

FACES OF MASS SPECTROMETRY

Karen Wang



Anne Brenner and J.D. Brookbank are science writers at Technica Editorial.

July 2023



Making a Difference, One Step at a Time

Karen Wang is the Executive Director of Translational Profiling, Chemical Biology & Therapeutics at the Novartis Institutes for BioMedical Research (NIBR). This global group includes locations in Cambridge, MA and Basel, Switzerland. The team works with various disease areas and therapeutic platform groups across the broader organization, focusing on proteomics, metabolomics, and imaging.

Karen was introduced to mass spectrometry while performing undergraduate research in China, which is the country where she was born and raised. She moved to the United States to pursue her PhD at the University of Michigan. While there, she applied mass spec analysis toward biology and biomedical research, a major area of interest that she has continued to explore throughout her successful career.

In 2005, Karen was recognized as a Novartis Leading Scientist in honor of her contributions toward the integration of new mass spec technologies and their impact on drug discovery research. When it comes to her current work, Karen is excited by advances in the understanding of diseases and emerging opportunities to apply cutting-edge technologies toward the goal of bringing much-needed medicines to patients.

Inside and outside the lab, Karen draws upon her experience as an immigrant and a working mother. She believes these influences have allowed her to grow both as a scientist and as

a leader. Karen is a founding member of an internal employee resource group for women at Novartis. Additionally, she recently participated in an internal panel where she discussed the topic of race and the importance of cross-cultural learning, understanding, and support.

As a leader in sciences, Karen emphasizes the need to maintain one's work ethic and passion for research. She also stresses the importance of inviting contribution and giving encouraging feedback to others to help employees grow and build confidence. In her free time, Karen enjoys being outdoors and traveling with her family. And she is very proud of her two daughters, who are both following her example by pursuing successful careers in the science and medicine fields.

How did you get your start in mass spec?

I first learned the power of mass spectrometry during my senior year of college when I was in China doing undergraduate research on flora fragrance extraction and analysis using gas chromatography, and later on, using mass spec for compound identification. In graduate school, the decision to join Dr. David Lubman's lab came quite naturally. His lab had a significant focus on mass spec instrumentation and new capability building, but the lab was also starting to get into biology applications and biomedical research, which was another strong area of interest for me. It was great training—building the mass spec foundation and applying mass spec in biology problem-solving. So, I would definitely say that's how the seeds were planted and then the trees grew throughout my career.

What brought you to your current position as Executive Director of Analytical Science and Imaging at Novartis Institutes for BioMedical Research?

It was a gradual career advancement. Novartis (Sandoz) is the only company I have worked at since I obtained my PhD. The name of the group has since changed to Translational Profiling, Chemical Biology & Therapeutics at NIBR. It's a global group (Cambridge & Basel), with proteomics, metabolomics, and imaging research areas. We collaborate with all disease areas and therapeutic platform teams.

How has being both an immigrant and a working mother impacted you as a scientist?

I think it has made me a better person, a better scientist, and a better leader. Being an immigrant born and raised in another culture in China has shaped a big part of who I am with the work ethic and passion for science. But now that I've lived in the United States for more than half of my life, and my entire professional



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The Translational Profiling Team, Chemical Biology & Therapeutics at the Novartis Institutes for BioMedical Research (NIBR), in Basel, Switzerland (top) and Cambridge, MA (bottom). (Photo courtesy of Johannes Voshol and Jennifer Cobb.)



We understand you were the recipient of the Novartis VIVA award. What specific achievements led to this honor?

The VIVA award (Vision, Innovation, Value, and Achievement) recognizes exceptional contributions made by Novartis scientists working in Research and Development worldwide. I was awarded it in 2005 as a Novartis Leading Scientist for the contribution of establishing and applying new mass spec technologies with significant impacts to drug discovery.

What has been your role in employee resource groups at Novartis for women specifically?

I was a founding member, around 2009, as a co-chair for the Career Development sub-team. We hosted panel discussions with senior leaders at NIBR on topics such as personal career development stories; women in leadership at Novartis; balancing one’s career with life and strategies for success; and partnering with HR on career transitions. We also provided small team networking opportunities for peer mentoring and support. All of the activities we hosted were open to everybody—not just women. Many new employees joined the group to meet new colleagues. That made their overall integration into a new company better and more successful. Activities like these are all part of my development and learning. I would also say that my viewpoint on diversity and impact on work environment has evolved over the years. It goes beyond gender, race, and ethnicity. It’s also about the behaviors that we promote. Drug discovery for innovative medicine is hard, and it takes a village to be successful. A high performing team is where everyone can be at their best.

What has been your role in internal panels focusing on Asian employees?

About two years ago, I was on the panel for an internal discussion titled “My Asian Experience.” My story was about cross-cultural learning and about how understanding and support brings out the best in everyone. I shared the story about how cultural differences can sometimes hinder career advancement. For example, I did not initially apply for the role I’m currently holding, because I didn’t think it was appropriate to advocate for your own promotion. I spoke about how I learned to be more proactive and

life, that has also shaped who I am today. My background as an immigrant has encouraged me to be open-minded and curious. It has also encouraged me to think of human connections and how we can learn, understand, and support each other. We do better science together.

In terms of being a working mother, it has helped my work–life balance. My twin daughters were born when I was in graduate school, which was definitely a challenge. But my daughters’ high school counselor’s advice really had a big impact on me—she told me to remember that my girls saw me as a role model. That absolutely was influential, and I’m happy to say that both of my daughters are now in the science and medicine fields.



Karen with her children, Daphne Xiao (left) and Dianne Xiao (right). (Photo courtesy of Karen Wang.)

to speak up to actively contribute. I also talked about how, from a leader’s perspective, we can lead in a way that allows people of all cultures and backgrounds to thrive—asking open questions, inviting people to contribute, and giving encouraging feedback can help people build confidence. For me, early in my career, receiving positive feedback from senior leaders really helped me with confidence building. I think we can all play that role!

Is there an advancement in mass spec analysis or instrumentation that has had a major impact on your research?

Throughout my career, there have been many mass spec advances that continue to make huge impacts in drug discovery and development. There are two relatively recent examples that come to mind. First, there’s deep proteomics (and metabolomics) coverage with limited amounts of input material at a good throughput. Representative applications include drug target identification, mechanistic understanding of novel targets, and characterization of advanced therapeutic candidates. Second, there’s targeted MS with high specificity and high sensitivity. For instance, this would be used in differentiating a human protein from a monkey/NHP (non-human primate) protein of a single amino acid difference in sequence, without the need for reagents (e.g., antibodies), which can quickly assess translation of a new therapeutic modality such as gene therapy.

What excites you about your current work? What is an important aspect of that work?

Science and technology are advancing at an unprecedented pace. For example, there’s access to human genetics information, advances in disease understanding, and in parallel the development of new therapeutic treatment platforms beyond the traditional small molecule, protein, and monoclonal antibody therapies (e.g., RNA, cell, gene, and radioligand therapies). It’s an exciting time. Yet, there are many open questions to address and therefore many opportunities to apply cutting-edge technology. Omics (genomics, proteomics, and

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metabolomics) and imaging have critical roles to play, to enable a path to drug discovery for early targets/concepts, and to enable a path to patients for therapeutic candidates—and, ultimately, in bringing much-needed medicines to patients.

Can you describe a relationship or major piece of advice that has had an impact on your career?

I don’t think there has been any single person or any single piece of advice—it has really been learning from many people and a whole host of experiences with a lot of self-reflection. You learn about what makes you happy, what drives you every day. You develop your passion and purpose. For me, that passion is science and people—that’s my source of energy and drive that helps me through the challenges and gives me the courage to make some of the tough decisions as a leader.

Can you share a key lesson learned or a quality you consider important for leaders in your field?

It is about passion, empathy, and courage. Work ethic and passion for science are my early or intrinsic strengths. Developing compassion and empathy has helped me grow as a manager. The courage piece is something that I’m still working on. For me, it comes down to leading with both your head and your heart, and to be your authentic self.

What are some of your interests outside the lab?

I love being outdoors and traveling with my family. For a period of time, I explored China, which is where I was born. I would love to do more. For work, I have traveled to quite a few places in Europe. I really enjoy a lot of the smaller, less industrial Mediterranean areas. I definitely love traveling to Asia.

What advice would you give to scientists who are working in or entering the mass spec field?

Follow your passion in choosing a career path, whether it’s in academia, in industry, or elsewhere. I think we all want to make a difference and leave this world a better place. So, one piece of advice that I’d give my younger self, and to others, is to just know that we can all make a difference—one person, one project, one team at a time. Thinking that way makes things easier and makes us happier, as it’s a source of empowerment and fulfillment; it really doesn’t need to be big.