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LETTER FROM THE EDITORS

Dear CAMB students, faculty, and alumni,

We hope everyone is having a good semester. In this issue of the CAMB Student Newsletter, we focus on ways students can work on career development during graduate school. We talked to Dr. Joseph Barber, Senior Associate Director at Career Services for graduate students and postdocs, about the resources offered by Career Services. We cover the topics discussed in the career panels at this year's CAMB Symposium. We also highlight two certificate programs, the Graduate Training in Medical Science program and the Certificate in Law program. Additionally, we spoke with Jinyang Li (Cancer Biology) about his exciting project on tumor heterogeneity and identifying biomarkers to improve patient- specific immunotherapies. Finally, we catch up with Microbiology, Virology, and Parasitology alumna Skye Geherin who talks about her path to becoming a medical writer.

For additional articles, past publications, and to learn more about the CAMB Newsletter team, visit our blog at **cambnewsletter.wix.com/blog**. Current students interested in contributing to the CAMB Newsletter can contact us at **camb.studentnews@gmail.com**. We hope you enjoy the November 2018 Issue!

Sincerely,

Lexy Stanley and Somdutta Mukherjee

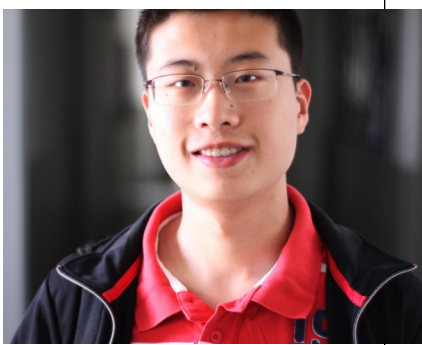
Editors-in-chief

RESEARCH SPOTLIGHT

A New Experimental System for Investigating Tumor Heterogeneity Reveals Biomarkers to Predict Immunotherapy Efficacy in Pancreatic Ductal Adenocarcinoma

Lindsey Weed

When we consider the future of cancer treatment, chemotherapy pales in comparison to immunotherapy. Unlike chemotherapy, which stops or blocks rapidly growing cells and can lead to adverse side effects, immunotherapy modifies a patient's own cells to enhance or restore the cancer- fighting ability of the immune system. Immunotherapy has led to a marked improvement in clinical outcomes, but unfortunately only a subset of patients respond positively to this treatment. It is well known that different tumors have diverse genetic and epigenetic alterations that contribute to the range of phenotypes, and ultimately the success of treatment. However, the field lacks a full understanding of how tumor heterogeneity confers sensitivity or resistance to immunotherapy. The degree of T cell infiltration into the tumor microenvironment (TME) has proven to be a critical factor in clinical outcomes. T cells induce apoptosis in cells that display foreign antigens, such as virus-infected or tumor cells. The TME is comprised of extracellular matrix and local stromal and immune cells, a combination that is likely regulated by signaling pathways intrinsic to tumor cells.

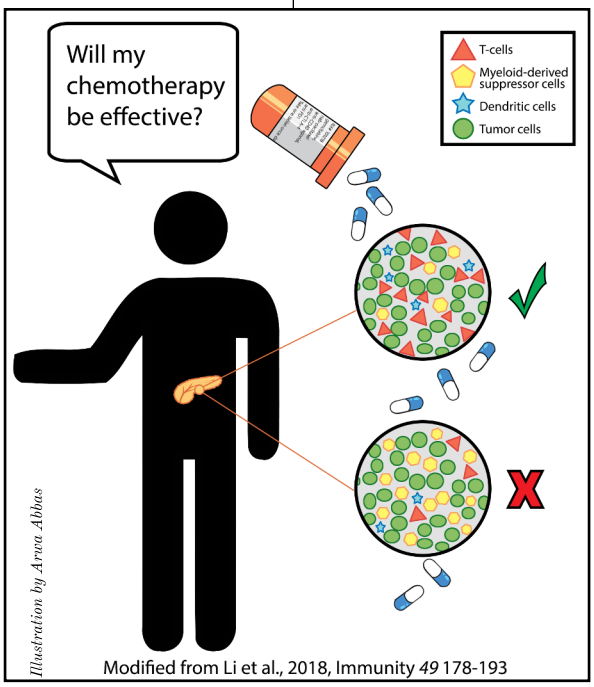


Jinyang Li, CB

The ability to investigate the regulation of distinct immune landscapes in tumors has been constrained by a lack of appropriate experimental systems that faithfully

recapitulate the heterogeneity of the TME. Enter the laboratory of Dr. Ben Stanger. His team, including Cancer Biology graduate student Jinyang Li, examined primary tumors from a mouse model of pancreatic ductal adenocarcinoma (PDA) and saw wide-ranging variation in the number of intratumoral T cells, similar to what was seen in human PDA tumors. Li hypothesized that whatever was dictating this variation might be retained in these tumor cells if transplanted into an immunocompetent wild type mouse.

In order to test their hypothesis, the team generated a new experimental system to investigate tumor heterogeneity and interrogate the mechanisms behind the correlation of PDA patient survival and abundance of T cell infiltration. They created a library of congenic tumor cells clones by isolating late-stage primary pancreatic tumors from a fully backcrossed cohort of mice. Upon implanting these tumor cell clones into wild type mice, it was clear that the library replicated the TME heterogeneity seen in humans and mice with PDA. The implantation experiments also corroborated findings that high T cell infiltration is consistent with tumor regression and improved survival upon administration of modified T cells in a combination immunotherapy regimen. Interestingly, the group observed a greater correlation between the abundance of PD-1^{+}CD8^{+} cytotoxic T cells in tumors and a positive response to therapy compared to total CD8^{+} T cell infiltration alone. PD-1 is a cell surface molecule that regulates the adaptive immune response. Its biological significance to the immune system makes it a potential therapeutic target. However, in this context, PD-1 appears to be a biomarker for predicting immunotherapy efficacy.



PDA tumors display unique T cell infiltration that dictates immunotherapy sensitivity. **The dominant tumor phenotype is a non-T-cell-inflammed microenvironment, which mobilizes myeloid cells rather than cross-presenting dendritic cells that promote recruitment of T cells. T cell low tumors are distinguished by differing epigenetic marks and transcriptomic status as compared to T cell-inflamed TMEs. An increase in tumor cell-derived chemokine CXCL1 is responsible for therapy-resistant in low T cells tumors. Ablation of CXCL1 can promote T cell infiltration and sensitivity to a combination immunotherapy regimen.**

To determine how different PDA clones establish T cell levels in TMEs, Li injected an equal mixture of T cell high and T cell low clones into a single site on a mouse. He observed that the composition of the TME resembled that of a T cell low tumor, with increased myeloid cell infiltration as compared to a T cell high clone. Li postulated that T cell low clones exert a dominant effect by which myeloid cells suppress T cell infiltration to the TME, and thus the anti-tumor T cell response. RNA-seq analysis of sorted tumor cells revealed differential expression of chemokine *Cxcl1* between T cell high and low tumors. *Cxcl1* encodes a ligand for CXCR2, which is required for myeloid cell infiltration into TMEs. Additionally, Li observed that the *Cxcl1* promoter region is more accessible in T cell low versus high tumor cells. He also found that reducing MYC protein, a known promoter of immunosuppressive TMEs, in T cell low clones decreases the expression of *Cxcl1* in these cells. The reduction of *Cxcl1* expression in T cell low clones resulted in cell survival and proliferation comparable to that of T cell high clones. Together, these results suggest that chromatin accessibility and MYC activity dictate expression of *Cxcl1*, and therefore T cell levels in TMEs of different PDA clones.

Li wanted to know if CXCL1 is the major driver of immune cell heterogeneity in the TME. He engineered T cell high clones to overexpress *Cxcl1*, and transplanted them into wild type mice. This resulted in increased myeloid infiltration and decreased T cell infiltration. Conversely, injecting T cell low clones into mice with a deletion of *Cxcr2* resulted in a decrease in intratumoral myeloid cells and an increase of PD-1^{+}CD8^{+} T cells. Therefore, tumor cell-derived CXCL1 is necessary and sufficient for recruiting myeloid cells into TMEs, consequently suppressing T cell infiltration and the anti-tumor response.

Li and his team were able to elucidate the major genomic, epigenetic, and transcriptomic features driving the formation of low T cell TMEs and resistance to immunotherapy. The biomarkers identified in this study expand our ability to predict immunotherapy efficacy in the clinic. Additionally, Li showed that interfering with tumor-cell-intrinsic expression of *Cxcl1* and *Cxcr2* could convert a low T cell TME into a high T cell TME capable of generating a robust and protective anti-tumor response. Of course, it's unlikely that a singular molecular mechanism is solely responsible for the TME heterogeneity in PDA, but the identification of even this one pathway pinpoints possible therapeutic targets and offers clues to other contributing mechanisms. Importantly, this work would not have been possible without the library of congenic tumor cell clones that reproduced the spectrum of TMEs observed in patients. This platform will certainly be useful as we make greater strides toward optimized patient-specific immunotherapy.

Li, J., Byrne, K.T., Yan, F., ..., Wherry, E.J., Vonderheide, R.H., Stranger, B.Z. Tumor Cell-Intrinsic Factors Underlie Heterogeneity of Immune Cell Infiltration and Response to Immunotherapy. *Immunity* 2018; 49:178-193.

SPECIAL INTEREST

Career Services: Helping Students Every Step of the Way

Somdutta Mukherjee

"What do you want to do after graduate school?" This is the question that every Ph.D. student dreads hearing. There are so many career paths that students with a Ph.D. can follow after graduating, and it can be quite overwhelming to chose which path to take. Fortunately, Career Services offers many resources that can help students choose a career. Dr. Joseph Barber, Senior Associate Director at Career Services for graduate students and postdocs, talks about the resources offered by Career Services and shares some tips for

easing the process of deciding the next steps after graduate school.

The first thing to keep in mind is that it is never too early to go to Career Services. During the first and second years, students can go to Career Services to learn about the different resources available at Penn, and how to use them effectively. Career Services works with students in the early stages of graduate school to devise a plan on what they can do during their time at Penn to help with their career development. Students in their middle years can go to Career Services to help develop their professional skills, such as communication, teamwork, and leadership skills. This is also a great time for students to get involved in different groups on campus and to gain different experiences outside of the lab. In their final years, students can come to Career Services to go over application materials, such as resumes and cover letters, and work on interviewing skills and negotiation strategies that can help them become stronger applicants for the jobs they are seeking. One of the most easily accessible resources offered by Career Services is the website itself, which addresses a wide range of topics, such as how to prepare a resume or cover letter, advice on networking, links for finding internships and jobs, and so much more.

While the Career Services website is abundant with information, many students may find it helpful to make in-person appointments with career advisors. There are different types of appointments students can make. Walk-in appointments are useful for quick questions, or for getting a general overview of the types of resources offered at Career Services. These are held on a first-come, first-serve basis every day from 2-3 pm everyday at Career Services in the McNeil Building. Additionally, walk-in appointments that are primarily focused on BGS students and postdocs are held on Wednesdays from 12-2 in 501 Stellar Chance. The most common type of appointment is the 30-minute one-on-one appointment. These appointments are good for having more in-depth discussions on broad topics such as "how should I prepare for this event?" or "what should I do next?" These appointments are also useful for reviewing documents such as resumes and cover letters. For those who may be intimidated by a one-on-one appointment, group appointments may be a better option. Here, students work together in groups of two or three to explore a variety of careers or develop their professional skills. Career Services also offers one-hour mock interviews, which are meant to help students prepare for upcoming interviews. The advisers at Career Services will devise a set of questions, based on what you are interviewing for, to simulate questions you may be asked during your interview. These mock interviews are recorded, played back, and discussed for feedback. Appointments can be scheduled by calling Career Services, but students are encouraged to make appointments through their Handshake accounts.

The Handshake platform provides a way for students to make appointments, and to see what upcoming workshops, events, and career fairs they might be interested in attending. Not only does Career Services post useful information on Handshake, but it is also an excellent way for students to engage with potential employers. When students activate their Handshake account, they are asked about career interests and job roles that they looking for. Based on these answers, students will see job and internship postings from employers they might be interested in. Dr. Barber describes Handshake as a smart system; "The more people select, the easier it is for us to make sure people are receiving relevant things." Students can further tailor the kinds of listings they see by liking job listings and following different employers. Additionally, students can sign up for career communication channels through Handshake. These monthly newsletters offer an overview of upcoming events, and other information about resources available to students. For CAMB students, Dr. Barber suggests the "Ph.D. students in STEM fields" option in particular.

Choosing a career path can feel very overwhelming, especially for Ph.D. students who have so many options after graduate school. Career Services helps ease this process by guiding students and providing an extensive number of resources. When asked what he enjoys about advising graduate students and postdocs, Dr. Barber says, "I think many people think they're alone in this journey, when really everyone is going through the same thing, and being able to tell people that is really reassuring." No matter where you are in your Ph.D., remember to take advantage of the helpful resources available at Career Services.

To learn more about the wide variety resources offered by Career Services, including how to set up a Handshake account, visit the general Career Services website (https://www.vpul.upenn.edu/careerservices/), and the specific Ph.D. student pages (https://www.vpul.upenn.edu/careerservices/Ph.D.postdoccareers.php).

Life After Graduate School as Told by CAMB Alumni

Audrey Allen, Gleb Bazilevsky, Isabel Sierra, and Camille Syrett

The CAMB Symposium helps strengthen the CAMB community by bringing together current and former students. Twenty-seven CAMB alumni, whose careers range from tenure track professors to patent judge, attended the symposium. They participated in career panels to share their post-graduation experiences, and give current students advice on how to navigate life after graduate school. Despite the varied career paths of the panelists, each panel discussed similar themes.

Many of the panelists commented on things they did, or wish they had done, during graduate school to help them while looking for jobs. Panelists stressed that networking is an extremely important skill to learn during graduate training. This includes interacting with potential employers outside of Penn, as well as older students and alumni from the different CAMB subprograms. Students should not be afraid to reach out to alumni, but also networking with people you currently work with can be just as helpful. Additionally, they advised students to take advantage of various groups at Penn in order to learn as many skills as possible during graduate school, technical or otherwise. For example, to learn more about the business side of science some panelists participated in the Penn Biotech Healthcare Consulting Group. One alumnus who was interested in teaching, completed the Center for Teaching and Learning certificate offered at Penn.

The panelists also highlighted the importance of communicating clearly and effectively. One panelist advised that when interviewing for academic positions, a huge weight is placed on your chalk talk, an hour or so long presentation where you present your first potential NIH grant to faculty members at the University you are interviewing for a position at. For both industry and academic positions, it is incredibly important that you can communicate your science well and defend your research ideas. A panelist tip to improve your science communication skills is to get outside of your lab and speak to people from various backgrounds about your work.

Additionally, try to set up collaborations during grad school so that you can get a wide range of strong letters of recommendation. Finally, learning how to ask the right questions is a critical skill that will follow you through any future science career.

Another topic addressed by the panelists was different aspects to consider when looking for a job. Even though your current research might be in a specific area, it is important not to box yourself in and label yourself "just a virologist" or "just a microbiologist." By getting a Ph.D., students do not just learn about one specific scientific field, but how to adapt and work out difficult problems. These skills allow students to apply for positions that might be out of their comfort zones. The panelists strongly urged current students to learn how to sell themselves and their skills. While interviewing, it is important to talk to people that hold similar positions to get an idea of what the work environment is like, and how happy people are in their current role. For jobs outside academia, your boss might not always be your mentor, so it is key to get a feel for how the company or institution is run. When applying to any job, it's also very important to have confidence in yourself and your degree. Students were advised to apply for any position that interests them, as casting a wide net cannot hurt. One of the panelists wanted to remind students that biology is universal, and to think about how your skills and expertise will benefit the lab you want to join. Diversity improves research, and different training allows you to have a unique view on various projects.

A question that many current students face is whether or not to do a postdoc. The panelists said a postdoc is necessary to be more competitive on the job market, and some found it challenging to find a job without one. This is especially true when trying to break into industry, so additional work experience is crucial for those positions. While it is possible to get a non-academic job without a postdoc, it can still be valuable to do one as you will gain more experience, develop new skills, and even regenerate your motivation for science. The final driving point the panelists made was to have intent when pursuing a postdoc. They caution against devoting longer than three years to that position, and to pick a postdoc lab that will allow you to achieve your career goals afterwards.

As for general advice, the panelists said it is important to really think about what you want for yourself after graduate school so you can take a step back and decide what skills you need to accomplish that goal. This self-reflection can help focus the types of jobs you apply for. Last but not least, you should never say no to an opportunity, both during and after graduate school.

To see a list of all the panelists visit https://cambu-penn.wixsite.com/2018cambsymposium/panelists.

From Bench to the Doctor's Office: My Experience with the Graduate Training in Medical Science Certificate Program

Lexy Stanley

Since beginning graduate school, I have been a part of the Graduate Training in Medical Science (GTMS) Certificate Program. The GTMS program integrates focused medical education and experience into the doctoral curriculum, giving Ph.D. students insight into the integration of lab and clinic. Started in 2006 and funded by the Howard Hughes Medical Institute, the program was so successful that Penn decided to keep it going after the three-year pilot grant ended.

Directed by Dr. Hao Shen and Dr. Jonathan Katz, the rigorous program focuses on training basic scientists to have a clearer understanding of human biology and pathology through clinically relevant research, and to foster clearer communication between basic and clinical scientists. Once in the program, graduate students select a physician mentor studying a disease or syndrome of interest to shadow. Students are also required to take six courses that reinforce the relationship between clinical and basic research, four required classes and two electives. In the first year, students have the option of taking Immunology, Immune Mechanisms, or Bioinformatics, and during the second year, students take Human Physiology and the Molecular Basis of Disease. Additionally, students take two "Bench to Bedside" Electives of their choice during the first 2 years. The classes can usually count for some of the requirements of your graduate program. Students also attend a monthly seminar series where translational scientists at Penn discuss their research, or physicians discuss their interesting cases. Upon successful completion of the program, students receive a Certificate in the Medical Sciences in addition to their doctoral degree.

The clinical clerkship is the highlight for the GTMS program. Students chose a physician/medical professional or biotech/pharma internship, preferably related to the student's area of research, in the greater Philadelphia area. Experiences can range from being in an operating room during surgery, to participating in hospital rounds, and even working in a private company lab on drug discovery. One student had the opportunity to go and set up portable PCR machines in Botswana to perform viral sequencing for detecting infection in the field. The schedule of the clerkship is decided amongst the student, the Ph.D. advisor, and person being shadowed, however, at least 40 hours is required.

Meeting with patient Kurt Kysar and his parents Carrie and Devon Kysar from Davenport, WA at the Center for Research in FOP and Related Disorders (reprinted with permission from the Annual Collaborative Research Report on the FOP Project.)

For my clerkship, I turned to Dr. Frederick Kaplan, a physician who works closely with my lab on the rare genetic disease fibrodysplasia ossificans progressiva (FOP). FOP is a rare genetic disease characterized by the formation of extra-skeletal bone known as heterotopic ossification. Dr. Kaplan is the Chief of the Division of Molecular Orthopaedic Medicine at the University of Pennsylvania School of Medicine, and the leading physician in FOP care. Our lab is not only interested in the molecular mechanisms driving FOP, but we also perform diagnostic sequencing for those suspected of having the disease. FOP patients come from all over world to receive care from Dr. Kaplan, and I had the opportunity to attend both new and existing patient appointments. I saw rewarding

moments such as a little boy demonstrating his walking abilities after a round of corticosteroids, as well as heartbreaking moments like the diagnosis of an infant with the disease. Dr. Kaplan encouraged me to connect with patients by talking about the scientific work I was doing to investigate FOP and even show them around the lab on occasion.

Being able to put a face to my research has been my driving force these past five years in graduate school, and has made me feel like my research means something beyond scientific curiosity. Basic science can sometimes feel purely academic, but doing translational research and meeting patients has made the science worthwhile for me. The program requires students to keep a journal of their clerkship experience, and I am reminded that there are real people relying on my work to improve their quality of life whenever I look back on it. Even though my clerkship is formally over, I still often go to patient appointments because I enjoy meeting them and sharing our research. The experiences and skills I've learned in the GTMS program have reinforced my passion for a career in clinically driven research that has a direct impact on patient health.

My advice for students wanting to participate in this program is to select an area you are passionate about for your clerkship. Most physicians and professionals are happy to help out eager graduate students learn more about the impact of basic science on the medical field. Although scheduling time away from lab may be difficult, I felt the sacrifice was worth it. However, you should clearly communicate the requirements of the program and the time commitment to the clerkship with your thesis advisor before formally setting anything up. This program offers a rare insight into the clinical world that most graduate students do not usually get to see, and is a valuable experience for anyone interested in translational research.

More information about the GTMS program and the application can be found at http://www.med.upenn.edu/gtms/.

The Certificate in Law: An Introduction to a Post-Ph.D. Career in Law

Hannah Kolev

As non-academic careers for biomedical scientists gain in popularity, certificate programs offer exciting opportunities to acquire academic and practical experience in diverse fields of study. One such program is the Certificate in Law. A subset of the Master in Law program offered by the University of Pennsylvania Law School, the certificate program allows students to expand their understanding of legal concepts and practices. Students receive their certification after successful completion of four courses at Penn Law, including the required foundational course "Introduction to U.S. Law and Legal Methods (LAWM 511)". At no extra cost to CAMB students, these courses explore fundamental concepts within the legal field and provide a solid framework upon which students can begin to build their legal prowess.

Having this legal framework can prove beneficial for scientists. Natalie Dury Green, the Assistant Director of the Master in Law program, explains "even as a BGS student, most [scientists] will interact with the legal system of the [United States]…so it's important to learn the law affecting your field." Through legal coursework and expert-led discussions, participants in the program develop skill sets necessary to analyze the legal documents that they will inevitably encounter in their own research. Whether writing a grant or obtaining Institutional Review Board permissions to carry out a clinical trial, acquiring basic legal language is undoubtedly beneficial.

Open to any graduate student at Penn, the Certificate in Law program also provides a diverse learning environment that imparts translatable professional skills to its students. From nursing students to Wharton MBAs, all are welcome to enroll. The certificate program therefore promotes discussions not only with legal experts, but also with fellow Penn citizens who bring their own unique professional experiences to the classroom. By leaving the lab bench and breaking out of the science "bubble", BGS students are exposed to new ways of presenting, writing, and problem-solving; in doing so, students may develop new soft skills and learn creative solutions to challenges faced in the lab. Echoing this sentiment, Natalie Dury Green notes that within Penn Law, "differing viewpoints are supported in the classroom, and through conversation comes understanding." She explains that the program's diverse student population allows certificate students to "learn from hearing the perspective that another student may have based on their professional career." This engaging and stimulating environment therefore instills not only a basic understanding of legal concepts, but also encourages diverse thinking that may help research in the lab.

While the Certificate in Law program is academically and professionally beneficial, it can often be difficult to divert attention away from research commitments. To address this issue, the program has developed a structure that is accommodating and accessible for its students. Courses may be completed at any time during a student's graduate degree, allowing for flexible scheduling of certificate classes around preliminary exams or grant applications. Furthermore, classes can be tailored towards a student's individual interests, thereby allowing program participants to gain the most from the required coursework. A plethora of healthcare related courses, such as "Healthcare Fraud and Abuse" or "Pharmaceutical Regulation and Enforcement," might be especially enticing to CAMB students. Importantly, courses offered in the Master in Law curriculum are designed specifically for non-law students. This makes the coursework more accessible for those who do not have a legal background, thus reducing any barriers for students that may feel out of place or intimidated by joining a law class.

Initially founded in 2005, the Certificate in Law has just recently been made available to BGS students. Since an information session held this past April, five new BGS students have enrolled in the program, demonstrating the growing excitement within BGS towards this new opportunity. For those students looking to join these program participants and develop their own legal understanding, enroll now in the Certificate in Law! See below for details.

CAMB Students interested in participating in the Certificate in Law

program can find more information at https://www.law.upenn.edu/registrar/certificate- in- law.php. Students may enroll at anytime during their Ph.D. program. To enroll in the Certificate in Law, students should first complete the BGS Authorization Form and receive permission from their thesis adviser and graduate group chair. Students may then complete the online application at https://www.law.upenn.edu/registrar/certificate- in- law.php. Interested students may also schedule a meeting with Natalie Green to discuss program details and design a class schedule suited towards individual interests. Please contact Ms. Green at ndgreen@law.upenn.edu.

WHERE ARE THEY NOW?

Skye Geherin

Sylvia Stankov

Dr. Skye Geherin describes herself as a scientific translator. The CAMB (Microbiology, Virology, and Parasitology) 2014 alumna and former student of Dr. Gudrun Philomena Fiona Debes is the Associate Director of Scientific Communications and a Senior Medical Writer at the Vaniam Group, a virtual network of healthcare and communications agencies.

The Vaniam Group provides four services: strategic consulting, external expert engagement, insights gathering initiatives, and scientific communications. In essence, the agency partners with pharmaceutical companies or biotech devices to help them publish their data. Skye reviews the client's raw data and translates it into stories for different audiences; these stories can be used for presentations and posters at scientific conferences, manuscripts for high-tier journals, or information to train doctors about interactions with their patients.

Her work also involves engaging with key opinion leaders (KOLs), advisory boards, and physicians enmeshed in the client's particular field. Skye gains valuable insight from these officials and physicians who are on the front lines using the drugs and/or performing the clinical trials. This feedback informs the design of other clinical trials, and the messaging strategy of the client's product. Skye distills pertinent information about the product and how best it can be disseminated, especially to community physicians who may not be as familiar with the current research.

Skye Geherin, MVP

Originally, Skye envisioned herself working in management consulting, and her initial interview and resume preparation was geared towards this career path. Penn's Career Services helped her formulate a resume tuned for a consulting job, and she urges current students to take advantage of these resources (see the article about Career Services in this issue). However, as Skye learned more about this time- intensive career path, she decided to refocus her job search. Soon thereafter, she learned about the medical communications field from an acquaintance who worked in a faster- paced environment outside of academia. Today, Skye likens her work as a medical writer to that of the small, bite-sized goals of rotations. She works on research that is broken down into finite goals, where projects are started and finished in shorter timescales than in academia.

Skye was hired as a medical writer at the first medical communications agency that she applied to, MediTech Media based out of New Jersey. After about two years, she was recruited to her current agency. Skye emphasizes that since Vaniam Group operates 100% virtually, starting at a brick and mortar agency was critical to her entry-level writing experience. Indeed, Vaniam Group does not hire new writers directly because they believe that you cannot adequately train someone remotely. Broadly, Skye describes medical communications interviews as a test of your ability to comfortably give talks, make presentations and distill research findings (like describing your thesis work in five minutes). While Skye mostly gives internal talks, effective presentation-making skills, such as understanding the nuances of a 15-minute presentation versus an hour-long presentation, are key.

After leaving graduate school, Skye felt well-prepared for this job market. Her graduate work in B cell malignancies closely aligned with Vaniam Group's oncology and hematology marketplace focus. More importantly, however, were the soft skills, such as interpersonal communication, planning, and problem solving, that she developed while in the CAMB program. Skye also gained valuable experience while acting as BGSA President and working with the finance committee.

Skye highlights the importance of real- world experience, which doesn't necessarily need to be cultivated outside of lab. Towards the end of her Ph.D., Skye recounts her roles as a combination graduate student, postdoc, lab tech and manager when interacting with laboratory supply and biotech company representatives to obtain products and when analyzing expense reports. These experiences summed up to tangible problem- solving skills. Her biggest career preparation advice? Keep a GoogleDoc of personal stories! She recommends that students write personal stories as they happen, especially anything with buzzwords. When did you resolve a conflict? Can you describe a leadership role, an instance of problem solving, or an example of collaboration? These stories may not be easy to think of on the spot or even a year after the fact, so keep track as they happen.

Overall, Skye wouldn't have said that she wanted to be a writer when she was finishing her Ph.D. work, but has found true passion in her medical communications career. She finds that manuscripts are easier to write when it's not your own research and enjoys her quality of life. In fact, when looking to buy an apartment with her fiancé, they decided to buy an RV instead and now travel across the country. She fondly remembers CAMB BBQs and mingling with students across disciplines, mirroring the microcosms of research that she now encounters as a senior medical writer.