CCR Fellows & Young Investigators Newsletter

Center for Cancer Research
Volume 20, Issue 3 **Summer 2022**

Special newsletter edition: 22nd CCR FYI Colloquium

Translating Cancer Research from Bench to Clinic: THE REAL DEAL!

In the picture above, the CCR-FYI Colloquium Planning Committee: Chairs: Anna Ratliff, Vasty Osei Amponsa. Vice Chairs: Todd Golden (not pictured), Poonam Aggarwal. Committee: Knicki Bergman, Whitney Leet Do, Amy Funk, Katie Hebron, Rasika Hudlikar, Suraj Joshi, Sabina Kaczanowska, Brittany Lord, Gabriel Matos-Rodrigues, Shweta Singh. Not in the picture, but part of the Planning Committee: Victoria Hill.

Support of the CCT-Office of Training and Education, CCR-FYI SC was essential for the success of this event, in particular the Committee wants to thank Mary Grace Katusiime, Wenjuan Wang, Angela Jones, Astrid Masfar, Maria Moten, Erika Ginsburg and Oliver Bogler.

CCR-FYI Association is supported by the NCI Center for Cancer Training (CCT) and CCR Office of the Director.

Connect with CCR-FYI

For more than two years, the COVID-19 pandemic continues to have a major impact on the life of many NCI fellows, but with resilience and commitment to continue producing and presenting excellent science, we are happy to see that the big yearly event of the CCR-FYI Colloquium was held virtually for a second year with great success!! Through an interactive virtual platform this annual two-day event was held in April 2022, and researchers from across CCR and NCI had the chance to participate in keynote addresses from extramural and intramural speakers along with panels and workshops to highlight the career development of CCR fellows.

In this edition of the Newsletter, we feature summaries of the various sections of the Colloquium, to give anyone who was not able to attend the chance to get some of the valuable insights and information that was shared by speakers and panelists.

I hope you enjoy reading the Summer 2022, Special edition of the FYI Newsletter! – Alida Palmisano (Editor-In-Chief)

(background image created with BioRender.com and picture by Dom Fou on Unsplash)

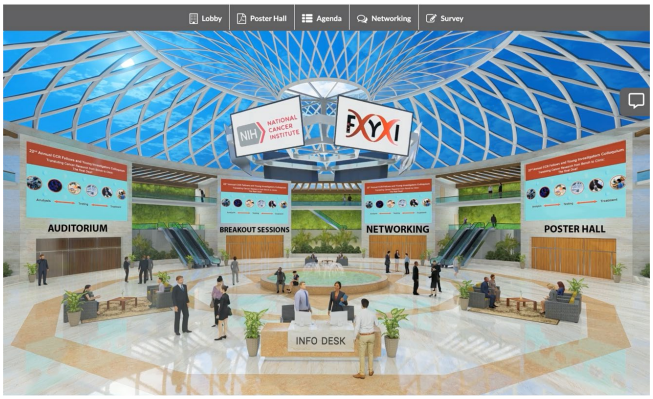
Inside this issue

The 22nd Annual CCR-FYI Colloquium: One for the books!

by: Vasty Osei Amponsa and Anna Ratliff

For the third consecutive year, the Annual CCR-FYI Colloquium was held virtually due to the COVID-19 pandemic. This year's Colloquium marked the 22nd Annual event, and the theme chosen was "Translating Cancer Research from Bench to Clinic: The Real Deal!". Though initially planned for an in-person conference, the Colloquium, which was held on April 20th and 21st, 2022, was hosted on vFairs, one of the latest interactive conference platforms out there. By using vFairs, we hoped that our attendees and speakers could gather on a platform that minimizes the now familiar term of "Zoom conference fatigue" while encouraging people to interact and actively participate in the event. And we must say that based on the positive feedback that we have received from both speakers and attendees, we have successfully achieved our goal! We congratulate the CCR-FYI Colloquium Planning Committee for the amazing team work on putting together this event with the objective of delivering an event featuring scientifically rigorous topics, encouraging networking, and promoting professional development opportunities to help CCR fellows reinforce their soft skills.

Attendance to the 22nd Annual Colloquium was restricted only to individuals that had registered for the Colloquium. To our surprise, the number of registrants recorded for this year's Colloquium was in the range observed in pre-pandemic: over three hundred and twenty registrants! Upon logging on vFairs, registered attendees were led into a virtual animated lobby (as shown in the image), from where they could access either the auditorium, where the main events occurred; the poster session listing all one hundred and thirty-eight posters; the breakout rooms, where attendees could choose either an oral presentation category to attend in the morning sessions or a workshop or panel discussion to attend in the afternoon sessions; and finally, the networking event where registrants could chat either by texting or video calling.



The articles in this edition of the CCR-FYI Newsletter summarize the details of the events of the Colloquium. This article will give a brief overview of the event.

The Colloquium kicked off on April 20th with opening remarks by the CCR-FYI Colloquium Planning Committee co-Chairs, Dr. Vasty Osei Amponsa and Dr. Anna Ratliff, welcoming and thanking everyone for attending the Colloquium. This was followed by a presentation from the Chief of the Office of Training and Education, Center for Cancer Training (CCT), Erika Ginsburg, who spoke about the resources available for the fellows in their training years at CCR. Following that same line, Dr. Oliver Bogler, the Director of the CCT, talked about CCT's commitment to assist trainees in their scientific career development.

This year's Colloquium was also a time for a series of goodbyes from some familiar faces of the CCR-FYI Annual Colloquium. Dr. Ned Sharpless, who had been serving as the NCI Director for the last four years was stepping down after the CCR-FYI Colloquium. Due to time constraints, we were not able to have Dr. Sharpless "live" with us but in his pre-recorded remarks, besides talking about the amazing research being conducted at the CCR and the NCI, he thanked fellows for their contribution to cancer research and advised them to be more mindful of their time and master time management to avoid getting burnt out from activities. Just like Dr. Sharpless, Dr. William "Bill" Dahut was stepping down from his position as CCR Scientific Director for Clinical Research and he gave his remarks at the opening of the second day following a speech from Dr. Glenn Merlino, the CCR Scientific Director for Basic Research. Both Directors highlighted the accomplishments of their respective research sectors at the CCR and future research directions. More details on the Directors' talks can be found in this newsletter.

The first keynote presentation was delivered by the intramural researcher, Dr. Steven A. Rosenberg, the Chief of Surgery and Head of the Tumor Immunology Section. During his talk entitled "Lymphocytes as a 'living drug' for the treatment of cancer", Dr. Rosenberg showed a page from a now archived page of his notebook from 1988 detailing some of the challenges of getting Institutional Review Board approval for the clinical trials of his research and talked about how his research has improved patients' lives. The morning sessions on day one of the Colloquium continued with breakout rooms for the oral presentations by selected CCR fellows. We had three concurrent well-attended and engaging oral presentations sessions. The oral presentations were followed by the poster presentation session. Each poster functioned as an individual breakout room, where presenters could video chat and share their screens with attendees. We were happy to learn that everyone that attended the poster session was really pleased by this engaging approach.

Later in the day we heard from the second intramural keynote speaker, Dr. Naomi Taylor, a Senior Investigator in the Pediatric Oncology Branch. Dr. Taylor gave a talk entitled "Nutrient shifts regulate hematopoiesis: Impact on retroviral infection and immunotherapies." This was followed by the presentation by the 2022 Outstanding Postdoctoral Fellow Award winner, Dr. Xiyuan Zhang, a research fellow in the Pediatric Oncology Branch. Her presentation entitled "Loss of PRC2 enforces a mesenchymal neural crest stem cell phenotype in NF1-deficient cancer through activation of core transcription factors" unraveled her research focus on understanding the epigenetic consequences of the loss of polycomb repressive complex 2 (PRC2) during the malignant transformation of benign to malignant neurofibromas in patients with neurofibromatosis type 1 (NF1).

The afternoon sessions continued with fellows entering breakout rooms designated for two workshops titled "Networking and Interviewing: What You Don't Know Can Hurt You!" and "Science Communications in the Era of Social Media: How to communicate and make information accessible", and a panel discussion entitled "Scientists in Tech, Industry and Small Business". During these sessions, fellows learned about effectively communicating and networking for their professional development, heard from

scientists in industry on how to pursue a career in industry.

In the morning of day two of the Colloquium, we hosted the first extramural keynote speaker. Dr. Livia S. Eberlin, an Associate Professor in the Department of Surgery in Baylor College of Medicine. In her presentation titled "Translating Mass Spectrometry Technologies to the Clinic: Challenges and Opportunities to Advance Patient Care", Dr. Eberlin spoke about the application of mass spectrometry as a clinical diagnostic tool in the forthcoming future. Although we had many superb keynote speakers, this Colloquium would not be complete without the hard work and scientific discoveries of our NCI fellows, and as on day one, the morning sessions of day two continued with fellows selected to give oral presentations followed by the poster presentation session.

The afternoon of day two was then opened by the second extramural keynote speaker for the Colloquium, Dr. Craig M. Crews, an American Cancer Society Professor and John C. Malone Professor of Molecular, Cellular, and Developmental Biology in the Department of Chemistry and the Department of Pharmacology, and Executive Director at the Yale Center for Molecular Discovery. Dr. Craig's talk entitled "PROTACs and Targeted Protein Degradation: A New Therapeutic Modality" covered the importance of PROTACs in drug design and as alternative therapeutic strategy. Our last keynote speaker was the survivorship speaker, Dr. Victoria Forster, a Postdoctoral Research Scientist in Pediatric Cancer at The Hospital for Sick Children in Canada and cancer survivor. Dr. Foster, who has been featured on several outlets including Forbes, AACR Cancer Discovery News and Cancer Therapy Advisor, spoke about her experience as a child cancer patient, and how that shaped her to pursue a career in science, advocate for cancer research and better treatment for patients as highlighted in her talk entitled "From Childhood Cancer Patient to Cancer Research Scientist: Lessons for the Future".

In the afternoon sessions of day two, we had breakout rooms for the workshop entitled "Getting the most out of your time at the NIH" and two panel discussions entitled "Academic and Alternative Academic Positions" and "Scientific Careers in the Government". Fellows attending this workshop and panels gained information on the resources available to them at NIH to advance their profession and learned tips on how to embark on academic and government related careers.

The 2022 Colloquium ended on April 21st with closing remarks by Dr. Tom Misteli, Director of CCR, who also presented the travels awards to this year's oral and poster presenter winners, as well as the Outstanding Postgraduate Fellow Award winner.

We would like to thank everyone that worked endlessly to make this a successful event, starting from the team at the Office of Training and Education at the CCT, the Colloquium Planning Committee, the CCR-FYI Steering Committee, the CCR Office of the Director and finally the vFairs team, to you all: THANK YOU!

Also, to both Dr. Sharpless and Dr. Dahut, on behalf of the CCR-FYI Steering Committee, we thank you for your commitment and dedication to the CCR-FYI Annual Colloquium, for your engagement with the fellows and for your

valuable advice for their scientific career development. On behalf of the CCR-FYI Colloquium, we wish you best of luck on your next endeavors!

If you would like to get involved in the CCR-FYI and the planning of the 2023 Colloquium, please contact the CCR-FYI Steering Committee co-chairs for more information. More information can be found at: https://www.cancer.gov/grants-training/training/resources-trainees/get-involved

Someone new is joining the Newsletter Team…

"The most beautiful thing we can experience is the mysterious. It is the source of all true art and science" - Albert Einstein

I, Shivalee Duduskar, am the illustrator for the CCR FYI newsletter. During my PhD, I developed a keen interest in conveying my research through comics and illustrations. This led to the creation of my character named "Nerdy Minku". Let's see what she has to say….

"This is not clear to me… how might this protein work in correlation with the KSHV? Did I stop my Gel? Oh! There is a journal club this Friday, let me pull out an interesting article. And this mid-week dinner with family God help me with work-life balance…

Ahhh.. Sorry about ranting my thought out loud but Hey!!!! I am Nerdy Minku :)

I am a woman in STEM, striving for a career in academia and a I recently immigrated to the United States from Europe! I am here to show you the triumphs and struggles in a scientific career through snapshots of my life. Join me with a hot cup of chai if you want to talk science.

See you around. "

Nerdy Minku

Never Been a Better Time to be in Cancer Research Than Now! – NCI, CCR and CCT leadership remarks

by: Vasty Osei Amponsa and Anna Ratliff

As per tradition, the first day of the 2022 CCR-FYI Colloquium kicked off with opening remarks from the leadership at the Center for Cancer Training (CCT): Erika Ginsburg, Chief of the Office of Training and Education (OTE) at CCT and Oliver Bogler, Director of CCT. This was followed by a speech from Dr. Ned Sharpless, the now-former Director of the National Cancer Institute (NCI). In her remarks, Ms. Erika Ginsburg highlighted the CCT's commitment to assisting fellows throughout their training experience at NCI. Specifically, she talked about the different training programs offered to fellows at all stages in their scientific career journey, from training programs for high school students to postdoctoral fellows. To support the career development of trainees at NCI, the OTE organizes several workshops, seminars and fellowships that assist fellows in their transition to academia, industry, or other scientific careers. Echoing Ms. Ginsburg's address, Dr. Oliver Bolger talked about CCT's mission of supporting the career development and achievements of NCI trainees. In efforts to better serve fellows, the CCT has put together a "Training Technology Advisory" group to help build a platform that will soon be available for fellows to interact and share research, career journey, or personal life interests.

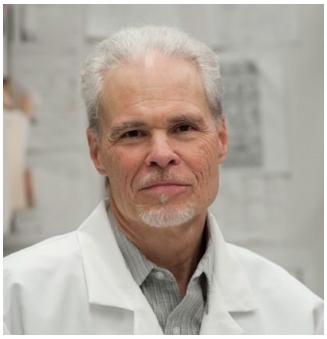
A cancer survivor himself, Dr. Bogler is of the opinion that this is a great time for fellows to be part of the cancer research community. His view was emphasized by Dr. Ned Sharpless whose opening remarks stated: "It's a great time to be in cancer research!". In his address as outgoing NCI Director, Dr. Sharpless emphasized on the decrease in rate of cancer-associated mortality in the United States accompanied by increased FDA approval rates of innovative diagnostics and therapeutic technologies. "This period, maybe the last ten years and the ten years to come were viewed as transformative time in cancer research and cancer care, sort of considered as golden age of cancer research" said Dr. Sharpless who also mentioned President Biden's commitment to ending cancer through the so called "Cancer Moonshot" vision, which is designed to bring together the scientific community, the medical and public health community, private sector, cancer patients and survivors to contribute towards the advancement of cancer research and care.

As Dr. Sharpless steps down as NCI Director, the efforts of NCI to

the White House "Cancer Moonshot" will be driven by the NCI Acting Director, Dr. Doug Lowy.

In his remarks, Dr. Sharpless also praised the leadership and the highly diverse intramural research conducted at the Center for Cancer Research (CCR), from basic science research to applied translational research to clinical trial studies. Some of the exciting research at CCR that he mentioned includes the work of Dr. James Gulley in investigating new technologies and approaches to oncology or the work of Drs. Doug Lowy and John T. Schiller in pioneering the development of the Human Papilloma Virus (HPV) vaccine among other research conducted at NCI. Dr. Sharpless also talked about the accomplishments of Dr. Steven Rosenberg in winning the Pezcoller Foundation-American Association for Cancer Research (AACR) International Award for extraordinary achievement in cancer research and Dr. Elaine Jaffe in winning AACR James S. Ewing-Thelma B. Dunn Award for outstanding achievement in pathological cancer research at the AACR National Cancer Meeting for Cancer Research. This progress and achievements showcase how NCI remains committed in pursuing cancer research.

As he concluded his speech, Dr. Sharpless shared some career development advice with the attendees. He invited the fellows to seek for critical feedback that would help them grow professionally. He emphasized the importance of mentorship and how the relationship between a mentor and a mentee is really a two-way street requiring effort from both sides. Additionally, he advised fellows to build their career on something that they believe in but also be open to new opportunities and explore the diverse directions in which their scientific career might go. He considered the most important advice to be "protective of your time" by learning to say "no" when needed and balancing your life and career. Lastly, as his last interaction with the CCR-FYI Colloquium as NCI Director, Dr. Sharpless thanked the fellows for their effort and contribution to cancer research.



The second day of the 2022 Colloquium opened with some remarks from the Scientific Directors at CCR. Dr. Glenn Merlino, the CCR Basic Science Scientific Director, introduced the structure of CCR and its leadership. According to Dr. Merlino, access to stable resources and cutting-edge technologies facilitate CCR's mission to improve cancer patients lives through cancer research. He talked about some new CCR Basic Science initiatives such as the "Human Virome Core" and the "Intravital Microscopy Core", as well as about the establishment of equity and inclusion programs. An example is the "Intramural Continuing Umbrella of Research Experience", an NCI-diversity focused program for post-bacs, pre-doctoral and post-doctoral fellows from underrepresented communities. Dr. Merlino advised fellows to be "proactive in your career" by taking advantage of the resources available at CCR, but mostly networking and publishing high impact research work.

In line with Dr. Merlino's remarks, Dr. William Dahut, the outgoing CCR Clinical Research Scientific Director at the time of the Colloquium, talked about how the NCI is the leading Institute/ Center (IC) in clinical trials among the other ICs at the NIH Clinical Center, and about the CCR Clinical Research initiatives including the "SYNTHESIS program". Dr. Dahut also highlighted

how the advent of COVID-19 has impacted clinical research leading to an increase in telehealth care for patients. The switch to telehealth allowed inclusion of patients from all over the United States and even internationally. It improved logistical aspects of the traditional clinical research, highlighting the need to introduce some amendment to promoting inclusion and diversity in clinical trials at NCI-CCR. To summarize his speech, Dr. Dahut thanked the fellows for being part of the NCI community and their dedication to the CCR mission of doing impactful work to change the way we treat cancer patients.

The closing remarks of the 2022 CCR-FYI Colloquium was delivered by Dr. Tom Misteli, the CCR Director, who jokingly remarked on the Colloquium tradition to have him be the last Director to speak. Dr. Misteli expressed wanting this session to be as interactive as possible with the fellows attending the event. In his remarks, he talked about how the organization of events like the CCR-FYI Colloquium is an example of how the training at CCR goes beyond science, allowing trainees to develop from a scientific professional standpoint but also building networks and other professional skills. Dr. Misteli also addressed the effect of the pandemic on fellows' training experience, how it not only led to isolation but also affected fellows' productivity.

In agreement with the views of the other Directors, Dr. Misteli said there has "never been a great time to be in cancer research like right now". This is thanks to the innovative technologies in both basic science and clinical research. He mentioned the new technologies that has revolutionized cancer research including single cells analysis, artificial intelligence application, the new application of cancer research such as microbiome and cancer, and the focus on health disparities in relation to cancer research. He also emphasized on the change in the scientific community on how it approaches bridging the gap between the basic and clinical science. Specifically, basic science investigators are increasingly interested in the applicative aspects of their discoveries, while clinical researchers seek to better unravel the mechanisms behind the malignancy for a more precise diagnosis and therapeutic decision; and the CCR is a perfect exemplary of this bridging of basic and clinical sciences.

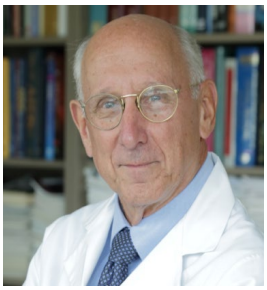
Before opening the floor for attendees to ask him questions, Dr. Misteli also talked about the different career options for fellows to evaluate. He mentioned about the competitiveness in academia for Principal Investigator (PI) positions, which in the last couple of years have been very limited. Nevertheless, there are many other scientific career paths other than academic PI, which he said, "are not lesser career choices", as each individual should really focus on "what they want to do and what suits them the best". The remaining part of the closing session with Dr. Misteli included dialogue with fellows asking questions and sharing concerns they have regarding their training experience at the CCR. Extracts from this dialogue is included in this follow up article.

A commonality between all the speeches from the NCI, CCR and CCT leadership is the encouragement for fellows to be pro-active in their career development by taking advantage of the resources available to them to assist shaping their scientific and professional journey.

Lymphocytes as a "living drug" for the treatment of cancer (Keynote talk: Dr. Steven A. Rosenberg)

by: Sabina Kaczanowska

The intramural keynote address was presented by the acclaimed Dr. Steven Rosenberg. Dr. Rosenberg serves as Chief of Surgery at the NCI, where he has dedicated his career to developing the first effective T cell immunotherapies for patients with advanced metastatic cancers.



Dr. Rosenberg gave an introduction on the history of immunotherapy and described his personal experiences with patients during his surgical residency that led him on the path to study immunotherapy. First, he saw a patient that received a kidney transplant containing renal cancer which spread throughout the patient's body. When the immunosuppressive medication was withdrawn, the kidney was rejected and the metastatic cancer regressed. This drastic response provided evidence that a sufficiently strong immune response could lead to cancer regression. The second patient, Dr. Rosenberg explained, experienced one of the rarest events known to medicine: the spontaneous disappearance of widespread gastric cancer without therapeutic intervention. These observations led Dr. Rosenberg to devote the next few decades to studying how the body could recognize and reject cancer, and how this phenomenon could be reproduced to treat cancer patients.

Dr. Rosenberg's first approach was to treat patients with the T cell growth factor IL-2. He demonstrated, for the first time, that activating the immune system could eliminate advanced cancers. These unprecedented results led Dr. Rosenberg to investigate which cells were driving such anti-tumor responses. He developed a protocol to expand lymphocytes from a surgically resected tumor and then infuse these tumor-infiltrating lymphocytes (TILs) back into the patient along with IL-2, leading to metastatic melanoma regression.

There are two general approaches that can be applied for T cell therapy: (1) identifying naturally occurring lymphocytes with anti-tumor activity and (2) genetically engineering lymphocytes to have improved anti-tumor activity. Relating to the first approach, Dr. Rosenberg's team found that most cancers contain antigens that are recognized by a patient's own T cells. Surprisingly, the majority of new peptides generated by mutations in cancer cells that are recognized by the immune system, termed neoantigens, were unique to each patient. Recent advances in Dr. Rosenberg's group were made by applying cutting-edge single cell transcriptomic technology to identify a stem-like T cell phenotype that is strongly associated with tumor regression. Looking at the expression of genes in this population by single cell RNA sequencing, a gene signature for tumor-reactive T cells was identified that can be used to predict tumor-reactive T cell receptors (TCRs) from

freshly resected tumor tissue. This discovery accelerates the identification of tumor-specific TCRs in patients and circumvents the need for traditional peptide-screening methods.

The second approach for T cell immunotherapy is to genetically engineer lymphocytes with receptors that enable tumor recognition. Dr. Rosenberg discussed the challenges associated with pioneering the novel breakthrough approach of genetically engineering cells for cancer therapy. In the 1980s, there was immense opposition to gene therapy because cells with foreign genes had never been given to patients. After approval by sixteen committees, the FDA, and a lawsuit settlement, in May 1989, Dr. Rosenberg treated the first patient with genetically modified cells that were engineered with a marker to enable cell tracking. Following this landmark cell engineering study, Dr. Rosenberg's group turned to chimeric antigen receptor (CAR) constructs that link a tumor-specific antibody fragment to intracellular signaling domains, resulting in T cell activation upon engagement with a tumor cell. The first patient to be treated with CD19-CAR T cells exhibited widespread lymphoma regression. Six out of ten patients in the initial trial experienced complete regression, five of which have remained cancer-free for over ten years.

Dr. Rosenberg described his success with technology transfer and the commercialization of this breakthrough CAR T cell therapy. In 2012, the NCI signed a cooperative research and development agreement (CRADA) with a biotech start up, Kite Pharma. Five years after its founding, Kite Pharma received FDA approval for CD19-CAR T cells for the treatment of B cell lymphomas and leukemias – the first genetically engineered cell transfer therapy approved for patients. When first developing TIL therapy, many large pharma companies believed the logistics of personalized cell therapy would be too complicated to commercialize. Now, over 300 cell transfer companies are working on cell therapy approaches. Dr. Rosenberg is confident that if researchers find a promising solution, no matter how complex, industry will figure out the logistics to make it available. This is an extraordinary example of how researchers at the NCI can develop a curative treatment into a commercial product.

Following Dr. Rosenberg's success with TIL and CAR T cell therapy, his group is now focusing on identifying TCRs that are reactive to shared tumor antigens. Although his earlier work demonstrated that naturally occurring neoantigens are rarely shared among patients, there are common mutations that occur in driver oncogenes or tumor suppressor genes. His team developed a screening approach to identify TCRs against KRAS and p53 and transduced these TCRs into a patient's T lymphocytes. The first patient treated with a TCR targeting a p53 mutation experienced 90% regression of her tumor burden. This study demonstrated that it is possible to mediate cancer regression by targeting oncogene mutations.

Throughout the span of his remarkable career, Dr. Rosenberg has made ground-breaking contributions to our understanding of tumor immunology and the application of immunotherapy as a life-saving treatment for advanced cancer patients. His team remains on the forefront of innovation to develop these approaches for the treatment of a larger patient population.

Nutrient shifts regulate hematopoiesis: Impact on retroviral infection and immunotherapies (Keynote talk: Dr. Naomi Taylor)

Senior Investigator, Pediatric Oncology Branch, NCI

by: Srikanta Basu

On the 20th of April 2022, Dr. Naomi Taylor delivered the second keynote address of the CCR FYI Colloquium 2022. Dr. Taylor completed her MD and PhD studies at Yale University followed by pediatrics training at Yale New Haven Hospital and subspecialty training at the Children's Hospital of Los Angeles, Bone Marrow Transplantation Program as a Howard Hughes Fellow. She then joined the Institut de Génétique Moléculaire de Montpellier in France and later served as its Deputy Director.

In 2018, Dr. Taylor joined the NCI's Pediatric Oncology Branch as Director of Basic to Translational Research.

Dr. Taylor is an expert in the fields of T cell-based gene/cell therapies, metabolic regulation of normal and malignant hematopoiesis, and thymus differentiation. Her research has prompted the development of optimized T-cell based immunotherapy protocols for cancer patients. Her group's recent studies on the interplay between metabolite transporters and fuel choice have resulted in the identification of new metabolic programs regulating erythropoiesis, physiological and pathological hematopoietic lineage commitment, and modulation of T cell effector function in the context of anti-tumor immunotherapies. Dr. Taylor has received numerous awards and honors for her exceptional work in the fields of immunology, metabolism, and oncology.

In her keynote address, Dr. Taylor addressed two important questions:

1. Can metabolites determine cell fate/lineage?
2. What is the intercellular role of metabolites?

Glucose is known to fuel cell growth, but Dr. Taylor's group discovered its novel role in cellular differentiation. Using hematopoietic stem cells (HSCs), they showed that a glycolytic enzyme, glucose 6 phosphate (G6PD) is essential for erythroid differentiation, i.e., conversion of HSCs to erythroblasts (EBs, precursors for red blood cells (RBCs)). EBs are cells undergoing fast turnover and thus need an abundant supply of nucleotides. Interestingly, inhibitors of glycolysis redirect G6PD to work for the pentose phosphate pathway (PPP) which is used to make new nucleotides. Redirection of glucose into the PPP instead of glycolysis causes erythroid differentiation. They went on to find that glutamine, an amino acid, and not glucose, is the major fuel source for HSCs and blocking glutamine import prevents EB production. They also showed that increasing nucleotide biosynthesis by glutamine favors erythroid differentiation. Apart from biosynthesis, cells uptake nucleosides (nucleotide precursors) using an importer, ENT1. Dr. Taylor's work demonstrated that mutations in ENT1 cause problems in RBC cell shape and function. However, an inhibitory mutation in ABCC1 (a nucleoside exporter) in ENT1 mutant patients can prevent the severity of this phenotype in

RBCs. Therefore, metabolites must regulate cellular differentiation, shape, and function. Based on her work and that of others, the FDA has approved the use of oral glutamine powder for the treatment of sickle cell anemia, a disease characterized by synthesis of irregular shaped RBCs, rapid clearance of these RBCs, and low RBC levels.

Dr. Taylor presented that during EB to RBC differentiation, EBs lose their nucleus (de-nucleation). Metabolites like alpha keto-glutarate (αKG) and Vitamin C regulates production of harmful reactive oxygen species and helps efficient de-nucleation. Thus, the metabolic state of cells dictates both the initial commitment and the fate of the cell during RBC differentiation.

Metabolites also regulate T cell differentiation. Naïve precursor T cells differentiate into anti-tumorigenic helper-T cells (Th) and pro-tumorigenic regulatory-T cells (Tregs). Dr. Taylor's team has found that in addition to cytokines like IL12, glutamine or αKG can promote differentiation of naïve precursor T cells to Th cells. Since Th cells are anti-tumorigenic, glutamine or αKG supplementation can potentially be important for cancer therapy.

To translate their work from bench to bedside, Dr. Taylor's team collaborates with Dr. Nirali N. Shah and Dr. Grégoire Altan-Bonnet's laboratories at NCI to understand why chimeric antigen receptor-T cell (CAR-T) immunotherapies fail in certain patients and not others. They are investigating methods to better predict the efficacy and toxicity of CAR-T cells and in turn help design highly efficient CAR-T cells.

As a mentor, Dr. Taylor believes that scientific research has the unique ability to bring together individuals from different backgrounds. She has worked tirelessly to promote the careers of women in science and trained a diverse group of students from more than 30 different countries, spanning 6 continents. Dr. Taylor believes that "Our research is helping add a piece to the puzzle called "cancer" and hopefully we will solve it. Our focus should be to think, be creative, find new areas of research and work hard to publish it."

References:

1. Glucose and glutamine metabolism regulate human hematopoietic stem cell lineage specification. Cell Stem Cell. 15(2): 169-184, 2014. Oburoglu L, Tardito S, Fritz V, De Barros SC, Merida P, Craveiro M, Mamede J, Cretenet G, Mongellaz C, An X, Klysz D, Touhami J, Battini J-L, Dardalhon V, Zimmermann VS, Mohandas N, Gottlieb E, Sitbon M, Kinet S, and Taylor N.

2. Erythrocyte Glut1 triggers dehydroascorbic acid uptake in mammals unable to synthesize vitamin C. Cell. 132(6): 1039-1048, 2008. Montel-Hagen A, Kinet S, Manel N, Mongellaz C, Prohaska R, Battini JL, Delaunay J, Sitbon M, and Taylor N.

PROTACs and Targeted Protein Degradation: A New Therapeutic Modality (Keynote talk: Dr. Craig Crews)

John C. Malone Professor of Molecular, Cellular, and Developmental Biology and Professor of Chemistry, of Pharmacology, and of Management; Executive Director, Yale Center for Molecular Discovery

by: Srikanta Basu

On the 21st of April 2022, Dr. Craig M. Crews delivered the fourth keynote address of the CCR FYI Colloquium 2022. Dr. Crews is the John C. Malone Professor of Molecular, Cellular, and Developmental Biology and a Professor of Chemistry and Pharmacology at Yale University. He established his academic career in 1995 and is internationally renowned as the founder of PROTAC (PROteolysis TArgeting Chimera).

Dr. Crews has worked at the interface of Biology and Chemistry to develop technologies based on the use of small molecules to control intracellular protein levels. His laboratory is the pioneer of 'Targeted Protein Degradation' drug development technology. In 2003, he co-founded Proteolix, Inc., whose proteasome inhibitor, Kyprolis™, received FDA approval for the treatment of multiple myeloma. In 2013, Dr. Crews launched Arvinas, Inc., which is currently performing tests on the first PROTAC-based drugs in clinical trials for prostate and breast cancer. In his illustrious career, Dr. Crews has received numerous awards and honors for his contributions to biotechnology and pharmacology.

In his keynote address, Dr. Crews discussed PROTACs and their use to solve the two major problems in developing small molecule drugs in the pharmaceutical industry.

1. Most small molecule drugs bind to and block the active site of target proteins, aiming to inhibit protein function. Unfortunately, many target proteins of clinical relevance do not have accessible active sites.
2. Most drugs reversibly bind to target proteins (i.e., they fall off), leading to the need for excess drugs and undesirable side effects.

PROTACs are chimeric molecules with two ends. At one end is a drug that can bind specifically to the target protein, and on the other end is a short peptide that can recruit an E3 ligase (an enzyme that transfers a tetra ubiquitin tag to a protein). PROTACs utilize the drug to achieve proximity to the target protein, followed by E3 ligase mediated ubiquitin tagging of the target. The proteosome (the cell's protein degrading machinery) recognizes this tag and destroys the target protein.

PROTACs offer several advantages as therapeutics. First, there is flexibility in using small molecule drugs since these do not need to bind to an active site. Also, PROTACs degrade the tagged target but are not degraded by the proteasome. This effectively amplifies the strength of each PROTAC molecule since they are reusable intracellularly, requiring lower doses and preventing undesirable side effects.

Dr. Crews talked about Halo-PROTACs which incorporates a bacterial Halo tag linker between the small molecule drug and the E3 ligase-recruiting peptide. This tag can be tracked using fluorescent probes, which allows quantification of the degradation rate of tagged proteins. The linker length, composition, and rigidity can be altered to optimize the quality, cell permeability, and target specificity of PROTACs.

Dr. Crews explained how PROTACs could be better than BRD4 inhibitors (upstream transcriptional regulator of the C-MYC oncogene). Selective BRD4 inhibition leads to a compensatory increase in BRD4 gene transcription and C-MYC levels, making BRD4 inhibitors clinically unsuccessful. The same inhibitor used with PROTAC to degrade BRD4 worked like clockwork. As expected, BRD4 loss causes a compensatory increase in BRD4 mRNA, but the protein is degraded by PROTAC, thus C-MYC expression is suppressed, and this causes cancer cells death by apoptosis.

Dr. Crews also discussed a potential PROTAC-based therapy for prostate cancer patients. Patients with androgen receptor overexpression are recommended to undergo chemical castration to prevent testosterone production. Testosterone is the activator hormone for the cytoplasmic androgen receptor. The testosterone-androgen receptor complex can enter the nucleus and activate gene transcription of pro-survival genes. Competitive inhibitors to the androgen receptor are available, but their efficacy is affected by reversible binding and the secretion of testosterone by tumor cells. Dr. Crews' company, Arvinas, has developed a PROTAC which selectively degrades the androgen receptor, and it is currently under Phase II clinical trials.

In summary, PROTACs have the potential to target currently 'undruggable' disease-causing proteins, a welcome development in therapeutics. We wish Dr. Crews the best of luck with his research.

References:

1. PROTAC targeted protein degraders: the past is prologue, Nature Reviews Drug Discovery; Volume 21, pages181–200, 2022. Miklós Békés, David R. Langley & Craig M. Crews.
2. Androgen receptor degradation by the proteolysis-targeting chimera ARCC-4 outperforms enzalutamide in cellular models of prostate cancer drug resistance. Communications Biology, Aug 2; 1:100, 2018. Jemilat Salami, Shanique Alabi, Ryan R Willard, Nick J Vitale, Jing Wang, Hanqing Dong, Meizhong Jin, Donald P McDonnell, Andrew P Crew, Taavi K Neklesa, Craig M Crews.

Loss of PRC2 enforces a mesenchymal neural crest stem cell phenotype in NF1-deficient cancer through activation of core transcription factors (Talk by Outstanding Postdoctoral Fellow: Dr. Xiyuan Zhang)

by: Omar Jose

The outstanding postdoctoral fellow (OPF) award is a highly competitive award presented to one NCI postdoc or research fellow every year in recognition of their scientific achievements and contributions to the NCI community, as a leader and as a mentor. The 2022 OPF winner is Dr. Xiyuan Zhang, a research fellow in the pediatric oncology branch working with Dr. Jack Shern. Dr. Zhang earned her Ph. D. in cancer biology from Georgetown University and has received numerous prestigious awards, including the AACR Women in Cancer Research Scholar Awards and the Department of Defense Early Investigator Research Award. Her research focus is on investigating the genetic and epigenetic alterations associated with the malignant transformation of Schwann cell-originated plexiform neurofibroma. She is currently performing drug screens and high-throughput genetic screens to explore the vulnerabilities of this rare cancer to develop effective treatment options.

During her presentation, Dr. Zhang talked about the transcriptional control of NF1-associated malignant peripheral nerve sheath tumors (MPNSTs). MPNST is an aggressive soft tissue sarcoma originated from the Schwann cells. In general, this type of cancer is resistant to chemotherapies and radiation therapy. Due to the advancement of sequencing studies, researchers have examined the genetic alterations that occur in the NF1-associated nerve tumors and several factors have been discovered to be involved in this process.

Dr. Zhang is currently investigating the gene-specific epigenetic consequences of the loss of factor PRC2, that drives the malignant program in MPNST. In her research, she found that PRC2-regulated transcription factors are highly expressed at the stem cell stage, but they are normally quickly turned off and repressed by mechanisms including Polycomb repression. She also found that in normal Schwann cells these transcription factors are not expressed at all. However, due to the PRC2 loss, the abnormal activation of different transcription factors drives the tumor transformation from benign to malignant, which sustains the oncogenic program of MPNST. Her laboratory currently utilizes other cutting-edge technologies to profile the transcription network in these cells. Using her recent Department of Defense award, she is now performing additional studies that utilize a CRISPR knock out system in MPNST cells to characterize the interconnected transcriptional network formed by the transcriptional factors involved in this type of cancer. Additionally, she is using a CRISPR activation system in normal Schwann cells to activate different candidate transcriptional factors, either individually or in specific combinations, to visualize their transformative

potential in driving the normal Schwann cells to become MPNST.

In the last part of her talk, Dr. Zhang provided advice to NCI postdoctoral fellows. One of the resources that she recommends is the Sallie Rosen Kaplan fellowship, which is an award for intramural women scientists in cancer research. She also recommends taking the K-Grant writing workshop, which is an excellent training resource to acquire funding and achieve research independence.

Dr. Zhang's work is an example of the top-quality research done at the NIH and we wish her all the best in her transition to an independent researcher.

Science Communication in the Era of Social Media (Workshop hosted by Jennifer Dorsey)

by: Mukta Nag

An average user has 8.6 social media accounts!

Ms. Jennifer Dorsey began the workshop with this surprising number. Social media platforms such as Twitter, LinkedIn, Instagram, Facebook, YouTube, TikTok, and Snapchat allow you to interact with others virtually, using video, text, and photos. While most of us use social media for personal use and entertainment, we usually don't consider utilizing social media platforms to discuss our work. Even if we think about it, most of us don't have the understanding or expertise to use these platforms to their full potential. In this era of fast communication, it is vital to understand ways to integrate social media into scientific information dissemination to maximize the impact of our work.

On the first day of the CCR-FYI Colloquium, Jennifer Dorsey, the Social Media Coordinator for the NIH National Cancer Institute, conducted a workshop titled "Science Communication in the Era of Social Media: how to communicate and make information accessible". Ms. Dorsey has extensive experience developing and managing strategies around social media events, campaigns, and policy both within the NIH and other institutions. Prior to joining the NIH in 2016, Ms. Dorsey held roles as a press officer, blog writer, and social media lead at the Office in Personnel Management for six years. With a Master's in communications and her ongoing Master's in public health, Ms. Dorsey explained the advantages of using social media in science with relatable examples for scientists and people supporting science. She made a compelling case for incorporating social media for sharing scientific information and suggested actionable strategies to integrate social media platforms into the daily professional lives of all scientists.

Why should a scientist use social media?

This is a common question asked by most people in science. Social media platforms allow the democratization of information and give scientists a chance to present and discuss accurate information with those in the public who might not have or share the same scientific

background. It provides an opportunity to network extensively and build your and your lab's reputation on a global platform while exposing you to new and upcoming research from other labs for free. Ms. Dorsey, while making a case for the advantages of using social media for a scientist's career growth, also noted the challenges presented by these platforms that need to be handled. Posting and regularly engaging, sharing content with videos and pictures, curating an interesting bio, building one's network carefully and strategically, observing and emulating "influencers" in their field of choice, adapting to the ever-changing algorithm and keeping up with social media news are some of the ways for scientists to distinguish themselves in the loud and crowded world of social media.

Through the workshop, Ms. Dorsey shared pointers for new users to launch their social media presence and offered strategies for intermediate and advanced users to scale and maximize their impact. For new users, Mr. Dorsey suggested starting with Twitter which is extensively used by other scientists for science communication, as it is intuitive to follow, and is faster than other platforms. The first steps include making an account, focusing your attention on one platform at a time, identifying influential people/groups and understanding their posting strategies. Next, setting realistic goals for sharing your own papers/work and entering conversation chains in established groups while keeping your expectations in check about the response to your posts are some of the ways for new users to warm up to social media platforms. For individuals looking to scale their presence and for advanced users, Ms. Dorsey emphasized the need to post multiple times each day, to engage with posts in real-time, and to monitor the response to their posts to improve engagement. She suggested the use of social media online managers such as Buffer and Hootsuite to schedule posts at once across different platforms and the use of inbuilt or third-party analytics tools to track post performance. Directly uploading videos, photos with active thumbnails, using simple infographics to explain complex scientific ideas, adding creative descriptions to journal links, tagging the appropriate people, and using relevant hashtags were some ideas to significantly improve engagement and accelerate network growth. Ms. Dorsey also recommended ways to handle difficult conversations and biases on these platforms by either ignoring the inappropriate comments or politely presenting factual resources for everyone's benefit. While the world of social media can be consuming, by using the tips and suggestions from Ms. Dorsey, scientists can leverage these platforms for their career growth.

The rising awareness and relevance of science communication via the use of social media have

gained momentum in the past five years. There are numerous science communities, journal clubs, science groups, disease support groups on various social media platforms. There are science communicators, science journalists, researchers, scientific journals, public health experts, medical professionals, interested public including patients, caregivers, advocates, and family members of patients who share and discuss science via these groups on social media. For individuals within the NIH network, there are guidelines, requirements, and permissions to be obtained before using social media for official NIH work. However, one can use personal accounts to share their professional work and grow their professional network. For more information on this, please reach out to the NIH Office of Communications and Public Liaison. Ms. Dorsey also shared the following resources that can help scientists develop their social media presence:

1. Nature: How to Use Twitter to Further Your Research career (2019), Social Media for Scientists (2018)
2. PLoS Computational Biology: Ten Simple Rules for Getting Started on Twitter as a Scientist (2020)
3. Facets: Scientists on Twitter: Preaching to the choir or singing from the rooftops? (2019)
4. University of Florida: Using Social Media to Engage Communities With Research (2020)
5. EMBO Reports: The Growth of Social Media in science (2018)

We hope these resources will help you in your science communication journey. I can already hear the tweets!

Networking and Interviewing: What you don't know can hurt you! (Workshop hosted by Mary M. Mitchell)

by: Mukta Nag

> "You teach best what you most need to learn" –Richard Bach

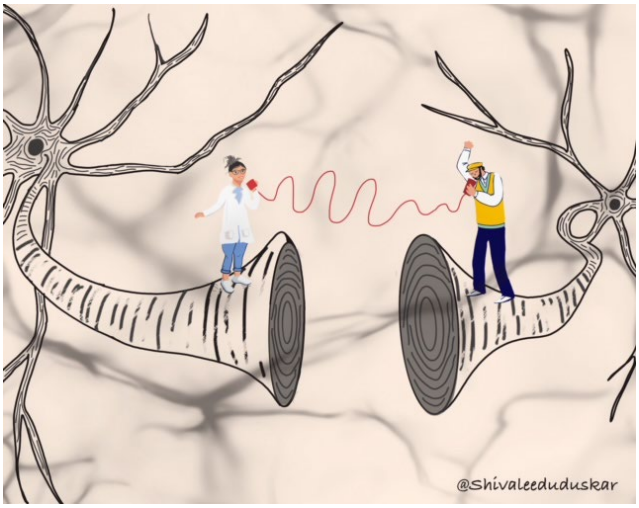
Ms. Mary M. Mitchell quoted Richard Bach as she began speaking in the workshop titled "Networking and Interviewing: What you don't know can hurt you!" on the first day of the 2022 CCR-FYI Colloquium. An impactful way to start the Colloquium, indeed!

Ms. Mitchell is an expert in executive coaching, leadership development, communication training, and presentation skills. Having lived and worked in four continents, published 9 books and multiple newspaper columns including online forums, Ms. Mitchell consistently emphasizes the importance of social, presentation, and communication skills as key pillars to success. She provides tailored training for developing communication skills to post-doctoral fellows, early career scientists, and physicians across different institutions. A passionate teacher, Ms. Mitchell through The Mitchell Organization (established in 1989), developed customized trainings geared towards skillful self-presentation and effective communication for individuals and groups within the United States and across the globe.

"All the world's an interview." said Ms. Mitchell. She drew our attention to how questions like **"Who am I?", "Where am I?", "Who is my audience?"** and **"What do I want from the audience?"**, form the central theme for all forms of communication and not just job interviews. During the Colloquium's workshop, Ms. Mitchell shared tips and tricks for effective networking and successful interviews within the United States' job market. She also highlighted the challenges and mistakes commonly made by scientists while interviewing and networking. This workshop highlighted the overwhelming impact of interpersonal skills on one's career as opposed to the popular notion of technical ability being the primary driver. She demonstrated that communication skills are key drivers of personal and professional success through real-life, relatable examples that kept the workshop engaging and fun.

Ms. Mitchell also shared her insights on networking effectively. Networking is the process of interacting with others to exchange information and to develop professional and social relationships. To develop these relationships, one must adopt a **"give before you receive"** attitude, which includes sharing resources before requesting them. To build a lasting and dependable network, Ms. Mitchell emphasized the need to build professional relationships based on mutual respect and not on transactional exchange. The effectiveness of an in-person or online networking session turning into a working relationship largely relies on one's ability to manage people's perception of them by instilling trust. This is one of the hardest, albeit the most essential, parts of a networking process. Focusing our attention on the expectations of the receiver while being our authentic self and speaking with honesty and confidence are some ways to conquer this seemingly insurmountable hurdle. In addition to this, kindness, genuine

inquisitiveness about other's field/work, good listening ability, good manners, giving personal space, being cognizant of other's time and background are all factors that contribute to a productive networking experience.



Effective networking often results in interview opportunities and new career prospects. The primary objective of an interview is for an applicant to persuade the interviewer(s) that hiring them will make the company more effective, productive, and profitable. Ms. Mitchell highlighted some of the common challenges to effective communication in the setting of an interview. Differences in educational level of the candidate and the interviewer, differences in culture, gender and age can prevent an effective line of communication from being established. To overcome these challenges, our attention should be focused on the four pillars of successful interviews:

(i) perspective,
(ii) verbal communication,
(iii) non-verbal communication,
(iv) practice.

To increase the chances of converting an interview into a job offer, a candidate must assess their skillset from the perspective of the hiring organization. Understanding the requirements for the position and researching the background and the current projects of the hiring group/ interviewer can help eliminate the disconnect stemming from different educational and cultural backgrounds. Next, the **verbal and non-verbal communication** play the most important role in a candidate's success in an interview. Not only is it important to be well-versed and confident about the content to be presented but it essential to weave the content into a story that the interviewer can connect with. Relating your work with the interviewer's technical background can help build a personal bridge. The non-verbal component of an interview includes being punctual, respectful, engaging, maintaining good posture, looking comfortable, maintaining eye contact, sporting a smile, a confident body language, and a composed demeanor during the interview. Neglecting these non-verbal modes of communication can be detrimental to one's prospects at an interview. Finally, practicing one's narrative multiple times to simulate the final interview is essential to feeling calm, comfortable, and confident on the day of the interview.

As Ms. Mitchell said, "Good manners build good relationships which build good careers!".

Through this workshop, Ms. Mitchell offered attendees a comprehensive guide for effective communication during interviews and networking sessions. To learn more about Ms. Mitchell's work, please visit the website: https://themitchellorganization.com.

Academic and Alternative Academic Positions (Panel)

by: Babul M Ram

Are you a graduate student contemplating career options in academia, or perhaps a postdoc at the crossroads of making career decisions? Are you wondering about challenges in setting up a research lab, or are you seeking alternate academic positions? Are you unsure how to navigate through your research career or switch to a role away from the bench?

The 22nd CCR-FYI Colloquium hosted a panel of speakers from diverse backgrounds and varied academic careers to provide some clarity in response to these questions. The panelists shared their experiences, the challenges they faced, the choices they made, and the path of their journey through their academic and alternative academic careers.

Panelists:

Kelsey Bohn, Ph.D.	*Manager of Postdoctoral Training and Programs, Cleveland Clinic*
Melissa Davis, Ph.D.	*Associate Professor of Cell and Developmental Biology, Department of Surgery, Scientific Director of the International Center for the Study of Breast Cancer Subtypes, Weill Cornell Medical College*
Erin Hopper, Ph.D.	*Director for Programs and Grants, Institute for Convergent Science University of North Carolina at Chapel Hill*
Thomas Keck, Ph.D.	*Associate Professor, Chemistry & Biochemistry, Molecular & Cellular Biosciences, and Research, Rowan University*

The event started with the panelists speaking about their backgrounds, hardships, and different careers.

Dr. Thomas Keck went to the University of Southern California (USC) to study biomedical engineering and worked in a pharmaceutical lab with Dr. Roger Dunkin at USC School of Pharmacy. Dr. Keck later earned his Ph.D. in Neuroscience at the Oregon Health and Science University. He joined Dr. Amy Newman's lab at the National Institute on Drug Abuse, NIH as a postdoctoral fellow, where he was highly productive in publishing manuscripts and building his professional network. He then joined Rowan University as an Assistant Professor in the Department of Chemistry & Biochemistry/Molecular & Cellular Biosciences at the College of Science and Mathematics, and he was later promoted to Associate Professor and Chair for the Department.

Dr. Kelsey Bohn earned her B.S. in chemistry

from Western Illinois University and her Ph.D. from the Chemistry Department at Purdue University. Her Ph.D. research was focused on exploring small molecule inhibitors of K-Ras in pancreatic cancer. She joined Cleveland Clinic as a postdoctoral fellow working on translational research in prostate cancer models. Amidst her research and volunteer activities, she found herself

uninterested in following a traditional research career. Screening job postings made her realize her career preferences and prompted her to join a postdoctoral program management position at Cleveland Clinic. Dr. Bohn pointed out that career paths are often more complex than they appear, and it's important to explore options while choosing your career. She also mentioned that imposter fears are common and advised starting with smaller steps and build up upon them.

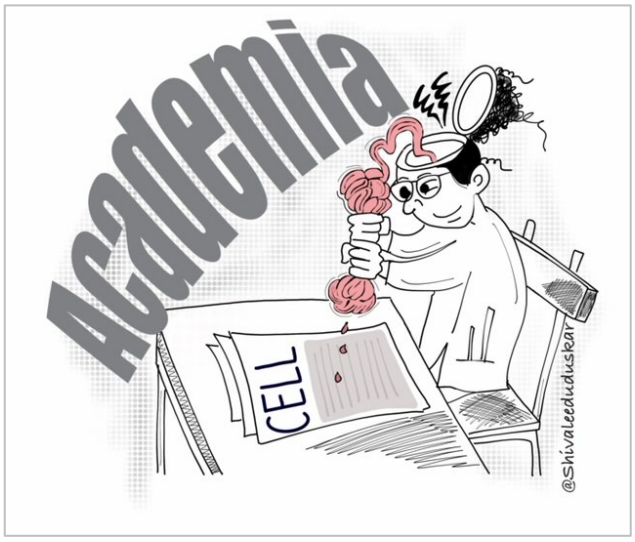
Dr. Melissa Davis was interested in science but didn't want to pursue a medical career. At the time, she was unaware of scientific research as a career option. She majored in Science at the Albany State University and did a summer term at the Ohio State University in a spinal cord regeneration lab, which sparked her interest in scientific research. After earning a Ph.D. in Molecular Genetics at the University of Georgia (UGA) she worked on ecdysone receptors in Drosophila development and metamorphosis. She later switched to genomics and worked in Dr. Kevin White's lab as a postdoctoral fellow. As a postdoc, she also acted as a liaison between the functional genomics core and a clinician studying the impact of racial and ethnic differences on tumor development and progression, which inspired her to join health disparities research. Next, she joined UGA as a faculty and collaborated with Dr. Lisa Newman at Henry Ford Health System to study the genetic predisposition of African women to develop breast cancer. Next, she transitioned to the role of the Scientific Director of the International Center for the Study of Breast Cancer Subtypes at the Weil Cornell Medical College.

Dr. Erin Hopper earned her B.S. in Chemistry from the University of North Carolina (UNC) and earned her Ph.D. in Chemistry at Duke University. She never planned on a career in academia but was interested in a career in scientific administration. She joined the National Institute of Environmental Health Sciences, NIH as a postdoctoral fellow but realized that benchwork was not her interest as she explored different opportunities such as teaching and outreach. Dr. Hopper became the Director of Training Internships in Biological and Biomedical Sciences at UNC, a program that supports graduate students and postdocs in Biomedical Sciences as they explore career options and develop professional skills. She then transitioned to the Research Director position at UNC Systems, an administrative body that coordinates the activities of all of North Carolina's public universities, a role that she found to be both challenging and rewarding. She ran grant programs and coordinated with North Carolina public universities on collaborative research projects. She also worked on research reports across the system such as system-wide research expenditure as well as technology transfer metrics. She later relocated to Wisconsin-Madison with her husband but continues to work remotely with the UNC. Her present role includes serving as the Director for Programs and Grants at the Institute for Convergent Science and helping scientists navigate through translating their work, pursuing funding or grants, commercializing their research, and growing professionally.

Some of the questions, insights and discussions from the panelists are summarized below.

Please tell us about your work-life balance. Have you seen it change or improve over time?

All the panelists agreed that the early stages of their careers were more demanding. Dr. Keck still finds himself struggling to maintain work-life balance as most of his time is devoted to running the lab and writing grants. His to-do list is always growing with closing deadlines, but he considers himself fortunate to have family support. He mentioned that taking up new roles over time has led him to prioritize his work schedule, and he declines many offers to avoid burnout. Dr. Bohn emphasized that different people manage work-life balance differently. Some situations demand extra time devoted to work, and she has improved her time management and overall work-life balance over time. Dr. Hopper shared that her work-life balance has changed with her different career roles and family needs. She mentioned that working remotely now has provided her the flexibility and freedom to maintain a healthy balance. Finally, Dr. Davis shared that as a single mother, she often found herself juggling between career demands and family needs. Learning to manage her time through careful planning and prioritization is her advice to maintain a work-life balance.



What would be your advice for someone who likes research and teaching but feels that they lack a grand vision/idea for success in the competitive academia? What other alternatives would you suggest?

Dr. Keck advised that it's important to realize your valuable scientific approach and problem-solving skills. This should be followed by thinking of new research problems in the field and addressing them by applying your skills. He further stressed the importance of having a vision of what you can bring to the 'research table' and being adaptive to the research environment. He advised looking at job postings to be aware of the kind of jobs available and their requirements. Dr. Davis shared that those initial stages of setting up a lab usually involve projects derived from postdoc research as newer ideas deviating from the field mostly lack the funding support. She advised to develop tangential ideas from the postdoc project and apply your skills to ask important questions. Dr. Bohn suggested that alternative academic positions are available in fields of teaching, grant writing, science communication, etc. She

also shared some alternative career resources (1, 2). Dr. Hopper stressed the importance of networking as a valuable means to learn about different positions, openings, and alternative career options. She also suggested looking for options like private research organizations and research foundations.

What would you advise to alleviate the concerns of being able to lead a successful lab in academia?

Dr. Davis stated that it's important to have self-confidence and positivity. She advised looking for the questions that have been overlooked in the past, thinking about the questions that can be solved with new technology, and thinking of the questions you find most interesting. She also pointed out the difficulty of securing grants due to competition and fund allocations. Dr. Keck seconded Dr. Davis and advised submitting multiple grant applications each cycle. He also added that it's important to be aware of the different funding opportunities available and to network to build collaborations with funded labs. He likened running a lab to running a business where you need to be aware of fund management. It's important to invest in the future when funding is available by purchasing new equipment, hiring the right people, and planning key experiments for future grant applications. He stressed having short- and long-term visions for the lab. Additionally, Dr. Bohn highlighted the importance of finding good mentors who have experienced the whole lab set-up process and seeking their guidance.

Could you discuss the benefits of identifying a senior mentor at the early stages of your academic career? How much do the department chairs and members help guide the tenure track professors both scientifically and logistically?

Dr. Davis shared that she had different mentors throughout her career who guided her in different areas, including lab set-up, grant writing, operations of the department, etc. Having multiple mentors brings different expertise, viewpoints, and experience, all of which can be valuable and complementary to each other. She added that it is beneficial having a sponsor you can turn to for short-term logistical needs. Dr. Keck reiterated the importance of having multiple mentors with whom you can build trust and ask hard, honest questions to, as everyone has different career paths. Dr. Hopper highlighted the importance of finding new mentors as mentoring needs change over time and with new roles. Dr. Bohn added that it's important to be open and receptive to anyone to be a potential mentor, irrespective of their position.

The panel discussion highlighted that the research faculty position is not the only career option in academia and it's possible to switch career tracks and pursue alternate academic careers at any stage with the right networking and mentorship.

Resources:

1. www.myidp.sciencecareers.org
2. www.imaginephd.com

Scientists in Technology, Industry, and Small Business (Panel)

by: Sabina Kaczanowska

Panelists:

Barbara Rath, Ph.D.	*Associate Principal Scientist at Merck*
Stephen Miller, Ph.D.	*Senior Scientist at Genentech*
Amy Beckley, Ph.D., M.B.A.,	*Founder and CEO of Proov (a women's health care company)*
Sunny Jansen, Ph.D.	*Technical Program Manager at Google*

The Scientists in Technology, Industry, and Small Business Panel was a thought-provoking discussion exploring opportunities for scientists outside academia. The panelist line up included former NIH trainees that are now working in various industry environments. The conversation was filled with motivational stories and practical tips, something for all fellows whether they have their sights set on industry or are exploring multiple career opportunities. The key takeaways from our panelists are presented below.

Dr. Barbara Rath is a former NCI postdoc and current Associate Principal Scientist at Merck. She spoke about transitioning to industry to try something new and get out of her comfort zone. Her advice to fellows in regards to interviews is to learn how to present your science well by putting together a coherent story. She also spoke about the transition process, to expect that many companies will start you off as a bench scientist to learn the industry lingo and the role of your group with respect to different cross-functional areas. Managing people is taken very seriously in industry because you are responsible for your team members' career development and need to be aware of available resources and potential career opportunities. She also encouraged fellows to consider applying to smaller start-ups and early-stage biotech companies in addition to big pharma, because once you have your foot in the door, it's relatively easy to move to other companies.

Dr. Stephen Miller is a recent NCI postdoc alum who transitioned to his role as a Senior Scientist at Genentech in 2020. One of the deciding factors for him to make the move to industry was the desire to see a compound go as far as it can go in the drug development pipeline. Dr. Miller spoke about the qualities that hiring managers are looking for in successful candidates. For entry level positions, they're looking for people with specific technical expertise. Beyond that, being open to collaboration and being able to work well with others in teams are very important qualities. For management positions, you need to demonstrate productivity in your postdoc, showing that you can handle diverse research and have the ability to lead teams. Communication is also important to being a

good manager, and you're not going to move into higher levels of management unless you can communicate at all levels in terms of scientific vision. Further, being comfortable with collaboration and delegation to allow other people to do the work so that you can prioritize other tasks. His advice to current fellows interested in industry is to look at qualifications in job postings and to take advantage of your time as a postdoc to develop those desired skills that will make you a competitive applicant.

Dr. Amy Beckley completed her postdoc at

NIEHS and became faculty at Kansas State University before founding Proov, a women's health care company specializing in at-home hormone testing kits, where she continues to lead the company as CEO. She opened with a personal anecdote, discussing her experience with a health issue for which there were no therapeutic options available, even though there was research published on the topic. She took matters into her own hands to take the research out of the lab to create a product where she saw a need in the market. When speaking about qualities that she looks for during the hiring process in a small biotech company, she specified preferring candidates with business sense. She described a common phrase at her company, "scientist problems," that refers to when a trained scientist wants to figure out the entire mechanism of action of the product. She stressed that it's less important to understand everything about the scientific mechanism and more important to understand how to make a consumer-facing product. Especially in small business, you need to shift your mindset because you are a strategic part of a company that's going to create products. Her inspirational parting words for the fellows were, "do what you love, don't be scared and follow what you feel is right."

Dr. Sunny Jansen completed her postdoc at the

NCI in Frederick and worked at the FDA and a small biotech company before starting her current role as a Technical Program Manager at Google. She became interested in Google because they were developing new efforts to use machine learning for oncology and it was a good fit for her to stay in science, apply her regulatory background, and explore her topic of interest (breast cancer screening). Dr. Jansen emphasized that communication, collaboration and influencing people from different backgrounds are very important elements for working in industry. These skills are developed during your scientific training, and applicants should highlight them during the interview process. Further, things change quickly and there isn't enough time to understand 100% of every problem, so being able to demonstrate that you can quickly learn new technical, scientific, and business concepts is good skillset. Dr. Jasen introduced the tech mantra of "thriving in ambiguity," being comfortable not knowing everything about an area or project and navigating teams forward through the ambiguity. Her advice to current fellows was to be open to not knowing exactly what comes next and to explore different opportunities that present themselves to you. The most important thing is to find an organization that shares your values, because once you are working an industry job, there are options to move around, try different hats, and gain new skills.

Thank you to our outstanding panelists, representing NIH-trained scientists who have successfully transitioned into multiple facets of industry, for serving as role models and coming back to share their experiences with us. Their insights will greatly help inspire and prepare current fellows for the next steps in their careers beyond the NIH.

Translating Mass Spectrometry Technologies to the Clinic: Challenges and Opportunities to Advance Patient Care (Keynote Talk: Dr. Livia Eberlin)

by: Vasty Osei Amponsa

For the 22nd Annual CCR-FYI Colloquium, keynote speakers whose work extends from basic research to applied translational studies in clinical settings, were selected to highlight the Colloquium's theme of "Translating Cancer Research from Bench to Clinic: The Real Deal!". This year's Keynote speakers included Drs. Steve Rosenberg, Naomi Taylor, Craig Crews and Livia Eberlin. On the second day of the Colloquium, Dr. Eberlin delivered a keynote talk entitled "Translating Mass Spectrometry Technologies to the Clinic: Challenges and Opportunities to Advance Patient Care" setting the stage for the overarching goal of the Colloquium.

Brazilian born, Dr. Eberlin obtained her Bachelor of Science in Chemistry from the State University of Campinas in Brazil. During her undergraduate studies she started working with Mass Spectrometry (MS) for her research project. Her goal was to assess what she defined as "Ion-molecule reactions in the gas phase", an inorganic reaction that only occurs in this phase. She recalled how fascinated she was about the ability of MS to measure the mass of a molecule and identify the composition of a sample. She then pursued her graduate studies in Analytical Chemistry at Purdue University under the supervision of Professor Graham Cooks. During her PhD, she contributed to the development of desorption electrospray ionization mass spectrometry imaging for tissue imaging and cancer diagnosis, an expertise that she mastered with her postdoctoral research experience at Stanford University. As she transitioned into her independent career initially as Assistant Professor at the University of Texas, the application of her research in clinical settings increased. Dr. Eberlin's success is evident in her current position as an Associate Professor in the Department of Surgery of Baylor College of Medicine. As a young successful scientist, she is a co-founder and shareholder of MS Pen Technologies Inc, a company that builds MS equipment applicable in clinical setting as explained later on.

In the opening of her talk, Dr. Eberlin discussed the advancement of technologies to study the primary macromolecules of cells within tissues, including sequencing technologies for the DNA, quantitative Polymerase Chain Reaction (qPCR)

for the RNA and Western blot, immunohistochemistry, or ELISA analysis for proteins. However, when it comes to metabolites, little to no assays have been applied for their studies.

As Dr. Eberlin explained, metabolites are good functional readouts of all cellular and molecular reactions controlled by gene and protein expressions. From a clinical standpoint, as products or byproducts of these reactions, metabolites can have implication in diagnosis, prognosis, disease development, treatment response, tissue heterogeneity and tissue microenvironment. According to Dr. Eberlin, one way to obtain clinical information from metabolites is through MS. Specifically, because MS identifies molecules based on the ratio of their mass and charge, it is highly sensitive and chemically specific allowing it to identify a diverse set of multiple molecules simultaneously. Nevertheless, though some metabolites can present very close mass and similar charges, Dr. Eberlin emphasized on how the MS technology has advanced to overcome this concern by increasing the resolution of detection. Some of the examples of metabolites that can be detected by MS include small molecules, fatty acids, ceramides, glycerophospholipids, glycerolipids, sphingolipids, cardiolipins and so on.

Unlike clinical applications such as Magnetic Resonance Imaging (MRI), positron emission tomography (PET) scan, computerized tomography (CT) scan or ultrasounds routinely used in clinical practice, the application of MS becomes challenging due to the complexity of the instrumentation. However, as Dr. Eberlin pointed out, new generation of MS instruments are designed as clinical units with objective to simplify their utilization in clinics. She showed the example of the mass spectrometer, "Orbitrap Exploris", used in operating room and consisting in MS unit without the chromatography portion, or the mass spectrometer "Portable MTE50" used for the measurements of metabolites of which the mass is known a priori. Besides the equipment, what complicates the use of MS in clinics is the time-consuming stages of sample preparation and extraction. One approach to bypass sample preparation and the chromatography step of MS is to perform a direct MS analysis on samples. Towards that end, Dr. Eberlin and her research group generated the MS Pen Technology, which utilizes a liquid-solid extraction method to perform MS analysis. In simplified non-technical terms, this approach involves using a solvent consisting, solely, of water to extract and remove molecules from a complex sample such as a clinical tissue, followed by MS analysis. The very first application of MS Pen Technology in clinical setting was reported in 2017. During her talk, Dr. Eberlin also showed a short clip from the televised series, Grey's Anatomy, promoting the use of MS Pen Technology in the operating room on a patient.

Designed best for "in vivo" soft tissues, the MS Pen presents three channels (incoming water, gas, and outgoing droplet), which meet at a reservoir at the "3D printed tip" that allows spot-to-spot analysis of a tissue within a 0.5-10 mm resolution analysis. The reservoir is where the solvent is released for the extraction of molecules. The three channels then connect with a mass spectrometer unit where the MS analysis occurs. The chemical information obtained is then analyzed through software and statistical classifiers rigorously developed through statistical methods, whereby different algorithms convert the MS information into a diagnostic report. Though this last aspect of statistical diagnosis is yet to be approved by the Institutional Review Board at her institution for its application in the

operating room, the MS Pen application appears to be promising in intraoperative diagnosis. Identification of metabolites during cancer surgery can help in therapeutic and surgical decision making, or in surgical margin evaluation on ex-vivo samples. Moreover, MS Pen application not only helps in differentiating between normal tissue and cancer tissues, but it also gives information on metabolites associate with different grades of tumors (low versus high), thus allowing inference information on tumor stages.

Dr. Eberlin concluded her presentation talking about an ongoing clinical trial study involving the use of MS Pen. At the time of her talk at the Colloquium, the MS Pen has been applied for about one hundred fifty surgeries, using one to six MS Pen per surgery. Some of the challenges that they have been observing is the mass spectrometer contamination and carry-over as well as the size and noise in the operating room and its maintenance. As these challenges are being addressed, she hopes that MS can soon be part of the routine of clinical practice contributing to the establishment of precision medicine.

From Childhood Cancer Patient to Cancer Research Scientist: Lessons for the Future (Talk by Dr. Victoria Forster)

by: Omar Jose

On April 21st at the 2022 NCI CCR-FYI Colloquium, Dr. Victoria Forster, currently a postdoctoral researcher at the Hospital for Sick Children in Toronto, Canada, presented her story about how being a childhood cancer survivor led to her career path as a pediatric cancer researcher. Her experience also led to her being a passionate advocate for better treatments for pediatric cancer patients.

Dr. Forster trained as a molecular biologist and earned a Ph. D. in Leukemia Biology. Through the years she has been on different projects in pediatric cancer and cancer survivorship, both as a research scientist and as a cancer survivor. Additionally, she has always been an avid science writer, which has led to several publications in different magazines, including both scientific and non-scientific, and through online platforms like Twitter.

Dr. Forster is a survivor of pediatric leukemia. In the nineties she was diagnosed at age seven with B-Cell acute lymphoblastic leukemia. For two and a half years she underwent chemotherapy to avoid a harsh treatment of radiotherapy of the cranium and spine, the common method to fight cancer at the time that unfortunately came with long-term cognitive side effects. She was put in a clinical trial consisting of injections of a novel drug called methotrexate. Although the trial successfully ended eliminating the cancerous cells, she unexpectedly developed side effects. These side effects included temporary behavioral and physical issues like aggressiveness and partial body paralysis,

respectively. She was taken immediately to the hospital, where she recovered with the help of her doctors. Today, it is well-established that chemotherapies like this, as well as the traditional radiotherapy to treat leukemia, can cause cognitive side effects in childhood cancer patients.

In the end, Dr. Forster defeated cancer and eventually became a scientist. One day, after giving a presentation where she shared her cancer survivorship story, a man approached her. He shared that a couple of years ago his daughter also had suffered for some days partial body paralysis due to a treatment with methotrexate. It was in that moment when Dr. Forster realized that after so many years, this compound was still being used as a leukemia treatment for children, and although its side effects were still prevalent among patients according to an online search, its cellular mechanism of action was still completely unknown. Dr. Forster decided to investigate this point in her lab, hoping that her results would prevent more children from suffering the methotrexate's side effects in the future. Thanks to her results, and results from other labs, the methotrexate's mechanism of action and a possible way to avoid its side effects were discovered, which brings a new hope to leukemia patients.

Based on her personal experience, Dr. Forster also discussed the importance of creating more spaces for patients and cancer survivors to communicate their thoughts, hopes, and experiences to the scientific community. Such collaboration could be a great opportunity to develop new and valuable research projects to fight cancer. Fortunately, over the last years she has seen an increase of patient involvement in research.

Recently, Dr. Forster was invited by Nature to share her experience as a cancer survivor and scientist, and her work trying to connect cancer patients with researchers. If you are interested in learning more about this topic, you can read Dr. Forster's article here: What cancer survivors can teach cancer researchers | Nature Reviews Cancer

Getting the Most Out of National Institutes of Health (NIH): Grants, Leadership, and Training Opportunities for the Transition from NIH to Your Career (Workshop hosted by Dr. Laura Hooper)

by: Rokeya Siddiqui

NIH trains thousands of trainees from all over the world every year. Many of us may not be aware of how the NIH organizes the research activities and the diverse training programs for the trainees. To make sure we are aware of the necessary resources to prepare for the next steps of our careers, Dr. Laura Hooper from the Office of the Director at CCR in NCI shared some of the NIH's resources for trainees in the 2022 CCR-FYI Colloquium.

Dr. Hooper has served as the activity director of the grand round lecture series since 2006, faculty coordinator on several centers of excellence, and Women Scientists Advisors committee. In her talk, she provided an overview of how trainees manage their experience at NIH.

Most of the trainees at NIH are comprised of postbaccalaureate and postdoctoral fellows. The next steps of career paths for postdoctoral fellows include academia, industry, technology transfer, science policy, grant management, or science administrative management. Most common career steps for postbaccalaureates are to enroll into medical schools and graduate schools. To get maximum benefits from the resources available at NIH to support these career paths, individuals should be intentional from the beginning in planning to get the most out of their training time to prepare for their future career endeavors. For these two groups of fellows NIH designs different types of trainings which help gain experience on grant writing, leadership and technical training on cutting edge technology, in addition to skills and resources for their transition to the next level of career. There are three main offices with targeted resources for trainees: the first is the NIH Office of Intramural Training and Education (OITE) [1], the second is the NCI Center for Cancer Training (CCT) [2], and the third is NCI Center for Cancer Research (CCR) – all which offer specific courses; all are designed to help manage trainees' time at NCI. Dr. Hooper sends weekly emails [3], and there is a wiki page [4], which is an excellent source of all upcoming events for grants, leadership, and training opportunities at NIH.

Dr. Hooper suggests trainees plan to develop these skills from the beginning of their training. For example, FAES offers various training opportunities that are relevant to people's individual research work and new techniques such as single-cell analysis, bioinformatics (BTEP) [5] or super-resolution microscopy in the first year of training. If English is a second language, trainee should consider courses on writing and presentation skills. For those

interested in academia or industry, it could be impactful to take K-grant classes or apply for other specific fellowships such as Intramural AIDS Research Fellowship (IARF). During the second year, all postdoctoral fellows are encouraged to apply for FARE Award, society travel awards such as best paper award from Cytokine Interested Group, or the Norman P Salmon award from Virology Interested Group Award. Fellows who are interested to build their career in academia should apply for a K grant in their 3rd and 4th year because this grant mechanism has eligibility restrictions. Other important sources of funding for the fellows are Department of Defense (DOD) grants [6] as well as some other extramural funding opportunities. In addition, there are some specific grant opportunities for postdocs such as Director Innovation Award, Cancer Health Disparity research funding opportunity, CCR Outstanding PhD award for postbaccalaureate fellows and many more.

Fellows who want to develop careers in science policy and scientific administration can take training through the Technology Transfer Ambassador Program, the American Association for the Advancement o Science (AAAS) and Technology Policy Fellowship, Detail Program, Presidential Management Fellowship, iCURE program [7], and science policy discussion group. There are also a few career opportunities within the NIH, for example postdoc to staff scientist or postdoc to principal investigator (PI) which are supported by the highly competitive Stadtman or Lasker Awards.

NIH offers various leadership opportunities by becoming member or chair for different groups such as the CCR-FYI Association, FelCom-Visiting Fellows Committee, and community-based groups such as Society for Advancement of Chicanos/Hispanics & Native American in Science (SACNAS), Network of African American Fellows at the NIH (NAAF) or any of the other groups listed on the OITE website [8]. Other two excellent sources of networking and professional development are the EXPOSE and Business of Science and SRK Fellowship for Scientists in Cancer Research (offered by the Office of Training and Education (OTE) of CCT) [9].

All these training opportunities help fellows to develop personal and professional skills, understand what career options are most suitable for them, and get direct exposure with a diverse group of professionals from all kinds of careers in science.

References:

1. https://www.training.nih.gov/
2. https://www.cancer.gov/grants-training/training/resources-trainees
3. List NCI-FREDERICK-POSTDOCS NCI-FREDERICK-POSTDOCS@LIST.NIH.GOV
4. https://ccrod.cancer.gov/confluence/display/CFFC/Frederick+Fellows+Fast+Facts+Newsletter
5. https://btep.ccr.cancer.gov/
6. https://cdmrp.army.mil/pubs/press/2020/funding_press_release20
7. https://www.cancer.gov/about-nci/organization/crchd/diversity-training/icure
8. https://www.training.nih.gov/you_are_not_alone
9. https://www.cancer.gov/grants-training/training/resources-trainees

Scientific Careers in the Government (Panel)

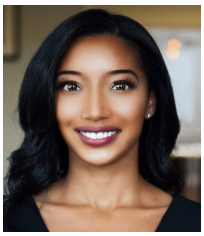
by: Shivalee Duduskar

Panelists:

Alisha Henderson, M.S.	*Forensic Chemist, U.S. Department of Homeland Security*
Robert L. Kortum, M.D., Ph.D.	*Assistant Professor, Pharmacology and Molecular Therapeutics, Director of the MD/PhD Program, Uniformed Services University*
Andrea McCollum, Ph.D.	*Patent Examiner, United States Patent and Trademark Office*
Darmood (David) Wei, Ph.D., DABT	*Pharmacology/Toxicology Reviewer, Office of Generics Drugs, Food and Drug Administration*

The Scientific Careers in the Government panel comprised of four highly talented researchers from diverse backgrounds that are Federal Government workers.

Dr. Robert L. Kortum started his career as a M.D./Ph.D. student at the University of Nebraska Medical Center. During his postdoctoral training at the National Institutes of Health (NIH), he was awarded the Pharmacology Research and Training Fellowship for his contribution in the RAS activation pathway. Dr. Kortum was appointed to staff scientist at the National Cancer Institute (NCI) at Frederick and was subsequently awarded the NCI Director's Award to develop drug screening assays. Since 2015, Dr. Kortum, has been working as Assistant Professor of Pharmacology and Molecular Therapeutics and serves as the director of the MD/PhD program at Uniformed Services University (USU), Bethesda, MD.



Ms. Alisha Henderson describes herself as a "road warrior and a lifelong learner." With a background in chemistry, Ms. Henderson earned her master's degree in forensic science and specialized in forensic chemistry and trace evidence from Virginia Commonwealth University. She completed an internship at the Stanford University School of Medicine at the NASA Johnson space center. Before joining Center for disease control and prevention (CDC) Ms. Henderson embarked on her federal career at the Centers for Disease Control and Prevention (CDC), where she helped develop and validate analytical methods to assess opioid exposure. In addition, she utilized her expertise to study deadly mushroom toxins and served as a remote COVID-19 emergency responder. As a member of the Opioid Response Project Team, she (and her colleagues) was honored by the National Center for Environmental Health for their excellence in laboratory research. Based in Los Angeles, California, Ms. Henderson currently serves as a forensic chemist for the Department of Homeland Security (DHS), U.S. Customs and Border Protection (CBP) Los Angeles Laboratory. She provides forensic and scientific support to CBP Officers, DHS Agents, and other government agencies to assist with illicit narcotics interdiction at U.S. ports of entry.

Dr. David Wei is a Diplomate of the American Board of Toxicology (DABT), a globally recognized credential in toxicology that is representative of Dr. Wei's

competency and commitment to human health and the environmental sciences. Dr. Wei has a Ph.D. in toxicology from The University of North Carolina at Chapel Hill and dual bachelor's degrees in molecular cell biology and molecular toxicology from the University of California, Berkeley. Additionally, Dr. Wei was a postdoctoral fellow at the NCI in the Urologic Oncology Branch, where he studied kidney cancer. Currently, Dr. Wei is a Pharmacology/Toxicology Reviewer in the Office of Generic Drugs (OGD) at the FDA.

Dr. Andrea McCollum graduated with a master's degree in chemistry and received her Ph.D. in molecular pharmacology and experimental therapeutics from the Mayo Clinic Graduate School of Biomedical Sciences. Dr. McCollum joined the NCI as a postdoctoral fellow in the Department of Medical Oncology. She is a Sallie Rosen Kaplan Fellow, and her research focused on the role of molecular chaperone proteins as novel prognostic biomarkers and molecular targets for ovarian cancer therapeutics. Her research was supported by the Pharmacology Research Training Association Fellowship from the National Institute of General Medical Sciences as well as the Kaleidoscope of Hope Ovarian Foundation Young Investigator Grant. During her time at the NCI, Dr. McCollum took classes in the technology transfer program for advanced education in sciences. This opened her path to patent law. She later worked in the Office of Program Integrity under the assistant secretary for financial resources at the Department of Health and Human Sciences. Subsequently, Dr. McCollum transitioned to a position at the United States Patent and Trademark Office where she works as a patent examiner in the biological sciences. Here, she reviews patents from several scientific fields.

How our panelists landed their jobs in the United States government

All the panelists secured their government jobs either through networking or through courses taken during their postdoctoral period.

Ms. Henderson thought she would be working with the FBI wearing hats and kicking doors, but she landed in Food and Drug Administration (FDA) through her position at the CDC. Now working as a forensic chemist in the government, she navigated back to her chemistry roots.

Dr. Kortum applied for a tenure track position at Uniformed Services University (USU) in the last year of his postdoc at NIH, and he currently works at USU. He shared that that there are currently many open scientific positions affiliated with the USU. Furthermore, Dr. Wei shared that he always wanted to make a positive impact on public health. Through the classes he took at the NCI, he became curious about the decision-making process at the FDA. Through networking, he found that the FDA has many opportunities for personal and professional growth and was able to land a role at the FDA. To continue, Dr. McCollum was initially on track to become a principal investigator, but she wasn't sure if this path was right for her. Like Dr. Wei, she took FDA classes since she was always interested in law. Dr. McCollum landed the position at the patent office through cold application in the mass hiring process. The panelists also encouraged the audience to explore new avenues to determine career paths that are good fits.

The Interview Process

The panelists all discussed the lengthy interview process when being hired for their government positions. Dr. Wei emphasized that conducting informational interviews for networking can help navigate the different internal processes and can give insights to put you on the right track to get the position. He added that his departmental hiring process went through three thirty-minute group interviews with the division and deputy directors, teams, and primary reviewers. The interview involves core discussions, giving interviewees an opportunity to showcase their skill sets. Dr. Wei also shared knowing your "why" for joining the agency is the key for cracking the interview. Dr. McCollum recollected that the patent office was interested in her knowledge of different technologies, such as antibody production and culturing different cell types. She added that one should look up the basics of patent law and understand the general process of an interview before attending one. Additionally, Dr. Kortum went through a traditional interview process of short thirty minute session with everyone in the department, following a research seminar and chalk talk. The important takeaway was to learn about professors' backgrounds, by reading papers before the interviews, as this allows you to speak in a better-informed manner. Ms. Henderson's interview process was lengthy as well. She suggested joining LinkedIn or other platforms as she was approached for her current role through an online platform. Ms. Henderson also emphasized showing that you are willing to learn and try out different roles during an interview. Finally, the panelists shared that everyone's career path is different, and it is not helpful or beneficial to compare one's path with others.

Pros and Cons of Working in the Government

The panelists concluded that one of the biggest pros with working in the government is job stability. Federal jobs are high salaried, which helps you to keep going for the purpose and mission of your chosen career. Dr. Wei called stability a double-edged sword as it makes you comfortable in your current role, but also encourages you to take steps to move upward. Dr. McCollum and Dr. Wei also considered flexible schedules as a pro since it often permits teleworking. For Dr. Kortum the laborious process of ordering supplies for the lab is a con, as working for large complex organizations adds some extra overhead and time/paperwork burden.

Work- Life

The panelists shared that their day-to-day work life comes with lots of meetings, reading, and literature searches. Dr. Kortum added that teamwork is a must and it is critical to meet all the deadlines and goals. Dr. McCollum's working day involves legal writing and literature searches about patents. She works independently but must meet team deadlines. Dr. Kortum spends much of his time writing grants and manuscripts. He also dedicates time to meetings with graduate students and with thesis committees. Dr. Kortum mentioned that he works in the lab and doing cell cultures keeps him close to bench. Ms. Henderson is currently involved in theoretical and practical work to learn the process used by her agency when a forensic request comes in. She further explained that when a case is assigned through the customs officer, the drugs go through analytical techniques such as UV-vis, GCMS, and MALDI to determine their nature. Ms. Henderson then writes reports on her findings

outlining the type of drug found and other information about harm.

The experiences of our panelists show how jobs in the government can vary greatly and allow people to pursue their interests.

What would be your advice to an early postdoctoral fellow interested in applying to a government agency?

The panelists advised all postdocs to start early in their career and emphasized on the benefit of conducting informational interviews. Ms. Henderson also added that postdocs should participate in different internships and summer programs to boost an individual's chances of a job offer. Dr. Wei mentioned that networking with people and letting them know that you exist is equally important. He believes that one should be ready to leave the bench when an opportunity steps in. Dr. McCollum advised investigating various types of job profiles to discover what one's interests. She encouraged taking FDA classes and applying to jobs as when advertised instead of waiting for the right time. Dr. Kortum strongly recommended starting your research proposal early and taking courses offered by the OITE on K grant writing. He added that instead of focusing on the number of papers published, one should focus on the quality of papers, as typically three first author papers are sufficient for grant applications.

What are some soft skills necessary for government jobs?

The panelists advised to gain transferable skills throughout one's postdoctoral training to prepare for working in government agencies. Dr. Wei emphasized the importance of verbal communication, time management, independent thinking, and customer service skills. Dr. McCollum shared that receiving constructive criticism and developing legal writing skills are important for working at the USPTO. She added that learning new skills and self-motivation are also beneficial for career growth. In addition, Dr. Kortum suggested to take grant writing courses if one wants to walk in the academic track. Ms. Henderson also added multi-tasking as a key transferable skill.

Five years ago, what did you hope for your career?

The panelists had a common answer to this question: a postdoctoral position is not necessary for working at the FDA, at the USPO, or in forensic science. Additionally, one does not need many publications to work in the patent office. Dr. Kortum mentioned that he wished he knew how many grants PIs must write.

In conclusion, the Scientific Careers in the Government panel was informative to people in all early stages of their careers. The panelists concluded the discussion advising participants to start thinking about their career goals in advance and to network with people from various backgrounds. Finally, they advised trainees to keep learning and be open-minded with their career choices.

Voices of the Fellows: Interviews with the Travel Award Winners about their Research

by: Suraj Joshi

The Travel and Outstanding Fellow Award winners represent CCR-FYI's recognition of excellence in basic, translational, and computational cancer research as exhibited by these fellows during their Colloquium presentations. This year, the Outstanding Postdoctoral Fellow awardee was Xiyuan Zhang and Outstanding Postgraduate Fellow awardee was Yeonju Kim. There were four travel awardees in both Best Poster and Best Oral presentation categories during the 2022 Colloquium. Oral award winners were Maximilia Frazao de Souza Degenhardt, Isaiah King, Roshan Shrestha, and Miranda Sowder. Poster award winners were Romina Araya, Vinutha Balachandra, Vibha Dwivedi, and Benjamin Green. In this article, we describe several interviews we conducted with some award winners where we talked to them about their research, factors that contributed to their success, advice for other fellows, and future career plans.

Yeonju Kim

ACROSS: Accrual and Access to neuRo-Oncology trialS in the United States

Why did you choose to study clinical trials in the US for your research project?

I wanted to understand the landscape of clinical trials in our field. I wanted to ask big-picture questions like "how have trials changed? Is the sample size of a given sufficient?" and similar questions.

We looked at about 2000-3000 trials studying a malignant primary Central Nervous System tumor. For this project, we were specifically interested in whether the trials were equitably distributed across the US in terms of location and socioeconomic status.

Recent work in the neuro-oncology space has asked "What are the barriers to patient access to clinical trials?" Many patients have tumors with no current effective standard of care treatments: clinical trials are an essential component of their care. However, there is data showing patients may not have access to trials near them. We wanted to see what factors contributed to this lack of access to clinical trials.

To do this, we started by correlating the presence of clinical trials with zip code-level socioeconomic & geographic status. We found that trials often clustered in highly populated cities, but even in these areas, several populations were being underserved. We performed logistic and linear regression analyses to find that trials were more likely to exist in urban areas, and that the number of

trials was significantly lower in socioeconomically disadvantaged neighborhoods.

We then looked at successful trial accrual. We found that multi-site studies that recruit patients in different locations were more likely to meet their accrual quota regardless of size. We also discovered that successfully accruing trials again clustered into densely populated areas but were more equitably distributed across socioeconomic status.

What went smoothly during your project?

It was relatively easy to incorporate new data into our analysis of trial access because we had already extracted most of the clinical trial data to answer previous research questions.

I also had a broad network of mentors with expertise in different fields, which helped me immensely when I needed advice, as well as access to past work in the field that helped a lot in determining the direction of my analysis.

What was one aspect that you struggled with during your project?

The biggest roadblock by far was trying to convert the data in our registries into the format needed for analysis. For many trials, we had to find creative workarounds (both manual and automated) to curate data to fit the desired format.

Because of this formatting issue, as well as missing data, there were some analyses we couldn't reasonably perform. That limited the types of questions we could ask.

What was the most interesting thing you learned during your project?

In terms of the conclusions, I was expecting to observe urban-rural disparities, but it was interesting to see that socioeconomically disadvantaged communities in urban areas lacked access to these resources, despite trials being more available in urban areas overall.

In terms of our analysis, I've never used Moran's I statistic before. Moran's I is a measure of spatial autocorrelation, which measures the degree to which objects nearby in space have similar (or different) values for certain measurements. It was interesting to learn about its previous use in ecological and agricultural studies and to apply this metric in our spatial analysis of the distribution of clinical trials across the US.

What are the next steps for your project? What are the next steps for your career as a scientist?

We were aware that there are disparities in clinical trial access, and our work has reiterated that. The next question would be how to better understand disparities in the underlying infrastructure of the neuro-oncology clinical trial space. NCORP is one initiative working to improve access – they partner with community sites to bring neuro-oncology trials to their areas. Incorporating programs like this into our analysis could help determine targetable geographic regions for trial development for neuro-oncology investigators. I would like to see two additional questions addressed. The first being: "How can the trials database be correlated to other datasets across variables besides socioeconomic status, such as health-related or demographic variables?" The second

is: "Where are patients in a given clinical trial coming from? Are they local or travelling from different regions?" That would be interesting to look at.

In terms of my career, I'm currently applying to medical school to become a physician and hopefully continue research throughout my career. Much of what inspires me to continue research is seeing my mentors cater their research to – and gain motivation from – their own patients for whom they are trying to get the best care.

What advice would you have for future Colloquium participants when preparing their presentations?

My general advice would be to find something that you're passionate about to work on and to share at the colloquium.

In terms of tangible advice, I found it helpful to prepare parts of the presentation intermittently throughout my project and get thoughts and feedback from people in my lab before the colloquium.

Xiyuan Zhang, PhD

Loss of PRC2 enforces a mesenchymal neural crest stem cell phenotype in NF1-deficient cancer through activation of core transcription factors

Why did you choose to specifically study MPNST for your research project?

For some brief background, my project seeks to understand the epigenetic consequences of PRC2 loss in NF1-associated Malignant Peripheral Nerve Sheath Tumor (MPNST). MPNST is an aggressive sarcoma of the Schwann cells, which wrap around the nerves in the peripheral nervous system. PRC2 is one kind of epigenetic regulator, which plays important role in gene silencing.

I studied this because here at the Pediatric Oncology Branch, we study all sorts of rare tumors and look for dysregulated pathways that lead to tumor progression. I chose to study MPNST because the molecular mechanisms underlying the malignant transformation from benign Schwann cells to cancer cells are largely unknown. Also, there has been an unmet need for treating this disease with an effective therapy. We need to know more and understand the disease better in order to better treat our patients.

What went smoothly during your project?

The project went smoothly overall. The bioinformatics analysis and model system construction went quite smoothly.

What was one aspect that you struggled with during your project?

Getting this published in a desired journal was tough. One prestigious journal commented that "while the mechanisms about PRC2 in cancer are interesting and valuable, MPNST was too rare to be considered". They wanted the results to be replicated in more common cancer types.

What was the most interesting thing you learned during your project?

The integrative analysis of single-cell transcriptomic data with cell line information that led to creation of a normal Schwann cell

developmental trajectory was quite interesting and informative!

Working directly with patient samples was also very interesting. I wanted to especially thank the people behind the great resources made available through the Childhood Cancer Data Initiative. We are so fortunate to learn from every patient seen at the clinic and to use the information to help our patients.

What are the next steps for your project? What are the next steps for your career as a scientist?

The first thing we want to do next, is to characterize the transcriptional network associated with MPNST tumorigenesis in PRC2 deficient vs. PRC2 wildtype cell lines. Thanks to the Concept Award from the DoD Rare Cancer Research Program, we can start doing this immediately via CRISPR cell knockout screens and use single cell sequencing as a readout.

We also want to use CRISPR activation screens to activate one or a small group of transcription factor candidates in Schwann cells to see if that can drive them to become tumors.

For my career, I want to have my own lab, hopefully in the near future.

What advice would you have for future Colloquium participants when preparing their presentations?

Talk to Scott Morgan! He's very helpful, if there's a space open for you to meet with him.

Romina Araya, PhD

Microbiota Triggers STING-IFN Signaling to Program an Antitumor Immune Microenvironment

Why did you choose to study microbiota in the context of the tumor microenvironment?

This project combined two major research areas I worked on in the past. During my PhD student years, I focused on things that happened in the gut, particular on gut immunology as relevant to celiac disease. But I always wondered how microbiota in our gut influenced our body systemically, beyond what was happening in the gut itself.

Then during my first postdoctoral fellowship, I worked on cancer research for the first time and learned completely new terminology for cancer immunology.

For this fellowship, my advisor combined these two topics together to study how gut microbiota influences the immune system. We wanted to assess its impact on cancer therapy. Since I had experience and an interest in both topics, this made the project incredibly exciting for me.

What went smoothly during your project?

Publication of the project went well! It was a lot of work, but our reception by reviewers was great. They did ask for us to add a lot of content to our paper, but we successfully addressed their key issues.

This process gave us extra confidence that we could swiftly address counterarguments about experiments and hypotheses that we didn't

necessarily think about. Doing this strengthened the case we made in our paper.

What was one aspect that you struggled with during the project?

I think the whole idea of working with microbiota is a struggle. The reason why it's so hard is the same reason why it's so important to study: data in microbiome physiology and phenotype is highly variable. We have tons of experiments demonstrating different microbiotic functions, and when you try to reproduce these phenomena under similar experimental conditions, you can't. You can have one situation today, and a completely different situation tomorrow, despite experimental protocols being the same in the lab.

One struggle we had was that one of our providers changed the facilities where our model organisms were coming from. It was the same animal raised on the same diet, but it ended up with a completely different microbiome composition. This had no explanation other than that the facility itself somehow accounted for the difference through an unknown mechanism. Because of this, we were worried about whether we could reproduce our results, and we had to spend a lot of time finding the proper dosages for our high-fiber versus low-fiber diets that we administered to our mice. We were able to reproduce our results, but it took a lot of testing.

What was the most interesting thing you learned during your research?

At the very beginning, I was skeptical of our ability to analyze all the changes and phenotypic variance due to microbiota. But when I saw one tumor respond to chemotherapy treatment from the same animal on the same diet with the same experimental conditions and a different tumor fail to respond that was from the same animal from a different facility raised under the same conditions, I started believing in the potential of leveraging microbiota to improve cancer treatment.

I had several "wow" moments in this project that supported this – trends that I never expected to see that were prevalent when I plotted the data that disappeared a week later after rerunning the experiment.

What are the next steps for your project? What are the next steps for your career as a scientist?

Right now, I'm working on writing another paper on the role of microbiota in modulating neutrophil function, and how that impacts chemotherapy efficacy. Neutrophils are considered a negative cell: if a patient has high neutrophil concentration, they will progress negatively in their disease. But neutrophils are much more plastic than we think: they can change in many ways depending on extracellular conditions. If we have the right conditions, they may change in a positive way in the context of therapy. This is what I want to show.

Furthermore, we have a bunch of other collaborations that I am also working on the manuscript for right now on lung carcinoma and other tumor models.

For my career, I really want to have my own lab. I would love to gain independence, have my own lab, and study my own projects. I just recently learned how to produce original science at this level: only during my postdoc

here I learned to produce science not only at a high quality and quantity, but also by learning the unwritten rules you need to learn to stay in academic research.

What advice would you have for future Colloquium participants when preparing their presentations?

I would recommend participating in several presentations, especially for the Colloquium. Also, I found that my first few presentations were a bit too technical and inaccessible to non-experts. I would recommend making your presentations much more general and make your explanations of mechanisms clear and detailed.

Also, for someone outside the field, the introduction and motivation sections of a presentation should take much higher priority than the other sections. For the analysis and conclusions, it's better if you can summarize the trends in your data without overwhelming your audience.

Maximilia Frazao De Souza Degenhardt, PhD

Structure and dynamics of Tetrahymena ribozyme in solution combining AFM and coarse-grained modeling

Why did you study RNA conformation and dynamics for your research project?

Rather than look at how RNA structure might affect cancer progression or other diseases, we wanted to answer fundamental questions about RNA dynamics in the cell. We were interested in how RNA structure changes over time. Here's an example of this kind of approach – rather than wanting to build a train or airplane, what if we wanted to first describe the fundamental theory of how objects move and how they are structured?

Today, most of our understanding of RNA structure is based off an implicit assumption that RNA structure is static and doesn't change in response to physiological conditions. But this isn't true – RNA structure changes all the time, and we need a model to describe these changes. We wanted to address this massive knowledge gap in RNA biology.

What went smoothly during your project?

Initially, learning the sample preparation and RNA wet lab protocols in my lab was quite challenging, as I had a Physics background with no wet lab experience. However, I was fortunate that our lab had such well-established sample prep protocols. Additionally, I had a lot of help from the lab. So overall I think this learning process ended up going smoothly for me.

What was one aspect that you struggled with during the project?

The hardest part of my project, which we are now working to address, is this: if you want to computationally calculate a model that is dynamic, there could be multiple model solutions.

Right now, we're using Atomic Force Microscopy (AFM), which gives us information about individual particles or molecules. We use a technique called dynamic fitting to infer a model of RNA structural change after AFM. But our technique doesn't have enough resolution to choose the most likely true model from many possibilities.

We want to make our approach more precise. Hence now we're trying to use neural networks to choose the most optimal solution state among multiple possibilities after AFM.

What was the most interesting thing you learned during your research?

Learning about how RNAs change in general! They are just amazing. I come from a protein analysis background, and I never focused on RNAs before. But now, it's just amazing – they are so rich in detail and are completely different from each other.

What are the next steps for your project? What are the next steps for your career as a scientist?

I'm planning to finish this project as soon as possible. We aim to find a good method to break this "one structure, one sequence" dogma. I'm thinking about having our overall method done by the next year.

About my career – this is an interesting question – I will look for some research position in the field of RNA structure in general.

What advice would you have for future Colloquium participants when preparing their presentations?

I think the rule of thumb for any talk that you give to someone is that you need to imagine that your audience does not have all the details that you have. And sometimes they don't need to have all the details that you have. They just need to listen to you and understand the main idea and what you're looking for. Sometimes if you give lots of details or more information than is needed, you lose your audience; it's hard to get their attention back once you've lost it.

Secondly, you need to show passion for your work. If you're not excited for your work, how can someone else be interested in it? So, the way I think about it is this: I really like what I'm doing, and I want to show you why I like what I'm doing.

These are the things I think about while preparing presentations in general. For the Colloquium specifically, I know that the participants generally know a lot about a wide variety of subjects. When preparing, I thus decided to raise a lot of deep and interesting scientific questions and use my work to attempt to answer those questions, such as "how can we understand RNA catalytic activity without knowing its structure, conformation, and motion in solution?". These were questions that I knew I could ask during my talk and for which people would appreciate or be curious about the answers.

Dr. Tom Misteli's Closing Remarks at the 2022 CCR-FYI Colloquium

by: Suraj Joshi

Dr. Tom Misteli, Director of the Center for Cancer Research at the National Cancer Institute, joined as the speaker for the CCR-FYI Colloquium's Closing Remarks. After announcing the travel award winners among the conference presenters, Dr. Misteli prioritized gauging feedback from CCR trainees about the quality of their research training. While attendees gathered their thoughts, Dr. Misteli had some excellent points to make himself, some of which we highlight below.

The 2022 Colloquium demonstrates that great research training is not just about the science, but also requires effective professionalism, networking, and communication about that science.

Dr. Misteli mentioned how the Colloquium was fully organized by trainees and how that exemplifies CCR's holistic commitment to high-quality research training. CCR trainees care about how they communicate and present their science to different audiences, not just about what's happening at the bench or *in silico*.

The Colloquium also gave us a bird's eye view of the CCR as an institution. Through the Colloquium, attendees and presenters got the chance to interact with other trainees, discover different science outside their laboratory branch, and develop authentic connections with junior and senior researchers across the CCR.

Admittedly, Dr. Misteli noted that these interactions become much harder in a virtual setting. While we can interact with each other across unlimited distances, behind the screen we may feel a sense of isolation from each other. Science cannot succeed in isolation; it thrives off collaborations and interactions. Even so, Dr. Misteli was impressed with the scale and success of the Colloquium in its second virtual iteration.

Trainees have handled the pandemic with extraordinary resilience and productivity.

Dr. Misteli recognized that the past few years have been difficult for trainees during the pandemic.

At some point, most, if not all postbaccalaureate fellows, graduate students, postdoctoral fellows, and visiting fellows have thought: "my time here is limited. I have a certain number of years here. Wouldn't it be nice if I got a paper out or finished this project?" There's a lot of pressure on trainees across the board, and productivity has suffered during the pandemic. A real sense of loss pervades our perspective of the last few years, not only with respect to the research time many of us lost, but the personal struggles trainees had to face.

Yet, remarkably, according to an analysis from the Office of the Director, CCR's publication rate has increased steadily during the pandemic. All of them were substantive papers, and almost all of them were driven by trainees. CCR's trainees have demonstrated extraordinary resilience during the pandemic with no signs of slowing down.

There has never been a better time to be involved in cancer research.

Dr. Misteli stated that we are living in a historic time in cancer research, although we may be unaware of it. The rate of progress in artificial intelligence, genomic engineering, tissue engineering, single-cell analysis, and synthetic biology technologies enables us to ask research questions we never thought possible. This trend will only continue. Additionally, revolutions in our understanding of human biology through immunology microbiomics will change our lives and understanding of human diseases, especially with cancer. Finally, Dr. Misteli addressed the rapid rise in health disparities research. Health disparities research not only enables us to address unmet needs across underserved populations, but also allows us to ask excellent scientific questions about public health and human diversity.

Another trend supporting the meteoric expansion of cancer research is the convergence between basic science and clinical research. Basic scientists now think often about clinical applications. Clinical scientists are now trained in rigorous molecular biology and laboratory-based research. CCR represents the interface between both fields and thrives off cross-disciplinary research. There's no question that we will see this trend continue for many years.

While science has become a relevant hot topic, career challenges have grown tougher during the pandemic.

Dr. Misteli concluded his comments by recognizing the severe competition and uncertainty associated with traditional academic research. As institutions slowed their search for new candidates during the pandemic, it has become much harder for Postdocs and Visiting Fellows to find stable academic positions. The number of open faculty positions has decreased, and the number of applicants is rising continuously. But the good news is that the academic path is not the only path. Only 10-15% of PhD holders end up in academic Principal Investigator (PI) positions. Biotech, Science Policy, Law, Investment, Science Administration all represent viable alternative paths for young biomedical researchers.

Dr. Misteli emphasized that these are not lesser career choices. We need people who understand science in all areas of public and business life. Science deeply affects all our lives, so it should behoove us to ensure that scientists have a place as educators, entrepreneurs, and public speakers.

Open Floor.

With that, Dr. Misteli opened the floor to allow trainees to ask questions and offer feedback. Some of his most insightful remarks are summarized below.

What would be your best piece of advice for current fellows who are moving forward in their science career?

"I think you want to think about what it is that you really want to do, and that can either be becoming a PI, or a lawyer, or in Biotech. Pick something you like, something you're passionate about. But then I think you have to pair that with 'what am I good at?' Sometimes there are things I would like to do, but I can't – I'm just not good at it. We all have talents. It's very important to find out what you're good at. Everyone develops a sense of what they're comfortable with. I think the combination of what excites you and what you're good at is a winning combination. I think that's a good starting point."

We hear a lot about the importance of mentorship. Can you name somebody who has been a mentor to you and has made an impact on your career? How did they impact your leadership style?

"I'll go back to the roots, which was my PhD mentor. There's a number of elements I learned from him that have really endured and that we talk about when we get together. One is that the quality of science that you do has to be very high. You don't want to be wrong in your science. That may sound obvious and trivial, but nowadays, in a very competitive environment, people don't always adhere to that. They say 'well, get it out quick, get it out to a high-impact journal, and we'll clean it up afterwards'. The integrity of science was ingrained in me, and that was very important.

"But the more important aspect of it was that even when I was a PhD student and he was a mid-career PI, we talked about transitioning from doing your own best science to helping other people do their best science. That really stuck with me, and ultimately that's the reason why I agreed to become the CCR Director. That's what I see as my role, which is to enable people to do the best science that they can do. I think about the postdocs in my lab in the same way. My role is to enable science. I'm a very strong believer that as you go through your career, it's less and less about you, and more about everyone else around you. My PhD supervisor really put that in my head, and it made a lot of sense to me. In fact, the longer I go through my career, the more sense it makes."

What is your vision for CCR in the next five or ten years? What do you envision CCR will be, especially with respect to the postdoctoral community?

"We haven't really produced a strategic plan, and the reason for that is that cancer research is a very rapidly changing landscape. I've read too many strategic plans that, by the time they were published, were essentially outdated. Five or ten years ago, nobody built a strategic plan thinking about CRISPR engineering. So, it's very difficult to predict the future of science. To me, the future of CCR in the next five or ten years is mostly about building an environment where wonderful things can happen. We're going to see a lot of development and growth in precision medicine, artificial intelligence. I'm fairly committed to investing in bioengineering, and the application of the vast knowledge of cell and developmental knowledge to cancer research. So, it's really about defining certain areas and then creating an environment where wonderful things can happen. Again, the sweet spot for us is at the interface of basic and clinical research; that will definitely grow in the next few years.

We touched on how the pandemic increased isolation. I think this highlights the isolation that folks in Frederick have in comparison to the folks in Bethesda – I know the Bethesda community is much larger. What are your thoughts or suggestions for fellows and the CCR-FYI to improve camaraderie between the Frederick and Bethesda campuses?

"Yeah, physical separation is a huge problem in building communities. We even see it on the Bethesda campus. Being in different buildings is an obstacle for people. You don't go to the

seminar in the other building if it's raining, right? Frankly, my hope actually is that, with all of us getting so used to video conferencing, joint virtual meetings with the Frederick and Bethesda campuses would be more natural. It wouldn't be 'oh, we're connecting Frederick to Bethesda, it's 'oh, I happen to be in Frederick, and they happen to be in Bethesda."

The other aspect is that having two campuses is institutionally a challenge. You have to make a decision: should Frederick be a little Bethesda, or should it be something different, and what does that mean? The decision we have made is that it will be different. Frederick has a different flavor of science than Bethesda. The difference obviously is that in Bethesda we have a clinical center, so a lot of the clinical and closely translational work is probably focused on Bethesda. But we're really building Frederick towards a technology-centered campus. We have structural biology, chemical biology, and a lot of drug screening up there. And those labs are kind of biology-agnostic. The structural biologists solve all sorts of structures. The chemists work on all sorts of projects. As I said, I want to expand to bioengineering which would primarily be based in Frederick. Really my hope is that it brings the Frederick community a little closer together as well."

It's safe to say Dr. Misteli has ambitious goals for CCR's expansion of its research capabilities in the next few years. And based on the success of the Colloquium, trainees will continue to excel despite the challenges of the pandemic.

Activities of interest for FELLOWS!

NIH NATIONAL CANCER INSTITUTE

Sallie Rosen Kaplan Postdoctoral Fellowship for Women Scientists in Cancer Research (SRK Program)

What happens during the transition from trainee to Independence? How do we better retain and advance the careers of women in science? How can we better face the competitive nature of the job market?

SRK Program Provides

• Leadership skills • Confidence building• Additional mentorship • Networking Opportunities • Peer-to-peer connections

SRK Program Elements

• 30-week professional coaching with customized program • Monthly meeting with second mentor selected from senior women in government, academia, or industry • Additional workshops by NCI Office of Workforce and Professional Development • Additional coaching on presentation and communication skills • Career development panel discussion • Grantsmanship seminar

For more information:

https://www.cancer.gov/grants-training/training/at-nci/srk

NIH NATIONAL CANCER INSTITUTE Center for Cancer Training

Frederick Diversity Committee FDC

Frederick Diversity Committee

Promoting Diversity

FDC Mission and Goals:

Celebrate diversity and inclusion on the Frederick campus

Promote productivity, work-life balance and career satisfaction

Meetings:

every 3rd Friday of the month at 1pm

Benefits:

Personal and Professional Development

Career Exploration and Enrichment

Networking

Mentorship

More information can be found at https://ncifrederick.cancer.gov/Diversity

CCR FYI

Are you interested in a career in science journalism or mass media communication? Join the CCR-FYI Newsletter Team to gain valuable experiences and skills!

Open positions:

• Writer • Editor • Advertisement Designer

Skills:

• Professional writing • Communicating science and non-science related topics to the public • Presenting academic information in a popular manner • Non-science investigatory writing

Benefits:

• Supportive team environment • Flexible writing topics • Gain writing experience• Network with fellows outside of your group • Positively influence the training experience with valuable information

Providing a Voice for CCR Fellows

To join, please contact: alida.palmisano@nih.gov

Join the Fellows and Young Investigators Steering Committee!

Are you interested in networking with other fellows, exploring alternative careers in science, gaining marketable skills, or giving back to the community? Join the CCR-FYI SC! Meetings are held monthly in Bethesda and Frederick on the last Thursday of the month, at 11am.

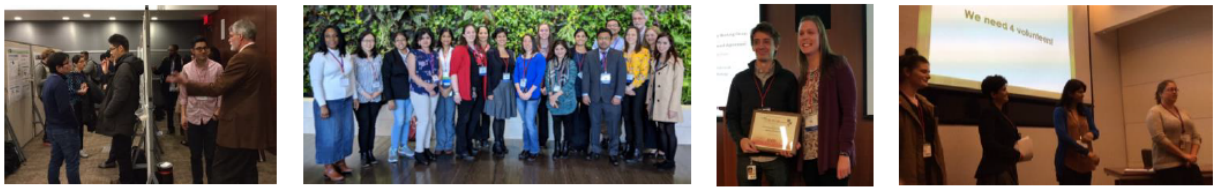
Providing Valuable Training Experiences for CCR Fellows

For more information, please contact:
marygrace.katusiime@nih.gov or yilun.sun@nih.gov

Join the 2023 CCR-FYI Colloquium Planning Committee!

Are you interested in networking with extramural scientists, exploring alternative careers in science, or giving back to the community?

To join, begin attending the CCR-FYI monthly meetings in Bethesda and Frederick on the last Thursday of the month, at 11am.



Providing Valuable Training Experiences for CCR Fellows

For more information, please contact:
christopher.schultz@nih.gov or guangai.xue@nih.gov

Mark Your Calendars

National Postdoc Appreciation Week

September 19 - 23, 2022

A week of activities for fellows to recognize the significant contributions that postdoctoral scholars make to U.S. research and discovery.

Events will be held on the Bethesda and Frederick Campuses

Past events include

Dark Roast and Donuts*

Free coffee and donuts!

Brown Bag Lunch Seminars

*Take a moment for some personal enrichment while enjoying lunch. Free cookies provided!***

Trivia Respite From Lab

Get off campus to celebrate the end of the week and relax with other fellows!

Questions? Contact: shivalee.duduskar@nih.gov

**Supported by the CCT Office of Training and Education. **not provided by government funds*