

The Art and Science of Pediatrics



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Pediatric Interest Group



Weill Cornell Medicine
Pediatrics

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Dear Weill Cornell Medicine Students and Faculty:

One measure of the quality and success of a special event lies in the support it generates in subsequent years. The reviews of all of previous Pediatric Medical Student Research Days have been overwhelmingly positive. All in attendance at these events agree they are a tradition worth continuing.

On behalf of the Department of Pediatrics and the Weill Cornell Medical Student Pediatric Interest Group, it is a pleasure for me to welcome you to the Fifteenth Annual Pediatric Research Day. In addition to medical student research and scholarly project abstracts, this year's Journal, "The Art and Science of Pediatrics," features interviews with faculty and community service opportunities. The work presented in this journal and displayed at Pediatric Research Day is the product of a wonderful collaboration between our medical students and faculty committed to developing the next generation of pediatric scientists. What makes this work even more special is that our students accomplished this work in spite of the tremendous demands placed on their time by medical school. We believe this exposure to research early in one's medical career is an essential first step not only in launching a successful career in investigation but also in establishing a foundation for lifelong learning for those who choose to pursue clinical medicine.

As Chairman of the Department of Pediatrics, I congratulate the students and their faculty mentors on the success of their research efforts, and acknowledge the strong leadership of the Pediatric Interest Group – Andzelika Dechnik and Isaac Mayefsky – and their advisors, Drs. Susanna Cunningham-Rundles and Thanakorn Jirasevijinda, on organizing and continuing this important pediatric program.

Sincerely,

A handwritten signature in black ink that reads "Gerald M. Loughlin". The signature is written in a cursive, flowing style.

Gerald M. Loughlin, M.D., M.S.
Nancy C. Paduano Professor and Chairman
Department of Pediatrics
Weill Cornell Medicine

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FACULTY INTERVIEWS

Interview with Dr. Alexis Jamie Feuer

Prithvi Mohan, MS1

Dr. Alexis Jamie Feuer is an Assistant Professor of Pediatrics at Weill Cornell Medical College and Assistant Attending Pediatrician at the New York-Presbyterian Phyllis and David Komansky Center for Children's Health/Weill Cornell Medical Center. She is board certified in Pediatrics and Pediatric Endocrinology. Dr. Feuer is extremely passionate about both her role as a clinician as well as her pursuits in research.

Path to medicine and Pediatric Endocrinology

Dr. Feuer was diagnosed with Type I diabetes as a child. This early exposure to illness and medicine influenced her decision to become a physician. She received a BA in Biology from NYU and started her PhD coursework, but soon realized her passion for medicine. She graduated with an MS in Biology and went on to medical school at the University at Buffalo School of Medicine and Biomedical Sciences. She was awarded with the Emilie Davis Rodenberg Memorial Award for Excellence in the Study of Diabetes, and graduated as the first physician in her family. Dr. Feuer then proceeded to complete her Residency in Pediatrics and Pediatric Endocrinology Fellowship at Weill Cornell Medical Center/New York-Presbyterian Hospital in New York.

Research Interests

As a resident, Dr. Feuer became very interested in the dearth of mental healthcare in pediatrics. She helped to start a project for the screening of pediatric patients for depression and psychosocial issues. The project looked at the feasibility of implementing universal mental health screenings during well child visits, and the potential benefits of these screenings. While the data is still being reviewed, her work indicates that mental health screenings can be incorporated into pediatric care feasibly and can detect patients with depressive symptoms.

Dr. Feuer turned her focus to the relationship between metabolic syndrome and anti-psychotic medications. She wanted to study the effects of SSRI use on bone mineral content and bone density. Using the NHANES database to mine for information on SSRI use and bone mineral contents, she found that SSRI use was associated with lower bone mineral density and content. In her research, she also found a significant association between stimulant use and low bone density. Her findings were published in JAMA pediatrics.

Dr. Feuer is now studying the skeletal effects of stimulant medication using a mouse model at the Hospital for Special Surgery. She hopes to start a clinical arm for her research, working with child development and psychiatry to look at the changes in rate of bone accrual in stimulant naïve patients. She was named a *Caryl and Israel E. Englander Clinical Scholar* and a *Rising Star* in New York Super Doctors.

Challenges of her career path and advice

Dr. Feuer stressed the difficult nature of balancing clinical practice and a successful research career, especially as a woman in medicine. Her job as a clinician and scholar requires her to work night and weekends in order to make sure her research progresses while keeping a high standard of care for her patients. Most importantly, she has “an intrinsic motivation to find out answers” for herself through novel research, instead of taking others’ word as sufficient. She emphasized the importance of being proactive and finding mentorship, which can often be very difficult within pediatrics for the research realm. She characterizes mentorship as an integral facet of her approach to build a career in research based medicine.

As a woman in medicine, Dr. Feuer is very passionate about being proactive and the importance of expressing self worth, advising others who would like to go forward on this path not to undersell or underestimate their worth and importance as a clinician. Most importantly, Dr. Feuer stresses that one can become an excellent clinician, a respected researcher, and have a family and social life, as long as one is able to learn how to manage personal and professional time effectively.

Interview with Dr. Zachary Grinspan

By Brienne Lubor, MSI

Dr. Zachary Grinspan is the director of Weill Cornell's pediatric epilepsy program through Phyllis and David Komansky Children's Hospital. A pediatric neurologist, Dr. Grinspan is a professor in pediatrics, healthcare policy, and research. During his busy schedule of medical practice, research, and mentorship, Dr. Grinspan graciously took the time to speak with me about his path to medicine, his medical career, and his discoveries in pediatric neurology.

Dr. Grinspan shared that he grew up in Simsbury, Connecticut, just outside Hartford. He received his undergraduate degree in mathematics and physics from Yale University in 1996 and then became a high school math and physics teacher for one year after college graduation. He continued his career in education with Teach for America as a high school mathematics and computer science teacher. Dr. Grinspan reflected that, through Teach for America, he found fulfilling yet extremely difficult challenges, describing teaching as one of the most difficult jobs of his life,, since, at age 22, he relied on minimal formal training in education yet faced the daunting responsibility of trying to motivate an uninterested adolescent audience. Nevertheless, he genuinely enjoyed sharing his enthusiasm for math and science with young people, and knew that he wanted to incorporate being an educator in his future career.

Dr. Grinspan has found the perfect balance of science and education through medicine. Equipped with rewarding experiences through Teach for America and a passion for math and science, Dr. Grinspan completed his premedical coursework and was accepted to Albert Einstein College of Medicine. Throughout his studies, Dr. Grinspan appreciated how he was taught medicine, gradually taking on responsibilities, and learning how to think critically by his inspiring professors. He had the opportunity for bench research through HHMI National Institute of Health cloister program for neuroscience research. Although he knew from his work in education that he enjoyed teaching young people, it was not until after he undertook a neurobiology course taught by multiple committed neurosurgeons, combined with the powerful experience and strong voice of his pediatrics mentor Dr. Isabelle Rapin, that he knew he wanted to pursue a career in pediatric neurology.

Upon medical school graduation, Dr. Grinspan completed his pediatrics residency at Mass General Hospital for Children in Boston, his residency in child neurology at Columbia University Medical Center in NYC, obtained a Masters of Science in Biostatistics, and then a fellowship in clinical neurophysiology at Montefiore Medical Center. Through a National Institute of Health initiative, Dr. Grinspan was selected and recruited to Cornell to develop his research career. At Weill Cornell Medicine, he completed a post-doctoral research program in quality of care and clinical informatics funded by a Neurologic Science Academic Development Award from the NIH. Dr. Grinspan is board-certified in pediatrics and neurology with special qualification in child neurology.

With over thirty publications, Dr. Grinspan leads a dynamic career in neurology research and shares his findings with students and patients. Since 2015, Dr. Grinspan has served as the Nanette Laitman Clinical Scholar in Healthcare Policy, Research and Community Health at Weill Cornell Medicine. He collaborates with international experts across several fields, from emergency medicine and critical care to bioinformatics and medical technology, to optimize the clinical care that he provides. He currently directs a large CDC-funded study striving to unravel the rarest forms of epilepsy cases found in NYC through large clinical data set analysis. He has established over sixteen centers of care with the goal to investigate quality and safety measures with epilepsy care and ultimately build a national learning healthcare system for pediatric epilepsy. Dr. Grinspan is proud that Pubmed nowlists an increasing number of publications on pediatric neurology written by his many students and mentees.

Although my interview questions explored Dr. Grinspan's path to medicine, his focus throughout the conversation was his students, past, present, and future, and now specifically his commitment to the students of Weill Cornell, whom he described as an extremely brilliant group of individuals. Whether he is taking care of pediatric epilepsy patients, educating math students, or mentoring medical students with research projects, Dr. Grinspan continues to dedicate his career to the health and wellness of the young mind. It was an honor to share Dr. Grinspan's story with the Weill Cornell community, whose work as a committed, positive educator inspires medical students learn to love what they do.

Interview with Dr. Ralf Holzer

By Rohini Koppam

Tell me about your journey in medicine. How did you get to where you are today?

In Germany, we don't do an undergraduate degree before medical school. So going in, I knew I was initially interested in congenital heart surgery. At my university, I attended a small lecture series about congenital heart disease and found it fascinating. I knew I wanted to be a heart surgeon for defects, and so I did electives in my hospital and assisted in operations, even just holding open the wound spreaders. One of my residents had spent some time in the US to get some experience and so I spent the last year of medical school doing cardiothoracic surgery rotations in Boston at Sick Kids, Massachusetts General, and Dana Farber. After returning, I found that it would be easy to get a job in England, so I decided to go there and understand the physiology of pediatric cardiology. I spent about 3 years working in general cardiology of which only about three months had a pediatric focus. Eventually, I wanted to do a fellowship that was more interventional and went to the University of Chicago. It was a productive year during which I wrote a lot of papers and got a faculty position at the University of Ohio and Nationwide Children's Hospital, where I spent 9 years as Co-Director of Cardiac Catheterization and Interventional Therapy. In 2013, I was offered the opportunity to be Division Chief in Cardiology in Qatar and it was nice to build up something new from scratch. There were a lot of challenges such as the oil crunch leading to research funding being pulled. I was put in touch with contacts here at Weill Cornell, and was officially appointed as the Division Chief of Pediatric Cardiology early in 2016.

What would you say the best part of your job is?

Today actually, I received a picture that a 5-year-old girl that I had operated on gave me. After the procedure, the patient gave me a little hug. In the Cath lab, patients have complex defects but you can do something and improve the life of your patients. When they come together with their family, it makes me happy to see them so happy.

What are some challenges that you've faced in your specialty?

Congenital heart disease is a challenging issue. On the opposite end of the spectrum, there is a lot that you may not be able to offer or do. The prognosis may not be great, and you wish you could help the patient and their patients so much, but you may be running out of ways to help them. When I do difficult procedures, statistically the chance of adverse event is 20%. Thus, it is challenging to go down and tell the parents that sometimes that patient's heart didn't tolerate the procedure. Sometimes I struggle to not join in crying with the family.

What advice do you have for medical students when choosing a specialty?

When you are a student you are exposed to a lot of things, and when you come across something that you feel is exciting, you'll know. Don't google, "where can I make the best income," but find out on your what it is you like and where your heart lies. Don't first research where the best job prospects or most income is. If your heart is not there, then you won't enjoy it. In a field that you are good at, you'll have the most energy and motivation. If you are engaged and enthusiastic it reflects and spreads to the people around you. Once you have that bond with a specialty, don't get demotivated by obstacles. Initially I had no clue what the speaker was talking about when describing the heart. I couldn't understand the four chambers, let alone what happens when there are defects.

CREATIVE WRITING

Watching Spongebob On 6 North

Ilana Scandariato, MS3

It was my second day on the Pediatric Hematology-Oncology service, and I was on my way to drop off a lab specimen when I saw the mother of one of our patients frantically trying to get the unit clerk's attention. *"I'll just be gone for an hour or so...I just want to run and grab him his food...the only thing he'll eat today is penne alla vodka...I can't find his nurse to say I'm leaving and to check on him..."* she said, looking back toward her son's room as if unsure that she should leave.

"C" was only 7 years old and had been diagnosed with Acute Lymphoblastic Leukemia a few weeks ago and was now in the hospital for induction chemotherapy, a rigorous 28-day cycle. A few weeks ago, he was a regular kid who was a bit more tired than usual and couldn't always keep up with sports at camp. A few weeks ago, he was supposed to start school back up in late August. He already knew who his teacher was and had picked out school supplies. And then the diagnosis came, and his admission, and his little paper calendar where he marked off every day until he could finally leave the hospital.

I interrupted the mother's conversation with the clerk and offered to sit at his bedside for the hour she would be gone. She warned me that C didn't really like to talk much, but that she knew he would feel better not being alone in the room. When I walked in, *Spongebob Squarepants* was on. Little did C and his mom know, this was my favorite TV show of all time—I was prepared to quote the entire episode. We didn't have to talk, but C was begrudgingly impressed by my ability to anticipate the next line of the show before the character even said it. We ended up laughing and enjoying the show together, and by the time his mother came back, he had warmed up to me, though I had been a stranger only an hour earlier. That day, my years of watching Spongebob reruns came in handy more than any UWorld question or First Aid mnemonic.

On my Pediatrics rotation, I learned that there is so much more to caring for patients than knowing the pathophysiology or the steps to a procedure. Of course, those things are extremely important too, and becoming closer to C and his family made me all the more motivated to study pediatric leukemia, his treatment regimen, and the procedures he endured. But I learned that day that I could play an important role just by being there, by reassuring his mom so she didn't have as much anxiety about leaving the hospital, and by keeping C company when he might have felt lonely and overwhelmed. I learned that bringing something of myself to patient care—even something as silly as my Spongebob obsession—can make all the difference.

NEW INITIATIVES

The Drukier Institute for Children's Health
Department of Pediatrics, Weill Cornell Medicine

Established in 2014 with a \$25 million gift from Gale and Ira Drukier, the Drukier Institute for Children's Health is a cross-disciplinary research hub dedicated to understanding the underlying causes of diseases that are devastating to children.

The mission of the Institute is to accelerate discovery from the bedside to the bench and back to the bedside with the ultimate goal of understanding and finding better treatments for childhood diseases. A very important goal is to participate in training and educational programs across the Department of Pediatrics and to foster interactions with other Centers and Departments at Weill Cornell.

We aim to build an environment where students as well as pediatric residents, fellows and junior faculty can be trained to become world-class leaders in the study of childhood diseases. The Institute will provide help in accessing some of the latest technologies required to successfully develop human research, especially in the area of genomics and in monitoring the human immune system. Some of these technologies will be available in the Institute, while others will be developed in collaboration with other Centers and Cores across Weill Cornell.

One of the main goals of the Institute is education and mentoring. Exposing medical students to pediatric research is a key step in attracting the next generation of physician scientists to the field of Pediatrics.

Virginia Pascual, MD

Director, Drukier Institute for Children's Health
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Office of Diversity in Pediatrics at Weill Cornell Medicine

I am pleased to have the opportunity to help address what many would consider a longstanding opportunity at WCM; that being the pursuit of diversity as a facet of excellence. In truth, I have long noted the relative paucity of physicians from some minority groups in academic medicine, in many neighboring academic centers, but also specifically at Cornell. Although I was aware that there has been an office of Diversity for a few years, I presumed the focus was on healthcare disparities and was unfamiliar with the Office of Diversity and Inclusion leadership in the greater context of national efforts to improve diversity in academic medicine. I have learned a tremendous amount in the past few months after having accepted the mantle of diversity champion for pediatrics.

In my learning thus far, it is clear that the merits and benefits of diversity are many and compelling; they include promotion of justice, reduction of healthcare disparities, improvement of care to underserved populations, economic support, and are based on the emerging recognition that diversity is a catalyst for excellence. But, truly embracing diversity and inclusion will require culture change, and culture change is hard. The strategies that have been described as successful elsewhere are multifaceted and require deep and durable commitment. They include initiatives intended to attract individuals from minority groups underrepresented in medicine (URiM) to medicine as a career, efforts to improve matriculation and success within medical schools, improve recruitment to graduate medical education, supportive, mentorship and retention of URiM faculty, ultimately leading to sustained diversity among the stakeholders and organizational leaders.

My vision thus far is to facilitate improved representation of URiM groups throughout pediatrics but as importantly, if not more so, to facilitate access to the resources (internal and external) necessary for qualifying individuals to thrive and succeed. This should yield gains in the clinical arena, in the scope (and beneficiaries) of research and affect the learning environment we create for our students and graduate medical trainees. The diversity literature asserts that learners appreciate and desire a diverse faculty and that diverse teams outperform teams lacking diversity. Not only will students continue to receive structured formal instruction around cultural competence but see more of it in practice. Ideally, what is messaged explicitly and implicitly about how we deliver care to minority and underserved populations should become more congruent with our goals and consistent across our medical environment.

As I explore the literature I am also cultivating a deeper understanding of the concept of inclusion. Laura Castillo Page from the AAMC described inclusion as: *“not just being invited to the party, but being asked to dance”*. I see my appointment as Vice Chair for Diversity as a tremendous opportunity **and** responsibility and I look forward to partnering with my colleagues to effect meaningful change.

Joy D. Howell, M.D., FAAP, FCCM

Pediatric Critical Care Medicine Fellowship Program Director

Associate Professor of Clinical Pediatrics

Vice Chair for Diversity in Pediatrics

RESEARCH ABSTRACTS
MEDICAL, GRADUATE, AND MD/ PHD STUDENTS

Bio-Psycho-Social Risk Factors Associated with Increased BMI During Participation in a Pediatric Weight Loss Program

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Purpose: This study aims to describe the various bio-psycho-social risk factors that are associated with an increase in BMI z-score during participation in a pediatric weight loss program.

Background: The prevalence of obesity among children and adolescents in America has been steadily increasing, with the most recent statistics from the CDC stating that 17% of American children aged 2-19 are obese. At the same time, the association between childhood obesity and significant medical morbidity in adulthood has been widely studied. As a result, obesity prevention has become a public health priority for many governmental and non-governmental organizations. At Weill Cornell Medicine, the Health for Life Program (H4L) targets overweight or obese children to educate them about the importance of nutrition, healthy eating and exercise, in addition to providing opportunities to partake in physical activity sessions. Over the course of the program's existence, it has been noted that about 1/3 of the program's participants experience an increase in their BMI despite continued attendance in the program. While the contributing factors to attrition in pediatric weight loss programs have been well-outlined, the literature is largely devoid of the bio-psycho-social factors that may correlate with failure during participation a weight loss program.

Methods: We performed a retrospective chart review of patients who participated in H4L between 2006-2013. Failure in H4L was defined as an increase in the patient's BMI z-score from their initial visit to their last follow-up visit in the program, while success was defined as an unchanged or decreased BMI z-score. If patients had only one H4L clinic visit, their follow-up BMI z-score was derived from clinic visits outside of H4L that took place 6 (+/- 3) months following their H4L visit. Patients who did not have a follow-up visit within this time period were excluded from the study. These two categories of patients were analyzed across demographic and clinical variables, as well as subjective data taken from patient questionnaires. Data from patient questionnaires included information regarding daily eating and exercise habits, as well as patient-reported self-image, mood and affect.

Results: Our study consisted of 189 patients, including 105 females and 84 males. Of the 189 patients, 120 were in the success group and 69 were in the failure group. The most common race/ethnicities represented in our sample were Hispanics (58.0%) and African Americans (25.8%). The average age at the patient's initial visit was 11.5 years old (6.5-18.6). There was no significant difference between groups with respect to demographics. The three most common comorbidities in our sample were asthma, vitamin D deficiency, and insulin resistance (28.5%, 22.7%, 16.9%, respectively), without significant differences between groups. The initial BMI z-score and hemoglobin A1C in each group was 2.1 and 5.5, respectively. There was no significant difference between groups in regards to initial glucose, plasma insulin, liver enzyme, cholesterol, or triglyceride levels. Children in the success group participated in organized sports at significantly higher levels than children in the failure group (42.4% vs. 17.2%, $p=.019$). Additionally, 68.8% of children in the failure group slept more than 8 hours per weekend night, compared to 32.4% in the success group ($p=.043$). Nearly a quarter of children in the study reported feeling sad or depressed, as well as often feeling grouchy and irritable, however there were no significant differences in mood or affect between groups.

Conclusions: Nearly 2/3 of children and adolescents who participated in H4L experienced a decrease in their BMI z-score. Lack of participation in organized sports and having >8 hours of sleep per weekend night was significantly correlated with failure. Of note, about 1/4 of children entering H4 have psychiatric symptoms that should be evaluated as they move through the program.

Magnetic Resonance Imaging for Assessment of Cardiac Function and Myocardial Mass in Newborn Infants of Diabetic Mothers

Brittany Abel¹, Amanda Garfinkel¹, Alan Groves, MB, ChB, MD², Shari Gelber, MD, PhD³, Jeffrey Dayton, MD², Jonathan Dyke, PhD⁴, Alexandra Channing, MD², and Arzu Kovanlikaya, MD⁴

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Purpose: To evaluate the effect of maternal diabetes during pregnancy on the cardiac structure and function of their newborn offspring using cardiac MRI and to assess the relationship between third trimester HbA1c and the extent of cardiac remodeling in these infants.

Background: Infants of diabetic mothers (IDMs) are known to be at higher risk for hypertrophic cardiomyopathy, however much of this data is based on intraventricular septal thickness as measured by echocardiography—a 2-dimensional assessment of a 3-dimensional structure. Although some studies have not found a dose-dependent relationship between maternal hyperglycemia during pregnancy and extent of cardiac remodeling in their infants, cardiac MRI may have the potential to reveal this relationship.

Methods: In a prospective case-control study, pregnant women diagnosed with type II or gestational diabetes mellitus (n=6) and their healthy counterparts (n=2) were recruited Weill Cornell Medicine between February and August 2017. After parental consent, newborns ages 1-5 days underwent anthropometric measurement and cardiac MRI. Gated steady state free precession four chamber and short axis views (10 stacks) were obtained using a 3 Tesla MRI scanner. MR images were analyzed by a single blinded observer using Segment software for LV mass (LVM), end-diastolic volume (EDV), end-systolic volume (ESV), stroke volume (SV), ejection fraction (EF) and left ventricular output (LVO) by manually tracing epicardial and endocardial borders at end-systole and end-diastole. These measurements were normalized by birthweight (BW) and separately by body surface area ($BSA = W^{0.5378} \times L^{0.3964} \times 0.024265$), using birthweight and length measured by stadiometer by the study team or at birth by the clinical team. Relevant maternal clinical data, including third trimester HbA1c, were also collected from the medical record.

Results: Among infants who underwent complete cardiac MRI (n=6), there was no significant difference (p<0.05) between IDMs (n=4) and control infants (n=2) (mean±SD) in maternal age at delivery (IDM 31.9 ± 2.5, control 37.3 ± 5.4 years), gestational age at birth (IDM 38.8 ± 1.2, control 40 ± 0.6 weeks), mode of delivery (C-section: IDM 4/4, control 1/2), sex (male: IDM 2/4, control 2/2), median Apgar score at 5 minutes (IDM 9, control 9), birthweight (IDM 3261 ± 695.4, control 3435 ± 49.5 grams) or BSA (IDM 0.216 ± 0.032, control 0.227 ± 0.006 m²). Mean 3rd trimester HbA1c of mothers with diabetes was 5.58 ± 0.62 %. There was a significantly lower BSA-normalized ESV in IDMs vs. control infants (IDM 10.2 ± 0.48, control 12.8 ± 0.19 ml/m², p=0.023), which was not demonstrated in the same BW-normalized volumes. No other significant differences were seen in IDMs vs. controls in myocardial mass or function. Among IDMs, there were no significant correlations between 3rd trimester HbA1c and BW- or BSA-normalized myocardial mass or function measurements.

Conclusion: BSA-normalized ESV found in IDMs compared to control infants, not demonstrated in the same BW-normalized measurements, indicates that the indexing method of CMR data should be considered in newborns. This finding could suggest an increase in inotropy in IDMs shortly after birth, however the study is limited by multiple comparisons and small sample size. Although no relationships were seen between maternal glycemic control and newborn cardiac parameters, this may be due to the aforementioned study limitations, the narrow range of maternal HbA1cs in our sample, or third trimester HbA1c as an inadequate measure of glycemic control throughout pregnancy.

Delirium in Children in the Post Anesthesia Care Unit (PACU)

Andzelika Dechnik¹, Allison Schacter², Chani Traube MD¹

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Purpose: To describe the frequency, subtypes, and risk factors of pediatric delirium after general anesthesia used in ambulatory surgery at NewYork-Presbyterian/Weill Cornell Medical Center.

Background: Delirium is a common and serious complication of illness characterized by cognitive impairment and reduced awareness, affecting more than 20% of children in the pediatric intensive care unit. Anesthesia is a known risk factor for delirium development in adults. In the pediatric population, the frequency of delirium after anesthesia is unknown. A hyperactive subtype of delirium, called emergence delirium, is estimated to affect 5% of children emerging from anesthesia. However, hypoactive and mixed delirium is likely missed without routine screening. This is significant because hypoactive and mixed delirium are far more common in children, and are associated with higher morbidity than hyperactive delirium. We hypothesized that more than 15% of pediatric patients in PACUs experience signs of delirium, with greater risk for younger patients and those with longer exposure to anesthesia.

Methods: PACU nurses completed the Cornell Assessment of Pediatric Delirium (CAPD) twice on all patients 0-18 years of age admitted to the PACU from June 14 to August 9, 2017. (A score of 9 or higher on the CAPD is consistent with the gold standard psychiatric diagnosis of delirium). Only children with severe developmental delay were excluded from analyses. The first screening was done 30 minutes post arrival in the PACU (or upon first awakening from sleep) and the second upon discharge. Basic demographic and clinical information were collected from the electronic medical record.

Results: 366 patients were enrolled. 120 patients (33.7%) showed delirium signs at the time of the first screening, and 29 patients (7.9%) showed delirium signs at discharge, with median ages of 39.5 months and 34 months, respectively. 244 patients (66.7%) did not show signs of delirium at any point during their stay in the PACU (median age of 85.5 months). Consistent with prior studies, younger children were shown to be at higher risk for development of delirium. Patients who underwent ENT ambulatory surgeries had greater risk of developing signs of delirium post anesthesia. Those who received fentanyl, dexmedetomidine, or inhalational sevoflurane were more likely to develop signs of delirium. Patients who showed signs of delirium at the time of the first screening or at discharge had higher pain scores (mean= 2.5 and 2.4, respectively), than those who were never delirious (mean = 0).

Conclusions: Preliminary results suggest that a substantial number of children develop signs of delirium after anesthesia. Furthermore, 7.9% of the patients continue to demonstrate signs of delirium at discharge, despite meeting PACU discharge criteria. This suggests that the signs of delirium do not merely reflect transient emergence from anesthesia. It is important to note that without screening, these patients' signs of delirium would not have been recognized. Further study is needed to determine whether delirium after anesthesia in children is related to negative long-term outcomes.

Alteration of Gene Expression and Cell Morphology in Brown Adipose Tissue after Targeted Fractionated Radiation to the Subcutaneous Fat Depot

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Purpose: This study seeks to characterize the effects of radiation on adipose tissue.

Background: With the five-year survival rate of pediatric cancer now over 80 percent, pediatric cancer survivors now comprise 1 in 570 young adults between the ages of 20 and 34. Survivors have been shown to have an increased prevalence of many chronic conditions, including metabolic syndrome. Specifically, survivors who received abdominal radiation and total body radiation (TBI) had a 3.4-fold and 12.6-fold increased risk of diabetes mellitus, respectively. Pediatric cancer survivors who underwent TBI were also found to have 4.5-fold increased risk of hypertriglyceridemia, 2.5-fold increased risk of low HDL levels, and 6.1-fold increased risk of elevated fasting glucose compared to survivors who received only chemotherapy. In addition, these survivors show a prototypic unhealthy distribution of adipose tissue, an organ central to metabolic health: survivors who received TBI showed decreased subcutaneous fat, increased intramuscular fat, and increased visceral fat when compared to both obese controls and survivors who received only chemotherapy. The effects of radiation on the subcutaneous, visceral, and brown adipose fat depots have not yet been determined.

Methods: Thirty male C57BL6 mice that were three weeks of age were randomized to three groups: sham, 6 Gy of localized radiation, or 1.5 Gy fractions of localized radiation repeated over four days, totaling 6 Gy. Mice were anesthetized using 150 mg/kg of avertin, and radiation was delivered to the right inguinal fat pad using a CT-guided small animal radiation platform. Dose-volume histograms were computed to ensure that surrounding structures were not affected by radiation. Mice were sacrificed after seven days with samples taken of the left inguinal, right inguinal, epididymal, and interscapular fat pads. In each group, seven samples were analyzed via qPCR to measure differential gene expression. Three samples in each group were fixed in 10% neutral-buffered formalin for H&E staining.

Results: Irradiated inguinal fat pads showed an increased in p21 expression when compared to the non-irradiated inguinal fat pad, indicative of radiation-induced DNA damage. However, there was no significant difference in the expression of thermogenic (UCP1, PRDM16, and Cidea), pro-inflammatory (SAA3, TNFa, IL-8, and F4/80), or adipose-specific (Adiponectin, aP2, and PPARg) genes between the irradiated and non-irradiated inguinal fat pads. In addition, there were no obvious visible differences between irradiated and non-irradiated subcutaneous fat pads upon light microscopy. Surprisingly, there was a reduction of thermogenic (Cidea, Elovl3, PGC1a, PRDM16, and PRDM3) gene expression in the interscapular brown adipose tissue (BAT) of mice exposed to fractionated radiation to a single inguinal fat pad. There was also an increase in white fat-specific pro-inflammatory genes in BAT (resistin and angiotensinogen) of fractionated mice. Expression of p21 was not elevated in BAT of fractionated mice. Furthermore, BAT of fractionated mice showed visibly larger lipid droplet size under light microscopy.

Conclusions: Mice exposed to fractionated radiation, targeted to a single subcutaneous fat pad, show dramatic changes in the morphology and gene expression of BAT. The phenotype is possibly consistent with a “whitening” of the BAT, but future studies are needed to confirm these findings and to explore the underlying mechanism.

GuideScan software for improved single and paired CRISPR guide RNA design

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Background: CRISPR genome editing tools have revolutionized the way we query gene function and hold tremendous potential for treating pediatric genetic diseases from Rett Syndrome to pediatric lymphomas. CRISPR systems utilize the co-expression of a bacterial endonuclease and a guide RNA (gRNA) to produce site-specific double-stranded breaks in cells which, when repaired through the error-prone non-homologous end-joining pathway (NHEJ) can generate premature stop codons or disrupt the function of essential protein domains. If the site is given a donor template then homology directed repair can occur as well. Target recognition requires only a short sequence complementarity between gRNA and target site, as well as the recognition of a protospacer adjacent motif (PAM) by the endonuclease itself. This simplicity allows the endonuclease to be easily programmed to cleave a locus of choice and has enabled the construction of genome-wide CRISPR libraries for loss-of-function screens.

Objective: Despite the power of this technology, its application outside the coding genome has remained limited. Disruption of noncoding RNA or DNA elements often requires the engineering of genomic deletions through the concomitant expression of two gRNAs. While efforts have been made towards making the construction of paired-gRNA vectors scalable, the functional query of noncoding sequences through loss-of-function screens has remained hampered by lack of tools that generate high-resolution gRNA databases and allow the design of deletion libraries in a genome-wide manner.

Method: To overcome these limitations we have developed GuideScan, a trie-based open-source software package that allows users to construct and query fully customizable gRNA databases for any genome and CRISPR endonuclease of choice.

Results: We provide both a command-line and website interface for our tool which allow the design of paired-gRNA deletion libraries, along with gRNA databases for the most common model organisms. This software package can allow for patient specific CRISPR databases which represent a first step towards translating CRISPR to the clinic.

Therapeutic assessment (TA) of adolescents presenting with self harm versus assessment as usual (AAU): 8-year follow-up on a randomized controlled trial

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Background: Suicide is a complex psychiatric and public health issue particularly prevalent in adolescents. Self-harm behavior in adolescence is the most closely-associated predictor of subsequent death by suicide. Furthermore, poor adherence to treatment regimens post self-harm predicts poor outcomes in adolescents. Thus, intervening with an effective treatment regimen once a self-harming adolescent presents to the emergency department (ED) is a crucial and time-sensitive challenge.

In 2011, Dr. Ougrin et al conducted a randomized controlled trial (RCT) of two different treatment assessments in adolescents presenting to the ED with self-harm. A control group of adolescents was randomly assigned to the Assessment as Usual (AAU) intervention, which involves taking an adolescent's psychosocial history and following up with their local health care provider according to the Institute for Health and Clinical Excellence (NICE) guidelines. A second group of adolescents was assigned to a Therapeutic Assessment (TA) intervention consisting of standard psychosocial history and risk assessment in addition to a motivational session stemming from Cognitive Analytic Therapy. The TA intervention also included diagramming—together with the adolescent and family members whenever possible—personalized strategies to break the cycle of self-harm.

Study Objective and Hypothesis: The principal aims of this study were to conduct a 8-year follow-up of the RCT from 2011. We hypothesized that adolescents who received the TA intervention in 2011 would have fewer self-harm presentations to the ED at 8-year follow-up than adolescents who received the usual assessment.

Methods: This was a rater-blinded analysis of medical records for the 8 years since initial randomization comparing two patient groups: adolescents receiving TA after ED presentation and those receiving AAU. We retrospectively analyzed electronic medical records from the ED, inpatient, and outpatient encounters of 69 adolescents (ages 12-17) recruited for the original RCT in 2011. Participants were recruited based on age (12-17 years), presentation of self-harm to the ED, and referral for assessment at child and adolescent mental health services (CAMHS). Participants were blinded to their assessment type in the original RCT. The primary outcomes we evaluated were: 1) the number of adolescents with one or more ED presentations due to self-harm, 2) the number of CAMHS and medical appointments each participant attended in the 8 years post-randomization, and 3) the suicide and mortality rates.

Results: Preliminary results suggest that the TA group received more therapy and adhered to the treatment regimen better throughout the 8 years following randomization. The only subject in the study who committed suicide in those 8 years was part of the AAU group, however a quantitative comparison between the two groups regarding self-harm outcomes is still pending. Qualitatively, the adolescents in the TA group seemed to better engage with their therapy regimen and both the TA and AAU adolescents found it difficult to transition from the adolescent mental health services to a new team of care providers in adult mental health services.

Working Conclusion: If our results show TA to be more effective than AAU, the TA protocol is highly generalizable to anywhere with trained mental health professionals and could prove equally beneficial in both high and low-resource settings.

Circulating exosomes as non-invasive biomarkers for pediatric medulloblastoma

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Background: Medulloblastoma (MB) is the most common malignant pediatric brain tumor and over one-third of children with this cerebellar tumor die within five years of diagnosis. Clinicians are currently limited in their ability to diagnose this tumor without surgical biopsy or resection nor identify recurrent disease at early stages. The development of a noninvasive biomarker could help address these problems. Exosomes are microvesicles that are secreted from tumors constitutively. They contain cell-type specific proteins and genetic material, including microRNAs, and are thought to play a crucial role in regulating tumor growth and metastasis. In addition, exosomes are easily isolated from plasma and provide an unexplored reserve for novel noninvasive biomarkers.

Objective: To determine whether circulating tumor exosomes can serve as novel noninvasive biomarkers to temporally monitor MB disease status in children.

Methods: We assessed exosomal profiles at early and late stages using a sporadic SHH-driven mouse model of MB. Primary tumor tissue explants and plasma samples were collected from SHH-MB mice at early preneoplastic (6 weeks old) and late symptomatic (>12 weeks old) tumor stages. Normal cerebellar tissue and plasma were similarly collected from age-matched control mice. Tumor tissue explants were cultured for 24 hours in exosome-depleted media. Conditioned media from explants and plasma samples then underwent differential ultracentrifugation to isolate exosomes and exosomal protein content was quantified using bicinchoninic acid assay. Tissue- and plasma-derived exosomes then underwent quantitative mass spectrometry, as well as microRNA sequencing. Exosome protein amount, protein expression, and microRNA expression were compared between early preneoplastic and late tumor stages, as well as between tumor tissue and plasma samples at each stage.

Results: Exosomal protein abundance from late stage tumor tissue was significantly higher than early stage preneoplastic tissue ($p = 0.0044$) after normalization for explant weight. Additionally, exosomal protein amounts from late stage tumor tissue was significantly higher than that of late stage control cerebellum ($p = 0.0001$). A similar trend was seen with exosomal plasma samples, although did not reach statistical significance. With regards to tumor exosomal content, proteomic analysis demonstrated proteins including members of the minichromosome maintenance (MCM) protein family that are essential for DNA replication, and microRNA sequencing revealed presence of the miR-17~92 cluster, previously associated with human SHH-driven MB.

Conclusions: Our data suggests that tumor exosomes may be a potential noninvasive biomarker for monitoring disease status in children with MB. Tumor tissue explant and plasma exosomal protein concentrations in our SHH-MB mouse model correlates with tumor stage. Furthermore, exosomal proteomic analysis from SHH MB demonstrates proteins associated with cellular proliferation, and exosomal microRNA sequencing shows upregulation of components of the miR-17~92 cluster that is specific for the SHH MB subgroup. Additional studies will be needed to validate these preclinical findings in human MB tissue and plasma samples.

SERVICE LEARNING ORGANIZATIONS

Camp Phoenix



Every year, almost one million American children are burned. Fortunately, advancements in trauma and resuscitative care have improved the treatment and survival of these young patients. Despite these medical and surgical advances, the psychosocial care of pediatric burn victims continues long after discharge. These children often return home with scars as permanent reminders of their trauma and the aftermath of surviving a serious burn usually includes considerable stress, diminished self-esteem, and difficulty creating positive social relationships. Camp Phoenix provides a safe environment for pediatric burn survivors and their siblings to interact with their peers, share their experiences and establish a system of support. Many of Camp Phoenix's campers come from low socio-economic backgrounds, and this is their only means to obtain a summer camp experience.

Camp Phoenix, the first burn camp in the United States run by medical students, was founded in 2000 by Paul Mullan, a 2004 Graduate of Weill Cornell Medical College. Since then, Camp Phoenix has expanded and now sponsors three single day events and one overnight camping trip each year. Past events have been held at the Intrepid Museum, the Bronx Zoo, Lucky Strikes Bowling, Sony Wonder Technology Lab, Chelsea Piers, New York Knicks games, the Museum of Natural History and NYC Firehouses, amongst many others. We have worked with over 250 children at these events, with an average of 30 campers and 25 volunteer counselors at each event. Camp Phoenix activities are designed to build confidence, emphasize teamwork, initiate friendship, and maximize fun.

Last June, a group of campers and volunteer counselors spent an incredible three days at Camp Kinder Ring in Hopewell Junction, NY. The overnight camping trip is always especially memorable for both campers and counselors. Campers participate in activities such as swimming, tie-dye, sports, and field games. For many of our campers, this is their first time away from home and outside of an urban setting. Campers are divided into cabins, where they work together and quickly develop their sense of community and camaraderie. They create cabin names and cheers and group enthusiasm is rewarded as the cabins participate in one of Camp Phoenix's favorite traditions, the Messy Olympics. Campers compete for cabin pride in games such as the Human Ice Cream Sundae.

In addition to helping the campers and their families, Camp Phoenix offers a unique educational experience for the medical students involved. Our volunteers serve as mentors for children with a range of medical and psychosocial issues, allowing them to hone their skills as leaders, role models, and caretakers. Positive experiences at the day events and overnight camp weekend have inspired many volunteers to develop interest in Pediatrics, Burn Surgery and Psychiatry.

Camp Phoenix aims to give future physicians opportunities outside of the classroom to better appreciate the art of compassionate and empathetic care for complex patients. Our shadowing program allows medical students to spend time with the pediatric team in the burn unit. These experiences will help students learn about the inpatient and surgical experiences of our campers and relevant psychosocial issues. Camp Phoenix creates a platform to educate all interested students about what our campers went through during the rehabilitation phase of their burn care and to provide unique insight from experts.

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The Heads Up! Pediatric Literacy Program

A Project of the Weill Cornell Medical College Department of Pediatrics

Economic disadvantage and limited parental education mean that children born into poverty are susceptible to delays in language development. These children routinely lag behind their peers before pre-school or kindergarten even begins. In most cases, this gap continues to widen in elementary and middle school as children with poorer educational foundations fall further below school standards. Weakness in language and reading skills can lead to poorer educational and health outcomes, such as school failure, low self-esteem, troubled behavior, and substance abuse. In contrast, recent studies have shown that reading aloud to children from early on in life has positive effects on children's language and pre-literacy skills.

In an effort to improve early literacy, the Heads Up! Pediatric Literacy program has initiated an intervention mediated by pediatric primary care physicians. Doctors are the professional constituent with the most access to children and parents before school begins. By having physicians alert parents to the need to read to their young children—and by giving an age-appropriate book as part of the physical exam—we make the promotion of early language and literacy development a standard part of primary pediatric care.

Beyond encouraging language development and school readiness, books can also be used for assessment in the exam room. Books can help physicians see whether a four-month-old reaches for objects or if a child who moves to accept a book has a normal gait. In addition, at WCMC, trained volunteers help children select more books and conduct parent outreach in the waiting room.

Because we believe deeply in the mission of promoting child literacy, we are working hard to keep this program going as strong as ever through continued involvement with volunteers as well as book donations.

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Health For Life

Health for Life is a program run by the NYP Department of Pediatrics that works with overweight children. A team of pediatricians, fitness specialists, social workers, nutritionists, and medical student volunteers help children and teens ages 7-18 learn about how to lead a healthier life. The 8-week program has 2 major components: nutrition and exercise. The nutrition sessions focus on learning how to prepare healthy meals via cooking demonstrations and hands on activities. The exercise portion focuses on having fun while engaging in physical activity and teaching participants how to incorporate activity into their daily lives. Medical students have the opportunity to form relationships with children and their parents, while also serving as role models and having a great time!

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Health Professions Recruitment & Exposure Program (HPREP)

The Health Professions Recruitment & Exposure Program (HPREP) is part of the Pipeline Mentoring Institute of the Student National Medical Association (SNMA). HPREP aims to expose high school students from underrepresented minorities to science, medicine and the health professions. The overarching goal is to encourage minority students to pursue a career in medicine by giving them meaningful exposure to the health field. During the three month after school program, the students attend a variety of lectures, participate in an anatomy lab dissection, receive assistance on their college application and essay, hear about the intersections of medicine and other disciplines, and build a lasting relationship with a medical student mentor. This year we anticipate around 96 high school students to engage roughly 45 medical students from across all classes to be mentors and role models for the high schoolers. HPREP has a rich history in the community, with alumni often coming back to speak on the program. This program began here at Cornell and has subsequently spread to many other medical colleges around the country.

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The Komansky Children's Hospital Family Advisory Council

The Komansky Children's Hospital Family Advisory Council (KCHFAC) is a group of 35 dedicated parents and family members of pediatric patients who are committed to working together as equal partners with hospital staff and administration to provide Patient and Family Centered Care to all patients since 2007. The work of the KCHFAC members is organized in the following three areas:

Quality and Patient Safety/Advisors: The KCHFAC members are active on numerous Departmental and Hospital Committees, including the Quality and Patient Safety Council. KCHFAC members have direct impact and influence on policies, programs, and practices which affect the care and services of children and their loved ones. The Komansky Children's Hospital joined the Solution for Patient Safety Learning Collaborative with over 97 hospitals working together to eliminate harm in pediatrics. We use the Patient and Family Centered approach to address current priorities in health care specifically in reducing readmission, decreasing infections and preventable medication errors, improving medication management, providing safe care transitions, and improving cost efficiency.

Medical Education/Family Faculty: Working in close collaboration with medical staff, we developed and host programs to educate medical students, residents and nurses on the principles of Family Centered Care. KCHFAC parents are afforded the opportunity to impart their experiences and opinions in order to contribute a family point of view based on "real life" situations. Family Faculty Groups work closely with Drs. Jennifer DiPace and Thanakorn Jirasevijinda, and Nursing Educator Nicole Farnsworth.

Patient Experience/Support Group: A child's stay in the hospital can often be a stressful and difficult time. Our members, through the sharing of their experiences, help guide other families and provide them with emotional support. From the parent lunches, teas and dinners to celebrating with patients and families at one of our many holiday events, we are committed to creating initiatives which supports families as well as systematically managing that support.

The Komansky Children's Hospital Family Advisory Council has partnered with Quality Improvement Research Team "Improving Pediatric Patient Centered Care Transitions (IMPACT)" to improve transitions care for patients with medical complexity who depend on technology for daily functioning. This technology includes tracheostomy. Feeding tubes, indwelling central venous lines, and ventriculoperitoneal shunt. We have developed the Simulation-based Discharge Program that has 2 parts: 1) Simulation-based education where caregivers can learn about tracheostomy care on mannequins 2) Parent to Parent Support provided by the Family Advisory Council Members in person and via telephone platform.

Parent To Parent Network is a peer to peer program that provides the emotional support to families of children inpatient at The Komansky Children's Hospital.

In addition to participating in the Simulation Discharge Program as described above, this program provides support to families with children with Autism, Cancer, Cerebral Palsy, Down Syndrome, Diabetes, Leukemia, Neuroblastoma, Pancreatitis, Seizure Disorder, and Sepsis.

Program Faculty Mentor:

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MACHO – Motivating Action Through Community Health Outreach

Motivating Action through Community Health Outreach (MACHO) is a Weill Cornell Medical College student led, community centered response to the alarmingly increasing rate of childhood obesity, particularly within minority and socioeconomically disadvantaged communities. The program partners with Public School 83 in East Harlem and aims to teach adolescents about nutrition and exercise through the lens of personal responsibility and practical tools for success in life. Although the immediate focus of our program is on healthy choices related to nutrition and exercise, MACHO's participants learn values and skills that can be applied to many other endeavors in life. By empowering our youth to lead healthy lives, we hope they can motivate and inspire others in their community to do the same.



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Weill Cornell Youth Scholars Program (WCYSP)

The main purpose of the Weill Cornell Youth Scholars Program (WCYSP) is to expose students of underprivileged and underrepresented backgrounds, especially from inner city high schools, to the substantial educational resources and opportunities at Weill Cornell Medical College and NewYork-Presbyterian Hospital/Weill Cornell Medical Center. Many of these high schools have exceptionally high drop-out rates that coincide with low percentages of graduates going on to attend a four year university. By developing early experiences in medicine, students can develop appropriate attitudes towards their education, interpersonal skills, and, more importantly, confidence in themselves to succeed academically. The WCYSP curriculum is designed to educate, inspire, and prepare participants for personal and professional success. We seek to address some of the weaknesses that prevent many inner city students from performing well at the college level through an innovative format that emphasizes critical reading and writing. Students attend lectures, given by WCMC students, in physiology, anatomy, and the basic medical sciences. Our daily Problem Based Learning (PBL) sessions provide a forum for youth scholars to interact with one another and learn the value of collaboration. All high school students that completed the program reported that it had a significant impact on their personal motivation to pursue a career in science or medicine and are more motivated to take more challenging courses in high school. Moreover, all of the students who graduated from the program went on to college, and most of those now in college major in science or other pre-medical tracks. Weill Cornell medical students, residents and attending physicians serve as mentors and teachers in the program. Volunteer teachers can choose one or more topics and are given lecture notes and powerpoint slides that are prepared in advance to maintain consistent quality. Alternatively, volunteer teachers may use their own teaching materials for their particular topic with proper review in advance. The program runs for four weeks every July from Tuesday to Friday. Typically, each lecturer will give one or two one-hour lectures, but can choose to volunteer more of their time. We also recruit new leadership every year to plan the next summer's program under the guidance of leaders from the previous year.

Student Leadership:

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Kids in Chronic Care Support (KICS)

KICS is a student-run program with the New York Presbyterian Hospital that creates one-on-one matches between Weill Cornell medical students and children or adolescents currently receiving therapy. The focus of the program is to provide support for the children and their families; it gives the kids an opportunity to form a close, consistent relationship with someone outside of their treatment team. KICS currently works with departments of pediatric neurosurgery and hematology/oncology.

KICS leadership personally matches students with patients interested in having a buddy. Once a match is made, the student makes the initial contact with the patient during a clinic visit. After this, buddies can spend time together whenever it is best for both; this can be during hospital visits or even outside of the hospital.

For kids, the hospital can be an intimidating place associated with pain, discomfort, and, of course, the terrible effects of chemotherapy. Medical students can help make their treatment experience a little better. Especially in pediatrics, the diagnosis of cancer can have a major impact not only on the patient but also on the patient's family. For parents, KICS can take some pressure off of the situation and give them a needed break. KICS provides medical students with the opportunity to follow a patient case longitudinally and also to delve into the impact of chronic illness on patients and their families.

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MENTORING AND RESEARCH OPPORTUNITIES IN PEDIATRICS

Erika Abramson, MD, MS

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Field(s) of Interest: Educational research, pediatric hospitalist and outpatient medicine, health services research, healthcare safety and quality research

Research Title: Health services research, healthcare safety and quality research

Project Description: I mentor a host of residents and fellows on general pediatric, educational, and health services research projects. There is frequently a role for medical students in these projects, with varying responsibilities ranging from subject recruitment, retrospective chart review, data analysis, and abstract/manuscript writing. If any interest in these fields, please feel free to reach out to me.

Preferred Experience: None required

Oleh Akchurin, MD

Assistant Professor of Pediatrics
Pediatric Nephrology
Weill Cornell Medicine
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oma9005@med.cornell.edu

Field(s) of interest: Nephrology / Pediatric Nephrology. Iron metabolism, fibrosis, bone health, growth and development.

Research Title: Anemia, iron metabolism, renal fibrosis and autophagy in chronic kidney disease

Project Description: In this project we are targeting the novel mechanisms linking iron metabolism alterations in chronic kidney disease (chronic renal insufficiency) with renal fibrosis, and systemic complications of chronic kidney disease, including those affecting the skeletal system. The studies are conducted in both basic science (mouse model) and clinical / translational (cohort of children with chronic kidney disease) settings.

Students' Role in the Project: Students interested in basic science will be able to participate in laboratory experiments. Students interested in clinical research will have an opportunity to work with our clinical database.

Preferred Background/ Experience: Previous research experience would be helpful but not required.

Michael J. Alfonzo, MD, MS

Pediatric Emergency Medicine
Department of Pediatrics and Emergency Medicine
Weill Cornell Medicine
mia2016@med.cornell.edu

Field(s) of Interest: Pediatric Emergency Medicine; Global Health; Sepsis; Electronic Health Records

Research Title: Impact of Saving Children's Lives Program on Provider Knowledge, Resource Capacity and Patient Outcomes in Tanzania

Co-investigators: Christine Joyce MD (Pediatric Critical Care Medicine, Weill Cornell), Adolphine Hokororo (Pediatrics, Weill Bugando)

Project Description: In 2013, "Saving Children's Lives" (SCL), was created to fill the gap in community healthcare providers' knowledge and skills to recognize and treat children with acute illness. It consists of a 2-day program adapted from the AHA program PEARS (Pediatric Advanced Emergency Assessment, Recognition, and Stabilization) designed to reinforce the WHO's IMCI (Integrated Management of Childhood Illness) training and focus on the acutely ill child needing urgent referral to a hospital. The program's goal is to increase the healthcare provider's ability to recognize and initiate stabilizing treatment of the severely ill child for disorders including acute respiratory distress and hypovolemic shock from diarrhea. Implemented in Kweneng District, Botswana, where a standardized mortality audit is standard of care, the program was associated with a 56% reduction in pediatric mortality. Funding obtained through the Laerdal foundation has allowed for contextualization and implementation of the training program in Mwanza, Tanzania. This project proposes implementation of a standardized mortality audit to allow for collection of outcome measures. Following provider training at both Weill Bugando Medical Center and Sekou Torre, the regional district hospital from which the majority of patients are referred, data will be collected and analyzed to assess for a decrease in mortality.

Students' Role in the Project: Students will have the opportunity to join a multidisciplinary team engaged in several projects regarding pediatric global health. We are anticipating that several secondary research projects will evolve from this primary research. Students can participate in research study design, data collection, and manuscript writing. Students will learn how to obtain informed consent, conduct chart reviews, and analyze data.

Preferred Background/ Experience: None required. Interested students should be creative, motivated, and interested in global health. Students who are planning to participate in a global health elective are strongly encouraged to collaborate.

Elaine Barfield, MD

Department of Pediatrics

Division of Gastroenterology and Nutrition

Helmsley Tower 3rd Floor

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Field(s) of Interest: Home Infusions in pediatric IBD, Quality Improvement, IBD, Celiac disease, Fecal Microbiota Transplant

Research Titles: Examination Of A Home Infusion Program In Pediatric Patients With Inflammatory Bowel Disease; Safety of home infliximab infusions in pediatric inflammatory bowel disease; The Effect of a Gluten-free Diet on Growth Velocity in Childhood Celiac Disease; A Multicenter Study Of Fecal Microbial Transplantation For Clostridium Difficile Infection In Children; Survey Of Aerodigestive Disorders And Sleep Abnormalities In Children With Bloom Syndrome; Cost Of Hospital Infliximab And Vedoluzimab Infusions In Pediatric Patients With Inflammatory Bowel Disease

Project Description: IRB proposal development, subject recruitment, data entry, abstract and manuscript preparation

Students' Role in the Project: Student will learn the basics of research project development, recruitment for research projects, writing abstracts/manuscripts

Preferred Background/ Experience: Must be enthusiastic, motivated and very organized. Knowledge of End Note and REDCap are helpful but not required

Marisa Censani, MD

Pediatric Endocrinology
Department of Pediatrics,
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Field(s) of Interest: Obesity and insulin resistance, bone and mineral metabolism, growth, thyroid disorders, and diabetes.

Project Description: Patient recruitment, data acquisition, data analysis, and abstract formulation in patient-oriented research studies; please contact Dr. Censani for further details.

Preferred Background/ Experience: None

Kimberley Chien, MD

Division of Pediatric Gastroenterology and Nutrition
Department of Pediatrics, Weill Cornell
Director, Pediatric Inflammatory Bowel Disease Transition Program
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Field(s) of interest: Transition care of pediatric patients with chronic gastrointestinal diseases, currently investigating the needs of adolescents with Inflammatory Bowel Disease (IBD) during the transition period to adulthood and measuring effectiveness of interventions to improve their patient outcomes and quality of life; Prevention of venous thromboembolism (VTE) in pediatric IBD

(1) Project Title: Assessment of VTE Burden in Hospitalized Pediatric IBD patients

Principal Investigators: Dr. Kimberley Chien, Dr. Nicole Kucine

Project Description: We are establishing the current risk/incidence of VTE among hospitalized pediatric IBD patients. We are also investigating the impact of VTE and its complications on the US healthcare system. Using national databases, we will apply qualitative and quantitative research methods to assess patients during their hospitalizations.

Students' Role in the Projects:

Students will be involved in collection and analysis of data, and abstract writing.

Preferred Experience: None required

(2) Project Title: Assessment of formal transition care program for WCM Pediatric IBD patients

Principal Investigators: Dr. Kimberley Chien

Project Description: We will investigate transition-care related issues and assess the impact of our newly established formal transition care program in transition readiness of adolescent IBD patients. We will assess adolescent IBD patients using qualitative and quantitative research methods.

Students' Role in the Projects:

Students will be involved in patient recruitment, collection and analysis of data, national presentation submission, and abstract writing.

Preferred Experience: None required

Chris Cunniff, MD

Division of Medical Genetics
Department of Pediatrics
Weill Cornell Medical College
646-962-2762
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Field(s) of Interest: Medical genetics, including genetic disorders associated with predisposition to cancer, multiple malformation syndromes and disorders of sexual development

Research Title: Bloom Syndrome Registry – a database of health information on persons with Bloom syndrome, a chromosome instability syndrome with predisposition to cancer

Project Description: The Bloom Syndrome Registry contains information on all aspects of health in this population and can be used to ask and answer questions about health and welfare in this population. We have ongoing projects examining feeding growth, cancer development, and intelligence and academic accomplishment. I am also interested in development of guidelines for care for people with genetic disorders and their utility.

Students' Role in the Projects: Students may propose a question that can be examined with Registry data, or he/she may also join in one of our currently existing or planned projects. The student will work closely with Dr. Cunniff and the Bloom Syndrome Registry Research Assistant to extract and analyze data from the Registry; or he/she will use data being actively collected to describe characteristics of a subset of persons in the population.

Preferred Experience: None required

Diane Felsen, PhD and Dix P Poppas, MD

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Field(s) of Interest: Congenital Adrenal Hyperplasia and Bladder dysfunction

Project Descriptions:

Modeling Congenital Adrenal Hyperplasia in zebrafish and in adrenocortical cells: Congenital Adrenal Hyperplasia [CAH] is an inherited deficiency of certain enzymes involved in steroid hormone production. In CAH, the most common enzyme deficiency is in steroid 21-hydroxylase [21-OHase]. The deficiency of 21-OHase not only decreases cortisol and aldosterone production, but also results in adrenocorticotrophic hormone stimulation of the adrenal cortex, leading to excess synthesis of male hormones. Children with the most severe form on CAH require life-long medical treatment to replace both the cortisol and aldosterone which are reduced due to 21-OHase deficiency. Furthermore, In females, the result of this enzyme deficiency is virilization which begin in utero; these girls are born with virilized external genitalia. The girls, who are all genetic females, are often treated with feminizing genitoplasty to correct their masculine appearance.

Our laboratory is involved in 2 projects related to CAH. The first is using the zebrafish to model CAH and 21-OHase deficiency. In this project, we will be using CRISPR/CAS-9 to delete 21-OHase in zebrafish to study its effects on zebrafish. Further studies would examine if replacement of 21-OHase in zebrafish restores the phenotype. These studies also involve understanding the general role of 21-OHase and other steroid synthetic enzymes in zebrafish. Similar studies will be carried out with the H-295 Human adrenocortical cell line. Results of

both of these studies will eventually be used to determine if/how 21-OHase enzyme activity can be restored in patients with CAH to attenuate or eliminate their metabolic dysfunction.

Design of a Synthetic Bladder Augment Patch: Bladder dysfunction related to small, fibrotic bladders is a significant problem in children, resulting in high bladder storage pressures and low bladder volume. The high pressures that build up impact upon bladder function by inducing fibrosis and on quality of life because of incontinence; if left untreated, high bladder pressure can lead to renal failure and a lifetime of dialysis, or renal transplantation. The conventional surgical approach to increase bladder size is bladder augmentation [ileocystoplasty], which is associated with significant morbidity. In our laboratory, we are interested in designing a synthetic bladder augmentation patch to increase the bladder storage capacity. This approach would reduce much of the current surgical morbidity, and would also eliminate the metabolic complications of ileocystoplasty. We are interested in testing this bladder patch in a porcine animal model.

Students' Role in the Project: Students will learn basic laboratory techniques related to zebrafish/cell growth and maintenance, as well as cloning, PCR, western blots and CRISPR/CAS9 technology. In the bladder project, the student will assist in surgery and will then study the tissue in vitro using a variety of basic lab techniques.

Preferred Background/ Experience: Willingness to learn and work hard and committed interest are pre-requisites.

Maura D. Frank, MD

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Field(s) of Interest: Obesity

Research Title: Effect of weight management program on weight/BMI, eating and physical activity behaviors, and quality of life.

Project Description: Data entry and management, study recruitment, medical student mentoring program, IRB proposal development.

Students' Role in the Project: Student will learn the basics of research project development, recruitment for research projects, formulation of an abstract.

Preferred Background/ Experience: Some prior research experience helpful but not necessary.

Cori Green, MD, MS

General Academic Pediatrics
Assistant Professor of Pediatrics
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Field(s) of interest: Integration of pediatric mental health (MH) care into primary care, training practicing and future pediatricians in managing pediatric mental health problems, integrated models of mental health care

Current Project Title: Predictors for Managing Pediatric Mental Health Problems in Pediatric Trainees: A Needs Assessment for Improved Education

Project Description: National assessment of pediatric training programs, their integrated models of mental health care, and trainee perceived responsibility and practice behaviors.

Students' Role in the Projects:

Students will be involved in recruitment of subjects, administrative tasks for the project, analysis of data, and abstract writing.

Preferred Experience: None required

Daniel W. Green, MS, MD

Dr. Emily Dodwell, MD, MPH, FRCSC

Dr. Peter Fabricant, MD, MPH

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Field(s) of Interest: Pediatric Orthopedic Surgery and Scoliosis

Research Title: Selected clinical projects in pediatric orthopedic surgery

Project Description: Previous projects include: DDH, congenital muscular torticollis, discoid meniscus, scoliosis and kyphosis.

Students' Role in the Project: Literature review, radiograph review, data analysis

Preferred Background/ Experience: None requested

Katherine A. Hajjar, MD

Division of Hematology-Oncology

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Department of Cell and Developmental Biology

Weill Cornell Medicine

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Field(s) of Interest: Hemostasis and thrombosis, angiogenesis, vascular leak and inflammatory syndromes, sepsis

Research Title: Regulation of Membrane Dynamics in Vascular Biology and Inflammation

Project Description: The plasma membrane serves as a dynamic platform for assembly of molecules that regulate the clotting of blood and prevent fluid leak from blood vessels. At the same time, repair of intracellular organelle membranes is central to the control of inflammation. In humans, the annexins are a 12-member family of calcium-regulated, phospholipid-binding proteins that modulate a spectrum of dynamic membrane-related events. Our lab is defining these mechanisms in the context of vascular health and the inflammatory response. We use in-patient and out-patient clinical samples, genetically engineered mice, and cell culture techniques to determine how the annexins, especially annexin A2, impact health and disease. Our aim is to understand their specific roles in preventing thrombosis and vascular leak, regulating the innate immune system, and controlling the development new blood vessels. In particular, we wish to examine these processes in the pediatric population, where little is

known about annexin expression and function. Ultimately, we hope that this research will lead to new treatment approaches for disorders involving thrombosis, excessive angiogenesis, and unregulated inflammation in children.

Students' Roles in the Projects: Depending on prior experience, students will learn basic laboratory techniques such as cell culture, basic molecular biology, western blotting, ELISA, mouse surgery, and blood and tissue processing. In addition, students may embark on analytical literature reviews relevant to ongoing projects.

Preferred Background/Experience: Strong interest in research, intellectual curiosity, and enthusiasm.

Barry Kosofsky, MD, PhD

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Research Title: Exercise Therapy as Treatment for Mild Traumatic Brain Injury (mTBI)

Project Description: We are pursuing a clinical research program to establish the efficacy of a graded exercise program to accelerate the recovery of individuals who have persistent post-concussive symptoms following mTBI. We are using functional (autonomic, EEG, evoked responses, and eye tracking), and structural (DTI/MRI) assessments to identify changes in the brain following mTBI that will be predictive of, and correlate with the response to exercise therapy.

Students' role in the project: Subject enrollment and assessments during participation in a clinical research protocol.

Preferred Background/ Experience: Clinical research experience preferred (especially prior work in clinical trials).

Nicole Kucine, MD

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Project Title: Assessment of VTE Burden in Hospitalized Pediatric IBD patients

Principal Investigators: Dr. Kimberley Chien, Dr. Nicole Kucine

Project Description: We are establishing the current risk/incidence of VTE among hospitalized pediatric IBD patients. We are also investigating the impact of VTE and its complications on the US healthcare system. Using national databases, we will apply qualitative and quantitative research methods to assess patients during their hospitalizations.

Students' Role in the Projects:

Students will be involved in collection and analysis of data, and abstract writing.

Preferred Experience: None required

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Field(s) of Interest: Cancer Metastasis

Research Title: Tumor exosomes determine pre-metastatic niche formation and organotropism

Project Description: Tumor microparticles known as exosomes are released into the circulation and fuse with specific cells at distant sites establishing a pre-metastatic niche in cancer patients. Tumor exosomes transfer exosomal tumor contents (proteins, miRNA and DNA) into normal cells and "educate" these cells to a pro-metastatic phenotype. Recently, our lab has discovered a new particle called exomere (a membranous particle smaller than an exosome) which packages proteins enriched in metabolic enzymes.

Students' Role in the Project: The student will be responsible for determining the key factors associated with exosomes that support their role in organotropism.

Preferred Background/ Experience: None requested

Marianne Nellis, MD, MS

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Field(s) of Interest: Transfusion medicine research

Research Title: The Effects of Transfusion of Blood Products in Critically Ill Children

Project Description: I am working on several retrospective and prospective projects looking at the effects of red blood cell and platelet transfusions on critically ill children.

Students' Role in the Projects: Students can be involved in the projects on several levels including data acquisition, analysis and manuscript writing.

Preferred Experience: None required

Snezana Nena Osorio, MD

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Field of Interest: Safety & quality in healthcare

Title of Project: Improving Pediatric Patient-Centered Care Transitions: A Multi-Center Research Quality Improvement Collaborative

Project Description: This study aims to promote partnership between patients/parents/caregivers and medical teams via shared ownership of care transitions at hospital discharge. The transition from the inpatient to outpatient setting presents a safety risk to pediatric patients. Errors in improper medication use, failure to recognize and activate contingency plans, and failure to adhere to follow-up appointments reflect poor patient hand-off prior to hospital discharge. We aim to improve parent/caregiver self-management. Our intervention- Pediatric Discharge Bundle consists of 1) pre-discharge confirmation of patient/caregiver readiness for discharge, 2) caregiver's ability to teach-back essential components of a patient/caregiver-generated care plan, and 3) post-discharge phone follow-up to review essential information and clarify questions to "bridge the gap" prior to follow-up with the PCP. Our secondary objectives are to improve care coordination, provider handoff, and to decrease readmission rate.

Medical Student Research Opportunities IMPACT Study:

Teach Back Direct Observation: to evaluate the quality of the Teach Back technique used at hospital discharge by the nursing staff. After training, students will observe discharge instructions by nursing staff using a checklist-type instrument. Schedule is flexible and can be in the afternoon or evening.

Preventable Readmissions: to understand the epidemiology of preventable pediatric readmissions and to identify the risk factors contributing to preventable readmissions. After training, students will 1) review charts to determine the causes for readmission using an established tool; 2) interview caregiver in person or by phone about their hospital experience.

Provider Satisfaction Surveys and Qualitative Study: to better understand discharge communication needs to handoff patients from the hospitalist services to outpatient subspecialty providers.

Preferred Background/ Experience: None

Jeffrey Perlman, MD

Department of Pediatrics, Division of Neonatology
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Field(s) of Interest: Neonatology, Brain development, Resuscitation, Global health

Title of Research Project: Determine biomarkers for identifying infants at high risk for neurodevelopmental deficits following perinatal hypoxia-ischemia treated with selective head cooling

Project Description: Evaluate the value of advanced MRI imaging and/or recovery of the EEG as early biomarkers of outcome in infants with HIE treated with selective head cooling

Students' Role in the Project: Assist in the review of the EEG after birth until the development of sleep awake cycling and delineate the pathways to recovery. Evaluate the potential role of MRI spectroscopy and or DTI in predicting recovery following HIE.

Preferred Background/ Experience: None

Heidi Stuhlmann, PhD

Department of Cell & Developmental Biology (primary)
Department of Pediatrics (secondary)
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Research Title: Placental Development and Placentopathies

Project Description:

The placenta serves as the site of contact for the maternal and embryonic circulatory systems to enable nutrient and gas exchange. It contains two primary functional cell types, trophoblast and endothelial cells. Proper placental development requires invasion and differentiation of trophoblast cells, as well as coordinated maternal vascular remodeling and fetal vasculogenesis. Any disruption in these processes can result in placental pathologies, including intrauterine growth restriction and preeclampsia (PE). Uteroplacental vascular insufficiency, a main cause of IUGR, results in chronic oxygen and nutrient deprivation. Fetal circulatory adaptations compensate for growth restriction, but also program the fetus for increased risk of hypertension, cardiovascular disease, and type 2 diabetes later in life. PE is a leading cause of maternal and fetal morbidity and mortality worldwide, and the only resolving treatment is delivery of the baby and placenta. Although the pathophysiology of PE remains largely unknown, inadequate trophoblast cell invasion, endothelial cell dysfunction, dysregulated uteroplacental vascularization, and an imbalance of pro- and anti-angiogenic growth factors have been implicated in the disease.

We are using mouse models, trophoblast stem cells and human placental samples to investigate the role of EGFL7 and miR-126 during normal and pathological placental development. EGFL7 is a secreted angiogenic factor, and miR-126 is a non-coding microRNA embedded within the *Egfl7* gene. Both were previously thought to be endothelial-restricted in their expression. However, our recent studies revealed that *Egfl7* and miR-126 are expressed in the placenta in the maternal and fetal vasculature, as well as in trophoblast cells (Lacko et al., 2014. *Mech. Dev.* 133:163-176).

Using loss-of-function mouse models, we uncovered specific and distinct roles for EGFL7 and miR-126 during placental development. Loss-of *Egfl7* results in defects of placental vascularization, malperfusion, and fetal growth restriction (Lacko et al., 2017. *Development* 144:2469-2479). Our studies show that miR-126 regulates glycogen trophoblast proliferation and expression of imprinted genes specifically in the placenta (Sharma et al., 2017. Manuscript in revision). We also have a keen interest to understand their role in human placentas. Specifically, in an ongoing collaboration with clinician-scientists in Maternal-Fetal Medicine at Weill Cornell, Columbia University Medical School, and the University of Rome, Italy, we are investigating the role of EGFL7 protein in preeclampsia.

Student's/Fellow's Role in the Project: The student/fellow would get “hands-on” lab experience. Initially, the student/fellow would work together with a research scientist in the lab to learn and master the required techniques, and later work more independently. Potential projects include: Analysis of serum, placental explants cultures from PE patients for presence of EGFL7, and miR-126.

Preferred Background/ Experience: Basic lab skills, some knowledge in developmental biology, strong interest in research to understand disease mechanisms.

Chani Traube, MD

Pediatric Critical Care Medicine
Department of Pediatrics, Weill Cornell
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Field(s) of Interest: Pediatric Critical Care Medicine; Pediatric Neuro-Intensive Care

Research Title: A Prospective Longitudinal Assessment of Pediatric Delirium, Associated Risk Factors and Short-Term Outcomes in Pediatric ICU Patients

Project Description:

The pediatric critical care community has just begun to explore delirium in its population, but an emerging literature indicates a prevalence greater than 20%, with associated short- and long-term morbidity. With an estimated 200,000 children admitted to intensive care in the US annually, more than 40,000 children are likely affected each year. At Cornell, we have implemented universal delirium screening in the PICU as standard of care.

This study is designed to define the natural history of pediatric delirium, identify associated risk factors, and assess the impact of delirium on long-term cognition, behavior, and psychological health.

Students' Role in the Project: Students will have the opportunity to join a multidisciplinary team engaged in several projects regarding pediatric critical illness and delirium. They will participate in research study design, data collection, and manuscript writing. Students will learn how to obtain informed consent, conduct chart reviews, analyze data, and perform follow-up phone calls using surveys to detect whether a patient has experienced long-term effects from delirium.

Preferred Background/ Experience: None required. Interested students should be friendly, comfortable interacting with children and their families, and demonstrate organizational skills and attention to detail. Research is ongoing, with active clinical trials in progress, others pending IRB approval, and others in planning stage.

CLASS OF 2017 PEDIATRIC RESIDENCY MATCHES

General Pediatrics

Danielle Daniels	SUNY Upstate Medical University	Syracuse, NY
Rebecca DeMaria	Children's Hospital-Los Angeles	Los Angeles, CA
Daniela Guisado	NewYork Presbyterian Hospital Weill Cornell Medicine	New York, NY
Megan McGeehan	University of Washington Affiliated Hospitals	Seattle WA
Rachel Rosenthal	University of Southern California	Los Angeles, CA

Pediatric- Medical Genetics

Xiao Peng	Johns Hopkins Hospital, J H Medical Center	Baltimore, MD
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Pediatrics- Preliminary

Julie Steinberg	St Louis Children's Hospital	St Louis, MO
Julie Steinberg	Diagnostic Radiology, Barnes-Jewish Hospital	St Louis, MO

Medicine-Pediatrics (Family Medicine)

Elizabeth O'Callahan	Icahn School of Medicine Beth Israel	New York, NY
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Child Neurology

Juan Duran	NewYork Presbyterian Hospital-Columbia University Medical Center	New York, NY
Min Ye Shen	NewYork Presbyterian Hospital-Columbia University Medical Center	New York, NY

**DEPARTMENT OF PEDIATRICS
GRADUATE MEDICAL EDUCATION
CLASS OF 2017**

Saif Eldeen Alzoobaee	Hospitalist, NYP-Lower Manhattan
Katherine Armstrong	Hematology/Oncology, MSK-NYP Weill Cornell
Yishan Cheng	Hospitalist, NYP-Queens
Ashley Cozzo	Neonatology, NYP-Weill Cornell
Kristin Crosby	Critical Care, NYP-Weill Cornell
Rula Green-Gladden	Chief Resident, MSKCC; Hematology/Oncology Seattle Children's
Bryce Hoffman	Allergy/Immunology, Denver
Stacie Kahn	Chief Resident, NYP- Weill Cornell
James Kim	Neonatology, NYP-Weill Cornell
Shazia Lutfeali	Allergy/Immunology, UT Southwestern
Hanna Moisander-Joyce	Hematology/Oncology, NYP-Columbia
Lauren Navallo	Hospitalist Fellowship, Rutgers
Jenna Piccininni	Cardiology, NYP Columbia
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