Quelles recommandations nutritionnelles chez l'insuffisant respiratoire chronique lors de la réhabilitation ?

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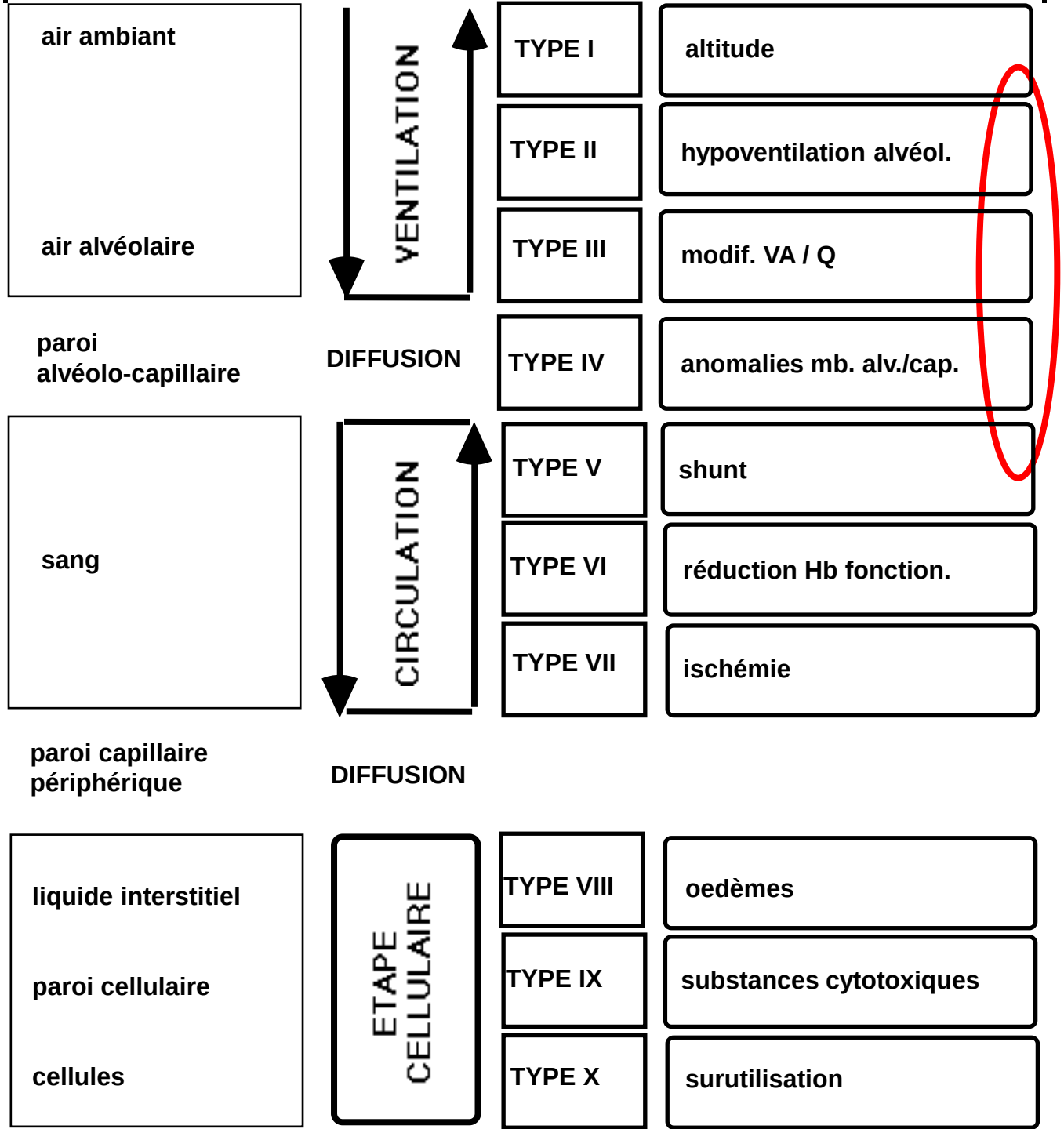
Université Grenoble Alpes

Conférence AKCR, Lyon, le 13-01-2014

Insuffisance Respiratoire Chronique



Poids de l'insuffisance respiratoire chronique

Mannino DM, Buist AS. Lancet 2007;370:765

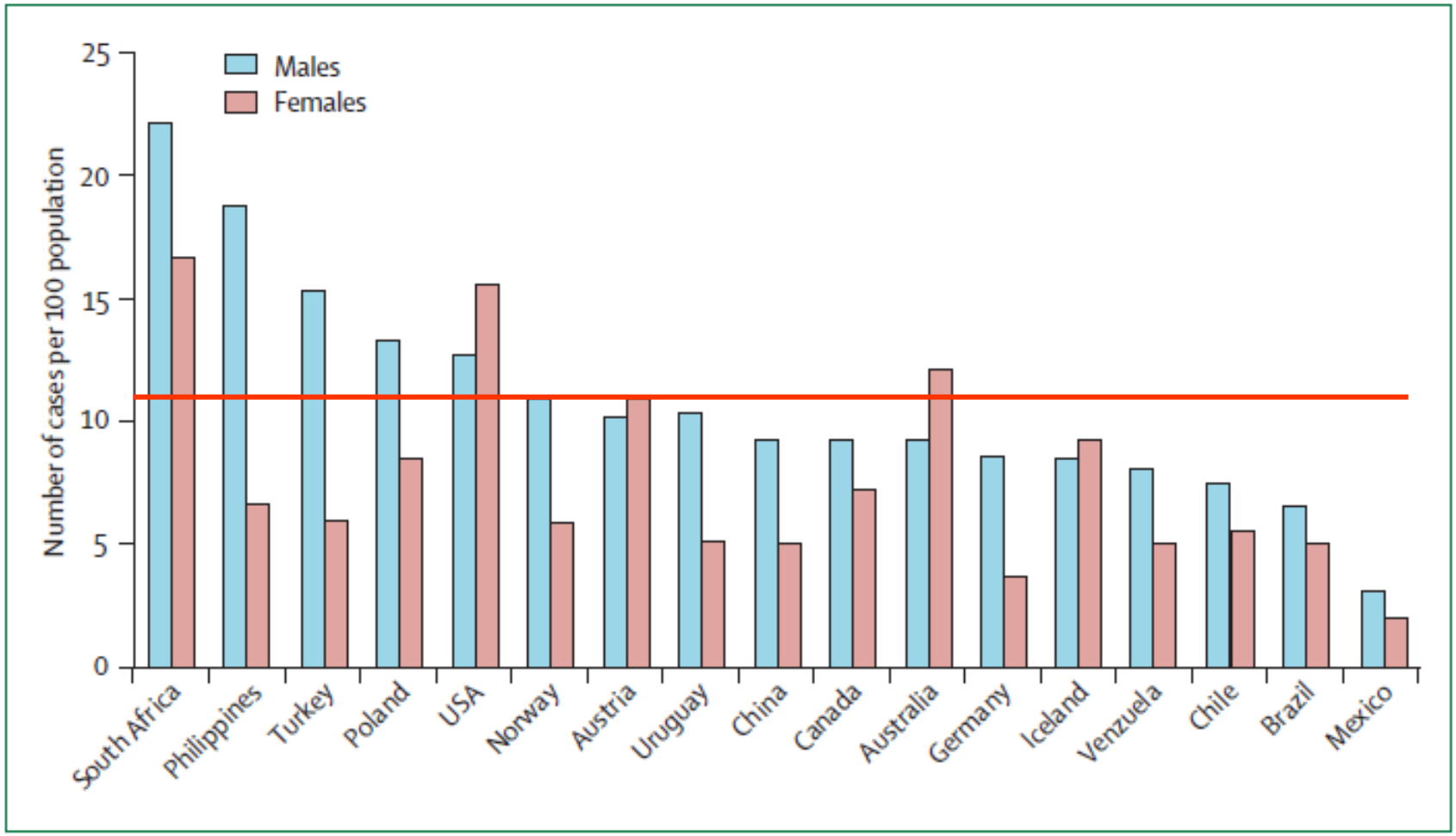
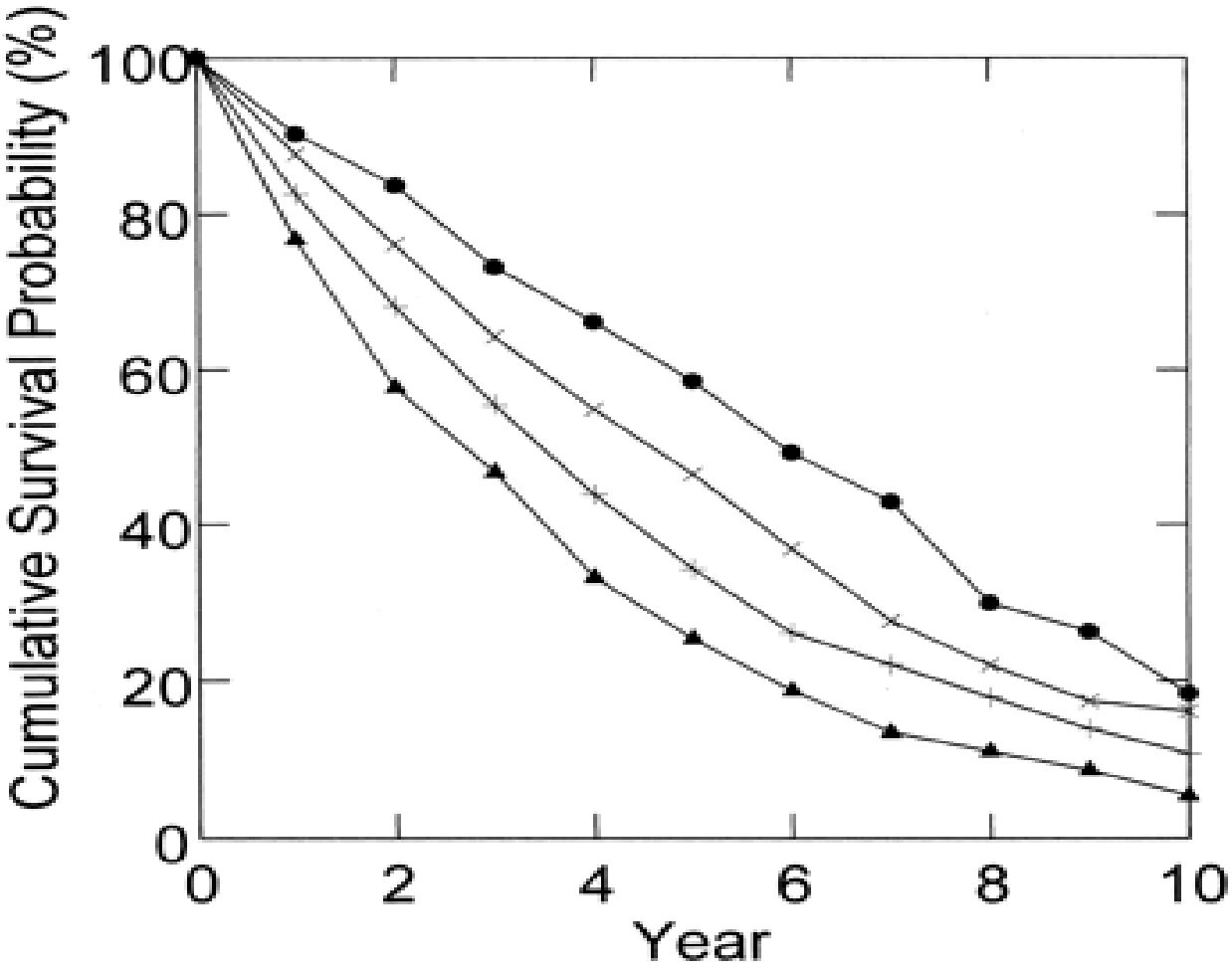


Figure 4: **Estimated prevalence of GOLD stage 2 or higher COPD**
Data taken from the PLATINO study[60] and the BOLD project.[26] Estimates are for small regions of the listed countries and do not necessarily represent national prevalence estimates.

Table 1. Top 10 Causes of Death, Years of Life Lost from Premature Death, Years Lived with Disability, and Disability-Adjusted Life-Years (DALYs) in the United States, 2010.

Cause of Death	Deaths (N=2664)		Years of Life Lost (N=45,145)		Years Lived with Disability (N=36,689)		DALYs (N=81,835)	
	Rank	No. (%) *in thousands*	Rank	No. (%) *in thousands*	Rank	No. (%) *in thousands*	Rank	No. (%) *in thousands*
Ischemic heart disease	1	563 (21.1)	1	7165 (15.9)	16	685 (1.9)	1	7850 (9.6)
Chronic obstructive pulmonary disease	5	154 (5.8)	4	1913 (4.2)	6	1745 (4.8)	2	3659 (4.5)
Low back pain	—	—	—	—	1	3181 (8.7)	3	3181 (3.9)
Cancer of the trachea, bronchus, or lung	3	163 (6.1)	2	2988 (6.6)	73	45 (0.1)	4	3033 (3.7)
Major depressive disorder	—	—	—	—	2	3049 (8.3)	5	3049 (3.7)
Other musculoskeletal disorders	36	14 (0.5)	37	254 (0.6)	3	2603 (7.1)	6	2857 (3.5)
Stroke	2	172 (6.5)	3	1945 (4.3)	17	629 (1.7)	7	2574 (3.1)
Diabetes mellitus	6	86 (3.2)	7	1392 (3.1)	8	1165 (3.2)	8	2557 (3.1)
Road-traffic injury	12	44 (1.7)	5	1873 (4.1)	26	373 (1.0)	9	2246 (2.7)
Drug-use disorders	27	19 (0.7)	15	841 (1.9)	7	1295 (3.5)	10	2136 (2.6)

Hypoxémie, Hypoxie, Oxygène conformité



4 088 BPCO

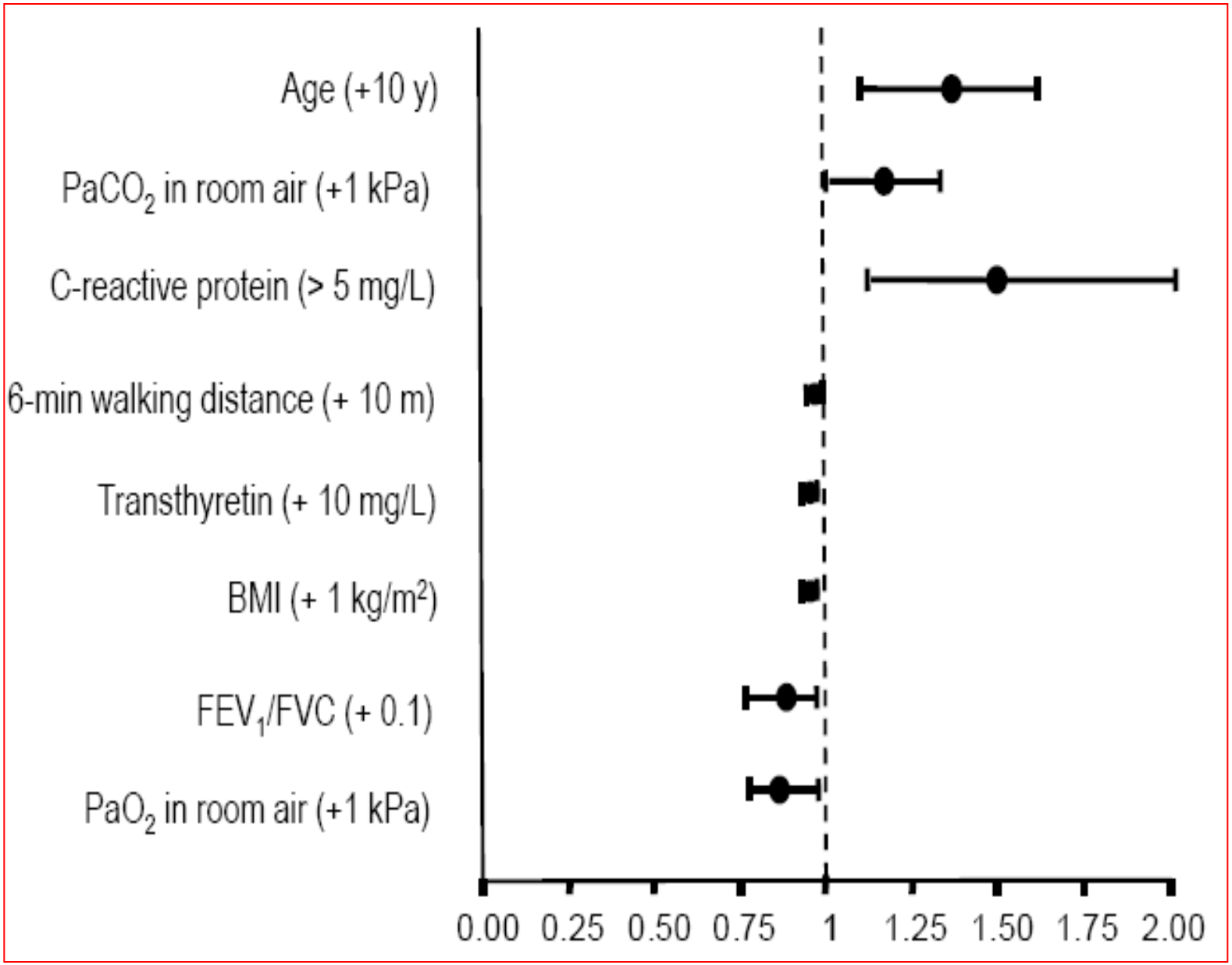
PaO_2 < 8 kPa

VEMS / CVF < 0,6

OLT 1984 - 93

***Chest* 2003;123:1460**

Hypoxémie, Hypoxie, Oxygène conformité



637 IRC suivis 53±31 mois

Cano NJM, Pichard C, Roth H, Court-Fortuné I, Cynober L, Gérard-Boncompain M, Cuvelier A, Jean-Pierre Laaban JP, Jean-Claude Melchior JCl, Raphaël JCl, Pison CM and the Clinical Research Group of the Société Francophone de Nutrition Entérale et Parentérale. Systems approach to survival of patients with chronic respiratory failure at home. *2013, submitted*

Evaluer

Classification Internationale du Fonctionnement-CIF, OMS, 2001

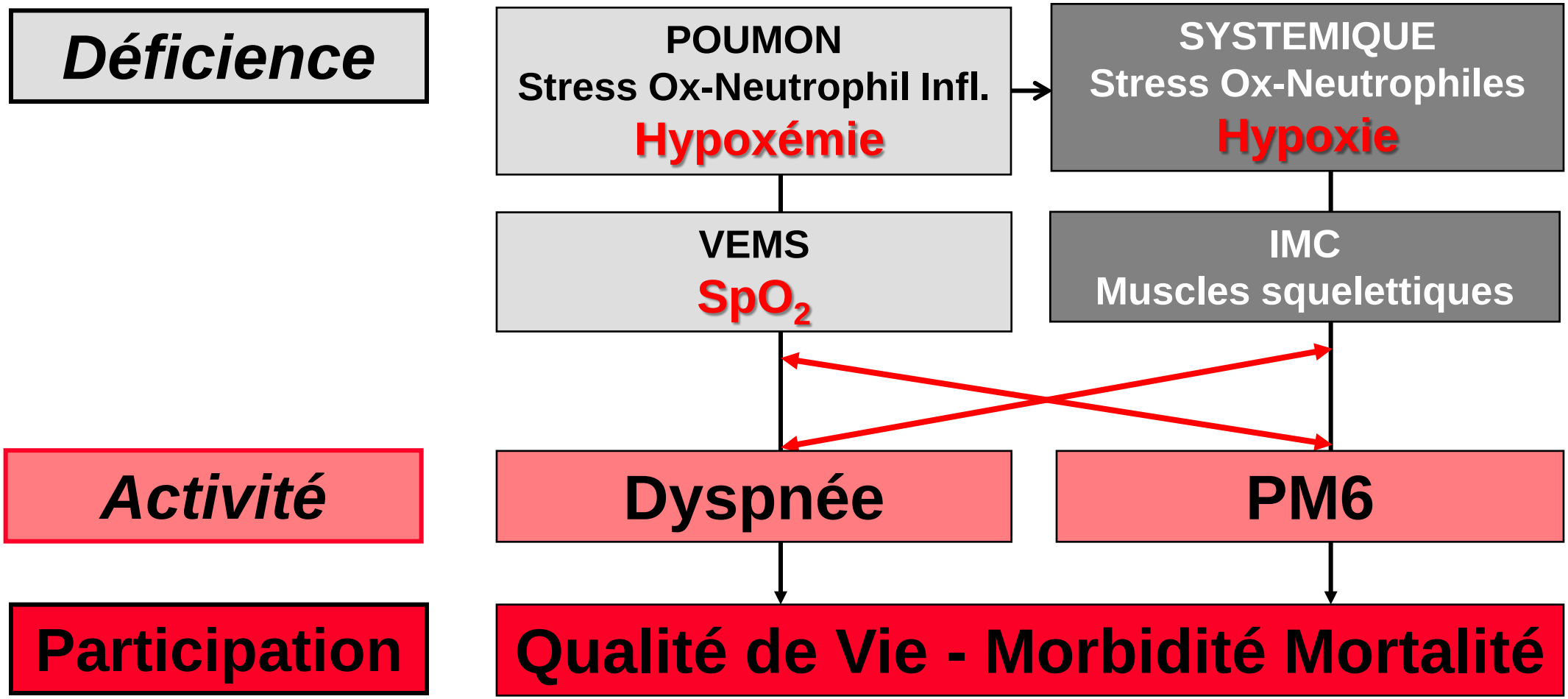
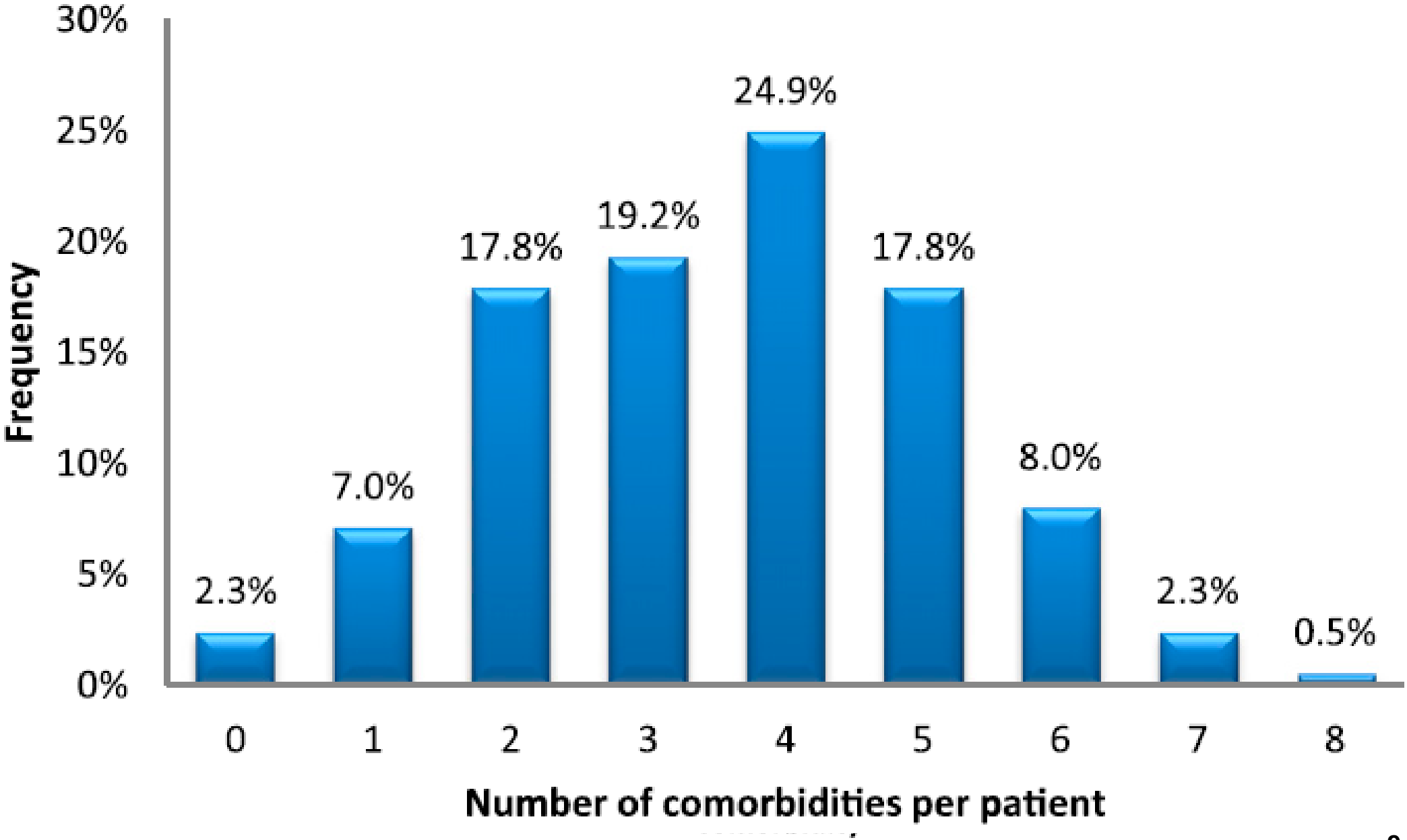


TABLE 1. PATIENTS' CHARACTERISTICS

	All Subjects ($n = 213$)
Age, yrs	63.6 ± 7.0
Male, %	59
BMI, kg/m^2	26.2 ± 5.1
FFMI, kg/m^2	17.0 ± 2.4
mMRC dyspnea grade	2.1 ± 1.09
Current smoker, %	28
Pack-years	46 ± 26
Long-term oxygen therapy, %	17
FEV_1, L	1.40 ± 0.54
FEV_1, % predicted	51.2 ± 16.9
FEV_1/FVC	0.40 ± 0.11
ITGV, % predicted	148 ± 33
TLCO, % predicted	56 ± 17
6MWD, m	470 ± 106
SGRQ, total score	51.3 ± 17.5
Updated BODE score	2.9 ± 2.5
Framingham 10-yr risk, %	9.4 ± 6.7

Evaluer


30%
25%
20%
15%
10%
5%
0%
Frequency
2.3%
7.0%
17.8%
19.2%
24.9%
17.8%
8.0%
2.3%
0.5%
0
1
2
3
4
5
6
7
8
Number of comorbidities per patient

Evaluer

TABLE 2. DETAILED DESCRIPTION OF THE FIVE CLUSTERS IN TERMS OF THE NUMBER OF COMORBIDITIES AND THE PREVALENCE OF EACH COMORBIDITY

Comorbidities	Cluster 1: Less Comorbidity	Cluster 2: Cardiovascular	Cluster 3: Cachectic	Cluster 4: Metabolic	Cluster 5: Psychologic
N	67	49	44	33	20
Number of comorbidities	2.5 ± 1.4*	3.8 ± 1.7	4.2 ± 1.4†	4.4 ± 1.1†	4.1 ± 1.8
Renal impairment, %	16	24	45†	9	5
Anemia, %	9	4	2	3	5
Hypertension, %	3*	98†	43	100†	5*
Obesity, %	30	14	0*	61†	15
Underweight, %	0*	0*	66†	3*	0
Muscle wasting, %	12*	10*	98†	0*	20
Hyperglycemia, %	52	41*	43	91†	60
Dyslipidemia, %	42	16*	25	67†	40
Osteoporosis, %	27	37	52†	0*	35
Anxiety, %	5*	28	26	0*	84†
Depression, %	6*	23	7	6	68†
Atherosclerosis, %	56	67†	12*	81†	53
Myocardial infarction, %	2*	11	7	13	32†

Summary variables are presented as mean ± standard deviation for quantitative variables, and percentage for discrete variables.
* Less prevalent compared with the whole study sample (95% confidence interval).
† More prevalent compared with the whole study sample (95% confidence interval).

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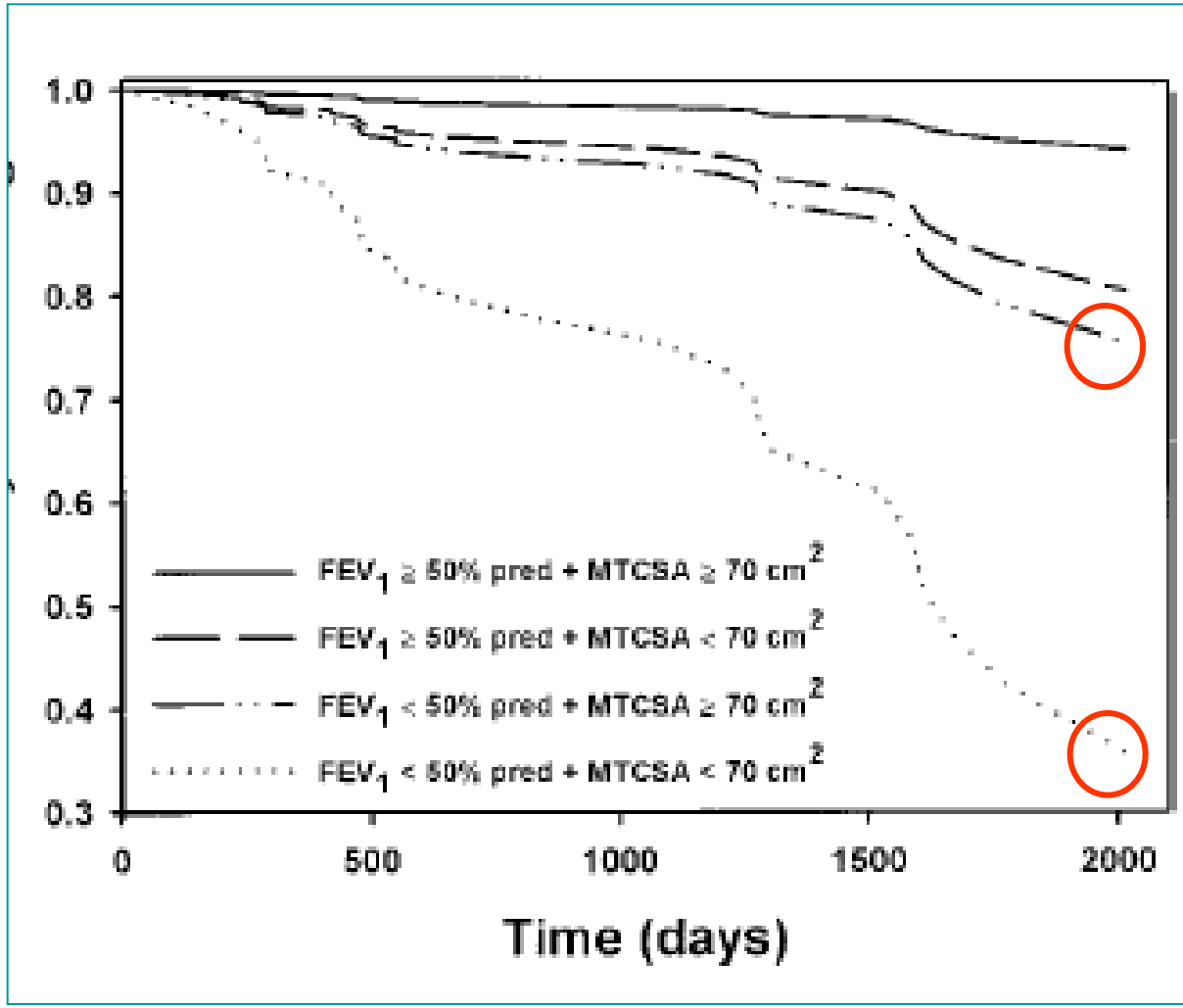
Section partie moyenne cuisse par TDM,
142 BPCO,
65 ± 16 ans
VEMS : 42 ± 16 % th.

AJRCCM 2002;166:809



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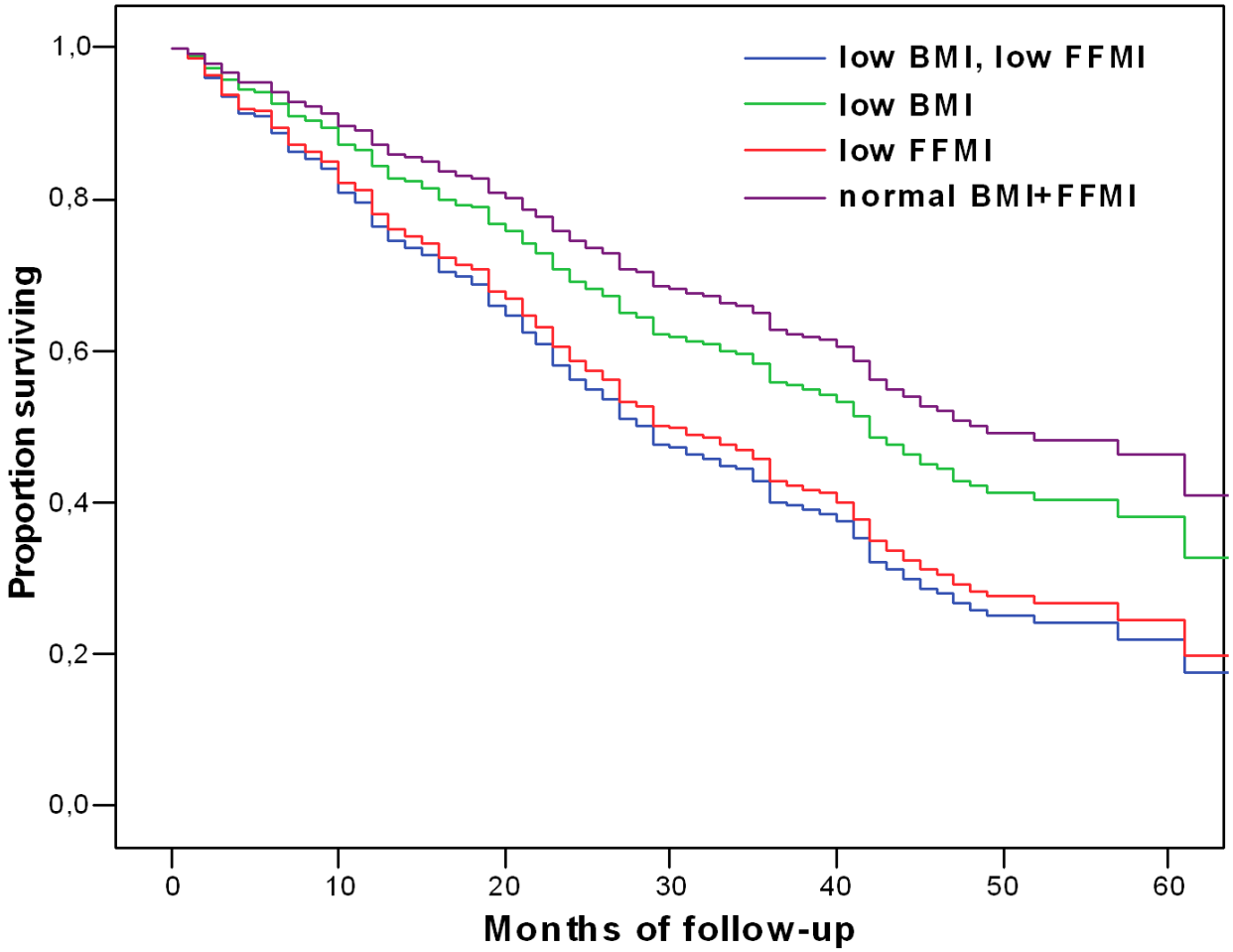
Survie en fonction de la composition corporelle, ajustée sur l'âge, le genre, la fonction respiratoire et le tabagisme



Malnutrition

Sarcopénie

Cachexie

Schols, AJCN 2005

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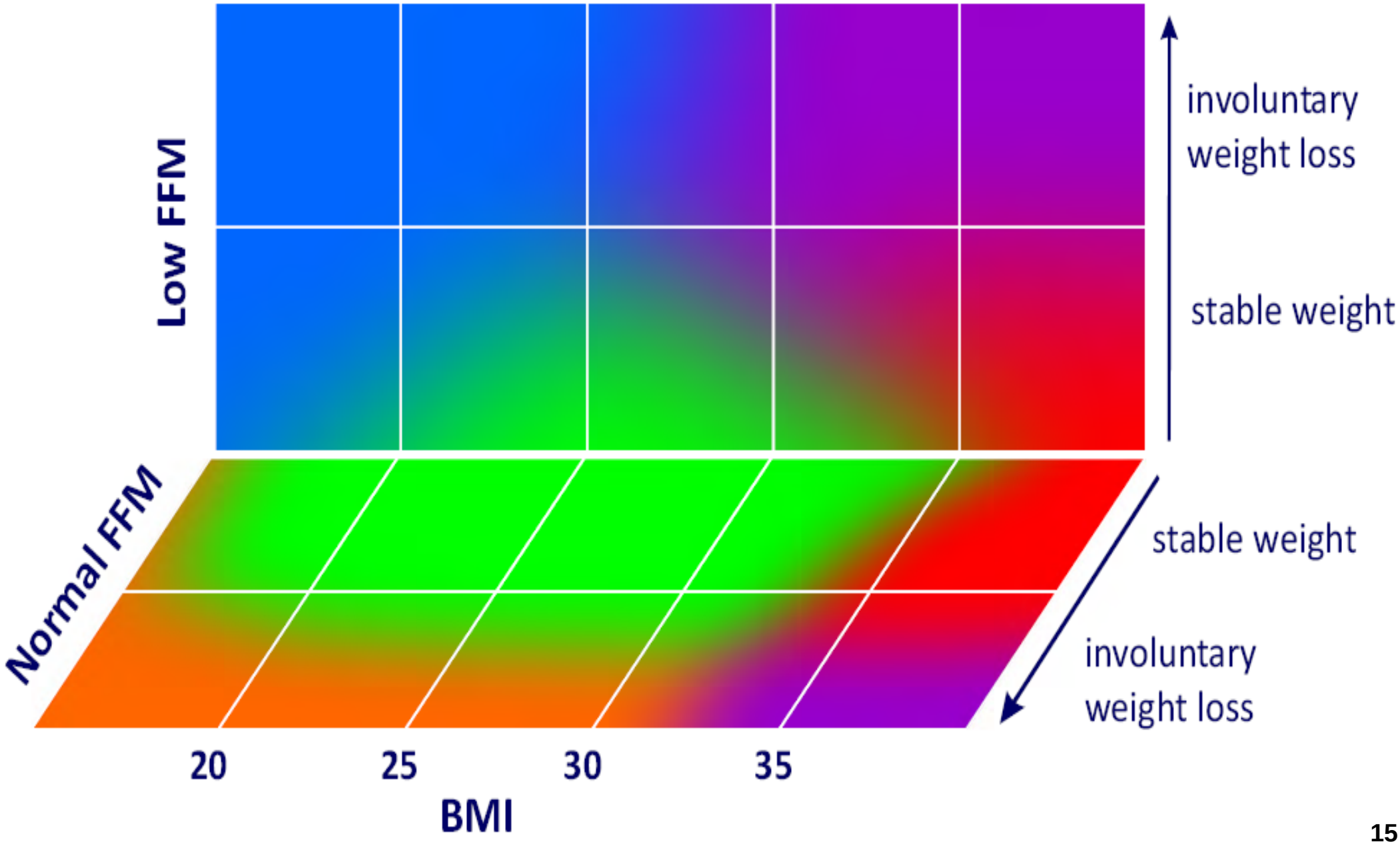
Metabolic phenotype	Definition	Clinical risk
Morbid obesity	BMI > 35	Elevated cardiovascular risk, reduced fitness
Obesity	BMI > 30	Elevated cardiovascular risk
Sarcopenic obesity	BMI > 30 Muscle loss	Elevated cardiovascular risk, reduced fitness
Pre-cachexia	Weight loss	Increased mortality risk
Sarcopenia	Muscle loss	Increased mortality risk and reduced fitness
Cachexia	Weight loss	Increased mortality risk and reduced fitness

An official European Respiratory Society statement Nutrition and COPD
Schols AM, Ferreira IM, Franssen FM, Janssen W, Langen RJ, Muscaritoli M, Pison C, Rutten van Mölken MPMH, Slinde F, Steiner M, Tzacova, Singh S, *in press*

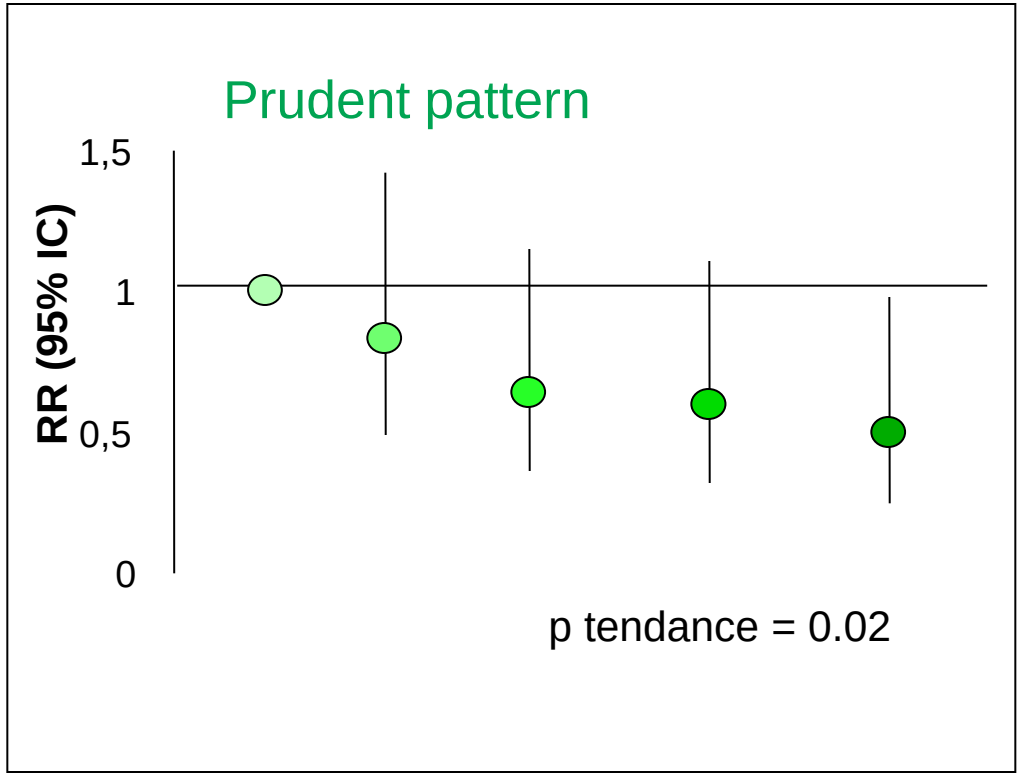
Evaluer

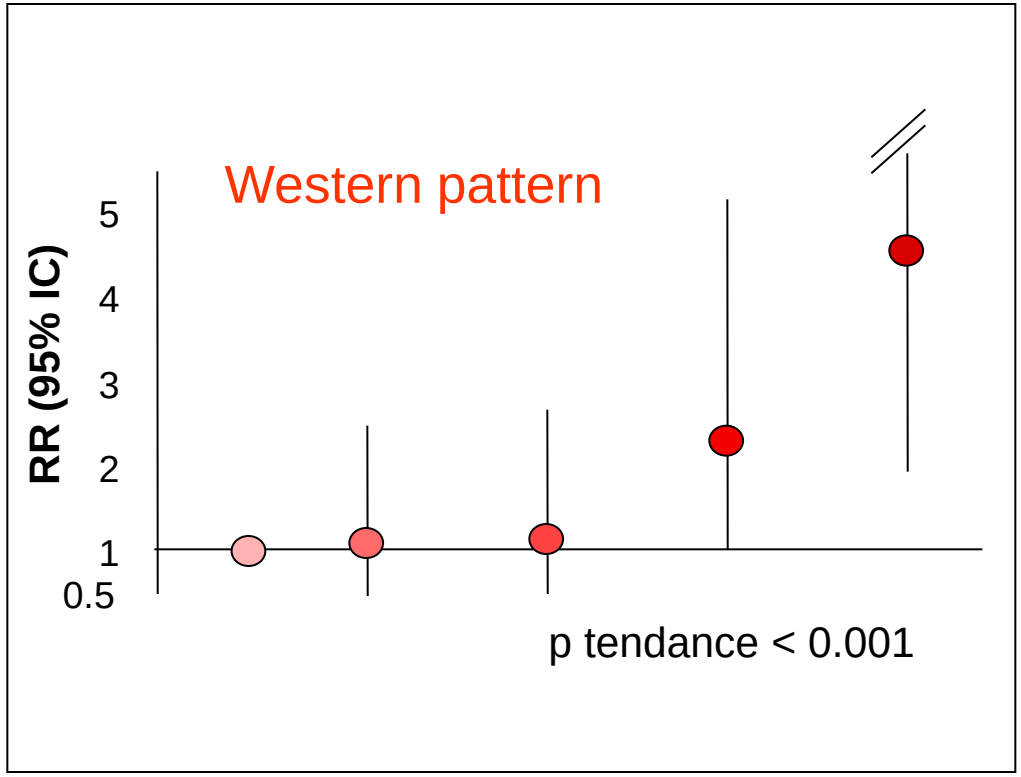

Low FFM
involuntary
weight loss
stable weight
Normal FFM
stable weight
involuntary
weight loss
20
25
30
35
BMI


AGIR-Prévenir
Max 5000g x 1g Max 11lb x 0.1oz
ON - TARE - UNIT - OFF

AGIR - Prévenir

Varraso *et al.* Thorax 2007. Dietary patterns & COPD men, longitudinal study (1986-1998), 42 915 men, 111 COPD





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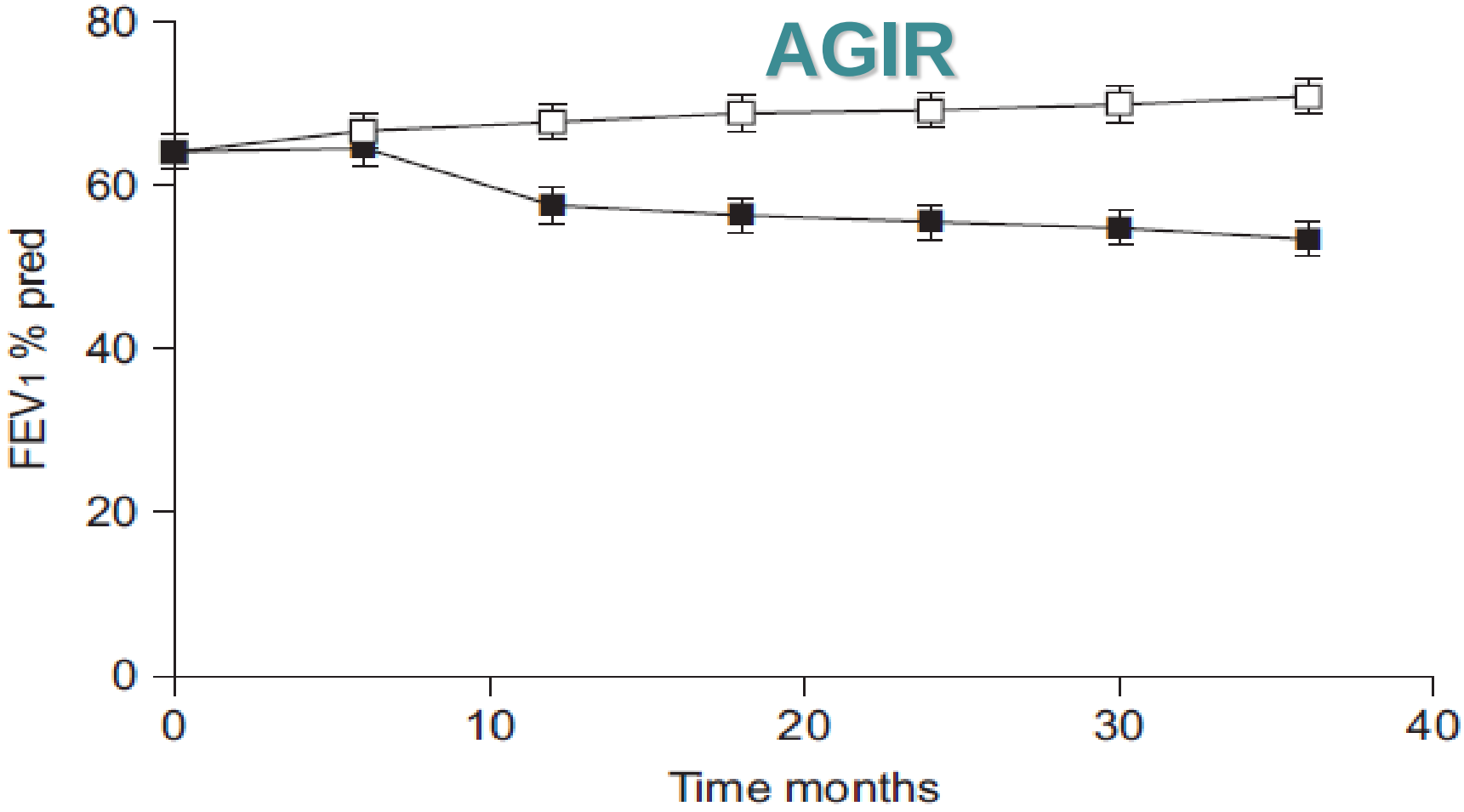

FIGURE 4. Change in forced expiratory volume in 1 s (FEV_1) over the 3-yr dietetic intervention study period in patients who followed a diet rich in fruit and vegetables (□) and in those who followed a free diet (■). Data are presented as mean ± SEM. The difference in mean annual decline in FEV_1 between the two groups obtained by a general linear model for repeated measures with Bonferroni adjustment gave a p-value of 0.03. % pred: % predicted.

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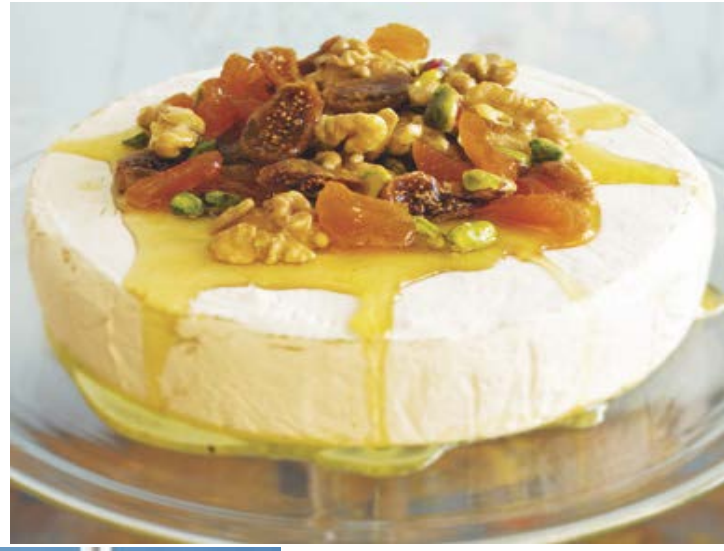

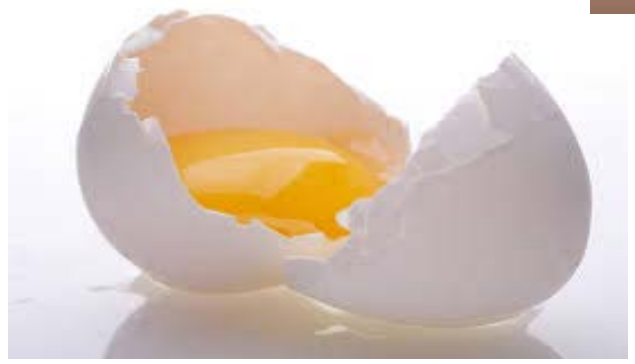

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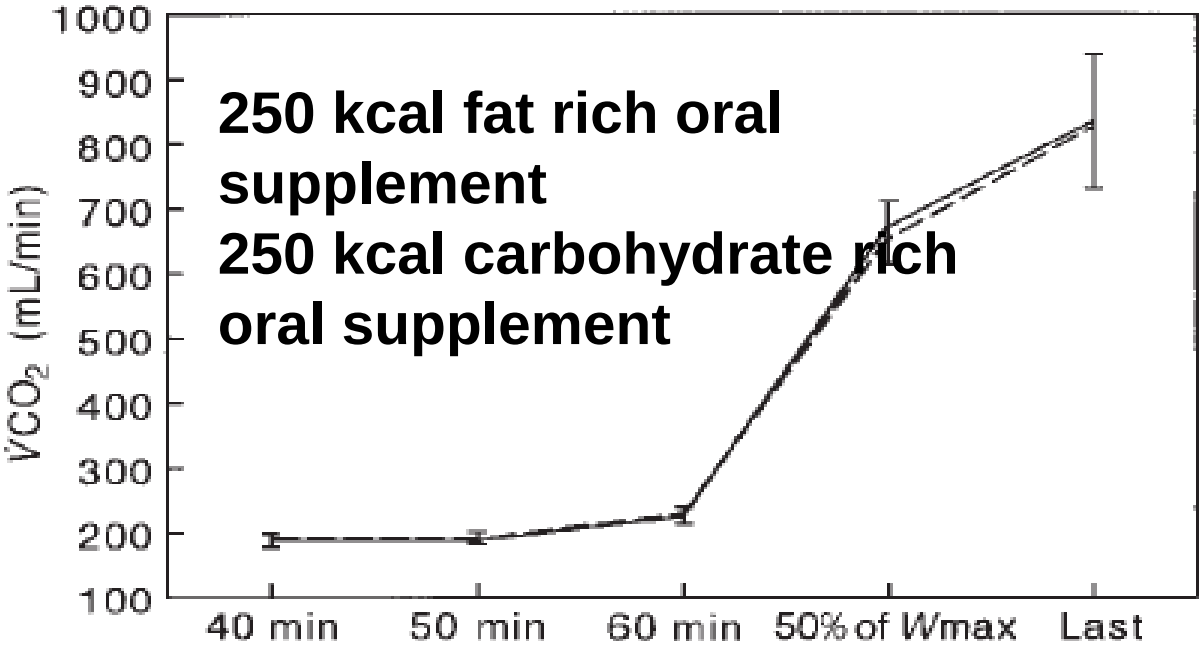
Acute effects of ONS, fat *vs.* carbohydrate, 11 subjects COPD, 62±8 yrs, FEV_1 34±12% pred., BMI 22.6±2.3
Vermeeren et al. AJCN 2001;73:295-301



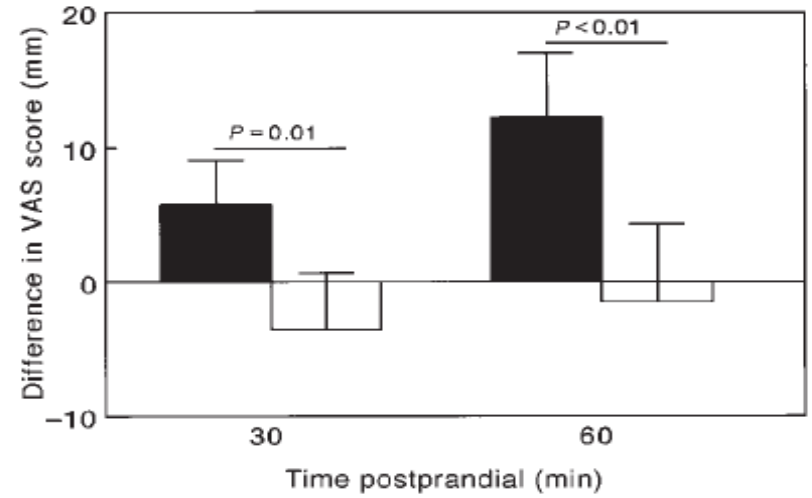


FIGURE 6. Difference between mean (±SEM) post- and preprandial shortness of breath score on a visual analogue scale (VAS) 30 and 60 min after consumption of a fat-rich (■) and a carbohydrate-rich (□) supplement. n = 11. ANOVA with postprandial value as the dependent variable, with treatment and period as fixed factors, and with patient as a random factor.

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- **IRC, métabolisme aérobie au final**

- **Lipides**
  - très grand stock et densité énergétique très élevée
  - par CO_2 produit, les lipides libèrent plus d'énergie que le glucose
  - mais, faible rendement par oxygène consommé
  - mais, couts élevés en substrats pour les cycles de Cori and Felig

- **Hydrates de carbone**
  - par O_2 consommé, le glucose libère plus d'énergie que les lipides
  - pas besoin d'hydrates de carbone pour le recyclage
  - mais, très faible stockage
  - mais, cout protéique élevé pour la synthèse

Xavier Leverve, Cuthberston lecture, Espen, Nice, 1998

Nutritional support: essential during rehabilitation

- **Risk of nutritional depletion in subjects, even normal weighted, undergoing Pulmonary Rehabilitation**
  - ***Steiner et al. Thorax 2003;58:745-51.***
  - ***Goris et al. The British journal of nutrition 2003;89:725-31.***
  - ***Slinde et al. Clinical nutrition 2003;22:159-65.***
  - ***Creutzberg et al. Nutrition 2003;19:120-7***
  - ***Weekes et al. Thorax 2010;64:326-31***

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Weekes et al. Thorax 2009;64:326-31

+ 194 kcal / j, + 11,8 g protéines / j *vs.* contrôles

pas de modification force des muscles et fonction respiratoire

St Georges + 10,1, MRC score + 1 , ADL score + 1,5

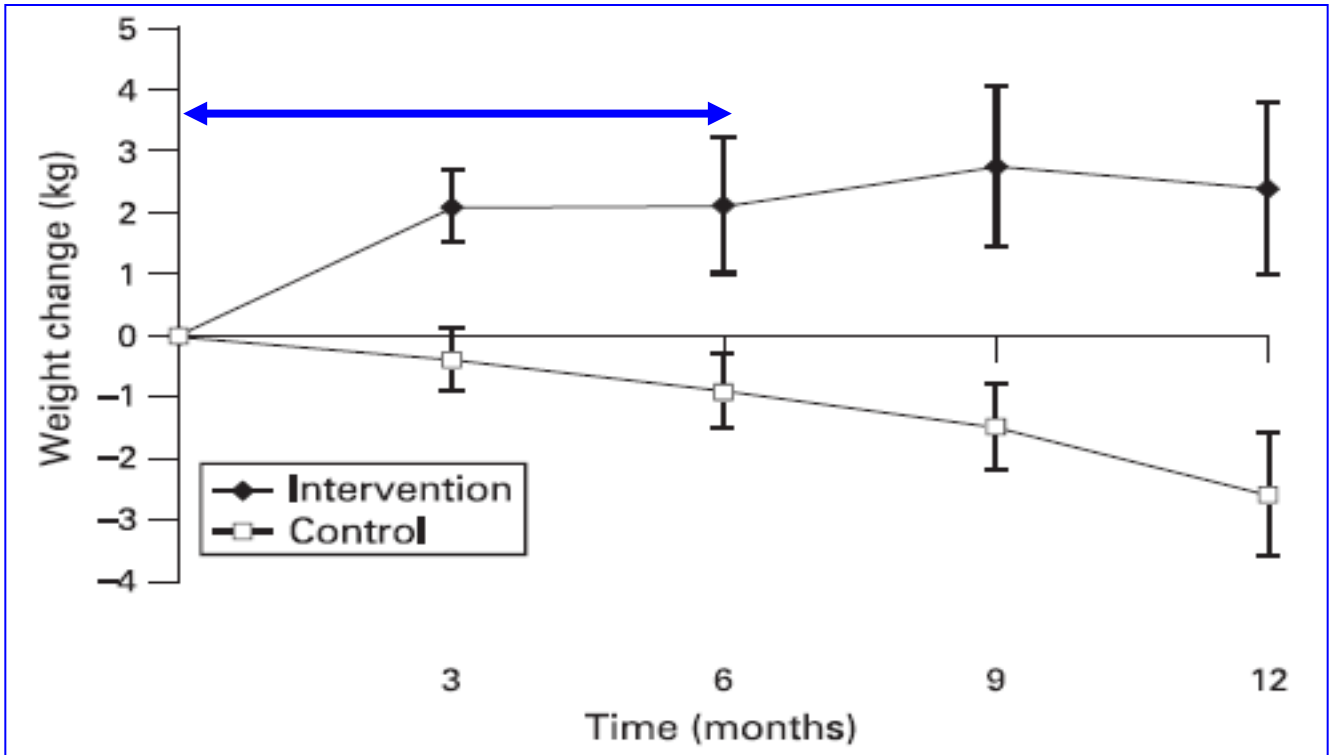

Figure 3 Weight change from baseline in patients who completed the study (n = 37).

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- **2006-2013 ERS/ATS guidelines**
  - **BMI < 21**
  - **involuntary weight loss: >10% during last 6 months or > 5% in the past month)**
  - **depletion in FFMI, <16 males, <15 females**

- **2010 SPLF guidelines*. RMR 2010;27:522-48***
  - **No attempt to lose weight**
  - **Rehabilitation > nutritional supplementation in any cases, especially if under nutrition**

- **2014 – ERS statement on Nutrition and COPD**

Recommandations SPLF 2010

- **Une évaluation nutritionnelle est nécessaire au cours de la réhabilitation respiratoire des BPCO car elle participe à la définition du pronostic fonctionnel et vital**

- **L'évaluation nutritionnelle de la BPCO comporte une histoire du poids sur les 6 derniers mois et un calcul de l'IMC. Un IMC < 21 engage le pronostic vital. Une impédancemétrie est utile pour dépister une baisse de la masse maigre chez les patients dont l'IMC est compris entre 21 et 25**

- **Il ne faut pas chercher à faire maigrir les patients atteints de BPCO**

- **Le réentraînement par l'exercice implique de façon systématique l'augmentation des apports nutritionnels, en particulier en cas de dénutrition, c'est-à-dire en cas d'IMC < 21, de perte de poids de 10 % dans les 6 derniers mois ou d'indice de masse non grasse < 25ème percentile**

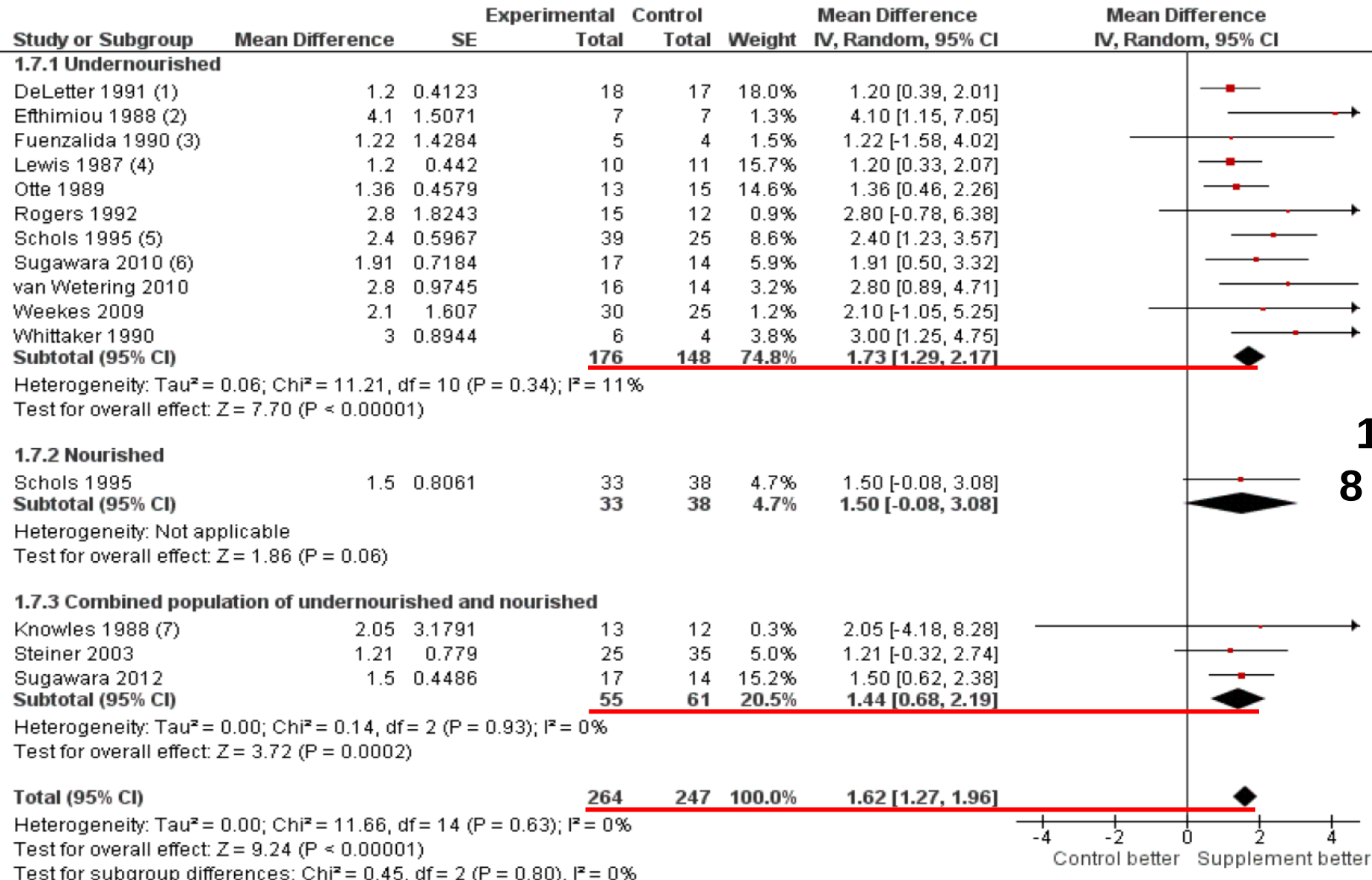
- **Une supplémentation orale couplée au réentraînement à l'effort est recommandée car elle est capable d'augmenter le poids et la masse maigre chez les patients atteints de BPCO qui sont dénutris (G1+).**

Nutritional supplementation for stable chronic obstructive pulmonary disease (Review)

Ferreira IM, Brooks D, White J, Goldstein R

THE COCHRANE COLLABORATION®

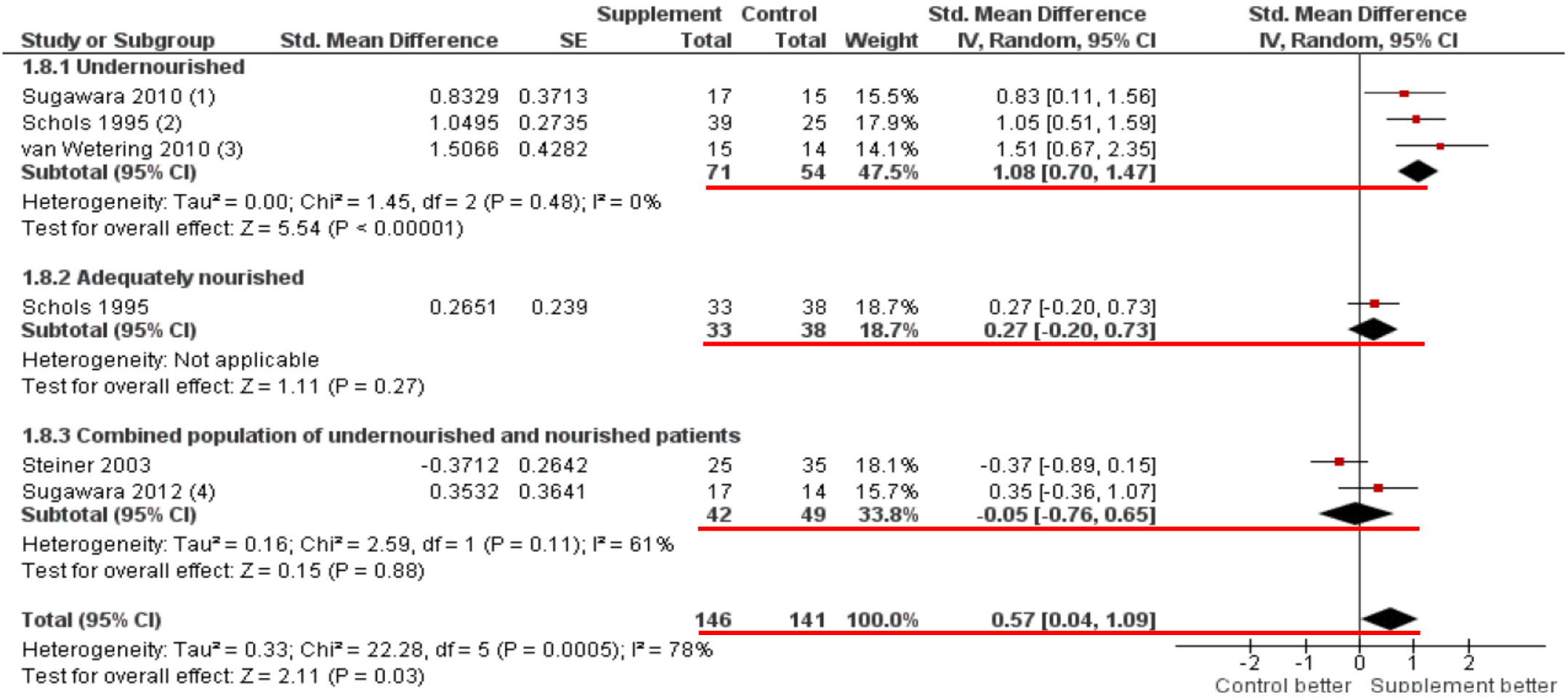
Support nutritionnel dans la BPCO, *poids, kg*



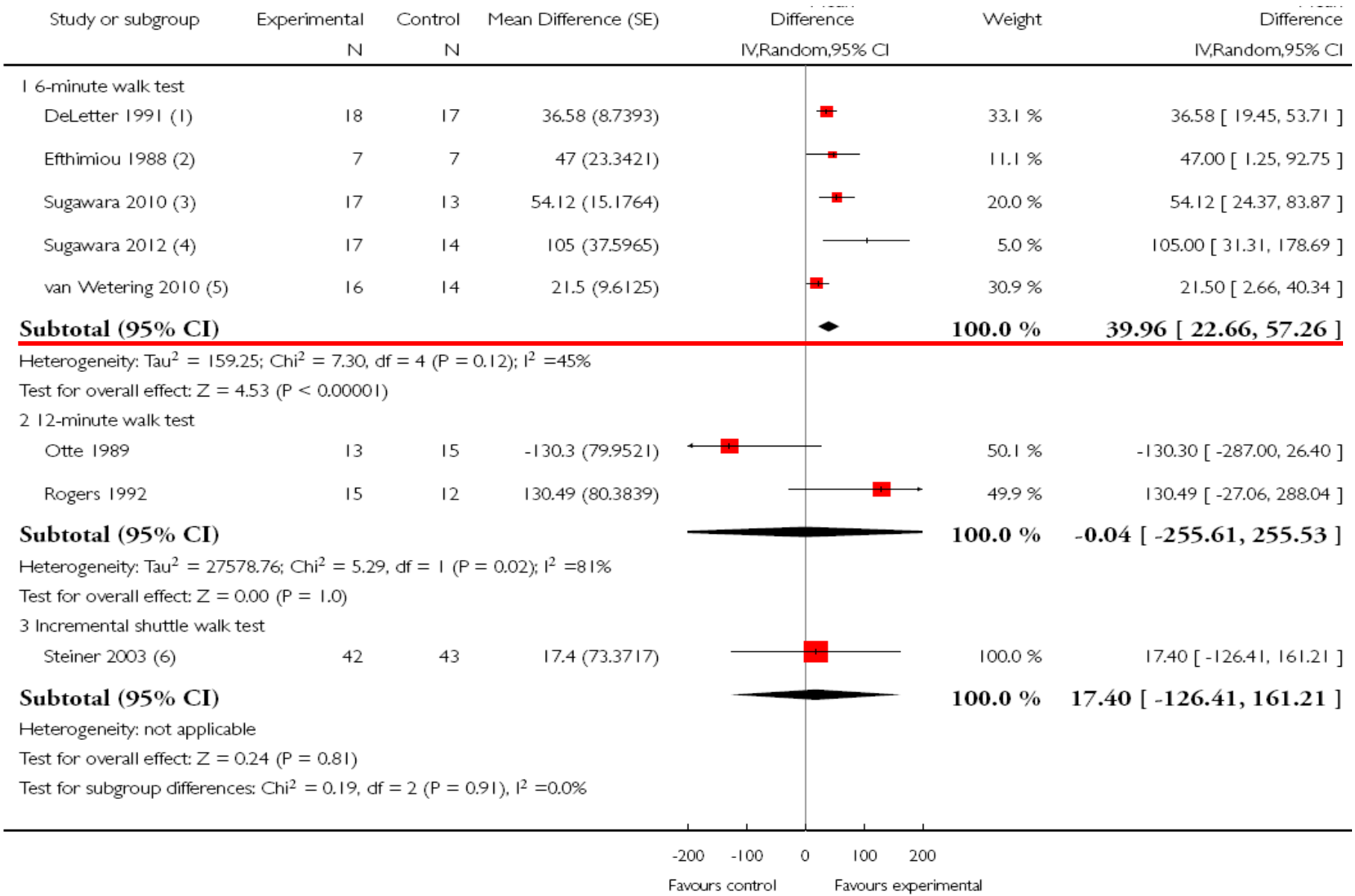
Study or Subgroup	Mean Difference	SE	Experimental Total	Control Total	Weight	Mean Difference IV, Random, 95% CI
1.7.1 Undernourished						
DeLetter 1991 (1)	1.2	0.4123	18	17	18.0%	1.20 [0.39, 2.01]
Efthimiou 1988 (2)	4.1	1.5071	7	7	1.3%	4.10 [1.15, 7.05]
Fuenzalida 1990 (3)	1.22	1.4284	5	4	1.5%	1.22 [-1.58, 4.02]
Lewis 1987 (4)	1.2	0.442	10	11	15.7%	1.20 [0.33, 2.07]
Otte 1989	1.36	0.4579	13	15	14.6%	1.36 [0.46, 2.26]
Rogers 1992	2.8	1.8243	15	12	0.9%	2.80 [-0.78, 6.38]
Schols 1995 (5)	2.4	0.5967	39	25	8.6%	2.40 [1.23, 3.57]
Sugawara 2010 (6)	1.91	0.7184	17	14	5.9%	1.91 [0.50, 3.32]
van Wetering 2010	2.8	0.9745	16	14	3.2%	2.80 [0.89, 4.71]
Weekes 2009	2.1	1.607	30	25	1.2%	2.10 [-1.05, 5.25]
Whittaker 1990	3	0.8944	6	4	3.8%	3.00 [1.25, 4.75]
Subtotal (95% CI)			**176**	**148**	**74.8%**	**1.73 [1.29, 2.17]**
Heterogeneity: Tau² = 0.06; Chi² = 11.21, df = 10 (P = 0.34); I² = 11%						
Test for overall effect: Z = 7.70 (P < 0.00001)						
1.7.2 Nourished						
Schols 1995	1.5	0.8061	33	38	4.7%	1.50 [-0.08, 3.08]
Subtotal (95% CI)			**33**	**38**	**4.7%**	**1.50 [-0.08, 3.08]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.86 (P = 0.06)						
1.7.3 Combined population of undernourished and nourished						
Knowles 1988 (7)	2.05	3.1791	13	12	0.3%	2.05 [-4.18, 8.28]
Steiner 2003	1.21	0.779	25	35	5.0%	1.21 [-0.32, 2.74]
Sugawara 2012	1.5	0.4486	17	14	15.2%	1.50 [0.62, 2.38]
Subtotal (95% CI)			**55**	**61**	**20.5%**	**1.44 [0.68, 2.19]**
Heterogeneity: Tau² = 0.00; Chi² = 0.14, df = 2 (P = 0.93); I² = 0%						
Test for overall effect: Z = 3.72 (P = 0.0002)						
Total (95% CI)			**264**	**247**	**100.0%**	**1.62 [1.27, 1.96]**
Heterogeneity: Tau² = 0.00; Chi² = 11.66, df = 14 (P = 0.63); I² = 0%						
Test for overall effect: Z = 9.24 (P < 0.00001)						
Test for subgroup differences: Chi² = 0.45, df = 2 (P = 0.80), I² = 0%						

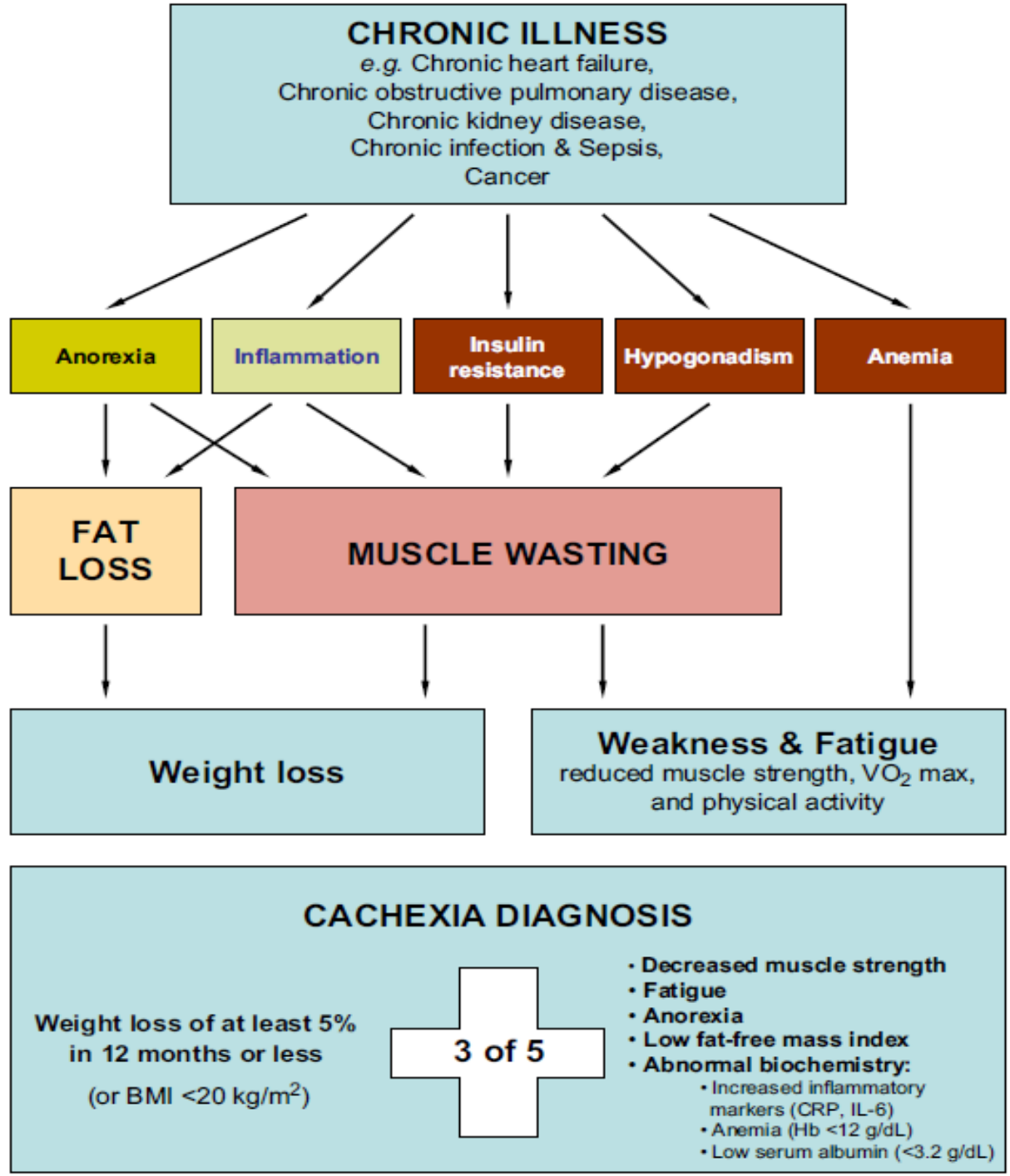
17 studies, 8 combined with exercise, increased body weight

Support nutritionnel dans la BPCO, *masse non grasse, kg*



Support nutritionnel dans la BPCO, *PM6, m*




CHRONIC ILLNESS
e.g. Chronic heart failure,
Chronic obstructive pulmonary disease,
Chronic kidney disease,
Chronic infection & Sepsis,
Cancer
Anorexia
Inflammation
Insulin resistance
Hypogonadism
Anemia
FAT LOSS
MUSCLE WASTING
Weight loss
Weakness & Fatigue
reduced muscle strength, VO2 max, and physical activity
CACHEXIA DIAGNOSIS
Weight loss of at least 5% in 12 months or less
(or BMI <20 kg/m2)
3 of 5
• Decreased muscle strength
• Fatigue
• Anorexia
• Low fat-free mass index
• Abnormal biochemistry:
• Increased inflammatory markers (CRP, IL-6)
• Anemia (Hb <12 g/dL)
• Low serum albumin (<3.2 g/dL)

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Schols *et al.* AJRCCM 1995;152;1268-74

- **Patients** 233, VEMS 35 ± 5 %
- **Durée** 8 semaines, réhabilitation
- **Intervention, 3 bras avec exercice en e**
  - exercice + éducation
  - exercice + éducation + SNO + placebo
  - exercice + éducation + SNO + anabolisant
- **Résultats**
  - augmentation poids avec SNO
  - augmentation masse non grasse et force maximale inspiratoire avec anabolisant

AGIR

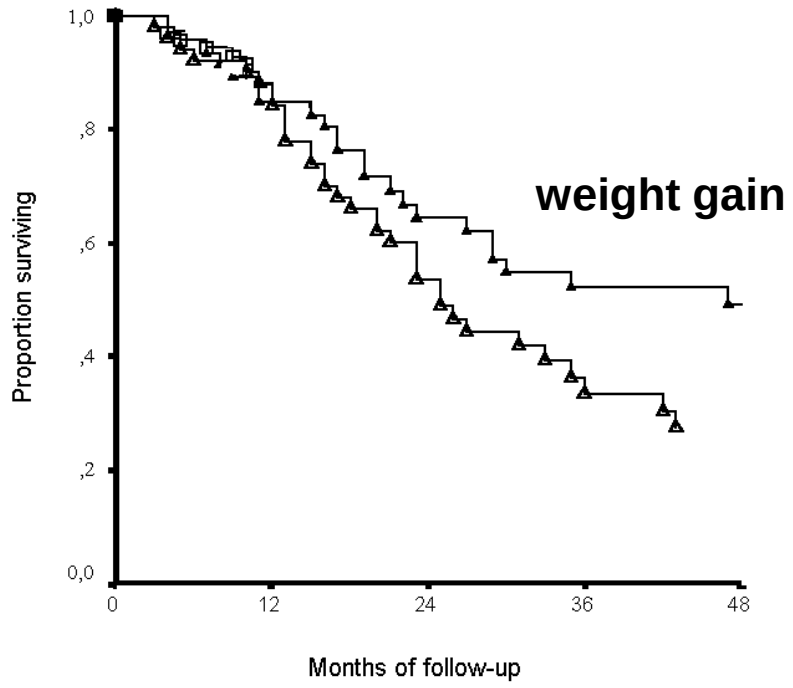
Schols *et al.* AJRCCM 1998;157;1791-7

MULTIVARIATE ANALYSIS OF PREDICTORS OF MORTALITY: PROSPECTIVE STUDY

Variables		RR	95% CI	p Value
Change in weight	Linear*	0.996	0.992–0.999	0.01
Change in PI_{max}	Linear	0.990	0.976–1.004	NS
Treatment	P versus A	0.753	0.447–1.267	NS
	N versus A	0.872	0.530–1.432	NS
BMI	Linear	0.868	0.803–0.939	< 0.001
FEV_1	Linear	0.983	0.962–1.003	NS
IVC	Linear	0.995	0.982–1.008	NS
Pa_{O_2}	Linear	0.877	0.751–1.024	NS
Pa_{CO_2}	Linear	0.977	0.707–1.352	NS
Age, yr	Linear	1.056	1.022–1.090	< 0.001

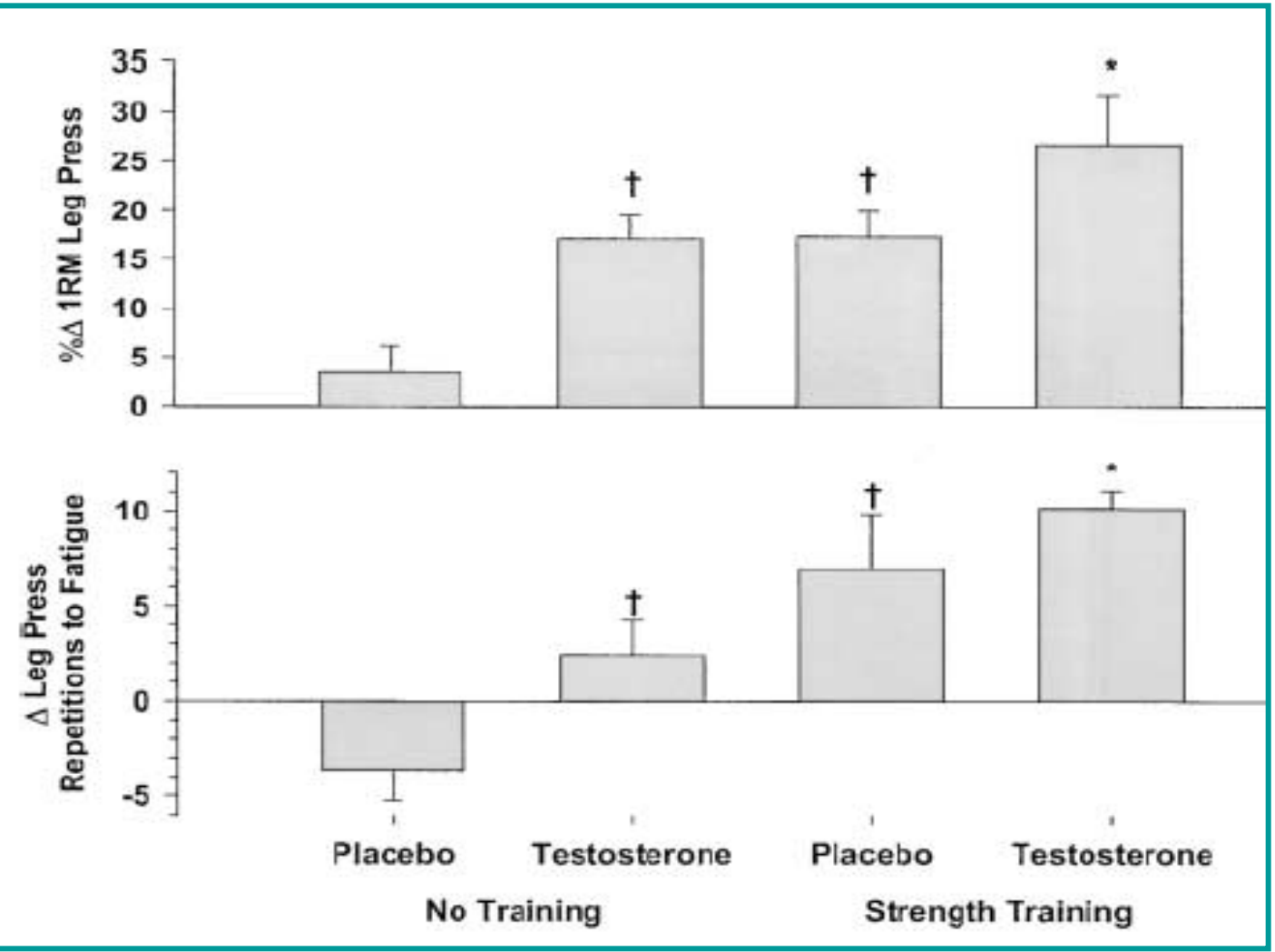
Definition of abbreviation: PI_{max} = maximal static inspiratory pressure. For other definitions, *see* Tables 1 and 2.

* Entered as time-dependent covariate.



AGIR

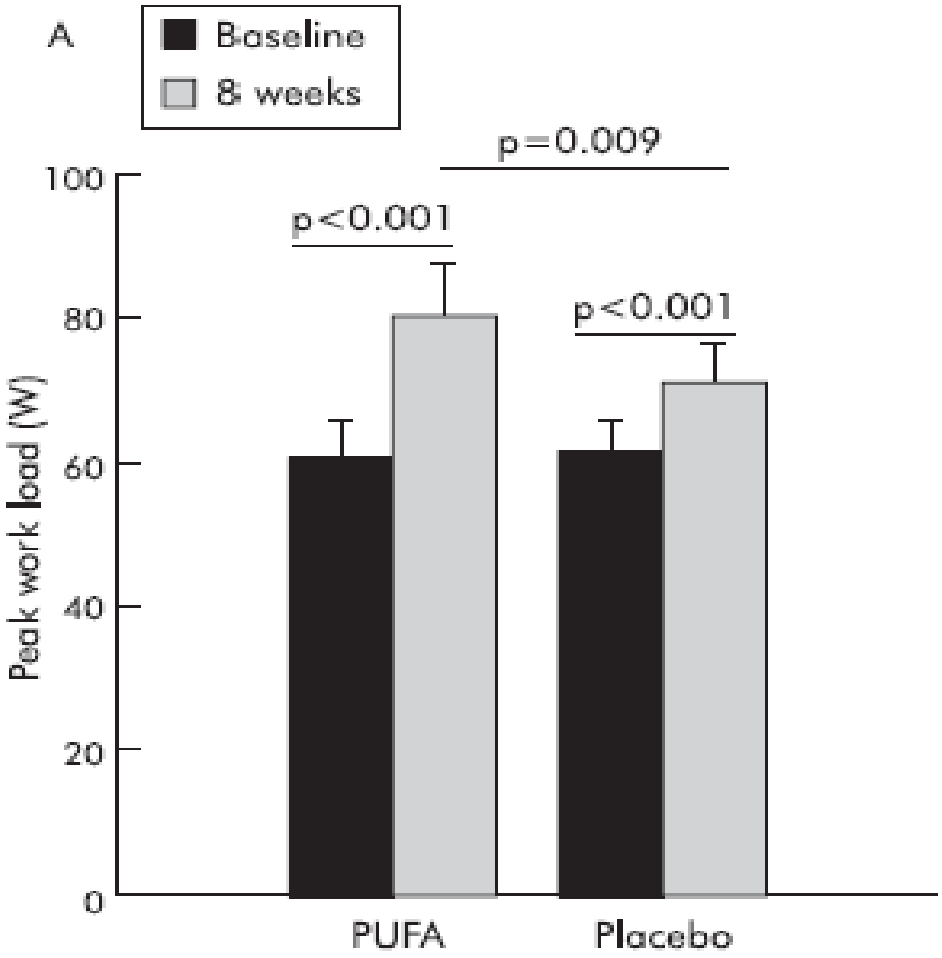
Casaburi *et al.* Am J Crit Care Med 2004;170;870-8



47 male patients with COPD, mean FEV_1 = 40% randomized, double blind, controlled 4 groups, resistance exercise, 100 mg testosterone IM/week, 10 weeks

AGIR

Brokhuizen *et al.* Thorax 2003;124:1733-42



80 COPD, 8 weeks rehabilitation plus oral nutritional supplement (Respifor®)

Double blind, controlled design: oral n-3 PUFA, 9 g/day during 8 weeks

AGIR

IRAD2, Pison, Cano *et al.* Thorax 2011;66:953-60

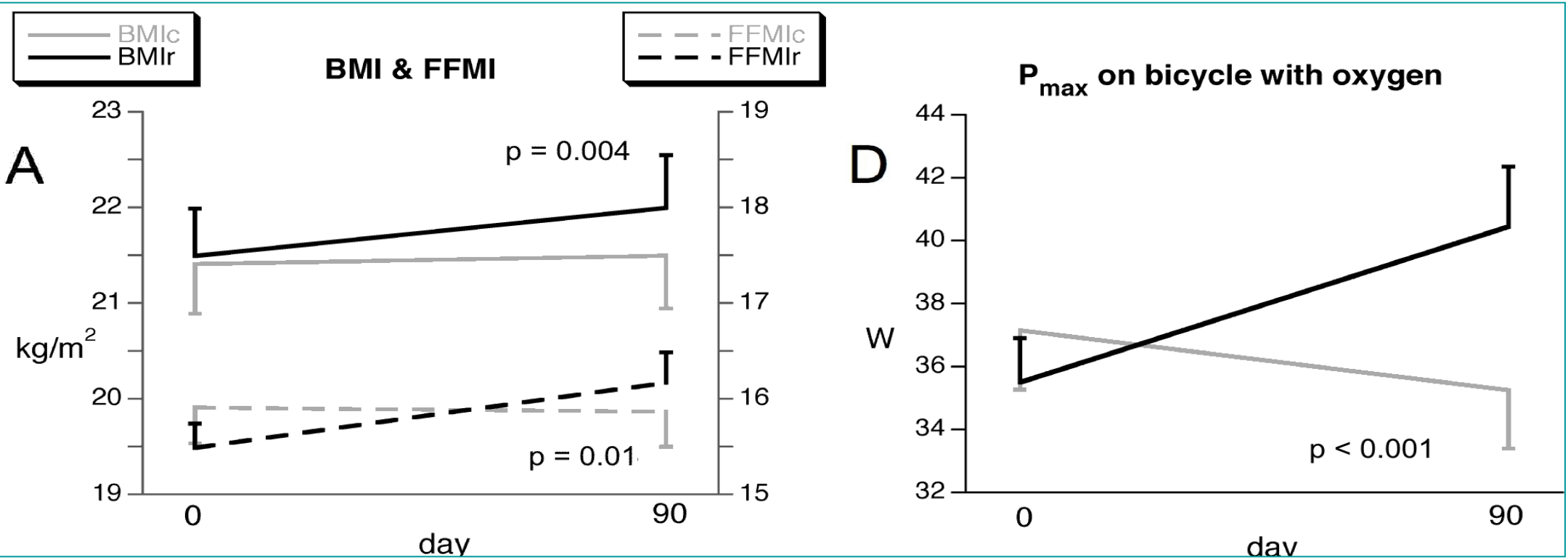
- **Patients** 60, 66,6 ± 9,6 ans, IMC 21,5 ± 3,8
  62, 65,1 ± 9,6 ans, IMC 21,4 ± 4,0

- **Duration** 12 semaines, 12 mois de suivis

- **Intervention** - Education + Exercice + ONS + testostérone orale
  - Education
- **Résultats**
  - 3 mois: augmentation poids, masse non grasse, force quadriceps, hémoglobine, endurance, W_{max}, QdV chez les femmes
  - 15 mois : meilleure survie en per-protocole

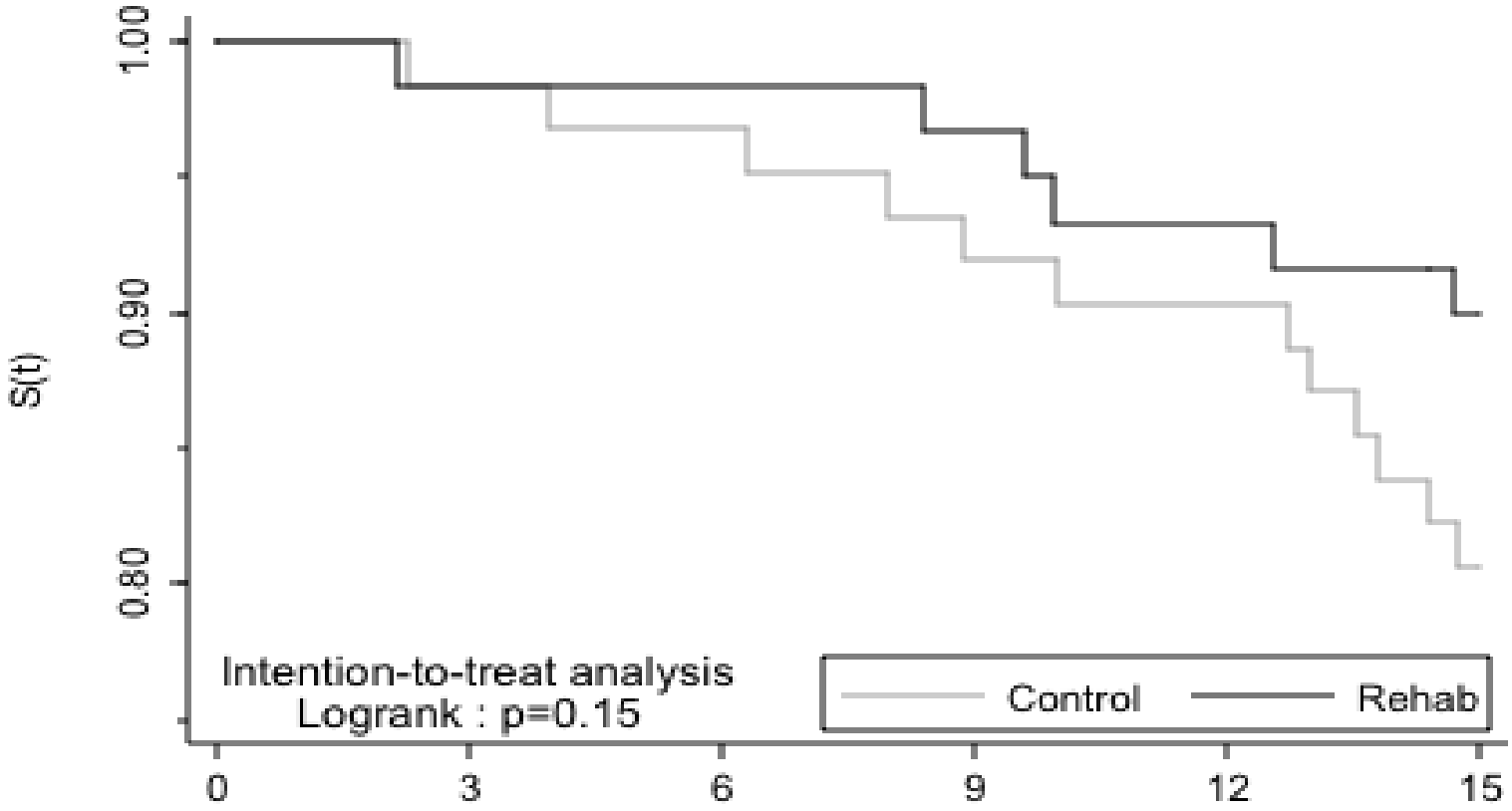
AGIR

IRAD2, Pison, Cano *et al.* Thorax 2011;66:953-60



AGIR

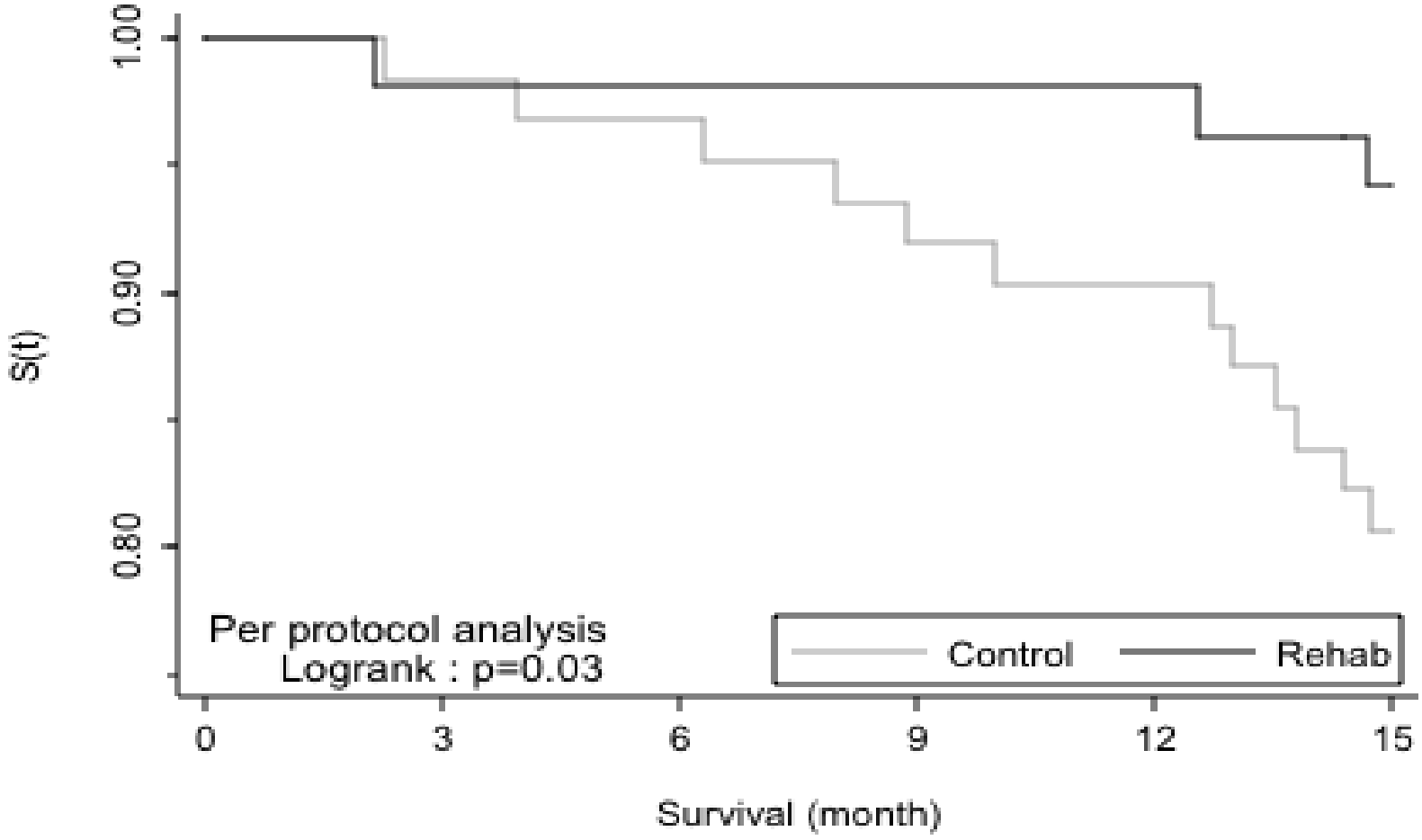
IRAD2, Pison, Cano *et al.* Thorax 2011;66:953-60



Number at risk						
Control	62	61	60	57	56	50
Rehabilitation	60	59	59	58	56	53

AGIR

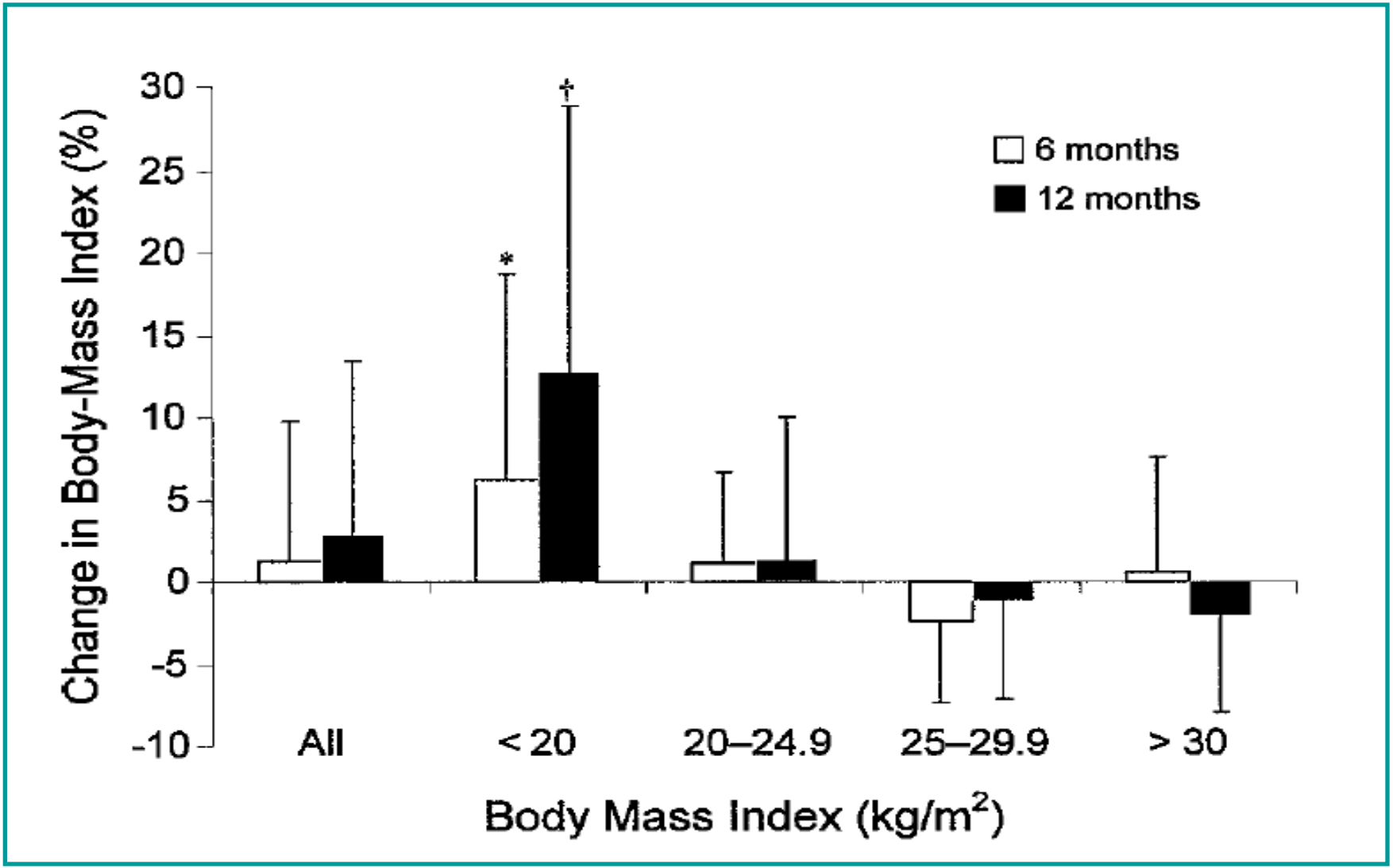
IRAD2, Pison, Cano *et al.* Thorax 2011;66:953-60



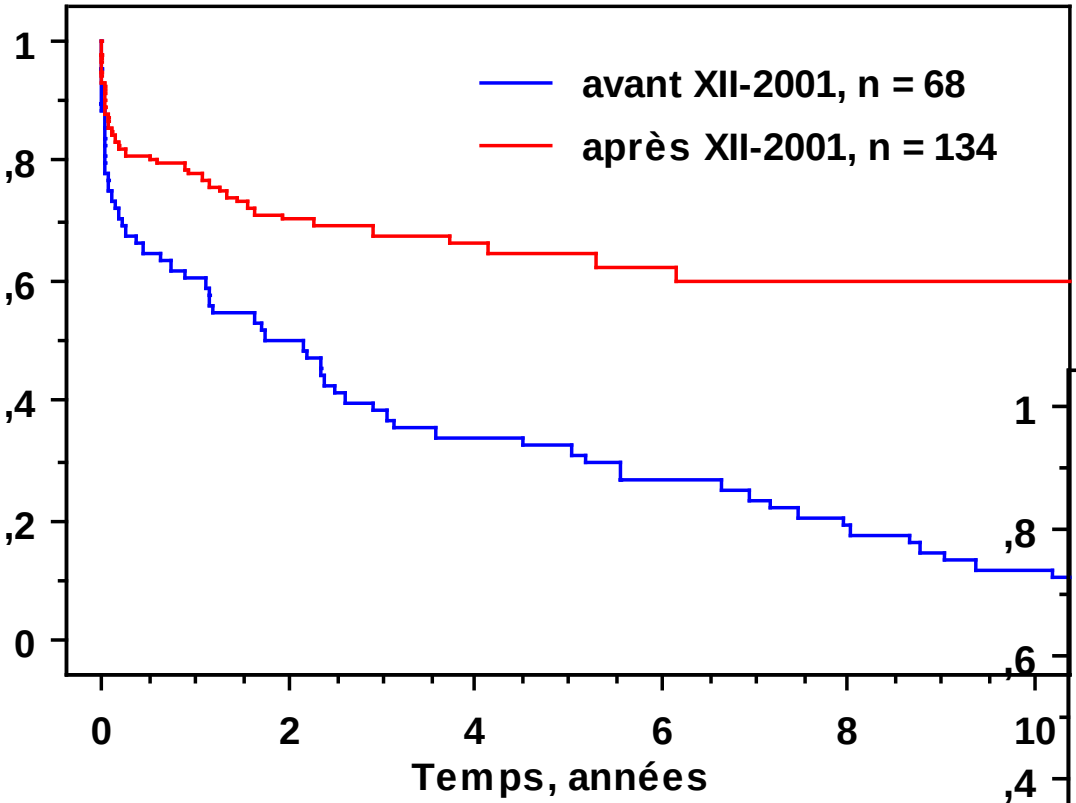
Number at risk						
Control	62	61	60	57	56	50
Rehabilitation	52	51	51	51	51	48

AGIR

Budweiser *et al.* Respir Care 2006;51:126-32

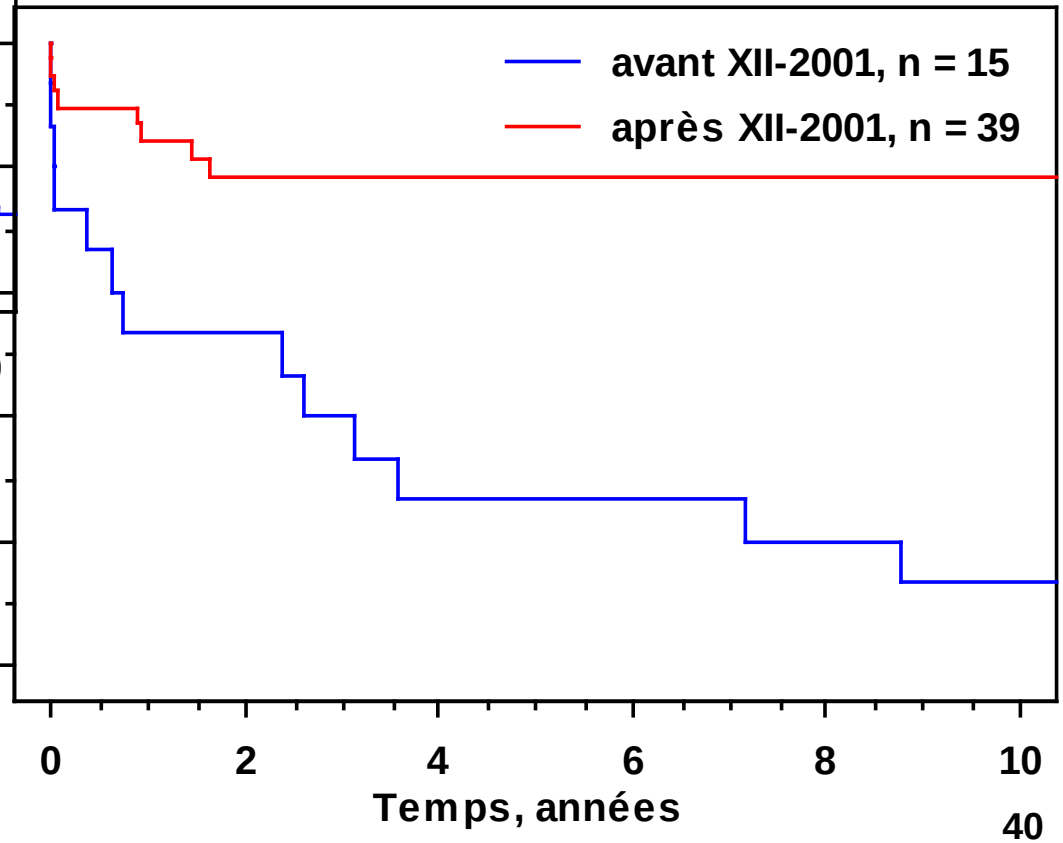


AGIR



Toutes indications, n = 204

Mucoviscidoses, n = 54



Multimodal Intervention

Education and Culture DG
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INTERCOM. ***van Wetering et al. J Am Med Dir Assoc 2010;11:179-187***

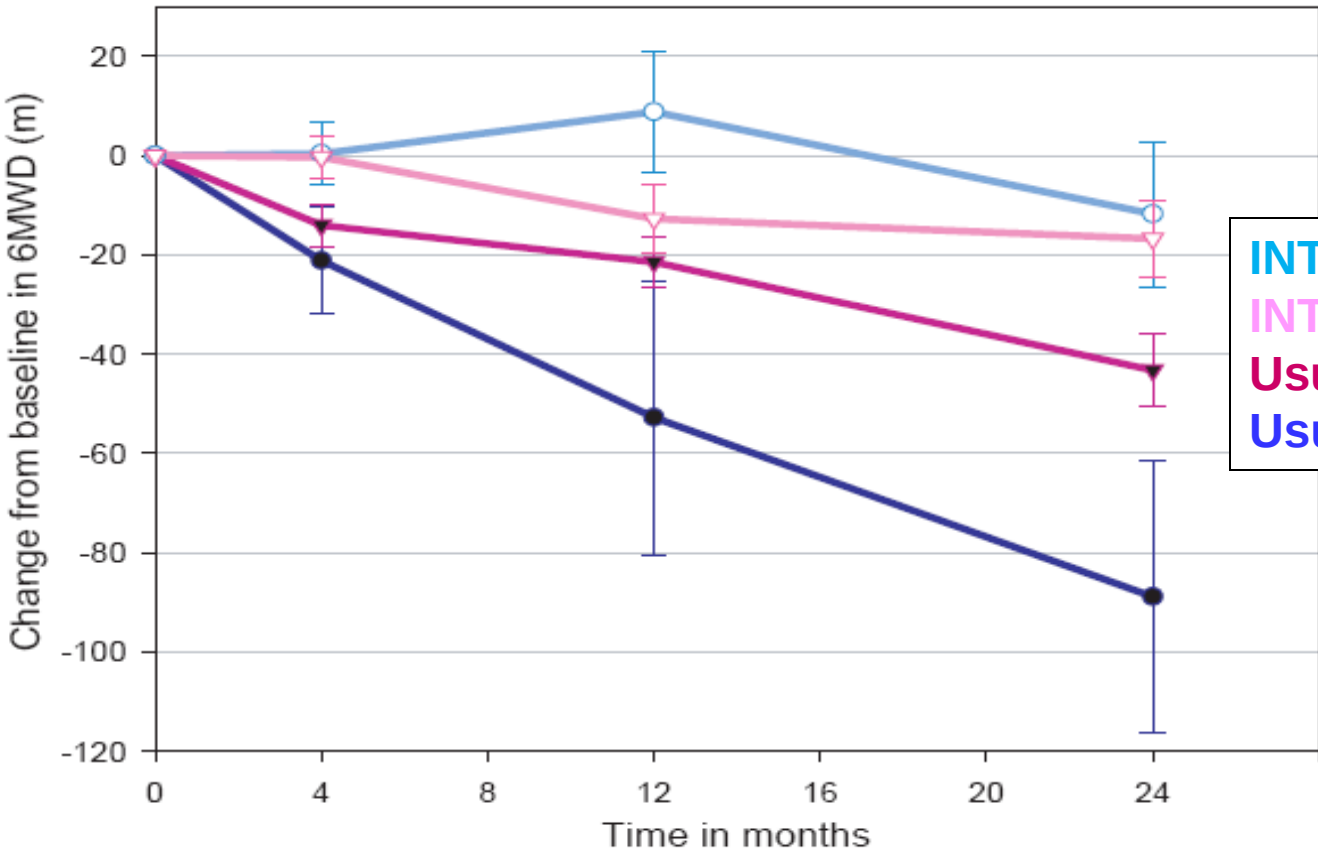
- **Patients** 102, 66±9 yrs, FEV_1 58±17 %, BMI 26.1±4.4
  97, 67±9 yrs, FEV_1 60±15 %, BMI 27.3±4.7
  Wmax < 70%, 20% depleted

- **Duration** 2 years
- **Intervention** 4 months home multimodal intervention,
  20 maintenance care
  versus usual care
- **Results**
  - 4 months: better FFM, QoL, Wmax, endurance, MRC dyspnea score, hand grip, 6MWD
  - 2 years : better QoL, MRC score, endurance, 6MWD

Multimodal Intervention

Education and Culture DG
Lifelong Learning Programme

INTERCOM. ***van Wetering et al. J Am Med Dir Assoc 2010;11:179-187***



INTERCOM muscle wasted
INTERCOM muscle non-wasted
Usual Care muscle non-wasted
Usual Care muscle wasted

Conclusions

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- **Évaluation multimodale nécessaire**
- **Intervention multimodale, si possible précoce**
  - **améliore les résultats cliniques**
  - **est efficace à la fois aux stades avancés et précoces de la maladie**
  - **mais nécessite d'être personnalisée selon les attentes du patient**
- **Rôle de la prise en charge à domicile - Coordination**
- **Perspectives, alicaments oméga-3, vitD, modulation épigénétiques**
- **Prévention du tabagisme à l'Ecole Primaire**

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