

Waters collaborates with A*star to expand biomarker discovery

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Singapore: Waters Corporation has 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.

As part of the research collaboration, Waters and BTI will develop a glycosphingolipid (GSL) head group database containing Glucose Unit (GU) retention times and collision cross-section (CCS) values in an effort to compile an experimental library for disease-related GSL glycans together with a glycan/MS spectral library.

GSLs are highly-complex structures in which glycan head groups are attached to fatty acyl moieties. Analyzing their molecular composition involves detailing the sequence, anomericity, branching, and linkage positions of the oligosaccharides as well as their fatty acyl motifs. GSLs are critical for cell growth, interaction, and signaling and alterations to their structure may result in diseases or promote the development of different types of cancer. The analysis of the glycan head groups poses a particular analytical challenge for glycoscience because isomeric structures are not easily differentiated by either liquid chromatography (LC) or mass spectrometry (MS) technologies when used alone.

"Collaborating with Waters will enable BTI to apply its expertise in glycomics to develop analytical methods and a library of information on GSLs that doesn't yet exist today. This will allow us to probe for potential clinical markers and to provide insights into disease progression and regression following therapeutic intervention. We anticipate our science will advance human health while at the same time address some of the needs of the biopharmaceutical industry," said scientific lead Dr. Susanto Woen, Research Scientist, BTI. "The partnership also allows us to be part of an international glycomics research network pioneering technologies required to determine the potential association between GSL glycosylation and any phenotypic/genotypic traits in disease or disease states."

"By taking our partnership to a new level, we will empower BTI to further develop novel analytical methods and establish a comprehensive experimental glycan spectral library for cancer glycobiology focusing on glycosphingolipids. Together, we want to advance methods to study GSL glycosylation in cancer classification and biomarker discovery," said Dr. Jose Castro-Perez, director, health sciences marketing, Waters Corporation.

As part of this collaboration, Waters will be contributing scientific expertise and the use of a Waters SYNAPT G2-S High Definition Mass Spectrometry System. The instrument features ion mobility mass spectrometry technology that rapidly separates molecular ions by not only their size and mass-to-charge ratio, but by their shape as well. A collisional cross-section (CCS) value is a precise physicochemical property of an ion related to its size, shape, and charge in the gas phase. 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 using just mass-to-charge ratio alone.

First established in 2014, the collaborative relationship with BTI initially focused on evaluating the performance of a new N-linked glycan label aimed at biopharmaceutical applications, the GlycoWorks RapiFluor-MS Glycan Kit, and its complete workflow - from sample preparation to analysis - for glycosylation profiling.