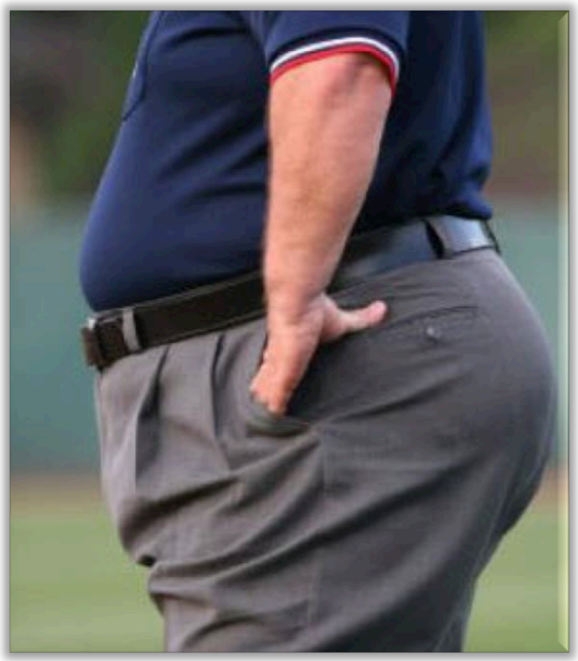
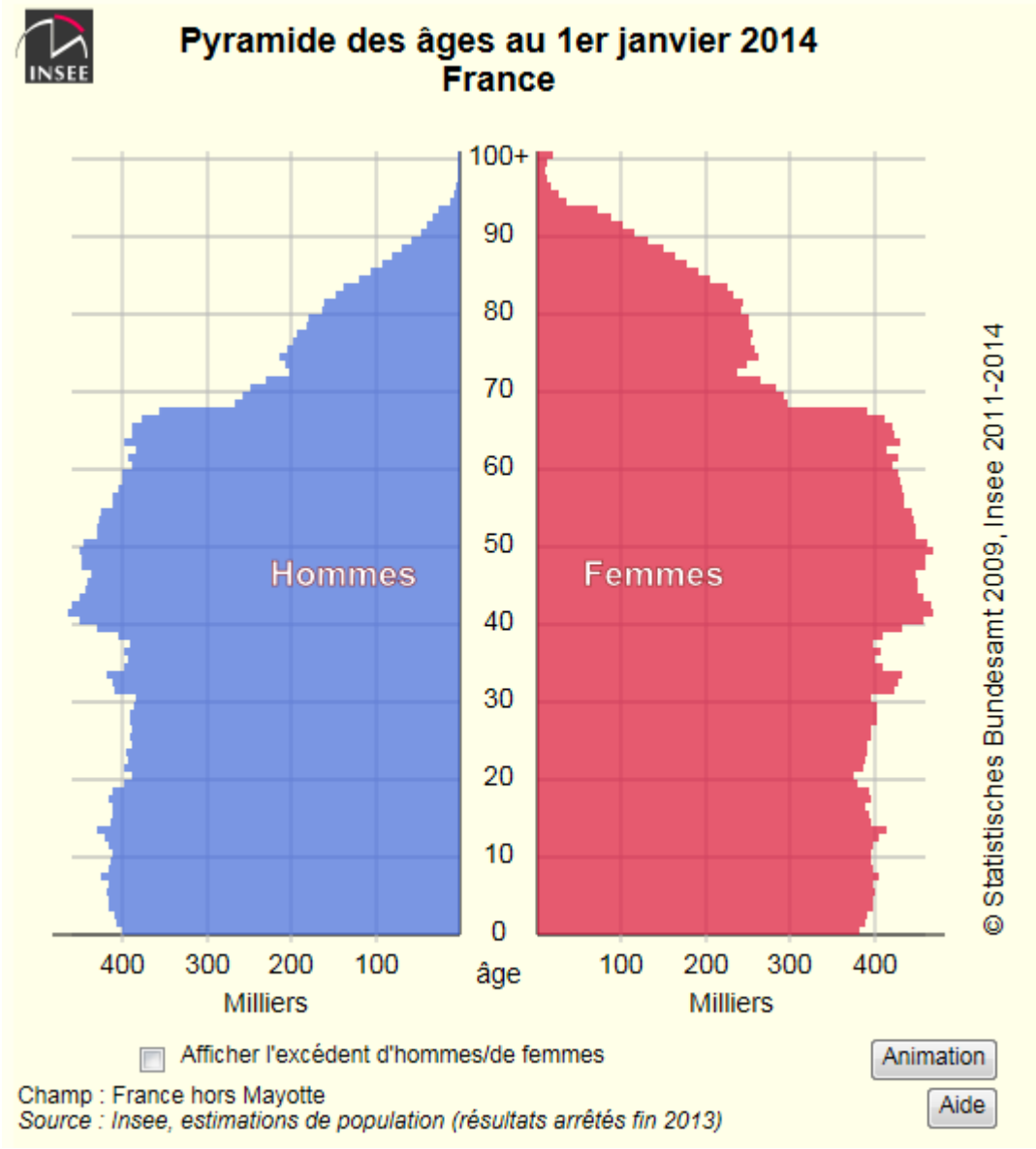
Obésité de la personne âgée : quelle prise en charge ?

Pr Patrice DARMON
CHU Sainte Marguerite, Marseille



Interclan PACA - Nice 25 novembre 2014



Espérance de vie à la naissance en 2013

H 78,7 ans F 85 ans

Espérance de vie à 60 ans en 2013

H 22,7 ans F 27,3 ans

Groupes d'âges (2014)

âge	millions	%	% femmes
65+	11,85	18	57,7
20 - 64	37,78	57,4	50,8
<20	16,19	24,6	48,8
Total	65,82	100	51,6

☐ Modifier les groupes d'âges

Projection de population par grand groupe d'âge en 2060

en %

	Population au 1er janvier (en millions)	Moins de 20 ans	20 ans à 59 ans	60 ans à 74 ans	75 ans ou plus
2015	64,5	24,2	51,0	15,5	9,3
2020	66,0	23,9	49,6	17,0	9,4
2025	67,3	23,5	48,4	17,2	10,9
2030	68,5	23,0	47,5	17,1	12,3
2035	69,7	22,6	46,7	17,1	13,6
2040	70,7	22,4	46,6	16,3	14,7
2050	72,3	22,3	45,9	15,9	16,0
2060	73,6	22,1	45,8	15,9	16,2

Champ : France métropolitaine.

Source : Insee, projections de population 2007-2060.

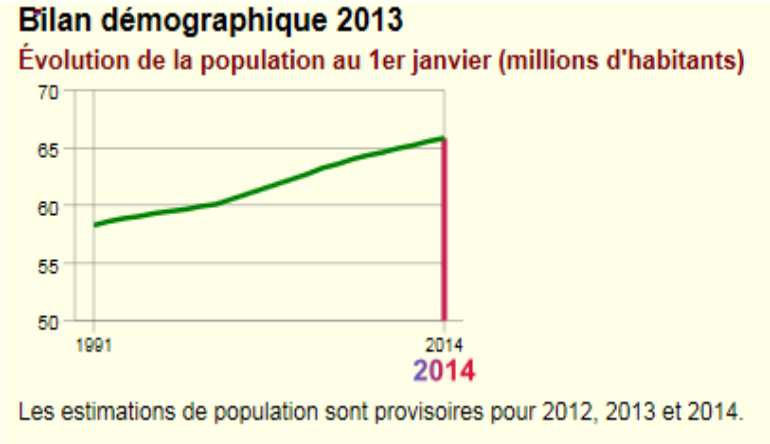
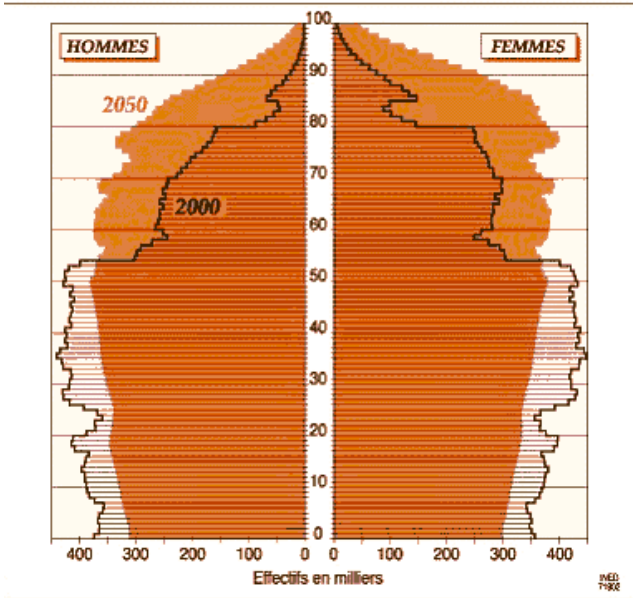
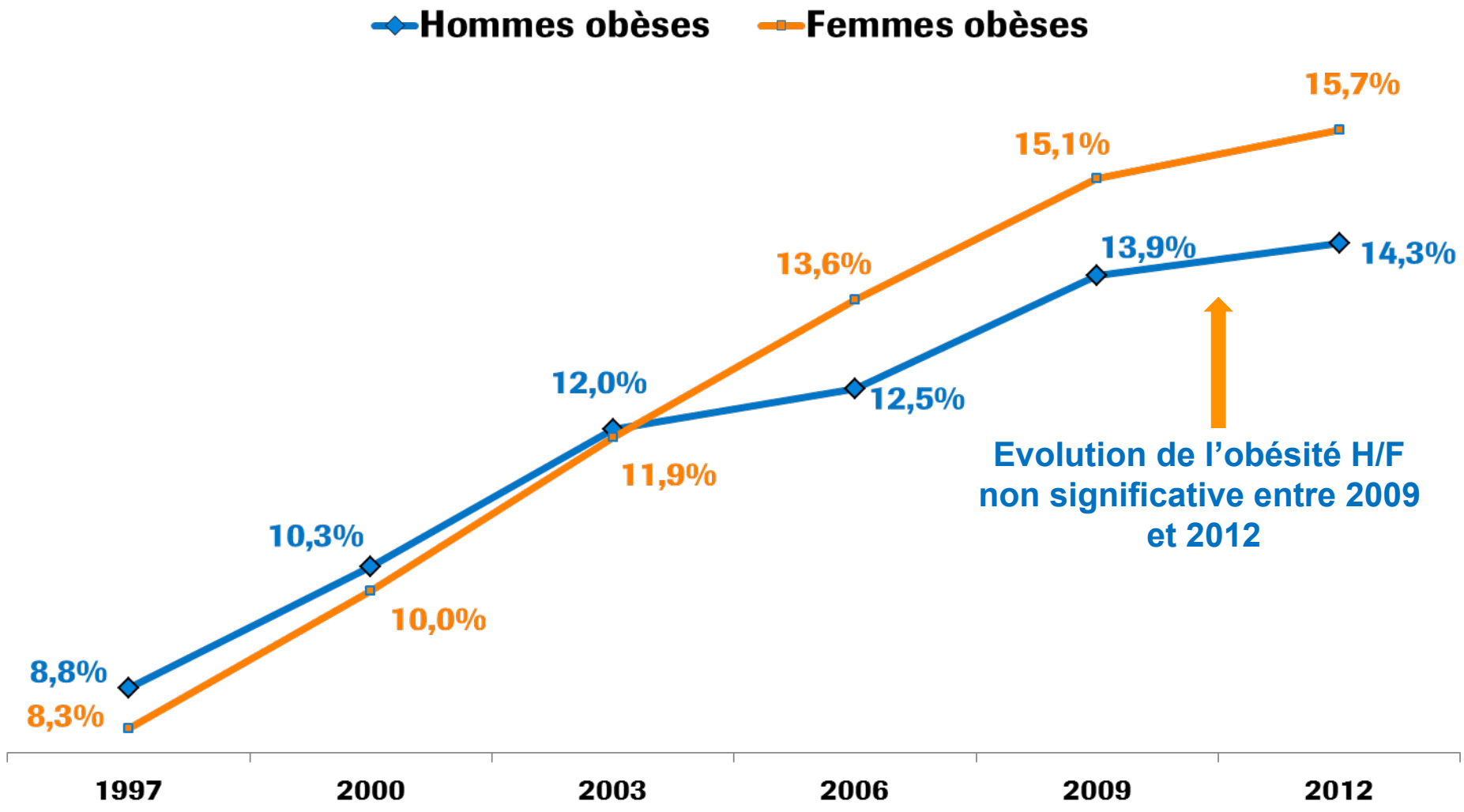


*Figure 1 – Pyramides des âges en 2000 et 2050**

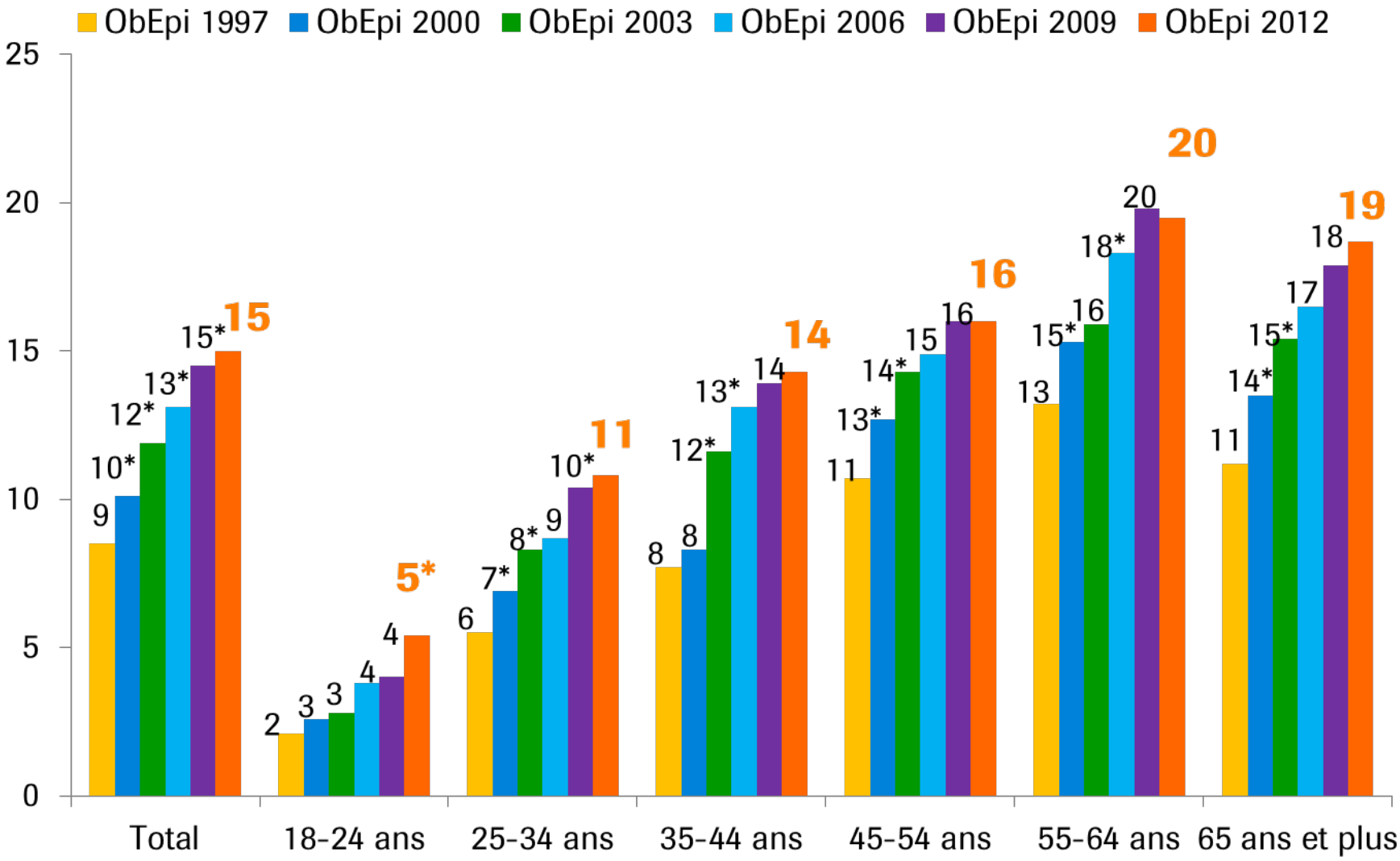


Evolution du taux d'obésité en France entre 1997 et 2012
selon le sexe, quel que soit l'âge



ObEpi

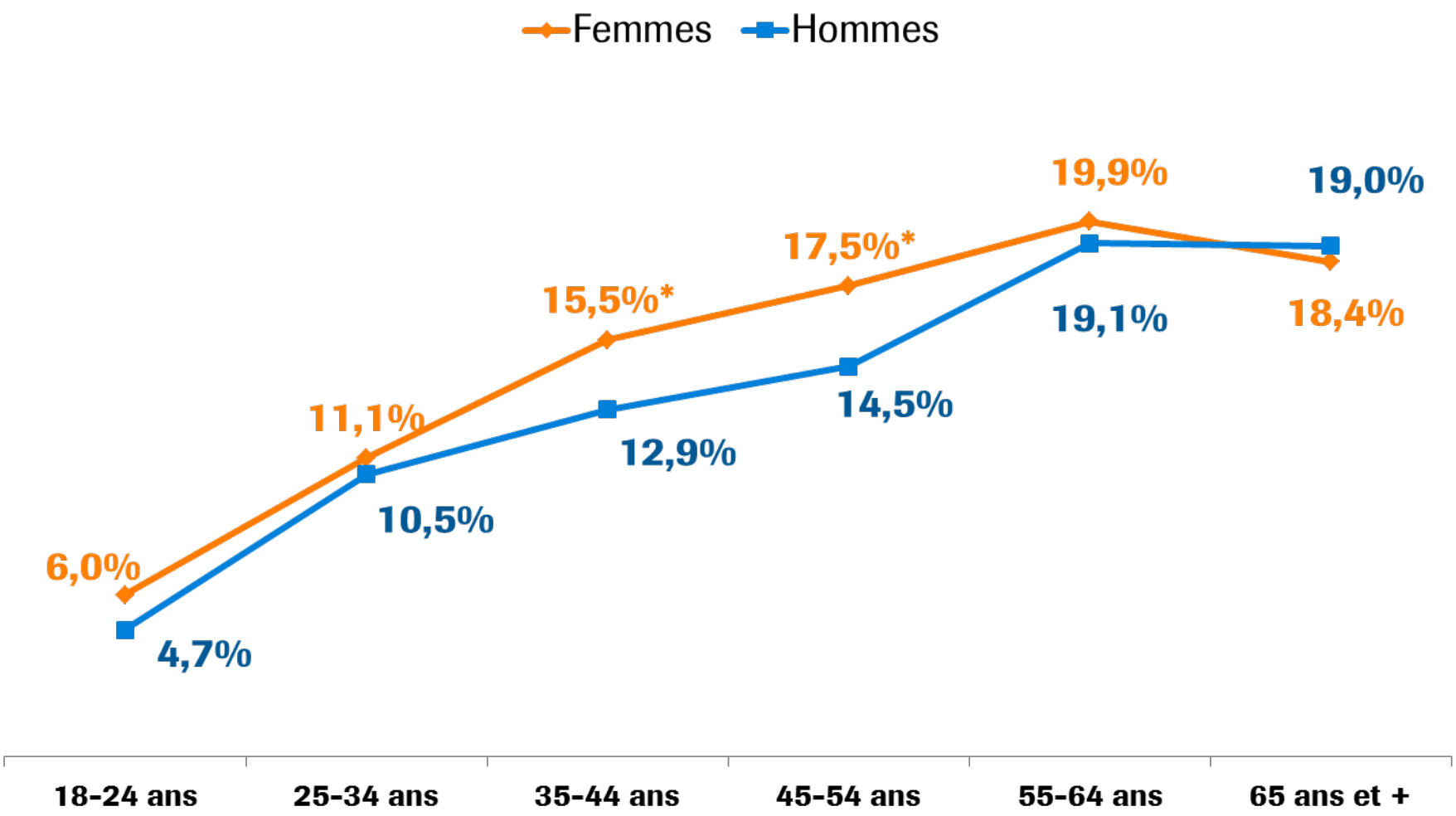
Evolution du taux d'obésité en France entre 1997 et 2012 *en fonction de l'âge*



*** augmentation significative par rapport à la vague précédente (p<0,05)**

ObEpi

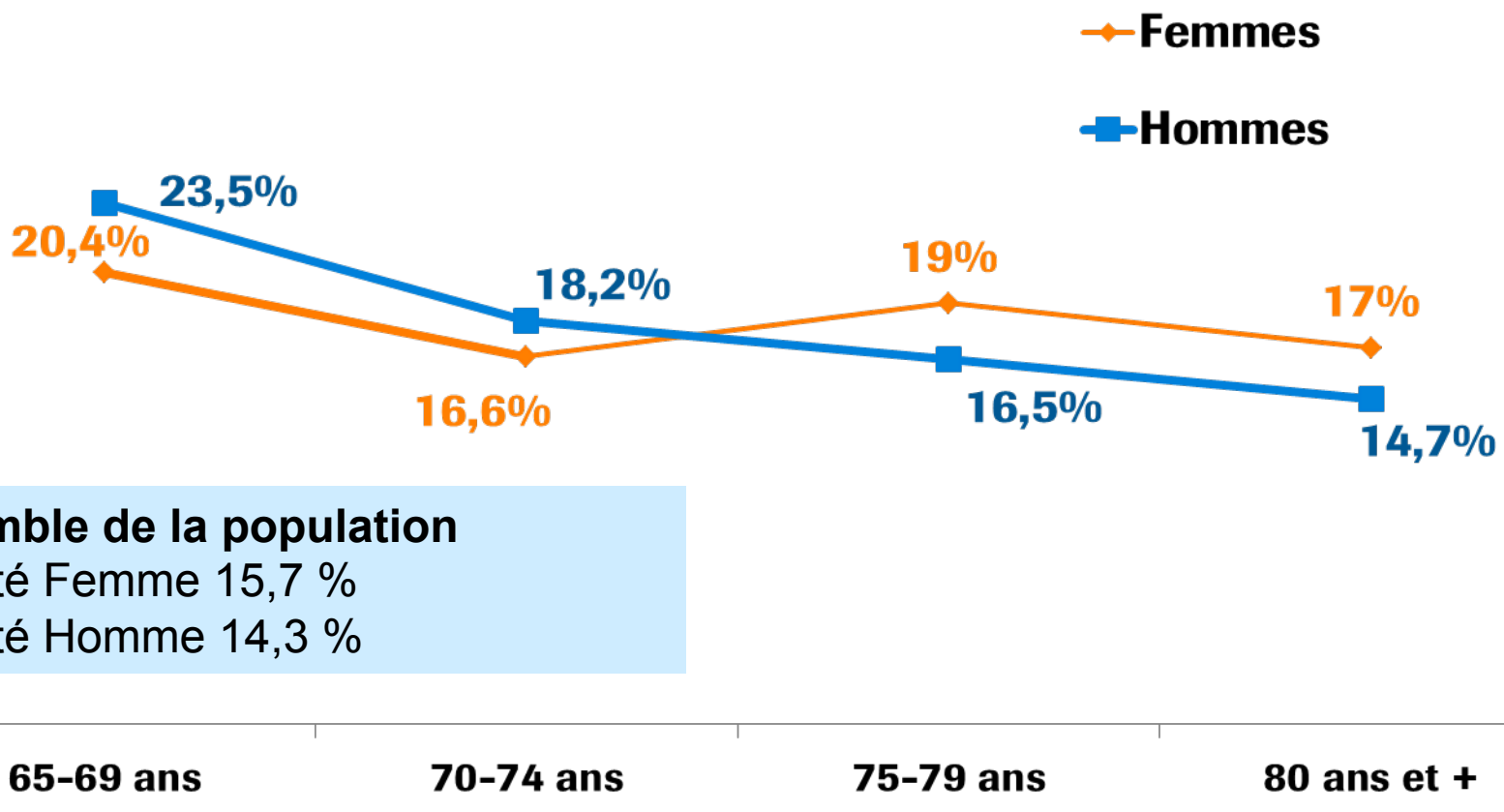
Prévalence de l'obésité en France en 2012
en fonction du sexe et de l'âge



* p< 0,01

ObEpi

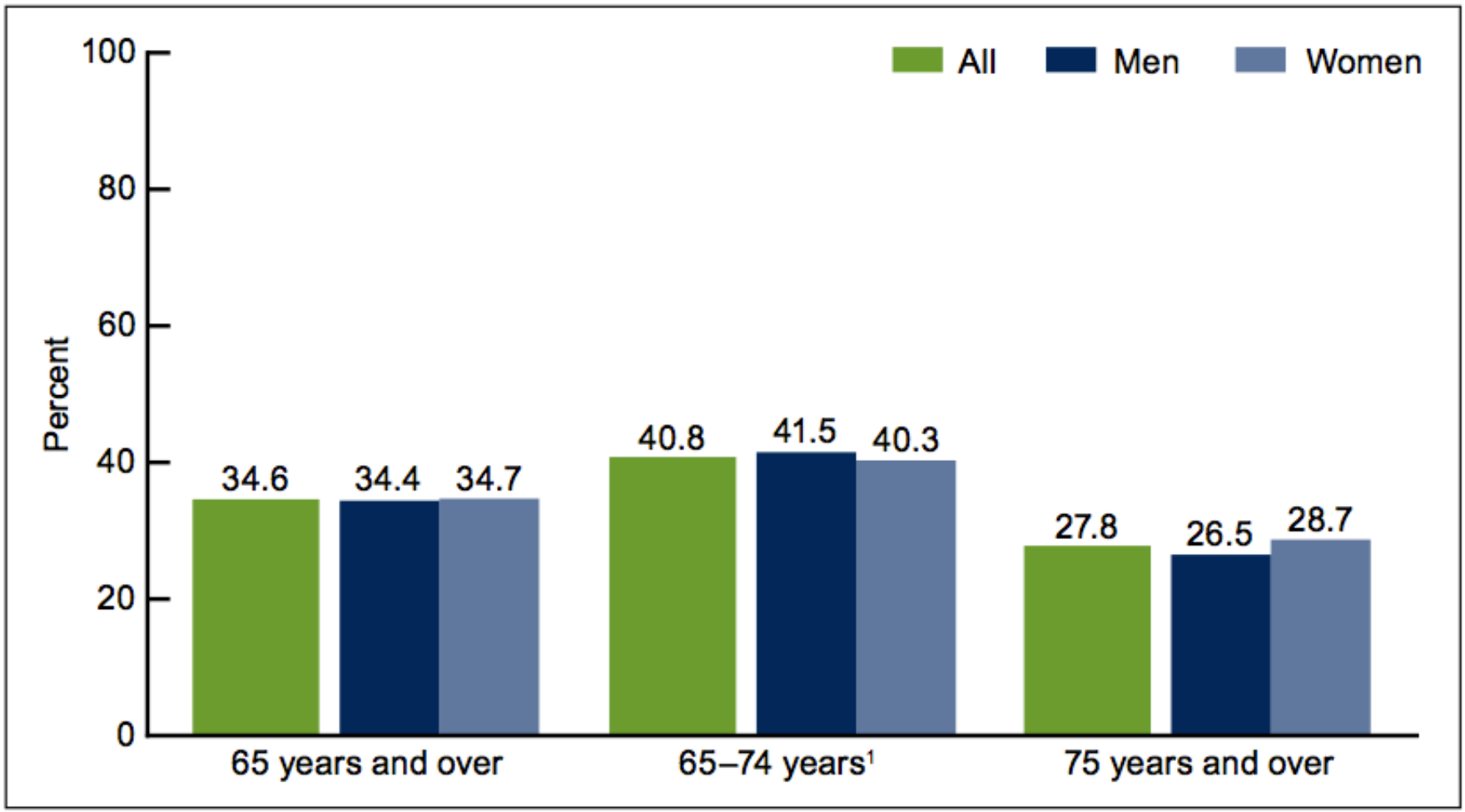
Prévalence de l'obésité en France en 2012
en fonction du sexe et de l'âge chez les 65 ans et plus



Ensemble de la population
Obésité Femme 15,7 %
Obésité Homme 14,3 %

Prevalence of Obesity Among Older Adults in the United States, 2007–2010

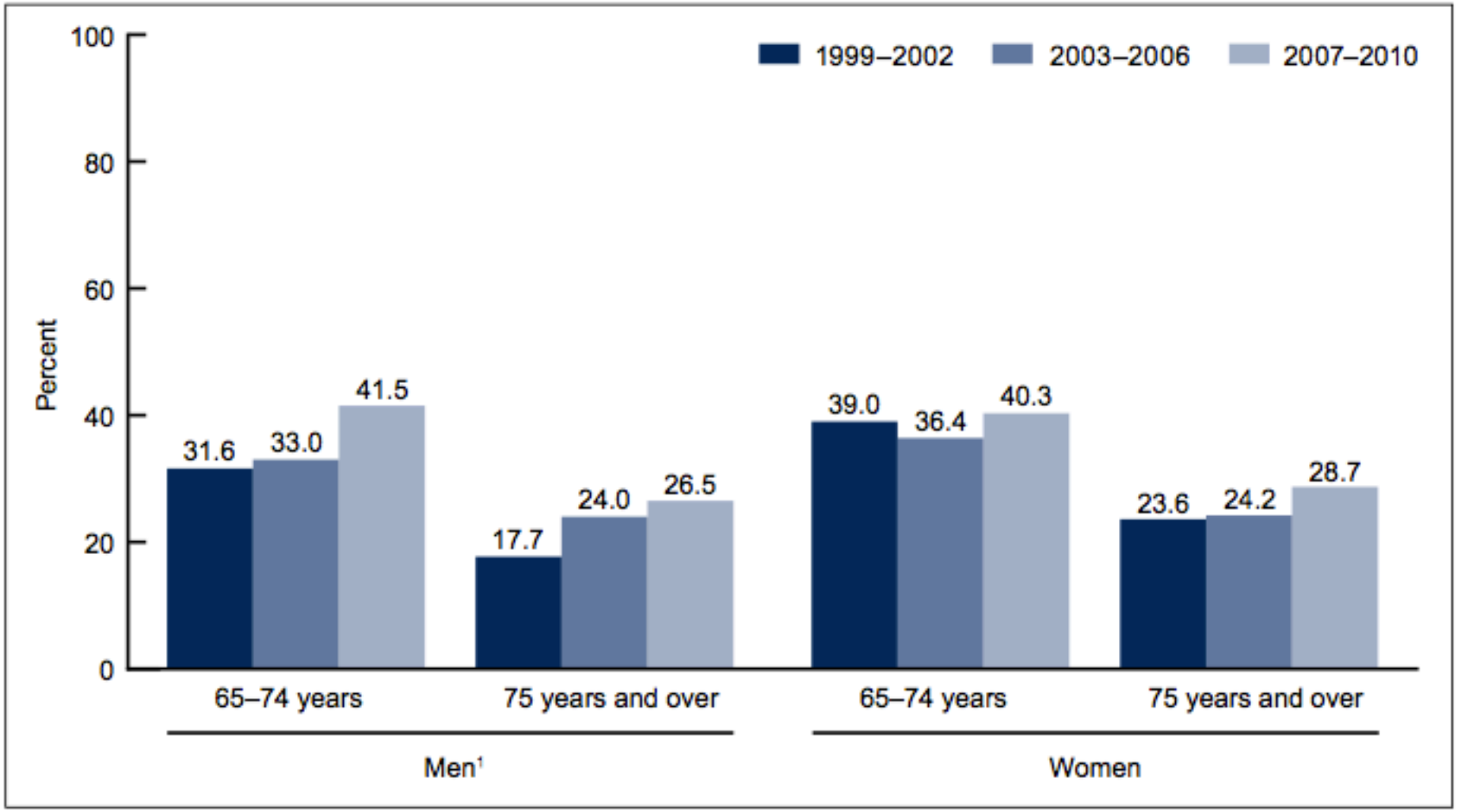
Figure 1. Prevalence of obesity among adults aged 65 and over, by sex: United States, 2007–2010



[1]Significantly different from 75 years and over.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2007–2010.

Prevalence of Obesity Among Older Adults in the United States, 2007–2010

Figure 4. Trends in the prevalence of obesity among adults aged 65 and over, by sex: United States, 1999–2010



[1]Significant linear trend.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2007–2010.

Prevalence of Childhood and Adult Obesity in the United States, 2011-2012 (NHANES)

	% (95% CI)				
	≥20 y				
	Crude	Age Adjusted[b]	20-39 y	40-59 y	≥60 y
Overweight or Obese (BMI ≥25)					
All race/Hispanic origin groups[c]					
All	69.0 (65.4-72.3)	68.5 (65.2-71.6)	60.3 (54.2-66.0)	75.3 (72.1-78.2)	71.6 (67.0-75.8)
Men	71.6 (68.0-75.0)	71.3 (68.2-74.2)	62.0 (56.2-67.5)	79.1 (74.8-82.8)	74.7 (70.0-78.9)
Women	66.5 (62.5-70.2)	65.8 (62.0-69.5)	58.5 (51.4-65.2)	71.7 (66.2-76.6)	69.1 (63.2-74.5)
Obese (All Grades, BMI ≥30)					
All race/Hispanic origin groups[c]					
All	35.1 (32.3-38.1)	34.9 (32.0-37.9)	30.3 (26.6-34.4)	39.5 (36.1-43.0)	35.4 (31.3-39.6)
Men	33.7 (30.9-36.6)	33.5 (30.7-36.5)	29.0 (23.9-34.6)	39.4 (36.0-42.9)	32.0 (27.5-36.9)
Women	36.5 (32.9-40.3)	36.1 (32.6-39.8)	31.8 (28.3-35.5)	39.5 (35.1-44.2)	38.1 (32.2-44.5)
Obese Grade 3 (BMI ≥40)					
All race/Hispanic origin groups[c]					
All	6.4 (5.2-7.7)	6.4 (5.2-7.7)	5.6 (4.4-7.1)	7.7 (6.2-9.4)	5.6 (3.8-8.0)
Men	4.4 (2.7-7.0)	4.4 (2.8-6.8)	3.5 (2.4-5.2)	5.4 (3.1-9.2)	4.1 (1.8-8.8)[e]
Women	8.3 (7.0-9.8)	8.3 (6.9-9.8)	7.7 (6.1-9.7)	9.8 (8.3-11.6)	6.8 (4.8-9.4)

JAMA 2014 Volume 311, Number 8

Prevalence of Childhood and Adult Obesity in the United States, 2011-2012 (NHANES)

Table 6. Unadjusted Tests of Linear Trends of High Weight for Length[a] and Obesity[b,c] by Age, United States, 2003-2012[d]

	% (95% CI)					Change 2003-2004 to 2011-2012, Point (95% CI)[e]	*P* Value[f]
	2003-2004	2005-2006	2007-2008	2009-2010	2011-2012		
Adult obesity, ≥20 y							
≥20	32.2 (29.7 to 34.8)	34.3 (31.5 to 37.3)	33.7 (31.5 to 36.1)	35.7 (33.8 to 37.7)	34.9 (32 to 37.9)	2.8 (−0.8 to 6.4)	.09
20-39	28.5 (25.3 to 31.9)	29.1 (25 to 33.7)	30.7 (26.6 to 35.1)	32.6 (29 to 36.4)	30.3 (26.6 to 34.4)	1.9 (−2.8 to 6.6)	.20
40-59	36.8 (33 to 40.8)	40.4 (36.1 to 44.7)	36.2 (32.8 to 39.8)	36.6 (34.5 to 38.7)	39.5 (36.1 to 43)	2.7 (−2.1 to 7.5)	.78
≥60	31.0 (28.2 to 33.9)	33.4 (31.1 to 35.9)	35.1 (32.9 to 37.3)	39.7 (36.6 to 42.9)	35.4 (31.3 to 39.6)	4.4 (−0.3 to 9.1)	.004

JAMA 2014 Volume 311, Number 8

Questions

Peut-on définir l'obésité selon les mêmes critères que chez l'adulte jeune ?

Faut-il tenir compte des modifications de la composition corporelle avec l'âge ?

L'obésité est-elle un facteur de risque de morbi-mortalité chez le sujet âgé ?

Faut-il ou non prendre en charge l'obésité chez le sujet âgé et de quelle façon ?

D. Quilliot et al. / Nutrition clinique et métabolisme 27 (2013) 95–101

Obesity in the elderly : adverse outcomes

Smaller global and regional grey matter volume
Cognitive impairment (if central obesity and/or metabolic abnormalities)
Poorer performance on neuropsychological tests
Impaired iron status and immune response
Decline in renal function
Poorer physical health
Poorer quality of life
Reduced falls efficacy
Lower resting oxygen saturation
Knee cartilage loss
Insulin resistance
Increased functional pain
Obstructive sleep apnea
Mobility limitations
Increased morbidity and mortality in general surgery…

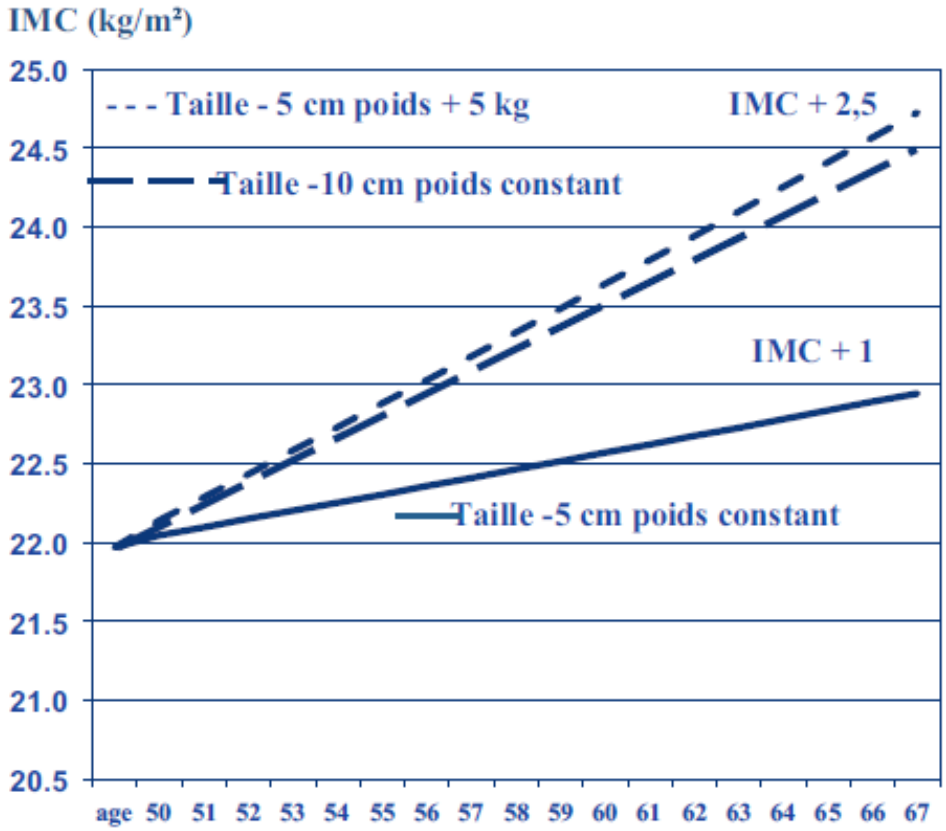
Woo J. Curr Opin Clin Nutr Metab Care 2014

Vieillissement : impact des modifications de la taille sur l'IMC

Effets des tassements des disques vertébraux et cypho-scoliose

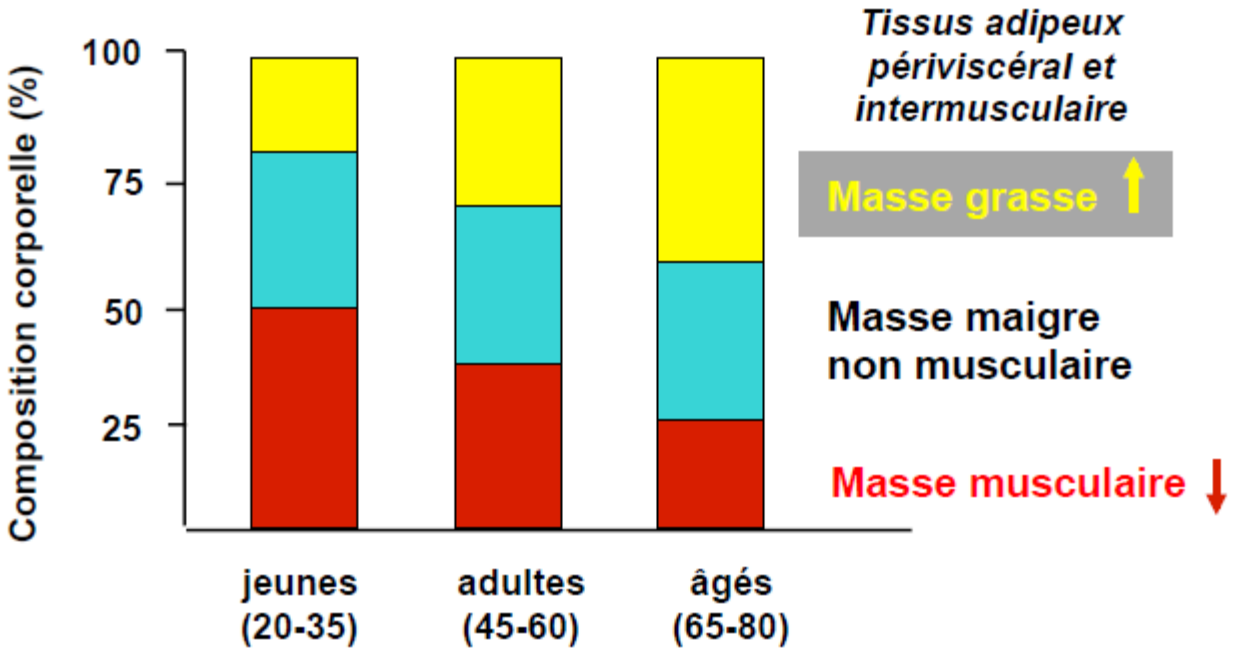
La taille diminue entre 30 et 70 ans
De - 3 cm chez l'homme
De - 5 cm chez la femme
à 80 ans
De - 5 cm chez l'homme
De - 8 cm chez la femme

↗ IMC
+ 1,5 hommes
+ 2,5 femmes



D. Quilliot et al. / Nutrition clinique et métabolisme 27 (2013) 95–101

Évolution de la composition corporelle



Entre 20 et 70 ans ↗ masse grasse

de 18-25% à 35-40% chez les femmes

de 13-18% à 30-35% chez les hommes

Cohn SH, 1980
Flynn MA, 1989

Age-related changes in total and regional fat distribution

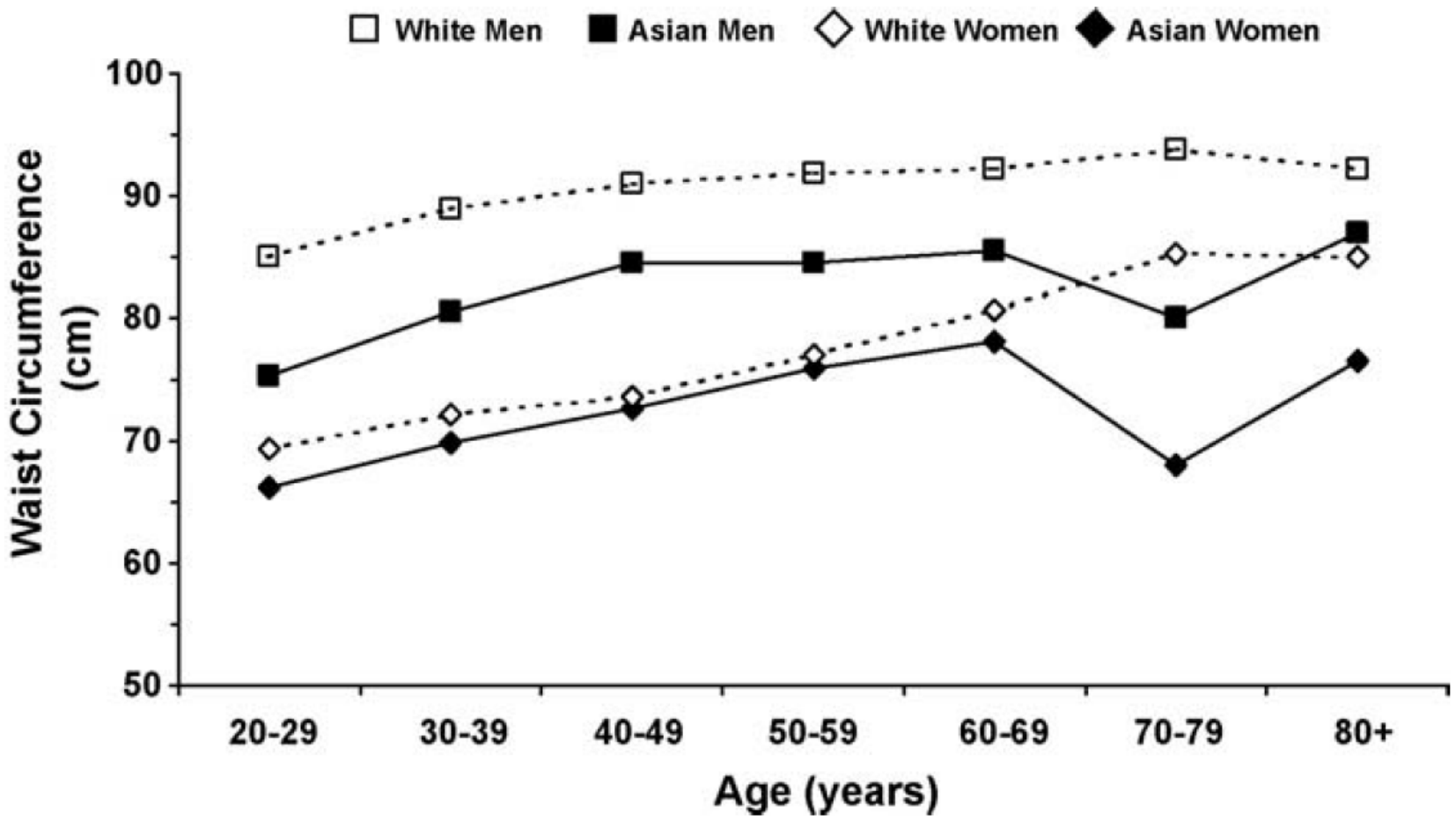


Fig. 1. Mean waist circumference reported in longitudinal and cross-sectional studies by age in White and Asian Men and Women.

Kuk JL et al. Ageing Research Reviews 8 (2009) 339–348

Age-related changes in total and regional fat distribution

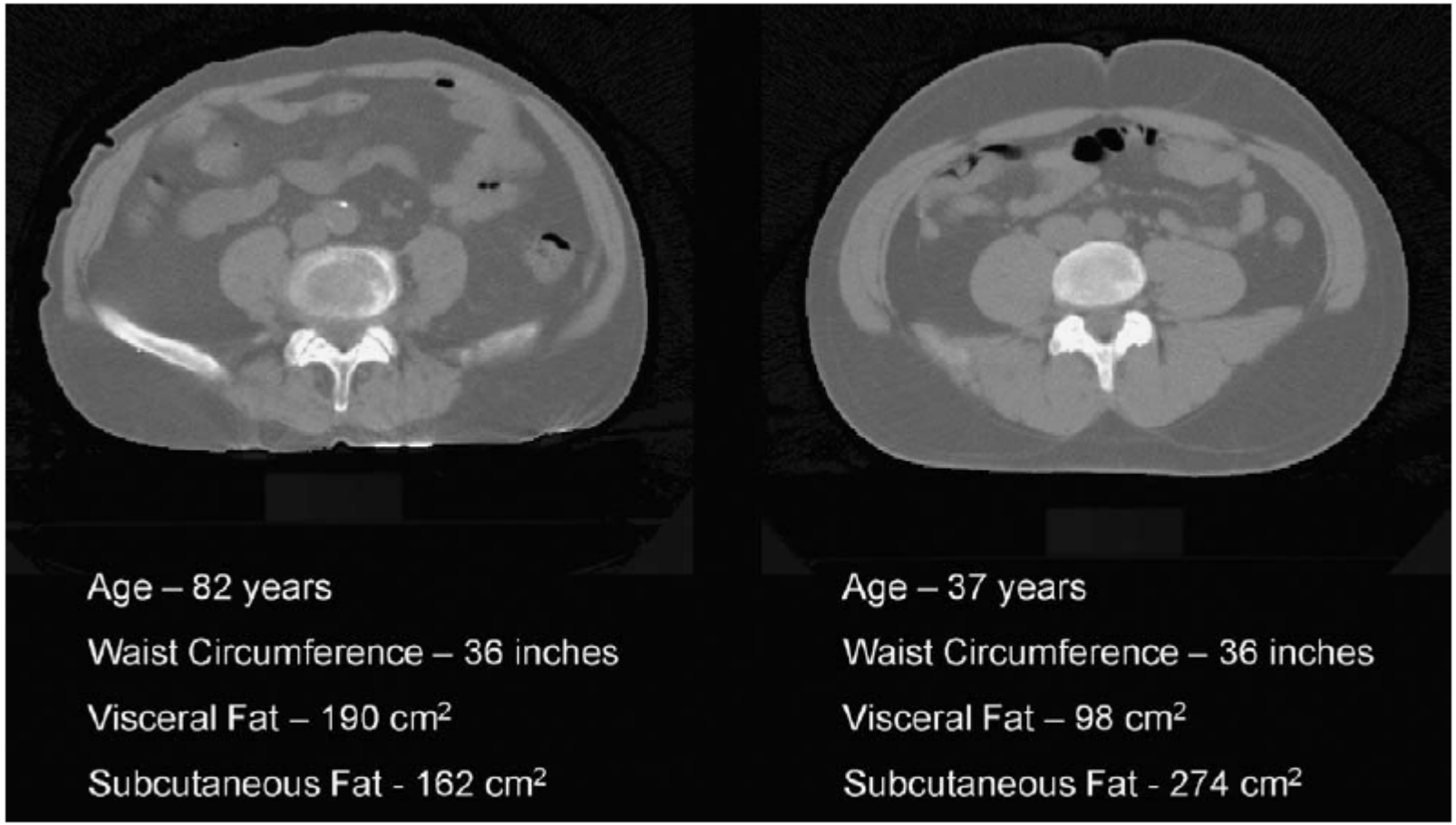


Fig. 2. Differences in abdominal fat distribution in a young and older man with the same waist circumference.

Kuk JL et al. Ageing Research Reviews 8 (2009) 339–348

Age-related changes in total and regional fat distribution

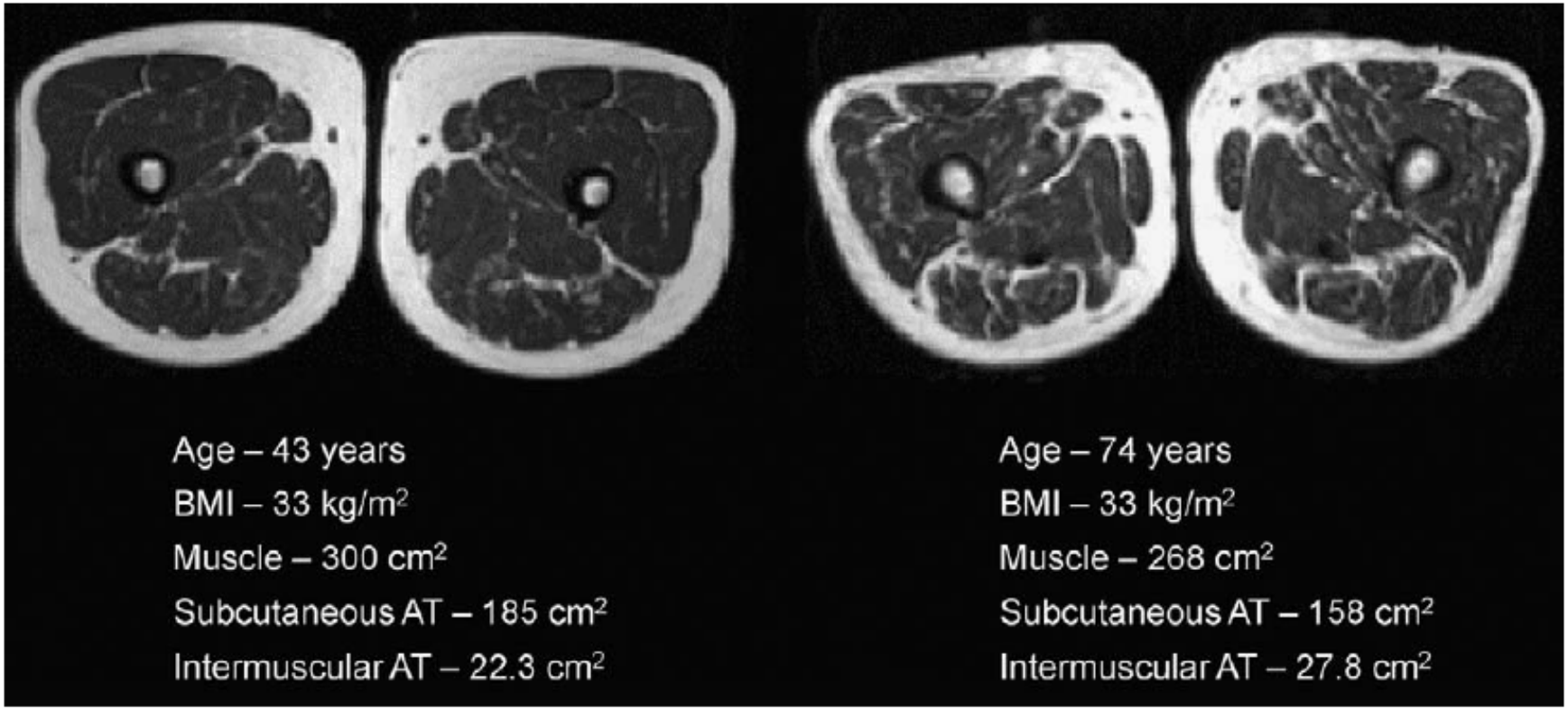


Fig. 3. Differences in thigh tissue composition in a young and old man with the same BMI.

Kuk JL et al. Ageing Research Reviews 8 (2009) 339–348

Changing distributions of body size and adiposity with age

> 110 000 individus Angleterre - Ecosse

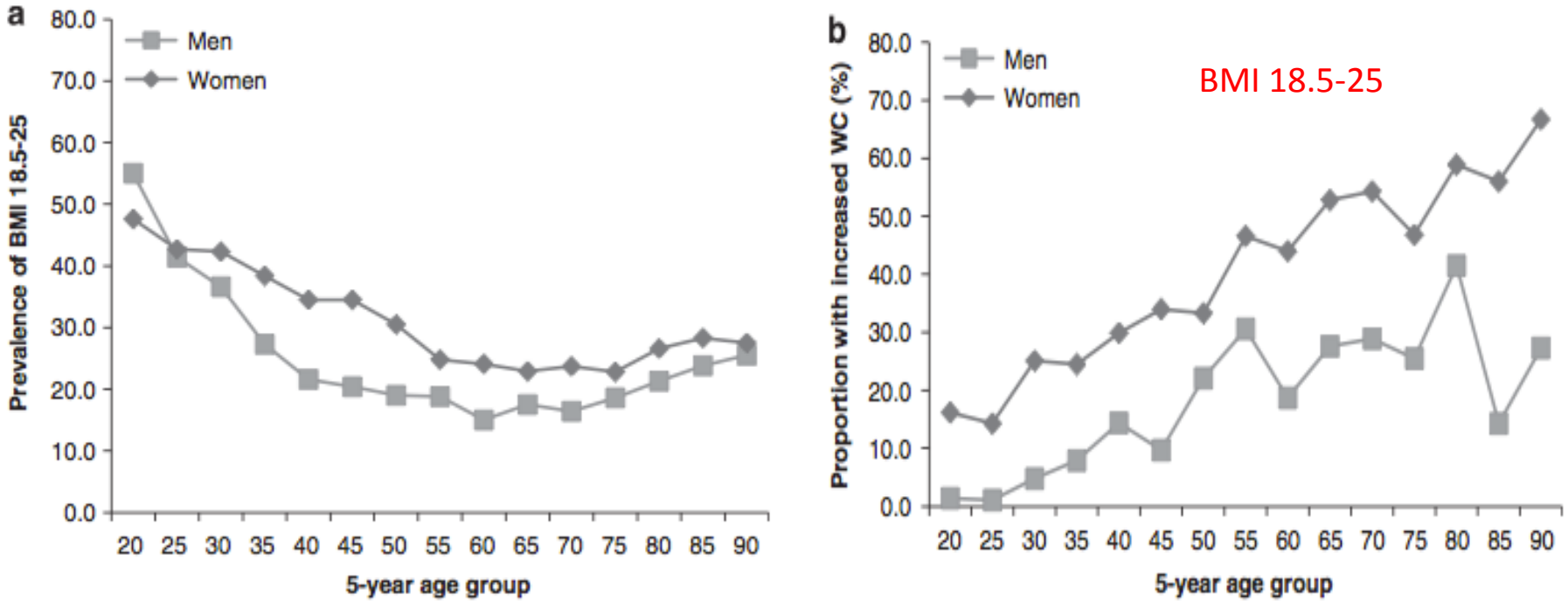


Figure 5. Prevalence by age of elevated WC (>80 cm for women, >94 cm for men) among individuals with BMI within the range 18.5–25 kg m^{-2} in 2008–10. Data for Scotland and England combined. (**a**) Prevalence of 'normal' BMI (18.5–25). (**b**) Proportion of participants with elevated WC[18] within this 'normal'-weight BMI with age. Data are presented combined for the two countries but split by sex.

Vlassopoulos A et al. J Int Obes 2014; 38:857-64

Sarcopenic obesity

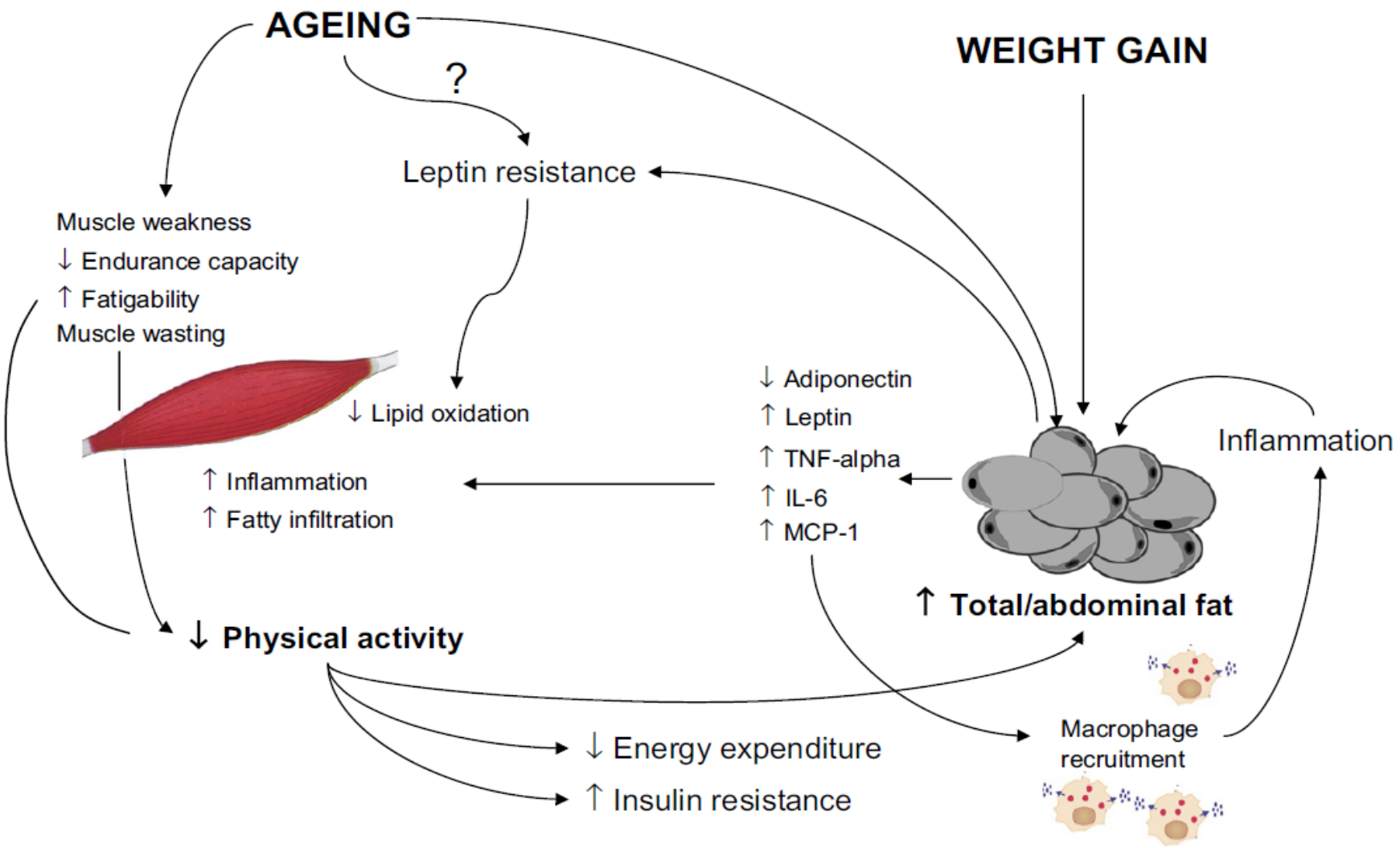
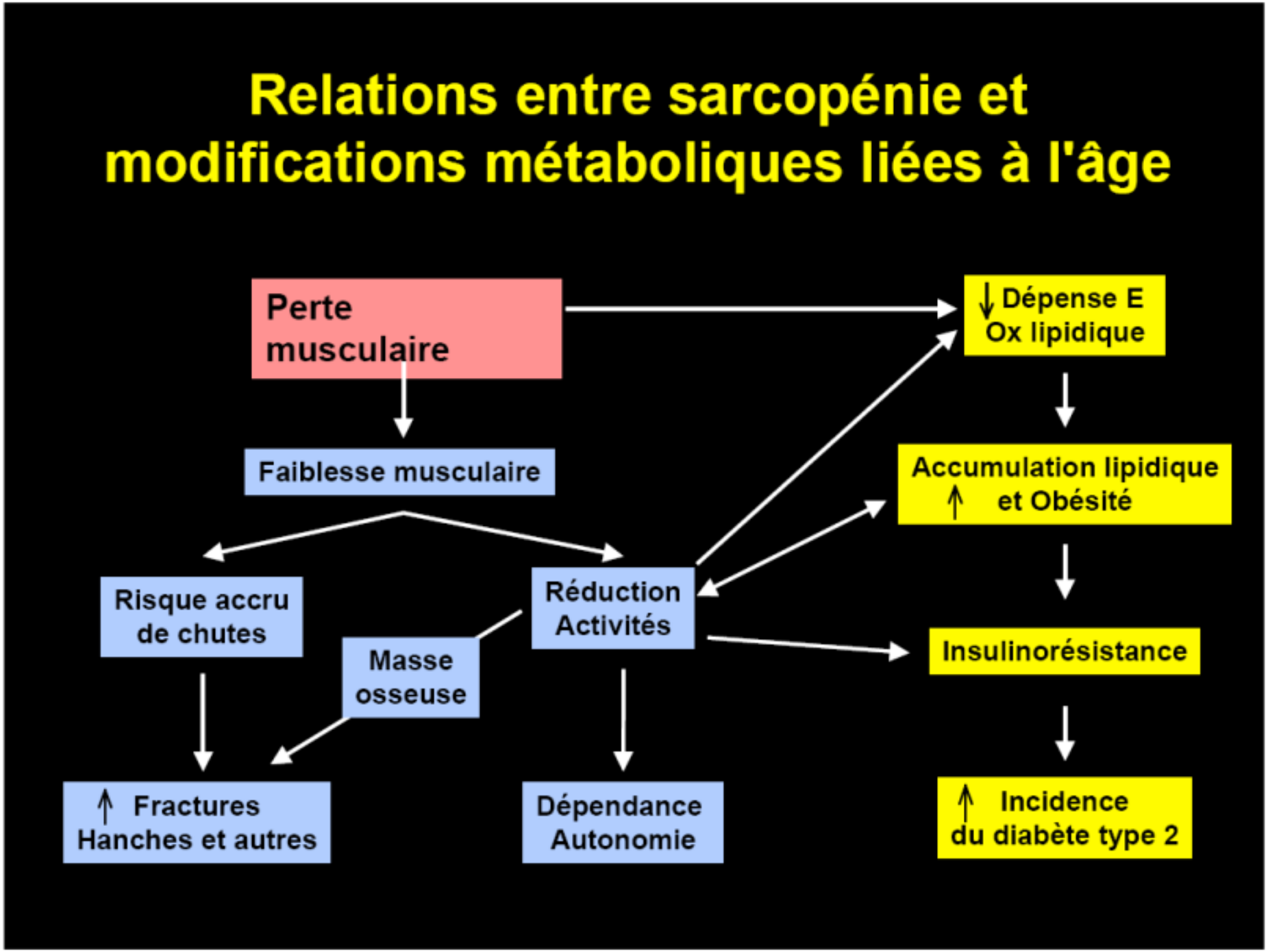
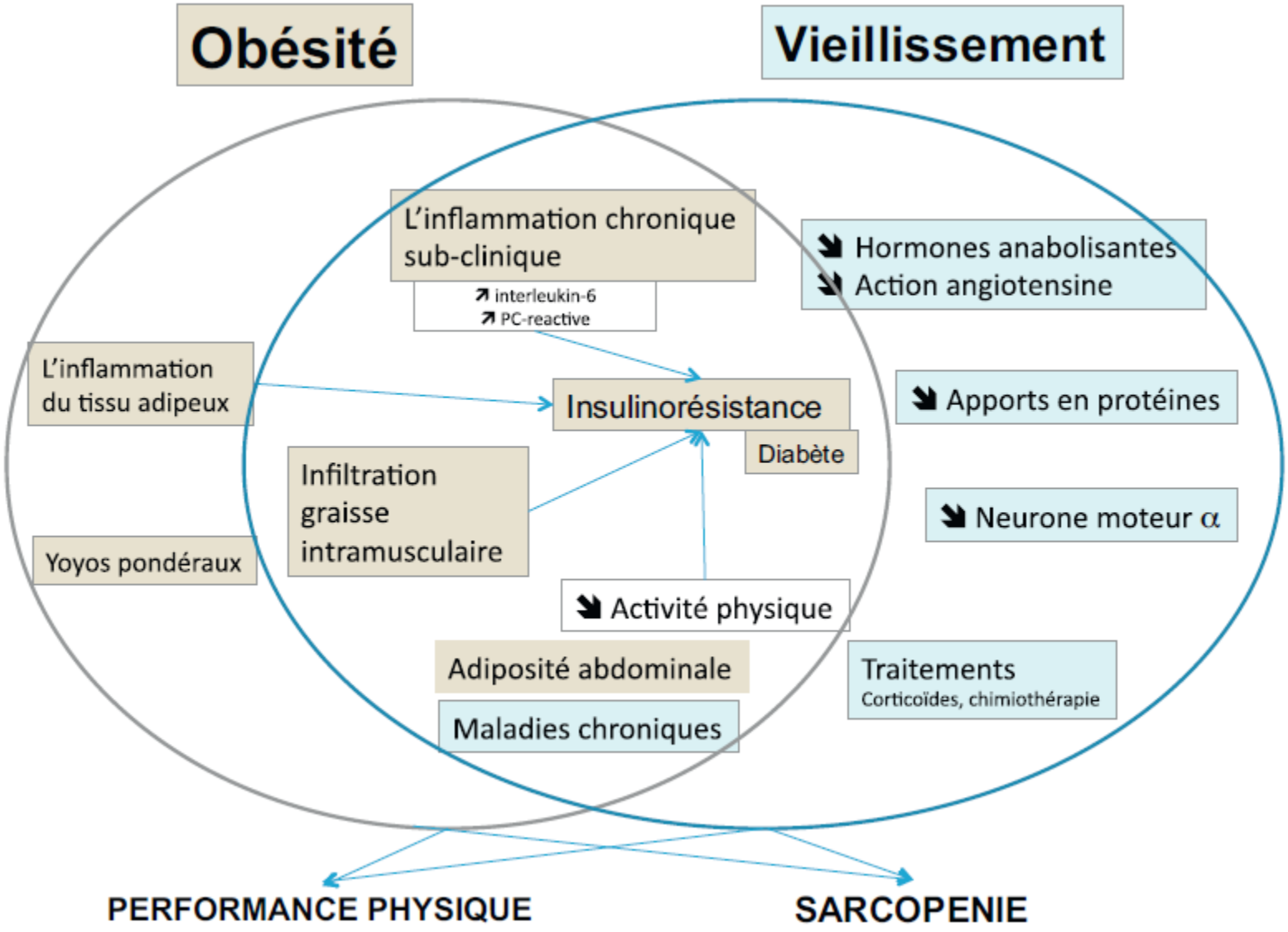


Figure 2 Inter-relationships between adipose tissue and muscle. A mechanism leading to sarcopenic obesity.

Zamboni M et al. Nutr Metab Cardiovasc Dis 2008

Relations entre sarcopénie et modifications métaboliques liées à l'âge





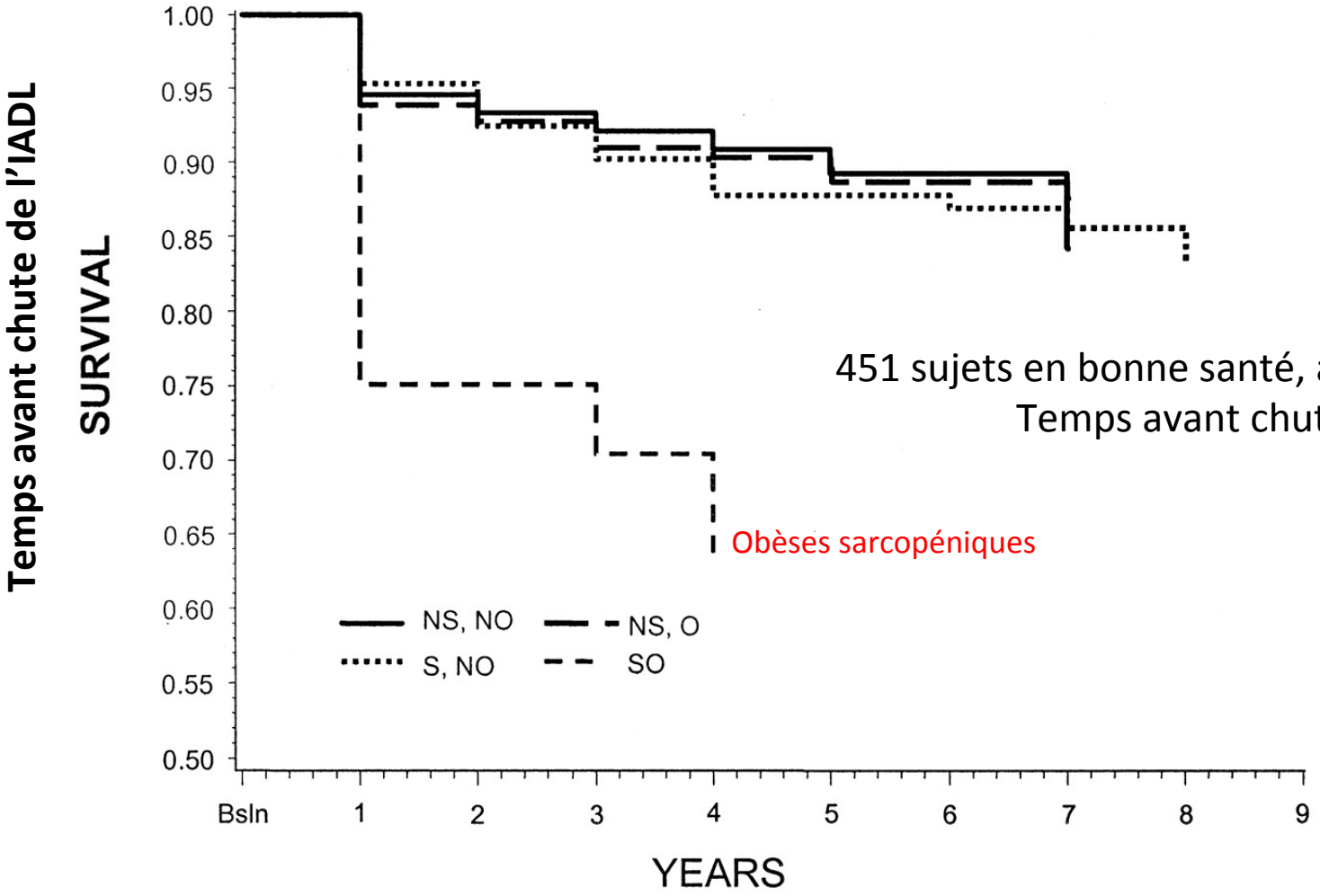
D. Quilliot et al. / Nutrition clinique et métabolisme 27 (2013) 95–101

Incapacités, chutes, troubles de la marche et sarcopénie

Caractéristiques	Obèses	Sarcopéniques	Obèses Sarcopéniques
Risque d'incapacités	+	++	+++
Chutes	+	++	+++
Troubles marche et équilibre	+	++	+++

Risque x 8

Obésité sarcopénique



451 sujets en bonne santé, autonomes
Temps avant chute de l'IADL

Obèses sarcopéniques

Baumgartner RN *et al.* Obes Res 2004

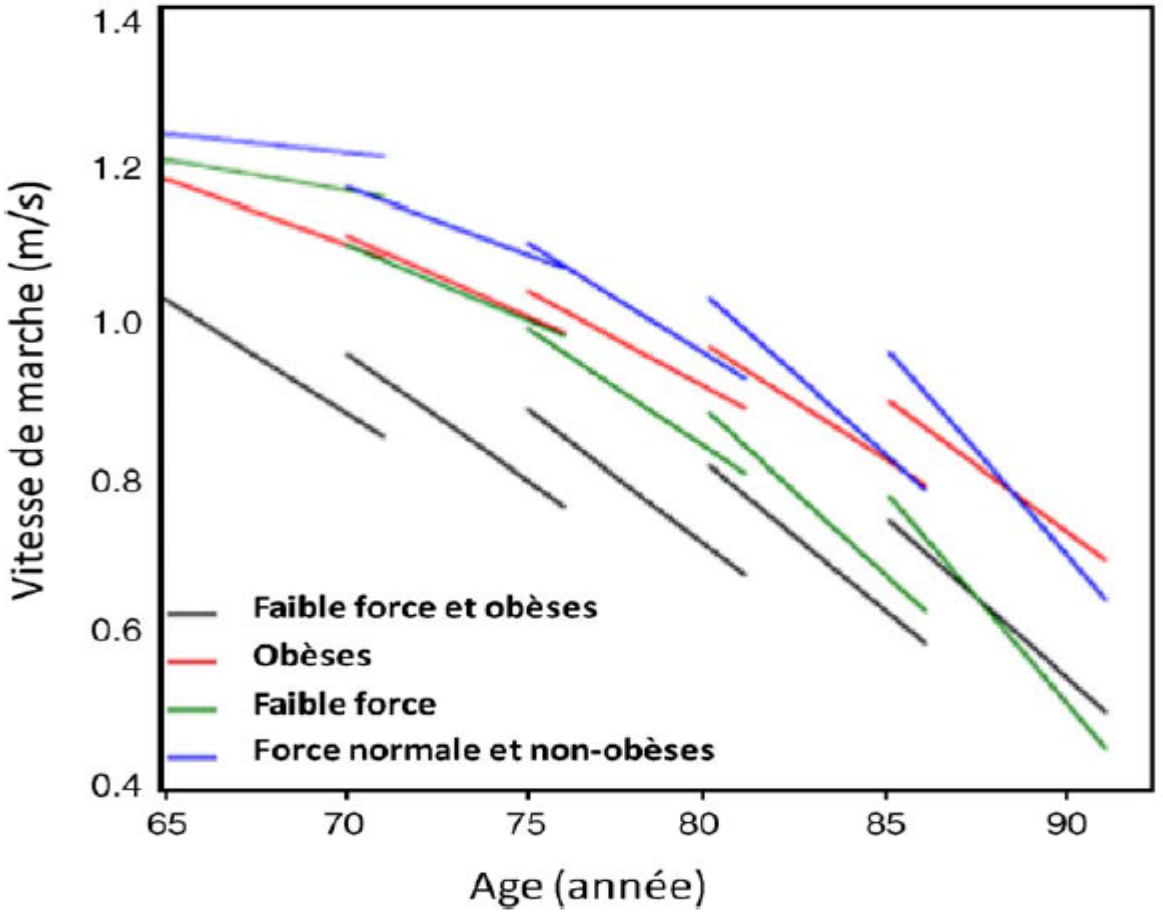
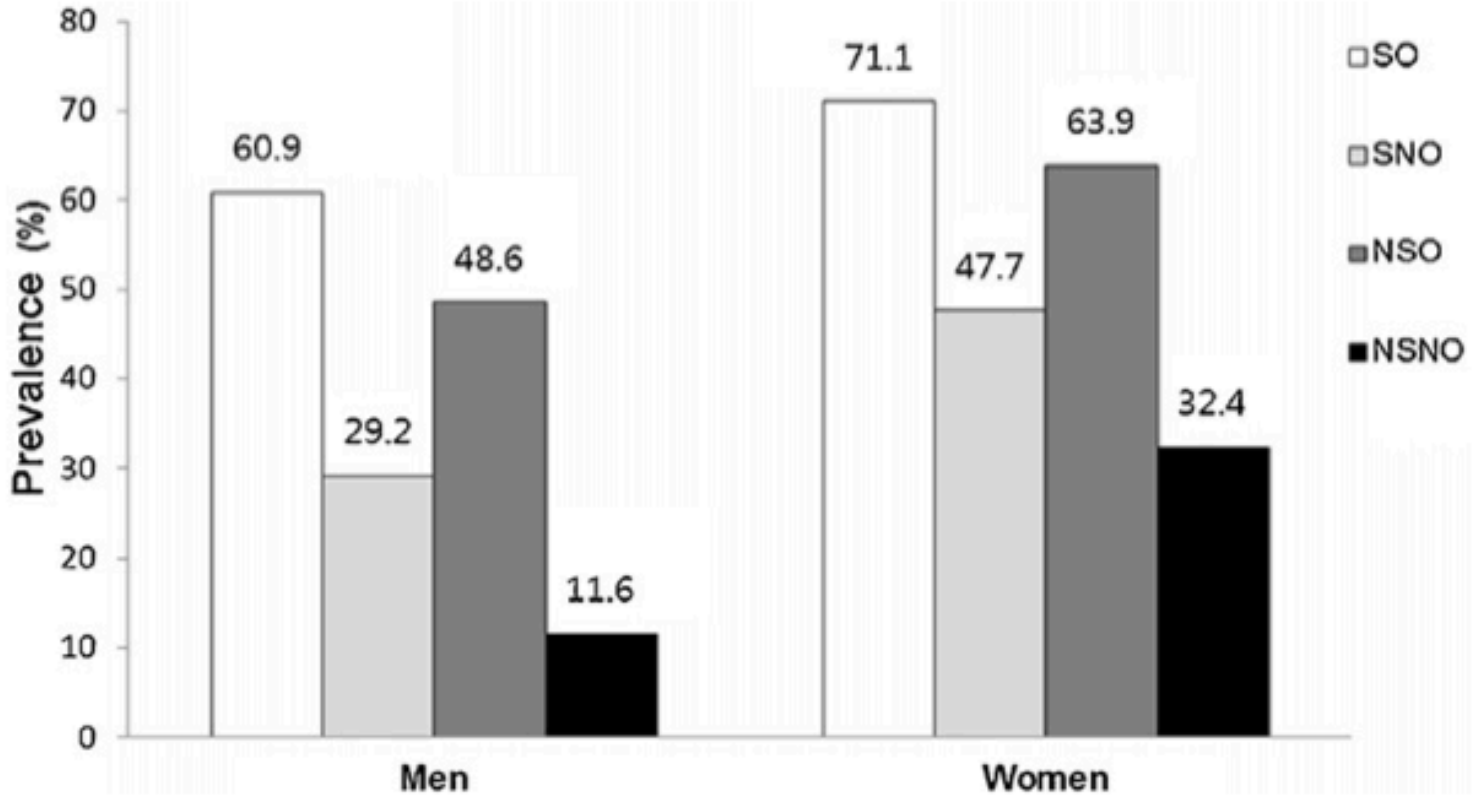


Fig. 2. Évolution de la vitesse de marche sur une période de six ans chez des personnes âgées de 65 à 85 ans séparées en fonction de la force musculaire et de l'obésité. Chaque ligne représente la variation de la vitesse de marche sur six ans dans différentes catégories d'âge. L'obésité est définie par un IMC > 30 kg/m^2. La force des muscles extenseurs du genou est mesurée à l'aide d'un dynamomètre. En dessous de 17 kg pour les hommes et 11 kg chez les femmes, les individus sont considérés comme ayant une faible force musculaire.
D'après Stenholm et al. [33].

Body composition and its association with cardiometabolic risk factors in the elderly: A focus on sarcopenic obesity

2943 subjects aged 60 years or older from Korean National Health Examination and Nutrition Survey
Prevalence of sarcopenic obesity = 18.4% in men and 25.8% in women



Prevalence of metabolic syndrome according to body composition in elderly (p<0,001)

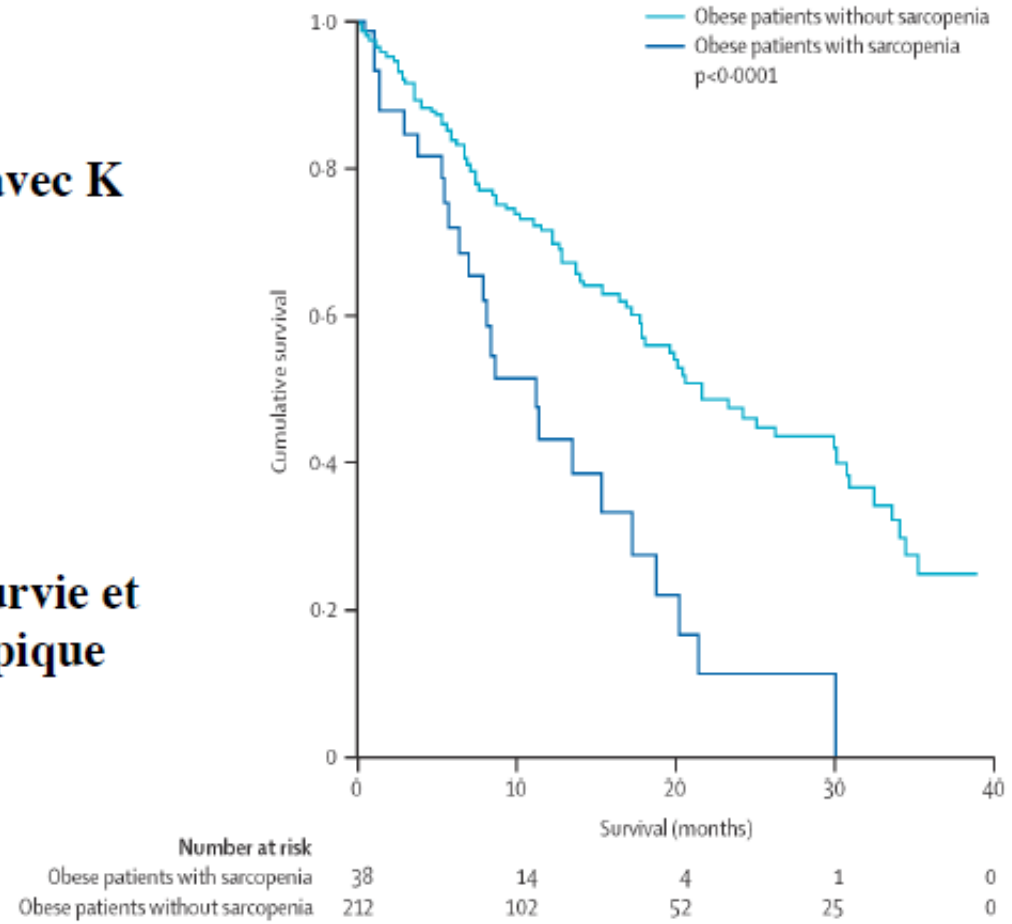
The sarcopenic obese group was more closely associated with insulin resistance, metabolic syndrome, and cardiovascular disease (CVD) risk factors than any other group in this elderly population.

Chung JY et al. Arch Gerontol Geriatr 2013;56:270-278

L'obésité sarcopénique conditionne la survie chez des patients cancéreux

- **325 patients obèses avec K poumon ou GI**
- **64 ans, IMC 34,3**
- **15% sarcopéniques (CT scan - L3)**
- **conséquences sur :**

  statut fonctionnel, survie et toxicité chimiothérapique

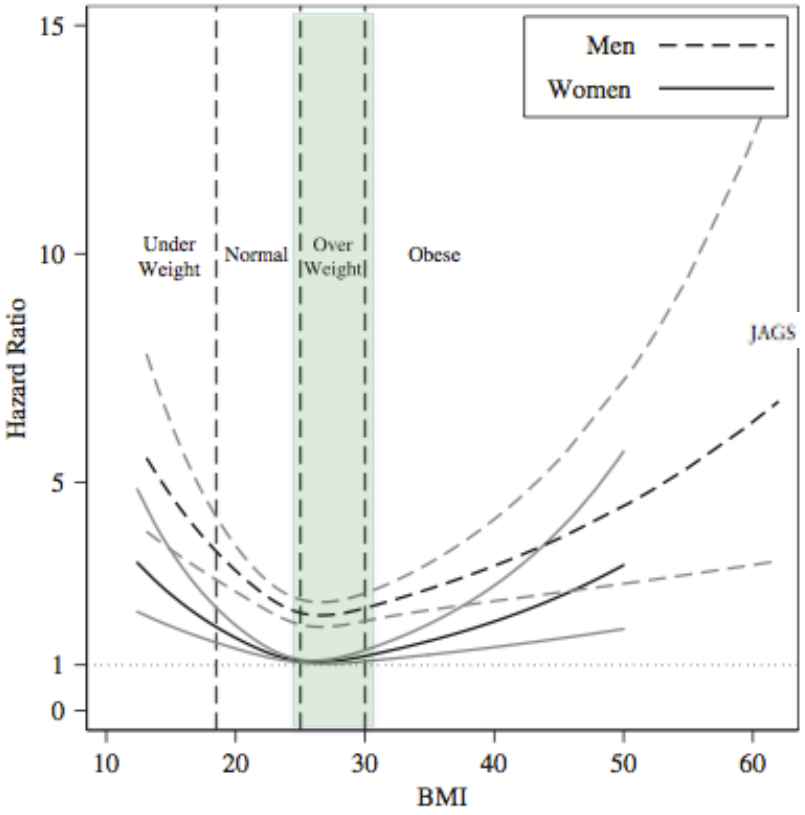


Prado CCM, Lancet Oncol 2008

Body Mass Index and Survival in Men and Women Aged 70 to 75

The Health in Men Study and the Australian Longitudinal Study of Women's Health

Adults aged 70 to 75, 4,677 men and 4,563 women recruited in 1996 and followed for up to 10 years



JAGS 58:234–241, 2010

Figure 1. Hazard ratios of all-cause mortality according to body mass index (BMI) in men and women aged 70 to 75 (lines are 95% confidence intervals).

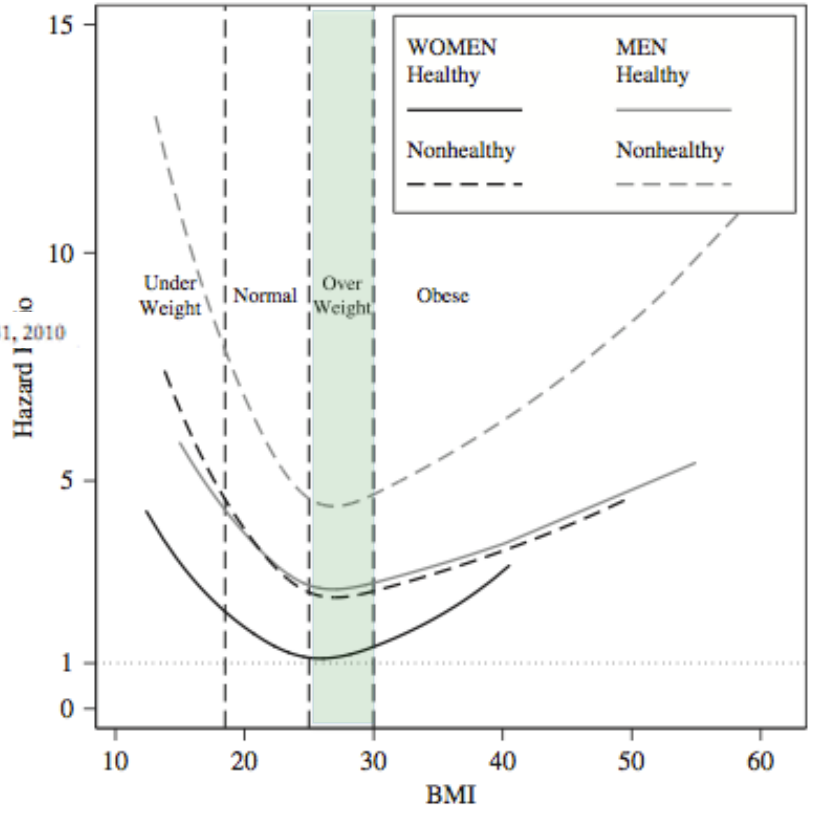


Figure 2. Hazard ratios of all-cause mortality according to body mass index (BMI) in healthy and nonhealthy men and women aged 70 to 75.

Flicker L et al. JAGS 2010;58:234-241

Body Mass Index and Survival in Men and Women Aged 70 to 75

The Health in Men Study and the Australian Longitudinal Study of Women's Health

Adults aged 70 to 75, 4,677 men and 4,563 women recruited in 1996 and followed for up to 10 years

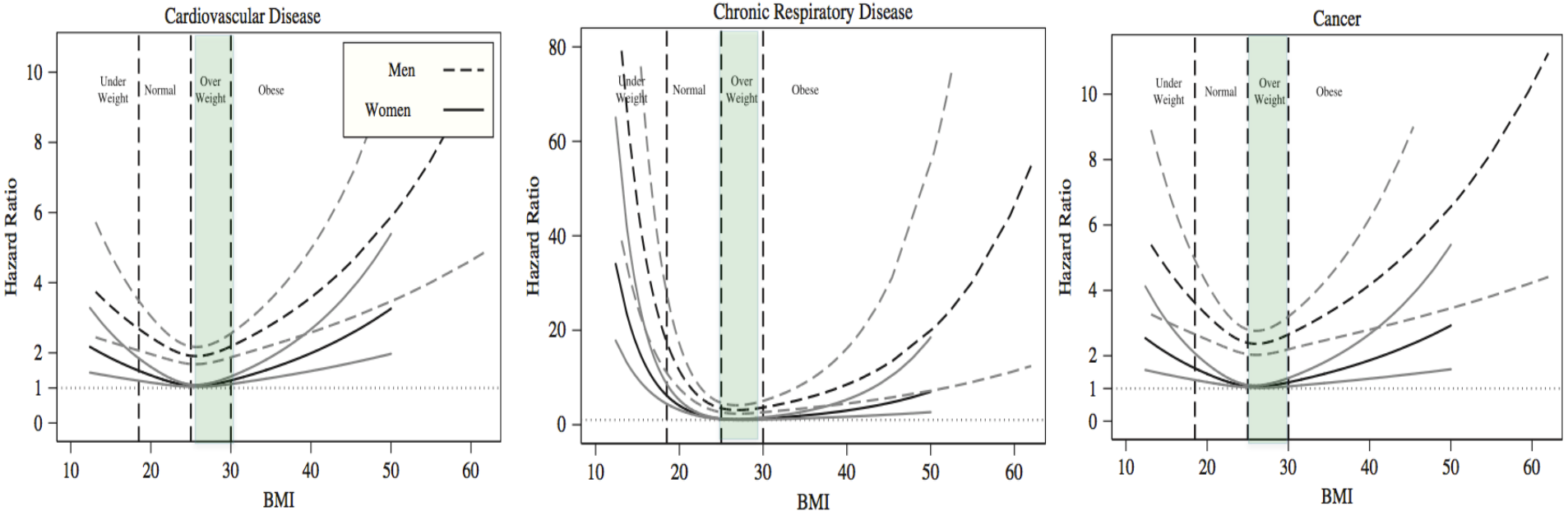


Figure 3. Hazard ratios of cause-specific mortality (cardiovascular, cancer, and chronic respiratory) according to body mass index (BMI) in men and women aged 70 to 75.

Flicker L et al. JAGS 2010;58:234-241

Body Mass Index and Survival in Men and Women Aged 70 to 75

The Health in Men Study and the Australian Longitudinal Study of Women's Health

Adults aged 70 to 75, 4,677 men and 4,563 women recruited in 1996 and followed for up to 10 years

Table 2. All-Cause Mortality in Men and Women Aged 70 to 75 According to Body Mass Index (BMI) and Exercise (Sedentary or Nonsedentary) Adjusted for Smoking

	Hazard Ratio (95% Confidence Interval)			
	Sedentary		Nonsedentary	
BMI	Men	Women	Men	Women
Adjusted for smoking				
<18.5 (underweight)	4.15 (3.16–5.45)	3.65 (2.78–4.80)	3.25 (2.50–4.22)	1.76 (1.39–2.22)
18.5–24.9 (normal)	2.36 (2.07–2.70)	2.08 (1.79–2.41)	1.85 (1.66–2.06)	Reference
25.0–29.9 (overweight)	2.03 (1.74–2.37)	1.78 (1.51–2.11)	1.59 (1.39–1.82)	0.86 (0.78–0.94)
≥30.0 (obese)	2.30 (1.92–2.76)	2.03 (1.68–2.44)	1.80 (1.52–2.14)	0.98 (0.85–1.11)

Flicker L et al. JAGS 2010;58:234-241

Waist Circumference and All-Cause Mortality in a Large US Cohort

Methods: We examined the association between WC and mortality among 48 500 men and 56 343 women, 50 years or older, in the Cancer Prevention Study II Nutrition Cohort. A total of 9315 men and 5332 women died between 1997 and the end of follow-up in 2006.

	Waist Circumference, cm									
	Men					Women				
Measure	<90	90 to <100	100 to <110	≥110	*P* Value[a]	<75	75 to <85	85 to <95	95 to <105	≥105	*P* Value[a]
Age at baseline											
<70 y											
Deaths	464	1038	842	508		360	573	560	336	312	
Multivariate RR (95% CI)[b]	1 [Reference]	0.89 (0.80-0.99)	1.04 (0.93-1.17)	1.24 (1.08-1.41)		1 [Reference]	1.04 (0.91-1.19)	1.10 (0.96-1.26)	1.12 (0.97-1.31)	1.75 (1.50-2.05)	
Multivariate- + BMI-adjusted RR (95% CI)[c]	1 [Reference]	0.98 (0.86-1.11)	1.15 (0.98-1.34)	1.24 (1.02-1.51)		1 [Reference]	1.27 (1.10-1.48)	1.53 (1.28-1.82)	1.61 (1.30-2.00)	2.24 (1.75-2.88)	
≥70 y											
Deaths	1005	2617	1922	919		443	809	926	618	395	
Multivariate RR (95% CI)[b]	1 [Reference]	0.99 (0.92-1.07)	1.05 (0.97-1.13)	1.30 (1.18-1.43)	.18	1 [Reference]	0.98 (0.87-1.10)	1.06 (0.95-1.19)	1.19 (1.05-1.35)	1.43 (1.24-1.65)	.12
Multivariate- + BMI-adjusted RR (95% CI)[c]	1 [Reference]	1.20 (1.10-1.30)	1.43 (1.29-1.58)	1.87 (1.64-2.14)	.003	1 [Reference]	1.16 (1.02-1.32)	1.46 (1.26-1.68)	1.75 (1.48-2.06)	2.10 (1.72-2.56)	.44

Jacobs EJ et al. Arch Intern Med 2010;170:1293-1301

BMI and all-cause mortality

Table 2. Summary Hazard Ratios (HRs) of All-Cause Mortality for Overweight and Obesity Relative to Normal Weight From Studies Considered Adequately Adjusted

	Self-reported or Measured Height and Weight		
	No. of HRs	Summary HR (95% CI)	I^2, %
BMI of 25-<30			
All ages	86	0.94 (0.90-0.97)[a]	87.6
Mixed ages	68	0.95 (0.91-0.99)[a]	89.3
Age ≥65 y only	18	0.90 (0.86-0.95)	27.9
BMI of ≥30			
All ages	42	1.21 (1.12-1.31)[a]	89.3
Mixed ages	33	1.26 (1.16-1.37)[a]	89.7
Age ≥65 y only	9	1.05 (0.92-1.21)[a]	63.9
BMI of 30-<35			
All ages	42	0.97 (0.90-1.04)[a]	83.8
Mixed ages	33	0.98 (0.91-1.06)[a]	84.8
Age ≥65 y only	9	0.88 (0.69-1.12)[a]	78.0
BMI of ≥35			
All ages	42	1.34 (1.21-1.47)[a]	81.2
Mixed ages	33	1.35 (1.22-1.50)[a]	82.2
Age ≥65 y only	9	1.28 (0.93-1.76)[a]	75.2

Flegal K et al. JAMA 2013;309:72-81

Body composition and mortality risk in later life

n =921 (Umea, Sweden), âge moyen 72 ans, IMC moyen 25.4 kg/m^2
Suivi moyen 9.2 ans (397 décès)

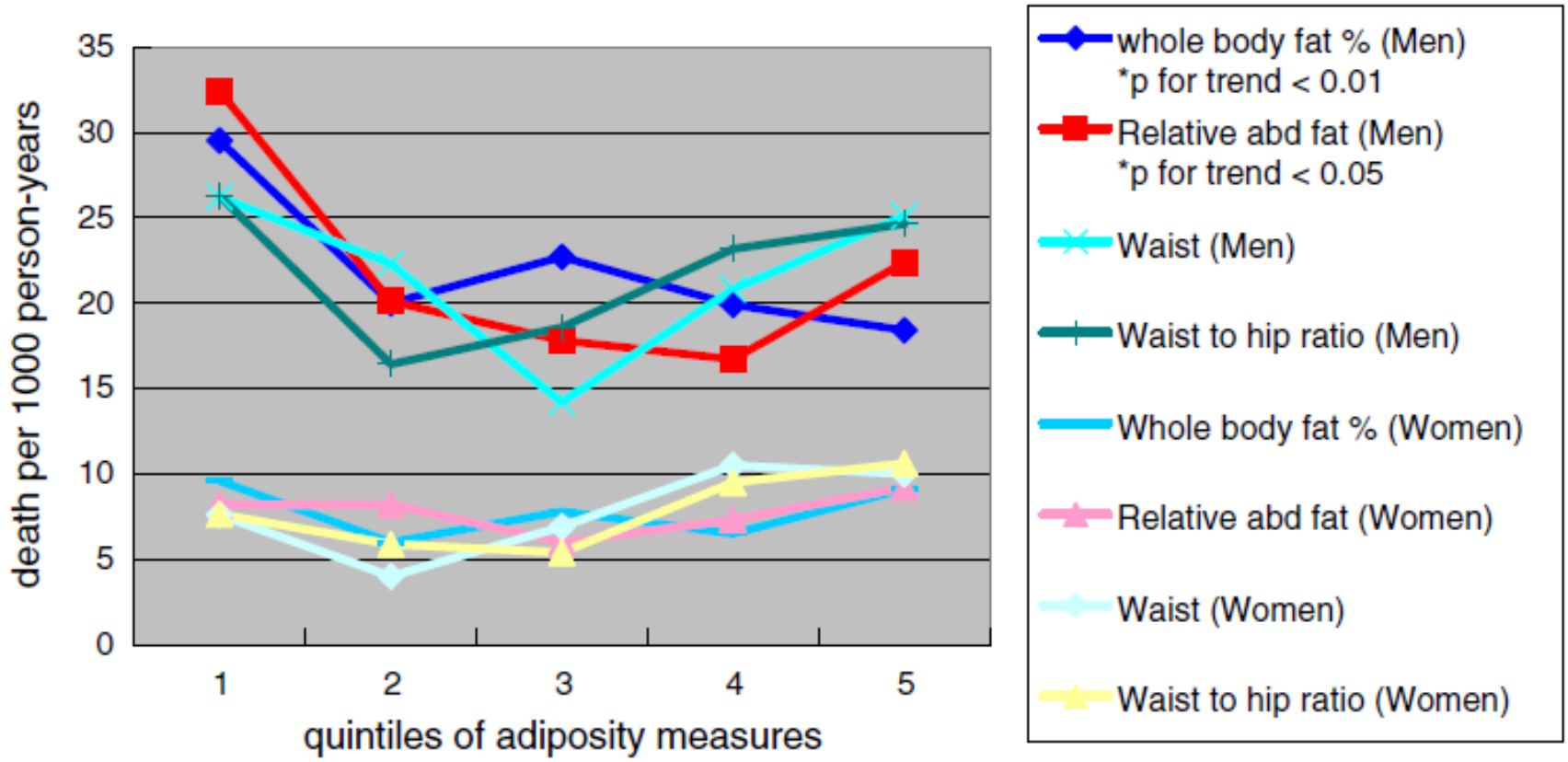
Table 2. Trends and risk of mortality per standard deviation of body composition parameter in women and men

	P for U-shaped trend	HR for linear trend	*P* for linear trend
Women			
Body mass index	0.114	0.84	0.003
Abdominal fat mass	0.018	–	–
Total fat mass	0.179	0.85	0.009
Gynoid fat mass	0.214	0.82	0.001
Abdominal:gynoid fat mass	0.104	1.13	0.044
Lean mass	0.512	0.81	<0.001
Men			
Body mass index	<0.001	–	–
Abdominal fat mass	<0.001	–	–
Total fat mass	<0.001	–	–
Gynoid fat mass	0.002	–	–
Abdominal: gynoid fat mass	0.382	1.01	0.910
Lean mass	0.480	0.69	0.001

Toss F et al. Age and Ageing 2012;41:677-681

Survival benefit of abdominal adiposity: a 6-year follow-up study with Dual X-ray absorptiometry in 3,978 older adults

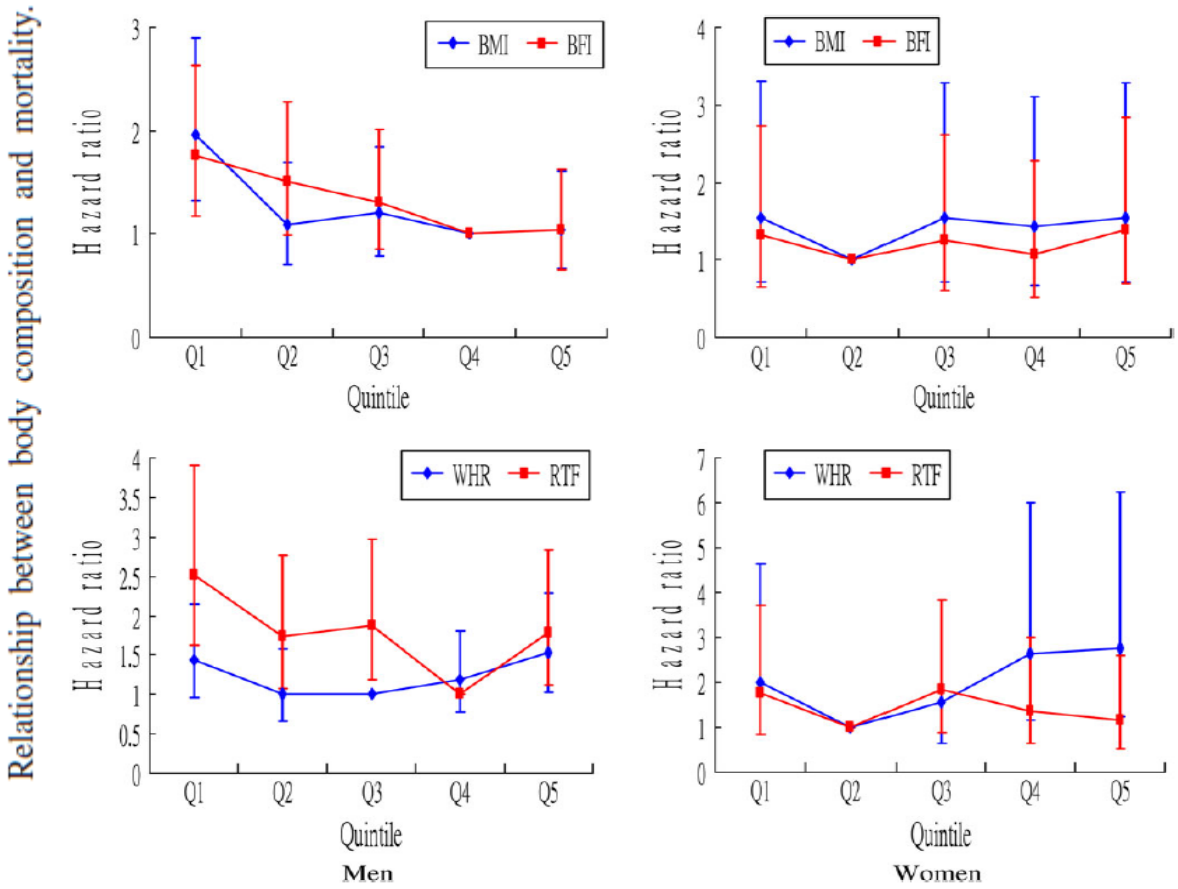
Crude mortality according to quintiles of adiposity measures



Lee JSW et al. Age 2012;34:597-308

Survival in Older Men May Benefit From Being Slightly Overweight and Centrally Obese—A 5-Year Follow-up Study in 4,000 Older Adults Using DXA

Methods. We recruited 2000 men and 2000 women aged 65 years or older. Baseline BMI, waist–hip ratio (WHR), body fat index (BFI = total body fat/height square), relative truncal fat (RTF = trunk fat/total body fat), and body muscle mass index (BMMI = total body muscle mass/height square) were measured. Mortality was ascertained by death registry after 63.3 (median) months.



Auyeung TW et al. J Gerontol A Biol Sci Med Sci 2010; 65A:99-104

Review

A systematic review of body fat distribution and mortality in older people

Su-Hsin Chang*, Tracey S. Beason, Jean M. Hunleth, Graham A. Colditz

A B S T R A C T

We conducted a systematic review investigating body fat distribution in older adults and its association with morbidity and mortality. Our search yielded 2702 citations. Following three levels of screening, 25 studies were selected to evaluate the association between body fat distribution and comorbidity, and 17 studies were used in the mortality analysis. Most of the selected studies in our analyses used anthropometric measures, e.g., body mass index (BMI), waist circumference, and waist–hip ratio; relatively few studies used direct measures, such as body fat/lean mass, and percentage body fat. Studies reported inconsistent findings regarding the strongest predictor(s) of morbidity and mortality. However, the majority of studies suggested that BMI per se was not the most appropriate predictor of morbidity and mortality in the elderly because of its inability to discern or detect age-related body fat redistribution. In addition, studies using BMI found that the optimal BMI range for the lowest mortality in the elderly was overweight ($25\ kg/m^2 \leq BMI < 30\ kg/m^2$) or mildly obese ($30\ kg/m^2 \leq BMI < 35\ kg/m^2$). Our findings suggest that the current clinical guidelines, recommending that overweight and obesity are major risk factors for increased morbidity and mortality are not applicable to this population. Therefore, the central message of this review is to advise the government to establish new guidelines specifically for this population, using a combination of body fat distribution measurements, and to certify that these guidelines will not be applied to inappropriate populations.

Chang SH et al. Maturitas *72 (2012) 175– 191*

Obesity paradox in elderly patients with cardiovascular diseases

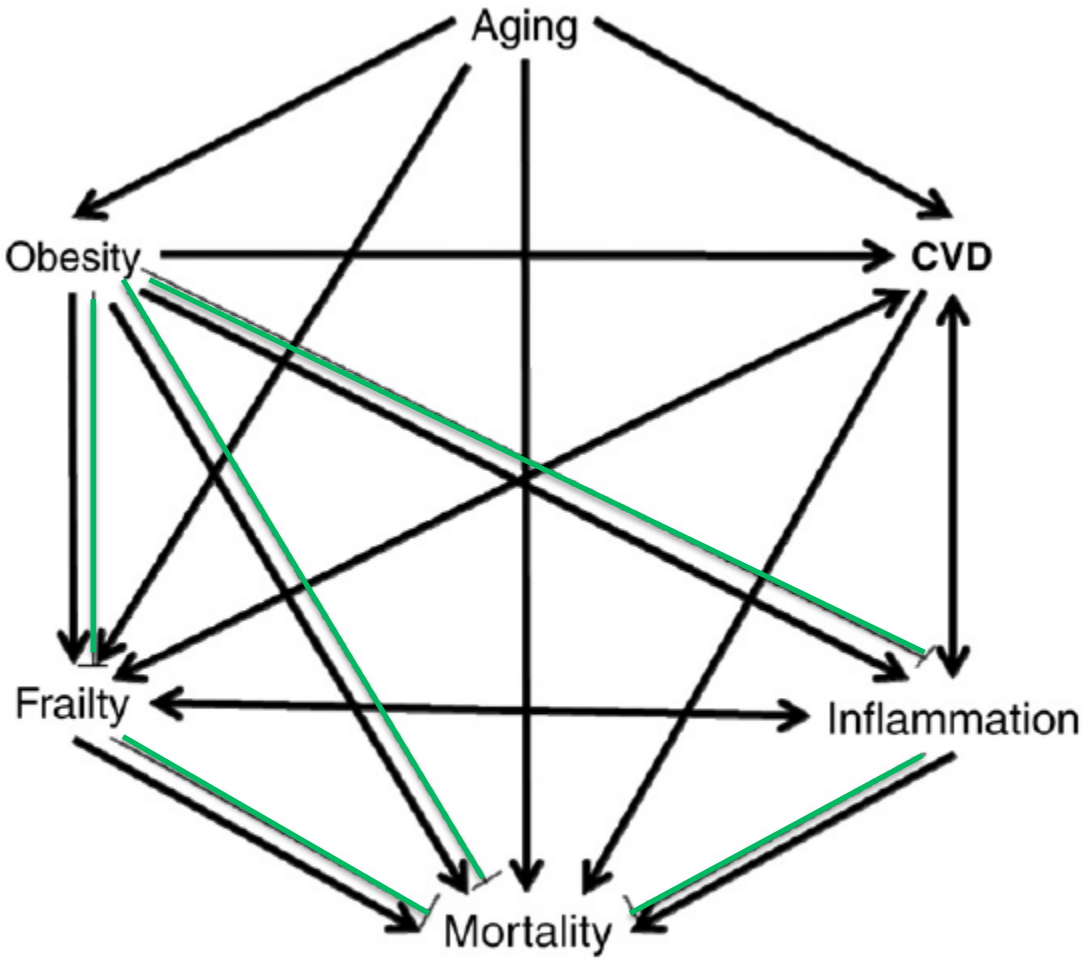


Fig. 1. Association of aging and mortality via obesity, cardiovascular diseases (CVD), frailty, and mortality (bold lines) and discussed antagonizing mechanisms of the obesity paradox (thin lines).

Dorner TE, Rieder A. Int J Cardiol 2012;155:56-65

Obesity and muscle strength as long-term determinants of all-cause mortality—a 33-year follow-up of the Mini-Finland Health Examination Survey

A total of 3594 men and women aged 50–91 years at baseline with 3043 deaths during the follow-up

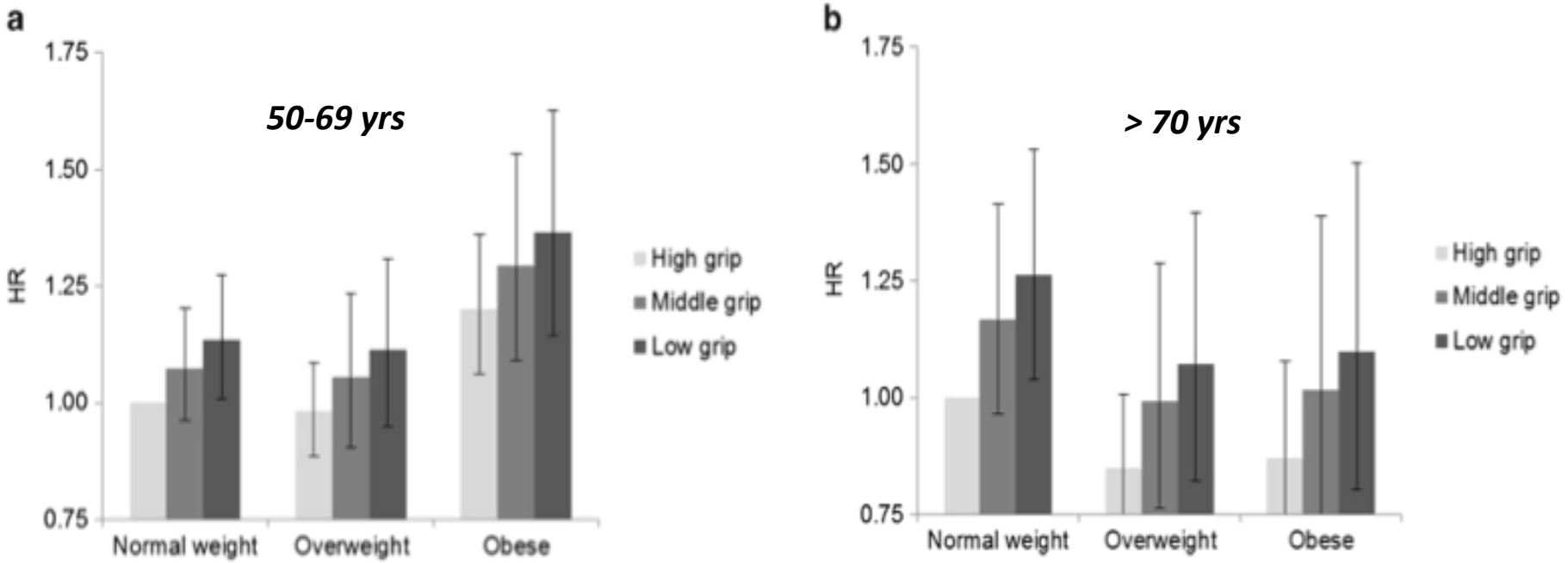
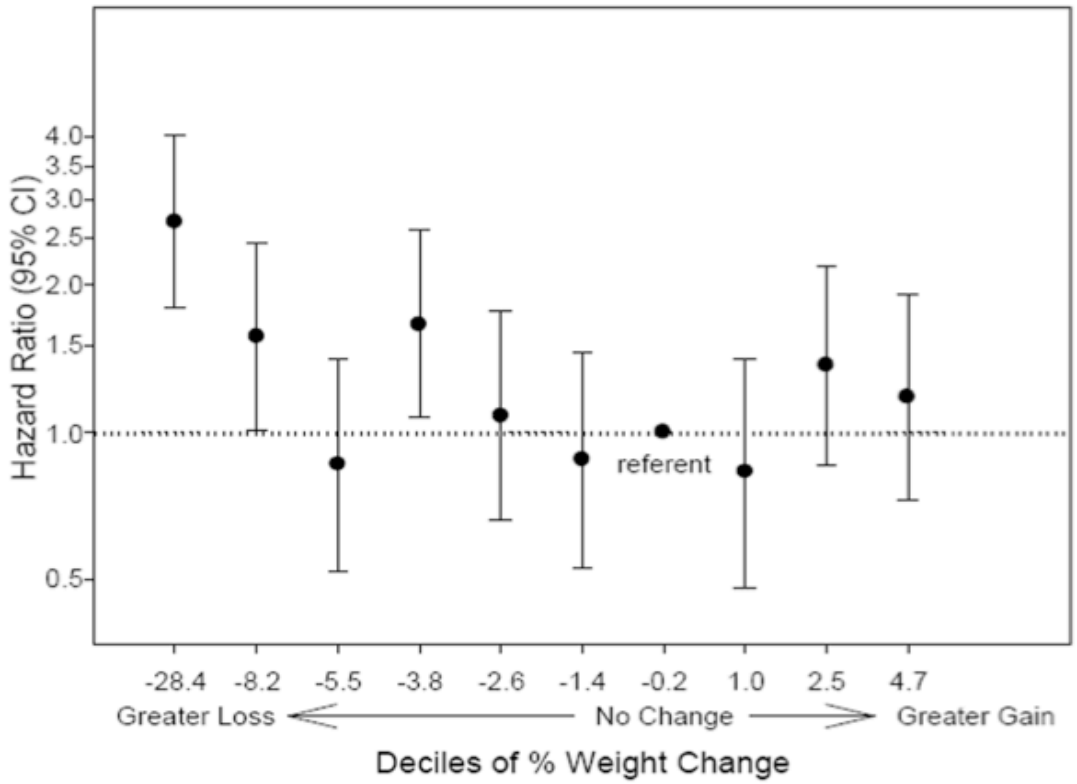


Figure 1. All-cause mortality during 33 years of follow-up according to the combination of Handgrip Strength and Body Mass Index among participants aged (**a**) 50–69 years and (**b**) ⩾70 years. Models adjusted for age, sex, education, smoking, alcohol use and physical activity.

Stenholm S et al. Int J Obes 2014;38:1126-32

Mortality Risk in Older Men Associated with Changes in Weight, Lean Mass and Fat Mass

Six US clinical centers - 4331 ambulatory men aged 65-93 at baseline
Repeated measurements of BW, total lean and total fat mass using DXA 4.6±0.4 yrs apart

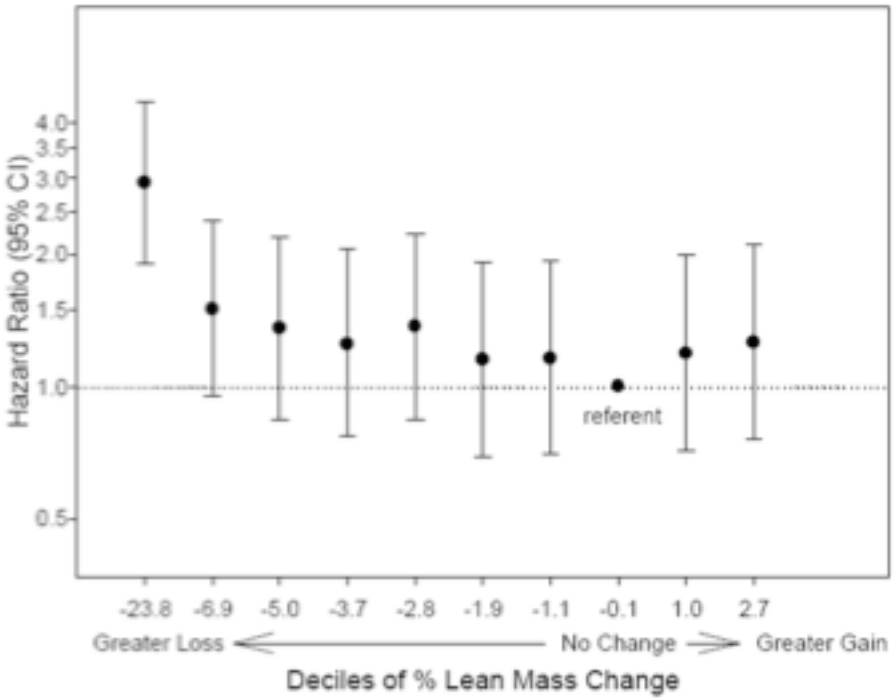


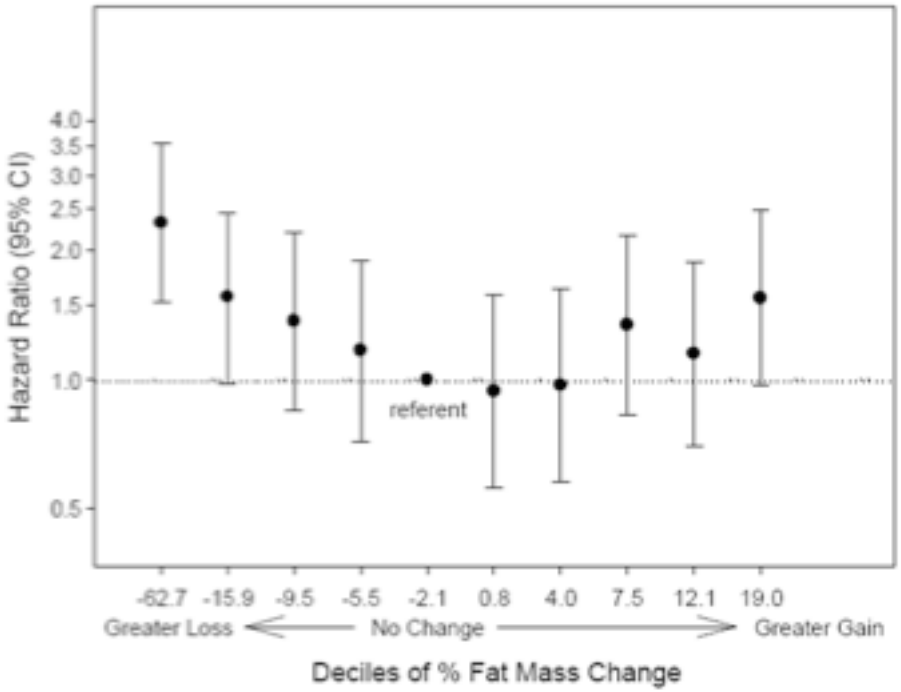
Hazard ratios are adjusted for age, race, clinic site, smoking status, alcohol use, education, physical activity, baseline health status, body mass index, congestive heart failure, chronic obstructive pulmonary disease and diabetes.

Lee CG et al. J Am Geriatr Soc. 2011 February ; 59(2): 233–240.

Mortality Risk in Older Men Associated with Changes in Weight, Lean Mass and Fat Mass

Six US clinical centers - 4331 ambulatory men aged 65-93 at baseline
Repeated measurements of BW, total lean and total fat mass using DXA 4.6±0.4 yrs apart



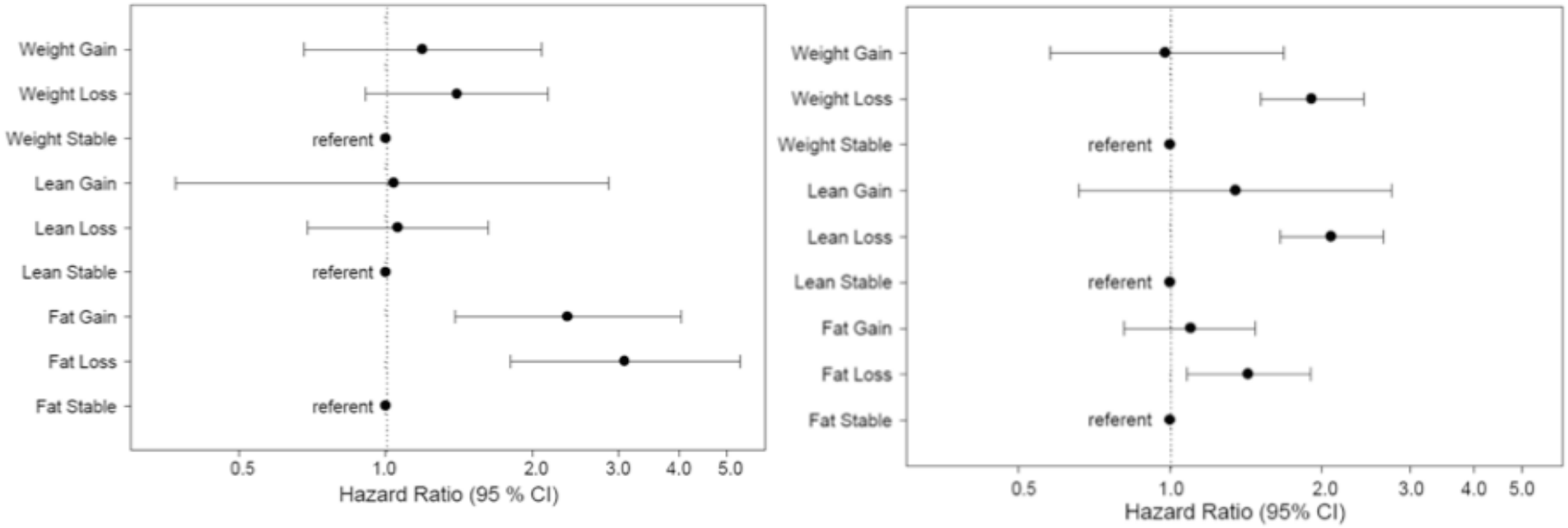


Hazard ratios are adjusted for age, race, clinic site, smoking status, alcohol use, education, physical activity, baseline health status, body mass index, congestive heart failure, chronic obstructive pulmonary disease and diabetes.

Lee CG et al. J Am Geriatr Soc. 2011 February ; 59(2): 233–240.

Mortality Risk in Older Men Associated with Changes in Weight, Lean Mass and Fat Mass

Risk of mortality with categories of body composition change for (a) men with weight- loss intent and for (b) men without weight-loss intent.



Stable is defined by <+5% gain and >-5% loss. Loss is defined by ≥-5% loss. Gain is defined by ≥+5% gain.
Hazard ratios are adjusted for age, race, clinic site, smoking status, alcohol use, education, physical activity, baseline health, body mass index, congestive heart failure, chronic obstructive pulmonary disease and diabetes

Lee CG et al. J Am Geriatr Soc. 2011 February ; 59(2): 233–240.

Body Weight Dynamics and Their Association With Physical Function and Mortality in Older Adults: The Cardiovascular Health Study

Methods. Longitudinal cohort study using prospectively collected data on weight, physical function, and health status in four U.S. Communities in the Cardiovascular Health Study. Included were 3,278 participants (2,013 women and 541 African Americans), aged 65 or older at enrollment, who had at least five weight measurements. Weight was measured at annual clinic visits between 1992 and 1999, and summary measures of mean weight, coefficient of variation, average annual weight change, and episodes of loss and gain (cycling) were calculated. Participants were followed from 1999 to 2006 for activities of daily living (ADL) difficulty, incident mobility limitations, and mortality.

Cite journal as: J Gerontol A Biol Sci Med Sci
2010 Vol. 65A, No. 1, 63–70

Table 2. Summaries of Weight History, 1992–1999

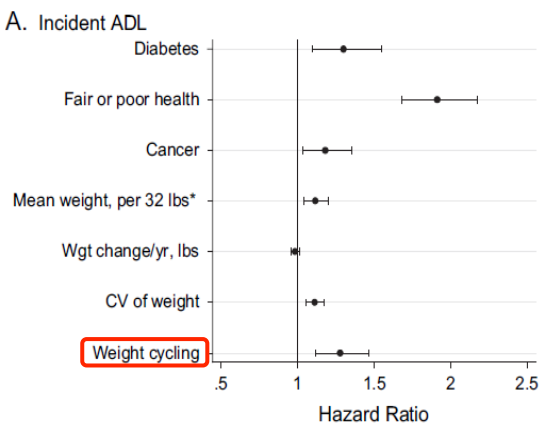
	Women, $N = 2{,}013$	Men, $N = 1{,}265$	All, $N = 3{,}278$
Mean weight, lbs	150 (30.0)	176 (27.4)	160 (31.6)
Weight change, lbs/y	–0.76 (2.22)	–0.68 (2.07)	–0.73 (2.16)
Weight variability, CV	0.038 (0.024)	0.031 (0.020)	0.035 (0.022)
Weight patterns, *N* (%)			
Loss	688 (34.2)	369 (29.2)	1,057 (32.2)
Stable	451 (22.4)	411 (32.5)	862 (26.3)
Gain	391 (19.4)	241 (19.0)	632 (19.3)
Cycling (unstable)	483 (24.0)	244 (19.3)	727 (22.2)

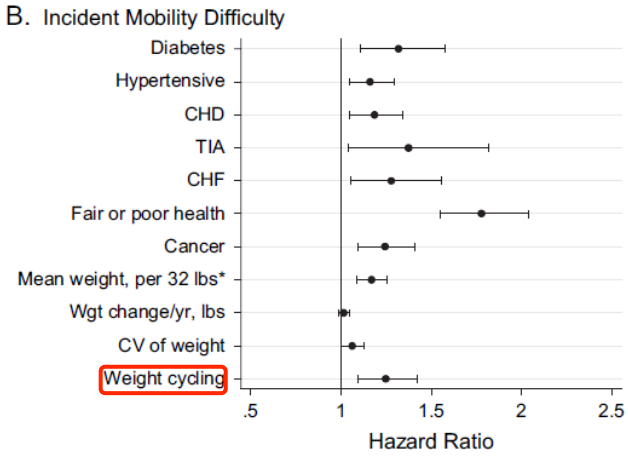
Arnold AM et al. J Gerontol A Biol Sci Med Sci 2010; 65A:63-70

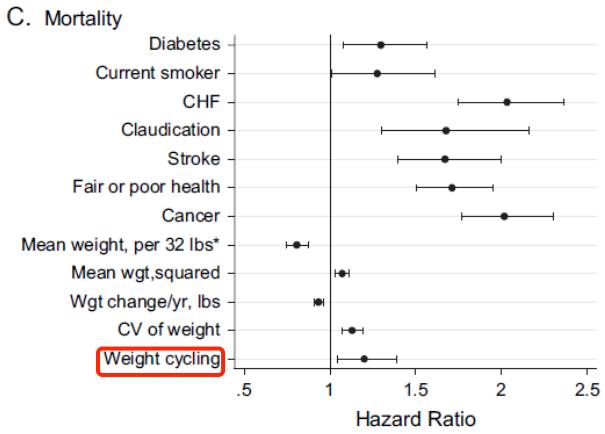
Body Weight Dynamics and Their Association With Physical Function and Mortality in Older Adults: The Cardiovascular Health Study

Table 3. Adjusted* Hazard Ratios of Weight Summaries by Outcome

	Incident ADL†	Incident Mobility Difficulty‡	Mortality§
No. of cases/no. at risk	1,350/2,492	1,537/2,136	1,072/3,278
Model 2. Weight patterns#			
Loss	1.32 (1.15, 1.53); 1.27 (1.10, 1.46)	1.14 (1.00, 1.31); 1.08 (0.95, 1.24)	1.82 (1.54, 2.17); 1.58 (1.33, 1.88)
Stable	1.00 (ref)	1.00 (ref)	1.00 (ref)
Gain	1.04 (0.88, 1.23); 1.03 (0.87, 1.22)	1.10 (0.95, 1.27); 1.06 (0.91, 1.22)	1.14 (0.92, 1.40); 1.10 (0.89, 1.36)
Cycling (unstable)	1.64 (1.40, 1.92); 1.54 (1.32, 1.80)	1.44 (1.25, 1.67); 1.36 (1.18, 1.58)	2.20 (1.83, 2.63); 1.66 (1.38, 2.00)



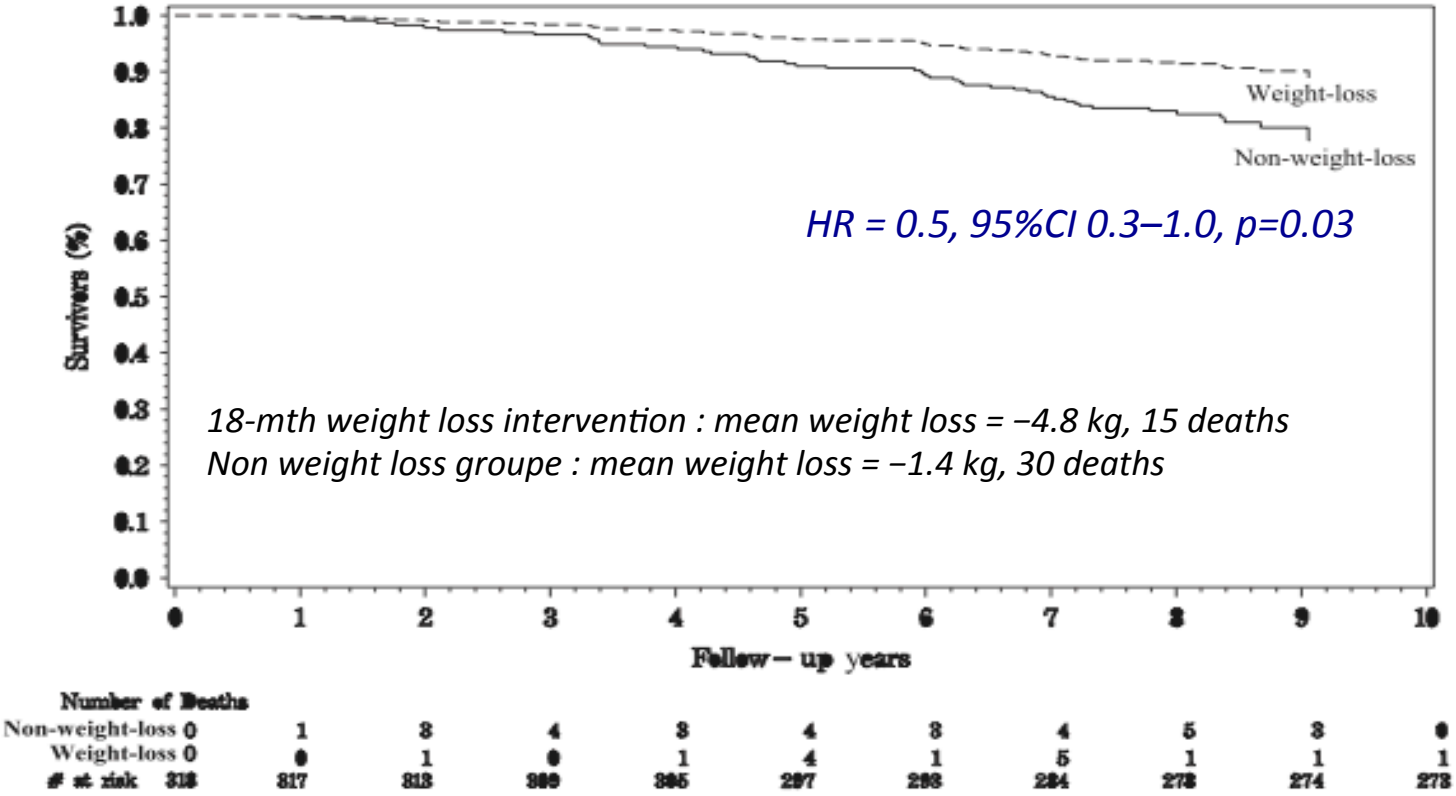




Arnold AM et al. J Gerontol A Biol Sci Med Sci 2010; 65A:63-70

The Effect of Randomization to Weight Loss on Total Mortality in Older Overweight and Obese Adults: The ADAPT Study

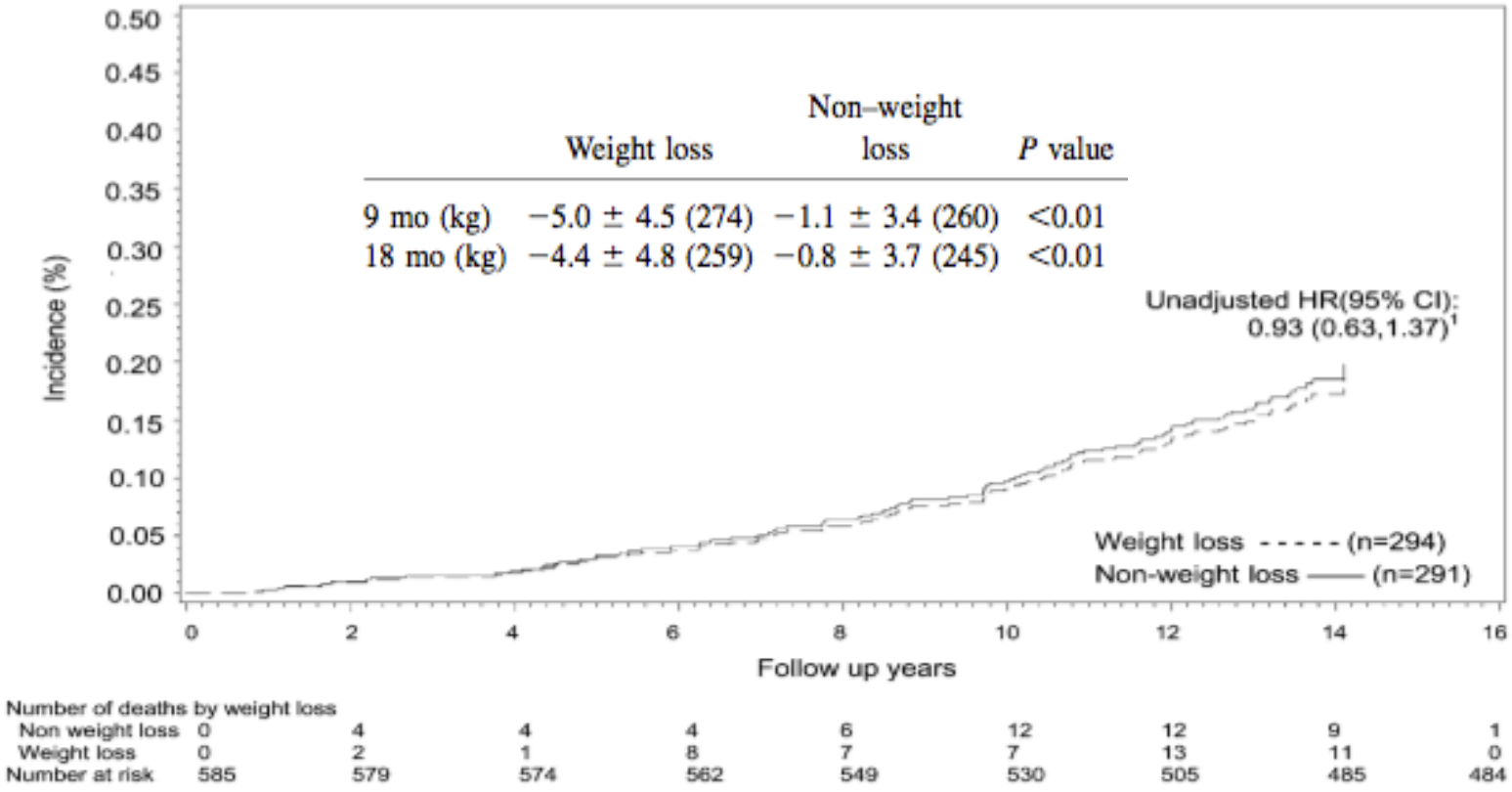
n=318 older adults with knee OA, mean age 69 ±6 years, BMI 34 ±5 kg/m^2, 72%female



Shea MK et al. J Gerontol A Biol Sci Med Sci 2010;65:519-25

The effect of intentional weight loss on all-cause mortality in older adults: results of a randomized controlled weight-loss trial[1–3]

TONE Trial - n =585, mean (± SD) age 65.5 ± 4.5 y, mean (± SD) BMI 31.1 ± 2.3 kg/m^2



Cumulative all-cause mortality associated with randomization to dietary weight loss

Shea MK et l. Trial of Nonpharmacologic Intervention in the Elderly (TONE). Am J Clin Nutr 2011;94:839-46

Intentional weight loss and mortality in the elderly

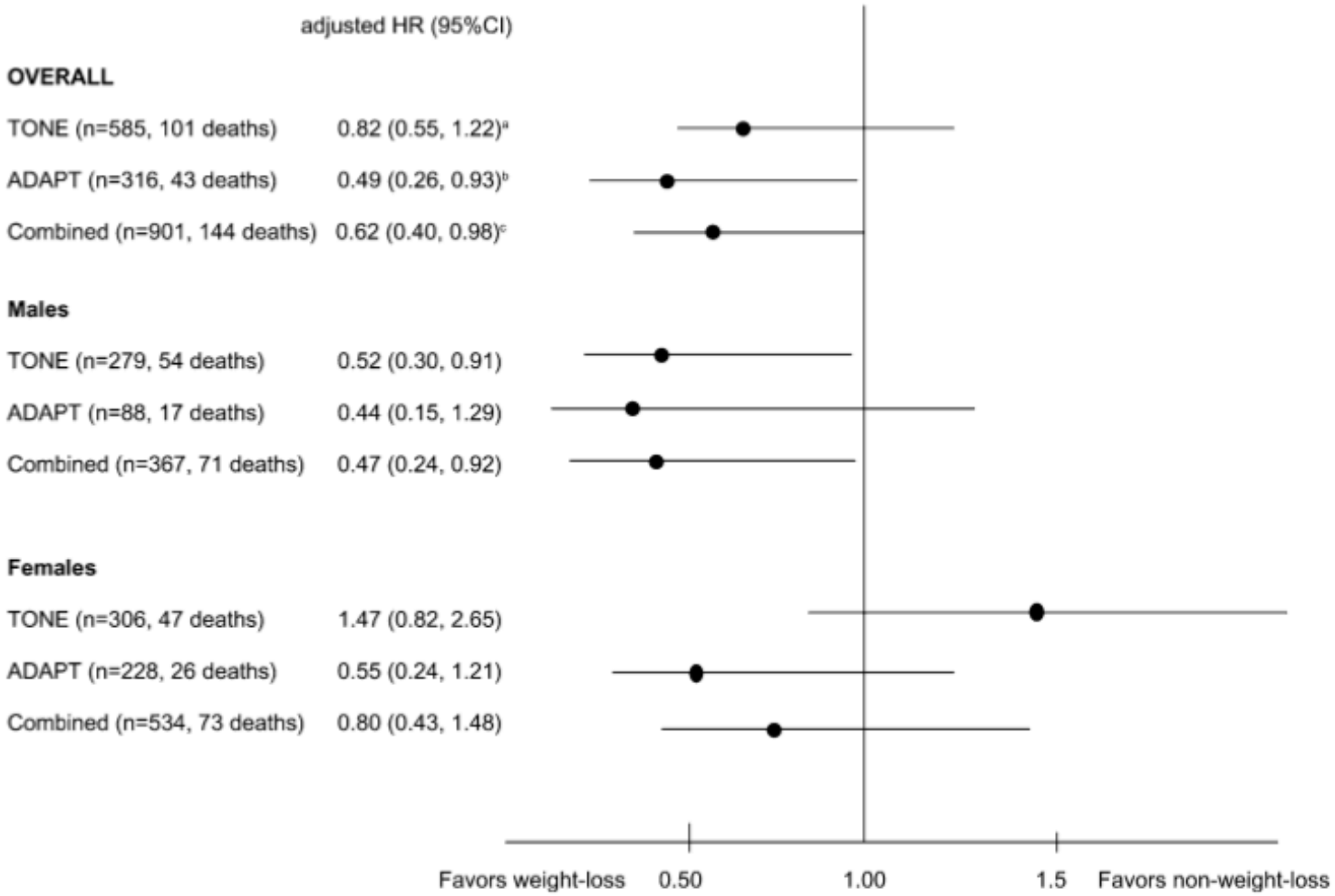


FIGURE 3. The effect of intentional weight loss on all-cause mortality over 8 y of follow-up in participants in the Trial of Nonpharmacologic Intervention in the Elderly (TONE); in the Arthritis, Diet, and Activity Promotion Trial (ADAPT); and in the studies combined. [a]Adjusted for age, sex (unless stratified), race, study site, history of cardiovascular disease (CVD), diastolic blood pressure, smoking status, and random assignment to a low-sodium intervention. [b]Adjusted for age, sex (unless stratified), history of CVD, and random assignment to exercise intervention. [c]Adjusted for age, sex (unless stratified), race, history of CVD, and study (TONE or ADAPT).

Shea MK et l. Trial of Nonpharmacologic Intervention in the Elderly (TONE). Am J Clin Nutr 2011;94:839-46

Original Article

Weight Loss, Exercise, or Both and Physical Function in Obese Older Adults

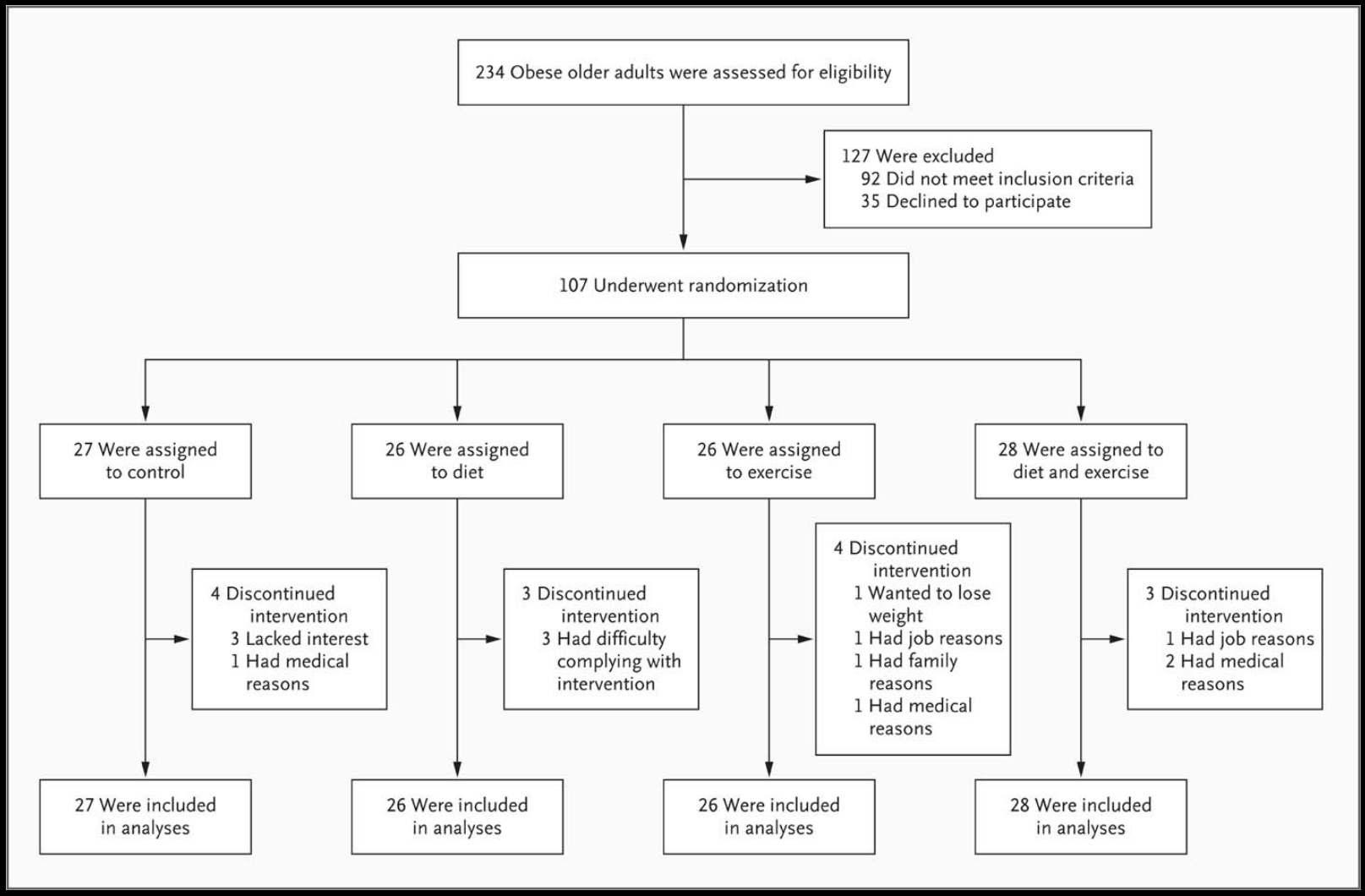
Dennis T. Villareal, M.D., Suresh Chode, M.D., Nehu Parimi, M.D., David R. Sinacore, P.T., Ph.D., Tiffany Hilton, P.T., Ph.D., Reina Armamento-Villareal, M.D., Nicola Napoli, M.D., Ph.D., Clifford Qualls, Ph.D., and Krupa Shah, M.D., M.P.H.

- This trial examined the independent and combined effects of weight loss and exercise in obese adults 65 years of age or older.
- The findings suggest that weight loss plus exercise provides greater improvement in physical function than either intervention alone.

N Engl J Med, Volume 364(13):1218-1229 - March 31, 2011

The NEW ENGLAND JOURNAL of MEDICINE

Screening, Randomization, and Follow-up.



Villareal DT et al. N Engl J Med 2011;364:1218-1229

Baseline Characteristics of Participants.

Table 1. Baseline Characteristics of Participants.*

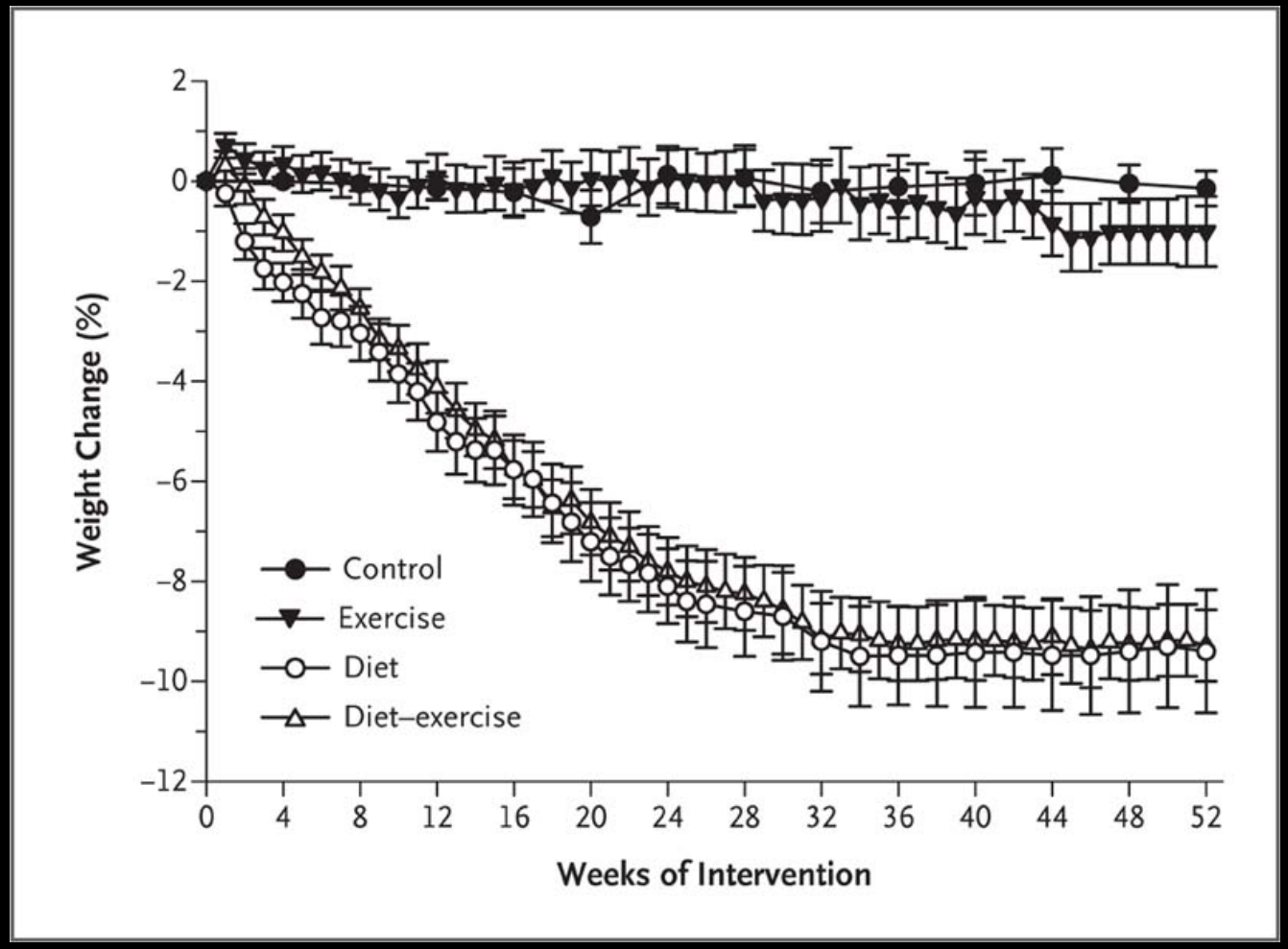
Characteristic	Control (N=27)	Diet (N=26)	Exercise (N=26)	Diet–Exercise (N=28)	P Value
Age — yr	69±4	70±4	70±4	70±4	0.85
Sex — no. (%)					
Male	9 (33)	9 (35)	10 (38)	12 (43)	0.89
Female	18 (67)	17 (65)	16 (62)	16 (57)	
Race — no. (%)†					
White	22 (81)	23 (88)	21 (81)	25 (89)	0.78
Black	4 (15)	3 (12)	4 (15)	3 (11)	
Other	1 (4)	0	1 (4)	0	
Education — no. (%)					
Less than college degree	9 (33)	7 (27)	7 (27)	9 (32)	0.85
College degree	13 (48)	15 (58)	10 (38)	9 (32)	
Graduate school	5 (19)	4 (15)	9 (35)	10 (36)	
Marital status — no. (%)					
Single	1 (4)	3 (12)	2 (8)	2 (7)	0.73
Married	19 (70)	19 (73)	13 (50)	16 (57)	
Divorced	2 (8)	2 (8)	6 (23)	5 (18)	
Widowed	5 (19)	2 (8)	5 (19)	5 (18)	
Weight — kg	101.0±16.3	104.1±15.3	99.2±17.4	99.1±16.8	0.66
Body-mass index‡	37.3±4.7	37.2±4.5	36.9±5.4	37.2±5.4	0.93
Chronic diseases — no.	2.2±1.2	2.2±1.4	2.0±1.3	2.2±1.3	0.93
Routine medications — no.	4.6 ±2.6	3.3±2.3	4.7±2.5	4.1±2.8	0.24

* Plus–minus values are means ±SD.
† Race was self-reported.
‡ The body-mass index is the weight in kilograms divided by the square of the height in meters.

Villareal DT et al. N Engl J Med 2011;364:1218-1229c

The NEW ENGLAND JOURNAL of MEDICINE

Mean Percentage Changes in Body Weight during the 1-Year Intervention.



Lean body mass and bone mineral density at the hip decreased less in the diet–exercise group than in the diet group (reductions of 3% and 1%, respectively, in the diet–exercise group vs. reductions of 5% and 3%, respectively, in the diet group; P<0.05 for both comparisons).

Villareal DT et al. N Engl J Med 2011;364:1218-1229

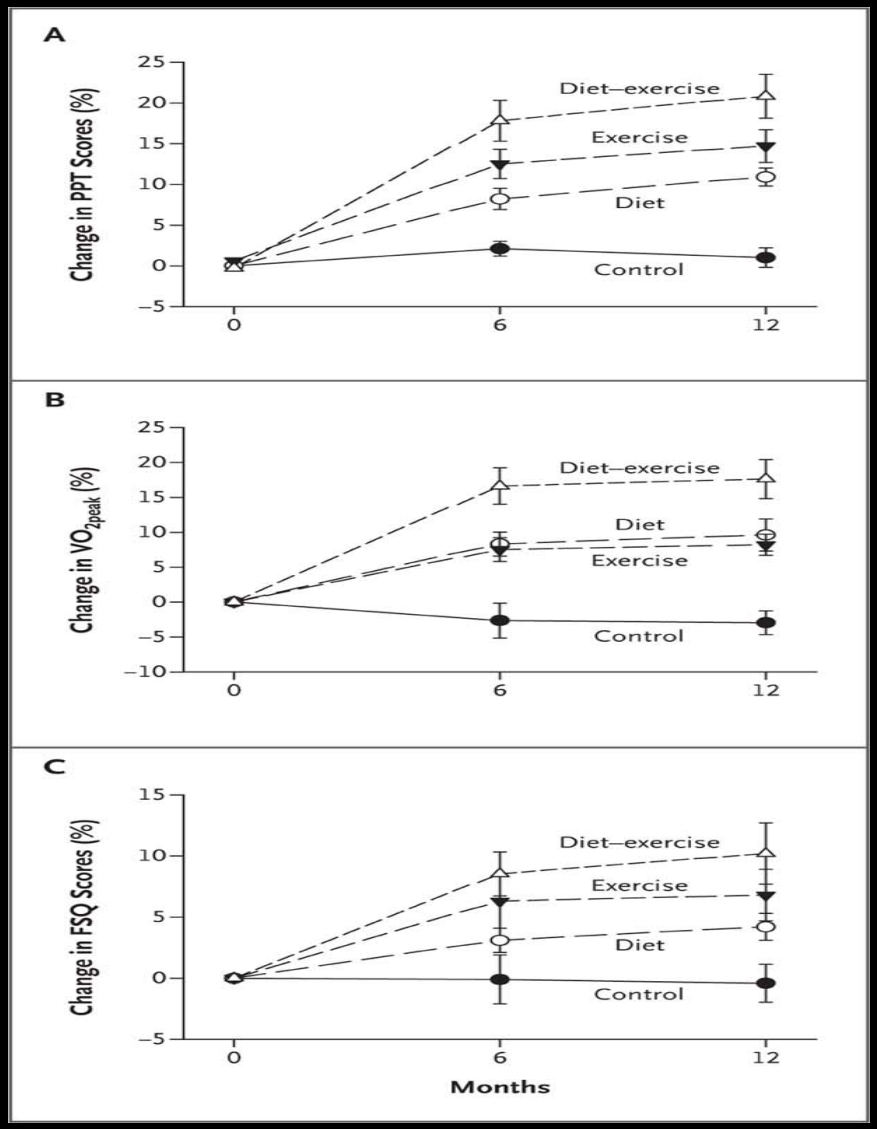
The NEW ENGLAND JOURNAL of MEDICINE

Mean Percentage Changes in Objective and Subjective Measures of Frailty during the 1-Year Intervention.

Physical Performance Test

$VO_{2\ peak}$

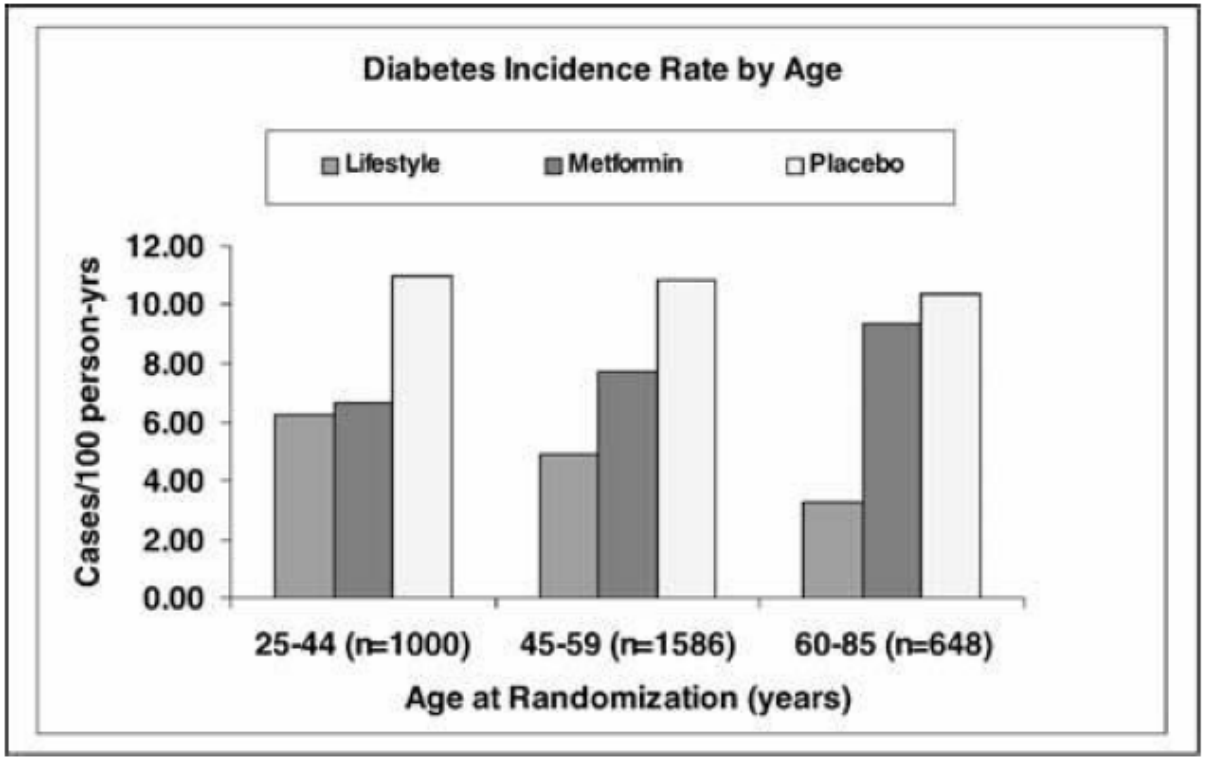
Functional Status Questionnaire



Strength, balance, and gait improved consistently in the diet–exercise group (P<0.05 for all comparisons)

Villareal DT et al. N Engl J Med 2011;364:1218-1229

The Influence of Age on the Effects of Lifestyle Modification and Metformin in Prevention of Diabetes



Metabolic and Activity Variable	25–44 Years (A)	45–59 Years (B)	60–85 Years (C)	Overall *p* Value
Weight change, kg	−4.1 (0.4)	−5.0 (0.3)	−6.4 (0.3)	<.001,#*†
Waist circumference change, cm	−4.3 (0.4)	−4.7 (0.3)	−6.7 (0.4)	<.001,*†
Percent at weight loss goal (7% of body weight)	33	39	55	<.001,#*†
Recreational activity change (MET-h/wk)	4.4 (1.6)	5.8 (1.3)	18.7 (2.1)	<.001,*†
Leisure activity change (MET-h/wk)	5.1 (0.8)	5.2 (0.7)	8.5 (1.0)	.02,*†
Percent at exercise goal (150 min/wk)	34	38	48	<.001,*#†
Percent change in calorie intake (at 1 y)	−18 (2)	−14 (2)	−10 (2)	.05

Crandall J et al. J Gerontol A Biol Sci Med Sci 2006;61:1075-81

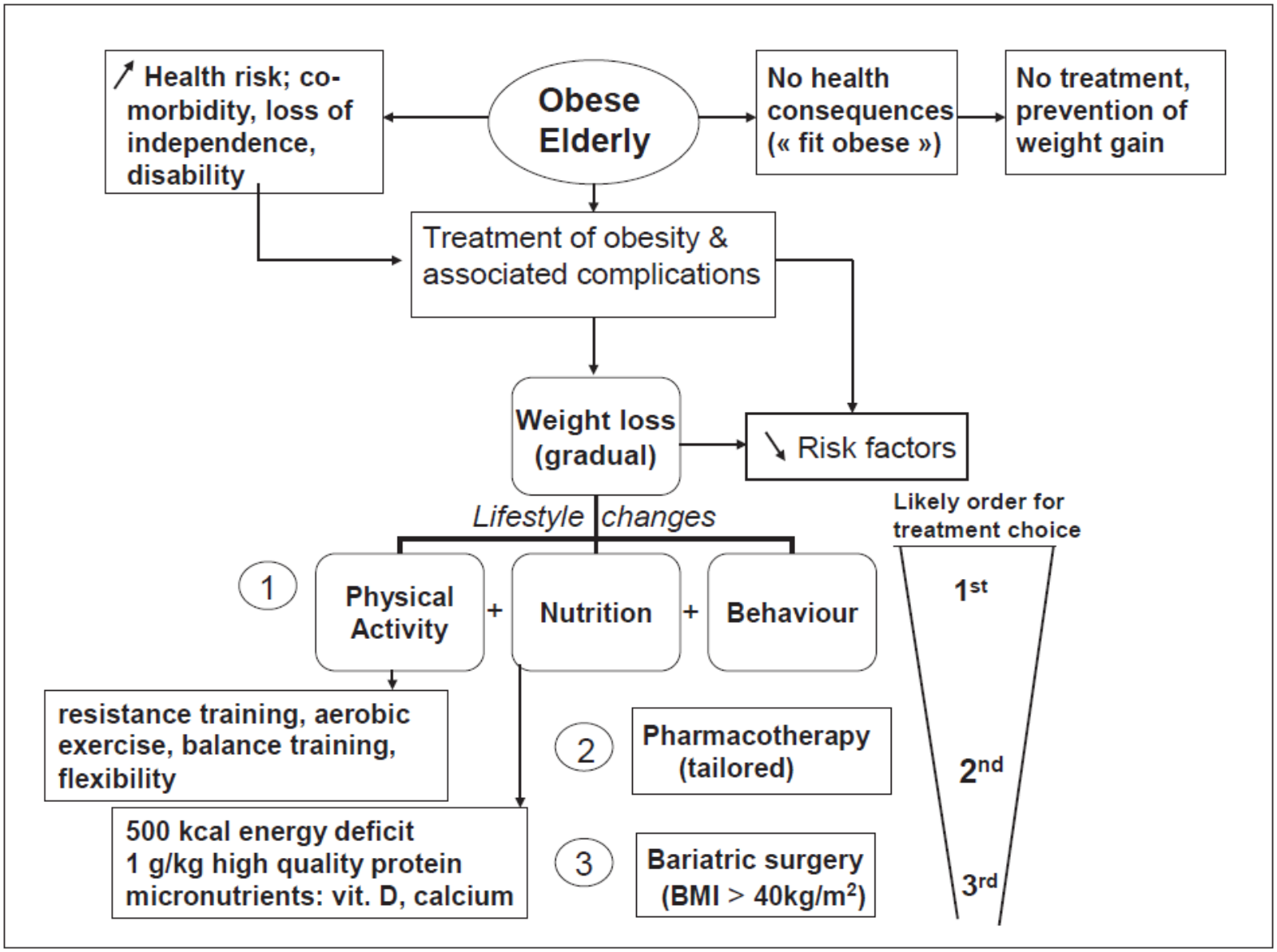
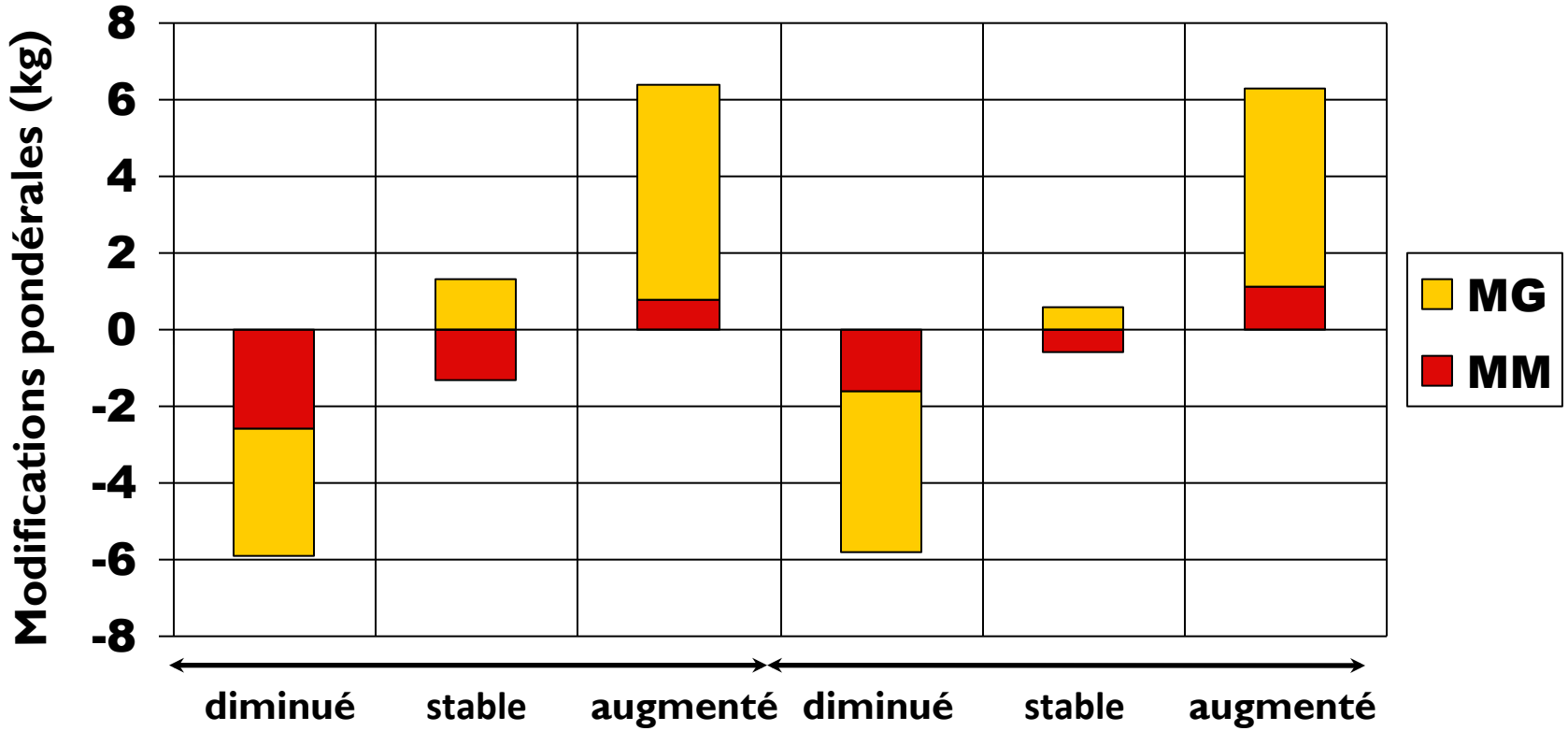


Fig. 2. Simplified schematic treatment strategy for obese elderly individuals.

Mathus-Vliegen et al.: Prevalence, Pathophysiology, Health Consequences and Treatment Options of Obesity in the Elderly: A Guideline Obes Facts 2012;5:460–483

Modification de la composition corporelle en fonction des modifications pondérales chez des sujets âgés en bonne santé



53 hommes et 78 femmes évalués par DXA
à 60,7 ± 7,8 ans puis 9,4 ± 1,4 ans plus tard

Hugues *et al.* Am J Clin Nutr 2002

Table 2 Anthropometric, body composition and fat distribution variables before and after moderate weight loss (nearly 5%) in a group of elderly obese women [63]

	Before ($n = 15$), Mean ± SD	After ($n = 15$), Mean ± SD	Δ (%)	p^a
Weight (kg)	85.2 ± 8.1	80.6 ± 6.9	−5.4	<0.001
BMI (kg/m^2)	35.5 ± 4.1	33.6 ± 3.6	−5.4	<0.001
Total fat mass (kg)	36.8 ± 56.6	33.6 ± 48.2	−8.4	<0.001
Mid-thigh subcutaneous AT (cm^2)	162.4 ± 51.0	151.1 ± 49.9	−6.6	0.053
Mid-thigh intermuscular AT (cm^2)	8.9 ± 3.8	6.8 ± 2.9	−23.1	<0.001
Mid-thigh LDLT (cm^2)	28.7 ± 7.9	26.1 ± 7.2	−8.0	<0.05
Mid-thigh muscle (cm^2)	75.3 ± 9.5	76.9 ± 12.3	2.1	NS

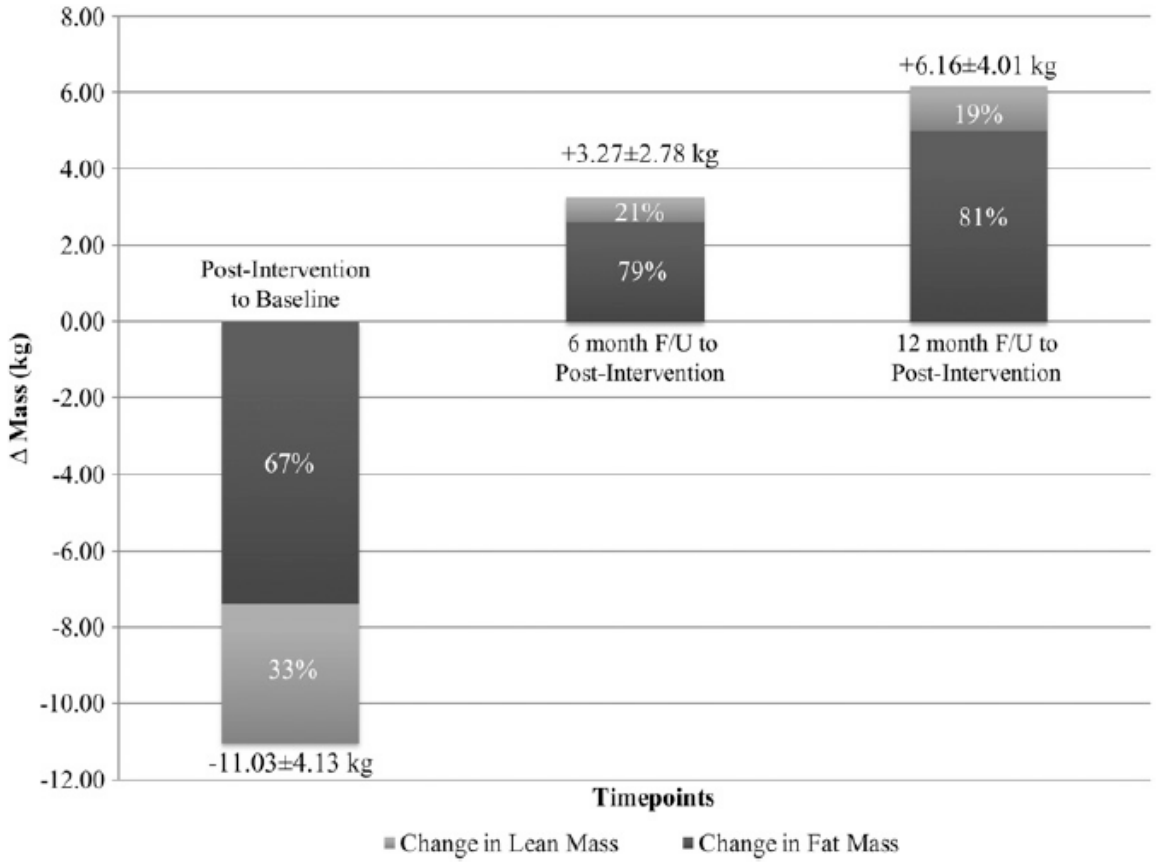
SD, standard deviation; BMI, body mass index; AT, adipose tissue; LDLT, low density lean tissue; NS, not significant.

[a] Differences before and after weight loss were tested with a paired samples *t*-test. Log transformation has been performed for not normally distributed variables.

Zamboni M et al. Nutr Metab Cardiovasc Dis 2008

Is lost lean mass from intentional weight loss recovered during weight regain in postmenopausal women?[1–3]

Design: The design was a follow-up to a randomized controlled trial of weight loss in which body composition was analyzed and compared in 78 postmenopausal women before the intervention, immediately after the intervention, and 6 and 12 mo after the intervention.



Beavers KM et al. Am J Clin Nutr 2011;94:767-774

Bariatric surgery in the elderly: 2009-2013

BACKGROUND:
We previously examined the outcome of bariatric surgery performed in the elderly between 1999 and 2005 using the University HealthSystem Consortium (UHC) Clinical Database.
The aim of this study was to analyze contemporary outcomes of bariatric surgery in the elderly and to compare them to previous data from 1999-2005.

METHODS:
We obtained data from the UHC database for all elderly (age >60 yr) and adult nonelderly (age 19-60 yr) patients who underwent bariatric surgery for the treatment of morbid obesity between 2009 and 2013.
Outcome measures, such as patient characteristics, LOS, morbidity, and observed-to-expected (risk-adjusted) mortality ratio were compared between elderly and nonelderly patients.

RESULTS:
Bariatric surgery in the elderly made up 2.7% of all bariatric operations in 1999-2005.
This represents an increase to **10.1% of all bariatric operations in 2009-2013**.
In-hospital mortality was 0.30% for the nonelderly and 0.70% for the elderly in 1999-2005, whereas contemporary in-hospital mortality has decreased to **0.11% for the nonelderly and 0.05% for the elderly**.

CONCLUSION:
Our results show that the number of bariatric procedures performed in the elderly is increasing and now represents 10% of all bariatric operations performed at academic centers.
In-hospital mortality in bariatric surgery in the elderly has improved so much that it is now even better than in-hospital mortality in the nonelderly in 1999-2005.

Gebhart A et al. Surg Obes Relat Dis 2014 Apr 24. pii: S1550-7289(14)00163-4.

Gastric Bypass for Obesity in the Elderly: Is It as Appropriate as for Young and Middle-Aged Populations?

	<40 years	40–55 years	>60 years	*p* value
Whole population	*n*=24	*n*=24	*n*=24	
Age (years)	34.2±1.4	48.1±0.9	61.7±0.5	0.002
Sex ratio (F/M)	0.67	0.67	0.67	1
BMI (kg m^{-2})	41.9±1	41.5±1	41.3±1	0.93
Height (m)	1.66±0.02	1.68±0.02	1.65±0.02	0.58
Weight (kg)	116.2±3.6	116.8±3.8	111.7±3.5	0.61
Maximal weight (kg)	127.4±3.7	129.8±5.1	128.4±4.2	0.94
Waist circumference (cm)	120±3	117±4	126±2	0.32
Primary gastric bypass	*n*=14	*n*=14	*n*=14	
Age (years)	33.8±1.5	48.7±0.8	62.3±0.6	0.001
Sex ratio (F/M)	0.60	0.60	0.60	1
BMI (kg m^{-2})	42.4±1	41.8±1	41.7±1	0.99
Height (m)	1.68±0.02	1.69±0.02	1.67±0.01	0.72
Weight (kg)	119.7±3.9	120±4.1	115.7±3.6	0.85
Maximal weight (kg)	126.8±3.7	136.7±5.1	127.6±4.2	0.49
Waist circumference (cm)	121±3	120±4	124±2	0.81

Robert M et al. Obes Surg. 2014 Oct;24(10):1662-9

Gastric Bypass for Obesity in the Elderly: Is It as Appropriate as for Young and Middle-Aged Populations?

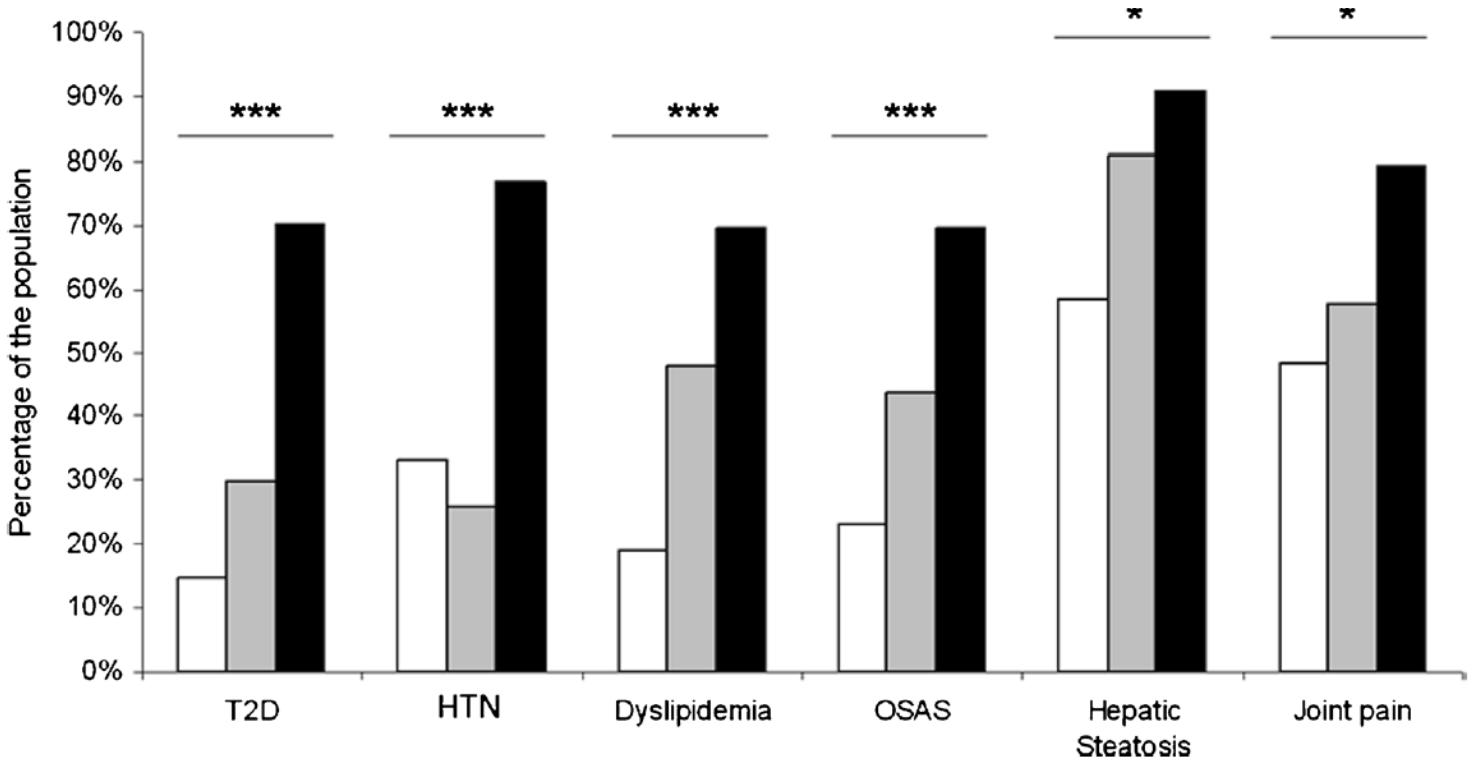


Table 5 Remission and improvement rates of metabolic comorbidities in each age group, 6 months after surgery

	<40 years		40–55 years		>60 years		Chi-square remission
	Remission	Improvement	Remission	Improvement	Remission	Improvement	*p* value
Type 2 diabetes (%)	2/4 (50 %)	2/4 (50 %)	2/8 (25 %)	6/8 (75 %)	7/19 (37 %)	11/19 (58 %)	0.83
HTN (%)	5/7 (71 %)	2/7 (29 %)	4/9 (44 %)	4/9 (44 %)	9/20 (45 %)	10/20 (50 %)	0.48
Dyslipidemia (%)	3/5 (60 %)	2/5 (40 %)	9/12 (75 %)	3/12 (25 %)	8/16 (50 %)	7/16 (43 %)	0.43

Robert M et al. Obes Surg. 2014 Oct;24(10):1662-9

Gastric Bypass for Obesity in the Elderly: Is It as Appropriate as for Young and Middle-Aged Populations?

	<40 years	40–55 years	>60 years	*p* value
Whole population	*n*=24	*n*=24	*n*=24	
Mean length of stay (day)	4.8±0.2	4.4±0.1	4.6±0.2	0.65
Operative time (min)	132±10	134±8	154±11	0.33
Postoperative death (*n*)	0	0	1	0.36
Early complications rate (*n* (%))	1 (4 %)	2 (8 %)	3 (13 %)	0.54
Late complications rate (*n* (%))	2 (8 %)	2 (8 %)	2 (8 %)	
Primary gastric bypass	*n*=14	*n*=14	*n*=14	
Mean length of stay (day)	4.8±0.2	4.4±0.1	4.6±0.2	0.65
Operative time (min)	132±10	134±8	154±11	0.33
Postoperative death (*n*)	0	0	0	
Early complications rate (*n* (%))	1 (7 %)	1 (7 %)	2 (13 %)	0.54
Late complications rate (*n* (%))	1 (7 %)	2 (13 %)	2 (13 %)	0.56

Robert M et al. Obes Surg. 2014 Oct;24(10):1662-9

Gastric Bypass for Obesity in the Elderly: Is It as Appropriate as for Young and Middle-Aged Populations?

	<40 years	40–55 years	>60 years	*p* value
Primary gastric bypass (n=42)				
BMI at 12 months (kg m^{-2})	28.8±0.7	28.4±0.7	29.0±1.1	0.99
EBL% at 12 months (%)	79.6±3.5	83.4±3	80.9±4.7	0.97
Whole population (n=72)				
BMI at 12 months (kg m^{-2})	29.4±0.6	29.0±0.8	29.8±0.9	0.86
EBL% at 12 months (%)	74.4±3.5	78.9±4.5	73.7±4.5	0.69
Time to weight nadir (months)	15.4±1	15±1	11.7±1	0.44
Weight loss failure at 1 year (%)	12.5 %	12.5 %	16.6 %	0.37

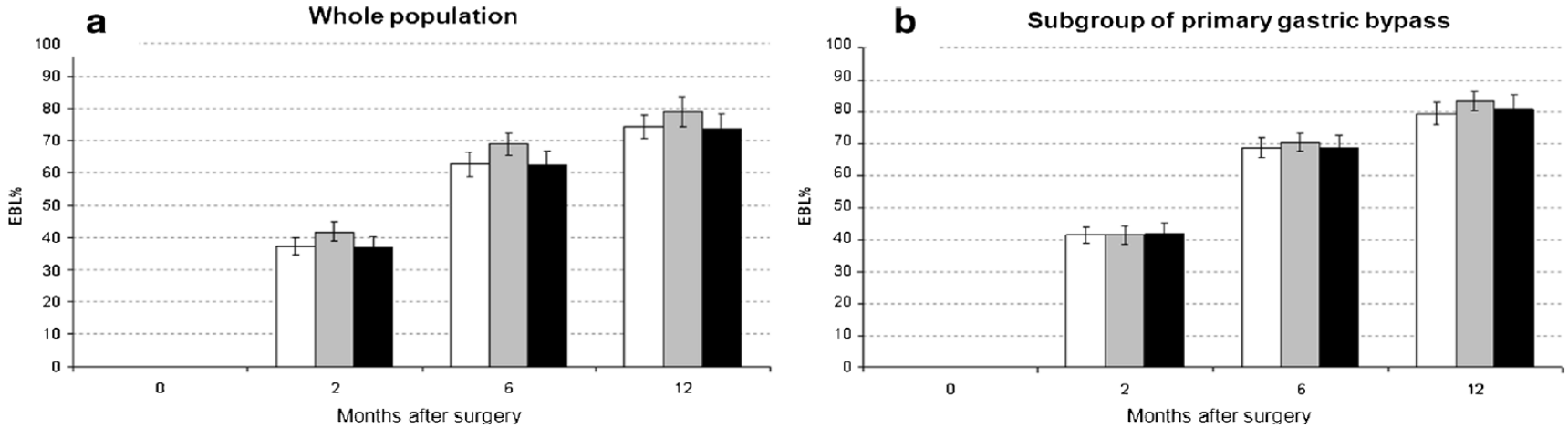


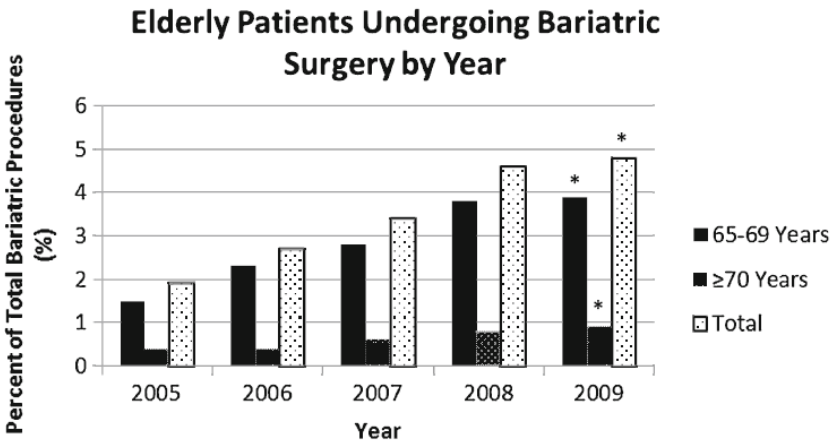
Fig. 2 Evolution of excess BMI loss percentage (EBL%) (**a** for the whole population; **b** for the subgroup of primary gastric bypass) during the first postoperative year according to age groups (*white bars*, <40 years of age group; *grey bars*, 40–55 years of age group; *black bars*, >60 years of age group)

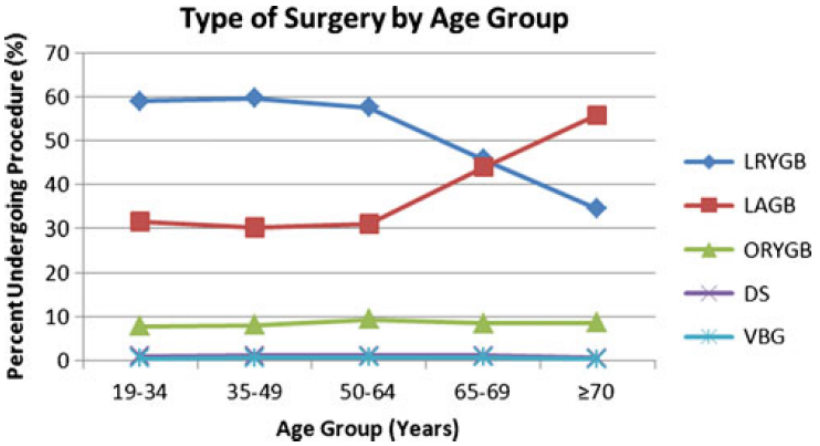
Robert M et al. Obes Surg. 2014 Oct;24(10):1662-9

Bariatric Surgery Outcomes in the Elderly: An ACS NSQIP Study

Demographic and co-morbid variables stratified by age (N=48,378)

19–34 years, 19.6% (N=9,486) (%)	35–49 years, 43.1% (N=2,0834) (%)	50–64 years, 33.2% (N=16,064) (%)	65–69 years, 3.4% (N=1,638) (%)	≥70 years, 0.7% (N=356) (%)





Dorman RB et al. J Gastrointest Surg 2012 Oct;16:35-44

Bariatric Surgery Outcomes in the Elderly: An ACS NSQIP Study

	19–34 years, % (*N*)	35–49 years, % (*N*)	50–64 years, % (*N*)	65–69 years, % (*N*)	≥70 years, % (*N*)	*P* value
30-day mortality (overall)	0.1 (7)	0.1 (24)	0.2 (33)	0.4 (6)	0.6 (2)	0.15

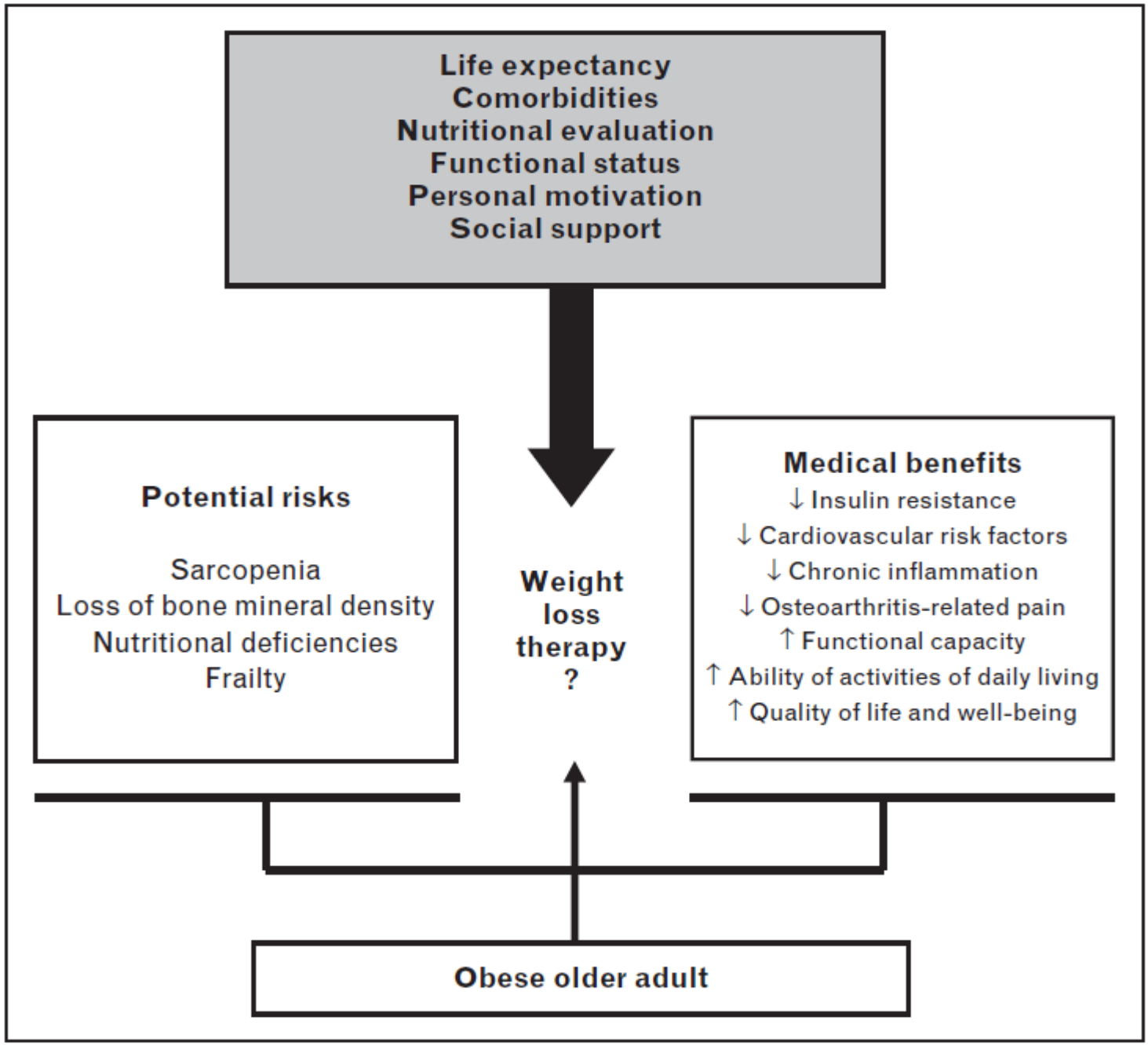
Table 3 Predictors of mortality following bariatric procedures stratified by open versus laparoscopic (*N*=48,378)

Predictors	Open (*N*=5,017) OR (95% CI)	Laparoscopic (*N*=43,361) OR (95% CI)
Age (years)		
19–34	1.3 (0.4, 4.4)	0.5 (0.1, 1.8)
35–49	Ref.	Ref.
50–64	1.2 (0.4, 3.1)	1.2 (0.6, 2.4)
≥65	3.3 (0.8, 14.3)	1.9 (0.6, 5.6)

Table 4 Predictors of major events and PLOS after bariatric procedures stratified by open versus laparoscopic

Predictors	Major events open, *N*=5,017 OR (95% CI)	Major events laparoscopic, *N*=43,361 OR (95% CI)	PLOS open, *N*=4,992[a] OR (95% CI)	PLOS laparoscopic *N*=43,314[a] OR (95% CI)
Age (years)				
19–34	1.0 (0.7, 1.3)	0.8 (0.7, 1.0)	*0.7 (0.6, 0.9)*	*0.9 (0.8, 0.9)*
35–49	Ref.	Ref.	Ref.	Ref.
50–64	*1.4 (1.1, 1.7)*	*1.2 (1.0, 1.3)*	1.2 (1.0, 1.5)	*1.2 (1.2, 1.3)*
65–69	0.9 (0.5, 1.6)	1.1 (0.8, 1.5)	*1.8 (1.2, 2.6)*	*1.2 (1.1, 1.4)*
≥70	0.7 (0.1, 2.9)	0.7 (0.3, 1.4)	*4.2 (2.1, 8.5)*	1.1 (0.8, 1.4)

Dorman RB et al. J Gastrointest Surg 2012 Oct;16:35-44



Darmon P. **Curr Opin Clin Nutr Metab Care** 2013, 16:284–289

The obesity paradox: weighing the benefit

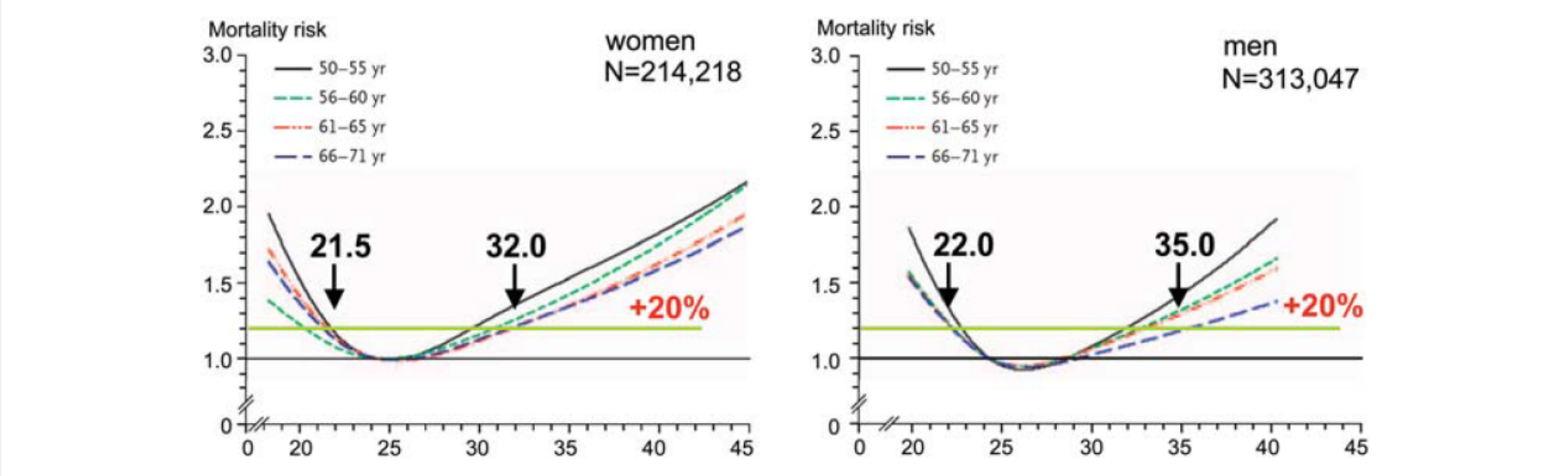
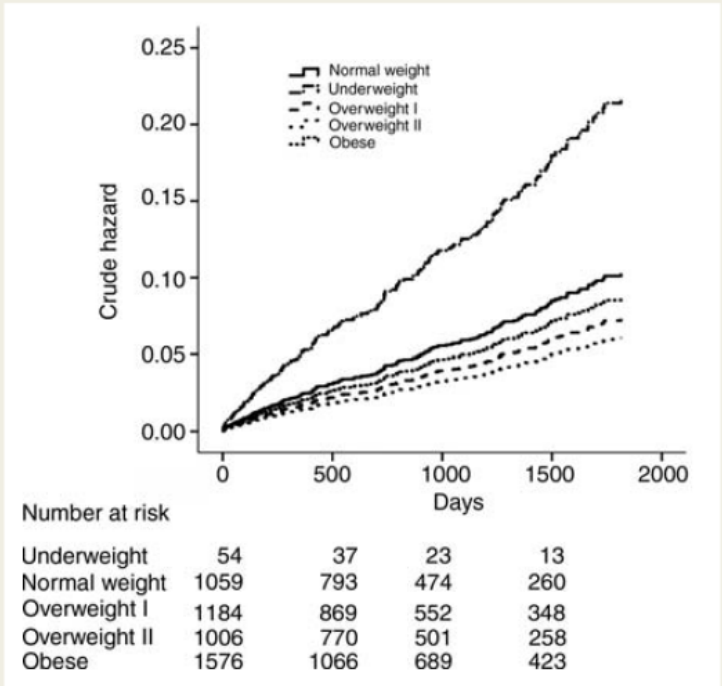


Figure 1 Association of BMI and mortality risk in age subgroups in men and women. The green line indicates a 20% increased risk of death, showing a similar risk for men aged over 66 years with a BMI of 22 kg/m^2 and with a BMI 35 of kg/m^2. Adapted from Adams *et al.*[18]

Doehner W et al. Eur H eart J 2010;31:146-148

Obesity paradox in a cohort of 4880 consecutive patients undergoing percutaneous coronary intervention



Number at risk

Underweight	54	37	23	13
Normal weight	1059	793	474	260
Overweight I	1184	869	552	348
Overweight II	1006	770	501	258
Obese	1576	1066	689	423

Figure 1 Crude hazard over 5 years following elective percutaneous coronary intervention by body mass index category.

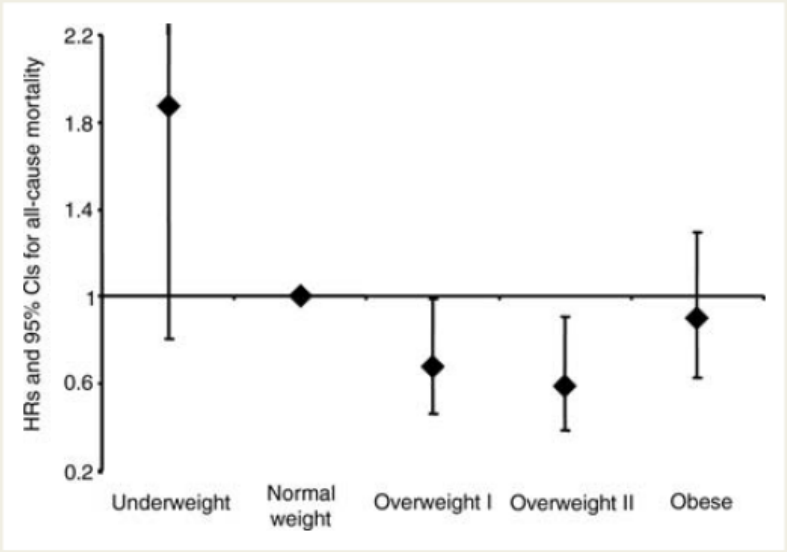


Figure 2 Adjusted cumulative risk of all-cause death 5 years following elective percutaneous coronary intervention by body mass index category referent to normal weight individuals. CI, confidence interval; HR, hazard ratio.

European Heart Journal (2010) **31**, 222–226

Overweight and obesity are associated with improved survival, functional outcome, and stroke recurrence after acute stroke or transient ischaemic attack: observations from the TEMPiS trial

	Death at 30 months (n = 1472)		Recurrent stroke or death within 30 months (n = 1462)	
	HR (95% CI)	***P* value**	**OR (95% CI)**	***P* value**
Variable				
Underweight (BMI <18.5)	2.76 (1.75–4.36)	<0.001	2.74 (1.23–6.03)	0.012
Normal weight (18.5 to <25)	1.0 (reference)		1.0 (reference)	
Overweight (25 to <30)	0.86 (0.69–1.08)	0.19	0.79 (0.60–1.03)	0.085
Obese (30 to <35)	0.76 (0.53–1.10)	0.15	0.56 (0.37–0.86)	<0.01
Very obese (≥35)	0.55 (0.29–1.02)	0.059	0.51 (0.27–0.97)	0.039

	Death or institutional care at 30 months (n = 1377)		Death or high dependency at 30 months (n = 1374)	
	OR (95% CI)	***P*-value**	**OR (95% CI)**	***P*-value**
Variable				
Underweight (BMI <18.5)	2.18 (0.90–5.28)	0.083	1.28 (0.50–3.25)	0.61
Normal weight (18.5 to <25)	1.0 (reference)		1.0 (reference)	
Overweight (25 to <30)	0.68 (0.51–0.91)	0.01	0.74 (0.50–1.00)	0.048
Obese (30 to <35)	0.60 (0.38–0.92)	0.02	0.60 (0.39–0.91)	0.018
Very obese (≥35)	0.49 (0.25–0.99)	0.045	0.68 (0.37–1.25)	0.21

European Heart Journal (2013) **34**, 268–277

Obesity is associated with lower mortality risk in elderly diabetic subjects: the Casale Monferrato study

1475 diabétiques (62,6% > 65 ans), suivi moyen 15 ans

Table 3 Cox-regression analyses of mortality in the Casale Monferrato survey, by BMI and increased WHR, by baseline age

	All-cause mortality		Cardiovascular mortality	
	HR* (95% CI)		HR* (95% CI)	
BMI quartiles (Kg/m^2)	<65 years	≥65 years	<65 years	≥65 years
<24.2	1.00	1.00	1.00	1.00
24.3–26.7	0.83 (0.49–1.39)	0.95 (0.76–1.18)	1.09 (0.50–2.36)	0.78 (0.57–1.06)
26.8–30.0	0.90 (0.55–1.48)	0.99 (0.79–1.24)	1.29 (0.62–2.65)	0.86 (0.64–1.19)
>30.0	0.84 (0.52–1.36)	0.75 (0.58–0.96)	0.83 (0.39–1.74)	0.67 (0.45–0.95)
Increased WHR				
No	1.00	1.00	1.00	1.00
Yes	0.93 (0.56–1.56)	0.93 (0.71–1.23)	1.01 (0.48–2.13)	0.85 (0.56–1.25)

* Adjusted for age, sex, diabetes duration, hypertension, CHD, AER, HbA1c, ApoB/ApoA1, smoking

Perotto M et al. Acta Diabetol (2013) 50:563–568

The Burden of Obesity on Blood Pressure is Reduced in Older Persons: The SardiNIA Study

Design and Methods: Three thousand fifty-six subjects (1,532 women and 1,524 men) consist of the drug naïve subjects from the SardiNIA study. Logistic regression models with backward elimination were used to determine and compare the association between categories of obesity on hypertension within young (≤39), middle aged (40–59), and older (60+) subjects. Additional terms controlled for in the model were smoking and alcohol intake status.

TABLE 1 Odds ratios of having hypertension between the three age groups in lean overweight and obese subjects

	Hypertension (yes) OR (95% CI)		
	Lean	Overweight	Obese
Old vs. Young (alcohol = no)	33.89 (17.94-64.02)[a]	12.84 (7.13-23.10)[a]	10.45 (4.58-23.85)[a]
Middle age vs. Young (alcohol = no)	10.98 (6.72-17.92)[a]	5.64 (3.38-9.40)[a]	4.23 (2.06-8.67)[a]
Old vs. Middle age (alcohol = no)	3.09 (1.71-5.58)[a]	2.28 (1.37-3.77)[a]	2.47 (1.29-4.72)[a]
Old vs. Young (alcohol = yes)	19.16 (10.86-33.80)[a]	7.26 (4.52-11.67)[a]	5.90 (2.76-12.66)[a]
Middle age vs. Young (alcohol = yes)	5.09 (3.18-8.14)[a]	2.62 (1.75-3.90)[a]	1.96 (0.99-3.86)
Old vs Middle age (alcohol=yes)	3.76 (2.23-6.32)[a]	2.78 (1.87-4.09)[a]	3.01 (1.66-5.46)[a]

Pikilidou MI et al. *Obesity* (2013) **21**, E10-E13. doi:10.1002/oby.20010

Look AHEAD: Study design

Look Action for Health in Diabetes

N = 5145
45-74 years with T2DM, BMI ≥25 kg/m^2 (≥27 kg/m^2 if taking insulin)

Usual medical care + diabetes support and education for 4 years	Total follow-up 11.5 years	Usual medical care + lifestyle intervention* for 4 years, with maintenance counseling thereafter

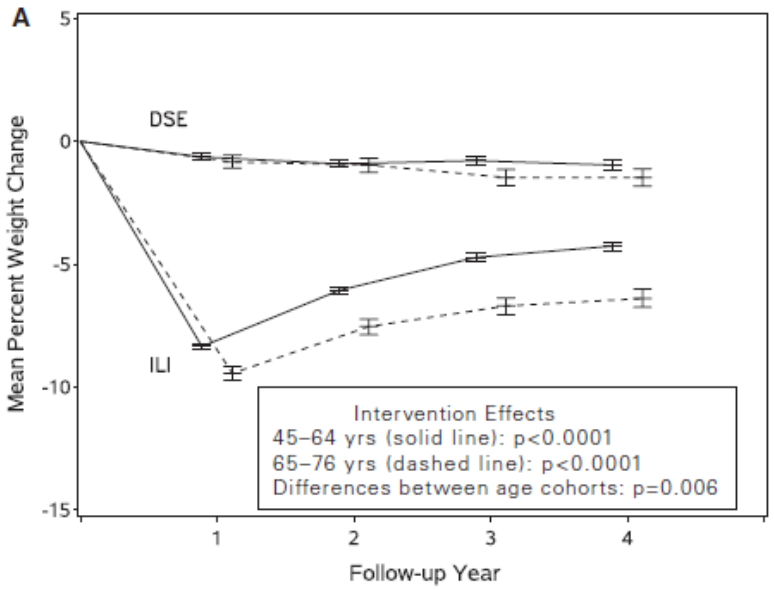
Primary endpoint: **CV death, nonfatal MI, nonfatal stroke**

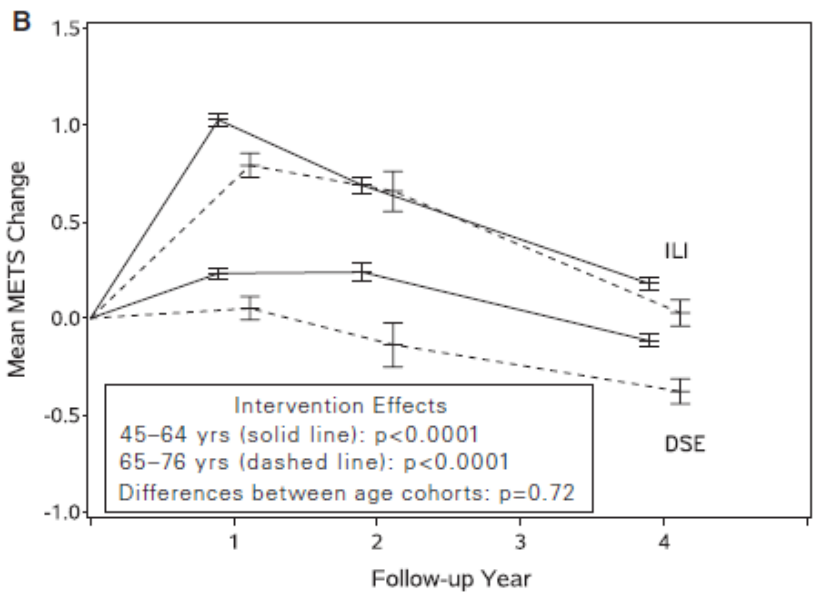
***≥7% mean weight loss with hypocaloric diet ± pharmacologic therapy + ≥175 min/week moderate physical activity**
Diet = 1200-1500 kcal/day (<250 lbs) or 1500-1800 kcal/day (≥250 lbs)

Look AHEAD Research Group. *Control Clin Trials*. 2003;24:610-28; *Obesity*. 2006;14:737-52.

Intensive Weight Loss Intervention in Older Individuals: Results from the Action for Health in Diabetes Type 2 Diabetes Mellitus Trial

Baseline Characteristic	Aged 45–64 at Enrollment			Aged 65–76 at Enrollment			
	DSE n = 2,022	ILI n = 2,072	Difference Between Intervention Groups *P*-Value	DSE n = 553	ILI n = 500	Difference Between Intervention Groups *P*-Value	Difference Between Age Cohorts *P*-Value
Body mass index, kg/m^2 (%)			.02			.14	<.001
25–29	12.5	14.2		19.7	21.8		
30–34	32.8	34.6		42.5	40.8		
35–39	30.6	26.3		21.9	25.6		
≥ 40	24.0	25.0		15.9	11.8		
Weight, kg, mean ± SD	101.9 ± 19.1	101.6 ± 20.3	.62	96.9 ± 17.4	96.2 ± 16.3	.47	<.001
Waist circumference, cm, mean ± SD	114.5 ± 13.7	114.1 ± 14.8	.46	112.6 ± 13.0	112.4 ± 12.4	.77	<.001





The intensive lifestyle intervention produced mean increases in HDL cholesterol (2.03 mg/dL; p< .001) and decreases in HbA1c (0.21%; p< .001) and waist circumference (3.52 cm; p< .001) over 4 years that were at least as large in older as in younger individuals.

Espeland MA et al. J Am Geriatr Soc 2013;61:912-22

Fat Mass Loss Predicts Gain in Physical Function With Intentional Weight Loss in Older Adults

Table 1. Study Descriptions

Study Name	*N* (M:F)	Age (y)	Intervention Duration (wk)	Initial BMI (kg/m^2)	Weight Loss Strategy and Goal
Cooperative Lifestyle Intervention Program (CLIP)	98 (31:67)	65–79	26	28–40	Nutrition education counseling and lifestyle behavior modification involving at least 150 min/wk of moderate intensity exercise; targeted loss of 7%–10% initial body mass.
Diet, Exercise, Metabolism, and Obesity in Older Women (DEMO)	85 (0:85)	50–70	20	25–40	Controlled feeding (–400 kcal/d deficit) and structured aerobic exercise for two thirds of study participants (45%–75% HRR for 30 mins 3 d/wk); targeted loss of 10% initial body mass.
Optimizing Body Composition for Function in Older Adults (OPTIMA)	88 (48:40)	65–79	16	>30 or 25–29.9 and WC >35" women or >40" men	Meal replacements, nutrition education counseling, and lifestyle behavior modification. Three d/wk resistance training (3 sets, 8–10 reps at 70% 1 RM) for half of study participants; targeted loss of 7% initial body mass.

Note: BMI = body mass index; HRR = heart rate reserve; M = male; N = sample size; RM = repetition maximum; WC = waist circumference.

Results. Overall loss of body weight was -7.8 ± 6.1 kg (-5.6 ± 4.1 kg and -2.7 ± 2.4 kg of fat and lean mass, respectively). In all studies combined, after adjustment for age, sex, and height, overall WL was associated with significant improvements in self-reported mobility disability ($p < .01$) and walking speed ($p < .01$). Models including change in both fat and lean mass as independent variables found only the change in fat mass to significantly predict change in mobility disability (β[fat] = 0.04; $p < .01$) and walking speed (β[fat] = –0.01; $p < .01$).

Beavers KM et al. J Gerontol A Biol Sci Med Sci 2013;68:80-86

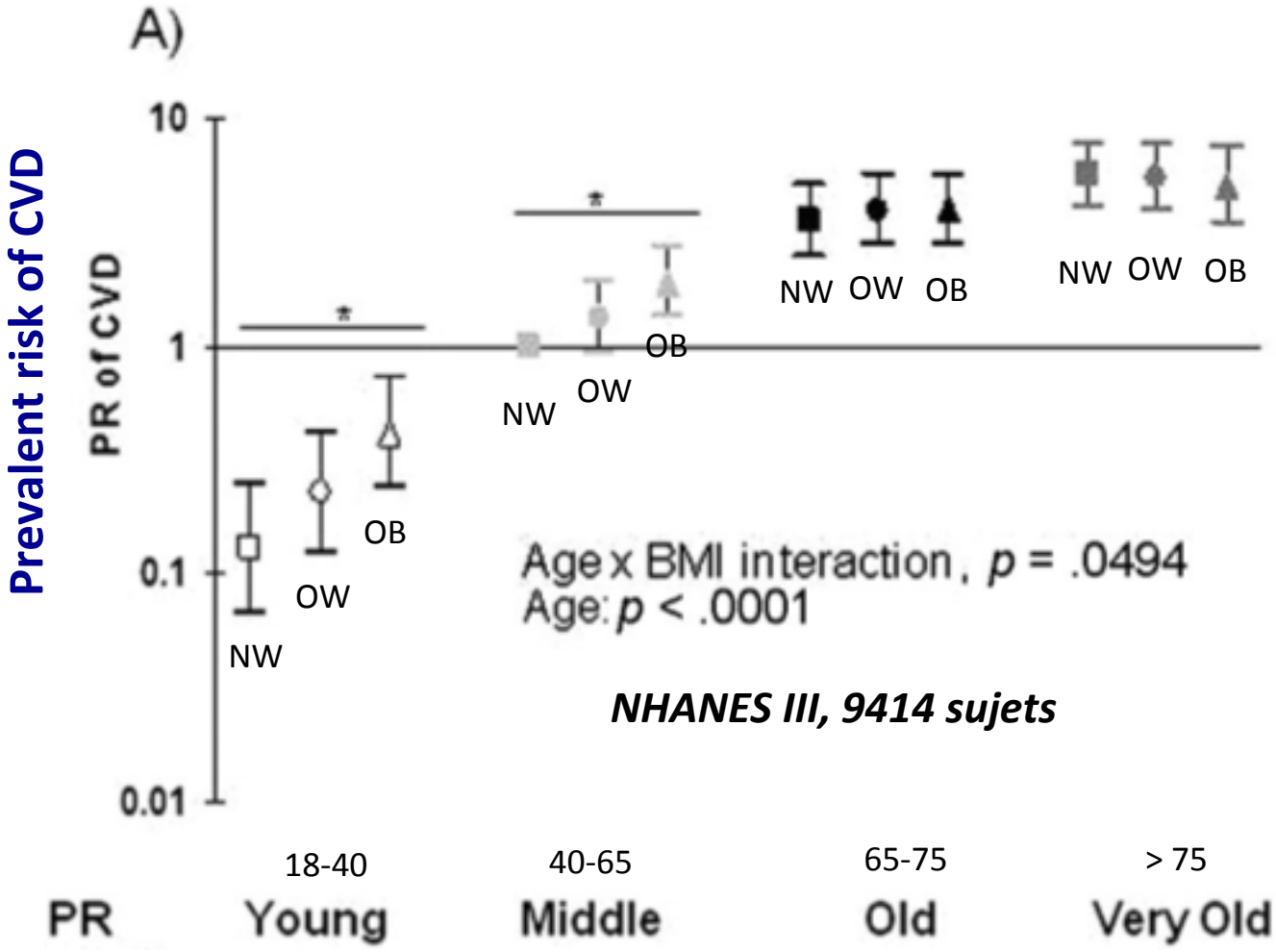
KEY POINTS

- Obesity in older adult people is a growing public health problem.
- Obesity exposes older people to chronic comorbidities, functional disabilities, and decreased quality of life, and constitutes a major source of frailty.
- Weight management in obese older people remains controversial because of the uncertainties about the 'obesity paradox' and the potential harmful effects of weight loss in this population (sarcopenia, loss of bone density, and micronutrient deficiencies).
- In individualized cases, a moderate dietary restriction can be proposed in obese older people provided that regular physical activity can be combined with the aim to minimize the loss of muscle and bone mass.
- Recent randomized studies have shown that in obese older people, intentional moderate weight loss obtained through a modest energy restriction coupled with regular exercise (both aerobic and resistance) may reduce insulin resistance, cardiovascular risk factors, and chronic inflammation and improve functional performances and quality of life.

Darmon P. **Curr Opin Clin Nutr Metab Care** 2013, 16:284–289


A. Cide
"Je vous le dis moi,...
Nos plus belles années sont devant nous!"...

Relationship Between Obesity and Obesity-Related Morbidities Weakens With Aging



Canning KL et al. J Gerontol A Biol Sci Med Sci 2014;69:87-92

Changes in body weight and blood pressure: paradoxical outcome events in overweight and obese subjects with cardiovascular disease

BACKGROUND/OBJECTIVES: The Sibutramine Cardiovascular OUTcomes (SCOUT) trial showed a significantly increased relative risk of nonfatal cardiovascular events, but not mortality, in overweight and obese subjects receiving long-term sibutramine treatment with diet and exercise. We examined the relationship between early changes (both increases and decreases) in body weight and blood pressure, and the impact of these changes on subsequent cardiovascular outcome events.

SUBJECTS/METHODS: A total of 9804 male and female subjects, aged 55 years or older, with a body mass index of 27–45 kg m^{-2} were included in this current subanalysis of the SCOUT trial. Subjects were required to have a history of cardiovascular disease and/or type 2 diabetes mellitus with at least one cardiovascular risk factor (hypertension, dyslipidemia, current smoking or diabetic nephropathy) to assess cardiovascular outcomes. *Post hoc* subgroup analyses of weight change (categories) and blood pressure were performed overall and by treatment group (6-week sibutramine followed by randomized placebo or continued sibutramine). The primary outcome event (POE) was a composite of nonfatal myocardial infarction, nonfatal stroke, resuscitated cardiac arrest or cardiovascular death. Time-to-event analyses of the POE were performed using Cox regression models with factors for treatment, subgroups and interactions.

RESULTS: During the initial 6-week sibutramine treatment period, systolic blood pressure decreased progressively with increasing weight loss in hypertensive subjects (-8.1 ± 10.5 mm Hg with < 5 kg weight loss to -10.8 ± 11.0 mm Hg with $\geqslant 5$ kg weight loss). The highest POE incidence occurred mainly in groups with increases in both weight and blood pressure. However, with long-term sibutramine treatment, a markedly lower blood pressure tended to increase POEs.

CONCLUSION: Modest weight loss and modest lower blood pressure each reduced the incidence of cardiovascular events, as expected. However, the combination of early marked weight loss and rapid blood pressure reduction seems to be harmful in this obese elderly cardiovascular diseased population.

International Journal of Obesity (2014) **38,** 1165–1171; doi:10.1038/ijo.2014.2

Obesity Paradox in End-Stage Kidney Disease Patients

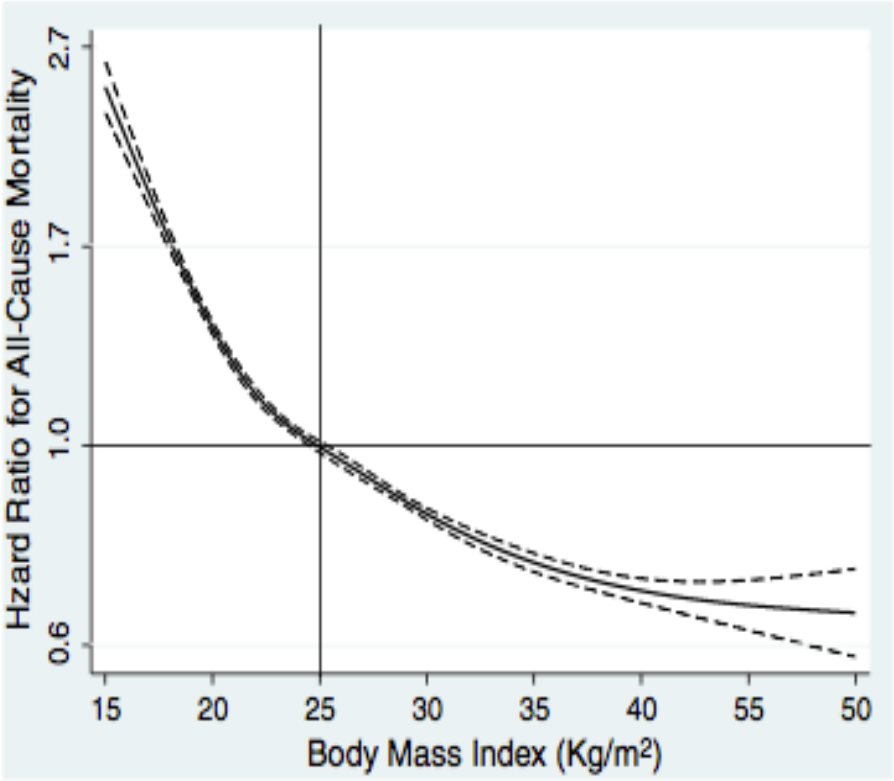


Fig 1 – Association of baseline BMI with mortality in 121,762 US HD patients over 5 years (July 2001–June 2006). The y-axis

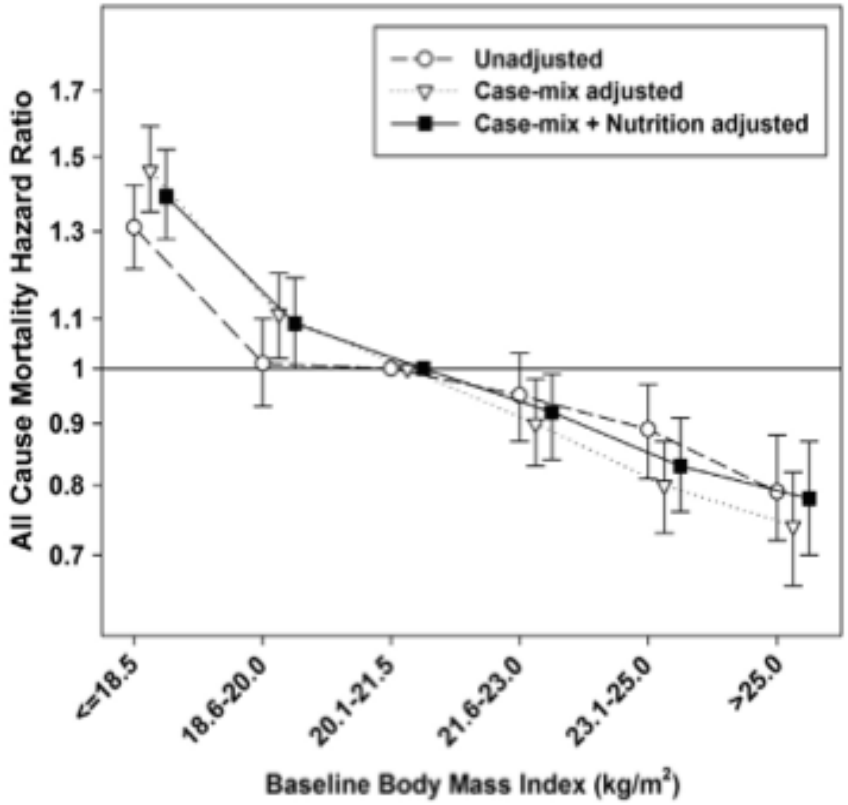
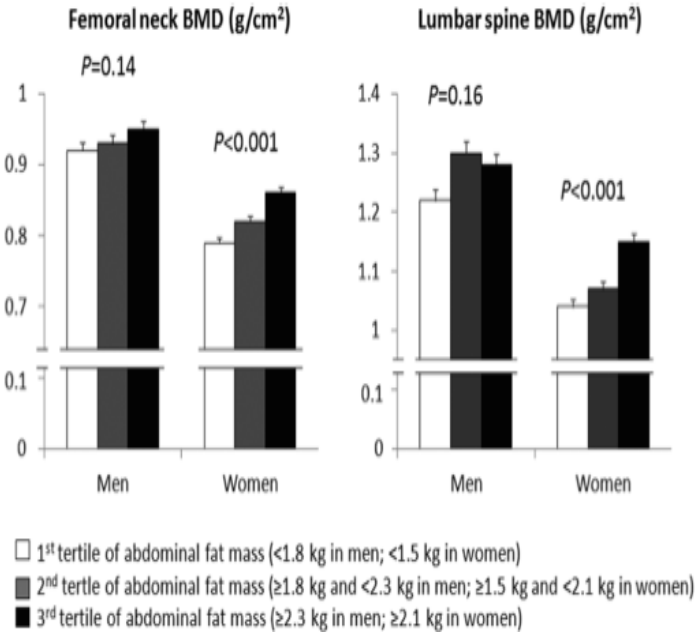


Fig 2 – Unadjusted and adjusted hazard ratios and 95% confidence intervals for all-cause mortality associated with BMI in 20,818 Korean HD patients. The model was adjusted

Park J et al. Prog Cardiovasc Dis 2014;56:415-25

Association Between Abdominal Obesity and Fracture Risk: A Prospective Study

1126 individus, âge moyen 71 ans, suivi moyen 5 ans



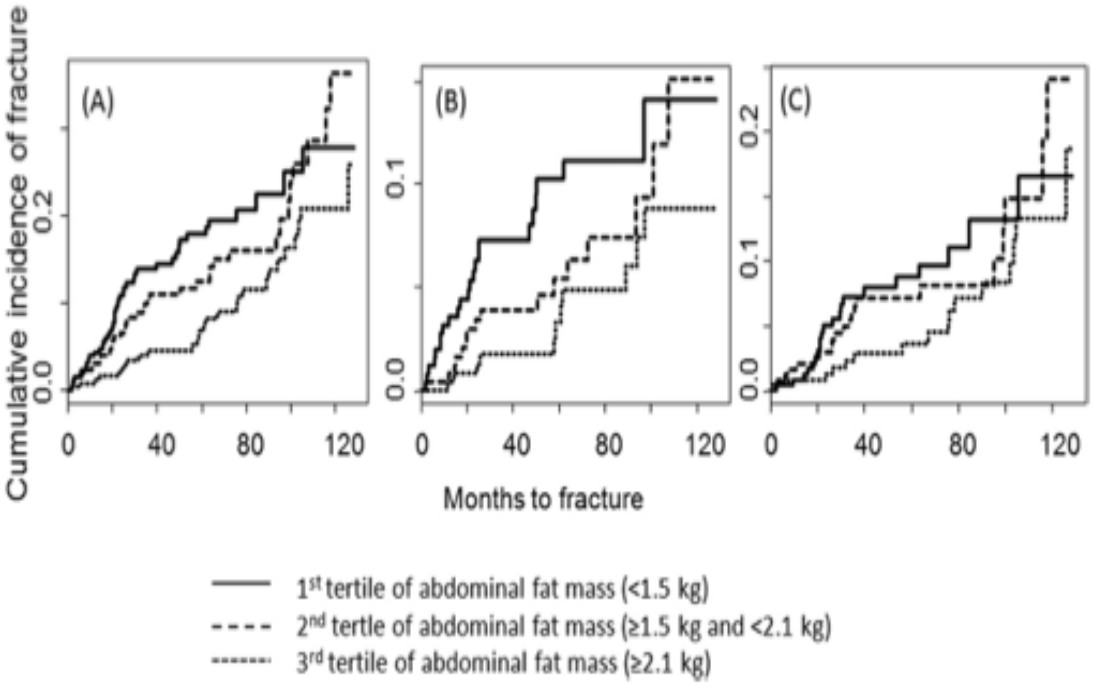


Figure 2. Cumulative risk of fracture in women stratified by aFM tertile. A, Any fracture. B, Vertebral fracture. C, Nonvertebral fracture. Numbers of participants in each tertile of aFM: n = 255, 255, and 256.

Yang S et al. J Clin Endocrinol Metab 2013;98:2478-83

Obesity and the Obesity Paradox in Heart Failure

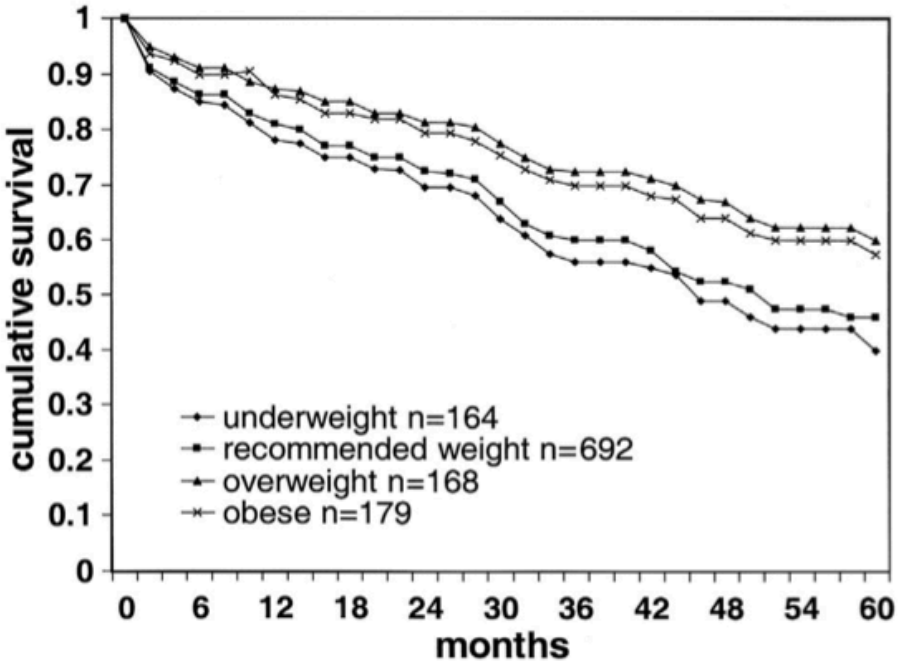


Fig 1 – Risk-adjusted survival curves for the four body mass index (BMI) categories at 5 years. The variables entered into

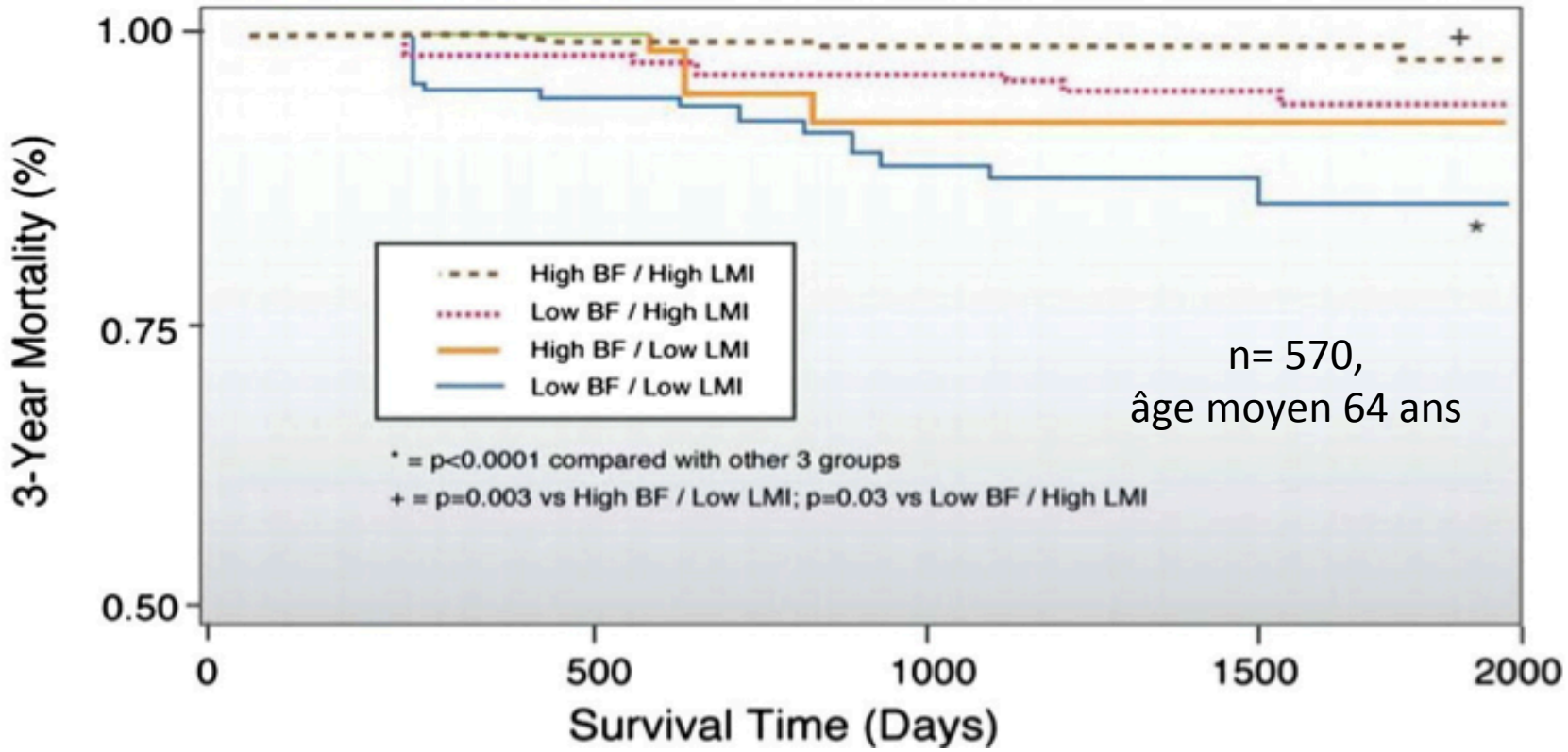
Table 1 – Proposed explanations for the obesity paradox in heart failure.

Nonpurposeful weight loss
Greater metabolic reserves
Less cachexia
Protective cytokines or adipokines
Earlier presentation due to symptomatology
Attenuated response to renin–angiotensin–aldosterone system
Higher blood pressure leading to more optimized cardioprotective medications
Different etiology of heart failure
Increased muscle mass and muscular strength in those with high body mass index
Implications related with cardiorespiratory fitness

Clark AL et al. Prog Cardiovasc Dis 2014;56:409-14

Body Composition and Survival in Stable Coronary Heart Disease

Impact of Lean Mass Index and Body Fat in the "Obesity Paradox"

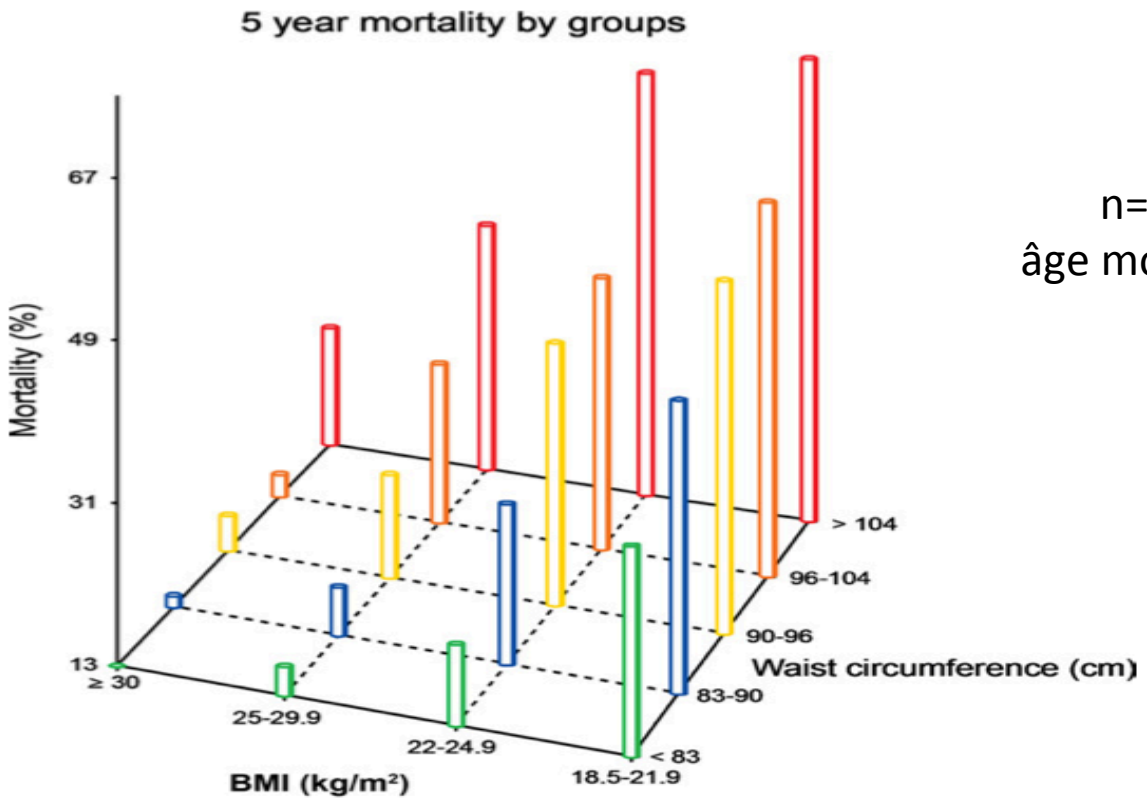


Kaplan–Meier survival curves of 570 subjects referred for cardiac rehabilitation by high and low lean mass index (LMI) and body fat (BF) followed for 3 years for all cause mortality.

Lavie CJ et al. JACC Vol. 60, No. 15, 2012

Combining Body Mass Index With Measures of Central Obesity in the Assessment of Mortality in Subjects With Coronary Disease

Role of "Normal Weight Central Obesity"



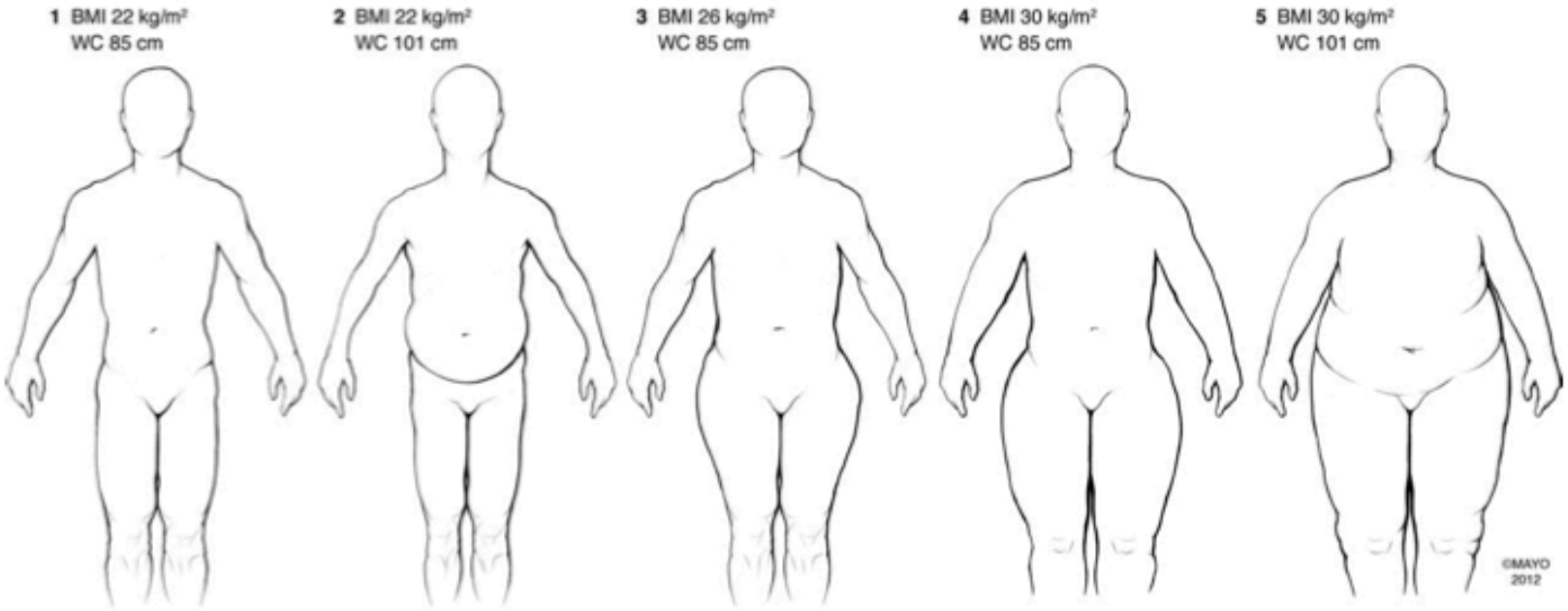
n= 15547,
âge moyen 66 ans

Figure 1 **5-Year Mortality in Patients With Coronary Artery Disease Based on Different Combinations of Body Mass Index With Central Obesity (Waist Circumference)**

Coutinho T et al. JACC Vol. 61, No. 5, 2013

Combining Body Mass Index With Measures of Central Obesity in the Assessment of Mortality in Subjects With Coronary Disease

Role of "Normal Weight Central Obesity"

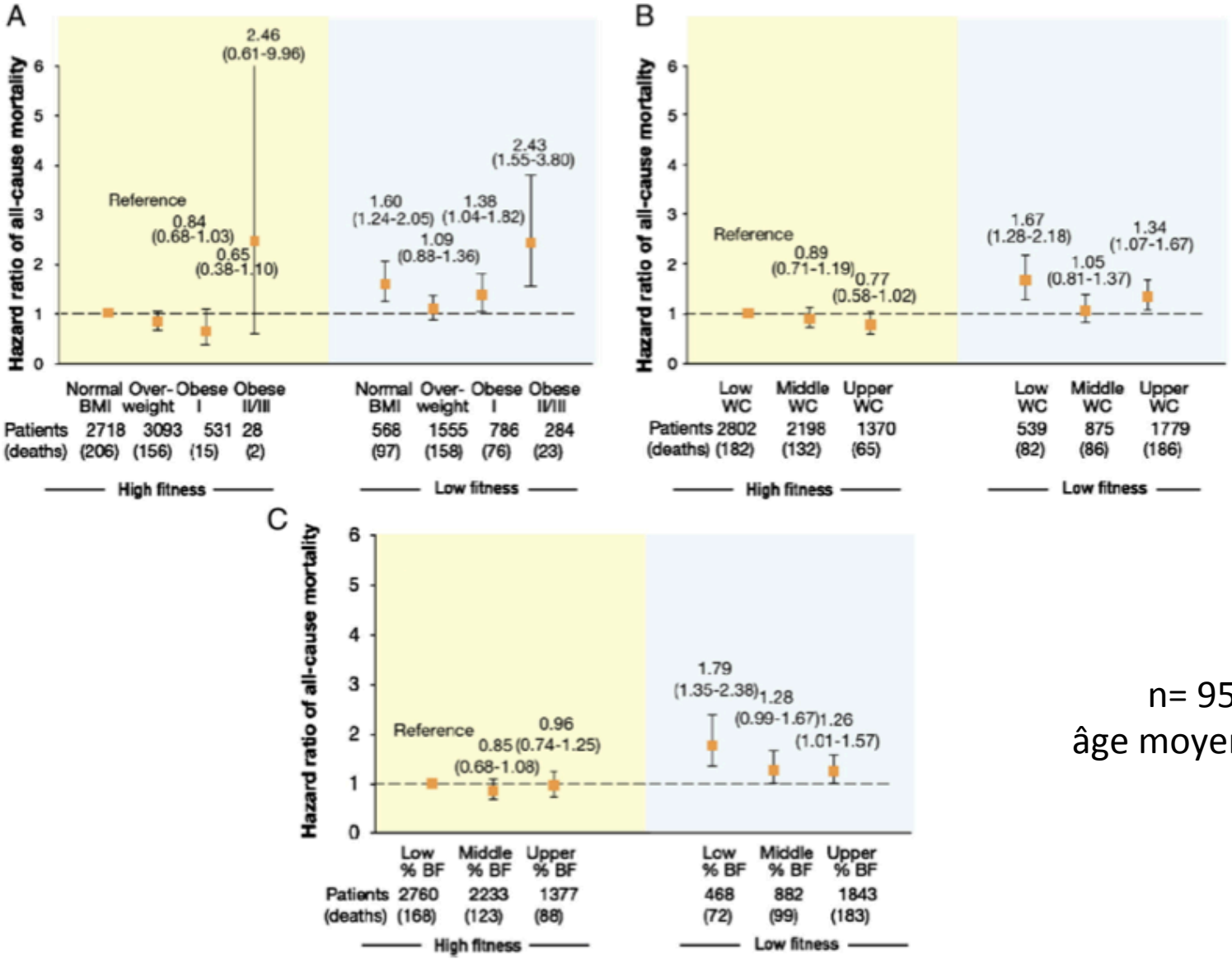


Risk of mortality (HR [95% CI]) for "Normal weight, central obesity" (person 2) compared to:
- *Person 1: HR 1.10 (1.05, 1.17), P < 0.0001*
- *Person 3: HR 1.20 (1.09, 1.31), P < 0.0001*
- *Person 4: HR 1.61 (1.39, 1.86), P < 0.0001*
- *Person 5: HR 1.27 (1.18, 1.39), P < 0.0001*

Figure 3 **Mortality Risk of Subjects With Normal Weight Central Obesity Compared With Subjects With Other Patterns of Adiposity, Using Waist Circumference as a Measure of Central Obesity**

Coutinho T et al. JACC Vol. 61, No. 5, 2013

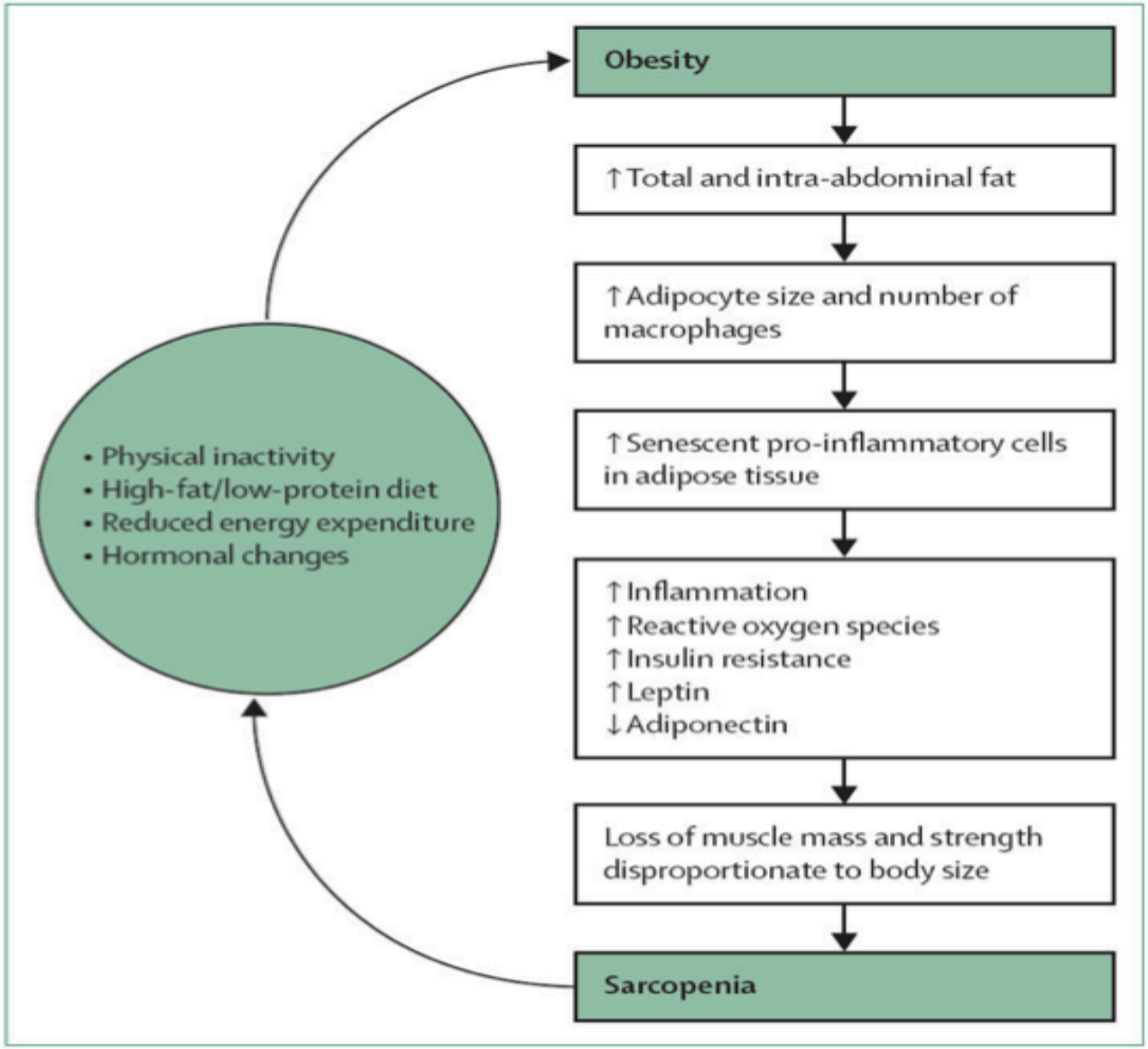
The Obesity Paradox, Cardiorespiratory Fitness, and Coronary Heart Disease



n= 9563,
âge moyen 47 ans

McAuley PA et al. Mayo Clin Proc. 2012;87(5):443-451

Development of Sarcopenic Obesity



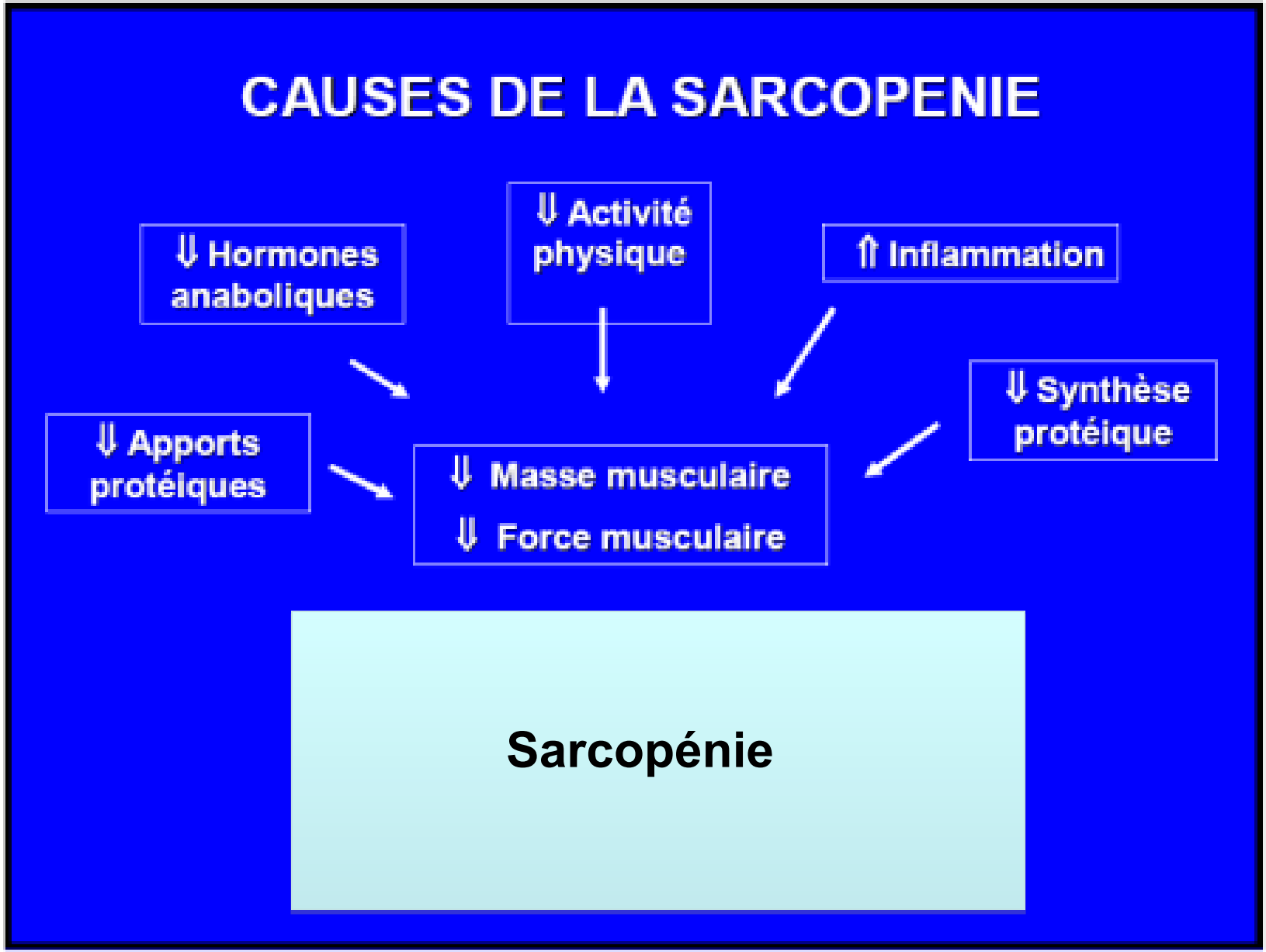
Kalyani RR et al. Lancet Diabetes Endocrinol 2014 October ; 2(10): 819–829

Fitness, fatness and survival in elderly populations

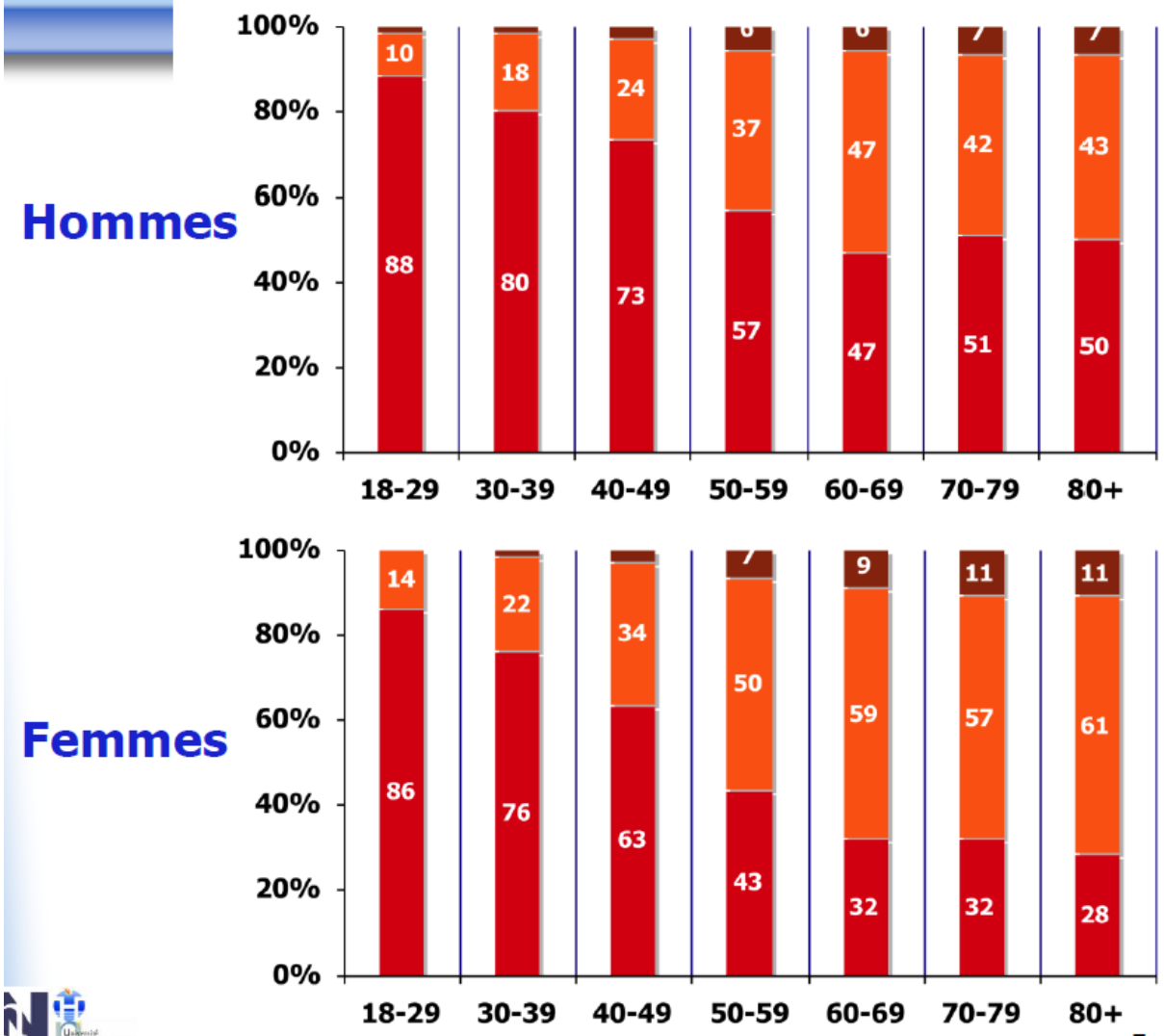
Table 5 Multivariate proportional mortality hazard ratios (HRs) by body mass index (BMI) and fitness category in study participants

Fitness category[a]	No. of subjects	No. (%) of deaths	*P* trend[b]	HR (95% CI)[c]	*P* value
BMI<18.5 (kg/m^2)					
Low fitness	84	29 (34.5)	0.018	3.34 (2.13–5.24)	0.000
Moderate fitness	63	15 (23.8)		2.67 (1.54–4.73)	0.001
High fitness	68	12 (17.6)		2.17 (1.18–4.01)	0.013
BMI 18.5–24.9 (kg/m^2)					
Low fitness	763	115 (15.1)	0.000	1.61 (1.19–2.18)	0.002
Moderate fitness	823	102 (12.4)		1.54 (1.14–2.07)	0.005
High fitness	885	76 (8.6)		1 (reference)	–
BMI 25.0–29.9 (kg/m^2)					
Low fitness	436	59 (13.5)	0.010	1.66 (1.17–2.36)	0.005
Moderate fitness	414	40 (9.7)		1.22 (0.83–1.80)	0.315
High fitness	340	27 (7.9)		0.92 (0.59–1.43)	0.697
BMI≥30.0 (kg/m^2)					
Low fitness	55	6 (10.9)	0.874	1.65 (0.71–3.84)	0.242
Moderate fitness	39	2 (5.1)		0.78 (0.19–3.19)	0.730
High fitness	30	4 (13.3)		1.53 (0.56–4.22)	0.407

Woo J et al. Age (2013) 35:973–984


CAUSES DE LA SARCOPENIE
⇓ Hormones anaboliques
⇓ Activité physique
⇑ Inflammation
⇓ Apports protéiques
⇓ Masse musculaire
⇓ Force musculaire
⇓ Synthèse protéique
Sarcopénie

Prévalence de la sarcopénie aux USA : résultats de la NHANES III



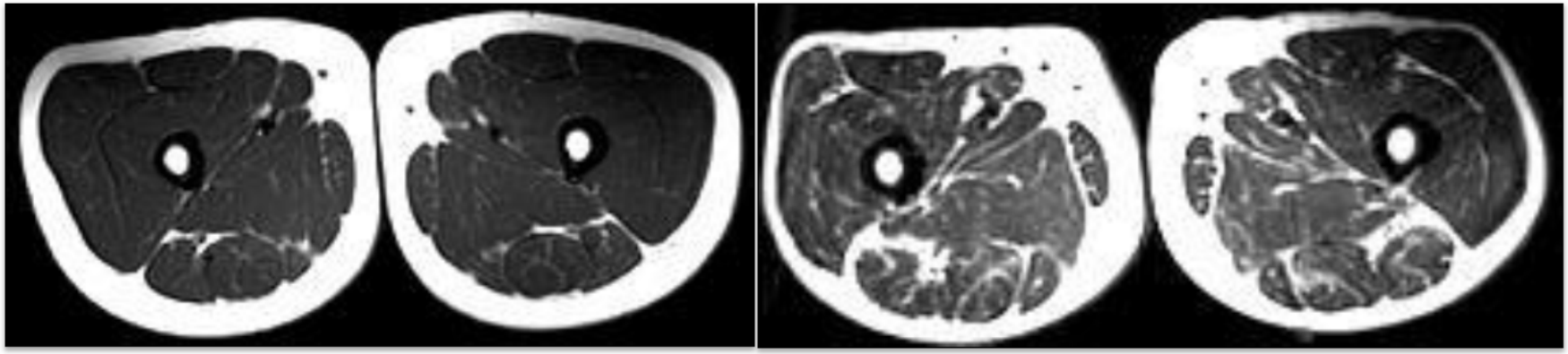
Détermination d'un indice de masse musculaire chez 14.818 adultes de plus de 18 ans dont 4.504 de plus de 60 ans

Janssen et al J Am Geriatr Soc 2002

Sarcopénie : perte involontaire de masse musculaire chez un sujet âgé bien portant

"No decline with age is more dramatic or potentially more functionally significant than the decline in lean body mass. Why have we not given it more attention? Perhaps it needs a name derived from the Greek. I'll suggest a couple: sarcomalacia or *sarcopenia*."

I.H. Rosenberg, *Am J Clin Nutr* 1989;50:1231-1233

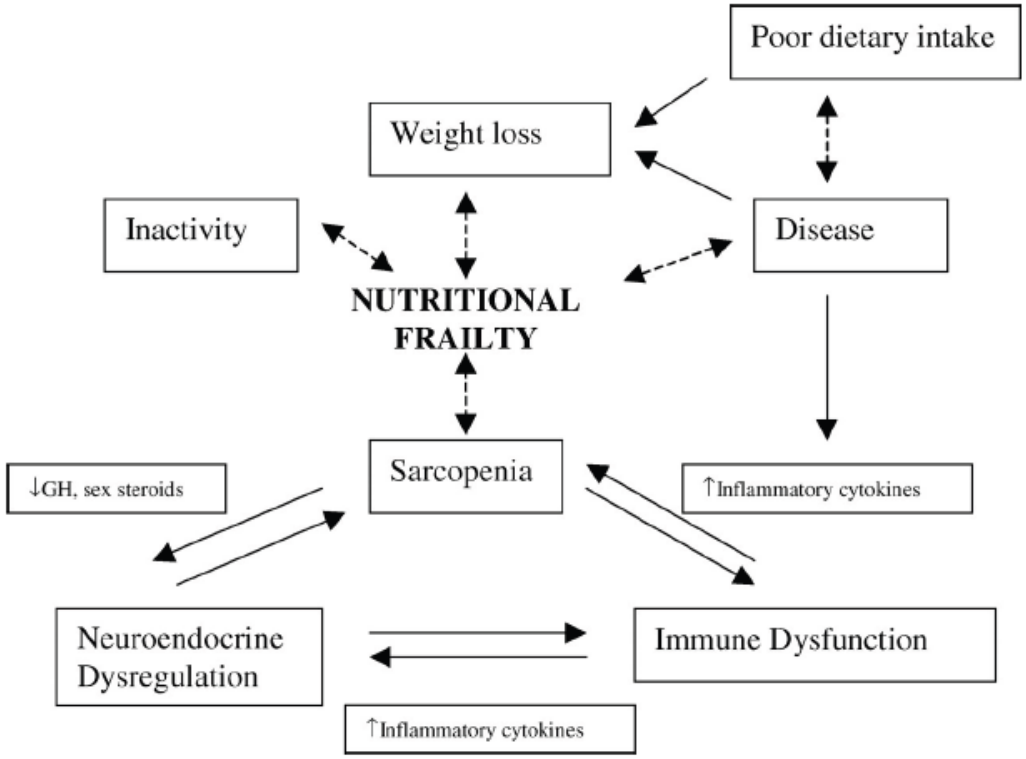


Age: 25 ans
IMC : 31.7
Surface musculaire: 398 cm^2
Surface graisseuse: 6 cm^2 (1.5%)

Age : 65 ans
IMC : 31.9
Surface musculaire : 292 cm^2
Surface graisseuse : 53 cm^2 (15.3%)

CONSEQUENCES DE LA SARCOPENIE

« Nutritional Frailty »



Syndrome responsable d' une altération fonctionnelle, de chutes, d' infections,…

Bales CW & CS Ritchie, 2002

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

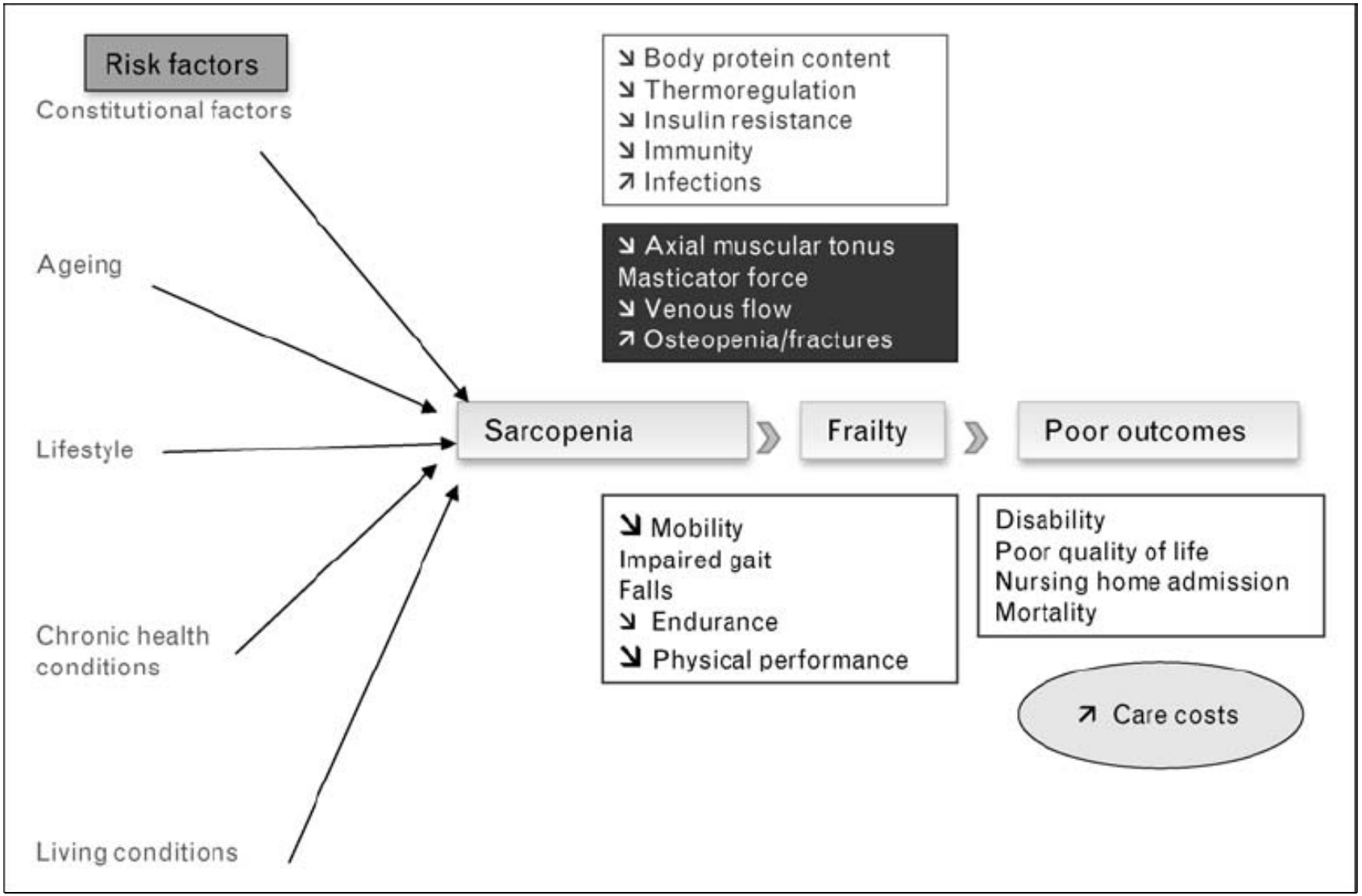
Stage	Muscle mass	Muscle strength		Performance
Presarcopenia	↓			
Sarcopenia	↓	↓	Or	↓
Severe sarcopenia	↓	↓		↓

Cruz-Jentoft *et al.* Age Ageing 2010

Tableau 2
Besoins moyens par kg de poids réel ou de poids idéal suivant l'IMC ; calcul à partir de la composition corporelle (DEXA) de 1963 sujets obèses (données personnelles).

IMC	18,5–24,9	25–29,9	30–34,9	35–39,9	>40
Besoins en g protéines/kg de poids réel					
Homme	0,9	0,8	0,75	0,7	0,65
Femme	0,8	0,7	0,6	0,6	0,55
Besoins en g protéines/kg de poids idéal					
Homme	1,0	1,0	1,1	1,2	1,3
Femme	0,8	0,8	0,9	1,0	1,1

Sarcopénie : un syndrome gériatrique



Cruz-Jentoft *et al.* Curr Opin Clin Nutr Metab Care 2010