



Center for Cancer Research
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CCR Fellows & Young Investigators Newsletter



Finding Your Niche

I have always seen the science field as a kind of ecosystem that requires some acclimatization and ongoing self-evolution to survive in. We as trainees at NIH can definitely attest that we are all small fishes in one large pond. So how

CCR-FYI Association is supported by the CCR Office of the Director, National Cancer Institute.

***From the Editor-in-
Chief's Desktop***

Anna Serquiña

does one become a big fish of distinction without getting lost? Or should we all relocate into smaller ponds?

As part of an ongoing dialogue regarding career development and career exploration, we feature the NCI EXPOSE program, of which Kyster Nanan reports on as one of the pilot participants. We also have Amanda Decker discuss the pros and cons of whether postdoc training is really required in one's career trajectory. Lastly, we have Abbey Zuehlke and Jailynn Harke writing about the networks available at NIH for both postdocs and postbacs.

We have a publication spotlight in this edition, reported by Namratha Sheshadri, so that we can aspire to submitting that next manuscript to Nature.

We hope that these articles give you food for thought and familiarize you with resources to help you in your search for your place in the sun.

(View from NIH Library, Building 10, photo by Anna Serquiña)

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NCI's Explore On Site Program

Offers trainees the “EXPOSE-ure” they need to succeed in non-academic careers

By Kyster K. Nanan

Like many of our readers, my career aspirations have taken wild swings during my youth (ex. from firefighter to astronaut, rally car driver to world-class chef, etc.). In retrospect, it seems like I may not have had a really solid career plan at all. The shapeless mass that was my career path adopted a more recognizable form, however, once I

started university: I would simply strut onto the tenure track and become a university professor. Super straightforward, right? Well, I soon realized that there was one major problem with my plan and it was that *all of my peers had the exact same plan!*

There are many, often bitter, editorials referencing the current

shortage of tenure-track academic positions, thereby precluding the need for me to delve too deeply into a subject about which most contemporary trainees are already keenly aware. This dwindling supply of tenure-track positions has prompted an exodus of doctoral level scientists from the traditional academic course to pursue a variety of so-called “alternative” careers.

The new reality of the alternative career path is slowly being recognized by colleges, universities, and other training institutions where many new career development options, aside from the typical grant-writing workshops, are being offered. One such initiative is the National Cancer Institute’s Explore On Site (EXPOSE) program, which accommodated 19 trainees earlier in 2016. I recently interviewed the program’s founder and Associate Director at the Center for Cancer Training (CCT), Dr. Julie Mason, to learn more about the inception of EXPOSE, the principles behind its design, and whether the program met her expectations.

While 2016 was the inaugural year for the program, Julie first proposed the idea of EXPOSE to her supervisor, Dr. Jonathan Wiest, over two years ago. Julie and other career development professionals at CCT put their heads together to carefully craft a unique program that would address the main barriers to success facing biomedical trainees at the moment, which includes the imbalance in the supply and demand for tenure-track academic positions

and the fact that many trainees may be neither aware nor prepared for the non-tenure-track careers that are out there.

The NIH training community has done well to inform trainees of career options, a task achieved mainly through testimony of invited speakers from various sectors of the business, education, and biomedical workforces in an informal, seminar-style setting. Julie reasoned that there may be value to be gained if, instead of having professionals stop by the campus to speak, trainees had the opportunity to visit the workplace of these individuals so that they may catch a glimpse of their daily lives *in situ*. This idea became the core principle of EXPOSE and, as a result, its participants had the opportunity to visit local public- and private-sector organizations to get a sense of the daily proceedings.

One of the main limitations of many Ph.D. programs is that they often fail to promote the development of so-called “soft skills,” which, frankly, is an invaluable asset whether you are planning to travel down the tenure-track or not. Recognizing this shortcoming, Julie incorporated a number of in-class interactive workshops into EXPOSE prior to the actual site visits. EXPOSE workshops were led by career development professionals such as Dr. Lori Conlan of the OITE and Dr. Randall Ribaud, co-founder of SciPHD, an organization that specializes in training scientists who wish to transition from academic to

non-academic careers. Workshop participants learned how to find and evaluate job postings, create a targeted resume, and effectively leverage their scientific skills during the job application process. Additionally, EXPOSE workshops also intimated the importance of establishing a personal “brand,” building an effective professional network, and possessing impeccable communication skills. By cleverly engineering these sessions into the front end of EXPOSE, Julie made sure that participants had an opportunity to put into practice what they learned in the workshops during the very first of their site visits.

Site visits are the crown jewels of EXPOSE and Julie made sure to include a diverse assortment of public- and private-sector organizations on the roster, such as the FDA, MedImmune, the NCI Shady Grove Research Administrations Office, AAAS, and QIAGEN. While each EXPOSE site visit was unique, they shared a common format wherein a group of representatives from different divisions within the organization would first connect with EXPOSE participants in a mostly didactic fashion and then provide a guided tour of the facilities, where applicable. For instance, at the Germantown location of QIAGEN, EXPOSE participants had an opportunity to tour the factory and witness the assembly-line procedure and quality-control measures that goes into manufacturing QIAGEN kits and reagents. At MedImmune, a pharmaceutical company in

Gaithersburg, trainees were offered a virtual reality tour (for safety reasons) where they were able to explore the facilities and “meet” with employees going about their daily business within the company, including scientists who were performing research at the bench and others in charge of assaying and packaging pharmaceuticals in their manufacturing facilities. Through the site visit component of EXPOSE, participants were immersed in the environments of these organizations and, thus, could garner a more visceral understanding of daily life at these institutions.

As my interview with Julie drew to a close, I asked whether EXPOSE met her expectations as a whole. Julie pointed to a set of pre- and post-EXPOSE surveys filled out by participants that she used as a tool to help gauge the success of the program. Rewardingly, the results of the survey showed that an overwhelming 90% of participants were “highly satisfied” with EXPOSE, whereas the remaining 10% were “somewhat satisfied” with their overall experience. Survey results also showed that after EXPOSE, participants had a 200% gain in their understanding of how to connect with potential employers and what daily life entailed for a subset of non-academic scientists. Additionally, while there were no formal surveys conducted with the host organizations, they all had positive remarks about the program and some even indicated their interest in pursuing a long-term partnership with the NCI and

“...trainees had the opportunity to visit the workplace of these individuals so that they may catch a glimpse of their daily lives in situ.”

EXPOSE. Finally, I asked Julie the burning question that many of you may be wondering, especially if you are thinking of pursuing a non-academic science career: Are there plans for another round of the EXPOSE program? And Julie's response was – wait for it... -- YES! The overwhelming success of the program and massive amount of

positive feedback has prompted plans for EXPOSE 2.0. The upcoming iteration of EXPOSE will include a rejigging of the preparatory workshops and opportunities for additional site visits with a more diverse array of organizations.

Lipolysis Pathway: The Achilles' Heel of Cancer Stem Cells

By Namratha Sheshadri

Cancer stem cells have been implicated in chemotherapy resistance and relapse, which are the leading causes of cancer-related death. A recent study from Dr. Steven Hou's Laboratory published in *Nature* (October 6th 2016) reports the crucial dependence of cancer stem cells on the lipolysis pathway to support the cellular energetic requirement. Dr. Singh and colleagues have demonstrated that Arf1 inhibitors can block the lipid catabolism pathway and effectively eradicate cancer stem cells by starving them.

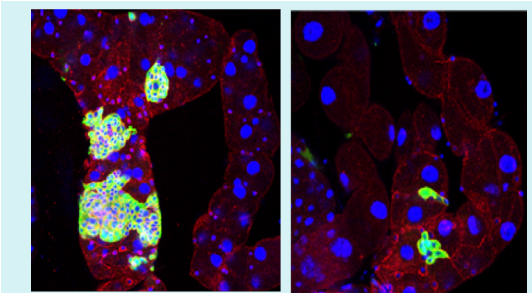
Using the *Drosophila* model system, the Hou laboratory is focused on identification of key signaling pathways that regulate stem cell survival. In fact, they were the first to report the identification of kidney (Singh et al., *Cell Stem Cell*, 2007) and gastric stem cells (Singh et al., *Cell Cycle*, 2010) in *Drosophila*

using an *in vivo* system. They have developed models to study neoplastic tumors in *Drosophila* which resemble advanced human cancers. Through a genome-wide RNAi screen, they have discovered a metabolic pathway that provides a unique survival advantage to the transformed stem cell repertoire, including the intestinal stem cells, renal and nephric stem cells and hindgut intestinal stem cells. In this landmark paper, they describe that the Arf1-mediated utilization of lipid content is critical for stem cell survival. The screen also pin-pointed the enzymes acyl-CoA synthetase long chain (ACSL) and bubblegum (bgm), a very long-chain fatty acid-CoA ligase, to be important for lipolysis. Owing to the higher lipid content and utilization in transformed stem cells compared to normal stem cells, Singh et al. proposed the use of Arf1 inhibitors to selectively target stem cells in cancer.

Further, they have characterized necrosis to be the mechanism of cell death of these transformed stem cells upon attenuating Arf1-mediated lipolysis. Necrotic cells were subsequently cleared by the surrounding enterocytes by JNK-activated autophagic pathway. The authors also validated the effectiveness of Arf1 inhibitors and fatty acid oxidation inhibitors to inhibit stemness phenotypes in human cancer cell lines.

While elevated glycolysis and glutamine addiction have been previously reported in cancer cells, this article highlights the importance of lipid metabolism in cancer stem cells. For more details, please refer to the full article: The lipolysis pathway sustains normal and transformed stem cells in adult *Drosophila*. **Nature** 538, 109–113 (06 October 2016) doi:

10.1038/nature19788. The authors of this paper are Shree Ram Singh, Xiankun Zeng, Jiangsha Zhao, Ying Liu, Gerald Hou, Hanhan Liu & Steven X. Hou from The Basic Research Laboratory, National Cancer Institute at Frederick. The lead author, Dr. Shree Ram Singh is a Staff Scientist in the Hou Laboratory since 2011.



DMSO

BFA

Arf1 inhibitor, Brefeldin A kills Ras-transformed renal nephric stem cells.
(Adapted from Singh et. al. *Nature* 2016)

7th Annual National Postdoctoral Association's National Postdoc Appreciation Week (NPAW)

By Abbey Zuehlke, CCR-FYI NPA Liaison

The National Postdoctoral Association (NPA) is a member-driven organization that was created to give a unique, national voice for postdoctoral scholars. Since its creation in 2003, the NPA has worked to build a collaborative postdoctoral community aimed at enhancing the quality of the postdoctoral experience in the United States. In order to achieve this goal, the NPA has

become involved in three key areas: advocacy and education, resource development and community building. Some of the more recent accomplishments of the NPA include four consecutive years of entry stipend increases for the NIH National Research Service Award (NRSA), Nation Science Foundation (NSF)-funded efforts to establish and

conduct a regular, nationwide survey of postdocs, and ongoing support to the White House Office of Science and Technology Policy Graduate Education Modernization Taskforce by providing information on the alignment of advanced training and career options.

On September 19th-23rd, the NPA sponsored a week-long celebration aimed at recognizing the significant contributions of postdoctoral scholars to U.S. research and discovery. Within the NIH, the Center for Cancer Research Fellows and Young Investigators (CCR-FYI) group on both the Bethesda and Frederick Campuses hosted events throughout this week to show appreciation for the role of NCI postdoctoral fellows in scientific advancement. These events included free coffee and donuts, brown bag lunch meet-ups, a social networking hour (Bethesda), and a bowling and pizza night (Frederick).

The National Postdoctoral Appreciation Week (NPAW) activities allowed the NCI postdoctoral community to come together and bond over their diverse roles as research fellows. Our sincere thanks to Melissa Fernandez and Brandi Carofino, who helped make these activities possible on both campuses, and to all the postdocs who participated as well. The CCR-FYI group hopes that the NCI postdoctoral fellows feel a sense of community and appreciation provided by the NPAW activities.

To join the CCR-FYI or NPA,
please contact

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NPAW activities in NCI Frederick included (from top to bottom) a CCR-FYI-sponsored seminar, coffee and donuts meet-up and a bowling night event. Photos by Melissa Fernandez

To Postdoc or Not to Postdoc

By Amanda Decker

As someone who did their undergraduate studies in engineering, I will admit I was a bit befuddled by the concept of a postdoctoral fellowship (or simply “postdoc”) when I started in the NCI last October. I have a distantly related cousin that spent quite a bit of time after graduate school studying *Drosophila*, but that is the extent of my experience with postdoctoral fellowships. Now, I’m working in an environment where 50% of my co-workers are postdocs, and this doesn’t include the PIs and staff scientists that have completed their own postdoctoral positions. With such a high concentration of postdocs and former postdocs around me, the lunch conversation inevitably segues into a debate over the pros and cons of a postdoc on a regular basis. Even before I finished applying to graduate school, I find myself answering questions about my plans for a postdoc, as if it was the only option after graduate school. But is it absolutely necessary for a newly-minted PhD to work in a postdoctoral position, or do we just think it is?

In a May 2016 edition of Science Magazine, Henry Sauermann (Georgia Institute of Technology, National Bureau of Economic Research) and Michael Roach (Cornell University) explored why students choose a postdoctoral position in “Why pursue the postdoc path?” ([Science 06 May 2016: Vol. 352, Issue 6286, pp. 663-664](#)). They interviewed 5,928 students in PhD programs in 2010 and then followed up in 2013 to see where those students ended up after graduation.

From the start of their study, it was clear that postdoctoral positions are more popular with biology and life sciences students than other STEM fields. Approximately 79% of biological and life sciences students surveyed in 2010 indicated that they were planning to complete a postdoc after graduation, compared to 53% of all other fields (chemistry, physics, engineering, and computer sciences). Come graduation in 2013, 74% of biological and life sciences students moved on to a postdoc while only 46% of students in other fields. Across the board, the students surveyed indicated that they plan on a postdoc for two main reasons: “to ensure landing a tenure-track faculty position” (56%), and “to increase their chances of getting a desired job” (47%). The other option responses included: “need more time”, “have difficulty in finding a job”, and “have a desire to strengthen skills” came in at 11%, 16%, and 20% respectively.

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position in “Why pursue the postdoc path?” ([Science 06 May 2016: Vol. 352, Issue 6286, pp. 663-664](#)). They interviewed 5,928 students in PhD programs in 2010 and then followed up in 2013 to see where those students ended up after graduation.

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However, the perception of postdocs differed between the two

groups when the desired career was outside of academia. For biological and life science students, 78% felt that at least one year of a postdoc training was required in order to do Ph.D. level R&D. That number drops significantly to 42% for other students. There appears to be some level of disconnect between the biological sciences and other STEM fields. The majority of biological and life sciences students believe a postdoc position to be required, regardless of the career path, where other fields see postdoc positions as necessary mainly for academia. This is likely for a variety of reasons, although the most likely is that there is less competition for non-academic jobs within the other fields of study. For example, according to the National Center for Education Statistics, in any given year (data was compiled from 1971 - 2014), the number of bachelor's degrees awarded in the US for biological sciences is nearly 3.5 times more than those in physical sciences (chemistry, physics) and mathematics. If the number of available jobs for chemistry versus biological sciences PhD are approximately equivalent, there is less of a drive to "distinguish" yourself from the other applicants, so a postdoc probably isn't necessary for non-academic career paths. Another reason may have to do with what potential employers see in a postdoc usually signals that that individual is interested in an academic research career and may be a red flag to hiring managers that the

candidate may not want to be in industry.

One of the more common complaints at the lunch table about postdocs is that there are too many. Between a massive influx of recent biological science PhDs, and PIs delaying retirement until later in life, there are a precious few tenured positions available for only a handful of hopefuls. This complaint isn't entirely unfounded. In 2009, the American Recovery and Reinvestment Act invested millions of dollars earmarked for research fellowships and other job training. As such, completing a PhD in biological sciences followed by a postdoc was a smart choice- there was a sudden influx of positions and more importantly, those positions paid well. However, for a student who decided to begin their Ph.D. in 2009, the market was saturated by the time they graduated. To put it into perspective, the number of postdoc positions have increased an astounding 150% between 2000 and 2012, while tenure track and full-time faculty positions have plateaued and have even started decreasing across the globe (*Nature* **472**, 276–279; 2011). Now, the problem is how to accommodate students in PhD programs that are preparing for jobs that don't exist anymore. In response, students decide to take on postdoc positions in order to improve their resumes while waiting for an available position, over which they'll have to compete with dozens, if not hundreds of other applicants. This creates a cycle of students applying to postdoc positions in order to

"...the number of postdoc positions have increased an astounding 150% between 2000 and 2012, while tenure track and full-time faculty positions have plateaued and have even started decreasing..."

compete with other postdocs, thus perpetuating the scientist-to-job imbalance.

One major finding of Sauermann and Roach was that regardless of the area of study for a Ph.D., nearly all postdocs felt well informed regarding careers in academia; between 4-8% felt that there was a lack of information regarding academic research careers. However, for other careers, such as in government, industry, and startups, those numbers climb to upwards of 20%. In other words, while getting their Ph.D., students are well informed as to how to get into an academic career, but are less so about other career pathways. If the clearest path to a career is through a postdoc, then students are far more likely to pursue a postdoc than other avenues. Paula Stephan agrees with this conclusion in her article “How to Exploit Postdocs” (*BioScience* (2013) 63 (4): 245-246): “*Programs rarely post job outcomes on their Web pages, and many doctoral programs offer few seminars or workshops that provide students with information on careers other than those in academia. programs, a postdoctoral appointment is seen as the next logical step on the road to a research career. Students graduate and head directly to a postdoc position without thinking about what their career options might be.*”

“...Postdocs provide the opportunity to learn what isn't taught in graduate school: how to run a research program, how to pick good projects, and how to decide what equipment your research will require ...”

In the end, postdoctoral fellowships do serve a purpose. For those recent

graduates who are adamant about a career in academia, a postdoc is the best course of action. Postdocs provide the opportunity to learn what isn't taught in graduate school: how to run a research program, how to pick good projects, and how to decide what equipment your research will require. It also provides invaluable opportunities to network with colleagues and develop collaborations, which will make starting your own lab that much easier. However, deciding whether or not to embark on a postdoctoral fellowship after graduate school is not a decision that should be made lightly if you're even considering a career outside of academia. In the past few years, we have seen an increasing number of Ph.D.'s getting stuck in a “holding pattern” as postdocs, often for half a dozen years or more. For graduate students and postdocs like myself, we should carefully consider all of our options before graduation. For those wishing to pursue a tenure-track faculty position, a postdoc position may be unavoidable, but is in no way a prerequisite for a career in other facets of scientific research. Take the time to explore all of the options available, including industry, government, and senior staff scientist positions. OITE and the NIH's BEST (Broadening Experiences in Scientific Training) program are good places to start to explore your options. Another article in this edition describes the NCI's EXPOSE program in detail.

Postbacs of Bethesda

By Jailynn Harke

Part of the postbac experience is networking, not only with recognized experts in your field but also with your peers. This can be a daunting task after relocating and settling into life as a postbac at the NIH. The Postbac Committee fills this void by organizing activities that are both approachable and accessible for new and veteran postbacs alike. Each month, committee leaders host a meeting open to all postbacs to discuss past successes and pitch ideas for future events.

Subcommittees spearhead activities both on and off campus, including professional development opportunities, volunteer outings and social events. The Seminar Series subcommittee organizes quarterly seminars given by postbacs, for postbacs. Here is your chance to get comfortable with sharing your research, an integral part of your future as a scientist, as well as learning about the work at the Children's Inn, local nursing homes, and food co-ops. This is a great way to integrate into the greater Bethesda community and give back. The savvy socialites of the Social/Workplace Wellness committee arrange events from relaxed happy hours and book clubs to indoor rock climbing, hiking, and trips to DC classics like the Cherry Blossom and jazz festivals.



Top photo: monthly Postbac Committee Meeting

Bottom photo: Art Night making picture frames for the Children's Inn at NIH

Being a postbac is more than just bench work so don't be shy about participating. Feel free to contact one of our fearless co-chairs about how to get involved.

Committee Co-Chairs - John Ciemniecki & Lynda Bradley
Social/Workplace Wellness - Dan Flores & Brittany MacTaggart
Volunteer - Maryknoll Palisoc
Seminar Series - Andrew Uhlman

To learn more about the on-going community service activities and social events, please join ClubPCR (Yahoo and Facebook) and MEDICALmysterion (Google group) listservs



*The Center for Cancer Research
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Supported by the CCR Office of Training and Education and the CCR Office of the Director