Synthesis of PIPs at the ER membrane

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This is just an excerpt of a full-length report for this pathway. To access the complete report, please download it at the Reactome Textbook.

30/10/2022

https://reactome.org
**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: 82

This document contains 1 pathway and 5 reactions ([see Table of Contents](#))
At the endoplasmic reticulum (ER) membrane, phosphatidylinositol (PI) and phosphatidylinositol 4-phosphate (PI4P) are interconverted (Wong et al. 1997, Gehrmann et al. 1999, Wei et al. 2002, Rohde et al. 2003).

**Literature references**

Wei, YJ., Barylko, B., Yamamoto, M., Albanesi, JP., Wlodarski, P., Sun, HQ. et al. (2002). Type II phosphatidylinositol 4-kinase beta is a cytosolic and peripheral membrane protein that is recruited to the plasma membrane and activated by Rac-GTP. *J Biol Chem*, 277, 46586-93.


PI is phosphorylated to PI4P by PI4KA/2B at the ER membrane

**Location:** Synthesis of PIPs at the ER membrane

**Stable identifier:** R-HSA-1675813

**Type:** transition

**Compartments:** endoplasmic reticulum membrane, cytosol

At the endoplasmic reticulum (ER) membrane, phosphatidylinositol 4-kinase alpha (PI4KA) (Wong et al. 1997, Gehrmann et al. 1999) or phosphatidylinositol 4-kinase type 2-beta (PI4K2B) (Wei et al. 2002) phosphorylate phosphatidylinositol (PI) to produce phosphatidylinositol 4-phosphate (PI4P).

**Preceded by:** PI4P is dephosphorylated to PI by SACM1L at the ER membrane

**Followed by:** PI4P is dephosphorylated to PI by SACM1L at the ER membrane

**Literature references**

Wei, YJ., Barylko, B., Yamamoto, M., Albanesi, JP., Wlodarski, P., Sun, HQ. et al. (2002). Type II phosphatidylinositol 4-kinase beta is a cytosolic and peripheral membrane protein that is recruited to the plasma membrane and activated by Rac-GTP. *J Biol Chem*, 277, 46586-93.


**Editions**

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PI4P is dephosphorylated to PI by SACM1L at the ER membrane

**Location:** Synthesis of PIPs at the ER membrane

**Stable identifier:** R-HSA-1676124

**Type:** transition

**Compartments:** endoplasmic reticulum membrane, cytosol

At the endoplasmic reticulum (ER) membrane, transmembrane protein phosphatidylinositide phosphatase SAC1 (SACM1L) efficiently dephosphorylates phosphatidylinositol 4-phosphate (PI4P), and to a lesser extent phosphatidylinositol 3-phosphate (PI3P), to phosphatidylinositol (PI). No significant activity of this enzyme towards phosphatidylinositol 3,5-bisphosphate (PI(3,5)P2) was detected (Rohde et al. 2003).

**Preceded by:** PI is phosphorylated to PI4P by PI4KA/2B at the ER membrane

**Followed by:** PI is phosphorylated to PI4P by PI4KA/2B at the ER membrane

**Literature references**


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SBF1 binds MTMR2

**Location:** Synthesis of PIPs at the ER membrane

**Stable identifier:** R-HSA-6809764

**Type:** binding

**Compartments:** endoplasmic reticulum membrane, cytosol

MTMR2 forms a heterodimer with SBF1 (MTMR5), an enzymatically inactive myotubularin family member. The interaction of MTMR2 and SBF1 involves coiled-coil domains of both proteins. SBF1 promotes perinuclear localization of MTMR2 (Kim et al. 2003), presumably to the endoplasmic reticulum (ER) membrane, as both proteins can localize to the ER membrane (Berger et al. 2003, Li et al. 2014).

**Followed by:** PI3P is dephosphorylated to PI by MTMR2:SBF1, PI(3,5)P2 is dephosphorylated to PI5P by MTMR2:SBF1

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PI3P is dephosphorylated to PI by MTMR2:SBF1

Location: Synthesis of PIPs at the ER membrane

Stable identifier: R-HSA-6809777

Type: transition

Compartments: endoplasmic reticulum membrane, cytosol

Binding to SBF1 (MTMR5) increases phosphatidylinositol-3-phosphatase catalytic activity of MTMR2 (Kim et al. 2003). SBF1 promotes perinuclear localization of MTMR2 (Kim et al. 2003), presumably to the endoplasmic reticulum (ER) membrane, as both proteins can localize to the ER membrane (Berger et al. 2003, Li et al. 2014).

Preceded by: SBF1 binds MTMR2

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PI(3,5)P2 is dephosphorylated to PI5P by MTMR2:SBF1

**Location:** Synthesis of PIPs at the ER membrane

**Stable identifier:** R-HSA-6809778

**Type:** transition

**Compartments:** endoplasmic reticulum membrane, cytosol

Formation of the complex with SBF1 (MTMR5) increases phosphatidylinositol-3,5-bisphosphate 3-phosphatase activity of MTMR2 (Kim et al. 2003). SBF1 promotes perinuclear localization of MTMR2 (Kim et al. 2003), presumably to the endoplasmic reticulum (ER) membrane, as both proteins can localize to the ER membrane (Berger et al. 2003, Li et al. 2014).

**Preceded by:** SBF1 binds MTMR2

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  - PI(3,5)P2 is dephosphorylated to PI5P by MTMR2:SBF1

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