

# Meeting the demands of ever-changing liquid handling workflows

The Bioprocess, Analytical and Formulation Sciences Group at Merck, West Point, Pennsylvania, USA, has accumulated several Tecan instruments over the years for the development and automation of high throughput biological assays, essential in the support of bioprocess development of vaccines and biological products.

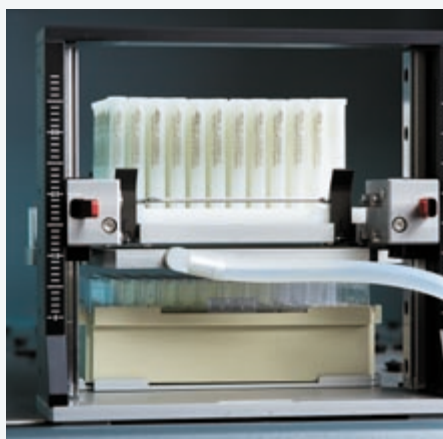
The Bioprocess, Analytical and Formulation Sciences Group at the Merck research and manufacturing facility at West Point, Pennsylvania, develops biological methods for a number of processes involved in the production of therapeutic proteins and vaccines. Over several years, the group has built up a wealth of Tecan liquid handling and detection systems and continues to develop new and innovative ways of automating its ever-changing workflow.

Kristine Little, Research Biochemist, said: "We use our Tecan systems to develop automated assays and provide a routine service in testing and processing to laboratories within the West Point site using these assays. We also carry out activity and binding assays for final products of the purification processes; biochemical testing including assays for residual DNA and concentrations of proteins and process residuals; assays for residual host cell proteins and binding assays such as EC<sub>50</sub> or IC<sub>50</sub>; and ELISA assays."

"We have accumulated our collection of 14 Tecan systems over the past decade,

including several Freedom EVO® platforms equipped with microplate readers and the Power Washer 384™ microplate washer for processing immunoassays, and some older Genesis RSP™ liquid handling platforms, also incorporating different add-on modules," Kristine continued. "The decks on all the instruments are set up to give us maximum flexibility so we can run a variety of assays on any workstation. Some are grouped to run immunoassays, whereas others run the protein and DNA assays – the 'mix and read' type of simple one- or two-step assays that can easily be automated. These usually involve adding dye and buffer mixture to the sample, followed by mixing and measurement of fluorescence intensity, giving sensitive, selective and quick quantification of nucleic acids and proteins."

Amy Bowman, Research Biochemist, continued: "The Tecan systems dedicated to 'mix and read' DNA and protein assays are set up to run five or six plates per run unattended, and we have a similar throughput for immunoassays of six plates at a time. Only one analyst is needed to



Tecan's Te-Chrom™ module, developed in close collaboration with Atoll GmbH, allows efficient automated processing of Atoll's MediaScout RoboColumns on the Freedom EVO platform. When combined with the Te-Stack™ module, the Te-Chrom is able to collect fractions of volumes as low as 25 µl.

(l to r) Kristine Little and Amy Bowman with their back-to-back Tecan system



set up the Tecan instrument and then, depending on the assays, the run time varies from two to 14 hours. The automated systems are in full-time use and the six analysts responsible for running the process-monitoring laboratories will often re-set more than one instrument on the same day.”

“Throughput and flexibility are the main reasons we continue to choose Tecan and why we have recently added even more systems to our collection. Our most recent acquisition is a new back-to-back system, built and customized for us by the Tecan Integration Group (TIG) in North Carolina, and consisting of a Freedom EVO 200 platform on the front and a Freedom EVO 150 platform at the back. Together these platforms will run various ELISA assays as a carousel-based, high throughput system, handling as many as 1,440 analyses in 20 96-well plates, unattended over the course of 24 hours.”

“For us, flexibility in programming is just as important as in the hardware; samples come to us in a diverse range of types and formats, and we need to be able to handle different numbers and types of samples from one run to the next,” Amy added. To achieve this we have written and developed some Visual Basic® software in-house so we can create customized worklists for our sample runs. It is also important that Tecan offers the choice of so many different devices compatible with its liquid handling systems.

We use several modules incorporated into our Genesis RSP and Freedom EVO platforms, including numerous Te-MO™ multichannel pipetting arms, four MCA™ 96 multichannel arms and one MCA™ 384. The multichannel arms allow us to increase throughput and will enable us to make use of microfluidic devices – for performing small-scale on-deck microscale processes – in our future development of purification methods. We recently purchased the first of these devices – a MediaScout® 96-array RoboColumn high throughput purification column system from Atoll – and have successfully integrated this into one of our Freedom EVO platforms. This will carry out chromatography analysis, specifically high throughput screening of chromatographic resins, which is the next step in our expansion plans for the whole set-up.”

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