## 77. CPAP: beneficial effects on different aspects of health

**P432**

**nCPAP's functional effects on ciliary function of nasal respiratory epithelium**

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Continuous positive airway pressure (CPAP) is the gold standard in therapy of obstructive sleep apnea (OSA) but is associated with numerous side effects often related to the nose and the upper airway. Humidified CPAP may, in-part relieve these symptoms. Nevertheless, little is known regarding the effects on ciliary function (CF).

M+M

In this prospective, randomized, crossover trial patients with OSA (AHI>20) were included and randomized to one of two treatment arms, nCPAP with or nCPAP without humidification, for a period of eight weeks. At the end of the eight-week period patients were swapped to the alternative treatment arm for a further eight week period. CF (beat frequency [CBF] and mucus transport time [MTT]) were assessed before and one day after the beginning of nocturnal ventilation and again at the end of each treatment arm.

R

The baseline CBF was 4.7±0.6Hz, the MTT 568±185s. Short-term changes without humidification (CBF +0.7±0.8Hz, MTT: -152±158s) and with humidification (CBF +0.7±0.82Hz +92±208s) were not statistically significant. Regarding the long-term effects, CPAP without humidification significantly increased the CF above the baseline level by +2.5±0.4Hz and -167±175s ($p<0.01$) and even more so with humidification (+4.6±0.7Hz, -256±95s; $p<0.01$).

D

Independent of airway humidification, nCPAP has limited effects on short-term ciliary function of the nasal respiratory epithelium that is not statistically significant. However, long-term effects showed a significant increase in ciliary function both in terms of an increased beat frequency and an increase in mucus transport time that has not been described previously. The effect was more pronounced when humidification was used during nCPAP.

**P433**

**CPAP therapy in OSA patients: The effects on healthcare use and medical costs related to cardio- and cerebrovascular diseases**

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**Background:** Obstructive sleep apnea (OSA) is a major risk factor for cardio- and cerebrovascular diseases, however, CPAP treatment could reduce the occurrence and healthcare costs of these complications.
**Aim:** To assess the impact of CPAP therapy on healthcare use and medical costs related to cardio- and cerebrovascular diseases.
**Methods:** By analysing the patient database of the Hungarian Health Insurance Fund Administration in a one-year period starting from July 2007, OSA patients with newly initiated CPAP therapy were identified. Hospital admission rates, hospital treatment days, and the use and costs of relevant medications of these patients were evaluated from 3 years before to 3 years after starting the CPAP therapy.
**Results:** In the study period, 993 OSA patients started CPAP therapy in Hungary. In comparison to the 3-year period on CPAP therapy (post-CPAP), the numbers of pre-CPAP cardio- and cerebrovascular disease related hospital admissions and treatment days were higher by 22.4% (205 vs. 159 admissions) and 25% (2254 vs. 1698 days), respectively. Mean hospital treatment costs were 34% lower in the post-CPAP than in the pre-CPAP period (238 vs. 156 €). The reduction in post-CPAP hospital admissions, treatment days and costs was more prominent in a subgroup analysis in patients fully complying with the follow-up care (112 patients). Interestingly, the use and costs of relevant medications were nearly identical in the pre- and post-CPAP periods.
**Conclusion:** Our study suggests that CPAP therapy could reduce healthcare costs of OSA patients by lowering hospital admission rates, treatment days and costs related to cardio- and cerebrovascular diseases.

**P434**

**Long-term CPAP compliance in women with obstructive sleep apnoea**

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**Background:** Continuous positive airway pressure (CPAP) is the treatment of choice for obstructive sleep apnoea (OSA). However, CPAP compliance and variables involved in long-term adherence in women are unknown.
**Objectives:** We sought to analyze long-term CPAP compliance and predictors of CPAP dropout, in a large female cohort with a prolonged follow-up.
**Methods:** Consecutive women diagnosed with OSA (apnoea-hypopnoea index [AHI] ≥10) and started on CPAP treatment in two Spanish Sleep Units between 1999-2007 were included in the study. Women were followed-up until December 2010. The Kaplan-Meier method was used to calculate the probability to continue on CPAP treatment, and a multivariate Cox regression analysis was used to identify baseline predictors of CPAP dropout.
**Results:** We analyzed 708 women with median (IQR) age 60 years (52-67), AHI 43 (27.2-66.8), and Epworth Scale 13 (9-16). Women were followed for a median period of 6.2 years (4.2-7.7) and average compliance with CPAP was 6 hours/day (4-7). During follow-up, there were 129 CPAP dropouts (18.2%), and the probability of being still on CPAP at 5 and 10 years was 82.8% and 79.9%, respectively. Baseline predictors of CPAP dropout in the multivariate analysis were age (OR 1.01, 95%CI 1.00-1.03), use of sedative/antidepressant medication (OR 1.47, 95% CI 1.03-2.08) and CPAP pressure (OR 0.89, 95%CI 0.82-0.97).
**Conclusions:** Long-term CPAP adherence in women with OSA is good. Increasing age and use of sedatives/antidepressants were independent predictors of CPAP dropout, whereas higher CPAP pressures were associated with continued treatment.

**P435**

**Titration of continuous positive airway pressure in Chinese patients with obstructive sleep apnea**

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**Objective:** Whether CPAP pressure derived from manual titration is the same as the pressure from automatic titrations is controversial. The purpose of this study was to compare the pressure derived from manual titration with the pressure from automatic titration. We also attempted to establish a formula to determine the appropriate CPAP pressure for Chinese individuals.
**Methods:** Fifty-one patients with OSA (mean apnea/hypopnea index [AHI] = 50.6±18.6 events/hour) who were newly diagnosed after an overnight full polysomnography and who were willing to accept CPAP as a long-term treatment were recruited for the study. Manual titration under the full polysomnography monitoring and unattended automatic titration with an automatic CPAP device

(REMstar-auto, Respironics Inc. USA) were performed. We also performed a separate cohort study of one hundred patients with OSA (AHI = 54.3±18.9 events/h) by observing the efficacy and safety of CPAP pressure derived from manual titration.
**Results:** The treatment pressure derived from automatic titration (9.8±2.2 $cmH_2O$) was significantly higher than that derived from manual titration (7.3±1.5 $cmH_2O$; $p<0.001$) in 51 patients. A cohort study of 100 patients showed that AHI was satisfactorily decreased after CPAP treatment using a pressure derived from manual titration (54.3±18.9 events/hour before treatment and 3.3±1.7 events/hour after treatment; $P<0.001$).
**Conclusion:** Our results suggest that automatic titration pressure derived from REMstar-auto, is usually higher than the pressure derived from manual titration.
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**P436**
**Prevalence of restless legs syndrome among patients with obstructive sleep apnea before and after CPAP treatment, compared to the general population. The Icelandic Sleep Apnea Cohort (ISAC)**
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**Objectives:** To compare the prevalence of reported restless legs syndrome (RLS) between subjects with obstructive sleep apnea (OSA) and the general population. Also possible changes with CPAP treatment.
**Materials and methods:** The OSA subjects (n=822) were newly diagnosed with moderate or severe OSA (665 males,157 females). The control subjects (n=742) were randomly chosen Icelanders (394 males, 348 females) who participated in another epidemiological study (www.boldcopd.org). Measurements included a standardized RLS rating scale, questions about sleep and the Epworth Sleepiness scale. The change with CPAP treatment was assessed after 2 years (n=538).
**Results:** Among OSA males 23.3% reported RLS but 12.9% of control males ($p<0.001$). 35.8% of OSA females reported RLS but 24.4% of control females ($p=0.03$). Both among OSA patients and controls those with RLS more commonly reported insomnia, daytime sleepiness, nocturnal sweating, snoring and gastro esophageal reflux ($p<0.05$). No relationship was found between RLS and age, BMI, hypertension or respiratory disease in a logistic regression adjusting for the presence of OSA and the other factors mentioned. No relationship was found between RLS and sleep apnea severity. Subjects using CPAP had a decreased prevalence of RLS from 25.7% to 13.8% while no change was observed in those subjects not using CPAP ($p=0.04$ for difference between groups).
**Conclusions:** RLS is more prevalent among OSA patients than controls. CPAP treatment decreases RLS symptoms significantly.

**P437**
**Nocturnal gastro-esophageal reflux and respiratory symptoms in patients with obstructive sleep apnea, before and after CPAP treatment, compared to the general population – The Icelandic Sleep Apnea Cohort (ISAC) study**
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**Introduction:** To estimate the prevalence of reported nocturnal gastro-esophageal reflux (nGER) and respiratory symptoms in obstructive sleep apnea (OSA) subjects compared to the general population. Also change in nGER with CPAP treatment.
**Methods:** 826 OSA patients referred for CPAP treatment. 623 subjects have had a 2 year follow-up visit (n=412 CPAP users, n=211 nonusers). The control group consisted of 939 subjects randomly selected from the general population (81% response rate). Both groups answered the same questionnaires on nGER, sleep, respiratory symptoms, general health and quality of life measured by SF-12.
**Results:** Altogether 18.6% of OSA females and 13.6% of males ($p=0.07$) compared to 7.5% of controls ($p<0.001$) reported nGER (≥ 1x a week). Wheeze was more common among OSA subjects with nGER compared to those without nGER (42.5% vs. 29.3%, $p=0.005$). Bringing up phlegm in the morning was also associated with reporting nGER (35.7% vs. 24.8%, $p=0.02$). Among OSA patients nGER was not related to smoking, obesity, hypertension, diabetes or OSA severity. SF-12 showed that among those with nGER both physical component scores (40.7±10.9 vs. 37.4±10.3, $p=0.003$) and mental scores (49.0±10.8 vs. 44.1±11.1, $p<0.0001$) were significantly lower. At two year follow-up nGER was only reported by 6.2% of the those followed and was lowest (3.8%) among full CPAP users ($p<0.0001$).
**Conclusion:** nGER is a common clinical symptom of OSA and often related to respiratory symptoms. Prevalence of nGER decreases with CPAP treatment in a majority of OSA patients.

**P438**
**Control of breathing in obstructive sleep apnoea patients: Role of CPAP therapy**
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**Aim:** Control of breathing during wakefulness in obstructive sleep apnoea (OSA) and the role of CPAP therapy is an ongoing controversy. We studied the ventilatory response of healthy controls and OSA patients before and after at least 1 year of CPAP therapy.
**Methods:** 17 never treated OSA patients (16 M; 53±13.2yrs; BMI=34.5±8.1; AHI=45±14.7) underwent nocturnal cardiopulmonary monitoring, spirometry and blood gas analysis. Read's rebreathing test was used to evaluate hypercapnic ventilatory response ($HVR_{CO2}$); hypoxic ventilator response ($HVR_{O2}$) was studied by both progressive and transient methods, to explore both peripheral oxygen chemoceptors and the central modulation. The relationship between minute ventilation (VE) or mean inspiratory flow (VT/Ti) and $P_{ET}CO_2$ or $P_{ET}O_2$ was expressed in terms of slope of linear regression for $HVR_{CO2}$ and of parameter A of hyperbolic relation for $HVR_{O2}$.
**Results:** OSA patients showed an increased responsiveness to transient, but not to progressive, hypoxemia, and a reduced response to hypercapnia when compared to controls. Transient $HVR_{O2}$ showed a significant reduction during CPAP therapy ($p<0.01$), whereas $HVR_{CO2}$ increased only slightly. Progressive $HVR_{O2}$ was not modified by CPAP [Tab 1].
**Conclusions:** The daytime glomic reactivity to transient hypoxia is increased by repeated nocturnal hypoxic stimuli; CPAP significantly restores the ventilatory stability during sleep.

Table 1. Chemosensitivity in Controls and in OSAS pre and post CPAP

| | Controls (a) | OSAS Pre CPAP (b) | p (a vs b) | OSAS Post CPAP (c) | p (b vs c) |
|---|---|---|---|---|---|
| HVR CO2 (l/min/mmHg) | 2.7±1.2 | 2.0±0.9 | <0.05 | 2.2±0.9 | 0.63 |
| HPVRO2 (l/min*mmHg) | 355.3±115.2 | 357.5±117.9 | 0.46 | 336.9±129.9 | 0.99 |
| HTVRO2 (l/min*mmHg) | 119.2±62.7 | 217.7±107.7 | <0.01 | 97.5±24.1 | <0.01 |

**P439**
**Differences between commercial vehicle drivers and other patients in symptoms of obstructive sleep apnoea and response to CPAP therapy**
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**Introduction:** Among patients with obstructive sleep apnoea (OSA), commercial vehicle drivers (CVD) should be treated with special care, since untreated OSA is a well established risk factor for traffic accidents. However, little is known whether symptoms and course of treatment of OSA in CVDs are similar to those of other OSA patients.
**Method:** We analysed the course of diagnosis and treatment in CVDs diagnosed with OSA in 2009 and 2010 and compared these data with a control group of non-CVD patients.
**Results:** We identified 37 CVDs treated with CPAP and compared their results with a control group of 74 patients. Both groups were well matched with respect to age, BMI, apnoea-hypopnoea-index and oxygen desaturation index. However, the Epworth Sleepiness Score (ESS) was significantly lower in the CVD group (8.1±2.8 vs. 11.0±2.7, $p < 0.0001$) and this difference was unchanged after 6 months of CPAP therapy (4.8±2.1 vs. 7.7±2.2, $p< 0.0001$). The adherence to CPAP therapy was lower in CVDs than in the control group: daily usage was 4.5±1.1 vs. 5.0±1.4 hrs ($p = 0.02$), % of days used was 75±14 vs. 83±19% ($p = 0.012$). CVDs had significantly more *unscheduled* visits in the first 6 months of treatment than control patients: 1.5±0.6 vs. 0.7±0.4 ($p < 0.001$).
**Conclusions:** Despite similar baseline characteristics, CVDs report significant lower values in the Epworth sleepiness score at diagnosis and under CPAP treatment. CPAP compliance is lower in CVDs than in control patients and CVDs have more unscheduled clnical visits than other CPAP patients. These points should be taken in consideration when starting OSA treatment in CVDs.

**P440**
**Increased alveolar nitric oxide by trumpet model in patients with obstructive sleep apnoea**
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**Background:** We assessed distal/alveolar inflammation in patients with suggestive symptoms of obstructive sleep apnoea (OSA) and measured exhaled alveolar concentration of nitric oxide (CANO) using 2-compartment model (2-CM) and the trumpet model (with correction for axial NO back-diffusion).
**Methods:** Ninety five patients suspected for OSA without advanced cardio-respiratory disease underwent pulmonary function test, overnight polysomnography, and exhaled NO measurement using 2-CM model and the trumpet model.

Patients with apnoea-hypopnoea index (AHI)<5/hour served as controls. Serial measurements of exhaled NO after PSG were performed in 21 OSA patients and 8 control subjects.
**Results:** CANO was significantly higher in OSA patients (n=71; 4.07±1.7ppb) as compared with controls (n=24; 2.24±1.06ppb; p<0.0001) whilst maximal bronchial NO flux and fractional concentration of exhaled NO did not significantly differ between the two groups. In patients with OSA, CANO was strongly associated to AHI (r=0.701; p<0.0001) and to recording time with SaO2<90% (ST-90%; r=0.659; p<0.0001). The area under ROC curve for screening patients with OSA and significant nocturnal oxygen desaturation (TS-90%>1%) was 0.855 (0.777-0.933) (p<0.0001). CANO at 4.49ppb could detect these patients with sensitivity of 46% and specificity of 94%. Increased CANO variation after PSG was significantly related to oxygen desaturation index (TS-90%).
**Conclusions:** Increased alveolar NO concentration was related to the severity of nocturnal oxygen desaturation in patients with OSA, linking the distal lung inflammation to intermittent hypoxia. CANO could be used to screen for severe OSA in suspected and symptomatic patients.

**P441**
**Predictors of long-term PAP-adherence in obstructive sleep apnea syndrome**
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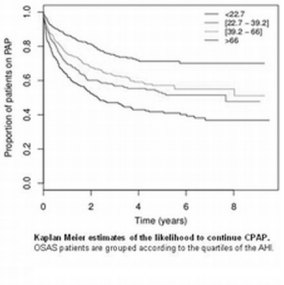
**Introduction:** Few studies have assessed long-term adherence to positive airway pressure therapy (PAP) in OSAS. The aim of this retrospective study was to determine adherence and its potential predictors.
**Methods:** All patients (pts) treated at the St.Gallen sleep centre from 11/2001 to 4/2011 were included for analysis of baseline data and follow-up information. The primary dependent variable of interest was continued use of PAP. Kaplan-Meier estimates and Cox-proportional hazards regression were used to model the risk of loss of adherence. A multivariate regression analysis was performed for age, gender, Epworth sleepiness score (ESS), BMI, apnea-hypopnea index (AHI) and oxygen desaturation index (ODI) at baseline.
**Results:** During the study period, of 2160 pts started on PAP, 42 (2%) died on PAP, 91 (4%) no longer needed PAP (weight reduction, alternative treatments) and 311 (14%) were lost to follow-up. In 1716 pts, adherence at 1y was 74 (95% CI: 71-76)%, at 5y 56 (53-59)%, and at 8y 52 (49-56)%. Results of univariate and multivariate analyses are summarized in the figure.

| | | n | HR | Lower 95% CI | Higher 95% CI | p (Wald-test) |
|---|---|---|---|---|---|---|
| Gender | n=1716 | | | | | |
| | male | 1375 | --- | | | |
| | female | 341 | 1.29 | 1.06 | 1.56 | *0.01* |
| Age [years] | n=1716 | | | | | |
| | <46.4 | 438 | --- | | | |
| | 46.4 - 54.3 | 434 | 0.94 | 0.76 | 1.19 | 0.61 |
| | 54.3 - 61.7 | 418 | 1.02 | 0.82 | 1.27 | 0.85 |
| | >61.7 | 426 | 1.02 | 0.82 | 1.28 | 0.83 |
| ESS [points] | n=1410 | | | | | |
| | <7 | 402 | --- | | | |
| | 7 to 10 | 334 | 0.75 | 0.6 | 0.95 | *0.018* |
| | 11 to 14 | 318 | 0.55 | 0.43 | 0.72 | *<0.0001* |
| | >14 | 356 | 0.71 | 0.56 | 0.89 | *0.003* |
| BMI | n=1552 | | | | | |
| | <27.2 | 397 | --- | | | |
| | 27.2 - 30.5 | 390 | 0.72 | 0.58 | 0.91 | **0.006** |
| | 30.5 - 34.9 | 387 | 0.78 | 0.62 | 0.98 | **0.034** |
| | >34.9 | 379 | 0.76 | 0.6 | 0.96 | **0.022** |
| ODI | n=1695 | | | | | |
| | <11.7 | 436 | --- | | | |
| | 11.7 - 25.4 | 415 | 0.67 | 0.54 | 0.82 | *0.0001* |
| | 25.4 - 50.4 | 426 | 0.61 | 0.5 | 0.75 | *<0.0001* |
| | > 54 | 418 | 0.35 | 0.27 | 0.45 | *<0.0001* |
| AHI | n=1698 | | | | | |
| | <22.7 | 425 | --- | | | |
| | 22.7 - 39.2 | 419 | 0.73 | 0.59 | 0.89 | *0.002* |
| | 39.2 - 66 | 432 | 0.6 | 0.49 | 0.74 | *<0.0001* |
| | >66 | 422 | 0.35 | 0.28 | 0.45 | *<0.0001* |
| Multivariate statistics | n=1365 | | | | | |
| | age | --- | 1.01 | 0.998 | 1.015 | 0.14 |
| | gender | --- | 1.13 | 0.9 | 1.413 | 0.3 |
| | BMI | --- | 1.01 | 0.99 | 1.021 | 0.5 |
| | ESS score | --- | 0.98 | 0.962 | 0.999 | *0.04* |
| | ODI | --- | 0.99 | 0.985 | 0.998 | *0.01* |
| | AHI | --- | 0.99 | 0.986 | 0.998 | *0.01* |

**Univariate and multivariate analyses for potential predictors of long-term CPAP adherence.**
For univariate analyses continuous variables were split into quartiles of their distribution.
A hazard ratio (HR) >1 denotes a higher likelihood to stop CPAP treatment.



**Kaplan Meier estimates of the likelihood to continue CPAP.**
OSAS patients are grouped according to the quartiles of the AHI.

**Conclusion:** Adherence is independently associated with clinical (ESS) and polysomnographic (ODI, AHI) measures of OSAS severity, but not with BMI, age, gender. Most pts who stopped PAP were lost to follow-up. With a relatively low long-term adherence, intensified efforts and alternative or novel follow-up options (e.g. telemetry) to support such patients should be tested.

**P442**
**Utility of a nurse-led visit program for patients with obstructive sleep apnea syndrome treated with CPAP**
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Obstructive Sleep Apnea Syndrome (OSAS) is a frequent cause of visit in our clinical practice. In order to diminish its impact in the physician's agenda we created a specific nurse-led individual consultation for their follow-up visits.
**Aim:** We want to analyze the characteristics of patients and changes made in terms of treatment or even medical discharge.
**Methods:** We have analyzed IAH, BMI, Epworth sleepness scale (ESS),CPAP compliance and satisfaction grade in patients attended from June to December 2010.
**Results:** We attended 243 patients, 88% of them were men, the age average was 56.6±11.6 years. At the moment of diagnose the IMC was 33.2, the IAH 52.2±4.4 and the ESS 10.3±4.9. At nurse-led visit IMC was 33.3±5,6 and ESS 5.9±4,2. We found an average of use of 6.03±2.2 hours per night and 6.4±1.6 days per week. We detected a good level of compliance in 78% of them, quite good in 8.5% and bad in 13.5%. They fulfilled a satisfaction test (scale 0-10) and the mean value obtained was 7.2±2.4. We needed to change the Mask model because of bad tolerance in 20% of patients. Because of good follow up, we could discharge from medical control 37,9% of the cases, they are followed now only in the Nurse unit and almost 60% remained control by both medical and nurse but medical one are their regular follow-up visit. We only give definitive discharge because of low compliance in 1.2%.
**Conclussions:**
– Our patients showed a good level of satisfaction
– We have found a good level of CPAP compliance
– We had to change mask model in a substantial number of cases
– We could discharge from medical follow up an important number of patients, optimizing the use of health care resources.

**P443**
**Impact of a respiratory rehabilitation program in the functional capacity of the patients with obstructive sleep apnea-hypopnea syndrome (OSAHS)**
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**Objectives:** Determine the basal exercise capacity in patients with severe OSAHS.Determine the exercise capacity modified after 3 months of treatment with CPAP or with CPAP and Respiratory Rehabilitation program.Analize the impact of these changes on the quality of life,physical activity and psychological impact.
**Methods:** A prospective study with a consecutive inclusion of healthy patients with the polysomnographic diagnosis of severe OSAHS.We evaluated the exercise capacity of these patients by means of a cardiopulmonary test in a cycloergometer,submaximal exercise capacity before the beginning of the treatment in both groups.
**Results:**

| CPAP BASAL n:39 | | 3M CPAP | CPAP+RR BASAL n:16 | 3M CPAP+RR | BOTH GROUPS |
|---|---|---|---|---|---|
| EPWORTH | 11.85±4.63 | 7±4.6 * | 12.08±3.82 | 7.33±3.4 * | NS |
| ANXIETY (HAD) | 5.73±4.42 | 4.96±4.61 | 5.42±4.16 | 4.92±3.75 | NS |
| DEPRESSION (HAD) | 2.62±2.49 | 2.5±2.67 | 2.92±1.83 | 1.25±1.76 * | NS |
| SELF-ASSES | 76.73±15.8 | 76.54±13.4 | 68.75±16.8 | 73.75±15.5 | NS |
| W MAX (w) | 133±36.2 | 133.2±37.96 | 116.5±26.9 | 128±26.2 | NS |
| W MAX (%) | 65.3±14.4 | 65.1±18.8 | 57.82±15.3 | 64.5±16.5 * | NS |
| VO2 max (l/min/kg) | 21.18±4.65 | 20.86±5.57 | 17.17±2.52 | 18.74±2.87 | NS |
| VO2 max (l/min) | 1.87±0.47 | 1.86±0.59 | 1.67±0.39 | 1.8±0.37 | NS |
| VO2 max (%) | 7.43±13.24 | 75.5±19.7 | 73.45±14.15 | 79.64±12.7 | NS |
| SUBMAX (s) | 552±337.1 | 716.4±546 * | 570±296.9 | 1236±512 * | NS |

Table1.Comparative of the main parameters before and after the treatment(there are not significant differences between the groups)

The average age was 48.55±12.55 years old,90.9% male,40% smokers,30.9% ex-smokers and 29.1% non-smokers (17.8±20.26 packet/year).The average BMI was 32.27±5.56.
**Conclusions:** There is a slight decrease of the basal exercise capacity in both groups.There are no differences between submaximal test and the maximum load (W).After 12weeks of treatment in both groups,we obtained a significant decrease in Epworth scale,without differences between groups.There is an increase in submaximal effort results in both groups,although in CPAP group increases 29.71% and CPAP+RR 116.84% with no differences.

**P444**
**Nasal inflammation and compliance with nasal CPAP therapy in obstructive sleep apnoea (OSA)**
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**Background:** CPAP is the standard therapy for treating OSA (1). However, CPAP can cause undesirable nasal side effects that compromise compliance (2).
**Aims and objectives:** Over a six month period, we assessed the association between nasal inflammation using nasal wash interleukin (IL-6) concentration and compliance with therapy.
**Methods:** Twenty-two patients were recruited with new confirmed OSA. Daily CPAP use was prospectively recorded on diary cards. Nasal wash IL-6 and diary cards for compliance were performed at no CPAP and at 1, 3 and 6 months

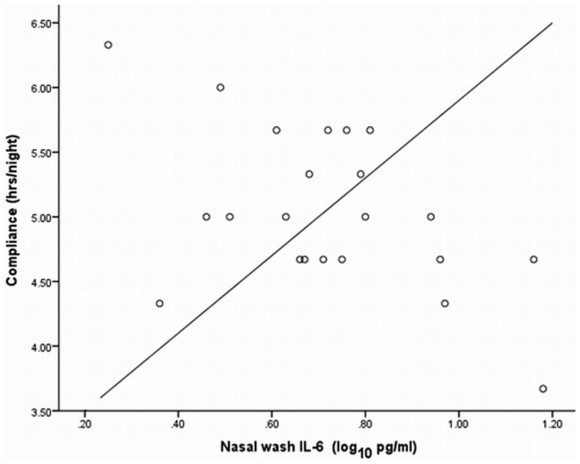
post-CPAP. Pearson correlation was conducted to assess the relationships. A P value < 0.05 was considered a statistical significance.
**Results:** The twenty-two patients (mean age±SD: 59.5±7.5 years) had AHI of mean (SD) 30.2±15.9.

Characteristics of the OSA patients

| Details of subjects studied (n=22) | Mean | SD |
|---|---|---|
| Subjects (M/F) | 13/9 (59%/41%) | |
| Age, years | 59.5 | 7.5 |
| BMI (kg/m$^2$) | 34.6 | 8.6 |
| AHI (events/h) | 30.2 | 15.9 |
| Neck circumference | 37.2 | 1.5 |
| CPAP (cm H2O) | 7.84 | 0.87 |
| Current Smoker (%)[§] | 22.7 | |

[§] At recruitment to the study.

We found a significant relationship between increased nasal IL-6 and decrease in compliance at baseline and six month of CPAP therapy, Pearson [r: -.517; P=0.014].




**Conclusion:** Our results show that nasal inflammation relates to compliance with CPAP therapy in OSA.
**References:**
[1] Kushida, C.A. *et al.* Sleep 2006; 29:375-380.
[2] Pepin, J.L. *et al.* Chest 1995; 107:375-381.

**P445**
**Residual sleepiness in obstructive sleep apnea (OSA) patients on CPAP: Not only a symptom but rather a true syndrome?**
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**Background:** Hypoxic brain damage might explain persistent sleepiness in some CPAP compliant OSA. Since residual sleepiness (RES) on CPAP remains not fully understood, wake promoting dugs in RES are no longer allowed by the European Medicines Agency.
**Aim:** To describe RES phenotype in a large prospective sample of OSA patients.
**Methods:** RES was defined by an Epworth Sleepiness Scale (ESS) ≥11. 1047 patients from the French National sleep registry (www.osfp.fr) attending follow-up CPAP visit were eligible. Patients using CPAP <3 hours (n=275), with residual apnea+hypopnea index >15/h (n=31) and major depression were excluded (n=150).
**Results:** RES prevalence in CPAP treated OSA was 13% and significantly decreased with CPAP use (9% in ≥6h/night users, p <0.005). Although patients with RES at the time of diagnosis had a worse subjective appreciation of their disease (general health scale, ESS and fatigue score) and complained more frequently from CPAP side effects, RES prevalence was lower in severe OSA than in mild-moderate OSA (11% when AHI >30/h versus 18% when AHI between 15 to 30, p <0.005). Moreover, there was no relationship between RES and BMI, cardiovascular co-morbidities or diabetes. CPAP did improved symptoms but to a lower extent (Fatigue scale:-5.2 vs-2.7 in RES- and RES+ patients respectively, p<0.001).
**Conclusions:** The CPAP adherence threshold associated with the lower RES prevalence was 6 hours/night. Hypoxic insult is probably not the explanation for RES since OSA severity does not seem to be critical. Residual symptoms are not limited to sleepiness and this true "CPAP resistant syndrome" may justify treatment by wake promoting drugs.

**P446**
**Home-based evaluation in patients with high risk for moderate to severe OSA**
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Obstructive sleep apnea (OSA) is a disorder characterized by recurrent obstruction of the upper airways during sleep. The high prevalence of this disease led to propose new strategies based on the home evaluation and management of patients. The aim of this study was to compare unattended home-based protocol with attended in-laboratory analysis, in a sample of patients with high risk for moderate to severe OSA.
We enrolled 131 patients, who were randomly divided into 2 groups: group 1 (n=66) was diagnosed and titrated at home; group 2 (n=65) was analyzed in the sleep lab of our hospital. Diagnostic evaluations were carried out with portable monitoring at home, and with polysomnography in the sleep lab. Titration was performed with the same autoCPAP device in both groups.
At the end of the study, 13 (19%) subjects had dropped out in the group 1, and 9 (14%) in the group 2 (p= not significant). There were no significant differences among groups in both basal and with-CPAP values of apnea-hypopnea index (AHI), oxygen desaturation index (ODI), and total sleep time with oxyhemoglobin saturation below 90% (TST90). In the home group, therapeutic pressure values reached at the end of each unattended home titration night were similar.
Home diagnosis and titration approach should be considered in a subset of patients with OSA. A single unattended titration night is sufficient to determine the therapeutic pressure.

**P447**
**The heterogeneity of obstructive sleep apnoea: Congestion leads to longer respiratory cycle lengths in heart failure**
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It is controversial if heart failure (HF) can influence obstructive sleep apnoea (OSA) per se. Previous studies documented increased cycle lengths (CL), ventilation lengths (VL), and circulatory delays (CD) of OSA in HF patients. Aim of the present study was to verify these results in a cohort of well-defined HF patients and to investigate possible interactions of HF and OSA.
**Methods:** 39 patients with OSA (apnoea-hypopnoea index, AHI > 10/h) with (NYHA ≥II, LV-EF ≤40%; n=26, 18 male, 67.2±9.4 years) and without (EF ≥50%, NT-proBNP <400; n=13, 6 male, 72.7±5.8 years) HF underwent simultaneous right- and left-heart catheterization within 12h of cardiorespiratory polygraphy.
**Results:** AHI as well as obstructive apnoea-index (oAI) were comparable in both groups (AHI= 34.3±26.5/h vs. 32.3±18.0, p=n.s.; oAI=8.5±7.8/h vs. 10.0±10.8, p=n.s.). We were able to verify increased CL, VL, time to peak ventilation (TTPV) and circulatory delay (CD) in patients with HF (CL: 37.8±10.6s vs. 46.0±10.0s, p=0.024; VL: 21.3±7.1 vs. 25.4±6.3, p=0.044; TTPV: 8.3±2.5s vs. 10.6±3.0s, p=0.021; CD: 22.6±3.7s vs. 28.5±7.5s, p=0.005). Apnoea length (AL) was higher in HF patients (16.5±3.9s vs. 20.5±4.9s, p=0.013). Positive and robust correlations between parameters of OSA and degree of congestion were found in OSA patients with HF exclusively: CL, VL, and TTPV increased with elevation of PCWP (CL: r=0.53; p=0.006; VL: r=0.55; p=0.004; TTPV: r=0.47; p=0.015).
Respiratory parameters of OSA (CL, VL, TTPV) correlate with the degree of congestion in patients with OSA and HF, but not in non-HF patients with OSA. These results point to a reciprocal relationship of HF and OSA severity.

**P448**
**Coexistence of central sleep apnea or periodic breathing pattern in patients with congestive heart failure and obstructive sleep apnea**
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**Background:** The presence of altered ventilator control instability in congestive heart failure (CHF) patients with obstructive sleep apnea (OSA) may have signif-

icant therapeutic implications. Indicators for ventilator control instability can be significant proportions of central sleep apnea (CSA) and/or a periodic breathing (PB) pattern. The aim of the present study was to determine the prevalence of such indicators in CHF patients with OSA.

**Patients and methods:** The ongoing German multi-center SchlaHF registry prospectively included 7007 stable CHF patients (NYHA class ≥II and LVEF ≤45%) from cardiology practices and cardiology departments of hospitals. Patients were studied with a two-channel screening device (nasal airflow, pulse oximetry; ApneaLink, ResMed, Sydney, Australia) that detects PB patterns based on an algorithm using pattern recognition. Patients with suspected SDB received polysomnography (PSG) with certified scoring.

**Results:** Of the 2183 PSG-patients 1583 (73%) had an AHI ≥15/h, of whom 49% had OSA (≥50% of apneas and hypopneas were obstructive). In such CHF patients with OSA the prevalence of a significant proportion of central apneas and hypopneas (20-49%) was 35%. The prevalence of objectively assessed PB was 44% in OSA patients. 350 (59%) heart failure patients with OSA presented with either a significant proportion of CSA and/or a PB pattern.

**Conclusions:** The high prevalence of a significant proportion of CSA and objectively assessed PB pattern in CHF patients with OSA suggests ventilator control instability that may have an impact on the appropriate modality of positive airway pressure therapy to suppress apneas and hypopneas.

**P449**

**Pulmonary diffusion capacity is not associated with severity of Cheyne-Stokes respiration in heart failure patients**

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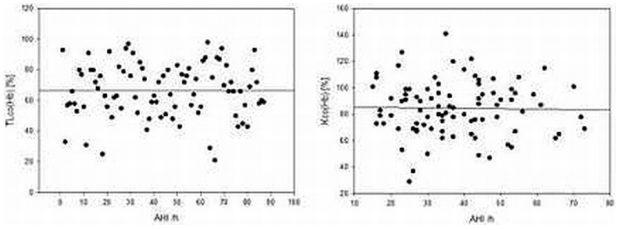
A recent study in severe heart failure (HF) patients indicates a possible pathophysiological role of an impaired pulmonary diffusion capacity and respiratory disturbance during sleep, especially the degree of Cheyne-Stokes respiration (CSR). Aim of the present study was to verify this hypothesis in a larger cohort of HF patients.

In 87 patients (83 male, age 68±9 years) with polysomnography confirmed and untreated CSR due to cardiac failure (NYHA ≥ II, LV-EF ≤45%), pulmonary diffusion capacity (TLCO and KCO) were prospectively investigated using the single-breath method. Apnoea-hypopnoea-index (AHI) was 38.0±14/h, LV-EF 34±7%, TLCO 67±17% of normal and alveolar-volume corrected diffusion capacity (KCO) 85±20% of normal. Correlation analysis using Spearman rank order correlation revealed no significant correlation of AHI and TLCO (r = 0.071, p = 0.516) or AHI and KCO (0.019, p = 0.863).



In our cohort of HF patients with untreated CSR no correlation of respiratory disturbance during sleep and pulmonary diffusion capacity was found. Thus, a significant role of an impaired pulmonary diffusion on CSR genesis seems to be unlikely.