Phospholipids

Quick Facts

Storage upon receipt:

- ≤–20° C
- Desiccate
- Protect from light

Ex/Em of Conjugates: See Tables 1 and 2

Introduction

Phospholipids are the primary structural constituents of biological membranes. In addition to this structural role, the importance of phospholipids as mediators in cellular signaling processes has become increasingly apparent. Consequently, research into metabolic processes such as phospholipase action [1,2] and lipid sorting and trafficking [3,4] is rapidly expanding. This expansion is reflected in the range of fluorescent phospholipid analogs offered by Molecular Probes, which includes phospholipids incorporating the intensely fluorescent and photostable BODIPY® fluorophore, and a wide variety of polar head group types.

Most phospholipids are derived from glycerol to which two fatty acyl residues (nonpolar tails) and a single phosphorylalcohol substituent (polar head group) are attached. Head groups represented in Molecular Probes' phospholipid product range are phosphate (phosphatidic acid), as well as phosphate esters of choline, ethanolamine, glycerol and methanol. Fluorescent phospholipid analogs may be conveniently subdivided according to whether the fluorophore is attached to the nonpolar tail (Table 1) or to the polar head group (Table 2).

Table 1. Phospholipids with fluorescently labeled acyl chains.

Fluorophore (Ex/Em) *	Phospholipid
BODIPY (500/510)	• Phosphocholine: D-3793, D-3795
BODIPY FL (503/512)	• Phosphocholine: D-3792, D- 3803, D-3771 • Phosphatidic Acid: D-3805
BODIPY (530/550)	• Phosphoethanolamine: D-3813
BODIPY (581/591)	• Phosphocholine: D-3806
DPH (362/433)	• Phosphocholine: D-476
NBD (460/534)	• Phosphocholine: N-3786, N-3787
Perylene (440/450)	• Phosphocholine: H-3790
Pyrene (342/377)	• Phosphocholine: H-361, H-3818, B-3781, B-3782 • Phosphoethanolamine: H-3784 • Phosphoglycerol: H-3809 • Phosphomethanol: H-3810, O-7703

* Excitation (Ex) and emission (Em) maxima, in nm, are in methanol. The spectra may be different in membranes.

Table 2. Phospholipids with fluorescently labeled head groups.

Label (Ex/Em or Application)*	Catalog Number
Dansyl (336/517)	D-57
Pyrene(340/376)	P-58
Marina Blue® (365/460)	M-12652
NBD (463/536)	N-360
Fluorescein (496/519)	F-362
Oregon Green® 488 (501/526)	O-12650
BODIPY® Fl (505/511)	D-3800, D-12656
TMR † (540/566)	T-1391
LRB ‡/Rhodamine Red™ (560/580)	L-1392
Texas Red® (582/601)	T-1395
Biotin (<250)	B-1550, B-1616
Maleimide (thiol-reactive)	M-1618

* Spectral maxima in nm are in methanol. The spectra may be different in membranes. † Tetramethylrhodamine. ‡ Lissamine™ rhodamine B maxima, in nm.

Storage and Handling

Fluorescent phospholipid analogs in solid form should be stored frozen at ≤–20°C, desiccated and protected from light. When properly stored, these products are stable for at least one year. The most suitable solvent for preparing stock solutions is generally chloroform. Phosphocholines are usually freely soluble in ethanol up to at least 20 mg/mL. Most other phospholipids (phosphoethanolamines, phosphatidic acids and phosphoglycerols) are less soluble in ethanol, but solutions up to 1–2 mg/mL should be obtainable, using sonication to aid dispersion if necessary. Either chloroform or mixtures of benzene or toluene with small fractional amounts of ethanol are superior solvents in these cases. Information on solubility of natural phospholipids can be found in the CRC Handbook of Lipid Bilayers.[5] Stock solutions of fluorescent phospholipids should be stored in the same way as indicated above for the solid material.

Application

Liposomes are commonly employed as carriers for labeling live cells with fluorescent phospholipids.[6,7] Liposomes may be prepared by a variety of techniques.[8,9] A particularly convenient method involves simply injecting a concentrated ethanolic phospholipid solution into aqueous buffer.[10] To prepare stock solutions of phospholipids that have been dissolved in water-immiscible solvents, a suspension of liposomes can be obtained by evaporating the organic solvent, followed by hydration and sonication.

References

1. Anal Biochem 219, 1 (1994); **2.** Biochim Biophys Acta 212, 26 (1994); **3.** Cell 80, 269 (1995); **4.** Cell 77, 329 (1994); **5.** Marsh, D., *CRC Handbook of Lipid Bilayers*, pp 71-80, CRC Press (1990); **6.** J Biol Chem 265, 5337 (1990); **7.** J Cell Biol 113, 235 (1991); **8.** Chem Phys Lipids 40, 89 (1986); **9.** Annu Rev Biophys Bioeng 9, 467 (1980); **10.** Biochemistry 16, 3932 (1977).

Product List *Current prices may be obtained from our Web site or from our Customer Service Department.*

Cat #	Product Name	Unit Size
B-1616	N-((6-(biotinoyl)amino)hexanoyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (biotin-X DHPE)	5 mg
B-1550	N-(biotinoyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (biotin DHPE)	10 mg
B-3781	1,2-bis-(1-pyrenebutanoyl)-*sn*-glycero-3-phosphocholine	1 mg
B-3782	1,2-bis-(1-pyrenedecanoyl)-*sn*-glycero-3-phosphocholine	1 mg
D-3771	2-decanoyl-1-(O-(11-(4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)amino)undecyl)-*sn*-glycero-3-phosphocholine	1 mg
D-3792	2-(4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-dodecanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (β-BODIPY® FL C_{12}-HPC)	100 µg
D-3805	2-(4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-pentanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphate, diammonium salt (β-BODIPY® FL C_5-HPA)	100 µg
D-3803	2-(4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-pentanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (β-BODIPY® FL C_5-HPC)	100 µg
D-3800	N-(4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (BODIPY® FL DHPE)	100 µg
D-12656	N-(4,4-difluoro-5,7-dimethyl-4-bora-3a,4a-diaza-s-indacene-3-propionyl)-1,2-dihexanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (BODIPY® FL dicaproyl PE)	100 µg
D-3813	2-(4,4-difluoro-5,7-diphenyl-4-bora-3a,4a-diaza-s-indacene-3-dodecanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphoethanolamine (β-BODIPY® 530/550 C_{12}-HPE)	100 µg
D-3793	2-(4,4-difluoro-5-methyl-4-bora-3a,4a-diaza-s-indacene-3-dodecanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (β-BODIPY® 500/510 C_{12}-HPC)	100 µg
D-3795	2-(4,4-difluoro-5-octyl-4-bora-3a,4a-diaza-s-indacene-3-pentanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (β-C_8-BODIPY® 500/510 C_5-HPC)	100 µg
D-3806	2-(4,4-difluoro-5-(4-phenyl-1,3-butadienyl)-4-bora-3a,4a-diaza-s-indacene-3-pentanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (β-BODIPY® 581/591 C_5-HPC)	100 µg
D-57	N-(5-dimethylaminonaphthalene-1-sulfonyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (dansyl DHPE)	25 mg
D-476	2-(3-(diphenylhexatrienyl)propanoyl)-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (β-DPH HPC)	1 mg
F-362	N-(fluorescein-5-thiocarbamoyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (fluorescein DHPE)	5 mg
H-3790	1-hexadecanoyl-2-(3-perylenedodecanoyl)-*sn*-glycero-3-phosphocholine	1 mg
H-361	1-hexadecanoyl-2-(1-pyrenedecanoyl)-*sn*-glycero-3-phosphocholine (β-py-C_{10}-HPC)	1 mg
H-3784	1-hexadecanoyl-2-(1-pyrenedecanoyl)-*sn*-glycero-3-phosphoethanolamine (β-py-C_{10}-HPE)	1 mg
H-3809	1-hexadecanoyl-2-(1-pyrenedecanoyl)-*sn*-glycero-3-phosphoglycerol, ammonium salt (β-py-C_{10}-PG)	1 mg
H-3810	1-hexadecanoyl-2-(1-pyrenedecanoyl)-*sn*-glycero-3-phosphomethanol, sodium salt (β-py-C_{10}-HPM)	1 mg
H-3818	1-hexadecanoyl-2-(1-pyrenehexanoyl)-*sn*-glycero-3-phosphocholine (β-py-C_6-HPC)	1 mg
L-1392	Lissamine™ rhodamine B 1,2-dihexadecanoyl-sn-glycero-3-phosphoethanolamine, triethylammonium salt (rhodamine DHPE)	5 mg
M-1618	N-((4-maleimidylmethyl)cyclohexane-1-carbonyl)-1,2-dihexadecanoyl-sn-glycero-3-phosphoethanolamine, triethylammonium salt (MMCC DHPE)	5 mg
M-12652	Marina Blue® 1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine (Marina Blue® DHPE)	1 mg
N-3787	2-(12-(7-nitrobenz-2-oxa-1,3-diazol-4-yl)amino)dodecanoyl-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (NBD C_{12}-HPC)	5 mg
N-3786	2-(6-(7-nitrobenz-2-oxa-1,3-diazol-4-yl)amino)hexanoyl-1-hexadecanoyl-*sn*-glycero-3-phosphocholine (NBD C_6-HPC)	5 mg
N-360	N-(7-nitrobenz-2-oxa-1,3-diazol-4-yl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (NBD-PE)	10 mg
O-7703	1-octacosanyl-2-(1-pyrenehexanoyl)-*sn*-glycero-3-phosphomethanol, ammonium salt (C_{28}-O-PHPM)	250 µg
O-12650	Oregon Green® 488 1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine (Oregon Green® 488 DHPE)	1 mg
P-58	N-(1-pyrenesulfonyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (pyS DHPE)	25 mg
T-1391	N-(6-tetramethylrhodaminethiocarbamoyl)-1,2-dihexadecanoyl-*sn*-glycero-3-phosphoethanolamine, triethylammonium salt (TRITC DHPE)	1 mg

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