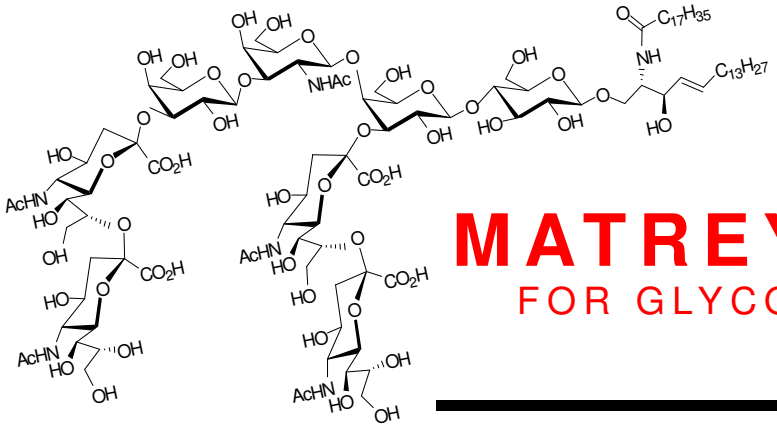

MATREYA NEWSLETTER

FOR GLYCO/SPHINGOLIPID RESEARCH

JULY 2013

Vitamin E: Tocopherols & Tocotrienols

Vitamin E consists of four tocopherols and four tocotrienols that demonstrate important and far reaching biological activities. These essential lipids contain a common chromanol ring and either a saturated (tocopherol) or unsaturated (tocotrienol) side chain. The eight common vitamin E isoforms (α-, β-, γ-, and δ-tocopherols and α-, β-, γ-, and δ-tocotrienols) are differentiated based on the number and position of methyl groups on the chromanol ring and the presence of a saturated or unsaturated side chain (figure 1 (pg. 2)). The vitamin E vitamers are commonly found in vegetables, fruits, seeds, nuts, grains and oils, where they exist in various ratios with each other. The unsaturated side chain in tocotrienols gives them physical properties different from tocopherols, such as an increased ability to cross the cell membrane bilayer (1). Vitamin E has become well known for its role as an antioxidant, in lowering cholesterol and other lipids, as a neuroprotective and anti-cancer agent, and in cardiovascular disease protection. Most vitamin E supplements contain (and many studies use) only α-tocopherol; however, several of the above biological effects are mostly or exclusively found in the other vitamers, making it critical for them to be included in future research. Indeed, the tocotrienols in general may have greater physiological functions than tocopherols (2) and may even be inhibited by an unbalanced excess of α-tocopherol supplements (3).

Scientists at the MD Anderson Cancer Center wrote an excellent article entitled "Tocotrienols fight cancer by targeting multiple cell signaling pathways" (4). Here it is suggested that since tumor cells result from dysregulation of multiple genes a drug is needed that will also target multiple genes. Tocotrienols affect numerous pathways linked with tumorigenesis and thus have potential in both the prevention and treatment of cancer as an active and mild anti-cancer drug.

A recent report from the Karolinska Institute in Sweden described the neuroprotective activity of tocopherols and tocotrienols (5). It is indicated that low plasma tocopherol and tocotrienol levels are associated with an increased incidence of mild cognitive impairment and Alzheimer's disease. Another report indicates that α-tocotrienol is the most potent neuroprotective form of vitamin E, inhibiting 12-LOX, c-Src, and PLA2, up-regulating MRP1, and inducing arteriogenesis through induction of TIMP1 and decreased activation of MMP2 (6).

Another beneficial function of tocopherols and tocotrienols is their role in preventing cardiovascular disease. The tocotrienols particularly have gained eminence recently due to an increased understanding of their antioxidant effects. Cardioprotective effects of tocotrienols include antagonizing the oxidation of low density lipoproteins, anti-atherosclerotic properties, inhibiting platelet aggregation and monocytes adhesion, and preventing smooth muscle proliferation (7).

Since its discovery, vitamin E has been shown to be a versatile and potent component of biological systems. α-Tocopherol has received much praise over the years due to its remarkable functions; now the less prevalent tocopherols and tocotrienols are starting to gain recognition as indispensable components of the vitamin E family. As Kannappan et al. point out more than 25,000 studies have been conducted on tocopherol while very few studies have considered the role of tocotrienols (4). But this is sure to change as more scientists become aware that "The multitargeted role of tocotrienols in most degenerative diseases proves it to be an ideal candidate as a nutraceutical/pharmaceutical agent for useful exploitation" (7). Matreya is pleased to introduce the full line of highly purified Tocopherols and Tocotrienols along with Tocols as internal standard markers. We have the capability to produce these compounds in multigram sizes to accommodate your research.

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References:

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3. Tan, B., (2005) *The Journal of the American Neutricutical Association* 8(1):35
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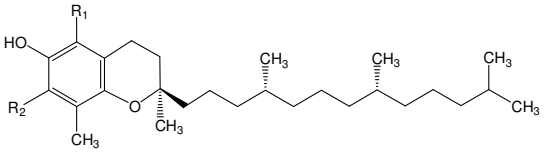
Vitamin E: Tocopherols & Tocotrienols Continued

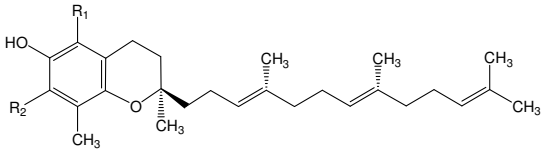
Figure 1

Tocopherols

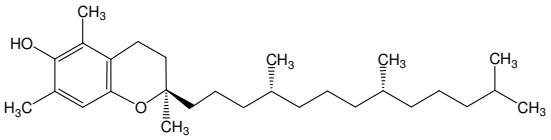


	R_1	R_2
α-Tocopherol	CH_3	CH_3
β-Tocopherol	CH_3	H
γ-Tocopherol	H	CH_3
δ-Tocopherol	H	H

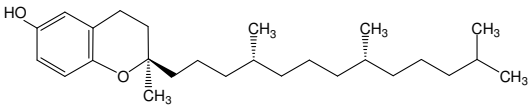
Tocotrienols



	R_1	R_2
α-Tocotrienol	CH_3	CH_3
β-Tocotrienol	CH_3	H
γ-Tocotrienol	H	CH_3
δ-Tocotrienol	H	H



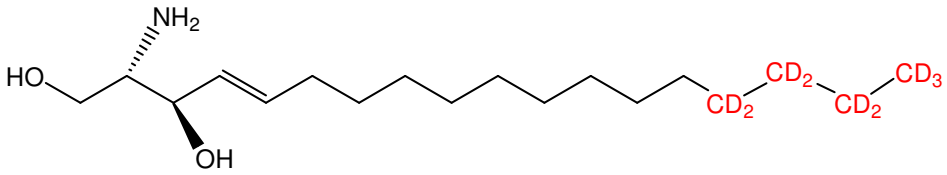
rac-5,7-Dimethyltocol
Catalog# 1074



Tocol
Catalog # 1797

	Catalog#	*Product Description*	*Size*	*Purity*
New!	2109	α- Tocotrienol	25 mg	98+% TLC/98+% GC
New!	2110	β- Tocotrienol	25 mg	98+% TLC/98+% GC
New!	2111	γ- Tocotrienol	25 mg	98+% TLC/98+% GC
New!	2112	δ-Tocotrienol	25 mg	98+% TLC/98+% GC
	1072	*rac*-α-Tocopherol	50 mg	95+% TLC/98+% GC
	1071	rac-β-Tocopherol	50 mg	95+% TLC/98+% GC
	1073	rac-γ-Tocopherol	50 mg	95+% TLC/98+% GC
	1790	δ-Tocopherol	50 mg	95+% TLC/98+% GC
	1074	*rac*-5,7-Dimethyltocol	50 mg	95+% TLC/98+% GC
	1797	Tocol	50 mg	95+% TLC/98+% GC

D-*erythro*-Sphingosine, D_9



This synthetic D-*erythro*-sphingosine contains nine deuterium atoms making it an ideal stable isotope-labeled standard for lipidomic studies using mass spectrometry. Stable isotope-labeled tracers are ideal for studies involving the metabolism and various metabolites of a lipid and can be used for the quantitative evaluation of major lipid pathways (1). Lipidomics has shown great success in the use of deuterium labeled compounds in identifying and quantifying individual molecular species by the use of tandem mass spectrometry (2). This deuterated sphingosine can also be used in the preparation of sphingolipids that are labeled on the sphingosine chain. In this way deuterated ceramides can be prepared that will not lose their label if the fatty acid is cleaved off *in vivo* and replaced by an alternate fatty acid.

Sphingosine is a characteristic structural unit of many sphingolipids such as ceramides, gangliosides, globosides, sulfatides, sphingomyelin, and others (3,4). It is most abundant in nervous tissue and cell membranes. Sphingosine with an 18-carbon chain and a double bond at carbon 4 is the most abundant sphingosine in animal tissues. Lysosphingolipids inhibit protein kinase C activity resulting in the pathogenesis of sphingolipidoses such as Krabbe's disease and Gaucher's disease (5). Sphingosine can be phosphorylated via two kinases to form sphingosine-1-phosphate, which has important signaling functions. While sphingosines and ceramides can induce apoptosis, (6) sphingosine-1-phosphate can promote cell survival or proliferation. Sphingosine has also been shown to cause an increase in the cytoplasmic calcium level of cells.

	Catalog#	***Product Description***	***Size***	***Purity***
New!	2079	D-*erythro*-Sphingosine, D_9	1 mg	$98^{+}\%$

References:

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New Products for 2013

Matreya's staff has many years of experience in the field of lipid chemistry. Our technology of extraction, isolation, and purification of natural products is unique, allowing us to produce high quality lipid preparations. If your need exceeds the catalog size, please contact us. We can quote from milligram to multigram sizes on our products.

Matreya's staff combines the experience of synthetic chemistry and expertise in natural product chemistry to come up with answers to your research problems. Please call our customer service for quotations on custom products or to suggest a new product for our catalog. We are always ready to help.

Catalog #	***Product Description***	***Size***	***Purity***
	Adamantyl Cerebrosides (Glycosphingolipid Inhibitors)		
1945	N-(1-Adamantaneacetyl)-glucosylceramide	5 mg	98$^+$%
1946	N-(1-Adamantaneacetyl)-galactosylceramide	5 mg	98$^+$%
	Sphingosine		
2079	D-*erythro*-Sphingosine, D_9	1 mg	98$^+$%
	Ceramide		
2201	N-Octadecanoyl-D_3-D-*erythro*-sphingosine (deuterated ceramide)	1 mg	98$^+$%
1939;1939-25	N-Octadecenoyl-(*cis*-9)-D-*erythro*-sphingosine	5 mg;25 mg	98$^+$%
2049	N-Triacontanoyl-D-*erythro*-sphingosine	1 mg	98$^+$%
2048	N-Dotriacontanoyl-D-*erythro*-sphingosine	5 mg	98$^+$%
1936;1936-100	N-Dodecanoyl-D-*erythro*-sphingosine	10 mg;100 mg	98$^+$%
	Galactosylceramide (cerebroside)		
1937;1937-50	N-Dodecanoyl-*beta*-D-galactosylceramide	10 mg;50 mg	98$^+$%
	Sulfatide (sulfo-galactosylceramide)		
1938	N-Dodecanoyl-sulfatide	1 mg	98$^+$%
1934	N-Heptadecanoyl-sulfatide	1 mg	98$^+$%
1935	N-Nonadecanoyl-sulfatide	1 mg	98$^+$%
	Globotriaosylceramide (Gb_3, ceramide trihexoside)		
1528	N-Hexadecanoyl-ceramide trihexoside	500 µg	98$^+$%
1529	N-Octadecanoyl-ceramide trihexoside	500 µg	98$^+$%
	Gangliosides		
2053	N-Hexanoyl-biotin-monosialoganglioside GM_1	500 µg	98$^+$%
	Tocotrienols		
2109	α- Tocotrienol	25 mg	98$^+$%
2110	β- Tocotrienol	25 mg	98$^+$%
2111	γ- Tocotrienol	25 mg	98$^+$%
2112	δ-Tocotrienol	25 mg	98$^+$%
	Fatty Acid Mixtures		
2012	FIM-FAME-8 Mixture	25 mg	98$^+$%
2013	FIM-FAME-9 Mixture	25 mg	98$^+$%