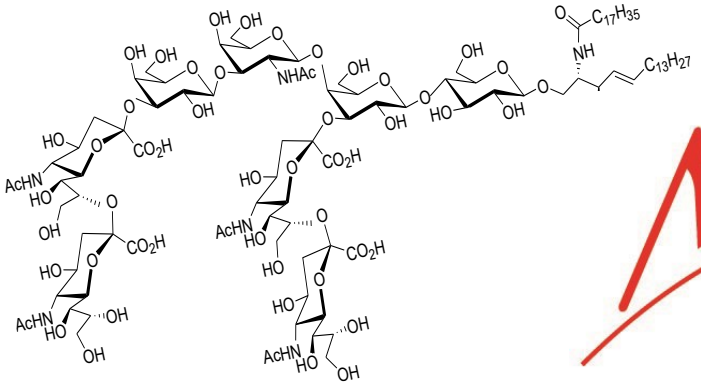


MATREYA LLC

Lipids and Biochemicals

NEWSLETTER FOR GLYCO/SPHINGOLIPID RESEARCH

JUNE 2019

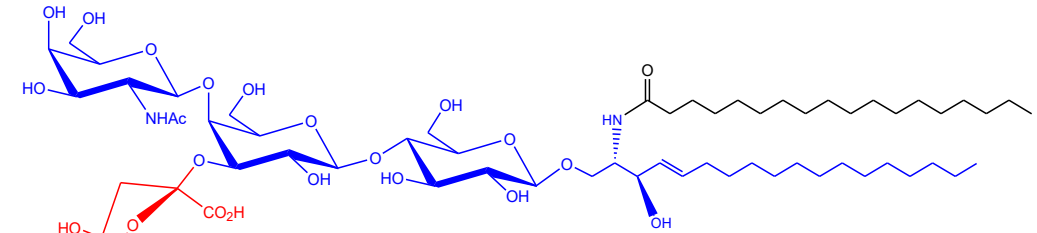
Ganglioside GD_2 and Breast Cancer

Disialoganglioside GD_2 is a sialic acid-containing glycosphingolipid that has important clinical and pathological implications. GD_2 is synthesized in the endoplasmatic reticulum and Golgi apparatus and is then transferred to the outside layer of the plasma membrane. On the cell surface, GD_2 is involved in cell-to-cell adhesion and signal transduction, playing a crucial role both in physiological and in pathological processes by driving proliferation, neoangiogenesis, immune-escape and invasion. It is primarily expressed on the cell surface and is normally found mostly in the central nervous system and in low amounts in peripheral nerves and skin melanocytes. One of GD_2's most important pathological implications is it's presence in elevated amounts in numerous tumor types, including breast cancer cells.

In malignant cells, GD_2 is uniformly expressed in neuroblastomas and most melanomas and to a variable degree in a variety of other tumors, including bone and soft-tissue sarcomas, small cell lung cancer, and brain tumors. GD_2 is thought to play an important role in the attachment of tumor cells to extracellular matrix proteins, thereby increasing tumorigenesis. Due to its prevalence in various tumor cells, GD_2 can potentially be utilized as a useful biomarker for various cancers. In a recent study, GD_2 has been found to be consistently elevated in a number of breast cancer patients. This finding led the researchers to evaluate its usefulness as a biomarker for breast cancer.

The researchers found a statistically significant correlation of GD_2 with triple-negative breast cancer in comparison to several other breast cancer subtypes, thus confirming that GD_2 may be a good candidate as a biomarker. It was speculated that the elevated GD_2 expression might be related to breast cancer stem cells and to the activation of the process of epithelial-mesenchymal transition.

The researchers were able to conclude that GD_2 immunohistochemical staining was able to be used to show a possible correlation with breast cancer histotypes strongly associated with epithelial-mesenchymal transition. A further study utilizing a larger patient pool is needed to confirm some of the findings of this report; however GD_2 appears to be a new valid biomarker for certain breast cancer subtypes, especially for triple-negative breast cancer which currently lacks any specific marker for diagnostics or targeted therapies.



Disialoganglioside GD_2
Cat.# 1527

Inside This Issue

Product Name	Catalog #	Amount	Purity
Disialoganglioside GD_2	1527	500 µg	98^{+}%

Reference:

G. Orsi et al. Oncotarget, (2017) 8:19, 31592-31600

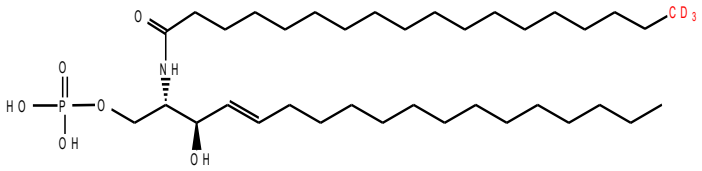
Stable Isotope Labeled Sphingolipids as Highly Specific Mass Spectrometry Standards

Sphingolipidomics is the determination of the complete sphingolipid profile of a given system and the metabolism and pathways of those sphingolipids. It is the sphingolipid subfield of the greater lipidomic discipline and began to appear as a distinct entity around 2005.[1,2] There are tens of thousands of possible naturally occurring sphingolipids that vary in their polar head groups, acyl chains, and sphingoid bases. The metabolic pathway of these sphingolipids has been extensively studied in an attempt to understand and treat diseases related to sphingolipids and to use sphingolipids to correct various diseases. Many of these sphingolipids are present in only picomole to nanomole amounts, making detection difficult. However, with the incorporation of soft ionization techniques in mass spectrometry the detection of very small amounts of sphingolipids has been accomplished. The two major approaches of sphingolipidomic studies are the LC-MS based methods and the shotgun lipidomics approach[3]. In both methods internal standards for each individual sphingolipid detected would be ideal. However, due to the vast number of possible sphingolipids in a system this is currently impractical. Therefore, the preferred method is to use internal standards for each class of sphingolipid expected to be found in a sample. To meet the need for standards in sphingolipidomic studies, sphingolipids that are modified on either the oligosaccharide head, ceramide acyl chain, or the sphingosine tail have been synthesized. These standards are usually stable isotope labeled, unusual chain length modified, or fluorescent sphingolipids.[4,5,6]

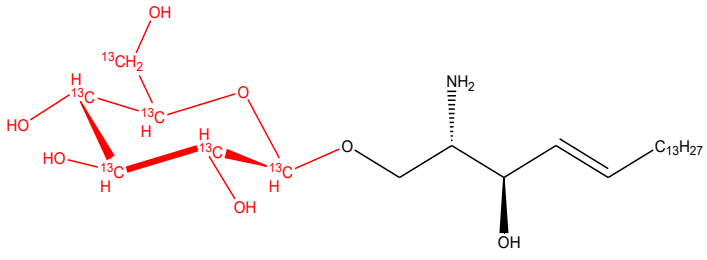
One of the most preferred internal standards for LC-MS and shotgun lipidomic studies are stable isotope labeled standards. These standards can be easily detected by mass spectrometry while demonstrating nearly identical physical properties as compared to natural sphingolipids. This is very important to ensure similar extraction properties between the analytes and the internal standards [3]. Most commonly, deuterium or carbon-13 atoms are introduced in the acyl chain of the ceramide. However, the label can also be introduced into the sphingosine tail or oligosaccharide head group, allowing for lyso-sphingolipids to be produced. Another useful internal standard is one that has an acyl or sphingosine chain that has been modified to a length not commonly found in nature, usually C_{17} or C_{19}, or the use of fluorescent tags on the lipid.[7,8]

In addition to the internal standards mentioned above there is a need for natural sphingolipid standards that can be compared to the analytes detected in samples. Methods have been developed to both synthesize these compounds and to extract them from natural sources. Matreya has over 25 years of experience working with lipids and offers an extensive selection of both labeled and naturally occurring standards.

Deuterium Labeled Ceramide-1-Phosphate, Cat.# 2206



^{13}C Labeled Glucosylsphingosine, Cat.# 2209

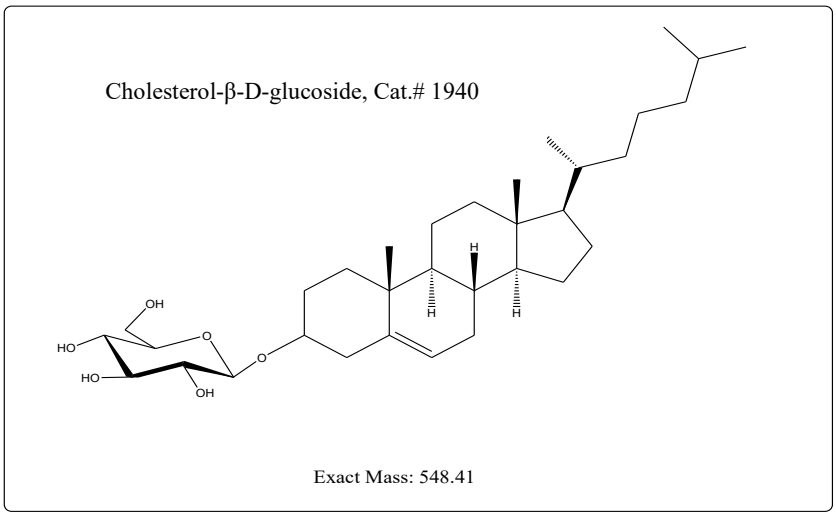


References:
1. M. Maceyka et al., Prostaglandins Other Lipid Mediat. (2005) 77, 15–22
2. A. Merrill et al., Methods (2005) 36, 207–224
3. X. Han and X. Jiang, Eur J Lipid Sci Technol. (2009) 111:1, 39–52
4. J. Huang et al., Mol Ther Methods Clin Dev. (2017) 12:5, 241-258
5. S. Kleinecke et al., eLife. (2017), 6, e23332
6. T. Sadowski et al., Sci Rep. (2017) 7:7, 43761
7. A. Merrill, Chemical Reviews (2011) 111, 6387-6422
8. N. Lipsky and R. Pagano, Journal of Cell Biology (1985) 100, 27-34

Stable Isotope Labeled Sphingolipids	Catalog #	Amount	Purity
D-*erythro*-sphingosine, D_9	2079	1 mg	98+%
N-*omega*-CD_3-Octadecanoyl-D-*erythro*-sphingosine	2201	1 mg	98+%
N-*omega*-CD_3-Octadecanoyl-D-*erythro*-dihydrosphingosine	2202	1 mg	98+%
N-1-^{13}C-Hexadecanoyl-D-*erythro*-sphingosylphosphorylcholine	2200	1 mg	98+%
N-Octadecanoyl-D_3-D-*erythro*-sphingosine-1-phosphate, deuterated	2206	1 mg	98+%
N-Octadecanoyl-D_{35}-psychosine	1914	5 mg	98+%
$^{13}C_6$-Glucosylsphingosine	2209	1 mg	98+%
N-*omega*-CD_3-Hexadecanoyl-glucopsychosine	1533	1 mg	98+%
N-*omega*-CD_3-Octadecanoyl-sulfatide	1536	1 mg	98+%
N-*omega*-CD_3-Hexadecanoyl-lactosylceramide	1534	1 mg	98+%
N-*omega*-CD_3-Octadecanoyl-ceramide trihexoside	1537	500 µg	98+%
N-*omega*-CD_3-Octadecanoyl monosialoganglioside GM_1	2050	500 µg	98+%
N-*omega*-CD_3-Octadecanoyl monosialoganglioside GM_2	2051	250 µg	98+%
N-*omega*-CD_3-Octadecanoyl monosialoganglioside GM_3	2052	250 µg	98+%
N-*omega*-CD_3-Octadecanoyl disialoganglioside GD_3	2091	500 µg	98+%

Cholesteryl-β-Glucoside

Steryl-β-glucosides are synthesized by plants including sitosteryl-β-glucoside can serve as primer in the biosynthesis of cellulose.1 Murakami, Murofushi, and his co-workers have reported on the formation of cholesterol-β-glucoside in cultered fibroblasts as a rapid response to heat stress.2 Recently they presented evidence that glucosylceramide as a sugar donor in the biosynthesis of chlosteryl-β-glucoside.3



References:
1. Peng.L., et. Al Science 2005 295, 147-150.
2. Akiyama, H., Hamada, T., Nagatsuka, Y., Kobayashi, S., Hirabayashi, Y., Murakami-Murafushi, Cytologia, 2011, 76, 19-25.
3. Akiyama, H., Sasaki, N., Hanazawa, S., Gotoh, M., Kobayashi, S., Hirabayashi, Y, Murakami-Murofushi. BBA-Mol-Cello Biol, L, 2011, 1811, 314-322

Product Name	Catalog #	Amount	Purity
Cholesterol-β-D-glucoside	1940	5mg	98+%

A HILIC-MS/MS Method for Simultaneous Quantification of the Lysosomal Disease Markers Galactosylsphingosine and Glucosylsphingosine in Mouse Serum

Deficiencies of galactosylceramidase and glucocerebrosidase result in the accumulation of galactosylsphingosine and glucosylsphingosine in Krabbe and Gaucher diseases, respectively. Galactosylsphingosine and glucosylsphingosine are useful biomarkers for both diagnosis and monitoring of treatment effects. Jiang and coworkers have developed and validated a sensitive, accurate high-throughput assay for simultaneous determination of the concentration of galactosylsphingosine and glucosylsphingosine in mouse serum. Galactosylsphingosine and glucosylsphingosine and their deuterated internal standards were extracted by protein precipitation in quantitative recoveries, baseline separated by hydrophilic interaction chromatography and detected by positive-ion electrospray mass spectrometry in multiple reaction monitoring mode. Total run time was 7 min. The lower limit of quantification was 0.2 ng/mL for both galactosylsphingosine and glucosylsphingosine. Sample stability, assay precision and accuracy, and method robustness were demonstrated. This method has been successfully applied to measurement of these lipid biomarkers in a natural history study in twitcher (Krabbe) mice.[1]

Product Name	Catalog #	Amount	Purity
Glucosylsphingosine, synthetic	2086	5 mg	98+%
Glucosylsphingosine, buttermilk	1306	5 mg	98+%
Glucosylsphingosine, plant	1310	5 mg	98+%
Galactosylsphingosine (Psychosine), bovine	1305	10 mg	98+%
Galactosylsphingosine (Psychosine), synthetic	2087	5 mg	98+%

References:

1. Sidhu, R, Mikulka, CR, Fujiwara, H, et al. A HILIC-MS/MS method for simultaneous quantification of the lysosomal disease markers galactosylsphingosine and glucosylsphingosine in mouse serum. *Biomedical Chromatography*. 2018; 32:e4235. https://doi.org/10.1002/bmc.4235

Matreya's Online Resources

Be sure to check out Matreya's helpful information found online at www.matreya.com. On our website you can: download COA's and SDS's, find dealers in your country, read past newsletters, find product data sheets, and more. Be sure to check the online catalog or download the PDF version for up to date product information and prices. Get expert advice on Matreya's products using our technical support form, or find out about an order status from the customer service link. We strive to provide you with useful information to help your research become a success with our products and services. If you can't find what you're looking for give us a call or send us an email. We're always delighted to help. You can even send us suggestions online, through email, or by phone on how we can improve our service to you or what new products you would like to see added to Matreya's product list.

We hope that you find all you need when you visit matreya.com.