

Bridging the gap with Automatic Genomics

The Centro Nacional de Investigaciones Cardiovasculares has developed Automatic Genomics, a software application that enables automation of medium throughput qPCR assays on the Freedom EVO® liquid handling platform.

The Centro Nacional de Investigaciones Cardiovasculares (CNIC), in Madrid, Spain, is an institute for cardiovascular research, jointly funded by the Spanish Government and some of the biggest private companies in the country. The CNIC aims to bring together the best of Spanish cardiovascular research and provide it with a modern infrastructure and ample funding to carry out world-leading biomedical research. Dr Sergio Callejas, a support scientist in the genomics unit, explained: “The genomics unit is involved in gene and miRNA expression, and DNA content studies, using three main technologies – microarray platforms, high throughput sequencing and qPCR. The Automatic Genomics project began about two years ago when we purchased a Freedom EVO liquid handling platform for high throughput screening. We looked at the various instruments available and selected the Freedom EVO system because it was so flexible, provided good value for money and was recommended by other users. We have a Freedom EVO 200 workstation equipped with liquid handling (LiHa), MCA 96 and robotic manipulator (RoMa) arms and controlled by Freedom EVOware® software. One of the most useful functions of the Freedom EVO is that it has the flexibility to configure the aspiration and dispensing of different classes of liquid, allowing very accurate determination of fluid volumes. Currently we are focusing on completely automating our qPCR experiments, but we have also used the Freedom EVO to automate most of our protocols for microarrays, labeling and hybridization.”

“We found Freedom EVOware very user-friendly and easy to use, but we needed to include many variables – in terms of the number of genes, samples and different constructs – in our experiments, and editing the scripts – could be quite time consuming for an inexperienced operator. It was easier for us to make any changes in a Microsoft Excel® file, creating a worklist that could be read by Freedom EVOware. Tecan had given us some basic Freedom EVOware training, and, combining Freedom EVOware’s open and extensible architecture with our knowledge of Microsoft Excel and Visual Basic®, we developed Automatic Genomics, an Excel-based application with a Visual Basic interface. Automatic Genomics enables users with limited programming experience to design 384-well plates for qPCR, and create all the necessary commands to enable the Freedom EVO to generate them.”

Sergio continued: “Initially we had planned to develop an application just for our own use, but, after speaking to staff at other institutes, we discovered that there were many small and medium sized laboratories that were interested in this software, and decided to make Automatic Genomics widely available. You can configure any Freedom EVO platform for this application, which was challenging as each laboratory’s worktable is different, with plate positions varying according to the individual user’s requirements. In addition to introducing all the parameters needed to design 384-well plates for qPCR through the Visual Basic interface, Automatic Genomics can prepare templates for the ABI Prism® 7900HT qPCR system, with considerable time savings for the user. No previous knowledge



of Microsoft Excel, and only minimal knowledge of Freedom EVOware, is required for the user to optimize plate design in terms of the number of genes, samples and controls.”

“Our sample throughput varies and, at the moment, Automatic Genomics covers sample transfer from 1.5 ml tubes to 96-well plates, qPCR master mix dispensing and qPCR plate loading. We can run small experiments, with just 10 samples and three or four genes, or larger experiments involving several 384-well plates, and automation has really improved this process.”

Sergio concluded: “We used to do everything manually, loading 384-well plates by hand, which is very labor intensive and prone to human error, and it was not possible to do more than two or three plates in a day. Now that we have Automatic Genomics and the Freedom EVO, manual handling errors have been eliminated and, depending on the number of samples and genes involved, we can usually prepare one 384-well plate in about 20 minutes, significantly increasing our sample throughput.”

To find out more on Tecan’s Freedom EVO, visit www.tecan.com/freedomevo

Automatic Genomics is a product of CNIC. For more information about CNIC and Automatic Genomics, including license agreements, visit

www.cnic.es/en/unidades/genomica

1. Callejas, S., Alvarez, R. and Dopazo A. (2011). Automatic Genomics: a user-friendly program for the automatic designing and plate loading of medium-throughput qPCR experiments. *Biotechniques* 50 (1): 46-50.

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