

Award winning efficiency

Pfizer's BioBank facility in Connecticut, USA, has revolutionized its DNA extraction workflow thanks to the open architecture of its Freedom EVO® workstations. By redesigning its extraction processes from the ground up, the Company has managed to achieve a 10-fold increase in throughput, while dramatically reducing waste generation and costs.



Bob Corr receives Pfizer's Green Chemistry Award.

Pfizer's state-of-the-art research and development facility in Groton, Connecticut, is home to the DNA and BioFluids Center of Emphasis, a large biorepository responsible for processing and storing biological samples from the Company's clinical research activities. Blood samples are sent to the BioBank from Pfizer's research and clinical facilities around the world, where they are stored as both whole blood for long term archiving, and extracted DNA for downstream analysis by the Molecular Medicine group.

The BioBank's first generation DNA extraction process was initiated in 2006, and was designed to extract over 250 µg of DNA from aliquots of up to 9 ml whole blood. While semi-automated, this process involved a large number of manual processing steps, requiring considerable staff time and significantly increasing the risk of processing errors. This process was also very costly – at \$8.34 a sample – and generated large volumes of biohazardous waste material. To address these issues, as well as to boost throughput to deal with an ever increasing workload, the BioBank team initiated a complete overhaul of its working practices. Bob Corr, Principal Scientist at the DNA and BioFluids Center of Emphasis, explained: "We were aware that the quantity of DNA required for downstream processing had decreased significantly since the inception of the first generation extraction process, and so held a workshop with the Molecular Medicine group to determine current DNA requirements. From this we concluded that, rather than the ~250 µg which was being extracted from each sample at the time, only 6 µg of extracted DNA was needed for short term scientific use (within three years), with further aliquots of whole blood held in long term storage, should additional DNA be required."

"Once we had established these requirements, we looked at the various automated platforms and extraction technologies available on the market, and decided that Tecan's Freedom EVO workstations were best suited to meet Pfizer's needs. Our team has extensive experience with Tecan instruments, both within the BioBank and in other areas of Pfizer Research, so this was a logical choice for us. Tecan was kind enough to loan us a test platform for assessment of over a dozen commercial DNA extraction chemistries, and we eventually chose Beckman Coulter's Agencourt® Genfind™ v2 System."

"This combination of a liquid handling platform and extraction technology allowed us to work in a 96-well microplate format, using just 300 µl of whole blood to yield the required 6-10 µg of DNA. We worked closely with application specialists from both companies to integrate the necessary Beckman Coulter hardware onto the Freedom EVO platform, program the Agencourt DNA extraction protocol into Freedom EVOware® and optimize the process to exactly meet our requirements. This three-way collaboration was a key element of the project, allowing us to develop and validate our automated process very rapidly."

"To further improve the efficiency of our laboratory, our entire laboratory workflow has been updated to reflect these changes in practice. The reduced volume requirements of the second generation DNA extraction protocol have allowed us to fully automate sample handling for both DNA extraction and long term whole blood storage, using a second Freedom EVO workstation to aliquot samples into 96-well plates for DNA extraction and REMP 96 Tube Technology™ plates for storage in our REMP Large-Size Store™. We have developed a series of



The BioBank uses multiple Freedom EVO platforms to improve the efficiency of its workflow.

software applications in-house for control of sample registration, allowing this platform's Freedom EVOware to communicate directly with our BioBank Sample Management System (BSMS) database. Barcode scanners mounted on each of the Freedom EVO workstations are able to identify each sample individually, eliminating the risk of errors and creating a comprehensive audit trail for every sample."

"Introduction of the second generation extraction protocol in early December has made a huge difference to our overall throughput, and the figures speak for themselves. Working with lower sample

volumes in a microplate format means we now process 96 samples in ~2 hours, compared to 11.5 hours using the old protocol, offering a four-fold increase in our daily throughput and eliminating the need to have overlapping shifts in the laboratory. The cost per sample has been reduced from \$8.34 to \$1.66, biohazard waste for 96 samples has gone down from 20 liters to just 295 ml, and we've made significant savings in storage space within the REMP stores. As a result of these advances, and of lowering our group's impact on the environment, the BioBank team recently received Pfizer's Green Chemistry Award for the project. However, we're not resting on

our laurels, and are now working with Tecan to implement parallel processing of three microplates using the dynamic scheduling capabilities of Freedom EVOware Plus. This will increase our capacity to almost 1,000 samples a day, more than 10 times the throughput of our old method."

To find out more on Tecan's Freedom EVO liquid handling platforms, visit www.tecan.com/freedomevo

Agencourt is a registered trademark and Genfind is a trademark of Beckman Coulter, Inc.