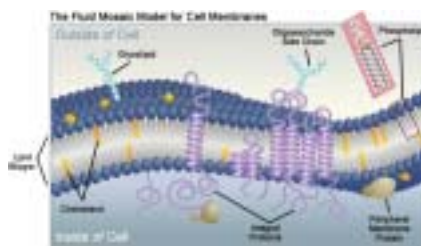


Technical tip - Architecture of Biological Membranes and lipids

Lipids are key components of membrane structure. Their distribution, between inner and outer leaflets, depends on lipid type and cell physiological state. See also the technical tip "Membrane constituents and probes" page E70.



Architecture of Biological Membranes: fluid mosaic model.

Membrane composition : type and amount of lipids vary with cells/tissues

Membrane	Cholesterol	Phosphatidyl-Choline	Sphingo-Myelin	Phosphatidyl-Serine	Glycolipids
Rat liver plasma cell	30	18	14	9	-
Rat liver RER	6	55	3	3	-
Rat liver nuclear	10	55	3	3	-
Rat liver myelin	22	11	6	7	12
E coli cytoplasm	0	0	-	-	-

Interchim provides important lipids found in membranes of animal or plant labeled by several fluorochromes (table below), either at fatty-acid terminus, or at the hydrophilic head. They are mainly used for the study of lipids in plasmatic membrane or other membranes bilayers (flip-flop translocation of lipids between the 2 layers, cell and organelles fusion)⁽⁶⁾.

Applications :

- ◆ Localization, movement and migration of lipids in membranes structure⁽³⁾
- ◆ Lipid flip/flop monitoring between layers^(4,5)
- ◆ Trafficking to intracellular organelles⁽¹⁾
- ◆ Function of lipids and membranes
- ◆ Role of peptide/drugs/ligands-membrane interactions⁽²⁾
- ◆ Lipids metabolic fates study

References :

- 1) Nichols J.W. (2002). Internalization and trafficking of fluorescent-labeled phospholipids in yeast. *Semin Cell Dev Biol* 13:179-84.
- 2) Jelokhani-Niaraki M., et al. (2002). Conformation and interaction of the cyclic cationic antimicrobial peptides in lipid bilayers. *J Pept Res* 60:23-36.
- 3) Menger F.M., et al. (2002). Depth-profiling with giant vesicle membranes. *J Am Chem Soc* 124:11842-3.
- 4) Hanson P.K., et al. (2002). NBD-labeled Phosphatidylcholine enters the yeast vacuole via the pre- vacuolar compartment. *J Cell Sci* 115:2725-33.
- 5) Dekkers D.W., et al. (2002). Comparison between Ca²⁺ -induced scrambling of various fluorescently labeled lipid analogues in red blood cells. *Biochem J* 362:741-7.
- 6) Araujo-Santos JM et al ; Rapid transport of phospholipids across the plasmatic membrane of Leishmania infantum. *Biochem Biophys Res Commun*. 2003, Jun 20 ;306(1):250-5.

Table of fluorophores groups :

Fluorescent Group	$\lambda_{exc.}$ (nm)	$\lambda_{em.}$ (nm)	Product/additional information
NBD	460	534	FP-T3226A p.B81
Lissamine Rhodamine	550	590	FP-18798A
Dansyl	340	578	FP-01595A
Pyrene	347	379	FP-33972A p.B84
Fluorescein	497	521	FP-19365A p.B62

Note : (E in following lipid products tables)

Provided lipids are synthetic products, available in chloroform solution (stored at +4°C) or in powder form (shipped with dry ice, unless noticed). For ordering, an extension is added to the following 5 digits part numbers, depending on quantity, and on the form ('-C' for chloroform, and '-P' for powder form) ; so please inquire for ordering.

Technical tip

Phospholipids (including sphingomyelins) are generally solubilized in chloroform, or freely soluble in ethanol.

Phosphoethanolamines, phosphatidic acids and phosphoglycerols are less soluble than Glycerophosphocholines in ethanol, but solutions up to 1–2 mg/mL should be achieved using sonication if necessary. Cyclodextrins may be added to fluorescent lipid during incubation to enhance cell labeling.

Sphingosine based lipids include , ceramides (sphingomyelins, phytosphingosine) and cerebroside.

Phospholipids

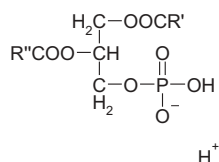
Most phospholipids are composed of two fatty acyl residues (nonpolar tails) linked to a glycerol substituted by a single phosphate ester (polar head group). The acyl chain unsaturation degree in fatty acid chains, and the type of polar head group are responsible of various localizations in a lipidic bilayer and of different biological activities.

Fatty acids based on glycerol include Phosphatidylcholine, Phosphatidic Acid, Phosphatidylethanolamine, Phosphatidylglycerol, Phosphatidylserine.

Lipids based on sphingosine are Ceramide, Sphingomyelin, Phytosphingosine, Galactosyl cerebroside.

Phosphatidic Acid lipids

Phosphatidic acid is not an abundant lipid constituent of any living organism but it is extremely important as an intermediate in the biosynthesis of triacylglycerols and of most phospholipids. The molecule is acidic and bears a negative charge so requires a counter ion, drawn here as H^+ , although it could equally be N^+ , K^+ , etc..



PhosphatidylCholine

Phosphatidylcholine is usually the most abundant phospholipids, often amounting to almost 50 % of the total . It is then obviously the key building block of membrane bilayer. In particular, it makes up a very high proportion of the outer leaflet of the plasmatic membrane.

It is a neutral or zwitterionic phospholipid over a pH ranging from strongly acid to strongly alkaline.

Reference :

Wustner D et al 2001. Vesicular and nonvesicular transport of phosphatidylcholine in polarized HepG2 cells. *Traffic*. 2001 Apr;2(4) : 277-96.

PhosphatidylSerine

Phosphatidylserine is the only amino acid containing glycerophospholipid in animal cells. Although it is distributed widely among animals, plants and microorganisms, it represents usually less than 10 % of the total phospholipid, the greatest concentration being in myelin from brain tissue. However, it may comprise 10 to 20 mol % of the total phospholipid in the plasmatic membrane and endoplasmic reticulum of the cell. It is an acidic (anionic phospholipid with three ionizable groups), i.e. the phosphate moiety, the amino group and the carboxyl function.

PhosphatidylEthanolamine (NBD)

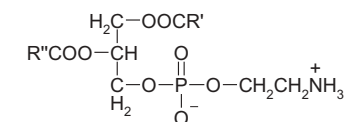
Phosphatidylethanolamine is the second most abundant phospholipid in animal and plant lipids. It is frequently the main lipid component of microbial membranes. It is a key building block of membrane bilayers. It is a neutral or zwitterionic phospholipid (only with a pH range between 2 to 7).

Reference :

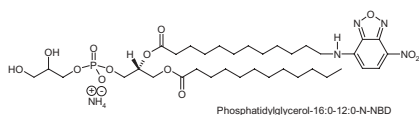
Betz G et al 2001. Interaction of liposome formulations with human skin in vitro. *Int J Pharm*. 2001 Oct 23 ; 229(1-2) : 117-29. ECrratum in : *Int J Pharm* 2002 Jan 31;232(1-2) : 243-4.

PhosphatidylGlycerol (NBD)

Phosphatidylglycerol is an ubiquitous lipid that can be the main component of some bacterial membranes. It can also be found in plants and animals membranes. Phosphatidylglycerol is found in almost all bacterial types.



E.76



1-R'-2-[6-[(7-nitro-2-1,3-benzoxadiazol-4-yl)amino]-R'']-sn-Glycero-3-[Phospho-rac-(1-glycerol)] (Ammonium Salt) (R'=palmitoyl 16:0; R''=Dodecanoyl 12:0)

Phosphatidyl labeled lipids

Label	Head	Acyl R'	Acyl R''	MW	Cat.# [£]	
Phosphatidyl EthanolAmine (PEA)						
NBD-	PEA	-14:0 (myristoyl)	-14:0	815.99	FP-216191	5 mg
NBD-	PEA	-16:0 (Palmitoyl)	-16:0	872.09	FP-110481	5 mg
NBD-	PEA	-18:1 (Oleoyl)	-18:1	924.17	FP-021381	5 mg
NBD-	PEA	-acyl**	-acyl**	898.13	FP-161161	5 mg
LRB-	PEA	-14:0 (myristoyl)	-14:0	1193.54	FP-N24931	5 mg
LRB-	PEA	-16:0 (Palmitoyl)	-16:0	1249.65	FP-N24941	5 mg
LRB-	PEA	-18:1 (Oleoyl)	-18:1	1301.73	FP-573091	5 mg
LRB-	PEA	-acyl***	-acyl***	1275.69*	FP-256991	5 mg
Dansyl-	PEA	-18:1 (Oleoyl)	-18:1	994.36	FP-Q64531	5 mg
Pyrene-	PEA	-18:1 (Oleoyl)	-18:1	1025.37	FP-Q64521	5 mg
Fluorescein-	PEA	-18:1 (Oleoyl)	-18:1	1136.41	FP-Q64431	5 mg
Biotin	PEA	-16:0	-16:0	1019.47	FP-599201	10 mg
PhosphatidylSerine (PS)						
NBD-	PS	-18:1 (Oleoyl)	-18:1	985.21	FP-323161	1 mg
Dansyl-	PS	-18:1 (Oleoyl)	-18:1	1055.40	FP-N25131	1 mg

****Fatty Acid Composition of Egg Lyso Phosphatidylcholine:**
Saturated Fatty Acid (45%): Palmitic Acid 34%, Stearic Acid 11%
Unsaturated Fatty Acid (55%): Oleic Acid 31%, Palmitoleic Acid 1%, Arachidonic Acid 3%, Linoleic Acid 18%, All Others 2%

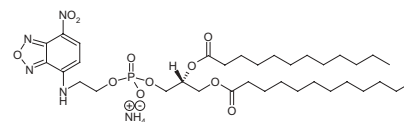
***** made by transphosphatidylation of Egg Phosphatidylcholine .**
Molecular Weight based on the 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphoethanolamine derivative

£ : for ordering, indicated cat numbers refer to powder state product, that are shipped with dry ice. Please replace the last digit by a '-C-qty' if you wish the chloroform state.

Examples of structures

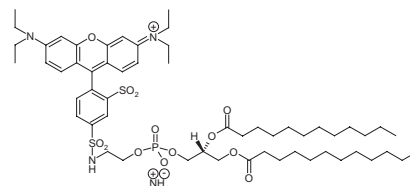
Dimyristoyl NDB PE

1,2-Dimyristoyl-sn-Glycero-3-Phosphoethanolamine-N-(7-nitro-2-1,3-benzoxadiazol-4-yl) (Ammonium Salt)



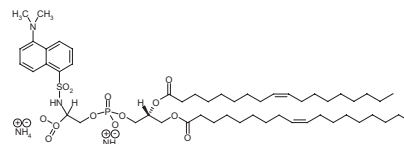
Dimyristoyl LRB PE

1,2-Dimyristoyl-sn-Glycero-3-Phosphoethanolamine-N-(Lissamine Rhodamine B Sulfonyl) (Ammonium Salt)



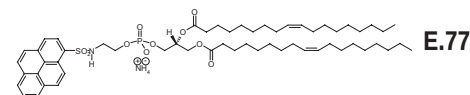
Dioleoyl Phosphatidylethanolamine-dansyl

1,2-Dioleoyl-sn-Glycero-3-Phospho-L-Serine-N-(Dansyl-4-yl) (Diammonium Salt)



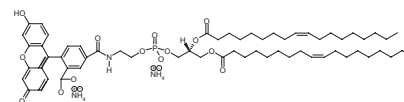
Dioleoyl Phosphatidylethanolamine-pyrene

1,2-Dioleoyl-sn-Glycero-3-Phosphoethanolamine-N-(1-pyrenesulfonyl)



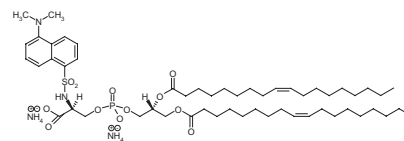
Dioleoyl Phosphatidylethanolamine-fluorescein

1,2-Dioleoyl-sn-Glycero-3-Phosphoethanolamine-N-(Carboxyfluorescein)



Dioleoyl Phosphatidylserine-dansyl

1,2-Dioleoyl-sn-Glycero-3-Phospho-L-Serine-N-(Dansyl-4-yl) (Diammonium Salt)



Cell Biology - Study/Probes

Fluorescent natural Lipids

Fatty acid labeled lipids

Fatty acid and label		Phosphatidic Acid		Phosphatidyl Ethanolamine		Phosphatidyl Glycerol	
Acyl R'	Acyl R''(labeled)	MW [§]	Cat.# [£]	MW [§]	Cat.# [£]	MW [§]	Cat.# [£]
-6:0(hexanoyl)	-6:0-N-NBD	563.50	FP-N25091	589.54	FP-N24791	637.58	FP-N25011
-6:0(hexanoyl)	-12:0-N-NBD	647.66	FP-N25101	673.70	FP-N24801	721.74	FP-N25021
-14:0(myristoyl)	-6:0-N-NBD	675.72	FP-N25031	701.75	FP-N24891	749.80	FP-N24951
-14:0(myristoyl)	-12:0-N-NBD	759.88	FP-N25041	785.92	FP-N24901	833.96	FP-N24961
-16:0(Palmitoyl)	-6:0-N-NBD	703.77	FP-N25051	729.81	FP-N24911	777.85	FP-N24971
-16:0(Palmitoyl)	-12:0-N-NBD	787.93	FP-N25061	813.97	FP-359351	862.01	FP-N24981
-18:1(Oleoyl)	-6:0-N-NBD	729.81	FP-N25071	755.85	FP-464121	803.89	FP-N24991
-18:1(Oleoyl)	-12:0-N-NBD	813.97	FP-N25081	729.81	FP-N24921	888.05	FP-N25001
-acyl*	-6:0-N-NBD	703.77	FP-N24871	729.81	FP-659591	777.85	FP-N24861
-acyl*	-12:0-N-NBD	787.93	FP-N24881	813.97	FP-119721	862.01	FP-981111
Quantity :		5 mg		5 mg		5 mg	

Fatty acid and label		Phosphatidic Choline		Phosphatidyl Serine	
Acyl R'	Acyl R''(labeled)	MW [§]	Cat.# [£]	MW [§]	Cat.# [£]
-6:0(hexanoyl)	-6:0-N-NBD	631.62	FP-N24811		
-6:0(hexanoyl)	-12:0-N-NBD	715.78	FP-N24821		
-14:0(myristoyl)	-6:0-N-NBD	743.84	FP-N24841		
-14:0(myristoyl)	-12:0-N-NBD	828.00	FP-N24851		
-16:0(Palmitoyl)	-6:0-N-NBD	771.89	FP-042281	790.85	FP-976011
-16:0(Palmitoyl)	-12:0-N-NBD	856.05	FP-103541	875.01	FP-N25111
-18:1(Oleoyl)	-6:0-N-NBD	797.93	FP-346471	816.89	FP-422241
-18:1(Oleoyl)	-12:0-N-NBD	882.09	FP-105631	901.05	FP-334911
-acyl*	-6:0-N-NBD	771.89	FP-N24831		
-acyl*	-12:0-N-NBD	856.05	FP-578241		
Quantity :		5 mg		1 mg	

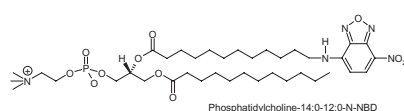
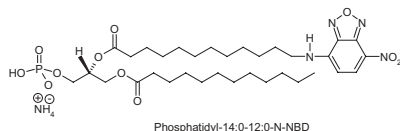
§ : provided as ammonium salt.

*Fatty Acid Composition :

Saturated Fatty Acid (45 %) : Palmitic Acid 34 %, Stearic Acid 11 %

Unsaturated Fatty Acid (55 %) : Oleic Acid 31 %
Palmitoleic Acid 1 %, Arachidonic Acid 3 %, Linoleic Acid 18 %, All Others 2 %.

£ : for ordering, indicated cat numbers refer to 5 mg of product (1 mg for PS) in powder state, that are shipped with dry ice. Please add the last digit by a '-C-qty' if you wish the chloroform state, and -10 mg if you wish a 10 mg quantity.



Examples of structures

Phosphatidyl-14:0-12:0-N-NBD

1-R'-2-[6-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-R'']-sn-Glycero-3-Phosphate (R'=myristoyl 14:0; R''=Dodecanoyl 12:0)

Phosphatidylcholine-14:0-12:0-N-NBD

1-R'-2-[6-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-R'']-sn-Glycero-3-Phosphocholine (R'=myristoyl 14:0; R''=Dodecanoyl 12:0)

Phosphatidylserine-16:0-12:0-N-NBD

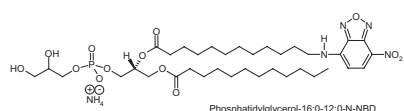
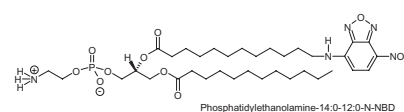
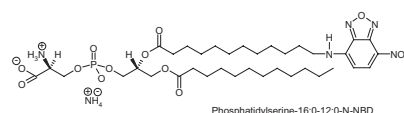
1-R'-2-[6-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-R'']-sn-Glycero-3-Phospho-L-Serine (R'=palmitoyl 16:0; R''=Dodecanoyl 12:0)

Phosphatidylethanolamine-14:0-12:0-N-NBD

1-R'-2-[6-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-R'']-sn-Glycero-3-Phosphoethanolamine (R'=myristoyl 14:0; R''=Dodecanoyl 12:0)

Phosphatidylethanolamine-14:0-12:0-N-NBD

1-R'-2-[6-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-R'']-sn-Glycero-3-[Phospho-rac-(1-glycerol)] (Ammonium Salt) (R'=palmitoyl 16:0; R''=Dodecanoyl 12:0)



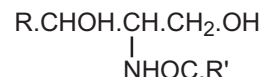
Sphingosine based lipids

Ceramides

Ceramides consist of a long-chain linked to a fatty acid via an amide bond. Ceramides are considered as the key intermediates in the biosynthesis of all the complex sphingolipids, in which the terminal primary hydroxyl group is linked to carbohydrate, phosphate, etc...

Ceramides have an important role in cell signaling, especially in the regulation of apoptosis and cell differentiation, transformation and proliferation. Indeed, they appear to be formed under all conditions of cellular stress in eukaryotic organisms. Failure to properly regulate apoptosis can have catastrophic consequences, and many disease states including cancer, diabetes, neuropathies, Alzheimer and Parkinson's diseases and atherosclerosis, are thought to arise from apoptosis deregulation.

Ceramide, prepared from synthetic D-erythro-Sphingosine, is available unlabeled (on request) and fatty acid labeled by NBD as follows :



abs em. C6 NBD Ceramide

MW : 575.75

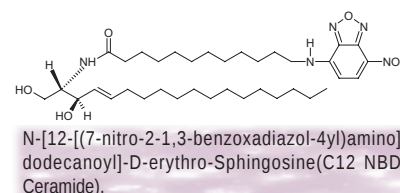
Reference : Bromley PEC et al ; Complex sphingolipid synthesis in plants : characterization of inositolphosphorylceramide synthase activity in bean microsomes. Arch Biochem Biophys. 2003 Sep 15; 417(2):219-26.

Description	Cat.#	Qty
C6 NBD Ceramide	FP-524811A	1 mg

abs em. C12 NBD Ceramide

MW : 659.91

Description	Cat.#	Qty
C12 NBD Ceramide	FP-R16221	1 mg

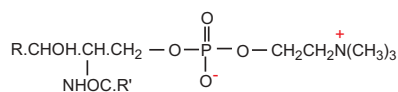


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E.79





Sphingomyelin

Sphingomyelin consists of a ceramide unit with a phosphorylcholine moiety attached to position 1. It is thus the phosphatidylcholine sphingolipid analogue. Ubiquitous component of animal membranes, sphingomyelin is the most abundant sphingolipid, representing as much as 50 % of the lipids in certain tissues, though it is less abundant than phosphatidylcholine. For example, it makes up about 10 % of the lipids in brain. Sphingomyelin serves as a precursor for ceramides, long-chain based and sphingosine-1-phosphate.

Reference :

Araujo-Santos JM et al ; Rapid transport of phospholipids across the plasma membrane of *Leishmania infantum*. *Biochem Biophys Res Commun.* 2003 Jun 20 ; 306(1) : 250-5.

Maier O 2003. Trans-Golgi network and subapical compartment of HepG2 cells display different properties in sorting and exiting of sphingolipids. *J Biol Chem.* 2003 Jan 3 ; 278(1) : 164-73. ECPub 2002 Oct 28.

Sphingomyelin is available unlabeled (on inquire), and fatty acid labeled by NBD as follows :

abs em. C6 NBD Sphingomyelin

MW : 740.89

Reference : Martin OC 1993. Cholesterol deprivation affects the fluorescence properties of a ceramide analog at the Golgi apparatus of living cells. *Proc Natl Acad Sci U S A* 90, 2661-2665 (1993)

Description	Cat.#	Qty
C6 NBD Sphingomyelin	FP-222285	1 mg

abs em. C12 NBD Sphingomyelin

N-[12-[(7-nitro-2-1,3-benzoxadiazol-4-yl)amino] dodecanoyl]-Sphingosine-1-Phosphocholine (C12-NBD Sphingomyelin)

MW : 825.04

Description	Cat.#	Qty
C12 NBD Sphingomyelin	FP-U47701	100 µg

Phytosphingosine

abs em. C12-NBD Phytosphingosine

N-[12-[(7-nitro-2-1,3-benzoxadiazol-4-yl) amino]dodecanoyl] Phytosphingosine (C12 NBD Phytosphingosine)

MW : 677.93

Description	Cat.#	Qty
C12-NBD Phytosphingosine	FP-U27811	100 µg

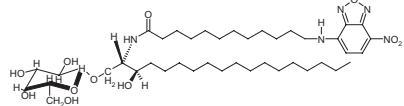
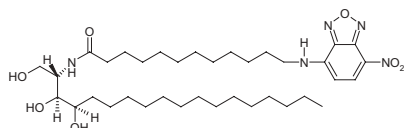
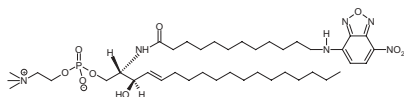
NBD Galactosyl Cerebroside

abs em. C12 NBD Galactosyl Cerebroside

N-[12-[(7-nitro-2-1,3-benzoxadiazol-4-yl) amino]dodecanoyl]-D-Galactosyl-b1-1'-Sphingosine (C12 NBD Galactosyl Ceramide)

MW : 822.05

Description	Cat.#	Qty
C12 NBD Galactosyl Cerebroside	FP-AY8141	100 µg



E.80

interchim

25-NBD-Cholesterol

Cholesterol exists in large amounts in biological membranes, and distributes in rich or poor domains that participate to membrane structure and function. Cholesterol organization in membranes containing very low amounts of cholesterol has not been investigated extensively. Cholesterol 25-NBD provides the researcher with the right probe to explore this issue. It incorporates into membranes and more effectively probes cholesterol containing domains more advantageously than previously used short-chain analogs.

NBD-cholesterol is available unlabeled (on request), and labeled with a NBD group at the flexible acyl chain. This labeling site prevents any alteration of the structural features necessary for proper membrane incorporation.

Cholesterol is an ubiquitous component of animal tissues and fungi, where much of it is located in the membranes (as much as 30% of some membrane lipids). In plants, it tends to be a minor component only of a complex sterol fraction.

abs em. Cholesterol 25-NBD

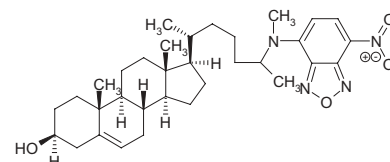
25-{N-[(7-nitrobenz-2-oxa-1,3-diazol-4-yl)-methyl]amino}-27-norcholesterol

Soluble : ≥ 10 mg/ml Chloroform, Acetonitrile (insoluble in water)

Store at -20°C and protect from light

MW : 564.77

Description	Cat.#	Qty
Cholesterol 25-NBD	FP-U47711	10 mg



Literature:

Mukherjee, S. and A. Chattopadhyay. (1996). Membrane organization at low cholesterol concentrations : a study using 7-nitrobenz-2-oxa-1,3-diazol-4-yl-labeled cholesterol. *Biochemistry* 35:1311-22.

Plasmalogen-12:0 NDB PC

Plasmalogens are glycerol based phospholipids but, at the opposite to acyl phospholipids, the aliphatic side chains are not attached by ester linkages. They are less easily studied than the acyl phospholipids, despite their widespread distribution (mainly in brain and spinal cord tissue).

Plasmalogen products are available unlabeled (on request), and as NBD fatty acid chain phosphocholine derivative.

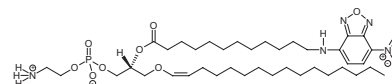
abs em. C16 Plasmalogen-12:0 NBD PC

1-O-1'-(Z)-Hexadecenyl-2-[12-[(7-nitro-2-1,3-benzoxadiazol-4-yl)amino]dodecanoyl]-sn

Glycero-3-Phosphocholine (Plasmalogen PC)

$C_{42}H_{74}N_2O_5P$ MW : 840.05

Description	Cat.#	Qty
C16 Plasmalogen-12:0 NBD PC	FP-AZ0351	100 µg



Other Lipids

Description	Cat.#	Qty
C-2 Ceramide	103631	5 mg
C-6 Ceramide	Q87040	5 mg
C-6 NBD Ceramide	FP-52481	1 mg
C-8 Ceramide	Q87080	1 mg
C-8 Ceramide-1-phosphate	Q87110	1 mg
C-8 Ceramine	Q87090	1 mg
1,2-Didecanoyl-sn-glycerol	Q86970	10 mg
1,2-Dioctanoyl-sn-glycerol	Q86990	10 mg
1,2-Dioleoyl-sn-glycerol	Q87000	1 mg
Dimethylallyl Pyrophosphate (triammonium salt)	Q87190	50 µg
D-myo-Inositol-1,3,4,5-triphosphate (sodium salt)	Q86950	100 µg
D-myo-Inositol-1,3,4-triphosphate (sodium salt)	S00990	100 µg
D-myo-Inositol-1,4,5-triphosphate (potassium salt)	Q86940	100 µg
Docosahexaenoyl PAF C-16	Q86790	1 mg
Eicosapentaenoyl PAF C-16	Q86830	1 mg
alpha-hydroxy Farnesyl Phosphonic Acid	Q87230	1 mg
2-Fluoropalmitic Acid	352811	5 mg
1,2-bis(heptanoylthio) Glycerophosphocholine	Q87010	5 mg
Hexadecyl Acetyl Glycerol	Q86890	5 mg
1-O-Hexadecyl-2-O-methyl-sn-glycerol	Q86910	5 mg
Lignoceric Ceramide	Q87070	1 mg
LY294002	Q87570	5 mg
N,N-Dimethylsphingosine	Q87130	5 mg
N-acetyl-S-farnesyl-L-Cysteine	Q87210	5 mg
N-acetyl-S-geranylgeranyl-L-Cysteine	483030	1 mg
Nervonic Ceramide	Q87060	1 mg
1-Oleoyl Lysophosphatidic Acid (sodium salt)	Q86980	1 mg
1-Oleoyl-2-acetyl-sn-glycerol	Q87150	5 mg
PAF Acetylhydrolase Blocking Peptide	Q89190	200 µg
PAF C-16	Q86760	5 mg
PAF C-16 .omega.-d3	Q89290	100 µg
PAF C-16-d4	Q89270	100 µg
PAF C-18	Q86860	5 mg
Arachidonoyl PAF C-16	Q86800	1 mg
Butanoyl PAF	AM0750	1 mg
Butenoyl PAF	GK1720	1 mg
Dihomo-.gamma.-Linolenoyl PAF C-16	Q86770	1 mg
2-O-ethyl PAF C-16	Q86900	5 mg
Hexanolamino PAF C-16	Q86810	1 mg
Lyso-PAF C-16	Q86820	5 mg
Lyso-PAF C-16-d4	Q89280	100 µg
Lyso-PAF C-18	Q86880	5 mg
Methylcarbaryl PAF C-16	Q86840	1 mg
2-O-methyl PAF C-16	Q86780	5 mg
2-O-methyl PAF C-18	Q86870	5 mg
2-Thio PAF	Q86920	5 mg
Pyrrolidino PAF C-16	Q86850	1 mg
PtdIns(3,4)-P2(1,2-dipalmitoyl) (sodium salt)	Q87260	100 µg
PtdIns-(3,4,5)-P3 (1-stearoyl, 2-arachidonoyl) (sodium salt)	T90920	50 µg
PtdIns(3,4,5)-P3(1,2-dipalmitoyl) (sodium salt)	S01000	100 µg
PtdIns-(4,5)-P2 (1,2-dioctanoyl)	Q87250	100 µg
PtdIns(4,5)-P2(1,2-dipalmitoyl) (ammonium salt)	Q87270	100 µg
Arachidonoyl Thio-PC	Q87020	5 mg
10-Pyrene-PC	Q87030	1 mg
S-Farnesylthioacetic Acid	Q87200	1 mg
Sphingosine-1-Phosphate	Q87120	1 mg
trans-BTP Dioxolane	Q86930	1 mg
REV 5901	Q87430	5 mg

See also oxidized lipids in section ROS probes.

Description	Cat.#
Fatty acids	
.omega.-3 Arachidonic Acid	10461B
.omega.-3 Arachidonic Acid-d8	Q89310
5,6-dehydro Arachidonic Acid	277704
Adrenic Acid	Q88330
AM404	822911
Arachidonic Acid	10462A
Arachidonic Acid methyl ester	S03740
Arachidonic Acid-d8	861710
Arachidonoyl Ethanolamide	719370
Arachidonoyl Ethanolamide-d8	758670
Arachidonyl Trifluoromethyl Ketone	Q86960
cis-Parinaric Acid	46900A
Conjugated Linoleic Acid (10E,12Z)	Q88230
Conjugated Linoleic Acid (9E,11E)	162520
Conjugated Linoleic Acid (9Z,11E)	P57920
Dihomo-.gamma.-Linolenic Acid	860110
Dihomo-.gamma.-Linolenoyl Ethanolamide	987610
Docosahexaenoic Acid	860120
Docosapentaenoic Acid	135121
Docosatetraenoyl Ethanolamide	987620
Docosatrienoic Acid	860100
13(Z)-Docosenoic Acid	Q88270
13-Docosenamide	Q88390
8,11-Eicosadiynoic Acid	Q88210
11,14-Eicosadienoic Acid	Q88360
7,7-dimethyl-5,8-Eicosadienoic Acid	049330
Eicosapentaenoic Acid	341116
Eicosatetraynoic Acid	549590
Eicosatrienoic Acid (11Z,14Z,17Z)	S03790
Eicosatrienoic Acid (5Z,8Z,11Z)	858970
Eicosatriynoic Acid	Q88290
Elaidic Acid	015850
2-Fluoropalmitic Acid	352811
20-HETE	Q88140
2-Hydroxymyristic Acid	728191
4,5-dehydro Docosahexaenoic Acid	S03800
Linoleic Acid	Q88260
Linoleic Acid	13558b
Linoleic Acid-d4	Q89320
.alpha.-Linolenic Acid	090720
.alpha.-Linolenoyl Ethanolamide	Q88300
.gamma.-Linolenic Acid	290053
Linoleoyl Ethanolamide	Q88250
Mead Acid Ethanolamide	G97690
MEDICA 16	Q88320
Methyl .alpha.-Linolenyl Fluorophosphonate	Q87470
Methyl .gamma.-Linolenyl Fluorophosphonate	Q87480
Methyl Arachidonyl Fluorophosphonate	574731
N-Oleoylglycine	Q88310
O-11	GK1980
17-Octadecynoic Acid	711922
9,12-Octadecadiynoic Acid	Q88400
9-Octadecenamide	Q88380
Oleic Acid	144299
Oleoyl Ethanolamide	B81440
Oleyl Trifluoromethyl Ketone	Q87160
Palmitoyl Ethanolamide	082471
Palmityl Trifluoromethyl Ketone	Q87170
Phytanic Acid	246042
Sesamin	Q87380
Stearidonic Acid	Q88350
Stearoyl Ethanolamide	G97680
Traumatic Acid	156054
Umbelliferyl Arachidonate	Q87180

Other probes for lipid studies

Oil Red O (solvent Red27)

A lipid stain commonly used for demonstrating triglycerides in frozen sections.

Description	Cat.#	Qty
Oil Red O (solvent Red27)	N1300A	100 g

Section membrane potential probes (E92)
Section amphiphilic probes (E70)