390. Pulmonary rehabilitation for non-COPD and severe COPD; field exercise testing

P4100

Differences in functional outcomes between single and double lung transplantation

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Introduction: Lung transplantation has become an established and effective treatment for patients with end-stage lung disease. Nevertheless, the best functional results between single (SLTx) or bilateral lung transplantation (BLTx) remains unclear.
Objectives: To compare functional outcomes between SLTx and BLTx one year post transplant.
Method: We analyzed retrospectively 25 patients, 9 SLTx (54±7 years; BMI 25±3 kg/m^2) and 16 BLTx (38±13 years; BMI 21±3 kg/m^2). Measures of respiratory frequency at rest, muscular respiratory strenght by measurement of maximal inspiratory (MIP) and expiratory pressure (MEP), functional capacity and oxygenation variables from the six-minute walk test (6MWT) were registered. The data were analysed by the Student's t test and ANOVA. The level of significance was $p<0.05$.
Results: The BLTx group was younger (p=0.004) and leaner (p=0.016) than SLTx. The respiratory frequency at rest decreased significantly (28±7 to 21±5 breaths per minute) in the SLTx group in post-surgery period. BLTx demonstrated significant improvement than the SLTx in MIP (average difference to control 35%, $p < 0.002$). The 6MWT distance increased following lung transplant in both groups; average difference to control 238m (43%) SLTx and 251m (41%) BLTx. The variation in oxygen saturation by pulse oxymetry (SpO_2) values during 6MWT decreased from 15% to 6% in SLTx and from 13% to 3% in BLTx. The oxygenation recovery time during 6MWT in BLTx reduced from 290s to 62s versus 188s to 143s in SLTx.
Conclusion: We observe a functional and oxygenation improvement in both groups (SLTx and BLTx) in similar way.

P4101

Determinants of physical activity in daily life 1 year after lung transplantation

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Purpose: Reduced exercise tolerance and inactivity are observed after lung transplantation (LTX) despite marked improvements in lung function. It remains unclear, however, which factors could explain variations in physical activity after LTX.
Methods: Physical activity (PA) and related variables were studied in 22 patients 14±2 months after LTX. Recipients of single (n=10) or bilateral (n=12) LTX (age-range: 45-66 yrs) with near normal lung function (FEV1: 79±18% pred.) were selected. PA was assessed simultaneously with 2 validated activity monitors (Sensewear Pro, Bodymedia and Dynaport, McRoberts). 6-min walking distance (6MWD) health related quality of life (SF-36) and mood status (HADS) were measured. Pearson correlation coefficients were calculated and significant correlates of physical activity were subsequently entered into a stepwise multiple linear regression model.
Results: Daily walking time (75% of reference values) and 6MWD (70% pred.) were reduced. Symptoms of anxiety or depression were observed in 8 out of 22 patients. Significant correlations were found between daily walking time and 6MWD (r=0.63) Role Physical (r=0.63), Physical Functioning (r=0.62), Bodily pain (r=0.54), Role Emotional (r=0.50), and Social Functioning (r=0.45) scales of the SF-36. 6MWD (partial r^2=0,40) and Role Emotional (partial r^2=0,25) scores were signifcant contributors to a multiple regression model, explaining 65% of the variance in daily walking time.
Conclusions: Both functional capacity (6MWD) and perceived limitations due to emotional problems (Role Emotional score SF-36) were significant predictors of physical activity after LTX.
DL, TT, and LD are (post-)doctoral fellows of FWO-Vlaanderen.

P4102

Rehabilitation and quality of life in lung cancer

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Background: Patients with lung cancer (LC) undergoing chemotherapy often experience symptoms and side effects that results in impaired physical capacity and worsening quality of life (QoL). Rehabilitation may be used to minimize physical inactivity and improve clinical symptoms. One of the most used QoL questionnaire is the European Organization for Research and Treatment of Cancer Quality of Life and its Lung Cancer supplement (EORTC QLQ C-30 LC-13) module.
Aim: Assess the QoL before and after six months of chemotherapy treatment, and the correlation with sex, age, six-minute walking test (6-MWT) and maximal inspiratory (MIP) and expiratory (MEP) pressures.
Method: A prospective and longitudinal study enrolled 23 patients, fourteen men, everyone with non-small cells in stages III e IV and performance status $\leq$ two. All patients were submitted to eight weeks of a rehabilitation program. For statistical analysis the *Mann-Whitney* and *Spearman* correlation tests were used.
Results: Mean age was 59.7±11 years, men showed decrease in the pain score and increase in the finals values of 6-MWT and MEP. Patients that obtained lower value in the 6-MWT showed improvement in emotional and fatigue scales. There was a significant reduction in scores: pain, constipation, hemoptysis, dysphagia and chest pain scales. All this values were statistically significant ($p \leq 0.05$).
Conclusion: After chemotherapy men showed increase in the finals values of 6-MWT and MEP; there was improvement QoL in the pain, constipation, hemoptysis, dysphagia and chest pain scales.

P4103

Pulmonary rehabilitation after radically treated lung cancer patients: a pilot study

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Introduction: The radical treatment for early stages (I-II) of lung cancer includes surgery or radiotherapy, both with/without chemotherapy. Lung cancer and its treatment are known to contribute to muscle weakness, atrophy and functional impairment.
Aim: To assess the effects of multidisciplinary pulmonary rehabilitation in patients with lung cancer.
Methods: Patients with lung cancer or mesothelioma, radically treated, either by surgical resection with or without perioperative chemotherapy and thoracic radiotherapy were included. Participants had to be younger than 75 years without severe cardiac, neurological and orthopedic co-morbidity interfering with exercise training. The program consisted of 90 minutes sessions, 3 times a week.
Results: At intake 10 patients (age: 62±9 years; FEV_1: 61±16%pred.) showed a reduced exercise tolerance (VO_2max: 58±16% pred.; 6MWD: 69±11% pred.), muscle force (PImax.: 54±21% pred.; QF: 59±12% pred.), whereas dyspnea and fatigue was increased (CRDQd: 19±5 points; CRDQf: 14±4 points). Maximal exercise tolerance, 6MWD, and dyspnea and fatigue improved after 12 weeks of multidisciplinary pulmonary rehabilitation (VO_2max: 62±25% pred.; 6MWD: 78±9% pred., CRDQd: 26±5 points, CRDQdf: 17±5 points).
Conclusion: Patients with lung cancer have a decreased exercise capacity, muscle force and an increased level of dyspnea after their radical treatment. A statistically significant improvement of exercise capacity and dyspnea is observed after 12 weeks of multidiscipinary rehabilitation.

P4104

Lung function, respiratory muscle strength, functional capacity, and peripheral muscle endurance between patients with suppurative lung disease and healthy subjects

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Aim: The aim of this study was to compare lung function, respiratory muscle strength, functional capacity, and peripheral muscle endurance between patients with suppurative lung disease and healthy subjects.
Methods: Sixteen patients with suppurative lung disease (10 bronchiectasis, 6 cystic fibrosis) (19.13±2.70 years, 6 M, 10 F) and fourteen age-matched healthy controls (20.86±1.79 years, 5 M, 9F) participated in this study. Pulmonary function test was performed using spirometry. Respiratory muscle strength (MIP and MEP) was measured using a mouth pressure device.
Functional capacity was evaluated with six-minute walk test. Dyspnea and fatigue perception were evaluated with modified Borg dyspnea scale. Body composition was determined using bioelectrical impedance analysis. Peripheral muscle endurance was determined using sit-ups, squat and push-up tests.
Results: Body mass index, fat free mass, pulmonary function test values, inspiratory and expiratory muscle strength, and six-minute walk test distance were significantly lower in patients as compared to healthy subjects ($p<0.05$). Perception of dyspnea and fatigue in 6MWT was significantly higher in patients than those of controls ($p<0.05$). Patients' number of sit-ups, squats and push-ups were significantly less than those of controls ($p<0.05$).
Conclusion: There is impaired body composition, pulmonary function tests, respiratory muscle strength, peripheral muscle endurance, and functional capacity in patients with suppurative lung disease.

P4105

The effects of an 8 week pulmonary rehabilitation programme in patients with bronchiectasis

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Although pulmonary rehabilitation programmes are potentially beneficial for patients with diagnoses other than COPD, the role of such programmes has not been widely investigated in patients with bronchiectasis.
The aim of the present study was to investigate the effects of an 8 week pulmonary rehabilitation programme in patients with bronchiectasis.
A convenience sample of 17 patients with an established diagnosis of bronchiectasis were recruited from respiratory outpatient clinics. All patients underwent an 8 week programme (16 supervised sessions) of exercise training and disease specific education. Subjects were assessed at baseline and 8 weeks on measures of exercise capacity (Incremental Shuttle Walk Test (ISWT)) and quality of life (St George's Respiratory Questionnaire (SGRQ)).
Thirteen patients (10 female, 3 male) completed the programme – mean age 64.94±10.14 years, mean %predicted FEV1 75.56±21.66%. After eight weeks, there was a significant increase ($p=0.045$) in the ISWT distance of 54.6 metres (95% Confidence Interval: 1.5 to 107.7m). There was a statistically significant improvement ($p=0.05$) in the SGRQ Impacts subscale although there was no statistically significant change in the overall score ($p=0.38$).
Results of this observational study support the role of pulmonary rehabilitation in patients with bronchiectasisis.

Changes in outcomes during the study

	Baseline	Programme completion	p
ISWT (m)	319.4 (174.9)	376.2 (219)	0.045
SGRQ (Symptoms)	57.25 (26.88)	65.35 (27.08)	0.131
SGRQ (Activity)	49.83 (17.8)	47.21 (28.9)	0.669
SGRQ (Impacts)	29.76 (22.79)	25.64 (19.75)	0.05
SGRQ (Total)	40.41 (20.3)	38.1 (21.21)	0.381

Data presented as Mean (SD)

P4106

Effects of exercise training on quality of life and 6 minute walk distance (6MWD) in adults with fixed airway obstruction asthma (FAOA)

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Aim: To determine the effectiveness of supervised exercise training in adults with FAOA.
Methods: 34 subjects (15 male) aged 67.8±10.6 yrs, FEV_1 59±16% pred, participated in a randomised controlled trial of supervised exercise training. Assessments of quality of life (AQLQ, SF-36), functional exercise capacity (6MWD), and asthma control (ACQ) were completed at baseline, immediately following (6wks), and 3mths after the intervention.
Results: Change in 6MWD and the total, symptom and activity domain scores of the AQLQ was significantly improved in the exercise group at 6wks and 3mths, however the difference between exercise and control groups was only significant for the AQLQ at 6wks. The SF-36 physical component summary scores (at 6wks and 3mths) were improved ($p<0.05$) in the exercise group only. Exercise training was associated with a trend towards improved asthma control ($p=0.05$) that was not observed in the control group.

6MWD at baseline and follow-up (mean ± SD)

	Exercise	Control
Baseline	571±91m	555±101m
6 wks	605±98m*	577±84m
3 months	602±102m*	586±94m*

*$p<0.05$ compared to baseline score

Conclusions: Supervised exercise training benefits adults with FAOA, though improvements in QOL, 6MWD, and asthma control decline when supervision ceases. 6MWD was high at baseline in this study population and results showed a relatively small increase in distance in the exercise group at follow-up. This may reflect an inability to further increase stride length thus limiting the responsiveness of 6MWD in adults with FAOA.

P4107

Nasal force inspiratory training in asthmatic patients

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The aim of this study was to determine whether a nasal force inspiratory training (NFIT) could improve nasal breathing, pulmonary function, exercise tolerance and decrease bronchial hyperreactivity (BH) in patients with BA and vasomotor rhinitis (VR). The method of respiratory rehabilitation with using a nasal force inspiratory maneuvers have in russian patients a good tradition. The trained group included 63 patients with stable BA and VR (mean age: 38,2 (12,8); 25m/38 f; FEV_1 59±19% pred.). They received 10 sessions of NFIT a week (twice a day breathing exercise included 500-750 force nasal inspirations with power of 50-75% peak nasal inspiratory flow). The other group (n=20) served as controls (mean age: 39,8 (10,5); 6 m/14 f; FEV_1 52±15% pred.) and had a formal medical treatment. The nasal peak inspiratory flow was evaluated with the nasal peak flow-meter "Yulten". Pulmonary function, ergospirometry and acetylcholine test were evaluated before and after 6 week of NFIT. Rhinobronchial reflex was evaluated by specific test. There was significant ($p<0,001$) improvement of the nasal breathing in trained group (rhinoscopy, decrease of nasal drops and sneezing, increase of nasal PIF). Improvement of FEV_1 and PIFR was not significant. BH significantly decreased ($p<0,05$) in patients, who had no pathological rhinobronchial reflex. Workload of VO_{2max} and others ergospirometry parameters had no significant difference in both group. We concluded that NFIT can significantly improve nasal breathing and decrease bronchial hyperreactivity in patients with BA and VR.

P4108

Chronotropic response to peak exercise in chronic obstructive pulmonary disease

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Purpose: Chronic obstructive pulmonary disease (COPD) may be associated with autonomic imbalance. The purpose of this study was to investigate heart rate (HR) recovery and chronotropic response to peak exercise in patients with COPD.
Materials and Methods: Twenty-five patients with COPD (37-77 years, 22 M, 3 F, FEV_1: 45±17%) participated in this study. Lung function test was performed, and arterial blood gas analysis was obtained. Breathlessness was measured using modified Medical Research Council (MRC) dyspnea scale. A graded treadmill exercise test was performed. HR recovery and chronotropic response index were calculated.
Results: Eleven patients (44%) had elevated resting HR. Seven patients (28%) had abnormal HR recovery. Twelve patients (48%) had lower chronotropic index. Patients with a lower chronotropic index were significantly heavier and had a significantly higher body mass index ($p<0.05$). There was no significant difference in pulmonary function test values, arterial blood gas tensions, and dyspnea perception between the patients with a normal chronotropic response to exercise and those with chronotropic incompetence ($p>0.05$). Chronotropic response index was significantly related with MRC score ($p<0.05$). HR recovery was significantly associated with age, gender, height, smoking history, FEV_1/FVC, bicarbonate, and functional capacity ($p<0.05$).
Conclusion: There is an altered autonomic response to peak exercise in clinically stable COPD patients. Body weight may be a determinant of chronotropic incompetence. Chronotropic and HR recovery responses obtained right after peak exercise are simple to obtain and easy to interpret.

P4109

Clinical outcome of nutritional intervention integrated in an INTERdisciplinary COMmunity-based COPD lifestyle program (INTERCOM) in moderate COPD

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Introduction: No data is available of nutritional intervention in depleted patients with moderate COPD in a community-based setting.
Methods: 36/199 INTERCOM patients were characterized as depleted. 20 patients were randomized to receive nutritional supplementation during 4 months (564 kcal per day; respifor®) supervised by a dietician as adjunct to exercise training while the others received usual care. Body composition, functional capacity, respiratory and limb muscle strength were assessed at baseline, 4, 12 and 24 months.
Results: After 4 months, compared to Usual Care, INTERCOM increased in BMI (mean difference: 1.1 (95% CI: 0.3-2.0) kg, p=0.015) and FFMI (mean difference: 0.6 (95%CI: 0.1-1.2) kg/m^2, p=0.013). Improved body composition sustained in INTERCOM, but was no longer different from Usual Care at 12 and 24 months. After 4 months, 6 min walking distance (WD) of Usual Care decreased while INTERCOM remained the same (between groups:p=0.033). The difference in WD sustained until 24 months. Quadriceps strength was significantly improved at 24 months in INTERCOM, while it was significantly decreased in the Usual care group (between groups: p= 0.001). Respiratory muscle function decreased at 4, 12 and 24 months in Usual Care but remained stable in INTERCOM (between groups: p=0.010 and 0.005 resp at 24 months)
Conclusion: This is the first study showing in depleted COPD patients a prolonged positive response to nutritional support as integrated part of a lifestyle program.

P4110

Disease severity in COPD patients with muscle wasting

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Muscle wasting in COPD patients is associated with a worse prognosis. Muscle wasting has been related to diminished muscle strength, exercise intolerance and decrease survival in COPD patients. The BODE index is a multidimensional grading system with a greater ability to predict mortality compared to lung function assessment only. This study aimed to assess different individual outcomes related to disease severity and the BODE index in a population of 10 COPD patients with low fat free mass index (FFM_L) as a surrogate of muscle mass, 10 age and sex matched COPD patient with normal FFMI ($FFMI_N$) and 10 age and sex matched healthy subjects (Controls).
In comparison with FFM_N and Controls, and despite no significant differences in FEV_1, $FFMI_L$ patients had statistically significant lower physical activity (Voorrips questionnaire), lower health related quality of life (St George Respiratory Questionnaire), less muscle strength, higher MRC dyspnoea score and a higher BODE index.
FFMI was strongly related with FEV_1 ($r=0.69$, $p<0.0001$), MRC ($r=-0.57$, $p=0.01$), Voorrips Questionnaire ($r=0.51$, $p=0.006$), BODE index ($r=-0.60$, $p=0.03$), Exacerbation frequency ($r=-0.60$, $p=0.01$), Muscle strength ($r=0.60$, $p=0.002$), and 6MWD ($r=0.49$, $p=0.02$).
We conclude that, despite comparable lung function, patients with muscle wasting showed worse scores in different indices of disease severity and muscle function than FFM_N and controls. The multidimensional BODE grading system was significantly and inversely correlated with muscle wasting.
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P4111

Effectiveness of a comprehensive pulmonary rehabilitation program in severe dyspnoeic COPD patients

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Introduction: Previous reports suggest that pulmonary rehabilitation programs might be less effective in severe dyspnoeic COPD patients with a Medical Research Council (MRC) dyspnoea score of 5 as compared to patients with a lower MRC score.
Aim of the study: The aim of our study was to evaluate the effects of a comprehensive pulmonary rehabilitation program in a tertiary pulmonary rehabilitation centre on physical capacity and health related quality of life in COPD patients with a baseline MRC score of 5.
Methods: From January 2006 to January 2008, 25 COPD patients with MRC score of 5 completed a comprehensive pulmonary rehabilitation program of 12 weeks during 5 days per week. Before and after rehabilitation, 6 minutes walking distance (6MWD), constant load exercise time at 75% of the Wmax, and the St-George Respiratory Questionnaire (SGRQ) was assessed. Patient characteristics are: mean age 64±9 years, mean FEV1 0.99±0.41 l, mean Wmax 30±20 W. 11 of the 25 patients were on chronic oxygen supplementation.
Results: 6MWD improved with a mean of 81m from a baseline value of 254±62m to 335±78m ($p<0.001$).This is above the minimal clinical important difference (MCID) of 54 meters. Endurance as measured with the constant load exercise time at 75% of Wmax increased clinically significant with 341 seconds from 254±105 to 595±332 seconds ($p<0.001$). The total score of the SGRQ decreased significantly with 12% from 70±10% to 58±15% ($p<0.001$), which is also above the MCID of 4%.
Conclusion: A comprehensive pulmonary rehabilitation program for severe dyspnoeic COPD patients is highly effective on both physical and quality of life outcomes.

P4112

Outcome following pulmonary rehabilitation (PR) stratified by the medical research council (MRC) dyspnoea scale

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Introduction: It is thought by some that PR may not be effective in patients with MRC grade 5. We do not exclude these patients and aim to review PR outcome stratifed by MRC grade. We use the Endurance Shuttle Walk Test (ESWT) as one of our outcome measures. Previously we demonstrated improvement in walking distance in all patients stratified by disease severity according to GOLD guidelines (Smith et al, 2004).
Method: Patients attending out-patient PR now complete MRC dyspnoea scale pre PR. We present data collected between January 2006 and January 2008. The ESWT is performed pre and post PR. We present our data comparing MRC grade and change in ESWT.
Results: n=76. All patients showed large improvements in ESWT. Table 1 shows mean (SD) % change in ESWT by MRC grade.

Table 1. Mean (SD) % change in ESWT post PR by MRC grade

MRC grade	1 (n=4)	2 (n=15)	3 (n=26)	4 (n=25)	5 (n=6)
Mean (SD) % change	90.52 (106.56)	96.9 (84.67)	112.79 (181.55)	146.97 (175.16)	128.83 (118.96)

Discussion: Although small numbers our preliminary data support our previous finding that the most disabled patients make large improvements post PR and should therefore not be excluded.
Conclusion: Our PR programme is effective for patients at all MRC grades.

P4113

Is a practice incremental shuttle walking test (ISWT) necessary for all patients?

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Introduction: The ISWT is a commonly used outcome measure for Pulmonary Rehabilitation (PR) with a Practice Incremental Shuttle Walking Test (PISWT) recommended.
Method: All patients attending PR completed a PISWT and ISWT. Patients were categorised by distance walked on PISWT.
We examined the data by the following categories; %change (PISWT to ISWT); % of patients making >10% improvement (meeting the UK guidelines for ambulatory oxygen) and those making >50m improvement (minimally clinically important difference-MCID) from PISWT to ISWT.
Results: n=327 See Table 1.

Table 1. Difference between PISWT and ISWT by baseline distance walked

	Distance walked on PISWT (m)						
	0-100	110-200	210-300	310-400	410-500	510-600	610-700
n	75	106	75	49	12	6	4
Mean % change (SD)	55.42 (71.73)	18.37 (28.85)	10.75 (19.74)	5.85 (14.24)	-0.88 (15.48)	0.59 (15.34)	2.85 (4.72)
>10% Improvement (%)	72	58	51	29	25	33	0
>50m Improvement (%)	20	32	35	22	25	33	25

Conclusions: Those walking <300m initially demonstrate particular benefit from a PISWT, with an average change of 26.99% (47.91) between walks.
However, our data support a PISWT for all patients because:
a) >20% of patients in all groups met the MCID between walks.
b) a large % of patients in all groups made a >10% improvement between walks, due to test familiarity. Thus omiting a PISWT may attribute artificial benefit to PR and inapproriate ambulatory oxygen prescription (by UK guidelines).

P4114

Relation between daily living activities, alexithymia and six minute walking test in patients with chronic obstructive pulmonary diseases

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Purpose: This study was designed to investigate the relation between daily living activities, alexithymia and six minutes walk test in patients with chronic obstructive pulmonary disease (COPD).
Methods: Nineteen patients with COPD were evaluated in this study (mean age 64.3±10,2). Activities of daily living were evaluated with London Chest Activity Daily Scale (LCADL). Alexithymia were determined using the 20 item Toronto Alexithymia Scale (TAS-20). Functional capacity was assesed using six minutes walk test. Anxiety and depression was evaluated by Hospital Anxiety and Depression score (HAD). Pulmonary function test using spirometry was performed.
Results: There was a significant relationship between dyspnea perception in daily life activities and anxiety (r=0.565, p=0.012). Six minute walk distance was significantly associated with self care activities (r=-0.526, p=0.021). There was correlation between the answer of "Do you live alone?" of LCADL scale and difficulty in identifying feelings factor of TAS 20 (r = -0,516 p = 0,024). Forced vital capacity was significantly correlated with depression (r = -0.573, p = 0.020).
Conclusion: It is found that there was only correlation between walk distance and self care activities. Further results is required to establish TAS 20 and LCADL in COPD.

P4115

Kinetics of haemoglobin oxygen saturation measured by continuous pulse oximetry during the 6 minute walking test

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Background: The distance walked during a 6MWT is commonly used to assess functional exercise capacity in cardiopulmonary diseases. Previous studies suggest that measuring exercise haemoglobin oxygen saturation by pulse oximetry (SpO2) may be of prognostic value in certain diseases. However, no consensus exists on the role and the methods of pulse oximetry to detect exercise induced hypoxemia during the 6MWT.
Aims and objectives: To analyze kinetics of SpO2 during 6MWT by using continuous pulse oximetry.
Methods: We studied 106 patients with various lung diseases. 6MWT was performed following strictly ATS guidelines. In addition, SpO2 was continuously analyzed. Values considered were: before (SpO2pre), lowest (SpO2min), and at the end of the test (SpO2end). Exercise desaturation was defined as a fall of ≥4% of SpO2.
Results: 94 patients completed the 6MWT and 12 stopped before 6 min. Whereas SpO2end corresponded to SpO2min in 26 patients, SpO2min occurred before the end of the test in 80 patients. Exercise desaturation was absent in 19 patients. Desaturation was present in 87 patients: SpO2pre was 93.7±3.8%, SpO2min was 83.4±6.8%, and SpO2end was 85.8±7.1%, meaning that desaturation was 30% deeper if SpO2min was considered instead of SpO2end. In this group, 17/87 patients (20%) would not be considered as showing exercise desaturation if only SpO2end was recorded.
Conclusion: Maximal desaturation occurs before the end of the 6MWT in a majority of patients. Continuous pulse oximetry during the 6MWT yields a more complete picture of exercise induced hypoxemia and may be of help in the assessment and follow-up of patients.

P4116

Published regression equations underestimate 6 minute walk distance (6MWD) for healthy Australians aged 45-85 years

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Background: Evidence of ethnic and regional differences in 6MWD exist.
Aims: To develop regression equations to predict 6MWD in healthy Caucasian Australian males and females aged 45-85 years and to compare measured 6MWDs with predicted 6MWDs obtained using equations developed in studies performed in North America[1,2,3] and Europe[4].
Methods: 109 adults (48 males) aged 62.1±8.3 years completed two 6MWTs. Peak heart rate (HR) achieved during the test was expressed as %predHRmax (220-age).
Results: 6MWD (best of 2 tests) was 682±73m (males) and 643±70m (females) ($p<0.01$). Regression equations were developed using (i) all significant variables and (ii) excluding %predHRmax in order to increase the clinical utility of the equations when applied to patients with cardiopulmonary disease (Table 1).
Use of published equations in our population underestimated 6MWDs by (mean, 95% confidence intervals) 114(98,130)m[1], 31(14,47)m[2], 186(156,216)m[3] and 27(12,43)m[4] in females and 107(86,128)m[1] and 182(153,211)m[3] in males (all $p<0.001$).

Table 1. Regression equations to predict 6MWD (m)

Males	748 – (6.32age) + (0.64ht) + (2.69%predHRmax)	R^2=0.61
Males	867 – (5.71age) + (1.03ht)	R^2=0.40
Females	541 – (3.81age) + (1.80ht) – (6.92BMI) + (2.41%predHRmax)	R^2=0.58
Females	525 – (2.86age) + (2.71ht) – (6.22BMI)	R^2=0.43

height (ht) in cm

Conclusions: Population specific equations to accurately predict 6MWD are required.
References:
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The importance of self-pacing during 6MWT

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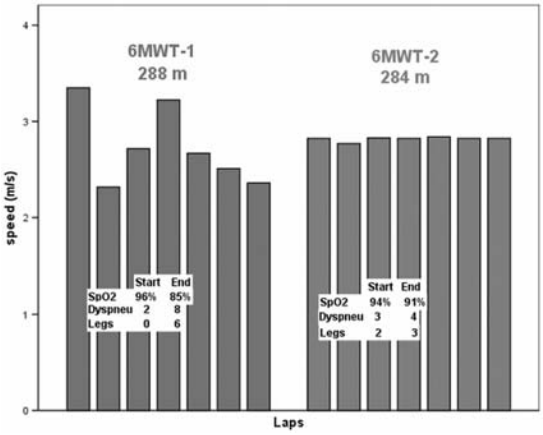
The distance walked after 6 minutes (6MWD) is the outcome measure of the 6 minute walk test (6MWT).The ultimate goal of pulmonary rehabilitation (PR) is to increase the ability to perform tasks of daily living. The intensity of the task will determine the sustainability of it. Due to the variability in effort dependent variables such as fatique or dyspnea optimally performing daily activities require strategy and pacing. The aim of this study was if additional parameters of the 6MWT might be useful to evaluate the impact of rehabilitation on these aspects.
Methods: 129 patients patients with COPD (FEV_1 37±5% predicted; age 62.8±8.6 yr) performed a 6MWT at baseline (6MWT-1) and at the end of PR (6MWT-2). No encouragement was given as not to interfere with self-pacing; each minute the



patient was told how much time was elapsed. Measurements before and after each test: dyspnea and leg effort by a Borg scale and pulse oximetric saturation (SpO_2).
Results and conclusion: 6MWT-1 vs 6MWT-2
334.2±107.2 m vs 331.7±122.6 m **ns**, dyspnea (5.0±2.0 vs 3.9±1.8) leg effort (4.3±2.6 vs 3.6±2.3) scores were significantly lower, SpO2 significantly higher (87.1±6.3 vs 93.8±2.3) (*all p<0.001*). These improvements might be caused by better pacing.
Patients should learn to recognize and integrate the self-imposed load-associated stress by self-pacing to achieve everyday goals. Walking distance is only one dimension of functional assessment of COPD treatments.

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A stair climbing test in chronic obstructive pulmonary disease (COPD) assessment
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Introduction: Exercise tolerance is a cornerstone of COPD assessment. Six-minute walking test (6MWT) is the gold standard for its evaluation but it does not simulate walking up a slope.
Objectives: To compare a stair climbing test (SCT) to the 6MWT and to observe specifically their sensitivity to dyspnoea.
Material and method: A self-paced 2-minutes SCT and the 6MWT were performed in 14 stable COPD patients (Age = 65.9±13.8 y.o.; FVC = 79.6±10.6% pred.val.; FEV1 = 52±17.2% pred.val.; 10/4 GOLD II/III, BMI = 24.5±3.8 $kg.m^{-2}$) without encouragement, on a separate day. SaO2, heart rate (HR), walking distance or height, dyspnoea (modified Borg scale) were measured before and after the tests. The physiological cost index (PCI) was calculated.
Results: Delta SaO2 and HR are similar after both tests. Dyspnoea and PCI were significantly higher with SCT (6±2 vs 3±1.5, $p<0.001$ and 0.29±0.12 vs 2.44±1.50, $p<0.001$ respectively). There was a significant correlation between PCI and FEV1 only with 6MWT ($r=0.59$, $p<0.05$).
Conclusion: These preliminary data suggest that SCT could be an alternative to assess exercise tolerance in COPD patients. SCT seems more sensitive than 6MWT regarding dyspnoea.