



Il percorso diagnostico terapeutico di 2° livello nella BPCO



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GOLD 2017 Report: Chapters

**Global Initiative for Chronic
Obstructive
Lung
Disease**



**GLOBAL STRATEGY FOR THE DIAGNOSIS,
MANAGEMENT, AND PREVENTION OF
CHRONIC OBSTRUCTIVE PULMONARY DISEASE**
2017 REPORT

1. Definition and Overview
2. Diagnosis and Initial Assessment
3. Evidence Supporting Prevention & Maintenance Therapy
4. Management of Stable COPD
5. Management of Exacerbations
6. COPD and Comorbidities



COPD Definition

- ▶ Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable and treatable disease that is characterized by **persistent respiratory symptoms and airflow limitation** that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases.

DYSPNEA

EXERCISE INTOLERANCE



Mechanisms Underlying Airflow Limitation in COPD

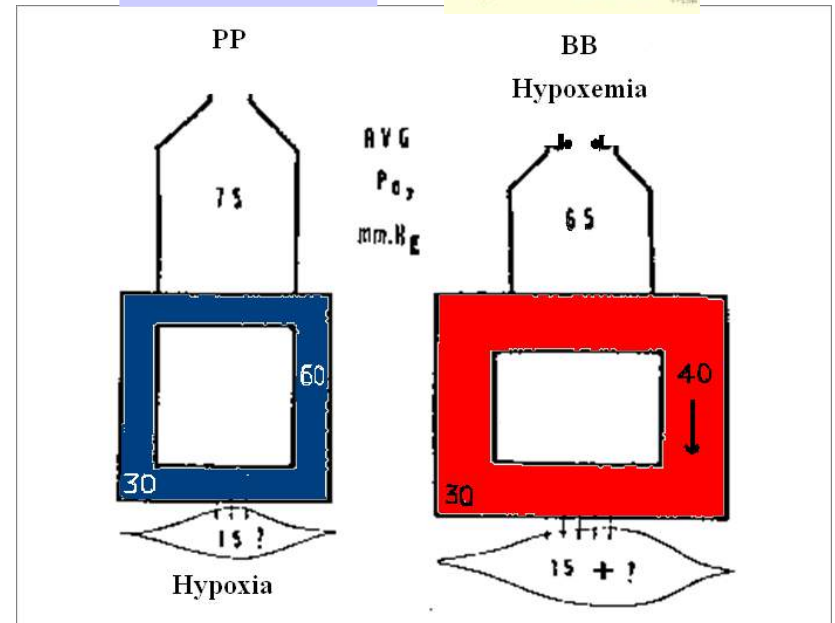
Small Airways Disease

- Airway inflammation
- Airway fibrosis, luminal plugs
- Increased airway resistance

Parenchymal Destruction

- Loss of alveolar attachments
- Decrease of elastic recoil

AIRFLOW LIMITATION





GOLD 2017 Report: Chapters

Global Initiative for Chronic Obstructive Lung Disease



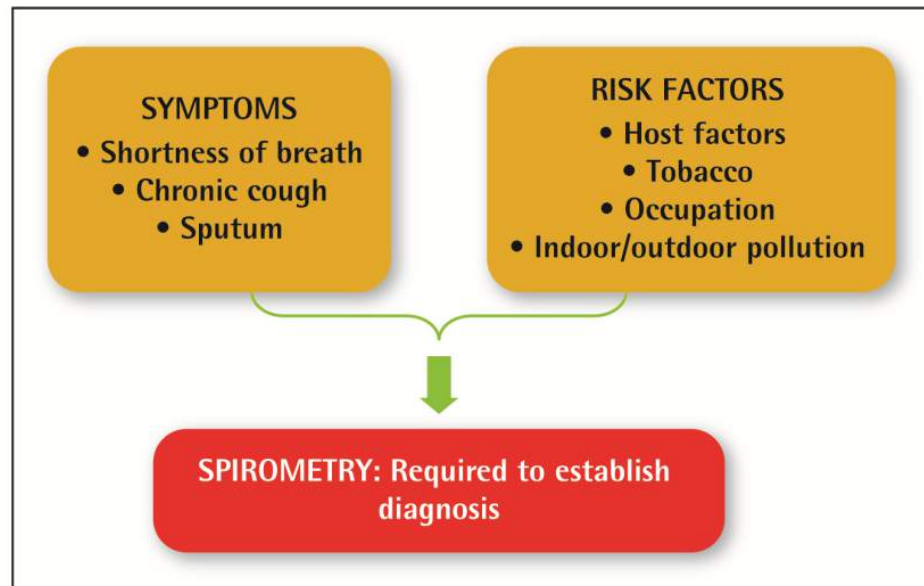
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Diagnosis and Initial Assessment

Figure 2.1. Pathways to the diagnosis of COPD





Spirometry

Figure 2.2A. Spirometry - Normal Trace

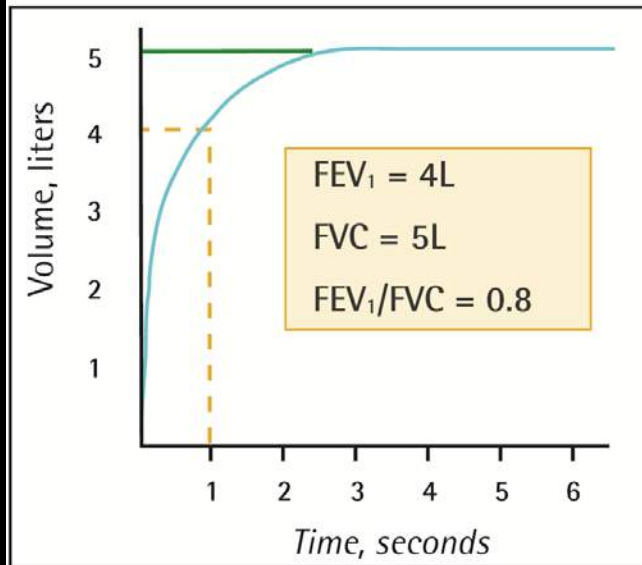
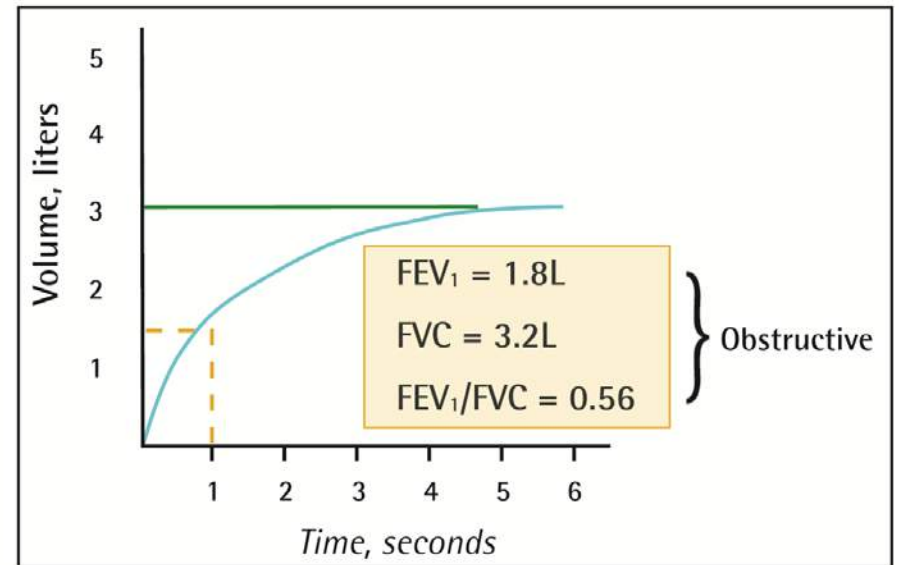


Figure 2.2B. Spirometry - Obstructive Disease



FVC = ———
FEV₁ = - - - - -



Classification of severity of airflow limitation

Table 2.4. Classification of airflow limitation severity in COPD (Based on post-bronchodilator FEV₁)

In patients with FEV₁/FVC < 0.70:

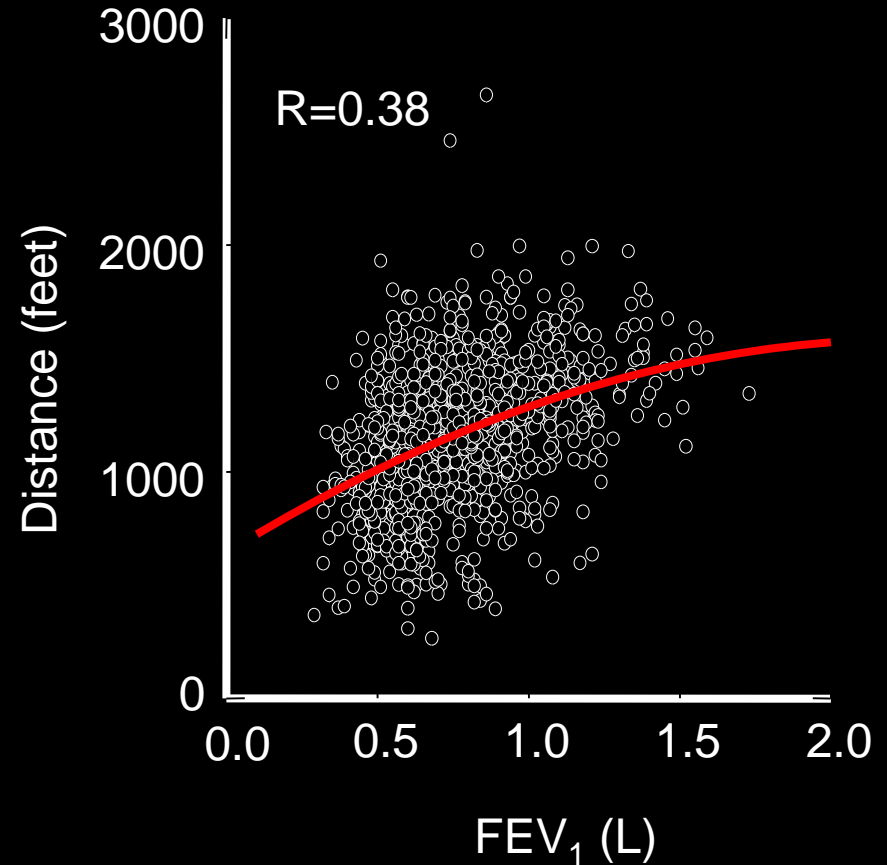
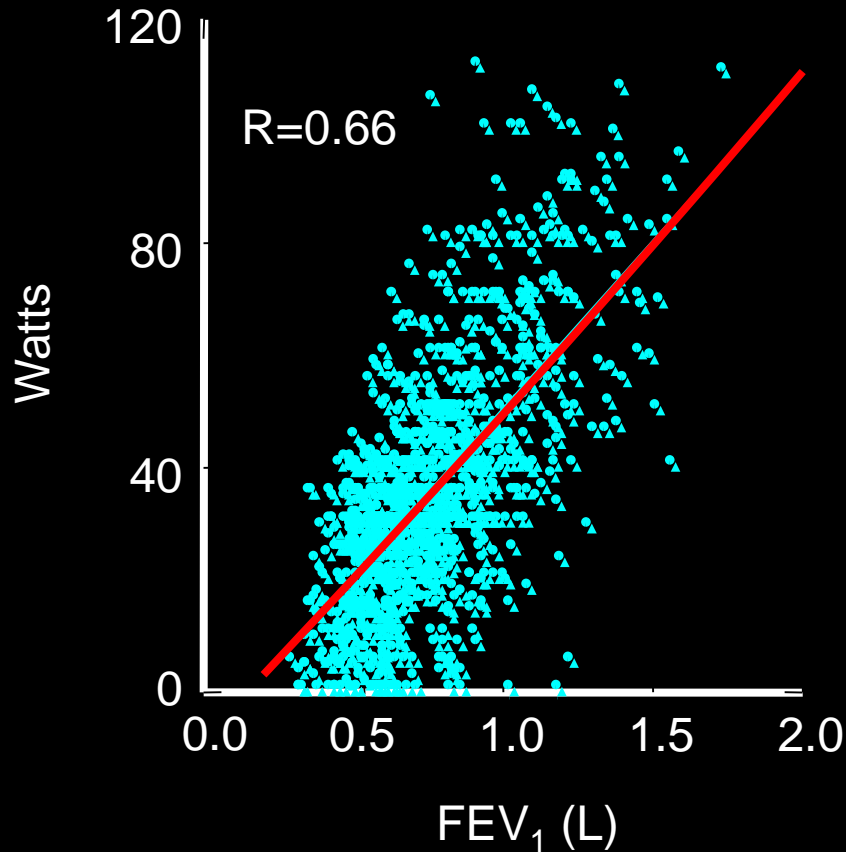
GOLD 1:	Mild	FEV ₁ ≥ 80% predicted
GOLD 2:	Moderate	50% ≤ FEV ₁ < 80% predicted
GOLD 3:	Severe	30% ≤ FEV ₁ < 50% predicted
GOLD 4:	Very Severe	FEV ₁ < 30% predicted



COPD Symptoms

- ▶ **Dyspnea and Exercise Intolerance** are the allmarks of the disease (COPD)
- ▶ **Dyspnea and Exercise Tolerance** poorly correlates with lung function (e.g Spirometry)

FEV₁ Correlates Poorly with Exercise Performance in COPD



Effect of Effort on Measurement of Forced Expiratory Volume in One Second

«We concluded that during standard spirometry, FEV₁ is inversely dependent on effort. Maximal effort decreases FEV₁ because of the effect of thoracic gas compression on lung volume»

Severity grading of chronic obstructive pulmonary disease: the confounding effect of phenotype and thoracic gas compression

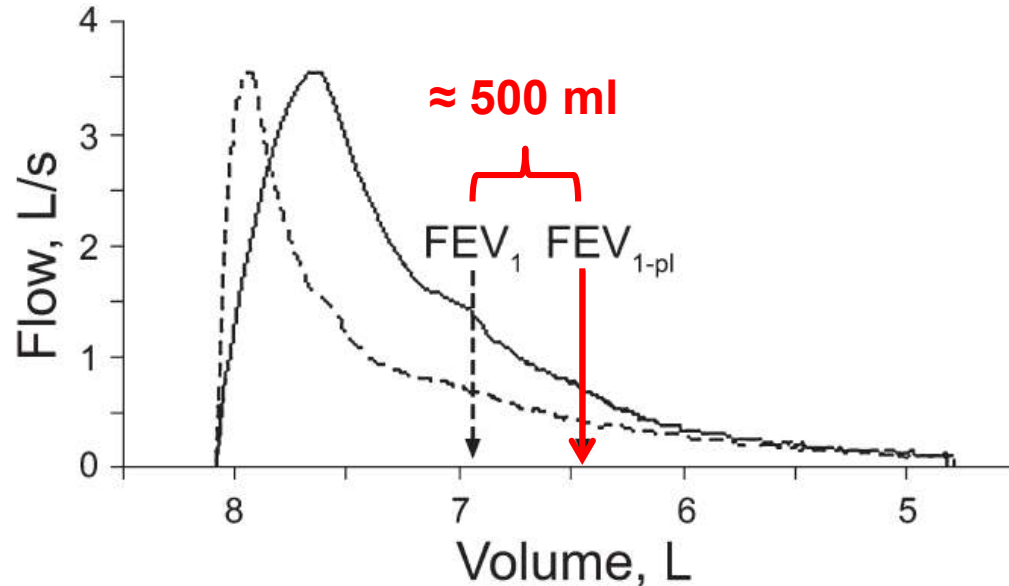
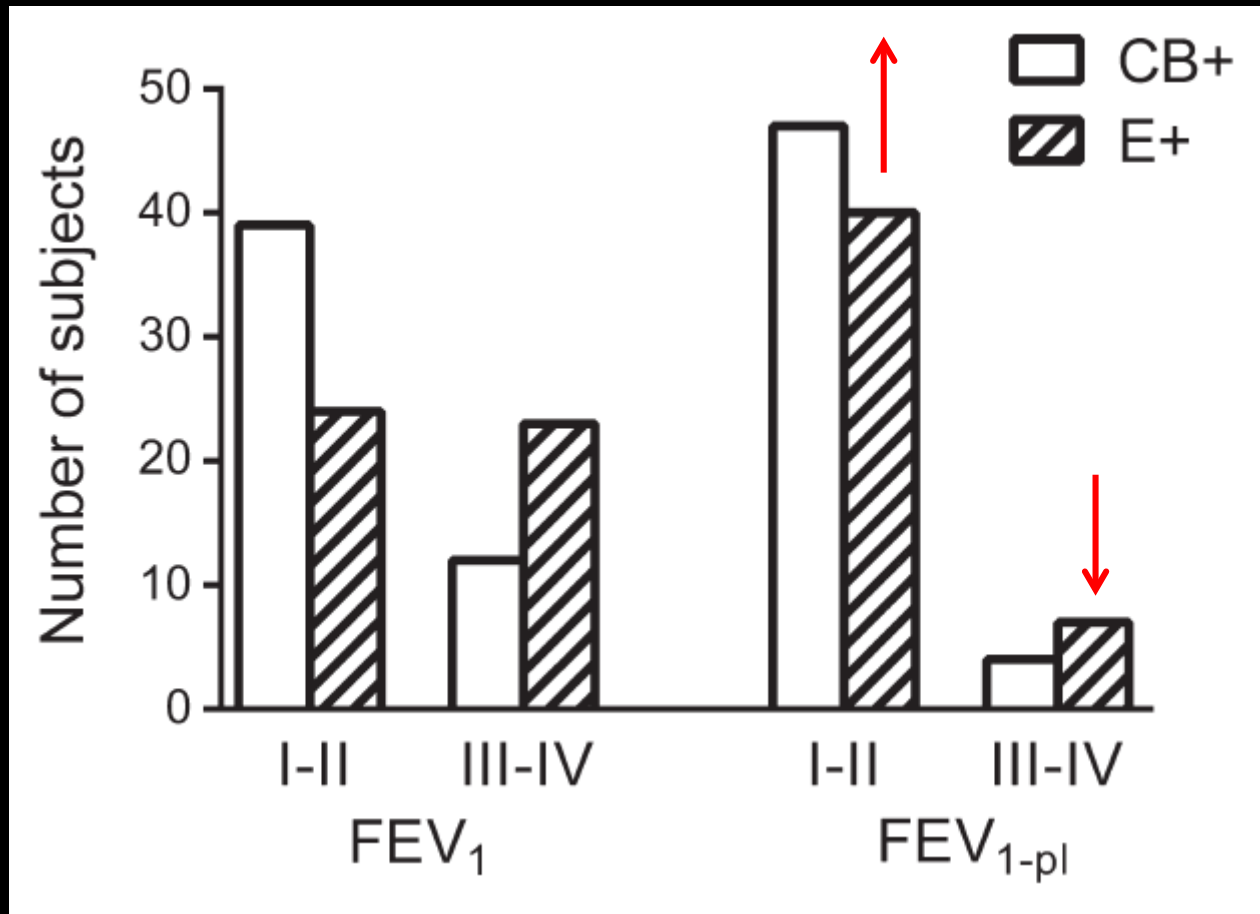
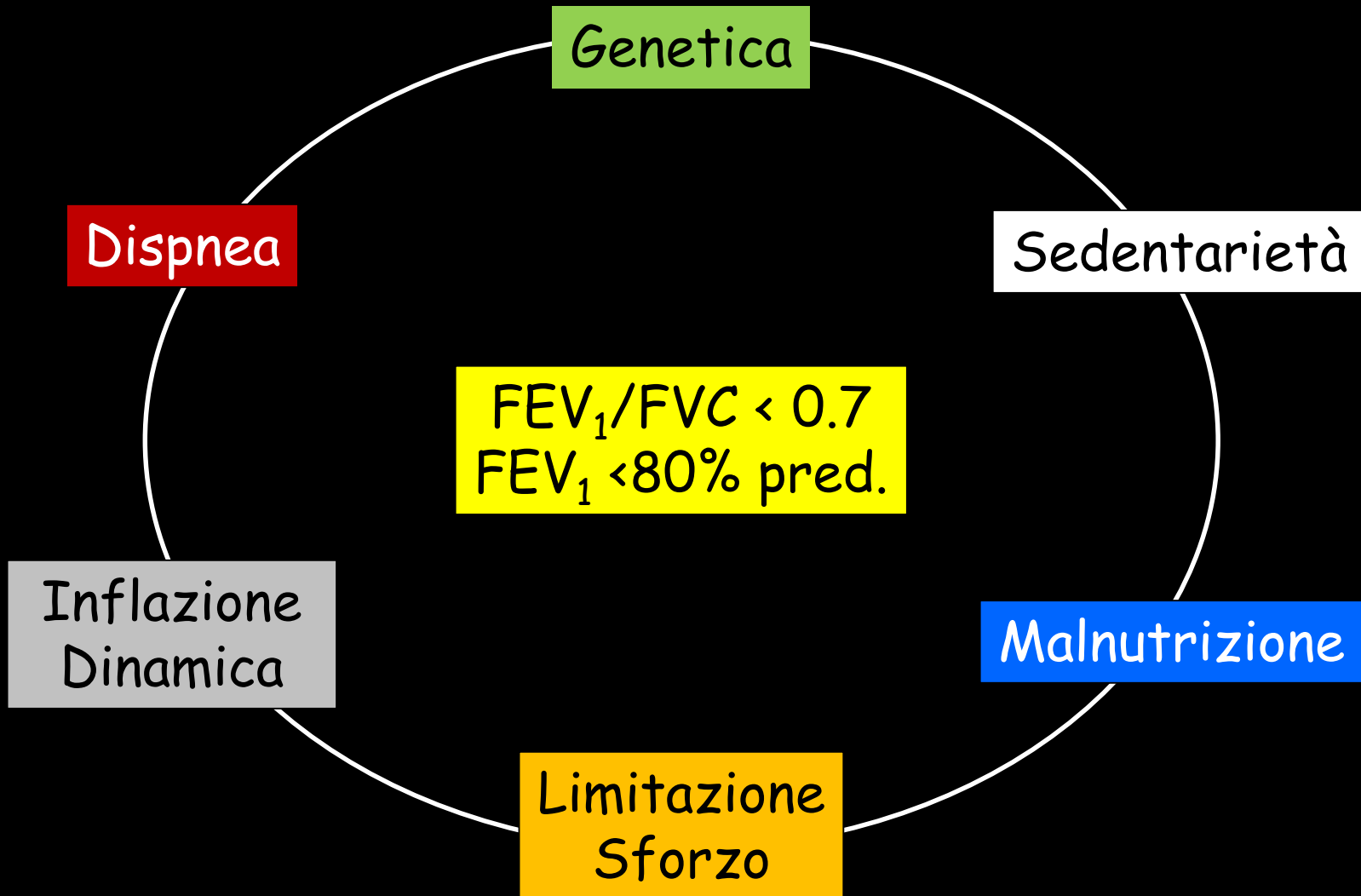


Fig. 1. Representative flow-volume curves of a chronic obstructive pulmonary disease subject with dominant emphysema. Flow is plotted against expired volume (dashed line) or plethysmographic volume (continuous line). Forced expiratory volume in 1 s measured at mouth (FEV₁) was 1.26 liters and by plethysmography (FEV_{1-pl}) 1.75 liters.

Severity grading of chronic obstructive pulmonary disease: the confounding effect of phenotype and thoracic gas compression



BPCO: teoria "spirometrico" centrica "Stone Age"

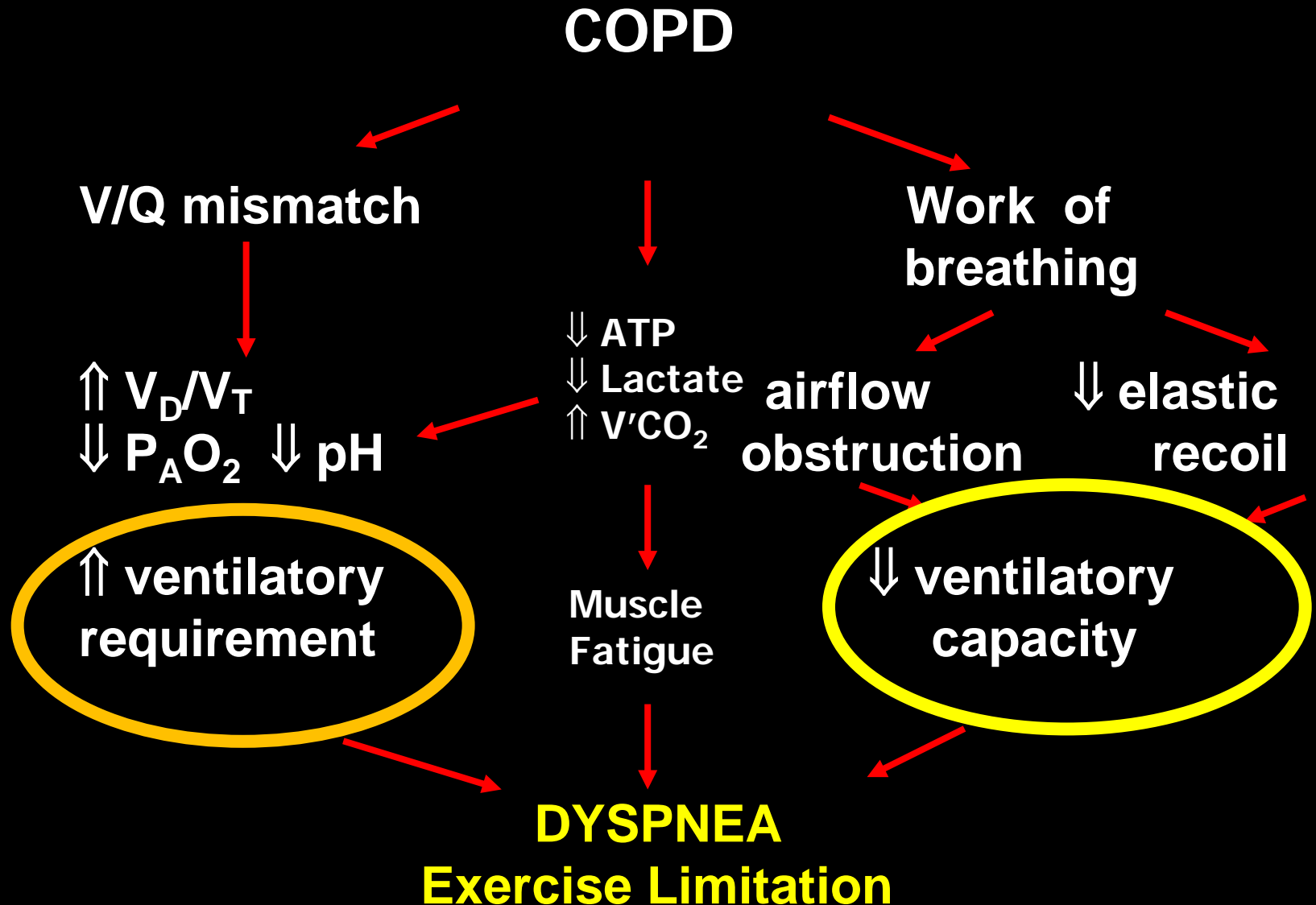


Dyspnea and exercise intolerance in COPD



Exercise limitation in lung diseases

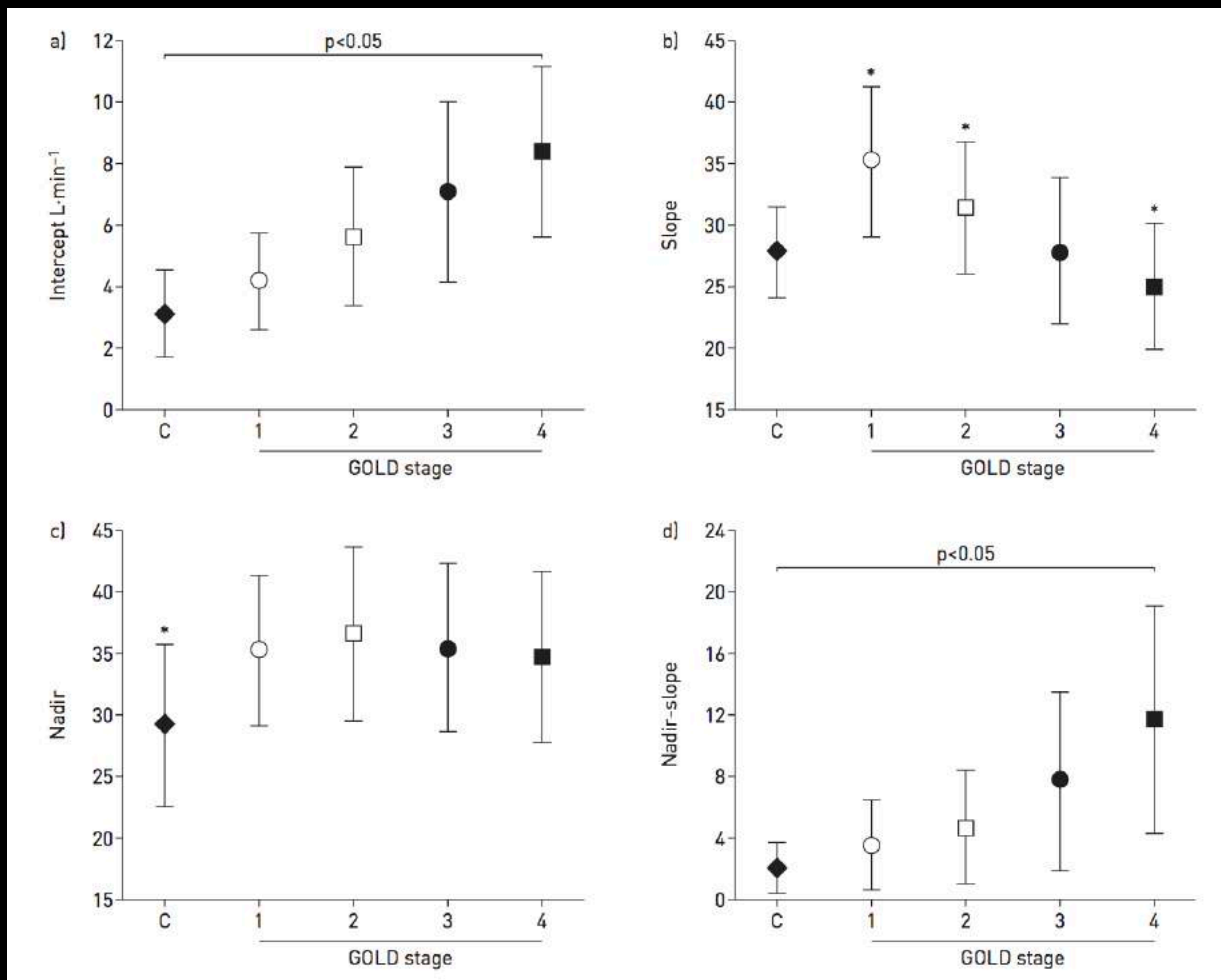
(K. Wasserman, 2010)

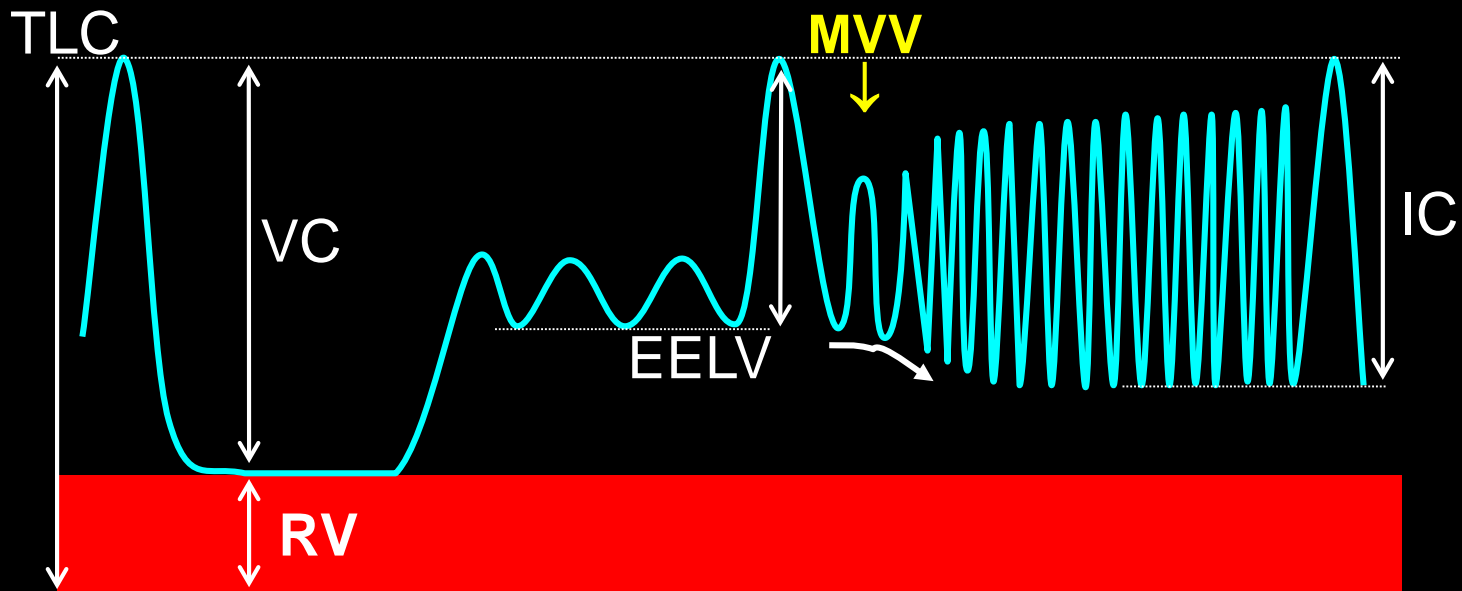


Physiological and clinical relevance of exercise ventilatory efficiency in COPD

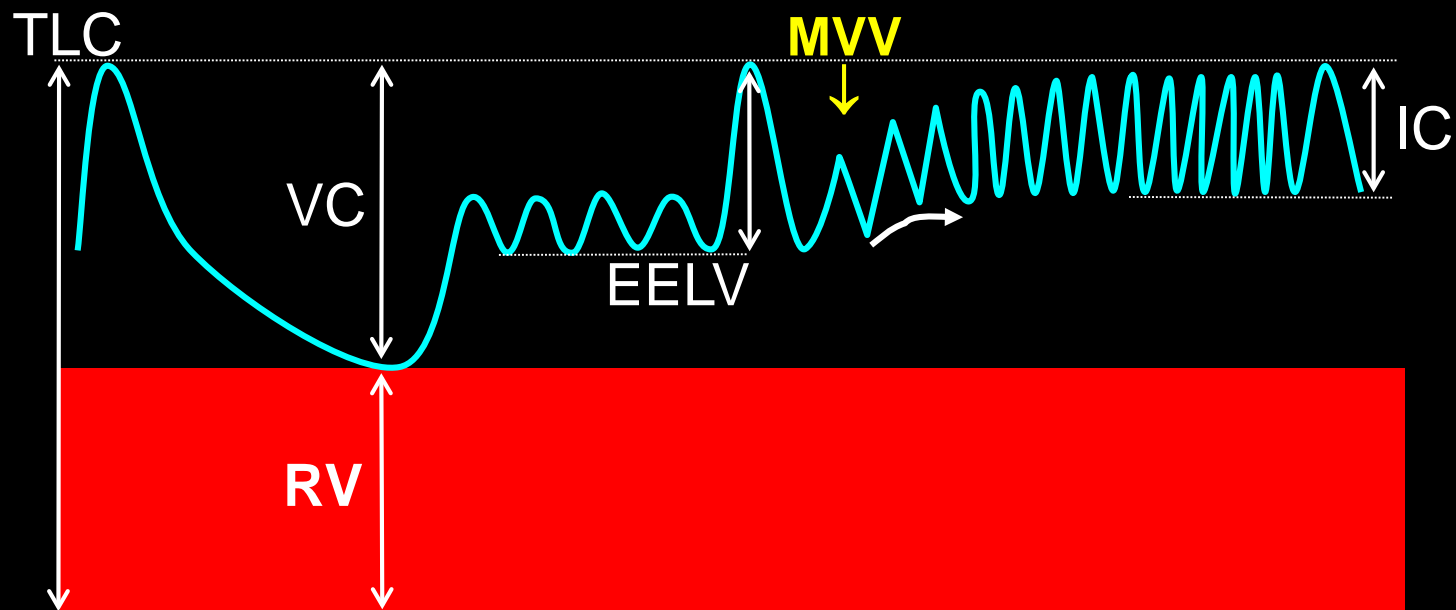
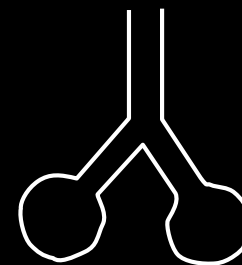


J. Alberto Neder¹, Danilo C. Berton^{1,2}, Flavio F. Arbex³, Maria Clara Alencar⁴, Alcides Rocha³, Priscila A. Sperandio³, Paolo Palange⁵ and Denis E. O'Donnell¹

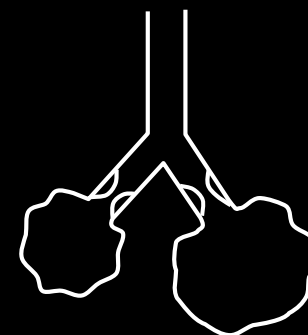




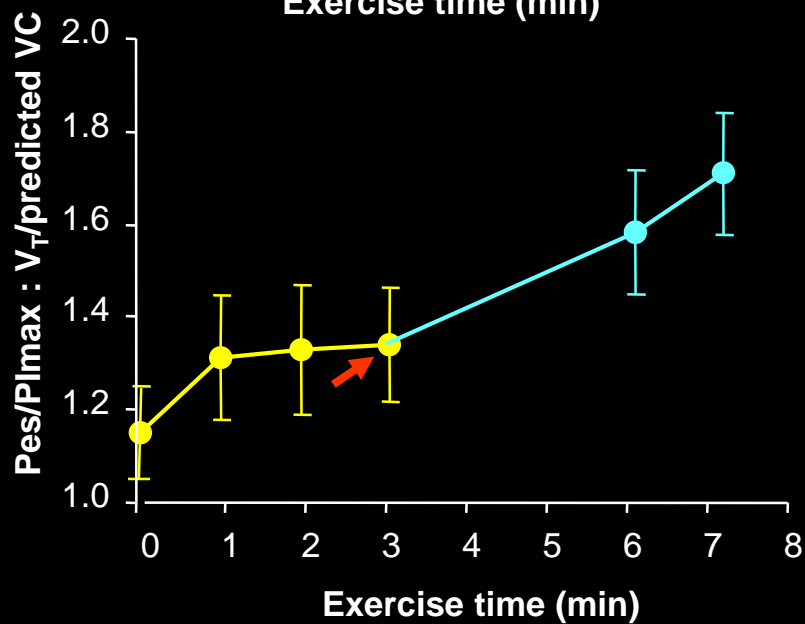
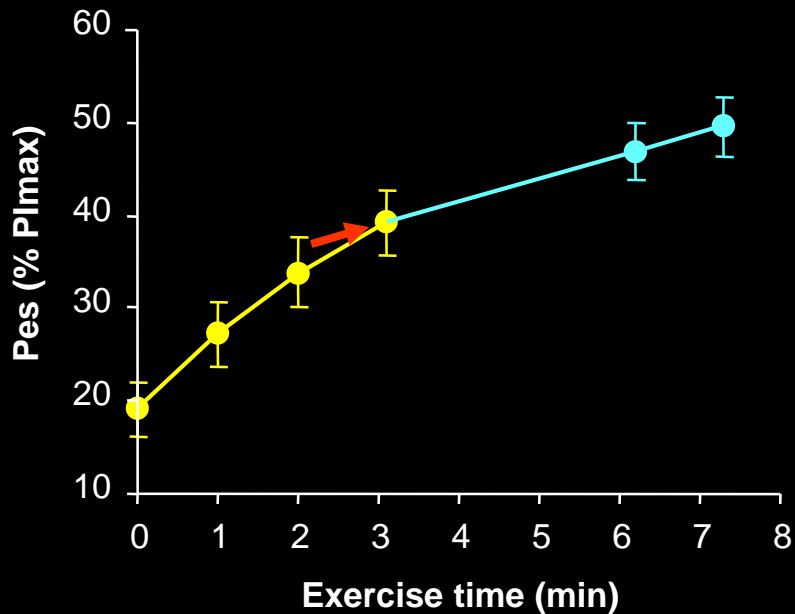
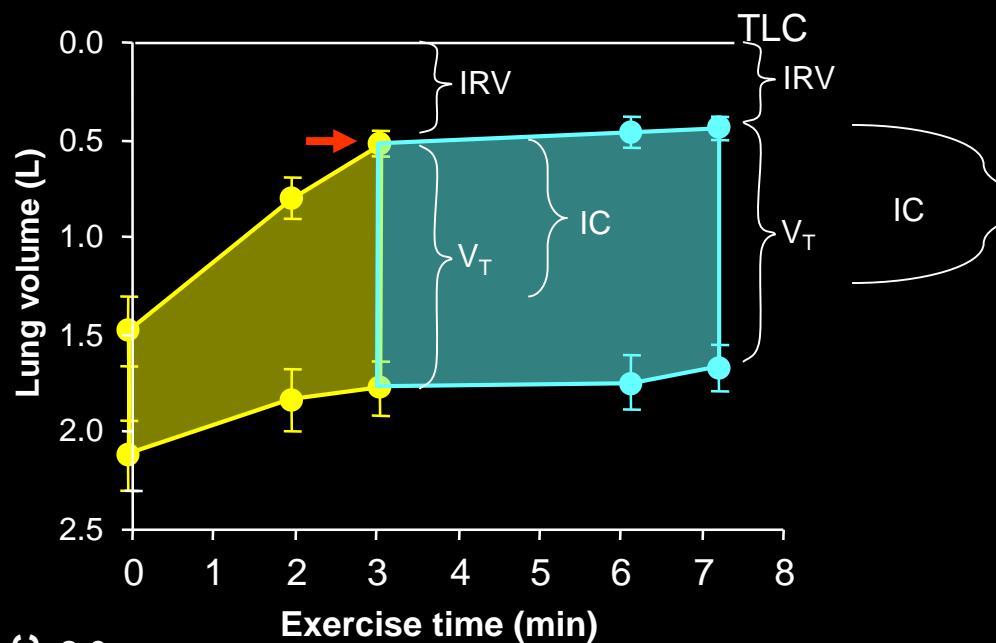
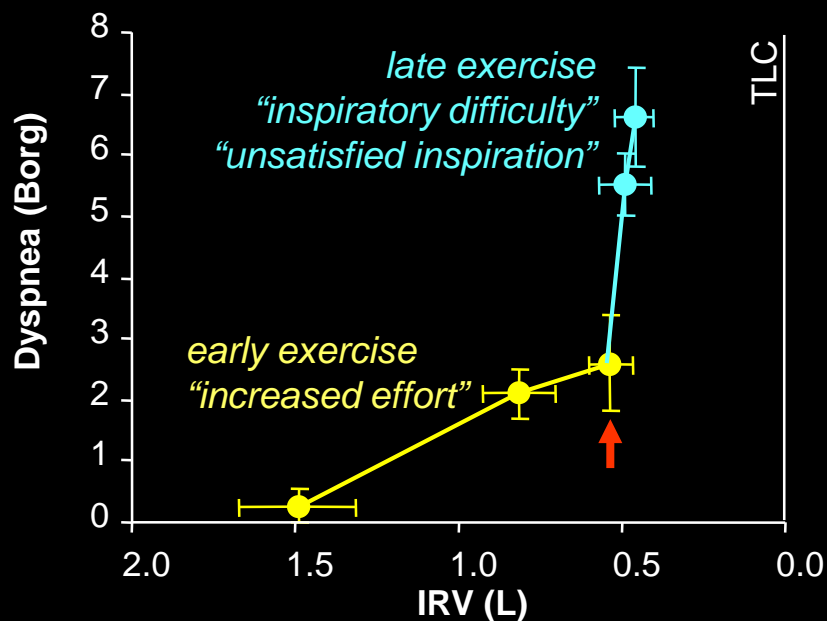
Health



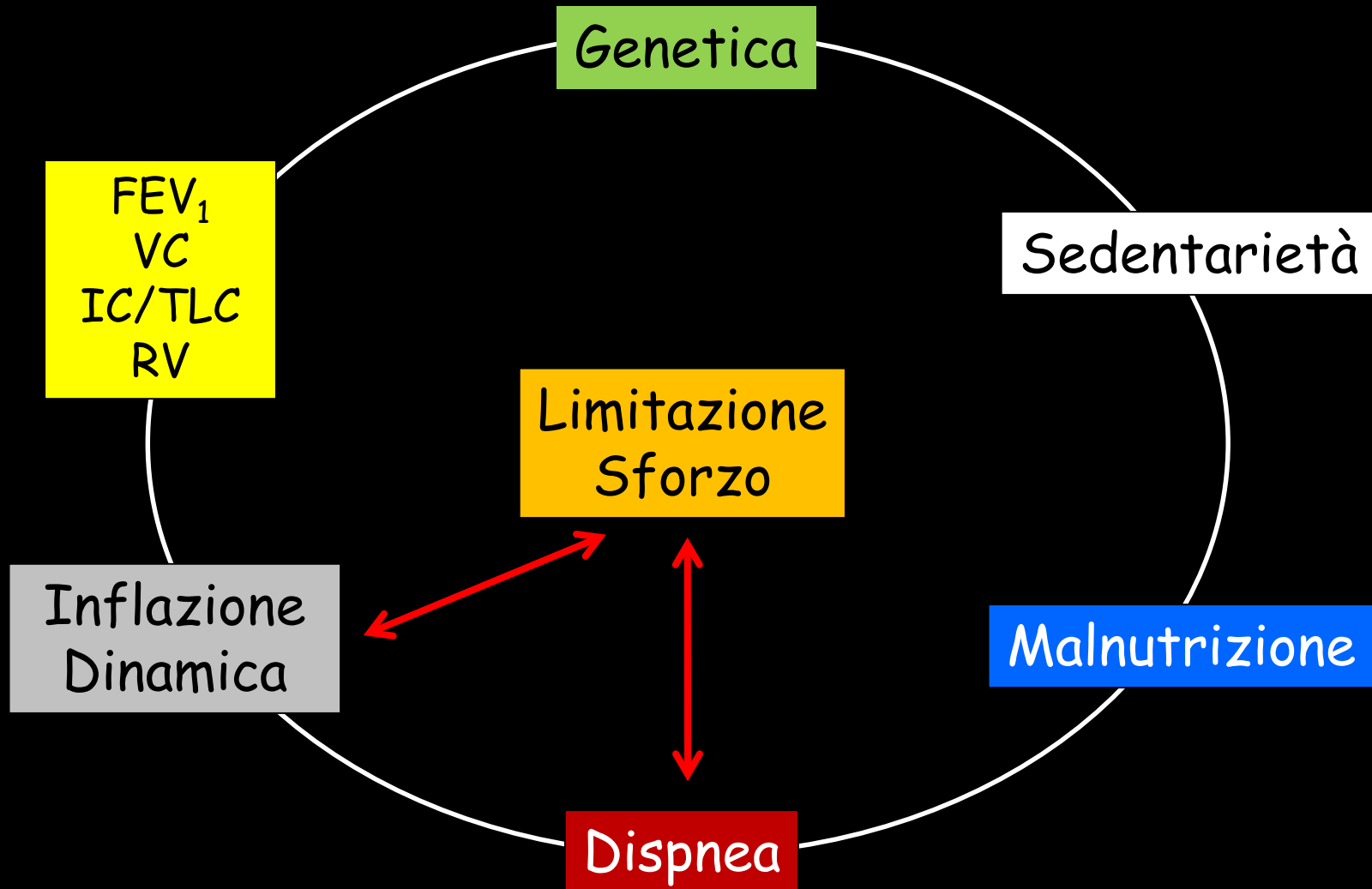
COPD



Sensory-Mechanical Relationships during Exercise in COPD



BPCO: teoria "sforzo" centrica





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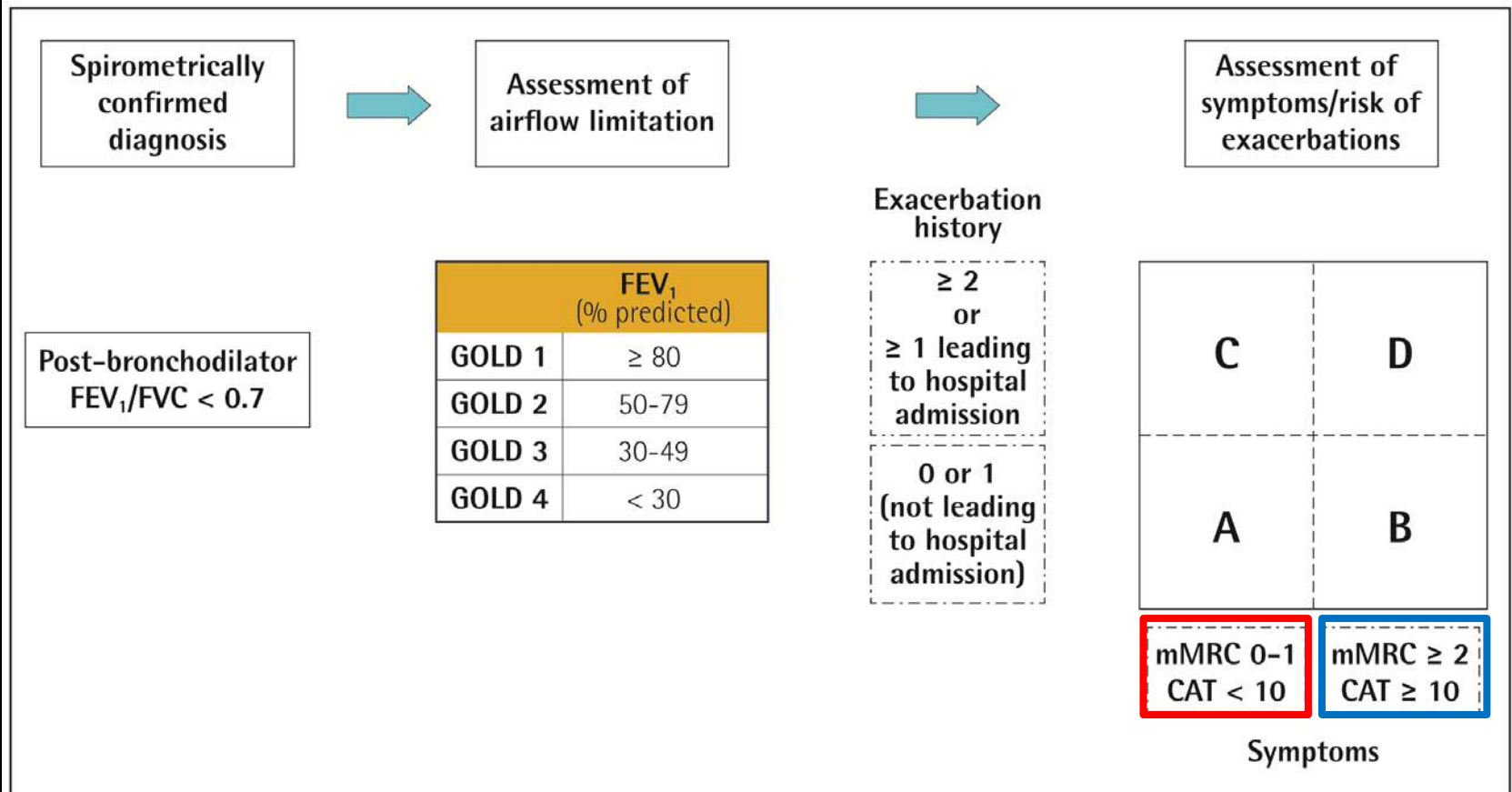
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ABCD Assessment Tool

Figure 2.4. The refined ABCD assessment tool





Choice of thresholds

- ▶ COPD Assessment Test (CAT™)
- ▶ Chronic Respiratory Questionnaire (CCQ®)
- ▶ St George's Respiratory Questionnaire (SGRQ)
- ▶ Chronic Respiratory Questionnaire (CRQ)
- ▶ Modified Medical Research Council (mMRC) questionnaire

Figure 2.3. CAT Assessment

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select one response for each question.

Example: I am very happy ① ② ③ ④ ⑤ I am very sad

Question	Response Options	SCORE
I never cough	① ② ③ ④ ⑤ I cough all the time	<input type="checkbox"/>
I have no phlegm (mucus) in my chest at all	① ② ③ ④ ⑤ My chest is completely full of phlegm (mucus)	<input type="checkbox"/>
My chest does not feel tight at all	① ② ③ ④ ⑤ My chest feels very tight	<input type="checkbox"/>
When I walk up a hill or one flight of stairs I am not breathless	① ② ③ ④ ⑤ When I walk up a hill or one flight of stairs I am very breathless	<input type="checkbox"/>
I am not limited doing any activities at home	① ② ③ ④ ⑤ I am very limited doing activities at home	<input type="checkbox"/>
I am confident leaving my home despite my lung condition	① ② ③ ④ ⑤ I am not at all confident leaving my home because of my lung condition	<input type="checkbox"/>
I sleep soundly	① ② ③ ④ ⑤ I don't sleep soundly because of my lung condition	<input type="checkbox"/>
I have lots of energy	① ② ③ ④ ⑤ I have no energy at all	<input type="checkbox"/>
TOTAL SCORE		<input type="checkbox"/>

Reference: Jones et al. ERJ 2009; 34 (3): 648-54.

Table 2.5. Modified MRC dyspnea scale^a

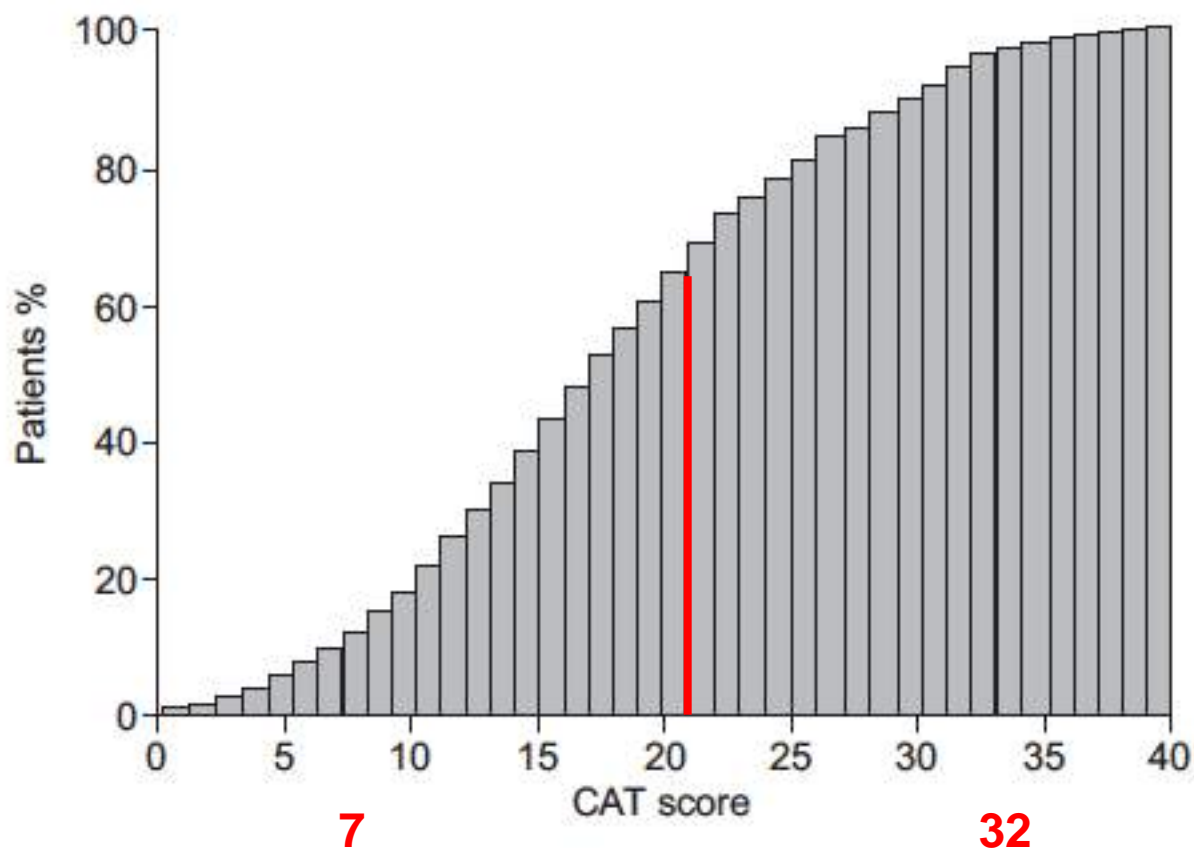
PLEASE TICK IN THE BOX THAT APPLIES TO YOU (ONE BOX ONLY) (Grades 0-4)

mMRC Grade 0. I only get breathless with strenuous exercise.	<input type="checkbox"/>
mMRC Grade 1. I get short of breath when hurrying on the level or walking up a slight hill.	<input type="checkbox"/>
mMRC Grade 2. I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level.	<input type="checkbox"/>
mMRC Grade 3. I stop for breath after walking about 100 meters or after a few minutes on the level.	<input type="checkbox"/>
mMRC Grade 4. I am too breathless to leave the house or I am breathless when dressing or undressing.	<input type="checkbox"/>

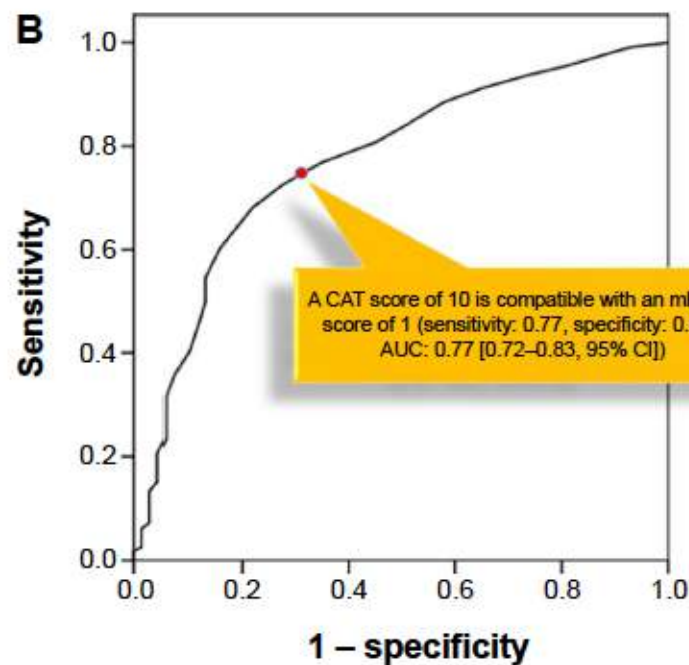
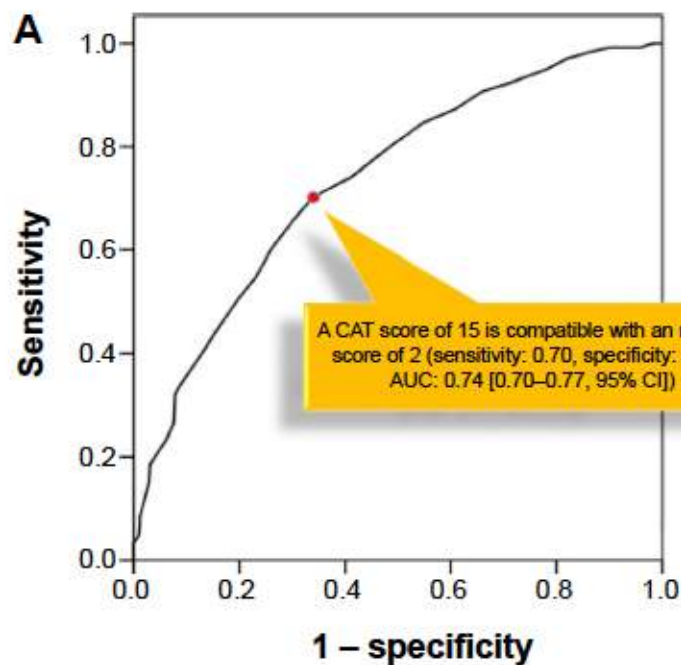
^a Fletcher CM. BMJ 1960; 2: 1662.

Development and first validation of the COPD Assessment Test

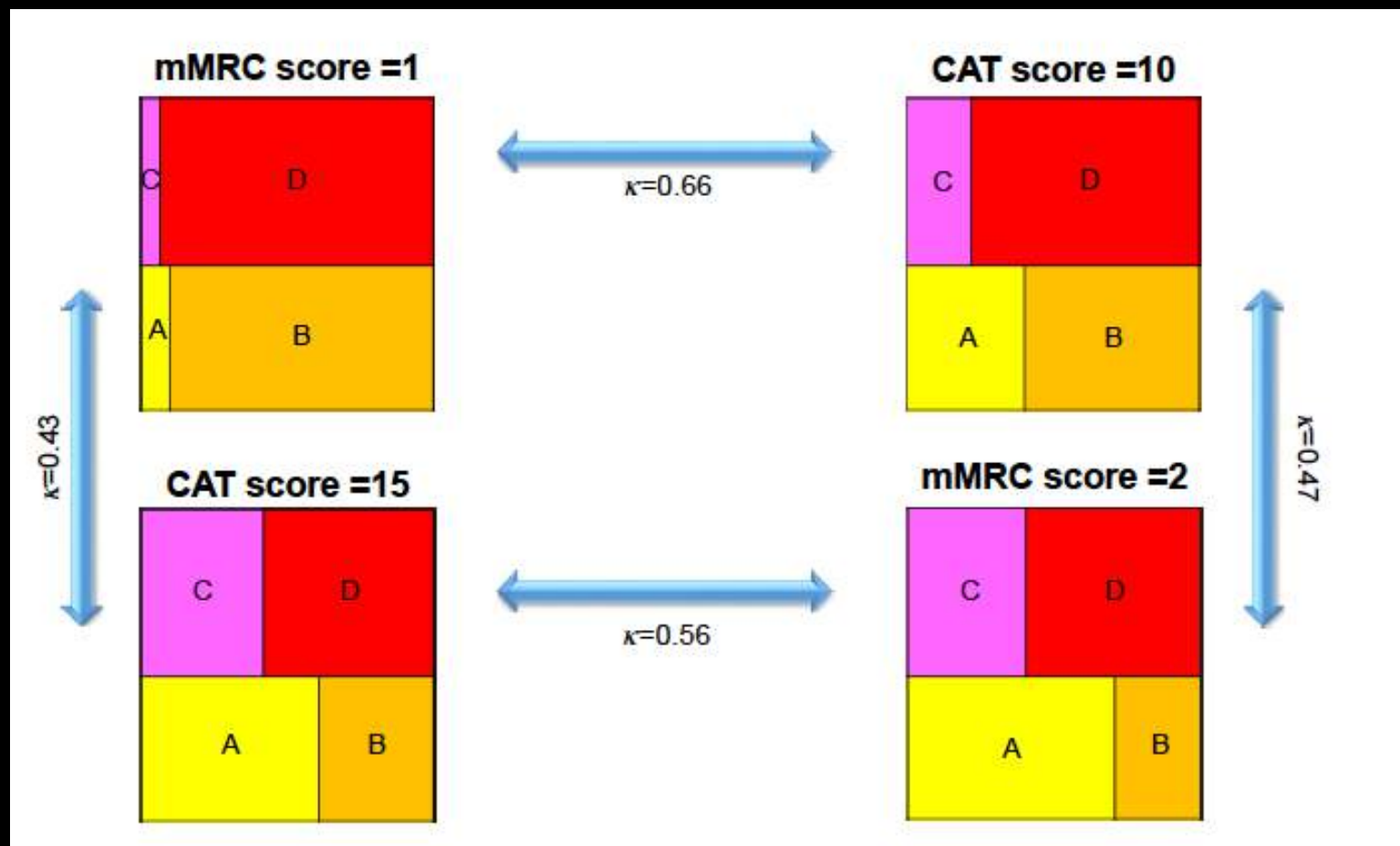
P.W. Jones*, G. Harding#, P. Berry[†], I. Wiklund[†], W-H. Chen# and N. Kline Leidy#



Discrepancies between modified Medical Research Council dyspnea score and COPD assessment test score in patients with COPD



Discrepancies between modified Medical Research Council dyspnea score and COPD assessment test score in patients with COPD



Terapia della BPCO stabile

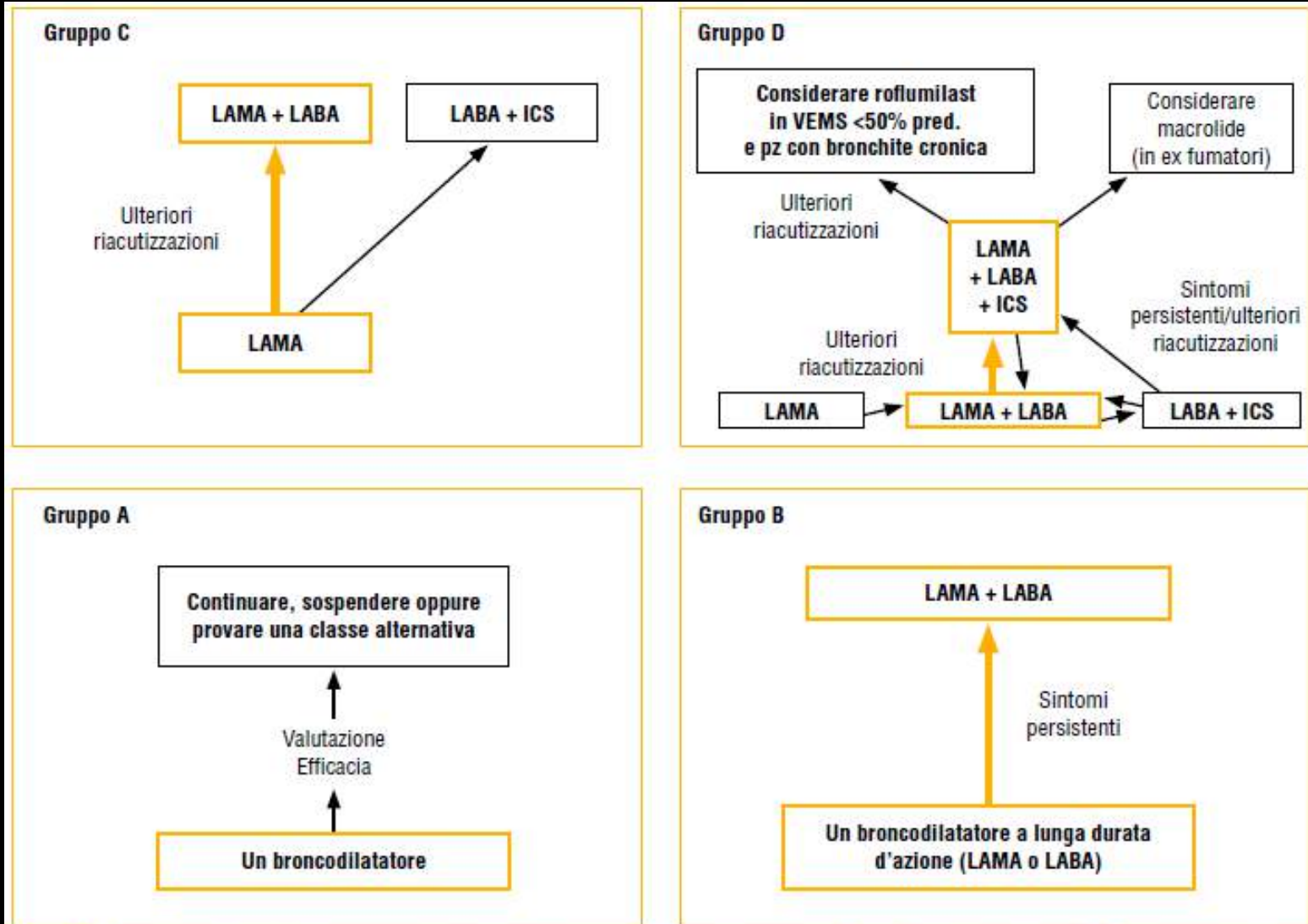


Figura 4.1. Algoritmo del trattamento farmacologico secondo il grado GOLD (le caselle sottolineate e le frecce indicano il percorso terapeutico preferenziale)

Dyspnea and exercise intolerance in COPD

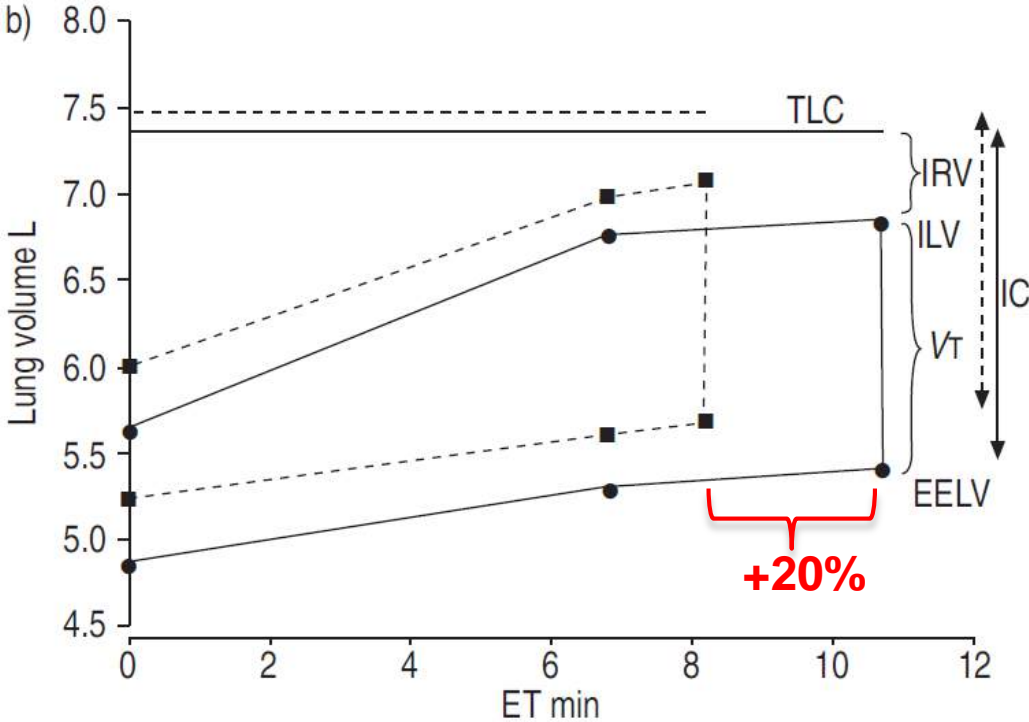


TREATMENT

Effects of tiotropium on lung hyperinflation, dyspnoea and exercise tolerance in COPD

D.E. O'Donnell*, T. Flüge#, F. Gerken#, A. Hamilton#, K. Webb*, B. Aguilaniu#, B. Make+,
H. Magnussen§

Eur Respir J 2004; 23: 832–840.



Recommendations on the use of exercise testing in clinical practice



Eur Respir J 2007

P. Palange*, S.A. Ward[#], K-H. Carlsen[¶], R. Casaburi⁺, C.G. Gallagher[§], R. Gosselink^f, D.E. O'Donnell^{**}, L. Puente-Maestu^{###}, A.M. Schols^{¶¶}, S. Singh⁺⁺ and B.J. Whipp[#]

TABLE 4 Indications for cardiopulmonary exercise testing in clinical practice

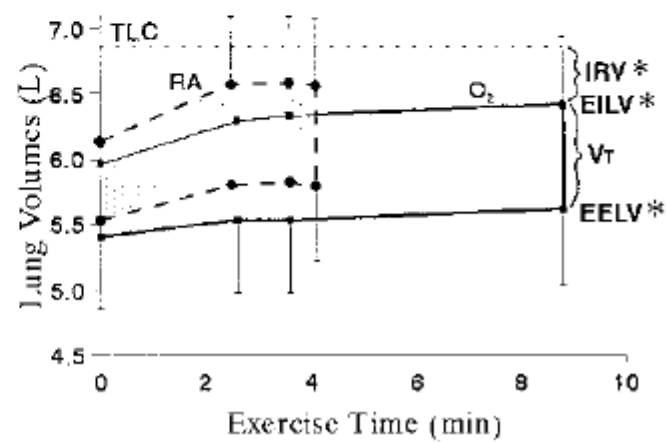
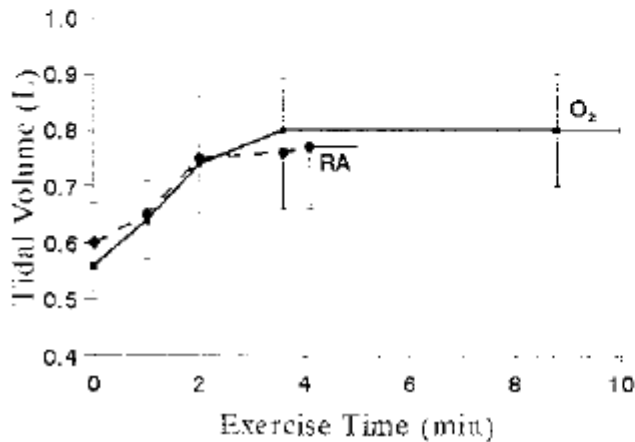
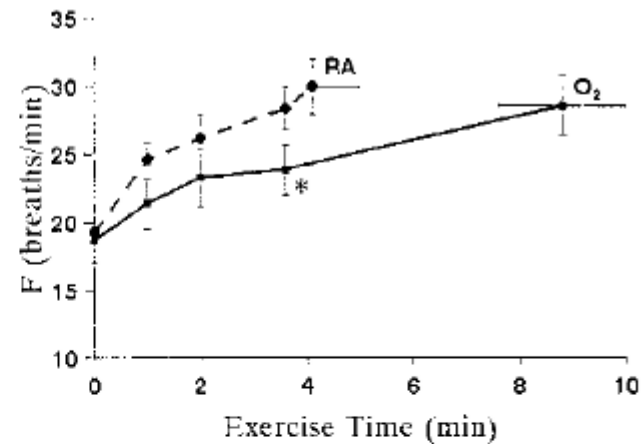
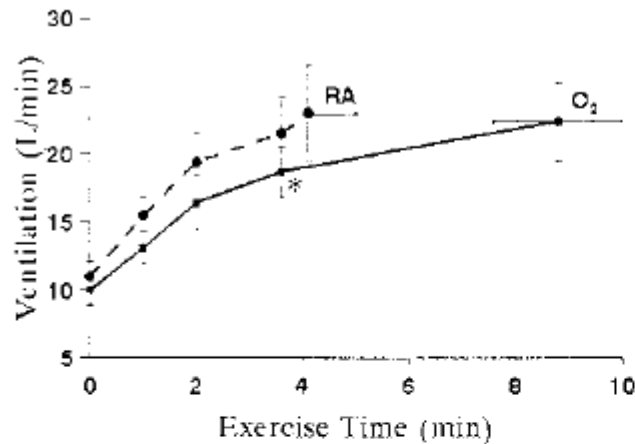
Indication	Recommendation grade
Detection of exercise-induced bronchoconstriction	A
Detection of exercise-induced arterial oxygen desaturation	B
Functional evaluation of subjects with unexplained exertional dyspnoea and/or exercise intolerance and normal resting lung and heart function	D
To recognise specific disease exercise response patterns that may help in the differential diagnosis of ventilatory versus circulatory causes of exercise limitation	C
Functional and prognostic evaluation of patients with COPD	B, C
Functional and prognostic evaluation of patients with ILD	B, B
Functional and prognostic evaluation of patients with CF	C, C
Functional and prognostic evaluation of patients with PPH	B, B
Functional and prognostic evaluation of patients with CHF	B, B
Evaluation of interventions	
Maximal incremental test	C
High-intensity constant work-rate "endurance" tests	B
Prescription of exercise training	B

HI CWR endurance T_{LIM}

With the use of this grading system, A is relatively rare and B is usually considered the best achievable. COPD: chronic obstructive pulmonary disease; ILD: interstitial lung disease; CF: cystic fibrosis; PPH: primary pulmonary hypertension; CHF: chronic heart failure.

Effects of Hyperoxia on Ventilatory Limitation During Exercise in Advanced Chronic Obstructive Pulmonary Disease

DENIS E. O'DONNELL, CHRISTINE D'ARSIGNY, and KATHERINE A. WEBB

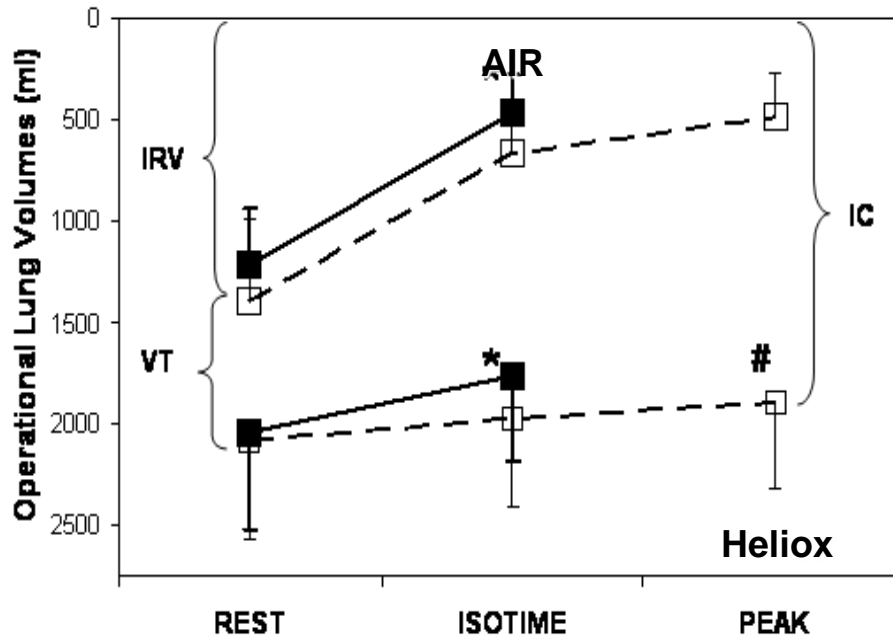


Effect of heliox on lung dynamic hyperinflation, dyspnea, and exercise endurance capacity in COPD patients

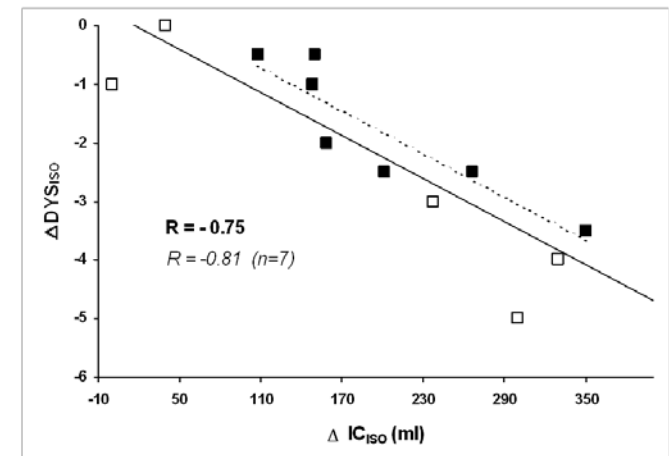
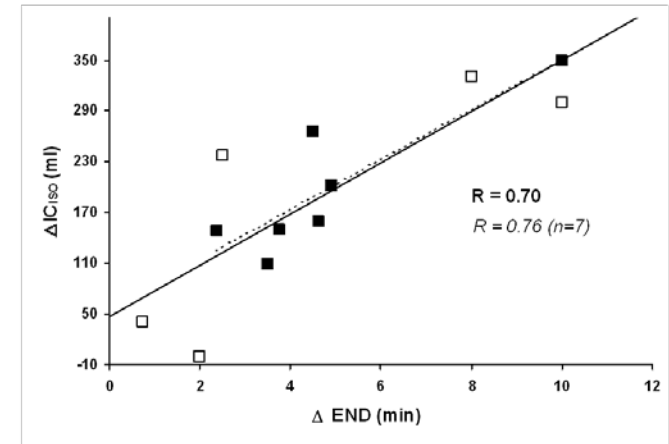


Paolo Palange, Gabriele Valli, Paolo Onorati, Rosa Antonucci,
Patrizia Paoletti, Alessia Rosato, Felice Manfredi, and Pietro Serra

Dipartimento di Medicina Clinica, Servizio di Fisiopatologia Respiratoria, Università "La Sapienza", 00185 Rome, Italy



J Appl Physiol 2004



Recommendations on the use of exercise testing in clinical practice



P. Palange*, S.A. Ward[#], K-H. Carlsen[¶], R. Casaburi⁺, C.G. Gallagher[§], R. Gosselink^f, D.E. O'Donnell^{**}, L. Puente-Maestu^{##}, A.M. Schols^{¶¶}, S. Singh⁺⁺ and B.J. Whipp[#]

Eur Respir J 2007

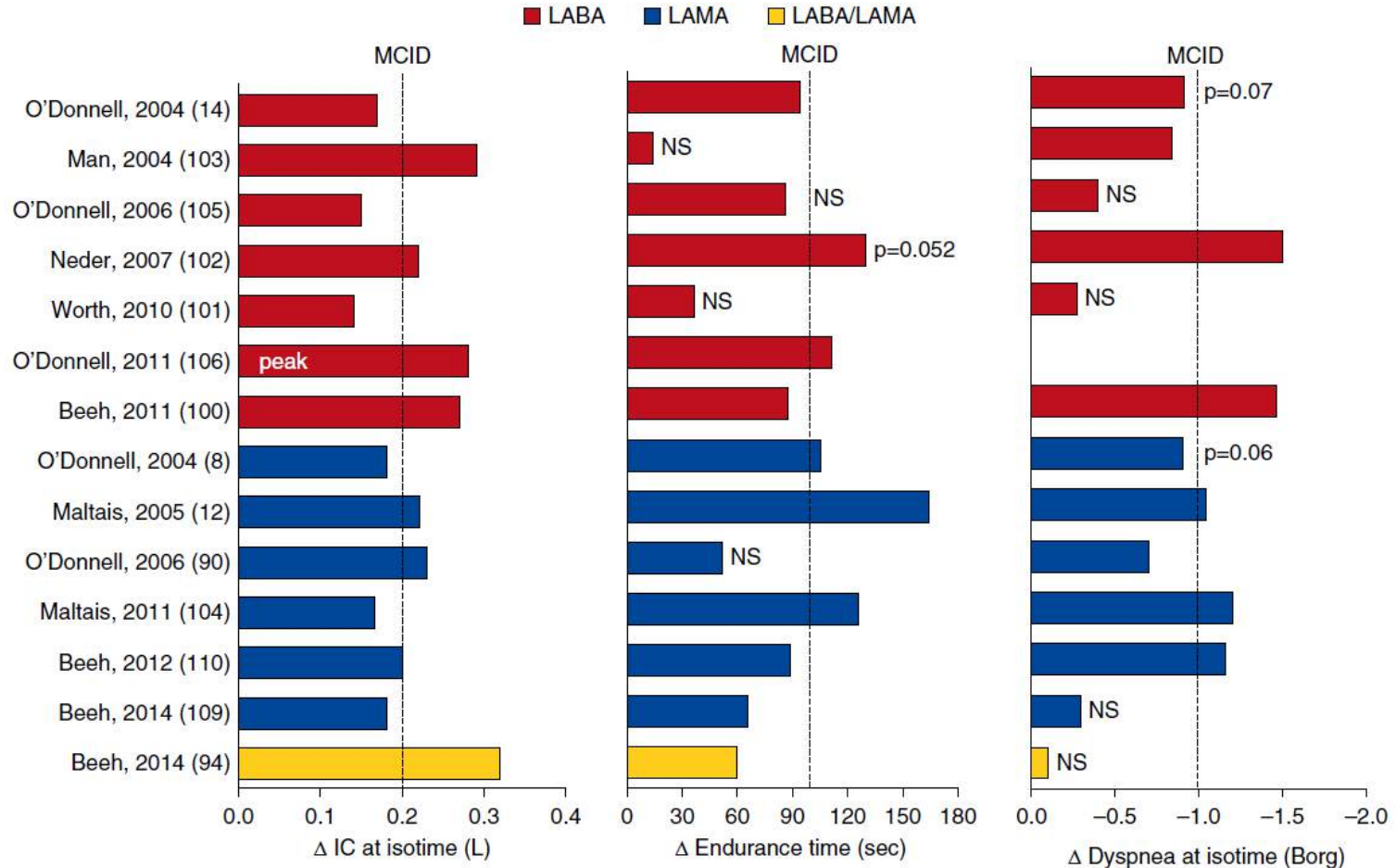
TABLE 3 Effects of different therapeutic interventions on endurance time, lung hyperinflation and dyspnoea in chronic obstructive pulmonary disease

	Type of intervention [Ref.]			
	Tiotropium [252]	Oxygen [263]	Heliox [254]	Rehabilitation [266]
Work-rate % max	75	75	80	75
FEV1 % pred	42	31	38	36
Δ Endurance time %	+21	+145	+115	+175
Δ IC at isotime %	+12	+24	+12	+13
Δ dyspnoea at isotime %	-14	-40	-25	

FEV1: forced expiratory volume in one second; % pred: % of predicted value; IC: inspiratory capacity; Δ : changes at isotime expressed as a percentage of control condition.

The Link between Reduced Inspiratory Capacity and Exercise Intolerance in Chronic Obstructive Pulmonary Disease

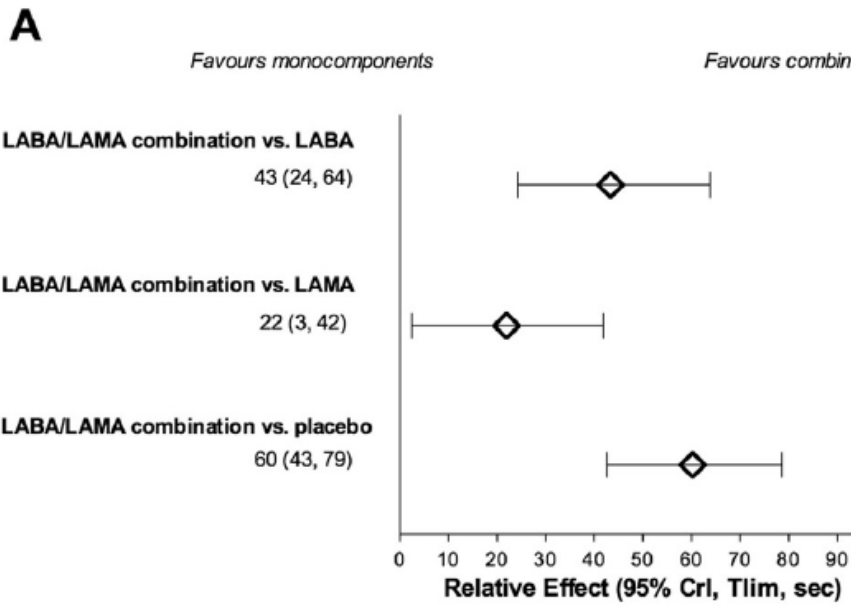
Denis E. O'Donnell¹, Amany F. Elbehairy^{1,2}, Katherine A. Webb¹, and J. Alberto Neder¹; on behalf of the Canadian Respiratory Research Network



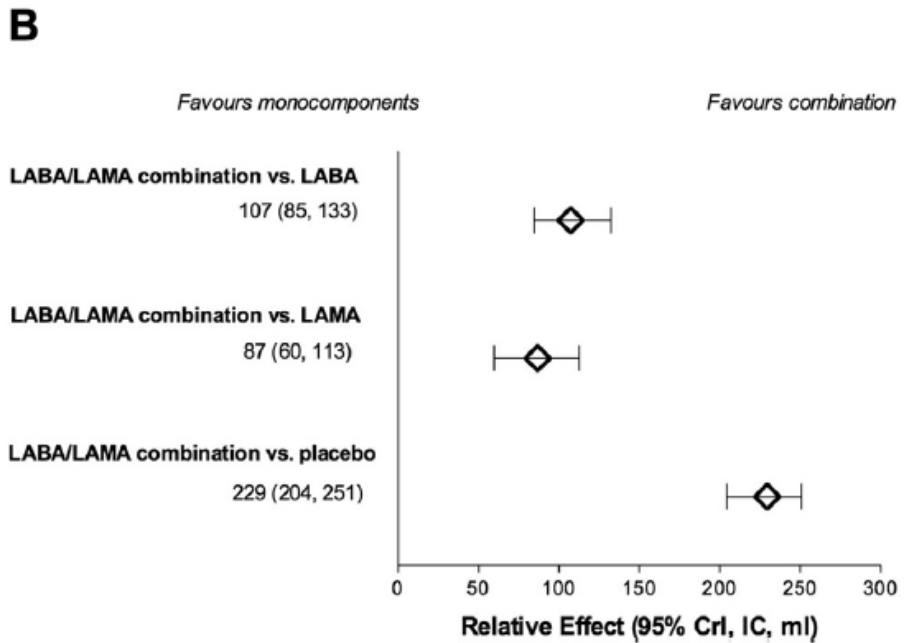
Impact of LABA/LAMA combination on exercise endurance and lung hyperinflation in COPD: A pair-wise and network meta-analysis



Luigino Calzetta ^a, Josuel Ora ^b, Francesco Cavalli ^a, Paola Rogliani ^{a, b}, Denis E. O'Donnell ^c, Mario Cazzola ^{a, *}



T_{LIM} sec

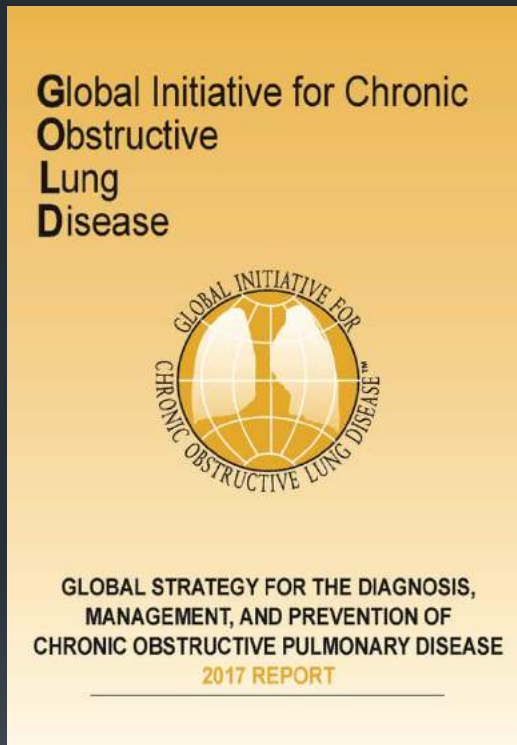


IC ml





GOLD 2017 Report: Capitoli



1. Definizione e inquadramento generale
2. Diagnosi e Valutazione Iniziale
3. Le evidenze a supporto della prevenzione & Terapia di Mantenimento
4. Gestione di BPCO stabili
5. Gestione delle Riacutizzazioni
6. BPCO e Comorbidità



BPCO e Comorbidità

PUNTI CHIAVE (1 di 2):

- ▶ La BPCO spesso coesiste con altre patologie (**comorbidità**) che possono avere un impatto significativo sul decorso della malattia.
- ▶ In generale, la presenza di comorbidità non dovrebbe alterare il trattamento della BPCO e le **comorbidità dovrebbero essere trattate secondo gli standard di cura, indipendentemente dalla presenza di BPCO.**
- ▶ Il **tumore del polmone** è frequente nei pazienti con BPCO ed è la principale causa di morte.
- ▶ Le **malattie cardiovascolari** sono comuni e importanti comorbidità nella BPCO



BPCO e Comorbidità

PUNTI CHIAVE (2 di 2):

- ▶ **L'osteoporosi, la depressione e l'ansia** sono comorbidità frequenti e importanti nella BPCO, spesso sottodiagnosticate e sono associate con uno scarso stato di salute e una peggior prognosi.
- ▶ **Il reflusso gastroesofageo (RGE)** è associato con un maggior rischio di riacutizzazioni e con un peggior stato di salute.
- ▶ Quando la BPCO è inclusa in piano di cura della multimorbidità, l'attenzione dovrebbe essere diretta verso l'assicurazione di un trattamento semplice e verso la **minimizzazione della politerapia farmacologica**



BPCO e Comorbidità

Alcune comuni comorbidità che sopravvivono in pazienti con BPCO con malattia stabile includono:

- ▶ Patologie Cardiovascolari (CVD)
- ▶ Insufficienza cardiaca
- ▶ Cardiopatia ischemica (IHD)
- ▶ Aritmie
- ▶ Patologie vascolari periferiche
- ▶ Ipertensione
- ▶ Osteoporosi
- ▶ Ansia e Depressione
- ▶ BPCO e tumore del polmone
- ▶ Sindromi metaboliche e Diabete
- ▶ Reflusso Gastro-Esofageo (RGE)
- ▶ Bronchiectasie
- ▶ Apnee ostruttive del sonno



Thanks

OXYGEN

*The Molecule that made
the World*