Non-invasive screening tests for preventive healthcare

Aqsens Health is focused on developing non-invasive screening and diagnostic tests based on enhanced time-resolved fluorescence for health monitoring and detection of serious diseases, such as cancer, where early diagnosis is vital. With an increasing workload, the company has turned to automation to allow higher throughput and rapid delivery of high quality results.

Healthcare providers and patients alike recognize the benefits of non-invasive testing using biological samples such as urine, saliva and feces. Aqsens Health in Turku, Finland, is dedicated to the development of non-invasive screening and diagnostic tests for preventive healthcare based on its proprietary enhanced time-resolved fluorescence (E-TRF) technology. Developed by Professor Pekka Hänninen, E-TRF is the foundation of the company's rapid, accurate and affordable solution for the analysis of biological samples for the early detection of cancers, and gastroenterological and infectious diseases. The highly sensitive and specific method combines TRF with proprietary modulators that interact with the sample molecules to create a unique fingerprint. Active disease indicators can be directly measured over a wide range of sample concentrations in a variety of biological matrices. This approach can outperform a screening method based on a single biomarker and its corresponding reference value, such as the PSA test for prostate cancer. Used in combination with artificial intelligence and big data analysis algorithms, it enables the detection of small-scale metabolic disease indicators, and is well suited for population-level screening purposes. Patient prognoses are improved due to earlier diagnosis based on large-scale disease screening.

Aqsens collaborates with a wide range of organizations around the world to apply its technology to an expanding test portfolio. Application scientist Vilhelmiina Lehti explained: "Our company has its roots in Finland, including an office in Helsinki and a research and development laboratory in Turku. Our focus is on the development of screening applications for cancers – for example, prostate, oral and breast cancers – inflammatory bowel disease and infectious diseases. This involves collaborations with hospitals, such as Helsinki University Hospital, biobanks, universities and global partners, including the VTT Technical Research Centre of Finland."

Benjamin Michelin, product scientist and a member of the board of directors, took up the story: "We chose to focus on samples that can be obtained using non-invasive methods, such as urine, saliva and feces, rather than blood. We knew that we could get good results using these matrices with our technology, sampling is quick and easy to do, and patients are more willing to engage with the process. The cost per test is also reduced because patients can collect the samples themselves, removing the need for highly trained personnel."

Vilhelmiina Lehti and Matias Tuomisalo with the Fluent Automation Workstation

> **"** Data integrity is crucial, and we know that we can trust Tecan. **"**

Benjamin continued: "Aqsens has a long association with Tecan going back to the development of the E-TRF technology. We began with an Infinite® reader, added a Spark® multimode instrument and then, as our throughput increased, introduced automation into our workflow. We took a comprehensive look at various laboratory automation and liquid handling systems on the market, but it was a natural step to continue our relationship with Tecan and we chose the Fluent® Automation Workstation. Everything we do depends on high quality results; data integrity is crucial, and we know that we can trust Tecan. Not only does the Fluent deliver the high data quality that we need, but Tecan systems are also available worldwide, which is really important for global collaborations."

Until now, Aqsens' multiplatform assay has been performed manually. "Research

Automation on the Fluent enables a fast and reliable workflow that is also very simple and flexible

and development pipelines for screening and diagnostic tests require rapid, high throughput processing of large numbers of samples to fully validate the methods before entering the global market. Automation provides the throughput we need to achieve this, producing high quality data in a controlled manner," said Benjamin. Laboratory technician Matias

Tuomisalo described the benefits: "When you are working with different matrices, you need flexibility. Automating the process on the Fluent allowed us to create a fast and reliable workflow that is also very simple and flexible, and removes the potential for human error. The system's modular design means that we can integrate our existing instruments, including the Spark reader, onto the platform with minimum effort. In addition, the ability to customize the platform will be very important in the future as we develop further applications."

"The Fluent is very intuitive and easy to use; all we needed from Tecan was a basic overview of the platform and the software. Since then, we've done everything ourselves, learning how to write scripts and operate the instrument from the ground up – I find that's the best way to learn. One big advantage of the FluentControl™ software is that the protocols can be remotely previewed in a 3D simulator to ensure that they are correct before use. It's a great tool, as you avoid wasting valuable reagents and consumables, which is particularly important in the current COVID-19 pandemic when supply chains have been interrupted. The Fluent is proving an ideal automation solution for us," Matias concluded.

Benjamin Michelin prepares a microplate for analysis

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> **To learn more about Aqsens Health, go to aqsenshealth.com**