

**Results:** Of the patients enrolled 8(34.7%) were diagnosed with HIV at the time of TB diagnosis or due to symptoms of this infection, 16 were diagnosed with HIV from 5-9 years before tuberculosis. Only 3 (13%) patients receive HAART and had diagnosed AIDS before onset of TB. In 10 cases pulmonary tuberculosis was recognized, 2 patients had disseminated tuberculosis and 11 had extrapulmonary TB. Among patients with pulmonary tuberculosis atypical clinical presentation was observed in 7 cases. Patients with extra pulmonary and disseminated disease were significantly immunosuppressed with CD4 T- cell count ranged between 4 -121 cell/mm3 (median 59 cell/mm3) and never received antiretrovirals. One of the patients with disseminated diseases died during 3 days after diagnosis. **Conclusion:** The majority of HIV associated TB in the last years occurred in persons who were never treated with HAART. TB can be the first symptom of late HIV infection.

## 79. Exercise: respiratory mechanics and dynamic hyperinflation

### P1052

**Dynamic hyperinflation and dyspnoea during exercise and isocapnic hyperventilation in patients with COPD**

Burghart Lehnigk, Anna K. Bieseberg, Helgo Magnussen, *Abteilung Pneumologie, Krankenhaus Großhansdorf, Zentrum für Pneumologie und Thoraxchirurgie, Großhansdorf, Germany*

**Aim:** Dynamic hyperinflation (DH) during exercise is related to dyspnoea in COPD. We investigated whether DH can also be induced by voluntary isocapnic hyperventilation (IH).

**Methods:** We studied 17 patients (3 female) with moderate to severe COPD, mean (SD) age 65 (7) years, mean (SD) FEV<sub>1</sub> 1.35 (0.3) L; 41% pred. First patients performed a symptom limited exercise test on a bicycle ergometer. Inspiratory capacity (IC) was determined every two minutes. Ventilation V<sub>E(ex)</sub>, breathing frequency f<sub>res</sub> and tidal volume (V<sub>T(ex)</sub>), were measured at the highest work load and taken to determine the ventilation targets during subsequent isocapnic hyperventilation tests. IH was done at a ventilation similar to exercise test, and in a second test with a breathing frequency of 30/min. Dyspnoea was assessed by the BORG scale.

**Results:** Mean (SD) V<sub>E(ex)</sub> and V<sub>E(IH)</sub> were 43 (11) and 40 (9) L/min (p>0.05). The corresponding changes in IC were -0.6 (0.18) L and -0.55 (0.22) L respectively (p<0.05). At f<sub>res</sub> 30/min V<sub>E(IH)</sub> was 29 (7) L/min compared to V<sub>E(ex)</sub> 43 (11) L/min at f<sub>res</sub> 31(5) /min and DIC at f<sub>res</sub> was -0.32 (0.18) L (p<0.05). Borg Score was significantly higher during exercise 4.8 (1.4), p<0.05, as compared to IH 3.8 (1.1) and f<sub>res</sub> 2.7 (1.1).

**Conclusion:** Dynamic hyperinflation during maximal exercise and hyperventilation at comparable V<sub>E</sub> is similar. Dyspnoea at comparable degree of hyperinflation is more pronounced during exercise than during hyperventilation.

### P1053

**Effect of dynamic hyperinflation on exertional dyspnea, exercise performance and quality of life in COPD**

Eyleen S. Ozgur<sup>1</sup>, Sibel Atis<sup>1</sup>, Arzu Kanik<sup>2</sup>, *<sup>1</sup>Chest Disease, Mersin University School of Medicine, Mersin, Turkey; <sup>2</sup>Biostatistics, Mersin University School of Medicine, Mersin, Turkey*

Recent studies have shown that pulmonary hyperinflation in resting was related with exercise capacity limitation and dyspnea in COPD patients. However, the effect of dynamic hyperinflation (DH) on exercise performance and quality of life in patients remains to be elucidated. We aimed to investigate effect of dynamic hyperinflation on exertional dyspnea, exercise performance and quality of life in patients with COPD.

72 clinically stable patients with moderate to severe COPD and 30 healthy age-matched controls were studied. Pulmonary function tests including lung volumes and maximal respiratory muscle forces, arterial blood gases, exertional dyspnea with the Borg scale, and The Saint George Respiratory Questionnaire (SGRQ, Turkish version) were evaluated at rest and after a 6-min walk test.

We measured the change in inspiratory capacity (ΔIC) after exercise to reflect DH. IC was significantly decreased in 80% of COPD patients after exercise (DH). ΔIC were -0.27±0.26 L in COPD and 0.8±0.17 L in controls (p=0.001). A stepwise multiple regression analysis showed that to be a patient with COPD, Basal Dyspnea Index (BDI) and ΔIC were the best predictors of 6MWD (r<sup>2</sup>=0.53, p<0.001). FEV<sub>1</sub> added an additional 9% to the variance in 6MWD. Exertional dyspnea (ΔBorg) correlated with ΔIC (r=-0.44, p=0.0001) and BDI (r=0.34, p=0.02). ΔIC significantly correlated with symptom (r=-36, p=0.008), activity (r=-31, p=0.03) and total scores (r=-30, p=0.04) of SGRQ.

In conclusion, dynamic hyperinflation can often occur during exercise in COPD patients. Extent of dynamic hyperinflation could able to explain exercise capacity limitation, exercise dyspnea, and poor quality of life in patients with COPD.

### P1054

**Flow limitation and the power-duration relationship in COPD**  
Luis Puente-Maestu, Africa Alcora, Elena Lopez-Mañiz, Villar Felipe, *Neumología, HGU Gregorio Marañón, Madrid, Spain*

The duration of high intensity exercise (t) bears a hyperbolic relationship to the applied power (WR) defined by its curvature constant (W') and its power asymptote or critical power (CP) as follows:  $t = W' / (WR - CP)$ . In normals CP is the upper limit of the ability of the exercising muscles to continuing working without metabolic acidosis increasing to the limit of tolerance and W' is thought to be related to energy available from anaerobic sources. This might not be true in patients with flow limitation (FL). We studied the power-duration relationship in 15 patients with resting IC below 70%, FL group [age 62 (SSD)yr; FEV<sub>1</sub> 35 (8)%; IC 56 (4)%] and 13 patients with resting inspiratory capacity >70%, non FL group [age 64 (7)yr; FEV<sub>1</sub> 52 (6)%; IC 74 (4)%] at 75, 80, 85 and 90% of the maximum WR.

Group	Ve/MVV%	t75 (min)	CP (%WRpeak)	W' (min/%WRpeak)
Non-FL	78(11)	10.4(3)	69(3)	105(3)
FL	84(12)	9.4(4)*	74(4)*	46(4)*

\* p<0.01

Correlations between resting IC and 75 were 0.68 in the FL group and 0.38 in the non-FL one. Correlations between end-exercise IC and t75, W' and CP were 0.57, 0.69 -0.60 respectively in the FL group and 0.38, 0.33, 0.33 in the non-FL one. Finally correlations between the rate of lactate accumulation [(end-exercise- basal lactate)/ t of the test] and t75, W' and CP at the 85% test were non-significant in the FL patients and 0.56, 0.80 0.54 respectively in the non-FL group. We conclude that patients with low IC have a different power-duration profile than patients with high IC. In the FL group W' is significantly lower W' and CP as percent of peak higher work rate. Our data also suggest that in subjects with IC<70%, flow limitation is a major determinant of the characteristics of the power-duration profile.

### P1055

**Effects of tiotropium on lung volumes during exercise in GOLD stage II to IV COPD patients**

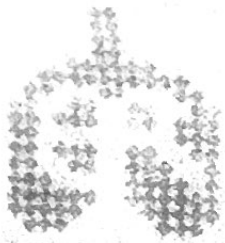
Denis E. O'Donnell<sup>1</sup>, Steven Kesten<sup>2</sup>, Helgo Magnussen<sup>3</sup>, Inge Leimer<sup>2</sup>, Alan Hamilton<sup>4</sup>, *<sup>1</sup>Department of Medicine, Queens University, Kingston, ON, Canada; <sup>2</sup>Clinical & Scientific Affairs, Boehringer Ingelheim, Ridgefield, CT, United States; <sup>3</sup>Pulmonary Research Institute, Hospital Grosshansdorf, Grosshansdorf, Germany; <sup>4</sup>Clinical Research, Boehringer Ingelheim Canada Ltd, Burlington, ON, Canada*

It has been proposed that dynamic hyperinflation during exercise in patients with severe COPD results in restrictions to tidal volume (V<sub>T</sub>) expansion when critical inspiratory reserve volume (IRV) is reached. Retrospective analysis of 2 large clinical trials allowed further exploration of this hypothesis across disease severity. In two 6-week, randomized, placebo-controlled trials evaluating the effects of tiotropium 18µg daily on exercise tolerance in COPD patients (FEV<sub>1</sub> ≤65%pred, FRC ≥120%pred), inspiratory capacity (IC) was used to track lung volumes during constant work cycle ergometry (pre- and 6wks post-treatment). Analysis included 218 patients receiving tiotropium (mean age 62yrs; FEV<sub>1</sub>=1.24L [44.0%pred]). Subjects were classified into GOLD Stages II, III and IV:

	II (n=72)		III (N=105)		IV (N=41)	
	Baseline	Day 42	Baseline	Day 42	Baseline	Day 42
Pre-Ex IC (L)	2.50	2.63	2.20	2.44	1.78	2.02
End-Ex IC (L)	2.11	2.21	1.75	1.91	1.32	1.48
Δ IC (mL)	-388	-423	-451	-532	-458	-541
% Patients with ↓ IC ≥10%	66	63	72	75	88	83
End-Ex V <sub>T</sub>	1.52	1.58	1.34	1.40	1.04	1.16
End-Ex Resp. Rate (b/min)	33.1	34.1	30.8	31.6	29.4	28.2
End-Ex IRV (mL)	587	630	403	512	277	312
Endurance Time (sec)	553	695	545	821	383	635

Ex=exercise

Prior to treatment, end-exercise IRV decreased with disease severity. Post-treatment changes from baseline in end-exercise IRV were more marked in Stage III compared with Stage II/IV, and in end-exercise V<sub>T</sub> were more marked in Stage IV compared with Stage II/III. Post-treatment decreases in end-exercise resp. rate were observed in Stage IV but not in Stage II/III. In conclusion, lung volume behaviour during constant work rate exercise following treatment with tiotropium may be dependent on disease severity.



European Respiratory  
Society

# European Respiratory Journal

**ABSTRACTS**  
16th ERS Annual  
Congress

Munich, Germany,  
September 2-6, 2006

VOLUME 28 | SUPPLEMENT 50 | SEPTEMBER 2006

[www.erj.ersjournals.com](http://www.erj.ersjournals.com)