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Special

Special report 2022: Meet 20 women blazing trails in biopharma R&D

ENDPOINTS

When you run a special report for a fourth year, it can start feeling a little bit like a ritual. You go through the motions — in our case opening up nominations for top women in biopharma R&D and reviewing more than 500 entries — you make your choices of inclusion and exclusion. You host a ceremony.

But then things happen that remind you why you do it in the first place. Perhaps a Supreme Court rules to overturn the constitutional right to abortion and a group of women biotech leaders makes it clear they strongly dissent; perhaps new data on gender diversity in the industry come out that look all too similar to the old ones, suggesting women are still dramatically underrepresented at the top; perhaps protests and conflicts around the world put in stark terms the struggles that many women still face in earning the most basic recognition.

And you listen to the stories.

Rituals, after all, are key to preserving and passing on memories. From the Endpoints team, we are happy to present the profiles of 20 women who have blazed trails and are still promising to reshape biopharma R&D for years to come.

— Nicole DeFeudis and Amber Tong

MEET 20 EXTRAORDINARY WOMEN WHO ARE SUPERCHARGING BIOPHARMA R&D

the UK and Texas ↓

Amber Salzman: Amber Salzman had few options when her son was diagnosed with a rare genetic disease. So she created a better one ↓

Laura Sepp-Lorenzino: A mother's pharmacy inspires daughter's science career ↓

Effie Tozzo: Effie Tozzo sets sail at Avilar, leading protein degradation crew to new waters ↓

Barbara Wirostko: Barbara Wirostko, 'supermom' and R&D exec, details journey to Qlaris ↓

Lili Yang: At the forefront of change in cancer treatment, Lili Yang shows no sign of stopping ↓

HIGHLIGHTS

Origination partner at Flagship, co-founder and CEO at Apriori Bio, AstraZeneca veteran

Lovisa Afzelius embraces 'curiosity and creativity' as Flagship partner

Two decades of leadership experience doesn't grow on trees. And for Flagship's Lovisa Afzelius, that experience has paid off as she's jumped from Big Pharma to now leading smaller biotechs.

When she began her work in this space, back at the turn of the 21st century, she said she had to write all her own algorithms, run all her own experiments, develop the interfaces to visualize the results and explain how to use quantum mechanics or neural networks and how that compares to human insights.

And it was a lot of that experience that shaped her current outlook.

“If you don’t understand the biology, you can’t design your algorithms in the best possible way,” she noted.

The AstraZeneca site was later shuttered. She said that she was asked to move to another site, but decided instead to take up an opportunity to be CEO at a small, local startup – and after some success re-profiling the company, she was recruited to Pfizer in the US.

At Pfizer, she led the immunology group, where she built its systems immunology function as well as led clinical programs in autoimmune diseases, managing the portfolio from early target discovery to Phase II studies. There, she also served on the worldwide R&D data strategy committee.

She also did an executive MBA at MIT, and that’s where she said she learned a lot about the startup ecosystem and was intrigued by it. After co-founding a digital health company, she moved on to lead strategy and operations at a synthetic biology play launched by Flagship Pioneering.

“What I love about working in this startup environment is the curiosity and the creativity and we also say ‘yes, and’ to build on what someone said,” Afzelius said, “It’s all about finding that next insight to get you to the next level of innovation. It’s a more deliberate process than when you’re in a big company, where it’s based on the corporate framework.”

As an origination partner at Flagship — a role she’s taken up since 2020 — she’s now involved intimately with companies looking to harness the power of AI and machine learning to help drug development. But how does one separate the wheat from the chaff when it comes to AI and ML?

sionate about — and don't settle for anything but that."

So what's top of mind for Afzelius when it comes to science today?

"Unlocking the concept of programmable medicines — I think that is something amazing that's happened over the last couple of years and that I think about most," she said.

As far as mentors along the way, she pointed to one of the first ones for her, a woman who chaired a big initiative she was set to lead right when she finished her PhD.

And this mentor's calmness "was telling me to focus on what you're doing and don't let the chatter get to you. Keep the track you're on and work with your team and take it easy and go for it.

"Instilling that confidence, knowing there's someone behind you, and the calmness to just keep at it — it's helpful to have someone behind you when you're doing something you've never done before," she said.

— Zachary Brennan

HIGHLIGHTS

Migraine research pioneer, VP of medical affairs at Impel Pharmaceuticals

Sheena Aurora was among a group of researchers to first show that painful episodes of migraine with aura — the signature visual and sensory flashes of the condition — happen because there is indeed something physiologically different with patients.

Using a then-nascent imaging technique known as MEG, or magnetoencephalography, the team measured and recorded the magnetic fields generated by electric currents in the brain when migraine sufferers see a visual stimulus. In the resulting images, whereas the control group showed relatively straight, short lines representing magnetic fields, induced aura patients had turbulent squiggly lines. That was the beginning of a career devoted to tackling migraines, from unpacking the disease to leading key trials for treatments to ensuring patients have access to the right drugs.

"We thought it was vascular, but it's actually neurovascular because we were able to capture this event," Aurora said. "So it lends credibility to the patients who were, before then, told, 'Well, fix your stress, fix your home life. You're just — it's all in — literally in your head.' But it wasn't that credibility behind that; it is a neurological condition that is equally impacting, and disabling, kind of like multiple sclerosis and epilepsy and stroke."

Aurora's interest in neurology began when she was a third-year medical student in India, but it wasn't until she moved to the US for a residency that she got exposed to a wide range of neuroscience research, including headache and stroke.

She was in a quandary about which area to pursue her fellowship in when she went home for vacation. One day, while she and her mom were sitting on the lawn, her mom turned to her and said, "Something is going on. I only see half of our dog."

Immediately recognizing it as a migraine aura, Aurora (who more than appreciates the room for the pun in her last name) found herself fascinated by how brain chemistry could trigger such a disruptive episode all of a sudden. She's been immersed in the field ever since.

sis of migraine using transcranial magnetic stimulation was seminal and the first in the field, still frequently referenced in the literature," said Michael Welch, former president of Rosalind Franklin University, who led the NIH grant in migraines and mentored Aurora. "Unusually, this is all accompanied by a modest disposition enabling her to make easy collaborations with leading scientific colleagues attested to by her extensive publications."

It wasn't all smooth sailing. At Detroit's Henry Ford Hospital, Aurora was treating stroke patients who had a twisted neck with Botox and finding that their neck pain would get better when Welch was invited by Allergan to a roundtable with a dermatologist who similarly noticed that Botox injections were helping alleviate migraines. Welch, a stroke specialist, admittedly didn't have as much first-hand experience as Aurora did, so he asked if she could go in his place.

Allergan said no — so he attended, but took her along to the meeting.

Sitting at the back of a room full of men, Aurora listened in on the discussion and raised her hand to disagree with their injection protocol. You should be injecting in the back of the head and in the neck area, she said. But the comment went nowhere.

"So anyway, fast forward, they came back to me," she recalled with a faint sigh and chuckle, "and they said, 'Oh, by the way, we listened to those recordings. And I think you should partner with us.'"

She ended up becoming the lead investigator in a Phase III trial that cemented the approval of Botox to treat chronic migraine, and has since led a number of other clinical trials.

"If I could advise anyone looking to follow her path, I'd tell them to channel Sheena's courage," Adrian Adams, Impel's CEO, wrote to Endpoints.

For Aurora, it's also key for scientists like herself to distill the scientific message so that it resonates with patients — communicating clearly what the medicines she's helping put on

away two days a week. That's too much."

Along the way, it's crucial to bring in a diversity of voices — a message that's especially pertinent in migraine, but just as important in other areas of neurology.

"There [are] glass ceilings everywhere, right?" she said. "So we have to recognize that, and it's just not a token. I understand when you bring a person like me, I'm a single mom. My son has autism. So I bring something different to the table. And it's not just a number. It's the thought process."

— Amber Tong

HIGHLIGHTS

Former head of immunology at Janssen, president and CEO at Aro Biotherapeutics

From big-shot J&J exec to now her own boss, Sue Dillon takes leap into next chapter of career

Four of J&J's well-known immunology drugs have one name in common: Sue Dillon.

The former immunology chief at J&J's Janssen and current Aro Biotherapeutics CEO helped run one of the biggest shows in immunology, working on Remicade, Simponi, Stelara and Tremfya. However, her story starts in college.

bocytopenia, a condition characterized by low platelets.

For Dillon, the Promacta collaboration offered valuable lessons on bringing groups together.

"These were two companies. East Coast, West Coast, different size, different everything. But the key thing was that we each had something that the other party needed," Dillon added.

After SmithKline merged with Glaxo Wellcome back in 2000 to form GSK, Dillon moved to Centocor, which had just been acquired by J&J.

One of her focuses was TNF inhibitor Remicade, which she helped expand from one indication in Crohn's disease to eight, including ulcerative colitis and rheumatoid arthritis. That work, when Dillon later became the head of Janssen's immunology therapeutic area, also expanded into Stelara, Simponi and Tremfya.

When she started at Janssen, Dillon was, in her words, the "new kid on the block" in development, since her previous experience was in discovery. "One of the things that I always believed is that there should be a very good connection between discovery and development. And then once you have data from development, to feed that back into discovery," Dillon said.

Dillon noted that one of the biggest lessons she learned while at Janssen was that you cannot do anything without a "phenomenal team" — noting the team's success with the IL-12 and IL-23 drug Stelara and others in the pharma juggernaut's portfolio.

While at J&J, she worked for Paul Stoffels, the pharma's former chief science officer and R&D chief who joined back in the early 2000s. Stoffels, now the CEO over at Galapagos, told Endpoints that he first met Dillon at a J&J science meeting somewhere around 2005 or 2006.

Stoffels described her as very "purpose-driven," praising her leadership skills and her ability to have both strong clinical

was just always learning, always something new," she said.

As she became more and more interested in genetic medicine, Dillon started thinking about the next phase of her career.

That led her to Karyn O'Neil, another J&J vet out of the Centyrex unit. O'Neil had designed a platform for molecules called centyrins, which can be engineered to bind to certain antigens with high affinity. Essentially, scientists could use centyrins to deliver drug payloads that might not normally be able to reach a target tissue.

"It looked, frankly, a lot more exciting to me than other opportunities — probably partially because I knew so much about it, because it had been hatched at J&J. And Karyn and I decided that we were going to have a go at it," Dillon said.

Aro Biotherapeutics raised $13 million back in 2018 with J&J's backing, and secured another $88 million for its clinical candidates three years later.

She officially joined as CEO in 2018.

"Very few people have the courage to start from a new target with a new platform and go to raise the money and do it. She was very successful in raising money and just making good progress and getting into the clinic. So I admire her for that," Stoffels said.

Dillon noted that while more women are entering the field, they remain underrepresented in executive roles.

"You just have to go look at the percent of women that are CEOs — is pitifully small," Dillon said. And while some progress is being made, "of course, I would like it to be faster," she added. Dillon has this advice for young women: Be bolder, don't wait.

"So many people — and I have to say probably more women — tend to think that they have to check every box on the list before they can make a move. And a move might not even be anything that dramatic. It could just be indicating interest in

HIGHLIGHTS

Head of global public health R&D at Janssen, former Merck exec, launched Innovative Medicines Initiative at European Commission

Discoveries are 'happening every day' — and Ruxandra Draghia-Akli wants to be on the forefront

Ruxandra Draghia-Akli was on her way to a board meeting when someone stopped her outside the elevator.

"Where's Dr. Draghia?" they asked, mistaking her for an assistant.

"I stepped into the meeting room, and I do vividly remember there were 12 men in the room, and here I was," she said. "But I thought that it was an opportunity to prove that it didn't matter that I was a woman. I was talking about science."

These days, Draghia-Akli is still talking about science, only for J&J as head of global public health R&D at Janssen. She's helped launch three new research centers around the world focused on conditions with "pandemic potential," including dengue virus and antimicrobial resistance.

"We are innovating specifically for resource-limited settings," she said.

Draghia-Akli was raised in Romania, where she was one of the few young girls in her class studying science and math. Her father was an endocrinologist, and she always liked the idea of following in his footsteps. Then the Berlin Wall fell in November 1989, and a revolution broke out in Romania. Draghia-Akli watched grenades explode outside her window. She remembers thinking that it was "the first step to a better life."

During a months-long fellowship — one of the shortest in the world, she joked — she worked on novel tools for gene therapies, such as new vectors, tissue-specific promoters and enhancers.

"Now everyone is doing it, but when I joined the lab in 1995, these were really things that were on the cutting edge," she said.

Around 1997 or 1998, the researcher came into a grant to set up her own lab, which eventually led to the spinout of a biotech named ADViSYS.

"I think that we were too innovative for the time. We were probably about 10 years ahead of the curve," she said. The company was focused on nucleic acid vaccines, which use genetic material from a virus or pathogen to mount an immune response against it.

In the early 2000s, however, investors weren't as open.

"With everything that was happening in the ecosystem, it was really difficult to both find the money but then engage into the regulatory process that would have allowed us to really start clinical trials and to bring those products to the market," Draghia-Akli said.

However, Draghia-Akli was inspired to change the system. That led her to a stint at the European Commission, where she helped launch the Innovative Medicines Initiative, a public-private partnership with a $5 billion-plus budget to kickstart new research. Among the project's successes are an approved Ebola vaccine and advances to liquid biopsies for cancer.

The industry, however, came calling again around 2017, and Draghia-Akli joined Merck as VP of global vaccines. She was in charge of scientific affairs and partnerships specifically focused on bringing in new programs and getting vaccines in arms around the world.

"The field had evolved dramatically in the area of gene therapy and nucleic acid vaccines, and really in the vaccines

J&J's program uses AI to forecast outbreaks four to eight weeks before they occur with about 85% accuracy, Draghia-Akli said, allowing scientists to pinpoint the best sites for clinical trials and prioritize vaccine distribution.

The other two centers are based at the London School of Hygiene and Tropical Medicine and the University of Cape Town in South Africa. They're focused on tuberculosis and antimicrobial resistance, or AMR, respectively, and seek to find therapies that can overcome multidrug resistance. By 2050, experts guess AMR could lead to as many as 10 million deaths per year.

"We wanted to put this partnership in a place where the populations are very much affected by microorganisms that are resistant to numerous drugs," she said of the AMR program in South Africa.

"I do believe that we have an opportunity nowadays to make a difference," she said. "Discoveries that are happening every day, and in biotech, it's even more important than in any other place, probably."

—Nicole DeFeudis

HIGHLIGHTS

VP, diabetes, obesity and cardiovascular research and early clinical development at Eli Lilly

industry, and then you realize you're not alone — that actually, everybody else feels the same way," she said.

That lesson, along with seeking role models and mentors and speaking up for herself, has served the now VP of diabetes, obesity and cardiometabolic research at Eli Lilly well across her 26-year career.

In many ways, Eli Lilly was the perfect fit for Gimeno, whose entire career is in metabolic disease. She initially fell in love with research as an undergraduate student in the UK, then moved to the US from her native Germany to attend MIT, where she earned her postdoctoral degree in biology. It was a brief postdoc stint at Millennium Pharmaceuticals that solidified her commitment to biopharma, and in 1996, she joined Millennium as a full-time employee working in metabolic diseases.

After seven years at Millennium, however, a company-wide downsizing meant Gimeno had to lay off her team — and eventually herself. She then joined Wyeth nearby in Cambridge to work again on metabolic diseases.

In 2009, Pfizer bought Wyeth, but around that same time, Lilly offered her a job. Gimeno and her husband, however, had three young children and decided against a big move to the Midwest. So she stayed on at Pfizer in biotherapeutics discovery for two more years before Lilly contacted her again and offered her the role of chief scientific officer in diabetes. This time she said yes.

"It just made sense then," she said. "I'd spent my entire career in metabolic diseases and Lilly was clearly a leader in diabetes and other metabolic diseases, so it really was my dream company to work for. And it was a leadership position in discovery which I felt I was ready for."

She took on her current role in 2016, but as she pointed out, it's been an expanding role. Lilly has a strong diabetes portfolio, of course, but obesity and cardiovascular research and treatments are growing as well. In fact, Gimeno's title changed in October from diabetes R&D to include diabetes, obesity and cardiovascular R&D.

obesity, but Gimeno and her team are already looking ahead to how they can do even better. They are investigating two molecules now in Phase II: GLP-1 receptor NPA orforglipron, and a triagonist GIP, GLP-1 and glucagon receptor in one called retatrutide, with much more to come.

While tirzepatide for obesity is still pending final study results — and FDA approval — Lilly expects the drug to be a megablockbuster. In its latest earnings call, Lilly CFO Anat Ashkenazi said Lilly plans to double manufacturing capacity by the end of next year to meet "unprecedented" demand for tirzepatide for chronic weight loss.

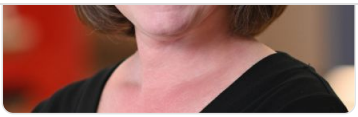
Gimeno said, "When we look at what comes next, there are a number of projects in Phase I, but what we try to do is listen to patients and what they tell us they want ... It's interesting too because once (a candidate) becomes an accomplishment, we've already moved on to the next accomplishment."

Gimeno holds seven patents, along with several co-inventors, and sits on the board of directors of BioCrossroads, the public-private initiative to grow Indiana's life science industry, and private biotech GLWL Research.

She's also passionate about empowering young women and the next generation of scientists and researchers in pharma — and working to make sure the industry workforce is diverse.

"Part of it is because I'm a little bit of an outsider. I came from a different country. My parents didn't go to college. So a lot of it becomes, 'you've lived through this yourself; how do you enable other people?' Also, one of the things I've always liked about the US is it's a very diverse culture. I cherish this, and I love to see people in science from all over the world collaborating," she said.

— Beth Snyder Bulik



HIGHLIGHTS

SVP of R&D at Excision BioTherapeutics

For Jennifer Gordon, the leap from academia to industry was a 'natural transition'

How can you become an senior vice president of a biotech company after only interviewing for one job? Jennifer Gordon, SVP of R&D at the clinical-stage company Excision BioTherapeutics, can tell you.

After studying biology in undergrad, she said she realized medicine wasn't the right path as she "was looking more for the science angle."

So after she graduated from Pennsylvania-based Albright College in the early '90s, she worked in a research lab. She said her one interview was to work as a technician in a lab, with Kamel Khalili, the chief scientific founder of Excision, and that's the last interview she's had to establish a lifelong connection with the company.

Excision is now bringing one of the first CRISPR-based treatments into the clinic for HIV. The idea is essentially to use CRISPR, which has been likened to molecular scissors, to snip out HIV in the DNA of patients' cells.

But the path to that trial has been a long and winding one. After finishing graduate work in pathology and completing her postdoc, she moved to Temple University and quickly moved up the ranks to faculty, where she began working on CRISPR, and then became associate dean for research.

Gordon spent 30 years in academia as an NIH-funded investigator and later worked on the projects to support Excision, which began as a small startup that came out of Temple.

About two years ago, Gordon made a big professional leap, leaving behind her tenured faculty position to focus full-time

But she pointed to the desire to make a bigger impact on the world and people's lives and working in the industry offered a more immediate opportunity to do that.

"I think you need to trust in yourself and have good mentors or colleagues. When you're committed and you know it's the right decision, then it's very easy," she said, pointing to Khalili as her "strongest mentor," who's been with her since the beginning.

"There were several women from the generation above me who I got to know from Kamel, and who were all very supportive. Just having a colleague to talk to or someone is giving you opportunities to serve in different leadership positions," she said.

She noted that building the community you're working with and mentoring the next generation is key too — "this is the way science gets done. Nobody goes to the clinic by themselves."

If you look at academia, she noted, it can be an open environment for sharing, but it also can be very patriarchal, closed and conservative, and there's a lot of politics.

But it's changing because of the diversity at the table and people from within, "so those of us on the inside need to make that change," she added. If you're at the table, she said, "make space for people to say something, and that's not just women but others who are underrepresented."

— *Zachary Brennan*

Aida Habtezion's path to one of the top jobs in all of biopharma was not a traditional one. Far from it.

Habtezion originally wanted to be a professor. From a young age, she found she had a passion for getting into the granular details of everything, but never felt satisfied. Reading one science book would never be enough — she'd have to read another book about the first, and then another and another, she said.

Even before she knew the subject she wanted to teach, a professorship was on her mind.

"I wasn't thinking about medicine, I wasn't thinking about engineering, but it was that, when we'd pass by the university, this was where I'd want to work, I want to be a professor," Habtezion said. "This was actually something that, for me, was fascinating."

She eventually landed in academia, earning tenure at Stanford and achieving her dream. But for an encore, Habtezion joined Pfizer's C-suite as chief medical officer in January 2021, helping run one of the biggest pharmaceutical companies in the world. The relatively new gig caps off a career that, for a while, seemed like a longshot.

Habtezion grew up in Eritrea, a small nation on the coast of the Red Sea in northeast Africa. A series of civil wars engulfed the country during Habtezion's childhood, and she eventually became a refugee in Europe with her brother before being granted political asylum in Canada. After an initial stint in Edmonton, Alberta, where Habtezion did her undergrad, she moved to Ontario, where more of her friends and family lived.

Education was a big part of her family's values growing up, she said, so as she moved around her studies always took priority. Once she arrived in Ontario, she completed her graduate work and then moved on to med school. Habtezion focused on internal medicine and specialized in gastroenterology, doing a fellowship in this field at the University of Toronto.

"There's more things that you do, your research lab expands, you get into different areas, you'd start to mentor the next generation of scientists, physicians, physician scientists, so my career was going well, but it was on an uphill [trajectory]," Habtezion said. "It wasn't — I don't think, once you have your research laboratory, your medical expertise, you don't really plateau in academic institutions. You continue, hopefully, I don't know. But you continue."

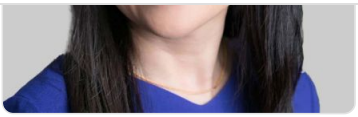
Before making the jump, she said she'd been thinking about a transition to pharma for a little while: "There's always something that you continue to compete with yourself." But when Pfizer first approached in the late summer of 2020, the urgency of the Covid-19 pandemic colored a more fresh — and urgent — perspective.

While that was happening, the Pfizer/BioNTech vaccines were still being tested, and no one knew for sure how effective they'd end up being. But that just proved another intriguing aspect to the job for Habtezion, she said. The whole interviewing process went "very fast" and by the time the new year rolled around, the vaccines were rolling out.

Now from her C-suite perch, Habtezion is making health equity a key part of her mission at Pfizer. She said her personal journey helps inform her goal, knowing that healthcare access — not just in the US, but around the world — is uneven. And at the end of the day, there's still that drive to continue until she's satisfied.

"We can see that many of our patients have difficulty accessing healthcare, right? For many reasons. And those reasons, there are just a multitude of issues," she said. "We talk about ... embedding it in everything that you do, so that you're not leaving anyone behind. So everything that we do, we look at it within an equity lens, rather than thinking of health equity as a separate entity."

— *Max Gelman*



HIGHLIGHTS

Metagenomi president and COO, led manufacturing at Kite for first CAR-T rollout

Learning from her father, Jian Irish brings a personal touch to new drug development

Growing up during the Cultural Revolution in China, Jian Irish quickly developed an appreciation for medicine watching her father.

Irish's dad was a chief surgeon who later went on to run a hospital, instilling a love for medicine and helping patients in his children from a young age. The passion and effort he put into his work, the constant interactions he'd have with patients and the dedication to his craft all made a strong impression on Irish growing up, she said.

But most striking were the personal relationships he'd developed with the people he treated — people who appreciated his help so much they'd trip over themselves to thank him.

"We used to have patients and their families coming to our house and come to thank my dad," Irish said. "That made such an impression on me when I was very young, and as I grew up, so I thought I would have become a doctor too."

Though Irish ended up taking a different career path, the love for medicine and helping others did not abate. From a young age, she channeled that passion into her own work, eventually getting a PhD in pharmaceutical sciences from a university in Japan, an MBA from UCLA and a few roles at Amgen, where she oversaw oncology operations and manufacturing.

Irish then moved on to a quick stint at Sanofi, followed by a four-year run at Kite, where she ran supply chain and manufacturing as the company prepared to launch its up-and-coming blockbuster cell therapy Yescarta. She landed her

they said, 'You need to join us.'"

Finding her own path took some time after Irish realized working as a doctor in the same capacity as her father might not be for her. Even though she loved working with patients and her father's strong work ethic set the tone, Irish wasn't sure whether she wanted to "directly interface with a live subject," she said.

That spawned a series of conversations about how Irish could still help people, and she discovered her love for chemistry and physics. So she decided that's where her first focus would be.

"I was really good at chemistry, I have to say, and my other subjects," she said. "And later on, I became really good with physics, and then mathematics, as chemistry was the first subject to sort of lit the fire under me, where I said, 'Hey, science is really interesting.'

"So I started asking my dad, like, is there any other way that I can contribute to taking care of the patients?" Irish continued. "And then we'll sort of talk about the medicines. And I said, 'Well, I'm really good at chemistry. Why don't I go there first?' So medicinal chemistry was my choice. And that was a defining moment for me, in my college application."

The thing that became more important than anything else, in Irish's mind, was staying at the forefront of new technologies. When she started at Amgen, the work encompassed what, at the time, were groundbreaking medicines like recombinant proteins and monoclonal antibodies, she said.

Irish was part of the oncology teams that saw Amgen's first data come in for these approaches, and their immediate impact was "forever ingrained in my mind," she said. Seeing tumors shrink on CT scans in just three months showed off, in her opinion, researchers' ability to innovate beyond what she saw growing up.

"I saw the power of a medicine that went beyond just the surgical medicine that my dad did that I was very familiar with," Irish said. "And so I thought, 'Well, that's amazing.' It

vation. What appealed to her for this opportunity (she started her gig in January 2021) was the potential ability to treat diseases at the DNA level, but in a more precise way than the earliest CRISPR approaches.

"We're in the process of continuing to push the boundary, seeing what other novel systems are out there not only just to knock out, but also can knock in through being delivered in various vehicles into the organ target where the mutations need to be fixed," she said.

But at the end of the day, the team that brings a new drug to the forefront is just as important as the medicine itself, Irish said. Because, as she learned growing up, everyone could be a patient one day in need of help.

"Being so close to the doctors who were caring, very caring, for the patients there, or I saw my dad walk around doing the morning rounds, seeing the patients and hearing about them talking about patients all the time," she said, "in many ways, it just becomes a part of our lives."

— *Max Gelman*

HIGHLIGHTS

Former director of medicinal chemistry at Cedilla, former Novartis staffer

From Novartis to startup biotech, Louise Kir-

part of building a company from the beginning."

So she threw her hat in the ring, and since 2019, she has led Cedilla's main cyclin dependent kinase 2 (CDK2) project. The protein is associated with breast cancer and also multiple other tumor types, but it's a difficult target that the industry has been trying to drug for decades. Kirman said what was needed was a "paradigm shift," and that's what she set about doing.

Fast forward to the second half of 2022, and Cedilla is initiating IND application-enabling studies for its selective CDK2 "conditional inhibitor" small molecule. Cedilla is a precision oncology biotech working to develop small molecule conditional inhibitors, currently focused on transcriptional enhanced associate domain (TEAD) and CDK2 targets.

One of the things that could have potentially held Kirman back is that she doesn't have a PhD. She admits it has been a challenge — the traditional path and thinking in the industry are that without that advanced degree, your options are limited. However, with Cedilla's leadership backing and willingness to take a chance on her, Kirman was able to break through.

"This industry is obviously dominated by men, so you've got this system that's designed for men, by men, so it's kind of difficult to disrupt that," she said. "I think role models are out there — at Cedilla there is a female CEO and a female COO — but in my experience, especially in chemistry, you have a lot of female leaders at the top, but then there's a kind of gap in the middle."

Now she also realizes her own leadership responsibility to other women in biotech, pharma and STEM in general.

"There's a thread here in showing that a non-PhD female leader can really lead this, can push through and challenge dogma and demonstrate that it can be done," Kirman said. "Role modeling for me is incredibly important, because there aren't that many women in my position and this is the level where women tend to drop out."

acetyl CoA carboxylase inhibitors for the treatment of NASH, glucokinase activators for the treatment of Type II diabetes, hERG activators for the treatment of long QT syndrome and the use of bifunctional degraders for the treatment of cardiomyopathy.

While pursuing a PhD path may have been the "easier" path to advancement, Kirman said she would not change that decision.

"When I got the job at Novartis straight out of school, I knew this was what I wanted to do. And the opportunities I've had, I wouldn't swap for anything," she said. "The one thing I would do, I think, is I would advocate more for myself ... You know your achievement better than anyone. You know what you've been doing."

Now closing in on the CDK2 program moving into development, she's not only glad to have jumped over to Cedilla, but appreciative of the opportunity.

"My work is in the discovery phase still, but it's really exciting," Kirman said. "I'm grateful to have worked on this project, but also to have leadership who have empowered me to make difficult decisions and supported me through it."

One of those leaders is Cedilla CEO and president Alexandra Glucksmann. She pointed to Kirman's dynamic, engaging personality as effective — and contagious.

"When she joined the company, she led a very important program and has championed that program and advanced it to a very exciting time," Glucksmann said. "She's passionate about the science, but she's just as passionate about the culture, sharing her learnings and then being part of a fun team."

Kirman's own advice to women coming up in pharma is to advocate for yourself, but also try not to pigeonhole or limit yourself. She also advised cultivating connections and mentors and keep taking risks.

"Not to be too cliché, but be curious and not judgmental —

HIGHLIGHTS

Co-founder and COO of Krystal Biotech, helped develop major drugs such as Vyvanse, Adderall XR and Fosrenol

Suma Krishnan co-founded a company to develop a treatment for 'the worst disease you've never heard of'

After spending time with patients who were diagnosed with what some call "the worst disease you've never heard of," Suma Krishnan dedicated herself to finding a treatment.

Krishnan, who is the co-founder and chief operating officer of Krystal Biotech, spearheaded a gene therapy gel that showed promise in a late-stage clinical trial for dystrophic epidermolysis bullosa. The FDA is reviewing whether to approve the therapy and will decide by February.

Those born with the disease are often called "butterfly children" because their skin is fragile and prone to large wounds that don't heal. Amid a dearth of treatment options, Krishnan and her team targeted the disease in a new way.

Krishnan feared that under a conventional gene therapy approach, the immune system would recognize the therapy as a foreign agent and reject it. Her solution was a topical gel that penetrates the skin to introduce two functional copies of the COL7A1 gene, which makes a protein that bolsters skin structure. Krishnan and other scientists spent long hours modifying the delivery vehicle, an HSV-1 virus that's largely been ignored by other gene therapy developers. But Krishnan

ing and closing that patients with epidermolysis bullosa experience."

The FDA has a deadline of Feb. 17 — also known as a PDUFA date — to review Krystal's therapy, dubbed B-VEC.

Krishnan said the positive clinical data are meaningful to her because of the company's close involvement with patients. "I remember a moment where we brought a couple of patients in, and each one of them told a story, and by the end of the day, every scientist and all of us had tears in our eyes. We went back motivated and inspired," Krishnan said.

Krystal isn't alone in the race to usher in a treatment for dystrophic epidermolysis bullosa. Abeona Therapeutics in November said it would ask the FDA to approve its cell therapy for the condition.

Prior to Krystal, Krishnan was known for discovering and developing major drugs like Vyvanse, Adderall XR and Fosrenol. But she had never co-founded a company.

"I worked for startup companies that made drugs successful with me as an inventor. Why not just do this for myself, I mean, start something," said Krishnan of her thinking at the time.

Krishnan's job now is to assemble and manage teams of scientists as they work toward new medicines to address unmet needs, using the platform that Krystal developed. That includes TGM1-deficient ARCI, a debilitating skin condition that disfigures patients and puts them at increased risk of bacteria and fungi infections. In 2020, the company announced positive Phase I/II results in the disease.

Last August, Krystal's cystic fibrosis program received FDA approval to begin clinical trials. Krystal hopes to demonstrate its platform can deliver genes to not just skin cells but also respiratory cells. Cystic fibrosis causes mucus buildup in the lungs and can be fatal in early adulthood without proper treatment.

While she oversees the science, Krish Krishnan, her husband

cility, with the goal of producing gene therapies as soon as they are approved.

Krishnan said young women often ask her for career advice. As a starting point, she encourages them to "be bold and confident."

"My advice to them is just be focused on what you do. Learn to be good at something. Don't be impatient," Krishnan said. She added that women often bring a different perspective.

"Women as leaders, I feel that we have this ability to just, you know, be compassionate," she said. "I see a great future for women in biotech."

— *Jared Whitlock*

RELATED: Special report: Meet 20 extraordinary women who are supercharging biopharma R&D

HIGHLIGHTS

First woman to lead Novartis Institutes for BioMedical Research, built Merck's research presence in the UK

Fiona Marshall: Chasing after ever-evolving science takes the drug hunter across the pond

Like many scientists, Fiona Marshall would tell you that she loved the natural world growing up — going to look at crabs running around the beach near her childhood home, ponder-

shall, the newly appointed president of the Novartis Institutes for BioMedical Research. Instead of being packed like a sandwich, proteins were moving around the lipid. “I always remember she said, they were like icebergs floating in the ocean.”

The science shifted again when Marshall was an undergraduate biochemistry student, with the cloning of the very first G protein-coupled receptor (GPCR), rhodopsin, in the retina.

“That was the first realization that the receptor for light was the very same family as the receptor that makes your heart beat,” she said. “And so you know how incredible all these hormones and signals in the body are all mediating their effects through this one family of proteins.”

She went on to study a number of neurotransmitter systems — which often signal through these cell surface receptors — in her PhD, but turned to GPCRs more broadly as she developed an interest in making new drugs. GPCRs, she was beginning to find, made good drug targets. Recruited to work for Glaxo Wellcome, she eventually moved from the neuroscience group to the molecular pharmacology department, which was tasked with cloning new GPCRs and figuring out what they do.

The momentum built up to one great big rush to identify hundreds of these receptors in the late 1990s with what Marshall described as a land grab, where companies raced each other to clone new GPCRs.

By the end of it, her group emerged as one of the global leaders. But around that time, Glaxo Wellcome merged with SmithKline Beecham, triggering a reorganization. Not excited by the position she was offered — line management reports across four time zones were too much considering she had young children at the time, and the work itself in assay development wasn’t particularly attractive — Marshall left to become Millennium Pharmaceuticals’ first biology employee in the UK.

The Boston-based biotech had been pioneering a new tool called transcriptional profiling, which shed light on the dif-

lize — they fall apart once taken out of the membrane. But an academic lab had found a way to engineer membrane proteins so that they're more stable, making it possible finally to solve for their three-dimensional structures. Marshall jumped on board to help start what became Heptares Therapeutics, as its chief scientific officer.

"One of the themes of my career is that I've tried to stay ahead of technology," she said, "and I've moved to sort of be in a place where I can exploit new technology and use that for discovering drugs."

Admittedly, Marshall thought Heptares' technology might become outdated in about five years and newer platforms would replace it. As it turned out, the biotech is still thriving, landing new deals from pharma partners. In the end, it was herself who wanted to move on after Sosei bought Heptares.

Marshall ended up taking up the big responsibility of rebuilding Merck's research presence in the UK, negotiating space within the Francis Crick Institute and assembling a discovery group that focused on elucidating the mechanisms of aging. The group grew to 80 people under her watch, and Merck is in the process of constructing a new bespoke site that can host 250.

"I think she was transformational, to be honest," said Roger Perlmutter, the former Merck R&D chief who recruited her for the role. "It was so impressive that as it became clear that she was the right person to lead more of pharmacology."

She did, moving to Pennsylvania and eventually becoming Merck's head of discovery research before Novartis recruited her away.

In addition to being a dedicated scientist, both Weir and Perlmutter described Marshall as a straightforward and direct — in a good way — leader who left no ambiguity in her interactions with others.

As the first woman to lead NIBR in its 20-year history, Marshall believes senior executives need to rethink the way talents are developed and not over-rely on the "standard" path.

and new understandings of how compounds change protein function; she's also paying close attention to computational methods that can speed up everything from the design and optimization of drugs to detection of safety signals and streamlining of clinical trials.

And you can be sure the science will still be changing. All the time.

— *Amber Tong*

HIGHLIGHTS

CEO of Daré Bioscience, leading charge for novel contraceptives

Sabrina Martucci Johnson builds a new kind of women's health company

When Sabrina Martucci Johnson asked venture capitalists to fund her new company in 2015, the lack of comps kept dooming the talks.

The company, Daré Bioscience, planned to build a portfolio of women's health products. In contrast, pharmaceuticals typically shunned the space or treated it as a one-off investment for reasons that Johnson couldn't comprehend.

"The whole reason why the opportunity was so fantastic was the same reason that getting it funded was more challenging

worked in so many therapeutic areas but I haven't been focused on women's health. When I think of what's important to me outside of the workplace through volunteering and philanthropy, it's all around women.'"

Her efforts are beginning to translate into approved medicines, though financial challenges remain.

Last year, the company won FDA approval of Xaciato, a vaginal gel for the treatment of bacterial vaginosis in patients 12 years or older. Daré estimates the condition affects 21 million women.

The centerpiece of the company's pipeline is Ovaprene, a hormone-free contraceptive that women insert themselves monthly. The mesh product acts as a barrier, while releasing a chemical that immobilizes sperm. In an early study, Ovaprene prevented essentially all sperm from entering the cervical canal.

Ovaprene is undergoing a Phase III clinical trial, and should the contraceptive win regulatory approval, Bayer will handle commercialization under a partnership deal.

Prior to Daré, Johnson was the president of WomanCare Global Trading, which launches women's health products in developing countries, the CFO/CAO of the California Institute for Biomedical Research and CFO/COO of Cypress Bioscience.

Her experience navigating commercialization and advancing a drug for fibromyalgia — a pain condition that primarily affects women — planted the idea of Daré. The company's portfolio model aims to take products from innovation to development, in contrast to what Johnson saw as fragmentation in the market.

The portfolio approach required that Daré pull in a large chunk of funding. When venture capitalists balked early on, Johnson decided to go public via a reverse merger to attract a broader set of investors. But education was still necessary, particularly for male investors who didn't always understand the impetus for Ovaprene.

program, a cream for female sexual arousal disorder, is in a Phase IIb trial.

"In other therapeutic areas, what you find is that often the conversations are just a lot more comfortable and the information about the disorder has been more broadly disseminated," Johnson said. "So one of the first things I had to do is just figure out how to normalize the conversation."

The company's sizable pipeline — which includes 10 programs — served as another attraction for investors. Then last summer, Daré garnered increased attention from retail investors after the US Supreme Court overturned Roe v. Wade and put the spotlight on contraceptive access. Each year, nearly half of all pregnancies in the United States are unintended.

"We need to do better, and part of that does come down to industry just getting more products out there," Johnson said.

Besides Ovaprene, Daré last year received up to a $49 million grant from The Bill & Melinda Gates Foundation for the company's preclinical contraceptive called DARE-LARC1. Daré hasn't provided many details about the technology, but regulatory filings have called the contraceptive reversible and long-acting.

In return for the funding, Daré has agreed to make the implant affordable to women in developing countries and in the US.

Even with a string of catalysts, the company's stock has struggled this year, which Johnson attributed to an industry downturn as the company awaits clinical trial data. Daré, in third quarter results, reported $40.3 million in cash and cash equivalents.

"You can perform exceedingly well, but in the end, there are these external influences that ultimately impact things like share price and market cap," Johnson said.

A biomedical engineer by training, Johnson said she was fortunate to have mentors who encouraged her to pursue sci-

— *Jared Whitlock*

HIGHLIGHT

Helped develop Galapagos' closely watched filgotinib, CSO at Confo Therapeutics

Christel Menet relishes idea of a 'white page' and new challenge at Confo Therapeutics

Despite being one of the most popular targets in drug development — representing about a third of existing drugs — G protein-coupled receptors remain rather perplexing.

That's mostly due to challenges in mapping their structure. Scientists have compared these tiny membrane proteins, called GPCRs for short, to inboxes responsible for recognizing things like light, taste, smell, hormones and pain. Almost everything around us is communicated by GPCRs, Christel Menet said — which is why the former Galapagos chemistry director finds them so interesting.

Menet has worked with GPCRs from the early days of her career at Faust Pharmaceuticals and throughout her time at Galapagos (when she wasn't busy with the company's closely watched filgotinib). So when she heard about the platform at Confo Therapeutics back in 2015, designed to stabilize functional conformations of GPCRs to explore new targets, she was intrigued.

Menet has pretty much always known she'd be a chemist. She went to a chemistry-focused high school in Montpellier, France, hundreds of miles away from her home in Brittany. After receiving her PhD from the University of Manchester, she took a job synthesizing compounds at Evotech. It wasn't long, though, before she realized she wanted to design those compounds.

That led her to Faust Pharmaceuticals, where she got experience working with GPCRs for central nervous system diseases such as Parkinson's. It was just about a year and a half before she joined Galapagos in 2005, where she worked closely with perhaps one of the company's most well-known programs — despite never winning approval in the US — filgotinib. It was under her leadership that filgotinib entered preclinical trials.

Galapagos touted the JAK inhibitor as a potential blockbuster, expected to rake in billions and put up a tough fight against rivals like AbbVie's Rinvoq. JAK inhibitors, named after the Roman god of doors, gates and transitions, consist of a family of enzymes: JAK1, JAK2, JAK3 and TYK2. But while other competitors focused on JAK3, filgotinib targeted JAK1.

Gilead inked a multibillion-dollar collaboration on the drug, which later got caught up in safety concerns surrounding the entire class. Despite winning approval in the EU and UK, filgotinib's application for rheumatoid arthritis was shot down by the FDA in 2020, with Gilead announcing that the agency wanted to see more data from two ongoing safety studies.

Menet left the company much earlier, as filgotinib was making its way through Phase II. Though the rejection left her disappointed, Menet cites one of the best moments of her career as hearing from a clinician in the UK whose patient improved upon taking filgotinib, or Jyseleca, as it's marketed overseas.

"When you hear this type of message, it's what makes you proud," she said.

It was the prospect of a greater challenge, however, that pulled her to Confo in 2016. Menet was contacted by a head-

name).

Picture GPCRs as "always moving, opening and closing," Menet said. Confo uses antibodies to keep them in one position, which helps scientists identify small molecules to treat disease. It's almost like studying the shape of a lock to find the correct key, she said.

The company's most advanced program, for peripheral neuropathic pain, is in Phase I, Menet said — and two other programs for undisclosed rare diseases follow behind.

"First and foremost, Christel is a pleasure to work with. She has a very open personality, good sense of humor, very collegial," Confo CEO Cedric Ververken told *Endpoints News*. "Even if something could seem too difficult to some, she will not easily give up and will find a way to make it work."

That brings Menet to another of her proudest moments: working with Confo's team of "really strong scientists."

"If you fail, it doesn't matter," she would tell young female scientists if given the chance. "You will succeed the next time."

—Nicole DeFeudis

HIGHLIGHTS

Amgen exec who worked on Tezspire, former Stanford professor

It was an odd move from Parnes, who says herself that she isn't someone who likes to move around a lot. At the time, she'd been a professor at Stanford for 24 years, and she liked her job — she found her immunology research stimulating, and she was surrounded by good friends.

But the year before, Parnes took a leave of absence from Stanford to take on a new role at Amgen, headquartered some 350 miles away in Thousand Oaks. Soon after she joined at Amgen, she began work on AMG 157, which later became known as the asthma antibody tezepelumab. While she initially wasn't sure about the jump to industry, as an executive medical director of early development at Amgen, Parnes soon found fascination in her new translational science work.

Flash forward 15 years. In December of last year, the FDA approved tezepelumab, marketed as Tezspire, for pretty much any patient 12 years or older with severe asthma. That broad indication rocketed Tezspire into blockbuster potential — and analysts predict that the drug will reach peak sales of $2 billion.

"I'd say Tezspire is the one crowning glory of my time at Amgen," Parnes said.

Parnes played a pivotal role in the development of Tezspire over a decade and a half as its early development lead. Before anything else, Parnes had to convince others that the drug would work in people. Parnes said that like other inflammatory disease programs, her team started their studies in healthy volunteers. But the challenge with finding some signal of efficacy for an asthma drug in healthy volunteers is that, unlike other conditions where you could measure some marker in the healthy volunteers (for example, weight loss for an obesity drug), asthma is measured in episodes, something healthy volunteers don't experience.

So Parnes and her team designed an inhaled allergen challenge — volunteers were exposed to what they were allergic to and then given tezepelumab after the challenge. Through that study, they showed that the drug could temper that reaction in volunteers who got it compared to those who got a

her mom had an interest in the area. But her high school science teacher encouraged her to attend a National Science Foundation-funded biology summer camp at Syracuse University, where she got the chance to work in a drosophila genetics lab. That experience propelled her into science research. And after going to Harvard for medical school, Parnes went to MIT for the first year of her postdoc, researching basic molecular biology.

But she realized she wasn't doing what she wanted to do at MIT.

"I needed to find a way out of that to get to where I wanted to be," Parnes said.

But it so happened that Phil Leder was giving a talk at MIT at the time, so Parnes went to talk to him. As a result, Parnes ended up joining the lab of John Seidman — Leider's postdoc who was just starting his independent lab and whom Parnes also knew from a class at Harvard — as the first postdoc.

In Seidman's lab, Parnes studied the immune system — cloning the cDNA and gene of beta-2 microglobulin, one part of the molecules that present antigens to T cells. It was a tiny lab, Parnes said, and her hours were crazy. But those three years, Parnes said, she was doing exactly what she wanted to do "and it was extremely rewarding." And it was that postdoc work that got her a position at Stanford soon after.

Parnes' story of jumping from academia to industry is one that has played out time and time again, but Parnes took the jump after a particularly illustrious and long career in academia, getting recognized as a professor emeritus after she left. She'd been the first woman on the tenure track at the Department of Medicine at Stanford.

Amgen's executive director of design and innovation May Mo worked with Parnes to evaluate potential products. "In those situations, you need to rely on your understanding of the science and make some difficult decisions. Jane has always had great confidence in her scientific work and that has allowed her to not second guess those difficult decisions," she told *Endpoints News* in an email.

HIGHLIGHTS

Pioneering NK cell researcher at University of Texas MD Anderson Cancer Center

Katy Rezvani: Leading NK cell researcher reflects on roots in Iran, the UK and Texas

In a small but widely-cited 11-person study published in NEJM in 2020, seven patients saw signs of their cancer completely go away after getting a new therapy made from natural killer cells. The study was one of the earliest to provide clinical proof that the experimental treatment method had promise.

The therapy was developed in the lab of Katy Rezvani at the University of Texas MD Anderson Cancer Center and later licensed to Takeda. And in November of last year, that NK cell therapy entered its pivotal Phase II trial, inching it closer to the finish line (though still years away) in a field with no approved treatments yet.

When Rezvani started her lab at MD Anderson a decade ago, it was just her and two others.

“When we first started working on the current program, there was quite rightly some skepticism as to whether this is going to work or not. It was a first-in-human approach,” she said.

is not something that is easy to forget, and up until his dying day, my father always wished that he could go back — being a military man, there is a strong sense of patriotism that he instilled in myself and my brother as well. It's just that what Iran is today isn't what it was 40 years ago, 45 years ago."

In the UK, Rezvani attended a French school in Canterbury. As she didn't speak English at the time, her school supported her through science. That was where Rezvani first took an interest in cancer research.

"I still have little yearbooks from when I was like 10 where my friends had written, 'I hope you grow up and achieve your goal of treating cancer,'" she recalled.

Rezvani later went to University College London Medical School, becoming the first student from her all-girls high school to be accepted into medical school. There, she nurtured her interest in immunology — during her chemo-oncology training, Rezvani learned about graft versus host disease, which seeded her research pursuits and spurred her to get a PhD in transplant immunology.

The next leg of Rezvani's journey brought her to the US. For her postdoc fellowship, Rezvani moved to Washington, DC, as a result of a joint UK Leukemia Research Fund and NIH program.

"Living in Washington, DC and working at the NIH I think were probably some of the most informative years of my life when it comes to my career," Rezvani said.

She pointed to her postdoc mentor John Barrett from the NIH, who instilled in her "this love of questioning science." While much of her medical school training was about memorizing, research pushed her to become inquisitive.

After the NIH program, Rezvani returned to London, joining the Hammersmith Hospital as an assistant professor. However, she knew she wanted to return to the US to build her career. That landed Rezvani at MD Anderson, where she started her own immunology lab.

She later adopted the two cats of that patient and brought them to Texas when she moved. “They love Texas, they love the heat,” she said. One of her cats, Bella, passed last year. Rezvani also has one dog.

Rezvani first became interested in NK cells after she returned to the UK from her NIH fellowship. She had studied T cells extensively, but found NK cells intriguing because they were more cytotoxic and didn’t cause graft versus host disease when transplanted from one patient to another. That’s because natural killer cells are a bit of an anomaly — unlike other immune cells, they don’t need to be taught to recognize antigens. In the 2020 NEJM study, Rezvani and her colleagues reported no instances of graft versus host disease, and no cytokine release syndrome or neurotoxicity, two complications seen with CAR-T therapies.

In December, Rezvani’s group started a new basket clinical trial testing a CD70 NK cell therapy in all blood cancers, recently dosing their first patient. Notably, the trial uses CAR-NK cell doses manufactured from the blood of a single umbilical cord, which Rezvani said massively reduces the cost of the therapy. In addition, Rezvani also led an NK cell partnership with Affimed, which bore its updated results at AACR earlier this year.

Her lab has a number of other projects in the works, including using CRISPR to edit NK cells to make them more resistant to the ever-hostile tumor microenvironment.

Rezvani spends much of her time in the lab. She meets with her mentees one-on-one every week, which, in a lab of that size, takes at least two and a half days, if not more. One point that Rezvani’s lab members highlighted was her dedication to them.

Rafet Basar started at Rezvani’s lab as a postdoc in the lab’s early days (“when two or three pizzas was enough for everyone”) and is now an assistant professor at MD Anderson. He said that when he started at Rezvani’s lab, he had no research background coming from med school in Turkey, but Rezvani was patient with him as he learned his way around the lab.

tennis and spending time with friends. She's also taking French classes.

Looking at the Iran protests today, Rezvani said, "It hurts me to see what is happening to women there. What's happening to women in Afghanistan in that part of the world are these kind of brilliant young women who are stuck or they're not allowed to work. They're not allowed to even go to school. So I was one of the very lucky few."

— Lei Lei Wu

HIGHLIGHTS

Helped invent bluebird's eli-cel, longtime GSK exec, CEO of Epic Bio

Amber Salzman had few options when her son was diagnosed with a rare genetic disease. So she created a better one

Amber Salzman's life changed on a cold, damp day in Paris over tiny plastic cups of lukewarm tea.

She was meeting with Patrick Aubourg, a French neurologist studying adrenoleukodystrophy, or ALD, a rare genetic condition that causes rapid neurological decline in young boys. It's a sinister disease that often leads to disability or death within just a few years. Salzman's nephew was diagnosed at just 6 or 7 years old, and died at the age of 12.

ALD is caused by a mutation on the X chromosome, meaning women tend to develop less severe symptoms later in life, if at all.

It was 2000 when Spencer's diagnosis came in, and Salzman was responsible for all things IT, analytical methods, competitive intelligence and such at GSK. The Michigan native studied computer science as an undergrad and earned a PhD in mathematics from Bryn Mawr, but it was serendipity and a desire to help drive new medicines to market that led her to GSK.

Her mentor, the late and highly esteemed physician-scientist Tachi Yamada, told her Spencer's best bet would be gene therapy, a breakthrough approach at the time that involves attaching a functioning copy of the gene to a virus for delivery to cells. Unfortunately, an option didn't yet exist, and the field was still reeling after the death of Jesse Gelsinger, a mostly healthy patient who died in 1999 after taking an experimental gene therapy for a rare metabolic disorder.

Yamada put Salzman in touch with gene therapy pioneer Jim Wilson, whose lab had designed Gelsinger's treatment. In the meantime, Salzman was making cold calls to anyone and everyone who may have a lead. When she heard back from Aubourg about his research in ALD, she immediately booked a plane ticket to France.

The team also joined hands with Cell Genesys, which agreed to provide a vector. Though Cell Genesys was focused strictly on cancer, Salzman convinced CEO Stephen Sherwin that she could get a candidate for ALD to the clinic faster.

"If these boys go untreated, they're going to die," she recalled telling him.

One in every 21,000 boys are diagnosed with ALD, according to Boston Children's Hospital. Stem cell transplants are available to some patients, but only if the disease is caught early enough, and the procedure comes with its own risks and months of recovery.

Together, the scientists developed what is now bluebird bio's

bers. But after plenty of phone calls and coming "just this close to stalking Steve," she joked, they agreed to do a trial in France. In 2009, results published in *Science* showed that their treatment stopped ALD progression in two boys. Salzman couldn't stop jumping.

"It was definitely not the ideal time to do a gene therapy or treatment, but thank goodness we did," Salzman said. "I was euphoric."

The results drew interest from Third Rock, which licensed the technology to create bluebird. The drug, marketed as Skysona, was cleared by the EMA in 2021, though the company has since ceased operations in Europe due to the cost of treatment, Salzman said.

It also ran into issues after some patients developed bone marrow cancer, though an FDA advisory committee voted unanimously in support of eli-cel's US approval despite the safety concerns, with one panelist arguing that the treatment could, at the very least, afford patients more time. Based on a post-hoc analysis, patients on eli-cel had an estimated 72% likelihood of Major Functional Disability (MFD)-free survival — meaning no loss of communication, cortical blindness, requirement for tube feeding, total incontinence, wheelchair dependence, or complete loss of voluntary movement — at 24 months, compared to just 43% of patients in a natural history control group.

"We knew we had to take things forward," Salzman said. "We met families left and right who were desperate for treatment and had no other options."

Salzman crossed over to the biotech biz in 2008, leading several companies, including Annapurna Therapeutics, Adverum Biotechnologies, Ohana Biosciences and now epigenetics-focused Epic Bio.

"I really owe so much to [what] I call my upbringing at GSK. I learned from incredible people, I had wonderful mentors and people that taught me so much, and I couldn't do what I was doing without that background. But it's a big company," she said. "You can't move it as quickly as you can when

Eli-cel came too late for Spencer, who had to receive an allogeneic hematopoietic stem cell transplant when his disease started to progress. He's now 22 and doing well, about to graduate college with degrees in psychology and French. He even spent a summer working in Wilson's lab, Salzman said.

He and the family have worked for years to raise awareness for genetic testing at birth. While they've successfully convinced officials to add ALD tests to the Recommended Uniform Screening Panel in the US, less than half of states routinely screen infants, according to Salzman.

"It's crazy that depending on what zip code you live in, you have a chance to live or not because if you don't get the early warning, you really don't have a shot," she said.

—Nicole DeFeudis

HIGHLIGHTS

CSO at Intellia Therapeutics, former Alnylam VP

Laura Sepp-Lorenzino: A mother's pharmacy inspires daughter's science career

Laura Sepp-Lorenzino's medical education started very early in life. As a child in 1960s Buenos Aires, she watched her mother fill prescriptions for people and witnessed the Argentinian pharmacy owner compound medicines in a chemical

small molecule could make a disease go away, she recalled thinking. At age 9, she attended a seminar alongside her mother, where she remembers a presenter mapping out how a drug traveled through a rat over time.

She eventually went to university in her hometown, got a PhD in biochemistry in the US and then did a postdoc at Sloan Kettering. While doing research on various inhibitors, including kinase ones, Sepp-Lorenzino collaborated with Merck. The company's drug development team came knocking and asked if she wanted to join the group. She wound up accepting and would go on to spend 14 years there, with the first half in oncology, a few years in the vaccines department and then a foray into RNA interference — a hot area at the time and one of the focuses of her work leading a cancer research unit in the Big Pharma's Pennsylvania group.

In 2014, she moved over to Alnylam — the biotech that ended up proving out the RNAi platform model — as a VP to lead infectious disease RNAi drugs for hepatitis B and D, as well as coordinate a partnership with Vir Biotechnology. Three and a half years later, she moved to Vertex as VP and head of nucleic acid therapies. Less than two years later, about 10 months before the Covid-19 pandemic, she made what she described as the best decision of her career.

At Intellia, she now heads up science strategy and research and early development for the CRISPR gene editing biotech. A mixture of "discipline" and "strong strategy" attracted her to the startup, which she had been observing from a distance since its inception, around the time of her Merck departure.

In her mind, the Intellia role is one of a lifetime.

"I get to do amazing science with dedicated, creative, smart colleagues," Sepp-Lorenzino said, "and we're changing the lives of patients, and I could not think of a better job."

Like the discipline of the Intellia pipeline, Sepp-Lorenzino views the arc of her career as quite strategic — going from oncology to rare diseases; testing first small molecules then CRISPR gene editing tools; and working across all sizes of drug development company, from Big Pharma to medium

women leaders in the industry.

"I mentor many people," the R&D leader said, "and I've also been the sponsor of many people, ensuring that they have opportunities to shine or to try and fail, but being there for them as they learn."

With a mission dedicated to helping patients, Sepp-Lorenzino feels a personal conviction to help pave the way for talented scientists and researchers "so they can do greater things much faster." She encourages newer entrants in the field to trust their instincts, ask probing questions and actively seek out knowledge from their peers as part of the process. "Sometimes, the way up is out," she said. "Go learn other things." In her own meetings, she is focused on getting clarity, resolutions and frameworks for action. Essentially, the discussion should lead to something.

Women's voices aren't always taken in by others in the room, though, she said. Work still needs to be done.

"We need to be flexible in ensuring that we make it equitable for men and women in the workforce," she said.

To get there, the industry needs to continue building out a pipeline of women leaders. Leadership is more female today, she notes, but "we need more."

Sepp-Lorenzino's mother, six decades ago, showed her it could be done.

— *Kyle LaHucik*

sands of miles south of biotech's bustling Northeastern hub along the Gulf Coast in Sarasota, FL, Effie Tozzo traverses choppy waters and charts courses on the fly as a sailor — after a day of guiding scientific operations at a startup.

Born in Greece, educated in France and a follower of the US Big Pharma-to-biotech executive path, Tozzo thinks outside the box while sailing with crewmates in three clubs. She's extremely alert while on the water. Lose focus and you can capsize. Let your mind wander and you can cause havoc for your team.

The same is true for Tozzo's role in the scientific leadership of a fledgling upstart built on the hypothesis that it can take protein degradation to the next level: fighting proteins outside the cell, rather than within. Arvinas, Frontier Medicines and a host of other drug developers have emerged in recent years to degrade proteins to the point where they no longer shape the way for diseases. In Avilar's case, the biotech wants to throw away the unwanted proteins found outside the cell.

Enter ATACs, or ASGPR Targeting Chimeras, which Avilar thinks will help ferry targeted proteins to waste sites on liver cells. Found on the surface of hepatocytes, the ASGPR receptor is critical in the process of breaking down proteins outside the liver cell. If a drug could bind a ligand to a target protein and another to ASGPR, Avilar bets, it could serve as a train to the trash bin and rid the blood of those unwanted proteins.

Critical to both Avilar and sailing is the art of communications. Lucky for her teammates and colleagues, the Avilar Therapeutics CSO possesses a love for languages: English, French, Greek and German (some Swiss-German from her time living in Switzerland), and enough self-taught to "chit chat" in Spanish and Mandarin.

"If the crew and the helm don't talk to each other," Tozzo said, "there is no way you will win the race."

Her voice grew when she switched from pharma to biotech.

and this is something also that I try to help younger women scientists," Tozzo said.

The Avilar chief scientist said she's "extremely fortunate" that she was never "held back because I was a woman." She always had supportive male colleagues, she noted. Her advice to women just entering the field is to exude confidence and "speak up." Go to the front of the room, she said, and soak up colleagues' knowledge and expertise, too.

When choosing to join Mitobridge, Tozzo said she had no reason to leave Merck. A colleague had been interviewing elsewhere, and one of the biotechs screamed Tozzo to him, so he recommended she check out the company. She reflects on the move as a "major step" in her career.

Right as the Covid-19 pandemic was picking up steam in the US, Tozzo was nearing the conclusion of her first stint in biotech. In the spring of 2020, she moved across town to Flagship Pioneering's Cellarity to run drug discovery as a senior vice president.

Last November, she entered the C-suite of Avilar, where she gets to continue wearing many hats in the hustle-and-bustle life of running a young biotech. She'll climb 20,000 feet in the morning for the strategic view, come back to base camp at noon to teach statistics or rework a graph for a presentation. Then she'll put on her toxicologist hat to help colleagues figure out how they're going to succeed with a new modality. It's not the same as a small molecule venture, she said.

If Avilar's theory works, they should be able to know whether they've degraded the targeted protein after just one dose. If successful, they might get to patients faster. If they fail, they'll know sooner than other areas of drug R&D.

With a platform of endocytotic receptors, Tozzo is molding a dynamic platform, not something static. Challenges motivate her, especially after decades of working in one of the most challenging R&D fields.

"It's a series of failures that you go through, and every time,

(more interest in how the body works than machines), followed by a desire to do a postdoc on exobiology for NASA. Instead, she went to Harvard Medical School and focused on insulin receptor regulation for a PhD.

When she's not reading papers, learning new languages on her drive to work, or figuring out how to get extracellular protein degradation into the clinic, Tozzo is out on the water.

Sometimes, coworkers tag along.

— *Kyle LaHucik*

HIGHLIGHTS

Co-founder and CMO at Qlaris Bio, investigator in clinical trials for new eye drugs

Barbara Wirostko, 'supermom' and R&D exec, details journey to Qlaris

Being a mother is a full-time job on its own. For Barbara Wirostko, juggling four kids and a career in the upper ranks of biotech leaves her plate especially full — but that's the way she likes it.

According to her eldest daughter Julia, everything Wirostko does points to her being a "supermom."

The co-founder of Qlaris Bio and ophthalmologist by train-

ways away at the hospital.

"I think that was the other thing that really drew me to ophthalmology — is that you were able to work with patients, make a difference in people's lives, also have a surgical as well as a medical aspect, practicing medicine, and then also have a family," she said.

Wirostko went to Cornell and studied microbiology before attending Columbia's medical school — her father's alma mater. It's also where she met her husband.

After med school, Wirostko got a phone call from a headhunter while she was working clinical trials as an investigator at a multi-specialty practice, where she was a glaucoma surgeon. The headhunter was looking for someone to consult for Pfizer on its launch of Macugen, a wet AMD drug the Big Pharma had partnered on with EyeTech Pharmaceuticals.

It just so happened that it was her day off, and she was able to get into the city and signed on part-time. Six months later, she joined as a full-time medical director.

From Wirostko's perspective, those years at Pfizer were her PhD in drug development.

She was at Pfizer for more than four years, overseeing Pfizer's Xalabrand franchise before the pharma giant shuttered the majority of its ophthalmology efforts. After that, she joined the glaucoma-focused biotech Altheos as CMO, as well as the faculty at the University of Utah in Salt Lake City, where she is currently based.

While at Altheos, Wirostko oversaw clinical strategy and helped design clinical protocol, guiding the company as it started clinical development for a rho-kinase inhibitor candidate. After spending more than a year there, Wirostko co-founded Jade Therapeutics alongside MaryJane Rafii, a former early asset lead at Pfizer's ophthalmology division.

Wirostko led Jade's R&D efforts in building a proprietary version of a polymer called hyaluronic acid, which was called cross-linked thiolated carboxymethyl hyaluronic acid

Qlaris CEO Thurein Htoo tells *Endpoints News* that he met Wirostko first at Pfizer, and kept in touch over the years as a key opinion leader in the space.

Htoo joked that Wirostko must have a time dilation device — or maybe a time machine.

"Somehow, she fits more into a 24-hour day than most people physically can. I don't know how she actually does that," Htoo said. "But that's always what impressed me the most in knowing her — has always been really that amount of time she finds to do everything, while not dropping the ball on anything, and finding the time at the same time to be a full-time dedicated mother."

A self-described "Pollyanna" (someone who's extremely optimistic), Wirostko offered two pieces of advice to younger women looking to forge their own path in the industry: Be willing to take risks, and understand that hardships happen.

"So, things fail. It's not you that's failing," Wirostko reiterated. And despite setbacks, "if you put your best foot forward and explore opportunities, you never know what's going to open up to you."

— *Paul Schloesser*

HIGHLIGHTS

UCLA associate professor, scientific co-founder of Appia Bio and Immune Design

Discovery and science are still what gets Yang out of bed in the morning. Though these days, she's focused on "engineering immunity." As a co-founder of Appia Bio, which spun out of her UCLA lab, Yang and a team of industry experts are looking to re-engineer a rare type of immune cell to conquer malignant tumors. The team also includes Nobel laureate David Baltimore, who's worked with Yang since her PhD days back in 1999.

The Caltech graduate started her work in cell and gene therapy around 2000, just as the cancer immunotherapy space was emerging from what she likened to a "Dark Age."

"Prior to that, cancer immunotherapy has been attempted for treating cancer in the late 19th century, but without too much success and even with some severe side effects," she said.

She was inspired by the work of pioneering scientists such as Steven Rosenberg, whose research led to the first effective immunotherapies for patients with advanced cancer. When it came time to pursue her PhD thesis, Yang was interested in pursuing a project that exploited new technologies such as gene and stem cell engineering to "beef up" immunotherapy for cancer.

Her study, titled "Towards Engineering Immunity," laid out Yang's goal to harness and engineer the immune system by using hematopoietic stem cells (HSC) to attack cancer.

Since then, Yang has worked at Caltech and is based at UCLA, where she heads up a lab that bears her name, the Yang Engineering Immunity Lab. She's also continued working with Baltimore, including on Immune Design, a biotech they co-founded in 2008. The company specialized in *in vivo* approaches that activate the body's own immune response in the fight against cancer and other chronic diseases. The company was eventually acquired by Merck in 2019 for $300 million.

"Honestly, I knew very little at the time, as a freshly, graduated a PhD student, but I worked with good people who really

Yang cited Baltimore as one of her greatest mentors. The famed biologist said of Yang:

> *Lili is a great scientist and a fine person. She joined my laboratory as a graduate student shortly after I came to Caltech. I was coming as President of Caltech and had not planned to take any graduate students into my small laboratory but she convinced me that she could function quite independently and she did. For her thesis she developed an efficient gene transfer method to program hematopoietic stem cells to differentiate into T cells of a defined specificity. She built this capability into the largest program ever undertaken by my laboratory. She then moved to UCLA where she became a key member of the microbiology faculty and the founder of a start-up company. Her capabilities know no bounds.*

Yang encourages women entering R&D not to limit themselves, and to think big. She notes that her PhD work may have seemed too broad or premature at the time, but it has propelled her career and is encouraging those who are in the field to think outside the box.

"For women scientists my age and stage there's a family side, right, so you just need to plan well. You cannot do everything perfectly," she said. "You know life is important, a career [is] important, life [is] important, family [is] important and that you just then needed to figure out a way to find the balance."

— *Tyler Patchen*

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