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



We want to be the comprehensive health innovator in disease prevention, diagnostics and therapeutics

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Bioneer, founded in 1992, lays claim to be Korea's oldest biotechnology company. President, founder and CEO, Dr Han-Oh Park introduces the technological advances they have developed in molecular research tools, Bioneer's globally distributed platform of molecular diagnostics, and its novel next-generation RNAi therapeutics platform SAMiRNA

TM*. Dr Park also comments on Bioneer's role in supporting the growth of the biotech infrastructure in Korea and provides his assessment on what the potential is for the Korean industry in the future.*

As the founder and CEO, can you introduce our readers to Bioneer?

I founded Bioneer in 1992 as the first spin-off company from the Korea Research Institute of Bioscience and Biotechnology. The goal of the company is to develop innovative tools for genetic engineering including instruments and reagents. We want to be the comprehensive health innovator in disease prevention, diagnostics and therapeutics. Bioneer is more focused on the technology development. Thus, our aim is to license out.

As the founder, I wanted to develop the next generation technologies and consequently developed many instruments for genetic engineering. We have since developed molecular biology tools including instruments and reagents by combining necessary technologies of biochemistry, genetic engineering, nanotechnology, and electronics. Bioneer provides total solutions of nucleic acid and

protein purification, PCR, real-time PCR, sequencing, gene expression, RNAi, gene synthesis and protein synthesis.

An example is our 384-parallel DNA synthesiser, developed in 2000, which can synthesize 384 oligonucleotides simultaneously, the first of its kind in the world and the highest throughput of its time. We built 40 systems and were able to synthesize 30,000 oligonucleotides per day, making it possible to apply various genome-wide applications such as DNA microarray synthesis and SiRNA genome library synthesis. After developing this big capacity of oligonucleotide synthesis, we began the fission genome knock out project in collaboration with KRIBB and UK Cancer Research to find out the essential genes in cell division through the construction of genome-wide haploid and diploid knock out libraries. To achieve this, we synthesized half a million oligos for library construction.

Through using this diploid library, we have developed a drug-induced haploinsuffiency screening system called GP screening which is a unique genome-wide drug discovery tool. We are now providing genome-wide drug target discovery services with GPScreening™ and the Accutarget™ human SiRNA library. We are also running an in-house project for drug repurposing with these tools.

What is Bioneer’s current business model?

Currently, we are focused on the RNAi therapeutic platform. After the human genome project, diagnostics and therapeutics radically changed. We began with oligonucleotide synthesis and PCR. The PCR technology is the core of molecular diagnostics. The oligonucleotide synthesis is now the core of the RNAi therapeutics.

We are currently in the process of spinning-off a number of business areas to form stand-alone subsidiaries. We have spun-off our disease prevention area, forming a subsidiary company called Ace Bio, which will also focus on the health supplement business. We have already licensed out an anti-obesity product in the USA and Canada and it will be launched globally this year. In addition, we are aiming to also spin off a drug development company this year too. We have already been in discussion with venture capitalists. We have some promising compounds for lung disease, lung fibrosis, and lung cancer.

What are the platforms and services that you are currently offering?

We have a full line of the molecular diagnostics systems. Molecular diagnostics, in the short term, is the main revenue driver for Bioneer. For the development of molecular diagnostic kits, we have used our in-house made instruments, primers, probes, enzymes, and extraction kits, which make it possible for us to develop our products quicker and at lower costs.

At the beginning of the global swine flu outbreak, we developed the first Swine Flu diagnostic kit, supplying 2.5 million tests. We also developed the first Zika, Dengue, Chikungunya multiplex kit and registered a first WHO EUAL. In total, we have developed more than 50 different molecular diagnostics kits including HIV, HPV, viral load test kit, respiratory infection, gastrointestinal infection, sexually transmitted infections, and pharmacogenomics kits.

Furthermore, we will launch a point-of-care molecular diagnostics platform called Iron-qPCR for a multiplex of qPCR near-patient diagnostics this year. I believe it will be an essential diagnostic platform for precision medicine.

You have developed the SAMiRNA^{TM} platform. What do you see as the potential of this?

Indeed, looking to the medium and long-term, we have also developed a novel next-generation RNAi therapeutics platform, SAMiRNA^{TM}, which is composed of unmodified native RNA. This project has been 15 years in the making. SAMiRNA^{TM} can deliver not only siRNA, but also miRNA. Its safety and delivery efficiency has been validated through preclinical studies in mice and NHP. It holds great potential to be the next generation of RNAi therapeutics.

The first RNAi drug globally was approved last year. However, this drug failed to overcome the innate immune stimulation. Hence, pre-medication is essential to suppress this. In contrast, SAMiRNA^{TM} has no innate immune stimulation. Another significant advantage is that we used RNAi without any modification, so we can use micro RNAi. Thus, it has great potential as an anti-viral, and in the treatment of autoimmune diseases.

I hope that essential drugs for incurable diseases can be efficiently developed at high speed through extensive collaboration with global pharma who have expertise in clinical development. We currently have the capacity to discover more than ten drug candidates per year.

Our leading project is for Idiopathic Pulmonary Fibrosis, but our target is a novel target, involved in the early stage of Fibrosis, which can be applied in the early stages of many fibrotic diseases. Thus, there is huge potential. We will finish the pre-clinical study this year and anticipate the completion of the phase I clinical study by 2020.

As the oldest biotech firm in Korea, what do you see as Bioneer's role in supporting the local biotech ecosystem?

Before I founded Bioneer, there was no infrastructure for scientific research in Korea; most of the research products were made by Western countries, or Japan. Consequently, they had to be imported, which made costs high and created long delays. For example, it would take one month to receive a primer in Korea for oligonucleotides.

Bioneer developed and started supplying novel thermostable enzymes and oligonucleotides for PCR to local customers. As a result, we can now supply Korean customers the next day. We also provide a gene to protein service, which can create a protein within six hours and without the cell culture.

Moreover, I invented the automatic protein synthesizer, which was purchased by the UK's National Physics Laboratory. Edinburgh University also purchased this. We have also sold many of our products to biotech firms, for example, Genentech, which uses our instruments for drug discovery. They had previously failed to create the drug target protein for over a year, but after only one day of learning how to use our equipment, they were able to succeed.

Therefore, perhaps one could say that Bioneer has contributed to the development of today's biotech infrastructure in Korea. This has accelerated the speed and reduced the cost of research. When I was in the KRIBB, due to the high prices, if I purchased one kit and failed the experiment, it would be taken out of my salary. We have managed cut prices by less than half and reinvented all of the molecular biology tools and instruments. We will accelerate the development of diagnostics by providing efficient R&D tools and increasing customer bases and collaborations.

What is your vision for the future of the Korean biotech sector in the upcoming years, and the future role of Bioneer within that?

In order to solve contemporary global health problems, Korean biotech plays a significant role in providing innovative diagnostics and therapeutics. The Korean government and large Korean companies have continuously invested in biotech and genetic engineering since 1983.

Korean major industries such as IT, automobile and shipbuilding, starting from scratch in the 1970s, have grown into global leaders. Based on the strength of manufacturing, the biosimilar sector is now also demonstrating the competitive edge of Korean biotech. Yet, this is merely the tip

of the iceberg for Korean. Many innovative and diagnostic and therapeutic companies are now being supported by venture capital and actively developing new products. Bioneer now has a full range line up and the appropriate research tools.

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