

National Space Biomedical Research Institute Society of Fellows

Quarterly Newsletter

Information for First Award Fellows

Spring/Summer 2014

Your First BIG Research Grant: How to Win It!

A step-by-step grant-writing
guide for young investigators

Torin Clark, Ph.D.

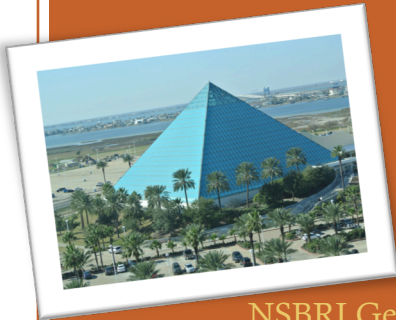
2013 NSBRI First Award Fellow

As federal funds for scientific research get tighter, it is becoming more and more difficult to secure support. And yet to be an independent investigator, it is essential to win that first big award. Fortunately, there are great guidelines and steps to help you be successful. These steps are broadly for applying towards large independent investigator awards, but more specifically for the National Institute of Health's (NIH) R01 program. There are many useful websites for offering support and guidance for writing your first R01 application, however, they may be helpful for any type of research grant application. Additional information can be found here:

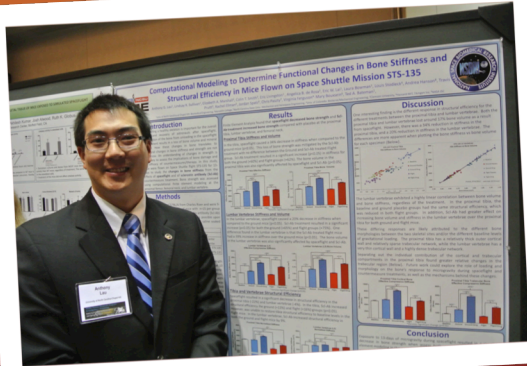
<http://www.niaid.nih.gov/researchfunding/grant/strategy/Pages/stepswin.aspx> Continued on Page 3



2014 NASA HRP Investigators' Workshop Wrap-Up



In February, scientists, fellows, and students gathered in Galveston, Texas at the Moody Gardens Resort and Convention Center for NASA's annual investigators' meeting. Many of the fellows presented posters during the conference and several fellows presented work from their First Award Fellowships during NSBRI's Student Session, "Innovation by a New NSBRI Generation". The conference was a success and provided a great opportunity for everyone to catch up and stay connected. See you in January 2015!



Anthony Lau, Ph.D., a 2012 First Award Fellow presented data regarding bone stiffness in mice flown on STS-135. Anthony received First Place in the Postdoc Poster Competition. Congratulations, Anthony!



Frances Meredith, Ph.D., a 2012 First Award Fellow, presents data during the NSBRI Student Session. Frances placed 2nd in the Poster Competition. Nice job, Frances!

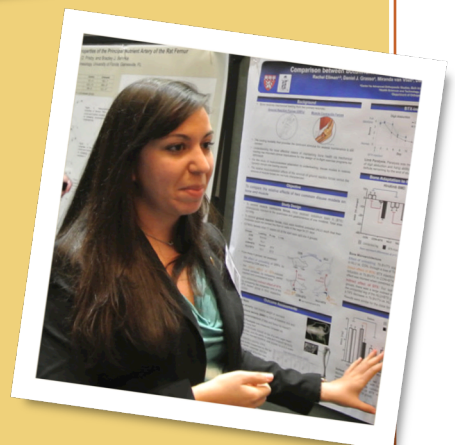
Brandon Macias, Ph.D., a 2012 First Award Fellow, presents his findings on fluid shifts during microgravity.



Michael Lee, Ph.D., a 2012 First Award Fellow, presents his findings on sleep and prefrontal cortex activity at the NSBRI Student Session.



Rachel Ellman, Ph.D., an alumna of the MIT-NSBRI Bioastronautics Program, presents her findings on hindlimb unloading.



10 Steps to a Winning R01 Application

1. Conduct a self-evaluation – If you are a new investigator or entering a new field, you need to start at the beginning (if you are continuing your research, jump to Step 3). Assess what field of research for which you are best qualified. To apply for an R01, you'll need experience and publications (preferably first or last author) in the field for which you are applying. Outside collaborators can help round out the technical expertise that your research demands, but reviewers will still expect you to understand all aspects of your project.

2. Find your niche – In your field of science, you should work to find a unique area where you could conduct research in for ~10 years creating important new knowledge and impacting the field. Make sure that your skills match those required for this particular specialty.

3. Draft specific aims – Focus your niche down to a single project. Write 2-4 (3 is most common) specific aims that you can accomplish within the time frame (4-5 years) of the grant and the resources available to you. Try to make the specific aims hypothesis-based instead of descriptive. Also try to avoid writing them such that the result depends upon only one outcome (e.g. A causes B, causing the project to end if A doesn't cause B).

4. Identify a study section – The NIH has standing study sections, which are responsible reviewing applications. Somewhat analogously, NSBRI has research teams. In the cover letter of your application you may request which study section you would like. If you are uncertain, you may contact a committee's Scientific Review Officer (SRO) to see if your proposal would be appropriate and appreciated by a specific study section. The roster of reviewers on each study section can also be viewed online:

<http://public.csr.nih.gov/StudySections/Standing/Pages/default.aspx>.

5. Size up your specific aims – At this point it is necessary to flesh out your specific aims. Ask yourself if they are clear, high-impact, innovative, and lend themselves to testable hypotheses. Finally can you justify them with preliminary data? Once you have your aims, determine to what institute you will direct your submission and get in touch with a Program Officer or PO. These scientists are responsible for the scientific portfolios of each NIH agency and can provide valuable feedback regarding funding mechanisms, study sections, and general guidance for your submission.



6. Outline your experiments – With your specific aims you can start drafting out experiments, timelines, and anticipated outcomes. Make sure that your experiments meet the objectives of the aims and are reasonable with the expertise and resources available to you within the available time frame. Finally, try to consider potential pitfalls and alternative approaches.



7. Build your team – Make sure you have the necessary expertise to complete all aspects of the project. Consider bringing in co-investigators, consultants, or even another PI. Further, be sure that each collaborator's role is justified and that his/her effort is an adequate representation of his/her role in completing the project.

8. Define resources – At this point, reassess if you have sufficient resources available to you to complete what you are proposing. If you don't have access to certain equipment or samples, explore other options for sharing it with another investigator or requesting funds to buy it in your application. As a new investigator, it is important that you demonstrate that equipment, office space, or even technician help is available specifically for your project.

9. Nail your budget – Go back and make sure that your plans are within the limits of the budget you're planning. Keep in mind that for most applications, personnel costs are typically the biggest expense.



10. Write to excite – Now that you designed a feasible and well-defined project that will interest your reviewers, begin writing. Convince your readers that you understand the problem, are capable of performing the research and have access to all of the necessary resources and expertise. Write for both those that are subject matter experts in your field and those that are experts in related fields.

Finally, remember to start early! NIH has three submission deadlines per year, but no late applications are accepted. Additional information on grant writing can be found here:

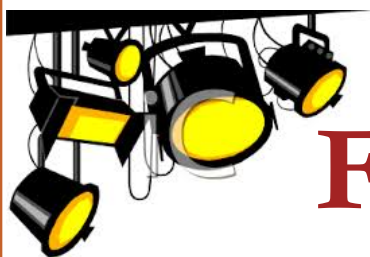
http://www.hhmi.org/sites/default/files/Educational%20Materials/Lab%20Management/Making%20the%20Right%20Moves/moves2_ch9.pdf#page=3 ■

Space Policy News

On March 5th, NSBRI investigators, fellows, and students gathered on Capitol Hill in Washington, DC to present their research and technologies to Congressional members and staffers. The two-hour demonstration event in the Capitol Visitor's Center included hands-on demonstrations with NSBRI-funded technologies, such as ultrasound for kidney stone removal (pictured top right), research-related resources and scientific papers, and informational tables describing NSBRI's various programs, including the Education and Outreach table that included former and current students and fellows ready to discuss the career benefits of NSBRI's education programming. On July 24th, NSBRI investigators, fellows, and students attended the House Committee on Science, Space, and Technology's hearing regarding the benefits of research on the ISS and ground-based space life sciences research programs. ■



Clockwise from top:
Dr. Bailey's ultrasound research team, including fellow, Julianna Simon; Ray Boudreaux, alumnus of NSBRI's Space Life Science graduate program at Texas A&M; former and current fellows at the Education and Outreach table (L to R): Ronke Olabisi, Astronaut Jay Buckey, Rachel Ellman, Catherine Davis, Jeff Willey, and Josh Swift.



Fellow Spotlight



Torin K. Clark, Ph.D.
2013 First Award Fellow

Project Title:
Predicting sensorimotor adaptation to altered gravity by measuring vestibular perceptual thresholds

Harvard Medical School
Massachusetts Eye and Ear
Infirmary
Sensorimotor Adaptation Team
Mentor: Daniel Merfeld, Ph.D.

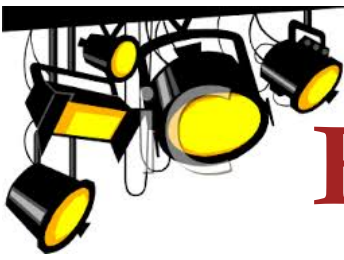


QN: Can you describe your NSBRI-funded research? **TC:** My research focuses on understanding astronauts' sensorimotor adaption to altered gravity environments. While all astronauts eventually adapt to these new gravity environments, there are substantial individual differences in how quickly and effectively they adapt and how intense the sensorimotor impairment is during adaptation. We hypothesize that noise in our orientation sensors, particularly in the vestibular system, prevents the brain from knowing immediately when the environment has changed and adaptation is appropriate. Thus we expect individuals with high orientation sensory noise levels to take longer to adapt and vice versa. To test this we measure human subjects' noise levels using vestibular perceptual thresholds and then measure how quickly they adapt to altered gravity environments. We hope to deliver to NASA a tool that will allow them to predict pre-flight which astronauts may have trouble adapting to the altered gravity environments experienced on space exploration missions. **QN:** What are



Torin and his fiancée, Allie

your future career goals? **TC:** I would like to pursue a career in academia as a faculty member. Combining research and teaching of space life sciences is my passion. **QN:** Do you have any major accomplishments to tell us about? **TC:** As a post-doctoral fellow I received the 2014 Stanley Roscoe Award for Best Doctoral Thesis from the Aerospace Human Factors Association (AsHFA). My thesis was entitled, "Human Perception and Control of Vehicle Roll Tilt in Hyper-Gravity," and my post-doctoral research hypothesis came from my PhD research. **QN:** Do you have any advice for those students wanting to apply for the NSBRI First Award? **TC:** Start early! Sometimes great ideas and science can take awhile to develop. A good proposal is often the result of much iteration; plus there is a lot of paperwork and items you need from other people, which may take longer than expected. I would allot at least 4-6 weeks! **QN:** How do you spend your free time? **TC:** I enjoy skiing, hiking/backpacking/camping with my fiancée, Allie. I also have fun applying some of the statistical techniques from my research to sports analytics where we try to debunk (or prove) NFL clichés (e.g., icing the kicker), resulting in MIT Sloan Sports Analytics Conference publications. ■



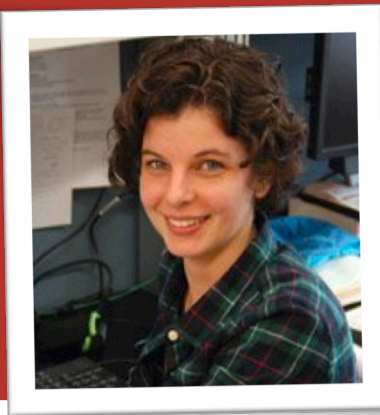
Fellow Spotlight



Alix C. Deymier-Black, Ph.D.
2013 First Award Fellow

Project Title:
Effect of unloading on the structure and mechanics of the rotator cuff tendon-to-bone insertion

Washington University
Department of Orthopaedic Surgery
Musculoskeletal Alterations Team
Mentor: Steve Thomopoulos, Ph.D.



QN: Can you describe your NSBRI-funded research? **ADB:** The attachment of tendon-to-bone is prone to tearing leading to pain and decreased performance. Due to the sensitivity of the musculoskeletal system to its loading environment long-term changes in mechanical loading on joints, such as may be experienced during extended space travel, will lead to modifications in the tissues' structural and therefore mechanical properties. I am examining the multi-scale structural and mechanical changes in the rotator cuff attachment with unloading. I am using a number of cutting edge techniques such as TEM-EELS, Synchrotron XRD, Combined AFM/SEM mechanical testing, and high resolution microCT to investigate how unloading affects the attachment site at the nano-, micro-, and macro-scale. The result will help explain how organization of the mineral within and outside of the collagen fibril, as well as across the mineral gradient, contributes to the mechanics of this unique tissue interface. A better understanding of structural and mechanical changes will help elucidate techniques for minimizing the risk of

injury. **QN:** What are your future plans and career goals? **ADB:** I would like to become an assistant professor in an academic research institute. In the future I would like to focus my research on how mineralized tissues such as bone and teeth adapt to their loading environments. I am specifically interested in the mineralization process and how mineral composition, structure, and organization can be tweaked to help bones become optimized for their mechanical milieu. **QN:** Can you share some advice for current or future postdocs about your experience thus far? **ADB:** It's a great opportunity to expand your knowledge base. Many graduate students feel very attached to their research and want to continue in their specific field. However, it is extremely important to step out of your comfort zone and learn something new. For me, jumping into a highly biology focused lab after years of engineering was terrifying, but so rewarding! In addition, having a broad base of knowledge and learning to use techniques from different disciplines will make you much more valuable in the job market. **QN:** When you're not in the lab, what other interests do you have? **ADB:** In addition to my work in the lab, I am also a dancer. I am a principal dancer with Consuming Kinetics Dance Company. Although I am principally trained in classical ballet and Jazz, I have expanded my horizons and now also perform contemporary,

modern, hiphop, aerial arts, and Chinese water sleeves. I find that dance helps me tap into the more creative side of my brain, which is great after having to be so analytical in the lab. I'm also married to my wonderful husband, Kvar Black, who is a postdoc in Radiology at Washington University in St Louis. ■



Right: Alix is a principal dancer with Consuming Kinetics Dance Company.

Dollars & Sense

NIH R21 Exploratory/Developmental Research Grant Award

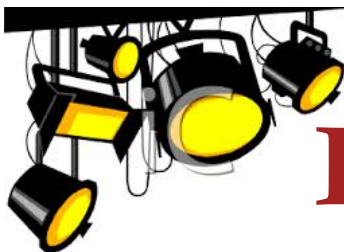
The primary purpose of this award is to encourage developmental/exploratory research by providing financial support for the early or pilot phase(s) of project development. These are investigator-initiated applications, meaning that they are not solicited for by the NIH, but are standardized, such that any investigator with the knowledge and skills to complete the project can apply. The Parent Funding Opportunity for this award is PA-13-303. Here you can determine what NIH Institutes and Centers (ICs) accept R21 applications and if any IC has specific application requirements and/or deadlines.

The R21 award provides up to 2 years of project support, with a combined budget for the two years that may not exceed \$275,000. \$200,000 is the maximum budget that can be requested in one year. Given that this award is meant to encourage developmental/exploratory or proof-of-concept work that will lead to larger grant applications, R21s cannot be renewed. No preliminary data are required for an R21 submission, however, including available preliminary data typically strengthens applications, especially for newer investigators or investigators changing fields.

Eligibility: Must have a faculty-level or equivalent position. Postdocs are not eligible to apply.

Application: The application should adhere to the guidelines described in the SF424 (R&R). Generally, R21 applications are limited to six pages for the various required sections, which include: Significance (background and significance), Innovation, and Approach (preliminary data, research design and methods).

Due dates: Standard NIH dates apply for the parent R21 announcement (PA-13-303). However, several ICs only accept R21s in response to specific funding opportunities; they can be found at this link: <http://grants.nih.gov/grants/funding/r21.htm>



Fellow Spotlight



Julianna Simon, Ph.D. 2013 First Award Fellow

Project Title:
**Improving kidney stone detection
in space analogs**

University of Washington
Department of Mechanical
Engineering
Smart Medical Systems and
Technology Team
Mentor: Michael Bailey, Ph.D.



QN: Can you describe your NSBRI-funded research? **JS:** The goal of my project is to enhance the color Doppler ultrasound "twinkling artifact" for kidney stone detection. B-mode or standard ultrasound images are generally greyscale, but the twinkling artifact appears as rapid shifting color that can selectively highlight hard objects such as kidney stones. While twinkling has the ability to improve kidney stone detection, its inconsistent appearance has limited its use in the clinic. Recently, it was found that crevice bubbles on the stone surface is what causes the twinkling artifact to appear, which are going to be very sensitive to the changes in gravity and pressure that occur with space travel. I am working on developing protocols to improve kidney stone detection in space. **QN:** What are your future plans and career goals?

JS: For my career, my first choice would be to find a position in NASA where I can use my experience with ultrasound to help develop and transition ultrasound therapies to flight-ready medical capabilities. **QN:**

Can you share some advice for those individuals wanting to apply for the First

Award

program? **JS:** My advice would be to make sure and use the bioastronautics roadmap to identify a risk or gap and write the application towards that risk. Make sure to find a great mentor and talk to others with a history of funding with NSBRI. Then, write and rewrite until you have a clear proposal! **QN:** When you're not in the lab, where else can we find you? **JS:**

I grew up in the small town of Leavenworth, WA, which is located at the foothills of the Cascade

Mountains in Washington. I am an avid equestrian and spend a

lot of time, when not in the lab, with my horse, Tiny, with whom I currently compete in dressage. I also have two cats and enjoy playing the piano and reading in my spare time. ■



Julianna and Tiny during a competition

Calendar of Events

January 12-16th 2015

- NASA HRP Investigators' Workshop in Galveston, TX
- Behavior, Health, and Performance Working Group meeting (Jan. 16th)
- NASA Space Radiation Investigators' Workshop (Jan. 12th-14th)

Comments, Questions, & Suggestions

The current NSBRI Frist Award Fellows created this newsletter and participated in editorial duties.

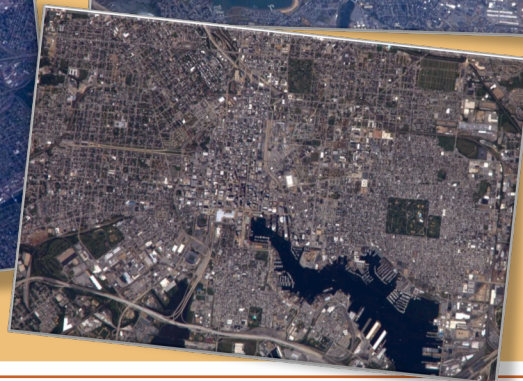
If you have suggestions for future newsletter topics or know a First Award Fellow or other NSBRI researcher who you would like to see featured here, please let us know!

Send any comments, questions, or suggestions via email to Amanda Smith Hackler, Head of Career Development and Outreach at hackler@bcm.edu.

Space Fun: Follow Astronaut Reid Wiseman on Twitter!



“Currently living on the ISS in low earth orbit,” is how Wiseman describes himself on Twitter. Join him as he tweets amazing pictures of various cities from space. Can you name the American cities pictured below that he’s shared on Twitter?



Clockwise: Boston, MA; Baltimore, MD; New Orleans, LA