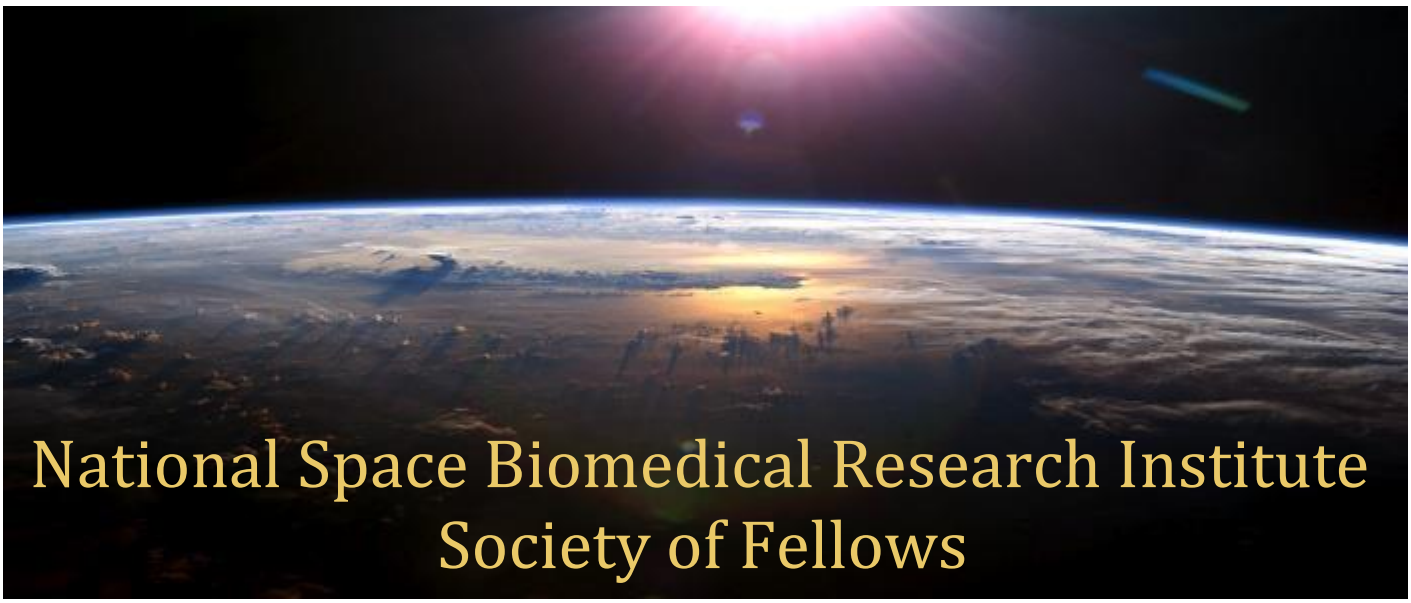


National Space Biomedical Research Institute
Society of Fellows

Quarterly Newsletter

Information for First Award Fellows Spring 2015

Hints for a Successful K-grant

Interviews with two recent recipients

Julianna Simon, Ph.D
2013 NSBRI First Award Fellow

As you're careening through your undergraduate years, graduate school, or even during your postdoc, I'm sure the thought hovering in the back of your mind is, "What do I want to do next?" The two broadly classified routes are academia or industry. But how do you go about getting one of those coveted positions? Well, if you'd like to become a professor, a postdoctoral fellowship from NSBRI and/or a K-grant can give you a huge leg-up! But how do you get them? I asked two recent K01 recipients from my lab, Drs. Adam Maxwell and Tanya Khokhlova, to give me the inside track in how to get a K-grant.

Continued on Page 3

In This Issue

HRP Recap: Innovation by a New NSBRI Generation

This January, many of us headed down to Galveston TX for the annual HRP Investigators Workshop. The "Innovation by a New NSBRI Generation" was an afternoon workshop focused on showing the unique work and opportunities afforded to the NSBRI fellows. A number of Fellows were selected to present their work and share their experiences with others at HRP.

Justin Lawley, Ph.D., a 2013 First Award Fellow presented his work on the effects of weightlessness on intercranial pressure.

Alix Deymier-Black, Ph.D., a 2013 First Award Fellow presents her work on the micromechanics of the tendon-to-bone attachment.

Julianna Simon, Ph.D., a 2013 First Award Fellow, discussing twinkling of kindney stones in space.

Torin Clark. Ph.D.. a 2013 First Award Fellow presents his work on vestibular perceptual threshholds.

Hints for a Successful K-grant

Interview with Dr. Adam Maxwell

JS: What made you decide to apply for a K grant?

AM: I'm interested in pursuing independent research, but transitioning from a postdoc to an independent research position can be difficult. The K grant is very appealing because it provides support for this transition by allowing you to dedicate time to develop research skills, as well as other career development activities that are needed to become an effective principal investigator.

JS: How did you choose your mentor?

AM: I am pursuing research to develop a new ultrasound-based method to noninvasively fragment kidney stones. Since my field is interdisciplinary, I chose to have a team of three mentors – a research engineer and two urologists who are at different points in their careers. The team members are complementary in both their scientific knowledge and their experiences with career development. Combined, their background covers the areas I wanted to develop in my proposal. I think it's most important, whether you have one member or three, that the mentors have the capabilities and background to support you on all the aspects of your proposal.

JS: Do you have any helpful hints on applying for the grant?

AM: Do a lot of research prior to writing. Find examples of successful proposals. Find others who have applied for a K grant and seek out their advice on specific parts of the proposal. Find faculty who have been on the review boards for these sorts of grants and ask them what they look for in the proposal. Study the program announcement very thoroughly. Additionally, make sure you work with your mentor(s) in preparing the research plan and career development plan. It should be clear what their role will be in their letter and in your written plan. It is important that you are coordinated and it will be obvious to the reviewers if you are not.

JS: What component of the grant do you feel is most important in terms of getting selected?

AM: For me, it was important to spend a lot of time on the career development plan. As a researcher, I have a tendency to want to spend a lot of time thinking and writing about my scientific work, and not as much time focusing on my career plans. Although the reviewers will not necessarily focus on this part in particular, it took a lot more preparation for me to write it clearly and write it well. My research proposal was easier, as I had previous publications I could refer to as a start for outlining this section.

JS: What does receiving a K01 mean in terms of your future career goals?

AM: The K grant does not necessarily change my future goals, but allows me to focus on these

Hints for a Successful K-grant

goals. These include developing my research to the point where I can successfully compete for R01 funding, obtaining a permanent academic position, and learning other skills I need to create and manage an independent research program.

Interview with Dr. Tanya Khokhlova

JS: What made you decide to apply for a K grant?

TK: For me this was a long-planned decision, because I received an NIH's T32 postdoctoral fellowship previously, and an application for a K award is, to an extent, expected from the T32-awardees. It is one of the NIH's standard paths that they like to see.

JS: Which NIH institute did you apply to?

TK: My K grant application had to do with the conditions of the prostate - determining between benign prostate hyperplasia and prostate cancer. I therefore initially applied to NIDDK (digestive, diabetes and kidney) that includes benign conditions of the prostate. However, my application was rerouted to NIBIB after the submission, and that is where it got funded.

JS: How did you choose your mentor?

TK: For my award I have three mentors, because it is a very multidisciplinary project, and I therefore have a mentor who supports each of the aspects: clinical, biological and acoustic engineering. My primary mentor was also my mentor on the T32 fellowship previously. My understanding is that the mentors are expected to be well-established researchers in the corresponding field, and have the necessary resources to help you accomplish the proposed project, since you don't have your own lab resources yet.

JS: Do you have any helpful hints on applying for the grant?

TK: It is always a good idea, before you even start the preparation of the application, to call or email the PO in your institute of choice and ask him/her about the specific requirements and whether the project you have in mind would fit the requirements. They often have helpful suggestions as to what type of projects get funded at the moment, how much preliminary data you need, who the mentor should be, etc. Also, leave ample time for preparation of research part of the application - about a month of just writing it (not counting gathering of preliminary data, etc). Enough attention should be paid to the "career development plan" portion. Good idea to discuss it with the PO and the mentor.

Hints for a Successful K-grant

Mine was very underdeveloped and got negative comments from all three reviewers. Do NOT waste your time on working on the "non-creative" parts of the application (e.g. facilities and resources, filling in the administrative blanks in the application form etc). Talk to your administrator in advance to see which parts he/she can help you with, and which parts need your input.

JS: What component of the grant do you feel is most important in terms of getting selected?

TK: It seems like in my case the most important parts were the specific aims page and the research plan. My career development plan was very underdeveloped and got bad reviews, but not bad enough to not get selected. I focused the most on the specific aims page, which is a common thing to do in any NIH grant writing. In my view, it has to be picture-perfect, and the reviewers need to love the idea. Everything else is downstream from there. Also important is to have enough relevant publications in your biosketch, as well as ones for your mentors, so that the reviewers are more confident that you will succeed in the current project, based on the previous track record.

JS: What does receiving a K01 mean in terms of your future career goals?

TK: Receiving any K award is a great launching site for obtaining independent funding, so if your future career goals include academic research, this is a great place to start. You have ample time for independent investigation and collecting preliminary data for your own R-series grants. You also get a status that allows you to apply for these grants (postdocs can not apply for R01s). Having received a K award is also a great selling point in finding junior faculty positions because the non-mentored phase is transferrable, so you arrive with your own funding.

Congratulations to Two of our First Award Fellows who won Poster awards at this years HRP Investigator's Workshop

Alix Deymier-Black (left) and Julianna Simon (right) with Dr. Jeffery Sutton

Thoughts from the Top: Mark Shelhamer, Sc.D.

What is your official title? Chief scientist of NASA HRP. **And what exactly does that entail?** The position includes maintaining scientific integrity of NASA's human research and comprehensive oversight of the scientific program. I try to make sure the science doesn't get lost amongst the machinery. **Describe your "average day" at work**. It is difficult to describe a typical day because it is very wide spread. There are lots of meetings. Different than an academic position, I don't generate new knowledge, but instead try to transfer knowledge. I represent HRP and NASA to external groups such as NSBRI, standing review panels, CASIS, NIH, etc. I oversee the grant review and selection process. Overall, I work to make sure we are doing the right science given the constraints we have, to meet the goals that NASA has provided. **What is the most challenging part of your job?** Finding the time to think more broadly and plan ahead while still doing the many tasks that come along day to day. **How about the most exciting?** Having the opportunity to get a broad overview across a broad range of areas. For example, HRP spans from physiological through behavioral/psychological, all the way to medical conditions, such as figuring out what medical conditions we may need to address on the way to Mars, which may be in 20 years, but which we need to plan for now in terms of vehicle design. The most exciting part is seeing the inter-connection between areas, which is exciting intellectually, plus if we identify connections we can better develop countermeasures. **In your opinion what is the most serious biomedical threat for astronauts venturing to Mars?** The most serious threat is the problem that we have not thought of. Our real job is not only to mitigate known risks, but also to make sure crews have tools, as individuals and a team, to address things we have not thought of. **Describe a NASA HRP science research project that you find particularly exciting.** Behavioral health and performance issues may be amongst the most serious for a Mars mission. But there is a limit in what you can do in an experimental session on the ISS. For example, we can't deliberatly inflict stressors. So we use a lot of analogs, such as HERA (Human Exploration Research Analog). In that facility, we run week, month, etc. long missions. We lock four people in and control stressors, food, etc. In these types of experiments you can study team cohesion and psychological issues in a controlled environment and see the interactions **Any advice to bioastronautics students or post-doctoral fellows?** Find something you like and get really good at it, while at the same time keeping your eyes on the broader picture. You need to be an expert in something, but don't be too narrowly focused. **Any changes/things to look forward to in the future for NASA HRP?** We are going to be using much more extensive use of analog facilities, in part because ISS is over-booked for crew time, but also because they provide an opportunity to do great interdisciplinary research.

Stories of Success: Anthony Lau, PhD

Congratulations on your new position at The College of New Jersey! How does it feel to be a First Award success story? Thanks! I am really excited about starting the next chapter of my career.

Have you always known that you wanted to become faculty? What were the factors that lead you to pursue this career? I've always enjoyed teaching others, so becoming a professor has always been on my mind. I have many interests and temporarily considered other career choices at various points throughout my career. However, my NSBRI fellowship experience helped solidify my interest in becoming a professor as I began taking on an increasing number of professor-like responsibilities. It confirmed how much I really enjoy teaching and mentoring students! **How was the job application process? Do you have any tips for other fellows applying for faculty positions?** It was quite a long process. First, there was the application package (Cover Letter, CV, Research Statement, and Teaching Statement), followed by a phone interview with the search committee. Then, there was an on-campus interview consisting of many meetings. I met with other faculty members, the department chair, the vice-provost, the search committee, and the dean. In addition, I gave a lunchtime seminar talk to interested undergraduate students and faculty. My advice to other fellows is to start looking and applying for positions early (August), and have the bulk of your materials prepared before you start applying. A couple of great websites for finding these positions are the Chronicle of Higher Education and AcademicKeys. Also, have a seminar talk already prepared in case you get an on-campus interview. You might not have much time to prepare after they offer you the interview, and you should be spending most of that time researching the school, the department, and all the people you'll be meeting. In addition, do some research on the public university salary databases for that dreaded question about salary expectations. And finally, have all your questions for the school written down and ready to go. The "Do you have any questions for us?" question is more important than it may sound.

Continued on pg 8

What made you pick the position at The College of New Jersey? I was incredibly impressed by the supportive atmosphere, for both the students and faculty, within the BME department and the school as a whole. I am excited to become part of this wonderful teaching community. **What kind of research are you hoping to pursue as a Professor at TCNJ?** I plan to continue exploring the biomechanics of bone through experimentation and computational modeling. There is a need for new and improved assessments for bone health to better understand bone strength and tolerance to injury. I hope to continue collaborating with other NASA/NSBRI researchers to better understand how these microstructural bone changes affect the overall bone health in astronauts during spaceflight and recovery. **How has your experience with NSBRI helped to prepare you for this next step in your career?** The NSBRI First Award program has been instrumental for preparing me to a faculty job. I have been able to build and run my own computational lab alongside my PI's while mentoring students and creating research opportunities for them. Also, having funds for conference travel was valuable for meeting other researchers to build new collaborations. **Finally and most importantly, you have been a Blue Devil, a Cavalier, and a Ram, how do you feel about becoming a TCNJ Lion?** I'll have one more mascot to add to the collection ;-). When it comes down to it, my loyalty will always remain strongest with my roots, Go Duke!

First Award Fellowship Application due June 5th!

This National Space Biomedical Research Institute (NSBRI) Request for Applications (NSBRI-RFA) is soliciting applications for the First Award Fellowship Program. First Award Fellowships will be competitively awarded for one year in any laboratory in the U.S. conducting biomedical/biotechnological research aligned with NSBRI's goals (Section A). Applications will initially be scientifically and technically peer-reviewed by the NSBRI First Award Fellowship Committee, consisting of a number of eminent scientists that are familiar with space biomedical/biotechnological research. Non-NSBRI as well as NSBRI-supported researchers qualify as Mentors for this competitive funding.

Website: http://www.nsbri.org/FUNDING-OPPORTUNITIES/Current-Announcements/

Fellow Spotlight

Vincent Koppelmans, Ph.D.
2014 First Award Fellow

Project Title:
Exercise Effects on Central nervous System Function and Strucutre in Bed Rest

University of Michigan
Sensorimotor Adaptation Team
Mentor: Rachel Seidler, Ph.D.

QN: Can you describe your NSBRI-funded research? **VK:** For my first fellow project I investigated the potential mitigating effects of aerobic and resistance exercise on head down tilt bed rest-induced brain and behavioral changes. Previous studies have found that astronauts present with gait and balance problems immediately after their return to Earth. Although several factors have been identified that could explain these adverse effects of spaceflight, it is unclear whether these sensorimotor problems are related to brain changes associated with the extraterrestrial environment. This relationship is not unlikely to exist, considering that experimental studies have linked microgravity to brain and behavioral deterioration. The head down tilt bed rest design used in my studies serves as a model to investigate microgravity on Earth because it mimics microgravity in bodily fluid shifts and unloading. However, the focus of my project is to evaluate if aerobic and resistance exercise can prevent or mitigate the detrimental effects of microgravity on the brain and behavior. It has been established that exercise can stave of neurodegenerative processes and even improve brain health. My hypothesis is that supine exercise in bed rest may prevent or mitigate adverse effects of bed rest on the brain. A unique aspect of my study is that I am combining data from two recently finished bed rest studies (i.e., one using MRI to look at the effects of bed rest on central nervous system function and structure and another looking at effects of exercise on physical outcome measures) that were simultaneously conducted in the same group of subjects. Therefore, I have a large set of outcome measures readily available, which allows me to investigate the effects of exercise on brain function and structure in bed rest from different perspectives. **QN:** What are your future plans or career goals? **VK:** In the long run, I would love to continue working in academia and ultimately run my own cognitive neuroscience lab. On shorter notice, I am excited to further explore the association between spaceflight and brain function and structure. In another study that is being conducted in parallel

with my first fellow project we aim to unravel brain and behavioral changes as a function of spaceflight. We are currently in the process of collecting data. So far, we have gathered pre-flight data from several astronauts and we are preparing to collect data from our first returning flight subject. It will be fascinating to validate the results from our head-down tilt bed rest study with those from the flight study. **QN:** Do you have any tip or piece of advice you would like to share with current or future postdocs? **VK:** If you are looking for a postdoc position, consider applying in labs abroad. The time in between finishing your PhD studies and landing a faculty position provides an ideal opportunity to travel the world and explore other cultures while at the same time you can be productive and pick up new skills. Post doc positions can be relatively short-term and once you transition into a faculty position it will become much harder to spend time abroad for longer periods of time.

Vincent in front of the Pyramid of Chichén Itzá, Yucatan, Mexico

QN: What do you do outside the lab? Do you have any particular hobbies or interests? **VK:** I love to travel! I try to make at least a few short trips each year. I am equally fascinated by national parks, historical landmarks, and modern cities. During one of my recent trips I drove from Miami to Key West, stopping by several state parks. **QN:** What motivated you to apply for this fellowship in biomedical space research? **VK:** Before I applied for the NSBRI first award fellowship I was already working with bed rest data. I was intrigued by preliminary results showing structural brain changes over the course of bed rest that made me want to explore preventive measures. Applying for the fellowship was therefore a logical step that eventually allowed me to fulfill this desire. ■

Fellow Spotlight

Kathleen Jagodnik, Ph.D.
2014 First Award Fellow

Project Title:
Improving the Efficacy of Resistive Exercise Microgravity Countermeasures for Musculoskeletal Health and Function using Biomechanical Simulation

Nasa Glenn Research Center
Digital Astronaut Project
Mentors: Beth Lewandowski, Ph.D. and Amanda Smith Hackler, Ed.D.

QN: Can you describe your NSBRI-funded research? **KJ:** I am using computational musculoskeletal modeling to develop resistive exercise prescriptions to maintain astronauts' health while in space. Astronauts who are exposed to extended durations of microgravity environments experience muscular atrophy, loss of muscle strength, and decreases in bone density. These issues can lead to an increased risk of bone fractures, loss of mobility, and may compromise the astronauts' ability to complete their missions while in space. Resistive exercise routines are presently employed by astronauts in space; however, to date, these exercise regimens have been insufficient to maintain the required levels of musculoskeletal function. The Lewandowski group at NASA Glenn Research Center in Cleveland, which I have joined, aims to develop improved prescriptions for resistive exercises that can help the astronauts to maintain their health while in space. Such prescriptions will describe the exercises to be performed, the resistance to be applied, the number of repetitions, and a variety of parameters related to particular exercise techniques (e.g. stance width, cadence, grip characteristics). The basis of our modeling efforts are data collected from human subjects performing the exercises of interest, using motion capture, EMG, force plates, and other metrics. Our musculoskeletal simulations allow us to perform experiments that often would not be possible to measure in a laboratory setting. Our research employs a resistive exercise device called the Hybrid Ultimate Lifting Kit (HULK), which permits a wide range of resistive exercises to be performed while featuring a small, mission-suitable footprint. I am also contributing to Dr. Lewandowski's work to develop an advanced mathematical model of human muscle that incorporates the changes in muscle properties due to time spent in space, as well as the contributions of the performance of exercise over an extended period. Developing this model will allow more accurate predictions from our musculoskeletal simulations concerning which exercise interventions will be the most useful. **QN:** What are your future plans or career goals**? KJ:** I would love to remain in research following my postdoctoral fellowship. I am very interested in the

human musculoskeletal system, and would be excited to continue pursuing work that aims to improve and optimize human health through the study of physiology and movement. **QN:** Do you have any tip or piece of advice you would like to share with current or future postdocs? **KJ:** I have found it useful to stay current with a range of news related to various professional organizations, scientific publication updates, and career development resources. I try to make time to read widely in an attempt to be aware of all of the research developments that are being reported, in order to be able to situate my own work in an accurate context and to plan for future projects. You never know when developments in a research field that is completely unrelated to yours will provide you with insights into your own work. **QN**: What do you do outside the lab? Do you have any particular hobbies or interests? **KJ:** I am an academic at heart, and when I'm not working on my fellowship research, I love to learn new skills via massive open online courses (MOOCs). To date, I have completed several dozen courses ranging from music composition and theory, to bioinformatics, epigenetics, genomic medicine, systems biology and microbiome studies. I am continually awed by the scope of topics being offered on these MOOC platforms, often for free, by many of the top researchers and universities. My long-term aim is to try to incorporate some of these newly-learned skills and disciplines into my research, and to develop and participate in collaborative projects that will allow me to extend my knowledge of these topics. I also enjoy spending time with my 4-year-old nephew, Joseph, who is endlessly intrigued by mechanical systems and who appears to be a budding engineer. :) **QN:** What motivated you to apply for this fellowship in biomedical space research? **KJ:** I have always been keenly interested in studying the human musculoskeletal system with an aim to improve human health, and this opportunity to enhance astronauts' muscular function and bone health was very appealing to me. I also appreciate that this research in developing resistive exercise prescriptions can ultimately benefit earthbound humans, as well; for example, aging or disabled populations who must find a way to maintain their strength and bone health despite their physical limitations.

Kathleen with her nephew, a future engineer!

Calendar of Events

June 5th: Deadline for First Award Fellow Applications

Comments, Questions, & Suggestions

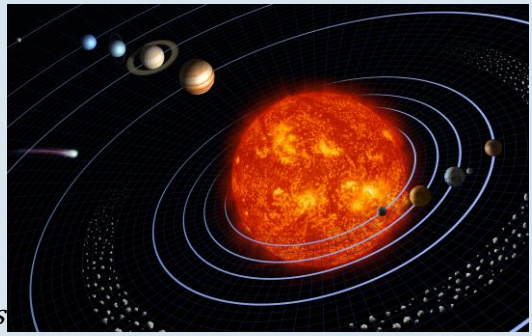
The current NSBRI Frist Award Fellows created this newsletter and participated in editorial duties.

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 Alix Deymier-Black, Newsletter Editor at alix.c.black@gmail.com or Amanda Smith Hackler, Head of Career Development and Outreach at hackler@bcm.edu.

Space Fun: Can you figure out these rhyming riddles.

1. What's up I'm ____ -- I'm red as rust. Topped with canyons and craters all covered in dust. I got 24 hours in my day. And I'm a lot like Earth some scientists say.
2. I've got a nickname, it's *Morning Star.* And I'm covered in clouds that are thick as tar. There are volcanoes all over my surface. Forgive me if I'm volatile, it's not on purpose.
3. Some like to call us satellites. There's hundreds of us in the sky. More discovered every day, lighting up the darkest nights. Some of us are icy. Some are dust and rock and stone. Some of us have really cool names. Some of us are unknown.
4. I'm No. 1. I go around the sun. In just 88 days, I get cold and then I blaze. I'm not tilted or wilted 'cause I got no air. Covered with craters so please don't stare.



Riddles courtesy of http://solarsystem.nasa.gov/kids/index.cfm?Filename=oss_kids

1) Mars 2)Venua 3)Moons 4)Mercury