

apart from patient's sex and age, when COLD exacerbates or since the III score. When scheduled continuously, Cs are lifelong. OP and BF are the main risk due to chronic Cs to be prevented as a primary duty of any physician and pneumologists. Our aim was to evaluate the prevalence of OP+BF in relation to lung function and Cs in a cohort of COLD outpatients of both sexes, over 50'. Our survey involved 52 pts, mean age  $70 \pm 7.9$  yrs, 23 F, 29M; FEV1 ( $D < 55\% NV$ ), Tiffenau I. ( $< 55\%$ ). We studied ultrasonically the OP at the heel (USDensitometry Achilles, Ex-Lunar-Ge; Osteopenia = Tscore  $< -2.5$ ); the bone fracture at thoracic vertebra (LL thoracic X-Rays; Software Image Metrics Morpho Xpress). Main items were the Tscore and vertebral BF numbers. 48% and respectively 11% to-17% of COLD pts showed BF and/or heavy OP without fracture. By us COLD + Age could sum to cause BF; as in literature where we found that age and patients' customs of life and Cs schedules are widely discordant. We discussed a such stimulating a critical review of the approach to Cs by pneumologists in order to improve early diagnosis of COLD, to pay attention to the modalities of preventing iatrogenic OP+BF and, finally, to previously inform COLD pts even if asymptomatic for OP/BF.

**E462****Anxiety and depression assessment in patients with chronic obstructive pulmonary disease**

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Psychological support is an important element of pulmonary rehabilitation programmes, therefore, scheduling such programmes requires an ample knowledge of the psychological traits of the target population. Aim of our study was to assess the levels of anxiety and depression in a registry of 53 COPD patients (38 males), aged  $66 \pm 9$  years (mean  $\pm$  SD) in comparison with an age- and gender-matched group of 40 control subjects. Anxiety and depressive symptoms were assessed using Spielberger's Trait-Anxiety Scale (STAS) and Beck Depression Inventory (BDI) respectively. Both STAS score ( $44.98 \pm 8.9$ ) and BDI score ( $16.01 \pm 8.5$ ) in COPD patients were significantly higher as compared with the control group ( $p < 0.05$  and  $p < 0.01$  respectively). Percentages of 55% and 25% of patients manifest depression and anxiety respectively. No significant difference was found between males and females, while no correlation was observed with the age, duration and severity of disease. In conclusion, a substantial number of COPD patients develop depression and/or anxiety, and this is something that should be taken into consideration when drafting pulmonary rehabilitation programmes. Comprehensive programmes should incorporate individualized depression and anxiety management techniques.

**E463****Resting energy expenditure in patients with moderate to severe chronic obstructive pulmonary disease**

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**Background:** Malnutrition and weight loss are commonly associated with chronic obstructive pulmonary disease (COPD). It's more prevalent and more severe in the subgroup of COPD patients who are more affected by the disease. Increased basal metabolic rate (BMR) has been suggested to contribute to the development of malnutrition and weight loss.

**Aim:** The aim of the study was to assess the energy expenditure, as measured by BMR, and describe its contribution in weight loss in patients with COPD.

**Methods:** Forty patients (26 males/ 14 females), median age 56.5 years old, with moderate to severe COPD (in stable state) and 28 controllers (19 males/ 9 females), median age 52.5 years old, were included in the study. At each subject, FEV1, TLC, RV, Raw, FRC and BMR were determined, by spirometry, body plethysmography and indirect calorimetry.

**Results:** Measured BMR was higher in the COPD group than the controllers. The median values for BMR was 103% of predicted (min 66%- max 204%) in patients with COPD versus 99.7% of predicted (min 68.4%- max 150.3%) in the control group (figure 1). There was no significant correlations between BMR and spirometric values. Significant correlation existed between BMR and VT ( $p < 0.05$ ) (figure 2).

**Conclusions:** We conclude that patients with moderate- to- severe COPD tend to have higher BMR than normal subjects, matched for age and habits. The influence of COPD- associated mediators, such as chronic low- grade inflammation, hypoxia, hormonal alterations, medications and physical activity need to be explored in future experimental studies.

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## 36. Assessment in COPD patients

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**E461****Does chronically assumption of inhaled/per os corticosteroids (Cs) allow osteoporosis/osteopenia (OP) and/or bone fracture (BF) in COLD patients? An epidemiological observational and transversal survey of an over 50 yrs out-patients cohort**

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As quite a systemic disease COLD requires multiple drugs, of which oral or inhaled (Cs) become important for curing illness and preventing its evolution to CRF. According to GOLD (and ERS) Guides Lines, Cs can be introduced quite

E464

**Cerebral cortical dysfunction in chronic obstructive pulmonary disease: role of transcranial magnetic stimulation**

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Few recent studies reported functional brain involvement in chronic obstructive pulmonary disease (COPD). It may be contributed to hypoxia, catecholamine changes, electrolyte disturbance and drugs. Hypoxemia, has been reported to alter the cortical brain excitability, damage brain synapses particularly GABAergic with resultant GABAergic deficiency. These excitability changes can be reversible by oxygen supplementation.

Transcranial magnetic stimulation (TMS) is a non-invasive electrophysiological method recently used to evaluate the excitatory and inhibitory cortical brain circuits through assessment of motor thresholds, cortical silent period (CSP), central motor conduction time (CMCT), intracortical inhibition (ICI) and intracortical facilitation (ICF).

**Aim:**

Detection of functional cortical brain involvement in patients with acute exacerbation of COPD (AECOPD), using TMS.

**Patients and Methods:**

41 patients with AECOPD, and 20 controls were chosen.

**For all subjects the following was done:**

- Complete medical, neurological history and examination.
- Arterial blood gases analysis, electrolytes and pulmonary function tests
- TMS for assessment of: resting and active motor thresholds, transcranial electrical stimulation (TES), CMCT, CSP, ICF and ICI.

**-Results:**

There was significant impairment in all a TMS parameters, and was correlated with degree of hypoxemia, hypercapnea, acidosis, serum potassium.

**- Conclusion:**

TMS is simple, non-invasive methods for assessment of functional involvement of central nervous system in acute exacerbation of COPD, further work is needed to investigate the improvement of these functions after medical treatment, oxygen and rehabilitation.

E465

**A comparison about effects of different broncodilators on pulmonary function and exercise tolerance tests for patients with COPD**

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**Aim:** Due to the severity of illness, different drug therapies can be applied on patients with COPD. We prospectively compared the effects of tiotropium and formoterol on pulmonary function and exercise tolerance tests 3 months later for the patients who never received any treatment before.

**Methods:** 30 patients (26 male, 4 female) with stable COPD with moderate severity due to GOLD classification were enrolled. Forced expiratory volume in 1 second (FEV<sub>1</sub>), forced vital capacity (FVC), FEV<sub>1</sub>/FVC, forced midexpiratory flow (FEF<sub>25-75</sub>), aerobic capacity and endurance time were measured. 15 patients (FEV<sub>1</sub>: 2.25 ± 0.80 L) and the other 15 patients (FEV<sub>1</sub>: 1.86 ± 0.72 L) were studied. On 15 patients, tiotropium (18 mcg/day); and on other 15 patients, formoterol (18 mcg/day) were applied. They were randomly selected among patients who received no treatment before. After a regularly applied treatment for 3 months, pulmonary function and symptom-limited exercise tolerance tests were repeated.

**Results:** There was a statistically significant improvement in the pulmonary function test (FEV<sub>1</sub>, FVC, FEV<sub>1</sub>/FVC, FEF<sub>25-75</sub>), maximal oxygen uptake (VO<sub>2max</sub>), maximal work rate (WR<sub>max</sub>) and anaerobic threshold (AT) values of the patients in both of the treatment groups following the treatment (at third month) compared with baseline (p<0.05). However, there was no statistically significant difference between the values of the two groups (p> 0.05).

**Conclusion:** For patients with moderate COPD, broncodilators are required due to the severity of the illness, however no significant difference was observed among broncodilators.

E466

**Relationship between respiratory muscle strength and chronic obstructive pulmonary disease, a descriptive study**

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COPD is known as the main reason of morbidity and mortality in the world. The main reason of morbidity of COPD patients is respiratory muscle impairment

especially diaphragm and chest wall muscles. Muscle impairment is most seen in severe and progressive stages of disease. COPD results in increasing Functional Residual Capacity (FRC). In severe cases of COPD, respiratory muscle impairment and FCR arousal, lead to hyperinflation deterioration.

In our study 30 COPD patients (28 male, 2 female) referring to Masih Daneshvari's Hospital were analyzed. All cases were studied with exact the same Body Plethysmography equipment and the same technician.

The average age, height, weight and BMI of cases were 53± 11, 168.86±6.33 cm, 65.44±16.78 kg and 23.56±6.32. Average FEV<sub>1</sub> regarding GOLD criteria was in the range of moderate and severe.

Hyperinflation which is noted by RV and reverse RV/TLC, was clearly noticed in our study (RV=225.9±82.11, RV/TLC%= 195±34.49).

Due to our study there was a straight and meaningful correlation between FEV<sub>1</sub>, Hyperinflation (RV/TL, RV), respiratory muscle function (P<sub>Imax</sub>/P<sub>I</sub>) and respiratory time cycle T<sub>1</sub>/T<sub>tot</sub>. It should be noted that there was meaningful correlation between P<sub>Imax</sub> and Tension Time Index.

E467

**Dysfunction of respiratory muscles contribute to 6-minut walk distance limitation in patients with COPD**

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**Background:** Respiratory muscle (RM) dysfunction may be one of the determinants of exercise intolerance in COPD patient.

This study aimed to evaluate the effects of respiratory muscle strength on six-minute walk distance (6MWD) in COPD patients.

**Methods:** spirometry and pneumotometry were performed by means MasterScreen Body/Diff ("Jaeger", German). FEV<sub>1</sub>, P<sub>Imax</sub>, P<sub>E</sub>max, P<sub>0.1</sub> were evaluated. All patients were tested by 6MWT.

**Study population:** 113 COPD patients, 65 males, age 56.43±12.10 years, main length of disease – 10.25±7.53 years) were included. Subjects were divide depending to stages of disease's in 3 groups: I stage – 13 patients, II stage – 52 patients, III stage – 48.

**Results:** We found positive significant correlations between 6MWD and P<sub>Imax</sub> (r=0.82, p=0.053), FEV<sub>1</sub> (r=0.14) and P<sub>0.1</sub> (r=0.26). Therefore, this date suggests the influence of main and accessory respiratory muscles to the functional exercise capacity in patients with bronchial obstruction. Interrelation between P<sub>Imax</sub> and 6MWD is performed in figure 1.

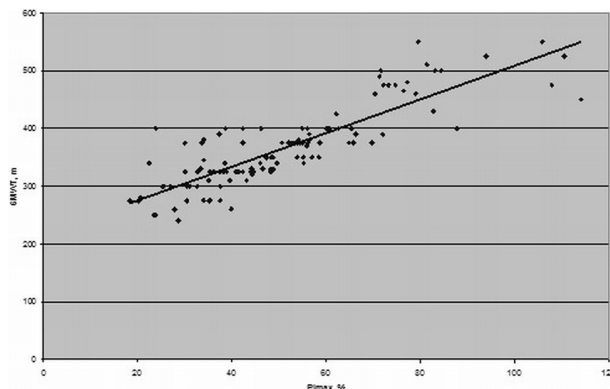


Figure 1. Correlation between strength of RM and results of 6MWT.

Thus and so we concluded that the correction of the RM' function, especially inspiratory part of the RM, must be one of the main components in treatment of COPD patients.

E468

**Correlation between body mass index, gender, smoking habits and severity of COPD**

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COPD makes many functional changes, with a great impact on metabolism and body composition. Cigarette smoking and bad nutritional habits generally make situation worse. Also, with increased smoking among women, especially in our country, COPD became important factor of their morbidity and mortality.

The aim of this work was to investigate correlation between body mass index, gender, smoking habits and severity of COPD.

**Methods:** In the tested group consisting of 1364 patients, BMI and lung function were measured, smoking habits and gender noted.

**Results:** Among 1364 patients, 1076 were men – 78.9% and 288 women – 21.1%, 744 or 54.55% were smokers and 620 or 45.45% non or ex smokers. Average age was 64.85 years, average BMI was 26.39kg/m<sup>2</sup>. Average BMI in women was

27.7 kg/m<sup>2</sup> and in men 26.4 kg/m<sup>2</sup>. Most patients were in the group with severe COPD (428 = 31.38%), and normal weight BMI = 18.5-24.9 kg/m<sup>2</sup> (500 or 36.66%). BMI was the highest in women non or ex smokers (27.74 kg/m<sup>2</sup>). Total number of extremely obese patients (BMI > 40 kg/m<sup>2</sup>) was 12 or 1%, and equal in women non or ex smokers with risk of COPD and men smokers with mild COPD (7%). Underweight patients were 68 or 5%, with the highest number among women smokers with very severe COPD (4 or 25% of them).

**Conclusion:** BMI is increased in patients with COPD, mostly females, also in non or ex smokers. Low BMI correlates with severity of disease and smoking status, but being present mostly in women, indicates that they are more vulnerable than men. High incidence of extreme obesity is noticed in both sexes. This shows that further education should be aimed primary to women, emphasizing importance of quitting smoking, appropriate nutrition and physical activity.

#### E469

##### Nebulized bronchodilator therapy in stable COPD – effect on quality of life and spirometry

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The National Institute of Clinical Excellence (2004) COPD guidelines suggest there is a role for long-term nebulized bronchodilator therapy following a trial showing an improvement in either symptoms or lung function in stable COPD patients who remain symptomatic despite maximal inhaled bronchodilators.

We conducted a retrospective audit over 20 months of our clinical practice in this specific context. Patients were initially prescribed salbutamol 400mcg and ipratropium 80mcg QDS for 2 weeks and then switched to nebulized salbutamol 2.5mg and ipratropium 500mcg QDS for 2 weeks. Spirometry and quality of life (QoL), assessed by chronic respiratory disease questionnaire (CRDQ), were recorded at baseline and after trials of inhaled and nebulized therapy.

Of 43 patients, 35 (81%) completed the assessment. Compared to both baseline and the trial of high dose inhaled therapy, 32 (91%) patients showed improvement in  $\geq 1$  CDRQ domain after nebulized therapy, with 26 (81%) reporting improvement in dyspnoea. 3 (8%) patients also demonstrated  $\geq 15\%$  improvement in FEV<sub>1</sub>. 3 (8%) patients showed no improvement in either QoL or spirometry. Most patients showed clinically significant improvements in QoL with nebulized therapy. Few patients showed improvements in spirometry, however, measurements of hyperinflation may be more sensitive in this clinical context.

#### E470

##### Vitamin D status by season in patients with advanced pulmonary disease

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Bone resorbing activity has been found to vary with season in temperate zone being highest in the winter months. The relative importance of diet and sunlight to serum calcidiol concentration varies with age and geographics. The aim of this study was to examine if serum concentration of calcidiol varied with season in patients with advanced pulmonary disease.

In this cross sectional study patients were included all year around, except in July. Seventy-one Norwegian candidates for lung transplantation with advanced pulmonary disease where the majority had chronic obstructive pulmonary disease (56%), had age mean (range) years 48.7 (25-60), body mass index mean (95% CI) kg/m<sup>2</sup> 19.3 (18.6; 20.0), forced expiratory volume in one second % of predicted 24.4 (21.3; 27.5), arterial oxygen tension (PaO<sub>2</sub>) 7.3 (7.0; 7.7), arterial carbon dioxide tension kPa 6.4 (6.0; 6.7), serum concentration of calcidiol nmol/L 37.7 (33.9; 41.5) and vitamin D intake median (range)  $\mu$ g 7 (0-38). In patients with vitamin D intake over or equal to 5.5  $\mu$ g, the serum concentration of calcidiol in the winter season (November-May, n=21) was nmol/L mean 41.9 (SD 14.2) and in the summer season (June-October, n=19) 43.4 (20.0) and in patients with vitamin D intake below 5.5  $\mu$ g (n=20) 31.0 (10.8) and (n=9) 33.2 (14.1), respectively. In conclusion, our results indicate that vitamin D level would not markedly vary with season in patients with advanced pulmonary disease living in Norway.

#### E471

##### Resting energy expenditure in young adults with asthma

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**Background:** The interaction of the disease process and energy expenditure in chronic disease states, such as asthma, are poorly understood.

**Objective:** To determine whether asthma affects resting energy expenditure in adults aged 19-31 years old.

**Methods:** Two groups matched for age and physical activities were studied. 7 females and 24 males with mild to moderate asthma compared with 25 normal

subjects. Resting energy expenditure was measured by indirect calorimetry, using an open circuit ventilated hood system for basal metabolic rate (BMR). In addition, we calculated forced expiratory volume in one second (FEV<sub>1</sub>), the functional residual capacity (FRC), the residual volume (RV), the total lung capacity (TLC) and the airways' resistance (Raw) by spirometry and body plethysmography.

**Results:** BMR was 113% of predicted (min 77- max 169%) in the group with asthma and 94.5% of predicted (min 75- max 130%) in the control group (p=0.047). Significant correlation existed between BMR and FEV<sub>1</sub> (r=0.018).

**Conclusions:** This study shows that patients with mild to moderate asthma are characterized by a higher energy expenditure at rest than normal subjects, as was detected by measuring BMR. They appear to save energy by reducing their spontaneous level of physical activity, as the majority of adults with asthma are not meeting the national recommendations for physical activity.

#### E472

##### Dyspnea is better than a multidimensional grading system (BODE index) as predictor of health-related quality of life in COPD

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**Aim:** to examine the relationship between health-related quality of life (HRQL), body mass index (BMI), airflow obstruction, dyspnea, exercise capacity and a multidimensional grading system including these variables (BODE Index) in order to determine what variables influence the HRQL in COPD patients.

**Patients and Methods:** Ninety-nine patients with mild/very severe COPD (mean age, 64.2 years; mean FEV<sub>1</sub>, 60.4% of predicted) were evaluated. BMI was calculated as the weight/(height)<sup>2</sup> ratio and a 6-min walk test (6MWD) was undertaken. Baseline dyspnea index (BDI) and Medical Research Council dyspnea scale (MRC) were used to determine levels of dyspnea. Saint George Respiratory Questionnaire (SGRQ) and Airways Questionnaire 20 (AQ20) were used to assess HRQL.

**Results:** BODE index correlated with AQ20 total score (r=0.52, p<0.001), SGRQ activity (r=0.66, p<0.001), symptom (r=0.40, p<0.001) and impact (r=0.51, p<0.001) domains scores; and with total SGRQ score (r=0.54, p<0.001). MRC, FEV<sub>1</sub> and 6MWD showed significant correlations with all HRQL dimensions. BDI presented the higher correlations values with BODE index (r=-0.64, p<0.001), AQ20 (r=-0.66, p<0.001) and SGRQ total scores (r=-0.72, p<0.001). In the multiple regression model BDI was the only variable selected and explained 25% of the total variance of AQ20 (R<sup>2</sup>=11.97) and 27% of the total variance of the SGRQ (R<sup>2</sup>=10.18) total scores.

**Conclusion:** Quality of life is better determined by intensity of dyspnea evaluated by BDI than by a multidimensional scale. Therefore, HRQL in COPD patients may be estimated by an inexpensive, simple and rapidly obtained dyspnea scale. Supported by Fapesp/Capes, Brazil.

#### E473

##### Correlation between tomographic quadriceps mass, quality of life, 6-minute-walk- test and shuttle test in COPD patients

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**Antecedents:** The reduction of the muscular mass area of the quadriceps obtained by computerized tomography was a predicting fort of mortality in patients with COPD more than the BMI

**Objectives:** To find association between the diameter of the quadriceps muscle measured by computerized tomography and health related quality of life questionnaires and exercise test performance in COPD patients.

**Materials and Methods:** Cross sectional, observational study. COPD diagnosis was established according to physiological definitions. COPD subjects were evaluated in a convenience sample. Computerized tomographies of the quadriceps muscle were performed in all subjects in a standardized manner. Likewise 6-minute walk and shuttle walk tests and previously spanish validated respiratory questionnaires St George's and Chronic Respiratory Questionnaire (CRQ) were applied.

**Results:** Twenty patients were recruited (mean age 73,56  $\pm$  9,13), male proportion was 56,25% (9 subjects). Muscle area was 96,42  $\pm$  22,52 cm<sup>2</sup> (range 55,56 to 143,37 cm<sup>2</sup>), intraclass correlation coefficient was 0,983. The distances in the 6-min-walk test and Shuttle walking test were 330  $\pm$  114 and 196,25  $\pm$  99,79 meters respectively. We found a statistical significant association between the distance in the walk test and the quadriceps area (r = 0,6162, p = 0,0042). We couldn't find statistical association between the St Georges's (39,17  $\pm$  18,77) or the CRQ (102,5  $\pm$  21,36) results and the quadriceps area.

**Conclusions:** Our study suggested an association between the exercise performance and the muscular area of the quadriceps. An association with health related quality of life could not be demonstrated.

## E474

**Comparison of metabolic work during the six minute walk and step test in patients with chronic obstructive pulmonary disease**

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Exercise limitation is a hallmark of chronic obstructive pulmonary disease (COPD). Functional capacity may be evaluated by using six-minute walk test (6MWT) and six-minute step test (6MST). The objective of this study was to compare the physiological responses and metabolic work in the 6MWT and 6MST. Twenty five patients (23 males) with stable COPD ( $FEV_1$   $50.5 \pm 20.5\%$  of predict) were studied. Patients performed two 6MWT in the same day (1h apart), and another day, they performed two 6MST (1h apart). The 6MWT and 6MST were highly repeatables. 6MWT and 6MST elicited similar cardiovascular (heart rate and arterial blood pressure) and respiratory (respiratory rate and oxygen saturation) responses. However, the scores for dyspnea and leg fatigue were higher in 6MST ( $p < 0.05$ ). It was observed a highly significant correlation between metabolic work performed during 6MWT and 6MST ( $r = 0.7$ ;  $p < 0.0001$ ). In conclusion, besides similar physiological responses, 6MWT and 6MST showed similar behavior in terms of metabolic work.

## E475

**Vitamin D status, bone health and hypoxia in patients with advanced pulmonary disease**

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Osteoporosis is common in patients with advanced pulmonary disease. The lung disease itself may be one of the potential risk factors for the development of low bone mineral density. Hypoxia is a characteristic feature of advanced pulmonary disease. The uptake and retention of calcium in bone has been shown to be an active process requiring energy, which could be affected by low oxygen tension and vitamin D. We hypothesised that patients with hypoxia would require more vitamin D to protect against hypoxic injury and consequently hypoxia would be associated with lower serum concentration of calcidiol.

We studied 71 candidates for lung transplantation with advanced pulmonary disease where the majority had chronic obstructive pulmonary disease (56%), age mean (range) years 48.7 (25-60), body mass index mean (95% CI)  $kg/m^2$  19.3 (18.6; 20.0), forced expiratory volume in one second % of predicted 24.4 (21.3; 27.5), arterial oxygen tension ( $PaO_2$ ) 7.3 (7.0; 7.7), arterial carbon dioxide tension kPa 6.4 (6.0; 6.7), serum concentration of calcidiol nmol/L 37.7 (33.9; 41.5). In a linear regression model with calcidiol as dependent variable, 17% of the variation in calcidiol was explained by the independent variables  $PaO_2$  ( $B=2.8$ , 95% CI 0.2; 5.3,  $p=0.035$ ), vitamin D intake ( $B=0.4$ , 95% CI 0.1; 0.8,  $p=0.017$ ) and sex (male=0, female=1.  $B= -3.9$ , 95% CI -11; 3,  $p=0.28$ ).

In conclusion, our results showed that serum calcidiol was positively associated with intake of vitamin D and with arterial oxygen tension. Further studies are needed to explore if vitamin D could protect against hypoxic injury.

## E476

**Factors effecting quality of life in elderly COPD patients**

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**Introduction:** Attaining a good Quality of life (QoL) is an important aspect of management in elderly COPD patients. We assessed quality of life and evaluated its relationship with demographic, social and clinical factors.

**Methods:** Elderly patients (60 years or above) admitted to hospital with an acute exacerbation of COPD. Quality of life (QoL) was assessed in a stable state using the Breathing Problem Questionnaire (BPQ), contains 32 items, scores varying from 1 to 103, higher scores predicting poor quality of life. Univariate statistics were carried out to examine associations between factors (age, gender, length of hospital stay, spirometry, exercise tolerance, living alone, NIV usage, mobility) and QoL status.

**Results:** 79 COPD patients had anxiety and depression levels assessed; a mean of 72 (sd=7.3, range 60-93 years). Thirty-four (43%) patients had a BPQ with no differences in any of the factors between those who received and did not receive the questionnaire. A significant association was found between age, spirometry, exercise tolerance and BPQ score ( $r=-0.36$ ,  $p=0.037$ ;  $r=-0.36$ ,  $p=0.036$ ;  $r=-0.57$ ,  $p<0.001$  respectively) indicating a lower quality of life in younger elderly, lower spirometric values and with lower exercise tolerance. Those on non-invasive ventilation also

had a significantly higher BPQ score ( $t=-3.14$ ,  $p=0.004$ ) though the number of COPD patients using NIV were low (8 (23%). Living alone, or immobility had no significant effect on QoL.

**Conclusions:** Elderly COPD patients have a poorer quality of life if they were

younger elderly cohorts, with low spirometric values, reduced exercise tolerance and required NIV treatment. QOL on NIV treatment in elderly needs further evaluation in larger trials.

## E477

**Investigation of validity, reliability Persian version of the St George respiratory questionnaire**

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**Objective:** Health related quality of life (HRQL) questionnaires allow clinicians to measure the impact of disease on a patient's daily life and is valuable in clinical trial designed to assess benefit and cost of management. We describe the adaptation into Persian version of St George Respiratory Questionnaires (SGRQ) a recognized valid self administered questionnaire for chronic airway lung disease.

**Material & Methods:** In order to adaptation the face validity, the forward and back- translation method was used and then was edited by researchers and one pulmonologist as one internist.

The content of tests evaluated for feasibility and comprehension by 35 educated COPD patients, then professional committee of researcher assessed content validity. At last, again another 35 patient with wide range of disease severity complete the Persian version of the (SGRQ) and internal consistency were calculated by Cronbach's alpha coefficient.

**Results:** The test coefficient for reliability was 0.69 in part I questionnaire "symptoms", factor analysis indicated that if later question of part I eliminated (if you wheeze, is it worse in the morning?) Cronbach's alpha elevated to 0.75. Pair II (activity & impact) Cronbach's alpha was 0.95 and for the overall scale 0.96.

**Conclusion:** Data from this study revealed that Persian version of SGRQ has good validity and is sufficiently reliable as a research tool. The present study suggest the feasibility adapting a specific instrument of health, quality of life of respiratory disease patient to be used in settings different from that where the instrument was originally developed.

## E478

**Increased arterial stiffness in chronic obstructive pulmonary disease (COPD)**

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**Background.** Patients with COPD have an increased risk of cardiovascular disease, even after allowing for smoking. Arterial stiffness (AS) is an independent indicator of cardiovascular risk. We assessed AS in patients with COPD.

**Method.** We recruited 58 (35 male) patients (GOLD I-IV) when clinically stable and also 21 (11 male) age and gender matched healthy smokers (HS), free from cardio-respiratory disease. All subjects completed spirometry (Vitalograph, UK) and circulating IL-6 was measured. Arterial stiffness was measured using aortic pulse wave velocity (PWV) and augmentation index (AIx) (Sphygmocor).

**Results.** Patients, median (range) age 66 (41-79) years had a mean (SD) % predicted  $FEV_1$  of 60.7 (18.6)%. Mean peripheral arterial pressure (MAP) was no different between patients (100 (7.4) and HS 104 (12.4) mmHg). Aortic PWV was greater in patients (11.4 (2.9) m/s) compared to HS (8.9 (1.2) m/s,  $p<0.001$ ), while AIx (adjusted for heart rate) was similar (58 patients, 14 HS). Patients had greater serum IL-6 levels (1.91 (1.86) pg/ml) as compared to HS (0.72 (2.08) pg/ml). Aortic PWV was inversely related to  $FEV_1$  (L) ( $r=-0.42$ ,  $p=0.001$ ) and both age ( $r=0.47$ ,  $p<0.001$ ) and MAP ( $r=0.33$ ,  $p<0.05$ ) were related in all subjects.

**Conclusions.** Arterial stiffness is increased and is related to airways obstruction in a population of HS and patients with COPD over a wide spectrum of severity, which may explain the increased risk of cardiovascular disease in COPD.

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## E479

**Psychological problems of COPD patients and their spouses in a pulmonary outpatient clinic in Germany**

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**Rationale:** High prevalence of psychiatric disorders in patients with chronic obstructive pulmonary disease (COPD) has been observed in several studies in recent years. Moreover, also partners of patients with COPD are at risk of being distressed because of the disease. In order to better understand the psychosocial impact of COPD, we analysed the prevalence rates of psychiatric disorders in both COPD patients and their partners.

**Methods:** A total of 105 consecutive patients (18% F (n=19), M age 67 yrs) with documented stable COPD (M  $FEV_1$  % = 51, stage I n=4, stage II n=49, stage III n=42, stage IV n=10) were evaluated using ICD-10 check lists for mental disorders and the St. George's Respiratory Questionnaire. 105 partners (M age 64 yrs) underwent the same psychological evaluation than the patients themselves.



**Aim:** it was to devise a simple integrated tool that rates functional autonomy and dyspnea in these patients. **Methods:** We evaluate five categories related to daily living: wash, transfer from bed to chair, walk, stairs and dyspnea. Each category is independently evaluated on a scale ranging from 1 to 7 according to graduated characteristics. We construct a multidimensional 35-point scale in which higher scores indicate a higher autonomy and a lesser dyspnea in ADL.

**Results:** we evaluated 47 severe non-or partially autonomous COPD patients referred for rehabilitation. Our preliminary results indicate that this instrument is reliable and reproducible to evaluate the functional autonomy and dyspnea in this population. It further appears responsive to appreciate the effects of rehabilitation. **Conclusion:** This is the first multidimensional grading system easily usable to evaluate the functional autonomy and dyspnea associated with ADL in severe COPD patients. It can be indicator of the outcome in rehabilitation or the clinical response to this or another therapy. The endpoint of this clinical validation is to statistically validate this tool on a larger cohort of patients.

#### E485

##### **Ambulatory O<sub>2</sub> assessment for COPD: can assessment at discharge predict exertional hypoxaemia at 8 weeks?**

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The UK advice on how to identify patients with COPD for ambulatory oxygen is time consuming; requiring several 6 minute walks (6MW). We hypothesised that patients who were hypoxaemic at rest (SaO<sub>2</sub> <92%) and/or desaturated on 6MW at hospital discharge after a COPD exacerbation were more likely to have exertional hypoxaemia when stable 8 weeks post discharge.

COPD patients performed a standardised 6MW on discharge (6MWD#1), and at 8 weeks (6MWD#2) following an exacerbation of COPD. At 6MW#2, we compared those with exertional hypoxaemia (SaO<sub>2</sub> <90%) to those without (SaO<sub>2</sub> ≥90%). 86 patients were eligible; 11 were excluded as they were receiving long term oxygen therapy, so qualified for ambulatory oxygen. Of the 57 who attended both 6MW; mean (SD) age 71(9) years, FEV<sub>1</sub> 0.95 (0.36) L, 29 female; 9(16%) had resting hypoxaemia at discharge (SaO<sub>2</sub> <92%) and a further 24(42%) desaturated during 6MW#1. At follow up, 34(60%) patients desaturated during 6MW#2. Desaturation at 6MW#1 was 91% sensitive and specific for desaturation at 6MW#2; positive predictive value was 94%.

All 9 patients with resting SaO<sub>2</sub> <92% at discharge desaturated on 6MW#2. No other variable predicted desaturation at 6MW#2.

Both resting and exertional hypoxaemia at hospital discharge are useful indicators of exertional desaturation 8 weeks post discharge.

#### E486

##### **The Endurance Shuttle Walking Test; how much better is better? A report of the CoHoRT study of pulmonary rehabilitation**

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In a recent UK Health Technology Assessment Board of pulmonary rehabilitation, the primary outcome measure was the Endurance Shuttle Walking Test (ESWT), a reproducible and robust measure of exercise capacity. The relationship between changes in this parameter and patients subjective improvement has not been clearly defined.

Patients underwent a six week, twice weekly pulmonary rehabilitation programme. They all had COPD with MRC breathlessness of 3 or worse, and oxygen saturations of better than 91% at rest. N =161 (m:f 88:73) Age = 69 (±7.8) FEV<sub>1</sub> 47% Predicted (±18)

After pulmonary rehabilitation, patients were asked whether they felt worse, unchanged or better and to rate the magnitude of change. 49 patients reported "no change".

Patients reporting improvement since start of pulmonary rehabilitation

Description	n	Mean change in distance (±sd) (metres)	% change in distance (±sd)
Almost the same, hardly any better at all	0		
A little better	18	173 (±180)	68 (±60)
Somewhat better	12	288 (±318)	113 (±143)
Moderately better	27	289 (±353)	125 (±150)
A good deal better	30	324 (±378)	128 (±142)
A great deal better	9	481 (±536)	138 (±176)
A very great deal better	1		

We conclude that a 68 per cent increase on ESWT is likely to have clinical significance in COPD.

#### E487

##### **Repeatability of the endurance shuttle walk test (ESWT) in severe COPD patients**

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**Introduction:** The endurance shuttle walk test (ESWT) is a frequently used walking test to assess endurance capacity in patients with chronic obstructive pulmonary disease (COPD). We examined the repeatability of the ESWT in hypercapnic COPD patients.

**Methods:** 22 GOLD stage IV hypercapnic COPD patients were included. The ESWT was performed 3 times after an initial incremental shuttle walk test. At the first visit (T1) the ESWT was performed twice, with an interval of at least 1 hour and a maximum of 4 hours. The second measurement (T2) was performed 3 months after T1. Patients had to be stable and without a change of treatment in this period.

**Results:** Table 1 shows the results. A significant improvement existed between test 1 and test 2 at T1, the mean difference being 25.1 m. There was no significant change in the ESWT between test 1 at T1 and test 1 at T2: the mean difference was -3.2 m.

Test-retest of the ESWT (n=22)

	mean (SD)
T1 test 1	342 (351)
T1 test 2	367 (349) *
T2 test 1	339 (311)

\* p<0.05 for comparison with T1, test 1

**Conclusion:** In hypercapnic COPD patients a learning effect exists when the second test is performed within 4 hours. However, 3 months later this learning effect has disappeared. For clinical practice one ESWT is sufficient.

#### E488

##### **Accuracy of patient reported distances**

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**Introduction:** Patients are often asked to estimate the distance at which breathlessness occurs. We hypothesized that the distances estimated by patients may not accurately reflect the true distance. To test this hypothesis we performed a prospective study of male and female patients and staff at a teaching hospital, to estimate the length of a ward corridor.

**Methods:** Subjects willing to participate stood at one end of a ward corridor 50 metres in length and were asked to estimate the length of the corridor in units of distance most familiar to them. Values were converted to metres by a standardised conversation table. The data were divided into groups. We compared the mean estimates of distance recorded by age, sex, staff, and patient subgroup.

**Results:** A total of 290 people participated in the study (60 female patients, 101 male patients, 106 female staff, 23 male staff). The true length of the corridor is 50 metres (m). Female and male patient estimates, respectively, ranged from 3-2414m (mean 182m) and 2-1609m (mean 80m). Female and male staff estimates, respectively, ranged from 10-1000m (mean 83m) and 20-100m (mean 56m).

**Conclusion:** We concluded that there was a wide variance in estimates of the length of the corridor, in particular among female patients. Overall, all subgroups overestimated the length of the corridor. Thus, subjective estimates of distance at which a person judges themselves to be breathless are unreliable.

#### E489

##### **Bone mineral status in patients with COPD: a cross-sectional study**

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**Introduction:** Patients with COPD have increased prevalence of low bone mineral density (BMD) and fractures. To our knowledge prevalence according to GOLD stages have not yet been described.

**Aim:** To assess BMD and prevalence of vertebral fractures in patients with COPD among different GOLD Stages.

**Methods:** COPD patients GOLD II-IV were included if they had been treated with 3 courses of systemic steroids over the last year or had been hospitalized for an exacerbation over the last 2 years. BMD was measured by DXA (Hologic QDR 4500) at the lumbar spine (L1-L4), total hip and femoral neck. Vertebral fractures were assessed according to Genant's method, using the most recent chest X-ray (AP and lateral) and IVA (Instant Vertebral Assessment) imaging of the DXA equipment.

**Results:** 54 patients (50 male; mean age  $62 \pm 10$  years; mean FEV<sub>1</sub> of  $1.35 \pm 0.53$  L; GOLD II: 15; GOLD III: 28; GOLD IV:11) were included. 12% of the patients had normal BMD, 85% of the patients had BMD T-scores  $\leq -1.0$  SD and 43% of the patients had T-scores  $\leq -2.5$  SD at least at one of the measured sites. Overall BMD decreased with increasing COPD severity: 33% of the GOLD II, 48% of the GOLD III and 63% of the GOLD IV patients had T-scores  $\leq -2.5$  SD. The prevalence of vertebral fractures in the whole COPD group determined by IVA was 38%. 30% of the chest X-rays showed one or more fractures.

**Conclusion:** COPD patients with GOLD II-IV have high prevalence of vertebral fractures. A substantial proportion of these fractures is visible on chest X-rays. IVA adds information about fracture status. The prevalence of low BMD increases with increasing GOLD stages. Osteoporosis screening should be performed in GOLD II-IV patients treated regularly with systemic steroids.

#### E490

**Nutritional status in COPD patients: role of bioelectrical impedance analysis**  
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BODE (Celli R, NEJM,2004,350,1005) is an index predictor of survival in COPD patients: it combines, body mass index (BMI), airflow obstruction, degree of dyspnea (MRC) and exercise performance (6-WT). However, BMI doesn't give complete information about nutritional status because it's enable to analyze body composition. For this reason we studied 55 COPD patients by bioelectrical impedance analysis (BIA). The study group consisted of 41 men and 14 women (age  $67 \pm 8$  y) with COPD (GOLD III-IV) admitted to our Pulmonary Center for a respiratory rehabilitation program. We measured by BIA, fat free mass, fat mass, intra and extracellular water.

Only 11/55 pts (20%) showed BMI  $\leq 21$ ; the others 44 had BMI  $>21$ . When we considered body composition we observed that 54/55 showed low pathological fat free mass.

We observed a direct correlation between fat free mass (% body weight) and distance walked in six minutes.

We think that BIA, non invasive, low-cost and repeatable test, could be used to better evaluate the nutritional compromise of COPD patients. The body composition appears more correlate than body weight to muscular efficiency in COPD. Fat free mass could be more predictive than BMI of survival of these patients. Furthermore BIA gives interesting informatios to allow us to tailor specific and individualized rehabilitation programs.

#### E491

**Predictors of health-related quality of life in COPD patients with chronic respiratory failure**

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**Introduction:** Little is known about predictors of Health-Related Quality of Life (HRQoL) in patients with Chronic Obstructive Pulmonary Disease (COPD) and Chronic Respiratory Failure (CRF). We obtained predictors of HRQoL, assessed by the Chronic Respiratory Questionnaire (CRQ), in COPD patients and CRF.

**Methods:** In 46 hypercapnic COPD patients (Forced Expiratory Volume  $< 50\%$  predicted; PaCO<sub>2</sub>  $> 6.0$  kPa), we obtained the CRQ, lung function, exercise tests, MRC dyspnea scale, HADS, and GARS.

**Results:** Forward multiple linear regression revealed that the HADS and MRC scores explained 67% of the total variability in CRQ total score (CRQt).

Significant correlations with CRQ subdomains and CRQt

	CRQ dyspnea	CRQ fatigue	CRQ emotion	CRQ mastery	CRQt
Sex (woman=0, man=1)	0.33*	0.34*	0.29*	0.30*	0.40*
Exacerbations (last 12 months (n))	-0.43**	-	-0.39**	-0.43**	-0.45**
Inspiratory Vital Capacity	0.29*	-	-	-	0.36*
Maximal expiratory pressure	-	0.38*	-	-	0.29*
Peak work rate (incremental cycle ergometry)	0.36*	0.36*	-	-	0.34*
6-minute walking distance	0.34*	0.47**	0.40**	0.33*	0.50**
Maugeri Respiratory Council dyspnea scale (MRC)	-0.42**	-0.51**	-0.30*	-0.30*	-0.47**
Hospital anxiety and depression scale (HADS)	-	-0.62**	-0.79**	-0.69**	-0.72**
Groningen Activity and Restriction scale (GARS)	-0.29*	-0.58**	-0.51**	-0.37**	-0.56**

\*=P<0.05; \*\*=P<0.001.

**Conclusion:** In COPD patients with CRF, HRQoL was explained primarily by the scores on the anxiety and depression scale and the MRC dyspnea score. Rehabilitation should focus on these outcomes.

#### E492

**Respiratory system impedance during pursed-lip breathing in patients with COPD and healthy subjects**

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Pursed-lip breathing (PLB) is a traditional skill to make breath more effective and to alleviate dyspnea, especially in patients with severe COPD. PLB has been supposed to prevent dynamic airway narrowing during expiration by producing intra-luminal positive pressure, like PEEP, in the airway. In this study, to ensure those hypothesis, effects of PLB on the respiratory system impedance (Zrs) were examined in patients with COPD (n=10, M: F=9:1; ae  $66.1 \pm 6.8$  years; Mean  $\pm$  SD) and healthy subjects (n=10, M:F= 2:8, age  $39.1 \pm 7.1$  years). Following instruction about PLB by a well-trained physiotherapist, Zrs was measured using forced oscillation technique at 3 Hz with quiet normal breathing or with PLB. The measurement of Zrs during PLB was performed using a hard plastic face mask. PLB significantly increased Zrs from  $6.7 \pm 3.7$  to  $10.4 \pm 1.6$  (cmH<sub>2</sub>O/l/sec; Mean $\pm$ SD, p<0.05) in patients with COPD while from  $3.8 \pm 1.3$  to  $8.8 \pm 1.9$  (p<0.0001). In the patients with mild COPD, the initial Zrs was around normal range, and was increased during PLB, which was almost the same result as in the healthy subjects. In severe case, the initial Zrs was very high and was decreased during PLB. The initial Zrs without PLB was significantly correlated with %FEV1 ( $r^2=0.38$ , p<0.05).  $\Delta$ Zrs (the Zrs difference between the initial one and the one during PLB) was correlated with %FEV1 ( $r^2=0.43$ , p<0.05) and %VC ( $r^2=0.38$ , p<0.05). These results suggest that the higher Zrs in severe case resulted in the lower and even the negative  $\Delta$ Zrs, which was considered to support our hypothesis.

#### E493

**Comparison of different activity measures in patients with severe COPD**

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In patients with COPD activity level improves after pulmonary rehabilitation (PR) and may predict prolonged benefit from PR, hence, is likely to become an important measurable outcome in intervention studies. Using activity monitoring (Dynaport) as gold standard we measured concurrent activity, over 2 days, using an accelerometer (ActiWatch) in 9 subjects with severe COPD (Mean FEV1 0.87L, FEV1%predicted 29.6%, FEV1/FVC 0.34). Subjects also completed activity questionnaires – Nottingham Extended Activities of Daily Living, London Chest ADL and St Georges Respiratory Questionnaire (activity domain).

Subjects were very inactive with only 2.7% of the daytime spent walking, 13.7% moving and a very low mean ADL index of 1.38, measured using Dynaport. Median NEADL score was 18, LCADL was 26 and SGRQ (activity) was 86.

ActiWatch measurements correlated well with many Dynaport variables: % of time moving ( $r=0.83$ , p=0.005), intensity of activity ( $r=0.96$ , p<0.001) and intensity during movement ( $r=0.9$ , p=0.001), although not with walking time ( $r=0.41$ , p=ns). However, ActiWatch consistently detected activity not detected by Dynaport measures. Activity questionnaires correlated well with each other (NEADL vs. LCADL:  $r=0.81$ , p<0.01) but were only weakly related to other activity measures derived from Dynaport or ActiWatch recordings, with LCADL consistently demonstrating better correlations than NEADL or SGRQ activity.

In a very inactive group of patients with COPD, an accelerometer (ActiWatch) measures activity with acceptable accuracy compared with activity monitoring (Dynaport) thus supporting use in clinical trials. Questionnaires predict activity less well and may in fact indicate perception and limitation of activity.

#### E494

**Prognostic value of hematocrit in chronic respiratory insufficiency – a 20-year analysis of the ANTADIR observatory**

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We previously reported that a low hematocrit (Hct) value was not uncommon in severe COPD patients receiving long-term oxygen therapy (LTOT) and that it was negatively associated with mortality and morbidity. The occurrence and prognostic value of this event in other groups of patients with chronic respiratory insufficiency (CRI) is unknown.

**Methods:** we analyzed a cohort of 5,440 patients requiring LTOT and/or non-invasive ventilation registered at the diagnosis of CRI in the French ANTADIR observatory between 1980 and 1999. Multivariate regression was performed to test whether Hct level was an independent predictor of 10-year mortality and annual rate of hospital admission. Correlation between Hct, demographic data including smoking status and pulmonary function were examined.

**Results:** respiratory diseases included sequelae of tuberculosis, fibrosis, pneumoconiosis, severe asthma, bronchiectasis, kyphoscoliosis, and neuromuscular disorders. Hct was negatively correlated with PaO<sub>2</sub> and the age, and positively correlated with PaCO<sub>2</sub> and body mass index in most of the groups. Multivariate analysis found Hct as an independent predictor of survival, hospital admission rate, and cumulative duration of hospitalisation. By comparing the cumulative survival

probability by categories of Hct, the 10-years survival curves show a significant decrease in the groups with lower Hct, except for the neuromuscular disorders.

**Conclusion:** Hct is negatively associated with mortality and morbidity whatever the cause of the CRI. If the systemic inflammation seems liable for the low Hct in some groups, different mechanisms are probably involved in others which remain to be elucidated.

**E495**

**Airways questionnaire 20/30 as an outcome measure for pulmonary rehabilitation**

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**Background:** The St George's Respiratory Questionnaire (SGRQ) and the Chronic Respiratory Disease Questionnaire (CRQ) are responsive instruments sensitive to changes following pulmonary rehabilitation. Both are time-consuming to complete and complex to score. The Airway Questionnaire 20/30 (AQ20/30) has 30 dichotomous self-completed items in its full format taking about 2 minutes to complete and score. Thus, if responsive to rehabilitation, the AQ20/30 could be valuable for routine rehabilitation evaluation.

**Method:** 262 patients with chronic airflow limitation, mean (SD) age 67 (9) years, FEV<sub>1</sub>, 41(16) % predicted, were enrolled in a pulmonary rehabilitation programme. They completed the SGRQ, CRQ and AQ20/30 questionnaires before and after rehabilitation. Spearman's correlation was used to investigate the relationship between the AQ 20/30 score and the SGRQ and CRQ total scores at baseline and between score changes following rehabilitation. Sensitivity was expressed as the ratio of the mean outcome change to its standard deviation.

**Results:** baseline correlation coefficients for AQ20/30 versus SGRQ and CRQ total scores were 0.653 and -0.554 respectively (p<0.01). Correlation coefficients for AQ20/30 change versus SGRQ and CRQ changes were 0.409 and -0.314 respectively (p<0.01). The mean changes in AQ20/30, SGRQ and CRQ divided by their SD were -0.34, -0.43 and 0.80 respectively.

**Conclusion:** AQ 20/30 score, is moderately strongly correlated with SGRQ and CRQ scores in patients with moderate and severe COPD, changes with rehabilitation are also significantly correlated. However, its smaller change in relation to its variability makes the AQ20/30 less sensitive for evaluating rehabilitation outcome.

**E496**

**Myopathy and polyneuropathy in patients with COPD: evaluation of frequency and effects on outcome of pulmonary rehabilitation**

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In patients with COPD, skeletal muscle dysfunction is a common finding and contributes to limiting exercise capacity.

We evaluated myopathy and/or polyneuropathy (M/P) frequency in 50 mild to severe COPD patients (age range 57-90 years) and their effects on the outcome of a pulmonary rehabilitation program (PRP). By electromyographic evaluation, we divided patients into two groups: A) with M/P (n=21); B) without M/P (n=23). In 6 patients, who refused needle application, the presence of myopathy was not assessed.

Before and after PRP, we assessed chronic dyspnea (MRC), exercise tolerance (6' walking test distance- 6'WTD), quality of life (QoL - St. George Respiratory Questionnaire).

Polyneuropathy was found in 28% and myopathy in 47,7% of study population. Before PRP, patients with M/P showed significantly higher MRC (p=0.005), lower 6'WTD (p=0.0003) and higher St. George total score (p=0.001) than patients without M/P. These difference in groups did not change after PRP. After PRP, both groups significantly improved MRC (p=0.009), 6'WTD (p=0.0002), and QoL (activity score, p=0.02); the degree of change was not significantly different between the two groups (p=0.72, p=0.67, p=0.14, respectively).

In COPD patients, the presence of myopathy and/or polyneuropathy results in a

greater degree of disability. M/P does not seem to affect the benefit of a PRP.

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**In patients with chronic respiratory failure, the Maugeri respiratory failure questionnaire (MRF<sub>28</sub>) is more specific and sensitive to changes than the St George's respiratory questionnaire (SGRQ)**

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The MRF<sub>28</sub> is the only questionnaire developed for use in patients with CRF. To verify its discriminative capacity and sensitivity in comparison to the SGRQ, during a large multicentre rehabilitative study on COPD with and without CRF, a subgroup of 93 patients with COPD but not CRF received SGRQ+MRF<sub>28</sub>, and a subgroup 81 COPD+CRF patients received MRF<sub>28</sub>+SGRQ.

At baseline, the SGRQ scores did not show any difference between COPD and COPD+CRF apart from the Impact score, whereas the MRF<sub>28</sub> discriminated better, showing more impaired scores in the COPD+CRF group, with the exception of the Cognitive function score (Table).

After a 4-week rehabilitation program, no difference in SGRQ was found between the two groups: the total scores decreased by 11±0.6 units in the COPD and by 8±1.5 units in the COPD+CRF groups (p=NS between groups). Conversely, the improvement found in the MRF<sub>28</sub> was significantly higher in the COPD+CRF than in the COPD group (12±1.3 vs 5±1.3; p=0.001 between groups).

Clini previously showed that the MRF<sub>28</sub> appeared to be more sensitive to changes than the SGRQ when comparing the effects of NPPV+LTOT versus LTOT in CRF (ERJ 2002).

MRF28 Total	53±13	46±13	p=0.01
MRF28 Activity	61±19	48±22	p=0.001
MRF28 Cognitive	39±25	39±25	ns
MRF28 Invalidity	60±23	50±25	p=0.01
SGRQ Total	39±15	41±17	ns
SGRQ Symptoms	53±18	50±21	ns
SGRQ Activity	53±22	52±21	ns
SGRQ Impact	27±15	33±18	p=0.04

These results suggest that for patients with CRF, a condition-specific questionnaire such as the MRF<sub>28</sub> may be more appropriate than a disease-specific questionnaire such as the SGRQ.

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**Effect of pulmonary rehabilitation on shortness of breath**

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Shortness of breath (SOB) is a common symptom in pulmonary patients (Pt). The aim of the study was to evaluate the effect of six weeks comprehensive in-Pt pulmonary rehabilitation (PR) on SOB among COPD Pt and the effect of psychological factors on SOB. The Hospital anxiety (A) and depression (D) scale (HADS) and the Shortness of breath Questionnaire (SOBQ) were used.

123 Pt answered the SOBQ before admission (T<sub>1</sub>), SOBQ and HADS at admission (T<sub>2</sub>) and at discharge (T<sub>3</sub>). 68 pt answered 1 year later (T<sub>4</sub>) SOBQ scores from 0-120, where a higher score means more SOB. The total SOB score decreased between T<sub>1</sub>→T<sub>2</sub> (p < 0.05) and T<sub>2</sub>→T<sub>3</sub> (p < 0.0001) but increased between T<sub>3</sub>→T<sub>4</sub> (p < 0.05). The changes in SOB from T<sub>1</sub> to T<sub>4</sub>, were significant (p < 0.0005). SOB was greater among pt with abnormal HADS even though there was no difference in other factors between the groups (Table 1).

Abstract E498 – Table 1

Variable	Mean ±SD	Mean±SD		p	HADS (T <sub>2</sub> ) §		P
		Male(N = 45)	Female (N = 78)		Normal (N =76)	Abnormal (N = 47)	
Age	67.2±8.9	69.7±8.5	65.8±8.8	†	68.1± 9.1	65.7±8.3	NS
FEV1 (%)	61.8±24.4	53.7±20.6	66.4±25.4	‡	63.1±24.4	59.6±24.6	NS
FEV1/FVC	0.59±0.15	0.55±0.13	0.61±0.15	†	0.58±0.14	0.60±0.15	NS
BMI	29.2±6.0	27.7±4.9	30.0±6.4	†	28.9±5.9	29.5±6.1	NS
SOB T <sub>1</sub>	59.1±20.5	60.4±20.5	58.4±20.7	NS			
T <sub>2</sub>	55.7±20.2	55.1±20.0	56.1±20.4	NS	49.1±18.4	66.5±18.4	*
T <sub>3</sub>	46.9±22.5	47.3±21.5	46.7±23.2	NS			
T <sub>4</sub> (N 68)	51.5±24.8	51.5±25.4 (N 23)	51.6±24.7 (N 45)	NS	45.5±23.1 (N 46)	63.3±24.1 (N 22)	‡

† p < 0.05 ‡ p < 0.005 \* p < 0.0001 § HADS is abnormal if A and D or both are ≥ 8

SOBQ is sensitive to changes in SOB after rehabilitation. SOB is not only explained by physiological parameters but also by psychological factors.

#### E499

##### Use of Bode index (BI) in patients with COPD undergoing inpatient pulmonary rehabilitation (IPR) after lung resection (LR) for non small cell lung cancer (NSCLC)

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There is paucity of data regarding the efficacy of IPR in COPD patients after LR for NSCLC. In the present study we evaluated the post-operative benefits of IPR in COPD patients who undergone LR for NSCLC using BI the multidimensional 10-point scale whose changes provides information regarding ultimate survival and reflect the effects of pulmonary rehabilitation. Seventy-five moderate to severe COPD patients who undergone surgical operation were studied. Mortality was nil, and morbidity was 6%. All patients underwent a 4-weeks IPR programme including respiratory muscle stretch, exercise training, mucus evacuation techniques, and relaxation techniques. BI, Medical Research Council Dyspnoea Scale (MRC), *Forced Expiratory Volume one second* (FEV<sub>1</sub>) and 6-minutes walking distance (6-MWD), were assessed on admission and discharge from IPR. The results were as it follows: BI significantly improved after IPR (pre 3.80 ± 1.94; post 1.32 ± 1.33, p<0.001). In particular, FEV<sub>1</sub> (lt) (pre 1.485 ± 0.329; post 1.648 ± 0.463 p=0.009). FEV<sub>1</sub> (%pred.) (pre 55.5 ± 9.57; post 60.3 ± 12.2, p=0.01); 6-MWD (pre 303 ± 76 m; post 401 ± 82 m, p<0.001). In conclusion inpatient pulmonary rehabilitation improves Bode Index and is associated with better outcomes in COPD patients who underwent surgical resection for lung cancer. In future controlled and long-term studies are needed.

#### E500

##### Pulmonary rehabilitation effects on BODE index in COPD

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**Introduction:** BODE Index (BI) incorporates an assessment of symptoms, nutritional state, and exercise capacity together with the spirometric measure of airflow (FEV<sub>1</sub>). Pulmonary rehabilitation (PR) is increasingly recognized as an important component of the comprehensive management of patients with COPD. PR can improve some components of BI.

**The objective** was to evaluate the changes of BI after sustained PR. Patients were considered PR responders if there was a change in BI of -1 point or more.

**Methods:** 32 patients with COPD completed a comprehensive 6-week PR program (PR1) which was repeated after 6 (PR2) and 12 months (PR3). BI was determined before and after each PR program.

**Results:** after PR1, PR2 and PR3 were 26 (BI improve by 22.1%), 24 (BI improve by 20.5%) and 23 responders (BI improve by 18.8%) and after 8 month from beginning one patient died. In **conclusion** PR program improve BI values.