110. Sleep monitoring, lung function and inflammation in childhood

P1071

Effect of high-flow nasal cannula on nasopharyngeal airway pressure, respiratory muscles loading and respiratory distress symptoms in young infants with severe acute viral bronchiolitis

infants with severe acute viral bronchiolitis <u>Stefan Matecki</u>^{1,2}, Christophe Milesie³, Julien Baleine³, Aurélien Jacquot³, Gilles Cambonie³. ¹Physiologie, CHU Arnaud de Villeneuve, Montpellier, France; ²INSERM U 1046, CHU Arnaud de Villeneuve, Montpellier, France; ³Réanimation Pédiatrique, CHU Arnaud de Villeneuve, Montpellier, France;

Objective: To determine the efficacy of high-flow nasal cannula (HFNC) at different flow level on respiratory distress symptoms, nasopharyngeal airway pressure (NAP) and respiratory effort in young infants with acute respiratory syncytial virus bronchiolitis.

Patients: 21 less than six month/old infants, with severe respiratory distress. **Interventions:** Oesophageal pressure (Pes) and NAP was measured simultaneously after 5 different flow of 1,4,6 and 7 l/mn delivered through a HFNC.

Measurements and results: Respiratory distress was quantified with a specific scoring system (m-WCAS). Mean respiratory rate (RR), inspiratory time over total time or respiratory cycle (Ti/Tot), NAP, Swing Pes and respiratory effort with the Pes-derived inspiratory muscles pressure-time product (PTPes) was calculated from the pressure curves. Results are presented in Table 1.

Effect HFNC at 1,4,6 and 7 l/mn on respiratory parameters

		Flow			
	1 l/mn	4 l/mn	6 l/mn	7 l/mn	
NAP (cmH20)	0,2 (0,9)	1,7 (1,3)	3,7 (2)	4 (2)	0,0001
Swing Pes (cmH20)	24 (12)	20 (10)	14(7)	15(7)	0,0003
PTP/mn (cmH20/mn)	546 (330)	425 (237)	312 (162)	289 (166)	0,0002
RR (breath/mn)	81 (16)	75 (14)	65 (12)	65 (15)	0,01
Ti/Tot	0,43 (0,9)	0,42 (0,1)	0,35 (0,1)	0,36 (0,1)	0,002
mWCAS	2,3 (1)	2(1)	1 (1)	1 (1)	0,0006

Conclusion: In young infants with severe acute respiratory syncytial virus bronchiolitis NAP progressively increase with flow delivery through HFNC. We observed a negative correlation between flow delivery, NAP and PTPes. HFNC are able to increase NAP, decrease PTPes and improve ventilatory function of infant with severe acute viral bronchiolitis.

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P1072

The effect of chronic intermittent hypoxia on bone homeostasis in children with sleep disordered breathing

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Introduction: Airflow obstruction is an important risk factor for osteoporosis in adults. Therapies for bone-loss disorders could be based on shifting systemic acid base balance in the alkaline direction. The effect of chronic intermittent hypoxia in obstructive sleep apnea syndrome (OSAS) on bone homeostasis has never been evaluated.

Aim: We evaluate the effect of OSAS on bone homeostasis and the efficacy of an alkaline diet to the bone remodelling in children.

Methods: Spot urinary hydroxyproline/creatinuria (UH/Cr, μ g/ml) was measured as a markers of osteoblastic and osteoclastic activity in a group of children who underwent clinical assessment and polysomnography for OSAS. Children were randomly selected to be treated with an alkaline diet (group 1) or with steroid therapy (group 2). The UH/Cr was measured at baseline and after one month of treatment (T1).

Results: We studied 12 children (mean age 6,42±2,52 years, 8 males). After one month, mean value of UH/Cr did not change (14,97 µg/ml vs 12,98 µg/ml). Four subjects (group 1) (mean age 7,9±2,7 years, 3 males) showed a reduction of UH/Cr after alkaline diet (from 23,2 µg/ml to 15,8 µg/ml), UH/Cr did not decrease in group 2. In all children UH/Cr correlated with total sleep time (r = -0,636, p <0,05), sleep efficiency (r = -0,935 p <0,001) and wake after sleep onset (r = 0,769, p<0,05), but not with sleep respiratory parameters.

Discussion: Our preliminary study showed that the efficacy of an alkaline diet to reduce urinary hydroxyproline. Although we did not find correlation with respiratory parameters, we found significant correlation with sleep fragmentations.

P1073

Evaluation of 8-isoprostane as a biomarker of oxidative stress in children with obstructive sleep apnea syndrome

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Background: Hypoxia-reoxigenation, characteristic of obstructive sleep apnea syndrome (OSAS), induces an increase of products of non-enzymatic free radical-catalyzed lipidic peroxidation, such as 8-isoprostane (8IsoP).

Aim: To evaluate urinary 8IsoP values in children with OSAS.

Methods: Thirty-eight children with OSAS (mean age: 6.23 ± 2.08 yr, range:3.16-10.83yr M/F:26/12), underwent urinary collection at the morning after nocturnal polysomnography. 8Isop levels were measured with an enzyme immunoassay and corrected by urinary creatinine (uCR) levels.

Results: According to the AHI (Apnoea/Hypopnea index, cut off>5 events/hours of sleep) obtained from polysomnography, we found 20 subjects (Group 1) with snoring/minimum OSAS (mean AHI:1.48 \pm 1.44 ev/hr; mean overnight oxygen saturation, SaO2:97.64 \pm 0.63%) and 18 subjects (Group 2) with moderate/severe OSAS (mean AHI:1.98 \pm 7.97 ev/hr; mean SaO2:96.51 \pm 1.98%). Compared to Group 1, urinary 8IsoP value was higher in Group 2 (1.10 \pm 0.66ng/mg uCR vs 0.76 \pm 0.36ng/mg uCR, p=0.046) and age was lower (5.45 \pm 1.69yr vs 6.93 \pm 2.18yr. p=0.033). We found a negative correlation between SaO2 and urinary 8IsoP (r=0.32; 0.00) and a positive correlation between AHI and urinary 8IsoP (r=0.32; 0.05 < p < 0.1). Linear regression analysis, performed using as dependent variable values of urinary 8Isop and as independent variables age, AHI, SaO2, showed that SaO2 and age were predictors for levels of urinary 8IsoP are related to OSAS severity and SaO2. Further studies are needed to assess usefulness of urinary 8Isop as a marker of inflammation likely due to oxidative stress.

P1074

A new proposal for OSA classification in children based on cardiovascular outcome

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Introduction: Pediatric OSA is associated to cardiovascular repercussions (CVR), adenotonsillectomy(AT) is considered its treatment of choice. We hypothesized that OSA leads to early CVR as loosing of nocturnal blood pressure dipping (NBPD); OSA treatment (AT) will recover NBPD.

Aim: To analyse which polysomnographic(PSG) criteria best defines OSA in children, based on the absence of NBPD before and its recovering after AT.

Methods: We included children with regular snoring, observed respiratory pauses and hypertrophy of the tonsills. Children with persisting snoring after AT,diagnosis of cardiovascular, renal or neurologic disease and obesity were excluded. Children realized PSG and 24-hour blood pressure monitoring before and six months after AT. AI and AHI were calculated, the presence or absence of NBPD was described before and after AT. Three current PSG definitions for OSA (D1:AHI>1; D2:AI>1 & AHI>4; D3: AHI>5) were tested for the best correlations of OSA and CVR before and NBPD recovering after AT(McNemar, Odd's ratio).

Results: 26 children, 8-12 years old, were included. AHI varied from 0,0 to 23,2. 10 children presented loosing of NBPD before, 4 persisted after AT. For D1 (AHI>1) OSA diagnosis showed no significant association to CVR neither before, nor after AT. For D3 (AHI>5) OSA diagnosis showed a significant correlation to CVR before AT, but not after surgery. For D2 (AI>1 & AHI>4) OSA diagnosis showed significant correlation to CVR before and after surgery.

Conclusion: Considering NBPD and surgery outcome, we identified AI>1 & AHI>4 as the best definition for OSA in children. Larger studies focusing CVR and surgical outcome should be realized to better define PSG criteria and OSA.

P1075

Frequency of ICU monitoring and respiratory complications after adenotonsilectomy in OSA children

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Introduction: Adenotonsilectomy(AT) is considered treatment of choice for obstructive breathing disorders (OBD) in children. Besides better diagnosis and earlier treatment of OSA, respiratory complications at the immediate posoperative period are described for several risk groups.

Aim: To evaluate the frequency of necessity of posoperative monitoring in an intensive care unit(ICU) and respiratory complications in OBD children submitted to adenotonsillectomy in a university hospital.

Methods: Retrospective study, analyzing patient's charts submitted to AT due to OBD in a university hospital in Brazil, during the period 2006 to 2010. We included children of both genders, aged 2 to 12 years. Patient's data included obesity, age at surgery, severity of ODB and presence of respiratory comorbidity (asthma). We analysed the frequency of ICU monitoring and the respiratory complications in the ICU during 24 hours after AT.

Results: Out of 811 AT, 164 realized polysomnography prior surgery. 47 children, 21 girls, needed monitoring in ICU, due to severe oxygen dessaturation (<85%), severe OSA (IA >10) or obesity. Six children were younger than 2 years. Eleven children (24%) suffered major complications at ICU, as acute lung oedeme in two patients, intubation for longer than 24 hours in one, bronchospasms in three, stridor in six.

Conclusions: Our study revealed a high risk for respiratory complications in OSA children. Major risk factors were age < 3 years old, asthma and obesity. Indication for respiratory monitoring/polysomnography for suspected OSA children prior to adenotonsillectoumy should be better discussed and normatized.

P1076

Adenotonsillectomy and orthodontic therapy: Outcome after one year of follow-up in children with obstructive sleep apnea syndrome

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Introduction: Adenotonsillectomy (AT) is the primary therapy for obstructive sleep apnea syndrome (OSAS) in children, although a residual disease is reported. Rapid maxillary espander (RME) is a valid treatment for children with malocclusion and high arched palate.

Aim: To evaluate the efficacy of AT and RME in children with OSAS.

Methods: We enrolled children undergoing a clinical and polysomnographic assessment for OSAS at baseline and after 12 months of follow-up, after treatment (T1).

Results: We studied 47 children (mean age 5.03 ± 2.03 years, body mass index, BMI, 17.15 ± 3.07 kg/m², 34 males). At T1, AHI (apnea hyponea index) decreased (11.90 ± 12.30 vs 2.18 ± 2.51 ev/h, p<0.0001) as well as arousal index (18.29 ± 6.71 vs 13.95 ± 6.11 ev/h, p<0.0001) while total sleep time (TST) increased (6.77 ± 0.96 vs 7.24 ± 0.85 , p<0.05), as overnight oxygen saturation (96.31 ± 2.21 vs $97.50\pm1.50\%$, p<0.001). Twenty five children underwent AT (group 1) whereas 22 orthodontic therapy (group 2). After one year of treatment, in group 1 percentile of BMI and overnight mean saturation increased significantly, while AHI and arousal index decreased. In group 2 mean overnight saturation and TST increased from T0 to T1, while AHI decreased. The correlation analysis showed that percentile of BMI is a negative predictive factor of the efficacy of AT in group 1, while duration of disease is a negative predictive factor in group 2. **Discussion:** Our results demonstrated that both treatments are efficacious for

Discussion: Our results demonstrated that both treatments are efficacious for pediatric OSAS, although the increase of BMI is a negative predictive factor for residual disease in group 1, and the duration of disease in group 2.

P1077

The effects of obstructive sleep apnea syndrome on cognitive and cardiovascular functioning in children with obesity

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Background: Paediatric obesity and sleep disordered breathing may be associated with cognitive problems and cardiovascular abnormalities and both may share the same common inflammatory and metabolic pathogenesis.

Aim: To evaluate and compare cardiovascular activity and cognitive functions of obese children with or without clinical obstructive sleep apnea syndrome (apnea hypopnea index >5 n/h of sleep).

Methods: Obese children underwent polysomnography in a standard laboratory setting, a neurocognitive assessment and a 24-hour ambulatory blood pressure monitoring.

Results: We studied ten children (mean age 9.2 ± 3.2 years, 6 males), with a mean body mass index (BMI) of 27.67 kg/m², a mean BMI percentile of 124.2 ± 20.7 . They had a mean apnea-hypopnea index of 9.6 ± 13.6 n/h, an overnight oxygen

saturation of 96.9 \pm 0.9%. Mean values of blood pressure did not show relevant differences between diurnal and nocturnal measurements: diurnal systolic and diastolic pressure were 114.8 \pm 22.2 and 68.5 \pm 10.3 mmHg, while nocturnal systolic and diastolic pressure were 110.7 \pm 10.9 and 66.1 \pm 14.3 mmHg. Wechsler Intelligence Scale for Children-revised revealed a mean total intelligent quotient score of 91.3 \pm 15.21, a mean verbal intelligent quotient (VIQ) score of 95.7 \pm 12.4, and a mean performance intelligence quotient scores of 90.3 \pm 20. Compared to those without clinical sleep apnea, children with AHI>5 n/h had a lower VIQ (89.3 \pm 9.3 vs 102.0 \pm 13.4).

Conclusions: Preliminary data showed that obese children had a peculiar blood pressure profile since they did not show the physiologic nocturnal deep. Obese children with obstructive sleep apnea display a specific verbal cognitive dysfunctions.

P1078

Parental history of adenotonsillectomy is a risk factor for tonsillar hypertrophy and snoring in children

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Recognition of subgroups of children predisposed to overgrowth of the pharyngeal lymphoid tissue, such as those with history of wheezing requiring treatment, may allow implementation of treatment interventions in early life for the prevention of obstructive sleep-disordered breathing (SDB). We hypothesized that parental history of adenoidectomy and/or tonsillectomy (AT) is a risk factor for tonsillar hypertrophy and snoring in childhood in addition to history of wheezing requiring treatment.

Methods: Children were recruited from outpatient clinics. Parental history of AT (explanatory variable) and snoring ≥ 1 night/week (outcome) were recorded and presence of tonsillar hypertrophy (outcome) was assessed.

Results: 435 children were recruited (2-16 yo) and 79 (18.2%) of them had parental history of AT. Parental history of AT was significantly associated with the presence of tonsillar hypertrophy and snoring even after adjustment for history of wheezing requiring treatment, age, gender, obesity and passive smoking [odds ratio (95% CI): 2.2 (1.2-3.9); p<0.01 and 1.8 (1.1-3.1); p<0.05, respectively]. When both tonsillar hypertrophy and parental history of AT were entered in the same multiple logistic regression model, the former was stronger predictor of snoring than the latter: 3.3 (2-5.3); p<0.01 vs. 1.6 (0.9-2.9); p=0.09), respectively.

Conclusions: Children with parental history of AT have more frequently tonsillar hypertrophy than those without such history. Familial predisposition to tonsillar hypertrophy may mediate at least in part the association between parental history of AT and SDB in children.

P1079

Prevalence of obesity and sleep disordered breathing in a cohorts of 9 year old schoolchildren studied 13 years apart

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Objective: The aim of this study was to evaluate the prevalence of obesity and sleep disordered breathing (SDB) in two different populations of Italian schoolchildren studied 13 years apart living in a country town of Central Italy (Ronciglione, VT). **Research methods and procedures:** Subjects were drawn from two populations, both non selected, of schoolchildren. Parents underwent to a 9-items sleep questionnaires investigating on SBD. We assessed measures of weight and height obtaining and using BMI values to assess obesity, with cut-off values proposed by the International Obesity Task Force.

Results: Two cross sectional surveys were carried out on 177 students (males 82; mean age 9.65 ± 0.61 years) in 1998 (group 1) and on 198 students (males 111; mean age 9.3 ± 0.9 years) in 2011 (group 2) from elementary school without significative differences for age and sex between groups. The prevalence of obesity from 1998 to 2011 was significally increased (from 10.21% to 20.7%, p<0.0001). No statistically significance was found in SBD for snoring (from 8,5% to 9,1%), nocturnal awakenings (from 2,3% to 2,5%) and sleep apnea (from 5,6% to 6,1%). Only the oral breathing increased significantly (from 36,2% to 57,6,%, p<0.0001). In group 2 the percentage of snoring and sleep apnea were higher in obese children than in those without obesity (from 12.2% to 7.7% and from 12.2 to 4.6%,

Discussion: The prevalence of obesity in young Italian children is very high, and it is rapidly growing. There is upward trend of SDB in the obese population while no statistically increments were showed in SBD in total population.

P1080 The clinical presentation of paediatric narcolepsy in one Canadian sleep

centre

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Narcolepsy is primarily characterized by an overwhelming feeling of sleepiness with or without cataplexy. More recently, there has been a dramatic increase in newly diagnosed childhood narcolepsy and it is hypothesized that H1N1 may play a role in these new cases. The objective of this study is to review the demographics and presenting symptoms of children with narcolepsy in Toronto.

Methods: At the Hospital for Sick Children, Toronto, we reviewed medical records and polysomnograms of patients with narcolepsy who presented to the sleep disorders clinic. All patients were referred with a history of excessive daytime sleepiness. Results:

# Patients	8 (6 male)	
Age years, mean (range)	9.5 (5.0-15.0)	
Weight, kg, mean (range)	39.5 (28.0-52.9)	
BMI, kg/m ²	20.3 (18-25.3)	
Excessive daytime sleepiness	8 (100%)	
Cataplexy	5 (62.5%)	
Night wakenings	2 (25.0%)	
Hallucinations	3 (37.5%)	
Weight gain	4 (50.0%)	
Behaviour change	4 (50.0%)	
H1N1 vaccination	2 (25.0%)	
MRI, normal	7 (87.5%)	
MSLT, abnormal	7/7*	
Ferritin, low	4 (50.0%)	
HLA DOB1*0602, positive	6/6**	

 $MRI = Magnetic \ Resonance \ Imaging, MSLT = Multiple \ Sleep \ Latency \ Test, \ *MSLT \ pending \ for one \ patient \ **HLA \ pending \ for two \ patients.$

Conclusion: All patients had excessive daytime sleepiness. Interestingly over half of these young patients had cataplexy on presentation. H1N1 vaccination was not given to the majority of these patients. More research is needed to understand the recent increase in the prevalence of childhood narcolepsy with cataplexy.

P1081

Diaphragmatic excursion in Duchenne muscular dystrophy (DMD) studied by M-mode ultrasonography

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Techniques traditionally employed to assess diaphragmatic weakness or paralysis in DMD, i.e. transdiaphragmatic pressure, EMG, fluoroscopy, plethysmography, MRI are invasive, associated with radiation or complex. The aim of this study was to determine the feasibility of diaphragmatic excursion (DE) measurements by ultrasonography (US) as an alternative.

Eight DMD patients (age 15.2 ± 4.1 yrs, BMI 20.5 ± 5.6 kg/m², FVC $59.3\pm20\%$ pred) and 10 healthy controls (age 25.4 ± 4.3 yrs, BMI 22.3 ± 2.5 kg/m²) were studied by M-mode US transverse scanning in supine position using a convex probe (2.7-5 MHz) positioned in the right subcostal anterior area. DE was determined by a custom-designed software for image processing at end-inspiration and end-expiration during quiet breathing (QB) and at full inspiration during an Inspiratory Capacity (IC) maneuver. In DMD, DE was in average 17.2 ± 4.7 (SD) and 32.8 ± 8.9 mm during QB and IC, respectively, whereas in controls it was 24.2 ± 8.1 and 57.5 ± 11.1 mm (see fig. for individual data). ANOVA analysis revealed significant differences in DE values between QB and IC in both DMD and controls (p<0.001) and between DMD and controls during both QB and IC (p<0.001).



In conclusion, DE is significantly reduced in DMD patients during both spontaneous breathing and maximal inspiration. US M-mode assessment of diaphragmatic displacement is a reliable noninvasive method for functional assessment of the diaphragm.

P1082

Maximal expiratory flow (MEP) and maximal inspiratory flow (MIP) in children with asthma and/or obese children

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Asthma and obesity cause alterations in the respiratory system because both diseases involve changes in the mechanics of airways and a systemic inflammation. The aim of this study was to compare the functionality of the respiratory musculature in a group of obese, asthmatic, obese-asthmatic children and controls, in order to determine if obesity cause a weakness in the respiratory muscles themselves. We tested 152 children, from 8 to 16 years of age, divided as follows: 31 asthmatics, 42 controls, 56 obese and 23 obese-asthmatic children. Every child performed a respiratory muscles function evaluation (MIP and MEP).

MIP and MEP values were comparable between obese (58.3 cmH2O and 49.6 cmH2O, respectively), obese-asthmatics (52.4 cmH2O and 50.6 cmH2O) and asthmatic children (64.4 cmH2O and 51.7 cmH2O) whereas controls parameters had lower values (45.0 cmH2O and 38.5 cmH2O, respectively; p < 0.01 and p=0.05). In conclusion obese children have normal MIP and MEP values, higher then the values of the controls. We suppose that this difference can be explained by a habit in the respiratory effort of the asthmatic children, with a greater force on the respiratory musculature of the obese children and by a poor compliance of the control group.

P1083

Response to β_2 -mimetics in asthmatic children: Which lung function parameters present reliable response?

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Rationale: Reversible airflow limitation after short-acting β_2 -agonist (SABA) is considered as a hallmark of asthma. However, in asthmatic children pulmonary hyperinflation significantly influences airway patency [1]. 'Effective' specific resistance (sR_{eff}) measures resistive changes throughout the whole breath cycle concomitantly to changes of resting end-expiratory level [2].

Objectives: Response to SABA assessed by various lung function parameters in asthmatic children.

Methods: Lung function measurements performed in 194 asthmatic children provided base-line (BL) data of functional residual capacity (FRC_{pleth}), sR_{eff}, sR_{tot}, volume-time and flow-volume indices such as FEV₁, MEF₅₀, and MMEF_{75.25}, analysed as SDS by z-transformation using reference equations. Reversibility was considered, if after inhalation of 1.25 mg albuterol lung function improved > 2 SD from BL.

Results: Significant response to SABA was found for sR_{tot} in 99.3%, sR_{eff} in 69.6%, MEF₅₀in 46.8%, MMEF₇₅₋₂₅ in 23.2% FRC_{pleth} in 15.5% and FEV₁ in 3.6% of all 754 tests. In 12.5% of tests, however, spirometry failed to indicate airway limitation at BL. Significant mean differences of improvement in SD were found for sR_{eff} 3.6±3.0, sR_{tot} : 3.4±3.0, and MEF₅₀: -2.0±2.52. Response to SABA was significantly higher in tests demonstrating airway obstruction only than in those with concomitant pulmonary hyperinflation (p< 0.001).

Conclusions: Compared to plethysmography, spirometry may fail detection of abnormal airway dynamics at BL, and otherwise only MEF_{50} reached significant response to SABA.

[1]. Kraemer R, et al.: J Pediatr 1983;102(3):347-350. [2]. Matthys H, et al.: Respiration 1975;32(2):121-134.

P1084

Within-breath changes in respiratory impedance in healthy neonates

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There are limited data on respiratory impedance (Zrs) in healthy newborns and infants and the within-breath changes of Zrs are not known.

We aimed to measure Zrs and the cyclic changes of resistance (R) and reactance (X) as functions of lung volume (V) and respiratory flow (V') in healthy term newborns.

Neonates (n=37) were measured during natural sleep. Forced oscillations at 16 Hz were superimposed on breathing via the face mask. Zrs was estimated with the wave tube technique and V' was measured with a pneumotachograph. Steady-state breathing cycles were selected for the analysis of R and X which were compared at minimum (Vmin) and maximum volume (Vmax), peak inspiratory (V'in) and expiratory (V'ex) flow.

The V' dependence of R was much more marked than the influence of V (see Figure). The difference between R at Vmin $(29.0\pm10.9 \text{ cmH}_2\text{O.s/l})$ and Vmax (28.9 ± 10.7) was negligible, whereas R at V'ex (53.3 ± 22.4) and V'in (45.1 ± 26.2) were far higher than the zero-flow values in the corresponding breathing phase

(P<0.001). Interestingly, X at Vmax (-6.9 \pm 3.0 cmH₂O.s/l) was significantly more negative (P<0.001) than at Vmin (-5.1 \pm 5.0 cmH₂O.s/l).



We conclude that the marked changes in Zrs during tidal breathing in healthy newborns are due to flow nonlinearities in the narrow nasal and glottal pathways. The absence of the V dependence of R may be a result of opposing changes in tissue resistance and airway resistance at Vmax.

P1085

Importance of nutrition status in lung function of infants born preterm with or without bronchopulmonary dysplasia

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Aims: To know if nutrition status (as measured by BMI) is associated to lung function of infants born preterm (PT) with or without bronchopulmonary dysplasia (BPD)

Methods: By means of the raised volume rapid thoracoabdominal compression (RVRTC) technique, FVC, FEV_{0.5}, FEF₅₀, FEF₇₅, and FEF_{25.75} were measured in 61 PT without BPD (65.6% male; corrected age 7.2 \pm 0.7 mo.) and in 55 PT with BPD (59.8% male; corrected age 7.75 \pm 0.9 mo.). A multiple regression analysis -stratified for BPD- was performed for BMI z-score (as calculated according to WHO values) and each lung function parameter (dependent variable), controlling for gender, gestational age, current corrected age, height, birth weight, smoking exposure in pregnancy.

Results: The coefficients of the regression analyses and their significance are shown in table.

	BPD - (n=6	BPD - (n=61)		7)
	Coef. (95% CI)	p value	Coef. (95% CI)	p value
FVC	9.79 (-1.24;20.8)	0.038	8.54 (-2.18;19.2)	0.200
FEV0.5	9.55 (0.57;18.5)	0.015	5.97 (-1.48;13.4)	0.113
FEF50	14.8 (-3.12;32.7)	0.060	3.51 (-16.5;23.5)	0.477
FEF75	15.7 (2.74;28.7)	0.007	8.48 (-2.89;19.8)	0.158
FEF25-75	23.3 (1.50;45.0)	0.027	8.09 (-10.3;26.5)	0.252

Conclusions: Lung function of infants 7-8 months of age, born PT without BPD, increases with BMI. This does not seem to be the case in infants of similar age born PT but with BPD.

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Changes in respiratory mechanics following surgical repair of mitral valve insufficiency in children

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Rationale: Postcapillary pulmonary hypertension (PHT) such as observed with mitral valve insufficiency (MVI) is associated with lung function impairment. We assessed airway resistance (Raw) and total respiratory elastance (Ers) before and after surgical repair of MVI in children to verify whether vascular engorgement is responsible for the increase in airway tone and stiffness of the respiratory tissues. **Methods:** The input impedance of the respiratory system during spontaneous breathing was measured in 16 children, aged 12.3 \pm 2.5 years (mean \pm SD), with congenital or post rheumatic mitral valve insufficiency preoperatively, and within 5 days and 3 weeks after mitral valve repair surgery. Raw was estimated by

calculating the average resistance values between 4 and 26 Hz, while Ers was assessed from the respiratory reactance data by model fitting.

Results: Raw decreased significantly 5 days after the surgery $(5.5\pm1.6 \text{ to } 4.3\pm1.0 \text{ cmH2O.s/l}, p<0.001)$. It remained lowered 3 weeks later in 8 children $(4.5\pm1.4 \text{ cmH2O.s/l}, p=0.003)$. Conversely, Ers exhibited no significant changes postoperatively (70±10, 58±6 and 77±9 cmH2O/l, before and 5 and 21 days after the surgery, respectively, p=0.4)

Conclusions: Decreasing vascular engorgement after surgical reparation of MVI in children results in a fast and sustained improvement in airway function. The lack of concomitant beneficial changes in the Ers suggests that mechanical interdependence between the airways and pulmonary vasculature is responsible for this finding.

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Longitudinal follow-up of lung function in ataxia telangiectasia

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Rationale: Individuals with Ataxia Telangiectasia (AT) are vulnerable to the development of significant pulmonary complications with age. This condition calls for a follow up on lung function evaluation.

Objectives: To follow the individual patient's lung functions during 3-5 years **Methods:** Yearly best spirometry data were collected from 39 AT patients (age 10.4 ± 5.3 years; 13 patients younger than 7 years). The yearly decline in spirometry indices were defined in relation to the preceding year, initial age, and airway hyper-reactivity (a positive response to $\beta2$ -agonist). **Results:** Young children showed low FVC (%predicted) between 43.1-70.7%.

Results: Young children showed low FVC (%predicted) between 43.1-70.7%. Yearly decline in spirometry was $-3.4\pm9.4\%$, $-2.7\pm7.6\%$; -5.9 ± 10.4 ; for FVC, FEV1 and in PEF respectively. FEF25-75 increased by $1.6\pm12.1\%$ /year. Patients having airway hyper-reactivity (n=21) showed initially worse flows (%predicted) than others in FEV0.5 (41.6\pm18.5\% vs. 57.7\pm15.7\%, p<0.0055) and in FEF25-75=83.3±19.2% vs. 106.3±20.8%; p<0.0006).

Conclusions: Young A-T patients showed a restricted FVC pattern that deteriorated with age. Patients having hyperactive airways showed initially restric-tive/obstructive worse lung function than others. Airway to volume ratio increases with age implying hypoventilation. The findings call for a restricted follow up on lung function in A-T patients.

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WITHDRAWN

P1089

Diagnostic value of nasal NO measurement using the NIOX MINO device <u>Andreas Jung</u>¹, Selina Summermatter², Christian Geidel³, Alexander Möller¹, Günter Menz³, Roger Lauener³. ¹*Paediatric Respiratory Medicine, University Childrens' Hospital, Zurich, Switzerland;* ²*CK-CARE, Christine Kühne – Center for Allergy Research and Education, Davos, Switzerland;* ³*Respiratory Medicine, Hochgebirgsklinik Davos, Switzerland*

Background: Screening for primary ciliary dyskinesia might become more widespread with the release of the new NIOX MINO hand held nasal NO (nNO) analyzer. However, no data on accuracy and quality of the measurements are available. This study aimed to compare nNO analysis with the NIOX MINO to the NIOX FLEX gold standard device.

Methods: Nasal NO was assessed in healthy children and adults by NIOX FLEX, followed by NIOX MINO (flow rate 5 ml/s). For each device, measurements consisted of a tests with subjects holding their breath (BH), followed by a tests with tidal breathing (TB) through a medium-sized straw (Jung 2012). A test was considered valid when nNO values reached a stable plateau.

Results: 48 subjects (median age 34.4 yrs) were included. No optical quality control (nNO or CO2 curve) was available for the NIOX MINO. A BH test with the NIOX MINO requires a breath hold of 45s, which only 12 subjects were able to perform (25%; median breath hold time 25s). In general, NIOX MINO nNO levels were significantly lower than for NIOX FLEX (all p<0.001). For the conventional BH technique, median (quartiles) nNO levels were 861 (670, 1147) ppb for NIOX FLEX vs. 657 (445, 786) ppb for NIOX Mino, whereas median nNO values for the TB technique were 867 (692, 1187) ppb vs. 687 (537, 865) ppb.

Conclusion: Nasal NO values in healthy subjects are generally lower when the NIOX MINO is used, compared to the gold standard method. This might lead to interpretation problems when the technique is applied in patients with chronic rhinosinusitis or younger children with lower expected nNO levels (ongoing studies). No quality control is available for the device, making the correct interpretation of low values even more difficult.

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Leptin and altered pulmonary function in Thai children and adolescents

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Introduction: FEV1 has been found to be inversely related to circulating leptin suggesting that reduced lung function could be related to high leptin levels. **Aims:** To determine the association between pulmonary function with leptin in Thai children and adolescents between 12 to 18 years of age.

Methods: Pulmonary function, expressed as % predicted except FEV1%, and leptin were measured in 39 children and adolescents and divided into 3 FEV1 groups; normal (A), obese normal (B) FEV1 80% and restrictive (C) FEV1<80%. **Results:** BMI were 20.2±1.6 kg/m² in A (n=19), 32.2±4.4 kg/m² in B (n=14) and 36.8±5.9 kg/m² in C (n=6). Group B had comparable FEV1, FVC, MVV and FEV1% to A, whereas C had reduced FEV1 (73.8%), FVC (77.5%) and MVV (73.7%) but normal FEV1% (95.5%). All values except FEV1% were lower than B (FEV1 94.7%; FVC 97.5%; MVV 94.8%) and A (FEV1 89.6%, FVC 89.6%, MVV 897.7%). Group C had significantly higher leptin than A and B, respectively. Moreover, there was a significant negative correlation between FEV1 and MVV with leptin (FEV1, R2= 0.560; MVV, R2 =0.582).

Conclusions: The data suggest that high leptin levels could be responsible for a restrictive lung in obese Thai children and adolescents.