



July 2009

Systematic knockdown

By Amy Swinderman

VICTORIA, Australia—The Peter MacCallum Cancer Centre (PMCC) is working with drug discovery and life sciences research tool provider Caliper Life Sciences, Inc. to automate oncology-related lab discovery experiments, speeding up its efforts to understand how to treat and prevent cancer through gene knockdown therapies.

In the collaboration, announced last month, the Functional Genomics Group of PMCC, a prestigious cancer research organization in Australia, will use Caliper's Staccato workstation to automate its large-scale, high-throughput gene knockdown lab processes. Caliper, which was selected in a competitive bid process, has given PMCC extensive training on the Staccato system and will continue to give the center technical assistance as it develops its own robotic programs in-house.

According to Dr. Kaylene Simpson, manager of the Functional Genomics Group at PMCC, Caliper's Staccato system was chosen because it offered a fully-integrated approach to liquid handling that best fit the researchers' specific requirements.

“The instrument helps us work towards our primary goals: to identify genes that regulate cancer cell growth, survival, proliferation and responses to drug targets,” Simpson says. “We would be unable to perform this type of large-scale research without the Staccato workstation from Caliper.”

Researchers at PMCC are currently working with the Dharmacon entire human and mouse genome collections—about 21,000 genes—attempting to “knock down” each one. According to Simpson, by eliminating a gene's ability to express, gene knockdown techniques may uncover ways to silence specific genes associated with cancer, leading to new forms of treatment. The Staccato system enables researchers to work through these gene sets in a rapid, systematic and reproducible way, Simpson says.

“The PeterMac purchased the automation system to facilitate high-throughput, whole-genome RNA interference screening,” she says. “Using small interfering RNA (siRNA) molecules purchased from Dharmacon RNAi Technologies, the functional effects of each gene of the human and mouse genomes can be assessed by systematically knocking down the expression of each gene. With approximately 21,000 genes represented in the human

genome siRNA collection, robotics are essential to enable research to progress in a timely manner. Researchers use different cancer cell lines to identify genes that regulate specific cancer-related signaling pathways, cell survival and proliferation.”

The collaboration evolved via Caliper’s relationship with Millennium Science, a distributor of instrumentation and reagents for the biotechnology research and industrial markets, and a Caliper partner and distributor for 12 years. Millennium worked closely with PMCC and has been responsible for driving awareness and usage of the Staccato system in Australia.

The Staccato series of systems provide scalable automation for drug discovery, genomics, proteomics and drug development laboratories and are available in three base configurations: Mini Workstation Series, Application Series and Custom Systems Series. The system is pre-integrated and arrives mostly assembled, requiring less than one day of installation. All system components are pre-mounted and all device locations are taught at the factory. Automated teaching routines are included, allowing the system to be “re-taught” in the field in less than five minutes. Methods are easily and quickly created using Caliper’s iLink software. Caliper’s Applied Science & Technology Group works with a variety of reagent and consumables manufacturers to pre-validate common assays for all Caliper systems.

Caliper has installed five large Staccato systems in Australia, and the deal with PMCC is indicative of the strides the automated solutions provider has made in oncology research says Kevin Hrusovsky, Caliper’s CEO.

“From automation to imaging and tumor models, Caliper provides researchers with the tools to conduct quality oncology research,” Hrusovsky says. “One of the beauties of this collaboration is the way this particular lab is set up. Every research institute in Australia has access to this facility, so therefore, they will all have access to the automation. I imagine that once the group starts using it internally, they will open it up to other research centers. In the long run, the researchers will see a tremendous cost benefit from the automation because it is cheaper than having people do it. If they had to knock down 21,000 genes manually using multiple people in multiple places, that would be labor- and cost-intensive.”

Ultimately, the PMCC team hopes that using Staccato to automate its lab processes will further its understanding of how to treat and prevent cancer through gene knockdown therapies.

“Gene knockdown studies in high-throughput enable relatively rapid dissection of cancer signaling pathways, and we envision that employing such cutting edge technology will lead researchers to identify novel gene targets that can be pursued in more detailed studies,” Simpson says.