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"We are looking to collaborate with visionary research institutes to develop new methods of discovering cancer"

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Singapore: Waters Corporation recently collaborated with Bioprocessing Technology Institute (BTI), a research institute within Singapore's Agency for Science, Technology and Research (A*STAR), to develop new methods of finding cancer markers and elucidating glycosylation pathways that could pave the way for new therapeutic strategies.

In an interview with BioSpectrum Asia, **Dr Jose Castro-Perez, Director, Health Sciences Marketing, Waters** shares more about the objective of this partnership and how significant it is for biotech research landscape in Singapore.

Tell us more about your partnership with Singapore's BTI. How did this partnership happen and what is the objective?

Waters Corporation has partnered with the Bioprocessing Technology Institute (BTI), a research institute within Singapore's

Agency for Science, Technology and Research (A*STAR), since 2014, to set up a world-class glycomics center at the Institute.

Apart from evaluating the performance of a new highly sensitive fluorescent label, RFMS, for the analysis of released N-glycans, we also support BTI with training for external parties on in-depth analysis of labelled N-glycans, from sample preparation to liquid chromatography-mass spectrometry (LC-MS) and data interpretation.

The platform uses the Waters UNIFI software Glycobase (NIBRT) that relates LC elution positions (GU) to glycan structures by means of a standard dextran ladder. On line MS data is automatically combined with the LC data to confirm assignments.

Through this extended partnership with BTI, we plan to build an experimental LC GU library for glycan head groups released from glycosphingolipids (GSLs) which are labelled with procainamide, a sensitive fluorescent label that also performs well in the MS. In addition, we aim to build a MS spectral library for GSL glycan identification based on their fragmentation pattern, to resolve ambiguities from co-eluting or isobaric glycans. Together with the configuration of Waters' ion mobility (IM) technology, BTI also plans to build an experimental collision cross-section (CCS) library for the precursor ions of GSL glycans.

Creating a CCS library would be extremely useful in cases where LC-MS is unable to deconvolute some isomers and ion mobility may offer enhanced peak capacity. Through Waters' new solutions, we are able to gain a fuller understanding of GSL glycans in a panel of cancer cell lines.

With the establishment of the libraries, analysts would be able to conduct their structural analyses, based on 3-dimensional data (GU values, MS spectral and CCS values), more effectively and efficiently.

In addition to experimental data gathered from separation technologies, information such as the biological source and labelling method used, can also be added to the library. In the near future, researchers will simply carry out a quick search via our libraries, and will have comprehensive historical results at their fingertips. Historical data can include the types of glycans present based on biological sources.

How important is it for biotech companies and research institutes to collaborate in order to enhance novel research and drug discovery?

By collaborating with Waters, BTI will be able to use its expertise in glycomics to develop the very first analytical methods and library of information on GSLs. This will allow BTI to probe for potential clinical research markers. BTI anticipates that their research will advance humanity's well-being, while also addressing some of the biopharmaceutical industry's scientific needs.

Through collaboration and powerful separation technologies, Waters and BTI are well-positioned to achieve their shared vision, to further develop novel analytical methods and establish a comprehensive experimental glycan spectral library for cancer glycobiology, which will focus on glycosphingolipids.

Our advanced methods for studying GSL glycosylation in terms of cancer classification and biomarker discovery, will serve as a solid foundation for further research, and have the potential to drive the development of biopharmaceutical companies and research institutions, as well as clinical research, for years to come.

How can this partnership enhance therapy for cancer? How long will it take to develop the new biomarkers?

The Waters-BTI research partnership will allow both companies to jointly develop new methods for discovering cancer markers and elucidating glycosylation pathways that could pave the way for new therapeutic strategies.

Through this partnership, we also hope to be able to find a link between GSL glycosylation in a wide range of phenotypes and genotypes, where we could gain in-depth knowledge of disease pathogenesis or progression.

What are the new technologies that Waters has developed to enhance research in cancer drug discovery?

Under this partnership, Waters is contributing its scientific expertise, and the use of a Waters SYNAPT G2-S High Definition Mass Spectrometry System. The instrument features ion-mobility spectrometry-mass spectrometry (IMS-MS) technology that rapidly separates molecular ions, not only by their size and mass-to-charge ratio, but also by their shape.

A collisional cross-section (CCS) value is a precise physicochemical property of an ion related to its size, shape and charge, in the gas state. The ability to determine the separation of molecules, based on a CCS value for each glycan head group, reveals insights into their unique chemical structure, which in turn can be used as an additional descriptor for the GSL in

question; thus providing a higher degree of specificity than just using mass-to-charge ratio alone.

What are the other disease areas in which Waters is specialized to provide support to biotech companies?

As a technology enabler, Waters strives to enable the biomedical community to achieve breakthrough scientific discoveries. For instance, our metabolic phenotyping partners at the Phenome Centre Birmingham, are working with the MRC-NIHR National Phenome Centre at Imperial College London and the Singapore Phenome Centre at Nanyang Technological University as parallel research centers. The aim is to determine whether the causes and mechanisms of diseases are determined by a subjects' genomes or environment, or how environment can affect genomes.

We are proud of our contributions in metabolic phenotyping; they have the potential to help the global metabolic phenotyping community understand how our environment makes us more or less susceptible to heart disease, cancer, autism, diabetes, Alzheimer's, and other health conditions.

As a technology provider for research and development, how do you suggest that costs of treatments for diseases like cancer can be more affordable?

According to IMS Health Holdings, the global spending on cancer medication will exceed USD150 billion by 2020, as expensive new therapies that help the immune system attack tumors, have become available. This represents an annual worldwide growth rate for oncology drug spending of 7.5 percent to 10.5 percent through to 2020.

At Waters, we are actively collaborating with biopharmaceutical companies, clinical researchers and research institutions to apply our leading separation solutions to advanced research, in order to develop new and more affordable medication to cure diseases such as cancers.

We are looking to collaborate with visionary research institutes, such as BTI, to develop new methods of discovering cancer markers and elucidating glycosylation pathways that could pave the way for new therapeutic strategies.

Scientific breakthroughs will provide robust historical data for biopharmaceuticals to develop more effective and affordable drugs that can potentially save millions of lives in the future. They can also reduce the burden on public health systems, as governments spend less and there will be fewer subjects.