158. Exercise training: new populations, new techniques

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Preliminary results of pulmonary rehabilitation in interstitial lung diseases: A randomised controlled trial B32220095560

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Background: Pulmonary rehabilitation (PR) is an excellent therapeutic option in chronic lung diseases, however there are little data on PR in interstitial lung diseases (ILD).

Aims: To report preliminary 3month outcomes of a randomised controlled trial evaluating the effects of PR on exercise capacity (Six Minute Walking Distance, 6MWD; Peak Work Rate, Wmax), quality of life (SGRQ, CRDQ) and muscle force (QF) in 50 ILD patients over 1 year.

Method: Patients were randomly assigned to receive a PR program or usual medical care. Mean changes in outcomes were compared between the study arms.

Results: 3month data are currently available in 34 patients (table 1). 6MWD and Wmax increased significantly in the PR group compared to the control group (mean differences 67m [95%CI 34 to 101m] (figure 1) and 16W [95%CI 5 to 26W]). An improvement in QOL was also observed (SGRQ -12,5 [95%CI-18 to-7] and CRDQ 17,5 [95%CI 12 to 23]). Improvements in QF between both groups did not reached statistical significance (p=0,06).

Table 1. Baseline characteristics of patients. Data as mean ± SD

	Controls (n=17)	PR (n=17)
Age (y)	65±9	63±12
Gender M/F	7/10	12/5
DLCO (%pred)	41±11	43±15
6MWD (%pred)	78±12	71±14
Wpeak (%pred)	72±27	61±20
QF (%pred)	75±37	77±26
SGRQ (points)	38±17	44±13
CRDQ (points)	86±23	83±15

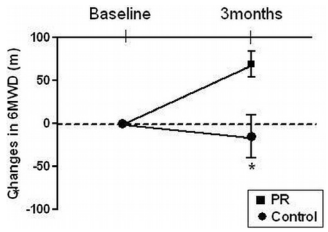

Figure 1

Conclusion: Our data strongly suggest that PR improves exercise capacity and quality of life in patients with ILD.

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Effects of exercise training after lung transplantation: 1 year follow-up of a randomized controlled trial

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In this study we investigated the effects of a 3-months exercise training program that was initiated immediately following hospital discharge after lung transplantation (LTx). Primary outcomes were participation in daily physical activity and physical fitness 1 year after LTx.
Methods: Patients were randomized after hospital discharge to receive either exercise training (n=17) or a control intervention consisting of instructions to be physically active (n=16). Patients were assessed upon hospital discharge following LTx (baseline) and outcomes of interventions were evaluated 1 year later. Comparisons between groups were adjusted for baseline measurements (ANCOVA). Daily activity was assessed with the DynaPort (McRoberts, The Hague, NL) and the SenseWear Monitor (BodyMedia, Pittsburgh, US).
Results: Age, gender distribution (51% female), Type of LTx (21% single LTx), pulmonary function, physical activity and physical fitness were comparable between groups on baseline. Statistically significant differences between groups 1 year after hospital discharge were observed in end-points reflecting physical fitness and daily physical activity.

Comparison between groups 1 year after hospital discharge

	Intervention	Control	p-value
Age (yrs)	59±4	59±6	0.90
FEV1 (% pred.)	92±21	89±25	0.657
6-minute walking distance (m)	559±69	476±75	0.003
Quadriceps force (% pred.)	91±21	71±20	0.009
Walking time (min/day)	84±28	54±30	0.006
Moderate Intense Activity (min/day)	100±68	58±70	0.09

Conclusions: Results of this randomized controlled trial show that supervised exercise training initiated immediately following hospital discharge improves functional recovery up to one year after LTx.

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Comparison of two resistance training protocols on muscle strength, functional capacity and quality of life of stable untrained COPD

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Reduced peripheral muscle strength is associated with exercise intolerance in patients with chronic obstructive pulmonary disease (COPD). The use of elastic tubing (ET) in resistance training has been reported to be a cheaper device and effective method to increase muscle strength. This study compared the effectiveness of two resistance training program after 8 weeks: a conventional (C) and a ET programs on muscle strength, functional capacity and quality of life in COPD patients. We evaluated 34 stable COPD (24 men, aged 62±8.27 years, pack/years index of 71,19±41,12 and FEV1 1,24±0,49) divided into two groups: conventional resistance training (n=17) performed at moderate intensity 60–80% (3×10 RM) and elastic tubing resistance trained at 2–7 sets of repetitions determined individually by resistance to fatigue test. Muscle strength (dynamometer), six-minute walk test (6MWT) and quality of life questionnaire for Chronic Respiratory Questionnaire (CRQ) were assessed. After 8 weeks both protocols showed improvements in muscle strength assessment for all motions made during the protocol ($p<0.05$) and in the performance on the 6MWT (from 427.29±95.03 to 491.64±79.67 and from 384.17±104.97 to 427.17±106.8, p=0.0018 and p=0.0092, EB and C program respectively). The CRQ showed statically significant improvement on dyspnea and emotional function ($p<0.05$) in ET group and in the dyspnea and self-control in C group ($p<0.05$).
Conclusion: Resistance training with ET showed similar results to those found in conventional training, which shows that this device can be used with a more accessible option for resistance training in COPD.

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Non-linear exercise training is the preferred training method in patients with severe COPD

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Methods: COPD patients underwent exercise training 3-times/wk for 12 weeks and were randomized to either NLE [N=36; FEV_1 31±9.2%pred, 61±7.1yr, fat-free mass (FFM) index 15.4±2.6 (kg FFM)/m^2] or combined endurance and progressive resistance training (Spruit et al ERJ 2002) [EPR N=36; FEV_1 33±9.5%pred, 61±5.4yr, FFM-index 15.5±2.3 (kg FFM)/m^2]. NLE: resistance training with varying repetition zones based on maximum load (1RM): strength 1-3, 4-6, 8-10 reps, 50-85%1RM; local muscle endurance 12-15, >20 reps, 30-50%1RM; ergometer training with varying intensity zones (%maximum workload (Wmax) from maximum exercise test: 60%, 65-80%, 80-85%, >85%).
Results: After 12 weeks cycle endurance time at 75%Wmax increased in both groups with significant larger improvements with NLE training (387±158 to 1049±244sec) compared to EPR (384±268 to 631±364sec) $p<0.001$.The NLE group showed significant larger improvements compared to EPR for dyspnea 1.6±1.3 vs 0.8±1.2 and fatigue 1.4±1 vs 0.6±1.2 domains of Chronic Respiratory Questionnaire ($p<0.01$). Both groups showed similar improvements for emotional functioning 0.9±0.9 vs 0.8±1.1 and mastery 1.0±1.2 vs 1.0±1.2.
Conclusion: NLE is the preferred method of exercise training in patients with severe COPD compared to the present guideline based method because of better improvement of both endurance and health-related quality of life.

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Effects of whole body vibration in patients with COPD: A randomized study

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Introduction: Besides conventional resistance training (CRT), whole body vibration (WBV) has been shown to be effective. Effects of WBV in COPD patients have not been assessed so far.
Aim: To compare, the effects of WBV with those obtained by CRT on exercise capacity, muscle force and QoL.
Methods: Patients with COPD, referred for pulmonary rehabilitation, were randomized in one of two training groups. Patients in CRT group performed resistance training on multigym equipment and patients in WBV group trained on a FITVIBE.
Results: 70 patients with COPD, showed at baseline an impaired exercise capacity, muscle force and QoL, no significant differences were seen between groups. Both groups improved the exercise capacity, muscle force and Qol over time. There were no significant differences after training.

	WBV (N=33)		CRT (N=37)	
	Baseline	Change after 12 w	Baseline	Change after 12 w
Age (years)	58 (53–72)		61 (53–66)	
FEV1 (L)	1.2 (0.9 to 2.2)	0 (–0.2 to 0.1)	1.0 (0.9 to 1.3)	0 (–0.2 to 0.1)
BMI (kg/m^2)	24 (22 to 26)	0.4 (–1 to 1.3)*	24 (22 to 29)	0.4 (–0.9 to 0.7)
Max.Load (Watt)	64 (43 to 89)	19 (2 to 25)*	52 (44 to 76)	12 (6 to 18)*
6MWD (m)	427 (310 to 500)	35 (5 to 98)*	350 (294 to 483)	55 (21 to 83)*
QF (Nm)	102 (60 to 119)	19 (–5 to 23)*	87 (55 to 104)	22 (–2 to 44)*
CRDQ (points)	72 (65 to 88)	14 (6 to 26)*	67 (59 to 90)	13 (5 to 18)*

Results were expressed as median (25P-75P); FEV1: Forced Expiratory Volume in one second; BMI: Body Mass Index; 6MWD: 6 Minute Walking Distance; QF: Quadriceps Force; CRDQ: Chronic Respiratory Disease Questionnaire. *$p<0.05$ baseline vs 12 weeks.

Conclusion: WBV is a promising training modality, which yielded the same magnitude of training effects as those obtained with CRT.

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Home-based rehabilitation program for lung cancer patients

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Patients with lung cancer often experience a reduction in exercise tolerance and muscle weakness. Despite the well-recognized effectiveness of pulmonary rehabilitation, few researches have studied its impact in lung cancer patients, particularly among whose awaiting for a lung resection surgery (LRS).
Objectives: To investigate the feasibility of a short home-based rehabilitation program (HBRP) in patients with lung cancer awaiting for a LRS and to determine its effectiveness on exercise tolerance and skeletal muscle strength.
Methods: Ten patients with lung cancer awaiting for a LRS were invited to a

4-week HBRP including moderate intensity aerobic activities (walking and cycling) and muscular training performed three times weekly. Prior to and after the 4-week HBRP, cardiopulmonary exercise test, six-minute walking test (6MWT) and muscle strengh were measured. Patients were asked to complete a diary including adverse events and training information.
Results: No adverse event was reported during the rehabilitation program and 7 patients completed ≥75% of the HBRP. In the latter, the cycle endurance test duration (277±70 Vs 379±165s,p=0.08) and the 6MWT (597±49 Vs 624±39m, $p<0.05$) tended to be, or significatively, improved with training. There was a significant improvement in strength of triceps and hamstrings (4±4kg and 10±9kg $p<0.05$, respectively).
Conclusion: In patients with lung cancer awaiting for LRS, home-based rehabilitation was feasible and induced some physiological gains, such as improved exercise tolerance and muscle strength. This may be clinically relevant, because poor exercise capacity is a strong predictor of postoperative complications in this population.
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Exercise training improves exercise capacity and quality of life in people with dust-related pleural and interstitial respiratory diseases: A randomised controlled trial

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The use of exercise training as a treatment option for people with dust-related pleural and interstitial respiratory diseases has not been evaluated. A randomised controlled trial was conducted to determine whether exercise training improved exercise capacity and quality of life in people with dust-related respiratory diseases compared to usual care. The inclusion criterion was a medical diagnosis of a dust-related respiratory disease including asbestosis, silicosis and asbestos related diffuse pleural thickening. Participants were randomised to exercise training (eight weeks, three times per week) or usual care (control). Exercise capacity (six-minute walk test and endurance cycle test) and quality of life (St George's Respiratory Questionnaire) were measured at baseline and at eight weeks by a blinded assessor. Thirty-six of 37 participants completed the study (mean (SD) age 71 (7) years, FVC 86 (20)% predicted, D_LCO 56 (14)% predicted). Compared to usual care, exercise training significantly increased six-minute walk distance (mean difference 50 metres, 95% CI 29 to 71), endurance cycle time (mean difference 225 seconds, 95% CI 92 to 359) and significantly improved the St George's Respiratory Questionnaire Total score (mean difference -7, 95% CI -12 to -1). Improvements in exercise capacity and quality of life reached the minimum clinically important difference established for chronic obstructive pulmonary disease. Exercise training is an effective treatment option for improving exercise capacity and quality of life in people with dust-related pleural and interstitial respiratory diseases.

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Referrals, attendance, delivery, and response in an integrated pulmonary rehabilitation pathway

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Introduction: Pulmonary rehabilitation is the most effective COPD treatment in improving quality of life. Access to PR is variable and rates of completion are relatively low at 35%. In this study of an integrated system-wide PR service we report on outcome, referral rates, and predictors of attendance and completion.
Method: Routine data were gathered prospectively on demography, rolling or stand alone courses, spirometry, walking distance, quality of life, BMI, and referrer, in patients referred for PR between April 2008 and October 2010. Predictors of attendance and course completion were sought using multiple regression.
Results: 1563 patients were referred, 1117 attended for assessment and 593 (38%) completed a PR course. Referred patients were of similar age and sex as the COPD population from which they were referred but were more severely affected. All PR programme types showed significant improvements in walking distance and quality of life, reaching the minimum clinically important difference. Twice weekly courses were more effective. Patients who were depressed (OR 0.75, CI 0.63-0.90), had a higher MRC dyspnea score (OR 00.76, CI 0.63-0.91), were from lower socio-economic groups (OR 0.98,CI 0.97-0.99), or were referred by GPs (OR 0.57, CI 0.35-0.94) were less likely to complete courses. Drop-out was not affected by venue, once or twice weekly courses, or rolling or stand-alone programmes.
Conclusions: Pulmonary rehabilitation is effective in real-world clinical practice achieving results comparable to clinical trials. We have identified patients in whom special intervention may be required to overcome the obstacles that place them at greater risk of not completing PR.