28ο ΠΑΝΕΛΛΗΝΙΟ Πνευμονολογικό ΣΥΝΕΔΡΙΟ
ΕΛΛΗΝΙΚΗ ΠΝΕΥΜΟΝΟΛΟΓΙΚΗ ΕΤΑΙΡΕΙΑ
HELLENIC THORACIC SOCIETY

ΧΑΠ και άσκηση

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Πνευμονολόγος-Εντατικολόγος,
Επιμελήτρια Β', ΓΝ "Γ. Παπανικολάου", Θεσσαλονίκη

No conflict of interest to declare

Ορισμοί

- Exercise limitation: Exercise limitation is a condition where the patient is *unable* to do physical exercise at the *level* or for the *duration* that would be expected of someone in his or her age and general physical condition.

-6MWD, ESWT, ISWT, ECPET, ICPET, e.t.c.

-t(min), Watt, VO_2, meters, METS, e.t.c.

- Physical activity: the totality of *voluntary movement* produced by skeletal muscles during everyday functioning

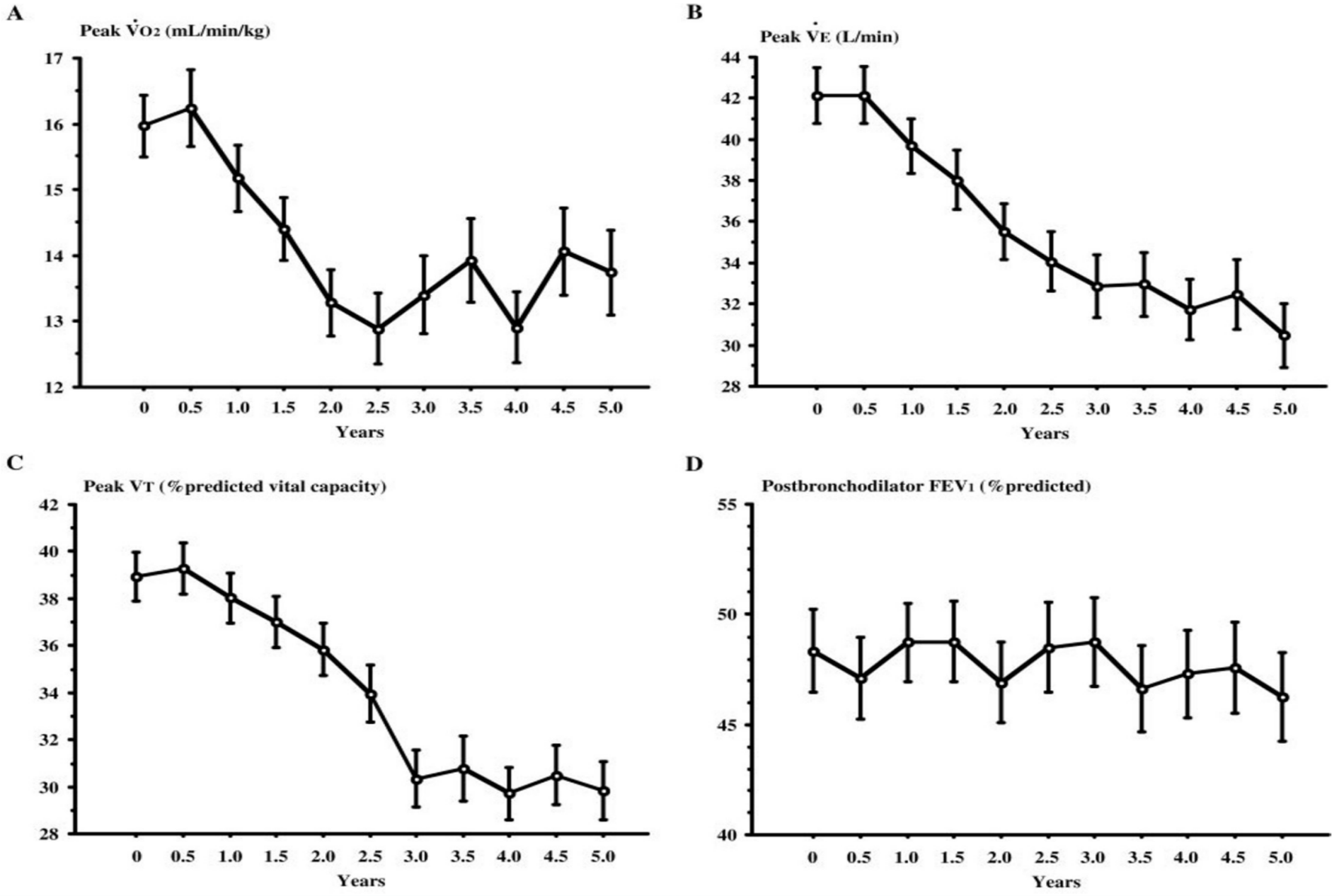
-subjective methods, measurement of energy expenditure, motor sensors

ATS/ERS Statement. AJRCCM 2013; Vogiatzis et al. Compr Physiol 2012

Exercise Capacity Deterioration in Patients With COPD*

Longitudinal Evaluation Over 5 Years

Oga et al. Chest 2005; 128:62-69

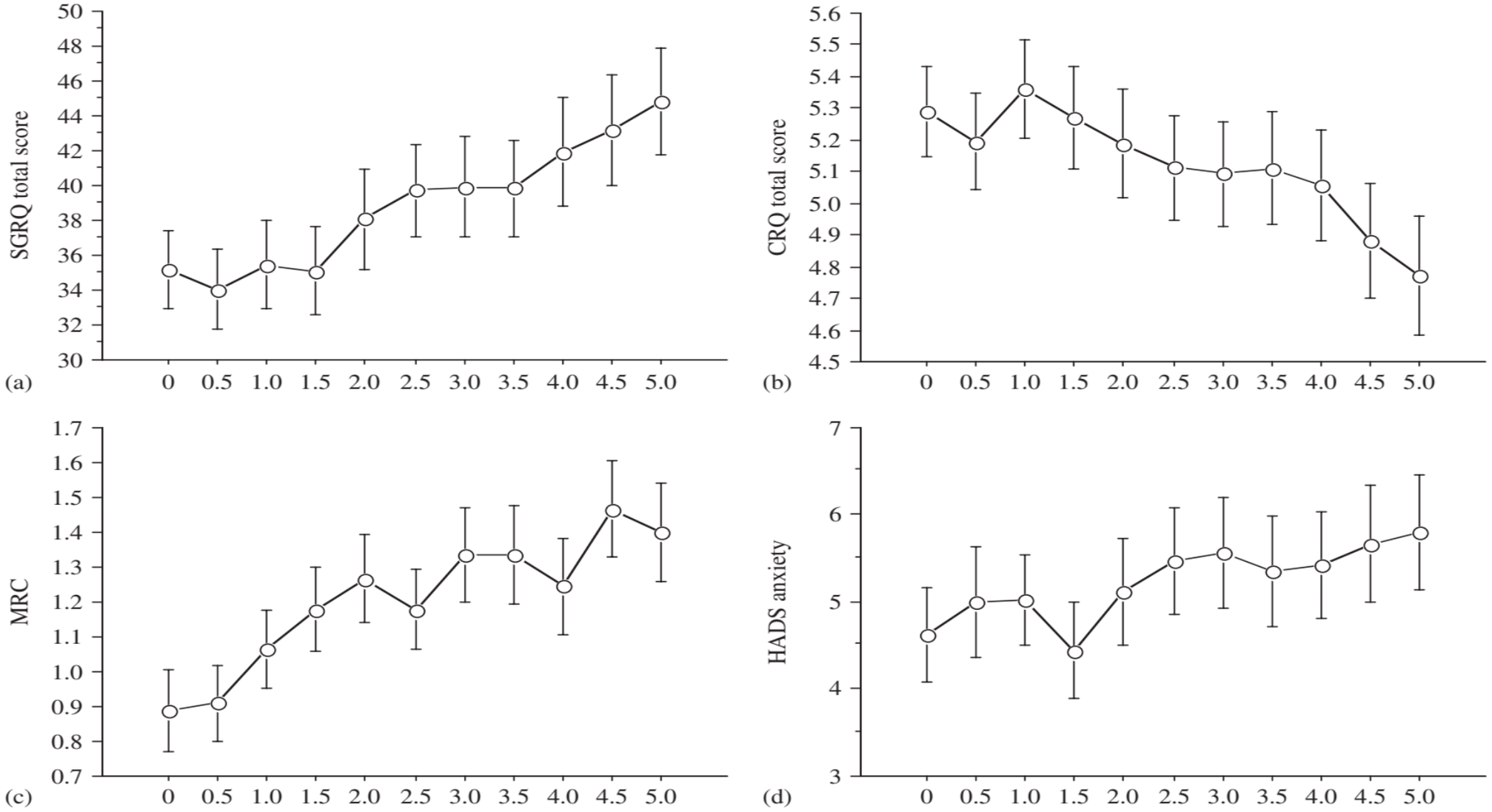


N=54 pts, every 6 months for 5 years

Longitudinal deteriorations in patient reported outcomes in patients with COPD

Respiratory Medicine (2007) 101, 146–153

Toru Oga[a,*], Koichi Nishimura[b], Mitsuhiro Tsukino[c], Susumu Sato[a], Takashi Hajiro[d], Michiaki Mishima[a]

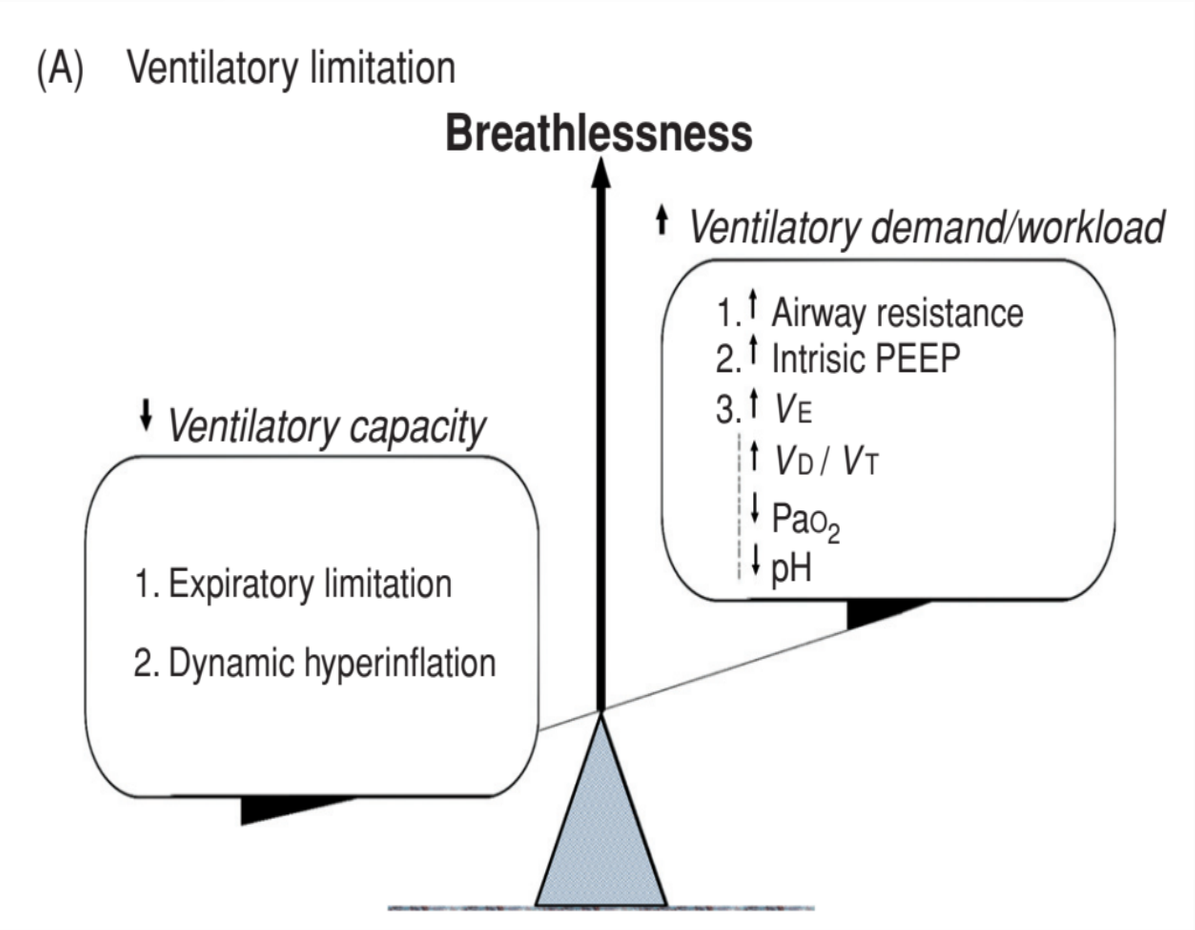


N=45 pts, every 6 m for 5 years

Factors Limiting Exercise Tolerance in Chronic Lung Diseases

Compr Physiol 2:1779-1817, 2012

Ioannis Vogiatzis*[1,2,3] and Spyros Zakynthinos[3]



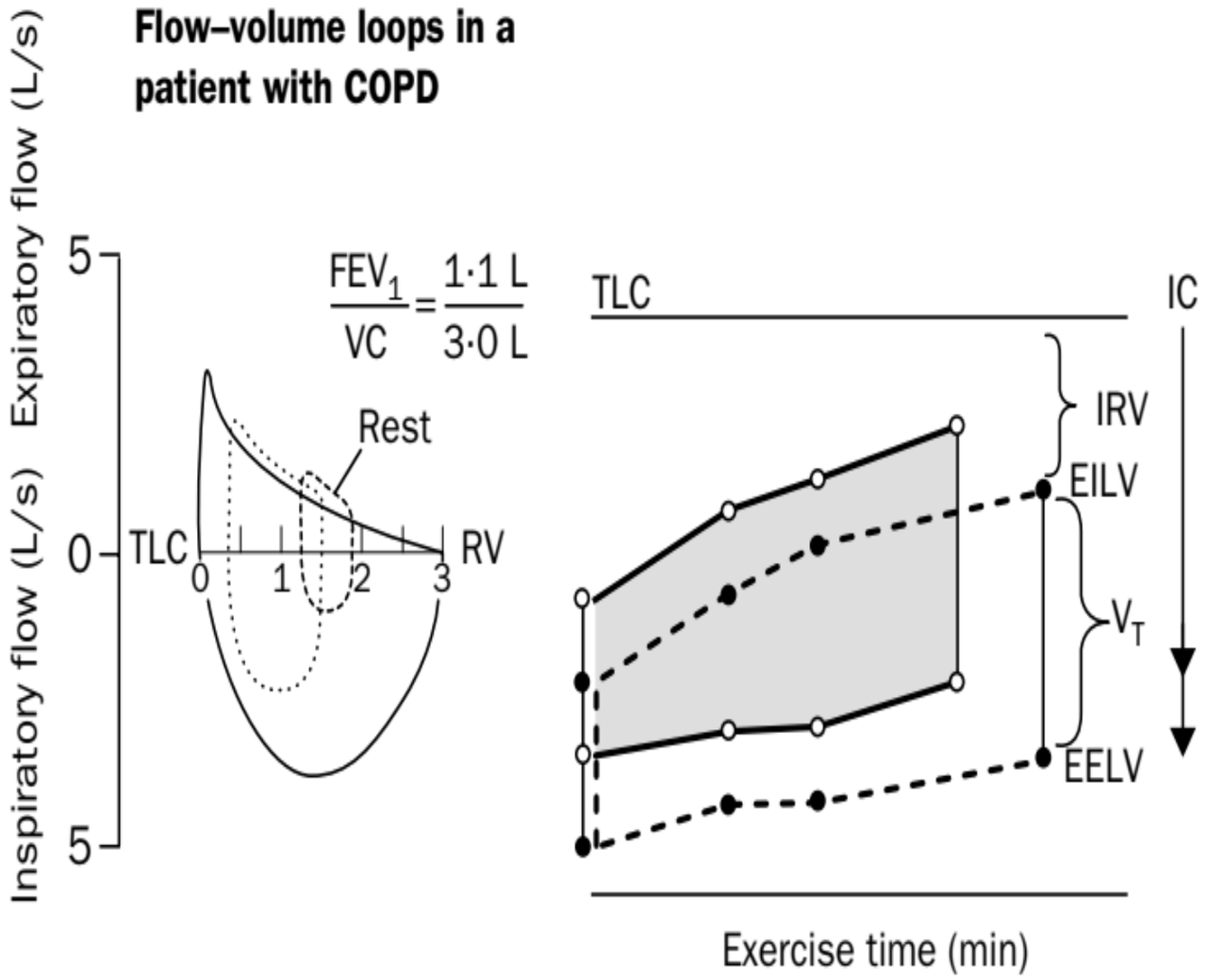
Seminar

Lancet 2003; **362:** 1053–61

Chronic obstructive pulmonary disease

P M A Calverley, Paul Walker

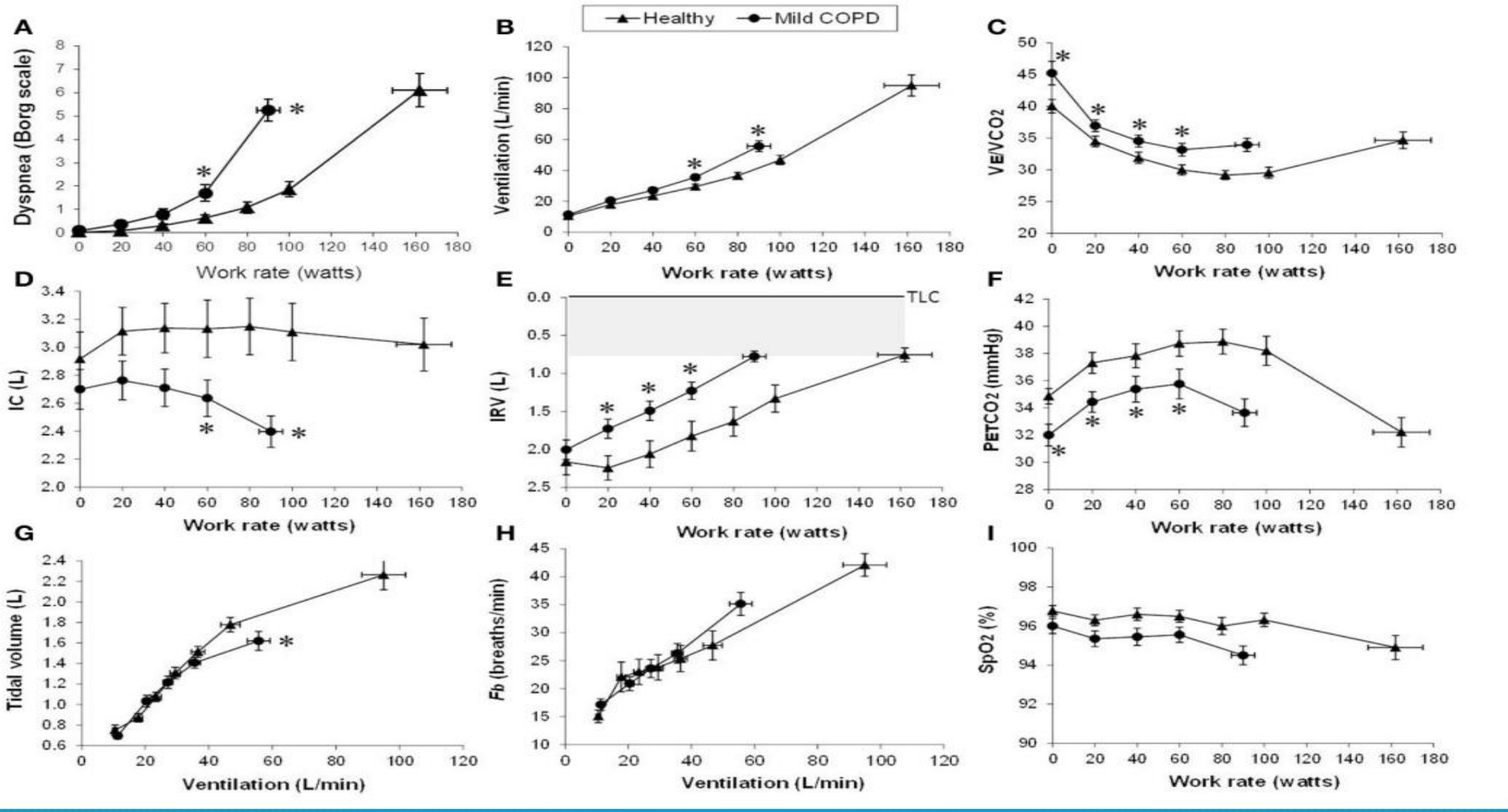
Flow–volume loops in a patient with COPD



Advances in the Evaluation of Respiratory Pathophysiology during Exercise in Chronic Lung Diseases

Front Physiol.2017; 8:82

Denis E. O'Donnell[1], Amany F. Elbehairy[1,2], Danilo C. Berton[1], Nicolle J. Domnik[1], J. Alberto Neder[1] on behalf of Canadian Respiratory Research Network (CRRN)*

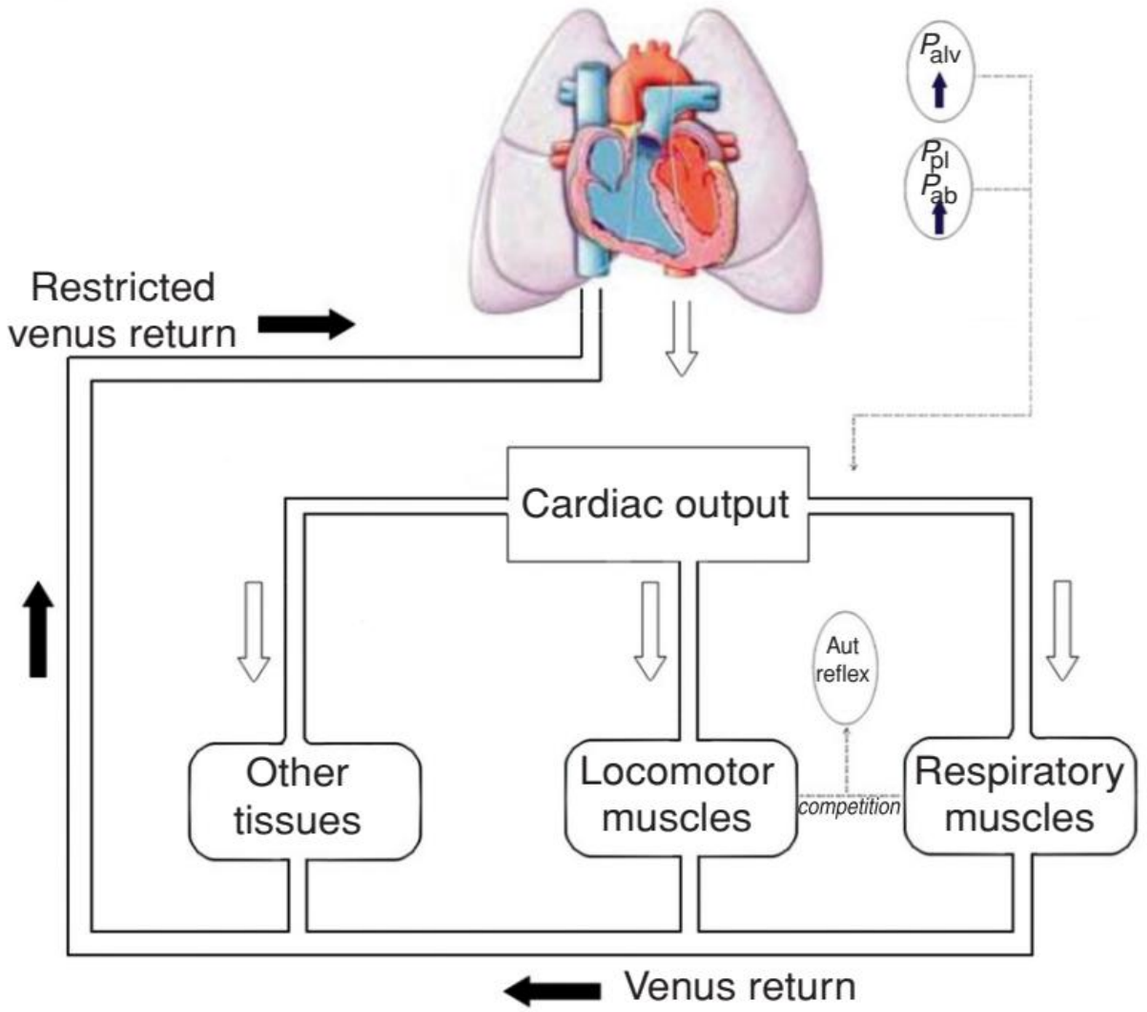


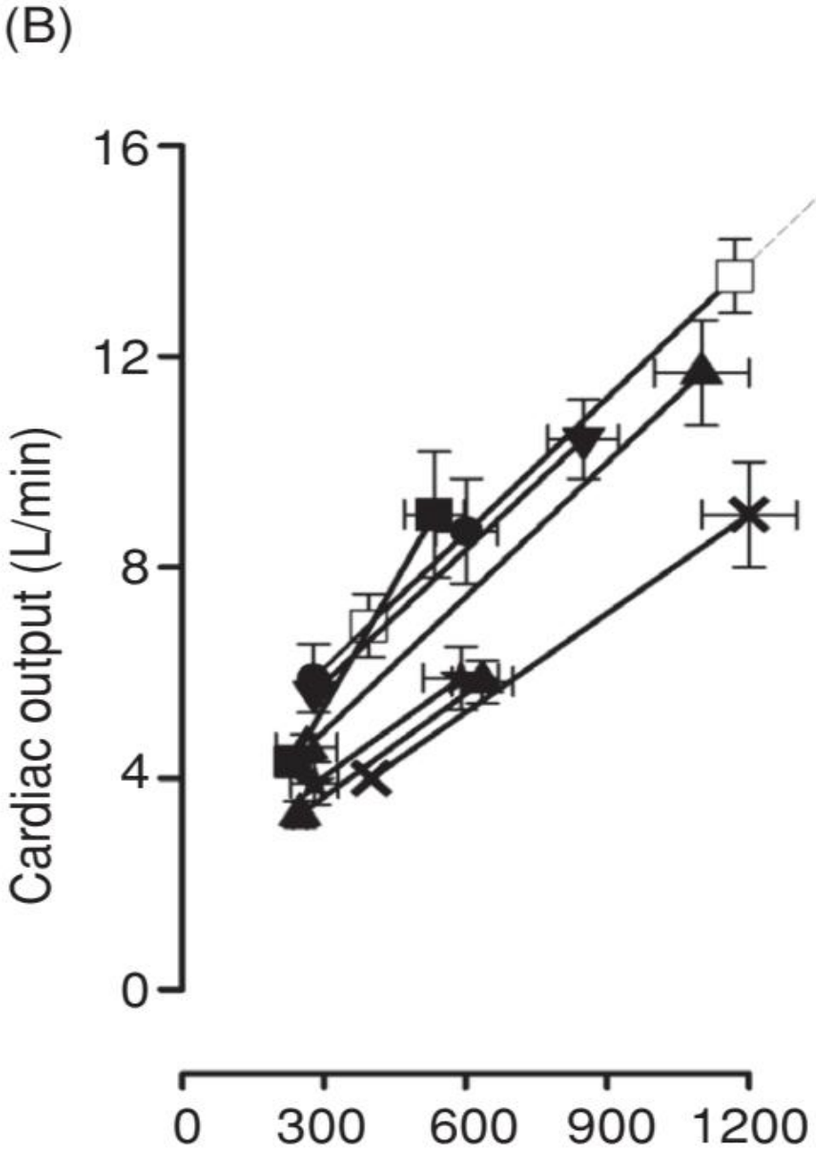
Factors Limiting Exercise Tolerance in Chronic Lung Diseases

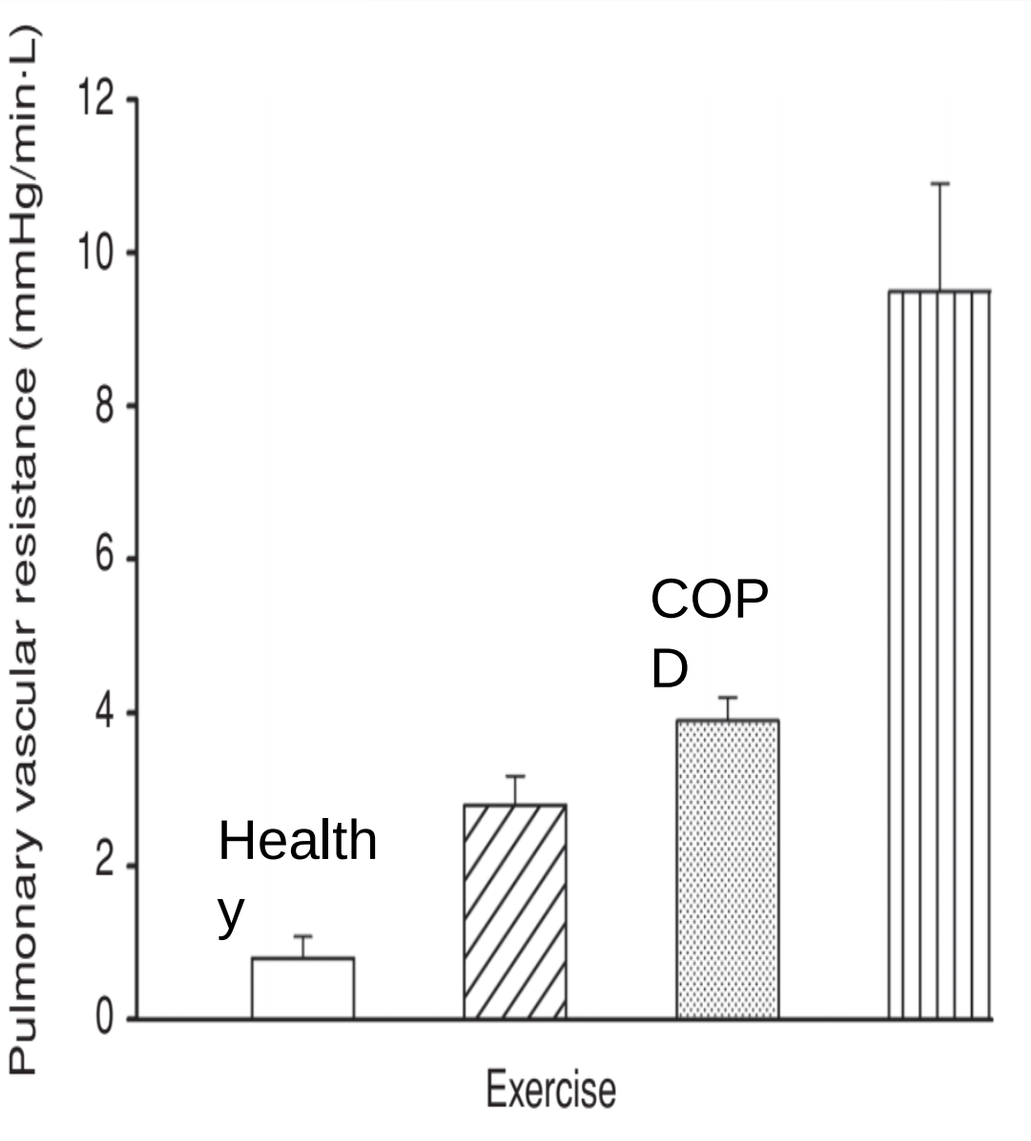
Ioannis Vogiatzis[*1,2,3] *and Spyros Zakynthinos*[3]

Compr Physiol 2:1779-1817, 2012

(B) Limitation of energy supply

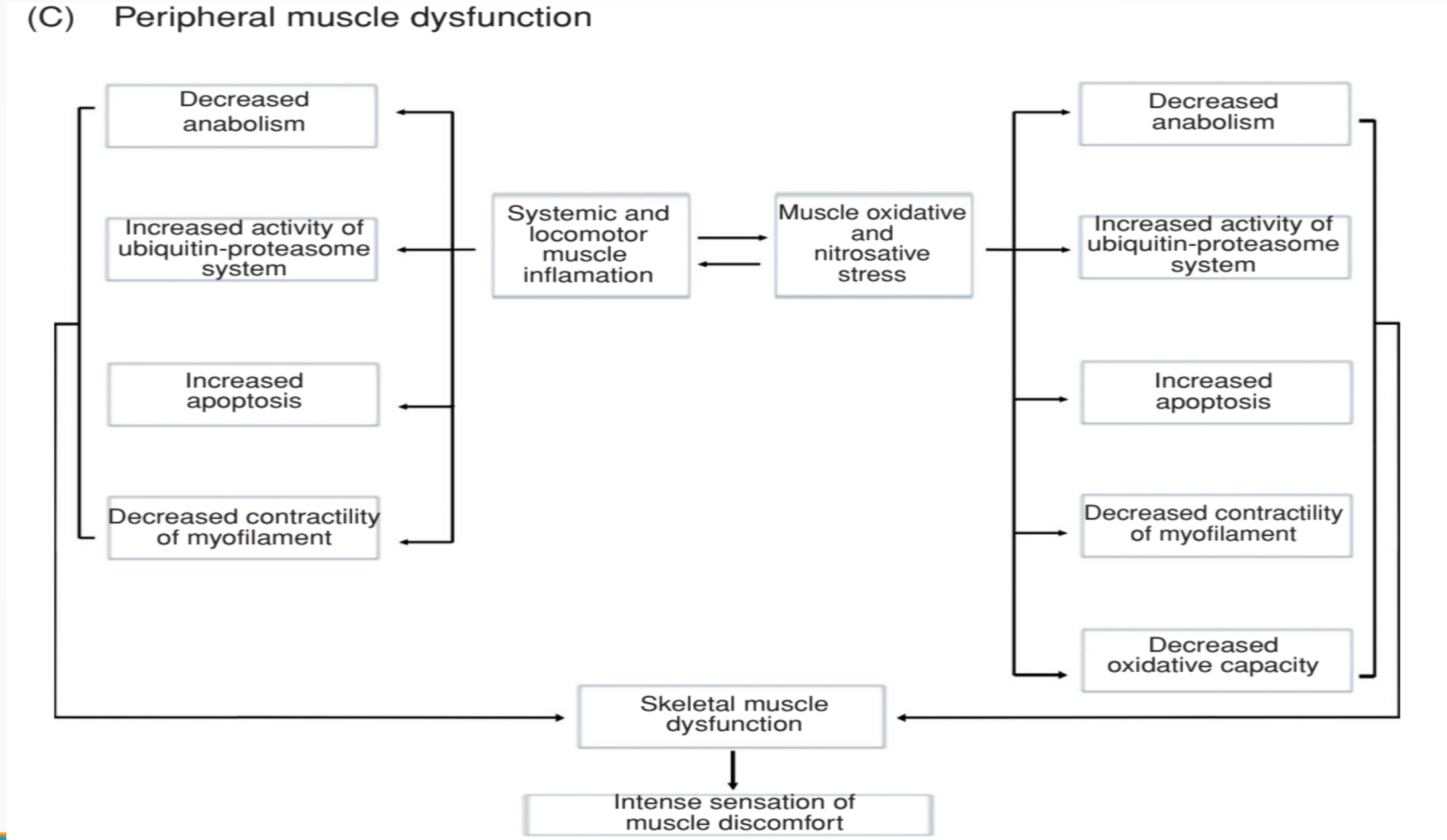




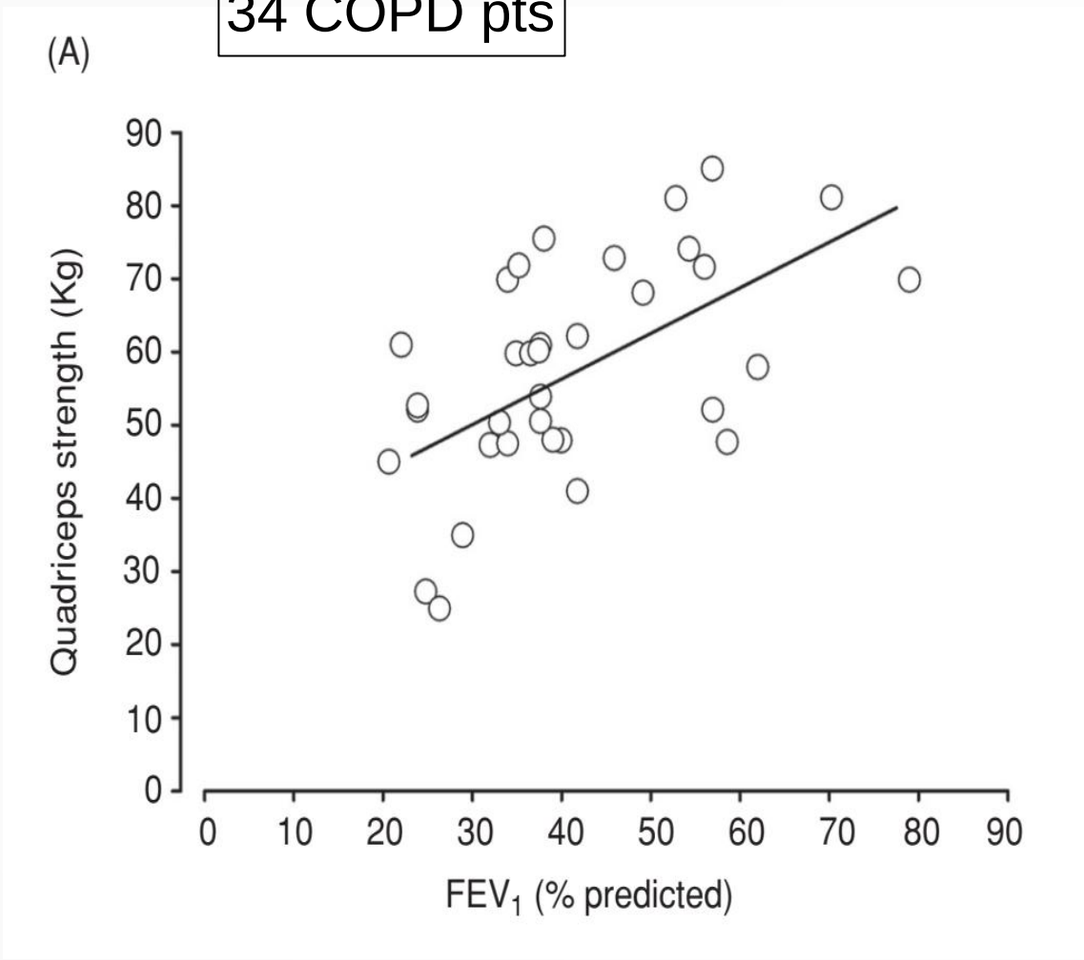


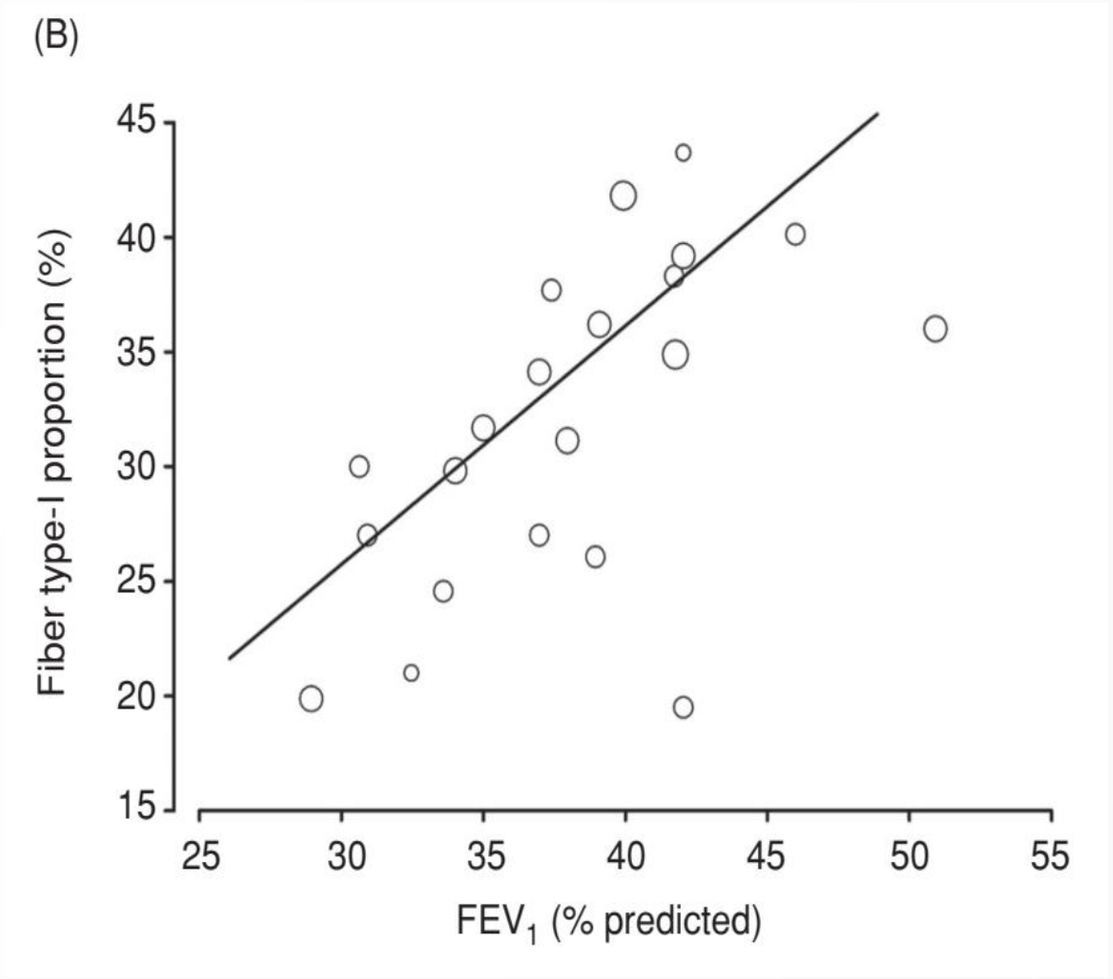
Agusti et al. European Respiratory Monograph. 1997, p. 32-50
Vogiatzis et al, Compr Physiol 2012; 1779-1817

Factors Limiting Exercise Tolerance in Chronic Lung Diseases



34 COPD pts



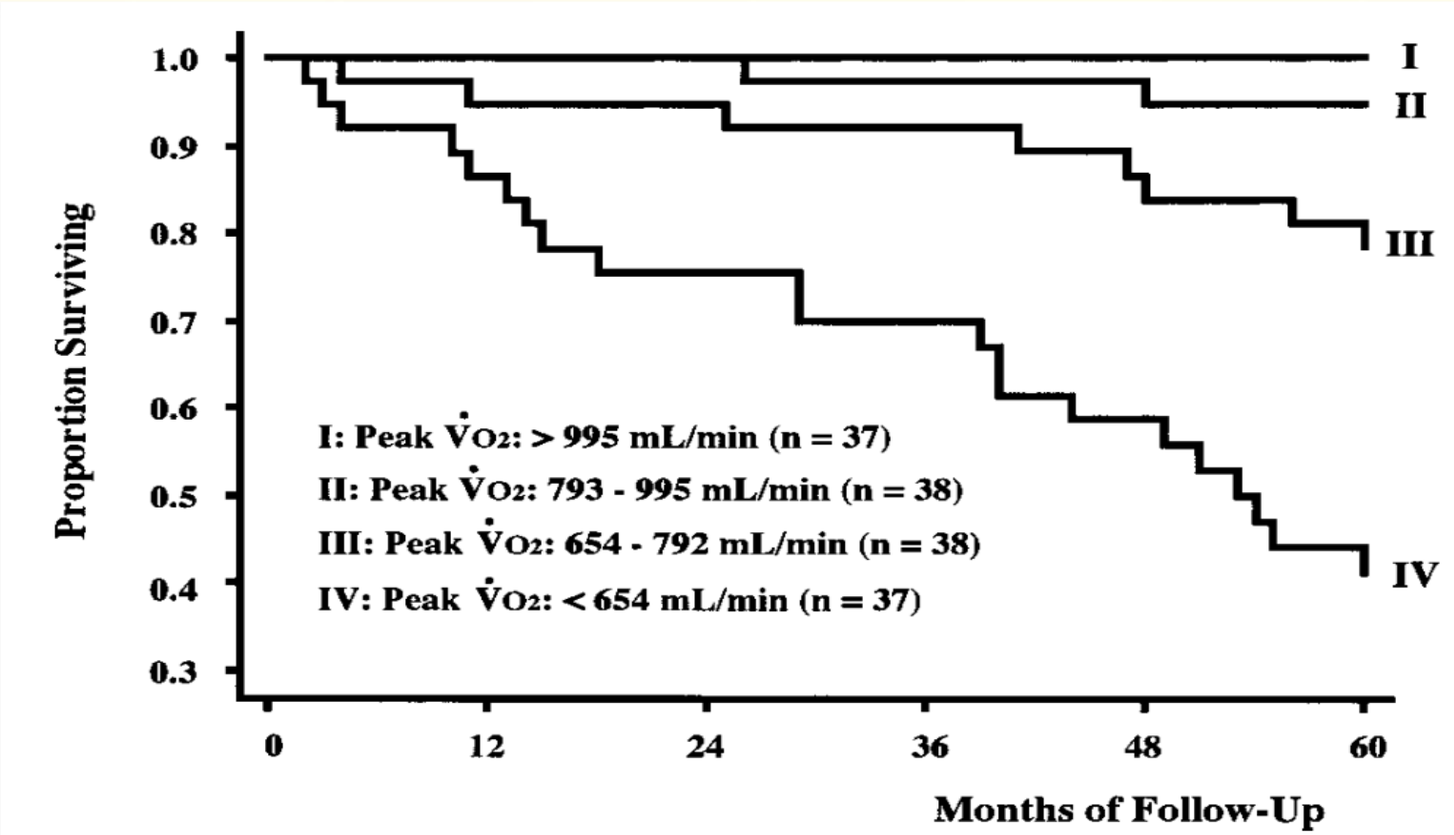


Gosker HR, et al. Thorax 2007; 62: 944-949.
Bernard S, et al. Am J Respir Crit Care Med 1998; 158: 629-634

Analysis of the Factors Related to Mortality in Chronic Obstructive Pulmonary Disease

Role of Exercise Capacity and Health Status

Oga, Nishimura, Tsukino, *et al.*



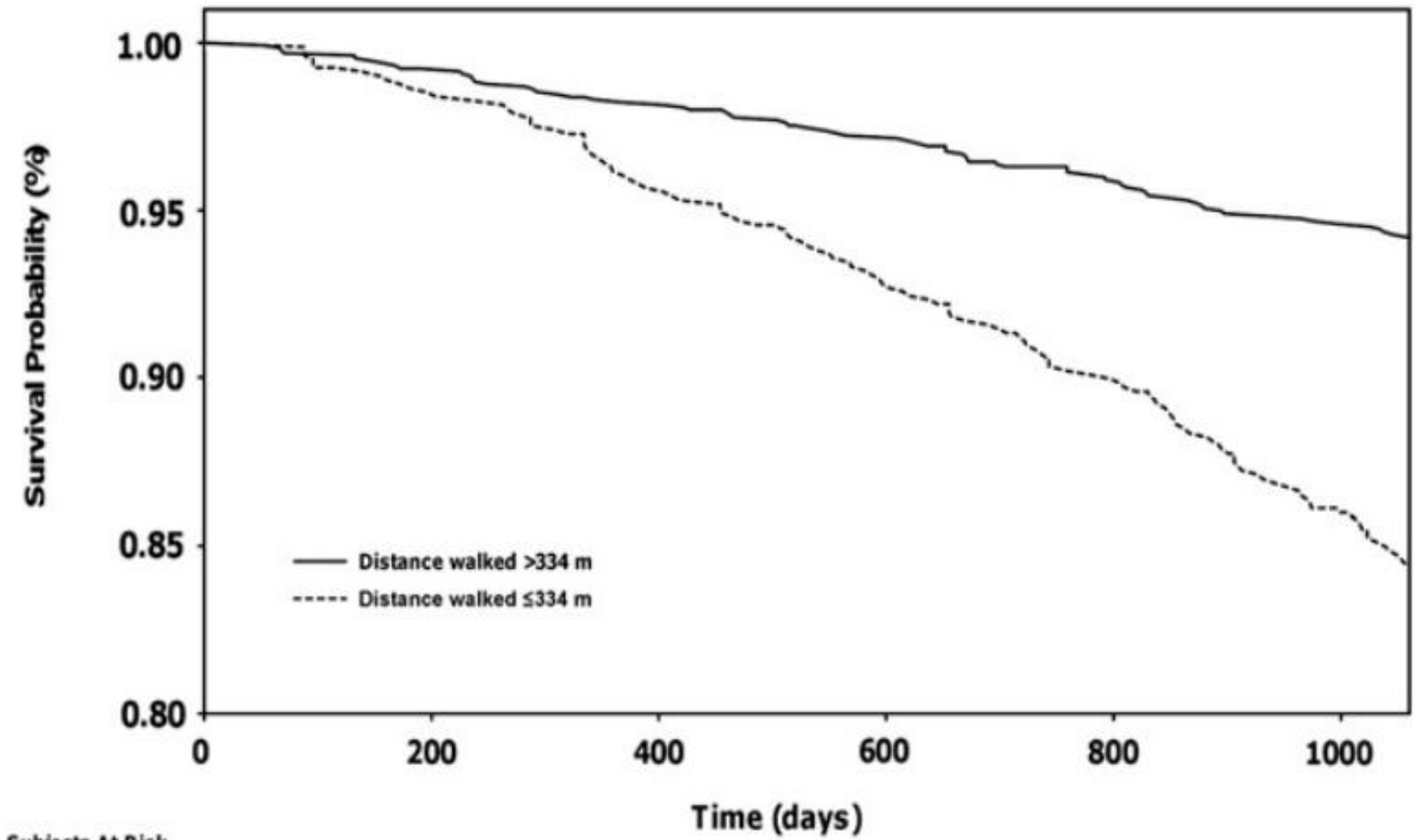
N=150 male COPD pts., followed up for 5 years

	Relative Risk	95% Confidence Interval	p Value
Age, yr	1.090	1.021–1.163	0.0093
Postbronchodilator FEV_1, % predicted	0.972	0.943–1.001	0.059
Peak $\dot{V}O_2$, ml/min	0.995	0.993–0.998	< 0.0001

Am J Respir Crit Care Med Vol 167. pp 544–549, 2003

Predicting Outcomes from 6-Minute Walk Distance in Chronic Obstructive Pulmonary Disease

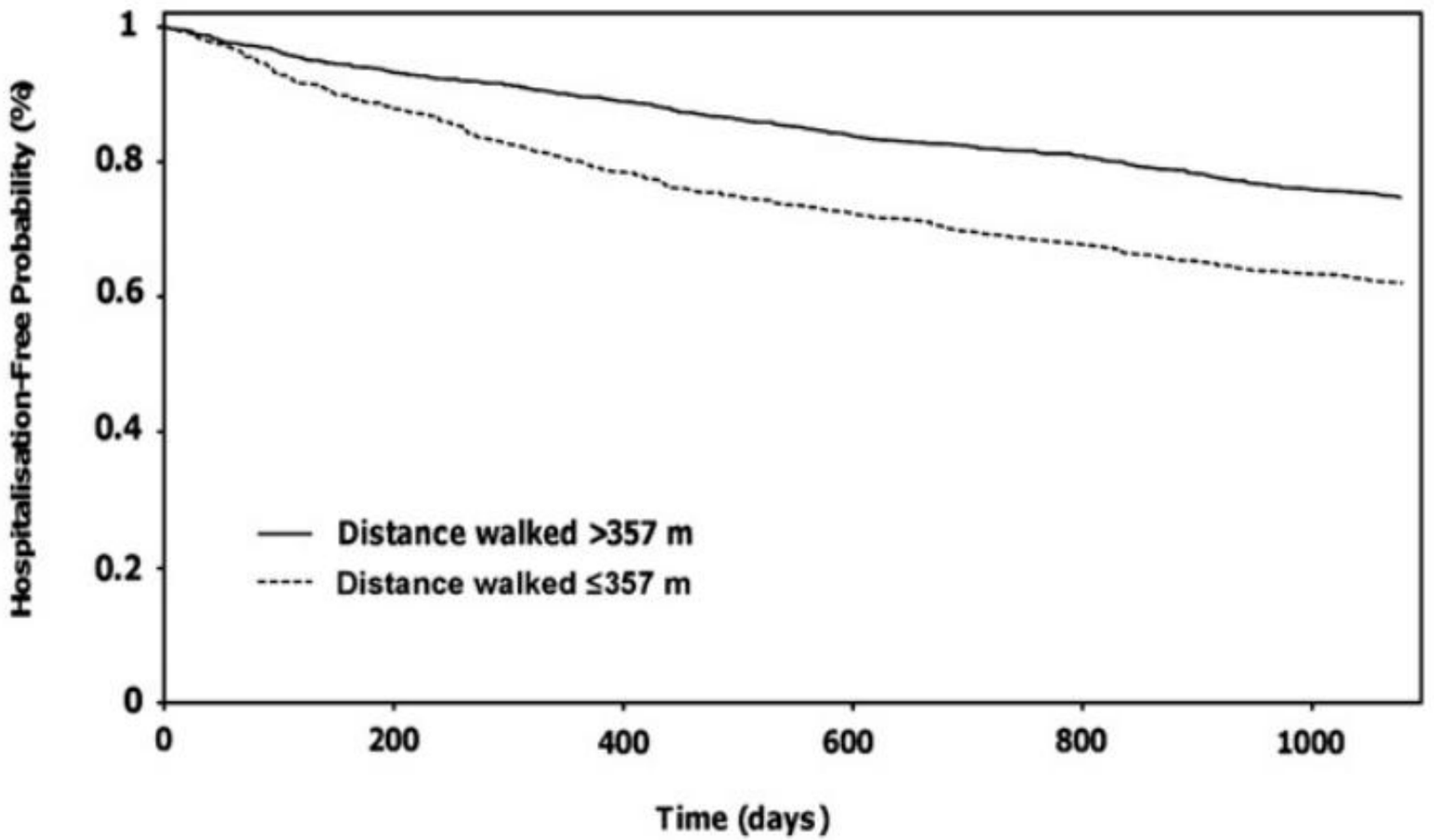
M.A. Spruit et al. / JAMDA 13 (2012) 291–297



ECLIPSE cohort: 2110 COPD, 3 years follow up

Predicting Outcomes from 6-Minute Walk Distance in Chronic Obstructive Pulmonary Disease

M.A. Spruit et al. / JAMDA 13 (2012) 291–297



Subjects At Risk						
Distance walked >357 m	1187	1107	1056	996	960	901
Distance walked ≤357 m	923	811	725	668	626	586

ECLIPSE cohort: 2110 COPD, 3 years follow up

An Official American Thoracic Society/European Respiratory Society Statement: Key Concepts and Advances in Pulmonary Rehabilitation

AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE VOL 188 2013

On the basis of our current insights, the ATS and the ERS have adopted the following new definition of pulmonary rehabilitation: "*Pulmonary rehabilitation is a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies, which include, but are not limited to, exercise training, education, and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence of health-enhancing behaviors.*"

Table 4.8. Non-pharmacologic management of COPD

Patient group	Essential	Recommended	Depending on local guidelines
A	Smoking cessation (can include pharmacologic treatment)	Physical activity	Flu vaccination Pneumococcal vaccination
B-D	Smoking cessation (can include pharmacologic treatment) Pulmonary rehabilitation	Physical activity	Flu vaccination Pneumococcal vaccination

An Official American Thoracic Society/European Respiratory Society Statement: Key Concepts and Advances in Pulmonary Rehabilitation

AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE VOL 188 2013

General principles of exercise training: no different from those for healthy individuals

-Total load should: reflect the individual's *specific requirements*,

exceed loads encountered during daily life

progress as improvement occurs.

-Various modes of training are required → endurance, strength and/or flexibility

AACVPR
American Association of Cardiovascular and Pulmonary Rehabilitation
Promoting Health & Preventing Disease

AMERICAN COLLEGE of SPORTS MEDICINE
LEADING THE WAY

British Thoracic Society

Προγράμματα άσκησης σε ασθενείς με ΧΑΠ: βασικές αρχές

- **Endurance Exercise training:** → *exercise capacity, muscle strength, cardiorespiratory fitness*
- - High-intensity continuous exercise

-> 60% of peak work rate or titrated according to Borg or RPE

- for 20 to 60 minutes, 3-5 sessions/week

- walking (treadmill) or cycling (ergometer)

- -Alternative: Interval, high-intensity exercise (short intervals <1 min)

- **Resistance/strength Exercise training:** → *muscle mass/strength, bone mineral density (?)*

- Less well characterised than endurance training (wide variations)

- 1- 3 sets of 8-12 repetitions, 2-3 days/week

- 60 – 70% of one repetition maximum

- increase exercise dosage over time

Προγράμματα άσκησης σε ασθενείς με ΧΑΠ: βασικές αρχές

- **Inspiratory muscle training:** → *pressure-generating capacity of inspiratory muscles, ↓dyspnea*

-devices that impose a resistive or a threshold load
-interval-based program with periods of rest, variable techniques
-loads ≥ 30% of PImax

- **Upper limb training:** → *↑ upper limb function, broader outcomes not known*

-aerobic and resistance upper limb training
-optimal modality not known

- **Flexibility training:** → *common component of PR, no trials demonstraning its efficacy*

-upper and lower body flexibility exercises (streching and range of motion)
-2 – 3 times/weekly

Πνευμονική αποκατάσταση: Που?

- Outpatients, hospitally-based
- Community-based

(church, health club etc)

- Home-based

(unsupervised, partially supervised,

telemonitoring/ web-based, etc)

Effects of Home-Based Pulmonary Rehabilitation in Patients with Chronic Obstructive Pulmonary Disease

A Randomized Trial

Maltais F, et al.

Table 3. **Six-Minute Walking Distance, Cycling Endurance Time, and St. George's Respiratory Questionnaire Score Differences from Baseline to 3 Months and 1 Year***

Variable	Within-Group Differences from Baseline (95% CI)							
	Outpatient Rehabilitation (n = 95)				Home Rehabilitation (n = 89)			
	3 mo	*P* Value	1 y	*P* Value	3 mo	*P* Value	1 y	*P* Value
6-minute walking distance, *m*	11 (2 to 20)	0.019	−5 (−17 to 7)	0.44	8 (−1 to 18)	0.076	0 (−13 to 12)	0.62
Cycling endurance time, *s*	237 (166 to 308)	<0.001	95 (20 to 170)	0.013	246 (173 to 320)	<0.001	122 (46 to 199)	0.002
SGRQ score								
Total	−6.3 (−8.4 to −4.3)	<0.001	−3.5 (−5.7 to −1.3)	<0.001	−7.7 (−9.8 to −5.6)	<0.001	−4.5 (−6.7 to −2.2)	<0.001
Symptoms	−3.1 (−6.5 to 0.3)	0.077	−6.3 (−10.5 to −2.9)	0.001	−9.2 (−12.6 to −5.6)	<0.001	−6.9 (−10.7 to −3.0)	<0.001
Activity	−5.7 (−8.6 to −2.7)	<0.001	−0.3 (−3.4 to 2.7)	0.83	−5.9 (−8.9 to −2.8)	<0.001	−1.6 (−4.7 to 1.5)	0.31
Impact	−7.9 (−10.2 to −5.5)	<0.001	−4.3 (−6.8 to −1.9)	<0.001	−8.1 (−10.5 to −5.6)	<0.001	−5.0 (−7.5 to −2.5)	<0.001

Ann Intern Med. 2008;149:869-878.

Πνευμονική αποκατάσταση: Για πόσο?

Duration of pulmonary rehabilitation programmes

- Pulmonary rehabilitation programmes of 6–12 weeks are recommended. (Grade A)
- Pulmonary rehabilitation programmes including the attendance at a minimum of 12 supervised sessions are recommended, although individual patients can gain some benefit from fewer sessions. (Grade A)

Bolton CE, *et al*. *Thorax* 2013;**68**:ii1–ii30.

- The panel is unable to make a recommendation due to lack of evidence evaluating whether programs of longer duration are more effective than the standard 8-week programs.

http://onlinelibrary.wiley.com/doi/10.1111/resp.13025/full

- There remains no consensus on the optimal duration of pulmonary rehabilitation…with a minimum of 8-weeks recommended to achieve a substantial effect.

ATS/ERS statement AJRCCM 2013

Pulmonary rehabilitation for chronic obstructive pulmonary disease (Review)

McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y

Rehabilitation versus usual care for chronic obstructive pulmonary disease

Patient or population: patients with chronic obstructive pulmonary disease
Settings: hospital and community
Intervention: rehabilitation versus usual care

Outcomes	Illustrative comparative effects* (95% CI)		Number of participants (studies)
	Response on control	Treatment effect	
	Usual care	Rehabilitation versus usual care	
QoL - Change in CRQ (dyspnoea) CRQ Questionnaire. Scale from 1 to 7 (Higher is better and 0.5 unit is an important difference) Follow-up: median 12 weeks	Median change = 0 units	Mean QoL - change in CRQ (Dyspnoea) in the intervention groups was **0.79 units higher** (0.56 to 1.03 higher)	1283 (19 studies)
QoL - Change in SGRQ (total) Scale from 0 to 100 (Lower is better and 4 units is an important difference) Follow-up: median 12 weeks	Median change = 0.42 units	Mean QOL - change in SGRQ (total) in the intervention groups was **6.89 units lower** (9.26 to 4.52 lower)	1146 (19 studies)

Cochrane Database of Systematic Reviews 2015, Issue 2. Art. No.: CD003793.

Pulmonary rehabilitation for chronic obstructive pulmonary disease (Review)

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Rehabilitation versus usual care for chronic obstructive pulmonary disease

Patient or population: patients with chronic obstructive pulmonary disease
Settings: hospital and community
Intervention: rehabilitation versus usual care

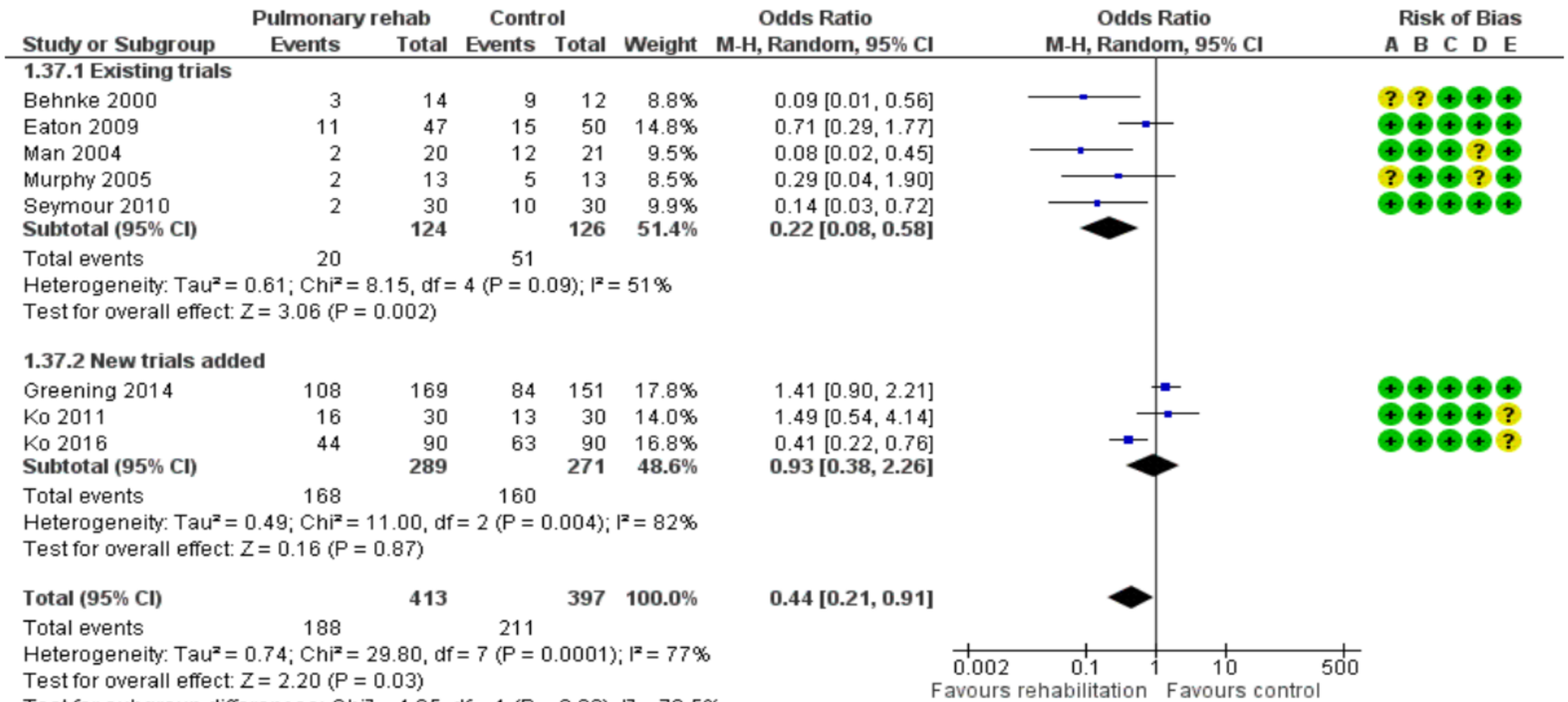
Outcomes	Illustrative comparative effects* (95% CI)		Number of participants (studies)
	Response on control	Treatment effect	
	Usual care	Rehabilitation versus usual care	
Change in maximal exercise (Incremental Shuttle walk test (ISWT)) Distance metres Follow-up: median 12	Median change = 1 metre	Mean maximal exercise (incremental shuttle walk test) in the intervention groups was **39.77 metres higher**	694 (8 studies)
Change in functional exercise capacity (6MWT)) Distance metres Follow-up: median 12 weeks	Median change = 3.4 metres	Mean functional exercise capacity (6MWT)) in the intervention groups was **43.93 metres higher** (32.64 to 55.21 higher)	1879 (38 studies)
Change in maximal exercise capacity (cycle ergometer) Workmax (watt) Follow-up: median 12 weeks	Median change = -0.05 watts	Mean maximal exercise capacity (cycle ergometer) in the intervention groups was **6.77 watts higher** (1.89 to 11.65 higher)	779 (16 studies)

Cochrane Database of Systematic Reviews 2015, Issue 2. Art. No.: CD003793.

Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease (Review)

Puhan MA, Gimeno-Santos E, Cates CJ, Troosters T

Figure 4. Forest plot of comparison: 1 Rehabilitation versus control, outcome: 1.37 Hospital readmission (to end of follow-up) with separated new trial data.

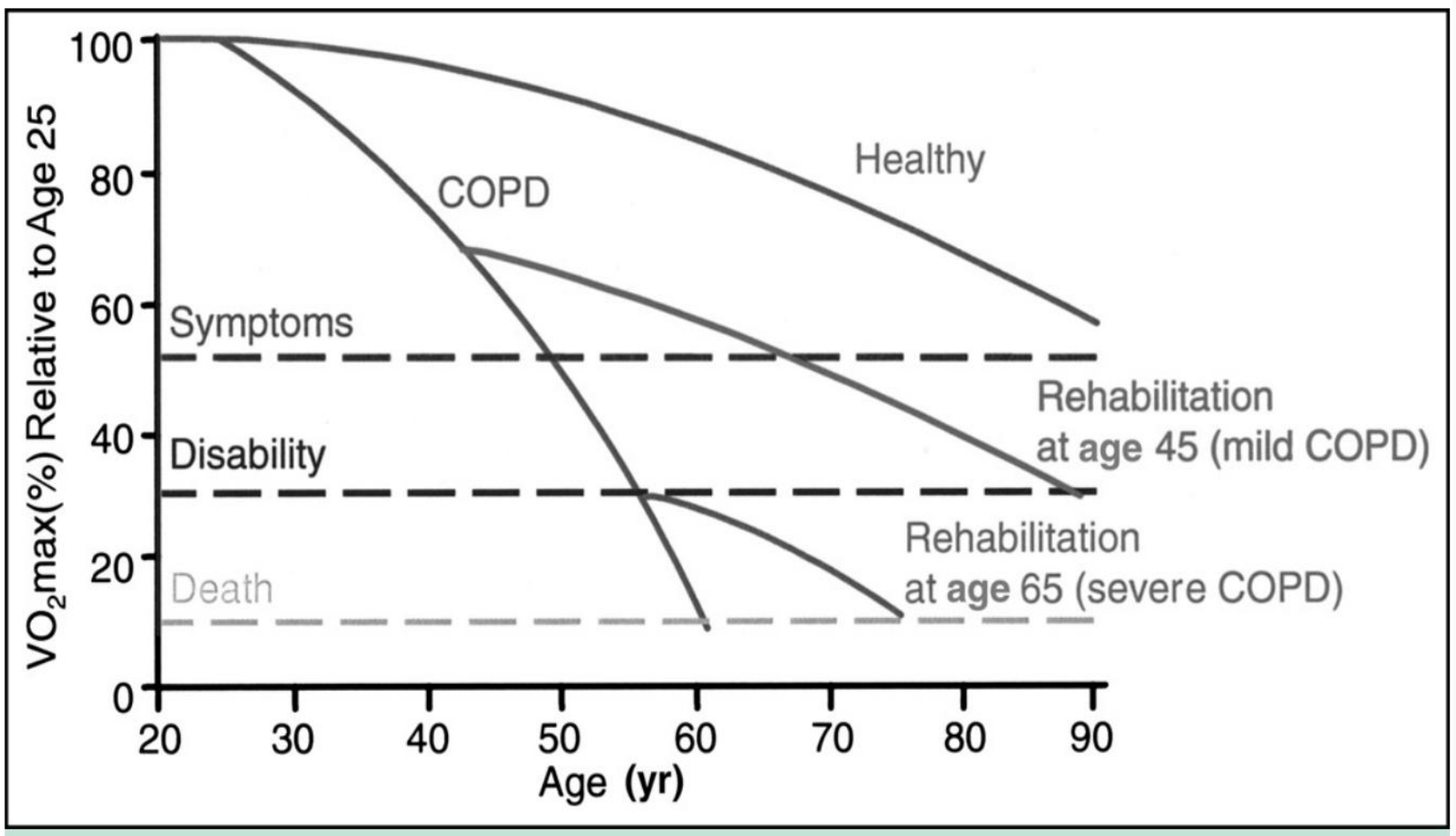


Pulmonary rehabilitation

Outcome	Evidence for expected improvements
Breathlessness	+++
Exercise tolerance	+++
Health-related quality of life	+++
Health resource consumption	++
Respiratory muscle function	++
Survival	+

Primary Care of the Patient with Chronic Obstructive Pulmonary Disease—Part 4: Understanding the Clinical Manifestations of a Progressive Disease

Christopher B. Cooper, MD, PhD,[a] and Mark Dransfield, MD[b,c]



The American Journal of Medicine, Vol 121, No 7A, July 2008

Ευχαριστώ πολύ