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Does a predominant clinical COPD phenotype predict different outcome responses to pulmonary rehabilitation?

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Introduction: A new multivariate model, using HRCT as a criterion standard, based on variables collected at rest has been proposed to identify two or more relevant phenotypes of COPD, emphysema (E) and chronic bronchitis (BC) (Pistoletti et al. *Respir Med* 2008;102:367-76). The aim of the study is to verify whether two distinct COPD groups whose characteristics correspond to either an airway obstructive or a parenchymal destructive COPD phenotype exhibit different outcome responses to a pulmonary rehabilitation program.

Methods: In 55 BC and 38 E patients we assessed the outcome responses to a pulmonary rehabilitation program (PRP): chronic exertional dyspnea (MRC, BDI and TDI), leg and arm ergometry, and exercise dyspnea by Borg scale during 6mWT. Four cluster descriptors of the language of dyspnea (work/effort, inspiratory difficulty, shallow breathing and expiratory difficulty) allowed the qualitative assessment of the symptom.

Results: At baseline, age, BMI, FEV₁ and DLco were lower, while FRC and TLC were higher in E. 6mWT, Borg, SGRQ and ergometry were similar in E and BC. Frequency of response for inspiratory difficulty cluster during 6mWT was significantly greater in E than in BC. PRP significantly improved most outcomes, similarly in the two groups, but neither in E nor in BC did significantly modify the frequency of response of cluster descriptors.

Conclusion: PRP allowed both COPD groups to improve similarly health status and exercise tolerance and to modify the intensity but not necessarily the quality of dyspnea.

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Efficacy of pulmonary rehabilitation in patients with interstitial lung disease

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Objectives: There are few reports describing the efficacy of pulmonary rehabilitation (PR) in patients with interstitial lung disease (ILD). We studied whether PR could improve functional status in a group of patients with ILD.

Methods: PR was carried out for 12 weeks for clinically stable outpatients of our institute. Fifteen patients with ILD were enrolled in this prospective study. Six-minute walking test (6MWT), lung function test and evaluation of health-related quality of life including SGRQ were performed before and after the program. 6MWT and lung function test were also evaluated in 18 ILD patients without PR program with an interval of 12 weeks and compared with ILD patients who completed the program.

Results: There was no significantly improved factor with the program in patients with ILD. %FVC (67.3% to 62.6%, p<0.05) and body weight (64.9 kg to 63.7 kg, p<0.05) were significantly decreased contrary to expectations. However, 6-minute walking distance (6MWD) was slightly improved after the program (369.3 m to 382.7 m) in contrast to the significant decrease in ILD patients without PR (409.4 m to 375.8 m, p<0.05). Statistically significant difference was confirmed in the amount of change in 6MWD in these two groups (13.3 m vs. -33.5 m, p<0.05). Despite that ILD patients with PR had lower lung function than those without PR at the initiation of the study, PR was effective to keep the exercise performance from deteriorating.

Conclusions: Our results show that PR prevents the deterioration of functional status in patients with ILD. PR should be considered as a standard of care for ILD patients.

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Effect of interval training on the BODE index, SF-36, EuroQol and St-George's Respiratory Questionnaires scores in COPD patients across GOLD stages I-IV

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In COPD patients, functional capacity, health-related quality of life and health status are respectively assessed by the clinical tools of BODE index, SF-36, EuroQol and St-George's Respiratory Questionnaires. Interval training as a therapeutic modality elicits substantial physiological effects; however, the impact of interval training to those tools across the whole spectrum of COPD severity still remains unknown.

Objective: To investigate whether beneficial effect of interval training is reflected to BODE and the 3 Questionnaires in GOLD stages(I-IV).

Methods: In a large cohort of 106 COPD patients, rehabilitative intervention and control groups consisted of 71 and 35 patients, respectively. Exercise training involved 30min cycling by alternating 30-s exercise intervals at 100%Wpeak with 30-s rest and large-muscle group resistance training for a period of 10 weeks, 3-times/week.

Results: Interval training improved significantly the clinical condition of patients across GOLD stages:II.(BODE:1.9 vs 1.1, SF-36psc:39.6 vs 44.9, SF-36mcs:43.7 vs 49.3, EuroQol-VAS:54.1 vs 70.8, St-George's:50.5 vs 38.9), III.(BODE:3.8 vs 2.3, SF-36psc:38.5 vs 43.0, SF-36mcs:40.1 vs 47.4, EuroQol-VAS:48.6 vs 65.5, St-George's:52.6 vs 40.4), IV.(BODE:5.7 vs 4.1, SF-36psc:33.1 vs 40.9, SF-36mcs:33.2 vs 46.3, EuroQol-VAS:40.4 vs 58.2, St-George's:60.1 vs 46.2) (P<0.05). Non significant changes were shown for patients in GOLD stage I and the control group.

Conclusions: Beneficial effects of interval training in functional capacity, health-related quality of life and physical status are reflected by improved clinical condition of patients in GOLD stages II-IV.

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Pulmonary rehabilitation in patients with sarcoidosis – First results of the prospective German multi-center study: ProKaSaRe

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Background: There are only sparse data concerning rehabilitation in sarcoidosis. Therefore we conducted a prospective multi-center study to investigate whether rehab leads to objective and subjective health changes.

Method: Clinical tests and questionnaires were performed at the beginning (T0) and the end (T1) of a 3-week in-house rehab program, followed by questionnaires 3, 6, and 12 month after discharge. The components of the rehab were physical training, breathing exercises, patient education and psychosocial support.

Results: The results of the short-term effects on the first 200 patients are displayed: mean-age 49.3±9.7 years, 56,2% male, 48,7% under systemic corticosteroids.

	T0	T1	p-value
6MWD [m]	496.5±110.6	538.2±111.1	<0.0001
VC [l] (% predicted)	3.54±1.06 (86.6%)	3.65±1.05 (89.1%)	0.2113
FEV1 [l]	2.78±0.89 (84.8%)	3.02±2.49 (86.8%)	0.2003
PI max [kPa]	6.37±3.31 (73.92%)	7.21±3.49 (87.6%)	0.0003
ACE [U/l]	44.0±28.5	41.8±28.5	0.3090
CRP [mg/l]	3.6±6.0	3.7±7.1	0.3090
SGRQ (symptoms)	43.4±24.6	35.5±25.7	0.0007
SGRQ (activity)	49.0±22.9	42.1±25.2	0.0025
SGRQ (impact)	29.6±20.3	25.0±21.3	0.0122
SGRQ (total score)	38.2±20.1	32.1±21.7	0.0026
SF-36 physical health	30.8±13.9	33.7±18.1	0.0335
SF-36 mental health	27.9±13.2	31.9±17.3	0.0027
FAS (Fatigue Assessment Scale)	2.7±0.78	2.2±0.73	<0.0001
MMRC [Score 0-4]	2.1±1.3	1.8±1.4	<0.0001

Discussion: The significant and clinically meaningful short term results of relevant outcomes like exercise capacity (6MWD), quality of life (SGRQ, SF 36), fatigue

(FAS) and dyspnea (MRC) suggest a high impact of rehabilitation on health related outcomes in sarcoidosis.

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Does pulmonary rehabilitation (PR) influence patient's perceptions of disease?

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Background: PR leads to behaviour modification. The common sense model assumes that perceptions of disease are influenced by increased knowledge, skill acquisition and goal attainment. The aim was to test whether PR influenced patient's perceptions of their disease.

Methods: This is a prospective cohort study of patients with COPD who completed the illness perceptions questionnaire-revised (IPQ-R) pre and post PR.

Results: The IPQ-R was completed by 51 patients [mean(SD) age 70.0 (9.0) years, FEV₁ 1.4 (0.7) l, 28 male]. Following PR patients adopt a less chronic view of their disease and perceived fewer consequences. Treatment control and coherence are reduced. Emotional impact of the disease is minimised by PR.

Table 1

Illness Perceptions	Pre	Change (95%CI)
Identity	5.18	0.67 (-0.03-1.37)
Timeline chronic	24.59	-4.94* (-7.06-2.83)
Timeline cyclical	12.59	0.41 (-0.63-1.46)
Consequences	20.85	-1.47* (-2.86-0.81)
Personal control	21.38	-1.29 (-2.58-0.06)
Treatment control	16.50	-2.37* (-3.60-1.14)
Illness coherence	17.55	-4.38* (-6.27-2.49)
Emotional representations	17.55	-1.14* (-0.04-2.25)

*p<0.05 level.

Conclusions: PR induces feelings of hope and increases patient's expectations. Prior to PR patients are unaware of their limitations in knowledge. The clinical benefits of PR reduce perceived consequences of the disease and as a result emotional impact is minimised.

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Prescribing exercise in advanced COPD: Training smart, not just hard!

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The high-intensity paradigm is prevailing in COPD training. Individualising training variables is considered the gold standard. Nonlinear periodized exercise (NLE) uses variation of the training variables (mode of exercise, work phase, rest phase, intensity, number of repetitions) to individualize training. The aim of this study was to compare the effects of NLE with traditional endurance and progressive resistance training (EPR) on cycle endurance time (CWT) at 75%Wmax.

Methods: Patients with severe COPD (N=110, FEV₁ 32%pred, 61 yrs) were stratified on normal or depleted fat-free mass index (depleted FFMi; male FFMi<15 kgFFM/m²; female FFMi<16). Per FFMi-group, patients were randomly assigned to NLE or EPR (3-times/week for 12 weeks). Difference in change was tested with intention-to-treat analysis using linear mixed-effects modeling. Trial number NTR 1045.

Results: NLE showed more improvement in cycle endurance at 12 weeks: NLE_{Depleted} (N=33, Δ569s = +143%) compared to EPR_{Depleted} (N=34, Δ262s=+66%), difference in change (307s, 95% CI: 162-425) and NLE_{NonDepleted} (N=22, Δ528s = +123%) compared to EPR_{NonDepleted} (N=21, Δ198s = +46%), difference in change (329s, 95%CI: 182-477). During the training, patients in the NLE groups had significantly more repetitions, lower % 1-repetition maximum load, shorter cycle time and lower Borg dyspnea, fatigue and exertion scores than the patients in EPR groups.

Conclusion: Nonlinear periodized exercise results in >5min more improvement in cycle endurance than traditional endurance and resistance training in patients with advanced COPD and depleted or normal FFM. Applying principles of nonlinear exercise training in athletes to the COPD population is feasible and worthwhile.

P1901**Exercise induced reduction in dynamic hyperinflation after interval training with oxygen breathing**

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Background: Exercise training reduces exercise induced dynamic hyperinflation (DH) at submaximal exercise (80% of peak work rate) in patients with COPD. Oxygen has dose-dependent effect (maximal at FIO₂:0.3) on operating lung volumes in COPD.

Methods: 10 COPD patients with moderate obstruction (FEV₁: 53±12%pred, age: 63±10 yrs, BMI: 26±4 kg/m²) performed an incremental exercise test to maximal exercise tolerance, and two constant work rate test (CWR, 80% of peak work rate) with inspiratory capacity (IC maneuver for DH) in every 2 minutes before and after training. Patients performed interval training (1 minute 40% and 1 minute 80% of peak work rate) 3 times a week for 8 weeks breathing oxygen (5 patients 3L/min., group O) or compressed air (5 patients 3 L/min., group C) during training.

Results: The initial peak work rate did not differ significantly between the groups (O: 94±18 vs. C: 86±19 W). Endurance improved in both group (O: 425±110 vs. 630±122, C:370±120 vs. 555±126 sec, p<0.05), oxygen uptake increased in group O (VO₂ O:1.20±0.12 vs. 1.36±0.10 L/min., p<0.05) after training. In group O, there was a tendency to reduction in DH after training (IC 1: 2.33±0.62 vs. 2.44±0.90; 2: 2.25±0.73 vs. 2.37±0.94; 3: 2.36±0.96 vs. 2.55±0.97; 4: 2.24±1.00 vs. 2.36±1.01; 5: 2.24±1.00 vs. 2.36±1.01; 6: 2.23±0.97 vs. 2.33±1.00; 7: 2.36±0.73 vs. 2.00±1.02 L). IC did not change in group C.

Conclusion: The pilot study revealed less hyperinflation tendency and improved oxygen uptake in group O, which might refer to better physiologic training effect.

P1902**Pulmonary rehabilitation in advanced lung cancer patients during chemotherapy – Preliminary report**

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Objectives: The aim of this study was to investigate the utility of a pulmonary rehabilitation (PR) program on mobility, pulmonary function, dyspnea and quality of life in patients with advanced lung cancer during chemotherapy.

Methods: This study included patients with newly diagnosed advanced lung cancer. Study group consisted of 12 pts with advanced non-small cell lung cancer and 5 pts with small cell lung cancer. Pulmonary function (FVC, FEV₁), mobility (6 MWT), perceived of dyspnea (MRC, OCD, BDI) and quality of life (SF-36, EORTC) was analyzed before and after the intervention. The inpatients rehabilitation program was based on Nordic Walking exercise training and respiratory muscle training. Sessions occurred twice daily, each lasting approximately 60 minutes with 10-minute warm-up period.

Results: Intention-to-treat analysis indicated that 6MW distance increased 55m (95% CI, 18-75, p=.012) with no changes in pulmonary function tests (FVC, FEV₁). Perceived of dyspnoea was improved in Oxygen Cost Diagram (2.4 vs. 1.3, p=.012), FI/BDI (1.7 vs. 2.4, p=.008) and overall score BDI (4.4 vs. 6.4, p=.006). General quality of life questionnaire showed improvement in Role-Physical, Bodily-Pain, Social-Functioning and Physical Cumulative Score of SF-36 without statistically significance. Lung cancer questionnaire showed significantly improvement (p<.05) in perception of dyspnoea, exercise tolerance, quality of life, improvement in social functioning, everyday living and decrease of consumption analgesic drugs.

Conclusion: Pulmonary rehabilitation in advanced lung cancer patients during chemotherapy is a beneficial intervention to improvement in their lung cancer symptoms and mobility.

P1903**Is pulmonary rehabilitation (PR) an effective therapy in lymphangioliomyomatosis (LAM)?**

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Background: LAM is an orphan lung disease affecting young women. There is an estimated prevalence of 200 patients in Germany. Beside supportive treatment of respiratory distress there are only few drug therapies (progesterone, sirolimus) of unknown effectiveness. In end-stage LAM lung transplantation (LTx) may be the only remaining therapeutic option. The role of PR is not yet defined.

Methods: In a prospective open clinical trial data of 22 LAM patients prior to LTx (LAM-P) (45,9±9y., FEV₁=31,4±17%pred, diffusion capacity=35,8±13%, paO₂=59,1±9 mmHg, LTOT n=19) and 24 LAM patients after LTx (LAM-Tx) (42,8±10y., FEV₁=65,7±19%pred) were evaluated. All patients underwent a specialized multidisciplinary inpatient PR for 45±9,6 (LAM-P) and 35,4±18 (LAM-Tx) days.

Results: We found significant and clinically relevant changes for both PR approaches.

For the LAM-P group we saw a significant improvement in 6-min walking distance (6MWD) 59±50m (p<.0,001). In LAM-Tx patients 6MWD increased significantly by 103±85m (p<.0,001).

Thus the benefit of post LTx-PR in LAM-patients is comparable to the results of lung transplant patients with other underlying disease. Health-related quality of life (HRQL) (SF36) improved significantly for the mental summary score in LAM-Tx.

Lung function parameters did not change for LAM-P but FEV₁ improved significantly for LAM-Tx patients.

Conclusion: PR in LAM patients before and after LTx is a safe therapeutic approach that leads to significant increases of exercise capacity and tends to improve HRQL. In view of a progressive disease with only a few therapeutic options rehabilitation should be considered early in the treatment of LAM, especially when LTx is necessary.

P1904**Effect of pulmonary rehabilitation on cardiac output responses during exercise in COPD**

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Introduction: In patients with COPD pulmonary rehabilitation (PR) induces true physiological effects reflected by reduced ventilatory requirement and improved peripheral muscle function. The effect of PR on central hemodynamic responses during exercise remains largely unknown.

Aim: To examine the impact of PR on cardiac output (Q) responses during incremental (IE) and constant-load exercise (CLE).

Method: 60 COPD patients (GOLD stages II- IV) were studied (including 15 controls). PR consisted of interval cycling exercise 3 days/week for 10 weeks, with 30-s work periods/30-s rest periods for 30 min/day and intensity at 100% of peak work capacity (Wpeak). Q was measured by bio-impedance (Physioflow PF-07) during IE and CLE at 75% Wpeak for 6-min during exercise and in recovery, prior to and following PR.

Results: At Wpeak there was an increase in Q after PR (from 10.1±0.5 to 12.4±0.6, L/min, p=0.001) due to increased SV (from 90±3.2 to 105.1±4.42 ml/min, p=0.003). Post-rehabilitation at an identical work rate during IE, Q did not differ compared to pre-rehabilitation; however SV was higher (pre: 90±3.2; post 95±3.2 ml/min) and HR lower (pre: 113±3; post 106±3 beats/min, p=0.008). Post-rehabilitation during CLE there were significant reductions in Q mean response time (MRT) at the onset and offset of exercise (pre: 79.8±4.4; post: 66.9±4.5sec, p=0.001) and (pre: 79.1±4.3, post: 66.1±4.2 sec, p=0.001), respectively.

Conclusion: Pulmonary rehabilitation induces an improvement in central hemodynamic function to incremental and constant-load exercise in patients with COPD across GOLD stages II to IV.

P1905**A multi-disciplinary integrated palliative care approach for patients with advanced COPD – A review of the breathing space clinic**

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COPD is a leading cause of morbidity and mortality worldwide. There is strong evidence demonstrating the impact of disease and the unmet needs of these patients.

Aim: Develop a hospice-based clinic for patients with advanced COPD. This multi-disciplinary assessment, facilitation and treatment clinic brings together expertise in a range of respiratory management and palliative care approaches to provide holistic care; improve self-management; integrate services; and to maximise the quality of life for patients who may be towards the end of life.

Method: Patients with advanced COPD are invited with their carers to attend the Clinic at the local hospice with a COPD nurse, a palliative medicine consultant and physiotherapist to identify their physical, psychological, social, spiritual and functional needs and engage them with a range of services. Informational needs are also addressed, including advance care planning. For those unable to attend, services are replicated in patients' homes. Metrics are undertaken at each clinic to evaluate symptoms and patient reported outcomes.

Results: Over a 9-month pilot 16 patients were referred (mean age 69). Mean FEV₁ 24% (N=14). For 6 patients there is incomplete data.

Table 1. Table of pre and post clinic attendance metrics (N=10)

	CAT	Anxiety (HADS)	Depression (HADS)	MRC	Borg at rest
Mean Pre	29	10.9	10.1	4.6	4.8
Mean Post	25	8.3	8.6	4.1	3.9
Change	-4	-2.6	-1.5	-0.5	-0.9

Conclusion: The outcome demonstrates a trend towards improvement in all domains. It is not possible to conclude that the clinic intervention is solely responsible

for these changes, these early data and patient feedback supports the effectiveness of this model.

P1906**Correlation between 6-minute pegboard and ring test and upper extremity activities of daily living in patients with chronic obstructive pulmonary disease**

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Background: Upper extremity training is recognized as an important component of pulmonary rehabilitation (PR). 6-minute pegboard and ring test (6PBRT) was developed for testing arm exercise capacity of patients with COPD. The purpose of this study was to apprehend characteristics of this test and to evaluate the relationship between 6PBRT and upper extremity activities of daily living (ADL) in patients with COPD.

Methods: Twenty outpatients with COPD performed 6PBRT, spirometry, maximal inspiratory pressures, maximal expiratory pressures and grip strength. The 6PBRT was done according to the method of Zhan et al. In brief, subjects were asked to move as many rings as possible, and the final score was the number of moved rings during a 6-minutes period. Upper extremity ADL was evaluated with the upper extremity activities subdomain of Pulmonary Functional Status & Dyspnea Questionnaire-Modified Version (PFSDQ-M). Upper extremity ADL was also measured objectively by the wrist accelerometer (Actiwatch2[®]) all day long for a week.

Results: There was a positive correlation between the 6PBRT scores and inspiratory capacity (IC) ($r = 0.71$, $p < 0.001$), inspiratory capacity/total lung capacity (IC/TLC predicted) ($r = 0.68$, $p < 0.01$), forced vital capacity (FVC) ($r = 0.57$, $p < 0.01$). And there was a positive correlation between 6PBRT scores and Actiwatch2[®] counts ($r = 0.54$, $p < 0.05$), and a negative correlation between 6PBRT scores and arm activities subdomain scores ($r = -0.49$, $p < 0.05$).

Conclusion: 6PBRT may be one of the predictive tests for PR to maintain and improve upper extremity ADL in patients with COPD.

P1907**Effects of BMI on task-related VO₂ and dyspnea during activities of daily life (ADLs) in COPD**

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COPD patients use a higher proportion of their peak VO₂ during the performance of domestic ADLs compared to healthy peers, accompanied by higher task-related dyspnea and fatigue. To date, the influence of BMI on the task-related metabolic demands remains unknown. Therefore, we aimed to study the effects of BMI on metabolic load in 94 COPD patients (61% men, age 60±9 yrs, BMI 25±5 kg/m², FEV₁ 51±19%pred) during the performance of 5 consecutive domestic ADLs: putting on socks, shoes and vest, ADL1; folding 10 towels, ADL2; putting away groceries, ADL3; washing up 4 dishes, cups and saucers, ADL4; sweeping the floor for 4 min, ADL5. Task-related VO₂ was assessed using a mobile oxycon, while Borg scores were used to assess task-related dyspnea and fatigue.

Baseline characteristics were comparable after stratification for BMI. Underweight COPD patients (<21 kg/m², n=24) had the lowest absolute task-related VO₂ after performance of 5 ADLs (629±151ml/min) compared to patients with normal (21-25 kg/m², n=31; VO₂: 818±242 mL/min), overweight (25-30 kg/m², n=26; VO₂: 806±161 mL/min) and obese BMI (>30 kg/m², n=13; VO₂: 1030±259 mL/min; all p<0.05). VO₂ expressed as a proportion of peak VO₂ and VO₂ per kilogram fat-free mass (FFM) were comparable between BMI groups (%VO₂peak: 65±16, 72±19, 65±15 and 73±21%; VO₂/kgFFM: 16±3, 19±4, 17±3 and 18±4 mL/min/kg in underweight, normal, overweight or obese BMI, respectively). Moreover, Borg symptom scores for dyspnea and fatigue were comparable between BMI groups.

To conclude, patients with different BMI's perform self-paced domestic ADLs at the same relative metabolic load, accompanied by comparable Borg symptom scores for dyspnea and fatigue.

P1908**A comparison of the energy expenditure between weight supported and unsupported exercise in obesity**

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Background: Weight loss is better achieved by a combination of diet and exercise. We hypothesised that obese individuals may be able to endure cycling (weight supported) for longer than walking (weight unsupported). We therefore investigated whether weight supported or unsupported exercise was associated with greater energy expenditure in obese individuals.

Methods: Individuals were recruited from a sleep clinic with a BMI > 30 kg/m² and treated obstructive sleep apnoea. Patients with pulmonary or cardiac disease were excluded. On separate days in a randomised order, participants performed an incremental cardiopulmonary exercise test on a cycle ergometer (CE) and a treadmill (TM) with expired gas analysis to determine the peak oxygen uptake (VO₂pk). Two endurance tests were performed on each modality matched at 80% and 60% of the highest VO₂ pk determined by the incremental tests. The total energy expenditure during each endurance test was calculated from the total oxygen uptake.

Results: 12 participants completed all six tests: 7 male, mean [SD] age 57 [14] y, BMI 34.5 [7.1] kg/m². The peak VO₂ on the TM vs CE was 2275 [522] vs 1791 [390] ml/min, respectively. Table one shows the duration (t_{limit}) and energy expenditure at 80 and 60% VO₂ pk on the TM and CE.

Table 1

	80% VO ₂ pk		60% VO ₂ pk	
	Cycle	Treadmill	Cycle	Treadmill
T _{limit} (s)	267 [103]	1105 [867]*	949 [563]	1851 [713]*
Total VO ₂ (L)	5840 [3026]	30382 [23916]*	22413 [12504]	46030 [22056]*
Energy Expenditure (Cal)	29 [15]	152 [120]*	112 [63]	230 [110]*

Mean (SD), *TM vs CE p<0.01.

Conclusion: In obese individuals, treadmill walking (weight unsupported) at a matched metabolic intensity led to significantly higher total energy expenditure than cycling.

P1909**Nutritional status of pulmonary rehabilitation patients**

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Introduction: Only about one-third of all adult German men and about 50% of women are normal weight. By contrast, the percent of overweight/obesity has reached epidemic proportions. Underweight is relatively rare. The nutritional status of the pneumologically ill varies considerably from this disease pattern. The prevalence of underweight in COPD III and IV (FEV₁ < 50%) cases ranges from 20%-60%.

Aims and objectives: The aim of the present study is to ascertain the nutritional status of a pneumological patient population and the respective frequency and meaning of underweight and overweight/obesity, using a large database.

Methods: From 2005 to end of 2011, the nutritional status of all pneumological patients was ascertained at a German inpatient rehabilitation clinic (n=13804). Additional from July 2010 until January 2012 the nutritional status of COPD patients with severity levels of III and IV based on GOLD was also ascertained for a sub-population.

Results: Of all patients (n=13804), the percent of underweight was 8.4%, normal weight 27.5% and overweight/obese 64.1%. Of all COPD patients (n=5470), 10.8% were underweight, 28.3% normal weight and 60.9% overweight/obese. Of the COPD III patients 20.6% were underweight and of the COPD IV group even 25.1%. The asthmatic (n=3811) had a lower percent of underweight (4.1%) but 72.5% overweight/obese.

Conclusions: The prevalence of underweight and obesity in a pneumological patient population is strikingly manifest when compared to a normal population. The percentage of underweight is significantly higher for COPD. Within the COPD, results show considerable differences, depending on degree of severity.

P1910**Effects of pulmonary rehabilitation in patients with COPD with and without fat free mass depletion**

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We aimed contrast the effects of exercise training in COPD patients with and without reductions in fat-free mass (FFM) and evaluate the relationship among changes in body composition, exercise capacity and health related quality of life.

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One hundred and four patients submitted to Pulmonary Rehabilitation (PR) were retrospectively stratified according their FFM status. FFM was measured by bio-electrical impedance and patients considered depleted if FFM index was ≤ 15 in women and ≤ 16 kg/m² in men). Saint George Respiratory Questionnaire (SGRQ) and 6 minute walk distance (6MWD) were evaluated before and after PR.

Characteristics of all patients are following: 64.1±8.7 years; body mass index (BMI)= 25.1±4.7 kg/m²; FFM index= 17.1±3.0 kg/m²; FVC=66.4±20.1%; FEV₁= 38.9±15.2%; 6MWD= 395.3±85.5m; and oxygen saturation (SpO₂)=93.2±4.2%. Thirty two subjects (30.7%) were considered depleted. They had worse resting lung function and SpO₂ (CVF= 59.4±19.5 vs 69.6 vs 19.6%, p=0.02; FEV₁=33.6±13.2 vs 41.4±15.5%, p=0.02; SpO₂= 91.7±4.8 vs 93.9±3.8, p=0.02). Improvement in 6MWD and SGRQ after PR were not different comparing groups. There is no difference in weight alteration (0.14±3.3 vs -0.43±2.7 kg) whereas depleted patients had a greater improvement in fat free mass (3.71±7.89 vs -0.29±2.56kg; p<0.01). Therefore, 24 of 32 depleted subjects (75%) were no more considered depleted after PR. This improvement has no correlation with SGRQ and 6MWD gains after PR.

Concluding, the clinical benefits of PR were not different comparing FFM depleted and non-depleted COPD patients. However, improvement in FFM was greater in depleted patients leading the majority of them to be considered non-depleted after PR.

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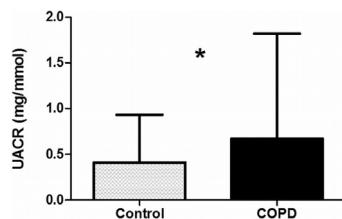
Glomerulopathy, microvascular damage and aortic stiffness in patients with COPD

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Background: The increased aortic stiffness in patients with COPD will lead to increased pulsatile energy which may in turn damage the microvasculature. The renal vascular bed is particularly susceptible. We hypothesised that urine albumin creatinine ratio (UACR) as a measure of glomerular damage would be related to aortic stiffness; pulse wave velocity (PWV).

Methods: Subjects with and without COPD, all with >10 pack year history of smoking had aortic PWV, BP, oxygen saturations, spirometry as well as urine for renal biomarkers measured at clinical stability.

Results: Age, gender and BMI were matched between patients, n=52 and controls, n=34. The UACR was increased in patients compared to controls, p<0.05, Figure 1 (median and IQR). Log₁₀ UACR was related to aortic PWV (r=0.43, p<0.001). Mean eGFR was similar between groups but low (<60mls/min) in 29% of each group. Biomarkers of proximal tubular damage (NGAL and KIM-1) standardised for urine concentration were not different between patients and controls. In multiple regression, aortic PWV and oxygen saturations were the independent variables of log₁₀UACR in all subjects and also in patients with COPD alone (other variables entered included MAP, FEV₁, age, gender, BMI, pack years).



Conclusions: There is glomerular damage in patients with COPD, consistent with microvascular damage which is related to aortic stiffness.

P1912

Characteristics and comorbidities associated with pain in people with chronic obstructive pulmonary disease (COPD)

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Background: A recent survey demonstrated that the prevalence of pain in people with COPD was more than twice that in age-matched people without COPD, and pain was ~2.5 times more severe.

Purpose/Hypothesis: To determine the characteristics and comorbidities associated with pain in people with COPD.

Methods: Patients were recruited from respiratory clinics and pulmonary rehabilitation programs. Respondents participated in a mail survey that included: the McGill Pain Questionnaire (MPQ), the Brief Pain Inventory (BPI), a form to list comorbidities (modified from the Charlson Index) and medications.

Results: Sixty-five of 92 COPD patients responded to the survey (70% response rate). They had an FEV₁ of 44±17% pred, a BMI of 27.6 kg/m² and were 74±8 years. Forty-four respondents (67%) self-reported pain. On the BPI, 64% of these

COPD patients had moderate to very severe pain and 73% had moderate to very high pain interference with daily activities. Average pain severity scores on the MPQ and BPI were correlated (r= 0.74). Of 44 COPD patients who experienced pain, 39 (89%) reported ≥ 2 comorbidities and 20 (45%) reported ≥ 4 comorbidities; the most common were musculoskeletal (21%) and circulatory disorders (21%). Twenty-eight (64%) of COPD patients used pain alleviating treatments, the most common were non-prescription pain medications (acetaminophen and ibuprophen [n=18; 64%]) followed by prescription NSAIDs and narcotics.

Conclusions: Moderate to severe pain is common in people with COPD. This pain likely compromises full participation in rehabilitation and the ability to increase physical activity. Musculoskeletal causes appear to be a major contributing factor.