



Eileen
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CANCER
RESEARCH
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The Ludwig Princeton Associate Director and Member on the defining scientific moments of her career, the solace of family and value of speaking up—both for yourself and for other women researchers.

A brand new postdoc in Bruce Stillman's group at Cold Spring Harbor National Laboratory in 1983, Eileen White couldn't believe her good fortune when her new boss handed her a viral oncogene and told her to figure out what it does.



Eileen White
in 1983

Scientific dogma at the time held that oncogenes do just one thing: drive cell proliferation. But White's viral oncogene—E1B—apparently hadn't received the memo. "This oncogene seemed instead to be preventing cells from dying," says White, who is today associate director of the Ludwig Princeton Branch. "People didn't believe it, but I could see what was happening with my own eyes. I knew I was right."

Collaborating with Harvard scientist Stanley Korsmeyer, White pressed ahead with the experiments required to prove her hypothesis. Those studies were completed after White set up her own lab at Rutgers University, where she is currently chief scientific officer and deputy director of the Rutgers Cancer Institute of New Jersey. They confirmed that oncogenes can function by inhibiting programmed cell death, or apoptosis, and helped launch a field of study that continues to inform new strategies and drugs for cancer therapy. And that was just for starters. While exploring the suppression of apoptosis in cancer, White and her colleagues made the serendipitous observation in the late 90s that cultured malignant cells could survive extreme starvation. Her laboratory's investigation of the phenomenon yielded yet another transformative discovery: that cancer cells depend on autophagy—in which cells cannibalize their innards—to survive.

White's lab has since demonstrated in mouse models the importance of autophagy to lung,

prostate, breast and melanoma tumors, and shown that both cancer cell and systemic autophagy are essential to tumor growth. Her work, often done in collaboration with Ludwig Princeton Director Joshua Rabinowitz, has elucidated metabolic reasons for this dependency and shown, more recently, how autophagy can additionally support tumor survival by suppressing anti-cancer immune responses. These discoveries and the ongoing research they've inspired hold considerable promise for the development of new treatments and therapeutic strategies for cancer.

WELLS OF CONFIDENCE

A native of Long Island, White had always been interested in biology. After obtaining her bachelor's degree at the Rensselaer Polytechnic Institute in New York, she completed her graduate studies in Eugene Katz's laboratory at the State University of New York, Stony Brook, studying developmental genetics. Aside from Katz, White found excellent mentors in her department chair Arnie Levine, who had co-discovered p53—the apoptosis-inducing tumor suppressor that is mutated in half of all cancers—and Joan Brugge, who had discovered and characterized the viral oncogene Src and is today co-director of the Ludwig Center at Harvard (see profile, page 48).

"Joan was a symbol of a successful woman in science," says White. "She is a brilliant scientist and was a role model in that she

demonstrated that what I was trying to achieve was actually possible.”

Confidence in her own possibilities—and capabilities—came from other sources as well. As she progressed through her scientific training, White recalls that she noticed senior researchers often asked the same questions at seminars that she had in her head.

“Knowing that I could carry my weight with leaders in the field gave me the confidence to speak up,” says White. “So, then it wouldn’t be the famous older scientists asking the question, it would be me.”

Today, when asked by young researchers, especially women, for advice on how to succeed as a scientist, White encourages them to believe in their own abilities and informed hunches, to speak up. Self-confidence was, after all, what empowered her to discard dogma and prove that her viral oncogene suppressed apoptosis. “I tell them, ‘Let your voice be heard and don’t be afraid,’” White says. “If you occasionally say something wrong, people will forget about it. If you know what you’re doing, there’s no downside to making your voice heard.”

INGREDIENTS OF SUCCESS

What you’re speaking up about also matters, of course. White notes that, as a postdoc, she was not only working on a problem she was passionate about, but one that was of some significance to both basic science and medicine. She often advises young researchers to carefully consider the problems they pick. They have to be intellectually stimulating to you—science is hard and fascination an important element of motivation—but the answers should also be of sufficient importance to science or health. And the problems absolutely must be technically tractable. “All these pieces have to come together,” she says.

Taking time for a personal life also matters. In White’s case, that desire additionally served



Photo by Flynn Larsen

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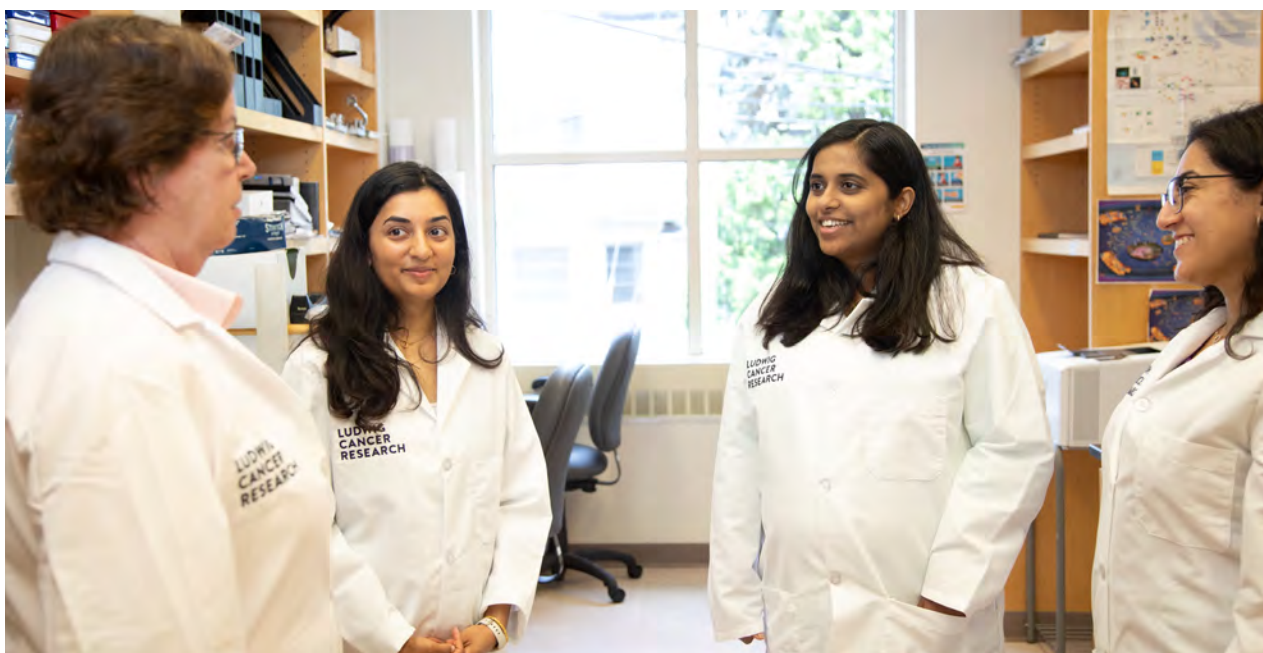


Photo by Flynn Larsen

Eileen White with, from left, PhD student Maria Ibrahim, research associate Akshada Sawant and postdoctoral fellow Maria Gomez.

as a kind of incentive. “I got married while I was a graduate student, and I wanted to have a family, but I knew it was going to be extremely hard to do that and be a scientist at the same time,” she says. “I thought, if I’m going to be sacrificing myself, and asking my family to sacrifice themselves, I’d better make it count.” Ultimately, she says, fulfilling both those ambitions depended a great deal on her husband’s support and entailed much coordination.

Not that family was an encumbrance. Quite the opposite. “Spending time with the family was a good outlet,” White says. “If things in the lab are terrible, and you go home and you play with your children, it sort of makes the bad things go away. Not being a scientist 24 hours a day, and setting aside time to do something completely different, like watch my child play soccer, was very important to my mental wellbeing.”

White recalls that some senior scientists she came across at the time assumed that

a woman who chose to become pregnant wasn’t serious about her career. But she had enough support from mentors and like-minded peers and was sufficiently self-assured to be unaffected by such biases.

WOMEN IN SCIENCE

Other manifestations of sexism were more systemic. White notes that, early in her career, the insights and opinions of women scientists were often accorded less weight than those of their male counterparts. That attitude also influenced professional events in tangible ways. “I would be invited to speak at a meeting and I’d notice that I was the only woman on the program, and I would confront the organizers of the meeting, saying, ‘Why are there no other women on the agenda?’” White recalls. On one such occasion, she was told by the organizers that they couldn’t think of any other women in the field worth inviting as speakers. She responded by offering them a list of women scientists she said were at least as, if not more, worthy of the honor.

This, she says, has changed in recent years. Many institutions that host or fund conferences, like the National Institutes of Health and Cold Spring Harbor, now routinely scrutinize the roster of invited speakers for gender disparities. “That was an evolution, and a resolution of this problem was to raise awareness about the bias we were seeing in scientific conferences,” says White. “It started mostly with gender equity because it was so obvious. But now it has transcended to other types of diversity issues, and I think that’s a great evolution.” Still, White continues to encourage young scientists to champion women in their field.

LOOKING AHEAD

Though sexism is now far less pervasive in science than it was in the early 1980s, White notes that it is also much harder today to establish a scientific career, a difficulty exacerbated by the COVID-19 pandemic, which has exacted a disproportionate toll on young researchers and women. More needs to be done to support women—and men—starting out on a scientific career, says White. One important step would be to increase salaries for young researchers. “Being a scientist can be very exciting but I think, more so than in other fields, the money you’re paid early in your career is very, very low,” she says. This discourages people who are starting families, as many are at that stage of their lives, from pursuing a life of science. The low pay particularly disincentivizes women, minorities and people of limited means, all of whom are typically already dealing with a mix of other structural and economic challenges.

This, says White, is particularly true given the ever-increasing time it takes for researchers to obtain their first RO-1 grant. Many don’t get these foundational grants until they’re in their mid-40s. Addressing that will require larger changes to funding in biomedical research. For now, however, White suggests research institutions can

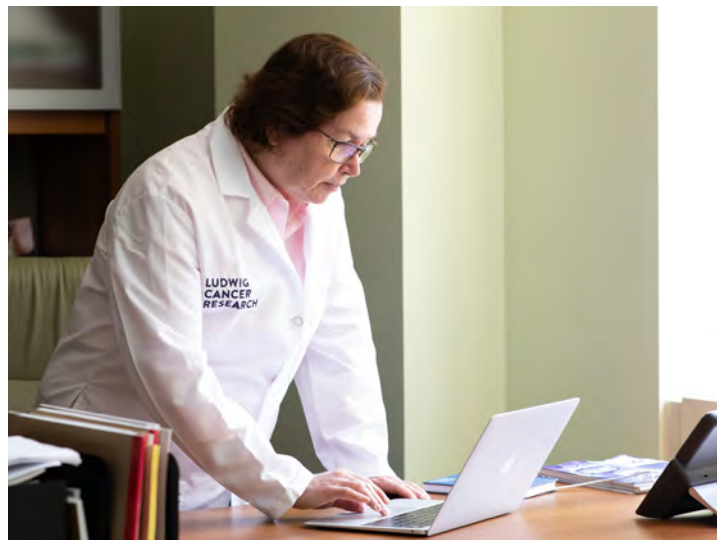


Photo by Flynn Larsen

support young scientists in other ways, by offering daycare support, for example, or giving researchers more time to complete the work necessary to achieve tenure. White notes that organizations like Ludwig can help address some of the difficulties, like the high expenditure of time and money that goes into childcare—which are burdens to all young researchers, but often disproportionately borne by women.

Many of the required changes will depend on more generous funding for research from government treasuries, White admits. But she argues that such funding is also eminently justifiable, given the economic, medical and societal rewards that demonstrably flow from public support for scientific research. For now, she encourages young researchers not to lose faith in their career choice.

“Perseverance is an important part of the job, but I would say that if you make great scientific discoveries, it’s worth it,” White says. “Those discoveries don’t happen every day but if you persevere, ask the right questions and answer them, the grants will come, the papers will come and your trainees will be excited about their work. It can be a very satisfying career.”