



Perfecting technology for

Scientists at Columbia University have created three flexible, fully automated workstations based on Freedom EVO® 200 platforms for the assay development work they are performing as part of the NIH Molecular Libraries Roadmap initiative.

A year into the NIH Roadmap initiative, a team of researchers at Columbia University has established a truly remarkable, purpose-built assay facility in the middle of Manhattan. The new 6,000 square foot facility, which has been set up from scratch, is one of ten screening centers in the US that together form the MLSCN, the Molecular Libraries Screening Centers Network. The centers aim to bring in a range of different types of assays from the scientific community, both enzymatic and high content cell-based assays, and use them to screen a large set of compounds, looking for those

that perturb specific functions in the cell or bind specific proteins and could consequently be further developed for use as biological probes.

Many of the Columbia team members were previously involved in other screening efforts at the Sloan-Kettering Cancer Center in New York, including Geoffrey Barger, the Automation Integration Manager. Geoff was an integral part of the planning and construction of the screening workstations in association with the Tecan Integration Group based in North Carolina in the US, and is now running all three systems single-handed!

Planning started in 2004, as Geoff explained: “We started with a concept that set out what we wanted to do, and we quickly learned that we wanted to do just about everything! We needed a very flexible system that could handle a wide range of labware, volumes, reading techniques, and assay types; anything from cell culture, adenovirus production, enzymatic assays or cell-based assays. We needed a completely automated system. From there, we constructed a wish-list and gave a full brief to over 10 companies, looking for a single source vendor to take care of all peripherals, software and full project management. For me this was a critical phase because I

asked the companies for their best efforts and, most importantly, gave them the opportunity to think outside of the box, to create something completely new and innovative.”

“Tecan came back to us with what I considered to be the right mindset to achieve just what we needed. Although the instruments themselves are off-the-shelf models, the way they are put together to make a comprehensive system is very different, very creative, and just what we needed. The flexibility and modularity of the hardware were also important, as was the intuitive scheduling software. The people too were an important factor for choosing Tecan. They were willing at all stages to look at different designs, different platforms and different configurations in great detail, and they took their time to develop these concepts together with us. We could then decide what we liked and didn't like and, through that process we learned everything that Tecan is capable of. Not only have we ended up with a very stable and productive platform, but we also have an intimate knowledge of the systems, how they're put together and what their capabilities are. This is what allowed us to get things up and running faster than was thought possible.”

the NIH Roadmap

All three units are now integrated in biosafety level 2 enclosures provided by BigNeat. These units are housed within a biosafety level 2+ room, with restricted access, special paint, special ceiling tiles, flooring, etc. The enclosures have Hepa filtered air in to protect the products and Hepa filtered air out to protect the personnel and environment. A typical assay starts with the compound and empty assay plates in a LPX 440 room temperature carousel from Liconic. The assay plates progress through a series of reagent additions and incubations which vary depending on the complexity of the assay. The platforms are equipped with various modules and options, including liquid handling arms, a Te-MO™ 96 multipipettor, PowerWasher™ 384 plate washers, a plate sealer, Columbus™ plate washer etc.

For cell-based assays the team has a high capacity, high resolution, laser line scanning confocal microscope called the INcell Analyzer 3000 (Amersham/GE). This serves as the basic workhorse for the high content analysis and is located in a dedicated room. However, for enzymatic assays, there is an Infinite™ 200 microplate reader integrated onto each of the three decks so the analysis of these assays can be performed entirely on these platforms.



The customized platforms are equipped with various modules and options



Dr Lars Branden, Associate Director of the Genome Center, Project Director and Director of Automation, continued: "For the NIH project our goal for year 2 is to screen and possibly supersede 10 assays with up to 100,000 compounds per screen, and for year 3 to screen 20 assays with 300,000 compounds. Amazing as it might seem, neither of these targets gets close to our capacity. It might be a challenge for the imaging systems but not the automation system. Another major project we have is creating arrayed adenovirus-based genomic libraries of human genes using the Te-Flipper™ and RoboFlasks® implemented on one of the platforms, which successfully produces around 150 adenovirus clones per week or more, depending on the logistical planning."

Geoff agreed: "We have the capacity, the systems are ready and waiting, and so we are now a full screening center and would like to develop collaborations with academia and industry. We are reaching out to the scientific community in the US and abroad and have already had good initial feedback from other research groups."

He concluded: "I personally have never seen an automated system quite like this one; it is truly fully automated; an engineer's dream! At every stage, the interaction with the team at Tecan US has been imperative for us to succeed and the way they have backed us up is tremendous. I can't stress enough that it's the people at Tecan that really have made the difference."

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