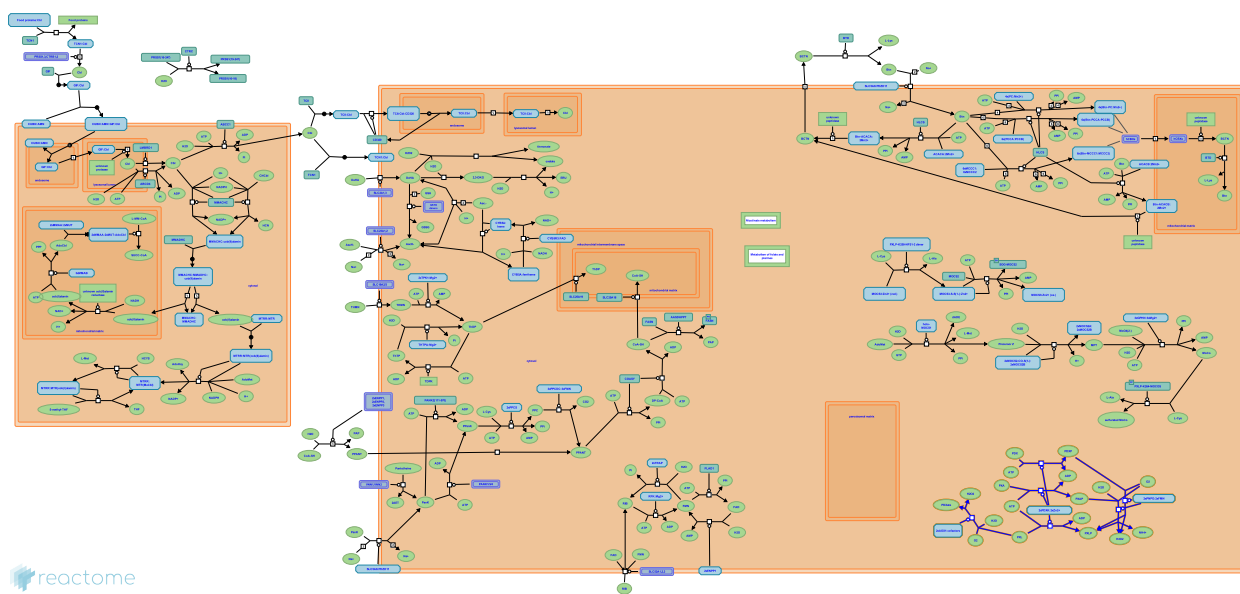


Vitamins B6 activation to pyridoxal phosphate



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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

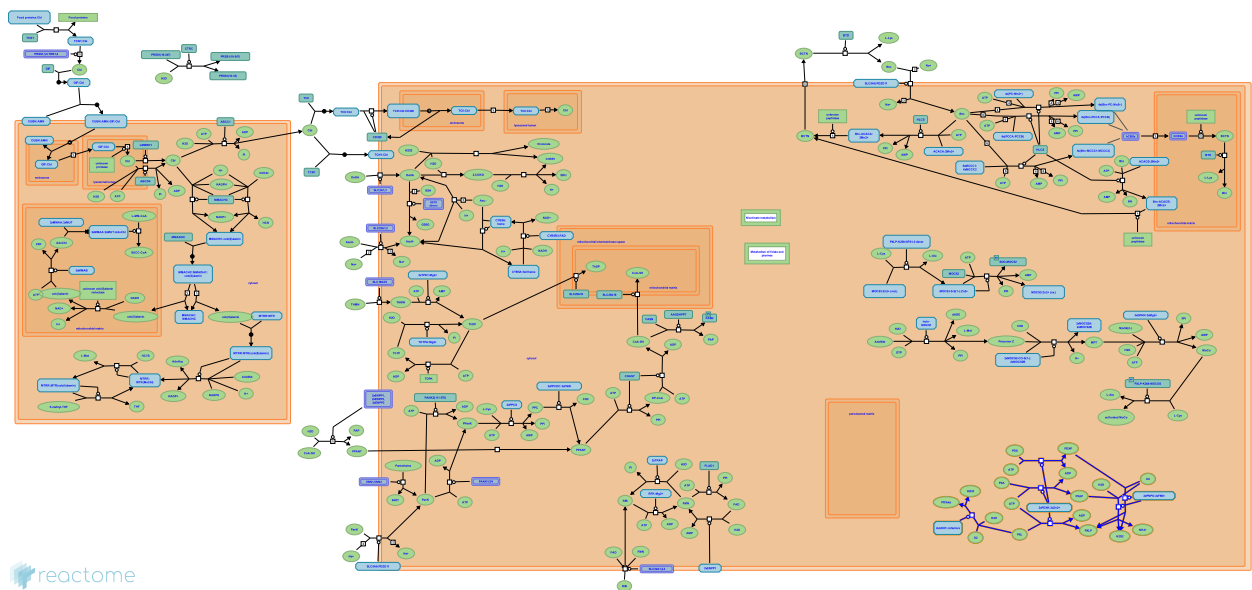
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- Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res*, 46, D649-D655. [↗](#)
- Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology*, 14, e1005968. [↗](#)

Reactome database release: 75

This document contains 1 pathway and 6 reactions ([see Table of Contents](#))

Vitamins B6 activation to pyridoxal phosphate ↗

Stable identifier: R-HSA-964975



Animals cannot synthesize pyridoxal 5'-phosphate (PLP) which is a ligand in aminotransferases and other enzymes. PLP's accessible derivatives pyridoxine, pyridoxal, and pyridoxamine are traditionally called vitamins B6. They are taken up nutritionally from bacteria and plants, but also created from PLP in the body. The pathways used to recycle PLP from these three compounds can therefore be called vitamin B6 activation as well as PLP salvage. Because of the close similarity of the molecules, only two enzymes are needed for the task (McCormick & Chen, 1999).

Literature references

McCormick, DB., Chen, H. (1999). Update on interconversions of vitamin B-6 with its coenzyme. *J Nutr*, 129, 325-7. ↗

Editions

2010-09-16	Authored	Stephan, R.
2010-09-20	Edited	Jassal, B.
2010-11-08	Reviewed	D'Eustachio, P.

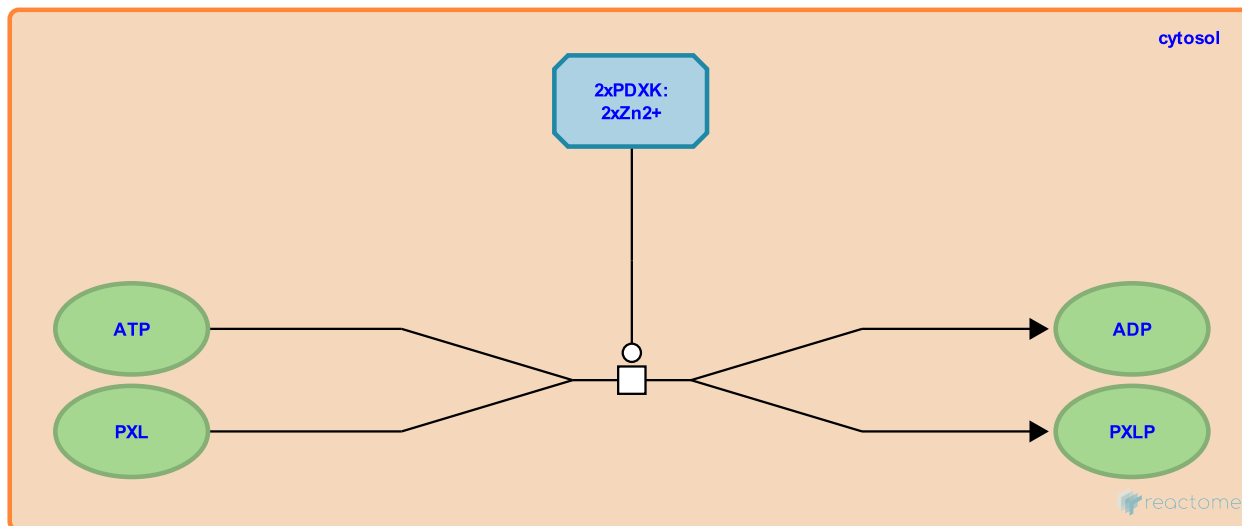
2xPDXK:2xZn2+ phosphorylates PXL ↗

Location: [Vitamins B6 activation to pyridoxal phosphate](#)

Stable identifier: R-HSA-964970

Type: transition

Compartments: cytosol



Pyridoxal kinase (PDXK) catalyzes the ATP-dependent phosphorylation of pyridoxal (PXL) to form pyridoxal 5'-phosphate (PXL P) (Lee et al. 2000, di Salvo et al. 2004).

Literature references

di Salvo, ML., Hunt, S., Schirch, V. (2004). Expression, purification, and kinetic constants for human and Escherichia coli pyridoxal kinases. *Protein Expr Purif*, 36, 300-6. ↗

Lee, HS., Moon, BJ., Choi, SY., Kwon, OS. (2000). Human pyridoxal kinase: overexpression and properties of the recombinant enzyme. *Mol Cells*, 10, 452-9. ↗

Editions

2010-09-16	Authored	Stephan, R.
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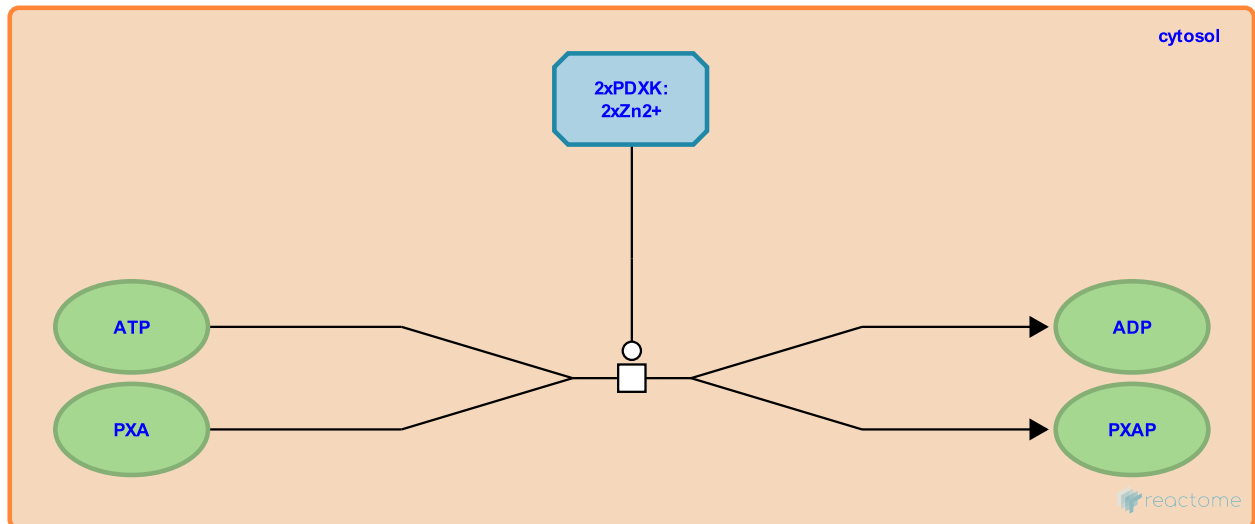
2xPDXK:2xZn2+ phosphorylates PXA ↗

Location: [Vitamins B6 activation to pyridoxal phosphate](#)

Stable identifier: R-HSA-964958

Type: transition

Compartments: cytosol



Pyridoxal kinase (PDXK) catalyzes the ATP-dependent phosphorylation of pyridoxamine (PXA) to form pyridoxamine phosphate (PXAP) (Lee et al. 2000, di Salvo et al. 2004).

Followed by: [2xPNPO:2xFMN oxidizes PXAP to PXLDP](#)

Literature references

di Salvo, ML., Hunt, S., Schirch, V. (2004). Expression, purification, and kinetic constants for human and *Escherichia coli* pyridoxal kinases. *Protein Expr Purif*, 36, 300-6. ↗

Lee, HS., Moon, BJ., Choi, SY., Kwon, OS. (2000). Human pyridoxal kinase: overexpression and properties of the recombinant enzyme. *Mol Cells*, 10, 452-9. ↗

Editions

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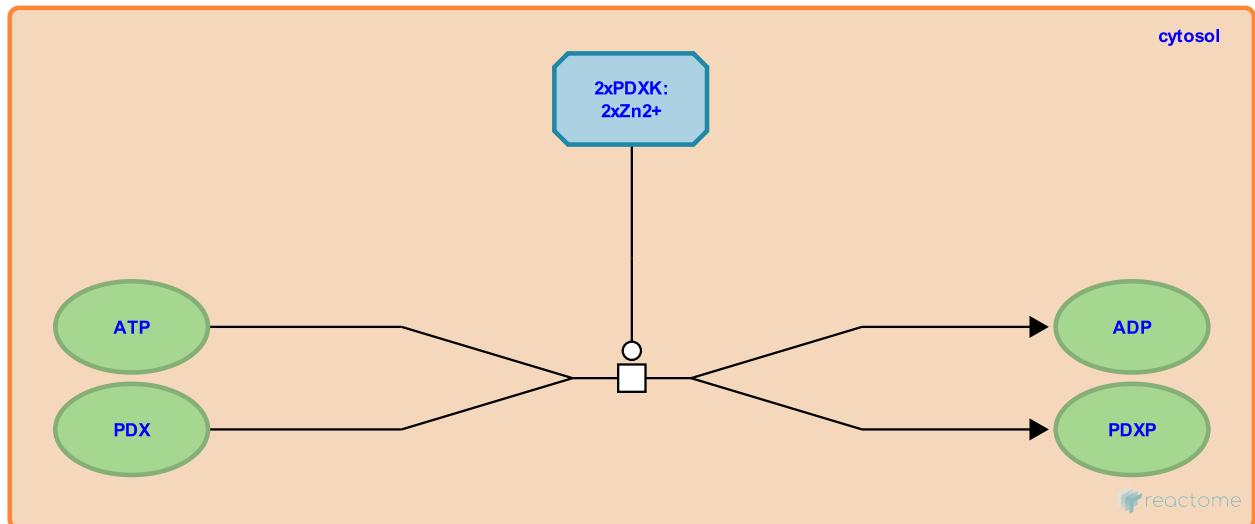
2xPDKX:2xZn2+ phosphorylates PDX ↗

Location: [Vitamins B6 activation to pyridoxal phosphate](#)

Stable identifier: R-HSA-964962

Type: transition

Compartments: cytosol



Pyridoxal kinase (PDXK) catalyzes the ATP-dependent phosphorylation of pyridoxine (PDX) to form pyridoxine phosphate (PDXP) (Lee et al. 2000, di Salvo et al. 2004).

Followed by: [2xPNPO:2xFMN oxidizes PDXP to PXL](#)

Literature references

di Salvo, ML., Hunt, S., Schirch, V. (2004). Expression, purification, and kinetic constants for human and *Escherichia coli* pyridoxal kinases. *Protein Expr Purif*, 36, 300-6. ↗

Lee, HS., Moon, BJ., Choi, SY., Kwon, OS. (2000). Human pyridoxal kinase: overexpression and properties of the recombinant enzyme. *Mol Cells*, 10, 452-9. ↗

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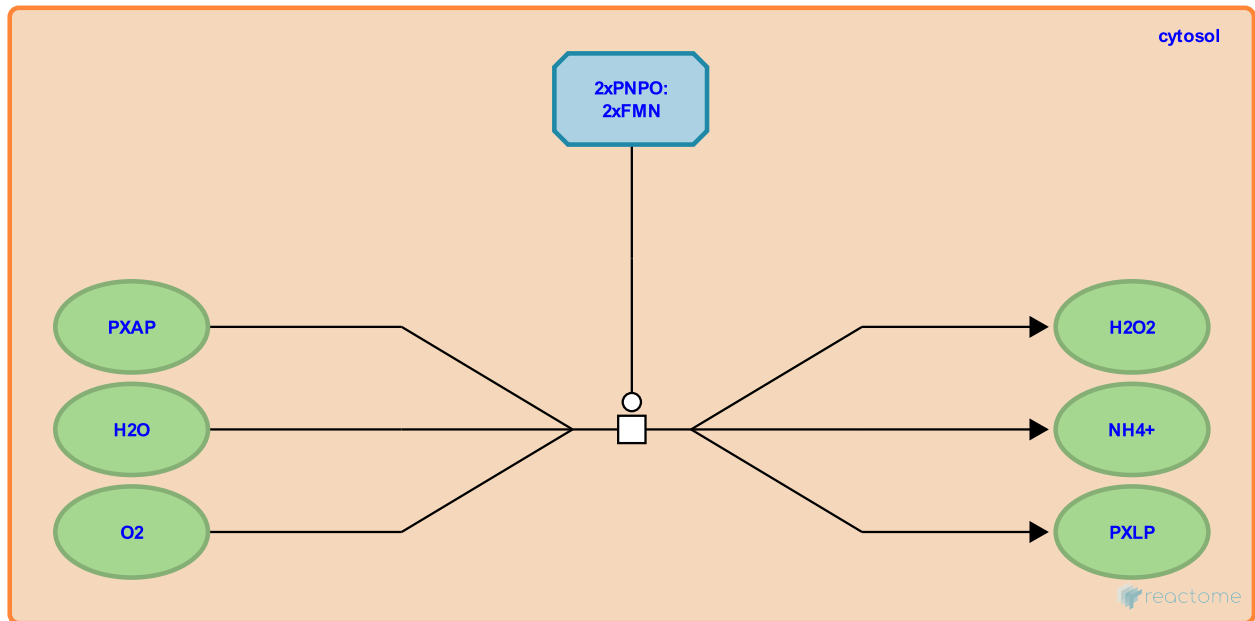
2xPNPO:2xFMN oxidizes PXAP to PXL P

Location: [Vitamins B6 activation to pyridoxal phosphate](#)

Stable identifier: R-HSA-965079

Type: transition

Compartments: cytosol



Pyridoxine-5'-phosphate oxidase (PNPO) is able to oxidize pyridoxamine phosphate (PXAP) to pyridoxal 5'-phosphate (PXL P) (Kang et al. 2004).

Preceded by: [2xPDXK:2xZn²⁺ phosphorylates PXA](#)

Literature references

Kang, JH., Hong, ML., Kim, DW., Park, J., Kang, TC., Won, MH. et al. (2004). Genomic organization, tissue distribution and deletion mutation of human pyridoxine 5'-phosphate oxidase. *Eur J Biochem*, 271, 2452-61. [↗](#)

Editions

2010-09-18	Authored	Stephan, R.
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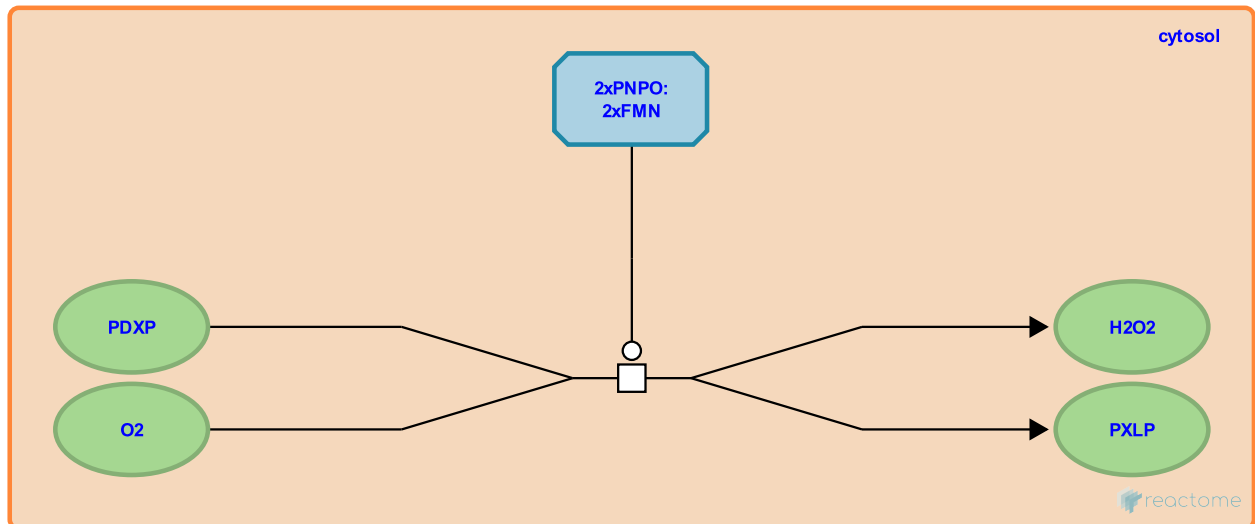
2xPNPO:2xFMN oxidizes PDXP to PXL P ↗

Location: [Vitamins B6 activation to pyridoxal phosphate](#)

Stable identifier: R-HSA-965019

Type: transition

Compartments: cytosol



Pyridoxine-5'-phosphate oxidase (PNPO) is able to oxidize pyridoxine phosphate (PDXP) to pyridoxal 5'-phosphate (PXL P) (Kang et al. 2004).

Preceded by: [2xPDKX:2xZn2+ phosphorylates PDX](#)

Literature references

Kang, JH., Hong, ML., Kim, DW., Park, J., Kang, TC., Won, MH. et al. (2004). Genomic organization, tissue distribution and deletion mutation of human pyridoxine 5'-phosphate oxidase. *Eur J Biochem*, 271, 2452-61. ↗

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2010-09-18	Authored	Stephan, R.
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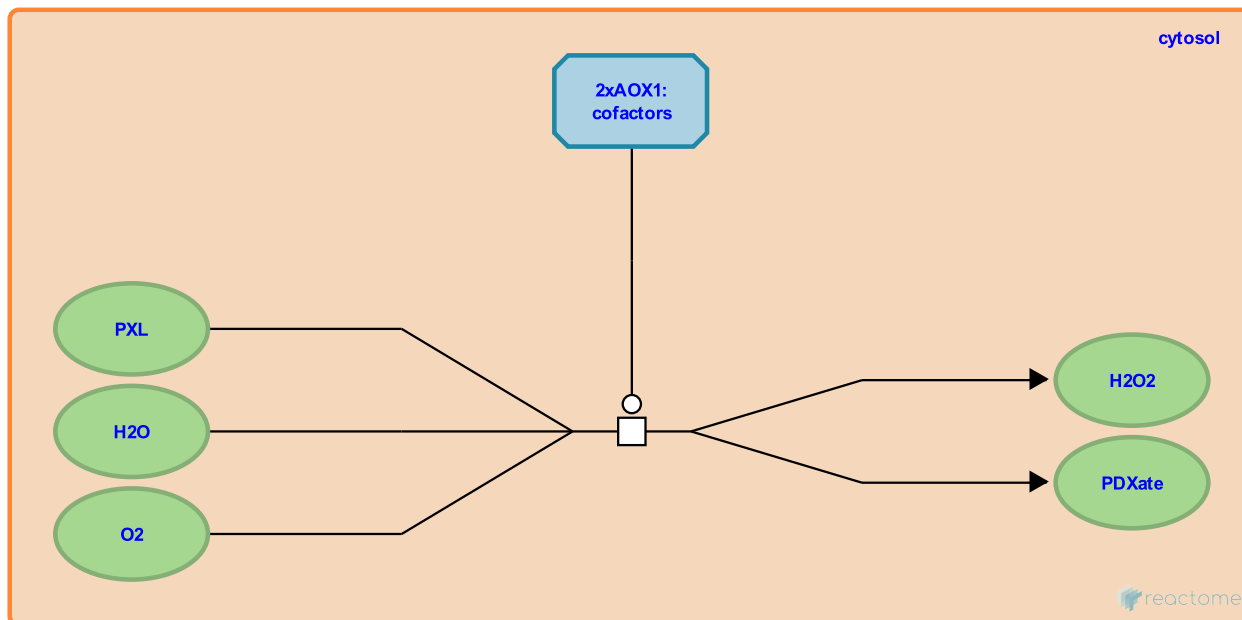
AOX1 oxidises PXL to PDXate ↗

Location: [Vitamins B6 activation to pyridoxal phosphate](#)

Stable identifier: R-HSA-3204311

Type: transition

Compartments: cytosol



Aldehyde oxidase (AOX1) is a complex molybdo-flavoprotein that belongs to the xanthine oxidase family. It is active as a homodimer, with each monomer binding two distinct [2Fe2S] clusters, FAD and the molybdenum cofactor. AOX1 plays an important role in the metabolism of drugs based on its broad substrate specificity oxidising aromatic aza-heterocycles and aldehydes (Hartmann et al. 2012).

Literature references

Hartmann, T., Terao, M., Garattini, E., Teutloff, C., Alfaro, JF., Jones, JP. et al. (2012). The impact of single nucleotide polymorphisms on human aldehyde oxidase. *Drug Metab. Dispos.*, 40, 856-64. ↗

Editions

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