Paediatric Allergy

Evidence Update

November 2017
Training Calendar 2017

All sessions are one hour

November (13.00)

- 2nd Thu: Literature Searching
- 10th Fri: Critical Appraisal
- 13th Mon: Statistics
- 21st Tues: Literature Searching
- 29th Wed: Critical Appraisal

December (12.00)

- 7th Thu: Statistics
- 15th Fri: Literature Searching

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1. Spatiotemporal patterns of childhood asthma hospitalization and utilization in Memphis Metropolitan Area from 2005 to 2015.

**Author(s):** Oyana, Tonny J; Podila, Pradeep; Wesley, Jagila Minso; Lomnicki, Slawo; Cormier, Stephania

**Source:** The Journal of asthma : official journal of the Association for the Care of Asthma; Oct 2017; vol. 54 (no. 8); p. 842-855

**Publication Date:** Oct 2017

**Publication Type(s):** Journal Article

**PubMedID:** 28055280

**Abstract:** OBJECTIVE To identify the key risk factors and explain the spatiotemporal patterns of childhood asthma in the Memphis metropolitan area (MMA) over an 11-year period (2005-2015). We hypothesize that in the MMA region this burden is more prevalent among urban children living south, downtown, and north of Memphis than in other areas. METHODS We used a large-scale longitudinal electronic health record database from an integrated healthcare system, Geographic information systems (GIS), and statistical and space-time models to study the spatiotemporal distributions of childhood asthma at census tract level. RESULTS We found statistically significant spatiotemporal clusters of childhood asthma in the south, west, and north of Memphis city after adjusting for key covariates. The results further show a significant increase in temporal gradient in frequency of emergency department (ED) visits and inpatient hospitalizations from 2009 to 2013, and an upward trajectory from 4 per 1,000 children in 2005 to 16 per 1,000 children in 2015. The multivariate logistic regression identified age, race, insurance, admit source, encounter type, and frequency of visits as significant risk factors for childhood asthma (p < 0.05). We observed a greater asthma burden and healthcare utilization for African American (AA) patients living in a high-risk area than those living in a low-risk area in comparison to the white patients: AA vs. white [odds ratio (OR) = 3.03, 95% confidence interval (CI): 2.75-3.34]; and Hispanic vs. white (OR = 1.62, 95% CI: 1.21-2.17). CONCLUSION These findings provide a strong basis for developing geographically tailored population health strategies at the neighborhood level for young children with chronic respiratory conditions.

2. DNA methylation levels associated with race and childhood asthma severity.

**Author(s):** Chan, Marcia A; Ciaccio, Christina E; Gigliotti, Nicole M; Rezaiekhahigh, Mo; Siedlik, Jacob A; Kennedy, Kevin; Barnes, Charles S

**Source:** The Journal of asthma : official journal of the Association for the Care of Asthma; Oct 2017; vol. 54 (no. 8); p. 825-832

**Publication Date:** Oct 2017

**Publication Type(s):** Journal Article

**PubMedID:** 27929694

**Abstract:** OBJECTIVE Asthma is a common chronic childhood disease worldwide. Socioeconomic status, genetic predisposition and environmental factors contribute to its incidence and severity. A disproportionate number of children with asthma are economically disadvantaged and live in substandard housing with potential indoor environmental exposures such as cockroaches, dust mites, rodents and molds. These exposures may manifest through epigenetic mechanisms that can lead to changes in relevant gene expression. We examined the association of global DNA
methylation levels with socioeconomic status, asthma severity and race/ethnicity.

**METHODS**

We measured global DNA methylation in peripheral blood of children with asthma enrolled in the Kansas City Safe and Healthy Homes Program. Inclusion criteria included residing in the same home for a minimum of 4 days per week and total family income of less than 80% of the Kansas City median family income. DNA methylation levels were quantified by an immunoassay that assessed the percentage of 5-methylcytosine. **RESULTS**

Our results indicate that overall, African American children had higher levels of global DNA methylation than children of other races/ethnicities (p = 0.029). This difference was more pronounced when socioeconomic status and asthma severity were coupled with race/ethnicity (p = 0.042) where low-income, African American children with persistent asthma had significantly elevated methylation levels relative to other races/ethnicities in the same context (p = 0.006, Hedges g = 1.14). **CONCLUSION**

Our study demonstrates a significant interaction effect among global DNA methylation levels, asthma severity, race/ethnicity, and socioeconomic status.

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3. Can we predict fall asthma exacerbations? Validation of the seasonal asthma exacerbation index.

**Author(s):** Hoch, Heather E; Calatroni, Agustin; West, Joseph B; Liu, Andrew H; Gergen, Peter J; Gruchalla, Rebecca S; Khurana Hershey, Gurjit K; Kercsmar, Carolyn M; Kim, Haejin; Lamm, Carin I; Makhija, Melanie M; Mitchell, Herman E; Teach, Stephen J; Wildfire, Jeremy J; Busse, William W; Szefler, Stanley J

**Source:** The Journal of allergy and clinical immunology; Oct 2017; vol. 140 (no. 4); p. 1130

**Publication Date:** Oct 2017

**Publication Type(s):** Multicenter Study Journal Article Validation Studies

**PubMedID:** 28238748

**Abstract:** BACKGROUND: A Seasonal Asthma Exacerbation Predictive Index (saEPI) was previously reported based on 2 prior National Institute of Allergy and Infectious Diseases Inner City Asthma Consortium trials. OBJECTIVE: This study sought to validate the saEPI in a separate trial designed to prevent fall exacerbations with omalizumab therapy. METHODS: The saEPI and its components were analyzed to characterize those who had an asthma exacerbation during the Preventative Omalizumab or Step-Up Therapy for Fall Exacerbations (PROSE) study. We characterized those inner-city children with and without asthma exacerbations in the fall period treated with guidelines-based therapy (GBT) in the absence and presence of omalizumab. RESULTS: A higher saEPI was associated with an exacerbation in both the GBT alone (P < .001; area under the curve, 0.76) and the GBT + omalizumab group (P < .01; area under the curve, 0.65). In the GBT group, younger age at recruitment, higher total IgE, higher blood eosinophil percentage and number, and higher treatment step were associated with those who had an exacerbation compared with those who did not. In the GBT + omalizumab group, younger age at recruitment, increased eosinophil number, recent exacerbation, and higher treatment step were also associated with those who had an exacerbation. The saEPI was associated with a high negative predictive value in both groups. CONCLUSION: An exacerbation in children treated with GBT with or without omalizumab was associated with a higher saEPI along with higher markers of allergic inflammation, treatment step, and a recent exacerbation. Those that exacerbated on omalizumab had similar features with the exception of some markers of allergic sensitization, indicating a need to develop better markers to predict poor response to omalizumab therapy and alternative treatment strategies for children with these risk factors. The saEPI was able to reliably predict those children unlikely to have an asthma exacerbation in both groups.
4. Allergic sensitization and objective measures of sleep in urban school-aged children with asthma.

**Author(s):** Esteban, Cynthia A.; Everhart, Robin S.; Kopel, Sheryl J.; Klein, Robert B.; Koinis-Mitchell, Daphne

**Source:** Annals of Allergy, Asthma & Immunology; Sep 2017; vol. 119 (no. 3); p. 238-245

**Publication Date:** Sep 2017

**Publication Type(s):** Academic Journal

**PubMedID:** 28890019

**Abstract:** Background: Allergic sensitization is associated with increased child asthma morbidity and decreased pulmonary function. Nocturnal symptoms and/or awakenings typically are measured by self-report from diary data, whereas objective assessments of sleep in child asthma studies are lacking. Objective: To investigate the association between increased allergic sensitization (number of positive allergy test results measured by skin prick test or specific immunoglobulin E) and sleep outcomes (sleep efficiency, sleep duration, and mean number of awakenings measured by actigraphy) in urban schoolchildren with persistent asthma. Methods: One hundred ninety-six children with persistent asthma (7-9 years old) attending public school in 1 of 4 large urban school districts completed allergy testing during a study clinic visit. Forced expiratory volume in 1 second was monitored at home using a handheld spirometer. Sleep outcomes were measured with a wrist Actiwatch during a 1-month period in the fall and winter seasons. Results: Number of positive allergy test results significantly predicted mean sleep efficiency (P = .02), such that children with more positive test results experienced less efficient sleep. Number of positive allergy test results significantly predicted mean number of night awakenings (P = .05), such that children with more positive allergy test results experienced more night awakenings. Variability in forced expiratory volume in 1 second was a significant moderator in the association between number of positive allergy test results and variability in sleep efficiency (P = .04). Racial and ethnic differences in allergic sensitization and sleep outcomes were found between African Americans and Latinos. Conclusion: More positive allergy test results were associated with poorer sleep outcomes measured objectively in this sample of urban children. Implications for environmental control interventions and asthma treatments in different racial and ethnic groups are discussed.

5. Predictors of polycyclic aromatic hydrocarbon exposure and internal dose in inner city Baltimore children

**Author(s):** Peters K.O.; Williams A.L.; Abubaker S.; McCormack M.C.; Breysse P.N.; Matsui E.C.; Hansel N.N.; Diette G.B.; Strickland P.T.; Curtin-Brosnan J.; Peng R.

**Source:** Journal of exposure science & environmental epidemiology; May 2017; vol. 27 (no. 3); p. 290-298

**Publication Date:** May 2017

**Publication Type(s):** Article

**PubMedID:** 27966668

**Abstract:** Polycyclic aromatic hydrocarbons (PAHs), the by-products of incomplete combustion of organic materials, are commonly found on particulate matter (PM) and have been associated with the development of asthma and asthma exacerbation in urban populations. We examined time spent in the home and outdoors as predictors of exposures to airborne PAHs and measured urinary 1-hydroxypyrene-glucuronide (1-OHPG) as internal dose of PAHs in 118 children aged 5-12 years from Baltimore, MD. During weeklong periods (Saturday-Saturday) in each of four seasons: daily activities were assessed using questionnaires, indoor air nicotine and PM concentrations were monitored, and urine specimens were collected on Tuesday (day 3) and Saturday (day 7) for
measurement of 1-OHPG. Time spent in non-smoking homes was associated with significantly decreased 1-OHPG concentration in urine (beta=-0.045, 95% CI (-0.076, -0.013)), and secondhand smoke (SHS) exposures modified these associations, with higher urinary 1-OHPG concentrations in children spending time in smoking homes than non-smoking homes (P-value for interaction=0.012). Time spent outdoors was associated with increased urinary 1-OHPG concentrations (beta=0.097, 95% CI (0.037, 0.157)) in boys only. Our results suggest that SHS and ambient (outdoor) air pollution contribute to internal dose of PAHs in inner city children.

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