MPC1:MPC2 imports PYR, H+ to mitochondrial matrix

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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

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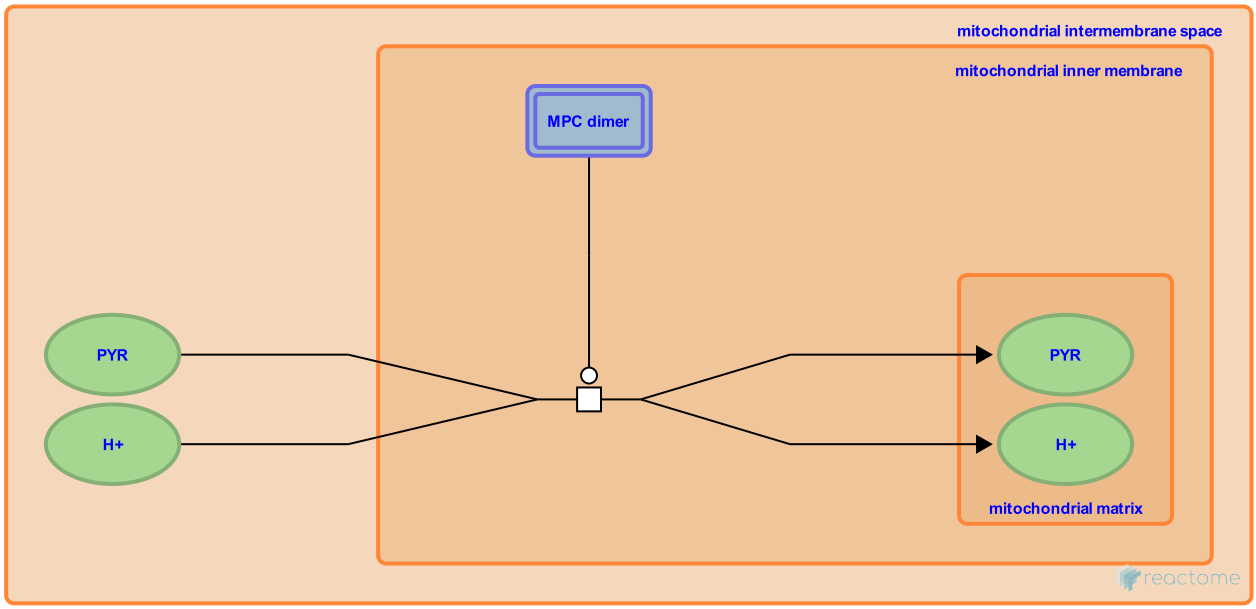
Stable identifier: R-HSA-372342

Type: transition

Compartments: mitochondrial intermembrane space, mitochondrial inner membrane, mitochondrial matrix

Inferred from: Cytosolic PYR is transported to the mitochondrial matrix (Rattus norvegicus)



Pyruvate (PYR) and a proton (H+) are cotransported from the mitochondrial intermembrane space to the mitochondrial matrix, mediated by a complex of mitochondrial pyruvate carriers located in the inner mitochondrial membrane. The complex is a heterodimer of MPC2 with either MCP1 or, in testis, MPC1L (Bricker et al., 2012; McCommis & Finck, 2015; Vanderperre et al., 2016; Lee et al., 2020; reviewed in Quesñay et al., 2020). However, the viability of an MPC2 oligomer has been shown, as well (Nagampalli et al., 2018). The proton gradient across the inner mitochondrial membrane must be maintained for ATP production. Transport of PYR across this membrane would collapse this gradient; therefore, PYR is cotransported with H+. Studies of pyruvate uptake in rats indicate that it is specific, saturable, and competitively inhibitable, indicating a specific role for a membrane transport protein (Papa et al. 1971, Halestrap & Denton 1974), and the stoichiometry of the human reaction is inferred from this work. Mutations in MPC1 or MPC2 can lead to mitochondrial pyruvate carrier deficiency (MPYCD, MIM:614741; Bricker et al., 2012; Pujol et al., 2023).

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Editions

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