



## Biophysicist in Profile

### Melody Swartz

‘Life is happening, and we’re missing it!’ is a phrase that encapsulates the exuberance Melody Swartz, Associate Professor in the Laboratory of Lymphatic and Cancer Bioengineering at the Swiss Federal Institute of Technology (EPFL) brings to all things science. “I was always interested in science,” she says. “Since I was young, I have been asking questions about how things work and doing experiments to better understand life.”

As a child, these experiments often took the form of science fair entries. “My mom used to stay up late helping me make my posters,” she recalls. “Back then we used big thick cardboard and those stick-on letters.” Though science held none of the fascination for her family that it did for Swartz, they helped her pursue her passion. “I was sort of the family geek,” she says. “My family was supportive, even if they didn’t understand.”

A trained bioengineer with a BS from Johns Hopkins and a PhD from MIT, Swartz’s career resides in what she calls the “blurry interface” between biophysics and bioengineering. “Although I call myself a bioengineer, I am probably in that interface,” she says, “probing basic questions with a perspective and tools of physical sciences and engineering.”

The moment Swartz first saw this multidisciplinary approach in *Rakesh Jain’s* lab at Massachusetts General Hospital (MGH), she was hooked. “Rakesh Jain was and is inspirational to me,” she says, “both in his breadth of vision as well as his expertise in incorporating bioengi-

neering and biophysics into cancer research in highly relevant and impactful ways, including in translation to clinic.” An eager grad student, Swartz showed up at the lab each day decked out in protective padding with rollerblades strapped to her feet, ready for anything. “This was her preferred mode of transportation—even on busy streets,” recalls *Lance Munn*, a postdoc at MGH at the time, now Associate Professor of Radiation Oncology at Harvard Medical School and Associate Biologist in the Edwin L. Steele Laboratory for Tumor Biology. While Swartz worked on biomechanical modeling of lymphatic drainage and tissue fluid balance for her PhD, she learned firsthand the thrill of a multidisciplinary career.

“To me, the biggest but also the most enjoyable challenge in multidisciplinary research is balancing the inherent breadth in approaches and disciplines with necessary depth, and writing papers that both biologists and engineers can appreciate,” she says. She has published such papers in *Biophysical Journal*, and when it comes to meetings, she keeps the diversity of perspectives at the forefront. “I prefer going to those that focus on the biological questions,” she says, “bringing together people of different disciplines trying to address common problems from different angles.” Not surprisingly, she harbors a solid respect for the opposite approach, which she finds at Biophysical Society meetings. “It’s great to have a society of like-minded people, working on very different problems,” she says.

Swartz likes a multifaceted challenge, and working within multiple disciplines appeals to her sense of adventure. “She’s passionate about science, supportive, energetic, creative ... and completely unafraid to try something new,” recalls colleague *Daniel Tschumperlin*, Associate Professor of Bioengineering and Airway Biology at the Department of Environmental Health. “Melody is a great example of how determination and trying bold things can pay off, and lead in new directions.”

It comes as no surprise that another bold thing Swartz takes in new directions is travel. She’s often accompanied by her six-year-old son, Ben; one of their recent adventures took them to Bangkok. But when it comes to science, Swartz’s boundless courage is also infectious. *Federica Boschetti*, Assistant Professor at the Department of Structural Engineering of Politecnico di Milano, collaborates with Swartz in developing computational fluid dynamic models. She notes Swartz’s open-mindedness, and her own lesson from Swartz that good things can come in small packages—if you’re open to possibility. “She taught me that even apparently small things I was doing with my research are important if they are novel,” says Boschetti. “She showed me that science can be an adventure if you look for discovery.”

While Swartz finds teaching to be deeply rewarding, it took her some time to find a happy medium between her career and the students’, especially as an early career scientist. The challenge was mainly in “learning how to balance my own ideas for experiments with students while still allowing them to develop their own ideas,” she says. Combine that with the added pressure to get tenure, and that’s an occasion that Swartz could rise to. “I have been incredibly lucky in the students and postdocs that I have worked with,” she says, “and we learn from experience.” Still, she’s a proponent of

building management training for new PIs into the postdoc experience. “It’s the management part of my work that I find most difficult,” she says.

Her work itself still focuses on the lymphatic system, and the role that lymphatics and interstitial flow play in tissue homeostasis, immune surveillance, and cancer. “My research is moving more and more into the interface of lymphatic function with immunology,” she says, “both in trying to understand its roles in tolerance and creating tools and methods to manipulate the immunological functions of lymphatic drainage.” Along with her research, she’s enthralled by the multidimensional way biophysics is growing. “As a field it has tools and approaches as its core rather than the types of problems being addressed,” she says.

Swartz has come a long way from sticking oversized lettering to cardboard posters, but her palpable enthusiasm for science persists. “Follow the questions that interest you the most, using all the relevant tools that are available to you,” she advises. “Don’t be constrained by your identity as a biophysicist, rather use it to be multidisciplinary and let the importance and impact of the problems drive you more than the methods.” She herself looks forward to contributing to biophysics’ multidisciplinary nature by incorporating more physiology and immunology—and she’ll do it on rollerblades.



Swartz with her son, Ben.