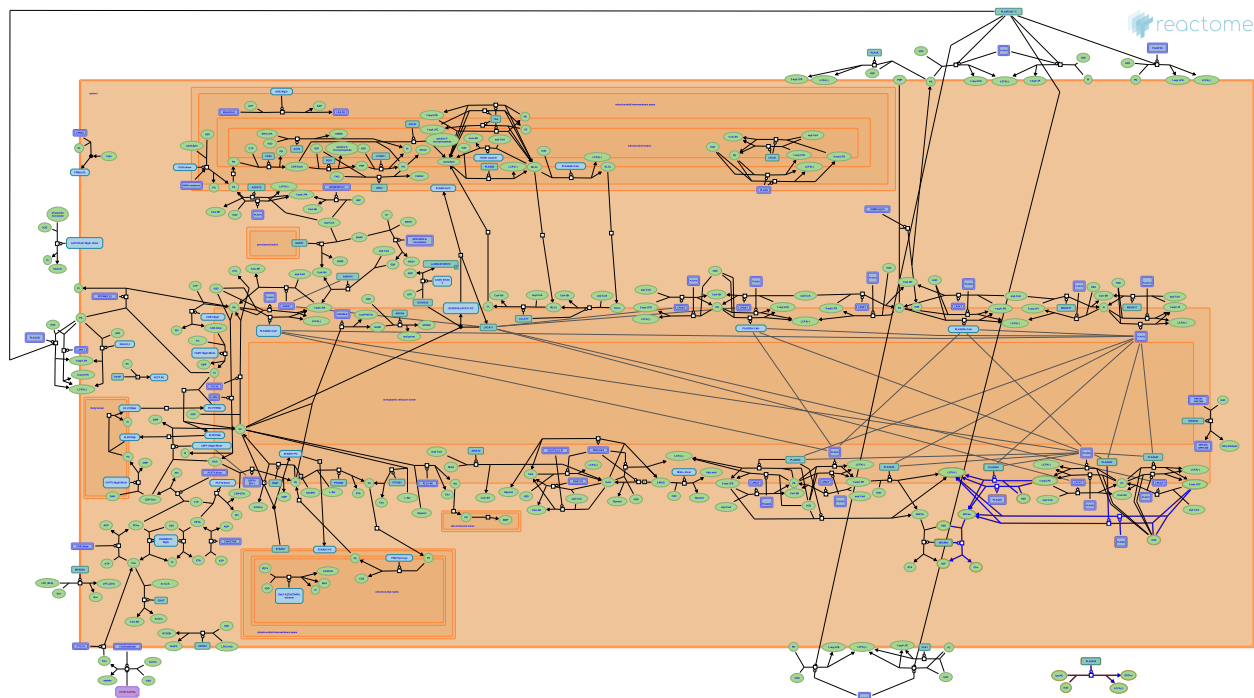


Hydrolysis of LPC



D'Eustachio, P., Jassal, B., Wakelam, M., Williams, MG.

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22/10/2020

Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

Literature references

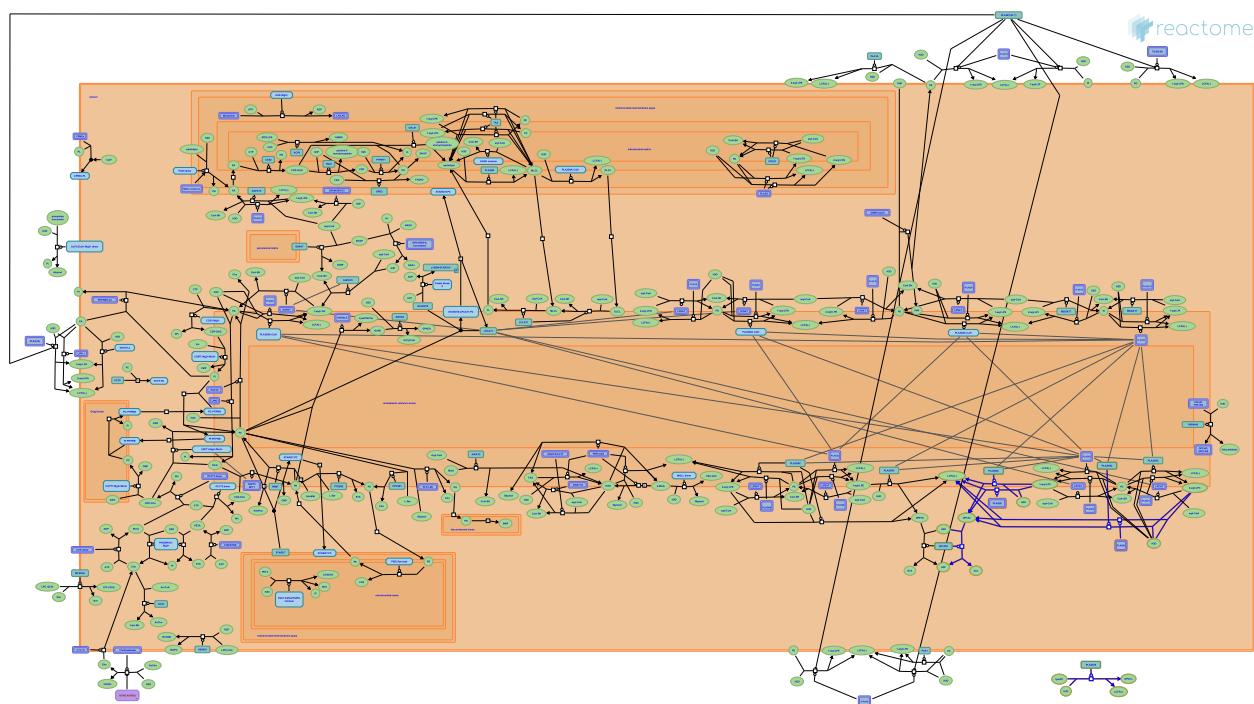
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Reactome database release: 74

This document contains 1 pathway and 6 reactions ([see Table of Contents](#))

Hydrolysis of LPC ↗

Stable identifier: R-HSA-1483115



Lysophosphatidylcholine (LPC) is hydrolyzed by phospholipases to produce glycerophosphocholine (GPCho) which is in turn hydrolyzed by glycerophosphocholine phosphodiesterase to produce choline (Cho) and glycerol-3-phosphate (G3P) (Yamashita et al. 2009, Yamashita et al. 2005, Ghomashchi et al. 2010).

Literature references

- Yamashita, A., Kamata, R., Kawagishi, N., Nakanishi, H., Suzuki, H., Sugiura, T. et al. (2005). Roles of C-terminal processing, and involvement in transacylation reaction of human group IVC phospholipase A2 (cPLA2gamma). *J Biochem*, 137, 557-67. ↗
- Yamashita, A., Tanaka, K., Kamata, R., Kumazawa, T., Suzuki, N., Koga, H. et al. (2009). Subcellular localization and lysophospholipase/transacylation activities of human group IVC phospholipase A2 (cPLA2gamma). *Biochim Biophys Acta*, 1791, 1011-22. ↗
- Ghomashchi, F., Naika, GS., Bollinger, JG., Aloulou, A., Lehr, M., Leslie, CC. et al. (2010). Interfacial kinetic and binding properties of mammalian group IVB phospholipase A2 (cPLA2beta) and comparison with the other cPLA2 isoforms. *J Biol Chem*, 285, 36100-11. ↗

Editions

2011-08-12	Edited	Williams, MG.
2011-09-14	Authored	Williams, MG.
2012-05-14	Reviewed	Wakelam, M.

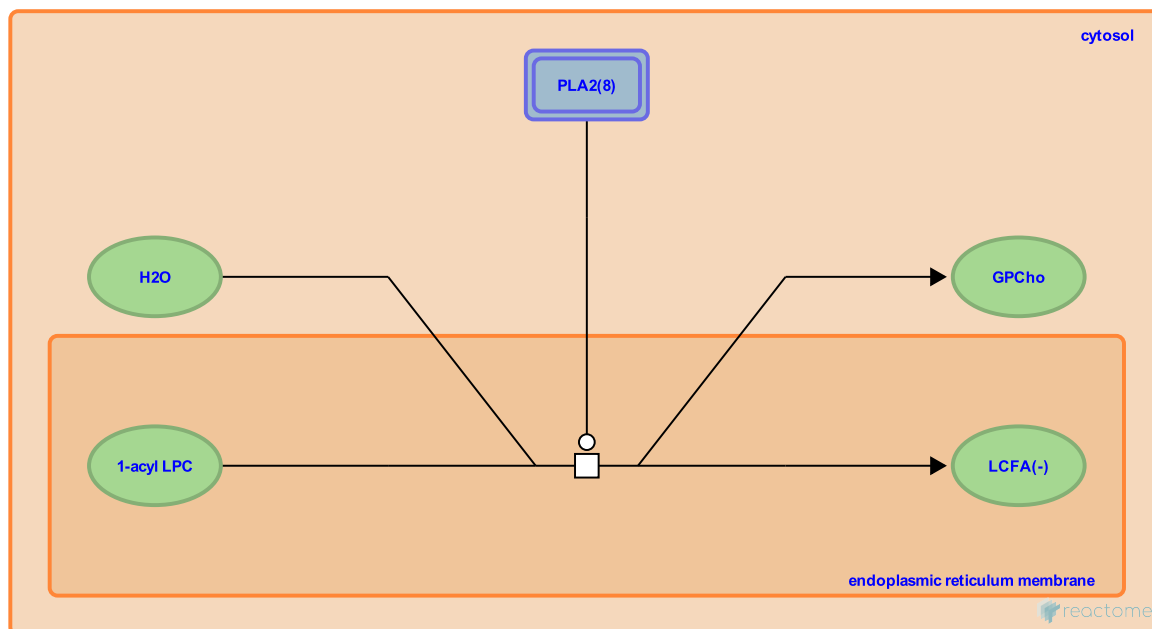
1-acyl LPC is hydrolyzed to GPCho by PLA2[8] ↗

Location: Hydrolysis of LPC

Stable identifier: R-HSA-1482685

Type: transition

Compartments: endoplasmic reticulum membrane, cytosol



At the endoplasmic reticulum (ER) membrane, 1-acyl lysophosphatidylcholine (LPC) is hydrolyzed to glycerophosphocholine (GPCho) by cytosolic phospholipase A2 alpha/beta/delta/epsilon/zeta (PLA2G4A/B/D/E/F) (Yamashita et al. 2005, Ghomashchi et al. 2010, Yamashita et al. 2009, Sharp et al. 1994) or by Phospholipase B1-like (PLBD1) (Xu et al. 2009). PLBD1 also acts as a phospholipase A2 but in addition has the propensity to hydrolyze the lysophospholipid formed in its initial reaction.

Followed by: GPCho is hydrolyzed to Cho and G3P by GPCPD1

Literature references

- Xu, S., Zhao, L., Larsson, A., Venge, P. (2009). The identification of a phospholipase B precursor in human neutrophils. *FEBS J*, 276, 175-86. ↗
- Ghomashchi, F., Naika, GS., Bollinger, JG., Aloulou, A., Lehr, M., Leslie, CC. et al. (2010). Interfacial kinetic and binding properties of mammalian group IVB phospholipase A2 (cPLA2beta) and comparison with the other cPLA2 isoforms. *J Biol Chem*, 285, 36100-11. ↗
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- Yamashita, A., Tanaka, K., Kamata, R., Kumazawa, T., Suzuki, N., Koga, H. et al. (2009). Subcellular localization and lysophospholipase/transacylation activities of human group IVC phospholipase A2 (cPLA2gamma). *Biochim Biophys Acta*, 1791, 1011-22. ↗
- Yamashita, A., Kamata, R., Kawagishi, N., Nakanishi, H., Suzuki, H., Sugiura, T. et al. (2005). Roles of C-terminal processing, and involvement in transacylation reaction of human group IVC phospholipase A2 (cPLA2gamma). *J Biochem*, 137, 557-67. ↗

Editions

2011-08-12	Edited	Williams, MG.
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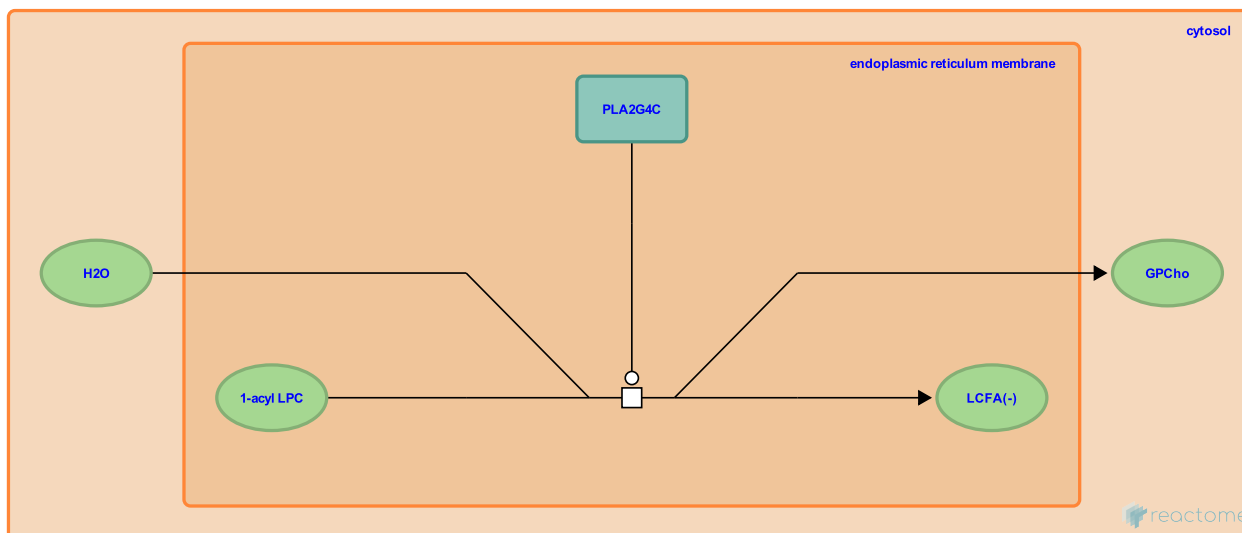
1-acyl LPC is hydrolyzed to GPCho by PLA2G4C ↗

Location: [Hydrolysis of LPC](#)

Stable identifier: R-HSA-1482696

Type: transition

Compartments: endoplasmic reticulum membrane, cytosol



At the endoplasmic reticulum (ER) membrane, 1-acyl lysophosphatidylcholine (LPC) is hydrolyzed to glycerophosphocholine (GPCho) by membrane-bound cytosolic phospholipase A2 gamma (PLA2G4C) (Yamashita et al. 2005, Ghomashchi et al. 2010, Yamashita et al. 2009).

Followed by: [GPCho is hydrolyzed to Cho and G3P by GPCPD1](#)

Literature references

- Ghomashchi, F., Naika, GS., Bollinger, JG., Aloulou, A., Lehr, M., Leslie, CC. et al. (2010). Interfacial kinetic and binding properties of mammalian group IVB phospholipase A2 (cPLA2beta) and comparison with the other cPLA2 isoforms. *J Biol Chem*, 285, 36100-11. ↗
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Editions

2011-08-12	Edited	Williams, MG.
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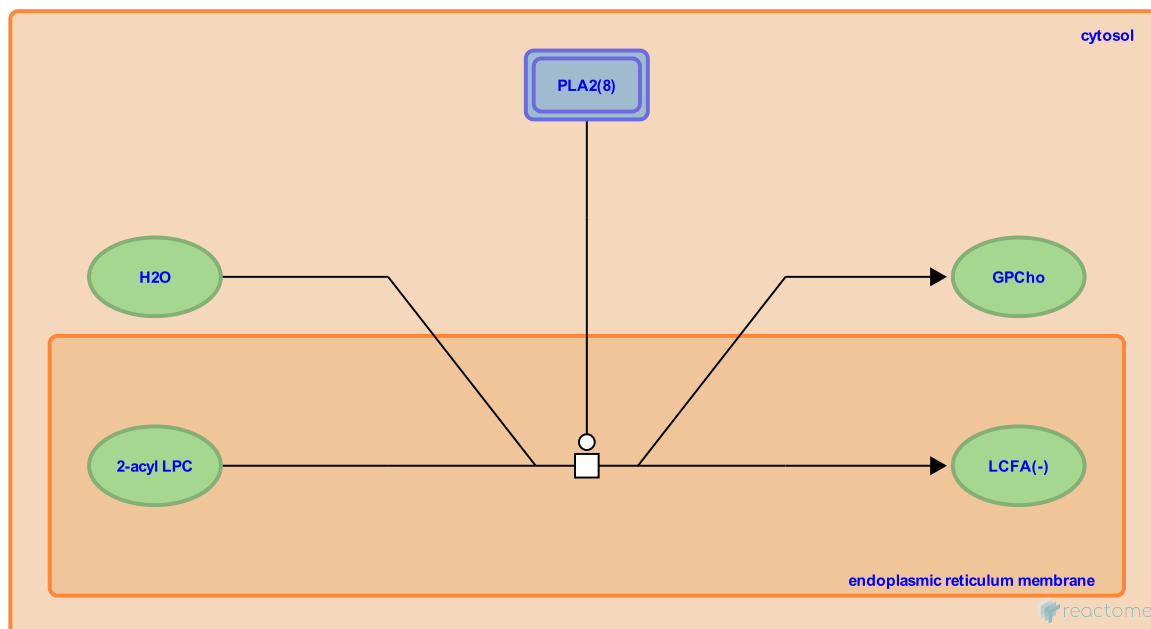
2-acyl LPC is hydrolyzed to GPCho by PLA2[8] ↗

Location: [Hydrolysis of LPC](#)

Stable identifier: R-HSA-1482612

Type: transition

Compartments: endoplasmic reticulum membrane, cytosol



At the endoplasmic reticulum (ER) membrane, 2-acyl lysophosphatidylcholine (LPC) is hydrolyzed to glycerophosphocholine (GPCho) by cytosolic phospholipase A2 alpha/beta/delta/epsilon/zeta (PLA2G4A/B/D/E/F) (Yamashita et al. 2005, Ghomashchi et al. 2010, Yamashita et al. 2009, Sharp et al. 1994) or by Phospholipase B1-like (PLBD1) (Xu et al. 2009). PLBD1 also acts as a phospholipase A2 but in addition has the propensity to hydrolyze the lysophospholipid formed in its initial reaction.

Followed by: [GPCho is hydrolyzed to Cho and G3P by GPCPD1](#)

Literature references

- Xu, S., Zhao, L., Larsson, A., Venge, P. (2009). The identification of a phospholipase B precursor in human neutrophils. *FEBS J*, 276, 175-86. ↗
- Ghomashchi, F., Naika, GS., Bollinger, JG., Aloulou, A., Lehr, M., Leslie, CC. et al. (2010). Interfacial kinetic and binding properties of mammalian group IVB phospholipase A2 (cPLA2beta) and comparison with the other cPLA2 isoforms. *J Biol Chem*, 285, 36100-11. ↗
- Sharp, JD., Pickard, RT., Chiou, XG., Manetta, JV., Kovacevic, S., Miller, JR. et al. (1994). Serine 228 is essential for catalytic activities of 85-kDa cytosolic phospholipase A2. *J Biol Chem*, 269, 23250-4. ↗
- Yamashita, A., Tanaka, K., Kamata, R., Kumazawa, T., Suzuki, N., Koga, H. et al. (2009). Subcellular localization and lysophospholipase/transacylation activities of human group IVC phospholipase A2 (cPLA2gamma). *Biochim Biophys Acta*, 1791, 1011-22. ↗
- Yamashita, A., Kamata, R., Kawagishi, N., Nakanishi, H., Suzuki, H., Sugiura, T. et al. (2005). Roles of C-terminal processing, and involvement in transacylation reaction of human group IVC phospholipase A2 (cPLA2gamma). *J Biochem*, 137, 557-67. ↗

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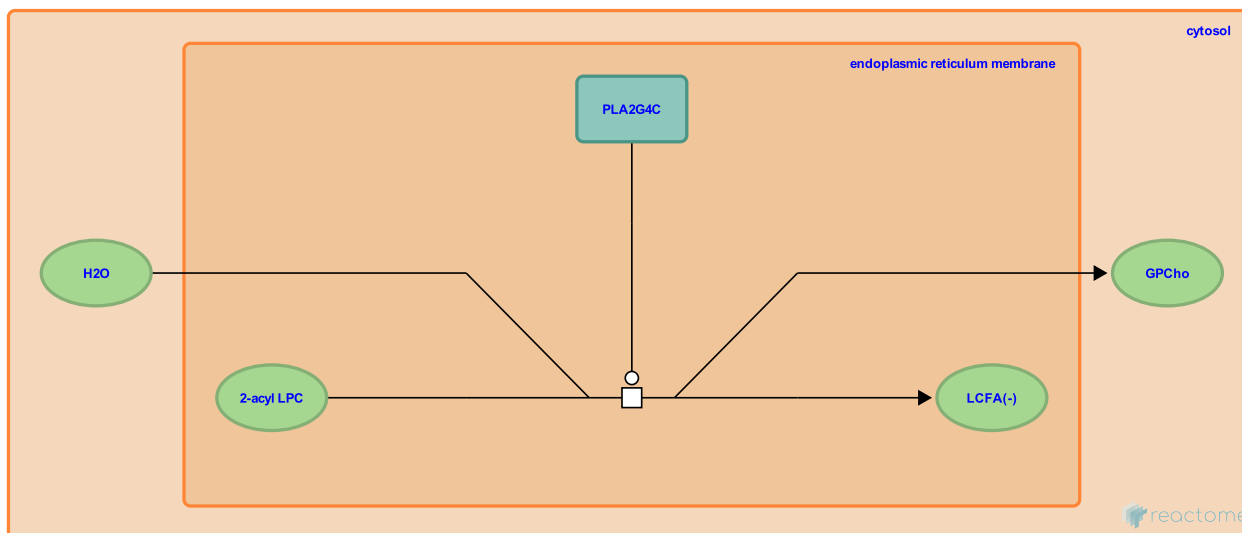
2-acyl LPC is hydrolyzed to GPCho by PLA2G4C [↗](#)

Location: [Hydrolysis of LPC](#)

Stable identifier: R-HSA-1482629

Type: transition

Compartments: endoplasmic reticulum membrane, cytosol



At the endoplasmic reticulum (ER) membrane, 2-acyl lysophosphatidylcholine (LPC) is hydrolyzed to glycerophosphocholine (GPCho) by membrane-bound cytosolic phospholipase A2 gamma (PLA2G4C) (Yamashita et al. 2005, Ghomashchi et al. 2010, Yamashita et al. 2009).

Followed by: [GPCho is hydrolyzed to Cho and G3P by GPCPD1](#)

Literature references

- Ghomashchi, F., Naika, GS., Bollinger, JG., Aloulou, A., Lehr, M., Leslie, CC. et al. (2010). Interfacial kinetic and binding properties of mammalian group IVB phospholipase A2 (cPLA2beta) and comparison with the other cPLA2 isoforms. *J Biol Chem*, 285, 36100-11. [↗](#)
- Yamashita, A., Tanaka, K., Kamata, R., Kumazawa, T., Suzuki, N., Koga, H. et al. (2009). Subcellular localization and lysophospholipase/transacylation activities of human group IVC phospholipase A2 (cPLA2gamma). *Biochim Biophys Acta*, 1791, 1011-22. [↗](#)
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Editions

2011-08-12	Edited	Williams, MG.
2011-09-14	Authored	Williams, MG.

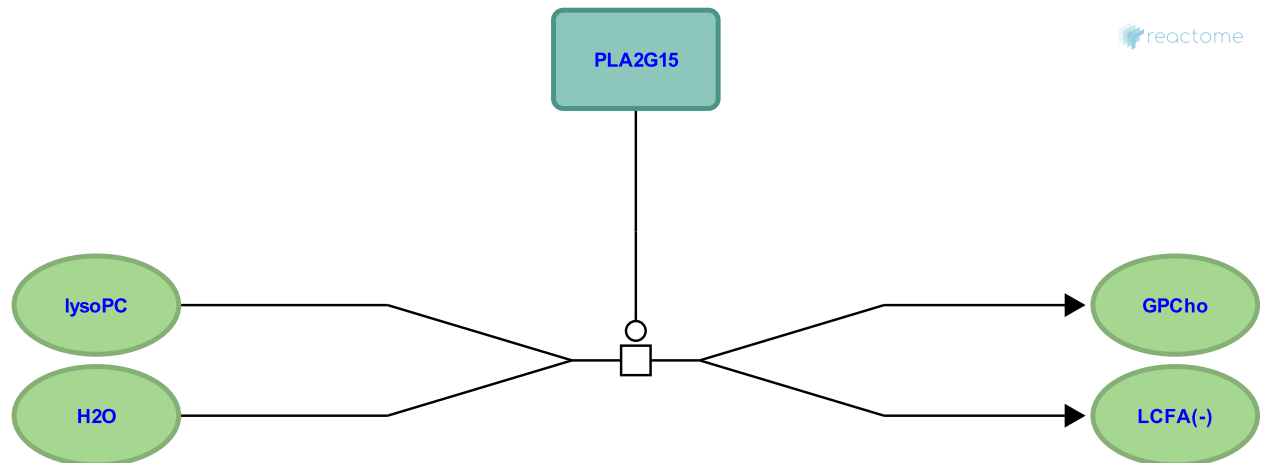
PLA2G15 hydrolyses LPC to GPCho and LCFA(-) ↗

Location: [Hydrolysis of LPC](#)

Stable identifier: R-HSA-8952251

Type: transition

Compartments: extracellular region



Lecithin cholesterol acyltransferase (LCAT) is a key enzyme in the esterification of plasma cholesterol. Group XV phospholipase A2 (PLA2G15 aka LCAT-like lysophospholipase, LLPL or lysosomal phospholipase A2, LPLA2) bears 49% sequence similarity to LCAT (Taniyama et al. 1999) and is present in plasma. PLA2G15 possesses both calcium-independent phospholipase A(2) and transacylase activities (Abe & Shayman 1998) and could hydrolyse lysophosphatidylcholine (lysoPC), a proatherogenic lipid, to glycerophosphorylcholine (GPCho) and a free fatty acid anion (LCFA(-)) (Taniyama et al. 1999, Hiraoka et al. 2002).

Followed by: [GPCho is hydrolyzed to Cho and G3P by GPCPD1](#)

Literature references

Taniyama, Y., Shibata, S., Kita, S., Horikoshi, K., Fuse, H., Shirafuji, H. et al. (1999). Cloning and expression of a novel lysophospholipase which structurally resembles lecithin cholesterol acyltransferase. *Biochem. Biophys. Res. Commun.*, 257, 50-6. ↗

Hiraoka, M., Abe, A., Shayman, JA. (2002). Cloning and characterization of a lysosomal phospholipase A2, 1-O-acylceramide synthase. *J. Biol. Chem.*, 277, 10090-9. ↗

Abe, A., Shayman, JA. (1998). Purification and characterization of 1-O-acylceramide synthase, a novel phospholipase A2 with transacylase activity. *J. Biol. Chem.*, 273, 8467-74. ↗

Editions

2016-12-14	Authored, Edited	Jassal, B.
2017-01-06	Reviewed	D'Eustachio, P.

GPCCho is hydrolyzed to Cho and G3P by GPCPD1 ↗

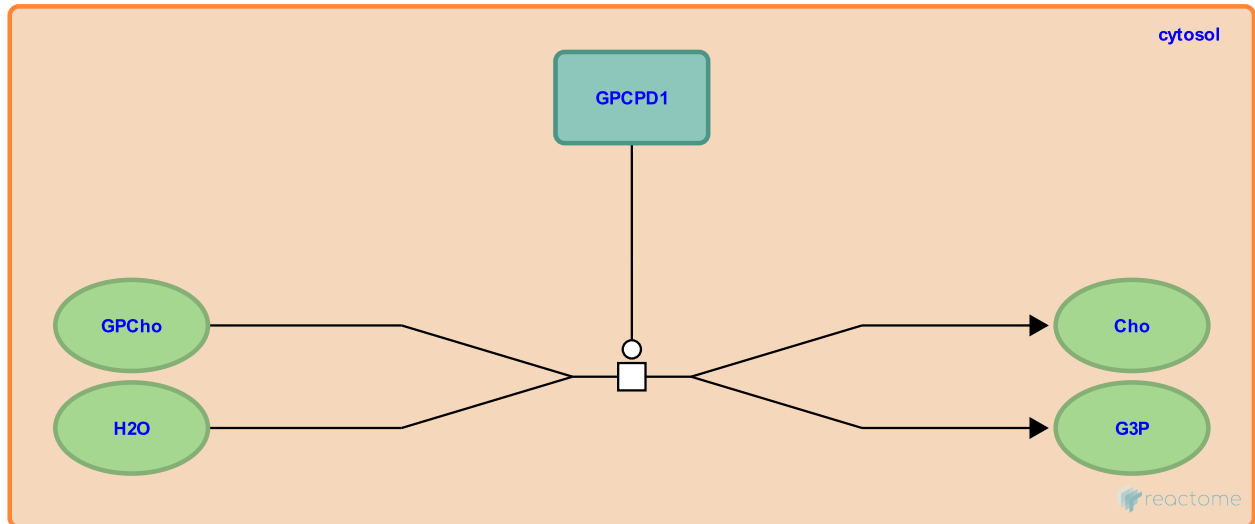
Location: [Hydrolysis of LPC](#)

Stable identifier: R-HSA-1483116

Type: transition

Compartments: cytosol

Inferred from: [GPCCho is hydrolyzed to Cho and G3P by Gpcpd1 \(Mus musculus\)](#)



In the cytosol, glycerophosphocholine phosphodiesterase (GPCPD1, also known as GDE5) hydrolyzes glycerophosphocholine (GPCCho) to produce choline (Cho) and glycerol-3-phosphate (G3P). This event has been inferred from mice. GPCPD1 has also been characterized in humans (Ota et al. 2004).

Preceded by: [1-acyl LPC is hydrolyzed to GPCho by PLA2\[8\]](#), [1-acyl LPC is hydrolyzed to GPCho by PLA2G4C](#), [2-acyl LPC is hydrolyzed to GPCho by PLA2\[8\]](#), [2-acyl LPC is hydrolyzed to GPCho by PLA2G4C](#), [PLA2G15 hydrolyses LPC to GPCho and LCFA\(-\)](#)

Literature references

Ota, T., Suzuki, Y., Nishikawa, T., Otsuki, T., Sugiyama, T., Irie, R. et al. (2004). Complete sequencing and characterization of 21,243 full-length human cDNAs. *Nat Genet*, 36, 40-5. ↗

Editions

2011-08-12	Edited	Williams, MG.
2011-09-14	Authored	Williams, MG.

Table of Contents

Introduction	1
☒ Hydrolysis of LPC	2
↳ 1-acyl LPC is hydrolyzed to GPCho by PLA2[8]	3
↳ 1-acyl LPC is hydrolyzed to GPCho by PLA2G4C	5
↳ 2-acyl LPC is hydrolyzed to GPCho by PLA2[8]	6
↳ 2-acyl LPC is hydrolyzed to GPCho by PLA2G4C	8
↳ PLA2G15 hydrolyses LPC to GPCho and LCFA(-)	9
↳ GPCho is hydrolyzed to Cho and G3P by GPCPD1	10
Table of Contents	11