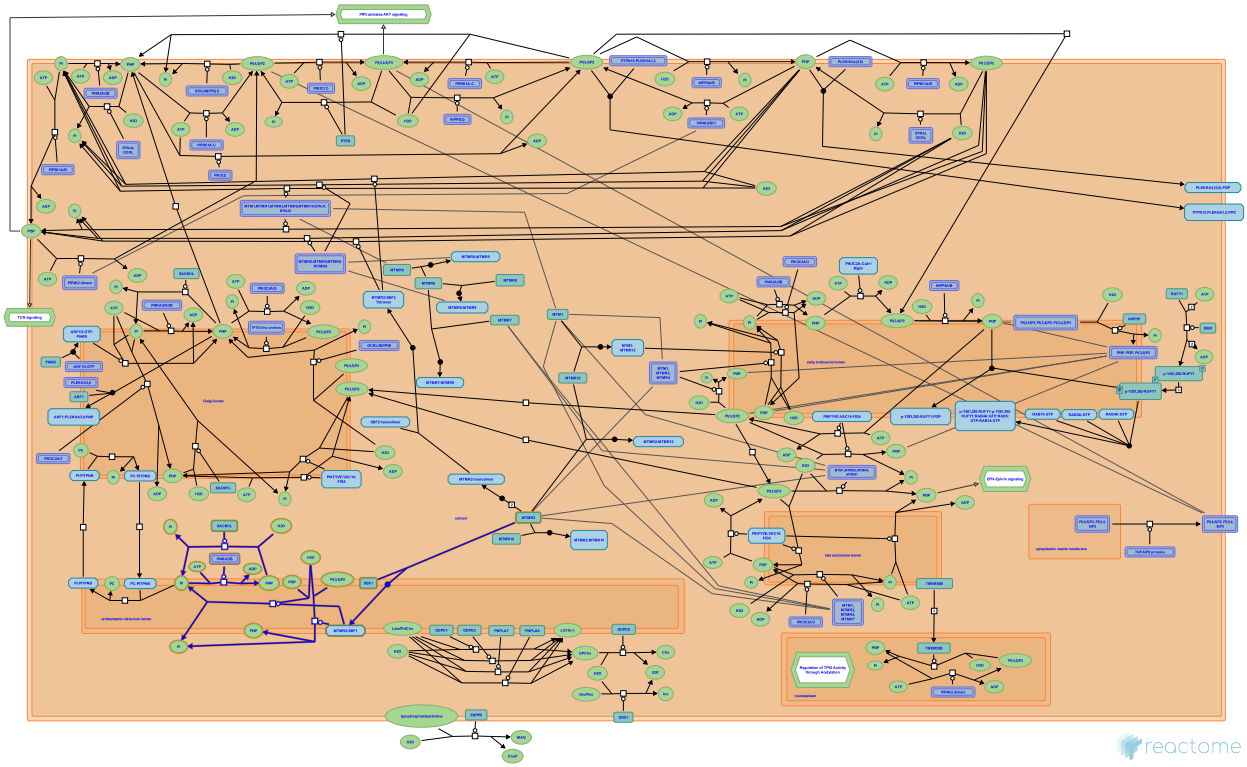
Synthesis of PIPs at the ER membrane



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15/11/2019

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.

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Literature references

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics, 18*, 142. ↗

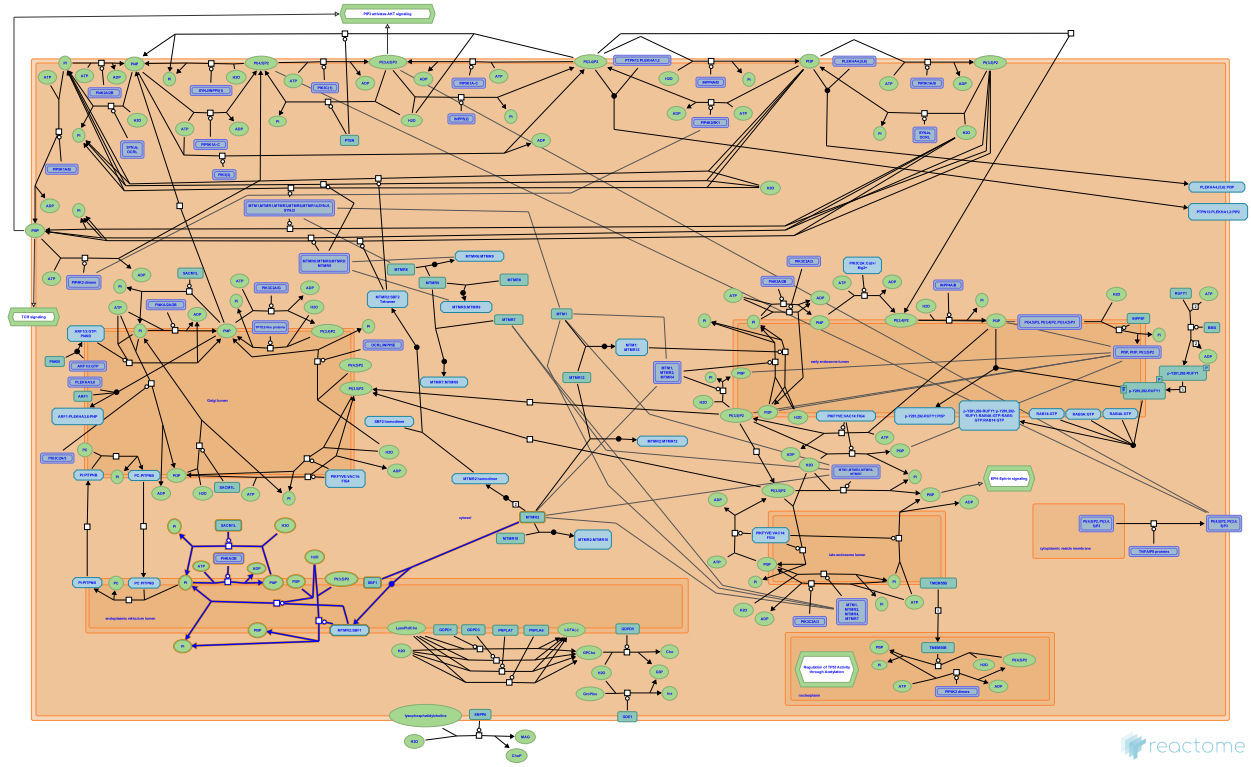
Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics, 33*, 3461-3467. ↗

Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res, 46*, D649-D655. ↗

Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology, 14*, e1005968. ↗

Synthesis of PIPs at the ER membrane ↗

Stable identifier: R-HSA-1483248



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

Gehrmann, T., Gülkan, H., Suer, S., Herberg, FW., Balla, A., Vereb, G. et al. (1999). Functional expression and characterisation of a new human phosphatidylinositol 4-kinase PI4K230. *Biochim Biophys Acta, 1437*, 341-56. ↗

Rohde, HM., Cheong, FY., Konrad, G., Paiha, K., Mayinger, P., Boehmelt, G. (2003). The human phosphatidylinositol phosphatase SAC1 interacts with the coatomer I complex. *J Biol Chem, 278*, 52689-99. ↗

Wong, K., Meyers, ddR., Cantley, LC. (1997). Subcellular locations of phosphatidylinositol 4-kinase isoforms. *J Biol Chem, 272*, 13236-41. ↗

Wei, YJ., Sun, HQ., Yamamoto, M., Wlodarski, P., Kunii, K., Martínez, M. 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

2011-08-12	Edited	Williams, MG.
2011-10-18	Authored	Williams, MG.
2012-05-14	Reviewed	Wakelam, M.
2017-02-24	Revised	Orlic-Milacic, M.

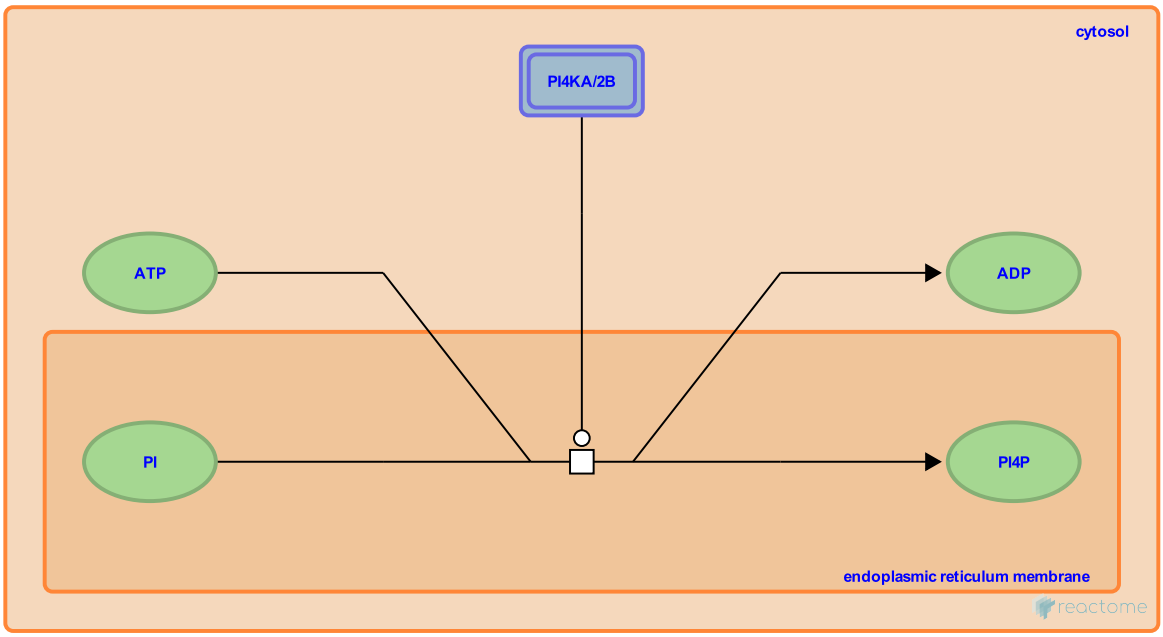
PI is phosphorylated to PI4P by PI4KA/2B at the ER membrane ↗

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

Gehrmann, T., Gülkan, H., Suer, S., Herberg, FW., Balla, A., Vereb, G. et al. (1999). Functional expression and characterisation of a new human phosphatidylinositol 4-kinase PI4K230. *Biochim Biophys Acta, 1437*, 341-56. ↗

Wong, K., Meyers, ddR., Cantley, LC. (1997). Subcellular locations of phosphatidylinositol 4-kinase isoforms. *J Biol Chem, 272*, 13236-41. ↗

Wei, YJ., Sun, HQ., Yamamoto, M., Wlodarski, P., Kunii, K., Martínez, M. 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

2011-08-12	Edited	Williams, MG.
2011-10-18	Authored	Williams, MG.
2012-05-14	Reviewed	Wakelam, M.

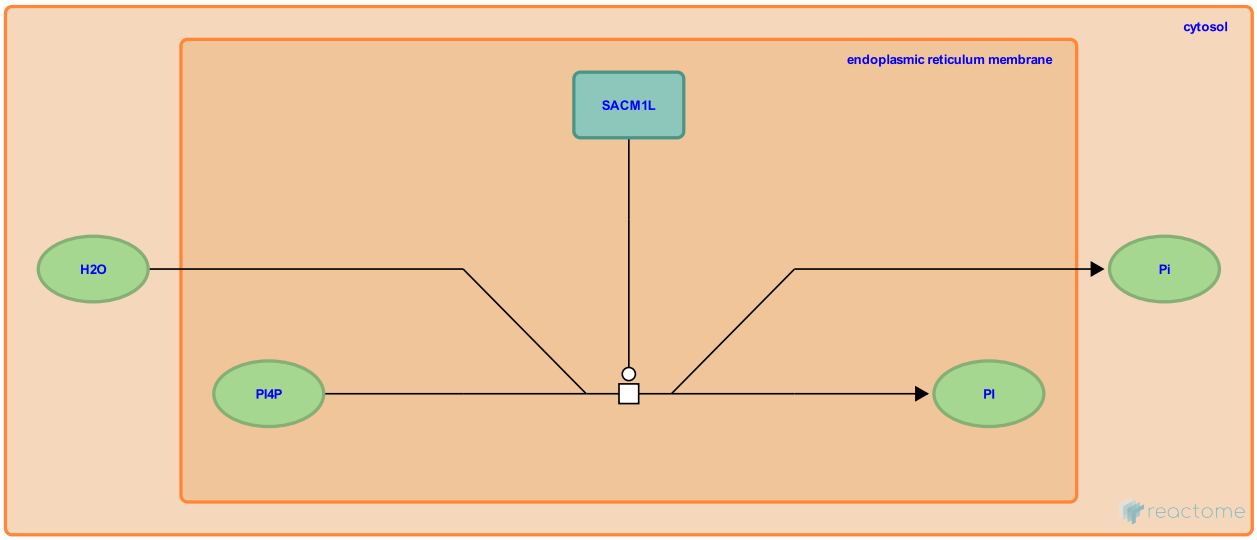
PI4P is dephosphorylated to PI by SACM1L at the ER membrane ↗

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

Rohde, HM., Cheong, FY., Konrad, G., Paiha, K., Mayinger, P., Boehmelt, G. (2003). The human phosphatidylinositol phosphatase SAC1 interacts with the coatomer I complex. *J Biol Chem, 278*, 52689-99. ↗

Editions

2011-08-12	Edited	Williams, MG.
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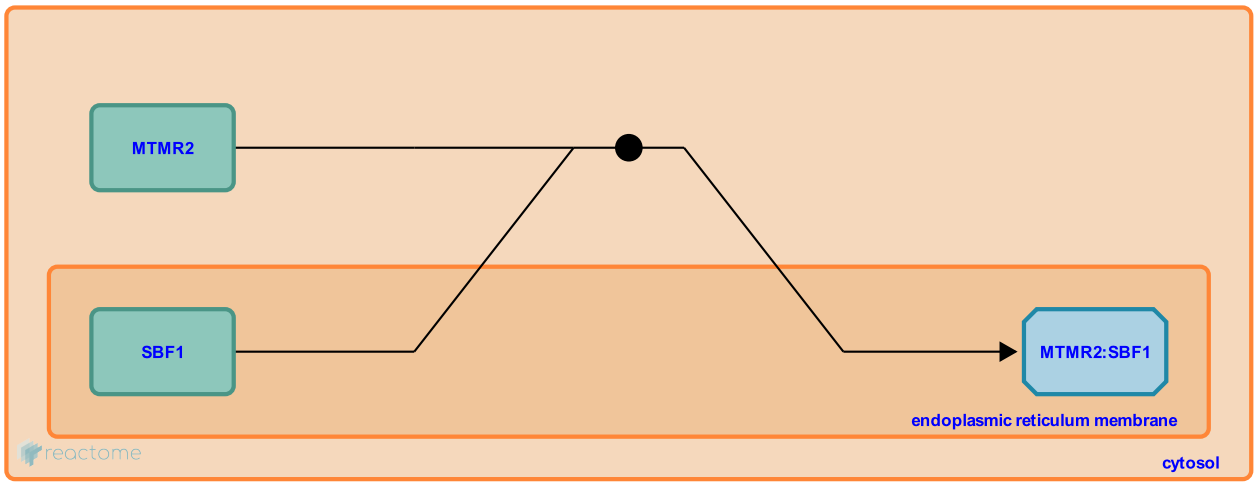
SBF1 binds MTMR2 ↗

Location: Synthesis of PIPs at the ER membrane

Stable identifier: R-HSA-6809764

Type: binding

Compartments: cytosol, endoplasmic reticulum membrane



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

Literature references

Berger, P., Schaffitzel, C., Berger, I., Ban, N., Suter, U. (2003). Membrane association of myotubularin-related protein 2 is mediated by a pleckstrin homology-GRAM domain and a coiled-coil dimerization module. *Proc. Natl. Acad. Sci. U.S.A., 100*, 12177-82. ↗

Kim, SA., Vacratsis, PO., Firestein, R., Cleary, ML., Dixon, JE. (2003). Regulation of myotubularin-related (MTMR)2 phosphatidylinositol phosphatase by MTMR5, a catalytically inactive phosphatase. *Proc. Natl. Acad. Sci. U.S.A., 100*, 4492-7. ↗

Li, W., Ouyang, Z., Zhang, Q., Wang, L., Shen, Y., Wu, X. et al. (2014). SBF-1 exerts strong anticervical cancer effect through inducing endoplasmic reticulum stress-associated cell death via targeting sarco/endoplasmic reticulum Ca(2+)-ATPase 2. *Cell Death Dis, 5*, e1581. ↗

Editions

2015-11-13	Authored	Orlic-Milacic, M.
2017-01-10	Reviewed	Rush, MG.
2017-01-25	Edited	Orlic-Milacic, M.

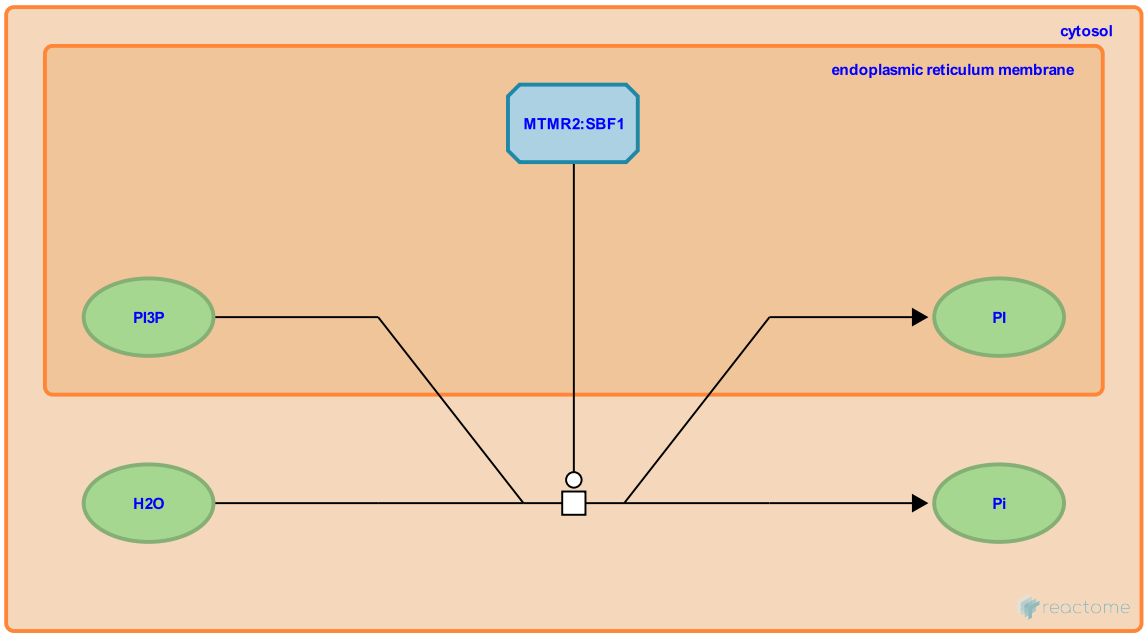
PI3P is dephosphorylated to PI by MTMR2:SBF1 ↗

Location: Synthesis of PIPs at the ER membrane

Stable identifier: R-HSA-6809777

Type: transition

Compartments: cytosol, endoplasmic reticulum membrane



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

Literature references

Kim, SA., Vacratsis, PO., Firestein, R., Cleary, ML., Dixon, JE. (2003). Regulation of myotubularin-related (MTMR)2 phosphatidylinositol phosphatase by MTMR5, a catalytically inactive phosphatase. *Proc. Natl. Acad. Sci. U.S.A., 100*, 4492-7. ↗

Berger, P., Schaffitzel, C., Berger, I., Ban, N., Suter, U. (2003). Membrane association of myotubularin-related protein 2 is mediated by a pleckstrin homology-GRAM domain and a coiled-coil dimerization module. *Proc. Natl. Acad. Sci. U.S.A., 100*, 12177-82. ↗

Li, W., Ouyang, Z., Zhang, Q., Wang, L., Shen, Y., Wu, X. et al. (2014). SBF-1 exerts strong anticervical cancer effect through inducing endoplasmic reticulum stress-associated cell death via targeting sarco/endoplasmic reticulum Ca(2+)-ATPase 2. *Cell Death Dis, 5*, e1581. ↗

Editions

2015-11-13	Authored	Orlic-Milacic, M.
2017-01-10	Reviewed	Rush, MG.
2017-01-25	Edited	Orlic-Milacic, M.

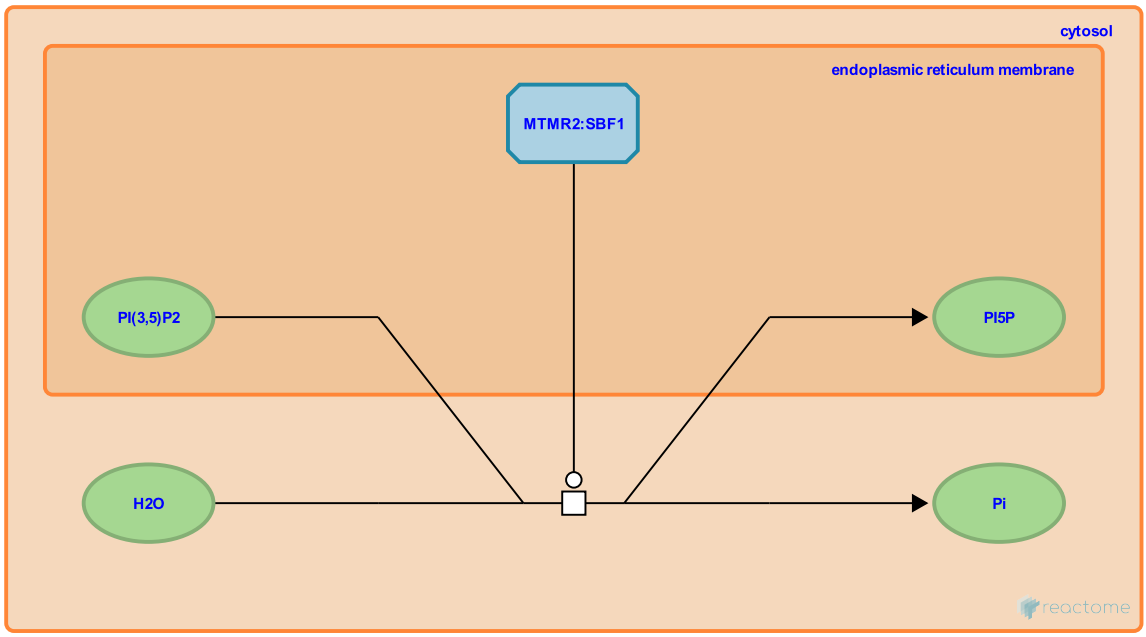
PI(3,5)P2 is dephosphorylated to PI5P by MTMR2:SBF1 ↗

Location: Synthesis of PIPs at the ER membrane

Stable identifier: R-HSA-6809778

Type: transition

Compartments: cytosol, endoplasmic reticulum membrane



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

Literature references

Kim, SA., Vacratsis, PO., Firestein, R., Cleary, ML., Dixon, JE. (2003). Regulation of myotubularin-related (MTMR)2 phosphatidylinositol phosphatase by MTMR5, a catalytically inactive phosphatase. *Proc. Natl. Acad. Sci. U.S.A., 100*, 4492-7. ↗

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Editions

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2017-01-10	Reviewed	Rush, MG.
2017-01-25	Edited	Orlic-Milacic, M.

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