La riabilitazione: efficace a qualunque età ?

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Fondazione Salvatore Maugeri, IRCCS

Pulmonary rehabilitation is defined as "a multidisciplinary programme of care for patients with chronic respiratory impairment that is individually tailored and designed to optimise physical and social performance and autonomy"

ERJ 2004; 23: 932-946

Pulmonary Rehabilitation

Rationale

Efficacy in COPD + CRF (Chronic Respiratory Failure)

Efficacy in COPD + Comorbiditis

Efficacy in old patients

Conclusions

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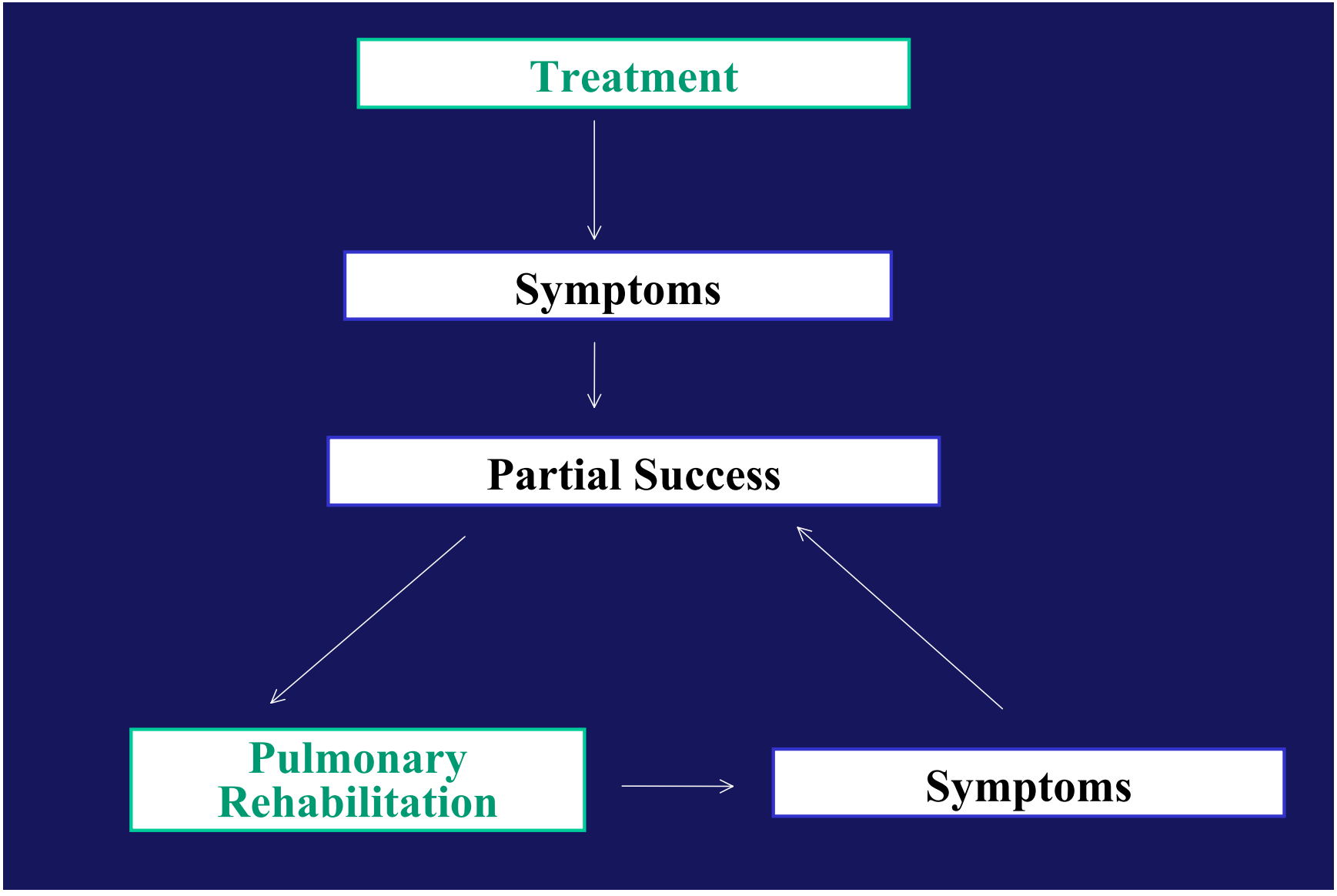

Treatment
Symptoms
Partial Success
Pulmonary Rehabilitation
Symptoms

Pulmonary rehabilitation results in improvements in multiple outcome aereas of considerable importance to the patient, including

Dyspnea

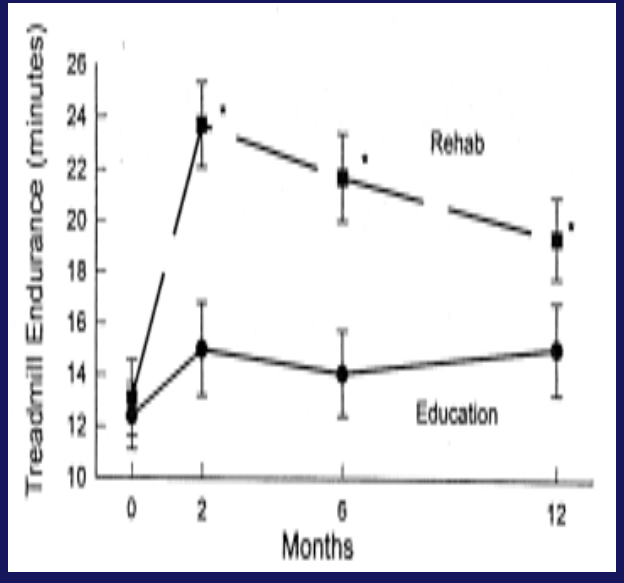
Exercise tolerance

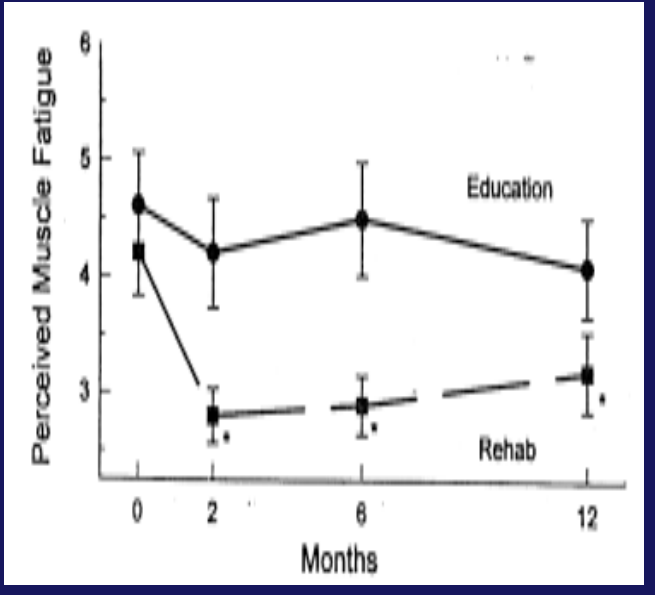
Health care utilisation

Health status

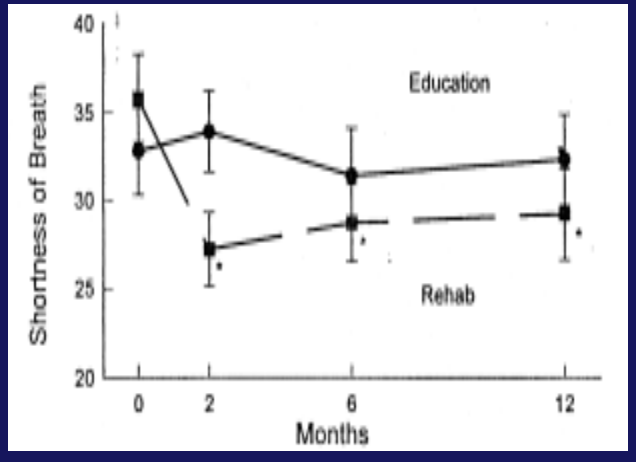
Survival

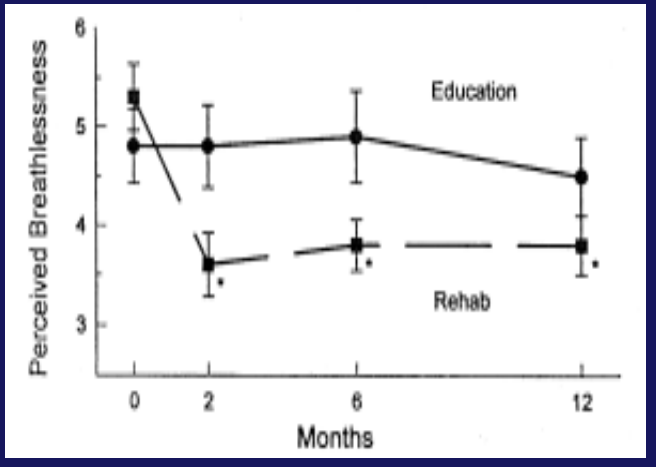
ERJ 2004; 23: 932-946





Ries AL et al Ann Intern Med 1995;122:823-832





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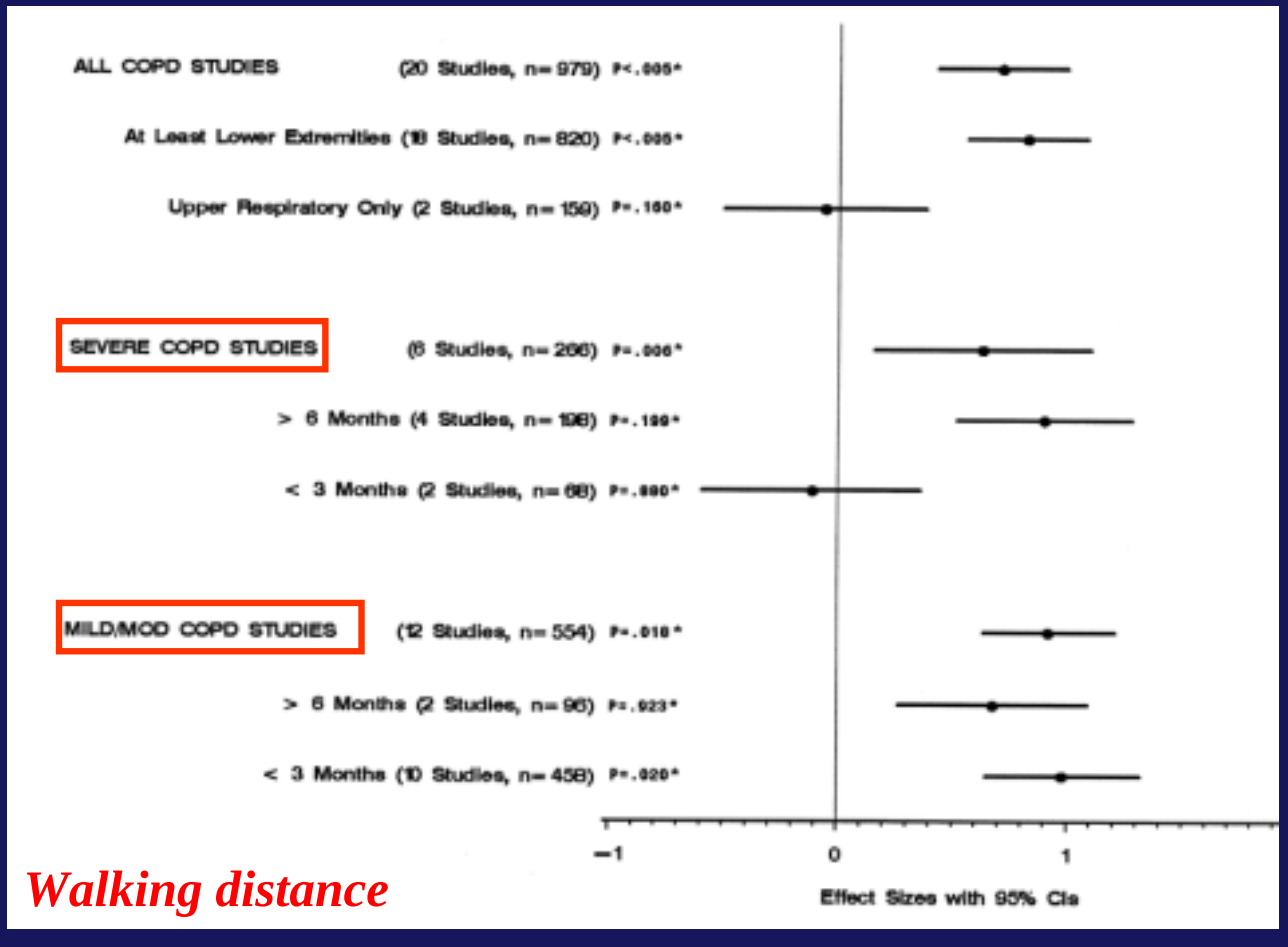
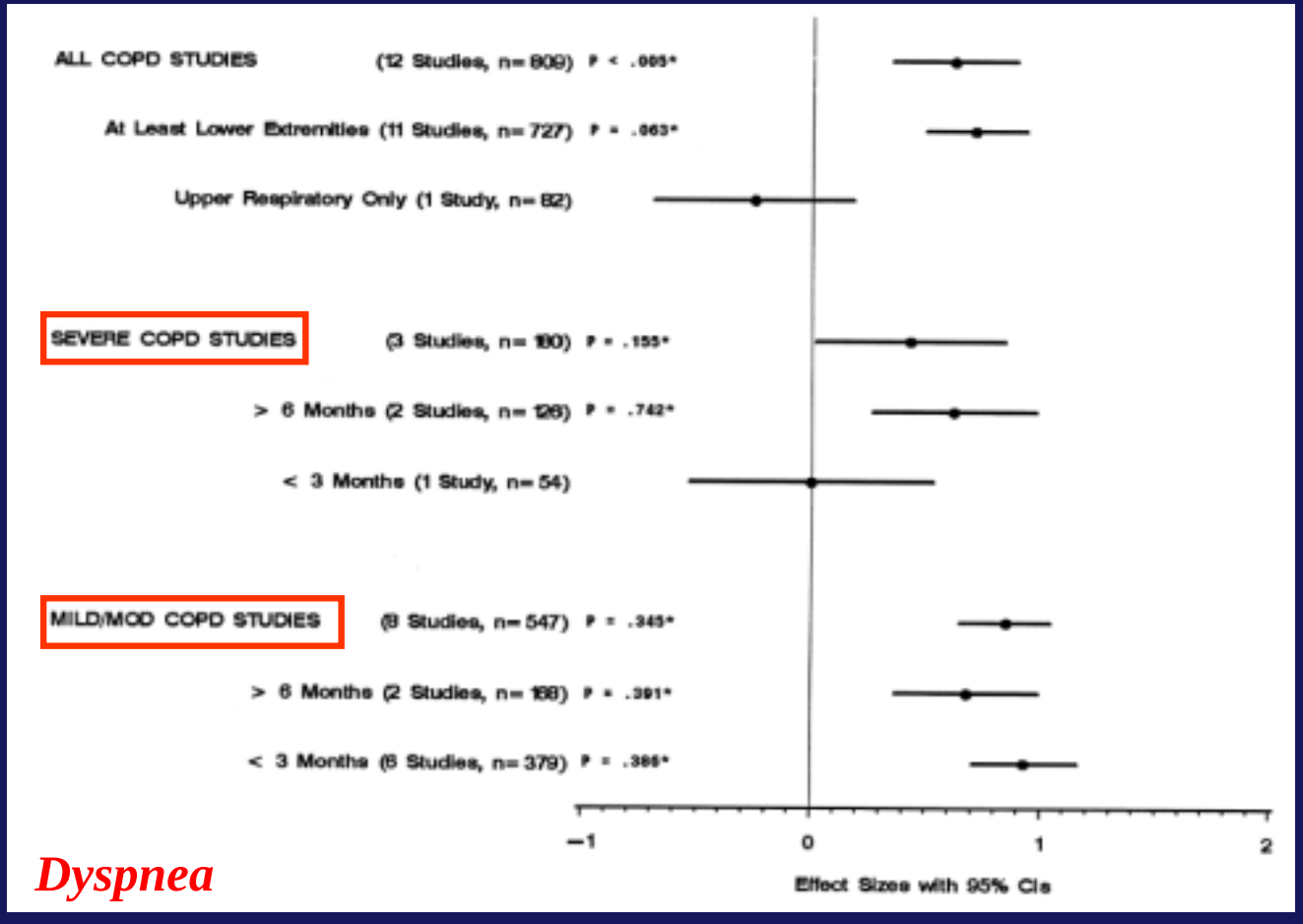


Walking distance

Journal General Internal Medicine 2003; 18 : 213-221



Dyspnea

Journal General Internal Medicine 2003; 18 : 213-221

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ERJ 2004; 23: 932-946

Community pulmonary rehabilitation after hospitalisation for acute exacerbations of chronic obstructive pulmonary disease: randomised controlled study

William D-C Man, Michael I Polkey, Nora Donaldson, Barry J Gray, John Moxham

What this study adds

BMJ 2004; 329:1209-1213)

Early pulmonary rehabilitation, in the recovery period after hospital discharge after an admission for an acute exacerbation of COPD, leads to significant improvements in functional capacity and quality of life at three months compared with usual care

	Control group	Rehabilitation group	p*
All patients admitted			
Total	41	40	0·98†
Hospital admissions			
Respiratory illness	1·9 (1·4)	1·4 (1·3)	0·044
All causes	2·2 (1·5)	1·7 (1·1)	0·048
Days spent in hospital			
Respiratory illness	18·1 (19·3)	9·4 (10·2)	0·021
All causes	21·0 (20·7)	10·4 (9·7)	0·022
Per admission	9·0 (7·6)	6·0 (3·4)	0·100

Griffiths TL, et al. Lancet 2000; 29:362-368

Pulmonary rehabilitation results in improvements in multiple outcome aereas of considerable importance to the patient, including

Dyspnea

Exercise tolerance and ability

Health care utilisation

Health status

Survival

ERJ 2004; 23: 932-946

Respiratory Medicine (2007) 101, 2447–2453

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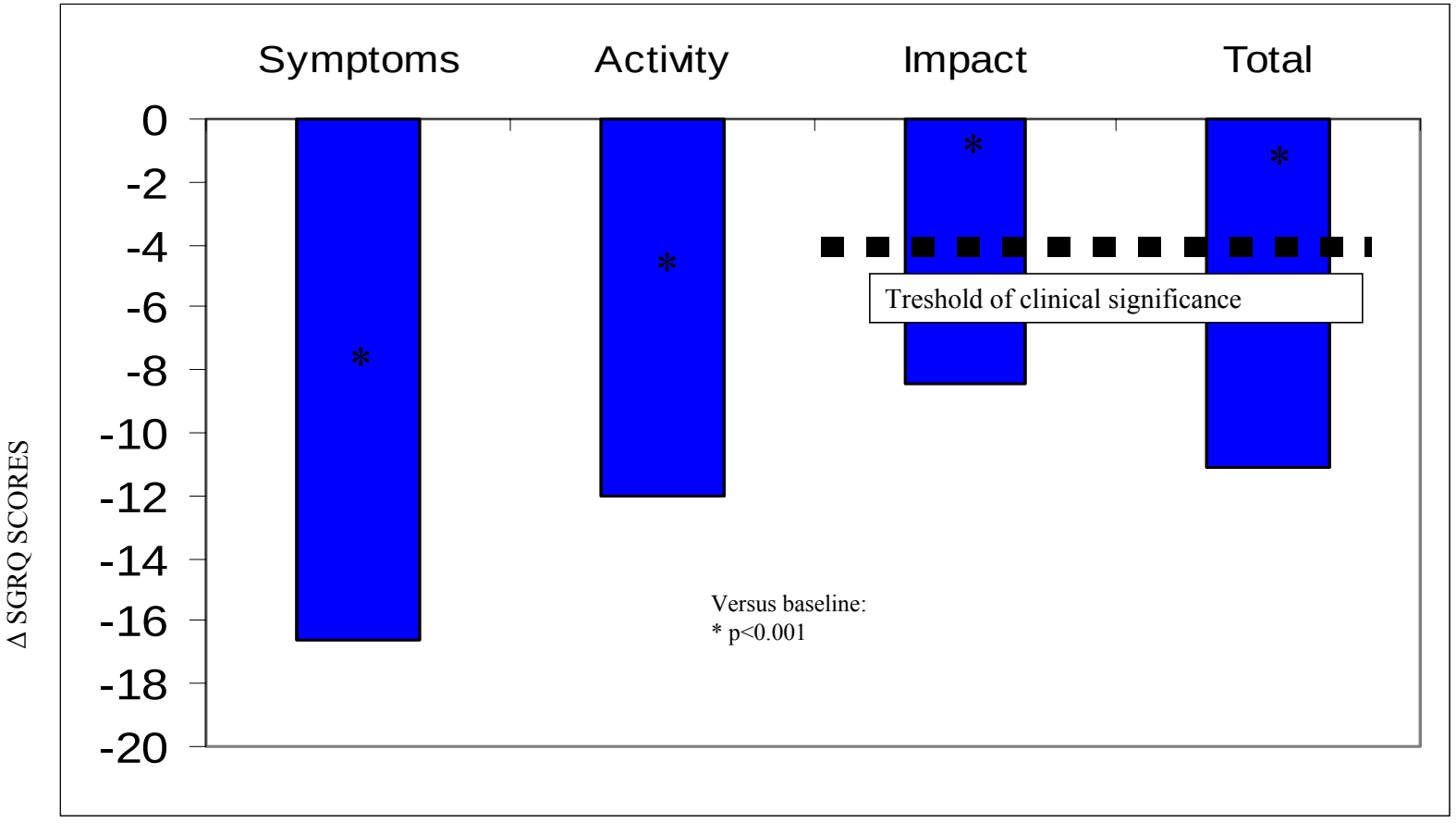
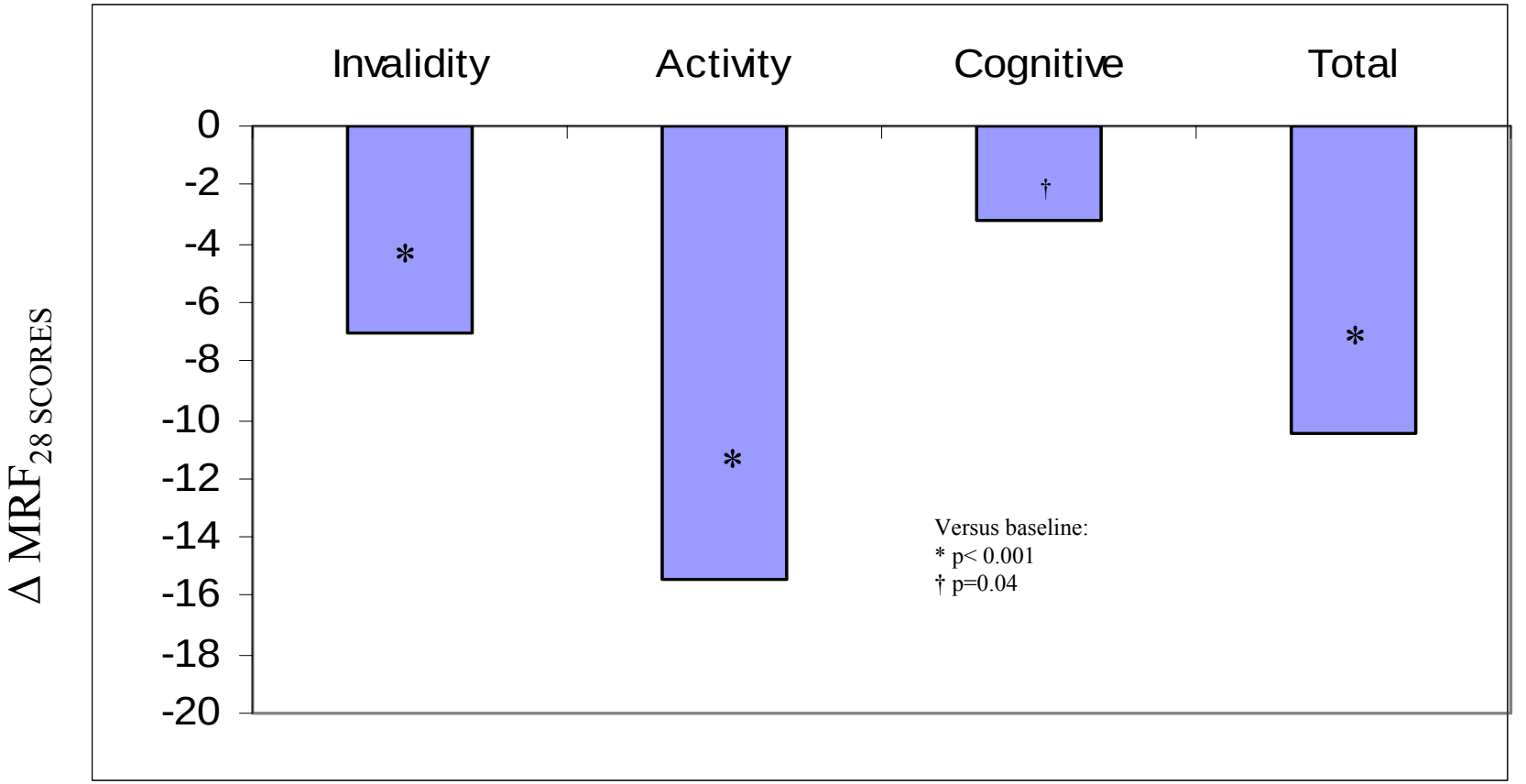
Efficacy of pulmonary rehabilitation in chronic respiratory failure (CRF) due to chronic obstructive pulmonary disease (COPD): The Maugeri Study

M. Carone[a,*], A. Patessio[a], N. Ambrosino[b], P. Baiardi[c], B. Balbi[a], G. Balzano[d], V. Cuomo[e], C.F. Donner[f], C. Fracchia[g], S. Nava[c], M. Neri[h], E. Pozzi[i], M. Vitacca[j], A. Spanevello[e]



Improvement in SGRQ scores (patients without CRF) (mean value ± SE) after PR programme



Improvement in Δ MRF_{28} scores (patients with CRF) (mean value ± SE) after PR programme.

Pulmonary rehabilitation results in improvements in multiple outcome aereas of considerable importance to the patient, including

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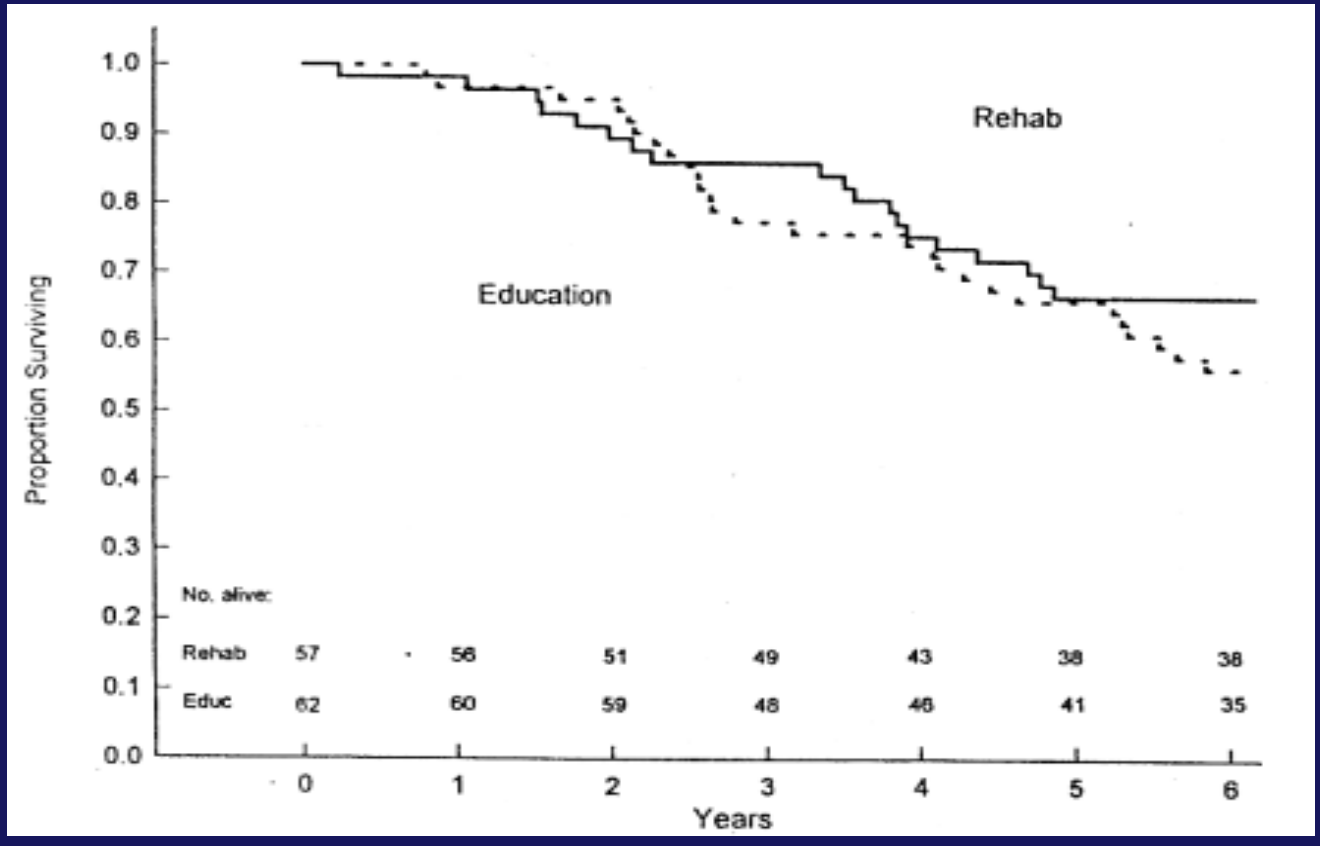
ERJ 2004; 23: 932-946



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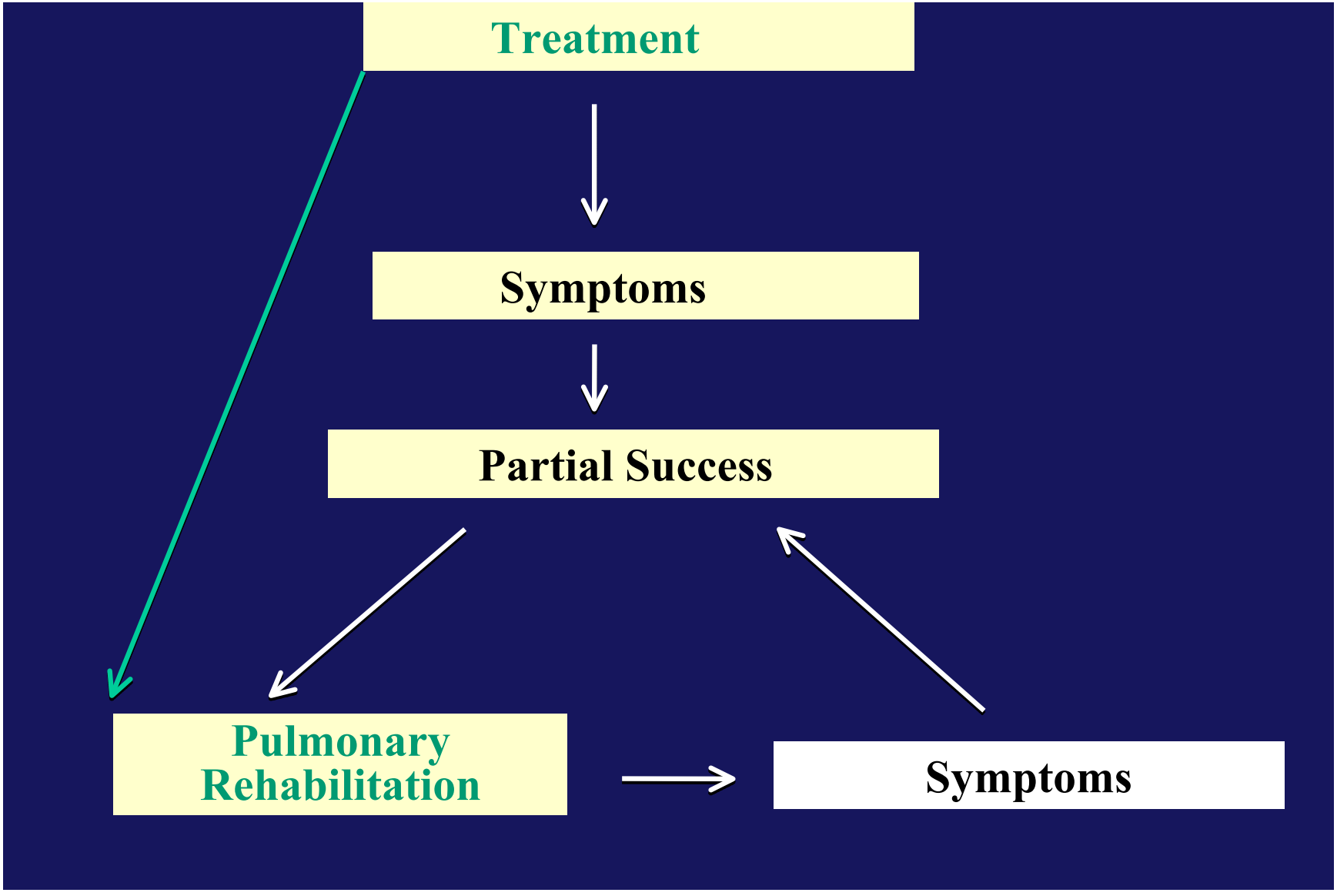
Treatment
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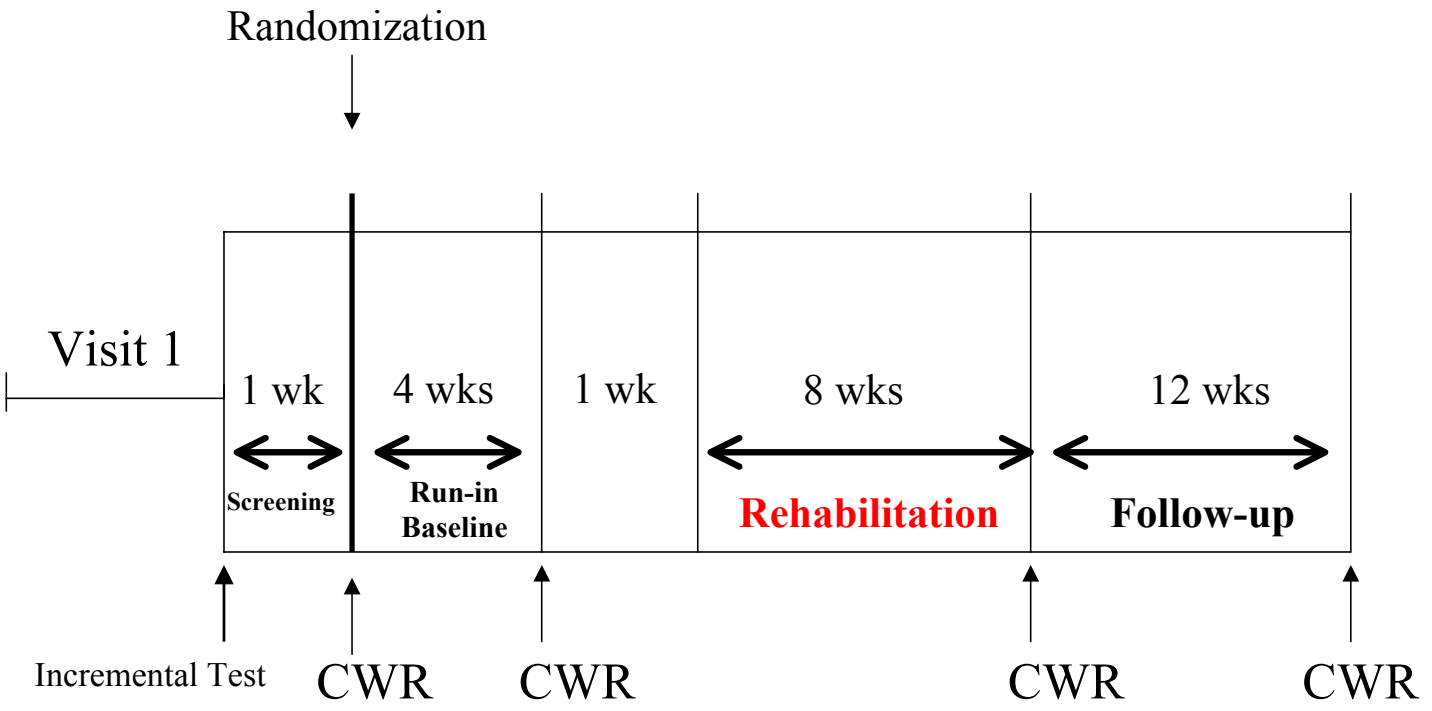
Improvement in Exercise Endurance with the Combination of Tiotropium and Rehabilitative Exercise Training in COPD Patients

Casaburi et al. Chest 2005;127:809-17

Study design



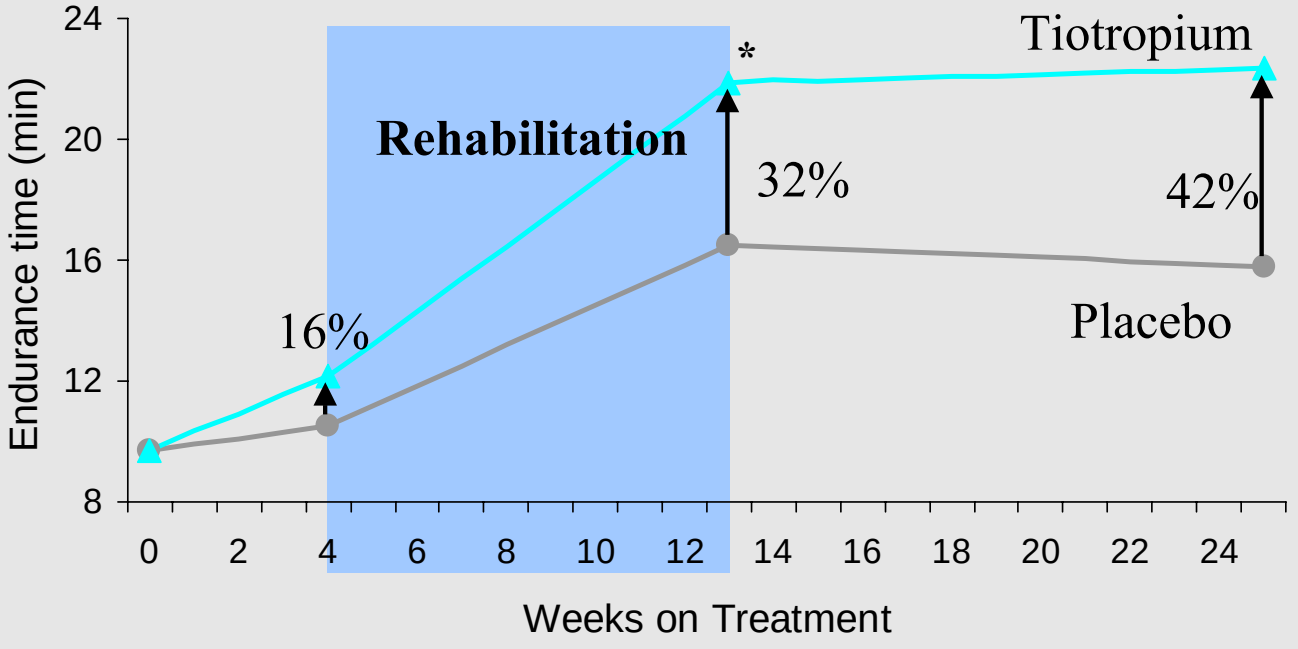
Casaburi et al. Chest 2005;127:809-17

Demographics and initial exercise responses

	Tiotropium	Placebo	Total
Total treated (n)	55	53	108
Male (%)	55	59	57
Age (yrs)	65.9	67.3	66.6
Duration of COPD (yrs)	9.7	8.9	9.3
BMI (kg/cm^2)	25.0	26.8	25.9
FEV_1 (L)	0.82	0.94	0.88
FEV_1 (% predicted)	32.6	36.2	34.4
FEV_1/FVC (%)	41.5	44.6	43.0
FVC (L)	2.01	2.14	2.08
Incremental treadmill test:			
Maximum speed (mph)	2.98	2.81	2.90

Casaburi et al. Chest 2005;127:809-17

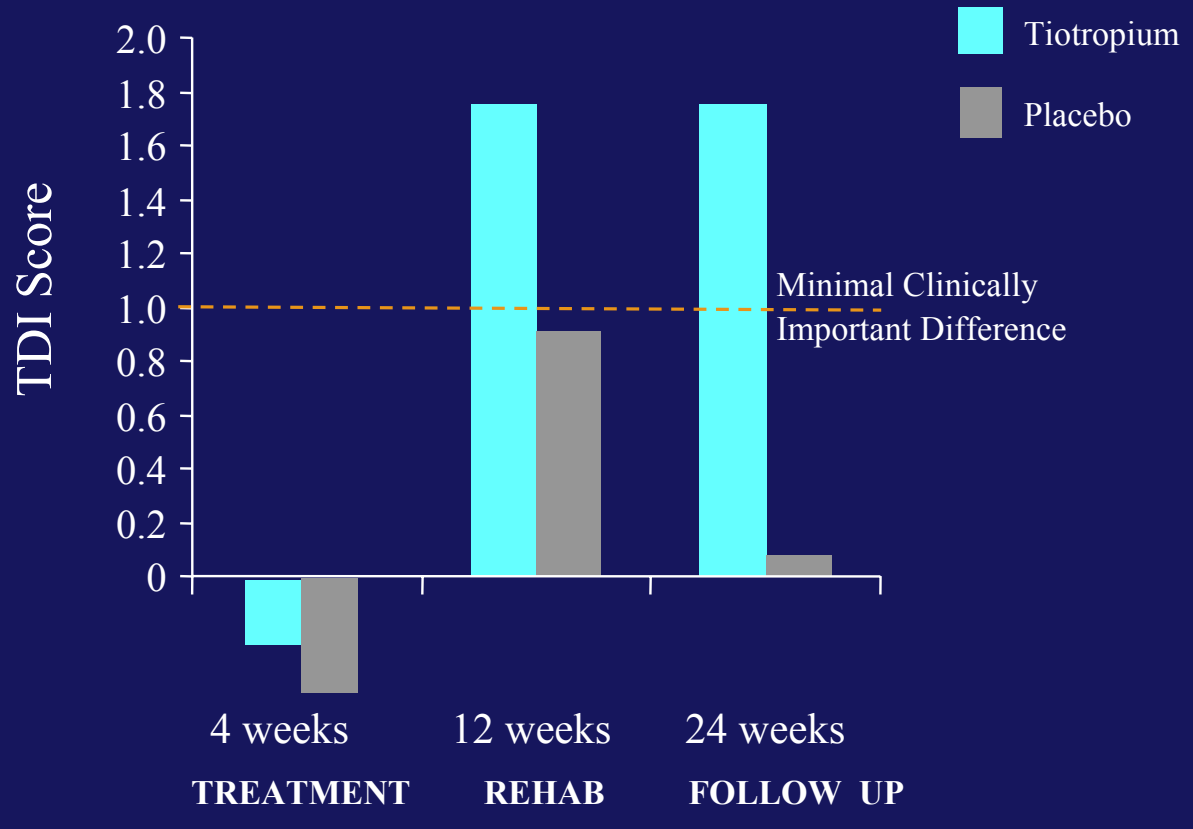
Effect of tiotropium on the improvement in exercise tolerance resulting from rehabilitation



*$P<0.05$

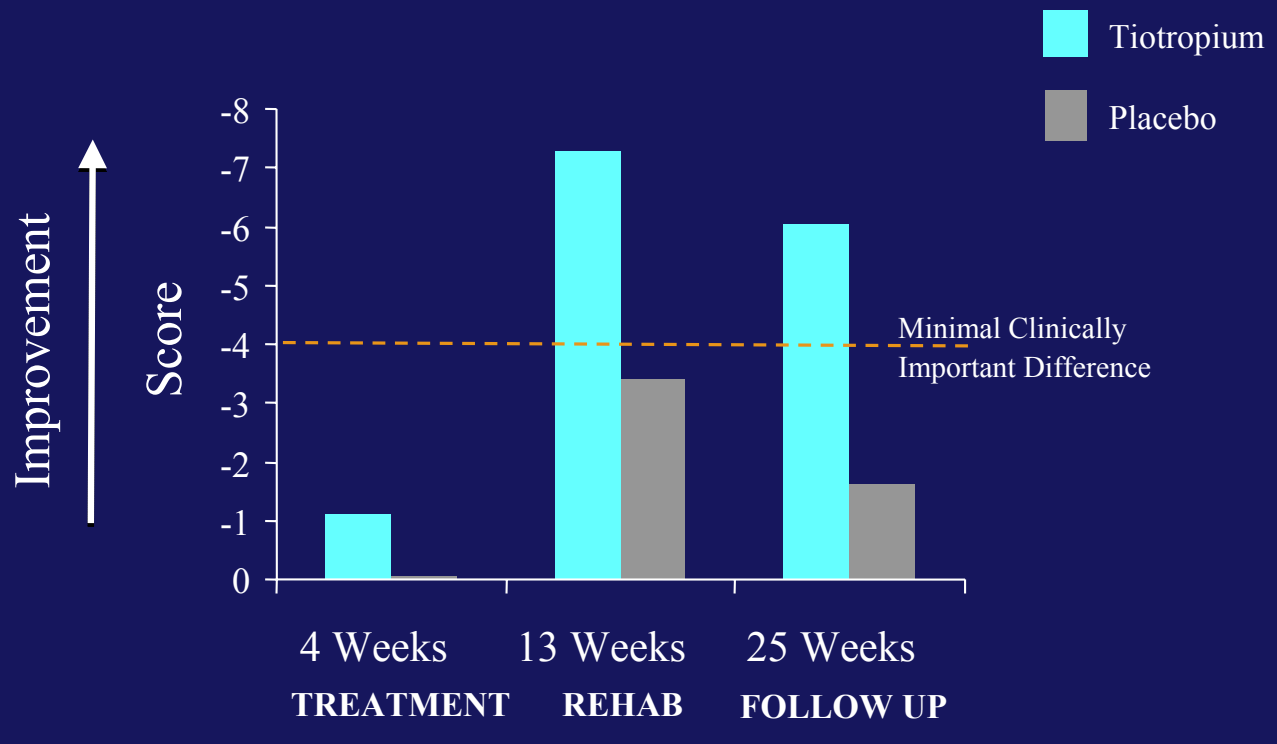
Casaburi et al. Chest 2005;127:809-17

Dyspnea – TDI results



Casaburi et al. Chest 2005;127:809-17

Health-related quality of life – SGRQ results



Casaburi et al. Chest 2005;127:809-17

Pulmonary Rehabilitation

Rationale

Efficacy in COPD + CRF (Chronic Respiratory Failure)

Efficacy in COPD + Comorbiditis

Efficacy in old patients

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Respiratory Medicine (2007) 101, 2447–2453

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Efficacy of pulmonary rehabilitation in chronic respiratory failure (CRF) due to chronic obstructive pulmonary disease (COPD): The Maugeri Study

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Table 1 Baseline characteristics (mean value ± SD) of the two groups of COPD patients.

Parameter	CRF	Non-CRF	*p*-Value
Number	327	720	
Males/females	251/76	604/116	0.008
Age (years)	69.6 ± 7.9	68.9 ± 8.8	NS
BMI (kg/m^2)	27.2 ± 5.7	26.6 ± 5.5	NS
FVC (% predicted)	61.7 ± 16.4	74.5 ± 16.3	0.001
FEV_1 (% predicted)	37.3 ± 14.3	48.6 ± 15.9	0.001
RV (% predicted)	154.1 ± 61.9	155.4 ± 53.8	NS
pH (units)	7.42 ± 0.04[‡]	7.43 ± 0.03	0.01
PaO_2 (mmHg)	53.7 ± 6.1[‡]	71.2 ± 7.9	0.001
$PaCO_2$ (mmHg)	46.9 ± 8.7[‡]	38.8 ± 4.7	0.001
6MWT (m)	283.3 ± 106.2	360.2 ± 110.5	0.001
MRC[*]	3.75 ± 1.16	3.21 ± 1.17	0.001
BDI[†]	4.09 ± 2.06	5.2 ± 2.36	0.001
MRF_{28}—Total score	53.7 ± 23.5	*46.4 ± 23.7*[§]	*0.01*[§]
MRF_{28}—Activity	64.1 ± 27.5	*56.8 ± 27.3*[§]	*0.04*[§]
MRF_{28}—Cognitive function	58.9 ± 26.9	*57.4 ± 27.7*[§]	*NS*[§]
MRF_{28}—Invalidity	66.9 ± 28.0	*63.5 ± 27.4*[§]	*0.02*[§]
SGRQ—Total score	*38.8 ± 16.1*[‖]	41.1 ± 16.9	*NS*[‖]
SGRQ—Symptoms	*53.0 ± 19.2*[‖]	49.6 ± 21.7	*NS*[‖]
SGRQ—Activity	52.6 ± 22.5[‖]	52.7 ± 20.7	*NS*[‖]
SGRQ—Impact	*27.2 ± 15.0*[‖]	32.7 ± 18.2	*0.004*[‖]

PULMONARY REHABILITATION
Maugeri Study

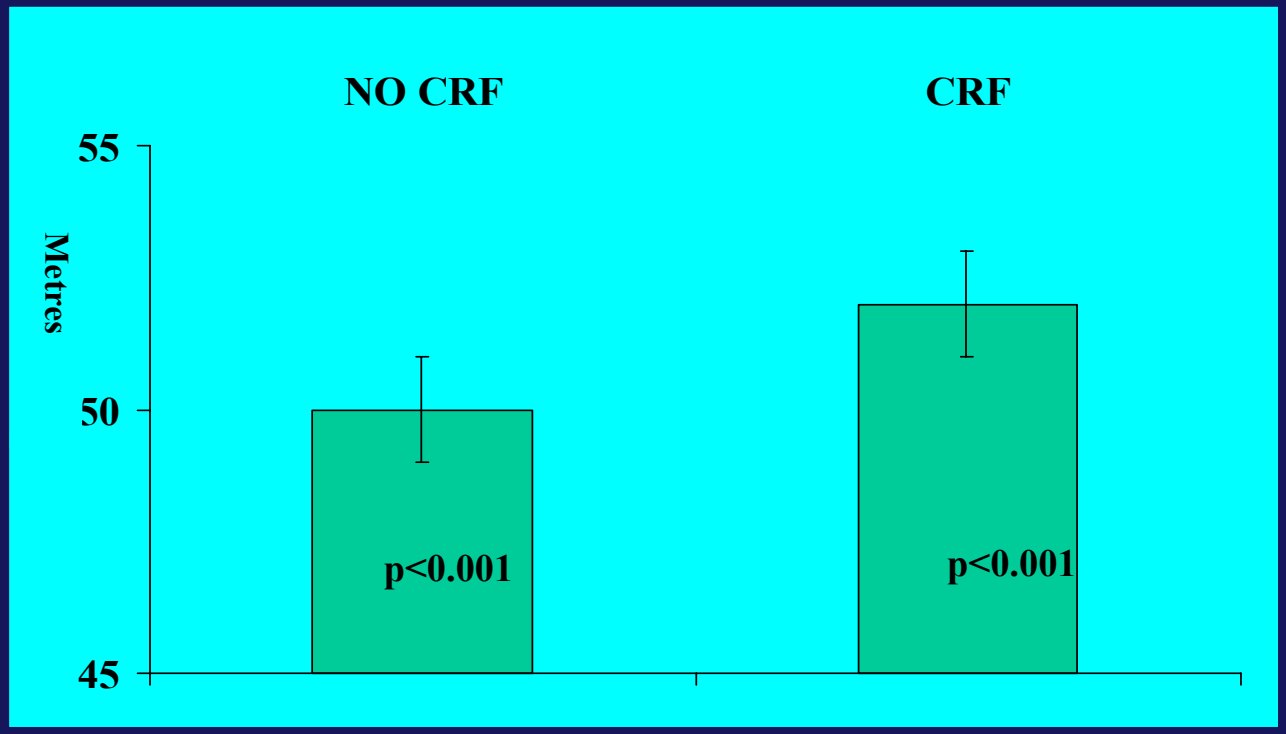
Mean duration: 24 ± 4 days

Exercise training

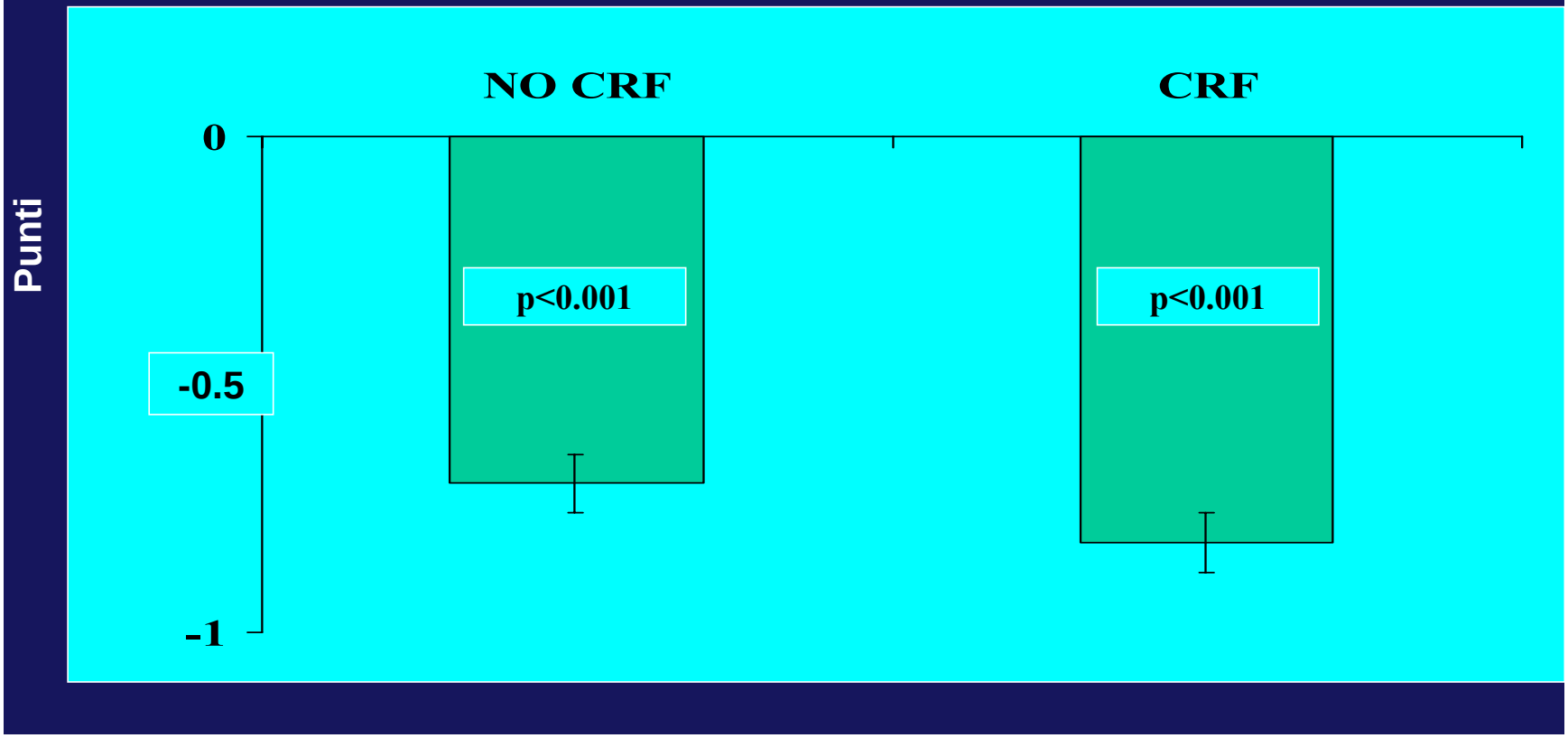
Educational support

Pharmacological therapy optimization

CHANGE IN WALKING DISTANCE (mean ± 95% CI)



CHANGE IN MRC SCORE (mean ± 95% CI)



Conclusions

This study shows that PR is equally effective in the more severe COPD patients, i.e. those with CRF, and supports the prescription of PR also in these patients

Pulmonary Rehabilitation

Rationale

Efficacy in COPD + CRF (Chronic Respiratory Failure)

Efficacy in COPD + Comorbiditis

Efficacy in old patients

Conclusions

ORIGINAL ARTICLE

The Body-Mass Index, Airflow Obstruction, Dyspnea, and Exercise Capacity Index in Chronic Obstructive Pulmonary Disease

Bartolome R. Celli, M.D., Claudia G. Cote, M.D., Jose M. Marin, M.D., Ciro Casanova, M.D., Maria Montes de Oca, M.D., Reina A. Mendez, M.D., Victor Pinto Plata, M.D., and Howard J. Cabral, Ph.D.

N Engl J Med 2004;350:1005-12.

Table 2. Variables and Points Values Used for the Computation of the Body-Mass Index, Degree of Airflow Obstruction and Dyspnea, and Exercise Capacity (BODE) Index.*

Variable	Points on BODE Index			
	0	1	2	3
FEV_1 (% of predicted)†	≥65	50–64	36–49	≤35
Distance walked in 6 min (m)	≥350	250–349	150–249	≤149
MMRC dyspnea scale‡	0–1	2	3	4
Body-mass index§	>21	≤21		

Pulmonary rehabilitation and the BODE index in COPD

C.G. Cote* and B.R. Celli#

Eur Respir J 2005; 26: 630–636

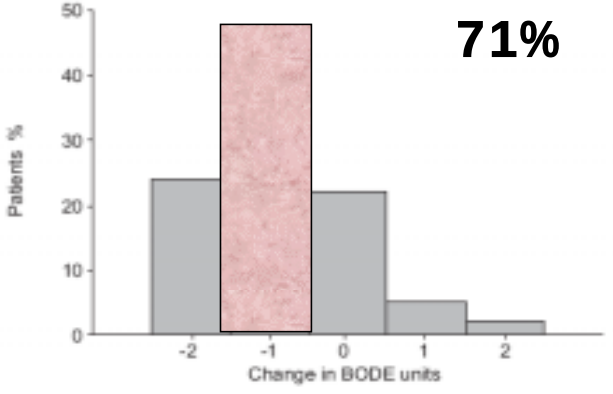


TABLE 2 Change in BODE following pulmonary rehabilitation (PR) in the patients enrolled in PR as well as the change in patients who did not enrol in rehabilitation (no PR)

Groups	Subjects n	Baseline	Post-PR (3 months)	1 yr	2 yrs
No PR	130	6.94±1.97	6.81±1.92	6.58±2.1	7.22±2¶
PR#	116	5.07±1.5	4.18±1.68¶	5.0±2.1	5.11±2.3¶

#: p<0.001 between no PR and PR at all time points; ¶: p<0.001 by ANOVA compared with baseline.

Pulmonary Rehabilitation

Rationale

Efficacy in COPD + CRF (Chronic Respiratory Failure)

Efficacy in COPD + Comorbidities

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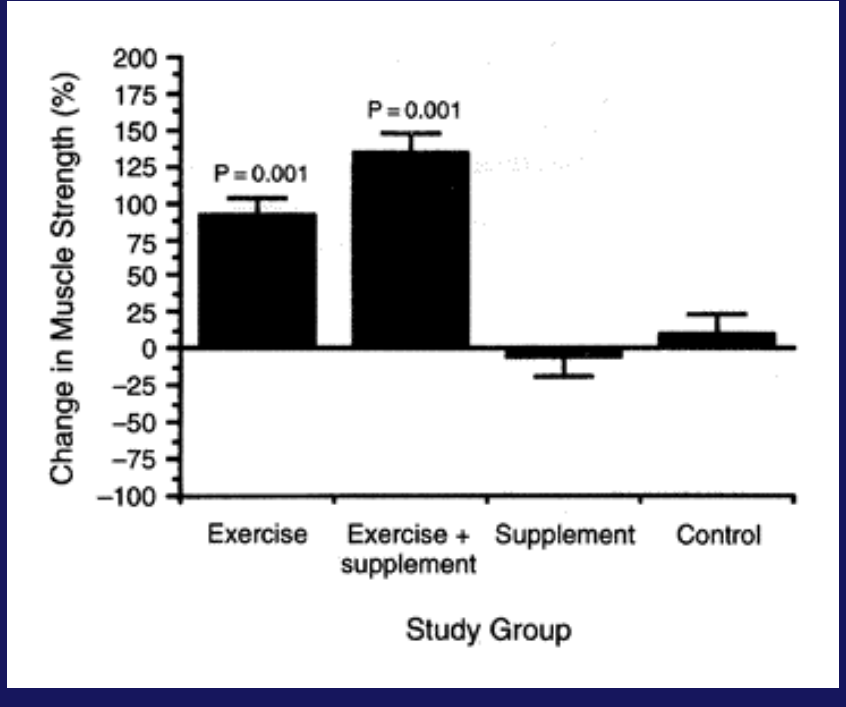
EXERCISE TRAINING AND NUTRITIONAL SUPPLEMENTATION FOR PHYSICAL FRAILTY IN VERY ELDERLY PEOPLE

Fiatarone M. et al. NEJM 1994;330(25):1769-1775)

A randomized, placebo-controlled trial comparing progressive exercise training, multinutrient supplementation, both interventions, and neither in 100 frail nursing home residents over a 10 week period

EXERCISE TRAINING AND NUTRITIONAL SUPPLEMENTATION FOR PHYSICAL FRAILTY IN VERY ELDERLY PEOPLE

Fiatarone M. et al. NEJM 1994;330(25):1769-1775)

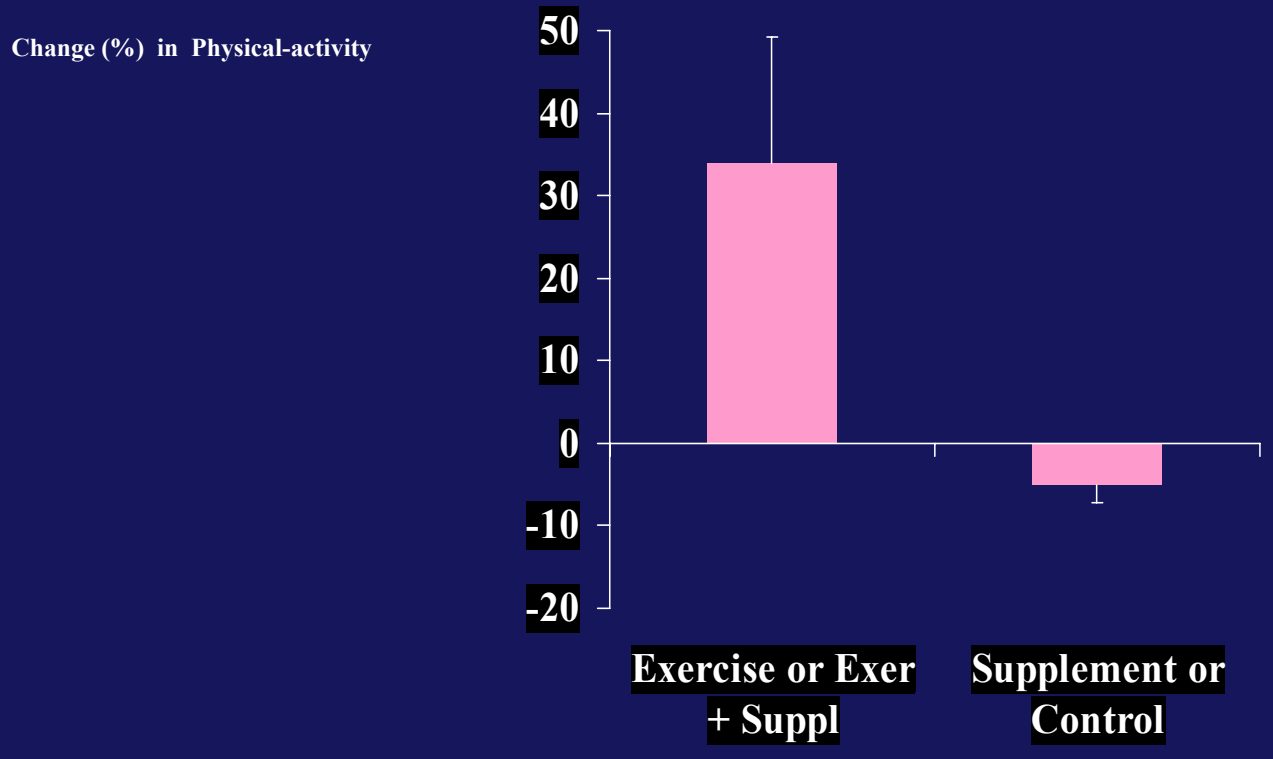


(n=100 age 87.1 ± 0.6 years)

Mean (±SE) Changes in Muscle Strength after Exercise, Nutritional Supplementation, Neither, or Both

EXERCISE TRAINING AND NUTRITIONAL SUPPLEMENTATION FOR PHYSICAL FRAILTY IN VERY ELDERLY PEOPLE

Fiatarone M. et al. NEJM 1994;330(25):1769-1775)



EXERCISE TRAINING AND NUTRITIONAL SUPPLEMENTATION FOR PHYSICAL FRAILTY IN VERY ELDERLY PEOPLE

Fiatarone M. et al. NEJM 1994;330(25):1769-1775)

High-intensity resistance exercise training is a feasible means of counteracting muscle weakness and physical frailty in very elderly people.

In contrast, multinutrient supplementation without concomitant exercise does not reduce muscle weakness or physical activity a 10 week period

Pulmonary Rehabilitation Improves Exercise Capacity in Older Elderly Patients with COPD*

(Chest 1995; 107:730-34)

James I. Couser, Jr, MD, FCCP; Richard Guthmann, BA;
M. Abdulgany Hamadeh, MD, FCCP; and Cynthia S. Kane, RN, MSN

Comparison between changes in 12-min walking distance (12MD) and self-assessment scores in 47 older elderly patients with moderate to severe COPD who completed inpatient or outpatient pulmonary rehabilitation with those achieved by 87 younger patients who partecipated in the same programs

Pulmonary Rehabilitation Improves Exercise Capacity in Older Elderly Patients with COPD*

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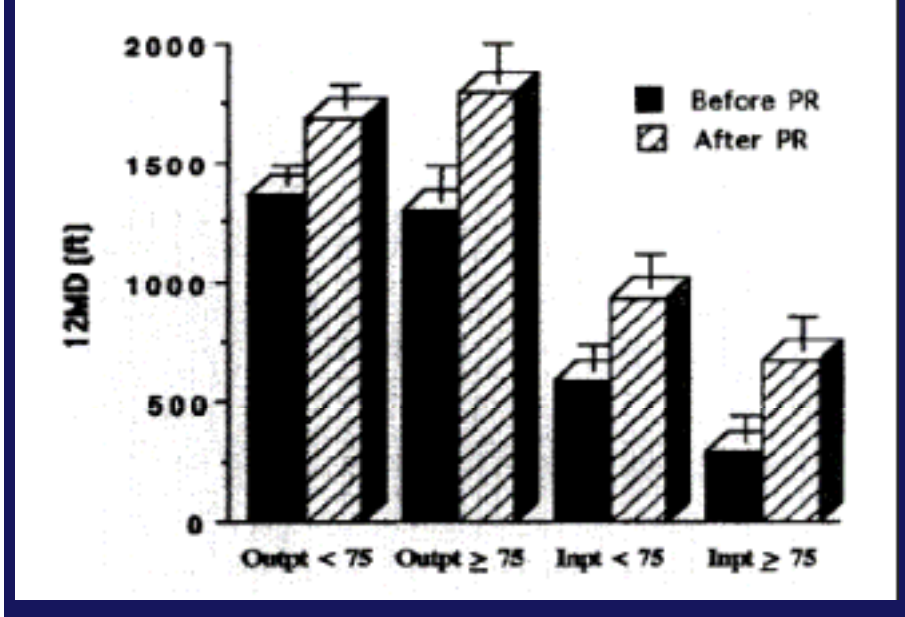

… comprehensive outpatient and inpatient pulmonary rehabilitation programs are as beneficial in older elderly patients with COPD as they are in younger patients with similar lung function abnormalities

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Table 2—*Changes in 12MD and Self-Assessment Scores Before and After Outpatient PR*

	Young (Age <75 yr)	Old (Age ≥75 yr)
12MD, feet		
Before PR	1,361 ± 658	1,298 ± 791
After PR	1,683 ± 728*	1,800 ± 841*
Increase, feet	322 ± 554	502 ± 591
% increase	24	39
Education score, % correct		
Before PR	73 ± 14	72 ± 16
After PR	93 ± 8*	92 ± 7*

*p<0.001 compared with values before PR.

Table 4—*Changes in 12MD and Self-Assessment Scores Before and After Inpatient PR*

	Young (Age <75 yr)	Old (Age ≥75 yr)
12MD, feet		
Before PR	581 ± 616	295 ± 465
After PR	931 ± 751*	669 ± 638*
Increase, feet	350 ± 365	374 ± 427
% increase	60	127
Education score, % correct		
Before PR	70 ± 13	63 ± 16
After PR	92 ± 8*	89 ± 10*

*p<0.001 compared with values before PR.

Pulmonary Rehabilitation Improves Exercise Capacity in Older Elderly Patients with COPD* (Chest 1995; 107:730-34)

James I. Couser, Jr, MD, FCCP; Richard Guthmann, BA; M. Abdulgany Hamadeh, MD, FCCP; and Cynthia S. Kane, RN, MSN

Comprehensive outpatient and inpatient pulmonary rehabilitation programs are as beneficial in older elderly patients with COPD as they are in younger patients with similar lung function abnormalities

Pulmonary rehabilitation improves functional capacity in patients 80 years of age or older

Marcel A Baltzan MD FRCPC, Hany Kamel MD, Arlene Alter PT, Michael Rotaple MD FRCPC, Norman Wolkove MD FRCPC FCCP

Can Respir J 2004;11(6):407-413.

The objectives of the present study was to determine whether patients 80 years of age or older gain similar benefits from pulmonary rehabilitation as do younger patients.

Outcomes were compare in 230 consecutive inpatients with moderate to severe lung disease who partecipated in a comprehensive pulmonary rehabilitation program during one-year period.

Pulmonary rehabilitation improves functional capacity in patients 80 years of age or older

Marcel A Baltzan MD FRCPC, Hany Kamel MD, Arlene Alter PT, Michael Rotaple MD FRCPC, Norman Wolkove MD FRCPC FCCP

Can Respir J 2004;11(6):407-413.

TABLE 2
Six-minute walk distance after pulmonary rehabilitation

	Age		P
	<80 years	80+ years	(YP vs OP)
6 min walk (m)			
Admission	144 (131 to 157)	133 (108 to 158)	0.48
Discharge	231 (231 to 244)	185 (159 to 211)	0.004
P (admission versus discharge)	<0.0001	<0.0001	
Dyspnea at end of 6 min walk (Borg scale)			
Admission	4.2 (3.9 to 4.5)	3.4 (2.8 to 4.1)	0.038
Discharge	3.5 (3.3 to 3.8)	3.1 (2.7 to 3.4)	0.033
P (admission versus discharge)	<0.0001	0.13	

Pulmonary rehabilitation improves functional capacity in patients 80 years of age or older

Marcel A Baltzan MD FRCPC, Hany Kamel MD, Arlene Alter PT, Michael Rotaple MD FRCPC, Norman Wolkove MD FRCPC FCCP

Can Respir J 2004;11(6):407-413.

TABLE 4
Global functional score before and after pulmonary rehabilitation

	Age		P
	<80 years	80+ years	YP vs OP
Global functional score (max 100)			
Admission	89 (87 to 90)	85 (81 to 89)	0.040
Discharge	94 (93 to 95)	91 (88 to 93)	0.002
P (admission versus discharge)	<0.0001	<0.0001	

TABLE 5
Length of program and stay in hospital

	Age		P
	<80 years	80+ years	
Days in rehabilitation	23.1 (21.9 to 24.3)	23.1 (20.3 to 26.0)	0.98
Days in hospital	28.7 (28.0 to 31.3)	32.2 (27.1 to 37.3)	0.35

A comprehensive inpatient pulmonary rehabilitation program is beneficial in selected patients 80 years of age or older

Can individualized rhabilitation improve functional independence in elderly patients with COPD?

L. Sewell et al. Chest 2005; 128: 1194-1200

The aims of this prospective randomized , controlled trial were to establish whether pulmonary rehabilitation (PR) improves domestic function and daily activity levels in COPD and whether individually targeted exercise is more effective than general exercise.

Patients were randomized to a conventional 7-week general exercise program (GEP) or an individual targeted exercise program (ITEP).

Can individualized rhabilitation improve functional independence in elderly patients with COPD?

L. Sewell et al. Chest 2005; 128: 1194-1200

Domestic function was assessed by the Canadian Occupational Performance Measure (COPM).

Exercise performance was assessed by the incremental shuttle walk test (ISWT) and the endurance shuttle walk test (ESWT).

Health status was assessed by the chronic respiratory questionnaire – self reported (CRQ-SR)

Can individualized rhabilitation improve functional independence in elderly patients with COPD?

L. Sewell et al. **Chest 2005; 128: 1194-1200**

Table 3—*Prerehabilitation and Mean Change Results for Measures of Self-Reported Domestic Function, Health Status, and Exercise Performance**

Variables	GEP Group			ITEP Group		
	Pre-PR	Mean Change (95% CI)	p Value	Pre-PR	Mean Change (95% CI)	p Value
COPM performance	3.53 ± 1.17	1.71 (1.37–2.05)	0.0001†	3.96 ± 1.38	1.46 (1.03–1.87)	0.0001†
COPM satisfaction	2.91 ± 1.41	2.27 (1.74–2.81	0.0001†	3.15 ± 1.69	2.04 (1.56–2.52)	0.0001†
ISWT, m	184.53 ± 92.01	81.72 (63.83–99.62)	0.0001‡	198.62 ± 119.48	85.82 (67.62–103.42)	0.0001‡
ESWT, s	235.16 ± 169.54	311.21 (217–404.58)	0.0001‡	262.42 ± 197.76	435.39 (344.60–526.17)	0.0001‡
CRQ-SR						
Dyspnea	2.45 ± 1.05	0.89 (0.55–1.23)	0.0001†	2.45 ± 0.94	0.62 (0.26–0.97)	0.001†
Fatigue	3.05 ± 1.06	0.83 (0.52–1.14)	0.0001†	3.45 ± 1.28	0.53 (0.15–0.55)	0.004†
Emotion	4.00 ± 1.39	0.60 (0.26–0.93)	0.001†	4.25 ± 1.36	0.62 (0.33–0.92)	0.0001†
Mastery	3.55 ± 1.31	0.79 (0.47–1.10)	0.0001†	4.24 ± 1.43	0.66 (0.28–1.04)	0.002†

*Values given as mean ± SD or No., unless otherwise indicated. ESWT = endurance shuttle walking test; CRQ-SR = chronic respiratory questionnaire—self-reported.
†p Value on difference between week 1 and week 7 from Wilcoxon signed rank test.
‡p Value on difference between week 1 and week 7 from paired *t* test.

No statistically significant difference was found between the general exercise group and the individually targeted exercise group for any outcome measures

Can individualized rhabilitation improve functional independence in elderly patients with COPD?

L. Sewell et al. Chest 2005; 128: 1194-1200

Pulmonary rehabilitation improves domestic function and physical activity.

This study also demonstarteds that general exercise training is as effective as individually targeted training

CONCLUSION

Pulmonary Rehabilitation improvements
Dyspnea, Exercise tolerance , Health care utilisation, Health status, Survival

Treatment + Pulmonary Rehabilitation
further improvement

CONCLUSION

Pulmonary Rehabilitation is equally effective in COPD patients with or without CRF

Pulmonary Rehabilitation results in improvements in secondary conditions (BODE index)

Pulmonary Rehabilitation is a feasible and effective intervention also in frail elderly