Agilent case study: 5200 Fragment Analyzer system

Scaling NGS Quality Control with Higher-Throughput Workflows at the Luxembourg Centre for Systems Biomedicine

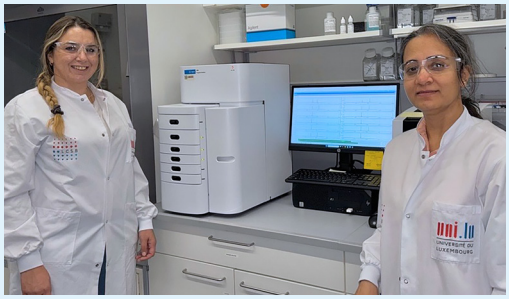
Advancing biomedical research through collaborative genomics

As demand for sequencing services continues to grow, laboratories need quality control (QC) workflows that can keep pace without compromising the reliable results researchers depend on.

The Luxembourg Centre for Systems Biomedicine (LCSB), an interdisciplinary research center at the University of Luxembourg, brings together expertise ranging from computational biology to experimental neuroscience to advance the understanding of neurodegenerative diseases. The center supports a diverse range of biomedical research projects, collaboratively partnering with researchers throughout the experimental lifecycle to provide high-quality sequencing services.

As an R&D specialist, Paula-Cristina Lupu helps evaluate new technologies, standardize protocols, and optimize workflows under the guidance of Dr. Rashi Halder, LCSB genomics platform manager. “My role is to bridge the gap between high-level scientific ideas and practical cutting-edge technology,” described Paula-Cristina. “In the LCSB, our goal is to deliver reliable, high-quality data and drive our partners’ scientific discoveries forward.”

Delivering consistently high-quality services, however, requires workflows that can efficiently accommodate various sample types, projects, and throughput demands.



Paula-Cristina Lupu (left), R&D Specialist, and Dr. Rashi Halder (right), Genomics Platform Manager, at the Luxembourg Centre for Systems Biomedicine with the Agilent 5200 Fragment Analyzer systems.

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Supporting diverse sequencing projects with consistent QC

Every day, the LCSB supports multiple projects across a wide range of sample types and next-generation sequencing (NGS) applications. The team works closely with researchers from project planning through sequencing, helping determine optimal strategies while maintaining quality standards throughout the workflow. Typically, the day begins with discussions around new and ongoing projects, sample assessment, and sequencing library preparation.

As project volumes and workflow complexity have grown, maintaining consistent and reliable sample QC while keeping turnaround times short has become increasingly important. "We are supporting a large number of researchers across multiple sequencing technologies that introduce significant workflow complexity," explained Paula-Cristina.

To support these demands, the lab uses the Agilent 4150 TapeStation system to assess incoming DNA and RNA samples, while the Agilent 5200 Fragment Analyzer system with the Agilent High Sensitivity NGS Fragment kit is used for library QC as well as genotyping applications. Together, these technologies help standardize workflows and support efficient sample processing.



Increasing throughput through conversion to the Fragment Analyzer

Before adopting the 5200 Fragment Analyzer system, library QC was performed using the Agilent 2100 Bioanalyzer system. As sample numbers increased, however, throughput became a limiting factor. "The main reason we switched from the Bioanalyzer to the Fragment Analyzer is the sample throughput," said Dr. Halder.

The team found that processing larger batches on the Bioanalyzer required frequent instrument interaction throughout the day. By contrast, the Fragment Analyzer enabled a higher-throughput workflow that integrated more naturally into day-to-day operations.

"If you have 40 samples, you can run only 11 at a time [on the Bioanalyzer], and then you have to wait. Whereas [with the Fragment Analyzer] we start processing at the end of the day, and the next morning everything is done."

In addition to increased throughput, improved workflow simplicity and consistency were also highlighted. "The Fragment Analyzer is more straightforward and gives more consistent results. It integrates better into our workflow, allowing us to handle a high number of samples while providing the data we need to confidently determine whether samples are ready for sequencing," said Paula-Cristina.

The Agilent ProSize data analysis software was also noted as a key benefit for visualizing fragment distributions and facilitating intuitive data analysis.

Improving workflow efficiency

Beyond throughput gains, the LCSB team identified several operational benefits after transitioning to the Fragment Analyzer.

The previous Bioanalyzer workflow involved labor-intensive switching between DNA and RNA analysis. According to Dr. Halder, improper cleaning of the Bioanalyzer electrode cartridge between runs could occasionally affect results and lead to delays. The Fragment Analyzer system simplifies this process while reducing the need for manual cleaning steps with the option to load two different gels for multiple kits within a single instrument setup.

The transition also reduced hands-on time and streamlined sample preparation and loading steps. "The system definitely helps timewise," said Paula-Cristina. "We don't need to spend as much time monitoring runs, and sample loading is much faster."

Dr. Halder added that automated molarity calculations and standardized plate-based workflows simplify sample management, plate handling, and sample labeling, helping scale operations as project demands expand.

Delivering consistent performance for NGS QC and genotyping

While switching platforms, comparable sensitivity was observed between the Bioanalyzer and Fragment Analyzer systems, so processing could move directly to the Fragment Analyzer workflow without extensive method redevelopment. “We could directly run the same samples with the same data and results,” said Dr. Halder.

In addition to NGS library QC, the Fragment Analyzer supports transgene mouse genotyping services. Dr. Halder explained that the system provides the reproducibility and fragment resolution needed for routine genotyping applications, including multiplex PCR assays where small differences in fragment size can be critical. Consistent fragment sizing across runs, weeks, and months is highly valued for robust results.

PCR products often produce high-intensity signals. The Fragment Analyzer can accurately size and quantify fragments across a broad concentration range, including highly concentrated samples, reducing the need for repeat dilutions and simplifying routine analyses.

Looking ahead

As NGS projects continue to expand in size and complexity, the LCSB genomics team expects technology to play an increasingly important role in maintaining efficient operations and high-quality results. “We are very happy with the consistency of the results and the features that the Fragment Analyzer offers,” noted Paula-Cristina.

Based on the lab’s experience, Dr. Halder recommends the transition to other laboratories seeking to improve throughput and workflow efficiency.

"I would suggest switching to the Fragment Analyzer because it gives reliable results. It's also cost-effective in terms of reagents compared to the Bioanalyzer system and has less downtime."

The LCSB remains focused on delivering high-quality data through standardized, scalable workflows. The Agilent 5200 Fragment Analyzer system has become an important part of that effort, supporting both operational efficiency and confidence in QC outcomes.

For more details about the Luxembourg Centre for Systems Biomedicine, visit
Luxembourg Centre for Systems Biomedicine | University of Luxembourg

Learn more about Agilent Fragment Analyzer systems at:
www.agilent.com/genomics/fragment-analyzer

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