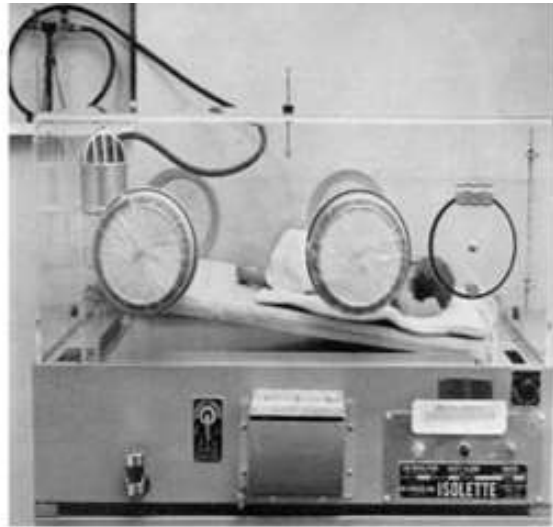


The Art and Science of Pediatrics

Volume 11, December 2013



**Pediatric Interest Group
Weill Cornell Medical College**



Weill Cornell Medical College



Dear Weill Cornell Medical 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 Eleventh Annual Pediatric Research Day. In addition to medical student research and scholarly project abstracts, this year's Journal "The Art and Science of Pediatrics," contains original essays by students about their experiences in pediatrics, and features on 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 -- Elizabeth (Betsy) Cowell, Anne Herbert, and Kristin Oshiro -- and their advisors, Drs. Susanna Cunningham-Rundles and Thanakorn Jirasevijinda, on organizing and continuing this important pediatric program.

Sincerely,

A handwritten signature in cursive script that reads "Gerald M. Loughlin".

Nancy C. Paduano Professor and Chairman
Department of Pediatrics
Weill Cornell Medical College

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Cover Image: *Progression of Neonatal Intensive Care Units Over Time*

Image source: <http://www.neonatology.org/tour/history2.jpg>

<http://www.neonatology.org/tour/history1.jpg>

<http://www.unc-nurse.org/wp-content/uploads/2013/03/neonatal-nurse-requirements.jpg>

http://nyp.org/komansky/static_local/images/photos/NewbornMedicineNICU.jpg

Student Leadership: Elizabeth (Betsy) Cowell, Anne Herbert, and Kristin Oshiro

Faculty Advisors: Susanna Cunningham-Rundles, PhD and Thanakorn Jirasevijinda, MD

STUDENT WRITING

FACULTY INTERVIEWS, POEM, AND ESSAYS

INTERVIEW WITH DR. JENNIFER DIPACE

Nicole Ramsey, Weill Cornell Medical College MD/PhD Student, Entering Class of 2007

What made you interested in medical education?

I didn't realize I was interested in medical education until I was a resident. I did my Pediatrics Residency here at Cornell and I think it was probably during that time. In our residency program still to this day, we have a Residents as Teachers Curriculum, where we get to learn about education and in particular how to teach adults. In the third year of residency we have a hands on experience - for a block of time all we're expected to do is teach medical students on their pediatrics clerkship. It was at that point that I realized I was very interested in it. I liked interacting with other people, especially those who were interested in Pediatrics. Shortly after that, I was a Chief Resident and that was a whole different experience.

As a Chief Resident I solidified that I wanted to be involved in medical education as a career. The Chief Residents were responsible for the bulk of education that goes on, including the didactics and leading conferences. I really enjoyed trying to figure out creative ways to get people engaged in learning by making a conference interactive or case-based.

How does the Chief Residency work?

It's different in different departments. In Pediatrics, it's an additional year. Usually two people are asked in their junior year of residency if they would like to stay on an extra year. The chief role for pediatrics is primarily teaching, administrative and departmental work towards goals for education, quality and safety.

There are Chief Residents in each department and they often get together as a group across the hospital. For example, they might get together to plan a session for the upcoming chief residents at the end of year retreat.

At other hospitals, are chief residents in Pediatrics similarly chosen?

It varies depending on the hospital. Some programs ask for everyone in their third year of residency to take a little bit of the role, especially if it's just administrative. Some ask for people from outside of the institution to come and be a Chief resident.

Are you still involved with the Pediatrics Clerkship?

Not to a large extent. I started work in medical education as the Associate Clerkship Director when I first joined the Faculty here. I was responsible for orienting medical students and did some work in tutoring medical students in tutor groups, where I would work with them on case-based learning. I did that for a few years and really enjoyed it but my heart is in resident education so I transitioned to the Associate Program Director for the Residency.

Do you have any research projects brewing, besides your published work on global health education?

I try to actively engage in research that's related to my educational work. This makes sense in particular as we implement new things in medical education. My colleagues and I have been trying to make that into a scholarly activity so that we can share it with other people.

The projects that I'm working on right now involve the numerous changes going on in graduate education. One of them is geared towards the way that programs and institutions are reviewed by the ACGME. The ACGME is the accrediting body of graduate medical education. The ACGME wants to know in general that people are following their rules and whether we are able as an institution to graduate residents that are capable of what we say they are. So the ACGME has changed the system of reviewing institutions. The new system is called the clinical learning environment review (CLER). A team of reviewers from the ACGME come to an institution and delineates the areas that they want to assess. These include resident supervision, hand off, quality and patient safety, and fatigue management. This is a new initiative in the past year.

A multi-institutional group of the pediatrics programs at Weill Cornell, Columbia, and Texas Children's Hospital is studying these areas that the ACGME is measuring. We designed a qualitative study looking at where in the

curriculum, as it's currently designed, do they learn each measurement. We ask particularly about explicit curriculum (lecture or grand rounds) or implicit curriculum (from an attending or nurse). We'd like to try to better elucidate in this qualitative study how the residents feel that they're learning these important concepts, and how we can enhance and build upon that process (particularly things that are learned in the implicit curriculum).

Prior to the CLER system, the ACGME would look at files and interview residents and administrators every five years. After this, they'd give a report or summary of where they thought you were doing well. This movement is focusing on outcomes vs. taking the programs word for their achievements. We're currently trying to figure out how our residents can be involved and how we can allow them to see some of those behind the scene processes.

Can you elaborate on your work with the global health elective? Have you ever visited Tanzania?

Our residents have a global health elective. One of our residents designed a study to assess the impact of the experience on our residents' future careers, trajectories, and whether it changed their practice after coming back from working in a resource poor area. We worked together on that.

I haven't yet made it to Tanzania. When I was a resident we didn't have that opportunity. When it became an opportunity, I had young children. I've been thinking a lot about how to get there in the recent past. I work closely with a Med-Peds physician who's on the ground there, Dr. Robert Peck. He directs the education of the residents when they're there. So, we actually have two Cornell faculty members who do the orientation and make sure that their experience is good. Dr. Peck is full time there and he has been for almost five years. The program is also run by the Office of Global Health and Dr. Warren Johnson. Many of the residents and students rotate through Bugando. It's a really worthwhile experience.

What makes an applicant stand out who's applying for pediatric residency?

I can honestly tell you that it's not any one particular item on somebody's application. It isn't the USMLE score or the grade that you got on the clerkship. It's a combination of those things in addition to how somebody presents himself or herself on an interview. The one thing that stands out for me is the person who has other interests outside of their career. The things that they're passionate about and the other things that they bring to the program besides just wanting to be a really great pediatrician. Those that seem themselves as an advocate for children, those that have a particular talent that they want to share; those things make a program really great. We look for that diversity.

Do you participate in any advocacy work?

The most direct advocacy work that I do is tied to medical education. In the 2nd year of training here, the residents have a longitudinal curriculum in community Pediatrics and advocacy. It's their opportunity to explore the organizations in the community near an affiliate of ours, New York Hospital Queens (NYHQ). Over time we've developed partnerships with some of these organizations, like Women Infant Children's (WIC) Early Intervention Program and The Department of Health's Lead Abatement Program.

Myself and one other person who directs the education at NYHQ have worked closely together to build the curriculum for advocacy and community pediatrics for our residents. Our goal is to be able to allow our residents to see first hand what our patients and their families have to experience. We want for our residents to be able to be good advocates. For example, in continuity clinic, when a baby needs a particular specialty formula, you often see the resident hand them a prescription and expect the next time that they see them, they'll be on that specialty formula. We hope that when our residents go to WIC, they'll see all the steps it takes for that mom to stand in line and acquire a specialty formula, especially if English isn't her first language. We hope that our residents are better able to understand those challenges and help patients be able to navigate them.

In the past two years, we've expanded that curriculum into a three-year curriculum for those residents who have a specific focus on advocacy. In their first year we get them linked. In their second year, we allow them to establish a relationship with one program. For instance, one resident has an interest in early childhood development. So her scholarly project will involve advocacy and early developmental screening. We hope to be able to give the residents in the concentration an in depth exposure to community pediatrics and advocacy.

Do you think that research is encouraged or feasible for Pediatrics residents?

I absolutely 100% do, for a couple of reasons. In this program, we not only expect that residents will engage in a scholarly activity like the advocacy program I described, but we require it. Sometimes applicants are scared away if they haven't had prior experience with research. The research requirement is about being able to understand the process that goes into developing a good research study, so that when residents go onto practice general Pediatrics and are trying to make a decision about whether a recommendation is appropriate for their practice, they can make a good decision about that because they know how to read the article and decide whether or not the methodology was appropriate.

It's also about giving you the skills to take a question (most commonly our residents do clinical research) that comes up in the middle of the night in the ER like – is there any evidence to support an X-Ray the first time a child is wheezing? We give residents the skills to take that question, develop it into a research question, and develop a feasible, relevant project that adds to the literature. We then pair them with an expert and allow them to build that project. For our residents who are interested in subspecialty training (about 75% of them are), they have the opportunity to start a project from beginning to end. They write a proposal and send it to the IRB. They get to see what it takes to navigate the IRB. They get to design methodology and think about data analysis. For some people, just having that under their belt in residency as opposed to fellowship, gives them a level of comfort and sometimes an advantage over someone else who applies for the same program with same qualifications. We've had residents tell us that their interview was "so great" because they could talk about the work they've been doing in their research project.

The other thing that it provides is an opportunity to network. The residents are able to submit their work to a local, regional, or national conference where they can present their work and meet other people in the field. So, research opens doors. There are lots of great advantages to research other than turning your career into a research career.

Dr. DiPace encourages any medical students interested in a Pediatric residency, advocacy or research to contact her via email with any questions at jed9008@med.cornell.edu

INTERVIEW WITH DR. JULIANN PAOLICCHI

Daniel Rosen, Weill Cornell Medical College MD/PhD Student, Entering Class of 2011

If you are reading this article, there's a good chance you are in medical school. According to a Harvard Freshman Seminar for future doctors, Jerome Groopman, MD (also of Harvard) requires that students read *The Spirit Catches You and You Fall Down*, by Anne Fadiman, as well as classics by Tolstoy, Kafka, Sacks, and Sontag. Unlike the other works, Fadiman's focuses on the patient, and not the physician. Her story of Lia Lee, a daughter of Hmong immigrants who fled war-torn Laos to settle in Merced, California, follows the conflict between modern medicine and traditional beliefs. Fadiman's expertly woven account of medical anthropology turns tragic when Lee, who has recalcitrant pediatric epilepsy, goes into status epilepticus and subsequent brain death, a consequence of both biology and botched communication between doctors and the patient's family. The book challenges us, as physicians in training, to consider our cultural competency as a fundamental component of our ability to deliver effective healthcare.

A physician at NewYork-Presbyterian hospital, Dr. Juliann Paolicchi MD, seeks to treat epilepsy from a medical and humanistic perspective as director of the Pediatric Comprehensive Epilepsy Center at NewYork-Presbyterian Phyllis and David Komanksy Center for Children's Health/Weill Cornell Center. She was kind enough to speak with me about her passion for pediatrics and neurology, both in terms of treating patients and research.

Journey to Becoming a Pediatric Neurologist

Dr. Paolicchi attributes her success and proclivity for her field to timing, natural predilection, a little bit of impatience and the intellectual appeal of epilepsy. Her background in molecular genetics, both in undergraduate work and prior to entering Johns Hopkins Medical School, placed Dr. Paolicchi in an excellent position at Hopkins and in the Bush proclaimed "Decade of the Brain" to investigate the genetic basis of neurological disease. As a medical student, Dr. Paolicchi had a sorting-hat-esque experience where a clinical instructor, who will remain only "Bruce," told her that neurology would certainly be her specialty. She recalls his assessment:

Well its clear because you blow through the physical exam until you get to the neuro exam and then you spend an excruciating amount of time on every single cranial nerve, every single part of the motor exam, its very clear that's where you are interested in, and you will go into neurology."

Indeed earlier that week, Dr. Paolicchi had decided to apply to residency in neurology. She was so eager to enter the field that she even insisted on starting her final year in medical school at the exact moment she finished laboratory research. This of course dismayed the registrar, as organizing clinical rotations already presents a logistical challenge, without the last minute additions:

"So the only spot they had available was peds at the community hospital, so I did pediatrics at the community hospital. They needed a tremendous amount of help, they let me do just about everything, I absolutely loved it and loved interacting with the kids. I realized how someone who was the eldest daughter of a large family, who had done tons of babysitting growing up would naturally be drawn to peds....I just loved pediatric patients."

Given her ebullience and success, it is clear that her love of pediatrics persists. The intellectual challenge and appeal of epilepsy emerged shortly thereafter:

"Dysfunction is too much or too little [brain activity]. In neurology loss is exemplified by stroke—identify what part of the anatomy has been lost, and you see what the patient can still do; positive function is demonstrated by epilepsy: overstimulation which allows the possibility of correction. It's an experiment to try to dampen the response."

Research

As director of a comprehensive epilepsy program, Dr. Paolicchi pursues three different avenues of epilepsy research.

Surgery: It may seem counterintuitive that cutting through the brain can actually save it, but Dr. Paolicchi shows us the numbers, “There is good data that it [surgery] works.” About 50% of patients will respond to the first anti-seizure medication, but after that response rates fall precipitously. The second medication will only treat 11% more patients, and if both medications fail, there is a <4% chance that a third will work. “That leaves a third, 33% of patients that will have continued seizures. Their only hope of seizure freedom is if they are amenable to surgery.” In fact, surgery, specifically in pediatric patients, can be life saving. In kids, the brain exhibits a higher level of plasticity, allowing areas to take over the functions of damaged regions. However, this ability is time sensitive. She likens living with epilepsy to pack-years in smoking. “The longer you have epilepsy the longer there are circuitry changes. Your developmental outcome is more affected...Early surgery makes a lot of difference. The brain learns by repetition, and this isn’t just restricted to algebra and math facts; your brain becomes better and more efficient at seizing, seizures beget seizures. If we can get to this early, we can stop it from spreading.”

Dietary Changes: Almost unbelievably, epilepsy can in many cases be controlled by diet. In her words, this gives a whole new meaning to the phrase, “brain food.” By administering a ketogenic diet, 1/3 of patients will get 90% better, 1/3 will get a 50% reduction in seizure activity and 1/3 will be relatively unaffected. However, despite the objective outcome in seizure activity, more than 70% of patients report cognition improvement and will stay on the diet! Despite the uproar at Mayor Bloomberg’s dietary legislation, placing a baby on a ketogenic diet can be as simple as changing the bottle. However, Dr. Paolicchi, as a culturally competent doctor and mother of four, admits, if they’re a teenager, “not having a Dorito ever!” is just not going to happen. The working hypothesis for the mechanism of the ketogenic diet is that changing circulating levels of amino acids alter neurotransmitter accessibility and therefore brain excitability.

Genetic Basis: As part of the Epilepsy Phenome/Genome Project, Dr Paolicchi explores how microdeletions are involved in genetic myoclonic epilepsy. By leveraging large populations, and large numbers of deletions with whole genome sequencing, researchers are finally beginning to understand the genetic basis of many complex neurological diseases. For example, whole genome sequencing has identified the portion of the gene loss in Angelman Syndrome, which encompasses a GABA receptor, increases brain excitability and prompts epilepsy. This further explains why Angelman patients were thought to be refractory to medication.

Advice for Getting Involved in Research

Dr. Paolicchi emphasized that research is accessible for all students at all stages of medical school. Students should focus on two things: (1) selecting a doable project that they can complete. This gives you a sense of satisfaction and allows you to present the abstract at a meeting. (2) Find a mentor that can tailor make a project for you. At some level, “the research has to suit your needs and availability. If it doesn’t, you won’t be excited.” She recommends considering: time constraints, patient or computer work, and project and career interests.

Conclusions and the Post Interview State

Lia Lee, chronicled in Fadiman’s novel recently passed away. In medical school, there is a joke that neurologists can tell a patient what’s wrong, but can’t fix it. However with the work and research of physicians such as Dr. Paolicchi, that kernel of truth is eroding. To further these goals, Dr. Paolicchi would like to see earlier opportunities to interact with medical students and expose them to pediatric neurology. She emphasized that pediatrics, medicine, and surgery are often seen as big silos, but the fields are much looser than that. There are many opportunities for cross-discipline practice and research. In that vein, if you are interested in pediatric neurology, she is the director of clinical research. Contact her at jup9037@med.cornell.edu.

To learn more, please visit the website of the Komanksy center:

http://nyp.org/komansky/patient_care/centers_programs/epilepsy/partners.html

UNDERSTANDING THE VIRTUE IN MEDICINE FROM A TRUE INSPIRATIONAL HERO

Alejandra Toro Bejarano, *Weill Cornell Medical College Class of 2017*

For two consecutive summers during college, I volunteered in the pediatric hematology oncology unit of the National Public Hospital in Honduras. I had never been as intimidated as my first day when I followed the attending oncologist, while he was showing me the pediatric unit and explaining my duties. As the psychologist's assistant, I was responsible for the playroom in the oncology department, therefore, my job consisted of assisting with the game therapy provided to the patients during their stay in the hospital, or when they visited to receive chemotherapy. When I was left to start my job, I felt almost as a nuisance in the midst of that hectic hospital room. Unsure on how to approach the patients, I looked around until I found a tender smiling face. Although I was nervous, the warmth of his expression gave me the confidence to walk towards his bed. After a long and pleasant talk, I learned that Diego (not his real name) was from a remote rural town, and that his father could only visit him three days a week because he had to work to support his family. Diego suffered from a severe type of leukemia and had been hospitalized for nine months. Due to his poor health, he was unable to walk or even sit up on his bed. Hence, he developed atrophy in his legs causing them to lose strength and mobility. Yet with a huge sparkle in his eyes, Diego shared with me his dreams of becoming a skilled soccer star. As I turned away to retrieve the board games that he requested, I was deeply moved by his courage to dream despite the hardships that he was enduring at such a young age. This encounter was the beginning of an important turning point in my life.

What initially began as a job became a real duty for me. I felt compelled and obligated to the children whom I interacted with, gaining satisfaction in doing so. Most of the patients in that hospital faced enormous socio-economic barriers. Many parents, due to their level of education, could not even understand the basics of their child's disease. Nevertheless, they were there every day, after spending the night on a plastic chair, hoping their child would get better. I felt profoundly obligated to the children and their family who were an extraordinary example of perseverance, courage, and unconditional love. Therefore, I dedicated every hour I was there to make them smile despite their unfortunate circumstances. At first, it seemed I was doing them a favor but rather it was the children who made a remarkable impact in my life. After I left Diego's bedside that day, I was heartbroken to see him apparently defeated by his cancer and only left with his inspiring hope. The next year when I went back, Diego recognized and received me with his usual and unfaltering smile, but I cannot describe how proud and sincerely happy I felt when he was able to stand up and walk to give me a heartfelt hug. In my life, I had never felt so accomplished, as when I realized that I had made an impact in the life of a boy, who I consider a hero.

I knew then I was not being a nuisance in that room. Instead by making them laugh despite their illness, I provided them an escape from leukemia, and for the briefest moment they could forget where they were. I gave them my dedication, but what I received was incomparable. I am so blessed to have watched these children smile, dream, and not complain while fighting for their lives against enormous obstacles. Being able to witness their inspirational battles and their victories against cancer, taught me one of the most important lessons of my life: to always fight and persevere with courage and faith, regardless of how strenuous the circumstances are. Furthermore, the memories that I shared with those children are my main reminder of why I am pursuing this career. This experience made me understand that the virtue in medicine lies in the complete fusion of science and humanity.

GRANDMOTHER'S KITCHEN

Megan McGeehan, *Weill Cornell Medical College Class of 2017*

"We're going to grandmother's kitchen," she reassured,
to her crying child in the stroller outside.
"Remember Dr. P? With her printed aprons galore,
her rainbow lollipops, and her glitter stickers?"
Though some children, like this one, turned away at the door,
crying and hiding,
tugging on their mother's hands to return home,
many patients excitedly came bouncing in the doors,
pointing at their christmas cards hanging on the walls,
their school portraits, their drawings,
their marks of childhood and happy doctor's visits.
Some appointments, we played with toys on the floor,
as Dr. P coaxed out the childrens' stories,
as I listened to their imaginations,
as their parents explained their aches, pains, and complaints,
with the wisdom only mothers and fathers can know.

Teens, also, walked through the door,
with more complicated histories, more intricate complaints.
One I remember quite clearly.
She entered the room slowly, her thin hair covering her eyes,
and answered my greeting with a tentative "hello."
Dr. P motioned me into the room, her hand frantically beckoning me,
and instructed, "just take her weight," briefly,
before moving on to the next patient.
After removing her jacket and shoes,
her head tilted down, her shoulders hunched high,
she stepped lightly onto the scale, turning away from the sliding bars.
"One-oh-one," I read, as her expression dropped,
and she asked, "but how did I lose weight from last time?"
At a loss for words, shrugging my shoulders helplessly,
beginning to open my lips to form a response,
Dr. P swooped in and took over for my hesitation.
She scheduled weekly check-ins, and I weighed her each week,
getting to know her aspirations to write,
her college application status,
her friends and brother,
little by little.

Before seeing a nutritionist, we brainstormed daily meals,
and Dr. P suggested Ensure.

We toasted small paper cups, filled with samples,
and we drank together,
tasting the "milkshake" in grandmother's kitchen.
My last week, I weighed her again.
Five pounds gained! and we celebrated.
"I just ate more, and more frequently," she supplied,
"I guess that makes sense."

Pediatrics mixes the sensical with abstract,
from parenting advice, sleeping tips, lullabies,
special tea for colds, brand name face cream for acne,
to the science, the diagnosis, the lab values,
the vaccinations and medication adjustments.
More than most times, I see the involvement of families,
the mother's and father's insight holding much sway,
the siblings who had the same cold,
or who, invariably, are about to get it,
lives colliding together in grandmother's kitchen.

CAMP PHOENIX

Jonathan Reiss, Weill Cornell Medical College Class of 2016

In the middle of the field with no place to hide, I was suddenly overcome by fear. People were running chaotically with foreign objects in their hands ready to pounce. After a short while I realized there was not much I could do except stand my ground and hope for the best. Suddenly I felt a warm dark liquid dripping from the back of my head and heard giggling in the background. Looking up, I could see the grinning faces of the young boys responsible, making sure I knew it was them who targeted me with their bottles of chocolate syrup.

It is sometimes hard not to dwell on the daily realities that the members of Camp Phoenix must face. Teasing and bullying have only recently been acknowledged as systemic problems that adolescents must contend with. Add to this the delicate psyche of a young child that may appear slightly different than his or her peers and one can imagine the daily struggles that these children likely contend with. Camp Phoenix, the organization responsible for overseeing a weekend trip to upstate New York for pediatric burn patients, attempts to fill the void felt by a group of children who ordinarily may never get the chance to share a meal, a discussion or a game of checkers with someone who has suffered a similar experience.

The weekend, put together by a combination of medical students, physicians and support staff, largely involves typical camp activities. Kickball, soccer, arts and crafts and kayaking were major hits among campers this past June. For those feeling more adventurous an impromptu talent show allowed many to experiment and challenge themselves in a friendly and encouraging environment. The non-stop flurry of activity was only interrupted during mealtimes when campers and counselors spent equal parts stuffing themselves and getting better acquainted with one another. The highlight of the weekend and a long held tradition, the food fight left counselors and campers in varying states of laughter and disarray with combinations of chocolate, mustard and honey dripping from their hair.

Although the weekend revolved around planned activities, it was the unexpected moments that made the weekend memorable. Witnessing a classmate rub sunblock over a young boy's arms and face as he anxiously waited to kayak was a heartwarming reminder of the vivacity and enthusiasm of many of the campers. Many rounds of late night hide-and-seek, scary story time and other festivities left the palpable feeling that despite everything, these campers were just like any other adolescent. The bond formed between campers and medical students may have been best demonstrated the following morning, as I awoke to see a camper huddled close to one of my classmates, apparently overwhelmed by one too many late night ghost stories, but comforted by the counselor's presence.

As we headed home on Sunday afternoon I began to reflect on the weekend, and hoped that our limited time with the campers had made a lasting impact on them. My thoughts then quickly turned to how much the campers had taught me. The kindness and respect they showed towards one another is something that will stay with me, and their fervor and enthusiasm for life was inspiring. After saying final goodbyes and scraping off the last bit of dried chocolate from my hair, I realized that Camp Phoenix had educated me in a way that little in my prior medical schooling had prepared me for. Given this, I am extremely grateful for the continued opportunity to participate and look forward to the coming events next year.

RESEARCH ABSTRACTS

MEDICAL, GRADUATE, AND MD/ PHD STUDENTS

NOVEL ABERRATIONS OF NOTCH1 IN HUMAN T LINEAGE ACUTE LYMPHOBLASTIC LEUKEMIA

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Background: Acute lymphoblastic leukemia (ALL) is the most common type of pediatric cancer. Human T cell lineage ALL (T-ALL) represents about 15% of ALL cases and has previously been associated with activating point mutations or chromosomal translocations within the negative regulatory region of the NOTCH1 receptor.

Methods: We performed whole genome DNA sequencing of matched leukemic and normal cells from a cohort of 15 children with T-ALL, and then determined the frequency of novel mutations in a separate recurrence cohort of 91 additional childhood T-ALL cases. A combination of the CONSERING and CREST algorithms was used to detect structural variations (SVs) from the next generation sequencing data. Genetic lesions identified within the *NOTCH1* gene in one of the whole genome sequenced cases were characterized.

Results: The combined use of the CONSERING and CREST algorithms detected a novel intragenic deletion of *NOTCH1* that is highly similar to that reported in mice but has not been seen before in humans. The 10kb in frame deletion spanned between exons 14 and 27 (774-1687 AA) and completely removed the negative regulatory region (NRR) domain along with several epidermal growth factor repeats in the C terminus. Upon normalization using the germ line sample, the *NOTCH1* deletion was predicted to be a heterozygous deletion. Sequencing data validated the presence of the deletion both at the genomic DNA and RNA level. Cell pellets from the T-ALL cell lines and SJTALL015 were lyzed and immunoblotted against an antibody specific to intracellular activated NOTCH1 (ICN). NOTCH1 mutants containing an HD/PEST mutation revealed a band at approximately 90 kDa. SJTALL015 and T-ALL cell lines with a JM/FBXW7 mutation revealed a band at 100 kDa.

Conclusions: Previous research has shown deletion-based mechanisms of *Notch1* activation in murine T-ALL models. Although our deletion site does not correlate exactly with their murine deletion site, both mechanisms result in the deletion of the NRR. Both deletions also maintain the 5' proximal promoter that presumably leads to expression of the aberrant *NOTCH1* splice variant. The NOTCH signaling pathway represents a critical component in the molecular circuits that control cell fate, and aberrant activation of the pathway contributes to tumorigenesis. This novel mechanism of NOTCH1 initiation in human T-ALL may lead to new approaches to abate abnormal NOTCH1 activation.

MACROCYTIC ANEMIA AND MITOCHONDRIOPATHY RESULTING FROM A DEFECT IN SIDEROFLEXIN *

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Background: Two children are presented with mitochondriopathies of unknown etiology. The first and more severe case also suffers from macrocytic anemia. The genes underlying many hereditary forms of mitochondrial disorders remain uncharacterized. In contrast, the etiologies of macrocytic anemia are better defined. However, in the first case, all known causes of macrocytosis were excluded. Next-generation sequencing revealed that both patients had mutations in *Sideroflexin 4 (SFXN4)*. *SFXN4* belongs to a family of genes that code for putative mitochondrial transmembrane proteins with yet uncharacterized function. Our studies in zebrafish and patient fibroblasts demonstrate the requirement for *SFXN4* in erythropoiesis and mitochondrial homeostasis.

Methods: Respiratory chain activity was determined spectroscopically. For individual 1, targeted-exome sequencing (Illumina GA-II platform) was used to interrogate mitochondrial genes, and genes encoding mitochondrial proteins. For individual 2, whole-exome sequencing was performed. Allele specific oligonucleotide hybridization and Sanger sequencing was used to establish inheritance pattern. Mitochondrial localization of *SFXN4* was confirmed by western and confocal analysis. *sfxn4* in zebrafish was knocked down using two splice site blocking morpholinos. Erythropoiesis in the knockdown fish was analyzed by o-dianisidine staining and flow cytometry. Rescue experiments in zebrafish and fibroblasts were performed with human and zebrafish *SFXN4* mRNA and cDNA respectively. qRT-PCR with Taqman probes was used to quantify *SFXN4* expression in the affected individuals' fibroblasts, and knockdown zebrafish.

Results: Both patients exhibited global respiratory chain defects. The first case had mild macrocytic anemia. Sequencing revealed that individual 1 has a homozygous single nucleotide deletion (c.233delC) in *SFXN4*; the severely truncated transcript was not efficiently expressed. Individual 2 was found to have two predicted loss of function mutations. The mutant alleles were inherited in a Mendelian recessive manner. *SFXN4* was confirmed to localize to the inner mitochondrial membrane. Knockdown of *sfxn4* in zebrafish produced anemia with megaloblastic features as well as mitochondrial dysfunction, phenocopying the disease in individual 1. The anemia in the knockdown zebrafish could not be rescued with either folate or vitamin B₁₂. Both human and zebrafish *SFXN4* mRNA could rescue the anemia in the knockdown animals. Furthermore, the respiratory chain defects in fibroblasts from individual 1 could be complemented with either human or zebrafish *SFXN4*.

Conclusions: The identification of these rare mutations in *SFXN4* and their *in vivo* functional validation illustrate the power of coupling targeted exome sequencing with the zebrafish system for rapidly identifying and validating disease causing mutations. These studies demonstrate the requirement for, the previously unstudied gene, *SFXN4* in mitochondrial homeostasis as well as erythropoiesis. Furthermore, these studies demonstrate the functional orthology of vertebrate *sfxn4*.

*Hildick-Smith GJ et al. AJHG 2013, 93:906-914.

IS THE EPIDEMIOLOGY OF BONE AND JOINT INFECTIONS IN CHILDREN CHANGING? EXPERIENCE OF TWO TERTIARY CARE CENTERS IN NYC

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Background: Bone and joint infections (BJI) are common in children. The most common bacterial agent is *Staphylococcus aureus* (SA). In the past years, community-associated methicillin resistant SA (MRSA) has become an increasing cause of invasive bacterial infections in some areas of the United States.

Objective: Evaluate the epidemiology of BJI at two tertiary care centers in New York City over a 12-year period

Design/Methods: Medical records of pediatric patients (pts), age range 0 to 21 yrs, admitted at New York Presbyterian Hospital/Weill Cornell Medical College or Hospital for Special Surgery from Feb 2000 to Feb 2012 with a diagnosis of BJI were reviewed. Information obtained includes: demographics, presence of bacteremia, microbiology and empiric antibiotic therapy

Results: 135 pts (median age 9 yrs; range 1 mo-20 yrs; 87 M, 48 F) were diagnosed with a BJI for a total of 151 admissions (48 pts during yrs 2000-2007 and 87 during 2008-2012). 11 pts had 2 or more admissions for BJI, all due to chronic osteomyelitis. Of the 135 pts, 45 (33.3%) had MSSA, 12 (8.8%) MRSA, 19 (14%) CoNS, 7 (5.1%) GAS, 2 (1.48%) *Kingella*. In 19 (14%) cases cultures were negative and in 14 (10.3%) cultures were not obtained. Between 2000 and 2007 and between 2008 and 2012, MSSA was found respectively in 11/48 (22.9%) and 34/87 (39%) cases, while MRSA in 3/48 (6.2%) and 9/87 (10.3%) cases; MSSA BJI increased 16.1% ($p=0.16$) compared to 4.1% of BJI due to MRSA ($p=0.46$).

33/135 (24.4%) pts had bacteremia, 6 of the 12 (50%) MRSA and 20 of the 45 (44.4%) MSSA BJI ($p>0.5$). Empiric MRSA coverage (clindamycin or vancomycin) was started in 27/48 (56.25%) cases between 2000 and 2007 and in 60/87 (68.9%) cases between 2008 and 2012 ($p=0.48$). There were only 4/57 (7%) SA isolates resistant to clindamycin (1 MRSA and 3 MSSA) and 1 MRSA out of 57 (1.7%) SA resistant to trimethoprim/sulfamethoxazole over the 12 yr study period.

Conclusions: Over a 12 yr period, BJI epidemiology in children did not show a significant increase in MRSA at our institutions; MSSA remains the most common organism. However, empiric coverage for MRSA has increased. Knowing the epidemiology of these organisms is important to reduce the exposure to less effective or potentially harmful empiric antibiotic regimens.

PROMOTING THE INCREMENTAL THEORY OF HEALTH IN ADOLESCENTS WITH TYPE 1 DIABETES

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Background: Children's belief systems have been shown to influence their behaviors in a variety of settings. Carol Dweck *et al.* have demonstrated that when people believe a particular trait to be fixed ("entity theory"), rather than subject to improvement ("incremental theory"), they respond negatively to situations in which that quality is tested. For instance, children who hold an entity theory of intelligence show less persistence and worse performance on difficult academic tasks than do incremental theorists. Mueller has furthermore proposed that Dweck's model may be applied to health and have important implications for behavior during illness. Data from Dr. Mueller's current research shows that chronically ill adolescents, in this sample defined as those with Type 1 Diabetes, hold implicit beliefs of health, which mirror those of healthy teenagers. Specifically, there is a group of children with diabetes who believe that their health is fixed (entity theorists) and a group who believe that their health is subject to change and improvement (incremental theorists). We further see that individuals who hold these differing beliefs have correspondingly different attitudes toward compliance as measured on our Adherence Questionnaire. Questionnaire items are phrased as statements, which require agreement or disagreement on a scale of 1-6. Incremental theorists agree that adherence is important to health significantly more than entity theorists do.

Objective: To determine whether there is an opportunity for intervention among adolescents with chronic illnesses who are determined to be entity theorists, and whether that intervention can alter health belief systems and health outcomes.

Methods: Modeling classroom interventions used in Dr. Dweck's research, we chose to create a scientific article promoting the incremental theory of health. The article was meant to mimic the New York Times Health section and was written at a 7.4 grade reading level. This was determined using Microsoft Word's "readability statistics" function. In addition to the article, we created a series of questions meant to validate participants' understanding of the main concepts written about.

To pretest the intervention before giving it to our chronically ill patients, we are using primarily English speaking adolescents between the ages of 12-19 years who have not previously been interviewed or given the questionnaire. Once the intervention has been validated, it will be administered to the patients previously determined to be entity theorists (as per Dr. Mueller's data). These are adolescents who are being treated for the chronic illness of Type 1 Diabetes in the outpatient clinic at Lucile Packard Children's Hospital at Stanford University (LPCH). Inclusion criteria are all patients who are primarily English speaking between the ages of 12 and 19 years.

Patients will be given the intervention, and then questionnaires to reassess their implicit theories of health and their adherence behaviors and beliefs. Health outcomes will also be assessed from the review of clinical documents in various formats: Actual health outcomes will be measured according to blood glucose values measured in both short term and longer term blood tests (e.g., metered blood glucose results and hemoglobin A1c). In addition, clinicians' notes will be reviewed for their reference to health outcomes and patient compliance.

Results: We are currently testing the intervention on healthy participants. So far, adolescents aged 12-19 years old seem to understand the scientific article. This is determined by the percentage of post article questions answered correctly. Based on the final results of this pretest, we will potentially edit the article slightly to bring it to a lower reading level. Once we are able to administer the intervention to our target population (patients with Type 1 Diabetes previously shown to be entity theorists), we anticipate that those entity theorists who complete the intervention will convert to an incremental theory of their health. If this occurs, we hope improved health outcomes will follow this shift in thinking, and would then expect to see the former entity theorists have better blood glucose levels and higher compliance ratings.

DEVELOPING A MEAL-PLANNING VISUAL AID TO TARGET CHILDHOOD OBESITY AND OVERWEIGHT IN THE CHINESE-SPEAKING COMMUNITY

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Background: Childhood obesity and overweight have skyrocketed to the forefront of national attention in the past decade. In 2010, the National Health and Nutrition Examination Survey (NHANES) measured a 33.2% prevalence of obesity and overweight in individuals aged 6 to 19, with similar rates among children (ages 6-11, 32.6%) and adolescents (ages 12-19, 33.6%). Undoubtedly, childhood obesity and overweight, along with their resultant metabolic and cardiovascular co-morbidities, have emerged as a serious epidemic in the United States.

While the literature regularly evaluates sample populations by ethnicity, one major group often left out of the childhood obesity discussion is the Asian and Pacific Islander-American (APIA) population, which comprises 5.2% of the national population and is currently the fastest-growing racial group at 43% in the last decade. Engaging the APIA community therefore needs to be a key piece in childhood obesity research and prevention efforts.

In 2011, 20.7% of New York City (NYC) elementary and middle school students were found to be obese; APIA children in the cohort had an obesity prevalence of 13.4%. However, much variation in obesity rates has previously been noted among Asian ethnic groups. In NYC, the predominant Asian ethnic group is Chinese, which has been found to have a 24.6% prevalence of obesity or overweight in individuals aged 6 to 19. While this rate appears to be significantly below the national average, one must also consider the lower BMI threshold in the ethnic Chinese population for obesity-related metabolic and cardiovascular co-morbidities. Furthermore, a 2003-2011 survey of low-income, preschool-aged children showed that the Asian population was the only racial group in NYC to experience an increase in obesity prevalence, while the Black, Hispanic, and White populations all experienced a decrease. As such, the epidemic of childhood obesity is equally concerning for this population and presents unique challenges, such as a lack of outreach and an underestimation of health risks.

Project Summary:

Meal-planning visual aids (MVA) are commonly used in the pediatric clinic setting to counsel patients and their families on healthier dietary habits. The popular “MyPlatePlanner” reflects the prevalent “Plate Model” used in the United States and Europe, which depicts a circular plate covered with the different food groups to aid in estimating healthy portion sizes. Although the Plate Model has been useful for Caucasian populations, the effect of non-Caucasian dining traditions has not been investigated. In particular, in East Asian cultures, the concept of individualized plates at family mealtimes is not commonplace; instead, dishes are shared among all diners. This raises the possibility that the current MVAs may have limited usefulness in this community.

Our study aims to investigate the two sides of meal-planning visual aid (MVA) usage: pediatric health care providers and patients’ caretakers. We have redesigned the “MyPlatePlanner” MVA to reflect a typical Chinese dining layout, which we have named “MyTablePlanner”. We will attach these two MVAs to a questionnaire given separately to health care providers (namely outpatient pediatricians and registered dietitians) and Chinese parents in the outpatient clinic to assess preference and perceived adherence. We hypothesize that both health care providers and parents would perceive the culturally modified “MyTablePlanner” to be preferable and better at facilitating adherence than the current “MyPlatePlanner”. The questionnaire will also gather invaluable feedback on pediatric nutrition counseling, attitudes toward child obesity, and home dietary habits in this population.

CAN PERFUSION MRI PERFORMED IN THE EARLY STAGES OF LEGG-CALVÉ-PERTHES DISEASE PREDICT LATERAL PILLAR INVOLVEMENT?

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Introduction: Lateral pillar classification cannot be applied at the early stages (Waldenstrom stage I or IIa) of LCPD. One must delay classifying until the maximum fragmentation stage, which is suboptimal since significant deformity of the femoral head can occur by this time.

Gadolinium MRI (Gd-MRI) evaluating the perfusion of the femoral epiphysis may provide earlier prognostic information about the hip before significant deformity occurs.

Purpose: To determine if Gd-MRI measurements of the epiphyseal perfusion obtained at the early stages of LCPD can predict the lateral pillar involvement at the maximum fragmentation stage.

Methods: 26 patients were prospectively enrolled. All patients had Gd-MRI at stage I or IIa and were radiographically followed. Gd-MRIs with subtraction technique that enhances the visualization of gadolinium were analyzed by 2 independent observers using a MRI analysis software, HipVasc. Total and lateral third epiphyseal perfusion were measured. Inter/intra-observer agreements were also assessed. Lateral pillar classification of the radiographs obtained at the max. fragmentation stage was performed by a consensus of 4 observers. Intraclass correlation coefficient and logistic regression were used for statistical analysis.

Results: Of 26 patients/29 affected hips, 18 hips were in stage I and 11 hips were in stage IIa at the time of Gd-MRI. Mean age at diagnosis was 7.6 ± 1.6 years (range 5.1-11.3). The mean interval between the time of Gd-MRI and the time of max. fragmentation was 5.9 ± 2.2 months. Logistic regression showed that % perfusion of the whole and the lateral third of the epiphysis were significant predictors of lateral pillar involvement ($p=0.002$). In the hips that developed lateral pillar A, B, or C, the mean % perfusion of the lateral third of epiphysis was 85%, 57%, and 38%, respectively. Inter/intra-observer agreements of MRI measurements ranged from 0.92 to 0.95. At the perfusion level of 75% in the lateral third, the odds ratio of developing lateral pillar A vs. B or C was 26. At the perfusion level of 45% in the lateral third, the odds ratio of developing lateral pillar C vs A or B was 16. Similar results were obtained using total epiphyseal perfusion.

Conclusion: The total and the lateral third epiphyseal perfusion measurements obtained at the early stages of LCPD using Gd-MRI were predictive of lateral pillar involvement at the maximum fragmentation stage.

Significance: Perfusion MRI obtained at the initial stage may yield prognostic information regarding lateral pillar involvement.

ENHANCING THERAPY TO AVOID FETAL BLOOD SAMPLING (FBS) IN ANTENATAL MANAGEMENT OF ALLOIMMUNE THROMBOCYTOPENIA (AIT)

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Introduction: Alloimmune Thrombocytopenia (AIT) is a potentially life-threatening, often severe thrombocytopenia caused by a parental human platelet antigen (HPA) incompatibility resulting in maternal alloantibodies attacking fetal platelets. AIT affects approximately 1 in 1000 live births and may be accompanied by intracranial hemorrhage (ICH) in 10-20% of cases. Since there is no routine screening for AIT, it is usually diagnosed after birth of the first affected thrombocytopenic fetus. Mothers of AIT babies can be treated during subsequent affected pregnancies with intravenous immunoglobulin (IVIG) and corticosteroids to increase fetal platelet counts (FPC) and avoid fetal/neonatal ICH, using fetal blood sampling (FBS) to monitor treatment. Using this approach in previous studies, IVIG 1g/kg alone (no steroids) was shown to not be effective in severely thrombocytopenic fetuses with AIT. While FBS allows enhancing therapy (salvage) in poor responders, it is a high-risk procedure associated with adverse fetal outcomes (e.g. premature delivery and fatal umbilical cord hemorrhage). This study assessed the efficacy, benefits and downsides of: a) 2 different regimens in treatment of fetal AIT, both of which are “more” than IVIG 1g/kg alone, and b) an alternative approach, omitting FBS in affected women without a history of ICH in a prior affected sibling and enhancing treatment empirically at 32 weeks, i.e. treating mothers as if they had undergone FBS and had a low fetal platelet count (FPC).

Methods: Antenatal treatment in this study compared IVIG 2g/kg/wk (arm A) to IVIG 1g/kg/wk + prednisone (arm B) starting at 20-30 weeks of gestation until delivery, with FBS at 32 weeks. In the alternative treatment arm which was added at the end of the study, all women were treated with IVIG 2g/kg/wk + prednisone 0.5mg/kg (salvage) after 32 weeks. This prospective multicenter study included 98 mothers and 102 fetuses enrolled from May 2001 to November 2012. All mothers had documented AIT and those with ICH in a previous child were excluded. FPC, birth platelet count (BPC) and ICH were compared among the 3 treatment regimens outlined above: 1) arm A, 2) arm B, and 3) either arm A or arm B followed by empiric salvage without FBS.

Results: There was no difference in efficacy of treatment between arm A versus arm B; both increased BPC to greater than or equal to 50k in the fetus/neonate in 85% or so of cases (table 1). In 29 fetuses (27 pregnancies including two sets of twins) in which salvage was used, there were 15 fetuses who did not undergo FBS and 14 who did. Only 2 of the 29 receiving salvage had BPC < 50,000/uL (50k); whereas, 9 of 73 neonates not receiving salvage therapy had a BPC < 50k. When only fetuses with an FPC < 50k were included, 12/13 receiving Salvage had a BPC ≥ 50k whereas only 1 of 6 not on Salvage did (table 2; p=0.0029). Overall, of 102 fetuses, 11 had a BPC < 50 (poor responders). Among these 11 poor responders, 0 resulted in ICH, 9 did not receive Salvage treatment (5 in arm A; 4 in Arm B), and 1 of 2 receiving Salvage was only on it for 1.5 weeks. Common adverse effects related to IVIG include headaches, skin rashes, flushing and nausea; these were self-reported by treated mothers and obtained by chart review including nursing records. Another adverse effect was increased hemolysis in mothers with blood type A, presumed to be caused by anti-A present in IVIG.

Conclusions: Arms A and B were approximately equally effective; however, both resulted in approximately 15% of low FPC at 32 weeks. These findings support the hypothesis that empiric addition of salvage treatment at approximately 32 weeks of gestation is needed in treating affected cases of AIT to avoid fetal blood sampling and its substantial attendant complications. The addition of salvage is highly effective in treating AIT, eliminates risks associated with FBS, and greatly reduces the chance of a BPC < 50k. However, adverse events have been seen from the increased dosage of IVIG and prolonged prednisone requires careful monitoring.

* KM (Class of 2016, U of Wisconsin) is a winner of an American Society of Hematology Minority Award for medical students

HEMOLYSIS AFTER HIGH DOSE INTRAVENOUS IMMUNOGLOBULIN (IVIG) IN BLOOD GROUP A WOMEN WITH ALLOIMMUNE THROMBOCYTOPENIA (AIT)

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Introduction: Hemolysis after intravenous immunoglobulin (IVIG) infusion has been observed in clinical trials and case reports. Certain factors seem to place a patient receiving IVIG at higher risk for hemolytic anemia: 1) having blood type A (BTA), B, or AB and 2) receiving high doses of IVIG (≥ 2 g/kg). IVIG contains isohemagglutinins that coat red blood cells and result in positive DAT tests. Concentrations of Anti-A, Anti-B, and Anti-D titers have been detected in IVIG products at varying concentrations by different IVIG manufacturers. It has been suggested that Anti-A titers $> 1:16$ are more likely to cause clinically significant hemolysis and anemia. 15 summarized studies that reported 63 patients experiencing hemolysis after IVIG infusion showed the role of non-group O recipients in hemolysis. In the current study, we sought to explore the degree of hemolysis as related to ABO blood types in mothers treated with IVIG for fetal alloimmune thrombocytopenia (AIT).

Methods: A retrospective chart review was conducted on 98 women who had received IVIG for AIT treatment during their pregnancy to increase the fetal platelet count. Women were randomized to receive IVIG 2g/kg/wk (arm A, n=50) or IVIG 1g/kg/wk + prednisone (arm B, n=48) starting at 20-30 weeks of gestation until delivery. One CBC per month was collected from each mother from the start of treatment until delivery. Hemoglobins and mean corpuscular volumes (MCVs) data were tracked and development of anemia was compared among women with blood types (BT) A, B, AB and O in each treatment arm. Patients who received IVIG 2g/kg/wk + prednisone together (salvage) or with missing blood work or blood type records were excluded from this study.

Results: Of 98 women, 27 received salvage therapy, 1 had unavailable blood work, 2 had unavailable blood type records. 27 of the remaining 68 women had hemoglobin (Hgb) less than 10 for one or more CBC during IVIG treatment. The MCV range for Arm A was 82-112.7 and Arm B was 75.8-109. The degree of anemia was greater in Arm A than Arm B ($p=0.0507$). Among women in arm A, BTA had a significantly higher incidence of anemia ($Hgb<10$) than those with BT non-A ($p=0.0184$). Among women in arm A BT non-O had a higher incidence of anemia ($Hgb<10$) than those with BT O ($p=0.0067$), with BT A having the highest number of women with $Hgb<10$ (13/14). There was no significant difference in the incidence of anemia among women with blood type O (n=3) versus non-O (n=6) in arm B. Both showed a low incidence of hemolysis.

Conclusions: Patients who were on 2g/kg/wk IVIG were substantially more anemic than those on the 1g/kg/wk IVIG + prednisone dosage, which supports reported findings that higher dose (HD) IVIG is associated with a higher risk of anemia. In this setting receiving 2g/kg/wk for multiple weeks is very high dose.

In addition, those receiving HD IVIG who were BT A had a greater risk of developing anemia and to a greater extent than seen in those of blood type O. This finding is consistent with the hypothesis that blood-group specific antibodies in IVIG result in immune hemolysis primarily in BT A recipients because of the higher anti-A titers. Furthermore, while 1 g/kg/wk of IVIG is not "low dose", the associated use of prednisone 0.5mg/kg/d may protect against development of a greater degree of anemia in these patients. IVIG is the standard of care treatment for AIT; however 1 g/kg/wk is known to not be sufficiently effective in severely thrombocytopenic fetuses¹ (Berkowitz et al, OB-GYN 2006). Our study findings indicate that hemolytic anemia in non-O blood types may be a major side effect of 2g/kg/wk IVIG treatment, indicating that patient blood type should be considered when which treatment to use.

* KM (Class of 2016, U of Wisconsin) is a winner of an American Society of Hematology Minority Award for medical students

INTERACTION ANALYSIS OF SHH SIGNALING AND ENGRAILED PROTEINS ON CEREBELLAR GROWTH

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Background: The cerebellum (Cb) is a posterior brain structure involved in motor coordination and learning, balance and cognition. In the first two weeks of mouse postnatal development, the Cb expands from a small simple structure to produce a deeply fissured and a stereotyped foliated form. Although not fully understood, this growth process is coordinated by the Sonic hedgehog (*Shh*) pathway and the engrailed homeobox transcription factors.

Summary of Methods and Results: In this study we tested if *Shh* signaling interacts with *En1* and *En2* (*En1/2*) in order to achieve proper Cb growth and foliation. Through conditional deletion of *En1/2* in the rhombic lip derived cells (*RLd-Cre; En1/2^{fx/fx}*) we found that *Shh* signaling was lost in the central zone. *En1/2*-deficient granule cell precursors (GCPs) cultured in medium containing SHH exhibited a proliferative response greater than control cells. qPCR expression analysis of cultured GCPs showed transcriptional alteration of *Shh* pathway components in *En1/2* mutant cells. Finally, genetic crosses with a gain-of-function in *Shh* transgene (*Shh-P1*) together with *RLd-Cre; En1/2^{fx/fx}* indicate that *En1/2* are epistatic to *Shh*.

Conclusions: Taken together, these results support an interaction between *Shh* and *En1/2* during postnatal Cb growth.

EFFECTS OF A HIGH FAT DIET ON MELANOCORTIN GENE EXPRESSION AND PEPTIDE LEVELS IN THE MOUSE HYPOTHALAMUS

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Background: The hypothalamic melanocortin system consisting of POMC and AgRP neurons is crucial in regulating food intake and body weight. POMC is synthesized in the arcuate nucleus of the hypothalamus and cleaved to various peptides, including α -MSH and β -EP (Figure 1). α -MSH binds to melanocortin receptors (MC-R) 3/4 and is associated with reduced food intake and decreased body weight. AgRP is an MC-R4 antagonist and produces the opposite physiologic effects.

Methods: In order to examine the response of the melanocortin system to a high fat diet, we have measured of POMC and AgRP mRNA and peptide levels after 3 days, 1 week, and 8 weeks exposure to a 60% Kcal high fat diet (HFD) that causes diet-induced obesity (DIO). We have also measured levels of the POMC processing enzymes (PC1, PC2, CPE) and PrCP, which degrades α -MSH. We are testing the hypothesis that diet-induced obesity resistant mice (DIO-R) will exhibit changes that lead to a more robust activation of the melanocortin system.

Results: Mice fed a HFD for 3 days exhibited higher plasma levels of leptin and insulin, and increased POMC peptide and mRNA in the arcuate nucleus ($p < 0.05$). AgRP levels were unchanged. After 1 week on a HFD, POMC mRNA was no longer elevated but AgRP mRNA was significantly suppressed ($p < 0.001$). Although there were no significant changes in peptide levels of POMC or AgRP, the α -MSH/POMC and β -EP/POMC ratios were decreased, consistent with reduced POMC processing. These findings correlate with lower levels of α -MSH ($p < 0.01$), β -EP ($p < 0.05$) and AgRP ($p < 0.05$) peptide content in the remaining hypothalamus surrounding the arcuate nucleus. Mice on the 8-week HFD gained more weight than control mice (13.54g vs 4.22g, $p < 0.01$), however the weight gain varied among the mice. The DIO-resistant mice gained an average of 7.3g while the heaviest mice gained an average of 13.66g ($p < 0.001$). Peptide and mRNA levels of POMC, AgRP, and the processing enzymes will be measured as described in above experiments.

Conclusions: These data suggest that the melanocortin system has different responses to acute and chronic high fat feeding and that the response may differ in DIO and DIO-R mice.

EXPLORING THE PATHOGENESIS OF CEREBRAL MALARIA

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Background: Cerebral malaria (CM) is one of the most severe and damaging complications of *P. falciparum* malaria, and a major source of morbidity and mortality around the world and in particular among the children of Sub-Saharan Africa. The pathogenesis of cerebral malaria is poorly understood and several theories exist. The original theories of cerebral vascular occlusion and ischemic brain damage were unsatisfying and have been largely supplanted by a paradigm of microvascular endothelial damage and dysfunction.

Summary of Methods and Objectives: We previously performed a cross-sectional case-control study of Ghanaian children to explore the hypothesis that circulating endothelial progenitor cells (cEPC) play a major role in repairing the endothelial damage caused by parasite sequestration and thereby in the prevention and also recovery from cerebral malaria. It was found that children with CM had lower serum numbers of cEPC than healthy and asymptomatic parasitemia controls. This current ongoing study is a prospective case-control study looking at children with CM (as well as the same controls) that examines cEPC levels via flow cytometry at diagnosis, recovery (or deterioration) of condition, as well as 7 days and 14 days post-recovery in order to correlate cEPC levels with the actual course of disease.

SEXUALLY TRANSMITTED INFECTIONS IN ADOLESCENT FEMALES IN HAITI: SCREENING USING GENEXPERT TECHNOLOGY

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Background: In resource-poor countries such as Haiti, limited diagnostic materials are a barrier to the implementation of screening programs for sexually transmitted infections (STIs). Untreated STIs are associated with significant morbidity and mortality, including increased risk of HIV transmission, pelvic inflammatory disease, and infertility. Chlamydia and gonorrhea are particularly under-diagnosed among the STIs because their presentation is often asymptomatic. Using new GeneXpert technology for the diagnosis of chlamydia and gonorrhea, a STI screening program for adolescent women was conducted at the Groupe Haitien d'Etudes du Sarcome du Kaposi et Autres Infections Opportunistes (GHESKIO) clinic in downtown Port-au-Prince, Haiti.

Methodology: Women ages 13 to 23 presenting at GHESKIO's adolescent clinic for the first time between April and July, 2013 were given an intake questionnaire about sexual activity. If female patients identified as sexually active, two cervical swabs were performed. One sample was tested for the presence of trichomonas vaginalis and candida by microscopy. The other sample was analyzed for the presence of *C. trachomatis* and *N. gonorrhoeae* using GeneXpert technology. Study participants were sent to an on-site laboratory where blood was drawn for HIV and syphilis testing.

Results: Of the 271 women tested, 10.8% had chlamydia, 3.7% had gonorrhea, 3.3% were seropositive for HIV, 3.9% were seropositive for syphilis, 15.2% had trichomonas, and 19.6% had candida. Excluding candida, 29.5% of women tested had at least one of the STIs listed above.

Conclusions: The purpose of this research was to determine the value of implementing a STI screening program for adolescent women at GHESKIO. Our results confirm an elevated prevalence of STIs among women in urban Haiti comparable to previous prevalence data reported in rural areas. The establishment of a STI screening program for new female patients at GHESKIO would decrease the time to diagnosis and reduce the likelihood of complications from untreated cervical infection. GHESKIO hopes to obtain funding from PEPFAR to support the ongoing use of GeneXpert technology to screen for chlamydia and gonorrhea in addition to testing for trichomonas, candida, HIV, and syphilis.

EVALUATING PHYSICIAN ADHERENCE TO A CLINICAL TREATMENT PROTOCOL FOR STATUS EPILEPTICUS USING DATA FROM AN ELECTRONIC MEDICAL RECORD SYSTEM

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Background: Status Epilepticus is an epileptic seizure that lasts more than 5 minutes. Under these circumstances, immediate and precise actions are required in order to stop the seizure, and prevent brain injury. The Weill Cornell Medical College (WCMC) Division of Child Neurology has developed a “status protocol,” which describes the suggested therapies to stop a patient from seizing. How well this protocol is followed is not well known.

Methods: A retrospective chart analysis is in progress using information from an electronic medical record (EMR) on recorded cases of patients with status epilepticus to determine how well the protocol was followed. Part of the process will include how to effectively extract and evaluate the data through the EMR. A draft of a data collection document has been created and is being iteratively revised based on how well it functions to record the necessary information. We have obtained preliminary data is being collected on three patients to determine the ease with which the specified data can be extracted.

Results: Qualitatively, our observations are as follows: (1) most clinical data is well labeled in the EMR; (2) the exact time of transfer from the emergency department to the ICU is not clearly indicated in the EMR; (3) manual search for the first recorded vital signs or blood pressure is often tedious due to the high volume of recorded information; (4) EEG reports generally do not contain sufficiently granular information to identify the exact time of seizure control.

Conclusions: Our observations illustrate the feasibility of building an algorithm to automate such an adherence evaluation.

PRECLINICAL ASSESSMENT OF GANT61, A SMALL MOLECULE GLI ANTAGONIST, IN SONIC HEDGEHOG-DRIVEN MEDULLOBLASTOMA

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Background: The Sonic Hedgehog (SHH) pathway is dysregulated in ~30% of medulloblastoma. Recent therapeutic strategies have targeted upstream SHH pathway components; however, these approaches result in rapidly acquired treatment resistance. To improve outcomes and overcome resistance, we focused our studies on targeting downstream SHH signaling components using the small molecule GLI antagonist, GANT61.

Methods: Postnatal (P4-P6) mouse cerebellar granule cell precursors (cGCPs) were isolated and cultured in the presence of SHH. GANT61 or vehicle control was administered at time 0 and cultures were assayed using immunocytochemistry for markers of proliferation (Ki67, EdU), neuronal differentiation (NeuN), and cell death (cleaved caspase-3) at 12 hours or 48 hours following GANT61 treatment.

Results: GANT61 reduced overall cGCP cell number at 48 hrs in a dose-dependent manner: vehicle (908.2 ± 59.9), $1\mu\text{M}$ (655.1 ± 38.5), $5\mu\text{M}$ (323.5 ± 38.5), and $10\mu\text{M}$ GANT61 (175.2 ± 18.4). Interestingly, GANT61 did not alter the proportion of proliferating or differentiating cGCPs at any dose tested compared to control. However, cell cycle analysis suggested that GANT61 decreased the proportion of cGCPs that enter S-phase as measured by EdU staining: $1\mu\text{M}$ ($19.5\% \pm 1.2$), $5\mu\text{M}$ ($11.2\% \pm 1.2$), and $10\mu\text{M}$ GANT61 ($6.1\% \pm 0.5$) compared to vehicle ($20.8\% \pm 1.7$). Finally, GANT61 induces cell death at 12 hrs post-treatment: $5\mu\text{M}$ ($7.4\% \pm 1.0$) and $10\mu\text{M}$ GANT61 ($9.3\% \pm 1.3$) compared to vehicle control ($2.8\% \pm 0.4$; $p = .001$ and $p < 0.001$, respectively).

Conclusions: GANT61 inhibits SHH mediated cGCP growth through both increased apoptosis and decreased mitotic rate.

LESSONS LEARNED IMPLEMENTING PRESCHOOL-BASED VISION SCREENING WITH EYE-MOBILE FOLLOW-UP

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Background: Preschool screening programs have been implemented across the US to promote early detection and treatment of common eye conditions such as amblyopia and strabismus. Obtaining follow-up in children referred from screening remains a challenge, leading programs to offer onsite follow-up examinations. Factors that create for a more successfully integrated program have not been previously investigated.

Methods: Data from a preschool vision screening program based in the San Francisco Bay Area, CA were collected and reviewed for the 2012-2013 academic year. Five major preschool organizations participated in the program, which provided free onsite vision screening and follow-up comprehensive eye examinations for referred children. Factors affecting screening and follow-up rates were examined including the day of the week and month of the academic year each were performed and the number of days between screening and follow-up examinations.

Results: 7,544 children were targeted for screening of which 6,446 (85%) were successfully screened. Absenteeism on the date of the screening (9.6%) accounted for the majority of those unsuccessfully screened. Absent rates did not differ significantly by the weekday or month of screening, but did differ significantly between preschool organizations ($p < 0.05$, chi-square). 1,005 children were referred for a comprehensive eye examination of which 694 (69%) were examined during the follow-up onsite appointment. Follow-up rates differed significantly between preschool organizations ($p < 0.05$, chi-square), and decreased with increasing number of days between screening and the follow-up examination appointment.

Conclusions: Screening and follow-up rates differed significantly between preschool organizations. Differences between preschool organizations may affect the efficiency of preschool-based vision screening programs. In addition, follow-up rates may be improved by shortening the time between screening and follow-up.

PROGRESSION OF DYSGLYCEMIA IN HEALTH FOR LIFE PARTICIPANTS

Cain MS, Freedman B, Frank M

Background: Progression of dysglycemia and relationship between BMI and HbA1c in the pediatric population is unclear.

Objective: To examine the progression of dysglycemia in overweight pediatric patients by examining HbA1c and BMI progression in a sample of patients participating in the Health for Life (H4L) program at New York Presbyterian Hospital.

Methods: Charts were reviewed for all 234 patients who have participated in the H4L program since 2006. BMI and HbA1c were recorded as far as 3 years after patients started the H4L program. Patients were excluded if they had an underlying endocrine disorder.

Results: Of the 234 participants, follow-up data was collected on 196 participants. Of the 196 participants, BMI remained the same for 4 participants (2.74%), increased for 44 participants (30.14%) and decreased for 98 participants (67.13%) since they first started working with H4L. 79 participants attended ≥ 5 sessions; post BMI data was collected on 55 of those participants. Of these 55 participants, the BMI remained the same for 4 participants (7.28%), increased for 20 participants (36.37%), and decreased for 31 participants (56.37%). Of the 11 participants that had more significant changes in BMI (≥ 5 % change), only 3 (27%) attended more than 5 sessions of H4L. Post 2 years program intervention, 5 participants were in the normal BMI range (< 85 %).

There was initial and follow-up HbA1c data on 88 patients, stratified into groups based on HbA1c when they presented to the program. Of the 88 patients, 55 patients (63%) had HbA1c \leq to 5.6%, 26 patients (30%) had an HbA1c in the pre-diabetic range of 5.7-5.9%, and 7 patients (8%) had HbA1c value \geq to 6.0%.

Of the patients who started the program with an A1c in the normal range, 15% had an increase in their A1c to the pre-diabetic range, however all of those patients lost weight over that time period. None of the patients that gained weight had an A1c that increased to the pre-diabetic range.

Of the patients who started the program with an A1c in the low pre-diabetic range (5.7-5.9%), 38% of patients had a decrease in the A1c values, 58% had stable A1c and 4% had an increase of A1c into high pre-diabetic range (> 6.0 %). Of the patients who had a decrease in A1c, 85% lost weight. The one patient who had an increase in A1c into the high pre-diabetic range, maintained the same BMI.

Of the 7 patients who started the program with A1c > 6.0 %, 29% remained in the high pre-diabetic range, 57% had decreased A1c to the low pre-diabetic range, and 14% had normalization of their A1c. Of the ones who had normalization of A1c, all lost weight or remained weight neutral. Of the 57% that decreased to the low pre-diabetic range, half lost weight and half gained weight. The patients who remained in the high pre-diabetic category, stayed weight neutral or had increased BMI.

Conclusion: The data indicate that most patients in H4L had either a stable or decreased A1c and BMI 3 years after first presenting to the program. BMI had some correlation with maintenance of elevated A1c, but larger studies are needed to determine a definitive association.

PEDIATRIC INTEREST GROUPS

and FIELD PROGRAMS

Camp Phoenix

Anne Herbert and Amy Kwon



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 one-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 almost 30 campers and volunteer counselors spent an incredible three days at Camp Kinder in Hopewell Junction, NY. The overnight camping trip is always especially memorable. Campers participate in activities such as canoeing, tie-dye, and hiking. 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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Chemistry for Kids

Christopher Robinson

Chemistry for Kids exists to give underprivileged young students the opportunity to experience science in fun and exciting ways. We hope that through our interactive experiments, we can provide young students an avenue to explore their interests in science, and inspire them to become future scientists and doctors. Overall, our main priority is to show students that science can be fun!

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Cornell Kids

Eda Dou and Kristin Oshiro

Cornell Kids is an interactive science learning and mentoring project in which sixth and seventh grade students from the East Harlem School in Manhattan are taught about the basic functioning of the body. Teaching sessions are held throughout the Spring semester and are lead by medical students of the Student National Medical Association. Students are taught about the circulatory, respiratory, gastrointestinal, and nervous systems. Students also participate in an Anatomy lab where they can apply what they learned in class and hear about the needs and value of medical research. After each session, students review the content and integrate their new knowledge with common diseases and conditions in their communities.

Medical students can get involved with this program by volunteering to lead a teaching session in the Spring.

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The Heads Up! Pediatric Literacy Program

**A Project of the Weill Cornell Medical College Department of Pediatrics,
Division of Child Development**

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 begin.¹ 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.² 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.³

In an effort to improve early literacy, the Heads Up! Pediatric Literacy program has initiated a mild 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. At some sites, including WCMC, trained volunteers help children select more books and conduct parent outreach in the waiting room.

Heads Up! targets pediatric clinics that serve needy populations. At all of our 12 clinic sites—pediatric outpatient clinics affiliated with WCMC, Lincoln Hospital, St. Barnabas Hospital, Methodist Hospital, and New York Hospital Queens—at least 85% of patients qualify for Medicaid. In 2010-2011, Heads Up! distributed 40,391 brand-new books and corresponding literacy guidance to nearly 20,000 children.

Sadly, this program has been placed in jeopardy due to loss of funding. Reading is Fundamental, Inc., which previously provided over 75% of our book funding, was recently cut from the federal budget. Without our main financial support, we are in danger of having to cut back on book distributions. Because we believe deeply in the mission of promoting child literacy, we are working hard to keep this program going as strong as ever.

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Health For Life

Simin Zhang

Health for Life is a program run by the NYPH Department of Pediatrics that works with overweight children. A team of pediatricians, physical therapists, social workers, nutritionists, and medical student volunteers help children and teens ages ~9 - 18 learn about how to lead a healthier life. The 10-week program has 2 major components: exercise and nutrition. During the exercise sessions, participants discover fun new ways to incorporate physical activity into their lives. As part of this, all participants receive pedometers that they carry around for the duration of the program. The nutrition sessions focus on learning about which foods are healthy and easy ways to make everyday food healthier. The exercise portion includes lessons in yoga, boxing, and other fun exercises to motivate the children.

Medical students get to form relationships with the children as well as the parents. In addition, students get to be role models and have a great time!

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Health Professions Recruitment & Exposure Program (HPREP)

Amare Assefa, jennifer bender, alan molina, liana nisimova

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 over-arching goal is to encourage minority students to pursue a career in medicine. 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, write a research paper on a topic of their choice and build a lasting relationship with a medical student mentor. We typically accept 80 high school students every year and engage 40 medical students from across all classes to be mentors and role models for the high-schoolers. This program began here at Cornell and has subsequently spread to many other medical colleges around the country.

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Kids in Chronic Care Support (KICS)

Elizabeth (Betsy) Cowell and Anne Herbert



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.

Past members of the program have had positive experiences with KICS:

"At first I thought, he's on chemo, I'm going to feel bad for him. But although his illness was always in the background that wasn't all there was to him, and you can lose sight of that when you're a doctor. You can forget the humanistic side, putting a person in the context of their life."

"It's nice for the kids to have someone who's relatively young; not their parent or a sibling, just somebody who wants to hang out with them. It distracts them from their treatment. We're medical students, but we're not there for any medical purpose... We just want to talk to them and have a little fun."

"In the first two years you spend so much time learning basic sciences, it can be a real drag. Being able to take yourself out of that, to put a face to what you're doing, really motivates you."

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Komansky Center Initiatives

Family Advisory Council



The Komansky Center Family Advisory Council (FAC) is a group of dedicated parents and family members of pediatric patients who are committed to working with Komansky Center hospital staff and administration to provide family-centered care to all patients. Our vision is to achieve a level of care where patient and family involvement is expected and welcomed by all. Among the Council's many current initiatives are:

Family Education and Orientation Workgroup

The goal of the Workgroup is to improve care while at the hospital by helping patients' families and Hospital staff communicate more effectively. The *Family Education and Orientation Workgroup* tries to identify ways to 1) Orient family members to the Hospital with written and verbal communication tools; 2) Enhance communication skills of new and current Hospital staff members; 3) Improve communication between Hospital staff and families and, d) Revise preoperative procedures for outpatient surgeries.

Family Experience Workgroup

A child's stay in the hospital is often very stressful for his or her family. The *Family Experience Workgroup* is committed to creating a pleasant environment for patients and their families. Workgroup members identify different ways to improve and expand the infrastructure and recreational services currently offered at the Hospital. Recent activities have included distribution of gifts during the holidays, participation in the Thanksgiving festivities hosted by Child Life, and engaging local school children to create holiday cards for hospitalized children.

Family Support Workgroup

By sharing experiences, families can help each other through a tumultuous and traumatic time. The *Family Support Workgroup* is committed to identifying ways to provide support to families and to managing that support systematically. *Family Support* is focused on three areas: 1) The development of a resource center for families; 2) the creation of a parent-to-parent directory; and 3) the development of a mentoring program so that current families can seek advice from families who have "graduated" from the hospital.

Family Faculty Program

The *Family Faculty Program* works with hospital staff and administration to incorporate FAC parents in orienting and educating new residents on the topic of family-centered care. FAC parents help residents learn by sharing their own stories within the healthcare system. The *Family Faculty Program* hopes to expand their activities to student education.

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Motivating Action through Community Health Outreach (MAChO)



Crystal Castaneda, Diana Mosquera, Nicole Ramsey

Overview: 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:

Motivating Action by building a community of empowered youth through dissemination of information that inspires the adoption of healthy living habits,

Motivating Action by providing youth with a platform and the mentorship necessary to become agents of healthy change in their community

Motivating Action by pursuing a holistic, adaptive, and individualized approach towards addressing poor nutrition and sedentary lifestyles, and

Motivating Action 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. By pairing with Settlement Health, a nonprofit community health center in East Harlem, MACHO initiated the Youth Wellness Program, a pilot-phase program to teach kids how to make healthy nutrition and fitness choices within their community. The pilot program met once a week for ten weeks. In 2010-2011, the program was expanded 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 2012-2013 year. In 2012, the MACHO Youth Leadership Program launched with the goal of engaging local high school students who will grow to be leaders in their community and within MACHO.

Program: The structure of the curriculum consists of one weekly after-school session coupled with one weekend session on mentoring and personal development. 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. The mentoring session includes our personal development curriculum, where we use a group-mentoring model: mentor teams are composed of college students who serve as mentors to our middle school and elementary school participants. The mentor teams work on group projects to be presented at the end of each semester based on a specific theme surrounding health.

Day 1			Day 3		
Nutrition	Exercise	Snack	Exercise	Group Project	P.D. Curriculum

For the 2013-2014 year, we run our Youth Wellness Program sessions at St Marks the Evangelist School in Harlem and the Silberman School of Social Work at Hunter College. The Youth Leadership Program meets bi-monthly at the Silberman School of Social Work. This fall we enrolled a total of 60 participants, ages 7-13 and 14-18.

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 York-Presbyterian 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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Science and Medicine Enhancement Program (SMEP)

Chioma Enweasor and Carlos Green

The Science and Medicine Enhancement Program (SMEP) provides middle school students with hands-on opportunities to learn about health and disease through a multi-subject approach. SMEP students are from the Science and Medicine Middle School, a school serving students from the Carnasie and East Flatbush communities in Brooklyn, NY. In a series of sessions held at the Weill Cornell Medical College in Manhattan, NY, groups of 3-4 students led by medical students work on hands-on group and individual activities designed to reinforce basic concepts in basic biology, physiology, pathophysiology, and healthy living related to the diseases and health conditions that most affect the students; communities. During the program, students also engage with material through reading, research, persuasive writing, presentations and clinical skill sessions. The program culminates with students presenting and leading demonstration tables related to various curricular topics at a Community Health Fair held at the Science and Medicine Middle School.

Student Leadership:

Chioma Enweasor (cme2001@med.cornell.edu)

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Weill Cornell Youth Scholars Program (WCYSP)

Andrew Hillman

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 pre-med 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.

Student Leadership:

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MENTORING AND RESEARCH

OPPORTUNITIES IN PEDIATRICS

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RESEARCH OPPORTUNITIES IN PEDIATRICS

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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: Medication Safety

I am working on several studies looking at improving outpatient medication safety. One involves studying the impact of electronic prescribing on medication safety among community providers in New York State. Another involves improving patient safety for patients transitioning from the inpatient to the outpatient setting.

Students' Role in the Projects:

Students will learn how to consent patients, perform structured interviews in the hospital, and perform follow-up phone calls using surveys to detect whether a patient has experienced harm from a medication.

Students would have the opportunity to participate in research team meetings where we discuss study design, data collection, analysis and manuscript writing.

Preferred Experience: None required

Adele Boskey, Ph.D.

Musculoskeletal Integrity Program
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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 projects in this laboratory is the determination of how matrix proteins 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 do the histology, and work on the infra red imaging analysis of the bones of animals of different ages.

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: Student should have computer skills

James B Bussel, MD

Department of Pediatrics
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Field(s) of Interest: Hematology/ Oncology

- *Antenatal Management of Fetal Alloimmune Thrombocytopenia*
- *Experimental treatments of Refractory ITP*

Project Description: Diagnosis, counseling, and entry into a multi-center randomized clinical trial. We design and coordinate this study, which is intended to prevent intracranial hemorrhage from immune thrombocytopenia in fetuses and neonates by administering treatment to mothers while they are who have a platelet antigen incompatibility with their husbands.

Children and adults with difficult to treat ITP are enrolled on treatment protocols of various agents including thrombopoietic agents, anti-CD20 including standard and augmented versions, anti-D, IV gammaglobulin, and inhibitors of syk and other novel agents. All of the studies have various research components (collaborative laboratory studies) connected with them.

Students' Role in the Project:

A) Helping to collect data. This entails contacting other centers to ensure that the various components of the trial are sent to us: consents and IRB paperwork; infusion related data, lab work (maternal data and fetal sonos), and follow up information on the neonates and infants. B) Helping to analyze the data that has been collected. C). Design and contribute to special projects related to AIT study.

1. Monitor the individual ITP patients to ensure that their visits and studies occur as per protocol and that the appropriate information is collected.
2. Help to develop new studies connected with individual protocol agents and/or help to develop novel studies of new agents .
3. Ongoing analysis of data to determine progress with protocols.
4. Facilitate laboratory studies by pulling freezer specimens to be batched and sent off

Preferred Background/ Experience: None requested

BJ Casey, PhD

Sackler Institute, Department of Psychiatry
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Field(s) of Interest: Developmental cognitive neuroscience

Research Title: Research in Developmental Psychobiology

Project Description:

Work on developmental brain imaging studies using functional magnetic resonance imaging and fiber tracking with diffusion tensor imaging to examine limbic forebrain regions implicated in addiction and impulsivity.

Work on attention and reading training interventions and how they impact behavior and neural systems testing pre and post-training effects with functional magnetic resonance imaging and diffusion tensor imaging. This work is relevant for the disorders of ADHD and reading disorders.

Work on developmental brain imaging studies using functional magnetic resonance imaging and fiber tracking with diffusion tensor imaging to examine limbic forebrain regions implicated in addiction and impulsivity.

Work on attention and reading training interventions and how they impact behavior and neural systems testing pre and post-training effects with functional magnetic resonance imaging and diffusion tensor imaging. This work is relevant for the disorders of ADHD and reading disorders.

Students' Role in the Project: Students would be provided with background reading, IRB and HIPAA training, image analysis, behavioral testing, programming and scientific discussions. Typically students are exposed to every aspect of the study and depending on contributions in the lab can be a co-author on a paper or conference presentation and as such get writing experience too. The student is jointly mentored by a team of investigators including pre and post-doctoral fellows and a faculty PI.

Preferred Background/Experience: Yes, some general computer experience would be very helpful.

Marisa Censani, MD

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

Research Title: Titles are pending. Topics include obesity and bone mineral metabolism

Project Description: Pending; please contact Dr. Censani

Preferred Background/ Experience: None

Margaret Crow, MD

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Field(s) of Interest: Autoimmune Disease; Immunoregulation

Research Title: Regulation of the Immune Response in Autoimmune Disease

Project Description: The laboratory studies the human immune system in healthy individuals and patients with systemic lupus erythematosus to better understand the triggers and mediators of autoimmunity and inflammation in that disease. Students are welcome to participate in ongoing laboratory projects, or initiate

their own projects, that use cell culture, flow cytometry, real-time PCR, cell transfection, protein analysis, and other approaches to study mechanisms of autoimmunity.

Preferred Background/ Experience: None, although laboratory experience helps.

Susanna Cunningham-Rundles, PhD

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Field of Interest: Cellular Immunology, host response to pathogens, development of immune response, cytokine regulation

Research Titles:

1. Role of beta glucans in immune response and hematopoiesis
2. Development of Neonatal Immune Response

Project Descriptions:

Role of beta glucans in immune response and hematopoiesis: The overall objective of our studies in collaboration with the MSKCC Research Center for Botanical Immunomodulators (NIH P50) is to identify botanicals with potential bioactivity for enhancement of immune function and reconstitution of hematopoietic and immune function after cancer chemotherapy, and to investigate botanicals that have adjuvant activity for cancer immunotherapy.

Development of neonatal immune response: The increased susceptibility of neonates to infections stems from the immaturity of the immune system at birth. Hematopoiesis and host defense in the neonate are developmentally immature. Studies focus on the role of microbes both commensals and potential pathogens on neonatal immune response in the regulation of proinflammatory response.

Students' Role in the Project: Student will participate in all aspects of the studies including experimental design and hypothesis testing and will learn relevant technology.

Preferred Background/Experience: Knowledge of basic laboratory skills and sterile technique.

Jessica G. Davis, MD

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Field (s) of Interest: Medical Genetics

Research Title: Student can work on one of two projects, these include study made in adolescent patients with Marfan syndrome and or parental attitudes re: newborn screening.

Project Description: Both studies will involve the use of questionnaires. We are in the process of developing a questionnaire for IRB approval re: Newborn screening. The aim is to determine what information pregnant

women and their partners have about newborn screening and the NYS Screening program in order to determine their needs as well as to develop an educational program about this subject in face of the expanded test panel. The educational program will be aimed at patients but will include a professional component. We plan to develop a questionnaire for adolescents with Marfan syndrome to learn more about their views on their asthenia appearance and life activities.

Students' Role in Project: Students can help develop and modify the questionnaires. Student will learn interview techniques.

Preferred background/Experience: None

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Field(s) of Interest: Hematology, disorders of iron metabolism, anemia of inflammation, beta-thalassemia.

Research Title: Investigating the role of cytokines and hepcidin in a mouse model of anemia of inflammation

Project Description: Anemia of inflammation (AI) is the second most common form of anemia, affecting patients with chronic illnesses, such as infections, autoimmune diseases, or cancer. The aim of the project is to better characterize the complex pattern of inflammatory cytokines that is responsible for AI, with the purpose of identifying new therapeutic targets for this condition. It has already been shown that interleukin-6 is increased in AI, activating the production of the iron regulatory hormone hepcidin in the liver. Through hepcidin, IL-6 ultimately affects iron metabolism reducing the availability of iron for erythropoiesis, and thus generating the anemia. However, together with IL-6, other cytokines (e.g. IFN- γ , TNF- α) have been shown to alter iron metabolism and erythropoiesis, with mechanisms that still need to be fully elucidated.

Students' Role in the Project: Student(s) will participate in all aspect of the above-described research, learning numerous techniques. These include: tissue samples collection, tissue iron analysis, flow-cytometry, ELISA, RNA extraction and analysis, quantitative PCR. Students will gain experience in many of the following experimental approaches:

1. Use of mouse models lacking the expression of hepcidin (Hamp KO) or specific cytokines (IL-6 KO, IFN- γ KO, and TNF- α KO), and generation of double knockout (e.g. IL-6/Hamp KO).
2. Induction of AI by injection of heat-killed *Brucella abortus* antigen (HKBA).
3. Study of iron metabolism by expression profile analysis of iron-related genes, and comparison of results to tissue and serum iron levels in HKBA-treated and control mice.
4. Study of erythropoiesis with the goal of elucidating the mechanisms responsible for anemia in mice.
5. Inactivation of specific cytokines by treatment with cytokine inhibitors to selectively analyze the effect of the numerous cytokines involved in AI.

Preferred Background/Experience: Basic knowledge of molecular biology and laboratory techniques. Literature review skills. Interest and motivation are required.

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Field(s) of Interest: Developmental and Evolutionary Biology

Research Title: Evolutionary conservation of notochord gene expression in the ascidian, *Ciona intestinalis*.

Project Description: Our lab is interested in identifying the components of the gene regulatory networks underlying notochord development and evolution. This particular project consists in determining whether genes that are expressed in the vertebrate notochord are also expressed in the notochord of larvae of the sea squirt, *Ciona*. The ultimate goal of these experiments is to establish how many of the genes found in the vertebrate notochord are also present in the *Ciona* notochord, the most primitive notochord experimentally available. A better understanding of the nature and characteristics of the minimum complement of genes necessary to build a functional notochord is crucial for understanding how the vertebrate notochord develops and, in turn, controls proper development of floor plate, liver, pancreas, and, ultimately, the correct formation of the vertebral column.

Students' Role in the Project: The student would be synthesizing RNA probes to be used for whole-mount *in situ* hybridization experiments on *in vitro* fertilized *Ciona* embryos.

Preferred background/Experience: Good will and some basic knowledge of developmental and molecular biology

Diane Felsen, PhD and Dix P Poppas, MD

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Field(s) of Interest: Uretal obstruction- renal histopathology and function

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.

Maura D. Frank, MD
Department of Pediatrics
The Weill Medical College
Helmsley Tower Room 508
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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, student will learn EndNote

Cori Green, MD, MS

General Academic Pediatrics
Department of Pediatrics, Weill-Cornell
Associate Director of Pediatric Undergraduate Medical Education
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Field(s) of interest: Access to care, Pediatric mental health, Maternal literacy, Maternal depression, Medical Education.

Current Project Title: Addressing the Not-So-New Morbidity within Pediatric Medical Education

Principal Investigators: Dr. Susan Bostwick and Dr. Cori Green

Project Description: We are conducting a needs assessment of pediatric residents and program directors to assess their current training in pediatric mental health issues. A survey is being conducted of all Pediatric Program Directors and focus groups of residents are being run. This project will conclude with the creation of an educational intervention to better train pediatric residents to address mental health issues within the primary care setting. This intervention will be tested in further projects.

Students' Role in the Projects:

Students will learn how to create and help implement educational interventions. Students will be involved in creation of assessment tools, recruitment of resident subjects, analysis of data, and abstract writing.

Preferred Experience: None required

Daniel W. Green, MS, MD

Hospital for Special Surgery
535 East 70th Street, New York, NY 10021
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greendw@hss.edu

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

Barry Kosofsky, MD, PhD

Department of Pediatrics, Division of Neurology
The Weill Medical College of Cornell University
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Research Title: Alterations in Brain Development following Prenatal Exposure to Cocaine

Project Description: We have a multidisciplinary basic research program in mice to study molecular, neuroanatomic, and behavioral alterations induced in mouse brain development following prenatal exposure to cocaine.

Students' role in the project: Basic Research Skills, including molecular biology, neuroanatomy, and behavioral analyses.

Preferred Background/ Experience: Bench lab experience preferred (especially molecular biology or neuroanatomy).

Alfred N. Krauss, MD

Division of Neonatology
Department of Pediatrics
Weill Medical College
212-746-3530
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Research Title: Neonatal Lung Function

Preferred Background/ Experience: None requested

Nicole Kucine, MD

Pediatric Hematology/Oncology
Department of Pediatrics
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Field(s) of Interest: Sickle Cell Disease, Anemia, Coagulation and Bleeding Disorders, Myeloproliferative disorders, Leukemia, Bone Marrow Failure/Abnormal Hematopoiesis

Potential Research Topics: I do not have currently established projects for students, however I have some ideas for survey-based projects that could be of interest to students whom I will mentor

1. Pediatrician assessment of menorrhagia – screening if and how pediatricians assess their female adolescent patients for menorrhagia, and their referral practices, with possible educational intervention after

2. Pediatric care providers and pain management – assessing boundaries in our institution to providing pain management for pediatric patients; possibly working with anesthesia to develop educational interventions
3. Thrombosis in Pediatric Inpatients – we are currently submitting an IRB for a retrospective chart review to look at incidence of thrombosis in our pediatric inpatients and to identify the most common risk factors in our population and possibly identify new risk factors for thrombosis in hospitalized children.

Juhi Kumar, MD, MPH

Pediatric Nephrology
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Weill Cornell Medical College
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juk2013@med.cornell.edu

Field(s) of Interest: Pediatric renal disease, vitamin D, cardiovascular outcomes of chronic kidney disease, kidney transport, Focal segmental glomerulosclerosis

Research Projects:

1. Vitamin D in children with chronic kidney disease (CKD): prevalence of deficiency and clinical correlates: This is a NIH funded ancillary study to the ongoing multicenter, prospective cohort study of children with CKD (CKiD). My study aims to define the prevalence and correlates of vitamin D deficiency. It will also prospectively evaluate the role of Vitamin D deficiency in growth failure, progression of CKD and cardiovascular outcomes.
2. Vitamin D supplementation in children with chronic kidney disease: Current guidelines for vitamin D supplementation in children with CKD are not evidence based and are extrapolated from adults. This study aims to evaluate the adequacy of the current KDOQI recommendations for treating vitamin D deficiency in these children.
3. Kidney transplant outcomes: This proposal aims to evaluate the effects of using a steroid free immunosuppression protocol on outcomes such as growth, allograft rejection and cardiovascular profile.
4. Focal segmental glomerulosclerosis (FSGS): FSGS is a devastating glomerulopathy that leads to end stage renal disease. It also tends to recur in 30-50% of patients after kidney transplantation, eventually leading to allograft loss. We have used Rituximab as a rescue therapy in our patients with recurrent FSGS with partial remission of proteinuria. We are collaborating with other centers in the US to evaluate the practice patterns for Rituximab use in recurrent FSGS.

Thomas J.A. Lehman, MD

Hospital for Special Surgery
Pediatric Rheumatology
535 E. 70th St.
212-606-1158
lehman@hss.edu

Field(s) of Interest: Pediatric rheumatic diseases

Project Description: Students have been involved in a variety of clinical research projects over the past years.

Students' Role in the Project: Chart review, data tabulation. We also teach basic aspects of clinical pediatric rheumatology/history.

Preferred Background/ Experience: None requested

David C. Lyden, MD, PhD

Children's Blood Foundation Labs, Pediatrics
515 East 71st ST, S726
212-746-3941
dcl2001@med.cornell.edu

Field(s) of Interest: Angiogenesis

Research Title: The role of bone marrow precursors in tumor angiogenesis and regeneration.

Project Description: Determine the role of VEGFR1 myeloid and VEGFR2 endothelial stem and progenitor cells in the formation of new vessels in tumor and Metastatic models and in wound healing studies such as burns and myocardial infarction.

Students' Role in the Project: The student will be responsible for leading one of several aspects in the study of neoangiogenesis.

Preferred Background/ Experience: None requested

Catharine McGuinn, MD

Pediatric Hematology/Oncology
Department of Pediatrics,
Weill-Cornell Medical College
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cam9061@med.cornell.edu

Field(s) of Interest: Benign Hematology, Thrombosis, Coagulation, Thrombocytopenia

Research Title: Quality Improvement/ Outcomes in Pediatric Hematology Population

Description of Project(s): To be decided in conjunction with research team. Prospective survey or retrospective chart review format. Ideas include looking at sickle cell pain management pathway, anti-coagulation adherence, etc.

Students' Role in the Project: Flexible. Would be developed as project expanded

Preferred Background/ Experience: None requested Enthusiasm is important.

W Beau Mitchell, MD

Pediatric Hematology/Oncology
Department of Pediatrics,
Weill-Cornell Medical College
Laboratory Address: New York Blood Center Platelet Biology
212-570-3280
E-mail Address: bmittell@nybloodcenter.org

Fields of Interest: Clinical and laboratory aspects of bleeding, clotting, and platelet biology

Research Project 1: Bleeding complications in patients with connective tissue disorders.

Description of Project: We have seen a series of patients with connective tissue disorders who present with bleeding. This project will be a retrospective chart review to compile and analyze the bleeding characteristics of this population. Given the large sample size this project should provide unique information about bleeding in connective tissue disorders.

Students' Role in the Project: Chart review. Assistance with IRB process, scientific writing.

Preferred Background/ Experience: None

Research Project 2: A novel mutation resulting in an unusual type 2A von Willebrand Disease

Description of Project: We have identified a family with a novel mutation causing severe type 2A VWD. The mutation completely eliminates some aspects of von Willebrand factor function, but leaves others intact. Review of these patients' laboratory and clinical findings in concert with what is known of the VWF structure will likely reveal novel information about VWF structure and function.

Students' Role in the Project: Chart review. Assist with IRB submission. Review of literature. Scientific writing. Work with 3D structure imaging software.

Preferred Background/ Experience: None, although it would help if adept at computers.

Research Project 3: Morphology of platelets during thrombopoiesis

Description of Project: We are producing platelets from stem cells derived from umbilical cord blood cells. One critical question is whether the produced platelets are "normal". To determine this we are analyzing the platelets in several different ways. One of these ways is by morphology. We use both light and fluorescence microscopy to study the platelets as they are being produced in culture. This project will establish a baseline morphology by which to judge the effects of changes in the production techniques.

Students' Role in the Project: This will be primarily a visual cataloguing of microscopy images. The student will learn to use our imaging software and microscopes.

Preferred Background/ Experience: None, but will have to take the NYBC volunteer orientation.

Anne Moscona, MD

Matteo Porotto, PhD

Pediatrics and Microbiology/Immunology

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Field(s) of Interest: Infectious diseases – Virology (specifically respiratory viruses and viral agents of bioterrorism).

Research Title: Molecular pathogenesis of human paramyxoviruses: parainfluenza virus type 3, and Hendra virus.

Project Description(s) The laboratory's research centers on molecular pathogenesis of human paramyxoviruses: parainfluenza virus type 3, and also the emerging pathogen Hendra virus. Parainfluenza virus is an important cause of lower respiratory tract infections in children, including croup and bronchiolitis, and there are currently no vaccines or antiviral agents for these diseases. Hendra virus is a highly fatal

paramyxovirus is a potential agent of bioterrorism. We are interested in how viruses enter cells by fusing with the cells' envelope, and in how we might interfere with entry.

Molecular basis for human parainfluenza virus 3 infection. This laboratory has identified the role of the parainfluenza virus receptor-binding protein hemagglutinin-neuraminidase (HN) in the virus-induced fusion process whereby all paramyxoviruses enter host cells. HN's receptor binding is the critical first step towards HN's role in fusion promotion, and leads to activating or "triggering" of the fusion protein (F) to mediate fusion. Our parainfluenza projects focus on the molecular mechanisms for HN in the viral life cycle and in lung pathogenesis. Ongoing studies have led to novel antiviral strategies that are being tested, and to understanding mechanisms of resistance to antivirals.

Role of human parainfluenza virus 3 hemagglutinin-neuraminidase in immunopathogenesis of lung disease. The role of HN in pathogenesis of lung disease in vivo is being studied in a cotton rat model. Our group showed that mutations in HN that alter HN-receptor interaction (but do not affect replication) lead to dramatic differences in the disease in the cotton rat lung. We are determining whether HN's receptor affinity, its receptor-cleaving, or its F-triggering activities determine its virulence in the lung. We also are interested in identifying which immune response is altered by HN mutations that lead to enhanced disease.

Triggering of fusion by Hendra virus F protein: the role of G: In the Hendra virus projects, we apply our strategies for the study of paramyxovirus entry and fusion to an emerging and potentially fatal paramyxovirus that is viewed as a potential bioterrorism agent. For Hendra virus, the receptor binding protein (G) is required in order for the F protein to mediate fusion. Hendra G binding to receptor, like parainfluenza virus HN binding to sialic acid, "triggers" F protein to mediate fusion. The study of the mechanism of triggering/activation of F protein in Hendra virus should lead to strategies for interfering with this key step in viral entry.

Triggering Hendra F to fuse: peptides to interfere with fusion: Taking advantage of our finding that peptides that correspond to regions of HPIV3 F are superior to those derived from Hendra F at inhibiting Hendra fusion, we will determine whether inhibitory F-peptides bind to Hendra F, as would be predicted if the peptides are preventing the formation of the 6-helix bundle (6HB) believed to be required for fusion, or if inhibitory F-peptides bind to G and interfere with G triggering of F.

Innovative approaches to developing therapeutic and diagnostic reagents for Hendra virus. Insertion of F into the target cell membrane leads to fusion of the viral envelope with the plasma membrane and release of the nucleocapsid into the cytoplasm. Efficiency of F-triggering by G influences the extent of fusion, and provides a range of strategies for preventing viral entry. Based upon our studies of the paramyxovirus F-triggering process, peptides corresponding to heptad repeat regions of F can be used to prevent F from reaching its fusion-active state. It may also be possible to induce F to trigger "prematurely", thus becoming incapacitated before it reaches its target. Finally, molecules that inhibit receptor binding may prevent receptor interaction and all downstream events. Targeting several stages of the entry process simultaneously may provide synergism.

Students' Role in the Project:

Virology, molecular biology, biochemistry, structural analysis, immunology

Preferred Background/Experience.

Some lab experience preferred but not required. Interest and motivation are required.

Christine M. Salvatore, MD

Division of Infectious Disease

Department of Pediatrics, Weill-Cornell

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Field(s) of Interest: Pediatric infectious disease

Research project 1: Serologic Response To High Dose Hepatitis B (HBV) Vaccine In HIV Infected Children

Project Description: The project is divided in 2 parts. Part 1) Is a retrospective chart review of all children/adolescents followed at our HIV Clinic to evaluate the response to the initial HBV vaccine. For each patient the following information will be collected: date of birth, age, gender, CDC clinical stage, nadir CD4 count, age at different doses of HBV and CD4 count at time of each dose if available, antiretroviral treatment history and in particular if on highly active antiretroviral therapy (HAART) at time of vaccination. Part 2) Is a prospective evaluation of antibody response after re-vaccination with a high dose of HBV vaccine. All subjects will have the HBV titers checked at baseline (week 0); if identified as “non-immune” the subject will receive a new series of HBV vaccine. Again CD4 count and percentage, CD19 count and percentage and viral load will be recorded and antiretroviral regimen will be reviewed.

At Week 24 from the vaccine booster the HBV titers and/or “immune”/“non-immune” status will again be rechecked in all subjects receiving the new dose to evaluate immune response.

The purpose of the study is to identify the possible risk factors that predispose HIV positive children to have a reduced immune response to HBV vaccine and to evaluate if administering a higher dose would improve the immune response

Students’ Role in the Project: Learn to review and collect the most important data from a medical history. Help creating a database, analyzing the data and eventually submitting an abstract to a national meeting.

Preferred Background/ Experience: None in particular. A lot of enthusiasm and willingness to spend some time looking into the charts and possibly interacting with a particular group of children with special needs.

Research project 2: Infectious Complications After Spine Surgery in Children

Project Description: Retrospective chart review. The medical records of pediatric patients who required from 2000 to 2010 a surgical spine fusion will retrospectively be reviewed. The medical records of pediatric patients who developed infections and required irrigation and debridement (I&D) will retrospectively be reviewed in detail. Among the data that will be collected are: underlying disease, the time of diagnosis of the infection from the surgery, antibiotics at time of surgery, organisms isolated, antibiotic therapy and length of therapy, outcome. The purpose of the study is to identify possible risks factors and most frequent microorganisms involved so to recommend the most appropriate prophylactic antibiotic regimen at time of the surgery.

Students’ Role in the Project: Learn to review and collect the most important data from a medical history. Help creating a database, analyzing the data and eventually submitting an abstract to a national meeting.

Preferred Background/ Experience: None in particular. A lot of enthusiasm and willing to spend some time looking into the charts

Snezana Nena Osorio,MD

General Academic Pediatrics

Department of Pediatrics, Weill-Cornell

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Field(s) of Interest: Obesity and Medical Communication skills

Title of Research Project: Medical Communication Skills and Exploratory cancer project

Project Descriptions: The project includes goals for empirical evaluation of the family-centered care program. There are two projects on Medical Communication Skills. A Third project is focused on the natural history of pre-malignancy and the metastatic niche.

The first project will assess parent satisfaction with patient care before and after the introduction of Family-Centered Rounds. Parent perceptions of clinical care will be assessed among all families of hospitalized pediatric service patients upon admission. Time series analyses will be used to evaluate changes in patient satisfaction in response to the new strategy for bedside rounds.

The second project is a study to evaluate the impact of Family Centered Rounds on medical communications skills among pediatric residents. The study was designed with the directors of pediatric resident training at KCCH to introduce standardized scales to assess resident communication skills by parents, nurses, and supervising physicians. I will use the existing data from education files without identifiers from two time periods to assess the utility of a new clinical program of family-centered rounds. I am also working on developing communication curriculum for pediatric residents.

The third project is collaborative with Dr. David Lyden. This is an investigation of profiles of angiogenic and metastatic parameters in children with and without cancer. Emerging evidence suggests that bone marrow-derived , hematopoietic stem progenitor cells (HPC's) and endothelial progenitor cells (EPC's) contribute to tissue vascularization during both embryonic and postnatal physiological processes. Identification of cellular mediators and tissue-specific chemokines, which facilitate selective recruitment of bone marrow-derived stem and progenitor cells to specific organs, may provide insight into the mechanisms by which the pre-metastatic niche develops in patients with pediatric malignancies. In this study, we seek to compare peripheral levels of circulating chemokines and progenitor cells in healthy pediatric controls to those of age-matched patients with pediatric malignancies. My role in this project involves recruiting and profiling blood samples from children who do not have cancer. Obtaining this information will be crucial in defining norms for the measures to be gathered among cancer patients. We will analyze blood samples gathered as "extra" blood when children already are undergoing blood testing. From these samples, we will measure plasma levels of growth factor and chemokine profile. This profile includes VEGF (vascular endothelial growth factor), PlGF (Placental derived growth factor), FGF (fibroblast derived growth factor), and SDF-1 (stromal derived growth factor). We have obtained IRB approval for this project, which also is approved by the WCMC CTSC.

I am also expanding my research to study angiogenesis and vasculogenesis among children who are overweight, as it is well known that the population of obese pediatric patients faces a future that includes elevated risk for cancers and cardiovascular problems. Research in adults has demonstrated that angiogenic factors are elevated in overweight and obese individuals. Furthermore, previous research demonstrated that coupling of adipogenesis and angiogenesis is essential for differentiation of adipocytes in obesity and that vascular growth factor (VEGF) is a key mediator. We will explore what genetic variants are responsible for this effect and possible predict which subtypes of obesity are more prone to cancer. This research can be enhanced by studying other family members with obesity and malignancies to determine the genetic factors involved in the pre-metastatic setting.

Students' Role in the Project: 1. Medical Communication skills and patient satisfaction projects will provide the student with opportunities to learn how to develop questionnaire as an assessment tool, IRB process, how to analyze data. The third project is now centering on obesity-data collection, data entry, data analysis in collaboration with Dr. Lyden's lab.

Preferred Background/ Experience: None

Jeffrey Perlman, MD
Department of Pediatrics, Division of Neonatology

Weill Medical College
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212-746-3530

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

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

Project Description: Evaluate the influence of compression rates on the depth of compressions including decay over time as well as the potential influence of surface location and gender.

Students' Role in the Project: Assist in the evaluations of data following a session and help to develop strategies to enhance CPR in the neonatal period

Preferred Background/ Experience: None

Cathleen L. Raggio, MD
Hospital for Special Surgery
212-606-1339
raggioc@hss.edu

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

Stefano Rivella, PhD
Pediatric-Hematology/Oncology
515 East 71st Street
212-746-4941
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Research Title:

- 1) Development of new strategies to cure beta-thalassemia
- 2) The role of iron in cancer and anemia of inflammation

Project(s) Description:

Gene therapy of beta-thalassemia
Abnormal erythropoiesis and iron metabolism in beta-thalassemia
The role of iron metabolism in cancer and anemia of inflammation

The projects include:

- Design and generation of retro or lentiviral vector harboring genes involved in abnormal hematopoiesis and iron disorders
- Design and generation of retro or lentiviral vector with genomic elements to regulate gene expression
- Test of the system *in vitro*
- Test of the system *in vivo* (infection of hematopoietic stem cells, embryonic stem cells, bone marrow transplantation and/or generation of transgenic animals)
- Generation of new tumor models and their correlation with inflammation, anemia and tumor progression

Students' Role in the Project:

Microbiology: bacteria transformation, plasmid DNA preparation

Molecular Biology: generation of recombinant DNA vectors, Southern blot analysis

Tissue Culture: maintenance and expansion of primary and secondary tissue culture cell lines; retroviral production, viral transduction

Mouse handling: analysis of hematopoietic parameters (CBC), facs, iron, gene and protein analyses, gene transfer in the bone marrow and liver, tumor induction and analysis

Preferred Background/ Experience: Basic and good knowledge of molecular biology and laboratory techniques; good skills in reviewing and summarizing scientific literature. The subjects that the candidate will review include: retrovirus, RNA interference, tetracycline controlled gene expression system, mouse embryonic stem cells. Good organization skills; computer literate.

Heidi Stuhlmann, PhD

Developmental Biology

Department of Cell & Developmental Biology

Department of Pediatrics (secondary)

212-746-6156

hes2011@med.cornell.edu

Research Title: Vascular Endothelium – A Life Line During Development And In The Adult

Development of a functional circulatory system in the vertebrate embryo is crucial for delivery of nutrients and oxygen to the embryo. Defects in the development of blood vessels result in death before birth or in congenital cardiovascular abnormalities. During physiological angiogenesis in the adult organism such as wound healing and during pregnancy, endothelial cells are stimulated to form new vessels, a process termed neo-angiogenesis. Similarly, during pathological processes such as ischemia, myocardial infarct, repair of injured tissue and tumor growth, endothelial cells become activated to sprout, migrate, and undergo remodeling. Thus, endothelial cells constitute a dynamic system that changes in response to environmental stimuli. Research in my laboratory focuses on understanding the molecular mechanisms that orchestrate these processes, using the mouse as a model system.

In a genetic screen for early developmental genes, we identified two novel genes that play important roles in vascular development and homeostasis. One of these, Vascular endothelial zinc finger 1 (Vezf1) encodes an endothelial transcription factor that plays essential, dosage-dependent roles in vascular system development. Vezf1KO embryos die at midgestation due to vascular remodeling defects and hemorrhaging. Unexpectedly, we found that heterozygous embryos display lymphatic vessel abnormalities that are reminiscent of the human congenital malformation syndrome, nuchal edema. We are presently collaborating with clinicians in the Fetal-Maternal Medicine Division at New York Presbyterian/Weill Cornell Medical College to investigate if human fetuses with nuchal edemas carry mutations in the VEZF1 gene.

A second gene identified in our screen, EGF-like domain 7 (Egfl7), is an early embryonic marker for endothelial cells and their progenitors. EGFL7 is a unique angiogenic factor: it is secreted specifically by endothelial cells, acts as a chemoattractant, and binds to the extracellular matrix. Importantly, we showed that EGFL7 interacts with and antagonizes endothelial Notch, a key vascular signaling pathway component. Overexpression or knockdown of Egfl7 in mouse embryonic stem cells, primary endothelial cells, mouse embryos and the post-natal retina results in defects in vascular sprouting, proliferation, and migration. Our ongoing studies indicate that Egfl7 expression is induced by hypoxia and Vascular endothelial growth factor, VEGF, and that it may play important roles in physiological angiogenesis during pregnancy. Specifically, we are examining its possible role in implantation and placentation, and how it may be involved in the development of preeclampsia.

Students' 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. The laboratory techniques could involve: Extraction of protein from tissue sample; protein gel electrophoresis; Western blot analysis Extraction of DNA from tissue samples; PCR amplification, DNA gel electrophoresis, preparation of sample for DNA sequence analysis
Dissection of mouse embryos; embedding and sectioning, immunostaining/immunofluorescence analysis

Preferred Background/ Experience: Basic lab skills, knowledge in molecular and developmental biology, strong interest in research

Sima Toussi, MD

Division of Infectious Disease
Department of Pediatrics, Weill-Cornell
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Field(s) of Interest: Pediatric Infectious Diseases

Research Title 1: *Clostridium difficile* colonization in infants and young children

Project Description: *Clostridium difficile* can cause diarrhea and severe illness in children and adults. *C. difficile* infection is likely under-recognized in the young pediatric population. Infants and young children are often not evaluated for *C. difficile* infection because it is thought to colonize their gut. However, it is unknown how commonly it colonizes the stool of young children. The rates published are extremely wide ranging and reported as being anywhere from 10-100% during the first year of life. The objective of this study is to describe the prevalence of *C. difficile* colonization in infants and young children and to assess possible risk factors.

Students' Role in the Project: The student's role will be the recruitment of study subjects in the inpatient and outpatient settings. This would involve learning how to consent and enroll patients with one of the co-investigator's and then eventually doing this independently. Part of the student's role will also be entry of the information into the database.

Preferred Background/ Experience: Interest in participating in clinical 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: Detection of Pediatric Delirium: Validation of a Rapid, Observational Assessment Tool

Project Description: Delirium in critically ill children represents acute brain dysfunction, with short- and long-term health implications. There is an emerging literature suggesting that this is a common, serious, and under-diagnosed problem in seriously ill children. Evidence-based assessments of outcomes and interventions for pediatric delirium are lacking, largely due to the absence of a simple and reliable screening tool.

My research partners and I have developed a novel screening tool for the detection of delirium in this population, and have completed a pilot study confirming its feasibility, and suggesting a prevalence of >25% in

our subjects. Once validated, this tool will allow for rapid and accurate identification of delirious children, facilitate appropriate interventions, and may improve long-term functional outcomes.

Students' Role in the Project: Students will have the opportunity to join a multidisciplinary team engaged in several projects regarding pediatric critical illness and its implications on brain function. 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.

Susan J. Vannucci, PhD

Neonatology
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Field(s) of Interest: Developmental Brain Injury/Hypoxic Ischemic Encephalopathy/Hypoglycemia/Neonatal Seizures

Research Title: Hypoxia-Ischemia in the Immature Brain

Project Description: Hypoxic-Ischemic (HI) brain damage resulting from asphyxia in the neonatal period is a major cause of death of premature and term infants and responsible for permanent neurologic handicap in the survivors. We have developed an animal model to study this injury in the newborn rat and utilize this model in both preterm and term-equivalent rodents. HIE is a major cause of seizures yet there is continued debate as to whether these seizures contribute to or merely reflect the severity of brain damage. We have recently extended our HIE model to include the detection of behavioral and electrographic seizures to test several of these relevant questions. A second project using this model will continue to look at the role of mast cells in promoting inflammation and cell death following HI in the immature brain.

Students' Role in the Project: The student can assist in performing the surgeries to induce the hypoxia-ischemia, as well as in the recording of the video EEG. It is important that the student is comfortable working with animals and in survival surgeries as well as in euthanasia of the animals to study the effects on brain development and injury. In addition, the student could participate in the study of the role of mast cells in mediating the inflammatory cascade as well as potentially contributing to the tissue repair.

Maria Vogiatzi, MD

Metabolic Bone Disease
Pediatric Endocrinology
Department of Pediatrics
212-746-3462 or 212-746-3486
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Research Topics:

Studies of osteoporosis in thalassemia: Thalassemia is a congenital hemolytic anemia that is associated with high rates of osteoporosis. The etiology of osteoporosis in this disease is poorly understood. Our project examines the etiology of bone disease in thalassemia, by doing both clinical and animal studies. We use a mouse model of thalassemia to determine the effect of certain medical interventions (such as PTH and bisphosphonates). The methodology that is used includes imaging, such as micro-CT, histology for assessment of bone remodeling and other basic science techniques.

Effect of erythropoiesis on mesenchymal differentiation: In this project, we use the thalassemia mouse as a model to study the effect of hematopoiesis on bone remodeling. Our results so far support the hypothesis that hematopoietic progenitors affect mesenchymal differentiation leading to decreased osteogenesis. In addition, we have identified that this process involves erythropoietin (EPO). Cell cultures and co cultures, other basic science techniques and other mice models are used to examine the interactions of EPO and autocrine/paracrine factors on bone remodeling.

The role of iron in the development of osteoporosis: This project involves studies in iron overloaded mice, and the effect of iron overload on bone remodeling. The methodology that is used includes imaging, such as micro-CT, and histology for assessment of bone remodeling. Cell cultures and other basic science techniques are used to determine the role of iron on mineralization and the osteoclast.

Inflammatory response to iron excess: Iron excess has been thought to lead to increased oxidative stress. Our animal data support the presence of ROS and an inflammatory response. Our lab is in the process of delineating the molecular mechanism by which iron excess triggers an inflammatory cascade. This is done by performing animal experiments using techniques such as flow cytometry.

Studies of diabetes in iron overload and thalassemia: Iron excess is associated with a number of endocrinopathies including diabetes. This project determines the development of insulin resistance and diabetes in our murine diabetes model as well the role of oxidative stress and inflammation in this process. In addition, we are conducting clinical studies that examine glucose abnormalities in iron overloaded patients with thalassemia by using continuous glucose monitoring by glucose sensors.

Studies of vitamin D supplementation on calcium excretion in thalassemia. This project studies the effect of various vitamin D doses on serum vitamin D concentrations and calcium excretion in regularly transfused patients with thalassemia. The study is supported by Cooley's Anemia Foundation grant.

Students' Role in the Projects: The student can be exposed to imaging techniques such as microCT, bone histology and dynamic histomorphometry for assessment of bone remodeling and basic science techniques including cell cultures and flow cytometry. The student will also have the opportunity to participate in clinical research in the area of diabetes and osteoporosis.

Preferred Background/ Experience: The student must be familiar with basic laboratory procedures. Biology majors preferred

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Field(s) of Interest: Development: infants, children, mother-child interaction

Research Title: Infant feeding skills, parental feeding practices, and growth disorders

Project Description: We will evaluate the effectiveness of an intervention delivered to the parents of infants from birth to 6 months of age. The study will include 75 families in a standard care group and 75 in an intervention group. The first group (standard care group) will receive routine well-child care on the schedule recommended by the American Academy of Pediatrics. The second (intervention group) will receive routine well-child care plus an intervention focused on teaching parents about age-appropriate infant nutrition and infant feeding skills. Group assignment will be made on the basis of historical cohort membership: the standard care group will be enrolled first and the intervention group enrolled approximately 3 months later. Subjects in both groups will be followed for 6 months. Outcome measures include parent feeding practices, infant diet, infant feeding skills, and infant overweight. Measures will address cultural and familial biases in favor of overweight children.

The following hypotheses will be tested:

- Compared to parents in the standard care group, more parents in the intervention group will report feeding only single-grain infant cereal and Stage 1 fruits and vegetables to their 6 month-olds. In contrast, more parents in the standard care group will report feeding Stage 2 and 3 foods, snacks, juice, and table foods.
- At 6 months, the rate of infant weight for length above the 75th percentile will be higher in the standard care versus intervention group.
- Parents in the intervention group will be more likely to report receiving accurate information about infant feeding and nutrition from their pediatricians than parents in the standard care group.
- More infants in the intervention than standard care group will use a cup for drinking and fewer will have been fed solid food in a baby bottle.

Student's role in the project: Students will be trained to conduct standardized interviews, to gather anthropometric data on adults and children, and to monitor delivery of the intervention, according to the research protocol.

Preferred Background/ Experience: Skills in interacting with adults from varied cultural backgrounds, interest in infant growth and development and primary care intervention models.

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Field(s) of Interest: Cystic fibrosis / host defense in lung / gene therapy

Research Titles:

Lung antigen presenting cells in cystic fibrosis

Respiratory syncytial virus vaccine using capsid-modified adenovirus vectors

Project Descriptions:

1. Cystic fibrosis lung disease is characterized by exaggerated inflammation and increased susceptibility to infections. Although the CFTR protein is primarily thought to be expressed by epithelial cells we and others have studied the expression of CFTR in non-epithelial cells, in particular antigen presenting cells in the lung. This project studies the abnormalities of lung dendritic cells derived from CF knock-out mice. Our data so far indicates that abnormal CFTR expression lung macrophages and dendritic cells is related to abnormalities in innate immune responses. These findings are important in understanding lung disease in CF and also to identify new targets for therapy of this severe disease.

2. Infections with RSV are one of the major causes for viral lower respiratory tract illness, especially in young children. Our laboratory has been working on the development of genetic vaccines for pulmonary pathogens. This project aims to analyze the immunological properties of a novel anti-RSV vaccine using a capsid-modified adenovirus vector. Protection against RSV could be achieved with an efficient vaccination strategy inducing neutralizing humoral immunity as well as a Th1-dominant cellular response. Adenovirus gene transfer vectors can be used to evoke robust systemic and mucosal immunity against an immunogen expressed as a transgene and Ad functions as a potent adjuvants. The Ad modifications include the addition of a RGD motif to the fiber knob, a modification known to enhance infection of antigen presenting cells and to increase Th1-type immune response, as well as the addition of RSV epitopes into the Ad capsid. These modified vectors will be assessed to induce immunity and protection against RSV in adult and neonatal mouse models. The study will evaluate if a modified Ad vector expressing the RSV F protein engineered to increase activation and infectivity of antigen presenting cells could be useful as a RSV vaccine.

Students' Role in the Project: Design of new and continuation of the present experiments. Student will be involved in cell culture studies and flow cytometry analysis of lung dendritic cells (project 1) and adenovirus vector construction and immunological analyses (project 2).

PROGRAM MATCHING

CLASS OF 2013 PEDIATRIC RESIDENCY MATCHES

NAME	PROGRAM	INSTITUTION	CITY, STATE
Kaitlin Greene	Child Neurology	UC San Francisco-CA	San Francisco, CA
Kelly Harris	Pediatrics	Emory Univ SOM-GA	Atlanta, GA
Julie Leviter	Pediatrics	Yale-New Haven Hosp-CT	New Haven, CT
Naomi Lewin	Child Neurology	Children's Hospital-Philadelphia-PA	Philadelphia, PA
Lillian Lewis	Pediatrics	Cincinnati Children's Hosp MC-OH	Cincinnati, OH
Jennifer Salant	Pediatrics	Children's Hospital-Philadelphia-PA	Philadelphia, PA
Miyuki Tanino	Medicine-Pediatrics	Albany Medical Center-NY	Albany, NY
Hanano Watanabe	Pediatrics	NYP Hosp-Weill Cornell Med Ctr-NY	New York, NY
Peng Wu	Pediatrics	UC San Francisco-CA	San Francisco, CA

DEPARTMENT OF PEDIATRICS GRADUATE MEDICAL EDUCATION CLASS OF 2013

Niti Sardana Agarwal Allergy/Immunology – NYP/Columbia
Ratna Behal Hematology/Oncology – MSKCC/Weill Cornell
Edmund Burke Cardiology – Children's Hospital of Philadelphia
Saskia Gex Chief Resident – NYP-Weill Cornell
Allison Hampton General Pediatrics – Kaiser Permanente, CA
Jacqueline Cooperman Jossen Gastroenterology – Mt. Sinai
Kimberly Friedman Kahne – Emergency Medicine – Mt. Sinai
Ryan Kearney Emergency Medicine – Seattle Children's
Ji Won Kim Emergency Medicine – Yale
Melissa Kivitz-Krantzow Emergency Medicine – Long Island Jewish
Sara Kopple General Pediatrics – NYHQ
Lyvia Larish General Pediatrics – Bronx Lebanon
Jennifer Northridge Adolescent Medicine – Montefiore Medical Center
Arielle Ornstein General Pediatrics – Tenafly Pediatrics, NJ
Anita Patel Critical Care – NYP-Columbia
Kavintha Ramaswamy Hematology/Oncology – MSKCC/Weill Cornell
Amisha Shah General Pediatrics – Private Practice, NJ
Brooke Siegel Chief Resident – NYP/Weill Cornell
Lesley Small Gastroenterology – NYP/Weill Cornell
Morgan Deacon Spaight Neonatology – NYP/Weill Cornell

Chief Residents 2012-13

Christine Joyce Critical Care – NYP/Weill Cornell
Elisa Hampton General Academic Pediatrics – NYP/Weill Cornell