

## 382. New adjuncts and modalities in pulmonary rehabilitation

### P3519

**Expiratory muscle activity and nasal expiratory pressure during reverse sniff**  
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The evaluation of expiratory muscle strength is of clinical importance in patients with neuromuscular respiratory disease. Maximal expiratory pressure (MEP) has achieved wide acceptance as a simple non-invasive measurement of expiratory muscle strength. However, MEP measurement is difficult for neuromuscular disease patients. In this study, we measured expiratory muscle activity during reverse sniff, a maneuver akin to "blowing your nose", and we analyzed the relationship between expiratory muscle activity and reverse sniff nasal expiratory pressure (RSNEP).

In 5 healthy subjects, mean age 21.2 yrs, weight 69.2 kg, height 176.6 cm, we inserted fine wire electrodes into transversus abdominis muscle (TA) using high-resolution ultrasound. RSNEP was measured through a catheter that occluded one nostril, while the contralateral nostril remained open. Subjects performed short, sharp, maximum and variable intensity of reverse sniff, beginning from FRC while standing. TA EMG activity was expressed as percent of maximum EMG (%EMGmax) throughout respiratory and non-respiratory maneuvers. Mean MEP was 80.8±0.6 cmH<sub>2</sub>O. Mean maximum RSNEP was 34.9±18.7 cmH<sub>2</sub>O, and mean TA EMG activity at maximum RSNEP was 73.9±23.6%EMGmax. TA EMG activity increased with stepwise increments in RSNEP. In every subject, the linear relationship between RSNEP and TA EMG activity was significant ( $r = 0.56-0.98$ ,  $p < 0.05$ ).

We conclude that RSNEP corresponds to the activity of the expiratory muscle transversus abdominis, and that this simple maneuver may be useful for assessment of expiratory muscle strength.

This study was approved by Kitasato university human ethics committee. This work was supported by MEXT of Japan KAKENHI (2350061).

### P3520

#### Inspiratory muscle training (IMT) as an adjunct to pulmonary rehabilitation (PR) in patients with severe COPD

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**Background:** Up to now there is insufficient evidence for IMT as an adjunct to PR in patients with COPD.

**Method:** From November 2011 until January 2012 in our clinic 198 COPD patients underwent a 3-week inpatient PR, including 90 with COPD III-IV. Of these patients the control group (CG, n=38) received standard PR, consisting among other things of physical training, education, breathing therapy and psychosocial support. The intervention group (IG, n=52) underwent an additional IMT with at least 19 sessions. Primary outcome was P<sub>Imax</sub>. Statistics are based on data that resulted in complete data samples at baseline (t<sub>0</sub>) and end of PR (t<sub>1</sub>).

**Results:** (mean±SD)

In the IG P<sub>Imax</sub> increased by 27%, in the CG only by 11%. There was a significant intergroup difference ( $p < 0.0021$ ). The improvements in 6MWD, MRC, FEV<sub>1</sub> and CAT tended to be better in the IG, but these differences didn't reach statistical significance.

**Discussion:** Considering all COPD patients (IG + CG) the PR program resulted in significant improvement in CAT, 6MWD and MRC score among others. The IG tended to reach greater improvements in these parameters than the CG, especially in P<sub>Imax</sub>.

**Conclusion:** IMT appears to be a promising additional therapeutic module to PR.

Abstract P3520 – Table 1

	CG (PR)		IG (PR+IMT)	
	t <sub>0</sub>	t <sub>1</sub>	t <sub>0</sub>	t <sub>1</sub>
PI max [kPa]	6.39±2.11	7.10±2.43; +0.71; p=0.0136	6.14±2.33	7.78±2.43; +1.64; p=0.0000
6 MWD [m]	381.6±112.8	419.3±120.2; +37.3; p=0.0001	384.9±115.6	433.5±109.2; +48.6; p=0.0000
MMRC Dyspnoea-score [0-4]	2.74±1.24	2.56±1.44; -0.18; p=0.2234	2.94±1.37	2.18±1.46; -0.76; p=0.0000
FEV <sub>1</sub> [l]	1.39±0.42	1.45±0.44; +60 ml; p=0.047	1.28±0.46	1.43±0.54; +150ml; p=0.0000
CAT (COPD assessment test) [0-40]	21.93±6.40	19.79±7.15; -2.14; p=0.0437	22.12±6.25	18.39±6.63; -3.73; p=0.0001

### P3521

#### Predictive factors of survival in amyotrophic lateral sclerosis patients with respiratory dysfunction

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**Background:** Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disorder that causes severe respiratory dysfunction which is the major cause of death. Early management of respiratory symptoms may improve outcomes and survival.

**Aim:** Describe survival of patients with ALS and respiratory dysfunction and identify predictive factors of survival.

**Methods:** Retrospective analysis of patients with ALS evaluated in an outpatient setting. Ventilatory support data was screened. Kaplan-Meier survival analysis was performed and predictive factors were evaluated by Cox multivariate regression.

**Results:** 60 patients (25 females) with a median age of 64.5 years (range 34-80) were analyzed. At presentation, 33 patients (55%) had slow bulbar-onset and 27 (45%) rapid bulbar-onset. Non-invasive ventilation (NIV) was initiated in 52 patients (86.7%), with a mean vital capacity of 1698.0±768.0 L and 22.0±40.8 months after diagnosis. Mean duration of NIV was 19.6±23.7 months. Mechanical assisted cough was used in 23 patients (38.3%). Gastrostomy was performed in 21 patients (17 rapidly bulbar) and tracheostomy in 10 (9 rapidly bulbar) after a mean time of 13.6±17.0 months under NIV. The 5-year survival was 48%. The median overall survival and survival after respiratory muscle aids initiation was significantly higher in slowly bulbar patients compared with rapidly bulbar ( $p=0.03$  and  $p < 0.01$ , respectively). In multivariate analysis, predictive factors of survival were younger age, slow bulbar-onset, and early NIV initiation.

**Conclusion:** Survival may be prolonged in patients with ALS and respiratory dysfunction with early NIV initiation. Age and bulbar onset have significant negative impact on survival.

### P3522

#### Short-form Sun-style Tai Chi as an exercise training modality in people with COPD: A randomised controlled trial

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The aims of the study were, in people with COPD to: determine the effect of short-form Sun-style Tai Chi (SSTC) compared to usual medical care on exercise capacity, balance and quality of life (Part A) and investigate the exercise intensity of SSTC (Part B).

**Methods:** Part A was a single blinded, randomised controlled trial with concealed, random allocation of participants to either the Tai Chi Group (TCG) or Control Group (CG) (usual medical care only) after confirmation of eligibility. Participants in the TCG trained for one hour, twice weekly for 12 weeks at a moderate dyspnoea or exertion level (score = 3 in a 10 point scale). Part B was a repeated measures design where participants who had completed training in TCG performed incremental shuttle walk test and SSTC while wearing a portable metabolic system. Exercise intensity of SSTC was determined by the percent of oxygen consumption (VO<sub>2</sub>) reserve.

**Results:** Of 42 participants (mean (SD) age 73 (8) years, FEV<sub>1</sub> 59 (16)% predicted), 38 completed Part A of the study (19 in each group) and 15 completed Part B. Compared to control, SSTC significantly increased incremental shuttle walk distance (mean difference, 95% CI 55 metres, 31 to 80) and endurance shuttle walk time (384 seconds, 186 to 510); reduced medial-lateral body sway in semi-tandem stand (-12.4 mm, -21 to -3); and increased total score on the chronic respiratory disease questionnaire (11 points, 4 to 18). The exercise intensity of SSTC in COPD was 53 (18%) of VO<sub>2</sub> reserve.

**Conclusion:** Short-form Sun-style Tai Chi was an effective training modality in people with COPD and the exercise intensity was moderate which met the recommendation for training in COPD.

## P3523

**Breathing retraining in COPD: A Cochrane review**

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**Background:** Breathing retraining aims to alter respiratory muscle recruitment in order to reduce dyspnoea and improve respiratory muscle performance. Our aim was to determine whether breathing retraining is safe and beneficial for people with COPD.

**Method:** The Cochrane Airways Group Specialised Register of trials and the PEDro database were searched to identify randomised controlled trials comparing breathing retraining to no breathing retraining or another intervention in COPD. Primary outcomes were dyspnoea, exercise capacity and quality of life; secondary outcomes were adverse events.

**Results:** 16 studies involving 1104 participants with mean FEV1 30-51% predicted were included. Few studies reported allocation concealment, assessor blinding or intention to treat analysis. Two studies showed improvement in 6-minute walk distance after 3 months of yoga involving pranayama timed breathing techniques (mean difference 45m, 95% CI 29-61m), with similar improvements in single studies of pursed lip breathing (mean 50m) and diaphragmatic breathing (mean 35m). Effects on dyspnoea and quality of life were inconsistent. Two studies reported that addition of ventilation feedback (VFB) to exercise training did not improve dyspnoea, exercise tolerance or quality of life more than exercise training alone, and one study showed that VFB alone was less effective than exercise training for improving exercise capacity. No adverse effects were reported.

**Conclusion:** Breathing retraining in COPD is safe and improves exercise capacity when compared to no intervention; however there are no consistent effects on dyspnoea or quality of life. Breathing retraining may not have additional benefits beyond that offered by exercise training for people with COPD.

## P3524

**Tai Chi, like it or not? The COPD experience**

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**Aim:** To determine the experience of people with COPD to Tai Chi. Methods: Participants, who finished 12 week short-form Sun-style Tai Chi (SSTC) training program, completed a survey of eight questions. Each question was answered by putting a stroke on a 10 cm Visual Analogue Scale with anchors at either end, ranging from the negative of the question on the left to the positive of the question on the right. The number of supervised training sessions attended and the number of days unsupervised home training practised was reported.

**Results:** Twenty-three participants completed the survey, mean (SD) age 74 (8) years, mean FEV<sub>1</sub>% predicted 59 (17)%. Participants attended 21 (2) supervised training sessions out of a possible 24 sessions and performed 4 (1) days per week of unsupervised home training. The Table below indicates the results of four survey questions.

Tai Chi survey questions (score out of 10 cm)	Mean (SD)
How enjoyable was your Tai Chi exercise program	8.9 (1) cm
How helpful was the Tai Chi program at improving	
a) Physical fitness	7.9 (2) cm
b) Balance	7.9 (1) cm
c) Shortness of breath	7.0 (2) cm
How hard were the following parts of the Tai Chi program	
a) Remembering the movements	5.3 (3) cm
b) Balancing during Tai Chi movements	6.5 (2) cm
c) Coordinating your breathing and the Tai Chi movements	7.0 (2) cm
Would you continue Tai Chi training as your regular exercise regime	8.4 (2) cm

**Conclusion:** Participants reported that SSTC was a highly enjoyable exercise which they perceived improved their physical fitness, balance and shortness of breath. Compliance with supervised and unsupervised training was high. Importantly, participants indicated that they would continue Tai Chi as their regular exercise regimen.

## P3525

**Effects of Tai Chi Qigong exercise training on asthma control**

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Though exercise training increased exercise capacity in asthma, its effect on asthma

control has not been well described. This study aims at exploring the impact of Tai Chi Qigong(TCQ) exercise training on asthma control.

**Methods:** This prospective, case-control study recruited adult asthmatics with pre-bronchodilator FEV<sub>1</sub> of  $\leq 75\%$  predicted. In addition to the self-monitored peak-expiratory flow rate(PEFR) and Asthma Control Questionnaires(ACQ), patients in TCQ and control groups were assessed at 0, 4 and 10 weeks. These included 6-minute walking distances(6MWD), pre and post-6MW spirometries and dyspnea indices(Borg), transitional dyspnea indices(TDI), Saint George Respiratory Questionnaires(SGRQ) and maximum inspiratory pressure(MIP). TCQ exercise trainings were provided to the TCQ group during week 4-10.

**Results:** There were 29 and 8 patients in TCQ and control groups respectively. After TCQ training, the TCQ group demonstrated significant improvements in asthma control, i.e. ACQ (1.38 $\pm$ 0.83 vs 1.05 $\pm$ 0.81,  $p=0.011$ ) and PEFR variability(%) (18.10 $\pm$ 12.87 vs 12.8 $\pm$ 11.39,  $p=0.007$ ); 6MWD(meters) (461.66 $\pm$ 44.83 vs 478.28 $\pm$ 57.25,  $p=0.0378$ ); MIP(-cmH<sub>2</sub>O) (81.07 $\pm$ 27.62 vs 91.1 $\pm$ 24.71,  $p<0.001$ ); Borg changes after 6MW (2.97 $\pm$ 1.57 vs 2.03 $\pm$ 1.15,  $p=0.0297$ ) and TDI (10.45 $\pm$ 2.26 vs 14.24 $\pm$ 4.06,  $p<0.0001$ ). Neither of these parameters improved with time in the control group. SGRQ improved in the TCQ group (25.02 $\pm$ 15.11 vs 21.13 $\pm$ 15.48,  $p=0.05$ ), but deteriorated in the control group (16.32 $\pm$ 11.81 vs 24.91 $\pm$ 17.03).

**Conclusions:** TCQ exercise training improved asthma control. This finding and the associated improvements in exercise capacity, muscle strength and dyspnea signified that TCQ training could be considered an effective, adjunctive asthma-therapy.

## P3526

**Effect of Chinese Tai chi exercise in COPD patients with moderate airflow limitation**

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**Introduction and background:** Recently, several small sample studies demonstrated the effectiveness of Chinese Tai chi exercise in people with COPD. However, the effect Tai Chi have not been specially evaluated in in COPD patients with moderate airflow limitation.

**Aims and objectives:** To evaluate the effectiveness of a 6-week Chinese Tai chi exercise in COPD patients with moderate airflow limitation.

**Methods:** Thirty COPD patients with moderate airflow limitation were recruited. All patients received standard COPD care and were taught tai chi exercise for 1 hour, thrice a week, which include gentle movement, relaxation and breathing techniques. St. George Respiratory questionnaire, lung function test and 6-min walk test were performed at the baseline and at the end of 6 weeks. Differences in pre-Tai chi versus post-Tai chi scores were evaluated using paired t-tests.

**Results:** Statistically significant improvements were observed on the St. George Respiratory questionnaire ( $p<0.01$ ) and FVC ( $p<0.05$ ). No changes were observed on FEV<sub>1</sub> and 6-min walk distance.

**Conclusions:** Tai chi exercise when practiced by COPD patients with moderate airflow limitation results in improvement in the quality of life and FVC on a 6 week-term basis, which provided an alternate form of exercise training which does not require exercise equipment.

## P3527

**Buteyko technique (BT) as an adjunct in pulmonary rehabilitation (PR) in patients with asthma and dysfunctional breathing – First results of an ongoing prospective controlled study**

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**Background:** BT is recommended as an additional therapeutic module in asthmatics. So far there is inconclusive evidence of the effectiveness of BT as part of standard PR.

**Method:** From November 2011 until January 2012 in our clinic 258 asthmatics underwent a 3-week inpatient PR. Of these 36% were characterised by dysfunctional breathing (Nijmegen Questionnaire, NQ $\geq 23$ ). Of those, the control-group patients (CG; n=21) received standard PR consisting among others of physical training, patient education, breathing therapy and psychosocial support. The intervention group (IG, n=39) additionally underwent at least 6 Buteyko sessions. The indication for enrolling patients to the BT was decided upon by the responsible physician. Primary outcome was the total score of the asthma control test (ACT), secondary outcome was the NQ-score. Statistics are based on data that resulted in complete data pairs of ACT and NQ at baseline (t0) and end of PR (t1).

**Results:** (mean $\pm$ SD):

	IG (PR+BT)		CG (Standard PR)	
	t <sub>0</sub>	t <sub>1</sub>	t <sub>0</sub>	t <sub>1</sub>
ACT [5-25]	14.1 $\pm$ 5.1	18.9 $\pm$ 3.9; +4.8; $p=0.0000$	15.2 $\pm$ 5.3	17.9 $\pm$ 4.6; +2.7; $p=0.0194$
NQ[0-64]	29.8 $\pm$ 6.4	18.4 $\pm$ 9.0; -11.4; $p=0.0000$	28.7 $\pm$ 5.8	21.1 $\pm$ 8.4; -7.6; $p=0.0001$

Between groups: ACT  $p=0.4483$ ; NQ  $p=0.0784$ .

**Discussion:** Considering all asthmatics with dysfunctional breathing, our PR program resulted in significant improvements in ACT (+4.4) and NQ (-8.8). The IG

tended to reach greater improvements in ACT (especially in items 2, 3 and 4, i.e. shortness of breath, asthma symptoms at night, rescue inhaler) and NQ than the CG, but these trends weren't significant between groups.  
**Conclusion:** BT could be a promising adjunct to PR.

**P3528**

**Speech and language therapy effectiveness in vocal cord dysfunction management**

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**Introduction:** Vocal cord dysfunction (VCD) "paradoxical vocal cord adduction" is misdiagnosed as asthma, resulting in over medication and increased hospital admissions. There is anecdotal evidence of the benefits of Speech Therapy (SLT) in management of VCD<sup>1</sup>. This study explored the impact of SLT on symptom control and hospital admission prevention.

**Method:** One hundred consecutively referred patients (m:f ratio=1:5, mean age 45yrs, range = 16-77) underwent detailed assessment at a tertiary VCD clinic with nasendoscopy confirmed VCD. N= 81/100 (81%) had physician-diagnosed asthma, 45/81 (56%) required oral steroids. Patients received four sessions of SLT. Treatment effectiveness was assessed pre/post therapy, using in-house self-rated, VCD symptoms score (range 0- 25). N=21/100 (21%) patients reported hospital admission with dyspnoea in the year prior to assessment. Data were analysed to determine number of hospital admissions one year pre/post SLT intervention.

**Results:** Differences pre/post therapy were assessed using Wilcoxon Signed Ranks Test. Significant reduction in patient-reported symptoms was noted post SLT; pre vs. post therapy; mean (SD) = 17.88 (3.10), 8.16 (4.13) respectively, p<0.0001.) Reduction in hospital admissions was noted in the year post SLT intervention; pre vs. post therapy mean (SD) = 10.7 (8.8), range = 2-30; 1.5 (2.2), range 0-6, p<0.0001).

**Conclusion:** SLT significantly improves symptom control and reduces hospital admissions in VCD. The availability of effective therapy prompts the need to increase awareness of vocal cord dysfunction.

**Reference:**

[1] Morris, Allan and Perkins (2006). Vocal Cord dysfunction: Etiologies and treatment. *Clin Pulm Med.* 13(2): 73-86.

**P3529**

**The long-term effect of ambulatory oxygen (AO) in normoxaemic COPD patients who participate in pulmonary rehabilitation (PR) and desaturate during exercise. A randomised study**

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**Introduction:** The long-term benefits of AO in combination with PR in COPD patients experiencing exertional desaturation have not been studied.

**Patients and methods:** Normoxaemic COPD who participated in PR and desaturate >4% and below 90% during endurance shuttle walk test (ESWT) were randomised to control (n=23) or AO 2 L/min. from a portable oxygen concentrator (n=22) to be used during physical activity.

PR consisted of supervised training 20 wks + unsupervised daily training at home and then 13 wks without supervised training.

**Results:** Only 45 of 165 eligible patients wanted to participate. Mean FEV<sub>1</sub>=32% and MRC=4.5 (3-5).

Supplemental oxygen improved satO<sub>2</sub> during ESWT by 2.3% (p<0.001). In the study period of 33 wks, 10 and 6 patients withdraw from the AO group and control group, respectively. Patients spent in average 7.9 hours/week on oxygen. PR improved ESWT and SGRQ after 7 wks, and these gains were remained at 33-wks evaluation. There were no differences between the AO group and controls.

Effect of PR on ESWT and SGRQ in patients on AO and room air (controls), respectively

Effect parameter	AO	p-level	Controls	p-level	p-level for difference between groups
Change in ESWT, 0-7 weeks, sec.	186 (213)	<0.001	169 (253)	<0.001	0.75
Change in SGRQ, 0-7 weeks, units	-1.8 (8.0)	0.38	-3.2 (7.2)	0.05	0.80
Change in ESWT, 0-33 weeks, sec.	223 (277)	0.004	241 (402)	0.015	0.32
Change in SGRQ, 0-33 weeks, units	-3.6 (7.9)	0.16	-4.5 (11.3)	0.16	0.91

**Conclusions:** AO provided no additional beneficial effects in patients with COPD participating in pulmonary rehabilitation and experiencing exertional desaturation without severe resting hypoxaemia.

**P3530**

**Preliminary results of noninvasive ventilation during a pulmonary rehabilitation program in patients with COPD**

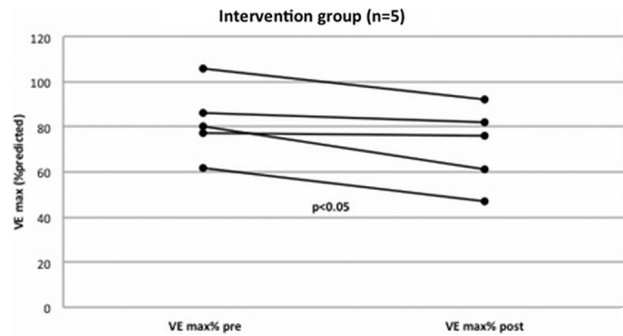
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**Introduction:** Exercise training at higher intensities seems to result in a better training effect. However, in some patients with COPD this intensity is limited due to decreased ventilatory pump capacity. Noninvasive ventilation (NIV) relieves the work of breathing, so higher intensities are reached and could result in a better exercise tolerance.

**Objective:** Analysis of the effects of Bi-pap during an exercise training program in COPD on lung function and maximal exercise capacity.

**Methods:** 8 patients were randomized in a NIV (n=5) or control group (n=3). Patients trained with or without NIV for a period of 6 weeks. Lungfunction and exercise tests were taken before and after 6 weeks. NIV was set on I/E pressure of 8/4 and 1 or 2 leakage valves were added for patients comfort.

**Results:** Ventilation at maximal tolerated load (VE max) changed significantly in the experimental group and did not reach significance in the control group compare to baseline (p=0.043). In the same test setting there was no significant drop in heart rate.



**Conclusions:** Noninvasive ventilation during exercise training may change ventilation at maximal tolerated load and heart rate after 6 weeks. This allows patients to train at a higher level and achieve better training results because of a better ventilatory adaption during exercise.

**P3531**

**Benefits of a new device for inspiratory muscle training in COPD**

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In chronic obstructive pulmonary disease (COPD), inspiratory muscle weakness may occur as a result of the combined effects of increased work of breathing, malnutrition, hypercapnia/hypoxemia and others. The benefit of inspiratory muscle training (IMT) depends on patients phenotype but also on the type exercise methods.

The aim of the study was the evaluation of medium (3 months) and short-term (at the end of a pulmonary rehabilitation program, PRP) effects of IMT using the TrainAir<sup>®</sup> electronic system.

47 patients with COPD (GOLD stage III, IV) without any previously PRP were divided in 2 groups. Both groups followed one month a comprehensive PRP, but to the group of patients that initially presented lower values of the respiratory maximal pressures IMT was added. Patients' assessment consisted of: spirometry, maximum inspiratory and expiratory pressures (MIP, MEP), 6-minute walk test (6MWT), body composition, MRC scale, and COPD Assessment Test (CAT).

Our results demonstrated in both groups the increase of exercise capacity on short and medium term (p=0.025) measured by the distance expressed in meters walked to 6MWT as compared to the initial value (500±37 and 488±46 vs. 457±51 for the IMT group; 492±99, and 479±87 vs. 452±105 for the control group). IMT significantly reduced the difference between groups for MIP (kPa) (from 2.91±0.74 to 2.35±0.75, p=0.002), and the effect had been maintained over the medium term (p=0.016). Also, CAT score reduces more significantly on medium term in the presence of IMT (from 21.27±4.13 to 16.91±2.21 vs. from 22.25±2.19 to 19.50±1.85 in control group, p <0.001).

In conclusion, in COPD patients, in addition to the improvement of MIP, IMT was beneficial for patients' symptomatology.

**P3532**

**The impact of PEEP, CPAP and BiPAP in post-exercise recovery from dyspnea in COPD patients**

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Dyspnea is the chief complaint of COPD patients limiting their ability to perform activities of daily living reducing quality of life. To relieve dyspnea, patients may try short acting bronchodilators, pursed lip breathing or physically stop activity. In this study we evaluated different types of positive airway pressure (PAP) therapies to help COPD patients recover from dyspnea following activity.

The aim of this study was to determine if PAP therapies would reduce the patient's recovery time from a Borg of 7 to their baseline Borg following a standardized exercise regimen. 10 COPD patients classified as Gold Stage 2, 3 or 4 with an FEV1 less than 55% were evaluated. These patients were subjected to a baseline test where they recovered without any device to the baseline Borg. During 2 successive visits, during the recovery phase, patients were asked to try 6 different types of PAP therapy. This included 2 levels of PEEP, CPAP or BiPAP therapy. Borg scores were measured every minute during exercise & every 30 seconds during recovery phase. Time to recover was measured with other physiological parameters.

Results indicate that all forms of PAP therapy tested aided the patients to recover fast. Among the 3 tested therapies, BiPAP provided the shortest recovery time improving the time to recover to baseline by 40±9%. CPAP was 2nd best at 27±16%. PEEP provided 26±13% improvement.

These findings indicate that PAP therapy helps COPD patients recover from shortness of breath following activity. The impact of these therapies on other physiological endpoints (Heart Rate, Respiratory Rate & SpO<sub>2</sub>) are being analyzed. These are being further tested to confirm the findings.

### P3533

#### Efficacy of Nordic walking in rehabilitation of patients with COPD:

##### Preliminary data

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**Background:** Nordic walking is a well-known activity which combines sport and wellness. It was conceived in Scandinavian countries as summer training for Nordic ski athletes and it is extremely simple to perform. However, there are very few studies which evaluated the use of Nordic walking in the field of physical rehabilitation. The aim of the study is to assess the efficacy of Nordic walking in patients with COPD.

**Methods:** We enrolled 11 patients with COPD (mean age 64,2±1,3) in a stable phase of their disease and randomized them into two groups. The study group was composed by 5 patients who performed a daily 30 minutes session of Nordic walking for 5 days a week for a total period of 3 weeks. The control group was composed by 6 patients who were treated with traditional rehabilitation (selective training of arms and legs) for the same period as study group. Both the groups performed educational intervention and exercises for respiratory coordination. The two groups of patients performed spirometry, blood gas analysis, 6 minutes walking test, MRC, BDI/TDI, EuroQoL and Saint George test before and after the rehabilitation period.

**Results:** Patients in the study group had a significant improvement in terms of post training 6 minutes walking test, MRC, EuroQoL and Saint George (p<0.05) whereas patients in the control group had only an improvement in MRC (p<0.05).

**Conclusions:** This preliminary study shows the efficacy of nordic walking in reducing dyspnoea, improving physical performance and quality of life in a small group of patients with COPD. If confirmed in larger studies nordic walking could become part of the training schedules for COPD rehabilitation.

### P3534

#### Effectiveness of pulmonary rehabilitation including occupational therapy (OT) on the prognosis of patients with COPD

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**Aim:** We reported that the appropriate pulmonary rehabilitation including OT according to the pathophysiology of patient with COPD improved his or her prognosis in the historical control study. In this prospective observational study, we investigated the effectiveness of our pulmonary rehabilitation program on the survival prognosis of COPD patients with long-term oxygen therapy (LTOT).

**Method:** The subjects were 72 patients with COPD (male: female, 65:7, 69.6±6.8 years old, FEV1 0.76±0.29 L, % predicted 31.6±11.0%, FEV1/FVC 0.38±0.10) who underwent LTOT between 1995 and 2005. All patients were on medication and underwent CPET before pulmonary rehabilitation program. We decided the safe range using the data of CPET, and it was represented by each patient's Spo<sub>2</sub> and pulse rate when a using pulse oximeter during exercise training and in daily life. All patients have been monthly followed up in our specialized clinic for the patients with LTOT.

**Result:** Forty-six patients died during the follow-up period. Causes of death were the respiratory failure in 20 cases (43.5%), malignant diseases in 10 cases (21.7%) and other diseases in 16 cases (34.8%). The overall 50% survival time was 9.0 years after LTOT. The 50% survival times in patients with less than 30% of FEV1% predicted, 11ml/kg/min of peak oxygen uptake were 8.7 years and 8.1 years after CPET, respectively.

**Conclusion:** The appropriate pulmonary rehabilitation including OT according to the pathophysiology of each individual patient with COPD decreased the number of death caused by respiratory failure and greatly improved the prognosis of patients with very severe COPD as compared to the previous studies.

### P3535

#### Respiratory muscles trainings as physical rehabilitation in patients with chronic obstructive pulmonary disease and myocardial infarction

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**Background:** Patients with MI and concomitant COPD often can't take part in physical trainings as a part of cardiac rehabilitation.

**Purpose:** To study the effect of respiratory muscles trainings (RMT) in patients with acute MI and COPD.

**Methods:** 87 patients were randomized to either an exercise training group (EG) or to a control group (CG). Patients were on their 5-7 day of MI. The EG participated in a RMT with gradual increase of inspire and expire resistance. RMT were held with the use of Threshold IMT and PEP devices. RMT were started at the hospital on the 5-7th day after MI and were continued for 1 year at home by patients themselves.

**Results:** In 1 year the distance of 6 minute walk test increased significantly in EG (285±8,7 m vs 275,3±9,28 m, p<0,01). VO<sub>2</sub>peak also increased significantly in EG (6,84±1,55 vs 4,61±1,16 ml/kg/min, p<0,01). RMT helped to stabilize mean pulmonary pressure (MPP) (35,4±7,7 mm Hg in TG vs 40,7±9,2 mm Hg in CG, p<0,05). There was a statistically significant increase in the maximal inspiratory mouth pressure in most of patients (5,6 kPa ± 0,8 vs 4,1 kPa ± 1,1; p < 0,01). Health related quality of life (HRQL) increased in both groups, but in EG patients it grew significantly higher according to SGRQ and SF-36. In a year there were no lethal outcome in both groups. EG patients had significantly less hospitalizations because of HF progression (7,8% in EG vs 14,6% in CG) and pneumonias (2,1% vs 15,3%).

**Conclusion:** RMT in patients with MI and COPD can be started at their acute period. It improves physical capacity, stabilize MPP, increase HRQL and decrease number of hospitalizations during first year after MI.

### P3536

#### Comparison of the effects of the diaphragmatic breathing exercise in rehabilitation to COPD subjects with normal and high body mass index

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**Background:** COPD rehabilitation is a coordinated program of exercise, disease management training, and counselling that can help COPD patients to stay more active and improve to carry out patient's day-to-day activities. COPD is a heterogeneous disease with a mixture of clinical and functional phenotypes, hence individualization of action strategies, such as pulmonary rehabilitation is very important.

**Aim:** To compare the effects of diaphragmatic breathing exercise technique in improving quality of the life in COPDs with normal and increased BMI

**Material and method:** We assessed 122 subjects with severe COPD, with grave smoking experience more than 20 yrs, and more than 15 cigarettes per day, with BMI more than 30. An equal number of COPDs, matched by COPD stage, sex, age, smoking experience, but with normal BMI, were evaluated like controls. All (examined group and controls) were educated how to use diaphragmatic breathing rehabilitation technique, and they practice it 3 times per day. Before study they could not walk more than 30 meters, and had dyspnoea with shortness of breath. Follow up period was 12 months.

**Results:** Our results show fantastic significant improvement of the quality of life especially in increased BMI group. The walking distance without dyspnoea was our criteria for assessment. After rehab, in group with augmented BMI the walking distance of at least 300 meters without symptoms was represented at 108 subjects (88,5%) vs. 52 (42,6%) in COPDs with normal BMI, (P < 0.05).

**Conclusion:** Our results suggest that BMI may play role in the breathing exercise rehab program in COPD patients.

### P3537

#### Change of breathing pattern after breathing assist technique and pursed-lip breathing intervention

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**Background:** The general pattern of breathing after breathing assist technique (BAT) and pursed-lip breathing (PLB) has never been reported.

**Aim:** The aim of this study was to evaluate the pattern of breathing after BAT and PLB using a portable sleep recorder (PSR: SAS2100 by NIHON KOHDEN).

**Methods:** Five patients with pulmonary disease (2 females and 3 males, mean ± SD age 81.8±1.8) participated in this research. BAT assists during expiration. Participants performed BAT for 10 min and training PLB for 10 min, 5 times a

TUESDAY, SEPTEMBER 4TH 2012

week for 8 to 56 days. We evaluated the breathing pattern by PSR, respiratory rate (RR), 6-minute distance (6MD), and oxygen saturation (SpO<sub>2</sub>) before and after these programs.

Case A: Vital Capacity (VC) 0.94L (%VC 44.8%), Forced Expiratory Volume in one second (FEV<sub>1.0</sub>) 0.52L (%FEV<sub>1.0</sub> 37.4%).

Case B: VC 2.34L (%VC 80.1%), FEV<sub>1.0</sub> 0.65L (%FEV<sub>1.0</sub> 37.4%).

Case C: VC 1.73L (%VC 60.1%), FEV<sub>1.0</sub> 0.57L (%FEV<sub>1.0</sub> 34.3%).

Case D: VC 2.17L (%VC 75.9%), FEV<sub>1.0</sub> 0.58L (%FEV<sub>1.0</sub> 35.6%).

Case E: VC 1.37L (%VC 61.6%), FEV<sub>1.0</sub> 0.96L (%FEV<sub>1.0</sub> 73.2%).

**Results:** The average height of waveforms of the breathing pattern increased about 3 times. 6MD in 2cases and SpO<sub>2</sub> in 3cases increased in this study; however, the 3 other cases of 6MD and 2 other cases of SpO<sub>2</sub> remained unchanged. Additionally, RR decreased in 4 cases. Since the start of the program, changes in the breathing pattern from mouth to nose breathing were observed in a case.

**Conclusions:** This study revealed that BAT and PLB resulted in a decrease of RR and a change in the breathing pattern; furthermore, after this program, changes from mouth to nose breathing were observed.

### P3538

#### Consumed by breathlessness – A critical interpretative synthesis

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**Background:** COPD is characterised by acute exacerbations (AE) often prompting hospital admission. The application of The Common Sense Model suggests that scrutinising the reported experiences of AE and increasing understanding of appraisals of AE may suggest ways to target interventions.

**Methods:** A systematic review was conducted. The terms: exacerbate\* OR hospital\* AND “Chronic obstructive” OR emphysema OR bronchitis AND interview\* OR qualitative were used to search electronic databases. Inclusion criteria included: primary research published in English of the patient’s experience of an AE COPD, using qualitative methodologies. 8 full text papers were included. Data were extracted by 3researchers and constructs elicited by 2researchers via Reciprocal Translational Analysis.

**Findings:** Themes reflected 3 stages of understanding an AE: 1. *Acute effect* - intense emotions, somatic awareness, need for rescue. 2. *Recurrent impact* –ongoing beliefs and behaviour, life interrupted. 3. *Systems engagement* - help-seeking, faith in the professional.

**Conclusions:** Patients are fearful of their symptoms, this prompts constant vigilance and increased passivity. Targeted interventions that acknowledge intense fear and shape appraisals and acceptance may reduce distress and improve focus of self-management messages.