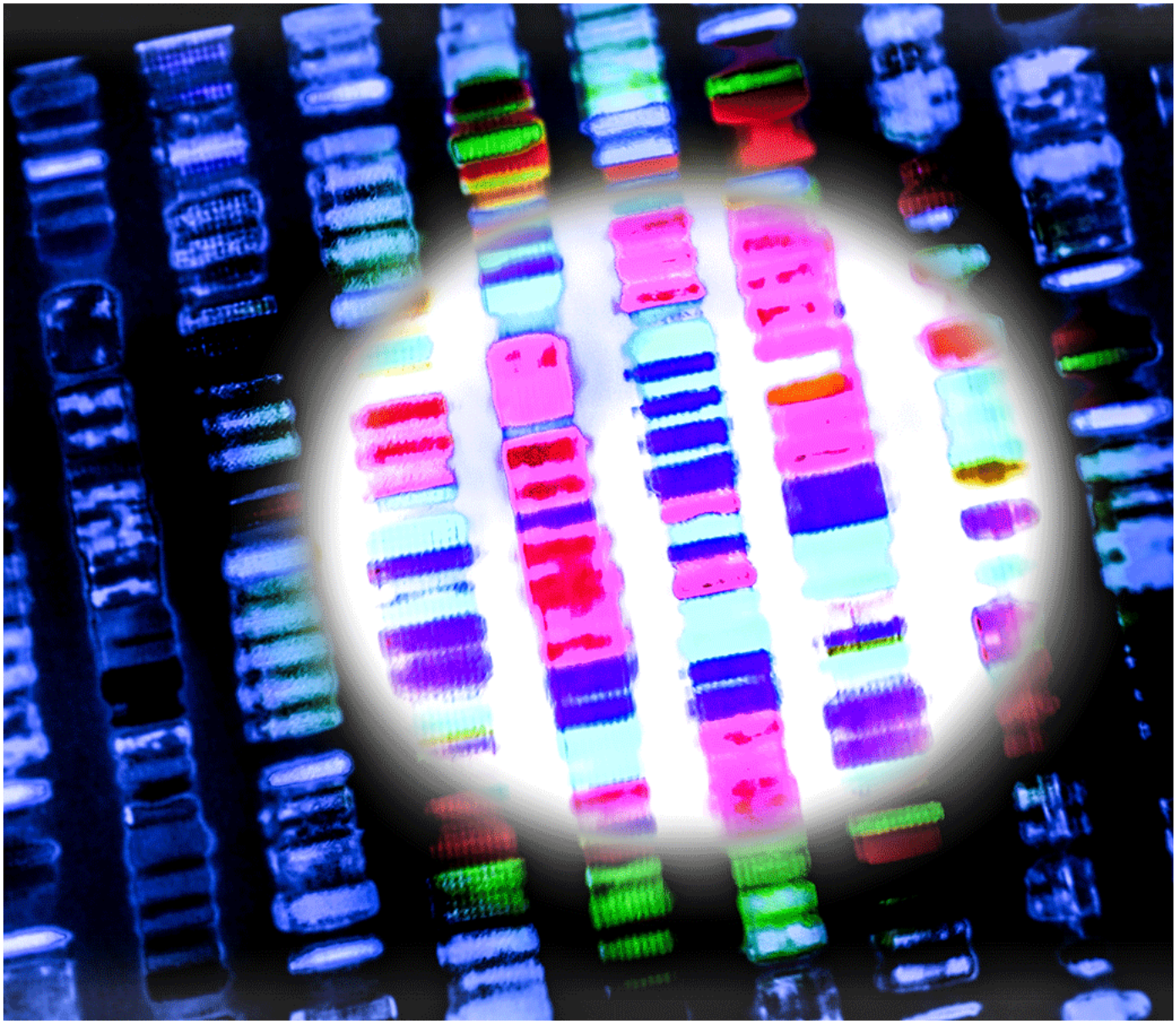
Complete Genomics sequencer reads human genome for under $100



Feb. 8, 2023
By Meg Bryant
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Complete Genomics Inc. launched a new line of genetic sequencers designed to decode DNA in greater quantities – and at a lower price point – than existing sequencing tools. The new products could signal a new era of more affordable testing, leading to wider availability and the potential to fulfill the long-desired promise of precision medicine.

According to the San Jose, Calif.-based company, a single set of its DNBseq-T20 can yield up to 50,000 whole genome sequencings (WGS) per year at a cost of under $100 per genome – half the cost of Illumina Inc.' s Novaseq X series, which debuted last year. The T20' s low cost is achieved by running the instrument at or near its operating capacity and requires users to order certain minimum amounts of chemicals and other consumables.

Intended for large population genome studies, the T20 features two imagers and a rotating robotic arm handling six slides simultaneously. Each run produces up to 42Tb with PE100, or up to 72Tb with PE150, reducing the footprint of Complete Genomics' prior-generation DNBseq-T10x4.

It produces up to 72Tb per run of WGS, shole genome bisulfite sequencing (WGBS), whole exome sequencing (WES), RNA-seq, single cell, spatial transcript omics (STOmics) and other sequencing applications, such as pooling and sequencing different libraries at the same time.

Rade Drmanac, CSO, Complete-Genomics

"We have made it our mission to address the global need for faster, cost-effective and accurate sequencing, whether it be to identify and trace pathogens in today's post-pandemic world or to meet the promise of precision medicine," said Rade Drmanac, Complete Genomics chief scientific officer.

"Now many more samples can be sequenced or a deeper more informative and accurate sequencing can be afforded per sample," he said.

As Drmanac explained, the T20 is enabled by innovative dip-immersion biochemistry that makes the sequencing reagents recyclable, saving more than 60% of the cost of sequencing reagents. The device's two-color sequencing further reduces cost, saving 50% of optical, computing, storage and broadband resources, compared with four-color sequencing technology.

"This is all in addition to our DNA nanoball [DNB] densely packed nanoarrays that provide billions of reads per one array," he told *BioWorld*.

For low-to-medium throughput sequencing, Complete Genomics also introduced the Dnbseq-G99, a high-speed option for jobs like targeted and small genome sequencing. The device, which was used to help identify the first imported case of Monkeypox in Chongqing, China, offers an overall throughput of 8-48 Gb per run, with turnaround times within 12 hours. Shorter read reports are available in two-and-a-half hours.

Complete Genomics, which is affiliated with Chinese genomics company BGI Group, plans to roll out the T20 in China in the second quarter of 2023, followed by a U.S. launch in the third quarter of this year. The G99, already available in China, will also launch in the U.S. in the third quarter.

A third product, the stLFR (single-tube long fragment read) Library prep kit uses patented DNA co-barcoding technology to produce synthetic or linked long reads on DNBseq platforms. All three products launched at the Advances in Genome Biology and Technology general meeting in Hollywood, Fla.

Complete Genomics aims to satisfy all of its customers' needs in a "one-stop shop," Drmanac said. The company already offers the low throughput sequencer, DNBseq-E25, medium throughput DNBseq-G400 and ultra-high throughput DNBseq-T7.

According to a report by Precedence Research, the next-generation sequencing market is expected to reach $24.48 billion by 2030, growing at a compound annual growth rate (CAGR) of 16% from 2022 to 2030. Once considered prohibitively expensive for routine clinical use, the cost of sequencing a high-quality draft human genome dropped in recent decades from an estimated $14 million in 2006, just three years after the first human genome was produced, to less than $1,500 in 2016.

"The cost of whole genome sequencing has fallen to less than $1,000 today, and the commercialization of DNBSEQ-T20 is reducing the cost of personal whole-genome sequencing to less than $100," Drmanac said. "Complete Genomics is reducing the sequencing price for the first time in the industry to less than $1 per gigabyte, which will become an important force driving the development and expansion of the global genetic industry, accelerating the progress of the human genome understanding and medical applications, and fundamentally reshaping the industry ecology."

With less costly WGS, "broader use on a larger number of samples and deeper sequencing per sample will get more informative results in genome sequencing, deep cfDNA sequencing, or yearly gene expression monitoring in thousands of single cells per person," he added. "We think that with this very affordable sub $100 price per genome, scientists and medical doctors will switch from partial genome analysis … to whole genome analysis."

Complete Genomics believes its affordable sequencing technology will pave the way for new applications, particularly in the clinic. For example, its DNA barcoding kit allows users to generate more complete and accurate haplotype-phased genomes – at under $200 – by sequencing a high-quality PCR-free library and complementary barcoded library that provide long-fragment reads enabling haplotype phasing.

The company is also working to improve the efficiency of its DNBseq platform "to make sequencing-based health monitoring and disease prevention at the molecular level affordable for all," Drmanac said. "We can pack more DNBs on the same size arrays."

BioWorld MedTech U.S.

KEYWORDS business Complete Genomics Inc. diagnostics DNBseq-720x2 DNBseq-G99 gene sequencing genomics precision medicine stLFR Library Prep Kit

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