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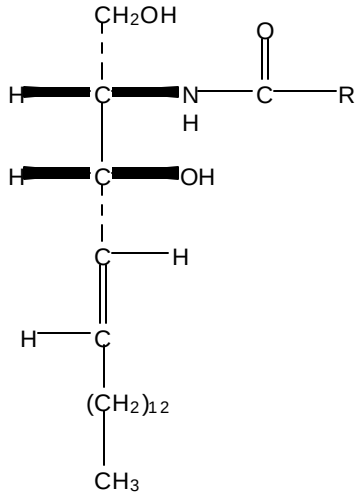
ProductInformation

CERAMIDES
Non-Hydroxy Fatty Acid
Sigma Prod. No. C2137

SYNONYMS: N-acyl-sphingosine

PHYSICAL DESCRIPTION:

Appearance: White powder
Molecular weight: Approximately 607 assuming sphingosine (trans-D-erythro-2-amino-4-octadecene-1,3-diol) is the base with N-acyl fatty acids of predominantly stearic (octadecanoic) and nervonic (cis-15-tetracosenoic) acids.
Molecular formula: $C_{39}H_{76}NO_3$ assuming sphingosine with predominantly stearic and nervonic acids.



R = Mixture of fatty acids, primarily stearic acid (C_{18}:0) and nervonic acid (C_{24}:1,cis-15)

METHOD OF PREPARATION:

Prepared by the action of phospholipase C on pure bovine brain sphingomyelin.[1] Purification to approx. 99% as measured by thin-layer chromatography is achieved using crystallization and partition techniques.

STABILITY / STORAGE AS SUPPLIED:

Store at –20º C

SOLUBILITY / SOLUTION STABILITY:

Soluble in chloroform at 10 mg per ml. Stable in chloroform for up to 3 months stored in freezer (-0EC).

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USAGE / APPLICATIONS:

Ceramide has a role as a signal transduction effector molecule for bioactive regulation of metabolic systems[2-12] and is available as an analytical standard for chromatography.

Ceramide is an endogenous lipid component of a novel biochemical pathway termed the sphingomyelin cycle.[2,3,4] The sphingomyelin cycle was discovered in human leukemia HL-60 cells[2,3] which are activated during differentiation induced with 1-alpha-25-dihydroxyvitamin D3. Ceramide is generated by hydrolysis of membrane sphingomyelin by a novel magnesium-independent, neutral, cytosolic sphingomyelinase.[5] The use of cell permeable synthetic ceramide (C-2 ceramide, N-acetyl-D-sphingosine), has been shown to produce a similar dose dependant induction of differentiation of HL-60 cells.[5] Other synthetic analogs such as C-6 ceramide (N-hexanoyl-D-sphingosine) have been found useful to study cell responses.[6] Ceramide is generated in response to cellular stimulation by hormones, cytokines and antigens.[6,7,8,9,10,11] Mechanisms for Ceramide action involve regulation of protein phosphorylation via stimulation of a serine/threonine protein phosphatase, a proline-directed kinase and possibly other direct and/or indirect targets.[8] Ceramide metabolites such as sphingosine and sphingosine-1-phosphate have potent biological activities of their own.[7] Other analogs such as D-erythro-dihydroceramide do not exhibit bioactive effects in certain biological systems.[4,6,10]

Ceramide appears to have a role in mediating biological responses in a wide variety of cell types.[8] Ceramide is emerging as an intracellular messenger that mediates effects on terminal differentiation and cell proliferation as well as apoptosis or cell death and cell-cycle arrest.[10,12] The interrelationships of ceramide actions with other bioactive lipids and systems represents an ongoing active research area.

GENERAL NOTES:

Ceramide has been available for many years as a representative member of this (non-hydroxy fatty acid) class of lipids. In recent years it has been defined as an important regulator of metabolic systems. A significant part of current research has centered around its involvement in apoptosis systems.

GENERAL NOTES: (continued)

Several of the following references (3,4,6,7,8,9,10, and 12) are review articles and cite the original research articles. They offer additional information on the role of ceramide in cellular events.

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