



SUMMER 2023
VOL. 4, NO. 3

**Research
Issue**

Investments in
both people and
infrastructure are
fueling our vision
for the future.



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UNDER THE MICROSCOPE

CLIMATE CHANGE AND WOMEN'S HEALTH

8th ANNUAL WOMEN IN SCIENCE AND HEALTHCARE SYMPOSIUM



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KEYNOTE SPEAKER

Re-thinking Women's Health
in a Changing Climate

Cecilia Sorensen, MD

*Director, Global Consortium on Climate and
Health Education, Columbia University*

*Associate Professor, Department of Environmental
Health Sciences, Mailman School of Public Health,
Columbia University*

*Associate Professor, Department of Emergency
Medicine, Columbia University Irving
Medical Center*

PANEL DISCUSSION TO FOLLOW



ROSALIND FRANKLIN UNIVERSITY
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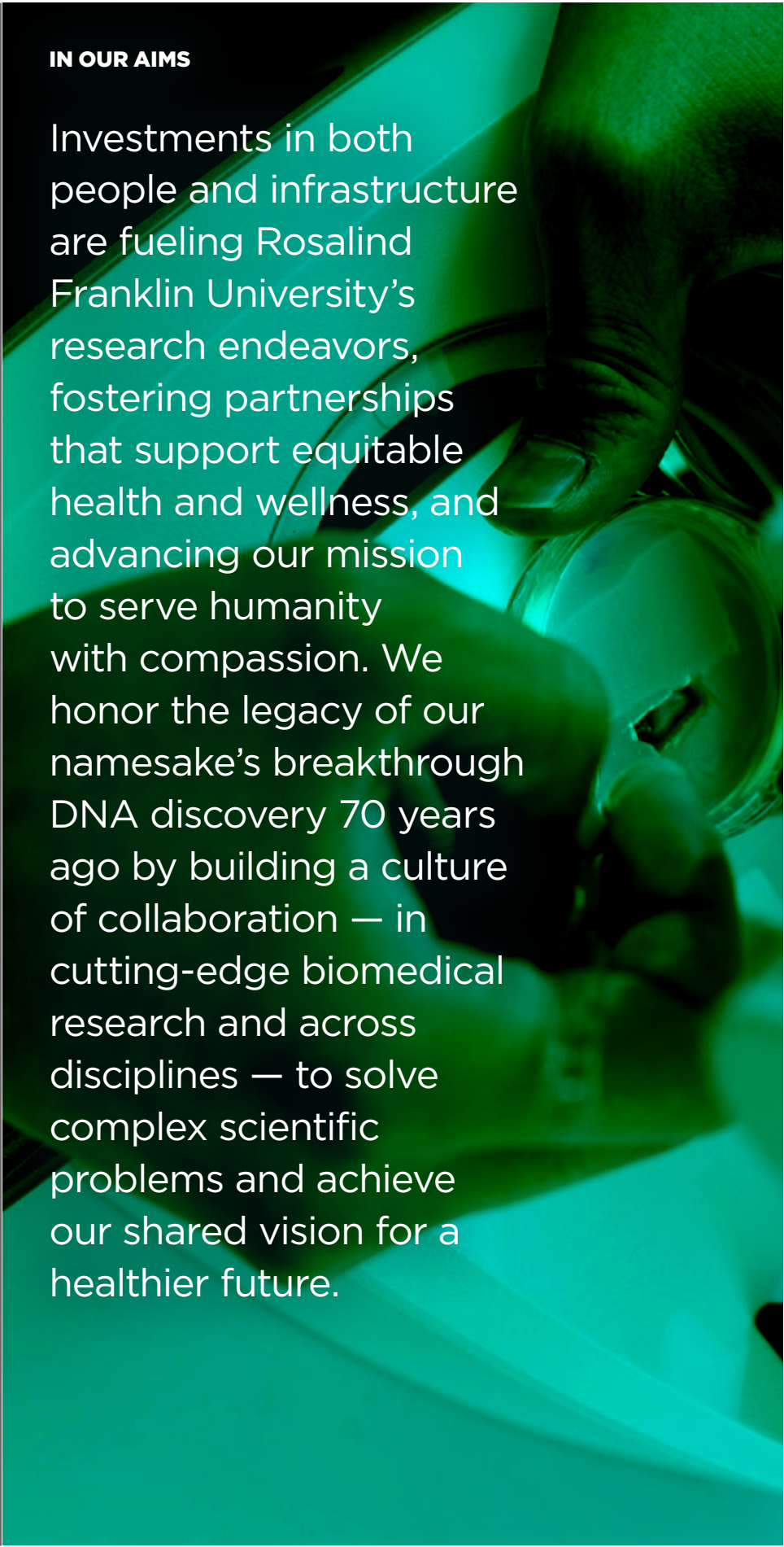
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IN OUR AIMS

A large, artistic photograph serves as the background for the right half of the page. It depicts a hand holding a magnifying glass, focusing on a glowing, translucent DNA double helix structure. The entire image is bathed in a vibrant green light, creating a high-tech, scientific atmosphere. The text is overlaid on the left side of this image.

Investments in both people and infrastructure are fueling Rosalind Franklin University's research endeavors, fostering partnerships that support equitable health and wellness, and advancing our mission to serve humanity with compassion. We honor the legacy of our namesake's breakthrough DNA discovery 70 years ago by building a culture of collaboration — in cutting-edge biomedical research and across disciplines — to solve complex scientific problems and achieve our shared vision for a healthier future.

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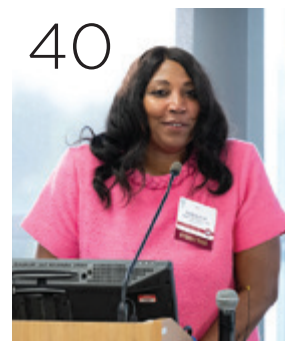
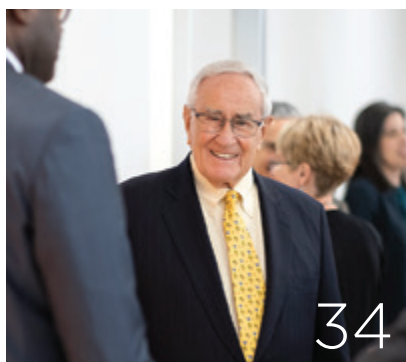
Immune System Heroes: Banding Together to Bring Relief to Gulf War Veterans

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ROSALIND FRANKLIN UNIVERSITY of MEDICINE AND SCIENCE

This issue of *Helix* highlights Rosalind Franklin University's thriving research enterprise. Our research in basic and applied science — the discovery and application of knowledge — is foundational to our mission to educate health and biomedical professionals who will improve the wellness of all people.

Evidence of our shared mission springs from these pages, where scientists and clinicians, faculty and students across RFU's therapeutic centers of excellence and more than 30 graduate programs ask questions aimed at transforming health and saving lives.

Nationally recognized RFU researchers are working in powerful, interdisciplinary collaboration to investigate psychology, movement disorders, health equity, interprofessional evidence-based practice and advanced simulation in health care. We're dedicated to the study of brain diseases, genetic diseases, cancer, immunology and infection. Stem cell and regenerative medicine, proteomics, cardiac resuscitation, clinical immunology and drug discovery/medicinal chemistry are also areas of powerful impact.

RFU continues to make strong investments in research and innovation. In June, we completed the final buildout of 14,000 square feet of wet lab space for bioscience-industry occupancy in our Innovation and Research Park. We're helping to meet the growing demand for wet lab space in the Chicago region and creating an environment where academic and industry scientists can work together to solve complex health challenges. Studying the use of wearable technology is just one way RFU faculty are engaging in new industry collaborations, with the goal of making it easier to stay healthy through noninvasive continuous monitoring and information delivery.

Our investment in faculty recruitment continues to advance our science and power our mission. We have added, over the past three years, 13 new faculty scientists across seven centers and three academic departments. Early-career psychologists are addressing systemic inequities, health disparities and mental health outcomes at a time of national mental health crisis. The National Institute of Mental Health has taken notice, awarding Associate Professor Brian Feinstein, PhD, a \$3.6 million grant to investigate the development of rejection sensitivity among sexual minority adolescents and to inform interventions to improve their mental health.


Our many research collaborations include work on behalf of service members and veterans with our longtime clinical partner, the Captain James A. Lovell Federal Health Care Center (FHCC). Joseph Reynolds, PhD, director of our Center for Cancer Cell Biology, Immunology, and Infection, and FHCC colleagues are working to understand the connection between high rates of irritable bowel syndrome among active duty soldiers and Gulf War veterans, with the goal of improved treatments.

Helix always reminds us that it's the people of RFU — students, faculty, loyal friends and alumni, and community, industry and philanthropic partners — who give life to our mission, support our quest for knowledge and deepen our commitment to human health and well-being.

Wishing you the best of health. ✕



Wendy Rheault, PT, PhD, FSAHP, FNAP, DipACLM
President and CEO



Ronald S. Kaplan, PhD
Executive Vice President for Research

EDITOR'S NOTE

When the chairman of Oracle Health admits to experiencing the fish-out-of-water phenomenon known as “Imposter Syndrome,” people listen.

Addressing the Class of 2023 at RFU's 109th Commencement on June 2, David Feinberg, MD '89, MBA — who had just been introduced as having also served in executive positions at Cerner, Geisinger, UCLA Health and Google Health — asked the 600-plus graduate candidates in attendance to hark back to their first week in school.

“It's actually pretty easy for me,” he said. “Thirty-eight years ago, that first week, I felt like an imposter. You see, they had this biochem test. It was a pretest — didn't count for any grades — but it was to see if you knew the difference between the essential and non-essential amino acids.”

Dr. Feinberg admitted that “I totally flunked it” — and then had to endure a classmate saying “Anyone who doesn't know those amino acids doesn't belong here.”

“You guys, that was me,” he told the crowd at Credit Union 1 Arena in Chicago. “Now, you heard from my introduction, I made it through.”

There are many famous tales of future triumphs that were in no way hinted at by the first steps taken. Abraham Lincoln finished eighth in his initial run for elected office, and he proceeded to launch failed campaigns for everything from Illinois land office commissioner to U.S. senator (twice). Test pilot Chuck Yeager, the World War II combat ace who would go on to break the sound barrier, vomited the first time he rode in an airplane.

Fortunately, for the vast majority of the population, those failures and hard lessons usually occur out of the spotlight. For researchers at labs around the globe and on the RFU campus, this necessary process of trial-and-error no doubt occurs every day.

But as indicated by Dr. Feinberg, results come from those who recognize that process and work through it. The stories shared in our annual research edition of *Helix* — including Dr. Feinberg's 10 essential life lessons — represent the fruitful end stages or acquisition of funds needed to pursue a goal, but we can rest assured that each success came with uncertainty.

“I still likely don't know the difference between lysine and valine and visine. I think Visine is actually eye drops,” Dr. Feinberg said to laughter on Commencement day. What he did know after that first week of school was that, like all of us, he belonged in a world that reveals its knowledge as long as we seek it. x

Dan Moran is the communications director with RFU's Division of Marketing and Brand Management.



Got ideas or feedback for *Helix* magazine?

Thoughts for upcoming issues? A resource to share with the research and education community? We want to hear about it!

We'll be highlighting opinions and announcements from RFU alumni, students, faculty and our community in a special section of each issue.

Send messages directly to our editors at helix.letters@rosalindfranklin.edu.

Before the next *Helix* issue arrives, you can find RFU news on the following social media platforms.

Be sure to tag us if you make a comment relating to RFU!

rfu.ms/socialmedia



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CONNECT

THERE ARE PEOPLE OUT THERE WHO CARE ABOUT THEM

‘There Are People Out There Who Care About Them’

NIMH Grant Addresses Mental Health Crisis Among Sexual Minority Adolescents

by Dan Moran

In May 2023, Brian Feinstein, PhD¹, was awarded a \$3.6 million, five-year National Institute of Mental Health grant to advance understanding of the development of rejection sensitivity among sexual minority adolescents and to inform interventions to improve their mental health.² The work of Dr. Feinstein and his team comes at a time when, he said, the LGBTQ+ community is seeing a new rise in “messaging that ‘who you are is not accepted in society’” — a scenario that he believes could have long-term consequences on their well-being.

Helix sat down with Dr. Feinstein to ask about the logistics of his latest research project and the challenges to health and well-being faced by sexual minority youth and adults.

Helix: The Emergency Care Research Institute (ECRI) this spring listed pediatric mental health as the leading patient safety concern of 2023, describing it as a “national public health emergency.” What are sexual minority adolescents (SMA) in particular experiencing right now?

Dr. Feinstein: I absolutely agree that there is a national crisis with respect to pediatric mental health, and there is a dire need for a better understanding of youth mental health and greater access to mental health care for youth. We’ve known for decades that sexual minority youth are disproportionately affected

by nearly every adverse mental health outcome — they are more likely than heterosexual youth to experience mood and anxiety disorders, to use substances, and to seriously consider, attempt and die by suicide — and these disparities are rooted in their exposure to rejection, discrimination and victimization.

“We’ve known for decades that sexual minority youth are disproportionately affected by nearly every adverse mental health outcome.”



Dr. Feinstein, shown on campus in summer 2023, has served as an associate editor of the American Psychological Association’s *Psychology of Sexual Orientation and Gender Diversity*. (Photo by Michael R. Schmidt)

From a logistical perspective, how will you be collecting data for your study?

We’re going to be recruiting 500 sexual minority adolescents ages 14 to 17 throughout the United States. All of our procedures are remote; participants will complete online surveys at four different time points across a year and a half. In addition, at two different time points, the experience-sampling component comes in — participants will download an app on their phones and, for three weeks at a time, they’ll be answering questions four times a day. We’ll be getting a lot of in-the-moment, real-time data about what they’re experiencing.

Your study will include a longitudinal and experience-sampling study using methods established in your prior work. What can you tell us about this previous research and what you’ve learned about sexual minority adolescents?

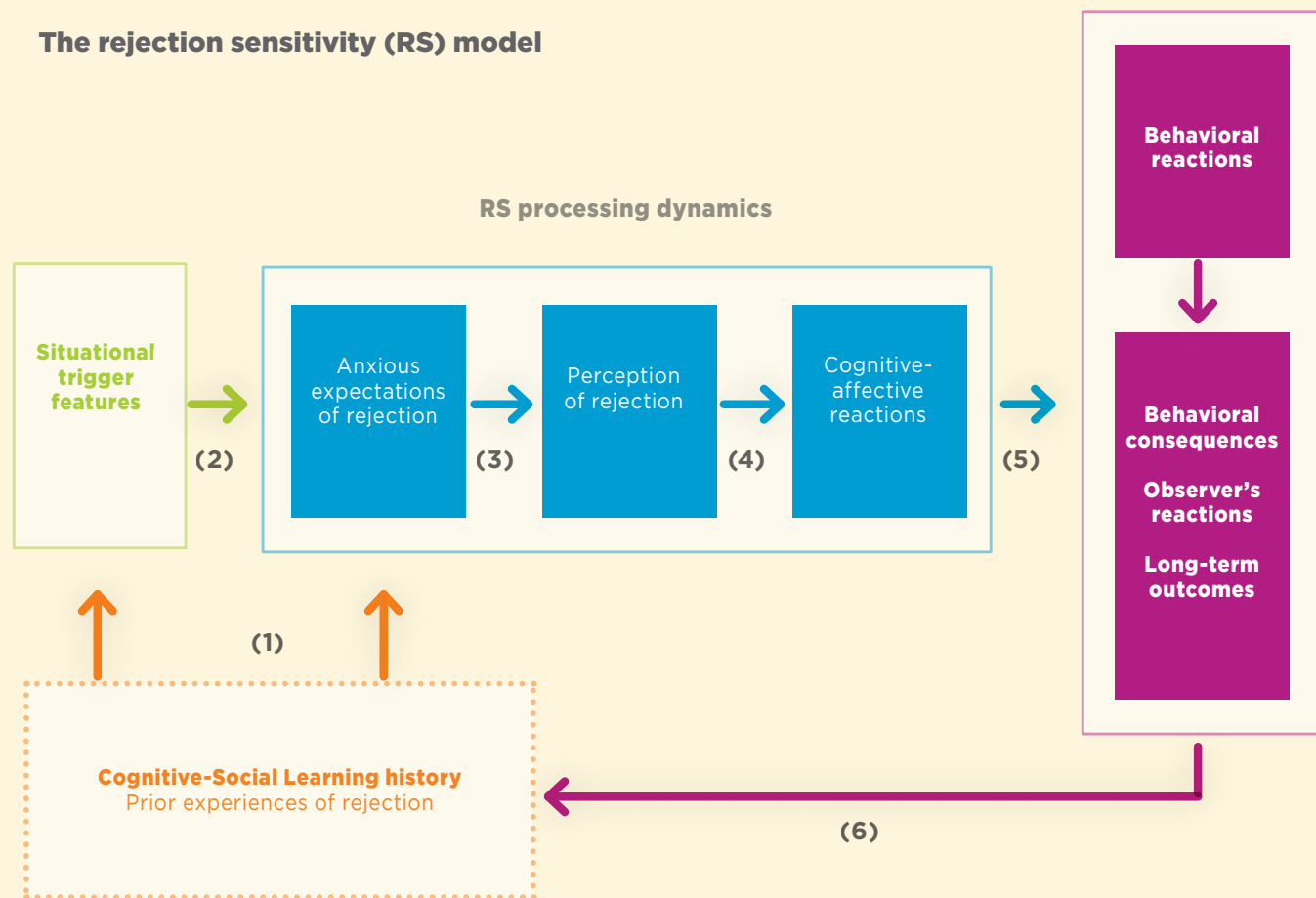
I’ve done a lot of work focused on the construct of rejection sensitivity³, which refers to both an expectation that somebody’s going to be rejected and feelings of anxiety about being rejected. What we see with sexual minority people in particular is that having a history of experiencing rejection, for example, being bullied or victimized because of one’s identity, can contribute to developing a sense that people are going to continue to reject you in your day-to-day life. Even when that’s not happening, simply carrying with you this kind of mindset — expecting and worrying about rejection — can continue to contribute to depression, suicidal ideation and other adverse mental health outcomes.

¹**Dr. Feinstein joined RFU in 2020** as an associate professor in the Department of Psychology. He obtained his PhD in Clinical Psychology from Stony Brook University and completed an NIH-funded postdoctoral fellowship at Northwestern University where he also served as a research assistant professor at the Institute for Sexual and Gender Minority Health and Wellbeing.

²**According to the grant’s abstract,** the project’s goal is to advance understanding of the development of rejection sensitivity among sexual minority adolescents (SMA), along with “its consequences, the underlying mechanisms, and protective factors, which will inform interventions to improve SMA’s mental health.”

³**The rejection sensitivity (RS) model (right).** Reproduced from Romero-Canyas, Downey, et al., (2010) with permission from the corresponding author. Minor formatting changes were made to the original figure to facilitate readability.

The rejection sensitivity (RS) model



You point to the fact that nearly all prior studies on mental health among sexual minorities have been cross-sectional studies of adults.

One of the major limitations is that most of the work in this area has been solely focused on adults, and most of it has studied people at a single time point, so we don't know much about how experiencing, expecting and worrying about rejection contribute to increases or changes in mental health over time.

My colleagues and I are particularly interested in how these processes unfold at the daily level. If a sexual minority adolescent experiences rejection or if they're worried about rejection, does that contribute to them feeling more depressed an hour later, or that evening, or the next day? One of the goals of this project is really to understand these temporal dynamics; in other words, we want to know how long experiencing, expecting and worrying about rejection influences sexual minority adolescents' mental health.

How effective are current interventions aimed at improving the mental health of the SMA population?

The reality is that there's a lack of interventions that have been developed specifically for addressing the unique challenges that sexual minority adolescents face. Frankly, this isn't very different for adults, where it's only in the last maybe five to 10 years that interventions have been designed to improve mental health by addressing the unique stressors that sexual minority people experience related to rejection, discrimination and internalizing negative societal attitudes toward their identity. We're really in a very nascent stage of research when it comes to sexual minority youth.

"... we don't know much about how experiencing, expecting and worrying about rejection contribute to increases or changes in mental health over time."

ANXIETY AND
DEPRESSION
IN
CHILDREN

AGES

3-17

INCREASED

29%

in 2020 and

27%

in 2016

Source: An Emergency Care
Research Institute report
on top patient concerns cited
a study in *JAMA Pediatrics*

ADOLESCENT
SUSPECTED SUICIDE
ATTEMPTS

The mean weekly number of
emergency department visits

39% HIGHER

in winter 2021
than in winter 2019

Source: Centers for Disease
Control and Prevention

YOUTH REPORTED
FEELING
PERSISTENTLY SAD
AND HOPELESS

69%

LGBQ+*

35%

HETEROSEXUAL

HIGH SCHOOL
STUDENTS
ATTEMPT SUICIDES
DURING COVID-19
PANDEMIC

LGBQ+* were

4X more likely

than
HETEROSEXUAL

Source: Centers for Disease Control
and Prevention, "LGBTQ+ Youth:
Addressing Health Disparities with a
School-Based Approach," [cdc.gov/
lgbthealth/youth.htm](https://cdc.gov/lgbthealth/youth.htm)

*Not all data sets in the
referenced study included
data on transgender youth

When you mention negative societal attitudes, we've recently seen growing challenges to acceptance — multiple bills filed in more than 20 state legislatures targeting LGBTQ+ issues, like access to gender-affirming care and participation in sports by transgender athletes. What are your thoughts on the impacts these measures and advocacy for them might have on the SMA community?

I think the consequences of what we're seeing now are going to be pretty dire and long-lasting. There's data to support that when sexual minority youth and adults live in states that have more affirming laws and policies that specifically name sexual orientation as a protected characteristic, they fare better in terms of their mental health than those living in states without affirming laws and policies.

The sociopolitical climate for LGBTQ+ people had been getting better in some respects — and that's not to say that it won't continue to improve in some places — but unfortunately, with all of the recent anti-LGBTQ+ legislative efforts, LGBTQ+ youth are receiving messages, often on a daily basis, that they're not valued in society. Their literal rights and access to health care are being taken away. Over the next five to 10 years, we're likely to see growing inequities based on what's happening right now.

With that in mind, along with generating data that will inform interventions generally, what are some ideal outcomes of your research and the advancements it might generate?

For the 500 sexual minority adolescents that we'll be recruiting into the study, one of the outcomes will be that we'll be letting them know that there are people out there who care about them and their mental health.



"... one of the outcomes [of the study] will be that we'll be letting them know that there are people out there who care about them and their mental health."

A lot of youth don't have that — they don't have opportunities to share the experiences they're having. What we often find in our work with sexual minority adolescents is they're so eager just to have adults who want to hear what's going on in their lives. I hope our research will increase the visibility of the need to understand and address the mental health challenges facing sexual minority youth, while letting sexual minority youth know that they're not alone. ✕

If you or someone you know is experiencing a mental health crisis or emotional distress, help is available 24/7 through the 988 Suicide and Crisis Lifeline by dialing or texting 988. Other resources include the American Foundation for Suicide Prevention (afsp.org) and The Trevor Project (trevorproject.org).

FROM LOS ANGELES WITH GRATITUDE



BY AMY KNUTSON STRACK

From the time Carey Strom, MD '80, was a child, he had more than an inkling that he would become a physician.

"I knew as a little boy I was going to be a doctor," said Dr. Strom. "It chose me, I didn't choose it."

He distinctly remembers playing with Visible Man building kits and painting the organs inside a plastic clear model. The fascination was undeniable.

"I was 6, and I knew then what I was going to do," said Dr. Strom.

Once completing his bachelor's degree at the University of Iowa, Dr. Strom set off to achieve that goal, returning to his home state of Illinois to attend Chicago Medical School (CMS). He credits CMS for his basic medical training and revealing areas of medicine that interested him most.

"I'm very grateful for CMS for giving me the foundation to practice medicine and for giving me that opportunity," said Dr. Strom. "It all builds on each other. I am very grateful for that."

He gravitated toward procedure-oriented sub-specialties and eventually settled on gastroenterology. Now a practicing clinician at Cedars-Sinai Medical Center in Los Angeles with a private practice in Beverly Hills for more than 25 years, Dr. Strom's commitment to the CMS student experience holds strong.

By focusing on scholarship and mentorship, Dr. Strom made RFU a personal philanthropic priority. Beginning with annual impact fund gifts, he grew his commitment of time and talents to include CMS as part of his estate plan. By establishing a charitable remainder unitrust and providing for CMS as a partial beneficiary, Dr. Strom's generosity allows him to support and nurture the next generation of students with dreams to become physicians.

"I do believe that you can't forget your roots," said Dr. Strom. "You can't forget people who did nice things for you. You have to show appreciation."

Dr. Strom also has shared his experience with RFU as a past member of the Board of Trustees and former president of the CMS Alumni Association.

He recommends recent graduates to remember their aspirations and maintain a patient-centered approach in health care, no matter what tools and technology they may encounter. He underscores that a focus on the patient is what matters.

"Always be attentive to the patient. They have a heart, mind and feelings," said Dr. Strom. "Just remember why you became a doctor." ✕

Amy Knutson Strack is director of advancement communications in the Office of Institutional Advancement.



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RESEARCH IN PRACTICE

The Injection Question:

Corticosteroids or Hyaluronic Acid for Knee Osteoarthritis?

by Dawn Rhodes

Research teams from both RFU and the University of California, San Francisco are shedding light on two popular noninvasive treatments for [knee osteoarthritis](#), uncovering results that suggest hyaluronic acid injections should be further explored, while the common approach of corticosteroid injections should be used more cautiously.

For the millions who struggle with constant knee pain because of osteoarthritis¹, doctors might consider a corticosteroid injection to provide temporary relief. But recent studies, including one co-authored by Azad Darbandi, MD '23, show that common treatment may actually worsen your joints long-term.

RFU researchers² used radiographic images to analyze the progression of osteoarthritis in 150 people. Pulling data from the Osteoarthritis Initiative sponsored by the National Institutes of Health, Dr. Darbandi and fellow researchers split patients into three groups: people who received no injections for treatment, patients who got corticosteroid shots and patients who got hyaluronic acid injections over a three-year period.

Researchers also matched the patients based on other conditions shown to contribute to osteoarthritis, like smoking, diabetes and rheumatoid arthritis. According to Dr. Darbandi, they eliminated patients who previously had surgery, or who had received corticosteroid and hyaluronic acid injections.

X-rays were examined for factors like medial joint space, a common indicator of arthritis, and the researchers found that osteoarthritis worsened faster in patients who received corticosteroid injections, Dr. Darbandi said.

Researchers at the University of California, San Francisco, did similar research that revealed similar conclusions. Both studies were presented in November at the Radiological Society of North America.³

Dr. Darbandi said the results weren't surprising, because there are limits to the use of corticosteroid injections.

"The main surprise was the hyaluronic acid data and the comparison with corticosteroids," he said. "I was surprised that the hyaluronic acid injections had better outcomes than the corticosteroid injections, which suggests more research needs to be done into that type of injection."

Dr. Darbandi said he previously found research showing that corticosteroids could contribute to poor postoperative outcomes, like in rotator cuff surgery. He added that he wanted to use radiology and clinical findings to explore impacts of the drug on osteoarthritis treatment before surgery.

There's long been evidence that such injections aren't always the best option, Dr. Darbandi said. He added that physicians usually recommend weight loss, exercise, physical therapy and nonsteroidal anti-inflammatory drugs before considering corticosteroids, which can reduce inflammation and relieve pain for one to three months.

But according to Dr. Darbandi, there isn't much research scrutinizing the long-term effects of steroids on joint health.

¹ **Around 32.5 million Americans suffer from osteoarthritis**, a condition in which cartilage between joints breaks down and causes bones to painfully rub against each other, according to the Centers for Disease Control and Prevention. It's the most common joint disorder in the country, according to the National Institutes of Health.

² **Dr. Darbandi's co-authors** for the study were Sean Hormozian, MD '23; Atefe Pooyan, MD, MPH; Ehsan Alipour, MD, MPH; Firoozeh Shomal Zadeh, MD; Parham Pezeshk, MD; and Majid Chalian, MD.

³ **Media attention** to Dr. Darbandi and his team's research flourished in late 2022, with articles published by outlets that included CNN and NBC News.



OCCURRENCE OF SYMPTOMATIC KNEE OSTEOARTHRITIS **individuals 60 years or older**

10%
OF MEN

13%
OF WOMEN

THE PREVALENCE RISES AS HIGH AS **40%** among individuals older than **70 years of age**

WOMEN are more likely to have osteoarthritis than men and have more severe cases

Does this new research mean doctors should eschew corticosteroids? Not necessarily.

It's not fair to say corticosteroids have no benefit, Dr. Darbandi said. For some patients, he added, physicians may decide that short-term pain relief is needed to help a patient jump-start exercise and physical therapy.

"You have to look at the demographic of a patient receiving these injections," Dr. Darbandi said. "Sometimes they're a little older. Are they more concerned about the disease progression of their osteoarthritis or pain management? If they're younger, their joints have more life to live, so a more conservative approach may be preferred."

“I was surprised that the hyaluronic acid injections had better outcomes than the corticosteroid injections, which suggests more research needs to be done into that type of injection.”



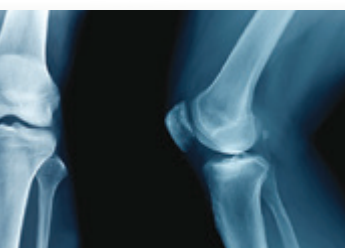
He added that it's also important to note that findings on a patient's X-rays don't always match up to clinical exams and the pain a patient is having.

“You might take an X-ray of someone's knee and it looks fine, but they're having severe pain,” Dr. Darbandi said. “Or you might take an image of someone's knee and it looks bad, but they're not experiencing much pain.”

It does mean providers and patients need to be more wary of when and how to use corticosteroids, and what the risks are, Dr. Darbandi added.

The results also don't necessarily mean hyaluronic acid is a viable swap for corticosteroids, said Dr. Darbandi, adding that for one thing, there is insufficient research into hyaluronic acid injections. That type of injection typically is not covered by insurance as corticosteroids are, greatly limiting which patients could consider it as a treatment option.

Dr. Darbandi studying images in a lab at RFU. His team's findings have appeared on popular health news sites, including Medscape and WebMD. (Photo by Michael R. Schmidt)



RESULTS FROM SEVERAL STUDIES HAVE SHOWN THAT **OSTEOARTHRITIS IS INHERITED** and may vary by joint site

OBESITY has long been recognized as a potent risk factor, especially involving the knee

NUMEROUS STUDIES HAVE SHOWN THAT **KNEE INJURY** is one of the strongest risk factors

REPETITIVE USE OF JOINTS AT WORK is associated with an increased risk of osteoarthritis

Sources: “Epidemiology of Osteoarthritis” and “Knee Osteoarthritis,” National Library of Medicine

For hyaluronic acid or other alternatives, the effects remain controversial, Dr. Darbandi said. For his research, it wasn't necessarily feasible to control for a patient's socioeconomic status. Dr. Darbandi also questions if there is a placebo effect from when a patient pays out of pocket for a less common form of treatment, versus something broadly covered by insurance.

“So if more studies are done looking at hyaluronic acid injections in a more objective lens, maybe over the course of time, it can be used as a form of standard of care,” Dr. Darbandi said. ✕

Dawn Rhodes is a Chicago-based writer and editor. She's worked in journalism for more than a decade.

Investing in People

New Faculty Members Bring
Neuropsychology, Health
Psychology Expertise to RFU

by Sara Skoog

Photos by Michael R. Schmidt



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The recruitment of several faculty researchers in the [Department of Psychology](#) over the past three years demonstrates RFU's commitment to investing in continuous growth. These faculty are developing innovative and exciting NIH- and FDA-funded research projects, broadening our knowledge and understanding of subjects including neuropsychology, genetics, PTSD and health psychology.

RFU's commitment to recruiting top talent has resulted in tremendous growth among the Psychology Department's research faculty. Since 2020, several new faculty members have come on board and brought with them a diverse range of research interests — from the effects of trauma exposure on health outcomes in 9/11 first responders and how genetics can help predict the severity of PTSD¹, to the impacts of stigma-related stress on the mental health of sexual and gender minority populations.²

Two of the most recent additions to the Psychology faculty are Assistant Professor Rachael Ellison, PhD, and Assistant Professor Nancy C. Jao, PhD. Both spoke with Helix about their current research, what brought them to RFU, and the importance of considering social justice and health disparities as factors in overall health and wellness.

ASSISTANT PROFESSOR **RACHAEL ELLISON, PhD**

Dr. Ellison's expertise is in neuropsychological research with a social and racial justice focus. She also chairs the Women in Neuropsychology Committee of the Society for Clinical Neuropsychology, Division 40 of the American Psychological Association.

Helix: What interested you the most about bringing your lab to RFU?

Dr. Ellison: RFU has an exceptionally strong history in clinical neuropsychology with a dedicated neuropsychology track. As a researcher and clinical neuropsychologist, I knew I was coming to a program that has this long history of well-respected training of students in clinical neuropsychology in the Chicagoland area. I also value the department's commitment to providing funding opportunities in terms of tuition remission and stipends, which I think is exceptionally important for a PhD program. That also helps with recruitment of diverse students from different socioeconomic and other types of backgrounds, and that's really important to me.

“The increase in faculty hires over the past few years was a really good sign to me that the department is growing and thriving, which also helps student recruitment.”

At the institutional level, I was impressed with the university's support of and respect for psychology as a profession and a discipline. The increase in faculty hires over the past few years was a really good sign to me that the department is growing and thriving, which also helps student recruitment.

Tell us about your research interests.

My background is in clinical neuropsychology, and I also have training in cognitive rehabilitation with patients who have clinical disorders such as ADHD, traumatic brain injury — anything that might disrupt someone's normal functioning, where they may need to figure out new tools and accommodation strategies to help regain or improve their level of daily functioning. That's a space I'm really interested in both clinically and in research.

I did my clinical internship at the San Diego VA Health System and trained under Dr. Amy Jak, who is one of the initial developers, along with Drs. Marilyn Huckans and Beth Twamley, on some of these really gold-standard cognitive rehab protocols. The original protocol they developed was for treating schizophrenia, which involves a lot of frontal lobe executive dysfunction so is well-suited for cognitive rehabilitation. The protocol was modified for individuals with a history of traumatic brain injury, and later modified again for individuals with mild neurocognitive disorder (mild cognitive impairment [MCI]).

This most recent iteration of the protocol for older adults with cognitive impairments includes discussions of how stress interferes with attentional capacity, which interferes with our subjective sense of memory functioning. Let's say I'm running late for a doctor's appointment, I'm on the phone, quarreling with my spouse, and after the appointment I forgot where I parked my car. Well, I didn't forget, I just wasn't paying attention. The stress interfered with my encoding of the information and made it so that functionally, I couldn't remember — but actually, I never learned the information in the first place, because I wasn't paying attention. And so this protocol has a lot of psychoeducation about stress as part of that process interfering with attention.



¹ **Associate Professor Monika Waszczuk, PhD**, authored “Treating 9/11 First Responders: Can Genetics Predict Severity of PTSD?” for the Research 2022 issue of *Helix*.

² **Associate Professor Brian A. Feinstein, PhD**, discusses his research in “There Are People Out There Who Care About Them” on page 6.

Your current research merges your neuropsychology expertise with your interest in social justice. What projects are you pursuing in your Socially Conscious Lab?

One project I'm really excited about is developing and testing a modification of the cognitive rehabilitation protocol I mentioned, with an integrated intentional focus on the impact of race-related stressors as part of the larger discussion of stress interfering with optimal attention. When the race-related riots were happening in Chicago in 2020, I started thinking, particularly in regard to racial and ethnic minority older adults, "How can we be talking about stress without talking about race-based stress? Is there some type of clinical intervention focused on race and stress that could combine with this cog-rehab protocol for older adults?" And there was!

Some colleagues at a different VA hospital created and successfully ran a process-oriented, race-related stress and coping group that demonstrated positive outcomes for group members. I received approval from the original developers of the cog-rehab protocol to incorporate aspects of this coping process group in order to develop and pilot a cognitive rehabilitation group for racial and ethnic minority older adults that specifically integrated discussions of racism, microaggressions, and stress related to systemic injustice and inequality into the larger discussions related to coping with stress.

The goal now is to pilot this new protocol for racial and ethnic older adults and assess whether this modified protocol results in improved patient outcomes compared to just doing the tried-and-true cog-rehab intervention for older adults. Will we see better subjective and objective cognitive functioning as well as improved mental health symptoms with this protocol? Depending on the outcomes, we could potentially modify this new protocol to focus on stressors related to other stigmatized parts of identity, and apply what we've learned to these populations as well.

ASSISTANT PROFESSOR NANCY C. JAO, PhD

Dr. Jao's current research project, funded by the National Heart, Lung, and Blood Institute (NHLBI) and the U.S. Food and Drug Administration (FDA), aims to examine the effect of menthol cigarette use on biomarkers of cardiovascular health. Read more about this research in Dr. Jao's "Through the Microscope" column on p. 28.

Helix: In addition to your research on the effects of menthol cigarette usage, what other projects are you interested in pursuing at RFU?

Dr. Jao: I'm in the process of establishing a health-behaviors and tobacco-use research lab. It's just me for now, but I'm bringing on a research assistant and will have a graduate student starting in the fall. The lab will be largely built upon my tobacco-use research project, but my hope, since I'm a health psychologist by training, is that we're going to be looking at a variety of health behaviors and conditions, like sleep and chronic pain.

Long-term, in addition to examining other nicotine products like e-cigarettes, I'd also like to branch into other areas of substance use. For example, many people are also using tobacco in conjunction with marijuana, so studying that type of co-use can help us better understand the real-world impacts of substance use.

Do you see potential for collaboration with other research areas at RFU?

Absolutely. Within the Psychology Department, I've talked a lot already with both Brian (Feinstein) and Monika (Waszczuk) about collaborating. I've talked with Brian in particular because of his focus on substance use in the LGBTQ+ community, which has been largely targeted by the tobacco industry. I've also talked with Monika about collaborating on some of our common interests in genetics and cognitive functioning. I see potential for grant collaborations with multiple departments at RFU to explore mechanisms of substance use or public health interventions to advance health equity.

Tobacco use affects so many different areas of health and chronic diseases. I find it interesting to pivot and collaborate with other people. I've worked on interdisciplinary teams for most of my career as a health psychologist, so it's part of my belief that our work shouldn't be so segregated. That's why I do translational work, and it's also one of the things I like about RFU — the focus on interdisciplinary work. I think it informs your own research a lot better that way, and I look forward to developing new projects with others at RFU. ✕

Sara Skoog is a staff writer with the RFU Division of Marketing and Brand Management. In addition to writing for Helix and other university publications, she also produces Pulse, RFU's monthly e-newsletter.



Clockwise from upper left: Dr. Ellison, Dr. Jao, Dr. Feinstein and Dr. Waszczuk.

GRANT FUNDING AWARDED TO PSYCHOLOGY RESEARCHERS, including multiple awards from the National Institutes of Health:

\$4.7M since 2021.

Source: RFU Office of Sponsored Research, June 2023

Immune System Heroes:

Banding Together to Bring Relief
to Gulf War Veterans

by Aubrey Penney

IMMUNE
SYSTEM
HEROES



In the years following the first Gulf War (1990–91), veterans reported chronic medical conditions that included fatigue, frequent or persistent headache, and frequent or persistent muscle or joint pain. Gastrointestinal symptoms were also in the mix, and the search for answers and treatments for those ailments includes collaboration between RFU researcher Joseph Reynolds, PhD, and a gastroenterology team at the Captain James A. Lovell Federal Health Care Center.

Though he began as a chemist in his undergraduate work, an elective in immunology changed everything for Joseph Reynolds, PhD. He described how immunology revealed the ways the body protects and defends itself against uncountable threats: “The immune system is so fascinating, like something out of a comic book — so many cells doing so many amazing things, and the public has no idea how many threats these cells are fighting off for them constantly.” At the encouragement of his mentors, Dr. Reynolds took his newfound fascination with the immune system’s heroics and dove into a life in discovery.

ALWAYS LOOKING CLOSER

Dr. Reynolds’ work at RFU has two main focuses. His NIH R01 grant examines T-cells and how they mediate autoimmune responses in multiple sclerosis, but his research also branches into the study of cytokines. “My lab started to look closer at models of inflammation and became interested in interleukin 17-C, which is found in the intestinal epithelial cells,” he said. “Using animal models, we found that it was very protective against inflammatory bowel disease.”

While studying this model, Dr. Reynolds found a novel research opportunity in partnership with the Captain James A. Lovell Federal Health Care Center (FHCC), working closely with Axel Feller, MD, the former chief of gastroenterology. This collaboration forged new research tracks while addressing the needs of veterans with longstanding repercussions from their service in the Gulf War.

“Dr. Feller often lamented that the FHCC sees many active duty soldiers with irritable bowel syndrome, particularly Gulf War veterans,” he said. “In sharing ideas, I mentioned my mouse models, and they offered a pilot program specifically studying these veterans. We took the concept of the cytokine interleukin 17-C being gut protective, and found that it helped the epithelial barrier repair itself.”

The study also garnered significant findings around the effects of neurotoxins, another dark consequence of the Gulf War. “It’s hard to prove 30 years later, but one of the major factors involves exposure to low-dose nerve agents, including Sarin gas. If that hypothesis is true, we should be able to see some effects of nerve agent exposure, what it does to the gut, and how our cytokine family fits into that web.

Left: Dr. Reynolds in an Innovation and Research Park laboratory. (Photo by Doug McGoldrick)
Opposite: Prior to Dr. Feller’s retirement, Dr. Reynolds worked with him at the Lovell Center. (Photo by Michael R. Schmidt)



“To study this, we started using DFP (a surrogate for Sarin, 40 times less toxic but using a similar mechanism). Our initial hypothesis turned out to be entirely correct. It did enormous damage to the gut: pipe junctions, control, permeability are all really dysregulated, causing a leaky gut-type syndrome. The composition of the microbiome is completely altered,” he added. “This was particularly fascinating because most work in this field focuses on neuroinflammation — we were the first to show that it affects the gut significantly, too. Fortunately, our studies also showed that the cytokine was very protective. If you pre-dose the cells or use it as a treatment, you can improve the damage or lessen the effects of the exposure.”

ASSEMBLING A TEAM

In the summer of 2022, Dr. Reynolds shared some of these findings in a presentation titled “Modeling Organophosphate Exposure and Gastrointestinal Dysfunction in a Model of Gulf War Illness” as part of the U.S. Department of Veterans Affairs National VA Research Week, a celebration of a successful research partnership.



“In the modern world of science, with so much that can be done digitally, I feel like you have no excuse for at least trying to improve your lab and your program by reaching out.”

In the midst of his research, Dr. Reynolds wears many hats at Rosalind Franklin University, serving as the director of the Center for Cancer Cell Biology, Immunology, and Infection, the graduate program administrator for microbiology and immunology, and as a primary mentor for students within the discipline. In training students to form similar collaborative research partnerships, Dr. Reynolds emphasizes the importance of reaching out and listening well. “In the modern world of science, with so much that can be done digitally, I feel like you have no excuse for at least trying to improve your lab and your program by reaching out. If I identify a deficiency in my research, I actively seek to plug that gap and learn from others.”

Looking back at the course of his own growth in science, Dr. Reynolds was struck by the generosity of his mentors and he now mentors students of his own. “Something I’ve come to appreciate much

more over the years is the time that my previous mentors spent educating, training and encouraging me. I didn’t realize how much I’d enjoy passing that legacy on until I started mentoring students of my own.”

Joseph DiMario, PhD, dean of SGPS, highlights what an asset Dr. Reynolds is to SGPS students: “The School of Graduate and Postdoctoral Studies is deeply grateful to have a dedicated mentor, researcher, collaborator and colleague in Dr. Joseph Reynolds.” In his ongoing research, Dr. Reynolds continues to shine a light on the heroism of the immune system and support the heroic efforts of the next generation of scientists. ✕

Aubrey Penney is academic program coordinator for RFU’s School of Graduate and Postdoctoral Studies.

According to a study by the **NATIONAL INSTITUTES OF HEALTH**, up to **25%** of the **700,000** United States military personnel who participated in the **PERSIAN GULF WAR BETWEEN AUGUST 1990 AND MARCH 1991** reported having chronic gastrointestinal symptoms.

Source: “Intestinal Hyperpermeability in Gulf War Veterans with Chronic Gastrointestinal Symptoms” ncbi.nlm.nih.gov/pmc/articles/PMC6435429/

The **U.S. DEPARTMENT OF VETERANS AFFAIRS** presumes that **“CERTAIN CHRONIC, UNEXPLAINED SYMPTOMS EXISTING FOR SIX MONTHS OR MORE ARE RELATED TO GULF WAR SERVICE WITHOUT REGARD TO CAUSE,”** including functional gastrointestinal disorders that include irritable bowel syndrome, functional dyspepsia and functional abdominal pain syndrome.

Source: “Gulf War Veterans’ Medically Unexplained Illnesses” publichealth.va.gov/exposures/gulfwar/medically-unexplained-illness.asp#connection

PRIORITIZING EMPATHY

PHARMACIST WITH HEARING LOSS SUPPORTS PATIENTS WITH DISABILITIES

By Dawn Rhodes

Photo by Michael R. Schmidt

Ally Brown, PharmD '22, navigated a challenging medical condition as she trained to become a pharmacist — an experience that informs a people-focused mission to improve health care.

Dr. Brown is deaf, not having been formally diagnosed with hearing loss until adulthood. As a patient, she sometimes had physicians who rushed through appointments, unable or unwilling to try different methods of communicating with her to ensure her disability didn't interfere with treatment.

Alexandria Brown
PharmD

She's trying to change that as a provider, and is pushing for more training and awareness to give quality care to patients across a range of unique abilities.

"We do have a lot of nurses, doctors, pharmacists and other healthcare providers; the thing we often lack in health care is providers who really know how to work with people," Dr. Brown said. "Someone has to advocate for the patients. Because without (that), we have a lot of patients that are not getting the best health care and have worse health outcomes."

Originally from Maryland, Dr. Brown attended a biomedical science high school and studied public health science at the University of Maryland. She was born with hearing loss, but she did not initially know that. She said her condition worsened as she got older while she rationalized why she struggled to hear.

"By the time I got to undergrad, it was starting to get really bad," Dr. Brown said. "I was just like, 'Oh, you know, I just can't hear because normally my hair is curly ... so my hair is blocking my ear,' or something like that."

She adjusted how she handled conversations and her studies, like changing where she sat in classes. She avoided going to places like cafes where it would be difficult to understand people.

Around the time she was 18, her grandmother pushed Dr. Brown to have her hearing examined, which showed she had mild to moderate hearing loss, she said. She was given a hearing aid.

Still, her condition worsened as she studied pharmacy at RFU, "to the point where it was just really, really hard to go to class and go to appointments," Dr. Brown said. She'd long relied on lip reading to understand people, but the pandemic shutting down in-person interactions took away that key form of communication. Doctors' appointments were also a struggle.

"Talking louder doesn't actually help the person hear better, so they're getting stuck on what to do," Dr. Brown said. "So it makes me feel discouraged from going to the doctor."

As she continued training as a pharmacist, she used that knowledge to advocate for herself as a patient.

"I'm very understanding as a patient," she said, "but when you're a provider at the same time, I know what they're doing and talking about."

Dr. Brown received a cochlear implant¹ in June 2022, she said, and her experiences as both a patient and provider helped her spot gaps in her medical training — there would rarely be a patient who had hearing loss, blindness or other unique abilities in addition to the illness for which they sought treatment.

In a lecture at RFU in April², Dr. Brown detailed why medical students need better training to work with patients with disabilities, and how doctors can spot and break down barriers to giving quality health care to those patients.

"I find the biggest problems can stem from communication. A lot of it is that doctors are uncomfortable or not trained or you don't have exposure. Sometimes it's bias, or things like that," Dr. Brown said. "But the biggest way to combat that is trying to be creative and thinking outside the box. Start educating students at the medical school level, giving them exposure to these patients so they know how to work with them. If they don't know their options, there's not much that they can do to help them."

Having more providers with unique abilities also could help, so they can bring their experiences to clinical practice and train future doctors to give better care, Dr. Brown said. It can be challenging being a doctor with a unique ability, but she sees how it makes a difference.

"More people are accepting and willing to work with you than people who are not," she said. "There are times where I've had patients who are like, 'I'm glad that we have a doctor who's deaf, because now we have people who understand. We need people like you.'"

"Someone has to advocate for the patients. Because without (that), we have a lot of patients that are not getting the best health care and have worse health outcomes."

¹ According to the U.S. Food and Drug Administration, a **cochlear implant** is an implanted electronic hearing device that is designed to produce "useful hearing sensations to a person with severe to profound nerve deafness by electrically stimulating nerves inside the inner ear." The implants usually consist of two main components: an externally worn microphone, sound processor and transmitter system; and an implanted receiver and electrode system, which contains the electronic circuits that receive signals from the external system and send electrical currents to the inner ear.

² **"Communication, Health Care, and Unique Abilities: Breaking Down Barriers to Provide Better Care to Your Patients with Disabilities/Unique Abilities,"** hosted by RFU's Office of Accessibility and Academic Services, was presented virtually by Dr. Brown on April 10.

ASRC SHOWCASES STUDENT RESEARCH ACROSS RFU

by Sara Skoog

Photos by Michael R. Schmidt

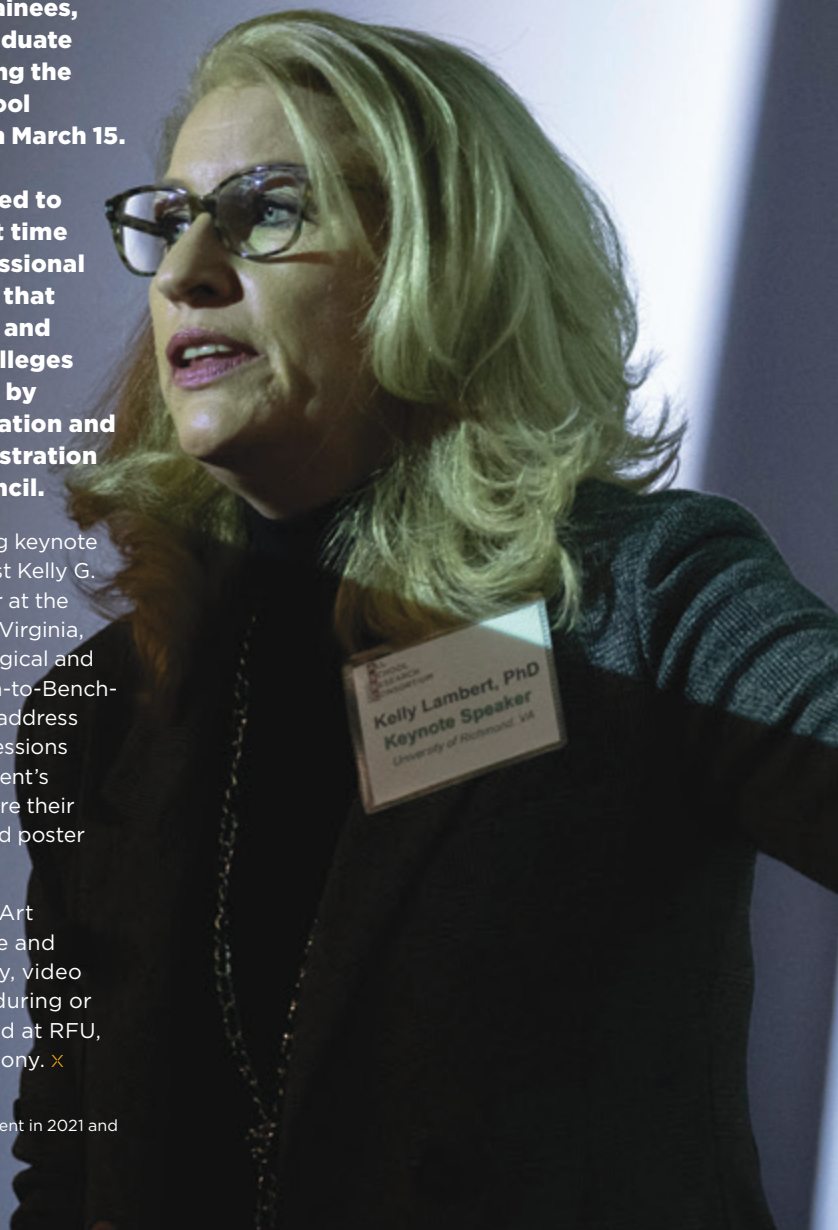
The wide-ranging research interests of RFU's students, postdoctoral trainees, resident clinicians and undergraduate interns were on full display during the university's 18th Annual All School Research Consortium (ASRC) on March 15.

This annual event, which returned to an in-person format for the first time since 2019¹, is a truly interprofessional healthcare and scientific forum that highlights the work of students and trainees from all six of RFU's colleges and schools. ASRC is organized by RFU's Graduate Student Association and supported by university administration and the Executive Student Council.

The program started with an engaging keynote address from behavioral neuroscientist Kelly G. Lambert, PhD, MacEldin Trawick Chair at the University of Richmond in Richmond, Virginia, titled "Brains Gone Wild: Neuroethological and Mental Health Perspectives from Bush-to-Bench-to-Bedside." Following Dr. Lambert's address were research symposia and poster sessions that provided opportunities for the event's approximately 100 participants to share their research project outcomes via oral and poster presentations.

The day concluded with the annual "Art from the Benchtop" exhibit, a diverse and illuminating selection of photography, video and other creative works produced during or inspired by research being conducted at RFU, followed by the ASRC awards ceremony. ✕

¹ ASRC was canceled in 2020 and was a virtual event in 2021 and 2022 due to the COVID-19 pandemic.



Above: Dr. Lambert is a professor in the Department of Psychology at the University of Richmond, where her current emphasis is on experience-based neuroplasticity. Left: ASRC attendees included student leadership, faculty and staff from the School of Graduate and Postdoctoral Studies, including SGPS Dean Joseph X. DiMario, PhD, at right.

ASRC 2023 Award Recipients

BEST SCIENTIFIC TALK AWARDS

Kaitlyn Alleman, CMS '25

"Multimodal Deep Learning-Based Prognostication in Glioma Patients: A Systematic Review."

Aya Alwan, COP '25

"Impact of COVID-19 on the Academic Performance of Graduate Healthcare."

Pauline DeJesus, DNP '23

"Ultrasound-Guided Regional Anesthesia Curriculum Development."

Umida Ganieva, MD, PhD, postdoctoral fellow (Microbiology and Immunology)

"Regenerative Power of IL-22 in Endometrial Healing."

Emily Shuangyue Cao, SCPM '25

"Utilizing a Plaque Assay and q-PCR Protocol to Correlate Coronavirus MHV-1 Concentration with Infectious Units."

Matthew Stratton, SGPS '24 (Cell Biology and Anatomy)

"Antisense Oligonucleotides to Treat Vision Loss in a Porcine Model of CLN3 Batten Disease."

Walter Wilson, CHP '23 (Physical Therapy)

"Results of a Portable Walking Response Inhibition Test (HMD-WRIT) with HMD & IMU in Healthy Young Adults."

BEST SCIENTIFIC POSTER AWARDS

Abigael Adediran, SCPM '25

"Do Current Prevention Guidelines Prevent Hospitalizations in People with Diabetes? An Analysis of a Large U.S. Health System in the Upper Northeast."

Yasmine Choroomi, CMS '24

"Comparison of Metrics between Zoom and Doxy.me in a Student-led Free Clinic."

Lijo John, DVM, PhD, postdoctoral research associate

"Therapeutic Blockade of Phosphatidylserine Receptors Enhances Anti-Malarial Immune Response."

Justin Marsee, DNP '23

"Lung Point-of-Care Ultrasound (POCUS) Content Creation."

Morgan Meulemans, CHP '23 (Physical Therapy)

"Prevalence and Faculty Perception of Obstetrics Education in the Entry-Level Doctor of Physical Therapy Curriculum in the United States."

Giorgio Papadatos, research intern, Lake Forest College/ RFU Summer Scholars Research Program

"7- or 8-Methyl-5-Substituted-Chromenopyridines and Their Anticancer Activity."

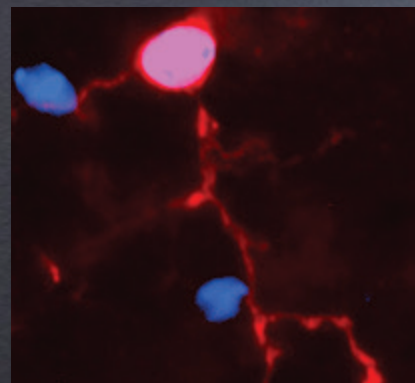
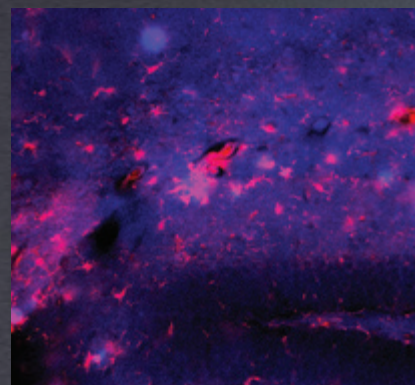
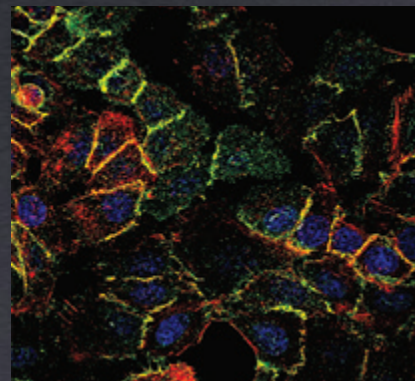
Elizabeth Sutherland, COP '24

"An Evaluation of Outpatient Pediatric Asthma Prescribing Patterns in the United States."

Ame Xiong, DPM/PhD student

"The Regulatory Mechanism of CaV2 Voltage-Gated Calcium Channel Abundance at the Presynaptic Terminal in *Caenorhabditis elegans*."

ART FROM THE BENCHTOP



"Art from the Benchtop" entries included (top to bottom) "Parade Ceremony" by the Sharma-Walia Laboratory; "Vecna's Curse" by Lainey Toennies; "Confluent Moon" by Elise Webber; and "Running Glial Girl" by Kelly Wilson, PhD.



ILLUMINATING THE IMPACT OF MENTHOL CIGARETTES ON CARDIOVASCULAR HEALTH

By Nancy C. Jao, PhD

THROUGH THE MICROSCOPE is a reoccurring *Helix* column that poses questions to members of the RFU community. Nancy C. Jao, PhD, was asked to detail her research on the impacts of menthol use in tobacco products.

Cardiovascular disease remains the leading cause of death in the U.S., with cigarette smoking accounting for one-third of cardiovascular disease-related deaths. While overall cigarette smoking is decreasing, the use of menthol cigarettes continues to raise concerns.

The U.S. Food and Drug Administration (FDA) has long considered banning menthol as a characterizing flavor in cigarettes due to its role in smoking initiation and smoking-related deaths. Menthol reduces the harshness and irritation from smoking, making it easier for individuals to start and continue smoking. As menthol suppresses nicotine processing, individuals who smoke menthols also often have a harder time quitting smoking. Due largely to targeted marketing by tobacco companies to minoritized and vulnerable groups, menthol cigarettes also contribute to tobacco-related health disparities.

Inflammation plays a significant role in the development and progression of smoking-related cardiovascular diseases, making it one of the top priorities of the FDA's Tobacco Regulatory Science Program. Cigarette smoke contains harmful chemicals that cause damage to blood vessels and trigger immune responses, leading to elevated biological markers of inflammation throughout the body. Elevations in these biomarkers are even detectable in individuals without visible symptoms, thus serving as early indicators of cardiovascular disease risk.

Studies on cellular and animal models have demonstrated that menthol flavoring can increase inflammatory response and dysfunction beyond the effects of smoking. However, limited research has explored whether menthol cigarette use also exacerbates cardiovascular damage by elevating system-wide inflammation in people who smoke.

Additionally, while a federal ban on menthol cigarettes would likely reduce overall use in the U.S., studies indicate that 25–50% of individuals who smoke menthols plan to switch to non-menthol cigarettes instead of quitting or switching to non-combustible products (e.g., e-cigarettes). It remains unclear whether switching from menthol to non-menthol cigarettes would have any benefit by reducing systemic inflammation.

As the Principal Investigator of the Health, Behaviors, and Tobacco Use (HaBiT) Research Lab at RFU, our lab's goal is to contribute to the development of clinical treatments and regulatory policies for tobacco products. Funded by the National Institutes of Health (NIH) and the FDA, our current five-year grant focuses on understanding the health effects of menthol cigarettes on inflammation and cardiovascular health. We will collect original data at the RFU Health Clinics by enrolling individuals who smoke menthol cigarettes in a five-week research study to examine potential changes in systemic inflammation biomarkers as they switch products. Through a smartphone app, we will gather real-time information to understand how behaviors, mood and perceptions may also change during a potential menthol cigarette ban.

While the clinical field has largely moved to focus on the rise of e-cigarette use, it is still essential to remain mindful of menthol cigarette use. It is important for both researchers and clinicians to note that cigarettes are not a uniform category, and that the type of cigarette an individual uses may have specific implications for their health and ability to quit smoking. By examining the impact of menthol on sensitive clinical measurements and chronic diseases, we hope to better understand the potential health implications of tobacco control policies. ✕

While the clinical field has largely moved to focus on the rise of e-cigarette use, it is still essential to remain mindful of menthol cigarette use.

Dr. Nancy C. Jao is an assistant professor and clinical psychologist in the Department of Psychology at RFU.



CONTROLLED BREATHING: CONNECTING TO CALM

By Kaiwen Kam, PhD

While the effects of breathing on emotion and pain are well-known, up until recently a biological mechanism evaded discovery.

“Take a deep breath in, and let it out ...”

Anyone who has practiced mindfulness, meditation, yoga or similar exercises would recognize the instruction to breathe as an integral aspect of their routines. Indeed, for millennia, breathing exercises have been recognized to produce calming and stress-relieving effects and can even help pain control during labor. While the effects of breathing on emotion and pain are well-known, up until recently a biological mechanism evaded discovery.

Breathing is controlled by the brain. The diaphragm and upper airway muscles that generate and regulate airflow contract in response to activity from nerve cells or neurons in the brain and spinal cord. In fact, a small network of neurons in your brainstem is responsible for generating the rhythm of breathing. This

small network is called the preBötzinger Complex. Despite the seeming simplicity of breathing, the preBötzinger Complex actually has a very difficult task. It needs to sustain breathing for the lifespan — in humans, half a billion breaths over the average 76-year lifespan. The preBötzinger Complex also has to regulate breathing frequency and tidal volume to accommodate changes in metabolic demand, such as during exercise, and to coordinate regular breathing with behaviors that share the airway like sighing, swallowing, crying and speaking.

To manage this task, groups of preBötzinger Complex neurons play different roles in processing the information that comes in and determining how and where respiratory activity is sent out. In collaboration with investigators at UCLA and Stanford University, we discovered a particular subgroup of preBötzinger Complex neurons that expressed a protein called cadherin-9. Inactivating these cadherin-9-expressing neurons in mice models caused the models to spend more time sitting or engaged in calm, resting behaviors, such as grooming, but did not otherwise appear to affect breathing. Interestingly, these neurons sent their signals to the locus coeruleus, a brain region known to regulate brainwide arousal and attention. We suggested that these cadherin-9-expressing preBötzinger Complex neurons therefore link breathing with arousal and attention.

Because breathing responds faithfully to physiological state, we speculate that this connection naturally functions to ensure heightened brain arousal and attention in stressful situations where breathing rate is increased. A weakened connection between breathing and arousal may underlie Sudden Infant Death Syndrome, whereas an overactive connection may produce a vulnerability to anxiety or panic disorders. On the other hand, we suggest that this link can be co-opted to produce calm and relaxation through volitional slowing of breathing that may be useful for relieving stress, fear, anxiety, panic, depression and pain. The discovery of these preBötzinger Complex cadherin-9 neurons thus fills a major gap in the complex interplay of breathing, emotion and cognition and opens up new avenues for exploring pathological and healthful links between breathing and complex behavior.

Cadherin-9 neurons are only one subpopulation of preBötzinger Complex neurons. My group continues to uncover roles for other neuronal subtypes in preBötzinger Complex and dissect the surprisingly complex circuitry controlling breathing. Through our study of this fundamental rhythm of life, we hope to understand how the simple act of breathing in and breathing out affects behavior, mood, and cognition in health and disease. X

Dr. Kaiwen Kam is an associate professor of Cell Biology and Anatomy in the Stanson Toshok Center for Brain Function and Repair at RFU. He received his PhD from the University of California, San Francisco, and did his postdoctoral studies at the University of California, Los Angeles.

THROUGH THE MICROSCOPE is a reoccurring *Helix* column that poses questions to members of the RFU community. Kaiwen Kam, PhD, was asked for an overview of his work identifying nerve cells in the brainstem that connect breathing to states of mind.

Perspectives expressed in “Through the Microscope” columns are solely those of the authors and are not intended to represent those of Rosalind Franklin University.

PUTTING FEET FIRST

FORMER SOCCER PLAYER PURSUES DPM

By Sabreen Alfadel

Photos by Michael R. Schmidt

Max Tefo, SCPM '25, is a father, husband, athlete, physical therapist and student. A descendant of the Bamiléké tribe from West Cameroon who was raised in France, Mr. Tefo was offered a full-ride scholarship to move to the United States and play soccer as a student-athlete. Little did he know that this opportunity would open many doors and actualizations in his personal and professional life.





He earned a bachelor's degree in biology from Iowa Wesleyan University, where he met his wife, earned a doctorate in physical therapy at St. Ambrose University in 2018, and is now enrolled at Dr. William M. Scholl College of Podiatric Medicine.

Mr. Tefo's journey to podiatric medicine was certainly eventful, reflecting his perseverance and discipline, qualities that he's carried with him since he was a child. Prior to his professional soccer career, he practiced martial arts for 10 years. Mr. Tefo's active lifestyle taught him about the importance of believing in oneself, and to push even at the point of giving up.

"I brought that mentality into soccer, into school (and) I have that same mentality as I go through my life," he explained. "As I mature and get more confident in myself and my abilities, I start searching for more growth. I don't think stability is a thing. You either grow, or you don't."

Before actualizing his path in podiatry, Mr. Tefo moved to Illinois with his wife, where he worked as a physical therapist at Northwest Rehabilitation among orthopedic surgeons. It was during this time that he was introduced to podiatry, specifically by a colleague of his who happened to be a foot surgeon. "He was absolutely phenomenal in what he did, and also knew physical therapy very closely. He was like a bridge between medicine and physical medicine. I (decided to) approach him, and he told me what 'DPM' means," Mr. Tefo recalled.

After a year of working as a physical therapist, Mr. Tefo knew that he wanted to go back to school. His work with physicians and ankle surgeons and researching podiatry inspired him to apply to Dr. William M. Scholl College of Podiatric Medicine.

"I always have that desire to prove myself," said Mr. Tefo, before he began to reflect on his upbringing in Cameroon. "When you have people that go two days without food, that is not okay. When you have people that would walk 10 miles to get water, like I did at seven years old, that is not okay.

"The only thing we can afford to do is play soccer barefoot," he continued. "So, growing up I saw a lot of people with foot deformities. That always intrigued me."

"When podiatrists see patients, they don't only think about fixing the problem — they also think about the patient's ability to live his life once the problem is fixed."

Having witnessed many pediatric foot deformities, Mr. Tefo discovered that his dream is to eventually travel back to his birth country to make an impact through conservative treatments and rehabilitation. More specifically, he desires to work toward developing a prosthesis that is less reactive to the body.

"When podiatrists see patients, they don't only think about fixing the problem — they also think about the patient's ability to live his life once the problem is fixed," Mr. Tefo said. "A hammer and a chisel are not the only tools we have. We have surgery, we have medicine, we treat wounds, we diagnose cancer — there's a whole world of medicine focused just on the foot. I want the future me of 10 years to think back and say, 'We did it.'" x

Sabreen Alfadel is a staff writer with the RFU Division of Marketing and Brand Management, specializing in content development for social media efforts and initiatives. Learn more at rfu.mslsocialmedia.

Mr. Tefo's display of soccer skills on the RFU campus reflects his athletic career at Iowa Central Community College and Iowa Wesleyan University.



PRETRIAL MOTIONS

THE 'INCREDIBLY HUMANIZING' FIELD OF FORENSIC PSYCHOLOGY

By Margaret Smith

At the junction of criminal justice and health care lies the field of clinical forensic psychology — which applies psychological skills related to research, assessment and treatment to the legal field. One common aspect of clinical forensic psychology is the assessment of criminal defendants in order to find the proper course of action, including treatment. The hybrid approach of a forensic psychologist — such as Sara Millspaugh, PhD '21 — aims to suss out, understand and treat the root causes of criminal behavior.



For Dr. Millspaugh, her decision to pursue this field was made her senior year of high school after an impassioned psychology teacher brought it to her attention. From there on, the academic path she followed — including undergrad at the University of Georgia, employment with the University of Virginia (UVA) and graduate studies at RFU — was lined with professors and mentors who encouraged her.

Because of that same high school teacher, Dr. Millspaugh said, she began taking and “fell in love with” criminal justice-related classes. Because of a teacher’s assistant, she found a love for researching, a core pillar of her career. Because of the work she did with people she described as her “most crucial mentors” — Dr. Janet Warren of UVA and David S. Kosson, PhD¹, who was “the reason I came to Rosalind Franklin” — she cemented her passion for the career.

Left: Dr. Millspaugh, at left, has authored or co-authored articles on the lethality of non-familial child abductions in *Behavioral Sciences & the Law* and on the relationship between psychopathy and conviction rates in *Psychology, Crime & Law*. (Provided by Dr. Millspaugh)

Now, Dr. Millspaugh — originally from Baltimore — is living in New Mexico, working with Gold Standard Forensics, LLC. A plus to her career thus far has been the opportunity to move around and see firsthand the differences between states’ legal systems — though regardless of location, the bulk of Dr. Millspaugh’s work revolves around competency to stand trial evaluations.

“Because of a client’s cognitive or mental health issues ... does that impact their ability to stand trial? Can they learn about court proceedings? Can they rationally take the information they know and apply it to their case? Can they work with their lawyer and defense?” Dr. Millspaugh said. “Typically, it’s just an interview with the person. Sometimes we’ll do testing if we think there’s a cognitive issue, like intellectual disability or anything like that.”

“Because of a client’s cognitive or mental health issues ... does that impact their ability to stand trial? Can they learn about court proceedings?”

Other types of evaluations Dr. Millspaugh conducts are mitigation and diagnostic/treatment evaluations — which involve assisting defense attorneys to ensure their client receives a certain sentence or a specific type of treatment. These evaluations may include discussing clinically relevant matters, such as the impact of trauma on the defendant’s functioning or the effects of incarceration of a parent on a child.

This type of consultation and intercession on behalf of the client reveals a part of the criminal justice system that is often stifled: humanizing those who have committed crimes.

“It’s really about talking to them. We go through their full background: Where were you born and raised? How was your relationship with your parents? ... Everything. What’s your mental health treatment? What are their current symptoms? Also, what do we observe by our interactions with them, and what do other people observe? So it really is kind of the human side,” Dr. Millspaugh said. “I’ve worked in jails, prisons and various other (institutions), but I loved working in corrections, because you really got to know the person instead of their crime.”

She added that in these circumstances, one must be aware of their biases and check them, because for Dr. Millspaugh, these experiences “really changed the way I view the world. ... That’s really what forensic psychology is, and I’ve found it should be incredibly humanizing.” ✕

¹**Dr. Kosson** is a professor of Psychology in the College of Health Professions, and of Foundational Sciences and Humanities and Humanities & Health Care in Chicago Medical School.

Margaret Smith is a Chicago-based freelance editor and writer whose work largely focuses on current sociopolitical happenings.

AN ENDURING LEGACY



MATTHEW N. HARRIS, MD '56

Devotion to Chicago Medical School and its students was a constant thread through the career of Matthew N. Harris, MD '56, who died in April 2023 at age 91.

Dr. Harris served on the RFU Board of Trustees from 2004 to 2012 and was a longtime member of the CMS Alumni Association Board of Governors. He was also a recipient of the CMS Distinguished Alumnus Award, which reflected a career that included service in a Mobile Army Surgical Hospital (MASH) unit in Korea from 1958-59 and 50 years as a surgical oncologist at NYU Langone Health in New York City. Dr. Harris also served as a professor of surgery at NYU School of Medicine and was one of the first attending physicians at NYU's University Hospital.

His enduring legacy on the RFU campus is witnessed through the Harris Collaboration Hub, which was named in honor of Dr. Harris and his wife Frances in 2020 to welcome arrivals and provide a common area at the Innovation and Research Park.

"I launched a very, very successful and satisfying career, and there's no question that it all started at CMS, and I never forgot it."

In 2022, Dr. Harris and several colleagues from the CMS Class of 1956 held a mini-reunion via Zoom, during which he described his loyalty for his alma mater.

"I launched a very, very successful and satisfying career," he said, "and there's no question that it all started at CMS, and I never forgot it." x



IRP UPDATE: MORE THAN 10 NEW WET LAB SPACES AVAILABLE FOLLOWING \$4 MILLION BUILDOUT

A successful collaboration between RFU and the state of Illinois was completed in May with final buildout of 14,000 square feet of wet lab space for bioscience-industry occupancy in the Innovation and Research Park (IRP).

The improvements encompass 8,000 square feet — two labs of approximately 4,000 square feet each — on the IRP's first floor and 6,000 square feet divided into nine individual labs on the second floor. RFU has recruited the real estate brokerage firm Avison Young to help attract life science industry tenants.

The work was completed in partnership with the Illinois Department of Commerce and Economic Opportunity (DCEO) under the state's Wet Lab Capital Program — designed to expand private wet lab research infrastructure for the state's growing bioscience industry. The university was awarded \$2 million in matching Rebuild Illinois funds in October 2021.

The buildout — which includes installation of chemical fume hoods, biosafety cabinets and emergency back-up power — was hailed by Gov. J.B. Pritzker as a boost for the region and the state.

"Here in Illinois, we are proud to be a hub for biosciences, technology and innovation — and one of the many ways we are pushing our rapidly-expanding industry forward is through our Rebuild Illinois Wet Lab Capital Program," he said. "Congratulations to the entire RFU team — I can't wait to see all that they will accomplish."

"We're creating an environment where academic and industry scientists can work together to solve complex health challenges," said RFU President and CEO Dr. Wendy Rheault. "We're grateful for state resources that encourage investment and drive innovation."

RFU completed its 100,000-square-foot IRP in December 2019 and began the relocation of six disease-based research centers and more than 100 scientists into 68,000 square feet of that space in January 2020. The remainder of the space was designated for industry partners. RFU next built out an additional 7,000 square feet for the biotech company Air Answers.

The IRP also houses eight conference rooms, and autoclave/glass wash and lab ice machines on each floor. The entry floor includes the Harris Collaboration Hub, which recently reopened its Grab N Go Cafe.

RFU's home base of Lake County, Illinois, contains more than 122 life-science companies and 33,000 life-science jobs. In April, RFU hosted Bisnow's Lake County Life Sciences Real Estate Summit at the IRP, and part of the discussion centered on the Chicago region's move into the CBRE's¹ top 10 life-science employment clusters in the U.S.

"Lake County and Chicagoland have long suffered from an acute shortage of wet lab research space," said RFU Executive Vice President for Research Ronald S. Kaplan, PhD. "The DCEO has helped bridge the gap so that Illinois life science companies can continue to attract investment." [x](#)

"Congratulations to the entire RFU team — I can't wait to see all that they will accomplish."

**Illinois Gov.
J.B. Pritzker**



Opposite page: Dr. Harris and his wife attended dedication ceremonies in November 2019 for the IRP Collaboration Hub named in their honor. Top of page: The Collaboration Hub in 2023. Above: Newly finished wet lab space in the IRP.

¹"2023 Life Sciences Outlook: Rising Uncertainty Amid Burgeoning Scientific Discovery"
[cbre.com/insights/books/2023-us-life-sciences-outlook](https://www.cbre.com/insights/books/2023-us-life-sciences-outlook)



PARTNERSHIP IS KEY COMPONENT IN WEARABLE-TECH DEVELOPMENT

By Sara Skoog

Collaboration is at the heart of our work at RFU, and the university's Innovation and Research Park (IRP) and Helix 51 incubator are hubs for research collaboration. RFU scientists and industry partners with expertise in a wide range of specializations are teaming up to translate lab discoveries into game-changing diagnostics and therapeutics.

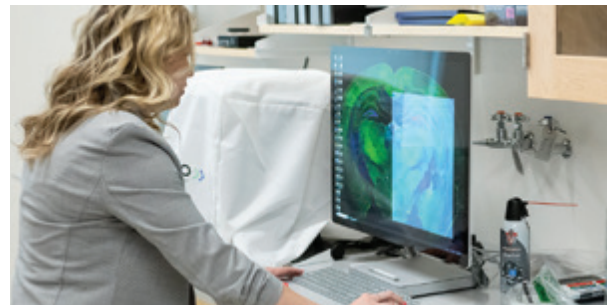
The IRP's Connie Cleary, DPM, director of innovation and industry relations, is a key facilitator for these research partnerships, with the support of Ronald S. Kaplan, PhD, RFU's executive vice president for research. Dr. Cleary recently connected RFU scientists in need of specialized biosensors with AffirmXH, a medical device startup that develops technology for gathering, analyzing and responding to biometric data. AffirmXH is currently working on projects with researchers at the Center for Lower Extremity Ambulatory Research (CLEAR) and with Holly Hunsberger, PhD, assistant professor of neuroscience.

"Our collaboration started with this idea I had about creating some kind of noninvasive, wearable tech for mice," Dr. Hunsberger said. "There are ways to monitor animals that are invasive, or there are special cages that you can use. But there's nothing that is truly noninvasive that tracks individual animals across their lifespan."

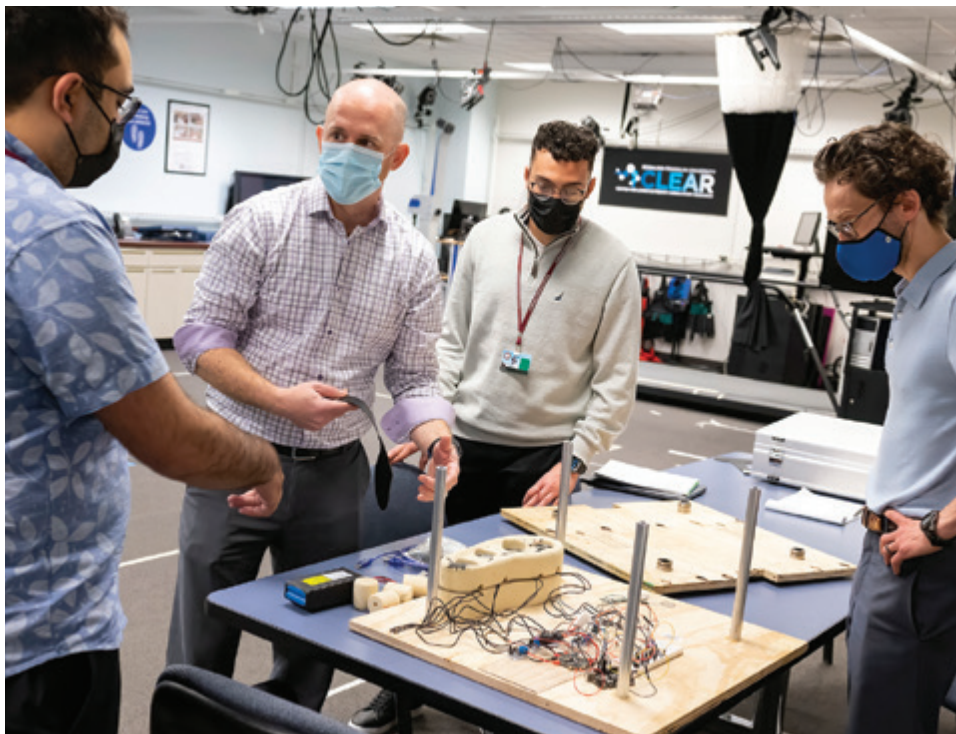
Dr. Hunsberger and AffirmXH created a basic version of the animal monitoring device, using a sensor the company developed for monitoring fevers in infants. "That sensor records the baby's temperature, and if it goes above a certain level, the sensor sends an alert to the parents' smartphone," Dr. Hunsberger explained. "We used that idea as the basis for something similar with animals. We put the sensors in little 'jackets' and put the jackets on rats. The sensors recorded the rats' temperatures while the rats were in their home cage, which demonstrated proof of concept that wearable tech could work for mice and rats."

Dr. Hunsberger notes that this project is still in the very early stages. Next steps include securing grants to fund development and testing of a sensor that measures multiple data points, not just temperature. "We're applying for a Department of Defense grant, and NIH funding through the National Institute on Aging. The grants would be used to shrink the sensor to a size small enough that it wouldn't be noticed by the mouse wearing it. The goal is for AffirmXH to help us develop different prototypes once we secure funding."

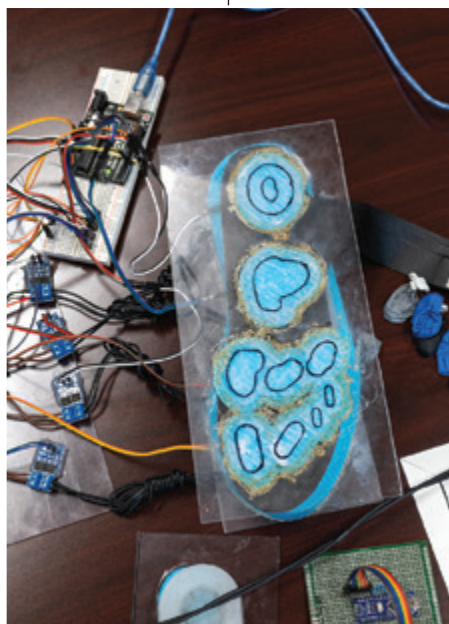
"Our collaboration started with this idea I had about creating some kind of noninvasive, wearable tech for mice."



Opposite page, clockwise from upper left: Dr. Hunsberger addresses a gathering in RFU's Centennial Room in September 2022; circuitry for the wearable tech experiments is shown with a quarter for scale; Dr. Hunsberger reviewing data in her lab; the vest used on animal models. Clockwise from top: Dr. Crews, second from left, and Dr. Rosenblatt, at far right, discuss a CyberSole prototype with colleagues from the University of Illinois, Chicago; CyberSole orthotics are tested on a treadmill; a footprint image that is used to determine pressure points.



“We’re starting with all the great research that the CLEAR group has developed, and combining that with our background in creating products for commercial use.”



CYBERSOLE PROJECT: NEXT STEPS

AffirmXH is also collaborating on an established project in development at RFU: CyberSole, an intelligent orthotic insole that measures the pressures exerted on the foot and adjusts its material properties to meet the wearer’s specific offloading needs throughout the day. Noah Rosenblatt, PhD, associate professor and Scholl College’s associate dean of research, and Ryan Crews, PhD, associate professor, CLEAR, have already established proof of concept and are now working with AffirmXH on a CyberSole prototype that can be developed into a finished product and brought to market.

“We’re starting with all the great research that the CLEAR group has developed, and combining that with our background in creating products for commercial use,” said Tom Hall, AffirmXH chief executive officer. “We’re currently testing various components to see how they work best in this type of insole. There’s lots of back-and-forth between our designers to determine the mechanical and electrical properties we need, and how we iterate on that to reach a point where we can say, ‘Yes, we can make this.’”

According to Mr. Hall, the current phase of the project involves identifying the specific characteristics needed to ensure appropriate responsiveness of the insoles to the pressures of the foot. He noted that this could be particularly helpful in minimizing or preventing “hotspots” that can develop into foot wounds in diabetic patients. “The next stage would be working with RFU to apply for grants to go ahead and start prototyping this, ultimately leading to a commercial product.” x



RESEARCH PUBLICATIONS AND EXTRAMURAL FUNDING

Rosalind Franklin University’s researchers are nationally recognized for their work in basic and clinical sciences. Visit our 2021-22 list of publications and extramural funding: rosalindfranklin.edu/research/researchers/recent-publications-or-grants



NORTHWESTERN UNIVERSITY STUDENTS HELP HELIX 51 COMPANIES COMMERCIALIZE THEIR SCIENCE

By Judy Masterson

RFU's Helix 51 incubator is helping its member companies make the leap from discovery to commercialization of urgently needed new therapeutics.

"The only way our science can reach cancer patients is to be successful as a business."

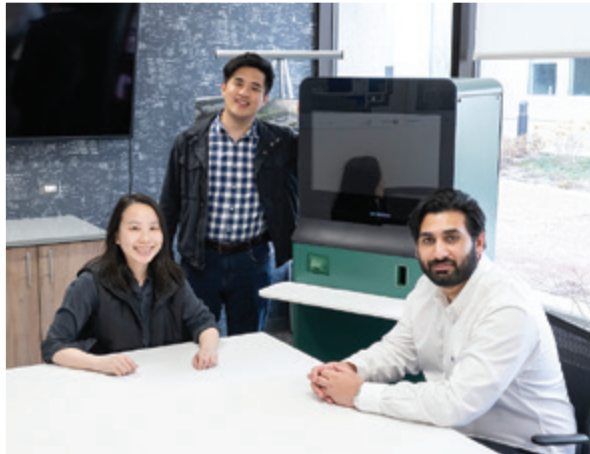
"We're scientists. We aren't trained in business," said Amanda M. Schalk, PhD, co-founder and COO for Enzyme by Design, which is engineering enzymes as superior cancer therapeutics. "But we're on this journey of entrepreneurship. We think we can make drugs that kill cancer cells without the horrible side effects of chemotherapy. The only way our science can reach cancer patients is to be successful as a business. We realize that we need a lot of help."

The incubator provides access to industry experts and other resources that now include services through a Northwestern University (NU) course practicum. Students in Northwestern Engineering's Master of Biotechnology Program helped Dr. Schalk and her colleagues understand drug pricing, think about how to pitch to potential investors and perceive competitive impact to include pre-approved pipeline drugs, as well as those already on the market.

"Our meetings with the interns were extremely proactive," Dr. Schalk said. "They did a deep dive into our molecule, into future markets, to see how we're going to be placed. They helped us figure out our target product profile and what's important to the patients, to the physicians, in order for this to get into clinical trials."





Students created a decision matrix for ARTEC Biotech to help determine the initial clinical application for their technology, which is focused on developing a natural killer (NK) cell-based cancer immunotherapy that is less toxic, less costly and more efficient than current treatments.





Left: Everyplace Labs co-founders, from left, Claire Zhou, Michael Tu and Burhan H. Adhami, move a prototype of their self-service diagnostic kiosk into the company's Helix 51 lab space in March 2022.

Opposite page: Top: Yekaterina Galat, MS, and Vasil Galat, PhD, meet with Michael S. Rosen, MBA, managing director of the Innovation and Research Park and Helix 51 Incubator. The Galats' early-stage company, ARTEC — which stands for Art of Engineered Cells — is working to develop a potent NK cell-based immunotherapeutic for cancer treatment. Below: The Helix 51 Incubator offers more than 5,500 square feet of laboratory, office and conference-room space, including labs with biological safety cabinets and chemical fume hoods.

IRP AND HELIX 51 INCUBATOR COMPANIES		
INDUSTRY SUPPORTERS    	CANCER	ARTEC BIOTECH
		ENZYME BY DESIGN
		UP ONCOLYTICS
		BLR BIO
	CARDIAC	RESUSCITATION THERAPEUTICS
	IMMUNE/FIBROTIC DISORDERS	BLR BIO
	FIBROMYALGIA	KATZ DIAGNOSTICS
	INFECTIOUS DISEASES/ ALLERGENS	EVERYPLACE LABS
		INTEGRATED LIFE SYSTEMS
		AIR ANSWERS
		COVIRA SURGICAL

“We’re developing a product that’s very versatile and could be beneficial in so many areas — cancer, infectious disease, fibrosis, HIV,” said ARTEC co-founder and COO Yekaterina Galat, MS. “It’s hard to just decide.”

Armed with the stipulation to seek out cancers that aggressively downregulate immune cells and analysis of factors including the competitive landscape, potential patient population and intellectual property assessment, the students helped ARTEC zoom in on options for product development.

“Thanks to the students, we will be able to create a strong narrative for future pitches and grant funding applications,” Ms. Galat said.

“We were one of the first labs to develop this technology to convert stem cells to NK cells,” said ARTEC Founder Vasil Galat, PhD. “It took us quite a lot of time to focus it into a commercial licensing strategy. We’re in a strong starting position to begin our search for funding and that’s something the incubator can help us with too.”

In addition to the assistance provided by NU, Helix 51 companies benefit from internships through the Chicago-Kent College of Law-Illinois Institute of Technology and RFU’s College of Pharmacy. X

Judy Masterson is a staff writer with RFU’s Division of Marketing and Brand Management.



LEARN MORE ABOUT HELIX 51 ENTREPRENEURS IN RESIDENCE

and watch the Biomedical Educational Seminars they presented in 2022 by visiting: rosalindfranklin.edu/calendar/biomedical-educational-seminars

“The team is wanting to understand the health education needs of community members. What’s their lived experience in obtaining health-related information?”



CENTER FOR HEALTH EQUITY RESEARCH PARTNERS WITH COMMUNITY COALITION TO ADDRESS HEALTH LITERACY

By Judy Masterson



The university’s Michael Reese Foundation Center for Health Equity Research (CHER) is partnering with the Live Well Lake County (LWLC) Access to Care Action Teams to collect information on the health needs in Lake County, Illinois.

Four Chicago Medical School students spent their summer designing a survey, as well as other methods of data gathering, which will be available in English and Spanish. Results will help inform the development of a community health curriculum, with the goal of improving health literacy by 10%.

The Live Well Lake County Network brings together over 50 community organizations and community members to implement the 2022-26 Community Health Improvement Plan (CHIP). CHIP is focusing on three priority areas for action: education, housing and access to care.

CHER Founding Director Amanda M. Simanek, PhD, MPH, and CHER Community Engagement Core Lead Yvette D. Castañeda, PhD, MPH, MBA, are members of LWLC’s Access to Care and Education action teams. The teams are led by representatives from groups including the Healthcare Foundation of Northern Lake County, the Waukegan Public Library and invested community members.

“The team is wanting to understand the health education needs of community members,” Dr. Simanek said. “What’s their lived experience in obtaining health-related information? How do they get it? Do they use WhatsApp or go to their doctor or to the library?”

A parallel survey will inventory existing health education services provided by community-facing organizations. RFU students may have the opportunity to participate in future phases of the project, including data collection and analysis or dissemination along with survey design, Dr. Simanek noted. Students will present a poster on the process this fall. [x](#)

Top of page: Dr. Castañeda is a research assistant professor in CMS’s Department of Foundational Sciences and Humanities. Above: Dr. Simanek was named CHER’s founding director in 2022.

DR. DAREY RETURNS TO ALMA MATER ON RFU BOARD

Elmhurst Hospital president and Chicago Medical School alum Kimberley Darey, MD '04, was elected in May to the RFU Board of Trustees.

Dr. Darey has been with Elmhurst Hospital since 2010, with roles that have included chair of the Diversity, Equity and Inclusion Council and Health Equity Taskforce. She has also been a member of the Elmhurst Hospital Foundation Board, the Elmhurst Outpatient Surgery Center Board and the Board of Managers for Illinois Health Partners. Prior to her role as president, she served as the hospital's medical director of obstetrics and gynecology.

After starting her career as a chemist working in the pharmaceutical industry following graduation from Xavier University of Louisiana as a chemistry major, Dr. Darey entered CMS. She completed an OB/GYN residency at St. Joseph Hospital in Chicago before going into private practice.

Among Dr. Darey's many awards and honors are *Crain's Chicago Business'* 2022 Most Notable Executives of Color in Healthcare, and the CMS 2022 Distinguished Alumni Award for Service. ✕



“These studies will increase our understanding of the mechanisms that regulate inflammation not only during infection but also in a number of pathologies caused by sterile inflammation.”

Left: Dr. Darey in 2022. Right: Dr. Re working with a lab colleague.

FIVE-YEAR STUDY OF SEVERE LUNG INFECTIONS EARNS NIH GRANT

Cancer Cell Biology, Immunology, and Infection professor of microbiology and immunology Fabio Re, PhD, was awarded a five-year, \$2.57 million grant from the National Institutes of Health's National Institute of Allergy and Infectious Diseases this spring to investigate the role of a key inflammatory response in lung bacterial infections such as sepsis.



The Centers for Disease Control and Prevention estimate that 1.7 million adults in the U.S. develop sepsis annually — the overwhelming or impaired whole-body immune response to an infection or injury — and nearly 270,000 die as a result. Sepsis can progress rapidly, with the patient spiraling toward septic shock with multiple organ failure. It is caused by bacterial and viral infections that include COVID-19.

“These studies will increase our understanding of the mechanisms that regulate inflammation not only during infection but also in a number of pathologies caused by sterile inflammation,” Dr. Re said. “Our work will potentially facilitate development of therapeutic interventions that encourage Caspase-11-dependent protective responses but inhibit the deleterious ones.” ✕



JOIN US IN SUPPORTING COMMUNITY HEALTH CARE FOR ALL

Learn more about how RFU is advancing health care in education, research and communities.

A philosophy of encouraging research was part of CMS, "in order to advance the boundaries of knowledge, and because it is believed that teaching without research is likely to be sterile."

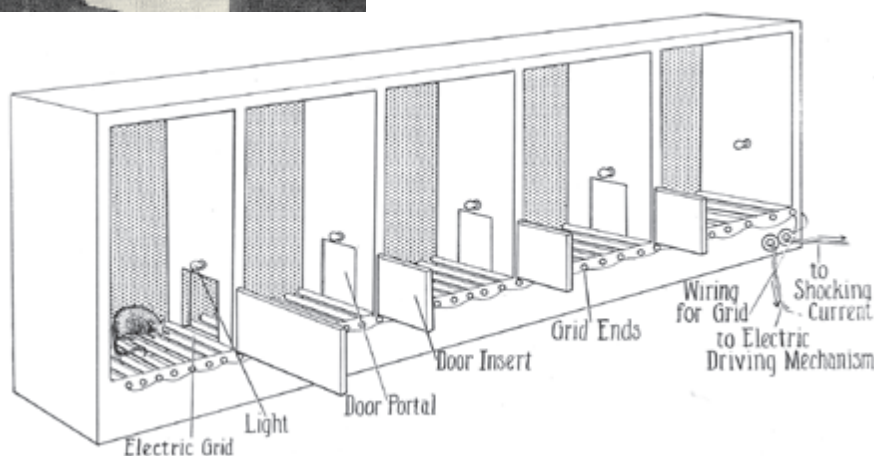
PARALLEL TRACKS: 70 YEARS AGO, DR. ROSALIND FRANKLIN'S DNA MILESTONE REFLECTED PROGRESSIVE RESEARCH CULTURE AT CMS

By Kelly Reiss

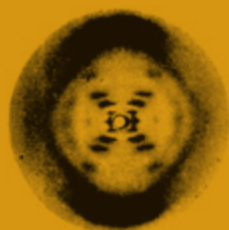
Dr. Rosalind Franklin's work more than 70 years ago at King's College in London (September 1951–May 1953) to create and analyze Photograph 51 unlocked mysteries behind the double-helix structure of DNA. Across the Atlantic in the middle of the U.S., research at Chicago Medical School aimed to unravel biological processes affecting patient health.



At left, a laboratory technician in the CMS Biochemistry laboratory on the first floor of the 710 S. Wolcott building investigates chemical changes in kidney disease in 1951. The study was both biochemical and clinical in nature, as it also involved patient populations from Cook County and Mount Sinai hospitals. The photo provides a window into the working spaces of those advancing science in the early 1950s, and allows for reflection on the similarities and differences of today's research environment.



As Dr. Franklin and Raymond Gosling toiled to modify and test the camera they would employ for X-ray crystallography in London, in Chicago, CMS Research Fellow Melvin Goldzband, MD '55, applied creativity to construct an apparatus (illustrated above from the October 1951 *CMS News*) for a study with Dr. George Clark, associate professor of neuro-anatomy, to employ critical fusion frequency to gain understanding of retina function and advance the diagnosis of brain injuries and visual disorders.



THE PATH TO
PHOTO 51

1951

Dr. Rosalind Franklin is awarded a three-year research fellowship at King's College London to study changes in protein solutions. King's College then instructed Dr. Franklin to use her expertise in X-ray diffraction to investigate the structure of DNA.



By October 1952, when the photo at left was published in *CMS News*, Dr. Franklin was deeply immersed in X-ray crystallography of the “B” form of DNA, a technique that included

long exposures to create an image. Over the same period of time, Dr. A. Robert Goldfarb, professor in the CMS Department of Biochemistry, partnered with several faculty members to use radioactive isotopes to investigate cancer growth on the skin, kidney function, the flow of blood through the heart and lungs, and the potency of inhibitors and stimulants of thyroid function. Dr. Goldfarb employed the known techniques and precautions of working with radioactive material.



The articles within the *CMS News* bimonthly newsletter published parallel to Dr. Franklin’s 20 months at King’s College contain many mentions of CMS faculty, staff and alumni drawing on their research activities to present to professional and community organizations and conferences; sharing laboratory space at CMS with international visitors; and rising to leadership on committees of the AMA and other organizations. The articles paint a landscape of diverse research activities, including studies in cancer, diabetes, hemolytic anemia and environmental health effects. A

philosophy of encouraging research was part of CMS, “in order to advance the boundaries of knowledge, and because it is believed that teaching without research is likely to be sterile,” as stated in the December 1951 *CMS News*.

The newsletters indicate CMS raised more than \$243,000 in contributions and laboratory equipment for research efforts during this period (\$2.7 million in today’s dollars). Several of the grants were from the U.S. Public Health Service, which established the Research Grants Office in January 1946 to administer the Office of Scientific Research and Development projects transferred at the end of World War II, and to operate a program of extramural research grants and fellowship awards. This support and accounting of activities illustrates the important place of the research both within the school and the greater scientific community. ✕

Kelly Reiss is director of the Rosalind Franklin University Archives and the Feet First Exhibition.

CORRECTING THE RECORD

April 25, 2023, marked the 70th anniversary of James Watson and Francis Crick revealing the structure of DNA in the journal *Nature*. The milestone brought with it widespread reappraisal of Dr. Franklin’s role in the discovery — including in a commentary published in *Nature* itself:

In 2022, we visited Franklin’s archive at Churchill College in Cambridge, U.K., and went through her notes together, reconstructing the development of her ideas. We also found a hitherto unstudied draft news article from 1953, written in consultation with Franklin and meant for *Time*, a U.S. magazine with international reach — as well as an overlooked letter from one of Franklin’s colleagues to Crick. Together, these documents suggest a different account of the discovery of the double helix. Franklin did not fail to grasp the structure of DNA. She was an equal contributor to solving it.

— “What Rosalind Franklin Truly Contributed to the Discovery of DNA’s Structure,” Matthew Cobb and Nathaniel Comfort, *Nature* [nature.com/articles/d41586-023-01313-5](https://www.nature.com/articles/d41586-023-01313-5)

Was Franklin robbed? Yes. It’s clear that her data was passed on without her knowledge, and she was given insufficient credit for it. That wasn’t proper then, and it’s not now.

— “Opinion: 70 Years Ago, the Structure of DNA Was Revealed. Was Rosalind Franklin Robbed?” Dan Levitt, CNN [cnn.com/2023/04/25/opinions/dna-structure-discovery-rosalind-franklin-levitt-scn/index.html](https://www.cnn.com/2023/04/25/opinions/dna-structure-discovery-rosalind-franklin-levitt-scn/index.html)

“What is unequal and has always been unequal and is still unequal about Rosalind Franklin is the credit that she didn’t get in the aftermath of the discovery,” said Dr. Jacalyn Duffin, a hematologist and historian of medicine at Queen’s University in Canada.

— “Untangling Rosalind Franklin’s Role in DNA Discovery, 70 Years On,” Emily Anthes, *The New York Times* [nytimes.com/2023/04/25/science/rosalind-franklin-dna.html](https://www.nytimes.com/2023/04/25/science/rosalind-franklin-dna.html)

“Getting Franklin’s story right is crucial, because she has become a role model for women going into science. She was up against not just the routine sexism of the day, but also more subtle forms embedded in science — some of which are still present today.” Lise Eliot, PhD, professor of neuroscience, RFU.

— “Rosalind Franklin’s Legacy Revisited,” Jon Asplund, *Crain’s Chicago Business*, May 1, 2023

May 1952

Working with PhD student Raymond Gosling, Dr. Franklin refines her diffraction equipment and bombards a tiny DNA fiber with an X-ray beam for 100 hours of exposure under carefully controlled humidity. The rays produce a pattern on a photographic plate — dubbed “Photo 51” because it was the 51st diffracted image they captured.

April 1953

Dr. Franklin, having performed mathematical computations to analyze the pattern in the photo that would help reveal the double-helix structure of DNA, publishes her findings in the scientific journal *Nature*.



Read more about Dr. Franklin’s life, work and legacy.

"To be a really good clinician, you need your people (in) your corner to comfort you, to cheer for you, to listen to you and to hold you after a long day."

'10 ESSENTIALS': LESSONS FROM BEYOND THE CLASSROOM

David Feinberg, MD '89, MBA, told the audience at RFU's 109th Commencement that earning his academic credentials included "getting the hang of that kind of study/exam, study/exam cycle." He immediately added a caveat: **"So what happens next?"**

The answer was learning the lessons only practice can teach. He shared his personal 10 essentials and the stories behind them:

1 **Treat the rat bites, but more importantly, kill the rats:** Go upstream to provide preventative care.

This real-world education stemmed from a residency on Chicago's South Side, where he was told to focus on eliminating the causes of his patients' trauma — in this case, rat bites — rather than just treating its effects.

2 **Be the tiger:** Health care is people caring for people.

A silent, seemingly unreachable 6-year-old liked a tiger-like striped shirt Dr. Feinberg wore to therapy sessions and enabled them to form a trusted connection.

3 **Don't be afraid of the nuns:** Do what's right for your patient.

Though intimidated by "strict protocol" at a hospital that kept neonatal intensive care unit (NICU) babies out of pediatric rooms, Dr. Feinberg approached the nuns in administration and obtained permission for a mom with postpartum depression to bond in a pediatrics room with her NICU baby.

4 **Despite all odds — like being the world's smallest baby — love can heal.**

Given "the privilege of caring for what was at the time the world's smallest baby," Dr. Feinberg watched the mother stand by an incubator for two months — and shared in her joy when she could finally hold her baby.

5 **A spoonful of sugar — or a bearded dragon — sometimes helps the medicine go down.**

A 17-year-old worn down by transplants and treatments was convinced to undergo a bone marrow biopsy when his nephrologist agreed to buy him the bearded dragon he'd always wanted.

6 **Thank you, Batman, for showing me that learning can happen anywhere.**

Dr. Feinberg recalled a scene from a movie he'd seen on a night off — "I think it was Batman" — and used sodium amytal to help an injured psychogenic amnesia patient reveal information that reunited him with family.

7 **A single diagnosis can change a family's trajectory:** Make health care easier to understand and navigate.

Giving a diagnosis of schizophrenia to the father of one of his very first patients, Dr. Feinberg realized that the terminology he was using — "neurotransmitters" and "nucleus accumbens" — was lost on the anguished parent.



8 **Knowing that Perry didn't stop at the second bell taught me sometimes it's better to be lucky than smart.**

Dr. Feinberg's young daughter told him about a classmate who didn't stop running after the second recess bell and hit his head on a pole. A few days later, he treated a patient by the same name and with a fresh cut on his forehead, and correctly diagnosed him with attention deficit hyperactivity disorder.

9 **Watching Jake officiate at his sister's wedding was the greatest gift:** Our patients can have as much of an impact on us as we do on them.

A young man officiated at his sister's wedding more than a quarter-century after Dr. Feinberg first treated him for extreme autism.

10 **Health care is a hard profession. Find your people, find your Andrea.**

"To be a really good clinician, you need your people (in) your corner to comfort you, to cheer for you, to listen to you and to hold you after a long day," said Dr. Feinberg — who specifically mentioned his wife, Andrea Feinberg, MD '90, whom he met while at CMS. "Andrea is my everything. I encourage you to find your people." ✕

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