KOCH INSTITUTE
for Integrative Cancer Research at MIT
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Mr. Jean-Marc Joerin
c/o JOERIN Advokatur & Mediation
Schneidergasse 1
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SWITZERLAND

Dear Mr. Joerin,

I am pleased to write to you with an update on the S. Leslie Misrock (1949) Fund for Nanotechnology at the Koch Institute for Integrative Cancer Research at MIT.

Following the completion of his fellowship term at the end of December, Mohi immediately departed MIT to begin his new position as a member of the faculty of the University of North Dakota in Fargo. While I do not imagine that he was eager to move to a region whose winters are even colder and snowier than Boston's, I know for a fact that he was tremendously excited to establish his own laboratory and to start sharing the knowledge and collaborative approaches he learned during his time here.

As for his research, Mohi has achieved both the objectives of his fellowship project. He wanted first to develop nanoparticles that can carry powerful new cancer drugs whose physical and chemical properties make them nearly impossible to use in an unencapsulated form, and second to be able to target these nanoparticles to deliver the drugs only inside cancer cells. Mohi has two manuscripts in preparation on his findings, which hold a great deal of potential to expand the development pipeline for new cancer drugs. He will continue to develop these nanoparticles, and other technologies, in his new laboratory.

Vikash, the second 2015 Fellow, has also made notable advances over the past year. In previous work, he discovered a mechanism that some breast and other cancers use to evade the immune system, as well as the new immunotherapies that have shown such promise against cancers of the blood, skin and lungs. During his fellowship, Vikash developed a nanotechnology-based approach to selectively deliver a drug he identified to disrupt this mechanism, working in a model of metastatic breast cancer. Moreover, he showed that his nanotherapeutics substantially improved response to immunotherapy.

Vikash has a paper on these findings currently in review, has filed a patent application on this technology, and has licensed it to a pharmaceutical company for development. In addition, he personally has been awarded a three-year fellowship to continue his research, and he and his research group in the Langer laboratory have been awarded a five-year grant to adapt the technology for liver cancer.

As both Mohi and Vikash have noted in their letters, the Misrock Foundation's support has come at an inflection point in the development of their research and their careers. This is a moment for them to prove themselves and their enterprising ideas, to the benefit of all of us touched by cancer. We are so grateful to the Foundation for this vital support.

On the same note, I am pleased to announce that two new Misrock Fellows, Neelkanth Bardhan and Li Gu, will benefit from the same opportunity, and support, in 2016.

Neel, as he is known, is a member of the laboratory of Koch Institute faculty member and materials scientist Angela Belcher. A nanotechnology expert, Professor Belcher developed a flexible platform of engineered bacteria, specifically M13 bacteriophages, and has adapted it to create solutions for electronics, sustainable energy fuels and batteries, and for cancer. Most notably, Professor Belcher has used these nanoparticles to create a safe, highly sensitive, non-invasive, and inexpensive imaging and detection system capable of revealing tumors smaller than a millimeter in size, even in deep tissue. The tiny probes are effective even at low doses, seeking out tumors and adhering to them, then rendering them visible to a special light, detected through a camera that forms part of a custom-designed second-near-infrared-window imaging instrument devised by Professor Belcher and her group.

Up to ten times more powerful than current imaging technologies, the system means cancer can be found and removed much earlier and with far greater precision. It holds special promise for some of the most intractable cancers, like prostate and ovarian tumors, which begin deep within the body and often go undetected until they have already progressed to late-stage disease. The current version of Professor Belcher's imaging system can be used for real-time guided surgery and is being tested in advanced ovarian cancer models with clinical collaborators at the Massachusetts General Hospital, to rather impressive results.

There are many aspects of Professor Belcher's imaging technology to get excited about—its high sensitivity, its safety (no radiation), and its low cost. However, I am especially pleased to tell you that, with the support of the Misrock Foundation, Neel proposes to design, prototype and test a human-scale version of the imaging system, for use in a small-scale, first-in-human clinical trial with his MGH partners. Additional aims of his fellowship proposal include some refinements to targeting methods and materials used in the imaging nanoparticles. We are extraordinarily eager to see the translation of this technology for human clinical use, and this is a critical phase in reaching that goal.

A native of India, Neel holds undergraduate and master's degrees in materials science from the Indian Institute of Technology in Mumbai, and earned his doctoral degree in the same field here at MIT last year. He has taken every opportunity to get involved in the Koch Institute and MIT communities, serving for example on the 2012 Joint Presidential Search Task Force, a student advisory body to the MIT Corporation contributing to the selection of L. Rafael Reif as MIT President, and as a founding member of the Koch Institute's Green Team, helping to make sure that our research and community programs are as environmentally responsible as possible. Actively engaged in policy debate, Neel is part of the MIT Science Policy Initiative's 2016 Congressional Visit Days delegation to Capitol Hill in Washington, D.C., to support funding for research and development. He is also an accomplished student and performer of Indian classical music.

Li Gu, the second 2016 Misrock Fellow, is a member of the laboratory of KI faculty member Professor Paula Hammond. Professor Hammond, you may remember from previous correspondence, specializes in the development of nanoparticles and nanomaterials for drug delivery, and was selected this past summer to head MIT's Department of Chemical Engineering.

Li's project is addressed at specific challenges, and opportunities, in treating ovarian cancer. Previous work by Koch Institute collaborators in MIT's Department of Biology, and by clinical partners at Boston's Dana-Farber Cancer Institute, suggest that specific cell surface receptors in ovarian cancer might serve as molecular targets for drug delivery. Li plans to develop a nanotechnology-based drug delivery platform that, through its specific interactions with these receptors, could simultaneously improve targeting, improve cancer cell uptake of chemotherapy, and shut down receptor-mediated signaling related to tumor growth and drug resistance. Because of their properties and function, these receptors offer a novel pathway for the creation of a powerful therapeutic synergy.

Over the course of his fellowship, Li will continue collaborating with existing clinical partners at Dana-Farber, and also bring on board a gynecologic oncology fellow at Brigham and Women's Hospital in Boston who is a visiting scientist in the Hammond laboratory this year.

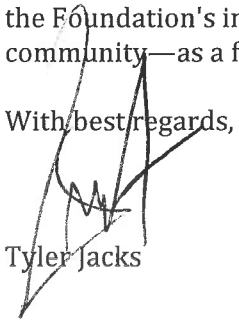
Li earned both his undergraduate and doctoral degrees in chemistry, the first from Peking University in his native China and the second from Rutgers University in New Jersey.

This spring, the Koch Institute will mark the fifth anniversary of the opening of our unique research facility, a bold organizational experiment that included the co-location of the many scientists, engineers, and others who comprise our organization.

The Misrock Foundation has been with us from the start, supporting young researchers who have taken Koch Institute's founding vision and run with it. Our trainees have helped shape an open and creative research culture and community, seamless and fully integrated across many disciplines and approaches. Five years on, several of the discoveries and technologies that came out of these early days together are already making their way into the clinic, and incredible new work is in development. These are the two Koch Institute "products" of which I am most proud, the researchers we mentor and the solutions they are creating for cancer patients and their families.

We could not have succeeded in this venture without the support of partners like the Misrock Foundation and family. It remains an honor for us to shepherd the Misrock fellowship program and the Foundation's investment—in young people, in new ideas to fight cancer, and in the MIT community—as a fitting tribute to Mr. Misrock.

With best regards,



Tyler Jacks

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Kathy Misrock