10 y thereafter

Marzetti. Exp Gerontol 2006;41:1234-8

Sarcopenia is a syndrome characterized by progressive loss of muscle mass and strength with a risk of adverse outcomes

Cruz-Jentoft et al. Age Aging 2010;39:412-23



Young, active Old, sedentary

Current efforts to define sarcopenia

Table 1
Current efforts to define sarcopenia and suggested diagnostic criteria

Study Group	Definition	Criteria
The European Society of Parenteral and Enteral Nutrition Special Interest Groups ESPEN -10	"Sarcopenia is a condition characterized by loss of muscle mass and muscle strength. Although sarcopenia is primarily a disease of the elderly, its development may be associated with conditions that are not exclusively seen in older persons, like disuse, malnutrition and cachexia. Like osteopenia, it can also be seen in younger patients such as	• Low muscle mass, eg, percentage of muscle mass >2 SDs below mean in individuals aged 18–39 y in the National Health and Nutrition Examination Survey III cohort • Walking speed <0.8 m/s in the 4-min test or reduced performance in any functional test used for the comprehensive geriatric assessment
The European Working Group on Sarcopenia in Older People EUGMS -10		h, eg, grip strength rmance, eg, gait speed of healthy young subjects <2 SDs below mean. Criterion 1
The International Working Group on Sarcopenia EU-US -11	sarcopenia are multi-factorial and can include disuse, altered endocrine function, chronic diseases, inflammation, insulin resistance, and nutritional deficiencies. While cachexia may be a component of sarcopenia, the two conditions are not the same"[45]	d low muscle mass, eg, appendicular mass relative to height squared, ie, <7.23 kg/m² in men and <5.67 kg/m² in women
The Society of Sarcopenia, Cachexia and Wasting Disorders SCWD, subm.	"Sarcopenia, i.e. reduced muscle mass, with limited mobility is an important clinical entity and most older persons should be screened for this condition. The limitation in mobility should not clearly be due to otherwise defined specific diseases of muscle, peripheral vascular disease with intermittent claudication, central and peripheral nervous system disorders or cachexia" (in progress)	• Walking speed ≤1 m/s or walking distance <400 m during a 6-min walk • A lean appendicular mass corrected for height squared of >2 SDs below the mean of healthy persons aged between 20 and 30 y of the same ethnic group
The Biomarkers Consortium NIA -12?	To be announced	To be announced

- muscle mass ↓
- walking speed ↓

Cederholm et al. Clin Ger Med 2011, in press

Criteria for sarcopenia
- adopted by ESPEN/EUGMS/IAGG/IANA

Reduced muscle mass

≥ 2 SD below mean of % muscle mass (in young adults in NHANES)

Janssen I et al, JAGS 2002;50:889–896.

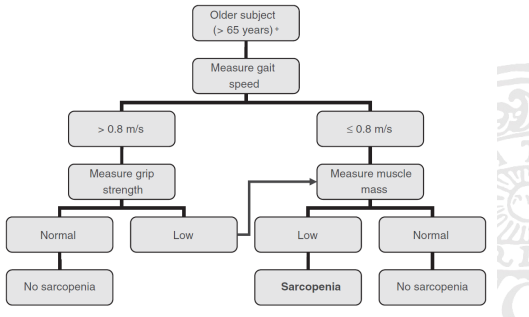
+

Impaired muscle function

4 m walking speed <0.8-1 m/sec or reduced hand grip strength

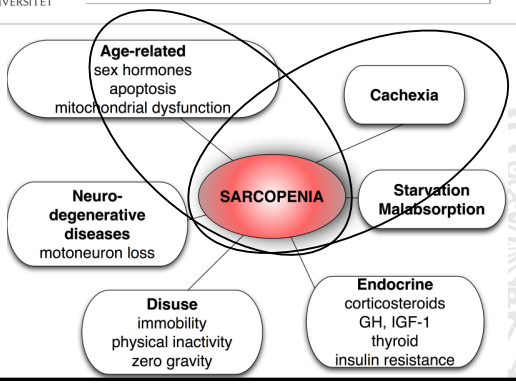
Guralnik JM et al. J Gerontol A Biol Sci Med Sci 2000; 55: M221-231.

Case finding algorithm by EUGMS



Cruz-Jentoft et al. Age Aging 2010;39:412-23

Sarcopenia pathogenesis



Is sarcopenia a gerontological or a clinical concept?

Age-related only

Gerontological concept - relevant for public health

General concept for all muscle wasting/loss

Gerontological/geriatric/clinical concept
- clinically relevant

Young, active Old, sedentary

Suggested classification

Primary sarcopenia *(or age-related)* when there is no evident caus

Secondary sa identified: auses are

- **Myopenia**
- **Dynapenia**
- **Karotopenia**

Activity-rel bed r ivity

Disease-related sarcopenia

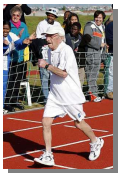
advanced organ failure (heart, respiratory, liver, renal, brain, intestinal), inflammatory disease, malignancy, endocrine disease

Nutrition-related sarcopenia

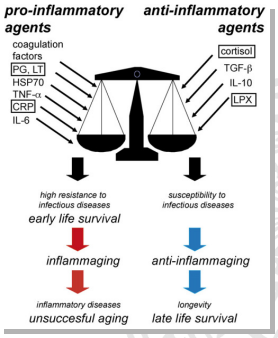
Cruz-Jentoft et al. Age Aging 2010

"Inflammaging"

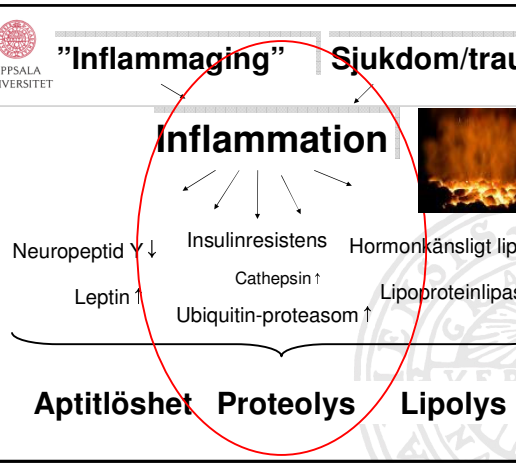
Ageing is governed by the balance between
Pro-inflammation –
"early life survival" and
anti-inflammation –
"late life survival"



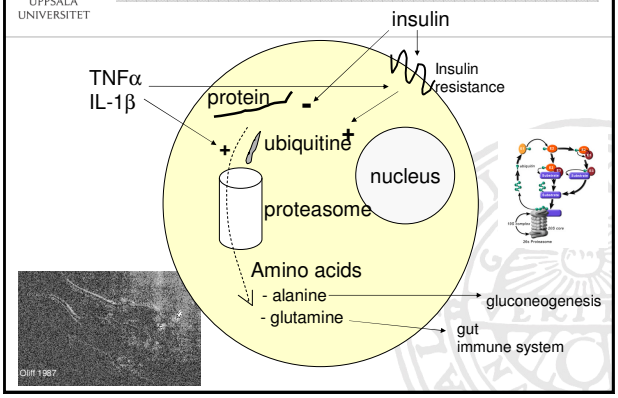
Franceschi et al. Mech Ageing 2007



"Inflammaging" Sjukdom/trauma



Cytokin-driven muskelnedbrytning

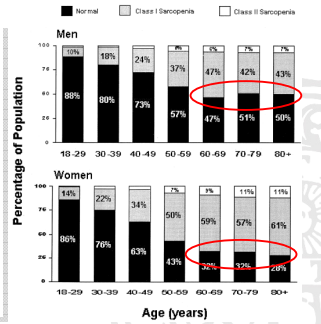


Prevalens av sarkopeni

4504 >60 år (NHANESIII)
6400 (18-39 år) – ref
SMI (BIA) = muskelmassa /vikt x 100
Klass I: T-score -1-2 SD
Klass II: T-score <-2 SD

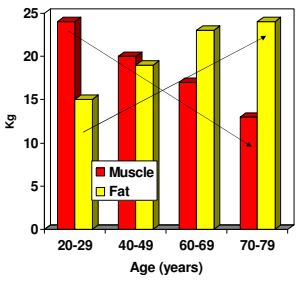
7-10% sarkopeni
45-60% risk för sarkopeni

Korrelerade med funktion



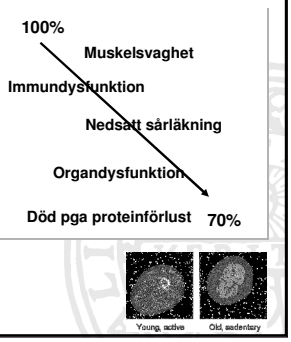
Janssen I et al. J Am Geriatr Soc 2002;50:889-89

Sarkopeni – svårupptäckt men allvarligt



75 män 20-80 år

Cohen. Am J Phys 1980



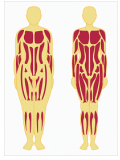
Sarkopen obesitas

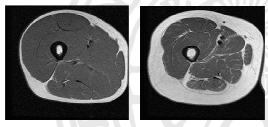
Muskelmassa ↓ + BMI/fettmassa --/↑
- **Fat Free Mass Index (FFMI) <10:e perc**
- **Fat Mass Index (FMI) >25:e perc**

i relation till relevant referensmaterial

Kyle et al. Eur J Clin Nutr 2001;55
Elkan A et al. Eur J Nutr 2009;48:315-22

- Reumatoid artrit
- Cancer
- Åldrande
- …?





Ökar fetma/sarkopen obesitas hos sjukhemsboende?

	1996 (n=166)	2010 (n=172)
	166 (61% kv)	172 (70% kv)
Ålder	83.8 ± 8.2	86.3 ± 7.7**
Vikt (kg)	59.1 ± 12.0	62.9 ± 15.0*
BMI (kg/m²)	22.3 ± 4.2	23.7 ± 5.1**

J Törmä 2011, abstr ESPEN

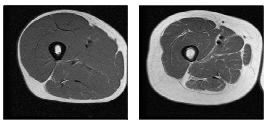
BMI/fetma ökar hos sjukhemsboende!?

	1996 (n=166)	2010 (n=172)
BMI <22	45%	41%
BMI 22-24	28%	23%
BMI 25-29	22%	26%
BMI ≥30	5%	10%

J Törmä 2011, abstr ESPEN

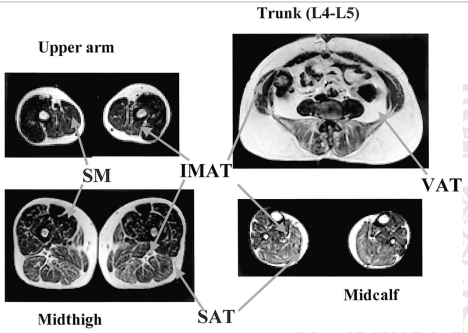
RA som modell för tidigt åldrande och sarkopen obesitas

Inflammation → muskelkatabolism↑
Perifer insulinresistens → muskelanabolism↓
Fysisk aktivitet↓
IGF-1↓



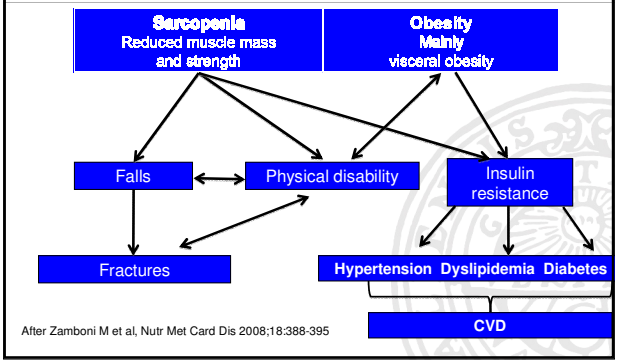
Age 25 Age 63

Myosteatos och ektopisk fettansamling



Song M et al. Am J Clin Nutr 2004;79:874-880

Possible consequences of sarcopenic obesity in older persons



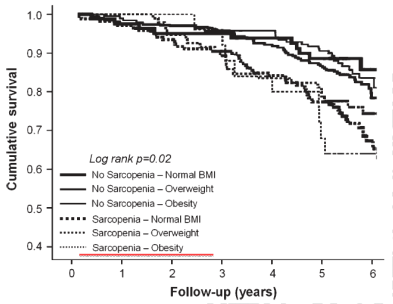
After Zamboni M et al, Nutr Met Card Dis 2008;18:388-395

Sarcopenic obesity and mortality

934 subjects >64 y InChianti Study

Mortality related to anthropometry

Walking speed best predictor



Cesari M et al, J Gerontol A Biol Sci Med Sci 2009;64A:377-384

Sarcopenic obesity – risk for mortality or for disability?

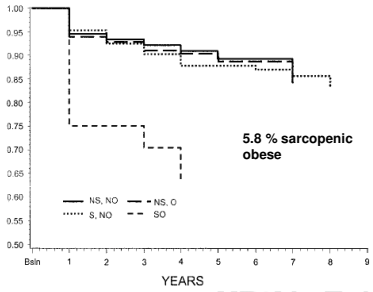
- Sarcopenic obesity has not been associated with a significantly increased risk of mortality
- Strength measures and functional parameters are much more relevant in this regard

Sarcopenic obesity predicts drop in IADL

450 elderly subjects, New Mexico

IADL related to anthropometry

RR for incident disability was 2.6 (CI 1.2-5.9) for SO adjusted for age, PA, morbidity etc.

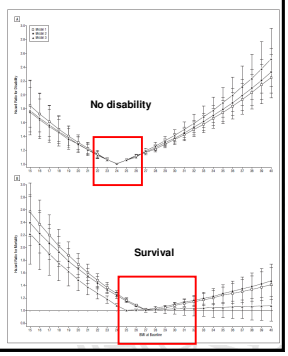


Baumgartner RN et al, Obesity Res 2004;12;1995-2004

Optimal BMI for function and survival

~13000 >65 y
7 y follow-up
Function: BMI~25
Survival: BMI ~25-30

Al Snih S et al. Arch Intern Med 2007;167:774-80



Dynapenic obesity and functionality

2,039 men/women, aged >55 years, from the 1999 – 2002 National Health and Nutrition Examination Survey (NHANES). Classification based on fat mass and leg strength tertiles

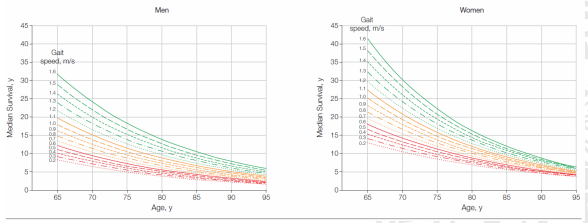
	Non-dynapenic and Non-obese	Obese Alone	Dynapenic Alone	Dynapenic-Obese
Men	$n = 437$	$n = 247$	$n = 246$	$n = 95$
Walking speed (m/s)				
Nonadjusted	1.09 ± 0.20	1.03 ± 0.18	0.99 ± 0.22	0.93 ± 0.21
Adjusted*	$0.94 \pm 0.38^{b,c,d}$	$0.89 \pm 0.32^{a,d}$	$0.87 \pm 0.30^{a,d}$	$0.81 \pm 0.24^{a,b,c}$
Adjusted**	$0.96 \pm 0.42^{b,c,d}$	$0.91 \pm 0.31^{a,d}$	$0.89 \pm 0.31^{a,d}$	$0.82 \pm 0.29^{a,b,c}$
Global subjective score (0–15)				
Nonadjusted	14.34 ± 3.19	13.80 ± 2.15	13.02 ± 2.54	12.42 ± 1.29
Adjusted*	$12.95 \pm 4.50^{b,c,d}$	$12.32 \pm 3.78^{a,d}$	11.90 ± 2.54^{a}	$11.33 \pm 1.29^{a,b,c}$
Adjusted**	$13.08 \pm 4.60^{b,c,d}$	$12.52 \pm 3.93^{a,d}$	12.17 ± 3.61^{a}	$11.55 \pm 2.92^{a,b,c}$
Women	$n = 427$	$n = 249$	$n = 249$	$n = 89$
Walking speed (m/s)				
Nonadjusted	1.03 ± 0.23	0.97 ± 0.28	0.95 ± 0.24	0.84 ± 0.20
Adjusted*	$0.95 \pm 0.63^{b,c,d}$	$0.88 \pm 0.52^{a,d}$	$0.86 \pm 0.50^{a,d}$	$0.80 \pm 0.35^{a,b,c}$
Adjusted**	$0.98 \pm 0.62^{b,c,d}$	$0.92 \pm 0.47^{a,d}$	$0.90 \pm 0.47^{a,d}$	$0.82 \pm 0.28^{a,b,c}$
Global subjective score (0–15)				
Nonadjusted	13.61 ± 3.87	12.01 ± 3.29	12.32 ± 3.29	10.53 ± 2.33
Adjusted*	$12.10 \pm 7.58^{b,c,d}$	$10.86 \pm 6.26^{a,d}$	$11.22 \pm 6.07^{a,d}$	$9.57 \pm 4.23^{a,b,c}$
Adjusted**	$12.46 \pm 9.09^{b,c,d}$	$11.43 \pm 6.31^{a,d}$	$11.64 \pm 6.00^{a,d}$	$10.14 \pm 4.15^{a,b,c}$

Bouchard DR et al. J Gerontol Biol Sci Med Sci 2010;65A:71–77

Gait Speed and Survival in Older Adults

Pooled analyses of 9 cohorts; 34500 community-dwelling old adults, 74 y, 60% w
Follow-up 6-21 years, 17500 deaths
HR for death was 0.88 (95%CI 0.87-0.90) per 0.1 m/s faster gait

Figure 2. Predicted Median Life Expectancy by Age and Gait Speed



Studenski et al. JAMA 2011;305:50-58

Therapy of sarcopenic obesity?

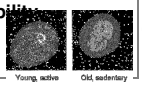
- **Should we focus on dynapenic obesity rather than sarcopenic obesity?**
- **Weight loss in older inidviduals has always to be combined with physical exercise, especially in the sarcopenic obese.**

The Japanese Centenarian Study

- 1907 100-year-olds, 10% were independent, i.e. preserved ADL, intact cognition & high social status

Variables Linked to Successful Aging

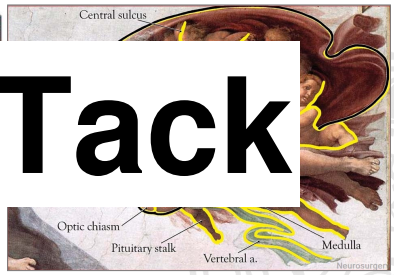
- Good vision
- Protein intake↑
- No falls
- Regular training
- No alcohol
- Good chewing ability
- Regular sleep
- Male



Ozaki JAGS 2007

The beauty of knowledge revealed
- The Creation of Adam - Michelangelo

Tack



…creative processes depends on knowledge transferred…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