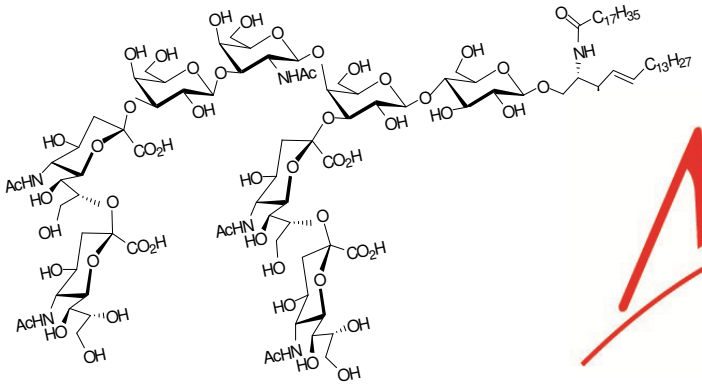

MATREYA LLC

Lipids and Biochemicals

NEWSLETTER FOR GLYCO/SPHINGOLIPID RESEARCH
MARCH 2016

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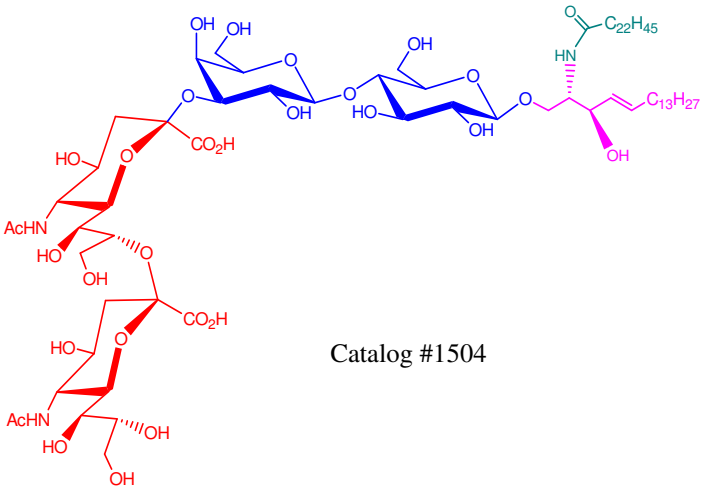
Ganglioside GD_3 and Neural Stem Cell Renewal

Gangliosides are vital acidic glycosphingolipids that are present in all vertebrate cells and are strongly associated with several regulatory roles in neurogenesis. Ganglioside GD_3 has been found to be a major ganglioside specie in embryonic mouse brain, constituting over 80% of the total gangliosides.

Dr. Yu and coworkers obtained strong evidence that GD_3 plays an important role in maintaining neural stem cell's (NSC) self-renewal capability. The findings also support the idea that GD_3 interacts with epidermal growth factor receptors (EGFR) in neural stem cells. This interaction maintains the self-renewal capacity of EGFR and preserves the EGFR thru a recycling pathway after endocytosis of EGF. This facilitates the EGF-mediated signaling responsible for regulating NSC cell-fate determination.



Catalog #1504

Mice with GD_3 synthesis deficiency demonstrated a loss of NSCs and a resulting impaired neurogenesis. Defects of the self-renewal capacity could be improved in the mice by restoration of GD_3 expression. Moreover, the evidence suggests a strong link between GD_3 deficiency, resulting in decreased maintenance of neurogenesis, and behavioral changes such as depression-like behaviors.

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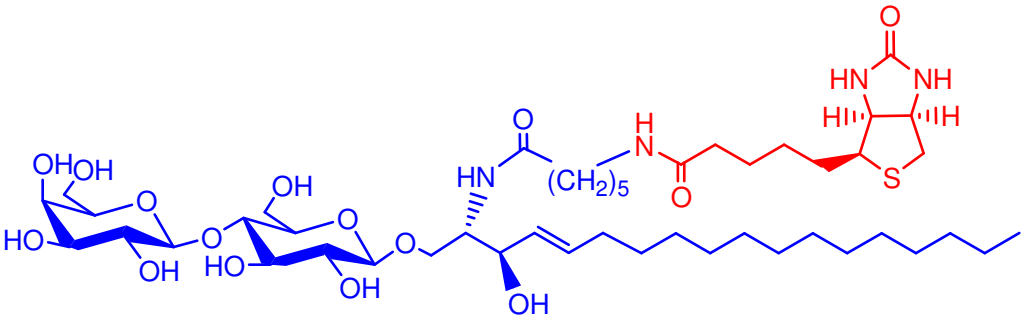
- Synthetic Psychosine for Krabbe Disease 3
- New Lipid Standards from Matreya 4

Product Name	Catalog #	Amount	Purity
Disialoganglioside GD_3	1504	5 mg	98^+%

References:

1. J. Wang and R. Yu (2013) PNAS 110(47):19137-19142
2. R. Yu et al. (2014) J. Neurosci. 34(41):13790-13800

N-Hexanoyl-Biotin-Lactosylceramide



Catalog #2205

N-Hexanoyl-biotin-lactosylceramide contains a biotin unit attached to the amine of the sphingosine moiety via a hexanoic acid linker and is ideal for use in sphingolipid studies. The biotin structure allows for the attachment of the lactosylceramide to streptavidin, avidin, or any other biotin binding protein making it extremely useful for substrate and toxin detection[1]. The avidin-biotin complex is the strongest known non-covalent interaction between a protein and ligand. The formation of the bond is very rapid and once formed is stable with regards to pH, temperature, organic solvents, and denaturing agents. The biotin label is attached via a 6-carbon linker reducing the interaction of the biotin with the lactosylceramide.

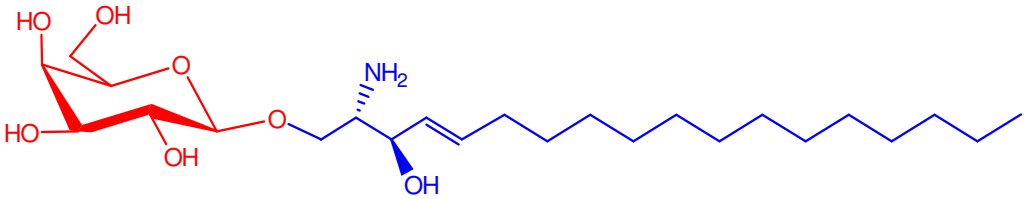
Lactosylceramide is the precursor of many other glycosphingolipids and also functions as a second messenger and protein receptor, making it a very important organic molecule. Many cellular processes are dependent on lactosylceramide since it is the substrate for neutral oligoglycosylceramides, sulfatides and gangliosides, all of which have their own vital functions. Lactosylceramide also helps to stabilize the lipid membrane, activate receptor molecules and acts as a receptor for certain bacteria and toxins. Its role as a second messenger has been found to be vital and dysfunctions in its processes can lead to cancer and inflammation since it is critical to neutrophil activity and in activating anti-inflammatory responses.[2] Other examples of lactosylceramide second messenger functions are tumor necrosis factor *alpha* and platelet-derived growth factor. A deficiency in the enzyme responsible for hydrolyzing the galactose of lactosylceramide leads to lactosylceramidosis, which is characterized by an accumulation of lactosylceramide that causes a primary neurological disorder.[3] Lactosylceramide is also important in the activation of platelet/endothelial cell adhesion molecule-1 which causes adhesion and diapedesis of monocytes and lymphocytes.[4]

	Product Name	Catalog #	Amount	Purity
	N-Hexanoyl-biotin-D-*erythro*-sphingosine	2081	5 mg	98^{+}%
	N-Hexanoyl-biotin-galactosylceramide	2203	5 mg	98^{+}%
	N-Hexanoyl-biotin-glucosylceramide	2085	5 mg	98^{+}%
New	N-Hexanoyl-biotin-lactosylceramide	2205	1 mg	98^{+}%
	N-Hexanoyl-biotin-monosialoganglioside GM1	2053	500 µg	98^{+}%

References:

1. A. Mukhopadhyay et al. (2009) FASEB, 23(3):751-763
2. 2. R. Pannu et al. (2005) Journal of Biological Chemistry, 280:13742-13751
3. 3. G. Dawson (1972) Journal of Lipid Research, 13:207-219
4. 4. N. Gong (2004) Proceedings of the National Academy of Sciences, 101(17):6490-6495

Synthetic Psychosine as a Krabbe Disease Biomarker



Catalog #2087

Matreya now offers fully synthetic psychosine (galactosylsphingosine) for mass spectrometry and other research areas. Synthetic psychosine contains only the most common naturally occurring d18:1 sphingosine isomer glycosylated to a *beta*-galactose. Psychosine and it's acylated form, cerebroside (galactosylceramide), are important components of biological systems and are critical biomarkers in syndromes such as Krabbe disease.

Psychosine (galactosylsphingosine, the deacylated form of cerebroside) is an intermediate in the biosynthesis of cerebrosides, the largest single component of the myelin sheath of nerves. It is formed biologically by the reaction of sphingosine with UDP-galactose and can then be acylated with a fatty acid. It is present naturally in small amounts and has a role in the sphingosine-1-phosphate receptor superfamily. Psychosine has been found to induce cell apoptosis, cytokine activation, phospholipase activation, peroxisomal dysfunction, and altered calcium homeostasis.[1]

Krabbe disease is characterized by an accumulation of cerebroside and psychosine due to a lack in activity of the lysosomal enzyme *beta*-galactosidase.[2] Therefore psychosine can be a useful biomarker for the detection of Krabbe disease. The accumulation of these lipids negatively affects the myelin of the nerve cells, causing severe nervous system deterioration. Psychosine is highly cytotoxic and may significantly contribute to the degeneration of axons, causing oligodendrocyte death, astrocyte activation and the formation of multinuclear globoid-like cells.[3] Although GM_1 gangliosidase can degrade cerebrosides it cannot degrade psychosine.[4] Bone marrow transplantation may be an effective therapeutic approach to slow down the disease in cases of early detection.

	Product Name	Catalog #	Amount	Purity
	Cerebrosides, bovine	1050	50 mg	98^+%
	Cerebroside (non-hydroxy fatty acids)	1066	10 mg	98^+%
	Cerebroside (2-hydroxy fatty acids)	1138	10 mg	98^+%
New	Psychosine, synthetic	2087	5 mg	98^+%
	Psychosine, bovine	1305	10 mg	98^+%
	N-Acetyl-psychosine	1325	10 mg	98^+%
	N-Octanoyl-psychosine	1334	10 mg	98^+%
	N-Dodecanoyl-psychosine	1937	10 mg	98^+%
	N-Pentadecanoyl-psychosine	1335	5 mg	98^+%
	N-Stearoyl-D_{35}-psychosine, deuterated	1914	5 mg	98^+%
	N-Hexanoyl-NBD-psychosine	1621	100 µg	98^+%
	N-Dodecanoyl-NBD-psychosine	1633	100 µg	98^+%
New	Lissamine-rhodamine B-dodecanoyl-psychosine	2204	500 µg	98^+%
New	N-Hexanoyl-biotin-psychosine	2203	5 mg	98^+%
	N-(1-Adamantaneacetyl)-psychosine	1946	5 mg	98^+%

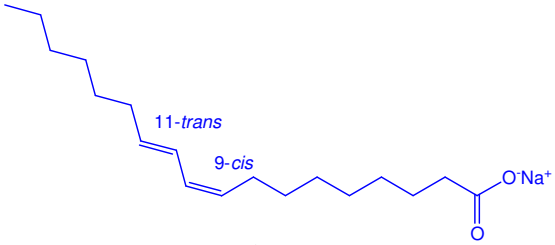
References:

1. X. Jiang, K. Yang, and X. Han, (2009) Journal of Lipid Research, 50:162
2. S. Giri et al., (2006) Journal of Lipid Research, 47:1478
3. Deane J., et al., (2011) PNAS 108(37):15169-15173
4. M. van der Knaap and J. Valk (2005) "Magnetic Resonance of Myelination and Myelin Disorders" 3rd ed., Springer-Verlag Berlin Heidelberg, ISBN 978-3-540-27660-9

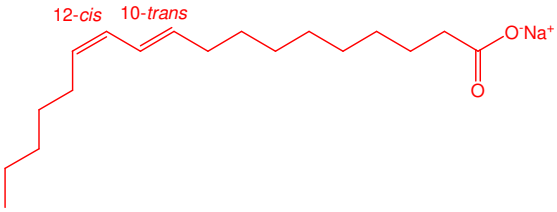
New High Purity Lipid Standards from Matreya!

Conjugated Linoleic Acid Sodium Salts:

- 9(Z),11(E)-Octadecadienoic acid (Na^+ salt) catalog # 1278
- 10(E),12(Z)-Octadecadienoic acid (Na^+ salt) catalog # 1279



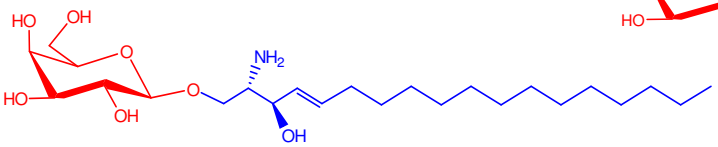
Catalog # 1278



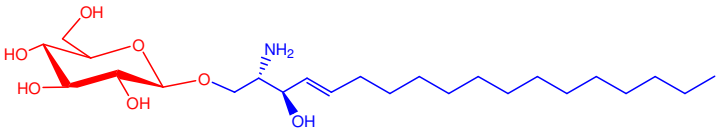
Catalog # 1279

Synthetic Glycosphingolipids:

- Glucosylsphingosine, synthetic catalog # 2086
- Psychosine, synthetic catalog # 2087



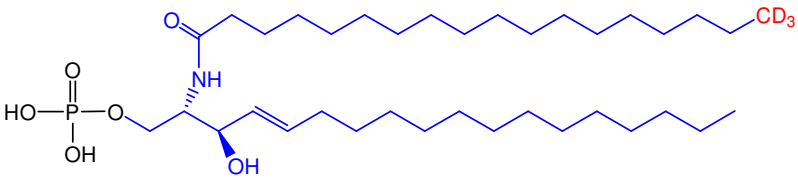
Catalog # 2087



Catalog # 2086

Fluorescent, Deuterium, and Biotin Labeled Glycosphingolipids:

- Lissamine-rhodamine B-dodecanoyl-galactosylceramide catalog # 2204
- N-Octadecanoyl-D3-D-erythro-sphingosine-1-phosphate, deuterated catalog # 2206
- N-Hexanoyl-biotin-lactosylceramide catalog # 2205



Catalog # 2206