

The NICHD Connection

August 2015

INSIDE THIS ISSUE

Promote Your Work with the NICHD Public Communications Branch	1
Letter from the Editor	2
Check Out the Latest Postbac Award-Winning Research	7
August Announcements	13
August Events	15

EDITOR IN CHIEF

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

LAYOUT & DESIGN

Nichole Swan

PHOTOGRAPHY

Jeremy Swan
Pixabay
Unsplash

CONTRIBUTORS

Nicket Dedhia
Vy Duong
Daniel Flores
Anthony Hickey, PhD
Jung Park
Maya Sangesland

Promote Your Work with the NICHD Public Communications Branch

By Anthony Hickey, PhD

While many fellows spend countless hours working solo in the lab, our success as scientists hinges on our ability to interact with others. We must communicate our research with other scientists, certainly. But what we may not think about enough is how to communicate our work with nonscientific audiences. This skill is becoming increasingly important, as technology allows for the widespread dissemination of information with the click of a button. Part of our training as scientists needs to include communicating our work to a wide array of audiences. The NICHD Public Communications Branch (PCB) is a good resource to do just that.



Paul Williams

The PCB mission is to communicate to diverse audiences how the research conducted and funded by NICHD is making a positive difference in the lives of people, families, and communities, in addition to fostering collaborations within and outside the institute. Paul Williams, the director of PCB, understands the importance of public support for NICHD research. With a background in journalism and scientific communication, he grasps the role that postdocs play in scientific progress and encourages postdocs to use PCB's resources to make themselves and their work known to the public.

On June 3, 2015, Mr. Williams and I discussed the functions of PCB and how the branch can help a postdoc during his or her NIH career. Below is a selection from our discussion together:

A.J. Hickey (AJH): I would like to thank you for taking the time to speak with us today.

P. Williams (PW): My pleasure.

AJH: If a postdoc or graduate student working within NIH wanted to get a better idea of what NICHD's Public Communications Branch does, or what

(continued on page 3)

Letter from the Editor

Has a nonscientist ever asked you what you *do*? Did your response sound like a string of incomprehensible words? Or maybe it was absurdly simple. Upon hearing that question for the first time as a graduate student, I felt wide-eyed and tongue-tied, with words like *mosaic analysis with a repressible cell marker* coursing through my mind. I think I managed to mumble something about dissecting brains out of bugs.

Communicating the importance of your work is a valuable skill; yet, formal training in science communication is not at the forefront of many curricula. We are taught how to follow the scientific method, keep a lab notebook, read a western blot, or write computer code. Hours of coursework drill the details of our disciplines into memory, and we become very good at discussing our work with others in our respective fields. But I would argue that an equally important quality is to be able to review research with nonspecialty scientists, journalists, policy makers, the general public, and even Grandma.

The key is to think about your target audience. For example, a grant reviewer has a different lexicon than a patient. What may be a straightforward sentence to one person might sound like complete gibberish to another. As an NICHD fellow, you have several opportunities to practice science communication (volunteering for this newsletter being one of them!). An excellent resource for NICHD fellows is the NICHD Public Communications Branch (PCB). See, too, [the upcoming public speaking workshop offered through our Office of Education!](#)

For those fellows who are unfamiliar with the PCB, [Dr. Anthony Hickey offers his interview with PCB Director Paul Williams.](#) Check out their transcribed conversation to learn about the purpose of the PCB and how the branch can help fellows. Continue reading for [several intriguing research summaries](#) written by this year's poster award-winning postbacs.

On a final note, I would like to personally congratulate [Kathryn Tabor, graduate student in the Burgess lab,](#) for her exciting first place win at the second annual Three-minute-Talk (TmT) competition. A three-minute talk is the epitome of succinct science communication!

Your Editor in Chief,
Shana R. Spindler, PhD

We always welcome new volunteer writers! Please send inquiries to Shana.Spindler@gmail.com.

NICHD Public Communications Branch (continued from page 1)

the PCB is all about, would going to the [NICHD public website](#) be a good place to start?

PW: Absolutely. PCB develops the content for the site, which covers current, relevant work conducted and supported by NICHD.

AJH: The website contains quite an impressive amount of information. Can you tell us about what is involved in getting this information together and organizing it?

PW: It starts with figuring out what is relevant. We begin with descriptions of basic programs at NICHD. From there, we decide what areas of focus we want to look at. We are trying to emulate what a user of the website is looking for, or would want to read about, in order to find out about what NICHD does—why the institute is relevant, important, and deserving of continued support.

AJH: Finding relevant material for the website means that PCB is always actively searching for new content. What about scientists within NICHD who wish to have their recent work or discoveries made public? Do scientists frequently reach out to PCB?

PW: Absolutely, and we want them to do that! We encourage scientists, both extramural and intramural, to talk with us about their portfolios and projects. Together, we may be able to find something that we can run with using the various resources we have at our disposal. It's all about the conversation. Reaching out to us is not a guarantee that the work will be made public, but discussing it with us is a great start.

AJH: From what I understand, you are trying to get postdocs involved in this process as well, not just senior PIs?

PW: Yes. Postdocs are extremely important to the mission. They are our lifeblood in a lot of ways and the future in terms of new ideas and new perspectives. Postdocs tend to be cutting-edge people, so we want to really

Paul Williams's office is located in Building 31, RM 2A32. He can be reached by phone at 301-496-5135, or by email at paul.williams@nih.gov.



Don't forget to check with your advisor before contacting the Public Communications Branch about your project.

(continued on page 4)

NICHD Public Communications Branch (continued from page 3)

promote their capacity for innovation, their passion for science, and their desire to make the world a better place. I think that we could be doing a lot more in promoting the work that postdocs are doing and showing the public and other audiences what great scientists and great talent we have here.

AJH: Many of us as postdocs are focused on communicating our work as published manuscripts or as presentations in front of other scientists. What additional benefits would postdocs see in taking such opportunities to share their work with nonscientific audiences?

PW: I feel that it's healthy for a postdoc to always be able to connect with non-scientists about their science. I think postdocs really need to work on how to distill what they are working on into a couple of bullet points summarizing the public health significance of their work. We are mandated as an institute to explain where the taxpayer money is going—how we are using it to improve health, to diagnose, treat and prevent disease.

“I think postdocs really need to work on how to distill what they are working on into a couple of bullet points summarizing the public health significance of their work.”

AJH: I am sure that many postdocs would appreciate the opportunity to do this, however some postdocs may be hesitant to come forward—maybe because they feel like they just can't commit the time outside of lab, or perhaps they are just intimidated by the idea of being interviewed. How would you encourage postdocs to break past that barrier?

PW: I do understand a postdoc's time constraints. I can help this process by having a team here that will work with them and try to relieve as much of the burden as possible. For example, it could start with a quick email to us about a paper the postdoc is getting ready to publish that they think is appropriate for coverage by PCB. We can begin an exchange with this postdoc and go back and forth until we have a final. For other things, such as videos, we try as best we can to limit filming and/or interviews to just a couple of hours. If they can invest an hour of their life on a day for us, that hour would go a long way for them and really help them get their science out there.

(continued on page 5)



NICHD Public Communications Branch (continued from page 4)

AJH: With current technology, video has become much easier and less expensive to work with. How often would you utilize this medium to get a postdoc's story across to the public?

PW: If I could, I would get every postdoc on film. I think it's really fascinating to hear the ideas, see the passion, and witness the eyes light up when they talk about their science and their work. I think it would be immensely valuable for the institute to do something like that. Realistically, we can't do it for everyone, but we'd like to do it for as many postdocs as we can. Part of my goal as director of communications is to get more postdocs on camera talking about their science, the significance of their research, and why people should care.

AJH: It sounds like PCB will take great efforts to reach out to postdocs, but let's discuss the flip side of this. Say a postdoc has something they really want to communicate, perhaps a cool or exciting result, or they just simply have an idea and would like a forum to discuss it. What would be a good way for them to initiate contact with PCB?

PW: They can come right to me. I would like to keep it as informal as possible. What I don't want is for it to become a bureaucratic exercise. They can call me; they can write me. I'd really be happy to hear from them. I am always looking for good ideas, and I am always looking to promote fellows. Like I said, they are such a huge and important part of this institute.

AJH: One of the goals listed in the PCB mission statement is to foster collaboration. In what ways could a postdoc's involvement with the PCB allow them to do this?

PW: The more you are out there with your science, the more people are seeing your science. It's easier nowadays to share information, especially by social media. Every website now has social media buttons where you can forward information to your contacts on LinkedIn or Pinterest or Facebook, or wherever you want to go. If you put your work out there and have a compelling story to tell, it will get shared. And who knows, it might get the attention of people who want to work with you.

AJH: And this can't hurt in the future when the fellowship is near finished and postdocs are ready to take the next step and are looking for jobs.

(continued on page 6)

NICHD Public Communications Branch (continued from page 5)

PW: Right. It may also be beneficial for meetings and presentations. When you go to a scientific meeting, perhaps you can use an audiovisual element in your talk, so you are doing more than just shining a laser pointer at your screen. Maybe you can play a YouTube video of yourself with a patient, or perhaps a video of yourself in the lab with your colleagues, just to show another side of you that may not otherwise come across in the presentation.

AJH: So in closing, I want to go back to the subject of this being an investment of time on the postdoc's part, which I do think is a worthwhile investment. What final encouraging words might you have for a postdoc that may be on the fence as to whether or not they want to reach out to PCB.

PW: Like you said, it is an investment—not only an investment in your career at NICHD/NIH, but also an investment in your career elsewhere, in the future. You learn, through this process, to distill your research into quick sound bites that retain all the precision and accuracy of your science. Being able to relate your work to nonscientists is a skill that is rare, but it is a skill that makes you more marketable...

...Scientists are always going to be in demand, and when discoveries are made, or new information becomes available regarding a disease or public health matter, it behooves young fellows to learn these strong communication skills now, and this will help them as they grow in their careers to differentiate themselves from others.

AJH: I think that wraps up our session. Again, I wish to thank for your time.

PW: It was my pleasure. Thanks for doing this article.

Check Out the Latest Postbac Award-Winning Research

Each year, postbacs from across the NIH gather at the annual Postbac Poster Day to share their research with the NIH community. We are excited to announce that a total of eight NICHD postbacs received an overall top 20 percent poster award (NIH-wide) and/or one of the three “Best Poster” NICHD awards at this year’s event. To honor this achievement, *The NICHD Connection* invited the winning postbacs to publish a synopsis of their research. Read below to learn more about the award-winning studies from several of our winners.

The 2015 postbac awardees include:

- » **Megan Bannon** (Lilly lab, NIH-wide award)
- » **Nicket Dedhia** (Yanovski lab, NIH-wide award)
- » **Vy Duong** (Pfeifer lab, NIH-wide and NICHD award)
- » **Daniel Flores** (Pfeifer lab, NIH-wide award)
- » **Robyn Kalwerisky** (Schisterman & Mumford lab of the DIPHR, NIH-wide award)
- » **Jung Park** (Hoffman lab, NIH-wide and NICHD award)
- » **Maya Sangesland** (Levin lab, NIH-wide award)
- » **Nathan Thomas** (Cashel lab, NICHD award)

(continued on page 8)

Postbac Award-Winning Research (continued from page 7)

OBESITY-LINKED GENE UNRELATED TO BONE DENSITY

By *Nicket Dedhia*

Advisor: *Dr. Jack Yanovski*

Obesity is an increasing problem without a single solution. Researchers have hypothesized several contributors to obesity susceptibility, including genetic background, viral infections, and chemical exposures. In the NICHD Section on Growth and Obesity, we study the genetic contributions to obesity. In particular, we examine how a protein called the melanocortin 3 receptor (MC3R) relates to energy homeostasis and obesity.

Children who have specific mutations in both copies of the *MC3R* gene (which we call “double mutant” or DM) have greater BMI, body fat mass, body fat percentage, and insulin resistance than children who carry one mutated copy (heterozygous, HET) or only wildtype (WT) *MC3R*. According to previous work in our lab, mice carrying this human genetic variant also display increased adiposity, as well as reductions in bone mineral content and bone area. The objective of my current study was to investigate if humans with two copies of the obesity-linked *MC3R* variation also show reductions in bone parameters

We completed *MC3R* genotype analysis and measured bone mineral density

using dual-energy X-ray absorptiometry imaging for 239 healthy adults. Consistent with previous research, the DM cohort displayed greater BMI, fat mass, and fat mass percentage when compared to WT and HET individuals. Additionally, African Americans constituted a greater percentage of the DM population, confirming our past observations that this polymorphism occurs more frequently in African Americans as compared with Caucasians.

However, unlike the mice, humans carrying two copies of the obesity-linked *MC3R* variant did not show any statistically significant changes in bone parameters. Although we report the largest cohort of DM-*MC3R* individuals studied to date, we hope to aggregate a larger number of individuals to better power further studies on their bone metrics, energy homeostasis, and brain-gut-adipose axis.



Nicket Dedhia

(continued on page 9)

Postbac Award-Winning Research (continued from page 8)

CARDIAC CALCIUM CONTROL CONUNDRUM

By *Vy Duong*

Advisor: *Dr. Karl Pfeifer*

Every muscle in the human body requires calcium to contract, and the heart is no exception. The release of calcium in heart cells is tightly regulated. A disturbance in this process can lead to an abnormal heart rhythm known as an arrhythmia. If prolonged, arrhythmias can be fatal. But what factors control calcium balance in the cell, and how can we use this information to improve human health?

My current work focuses on Cardiac Calsequestrin (encoded by the gene *Casq2*), a calcium-binding protein that prevents the inappropriate release of calcium inside heart cells. Patients with genetic defects in *Casq2* suffer from stress-induced cardiac arrhythmias (a condition called CPVT for catecholaminergic polymorphic ventricular tachycardia) and an abnormally slow basal heart rate.

In previous studies, our lab generated a *Casq2* knockout mouse model. To assess whether this model effectively phenocopies the human disease, I and Daniel Flores, another postbac in the lab, recorded electrocardiograms (ECG) from *Casq2* knockout and control mice under adrenaline-induced stress, and we measured basal heart rate.

The ECG data revealed that only *Casq2* knockout mice respond with multiple arrhythmias when under stress. They also display a lower basal heart rate than control mice. These results indicate that our mouse model effectively phenocopies the overt symptoms of CPVT.

We noted, however, that not every mutant mouse showed stress-induced arrhythmias. We believe such variation within the mutants is not atypical to what one would see in human diseases with patient-to-patient phenotype variation. We hope to use this mouse model to further elucidate the role *Casq2* plays in causing arrhythmias and to identify candidate genes and pathways to target for treatment.



Vy Duong

(continued on page 10)

Postbac Award-Winning Research (continued from page 9)

DO MICE MAKE UP FOR MISSING CASQ2?
 By Daniel Flores
 Advisor: Dr. Karl Pfeifer

Patients lacking functional Cardiac Calsequestrin (CASQ2) protein experience episodes of irregular heart muscle contractions (arrhythmia) while under stress, a condition known as catecholaminergic polymorphic ventricular tachycardia (CPVT). Most individuals with CPVT experience their first heart attack by twenty years of age—often without warning.

CASQ2, encoded by the *Casq2* gene, is a heart-specific protein responsible for binding and releasing calcium ions in the sarcoplasmic reticulum. Preliminary data from electrocardiogram readings using *Casq2* loss-of-function mouse models suggests that symptoms are less severe in mice that inherit a bad copy of *Casq2* compared to mice that have induced *Casq2* loss. From these findings, we hypothesize that mice with inherited loss of CASQ2 undergo a developmental adaptation to compensate for this deletion, reducing the severity of cardiac arrhythmia.

I began to address my hypothesis in September 2014, working alongside

Vy Duong, another postbaccalaureate fellow in our laboratory. We discovered a number of challenges with our experimental plan. Specifically, RT-QPCR data of *Casq2* expression revealed that our tamoxifen inducible **Cre recombinase** system is active even without the administration of tamoxifen to the mouse. This leads to a gradual, unintended deletion of *Casq2*. We also found that this accidental deletion appears to increase as the mice age.

To address these findings in the short term, we are working with juvenile mice, in which the uncontrolled *Casq2* deletion is at a minimum. In the long term, we are exploring the use of an Adeno-associated virus vector that will deliver Cre recombinase to cardiomyocytes for *Casq2* deletion in our mouse model. Obtaining a precise method of deleting *Casq2* in adult mice will provide us with a reliable method to determine if genomic plasticity occurs in mice with an inherited loss of CASQ2.



Dan Flores

(continued on page 11)

Postbac Award-Winning Research

(continued from page 10)

NOVEL MODIFICATION TO ALZHEIMER'S-LINKED ION CHANNEL

By Jung Park

Advisor: Dr. Dax Hoffman

Billions of interconnected neurons in the brain communicate with each other via trillions of synaptic connections. To make sense of this complex neuronal network, our lab specializes in the synaptic ion channels that regulate the excitability of individual neurons. Specifically, I am interested in the potassium voltage-gated channel Kv4.2 found in the CA1 neurons of the hippocampus—a region of the brain responsible for learning and memory.

Understanding Kv4.2's regulation may provide new insight into how we tackle cognitive neurodegenerative disorders. For example, increased dendritic excitability induced by Kv4.2 deficiency contributes to neuronal dysfunction and memory deficits found in early stages of Alzheimer's disease. Characterization of Kv4.2 trafficking and degradation mechanisms will help us appreciate the role of synaptic ion channel regulation in psychiatric illnesses.

Due to its dynamic regulation upon neuronal stimulation, Kv4.2 most likely undergoes

post-translational modifications in response to changes in the environment. Currently, there are gaps in the literature on how such channels are modified by the ubiquitination pathway, a process that directs substrates towards various cellular fates, including lysosomal and proteasomal degradation, endosomal sorting, and the internalization of surface proteins.

We have identified that Kv4.2 trafficking and degradation is regulated by ubiquitin. Our optimized protocol allows for an unprecedented, high-resolution visualization of Kv4.2 ubiquitination. However, our most recent findings indicate that Kv4.2 may undergo a novel ubiquitination pathway. Should our data hold true, our discovery would be among the first of its kind for synaptic ion channels.

(continued on page 12)



Jung Park

Postbac Award-Winning Research

(continued from page 11)

WHO'S HELPING RETROTRANSPOSONS FIT IN?

By *Maya Sangesland*

Advisor: *Dr. Henry Levin*

Retrotransposons are mobile portions of DNA that are able to move from one location to another in a host genome through an RNA intermediate. Our lab uses the yeast retrotransposon Tfl—of particular interest as it mimics the life cycle of many mammalian retroviruses, such as HIV-1—to study host factors responsible for mediating integration of this retrotransposon into the genome.

Last year*, we conducted a systematic screen of each non-essential gene (roughly 3000 genes) in *Schizosaccharomyces pombe* yeast and identified 116 candidate genes that might contribute to integration of this transposable element. Through gene ontology analysis, we have grouped the identified candidates based on function, which includes DNA repair, chromatin modification, nucleosome assembly, transcription, as well as cell-cycle regulation.

Building upon my previous work, this year we focused on a specific histone variant, H2A.Z, which we believe may be directly or indirectly interacting with the Tfl integrase protein and therefore facilitating integration of Tfl at promoter regions. Currently, I am working on affinity pull-down experiments, which may reveal any Tfl-related binding partners with H2A.Z. We hope that our work will help elucidate the mechanisms employed during retroviral propagation and integration site targeting during infection.

***Editor's Note:** To read about Maya Sangesland's award-winning work from last year, check out her Postbac Poster Award **summary** in our July 2014 issue.



Maya Sangesland



August Announcements

NICHD POSTDOCTORAL FELLOW KATHRYN TABOR TAKES FIRST PRIZE!

During the second annual Three-minute-Talk (TmT) competition on July 16, fourteen intramural NICHD, NHGRI, and NIDCR postdoc and graduate student fellows competed for the title of first, second, or third place winner. The top three fellows receive travel/training support and will have their talk professionally produced for a video.

After an exciting event packed with outstanding presentations from the finalists, our very own Kathryn Tabor, graduate student in the Burgess lab, amazed the judges with neurons that modulate the acoustic startle reflex in zebrafish. Her clear presentation and beautiful slide earned her first place among all fellows.

Congratulations to Dr. Tabor and to all of our NICHD TmT finalists. Great job!



(continued on page 14)

August Announcements *(continued from page 13)*

INTERESTED IN SCIENCE POLICY?

From the Association of American Medical Colleges:

The Christine Mirzayan Science & Technology Policy Graduate Fellowship Program is now accepting applications for the 2016 season to spend 12 weeks at the Academies in Washington, DC learning about science and technology policy and the role that scientists and engineers play in advising the nation. Graduate and professional school students and those who have completed graduate studies within the last five years may apply. The application deadline is September 9, 2015. Please see: <http://tinyurl.com/qcg8rw8>

FOURTH ANNUAL BIOART COMPETITION ACCEPTING SUBMISSIONS

The Federation of American Societies for Experimental Biology (FASEB) is hosting its fourth annual BioArt competition. They welcome images or videos produced as part of everyday research from both intra- and extramural researchers. The submission deadline is August 31, 2015. Details about the competition are available at www.faseb.org/BioArt.

August Events

THURSDAY, AUGUST 6, 9 AM – 3 PM

Summer Poster Day 2015
Natcher Conference Center (Building 45)

WEDNESDAY, AUGUST 18, 10 AM – 12 PM

Speaking about Science: Giving Scientific Talks
with Scott Morgan
Up to 25 participants

Speaking about Science is a highly interactive workshop and the core of this session is a 9-step preparation process that ensures a clear and engaging talk for a variety of audiences. Topics include: the presentation of data, identifying the theme and focus, how to create effective visual aids, and how to begin and end a talk.

WEDNESDAY, AUGUST 26, 10 AM – 3 PM

College Teaching Workshop: Preparing for Your Academic Career
“Challenges in Teaching and Learning: Concepts, Strategies, and Tips”
with Todd Zakrajsek, Ph.D.
President, International Teaching Learning Cooperative
Executive Director, Academy of Educators, University of North Carolina
School of Medicine, Chapel Hill, NC

Participants will be able to:

- » Identify at least five major challenges that all teachers face when educating others
- » Explain why these challenges occur within a framework of human learning and memory
- » Describe at least three strategies for overcoming the most common challenges
- » Adapt at least one engaged learning strategy to be used for any classroom situation

Twenty slots for NICHD fellows and graduate students. If you would like to register, please email Yvette Pittman at yvette.pittman@nih.gov.

<https://www.youtube.com/watch?v=tYg3sLcyLB8> for a sneak preview.