December 2016

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 Fourteenth 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 – Ilana Scandariato, Micha Thompson, and Tyler Uppstrom – and their advisors, Drs. Susanna Cunningham-Rundles and Thanakorn Jirasevijinda, on organizing and continuing this important pediatric program.

Sincerely,

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. CORI GREEN

Claire Stewart, MS1

Dr. Cori Green, an Assistant Attending Pediatrician at New York Presbyterian Hospital and Assistant Professor of Pediatrics at Weill Cornell Medical College, has dedicated her career to caring for both the physical and mental health of children. Dr. Green focuses on researching and implementing ways to best integrate mental health within pediatric primary medical home. Dr. Green was kind enough to take time in October to talk to me about her journey to medicine, career in pediatrics, and dedication to educating other physicians about the mental health issues that affect children.

While she has always been interested in working with children, it was not until her pediatric clerkship at Rush Medical College that it became obvious that to Dr. Green that she would pursue a career in pediatrics. She realized that while kids can quickly become “scary sick,” she found pediatrics to be fun and rewarding, given that most of her patients have resilient and happy attitudes. After completing her residency at Rush, Dr. Green began a General Academic Pediatric Fellowship at the New York University School of Medicine, knowing she wanted, ultimately, to be involved in academia. During that time, she completed her Masters in Clinical Investigation.

As part of her General Academic Pediatric Fellowship, Dr. Green worked on a large NIH funded research project investigating the effects of a child’s home environment on health, primarily of those growing up in poverty. Dr. Green notes that she has “always had a passion for helping vulnerable populations.” Being aware of the “cycle of poverty,” she looked into how maternal literacy and depression influenced parenting and child development. Dr. Green notes that she has “always had a passion for helping vulnerable populations.” In medical school and residency, she found time to work at a homeless shelter and performed a needs assessment for early literacy for homeless children. Despite finding the subject matter interesting and important during her fellowship, Dr. Green found that she was not sure she enjoyed the constraints of working on such a large funded project.

Dr. Green later completed a second fellowship in medical education at Montefiore, and then joined the Cornell faculty in 2009. At Cornell, she became immersed in the education of medical students as the Associate Director of the Pediatric Clerkship and the Director of the Pediatric Sub-Internship. She loved working with medical students at the exciting point in their education, discovering their own path. While Dr. Green’s current research grant “buys out” about 75 percent of her time for research, she is actively involved in the clinical care of patients and education of residents in the outpatient continuity clinic. Her background in medical education is also put to good use through New York State’s Community and Adolescent Psychiatry for Primary Care program. With this program, Dr. Green educates pediatricians throughout the state and country in three-day intensive training sessions on the integration of mental health care within the primary care setting.

Dr. Green’s pediatric mental health research happened to coincide with a national push for pediatricians to take on more responsibility for mental health treatment as a shortage of pediatric psychiatrists has left untreated many pediatric mental health problems. In clinic, Dr. Green witnessed a shift in the illnesses with which children presented. While she trained in school to treat infectious
diseases like meningitis, she was, in fact, seeing more and more behavioral issues, like ADHD. Having studied psychology as an undergraduate at the University of Michigan, “all of the pieces fell into place,” and Dr. Green began to work with the question of how psychosocial factors impact a child’s health. She began by uncovering the current state of mental health education among pediatric residents by surveying pediatric program directors on a national level and conducting focus groups with residents, locally. Perhaps unsurprisingly, she found that, while some programs were implementing innovative training, the vast majority of residents were not trained adequately to meet the mental health needs of their pediatric patients. This research interest lead Dr. Green to be an active member of the American Academy of Pediatrics Mental Health Leadership Workgroup. Her project has now grown into a national project to document the efficacy of a wide array of mental health initiatives. From training residents to conduct mental health screenings to collaborating with onsite mental health professionals site to work in parallel with physicians, Dr. Green hopes to discover “what actually works and changes behavior.” Upon reflection, Dr. Green feels that her journey in medicine has been “kind of fortuitous, but I also know it’s everything I’m supposed to do.”

For those interested in getting involved with research, Dr. Green suggests that medical students should start talking to people early on to find out what projects are ongoing, but ultimately, she suggests that students should “stress and worry less.” Dr. Green ended by advising on the importance of maintaining a balance between medical school and the many other things in life to be enjoyed.
INTERVIEW WITH DR. SHEILA J. CARROLL

Andzelika Dechnik, MS1

Dr. Sheila J. Carroll is an associate attending pediatrician at New York-Presbyterian Hospital and an associate professor of clinical pediatrics at Weill Cornell Medical College. Dr. Carroll graduated from SUNY Downstate College of Medicine, completed her residency at Hasbro Children’s Hospital, and then returned to New York City to complete her cardiology fellowship at a joint program between Columbia and Cornell. With a particular focus on fetal cardiology, Dr. Carroll is extremely passionate about her field, research, and teaching future physicians about what she does.

Why pediatric cardiology?

Dr. Carroll always enjoyed working with kids. Growing up, she was a camp counselor and did a lot of theater work. Once in medical school, she enjoyed other rotations such as Internal Medicine and Obstetrics/Gynecology, however she felt herself always wanting to go with the newborn and discussing the health of the child. She wanted to work with children and their families to help with their medical problems. Pediatrics was the obvious choice.

In her pediatrics residency, Dr. Carroll spent a lot of her time in inpatient situations. She enjoyed being in the Emergency Room and in the Intensive Care Unit, being obviously drawn to intensive care situations. She describes codes as “very exciting and interesting,” being intrigued by the high energy fields. Dr. Carroll considered Emergency Medicine, but found that it lacked the continuity of care and potential to develop strong relationships with the patients.

During her time at Hasbro Children’s Hospital, Dr. Carroll truly enjoyed her cardiology rotation, and soon after fell into a cardiology elective at Columbia that guided her towards her current career. This was the point in her training when Dr. Carroll felt the most eager to read about her patients and their medical issues. Cardiology was the way for her to bridge all of her interests: it is a field that is high energy, however it is a good way to work with children and have them experience a continuity of care.

Clinical Work

Although Dr. Carroll sees children of all ages with congenital heart disease, she has a specific focus on fetal cardiology, which was a perfect way to link her interest of both obstetrics and pediatrics. Obstetricians will send Dr. Carroll patients if they have suspicion of congenital heart disease based on the initial scan, or if there are aspects of the pregnant woman’s medical history that would set up the fetus for potential congenital heart disease. Dr. Carroll and her team will then do scans on the pregnant women to assess the fetal heart. Depending on the problem discovered, there are medications that can be given to the mother to treat things such as fetal arrhythmias. However, the most important aspect of diagnosing a fetus with congenital heart disease is the ability to prepare the parents and let them know what to expect. Though it is a shock to be told that the baby that hasn’t even been born yet has heart disease, patients really appreciate the preparation prior to the birth of the child.
Dr. Carroll is in somewhat of a unique situation. Though she spends a lot of time in a hospital setting, she is still able to provide continuity of care to her patients. Often, she will meet with the parents before the baby is born, and she will be there right after the delivery. Dr. Carroll and her team will then take over the baby’s care, following him or her through their development. If surgical intervention is needed, Dr. Carroll is there at the hospital before and after the surgery, and will then have follow up visits in her outpatient clinic. She truly enjoys this type of system, being able to guide families through difficult times, and at the same time, having the children as her patients long term.

Favorite Aspect of the Job
Dr. Carroll truly loves all of her patients. Every patient has an amazing story and every family is fantastic to work with. Her favorite thing about the job is being able to follow the children long term, and see how they are doing. After all, she knew some of her patients before they were even born, so seeing them being successful in middle school, is rewarding and exciting.

She recounts how she had one family that adopted their son from China. They knew he had a heart defect, but they did not know what it was, so they brought him in to see Dr. Carroll. He was just a toddler at the time, and she was a new attending, putting her in an exciting position early in her career. She worked together with the family through a complex operation that was done in one stage, rather than the multiple stages it would have been done in if he had been born here in the U.S. Today, he is in middle school, and doing extremely well.

Challenges
As we can all imagine, the most challenging aspect of Dr. Carroll’s career is delivering bad news to parents. Having to tell parents that their child will not survive does not get easier with time, and is difficult whether this happens prenatally, in infancy, before, or after surgery. Dr. Carroll praises her team, who is experienced and trained in such situations: a feature that patients greatly appreciate. While it is important to be there for the family, the person delivering the bad news also has to keep their emotions in check, and learn to be straightforward with the parents.

Research
Within her field, Dr. Carroll spends some time looking at her surgical population. She is interested in the impact of gestational age on surgical outcome. She looks at the data to see how long patients with the same disorder stay in the hospital post-surgery if they were born at 28 weeks versus at 38 weeks. As one may hypothesize, those who were born at an earlier gestational age have to be monitored longer and stay in the hospital for a longer period of time.

Another area of interest of Dr. Carroll’s is fetal echocardiography, which is a test that is similar to an ultrasound. She is interested in the quality of the echo and how we can use this technology to look at outcomes and see what parents really take away from these visits.

Advice
The most important piece of advice that Dr. Carroll has for aspiring future pediatricians is to stay open minded and to take time to figure out what is it that truly interests you. No matter which path you take in pediatrics, you will enjoy working with kids because it is fascinating and a lot of fun. However, it is
important that you enjoy what you do, and taking the time to figure out what that is can make the job even more amazing than it already is.

A Varied Job
Dr. Carroll loves her job partially due to the fact that it provides her with variation. She is inpatient and is she is outpatient. She is on her feet a lot, and can be found in many scenarios in the hospital. One day she is in the cath lab, the next in the operating room, and then in the intensive care unit. If this is something you are interested in, feel free to reach out, as Dr. Carroll is extremely excited to be part of a teaching institution and would love to educate aspiring doctors about her field.
RESEARCH ABSTRACTS
MEDICAL, GRADUATE, AND MD/ PHD STUDENTS
Improving Bacteremia Bundle Use in 6 South
Brandon Sumida; Snezana Osorio¹ MD; Marianne Nellis¹ MD, MS
¹Department of Pediatrics, Weill Cornell Medicine, New York, NY

Background: Sepsis is a systemic inflammatory state in response to infection that is a major cause of morbidity and mortality in the pediatric population. Good outcomes require immediate identification and proper management. Dissemination of bacteria to the blood (bacteremia) is a common etiology of sepsis, however diagnostic tests like blood culture are limited in their timeliness and detection ability. Serum procalcitonin (PCT) shows potential in identifying bacteremia, although its accuracy has yet to be proven in the critically ill pediatric population. A retrospective study in the NYP-Cornell PICU identified a combination of PCT and lactate as relatively specific compared to markers like C-reactive protein (CRP) or PCT alone. A prospective study of PCT in comparison with blood culture, WBC, C-reactive protein (CRP), and blood gas (pH, ionized Ca²⁺, and lactate) would better assess PCT's diagnostic accuracy. A “bacteremia bundle” composed of the above tests was implemented within the NYP-Cornell PICU to be used in febrile/hypothermic patients with suspected bacteremia. An aim was set to increase compliance to 80% within 6 months.

Methods: A quality improvement initiative using an observational time series with several planned sequential interventions.

Results: Over the course of 7 weeks, 90 instances of fever/hypothermia meeting inclusion criteria were collected in the PICU. Preliminary mean compliance with all bundle components increased from 26.25% to 69.23%. Blood gas compliance showed the least improvement from 40.43% to 76.92%.

Conclusion/Discussion: Interventions targeting understanding of the bundle/population of interest and blood gas collection correlated with the major improvements in use.
Association Between Birth Via Caesarean Section and Childhood Obesity: Does it Persist Among High-Risk Populations?
Sarah Littlehale¹ and Maura Frank, MD²
¹Weill Cornell Medical College, ²Division of General Academic Pediatrics, Weill Cornell Medical College

Background: Several recent studies (Blustein et al. 2013, Huh et al. 2012) found that being born via c-section, as opposed to vaginal delivery, is associated with a significantly higher risk of childhood obesity. However, these studies were comprised largely of subjects of higher socioeconomic status (SES) and/or of overwhelmingly white populations and so do not address the question in those populations at greatest risk for childhood obesity: minority groups (e.g., African-Americans and Hispanics) and those of lower SES.

Objective: This study evaluates whether a previously identified association between birth via caesarean section and childhood obesity persists among groups at already elevated risk of obesity.

Methods: We performed a retrospective review of medical records from the Pediatric Primary Care clinic of NYP-Weill Cornell, which has patient population primarily of low SES (90% on Medicaid). We utilized a convenience sample of patients age 2-17 seen in the clinic between May 2015 and May 2016. Each record was reviewed for delivery method, BMI, and age of onset of obesity (defined as ≥95th percentile for age). Any subjects lacking this information were excluded.

Other pertinent data (formula or breastfed, age at introduction of solid foods, race/ethnicity as listed in the medical record) was collected, if available. Children with major medical conditions affecting anthropometrics were excluded, as were those with frequent/chronic use of oral steroids. Goal enrollment was 340 subjects for a statistical power of 80% (based on an assumed obesity proportion of 17% in the vaginal delivery group and 32% in the c-section group, as identified in previous studies).

Results: A total of 825 charts were reviewed, with 340 patients identified as having BMI and birth record data (485 met exclusion criteria). Two-hundred and thirty-three (69%) of these subjects were born via vaginal delivery, while 107 (31%) were delivered via c-section, consistent with national statistics. The breakdown by sex showed a slight female predominance, with 187 females (55%) and 153 males (45%). Ages ranged from 2 to 15, with a mean age of 5.2 years (median=5, mode=2). The most common listings of race were “Other combinations not described” (56%, 189) and “Black or African-American” (22%, 75), and only 8% (28) were listed as white.

The prevalence of obesity was 31% (33) in the c-section group and 28% (66) in the vaginal birth group. A chi-square analysis was performed, which showed no association between c-section and obesity ($\chi^2$ statistic 0.22, p=0.63). There was no statistically significant difference in the mean BMI percentile between birth method groups (c-section=72, vaginal=70, p=0.23), nor was there a difference in the mean age of onset of obesity between groups (p=0.31).

No association was observed between c-section and obesity when broken into subgroups based on sex (females: p=0.57, males: p=0.71) or race/ethnicity, with the exception of the 28 subjects identified as “White,” which actually showed a statistically significantly higher BMI percentile (p=0.03) among the vaginal births (mean=77) than among the c-sections (mean=44). There was a statistically significant difference in BMI percentile (p<0.007) between the breastfed (mean=68) and formula-fed
(mean=79) groups. No statistically significant relation was observed between BMI percentile and age at introduction of solid foods (mean=6 months, standard deviation=1.3, $R^2=0.001$, $p=0.44$).

**Conclusions:** Among a primarily low SES and non-white population, there was no measurable association between birth method and obesity or BMI percentile. This suggests that the already increased risk of obesity due to low SES and among certain minorities may outweigh any contribution from caesarian section. Thus, reducing the rate of elective caesarian sections in these populations may not be a meaningful intervention for reducing childhood obesity.
The Quality of National Birth Certificate Data for Neonatal Seizure Epidemiology

Kristen Berry, BA, Michael F. Pesko, PhD, Dale C. Hesdorffer, PhD, Renée A. Shellhaas, MD MS, Joanna K. Seirup, MPH, Zachary M. Grinspan, MD MS

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Background: Seizures are a common manifestation of neurological dysfunction in neonates and carry high risk for mortality and adverse long-term outcomes. National birth certificates are a potentially valuable source to study the epidemiology of neonatal seizures. However, the quality of the data is understudied.

Methods: We reviewed national birth records from 2003-2013 to describe evidence of underreporting, rates of missing data, and effect of the 2003 revision of the birth certificate form. To measure underreporting, we compared estimates to a published reference rate of 0.95 neonatal seizures per 1000 live births - the “California rate” (Glass et al., Pediatr 2009; 154(1); 24-28 e21). We evaluated missingness by state and year using a two-way ANOVA, and evaluated missingness by demographic, infant health, and medical care factors using bivariate analyses. We developed 3 criteria for data utility and plausibility: (1) use of revised form for at least 4 years, (2) less than 1% missing data, and (3) reported seizure rate within 50% of the California rate. We reported which states met these criteria.

Results: Of 22,834,395 live term births (≥36 weeks) recorded using the revised form from 2005-2015, there were 5,875 with neonatal seizures, suggesting a rate of 0.26 per 1000 term births, a quarter of the expected rate. The overall rate of missing seizure data was low (0.5%). However, missingness varied significantly by state and year (p<0.001), as well as by demographic, infant health, and medical care factors (Table 1). After the 2003 birth certificate form revision, missing data (p<0.001) and underreporting (Figure 1) increased. Nine states met criteria for utility and plausibility: IA, MT, NE, OR, SD, UT, VT, WA, and WY.

Conclusions: Results show that birth certificate data are limited by underreporting, biased missingness, and changes in reporting subsequent to the 2003 revision. Data from nine states merit further investigation for their use in neonatal seizure epidemiology research.
Targeting the aberrant SWI/SNF complex in childhood synovial sarcoma using BRG-1 Peptidomimetics and BRD9 bromodomain inhibitors

Mitali Kini, Michael Ortiz, Alex Kentsis

Weill Cornell Medical College, Department of Pediatrics, Molecular Pharmacology Program, Memorial Sloan Kettering Cancer Center, New York, NY

Background: The SWI/SNF ATP-dependent chromatin remodeling complex is mutated in more than 20% of human cancers, including refractory childhood tumor such as synovial sarcoma, rhabdoid tumors, neuroblastoma, and medulloblastoma. Synovial sarcoma is the second most common soft tissue sarcoma seen in adolescents and young adults, in which 100% of tumors have a pathognomonic t(X;18) chromosomal translocation resulting in the expression of an abnormal fusion protein called SS18-SSX. This oncogenic fusion disrupts the normal function of the SWI/SNF complex by outcompeting the wild-type SS18, causing displacement of the adjacent BAF47 subunit, which leads to aberrant gene expression of oncogenic targets such as SOX2 and PAX6.

We hypothesize that by disrupting the association of the BRG-1/BRM subunit using a peptide that mimics binding with the SS18-SSX fusion protein in cancer cells, we can prevent the displacement of BAF47 and allow reversion to the normal SWI/SNF complex. As an alternative approach to targeting this complex, we tested small molecule inhibitors of the BRD9 bromodomain of the SWI/SNF complex. Recent studies have shown these inhibitors to have efficacy against acute myeloid leukemia cells, which prompts us to believe they could be efficacious in synovial sarcoma as well. In this project, we studied the characteristics and effects of treating synovial sarcoma and rhabdoid tumor cells with novel peptides mimicking the QLQ domain of BRG-1, which is believed to bind SS18-SSX. We also tested the effects of BRD9 bromodomain (BD) inhibitors and hypothesized that by targeting the SWI/SNF complex with these molecules, we could preferentially decrease growth of cancer cells.

Objectives: To characterize the effects of BRG-1 peptidomimetics and BRD9 bromodomain inhibitors in synovial sarcoma cells and to determine the nuclear interactions of BRG-1 and SS18 subunits in synovial sarcoma cells.

Design/Methods: In order to test the effects of BRD9 inhibitors and BRG-1 Peptidomimetics on cancer cells, we conducted experiments treating two synovial sarcoma cell lines, SYO-I and HS-SYII, two rhabdoid tumor lines, G401 and A204, and two control cell lines, RPE and BJ, with our drugs of interest. The experiments were conducted as follows. 1) We performed a 7-day dose response assay of synovial sarcoma cell lines to determine the IC_{50} for each BRD9 inhibitor (BI-9564, BI-7273). The cell viability was determined by measuring ATP levels by luminescence after lysing and reacting the cells with Cell Titer Glo ®. 2) We performed a colony forming assay of synovial sarcoma cell lines treated with an active Brg-1 peptidomimetic (RI-BRG) and three inactive variants (RI-TAT, RI-BG3, RI-BRGRAN) for 20 days. We quantified the effects of the drugs by fixing and staining cells with crystal violet after the treatment period. 3) We adapted and developed a protocol to isolate the nuclear SWI/SNF complex proteins Brg-1 and SS18, in order to determine if an interaction exists between the two subunits in synovial sarcoma cell lines, rhabdoid tumor lines, or control lines.
**Results and Conclusions:** The results of our experiments showed that synovial sarcoma cells have reduced cell viability when treated with BRD9 BD inhibitors. For synovial sarcoma cells treated with BI-9564 and BI-7273, the IC$_{50}$ of each cell line was less than those of both the rhabdoid tumor cell lines and the control cell lines. This suggests that the development of more potent inhibitors is necessary to detect a larger decrease in relative cell viability. Additionally, the treatment of cells with 15 μM BRG-1 peptidomimetics led to reduced clonogenic efficiency in all cell lines. SYO-I, HS-SYII, and BJ cells demonstrated low (2-16%) clonogenic efficiency when treated with no drug (PBS and RI-TAT). This suggests that further steps need to be taken to determine the appropriate concentration and length of treatment at which these peptides will preferentially decrease colony formation in cancer cells. Finally, biochemical analysis confirmed the expression of BRG-1 and SS18 in lysates and nuclear extracts of control cell lines, rhabdoid tumor cell lines, and synovial sarcoma cell lines, which will allow for downstream analysis of nuclear interactions by co-immunoprecipitation.
A High-Throughput In Vitro Drug Screen in Patient-Derived Diffuse Intrinsic Pontine Glioma Cultures Reveals Sensitivity to Androgen Receptor, Estrogen Receptor, and Aromatase Inhibition

Christopher S. Marnell¹, Uday B. Maachani, PhD¹, Umberto Tosi¹, Raymond K. Chang¹, Melanie Schweitzer¹, Iulia Voronina¹, and Mark M. Souweidane, MD¹,²

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Background: Diffuse intrinsic pontine glioma (DIPG) is a fatal pediatric CNS malignancy with no effective therapies. Identifying potentially efficacious therapeutic agents is of high priority, especially those which are already in clinical use. The aim of this study was to execute a high-throughput screen with FDA-approved drugs in patient-derived DIPG cultures, and characterize relevant gene targets for further preclinical assessment.

Methods: A high-throughput in vitro screen of 114 compounds derived from the NCI Approved Oncology Drugs V panel was tested against patient-derived glioma cells lines: two patient derived pediatric glioma cultures, SU-DIPG-IV and SU-DIPG-XIII and one adult glioma cell line, U87MG. Cell lines were plated in 96-well format 24 hours prior to compound treatment, and cell viability was determined by Cell Titer Glo 3 days following treatment.

Results: Four compounds commonly used in the treatment of estrogen and androgen-receptor driven breast and prostate cancers showed significant growth inhibition of DIPG proliferation: the selective estrogen receptor modulator (SERM) tamoxifen citrate, the selective estrogen receptor degrader (SERD) fulvestrant, the aromatase inhibitor anastrazole, and the androgen receptor inhibitor enzalutamide. Western blot analysis of DIPG IV, XIII and WCM-DIPG-2 cell lysates revealed increased gene expression of aromatase and AR compared to normal astrocyte controls. Using publically available, retrospective gene expression data (n=51) from the Treehouse - Diffuse Intrinsic Pontine Glioma dataset, we identified a subset of DIPG tumor samples had a high expression of CYP19A1 and AR relative to normal brain tissue, but no clear upregulation of ESR1 or ESR2. Kaplan-Meier plots were then generated to compare the survival of those with high vs. low expression of the target genes. Enhanced AR expression in DIPG tumors correlated with statistically significant shorter survival (p=0.02821, log-rank test statistic = 4.815).

Conclusion: Further investigation into the role of sex hormone signaling in DIPG will be an important step in better understanding this tumor’s molecular characteristics, and identifying new strategies for targeted therapy in DIPG.
Screw Removal vs. Screw Retention: Long-term Functional and Quality of Life Outcomes Following Epiphyseal Intra-Articular Ankle Fractures
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[Interim Report]

Background: Pediatric intra-articular physeal fractures of the ankle are common injuries accounting for 10-25% of all growth plate injuries in children. They are most commonly seen in patients near skeletal maturity and thus necessitate surgical intervention. Surgical treatment involves epiphyseal fixation of the fracture fragments with cannulated screws and subsequent immobilization. The goal of treatment is to restore or maintain intra-articular congruity to minimize the risk of complications, such as premature degenerative joint disease, leg length discrepancy, and angular deformity.

While surgical intervention is generally agreed upon by pediatric orthopedic surgeons, a discrepancy exists among surgeons on whether these screws should be removed or retained after placement and healing. Currently, the majority of surgeons remove epiphyseal screws post-surgical correction based on findings from a single cadaveric study that showed increased forces and contact pressures within tibiotalar joint after screw placement – these increased tibiotalar joint contact forces are believed to presumably lead to early tibiotalar arthritis and thus screw removal is favored. This study aims to assess the long-term function and quality of life outcomes between adults who had sustained intra-articular growth plate fracture as children and underwent ankle screw removal versus screw retention.

Objective: Our goal was to assess whether there is a difference at long term follow-up in ankle function and quality of life in patients with retained epiphyseal screws compared to those who underwent screw removal.

Methods: Patients 8-16 years old at the time of injury who had an intra-articular fracture (Salter III or IV) and follow-up of at least 10 years were included in the study. Patients were contact via phone and online questionnaire system, OBERD, to answer the Foot and Ankle Outcome Survey, the UCLA activity scale, and the PROMIS pain interference and pain intensity scales. Data analyzed with student’s t-test and linear regression analysis.

Results: Interim demographic results show a mean age at injury of 12 years old with Salter IV fractures. Most fractures were due to low velocity mechanisms of injury, however in the screw removal group there were more high velocity injuries. Delay in fracture fixation was similar between the groups with a mean of 7.5 days in the retained screw group and 6 days in the screw removal group. The time between implantation of screws and removal was fairly variable ranging from 55 days to just over 2 years. The majority of hardware was removed without any specific indication documented in the chart, while some patients had hardware removed due to pain symptoms. Of note, there were no incidences of complications of the removal of hardware surgery. Follow-up data on Long term outcomes are not yet available.
Sleep in Hospitalized Children with Cancer and Related Diseases
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Background: Disrupted sleep is a frequent and serious problem in adults hospitalized with cancer, but little is known about sleep in children. We hypothesize that sleep is frequently disrupted in hospitalized children with cancer, and that disrupted sleep is associated with both non-modifiable (age, underlying illness, pre-existing sleep disorder) and modifiable (noise level, medications, and other) environmental risk factors. Further, we hypothesize that disrupted sleep is associated with increased rates of delirium, and longer hospital length of stay (LOS). Finally, we explore the relationship between perception of sleep (as self-reported in questionnaires) and more objective measures of sleep (as measured by actigraphy).

Methods: This is a prospective, descriptive study to assess sleep in up to 100 hospitalized pediatric subjects with cancer. This study involves completion of two questionnaires. One questionnaire describes the subject’s sleep pre-hospitalization and is completed once upon enrollment. The other questionnaire describes the subject’s sleep while admitted to the hospital and is obtained for up to three consecutive nights after enrollment. A subgroup of up to 40 patients between 5-18 years of age is invited to wear an actigraph, a “sleep watch”, for up to 72 hours. The actigraph measures activity levels and quantifies sleep, with time-stamped information on frequency and duration of activity over the course of monitoring, and a summary of total sleep time and arousals.

Results: Enrollment is ongoing, so descriptive results including only the first 55 subjects will be reported here. In our preliminary assessment, we have captured 127 hospital nights. In 94% of these nights (n=119), subjects reported disrupted sleep. Specifically, sleep was most frequently disrupted by the following: alarms beeping on medical equipment (63%), nurse taking child’s temperature or blood pressure in the middle of the night (53%), thoughts or worries about other family members (49%), thoughts or worries about why child is in the hospital (47%), doors opening, closing, slamming (46%), pain at bedtime (45%) and in the middle of the night (31%), noisy roommate (35%), people talking outside the room (27%), uncomfortable bed (27%), and nurse giving child medications in the middle of the night (27%).

We have actigraphy data for 24 of these 127 nights, and plan to correlate with questionnaires in order to assess reliability of self-reports of total sleep time and nighttime awakenings. At study completion, we will assess effect of sleep disruption on delirium rates and hospital length of stay.

Conclusions: While our results are preliminary, they suggest that noise, nursing interventions, worry, and pain all disrupt in-hospital sleep. Many of these risk factors are potentially modifiable. By eliminating unnecessary overnight interventions, rethinking how best to keep shared rooms comfortable, and increasing awareness amongst hospital staff about the importance of creating a quiet sleep environment, we may be able to improve the quality of care we provide. A better understanding of sleep in hospitalized children with cancer will allow for targeted interventional trials in the future.
Quality of Life in Pediatric Patients with Obesity and at Risk for Type 2 Diabetes Mellitus

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Background: Obesity and type 2 diabetes mellitus are associated with a lower health related quality of life (HRQOL)[1][2]. However, there is scarce pediatric research focusing on HRQOL in patients with obesity and documented cardiometabolic risk. Patients with insulin resistance and prediabetes are at the crossroads of obesity and diabetes with strong risk for progression to type 2 diabetes mellitus (T2DM). There is a need for further research to describe the biopsychosocial context for HRQOL in these at risk pediatric patients in order to develop family based approaches to the prevention of type 2 diabetes in childhood.

Objective: Our goal was to determine, using the Pediatric Quality of Life Inventory Version 4.0, if having obesity and T2DM risk significantly impacts children's health related quality of life compared to 2 control groups: 1.) the general population and 2.) patients with obesity and not at risk for type 2 diabetes

Methods: Patients are prospectively recruited through the university affiliated pediatric endocrinology clinics at New York-Presbyterian/Weill Cornell Medicine during their regularly scheduled appointments. This study involves pediatric patients ages 8-18 years with obesity (BMI ≥95th percentile). An intake form is administered and reviewed by investigators. One parent is required to participate in the study with the pediatric patient. We are using the established and validated PedsQL Measurement Model to assess the patients' and their parents' perceptions of the patients' HRQOL overall and in specific domains. We are also using the established and validated Family Nutrition Physical Activity (FNPA) screening tool to evaluate obesogenic environments/ practices. The minimal clinically important difference (MCID) was determined for each domain score, allowing a comparison with the general population whose mean scores were established by Varni et al.[3].

Results: Currently, we have enrolled 29 patients in this prospective study with 17 meeting criteria for at risk for T2DM with a target total of 40 patients at risk for T2DM. In our current cohort, 13 patients are 8-12 years of age and 16 patients are 13-18 years of age with study goal to perform statistical analyses on the group as a whole and stratify by risk and age. With the data gathered so far, parents of children at risk reported a total QoL score and physical domain score lower than the general pediatric mean.

Conclusions: With the increasing rate of pediatric obesity, it is important to understand the biopsychosocial impact on children. The results of this study will provide preliminary data for the development of new prevention and treatment strategies for the medical management of this at risk patient population and identify subsets of pediatric patients who would benefit from earlier screening and intervention strategies. This knowledge will help the investigator and other practicing endocrinologists tailor their clinical approach to pediatric patients with obesity.
Retrospective Cohort Study of 206 Cases of Osteochondritis Dissecans of the Knee: Risk Factors and Outcomes Associated with Surgical Treatment

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**Background:** Describe the clinical characteristics, image findings, and outcomes of patients with juvenile osteochondritis dissecans (JOCD) of the knee. To our knowledge, this is the largest single-surgeon cohort of JOCD patients.

**Methods:** Retrospective cohort study of knee JOCD patients assessed by a single pediatric orthopaedic surgeon at a tertiary care center between 2005-2015. All diagnoses were confirmed by magnetic resonance imaging (MRI). Patients with patellar dislocations or osteochondral fractures were excluded. Demographic data, sports played, comorbidities, surgical procedures, and clinical data were extracted from charts. Images were analyzed to identify location and size of lesions, status of physes and healing of lesions. Chi-square or Fisher’s exact tests were used to compare discrete variables, and Mann-Whitney U and Kruskal Wallis tests to compare continuous variables between groups. P-values of <0.05 were considered significant.

**Results:** Sample consisted of 179 patients (206 knees), 123 boys and 56 girls. Average age at diagnosis was 12.9 years (5.6-17.6). Majority were active in sports (78.2%). The most common location was the medial femoral condyle (56.4%) followed by lateral femoral condyle (22.9%), trochlea (11.5%), patella (8.7%), and tibia (0.5%). Surgery was performed in 68 patients (38.0%) or 71 knees (34.4%), with an average age at surgery of 14.1 years (9.3-17.6). At the time of surgery, 53 knees had an open physis, while 18 knees had reached skeletal maturity. Location distribution did not differ between surgical and non-surgical lesions. The average normalized area of non-surgical lesions was 6.8 (0.1-18), whereas surgical lesions averaged a higher area of 7.7 (0.5-17.3) (p=0.023). Average BMI was 21.6 versus 20.1 for surgical and non-surgical patients, respectively, significantly higher for those who underwent surgery (p=0.002). Most common procedure was fixation with 1.6mm bioabsorbable nails (53.5%), using an average of 4 nails (1-9). Only 2 cases were fixed using metallic headless screws. Other surgical treatments were drilling (14.1%), microfracture (14.1%), microfracture + fixation (7%), removal of loose body/chondroplasty (7%), and allograft transplantation (4.2%). Fixation was achieved all-arthroscopic in 43.1% of the cases, and 61.3% of the lesions that were fixed underwent curettage of the subchondral bone. Forty patients in the surgical cohort reached clinical and/or radiological follow-up of at least 12 months, with an average follow-up of 20.7 months (12.0-75.3). Of the patients who underwent fixation with bioabsorbable SmartNails, 89.5% displayed signs of healing during follow-up. In total, 59 knees (83.1%) demonstrated significant healing on their most recent radiographic images.

**Conclusion:** JOCD occurs more frequently in young adolescent athlete boys, affecting the middle third of the medial femoral condyle. In our cohort, ¼ of the patients had surgery, where bigger lesions and higher BMI were risk factors for operative treatment. At short-term follow up, biodegradable nails proved to be an effective method of fixation for JOCD lesions where 93.0% avoided a second surgery for hardware removal.
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, 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 provided a safe environment for pediatric burn survivors and their siblings to interact with their peers and share their experiences.

Camp Phoenix 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. Campers participate in activities such as swimming, tiedye, 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 and Burn Surgery.

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. Started in 2011, our shadowing program allows medical students to spend time with the pediatric team in the burn unit. We expect to enhance this shadowing program further with the 2013 implementation of burn surgery shadowing. These experiences will help students learn about the inpatient and surgical experiences of our campers and relevant psychosocial issues. These experiences are meant to educate all interested students about what our campers went through during the rehabilitation phase of their burn care and to have any questions and concerns fully addressed by 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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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 Center Family Advisory Council

The Komansky Center Family Advisory Council (KCFAC) 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 KCFAC members is organized in the following three areas:

Quality and Patient Safety/Advisors: The KCFAC members are active on numerous Departmental and Hospital Committees, including the Quality and Patient Safety Council. KCFAC members have direct impact and influence on policies, programs, and practices which affect the care and services of children and their loved ones. The KCCH 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.

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.

Medical Education/Family Faculty: Working in close collaboration with medical staff, we developed and host programs to educate interns, medical students and nurses on the principles of Family Centered Care. KCFAC 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 Monique Zayas.

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Motivating Action through Community Health Outreach (MAChO)

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 has a two-pronged approach to improving health within disadvantaged communities: the Youth Wellness and Youth Leadership programs. These programs are aimed at motivating young children to lead healthier lives and engaging high school students on health oriented community projects and leadership training.

Mission: The goal of MAChO is to empower youth with the knowledge and practical tools to take control of their health and find solutions health challenges facing their communities. Our focus is on proper nutrition, fitness, personal development and leadership. We aim to accomplish this goal by inspiring the adoption of healthy living habits, by guiding youth to become agents of healthy change in their community, and by partnering with community organizations to build a supportive network of empowered individuals and families.

History: MAChO was established in the fall of 2009 by a handful of Weill Cornell Medical College students who recognized the desperate need for education and resources to fight the obesity epidemic. It began as a pilot project and the program was then expanded in 2010-2011 to a full year curriculum that met once a week during the school year and every day in the summer. The scope of MAChO was broadened to include a pilot mentoring program, educational field trips, and assessments to track knowledge and fitness progress. The lessons from the first three years have served as a foundation for the revamped Youth Wellness Program and new initiatives for the upcoming year.

Program: The structure of the curriculum consists of twice weekly after school sessions coupled as well as occasional weekend sessions that focus on mentoring and personal development, with an effort to involve the families. For the after school program, our volunteer graduate and undergraduate teachers lead the nutrition, physiology and exercise classes under the leadership of a site coordinator. For the 2015-2016 year, the program continues to be held at the Silberman School of Social Work. The age range of our participants is 8-14 years.

Members: MAChO volunteers include students from WCMC, Cornell University, Columbia University, Hunter College, City College and Queens College. We are overseen by faculty advisors from New YorkPresbyterian Hospital Pediatrics department, WCMC, Hunter College, and Hunter School of Public Health and Social Work. Our community health outreach partners include the Boys’ Club of New York, Settlement Health, Harlem Center for Healthy Living, and Choosing Healthy and Active Lifestyle for Kids (CHALK)

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Weill Cornell Youth Scholars Program (WCYSP)

The main purpose of the Weill Cornell Youth Scholars Program (WCYSP) is to expose underprivileged, underrepresented students, especially from inner city high schools, to the vast educational resources and opportunities at Weill Cornell Medical College and NewYork Presbyterian Hospital. Many of these high schools have exceptionally high drop out rates that coincide with low percentages of graduates that go 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 groom 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 basic science. Our daily Problem Based Learning (PBL) sessions provide a forum for youth scholars to interact with one another and build their teamwork abilities. 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 matriculated in college and most who are now in college plan on majoring in science and/or pursuing a premed track. 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 will be given lecture notes and powerpoint slides that are already prepared for each topic. Alternatively, volunteer teachers may use their own teaching materials for their particular topic. The program runs for one month 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.
**Kids in Chronic Care Support (KICS)**

KICS is a student-run program with the New York Presbyterian department of Pediatric Hematology/Oncology 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 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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Field(s) of Interest: 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
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Field(s) of interest: Nephrology / Pediatric nephrology. Students interested in pediatric or adult endocrinology, hematology, bone biology / bone health are welcome as well.

Research Title: Anemia, iron metabolism, linear growth and programmed cell death in chronic kidney disease

Project Description: In this project we are investigating the novel mechanisms linking iron metabolism alterations in chronic kidney disease (chronic renal insufficiency) with bone and mineral metabolism, and the process of bone elongation at the metaphyseal growth plate. The study has basic science (mouse model) and clinical / translational (cohort of children with chronic kidney disease) arms.

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
Elaine Barfield, MD
Department of Pediatrics
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elb2020@med.cornell.edu

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

Research Titles: Examinaton 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

Project Description: IRB proposal development, subject recruitment, data entry and management

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

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

Adele Boskey, Ph.D.
Musculoskeletal Integrity Program
Hospital for Special Surgery;
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Field(s) of Interest: Mineralization, matrix formation, bone development and repair.

Research Title: Mineral analysis in bones of animals with developmental abnormalities

Project Description: The goals of one of the major project in this laboratory is the determination of how matrix proteins including collagen regulate biomineralization. As such we study the effects of these proteins in solution, in culture, and when they are ablated or over expressed in transgenic animals. The project would be based on one of the models currently under investigation, where the student would work on the infra red imaging and micro-CT analysis of the bones of animals of different sexes, ages, or genotypes.

Students’ Role in the Project: Infrared and microCT analyses of bones and teeth of a specific KO or TG animal. Student will learn about the ablated protein and perform IR Imaging and microCT

Preferred Background/Experience: Students should have computer skills.
**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.

**Research Title:** Quality of Life in Pediatric Patients with Obesity and at Risk for Type 2 Diabetes Mellitus

**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

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**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

**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

**Project Title:** Assessment of formal transition care program for WCM Pediatric IBD patients

**Principal Investigators:** Dr. Kimberley Chien

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**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

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**Diane Felsen, PhD and Dix P Poppas, MD**
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**Field(s) of Interest:** Uretal obstruction- renal histopathology and function

**Project Descriptions:**

**Renal Dysfunction models:** Hydronephrosis and polycystic kidney disease: In children, the most commonly detected prenatal anomaly is hydronephrosis, the dilation of the renal collecting system. Our laboratory has had a long-standing interest in the molecular mechanisms of damage to the kidney after obstruction, especially the fibrotic response, in which there is a pathologic accumulation of extracellular matrix proteins, which damage the kidney and reduce its function. One of the first events in the obstructed kidney is the build-up of pressure, which results from obstruction of the ureter. We have previously found that pressure activates important signaling pathways in the generation of Nitric Oxide, a cytokine with an important role in renal. Currently, we are investigating how pressure activates the fibrotic process in various cells in the kidney. These studies will use gene array, proteomic and metabolomic approaches to identify appropriate candidates. These studies will be important to determine if there are pathways which might be amenable to therapeutic intervention to halt or reverse renal damage in obstruction. We are also investigating an in vitro model of polycystic kidney disease. Using embryonic kidneys, we are studying different signaling pathways and examining their role in cAMP-mediated cyst formation.

**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. Studies are underway to determine the biocompatibility of the synthetic patch to determine its suitability for use in vivo.
Effect of Androgens on Development of Genitourinary Tissue: Congenital Adrenal Hyperplasia is an inherited deficiency of certain enzymes involved in the production of male hormones [such as androgens]. The most common deficiency is 21-hydroxylase, the enzyme involved in cortisol production. The deficiency of 21-hydroxylase not only decreases cortisol, but also stimulates adrenocorticotrophic hormone, leading to excess male hormones. In females, the result of this enzyme deficiency is virilization [the appearance of secondary male characters in the female], which begin in utero; these girls are born with genital ambiguity and an enlarged clitoris. The molecular mechanisms controlling androgen’s action in the clitoris are unknown. Therefore, we are studying the in vitro expression of androgen and estrogen receptors in surgical waste tissue obtained from CAH patients. These preliminary studies will allow us to understand how androgens act on female genitalia, so that we may be able to design strategies to prevent female genitals from the negative effects of androgen excess in CAH.

Wound Healing: The healing of acute cutaneous wounds requires interactions among cytokines, immune cells, parenchymal cells, and components of the extracellular matrix. This process is dynamic and results in scar formation, which restores functional continuity in the affected area. Compromise of the wound-healing process contributes to significant morbidity and even death. Our laboratory has developed a model in which to study wound healing in full thickness human skin. This model was originally developed using pediatric foreskin and was used in several studies by our laboratory. We have recently expanded the model to use adult tissue and to study aspects of the immunology of wound healing in both adult and pediatric skin. We have further adapted this model for use in studies on squamous cell carcinoma.

Students’ Role in the Project: Students will learn basic biochemical and molecular biology techniques including immunostaining, PCR, and western blot analysis. They will use these skills in experiments evaluating the effects of pressure on cells in the urinary tract.

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

Chris Cunniff, MD
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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

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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:** Knowledge of Excel helpful

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**Cori Green, MD, MS**  
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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

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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

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Field(s) of Interest: Heart function and growth in the newborn

Project Description: MRI and ultrasound assessment of heart function and growth in the newborn.

Students’ Role in the Project: Possibly help analyze echocardiography and MRI data to understand more about the development of heart function and growth in the newborn
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).

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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.

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**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
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.

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

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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
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  
Weill Medical College  
jmp2007@med.cornell.edu  
212-746-3530

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

Title of Research Project: Evaluation of the Ergonomics of Chest Compressions in a Neonatal Manikin Model

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

Cathleen L. Raggio, MD  
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212-606-1339  
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Project Description: Pediatric, clinical and lab research. Spine Osteogenesis Imperfecta, Skeletal Dysplasia

Students’ Role in the Project: Patient interaction, dissection, x-ray review, computer work

Preferred Background/ Experience: Good work ethic and enthusiasm
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 and human placentas to investigate the role of EGFL7 and miR-126 that is embedded within the gene, during normal and pathological placental development. EGFL7 is a secreted angiogenic factor, and miR-126 is a non-coding microRNA. 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 endothelium of both the maternal and fetal vasculature, as well as in a previously unknown site, the trophoblast cells. Our results showed a significant down-regulation of Egfl7 expression in human PE placentas at term and in compromised placentas of a mouse model of PE prior to the onset of the characteristic maternal signs of PE (Lacko et al., 2014. Novel expression of EGFL7 in placental trophoblast and endothelial cells and its implication in preeclampsia. Mech. Dev. 133:163-176). Studies from our lab, using gain- and loss-of-function mouse models, point to specific and distinct roles for EGFL7 and miR-126 during placental development. We also have a keen interest to understand its role in human placentas and preeclampsia. Specifically, in an ongoing collaboration with clinician-scientists in Maternal-Fetal Medicine at Weill Cornell and Columbia University Medical School we are investigating if EGFL7 protein can be detected in the serum during pregnancy, and if EGFL7 is an early indicator for the onset of preeclampsia.

**Student’s/Fellow’s Role in the Project:** The student would get “hands-on” lab experience. Initially, the student 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
Chani Traube, MD
Pediatric Critical Care Medicine
Department of Pediatrics, Weill Cornell
212-746-3056, chr9008@med.cornell.edu

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 2016 PEDIATRIC RESIDENCY MATCHES

General Pediatrics
Betsy Cowell -- Texas Children's Hospital
Jenny Jin -- New York Presbyterian Weill Cornell
Kristin Oshiro -- New York Presbyterian Weill Cornell
Reya Liilii -- Hofstra Northwell School of Medicine
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