

# The NICHD Connection

**April 2013**

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### EDITOR IN CHIEF

Shana R. Spindler, PhD  
Shana.Spindler@gmail.com

### LAYOUT & DESIGN

Nichole Swan

### CONTRIBUTORS

Ramona Neunuebel, PhD  
Mark N. Ziats

### PHOTOGRAPHY

Jeremy Swan  
Stock.XCHNG  
Morguefile

## The Era of Big Data: Time for a Lean Laboratory Model?

By Mark N. Ziats

In the business world, “lean startups” are in vogue. The premise is simple: do as much work as possible with as few resources as necessary. In the software industry, lean startups develop products from home offices, building on already existing platforms (i.e., Windows or MacOS) to bring a product to market quickly. DropBox, Twitter, and Instagram all began through lean models. In contrast, IBM, Windows, and Apple spent millions on infrastructure, people, and research and development before revealing a product.

The lean model relies on a basic principle: a core group of founders with unique expertise focus on specific tasks, outsourcing parts of the project that are expensive, time consuming, or require specialized expertise that the core team does not have. Many small biotech companies, for example, employ lean tactics—licensing compounds discovered and validated in academic labs, renting expertise through part-time consultants, and paying contract research organizations to run animal safety experiments and clinical trials.

Academic laboratories have traditionally behaved more like IBM and Apple than Twitter and DropBox. They are given dedicated lab space, startup packages to buy their own equipment and reagents, slots for technicians and postdocs, and bridge funding to get them to their first grant, all with a singular goal in mind—to create, analyze, and publish data they generate *themselves*. But is this the most efficient model in today’s research atmosphere? In the era of big data and team science, should some academics shift their focus to data *analysis* rather than data generation?

Biomedical research is moving in a direction that lends itself toward individual academic labs pursuing such a lean laboratory model. In genomics, large NIH-led consortia (e.g., 1000s Genomes, Encode, and genome-wide association studies) are necessary to achieve sample sizes large enough for any useful conclusions to be drawn—obviating the need for individual labs to perform any of the pipeline work themselves.

Similarly, the recent announcement of the Brain Activity Map suggests the

*(continued on page 3)*

## Letter from the Editor

Ten years ago—to the month—we witnessed the release of a fully mapped human genome. April 2003 marked the beginning of a new kind of science. We were given the task of analyzing a sequence that could fill thousands of books, and the concept of personalized medicine took on a whole new meaning. Since then, a monstrous heap of virtual data, in which exists answers to questions that have puzzled scientists for centuries, has been stored in labs around the world. But how do we mine that data?

The theme of this month's issue is team science and bioinformatics. Teams of biologists, mathematicians, computer scientists, and researchers from varying disciplines are uniting to form what some have referred to as “dream teams.” A new air of cooperation has descended upon many of the world's laboratories, perhaps out of necessity, perhaps out of excitement. As techniques and skills require more and more specialized training, and projects require the expertise of more than one discipline, these so-called dream teams are changing the way we do research.

In the following pages, you will find forward-thinking ideas from current and former fellows on the topics of bioinformatics and team science.

Graduate student Mark Ziats argues for the incorporation of a “lean laboratory” model given the prevalence of large, comprehensive datasets ([pg 1](#)). Dr. Sharmila Banerjee-Basu, former NICHD postdoctoral fellow, describes her experience starting a bioinformatics-based nonprofit organization in her quest to understand genetic factors in neurodevelopmental disorders ([pg 4](#)). We also highlight a thorough list of bioinformatics resources compiled by Dr. Andy Baxevanis from his recent talk with NICHD fellows ([pg 6](#)).

Please be sure to also check out Dr. Ramona Neunuebel's article on informational interviews in the “Career Planning with myIDP” column ([pg 8](#)), registration information for the 9th Annual Meeting of NICHD Fellows ([pg 12](#)), the exciting announcement about Dr. Yvette Pittman's new position in the NICHD Office of Education ([pg 10](#)), and April announcements and events ([pg 13-16](#)).

May the next decade bring as many groundbreaking endeavors as the last.

Your Editor in Chief,  
Shana R. Spindler, PhD

Questions, comments, suggestions? Please contact us at [Shana.Spindler@gmail.com](mailto:Shana.Spindler@gmail.com).

## The Era of Big Data: Time for a Lean Laboratory Model? (continued from page 1)

neuroscience field will soon inherit a trove of standardized, publically available data. Related datasets already exist for brain MRI “connectomes” and brain-wide whole-genome RNA expression, with European counterparts to all these projects also ongoing. Similar movements are taking place within NICHD (the Children’s Health Study is a prime example).

Apart from the decreased costs and reduced duplication of experiments associated with one centralized data generation scheme, data banks help provide information that is standardized across all labs. This facet, coupled with data structures that are inter-operable between labs, can lead to better scientific collaborations, easier data-sharing, and proper comparison, replication, and assessment of reported results.

The lean laboratory model is not limited to large, shared datasets. Team collaborations between laboratories with varying expertise can provide similar benefits. Why spend money and months buying equipment and training personnel for a project that could be completed in a few days by the lab next door?

The amount of information garnered from large data-generating projects or multidisciplinary

collaborations will be enough to keep hundreds (thousands?) of individual academic labs busy for the foreseeable future. Yet the existence of “lean” labs is not yet commonplace outside computational or systems biology departments.

The emergence of lean laboratories faces many obstacles. Most important, the reward system for quality scientific work—publication in high-impact factor journals—currently favors the first description of data over downstream analysis. For instance, the recent publication of data from both the 1000 Genomes Project and Encode was in *Nature*, but the follow-on papers where specific scientific questions were asked garnered publication in various middle-tier journals.

In the clinical setting, doctors are constantly weighing benefits versus risks. The risks associated with transforming into a lean lab mostly relate to our current reward system in science, but the benefits of such a model are enormous. Utilizing a lean laboratory model, by relying on big science projects or collaborative arrangements, allows biomedical researchers the time to focus on what they presumably do best—analyzing and interpreting biological observations for the betterment of human health and society.

## Former Fellow Follow-up with Dr. Sharmila Banerjee-Basu

This month, *The NICHD Connection* presents a conversation with Dr. Sharmila Banerjee-Basu, Founder, President, and Chief Scientific Officer of **MindSpec Inc.**, a nonprofit organization that uses bioinformatics strategies to accelerate research on common neurodevelopmental disorders.

Dr. Banerjee-Basu served as a postdoctoral fellow in the laboratory of Dr. Andres Buonanno within the Laboratory of Developmental Neurobiology during the period of fall 1991 until early spring 1994. Read below to learn how and why Dr. Banerjee-Basu moved from researching in a postdoctoral position to running her own nonprofit bioinformatics organization.



*Dr. Sharmila Banerjee-Basu, photo courtesy of Dr. Banerjee-Basu*

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***Can you please describe the career moves that led you to your current position and why you made those choices?***

I have a long-term interest in understanding the molecular basis of human genetic disorders, although the first part of my research career (1991 – 1996) focused on promoter binding by transcription factors. From NICHD, I published several papers focusing on transcriptional regulation of slow- and fast- twitch muscle fibers. Later on at NHGRI, I worked on the structural basis of human disease causing mutations mostly involving transcription factors of the homeobox family and forkhead family. Also, at NHGRI, I developed the Homeodomain database. It was good research but has limitations for practical applications.

During this time, trying to predict functional consequences of a disease mutation by structural modeling, I realized the need for a systems approach for understanding the complexity of human disorders. Also, I realized the power of large datasets and potential of bioinformatics to mine that data.

The sum of these individual realizations plus my personal experience with my son's autism led me to move to do bioinformatics research on autism. I ended up building the first genetic database for autism and the research organization, MindSpec.

*(continued on page 5)*

## Former Fellow Follow-up (continued from page 4)

### *What is your typical day like?*

Well, it starts with going through my emails and scanning the scientific papers from PubMed. We have an excellent team at MindSpec, scientists and IT professionals. I work closely with my team. Most of my time at work involves some type of meeting: either one-to-one going through scientific analysis, group meetings to discuss projects, or teleconferences on various collaboration projects. I do most of my writing at the end of the day and weekends.

### *How do you plan for a career as a nonprofit leader?*

It's a hard question as I did not plan, per se. Rather, I was interested in a research question and I truly believed that state-of-the-art informatics combined with in-depth biology of a disease is needed to address the complexity. As I pursued the questions and drilled deeper, it became an obvious path. Trying to build a nonprofit research organization, I asked a lot of questions of many scientists, even the very top ones. I think communication by conversation or email played a key role in building MindSpec.

### *How did your training at the NICHD help prepare you for your current career?*

I learned the fundamentals of neuroscience while at LDN, NICHD. Looking back, I benefited the most by going to seminars on far-out subjects that were not related to the exact work that I was doing there. I think the "neuro" environment at LDN shaped my thinking to a large extent. Additionally, I have friends and collaborators from NICHD with whom I interact on a regular basis even after all these years.

### *Do you have any advice for other NICHD fellows who are interested in going into the nonprofit sector?*

Follow your research question. Communicate, communicate and communicate. Don't be afraid to ask questions. There is nothing called a "stupid" question as long as you know the basics.

### *Do you have any advice for other NICHD fellows who are interested in starting their own business?*

You can run a business if you believe in it.

### *If NICHD Fellows have questions about a nonprofit career, may they contact you?*

Yes, of course. [Sharmila@mindspec.org](mailto:Sharmila@mindspec.org)

## Bioinformatics in the Genomic Era: A Resource List

Adapted from the March 21, 2013 talk by Dr. Andy Baxevanis discussing the role of bioinformatics in 21st-century science

For those fellows who were able to attend Dr. Baxevanis' talk last month, you will quickly realize this list does little justice to the passion and energy he exudes on bioinformatics and team science. While it's difficult to capture his enthusiasm in a few short words, we can certainly deliver the list of resources he generously accumulated for our benefit. If you are currently working with large datasets, or would like to understand how bioinformatics works, please refer to the following resources as a good starting point.

### BIOINFORMATIC RESOURCES AT THE NIH:

#### NHGRI Current Topics in Genome Analysis Lecture Series

<http://www.genome.gov/12514286>

Site excerpt: Given the rapid advances in genomics and bioinformatics that have taken place in the past few years, an intensive review of the major areas of ongoing genome research would be of great value to our fellow National Institutes of Health investigators...[This] series consists of 13 lectures on successive Wednesdays, with a mixture of local and outside speakers covering the major areas of genomics...Rather than splitting the lectures into "laboratory-based" and "computationally based" blocks, we have intermingled the lectures by general subject area. We hope that this approach conveys the idea that both laboratory- and computationally based approaches are necessary in order to do cutting-edge biological research in the future.

#### NIH Library's Bioinformatics Support Program

<http://nihlibrary.nih.gov>

Site excerpt: The NIH Library's Bioinformatics Support Program was developed to provide researchers with powerful tools to analyze and understand the biological significance of a variety of data. The program is conducted by an expert bioinformatics trainer, **Dr. Medha Bhagwat**, and consists of the following: one-on-one consultation, online tutorials, classroom training, analysis tools and databases, bioinformatics program staff, testimonials, and social networking opportunities.

### FAES BIOINFORMATICS COURSES

<http://faes.org>

Site excerpt: The FAES Bioinformatics & Computational Biology Department offers basic programming courses in Perl and Python, in order to help analyze the data currently produced by high-throughput technologies. The department also offers practical and applied bioinformatics courses in biological sequence and macromolecular analysis.

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## Bioinformatics Resource List

(continued from page 6)

### NCBI EDUCATIONAL RESOURCES

<http://ncbi.nlm.nih.gov>

Site excerpt: The National Center for Biotechnology Information advances science and health by providing access to biomedical and genomic information. Get started with: tools to analyze data using NCBI software, downloads of NCBI data or software, how-to guides for how to accomplish specific tasks at NCBI, and submission interfaces to submit data to GenBank or other NCBI databases.

### BIOINFORMATICS SCIENTIFIC INTEREST GROUP

<http://list.nih.gov>, search for *BIOINFORMATICS-SIG-L*

Site excerpt: The goals of the Bioinformatics Interest Group are to: 1. Promote collaborations and knowledge-sharing between computational biologists and bioinformatics researchers across all institutes within the NIH, 2. Provide people with an interest in bioinformatics an opportunity to meet experienced computational researchers that can relay practical knowledge about a given area, thereby establishing a forum through which productive scientific collaborations can be fostered and encouraged, and 3. Mentor students for professional and academic development, on a peer-to-peer basis

### BIOINFORMATICS RESOURCES BEYOND THE NIH:

- » **Free Software Tutorials**  
For example: <http://openhelix.eu>
- » **In-Depth Workshops**  
For example: <http://meetings.cshl.edu/courses/2013/c-ecg13.shtml>
- » **Online Courses**  
For example: <http://www.iscb.org>
- » **Targeted Curricula**  
For example: <http://www.ncbi.nlm.nih.gov/pubmed/23028269>



## Career Planning with myIDP: Informational Interviews

By Ramona Neunuebel, PhD

This third article in our myIDP series highlights the importance of informational interviews. By using the self-assessment tools available on the myIDP website as described in our previous articles, you should now have a list of careers that closely matches your skill set, personal values, and interests. Whether your list includes previously considered careers or some unexpected (but intriguing!) possibilities, the next step is to further research your options. Informational interviews are a great way to do just that. As the name implies, this type of interview is meant for getting information—not a job. The interview can be conducted in person, over the phone, or through email, and it typically lasts between 15 and 30 minutes.

Getting an informational interview is easier than you might think. First, you need to find people to interview. In the workshop titled “Putting your PhD to Work: Planning for a Successful Career in Science,” Dr. Philip Clifford, co-author of the myIDP website, examined several ways of identifying interview prospects. You may ask friends

or colleagues to introduce you to a person of interest, or you can find someone who shares common ground with you by using an alumni or social network such as LinkedIn.

Approach the people you would like to interview by sending a concise, to-the-point e-mail. You should clearly state your interest in their career path and that you are asking them for an informational interview to learn more about it. Assure them that you will not be taking much of their time and leave it up to them to decide whether the interview will be in person, over the phone, or via email.

Since you initiated the interview, you are in charge of leading it. Remember, the focus is on the person you are interviewing. Your aspirations and credentials are better left out of the conversation, unless you are directly asked about them.

Think ahead about your goals for the interview and prepare a list of questions, keeping in mind your prioritized career-related values identified with the myIDP

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**FUN FELLOW FACT:**

Dr. Michael Dambach, a postdoctoral fellow in Dr. Gisela Storz's lab, is in the midst of a job hunt geared toward patent law. He has conducted several informational interviews with people working in positions he aspires to obtain. He felt that people were open and honest when answering his questions about this career path, and was surprised at their willingness to offer additional advice on how to secure such a position.

## Career Planning with myIDP (continued from page 8)

values assessment tool. If your questions are well-crafted, you should come away from the interview with at least some basic information, such as: understanding the job responsibilities, knowing the skills necessary to succeed in this position, and learning the possibilities for career advancement. You can find an expanded list of questions on the myIDP website under the section titled "Talk to People" or by visiting this link ([https://www.training.nih.gov/assets/Informational\\_Interviews.pdf](https://www.training.nih.gov/assets/Informational_Interviews.pdf)) on the OITE website.

Bring the interview to a close by asking if they can refer you to another informational interview contact and remember to thank them for their time and advice. You can keep a log of your informational interviews on the myIDP website. Although informational interviews may not land you a job right away, they will help you build your professional network, boost your interviewing confidence, and they may even pay off in the future when the institution is hiring.

## NICHD Office of Education Welcomes Dr. Yvette Pittman

Dr. Yvette Pittman, postdoctoral fellow in the laboratory of Dr. Thomas Dever, will assume the position of Associate Director in the NICHD Office of Education on April 29, 2013. Dr. Pittman has served in a supporting role to the office since her part-time detail as an Educational Administrator beginning March 2012. Before that, she was course director for the postbaccalaureate series “Becoming an Effective Scientist,” participant on the annual retreat steering committee, and the force behind the Fellows Recruitment Incentive Award, a competitive award providing support to investigators who recruit postdoctoral fellows from underrepresented backgrounds in science. In addition to her activities within the NICHD, Dr. Pittman served as a planning committee member for the annual NIH-wide Career Symposium.

Brenda Hanning, who will continue as Director, Office of Education in addition to her role as a deputy to the Scientific Director, says: “Yvette knows the NIH well, and she understands from her own experience all of the challenges that students of science go through at each stage of their professional growth.” As the Associate Director of the office, Dr. Pittman will create and manage scientific career development programming for

intramural postbaccalaureate, graduate, and postdoctoral trainees. Her extensive experience with training activities, career planning, and grant application and submission will enable Dr. Pittman to coordinate and perform the multiple duties associated with her new position in the Institute.

“I know Yvette will be effective in this new leadership role, she is thoughtful, proactive, and organized,” says Brenda. “We’ve worked seamlessly together this past year, and with her help the office will be able to expand its support of all of the fellows in NICHD.”

Before her postdoctoral fellowship at the NICHD, Dr. Pittman received a Bachelor’s degree in Science, with summa cum laude distinction, from Delaware State University and a Ph.D. in Molecular Genetics and Microbiology from the University of Medicine and Dentistry of New Jersey - Robert Wood Johnson Medical School.

We welcome Dr. Pittman to the Office of Education and look forward to incorporating her ideas on training opportunities and career guidance as she begins her role as Associate Director.

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## NICHD Office of Education Welcomes Dr. Yvette Pittman

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### A FEW WORDS FROM DR. YVETTE PITTMAN:

Throughout my career starting as an undergraduate and continuing through my current postdoctoral research training here at NIH, science education has always been a long-standing interest of mine. Along with being at the bench, I would always find the time to do things I enjoy in science: outreach activities, development and management of career programming, and mentoring and teaching students in and out of the lab. Even though I enjoy performing experiments and analyzing data, my transition to the Office of Education best fits with my interests and values as it will give me the platform to positively impact the academic and professional development of young scientists.

As Associate Director of the Office of Education, my role will focus on the delivery of training activities that support the needs of intramural trainees at all levels. Topics for training activities include public speaking, writing, job interviewing, grantsmanship, college teaching skills, and career planning. In addition to encouraging fellows to build their portfolio of scientific and professional skills, some of my primary responsibilities will include one-on-one career guidance sessions, the implementation of an orientation for new fellows to ensure integration and retention, and providing teaching opportunities through the NICHD “Becoming an Effective Scientist” course for postbaccalaureate fellows.

Whether it’s related to teaching, grant writing, or promoting career exploration for scientists, working in the Office of Education has afforded me numerous opportunities to develop academic support programs for intramural fellows. I take great pride in my service to the scientific community, being able to provide fellows with valuable resources that contribute to their success. I look forward to a career where I can combine my love for science and education.



*Dr. Yvette Pittman; photo courtesy of Yvette Pittman*



Shirley Tilghman, PhD  
Photo: Princeton University, Office of Communications, Denise Applewhite



John Bohannon, PhD  
Photo: John Bohannon



Photo: Wikimedia Commons

EUNICE KENNEDY SHRIVER NATIONAL INSTITUTE OF  
CHILD HEALTH AND HUMAN DEVELOPMENT

## NINTH ANNUAL MEETING

OF POSTDOCTORAL, CLINICAL, & VISITING  
FELLOWS & GRADUATE STUDENTS

TUESDAY, MAY 21, 2013

NATIONAL MUSEUM OF THE AMERICAN INDIAN  
WASHINGTON, DC

With keynotes by

- » DR. SHIRLEY TILGHMAN, president of Princeton University
- » DR. JOHN BOHANNON, award-winning journalist

# *Your opportunity awaits.*

A chance to meet WORLD-RENOWNED SPEAKERS

A chance to discover REMARKABLE NICHD RESEARCH

A chance to discuss EXCITING CAREER OPPORTUNITIES

A chance to STIMULATE THE MIND

### *Good food. Good fun. Good atmosphere.*

**Don't miss your chance.**

Please register at <http://retreat.nichd.nih.gov/registration.html>



Photo: Jeremy Swan

## April Announcements

### CONGRATULATIONS TO DR. CONSTANTINE STRATAKIS!

The *NICHD Connection* is proud to announce that the University of Liège in Belgium awarded Dr. Stratakis a Doctorate honoris causa on Saturday, March 23, 2013. Congratulations to Dr. Stratakis on behalf of the NICHD fellow community!



*Dr. Stratakis stands with Professor Albert Beckers*

### MENTOR OF THE YEAR AWARDS 2013

The intramural scientific program of NICHD established two mentoring awards in 2008, to recognize individuals who have served as exceptional mentors to trainees in the institute. Awards will be made to winners in both the investigator and the fellow categories at a spring event held to honor graduating postbaccalaureate fellows, to which members of the intramural NICHD community will be invited. Finalists for the awards will be recognized at the event, at which the winner will be announced. Awards will include a certificate for the individual winners, posting of names on a perpetual plaque, and publicity on the DIR web site.

Nominations should be e-mailed, with the attached nomination form, to: [hanningb@mail.nih.gov](mailto:hanningb@mail.nih.gov).

For nomination forms and more information on the nomination process, please visit: <https://science.nichd.nih.gov/confluence/display/fellows/Mentor+of+the+Year+Awards+2013>

The deadline for receipt of submissions is **Friday, April 29, 2013**. Please contact Brenda Hanning at [hanningb@mail.nih.gov](mailto:hanningb@mail.nih.gov) with any questions.

A poster for the 2013 NICHD intramural Mentor of the Year Awards. The poster features a background of overlapping green and blue rectangular blocks. The text is arranged in a vertical stack. At the top, it says "2013 NICHD intramural MENTOR of the YEAR AWARDS". Below this, it says "DETAILS &amp; NOMINATION FORMS AT: fellows.nichd.nih.gov". Further down, it says "DEADLINE: April 29th, 2013". At the bottom, it says "Nominations are invited for two Mentor of the Year awards, one for an investigator (tenured, tenure-track, staff clinician, staff scientist) and one for a fellow (postdoctoral, clinical, visiting, or research fellows)". The NIH logo is in the bottom left corner, with the text "National Institutes of Health" and "National Institute of Child Health and Human Development" below it.

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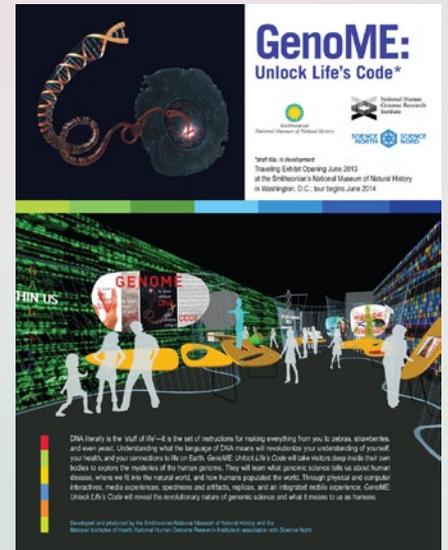
## April Announcements (continued from page 13)

### SEEKING VOLUNTEERS FOR GENOME: UNLOCK LIFE'S CODE

This traveling exhibit, opening June 2013 at the Smithsonian National Museum of Natural History (NMNH), is developed and produced by the NMNH and the National Human Genome Research Institute in association with Science North.

Excerpt from the exhibit promotional: "GenoME: *Unlock Life's Code* will take visitors deep inside their own bodies to explore the mysteries of the human genome. They will learn what genomic science tells us about human disease, where we fit into the natural world, and how humans populated the world. Through physical and computer interactives, media experiences, specimens and artifacts, replicas, and an integrated mobile experience, *GenoME: Unlock Life's Code* will reveal the revolutionary nature of genomic science and what it means to us as humans."

The exhibit coordinators are seeking the help of graduate- and senior-level scientists to lead informal discussions about their area of research for the visiting general public. The commitment includes a 1-hour training session at the NIH campus and one 3-hour session at the exhibit. For more information or to register as a volunteer, please email [bhurle@mail.nih.gov](mailto:bhurle@mail.nih.gov).



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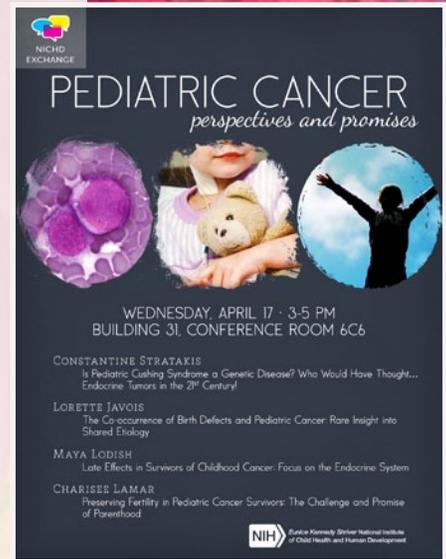
## April Announcements

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### NICHD EXCHANGE MEETS WEDNESDAY, APRIL 17, 3-5 PM

Mark your calendars now so you don't miss the highly regarded NICHD Exchange quarterly meeting. This month's topic is "Pediatric Cancer: Perspectives and Promises" with presentations from:

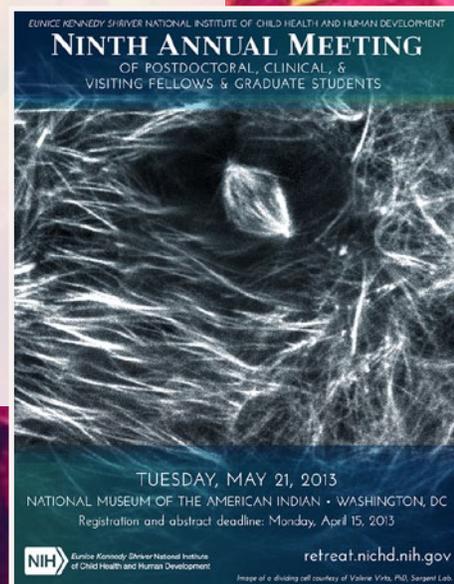
- » **Dr. Constantine Stratakis** on the genetics of pediatric Cushing syndrome and endocrine tumors in the 21st century
- » **Dr. Lorette Javois** on the co-occurrence of birth defects and pediatric cancer
- » **Dr. Maya Lodish** on the late effects in survivors of childhood cancer
- » **Dr. Charisee Lamar** on preserving fertility in pediatric cancer survivors



### REGISTRATION IS OPEN FOR THE 9TH ANNUAL MEETING OF NICHD FELLOWS

Don't delay, register now for the 9th Annual Meeting of Postdoctoral, Clinical and Visiting Fellows, and Graduate Students. The meeting, to be held at the Smithsonian National Museum of the American Indian, promises to be a special one. Abstract submission deadline is **Monday, April 15, 2013**.

For more meeting info, announcements, agenda, speaker profiles, registration, abstract submission, and contact information, please visit <http://retreat.nichd.nih.gov>.



## April Events

### WEDNESDAY, APRIL 17, 3-5 PM

The NICHD Exchange quarterly meeting  
“Pediatric Cancer: perspectives and promises”  
with presentations by Drs. Stratakis, Javois, Lodish, and Lamar  
Building 31, Conference Room 6C6

### FRIDAY, APRIL 19, 10-12 PM

Postbac workshop on poster presentations  
With Scott Morgan  
Prepare to give a clear and crisp poster presentation, in  
preparation for the May 1st poster day. Don't forget, NICHD  
will give three “best poster” awards.  
Please register with Yvette Pittman at [Yvette.Pittman@nih.gov](mailto:Yvette.Pittman@nih.gov)



<http://www.phdcomics.com/comics/archive.php?comid=1568>