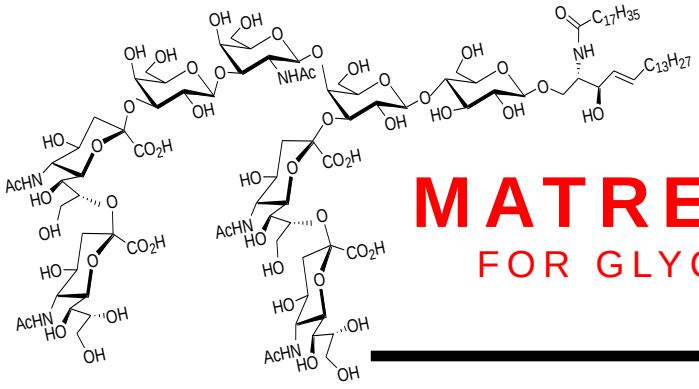

MATREYA NEWSLETTER

FOR GLYCO/SPHINGOLIPID RESEARCH

JANUARY 2016

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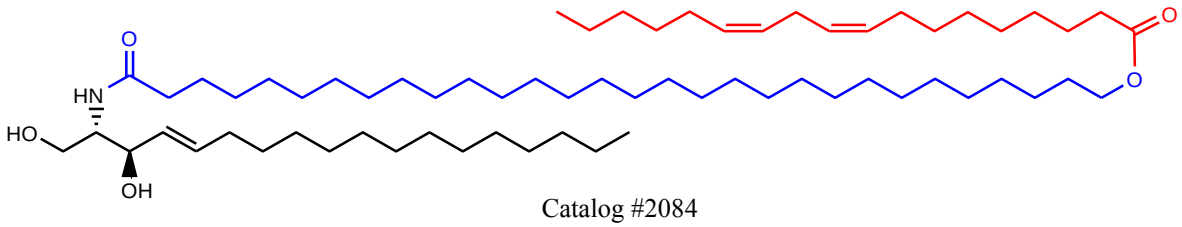
Vital Ceramides of Human *Stratum Corneum*



Catalog #2084

Ceramides in human cells have important and divergent functions that make their study both challenging and important. Ceramides have functions that include signal transduction and cellular regulation of apoptosis, cell growth arrest, differentiation, senescence, and immune responses. Many of the functions of ceramides are dependent on the specific structure of each ceramide specie. Relative to other tissues, human *stratum corneum* contains a number of very complex ceramide species that play important physiochemical roles in determining cutaneous barrier and water-holding functions.

The *stratum corneum* is the outermost cellular layer of the epidermis and functions as the permeability barrier in mammals. It contains 12 extractable ceramide fractions containing sphingosine, 6-hydroxysphingosine, dihydrosphingosine and phytosphingosine bases. Mammalian skin contains significant amounts of sphingolipids (as much as 50% of the total lipids), particularly very long chain linoleoyl esterified ceramide and glucosylceramide (also called O-acylceramide and O-acylglucosylceramide). These lipids, which are mostly found in the extracellular domains, are vital to the water permeability barrier to prevent lethal loss of water and pathogen invasion. The *omega*-esterified ceramides are formed from glucosylceramide and sphingomyelin in special lamellar bodies in epidermal cells from which they are excreted into the extracellular domain of the outermost cell layer of the epidermis. The *omega*-esterified ceramides can be covalently bound to proteins of the cornified envelope where they form a hydrophobic layer. A deficiency of linoleoyl *omega*-esterified ceramides is strongly correlated with skin diseases such as psoriasis and atopic dermatitis.[1,2,3]

Inside This Issue

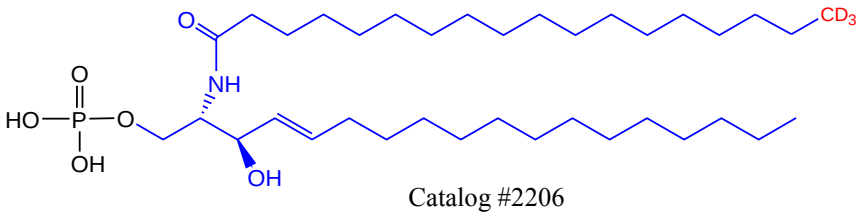
- Ceramides of *Stratum Corneum* 1
- Sphingosine- and Ceramide-1-Phosphate 2
- New Fluorescent Cerebroside 3
- Water Soluble CLA Salt 4

Product Name	Cat. #	Amount	Purity
N-(30-Linoleoyloxy-triacontanoyl)-sphingosine	2084	1 mg	98^{+}%

References:

1. B. Breiden and K. Sandhoff (2014) Biochimica et Biophysica Acta 1841:441-452
2. R. Sandhoff (2010) FEBS Letters 584:1907-1913
3. Y. Masukawa et al. (2008) Journal of Lipid Research 49(7):1466-1476

Sphingosine– And Ceramide-1-Phosphate



Catalog #2206

Sphingolipids are ubiquitous components of all eukaryotic cells that have important and far reaching biological effects. Among the many different sphingolipid species, phosphorylated sphingolipids demonstrate vital and specific cellular functions. Sphingosine-1-phosphate (S1P) and ceramide-1-phosphate (C1P) are two important biological sphingolipids that have key roles in regulating many important physiological and pathological functions. These lipid species are much less studied than their analogs sphingosine and ceramide but their functions have been confirmed to be no less vital.

D-*erythro*-Sphingosine-1-phosphate has important signaling functions both intra- and inter-cellularly and is present at low concentrations in cells. It can promote cellular division, regulate calcium mobilization and cell growth, and inhibits apoptosis.[1] Sphingosine-1-phosphate is involved in regulating the proliferation, survival, differentiation, and migration of many types of stem cells, especially in the development of the vascular and nervous systems. In the metabolism of S1P, sphingosine is phosphorylated by sphingosine kinase. Unlike most other sphingolipids it does not form lipid rafts in membranes and is found in the low nanomolar amounts in cells. However, in plasma, it can reach a much higher concentration and is stored in relatively high concentrations in human platelets and erythrocytes. S1P exerts its extra-cellular effects by acting as a ligand for specific receptors. These ligand-receptor interactions are important for the growth of new blood vessels, vascular maturation, cardiac development and immunity, the inflammatory process, and for directed cell movement.[2] S1P is abundant in some cancers, probably due to its role in cell division and proliferation, and is therefore undergoing much scrutiny in an attempt to find therapeutic interventions such as inhibiting its biosynthesis.

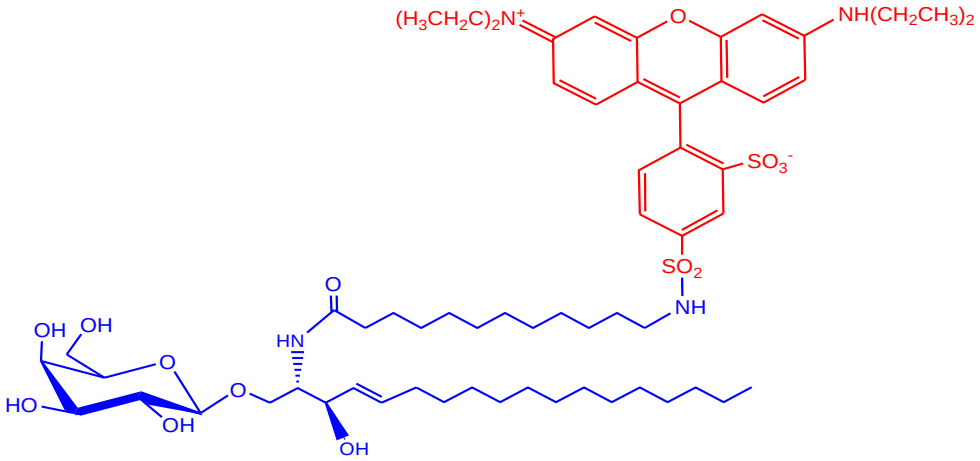
Ceramide-1-phosphate is generated by the phosphorylation of ceramide by the enzyme ceramide kinase. C1P is a novel second messenger that demonstrates important cellular functions such as influencing inflammation, phagocytosis, potassium channel function, inflammatory responses, cell survival, and tumorigenesis.[3] The first reported biological action of C1P was its ability to stimulate DNA synthesis and cell division. C1P has also been found to be mitogenic for both fibroblasts and macrophages. The mitogenic effect of C1P is dependent on its intracellular ability to stimulate reactive oxygen specie production in macrophages *via* the enzyme NADPH oxidase. This enzyme is downstream of PKC-α and cPLA(2)-α in this pathway.[4,5] Another important function of C1P is its promotion of cell survival. Ceramide-1-phosphate stimulates the phosphatidylinositol 3-kinase (PI3-K)/protein kinase B (PKB) pathway, a major mechanism whereby growth factors promote cell survival. It is probable that C1P blocks apoptosis by stimulating the PI3-K/PKB/NF-kappaB pathway and thereby maintaining the production of antiapoptotic Bcl-X(L). Based on these and previous findings it has been proposed that the inhibition of acid sphingomyelinase and the subsequent decrease in ceramide levels would allow cell signaling through stimulation of the PI3-K/PKB pathway to promote cell survival.[6]

	Product Name	Catalog #	Amount	Purity
	D-erythro-Sphingosine-1-phosphate	1803	5 mg	98+%
	D-erythro-Dihydrosphingosine-1-phosphate	1852	5 mg	98+%
	N-Hexadecanoyl-D-erythro-sphingosine-1-phosphate	2046	5 mg	98+%
New	N-Octadecanoyl-D_3-D-erythro-sphingosine-1-phosphate	2206	1 mg	98+%

References:

1. M. Maceyka, S. Milstien, and S. Spiegel (2009) Journal of Lipid Research, 50:S272-S276
2. J. Nofer (2008) J. Clin. Lipidology, 2:4-11
3. E. Kooijman et al. (2009) Journal of Biophysics, 96(6):2204-2215
4. R. Stahelin et al. (2007) The Journal of Biological Chemistry, 282(28):20467-20474
5. Arana, L. et al. (2012) Exp. Cell Res., 318(4):350-360
6. Gómez-Muñoz A. et al. (2005) FEBS Lett., 579(17):3744-3750

New Fluorescent Cerebroside for Cellular Studies



Catalog #2204

Lissamine-rhodamine B-dodecanoyl-galactosylceramide is a fluorescent labeled glycosphingolipid labeled with a fluorescent lissamine-rhodamine B marker. This fluorescent standard from Matreya is excellent for use in the study of Krabbe disease and other disorders.(1) Lissamine-rhodamine B dyes have an excitation/emission maxima ~560/580 nm. The fluorescent marker is attached via a 12-carbon linker reducing the interaction of the fluorophore with the sphingolipid.

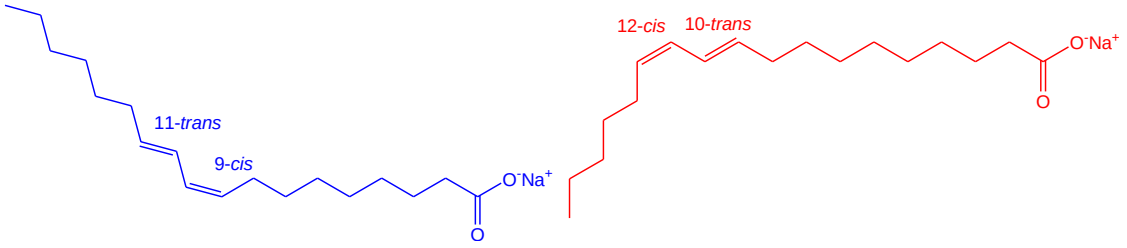
Cerebrosides (galactosylceramides) are found primarily in neuronal tissues and are a major component of the central nervous system. They are the largest single component of the myelin sheath of nerves and seem to act, along with other molecules, to form part of the structural support of the myelin sheath.(2) Cerebrosides are involved in a very wide range of biological activities such as cell agglutination, intracellular communication, cellular development, and antitumor/cytotoxic effects.(3) It can be metabolized into sulfatide which is also abundant in the nervous system and myelin sheath. Due to the relatively high melting point of cerebrosides (much greater than physiological body temperature) they have a para-crystalline structure. Krabbe disease (globoid cell leukodystrophy) is characterized by a deficiency in the enzyme galactocerebrosidase, which is responsible for degrading cerebroside. This leads to an accumulation of cerebroside and psychosine which can result in demyelination of nerves and loss of axonal conductivity.(4)

	Product Name	Catalog #	Amount	Purity
New	Lissamine-rhodamine B-dodecanoyl-galactosylceramide	2204	500 µg	98+%

References:

1. K. Zama et al. (2009) Glycobiology, 19:767-775
2. M. Sheldon and D.Lyudmila (1998) Lipids, 33(4):441-443
3. X. Zhou, L. Tang and Y. Liu (2009) Lipids, 44(8):759-763
4. A. Graziano and V. Cardile (2015) Gene, 555(1):2-13

Water Soluble CLA Salts
For a Better Method of Introduction



Catalog # 1278 Catalog # 1279

9(Z),11(E)-Octadecadienoic acid, Na^+ salt and 10(E),12(Z)-Octadecadienoic acid, Na^+ salt are conjugated linoleic acids (CLA) that have unique water soluble properties. One major challenge to the study of CLA isomers is its method of introduction. By making them water soluble these CLA salts can now be introduced into various aqueous systems, thereby reducing method variations.

CLA is found mostly in lipids originating in ruminant animals including dairy products. It has several biological properties including anti-carcinogenic activity, suppressing *in vitro* growth of human melanoma, colorectal, and breast cancer cells, and exhibiting anti-atherogenic activity.(1) It is thought that CLA itself may not have anti-oxidant capabilities but may produce substances which protect cells from the detrimental effects of peroxides.

9(Z),11(E)-Octadecadienoic acid is the major natural isomer of CLA constituting 73% to 93% of the total CLA in dairy products(2) and it appears to be the most biologically active isomer. It has been shown to enhance animal growth and inhibit osteoclast formation and activity from human cells,(3) as well as decrease LDL:HDL and total HDL:cholesterol levels in humans.(4)

Animals fed a diet containing high levels of CLA have been observed to have improved feed efficiency (lean body mass increased while body fat decreased) and this seems to be due, mainly or exclusively, to the 10(E),12(Z)-Octadecadienoic acid.(5) However, this isomer appears to increase oxidative stress and inflammatory biomarkers in obese men, which can lead to insulin resistance.(6,7) 10(E),12(Z)-Octadecadienoic acid increases LDL:HDL cholesterol and total:HDL cholesterol in humans.(4)

Research in the CLA area is often hindered by a lack of pure standards. Matreya is proud to offer an extensive line of CLA isomers of high purity. These products are ideal for determining the specific effects of the individual CLA isomers in biological systems.

	Product Name	Cat. #	Amount	Purity
New	9(Z),11(E)-Octadecadienoic acid, Na^+ salt	1278	25 mg	98+%
	9(Z),11(E)-Octadecadienoic acid	1245	25 mg	98+%
	Methyl 9(Z),11(E)-Octadecadienoate	1255	25 mg	98+%
	9(E),11(E)-Octadecadienoic acid	1181	25 mg	98+%
	Methyl 9(E),11(E)-Octadecadienoate	1257	25 mg	98+%
	9(Z),11(Z)-Octadecadienoic acid	1248	25 mg	96+%
	Methyl 9(Z),11(Z)-Octadecadienoate	1256	25 mg	96+%
New	10(E),12(Z)-Octadecadienoic acid, Na^+ salt	1279	25 mg	98+%
	10(E),12(Z)-Octadecadienoic acid	1249	25 mg	98+%
	Methyl 10(E),12(Z)-Octadecadienoate	1254	25 mg	98+%

References:

1. Helen B. MacDonald, (2000) Journal of the American College of Nutrition, 19:90002, 111S-118S
2. M. Belury, (2002) Annual Review of Nutrition, 22:505
3. Ilana Platt, Ahmed El-Sohemy (2009) Lipids in Health and Disease, 8:15
4. S. Tricon, et al., (2004) The American Journal of Clinical Nutrition, 80:614,
5. Yanwen Wang and Peter J. H. Jones (2004) The American Journal of Clinical Nutrition, 79(6):1153S-1158S
6. Ulf Risérus, et al., (2002) Circulation, 106:1925
7. Soonkyu Chung, et al., (2005) The Journal of Biological Chemistry, 280:38445