

Oral Abstract Session 7

Peering into the Future: Interventions for Pediatric Allergy and Respiratory Diseases

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Serum Periostin Levels are Associated with Allergic Sensitization in 7 Years Old Children

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Background: Previous studies have used serum periostin levels as a biomarker of Th2-driven inflammatory responses. However, no population-based study has yet examined the association of serum periostin levels with the allergic status of children.

Objective: The aim of this study was to determine the relationship of serum periostin levels with sensitization to allergens and perinatal and postnatal factors in 7 years old children.

Methods: This prospective cross-sectional study examined 451 children enrolled from the general pediatric population who were at 6 different schools between June and July 2016. Of the 451 children with aged 7 years, 249 children with questionnaire data, skin prick test, and blood samples were included for the final analysis.

Results: The geometric mean serum periostin level was 107.6ng/mL (95% confidence interval [CI]: 104.5–110.7). After adjustment for confounding, serum periostin levels were significantly associated with sensitization to poly-allergens (adjusted odds ratio [aOR]=1.032, 95% CI: 1.006–1.059, P=0.016) and pollen (aOR=1.020, 95% CI: 1.002 – 1.039, P=0.026). Serum periostin level were also associated with eosinophil level (adjusted β =0.023, SE=0.009, P=0.010), exposure to secondhand smoke during pregnancy (aOR, 1.083, 95% CI 1.005–1.168, P=0.036), and weaning before 6 months (aOR 1.098, 95% CI 1.025 –1.176, P=0.008), but was unrelated to body mass index, sex, obesity, or presence of an allergic disease.

Conclusion: Serum periostin levels may affect the severity and sub-phenotypes of allergic diseases in 7 years old children.

Key Words: Allergen, Pediatrics, Periostin, Polysensitization

Pattern of Allergen Sensitization in Filipino Pediatric Patients with Allergic Diseases Seen in an Allergy Clinic

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Background: Allergen sensitization is strongly associated with most common allergic conditions such as rhinitis, asthma and atopic dermatitis. We aimed to describe the sensitization patterns among pediatric patients and explored possible association with various allergic diseases.

Methods: This is a chart review of skin test results and medical records of all patients diagnosed with allergic diseases aged 19 years old and below, who underwent allergy skin prick testing from 2007–2017 at the Allergology and Immunology unit of a tertiary hospital. Clinical and demographic data were collected and data analysis was performed using Strata SE version 13.

Results: A total of 202 allergen skin prick test results were analyzed. Among all patients, sensitization to house dust mite (HDM) and crab meat were the most common aeroallergen and food allergen sensitization. Patients with AR were significantly sensitized with Dermatophagoides pteronyssinus (Dp) (p=0.005) and crab meat. Severe intermittent and severe and persistent AR were significantly associated with koroskorosan (p=0.005) and yardgrass (p=0.041) sensitization. Mild persistent AR was associated with shrimp sensitization (p=0.033). Patients with bronchial asthma were commonly sensitized to HDM and shrimp. Sensitization to mosquito was associated with controlled and uncontrolled asthma (p=0.028). Patients with atopic dermatitis were commonly sensitized to Dp and shrimp paste.

Conclusion: Sensitization to Dp was associated with AR and common in AD. Sensitization with yardgrass and koroskorosan were associated with severe intermittent and persistent AR. Sensitization to mosquito was associated with controlled and uncontrolled asthma. Sensitization to shrimp was associated with mild persistent AR and common in asthma.

Associations of Urinary Triclosan and Propylparaben with Serum Staphylococcal Toxin-Specific IgE (ST-IgE) and Severity of Allergic Diseases

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Heavy usage of industrial products containing triclosan and parabens can lead to microbiome imbalances in the human body, and this may explain the effects of these chemicals on increasing the sensitization to allergens. We hypothesized that urinary levels of triclosan and parabens are associated with increased staphylococcal toxin (ST)-IgE level and the severity of allergic diseases. This study enrolled 485 fifth- and sixth-grade subjects from the Seongnam Atopy Project of 2017. The serum levels of staphylococcal enterotoxin A (SEA), B (SEB), and toxic shock syndrome toxin (TSST), and the urinary levels of triclosan, propyl-, methyl-, ethyl-, and butylparaben were determined. We also performed impulse oscillometry and acoustic rhinometry, and measured fractional exhaled nitric oxide (FeNO), eczema area and severity index (EASI). A urinary triclosan concentration in the 5th quintile was associated with increased SEA ($\alpha\beta$ 0.880, $P<0.001$) and SEB ($\alpha\beta$ 0.683, $P=0.018$), and a trend toward increased TSST ($\alpha\beta$ 0.140, $P=0.037$), compared to the 1st quintile. In addition, high triclosan level increased the risk of allergic rhinitis (aOR 2.000, $P=0.031$), atopic dermatitis (aOR 2.967, $P=0.009$) and the Rrs5-20 (reactance at 5 Hz, aOR 1.033, $P=0.038$). A propyl paraben concentration in a high quintile was associated with an increasing trend in SEA ($\alpha\beta$ 0.179, $P=0.001$), SEB ($\alpha\beta$ 0.273, $P=0.001$) and TSST ($\alpha\beta$ 0.261, $P<0.001$) and propyl paraben level was related to severe EASI (aOR 1.008, $P=0.030$) in atopic dermatitis and with decreased nasal patency ($\alpha\beta$ -0.120, $P<0.001$). Interestingly, compared with children with triclosan in the 1st quintile, those with triclosan in quintile 5 showed a reverse association with FeNO (OR 0.477, $P=0.025$) and total eosinophil count (OR 0.419, $P=0.017$). Elevated urinary levels of triclosan and propylparaben are associated with increased sensitization to staphylococcal enterotoxin, and with increased risk and greater severity of allergic disease.

Key Words: Triclosan, Paraben, Allergic sensitization

Evaluation of the Dose Effect of Birch Pollen-based Subcutaneous Immunotherapy for Apple Allergy

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Purpose: Some patients with sensitization to birch develop apple allergy. Birch pollen allergen-specific subcutaneous immunotherapy (SCIT) is reportedly beneficial for apple allergy; however, the dose efficacy of birch pollen-based SCIT for apple allergy remains unclear. The purpose of the present study was to evaluate the optimal effective dose of birch pollen-based SCIT for apple allergy.

Methods: Thirteen patients (7 male and 6 female; age 6-16 years) with apple allergy and sensitization to birch were administered birch pollen SCIT (Birch Mix 1:10 w/v; ALK-Abello, INC.). Apple and birch-specific IgE levels were determined before and after 2 years of maintenance SCIT. Immunological changes were compared between high-dose group ($\geq 1:100$ w/v 0.1 ml) and low-dose group ($< 1:100$ w/v 0.1 ml).

Results: The high- and low-dose groups had 7 and 6 patients, respectively. The apple-specific IgE levels tended to decrease in the high-dose group (from 18.9 to 9.89 UA/ml), whereas these levels did not among low-dose group (from 3.29 to 5.12 UA/ml). The birch-specific IgE levels tended to decrease in both the groups.

Conclusions: Although further studies are needed to confirm the statistical significance of the difference, our result suggested that the optimal dose of birch pollen allergen-specific SCIT for the treatment of apple allergy was above "1:100 w/v 0.1 ml" to produce the desired effect.

Outcomes of Respiratory Allergic Diseases in School Children by Phenotypes of Allergic Disease in Early Childhood: PSKC Study

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Background: Atopic dermatitis (AD) and food allergy (FA) are the first step of atopic march and have variable disease courses. However, there have been few studies on the comparison of natural course of FA and AD in children, in terms of their respiratory comorbidities. Therefore, we analyzed and compared the respiratory comorbidities of FA and AD in children.

Methods: The Panel Study on Korean Children (PSKC) cohort recruited in 2008 and has since followed these subjects annually, and total of 1,577 children were followed in 2015. Among them, 3 groups (AD without FA group, FA without AD group and AD with FA group) were selected according to AD diagnosis history before 3 years of age and FA diagnosis history from the questionnaire. The respiratory comorbidities were investigated at age of 5, 6, and 7. And skin prick tests and bronchial challenge test were performed at age 7 years. We compared the respiratory comorbidities and the results of allergic evaluation in each group.

Results: In PSKC, the number of subjects in AD without FA was 174 (11.1%, 174/1573), FA without AD was 56 (3.6%, 56/1573), and AD with FA was 32 (2.0%, 32/1573). In AD group regardless of FA, the wheezing episode tended to increase, as age increased from 5 years to 7 years. However, in FA without AD group, wheezing episodes tended to decrease, as age increased from 5 years to 7 years. In the allergic sensitization rate at 7 years of age, FA without AD group was the lowest (43.5%), and AD with FA group was the highest (52.9%). FA without AD group had the lowest rate of bronchial hyperresponsiveness (PC20 < 16 mg/ml) (19.0%), and AD without FA was 34.1%, and AD with FA was 27.3%.

Conclusions: There was a difference in the effect on the respiratory allergic diseases in school children according to phenotype of allergic disease composed of AD and FA which started in early childhood. Understanding of the distinctive phenotypes of allergic disease in early childhood can be helpful in the management.

Key Words: Food allergy, Atopic dermatitis, Respiratory comorbidities

Neonatal Outcomes of Women with Recurrent Pregnancy Loss from Immunologic Causes in the Philippine General Hospital from 2010-2015

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Purpose: Recurrent pregnancy loss (RPL), defined as 3 consecutive pregnancy loss, may be associated with several immunologic and non-immunologic etiologies. Pregnant women with RPL from immunologic cause are classified as high-risk due to its association with serious morbidity for mother and fetus. This study hopes to guide physicians in close monitoring and early intervention of mothers with RPL and their neonates. This aims to determine the neonatal outcome of infants born from mothers with Recurrent Pregnancy Loss from immunologic causes at the Philippine General Hospital (PGH) from 2010-2015.

Methodology: A retrospective study which included all neonates born from mothers with immunologic cause of RPL from 2010-2015 based on the patient database of the section of Allergy and Immunology of PGH. Results were expressed as numbers, percentages and mean, standard deviation for categorical and continuous variables respectively.

Results: The prevalence of neonates born from mothers with RPL from identified immunologic causes and unexplained causes among all infants born at the PGH from 2010 to 2015 is 0.18%; 5.1% were classified as Classical Antiphospholipid Antibody Syndrome (APS), 63.8% as Obstetric Morbidity Associated with APS (OMAPS), 31% had an unexplained cause and no cases under Other Immunologic Causes. Most neonates under Classical APS were born live, fullterm, via Cesarean delivery with a mean birth weight of 2206 g±539.48 with Apgar Score (AS) of 9 and 9; under OMAPS were born live, fullterm, via Cesarean delivery with a mean birth weight of 2537±737.46 grams and AS of 9 and 9; and with unclassified cause of RPL were born live, fullterm via Cesarean delivery with a mean birth weight of 2228.75±887.05 and an AS of 9 and 9.

Conclusion: Majority of infants born from mothers with RPL from immunologic or unexplained cause had a good birth outcome.

Overweight/Obesity Trajectories and Asthma in Children: From COCOA Study

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Background: The prevalence of childhood asthma has been increasing worldwide in parallel with obesity.

Purpose: We investigated the association of temporal weight gain in early life and asthma in children.

Methods: This study includes 850 children from the COhort for Childhood Origin of Asthma and allergic diseases (COCO) birth cohort. Body mass index z-scores adjusted for age and sex were generated according to World Health Organization criteria and overweight/obesity (OW/OB) was defined > 97 percentile. Group-based trajectory modeling of OW/OB was performed and plotted from birth to 6 years. Asthma was defined by ever diagnosis of asthma to 9 years. To characterize the trajectories, general factors and biochemical measurements in cord blood (CB) were compared.

Results: Four trajectories of OW/OB were identified: 'normal', 'delayed over-weighted', 'early transient overweight', and 'early persistent obesity'. Early persistent obese children had lower CB vitamin D, higher CB IL-13 level, and high rate of bronchial hyperresponsiveness at 6 or 7 years. Lower cord blood vitamin D increased the risk of early persistent obesity (aOR, 95% CI=3.10, 1.05-9.15). Early persistent obese children (aOR, 95% CI=2.25, 1.03-4.92) and delayed over-weighted children (3.48, 1.22-9.92) exhibited significantly increased risk of asthma.

Conclusion: Early persistent overweight characterized by lower cord blood vitamin D have higher risk of asthma in children. More research is needed to explain the influence of prenatal vitamin D and abnormal weight gain in early life on the development of asthma.

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Key Words: Obesity, Asthma, Cohort

Carrying Rates of Epinephrine Devices in Children with Food-Induced Anaphylaxis

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Purpose: Carrying epinephrine can save lives in patients with anaphylaxis. The feature of epinephrine in pre-filled syringe that commonly prescribed in Thailand may influence the willingness to carry. However, the rates of carrying pre-filled syringe epinephrine are unknown in children with history of food-induced anaphylaxis. This study was performed to determine the rate of epinephrine carrying in children with history of food-induced anaphylaxis and factors influencing the decision to use the devices.

Methods: A cross-sectional study was conducted by performing the structured interview in the parent(s) who were the main caregiver of the children with history of food-induced anaphylaxis.

Results: The parents of 99 children (male 50.5%) were interviewed. The median age of the child was 11 years old (range 9 months-18 years). Rate of carrying epinephrine was 84.7% (always 57.5%, some occasions 27.2%). The most common reason for not carrying was the thoughts that the children could avoid the food allergens. The first-aid facility at school was available in 48.3%. Rate of carrying epinephrine tended to be lesser in children attend the schools without first aid facility (P=0.053). Forty-one patients had relapsing episodes, 34 (82.9%) had epinephrine carried, and 20 (58.8%) injected the epinephrine. The most common reason for not using epinephrine despite carrying was that they were afraid of getting injection (28.5%).

Conclusion: Most children with history of food-induced anaphylaxis carried epinephrine, but only half used it at the episodes. Interventions to promote epinephrine-carrying and injection training are needed in our setting.

Comparison of Clinical Severity between Single and Co-Infections in Respiratory Syncytial Virus (RSV) and Influenza Virus

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Background: Multiple virus infections may affect clinical severity. We investigated the co-infection effect for clinical severity of respiratory syncytial virus (RSV) and influenza virus with other respiratory viruses.

Methods: Data for 634 samples from a single tertiary hospital between September 2014 and April 2015 were analyzed for clinical characteristics (fever duration and respiratory difficulties – O₂ need, steroid use and ICU care) between single infection and co-infection of RSV (n=290) and influenza (n=74) virus with 16 common respiratory viruses from hospitalized children.

Results: RSV co-infection group (n=109) (3.1±2.7 days) showed significantly longer fever duration than RSV single infection group (n=181) (2.6±2.6 days) (P=0.04), while there was no differences in O₂ need, steroid use or ICU care in two groups.

Influenza co-infection group (n=38) showed significantly higher O₂ need than Influenza single infection group (n=36) (21.1% vs. 5.6%, P=0.05) while there were no differences in fever duration between two groups.

Conclusion: The results indicate that RSV and Influenza co-infections increase the clinical severity, and this severity may be influenced by the nature of the co-infecting viruses.

Key Words: Respiratory syncytial viruses, Influenza, Co-infection

Clinical Outcomes of Lung Transplantation in Children: Single Center Study

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Background: Lung transplantation (LT) is the only curative treatment for end-stage lung diseases. LT cases in Korea are gradually increasing since the first case performed in 1996. Our aims are to evaluate the outcomes of lung transplantation in children at a single center.

Methods: We retrospectively evaluated the outcomes and survival rate of 15 children who received lung transplant at Asan Medical Center between August 2011 and February 2019 through medical chart review.

Results: A total of 15 children (M:F=9:6) received LT. The mean age of lung transplant recipients was 10.1±5.1 years (1.7–16.9 years). The reasons for LT were bronchiolitis obliterans syndrome after hematopoietic stem cell transplantation (HSCT) (5 of 15 patients, 33.3%), interstitial lung disease (ILD) after HSCT (3 of 15, 20.0%), ILD due to chemotherapy-induced lung injury (1 of 15, 6.7%), ILD due to pulmonary alveolar proteinosis (1 of 15, 6.7%), cystic fibrosis (2 of 15, 13.3%), primary pulmonary hypertension (1 of 15, 6.7%), lung injury induced by humidifier disinfectant (1 of 15, 6.7%), and bronchopulmonary dysplasia (1 of 15, 6.7%). Among the 15 patients, only two expired: one patient died of fungal infection and one died of postoperative bleeding. The mean observation period was 1.9±2.5 years. The one-year survival rate was 92.9%. As of complications after LT, 3 patients changed immunosuppressants because of adverse drug reactions, and 2 patients were diagnosed with diaphragmatic palsy. In addition, polyneuropathy, fungal infection, post-op bleeding, right pulmonary vein stenosis and sepsis occurred in one case each.

Conclusion: In Korea, the leading indication for LT was pulmonary disease after HSCT. An early outcome of LT in Korea was comparable to the results from International Society for Heart and Lung Transplantation. Pulmonary transplantation in children can be an acceptable choice that improves the survival rate of children with end-stage lung disease in Korea.

Key Words: Lung transplantation, Outcomes, Children

Pre Transplant Diffusing Capacity Predicts Long Term Survival after Hematopoietic Stem Cell Transplantation in Children

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Background: A single breath carbon monoxide diffusing capacity (DLCO) is commonly used to measure diffusing capacity of lung. The purpose of this study was to evaluate the pre-transplant diffusing capacity as predictors of outcome in pediatric allogeneic hematopoietic stem cell transplantation (HSCT).

Methods: We conducted a retrospective analysis of the pre-transplant pulmonary function who underwent allogeneic HSCT. Pre-transplant FEV1, FVC, total lung capacity(TLC), DLCO, DLCOadj, DLCO/VA (KCO), DLCOadj/VA and lung function score (LFS) were assessed for association with development of mortality in Cox proportional hazard logistic models. DLCO was adjusted Hb using the cotes methods, and expressed as a percent of predicted according various reference equations including polgar and GLI 2017.

Results: Total mortality rate after HSCT was 21.1% (59/279) and non-relapse mortality (NRM) rate was 10.6% (28/279). There was no difference in pre-transplantation DLCO results between total mortality and survival group. Univariate analysis showed that patients with higher pre-transplant LFS (grade III hazard ratio [HR], 2.85, $p=0.060$; category IV HR, 5.53; $p=0.036$) had increased risk of NRM. Multivariate analysis indicated that lower pre-transplant DLCOadj %pred (category III hazard ratio [HR], 2.91, $p=0.039$), VA %pred (category II hazard ratio [HR], 2.85; category III HR, 3.80; $p=0.010$) are associated with a significant increased risk for NRM.

Conclusion: Compromised pre-transplant diffusing capacity and higher lung function score significantly increased risk for NRM after allogeneic HSCT in children.

Key Words: Pulmonary, Diffusing capacity, Children

Figure 1. Kaplan-Meier survival curves demonstrating the relationship between NRM and pre-transplant DLCO parameters.

