

## Perspectives

# It's All Automatic

Combining the Illumina® Expression BeadChip platform with SciGene's Little Dipper Microarray Processor increases throughput, accuracy, and reproducibility.

Bringing Illumina Expression BeadChips into the lab and automating processing on the Little Dipper Microarray Processor has expanded possibilities for Dr. Damien Chaussabel of the Baylor Research Institute (BRI) in Dallas, Texas. Using microarray-based methods, Dr. Chaussabel searches for a deeper understanding of disease pathogenesis. This information will be used to develop more focused tests for disease, leading to earlier detection and, hopefully, earlier intervention and better treatments to minimize the effects of a disease.

The BRI translational genomics program began seven years ago with the goal of finding genetic clues to disease by studying gene expression levels in peripheral blood mononuclear cells. At that time, the group isolated cells from whole blood and analyzed gene expression using Affymetrix GeneChips. In late 2005, they expanded the patient base beyond the Dallas-Fort Worth metroplex. Instead of isolating peripheral blood cells from patients, RNA was extracted directly from whole blood. Now, blood samples could be collected from anywhere in the world using Vacutainer tubes that stabilize RNA and allow samples to be shipped to the Baylor facility.

### MAKING THE SWITCH TO AUTOMATION

This sample source expansion required the group to scale up analysis operations and led to the decision to move from an

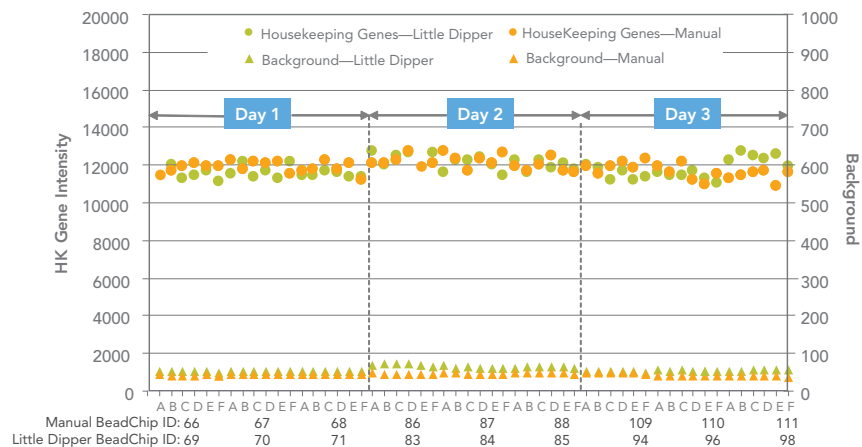
Affymetrix system to Illumina Expression BeadChips. "Switching from an Affymetrix to an Illumina platform gave us the ability to process many more samples per batch. Now we can process up to 80 samples per day. Not that we do that every day, but what is important is the batch size is much bigger so that we are able to generate entire data sets in one go and in a single day, which is very important for controlling technique variability," states Dr. Chaussabel. He also cites the cost as a reason for switching. "The fact that the Illumina platform is more affordable allows us to process and analyze more samples and have a higher number of replicates, which impacts statistical analysis of the data."

After these changes, the decision was made to automate everything—sample process, RNA extraction, globin reduction, and BeadChip analysis. The goal was to increase batch size while maintaining, even increasing, control over technical variability. With this in mind, Dr. Chaussabel conferred with Illumina and SciGene, a known provider for automated array processing equipment, regarding opportunities for automating analysis of Illumina's Expression BeadChips.

From this collaboration, optimized protocols for analyzing Illumina Expression BeadChips on the Little Dipper Microarray Processor have been established. The analysis step is controlled, regardless of who is in the lab that day. The temperature of the

Damien Chaussabel, Ph.D., is an Assistant Investigator at the Baylor Institute for Immunology Research (BIIR) in Dallas, where he also leads the Genomic Microarray Core facility. He earned his Ph.D. in Immunology from The University of Brussels in 1999. From 2000–2004, Dr. Chaussabel was a post-doctoral fellow at the National Institute of Allergy and Infectious Diseases in Bethesda, Maryland. He joined Baylor Institute for Immunology Research in 2004 as an Assistant Investigator. Dr. Chaussabel is using microarray technology to identify disease markers in patients with cancer, autoimmune and infectious diseases, and in transplant recipients.

**AUTOMATION PROVIDES PROCESSING CONTROL AND HIGHER THROUGHPUT, WITHOUT COMPROMISING DATA QUALITY.**



The Illumina Human-6 v2 Expression BeadChip was processed manually and on the Little Dipper Microarray Processor. BeadChips were probed with Illumina reference cDNA.

bath is always exactly the same, day in and day out. Time at each station, including washing, blocking, and staining, is always the same. Shaking is done at the same intensity. When working with what may be very minor changes in transcript levels, every point of contact within an experiment is critical. Exercising this level of control reduces the risk of incorrect calls that could have deadly downstream potentials.

And the data quality? It remains the same. To date, Dr. Chaussabel has not experienced changes in data quality due to automation.

**THERAPEUTIC POTENTIAL**

BRI's translational genomics program has achieved much success, identifying type-1 interferon and interleukin-1 beta as therapeutic targets for systemic lupus erythematosus (SLE) and systemic onset juvenile idiopathic arthritis (SoJIA), respectively<sup>1-3</sup>. Much to his satisfaction, and the relief of many patients, these newly identified targets have helped to make great strides in the development of

new therapies, greatly reducing disease symptoms and almost immediately improving the quality of life for afflicted children. In addition to SLE and SoJIA, Dr. Chaussabel is involved with infectious disease, cancer, and transplantation studies. Although this appears to be a very broad-based interest set, it is focused in terms of the technology used and the methods established for profiling blood. The increased throughput and control provided by Illumina BeadChips and the Little Dipper will continue to be an asset in future studies.

**REFERENCES**

- (1) Allantaz F, Chaussabel D, Stichweh D, Bennett L, Allman W (2007) Blood leukocyte microarrays to diagnose systemic onset juvenile idiopathic arthritis and follow the response to IL-1 blockade. *J Exp Med* 204: 2131-2144.
- (2) Pascual V, Allantaz F, Arce E, Punaro M, and Banchereau J (2005) Role of interleukin-1 (IL-1) in the pathogenesis of systemic onset juvenile idiopathic arthritis and clinical response to IL-1 blockade. *J Exp Med* 201: 1479-1486.
- (3) Bennett L, Palucka AK, Arce E, Cantrell V, Borvak J, et al. (2003) Interferon and granulopoiesis signatures in systemic lupus erythematosus blood. *J Exp Med* 197: 681-685.

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**ADDITIONAL INFORMATION**

To learn more about Illumina's Expression BeadChips visit our website at [www.illumina.com](http://www.illumina.com)

We are committed to providing you with the content you want as a member of the Illumina community. Please email us with comments and suggestions for topics at [icommunity@illumina.com](mailto:icommunity@illumina.com).

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