Pharmaceutical Executive

The Path to Pioneership: Dr. J. Joseph Kim, Inovio Pharmaceuticals

By Julian Upton

Dr. J. Joseph Kim

Pennsylvania-headquartered Inovio Pharmaceuticals is a late clinical-stage biotechnology company focused on the discovery, development, and commercialization of DNA immunotherapies that transform the treatment of cancer and infectious diseases. Inovio's proprietary platform technology applies next-generation antigen sequencing and DNA delivery to activate potent immune responses to targeted diseases.

Inovio is the only immunotherapy company that has reported generating T cells whose killing capacity correlates with relevant clinical outcomes. Inovio's most advanced clinical program, VGX-3100, is in Phase 3 for the treatment of HPV-related cervical pre-cancer. Also in development are Phase 2 immuno-oncology programs targeting head and neck cancer, bladder cancer, and glioblastoma, as well as platform development programs in hepatitis B, Zika, Ebola, MERS, and HIV.

Inovio was co-founded by President, CEO, and Director, J. Joseph Kim, Ph.D, and David B. Weiner, Ph.D, currently Executive Vice President and Director, of The Wistar Institute's Vaccine Center. The company, which spun out of the University of Pennsylvania Medical School, now has a market cap of around $500 million and close to 300 employees. This week, following publication of data in *Clinical Cancer Research* from a study of MEDI0457, an investigational immunotherapy developed by Inovio (and licensed to MedImmune in August 2015) to treat human papillomavirus (HPV)-positive cervical cancer and head and neck cancer, Inovio shares increased by 13.3%.

Dr. J. Joseph Kim earned B .S. degrees in Chemical Engineering and Economics from the Massachusetts Institute of Technology (MIT), a Ph.D. in Immunology from the University of Pennsylvania, and MBA in Finance from the Wharton School. Co-founding Inovio (previously VGX Pharmaceuticals) in 2000, he has led the company to become a thriving late-stage biotech deeply focused on developing next-generation immunotherapies.

Pharm Exec sat down with Dr. Kim to discuss his journey from humble beginnings as an 11-year-old Korean immigrant with no English to his present position at the forefront of a new medical frontier.

Pharm Exec: How difficult was it to move from research scientist to entrepreneur?

J. Joseph Kim: I'd like to say it was easy, but memory is a funny thing, you tend to remember the positive things, and forget the negative things. I always had this vision of combining business and technology to bring medical products that can positively impact hundreds of thousands of patients, if not millions. That's why I got into pharma and biotech. When Genentech went public in the 80s, and they were getting their first products approved—the human growth hormone, the insulin, and so on—I was really smitten by that. The founding CEO was Bob Swanson, an MIT-trained chemist and venture capitalist. As an impressionable young teenager, I wanted to be like that guy. That's actually what drew me to MIT to do my undergraduate degree. I joined Merck shortly thereafter, then the largest pharma company in the world, and Merck actually financed my PhD at the University of Pennsylvania.

In reality I had been preparing for launching what became Inovio Pharmaceuticals for close to a decade. When I found the science that I fell in love with, and a pioneer in the field of DNA therapies and vaccines in Professor David Weiner at the University of Pennsylvania, I felt that this was an area that I wanted to devote my career.

It's been a fantastic journey, but obviously the biggest lesson early on was that no one teaches you how to raise money. I must have taken like five business plan classes between MIT and Wharton, but there is no course on "fundraising". But I'm a quick learner, and I've had a lot of great mentors and teachers. We ended up raising about $40 million in the first seven years as a private company. We went public in 2009 and subsequently have raised over $250 million in capital, and another $150 million in non-dilutive grants and supported capital from places like the US NIH, the Gates Foundation, DARPA, and most recently from CEPI (Coalition for Epidemic Preparedness Innovations). I believe I was able to turn fund-raising, one of our greater challenges, into one of our strengths as we grew.

In 2009 Inovio consisted of about 30 people, and now you have about 300. How did that acceleration come about?

I guess the first six years of that nine- or ten-year span was pretty steady growth. In the last three years it became more like an inverse hockey stick. That was predicated upon preparing and launching our first Phase 3 Trials, transforming our com-

pany into a Phase 3 near-commercial organization. We also entered global partnerships with AstraZeneca's Biologics Unit, MedImmune, about three years ago, and then we received a $57 million contract from DARPA (Defense Advanced Research Projects Agency) in two tranches, to accelerate some of our technology and vaccine development. We also received $56 million in April from CEPI to advance our vaccines for MERS and Lassa fever through Phase 2 clinical testing. All these catalysts propelled us to where we are today.

In terms of the DNA technology you're working on at Inovio, where are we now in terms of bringing this kind of treatment to humans?

I think we're very close. We're probably two, three years from getting out first products approved. Our lead product is in Phase 3 global registration trials right now. In the next three to five years, I expect to have multiple products hitting the markets from our clinical pipeline.

Even with all of the advancements in immunotherapies and targeted therapies, we are still losing millions of people to cancer. We have a mantra in our company: "Patients are waiting," so we need to make sure we do everything possible to accelerate our, potentially, life-saving products to these patients as rapidly as possible.

Was it difficult, in the early days, to communicate the importance of the technology that you're working on?

Ironically, in the very beginning, where your new technology is in early development--you are testing only in mice and you're dream casting--it's easier. You can see some of these unicorns with very little clinical data capturing the imagination of the financial and investing public. Then eventually the reality hits, and you have to do things like clinical trials, and where you may have successes and failures. But as you get past Phase 1 and Phase 2, and subsequently Phase 3, your credibility and value increase, and true, long-term investors come on board once you have products on the market that are actually helping patients and making money for the shareholders, where there's a sustainable growth. This is precisely where Inovio is now, with growing level of impressive clinical data of our products.

Inovio has gone through all aspects of this cycle. DNA vaccine had a Eureka moment, and a lot of hype, in the late 90s early 2000s, but it was dominated by companies like Merck and Pfizer, big companies with big research plans. But a lot of their early trials failed, and that actually allowed Inovio to move in. We kept asking: how do we make this incredible technology work in the clinical setting, and then in patient setting? And around the mid-2000s we found a way to deliver these incredible high-potential products and demonstrate clinical efficacy and safety.

Now we have a wealth of almost 2000 patient's worth of data, late-stage products, and mid-stage products coming right after, with a very strong funding and partnership support from big pharma companies and global organizations.

Going back to your childhood, you had quite a few obstacles to overcome, coming to the U.S. without speaking English, for example. Who have been your key mentors since that time?

I didn't know English beyond "Thank you" and shaking my head and shrugging my shoulder when I landed as an 11-year-old with my mom and our life savings of just $300. I thank my mom's foresight. She brought me to America mostly for my education and better economic opportunities. It's a typical immigrants' story.

Later at MIT, Professor Bob Langer became my mentor and advisor during my undergraduate years and was a Founding Scientific Advisor of Inovio. And, of course, Professor David Weiner has been very impactful in my career. He played an even greater role as a co-founder of the company and as head of the Scientific Advisory Board still does today. These are two of the most influential people in biomedical scientific field today. There were other business mentors such as Hubert Schoemacher, who founded Centocor, which later became Janssen Pharmaceuticals, one of the most successful biotech companies of its time. When I started, he was suffering from a brain cancer, but he still gave me a lot of advice, especially regarding fundraising and starting up an innovative, disruptive companies.

How do you feel about the company growing larger? Do you see yourself looking to expand considerably when this technology starts to heat up?

I think we're prepared to grow it as much as our product development and the advancement of our pipelines allow us. I focus on maintaining our entrepreneurial culture and spirit, however. One of our corporate values is acting, thinking, and behaving like an entrepreneur. Every employee is encouraged to be her or his own entrepreneur, thinking about how best to develop his or her own business within our overall business. It's something that we stress all the time at Inovio. We can be very successful and very large, but we can't lose that spirit. This is a very fast-moving industry, and if you lose that entrepreneurial drive, as you know, hungry dogs run faster and hunt faster.

Obviously, we have great science behind us--great data coming out of the trials. The CEO of Regeneron once told me that Inovio reminded him of Regeneron ten years ago. So that's a good aspiration to have in the next five years or so — to become the next Regeneron.