ELSEVIER

Sleep Medicine 4S1 (2003) S1–S56

SLEEP MEDICINE

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Abstracts
7th World Congress on Sleep Apnea, June 29th – July 3rd, 2003, Helsinki, Finland

001

Evaluation of auto adjusted positive airway pressure devices (APAP) on a mechanical model of the respiratory system

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Objectives: Compare and evaluate 5 APAP on a mechanical model of the human respiratory system by simulating obstructive and central events and situations of mask leaks.

Materials and methods: A sinusoidal flow generator connected to a Starling resistor contained in a sealed box where pressure was controlled. Tracheal and mask pressures, and flow were measured.

Results: are presented residual events as apnea/hypopnea index (AHI) and persistent flow limited cycles (FLC) as % of total cycles.

	Apnea AHI	Hypopnea square shape AHI	Hypopnea U shape AHI	Flow limitation (% FLC)
GK 418P	23	30	76	100
AUTOSET T	53	0	75	100
PV 10I	0	0	0	100
REMSTAR Auto	0	0	0	100
Somnosmart	0	77	0	97

Central apnea: all devices increased pressure but the Somnosmart maintain pressure to 4 mbar. Mask leak (0.8l/s) were not compensated by all devices.

Conclusions: The model demonstrates algorithm's insufficiencies in detecting and reacting to events in some APAP.

002

Principal Components Analysis of Inspiratory Flow Shapes

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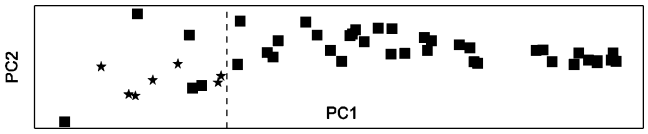
Objectives: To construct a low-dimensional representation of our 7-dimensional inspiratory flow shape data in non-symptomatic adults and select subjects susceptible to sleep-disordered breathing (SDB).

Material and methods: Nasal airflow was monitored during sleep in 40 healthy adults. Automated flow shape classification into one sinusoidal (c1) or six flow-limited classes (c2–c7) was performed on breath-by-breath basis (n = 216 197). The key components of the classes were determined with principal component analysis (PCA).

Results: The first two principal components (PC1 and PC2) explained 83% of the shape frequency data. PC1 represents mostly the variation observed in c1. It distinguished 35 presumably healthy subjects (boxes on the right side of the dotted line) from the seven patients with SDB (stars). PC2 described the five outliers especially for the differences observed in the frequencies between c2 and c4.



Conclusions: PCA provides a feasible 2-D projection of the flow shape data and helps to rank subjects according to degree of SDB.

003

Testing a new sensor for the analysis of breathing and heart rate

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Objectives: The purpose of the study was to test the applicability of the Electro Mechanical Film (EMFI) sensor in the analysis of breathing and heart rate during sleep.

Materials and methods: EMFI film is a low-priced thin and flexible electret material which consists of permanently charged conductive layers and isolation layers. A 40 × 40 cm piece of EMFI was used placed under the lower sheet of a four-month old healthy baby and the resulting signal was recorded during eleven hours in the night. As no electrodes or other sensors were attached to the baby, the recording was quite unobtrusive. The resulting ballistocardiograp-hic signal was low-pass filtered to extract breathing and high-pass filtered to extract heart activity.

Results: The obtained signal clearly indicated the breathing and heart activity of the baby when the baby was sleeping quietly. The signal waveform varied somewhat in different sleeping positions. A small number of short, less than 10 s apnea could be seen in the filtered signal.

Conlusions: The EMFI sensor showed its potential as an unobtrusi-ve sleep sensor. More recordings need to be made and different age groups must be studied to assess its capabilities exhaustively.

004

Psychological Interventions to Improve CPAP Adherence

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CPAP is the most commonly used form of treatment for Sleep Apnea Syndrome. Adherence to CPAP, however, is generally poor, making treatment efficacy difficult to measure. There have been numerous studies designed to address the potential barriers to treatment adherence in patients with sleep apnea. Recent studies have identified psychological constructs associated with behavior change principles as predictive of long-term adherence. As a part of this symposium, we will outline the behavioral approaches that have been taken to improve adherence to CPAP. These approaches have generally met with mixed results. Despite the recent evidence that behavior change constructs predict CPAP adherence, few interventions have been based on fundemental theories of behavior change. We will outline an approach to improve adherence to CPAP based on theoretical models of behavior change, specifically the transtheoretical model and social cognitive theory. We will present an example of a moti-

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doi:10.1016/S1389-9457(03)00074-1

vational intervention that is derived from these theories and will provide preliminary data for its efficacy. We believe that the most efficacious approaches to improving adherence in the long term will be those based on such theoretical models.

005

Achondroplasia and Obstructive Sleep Apnea Syndrome (OSAS)

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Objectives: The aim of the study is to show the association between achondroplasia (a hereditary form of dwarfism) and OSAS.

Materials and methods: Two achondroplastic women visited our Sleep Lab, complaining for unrefreshing sleep, loud snoring since childhood, witnessed apneas and fatigue. Past history: Both mentioned tonsillectomy and adenoidectomy. Polysomnography, spirometry, blood gases, biochemistry were performed.

Results: They had OSAS with Respiratory Disturbance Indices 42/h and 23/h respectively. Spirometry and blood gases were within normal limits, but blood biochemistry showed hyperlipidemia. Cephalometry showed middle face hypoplasia. Neck CT demonstrated stenosis of the oropharynx and hypopharynx.

Conclusions: OSAS should be suspected in any medical condition that affects skeletal development of the face and upper airways soft tissues, especially since loud snoring is a persistent symptom despite tonsillectomy and adenoidectomy.

006

Alveolar Hypoventilation (AH) and Sleep Apnea Syndrome (SAS) associated with Leucodystrophy

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Objectives: The aim of this presentation is to uncover possible causative associations between leucodystrophy, and AH, or SAS.

Materials and methods: The patient, a 23-year old man with leucodystrophy for 20 years, had hypercapnic respiratory failure, and complained for sleepiness, bad sleep quality, headaches and fatigue. Neurological syndrome: Spastic paraplegia and severe facial (temporomandibular), upper and lower limbs ankylosis.

Blood gases (BG) and polysomnography (PSG) were performed. Bilevel positive pressure ventilation (BiPAP) was applied for everyday nocturnal use, after a titration night under PSG. One year later and under Bipap, PSG was repeated.

Results: BG: $PO_2 = 63.3$mmHg, $PCO_2 = 51.1$mmHg, pH = 7.38 PSG: Apnea-Hypopnea Index = 26.2/h, Saturation min = 47%. BiPAP pressures: 8 cm H_2O − 4 cm H_2O. One year later the patient had obvious improvement in PSG indices and subjective well-being.

Conclusions: Leucodystrophy affects respiratory muscles, which results in AH and respiratory failure, and upper airways muscles also, resulting in upper airways instability and therefore SAS.

007

Sleep Apnoea: Finnish National guidelines for prevention and treatment 2002–2012

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Objectives: This national programme deals with the prevention and treatment of obstructive sleep apnoea in Finland.

Materials and methods: According to Finnish population studies, the Health 2000 survey and the register of hospital treatment periods, approximately 150 000 Finnish patients suffer from sleep apnoea. The main target of prevention and treatment is to achieve lower weight and weight control in public health care. N-CPAP (nasal continuous positive air pressure) treatment is individually initiated by specialist care.

Results: The national programme has the following goals: 1. a decrease in the incidence of sleep apnoea; 2. full recovery of as many sleep apnoea patients as possible; 3. maintenance of good functional and working ability of sleep apnoea patients; 4. a decrease in the number of patients with severe sleep apnoea; 5. a decrease in the number of sleep apnoea patients requiring hospitalisation; and 6. an improvement in the cost-effect ratio of sleep apnoea treatment.

Conclusions: The implementation of this national programme is vital. Regional direction and training will mainly be organized by hospital districts and/ or provincial governments and local health care centres. Special attention must be paid on the evaluation of the success of sleep apnoea prevention and treatment.

008

Partial Upper Airway Obstruction Is The Most Common Manifestation of SDB

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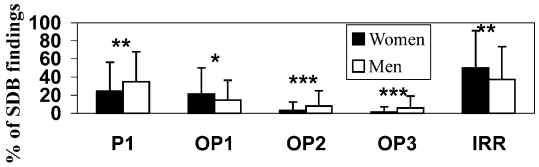
Objectives: To determine the proportion of partial upper airway obstruction of all SDB events in women and men.

Subjects and methods: The Static-Charge Sensitive bed (SCSB) and pulse oximeter recordings were compared between 233 pre- and postmenopausal women and their age and BMI matched male pairs. The data was obtained from patients, who had been referred for a sleep study between between 1994–2000 because of symptoms suggesting SDB.

Results: Data as % of all SDB-findings (mean ± SD), $^{*}p < 0.05$, $^{**}p < 0.001$, $^{***}p < 0.0001$. P-1, OP1, OP2 and OP3 are forms of periodic breathing. IRR is partial obstruction (Increased Respiratory Resistance).



Conclusions: Partial upper airway obstruction (IRR) is the predominant breathing abnormality in both sexes. In women it is even more common than in men matched for age and BMI.

009

Mouth Breathing Compromises Nasal CPAP therapy

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Aims: We hypothesized that patients who breathe mainly through their mouth during sleep would have more mouth leak during nasal continuous positive airway pressure (nCPAP) and therefore low CPAP compliance.

Methods: We quantified mouth breathing during sleep in patients with moderate to severe sleep-disordered breathing (SDB) and followed their subsequent compliance to nCPAP therapy for one year. Polysomnography was performed at baseline, during two-nights CPAP titration and after 3 months. Mouth and nasal airflow was monitored by two thermistors separated by a 3 × 6-cm silicon horizontal diaphragm. CPAP compliance measured as a mean daily CPAP use in hours.

Patients: Fifty CPAP-naive patients (4 women), with RDI ≥ 15/h.

Twenty-nine patients breathed mainly ($\geq$ 70% of total sleep time) through their mouth (mouth-breathers) and 21 patients $<$ 35% (nose-breathers).

Results: RDI decreased from (mean $\pm$ SDM) 38 $\pm$ 3.1 to 1.8 $\pm$ 0.4/hour at 3 months. CPAP compliance was better ($p < 0.05$) in nose-breathers throughout the study. Seventy-one % of nose-breathers and only 31% of mouth-breathers used CPAP daily for $\geq$ 4hours at one year. Mouth breathing decreased significantly ($p < 0.001$) from 84.8% $\pm$ 1.6% at baseline to 22.2 $\pm$ 3.9 at 3 months in mouth-breathers. Nevertheless, it stayed significantly higher ($p < 0.02$) than in nose-breathers.

We conclude that moderate to severe SDB patients with a high percentage of mouth breathing during sleep comply less to future nasal CPAP therapy than patients with a low percentage of mouth breathing.

010

A longitudinal observational 3 year compliance study of patients treated with Ncpap

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Objectives: nCPAP efficiency depends on long-term effective use. There are no studies in this country regarding sleep apneoa and the use of nCPAP. Many patients remain undiagnosed and untreated. This study was undertaken to assess long-term compliance on nCPAP and to correlate this with symptom improvement on treatment. This was done to examine the impact and financial implications as well as the impact of treatment versus no treatment on nCPAP, in patient's with sleep apnea syndrome.

Methods: Pre (diagnostic PSG) and post-test (30 month telephonic follow up) questionnaires were applied using identical questions.

Results: A 56% return rate of the original 97 patients was realised.

A Mc Nemar's test of variance was used to analyse and tabulate significant improvements in symptoms in symptoms (p values). The patients were divided into two groups: G1 = compliant (those who chose nCPAP and stayed on the treatment) G2 = Those who chose no treatment or stopped the treatment after 6 weeks. (Drop off 23%).

The questionnaire outcomes considered significant were analysed according to those patients who had the symptoms before and improved after treatment.

Conclusions: Significant improvement ($\geq$ 60%) in symptoms of snoring, restlessness, breath holding, concentration, headaches, and excessive daytime sleepiness were found. Examination of the trend of the A + HI index related to long term compliance showed a positive correlation ($p = .007$).

011

Nasal surgery in the treatment of Obstructive Sleep Apnea Syndrome

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Objectives: The aim of this study was to evaluate the effects of nasal surgery on obstructive sleep apnea syndrome (OSAS) diagnosed on the basis of overnight polysomnography.

Material and methods: Twenty seven patients with OSAS, confirmed by polysomnography, participated in the study. In all the patients, the physical examination revealed decreased nasal patency due to the variety of nasal skeleton abnormalities, confirmed by acoustic rhinometry and rhinomanometry. All patients underwent nasal surgery for the above-mentioned irregularities. Follow-up polysomnography was carried out two to three months after surgery and the results were compared to baseline values.

Conclusions: In contrast to subjective improvement, reported by most of the patients, no significant changes were observed in the results of follow-up polysomnography. The authors conclude that nasal obstruction caused by the deformation of nasal framework and OSAS are not directly related. Surgical correction of nasal abnormalities may improve the sleep apnea severity and lead to a better compliance with nCPAP therapy, therefore it should be considered in all patients with OSAS in whom the coexisting decrease in nasal patency is observed.

012

Sleep-disordered Breathing in Patients With Idiopathic Cardiomyopathy

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Objectives: The relationship between idiopathic cardiomyopathy and sleep-disordered breathing (SDB) was investigated.

Subjects and methods: Thirty-five patients with a diagnosis of idiopathic cardiomyopathy underwent overnight polysomnography, including 20 patients with dilated cardiomyopathy (DCM) and 15 patients with hypertrophic cardiomyopathy (HCM).

Results: The diagnosis of sleep apnea-hypopnea syndrome (SAHS) was made in 16 (80%) of the DCM patients and in 7(47%) of the HCM patients. Central SAHS (CSAHS) was seen in 10 DCM patients but not in HCM patients, while obstructive SAHS (OSAHS) was seen in 6 DCM patients and in 7 HCM patients. CSAHS was seen in DCM patients with a low left ventricular ejection fraction (LVEF). HCM patients with OSAHS had a significantly greater body mass index (BMI) than those with non-SAHS (27.6 $\pm$ 3.8 vs 22.0 $\pm$ 4.0 kg/m^2, $P < 0.05$). DCM patients with OSAHS had a larger BMI than those with CSAHS (29.3 $\pm$ 5.8 vs 24.2 $\pm$ 4.0 kg/m^2, $P < 0.05$) and those with non-SAHS (29.3 $\pm$ 5.8 vs 21.3 $\pm$ 3.1 kg/m^2, $P < 0.05$).

Conclusions: In this study, half the DCM patients had CSAHS and a close association existed between OSAHS and BMI.

013

Effect of Therapeutic and Subtherapeutic Nasal Continuous Positive Airway Pressure (nCPAP) Treatment on Blood Pressure in Obstructive Sleep Apnea (OSA)

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Objectives: The effect of nCPAP on arterial hypertension in patients (pts) with OSA was studied, as there are no controlled studies showing a clinically important effect of this treatment on hypertension in OSA pts.

Material & Methods: Sixty consecutive OSA pts were included. After diagnostic polysomnography and continuous non-invasive blood pressure recording, pts were randomly assigned to either effective or subtherapeutic nCPAP (3–4 cmH_2O) for 65.2 $\pm$ 49.6 days, when all recordings were repeated.

Results: Sixteen pts in each group completed the study. AHI was reduced by approx. 95% and 50% in the therapeutic and subtherapeutic group respectively. Mean arterial blood pressure decreased by 9.9 $\pm$ 11.4 mmHg with effective nCPAP whereas no relevant change occurred with subtherapeutic nCPAP ($p = 0.01$). Mean, diastolic and systolic blood pressure all decreased significantly both during daytime and nighttime.

Conclusions: Effective nCPAP treatment leads to a substantial reduction in arterial blood pressure in OSA pts and should therefore reduce cardiovascular morbidity and mortality. The fact that a 50% reduction in AHI did not result in a decrease in blood pressure emphasizes the importance of highly effective treatment.

014

Estrogenic hormonal function and development of OSAS in women

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Objectives: To assess influence of female hormonal function on breathing during sleep.

Materials and methods: Random population sample of 320 women, mean age 56.2 $\pm$ 8 years (range 41–72), had history of sleep disordered breathing (SDB) taken and polysomnography performed. Hormonal status was assessed using self-reported questionnaire. 107 women menstruated either spontaneously or using hormonal replacement therapy (HRT). 213 of them did not menstruate due to menopause (171), hysterectomy (34) or

from unknown reasons. 20 of non-menstruating ones used HRT. In a whole sample 40% of women were concluded as having estrogenic activity (E).

Results: are shown in the Table.

	Age (years)	AHI	SaO2 mean	SaO2 min	Desat Index	T90 %	OSAS N (%)
E	49.5	2.2	94.1	83.9	6.7	5.0	1 (6)
Non-E	61.0	5.8	93.1	79.9	11.4	11.7	15 (94)
P value	0.001	0.001	0.001	0.001	0.01	0.005	0.01

Conclusions: OSAS was more frequent in women in non-estrogenic activity group.

015

Hypertension, sex and OSAS

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Objectives: To assess relations between OSAS, sex and arterial hypertension (AH) in a random population sample.

Materials and methods: Study population, 356 males (53%) and 320 females (47%), mean age 56.6 ± 8.2 (range 41–72) years, was selected from voting list for parliamentary election in Warsaw. History of AH and drugs usage was taken. Overnight polysomnography and repeated blood pressure measurements were recorded.

Results: OSAS was diagnosed in 59 (8.8%) males and 17 (2.5%) females. Mean AHI was 25.3, mean SaO_2 92.1%, min SaO_2 76.9%, and T90 of 18.9% did not differ between males and females. AH was diagnosed in 173 (48.6%) males and 135 (42.2%) females (NS). 55% of males and 76% of females were treated for AH ($p < 0.001$), using 1.7 ± 0.8 drugs. Odds ratio for coincidence of OSAS and AH in males was 1.9 (CI 1.3–2.9), in females 6.9 (CI 1.9–24.7). AH was present in 59% of males and 82% of females with OSAS. Multivariate regression analysis showed significant role of sex, age, body composition, and snoring, but not of AHI or oxygenation in the development of AH.

Conclusions: AH was more frequent in OSAS population, especially in women. It was not related to severity of OSAS.

016

Epidemiological study on relations between OSAS and COPD

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Objectives: To determine relations between OSAS and COPD in a random population sample.

Materials and methods: Study population, 356 males (53%) and 320 females (47%), mean age 56.6 ± 8.2 (range 41–72) years, was selected from voting list for parliamentary election in Warsaw. Anthropometric data and smoking history were taken. Polysomnography and spirometry were recorded.

Results: OSAS was diagnosed in 76 subjects (11.3%), mean AHI was 25.3, mean SaO_2 92.1%, min SaO_2 76.9%, T90 18.9%. COPD was diagnosed in 72 (10.7%) subjects, 43% of current smokers, 30% of former smokers and 27% lifelong non-smokers. Severity of airflow limitation was assessed according to ERS guidelines: mild in 70%, moderate in 22%, severe in 8%. In 7 subjects (9.2% of OSA population, 1% of total population) OSAS and COPD overlapped. Mean AHI in the overlap group was 19.0, mean SaO_2 89.6% ($p < 0.005$), min SaO_2 77.3%, T90 25.4% ($p = 0.04$).

Conclusions: COPD in OSAS group was as frequent as in general population. In the overlap group mean saturation was lower than in OSAS, also time spent in desaturation was longer. Presented data indicate more severe course of sleep disordered breathing in subjects with coexisting COPD.

017

Collaborative protocol between Pneumology and Primary Care for patients with Obstructive Sleep Apnea Syndrome

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Objectives: To set up a project work group between Pneumology and a Primary Care Unit to manage the patients are thought to have Obstructive Sleep Apnea Syndrome.

Materials and methods: Initially we established the guidelines to work with patients who go to a particular Primary Care Unit. Secondly we created a data base which took the guided clinical reports, Epworth, drivers and bed partner questionnaires, and complementary tests that we believed necessary to evaluate the patients. The organised information and the agreed guidelines, between the different care levels, make it easier to take clinical decisions in different situations.

Results: To set up a decision "tree" which can improve the study of patients from Primary Care to Specialized Care.

Conclusions: This protocol is being used at the moment for the earlier diagnosis, evaluation and prompt referral of patients, who may have Obstructive Sleep Apnea Syndrome, from Primary Care to the Sleep Respiratory Disorders Unit of Pneumology.

018

Plasma surgery in multilevel synchronous minimally invasive surgery for simple snorers and osas

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Introduction: In our Institution the multilevel synchronous minimally invasive surgery is the ordinary surgical procedure for simple snorers (75% soft palate is involved) and osas.

Materials and methods: A specialised surgical Wand connected to the R.F. generator is placed respectively

a) Into the inferior turbinate in 1 or 2 locations with R.F. energy applied for 10 seconds each lesion

b) Into the soft palate in 3 or 4 locations for 10 seconds each lesion

Patients presenting simple snoring and osas undergo ENT examination, including flexible endoscopy, polysomnography, ESS questionnaire. Surgeries are performed:

- In local anaesthesia: soft palate, inf. turbinate and volumetric tonsil reduction.
- In general anaesthesia: inf. turbinate and soft palate / UP3 / hyoid myotomy (HM_2).

Results: Patients experience minimal discomfort following local anaesthesia. In our paper are compared the pre and post-op parameters in a short follow up (mean 4 months)

Conclusions: In our experience the multiple synchronous surgery is a better approach in respect of single level surgery. Coblation plasma surgery is an effective minimally invasive system for multilevel synchronous surgery in local and general anaesthesia.

019

Comparative study of 11 different fixed CPAP devices.

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Objective: We designed an algorithm based on objective and subjective criteria in order to compare 11 different fixed CPAP devices.

Methods: We tested both objectively and subjectively 11 different devices currently available in Belgium. The objective criteria are noise level, price, patient monitoring, weight, power supply, pressure port, warranty and pressure stability. The subjective criteria are simplicity in use, esthetical aspects and quality of the manual. All investigators individually and independently scored all subjective criteria and the mean was

calculated. The relative weight of the criteria was determined before testing and scoring the different devices.

Results: This table shows the individual scores of three devices.

	Obj. crit.	Subj. crit.	All criteria
ResmedS6Elite	79	70	77
Bora C Taema	68	78	71
Remstar Plus	52	87	62

Conclusions: The best device scores 77 overall. So there still is a significant margin for improvement. We plan to further improve our algorithm.

020

REM sleep structure in OSAS patients before and after CPAP treatment

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Objectives: In OSAS patients a REM sleep reduction occurs. The aim of this study was to compare the REM sleep structure before and after CPAP treatment.

Methods: 50 OSAS patients ($f = 9$, $m = 41$; age $= 54.2 \pm 10.9$yrs., BMI $= 33.5 \pm 5.3$kg/m^2) underwent polysomnography before treatment and during the second CPAP night as well as after three month after CPAP treatment. The evaluation included the total amount of REM sleep, the number of REM episodes and elongation of REM episodes across the night.

Results: The amount of REM sleep compared to untreated conditions is higher at the second CPAP night ($p < 0.0001$) and after three month of treatment ($p < 0.001$). With CPAP the number of REM episodes was increased ($p < 0.05$). We did not detected an elongation of REM episodes across the night. This finding remained unchanged after CPAP treatment.

Conclusions: In accordance to previous findings we found an increase of total REM sleep time under CPAP treatment due to a rise of the number of REM sleep episodes across the night. The elongation of REM episodes across the night was unchanged.

021

Changes in arterial blood velocity (ABV) in coronary arteries during sleep

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Background: Acute coronary events occur with a diurnal variation in incidence that suggests a relationship with sleep and arousal from sleep. Obstructive sleep apnoea syndrome is associated with increased mortality in patients with known coronary vascular disease (CVD). The mechanisms for these associations are unclear.

Aim: To demonstrate changes in Coronary Blood Velocity (CBV) during sleep-related respiratory events.

Methods: 4 patients with known CVD were studied after sedation with midazolam and coronary artery stenting. Beat-to-beat CBV was measured invasively in a normal coronary artery utilising intra-coronary Doppler flow velocimetry, while a limited polysomnograph was performed. Changes in coronary velocity related to arousals from sleep, respiratory events and snoring were measured.

Results: 3 out of the 4 patients slept. There was a 15% increase in instant peak velocity and a 30% increase in diastolic/systolic velocity ratio during snoring. Arterial oxygen desaturation to 92%, resulting from respiratory events, was associated with a linear increase in CBV of 20–40% in all patients. With SaO2 $< 92\%$, there was an increase in CBV of 150% of baseline, which plateaued with further decreases in SaO2.

Conclusion: Respiratory events, associated with oxygen desaturation, were associated with changes in CBV in our study.

022

Visual, auditory and somatosensory evoked potentials in the patients with obstructive sleep apnea syndrome

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Objectives: Evoked potentials (EP) are sensitive to different stimuli. The aim of the study was to determine whether the disorders of the central nervous system could be detected using EP studies in patients with obstructive sleep apnea (OSA) syndrome.

Materials and methods: Material of the study consisted of 36 OSA patients (age 47 ± 10 years) with mean apnea index 46 ± 10. Control group consisted of 50 healthy persons. Visual (VEP), brain-stem auditory (BAEP), and somatosensory (SEP) EP were investigated.

Results: As compared with healthy controls, in OSA patients there were longer the mean latencies of VEP ($117{,}6 \pm 10{,}5$ms *vs* $104{,}3 \pm 4{,}6$ms), N20-SEP ($24{,}2 \pm 1{,}9$ms *vs* $20{,}9 \pm 1{,}2$ms), N14-SEP ($15{,}2 \pm 1{,}2$ms *vs* $13{,}2 \pm 0{,}7$ms), waves III ($4{,}4 \pm 0{,}4$ms *vs* $4{,}0 \pm 0{,}3$ms) and V ($6{,}5 \pm 0{,}4$ms *vs* $5{,}8 \pm 0{,}3$ms) of BAEP, and interlatencies I-III ($2{,}5 \pm 0{,}3$ms *vs* $2{,}2 \pm 0{,}25$ms), III-V ($2{,}1 \pm 0{,}3$ms *vs* $1{,}8 \pm 0{,}3$ms) and I-V ($4{,}7 \pm 0{,}3$ms *vs* $4{,}0 \pm 0{,}3$ms) of BAEP (the differences statistically significant, $p < 0{,}001$).

Conclusions: The studies of EP in patients with OSA syndrome reveal abnormalities indicating dysfunction in the visual pathway, afferent sensory system, and the lower part of brain stem.

023

The effect of theophylline on the continuous attention in osas patients

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Aims: Some of the symptoms obstructive sleep apnea syndrome patients suffer from are excessive daytime drowsiness and reduced continuous attention, caused by nocturnal arousal reactions and sleep fragmentation. Among other aspects, such a decline in performance influences the persons affected in their ability to drive a car. The objective of this study is to investigate the effect of theophylline on the continuous attention of patients suffering from obstructive sleep apnea syndrome (OSAS) with the aid of "carsim", a driving simulator newly developed by us.

Spurabweichungen in sek = tracking deviations in sec.

Wirkung von Theophyllin = effect of theophylline

Methods: For 50 consecutive patients with OSAS (age: 49.6 ± 7.7; theophylline level: $11.8\mu g/ml \pm 3.1\ \mu g/ml$; AHI: $28.7/h \pm 20.6/h$; mean AH duration: $49.8s \pm 20.1s$; SaO_{2min}: $79.8\% \pm 7.7\%$; ESS score: 11.6 ± 4.9), a diagnostic polysomnography in compliance with the criteria established by the DGSM (*Deutsche Gesellschaft für Schlafmedizin*; approx.: German Society for the Treatment of Sleep Disorders) was carried out.

Test procedure: In a randomised cross-over, 50 OSAS patients were treated with placebo or theophylline (Bronchoretard 6mg/ kg of body weight). On two consecutive days, a delayed-action theophylline preparation or placebo was taken in the morning and at noontime. The aim was to achieve a theophylline level of $\geq 10\mu g/ml$. The measurements concerning continuous attention (see above) were carried out at 1600 hrs.

Results: To check continuous attention under the influence of theophylline, tracking deviations in "carsim" were analysed. For 34 of 50 patients treated with theophylline, continuous attention improved. The duration of tracking deviations in case of placebo was 50.9 ± 107.8 sec, and dropped significantly under the influence of theophylline, to 22.1 ± 52.3 sec ($p = 0.027 *$).

Conclusion: The administering of theophylline shows a significant improvement of continuous attention. As CPAP therapy alone cannot

normalise continuous attention for a high percentage of patients (23%) (Büttner, 1999, 2000), it may be feasible to employ theophylline as an additional active principle for patients who despite nCPAP therapy show limited continuous attention. The administering of theophylline alone cannot be recommended, though, as in many cases, causal therapy of sleep fragmentation is achieved by CPAP.

024

Evaluation of cerebral hemodynamics in patients with OSA by overnight rheoencephalography monitoring

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Aims: To investigate the diagnostic value of overnight rheoencephalography (REG) for evaluation of cerebral blood flow (CBF) changes in patients with obstructive sleep apnea (OSA).

Methods: We performed overnight REG monitoring using computerized system Rheo-Spectr (Neurosoft, Russia) accompanied by standard polysomnography in 6 patients with severe OSAS (all men, mean apnea/hypopnea index (AHI) 55 + 12,2, mean age 48 ± 10.9, BMI 34,6 ± 4,0).

Results: Over the course of apnea there was a rather good REG signal that gave an opportunity to evaluate acute changes in CBF during that part of respiratory event. It was shown that at the end of apnea despite of vasodilatation there was a decrease of CBF volume on the background of hypoxemia that can provoke ischemic events. On the contrary at the end of postapnetic ventilation there was a sharp increase of CBF on the background of vasodilatation and known sharp blood pressure rise that can lead to hemorrhagic events.

Conclusions: 1. Overnight REG monitoring is appear a good diagnostic tool in evaluating acute CBF changes in patients with OSA. 2. OSA leads to acute CBF fluctuations that can provoke cerebrovascular complications.

025

Serotonin Antagonist Improves Obstructive Sleep Apnea

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Aim: To test the clinical efficacy of mirtazapine in obstructive sleep apnea (OSA). This drug reduced sleep apneas by 50% in a rat model.

Methods: Twelve newly diagnosed patients participated in this randomized double-blind crossover study comparing the effects of 0 (placebo), 4.5, and 15 mg QD of mirtazapine on OSA. A full PSG was conducted on the final night of each 7-day treatment period.

Results: Overall, the 15 mg dose reduced the apnea/hypopnea (AHI) and arousal (ArI) indexes by 50% ($p = 0.0001$) and 29% ($p = 0.05$), respectively. Individual values are tabulated below:

Pt #	AHI			ArI		
	0 mg	4.5 mg	15 mg	0 mg	4.5 mg	15 mg
1 (M)	31.1	35.0	26.8	14.1	19.2	18.5
2 (M)	18.7	17.4	14.9	22.8	8.5	18.0
3 (F)	1.8	0.2	0.4	13.6	19.9	7.5
4 (M)	34.3	17.1	9.0	31.8	31.5	5.7
5 (M)	2.8	1.4	1.3	33.0	21.4	18.2
6 (M)	31.8	21.8	8.2	76.1	115.2	70.4
7 (M)	15.5		3.2	41.4		16.2
8 (F)	63.4	37.6	42.8	84.5	53.4	45.6
9 (F)	24.1	14.0	15.9	40.3	125.9	49.4
10 (F)	13.9	6.8	7.9	17.8	15.7	11.8

Conclusions: This study demonstrates the potential value of serotonin antagonists in clinical management of OSA. It also validates the rat model as a tool for screening additional drug candidates.

026

Prevalence of Dobutamine Induced Hypertrophic Obstructive Cardiomyopathy (DiHOCM) in Obstructive Sleep Apnea (OSA)

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Purpose: To study the prevalence of DiHOCM in OSA among Asian Americans.

Materials and Methods: 155 patients (male female ratio 1.2:1, ages 32–94) with OSA underwent dobutamine stress echocardiogram because of recurrent chest pain and suspected coronary artery disease (CAD).

Results: 23 (14.8%) patients have CAD with no DiHOCM, 40 (25.8%) patients have both CAD and DiHOCM; 92 (59.4%) patients have DiHOCM but no CAD. We found an 85.2% prevalence of DiHOCM in patients with diagnosed OSA.

Conclusions: Increase sympathetic nervous activity (SNA) and dysmetabolism (insulin resistance) among OSA patients lead to hypertrophy of the interventricular septum and posterior wall of the heart, hence concentric left ventricular hypertrophy (cLVH). cLVH in turn lead to increase myocardial oxygen demand (MVO2) of the heart, and symptoms of chest pain with or without CAD. cLVH predisposes to DiHOCM.

027

Dysmetabolic Pattern in Obstructive Sleep Apnea (OSA)

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Purpose: To study the pattern of dysmetabolism (insulin resistance, elevated LDL IIIa, IIIb, low HDL2b) and OSA. *Materials and Methods*: The study is derived from the patients database of the Chanwell Clinic referred to Stanford University and nearby Sleep Center who were discovered to have OSA during the years of 1992–2002 were retrospectively analyzed.

Results: We found a high association of dysmetabolism among Asian Americans (AA). Out of a total of 175 AA patients with OSA, 155 have dysmetabolism (age range = 32–82 y; M: F ratio = 85:90). The sleep study and overnight pulse oximetry documented OSA in these patients with peak SaO2 desaturation ranging from 52% to 86%.

Conclusions: Ethnic and genetic predisposition combined with lifestyle and possible migratory environmental factors give rise to a high incidence of dysmetabolism and OSA among Asian Americans. Clinical Implications: Physicians should look for dysmetabolism when treating Asian American with OSA. Aggressive treatment of dysmetabolism and OSA could reduce worsening morbidity and mortality.

028

A3H5 Syndrome, Unrecognized Epidemic Among Asians

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Purpose: To study the high prevalence of obstructive sleep apnea (OSA), arrhythmia, hypertension, and dobutamine induced hypertrophic obstructive cardiomyopathy, hyperinsulinemia, hyperlipidemia and hyfibrinogenimia among Asians. We have identified this as A3H5 Syndrome (A3H5S).

Methods: The study is derived from the database of the Chanwell Clinic referred to Stanford University Medical and nearby Sleep Center during1992–2003 were retrospectively analyzed.

Results: We found a high incidence of A3H5S in California with large Asian population and patients from Asia. There were 258 patients (age range = 32–96; M: F ratio = 1.2:1) with A3H5S. The most common symptoms were lightheadedness, headaches, easy fatigability, and chest discomfort. Most common signs were mild to severe obesity, BP range 160/90–240/120), PACs, PVCs, paroxysmal supraventricular tachycardia (PSVT) on Holter, echocardiogram findings of diastolic dysfunction, thickened LV

wall (IVS $\geq$ 13 mm, PW $\geq$ 13 mm), small LV cavity, and abnormal dobutamine echo manifested as dobutamine-induced hyperdynamic or hypertrophic obstructive cardiomyopathy, average peak and mean LV intracavitary gradient of 122 and 29 mm Hg respectively. The sleep study and overnight pulse oximetry documented OSA in these patients with O2 desaturation ranging from 52% to 85%.

Conclusions: A3H5S is a disease group that is common among Asians and contribute to rising morbidity and mortality with deaths from cardiovascular and neurovascular diseases.

029

Claustrophobia Tendencies and CPAP Adherence

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Aims: There have been studies reporting differences in CPAP adherence between those who do and do not experience claustrophobia. Given the retrospective nature of those studies, there remains a question about the effect of claustrophobia on CPAP adherence

Methods: Subjects (n = 153) were in a prospective multi-site study with inclusion criteria: ages 20–60, AHI $\geq$ 15, and a candidate for CPAP. An overt monitor attached to CPAP machines measured CPAP 24-hr use over 3 months of treatment. A five-item sub-scale on the Fear and Avoidance Form measured claustrophobic tendencies.

Results: Subjects were age: 46.3 $\pm$ 9 yrs; BMI: 37.7 $\pm$ 8.49; AHI: 63 $\pm$ 31; 89% male. Claustrophobia was identified as a problem by 29% of the sample. Pre-treatment claustrophobia tendencies were significantly associated with CPAP use (Mean CPAP = 4.91 hrs, r = -0.19, p < 0.02). There were differences in pre-treatment claustrophobia scores between subjects with $<$ 2 hrs, 2- $<$ 5 hrs, and $\geq$ 5 hrs of CPAP using a one-way ANOVA (F = 8.18, p = 0.0004). Post hoc t-test comparisons of claustrophobia tendency were significant between subjects with $<$ 2 hr CPAP and 2– $<$ 5 hours and $\geq$ 5 hrs.

Conclusions: Pre-CPAP claustrophobia tendencies were associated with decreased adherence to CPAP treatment. Pre-treatment identification of claustrophobia tendencies may be important to increase CPAP adherence.

030

Discussion on relationship between severity of OSAHS and it's clinical characteristics

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Objectives: Discussion on relationship between severity of OSAHS and clinical characteristics such as snoring body weight and neck collar.

Materials and methods: According to AHI (5 and $<$ 5), all patients were divided into single snoring team (16 person) and OSAHS team (54 person) and were determination the snoring, neck collar, AHI, and BMI.

Results: All indexes (snoring, neck collar, AHI, and BMI.) in OSAHS team were remarkably higher than that of SS team($P < 0.05$).

conclusion: It is helpful to diagnose the OSAHS with the neck collar, Snoring and BMI. For OSAHS patients AHI is positive-correlative with BMI, and is not correlative with neck collar and Snoring.

031

The Behavioural Disturbance in Childhood Sleep Disordered Breathing

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Aims: There are growing evidence showing Sleep disordered Breathing (SDB) and Attention deficit/hyperactivity disorder (ADHD) have close relationship. The purpose of this study is to evaluate the behavioural problems in children with SDB.

Methods: 40 children who came to our clinics with the chief complain of snore were included into this study. Overnight polysomnography and Test of variables of attention-Visual (TOVA-V) were performed. Child Behaviour Checklist (CBCL) and Obstructive Sleep Apnea –18 Quality of Life Survey (OSA-18) were completed by their parents and teachers.

Results: Their Respiratory Disturbance Index (RDI) is 13.4 $\pm$ 17.6/h. 23 children met the DSM IV criteria for ADHD. 9 of these 23 patients were inattention type, 4 were hyperactive type and 10 of them were mixed type. The other 9 children also have attention problem although they do not fit the criteria.

Conclusions: Attention problem was noted in most children with SDB. More than half of children with snore were diagnosted to have ADHD by child psychiatry. Sleep specialist who handle childhood SDB should pay more attention on their behaviour problems.

032

What mathematical models tell us of the clinical causes of apneas during sleep

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We have examined the effects of alertness on the chemosensitivity of chest wall and upper airway muscles on breathing in a mathematical model of the respiratory system. The model included peripheral and central chemoreceptors, the body gas stores, the effects of changes in cerebral blood flow, hypoxic depression, and postsynaptic potentiation. Responses of both upper airway and chest wall muscles were considered to be nonlinear.

Central apneas could be made to occur in non-Rem sleep by shifts in alertness level, more easily with abrupt than with more gradual shifts. Hypocapnia or hypoxia could also produce central apneas. The addition to the model of representations of the respiratory pattern generator allowed total cessation of breathing to be differentiated from expiratory prolongations. Simulations showed that differences in the effects of arousal on upper airway and chest wall muscles might explain the occurrence of many episodes of obstructive apnea. Disturbances that provoked instabilities in respiratory control tended to facilitate the occurrence of both central and obstructive apneas.

Apneas during REM sleep may involve responses to internal disturbances (noise) in situations in which neural responses are augmented but chemosensitvity is suppressed.

033

Cephalometric Analysis Parameters Related to Severity of the Sleep-Breathing Disordered (SBD)

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Objectives: Purpose of this study is to indicate cephalometric parameters of craniomandibular characteristics for decision of severity in SBD.

Materials and methods: 88 subjects who were evaluated using PSG were included. We used logistic regression analysis. AHI, RERA, and 90% $\geq$ SpO_2 were applied the severity of SBD as a dependent variable. SNA, N-ANS, ANS-Gn, PAS, MP-H, PNS-P, Facial-axis were applied as independent variables.

Results: In the variables in the equation, the Facial-axis showed 0.191 (odds ratio) with a significant difference.

Conclusions: The results indicated when the Facial-axis was smaller than 85.0, SBD was predicted severe. We conclude that the Facial-axis was useful for evaluating severity in SBD.

034

Is useful rhinomanometry to evaluate nasal resistance on patients using n-CPAP

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Objectives: It is reported that there is an association between severity of sleep breathing disorder and nasal resistance and it is known that high nasal resistance is a risk factor of n-CPAP failure. In this study we discuss the indication of nasal therapy in OSAS patients using n-CPAP.

Materials and methods: we enrolled cohort of OSAS patients (AHI $\geq$ 20 PSG and rhinomanometry were performed) with n-CPAP therapy, who were followed up for more than one year.

Results: Of the 117 patients continued n-CPAP, 24% could not use n-CPAP because the nose obstruction complain. And after the nasal therapy(clinical and surgical treatment) n-CPAP adherence was successful. In this group the nasal resistance measurement as higher than in the group with out nasal therapy 0.351pa/cm^3/sec vs 0.205pa/cm^3/sec; 100pa)

Conclusions: The results showed that OSAS patients with high nasal resistance needs nasal therapy to increase the compliance of n-CPAP and rhinomatometry is useful to evaluate nasal resistance and indicate nasal therapy for OSAS patients using n-CPAP.

035

The association of 2 type diabetes and obstructive sleep apnea.

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Objectives: In order to evaluate the frequency of obstructive sleep apnea syndrome (OSAS) in patients with 2 type diabetes 52 male patients (mean age: 53.3 $\pm$ 6.4years) with mean 2 type diabetes duration of 7 $\pm$ 1.2 years were included into the study.

Materials and methods: 12 channel polysomnography (PSG) with night and wake up blood pressure (BP) control were applied to all 52 patients.

Results: PSG revealed OSAS in 34 (65.4%) cases. BP control showed wake up hypertension in all patients with OSAS. A positive relationship was detected between wake up hypertension and AHI ($p < 1$).

Conclusions: PSG should be performed in all patients with 2 type diabetes with wake up hypertension.

036

Metabolic syndrome (MS) and obstructive sleep apnea (OSA).

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Objectives:The aim of this study was to assess the effects of treatment with continuous positive airway pressure (CPAP) in patients with MS accompanied with OSA.

Materials and methods: We have carried out 34 patients, aged 41 to 65 with type 2 diabetes, obesity, and hypertension. All these patients were resistant to the conservative therapy (CT) and revealed OSA (67%-mild, 33%-severe) by polysomnography. All of them used long-term treatment by CPAP. The effect of CPAP was followed-up after 2 mo. - treatment response was assessed from changes between baseline and follow-up measures of body mass index (BMI), HbA1c, and dose of hypoglycemic drugs, hypertension and functional status/general health.

Results: Finally as a results of CPAP- therapy we observed not only the improvement of functional status/general health of all 34 subjects which confirmed by the reducing of BMI and hypertension but the normalization in glucose metabolism by reducing in HbA1c and dose of hypoglycemic drugs ($p < 0.05$).

Conclusions: The effects of CPAP- therapy to the glucose metabolism can give us new views to the pathogenesis of OSA.

037

Serial changes of upper airways in snorers after uvulopalatopharyngoplasty: volumetric CT evaluation

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Objectives: To evaluate volumetric and morphological changes of pharynx in snorers after uvulopalatopharyngoplasty (UPPP) at different lung volumes and to correlate to functional indexes.

Materials and methods: Ten snorers were prospectively analyzed by using dual slice spiral CT (Twin, Philips, Cleveland). CT examinations were performed pre-operatively, 24–48hrs and 3–9 months after surgery at different lung volumes (full inspiration, normal and forced expiration) during wakefulness. Changes in three-dimensional upper airway volume and morphology of the uvula (thickness, length, angulation) were evaluated at different lung volumes and correlated with polysomnographic (PSG) and subjective data for each period of CT evaluation.

Results: All patients were considered as subjective good responders, after UPPP. CT revealed a wide variation of volumetric measurements at the different lung volumes after UPPP. Early post-operative CT revealed narrowing of the pharynx in some patients which was directly correlated to the desaturation index assessed during PSG post UPPP. After surgery, there was a significant shortening (40.8 mm vs 29.5mm), widening (9.1 mm vs 10.5 mm) and straightening of the soft palate (35.8° vs 13°) ($p < 0.05$).

Conclusions: CT revealed non uniform changes of the pharynx after surgery. Modifications of soft palate geometry may explain reduction of snoring after UPPP. Significant sleep-related desaturations in the early post-operative period may be explained by transient upper airways narrowing.

038

Comparison of stand alone (Nellcor n-200e) and inbuilt (compumedics siesta) oximeters

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Introduction: The measurement of Oximetry during polysomnography (PSG), is vital in the assessment of sleep disordered breathing. The acquisition of a Compumedics Siesta sleep system with in-built Nonin Oximeter raised the question of comparability with our pre-existing Nellcor N200E Oximeters.

Aims: To assess: 1) accuracy of each pulse Oximeter against arterial blood gas(??)., 2) size and nature of any differences between the Oximeters during PSG(??)., 3) if any observed difference in measured SaO_2 affected reported clinical parameters.

Method: 1) 15 subjects had both oximeter probes placed on the same hand from which an arterial sample was taken. 2) 9 consecutive patients, during routine PSG, had both oximeters placed on the same hand. Oximetry readings were from 3 stable periods of sleep. 3) For each PSG the RDI, average decrease in SaO_2, nadir from each oximeter were calculated..

Result: 1) compared with arterial blood gases both oximeters had all points within $\pm$ 2sd of the mean difference. 2) The mean difference during measured sections of the PSG was 0.9%. 82% of all differences were between $\pm$ 2%. 3) The difference between calculated RDI, average decrease in SaO_2 or nadir was insignificant.

Conclusion: Both oximeters accurately compared with arterial blood gases. The differences were not clinically significant and did not affect the reported parameters.

039

Cardiovascular consequences of obstructive sleep apnoea

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Aims: To determine whether obstructive sleep apnoea (OSA) is asso-

ciated with cardiovascular and metabolic risk factors independently of obesity.

Methods: We studied autonomic tone (ms^2) and baroreflex sensitivity (BRS-ms/mmHg), by a spectral approach, and insulin resistance (IR-HOMA) in subjects with OSA ($n = 40$) and controls ($n = 38$), similar for age, sex, BMI, waist circumference, percentage body fat, fat mass. BP (mmHg), urinary noradrenaline (NA-mmol/24hr) and HDL cholesterol (mmol/l) were also measured.

Results: The low frequency (LF-217 ± 56 v 410 ± 75, $p < 0.01$) and high frequency (HF-150 ± 47 v 360 ± 151, $p < 0.01$) power of heart rate variability were reduced in subjects with OSA, indicating sympathetic and parasympathetic withdrawal and an overall reduction in cardiac autonomic tone. Subjects with OSA also had a lower BRS (5.2 ± 0.5 v 7.0 ± 0.8, $p < 0.03$), were more insulin resistant (2.9 (1.7–4.4) v 1.7 (1.4–3.1), $P = 0.01$), had a higher systolic blood pressure (141 ± 2.8 v 132 ± 2.2, $P = 0.01$) and a reduced HDL cholesterol (1.1 (0.9–1.3) v 1.3 (1.1–1.5), $p < 0.001$) compared to controls. Urinary noradrenaline was similar between groups.

Conclusions: These data suggest that OSA is independently associated with a reduced autonomic tone, BRS, insulin resistance, an increased BP and a reduced HDL cholesterol. These abnormalities may contribute to an increased CV risk in this group.

040

Improvement of erectile dysfunction in patients with sleep-apnoe-syndrom under CPAP therapy

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Introduction: We prospectively evaluated the impact of SAS on ED in a larger group of patients over a half year period.

Methods: 45 male middle-aged patients with SAS were prospec-tively evaluated before and at first night with CPAP therapy as well as four weeks and six months after continous CPAP therapy. Sleep architecture was evaluated and nocturnal penile tumescence (NPT) was recorded by mercury-filled strain gauges in 50% of the patients. IIEF (International Index of Erectile Function) was in-vestigated by a questionaire.

Results: (mean ± SD) 11 patients had mild, 14 moderate and 23 severe SAS. 58% of all patients had ED. CPAP therapy was asso-ciated, as expected, with an improvement in sleep behaviour : AHI decreases from 44/h to 1/h. We also observed an increase of sleep related erections (SRE) from 0,9 ± 0,9 to 2,4 ± 0,9/night ($p < 0.01$) and increase of total tumescence time (TTT) from 24,8 ± 27,2 min to 68,4 ± 26,3 min ($p < 0.01$). The tumescence maximum (Tmax) raised from 1,3 ± 1,2 cm to 2,9 ± 0,9 cm ($p < 0.01$). 50% perceived an improvement in sexual function in general.

Conclusions: ED is highly prevalent in patients with SAS. This prospective study clearly demonstrates the striking improvement of sexual function in 50% during CPAP therapy which is associated with improved sleep architecture.

041

High Resolution Detection of Sleep Apnoea using the Electrocardiogram

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Objectives: Sleep related breathing disorders are accompanied by cyclical variations of heart rate. This project investigated the high-resolution detection of obstructive sleep apnoea (OSA) using a single-lead electrocardiogram (ECG).

Materials and methods: Thirty-five ECG recordings (duration: 401–578 minutes) for diagnostic sleep studies collected at the Hospital of Philipps-University were used. Each recording was visually examined by an expert and periods of normal and disordered breathing identified. Periods of disordered breathing contained apnoea or hypopnoea were labelled based on oronasal airflow, respiratory movement, and pulse oximetry. In addition, each recording was labelled as 'control', 'borderline', or 'apnoea'. All recordings were sampled at 100 Hz. The periods of normal and disordered breathing were mapped to three time-scales: 15, 30 and 60 seconds. An automated processing system was developed to mimic the classifications of the human expert for each time-scale. The classifier used features based on spectral and time-domain measures of RR intervals, as well as an ECG-derived respiratory signal.

Results: The accuracy of normal/OSA event identification on the 15, 30 and 60 second time-scales were 86.6%, 88.6% and 90.0% respectively. Controls were separated from apnoea subjects with 100% accuracy.

Conclusions: Precise identification of OSA events from the ECG can be achieved with high accuracy.

042

Laser-assisted uvulopalatoplasty in the therapy of primary snoring

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Objectives: The purpose of this study was to find out whether patients treated with LAUP in a defocussed modus have less pain than patients treated in a focussed modus.

Materials and methods: LAUP was performed in 35 patients suffering from velar snoring as detected by esophagopharyngeal pressure measurement (snoring-index 350/hour). A subgroup of 20 patients were treated in a focussed laser-mode, the other 15 patients were treated in a defocussed mode (swift) with the same energy of 10 Watt.

Results: Postoperative polysomnography showed a reduction of snoring in both patient-groups (snoring-index 75/h). In 10 patients who did not respond to treatment (snoring-index $\geq$ 150/hour) a change of the site of snoring to the retroglossal and the hypopharyngeal region could be determined by esophagopharyngeal pressure measurement. Postoperative pain was lower in patients treated in defocussed mode, which might be explainable by a lower traumatization of the velar soft tissue.

Conclusions: In summary, LAUP is an effective treatment option in several patients with primary snoring. Postoperative pain can be reduced by performing the procedure with a CO_2-laser in defocussed mode.

043

Nasal Resistance in Sleep-Related Breathing Disorders

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Objectives: To compare total nasal resistance in a group of patients with primary snoring versus obstructive sleep apnea syndrome (OSAS).

Materials and methods: Total nasal resistance was calculated from pressure/volume data obtained by active anterior rhinomanometry in a total of 162 consecutive sleeplab patients. 71 patients were primary snorers, 91 had OSAS. Total nasal resistance was calculated at 75 and 150 daPa. Statistical analysis was performed based on non-parametric testing.

Results: At 75 daPa the mean calculated total nasal resistance was 0.16 (+/− 0.05) $Pa/cm^3/s$ in the snorers and 0.17 (+/− 0.08) $Pa/cm^3/s$ in the OSAS patients. In a reference group of normal patients the mean nasal resistance was 0.15 (+/− 0.04) $Pa/cm^3/s$. At 150 daPa the mean values were 0.22 (+/− 0.06) $Pa/cm^3/s$ in the snorers and 0.24 (+/− 0.1) $Pa/cm^3/s$ in the OSAS patients, compared to 0.21 (+/− 0.04) $Pa/cm^3/s$ for the reference group. Statistical analysis of all the data could not show any significant difference in total nasal resistance between the different groups of patients, neither at 75 nor at 150 daPa.

Conclusion: Total nasal resistance does not differentiate normals, snorers and OSAS-patients.

044

Sleep apnea after renal transplantation. an underdiagnosed complication

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Aim: To analyse the presence of obstructive sleep apnea syndrome (OSAS) in obese patients after renal transplantation.

Methods: Case-series study of two populations: Group A: obese patients, [Body mass index (BMI) ≥ 30]; group B: non-obese patients (BMI < 30 at transplantation). All patients completed an OSAS related symptoms questionnaire. A polygraphy (ApnoeScreen Pro, Jaeger) was performed. OSAS was diagnosed when apnea hypopnea index (AHI) was ≥ 10 and OSAS was considered severe with AHI $\geq$ 30. Demographic data were similar between groups except for mean BMI at the moment of the study (39 ± 7.5 and 25 ± 3 in group A and B respectively).

Results: Obesity was the only independent significant risk for severe OSAS [OR 5.7 (1.32–24.7) CI 95%].

	Group A, $n = 27$	Group B, $n = 20$	*P*
OSAS	25 (93%)	19 (95%)	NS
AHI	41 ± 21	21 ± 10	0.001
Severe OSAS	18 (66.6%)	6 (30%)	<0.0025
CPAP	20 (74%)	12 (60%)	NS

Conclusions: OSAS seems to be a frequent complication after renal transplantation, being more severe in obese patients.

045

Five levels of sleep related breathing disorders reflected by respiratory and sleep parameters in adults

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Aims: Sleep related breathing disorders (SRBD) includes 3 levels of sleep apnoea hypopnoea syndrome (SAHS) and respiratory effort related arousal (RERA) and simple snoring (SS).

Methods: Twenty parameters obtained during standard polysomnography were analyzed in 101 adults to assess their usefulness for better characterizing of similarly old SRBD graded usually by apnoea/hypopnoea index (AHI). Results: The severe SAHS group (AHI $58{,}5 \pm 1.8$, Mean $\pm$ SEM had higher ($p < 0{,}05$) BMI ($36{,}4 \pm 1{,}3$), lower average and minimum Sa02 ($86{,}6 \pm 1{,}2\%$ and $59{,}7 \pm 2{,}6$) connected with higher respiratory arousal- RA ($75{,}8 \pm 15{,}3$/h) and lower non-respiratory arousal- NRA ($47{,}4 \pm 7$) than the other 4 milder groups. Parameters reflecting arousal were more or less increased (arousal index- ArI, sleep fragmentation index- SFI, macroarousal, movements- NVT, sleep phase shifts, superficial sleep, wakefulness, snoring) or decreased (sleep efficacy, REM and slow wave sleep) without significant differences in all 5 groups.

Conclusion: While all 5 groups of SRBD were characterized by increased levels of general arousal against the normal values, significant changes of respiratory parameters (AHI, RA, SaO2) predominated in severe and moderate SAHS, and the significance of sleep parameters prevailed in simple snoring, RERA and mild SAHS.

046

Comparison of AHI and mean esophageal pressure in OSAS

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Objectives: To determine the usefulness of measuring mean esophageal pressure (MEP) compared to the AHI for characterising OSAS.

Materials and methods: 30 patients with suspected OSAS underwent polysomnography including MEP measurement. The pressure amplitudes for all breaths during the whole night were analysed and the MEP was calculated for each patient. In 20 patients, a differentiated MEP was also determined for all sleep stages during normal breathing and apneas.

Results: The mean AHI was 35.4. The MEP (mmHg) was 14.2 during sleep and 7.0 during wakefulness. There was a significant correlation ($p < 0.001$) between MEP during sleep and the AHI. But the MEP was lower in patients suffering from both central breathing disorders and OSAS compared to patients with only OSAS, although the AHIs were similar. MEP during normal breathing within sleep stages was 6.5 in S1, 10.2 in S2, 16.5 in S3, 12.7 in S4 and 9.0 in REM sleep. Patients with an AHI < 20 vs. ≥ 20 had a MEP in S3 of 7.4 vs. 28.9 during normal breathing.

Conclusions: MEP also indicates elevated breathing effort during "normal breathing", which is not reflected in the AHI, and which can clearly indicate the main cause (high MEP: obstructive; low MEP: central) of the breathing disorder.

047

Obstructive Sleep apnea and systemic hypertension in middle-aged (30–70) men. A prospective study of general population.

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Objectives: We studied *(AJRCCM 2001; 163:1–5)*, by sleep tests, the prevalence of obstructive sleep apnea (OSA). This cohort has been followed to identify the risk of systemic hypertension (SH).

Materials and methods: To date, we contacted 851 subjects (623 fully valuables) followed 7.8 ± 0.8 years. OSA was classified by the respiratory disturbance index (RDI) at base line, by quartiles, and SH en two groups: stage 1 (S1): BP $\geq$ 140/90; and stage 2 (S2): BP $\geq$ 160/100. The prevalence of SH for S1 and S2 at baseline were 22.6% and 9.8%, and at follow-up were 45.8% and 27.2%, respectively. Among those free of SH at baseline, the incidence of SH was 34.1 % (S1) and 17.8% (S2). The table shows the adjusted OR* for SH, depending of severity of OSA.

RDI	0–2 (102)	3–6 (150)	7–13 (115)	>13 (105)	*P* trend
S1 (OR)	1	0.8 (0.5–1.5)	1.0 (0.6–1.8)	1.3 (0.7–2.3)	0.014
S1 (OR)	1	1.1 (0.5–2.3)	1.2 (0.5–2.6)	2.0 (0.9–4.4)	0.003

∗ *Adjusted by age, body mass index and alcohol and tobacco consumption*

Conclusions: OSA is an independent risk factor for more severe stages of SH and there is a dose-response relationship.

Acknowledgement: Funded by FIS (01/157); Department of Health of Basque Govern 2001 and FEPAR 2001.

048

Association between systemic hypertension and the apnea-hypopnea Index in the elderly. A cross-sectional study.

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Objectives: To know the association between the apnea-hipopneas index (AHI) and systemic hypertension (SH) in the elderly.

Materials and methods: We studied, by polysomnography, a cohort of general population of 405 subjects from 71 to 100.

Results: The prevalence of obesity (BMI $\geq$ 30 Kg/m2) was 27 %. The table shows the results of the association between AHI and SH controlled by confounding variables.

AHI[a]	*n*	Crude OR (CI 95%)	Adjusted OR* (CI 95%)
< 4.9	75	1.0	1.0
5–14.9	111	1.0 (0.6–1.9)	0.9 (0.4–1.8)
15–29.9	119	0.8 (0.4–1.4)	0.6 (0.3–1.2)
≥ 30	100	2.0 (1.0–3.9)	1.8 (0.8–4)

[a] 428 subjects from the general population, 71–100 years (mean 81.5; DE 7).

* *By sex, age, BMI, neck (cm), alcohol and tobacco consumption.*

Conclusions: There is an association between AHI and SH in the elderly, but the effect is less than in the middle age, and it is only present for high levels of AHI.

Acknowledgement: Financed by FIS (93/0053), (95/1176), (97/0844; FEDES 2FD97/0766-C03-33; D.S.G. Vasco 1992 y 1996 y FEPAR 1996, 1997.

049

Picking REM from the Finger: Automatic detection of REM sleep based on Peripheral Arterial Tone (PAT)

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Objectives: This study assessed the validity of a novel automatic REM detection algorithm (ARDA) that is based on a single channel of arterial peripheral tone as measured from the finger to detect REM sleep in patients with breathing disorders in sleep.

Materials and methods: Polysomnographic recordings were obtained simultaneously with peripheral arterial tone measured from the finger with the WatchPAT100 from 156 patients investigated in two sleep disorders centres because of suspected breathing disorders in sleep: 89 in Haifa Israel and 67 in Sklara Sweden. The performance of ARDA was compared with manual scoring for patients with mild, moderate and severe sleep apnea, by calculating the sensitivity and specificity for identifying each sleep epoch as REM sleep. Sleep epochs were identified by the automatic sleep-wake algorithm embedded in the Watch-PAT100.

Results: The sensitivity, specificity and agreement for the mild, moderate and severe groups were: 66.5%, 89.5% and 85.5%; 67.3%, 89.5%, and 85.6%, and 60.4%, 91.1% and 86.9%, respectively. Overall ARDA tended to overestimate percent REM sleep by 4%.

Conclusions: Our results demonstrate that the novel REM detection algorithm which is based on a single channel of information can provide a reasonable assessment of REM sleep in patients with breathing disorders in sleep. Information about REM sleep will allow better assessment of sleep quality by the Watch-PAT100.

050

Lymphocyte dysfunction as a risk factor for endothelial cell damage in sleep apnea patients

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Objectives: The aim of this study was to assess the possible involvement of circulating T lymphocytes in endothelial cell damage in sleep apnea (OSA) patients. We characterized the phenotype, cytokines profile, adhesion properties and cytotoxicity of CD4, CD8 and γδ T cells from OSA patients.

Methods: CD4, CD8 and γδ T cells were isolated by magnet separation from peripheral blood of 38 OSA patients (age 51.2 ± 13; BMI 28.9 ± 9; RDI 31.3 ± 12) and 26 controls (age 49.8 ± 11; BMI 27.8 ± 3.3; RDI 11.6 ± 2.8). The phenotype and cytokine profile were analyzed by flow cytometry. Adhesion and cytotoxicity against K562 cells and human endothelial cells (HUVECs) were assessed by ^{51}Cr release assay.

Results: The percentage of γδ T cells expressing TNF-α was 3.8-fold higher in OSA patients. Adherence and cytotoxicity towards non-stimulated HUVECs were respectively 3-fold and 2.5-fold higher in OSA γδ T cells compared to controls. Anti-TNF-α lowered the binding and prevented HUVECs damage. Preincubation of non-stimulated HUVECs with OSA γδ T cells increased the adhesion of CD4 + and CD8 + lymphocytes to HUVECs by 2.7-fold. It suggests that γδ T cells mediate the binding of other lymphocyte subpopulations to non-stimulated HUVECs. OSA CD8 lymphocytes exhibited higher cytotoxicity that was significantly decreased by nCPAP treatment.

Conclusions: Pro-atherogenic lymphocyte activation, which resulted in endothelial cell damage, may constitute a risk factor for atherosclerosis in OSA. nCPAP treatment can ameliorate some lymphocyte dysfunctions.

051

The efficacy of upper airway surgery in the treatment of snoring and osas

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Objective: To evaluate the efficacy of surgery in the treatment of snoring and Obstructive sleep apnea.

Patients and Methodology: UPPP was performed in 12 patients all males, LAUP was performed in 41 males and 5 females, Nasal Surgery was performed in 18 males and 15 females in El-Karama Hospital in Gaza, in the period of Sep. 1998 and Aug 2001.in patients with snoring and mild to moderate obstructive sleep apnea.

All patients were evaluated preoperative, one month and six months postoperatively with very limited resources (clinical evaluation and sleep questionnaire in the presence of bed partner.

Results: All patients have decreased snoring, the quality of sleep increased in 83%, the clinical improvement seen in the first month continued through the six months postoperative, satisfaction rate for the patients and their families were 90% and 85% respectively.

No complications were encountered during and after operations.

Conclusion: Upper airway surgery has high efficacy in the treatment of snoring and mild to moderate sleep apnea in our area in the absence of sleep laboratories afor correct diagnosis and in the absence of other alternative treatment.

052

Clinical prediction rule for identifying of OSA syndrome based on weight gain after beginning of snoring

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Aims:. The aim of the study was to evaluate the predictive value of weight gain after the beginning of snoring (WGABS) in identifying patients with OSA and its severity.

Methods: We perform a retrospective analysis of 389 patients with snoring and OSAS (321 men, 68 women, mean age 55.2 ± 10.9, mean BMI 32,2 + 3,3) who had the following data: the amount of weight that the patient gained after the beginning of snoring, weight and height at the moment of PSG implementation, PSG data.

Results: There was an exponential correlation between WGABS and apnea/hypopnea index (AHI) with liner correlation (0.84, $p < 0.0001$) in range of 1 to 20 kg of weight gain. This give an opportunity to calculate the OSA severety based on WGABS: AHI = 4,2 + 2,3x, where x = WGABS). In patients with WGABS ≥ 5 kg the likelihood of having moderate to severe OSAS (AHI ≥ 20) was 60,6%, with WGABS ≥ 10 kg - 94,6%. All the patients with WGABS ≥ 20 kg had severe OSA.

Conclusions: 1. There is a strong correlation between WGABS and AHI. 2. WGABS can be used as a simple clinical prediction rule for identifying patients with OSAS and predicting its severity.

053

Nasal Radiofrequency Surgery for Snoring and Light OSAS Patients

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Objectives: The purpose of this study is to evaluate on a three years follow-up period the results regarding nasal patency in patients affected by snoring and/or light OSAS, treated for nasal obstruction with Coblator.

Materials and methods: 722 patients suffering for snoring (n = 518) or light OSAS ($20 \geq RDI < 35$; n = 204) underwent Coblation surgery for Turbinate Volume Reduction (TVR) or Nasal Synechia Separation (NSD). All patients were evaluated with ENT visit, sleep study, rhinomanometry and other diagnostic procedures for determining the site of obstruction, the sleep disturbance gravity and the snoring intensity

Results: Most of patients (89.24%) achieved the result of an increased nasal patency that lasted over the three years period. In 67.5 of patients RDI reduced significantly after six months and in 43.2% of them was brought within normal limits. This result was maintained over the three years period in 39.6% of them. Snoring intensity decreased only in 12.3% of cases and increased in 34.7%.

Conclusions: Minor surgical nasal radiofrequency procedures appear effective for treating light OSAS, highly uneffective for reducing snoring.

054

Effect of CPAP on cognitive function in OSA patients

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Introduction: Neuropsychological deficits has been showed to be associated with obstructive sleep apnea syndrome (OSA) [1,2]. Data about the cognitive performances of OSA patients and on the effect of CPAP therapy (4–6 months of use) on these are still controversial, mainly because these studies have used different tests to evaluate the same cognitive area. Moreover, there are only few data on the effect of short term (1–2 nights) CPAP use and the results of these studies [3] might be influenced by confounding variables as REM and slow-wave sleep rebound.

Aim of this study was to assess the possible cognitive functions impairment of OSA patients and to evaluate the effect of CPAP therapy both after a short and a long term period of usage.

Methods: 23 severe OSA patients were selected according to the following criteria: age between 45–70, AHI ≥ 40, acceptance of CPAP therapy, absence of other neurological diseases and of alcohol or psychotropic drug use. Mean age was 56,5 ± 6.1 yrs; mean AHI = 54,9 ± 13,4; as control group 23 age- and education- matched subjects were selected.

A battery of neuropsychological tests able to evaluate a wide range of cognitive functions was administered to each patient and control. This battery includes the following tests: tests of visual selective attention (attentive matrixes), sustained attention (TR2), verbal and spatial short-term memory (digit span forward and backward, Corsi block tapping span), verbal and spatial long-term memory (short tale, Corsi supraspan learning), motor abilities (Purdue Pegboard test), constructional abilities (copy of Rey-Osterrieth complex figure), executive functions (Stroop color word interference test, Trail Making Test [A and B], Raven's progressive matrices, verbal fluency). Moreover a self-administered sleepiness scale (Epworth Sleepiness Scale) and depression rating scale (Beck Depression Inventory) were also evaluated.

OSA patients were evaluated before the first night of CPAP therapy (baseline) and in two follow-up sessions (respectively after 15 days and after 4 months of continuous CPAP use); during the first follow-up, equivalent alternative versions of the tests with learning effect were used.

Results: At baseline, the scores of OSA patients vs controls, were significantly impaired ($p < 0.004$, Bonferroni correction) in the tests measuring sustained attention, visuo-spatial learning, executive functions, motor and constructional abilities. The longitudinal evaluation showed that a short period of CPAP therapy (15 days) was already able to normalize the attentive, visuo-spatial learning and motor deficits; moreover the long term use of CPAP (4 months) further improved these deficits. However, both the short and long period of CPAP therapy did not change the performances on the tests evaluating the executive functions and the constructional abilities. With regard to the Epworth Sleepiness Scale, the baseline score of OSA patients (mean score = 11) significantly decreased ($p < 0.004$) both at the first follow up (mean score = 6,2) and at the second one (mean score = 4,9). At baseline, the depression score (Beck Depression Inventory) of OSA patients, was not significantly different respect to controls.

Conclusion: According with other literature data, our data are indictaive that OSA patients have some kind of cognitive deficits. Moreover CPAP therapy showed to be effective in reducing some of these. In particular, the CPAP therapeutic effect is already evident after a short period of treatment.

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055

Contact Laser Surgery for Snore and Sleep Apnea Treatment

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One of the main problems of modern otorhinolaryngology is snore and respiration's obstruction during the sleep.

Under observation were 42 patients at the age of 24–62 (25 males and 17 females) with diagnosis of snore and sleep apnea. All those patients underwent full clinical examination and had surgical treatment with the uvuloplasty and tonsillotomia. The Nd-YAG laser was used in contact regime with quartz-polymeric fibres (diameter of quartz thread from 0.2 up to 1.0 mm) with special configuration of the working tip, served as laser energy conductor.

From those patients 33 had deviation of nasal septum and chronicle hypertrophic rhinitis. Before this they experienced septoplasty and partial laser coagulation of inferior turbinate. All operative interventions were carded out with intravenous and local application anaesthesia. Post-op. period was going on smoothly, patients were prescribed antibiotics, antihistamine and antiphlogistic medicines. The results of treatment were valued with polisomnography. All patients did not suffer sleep apnea, 9 patients preserved a small degree of snore, 33 completely stopped to snore. It is important to mention that practically all patients had chronicle tonsillitis of decompensation form that was partially caused by snore.

Laser contact surgery permits to perform interventions with the highest degree of accuracy and minimum traumatic effects.

056

Sleep apnea in acute cerebrovascular diseases (prospective study of 39 patients)

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Introduction: Although obstructive sleep apnea hypoventilation syndrome(OSAHS) appears to be a cardiovascular risk factor, its frequency in patients with acute stroke remains poorly known.

Methods: We prospectively studied 39 patients (Mean ± SD age = 60.3 ± 12.5 years, Male n = 34, Female n = 5) with acute stroke (9 to 20 days). Assessment included body mass index (BMI:28.4 ± 4.0kg/m^2); history of snoring and daytime sleepiness; cardiovascular risk factors and diseases. Polysomnography (PSG) or Autoset Portable II Plus was obtained in 39 patients after acute stroke.

Results: 35(89.7%) 0f 39 patients with acute stroke was diagnosed OSAHS. An apnea-hypopnea index (AHI)5–15(mild OSAHS) was 15 of 39 (38.4%); AHI:15–30 (moderate OSAHS) was 9 of 39 (23.1%); AHI: ≥ 30 (severe OSAHS) 14 of 39 (35.9%). Sleep apnea has a high frequency in patients with stroke, particularly in older patients with high

BMI, diabetes, and severe stroke. These results may have implications for prevention, acute treatment, and rehabilitation of patients with acute cerebrovascular diseases.

Conclusions: OSAHS is both high risk factor of stroke and result of stroke.

057

The Effects of Surgical Technique on Wound Healing and Therapeutic Outcomes after Uvulopalatopharyngoplasty

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Aims: To assess four common surgical methods for performing a palatopharyngoplasty to determine if the method of surgical instrumentation was related to wound healing and therapeutic outcome.

Methods: Forty patients were randomly assigned to four treatment groups prior to undergoing a UPPP for sleep apnea. Group I was treated using a Bovie electrocautery, Group II was treated using a CO_2 LASER, Group III was treated using a scalpel, and Group IV was treated using a harmonic scalpel. Patients were evaluated postoperatively on days 7, 14 and, 84 to assess wound dehissence, oropharyngeal healing, and outcome. Histological sections were performed on excised tissue to assess for tissue necrosis and cellular injury.

Results: Electrocautery and $C0_2$ LASER were associated with a higher degree of early suture loss, wound dehissence and adverse healing (mild velopharyngeal stenosis and posterior pharyngeal wall adhesions), when compared with scalpel or harmonic scalpel techniques. Histological sections demonstrated mucosal cellular injury and tissue necrosis in electrocautery and LASER groups. There was no significant difference in outcomes.

Conclusions: Tissue injury associated with electrocautery and CO_2 LASER techniques appears to correlate with early suture loss, mucosal dehissence and adverse oropharyngeal scarring. However the method of instrumentation did not impact on treatment outcome. Our results suggest that scalpel and harmonic scalpel yield reliable healing with minimal adverse scarring but no therapeutic advantage.

058

Patterns of respiratory episodes in obese children requiring non-invasive ventilation for sleep disordered breathing

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Background: We sought to review the clinical and Polysomnography (PSG) data of obese (BMI $\geq$ 99.6th centile) children with sleep disordered breathing who have had non-invasive ventilation (NIV) from our service.

Methods: Clinical history, measurement data and the response to treatment were reviewed. PSG with the Alice 4 system, events scored manually using commonly used criteria.

Results: 13 children are described, mean age 8 yrs at diagnosis (range 3–14). BMI ranged from 26 to 45 Kg/m2. Three had clinical syndromes and ten had "simple obesity." All had abnormal oxygen profiles but there was huge variability in respiratory events with Obstructive Apnoea Index varying between 2.1/hr and 90/hr. The "Pickwickian" pattern of central hypoventilation was seen in 6, with the others seeming to have, predominately, obstructive events. BMI did not appear to relate to PSG data. All were offered NIV (4 CPAP, 9 bilevel PAP) but adherence and follow-up has been a huge problem. Only 2 have resolved with good weight loss.

Conclusions: In morbidly obese children requiring NIV we noted on PSG either a pattern of central hypoventilation or largely obstructive events. With the rise in childhood obesity are we seeing the effects of the "metabolic syndrome" start in children?

059

Susceptibility Loci for Obstructive Sleep Apnea Map to Different Areas in Obese and Non-Obese Patients – preliminary results from an ongoing study in Iceland

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Aim We have previously reported a strong familial association among Icelanders diagnosed with obstructive sleep apnea syndrome (OSAS) [1]. To investigate the genetic aspects of this association we examined 2,929 Icelandic OSA patients of whom 1,476 were using continuous positive airway pressure (CPAP). Approximately 3/4 were males and 1/4 females; mean age was 58 years.

Methods: A genealogy data base was used to generate families wherein all patients were related to at least one other patient within and including 6 meioses. Linkage analyses was performed using Allegro linkage software in the first 581 patients (263 on CPAP) who were genotyped with Decode's framework set of 1100 markers, together with over 1000 of their first degree relatives. The linkage analysis used the S_{pairs} scoring function, the exponential allele-sharing model, and a family weighting scheme that is halfway, on the log scale, between weighting each affected pair equally and weighting each family equally.

Results: We detected a LOD score of ≥ 2 on chr 6q using all the material (locus A). When linkage analyses was performed after fractionating the sample into the relatively obese (BMI ≥ 30 kg/m^2) and non-obese (BMI < 30 kg/m^2), we detected linkage of 1.8 (chr 1q; locus B) and 3.1 (chr 6q; locus C), respectively. It should be noted that the locus for the non-obese subjects (locus C) was almost 30 cM telomeric to the locus we mapped in the obese and non-obese combined (locus A). Morover, in contrast to locus A, there was no contribution from the obese patients to locus C. Overall, 6 loci revealed lod scores of 1.5 or higher.

Conclusions: These results support our hypothesis that apart from genes that underlie the susceptibility to OSA in general, there may be additional genetic determinants that differ in obese and non-obese individuals. Moreover, it should be noted that the area of linkage uncovered in the obese subjects are not the same as those that have been mapped in ongoing studies of genetics of obesity itself in Iceland, suggesting that we are mapping susceptibility genes for OSA rather than for obesity.

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060

Baroreceptor Sensitivity is Impaired at Daytime in Patients with Congestive Heart Failure and Cheyne Stokes Respiration

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Objectives: We investigated the spontaneous baroreceptor sensitivity under standardised conditions at daytime in heart failure patients with Cheyne Stokes Respiration (CSR) in comparison to healthy subjects without sleep disordered breathing (normals).

Methods: At daytime during metronome controlled breathing (12/min & 15/min) the respiration, the heart rate and the continuos blood pressure (Portapres) were recorded in 20 patients with CSR (age 58 ± 12 yrs., BMI 28 ± 8 kg/m^2, RDI 34 ± 22/h, EF 25 ± 10 %) and in 50 normals (age 46 ± 10 yrs., BMI 24 ± 3 kg/m^2). The spontaneous baroreceptor sensitivity in the low frequency (α-LF) and high frequency bands (α-HF) was calculated by cross spectral analysis.

Results: In patients with CSR we found decreased values of α-LF (RF 12/min: $p < 0.001$) and α-HF (RF 12/min: $p < 0.009$, RF15/min: $p < 0.001$) in comparison to normals. There were no differences in heart rate whereas the systolic blood pressure was lower in patients with CSR (RF 12/min: $p < 0.002$, RF 15/min: $p < 0.003$).

Conclusions: In heart failure patients with nocturnal CSR a reduced baroreceptor sensitivity and systolic blood pressure are present during daytime. By using noninvasive assessment under standardised conditions it can be demonstrate that cardiovascular functions in patients with CSR are impaired during daytime.

061

Erectile dysfunction, OSAS and CPAP treatment

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Aim: Prospective evaluation of erectile dysfunction present longer than 6 months in a male OSA patient, response to one month of CPAP on a compliant subgroup, compared to age and BMI matched control group with OSA without erectile dysfunction (ED).

Method: A systematic prospective evaluation, with medical, sleep, psychiatric and sexologic specialized evaluations; measurement of Epworth Sleepiness Scale (ESS), Beck Depression Inventory (BDI), Sleep Disorders Questionnaire, Quality of Life SF-36, and polysomnography were performed. 34 patients, with and without ED, matched for age and BMI were studied with CPAP treatment. Parametric and non-parametric statistics, Chi-square, Fisher Exact Test and Multiple regression analysis, were performed.

Results: 98 men, with BMI = 28.8, AHI = 49.6, ESS = 14.8, BDI = 8.4, Lowest SaO_2 = 75.3% were studied. They were divided on 80% lowest SaO_2. A) 46 men, lowest SaO_2 85.7% ± 2.9, AHI = 29.5, age = 47.4, ESS = 13.6, BMI = 25.8, 7 subjects with ED. B) 52 men, lowest SaO_2 60.10 ± 10.0, AHI = 67.4, BDI = 9.0, age 47.4, ESS = 16.2, BMI = 31.4. 21 subjects had ED (χ^2: $p = 0.006$). Multiple regression significant variables: Lowest SaO_2 and age at $r = 0.17$.

With CPAP, resolution of ED was seen in 13/17 OSA. ED had significantly lower SaO_2, ESS, BDI, SF36 subscales scores than OSA controls. Nasal CPAP eliminated differences between groups.

Conclusion: ED is related to nocturnal hypoxemia. OSA must be recognized in patients with erectile dysfunction as nasal CPAP can eliminate it in many cases, and improve significantly their quality of life

062

Nocturia in Men with OSAS

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Aim: Prospective evaluation of nocturia in OSAS males 60 years old and younger and treatment response in a subgroup CPAP compliant.

Method: Nocturia was systematically and prospectively investigated in men with snoring and daytime sleepiness or fatigue, after eliminating patients with chronic medical or psychiatric disorders and unstable drug regimen. Evaluation included medical and specialized sleep and psychiatric evaluations, Epworth Sleepiness Scale (ESS), Beck Depression Inventory, Sleep Disorders Questionnaire, Quality of Life SF-36, tabulation of nocturia data and polysomnography. 22 patients had follow-up evaluations after 4 weeks controlled CPAP usage. Parametric and non-parametric statistics, Chi-square and multiple regression analysis were performed.

Result: 99 men were studied. Mean age 46.6 ± 9.3; BMI, 28.5 ± 5.7; AHI, 49.4 ± 28.5; lowest SaO_2, 75.9 ± 12.4; TST, 448 ± 81.0; arousal index, 35.2 ± 27.3; and ESS, 14.8 ± 4.5. 38 had 2 or more nocturia/night. Patients with nocturia ≥ 1/night had higher BMI (0.0001), AHI (0.0001), arousal index (0.0001), lower lowest SaO2 (0.002), with similar TST, and worse score at RP (0.03) and PF (0.05) SF-36 subscales. Multiple regression analysis after adjusting for age, BMI, AHI, ESS indicated only BMI as significant: ($p = 0.02$, Beta = 0.13). CPAP eliminated nocturia in all the subjects.

Conclusion: Nocturia is related to OSA severity. It is seen early in life (mean age of nocturic OSA: 44 years). It impacts on quality of life. Complaint of nocturia should lead to systematic questioning about OSA, and more so with younger the subject.

063

Outcome of 400 SDB children sent to ENT

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Objective: To evaluate the treatment outcomes of Sleep Disordered Breathing (SDB) in prepubertal children 3 months following otolaryngological surgical intervention.

Study Design: Retrospective investigation of 400 consecutively seen children with SDB referred to otolaryngologists for treatment.

Method: After masking the identities, the following were tabulated: clinical symptoms, results of clinical evaluation and polysomnography at entry, the treatment chosen by the otolaryngologists, and clinical and polysomnographic results 3 months after surgery.

Results: 1) Of the 150 children who initially consulted otolaryngologists, only 75 were referred to sleep clinics to investigate SDB. 2) After being referred for SDB, treatment recommendations ranged from nasal steroids to various surgical procedures. Adenotonsillectomy was performed in only 251/400 (68%) cases. Four cases included closure of the tonsillar wound by suturing the anterior and posterior pillar to tighten the airway. Persistent SDB was seen in 57/400 (14.25%) children, and an additional 8 had persistent snoring. Best results were with adenotonsillectomy.

Conclusion: SDB involves obstruction of the upper airway, which may be due to cranio-facial structure involvement. The goal of surgical treatment should be aimed at enlarging the airway, and not solely focused on treating inflammation or infection of the lymphoid tissues. This goal may not be met in some patients, thus contributing to residual problems seen post-surgery. The possibility of further treatment, including collaboration with orthodontists to improve the craniofacial risk factors, should be considered in children with residual problems.

064

Sleep-breathing disorders in patients with COPD

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Objective: In order to study sleep-breathing disorders in patients with chronic obstructive pulmonary disease.

Methods: 72 consecutive patients (male 55, female 17, mean aged 63.4 ± 10.1 yrs, BMI 27.3 ± 3.4) with confirmed diagnosis of COPD in steady-state were recruited for nocturnal polysomnography (PSG). 40 normal subjects with matched sex, age and BMI as control.

Results: 72 COPD patients showed remarkably sleep hypoxemia and abnormal sleep architecture (higher percentage of NREM stage 1 + 2, lower percentage of slow wave sleep (SWS) and REM sleep significantly). 46 OSAHS in COPD study population, named overlap syndrome, with mean AHI 33.1 ± 13.3, and mean $sao2_2$ decreased from 86.8% ± 10.5% to 73.5% ± 13.8% ($p < 0.01$) during sleep. Sleep architecture was abnormal more significantly than that of simple COPD. Bilevel positive airway pressure and oxygen therapy decreased AHI ($p < 0.001$), improved sao2 ($p < 0.05$) and sleep architecture effectively in patients with overlap syndrome. Nocturnal oxygen therapy improved sleep quality (SWS $p < 0.05$) and hypoxemia ($p < 0.05$) in patients with simple COPD.

Conclusion: Sleep hypoxemia, apnea and sleep disturbance are common in COPD population and may be potential important disadvantage factors influence COPD prognosis. Early diagnosis and effective management are important.

065

The influence of sleep position on sleep apnea

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Objectives: In order to study the influence of sleep position on the frequency of sleep apnea and its severity, and the association and clinical characters of positional apnea and non-positional apnea.

Methods: 347 with OSA underwent nocturnal PSG and were divided into positional apnea (P-OSA) group and non-positional apnea (NP-OSA) group.

Result: 199 (57.3%) were found to be P-OSA group, 148 (42.7%) to be NP-OSA group. Mean BMI of P-OSA was lower than NP-OSA ($p < 0.05$).

There were statistical differences between P-OSA and NP-OSA in sleep efficiency ($p < 0.05$), REM latency ($p < 0.05$), percentage of II, III + IV and REM ($p < 0.01$, respectively). Sleep times in supine position were significantly higher than those of lateral position in both groups ($p = 0.001$, respectively). The total RDI ($p < 0.01$), supine RDI ($p < 0.01$), oxygen desaturation index ($p < 0.01$) and min-SaO2 ($p < 0.01$) were statistical differences between two groups. In P-OSA group, supine RDI ($p < 0.001$), SaO2-des index ($p < 0.001$) and min-SaO2 ($p < 0.01$) were significantly differences than those of lateral. Also, in NP-OSA group RDI ($p < 0.005$), SaO2-des index($p < 0.05$), min-SaO2 ($p < 0.02$). The prevalence remained high and fairly steady in the mild-moderate categories, but showed a marked and significant reduction in the prevalence of P-OSA in the most severe RDI category ($p = 0.001$).

Conclusions: Sleep position is one of major important factors correlating with the frequency and severity abnormalities in OSA patients. There are 57.3% patients with OSA were found to have at least twice as many apnea/hypopnea in the supine than in the lateral position.

066

Clinical Evaluation of Plasma Radiofrequency for Treating OSAS

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Objective: In order to study and evaluate radiofrequency for OSAS.

Methods: 65 OSA patients were selected according to mainly narrow and obstructive level of soft palate and uvula. PSGs were performed before and 6 ~ 8 weeks after radiofrequency operations.

Results: All 65 patients underwent the 5 to 12 min operation under local anesthesia as an outpatient procedure successfully. Clinical symptoms improved significantly after four to eight weeks, Free margin of soft palate was elevated 5 ~ 8mm, uvula was shorten over 50%. Pharyngeal space was expanded significantly. No bleeding, choke, open rhinolalia and cicatricial stricture occurred. Of AHI < 20 group, sleep stages, AHI and lowest SaO2 were improved much more significantly than AHI ≥ 20 group. Weight loss would be benefit for improvement. Among these enrolled patients, in normal weight group, 25 (80.6%) were with excellent efficiency, 6 (19.4%) with good efficiency, while in overweight group, 16 (47.1%) were with excellent efficiency, 18 (52.9%)with good efficiency

Conclusion: This study indicated that plasma radiofrequency as an outpatient procedure can treat obstructive sleep apnea syndrome, especially those with AHI < 20 and normal weight. Excellent effects at least on a short-term basis could be received under strict patient selection.

067

Effects of zolpidem on nocturnal breathing and sleep in normal and SAHS subjects

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Study objectives: To assess the effects of 5-mg and 10-mg oral doses of zolpidem on sleep architecture and nocturnal respiration in normal and SAHS subjects.

Methods: Prospective double-blind placebo-controlled clinical study was carried in sleep lab. 40 normal subjects and 40 subjects with mild and moderate SAHS (20 with obstructive and 20 with central) were enrolled for baseline, placebo, 5-mg and 10-mg zolpidem nocturnal PSG studies with intervals of 3 to 10 days.

Results: Compared with baseline and placebo, mean NREM sleep latency decreased ($p < 0.05$), sleep efficiency increased ($p < 0.05$) and an increase in the percentages of stage 3 and 4 ($p < 0.05$), decreased in the percentages of stage 1 and 2, except no significant changes in REM latency and the percentage of REM sleep. reduction in arousal times ($p < 0.05$). No significant different in RDI, longest apnea duration (LAD), Lowest SaO2 and times of deSaO2 between baseline, placebo and after proscriptions in the three group. There were no statistics differences between 5-mg and 10-mg oral doses of zolpidem sleep architecture, respiration and oxygen saturations. For the first two hours, there were no significant changes in OAI and CAI between OSA and CSA groups before and after administrations.

Side effects: 2 normal and 2 OSA subjects felled tired, nausea and dizziness after 90 min in taking 10-mg. One lower limbs hypodynamia and two normal subjects felled dizziness in the morning. Two OSA explain nightmares and four mild dizziness and fatigue but disappear soon.

Conclusions: Routine doses of zolpidem can decrease sleep latency time, awake and prolong sleep time, especially deep sleep time. While no significant effect on normal respiration and apneas in patients with mild and moderate sleep apnea, no increase central and obstructive apneas and no servers the degree oxygen desaturation. The effects on severe SAHS remain to be future study.

068

EMG-findings consistent with neurogenic lesions in upper airway muscles in obstructive sleep apnea

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Objectives: This study aims to evaluate whether concentric needle EMG may be used to substantiate the presence of peripheral motor neuron lesions in the oropharyngeal muscles. Previously, signs of such lesions have been found in muscle biopsies.

Methods: EMG was performed with a concentric needle electrode in the glossopharyngeus and the uvular muscles. 7 OSA patients, 10 habitual snorers without significant apneas and 2 healthy non-snoring volunteers have been evaluated so far.

Results: In 6/7 OSA patients there were signs of a peripheral motor nerve lesion consisting of polyphasic motor unit potentials of increased duration and/or high amplitudes. In 2 OSA patients active denervation activity was recorded. Normal EMG findings with short and fairly low motor motor unit potentials were found in all snorers, one OSA patient and the two volunteers.

Conclusions: Our findings support the hypothesis of a peripheral motor nerve lesion in the oropharynx in OSA patients. A local peripheral nerve lesion in the oropharynx, probably due to snoring-induced vibration, could be a contributing factor in the developement of OSA. EMG could become clinical routine method to evaluate peripheral motor nerve lesion in the oropharynx, which, in turn, might have implications for the choice of therapy.

069

Clinical experience with the Watch-PAT100, an ambulatory device based on Peripheral Arterial Tone: recommended guidelines

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Introduction: The diagnosis Obstructive Sleep Apnea Syndrome (OSAS) using Cardio-Pulmonary devices is getting more popular. However these systems lack the capability to detect arousals, thus cannot detect Respiratory Effort Related Arousal (RERA), the marker for Upper Airways Resistance Syndrome (UARS). Since UARS is an integral part of OSAS, a negative screening, requires additional full Polysomnography (PSG). The Watch-PAT100 (WP100) ambulatory device is based on the Peripheral Arterial Tone (PAT) signal, and is also sensitive to RERA via the arousal-related autonomic nervous system activation. Additionally, embedded actigraphy data serve for sleep-wake analysis. Therefore, the results are derived from sleep periods only, rather than total recording time.

Objective: Clinical evaluation of the WP100 and determination of practical guidelines.

Method: Fifty consecutive subjects with suspected OSAS were studied over a 3 months period using the WP100. The first 25 subjects served for evaluation of the device and clinical guidelines determination. In the next 25 subjects, these guidelines were implemented and evaluated. In the first

subgroup, a full night PSG recordings was performed in addition to the WP100 recording. The PSG studies were manually scored according to standard criteria (AASM 1999), while the scorer was blinded to the WP100 data. Respiratory Disturbance Index (RDI), including RERAs, was calculated. The WP studies were scored automatically by the device.

The following guidelines were determined:

(A) Pre-study guidelines: Full PSG was indicated in the presence of: (1) WP100 exclusion criteria such as alpha-blocker (2) Suspicion of combined sleep disorders (OSAS, PLMS, narcolepsia..).

(B) Post-study guidelines: (1) Full PSG is indicated in arrhythmia as seen on the PAT signal waveform (2) Therapeutic decision can be made based on the PAT results in normal and moderate to severe cases (3) In mild cases, additional visual inspection is indicated looking for additional supportive evidence, such as, respiratory modulation of the PAT signal or low frequency periodic patterns of the actigraphy channel.

Results: A high level of correlation and agreement (0.97 and 95%, respectively) were found between the WP100-RDIs and the PSG-RDIs. A significant proportion (60%) of the evaluation subgroup subjects were in the mild range of OSAS/UARS severity (PSG-RDI < 25 events/h). The WP100 accuracy was not reduced in these milder patients.

Based on these guidelines additional PSG study was required in 2 cases due to technical problems and in 5 cases due to other symptoms like PLMS/RLS.

Conclusion: Based on our experience, the WP100 can be used efficiently according to the suggested guidelines, and due to its essential features of sensitivity to RERAs and sleep-wake analysis, there is no need for further PSG study in the negative and mild cases.

070

Influence of UPPP surgery on tolerance to subsequent CPAP in patients with OSAHS

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Objectives: To investigate the effect of UPPP on post-surgery CPAP treatment during sleep in patients with OSAHS.

Methods: 31 OSAHS patients after UPPP were recruited. Among them 24 patients were treated with classical UPPP (cUPPP), which removes all of uvula and part of soft palate. 7 had modified UPPP (mUPPP), keeping part of uvula. The control group we chose were 31 age, BMI and AHI matched, newly diagnosed OSAHS patients without prior treatment. A titration of CPAP was tested during both NREM and REM sleep during manual CPAP titration in all 62 patients. Among them, 3 patients were tested both before and after UPPP. Patients were asked to keep supine sleep during the test. When significant mouth air leakage occurred and/or titration worsened with an increase of CPAP pressure, the pressure level was considered as the highest CPAP patient can tolerate in that sleep stage.

Results: 74% (23/31) of UPPP patients had less than 50% decrease in AHI, and 84% (26/31) of the 31 patients still had AHI ≥ 15 (range: 16–110) during post-operation PSG test.All of the untreated OSAHS patients could tolerate 17–20cmH_2O of CPAP during sleep. In contrast, four of the surgery group failed to respond to CPAP treatment during both NREM and REM sleep, and one more during REM sleep. All of the seven patients who had a mUPPP could tolerate CPAP. One of the three tested both before and after surgery failed to CPAP treatment after surgery during REM sleep.

Conclusion: UPPP may compromise CPAP therapy, especially in procedures with greater resection of the soft palette.

071

An Epidemiology Survey of Chinese Women with Sleep-disordered Breathing

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Objectives: To find out the prevalence and risk factors related sleep-disordered breathing (SDB) in Chinese women aged 40 years and older.

Materials and methods: All participants living in twelve communities must be of age ≥ 40 years and were given questionnaires, which developed a scale of 11 questions. Subjects were divided into five groups by scale scores. Those with higher scores were oversampled (1.8%, 8.6%, 20.9%, 53.3%, 55.6% respectively). And subjects of this community-based sample were recorded in the sleep laberatory to ascertain patients (AHI ≥ 5). Contrasting patients with the others (AHI ≤ 5), explored differences in risk of SDB among the age, body mass index(BMI), sex steroids etc.

Results: 91.4% of 1336 eligible women completed questionnaires and 49.1% of those admitted various degrees of snoring. Cronbach's αcoefficient of scale reached 0.7069. Factor Analysis reduced 11 questions of scale to four common factors as we have designed: snorning, apneas, other symptoms, risk factors. Sixty subjects experienced polysomnography evaluation. The ratios of patients to controls were 3:6, 9:10, 12:6, 6:2, 5:0 from low scores group to higher. We estimated the prevalence of SDB in this population is 42.1%. As far as postmenopausal women were concerned, patients had great BMI, waist circumference but lower serum level of testosterons ($P < 0.05$) and there were no significant differences between the SDB and non-SDB groups in age, neck circumference, the serum levels of follicle-stimulating hormone and estradiol.

Conclusions: This scale has good validity and reliability. Snoring and SDB correlated with obesity and testosterons are very common in Chinese women 40 years of age and older.

072

Bipolar Scissors vs Conventional Tonsillectomy

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Aims: Tonsillar hyperplasia may cause obstructed upper airways in young patients. Tonsillectomy (TE) is traditionally performed with scissors, elevator and diathermy. The new bipolar scissors may combine them all. The present prospective study compares the methods. Time consumption, blood loss, pain and complications were evaluated on the same subjects.

Methods: Consecutive heavy snorers with significant tonsillar hyperplasia, were after informed consent subjected to TE, randomised, single-blind using one procedure on each side. Method I: scissors, Henke tonsil elevator, bipolar diathermy. Method II: bipolar scissors (Ethicon, set on 20 W), bipolar diathermy if necessary. Each side was completed at a time, blood loss and total surgical time was registered. Pain was evaluated daily on a visual-analogue scale, VAS (0–100 mm).

Results: 32 patients (M/F 12/20), mean age 9,7 (4–24) years, have been operated so far by the senior surgeons (POH/LF). Mean time consumption Method I 10,1 (2–23) minutes and for Method II 2,4 (1–5) minutes (4,2 $\times$ difference; t-test $p < 0.001$). The corresponding mean blood loss was 47 (7–225) ml *vs* 2,4 (0–10) ml (20 $\times$ difference; t-test $p < 0.001$). There was no difference in pain, (VAS max 21–95 mm); duration 6–12 days. Two late uncomplicated haemorrhagies were found in each group.

Conclusions: Tonsillectomy with bipolar scissors was 4 times faster and the blood loss was only 1/20 (5%) of than that seen with the conventional technique, whereas pain and complication rate did not differ.

073

UPPP with Bipolar Scissors in Daycare Surgery

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Aims: Uvulopalatopharyngoplasty (UPPP) for ronchopathy has shown better long-term results than laser-UPP. It has traditionally been performed as an in-patient procedure with one to three nights of supervision. New concepts of anesthesia and surgery have made patients recover far more rapidly and made it possible to consider daycare surgery for non-obese patients with non-serious disease. This is a prospective evaluation of patients subjected to UPPP using bipolar scissors in a daycare unit since 2000.

Methods: Healthy (ASA class 1) patients (20–60 years; BMI < 30; ODI_4 < 30) planned for surgery were after informed consent subjected to a modified UPPP with bipolar scissors (Ethicon, 20W) under general anesthesia in a hospital daycare setting and supervised for a minimum of 6 hours postoperatively before dismissal with an accompanying person. Patient self-reports and complications were evaluated as well as the effect of surgery.

Results: 41 patients (35M/6F), mean age 42 (20–62) years. Effective operation time was mean 16 (11–21) minutes with a blood loss of mean 38 (2–280) ml. One patient was re-operated within 1 h and another 8 patients were readmitted within the first week due to minor postoperative hemorrhages, of whom only one needed diathermy. Patients were principally satisfied with the daycare solution.

Conclusions: UPPP can be performed in daycare on healthy, non-obese snorers with an ODI_4 < 30 if hospital backup is available. Postoperative care and risks will be discussed.

074

The association between 0_2 desaturation dip rate in obstructive sleep apnoea (OSA) and neuropsychological function

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Objectives: To report the baseline findings of a prospective controlled trial to determine neuropsychological performance in patients with OSA before and after treatment with continuous positive airway pressure (CPAP) compared to simple snorers.

Materials and methods: Patients (n = 134) attending the respiratory medicine clinic for suspected OSA participated in the study. Patients completed the Oxford Sleep Resistance Test (OSLER), a brief neuropsychological test battery (8 tests) prior to an overnight sleep study (Visilab,Oxford). Diagnosis of OSA was based on 4% oxygen desaturation dip rate ≥ 10.

Results: Significantly poorer performance was found between higher dip rates and five neuropsychological tests; Two Choice Reaction Time ($p < .01$) Grooved pegboard, dominant and non-dominant hands ($p < .01$), Rey Auditory Verbal Learning Test ($p < 01$) and the Symbol Digit ($p < .01$). Significant differences were found between OSA patients (n = 74) and controls (n = 57) on the Grooved Pegboard dominant and non-dominant ($p < .05$; $p < .01$) and the Rey ($p < .01$).

Conclusions: Greater O_2 desaturation dip rates were associated with poorer neuropsychological functioning and there were significant differences found between OSA patients and controls on tests of manual dexterity and learning.

075

Application of the Visual Adaptive Scoring System (VASS) in the analysis MSLT recordings of sleep apnea patients

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Objectives: The purpose was to examine, if VASS would be more sensitive than standard sleep stage scoring (RKS, Rechtschaffen and Kales 1968) in revealing excessive daytime sleepiness (EDS) of sleep apnea patients by the Multiple Sleep Latency Test (MSLT).

Materials and methods: 10 OSAS patients (AHI ≥ 10) and 7 controls were studied by whole night polygraphy followed by a MSLT. The MSLT recordings were visually scored both by RKS and VASS (Himanen 2000). In VASS electrophysiologically stationary segments and more stages and EEG derivations are used than in RKS. A mean sleep onset latency (mSOL) < 5 min was used to indicate EDS.

Results: By RKS four out of ten patients had < 5 min mSOL. All controls had long latencies. By VASS 7 patients had < 5 min mSOL and all controls ≥ 5 min mSOL. In hypnograms the short wake-sleep fluctuations of sleep onset and apnea related arousals were clearly visible by VASS.

Conclusions: VASS was more sensitive in revealing OSAS related EDS than RKS. VASS also followed the electrophysiological changes of the sleep onset period more closely than RKS.

076

EEG mapping in patients with obstructive sleep apnea

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Aims: The purpose of this study was to investigate alterations in brain function evaluated by quantitative EEG (qEEG) in patients with obstructive sleep apnea (OSA).

Methods: Polysomnographic studies and EEG mapping of the first 3 minutes of normal vigilance EEG were carried out in 33 males with snoring and/or daytime sleepiness evaluated by Epworth Scale Score (ESS). Subjects were divided in 4 groups based on apnea/hypopnea index (AHI): Group A, AHI < 5, N = 5, age in years 34 ± 13(SD), Group B, AHI 5–15, N = 5, age 48 ± 6, Group C, AHI 15–30, N = 11, age 54 ± 12 and Group D, AHI ≥ 30, N = 12, age 56 ± 6.

Results: AHI and ESS were in positive correlation with age ($p < 0.05$). Analysis of qEEG data, demonstrated no differences between Groups A, B and C considering mean power of EEG rhythms. Significant differences were revealed between Groups A and D in mean power of rhythm in frontal, temporal and occipital areas ($p < 0.05$). No differences of mean power were demonstrated between Group D and age-matched control. The percentage of power was in positive correlation with age and ESS ($p < 0.05$). *Conclusions*: qEEG revealed no obvious differences between OSA patients and normal subjects. The increase of power in patients with severe OSA could be attributed to age and sleepiness.

077

Nocturnal hypoxaemia and pulmonary hypertension in patients with OSA and with overlap syndrome (OSA + COPD)

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Aim: The aim of our study was to investigate the effects of episodes of nocturnal hypoxaemia on pulmonary haemodynamics in patient with pure OSA and with overlap syndrome (OS).

Material: 67 pts with OSA (mean age 45 ± 8 years, mean BMI = 35 ± 7 kg/m^2, mean AHI = 62 ± 22, FEV_1 = 3.6 ± 0.8L (97%N), PaO_2 = 72 ± 10 mmHg) and 17 pts with OS (mean age 51 ± 8 years, mean BMI = 37 ± 4, mean AHI = 64 ± 19, FEV_1 = 1.5 ± 0.7L (43%N), PaO_2 = 57 ± 9 mmHg.

Methods: Full polysomnography and right heart catheterisation.

Results: mean nocturnal desaturation and pulmonary haemodynamics in pts with OSA and OS are shown in

	OSA	OS
SaO_2 mean (%)	87.4 ± 5.4	80.2 ± 8.5
PPA mean (mmHg)	15.8 ± 4.6	24.2 ± 7.4
PW mean (mmHg)	6.7 ± 3.1	9.1 ± 7.3
CO (L/min)	5.6 ± 2.2	5.6 ± 2.3
PVR (dyn.sec.cm^{-5})	150 ± 83	229 ± 97

Conclusions: We did not find statistically significant relationship between SaO_2 and pulmonary haemodynamics. Nocturnal hypoxaemia did not play the important role on development of pulmonary hypertension in patients with OSA.

078

Neurogenic Cheyne-Stokes Breathing in Acute Ischemic Stroke

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Aims: Cheyne-Stokes breathing (CSB) is commonly considered to result from severe cardiac failure or somnolence/coma. The question arose whether CSB may also occur in hemispheric stroke without cardiac disease / vigilance disturbances. To elucidate this issue, we studied breathing patterns in 28 consecutive stroke pts.

Methods: We report three male pts. with clinical first-ever stroke in whom CSB was noted without major cardiopulmonary or vigilance disturbances. Acute pt. assessments included estimation of stroke severity (NIHSS), diffusion-weighted magnetic resonance imaging, echocardiography, polysomnography and respiratory polygraphy. Polygraphies were repeated 1–3 months after stroke onset.

Results: Pt. 1 (age 49 yrs.), who had a left-sided anterior cerebral artery stroke and an NIHSS of 7, initially exhibited a cardiac ejection fraction (EF) of 67%. CSB was present during 18% of total sleep time (TST), the apnea-hypopnea-index (AHI) was 23/h. At follow-up CSB was recorded during 4% of TST, and the AHI was 0. Pt. 2 (52 yrs.) had a left insular stroke, a NIHSS of 9 and an EF of 48%. CSB was present during 32% TST, and AHI was 39/h. At follow-up, CSB was recorded during 22% of TST, and AHI was 22/h. Pt. 3 (68 yrs.) had a right thalamic stroke, a NIHSS of 12 and an EF of 65%. CSB was present during 24% TST, and AHI was 28/h. At follow-up, the AHI had again improved (10/h).

Conclusions: Our data indicate the existence of neurogenic CSB after stroke without major cardiopulmonary or vigilance changes.

079

Wayne, the Mechanical Model of Snorer's Upper Airway

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Objective: To construct a mechanical model of human respiratory system as a tool for studies into sleep-disordered breathing.

Material and methods: Wayne comprises of the upper airway (rigid nose and collapsible pharynx), trachea with elastic posterior part and bellows, driven by a motor with controllable respiratory rate. The upper airway tone and the phasic muscle activity are implemented through controlling the pressure in the hermetic chamber around the collapsible tube. Stiffness and tracheal traction support of the collapsible part are also controlled. The nasal pressure and inspiratory flow shape are monitored at the nose.

Results: Wayne snores 80 dB and reproduces the inspiratory flow shape changes observed during partial upper airway obstruction.

Conclusions: Wayne is a useful intermediate of a mathematical model and a sleeping subject in the development of diagnostic methods and inventing new therapies of snoring and sleep apnea.

080

Differences in sleep spindle frequencies between apnea patients and normal controls

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Objectives: Our previous data showed that in normal sleep the frequency of sleep spindles would be related to sleep depth and maybe even to sleep pressure. So far spindle frequency patterns in patients with fragmented sleep have not been studied. It would be expected that the spindle frequencies might be affected by disturbed sleep process caused by sleep apneas.

Materials and methods: Twelve apnea patients with age- and sex matched control subjects were studied. Sleep spindles were visually selected and their frequency was determined by spectral analysis.

Results: Sleep spindles of the apnea patients were in general slower than in the control subjects. As in our previous study, the frequency of the spindles in the middle-part of the NREM sleep episodes increased towards the end of the night in the control group. In the patient group no such increase was found. There were no statistically significant differences in the spindle density between the groups.

Conclusions: The slow spindle frequencies in apnea patients might indicate sleep disruption with unrefreshing sleep as well as altered neural mechanisms in the structures regulating sleep spindle activity.

081

Epworth Sleepiness Scale Normative Values

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Objectives: The purpose of this study was to establish local normative values for the Epworth Sleepiness Scale (ESS).

Materials and methods: ESS was administered to several groups of young adult, middle-age, and elderly individuals. Group1 ($n = 1500$) consisted of patients referred to our sleep clinic for possible sleep-disordered breathing. Group 2 ($N = 942$) was composed of patients waiting at various outpatient clinics (e.g., dermatology, audiology, eye clinic). Group 3 ($N = 1120$) consisted of non-patients attending health fairs and community health lectures.

Results: Means for each group stratified by age are shown below.

	<40 years	40–65 years	>65 years	Mean
Group 1	15.2	16.3	13.8	15.4
Group 2	7.1	6.9	9.2	8.1
Group 3	3.6	4.1	7.0	5.2

Conclusions: As expected, patients referred to the sleep clinic were quite sleepy. This outcome likely reflects incorporation bias because sleepiness is a major factor leading to referral. Patients visiting outpatient clinics other than the sleep clinic had a mean sleepiness score of 8.1 compared to non-selected groups of individuals outside the hospital who scored only 5.2 on the ESS. On the basis of these data we have adopted 8 as our cut-off score for daytime sleepiness on ESS in our practice.

082

The efficacy of a Dacron palatal implant in reducing the loudness of snoring during sleep

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Aims: This study evaluated the efficacy of newly designed Dacron implants in the soft palate in reducing the loudness of disturbing snoring during sleep.

Methods: Patients with disturbing snoring were recruited for study. All patients underwent thorough clinical, endoscopic and polysomnographic examinations before surgery. Under local anesthesia, pieces of cylindrical knitted Dacron rods, 0.2 cm in diameter and 1.8 cm in length, were inserted into the soft palate with a specially-designed introducer. The loudness of snoring was assessed by the patients' bed-partners before, and after surgery at 3 months.

Results: Twelve patients were included in the study. One patient defaulted follow-up. The mean body mass index, apnea-hyponea index AHI, score from the Epworth Sleepiness scale of the 11 patients were 25.0 ($s.d. = 2.91$), 3.4 ($s.d. = 4.06$), 7.6 ($s.d. = 5.68$) respectively. The loudness of snoring as assessed by the bed-partners with a visual analogue scale VAS had a mean value of 77 ($s.d. = 18.1$) out of 100 before implantation. This significantly decreased to a mean VAS value of 44 ($s.d. = 20.7$) at 3 months after operation (*Wilcoxon Signed Rank test*, $p = 0.003$)

Conclusions: Dacron palatal implant was found to be safe. Snoring significantly improved at 3 months after implantation.

083

Somnoplasty of the Tongue by Ventral Approach

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Objectives: We have prospectively studied the effects of an alternate approach (enorally through the floor of the mouth) of Somnoplasty of the tongue in OSAS - patients.

Methods: 10 subjects with moderate to severe OSAS were treated with Somnoplasty of the tongue after full-night polysomnography (PSG). In each subject 2–3 sessions with 3 lesions were performed under local anesthesia without sedation or systemic analgesics. Eight weeks after the last session a follow-up PSG was performed. Each subject completed detailed questionnaires on subjective effects, side effects and the Epworth Sleepiness Scale (ESS).

Results: 3 women and 7 men participated in the study (mean preop RDI 47). After treatment the mean RDI was 24 ($P = 0.02$). Preop 10% of the participants had an RDI < 15, postop 50% ($P = 0.025$). Subjective daytime sleepiness decreased significantly from ESS baseline 10.2 to 7.1 ($P = 0.0052$). No severe or persisting complications or side effects were observed.

Conclusions: Somnoplasty of the tongue by ventral approach is a safe and effective procedure for the treatment of OSAS. Advantages of the ventral approach are less pain and - avoiding the gag reflex - an easier and more comfortable procedure for patients and surgeons.

084

PropofolSomnoEndoscopy(PSE) in Sleep-Disordered Breathing

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Introduction: Snoring and OSAS are caused by vibrations or collapse of different structures as uvula, velum, lateral pharyngeal walls, tongue base and epiglottis due to reduced dilatory muscle activity during natural sleep. Until now it has been difficult to relate endoscopic results during the wake state to conditions during sleep. Fibre-optic assessment during natural sleep is time consuming and difficult to perform.

Method: Using PSE, anatomical sites and types of narrowing can be identified. Aided by a number of specific passive maneuvers, indication, choice and invasiveness of conservative or surgical therapies can be planned. PSE is administered based on data of polysomnographic monitoring conducted prior to PSE. After decongestion and topical anesthesia of the nasal mucosa different levels can be examined in vivo. ECG and oxygen saturation are monitored continuously. Passive maneuvers during PSE include partial and complete nasal obstruction, various mandible, head, and body positions.

Results: Based on the experience of more than 2000 PSE the video presentation includes typical pathologic findings of all involved structures as well as posttherapeutic results.

085

Quantitative computer-assisted digital-imaging upper airway analysis for obstructive sleep apnoea - an innovative method

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Aim: Traditional assessment of levels and severity of airway obstruction in OSA is imprecise and subjective. We have pioneered an innovation of quantitative assessment of upper airway obstruction using computer-aided measurement and analysis.

Methods: Video-nasopharyngoscopic examinations of upper airways of 45 patients were carried out with a calibrator placed at the levels of interest. Images during quiet respiration, Mueller in erect, supine positions were obtained, digitized, analysed by computer to generate the diameters, surface areas, collapsibility of obstructive sites. These measurements were validated by comparing 90 videoendoscopic measurements with upper airway MRI scans at identical levels (points above uvula and epiglottis) and statistical accuracy calculated using MRI measurements as the standard.

Results: Accuracy for the retro-palatal and retro-lingual levels is 92.53% and 92.34% respectively. Quantitative precision is 100% for retro-palatal level and 95.6% for retro-lingual level. The absolute mean of the difference between the two methods of measurement is $0.08cm^2$ ($SD \pm 0.09cm^2$) at retro-palatal level, $0.18\ cm^2$ ($SD \pm 0.17cm^2$) at retro-lingual level. The agreement between the digital-imaging videoendoscopic and MRI measurements were 93.3% for the first level and 95.6% for the second level, Bland-Altman plot.

Conclusion: This innovation integrates OSA medicine with modern computer technology, enabling surgeons to quantitatively, objectively examine the dynamic and static morphology and measure surgical outcomes of the upper airway, opening up new avenues for management and research into evidence-based OSA treatment.

086

CLINICAL PREDICTORS FOR OSA WITH CALIBRATED CEPHALOMETRIC ANALYSIS - AN INNOVATIVE APPROACH

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Aim: Prospective study with an innovation to quantify the differences in cephalometry- OSA patients and the normal. Identify the parameters which are good predictors for OSA. Compare and illustrate the cephalometry between local and other ethnic groups.

Method: This study involves 106 Southeast Asians. A calibrated catheter is inserted into upper airway during cephalometry to obtain the precise magnification and measurement in erect, supine positions. Mann Whitney U test/Independent samples test, Receiver Operating Characteristics (ROC) curves are used for analysis.

Results: In this study, OSA patients have shorter facial length, narrower skull base, shorter receding mandible, smaller posterior airway space, narrower retro-palatal space, longer-thicker soft palate, smaller hard, soft palate angle; longer tongue length and inferior displaced hyoid. Palatal level, retro-palatal distance of 11.19mm for male and 5.47mm for female, are predictors. Retro-lingual level, posterior airway space of 10.05 mm for male, 5.32 mm for female, are predictors. Gender and anatomical-site specific formulas with enhanced predictability are devised. Our study shows that Southeast Asians have distinct cephalometry compared with Caucasians, Blacks and Hispanics.

Conclusion: This innovation provides a simple method to obtain precise cephalometric measurements. We obtained sets of cephalometric parameters for normal and OSA patients, with predictors, locally. There is no OSA cephalometric data from South-east Asia. Our results suggest that surgeons using cephalometry as a diagnostic method should have sets of normative and OSA cephalometric values that apply to locally.

087

CLINICAL PREDICTORS IN OSA WITH COMPUTER-ASSISTED DIGITAL-IMAGING QUANTITTATIVE VIDEOENDOSCOPIC UPPER AIRWAY ANALYSIS

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Aim: Prospective study with a new method to analyse static and dynamic upper airway morphology between OSA patients and normal. Identify the clinical predictors and assist surgeons in their clinical management of OSA.

Method: Quantitative computer-assisted videoendoscopy (validated with upper airway MRI) was performed in 49 patients with OSA and compared with 39 controls ($AHI < 5$). Absolute cross-sectional areas, transverse and longitudinal diameters at retro-palatal and retro-lingual levels were measured during end of quiet respiration and during Mueller's manoeuvre in erect, supine positions, allowing us to study static and dynamic morphology (collapsibility) of the upper airway. 3744 parameters were analysed.

Results: In males, retro-palatal and retro-lingual areas during supine Mueller's of 0.7981 cm^2 and 2.0648 cm^2 respectively were found to be good predictors/ cut-off for OSA. In females, Mueller's in supine position of 0.522 cm^2 at retro-palatal level and transverse diameter at retrolingual level during erect Mueller's of 1.1843 cm to be predictive. All measurements in retro-palatal level and supine position had higher predictability. Parameters obtained during Muller manoeuvre were more predictive than resting areas. Several gender and anatomical-site specific formulas with excellent predictability were also devised.

Conclusion: Upper airway dynamic studies are more predictive and useful. With these gender and anatomical-site specific OSA predictors and this innovative clinical method, we hope to assist other surgeons with quantitative clinical diagnosis, surgical planning and outcome assessment for OSA patients.

088

Surgical outcome assessment for osa with computer-assisted digital-imaging quantitative videoendoscopic upper airway analysis- an innovative approach

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Aim: Prospective study to evaluate the outcomes of existing OSA surgery with an innovative digital-imaging quantitative videoendoscopic upper airway analysis. Objectively quantify and correlate the changes in surgical parameters with improvement of OSA.

Method: 22 patients underwent surgery for OSA after CPAP trial. All have pre and post-operative digital imaging examination (validated with upper airway MRI), Epworth scores, and sleep study. Post-operative static (quite respiration) and dynamic (Mueller) changes in upper airway parameters were compared, analysed and correlate with improvement of AHI by Wilcoxon signed rank test and statistical regression.

Results: In males, there were 75% and 67% improvement in AHI and Epworth scale respectively after palatal surgery. Retro-palatal areas measured at static and dynamic studies were significantly correlated with improvement of AHI. One cm^2 increases in retro-palatal area during Mueller resulted in an improvement of 33.97 in AHI, and one cm increase of transverse diameter of retro-palatal area at resulted in an improvement of 33.94 in AHI.

Conclusions: Quantitative digital-imaging upper airway analysis enables us to assess postoperative upper airway morphology quantitatively, objectively and accurately, and correlate these changes in surgical parameters with improvement of OSA. With this newly acquired dimension of knowledge, we believe it would assist us in developing a least invasive, but more efficacious, target orientated upper airway surgery for OSA in the near future

089

Surgical outcome for osa with calibrated cephalometric analysis - a new perspective

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Aim: Prospective study to evaluate outcome of current surgery for OSA with an innovative method of calibrated cephalometric analysis. Correlate and quantify the changes in surgical parameters with improvement of OSA.

Methods: 31 patients underwent surgery for OSA after failed CPAP. All have pre and post-operative upper airway examination, calibrated cephalometric analysis, Epworth scores, and sleep study. Wilcoxon Signed Rank Test, statistical regression were used to determine, correlate the operative changes in surgical parameters with AHI, to identify these parameters which would significantly improve the results of OSA surgery

Results: In males, there were 64.1% and 63.9 % improvement in AHI and Epworth respectively after palatal surgery. Soft palate length and retro-palatal distance measured were significantly correlated with improvement of AHI. One mmdecreases in soft palate length resulted in an improvement of 1.293 in AHI, and one mm increase of retro-palatal distance resulted in an improvement of 7.18 in AHI. There were 75.56% and 76.15% improvement in AHI and Epworth respectively after hypopharyngeal surgery. One mm increase in posterior airway space resulted in an improvement of 8.71 in AHI.

Conclusions: Calibrated cephalometric analysis enables us to assess postoperative upper airway quantitatively, objectively, correlate surgical changes with improvement of OSA. With this newly acquired dimension of knowledge, we believe it would assist surgeons in developing a least invasive, more efficacious, precise surgery for OSA in future.

090

An Investigation of the relationship between Lepr gene Gln223Arg polymorphism and OSAHS

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Objective: To investigate the relationship between leptin receptor (Lepr) gene Gln223Arg polymorphism and obstructive sleep apnea hypopnea syndrome (OSAHS).

Materials and Methods: The genotypes of Gln223Arg polymorphism in Lepr gene were determined by polymerase chain reaction-restriction fragment length polymorphisms (PCR-RFLP) assay in 181 unrelated subjects of North region "Han" population (including 78 non-OSAHS subjects and 103 OSAHS subjects).

Results: The OSAHS patients with GG genotype had significantly larger neck circumference (NC) than did OSAHS patients with GA/AA genotype ($P = 0.031$); The study revealed no difference in genotype of Gln223Arg polymorphism between OSAHS group and non-OSAHS group ($P = 0.381$); There was also no significant difference about body mass index (BMI), waist hip rate (WHR),blood pressure (BP), leptin (Lep), true insulin(TI), fast blood glucose (FBG), triglyceral (TG), cholesterol (Chol) and polysomnography (PSG) parameters between GG and GA/AA genotype of OSAHS patients($P \geq 0.05$).

Conclusions: Lepr gene Gln223Arg polymorphism may be involved in the regulation of the neck regional fat distribution in OSAHS patients; It is unlikely that Lepr gene Gln223Arg polymorphism may contribute to the pathogenesis of OSAHS.

091

The Polysomnographic characteristics in children with Attention Deficit/Hyperactivity Disorder

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Aims: In recent studies, there has been some speculation about the relationship between ADHD and sleep disorder, such as obstructive sleep apnea syndrome (OSA), periodic limbs movement disorder (PLMD), To further explore this, we performed polysomnography on 104 children with ADHD. This study intends to examine the relationship between ADHD and sleep disorder using objective laboratory measures.

Methods: Six- to 13-year-old children who visited the Child Psychiatric clinics of the Chang Gung Memorial Hospital in Taiwan were recruited for this study. 104 children (82 boys and 22 girls) met the DSM IV criteria for ADHD and completed the Test of variables of Attention-Visual and overnight polysomnography. Three inventories: Child Behavior Checklist, Disruptive Behavior Rating Scale, Obstructive Sleep Apnea-18 Quality of Life Survey were completed by the parents and teachers of participating children.

Results: The results showed that 72.1% ADHD children have comorbid OSA (Respiratory Disturbance Index $\geq$ 1/h) and 11.5% have comorbid PLMD (Periodic leg movement Index $\geq$ 5/h). There is also a significant relationship between the behavior ratings on the CBCL and the OSA-18.

Conclusions: ADHD is likely a multi-etiological syndrome. In our study,

it can be seen that there is a strong relationship between ADHD and OSA, as well as between sleep disturbance and daytime behavioral problems.

092

Augmented clinical support for CPAP users

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Nasal CPAP is the standard treatment for OSA. Several studies have examined different ways of clinical support to facilitate CPAP compliance. Fletcher and Luckett (ARRD 1991) found that positive reinforcement by telephone did not favourably alter compliance. In a randomized controlled trial involving 33 subjects of two interventions to improve compliance, Chervin et al. (Sleep 1997) showed that telephone support or educational literature might improve self-reported CPAP usage. In a retrospective and non-randomized study of 73 patients in an outpatient clinic, Likar et al. (Chest 1997) showed that group education sessions could improve compliance with CPAP therapy. In a prospective study of 80 consecutive new patients with OSA randomized to receive usual support or additional nursing input (including CPAP education at home and involving their partners, a 3-night trial of CPAP titration in a sleep centre followed by additional home visits), Hoy et al. (AJRCCM 1999) reported that there was greater improvement of objective CPAP compliance, OSA symptoms, mood and reaction time in the intensively supported group at 6 months.

A randomized controlled study from HK has however shown that augmentation of CPAP education and support (with a video, a longer CPAP education session by nurses, telephone support in the first three months and early follow-up) does not improve CPAP usage in 1 month and 3 months but leads to a greater improvement of quality of life during the reinforced period. Nevertheless good basic education and support are essential in ensuring good CPAP compliance (Hui et al., Chest 2000).

093

Cephalometric airway analysis in sleep–disordered breathing: A comparison between Taiwan Asian and Caucasian

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Objectives: Cephalometric airway analysis has been proved to be essential in the diagnosis and of sleep-disordered breathing (SDB) .It also plays a major role in the predictive value of surgical outcome. Disproportional craniofacial anatomy was proved to be a significant risk factor in western people. To investigate the racial difference of craniofacial anatomy between Asian in Taiwan and Caucasian, and relationship to respiratory disturbance index (RDI), a comparison study was done.

Materials and Methods: 350 patients complained of loud snoring and/or disturbed breathing during sleep was diagnosed SDB via nocturnal polysomnography. Lateral cephalometric analysis was performed on all subjects. Cephalometric parameters and RDI were statistically analyzed.

Results: Long mandibular plane to hyoid bone (MP-H) distance and width of the posterior airway space (PAS) (space behind the base of the tongue) were statistically significant predictors of elevated RDI. Comparing with the reports of population-based survey in Caucasian, our study revealed that the Asian of Taiwan have statistical difference in craniofacial anatomy.

Conclusions: Further survey should be carried on to investigate the different mechanism and anatomy of people with SDB in Asian.

094

Knowledge and practices of general physicians from a developing country in management of sleep apnea

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Objective: To assess the knowledge of general physicians about the diagnosis and management of obstructive sleep apnea (OSA).

Methods: A self-administered questionnaire was distributed to 160 doctors attending pulmonary CME program in March 2002. The data was entered and analyzed on SPSS (Version 10.0) software.

Results: Questionnaires were completed by 120(75%) doctors. Only 43% had ever read an article about OSA and 39% had suspected it at least once in their practice. Majority (61–77%) of responders were aware of the common symptoms of OSA but 53% did not recognize its association with hypertension. A significant number of doctors were not aware that OSA could occur in non-obese individuals (33%), women (42%) and children (39%). Only 25% of responders recognized that history and blood tests were insufficient to make a reliable diagnosis of OSA. One-half of the doctors were aware of CPAP therapy for OSA and 17% would have prescribed sedatives to treat sleep disturbances in OSA.

Conclusion: There were significant gaps in the knowledge about OSA amongst general physicians of a developing country.

095

A prospective study to evaluate the efficacy of overnight home oximetry in identifying patients with OSAH who have minimal daytime sleepiness?

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Objective: To evaluate the accuracy of overnight home oximetry in excluding significant obstructive sleep apnea-hypopnea (OSAH) among patients with snoring and/or witnessed apnea without excessive daytime sleepiness (EDS).

Methods: Unselected patients referred for investigation of suspected OSAH with ESS score < 10 were and a normal overnight oximetry were studied by polysomnography for presence of significant OSAH (apnea/hypopnea index (AHI) ≥ 15/hour).

Results: Twelve (40%) of the 30 patients studied had significant OSAH. All had a 2% oxygen desaturation index of less than 10/hour. The sensitivity of oximetry increased at lower desaturation indices but this was associated with decreased specificity. Review of oximetry waveform pattern, by experienced physicians, did not improve the diagnostic accuracy. Combining oximetry with a clinical prediction rule would have reduced the need for polysomnography by 30%.

Conclusion: Many patients with snoring and/or witnessed apnea have significant OSAH even if they deny EDS. Overnight home oximetry did not help discriminate between those patients with or without OSAH.

096

A prospective study to evaluate sleep disordered breathing among Asian health care workers

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Objective: To evaluate the presence of sleep disordered breathing (SDB) among employees of a university hospital in Karachi.

Methods: All full-time employees were identified. A questionnaire, that elicited information about features of SDB and Epworth sleepiness scale was distributed. This study presents the preliminary results of questionnaire data. In the second phase, those with features of SDB will be invited for overnight study.

Results: A response rate of 70.2% was achieved. Of 2456 responders, 74.7% were male and 48.2% performed shift work. Their mean (SD) age was 32.98 (9.05) years, weight 64.02 (11.16) kg, body mass index 23.0 (3.55), collar size 37.56 (5.33) cm and Epworth score of 4.59 (3.51). Snoring was reported by 32%, witnessed apnea by 5.1%, unrefreshing sleep by 37.7% and excessive daytime sleepiness by 56.5%. Snoring was significantly associated with male sex, increasing weight and age, shift work, smoking and alcohol use, and history of hypertension. Hypertension was reported by 55% and a family history of snoring by 54.1%.

Conclusion: This is the first study to report significant prevalence of SDB among Asian health care workers.

097

Epworth sleepiness scale score and sleeping habits of hospital employees in Pakistan

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Objective: To evaluate the sleeping habits and factors associated with excessive daytime sleepiness (EDS) among employees of a university hospital in Karachi, Pakistan.

Methods: During evaluation of all full-time hospital employees for sleep disordered breathing, questions were asked about sleeping habit and excessive daytime sleepiness. Epworth sleepiness scale (ESS) was administered to all participants.

Results: A total of 2456 (70.2%) employees responded. Of these, 42.9% reported sleeping alone and 48.2% performed shift work. Difficulty in falling asleep (daily and sometimes) was reported by 4.7% and 33.8%, use of sleeping tablet 0.5% and 4.2%, unrefreshing sleep 8.6% and 29.1%, snoring 5.3% and 26.7%, and EDS 4.4% and 52.1% respectively. The mean (range) ESS score was 4.59 (0–21 out of 24) with 9.2% having a score of 10 or over. Snoring was significantly associated with increased chance of dozing in each ESS situation except for 'while stopped for a few minutes in the traffic'. Shift work was significantly associated with dozing only as a passenger in car for an hour and on lying down to rest in the afternoon.

Conclusion: A significant number of hospital employees had sleeping difficulty, unrefreshing sleep, EDS and high ESS score.

098

Automatic Analysis Shows a Difference in Sleep Depth of Healthy Controls and Apnea Patients

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Objectives: The purpose was to study sleep depth in healthy subjects and apnea patienst.

Materials and methods: A total of 20 subjects ($N = 20$), 10 healthy control subjects and 10 apnea patients, were studied. The group of control subjects consisted of six females and four males (age range 31–63 years), as did the patient group (age range 34–66 years). All-night EEG derivation C3-A2 was analyzed. A novel automatic measure was developed to analyze the sleep depth, focusing on the light sleep. Student's t-test was utilized.

Results: Statistically significant outcome was obtained between the two groups ($p < 0.03$). Sleep depth of apnea patients remained generally lighter than sleep of controls.

Conclusions: There was difference in the sleep EEG of healthy subjects and in apnea patients in the part of the light sleep. It is probable that the sleep fragmentation of apnea patients causes this difference in the EEG.

099

Positional effect on Obstructive Sleep Apnea Hypopnea Syndrome

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Objectives: The severity of obstructive sleep apnea-hypopnea syndrome (OSAHS) can be influenced by the change of sleep position. We evaluated the positional effect on OSAHS and analyzed the related factors.

Materials and Methods: Thirty six OSAHS patients (mean age; 46.4 ± 11.8 years, male:female; 31:5), who were diagnosed by standard polysomnography, were recruited between May 2001 and July 2002. Anthropometric data, sleep-related symptoms, Epworth Sleepiness Scale, and polysomnography data were evaluated. Positional effect on OSAHS was measured by positional difference index (PDI) which was calculated as follow; [PDI = RDI_S - RDI_L / RDI_S + RDI_L] (RDI_S; respiratory disturbance index in supine position, RDI_L; respiratory disturbance index in lateral position). Several related factors to the positional effect on OSAHS were investigated.

Results: The mean RDI was 20.9/hr (ranged from 5.3 to 75.2/hr). Three patients (8.3%) aggravated sleep apnea and 33 patients (91.7%) relieved their symptoms in lateral position. Of 33 lateral position relievers, 21 patients (63.6%) became normal during lateral position (RDI < 5/hr). Correlation analysis of the related factors for positional effect on OSAHS revealed that total RDI was the only significant factor with negative correlation ($p = 0.26$).

Conclusion: Lateral positioning during sleep could be a simple and effective therapeutic modality in about two third of OSAHS patients. Lowering the total RDI may have additive effect on the positional effects on the treatment of OSAHS.

100

Microbiological contamination of CPAP and BiPAP devices: analysis of the spectrum of contamination

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Objectives: One of the most common questions asked about safety of CPAP therapy is if there is a microbiological contamination of devices and a possible risk of infection.

Materials and methods: We collected swab cultures from the tube outlet of CPAP and BiPAP devices and evaluated the microbiological contamination of 712 CPAP devices, 69 BiPAP devices, and 24 humidifiers. In 251 devices bacterial and/or fungal contamination was detected.

Results: The frequently found bacteria represent a low infection risk (e.g. Micrococcus species (found 55 times), coagulase-negative Staphylococcus species (50), yeast-like fungi e.g. Rhodotorula species (27) etc.). Pathogens which might cause ventilator associated pneumonia were found in small numbers (e.g. alpha-hemolytic Streptococcus (9) Pseudomonas species (5), Staphylococcus aureus (2), Acinetobacter baumanii (2)) as well as other aggressive pathogens which may cause other serious infections (e.g. bacterial meningitis – Neisseria species (1), Proteus species (1), etc.).

Conclusions: The spectrum of bacteria found in this study predicts a low infection risk for the immunocompetent patient receiving CPAP or BiPAP therapy.

101

Comparison of answers to a sleep questionnaire in middle-aged adults of Warsaw

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Aims: Comparison of answers to a sleep questionnaire sent in 1997 and 2000 to a representative sample middle-aged adults of Warsaw.

Methods: In 2000 we sent the standardized sleep questionnaire to 1186 persons who participated in the 1997 investigations.

Results: 674 subjects responded (57%), 53% males and 47% females. Their mean age was 56.6 ± 8 years. We found a decrease in percentage of snorers from 81% to75%($p < 0.001$) and increase in BMI from 27 ± 4.5 to 29 ± 5 kg/m^2($p < 0.001$). The daytime sleepiness in Epworth Sleepiness Scale (ESS) decreased from 7.9 ± 4.5 to 6.4 ± 3.9 points ($p < 0.001$). Other results are shown in the Table.

Sex	Male		Female	
Years	1997	2000	1997	2000
% Non-snorers	15	22	24	29
% Moderate snorers	31	30	34	35
% Habitual snorers	54	48	42	36
Mean ESS	8.6 ± 4.5	7.1 ± 4	7.0 ± 4 ± 4.3	5.5 ± 3.5
% with ESS > 9	35	22	22	10

Conclusions: There was a decrease in the percentage of habitual snorers and an increase in the percentage of non-snorers. The daytime sleepiness was reduced. Snoring and sleepiness were more frequent in males.

102

Follow-up of Upper Airway Resistance Syndrome (UARS) patients

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Aims: Comparison of answers to a sleep questionnaire filled twice by UARS patients: before establishing diagnosis and after ≥ 4 years.

Methods: Sleep questionnaire was sent to 38 patients with UARS diagnosed more than 4 years ago (mean 6.52 ± 2.4y).

Results: 29 subjects responded (76%), 25 males and 4 females. Their mean age was 53.2 ± 9.3y. PSG results: AHI 4.4 ± 4/h, arousals index 26.5 ± 16.5/h, mean SaO_2 $92.6 \pm 2.8\%$ and min.SaO_2 $86 \pm 5.2\%$. All subjects were snorers and experienced daytime sleepiness (DS) assessed by Epworth Sleepiness Scale (ESS) over 9 points (10–14pts 61% and $\geq$ 14pts 39% subjects). The CPAP treatment was recommended for 17 patients, but only 8 of them used it with a mean pressure 7.2 ± 1.2. During follow-up period mean BMI significantly increased from 30.1 ± 5 to 31 ± 6 kg/m^2 ($p = 0.008$). There was no significant difference in DS; mean ESS was 13 ± 6 and 12 ± 5pts respectively. However, in 48% of subjects DS decreased, in 33% increased and in 19% no change of DS (ESS $<$ 9pts 31%, 10–14pts 45% and $\geq$ 14pts 24% subjects). CPAP treatment resulted in a decrease in DS in 2 subjects. Four patients stopped to snore.

Conclusions: During six year follow-up there was not significant change in DS. There was an increase in BMI. About 50% of patients followed recommended CPAP treatment.

103

Sleep-disordered breathing, daytime sleepiness and impaired performance in motor vehicle crashes

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Objectives: To compare the levels of sleep-disordered breathing (SDB), daytime sleepiness and impaired performance in 60 crash drivers and 60 age, gender and BMI matched controls.

Materials and methods: Subjects underwent polysomnography and daytime function testing. Tests included the Maintenance of Wakefulness test (MWT), self- and EEG assessments of sleepiness levels, self-rating questionnaires and computerised vigilance tasks.

Results: Cases reported significantly higher levels of driver sleepiness (% sleepiness; mean $\pm$ SD; cases $26 \pm 17\%$, controls $16 \pm 12\%$; $p = 0.003$) and demonstrated slower reaction times on a sustained attention task ($p = 0.02$). There was a trend for more objective sleepiness in cases (MWT; cases 17 ± 4 min, controls 18 ± 3; $p = 0.06$) who were also significantly poorer assessors of their own sleepiness. There were no significant differences in any of the PSG measures for cases vs. controls.

Conclusions: Both cases and controls had similar levels of SDB. Results suggest that attention should be focused as much on performance impairment as upon potential medical causes of sleepiness. Improving recognition of such impairment and perceptions of sleepiness ought to form the primary goal for crash prevention strategies.

104

Development and validation of the simplified obstructive sleep apnea risk prediction

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Objectives: To develop and validate a simplified obstructive sleep apnea risk prediction score that will be able to predict the probability of having OSA in a suspect patient before proceeding to PSG study.

Materials and methods: This is a cross-sectional retrospective study of patients who had been scheduled for PSG at the Newcastle Sleep Disorders Centre. Patients are divided into two groups according to period of schedule, test and validate groups. Variables age, sex, BMI, history of snoring, self reported symptoms (eg. stoping breathing, choking, leg kicking), allergy, hypertension, diabetes, alcohol use, smoking, and Epworth Sleepiness Scale Score (ESSS) are considered to include in a logistic regression model. Likelihood ratio test is used to select the parsimonious model. The logistic coefficient/odds ratios of this parsimonious model are used to construct scoring.

Results: Five-hundred twenty five patients are used to construct the model. Age, sex, stop breathing, hypertension, ESS, and BMI are significantly associated with the OSA. The scoring systems are constructed using ORs of these variables. The ROC curve analysis is used to estimate predictive values of this model. Probability of OSA is estimated according to scoring.

Conclusions: This simplified OSA risk prediction score is developed, which allows general practitioners to predict the probability of OSA.

105

Hypertension in patiens with sleep disordered breathing.

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Aims: To find out the occurrence of hypertension in different groups of patients with sleep disordered breathing. Further we wanted to know if it is influenced by straight relations of sleep disordered breathing or confounding factors.

Materials and methods: We investigated 87 adults patients, aged 23- 64 years. Patients were divided in 3 same groups with 29 patients. Group A patients mostly with upper airway resistance syndrome and mild sleep apnoea syndrome, Group B with severe sleep apnoea syndrome and Group C with sleep apnoea syndrome and daytime hypoxaemia and hypercapnia.

We took medical history, provide measuring of blood pressure and sleep monitoring with screening device MESAM4. Next day we provide lung function testing and investigating of blood for biochemical analysing

Results: Patients in Group C had the highest occurrence of (75%) than patients in Group A and B (11% resp.38%). The confounding factors were also much abnormal in patients in Group C. The biggest differences in following factors were in parameters of sleep breathing.

Conclusion: The occurrence of hypertension is depending on confounding factors. We assume this relation is supported by contemporary presents of sleep disordered breathing.

106

Internet–based service and epidemiological studies on sleep breathing disorders and comorbid states

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Objectives: Previously we reported about Internet-based service for epidemiological studies on sleep breathing disorders and cardiovascular diseases in Russia and CIS.

Materials and methods: Our service was based in February 2002. Since that time we received 1221 filled-in forms. Among those there were a questionnaire on sleep breathing disorders and cardiovascular disease ($n = 471$), Epworth Sleepiness Scale ($n = 236$), Zung Scale ($n = 363$), HADS ($n = 151$).

Results: Among snorers ($n = 428$, age $= 36 \pm 10$, m $\pm$ SD) 34,3% reported about sleep apnea, 65% had somnolence, 31,7% - arterial hyper-

tension (AH), 4,0% - diabetes mellitus, ishemic heart disease – 5,1%, myocardial infarction – 2,8%, stroke – 1,4%, 61% were overweight. It was revealed that the highest prevalence of sleep apnea was in the middle age group (40–49 years) - 47,5%. In the group of 50–59 years the prevalence of sleep apnea was dramatically reduced to 34,5%. On the other hand the prevalence of AH was progressing with the age. For age groups of 20–29, 30–39, 40–49 and 50–59 the prevalence of AH was 16%; 19,7%; 45,8%; 65,5% accordingly.

On the base of getting data we offered a suitable scheme of diagnostic studies but not the treatment options. Further diagnostic measures and treatment were conducted in our clinic and sleep center.

107

Prevalence of gastroesophageal reflux correlates with degree of thoraco-abdominal discoordination in OSA patients

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Objectives: Multiple studies have shown high prevalence of gastroesophageal reflux disease in OSA patients. The purpose of the study was to assess the influence of factors related to sleep disordered breathing on frequency and severity of GERD symptoms.

Materials and methods: 85 patients referred to sleep center because of clinical manifestations of sleep disordered breathing underwent nocturnal cardiorespiratory study (inductance plethysmography calibrated with isovolume maneuver), and were interviewed using a structured questionnaire.

Results: Symptoms of GERD were found in 15 of 45 SAS patients and in 2 of 23 UARS patients. Stepwise linear regression analysis showed strong positive correlation between the frequency of GERD symptoms and mean apnea duration and degree of thoraco-abdominal discoordination (labored breathing index). Apnea-hypopnea index was non-correlated significantly with GERD symptoms severity.

Conclusions: prevalence of GERD is higher in OSA patients compared to UARS and controls. Increased respiratory effort independently of actual apnea-hypopnea index is associated with increased prevalence of GERD symptoms.

108

Long-term changes in LV systolic function in CPAP-treated and non-treated severe OSA patients

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Objectives: Sleep related breathing disorders are known to be associated with increased cardiovascular morbidity and mortality. Association of sleep apnea syndrome with heart failure urges further investigations of left ventricular function and effects of long-term CPAP-therapy on central haemodynamics of SAS patients.

Materials and methods: echocardiography was performed in 32 hypertensive severe OSA patients (AHI = 47,3 + 11,7) and 12 BMI, age and presence of coronary heart disease matched controls. After CPAP-titration 17 patients continued CPAP-therapy in ambulatory settings, 15 did not use CPAP due to different reasons. Echocardiography was repeated in 39 – 47 months after the initial study in treated patients and controls.

Results: Ejection fraction was non significantly lower in patients compared to controls (54,2 ± 5,1 and 59,5 ± 3,9 %). Follow-up studies revealed further reduction of EF in untreated patients (54,5 ± 5,0 and 52,3 ± 5,9) compared to slight improvement in patients on CPAP (54,0 ± 5,3 and 54,7 ± 5,8%).

Conclusions: Left ventricular systolic function progressively deteriorates in untreated severe OSA patients. Long term CPAP therapy can reduce negative changes in ventricular function.

109

Cerebral white matter impairment in patients with sleep-disordered breathing

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Objectives: To determine whether metabolic impairment in the cerebral white matter is associated with sleep-disordered breathing (SDB), aging and co-morbidities related to SDB.

Materials and methods: Patients with SDB were separately studied by proton magnetic resonance (MR) spectroscopic and polysomnographic examinations. Chronic metabolic impairment in the cerebral white matter was evaluated by the *N*-acetylaspartate (NAA)/choline ratio. Hypoxia in the cerebral white matter during sleep periods was determined by accumulation of lactate. All patients were evaluated for the presence or absence of co-morbidities including hypertension, cardiac disease, diabetes mellitus, and hyperlipidemia.

Results: Analysis of 55 patients with SDB revealed a significant negative correlation between the NAA/choline ratio and AHI, independent of age and the presence or absence of cardiac disease. Results of MR spectroscopic examinations of 31 patients during arousal and sleep periods revealed that aging was significantly correlated with accumulation of lactate during sleep, and that AI, AHI and minimum value of SpO_2 each significantly interacted with age.

Conclusions: SDB was significantly related to acute and chronic metabolic impairment in the cerebral white matter.

110

Assessment of Respiratory and Cardiac Parameters in Sleep Studies using Bioimpedance Measurements

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Objectives: We wished to derive a method to estimate oro-nasal airflow without the need for oro-nasal thermistors or cannulae, using bioimpedance measurements across the neck and thorax. Potentially, this could lead to more convenient instrumentation for oro-nasal airflow measurement during sleep studies. Furthermore, thoracic bioimpedance measurements can be used to estimate cardiac parameters such as heart rate and stroke volume.

Materials and Methods: Six volunteers with previously diagnosed moderate to severe sleep apnoea underwent a sleep study in which bioimpedance measurements across the neck and thorax (EBI100C, Biopac, CA) were acquired simultaneously with polysomnography (PSG). The measured impedance signals contained information about both respiratory and cardiac activity. Using adaptive filtering techniques, we separated these two components resulting in a cardiac artefact free signal (highly correlated to the nasal airflow obtained by PSG), and estimates of heart rate.

Results and Conclusions: The mean correlation coefficient of the raw bioimpedance estimated airflow and the actual nasal airflow is 0.65 (maximum 0.85). Further signal processing can increase the mean correlation to 0.74 (maximum 0.89). We propose that our method can be used to reliably estimate airflow during normal breathing, hypopnoea and apnoea during sleep.

111

Cerebral Atherosclerosis in Sleep Disordered Breathing

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Objective: Atherosclerotic degeneration at the level of carotid arteries in subjects with sleep disordered breathing (SDB) was evaluated.

Materials and Methods: 114 male patients between 40–65 years old were evaluated. Subjects were divided into habitual snoring, mild-moderate obstructive sleep apnea syndrome (OSAS), and severe OSAS groups. Intima-media thickness (IMT) and the presence of plaque was determined by ultrasonongraphic evaluation. ANOVA with post-hoc comparisons and chi-square test were used to determine whether demographic, polysomno-

graphic, clinical and ultrasonographic data varied across the RDI categories. Multiple linear and logistic regression analysis were performed to identify predictors of IMT and plaque.

Results: OSAS groups had higher IMT values compared to habitual snoring group ($p < 0.001$). Three groups were different with regard to prevalence of plaque ($p < 0.001$). The age and BMI were found to be associated with IMT (Beta = 0.02, $p < 0.005$, Beta = 0.03, $p < 0.05$) while age and RDI were found to be most likely predictors of plaque (Beta = 0.08, $p < 0.05$, Beta = 0.04, $p < 0.05$). There were no significant differences between three groups with respect to age, prevalence of hypertension, diabetes, smoking, total cholesterol and triglyceride levels. Three groups were different in BMI ($p < 0{,}05$) and duration of SDB. ($p < 0{,}001$).

Conclusion: There is a dose-response relationship between the severity of SDB and the IMT values, prevelance of plaque.

112

Abnormal breathing during NREM sleep is common in children with Arnold-Chiari type I malformation

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Aims: To study the effect of Arnold-Chiari type I malformation on breathing during sleep in children.

Methods: PSG was performed on 11 children aged 7.3 (1–14) year with Arnold-Chiari type I malformation. The diagnosis of malformation was based on MRI study.

Results: Seven out of 11 patients had abnormal breathing during sleep. Mean RDI was 7.5 (0–49)/h and ORDI 3.4 (0–12)/h. Six out of 7 children had more apneas or more significant partial upper airway obstruction during NREM than REM sleep, and only one child had more apneas on REM sleep. One child had a severe central sleep apnea with RDI of 49/h. Added oxygen of 2l/min significantly reduced the amount of central apneas but resulted in increased EtCO2 level above the normal limit.

Conclusions: Sleep-related breathing disorder is common in children with Arnold-Chiari type I malformation. Most of this pathology is obstructive in nature. In contrast to normal OSA in children, these children present with more apneas and partial upper airway obstruction during NREM than REM sleep. Sleep stage distribution of pathology and treatment trial suggest that the breathing disorder is related to altered ventilatory chemodetection.

113

Echocardiographic Assessment of Right Ventricle in Patients with Overlap Syndrome (OS) (association of SAS and COPD)

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Aim: To investigate changes of cardiac size and function in pts with OS.

Material: The study population consisted of 21 pts (16M, 5F). Means ± SD: age 58 ± 8.2 years, BMI 34.5 ± 3.8 kg/m^2, apnoea/hypopnoea index (AHI) 41 ± 25.8, SO_2 mean 86 ± 6.4%, SO_2 min 64.4 ± 15.9%, T 90 60.3 ± 34.5%, FVC% 84 ± 16.8, FEV_1% 60.4 ± 26, FEV_1/VC 60 ± 11.6, PaO_2 65 ± 7.5mmHg, $PaCO_2$ 43 ± 6.3mmHg.

Methods: Echocardiography was used to assess:1. right ventricle thickness in diastole (RVW) and its diastolic diameter (RVD), 2. presence of pulmonary hypertension [tricuspid regurgitation peak gradient (TVPG), acceleration time of pulmonary artery (ACT)], 3. function of right ventricle [tricuspid early diastolic velocity to atrial velocity ratio (Ev/Av), atrial flow to total tricuspid flow ratio (Af/Tf), systolic thickening of right ventricle free wall (ST-RVW)].

Results: RVW 5.1 ± 0.7mm, RVD 28.6 ± 2.5mm, TVPG 26.3 ± 7.7 mmHg, ACT 104.2 ± 14.4msec, Ev/Av 0.89 ± 0.2, Af/Tf 0.49 ± 0.07, ST-RVW 52 ± 13.9. Correlation was found between:1. polysomnographic values and RVD, ACT, TVPG; 2. $PaCO_2$ and RVD, ACT, TVPG; 3. PaO_2 and RVD, Ev/Av.

Conclusions: Pts with OS seems to be associated with: right ventricle enlargement, mild right hyperthrophy, mild pulmonary hypertension and diastolic right ventricle dysfunction.

114

A New Index In The Definition Of The Severity Of Obstructive Sleep Apnea Syndrome (OSAS): Apnea-Hypopneaa Duration Index (AHDI)

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The apnea-hypopnea index is calculated by considering the count of the apnea and hypopnea without giving any importance to their duration. In our study we created an "apnea-hypopnea duration index (AHDI)" via calculating the total apnea-hypopnea duration per sleep hour of the patients with OSAS. We aimed to compare the severity degree of AHDI with the severity degree of AHI. We examined 90 patients with AHI ≥ 5 who applied to our sleep center. The calculation of AHDI: (mean of apnea duration (sec) × apnea count) + (mean of hypopnea duration (sec) × hypopnea count) / total sleep hour/60.

The patients are divided into 3 groups according to their AHDI; mild (2–5 minutes), moderate (5–25 min) and severe (≥ 25 min). The groups are compared. According to AHDI; while hypertension is rarely seen in the mild group, daytime sleepness is mostly seen in the severe group. According to AHI; there is no difference between the groups considering hypertension, the daytime sleepness is found high in the severel group. It is found that the AHDI and AHI index show a significantly positive correlation (r:0.94, p: 0.001). In our study; it is decided that the new index AHDI is as important as AHI in determination of the OSAS severity and in order to determine that its duration is as important as its count in the definition of apnea-hypopnea new studies are needed which contain more facts and which evaluate long term durations of OSAS.

115

Modelling the respiratory mechanics for a reliable measure of apnoea and hypopnoea

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Introduction: Thoracic-abdominal asynchrony (TAA) is an index of upper airway obstruction. This paper presents an objective measure of respiratory disturbance by modelling the mechanical instability of the thoracic-abdominal interaction instead of calculating TAA alone.

Materials and methods: We recorded the PSG of 151 subjects, with RDI's ranging from 0 to 107. Abdominal and rib cage effort was recorded with piezo sensors. The proposed model delivers an index of the instability of thoracic and abdominal interaction. The index is calculated from the Respiratory Instability Measure (RIM). RIM is derived from the variance in the phase relationship between the two effort signals. The Respiratory Instability Measure Index (RIM-I) was compared with the Respiratory Disturbance Index.

Results: The Spearman rho correlation between the RIM-I and the RDI was 0.632 ($p = .000$). RIM was more sensitive to respiratory related sleep disturbances than RDI, because RIM-I also identified periods with desats without apnea events.

Conclusions: Modelling the instability of thoracic and abdominal interactions offers a useful marker of respiratory disturbance. Moreover, the RIM-Imight be more sensitive to detect upper airway resistance.

116

Sleepapnea and sexual disorder by men and women

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In recent years scientific understanding of pathogenesis of sleep apnea has been progressing considerably. After decades during which it was not considered totally acceptable to admit to an interest in this clinically highly

relevant topic sexual disorder in sleep apnea is now loosing its shady reputation.

Psychological aspects in form of family problems, individual problems, e.g., changing of character, problems of self consious, sexual abilities will be reported. An epidemiological analysis about sexual disorders by men and women suffering from sleep apnea with the help of questionnaires will be in form of Diagrams, figures and pictures demonstrated. The main conclusions of this clinical observation is following.

About 56% of sleep apnea patiens suffering under sexual disorder in form of reduction of Libido and erectile dysfunction.

117

A randomized controlled study for the treatment of mild/moderate obstructive sleep apnea (OSA)

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Objectives: To evaluate the effectiveness of conservative management (CM) alone, and in combination with continuous positive airway pressure (CPAP) or oral appliance (OA) in improving physiological parameters (apnea hypopnea index, AHI), symptoms and quality of life (QoL) in mild/moderate OSA.

Materials and methods: 92 subjects with AHI of 22.6 ± 11.6 were randomized to CM, CM + CPAP, CM + OA groups. Polysomnogram performed at baseline, 10 weeks after treatment and one week after stopping CPAP or OA. Sleepiness and quality of life (QoL) were assessed at baseline and 10 weeks of treatment.

Results: AHI decreased more significantly with CPAP than OA, while AHI of subjects managed with CM alone remained the same. The relief of sleepiness was also the greatest in CPAP group and smallest in CM group. QoL of subjects was restored to that of normal level in the CPAP and OA groups after treatment while no change was observed in the CM group.

Conclusions: CPAP and OA are effective in treating symptomatic mild to moderate OSA while CM alone is of limited effect.

118

A Community-based Study of the Metabolic Parameters in Chinese Subjects with Obstructive Sleep Apnoea

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Objectives: This prospective cross-sectional study investigated the relationship of the metabolic parameters to obstructive sleep apnoea (OSA) in Chinese subjects in Hong Kong.

Materials and methods: 255 consecutive subjects of either sex, aged between 30–60 years old were recruited. Demographic and anthropometric data, metabolic profile (fasting blood glucose, LDL & HDL –cholesterol and triglycerides), and polysomnographic findings were collected.

Results: The major dependent outcome variable was the apnoea-hypopnoea index (AHI). Independent variables were anthropometric measurement, blood pressure, serum lipoproteins, fasting blood glucose, age and sex. Significant linear relationship of AHI with age, BMI, waist circumference, systolic and diastolic blood pressure, triglycerides and HDL-cholesterol could be established. Multiple regression analysis identified age and obesity as major determinants of AHI. OSA was highly associated with more than one risk factor of the metabolic syndrome.

Conclusion: Among community-based Chinese subjects, the presence of OSA is associated with a cluster of metabolic risk factors known to contribute to cardiovascular mortality and morbidity.

119

Simultaneous nasal and palatopharyngeal surgery for obstructive sleep apnea

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Aims: The purpose of this study was to investigate the safety and cost of simultaneous performing the nasal and palatopharyngeal surgery in the treatment of obstructive sleep apnea

Methods: The cohort was divided into 2 groups: group 1 patients ($n = 45$) had nasal and palatopharyngeal surgery in the same stage, whereas group 2 patients ($n = 30$) had separate stages of nasal and palatopharyngeal surgery. The demographics, severity of sleep apnea, postoperative complication, hospital stay, and total charges were reviewed.

Results: Comparison between group 1 and 2 in age, BMI, respiratory disturbance index, and minimal O2 saturation were insignificant (t test, $p \geq 0.05$). However, patients in group 1 had less hospital stay and total charges than group 2 (t test, $p < 0.05$). Regarding the complications, there were 1 tonsillar bleeding in each group. There was no incidence of airway compromise or cardiovascular events in the postoperative period in both groups.

Conclusions: Under cautious care, simultaneous nasal and palatopharyngeal surgery for obstructive sleep apnea is safe and more cost effective.

120

Clinical Predictors and Staging for Obstructive Sleep Apnea

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Aims: To evaluate the relation between clinical predictors and severity of obstructive sleep apnea, and to verify the association of clinical staging to surgical results.

Methods: one hundred and five consecutive patients (101 men, 4 women; mean age, 43 years) with obstructive sleep apnea were enrolled in this study. A modified palatopharyngeal surgery - extended uvulopalatal flap (EUPF) was undertaken. Modified Mallampati grade (MMP), tonsil size (TON) and body mass index (BMI) were recorded preoperatively. Polysomnography was performed before and six month after surgery. Parameters included: MMP I - IV; TON 0 - IV; clinical staging I - III, and respiratory disturbance index (RDI). Success of operation was defined as a $> 50\%$ reduction of the RDI from the initial value and a postoperative RDI of < 20.

Results: RDI was significantly correlated with MMP ($p < 0.0001$), TON ($p = 0.003$), BMI ($p = 0.0017$) and stage ($p < 0.0001$). The overall success rate of EUPF was 80%; the success rate in stages I, II, and III was 100%, 92.6%, and 61.4%, respectively.

Conclusion: MMP, TON, BMI and stage were reliable predictors of OSA. A clinical staging based on MMP, TON and BMI appeared to be valuable predictor of the success of EUPF.

121

Changes in Quality of Life after Palatopharyngeal Surgery in Patients with Obstructive Sleep Apnea (OSA)

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Aims: To evaluate the subjective and objective outcomes of a modified palatopharyngeal surgery in patients with OSA.

Methods: Fifty-five consecutive patients with OSA were enrolled in this study. A modified palatopharyngeal surgery - extended uvulopalatal flap (EUPF) was undertaken. Medical outcomes study including 36-item short-form health survey (SF-36), snore outcomes survey (SOS), Epworth sleepiness scale (ESS), and polysomnography (PSG) were performed. Success of operation was defined as a $> 50\%$ reduction of the RDI from the initial value and a postoperative RDI of < 20.

Results: The overall success rate of EUPF was 81.8%; the respiratory disturbance index improved significantly after surgery ($P < 0.0001$).

Patients demonstrated significant improvement in both their SOS and ESS scores ($P < 0.0001$) and significant increases in 7 out of 8 SF-36 subscales ($P < 0.05$). However, there was poor correlation between the improvement in quality of life and the reduction in sleep-related respiratory events.

Conclusion: EUPF can greatly reduce sleep-related adverse events and proves to be an effective therapy to enhance the quality of life of patients with OSA. This study also suggests that subjective and objective outcomes are equally important when reporting the results of EUPF surgery.

122

Is two-night polysomnographic sleep study necessary in childhood sleep assessment?

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Objectives: To assess the night-to-night variability of the presence and severity of obstructive sleep apnoea (OSA) in children.

Materials and methods: Forty-six obese children with symptoms of OSA were recruited from the out-patient clinic and forty-four age- and sex-matched normal weight controls were recruited from local schools. Two consecutive overnight polysomnographic studies were performed on each subject. A respiratory disturbance index (RDI) of greater than 5 was considered abnormal.

Results: The mean age of the children was 11.33 years [Standard deviation (SD) 2.28]. Forty-four cases and all control subjects completed the two-night study. Sixteen of the cases were found to have OSA. The RDI of these cases did not show significant difference between the first and second night [24.94 (SD 26.6) vs 21.97 (SD 27.10), $p = 0.061$]. The sleep efficiency of all subjects improved on the second night [80.85% (SD 12.58) vs 89.36% (SD 6.13), $p < 0.001$] and sleep onset latency was also reduced on the second night [28.37 minutes (SD 25.21) vs 17.30 minutes (SD 16.81), $p < 0.000$].

Conclusions: The phenomenon of "first night effect" was detected but the clinical diagnosis remained unchanged. We propose that a single-night sleep study is adequate in assessing for OSA in obese children.

123

Changes of Pulmonary Function in Patients with Obstructive Sleep Apnea Syndrome and with Overlap Syndrome

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Objectives: To evaluated pulmonary function abnormalities associated with the sleep breath disorder in patients with obstructive sleep apnea syndrome (OSAS) and with overlap syndrome–OSAS coexisting chronic obstructive pulmonary disease(COPD).

Methods: All subjects were received polysomnography and pulmonary function test ($n = 141$), then they were classified into 3 groups: group OSAS ($n = 62$), group overlap syndrome ($n = 52$), and group normal control ($n = 27$).

Results: Forced vital capacity (FVC), maximal voluntary ventilation (MVV) were decreased in patients with OSAS and with overlap syndrome compared to control subjects ($P < 0.01$), Forced expiratory volume in one second (FEV1), maximal midexpiratory flow curve (MMEF), FVC and MVV were the lowest in patients with overlap syndrome. Oxygen saturation (SaO_2) were decreased in the patients during sleep . The FVC, MVV were inversely correlated with AHI, but positively correlated with SaO_2 nadir in patients with OSAS; and FEV1, FVC, MVV, MMEF were inversely correlated with AHI, but positively correlated with SaO_2 nadir in patients with overlap syndrome, SaO_2 nadir in all patients were inversely related to the AHI.

Conclusions: Sleep apnea and hypoxemia at night are correlate with decrease of lung volume in patients with OSAS, and severity degree of sleep apnea and oxygen desaturation are correlate with pulmonary function abnormalities and airway obstruction in patients with overlap syndrome.

124

Automated continuous positive airway pressure in treating obstructive sleep apnea syndrome

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Objectives: This study tested the effectiveness of the AutoSet self-titrating continuous positive airway pressure (CPAP) system in treating obstructive sleep apnea syndrome (OSAS), and observed suitable pressure for fixed-pressure CPAP therapy.

Methods: Thirty-five subjects with OSAS [apnea hypopnea index (AHI) $\geq$ 5/hour] were studied with full polysomnography on diagnostic night, and performed AutoSet CPAP titration, monitoring of respiratory and sleep variables on other night.

Results: In all subjects, AHI was 43.3+/−22.1 (mean+/−SEM) on the diagnostic night and lower with Autoset (6.4+/−5.0, $p < 0.001$) on titration night, Oxygen saturation (SaO_2) nadir was 66.1%+/−14.8% on diagnostic night and higher with Autoset (89.5%+/−5.2%, $p < 0.001$) on titration night. Titration pressure 95th centile was 0.95+/−0.2 Kpa and maximum pressure was 1.13+/−0.24 Kpa in mild-moderate subjects ($n = 20$, AHI ≤ 50), but higher in severe subjects ($n = 20$, AHI > 50) — the pressure 95th centile was 1.28+/−0.26 Kpa and maximum pressure was 1.50+/−0.27Kpa ($P < 0.001$).

Conclusions: AutoSet system is suitable for automated CPAP pressure titration, the pressure is vary according to degree of sleep apnea.

125

Simple uvulopalatal flap for treatment of primary snoring and mild obstructive sleep apnea syndrome

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Objectives: The treatment objective for simple snoring and mild obstructive sleep apnea(OSAS) had been focused on elimination of annoying snoring. However, excessive daytime sleepiness in these patients can also increase mortality and should be considered an important goal for treatment. Surgeries generally used now such as laser assisted uvulopalatoplasty (LAUP) or Radiofrequency tissue ablation had been shown to have limited value on decreasing daytime sleepiness in these patients. We had adapted simple uvulopalatoplasty for achieving this goal.

Materials and methods: The author performed simple uvulopalatalplasty in 34 patients, using the technique described in 1996 by Powell, under local or general anesthesia. Evaluations include polysomnography, snoring score, pain scale and Epworth sleepiness scale (ESS) before and after surgeries.

Results: There were significant improvements in both snoring score and ESS after surgery. The postoperative pain is also more tolerable than LAUP.

Conclusions: Simple uvulopalatal flap is both effective and tolerable, thus should be considered as an alternative in choosing surgeries for treatment of simple snoring and mild OSAS.

126

Usage of digital recorder in the comparison of pre- and post-operative sleep-disordered breathing patients

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Objectives: To establish an objective method for evaluation of snoring after surgery for sleep-disordered breathing patients and compare the difference between subjective questionnaire and objective measurement.

Materials and methods: 20 patients with RDI less then 30/h during nocturnal polysomnography were included. The snoring sounds were recorded via digital recorder placed about 60 cm away from head in their home before surgery. The same procedures were repeated 3 months after

surgery. The sounds were analysed by CSL™. (Computerized Speech Lab, Model 4300B, software Version 5.X, Kay Electrics Crop. NJ, USA). The variables included loudness and frequency. Questionnaire, basic data were also obtained and analysed.

Results: The subjective descriptions of snoring by patients themselves and their bed partners were improved after surgery. The objective measurements also showed reduce in the loudness of snoring sounds (Paired T-test $p < 0.05$). The subjective questionnaires were compatible with objective findings.

Conclusions: Digital recorder is a simple and reliable method for evaluation of snoring before and after surgery. In addition, it provides us objective information if the patient slept along.

127

The Role of Neural Mechanisms in Causing Apneas and Irregular Breathing: Lessons from Mathematical Models

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Objectives: In the production of apneas associated with periodic breathing, neural factors may be as important as disturbances in cardiovascular function. Their study has been relatively neglected in mathematical simulations of respiration in part because of problems in quantifying their effects. Nonetheless it is possible to examine the effects of neural mechanisms using mathematical models.

Neural Factors Studied: Changes in the level of alertness through impact on chemical regulation may be the most important factor accounting for the differences in breathing awake and asleep. Abrupt fluctuations in alertness level can disturb breathing and cause persisting breathing irregularities. The complexities of *respiratory pattern generation*, e.g. the strength of excitatory and inhibitory connections among pontomedullary neurons further increase the opportunity for irregular breathing as do the possible actions of *respiratory pacemakers* and *environmental noise. Postsynaptic potentiation* acts to smooth ventilation but its influence may be diminished during sleep. Altered respiratory neuron excitability as a result of *hypoxic depression of ventilation* or produced by variations in *cerebral blood flow* can affect the ability of the respiratory system to resist disturbances to breathing regularity.

Conclusions: Mathematical models can be used to examine such interactions as well as the interplay between neural factors and circulation time.

128

Effective Patient Compliance Supports an Improvement in the Quality of Life in Patients with Obstructive Sleep Apnoea.

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Introduction: MOST (Management of Sleep Therapy) is a new therapy service solution provided by Profile Respiratory Systems. Recent data from a retrospective study of 33 patients enrolled on MOST demonstrated effective patient compliance (time spent at optimum pressure) with continual improvement at 7, 30 and 90 days with CPAP in subjects diagnosed with Obstructive Sleep Apnoea (OSA). The aim of our study was to demonstrate an associated improvement in Quality of Life (QOL) in these subjects using the Functional Outcome of Sleep questionnaire (FOSQ).

Methods: During the first 90 days of treatment patients on MOST were asked to complete the FOSQ questionnaire at 7, 30 and 90 days and record the outcome.

Results: are as shown in the Table.

	7 days	30 days	90 days
Mean hrs per night used (days used)	5.8 ± 1.7	6.3 ± 1.5	6.6 ± 1.4
Mean FOSQ	15.8 ± 2.7	17.9 ± 2.2	18.8 ± 1.4

Conclusion: These data shows associated improvement in QOL with effective patient compliance between 7–90 days. (Normal range 16.33–19.41). This therefore suggests that the improvement in effective patient compliance has a positive outcome on patients' QOL.

129

Therapy of sleep apnea with a new individually adapted intraoral electromyostimulation electrode

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Objectives: For electromyostimulation (EMS) of the geniohyoid muscle up to now extraorally applied electrodes or enoral-cutaneous electrodes have been used, which could not savely be placed to the mouth floor.

Materials and methods: For the preparation of the intraoral electrode first a pattern of the lower jaw is produced with special casting of the mouth floor. On the basis of this a negative form of the mouth floor is produced, on both sides of the geniohyoid muscle an electrode is integrated and a feed line is led to the extraoral area. The negative form with the attached electrode can additionally be stabilized by a biteguard splint. It is possible to adapt each EMS apparatus to this new device and is also applicable for longterm therapy.

Results: The new intraoral device consists of an electrode which is individually adapted to the anatomical form of the mouth floor. Due to the negative shape the exact placement of the electrodes is also ensured by additional pressure of the tongue on the electrodes. An additional guidance by a biteguard splint also enhances the stability. First applications in patients over a period of 1 year showed improved comfort and handling of the device.

Conclusions: The new intraoral mouth floor electrode for EMS is expected to improve the effectivity and comfort of the EMS in therapy of obstructive sleep apnea.

130

Electromyostimulation for therapy of sleep induced apnea syndrome

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Objectives: The electrostimulation (EMS) is an innovative procedure for therapy in obstructive sleep induced apnea syndrome (OSAS).

Materials and methods: In 15 male patients (mean age 52,2 years) with OSAS over a time period of 4 weeks 2 times daily the enoral-cutaneous EMS was applied by the BMR PolyStim 262 (Bio-Medical Research Company). All patients were registered previously and after 4 weeks by polysomnography and the volumetric measurement of the geniohyoid muscle was carried out by 3D-ultrasound.

Results: 4 patients had a light, 9 a moderate and 2 a strong OSAS. After 4 weeks stimulation a reduction of the RDI in all groups of 34 % (group 1: RDI 34 %, group 2: 32 %, group 3: 46 %) could be proved with a responder ratio of 76 %. No improvement of the sleep parameters were only registered in group 1 and 2. The sonographical measure-ments of the geniohyoid muscle confirmed the influence of the training. Moreover, after 4 weeks stimulation an increase of volume could be proved in average of 7 %, 8 % and 8.3 % (group 1 – 3). In cases of an initial volume $\geq$ 12 ml of the muscles less training effects could be registered.

Conclusions: The EMS enables a physio-logically, non-invasive therapy of OSAS and should continuously be applied otherwise a relapse of the muscles is to be expected.

131

Polysensography of the tongue force – A parameter for controlling the effectivity of electromyostimulation in patient with sleep apnoe?

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Objectives: It is unknown so far in how far electromyostimulation

(EMS) of the mylohyoid muscles and lingual muscles causes changes in tongue force.

Material and Methods: In 17 patients with OSAS and 9 healthy probands over a time period of 4 weeks 2 times daily the enoral-cutaneous EMS was applied by using the apparatus BMR

Poly-Stim 262 (Bio-Medical Research Company). In all patients and probands the measurement of the lingual force was done before stimulation and in the fourth week under stimulation by the poly-sensographical system Sensoral (SensoMedical Comp.). A calibrated Sensor FlexiForce TM Single Serial Button (Hoven Comp.) was connected to it by a digital, multifunctional interface. The sensor was fixed to the palate by histo acrylic glue one centimeter behind the maxilllary front teeth.

Results: All patients and probands reliably applied the EMS. In all healthy probands as well as in the OSAS patients after 4 week stimulation therapy an increase of the tongue force could be found. On average the amount of increase of lingual force was minimaly 7 % and maximaly 99 % (mean 31%). In the group of healthy probands the increase was between 14 % and 39 % (mean 28%).

Conclusions: The polysensography enables an exact determination of the tongue force and is a suitable technique to prove the effects of EMS.

132

Initial experience of a multidisciplinary team on the treatment of the Obstructive Sleep Apnea Syndrome with a Mandibular Advancement Splint

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Objectives: To evaluate the effectiveness of a mandibular advancement splint in the treatment of Obstructive sleep apnea syndrome.

Materials and methods: We studied 34 patients with mild to severe obstructive sleep apnea syndrome coming from the sleep consultancy of pneumology. These patients are referred to Maxillo-facial surgery having previously been evaluated by Otolaryngology. A provisional device (Silensor®) is made and its clinical and polygraphic effectiveness is controlled two months later for the subsequent manufacture of the permanent device.

Results: The treatment began with 10 patients at least eight months ago: 8 patients are undergoing treatment successfully and 2 cases were unsuccessful.

Of the other 24, 1 needed an ortognatic operation, 1 died as a result of another illness, 1 refused the device, 1 did not return and 20 have not finished their evaluation yet.

Conclusions: We believe that the mandibular advancement splint can be an alternative effective treatment in our multidisciplinary group but we need to study the patients over a longer period of time.

133

Proposed Classification of the Signal Variations

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Background: The Gold Standard measures of polysomnographic signal variations for OSA diagnosis and severity is very limited and comprises a simple process of counting events.

Objectives: To propose a more comprehensive classification process for identifying and characterizing OSA physiologic signal variations for iterative comparisons in future morbidity trials.

Class I. Isolated Events [Examples are Flow/Pressure attenuation, EEG arousal, Desaturation, rise in pulse, etc.]

- Number of events above threshold X (This is the AHI if X = 10)
- Length, Magnitude, slope, shape of events
- Frequencies within the event
- Weighted events applying a combination of features of the events

Class II. Relational Patterns [Examples of relational patterns include, event coupling, event clustering, etc.]

- Duration of a relational pattern (e.g. % of total time evidencing closely spaced clusters of events)
- Event duration, slope, shape, frequency, within patterns
- Duration, slope, shape, frequency of the relational patterns
- Recovery intervals between events within a relational pattern
- Intervals between the rational patterns themselves
- Relational patterns within relational patterns (such as the pattern of the nadirs of desaturation events within a cluster)

Acknowledgement: Research Funded by Lyntek Medical Technologies, Inc., USA.

134

Uvulopalatopharyngoplasty versus Laser Uvulopalatoplasty: Prospective Long-Term Follow-up of Self Reported Symptoms

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Aims: No study to date has prospectively compared the results of uvulopalatopharyngoplasty (UPPP) and CO_2 laser palatal surgery. The aim of this study was to investigate and compare clinical outcomes in 121 consecutive patients suffering from rhonchopathy, the majority of whom reported apneas.

Methods: Sixty-one patients underwent UPPP and 60 laser uvulopalatoplasty (LUPP). Patients were requested to assess the frequency of symptoms associated with obstructive sleep apnea syndrome prior to surgery, at 3-month follow-up and 5–8 years postoperatively.

Results: Although short-term results were generally better, the overall results showed a significant long-term improvement for all patients. However, UPPP was superior to LUPP in terms of all clinical effect parameters. Although patients treated with UPPP had more severe symptoms preoperatively they also had a better long-term outcome. Side effects such as minor swallowing disturbances were frequent, using either surgical modality, but few patients were bothered if surgery was successful.

Conclusions: Palatal surgery remains a valuable treatment modality for snoring and OSAS. Both methods offer a reasonable long-term effect. However, UPPP is superior to LUPP.

135

Sleep Disorder Analysis using Wavelet Transforms and Neural Networks

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Aims: Polysomnographic (sleep) signals are non-stationary signals characterised by having both quantitative information in the frequency domain and rich, dynamic data in the time domain. This paper presents a novel signal processing based methodology which seeks to alleviate some of the problems in traditional visual methods of sleep apnea analysis. The longer-term aim of this research is to develop a system to assist clinicians with OSA diagnosis

Methods: (1) an automated wavelet-packet and neural network-based mechanism by which the appropriate stage of sleep for disorder observation may be extracted from the composite electroencephalograph (EEG) data set. (2) an ensuing technique to assist in the diagnosis of full OSA arousal by correlation of wavelet and neural network-extracted information from a number of specific patient data sources (e.g. pulse oximetry, electromyogram (EMG) etc.).

Results: The results are based on a sample of 9 patients, ranging from normal through atypical to severe sleep apnea. Approximately eight hours of data were collected for each individual. The results from our methodology were compared with the clinically-validated stages for each patient, as provided by the Scottish Sleep Centre at Edinburgh University.

Conclusions: Preliminary results are encouraging and will be supported by a rigorous analysis within the final submission.

136

Mandibular Advancement Devices in 630 Men and Women with Obstructive Sleep Apnea or Snoring—Predictors for Treatment Success

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Objectives: To evaluate the tolerability and to find predictors for treatment success with a mandibular advancement device (MAD).

Materials and methods: Six-hundred and thirty consecutively treated patients with snoring or OSA. Sleep apnea recordings without MAD and with it. A lateral-AHI of < 10 together with a supine-AHI of ≥ 10 defined supine-dependent sleep apneas. An AHI of < 10 in supine and lateral positions defined treatment success.

Results: After one year, 471 of 630 patients (75%) continued treatment. Women had a higher success rate than men with an odds ratio of 2.4 ($p = 0.01$). In men, the odds ratios for treatment success were 6.0 ($p < 0.001$) for supine-dependent sleep apneas, 2.5 ($p < 0.05$) for mild sleep apnea, 1.3 ($p < 0.05$) for mandibular advancement (mm) and 0.81 ($p = 0.001$) for weight increase (kg). In women, the odds ratios for treatment success were 12 ($p < 0.05$) for mild sleep apnea and 0.11 ($p < 0.05$) for nasal congestion.

Conclusions: Women are more likely than men to be successfully treated with a MAD for obstructive sleep apnea. In men, supine-dependent sleep apneas are highly related to treatment success and weight increase is associated with treatment failure with the device.

137

Sleep-disordered breathing in patients with chronic renal failure who are not in need of renal replacement therapy.

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Objective: An AHI $\geq$ 5/h has been reported in as many as 70% of patients with chronic renal failure (CRF) undergoing renal replacement therapy (RRT). The incidence of sleep-related breathing disorders in patients with CRF who are not yet in need of RRT remains unknown. We studied the presence of sleep-disordered breathing in CRF patients who are not receiving RRT.

Material and methods: Inclusion criteria were: a)age ≤ 70 years, b) absence of systolic dysfunction, c)absence of neurologic disease, d) creatinine clearance < 40 mg/dl, e)BMI < 30, f)FEV1 $\geq 60\%$ pr. Sixteen patients (7 male, 9 female), with a mean age of 56,8 $\pm$ 2,9 and mean creatinine clearance 19,8 $\pm$ 1,12 mg/dl were studied. All patients underwent diagnostic polysomnography.

Results: Five patients (31,25%) had an AHI $\geq$ 5/h (predominantly obstructive events), but only two were symptomatic. No patient had an AHI $\geq$ 30/h. No significant correlation was observed between AHI and creatinine clearance. In most cases sleep complaints were unrelated to sleep-related respiratory disorders.

Conclusions: Patients with CRF who are not yet undergoing RRT have a much lower incidence of sleep-related breathing disorders than patients with end-stage renal failure.

138

A New UK Approach in the Management of Patients on CPAP.

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Introduction: Effective patient compliance (time spent at optimum pressure) with CPAP in subjects with Obstructive Sleep Apnoea (OSA) is often difficult to achieve and maintain. Factors influencing the poor adherence to CPAP therapy (reported in several previous studies), including time invested during the initiation of therapy, followed by continuous support during treatment is becoming less achievable within the hospital environment. MOST (Management of Sleep Therapy) is a new therapy service solution provided by Profile Respiratory Systems. The aim of our study was to compare compliance on MOST with previously published compliance data.

Methods: Compliance data during the first 3 months of treatment was retrospectively analysed from 33 patients on MOST.

Results: are as shown in the Table.

	7 days	30 days	90 days
Mean % compliance (all days)	85.4 ± 22.7	93.9 ± 12.1	96.8 ± 8.7
Mean % days used >4 h	87.9 ± 33.1	93.9 ± 24.2	97 ± 17.4
Mean hrs/night/days used	5.8 ± 1.7	6.3 ± 1.5	6.6 ± 1.4

Conclusion: Previous data shows fewer than 50% of patients to be considered regular users (using CPAP for $\geq$ 4h per night for 70% of nights) at 90 days. These data shows continual improvement in compliance between 7–90 days. Supporting patients on MOST shows an improvement on documented patient compliance.

139

Is a single night titration study sufficient to assess a fixed pressure for Continuous Positive Airway Pressure Therapy?

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Objective: We wished to compare night-to-night variation (95th centile pressure (95CP)) on an Auto-adjusting Positive Airway Pressure (APAP) against an overnight titration study predetermined fixed pressure CPAP.

Method: A retrospective study looked at non-naïve fixed pressure CPAP patients who were using CPAP for 4h per night for 70% of nights. A single night laboratory autotitration was performed on all patients and patients then established on fixed pressure CPAP set at the 95CP. These patients were subsequently transferred to APAP, and the first 7 nights of APAP 95CP were analysed.

Results: For the group, analysis of variance showed no significant variation over nights 1 - 7, with the mean and SD pressures similar, although individual differences existed. The individual subject coefficient of variation of the seven nights pressures ranged from 2.3% – 35.6% (mean 12.4%). Comparing the 7 nights of APAP 95CP to the 95CP fixed pressure showed that the auto adjusting pressures were significantly higher than the fixed 95CP ($p < 0.05$). Mean APAP was 1.2 cmH_2O higher than fixed 95CP (range -2.0 to $+7.4$).

Conclusions: On average the APAP provides higher pressures than the Fixed CPAP and therefore warrants further investigation as using the 95CP from a single night titration study may simply underestimate the required pressure.

140

Physical simulation of a Cheynes-Stokes patient

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Objectives: To accelerate validation of a new therapy for Cheynes-Stokes Respiration (CSR), advanced modelling techniques were applied to develop a representative bench approximation to a patient with CSR.

Materials and methods: Khoo's model of periodic breathing (1982, 1991) was adapted to convert continuous ventilatory drive into phasic breathing at fixed rate and variable effort. The effort was applied to a single-compartment lung model, in the form of a physical breathing simulator (Hans-Rudolph Inc). The ensuing respiratory flow was filtered to

approximate alveolar ventilation and fed back into the Khoo model. Gains and delays were selected to produce a physical bench simulation of a Cheynes-Stokes patient.

Results: The resulting bench 'patient' exhibited CSR that compared well with clinical data, and the 'patient' responded appropriately to ResMed's Autoset CS therapy. It facilitated development of the Autoset CS therapy device in the following ways: (1) it allowed comparison of the response of the first- and second-generation CS therapy product; (2) it fully exercised algorithm functionality in a controlled environment, allowing rapid debug cycles; (3) therapy and alarms were thoroughly verified prior to trials on real CS patients, an, consequently, (4) the magnitude and duration of clinical trials was markedly reduced.

Conclusions: The bench patient was successful in greatly accelerating equivalence-testing of ResMed's second-generation CSR therapy device. Benefits of the simulator included: product quality, shorter & safer clinical trials, and reduced therapy verification time.

141

CPAP Technology: Humidification, Mask Interface and Auto-CPAP

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This presentation will focus on three areas germane to CPAP therapy: humidification, interface and auto-titrating CPAP. These technologies impact compliance, treatment outcome and patient satisfaction with therapy. Data will be presented to support the routine use of heated humidification. The potential applications for auto-titrating CPAP as an alternative to fixed pressure therapy will be discussed. Interface type and how it affects CPAP efficacy and outcome is an important area that has received little research attention. The presentation will conclude with a discussion of future research directions aimed at enhancing CPAP outcomes.

142

Majority of the apneic patients exhibit objective sleepiness when adequate battery of test is used

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Different tools have recently been developed to assess vigilance in OSA patients. These tests aim to measure vigilance during different cognitive processes corresponding to different daily activities. None of the recent papers published have used in combination a panel of tests able to characterize in OSA patients the different kind of vigilance altered. Methods: Three vigilance tests were performed at three times (9, 11, 11:30); the OSleR test assesses maintenance of wakefulness, the Continuous Performance test (CPT) assesses sustained attention and the Driving simulator test measures divided attention.

Twenty OSA patients (51 ± 12 yrs, AHI = 45 ± 22) and 40 control subjects matched for age were tested.

Results: Patients with OSA performed significantly less well on the 3 tests than the control subjects at the 3 times:

	Patients (mean ± SD, $n = 20$)	Controls (mean ± SD, $n = 40$)	P
OSleR test			
Sleep latency (s)	1899 ± 475	2388 ± 41	< 0.001
CPT			
Reaction time (ms)	363 ± 38	377 ± 59	NS
Attentiveness	2.53 ± 0.72	3.42 ± 0.76	< 0.001
Driving simulator			
Test duration (s)	989 ± 249	1139 ± 115	0.01
Reaction time (s)	3.0 ± 1.9	1.9 ± 1.0	0.004
Off road events/h	90.7 ± 71.3	40.1 ± 36.7	0.01

Conclusion: Vigilance is impaired in OSA patients over a wide range of cognitive processes. Not only is their ability to remain awake in monotonous situations impaired but also their ability to maintain attention in more stimulating conditions.

143

Evaluating pharyngeal airway changes comparing Three Dimensional Computer Tomographic reconstruction and Acoustic Reflection technique in patients using an Adjustable Dental Appliance for the treatment of Obstructive Sleep Apnea Syndrome

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Aims: To evaluate pharyngeal airway dimensions scientifically, comparing anatomic and dynamic changes in pharyngeal cross sections and volume with two validated methods in sleep apnea patients, in order to predict treatment success or failure in future patients treated with Dental Appliance (DA).

Methods: 40 consecutive patients were selected at the Pain Center (ages between 23 and 72 years old) seven woman and 33 men; who were diagnosed with Obstructive Sleep Apnea Syndrome (OSA) and preferred dental appliance to continuous positive airway pressure treatment (CPAP). The group contained mild (AHI: 10–40/hours) moderate (AHI: 40–60/hours) and severe (AHI: more than 60/hours) obstructive sleep apnea patients. 16 patients previously had used CPAP, but failed to comply with the treatment.

At the first visit the patients filled out a Consent Form, the "Cedars Sinai Pain Center Sleep Evaluation Form" and the Epworth Sleepiness Scale. After a comprehensive Clinical, head and neck and dental examination a patients were consulted about a six-visit treatment plan and follow up program using the "modified Herbst dental appliance". 1. First visit: Dental impressions taken. 2. Second visit: Delivery and adjustment of costume-made device. 3. Third visit: Advancement and adjustment of individual dental appliance. 4. Fourth visit: Clinical evaluation after 2 weeks of using the dental device at home every night and further advancement or adjustment if needed. 5. Fifth visit: 6–8 weeks after using the dental appliance and a control polysomnography is ordered, using a protocol: the first part of the sleep study is done without the DA, the second part with the DA. 6. Sixth visit: After scoring, evaluating and reporting the polysomnography by a Board Certified Sleep Specialist the patients are evaluated again at the Pain Center.

All patients upper airway dimensions are measured with three dimensions computer tomography (3DCT) and pharyngeal acoustic examination. Clinical follow up at 6 month.

Results: Success and failure rates are presented with correlation of airway dimensions and statistical analysis.

Conclusion: Authors found in agreement with other peer reviewed published studies, that the adjustable dental appliance is a good alternative treatment tin OSA. Authors believe, that with the outlined comprehensive 6 step clinical program and evaluation the airway dimensions the treatment success will be predicted and a much higher compliance will be achieved in the future.

144

Near-Infrared Brain Oximetry in Obstructive Sleep Apnea Syndrome

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Objectives: Obstructive sleep apnea syndrome (OSAS) is associated with cardiovascular and cerebrovascular morbidity and mortality. Our goal is the application of Near-Infrared Spectroscopy (NIRS) for the assessment of brain tissue oxygenation and hemodynamics in OSAS subjects for the detection, diagnosis and monitoring of cerebrovascular disease.

Materials and methods: We used breath holding protocols on OSAS patients (AHI ≥ 20) and on healthy controls. The brain tissue NIRS parameters, such as oxy-, deoxy-, total hemoglobin concentrations, and cerebral

hemoglobin oxygen saturation were monitored and assessed by a frequency-domain tissue oximeter.

Results: Our findings suggest that compromised brain microvasculature in OSAS may lead to impaired ability to react to hypoxia and consequent hypercapnia. OSAS subjects showed a reduced or absent brain vascular reactivity compared to the cerebrovascular responsiveness in the healthy controls.

Conclusions: NIRS offers the advantage of performing non-invasive, transcranial, real time measurements of changes in cerebral hemodynamics and oxygenation for the screening of OSAS patients at risk of cerebrovascular morbidity and mortality.

145

Treatment of Obstructive Sleep Apnea Syndrome may Decrease the Risk of Ischemic Events.

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Background: Obstructive sleep apnea syndrome (OSAS) is associated with an increased cardiovascular (CV) morbidity. We evaluated the role of OSAS treatment on CV events in patients with coronary artery disease (CAD).

Methods: We prospectively studied 54 CAD-pts (mean age 57.3 ± 10.1 years) with OSAS defined as apnea-hypopnea index (AHI) ≥ 15/hour. All pts had proven CAD at coronary angiography. 25 pts (group I) were treated with continuous positive airway pressure (n = 20) or upper airway surgery (n = 5); 29 pts declined treatment for OSAS (group II). The primary endpoint was the composite incidence of CV deaths, ischemic events and CV hospitalizations.

Results: Mean follow-up was 74.7 ± 31 months. The 2 groups were not significantly different according to age, sex, BMI, smoking history, hypertension, hypercholesterolemia, diabetes mellitus, CAD and anti-ischemic therapy at baseline and at the end of follow up. The composite endpoint was observed in 6 pts (24%) of group I and in 17 pts (58%) of group II ($p < 0.01$). The risk of deaths, ischemic events and CV hospitalizations was significantly decreased by treatment of OSAS (OR 0.3, 95%CI 0.11–0.76; $p < 0.01$).

Conclusion: Our data suggest that effective treatment of OSAS in CAD-pts is associated with a significant decrease in cardiovascular events.

146

New methods of the treatment efficacy evaluation at asthmatic children.

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For an efficacy therapy evaluation at asthmatic children the polysomnogram has been added to the complex examination of patients (clinical, allergological, immunological, neurologic), that was spent in the department of ambulatory medicine of Scientific Center of Children Health.

13 children, suffering of bronchial asthma 4 - 14 years old (middle age 7,6 ± 1,2 y.o) have been examined in dynamics (in the exacerbation and in the remission). Among our patients were 9 boys and 4 girls. This research was carried out on computer diagnostic system - Laboratories of sleep (SAGURA-SCHLAFLBOR-II).

At first research (in a stage of an astma exacerbation), 1 girl of 10 years had sleep apnoea of a mild degree, and 12 children - insomniya connected with an exacerbation of bronchial asthma, a disadvantage of a REM-stage of sleep, a fragmentation of dream, augmentation of latention time to dream. All patients were treated by anti-inflammatory therapy (inhalation of corticosteroids – fluticasone propionate, bronholythics and other symptomatic drugs). Clinical remission or stabilisation of patients has been achieved within 3–7 days.

During the next examination after 4–10 weeks of corticosteroid inhalation treatment, in the disease remission, at the girl with a set of symptoms apnoae it was marked expressed positive changes, polysomnogram conformed to age norm. At others 10 children were observed augmentation REM- stage of sleep, decrease of a fragmentation of dream. Unchanged data of polysomnogram were observed in 2 children and demanded follow-up appointed therapy normalizing phases of dream.

Thus, the data polysomnogram can be regarded as padding criteria of an asthma evaluation, and remaining changes demand treatment correction.

147

Effect of bi-level PAP on Cheyne-Stokes respiration with central sleep apnea in patients with congestive heart failure

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Background: Central sleep apnea with a Cheyne-Stokes pattern (CSR-CSA) may contribute to the poor prognosis in patients with CHF. Nasal continuous positive airway pressure(CPAP) could be an useful alternative to treat CSR-CSA patients. Bi-level positive airway pressure(BiPAP) is added inspiratory pressure support to CPAP. We suppose BiPAP has similar effect to CPAP on CSR-CSA. Therefore we evaluated the effect of nasal BiPAP on CSR-CSA in patients with CHF.

Methods: With use of pulse-oxymetry, patients with CHF were screened for sleep disordered breathing. Then patients with obstructive sleep apnea were excluded by polysomnography (PSG). Thus, five patients were diagnosed as CSR-CSA. Serum BNP level, LVEF and NYHA class were evaluated before and 1month and 6months after indication of BiPAP. Apneahypopnea index, arousal index and percentages of the sleep stage were evaluated by PSG.

Results: After indication of BiPAP, apneahypopnea index was decreased from 37.3 ± 18.3 to 8.1 ± 7.1($p = 0.02$). Although arousal index was not decreased significantly (18.2 ± 16.3 to 12.9 + ± 6.4), the percentage of deep sleep was increased from 9.8 ± 11.8% to 23.1 ± 12.6%($p = 0.02$). Serum BNP level tended to decrease and LVEF was increased, NYHA class was improved, one month and 6months after treatment.

148

Nasal Continuous Positive Airway Pressure (nCPAP) in Obstructive Sleep Apnoea (OSA) and Heart Failure (HF)

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Objectives: To assess the effect of nCPAP on HF indices in patients with HF and OSA.

Methods: Stable outpatients with HF/OSA (LVEF < 45%, AHI ≥ 15/hr) were compared by intention to treat with n-CPAP to a control group (LVEF < 45%, AHI < 10/hr) at baseline and 6 months by measuring: Minnesota Heart Failure (MHF) score, Epworth Sleepiness Score (ESS), shuttle walk distance (SWD), natriuretic hormones (NT-BNP), 24 hr urinary catecholamines and echocardiographic indices.

Results: are as shown in the Table.

Variable[a]	OSA ($n = 20$)		P	Control ($n = 8$)		P
	Baseline	6 months		Baseline	6 months	
LVEF %	36 ± 6	40 ± 8	0.04	34 ± 9	37 ± 11	ns
SWD (m)	420 ± 178	435 ± 79	ns	440 ± 257	541 ± 202	ns
MHF score/100	47 ± 28	37 ± 26	0.06	38 ± 24	33 ± 26	ns
AHI/hr	30 ± 15	12 ± 12	< 0.01	5 ± 3	5 ± 4	ns
N-adren umol/l	372 ± 183	337 ± 168	0.07	224 ± 51	251 ± 120	ns
NT-BNP umol/l	238 ± 195	230 ± 183	ns	189 ± 168	170 ± 206	ns
ESS/24	9 ± 5	7 ± 4	0.06	8 ± 3	7 ± 5	ns

[a] Data, mean ± SD, compared by paired *t*-test, ns: $P > 0.1$. After 6 months 13 (65%) patients

Conclusions: N CPAP improves LVEF in patients with OSA and HF but compliance is challenging and may limit effectiveness.

Acknowledgement: Study supported by the Wellington Medical Research Foundation.

149

The effect of weight reduction on male and female patients with obstructive sleep apnea syndrome (OSAS).

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Objectives: To evaluate the effect of weight reduction in a group of obese OSAS patients concerning daytime sleepiness, number of nightly desaturations and metabolic factors.

Materials and methods: 21 patients (6 women and 15 men) with OSAS (median Oxygen Desaturation Index, ODI 44) and obesity (median Body Mass Index, BMI 38.7) were included in a weight reduction program. Low Calorie Diet (LCD) for 7 weeks was followed by behavioural modification day-care for up to 2 years. The patients were studied by home polysomnography (hPSG), blood samples for metabolic profile, blood pressure tests as well as evaluation forms including Epworth Sleepiness Scale (ESS) before diet, when entering and finishing the day-care.

Results: All 21 patients completed the LCD-period during which they significantly reduced their weight from median 119 to 101 kg (p 0.0001, WSR-test). Their median ESS-scores were significantly reduced from 9 to 6 (p 0.014, WSR-test, dropout 2 patients). Several were in a better metabolic health, 5 had reduced their medication for diabetes mellitus, and one for hypertension. The day-care and follow-up hPSG are in progress.

Conclusions: Weight reduction with LCD and day-care seems to be an effective treatment of obese patients with OSAS.

150

Association of daytime sleepiness with intima-media thickness

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Objectives: We examined the prevalence of excessive daytime sleepiness (EDS) and his association with the carotid intima-media thickness (IMT) and cardiovascular risk factors

Methods: The Epworth Sleepiness Scale (ESS) was used for EDS. Cardiovascular risk factors were assessed systematically and IMT was performed by B mode ultrasound in a cross sectional study.

Results: A total of 240 (82.3 % women and 17.7% men, mean age of 42.1 $\pm$ 11) non-shift employees working at our university hospital attended our one day cardiovascular screening campaign. Of those 145 having at least one cardiovascular risk factor, underwent IMT assessment. Mean ESS and mean IMT were respectively 6.75 $\pm$ 3.5 and 0.65 $\pm$ 0.12 mm. The prevalence rates of EDS (ESS $\geq$ 10) were 21.5 % for the total population, 35.9% for subjects with an infra-clinical atherosclerosis (IMT $\geq$ 0.70 mm) versus 16.2% for subjects without ($p = 0.02$, chi squared test). Obesity (BMI $\geq$ 30 kg/m^2) was more frequent (33.3% versus 14.8%) in subjects with EDS. Multivariate analysis clearly showed an unique significant relationship between EDS and higher IMT. Subjects with EDS presented higher number of associated cardiovascular risk factors: 19.1 % with EDS had 3 and more cardiovascular risk factors versus 6.8% ($p = 0.023$). An history of arterial hypertension was more frequent in subjects with EDS (26.7 % versus 12.7%, $p = 0.03$).

Conclusion: EDS is frequent and positively associated with higher IMT. These findings provided useful key issues for the selection of subjects for the prevention policies in a hospital.

151

Comparison of algorithms for derivation of a respiratory signal from surface electrocardiogram measurements

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Objectives: We provide a quantitative comparison between a new method for deriving a respiratory signal from a single lead electrocardiogram, and the published technique of Bebehani et al. (based on variations of the electrical axis of the heart, using multiple leads). A second objective is to determine the effect of different body position on the derived respiratory signal. Reliable ECG-based respiratory estimates may allow simplified apnea diagnostic techniques.

Materials and methods: Respiration causes modulation of the QRS amplitude in the surface ECG. Our proposed method identifies each QRS peak in the ECG (Lead I, Lead III and modified V5R), and interpolates between these values to form an estimated respiratory signal, which is compared with a simultaneous inductance plethysmogram respiration signal. An alternative estimate can be formed by calculating variations in cardiac electrical axis. Recordings from 6 adult subjects were used, in four postural positions (on back, on left side, on right side, standing).

Results and conclusions: The mean correlation coefficient between our respiratory estimate and the plethysmogram was 0.77; the corresponding figure for Bebehani's method was 0.65. Body position caused only minor variation in these correlation coefficients (range 0.73–0.81 for our method).

152

Gender, risk factors and Sleep Apnea Syndrome in Girona (Spain)

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Objectives: The analysis of patients diagnosed of Sleep Apnea Syndrome (SAS) in two Sleep Units of Girona .and determine if there were differences according to gender.

Materials and methods: All patients with SAS diagnosed between June 1999 and December 2002. We analysed according to gender, age, body mass index (BMI), sleepiness (S), traffic accidents (A), hypertension (HTA), cardiopathy (C), stroke (ST), respiratory disturbance index (RDI) and treatment (CPAP).

Results: are as shown in the Table.

Conclusions: 1. We did not find differences statistically significant between men and women in our series. 2. SAS prevalence in women is low, possibly because they go less to the doctor. 3. High number of patients who require CPAP, probably because we are seeing the most serious now.

	SAS	Age (y)	S (1–4)	A	C
Men	384 (82%)	53.5 $\pm$ 24	2.5	40 (10.4%)	57 (14.8%)
Women	82 (18%)	56.5 $\pm$ 23	2.1	5 (6%)	11 (13.4%)
P value		ns	ns	ns	ns
	ST	HTI	BMI (kg/m^2)	RDI	CPAP
Men	9 (2.3%)	139 (36.2%)	31.5 $\pm$ 11	44 $\pm$ 26	270 (70%)
Women	3 (3.6%)	36 (43.9%)	37 $\pm$ 16	42 $\pm$ 26	60 (73%)
P value		ns	ns	ns	ns

153

Neuropsychological testing, fMRI and Obstructive Sleep Apnea

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Objectives: To determine effect of severe obstructive sleep apnea (OSA) on neuropsychological function and brain activation networks in response to cognitive challenges using fMRI imaging.

Materials and methods: Two middle aged men with severe OSA (AHI 91, BMI 34, ESS 15) underwent a brief Neuropsychological evaluation, structural and functional MRI (3 Telsa) using language comprehension (LC), visually guided saccades (VGS), and word memory (VM) activation tasks.

Results: Both subjects demonstrated impairment in sustained attention (Digit Vigilance Test) and verbal memory (Cal. Verbal Learning Test). The fMRI showed significant activation on LC in bilateral Broca's, left

Wernicke's, bilateral frontal eye fields, and inferior parietal areas. VGS involved more extensive inferior parietal activation, left and right frontal eye fields, and the supplemental eye field. On the VM task, significant activation occurred in bilateral hippocampus, anterior bilateral frontal regions, bilateral frontal eye fields, and inferior parietal regions. Both subjects demonstrated reduced accuracy on the VM task. No structural abnormalities were detected on MRI.

Conclusions: We observed intact activation networks responsive to simple cognitive challenges even in severe OSA, suggesting that patients with OSA and neuropsychological deficits may experience significant cognitive recovery upon successful institution of CPAP therapy.

154

Efficacy of Adenoidectomy in the Treatment of Nasal Symptoms and Upper Airway Obstruction in Children with Down Syndrome

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Objectives: To examine the efficacy of adenoidectomy in children with Down syndrome and compare to normal controls.

Design: Retrospective chart review and phone interviews.

Setting: Tertiary Care Center

Patients: Twenty-seven children (mean age, 6.0; 1.6–14.5 years) with Down syndrome (DS) who underwent adenoidectomy between January 1978 and September 1997, and two matched controls (CG).

Methods: Patient charts were reviewed for preoperative symptoms, date and reason for adenoidectomy and postoperative symptoms. Long-term follow-up (mean, 12.1 years) was aided by phone interview.

Results: Following adenoidectomy, the control group consistently exhibited a higher rate of improvement in symptoms including nasal obstruction (87% CG, 50% DS, $p = 0.005$), snoring (73% CG, 41% DS, $p = 0.012$), mouth breathing (84% CG, 41% DS, $p < 0.001$) and apnea (in combination with tonsillectomy) (90% CG, 20% DS, $p = 0.002$).

155

The role of sleep and vasopressin in children with growth hormone deficiency

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Objectives: GH secretion and pulses of GH are influenced by the first slow wave sleep episode at the beginning of the night and deepest phases of sleep. Vasopressin (AVP) is also well known to stimulate GH secretion. We investigated the role of sleep and AVP in children with GH deficiency (GHD).

Materials and methods: The children with GHD (ten pituitary short statue) were monitored using oxymeter overnight before provocation tests. Two methods were selected provocation of L-dopa and injection of arginine. AVPandGHwere measured before and 30, 60, 90, 120 min after provocation.

Results: There was no difference in resting levels of AVP between GHD and control. In seven patients without sleep hypopnoea, L-dopa siginificantly elevated AVP in GHD from 3.4 pg/ml in a baseline to 12.2 pg /ml. In three patients who showed hypopnoea in the night, AVP responsiveness to the administration of L-dopa was impaired. In contrast, arginine injection test in GH deficiency could not alter AVP level. Furthermore, normal control showed no response to two provocation tests. *Conclusions*: AVP elevated by L-dopa in children with impairing GH secretion, but this effect was distinguished by central apnoea and hypopnoea.

156

Flow-volume curves in patients with obstructive sleep apnea syndrome and primary snoring

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Objectives: The aim of our study was to determine the diagnostic value of flow-volume curves (oscillations on flow-volume curve – a "saw-tooth" sign, ratio of expiratory flow to inspiratory flow at 50 percent of forced vital capacity [FEF50/FIF50] greater than 1 and both) as a screening test for obstructive sleep apnea syndrome (OSAS) in awake patients.

Materials and methods: We have investigated 58 consecutive adult patients with complaint of habitual snoring. All subjects underwent cardiorespiratory monitoring during sleep and conventional spirometry with assessment of flow-volume curves.

Results: 45 patients had OSAS and 13 patients were found to have only primary snoring. Different degrees of "saw-toothing" on the flow-volume curves were present in 42% of patients with OSAS and in 38% of subjects with simple snoring. FEF50/FIF50 was greater than 1 in 60% of OSAS patients and in 54% of snorers. Both phenomena were found in 31% patients with OSAS vs. 38% of simple snorers. In patients with OSAS there was no significant difference in the severity of sleep apnea between patients with normal and abnormal flow-volume curves.

Thus, we conclude the flow-volume curve abnormalities have no value in predicting of OSAS in snoring patients.

157

The role of the craniofacial complex hard tissues in OSAHS

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Aim: To record the radiological diagnostic characteristics of the hard tissues of the craniofacial complex of Greek patients with OSAHS.

Material: The material of the study consists of 40 lateral cephalometric radiographs of male patients aged 27–64 years, with symptoms of OSAHS who were treated at the Sismanoglio Hospital and 44 lateral cephalometric radiographs of male individuals aged 20–59 years, who had not undergone orthodontic treatment.

Methods: The lateral radiographs of the material were taken according to the principles of the Broadbent method.

All parameters that participate in the craniofacial morphology of patients with OSAHS seem to readjust their position, or size, or indirectly their function, so that essential functions, like breathing, are accomplished.

Results: This study showed that there exists a relevance between the hard and the soft tissues of the craniofacial complex, so that the unhindered function of the airway is ensured.

Conclusions: A change in head posture in apneic patients (the angle of the plane of the front base of the cranium and the plane of the spine is bigger than in normal individuals, $p < .05$) seems to facilitate the function of breathing, therefore we could characterize it a position of adaptation for the viability of the individual.

158

Obstructive sleep apnea among professional truck drivers in Finland

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Aim: The aim of this study is a) to estimate the prevalence of obstructive sleep apnea syndrome (OSAS) among professional truck drivers, and b) to relate possible sleep-related breathing disorders to driving ability and daytime alertness.

Subjects and methods: A structured questionnaire was responded by 1104 (38 women; 3.4%) truck drivers living in Southern Finland. The median age was 40.3 years (18–71 y) and median BMI 27.0 kgm^{-2}. A randomized sample of 75 subjects with suspected OSAS, 75 controls, and

a random sample of 25 other subjects were examined in the laboratory. PSG followed by MWT and driving simulator studies (STISIM) were done.

Results: Habitual snoring (snoring almost every night or every night) was reported by 35%, and 10.2% reported having apneas almost every night. 39.6% had been snoring for longer than 10 years and 14% for more than 20 years. 72 subjects had AHI $\geq$ 5 and 43 subjects had OSAS. The prevalence of the sleep-disordered breathing defined by AHI $\geq$ 5 was 17.6%. The prevalence of symptomatic OSAS with MWT SL $<$ 20 min was 7.1% and the prevalence of OSAS with excessive daytime sleepiness on at least 3 days per week was 4.9%. The median ESS was 9 (2–18) among subjects with OSAS and 8 (0–24) among subjects without OSAS. The median MWT sleep latency was 31.4 (1.5–40) min among subjects with OSAS and 33.7 (7.6–40) min among controls. The respective mean MWT sleep latencies were 26.2 min (SD 12.9) and 30.5 min (SD 9.4; P = 0.26).

Comment: Our prevalence figures are smaller those in some earlier studies. As concerns sleepiness it seems that many truck drivers with OSAS have normal ability to stay alert. ESS and MWT are necessary, but not sufficient when working capability is examined.

159

Psychiatric evaluation by SCL-90 of patients with obstructive sleep apnea

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Aims: The purpose of this study was to carry out psychiatric evaluation by Symptom Distress Checklist (SCL-90) in males with obstructive sleep apnea (OSA).

Methods: Polysomnographic studies and psychiatric evaluation by SCL-90 were carried out in 45 males with snoring and/or daytime sleepiness evaluated by Epworth Scale Score. Subjects were divided in 4 groups based on apnea/hypopnea index (AHI): Group A, AHI $<$ 5, N = 7, age in years 38 $\pm$ 13 (SD), Group B, AHI 5–15, N = 10, age 53 $\pm$ 9, Group C, AHI 15–30, N = 10, age 51 $\pm$ 11 and Group D, AHI $\geq$ 30, N = 18, age 54 $\pm$ 10.

Results: No differences were detected between Group A (patients without OSA) and patients of groups B, C and D, in the psychiatric parameters of somatization (I), obsessive-compulsiveness (II), interpersonal sensitivity (II), depression (IV), anxiety (V), anger-hostility (VI), phobic anxiety (VII), paranoid ideation (VIII) and psychoticism (IX) evaluated by SCL-90 scale. Only parameter V (anxiety) was in negative correlation with AHI ($p = 0.047$).

Conclusions: Until now our available data obtained from psychiatric evaluation by SCL-90 revealed no differences in symptoms of psychiatric disorders between subjects with OSA and those without OSA.

160

Differential Diagnosis in the Apnoeas of Prematurity

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Aim: The aim of the study is to draw attention to the importance of the differential diagnosis in the apnoeas of prematurity.

Method: We examined polygraphically (EEG-8 channels, respiration-2 channels (respitratory movements of the abdomen and nasal air flow), ECG, EOG, EMG of chin muscles, SaO2) 36 pre-term neonates. The examination was asked after an unsuccessful treatment of apnoeas by methylxanthin derivates and aimed to clarify the cause of apnoeas.

Results: Obstructive apnoeas started with phasic burst in the EMG of chin muscles were observed in 31 patients. We suppose that these apneas were evoked by the gastro-esofageal reflux. Early bradycardias without decrease of Sa O2 and preceeded by a phasic burst of the chin EMG were detected in 8 patients. According to our opinion, these bradycardias represented the vagal reflex response inducted by gastro-eosophageal reflux. In all cases, the anti-reflux treatment led to significant reduction or even to disappearance of events.

Conclusion: Diagnosis of the apnoeas of prematurity are usually made on the basis of an alarm signalization of the puls oxymeter monitor. The real cause of these alarms is frequently not identified. A significant number of these alarms is probably evoked by events induced by gastro-eosophageal reflux.

161

Renin-angiotensin-aldosterone system in obstructive sleep apnoea

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Objectives: To assess the renin-angiotensin-aldosterone system (RAAS)-activity in normotensive men with obstructive sleep apnoea (OSA).

Materials and methods: 18 men were included. Measurements were made in the supine position and after 1-hour of upright posture (stimulation-test).

Results: Plasma renin activity (PRA) increased from 0.75 $\pm$ 0.62 to 1.67 $\pm$ 1.67 ngAngI/mL/hr upon standing ($p = 0.003$), plasma angiotensin II from 5.29 $\pm$ 2.60 to 6.53 $\pm$ 2.74 pg/mL ($p = 0.018$) and plasma aldosterone from 26.50 $\pm$ 7.75 to 44.83 $\pm$ 22.15 pg/mL ($p = 0.001$). In a stepwise multiple regression model, Body-Mass-Index (BMI) ($\beta = 0.39$, 95% CI 0.01–0.22, $p = 0.031$), plasma insulin ($\beta = 0.41$, 95% CI 0.01–0.10, $p = 0.027$), and noradrenalin ($\beta = 0.54$, 95% CI 0.37–1.32, $p = 0.002$) predicted the PRA increase in the stimulation-test. When analysed together with BMI, Apnoea-Hypopnoea-Index seemed to suppress this response ($\beta = -0.54$, 95% CI -0.05–0.00, $p = 0.027$) but failed to have a significant impact when plasma insulin and noradrenalin were entered into the analysis.

Conclusions: It is proposed that RAAS activity, in particular PRA is suppressed, in OSA in order to maintain a normotensive state. With increasing BMI, insulin and noradrenalin, this suppression tends to disappear.

162

Sleep Medicine in Germany: Guideline Non-restorative Sleep

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In 1995 the German Sleep Society published “white papers” on sleep medicine for politicians and health authorities. The book reflected the costs and benefits of sleep medicine and sleep apnea treatment based on expert knowledge. The costs for an attended sleep study in addition to general hospital service were calculated as 600 Euro. In 1997 a HTA report on polysomnography used these costs and the steadily increasing number of sleep labs in Germany to demonstrate an uncontrolled expansion of medical service without proof of evidence. Using the first controlled CPAP trials the German sleep Society set up a formal process to create a medical society consensus guideline on “Non-restorative Sleep”. The guideline was accepted as level 2 by the German Association of Medical Societies and was published in the internet. The guideline gives a “clinical algorithm” which defines procedures to be managed by general practitioners, and the indications for attended sleep studies restricted to sleep laboratories. Basically these indications concern the intrinsic dyssomnias. Currently Germany has 240 accredited sleep labs with an average of 5.5 sleep study rooms. Each year almost 40,000 new CPAP devices are prescribed in Germany. A quality management system has been introduced including accreditation of sleep laboratories, certification of medical training, regular courses and an annual diagnostic/therapeutic process control based on a peer-review of medical records.

163

Diastolic Diurnal Hypertension Is A Common And Underestimated Situation In Patients With Unknown Hypertension At Time Of Sleep Apnea Diagnosis

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Objective: To characterize clinical and ambulatory blood pressure (BP) in newly diagnosed sleep apnea (SAS) patients without known hypertension (HT).

Design and Methods: 41 unselected patients (34 men), mean age = 48 ± 12 years, mean body mass index = 28.6 ± 5.7 kg/m^2 referred to sleep laboratory for symptoms suggesting SAS were included. SAS diagnosis was accepted when apnea-hypopnea index (AHI) was ≥ 15/hour (mean = 43 ± 21/h). BP was considered as normal by their general practioner and all of them were free of any medication for HT. Clinical BP was measured following the WHO recommendations and 24 hours ambulatory blood pressure monitoring (ABPM) was assessed using the Spacelabs ® monitor. Clinical HT was defined as a clinical systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg and ambulatory HT as a daytime SBP ≥ 135 mmHg and/or DBP ≥ 85 mmHg.

Results: Mean clinical BP was 133/86 mmHg and mean daytime ambulatory BP was 128/86 mmHg. 16/41 (39%) of the patients exhibited a clinical HT, and 62.5% (25/40) demonstrated a diurnal HT on ABPM. Isolated diastolic HT was found in 25% (4/16) of the patients with clinical HT and in 52% (13/25) of the patients with diurnal ambulatory HT. AHI tended to be higher in patients with isolated diastolic HT than in patients with systolo-diastolic HT (50 ± 25 vs 38 ± 23/h).

Conclusions: HT is hugely under-diagnosed particularly in apneic patients unknown to be hypertensive. Isolated diastolic HT is more prevalent in SAS than in essential HT. Use of 24 hour ABPM allows to identify one third of HT undiagnosed by clinical measurement. Conversely, SAS should be evoked in patients with isolated diastolic HT.

164

Weight loss in obese patients with severe OSAS decreases neck circumference and lowers level of CPAP pressure– a trial of dietary intervention with or without lipase inhibition therapy

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Objectives: To investigate effect of weight loss in patients with OSAS on different weight related parameters, including level of CPAP pressure.

Materials and methods: 24 OSAS patients, BMI ≥ 30 kg/m^2, were randomized to therapy with a lipase inhibitor (Lip) (Xenical®, Roche). Both groups received intensive dietary instructions by a professional dietician for 14 weeks.

Results: 20 patients completed the study. 12 patients were treated with CPAP, 8 with BiPAP (Pickwick). Weight loss was highly significant within both groups: + Lip: 7.70 kg ($p \geq 0.005$), − Lip: 4.6 kg ($p \geq 0.05$), but not significant when compared. Significant reductions were also found in neck and waist circumference. Fat impedance measurements showed no change in both groups. In the 12 patients treated with CPAP we found a small but significant reduction of CPAP pressure (0.55 cm H_2O) – which was highly correlated to weight loss ($p \geq 0.0001$).

Conclusions: Weight loss in obese patients with severe OSAS treated with CPAP and BiPAP achieved by dietary instructions, irrespectively of lipase inhibition therapy, cause a small but significant reduction in CPAP-level. Likewise, waist and neck circumference was reduced, whereas no change in fat impedance was found.

165

A new technique for objective measurement of mask sealing performance.

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Objectives: Problems with mask comfort and seal are frequently reported by nCPAP users and may have a detrimental effect on compliance. This study aimed to measure objectively the ability to achieve and maintain a seal under a variety of conditions of a recently developed mask, ResMed ACTiva (ACT), compared with the ResMed UltraMirage (UM).

Methods: Twenty current nCPAP users reporting problems with mask comfort were recruited. Tests were performed using a specially designed headbox, a flow generator supplying a pressure of 10cmH_2O, and a pneumotach measuring leak. Comparisons were made of minimum headgear strap tension required to achieve a mask seal by reducing a weight hanging from the bottom straps of the mask. This tension was used in subsequent tests to compare maintenance of seal during increasing lateral displacement and during incremental 3mm changes in headgear strap length.

Results: Results are available on 7 patients. ACT was significantly better able to maintain a seal during lateral displacement than UM (ACT = 19 mm+/− 3, UM = 11 mm +/−2.0, $p = 0.005$), and was significantly more tolerant of increases in strap length (ACT = 11mm +/− 3, UM = 4mm +/− 2, $p = 0.019$).

Conclusions: The ability of the ACT mask to achieve a seal and maintain a mask seal under lateral displacement with lower headgear tension is likely to have a positive effect on patient comfort and may improve compliance with therapy.

166

Active cushion technology: clinical assessment and patient satisfaction

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Objectives: Studies of patient compliance to nCPAP suggest that difficulties with mask fit and discomfort are among the most common problems experienced by nCPAP users despite patients trying multiple styles and brands of masks. The aim of this study was to determine the subjective seal, comfort and satisfaction rating of a recently developed mask, the ResMed ACTiva (ACT), which is designed to minimize leak and headgear strap tension.

Materials and Methods: 20 subjects (mean age 54.64+/−9.42 years and mean AHI 56.27+/−17.16) with long term difficulties with mask seal and comfort were selected. Baseline data was collected, including a subjective questionnaire of mask satisfaction and mask side effects. All patients were given an ACT to trial and the questionnaire was repeated at 15 days, 1 month and 3 months.

Results: Data is available for the baseline and day 15 visit for 16 of the 20 recruited patients. 12 of the 16 subjects reported facial marks with their original masks. After 15 days of using the ACT facial marks had resolved in 70% of patients. 14 out of 16 subjects preferred the ACT to their previous mask.

Conclusions: This preliminary data suggests that the reduced headgear tension required by the ACT to achieve adequate seal is likely to be the cause of increased satisfaction in patients with long-term compliance issues.

167

The results of treatment patients with obstructive sleep apnea syndrome treated with oral appliances in own modification.

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Objectives: assessment wheather oral appliances correct respiratory disturbance index and snoring.

Materials and methods: 17 men (age 35 – 64) with respiratory disturbance index above 15 and intensive snoring, were qualified to the treatment with oral appliances. During the treatment chosen somnographic parameters were tested with Poly-MESAM device. The decision about the type of the device was made also by ENT surgeon. The various oral appliances were used; some of which were modified by us.

Results: Oral appliances influenced obstructive sleep apnoea in various degree. The best results were obtained with the use of devices that correct

the position of soft palate. All the devices did not have significant influence on respiratory disturbance index, but they decreased snoring significantly.

Conclusions: Positive results of snoring treatment were obtained in all the treated patients. Oral appliances were tolerated by the majority of patients.

168

Upper jaw contraction and OSAS in children: results of RME therapy

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Objectives: Correlations between OSAS, malocclusions and maxillofacial malformations are particularly interesting. The Authors decided to study whether Rapid Maxillary Expansion (RME) therapy in the upper jaw could improve both the patency of the nasal airways and OSAS.

Materials and methods: The Authors selected 31 children with a case history of oral breathing, snoring and OSAS. Patients underwent an ENT examination, polysomnography; orthognatodontic examination; X-rays. All investigations were carried out prior to orthodontic therapy (T0), after one month (T1) with the device still on, and 4 months after the end of the orthodontic treatment which lasted for about 6–12 months (T2).

Results: In all treated cases, the Authors obtained an opening of the midpalatal suture; this was confirmed both by intraoral occlusal X-rays and cephalograms. This manoeuvre is responsible for the expansion of both jaws with an average cross-section increase (JL-JR distance) of 4.32 ± 0.7 mm. Nasal function and polisomnography showed improvement of T1 and remission of symptoms in T2.

Conclusions: The results show that the RME therapy widens nasal fossa and releases the septum thus restoring a normal nasal airflow with disappearance of obstructive sleep disordered breathing. Results demonstrated that RME intervention is effective in children affected by OSAS and suggest carefully evaluating the status of the maxilla as a possible common cause of OSAS and resort to RME therapy.

169

Hyperuricaemia in females with obstructive sleep apnea (OSA)

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Aim: The aim of our study was to assess serum uric acid (UA) in a large group of females with OSA before treatment.

Material: We studied 105 consecutive females, mean age 58.5 ± 9.9 years, mean BMI $= 33.3 \pm 8.2$ kg/m^2 with OSA (mean AHI $= 35.6 \pm$ 21.5, mean overnight $SaO_2 = 89 \pm 6.3\%$). Normal UA value is from 2.4 to 5.7 mg/dL. We divided patients in two groups: A-UA $\geq$ 5.7mg/dL (53pts, 50.5%) and B–UA $\leq$ 5.7mg/dL (52pts, 49.5%).

Results: Relations between hyperuricaemia, OSA and other diseases are shown in the table.

Variable	Group A	Group B	*P*
Serum uric acid (mg/dL)	7.2 ± 1.4	4.8 ± 0.7	< 0.001
BMI (kg/m^2)	36.8 ± 9.1	29.8 ± 5.2	< 0.001
AHI (n/h)	37.6 ± 19.3	33.5 ± 23.5	NS
SaO_2 mean (%)	87.3 ± 7	90.7 ± 5	< 0.01
T90 (%)	52.8 ± 37.8	31 ± 30.2	< 0.01
Hypertension (pts/%)	40 (75.5%)	20 (38.5%)	< 0.001
Coronary h. disease (pts/%)	23 (43.4%)	11 (21.1%)	< 0.05
Diabetes (pts/%)	14 (26.4%)	7 (13.5%)	NS

Conclusions: Hyperuricaemia is frequent in females with OSA. Increased UA levels were related to extreme obesity, lower overnight SaO_2 higher frequency of systemic hypertension, coronary heart disease and diabetes.

170

Sleep and periodic breathing (PB) in Tibetans and Han during polysomnography (PSG) at simulated altitude 5000 m

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Aim: Comparison of sleep quality and PB in Tibetans and Han at simulated altitude 5000m.

Material: We studied 8 Tibetans, mean age 26.6 ± 7.4 years, and 6 Han, mean age 30.5 ± 4.5 years.

Methods: Two PSG were performed , 1st at ambient altitude 2261m, the 2nd during acute exposure to altitude of 5000m (split night design).

Results: At 2261m, no differences in PSG were found, except higher number of arousals in Han ($p = 0.022$). Results of PSG at 5000 in the Table.

Variable	Tibetans	Han	*P*
Sleep efficiency (%)	62.6 ± 8.3	51.8 ± 14.3	NS
Arousals (n/h)	25.8 ± 6.2	24.3 ± 36.7	NS
nREM 1 (%)	23.9 ± 9.8	50.5 ± 14.2	0.001
nREM 2 (%)	64.1 ± 11.5	39.8 ± 9.9	<0.001
nREM 3 + 4 (%)	6.7 ± 5.5	4 ± 4.9	NS
REM (%)	5.3 ± 3.6	5.7 ± 3.3	NS
PB (%)	53 ± 21	44.6 ± 30.3	NS
SaO_2 mean (%)	68.3 ± 5.3	64.3 ± 8	NS

Conclusions: Tibetans preserved better sleep structure and arterial blood oxygenation than Han on acute exposure to altitude of 5000m.

171

Management of sleep disordered breathing (SDB) in Poland

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Patients are managed in sleep centres. Subject suspected of SDB fill-in a sleep questionnaire focused on snoring, observed apnoeas, daytime sleepiness (Epworth sleepiness scale) and concomitant diseases like: hypertension, coronary artery disease, ORL abnormalities. During physical examination BMI, neck circumference and blood pressure are measured.

When case history and physical examination suggest SDB, limited sleep study (registration of airflow, chest and abdominal movements, arterial blood saturation, ECG and snoring) is performed. This allows to confirm or reject diagnosis in majority of cases of obstructive sleep apnoea (OSA). After positive result of limited study, CPAP treatment is introduced after pressure being adjusted with autoCPAP monitoring. In case of positive history and physical examination and negative results of limited recording full polysomnography is performed.

Patients requiring treatment receive prescription for CPAP (health insurance company reimburse 70% of costs of CPAP). Patients using CPAP are followed-up in outpatients clinic at 3, 6, 12 months after starting therapy. The main problem of sleep medicine in Poland is an insufficient number of sleep centres throughout the country and shortage of full polysomnography facilities.

172

Epidemiology of obstructive sleep apnea (OSA) in Poland

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Aim: Assessment of OSA in a representative population sample of Warsaw (676 subjects randomly chosen from voting lists; 320 females and 356 males), mean age 56.6 ± 8.2 years (range 41–72).

Methods: Full polysomnography (PSG) was performed in 288 subjects (42.6%) and limited PSG (PolyMesam) in 388 subjects (57.4 %).

Results: AHI/RDI ≥ 5 was found in 215 subjects (32%). OSA was diagnosed when AHI/RDI ≥ 5 was accompanied by excessive daytime sleepiness (Epworth sleepiness scale - ESS ≥ 9 points). OSA was diagnosed in 76 subjects (11.3%). OSA was more frequent in males (59; 16.7%) than females (17; 5.4%) ($p < 0{,}001$). Characteristics of males and females with OSA is shown in the Table.

Variable	Females	Males	*P*
Age (years)	62.6 ± 6	59 ± 7.7	NS
AHI/RDI (n/h)	25.2 ± 15.2	25.4 ± 16.4	NS
SaO_2 mean (%)	92.2 ± 3.3	92 ± 3.3	NS
T90 (%)	26.9 ± 34	16.6 ± 19.9	NS
BMI (kg/m^2)	32.3 ± 6	30.2 ± 4.9	NS
ESS (points)	12.5 ± 2.4	12.9 ± 2.5	NS

Conclusions: OSA is frequent in Warsaw population especially in males. Severity of OSA was similar in males and females.

Acknowledgement: Study supported by Polish Committee for Research, Grant No 4PO5D 08216.

173

Chronic Intermittent Hypoxia Worsens Insulin Resistance and Glucose Intolerance in the Mouse Model of Obesity

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Objectives: The purpose of this study was to determine the influence of long-term exposure to intermittent hypoxia (IH), similar to that seen in Obstructive Sleep Apnea (OSA), on glucose and insulin regulation in a murine model of obesity.

Materials and methods: We subjected *ob/ob* mice ($n = 7$, body weight 44.4 ± 1.8 g) to IH (FiO_2 cycled from 20.9% to 5% over 30 sec throughout the12 hr light cycle) for 12 weeks, and compared their fasting glucose and insulin levels to weight-matched control mice exposed to intermittent air (IA) ($n = 7$). After 12-week exposure, we performed an intra-peritoneal glucose tolerance test (GTT; 0.5 mg/g glucose load).

Results: IH caused a time-related increase ($p < 0.001$) in fasting serum insulin levels that was significantly elevated ($P < 0.05$) compared to the IA group at week 8 (5.9 ± 1.8 ng/ml *vs* 2.1 ± 0.5) and week 12 (9.8 ± 1.8 ng/ml *vs* 4.3 ± 0.8). Fasting blood glucose levels were similar in both the IH and IA groups throughout the 12 week exposure. However, the GTT revealed that blood glucose levels 2 hrs after glucose infusion were elevated by 116 ± 24 mg/dl in the IH group compared to the IA group ($p < 0.001$).

Conclusions: Long-term exposure to IH worsens insulin resistance and glucose intolerance in a murine model of obesity.

174

Habitual Snoring is Associated with Enhanced Flow-Mediated Vasodilatation in Young Adults

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Objective: Do self-reported snoring or ESS score associate with endothelial dysfunction in young adult population?

Material and methods: Questionnaires were mailed to 3596 participants of the population based Cardiovascular Risk in Young Finns Study (age range 24–39 yrs). Carotid IMT and brachial artery responses to shear stress and nitroglycerin were measured with ultrasonography in 2550 subjects.

Results: The prevalence of habitual snoring was 5.4 % in women and 16.3 % of men. After adjustment for sex, age, vessel size and BMI flow-mediated vasodilatation was higher in those snoring at least three nights a week than those snoring less than once a week (8.52 % vs. 7.87 %, $p = 0.015$). IMT did not differ. ESS score associated neither with IMT nor flow-mediated vasodilatation.

Conclusions: Unexpectedly, snoring was associated with enhanced endothelial function. In young adults, snoring may initiate mechanisms that promote endothelial nitric oxide production.

175

Breathing during sleep in menopause: a randomized, controlled, crossover trial with estrogen replacement therapy

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Objectives: To evaluate the prevalence of nocturnal breathing abnormalities in postmenopausal women and the effect of estrogen replacement therapy (ERT).

Materials and methods: A prospective, randomized, placebo-controlled, double blind, crossover study was completed by 62 of 71 recruited women. Sleep was monitored using polysomnography and breathing was assessed with a static-charge-sensitive bed and oximeter.

Results: The occurrence of obstructive sleep apnea was low (1.6%) but partial upper airway obstruction was more common (17.7%). ERT decreased the occurrence ($p = 0.047$) and frequency ($p = 0.049$) of sleep apnea, but had no effect on partial upper airway obstruction or arterial oxyhemoglobin saturation.

Conclusions: Partial upper airway obstruction is the most prevalent form of sleep-disordered breathing, occurring ten times more frequently than sleep apnea in postmenopausal women. Unopposed estrogen replacement therapy only has a minor effect on sleep apnea and has no effect on partial airway obstruction.

176

Sleep-related breathing disturbances (SRBD) and the lesions on different levels of nervous system

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Objectives: The purpose of the study was to estimate the role of neurological lesions on different levels in the genesis of SRBD.

Materials and methods: 185 patients with neurological disorders were investigated. 25 – with diabetic autonomic neuropathy (AN), 122 – with cerebral stroke, 30 – with neuromuscular disorders (NMD), 8 – with amyotrophic lateral sclerosis (ALS). The indirect study of respiration during sleep was performed by MESAM-IV device (MAP, Germany). The device allows to record oxyhaemoglobin saturation (SaO2), heart rate, body position and breathing sounds during the night. Upper airway abnormalities as the cause for the SRBD were excluded.

Results: Patients with AN and strokes had significantly ($p < 0{,}05$) higher ODI than the NMD and ALS patients (14,5 ± 18,1 and 13,6 ± 16,4 vs. 6,1 ± 8,5 and 3,0 ± 2,5 epis/hour correspondingly). Mean SaO2 was significantly lower in AN patients comparing with stroke patients (95,5 ± 2,3 vs. 96,6 ± 1,4%).

Conclusions: The site of neurological damage has an influence on the possibility of SRBD development. Patients with cerebral and autonomic nervous system lesions have higher severity of SRBD than the others.

177

Predictors of excessive daytime sleepiness(EDS) in obstructive sleep apnoea(OSA)

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Aims: To assess prevalence and delineate predictive factors of EDS in OSA.

Methods: Clinical, polysomnographic, and multiple sleep latency test

(MSLT) data were collected retrospectively from all patients diagnosed as OSA at the Sleep Disorder Unit of the Singapore General Hospital over three years. Respiratory disturbance index (RDI) was used for diagnosis and assessment of severity. OSA was classified as mild (RDI 5–20), moderate (RDI 20–40), and severe (RDI $\geq$ 40). EDS was objectively assessed using MSLT. According to MSLT patients were categorised into two groups; sleepy (mean sleep latency: MSL $<$ 10) and non-sleepy (MSL $\geq$ 10). MSL of $<$ 5 and 5–10 were considered severe and moderate sleepiness respectively. Univariate and multivariate analyses were performed to ascertain predictive factors of EDS.

Results: A total of 195 patients were studied. There were 89.4% males and 10.6% females. The severity of OSA was found to be mild in 35.9%, moderate in 27.2%, and severe in 36.9%. EDS was demonstrated in 87.2% comprising severe sleepiness in 52.3% and moderate sleepiness in 34.9%. Sleep onset REM periods were detected in MSLT of 28.2% patients. Univariate analysis demonstrated age, RDI, sleep efficiency, total arousals, arousals with apnoea, arousal index, number of desaturations, and severity of snoring as significant predictors of EDS. However multivariate analysis identified only sleep efficiency, total arousals, and severity of snoring as significant predictive factors.

Conclusions: OSA causes EDS in the majority of patients. Severe snoring, impaired sleep efficiency, and increased total arousals in polysomnography seem to positively predict EDS.

178

Direct bimaxillary advancement in treating OSAS patients

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Aims: Stanford's protocol is a generally approved and utilized method in treating OSAS. (It provides, though, several operations if the whole category of treatment options are being utilized.

In the Central Hospital of Satakunta, i we, therefore, concluded, that in more demanding cases it would be favourable for the patient to do bimaxillary advancement without preceding other, smaller operations (i.e. UPPP, UPP; Box-operations). The minor operations, most likely, cannot sufficiently help the patients and yet the surgical discomfort remains to be suffered.

Methods: In this material we follow 17 patients which all have undergone direct bimaxillary advancement, because of diagnosed OSAS. 15 were men and 2 women. The age varied from 33 to 68 the average being 50.5years. Patient interview, polysomnographia, lateral x-ray and assessment of general health status were made prior to operation and postoperatively. PAS was measured before the operation, usually next day after the operation and then 3, 6 and 12 mos postoperatively.

Results: As a rule patients felt considerable relief or even cure of their OSAS disease after bimaxillary advancement Oxygen saturation was improved in all cases and the amount of saturation "dips" was diminished. PAS was increased in all cases except one. The results are presented in a form of tables.

Conclusions: Direct bimaxillary advancement in OSAS seems to be a good choice in selected cases.

179

TNF-α (-308A) Allele Carriage is associated with OSAHS

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Objectives: to investigate the TNF-α (-308A) gene polymorphism in OSAHS patients, their siblings and population controls.

Method: 104 patients with OSAHS and 105 of their sibs (66 w/o OSAHS; 39 indeterminate) were recruited for sleep studies and had blood collected. Population controls were 192 random UK blood donors. Genotyping was performed using a TaqMan ™ based assay for allelic discrimination (ABIsystems®).

Results: The OSAHS group had more males (80%) compared to either sibs w/o OSAHS or blood donors and had a higher BMI (30 $\pm$ sd6 vs. 28 $\pm$ 5 kg/m^2), AHI (42 $\pm$ 23 vs. 10 $\pm$ 5 events/hr) and Epworth Sleepiness Score (15 $\pm$ 3 vs. 8 $\pm$ 5) compared to sibs w/o OSAHS ($p < 0.001$). TNF-α (-308A) was commoner in the OSAHS group compared to blood donors – 49% vs. 32% ($p = 0.004$). There was no difference in allele distribution between OSAHS and sibs w/o OSAHS ($p = 0.9$). Logistic regression showed increasing age and male sex alone to be independently associated with carriage of the A allele ($p = 0.01$ OR 1.03; $p = 0.03$ OR 1.7 respectively).

Conclusions: This study is the first to show that TNF-α (-308A) carriage is associated with OSAHS (particularly older males) and may partly explain elevations in TNF-α levels in this group.

180

Gastroesphageal Reflux and Sleep Disordered Breathing

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Introduction: The prevalence of GER in OSA patients is estimated at 53 to 76%, the nature and mechanism(s) of this relationship are unknown. The purpose of this study was to evaluate the severity of SRBD with severity of GER events.

Methods: 14 patients with clinical symptoms of GER and SRBD (mean age: 45.6 years, mean BMI: 27.8 kg/m^2) were evaluated with 24-hour pH monitor (Mark III- Medtronic); and overnight polysomnogram (PSG). Analysis of reflux, arousal and respiratory events was made in a time window of 2 minutes surrounding reflux events

Results: 347 reflux events were observed. 25 events were seen on PSG, 10 occurred during scored sleep, 2 after a respiratory event (hypopnea).

With OSA defined as RDI $\geq$ 5, SRBD RDI $<$ 5 events/hour, eight patients were classified as SRBD, six as OSA. The mean (standard deviation) of age, RDI, DeMeester score, % of time with pH $<$ 4 and BMI for SRBD and OSA respectively were: 36.7 (8.5), 61.6 (2.3); 2.1 (1.1), 28.8 (12.9); 16.2 (12.2), 34.7(19.6); 2.6 (2.6), 7.4 (4.8); and 25.3 (4.5), 27.1(7.8).

Conclusion: OSA has been associated with GER we believe increased respiratory effort may trigger reflux. Our study indicated that OSA patients had higher DeMeester scores and longer time with pH $<$ 4 than SRBD. We conclude that the severity of the SRBD may be related to the severity of GER, worse OSA representing higher risk.

181

Predicting the presence of OSAS from the continuous nocturnal heart period: a time-frequency domain analysis.

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Objectives: We evaluated a time-frequency domain analysis of the nocturnal heart rate variability (HRV) as the single diagnostic marker for obstructive sleep apnea syndrome.

Methods: The predictive accuracy of time-frequency HRV variables (Wavelet "Wv" Decomposition parameters from level 2 " Wv2 " to level 256 " Wv256 ") obtained from nocturnal ECG Holter monitoring were analysed in 147 consecutive patients aged 53.8 $\pm$ 11.2 years referred for possible OSAS. OSAS was diagnosed in 66 patients (44.9%) according to an apnea/hypopnea index $\geq$ 10. *Results*: Using ROC curves analysis, the most powerful predictor variables was Wv32 ($W = 0.758$, $p < 0.0001$), followed by Wv16 ($W = 0.729$, $p < 0.0001$) and Wv64 ($W = 0.700$, $p < 0.0001$). Classification And Regression Trees (CART) methodology generated a decision tree for OSAS prediction including all levels of Wv coefficients, from Wv2 to Wv256 with a sensitivity reaching 92.4%, and a specificity of 90.12% (% of agreement: 91.2%) with this non-parametric analysis.

Conclusions: Wavelet Transform extracted from the nocturnal heart period appeared as powerful tools for OSAS diagnosis.

182

The unexpected SAS is highly prevalent and associated with the alteration of the autonomic nervous system activity in a general 65 years old population. The PROOF study.

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Objectives: The identification of SAS and autonomic disorders as cardiovascular risk factors is needed in elderly since they should become candidates for specific treatment.

Materials and methods: We prospectively evaluated in a large cohort ($n = 1011$) of 65 ± 0.4 years old men (40%) and women (60%) free of cardiovascular of cerebrovascular event or of diagnosed SRBD, the prevalence of unexpected SAS and its relationship with ambulatory blood pressure, spontaneous cardiac baroreflex sensitivity and basal cardiac autonomic activity.

Results: According to the presence of nocturnal cyclical heart rate variability quantified using validated algorithm, the probability of SAS was retained in 35% and 14% of this population with a VLFi threshold responding to, respectively 15 and 30 brady/tachycardia cycles per hour of sleep. Using logistic regression analysis, the severity of the SAS was highly correlated with spontaneous baroreflex sensitivity ($p < 0.01$), and heart rate variability parameters (parasympathetic indicators, $p < 0.0001$). Neither BMI, nor ambulatory blood pressure, were significantly associated with SAS.

183

Sleep disordered breathing index obtained from polysomnography and peripheral arterial tonometry

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Peripheral arterial tonometry (PAT) allows the detection of episodes of peripheral vasoconstriction associated with respiratory obstructive sleep disorders. We simultaneously recorded the signals of PSG and PAT in 46 subjects (37 M, 52 ± 13.1 years, BMI 28.6 ± 4.9 kg/m^2) complaining of snoring and daytime hypersomnolence. PAT respiratory disturbance index (PRDI) correlated to PSG apnea hypopnea index (AHI) ($r = 0.82$, $p < 0.0001$). The intraclass correlation coefficient (r_I) between the PRDI and the AHI was 0.80 ($p < 0.001$). Results were similar when the flow limitation index was included in this correlation analysis. PAT oxygen desaturation index (PODI) was also correlated to AHI ($r = 0.82$ $p < 0.0001$ and $r_I = 0.72$ $p < 0.001$). A PRDI $\geq$ 25 identified subjects with OSA (AHI $\geq$ 10) with a sensitivity of 81% and a specificity of 83%. Including subjects with UARS, the specificity of PRDI $\geq$ 25 increased to 100% but sensitivity fell to 72%. A PODI $\geq$ 10 identified subjects with OSA with a sensitivity of 88% and a specificity of 79%. Our results indicate that the PAT is a useful tool for screening respiratory obstructive sleep disorders.

184

Postoperative complications and side effects of three procedures designed for the snoring patient; UPPP, LAUP and Coblation

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Introduction and aim: We compared in a prospective study the side effects and the postoperative complications of three procedures commonly designed for the treatment of primary snoring. Methods; Forty nine patients underwent velopharyngeal surgery for primary snoring (UPPP:17; LAUP:15;Coblation:17) Patient's evaluation encompassed postoperative pharyngeal pain (visual analog scale on five point scale) and use of narcotic drugs in the early postoperative period as well as a subjective evaluation of late postoperative complaints. Surgeon's examination was performed to recognize postoperative complications in the oropharynx.

Results: Postoperative pharyngeal pain was less important in the Coblation group than in the UPPP and LAUP group;UPPP vs LAUP: ns,UPPP vs Coblation : $p = 0{,}0001$, LAUP vs Coblation : $p = 0{,}009$. Mean duration of pain with a score $\geq$ 2 was calculated as follow; UPPP: 21.3 days; LAUP: 14.6 days and Coblation: 8.1 days. Mean duration of narcotic drug use for the patients who needed this medication was 10.1 days for UPPP, 7.2 days for LAUP and 1.3 for Coblation. Postoperative side effects and surgeon's assessment for postoperative complications were more present in the UPPP and LAUP groups than in the Coblation group.

Conclusion: Coblation is a safer and painless procedure than UPPP and LAUP for the treatment of primary snoring. Postoperative discomfort after LAUP or UPPP appears to be very similar.

185

Auto-adjusting versus conventional nCPAP therapy in sleep apnea patients with low treatment compliance

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Backround: We tested in a prospective randomized crossover study the hypothesis that continuous positive airway pressure (nCPAP) use and outcomes can be improved by an auto-adjusting nCPAP device in patients with obstructive sleep apnea who have a low treatement compliance.

Methods: 30 patients, who were on long-term nCPAP therapy with an nightly use of less than 4 hours were randomly assigned to 1 month of auto-adjusting nCPAP followed by 1 month of fixed nCPAP or vice versa using the AutoSet T device (ResMed, San Diego, USA). Compliance, apnea hypopnea index (AHI), mask pressure and leak were objectively measured.

Results: Daily home use was significantly higher with auto-adjusting nCPAP than with fixed nCPAP (4.3 ± 1.8 vs. 3.8 ± 2.2 hours; $p = 0.04$) and increased markedly from the last follow up period (1.2 ± 1.0 hours). Median pressure was lower on automatic compared to fixed nCPAP (7.7 ± 2.2 vs. 8.7 ± 1.7 cmH_2O; $p < 0.05$). Machine-scored AHI was not different between auto-adjusting and fixed nCPAP (8.2 ± 4.8 vs. 7.7 ± 4.0; ns). Moreover, median mask leak were not different between the two modes. 18 patients subjectively preferred auto-adjusting nCPAP, wheras only 5 patients preferred fixed nCPAP and 7 patients did not have preference.

Conclusion: Our data show that patient motivation and improvements in the equipment used for long-term treatment substantially increased compliance. A further improvement in compliance was achieved by the use of auto-adjusting nCPAP. We conclude that auto-adjusting nCPAP can be used to substantially improve compliance in patients who fail to comply with fixed nCPAP.

186

What Disrupts the Patients' Sleep after Light-Off during In-Lab Overnight Polysomnography?

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Aims: To evaluate factors that disrupt the patients' sleep during polysomnography.

Methods: Our sleep laboratory has two patient rooms and a third one for data-video monitoring. Whenever the nurse enters the patient's room, the time and reason for the intervention are noted. We reviewed 184 polysomnographies randomly selected between 1996–2002.

Results: We studied 184 patients (39 women), mean age $\pm$ (SD) 51 (10) years, and total sleeping time 348 (96) minutes. Approximately 14% of interventions were not noted. 109 patients had CPAP. Fifty-one% of women versus 61% of men had CPAP ($p =$ n.s). Forty-five% of CPAP patients needed intervention versus 27% non-CPAP patients ($p < 0.05$).

Fifty-one % of women versus 34% of men needed intervention ($P < 0.05$). 107 interventions were reported in 69 patients (35 asked by the patient). Forty % of interventions were related to CPAP, 29% to electrodes, 8% to difficulties in falling or in sleeping again, 7% to voids, 4 % to pain or dyspnea and 12% to other reasons. No difference in age was found between patients who did or did not need intervention. Fifty % of interventions occurred between midnight and 3:00 AM.

We conclude that 38% of polysomnography patients needed nurse intervention after light off, mainly for CPAP and electrodes related problems. Patients with CPAP and women needed more nursing care.

187

Role of Estrogen and Progestin Therapy in Female Breathing Disorders

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Sleep-disordered breathing (SDB) is more common among post-menopausal women than among their premenopausal counterparts possibly due to menopause-related decrease in estrogen and progesterone levels. Progesterone is a powerful respiratory stimulant and estrogens upregulate progesterone receptors.

Few studies have investigated the effect of short-term estrogen or progestin monotherapy or their combination in postmenopausal women with SDB with inconsistent results.[1–4] However, the respira-tory effects of progestin therapy seem to be more consistent and more long-lived in females[3] than in males.[5] Epidemiological data and preli-minary results from prospective studies in our group suggest that long-term estrogen replacement may be beneficial for postmenopausal nonapneic SDB. The respiratory effects of long-term progestin ther-apy in postmenopausal women are not known. Hormone replacement (HRT) may benefit especially those patients with low respiratory drive but without major anatomical abnormalities of the upper airway.

The current data warrants controlled trials in larger patient groups to specify 1) the subgroups most likely to benefit of HRT, 2) the most efficient dosage regimen (dose, timing of dose, monotherapy/ combination, cyclical/ continuous), 3) the type of HRT and 4) to allow the comparison of the effects to those of nasal CPAP.

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188

Long-term estrogen replacement therapy improves nocturnal oxygenation in postmenopausal women

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Objectives: To prospectively evaluate the long-term effects of estrogen replacement therapy (ERT) on nocturnal breathing.

Materials and methods: 64 healthy hysterectomized postmenopau-sal women completed a 5-year follow-up. Baseline studies included questionnaires, hormone assessments and a PSG with oximeter. At follow-up, also AHI, $EtCO_2$ and $tcCO_2$ were evaluated. After baseline women were on or off ERT according to their choice.

Results: At follow-up, serum estradiol (E_2) correlated with mean SaO_2 (Pearson $r = 0.29$, $p = 0.028$). When adjusted for age and BMI, mean SaO_2 ($\pm$ SD) was higher in long-term ERT users (continuous use for 5 yrs, $n = 21$) than in 11 never-users ($94.8 \pm 0.3\%$ *vs.* $94.1 \pm 0.5\%$, $p = 0.018$). Mean SaO_2 ($94.9 \pm 1.5\%$ *vs.* $94.0 \pm 1.5\%$, $p = 0.001$) and nadir SaO_2 ($86.1 \pm 3.4\%$ *vs.* $85.2 \pm 4.0\%$, $p = 0.004$) were higher in pooled present users ($n = 32$) than in non-users ($n = 32$). When adjusted for age and the change in BMI over time, the change in mean SaO_2 correlated with S-E_2 at follow-up ($0.21 \pm 1.1\%$, $r = 0.27$, $p = 0.032$). When adjusted for confounders, AHI at follow-up correlated inversely with baseline nadir SaO_2 ($r = -0.37$, $p = 0.004$) and directly with the change in mean SaO_2 ($r = 0.34$, $p = 0.007$).

Conclusions: Long-term ERT improves nocturnal SaO_2 in healthy postmenopausal women. Prospective trials to investigate the effect of ERT in women with respiratory impairment are warranted.

189

Sleep anea/hypopnea syndrome

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Sleep apnea/hypopnea syndrome is more prevalent in men than in women. Differences in upper airway structure/function and/or ventilatory control during sleep could explain the gender difference. However, the precise mechanism(s) underlying gender differences in the occurrence of sleep apnea remains uncertain.

Genderdifferences in upper airway structure and function are believed to explain the clear male predominance of OSAS in the general population. This is supported by studies showing differences in upper airway structure between genders during wakefulness. In this presentation, studies comparing upper airway mechanics in men and women will be reviewed including recent work demonstrating no significant gender difference in upper airway mechanics. Specifically, there is no gender difference in upper airway resistance, critical closing pressure or pharyngeal collapsibility during NREM sleep.

Gender differences in ventilatory control have also been documented during wakefulness, including increased sensitivity to CO_2 in men relative to women. Likewise, the higher prevalence of central sleep apnea in men than in women suggests a gender difference in CO_2 chemo sensitivity and/ or higherpropensity to sleep discontinuity. In this presentation, recent work demonstrating a significant gender difference in the susceptibility to develop central apnea will be reviewed including the effect of manipulations of sex hormone levels.

190

Japanese patients with obstructive sleep apnea (OSA) are not allowed to become obese due to their poor facial structure

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Objectives: It has been reported that BMI of Asian patients with OSA is smaller than that of White patients. We hypothesize that Japanese OSA patients are not allowed to become obese due to their poor craniomandibular structure.

Materials and methods: 178 Japanese male patients (49.8 ± 10.3 yr., 28.8 ± 3.5 kg/m^2, means $\pm$ SD) with OSA were studied. They were classed into three subgroups according to BMI; non obese (N; $BMI < 26.4$), moderately obese (M; $26.4 \leq BMI < 32.6$) and severely obese (S; $BMI \geq 32.6$). Facial axis (angle formed by intersection between basion-nasion and the line from the point of the lower border of the foramen rotundum through gnathion) were measured as an index of craniomandibular structure from lateral cephalometric radiographs.

Results: There were significant differences between all three groups in facial axis (N; 79.3 ± 4.1. M; 82.1 ± 4.3. S; 84.0 ± 4.5 $p = 0.001$ ANOVA).

Conclusions: These results suggest that Japanese may be susceptible to OSA at small BMI and that there is racial difference between Japanese and others in craniomandibular structure.

191

Spectralanalytical study concerning EEG-maturation in the first weeks of life (Frequency distribution in percentage curves)

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Objectives: During the last years the neonatal EEG was analysed by the aid of quantitative parameters. In earlier we could demonstrate that the EEG-development is not only characterized by visual patterns. We could show the very closely relation between PCA and the frequency quotients, a basis for an EEG-age signature of neonate.

Materials and methods: The study based on the routine examinations of neonates via polysomnography including records of EEG channels, in a group of 546 term born infants of 38 to 50 weeks of postconceptional age (PCA)

Results: Ass expected the maturation of the EEG takes place in the first weeks of life with significant interindividual differences. In clinical practice for this the presentation of the distribution of the measured values by percentage curves. The quotient of the alpha and theta frequency an obvious con increase in connection with the PCA.

Conclusions: The correlation between the frequency shifts and the PCA agreed with measures of brain maturity in healthy neonates. Thus the presented trend in early EEG development demonstrates that is possible to establish clinically relevant age dysmaturity scores.

192

Minimal invasive surgery with Coblator

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Objectives: Beside of turbinates and palatal surgery radio-frequencies may be applied to other minimal invasive upper airways day surgery procedures. In particular in tonsillar surgery, tonsil hypertrophia can be reduced using Coblator to enlarge cryptae.

Materials and methods: Coblator Tonsillar Cryptolysis (CTC) is obtained by sculpturing tonsillar criptae stomas, this give back to criptae the function of self-cleaning, that is lost in most cases of caseous cryptic tonsillitis. Intervention is performed in local anesthesia. 12 light OSAS patients ($20 \geq RDI \geq 30$) with their upper airway obstruction mostly due to tonsillar hyperthophy underwent the CTC procedure. The effect in Tonsil volume reduction was measured after 15 days.

Results: 9 of the 12 patients attained more than 1 cm of reduction in tonsillar surface distance, measured after 15 days also RDI became normal (< 15) The remaining three patients underwent a second CTC procedure obtaining a satisfactory result. No one had haemorragia and pain was minimal also after that the effect of anesthesia was over.

Conclusions: Our results are encouraging in developing and applying new surgical application of Coblator in the minimal surgery of upper airways for the therapy of light OSAS.

193

Comorbidities associated with sleep-disordered breathing (SDB) in US Veteran Beneficiaries

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Objectives: An estimated 4% of adult men have SDB according to prospective epidemiological population studies. SDB risk factors include being male, obese, or middle aged. These risk factors are common among veterans. Centralized databases provide access to diagnostic and therapeutic information for more than 3.5 million US Veteran health beneficiaries. Purpose of this study was to determine comorbidities associated with SDB in this high-risk population.

Materials and methods: This is a retrospective cohort study for fiscal years of 1998 to 2001 on all Veterans Affairs (VA) beneficiaries with a VA Outpatient Clinic File (OCF) and/or a VA Patient Treatment File (PTF) diagnosis of SDB using ICD9-CM codes 780.53, 780.57, and 780.51.

Results: 98,791 individuals were diagnosed with SDB in the study period. Less than 4% were female. Mean age was 57.6 (SD 12.4) with 62% of subjects younger than 65 years old. Prevalent comorbidities included HTN (40%), Obesity (28.6%), Diabetes Mellitus (25.7%), CAD (18.3%), CHF (11.7%), CAV (7.3%), and COPD (6.8%).

Conclusions: The cardiovascular comorbidities, diabetes mellitus, and obesity are common in this population. Our findings are consistent with data obtained in other studies showing higher prevalence of the comorbidities. It is not clear if the above association is causal. Obesity is part of a metabolic syndrome that predisposes to DM, CAD, and SDB. Longitudinal studies are needed to assess any causal relationship between SDB and cardiovascular diseases.

194

Utilization of standard deviation of chest and abdominal phase angle in identification of obstructive sleep apnea in children

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Objectives: This study assessed the reliability of variation in standard deviation of the phase angle of chest and abdominal excursion to identify obstructive sleep apnea in children.

Materials and methods: Piezo crystal belts obtained measurement of changes in circumference of the chest and abdomen. Because of the instability of the piezo dipole, we measured standard deviation of 10-second epochs and this statistic was compared to the RDI using 2-tailed Pearson Correlation and 2-tailed Spearman's rho.

Results: Standard deviation of greater than 10% was very highly correlated with the RDI (Pearson Correlation, $p < .000$; Spearman's, $p < .000$). Three clusters were identified: RDI < 5 with phase angle $< 10\%$; RDI $\geq$ than 5 with phase angle $\geq 10\%$; and RDI < 5 with phase angle $\geq 10\%$. Cluster analysis supported these three cohorts (the third potentially representing high upper airway resistance syndrome).

Conclusions: Evaluation of the standard deviation of periodic variation in the phase angle between the changes in circumference of the chest and abdomen, may provide a screening tool for the diagnosis of obstructive sleep apnea in children.

195

Prediction of Uvulopalatopharyngoplasty effect using Ricketts analysis

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Objectives: Uvulopalatopharyngoplasty (UPPP) is effective in less than 50% of patients with obstructive sleep apnea syndrome (OSAS). However, UPPP is an effective treatment for some patients with OSAS. A major difficulty has been to select those patients who will have a good response to UPPP. The hypothesize is that relationship between body mass index and facial axis (Fx) in OSAS with tonsillar hypertrophy patients could respond to UPPP.

Patients and Methods: 30 OSAS with tonsillar hypertrophy patients who had undergone UPPP were reviewed. BMI and Ricketts analysis of cephalograms were used in this study.

Results: By Ricketts analysis, there were significant differences between responders and non-responders OSAS patients on Fx (responders $86.4° \pm 4.2°$: mesio facial pattern, non-responders $79.6° \pm 4.8°$: dolico facial pattern). However, an exception to Ricketts analysis was made for severely obese patients.

Conclusions: We concluded that the efficacy of UPPP is higher in OSAS patients who have several factors such as tonsillar hypertrophy, not dolico facial pattern, and no obesity.

196

High prevalence of coronary artery disease in postmenopausal women with obstructive sleep apnea syndrome

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Objectives: Women appear to be increasingly susceptible to regular snoring and sleep apnea after menopause. Whether sleep apnea increases risk of coronary artery disease (CAD) in obese women remains unclear. We investigated the prevalence of CAD in women with obstructive sleep apnea syndrome (OSAS).

Methods: Among 561 patients with OSAS, verified by overnight polysomnography (PSG), 83 women were compared with 478 men.

Results: The prevalence of CAD was 88 of the 561 OSAS patients (15.7%) with an apnea-hypopnea index (AHI; the number of apneas or hypopneas per hour of sleep) ≥ 5. Women with CAD had AHI>5, 19.2% ($n = 16$), and AHI>30, 37.0% ($n = 10$), while men with CAD had 14.4% ($n = 69$, ns), and 16.6% ($n = 34$, $P < 0.05$), respectively. The mean age of female patients was older than that of male patients (57.7 ± 9.9 vs 66.2 ± 7.1 years of old, $P < 0.01$), and women with both of CAD and OSAS were postmenopausal.

Conclusions: Since a complication of OSAS in CAD was a high incidence, all of CAD patients with snoring should lead to evaluation for sleep-disordered breathing using PSG. We consider OSAS as one of the causative factors of CAD, especially in postmenopausal women.

197

Obstructive Sleep Apnea Detection in Pediatric Subjects using Surface Lead Electrocardiogram Characteristic Intervals

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Objectives: The purpose of this work is to detect obstructive sleep apnea (OSA) in children using an automated method based solely on ECG recordings rather than a full polysomnographic study.

Materials and methods: ECG data is acquired at 256Hz from 21 pediatric subjects as part of a polysomnographic study. The ECG RR intervals are extracted using a wavelet-based technique. The ECG data is divided into epochs which have been annotated by an expert evaluator. The following features are extracted from each ECG epoch: (a) selected power spectral density (PSD) bins using Welch's method of RR intervals, (b) the PSD of an ECG derived estimate of respiration and (c) serial correlation coefficients. A linear discriminant classifier using Mahalanobis distance is applied to automatically classify obstructive/mixed apnea (OA/MA) epochs versus non-OA/MA epochs.

Results: Detection of 30 sec OA/MA epochs was achieved with an estimated accuracy of 77.6%, specificity of 78%, and sensitivity of 71% (estimates based on cross-fold validation).

Conclusions: Automated OSA detection may be possible in pediatric subjects and be particularly useful for screening.

198

Acute ischemic stroke and sleep apnea: Evolution of clinical findings, diffusion-weighted MRI, and blood pressure in the first 3 days after stroke onset

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Objectives: To test the hypothesis that in the acute phase of stroke moderate-severe SA leads to an enlargement of the ischemic volume.

Methods: We include pts with ischemic stroke and admission within 12 hours after stroke onset. Sleep breathing is assessed in the first night after admission. Moderate-severe SA is defined by an AHI ≥ 25. A blood pressure (BP) monitoring is performed until 7 p.m. of day 3. MR imaging is performed at 7 p.m. of day 1 and 7 a.m. of day 3. Stroke volumes are measured on DWI.

Results: We included so far 10 pts. Moderate-severe SA was present in 5 pts. Three of them had a clinical stroke progression, accompanied in two pts by a clear-cut increase of stroke volumes. In 4 pts SA was mild or absent. None of them had a clinical stroke progression and two of them had an increase of stroke volumes. Mean values of BP during daytime and nighttime were similar in the two groups.

Conclusions: Preliminary results of this ongoing project suggest that in pts with acute ischemic stroke moderate-severe SA may lead to 1) clinical stroke progression, and 2) increase of stroke volumes within the first 3 days after stroke onset. These detrimental effects may not be related to blood pressure changes.

199

A Wireless Data Acquistion for Monitor, Analysis and Treatment follow-up of Patients Suffering Sleep Disorders

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Welfare technologies and methods commonly in use in special health care can be used for follow-up patient's treatment outside hospitals.The modern information and communication technology is available for heath care and gives a change to carry out measures, which can help to bind different partcipants of health care services. The examinations of the patients suffering from sleep disorders, as obstructive sleep apnoe syndrome(OSAS) are examined, with the polysomnography, over the night including different physiological parameters, such as respiration, oxygen saturation (SpO2), body position, EEG etc.; usually 4–5 physiological parameters, must be examined, before the diagnosis can be performed with the relatively high sensitivity and specificity. This method needs that the patients are under supervise of hospital personel for measurement time. We have used for screening of sleep disorders following parameters: PVDF-polymer transducers for both nose and diaphragm respiration, pulse oximetry for SpO2 and pulse and body positions with web camera.- The physiological signals of these parametries are transported wirelessly to the SoapBox network consisting of a central SoapBox which is connected to a terminal device such as PC or PDA by RS-232 serial communications, and one or more remote SoapBoxes. This procedure makes it possible to deliver data widely from the peripherical measurement sites to the centers, where the analysis will be performed. Both control subjects and patients suffering from OSAS will be presented in this study.

200

Sleep Quality Differences Between Men and Women With Congestive Heart Failure

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Objectives: Investigate the presence of Sleep Breathing Disorders (SBD) and the impact on sleep quality in ambulatory patients with CHF, according gender.

Materials and Methods: Overnight polysomnography was performed in 72 consecutive, unselected patients (46 male) with severe and stable CHF, optimally treated (LVEF $= 35.5 \pm 6.5\%$), recruited from a single clinic. Apnea-hypopnea Index (AHI) $\geq$ 15 was considered abnormal.

Results: Male vs Female had a similar age (57 ± 12 vs 59 ± 11 years), body mass index (21 ± 5 vs 20 ± 4 kg/m^2), and LVEF (35 ± 7 vs $36 \pm 6\%$). There were significant differences in (male vs female) ($p < 0.05$): AHI $= 31 \pm 24$ vs 16 ± 14; Total sleep time (min) $= 288 \pm 87$ vs 337 ± 54; Sleep efficiency (%) $= 71 \pm 19$ vs 81 ± 11; Arousals $= 28 \pm 16$ vs 20 ± 16; S1 (%) $= 10 \pm 6$ vs 6 ± 4; S2 (%) $= 66 \pm 10$ vs 59 ± 14; and S4 (%) $= 10 \pm 8$ vs 17 ± 8. SBD was present in 42% of Males and only 14% of Females ($p = 0.035$).

Conclusions: Comparing the polysomnographic characteristics according gender, in a prospective study of ambulatory patients with CHF, sleep breathing disorders were more prevalent in males than females. Males had a worst sleep quality and more severe sleep-disordered breathing than women.

201

A novel, simplified approach to starting CPAP therapy in OSA

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Objectives: Due to ever increasing referral rates, we have had to move the nasal CPAP induction program for patients with obstructive sleep apnoea (OSA) out of the sleep laboratories and into an out-patient setting. We report the effects this has had on patient outcomes.

Materials and methods: The last 75 patients with OSA who had an overnight CPAP titration in the sleep laboratory (group 1) were compared with the first 75 coming to an afternoon clinic and set up on CPAP in groups, and had their CPAP pressure determined from an algorithm (group 2). They were assessed at 1 and 11 months using the Epworth Sleepiness Score (ESS), compliance with CPAP (hrs/night), whether still using CPAP, and the number of clinic appointments in the first 11 months.

Results: The two groups were similar at baseline. There were no differences in any of the outcome measures. ESS values fell from 14.6 to 5.0, and from 14.0 to 5.1, at 11 months in groups 1 and 2 respectively: compliance, 5.2 versus 5.1 hours/night; clinic appointments, 1.75 versus 1.96; discontinuation rates at 1 month, 8 and 7%, and at 11 months, 25 and 21%.

Conclusions: Using these simple outcome measures we have shown that using an outpatient based approach, and an algorithm based CPAP pressure prescription, has not reduced the efficacy of our CPAP induction program for patients with OSA.

202

Accuracy of algorithm-based prescription of CPAP in OSA

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Objectives: Patients with OSA on CPAP have considerable night to night variation in their pressure requirements, suggesting a one-night titration is not very precise. This study investigates the likely error incurred using a one-night titration, and explores whether an algorithm based approach to determine the pressure is as accurate.

Materials and methods: 30 patients with OSA used an autotitrating CPAP device for 28 nights. For each patient, the 95th centile data from each night were used to derive the average pressure (regarded as the 'Gold Standard'). For each patient, this 'Gold Standard' pressure was compared with, 1) an algorithm-derived pressure (based on neck circumference and OSA severity), 2) a one-night titration pressure (using four alternative single nights), and 3) a fixed pressure of 10 cmsH_2O, and these differences processed to give overall bias (error) and precision (1SD) for each situation.

Results: The mean 'Gold Standard' pressure for the group was

9.8 (SD 2.1) cmsH_2O. There was little bias from any of the alternatives. However, the precision varied between 1.65 and 2.45 cmsH_2O for the one-night titrations, was 2.00 for the algorithm, and was 2.12 using a fixed pressure of 10 cmsH_2O.

Conclusions: Considerable night-to-night variation means that a one-night titration is subject to random variation. A one-night titration has a similar inaccuracy to that resulting from using an algorithm, based on OSA severity and neck circumference. Setting all patients with OSA at 10 cmsH_2O would be little worse.

203

Role of orthodontics in children with sleep disordered breathing

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While there are many treatment modalities to address problems of sleep disordered breathing (SDB) in children this presentation will describe the role of orthodontics in modifying jaw development and subsequent effects on the nasal and posterior airway.

Children with SDB commonly have similar facial growth profiles. However the symptoms of SDB in children are manifested differently than in adults. Often times these subtle signs go undetected, and can be mistakenly taken for other behavioral or developmental disorders. The treatment advantage that children present over adults is the capability to effect growth at the suture level, as well as at the local alveolar level. Maintaining these growth changes is paramount to long term treatment success. It is important that these children with SDB are followed throughout their developmental years, for the likelihood of symptoms to reappear is high. Three different cases illustrate these points along with the biologic rational for treatment in the presentation. And the timing of treatment and mechanics of treatment will be outlined

204

Plasma viscosity and fibrinogen in obstructive sleep apnea

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Objective: Since blood rheology and coagulation system may contribute to an increased risk of cardiovascular events, purpose of the study was to correlate morning plasma-fibrinogen and viscosity with markers of severity of obstructive sleep apnea (OSA).

Materials and Methods: Consecutive patients admitted to the sleep laboratory were included. The association of plasma fibrinogen and viscosity with OSA was analysed in consideration of arterial hypertension.

Results: There were 100 males and 10 females with an age of 61,4 ± 10,1 years and a BMI of 28,4 ± 4,1 kg/m^2. OSA was confirmed in 63 pt. (57,2 %) with an apnea-hypopnea-index (AHI) of 28,7 ± 14,9 events/h. Fibrinogen was correlated with nocturnal minimal oxygen saturation (r = -0275, p = 0,004) and AHI (r = 0,297, p = 0,002). Pt. with OSA showed higher levels of plasma viscosity (1,36 ± 0,1 mPas vs. 1,30 ± 0,08 mPas, p = 0,006) and fibrinogen (317 mg/dl vs. 353 mg/dl, p = 0,017), independent of co-morbid arterial hypertension.

Conclusions: These findings indicate an association between morning plasma-fibrinogen, elevated plasma-viscosity and obstructive sleep apnea. This reflects a hypercoagulability state, which might explain at least in part the accelerated forms of atherosclerosis and coronary artery disease.

205

Patients with obstructive sleep apnea are at risk of coronary plaque rupture

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Objective: Obstructive sleep apnea (OSA) is thought to be a predictor of mortality in coronary heart disease. The aim of the study was to analyse the contribution of obstructive sleep apnea on coronary

Plaque disruption, which might be triggered by several mechanisms (e.g. mechanical stress, inflammation, hypercoagulable state). Materials and Methods: Therefore we compared 66 Pt. with OSA (A) to a control group (n = 56 (B)) in order to estimate the risk of coronary plaque rupture.

Results: are as shown in the Table.

	Group A ($n = 66$)	Group B ($n = 56$)	*P*
LV-Mass (g)	266 ± 141	207.8 ± 90	0.01
Heart rate (b/min)	75 ± 11	71 ± 11	ns
RRsys	147 ± 21	142 ± 28	ns
Fibrinogen (mg/dl)	359 ± 103	317 ± 63	0.02
Plasma-viscosity (mpas)	1.35	1.30	0.01
HDL (mg/dl)	46 ± 11	53 ± 18	0.02

Conclusions: These data document that OSA, which is known to be an independent cardiovascular risk factor, might also contribute to coronary

plaque rupture and therefore trigger coronary thrombosis and acute coronary syndrome.

206

Positive effect of Modafinil on Daytime Somnolence in patients with Myotonic dystrophy (MyD)

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Objectives: Does Modafinil reverse the excessive daytime sleepiness (EDS) seen in many patients with MyD?

Materials and methods: Patients with MyD were recruited from a clinic population following screening with the Epworth Sleepiness Scale (ESS). Patients scoring 10 and above were invited to participate in a randomised double blind crossover trial of Modafinil versus placebo, with four weeks in each arm of the study and a two week washout period. 20 patients were assessed at baseline and during week 3 of each intervention period. The primary outcome measures were ESS and Maintenance of wakefulness Test (MWT).

Results: Sleepiness was not correlated with CTG expansion size. No patient had severe SA. Treatment with Modafinil showed a small and non significant reduction in median ESS. However the median MWT rose nearly 30% on Modafinil (31.7 to 40 minutes, $p = 0.006$). There were no significant adverse effects of the drug in this group of patients.

Conclusions: Selected patients with MyD and EDS may benefit from Modafinil. In MyD the ESS may not measure the sleepiness well, which may have characteristics different from other sleep disorders. Despite the potential for cardiac disease in these patients, the drug had no adverse effect on the 24 hr and 12 lead ECG.

207

Combined radiofrequency volumetric tissue reduction of the tongue base and the soft palate in obstructive sleep apnea

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Objectives: The combination of surgical approaches is a topic of increasing attention in the management of sleep disordered breathing. Aim of the study was to investigate the effects of combined radiofrequency surgery in obstructive sleep apnea (OSA).

Materials and methods: 20 patients with OSA were treated with temperature controlled radiofrequency energy at the tongue base and the soft palate. Postoperative morbidity, functional parameters and subjective results were assessed with questionnaires (visual analogue scales, VAS and Epworth Sleepiness Scale, ESS). Two nights of polysomnography were performed pre- and postoperatively to evaluate treatment success.

Results: 18 patients completed the study. Mean pain scores dropped from 5.3 at day 1 to 0.6 at day 7. Patients returned to solid food after 2 days, complications did not occurr. Daytime sleepiness and subjective snoring improved significantly (ESS: 9.1 to 6.0; VAS: 7.4 to 3.5; $p < 0.05$). Functional parameters were unchanged. Mean Apnea-Hypopnea-Index dropped von 25.3 to 16.7 ($p < 0.05$), 7 out of 18 patients (39%) were cured after a mean of 2.7 treatments.

Conclusions: Combined radiofrequency surgery of the tongue base and the soft palate is safe and effective in the treatment of OSA.

208

The Portable Device Watch-PAT 100 is accurate in detection of respiratory disturbances in stable CPAP users

Sohir Suraya, Ron Peled, Peretz Lavie

Background: The WatchPAT100 (WP100) is a portable device which utilizes the sympathetic tone for the diagnosis of breathing disorders during sleep. Patients on CPAP may have difficulties dealing with the air pressure, which may result in altered sympathetic activation. We sought to examine whether the WP100 is accurate in detecting SDB events in patients on CPAP treatment.

Methods: Twenty-one patients (19 males) with a previous diagnosis of obstructive sleep apnea participated (age 57 ± 12years, BMI 31 ± 7Kg/m^2). All were on CPAP for at least 3 months (range 4–140 months). All underwent in lab full polysomnography (PSG) simultaneously with WP100 recording, while sleeping with their own CPAP. The PSG recordings were blindly scored for apnea/hypopnea according to the American Academy of Sleep Medicine criteria (1999), and the PSG-respiratory disturbance index (PSG-RDI) was calculated. The WP100 data was analyzed automatically for PAT-RDI (PRDI) by an algorithm developed and validated in patients not on CPAP.

Results: Although chronically on CPAP, some of the patients had substantial SDB (mean PSG: 14 ± 12 events/h, range 1–43). Across this wide range of RDI levels, the PRDI was highly correlated with the PSG–RDI ($R = 0.87$, $p < 0.001$). The white-Westbrook agreement between RDI based on the PSG and the WP100 was 85%. Clinical decision of a need to change CPAP pressure was similar in 90% of the patients based on PSG or WP100.

Conclusion: The WP100 device may offer an accurate and useful tool for follow-up of patients with OSA treated with CPAP.

209

Relative Contribution of Home Sleep Time and Sleep Disordered Breathing on Tests of Intelligence in Children

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Objectives: The purpose of this study was to quantify the relative contribution of average sleep time at home (STH) and sleep disordered breathing (SDB) on tests of intelligence.

Materials and methods: We studied 31 children, 6 to 12 years old.; Home sleep time was measured by actigraphy for 6 nights before performing Wechsler intelligence tests on day 7. Polysomnography was performed on the 7th night.; *Results*: STH and AHI were predictors of 2 tests of intelligence, (Vocabulary & Similarities). The fitted model for Vocabulary was: Vocabulary = $-16.6438 + 0.0671 * STH + 26.8833 * Log10(AHI + 1) - 0.0680 * STH * Log10(AHI + 1)$; R-Squared: 52.1%, $p = 0.00015$. An analogous model with comparable predictive performance held for Similarities.; *Conclusion*: There is a close relationship between longer STH and higher scores on tests of general intelligence. This relationship progressively degrades in the presence of increasing degrees of SDB to the point that in subjects with an AHI of ≥ 8.7, increasing sleep time at home is not related to higher scores on intelligence tests. We speculate that SDB impairs sleep quality and that this impairment is not compensated for by increasing sleep time at night. Funded By: HL62401 and MO1RR00847

210

The SleepStrip method as a screening tool for sleep apnea.

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Aim: Compare ambulatory home SleepStrip (SS) recordings to in-laboratory SleepStrip and full-night polysomnographic (PSG) recordings in patients with suspected snoring and/or obstructive sleep apnea (OSAS).

Subjects and methods: Sixteen subjects (median age 48 y, range 32–69 y). Eleven patients had OSAS with AHI ≥ 10. After a home SleepStrip another recording was done in the laboratory combined with simultaneous PSG. The interpretations of the SleepStrip (Sscore) and PSG were done blinded.

Results: Thirteen (81.2%) of the 16 home-recordings were successful. In two cases the Sscore could not be read because of an oxygenation problem, and in one case the system was not activated. When only successful recordings were included the sensitivity was 87.5% and specificity 60%. The positive predictive value was 77.8% and the negative predictive value was 75%. When the unsuccessful recordings ($N = 3$) were considered as negative for sleep apnea the sensitivity was 63.6% and specificity 60%. The

positive predictive value was 77.8% and the negative predictive value was 42.9%. One of the 16 SleepStrip recordings during the PSG was not successful. When the result of this unsuccessful recording was considered as wrong result, the sensitivity was 81.8% and specificity 100%. The positive predictive value was 100% and the negative predictive value was 71.4%.

Conclusions: This study confirms earlier reports (Shochar et al. 2002) according to which SleepStrip is a valid screening tool. Good instructions are needed. The oxygenation problem should be eliminated without need to attach plastic pads.

211

HMPAO rCBF SPECT findings in OSAS patients

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Objectives:.The present study was designed to improve our understanding upon the characteristics of local cerebral perfusion developed by OSAS patients.

Materials and methods: Patients: 39 males, age < 60 yrs., RDI: between 15 and 50, Epworth < 10, htc < 0.5, stroke free patient's history and negative CDS finding, right handedness. Protocol (sleep lab examination, laboratory tests, CDS, CT, HMPAO SPECT) was repeated at the end at each 6-month period.

Results: A. SPECT showed 4 types of regional hypoperfusion: frontal in 17 pts. (in 14 pts. on the right side), right frontoparietal in 11 pts., bifrontal left parietal in 8 pts., left parietal in 1 pt. , normal finding in 3 pts. B. All cases with frontal hypoperfusion (inlcuded right and bifrontal cases) had been completely normalized by effective CPAP treatment . Right parietal hypoperfusion returned to normal in 9 of 11 pts while left parietal remained unchanged in 4 of 9 patients.

Conclusions: Our study proves the early vulnerability of the frontal lobe in OSAS. Frontal rCBF deficits detected by HMPAO SPECT early in the morning, seem to be characteristic of the majority of OSAS pts. and turn to normal in almost all pts. treated with CPAP.

212

Cheyne-Stokes respiration response in a Clinical Sleep Laboratory setting: still a confounding problem

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For all patients with significant cardiac disease (moderate to severe CHF), the incidence of Cheyne-Stokes respiration (CSR) may be 50%. Its frequency appears to range between 2 to 5% of routine sleep disorders patients.

Methods: In this on-going retrospective study, we reviewed the medical setting and follow-up results of PSGs performed over a single one year period with any component of CSR.

Results: From a total of 1353 PSGs, CSR was seen in 22 patients (17 males), 21 (95%) had a cardio-vascular history including CHF (12), right-sided heart failure (1), atrial fibrillation (2), pacemaker/heart valve replacement (1), Coronary Artery Disease or CAD (1), and Hypertension or HTN (4). Of the 15 patients were managed by oxygen therapy, CPAP, and/or BiPAP, CSR was abolished in two of the five treated with oxygen, markedly improved in one, and ineffective in the remaining two. CPAP corrected CSR in 3 out of nine patients. On BiPAP, two were significantly improved, and two were unchanged.

Conclusions: While CSR pathophysiology remains unclear, its management in the clinical lab setting with BiPAP or oxygen may be the most successful treatment modality.

213

Obstructive sleep apnea syndrome in the Åland islands 1996–2002

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Objectives: There was no obstructive sleep apnea diagnostics, specific treatment nor postoperative registrations in the land Islands before 1996 though some uvulopharyngoplastic operations (UPPP) had been performed because of heavy snoring. The success of ambulatory diagnostics and treatment with continuous airway pressure (C-PAP) treatment was studied.

Materials and methods: The patient register maintained for follow-ups of treatment has been analysed in regard to distribution of age, sex, type of masks and equipment used at home at night , separately in mainly OSA and Overlap syndrome.

Results: In pure obstructive sleep apnea (OSAS) C-PAP-treatment could be started successfully on the basis of pulse oximetry though from 1997 on static charge sensitive bed (SCSB) and from1998 Autoset diagnostic and Autoset-T registrations were used even in OSAS post-UPPP. Successful bilevel treatment needs pressure control on SCSB in the pulmonary ward over night(s).The patients with COPD or asthma were usually severely disabled with severe morning airways obstruction, hypertension and cardiac disease, periodic night hypoventilation-hypoxemia and obstructive apnea, which were corrected to satisfactory levels.

Conclusions: Ambulatory registrations are mostly successful in OSAS.-Starting bilevel demands SCSB at the hospital ward.

214

Sleep-disordered breathing and neurocognitive function in children

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Introduction: The association of childhood sleep-disordered breathing (SDB) with deficits in learning, behaviour, concentration and attention is increasingly recognised.

Aim: To describe the polysomnographic and neuropsychological features of children referred for investigation of SDB.

Methods: Full polysomnography (PSG) was performed in otherwise normal children referred for investigation of SDB. Psychological tests in the morning were applied.

Results: 25 females and 34 males with mean age 8.9 ($\pm$ 2.32) years. PSG: mixed and obstructive apnea/ hypopnea index was 3.3 per hour of sleep ($\pm$ 0.4; CI 2.3), range: 0 - 63.5, lowest $SaO_2 = 89.3\%$ ($\pm$ 13.6%,CI 3.5); Intelligence was average(WISC-III DQ), clinically significant deficit in attention/concentration on Conner's questionnaires (parent and teacher) and on independent cognitive testing (Test of Everyday Attention in children); lower auditory verbal short-term memory both for digits (Digit Span) and for more complex material, such as short stories read to them.

Conclusion: Relatively mild SDB in children is associated with clinical deficits in attention, concentration and short-term memory.

215

Obstructive sleep apnea in infants

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Introduction: Obstructive sleep apnea (OSA) is unusual in otherwise healthy infants. Nasal continuous positive airway pressure (nCPAP) can be an effective treatment.

Aim: To describe the polysomnographic features & clinical course of otherwise normal infants presenting with OSA.

Methods: Full polysomnography (PSG) was performed in the 5 identified infants over a 12-month period (January 2002 to January 2003) during which 40 infants under the age of 12 months were studied. EEG, respiratory effort, oronasal airflow & oxyhaemoglobin saturation (SaO_2) were measured.

Results: There were 3 females & 2 males. 3 presented with apparent life-threatening events & 2 with snoring. Mean presenting age was 44 days (range: 9 to 92). Mean number of central apneas per hour (CAI) & obstructive/mixed apneas/hypopneas per hour of sleep (OMAHI) were 9.7 $\pm$ 13.9

(1.3–34) & 12.0 ± 4.5 (6.5–18.1) respectively. Mean lowest SaO_2 was 82 ± 8% (67–88). All 5 infants responded well to nCPAP (mean pressure 4.0 ± 0.3 cm H_2O). Subsequent PSG: CAI & OMAHI were 2.2 ± 2.7 (0–6.2) and 2.1 ± 1.6 (0.1–3.9) respectively. Mean treatment time with nCPAP: 116 days.

Conclusion: Early recognition of otherwise normal infants with OSA allows effective treatment with nCPAP preventing sequelae.

216

Cyclic alternating pattern-dominant obstructive sleep-disordered breathing

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Objectives: To describe a new clinical and polysomnographic obstructive sleep-disordered breathing (OSDB) syndrome.

Materials and methods: A prospective clinical and polysomnographic study of 35 medication-free patients. Sleep scoring used the classic and Cyclic Alternating Pattern systems (CAP). Patterns of respiratory abnormality were tabulated. Patients with overt periodic breathing / central sleep apnea and Cheyne-Stokes respiration, heart failure, renal failure, stroke, or neurologic diseases, were excluded.

Results: A distinct polysomnographic profile emerged, characterized by severe obstructive events during NREM sleep that were relatively mild in REM sleep. Relative to REM-dominant OSDB, patients had a lower body mass index, fewer apneas and a lower hypoxic burden as reflected by frequency and severity of nocturnal oxygen desaturation. During positive pressure titration, a remarkable instability emerged selectively during CAP-NREM sleep, in contrast to near perfect stability during REM sleep. This partial treatment failure was associated with persistent clinical symptoms.

Conclusions: CAP-dominant OSDB is a distinct clinical and polysomnographic syndrome that may reflect a dominant component of respiratory instability and dyscontrol coupled with upper airway obstruction. Its existence questions the conventional practice of calculating global respiratory indices. Measures to promote sleep stability such as oxygen, carbon dioxide or benzodiazepines may be required to optimise therapy.

217

Obstructive sleep Apnea Syndrome and Nocturnal Angina Episodes

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Objective: Study the relationship between obstructive sleep apnea syndrome (OSAS) and nocturnal angina of coronal heart disease (CHD).

Methods: Fifteen patients with CHD were admitted due to frequency nocturnal angina episodes. Nitroglycerin and Isosorbide Dinitrate to treat these patients without positive effects. Then all fifteen patients were confirmed severe OSAS (AHI > 30 , SaO_2 < 80% = by nocturnal Polysomnographs. Fourteen patients were treated with nCPAP (8–12cmH_2O) and one with nBiPAP(IPAP 14cmH_2O, EPAP 9cmH_2O).

Result: All clinical symptoms improved remarkably with the treatment. No heart angina occured again. Nocturnal myocardial ischemia improved significant with Holter of ECG Parameters of PSG changed as follows :Sleep efficiency decreased from 66 ± 13 to 90 ± 7, NREM /IST(%) decreased from 92 ± 8 to 85 ± 9, stage I/TST (%) dropped from 72 ± 9 to 30 ± 14, stage + /TST(%) risen from 5 ± 5 to 15 ± 6. REM/TST(%) increased from 7 ± 7 to 16 ± 16, AHI decreased from 70 ± 20 to 3 ± 3. The lowest SaO_2 (%) changed from 70 ± 10 to 90 ± 4.

Conclusion: There are great relationships between obstructive sleep apnea and ischemia heart disease. nCPAP can eliminated sleep apnea and improve nocturnal angina episodes.

218

Coblation Tonsillectomy: Morbidity and Complications in a Series of 850 cases

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Aims: To compare post-operative pain scores, return to normal diet, and post-operative haemorrhage rates in conventional tonsillectomy and Coblation tonsillectomy patients.

Methods: Two level 1 trials were conducted. The first used ten adults as their own controls, one tonsil being removed by standard dissection, the other by Coblation dissection. Post-operative daily pain levels for each side were compared.

The second compared the daily pain scores of two groups of ten children, one group having standard tonsillectomy, the other having Coblation tonsillectomy. The haemorrhage rates of 850 patients undergoing Coblation tonsillectomy were compared with a similar number of conventional tonsillectomy patients. Paediatric and adult results were analysed separately.

Results: Post-operative pain levels in both adult and children's studies were significantly less in the Coblation patients.

There was no difference in reactionary haemorrhage rates, but secondary haemorrhage rates were significantly lower in the Coblation patients.

Conclusions: Coblation tonsillectomy has significant advantages over conventional methods.

219

Sleep-disordered breathing in morbidly obese patients referred for bariatric surgery

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Introduction: Sleep disordered breathing (SDB) is not extensively studied in morbidly obese patients although if it is recognized and treated could improve health and avoid postoperative complications.

Objective: To evaluate SDB in morbidly obese population referred for bariatric surgery.

Methods: 25 obese patients, (15 female/10 male) evaluated for bariatric surgery underwent clinical and polysomnographic evaluations.

Results: The mean age was 38.9 ± 10 y and BMI of 47.5 ± 6,8 kg/$m^{2.}$ Neck and abdomen circumferences were 43.5 ± 4.3 and 132 ± 17.2 cm, respectively. Daytime sleepiness was present in 48% of the patients. All of them showed snoring. Apnea/hypopnea index (AHI), defined as higher than 5/hour , occurred in 24% of patients, mostly frequent in men (40%) than women (13%). From these patients, 88%, presented air flow limitation characterized by flattened signal of airflow without hypopnea or oxygen desaturation, with mean events overnight of 25.7 ± 23.9. Oxygen desaturation during REM sleep no related to apnea or hypopneas ocurred in 36% of patients. The mean of the minimum O2 saturation was 88.6 ± 4.3 suggesting REM hypoventilation. None of them showed obesity hypoventilation syndrome. Correlation was found for daytime sleepiness and AHI ($r = 0.44$, $p = 0.04$). No associations between BMI and circumferences and AHI were found.

Conclusion: Air flow limitation, REM hypoventilation and sleep apnea were frequently found in these patients referred to bariatric surgery. Sleep evaluation should be considered as a routine exam in this population.

220

Intima Media Thickness (IMT) and Partial Upper Airway Obstruction During Sleep in Premenopausal Women

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Objectives: To study the early markers of atherosclerosis in premenopausal women with sleep-disordered breathing.

Materials and methods: 27 healthy premenopausal women aged 46 years

were recruited for sleep and vascular investigations with advertisement. Partial upper airway obstruction was determined with a static-charge sensitive bed (SCSB). Carotid IMT and brachial artery responses to shear stress and nitroglycerin were measured with ultrasonography.

Results: The frequency of partial upper airway obstruction correlated ($r^2 = 0.1721$, $p = 0.031$) with IMT. Non-significant trends of impairment were observed in endothelium dependent and endothelium independent vasodilatation.

Conclusions: Although premenopausal women are proposed to be protected from cardiovascular disease and sleep-disordered breathing, an association between partial upper airway obstruction and increased IMT can already be observed in 46 years old premenopausal women.

Sponsor: Research Foundation of Orion Corporation, Finland.

221

Undergratuate and postgraduate education in sleep medicine at The Medical Faculty Safarik University, Kosice

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Aims: A Tempus project (1995–1998) allowed introduction of undergraduate education for medical students and organization of postgraduate conferences.

Results: 140 undergraduate students completed facultative courses of sleep medicine during 7 years. About 50 postgraduate lectures were presented at specialized conferences in Slovakia. An ERS sponsored postgraduate conference: "School of Sleep Medicine" was successfully organized in October 2002 for 45 participants from 9 countries of Central Europe. A textbook, Basics of Sleep Medicine (Tomori, Z., Redhammer R., Donic V eds., in slovak), VLA Kosice 1999 was published to support undergraduate and postgraduate education. Establishment of a sleep laboratory in Kosice with full polysomnograph allowed complex investigation of more than 600 adults and children during the last 7 years. As a result CPAP therapy was successfully introduced since 1995 in the country, and during the last two years it is fully reimbursed by national health insurance system. Laboratory allowed intensive multidisciplinary cooperation of 6 PhD students and 5 teachers from various medical disciplines in health care, teaching and research.

Conclusion: The Tempus project substantially improved management of SRBD in Slovakia through retraining of teachers, undergraduate and postgraduate teaching, as well as diagnostic and therapy.

222

Sleep apnea provokes nocturnal cardiac dysrhythmias in adults with and without hypertension and coronary artery disease

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Aims: Prevalence and severity of nocturnal cardiac dysrhythmias (NCD were compared in 6 groups with and without moderate sleep apnea hypopnea syndrome (SAHS), arterial hypertension (AH) or coronary artery disease (CAD).

Methods: 80-adults (AH + SAHS, AH without SAHS, CAD + SAHS, CAD without SAHS, SAHS without cardiovascular pathology (CVP) and healthy subjects underwent complex investigation including PSG.

Results: Apnea/hypopnea events inducing functional changes, increased the number of total and potentially malignant NCD/hour of sleep/person 4 and 20- times in 52 patients compared to controls without SAHS (3.8 ± 7.7: 0.9 ± 2.3/h/p and 0.4 ± 2.3: 0.02 ± 0.09/h/p). Severity of NCD from a 7-grade scale occurred in REM and unstable sleep, and correlated with the apnea hypopnea index- $p < 0.05$ and negatively with the sleep efficacy - $p < 0.02$. CAD and AH characterized by structural echokg changes and positive CV risk factors tended to increase the number and severity of NCD compared to healthy controls (1.4 ± 2.1: 0.2 ± 0.3/h/p, $p = 0.29$ and 1.06 ± 0.26: $0.82 + 0.26$, $p < 0.01$).

Conclusions: Sleep apnea represents a functional risk for provoking more frequent and severe NCD in adults with and without CVP compared to healthy controls. CAD and AH predisposed to NCD against controls without CVP.

223

Mental illness in patients with Sleep Apnea Hypopnea Syndrome and the effect of CPAP therapy

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Sleep Apnea Hypopnea Syndrome (SAHS) influences patients' neuropsychological and cognitive function. The aim of this study was to detect the risk of mental illness in patients with SAHS and the effect of CPAP therapy.

Subjects: The risk of mental illness was ascertained in 134 patients, with various severity of SAHS (AHI $42{,}1 \pm 22{,}3$/h) by the General Health Questionnaire 30 (GHQ Goldberg 1976, validated in Greek), which detects the probability of anxiety, depression, psychosomatic symptoms and social dysfunction, using a cut-off point of 4/5. All patients had normal respiratory function and their daytime sleepiness was estimated with Epworth Sleepiness Scale (ESS: $11{,}2 \pm 5{,}8$). GHQ was answered after CPAP therapy by 22 patients.

Results: GHQ score above 4 ($13{,}5 \pm 8{,}1$) was found in 82 (62%) of patients. There was a positive correlation with ESS at the limits of significance ($r = 0{,}212$, $p < 0{,}58$). After CPAP application there was a significant improvement in ESS (from $13{,}8 \pm 3{,}6$ to $4{,}3 \pm 3{,}6$ $p < 0{,}001$) and a reduction in the GHQ score (from $10{,}13 \pm 9{,}2$, to $3{,}5 \pm 6{,}1$, $p < 0{,}01$).

Conclusions: These data demonstrate that patients with SAHS are at high risk to develop mental illness. This risk seems to be linked with subjective experience of daytime sleepiness and is reduced after CPAP therapy.

224

The Different Apnea-Hypopnea Index (AHI) Calculated According To Different Hypopnea Definitions And Their Relation With The Oxygen Desaturation And Major Symptoms

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The biggest problem in the sleep disordered breathing is caused by the different criteria used in the definitions. Hypopnea is a good example of this issue and there is no consensus in its definition yet. In our study, the diagnosis value of AHI's determined by different hypopnea definitions, is searched in the consequence of OSAS. The 90 patients who applied to our sleep disorders center and has an AHI ≥ 5 by scoring according to the hypopnea definition of the American Academy of Sleep Medicine (AASM), participated in our study. The records of these patients are scored 3 times more according to different hypopnea definitions (hypopnea-arousal, hypopnea-desaturation, hypopnea-effort). AHI_{AASM}, $AHI_{arousal}$, AHI_{desat} ve AHI_{effor} are made via new scorings. The daytime sleepness of the patients is evaluated by Epworth sleepness scale (≥ 10), the difference between the SaO_2 value in daytime wakefulness and the mean of SaO_2 value in night sleep is calculated. In addition to this, when all of three major symptoms which are snoring, witnessed apnea and daytime sleepness are found in the anamnesis, "the clinical OSAS" is diagnosed. In our study; when the Epworth value and SaO_2 difference are compared with all of these 4 index, both the Epworth value and SaO_2 difference are correlated with all of the index. Nonetheless, in the scope of both the determination of the daytime sleepness and the verification of "clinical OSAS" diagnosis, the $AHI_{AASM} = 5$ has the highest sensitivity (%100) and specifity (%94).

225

Anthropometrical and polysomnographic predictors of the efficacy of a thermoplastic mandibular advancement device

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Objective: To investigate whether any polysomnographic or anthropometrical measure could predict treatment success with a 'boil-and-bite' mandibular advancement device (MAD) in a population of heavy snorers (Apnea/Hypopnea-Index (AHI) < 20).

Methods: 36 subjects (7 females, 29 males; age 47.1 ± 11.6 years (mean ± SD); body mass index(BMI) 25.9 ± 3.4 kg/m^2; AHI 6.3 ± 7.0 events per hour sleep) were included. A standard 10 cm visual analogue scale (VAS) (0–10) was used to evaluate snoring as reported by the sleeping partner. The positional dependence of both sleep apnea and snoring was determined by calculating the difference between supine AHI and non-supine AHI (diffAHI) and the difference between percentage snoring time in supine and non-supine position (diff%snor) respectively. Patients were considered responders when still using MAD together with a subjectively evaluated reduction in snoring (VAS ≤ 3). A multiple linear regression analysis was used to determine if AHI, diffAHI, diff%snor, BMI or age were predictors of treatment success.

Results: At follow-up after 0.8 ± 0.4 years, 20 of 36 patients (56 %) were responders. Only a higher BMI was associated with better treatment response ($\beta = 0.545$, $p = 0.019$).

Conclusions: Treatment success with a one-piece, thermoplastic MAD could not be predicted based on supine-dependence of snoring or sleep apnea, AHI or age. Obesity might be a predictor of successful treatment with this type of MAD, rather than supine dependence.

226

Subjective assessment of the effect of a one-piece mandibular advancement device out of thermoplastic material on snoring and daytime sleepiness

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Objective: To prospectively evaluate the efficacy of a one-piece, thermoplastic mandibular advancement device (MAD) in treatment of heavy snorers (Apnea/Hypopnea-index (AHI) < 20) with and without excessive daytime sleepiness (EDS).

Materials and Methods: 36 subjects (29 males; age 47.1 ± 11.6 years (mean ± SD); body mass index(BMI) 25.9 ± 3.4 kg/m^2; AHI 6.3 ± 7.0) were studied. A standard 10 cm visual analogue scale (VAS) (0–10) was used to evaluate snoring as reported by the partner. To assess daytime sleepiness the Epworth Sleepiness Scale (ESS) was employed. VAS and ESS were filled out before and, four weeks and six months after adaptation. Patients were considered responders when still using the device together with a subjectively evaluated reduction in snoring (VAS ≤ 3).

Results: At first control visit, VAS decreased from 9.0 ± 1.2 to 4.0 ± 3.3 ($p < 0.001$) and a significant drop in ESS ($p < 0.002$) is observed from 7.4 ± 4.8 to 5.3 ± 4.7. In six out of 9 patients (67%) reporting EDS (ESS $\geq$ 10/24) at baseline, ESS became $\leq$ 10/24 with MAD. Mid-term findings (VAS 4.2 ± 3.8, ESS 4.2 ± 4.3) indicate a succesfull reduction of VAS ($p < 0.001$) and ESS ($p < 0.001$). Long-term follow-up after 0.8 ± 0.4 years, showed a 56 % responder rate.

Conclusions: Immediate intraoral adaptation of low cost fabricated MAD is a proper treatment for heavy snoring +/−EDS.

227

Myotonometry demonstrates changes in soft palate and genioglossal muscle

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Objectives: We used computerized endopharyngeal myotonometry (CEM) to measure the biomechanical properties of the soft palate (SP) and genioglossal muscle (GL) in patients with OSAS during wakefulness.

Materials and methods: The study included 15 subjects with OSAS: aged 30–70 y; RDI 35.3 ± 9.9 and 10 healthy volunteers: 30–70 y; RDI 1.5 ± 1.2. CEM records and analyses the tissue response after a brief mechanical impact in the central part of the SP and sublingually GL. CEM enabled us to evaluate the parameters of tissue tone - stiffness, which is expressed as a frequency F, and elasticity as a logarithmic decrement Θ of the damped oscillation.

Results: of the CEM measurement of the GL and the soft palate.

	OSAS with patients	Healthy volunteers	I–II (*P*)
F (GL) Hz	14.1 ± 0.7	11.5 ± 0.2	< 0.001*
Θ (GL)	4.0 ± 0.2	2.5 ± 0.2	< 0.001*
F (SP) Hz	13.9 ± 2.29	20.3 ± 4.7	< 0.001*
Θ (SP)	1.6 ± 0.3	1.7 ± 0.8	> 0.05 NS

Conclusions: Such a change in the properties of SP and GL is impossible without neuroregulatory disorders and structural changes in the tissue.

228

Prevalence of obstructive sleep apnea (OSA) and periodic leg movements (PLM) in patients with chronic sarcoidosis

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Objectives: Many sarcoidosis patients suffer from fatigue and sleep disturbances. Recently it was demonstrated that OSA is frequent in patients with sarcoidosis. Periodic leg movements (PLM) are however not well evaluated in these patients. The aim of the present study was to evaluate the prevalence of OSA as well as PLM in chronic sarcoidosis.

Materials and methods: Polysomnography was performed in 46 chronic sarcoidosis patients, indicating awakening unrefreshed in the morning. Criteria for OSA and PLM were apnea/hypopnea index ≥ 5 and PLM-index ≥ 5.

Results: In 20 patients (44%) OSA was demonstrated (60% with PLM, 40% without), while in 7 patients (15%) PLM without OSA was found. In 19 patients (41%) no OSA or PLM was present. In all groups, sleep stage distribution was equal but abnormally high arousal indices were found (not completely explained by OSA or PLM alone).

Conclusions: This study underlines that sleep disorders are a substantial problem in chronic sarcoidosis. Polysomnography is recommended in the check-up of chronic sarcoidosis.

229

New methods of the treatment efficacy evaluation in children with bronchial asthma

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Aim: For an easy therapy evaluation in children with bronchial asthma the polysomnoprogramm has been added to the complex examination of the patients that was spent in the ambulatory medicine department of the Scientific Center of Children's health RAMS.

Materials and methods:: 13 children suffering of bronchial asthma, 4–14 y.o. (average age 7.6 ± 1.2 y.o.) were examined in dynamics . The research was carried out on a computer diagnostic system – laboratories of sleep (SAGURA-SCHLAFLABOR).

Results: At first research 1 girl of 10 years had sleep apnea of a mild degree, and 12 children – insomnia connected with an exacerbation of bronchial asthma, a disadvantage of a REM-stage of sleep, a fragmentation of dream, augmentation of latention time to dream. All patients were treated by anti-inflammatory therapy. Clinical remission or stabilization of patients was archieved within 3–7 days. During the next examination after 4–10

weeks of corticisteroid inhalation treatment, in the disease remission, at the girl with a set of of symptoms apnoae it was marked expressed posotove changes, polysomnogram conformed to age norm. At others 10 children were observed augmentation REM-stage children and demanded follow-up appointed therapy normalizing phase of dream.

Conclusion: Thus, the data polysomnogram can be regarded as padding criteria of an asthma evaluation, and remaining changes demand treatment correction.

230

Supine cephalometric analysis and nasal resistance in snorers

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Aims: To compare upright and supine cephalometric measurements in snorers and to evaluate the effects of mandibular position and nasal resistance on pharyngeal dimensions. Anthropometric, rhino-manometric and cephalometric measurements were used to investigate predictors of apnea-hypopnea index (AHI).

Methods: Forty consecutive habitually snoring men waiting for nasal surgery underwent polysomnography, anterior rhinomano-metry and cephalometric analysis in upright and supine positions.

Results: In stepwise multiple regression analysis the overall patient model explained 68% of the variation in AHI with body mass index as the largest predictor. In the non-obese patients the model explained 86% of variation in AHI with change in antero-posterior position of the lower jaw in upright and supine measurements and combined nasal resistance after mucosal decongestion as independent determinants.

Conclusions: A model including nasal resistance and backward movement of the mandibular position on relaxation had a high predictive power of AHI among non-obese patients. Further reseach on supine cephalometry and relaxed mandibular position may improve prediction of sleep apnea in snorers.

231

Intrathoracic Pressure Profiles Filtered from Whole-Body Impedance Cardiography Signal

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Objectives: To investigate, if adaptive filtering of impedance cardiography signal could be used to estimate intrathoracic pressure profile for monitoring respiratory disturbances during sleep. Earlier work indicates that visual analysis of variations in impedance signal can be used to detect apneas and hypopneas. (Saarelainen et al., Clinical Physiology and Functional Imaging, in press).

Materials and methods: Fourteen patients were recorded using the whole-body impedance cardiography-based circulation monitoring system connected to polysomnography. The apnea-hypopnea index varied between 3–113 /h with a mean of 35 /h. Filtering was used to remove cardiac components from the impedance signal leaving waveforms similar to intrathoracic pressure changes during breathing.

Results: Low-pass filtering removed important high-frequency variations of the signal, while adaptive filtering removed only the cardiac component. Filtered profiles were compared to nasal pressure profiles during normal breathing, hypopneas and apneas.

Conclusions: Filtering the impedance signal could provide useful respiratory parameters especially when an esophageal or nasal pressure sensor cannot be used.

232

Lipid status, cardiovascular disease, and sleep-disordered breathing during five years in postmenopausal women

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Objectives: To study the relationship between markers and risk factors of cardiovascular disease (CVD) and sleep-disordered breathing (SDB) in postmenopausal women.

Materials and methods: Sixty-four initially healthy postmenopausal women were studied in a sleep laboratory at five years' interval. BMI, lipid status and SaO_2 were determined at both occasions. AHI and the risk factors and markers of CVD including hypertension were recorded at follow-up.

Results: The baseline and follow-up mean and minimum SaO_2 and the follow-up AHI were similar in healthy ($n = 45$), hypertensive ($n = 13$) and other CVD subjects ($n = 7$). Baseline HDL cholesterol correlated with mean follow-up SaO_2 ($r = 0.28$, $p < 0.05$), and follow-up HDL cholesterol with mean baseline SaO_2 ($r = 0.42$, $p < 0.001$). Baseline triglycerides inversely correlated with baseline SaO_2 ($r = -0.36$, $p < 0.01$). The correlations were unrelated to age, BMI, AHI, or serum oestradiol ($S\text{-}E_2$) levels.

Conclusions: AHI did not predict CVD. Decreased HDL cholesterol and increased triglycerides were associated with lower mean nocturnal SaO_2 independently of AHI and $S\text{-}E_2$ levels, suggesting that nonapnoeic SDB could contribute to lipid abnormalities which associate with CVD.

233

Chronic hypoxia in infants with univentricular heart does not affect postural heart rate or blood pressure responses during sleep

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Aims: It has been shown that infants who have suffered an apparent life-threatening event (ALTE) and who have obstructive sleep apnea (OSA) have abnormal heart rate (HR) and blood pressure (BP) responses to 45° heap-up tilt in NREM sleep. We studied infants with univentricular heart failure (UVH) to evaluate the effects of chronic hypoxia on HR and BP responses during tilt, and to evaluate whether hypoxia could explain abnormal HR and BP responses in OSA infants with ALTE.

Methods: 45° heap-up tilt tests were performed during PSG in NREM and REM sleep. BP was measured by using Finapres with the measuring cuff around the infant's wrist. Five infants with UVH and 5 control infants were studied at the age of 2–6 months. Only tilt tests without arousal were included in the analysis.

Results: Sleep quality of infants with UVH was normal. Chronic hypoxia did not interfere with REM sleep. HR and BP responses to 45° heap-up tilt did not differ significantly from the response observed in normal controls.

Conclusions: Chronic hypoxia observed in infants with UVH does not significantly affect sleep quality or baroreflex activity.

234

Three Faces of Radio Frequency Surgery (4 MHz –Technique) in snoring and sleep apnea: Radiotonsillotomy, Submucosal Tissue Reduction and Radiofrequency Assisted Uvulopalatopharyngoplasty (SRUP and RAUP)

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Objectives: Introducing indications and results of radiotonsillotomy in small children and demonstration of a combined surgical approach for correction of the soft palate.

Materials and methods: The reduction of tonsillar tissue by CO2-laser combined with adenectomy has been proofed as effective method to preserve the immunologic function of the tonsils and to widen the pharyngeal space. Histological studies show, that identical results can be obtained by using the patented 4 MHz-RF-tonsillotomy (Ellman Surgitron Dual Frequency). The combination of the submucosal reduction of tissue in

the soft palate ("somnoplasty) with the reduction of "webbing" tissue at the lower border is more effective then the somnoplasty alone

Results: The results of both methods are discussed in samples of 35 resp.39 patients. The new procedure of radiotonsillotomy is a very reliable procedure with low risks, which can be carried out as an outpatient procedure.

Conclusions: The versitility of the Radiofrequency and the adaptability to different tasks leads to very good results and is a cost effective method of high and increasing clinical impact.

235

High Resolution Rhinomanometry (HRR): basement for a the functional rhinological diagnosis in snoring and OSAS

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Objectives: The purpose is the introduction of a new and portable rhinomanometer for sleep studies and the introduction of new parameters for the evaluation of the nasal obstruction.

Materials and methods: The patency of the nasal air stream is an essential precondition for the further treatment of snoring and sleep apnea. However, the success of surgery of the nose towards snoring is not predictable. By means of HRR a reliable differentiation between diseases of the nasal mucosa or the skeleton can be obtained. Following the diagnosis either radiofrequency surgery of the turbinates and/or septoplasty can be carried out to improve snoring or the nightly ventilation of the nose or to achieve a sufficient patency of the nose before providing the patient with CPAP-ventilation.

Up to now, it was impossible to carry out rhinomanometry as a bed-side-method because of the size and weight of the instruments.

The new HRR2-unit (RhinoLab, Germany), because of its movability, allows to measure the patency of the nose in the patients domestic environment.

The techniques of HRR as well of the radiofrequency turbinotomy by a bipolar 4 MHz-technique (Ellman Surgitron) are demonstrated in video-spots.

236

Ambulatory Polysomnography in the Elderly.

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Objectives: we investigated the feasibility of ambulatory poly-somnography in an unselected population of elderly persons. The incidence of OSAS, PLMD and insomnia was evaluated.

Materials and methods: 10 males en 8 females (70 ± 6 years old) underwent 2 consecutive full polysomnography studies overnight with an ambulatory polysomnograph (Sleepwalker, Sensormedics). The nights were analysed by two experienced sleeptechnicians independently.

Results: on a total of 36 nights, 34 registrations were obtained as 2 persons refused a second registration. Only 1 sleepstudy was technically of poor quality.

Sleeplatency, sleepefficiency and total sleep time were not significantly different between the two nights (Wilcoxon Signed Rank Test, $p \geq 0.05$).

The diagnosis of unsuspected (subclinically) PLMD, OSA(S) and insomnia was high.

Conclusions: ambulatory polysomnography is feasible in elderly patients. The registration of only one night is in elderly sufficient in nearly all patients to obtain a correct diagnosis. The prevalence of insomnia, (sub)clinical OSAS and PLMD in the elderly is high!

237

A case- control study of erythrocytosis caused by obstructive sleep apnoea/hypoventilation syndrome

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Objective: To investigate clinical characteristic and to determine the predictor of obstructive sleep apnoea/hypoventilation syndrome (OSAHS) patients with erythrocytosis.

Methods: By case-control, 1:3 matching by age, sex, apnea /hypoventilation index (AHI) and weigh index, OSAHS patients with and without erythrocytosis were compared in clinical characteristic and predictors were retrospectively analyzed.

Results: (1) erythrocytosis were found in severe patients with AHI $\geq$ 40/h. In 42 patients with erythrocytosis, only 4 secondary plycythemia was confirmed. Thirty-six patients were relative erythrocytosis (Gaisböck syndrome). (2) multiple logistic regression analysis indicated hypertension, sex, AHI $\geq$ 40/h and stroke were predictors of erythrocytosis. (3)erythrocytosis were improved rapidly by therapeutic nCPAP.

Conclusion: Second polycythemia is a rare disorder but Gaisböck syndrome is more common in patients with OSAHS, which can be improved easily by nCPAP treatment.. Hypotension, being male and AHI $\geq$ 40/h are independent risk factor for erythrocytosis. The stroke increased among the erythrocytosis populations.

238

Multiple areas Associated Surgeries at Primary Therapy for Obstructive Sleep Apnea Hypopnea Syndrome

Jian Wang, Shangying Shen, Xiuyun Zhao

Objective: Performing associated surgery at primary therapy for the patients with Obstructive Sleep Apnea Hypopnea Syndrome (OSAHS) who have multilevel collapse and narrow at nasal cavity, retropalatal region (RP), retroglossal region (RG) and epiglottal region (EPG).

Study design: After the regions of the upper airway–the nasal cavity – the retropalatal– retroglossal–and epiglottal –had been diagnosed we performed associated surgeries at primary therapy.

Methods: We describe our experience with associated surgeries in 7 patients with a mean age of $46.7+/-9.0$ years and body mass index of $28.3+/-5.1 kg/m^2$. Underwent nasopharyngoscopy with Muller maneuver and cephalometric parameters before surgery for patients with obstructive sleep apnea hypopnea syndrme. Operations including partial turbinectomy (1 case), submucous resection of nasal septal (2 cases), advancement genioplasty, and genioglossus advancement (2 cases), hyoid myotomy and suspension (6 cases), partial resection of tongue via neck (4 cases), partial epiglottidectomy (1 case), palatopharyngoplasty (7 cases), preventive tracheotomy (5 cases). Every patient was performed 2 to 7 surgeries at primary therapy.

Results: Response to treatment was defined as a postoperative respiratory disturbance index (RDI) reduce $\geq$ 50%. The mean apnea index decreased from 44.3 to 7.6, RDI decreased from 49.4 to 13.4, and lowest oxygen saturation increased from 56.4% to 74.7%. RDI in responders decreased from 252 to 3. The surgical success rate in this group of patients was 86 % (6/7cases) when commonly accepted criteria were applied.

Conclusion: The patients who have been marked with OSAHS multilevel collapse and narrow at nasal cavity, retropalatal region, retriglossal region and epiglottal region may perform associated surgeries at primary therapy. It can reduce the spirit press, the pain, the times of treatment and the economy payment of patient.

239

Three-dimensional CT scan for upper airway evaluation of OSA

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Objectives: To investigate the correlation between upper airway three-dimensional computed tomography (3-D CT) measurements and polysomnogrphy (PSG) data of patients with SDB; furthermore, to apply CT infor-

mation in the management of patients with OSA, who are likely to benefit from surgical treatment.

Materials and methods: One hundred and ninety-four patients with SDB were enrolled. All received CT scan of the upper airway in awake condition and standard overnight PSG. We collect some 2-D and 3-D CT measurements, such as retropalatal (RP) and retroglossal spaces, anteroposterior and lateral dimensions (LAT) of retropalatal spaces, and correlated them with the PSG parameters, such as respiratory distress index (RDI).

Results: Retropalatal narrowing was the most relevant parameter in contribution of upper airway obstruction in subjects with OSA. RP values correlated inversely with RDI. LAT values correlated with RDI in overweight individuals with OSA.

Conclusions: CT measurements (RP, LAT) correlate with PSG (RDI). 3D-CT images and measurements may be helpful in the selection process of OSA patients who are likely to benefit from surgical treatment and can be applied to tailor modifications in upper airway surgery for individual patients.

240

Evidence for differential sleepiness in OSA

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Objectives: The purpose of this presentation will be to discuss the concept of differential vulnerability to daytime sleepiness in the sleep apnea population. The extent to which sleepiness is a characteristic of this population and the best method of measuring daytime sleepiness remains undetermined. Previous studies have documented the absence of daytime sleepiness, even in more severe patients. It is unclear the proportion of OSA patients who do not manifest sleepiness both objectively and subjectively and therefore would not be candidates for treatment based on the current treatment criteria.

Materials and methods: Data from a multisite study will be presented describing the profile of sleepiness in a group of subjects with moderate/severe sleep apnea.

Results: Approximately 40% of the subjects manifested sleepiness both subjectively and objectively, 17% of the sample failed to manifest any sleepiness measured either subjectively or objectively, and 34% displayed discordant sleepiness.

Conclusions: A sizeable proportion of patients does not manifest sleepiness measured either subjectively or objectively. This raises the issue whether sleepiness should be the basis for treatment decisions, especially in the presence of discordant responses and whether those who do not manifest sleepiness both subjectively and objectively should be candidates for treatment.

241

How much is enough CPAP?

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Objectives: The purpose of this seminar presentation is to discuss the relationship between positive treatment outcomes and duration of CPAP use. The few studies that have examined differences in outcomes relative to duration of CPAP use in which used either the median as a cut point to discern effective versus non-effective duration or arbitrary categories of duration of use will be reviewed.

Materials and methods: Data from a multisite study will be presented that determined the minimum duration of use, or "dose", necessary to restore normal performance in individuals who presented with abnormal pre-treatment value. 159 subjects recruited from 6 sleep centers participated in the study. Outcome data was collected pre- and 3 m post-treatment. Probit analysis was used to determine the nightly hourly duration required to achieve normal outcome values in subjects with abnormal pre-treatment values.

Results: Use $\geq$ 6 h per night are estimated to be required for 70% of the sample to achieve a normal Epworth Sleepiness Scale and Functional Outcomes of Sleep scores. Greater than 6.1 h per night are estimated to be required to achieve a 0.50 probability of a Multiple sleep Latency Test (MSLT) $\geq$ 7 min. among patients with MSLT $<$ 7 min pre-treatment.

Conclusions: These data suggest that CPAP should be used $\geq$ 6 h every night to restore normal functioning in OSA patients.

242

Injection Snoreplasty: Rationale, Indications, technique and outcomes

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Objectives: To review the evolution and rationale for Injection Snoreplasty (IS) a relatively new procedure for the treatment of snoring. Patient selection criteria and outcomes are presented utilizing a cohort of 20 patients.

Material and Methods: The concept of Injection Snoreplasty was recently introduced by two of the authors (SB, EM) as a minimally invasive, cost effective treatment for the control of snoring. Pertinent details of the procedure will be presented including patient selection. A cohort of 20 IS patients was objectively evaluated using acoustic analysis of snoring. The patients were also queried regarding their subjective assessment of outcomes.

Results: Objective analysis found significant reduction in the incidence and loudness of palatal snoring. Satisfactory subjective reduction of snoring was reported by 80% of patients queried 6 to 12 months post treatment. Pretreatment objective snoring analysis was correlated to outcomes.

Conclusions: Injection Snoreplasty is an effective procedure for controlling snoring. Acoustic analysis can objectively document snoring reduction and may provide prediction criteria to aid in patient selection.

243

Incidence of Sleep Apnea in Children Referred for Sleep Testing by Otolaryngologists

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Objectives: The goal of this study was to determine the incidence of sleep related breathing disturbances in children referred for sleep testing by otolaryngologists.

Methods and Materials: A sequential cohort of 436 children referred for sleep testing by a diverse group of Otolaryngologists was analysed. All children completed home sleep testing including acoustic analysis of oronasal respiration, snoring analysis and pulse oximetry. Included were 436 children including 199 females and 237 males ranging in age from 2 to 12 (mean 6.9) years of age.

Results: Snoring was documented in 96% of the children. Using criteria of Apnea/Hypopnea Indices of 2 ,5 and 10 the incidence of sleep apnea was 69%, 47% and 22% respectively. Utilizing the apnea index alone, using the same criteria of 2, 5 and 10, yielded incidences of 26.6%, 11.9% and 6%. Correlation of these with desaturation indices was significant.

Conclusions: The incidence of sleep apnea and particularly severe sleep apnea in this population of children with the presumptive diagnosis of adeno-tonsillar hypertrophy is greater than previously reported. The predominant contribution to the AHI in this group of children was hypopneas. This suggests that testing of children with this diagnosis should be tested for sleep apnea and that given the high incidence of severe sleep apnea, post treatment testing is suggested to ensure complete resolution of apnea.

244

Cardiac Arousal in different age patients of sleep-disordered breathing

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Objectives: To study whether cardiac arousal at the termination of apnea/hypopnea are related to aging.

Methods: Apnea index (AI), hypopnea index (HI), apnea/hypopnea index (AHI), sleep stage ,the amount of time during which nocturnal oxygen saturation was decreased below 90%(ODT), and cardiac arousal at the apnea/hypopnea were evaluated in 32 cases of middle-aged and 28 cases of elderly patients by using polysomnography

Results: (1)The radio of apnea/hypopnea with cardiac arousal was significantly lower in elderly than in middle-aged patients. (2)The ratio of HI to AHI was significantly higher in elderly than in middle-aged patients. (3) In middle-aged patients, cardiac arousal were significantly correlated with AI, AHI, and ODT, whereas, in elderly patients, these parameters were not similarly correlated.

Conclusions: The differences in cardiac arousal and the pattern of sleep-disordered breathing are related to aging.

245

Mortality of SDB After Stroke: 5 Year-Follow-Up

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Objectives: The prevalence of sleep apnea in stroke patients is high, but data on mortality are lacking.

Materials and methods: 90 stroke patients (61 men, 29 women, age 63 ± 8.0 yrs, BMI 27 ± 3.7 kg/m^2), in whom full polysomnography was performed during rehabilitation, were divided in three groups (A: RDI < 5, B: $5 \leq$ RDI < 20, C: RDI ≥ 20), matched for age, gender, and BMI. There was no special treatment for SDB. Patients with RDI ≥ 20 declined CPAP or were asymptomatic. Follow-up was by telephone contact. The mean observation time was 4.8 ± 1.5 years (overall 420 patient years).

Results: 2 patients were lost to follow up (one each in group A and group C). There was no difference in mortality between the groups.

Group	Observation time (months)	Deaths
A	57 ± 18.8	6
B	59 ± 17.4	4
C	55 ± 16.5	5

Conclusions: Sleep disordered breathing diagnosed in rehabilitation after stroke is not associated with a higher mortality within 5 years.

246

Effects of AutoSet in OSA and Stroke: First Results of a Randomized Controlled Trial (RCT)

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Objectives: To analyze the effects of automatic CPAP (AutoSet T®) on polysomnographic parameters of OSA in stroke patients.

Materials and methods: In an ongoing RCT, stroke patients with OSA (RDI $\geq$ 15/h) are titrated with AutoSet T and then randomly assigned to effective vs. Sham-CPAP. PSG is performed for diagnosis, during the first night and after 6 weeks of verum or placebo CPAP treatment.

Results: 20 stroke patients with OSA (RDI $= 55 \pm 21.4$/h) have been included and 17 completed the 6 weeks trial. During first night titration ($n = 20$) the RDI was reduced to 9 ± 11.3/h. After 6 weeks of treatment the RDI was reduced to 7 ± 6.3/h in the verum group ($n = 9$, $p < 0.001$ vs. baseline) and changed only slightly in the sham group (36 ± 21.7/h, $n = 8$, $p = 0.015$ vs. baseline). The difference in change between verum and placebo was significant (ΔRDI -53 vs. -18/h, $p = 0.004$).

Conclusions: AutoSet T is an effective and feasible treatment of OSA in stroke patients. There is a tendency for spontaneous improvement of sleep-disordered breathing after stroke.

247

CPAP Outcomes Stratified on CPAP Use

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Objectives: The relationship between the amount of CPAP use and outcome has not been well defined. We sought to define the CPAP benefit on outcome after stratifying for objectively measured use in mild-moderate obstructive sleep apnea patients.

Methods: 30 subjects with newly diagnosed mild-moderate sleep apnea received 8 weeks CPAP therapy. Pressure-on recorders stratified users and non-users (≥ 4 hrs/night AND ≥ 5 nights/wk average versus not). Improvement in sleep-apnea-specific quality of life (SNORE25 and FOSQ) and slowest reaction time (SRT) were compared between users and non-users.

Results: 24 subjects (80%) completed outcome measures, 9 (30%) were users (6.1 ± 1.3 hrs/night & 6.3 ± 0.8 nights/wk), and 15 (50%) were non-users (3.1 ± 2.3 hrs/night & 2.7 ± 2.2 nights/wk). There was no difference in CPAP pressure (8.4 ± 1.2 v 7.6 ± 1.8 cm H2O, $p = 0.24$) or apnea-hypopnea index on CPAP (5.1 ± 2.1 v 4.6 ± 2.9 events/hr, $p = 0.62$). Users had greater improvement in quality of life but not in slowest reaction time compared to non-users (SNORE25: 0.61 ± 0.65 v 0.12 ± 0.35, $p = 0.03$; FOSQ: 2.6 ± 2.4 v 1.0 ± 1.8, $p = 0.06$; SRT -44 ± 75 v 43 ± 75 msec, $p = 0.96$).

Conclusions: In our mild-moderate sleep apnea patients, quality of life improvement depended on adequate CPAP use but reaction time improvement did not.

248

Outcomes of Non-Attended Home Autosetting CPAP Titration

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Objective: Automated adjusting CPAP devices both treat and self-titrate applied pressure for obstructive sleep apnea (OSA). The effectiveness using automated CPAP non-attended home titration in mild or moderate OSAS (apnea hypopnea index (AHI) < 30 events/hr.) is assessed

Methods: CPAP subgroup analysis of a multi-center randomized, placebo-controlled trial comparing CPAP ($n = 30$), and radiofrequency treatment ($n = 30$) to a surgical sham-placebo ($n = 30$) using intention-to-treat analysis was performed. Non-attended home titration was performed using Autoset T (Resmed, Poway,CA) for 2–3 nights with subsequent fixed CPAP applied at the 95% auto-setting pressure. Baseline and two month outcomes (Functional outcomes sleep quality of life (FOSQ), Symptoms of nocturnal obstruction and related events (SNORE 25), Epworth sleepiness scale (ESS), AHI, objective CPAP use, and vigilance testing were assessed.

Results: AHI decreased from 19.8 (9.9) to 4.6 (2.7) events/hr. Objective utilization for the entire group was 4.2 (2.5) hr/night and 4.0 (2.5) nights/wk. Compared to pre-treatment baseline, CPAP improved QOL and sleepiness (FOSQ, 1.5 (2.1) SNORE, -0.3 (0.52), and ESS, -3.0 (5.8), all $p < 0.05$) and QOL when compared to sham placebo (FOSQ, 1.2 (95% CI 0.1–2.3)).

Conclusion: CPAP improved QOL for mild-moderate OSA patients using an algorithm of non-attended home titration.

249

Computer-aid designed Surgical treatment of the Obese patients with OSAHS

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Objective: To enhance the efficiency of UPPP and to obtain ideal post-op profile of Obese patients with severe OSAHS, as well as reduce the surgical complications.

Methods: 1.the craniomaxillofacial profile and upper airway space as well as dimension of the patients were evaluated by using our computer-aid cephalometric analysis system. And then patients were asked to sound continuously /i/ and taken the X film to find the palatopharyngeal closure point, the distance from the point to the top of uvula were measured to design how to cut the soft palate. 2. the surgical procedure is gained using computer-aid simulated system to enlarge upper airway enough and obtain a good post-op profile. The post-op results of PSG, cephalometric analysis and evaluation of speech were compared with pre-operate'.

Results: 85.29 percent of patients had a good response to the procedure. Their sleep-related breathing disorders were relieved and there are no remarkable different in all patients' speech pro-and post-operately.

Conclusions: it is key for us to master the quantity of removal of soft palate when UPPP is performed, and it is clear that UPPP only relieved the obstruct in the level of oropharynx. It will pay attention to the surgical procedure for the oriental obese patients with severe OSAHS that need bi-maxillary advancement.

Keywords: OSAHS, Computer-aid, UPPP, Bi-maxillary advancement

250

Autonomic Arousals detected by Pulse Transit Time distinctly differentiate OSA Patients

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Objective: Pulse transit time (PTT) can be used as a measure of autonomic arousals. However standard parameters of PTT-arousals and the sensitivity and specificity of detection have to be established. we present results from 25 patients to determine the parameters of PTT-arousals.

Materials and methods: 25 males who were referred to a sleep clinic with suspicion of OSAS. AHI, ODI and LMI were calculated. PTT-arousal Index (PTTI) with 4 different settings Baseline of 5 seconds, decrease of 5 or 10 milliseconds; Baseline of 10 seconds, decrease of 5 or 10 milliseconds. Groups were created based on AHI $= <$ or $\geq$ 5. ROC curves calculated.

Results: The Receiver Operating Characteristic (ROC) was determined to evaluate the classification of patients by PTT-arousals. Different thresholds of PTT-arousal index were used to determine the true- and false-positives. PTT-arousals differentiate OSAS from a fairly mixed group of non-patients and patients ranging from mild to severe.

A population divided into 2 groups based on an AHI greater or smaller than 5 also shows a difference in PTT-arousals. The correlation of PTT-arousal index with the AHI or ODI is high.

Conclusions: The ROC characteristics show that the PTT-arousals with a parameter of 10 seconds baseline and 10 milliseconds decrease ($PTTI_{10-10}$) have very good sensitivity and specificity. A large study is in progress to determine the validity of these findings.

251

Determing the site of airway obstruction in obstructive sleep apnea with airway pressure monitoring

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Objectives: To determine the site(s) of upper airway obstruction in obstructive sleep apnea with airway pressure monitoring.

Methods: Twenty patients with obstructive sleep apnea underwent complete polysomnography and simultaneous upper airway pressure monitoring with a custom-made, soft silicone-covered catheter measuring 1.9mm in diameter. The catheter had three solid-state ultraminiature sensors located at tip of the uvula, base of the tongue and midesophagus. The site(s) of airway obstruction was determined by changes in pressure patterns between transducers.

Results: Obstruction occurred associated with disappearing inspiratory pressure above the site of obstruction. Two patterns of obstruction were observed. In 3 of the 20 patients, airway obstruction was located at velopharyngeal region. 17 patients had obstruction in velopharyngeal and hypopharyngeal region.

Conclusions: Airway pressure monitoring can objectively identify the level of airway obstruction during sleep. It is beneficial for diagnosis and treatment of obstructive sleep apnea.

252

Computer Assisting Fiberoptic Pharyngoscopy in Obstructive Sleep Syndrome

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Objective: Evaluating whether preoperative Computer assisting fiberoptic pharyngocopy with müller's maneuver(CFPMM.) could be used to establish a subgroup of obstructive sleep apnea syndrom (OSAS) patients with better outcome after Uvulopalatopharyngoplasty(UPPP).

Materials and methods: (1) 55 patients who underwent UPPP were divided into two groups based on the findings of preoperative CFPMM: group 1(35 patients) had obstruction in the velopharynx only and group 2 (20 patients) had obstruction of velopharynx and base of tongue-pharynx complex. (2)Surgical success was defined using a conventional definition ($\geq$ 50% reduction in the apnea plus hypopnea index). (3) All patient had been taken CFPMM examination at preoperation and 6 months after operation. And the correlation between the changes of pharyngeal apertures and outcome of UPPP assessed by PSG were analysed.

Result: Both groups had a significant improvement in their AHI. The success rate was significantly higher in patients with velopharyngeal only compared with patients with additional obstruction of the tongue-pharynx complex.(68.75 vs 25%).

Conclusions: (1) CFPMM is able to measure and calculate UA's cross-section area and collapsibility of the OSAS correctly, evaluating the site of obstruction. (2) Computer assisting fiberoptic pharyngocopy with müller's maneuver may help establish a subgroup of OSAS patients with greater likelihood of successful UPPP.

253

Therapeutic effect of oral appliance for sleep apnea syndrome differs with sleep position

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Aims: This study evaluated the effect of sleep posture on oral appliance therapy to elucidate the difference of response.

Methods: Seventy-two patients with sleep apnea syndrome were studied polysomnographically before and after insertion of the device. The patients were classified into three groups; supine, lateral and prone groups, according to the position in which apneas were most frequently observed.

Results: The mean apnea-hypopnea index (AHI) before treatment (43.0) was significantly decreased after insertion of the appliance (21.6). The device decreased the mean AHI significantly from 29.8 to 11.3 in the supine

position and 5.5 to 1.6 in the prone position, and increased, but not significantly, from 7.7 to 8.7 in the lateral posture. Responders defined by AHI < 10 accounted for 61.4 % in the supine group, 0 % in the lateral group and 84.6 % in the prone group. Responders defined by a 50 % drop in AHI accounted for 84.1 %, 6.7 %, and 46.7 %, respectively.

Conclusions: The effectiveness of oral appliance therapy is greatly influenced by sleep posture. Sleep posture recorded by polysomnography may be useful to predict the future success of the device.

254

Effect of sleep fragmentation on the arousal responses to inspiratory loading in non-REM and REM sleep in normal men

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Objectives: Does sleep fragmentation attenuate the known brisk arousal response to resistive loading during REM sleep in normals?

Materials and methods: In 16 subjects 2 blocks (separated ≥ 1 week) of 3 polysomnographies were performed randomly. Loading nights (LN) followed either 2 undisturbed control nights (CN) or 2 acoustically fragmented nights (FN). During LN an inspiratory resistance was added via a valved face mask every 2 min during sleep and turned off when arousal (A) occurred or after 2 min when no A (NA) occurred. Arousal was defined as a return of alpha or theta rhythm for ≥ 3 sec (with an increase in EMG tone in REM).

Results: Both after 2 CN ($p < 0.05$) and after 2 FN ($p < 0.05$) the added resistance aroused the subjects more often and faster from REM sleep (11A/5NA; 11A/5NA; mean/subject)(36s; 43s) than from stage 2 (15A/24NA; 12A/30NA)(45s; 49s) and from stage 3/4 (2A/13NA; 3A/16NA)(55s; 54s). The ratio A/(A + NA) after FN was lower than after CN for LN (pooled all-night data; 34%; 40%; $p < 0.05$) and stage 2 (29%; 38%; $p < 0.05$), but not for 3/4 or REM.

Conclusions: Acoustic sleep fragmentation attenuates the arousal response to inspiratory resistive loading in stage 2. After sleep fragmentation the arousal response to loading remains best and unimpaired in REM sleep.

255

EEG spectral analysis: respiratory induced sleep EEG-changes in healthy young subjects

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Objectives: To use spectral analysis (Fast Fourier Transformation, FFT) as a tool to investigate respiratory induced EEG-changes.

Methods: In 16 healthy men 2 undisturbed nights (UN) with sham loading and 2 nights with repetitive respiratory loading (LN) were analysed. An FFT of the sleep EEG was performed for 9 frequency bands. An EEG-change was defined as a 2SD power change during intervention (2min) compared to 2min before intervention.

Results: EEG-changes occurred in 82–90% of all interventions in LN and UN. LN: EEG-changes occurred significantly earlier in the frequencies ≥ 9 Hz in stage 2 (except for 13 Hz) and REM sleep.

In slow wave sleep (SWS) the changes were significantly delayed in high alpha (Fig. 1).

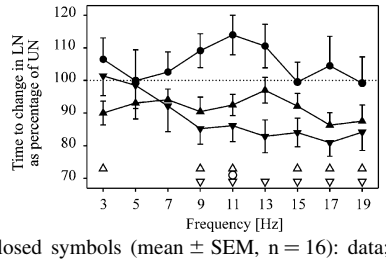

Fig. 1: Closed symbols (mean ± SEM, $n = 16$): data; open symbols: $p < 0.05$ (paired t-test); • SWS; 5, stage 2; 6, REM.

Conclusions: FFT analysis confirms that respiratory induced arousals occur fastest in REM sleep. In addition it shows not only different timing, but also that changes occur in different frequency bands in stage 2, SWS and REM sleep.

256

Systematic head and neck physical examination: comparison between OSA patients and non-apneic patients (preliminary results)

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Aims: the purpose of this study was to apply a systematic head and neck physical examination, developed to evaluate patients with sleep apnea, in non-apneic adult patients.

Methods: a group of non-apneic patients ($n = 70$) from an insomnia ambulatory were enrolled in this study. Exclusion criteria comprised: patients with AHI ≥ 5 and frequent snore. Physical examination evaluated pharyngeal soft tissue, facial skeleton, anterior rhinoscopy and BMI. All physical findings were compare with a group of OSA patients ($n = 223$) previously studied (paper submitted to The Laryngoscope Journal).

Results: all facial skeletal alterations are more frequent in OSA patients; majority of non-apneic patients are Mallampati class I-II, as well, the majority of OSA patients are class III-IV; none of non-apneic patients have tonsils degree III or IV; palate (thick, posterior) and uvula (thick, long) alterations are more frequent in OSA patients; according to mean BMI, non-apneic aren't obese and OSA patients are obese. No statistical difference was observed in rhinoscopy, webbed-palate, previous tonsillectomy and tongue volume.

Conclusions: the systematic head and neck physical examination observed differences between non-apneic and OSA patients considering both skeletal and soft tissue alterations. BMI and modified Mallampati classification that are related to both presence and severity of OSA, have different expression in non-apneic patients. Specific anatomical alterations may be useful to identify patients with sleep apnea.

257

Upper airway surgery to improve CPAP titration level in patients with obstructive sleep apnea

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Aims: The purpose of this study was to analyze the effect of nasal and pharynx surgical treatment in reduce CPAP titration levels.

Methods: OSA patients with high CPAP pressure or nasal discomfort during CPAP titration were enrolled. All patients were treated by a surgical procedure to correct nasal or pharynx anatomical restrictions. The upper airway was the focus of surgical treatment and the assessed abnormalities were deviated septum, hypertrophied turbinate and hypertrophied tonsil.

Results: 17 patients were included with a mean age of 49 ± 9, body mass index of 30 ± 4 kg/m^2 and a mean AHI of 38 ± 19. The performed surgery were radiofrequency volumetric reduction of inferior turbinate in 8 patients; septoplasty in 1 patient; septoplasty with inferior turbinectomy in 2 patients; septoplasty with inferior turbinate submucosal diathermy in 2 patients; septoplasty with tonsillectomy in 2 patients, septoplasty with inferior turbinate submucosal diathermy and tonsillectomy in 1 patient; and tonsillectomy in 1 patient. Polysomnography before and after surgery reveled: CPAP pressure of 12.4 ± 2.5 cmH_2O and 10.2 ± 2.2 cmH_2O ($p = 0{,}001$). The maximum CPAP pressure was 16.4 cmH_2O before surgery and 13 cmH_2O after that. It was observed a pressure decrease in 76.5% of patients (13/17).

Conclusions: surgical treatment to promote better upper airway permeability in patients with nasal or pharynx anatomical abnormalities has significant benefit by reducing nasal CPAP pressure levels during titration.

258

Blood pressure and skin circulatory response after antihypertensive treatment in OSA patients

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Objective: To compare the effect of Doxazosin (DO, an α-receptor inhibitor) and Enalapril (EN, an ACE inhibitor) on blood pressure (BP) and apnea induced digital skin vasoconstriction in hypertensive OSA patients

Methods: Double-blind cross-over study of DO and EN (8 and 20 mg o.d. for two weeks, respectively) in 14 hypertensive OSA patients. 24-hour ambulatory BP, continuous nocturnal non-invasive BP, peripheral arterial tonometry (PAT) and polysomnography were performed at the end of each treatment period. Skin circulatory changes associated with apnea were expressed as the ratio (PAT ratio) between the 3 nadir pulse amplitudes following apnea and the 3 peak pulse amplitudes during apnea. Ten events with the highest systolic pressure fluctuation were analysed during nREM and REM sleep, respectively.

Results: Office systolic BP ($P = 0.047$, ANOVA) but not diastolic BP was lower at the end of EN treatment while 24-hour BP did not differ. PAT ratio was higher after DO treatment ($p < 0.001$). There was no difference in OSA severity between the two treatments.

Conclusion: Skin vascular responses following apnea are at least in part α -receptor mediated. The antihypertensive effect of DO was proportionally weak in hypertensive OSA patients and possible mechanisms behind this phenomenon need to be further studied.