ALAD condenses 2 dALAs to form PBG

D'Eustachio, P., Jassal, B., Sassa, S.

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

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

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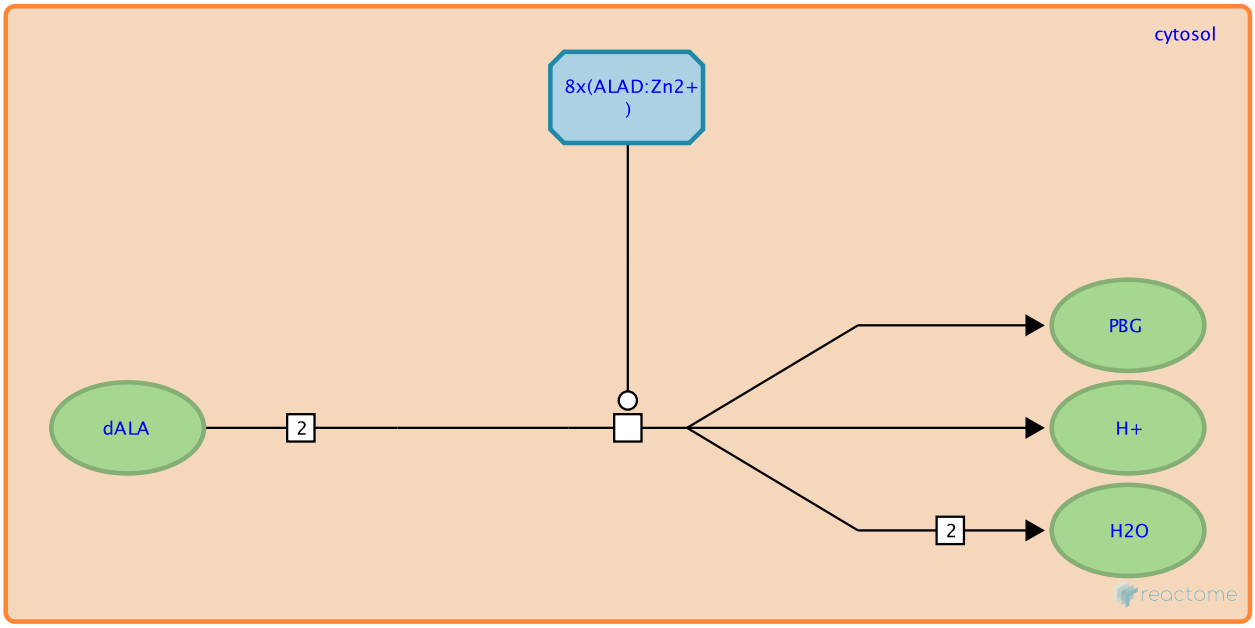
Stable identifier: R-HSA-189439

Type: transition

Compartments: cytosol



5-Aminolevulinic acid dehydratase (ALAD aka porphobilinogen synthase, PBGS), catalyzes the asymmetric condensation of two molecules of ALA to form porphobilinogen (PBG). The substrate that becomes the acetyl side chain-containing half of PBG is called A-side ALA; the half that becomes the propionyl side chains and the pyrrole nitrogen is called P-ALA (Jaffe 2004). PBG is the first pyrrole formed, the precursor to all tetrapyrrole pigments such as heme and chlorophyll. There are at least eight bonds that are made or broken during this reaction. The active form of the ALAD enzyme is an octamer complexed with eight Zn2+ ions, four that are strongly bound and four that are weakly bound. The four weakly bound ones are dispensible for enzyme activity in vitro (Bevan et al. 1980; Mitchell et al. 2001).

Deficiencies of ALAD enzyme in vivo are associated with 5-aminolevulinate dehydratase-deficient porphyria (e.g., Akagi et al. 2000).

Literature references

Mitchell, LW., Volin, M., Martins, J., Jaffe, EK. (2001). Mechanistic implications of mutations to the active site lysine of porphobilinogen synthase. *J Biol Chem, 276*, 1538-44. ↗

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Editions

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