Making advances in the battle against autoimmune disease

Scientists at the National Institute of Molecular Genetics in Italy rely on the Freedom EVO® platform for automated diagnostic screening of sera from patients suffering from autoimmune diseases.

Autoimmune diseases are caused by an inappropriate immune response that results in the body attacking its own tissues and generating autoantibodies. The prevalence of these diseases is increasing worldwide, with only limited diagnostic tools available. The National Institute of Molecular Genetics (INGM), based on the IRCCS Ospedale Maggiore campus in Milan, Italy, is a non-profit research foundation that was set up to perform research into the discovery and initial development of innovative therapies and diagnostics for tumors and autoimmune diseases. As an advanced research center, INGM is creating a well-defined niche of activities in the field of human proteomics research, taking advantage of its location to establish strong connections with hospital clinics. Its diverse network of public and private collaborations with leading Italian and international institutes and biotechnology companies is playing a key role in the identification of new therapeutic targets, and the development of new diagnostic methods for neoplastic and autoimmune diseases.

The INGM team with the Freedom EVO. Left to right: Antonella Sinisi, Mauro Bombaci, Angela Cardaci

INGM's proteomic group focuses its research on the development of reliable and automation-friendly assays for screening large sets of sera for new biomarkers in autoimmune diseases. Mauro Bombaci, group leader of the protein microarray laboratory – which specializes in method development and the validation of novel candidates – described the Group's work: "We are a multidisciplinary research center involved in the discovery of new signature profiles in autoimmune diseases. Our work involves the use of protein microarrays to perform a variety of assays – including biomarker identification, antibody specificity profiling, protein-protein interaction studies and drug target discovery – and we are currently turning our attention to the development of a protein microarray containing poorly-characterized recombinant human proteins that are predicted to be surface-exposed or secreted."

"We need to be able to perform a wide variety of tasks and implement new processes, from general liquid handling for a range of different purposes, to running ELISA, DELFIA® and Bio-Plex® assays. High throughput screening is also important, helping us to be competitive in the marketplace. To achieve these goals, we have invested in a Freedom EVO 150 workstation equipped with Liquid Handling (LiHa) and Robotic Manipulator (RoMa) Arms, an integrated Infinite® F200 multimode microplate reader, an ambient temperature incubator, a HydroSpeed™ washer, a Variomag® Teleshake, a heating plate and various hotels that allow us to store up to 15 microplates. We also have a HS 4800™ Pro hybridization station and an Infinite M200 microplate reader."

Mauro continued: "We use our Freedom EVO workstation to run fully automated DELFIA TRF assays. The DELFIA is a robust, high performance immunodetection assay that uses Eu-labelled anti-human IgG to detect antibodies in sera, offering several advantages over conventional ELISAs, such as enhanced sensitivity and a wider dynamic range. As we often use sera from patients suffering from infectious diseases, we prepare our sera dilutions prior to analysis in a sterile clean room, then use the Freedom EVO workstation to perform the assay, analyzing the samples and controls in 96-well microplates. Automating DELFIA protocols on the Freedom EVO enables us to screen large sample numbers to validate new biomarkers in autoimmune diseases."

"Before we purchased the Freedom EVO, we used manual and semi-automatic processes to perform our assays. The system is reliable and easy to use, and allows us to process

Simon Fogarty, Director of Application Sciences, Tecan US, Inc.

Leading the debate

Mass spectrometry (MS) has long been associated with the analysis of small molecules and their metabolites as part of the drug discovery and development process. However, over the last 10 years there has been a significant increase in the use of MS in a clinical setting, driven by a number of technical innovations – expanding the range of molecules that can be detected – and the development of more user-friendly software and bioinformatics tools.

MS applications now include biomarker analysis, identifying genes, lipids, proteins and metabolites that have diagnostic potential in disease management; forensic toxicology applications, particularly in the analysis of pain management drugs and their metabolites; and lipid profile analysis to reveal alterations that occur in metabolic diseases.

To support MS customers, Tecan has developed a range of sample preparation applications and protocols on the Freedom EVO liquid handling platform. From simple sample handling, aliquoting and dilution protocols to MALDI target plate set-up and advanced sample processing such as protein crash, liquid-liquid and solid-phase extraction protocols.

Recognizing the growing importance of this technique to both Tecan and its customers, this year's Tecan Symposium in Boston, USA, will focus on MS. Titled *Mass spectrometry – the expanding role in life sciences and diagnostics,* the Symposium will feature speakers from a number of organizations using MS techniques in the clinical environment. Presentations will cover the use of MS technology in a range of areas including protease analyses as cancer biomarkers, automation of sample handling for analysis of 25-hydroxy vitamin D by LC-MSMS, and its use in assays where samples are precious or minimal, such as pediatrics and neonates.

Email talk@tecan.com to tell us about how Tecan can help to further expand the role of MS in life sciences and diagnostics.

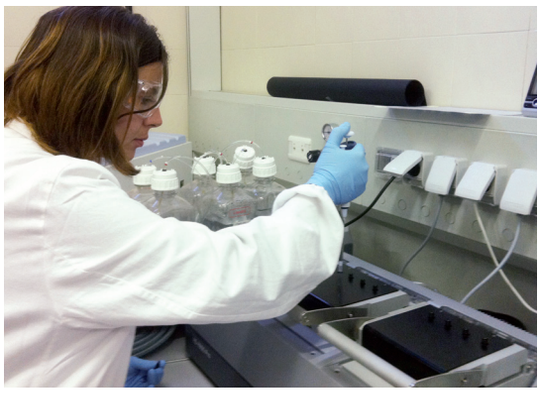
hundreds of samples in a day, taking just two to three hours for each assay. By fully automating the DELFIA method on the Freedom EVO workstation, we are now able to perform in one day what it used to take us three days to do," concluded Mauro.

To find out more on Tecan's microarray solutions, visit **www.tecan.com/microarray**

To find out more about INGM, visit **www.ingm.org**

"By fully automating the DELFIA method on the Freedom EVO workstation, we are now able to perform in one day what it used to take us three days to do."

The National Institute of Molecular Genetics, Milan



Antonella Sinisi using the HS 4800 Pro hybridization station