331. Obstructive sleep apnoea: inflammation and metabolism

P3044

Markers of liver dysfunction in patients with obstructive sleep apnea

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Increased serum levels of liver enzymes have been reported in patients with obstructive sleep apnea (OSA), but the prevalence of liver dysfunction in OSA is poorly defined. In 91 consecutive patients (23 females) without serological evidence of viral hepatitis or alcohol-induced liver disease who underwent nocturnal respiratory monitoring for diagnosis of OSA, we measured alanine (ALT) and aspartate (AST) aminotransferase, and gamma-glutamyltransferase (GGT) in serum, together with the HOMA Index and the lipid profile. Mean age and BMI were 55±14 (SD) yr, and 37.4±8.4 kg/m^2, respectively. OSA was moderate to severe (mean AHI 49±24/h, lowest SaO_2 69.3±12.8%). Increased ALT or AST (≥41 IU/L) was found in 11 and 5 patients (12% and 5.5%), respectively. Compared to patients with normal ALT levels, patients with elevated ALT were significantly younger (43.2±5.5 vs 56.4±14.3 yr, $p<0.005$ by unpaired t-test) and showed higher HOMA index values (8.28±5.09 vs 3.48±2.44, $p<0.005$) and triglyceride level (229±193 vs 132±71 mg/dL). Elevated AST levels were also significantly associated with high HOMA index. No association was found between OSA severity or the degree of obesity assessed as BMI and increased liver enzymes. Increased GGT (≥51 IU/L) occurred in 9% of the sample but showed no association with any of the variables tested. Our results suggest that increased liver enzymes are associated with more severe insulin resistance, but are not directly linked with obesity or OSA severity.

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P3045

The circadian profile of melatonin secretion in patients with OSAS

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Introduction: There is evidence to suggest that certain endocrine disorders are associated with impaired breathing during the sleep. One of the hormones closely associated with sleep is melatonin. It is a hormone secreted cyclically, which controls the rhythm of sleep and waking.
Aim: Aim of the study was to investigate circadian profile of melatonin secretion in patients with OSAS.
Methods: Study group consisted of 71 patients with OSAS: 66 men (93%) and 5 women (7%). The average age was 49,2±9,1 years. Body mass index was 32,7±5,9 kg/m^2,mean AHI 45±22,8/hour. OSAS was diagnosed with full polysomnography. In the study group 6 patients (8,45%) diagnosed with mild OSAS, 10 patients (26,76%) moderate OSAS and 46 patients (64,89%) severe OSAS. Control group consisted of 18 subjects with excluded OSAS, mean age 43±13 years, mean BMI 28,7±4 kg/m^2, mean AHI 2,5±2,1. In the study group and control group circadian profile of melatonin secretion was assessed with radioimmunoassay method (RIA) at 6 time points.
Results: Melatonin concentration (pg/ml) at 2.00, 6.00, 10.00 am, and 2.00, 6.00, 10.00 pm were: in the study group 91,8±70,7, 63,2±54,8, 21,4±11,3, 17±8,3, 21,1±16,2, 50,1±40,6, and in the control group 136,7±93,9, 94,2±75,5, 30,4±29,5, 13,9±6,1, 16,5±11,9, 43,6±27,6 respectively. In the study group mean concentration of melatonin at 2.00 am and 6.00 am was significantly lower than in the control group, p=0,04 and p=0,02 respectively.
Conclusion: Patients with OSAS have preserved circadian rhythm of melatonin secretion, with peak secretion at night hours. The maximum concentration of melatonin at night is significantly lower than in the healthy group.

P3046

Albuminuria in children with obstructive sleep apnea

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Increased excretion of albumin in urine has been considered a surrogate marker of endothelial dysfunction in adults with obstructive sleep apnea (OSA). Aim of this study was to evaluate urinary excretion of albumin in children with OSA.
Methods: Albumin-to-creatinine ratio (ACR) was calculated in a morning urine specimen collected from children with or without OSA. An assay appropriate for detection of microalbuminuria was used.
Results: Twenty seven subjects with moderate-to-severe OSA (5.6±2.1 y.o.; AHI 9.1±3.7 episodes/h), 71 subjects with mild OSA (6.2±2.3 y.o.; 2.4±1 episodes/h) and 31 children without habitual snoring (6.7±2.4 y.o.; 0.6±0.3 episodes/h) were studied. Subjects with moderate-to-severe OSA had similar ACR to those with mild OSA (p=0.072) and significantly higher ACR relative to subjects without habitual snoring (p=0.007): median 0.38 (0-14.3) mg/g vs. 0.31 (0-13) vs.0 (0-3.26), respectively. There was significantly increased risk for having ACR>0 in children with moderate-to-severe or mild OSA compared to children without habitual snoring after adjustment for age and gender: OR (95% CI) 6.4 (1.8-23.3) or 2.7 (1.1-6.9) vs. 1.0.
Conclusions: Children with OSA are at increased risk for having detectable morning abuminuria.

P3047

Biochemical basis of inflammation in children with obstructive sleep apnea syndrome (OSAS) and in children with obesity

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Rationale: OSAS and obesity are two risk factors that can lead to the early development of cardiovascular events. These two diseases very often coexist, and it's hard to understand the mecchanisms that characterize each one. Our aim was to determine the different pathways of these two disorders.
Methods: We evaluated 38 children (M/F=23/15; mean age: 7.68±3.78 years), divided in three groups (18 children with OSAS but non obese, 10 Obese children but without OASA, 10 controls). All children underwent blood sample test for the evaluation of CRP hs, the lipidic and metabolic aspect (Glycemia, Insulin, Cholesterol total, LDL and HDL, triglycerides, leptin, adiponectin, and resistin), the interleuchines pattern (IL-1 α e β, IL-2, IL-4, IL-6, IL-8, IL-10, IFN-γ, TNF-α, VEGF, EGF, MCP1) and the polysomnography examination.
Results: Children with OSAS and children with obesity showed higher levels of LDL-cholesterol and triglycerides compared to controls (OSAS p=0.005 and p=0.01; Obese p=0.01 and p=0.005). In the obese group leptin levels were significantly higher compared to controls and to the OSAS (p=0.00). In the OSAS groups we found significantly higher levels of IL 1 β (p=0.04) and TNF-α (p=0.05) compared to controls and obese groups.
Conclusions: OSAS and obesity have two different pathways. OSAS promotes an inflammatory pattern through the stimulation of TNF-α, wehereas obesity determines an hormonal deregulation especially of the adipokines one, as leptin.

P3048

Expression of cysteinyl leukotriene receptors in tonsillar T and B lymphocytes of children with obstructive sleep apnea

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Antiinflammatory medications administered to children with obstructive sleep apnea (OSA) decrease size of pharyngeal lymphoid tissue and severity of airway obstruction. Aim of this study was to define subpopulations of tonsillar lymphocytes with potential susceptibility to inhibitors of cysteinyl leukotriene receptors.
Methods: Tonsillar tissue excised from children with OSA or controls with recurrent tonsillitis (RT) was studied for expression of types 1 and 2 cysteinyl leukotriene receptors (LT1R and LT2R) by immunofluorescence and flow cytometry.
Results: Ten children with moderate-to-severe OSA (age 5.8±3.3 years) and 10 subjects with RT (7.5±4.7 years) were studied. In both children with OSA and RT, immunoreactivity for LT1R and LT2R was detected in CD3+ tonsillar T lymphocytes (extrafollicular areas) and in CD19+ B lymphocytes (germinal centers and mantle/marginal zones). In subjects with OSA, LT1R+ fraction of small size CD19+ B lymphocytes (median 26.4%, range 4.7%-77.7%) was similar to the LTR1+ fraction of CD3+ T lymphocytes (5.7%, 0.7%-50.3%) and significantly higher than the LT1R+ fraction of large size CD19+ B lymphocytes (3.3%, 1%-31.9%) ($p>0.05$ and $p<0.05$). Similar trend was identified for LTR2 in children with OSA or RT and for LTR1 in participants with RT.
Conclusions: Children with OSA or RT and tonsillar hypertrophy express cysteinyl leukotriene receptors in B lymphocytes of the tonsillar germinal centers and mantle/marginal zones and in extrafollicular T lymphocytes. These findings explain the beneficial effects of cysteinyl leukotriene receptor inhibitors on pharyngeal lymphoid tissue hypertrophy and OSA.

P3049
Effect of intermittent hypoxia on the expression of fatty acid binding proteins in human adipocytes and macrophages
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Background: Intermittent hypoxia (IH) is a hallmark feature in obstructive sleep apnea (OSA), which is increasingly recognized as an independent risk factor of cardiovascular diseases. Different fatty acid binding proteins (FABPs), including adipocyte (A)-FABP (FABP4) and epidermal (E)-FABP (FABP5), are now widely accepted as biomarkers associated with increased cardio-metabolic risks and carotid atherosclerosis. We hypothesize that IH exposure may regulate the expression of FABPs in two major cell types involved in the development of atherosclerosis, namely adipocytes and macrophages.
Methods: Human preadipocytes and THP-1 cells were cultivated in the differentiation media until reaching final differentiation level of ~80% before treatment. Differentiated cells were exposed to intermittent normoxia (IN as control) or IH [a 10-min hypoxia (5% O_2) followed by a 5-min normoxia (21% O_2) for 64 cycles using the BioSpherix OxyCycler C42 system (Redfield, NY)]. FABP4 and FABP5 mRNA expressions were measured by RT-PCR, and protein by Western blot.
Results: Adipocytes expressed very high levels of FABP4 and low levels of FABP5 while differentiated macrophages expressed high levels of both FABP4 and FABP5, consistent with previous reports. IH exposure resulted in an up-regulation of FABP5 but not FABP4 expression in adipocytes. Macrophage FABP4 and FABP5 levels remained unchanged following IH treatment, suggesting that the two cell types are likely to have distinct functions.
Conclusions: These data suggest that FABP5 may play a role in atherogenesis in OSA subjects.
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P3050
Predictors of obstructive sleep apnea syndrome and metabolic syndrome
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Background: Obstructive sleep apnea syndrome (OSAS) is a well-known factor of cardiovascular disease and it is also related with metabolic syndrome (MS). Some factors are predictors of OSAS and also of MS.
Objective: We wanted to know if OSAS and MS had some factors that can predict both diseases. We also wanted to know the prevalence of the individual components of MS and MS as a entity in patients with suspected OSAS.
Patients and methods: We studied all the patients that were referred to our sleep laboratory from January to December 2009. The patients underwent polysomnography and respiratory polygraphy. OSAS was diagnosed when apnea hipopnea index (AHI) was > 5. MS was diagnosed according to the International Diabetes Federation criteria.
Results: We studied 486 patients; 73,9% were men, with a mean age of 57,3±13,5 years and a body mass index (BMI) 32,1±6,5 kg/m^2. 66,9% of patients were diagnosed of moderate-severe OSAS. Mean AHI was 30,2±23,8. 93,8% of subjects had enough data to study MS. The prevalence of MS was 64,7%. Hypertension and hyperglycemia increased with the severity of MS ($p< 0,001$). Age and waist circumference were predictors of OSAS and MS ($p<0,05$).
Conclusions:
- Central obesity, measured as waist circumference, and age are predictors of both, OSAS and MS.
- MS is more frequent in OSAS patients and its prevalence increases with OSAS severity.
- Hypertension and hyperglycemia are related with OSAS severity.

P3051
Sleep apnea symptoms in diabetics and their first degree relatives
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Background: The purpose of our study was to investigate high risk for sleep apnea syndrome, in a cohort of diabetics and their first degree relatives with different categories of serum glucose level: diabetic, impaired glucose tolerance (IGT), and normal glucose.
Methods: As a part of a cohort study, all of diabetic and their first degree relatives who came for glucose control in diabetes clinic, were invited to take part in the survey. 2,462 individuals (82%) agreed to fill out the Berlin and Epworth sleep questionnaire. Participants consisted of 2462 subjects 15–70 years of age, both males and females With diabetes and family history of type 2 diabetes mellitus. A total of 1232 (50.1%) participants had diabetes, 568 (23.1%) abnormal glucose tolerance test, and 662 (26.8%) normal glucose. High risk for sleep apnea regarding Berlin questionnaire and Epworth sleepiness scale, diabetic, impaired glucose tolerance and relative with normal glucose were analyzed.
Results: Prevalences of high risk for sleep apnea were lowest in first degree relatives with normal glucose group (30.6%) and highest among diabetics (50.5%). In a multiple regression analysis, "age, BMI, education, high blood pressure" were risk factor for sleep apnea symptoms while isolated blood glucose level was not by Berlin questionnaire. By Epworth sleep scale only education level was a risk factor for sleep apnea symptoms while isolated blood glucose level was not risk factor.
Conclusions: Sleep apnea symptoms are common in first degree relatives of diabetic patients regardless of blood glucose level. Level of blood glucose in Groups with diabetes and abnormal GTT and family of diabetic could not affect sleep apnea symptoms.

P3052
How can identified early presence of atherosclerotic plaque in severe OSAS?
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Carotid plaque is frequent and often unacknowledged in severe OSAS. Ultrasonographic evaluation of the carotid arteries is the fastest way to disclose a different level of stenosis in absence of clinical symptoms, but not all OSAS patients are submitted this examination. Nocturnal hypoxemia related to OSAS can induce retinal vessel constriction with a reduction of artero-venous ratio (AVR) evaluated by retinography. Aim of this study was to evaluate in severe OSAS patients a correlation between a severe constriction of AVR index (<75) and carotid stenosis, with ultrasonography of the carotid arteries. 30 obese patients (BMI 35+18 kg/m^2), aged from 35 to 60 years, non smokers, non diabetics, non cardiopathics, non hypertensive, diagnosed for severe OSAS (AHI=43,5±22/h) after a polisomnography, underwent retinography of the two eyes with Topcon TCR NW200 non mydriatic retinal camera. 27/30 patients with a severe constricted AVR Index (< 75) underwent ultrasonographic evaluation of the carotid arteries. In 70% (20/27) of this patients ultrasonographic evaluation revealed the presence of plaque of at least one of the two carotids. If the pathological constriction of retinal vessels could be an indirect evidence of carotid artery stenosis, a transthoracic echocardiography and.chest computed tomography angiography probably can show also the presence non calcified coronary plaque in absence of clinical symptoms.

P3053
Sleep-disordered breathing and metabolic dysregulation in obese children before and after weight loss
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Introduction: A high prevalence of sleep-disordered breathing (SDB) is found in childhood obesity. SDB is a known risk factor for developing the metabolic syndrome. Weight loss has been suggested to be the treatment of choice in obese children.

Aim: In this study we focused on the effects of weight loss and SDB on common metabolic parameters.
Methods: Consecutive obese children between 10 and 18 years were recruited. They followed a treatment program with diet, increased physical activity and psychological support. All children underwent a baseline sleep screening and a control study after 4-6 months of treatment in case of diagnosed SDB. A fasting blood assay was performed baseline and after 4-6 months.
Results: 84 children and adolescents with a median age of 15.1 years (9.5-18.9) were included. Mean BMI z-score was 2.73±0.41. 44% of the subjects had SDB. Respiratory disturbance index correlated with HDL-cholesterol (r=-0.34; *P*=0.002), ASAT (r=0.33; *P*=0.003) and ALAT (r=0.35; *P*=0.001). No correlations were found for glucose, triglycerides and total cholesterol. After weight loss treatment all metabolic parameters improved and only 8% of the patients had residual SDB. Improvements in ASAT and ALAT were mediated by improvements in BMI. Improvements in oxygen desaturation index (ODI) were associated with an increase in HDL-cholesterol (r=0.49; *P*=0.003).
Conclusion: This study confirms the link between ASAT, ALAT, HDL-cholesterol and SDB baseline. HDL-cholesterol improved after weight loss in association with improvements in ODI.

P3054
The impact of sleep apnea on glucose metabolism. Results from a long-time follow-up
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Background: It has been suggested that sleep-disordered breathing (SDB) is a risk factor for diabetes, but long-term follow-ups are lacking.
Objectives: To analyze the influence of SDB on future glucose metabolism.
Methods: Men without diabetes (n=141) were investigated with whole-night respiratory monitoring. After a mean period of 11.3 years, they were followed up with an interview, blood sampling and anthropometric measurements. Insulin resistance was quantified using the homeostasis model assessment (HOMA). Delta-HOMA-IR was calculated as ($HOMA\text{-}IR_{follow\text{-}up}$ – $HOMA\text{-}IR_{baseline}$). An oral glucose tolerance test was performed in 113 men to calculate the insulin sensitivity index. Confounders adjusted for were age, BMI¸ weight gain, hypertension, treatment for diabetes and years with CPAP during the period.
Main results: At the follow-up, 23 men had diabetes. An apnea-hypopnea index (AHI) of >5 and an oxygen desaturation index (ODI) of >5 were significant predictors of developing diabetes. After adjusting for confounders, the association with ODI remained significant (adj. OR 4.4, 95% CI 1.1-18.1). The ODI at baseline was inversely related to the insulin sensitivity index at the follow-up (r= -0.27, p=0.003). A deterioration in HOMA-IR was significantly related to all measured variables of sleep-disordered breathing (AHI, AHI>5, ODI, ODI>5 and MinSaO2) even when adjusting for confounders. When excluding the variable "years on CPAP" from the multivariate model, all associations weakened.
Conclusions: SDB is independently related to the development of insulin resistance and thereby the risk of manifest diabetes mellitus. The results indicate that CPAP treatment can modify this risk.

P3055
Coronary plaque distribution and endothelial dysfunction in younger obstructive sleep apnea patients
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Background: Obstructive sleep apnea (OSA) occurs mainly in middle aged subjects and is associated with a higher incidence of cardiovascular complications.
Aim: Assessment of subclinical cardiovascular risk factors in asymptomatic younger OSA patients.
Methods: Patients undergoing a full polysomnography and with an apnea hypopnea index (AHI) >20, were included. They underwent an echocardiography, a measurement of the carotid intima media thickness (IMT), analysis of the endothelial function (brachial flow mediated dilatation, FMD) and a Multislice Computed Tomography (CT) for determination of the coronary plaque burden. We assessed 13 coronary segments for degree of stenosis (1: normal; 2: <50% stenosis; 3: 50-70% stenosis; 4: >70% stenosis).
Results: The patients [n=91; age=50±10y, M/F 79/12] had severe OSA, mean AHI of 52±23, and 59% had up to eleven coronary segments showing a variable degree of plaque burden. There was a significant correlation between the number of affected coronary segments and IMT (r=0.451; p<0.001), FMD (r=-0.255; p=0.019), coronary arterial calcium score (r=0.546;p<0.001), interventricular septum thickness (r=0.217;p=0.041) and age (r=0.414;p<0.01). Correlations were maintained after adjustment for hypertension, age and smoking. Patients with coronary plaques were older (54±9y versus 47±9y; p<0.01), had thicker IMT (680±127μm versus 587±89μm; p<0.01) and had abnormal FMD (6.1±2.1% versus 7.3±2.5%; p=0.029).
Discussion: Our results suggest occurrence of significant subclinical coronary abnormalities and endothelial dysfunction in asymptomatic younger severe OSA patients. Routine screening for subclinical cardiovascular risk factors in OSA may be beneficial.

P3057
Endothelial dysfunction in patients with obstructive sleep apnea
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Background: Obstructive sleep apnea (OSA) influences endothelial function and causes cardiovascular diseases.
Objectives: To assess the prevalence of endothelial dysfunction in patients with OSA.
Methods: Twenty-seven obese patients with OSA and 26 healthy obese subjects were investigated. The presence or absence of OSA was evaluated with a sleep study. Endothelial function was investigated with brachial artery ultrasound examination.
Results: Baseline characteristics were equivalent between the two groups.Minimal SaO2 and AHI in the OSA and control groups were [72.1±11.6 versus 86.5±4.5% (P=0.000), and 27.9±23.1 versus 2.0±1.5 (P=0.000). There was no statistically significant difference in percentage change 2 of BADSLnitrate between patients and control groups (P=0.05) i.e. endothelial independent dilatation. Flow-mediated dilatation (FMD) percentage change 1 was highly significant lower in OSA patients in comparison to control group [Mean ± SD: 3.1±2.8 vs 10.6±6.9, (P=0.000) respectively. i.e. endothelial dysfunction. There was positive significant statistical correlation between BMI and BAD (basal, FMD and SL nitrate).Regarding the correlations, there was positive significant statistical correlation between ESS and AHI, the time in which O2 saturation <90%, BADFMD and BADbasal among the patients with OSA, but there was negative significant correlation between ESS and minimal nocturnal O2 saturation among the patients with OSA.
Conclusions: We detected a prominent deterioration in endothelial function in obese OSA patients compared with healthy obese subjects. This deterioration may occur due to ongoing hypoxemia and it may be a possible cause of cardiovascular diseases in patients with OSA.

P3058
A hospital based study of sleep in metabolic syndrome between obese & non obese North Indians
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Metabolic syndrome's association with sleep apnoea is established. However, differences amongst obese and non-obese patients of metabolic syndrome are not clear.
Methods: 50 consecutive patients fulfilling the criteria of metabolic syndrome as per revised National Cholesterol Education Program (NCEP) Adult Treatment PANEL-3 guidelines were included. They were divided into two groups based on body mass index (BMI) as applicable in Asian Indians-Group I with BMI $\leq 25 kg/m^2$ and Group II with BMI $>25 kg/m^2$.Patients on CPAP therapy & having any other systemic diseases were excluded. All eligible patients underwent overnight polysomnography.
Results: Demographically there was no difference between two groups. The mean BMI of group I & II were 23.20±1.68 $kg/m^{2,}$ & 31.69±4.93 kg/m^2 respectively. Snoring, unrefreshing sleep & daytime sleepiness were the commonest presenting symptoms. Both groups had similar Epworth sleepiness scale. Diabetes & hypertension was significantly higher amongst group I & group II respectively. Both groups had similar sleep time & disribution of all stages of NREM sleep. Group I had insignificant less REM sleep (7.18±23.57 versus 14.12±24.96,pvalue>.05).Snoring time was significantly higher among group II (95.82±51.48 vs 44.76±29.96) and apneic episodes were common during NREM sleep in both groups. However the mean apnoea/hypoapnoea index (AHI) was similar in both groups (34.10±30.04 v/s 32.72±30.90; p value=0.607).
Conclusion: The prevalence of sleep disordered breathing in selective North Indian population with metabolic syndrome irrespective of BMI was high. Community based epidemiological study is the need of hour to define the extent of the problem.

P3059
OSAS and oxidative stress before and after CPAP therapy
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Obstructive Sleep Apnea Syndrome is frequently associated with oxidative stress

which might contribute to the onset of some of the systemic co-morbidities. Repeated hypoxia/re-oxygenation cycles may cause increase in Reactive Oxygen Species (ROS) with a reduction of Nitric Oxide (NO) availability.
This study was undertaken to assess oxidative stress in patients with severe OSAS (Apnea-Hypopnea index > 30/h) by evaluation of brachial artery Flow mediated dilation (FMD), $gp91^{phox}$ and serum levels of nitrite and nitrate (NOx), and to test the hypothesis that Continuous Positive Airway Pressure (CPAP) therapy can reduce oxidative stress.
We choose FMD as indirect marker of endothelial NO-mediated reactivity; $gp91^{phox}$ for NADPH oxidase activity and serum levels of NOx, markers of nitric oxide generation.
We enrolled 10 patients with severe OSAS. After polysomnography, for evaluation AHI and oxygen desaturation index (ODI), FMD, $gp91^{phox}$ and NOx were measured before and after 90 days of CPAP treatment.None of the patients smoked. The mean AHI and ODI prior to CPAP were respectively 43.3±11.9/h and 35.8±22.3/h, which decreased to 7±5/h and 2.8±1.6/h ($p<0.001$). The mean BMI was 35,3±5,5 kg/m^2 and it didn't change during 90 days of therapy. $Gp91^{phox}$ decreased from 38.2±7.4 to 23.6±5.1 ($p<0.001$).
FMD and NOx were not statistically significant.
While confirming the association between OSAS and oxidative stress, we found CPAP therapy managed to reduce $gp91^{phox}$ in patients who adhered to treatment for at least 4 hours daily, for 90 days, although there was no significant change in body weight.
CPAP treatment could therefore decrease Oxidative stress in patients with OSAS by correction of apnea and restoring normal oxygenation.

P3060

Is substance P (SP) involved in sleep physiology and behavioural characteristics in children with obstructive sleep apnea-hypopnea syndrome during sleep (OSAHS)?

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The neuropeptide substance P (SP) has been supposed to mediate sleep physiology and influence behavioral and cognitive functions. Its levels are found to be significantly lowered in patients with OSAHS.
This study aimed to measure SP levels' in serum of children with OSAHS and to correlate them with sleep physiology and possible behavioural problems.
40 children were evaluated with overnight polysomnography for OSAHS. A questionnaire concerning the presence of aggressiveness, hyper-motility, attention deficit disorders and behaviour problems was fulfilled. Relationship between serum SP levels and number of total apneas, respiratory events, REM/ non-REM sleep were calculated using Pearson correlation analysis; $p < 0.05$ was considered statistically significant.
14/40 children had mild, 14/40 moderate and 12/40 (30%) severe degree of OSAHS. In 25/40 (62.5%) children low levels of SP were recorded (314.36±58.32), and the rest 15/40 (37.5%) had normal values (538.51±128.79). No statistical significance was found between SP levels and: the presence of aggressiveness (p=0.191), hypermobility (p=0.346), attention deficit disorders (p=0.388) or behavioural problems (p=0.586).
Positive correlation was found between SP and: a) total number of apnoeas (r=0.477, p=0.002) and b) total respiratory events (r=0.311, p=0.051). There was important statistical significance between SP levels and: a) stage 1 of non-REM sleep (r= - 0.345, p=0.032), and b) stage 2 of non-REM sleep (r=0.414, p=0.009). Therefore, SP appears to influence sleep characteristics, although further studies are required in order to define its role at nervous system.

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Circadian rhythms of melatonin, cortisol and cytokines in pediatric obstructive sleep apnea syndrome

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Introduction: Several neuroimmunological mediators exhibit a circadian organization. Melatonin, cortisol and somnogenic cytokines can be altered in conditions of disturbed sleep.
Aims and objectives: The aim of the research is to investigate whether melatonin, cortisol, Tumor Necrosis Factor-α (TNF-α) and Interleukin-1β (IL-1β) show altered circadian rhythms in pediatric Obstructive Sleep Apnea (OSAS).
Methods: 47 children (26 OSAS, 21 not OSAS) underwent a nocturnal polysomnography and 2 blood samples were taken (2.00 am and 8.00 am). Cortisol and melatonin plasma concentrations were assayed using a radioimmunoassay technique. Cytokines were dosed from the supernatant of a 24-hours cell culture system (ELISA) in basal condition and after stimulation with phytohemagglutinin (PHA).
Results: The circadian organization of cortisol and melatonin was not altered in OSAS. In fact pediatric OSAS is not associated with an important sleep fragmentation that could affect circadian rhythms of hormones. Circadian rhythms of TNF-α and IL-1β had lost the nocturnal physiological peak and an additional early morning peak had developed (TNF-α: $P<0.05$). Cortisol and TNF-α basal levels were higher in OSAS than in controls (cortisol $P<0.05$ at 8.00 am). On the contrary TNF-α, after stimulation with PHA, was lower in OSAS than in controls ($P<0.01$ at h. 02.00 am and $P<0.05$ at h. 08.00 am). In addition we found higher melatonin levels in patients with an anamnestic agitated sleep.
Conclusions: The interaction among sleep regulation, circadian rhythms, inflammation, immunomodulation and hormone release is an interesting starting point for future research in this field.