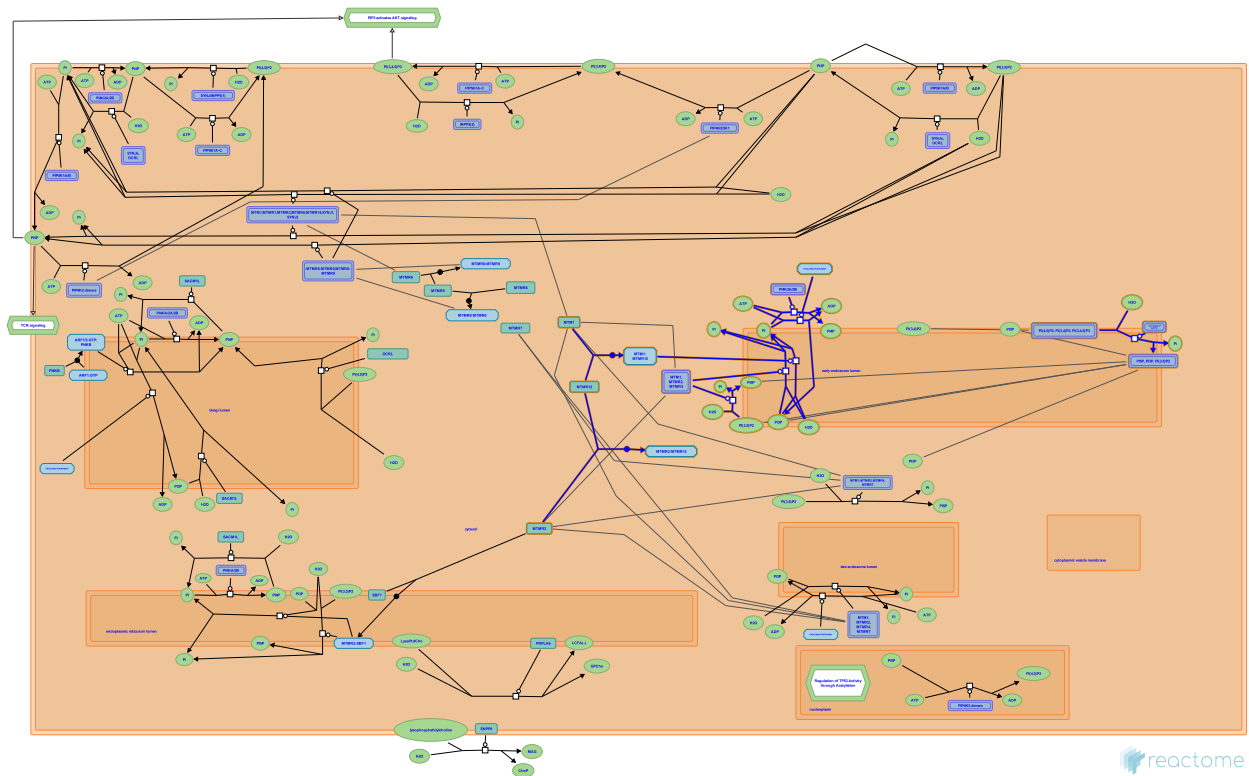


Synthesis of PIPs at the early endosome membrane



European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

The contents of this document may be freely copied and distributed in any media, provided the authors, plus the institutions, are credited, as stated under the terms of [Creative Commons Attribution 4.0 International \(CC BY 4.0\) License](https://creativecommons.org/licenses/by/4.0/). For more information see our [license](https://creativecommons.org/licenses/by/4.0/).

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

- 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. [↗](#)

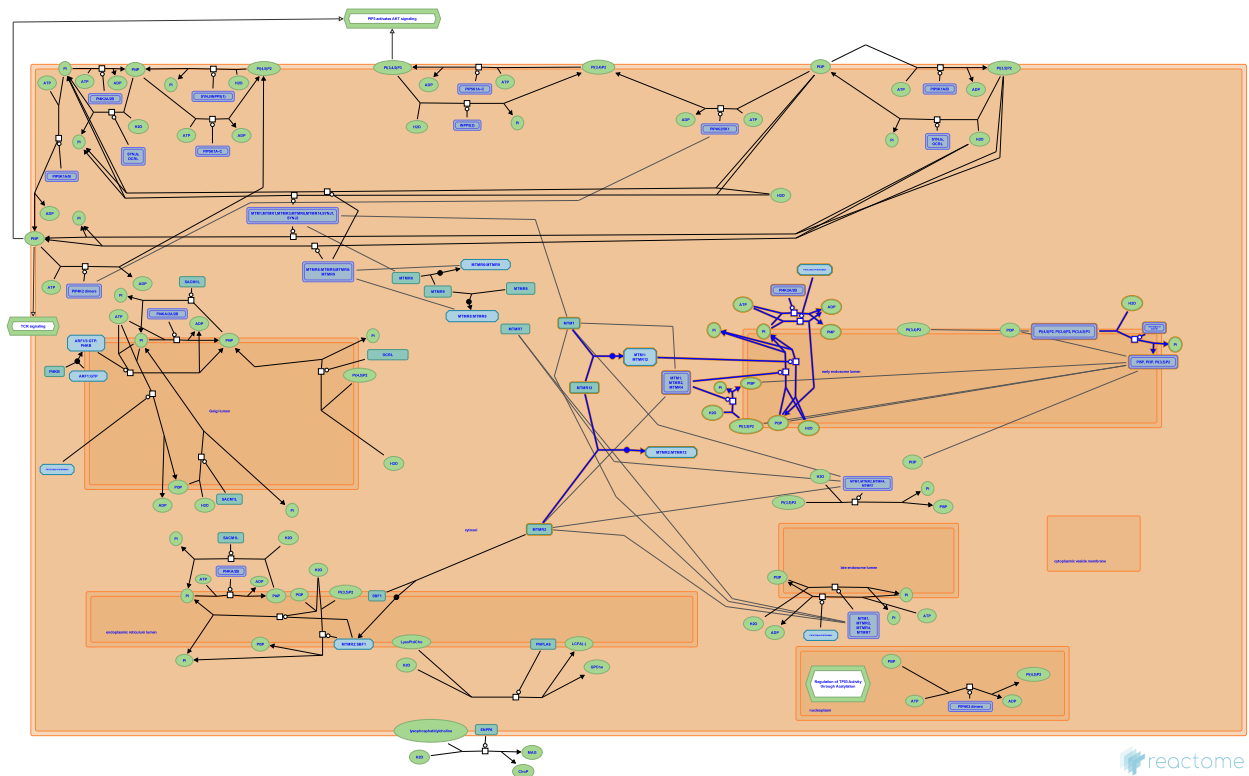
Reactome database release: 70

This document contains 1 pathway and 8 reactions ([see Table of Contents](#))

Synthesis of PIPs at the early endosome membrane ↗

Stable identifier: R-SPO-1660516

Inferred from: Synthesis of PIPs at the early endosome membrane (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

PI(4,5)P₂, PI(3,4)P₂ and PI(3,4,5)P₃ are dephosphorylated to PI5P, PI3P and PI(3,4)P by INPP5F at the endosome membrane ↗

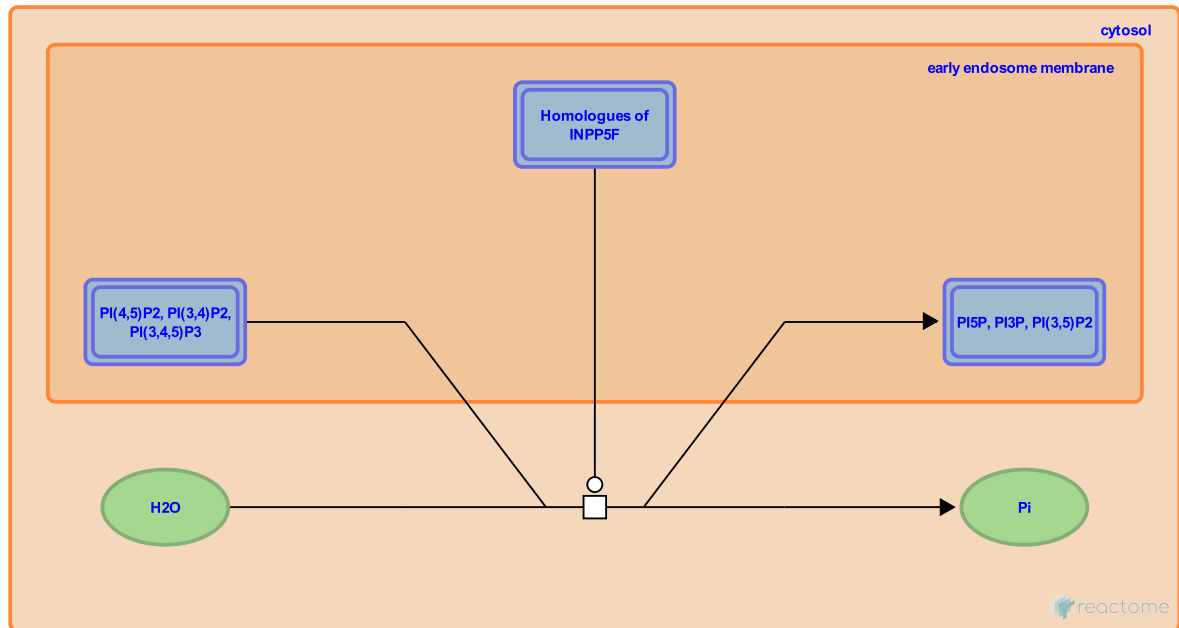
Location: Synthesis of PIPs at the early endosome membrane

Stable identifier: R-SPO-8849969

Type: transition

Compartments: cytosol, early endosome membrane

Inferred from: PI(4,5)P₂, PI(3,4)P₂ and PI(3,4,5)P₃ are dephosphorylated to PI5P, PI3P and PI(3,4)P by INPP5F at the endosome membrane (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

PI(3,5)P2 is dephosphorylated to PI5P by MTM proteins at the early endosome membrane ↗

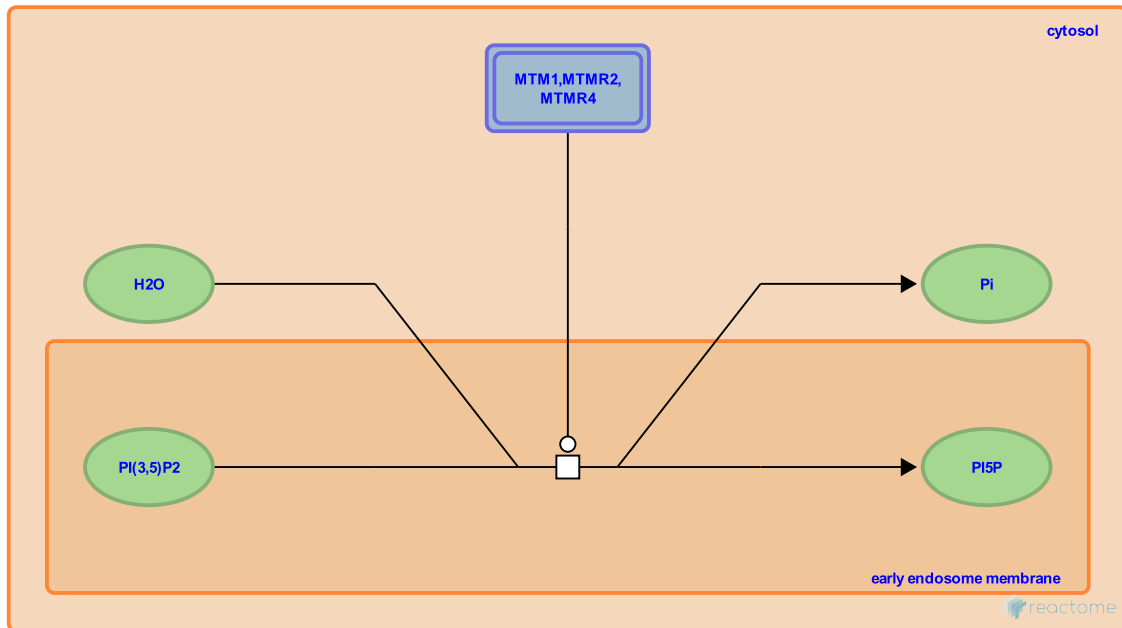
Location: [Synthesis of PIPs at the early endosome membrane](#)

Stable identifier: R-SPO-1676105

Type: transition

Compartments: early endosome membrane, cytosol

Inferred from: [PI\(3,5\)P2 is dephosphorylated to PI5P by MTM proteins at the early endosome membrane \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

PI is phosphorylated to PI3P by PIK3C2A/3 at the early endosome membrane ↗

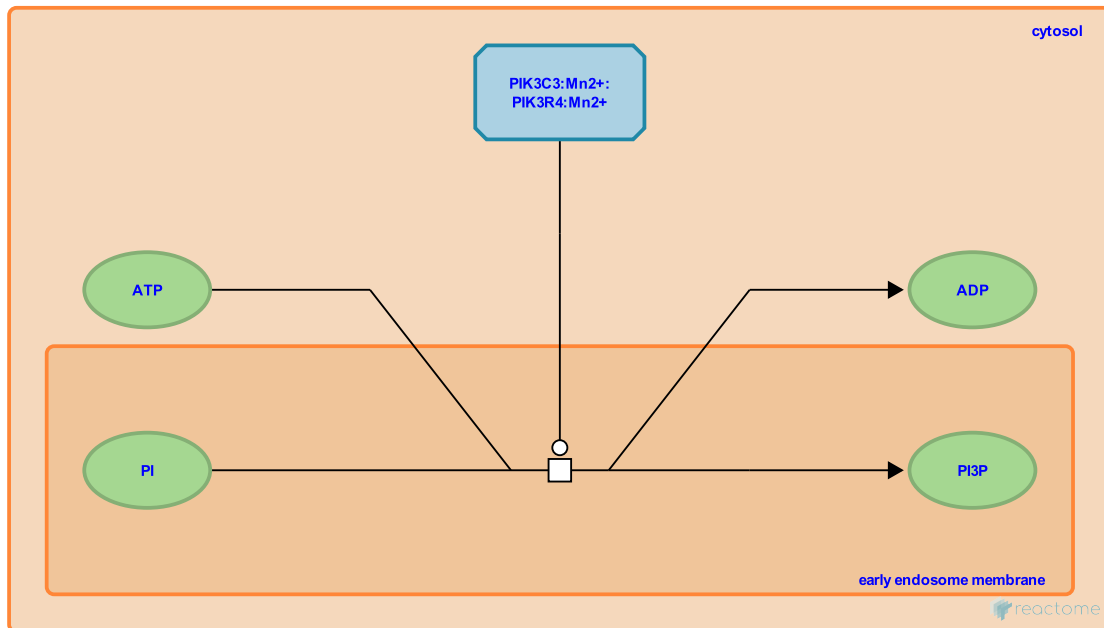
Location: Synthesis of PIPs at the early endosome membrane

Stable identifier: R-SPO-1675939

Type: transition

Compartments: early endosome membrane, cytosol

Inferred from: PI is phosphorylated to PI3P by PIK3C2A/3 at the early endosome membrane (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Preceded by: PI3P is dephosphorylated to PI by MTM proteins at the early endosome membrane

Followed by: PI3P is dephosphorylated to PI by MTM1:MTMR12, PI3P is dephosphorylated to PI by MTM proteins at the early endosome membrane

PI3P is dephosphorylated to PI by MTM proteins at the early endosome membrane ↗

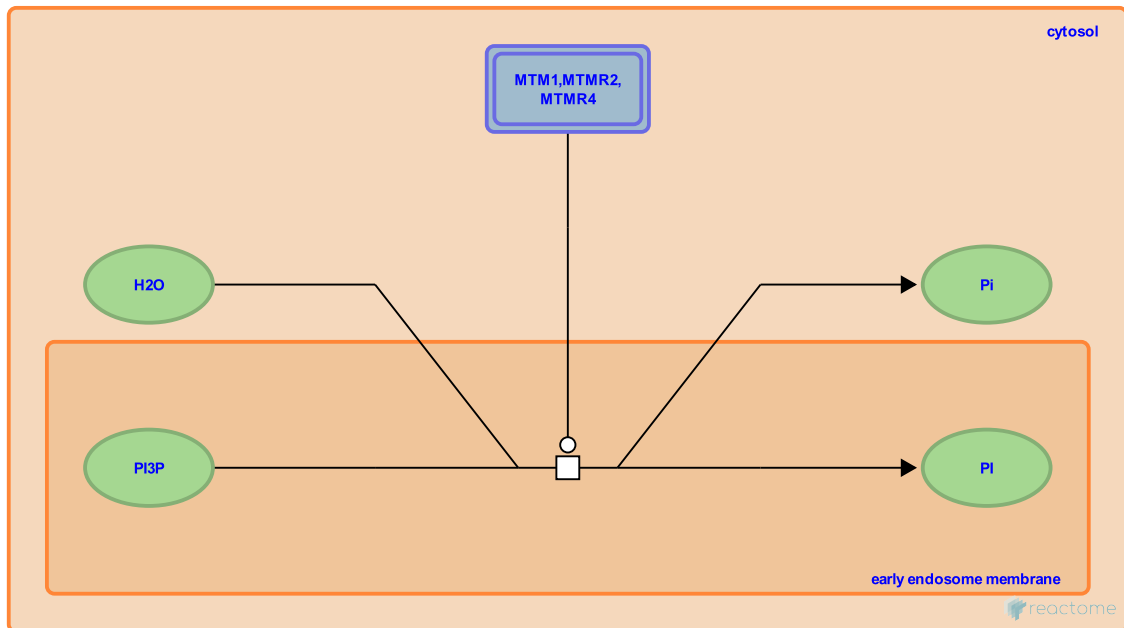
Location: [Synthesis of PIPs at the early endosome membrane](#)

Stable identifier: R-SPO-1676141

Type: transition

Compartments: early endosome membrane, cytosol

Inferred from: [PI3P is dephosphorylated to PI by MTM proteins at the early endosome membrane \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Preceded by: [PI is phosphorylated to PI3P by PIK3C2A/3 at the early endosome membrane](#)

Followed by: [PI is phosphorylated to PI4P by PI4K2A/B at the early endosome membrane](#), [PI is phosphorylated to PI3P by PIK3C2A/3 at the early endosome membrane](#)

MTMR12 binds MTM1 ↗

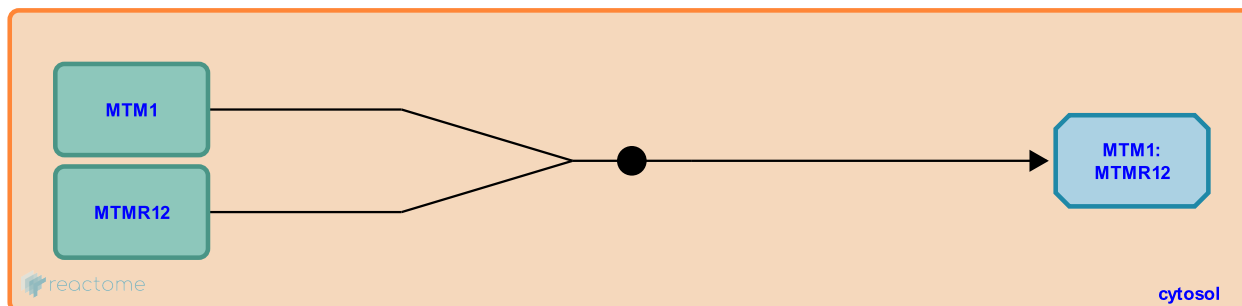
Location: [Synthesis of PIPs at the early endosome membrane](#)

Stable identifier: R-SPO-6809680

Type: binding

Compartments: cytosol

Inferred from: [MTMR12 binds MTM1 \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Followed by: [PI3P is dephosphorylated to PI by MTM1:MTMR12](#)

PI3P is dephosphorylated to PI by MTM1:MTMR12 ↗

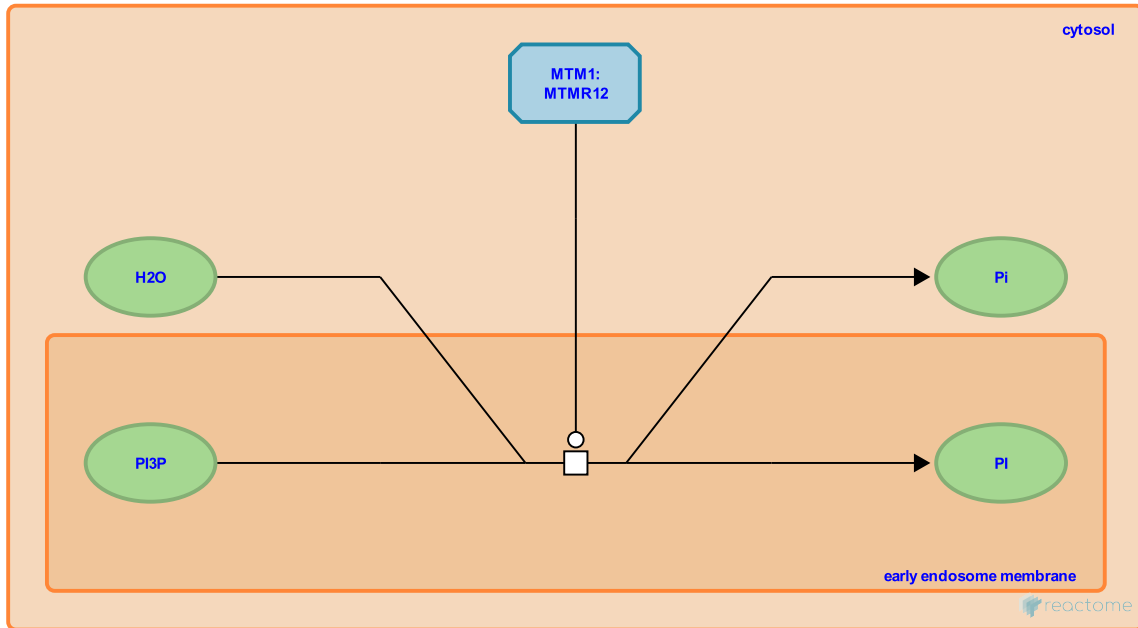
Location: [Synthesis of PIPs at the early endosome membrane](#)

Stable identifier: R-SPO-6809720

Type: transition

Compartments: early endosome membrane, cytosol

Inferred from: [PI3P is dephosphorylated to PI by MTM1:MTMR12 \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Preceded by: [PI is phosphorylated to PI3P by PIK3C2A/3 at the early endosome membrane](#), [MTMR12 binds MTM1](#)

MTMR12 binds MTMR2 ↗

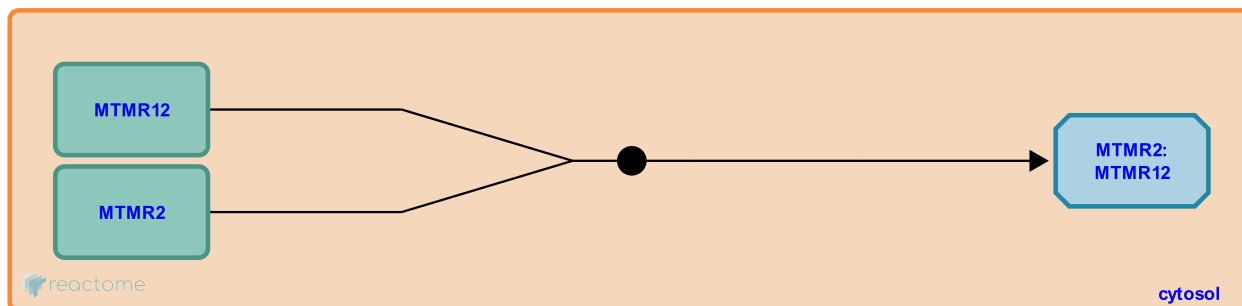
Location: [Synthesis of PIPs at the early endosome membrane](#)

Stable identifier: R-SPO-6809707

Type: binding

Compartments: cytosol

Inferred from: [MTMR12 binds MTMR2 \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

PI is phosphorylated to PI4P by PI4K2A/B at the early endosome membrane [↗](#)

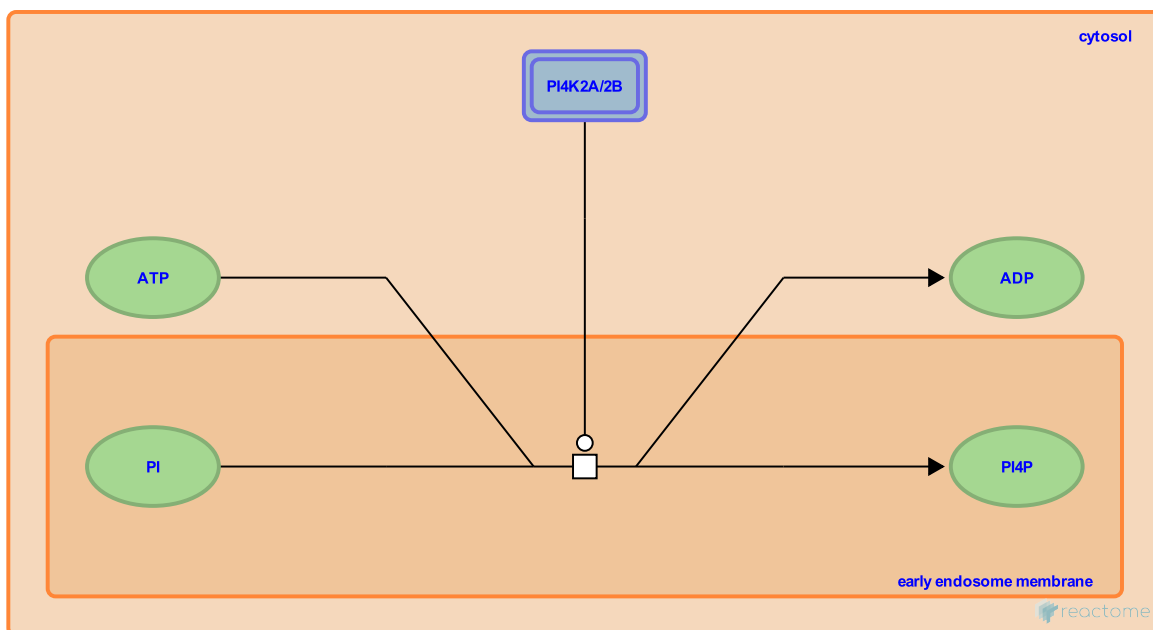
Location: [Synthesis of PIPs at the early endosome membrane](#)

Stable identifier: R-SPO-1675974

Type: transition

Compartments: early endosome membrane, cytosol

Inferred from: [PI is phosphorylated to PI4P by PI4K2A/B at the early endosome membrane \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Preceded by: [PI3P is dephosphorylated to PI by MTM proteins at the early endosome membrane](#)

Table of Contents

Introduction	1
☰ Synthesis of PIPs at the early endosome membrane	2
↳ PI(4,5)P ₂ , PI(3,4)P ₂ and PI(3,4,5)P ₃ are dephosphorylated to PI5P, PI3P and PI(3,4)P by INPP5F at the endosome membrane	3
↳ PI(3,5)P ₂ is dephosphorylated to PI5P by MTM proteins at the early endosome membrane	4
↳ PI is phosphorylated to PI3P by PIK3C2A/3 at the early endosome membrane	5
↳ PI3P is dephosphorylated to PI by MTM proteins at the early endosome membrane	6
↳ MTMR12 binds MTM1	7
↳ PI3P is dephosphorylated to PI by MTM1:MTMR12	8
↳ MTMR12 binds MTMR2	9
↳ PI is phosphorylated to PI4P by PI4K2A/B at the early endosome membrane	10
Table of Contents	11