CCR Fellows & Young Investigators Newsletter

Center for Cancer Research
Volume 20, Issue 3 **Summer 2021**

Special newsletter edition: **21st CCR FYI Colloquium**

From Mechanisms to Therapies: Current Highlights in Cancer Research

In the picture above, the CCR-FYI Colloquium Planning Committee:
Chairs: Srikanta Basu, Katelyn Ludwig. Vice Chairs: Dorothy L. Butler, Anna Ratliff.
Knicki Bergman, Molly Congdon, Ruchika Bhujbalrao, Vasty Osei Amponsa, Sabina Kaczanowska, Neha Wali, Joshua Rose, Sunita Chopra, Isita Jhulki, Mary Grace Katusiime, Sumirtha Balaratnam.
Not in the picture, but part of the Planning Committee: Cassey Singler, Jose Delgado

Support of the CCT-Office of Training and Education, CCR-FYI SC and CBIIT was essential for the success of this event, in particular the Committee wants to thank Amy Funk, Jessica Eisenstatt, Angela Jones, Robert Montano, Erika Ginsburg and Oliver Bogler.

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

While the COVID-19 pandemic continues to have a major impact on the life of many NCI fellows, we are happy to see that one of the big CCR events of the year (the CCR-FYI Colloquium) returned in 2021 after being cancelled in 2020. Even though this annual two-day event was held virtually in April 2021, fellows and young investigators 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 each section 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. And if you want to listen to some of the workshops or panels again, make sure to click the links to the video recordings of the event!

I hope you enjoy reading the Summer 2021, Special edition of the FYI Newsletter! – Alida Palmisano (Editor-In-Chief)

(background image created with BioRender.com and picture by guy stevens on Unsplash)

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SACHI HORIBATA, PhD
Laboratory of Cell Biology,
Center for Cancer Research

Talk title:
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OUTSTANDING POST-GRADUATE FELLOW (OPGF)

MADELINE SPETZ
Laboratory of Molecular Biology,
Center for Cancer Research

Talk title:
"CAR T CELLS TARGETING GPC2 AS A TREATMENT FOR CHILDHOOD CANCER"

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ARUN KUMAR GANESAN
"Oncogenic LncRNAs drive histone variant mislocalization in cancer cells"
(Arun Kumar Ganesan & Yamini Dalal
Laboratory of Receptor Biology & Gene Expression,
Center for Cancer Research, NCI, NIH)

DEBASHISH PAUL
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(Debasish Paul & Steven D Cappell
Laboratory of Cancer Biology and Genetics,
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Laboratory of Cell and Developmental Signaling,
Center for Cancer Research, NCI, NIH)

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Pediatric Oncology Branch, NCI, NIH

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Genetics Branch, CCR, NCI-Bethesda, Genome Modification Core, Frederick National Lab for Cancer Research

ZHILIN YANG
"Cell cycle dependence of p53 dynamics during the DNA damage response "
Zhilin Yang, Eric Batchelor
Laboratory of Cell Biology, NCI, NIH

Opening Remarks from Colloquium Planning Committee Chairs

by: Srikanta Basu and Katelyn Ludwig

The 21st Annual CCR-FYI Colloquium, entitled "From Mechanisms to Therapies: Current Highlights in Cancer Research," took place on April 19-20th, 2021. In response to the COVID-19 pandemic, the Colloquium was held virtually for the second year in a row. Despite these circumstances, we strove to design an event featuring scientifically diverse topics and professional development opportunities to develop the skills of the CCR fellows.

The first day of the Colloquium began with opening remarks by Dr. Srikanta Basu, the CCR-FYI Colloquium Planning Committee co-chair from Frederick. Next, Erika Ginsburg, the Chief of the Office of Training and Education, Center for Cancer Training (CCT), spoke about the resources available for the CCR fellows, including fellowship opportunities. The attendees then heard from Dr. Oliver Bogler, the Director of the CCT, regarding the current directives of the CCT and its future directions. We also heard remarks from Dr. Ned Sharpless, the Director of the NCI. The second day of the Colloquium was also opened with talks by NCI leadership including Dr. Glenn Merlino, the CCR Scientific Director for Basic Research, and Dr. William Dahut, the CCR Scientific Director for Clinical Research, who spoke about the ongoing work at the NCI, including an update on the clinical trials in progress.

Over the course of the two days, we hosted two intramural keynote speakers from the NCI. The first was Dr. Michael Gottesman, the Deputy Director for Intramural Research & Chief of the Laboratory of Cell Biology. Dr. Gottesman gave a talk entitled "The Role of Multidrug Transporters in Drug Resistance in Cancer." On the second day of the Colloquium, Dr. Barbara Felber, a Senior Investigator in the Vaccine Branch and Head of the Human Retrovirus Pathogenesis Section at the NIH, delivered her talk entitled "DNA vaccine for Broad and Durable Immunity." Additionally, we heard a talk from Dr. Sachi Horibata, who was selected as the 2021 Outstanding Postdoctoral fellow awardee. Dr. Horibata spoke about "Identifying underlying determinants of chemotherapy resistance in cancer," and she detailed her work examining distinct gene profiles in refractory acute myeloid leukemia.

In addition, we hosted two extramural speakers and one survivorship speaker. Dr. Alexandra Newton, a Distinguished Professor of Pharmacology at the University of California, San Diego, spoke about "Reversing the Paradigm: Protein Kinase C as a Tumor Suppressor." On the second day of the Colloquium, Dr. J. Carl Barrett, the Vice President of Oncology and Translational Sciences at AstraZeneca, and the founding Director of the CCR, spoke about "Translational Medicine in Driving Drug Development in Oncology." Next, we heard from Dr. Marty Tenenbaum, a computer scientist and cancer survivor. He is the founder of Cancer Commons and CollabRx, and he spoke about his experience as a cancer patient as well as the work he does in the cancer field as a computer scientist.

Finally, we hosted concurrent oral presentations and virtual poster presentations to provide the CCR fellows with opportunities to share their work. We also hosted three panels and three workshops covering topics related to professional development. Two panels covered academia and

industry career topics, while the last panel focused on scientific opportunities at nonprofit organizations. Additionally, we hosted workshops on virtual interview techniques, scientific communication, and management techniques, to enhance the non-technical skills of the CCR fellows.

The articles in this edition of the CCR-FYI Newsletter summarize the details of the events of the Colloquium. We would like to thank NCI IT for all their help designing a virtual colloquium. We would also like to thank the CCR-FYI volunteers that helped plan and run the 2021 Colloquium.

If you would like to get involved in the CCR-FYI and the planning of the 2022 Colloquium, please contact either
Dorothy Butler (dorothy.ackerman@nih.gov) or Anna Ratliff (anna.ratliff@nih.gov) for more information.

Watch the recordings of the CCR-FYI Colloquium!

For people unable to attend the Colloquium or desiring to listen to the discussions and workshops again, a recording of some of the events is available in the following NIH Sharepoint folders:

Day 1 Recordings

Day 2 Recordings

Access to the recording requires NIH login.

NOTE: The video files are very large so browsers may encounter some delays in loading them.
If you cannot load the files, please try to refresh the page and be patient!

Remarks from the NCI Director, Dr. Sharpless

by: Geraldine Vilmen

The 2021 Virtual edition of the CCR FYI Colloquium that took place on April 19th and 20th started with remarks from CCR leadership. The introductory address was from Dr. Ned Sharpless, Director of the National Cancer Institute. In his opening remarks, he highlighted the striking revolution in cancer research, prevention, and screening that have led to declining mortality. He pointed out that the number of FDA approvals for cancer treatments have increased over the last years. In addition, the number of new devices for cancer diagnostics have also increased, demonstrating the importance of the joint work from academia and industry in the fight against cancer. He also focused attention on the vaccine that prevents Human Papilloma Virus (HPV) related cancer and its efficiency against cancer proliferation. Another example of the successful advances in research was a collaboration aimed at inducing immunity with a fecal microbiota transplant that helps convert non-responders of immunotherapy to responders.

Dr. Sharpless spoke about President Joe Biden and First Lady Dr. Jill Biden's strong commitment to ending the tragedy of cancer. He emphasized the importance for scientists to move out of their comfort zones and become innovative throughout their careers. He stressed the importance of having good mentors, that can help play on our strengths and transpose them to our research. However, it is important to differentiate a good mentor, who should be fair and critical, from a friend. He called attention to the importance of continuing to consider serving the NCI after moving to the next step of our career. He reminded us of the importance of time, and not getting overwhelmed by getting too many projects at once. Lastly, Dr. Sharpless reminded us that collaboration leads to great science.

"The Role of Multidrug Transporters in Drug Resistance in Cancer" Keynote talk: Dr. Michael M. Gottesman

NIH Deputy Director for Intramural Research & Chief of the Laboratory of Cell Biology, NCI

by: Srikanta Basu

On the beautiful morning of April 19th, 2021, the first keynote address of the virtual 2021 CCR FYI Colloquium was delivered by Dr. Michael M. Gottesman, the Deputy Director for Intramural Research at NIH since 1993.

A graduate of Harvard College and Harvard Medical School, Dr. Gottesman completed an internship and residency at the Peter Bent Brigham Hospital in Boston and was a research associate at NIH from 1971 to 1974. He returned to Harvard Medical School as an assistant professor in the Department of Anatomy before returning to NIH to be a principal investigator in 1976. He became Chief of the Molecular Cell Genetics section in NCI's Laboratory of Molecular Biology in 1980 and Chief of the NCI's Laboratory of Cell Biology in 1990.

Dr. Gottesman is a prime example of a person who has been successful both as a researcher and administrator. In the last 45 years of being a principal investigator at the NIH, he has contributed to over 500 peer-reviewed scientific publications in topics ranging from how DNA is replicated in bacteria to how cancer cells elude chemotherapy. His team collaborated with Dr. Ira Pastan (Chief of NCI's Laboratory of Molecular Biology) to identify the MDR1 gene that codes for a protein called P-glycoprotein (P-gp). This protein is an energy-dependent pump that removes toxins or drugs out of the cell and is widely accepted to be a major contributor towards drug resistance mechanisms in multiple cancers. During his role overseeing the intramural research program at the NIH, Dr. Gottesman initiated several training and mentoring programs for high school, college, post-baccalaureate, medical, and graduate students. He instituted training programs for students from disadvantaged populations, programs to advance the careers of women scientists, loan repayment programs for clinical researchers at NIH, and a clinical research training program for early-career clinical investigators.

In his keynote address, Dr. Gottesman emphasized the problem of multidrug resistance in cancers, which pose a serious hindrance to NCI's goal of curing cancer. His approach to tackle this problem is three pronged:

1. To understand the molecular mechanisms and physiology of drug resistance using in-vitro studies.
2. To determine the clinical relevance of these mechanisms.
3. To develop new approaches to circumvent resistant mechanisms in cancer patients.

Some physiological mechanisms that alter drug resistance are tissue stiffness, the interaction between the immune system and tissue microbiome, and the presence of "privileged sanctuaries" or safe havens for cancer cells where drugs cannot reach them, like the blood brain barrier. Cellular mechanisms like drug

uptake, metabolism, and efflux also alter drug resistance. Dr. Gottesman discussed the structure, substrates, and mechanisms of action of the ABC family of drug transporters responsible for energy dependent drug efflux, namely ABCB1 (also called P-gp), ABCG2, and ABCC1. It is important to understand that these efflux pumps are required for the normal functioning of cells in organs exposed to toxic chemicals/drugs like the liver, kidney, brain, and intestines. Drugs used in general medicine (like antacids, antibiotics) are also exported by these transporters.

It has been observed that in approximately 50% of all human cancers, increased P-gp expression levels are responsible for intrinsic or acquired drug resistance. Although multiple P-gp inhibitors exist, the overall response of using these inhibitors during chemotherapy has been disappointing. This may be because although P-gp may be sufficient to confer drug resistance, it may not be the only cause of drug resistance in cancers. Recent clinical evidence suggests that personalized therapy strategies, including drug and patient stratification, could improve the efficacy of P-gp inhibitors in multi-drug therapeutic regimens. As an example of this strategy, Dr. Gottesman presented an example of the use of P-gp inhibitors in the treatment of Acute myelogenous leukemia (AML). Patients with AML had been known to express high P-gp levels but P-gp inhibitors were ineffective in treating AML patients. Dr. Gottesman's lab analyzed the existing gene expression databases and found a striking degree of heterogeneity of P-gp and ABCG2 expression in AML patients. In collaboration with Christopher Hourigan (from NHLBI), his lab performed a detailed RNA sequencing-based stratification analysis of all the cases of patients having refractory AML, i.e. patients which developed resistance to chemotherapy. They found that there are 3 groups of refractory AML patients and only one of these groups are responsive to ABCG2 inhibitors. Thus, treating only this specific AML group with ABCG2 inhibitors can be clinically successful.

In the second portion of his talk, Dr. Gottesman talked about the use of an *in-vivo* bio-luminescence assay in mice to study drug efflux/delivery across the blood-brain barrier (BBB). The BBB is known to be rich in ABC drug transporters and thus the brain becomes privileged sanctuaries for cancer cells. Using the bioluminescence assay, Dr. Gottesman's team showed that treatment with ABCG2 inhibitor can circumvent the blood brain barrier and allow the passage of chemotherapeutic drugs. His lab is currently trying to develop a similar bioluminescence zebrafish brain model that can be used for drug screening of ABC transporter inhibitors and compounds that can cross the blood brain barrier. These inhibitors can be potentially used to treat drug resistance in both primary and metastatic brain tumors.

Finally, Dr. Gottesman discussed the role of metabolic changes to drugs which can alter drug resistance. He gave the example of romidepsin (a histone deacetylase inhibitor). Romidepsin is a pro-drug which when activated, has a chemically active thiol group. Dr. Gottesman's group found that METTL7A (methyltransferase like 7A) can methylate this thiol group and render romidepsin inactive.

Dr. Gottesman concluded his talk by emphasizing that the drug resistance in most tumors are multifactorial. It is important to make a detailed catalogue of all possible regulatory mechanisms that alter drug resistance and more efforts should be made to develop advanced technical approaches to assess drug resistance like liquid biopsies and *in-vivo* models.

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"Release of PKC from Quarantine by mTORC2"
Keynote talk: Dr. Alexandra Newton
Distinguished Professor of Pharmacology, University of California, San Diego

by: Srikanta Basu

On April 19th, the second keynote address of the 2021 CCR FYI Colloquium was given by Dr. Alexandra Newton. A highly successful researcher in the field of biomedical sciences, Dr. Newton received her PhD in Chemistry from Stanford University, spent two years at the University of California, Berkeley as a postdoctoral fellow in the lab of Daniel E. Koshland, Jr. , and joined the Chemistry Department at Indiana University in 1988. She was recruited to the Department of Pharmacology at UCSD in 1995, where she is currently a Distinguished Professor. She is a fellow of the American Association for the Advancement of Science, received an NIH MERIT Award, and currently has an NIH MIRA Award.

Dr. Newton has served as Chair of the Biomedical Sciences Graduate Program at UCSD. She is currently the Co-Director of the Molecular Pharmacology Training Area at UCSD and on the board of Scientific Directors of the National Cancer Institute. She was recently elected to lead the International Union of Biochemistry and Molecular Biology, which represents biochemical societies in 79 countries, and is the first American woman to head this organization. Finally, she is the Director of Cell Signaling San Diego, a center created in 2020 that brings together the outstanding talent in San Diego that studies cell signaling mechanisms.

Dr. Newton is very passionate about training the next generation of biochemists and biomedical researchers and has trained many PhD students and postdoctoral fellows for successful careers in academia and industry. Her research focuses on understanding the structure, function, and regulation of a key signaling molecule in cells, protein kinase C (PKC), and how its function is altered in various disease conditions. Overturning a 30-year dogma, her recent analysis of mutations in PKC isozymes found in various cancers revealed a tumor suppressive

function of these enzymes, indicating that therapies should focus on restoring, rather than inhibiting, enzyme activity. Conversely, she showed that enhanced function of PKC contributes to the pathophysiology of degenerative diseases, identifying activity-enhancing variants of PKC in patients with Alzheimer's Disease.

Mechanism of PKC activation

In her keynote address, Dr. Newton discussed the relationship between the structure and function of PKCs. Her lab used genetically encoded fluorescence reporters to measure PKC activity and showed that PKC activation is transient and exquisitely tuned with the transient increase in cellular calcium levels. Physiological PKC activity is tightly balanced. Too much or too little activity can give rise to pathophysiological problems. Her lab showed that in the cytoplasm, PKC protein forms a tight, auto-inhibitory, bundle-like, structural conformation which is the predominant form of PKC. Upon activation via second messengers that increase calcium in the cytoplasm, PKC binds to calcium and translocates to the plasma membrane. Here PKC binds to a lipid called phospho-inositol diphosphate (PIP2) and a second messenger called diacyl glycerol (DAG). This opens the auto-inhibitory conformation of PKC to form an intermediate open conformation and allows it to bind and phosphorylate substrates. PKC activation is transient and can be monitored by fluorescent reporter assays.

Overturning a 30-year dogma: Proving PKC is a tumor suppressor not a tumor promoter

In 1980, Peter Blumberg of the NIH had discovered that phorbol esters (present in croton oil) were potent tumor promoting agents. His lab demonstrated that phorbol esters bind to PKC and in turn mimic the DAG mediated acute activation of PKC. They showed that repeated application of 12-O-tetradecanoyl phorbol-13-acetate (TPA, a phorbol ester) after a single application of the carcinogenic chemical, 7,12-dimethylbenz[a]anthracene (DMBA), consistently caused mouse skin carcinogenesis. This gave rise to the classical DMBA-TPA skin carcinogenesis model. All this data suggested that PKC was a tumor promoter, but inhibitors against PKC failed in the clinic. In fact, chemotherapy with PKC inhibitors have proven to be deleterious to cancer patient survival. To understand this anomaly, Dr. Newton's lab characterized the effect of almost 50 mutations found in the TCGA cancer mutation database for their respective PKC activity. Interestingly, while many of them decreased PKC activity, none of the mutations increased it. Using a colon cancer cell line with a mutant PKC allele and correcting it genetically to a wild type PKC, they showed that PKC functions as a tumor suppressor. They also showed that in patient samples, having low PKC protein levels decreased patient survival.

Dr. Newton went on to address this paradoxical mechanism of the activation and degradation of PKC. Her lab demonstrated that PKC undergoes co-translational phosphorylation at three sites and these phosphorylation sites are required to maintain its autoinhibitory rock-like conformation. Also, an amino acid sequence at the N terminal of PKC acts as a pseudo-substrate, is inserted into the active site of PKC, and is critical in forming the auto-inhibitory stable conformation. The unphosphorylated protein has a fully open conformation and is unstable. During protein synthesis, PKC is present in an open conformation and the phosphatase PHLPP (PH domain leucine rich repeat protein phosphatase) gets bound to PKC co-translationally. When PKC gets phosphorylated at the three sites by

autophosphorylation and by kinases like PDK1, it removes PHLPP; the pseudo-substrate inserts into the active site and PKC attains the closed stable conformation. Inability to form this closed conformation due to the presence of mutations in the pseudo-substrate domain or in the phosphorylation sites, cause PKC to be dephosphorylated by PHLPP and lead to its degradation. Therefore, PHLPP can be called a gatekeeper for PKC function. This mechanism can explain why phorbol esters make PKC constitutively active but also degrade the protein in 16-24 hours. Dr. Newton's lab showed that PHLPP dephosphorylates DAG bound active PKC in the intermediate open conformation (interacting with substrates) which causes PKC degradation. Her lab also found that having low PKC and high PHLPP is correlated with low survival rates in patients with pancreatic or colorectal cancer.

Gain of function mutations of PKC in neurodegenerative diseases

While loss of function mutations or a decrease in protein levels of PKC is seen in cancer, gain of function mutations are observed in neuro-degenerative diseases. A PKC mutation from methionine to valine at the amino acid position 489 (M489V) is associated with Alzheimer's disease. This mutation alters the active site and increases the protein activity but does not affect its stability. Similarly, gain of function PKC mutations in cerebral ataxia prevent its binding to PHLPP and in turn prevent degradation.

mTORC2 disrupts PKC dimerization, leads to PKC maturation, and prevents degradation

Dr. Newton's laboratory demonstrated that mTOR complex2 (mTORC2) is a major regulator of PKC. Referring to the Covid19 pandemic, she related the interaction of PKC and mTORC2 to that of a quarantine situation. Newly formed PKC protein is present as a head to head dimer of two PKCs both present in open conformations. mTORC2 binds to PKC at a TOR interaction motif (TIM) and disrupts the dimer. This dimer is stable and is not degraded, thus it can be related to a person in a safe quarantine stage. Although mTORC2 does not phosphorylate PKC itself, it participates in recruitment of kinases that phosphorylate PKC and activate its intrinsic autophosphorylation capacity. Three sites in monomeric PKC are phosphorylated, which is necessary for PKC to attain the auto-inhibited, stable, closed conformation with the pseudo-substrate blocking the active site. Thus, mTORC2 releases PKC from quarantine in a safe manner with social distancing and the pseudo-substrate acting as a mask. To mimic this mechanism and prove their hypothesis, Dr. Newton used stapled peptides that can disrupt dimerization and showed that the monomer with its triple phosphorylated closed conformation is advantageous for the stability and activity of PKC. The monomeric PKC is the mature form of PKC since it is the only form that reversibly responds to second messengers and DAG. Dr. Newton compared this to a situation where regulated release of quarantine by mTORC2 allows PKC to work (phosphorylate substrates) transiently, while unregulated release without a mask and social distancing (non-phosphorylated and non-autoinhibited PKC) causes health problems (PHLPP dephosphorylates and degrades PKC).

She ended her talk by saying that caution must be used to treat cancers with mTORC2 inhibitors since it can paradoxically inhibit PKC maturation. In pancreatic and colon cancer, where PKC acts as a tumor suppressor, mTORC2 inhibitors can increase tumorigenesis. Instead, a better therapeutic strategy for cancer is to focus on developing agents that restore PKC activity.

Dr. Newton's talk encompassed the impressive history and structure-function relationship of PKC and its interactors. Her talk exemplifies how a detailed dissection of the mechanisms of allosteric regulation of enzyme function provides the necessary biochemical understanding to drive effective therapeutic strategies.

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3. Tuning the signaling output of protein kinase C. Biochem Soc Trans. 2014 Dec; 42(6):1477-83. Antal CE, Newton AC. PMID: 25399557.

Management Techniques (Workshop hosted by Shannon Bell)

by: Mary Grace Katusiime

This year, day 1 of the Colloquium featured a workshop on 'Management Styles' led by Shannon Bell. Ms. Bell has been the Director of the NCI Office for Workforce Planning and Development (OWPD) for the past 13 years. As a seasoned organizational leader and executive coach with over 20 years of experience in the public sector, her work focuses on organizational development, cultivating a high-performance workforce, conflict resolution, and diversity. The objective of the workshop was to understand the key skills required for management and leadership positions, particularly as it relates to people. Here are a few take-aways from the session.

Leadership skills

We started off with a reflection exercise. Each attendee took a moment to think of a person considered to be a good leader and the attributes that made them stand out. When our answers were shared, it was apparent that different leadership qualities were important to different people. For example, whereas one participant valued their leader for being 'involved and hands-on', another appreciated the fact that their leader gave them independence. Ms. Bell made the point that 'what one person values may not be the same for another'. Ms. Bell further explained that the most important skill a leader can possess is relationship building. Good leaders take the time to know their team and understand their individual needs. Building relationships helps to offset the innate assumption our brains makes that an interaction with a superior is a threat; this allows for trust and effective communication.

Although skills like decision-making, managing-up, and accountability are universal, different organizations may vary in the definition of a leader or a manager - and what is considered as

critical skills for each role. One important action that can be taken on joining a new organization is to meet with HR or your supervisor and ask them to define what success in your role looks like and the top three skills required.

The difference between a leader and manager

There are key differences between leaders and managers. Leaders lead people while managers lead processes and organizational goals. A leader's role is to facilitate the individual goals of one's stakeholders (whether or not they align with the organization's goals) by utilizing influence. On the other hand, a manager's role is to streamline people towards organizational goals by utilizing authority and consequences. Leaders innovate and find solutions to limitations, while managers find a way to work within the limitations. Leaders set the vision while managers help to execute it. It is important to note however, that these two roles are not mutually exclusive. Although most individuals are either natural leaders or managers, the best managers are also good leaders.

The 'people pieces' of leading

Most of what we do professionally is in the context of a team. A team is a group of people working together for a collective purpose with coordinated and complementary skills and effort. Teams often go through various stages of development; the hallmark of good leadership is being able to adjust your strategy as the team dynamics evolve. Using personal assessment tools like DiSC (https://www.discprofile.com/what-is-disc) can enhance our understanding of the different personalities within a team and help build effective relationships. Knowing how to ask good questions is another powerful team-building skill. Questions are empowering. They invite others into conversation and help you understand what they value. A good question is always neutral, open-ended, simple, short, and comes from a place of curiosity.

Building trust is another key people-aspect of leadership. It is the foundation of all relationships and has a direct impact on the performance of a team. Trust is the combination of character (who you are) and competence (what you can do), and when it is present, it multiplies performance. We build trust by doing what we say (follow-through), treating others fairly and with respect, and keeping our stakeholders informed during times of change.

On the other side of trust is conflict. Most leaders will have to spend a significant portion of their time resolving conflict. Knowing how to do this effectively is an essential skill. Conflict is brought about by differences in work styles, needs, ideas, values, and goals within a team. Conflict can often be resolved when there is clarity on the purposes, roles and processes within an organization.

The essence of leadership

Ultimately, the essence of leadership is influence. You become influential when people choose to trust you and your intentions and give you the gift of their discretionary energy and effort. Influence can be built by: (i) having integrity (the space between what you say and what you do), (ii) demonstrating a positive attitude, (iii) considering others' interests more than your own, (iv) doing your own job with excellence.

Use the links below for more information on how to build your skills as a leader and manager (please note that all NCI connect pages require login credentials).

- NCI Office of Workforce Planning and Development https://nciconnect.nci.nih.gov/ba/OWPD/SitePages/Home.aspx

- Is Supervision For You https://nciconnect.nci.nih.gov/ba/OWPD/Pages/ISFY.aspx
- LEAP https://nciconnect.nci.nih.gov/ba/OWPD/Pages/Leadership%20Education%20Action%20Program%20(LEAP).aspx
- Training Portal https://nciconnect.nci.nih.gov/ba/OWPD/SitePages/Training%20&%20Development%20Opportunity%20Catalog.aspx
- NIH Training Center https://hr.nih.gov/training-center
- NIH Office of Intramural Training & Education https://www.training.nih.gov/trainees
- Skillsoft Books and Videos https://hhs.skillport.com/skillportfe/main.action#whatshappening
  If asked for login credentials, go in through LMS Portal https://ams.hhs.gov/amsLogin/SimpleLogin.jsp#topLinks#topLinks
  Find Catalog Search & click Advanced Search, Search for SkillSoft

Careers in Academia: A summary of the Panel Discussion

by: Babul M Ram

Are you a graduate student planning a career in academia or a postdoc gearing up for an independent academic position? Are you wondering when to start applying for academic positions or what challenges you may face during the early stages of your academic career? What are the career options available in academia and how do you prioritize and make choices in academic careers?

The 21st CCR-FYI Colloquium hosted a workshop with a panel of speakers from different stages and backgrounds of academic careers to provide some clarity on these questions. The panelists shared their experiences, their challenges, and their paths throughout their academic careers.

Panelists:

Kirill Afonin, Ph.D.	*Associate Professor, Department of Chemistry, UNC-Charlotte*
Emma Benn, DrPH	*Associate Professor, Center for Biostatistics and Department of Population Health Science and Policy, Icahn School of Medicine at Mount Sinai*
Alexandra Newton, Ph.D.	*Professor, Department of Pharmacology, UC-San Diego*
Regina Nuzzo, Ph.D.	*Professor, Department of Science, Technology & Mathematics, Gallaudet University, Washington DC*

The workshop started with the panelists speaking about their respective career paths.

Alexandra Newton started her career as an undergraduate majoring in Biochemistry and French Literature before doing her graduate work in the Stanford University Chemistry Department. After 2 years of postdoctoral training at UC Berkeley, she was recruited to the Chemistry Department at Indiana University and then moved to the Pharmacology Department

at UC San Diego. She had been actively involved in the Graduate Program at UCSD and trained numerous graduate students and postdocs. Although she loves and enjoys lab work, she also finds herself occupied with serving on committees.

Kirill Afonin obtained his MS in Chemistry and then a Ph.D. in Photochemistry from Bowling Green State University. He worked at UC Santa Barbara as a postdoctoral fellow for 3 years before joining the NCI to work on human diseases as a Research Fellow, where he established and managed the experimental branch within the Computational RNA Structure group. After four years at NCI, he started a tenure track position at UNC Charlotte and was subsequently promoted to Full Professor. Although initially interested in joining the industry sector, he decided to stay in academia and is now trying to address human diseases through RNA-based nanostructures.

Emma Benn started her career with a major in Chemistry and a minor in Spanish language. She then worked as a quality control chemist for a year in a pharmaceutical company but realized that Chemistry was not her passion. Instead, healthcare disparities in society had inspired her to work in the drug development sector and help people. She wanted to join the pharmacological sector but decided to seek an understanding of the structural organization of the healthcare system. She went on to obtain an MPH in Sociology and a DrPH in Biostatistics from the Columbia University Mailman School of Public Health. Subsequently, she also realized the dearth of diversity and underrepresentation of people of color and LGBTQ communities. She became an Assistant Professor & Director of Academic Programs for the Center for Biostatistics in 2012 at the Icahn School of Medicine at Mount Sinai. At present, she is serving as an Associate Professor and Founding Director of the Center for Scientific Diversity as well as the Director of Data Science Training and Enrichment for the Graduate School of Biomedical Sciences at Icahn School of Medicine at Mount Sinai. Emma Benn found her passion in health disparity research and the promotion and advancement of underrepresented communities in academia.

Regina Nuzzo started with a BS in Industrial engineering before obtaining a Ph.D. in Statistics from Stanford University. Working as a postdoc, she realized her passion for communication and went on to study journalism at the UC Santa Cruz Science Communication Training Program to blend science writing and communication with statistics. She joined Gallaudet University, Washington, DC, in 2006 as a Professor in the Department of Science, Technology & Mathematics. She is also a freelance science writer with her journalism centered around data probability statistics and research process. Regina Nuzzo is passionate about communicating complex scientific information, statistics, and ideas to the general public in simpler terms. She also works with the American Statistical Association to help them with preparation of the ASA statement on the context, process, and purpose of p values.

The panelists answered and discussed a set of pre-submitted questions by the audience. The questions and the discussions by the panelists are summarized below.

How do you manage your time between research, teaching, and service?

The panelists discussed their time management strategies and priorities at their various career stages. Dr. Newton does not consciously

compartmentalize her time between the different activities and finds the overlap works for her. However, she enjoys and prefers doing research and training students over serving on committees. Dr. Benn advises against serving on committees if you are not passionate about it. She also believes that although challenging, being on committees helps you to understand the functioning of the institution as well as to network early during your career and to look at the challenges as an opportunity for growth and development. She recommends resetting your priorities to find the right balance at individual levels by finding your definition of success and choosing the right mentors and supervisors. Dr. Afonin stressed the importance of strategic planning and understanding the expectations for the first five years in a tenure track position such as being a successful scholar, or an outstanding teacher, or an administrator. His strategy is to devote 60% of the time to research and 20% each to teaching and service. As the early career in academia is focused on writing grants and publishing papers, spending time as a reviewer helps understanding the writing, acceptance, and rejection process. He further highlighted the importance of finding a niche and networking early in one's career and spending more time on teaching and outreach at later stages. He also mentioned that some grants require the teaching and outreach aspects. The panelists also warned against getting disheartened and to be prepared for rejections.

When did you know you were ready to start applying for jobs in academia?

The panelists recommended getting good publications, learning communication and writing skills, and preparing for jobs. Dr. Newton recommended publishing one excellent paper, planning for one year of the application process, and being aware of deadlines. Dr. Afonin stressed attending grant writing workshops and the need to learn how to express and convey your ideas clearly and concisely in writing. He further highlighted the role of effective writing in academia and treating it as a job. "If you don't like writing, academia is not for you," he added.

Dr. Nuzzo, can you talk about your transition from a postdoc to a journalism school and the decision-making process behind it?

Dr. Nuzzo discussed not feeling passionate about lab work and enjoying writing. She shared that it was a hard decision going off the traditional path, while her colleagues were doing things typical of a research track. During a departmental reunion with her seniors and alumni, she was advised to pursue a career she wanted, which encouraged her to follow her unconventional path after a lot of introspection. Dr. Nuzzo believes that academia is better with public engagement and the general public and the policymakers must understand and believe in the scientific research being conducted. This creates a requirement and opportunity for translators to communicate complex scientific research in simpler yet effective terms.

What are the qualities that set applicants apart besides their publication records?

The panelists highlighted the importance of effective communication skills in academia while discussing research projects and findings with potential collaborators. Dr. Newton advised looking at the online communication course organized by the American Society for Biochemistry and Molecular Biology.

Are the salary and start-up package negotiation an important part of the job application process?

The panelists discussed what to consider while applying for or accepting a position. Dr. Benn advised to do the research beforehand and focus on things apart from salary such as infrastructure, support staff access, childcare policy, work-life balance, and inclusive environments, etc. She added that you can discuss the specifics while meeting with other faculty members to get a general idea of the environment. Dr. Newton also considers the colleagues and lab space availability as a criterion. Dr. Afonin believes in asking for what you need for your research and negotiating salary as well as a position for a spouse before accepting the job offer.

What is the best way to seek out opportunities at universities?

The panelists recommended looking for advertisements on the university and journal websites and meeting people at conferences. Dr. Newton highlighted the importance of chalk talks and practicing communicating using a whiteboard and marker. Dr. Afonin advised being a nice and easygoing person with whom people would like to work and collaborate.

Would you like to share something you wish you would have known and any final advice you would like to give?

Dr. Nuzzo stated, "Have the career you want, not the one others want you to have." She also mentioned that it is tricky to figure out what you want, but feel free to experiment. Dr. Benn advised being true to yourself and to say no if you do not feel passionate about a position. Dr. Newton recommended speaking in meetings, which helps in teaching as well as improving the way you communicate with colleagues and people outside your lab. Dr. Afonin's final advice was to get an independent position as soon as possible. "Don't get too comfortable with your current position," he advised.

Panel Discussion: Non-profit Organizations

by: Sunita Chopra

Panelists:

Lynn Marquis, B.A.	*Director at the Coalition for the Life Sciences*
Laurel Oldach, Ph.D.	*Scientific Communicator at the American Society for Biochemistry and Molecular Biology*
Erin Rosenbaugh, Ph.D., P.M.P.	*Associate Scientific Project Manager for Neuroscience at the Foundation for the National Institutes of Health*
Richard Turman, M.P.P.	*President at ACT for NIH*

The 'Non-profit Organizations' panel comprised of four highly talented individuals from diverse backgrounds with the common motivator of advancing and communicating science.

Lynn Marquis, who has over 20 years of experience working with non-profits in Washington DC, started her career as a legislative aide at the Capitol. After taking a short break at the age of 30, Lynn found her passion for science advocacy and medical research. She initially started in the non-profit, Alliance into Aging Research and later joined the Coalition for the Life Sciences (CLS). Here her interests broadened from aging research to research encompassing all aspects of the biomedical field. She is now the Director at CLS and leads over 60,000 members. She is committed to representing scientific interests before Congress and advocating for continuously improving federal funding for science by better educating the political leaders.

Richard Turman calls himself 'the budget guy' and has been dealing with budgets worth billions of dollars since 1987. Prior to starting his present position as President of ACT for NIH, Richard has held multiple senior level executive positions in the federal and non-profit sectors. He has served as NIH's Associate Director for Budget, the HHS Deputy Assistant Secretary for Budget, the HHS Principal Deputy Assistant Secretary for Financial Resources, the Deputy Director of FDA's Center for Tobacco Products, and most recently as the Chief Operating Officer of the People-Centered Research Foundation. In his present role as President of ACT for NIH, his mission is to keep federal dollars flowing to the NIH for continuing life-saving research. He and his team learn from the scientific leadership at the NIH about their needs and interests. They then present the case to the most senior members in the House and Senate who make the annual funding allocation decisions. He is hopeful that their advocacy efforts will restore the NIH funding to 2003 levels and double the funding over the next decade.

Laurel Oldach is a science writer at the American Society for Biochemistry and Molecular Biology (ASBMB). Unlike most grad students and post-doctoral fellows (including myself) who are forever unsure what they want to do, Laurel entered grad school knowing that she did not want to stay in academia. She loved freelance science writing during grad school and decided to explore it as a career. To her pleasant surprise, she found numerous writing careers including scientific societies and non-profits which fitted her interests. She landed an internship at ASBMB working in both department of publications and communications. She liked the job profile, which consisted of science reporting and news gathering for scientists in a non-academic way. Fortunately, ASBMB also valued her work and the internship turned into a full-time job. She loves the fact that she gets to cover broad research areas and converse with scientists from varied fields as part of her job at ASBMB.

Erin Rosenbaugh describes her career trajectory as non-linear. When leaving grad school, she was considering pursuing the traditional academic route but soon discovered it wasn't the right fit for her. She experimented with jobs available to her in Vermont which included working as a confirmation scientist for a clinical drug testing lab and teaching as an Adjunct Faculty Instructor in Burlington, but it was after relocating to the DC area that she found the right fit for her. She was initially overjoyed at the diversity of non-bench scientific jobs available in the DMV area and started working as a Scientific Project Manager at the Cape Fox Corporation. She is now an Associate Scientific Project Manager for Neuroscience at the FNIH and

loves her job. She enjoys convening teams, managing resources and budgets, and being involved in different projects as part of her job.

Fielding questions

Challenges of working with an administration which may not fully value scientific facts and scientists

Both Lynn and Richard assured the audience that the challenges were not as great as one might gather from the news. House and Senate members understood the basic need for providing additional money for the containment of the COVID-19 crisis and billions of federal dollars were spent in the last year towards developing COVID-19 diagnostic kits and vaccines, remarked Richard. NIH was directly or indirectly involved in both the endeavors. The impressive timeline of this scientific success story is an example of Congress understanding the importance for supporting science. Laurel and Erin suggested that misinformation campaigns could most effectively be dispelled by building trusted relationships with your audience and communicating facts clearly and continuously using platforms trusted by the public.

Transitioning from bench to non-bench careers

There are many questions PhD students and post-docs have while considering the switch to non-bench careers. For example: how to find the right job, when to start searching, what preparation is needed, is it the right move, how long will it take, etc. From Laurel and Erin's responses, it looks like everybody's career journey is different and one would have to chart their own way. Laurel, who did freelance writing while in grad school, took two years to explore and figure out what she liked. During this time, she tried many different options and spent a lot of time thinking about what she really loved doing. She realized that she loved analyzing, investigating, and finding meaning but in a non-academic setting. She identified and started applying for jobs with those features before settling in on her current position. Erin on the other hand kept her options open; she developed a wide network of contacts by attending biotech networking events in DC and joined the 'Women in Bio' organization. She stressed how important it was to build connections through LinkedIn, where she was approached for her present position.

Communicating science to non-scientists

Lynn suggested joining scientific societies which offer mentoring programs for science writing, communication, policy, and advocacy. These are great resources for learning and fine-tuning skills required in non-bench scientific careers. Laurel suggested to learn by doing; start practicing in whatever way you would like to communicate in. Richard suggested imagining how you could explain it to your grandmother (provided she isn't a scientist herself). One must have passion for what one does; your audience will gather that from you. He also suggested to learn from other scientists (Dr. Francis Collins, for instance) who are good at communicating science, to watch their public sessions, to practice elevator pitches and, most importantly, to learn by doing. Erin recommended asking for feedback from your colleagues and supervisors and tailor your message considering your audience.

Skills PhDs bring to the table and scope for improvement

Richard was of the view that it all depends on your interest. If you are interested and love what you do you will learn all that is needed for you to be successful in that job: finding your passion is the key. Lynn said that PhDs have excellent communication skills and all jobs require that in some measure. Erin advocated for developing your soft skills; your emotional intelligence is as important, if not more, as your talent and scientific skill set. She also encouraged developing your collaborative skills as most workplaces keep evolving into nodes in a multi-collaborative network. Laurel agreed that building relationships and learning to work in teams are important for all jobs. She observed that one can earn a PhD without much interaction with other people but in non-bench work environments one must work with teams. Hence your social, team building, and time-management skills are crucial.

Concluding remarks

Erin would like post-docs to keep the non-profit sector in mind when exploring jobs. Their missions are important, and you feel good about the impact you can have driving the field forward. She also recommended getting your most important work done first; using the Eisenhower Matrix, a tool that helps you decide on and prioritize tasks by urgency and importance is a great way to go. Richard also stressed the importance of prioritizing and getting things done in a timely manner; building trusting relationships with colleagues; building soft skills (which are really important skills according to him and should not be called soft); and remembering to have fun on the job and with your team. Laurel suggested having deadlines to finish your tasks; keeping blocks of time to work on your projects by turning off emails; exploring and applying your scientific skills to whatever problem seems interesting to you. Lynn stressed on building communication channels, expanding one's network, and building relationships with people who have done what one is looking to do.

I loved the energy and vibe of the panel. The nuggets of advice shared by the panelists are applicable for all post-docs irrespective of whether they want to enter the non-profit sector. One would do well to live by this advice in their job search.

DNA-based Vaccines: an emerging technique for safe and efficient vaccination (Keynote talk: Dr. Barbara Felber)

by: Isita Jhulki

Tuesday morning of the 21st CCR-FYI annual Colloquium started with a keynote lecture delivered by Dr. Barbara Felber.

After completing her PhD from the University of Bern, Switzerland, Dr. Felber joined the Laboratory of Biochemistry, NCI Bethesda for her post-doctoral study.

After completing her postdoctoral studies, she joined the Molecular Mechanisms of Carcinogenesis Laboratory under the NCI contract Basic Research Program, beginning in 1985. In 1990 Dr. Felber established the Human Retrovirus Pathogenesis Group. In 1998, Dr. Felber received her tenure appointment, and in 1999, she joined the Center for Cancer Research, NCI. Now she is a senior investigator in the NCI Vaccine Branch and her work focuses on the posttranscriptional mechanisms of gene regulation, use of cytokines in cancer and AIDS, and the development of DNA-based HIV vaccines.

In the last 40 years of research Dr. Felber contributed immensely to deepen the understanding the basic mechanism of HIV mRNA expression. This set the foundation for development of RNA optimization (also referred to as codon optimization) as a key strategy to improve gene expression and translational efficiency of a gene in retroviruses. As the head of the Human Retrovirus Pathogenesis Group Dr. Felber navigated discoveries of regulated expression of HIV, simple retroviruses and retroelements. Her methodology to generate efficient expression vectors has paved the way for development of safe and effective vaccine for the prevention of HIV infection, a disease that has caused an estimated 35 million deaths worldwide between the time that AIDS was identified (in the early 1980s) and 2018, classifying it as a pandemic.

The common theme of Dr. Felber's lifelong research is nucleic acid. She started her career by working on RNA and later moved onto the transfer of DNA as a vaccination strategy. At the beginning of her talk, she explained how Rev protein is essential to the protein expression in HIV. Retroviruses also contain three major structural proteins, gag, pol and env encoded within the viral genome. Within gag/pol and env coding regions there are inhibitory/instability elements (INS) that are counterproductive for transcription of RNA and prevents transfer of mRNA from the nucleus thereby inhibiting its translation. She showed that expression of Rev protein prevents retention of mRNA in the nucleus thus helping in protein expression. Codon optimization to remove those INS can synthesize more stable mRNA that can be efficiently exported out of the nucleus and translated in the ribosome. She demonstrated this experimentally by co-expressing Rev with RRE (Rev Response Element) and additionally, by codon optimization to get beautiful expression of gag protein. This paved the way

for using modified nucleic acid (DNA/RNA) for modulating protein expression *in-vivo* and hence their use as a vaccination strategy. There are some fundamental differences between DNA- and RNA-based vaccines. DNA-based vaccines generate antibody and T-cell responses, and the immune response is maintained for a long period of time. RNA-based vaccines, instead, induce a low T-cell response that might have a negative impact on the durability of the vaccines. In the first part of her talk, she discussed the problem in classic vaccination strategies; either the vaccine produces high immune response or provides high longevity. The team's solution to this problem was to combine the best of both methods, i.e., DNA and protein co-immunization which can provide a high and durable immune response. Dr. Felber's group wanted to also explore the difference in efficacy between 'co-administration' (same anatomical site) vs contralateral sites (separate administration sites). They performed the co-administration and contralateral vaccination on 20 female macaques using DNA expressing Gag and Env protein and TLR-4 agonist adjuvanted protein and compared the results. The outcome was surprisingly in favor of co-administration of the vaccine at the same anatomical site in terms of protecting the animals against infection, higher antibody production, comparable kinetics, mucosal dissemination, higher T-cell response etc. Also, the antibody dependent cytotoxicity (ADCC) contributed to reduced risk of infection (67% per exposure) which is mediated through non-neutralizing antibody functions. Dr. Felber's lab is currently trying to understand the underlying mechanism using macaques as model system.

In the second part of the talk, she focused on the major challenges of HIV-1 vaccine and to develop DNA/mRNA vaccines related to highly conserved regions in HIV genome. In this context she emphasized that in vaccine development research, it takes a long time to get from model studies to clinical trials. So, perseverance is the key for success here. Vaccination is often performed in two stages: the initial dose is called a primer and the follow up immunization is known as a booster dose. To start with her group identified 7 conserved elements (CE) in HIV gag protein and 12 CE in the env protein and generated DNA vaccines only expressing those regions. Later they showed that those DNA vaccines induce robust cytotoxic T-cell responses in 100% macaques whereas the DNA vaccines expressing full length proteins only generated immune response in 50% of the animals. However, gag and env encoding full-length DNA vaccine potently increase the pre-existing T-cell responses when used as a booster vaccination. Now when they also introduced the CE DNA vaccine in the booster dose along with full length DNA they get statically more responses. So, CE prime and CE+gag DNA booster is the preferred vaccination strategy for the clinical trial. This type of vaccination strategy is long-lasting (years) which can be also boosted farther by another dose of CE DNA. This is a very novel strategy to increase breadth and magnitude of cellular immunity. They have now two successfully closed clinical trial awaiting analysis and one ongoing clinical trial.

In the last part of the talk, Dr. Felber described the identification of a small region on the top of the HIV envelope protein, away from interface region or other variable regions. For this work

she collaborated with Susan Zolla-Pazner at the Icahn School of Medicine at Mount Sinai to express the above-mentioned part of the protein and show immunogenicity and production of the correct type of antibody. Next, they used this small region DNA to prime the vaccination strategy and showed that protection against RV144 can be induced which has previously failed in other vaccination trials. This study emphasizes the importance of priming vaccination as a general and efficient strategy to modulate humoral and cellular immune responses which can be extended beyond HIV vaccination.

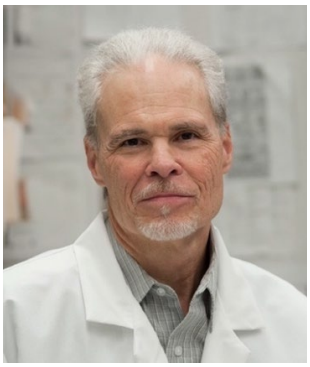
Dr. Felber presented her team's findings during her talk in a simple but convincing way that DNA-based vaccines are very effective and novel vaccination strategy. She concluded her talk by describing the development of DNA vaccine for SARS-CoV-2, the virus that has caused the ongoing global pandemic. Similar to the development of an HIV vaccine, her team adopted the strategy of DNA and Spike protein co-immunization, and indeed, they showed that this vaccination strategy creates high, robust antibody responses and provides efficient protection against SARS-CoV-2. It also provides evidence that vaccine development plan for HIV is promising, but biologically HIV is a more difficult system than SARS-CoV-2. In conclusion, her talk summarized 40 years of hard work in developing a novel and very effective vaccination strategy against HIV, a virus that has plagued humanity for decades.

CCR Directors' Addresses

by: Dorothy L. Butler

The second day of the 2021 CCR-FYI Colloquium kicked off with short talks by Glen Merlino, Ph.D., the NCI CCR Scientific Director for Basic Research, and William Dahut, M.D., the CCR Scientific Director for Clinical Research.

Dr. Merlino began his talk by giving an overview of the Center for Cancer Research (CCR) and its mission and vision, which are: (i) to improve the lives of all cancer patients by solving important, challenging, and neglected problems in cancer research, prevention, and patient care and (ii) to create the cancer medicines of tomorrow. He emphasized the unique position of investigators at the NCI to have a global reach and pursue long-term projects that might not be able to be addressed at extramural facilities. To this end, CCR has recently established new initiatives that include the Laboratory of Cancer Immunometabolism, the Laboratory of Integrated Cancer Immunology, and the CCR Center for Structural Biology.



The goals for achieving diversity, equity, and inclusion (DEI) within CCR stem from the broader NIH-wide initiatives. Specifically, the CCR strives

to create an entirely equitable community through awareness, training, and accountability, to build a diverse biomedical workforce through recruitment and training opportunities, and to enhance CCR research in cancer disparities by strengthening existing and launching new funding programs. One of the NCI diversity-oriented training programs includes the Intramural Continuing Umbrella of Research Experiences (iCURE). iCURE is modeled after the extramural CURE program and aims to support the research and experiences of underrepresented students and scientists. Dr. Merlino challenged the FYI population to take the initiative in improving the culture at the NCI because he believes that fellows and new Principal Investigators (PIs) have the greatest ability to make a difference.

Dr. Merlino ended his talk with some advice for being proactive in one's career. He encouraged fellows to take advantage of the training, research, networking, and mentoring opportunities. He also encouraged fellows to be flexible and open-minded because paths to success can be variable and unpredictable. The fellows are an integral part of the CCR community, and he thanked them for their many contributions to the CCR and its improvement.

Dr. Dahut began by familiarizing the basic research fellows with the many facets of clinical work done at the NCI. Although the Clinical Center sees some of the sickest patients, everyone is on a clinical trial and does not have to worry about insurance or finding a way to pay for their treatment. The work done at the Clinical Center is a resource for both basic and clinical scientists. Dr. Dahut encouraged fellows working on basic research to be proud of their research because that work gets translated to the clinic to improve peoples' lives.

While the pandemic has created some hurdles for administering clinical care, clinical activities have continued, and the Clinical Center has begun over 50 new clinical trials and accepted over one thousand new patients. Additionally, the Clinical Center has dramatically improved their quality and quantity of telehealth visits making it easier to do follow-up appointments with patients who live across the country. The use of telehealth medicine is something that the Clinical Center plans to continue to utilize in the future.

Dr. Dahut also ended his talk with some advice and encouragement for the fellows. First, fellows should take advantage of the well-renowned scientists that work within their Institute and to utilize the culture of collaboration that is present. Second, young investigators and fellows are the future, and the CCR is committed to training and mentoring the next generations of great scientists.

From Past to Future: Catching up with the Founding Director of the CCR

by: Geraldine Vilmen

J. Carl Barrett, Ph.D., Vice President at AstraZeneca, Oncology Translational Sciences, Founding Director of the CCR, and Keynote Speaker at the Inaugural Colloquium

The second extramural Keynote Speaker of the 2021 CCR FYI Colloquium, Dr. J. Carl Barrett, gave a talk 20 years after his keynote speech at the first CCR FYI Colloquium. This year, Dr. Barrett provided an overview of the drugs his team developed that were approved by the FDA throughout the years.

Dr. J. Carl Barrett was trained as a chemist at the College of William and Mary and received his Ph.D. in biophysical chemistry from Johns Hopkins University. Dr. Barrett has published over 600 articles throughout his career and discovered genes involved in breast cancer, such as BRCA1. He was the founding director of the NCI Center for Cancer Research and the Global Head of Oncology Biomarkers and Imaging at Novartis. He is now Vice President of Translational Science in Oncology at AstraZeneca. Dr. Barrett's main focus has been to promote translational medicine and to improve the understanding of the impact of drugs on tumors. Above all, he stressed that drug development needs to adapt to therapy for individual patients.

To start his talk, Dr. Barrett quoted the Nobel prize winner Sydney Brenner saying, "Progress of science depends on new techniques, new discoveries, and new ideas, probably in that order." So far drug development appears to be unsuccessful both chemically and biologically as off-target activity or toxicity can be limiting. Selecting the right patient, right drug, right target, or the right doses appear to be the principal challenges.

He gave examples including Lynparza (Olaparib, targeting PARP), TAGRISSO (Osimertinib, third generation EGFR inhibitor), and Trastuzumab (Deruxtecan, a humanized anti-HER2 IgG1 mAb). These drugs showed poor clinical efficacy but were ultimately approved by the FDA for their intended uses.

Dr. Barrett pointed out the need to acquire a better understanding of drug resistance in cancers, stating that early detection and early treatment should be the approach to adopt in curing cancer.

Finally, Dr Barrett was very optimistic, mentioning ctDNA (circulating tumor DNA) as a promising tool to distinguish patients that have been cured from those with drug resistance.

Marty Tenenbaum, Computer Scientist and Cancer Survivor, delivers a clarion call to redesign oncology

by: Sunita Chopra

The Cancer Survivorship talk in the CCR-FYI Annual Colloquium 2021 was delivered by the world-renowned computer scientist and ecommerce pioneer, Dr. Marty Tenenbaum. He fought metastatic melanoma with fortitude and drive, and has dedicated his life to helping other cancer patients defeat cancer. Marty recounted his life's journey of making daring and paradigm-challenging decisions in both his career and fight with cancer in his inspiring address entitled 'Reinventing Oncology- A Survivor's Perspective'.

Early life and career

Marty grew up in New York City in the 1950s and displayed signs of ingenuity from a young age. His passion for science was evident since childhood. In eighth grade, he won second place in the NYC science fair for designing a solar-powered car. He received his college education at prestigious US universities, obtaining his BS and MS degrees in electrical engineering from the Massachusetts Institute of Technology (MIT) and PhD from Stanford University. Staying true to his inquisitive and challenge-loving nature, Marty took the first major risk of his life by delving into the field of artificial intelligence (AI) in the 1970s to build robots, that are now displayed at the Smithsonian Computer History Museum. In the 1980s, he led large computer science labs for SRI International. Switching interests, Marty took another risk by entering the growing field of ecommerce in the 1990s. During this time, he started the first company (Enterprise Integration Technologies) that was exclusively chartered to commercialize the internet and performed the first ever commercial transaction online with a credit card. He also started the first major ecommerce industries association, CommerceNet, to provide young ecommerce companies a platform to do business among themselves. Marty has founded and co-founded several additional start-ups. In 1999, he was the vice-president, chief scientist, and the chief visionary for CommerceOne, a company that grew from 50 to 4000 people in 18 months under his leadership. Owing to his successful career, he was close to becoming a billionaire when he was diagnosed with melanoma that had metastasized to his liver; he was given nine months to live.

Defeating Cancer

Suddenly, thrust into the labyrinthine world of cancer care, Marty was overwhelmed, devastated, and frightened. He tried to learn as much as he could and visited every melanoma clinic in the Southern California bay area only to be told that his prognosis was dire. Every specialist he met suggested a different treatment but without any promise of a cure. After confronting the chaotic *non-informing* plethora of information on the web, the reality that physicians also did not know what would defeat his cancer sunk in. Instead of admitting defeat, Marty decided to take things into his own hands. He learned about two experimental therapies by leveraging his proximity to Dr. Rick Klausner (then NCI Director

and for whom he was consulting on launching the international journal *Cancer Informatics*) and Dr. Jeff Abrams (then Director of the Melanoma Therapeutics Program). The two therapies that he learned about were, a peptide vaccine designed by Jeff Weber (University of Southern California) and Canvaxin, a polyvalent cancer vaccine, designed by Don Morton (John Wayne Cancer Institute). Although Marty wanted the peptide vaccine, he failed to pass the inclusion criteria. Left with the only option, Canvaxin, Marty took another risk and registered for the clinical trial. Although he was one of the few lucky responders, the clinical trial was abruptly ended in 2005 because a majority of the patients had failed to derive an advantage. Fortunately for Marty, his cancer was already regressing and with assistance of a few more surgeries and co-therapies, he managed to defeat it. Marty has stayed cancer-free for the last 22 years. His struggles with finding a cure exposed the insurmountable systemic barriers patients face daily. Motivated by his personal experience, he vowed to help other patients by bringing order into the chaotic landscape of cancer care.

Cancer Commons: Fusing the Worlds of Cancer Care and Cancer Research

Marty believed that bringing order into cancer care would only happen by removing the distance between cancer research and cancer care. Furthermore, he believed that the discoveries of novel drugs and therapies should be immediately accessible to patients and should not take decades to percolate down from research institutes to local hospitals. Marty started a non-profit, Cancer Commons, in 2010 to fulfill this very specific need of collating and presenting knowledge on all known and possible therapies to patients, allowing them to make informed decisions without being overwhelmed. Cancer Commons links each patient with a network of researchers and physicians who help them identify and get access to the most promising treatment options. In its first decade, Cancer Commons has helped over 10,000 patients in 60+ countries across the globe. Cancer Commons also connects patients with researchers who have novel investigational therapies. The progress and outcome of every patient are recorded and used to enrich the knowledge bank, subsequently influencing treatment advice for future patients. Marty says he is very proud of the 10,000 patients helped over the last decade, but he would like to improve the system so that Cancer Commons can help that many patients a month. Hence, he launched a for-profit company, xCures, which develops software to automate several steps of the process and help reduce costs.

xCures: Machine Learning Algorithms for Accelerating Cancer Care

Marty outlined three problems that xCures solved to accelerate the process of finding optimal therapies. The first was the implementation of Natural Language Processing (NLP), which converts unstructured medical data into crisp summary called "patient card", to drastically reduce time and cost. The same process done manually in Cancer Commons took up to two days and cost thousands of dollars. By employing machine learning to match patient records with a comprehensive library of treatment options, xCures suggests treatments best suited for each individual patient profile. Secondly, xCures developed multi-layer Bayesian models to predict outcomes for the short-listed treatments, enabling ranking of the available options to the patient. Thirdly, the outcome of every patient is routinely monitored and updated in the system regularly to inform future decisions.

Getting Patients Access to Drugs: Incentivizing Biopharma

Besides finding the best treatments for patients, Marty and his team are also dedicated to helping them get access to these therapies which are often very expensive. Patients are assisted at every step of the way from finding and registering in clinical trials to claiming insurance reimbursements. In addition, they have launched XCELSIOR, an IRB approved, open distributed data registry currently in clinical trials. Marty hopes that XCELSIOR will motivate drug companies to place their drugs on xCures. In return, companies get access to real-time patient outcomes. Through this collaborative approach, they have helped almost a thousand patients over the last year.

Moving from 'Drug-Centric' to 'Patient-Centric' Oncology

Marty presented evidence to support the idea that a reversal in the design of clinical trials is needed. Paradigms must shift from getting approval for drugs to curing patients. Evidence points to the fact clinical trials are unsustainable: they are slow (5-10 years), very expensive ($100M+) and most importantly, 97% of drugs fail in clinical trials. Furthermore, even when a trial works, it only provides information on a single hypothesis; there is no way to determine the right dose for each patient, if it will work in a multi-drug regimen, or what happens if doses, timings or order of the drugs are changed. With the ever-increasing repertoire of drugs and drug combinations, as well as molecular sub-typing of cancers, it is impossible to design a traditionally rigid clinical trial considering all the variables. Hence, a novel way of conducting oncology research must be envisioned to wisely use available resources for optimally treating and curing all patients. Marty proposed a fluid approach to clinical care for cancer patients. First, focusing and finding optimal treatment for each patient which may involve drugs manufactured by different pharmaceutical companies is paramount. Oncology care must move towards a more coordinated and collaborative environment where multi-company trials are the norm. Secondly, a patient's treatments should be adaptable. Patient responses and outcomes should be continuously monitored, and that information should be disseminated in real-time to maximize learning and prioritize best drugs.

Global Cumulative Treatment Analysis: Air Traffic Control for Oncology Care

Marty argued that many more lives can be saved by matching the standard of cancer care across the globe to the best advanced care centers. This can be achieved simply by better coordination and sharing of information on the therapies already in the market. The Global Cumulative Treatment Analysis (GCTA) algorithm was born to answer this pertinent need. The GCTA algorithm enables data sharing for everyday treatment decisions similar to an air traffic control system. It follows that simply by sharing information quickly, successful treatments could be replicated across the globe while drugs which aren't working could be discarded. Moreover, these efforts are accruing gains. Marty reported that patients on XCELSIOR lived on average a year longer than patients being treated in traditional ways, and this was due to the fact that GCTA can find a multi-drug treatment that works much more efficiently.

Cancer Care as a Marketplace

Marty envisions the ideal cancer care space as a marketplace with different stakeholders coming together, probably taking inspiration from his earlier days of founding ecommerce industry associations. Cancer care marketplace players

include big pharma, insurance companies, patient advocacy groups, clinical testing service providers, novel diagnostics' providers, physicians, researchers, community health-care providers, patients, caregivers, and everyone involved in the fight against cancer. Marty and his team are invested in building a 'learning health ecosystem' involving all the stakeholders around the XCELSIOR platform to accelerate care, remove bottlenecks, promote successful therapies and hence, save more lives.

Join Marty and Help Advance Cancer Care

All physician-scientists who are earnest, passionate, and brave enough to challenge current paradigms are invited to join Marty's network. He wants to hear from you, if you desire to accelerate the pace of research. There are three ways that physician-scientists can onboard and start making an impact. First, they can share their insights and rationales on new and/or existing treatment options. Second, they can join XCELSIOR to quickly and inexpensively run studies on large number of patients across the US. Finally, they can refer challenging cases and participate in virtual tumor boards to find answers sooner than traditional approaches. Marty took enormous risks in his life and career; he encourages cancer researchers to do the same.

Virtual Interview Techniques (Workshop by Scott Morgan)

by: Mary Grace Katusiime

This year, we had the pleasure of inviting Scott Morgan to lead a workshop on 'Virtual Interview Techniques.' Scott is a dynamic communicator with over 26 years of experience as a science communication consultant to the NIH. With a background in Theatre and Clinical Psychology, Scott has led seminars, workshops, retreats, think tanks, and private coaching for organizations all over the world. He is the director of The Morgan Group, which focuses on leadership, public speaking, media training, and mindful communication, and is a senior associate at the Leadership Academy of the Center for Strategic and International Studies (CSIS). In this workshop, Scott shared key techniques for formulating the best responses to the behavioral, psychological, and technical questions that apply to every interview, virtual and in-person.

The session started off with a reminder that "by the time you have made it to an interview, you have already passed a few levels in the process." Your CV gets you in the door, but the interview is meant to add meaning to the 'white spaces' on your CV. All questions in an interview will probably fall within one of the 9 categories listed below. The key to making a memorable impression on your interview panel and standing out from the crowd is in how you choose to answer these. Here are a few tips from Scott:

1. **Background question** - When this question is asked, it is important to clarify whether your interviewers want to know about your academic background or personal background. Personal background refers to your upbringing from birth to the age of 18 years, whereas academic background refers to your academic career from the age of 18 to the present day. This question will typically be phrased as: "Where are you from?" or "What is your background?" or "Tell me more

about yourself." Use this as an opportunity to illustrate your strengths by sharing a single, vivid, positive example from your past, as opposed to giving a chronological account of your background.

2. **Field motivation question** - This question is typically asked to ascertain whether you know that the role you are interviewing for is right for you and if you intend to stay in it. You need to show that your motivation is genuine and that you are passionate about the role, not that you just want a job. Use this question as an opportunity to share what is not obvious on your CV such as the reasons behind the milestones you listed. An example could be an "Aha!" moment when you decided to change fields or study your particular discipline.
3. **Future plans question** - An interviewer could ask "Where do you see yourself in 5 or 10 years?" This question is used to determine whether you have vision and intend to stay with the organization. Use this as an opportunity to show that you have thought this job prospect all the way through. Speak in present tense and first person, for example, "In 5 years I will …" Be as descriptive and specific as possible while also demonstrating passion and motivation.
4. **Current work question** - This question could be phrased as: "What do you do at the NIH?" or "What is your current project about?" Interviewers ask this to assess whether you understand the connection between what you do and the goals of their organization. The key to answering this question is to find common ground by demonstrating 'big picture' thinking. Start by speaking about what they do, put it in context of the larger scientific issue, and then tie in the rationale behind your own work. Avoid going into the details of your data.
5. **Weak point** - Mention a genuine weakness, not a strength disguised as a weakness. After you mention this, go on to describe what you are doing to address your weakness.
6. **Strong point** - Answer this question with a very specific technical skill like quantitative PCR or flow cytometry. You should describe the skill in as much detail as possible while explaining why it is one of your strengths.
7. **Why you**? – Use this to showcase how your particular skills and experiences align with the larger objectives of the organization. Once again, utilize 'big picture' thinking.
8. **Why them?** – Ask yourself "Why would I pick this organization?" To help you answer this, do some research on their mission, their publications, and where their grants and funding come from. If you have answered this question well, your interviewers should feel that they are your 'special pick.'
9. **Technical Question** - A great way to showcase your technical knowledge of a technique (whether or not you have practical experience in it) is to describe its pros and cons.

Scott ended the workshop with some specific pointers for virtual interviews. First, it is important to remember that the camera is a 'presence barometer': it exposes whether you are present and engaged or not. Secondly, when considering what to wear, avoid black and white shades because cameras do not adjust well enough to those tones. Instead, opt for pastel colors. Be careful to have a simple, professional background such that you are the main focus of the frame. Lastly, it is OK to pause and breathe for a second before answering a question and also OK to use as many sticky notes as you may need!

"Networking - The open secret for a highly successful scientist" (Workshop by Dr. Phil Ryan)

Deputy Director of Graduate Programs and Student Services,

NIH Office of Intramural Training & Education

by: Srikanta Basu

The Networking and Scientific Communication workshop for the 21st CCR FYI Colloquium was presented by Dr. Phil Ryan. He currently serves as Deputy Director, Graduate Programs and Student Services in the NIH Office of Training and Education (OITE). In this role, he helps oversee and organize numerous training programs in addition to holding workshops and seminars on career and professional development topics. A few notable training programs are the NIH Graduate Partnerships Program (GPP), The Graduate Summer Opportunity to Advance Research (GSOAR) program and the Graduate Data Science Summer Program (GDSSP). In his spare time, Dr. Ryan teaches an online Cancer Biology course through the University of Maryland, Office of Extended Studies.

After spending six years at NCI during his graduate and post-graduate training, Dr. Ryan made the successful transition to a program analyst and subsequently directorial roles at the OITE. As someone who feels that networking and mentoring has played a major role in his career transitions and successes, Dr. Ryan is passionate about helping others find mentors and make the most out of mentoring relationships. He had some great advice to share during this workshop on networking.

What is networking?

Networking is a skill to foster and build relationships with your colleagues such that they want to work with you, for you and are willing to introduce you to other people. This involves meeting new people, growing current relationships, and figuring out how each person can benefit from knowing the other person.

Why should you network?

- *To establish collaborations.* One great example of modern-day networking is that of scientists from Pfizer and BioNTech which led to the hugely successful scientific collaboration of making the first Covid-19 vaccine in record time. Thus, networking and collaboration is not only great for your career but for the entire biomedical community.
- *To strengthen relationships with scientific and career mentors.* Having strong relationships with your mentors can help you get the best advice concerning important career decisions.
- *To find new career opportunities.* Networking can facilitate the discovery of a new position as well as help you investigate a position or organization through informational interviews.
- *To discover opportunities for leadership roles.* Involvement in professional societies is advantageous for career growth and improves your CV; however, taking on key leadership roles in the organization frequently requires advocacy and support from your peers and people in your network who know you and your capabilities.

What are the different forms of networking?

- *Passive networking*. This is networking via using social media sites like LinkedIn and networking during meetings and conferences.
- *Active networking*. This type of networking requires time and energy, e.g. informational interviews.

The key elements to develop a networking plan:

- *Finding points of contact.* Seek out the people who will have the information you want concerning a skill, position, or organization.
- *Planning.* Design talking points to obtain the critical information that you need.
- *Preparing the elevator speech.* Create and practice your professional elevator speech.

The aim of networking is to have a conversation. The elements of a simple conversation:

- *Elevator speech*. A 30-60 second elevator speech mentioning who you are, where you work and what you are looking for. Especially mention what you have to offer and don't hesitate to be specific. The aim is to have a conversation after you finish your elevator speech.
- *Open ended questions*. Ask open ended questions like "how did you find my talk?". It takes a lot of effort to keep a conversation going but stop asking questions that can be answered with a simple "yes" or "no" since that may quickly bring an end to the conversation.
- *Have talking points*. Something specific (project related) and something non-specific (like the weather) can be used as good talking points. Remember to always have an agenda in mind and at the end of the discussion, ask for informational interviews.

How to network: Organize contacts and grow from them.

- *Business cards*. Have business cards, exchange them during conferences, and use them judiciously. Write follow up emails making note of the conversation that you had with the person to makes it easier for them to recall you and this would start building the relationship.
- *Use professional networking sites*. Social media sites like Facebook and Twitter are not designed for professional networking. Professional networking sites include ResearchGate and Epernicus; however, LinkedIn takes the lead in professional networking and science communication.

How to get the best out of your LinkedIn profile?

- Create a strong LinkedIn profile. Presently, all companies are on LinkedIn and it has become an invaluable tool for job recruitment. Moreover, alumni associations are especially helpful in networking and highly active on LinkedIn.
- Update your LinkedIn profile with all professional achievements.
- Verify all information in the top box of LinkedIn since it is the most visible part of LinkedIn.
- Have a professional picture.
- Avoid jargons and acronyms.
- Add a summary and break it up with bullet points to improve readability.
- Use action words like track, oversee, communicate, administer, manage, coordinate. This helps better describe your work.
- If you want to invite a person to your LinkedIn network, include a personal note with the invitation. It helps create trust and remind the person who you are, creating a stronger foundation to the relationship.

Ways to expand your network: "Ask questions"

- Attend meetings, conferences, and career development workshops.
- Be specific and intentional with the questions you ask.
- Read scientific papers and journal articles, and email corresponding authors for clarification or follow-ups.
- Actively participate in a journal club or an interest group.
- Keep up with organizers, presenters, and participants of conferences.
- Set up an informational interview.

Develop a professional and personal networking map:

Help can come from a place you least expect, so develop a networking map. As an illustration, Dr. Ryan showed different networks arranged in concentric circles.

- *1st circle.* People in your office like your lab colleagues (past and present), principal investigator, mentors.
- *2nd circle*. People in your professional life including people in your building or department and those with whom you have met at lab meetings/retreats.
- *Further concentric circles.* People in your professional and scientific community like lab chiefs, department chiefs as well as networks you developed in national and international conferences.
- *Final circle.* People in your personal community. You never know whom your mom/neighbor/friend/relatives may know. Their networks can help you in future.

For long term networking: know what is important for the person with whom you are building or maintaining the relationship.

Congratulate people, follow up on their big experiments and share articles related to their research. Sometimes, things that are personal can be of importance and help maintain the relationship. Congratulate them on life achievements like birthdays, marriage, graduation of children. Remember, how you maintain the relationship is going to be specific for each connection.

Networking is the 1st step to find mentors. Things to know before you search for a mentor.

- *Finding mentors.* Finding mentors within as well as outside of your immediate scientific field can be extremely helpful.
- *Mentoring is a two-way street.* You must be clear and intentional about what you want from a mentor. Respect their time and wisdom. Be early at meetings and thank them for mentoring you.
- *Have multiple mentors.* Remember that there is no one size fits all. There are various types of mentors, some professional, some personal, so make sure you are clear and open with them about what specifically you are looking them to help you with.

Final takeaways/advice from the workshop:

- Having a plan makes networking more productive.
- Networking, just like mentoring, is a two-way street.

- Practice makes perfect. So, start perfecting your elevator pitch, try informational interviews, maintain an updated and professional LinkedIn page, and find mentors.
- You don't need to be interesting, but you do need to be interested.
- The more you interact with people, the greater chance they will remember you!

The workshop provided invaluable advice for trainees at all stages of their careers and I would highly recommend it to all.

If you would like to do some further reading, Dr. Ryan provided a list of references/literature that are included below:

- *Never Eat Alone by Keith Ferrazzi*
- *Make Your Contacts Count by Baber and Waymon*
- *Power Networking by Fisher and Vilas*
- *Networking for People Who Hate Networking: A field Guide for Introverts, the Overwhelmed and the Under-connected, by Devora Zack*
- *The Riley Guide: Network, Interview, & Negotiate or How to Job Search*

Advice from the 2021 CCR-FYI Colloquium Drug Development and Industry Career Panel

by: Molly Congdon

After a year's hiatus due to the COVID-19 pandemic, the Center for Cancer Research Fellows and Young Investigators (CCR-FYI) Annual Colloquium was virtually back in action. Open to all NIH fellows, the colloquium includes a variety of career panels and workshops to aid fellows with their career path decisions and preparations. Over the past 15 months, the pandemic has transformed the way we interact with our co-workers, family, and friends. Beyond the day-to-day changes, the pandemic has also had a profound effect on the job market and added extra stress to the daunting process of applying and interviewing for new positions. Furthermore, it has caused fellows to reevaluate their priorities regarding job location, telework capabilities, and in some cases, alter their career trajectories.

The 2021 "Drug Development and Industry Career Panel" featured panelists at various career stages from renowned pharmaceutical companies.

Panelists:

J. Carl Barrett, Ph.D.	*Vice President, Oncology Translational Sciences, Astra Zeneca*
Scott Martin, Ph.D.	*Director, Functional Genomics and Principle Scientific Manager, Department of Discovery Oncology, Genentech*
Nicole Schiavone, Ph.D.	*Senior Scientist, Pfizer*
Matthew Meyer, Ph.D.	*Senior Director and Head, Discovery Pharmacology and In Vivo Biology, Bristol-Myers Squibb*

Several important topics were reiterated by panelists throughout the discussion: collaboration, learning, networking, and passion. While some of these topics may seem straightforward and redundant, the frequency in which they were mentioned by the panelists, as well as the NIH Office of Intramural Training and Education (OITE) and other career counseling organizations highlights their importance.

Industry is a collaborative space. To succeed, you need to fulfill your responsibilities but also understand what is going on across the organization and larger community. Drug discovery takes a village, and you are a piece in a larger puzzle. As Dr. Barrett stated, "You may be the best molecular biologist or cell biologist in the world, but you have to work with the chemists, you have to work with toxicologists, you have to work with [pharmacokinetic] modelers." Take the time to talk to others in your team, department, and organization to learn the various functional areas and partner lines within the company. Identify how you can fill a need and contribute to the company's science and larger goal.

Although your job will be to represent your area of expertise, this collaborative team environment will allow you to become familiar with areas beyond your original focus. You will have opportunities to learn more biology and targets as they enter the company's portfolio and you contribute to different projects. "You have to have a diversity of skills… you have to be able to sit at the table. You're not the expert, but you have to understand what they are talking about. You have to understand the reasons why we are doing the things that we do to find the best drug," Dr. Barrett told the fellows in attendance. Your eagerness to learn, flexibility, adaptability, and willingness to help others will help you succeed in industry.

If we all had a penny for every time that we heard that networking is vital for career advancement, we could fund our own labs. Networking is vital for every sector of the job market. An industry postdoctoral position or internship is one useful route to facilitate your transition. These positions allow you to get your foot in the door, familiarize yourself with a specific company and its day-to-day operations, learn what roles, types of people and skills are needed, and network. Another way to network with those in industry is at scientific meetings. Dr. Meyer's advice, "Go to those posters that are being presented by individuals in industry that are focusing on biology that you are interested in or researching." While these connections may not immediately lead to a new position, they will help grow your network and can lead to a position in the future. LinkedIn is an amazingly effective tool for maintaining connections and can be utilized to effectively grow one's network. Furthermore, your network is not just who you know, but it is who your connections know as well. As you get ready to enter the job market, be proactive. Let your network know your goals and reach out for an informational interview (in person or virtually).

The pandemic has affected all aspects of life; however, fellows looking to transition into industry do not need to worry. All the panelists indicated that their companies have been hiring new team members throughout the pandemic. "I think this idea of interviewing virtually and feeling very comfortable entertaining candidates who are not a couple subway stops away… has become comfortable and almost the norm," Dr. Meyer stated. Furthermore, they all indicated that the adaptability of the interviewing and on-boarding processes have been fast and effective. Despite the relatively smooth transition for interviewing candidates, our panelists agreed that starting a new job without knowing your colleagues beyond the virtual

setting can be a bit intimidating and challenging. "I do think that as a new hire in this environment, it has made it harder to connect to the community," Dr. Martin told the attendees. Like at the NIH, managers in the drug discovery industry have used virtual meetings and casual coffee breaks to help maintain and build scientific and personal connections among team members.

If you are still deciding if you would like to pursue a career in industry vs academia, there are a few things you should know. Like everything in life, rumors and stereotypes are not always true. Industry does not run at a slower pace than academia. The pharmaceutical industry is committed to and driven by fundamental, basic biology. It upholds professionalism, engages in rigorous science, and pushes the limits. The big difference is that industry is more pragmatic when it comes to advancing specific projects or investigating certain questions. "The overall goal is putting medicines into people. And if that's what floats your boat then it's for you. If you want to work on some specific mechanism… or you like training people than that is more of the academic path," Dr. Martin summarized. During an industry career, you will likely be involved with multiple projects that will be discontinued since data says that it will not succeed. As a result of working on multiple projects, you can continue grow and learn as a scientist. Finally, the rumor that a posted industry position is just a human resource formality and that the company already had a person identified for the role is false. If you think you are a good fit or the job, go for it!

If you are getting ready to step into the job market, our panelists recommend starting your search looking at the company postings, LinkedIn, and job boards to get started. "[When] you find those job descriptions that align with what you have done… highlight that," Dr. Meyers told the attendees. This advice was reiterated by Dr. Schiavone, "Tailoring your application to the post will really, really help… Don't get discouraged. Cold applying still works. So, if you see a position you really like, go for it." Today, when a company posts a position, it is not uncommon for the hiring manager to post the position on LinkedIn or another job site. To simultaneously apply for positions and build your network, Dr. Martin's suggests that you "reach out to [the hiring manager] directly and provide your CV and engage. Tell them what your skills are and what you're excited about and what you can bring to the table and try to start a dialog. As your CV comes through the pool or through another channel [your] name is already there, that connection may already be there. It's simple, but it's getting your name out there making that first contact other than HR."

No matter what career path you choose to follow, you want to make sure the job you accept is the right fit for you. "Being passionate about what you're doing is the number one key to success," Dr. Barrett stated; however, as the panelists pointed out, not every position, every team or every manager is created equal. You want to accept a position where you fit scientifically and personally. As Dr. Schiavone stated at the end of the panel, "Ultimately, you want to be in a career that is going to make you happy. So just really reflect on that and I don't think you can go wrong." If you were unable to attend the symposium or wish to listen to the full discussion again, a complete recording of the panel can be found on the CCR-FYI wiki page (https://ccrod.cancer.gov/confluence/display/FYISteering).

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

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• Networking with fellows beyond your group and branch • Positively influence the training experience with valuable information

Providing a voice for CCR Fellows

For more information, please contact: alida.palmisano@nih.gov

NATIONAL POSTDOCTORAL ASSOCIATION

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NPA Goals:

- Promote positive change in the postdoctoral experience
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- Visit www.nationalpostdoc.org
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NPA Membership Benefits:

- Leadership and professional development opportunities through volunteer service
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- Subscriptions to the NPA e-alerts and The POSTDOCket (quarterly newsletter)
- Reduced meeting registration fees, as well as other discounts
- Access to members-only Web content
- The Elsevier Foundation New Scholars Grant
- Recommendations for postdoctoral policies and practices
- Resources for developing mentoring plans for postdocs
- International postdoc survival guide
- Responsible conduct of research toolkit
- PDA and PDO toolkits

FYI

The Children's Inn at NIH

CCR-FYI Annual Holiday Gift Drive Benefiting the NIH Children's Inn

Help stock the "Gingerbread Gift Shop" for The Children's Inn at NIH
Children and their families can shop for holiday gifts – at no cost – for their loved ones!

Festive, marked collection boxes will be placed around all campuses during the end of November and beginning of December.

All gift items should be **new**, in original packaging, and **not wrapped**
***stuffed toys cannot be accepted**

Questions?

Contact: marygrace.katusiime@nih.gov and wangw20@mail.nih.gov

Join the CCR Fellows and Young Investigators Steering Committee!

FYI

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 on the last Thursday of the month at 11am.

Due to current guidelines meetings are held on MS Teams.

Providing Valuable Training Experiences for CCR Fellows

For more information, please contact: marygrace.katusiime@nih.gov and wangw20@mail.nih.gov

Mark Your Calendars

National Postdoc Appreciation Week

September 20th – 24th, 2021

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: marygrace.katusiime@nih.gov and wangw20@mail.nih.gov

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

Join the 2022 CCR-FYI Colloquium Planning Committee!

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

The planning of the 2022 CCR-FYI Colloquium will begin in July!

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:
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