

Case Study

Génomique Québec Innovation Centre Discovers Lower Costs, Improved Processes with Agencourt® CosMCPrep® and Agencourt CleanSEQ®

Genomics
Proteomics
Cell Analysis
Particle Characterization
Centrifugation
Lab Automation
Bioseparation
Lab Tools

Laboratory Profile:

Génomique Québec Innovation Centre at
McGill University, Montréal (Québec)
Canada

- Laboratory serves research projects funded through Génomique Canada/Génomique Québec
- Operates nine hours a day, five days a week
- High throughput genomics research is supported by three essential platforms: genotyping, sequencing and functional genomics
- Agencourt Solutions: Agencourt CosMCPrep Kit, Agencourt CleanSEQ Kit
- Chemistries are run on: Beckman Coulter Biomek® FXP Laboratory Automation Workstation

Located in Montreal, Canada, the McGill University Génomique Québec Innovation Centre is a world class research facility for genomics and proteomics. The Centre provides support for a wide variety of research projects funded through Génomique Québec. One of the programs currently underway: an effort to create a genetic/physical genome map of the vervet monkey (Cercopithecus aethiops).

In the past, the lab had been using an expensive robotic system to prepare and sequence DNA for this project. To reduce costs, it switched to Agencourt products—and a cascade of additional benefits followed.

The Search for a Less Expensive Solution

Dr. Ken Dewar, principal investigator at McGill University and Acting Scientific Director of the Innovation Centre, is leading an effort funded by Génomique Québec to develop an integrated genetic/physical genome map of the vervet monkey, a non-endangered species native to southern Africa. The non-human primate is genetically close to humans, and helps scientists understand complex human behaviors and diseases.

Indeed, a genome map of the vervet monkey could create new insight into human conditions such as Parkinson's disease and substance abuse—as well as general neuro-development and neuro-degradation. Researchers will also be able to learn more about how genes influence human traits, and where genetic markers may exist.

The Génomique Québec Sequencing Platform, led by Dr. Pierre Lepage, is supporting this research. "We provide technology platforms for the projects funded through Génomique Québec," he explains. "Among other services, we prepare and sequence DNA."

For Dr. Dewar's project, the Centre has focused on bacterial artificial chromosome (BAC) sequencing—including growing cultures, picking BAC clones, prepping the BACs, and managing the sequencing. The lab had developed and optimized an in-house alkaline lysis method using vacuum filtration and automated on Sciclone 1 liquid handling robot.

"The process was quite expensive," says Dr. Lepage. "We were already working with Agencourt on a different sequencing project, so we decided to try the products in this project as well."

The lab chose Agencourt CosMCPrep and Agencourt CleanSEQ kits. The result: the lab not only saved money, it adopted a faster, simpler sample preparation process with less risk of error. It also discovered that Agencourt is not just a vendor, but a true partner in the success of the lab.



The vervet monkey: *Cercopithecus aethiops*

A Faster, Easier Process

The laboratory uses robots to automate most of the sample preparation activities, but before the introduction of Agencourt products, there was one noticeable gap: technicians had to prepare sequencing plates manually. The process of aliquotting the DNA from the 96-well plate and mixing it with the sequencing reagent added unnecessary time and kept technicians from tending to other tasks.

By using the Agencourt CosMCPrep kit optimized on Beckman Coulter's Biomek FX^P Laboratory Automation Workstation, the lab is now providing high quality BACs that are ready to be used in sequencing reactions. For dye-terminator removal, the laboratory uses Agencourt CleanSEQ, a rapid process that requires no centrifugation or filtration.

"We've created a complete automation process, so there is no need for a technologist to prepare sequencing plates," says Dr. Lepage. "The process is much more streamlined."

Similar to the lab's prior process, the Agencourt CosMCPrep system does not require the labor-intensive step of cellular debris removal without the need for vacuum filtration. Instead, the system uses alkaline lysis followed by SPRI[®] (Solid Phase Reversible Immobilization) purification to differentially bind plasmid DNA to paramagnetic beads. While the DNA is bound to the beads, contaminants can be rinsed away using a simple washing procedure.

Like Agencourt CosMCPrep, the Agencourt CleanSEQ system also follows a paramagnetic bead format, making dye-termination removal a fast, easy process.

Adding to the benefits, the laboratory can now use a 384-well plate instead of a 96-well plate, which allows it to scale up the sequencing throughput.

The faster, simpler process has allowed the lab to reduce its turnaround time significantly. Instead of taking five days to prepare sequencing plates, the lab can complete the work in three days, a 40 percent improvement.

Quality Remains High

Best of all, the lab has been able to speed its processes without impacting quality.

One of Agencourt CosMCPrep's unique features is the ability to use a single process to purify both low and high copy plasmids in a fully automated format. Purified plasmids have exceptional sequencing performance with Phred 20 values routinely greater than 600 base pairs. By producing sequences with longer Phred 20 read lengths and higher signal intensities, the Agencourt CleanSEQ technology offers higher quality than competitive methods.

In addition, because the overall process is simpler, it is easier for the lab to identify the root cause of any issues, which may arise. "There are fewer steps, so we can quickly determine if and where something went wrong," says Dr. Lepage.

The risk of human error is minimized because manual processes are eliminated. This further improves quality and reduces any re-work that might be needed.

Creating a Partnership

The laboratory not only benefits from simpler processes and excellent quality, it also benefits from a strong partnership with Agencourt.

"What I appreciate is that Agencourt helps us from beginning to end," says Dr. Lepage. "They aren't just here to sell a product. They're helping us set up protocols, prepare the plates, establish how much reagent to use and more. They even help in areas where they don't have anything to gain."

The lab at G enome Qu ebec receives regular phone calls from Agencourt to check in and when representatives visit, they share best practices, tips, and ideas for improving processes in the lab. "The relationship," says Dr. Lepage, "has become a true partnership."

Achieving the Original Goal, and More

All of these benefits were realized because G enome Qu ebec sought a less expensive alternative to prepare and sequence BAC DNA. Indeed, the Agencourt products have reduced costs in the laboratory. Not only is the Agencourt chemistry less expensive, but the Agencourt CosMCPrep and Agencourt CleanSEQ kits have allowed the lab to achieve a 75 percent reduction in the amount of BigDye¹ used in each reaction.

"We used to use four microliters of BigDye in the reaction, but now we are down to one microliter," says Dr. Lepage. "This represents a significant savings for us. Overall, the Agencourt chemistries have allowed the laboratory to achieve a new level of automation and speed, while also continuing to deliver high quality work."

"The vervet monkey project is an exciting one to support," adds Dr. Lepage. "Our goal is to deliver the best possible information to the principle investigator and to help advance the important research underway at G enome Qu ebec."

Faster turnaround	The laboratory has improved sample-preparation turnaround by 40% (from five days down to three days).
Reduced risk of error	By automating the preparation of sequencing plates the lab has eliminated the risk of human error.
Lower costs	The lab has achieved a 75% reduction in the amount of BigDye it uses in each reaction.

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