

# A lifeline for sample processing

The University Medical Center Groningen is using customized biobanking solutions from the Tecan Integration Group to perform front-end sample management and aliquoting for its LifeLines population study.

---

LifeLines is a three generation population study and biobanking initiative by the University Medical Center Groningen (UMCG) and the University of Groningen in the Netherlands. This long term study is designed to investigate the interaction between genetic and environmental factors in the development of multifactorial diseases, and will follow over 165,000 volunteers from the three northern provinces of the Netherlands – Groningen, Friesland and Drenthe – for 30 years.

Each volunteer for the study completes a detailed questionnaire on their individual and familial medical and socioeconomic histories, as well as providing blood and urine samples for the biobank every five years. Jacko Duker, Biomaterials and Cryofacility Manager for the LifeLines project, explained: “The northern provinces of the Netherlands have low migration

rates, offering the opportunity to perform a true multigenerational study. The LifeLines initiative began in 2007 with a small pilot-scale study during which we asked each volunteer to provide blood and urine samples for analysis and inclusion in our biobank. A variety of biochemical and genetic tests were performed on each sample, looking at factors such as kidney, liver and lung function, as well as screening for numerous genetic markers.”

“Following the success of this small-scale study, we have significantly extended the scope of the project, and now aim to include biological material and data from over 165,000 volunteers in the biobank, encompassing three generations of the region's population. We will be following a wide range of environmental and disease markers over the course of the study, and currently have a panel of over 40 clinical chemistry assays which are performed on each sample. We do most of the testing in house, to ensure we retain control of the

quality and reliability of the data, but some work is done by other groups investigating particular subjects related to our central theme of aging and multifactorial disease. This broad spectrum of tests requires multiple sample types, and so for each volunteer we generate 48 different aliquots of material. Although, for the pilot study, this aliquoting was performed entirely manually, the scale of the LifeLines initiative requires an automated system to handle sample management and aliquoting. This was put out to tender in 2008, and Tecan was able to provide the most comprehensive solution for our needs, offering high throughput and reliable, error-free processing for serum and plasma aliquoting.”

To meet the highly specific requirements of the LifeLines project, the Tecan Integration Group (TIG) developed three customized platforms to generate the high number of secondary tubes required. Combining the modules of an FE500pro™ front-end sample management system with a Freedom EVO® liquid handling workstation, these integrated platforms offer complete automation of the sample preparation workflow, from tube identification and





The LifeLines team at Groningen: front (left to right) Dieuwke Huizingh, Margje Kleinhuis, Dirk Barkhof; back (left to right) Evelien Werners, Jacko Duker, Marcel Bruinenberg, Annemieke Boesjes

decapping through to sample sorting for archiving and analysis. Jacko continued: "Tubes are immediately centrifuged on arrival, then loaded onto the platform. The tube inspection unit identifies the separation layer within the primary tube and calculates the total sample volume available for aliquoting. The tube cap is then removed, and the individual layers are distributed into various types of storage and archiving tubes by the eight-channel liquid handling (LiHa) arm of the Freedom EVO. This entire process must be performed very quickly to ensure that sample integrity is maintained."

"Samples are taken from fasting volunteers before 9:30 in the morning, then shipped via courier from around the region to our central laboratory facility, arriving between 11:30 and 12:30. We receive samples from almost 150 individuals each day, all of which must be processed the same day, meaning that we generate up to 7,000 aliquots for archiving in just five hours. All three platforms are identical, offering sufficient capacity to allow each instrument to be taken offline for routine maintenance without impacting on the laboratory's workflow. This is very important, because we need to ensure

samples are aliquoted and placed into storage at -80 °C on the same day they are taken, to avoid any degradation or loss of material. Automation is also very important for sample tracking, avoiding the inevitable loss or mislabeling of samples that would arise during manual processing on this scale, and allowing any erroneous results to be traced back through the entire workflow."

"We originally chose to work with Tecan due to a combination of competitive pricing and application flexibility, and have been very happy with our decision," Jacko concluded. "The service and support we receive has been good, and the Tecan name is a good assurance of quality."

To learn more about LifeLines, go to [www.lifelines.net](http://www.lifelines.net)

To find out more about Tecan's custom automation solutions, visit [www.tecan.com/tig](http://www.tecan.com/tig)

