GBS newsletter

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25th Annual

GBS Symposium

Written by Breanna Brenneman

Congratulations to the Award Winners from the GBS Symposium!

2017 Outstanding Students nominated by their Departments

Physiology: **Lauren Biwer** (Isakson lab)

Biochemistry and Molecular Genetics (BMG): **Magdalena Chichewicz** (Dutta lab)

Pharmacology: **Sarah Gray** (Barrett lab)

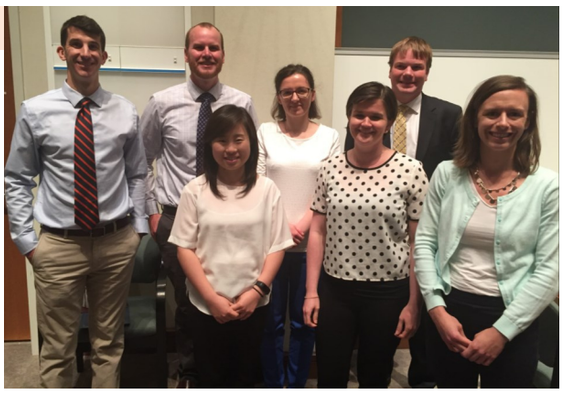
Microbiology, Immunology, and Cancer Biology (MIC): **Claudia Han** (Ravichandran lab)

Biomedical Engineering (BME): **Josh Heuslein** (Price lab)

Biophysics: **Alex Kreutzberger** (Tamm lab)

Neuroscience (NGP): **Sachin Gadani** (Kipnis lab)

Experimental Pathology: **Brian Reon** (Dutta lab)



Outstanding students- *Back*: Josh Heuslein, Brian Reon, Magdalena Chichewicz, Alex Kreutzberger. *Front*: Claudia Han, Lauren Biwer, Sarah Gray. *Not pictured*: Sachin Gadani

Dr. Kodi Ravichandran, Dr. Claudia Han (Peach award winner), Beth Ginter (Dr. Peach's daughter)

Michael J. Peach Award Winner

Name: Claudia Han

Lab: Kodi Ravichandran lab in MIC

Area of Study: Phagocytic communication during apoptotic cell clearance and inflammation

How do you feel after winning the Peach Award?

It was such an honor to receive the Michael J. Peach award and to be nominated with a group of talented colleagues, collaborators and friends. I feel grateful and lucky to have received the support of my mentor, Dr. Kodi Ravichandran, and the support of numerous faculty and staff members, post-docs, and graduate students throughout my time at UVa.

What are your future plans?

Currently, I am pursuing a postdoctoral fellowship at UCSD. I really enjoy discussing science and solving bench and ideological problems, thus I hope to have a career in which I can lead a group of scientific investigators to continue engaging in these activities and learning about all aspects of biology.

What do you do in your free time (if any)?

I spend most of my free time with my family. I also like to binge watch TV and play Ultimate Frisbee and eat a lot of food.

Do you have any advice for other graduate students?

Graduate school is not easy; honestly, since when do people say sure, I'll engage in a career in which 90%+ of my everyday work life is dealing with failure? Make sure you celebrate the small successes, even if it's that you finally found the correct drug titration. Also, focus on yourself in your studies; don't make comparisons between yourself and others and use those comparisons as benchmarks of success. Lastly, take the time to enjoy and appreciate the collaborative and supportive environment of UVa; it is an uniquely nurturing environment.

Jill E. Hungerford Prize in Biomedical Sciences Winner

Name: Josh Heuslein

Lab: Rich Price lab in BME

Area of Study: Mechanosensitive regulation of arteriogenesis: Moving toward treating peripheral arterial disease

How do you feel after winning the Hungerford Prize?

I was very surprised and maybe a bit in shock after my name was announced as all the other nominees had very impressive research and credentials. I am also greatly honored to have won this award remembering such a dedicated scientist, leader, teacher, and enthusiastic contributor to the UVa community. It was a fantastic opportunity to meet the Hungerford family and hear stories about Jill, see their passion for life (especially tennis!), and their excitement for the biomedical research occurring here at UVa.

Dr. Rich Price, Dr. Josh Heuslein (Hungerford Prize winner), Nancy and Charles Hungerford (Dr. Jill Hungerford's parents)

What are your future plans?

I successfully defended my thesis last November and in January started a post-doc in Dr. Brian Annex's lab in the CVRC on the NIH-funded Cardiovascular Training Grant. During this post-doc I will explore the role of microRNAs in angiogenesis and as potential therapeutic targets for treating peripheral arterial disease. I'll also be starting to look for a "real" job, so if you know anyone…

What do you do in your free time (if any)?

In my free time, I enjoy exploring Charlottesville, especially its many restaurants, as well as hiking the Blue Ridge. I also play in a weekly soccer league and like to play beach volleyball, ultimate Frisbee, and will occasionally go for a run.

Do you have any advice for other graduate students?

I don't think I have any particularly novel advice - just try to keep the bigger objective in mind (whether for a particular project or career path), especially when you get negative results and remember that there is life beyond and after graduate school.

Kelly Barford (GBS Student Leadership Award Winner)

GBS Student Leadership Award

Name: Kelly Barford (WIMS President 2016-17)

Lab: Bettina Winckler in Cell/NGP

Area of Study: Endosomal Pathways Underlying NGF/TrkA Dependent Dendrite Development

How do you feel after winning the GBS Student Leadership Award?

I feel very honored to be receiving this award. There are a lot of incredible graduate students in BIMS, and it means a lot to be recognized.

What are your future plans?

My plan right now is to publish and graduate, but my long term goal is get involved in science communication on a bigger scale. I would love to work for a science communication or literacy nonprofit and work towards connecting the community with bench science.

What do you do in your free time (if any)?

I love spending time outside, running, and hanging out at the local breweries/wineries.

Do you have any advice for other graduate students?

The only piece of advice I can give is to do something outside of the lab. Getting involved in WIMS, GBS, or other local outreach organizations is always a good way to get a different perspective and diversify your skills. Getting out of the lab and doing outreach is how I figured out what I want to do in the future, and it can be a really rewarding experience.

Many Charlottesville community members marched from IX Park to the Sprint Pavilion to show their support for science on April 22nd. *Photo taken by Alex Keller.*

MARCH FOR SCIENCE

By Tori Osinski

On April 22nd, BIMS graduate students and faculty joined the masses to show their support for the pursuit of scientific inquiry in Washington D.C. as well as here in Charlottesville. Overall, science supporters gathered in over 600 cities worldwide (nine locations in Virginia!) with the common goal to "Champion science for the common good." Despite the rain in D.C. and C'ville, people from all walks of life came out to show their support.

Drew Grainger, a 3rd year BMG student, went up to D.C. where he observed a range of people "from elementary school kids to people 80+ [years of age]." He seemed energized by this, saying "it was pretty cool how wide a spread [of people] there was." Drew was not alone in D.C. BIMS faculty members including Mike Brown, Dan Engel, David Kashatus, and Dean Kedes spearheaded an effort to provide transportation (multiple busses!) for UVA scientists to make their way up to the capitol to show their support for science.

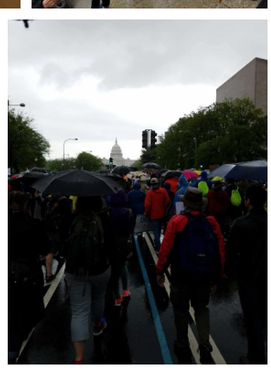
Some UVA scientists also stayed in Charlottesville to March. Spearheaded by many of our own BIMS graduate students, a satellite march was held in IX Park and the Sprint Pavilion. Before marching along the Downtown mall, many members of the Charlottesville community congregated at IX Park to check out a multitude of informational science booths and listen to speeches given by scientists from around Charlottesville. BIMS professors Janet Cross and Chris Deppmann were amongst those speakers.

Overall, the marches were a special event for many. Olivia Sabik, a 3rd year BMG student, attended the March in D.C., but her thoughts on and reaction to the March represent those of many who marched in both D.C. and in Charlottesville. She reflected, "It's rare that we see such an outpouring of enthusiasm for science, especially on that scale… [and] seeing a massive crowd of supporters cheering for the scientists who are doing important, and now threatened, climate and environmental research was invigorating."

Irene Cheng, a 5th year Neuroscience student, was one of the chief organizers for the March in Charlotteville. Here are some of her thoughts on the event: "March for Science was a fantastic coming-together of Charlottesville community members for a common goal - to rally behind and promote science. This provided an opportunity for active scientists, science enthusiasts, local legislators, and families to integrate into the Central Virginia community and to make connections with a scientific root. The local support and enthusiasm for science gave the organizers unlimited inspiration and provided us with energy when we encountered logistical speed bumps and roadblocks. Our hard work was completely validated when we saw over 500 excited community members attend our event even in torrential downpour. The hardest task moving forward will be to maintain this momentum and to continue channeling this energy towards supporting and defending science."

Photo taken by Stephanie Ragland

Dr. Martin Chapman, CEO of Indoor Bio, spoke on behalf of Cville BioHub, the network of local biotechs, at IX Park on April 22nd. *Photo taken by Alex Keller.*



D.C. despite the rainy weather. *Photos taken by Olivia Sabik and Drew Grainger.*

If you're interested in continuing to show your support for science outside of the lab, there will be more opportunities for you to do so! Check out ways to get involved with C'ville Comm-UNI-ty (information below) and look for more events in the future.

Finally, the GBS Newsletter would like to recognize all of the graduate students who were involved in planning this March for Science (listed below). They demonstrated terrific leadership in putting their energy and time into a community-based effort that worked toward some of their passions and goals!

Shoutouts to Irene Cheng, Kelly Barford, Ioana Marin, Lyndsey Muehling, Alex Keller, Andrew Chen, Kristen Balogh, Casey Hoffman, Aditi Upadhye, Sarah Gray, Emily Andre, Elizabeth Hoffman, and Adam Huckaby!

C'ville Comm-UNI-ty Facebook page: https://www.facebook.com/cvillecommunity/, and website: https://communitycville.wixsite.com/cville-community.

PROMOTING COMPASSION

By TK Phung

C.A.L.M., Compassionate Awareness and Living Mindfully, started in the fall of 2013 as a student group led by medical student Rob Abbott. C.A.L.M. is an interdisciplinary organization within the schools of medicine and nursing that aims to promote self-care, resilience and kindness in all aspects of life. Originally called *Thoughtful Medicine*, the student group joined as the student arm of the Compassionate Care Initiative in the School of Nursing early in 2014 and has programmed many free events for students to promote wellness- such as the recent Self Care Day, weekly drop-in meditations, and wellness fairs exposing students to mindfulness practices as well as complementary health care techniques.

Every week, C.A.L.M. sends their newsletter *A Week of Compassion* including thoughtful readings and a list of events from the Compassionate Care Initiative including free yoga and meditation sessions. They hope to bring people from different backgrounds and experiences together to fulfill their mission of cultivating a resilient and compassionate healthcare workforce.

Compassionate Care Initiative
at the University of Virginia

Through his time at UVA, Rob Abbott has built C.A.L.M. to be an incredible student-driven resource to support peers in the nursing and medical schools. Moving forward, Abbott has passed the leadership on to Corinne Roberts, a first year medical student, to continue their organization in hopes of expanding their mission to different professional schools at UVA.

If you would like to learn more about C.A.L.M. and sign up for their weekly newsletter, please visit http://www.amedicinalmind.com/our-newsletter-a-week-of-compassion.html. And for more information on the School of Nursing Compassionate Care initiative, visit https://cci.nursing.virginia.edu/.

A GRADUATE STUDENT'S ANALYSIS OF

America First
A Budget Blueprint to Make America Great Again

AND ITS AFTERMATH

Written by Jeremy Shaw

It's hard to scroll through Facebook, Twitter, or even make it through a family dinner without hearing about President Trump. Whether a supporter, critic, or one of the scarce few in the middle, it is imperative that the scientific community can separate truth from falsehood in the midst of a sea of "fake news" and "alternative facts." We need to be able to trust our observations; after all, they are the base of our scientific method! Below is a short summary of the scientific implications of proposals made to the Department of Health and Human Services by President Trump's proposed "America First" budget, a summary of the current "omnibus" passed budget on many scientific departments, and a short opinion looking to the future.

Department of Health and Human Services "America First Budget" Summary

Department of Health and Human Services $84.1 billion -> $69.0 billion (17.9% decrease)

Specifics:

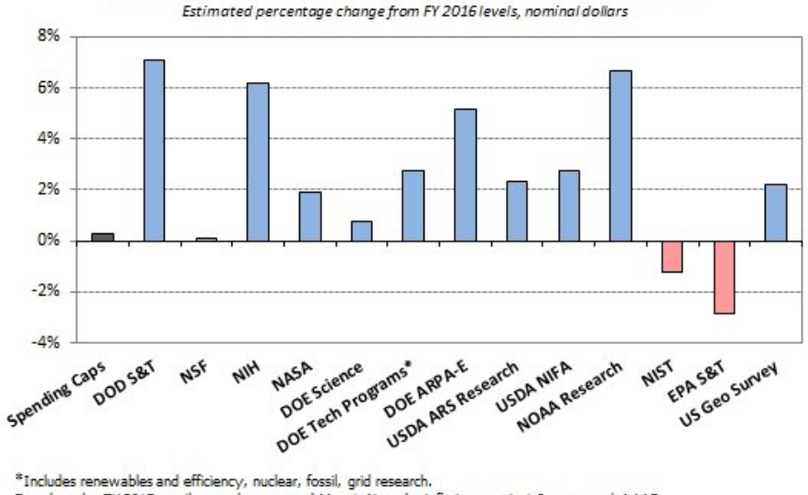
- Reduces the **National Institutes of Health's (NIH)** spending relative to the 2017 annualized CR level by **$5.8 billion** to $25.9 billion. The Budget includes a major reorganization of NIH Institutes and Centers to help focus resources on the highest priority research and training activities, including: eliminating the Fogarty International Center; consolidating the Agency for Healthcare Research and Quality within NIH; and other consolidations and structural changes across NIH organizations and activities. The Budget also reduces administrative costs and rebalances Federal contributions to research funding.

Other noteworthy departmental considerations

- Environmental Protection Agency $8.3 billion -> $5.7 billion (31% decrease)
- Department of Energy $29.7 billion -> $28 billion (5.6% decrease)
- Despite a large amount of current Department of Defense funded research, the budget summary made no mention of any increases or decreases to this amount in the President's plan to increase DOD funding by $52 billion to a new $639 billion total.
- Furthermore, despite the wide range of budget cuts, NASA remained relatively unscathed with only a 0.8% budget decrease leaving it at $19.1 billion.

Figure 1: Science & Tech Agencies and Offices in the FY 2017 Omibus

Estimated percentage change from FY 2016 levels, nominal dollars



*Includes renewables and efficiency, nuclear, fossil, grid research.
Based on the FY 2017 omnibus package posted May 1. Note the inflation rate is 1.8 percent. | AAAS

-Image taken from AAAS.org

2017 Implemented "Omnibus" Spending Bill Summary

After considering all of the above proposed budget cuts and increases, it's important to remember that in the end the president doesn't set the budget – Congress sets the budget. Sixty percent of Congress is required to pass budget proposals, meaning that although the America First budget may outline the priorities of the president and his cabinet, at the end of the day, Congress makes the bill to put on his desk for a signature. In this instance, despite large differences between his proposed plan and the one set forth by Congress on May 1st, President Trump approved the following "omnibus" spending bill to avoid a government shut down on Friday, pushing it off until September.

This omnibus spending bill has been regarded as a win for both parties as evidenced by its 79-18 vote in the Senate. However, if we stay focused mainly on the sciences, most would agree it is quite a win for scientists across disciplines. Below is a figure from the AAAS outlining a large amount of increases across the board (note 1.8% is the rate of inflation since 2016). However, the major takeaways for the Department of Health and Human Services are as follows:

Department of Health and Human Services $70.7 -> $73.5 billion

National Institute of Health (NIH) - $32 -> $34 billion

- Specific increases for research related to Alzheimer's disease, the brain, antibiotic resistance, and the Precision Medicine Initiative.
- A general increase to all NIH Institutes and Centers to continue progress in developing new treatments and cures, including increases for Clinical and Translational Science Awards and Institutional Development Awards. The legislation continues support for the Gabriella Miller Kids First pediatric research initiative.

Centers for Disease Control and Prevention (CDC) $7.3 billion (increase of $22 million)

- The legislation prioritizes funding for critical disease prevention and biodefense activities. This includes $6.3 billion in appropriated funds, as well as $891 million in transfers from the Prevention and Public Health Fund.

Looking Forward

Although many scientists' fears appeared unwarranted following the America First budget proposal, a sense of relaxation may also be premature following the passed omnibus budget. The current administration showed its hand with the America First budget proposal; it's important to remember that just because that budget failed to pass on this occasion, the motivation for those changes will not so quickly dissipate. The March for Science was an excellent start and display to show that science is important to the American people, and it may have even influenced some of the benefits to science passed in the omnibus bill. However, if we want to continue to make scientific progress in Washington, D.C., the end of the march needs to be the beginning of many new efforts promoting science and showing its vital role in our country.

Sources:
https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/fy2018/2018_blueprint.pdf
http://appropriations.house.gov/news/documentsingle.aspx?DocumentID=394859
https://www.aaas.org/news/congress-rejects-white-house-approach-pursues-targeted-science-technology-boosts

PROFESSIONAL COLUMN

GBS Career Panel Recap

By Alex Keller

The 2017 GBS Career Panel took place on Thursday, March 9, featuring four graduates of the BIMS program who have gone on to successful scientific careers beyond academia: Mark Miglarese (MIC ‘95) of Caris Life Sciences, Michael Torok (BMG ‘05) of Astellas Pharma, Allison Armstrong (Pharm ‘09) of Hemoshear Therapeutics, and Shaun McCullough (BMG ‘11) of the EPA. In a panel discussion moderated by the UVA Office of Graduate and Postdoctoral Affairs’ Amy Clobes, the panelists talked about their work, gave advice on choosing and following a career path, and took questions from current trainees. A few topics highlighted during the panel were:

1. The importance of planning a career strategy based on future goals and the steps needed to get there.
2. Paying attention to one’s sources of fulfilment to find a good job fit.
3. The need for resourcefulness and non-scientific skills beyond the bench.
4. Networking and developing meaningful relationships.
5. Getting involved in the scientific community beyond one’s immediate role.

Kelly Barford, a fourth-year PhD candidate in the neuroscience department, said she appreciated hearing about the diverse routes that the panelists took to reach their current positions and their enjoyment of these roles. She also expressed surprise at the number of position changes that facilitated these progressions, noting that a related takeaway was that the PhD increased panelists’ ability to make career moves not only upward but also laterally within their organizations. Irene Cheng, a fifth-year PhD candidate in the neuroscience department, said she especially enjoyed hearing from some graduates who had taken their degrees to pursue scientific careers beyond the bench and noted that the panelists emphasized the acquisition of transferable skills and leadership experience. GBS would like to thank our panelists again for traveling to UVA from across the country to share their experiences with current trainees! We look forward to the next career panel in 2018.

INTERVIEWS WITH ALUMNI

Dr. Marta K. Domanska

Interview by Jeremy Shaw

Edited for clarity

I recently reached out to UVa Alumnus, Dr. Marta K. Domanska, to learn more about her career at PRA Health Sciences including how she got the job, why she went into the field of clinical trials, unexpected challenges she faced, and even advice for those wishing to pursue a similar career – read the full interview below!

Name - *Marta K. Domanska*
Year of Graduation - *2010*
PI/Lab Name - *Lukas Tamm/Tamm Lab*
General field of study when in graduate school: *Biophysics - Studies of mechanisms of SNARE-mediated membrane fusion during neuronal exocytosis.*
Current Job Title/Company: *Drug Safety Associate II / PRA Health Sciences*

What does an average day consist of for you?
MD: *An average day will depend on a seniority of your position. Regardless of your position, every day you start it by reviewing your emails and then your calendar for any scheduled meetings (either with clients, internal study team or departmental).*

When I was DSA I, I would mostly process cases (serious adverse events (SAEs), adverse events of interest (AEIs) or pregnancy) that we have received for a study, sent notifications to clients informing them about new events that occurred, perform safety submissions (MedWatch or CIOMS) to health authorities, IRB/ EC or principal investigators.

In more detail, processing cases means data entry into safety database from SAE report forms that we receive from clinical sites and generation of case narratives that describe the reported event, quality control review of your peers cases, as well as forwarding the case information to medical reviewers and clients.

Depending on the size/phase of the study as well as contracted services, you will perform different tasks that are delegated to you by a safety study lead.

Once you advance in your position and became the safety lead for assigned project you start to interact with the clients and people from other departments within company by participating in study start-up and conduct meetings. In addition to tasks mentioned above, you are also responsible for the training of your DSA team on project specific procedures. You are also responsible for setting up those procedures, drafting study documents all according to the company SOPs.

How did you end up in your current position with PRA Health Sciences?
MD: *At the end of my postdoc at UVA, I reconnected with my old grad school friends. It turned out that one of them was a manager at the department that I'm working currently. Following his advice, I enrolled into Regulatory Affairs Certificate program from UC San Diego Extension to learn more about clinical trials and GxPs (Good Practice qualities and guidelines). I also forwarded him my resume, which he presented to his boss and shortly after that I was invited to an interview. Few weeks later, I started working for PRA.*

I think this is a sign of our times, and not exaggerated statement when people emphasize the importance of networking especially when you want to break into a new field.

Do you work with many people with different degrees (BS/ MS/MD/JD/MBA etc.) at your company?
MD: *Yes. The minimum requirement to become a DSA at PRA is a BS degree. We have also couple of DSAs with MS and Ph.D. Besides that on a daily basis you will interact with people that have nursing, medical and/or business degree. Medical reviewers that assess and provide comments to the processed cases (I mentioned above) are MDs.*

What would you say are your favorite and least favorite aspects of your job?
MD: *Favorite aspect of this job is the constant learning, you can rarely get bored. After all you are part of drug development by collecting the data on the safety profile of the potential new medication.*

Have you ever read the warning information on a medication box? It all comes from the work we do. We collect on behalf of our clients the adverse events, analyze that data and compile statistics that are later presented to FDA (for example).

Least favorite is ...hmm nothing comes to my mind.

What were some of the most difficult or unexpected challenges you faced in transitioning from your graduate studies to your current position?
MD: *I don't recall any. After my postdoc, I was ready to leave the bench and switch to non-academia path. But I heard some of my colleagues, complaining about working 8 hours at the computer every day.*

On an opposing note, which aspects of your graduate training do you think benefited you the most?
MD: *All of it. :) all the skills that you develop as graduate student come very handy in any type of job outside academia. Your critical thinking, problem solving skills, ability to work independently or as a team member, managing multiple task on daily basis, being detail oriented, mentoring others, reading complex medical literature or source records. All of it will make any graduate student successful in a job outside of academia.*

Why did you decide to go into this career path over others? (Academia, industry, biotech, etc.)
MD: *Different factors contributed to my decision. Academia was not an option. Once I decided to leave the bench, I did not want to pursue anything in this path (that also included any type of teaching positions).*

Industry - I applied to a number of jobs (not postdoc positions) including big pharma like Merck or Pfizer, however I did not have any direct contact within those companies, so my applications were not successful. I was simply not interested in another postdoc at that point.

I wanted to find a career path that would allow me leave the bench and that would have perspective for growth and development. My choice was clinical trials. I conducted number of informative interviews with Clinical Research Coordinators within UVA. And I was actively learning about clinical trials and jobs in this path. There are a number of different positions that you can choose from and CRO environment offers that.

So final question, what advice would you give to our current graduate students who might want to enter your field?
MD: *Network, network, and one more time network...*

If you really interested in pursuing career in clinical trials, learn as much as you can about Good Clinical Practice (GCP) and International Conference on Harmonisation (ICH) as these are the principal rules that govern how clinical trials are conducted today. There are different courses or certificates offered on that topic.

Seek opportunities for internship. I think since last summer PRA HS has a summer internship for new graduates that allows them to learn more about what our company does.

Ask people for informative interview, ask about their experience and ask their advice on securing a job in their field... be proactive.

Dr. Chong Xu

Interview by Alex Keller

Chong Xu is a 2009 graduate of the Cell Biology graduate program at UVA. While at UVA, Chong's predoctoral research focused on Wnt signaling under the mentorship of Dr. Barry Gumbiner. He returned to UVA in 2012 to get his MBA at Darden, and now works in Boston at F-Prime Capital, a venture capital firm. Chong talked with us about his life in business and finance, how science informs his current work, and the opportunities available in this alternative career option.

GBS: Could you introduce venture capital and F-Prime Capital, for readers who might be less familiar with the industry?

Chong: Venture capital (VC) invests in early stage startup companies. F-Prime Capital is a Boston-based VC focused on healthcare and financial technology.

GBS: How did you decide on your current career track? What steps led to the point where you are now?

Chong: I worked at a hedge fund and in management consulting, and also explored other career tracks. I think VC is interesting as it is close to science but also uses a lot of business skills.

GBS: What differed among these settings, and why might a PhD student be interested in each?

Chong: This is a very big topic that may need a longer answer than I can type here. There is a lot of readily-available information online that one can access to learn about each career path - a lot of PhDs may find them interesting as they require a lot of intellectual curiosity and problem-solving.

GBS: As a PhD, how does your role and skill set fit into your firm?

Chong: At my job, I read more scientific papers than my PhD days. One needs to learn about a field/topic before investing in a company - for example, learn about a disease, molecular mechanism, current research, etc. before investing in a new drug.

GBS: Could you describe a typical workday in your current role? What hours and tasks are common?

Chong: I arrive at 8am, leaving at 6-7pm. Usually there are a few typical activities: Reading - a lot of reading scientific papers, investment reports, market researches, medical guidelines, etc. to learn about a field. Meetings - meeting with companies to figure out if they are worth following up, with peer fund professionals to see if there are collaboration opportunities, with team members to work together on deals, etc. Writing - writing emails, memos, making PPTs, etc. to communicate our thinking with others.

GBS: What are your favorite and least favorite parts about your job?

Chong: My favorite part is working closely with some of the best and brightest scientists in biotech. My least favorite is that it takes a long time for an investment to work out.

GBS: What parts of your scientific training do you (or don't you) use in your work? In what ways?

Chong: I think I use two skills most - the ability to read extensively quickly and distill key takeaways; and the ability to dig deep into a problem and find answers.

GBS: What are the most important skills and personal characteristics that make someone successful in your field? Did you learn any of these skills during graduate school?

Chong: Be open, thoughtful and persistent in communication with others. I think in graduate school one tends to be closed and shy, not willing to bother others - in the business world, talking to others is essential.

GBS: What background is necessary or ideal for a career in VC? What skills or training are needed beyond a PhD? What would your firm look for in an applicant from a scientific background?

Chong: Scientific & business skills would be a killer combination for VC, so for a PhD, the key is to get some business experience. One can work in any business capacity for that - for example, one of the best entries to VC is to be a successful entrepreneur yourself.

GBS: What specifically helped or hindered your success at getting a job after graduate school?

Chong: I sought and received help from a lot of people I have never met, who responded to my cold emails/calls and gave wonderful advices. I am forever grateful. I also took classes at Darden, attended different clubs, got to know business students, did case competition and business plan competitions...think those definitely helped.

GBS: What is the next step in your career path? What are the future career opportunities for someone in your position?

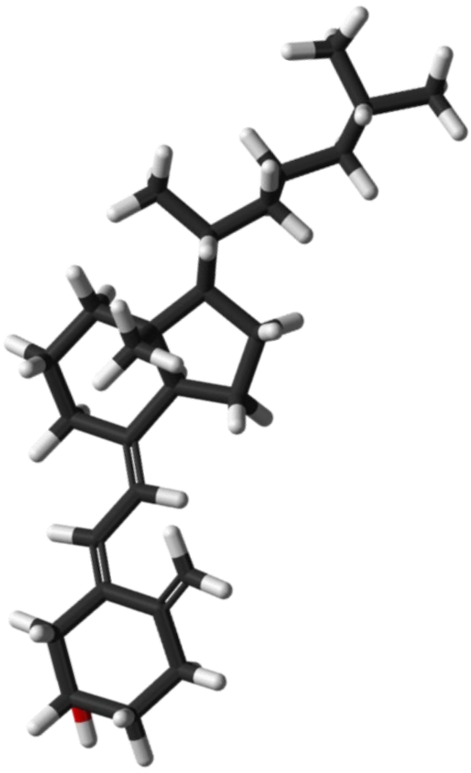
Chong: I don't know yet. Many in this role eventually go to a portfolio company to help build the company up - I might do that too.

GBS: What advice would you give a graduate student interested in pursuing your career path?

Chong: Take it slow. Aim to learn, not to get a job, and you will eventually get to where you aim to be. Reach out of the lab and talk to people.

Thanks to Chong for sharing these insights with us! *Stay tuned for more information about the many exciting career paths available to PhDs beyond the traditional choices.*

Science Hot Topics



Vitamin D *is* a Potential Cancer Therapeutic

By Paige Kulling

Vitamin D is a steroid that is often obtained from ultraviolet radiation exposure or fatty foods such as fish or fortified milk. Vitamin D status has long been associated with rickets and bone health. However, more recently, vitamin D has proven to be a potent anti-cancer therapeutic. Deficiency in serum levels of vitamin D ($25(OH)D_3$) is correlated with an increased risk of developing numerous cancers as well as worse overall survival, shorter relapse-free survival, poorer molecular and overall response to therapies, higher malignant disease cell burden, and more aggressive disease state. Therefore, there has been significant efforts in the cancer field to utilize vitamin D, specifically the active form, calcitriol, to restore vitamin D levels to improve patient outcomes. Studies in animal models and *in vitro cell culture systems demonstrate that vitamin D treatment reduces pro-inflammatory cytokine output, induces apoptosis, inhibits proliferation, promotes differentiation, and sensitizes cancer cells to therapies. Interestingly, the mechanism behind these effects is generally not well understood and it appears that vitamin D often acts on different cell types and cancers through unique mechanisms. Canonically though, vitamin D binds to the vitamin D receptor (VDR) to induce transcription or suppression of VDR target genes, leading to many anti-cancer effects. For example, vitamin D increases transcription of cyclin-dependent kinase (CDK) inhibitors or the pro-apoptotic protein BAX, which reduces proliferation or induces apoptosis, respectively, in colon cancer cell lines. Vitamin D has been evaluated in clinical trials and is well tolerated aside from hypercalcemia at high dosages; a negative side effect which can be circumvented with intermittent dosing or vitamin D analogs. One of the largest ongoing phase 3 clinical trials (VITAL) is assessing the effects of vitamin D and omega-3 supplementation on the development of cancer and cardiovascular disease and is expected to be completed in December 2017. Taken together, vitamin D and its analogs show great promise for use in the clinic.*

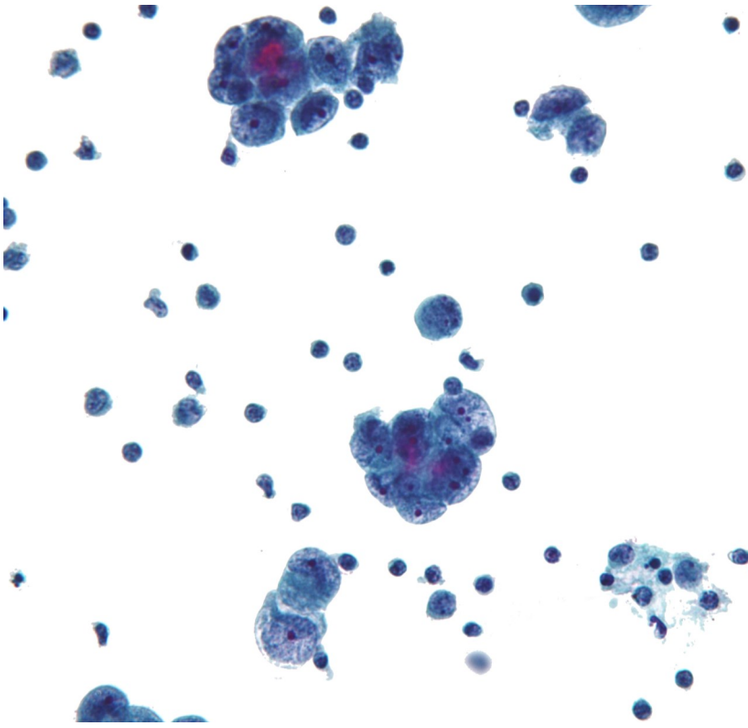
Immunotherapies

By Phil Seegren

“New Era in the War on Cancer,” “The Great Cancer Hope,” “The Search for a Cure.” These headlines pronounce recent advances in immunotherapy and inspire the scientific community to find new personalized treatments for cancer.

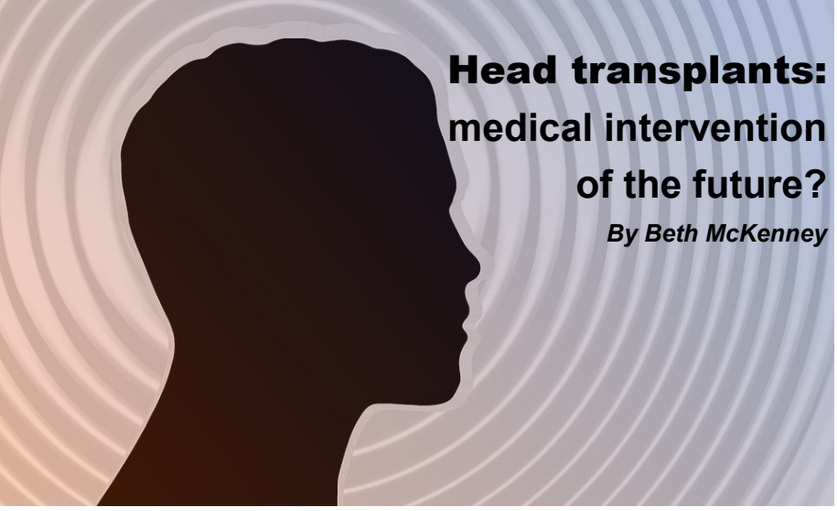
Immunotherapy has been at the forefront of medicine since Edward Jenner first vaccinated against smallpox in 1796. Jenner observed that by inoculating people with cowpox, you could protect them from future exposure to smallpox. At the time no one would have used immunotherapy to describe these observations, but looking back we can appreciate that these vaccines mobilized the immune system to protect against smallpox. Scientist today are attempting to harness this power of the immune system to fight cancer.

The current mechanisms for mobilizing immune cells against cancer are monoclonal antibodies (mAbs), checkpoint inhibitors, cancer vaccines, peptide immunotherapy, CAR-T cells, and other non-specific immune modulatory drugs. The list of new therapy ideas is continually growing and for simplicity, I will focus on the two most prominent in news today, mAbs and checkpoint inhibitors. To illustrate their unique activity, I will use an analogy taught to every immunologist-in-training. In this analogy, the immune system is a car: our immune system relies heavily on accelerating to remove a disease and braking to prevent unnecessary damage. Cancer immunotherapies take advantage of these properties to enhance immune recognition (accelerate) and promote immune activation (remove the brakes) against cancer. mAbs are generated by the immune system to recognize and bind proteins (antigens) on cancer cells. mAbs are a gas pedal for innate immune recognition. Innate cells in our bodies recognize mAbs as “find me” signals accelerating the destruction of cancer cells. mAbs can also coat cancer cells, rendering them incapable of surviving. Cancer cells require biochemical processes to stay alive, several of these processes are triggered by the upregulation of receptors that promote cell survival. mAbs that recognize these receptors can deprive the cancer cell of critical signals for survival resulting in cancer cell death. Two examples of mAbs used in the clinic are alemtuzumab (Campath) and trastuzumab (Herceptin). Persisting hurdles for mAb include lack of tumor-specific antigens, tumor heterogeneity, and off-target effects. Nevertheless, the future of mAb therapies is exciting as researchers improve purification methods, enhance binding affinities, lower off-target effects and conjugate toxins for increased efficacy[1]. More recently, checkpoint inhibitors have wowed clinicians with their successes. The first example of this success was the clinical trials for ipilimumab (Yervoy). Of ~2,000 patients with metastatic melanoma, 20% responded, with a majority still alive today. Checkpoint inhibitors work by targeting inhibitor receptors (the brakes) on the surface of immune cells. By removing the brakes, the immune cells can become activated and attack nearby cancer cells. Current research is aimed at identifying novel brakes within the tumor microenvironment, improving immune infiltration of tumors and identifying patient markers that correlate with a robust immune response to checkpoint inhibitors[2].



Immunotherapies have galvanized a generation of scientist to fight cancer. History teaches us that our greatest advances against disease stem from our ability to exploit intrinsic biology. Time will tell if we can fight biology with biology in our attempts to run cancer off the road.

1. Ayyar, B. Vijayalakshmi, Sushrut Arora, and Richard O’Kennedy. "Coming-of-Age of Antibodies in Cancer Therapeutics." *Trends in Pharmacological Sciences 37.12 (2016): 1009-1028.*
2. Pardoll, Drew M. "The blockade of immune checkpoints in cancer immunotherapy." *Nature Reviews Cancer 12.4 (2012): 252-264.*



Head transplants: medical intervention of the future?

By Beth McKenney

In 2015, Italian neurosurgeon Dr. Sergio Canavero boldly claimed that he would be performing the world's first human head transplant in 2017. Well, 2017 is upon us, and many are asking if Dr. Canavero still plans to go through with it. Although it sounds like something out of a horror movie, proponents, including Dr. Canavero, argue that it is the last frontier towards saving the lives of people with deadly, degenerative diseases. However, as one can probably imagine, transplanting a head onto a new body is easier said than done. There are several obstacles that need to be overcome before head transplantation would be feasible. For starters, keeping a brain alive is incredibly difficult after it has been severed from the body. In a recent mouse experiment, Dr. Canavero and his collaborator Dr. Ren Xiaoping claim to have solved this problem by maintaining a constant blood flow from a donor mouse to the two mice undergoing the head transplant. However, these mice only survived for less than two days. Even if the issue of keeping the brain alive long enough to transfer the head from one body to the other can be solved, the likelihood of rejection of the transplanted head by the recipient body is extremely high. Additionally, in order for the transplant to be successful, the spinal cords must be seamlessly fused. Dr. Canavero claims to have accomplished this feat this in a dog, by severing the spinal cord by 90% and then re-fusing it; however, evidence for these claims is lacking. Despite the lack of evidence in general that a head transplant would even be possible, Dr. Canavero has at least two volunteers for the procedure. Both have debilitating, degenerative diseases.

Aside from all technical considerations, ethical considerations must be taken into account as well. What sort of life does one have to look forward to after a head transplant? Critics of the procedure argue that the likelihood of depression and other mental illnesses, or even severe mental disability, is high. While the possibility of successful head transplants is still far in the future, potential patients will have to weigh these costs and benefits.

Sources:

Li et al. 2017. A cross-circulated bicephalic model of head transplantation. *CNS neuro & therap.*

Kim et al. 2016. Accelerated recovery of sensorimeter function in a dog submitted to quasi-total transection of the cervical spinal cord and treated with PEG. *Surg Neruol Int.*

STORIES YOU MAY HAVE MISSED

Compiled by M. Schappe

We have compiled a brief collection of stories from the past month that you may have missed. Ranging from year-in-review to headlines to food-for-thought, we hope you find something interesting.

CellPress

Sneak Peek
A PREVIEW OF PAPERS UNDER REVIEW

Cell Press launches "Sneak Peek" feature to explore papers under review

Pubmed doesn't have enough literature to keep you busy? Then, check out "Sneak Peek" from Cell Press and Mendeley, which makes complete manuscripts available from papers under review with Cell Press. The goal is to reduce the time readers need to wait from submission to publication. Authors can opt-in to share their manuscripts through this service. To use this, you can join the public Mendeley user group. Mendeley is a free citation manager software. Cell Press publishes journals such as *Cell, Immunity, Neuron, and Trends.*

Source:
http://www.cell.com/sneakpeek

Vaccine Myths - share with friends and family!

Recent headlines, such as a mumps outbreak in Minnesota, demonstrate the effect of efforts to question the "safety" of vaccines. *Science recently compiled common myths and facts about vaccines. While staying up to date on popular misconceptions can be difficult, scientific awareness and education is a vital part of our mission as professional scientists.*

Source:
http://science.sciencemag.org/content/356/6336/368

23andMe

FDA Approves 23andMe to sell genetic test for some disorders

At the start of April, the FDA approved 23andMe to sell their genetic testing kits to be used for select medical conditions. This is the first approval of a test to be permitted for sale directly to consumers that provides genetic information. Using a small saliva sample, 23andMe tests 500,000 genetic variants and can be used to measure risk for conditions such as Alzheimer's disease, Parkinson's, Celiac and more. The FDA noted that the approval was also due the strong association of these diseases with genetic mutations supported by scientific literature, but cautioned against using the kit results to inform treatment decisions.

Announcement:
https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm551185.htm

Source:
https://www.nytimes.com/2017/04/06/health/fda-genetic-tests-23andme.html?_r=0

Recent analysis shows impact of NIH funding on economy

30.8% of NIH grants between 1980 and 2007 supported an article cited by a commercial patent, according to an analysis published in *Science. Patents can serve as a measure for economic growth. The analysis showed a surprising, "indirect" impact of government funded research, rather than looking at solely at patents or companies directly established by academic researchers. By this analysis, every $100 million of NIH spending yields approximately 23 patents. Likewise, every $1 the NIH spends yields $1.40 in drug sales, which does not include benefits derived from devices, techniques, or public health improvements.*

Source:
http://www.nature.com/news/nih-research-grants-yield-economic-windfall-1.21752#/b1

CRISPR research complicates older genetic studies

As researchers turn to CRISPR for their research, new studies report discrepancies between large screens using RNAi or morpholinos and genetic mutants. The accessibility of CRISPR-based gene targeting permits researchers to validate previous studies, but this has led to concerns about reports invalidating entire bodies of literature. While targeted genetic approaches may shake-up scientific foundations, new studies do not "mean one approach was right and the other wrong."

Source:
http://www.nature.com/news/crispr-studies-muddy-results-of-older-gene-research-1.21763

Alphabet

Google and Bioscience Research: "B is for Biotech"

Alphabet (i.e. Google) is rapidly expanding into the biotech sector, investing increasingly larger funds into life science ventures. GV (formerly, Google Ventures) has $2.4 billion dollars under management has recently invested in biotechnologies, therapeutics, and medical devices. Part of Alphabet's package include their own biotech companies Verily and Calico. While some are critical of Google's ability to "disrupt" medicine and disease, successes achieved in biology provide an attractive frontier for future investments and potential returns.

Source:
http://www.fiercebiotech.com/biotech/b-for-biotech-alphabet-and-its-search-for-life-science-glory

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Any questions, concerns or opinions? Feel free to fill out our survey

https://goo.gl/forms/RZ1A8zBVdgstAJLf1

or email Tori Osinski at vo3sc@virginia.edu