D-fructose 6-phosphate + ATP => D-fructose 1,6-bisphosphate + ADP

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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

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. ↗

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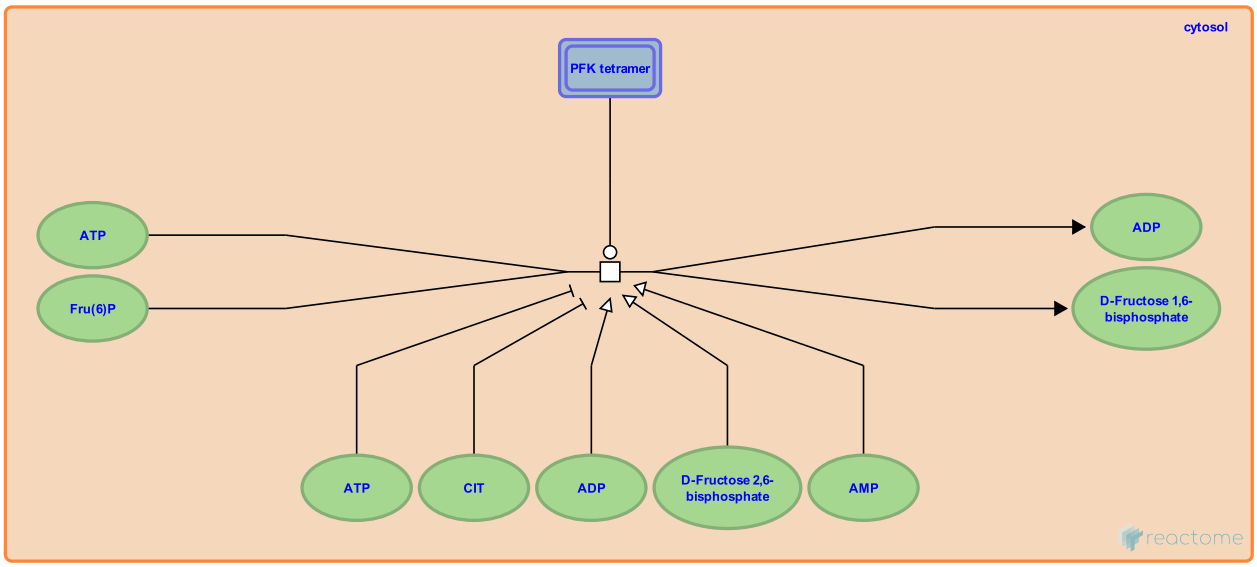
Stable identifier: R-HSA-70467

Type: transition

Compartments: cytosol



Cytosolic phosphofructokinase 1 catalyzes the reaction of fructose 6-phosphate and ATP to form fructose 1,6-bisphosphate and ADP. This reaction, irreversible under physiological conditions, is the rate limiting step of glycolysis. Phosphofructokinase 1 activity is allosterically regulated by ATP, citrate, and fructose 2,6-bisphosphate.

Phosphofructokinase 1 is active as a tetramer (although higher order multimers, not annotated here, may form in vivo). Two isoforms of phosphofructokinase 1 monomer, L and M, are widely expressed in human tissues. Different tissues can contain different homotetramers or heterotetramers: L4 in liver, M4 in muscle, and all possible heterotetramers, L4, L3M, L2M2, LM3, and M4, in red blood cells, for example (Raben et al. 1995; Vora et al. 1980, 1987; Vora 1981). A third isoform, P, is abundant in platelets, where it is found in P4, P3L, P2L2, and PL3 tetramers (Eto et al. 1994; Vora et al. 1987).

Literature references

Eto, K., Sakura, H., Yasuda, K., Hayakawa, T., Kawasaki, E., Moriuchi, R. et al. (1994). Cloning of a complete protein-coding sequence of human platelet-type phosphofructokinase isozyme from pancreatic islet. *Biochem Biophys Res Commun, 198*, 990-8. ↗

Vora, S., DiMauro, S., Spear, D., Harker, D., Danon, MJ. (1987). Characterization of the enzymatic defect in late-onset muscle phosphofructokinase deficiency. New subtype of glycogen storage disease type VII. *J Clin Invest, 80*, 1479-85. ↗

Raben, N., Exelbert, R., Spiegel, R., Sherman, JB., Nakajima, H., Plotz, P. et al. (1995). Functional expression of human mutant phosphofructokinase in yeast: genetic defects in French Canadian and Swiss patients with phosphofructokinase deficiency. *Am J Hum Genet, 56*, 131-41. ↗

Vora, S., Seaman, C., Durham, S., Piomelli, S. (1980). Isozymes of human phosphofructokinase: identification and subunit structural characterization of a new system. *Proc Natl Acad Sci U S A, 77*, 62-6. ↗

Vora, S. (1981). Isozymes of human phosphofructokinase in blood cells and cultured cell lines: molecular and genetic evidence for a trigenic system. *Blood, 57*, 724-32. ↗

Editions

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