Bioneer – Park Han-Oh, Founder and CEO – South Korea

11.12.2014

Prior to founding Bioneer, Park Han-Oh spent a number of years working at KRIBB. Today he speaks about the company's latest breakthrough technology in DNA synthesis and his outlook for the future of Korean biotechnology.

What was the inspiration for creating this company?

When I started Bioneer, there was no modern biotech company in Korea. Traditionally, Korea has been very strong in the process and fermentation industry for refineries, as well as chemical engineering, and it is only now that we start to see the biotechnology and pharmaceutical industries emerging as competitive sectors here.

Prior to Bioneer, I studied at the Korea Institute for Science and Technology (KIST), at a time when DNA synthesis technology was just being introduced in the US. My work at KIST and subsequently at KRIBB was involved with genetic engineering that was focused on this technology. While at KRIBB, I finished my PhD work as a researcher.

In 1988, DNA polymerase became a subject of great interest in the scientific community, and we started projects to develop another polymerase in KRIBB's molecular biology laboratories. One year later, the team developed new polymerase for fissure technology, which presented an opportunity to create a new company. In 1992, I founded Bioneer, whose activities were based upon custom DNA synthesis thermostable polymerase.

How has the progression of biotechnology evolved over the last 25 years in Korea?

Korea has had to play catch-up economy over the last 50 years. In the case of life sciences, Korea has been exceptional in developing more rapidly than just about anywhere in Asia except Japan. The DNA synthesis and PCR technology that Bioneer commercialized in 1992 was visionary for its time. Nowadays, Korean life scientists are exceptional in DNA research and the country's infrastructure for new biotechnology is world-class.

After Bioneer's foundation, we started bringing in profits after six months, which we continually reinvested in for the development of new products in DNA synthesis. We also post-commercialized synthesizers for large-scale synthesis. The company has continuously developed new chemicals for DNA modification and RNA synthesis, and has developed more than 180 chemicals for DNA raw material and specially modified RNA nucleotides. We also expanded to Small Interfering RNA (siRNA) after publication of synthetic double strand RNA, which includes different modifications for next generation siRNA. In 2009, I invented a new class of siRNA, a SAMiRNA, which is a single molecular, stable self-assembled siRNA as a nano-particle. We are collaborating with Sanofi to develop liver cancer drug project using this platform technology and we have international collaborations to develop drugs for idiopathic pulmonary fibrosis (IPF), an unmet need that kills more Chinese patients than cancer. Our targets are extremely valuable in terms of actually controlling this disease, which uses our SAMiRNA technology. Recently, we also obtained a USD 1.2 million government grant for developing drugs to treat dengue fever..

Bioneer has been at the forefront of new technology development. What application do these technologies have across different disease areas?

After the completion of the human genome project, the future of healthcare indicates a movement towards sequence-based diagnostics and therapeutics. Molecular diagnostics are already very popular and will be a key technology for early diagnostics and personalized medicine. Bioneer has fortunately initiated the use of PCR technology; recently we invented very important technology called Dual Hotstart, reverse transcription and Hotstart PCR which is the most sensitive RNA detection technology. siRNA is a sequence-based drug and SAMiRNA is the second generation siRNA which overcomes the limits of siRNA. We are now focusing on the disease which has no effective therapeutics.

Where do you see Bioneer in terms of being a global biotech player?

We are very weak in commercialization and sales & marketing. Our strength can now be described as having over twenty years of experience focusing on DNA technology. To commercialize our

platform technology, we are actively looking for a business partner. After processing our core technology, it is our expectation that a global company will recognize its value. In the field of molecular diagnostics, we have already proved this. We are introducing an HIV molecular diagnostic kit in the European legislation, which we expect to register in the EU in 2015. This device will be the most sensitive of its kind, and will certainly be an important product; HIV patients live as long as those not affected by the disease nowadays. There are several drugs for HIV today, but the disease is very difficult to terminate completely. Our new kit has a much higher detection capacity than the Roche kit. After using the diagnostics with Bioneer kit, HIV patients may be able to stop taking medication for it altogether.

How can you become an aggressive in the commercialization process?

We do not want to spend too much time investing in a sales network, which can take more than a decade. Instead, I am looking for a solid partner, such as a big pharmaceutical company that already has a well-established sales network. Using big pharma as a collaborator is the fastest way to distribute good technology.

Is this model of developing and then partnering better for the Korean industry? Or should Korean companies really be focused on developing new drugs from start to finish?

There is no pharmaceutical company in Korea with a global sales network. Even Samsung, which invested $2 billion in biomedical technology, has no sales network for that particular niche of their portfolio. Building sales networks for pharmaceuticals is much more difficult and takes much longer than consumer electronics. Samsung might want to establish a network for life sciences one day, but a company the size of Bioneer cannot develop this on its own.

Can Korea become a more competitive player worldwide given the government push?

Bioneer started distributing DNA technology in 1992, which was very early in Asia. The most intelligent and smartest students in Korea have studied the life sciences rather than go to medical school. Now these talented individuals are actively working in different places in this country and worldwide. Our manpower is our competitive edge, in that sense. Furthermore, the building of a strong clinical trial infrastructure through the creation of research centers and in teaching hospitals has lead to Seoul becoming the third best clinical trial city worldwide in 2014 and the clinical trial quality throughout the country is now very high. With this high capacity, Korea can develop novel drugs.

What makes Bioneer the strategic partner of choice for the biotech industry?

As a small biotech company, our business strategy is the collaboration with big pharmaceutical companies.

Bioneer is already working together with Sanofi, and Sanofi truly understands the potential of sequence-based drugs. We have already seen the first sequence-based drugs for genetic-based hypercholesterolemia, which have already been approved in FDA. Similarly, any big pharmaceutical company who understands the potential of our technology can be our partner, which will accelerate the development of new drugs with the second generation siRNA technology.

In the molecular diagnostics field, our technology can be used not only in HIV diagnostics but also blood bank screening for HIV, HBV, HCV. It can also be applied for cancer diagnostics. The beauty of this technology is that it can be applied to any type of cancer disease in terms of patient monitoring or bio-testing. There are many applications in which it can be used as a companion diagnostic with any company. If a company that understands the capacity of our technology wants to collaborate with us, there is great potential there to be unlocked.

We have built an excellent facility during the last twenty years; we are very strong in molecular diagnostics and siRNA therapeutics.

What are your plans for 2020?

Our vision is to improve healthcare with genome technology. Since Bioneer's foundation, we have been focused on PCRs and synthesis and have filed hundreds of patents. Now we have a unique technology to make molecular diagnostics and second generation siRNA therapeutics. We will combine this technology and we will become very strongly focused on molecular diagnostics and therapeutics. We have various technologies, so now we are focusing on the specific markets with different technologies. Only with the COPD IPF market, we can expect billions of dollars in sales.

The most demanding technology in the biotech revolution is high-throughput protein synthesis, so Bioneer has developed a synthesizer, ExiProgen™ for that. We have already sold to Genentech, Biogen Idec and Boehringer Ingelheim. Many companies will make the innovation with us.
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