

Press Release

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Industry-first glycolipid-specific library

**Identifies 256 types of glycolipids with LCMS-IT-TOF /
Precise analysis of entire glycolipid structure /
Supports high precision analysis in various fields**

Shimadzu, one of the world leaders in analytical instrumentation, has released the industry-first glycolipid-specific library, containing information on 256 types of glycolipids. The library is a result of joint research with Dr. Akemi Suzuki, Director of the Institute of Glycoscience at Tokai University, Japan. Even users without specialized expertise can now prepare samples, specify analytical conditions, analyze data and identify glycolipids using an LCMS-IT-TOF liquid chromatograph mass spectrometer.

Glycolipids have gained considerable attention in recent years. However, glycolipids have complicated structures containing both sugar chain and lipid structures. This requires a high level of knowledge and expertise for pretreatment, setting of analytical conditions and so on. As a result, there has been a high barrier to entry for researching of glycolipids.

Precise analysis of entire glycolipid structure

The glycolipid library, developed jointly by Shimadzu and Dr. Suzuki, includes glycolipid extraction methods, analytical conditions, a library for identifying glycolipids and other information so

that even researchers who have never analyzed glycolipids before can quickly analyze glycolipids with high precision. The library contains mass spectra for a total of 256 types of glycolipids, including 21 ceramides, 193 acidic glycolipids and 42 neutral glycolipids, all of which were acquired from real measurements. By using these extraction methods, measurement parameters and other instructions specified in the instruction manual, researchers can now analyze and identify glycolipids based on the library.

The LCMS-IT-TOF system applied for analysis captures specific ions using an ion trap (IT) mechanism and splits them into fragments. It then measures the masses of the fragments accurately based on the difference in length of time taken for the fragments to reach the detector (TOF-MS). By repeatedly trapping specific ions and measuring fragment masses, it is able to predict the structure of compounds with high precision. The library even includes MS³ spectra which can be used to identify ceramides structures, which is not possible with MS/MS spectra. Using this library makes it possible to analyze the entire glycolipid structure easily and precisely, not just the sugar chain portion but also the lipid portion, which was previously difficult to accomplish.

What are glycolipids?

Glycolipids are compounds consisting of a sugar chain attached to a lipid, which are found widely in cell membranes and intercellular membrane structure within the body, such as in the brain, spine and nervous system. The membrane at the surface layer of cells is not uniform, but rather is known to have a non-uniform structure consisting of glycolipids and glycoproteins. Such structures are referred to as microdomains or lipid rafts and are known to serve important physiological functions such as signal transmission, bacterial and viral adhesion, toxin binding and as receptors for bioactive substances. They have consequently attracted considerable interest as a target for research in a wide variety of fields including drug discovery and cosmetics development.

Possible drug for treating diabetes

One typical glycolipid is the sphingolipid, comprising a sugar chain attached to a fatty acid and sphingosine. Sphingolipids containing sialic acid, which is an acidic sugar, are called "gangliosides." If insulin loses its effectiveness in the body (insulin resistance), the number of these gangliosides increases in cell membranes. Results from mouse experiments have clearly shown that gangliosides weaken the bonds of caveolin, an essential protein for proper insulin receptor function. Ganglioside inhibitors are therefore anticipated to have potential as a possible drug for treating diabetes.

Application in cosmetics

Furthermore, certain sphingolipids called ceramides are known to be responsible for the barrier function of the skin. Ceramides are therefore being analyzed by those involved in developing cosmetics products, such by analyzing the structure and function of ceramides to chemically synthesize substances that exhibit similar functions as human skin or by analyzing the ceramide in the horny layer of subjects with and without atopic dermatitis to search for ceramide varieties closely associated with skin characteristics.

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