

Medical Scientist Training Program Fall Newsletter



Icahn School
of Medicine at
**Mount
Sinai**

November 2018

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Margaret H. Baron, MD/PhD



A Message from the Director

The **Mount Sinai MSTP** is now comfortably into the fall of its **47th year** and its 41st year of NIH funding! Our 12 new students matriculated into the MSTP in early July and immersed themselves immediately into their laboratory rotations and the interactive course Problem Solving in Biomedical Sciences (PSBS), in which they worked collaboratively and brainstormed with a group of enthusiastic faculty to propose studies that address critical biomedical problems. PSBS ended with a stimulating day of rotation presentations by the MD1 students, with MD2 students providing individual feedback (including comments from MTA Directors). They have completed their first course in medical school, STRUCTURES and are now back in graduate school mode for the MSTP core course, Biomedical Sciences for MD/PhDs. They have rapidly integrated into the MSTP and we look forward to following their growth and progress over the coming years.

Director, MD/PhD Program
Senior Associate Dean for MD/PhD Education
Professor of Medicine (Hematology and Medical Oncology)
Professor, Cell, Developmental and Regenerative Biology
Professor, Oncological Sciences

Our 13 most recent graduates are now training in their chosen clinical specialties in top residency programs around the country, while 11 students in their final year of the MSTP have sent out their residency applications and are preparing for interviews. One graduating senior student will pursue a postdoc before applying for residencies. Next spring, we will once again celebrate the important milestone of graduation by holding a champagne reception for these students.

Celebrating
50
years
1968-2018



Celebrating
MSTP
41
years
1977-2018

For the second year in a row, the MSTP held its **Annual Retreat** in the Catskill Mountains at Honors Haven Resort in Ellenville, NY. The MSTP Retreat Planning Committee worked hard to develop a wonderful program, highlights of which were a very engaging keynote address by an ISMMS MSTP alumnus and second recipient of the **Terry Ann Krulwich Physician Scientist Alumni Award**, Ayotunde Dokun, MD/PhD, an alumni panel representing a diversity of physician scientist career paths (Erin Rich and Hideo Makimura, joined by Dr. Dokun), three senior student research presentations (Mark Bailey, Sandhya Chandrasekaran, and Fiona Desland) and a stimulating session on **"The Diversity Iceberg"** organized by Ann-Gel Palermo (Associate Dean for Diversity and Inclusion in Biomedical Education) and MSTP student Sope Oguntuyo.

During the past year, the MSTP increased recruitment through FlexMed, SURP and PREP to achieve a **diverse class** (42% women and 25% under-represented in science and medicine). We were pleased to be **awarded two additional training grant slots for 2018-2019**, one of which was explicitly designated in recognition of the MSTP's commitment to diversity.

The MSTP continues to sponsor collegial and social events offered to maintain and foster a strong *esprit de corps*, including the student-organized Table 4 Eight (thanks to Rachel Levantovsky, Don Nguyen, and Prashanth Rajarajan), Meet the Physician Scientist (thanks to MD1 students Brandon Dale, Matt Lin and Adam Marks), and MSTPhamilies (thanks to Rachel Levantovsky). Steven Chen has generously agreed to continue to organize Bedside Rounds, an academic activity that would be of particular value for those MSTP students who are in the PhD phase of training.

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Last year the MSTP launched an electronic MSTP-specific **Individual Development Plan (IDP)** that helps students track their progress through the Program. This online platform allows students to update their forms on an annual basis, to minimize redundancy and to allow the MSTP to maintain a central database that we are using to provide students with records of laboratory rotations and mentors, F30/F31 awards, and career choice. This database will also be very helpful in the future in tracking the accomplishments of our alumni.

An exciting new initiative introduced this year by the Medical School for both MD and MD/PhD students is an **Early Assurance of Acceptance to Residency program** for which MD2 students are eligible to apply, early in the fall semester, for a space in one of several Mount Sinai research residencies. One of our MD2 students has applied for this program and we hope that MSTP students will continue to take advantage of this program in the future.

The MSTP is committed to providing our students with opportunities that will allow them to explore new areas and to grow as scientists, as clinicians, and as individuals. Toward this end, our program emphasizes individualized learning, flexibility, innovation, a network of support and guidance, and exposure to role models engaged in careers across the spectrum of patient care and biomedical research – in short, an environment in which they can pursue their ambitions.

I look forward to working with each of you during the coming academic year to ensure your continued success in the Program!

-Margaret Baron, MD/PhD



The new MD1s at their White Coat Ceremony!

(From left to right): Yasha Chattampalli, Matthew Challman, Adam Marks, Justin Frere, Jeremy Sherman, Michelle Tran, Matthew Lin, Nicole Zatorski, Jessica Crowley. (Not pictured): Brandon Dale, DeAnalisa Jones, Alex Serafini

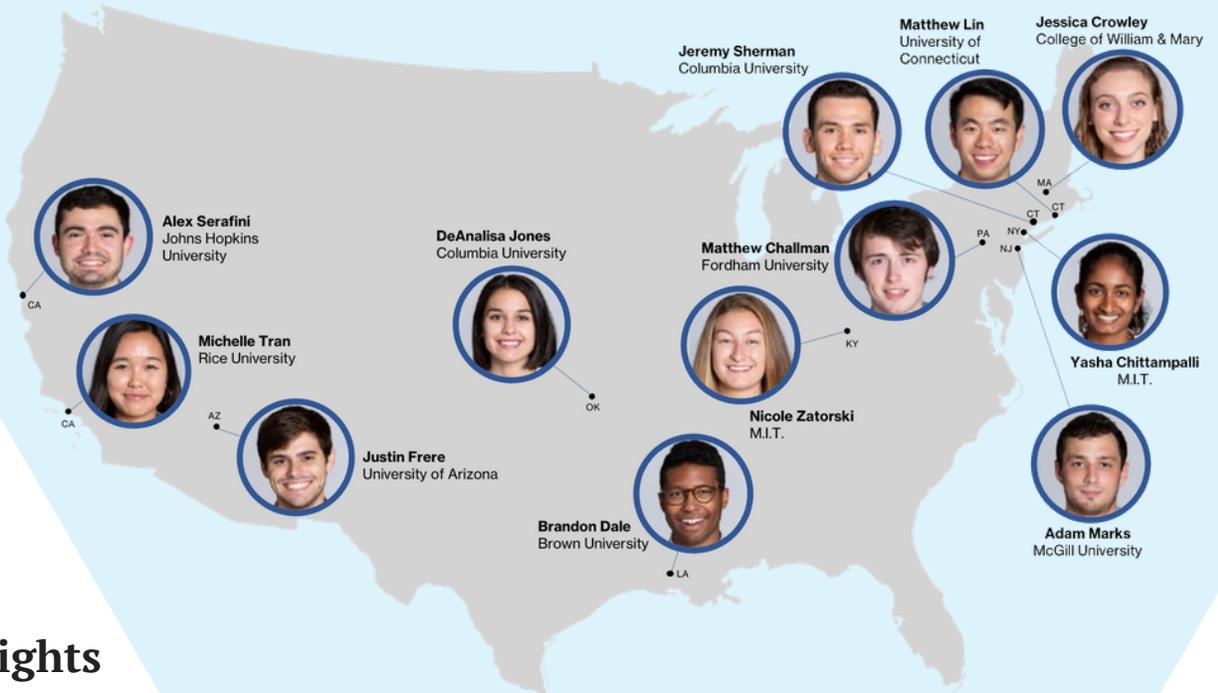
Select Publications

- Predicting Surgical Complications in Patients Undergoing Elective Adult Spinal Deformities Procedures using Machine Learning. Kim J, **Arvind V**, Oermann E, **Kaji D**, Ranson W, Ukogu C, Hussain A, Caridi J, Cho S. Spine Deformity. 2018 Nov;6(6):762-770.
- Physiologic, Pathologic, and Therapeutic Paracrine Modulation of Cardiac Excitation-Contraction Coupling. **Mayourian J**, Ceholski DK, **Gonzalez DM**, Cashman TJ, Sahoo S, Hajjar RJ, Costa KD. irc Res. 2018 Jan;122(1):167-183.
- Transcriptional and physiological adaptations in nucleus accumbens somatostatin interneurons that regulate behavioral responses to cocaine. **Ribeiro EA**, Sallery M, **Scarpa JR**, Calipari ES, Hamilton PJ, Ku SM, **Kronman H**, et al. Nat Commun. 2018 Aug;9(1):3149
- The Library of Integrated Network-Based Cellular Signatures NIH Program: System-Level Cataloging of Human Cells Response to Perturbations. **Keenan AB** et al. Cell Systems. 2018 Jan;6(1):13-24, 2018.
- A method to assess Fc-mediated effector functions induced by influenza hemagglutinin specific antibodies. **Bailey MJ**, Broecker F, Leon PE, Tan GS. J Vis Exp..2018 Feb 23;(132)
- Gut microbiota density influences host physiology and is shaped by host and microbial factors. **Contijoch E**, Britton GJ, Yang C, Mogno I, Li Z, Ng R, **Llewellyn SR**, et al. BioRxiv. 2018 Mar 8.
- Exploring Antidepressant Adherence at a Student-Run Free Mental Health Clinic. Mann CL, **Rifkin RA**, **Nabel EM**, Thomas DC, Meah YS, Katz CL. Community Mental Health J. 2018 Jul 30.

Meet the First Years!

Can you match the fun fact to the first-year?

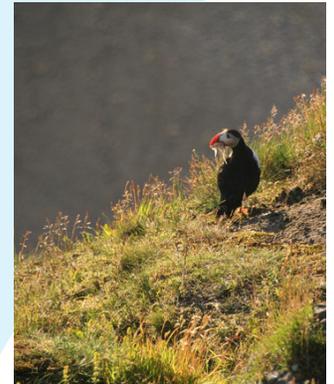
- I've run 2 marathons and I'm fixin' to run more.
- I love to dance.
- I was a Division 1 Swimmer.
- I always follow through on my New Year's resolutions. Last year, it was to read 3 books per month. This year, it's to buy zero plastic water bottles.
- You can find a picture of 7 year-old-me on a toy box at Costco.
- I've seen the insides of a volcano while living in Nicaragua for a summer!
- I once convinced my friends they had an imaginary roommate for over a month.
- I'm a fishing addict. Particularly, I love fly-fishing.
- I love cooking and eating, particularly noodles.
- I enjoy biotech investing and consulting.
- I have a black belt in Tae-Kwon-Do.
- I enjoy long walks on the beach and speed-walking.



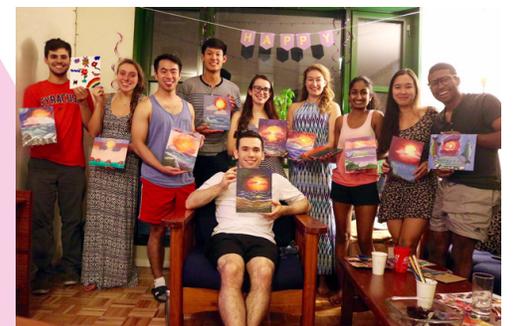
Summer Highlights

Many of our students found time to travel to many places this summer, including Cuba, Iceland, Banff National Park, and Bermuda, while many others enjoyed the local New York City scene. Here are just a few snapshots!

Answers: 1. Matthew Challman 2. Yasha Chittampalli 3. Jessica Crowley 4. DeAnalisa Jones 5. Justin Frere 6. Michelle Tran 7. Jeremy Sherman 8. Brandon Dale 9. Matthew Lin 10. Alex Serafini 11. Nicole Zatorski 12. Adam Marks



From left to right: Amara Plaza-Jennings (MP1) and Christie Nguyen (MP1) in Bermuda; Brandon Dale (MD1) shows off his catch in upstate NY; Rachel Levantovsky (MD2) swims with a school of fish in Mexico; Camille van Neste (MP1) captures a Puffin in Iceland; First and second years bond during a food outing; Yasha Chittampalli, Nicole Zatorski, Jess Crowley, & Michelle Tran (MD1's) pose before a night of dancing; Matt Lin, Michelle Tran, & Jeremy Sherman (MD1's) hike on Bear Mountain; Fred Kwon (MP1) visited the Overwatch League Finals in Brooklyn; Some first years hosted a paint night!





Dr. Filizola is the recipient of an endowed chair, the Sharon & Frederick A. Klingenstein-Nathan G. Kase, MD Professorship, and the Dean of the Graduate School of Biomedical Sciences. She is a dedicated leader in computational biophysics of membrane proteins with over 20 years of experience in the application of methods of computational and theoretical chemistry to biochemical and biomedical problems, as well as to rational drug design. Dr. Filizola's research program is mainly focused on G Protein-Coupled Receptors (GPCRs), which are the targets for about half of all currently used drugs. Nicole Zatorski (MD1) sat down to discuss Dr. Filizola's career with her.

Could you please share what inspired you to go into your field?

Mostly because of inspiration from teachers or mentors and the love for the topic. I found it very interesting. It was fun to work on it. Since I was having fun I stuck to it.

I can tell you about the love for chemistry first. It was because of my high school teacher. She was a very tough woman and very knowledgeable about chemistry. I loved the way she taught and I found what she was explaining very inspiring and stimulating. This is the reason why I took chemistry in college. So I did an undergrad in chemistry in Naples, in Italy, where I lived.

The reason I took computational chemistry is a little bit more convoluted. I started as a crystallographer. I was interested in a lab in Naples that was very strong on peptides. So I did my Master's thesis there on elucidating the effect of solvation on the conformation of peptides by X-ray crystallography. After this I started a small internship in Barcelona, Spain. I was supposed to be there for 6 months to do my crystallography training on proteins, but then I got to meet a faculty who had been working on G-protein coupled receptors (GPCRs), using a variety of computational methods. I found the topic fascinating, and I started working with him. At the time there were no crystal structures of GPCRs. There was an electron density map of rhodopsin obtained from electron microscopy studies of 2D crystals, not even a high-resolution map, literally a 2D projection

of 7 transmembrane helices on a paper. So we used geometric measurements to characterize the relative position of these helices and built an algorithm that would produce a 3D atomic model of the 7 helices automatically. This was the main topic of my PhD thesis.

It was slightly after I wrote my thesis that I joined a lab here in the United States. They were also interested in GPCRs, in particular, opioid receptors. They were using different computer-aided approaches, from ligand-based to structure-based drug discovery approaches. I had been exposed to the structure-based approaches through my PhD, but I had no idea about cheminformatics tools for small molecules. I started to be very interested in this type of research and the passion arose from this incredible female mentor I was working for. She was very inspiring. She was a tough woman, incredibly energetic, and she could really transmit the love for the discipline. So I became passionate about opioid receptors, and how to develop improved drugs at these receptors using ligand-based and structure-based drug discovery approaches.

Do you see chemistry and computational chemistry as different fields?

I see them as different fields because when I talk about 'chemistry' I mostly mean analytical chemistry, biochemistry, or any other experimental subdiscipline that

requires the use of pipettes and things like that. In the moment that I became a computational chemist I did not use any pipettes at all. My lab is a completely dry lab and we test our computational predictions through collaboration with various experimentalists.

Do you think it is easy to jump between fields in science or do you think it is very stratified and hard to make a transition?

I don't think so. I think you have to follow your passions. And if there are things that interest you, you have an obligation to explore. And maybe you explore a field that seems cool from the exterior but then when you get involved you become easily bored. To me, structural determination by crystallography was cool when I started it, but I became immediately more interested in its applications to proteins. Nowadays it is not even crystallography that excites me the most.

What nascent technology or techniques do you think have potential for future scientific research?

I definitely think cryo-EM has good potential. Don't get me wrong, I don't think that any one technique in isolation does anything. Cryo-EM combined with computational methods for instance or with functional assays or other biophysical methods can actually be pretty powerful. You might have seen a new structure of the mu-opioid receptor bound to the G protein and solved by cryo-EM. There are new cryo-EM structures of this opioid receptor solved by Kobilka and Skiniotis labs that show small molecules bound in the receptor. The atomic resolution in

these binding pockets, however, is still not very high to unambiguously characterize the interactions of small-molecules with the receptor. But if you combine this information with computational methods, for instance, some molecular dynamics simulations, you can see if the predicted binding mode of the small molecule based on electron density is a stable pose or not, and then, you can really tell a story.

If you could find out the definitive answer to a scientific question, what would be the question?

It all depends on what you are studying. I guess the problems that I am interested in are so complex that it is difficult to find one single question and one single answer for it. I also don't think you can have one simple answer or one single way to address the same question. If you are trying to tackle a question with one single technique you will see only one aspect of the whole thing. It is like the parable of the 'blind men and the elephant', where each blind man, who has never come across an elephant before, feels a different part of an elephant's body, and tries to conceptualize what the elephant is like based on the small parts they have touched, like the nose or the tail. It all depends on perspective. It's the same thing with these techniques. For instance even for experimental 3D structures of GPCRs you see a nice

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- Dr. Marta Filizola

picture but then how do they really activate other proteins in the signaling cascade? What is happening there? What are the dynamics involved? You don't know, and not even molecular dynamics, in isolation, will tell you the entire story about that.

What advice do you have for scientists that are beginning on their research journey?

Well, to follow their passion and have fun. I see more anxiety in the new generation going into science and I wish that they would just try to enjoy what they are doing.

The joy of starting an MD/PhD or a PhD program comes from what you see around, from the environment you are in. If it is as intellectually vibrant as here at Sinai, then you can make the best out of your experience, and even if an experiment goes wrong, you have learned a lot out of it. So just follow your passion and complement it with life outside the lab, because it is good to have a healthy, social life, in addition to pursuing your scientific passion.

Students nowadays are a little bit too anxious, you know. You would like all the experiments to work, you don't know what future holds, whether you are going to find a respectable position, etc. When I started, I was perhaps naïve. I was not thinking

about what is going to happen five years from now; I was thinking: what am I doing right now, and am I enjoying it or not. I think that takes off a little bit of anxiety. I also think that it is wrong to define success by only certain parameters. In my time, I was not even thinking of being successful as a goal. For me, it was having fun with what I was doing.

And speaking of that sort of balance, outside of research what things excite you or interest you?

I like to travel when I have the opportunity. I am starting to plan my trip for my 50th birthday, that is two years from now, and my family and I are considering Japan so we'll see. Japan or Australia we haven't decided yet.

Also, what is your favorite place in NYC and why?

There is no specific place. It's just going around the city and benefiting from the vibe that you get from this crazy but exciting place. I love New York: the fact that it is always lively, that you always see people in the streets, that you just walk around and see humanity in action. This already makes New York worth living in. In terms of museums, I like the MOMA a lot, although there are many worth going to. If you are feeling a little tired or upset at work or in the lab, you can just go across the street, to Central Park, and enjoy the surroundings. Try it; it's great!



One of the many projects the Filizola Lab drives is understanding the structure and function of $\beta 3$ -Integrins

Alumni Feature

Dr. Ayotunde Dokun, MD, PhD

By Amara Plaza-Jennings (MP1)

Dr. Ayotunde Dokun is a distinguished alumnus of the MSTP program at Mount Sinai and the winner of the **2018 Terry Ann Krulwich Physician-Scientist Alumni Award**. He attended this year's MSTP retreat at Honor's Haven where he was the Keynote speaker. We were lucky to hear him speak about his career, and for this feature in the newsletter I was able to delve deeper and learn more about his time at Sinai and beyond.

Dr. Dokun was born in Nigeria and moved to the U.S. at age 18. Once here he attended Bronx Community College where he first became involved in research through a position that began with washing glassware for a lab. He found the science fascinating and soon began working on experiments. From there he moved on to SUNY Long Island where his research career continued. But, Dr. Dokun says, "It was during my time in the MSTP program that I learned how to be a scientist." He goes on to explain this further, "I did not just work on a project; I learned how to be a scientist. This has helped me pursue my research interest, without being limited to my area of prior training."

During his time at Sinai, Dr. Dokun was also busy starting a family and enjoying life in New York. He recalls some of



"It was during my time in the MSTP program that I learned how to be a scientist."

his favorite memories at Sinai as playing soccer in Central Park and Friday night sushi dinners with fellow MSTP and graduate students.

After graduating from the MSTP program in 2003, Dr. Dokun went on to a residency in Internal Medicine and a fellowship in Endocrinology and Metabolism at Duke University.

Throughout all this time, he credits his faith and desire to help as many

people as possible as motivation to continue working in medicine and science.

Even now, Dr. Dokun continues to work in both fields as an Associate Professor and Attending Physician in Medicine and Endocrinology at the University of Tennessee Health Science Center. He spends 30% of his time seeing patients, 10% teaching, and 10% on administrative roles. The other 50% of his time is spent on his research, which focuses on peripheral artery disease and the mechanisms of worsened outcomes in patients with diabetes. For him, the future of science is very promising, particularly the biomedical sciences, which he believes are "on the brink of incredible discoveries that will transform how medicine is practiced."

Looking back on his career so far, Dr. Dokun comments, "One of the most surprising things for me is that I made it this far and have the opportunity to go further!" He left me with a piece of advice important for all of us in the program: that we should not let others define what success means to us. Dr. Dokun is one example of a great physician-scientist career, but we will all have different paths and should not let others define these and our successes for us.

Congratulations to our newest alumni!

The Class of 2018

Kevin Barnum → Internal Medicine
David Chiang → Pediatrics
Tobias Cohen → Pathology
Ryan Devenyi → Neurology
Virginia Gao → Neurology
Rebecca Hamlin → Internal Medicine
Igor Katsyv → Pathology
Andrew Kent → Internal Medicine

Benjamin Laitman → Otolaryngology
Yonit Lavan → Internal Medicine
Peter Liu → General Surgery
Michael Miller → Pathology
David Shiovitz → Anesthesiology



Alumni Notes

I'm currently in the second year of fellowship in neonatal intensive care at Columbia-Presbyterian. I'm broadly interested in renal disease in the newborn period. Specifically, I'm studying the use of whole exome sequencing to diagnose the causes of congenital kidney disease. And, I'm also working on a few smaller projects involving renal development and physiology. I'm hoping to pursue early investigator support, and to transition into an academic position following fellowship. I live in Brooklyn, with my amazing wife, Naomi, a clinical psychologist, and our indefatigable two-year-old daughter Ella.

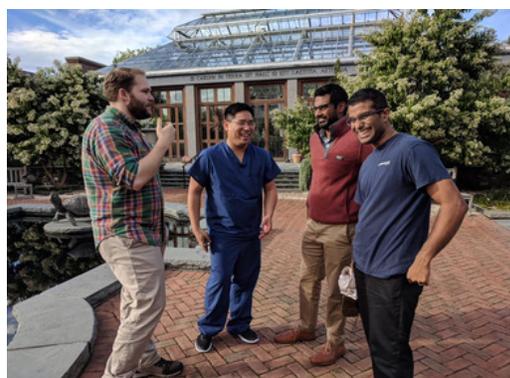


Thomas Hays, Class of 2014



It's a bittersweet time in my prolonged training at Mount Sinai that my long-time mentor, PhD advisor, and role model, Dr. Terry Ann Krulwich will be retiring this fall. Terry was the Dean of the Graduate School of Biological Sciences (1981-2000), the founding director of the Medical Scientist Training Program (1974-1999), and the founding director of the Post-Baccalaureate Research Education Program (2001-2017). She has taught countless trainees to think creatively and to overcome boundaries of conventional paradigms and has left a permanent impression on this institution. I'm grateful for my mentors, Terry, and many others who are continuously helping me to develop a career as a physician scientist. I am Assistant Professor in the Division of Infectious Diseases at the Icahn School of Medicine at Mount Sinai, studying the role of inflammatory signaling in HIV-1 infection. The majority of my time is spent in the laboratory and thinking about science, with the remainder of my time focused on clinical infectious diseases and academic pursuits as Associate Director of the MD/PhD Program and Faculty Advisor for the MD/PhD students in working to improve the transition in training from laboratory to clinical training.

Talia Swartz, Class of 2008



I started intern in July in full-force in the Peds Hem/Onc team (a lot of sick kids!) and now am in the Adult ED (a lot of sick adults!). Residency is fun, but it's a bit weird not doing any science at all, so I've also reached out to a PI to see if we can set up a collaboration/research rotation, the exact specifics of the project TBD. Otherwise, definitely taking the time to explore the greater NE area, including heading up to Acadia National Park and going to Boston.

David Chiang, Class of 2018

Alumni, we want to hear from you! Please drop us a note! >>>>>>>

Have updates you want to share?

Click here!



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