NextSeq 500® System Impresses Genomic Researchers in India

Genotypic Technology performs a variety of sequencing applications on its NextSeq 500 System, delivering faster data turnaround times for its customers.

Introduction

In the early 1990s, Raja Mugasimangalam, Ph.D. was participating in the Human Genome Project as a Weizmann Institute post-doctoral researcher and as a researcher at the Argonne National Lab. Inspired by his studies, he soon returned to India, and along with Dr. Sudha N Rao, founded Genotypic Technology, a genomics technology development company.[1] Drs. Mugasimangalam and Rao soon expanded the company's portfolio, introducing the latest microarray and next-generation sequencing (NGS) technologies to India.

As the company grew, it remained focused on providing customers with high-quality, accurate sequencing data using the best technologies available, including Illumina NGS systems. Eager to keep Genotypic on the cutting edge, Dr. Mugasimangalam acquired an Illumina NextSeq® 500 system soon after Illumina announced its launch. Integration of the new sequencing system went seamlessly. The Genotypic team was pleased with the fast turnaround of the NextSeq 500 system, especially for transcriptome sequencing, becoming the first to upload NextSeq data to the short read archive (SRA) of the National Center for Biotechnology Information (NCBI). Genotypic customers were equally pleased. The speed of the NextSeq 500 system meant they were receiving results of their sequencing studies in record time.

iCommunity spoke with Dr. Mugasimangalam about his experience with Illumina sequencing systems, and in particular, how the NextSeq 500 system has expanded the services Genotypic provides to customers worldwide.

Q: What was the inspiration behind the founding of Genotypic Technology?

Raja Mugasimangalam (RM): Genotypic started off as an R&D and technology company, focused on developing genomic and data analysis methods. As genomics technologies matured, we recognized that there was a need for core facilities in India. We began to fill this gap, working with scientists and assisting them with their research projects. Slowly, we became a genomic service provider, but our heart and soul is still that of a technology development company.

Raja Mugasimangalam, Ph.D., is President, Founder and CEO of Genotypic Technology headquartered in Bangalore, India.

Q: What do you offer in addition to microarray and sequencing services?

RM: We're a technology hub and have a team of scientists who are experienced in performing genotyping and sequencing studies that use a wide range of sequencing systems, including the NextSeq 500 system. Almost 90% of the services we provide are customized studies designed to fit the research needs of our customers. For example, not everyone wants just exome sequencing. They might want to cover exomes and something else, or interpret the data in a different way. Other times, they'll need a customized analysis or database interpretation. For example, we'll perform a sequencing study using an Illumina TruSight® sequencing panel and interpret it in an Indian population.

In addition, customers often ask us to customize a panel with additional genes or increase gene coverage in a TruSeq® Targeted RNA Expression Panel. Depth of coverage is also a variable and we'll work with the customer to determine what's necessary for their research project. In addition to optimizing the sequencing application, we'll perform follow-on studies giving them an edge in their research.

Q: What sets Genotypic apart from other genomic services companies?

RM: We've found that people want to work with an organization that operates with the highest quality standards. We're proud that we have ISO 9001, and our processes run on SAP by Design. Our in-house R&D unit is also recognized

by DSIR (Department of Scientific and Industrial Research, Government of India). We're certified by technology companies for specific systems and are in the process of becoming a certified service provider (CSPro®) for Illumina. Most other genomic service companies and core facilities do not have such a multitude of certifications. We feel this is a very important aspect of our business, helping us to maintain the quality of our operations and instill customer's confidence on the results that we deliver.

Q: What are the demographics of your service customers?
RM: We work with researchers at universities, research institutes, and companies who are performing a wide range of studies, from agrigenomics to pharmaceutical research and clinical trials. The makeup of our customer base is a 50:50 split between academic and industry-based researchers. From a geographic standpoint, about 50% of our customers are based in India and the other half in the rest of the world. Many are inexperienced in working with genomics and sequencing, which is why we now offer genomics workshops and conferences.

Recently, we conducted a conference on "Applying NGS in Basic Research, Agriculture and Healthcare." It was attended by more than 350 academic researchers and industry scientists who were thrilled to see applications of NGS for different applications. We organized a four-day, hands-on workshop where 20 scientists from academia and industry performed a variety of NGS applications, including plant RNA-Seq using the NextSeq 500 system and metagenomics using the MiSeq system.

We also find it rewarding to work with technology companies to validate or benchmark their systems and products. This helps us to stay true with our DNA as a technology company.

> "You don't need to be an expert to operate the NextSeq 500 system, anyone can run it. It has made sequencing that easy. "

Q: How has the evolution of sequencing tools impacted your business?
RM: The speed of development has been phenomenal. I think it's almost keeping pace with mobile phones and their applications. Things are changing fast and, at the same time, massive improvements are being made. The major issue is equipment obsolescence. Yet, if the technology is sound, the data from first-generation systems can be combined with data generated by the latest instruments. Apart from generating quality data, the key is being able to analyze the data and realize its value. Our association with the technology companies is critical for us to stay abreast of the latest technology advancements.

We host one of the largest genomics and NGS LinkedIn® groups to keep our customers and the research community informed about the latest advancements in genomics. It now has more than 28,000 members.[2]

Q: How did the Genome Analyzer® system impact your lab?
RM: The GA_{IIx} system is like a stick-shift car, it's fun to drive, but you have to pay attention to what you're doing. With the NextSeq 500 system, you just push the button and go. You don't need an expert to operate the NextSeq 500 system, anyone can run it. It has made sequencing that easy.

> "The faster sequencing speed of the NextSeq 500 system is enabling us to handle a higher workload."

Q: In addition to its ease of use, what other features of the NextSeq 500 system do you like?
RM: I've nicknamed it the "MiHiSeq system", because it's a combination of the MiSeq® and HiSeq® systems. The NextSeq 500 system is easy to use and it's fast, like the MiSeq system. It has the advantage of offering 2 × 150 bp read lengths with an amazing throughput of 120 Gb data in a little over a day. It's comparable to what we obtain from a HiSeq system. I can load samples in the morning and provide the customer with the results in the evening or the next morning. The NextSeq 500 system enables us to generate data quickly for applications such as exome sequencing that are used in biopharmaceutical development. We can now move many of our sequencing projects from other platforms to the NextSeq 500 system.

Q: How long did it take before you were using the NextSeq 500 system to perform sequencing studies?
RM: The NextSeq 500 system was up and running very quickly. Ours was the first installation in India - maybe 20th or 30th in the world. The installation didn't take very long, enabling us to generate data quickly and upload it to NCBI faster.

Q: What do you think of the NextSeq 500 system data quality?
RM: We compared NextSeq 500 data with several Illumina systems, including benchmarking with GA_{IIx} data. The data quality is high and comparable to all other Illumina systems. We're looking forward to improvements in the real-time analysis (RTA) of low-complexity applications like genotyping by sequencing (GBS) and 16s sequencing.

Q: What types of sequencing studies are you performing on the system?
RM: We like the flexibility of the NextSeq 500 system. We're performing RNA-Seq — both reference-based and *de novo* — as well as whole-genome sequencing at the moment. Where it really has the edge over other systems is its ability to generate 2 × 150 paired-end reads. That's what we're running most. Because of the speed, we're also using it for small RNA sequencing and ChIP-Seq®. We have also run whole exomes.

Q: Do you use BaseSpace® genomics computing in performing data analysis?
RM: All the NextSeq 500 data can be uploaded automatically to the BaseSpace cloud. However, most of our analysis happens at our servers.

Q: Has the NextSeq 500 system impacted the number of customer studies you can perform?
RM: The faster sequencing speed of the NextSeq 500 system is enabling us to handle a higher workload. It's reducing our project turnaround time by 2-3 weeks.

Q: If somebody had told you in the early 2000s that you'd be able to sequence a whole genome in a little over a day what would you have thought?
RM: In 2000, it was a dream that we'd sequence a whole genome in a day. Now it's a reality with the NextSeq 500 system.

References

1. www.genotypic.co.in/
2. www.linkedin.com/company/236387

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