

# Proceedings of Congress

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### The Expression of 5-lipoxygenase mRNA and 5-lipoxygenase-activating Protein mRNA in the Peripheral Blood White Blood Cells in Children with Respiratory Syncytial Virus Bronchiolitis

LY HUANG,<sup>1</sup> XY JIANG,<sup>1</sup> ZH YUE,<sup>1</sup> LZ SUN,<sup>1</sup> QM WANG<sup>2</sup>

<sup>1</sup>Department of pediatrics, the First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China; <sup>2</sup>Guangzhou Children Hospital, Guangzhou, China

**Objectives:** To observe 5-lipoxygenase (5-LO) mRNA level and 5-lipoxygenase-Activating protein (FLAP) mRNA level in peripheral blood white blood cells (WBC) and their correlation to the clinical manifestation in children with RSV bronchiolitis.

**Methods:** Seventeen children who suffered from bronchiolitis and whose nasopharyngeal secretion was positive for RSV-Ag were grouped as cases. Ten preoperative age and gender-matched patients with no evidence of infection were chosen as controls. 5-LO mRNA level and FLAP mRNA level in peripheral blood WBC were measured by FQ Reverse Transcription- Polymerase Chain Reaction in both groups. Severity of RSV bronchiolitis was assessed by respiratory disease assess instrument (RDAI) and the correlation between 5-LO/FLAP mRNA levels and the severity of RSV bronchiolitis was examined.

**Results:** In patient group the mRNA levels of 5-LO ( $0.2364 \pm 0.0332$ ) and FLAP ( $0.4106 \pm 0.0575$ ) were significantly higher than that in control group ( $0.0018 \pm 0.0013$  and  $0.0044 \pm 0.0030$  respectively) ( $P < 0.01$  both). Both the 5-LO mRNA level and the FLAP mRNA level were positively related to the severity of RSV bronchiolitis ( $R = 0.745, 0.594$ , respectively,  $P < 0.05$  both).

**Conclusions:** The mRNA levels of 5-LO and FLAP in peripheral blood WBC in children with RSV bronchiolitis were elevated and positively related to the severity of disease.

### Commensal Clearance by Antibiotics Promotes Airway Hyperresponsiveness via Decreasing Pulmonary Treg after Respiratory Syncytial virus Infection

K NI, N ZANG, Y DENG, EM LIU

Key Laboratory of Developmental Diseases in Childhood (Chongqing Medical University), Ministry of Education, Chongqing 400014, China

**Objectives:** Incentives of recurrent wheezing after respiratory syncytial virus (RSV) infection are not clear. Commensal bacterium can be cleared by broad-spectrum antibiotics, which will affect moderate immune response. The influence of commensal clearance by antibiotics on RSV infection illness and the mechanism are worth exploring.

**Methods:** Three-week-old BALB/c were infected by RSV, and divided into cefoperazone treatment group and distilled water treatment group. Pharyngeal flora changes were tested by PCR after 7 days. The airway inflammation and airway hyperresponsiveness (AHR) were tested at 8d pi and 15d pi. At the same time, pulmonary regulatory T cell (Treg) responses were tested by flow cytometry, pulmonary Foxp3 mRNA expression were tested by real time-PCR, IL-10 and TGF- $\beta$  in airway were tested by ELISA. To understand the influence of allergen stimulation on the process above, 7d-OVA challenge was introduced at 8d pi, and all the tests above were done at 15d pi, 7d-PBS challenge was used as control.

**Results:** The predominant pharyngeal commensal, streptococcus, was cleared by cefoperazone. But *E. coli* appeared after antibiotic treatment. RSV infection induced airway inflammation. At 8d pi, no significant difference was found between antibiotic treatment group and its control group. But at 15d pi, AHR was obviously promoted in antibiotic treatment group vs. distilled water treatment group, which was synchronous with the decrease of

pulmonary Treg. Under OVA challenge, the same results were obtained.

**Conclusions:** Antibiotic treatment could clear pharyngeal commensal bacterium. After RSV infection, commensal clearance caused by antibiotics could prolong the existence of AHR, which may be related to the decrease of pulmonary Treg.

### Etiology Distribution of Nonspecific Chronic Cough of Children in Chongqing Area

XN ZHANG,<sup>1</sup> J YANG,<sup>2</sup> ZX LUO,<sup>1</sup> L REN,<sup>1</sup> B LI,<sup>1</sup> Y DENG,<sup>1</sup> EM LIU<sup>1</sup>

<sup>1</sup>Department of Respiratory Medicine, Children's Hospital, Chongqing Medical University, Key Laboratory of Developmental Diseases in Childhood Ministry of Education, Chongqing (400014), China; <sup>2</sup>Intensive Care Unit 2, Children's Hospital of Hebei Province, Hebei Province (050000), China

**Objectives:** To evaluate the causes of nonspecific chronic cough in children, and investigate the predictors for risk of typical asthma onset from cough variant asthma (CVA).

**Study design:** Four hundred and fifty-one children (255 boys and 196 girls; age range, 1 to 14 years; mean age 63.8±32.6 months) who had a chronic cough for more than 4 weeks presenting to out-patient Department of Children's Hospital, Chongqing Medical University between June 2008 and October 2010 were recruited into this study. All cases were followed up at the second week, the fourth week and the twelfth week after first consultation. One hundred and five children with CVA (56 boys and 49 girls; age range between 1 to 11 years old; mean age 4.59±2.17 years) recruited between June 2008 and September 2009 had been followed up for one year to ascertain whether classic asthma developed or not.

**Results:** Of all the 451 patients, 172 (38.1%) patients received a diagnosis of cough variant asthma (CVA), 136 (30.2%) patients were diagnosed cough variant asthma combined with upper airway cough syndrome (CVA+UACS), 77 (17.1%) patients were diagnosed postinfection cough, 57 (12.6%) patients were diagnosed upper airway cough syndrome (UACS), 3 (0.7%) patients were diagnosed Psychogenic cough, the diagnoses were uncertain in 6 (1.3%) patients. After one year of follow up assessment, 18 of the 105 patients with CVA developed wheezing (identify as wheezing-developed patients).

Results of multivariate logistic analysis showed that age (adjusted OR 1.316, 95%CI 1.005-1.724, P=0.0462) and allergic to pollen (adjusted OR 10.840, 95%CI 1.481-79.356, P=0.0190) were the predictors for wheezing onset from cough variant asthma.

**Conclusions:** Cough variant asthma (CVA), upper airway cough syndrome (UACS), postinfection cough were the three most common causes in children with nonspecific chronic cough in Chongqing area. Sensitive to pollen and the onset age of CVA may be risk factors for the development of wheezing in patients with CVA.

### RSV-induced Airway Inflammation and AHR Persistence in Immunocompromised-BALB/c Mice

E LIU, N ZANG, X XIE, Y DENG, S LI

Department of Respiratory Medicine, Children's Hospital of Chongqing Medical University, Chongqing, China

**Objectives:** This study was designed to characterize the significance of RSV RNA persistence and its relation to RSV-induced chronic airway disease in immunocompromised mice.

**Methods:** Immunocompromised-mice were inoculated with RSV, bronchoalveolar lavage fluid (BALF) was obtained and lung specimens were harvested on day 5, 7, 14, 21, 30 and 60 after inoculation. RSV loads were detected by real-time PCR. Total cells and different cytokines including NGF and BDNF in BALF at different time point were tested with ELISA. Lung histopathology and pulmonary function were detected by H & E and whole-body plethysmography respectively.

**Results:** During the acute phase of infection, RSV loads as indicated by PCR were significantly higher in mice inoculated with RSV. On day 14 until day 60, RSV RNA remained detectable in immunocompromised-mice inoculated with RSV. The copies of RSV were gradually reduced. Total cells in BALF were dramatically increased, and the percentage of lymphocytes had also increased, the percentage of macrophage was reduced after RSV infection. There was a decrease gradually in total cells and lymphocytes, but an increase in macrophage. The inoculating cells were also decreased gradually. IFN- $\gamma$  and TNF- $\alpha$  were dramatically increased on day 7, but not other cytokines. The high level of IFN- $\gamma$  was only persistence to day 14. Interestingly, the concentration of NGF and BDNF in BALF was gradually increased from day 14. The level

of TGF- $\beta$  was dramatically increased only on day 60 after RSV infection. The airway hyperreactivity (AHR) were significantly increased and persistent to 60 days in mice post- RSV infection.

**Conclusions:** Infection with RSV induced acute airway inflammation and AHR was associated with IFN- $\gamma$ , however, the chronic airway disease might be associated with RSV RNA persistence. The role of NGF and BDNF high expression needs to be further elucidated.

### A Cross-sectional Survey of Participation of Asthmatic Children in Physical Activity

BL CHENG,<sup>1</sup> Y HUANG,<sup>1</sup> C SHU,<sup>1</sup> XL LOU,<sup>1</sup> Z FU,<sup>1</sup> J ZHAO<sup>2</sup>

<sup>1</sup>Department of Respiratory Medicine, Children's Hospital, Chongqing University of Medical Science, China.; <sup>2</sup>Department of Respiratory Medicine, Capital Institute of Pediatrics, Beijing, China

**Aim:** This study was undertaken to ascertain the current status of children with asthma taking part in exercise in China.

**Methods:** One hundred and twenty-three asthmatic children (7-14 years old) who had visited our asthma control center between February 2009 and June 2009 were enrolled in this cross-sectional study. Each child had a pulmonary function test and his/her health-related quality of life was assessed. The children also replied to a questionnaire about their physical activity. As a control group, 109 non-asthmatic children from a primary school were questioned about their level of activity.

**Results:** Asthmatic children took part in less exercise than their healthy peers, and 62.6% (77/123) of the children with asthma never reached the criteria of exercise prescription for patients with asthma advised by the American College of Sports Medicine. The asthmatic children were divided into two groups based on the level of activity; compared with the group with a higher physical activity level, more children in the group with lower activity believed that exercise could make their asthma worse, more parents and teachers restricted the children's exercise, and fewer doctors approved them participating in exercise. All of the parameters of basic lung function were higher in the group with higher activity level, and one was significantly higher. Moreover, the children with a higher exercise level had a higher score on all parts of the pediatric asthma quality-of-life questionnaire. About chest distress, dyspnea, or gasping during exercise, but 49.6% (61/123) had these

symptoms only occasionally.

**Conclusions:** In our study group, children with asthma generally did not exercise enough. The conception that children, parents, teachers and doctors have about exercise for patients with asthma should be updated. We need to prescribe appropriate exercise for children with asthma.

### Effects of Urine Leukotriene E4 Detection in Infants with Bronchiolitis

MS SU,<sup>1</sup> MH XU,<sup>2</sup> HL ZHANG,<sup>1</sup> QF CHEN,<sup>1</sup> CC LI<sup>1</sup>

<sup>1</sup>Department of Respiratory Medicine, the Affiliated Yuying Children's Hospital; <sup>2</sup>School of Nursing, Wenzhou Medical College, Zhejiang 325027, China

**Objectives:** To investigate the effects of leukotriene E4 (LTE4) on clinical symptoms, pulmonary function, cardiovascular reactivity and recurrent wheezing in infants with bronchiolitis.

**Methods:** Clinical data of 180 infants with bronchiolitis aged 2 to 12 months were recruited from 2007 to 2009. All subjects were divided into mild and severe groups according to clinical symptoms. Urine samples were obtained to detect the levels of LTE4. Pulmonary function, chest X-ray and cardiac ultrasonic tests were performed, and those severe subjects with and without LTRA treatment were followed for two years.

**Results:** A total of 98 infants (46 girls and 52 boys) had RSV bronchiolitis (54.4%). Urine LTE4 levels were increased with the severity of clinical symptoms. Pulmonary function parameters, namely tPTEF/ tE and vPTEF/ Ve were increased in severe bronchiolitis. Logistic analysis demonstrated RSV infection, atopy and second-hand smoking were risk factors for recurrent wheezing after RSV bronchiolitis. LOC-square showed Urine LTE4 ( $\geq 106.925$  pg/ml) as cut-off to predict for recurrent wheezing (sensitivity 0.688, specificity 0.743). However, chest X-ray and cardiac ultrasonic tests demonstrated no significant differences in the two groups. Two-year follow up study suggested that LTRA treatment may reduce the severity and frequency of wheezing after bronchiolitis.

**Conclusions:** This study demonstrates that urine LTE4 level correlated with severity of symptoms may predict recurrent wheezing in infants, and LTRA treatment may protect infants from recurrent wheezing after bronchiolitis.

### **Risk Factors Associated with the Severity of Asthma Exacerbation in Children: A Retrospective Study of Hospitalization Cases with Asthma Attack in ChongQing, China, from 1996 to 2008**

GC SONG,<sup>1</sup> Y DENG,<sup>1</sup> QB LU,<sup>2</sup> W LIU,<sup>2</sup> EM LIU<sup>1</sup>

<sup>1</sup>Department of Respiratory Medicine, Children's Hospital, Chongqing Medical University, Key Laboratory of Developmental Diseases in Childhood Ministry of Education, Chongqing (400014), China; <sup>2</sup>State Key Laboratory of Pathogen and Biosecurity, Beijing Institute of Microbiology and Epidemiology, Beijing(100071), China

**Objectives:** To investigate respectively the risk factors associated with re-hospitalization, the status asthmaticus and the occurrence of fatal complications such as pneumothorax, mediastinal emphysema and cutaneous emphysema during the exacerbation of asthma in children by analysing their clinical characteristics retrospectively.

**Methods:** In this retrospective study, data were collected on 3370 asthmatic children ( $\geq 12$  months old) admitted to Chongqing Children's Hospital from 1996 to 2008, through standardized chart review forms including all the information of a admission case. Three case-control models from the entire samples were generated: Risk factors associated with the re-hospitalization, status asthmaticus, and fatal complications. Firstly, we made the descriptive analysis of the entire samples. Then, we described the 3 models' characteristics followed by the univariate  $\chi^2$  test or Fisher's exact test analysis and multivariate logistic regression analysis investigating the risk factors associated with 3 conditions.

**Results:** Our results showed that low birthweight, eczema history, allergic rhinitis history and food-medicine allergy history were risk factors for re-hospitalization while rural living place and age  $\geq 24$  months were protective; age  $\geq 72$  months, summer attack and anemia were the risk factors for status asthmaticus and having older siblings was protective; The interaction analysis of age-gender demonstrated female of older age had higher risk of status asthmaticus; age  $\geq 108$  months and respiratory tract infection were risk factors for fatal complications.

**Conclusions:** The recurrent acute asthma attack, the status asthmaticus and the occurrence of fatal complications are associated with BW, age, living place, RTI, anemia and so on. The further prospective study for analyzing the risk factors of the recurrent and severe acute asthma attack in childhood need to be considered and could guide the prevention and treatment of asthma in the future.

### **An Analysis of Factors Determining Asthma Control in a Secondary Care Asthma Service: A Prospective Cohort Study**

IK LEPCHA

National University Hospital, Singapore

**Objectives:** Guidelines for managing asthma emphasize the importance of asthma control as an important outcome measure for chronic disease management but there are few studies assessing real-world effectiveness of asthma care programmes. A prospective cohort study of asthma control, according to GINA guidelines, and predictors of poor control amongst children aged 1-18 years with chronic asthma requiring long term follow-up in a secondary care asthma service was done.

**Methods:** Data were analysed for 15 consecutive clinic visits in 105 children attending between January 2003-December 2010. Binary logistic regression analysis was used to explore the relative contribution of type of asthma treatment prescribed, the presence of eczema and allergic rhinitis symptoms, reported compliance and inhaler technique to disease control.

**Results:** At first referral, 35% and 68% of children were uncontrolled and controlled or partly controlled respectively. Percentages increased to 51% and 79% at the second visit and 47% and 80% at the third visit. Percentages increased gradually thereafter to 63% and 93% at the 15th clinic visit. Admission to missing preventer treatments a few days/month or a few days/week were significantly associated with uncontrolled asthma (OR 1.77 95%CI: 1.13-2.76  $p < 0.012$  and OR 2.45 95%CI: 1.50-4.01  $p < 0.001$  respectively) as was the presence of symptoms of eczema and acute rhinitis at the time of assessment (OR 1.66 95%CI: 1.10-2.49  $p < 0.015$  and OR 1.58 95%CI: 1.11-2.24  $p < 0.01$  respectively). Choice of treatment and steroid dose were not related to asthma control.

**Conclusions:** High levels of asthma control are achievable within comprehensive secondary care services for asthma. Reported non-compliance and active eczema and rhinitis at the time of follow-up are important markers for uncontrolled asthma.

### Secondhand Smoke Exposure Outside Home and Its association with Respiratory Symptoms in Hong Kong Adolescents

SPP TIN, SY HO, MP WANG, HK LAI, TH LAM

School of Public Health, the University of Hong Kong, Hong Kong SAR

**Objectives:** Smoking in most public indoor places has been banned since 2007. Secondhand smoke (SHS) exposure outside home occurred mainly outdoors and was deemed negligible to health. We investigated the post-legislation SHS exposure outside home among adolescents, and its relation with respiratory symptoms among never-smokers.

**Methods:** In 2009, 3181 students from 13 secondary schools (48.4% boys, mean age 14.6 years) reported the number of days exposed to SHS outside home in the past 7 days, the average duration on an exposed day, the location of exposure in the past 30 days, and whether they had any respiratory symptoms (cough or phlegm) in the past fortnight. Logistic regression yielded odds ratios (AORs) for respiratory symptoms by outside home SHS exposure adjusting for age, sex, home SHS exposure and socioeconomic status among 2742 never-smokers.

**Results:** Two-thirds of students were exposed, including 45.7% for 1-4 days and 21.0% for 5-7 days. The mean duration was 49.2 (SD: 193.87) minutes/week. Exposure locations included streets (60.2%), bus stops (35.3%), parks (20.8%), subways (15.4%), covered walkway/footbridges (14.9%), playgrounds (7.3%), others' homes (6.2%), and statutory smokefree indoor premises such as restaurants (13.5%), shopping malls (6.5%) and washroom/back stairs (8.3%). Compared with zero days of SHS exposure outside home, exposure for 5-7 days was associated with respiratory symptoms (AOR: 1.56; 95% CI 1.24 to 1.96) among never-smokers. The AOR remained significant (1.46; 1.12 to 1.86) after excluding students with any indoor exposures outside home.

**Conclusions:** Most Hong Kong adolescents were exposed to SHS outside home, most commonly outdoors but also in statutory smokefree indoor locations. Respiratory symptoms were associated with outside home SHS exposures in general and also with outdoor exposures, suggesting that such harmful effects should not be overlooked. Stronger smokefree policies and enforcement are needed to protect adolescents from SHS.

**Funding:** Health Care and Promotional Fund (22080664) and Hong Kong Council on Smoking and Health (COSH)

### Exposure to Secondhand Smoke at Home Among Adolescents Before and After the 2007 Smokefree Legislation in Hong Kong

R HUANG, SY HO, MP WANG, HK LAI, WS LO, TH LAM

School of Public Health, the University of Hong Kong, Hong Kong SAR

**Objective:** Exposure to secondhand smoke (SHS) at home among primary school students increased after smoking was banned in most public indoor places in 2007. We investigated such exposure among secondary school students in 2009 and compared with that in 2003/04.

**Methods:** Two youth smoking surveys were conducted among form 1 (US grade 7) to 5 students before (2003/04) and after (2009) the smokefree legislation. 36612 (2003/04) and 4486 (2009) students from 85 and 13 schools respectively completed an anonymous questionnaire on socio-demographic characteristics, smoking and the number of days exposed to SHS at home in the past 7 days. In 2009, students also reported the average duration of exposure in an exposed day and who smoked at home.

**Results:** The prevalence of exposure decreased from 32.7% (95% CI: 32.2%-33.2%) in 2003/4 to 25.1% (95% CI: 23.8%-26.4%) in 2009 ( $P<0.001$ ). However, the mean number of exposed days increased from 3.6 days to 4.3 days ( $P<0.001$ ) among those exposed. In 2009, the average duration was 33.7 (SD=61.3) minutes in an exposed day. In exposed families, the smokers were most commonly fathers (69.2%), followed by relatives (15.2%), mothers (14.2%), siblings (8.7%), grandparents (7.2%), and others (5.7%). The prevalence of exposure was much higher for public (29.9%) than private (17.9%) housing ( $P<0.001$ ), and increased from those with high perceived family affluence (18.2%) to those with medium (24.7%) and low (30.8%) affluence ( $P<0.001$ ).

**Conclusions:** The prevalence of SHS exposure at home among Hong Kong adolescents was lower in 2009 after the 2007 legislation than in 2003/04, but still 1 in 4 was exposed. Smoking at home in the presence of children should ultimately be banned. Meanwhile, higher tobacco tax, better smoking cessation services and health education should help reduce the harm of SHS.

**Funding:** Hong Kong Council on Smoking and Health, Department of Health, and the Health Care and Promotional Fund (22080664).

## Associations of Alcohol Drinking and Smoking with Respiratory Symptoms in Hong Kong Adolescents

MP WANG, SY HO, WS LO, TH LAM

School of Public Health, the University of Hong Kong, Hong Kong

**Objectives:** Smoking causes respiratory symptoms and alcohol drinking was associated with some respiratory diseases in adults. Less is known about the respiratory effects of alcohol drinking in adolescents. We investigated the independent and combined effects of alcohol drinking and smoking on respiratory symptoms among adolescents in Hong Kong.

**Methods:** In 2003/04, 34563 form 1 (US grade 7) to 5 students from 85 randomly selected secondary schools completed an anonymous questionnaire on socio-demographic characteristics, smoking, drinking, illicit drug use and secondhand smoke exposure. Smoking status was classified as never (reference), experimental, former and current. Alcohol drinking was categorised as none (reference), <1 day/week and 1-7 days/week. Respiratory symptoms were defined as having persistent coughs or sputum for 3 consecutive months during the past 12 months. The independent and combined effects of drinking and smoking on respiratory symptoms were calculated with odds ratios (AORs) adjusting for potential confounders.

**Results:** One-quarter (24.9%) of students had ever smoked including 13.5% experimenters, 1.8% former smokers and 9.5% current smokers. Compared with never smokers, the AORs (95%CI) for respiratory symptoms were 1.16 (1.04-1.28) in experimenters, 1.26 (1.02-1.56) in former smokers and 1.87 (1.65-2.12) in current smokers ( $P<0.001$  for trend). 21.4% students drank <1 day/week and 6.7% drank 1-7days/week. Compared with no drinking, the AORs(95%CI) for drinking of <1day/week and 1-7 days/week were 1.28 (1.15-1.41) and 1.42 (1.24-1.63) ( $P<0.001$  for trend). Compared with students who were never smokers and non-drinkers, the AOR (95%CI) of respiratory symptoms was 2.57 (2.13-3.11) for those who both currently smoked and drank weekly.

**Conclusions:** Weekly alcohol drinking was associated with excess risk of respiratory symptoms in Hong Kong adolescents comparable to that of current smoking. Those who both smoked and drank had an even higher risk. Health care workers could use these results to dissuade adolescents with respiratory symptoms from drinking as well as smoking.

## Minimal Exhaled Nitric Oxide Production in the Lower Respiratory Tract of Healthy Children Aged 2-7 Years

T AL-AYED,<sup>1</sup> D WITHINGTON,<sup>2</sup> G DAVIS<sup>3</sup>

<sup>1</sup>Department of Pediatrics, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia; <sup>2</sup>Anesthesia and <sup>3</sup>Respiratory Medicine Montreal Children's Hospital, Montreal, Quebec, Canada

**Background:** Elevated exhaled nitric oxide (eNO) has been demonstrated in inflammatory airway conditions e.g. asthma. This study has measured eNO levels in normal preschool children for whom there is little data available and in whom the prevalence of asthma is high. Fifty children, 2-7 years old, undergoing elective surgery, excluding airway procedures, were recruited. Children with known respiratory disease or acute viral infections were excluded.

**Methods:** Gas for eNO measurement was collected in a non-diffusion bag: 1) via the mask after inhalation induction of anesthesia; 2) via endotracheal tube (ETT) or laryngeal mask airway (LMA); and 3) during emergence. Measurement was off-line by chemiluminescent analyzer.

**Results:** Mean eNO level by mask was 10.23 ppb (mean value  $\pm$ SD 8.8-11.1 ppb) after induction and 8.35 ppb (mean value  $\pm$ SD 5.9-10.8 ppb) on emergence. Mean eNO for the intubated group (n=25) was 0.75 ppb (mean value  $\pm$ SD 0.4-1 ppb) ( $p<0.0001$  vs mask); mean eNO for LMA group (n=25) was 2.6 ppb (mean value  $\pm$ SD 2-3.2 ppb), which is different from the mask ( $p<0.0001$ ), and from ETT values ( $p<0.0001$ ).

**Conclusions:** Most eNO is produced by the upper airway in healthy preschool children. The lower airway constitutive eNO production is very low. The LMA does not completely isolate the upper airway, and current mask collection techniques allow significant contamination of samples by sino-nasal eNO production in young children.

## The Polymorphism of IFN- $\gamma$ CA Short Tandem Repeats is Associated with the Susceptibility of RSV Bronchitis

MZ ZHANG, LB WANG, AZ LU, XB ZHANG, C CHEN

Department of Respiratory Care, Children's Hospital of Fudan University, Shanghai 201102, China

**Objectives:** To study the relationship between the polymorphism of CA short tandem repeats of IFN- $\gamma$  gene and the susceptibility of RSV bronchitis.

**Methods:** The CA short tandem repeats in the first intron region of IFN- $\gamma$  gene were tested by capillary electrophoresis in 168 inpatients with RSV bronchitis, 215 inpatients with non-RSV pneumonia and 88 healthy children. In addition, the severity of RSV infection in children with RSV bronchitis was evaluated by RSV scoring.

**Results:** (1) The frequencies of (CA12)<sup>+</sup>/(CA12)<sup>+</sup>, (CA12)<sup>+</sup>/(CA12)<sup>-</sup> and (CA12)<sup>-</sup>/(CA12)<sup>-</sup> in the RSV bronchitis group were 8.9%, 58.3% and 32.7% respectively. The frequencies of (CA12)<sup>+</sup>/(CA12)<sup>+</sup>, (CA12)<sup>+</sup>/(CA12)<sup>-</sup> and (CA12)<sup>-</sup>/(CA12)<sup>-</sup> in the non-RSV pneumonia group were 19.5%, 52.1% and 28.4% respectively. The gene polymorphism of IFN- $\gamma$  CA short tandem repeats between both groups was statistically different ( $\chi^2=8.392$ ,  $P=0.015$ ). (2) The frequency of 12-time IFN- $\gamma$  CA repeats was 38.1% in the RSV bronchitis group, which was significantly lower than that in the non-RSV pneumonia group (45.58%) ( $\chi^2 = 4.331$ ,  $P=0.037$ ). (3) The clinical RSV scores of children with 12-time IFN- $\gamma$  CA short tandem repeats ( $2.91\pm 0.46$ ) were lower than those without 12-time CA short tandem repeats ( $3.0\pm 0.43$ ) ( $t=2.005$ ,  $P=0.047$ ).

**Conclusions:** The polymorphism of IFN- $\gamma$  CA short tandem repeats is associated with the susceptibility of RSV bronchitis. If a patient has 12-time CA short tandem repeats and the serum IFN- $\gamma$  level is high, then the patient's conditions are mild and the possibility of developing into severe RSV is relatively low.

### Comparison of Characteristics and Outcome of Pediatric Hypoxemic Respiratory Failure from Three Nation-wide Pediatric Network Studies

B SUN AND CHINESE COLLABORATIVE STUDY GROUP FOR PEDIATRIC HYPOXEMIC RESPIRATORY FAILURE

Departments of Pediatrics and Pediatric Critical Care, Children's Hospital of Fudan University, Shanghai, China

**Background:** In recent development of advanced respiratory care in Chinese pediatric intensive care unit (PICU) at tertiary centers, the interventions such as restricted tidal volume ( $V_T$ ) and fluid administration that improved survival of adult ARDS have impact on the management of acute respiratory distress syndrome (ARDS), but their overall efficacy has not been evaluated in pediatric ARDS yet.

**Objectives:** To evaluate whether a treatment protocol of respiratory support with restricted  $V_T$  and fluid balance may improve survival for children with acute hypoxemic respiratory failure (AHRF) and reduce the risk of ARDS.

**Methods:** Data from three multicenter surveys of AHRF in pediatric PICU network conducted in 2004-2010 were analyzed. A protocol of restricted  $V_T$  and fluid balance in the first seven days was recommended in the treatment of AHRF and ARDS

**Results:** Compared with the previous two surveys in 2004-2007, the results in 2009 revealed: the incidence of AHRF was consistent with 2007 (3.6% vs. 4.0%), but the mortality of AHRF was lower than the previous study in 2007 (30.3% vs. 41.6%), and the mortality of ARDS (32.8%) was also lower than the previous two studies in 2005 and 2007 (62.9%, 44.8%). The same tendency was true for the mortality of the underlying diseases with ARDS in these three studies: 60.3%, 42.6% and 31.1% for pneumonia, and 79.2%, 62.7% and 35.7% for sepsis, respectively. The costs and length of PICU stay were variable in the three studies.

**Conclusions:** The results demonstrate a decreasing trend in the mortality of AHRF, representative of current status of AHRF in these PICUs. There is no strong link between the recommended treatment protocol and reduction of the mortality of AHRF. These evidences should be a benchmark and guide in future studies for more efficient intervention.

### Systemic Inflammation and Endothelial Function in Children with Asthma: Effects of Intervention

AM LI, KCC CHAN, CM NG, CT AU, P CHOOK, HS LAM  
Department of Paediatrics, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

**Background:** Recent evidence from adults suggests uncontrolled asthma can lead to systemic inflammation. There is currently no similar data in the paediatric population.

**Objectives:** This study aimed to assess correlation between airway, systemic inflammation and endothelial function in children with uncontrolled asthma, and to examine changes in endothelial function after initiation of inhaled corticosteroids (ICS).

**Methods:** Children with uncontrolled asthma (Asthma

Control Test score <19) and necessitated the initiation of ICS were recruited from the Chest and Paediatric General Clinic at the Prince of Wales Hospital. After baseline investigations, each subject was given ICS (Fluticasone 125 mcg per puff) to be taken twice daily. Repeat assessments were carried out 2 months after initiation of ICS. The investigations included lung function test, FeNO measurement, endothelial function test (flow-mediated dilatation following hyperaemia) and completion of a symptom questionnaire (ACT). The results were compared with that from healthy normal controls recruited from a sleep apnoea survey study.

**Results:** Twenty-three uncontrolled asthmatic children of whom 12 were boys, with mean±SD age of 11.2±2.9

years were recruited. Twenty-three age- and BMI-matched healthy normal controls, without snoring and any atopic disease, were also recruited for comparison. Uncontrolled asthmatic children were found to have lower flow-mediated dilatation (FMD) than controls, although it did not reach statistical significance (7.99±0.81 vs. 8.42±0.79,  $P=0.077$ ). Twenty-two subjects were prescribed ICS treatment and there was significant improvement in FMD at 2 months' follow-up (pre vs. post-FMD, 7.94±0.78 vs. 8.68±0.53,  $P<0.001$ ).

**Conclusions:** Uncontrolled asthmatic children appeared to have poorer endothelial function than healthy controls, and ICS intervention could significantly improve their endothelial dysfunction.