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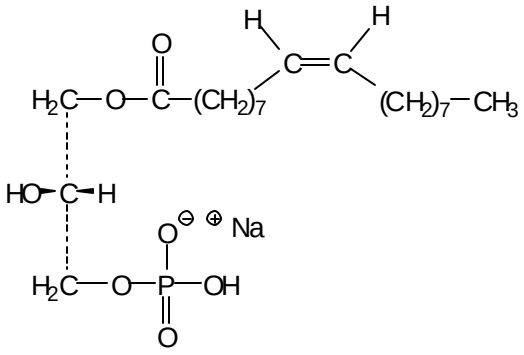
L-α-LYSOPHOSPHATIDIC ACID, OLEOYL, SODIUM
Sigma Prod. No. L7260
Storage temp: -20°C

CAS NUMBER: 22556-62-3
SYNONYMS: LPA, 1-Oleoyl-sn-Glycero-3-Phosphate, Sodium
L-α-Glycerophosphate, gamma-oleoyl, sodium.

STRUCTURE:



Based on the method of synthesis, the 1-Oleoyl isomer would be the expected isomer.

PHYSICAL PROPERTIES:

Molecular formula: $C_{21}H_{41}O_7P$ (for free acid)
Formula weight: 436.5 (for free acid)
Critical micelle concentration (CMC): approx. 1.3 mM (0.6 mg/ml) in 0.1 M NaCl, 10 mM HEPES buffer, pH 7.4[1]

METHOD OF PREPARATION:

L7260 is prepared enzymatically from pure L-alpha-phosphatidic acid, dioleoyl. Preparation from lysophosphatidylcholine using phospholipase D or from phosphatidic acid using phospholipase A2 has been reported.[2]

STABILITY / STORAGE AS SUPPLIED:

Supplied as the sodium salt form which is more stable than the free acid.

SOLUBILITY / SOLUTION STABILITY:

Analytical evaluation at 10 mg per ml of chloroform:methanol:acetic acid (95:5:5) gives a clear solution. Solubility in dimethylsulfoxide (DMSO) or ethanol is limited. The sodium salt of oleoyl-LPA is reported to be readily soluble at 5 mg per ml (approx. 11 mM) in calcium and magnesium free buffers.[1] Solution has also been achieved[3] in phosphate buffered saline (PBS), pH 7.2, at up to 0.3 mM (0.14 mg per ml) in the presence of 0.1% (w/v) bovine serum albumin (essentially fatty acid free).

SOLUBILITY / SOLUTION STABILITY: (continued)

LPA should be stable in solution at neutral conditions. Freezer storage is recommended for solutions or aqueous preparations. Partial acyl migration from the gamma (1) position to the beta (2) position may be possible under certain non-neutral conditions such as causes formation of an equilibrium mixture of 1,2 and 1,3-diglycerides in acidic or basic solution.[4] Oxidation of the fatty acid double bond may occur if submitted to oxidizing conditions.[5] Maintaining the product under an inert atmosphere (nitrogen or argon) may be appropriate for some applications.

USAGE / APPLICATIONS:

LPA has emerged as a multifunctional cell signaling molecule which exhibits a broad spectrum of bioactivity.[6,7] This includes autocrine stimulation of platelet aggregation[7], as well as mitogenic stimulation of growth of fibroblasts[2,8], smooth-muscle cells[9], endothelial cells[6], keratinocytes[10] and embryo cells[11]. It also promotes cellular tension[12] and cell-surface fibronectin binding[13] which are important events in wound repair. The biochemical signal transduction pathways which involve such functional proteins as Protein Kinase C, Adenylyl Cyclase, G proteins, Tyrosine Kinase and mitogen-activated protein (MAP) kinase systems are being explored in relation to these functions.[6,7] LPA has been considered a key metabolic intermediate in de novo lipid biosynthesis[7] although early reports had indicated effects on blood pressure[12] and smooth muscle contraction[15]. Possible involvement with Phosphatidylinositol 3'-Kinase systems is also under study.[11]

HOW TO USE:

The bioactivity of LPA seems to require long (i.e. C:16 to C:18) acyl carbon chains of the type usually found associated with membrane lipids [2,6,11,16] although optimum requirements for a single type of acyl carbon chain are not universal. The bioactivity decreases with shorter chain length.[11,16] In serum, oleoyl and palmitoyl fatty acid containing LPA are the predominant species.[6,9] Other structural requirements have been reviewed.[6,8,10] LPA is prepared in an appropriate media, such as described in the solubility section and added to the system under study.

GENERAL NOTES:

Some of the following references[6,7] are review articles and cite the original research articles. They offer additional information on the role of LPA in cellular events.

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REFERENCES:

1. Jalink, K. et al., *J. Biol. Chem.*, 265, 12232-12239 (1990).
2. Van Corven, E.J. et al., *Biochem. J.*, 281, 163-169 (1992).
3. Seufferlein, T. and Rozengurt, E., *J. Biol. Chem.*, 269, 9345-9351 (1994).
4. Kodali, D.R. et al., *Chem. Phys. of Lipids*, 52, 163-170 (1990).
5. Frankel, E.N., *J. Amer. Oil Chem. Soc.*, 61, 1908-1917 (1984).
6. Moolenaar, W.H., *J. Biol. Chem.*, 270, 12949-12952 (1995)., Review Article.
7. Moolenaar, W.H., *Trends Cell Biol.*, 4, 213-219 (1994)., Review Article.
8. Tigyi, G. et al., *Proc. Natl. Acad. Sci.* U.S.A., 91, 1908-1912 (1994).
9. Tokumura, A. et al., *Am. J. Physiol.*, 267, C204-C210 (1994).
10. Piazza, G.A. et al., *Exp. Cell Res.*, 216, 51-64 (1995).
11. Thompson, F.J. et. al., *Biochem. J.*, 316, 161-166 (1996).
12. Kolodney, M.S. and Elson, E.L., *J. Biol. Chem.*, 268, 23850-23855 (1993).
13. Zhang, Q. et al., *J. Cell Biol.*, 127, 1447-1459 (1994).
14. Schumacher, K.A. et al., *Thromb. Haemost.*, 42, 631-640 (1979).
15. Tokumura, A. et al., *Arch. Int. Pharmacodyn.*, 245, 74-83 (1970).
16. Jalink, K. et al., *J. Cell Biol.*, 126, 801-810 (1994).