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period of follow-back before HC); intensive care admissions (IA) was 0.3 ± 0.5 nr/pt/year (while it was 0.9 ± 0.5 nr/pt/year during the same period of follow-back).

The presented data are consistent with a positive influence of HC on the clinical management in CHRF patients with hypercapnia. A possible cost saving could be also supposed. A revision of data from the Lombardy regional centers dealing with HC for these patients is in progress.

P2641
Oxygen Desaturation during Sleep, Quality of Life and Compliance in Hypercapnic COPD Treated with Nocturnal Nasal Ventilation at Home
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Few studies of nocturnal nasal ventilation (NNV) in COPD have been reported. Moreover, the quality of life (QOL) of COPD treated with home NNV has not been well described. To assess the compliance and the efficacy of NNV at home 10 hypercapnic COPD (PaO₂ 48 mmHg, PaCO₂ 53 mmHg, FEV₁ 0.74 L) were monitored during sleep and evaluated at home every 3 months for 1 year after the start of NNV (BiPAP ventilator). The Chronic Respiratory Disease Questionnaire (CRDQ) was administered as an assessment of QOL every 3 months by a respiratory therapist who was not concerned in other assessments. The results are reported in the table:

	1 month	3 months	12 months
Mean median use h	10.1 (2)	9.8 (2)	7.2 (3.4)
Mean night SaO ₂ %	90.7 (2.3)	92.8 (2.5) ⁺	89.9 (3)
Mean SaO ₂ + 90%	67.9 (27)	78 (36) ⁺	61 (25)
Mean L SaO ₂ %	75.8 (7.4)	80.8 (5.1)	76.1 (7)
CRDQ dyspnea	6.9 (1.3)	4.9 (1.5) ⁺	6.2 (1.6)
CRDQ fatigue	7.7 (1.5)	5.6 (1.1) ⁺	6.6 (1.2)
CRDQ mastery	5.9 (1.2)	6.1 (1.4) ⁺	5 (1.5) ⁺⁺
CRDQ emotion	6.2 (1.7)	5.8 (1.1) ⁺	5.8 (0.8)

⁺p 0.01, ⁺⁺p 0.055

There was a positive correlation between mean overnight SaO₂ and measured use of NNV after 12 months ($r = 0.70$, $p 0.01$) and a negative correlation between measured use of NNV and QOL ($r = -0.67$). In the majority of patients the use of NNV increased over a period of 3 months, but subsequently decreased. Our data suggest that amelioration of nocturnal desaturation and QOL is sustained after 3 months as long as compliance to NNV is maintained.

P2642
Perception of Reversibility
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Introduction: Patients with asthma or COPD often have a poor perception of changes in lung function (FEV₁). In this study we investigated whether patients are able to perceive an increase in FEV₁, after using bronchodilators. We also tried to distinguish determinants related to this perception.

Methods: Reversibility in FEV₁ was measured within 105 patients after 200 µg of salbutamol and 80 µg ipratropiumbromide. Changes in dyspnoea were determined by a borgscore. Age, gender, allergy, age of onset, packyears and hyperresponsiveness are factors that might be related to the ability of perception and therefore investigated.

Results: The frequencies of patients who had an objective reversibility ($\Delta FEV_1 > 9\%$ of the predicted value, $N = 32$) or no reversibility ($\Delta FEV_1 < 5\%$, $N = 38$) classified by change in dyspnoea are shown in the table.

N = 70	$\Delta FEV_1 \geq 9\%$	$\Delta FEV_1 < 5\%$
Decrease in dyspnoea	19	13
Equal dyspnoea	13	25

Of the patients who had an objective increase in FEV₁, 59% perceived a decrease in dyspnoea. However, 34% of those with no (or little) increase in FEV₁, also had decrease in dyspnoea. In the group of reversible patients, there was a significant difference in the number of housedust (mite) allergic patients between those who did or did not experience a decrease in dyspnoea ($p < 0.05$). The age of onset and the level of dyspnoea before medication also seemed to differ between perceivers and non-perceivers ($p < 0.1$). No differences were found in age, gender, packyears and hyperresponsiveness between the two groups.

Conclusion: The majority of the reversible patients perceived a decrease in dyspnoea, but 41% didn't. Reversible patients with a decrease in dyspnoea seemed to perceive their dyspnoea as more serious, were younger at the start of the disease and were significantly more often allergic to housedust (mite).

P2643
Are Changes in Dyspnea Perceived by Copd Patients Related to Changes in Lung Function: Terbutaline vs. Placebo
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Many COPD patients report a relief of dyspnea sensation after administration of bronchodilators without showing important changes in FEV₁. According to Nosedá et al., *Eur Respir J*, 1993; 6: 636-644, the change in dyspnea mentioned by COPD patients is best related to the change in lung volume. Our objective was to determine the relationship between the subjective change in dyspnea and the objective change in lung function after bronchodilation in COPD patients. **Methods:** Twenty-two stable COPD outpatients (M/F: 16/6) aged 62 ± 8 yr. and baseline FEV₁ of $50 \pm 13\%$ pred. were included in our double blind cross-over designed study. All patients were seen on two separate occasions within one week and received either terbutaline (1 mg) or placebo inhalation in random order. After body plethysmographic determination of baseline lung function an inhalation was given. After ten minutes the change in dyspnea was rated with a bipolar Visual Analogue Scale (VAS) and measurement of lung function was repeated. **Results:** Terbutaline inhalation resulted in an improvement of dyspnea in 15 patients (VAS $> +15\%$) while 9 out of the 22 patients improved after placebo inhalation.

	Terbutaline	Placebo
VAS (%)	+30 (***)	+20 (**)
ΔFEV_1 (L)	+0.17 (***)	-0.13 (*)
ΔIVC (L)	+0.25 (***)	-0.04 (n.s.)
ΔTGV (L)	-0.35 (***)	+0.04 (n.s.)
ΔRin (kPa.s/L)	-0.14 (***)	+0.06 (*)
ΔRex (kPa.s/L)	-0.39 (**)	+0.16 (*)

VAS and change of lung function in COPD patients after terbutaline or placebo inhalation (* **): significant change from baseline $p < 0.05$, 0.01, 0.001, respectively (paired t-test)

There was no significant correlation between VAS and change in lung function after terbutaline inhalation. Excluding the non-perceivers from the analysis, a weak correlation was found between VAS and change in Rex ($r = 0.50$, $p < 0.06$). **Conclusion:** In contrast to previous suggestions we found no correlation between changes in sensation of dyspnea and lung function after inhalation of terbutaline in COPD patients.

P2644
Dyspnea Sensation in COPD. Physiological Determinants

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Dyspnea sensation is one of the most common symptoms in COPD but its intensity is very among patients. The aim of this study was to assess the relationship between dyspnea and pulmonary and inspiratory muscle function impairment. We studied 20 male patients with a previous diagnosis of COPD in a stable situation. In all patients we performed pulmonary function test (PFT), maximal inspiratory and expiratory pressure measurements (MIP, MEP), maximal symptom limited exercise test and submaximal constant exercise test. Dyspnea sensation was evaluated at the end of both exercise tests, using a Borg scale (B). The same studies were carried out after a 4 week period of inspiratory muscle training. All patients had a moderate to severe airflow obstruction (FEV₁: $37.6 \pm 13\%$, FVC: $80.4 \pm 15\%$, FRC: $140 \pm 21\%$, RV: $159.4 \pm 14\%$) and a reduction in MIP (54 ± 9 cmH₂O). We found a negative correlation between MIP and both maximal and submaximal exercise B before and after training. (In: PIM-Bmax: $r 0.46$ $p < 0.05$; PIM-Bsubmax $r 0.57$ $p < 0.01$. Final: PIM-Bmax: $r 0.56$ $p < 0.01$; PIM-Bsubmax: $r 0.73$ $p < 0.005$). There was also a negative correlation between FEV₁ and initial B (FEV₁-Bmax: $r 0.52$; FEV₁-Bsubmax: $r 0.51$; $p < 0.05$). Finally we found a negative correlation between changes in B and changes in FEV₁*MIP (Bmax-PIM*FEV₁ $r 0.56$ $p < 0.01$; Bsubmax-Pim*FEV₁ $r 0.53$ $p < 0.05$). We conclude that, according to our results, the dyspnea sensation in COPD is related not only to the mechanical impairment but also to muscle capacity to cope with it. Therapeutical measures directed to improve muscle function may reduce the dyspnea sensation.

P2645
The Effect of Low Carbohydrate/High Fat Diet on Respiratory Function in Patients with Chronic Obstructive Pulmonary Disease (COPD)
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The aim of the study was to evaluate the effect of low carbohydrate high fat diet in stable hypercapnic COPD patients. On the 1st and 15th days respiratory function tests were performed and 14 stable COPD patients entered the study. Activity of excess respiratory muscles were determined by electromyograms of sternocleidomastoid and external oblique muscles. Patients began a diet with low carbohydrate and high fat and were supported by 500 ml/day liquid diet which contained 16.7% protein, 55.2% fat, 28.1% carbohydrate, vitamins and minerals (Pulmocare). After 10 days of diet FVC increased ($p < 0.05$) and PaCO₂ decreased ($p < 0.05$). The activation time of both muscles decreased ($p < 0.05$) significantly.