Jongmoon Kim â?? CEO, ToolGen, South Korea

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Jongmoon Kim, CEO of ToolGen discusses the potential for their CRISPR technology to revolutionize not only therapy for genetic illnesses, but also agriculture. Kim explains his move from information technology to biotechnology and the importance of building international partnerships across the industry.

You joined ThruNet, an IT company, and the first Korean company to be listed on the NASDAQ, as an executive director. What was the rationale behind your decision to move into biotechnology?

I joined IBM Korea immediately after graduating from university. At the time, IBMâ??s position was analogous to that of Google in todayâ??s market â?? one of the largest corporations in the world. After working there for more than six years, I felt an obligation to work for a Korean company. Consequently, I joined a subsidiary of Trigem computers, the pioneer in Korean IT development.

Several years later, the chairman of Trigem decided to form a telecommunications company, ThruNet, which I joined as an executive managing director. Two years later, however, Korea entered an economic crisis. At that time, the Korean government and Korean industry had little experience with overseas markets. Thus, to secure the company financially during that difficult period, I insisted that the board float the company on the financial market and join the NASDAQ. The float successfully occurred in 1999, creating a USD 180 million investment into the company.

Following the IPO, I decided that, given the chance, I would make a career change and venture into a new industry outside IT. I received many opportunities throughout my career to become acquainted with members of the biotech industry. In 2008 I met Dr Jin-Soo Kim, ToolGenâ??s founder. I saw a lot of potential in the new technology he had developed. Dr Kim being a scientist not a business man, did not have the experience and knowledge to commercialise, so I began supporting him on a voluntary basis. In the year 2011, I was asked to formally join the company as its CEO. After seriously considering the offer, I sold my IT company and joined ToolGen, not taking a salary for the first year.

Could you give us an overview into ToolGenâ??s offering?

Our technology is able to edit specific gene sequences. Our genome editing technology uses a targeted cleavage in the genome for efficient genome editing. The actual process depends on the

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industry. In human therapeutics, the CRISPR technology can remove the targeted cleavage from the DNA, whereas it works on repairing it in agricultural and drug developments. In the case of industrial biotechnology, it can even insert genes back into the targeted cleavage.

Since establishment of ToolGen in 1999, we have continuously developed genome editing technology from first and second generation, up to third generation, CRISPR in 2012. At the same time, MIT and Harvard formed a joint institute called the Broad institute, based in Boston, developing a technology similar to CRISPR.

CRISPRâ??s innovation stems from its accuracy, cost-effectiveness, and simplicity to use. Conversely, the alternative technologies are more difficult to use, expensive, and lack accuracy. CRISPR simplifies some of the complex tasks required of researchers and is why our technology is being utilised around the world to develop new solutions to gene-based challenges.

What do you evaluate as the potential in the market for future genome editing?

I was born in the 1960s, only seven years after the end of the Korean war. Since then, Korea has grown from a poor nation into a highly developed one. Nonetheless, we have never led on a platform technology, always following. In my opinion, what we are developing is the platform for the biotechnology industry â?? the CRISPR technology.

Our main clients work in pharmaceutical companies, and other therapy developed related industries, given the breadth of possibilities in this sector that our technology can unlock. Our genome editing based therapy pipeline covers conditions such as Huntingtonâ??s, AMD/DR, Hemophilia/LSD, and Charcot-Marie-Tooth. CRISPR technology, theoretically, can offer a cure, which in two decades will open a new market for medicine â?? in vivo gene therapy. Moreover, ToolGenâ??s Styx-T, which is a CAR-T applied immune cell therapy, is also in our ex-vivo therapy pipeline. This is what excites me most.

Nonetheless, CRISPRâ??s reach is not limited to healthcare: given that the USFDA ruled in March 2018 that it will not regulate crops edited by CRISPR as GM products, the agricultural industry has potential to become a client too. Moreover, CRISPR not only has the potential to reduce development costs, but also cut development timelines from 13 to only five years. We have even achieved success in using our CRISPR technology in livestock too. Through the removal of certain gene expression, we developed the worldâ??s first muscle strengthening pig, increasing the leanness of the meat, its quality, and the productivity and profitability of the farming.

What differentiates ToolGen?

ToolGen Is the only company in the world to develop three generations of landmark genome editing tools. Our first generation came in 2006, with our Zinc Finger technology. The second generation was the TALEN, developed in 2011. Our most recent third generation in the form of the Cas9 Protein guide RNA came in 2012.

In addition to ToolGen, there are four other companies offering a similar technology: Editas, Intellia, CRISPR therapeutics, and Sangamo. What differentiates us from our competitors is that we own the ground IP, so can license it out to various players in the industry under special agreements. In 2017, for example, Monsanto in-licensed our IP for some seed developments. Thus, we can create our own projects and form collaborations across industries, such as biotech, and agriculture.

As the CEO of the company, I am proud that we create several other application IPs which will in turn strengthen our ground IP. We have since developed two new advancements in our technologies: our Cas9 technology is significantly smaller than the previous versions, and thus the vessel can be more easily transferred into the cell. Our other development, called sniper cas9, has a much higher level of accuracy in its delivery.

What kind of strategic role do your partnership agreements play for ToolGenâ??s business?

We are small and medium-sized biotech enterprise, so collaboration is non-negotiable. We aim to develop partnerships with the strong players across sectors, like Monsanto in agriculture, or the New York Stem Cell Foundation in stem cell therapies, with whom we recently signed a collaboration agreement.

Can you tell us more about your agreement with the New York Stem Cell Foundation?

When we decided to venture into developing stem cell related therapies, our due diligence found that the New York Stem Cell Foundation was one of the top three candidates for collaboration. Following three-way negotiations between ToolGen, the New York Stem Cell Foundation, and nSAGE, a stem cell technology firm in Korea, we signed a collaboration agreement to develop new, high quality stem cell therapies. Dr Bong Hee Lee, a world leading expert also collaborates on the project. Together we have formed a new company, *Ngene*.

What is your vision as ToolGenâ??s CEO for the future?

The company is structured with the ambition of internationalization in mind and a view to taking the company global. To do this, we are developing both our scientific expertise â?? 56 percent of our employees are involved in R&D and 25 percent of our employees hold PhDs â?? and our administration services, to be prepared for the complexities of international business. This is why we have four in-house lawyers, including our own patent lawyer â?? in achieving ToolGenâ??s will inevitably be faced with complex IP issues. As a result, our successes will be ensured in two ways: by thinking differently and implementing differently.

After spending five years with ToolGen, I frequently considered the question of what our motto should be. All leading companies need a vision. The company with the most ambitious visions eventually achieves success. Last year, it was decided that our slogan would be â??innovate genomeâ?• â?? to innovate within the gene therapy project. Our ambition is to develop products which promote a healthy, and a wealthy life.

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