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Innovative Biochips for protein multiplexing

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Singapore:Ã?Â In the field of genomic analysis, DNA microarray technology is well-established and paved the way for remarkable business success of companies like Affymetrix or Illumina. Looking at immunoassays, particularly in the field of multiplex protein analysis, the same applies for bead technology. In 2010, Associate
Professor Dieter Trau from the National University of Singapore discovered microsphere-based arrays for proteins, and combined in this way the benefits of both technologies. Today, the biochips build the core of AYOXXA's protein multiplex analysis. They allow simultaneous detection of analytes in very small sample volumes of 3 Ã?Â½Ã?Â¼L offering sensitivity in the pg/mL range. Currently AYOXXA is about to launch various products including panels covering a wide range of disease-specific biomarkers. Products are developed, produced and marketed from AYOXXA's global headquarters based in Cologne, Germany. Applications target academic and industrial
research including high-throughput applications in biomedicine, pharmacological screening, and preclinical diagnostics development.

In-situ encoded bead-arrays (IEBA) AYOXXA's multiplex protein assay is based on antibodycoated microspheres on a planar surface (chip). During chip production, single bead families carrying capture antibodies specific for different target proteins are sequentially deposited, creating a unique pattern for every well. For data analysis the bead coordinates are provided to the user as a decoding table alongside the carrier. The assay itself follows the well-established sandwich ELISA principle with a read-out based on fluorescent reporter introduced at the final step. Imaging using fluorescent microscopy technology will be analyzed by AYOXXA software to allocate every fluorescent signal to its respective antibody-coated bead returning a tailor-

made report to the customer.

Position-dependent protein multiplexing
The AYOXXA-technology combines the ease of use and assay quality known from ELISA with the advantages of multiplexing. Therefore it yields up to 10.000-fold more data points compared to a standard immunoassay. Today, alternative available technologies demand at least 25 - 30 Ã?Å½Ã?Â¼L of sample volume per analysis restricting researchers to single point measurements or high dilutions. In contrast, the AYOXXA technology requires as little as 3 Ã?Å½Ã?Â¼L of sample volume to allow for reliable multiplex analysis in a number of research fields dealing with high valuable, precious samples of low quantities. Furthermore, the IEBA is not dependent on physical labels such as bar codes or fluorescent colors to allow protein multiplex analysis. It rather counts on position-dependent identification of antibody-coated microspheres. Due to its reduced degree of complexity the assays are easy to handle and the results are less prone to error.

Despite the extraordinary performance it delivers, AYOXXA-multiplexing needs standard fluorescent microscope technology for analysis. Therefore it well integrates into existing workflows in the research lab. A flexible plug-and-play format enables users to adapt to different requirements on sample throughput without wasting or lacking the capacity of the assay. Sizes from 16-384 wells will be available, so the assay can be performed using a standard multichannel pipette or even liquid handling systems, thus the AYOXXA addresses the needs for academic labs up to screening labs respectively.

Open platform technology for protein multiplexing
AYOXXA's technology can be fitted with a broad range of bioassay applications. The biochips will cover biomarkers crucial for major research and disease areas. They will include biomarker content provided by AYOXXA as well as novel antibody panels from external developers. AYOXXA is currently validating the quantification of human cytokines from cell culture supernatants, serum, and plasma samples. Panels targeting biomarkers linked to different disease models are in the pipeline.

Leveraging success in proteomics
AYOXXA technology platform will be available to innovative proteome research in academia and industry, key to understand and cure most of known disease conditions. Proteomics will take a lead in the development of personalized
medicine, able to provide patients with highly tailored therapy approaches to maximize effects and to minimize reverse reactions. This approach is based on
sophisticated proteome research and on innovative technologies for analysis. AYOXXA will provide a platform, which allows the simultaneous measurement of large amounts of different proteins, capable of identifying markers for cancer, allergies, cardiovascular or infectious diseases.