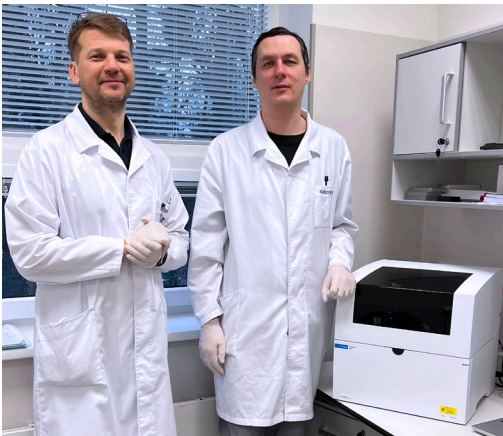


Agilent Case Study: 4200 TapeStation system

Building with Quality: Incorporating NGS Approaches to Infectious Disease, Pathology, and Oncology Research in Latvia



Dr. Ģirts Šķenders, Laboratory Development Project Manager, and Mr. Reinis Zeltmatis, M.Sc., Laboratory Specialist, work at the Riga East Clinical University Hospital where their lab provides clinical reporting of infectious disease, pathology, and oncology patient samples. Although the COVID-19 pandemic brought significant changes to their lab, Dr. Šķenders and Mr. Zeltmatis expertly led their team in upgrading from Sanger sequencing-based approaches to next-generation sequencing (NGS).

These clinical researchers are accustomed to challenges and problem-solving. The pressures brought on by the pandemic created extraordinary circumstances. This case study illustrates how the laboratory team managed the transition from Sanger sequencing to NGS. Here, Dr. Šķenders and Mr. Zeltmatis share the insights they gained throughout the successful adoption of the new workflow.

Taking a New Approach

Initially, the laboratory was part of the infectious disease department of the university hospital. This later changed when five hospitals were brought together under the umbrella of the Riga East Clinical University Hospital, now the biggest hospital consortium in Latvia. Included in this consolidation were several independent laboratories focusing on pathology, oncology, and infectious disease.

While Dr. Skenders' and Mr. Zeltmatis' lab had been performing Sanger sequencing for approximately ten years, it was only two years ago that they began adopting NGS workflows into their infrastructure. "The plan to begin NGS of oncology and infectious disease samples already started in 2018," Dr. Šķenders said. However, some logistical and administrative challenges impacted their ability to take delivery of their sequencing instruments and reagents until early 2020.

Fortunately, the lab's new direction in sequencing received a boost in June 2020, when the Latvian Center for Biomedicine Studies and Research received an additional sequencing grant. "The state decided they needed more sequencing and European governments were concerned about the public impact of COVID-19, so some additional money was given with the aim of increasing essential sequencing capabilities for critical laboratories," Dr. Šķenders said. Now, almost two years later, the lab's workload is still focused on SARS-CoV-2 analysis: they analyze nearly 200 SARS-CoV-2 samples and roughly 12 oncology specimens each week.

Finding the Right Tools for the Job

Building NGS workflows into their lab required benchmarking and optimization. Sample quality control (QC) is a critical part of optimizing NGS workflows, especially for labs that analyze formalin-fixed, paraffin-embedded (FFPE) tissue samples. So how did they select a sample QC method? By learning which solutions other clinical researchers found to be the most successful for their genomics labs.

"We checked the other users' experiences with kits or instruments, and tried to choose the ones that had the greatest customer reviews," Mr. Zeltmatis said. "The community out there probably had already done everything we would start with," Dr. Šķenders added.

While their lab eventually settled on the Agilent 4200 TapeStation system, prior knowledge of another instrument enabled them to compare and contrast. "We didn't like our experiences with the other system because it wasn't very precise. The TapeStation system is faster, much easier to use, and the precision is much higher, so we can really determine what our average library size is. Using the original platform, we could only guess; but the TapeStation system really shows the definitive number."

Considering the large volume of samples they process weekly, including the additional labor of nucleic acid extraction and sample prep that they perform in their own labs, the speed of the TapeStation system was also praised as a benefit.

"Although you can analyze up to 12 samples per run with our previous system, the time to results is significant. With the TapeStation system, we are able to obtain results within 10 to 15 minutes, maximum," said Mr. Zeltmatis.

Ease of use is also an important consideration. "It is simple to learn the workflow. Mix a little buffer with the sample, vortex, and you're ready to go. It's very easy!" said Mr. Zeltmatis. "I have seen people working with other electrophoresis-based platforms, and the TapeStation system is much easier."

Looking Towards the Future

Though NGS may be a relatively recent addition to their lab, Dr. Šķenders and Mr. Zeltmatis wasted no time using the workflow to maximize their lab's potential. They touched on their plan to replace all current genotyping methods with whole-genome sequencing within the next year.

When asked about future directions, their immediate response was, "liquid biopsies." Dr. Šķenders continued, "currently we are sending those samples to external service labs for analysis, but liquid biopsies are a very promising direction, especially for oncology. The accessibility of samples is much easier than tumor cases." They also mentioned that RNA sequencing for oncology, as well as for rare genetic diseases, was a priority. While the Agilent High Sensitivity D1000 and D5000 ScreenTape devices were fully sufficient for their current analyses, they noted that Agilent Cell-free DNA and RNA ScreenTape devices will become must-haves for the more challenging sample types used in RNA sequencing and liquid biopsies.

Continued efforts for infectious diseases beyond SARS-CoV-2 are another focus of expansion. "We are going to do more bacterial work, such as sequencing tuberculosis. Tuberculosis is still an issue in Latvia because of multidrug-resistant cases. We will also focus on other bacterial isolates and look into the possibility of finding bacterial DNA in the primary samples," Dr. Šķenders noted.

Wrapping It Up

Dr. Šķenders and Mr. Zeltmatis have brought the Riga East Clinical University Hospital a long way in a short period of time using NGS workflows in conjunction with robust sample QC to study various diseases. Learn more about the solutions that helped them as they implemented their NGS workflows. You can get a virtual hands-on view of the TapeStation system and the importance of NGS sample QC by visiting our [interactive TapeStation lab](#).

www.agilent.com/genomics/sample-qc

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PR7000-8555

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Published in the USA, March 10, 2022
5994-4644EN