Pediatric Insights

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An Update From the Division of Pediatric Pulmonary Medicine

In This Issue

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UPMC CHILDREN'S HOSPITAL OF PITTSBURGH

Severe Childhood Asthma — A Patient With Drowsiness and Low Blood Pressure

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Case Overview

LF is a 9-year-old boy with a history of poorly controlled, severe persistent asthma, allergic rhinitis, and food allergies who presented with the chief complaint of drowsiness.

On the day of presentation, LF was seen in the Severe and Difficult-to-treat Asthma Clinic at UPMC Children's Hospital of Pittsburgh. He was found to be drowsy, uncooperative, and hypotensive (blood pressure 87/62 mmHg), and he was immediately referred to the Emergency Department (ED) for further evaluation. His mother reported a 10-day history of drowsiness, headaches that worsened upon standing, decreased appetite, nausea, dizziness, and chills. She stated that his symptoms had started gradually but had progressively worsened over the past couple of days; no particular alleviating or exacerbating factors were identified. She denied fever, wheezing, shortness of breath, chest pain, emesis, abdominal pain, or diarrhea.

LF's asthma treatment included high-dose fluticasone/salmeterol HFA (230/21 mcg, 2 puffs twice a day, for most of the past three years), tiotropium 2.5 mcg, 1 puff daily, and montelukast 5 mg daily. Despite these medications, he had received courses of oral prednisone almost monthly over the past year for acute asthma exacerbations. The last course had been 13 days prior, when he was prescribed 15 mg of prednisone (0.4 mg/kg/day) for five days. Because he did not improve with that regimen, he received an additional three-day course of 60 mg of prednisone per day (1.6 mg/kg/day), followed by a four-day taper (30 mg per day for two days, then 15 mg per day for two days), that was completed the day prior to his admission.

In the ED, the patient was afebrile, alert and cooperative, hydrated, and he did not have signs of bronchospasm. Due to the presenting symptoms in the clinic and the history of prolonged exposure to both inhaled and systemic steroids, acute adrenal crisis in the

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setting of chronically suppressed adrenal glands was suspected. Cortisol and ACTH levels were ordered, and hydrocortisone 2 mg/kg IV was administered. Following the hydrocortisone bolus, blood pressure normalized and dizziness resolved. Cortisol and ACTH levels, obtained prior to receiving hydrocortisone, were 4 μg/dL and 17 pg/mL, respectively. While detectable, these concentrations are not robust and were consistent with partial hypothalamic-pituitary-adrenal (HPA) axis suppression.

Because the HPA axis can take months to recover, a prolonged hydrocortisone taper was prescribed and the patient was referred to the UPMC Children's Division of Pediatric Endocrinology, Diabetes and Metabolism. The patient's mother reported that his symptoms resolved on the hydrocortisone. A cosyntropin stimulation test was performed one month after he completed the taper and showed normal baseline and stimulated ACTH-cortisol responses, indicating that the patient no longer required stress-dose glucocorticoids.

In summary, LF is a 9-year-old boy with poorly controlled severe asthma who presented with drowsiness, headaches, decreased appetite, nausea, dizziness, chills, and hypotension in the setting of chronic exposure to high doses of inhaled corticosteroids, numerous courses of oral steroids over the past year, and a recent steroid course significantly above his physiologic dosing of 8-12 μg/m^2/day of hydrocortisone (his last prednisone dose was equivalent to 49 mg/m^2/day of hydrocortisone). In this situation, acute adrenal insufficiency should be suspected and treated with at least one parenteral glucocorticoid dose.

Background — Asthma

Asthma is the most prevalent chronic respiratory disease, affecting more than 330 million people worldwide. In the United States, approximately 7 million children have asthma.[1]

Glucocorticoids are the cornerstone for the long-term management of persistent asthma, since their anti-inflammatory effects reduce bronchial inflammation and hyperreactivity, resulting in better symptom control and decreased asthma morbidity and mortality. Current asthma guidelines recommend inhaled corticosteroids (ICS) as the first line of treatment in persistent asthma, and oral corticosteroids as adjuvants in the management of acute exacerbations.[2]

ICS at low to moderate doses and short-term oral corticosteroids courses are generally safe and not associated with clinically significant adverse effects.[3] However, in the last two decades, there has been increased attention given to the effect of these medications on HPA axis in patients with asthma, particularly those receiving high doses of ICS or frequent systemic courses.

Adrenal Insufficiency

Adrenal insufficiency (AI) refers to an impaired secretion of adrenal hormones. It can result from primary dysfunction of the adrenal glands or from impairment of the HPA axis.[4]

Adrenal suppression (AS) refers to decreased endogenous cortisol production resulting from exposure to exogenous glucocorticoids.[3]

Adrenal crisis is a life-threatening episode of adrenal insufficiency characterized by severe hypotension and/or hypoglycemia that may lead to seizures and coma.[3]

Pathophysiology

The HPA axis regulates the production of adrenal glucocorticoids.[5] Neurons in the hypothalamus synthesize corticotropin-releasing hormone (CRH), which stimulates the anterior pituitary to produce adreno-corticotropic hormone (ACTH), which in turn induces the adrenal cortex to secrete cortisol, the major endogenous glucocorticoid.

Glucocorticoids, whether endogenous or exogenous, exert negative feedback at the pituitary and hypothalamus levels[3] (Figure 1). Generally, the HPA axis recovers rapidly (days to weeks) after cessation of glucocorticoids, but recovery can take six to 12 months following prolonged exposure.[4,6]

Cortisol has multiple functions in the body. It stimulates hepatic gluconeogenesis and lipolysis, maintains serum glucose concentrations, maintains blood pressure, and regulates immune response.[4] Cortisol production is critical during periods of physiological stress (e.g., infection, burns, surgery). Adrenal suppression secondary to exogenous glucocorticoid treatment can precipitate adrenal crisis and death.[5,7]

Clinical Manifestations

AS usually has an insidious presentation with nonspecific symptoms, such as fatigue, lethargy, weakness, nausea, abdominal pain, vomiting, weight loss, and headaches. For this reason, this disorder can often go unrecognized until an illness or severe injury precipitate an acute adrenal crisis.[7] Because of the nonspecific symptoms, patients with AI should receive education and should carry a "steroid emergency card" that they can show to emergency care providers.[5]

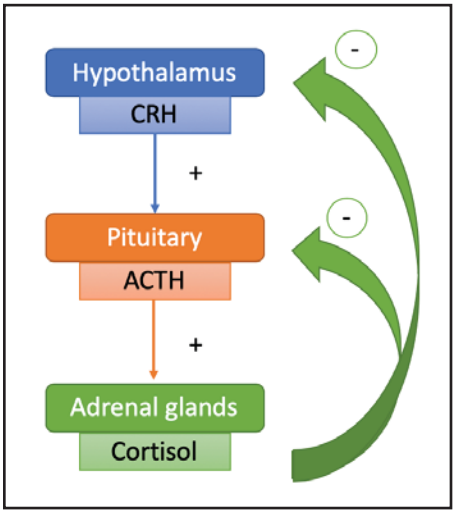

Figure 1. Schematic representation of the HPA axis.

Diagnosis

Screening and diagnostic tests for AS include:

- **Cortisol Level.** The initial screening should include the measurement of early morning cortisol. A morning cortisol of < 3 μg/dL is suggestive of adrenal insufficiency, whereas values higher than 18 μg/dL generally exclude this diagnosis.[7,8]
- **ACTH Stimulation Test.** Physiological circadian secretion of cortisol may recover before the ability of the hypothalamus to respond to stress, and thus some patients may have a normal morning cortisol but still experience AI symptoms under stressful situations.[8] In those cases, an ACTH stimulation test is indicated. This test is typically performed with a low dose (1 μg) of cosyntropin (synthetic ACTH) followed by a high dose (250 μg). The low dose stimulation test is more sensitive in detecting mild AI or recent-onset secondary AI, as adrenal reserve may still be adequate with a normal cortisol response to exogenous ACTH. A normal response is defined as plasma cortisol levels ≥ 18 μg/dL.[7]

ICS for Asthma and Adrenal Suppression

Extensive clinical experience with ICS over the last 30 years suggests that the risk of AI caused by ICS treatment alone is low. However, this risk may be more significant in patients receiving high-dose or prolonged ICS. Some studies have shown that up to 90% of patients who developed AI during ICS treatment were receiving doses equivalent to ≥ 1500 μg/day of budesonide.[9,10] Additionally, several factors could precipitate HPA axis dysfunction in patients receiving lower doses of ICS, such as a small body size, the concomitant use of other forms of corticosteroids (particularly nasal sprays), or use of CYP3A4 liver enzyme inhibitors (e.g., some macrolides, antifungals, and antivirals) which could interfere with ICS metabolism.[11]

On the other hand, the risk for AS seems to vary among different types of ICS. Most studies have found a higher impact on adrenal function with fluticasone propionate, which has been attributed to its pharmacodynamic and pharmacokinetic properties (long half-life and high lipophilicity).[10-12] Conversely, ciclesonide has shown a lower risk of AS, possibly because its active metabolite undergoes hepatic first-pass metabolism, minimizing its systemic bioactivity.[12-14]

Short-Term Oral Corticosteroids (OCS) Courses for Asthma and Adrenal Suppression

Short-term OCS courses used in asthma exacerbations are normally considered to be safe[6] and are clinically indicated for acute management in that setting. However, their side effects have not been extensively evaluated and their relative risks are unclear.[15] Available evidence suggests that children who require multiple OCS courses per year may be at higher risk for developing adrenal insufficiency. While these children may appear to have intact adrenal function based on baseline morning cortisol, their stress response may be insufficient, and thus they may be at risk of an adrenal crisis when sick (i.e., with an asthma exacerbation). Some studies have shown that the risk of adrenal crisis doubles with each additional OCS course per year.[16]

Conclusions

Corticosteroids (inhaled and oral) are the cornerstone for the treatment of asthma, and the risk of AS is low in patients treated with ICS at recommended doses. However, health care providers must be aware of the risk of adrenal suppression in patients who receive high doses of ICS, prolonged ICS, or repeated courses of oral steroids. For this reason, consultation with an asthma specialist is strongly recommended if asthma control is poor or if treatment escalation is necessary.

Currently, there are no national guidelines for AS screening in children with asthma, and available evidence suggests that screening approaches vary widely. Based on this, the Divisions of Pulmonary Medicine, Allergy/Immunology, and Endocrinology

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at UPMC Children's have joined efforts to develop a study that seeks to better understand the endocrine consequences of corticosteroid treatment (inhaled and systemic) in patients with asthma seen in our Difficult-to-Treat Asthma Clinic.

*The authors thank **Ally Larkin, MD** (Allergy/Immunology), and **Selma Witchel, MD** (Endocrinology), for their help with this article.*

References

1. CDC. Most Recent Asthma Data | CDC. Centers for Disease Control and Prevention.
2. Global Initiative for Asthma. *2019 GINA Report: Global Strategy for Asthma Management and Prevention 2019;* 2018. doi:10.1002/uog.8947.
3. Ahmet A, Kim H, Spier S. Adrenal Suppression: A Practical Guide to the Screening and Management of This Under-Recognized Complication of Inhaled Corticosteroid Therapy. Allergy, *Asthma Clin Immunol.* 2011; doi:10.1186/1710-1492-7-13.
4. Shulman DI, Palmert MR, Kemp SF. Adrenal Insufficiency: Still a Cause of Morbidity and Death in Childhood. *Pediatrics.* 2007; doi:10.1542/peds.2006-1612.
5. Bowden SA, Connolly AM, Kinnett K, Zeitler PS. Management of Adrenal Insufficiency Risk After Long-Term Systemic Glucocorticoid Therapy in Duchenne Muscular Dystrophy: Clinical Practice Recommendations. *J Neuromuscul Dis.* 2019; doi:10.3233/JND-180346.
6. Ducharme FM, Chabot G, Polychronakos C, Glorieux F, Mazer B. Safety Profile of Frequent Short Courses of Oral Glucocorticoids in Acute Pediatric Asthma: Impact on Bone Metabolism, Bone Density, and Adrenal Function. *Pediatrics.* 2003; doi:10.1542/peds.111.2.376.
7. Bowden SA, Henry R. Pediatric Adrenal Insufficiency: Diagnosis, Management, and New Therapies. *Int J Pediatr.* 2018; doi:10.1155/2018/1739831.
8. Kapadia CR, Nebesio TD, Myers SE, et al. Endocrine Effects of Inhaled Corticosteroids in Children. *JAMA Pediatr.* 2016; doi:10.1001/jamapediatrics.2015.3526.
9. Fitzgerald D, Van Asperen P, Mellis C, Honner M, Smith L, Ambler G. Fluticasone Propionate 750 μg/day Versus Beclomethasone Dipropionate 1500 μg/day: Comparison of Efficacy and Adrenal Function in Paediatric Asthma. *Thorax.* 1998; doi:10.1136/thx.53.8.656.
10. Lipworth BJ. Systemic Adverse Effects of Inhaled Corticosteroid Therapy: A Systematic Review and Meta-Analysis. *Arch Intern Med.* 1999; doi:10.1001/archinte.159.9.941.
11. Sannarangappa V, Jalleh R. Inhaled Corticosteroids and Secondary Adrenal Insufficiency. *Open Respir Med J.* 2015; doi:10.2174/1874306401408010093.
12. Todd GRG, Acerini CL, Ross-Russell R, Zahra S, Warner JT, McCance D. Survey of Adrenal Crisis Associated With Inhaled Corticosteroids in the United Kingdom. *Arch Dis Child.* 2002; doi:10.1136/adc.87.6.457.
13. Weinbrenner A, Hüneke D, Zschiesche M, et al. Circadian Rhythm of Serum Cortisol After Repeated Inhalation of the New Topical Steroid Ciclesonide. *J Clin Endocrinol Metab.* 2002; doi:10.1210/jcem.87.5.8447.
14. Postma DS, Sevette C, Martinat Y, Schlösser N, Aumann J, Kafé H. Treatment of Asthma by the Inhaled Corticosteroid Ciclesonide Given Either in the Morning or Evening. *Eur Respir J.* 2001; doi:10.1183/09031936.01.00099701.
15. Aljebab F, Choonara I, Conroy S. Systematic Review of the Toxicity of Short-Course Oral Corticosteroids in Children. *Arch Dis Child.* 2016; doi:10.1136/archdischild-2015-309522.
16. Mortimer KJ, Tata LJ, Smith CJP, et al. Oral and Inhaled Corticosteroids and Adrenal Insufficiency: A Case-control Study. *Thorax.* 2006; doi:10.1136/thx.2005.052456.

UPMC Physician Resources

For the latest news, events, videos, and free CME courses presented by UPMC clinicians and researchers, visit **UPMCPhysicianResources.com/Pediatrics.**

CME Courses

Solving the Puzzle of Asthma Disparities
Juan Carlos Celedón, MD, DrPH, ATSF

Pediatric Sleep Disordered Breathing
Allison B.J. Tobey, MD

Video Rounds

Video Rounds is a series of short, informative, and educational videos created for physicians and covering a variety of medical and surgical disciplines. Current topics in pulmonology include:

- **Cystic Fibrosis** — *Presented by Daniel Weiner, MD, ATSF*
- **Cellular Mechanisms Linking Influenza to Pneumonia** — *Presented by John Alcorn, PhD*
- **Pulmonary Function Testing in the Pediatric Population** — *Presented by Daniel Weiner, MD, ATSF*
- **The Connection Between Obesity and Asthma** — *Presented by Erick Forno, MD, MPH, ATSF*

Recent Publications From the Division of Pediatric Pulmonary Medicine

Lu KD, **Forno E**. Exercise and Lifestyle Changes in Pediatric Asthma. *Curr Opin Pulm Med.* 2019 Oct 24. Epub ahead of print.

Gong Z, Zhang X, Su K, Jiang R, Sun Z, **Chen W**, **Forno E**, Goetzman ES, Wang J, Dong HH, Dutta P, Muzumdar R. Deficiency in AIM2 Induces Inflammation and Adipogenesis in White Adipose Tissue Leading to Obesity and Insulin Resistance. *Diabetologia.* 2019 Sept 11. Epub ahead of print.

Forno E, Litonjua AA. Pollution, Obesity, Vitamin D, or Why Is Asthma so Complicated-and Interesting. *J Allergy Clin Immunol Pract.* 2019 Jul - Aug; 7(6): 1823-1824.

Gopal R, Mendy A, Marinelli MA, Richwalls LJ, Seger PJ, Patel S, McHugh KJ, Rich HE, **Grousd JA**, **Forno E**, **Alcorn JF**. Peroxisome Proliferator-Activated Receptor Gamma (PPARγ) Suppresses Inflammation and Bacterial Clearance During Influenza-Bacterial Super-Infection. *Viruses.* 2019 Jun 1; 11(6).

Mendy A, **Gopal R**, **Alcorn JF**, **Forno E**. Reduced Mortality From Lower Respiratory Tract Disease in Adult Diabetic Patients Treated With Metformin. *Respirology.* 2019 Jul; 24(7): 646-651.

Ross KR, Gupta R, DeBoer MD, Zein J, Phillips BR, Mauger DT, Li C, Myers RE, Phipatanakul W, Fitzpatrick AM, Ly NP, Bacharier LB, Jackson DJ, **Celedón JC**, Larkin A, Israel E, Levy B, Fahy JV, Castro M, Bleecker ER, Meyers D, Moore WC, Wenzel SE, Jarjour NN, Erzurum SC, Teague WG, Gaston B. Severe Asthma During Childhood and Adolescence: A Longitudinal Study. *J Allergy Clin Immunol.* 2019 Oct 14. Epub ahead of print.

Forno E, Wang T, Qi C, **Yan Q**, Xu CJ, Boutaoui N, **Han YY**, Weeks DE, Jiang Y, **Rosser F**, Vonk JM, Brouwer S, Acosta-Perez E, Colón-Semidey A, Alvarez M, Canino G, Koppelman GH, **Chen W**, **Celedón JC**. DNA methylation in nasal epithelium, atopy, and atopic asthma in children: a genome-wide study. *Lancet Respir Med.* 2019 Apr; 7(4): 336-346

Jiang Y, Gruzieva O, Wang T, **Forno E**, Boutaoui N, Sun T, Merid SK, Acosta-Pérez E, Kull I, Canino G, Antó JM, Bousquet J, Melén E, **Chen W**, **Celedón JC**. Transcriptomics of atopy and atopic asthma in white blood cells from children and adolescents. *Eur Respir J.* 2019 May 18; 53(5).

Han YY, Jerschow E, **Forno E**, Hua S, Mossavar-Rahmani Y, Perreira K, Sotres-Alvarez D, Afshar M, Punjabi NM, Thyagarajan B, Shivappa N, Hébert JR, Kaplan RC, **Celedón JC**. Dietary Patterns, Asthma, and Lung Function in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). *Ann Am Thorac Soc.* 2019 Nov 5. Epub ahead of print.

Okoniewski W, Lu KD, **Forno E**. Weight Loss for Children and Adults with Obesity and Asthma. A Systematic Review of Randomized Controlled Trials. *Ann Am Thorac Soc.* 2019 May; 16(5): 613-625.

Kachroo P, Hecker J, Chawes BL, Ahluwalia TS, Cho MH, Qiao D, Kelly RS, Chu SH, Virkud YV, Huang M, Barnes KC, Burchard EG, Eng C, Hu D, **Celedón JC**, Daya M, Levin AM, Gui H, Williams LK, **Forno E**, Mak ACY, Avila L, Soto-Quiros ME, Cloutier MM, Acosta-Pérez E, Canino G, Bønnelykke K, Bisgaard H, Raby BA, Lange C, Weiss ST, Lasky-Su JA; National Heart, Lung, and Blood Institute Trans-Omics for Precision Medicine (TOPMed) Consortium. Whole Genome Sequencing Identifies CRISPLD2 as a Lung Function Gene in Children With Asthma. *Chest.* 2019 Sep 23. pii: S0012-3692(19)33933-9.

Han YY, **Forno E**, **Celedón JC**. Sex Steroid Hormones and Asthma in a Nationwide Study of U.S. Adults. *Am J Respir Crit Care Med.* 2019 Sep 16.

Cardenas A, Sordillo JE, Rifas-Shiman SL, Chung W, Liang L, Coull BA, Hivert MF, Lai PS, **Forno E**, **Celedón JC**, Litonjua AA, Brennan KJ, DeMeo DL, Baccarelli AA, Oken E, Gold DR. The Nasal Methylome as a Biomarker of Asthma and Airway Inflammation in Children. *Nat Commun.* 2019 Jul 12; 10(1): 3095.

Sigel KM, Xu D, Weber J, Wisnivesky JP, **Celedón JC**, de la Hoz RE. The Prevalence of Pulmonary Nodules on Computed Tomography in World Trade Center Rescue and Recovery Workers. *Ann Am Thorac Soc.* 2019 Sep 9. Epub ahead of print.

de la Hoz RE, Liu X, **Celedón JC**, Doucette JT, Jeon Y, Reeves AP, San José Estépar R. Association of Obesity with Quantitative Chest CT Measured Airway Wall Thickness in WTC Workers with Lower Airway Disease. *Lung.* 2019 Aug; 197(4): 517-522.

Yang G, **Han YY**, Sun T, Li L, **Rosser F**, **Forno E**, Patel SR, **Chen W**, **Celedón JC**. Sleep Duration, Current Asthma, and Lung Function in a Nationwide Study of U.S. Adults. *Am J Respir Crit Care Med.* 2019 Oct 1; 200(7): 926-929.

Yang G, Sun T, **Han YY**, **Rosser F**, **Forno E**, **Chen W**, **Celedón JC**. Serum Cadmium and Lead, Current Wheeze, and Lung Function in a Nationwide Study of Adults in the United States. *J Allergy Clin Immunol Pract.* 2019 May 28. pii: S2213-2198(19)30486-6.

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About the Pediatric Asthma Center at UPMC Children's

Asthma is the most common chronic childhood disease in the United States, where approximately 8.3% of children (7 million individuals) are affected.

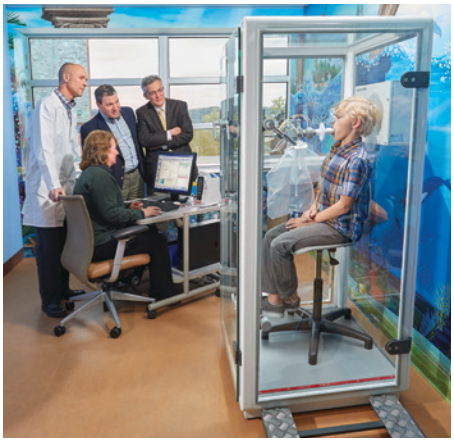
The Division of Pediatric Pulmonary Medicine contains the Pediatric Asthma Center to conduct innovative research and provide state-of-the-art clinical care to children with asthma.

Led by **Juan C. Celedón, MD, DrPH, ATSF**, division chief, the Pediatric Asthma Center conducts research on the role of genetics and epigenetics, diet and vitamin D, obesity, and stress on childhood asthma. This research is supported by the U.S. National Institutes of Health (NIH) as well as private foundations, and emphasizes the inclusion of underserved minority children, including Puerto Ricans and African-Americans.

As part of the Asthma Center, we have established a Severe and Difficult-to-treat Asthma Clinic, led by **Erick Forno, MD, MPH, ATSF**, a pediatric pulmonologist, and **Allyson Larkin, MD**, a pediatric allergist. The clinic employs a multidisciplinary approach to treating children who have asthma that is either severe and resistant to treatments, or is difficult to treat due to multiple factors such as adherence, environment, or comorbidities such as obesity.

The Difficult-to-Treat Asthma Clinic is located at the main campus of UPMC Children's. The Asthma Center also has seven clinics in the community throughout southwestern Pennsylvania to serve children with asthma.

For consults or referrals to the Pediatric Asthma Center, please call **412-692-LUNG (5864)**.



Pediatric Asthma Center members include:

- John Alcorn, PhD
- Juan C. Celedón, MD, DrPH, ATSF
- Wei Chen, PhD
- Mark Dovey, MD
- Erick Forno, MD, MPH, ATSF
- Yueh-Ying Han, PhD
- Allyson Larkin, MD
- Michelle Manni, PhD
- Franziska Rosser, MD, MPH

Recent Publications *Continued from Page 5*

Boutaoui N, Puranik S, Zhang R, Wang T, Hui DH, Brehm J, **Forno E**, **Chen W**, **Celedón JC**. Epigenome-wide Effects of Vitamin D on Asthma Bronchial Epithelial Cells. *Epigenetics.* 2019 Sep; 14(9): 844-849.

Yan Q, Liu N, **Forno E**, Canino G, **Celedón JC**, **Chen W**. An Integrative Association Method for Omics Data Based on a Modified Fisher's Method With Application to Childhood Asthma. *PLoS Genet.* 2019 May 7; v15(5)v: e1008142.

Forno E, **Celedón JC**. Epigenomics and Transcriptomics in the Prediction and Diagnosis of Childhood Asthma: Are We There Yet? *Front Pediatr.* 2019 Apr 2; 7: 115.

Yang G, **Han YY**, **Forno E**, Acosta-Pérez E, Colón-Semidey A, Alvarez M, Canino G, **Chen W**, **Celedón JC**. Under-diagnosis of Atopic Dermatitis in Puerto Rican Children. *World Allergy Organ J.* 2019 Jan 26; 12(1): 100003.

Stevens E, **Rosser F**, **Forno E**, Peden D, **Celedón JC**. Can the effects of outdoor air pollution on asthma be mitigated? *J Allergy Clin Immunol.* 2019 Jun; 143(6): 2016-2018.

Han YY, **Forno E**, **Celedón JC**. Health Risk Behaviors, Violence Exposure, and Current Asthma Among Adolescents in the United States. *Pediatr Pulmonol.* 2019 Mar; 54(3): 237-244.

Robinson KM, Ramanan K, Tobin JM, Nickolich KL, Pilewski MJ, Kallewaard NL, Sellman BR, Cohen TS, **Alcorn JF**. Survival During Influenza-associated Bacterial Superinfection Improves Following Viral- and Bacterial-specific Monoclonal Antibody Treatment. *JCI Insight.* 2019 Jul 25; 4(14).

News From the Division

The Division of Pediatric Pulmonary Medicine at UPMC Children's is pleased to welcome its newest faculty member, **Jane Taylor, MD**. Dr. Taylor earned her medical degree from the University of North Carolina School of Medicine, followed by residency at Vanderbilt University and a fellowship in pulmonary medicine at Washington University School of Medicine in St. Louis, Missouri. Prior to joining UPMC Children's, Dr. Taylor was an associate professor of Pediatrics at the University of Missouri Kansas City School of Medicine and practiced at Children's Mercy Hospital in Kansas City.

Dr. Taylor's clinical and research interests include interstitial lung disease, asthma and the environmental factors that affect lung health, extreme premature and chronic lung disease of infancy, and neuromuscular conditions and their effect on airway clearance impairment.

At UPMC Children's, Dr. Taylor will work to establish and lead a new pulmonary clinic for neuromuscular patients.

Juan C. Celedón, MD, DrPH, ATSF, is the president-elect of the American Thoracic Society for the 2019-2020 term and will assume the role of president for the 2020-2021 term.

Dr. Celedón is the Niels K. Jerne Professor of Pediatrics and Medicine, and Chief of the Division of Pediatric Pulmonary Medicine at the University of Pittsburgh School of Medicine.

Dr. Celedón earned a degree in medicine from Javeriana University in Colombia and a doctoral degree in public health from Harvard University. He completed a residency in Internal Medicine at Beth Israel Medical Center in New York, a fellowship in Pulmonary and Critical Care Medicine at Brown University, and a research fellowship at the Channing Laboratory of Brigham and Women's Hospital and Harvard Medical School. In 2000, he joined the faculty at Harvard Medical School, rising to associate professor before joining the University of Pittsburgh in 2010.

Dr. Celedón's research has focused on asthma, COPD, and health disparities in airway diseases. His scientific contributions have been acknowledged through his election to the American Society for Clinical Investigation and the Association of American Physicians, as well as through the ATS Recognition Award for Scientific Accomplishments, among other honors. A devoted mentor, he was the first faculty member to ever receive both the Young Mentor Award and the A. Clifford Barger Excellence in Mentoring Award from Harvard Medical School.

"That's Pediatrics" Research Podcast Series

UPMC Children's Hospital of Pittsburgh medical podcast series for physicians, scientists, and other health care professionals features compelling interviews with the hospital's leading researchers and clinicians discussing innovative basic, translational, and clinical research. New episodes are released every two weeks.

"Going back to the polio vaccine, Pittsburgh has always been a hub of very innovative research, and in recent years has really become a nexus for some groundbreaking research in pediatric medicine," says **John Williams, MD**, chief of the Division of Pediatric Infectious Diseases at UPMC Children's and one of the podcast hosts. "There is a spirit of collaboration here in Pittsburgh that makes it somewhat unique nationally and we really want to explore the research that is happening here and how we have a real opportunity to change the way pediatric medicine is practiced around the world."

In addition to Dr. Williams, "That's Pediatrics" hosts are:

Carolyn Coyne, PhD, director of the Center for Microbial Pathogenesis, UPMC Children's Hospital

Stephanie Dewar, MD, director of Pediatric Residency Training Program, UPMC Children's Hospital

Brian Martin, DMD, vice president, Medical Affairs, UPMC Children's Hospital

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About UPMC Children's Hospital of Pittsburgh

Regionally, nationally, and globally, UPMC Children's Hospital of Pittsburgh is a leader in the treatment of childhood conditions and diseases, a pioneer in the development of new and improved therapies, and a top educator of the next generation of pediatricians and pediatric subspecialists. With generous community support, UPMC Children's Hospital has fulfilled this mission since its founding in 1890. UPMC Children's is recognized consistently for its clinical, research, educational, and advocacy-related accomplishments, including ranking 15th among children's hospitals and schools of medicine in funding for pediatric research provided by the National Institutes of Health (FY2018) and ranking on *U.S. News & World Report's* Honor Roll of America's Best Children's Hospitals (2019–20).

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