alpha-ketoadipate + CoASH + NAD+ => glutaryl-CoA + CO2 + NADH + H+

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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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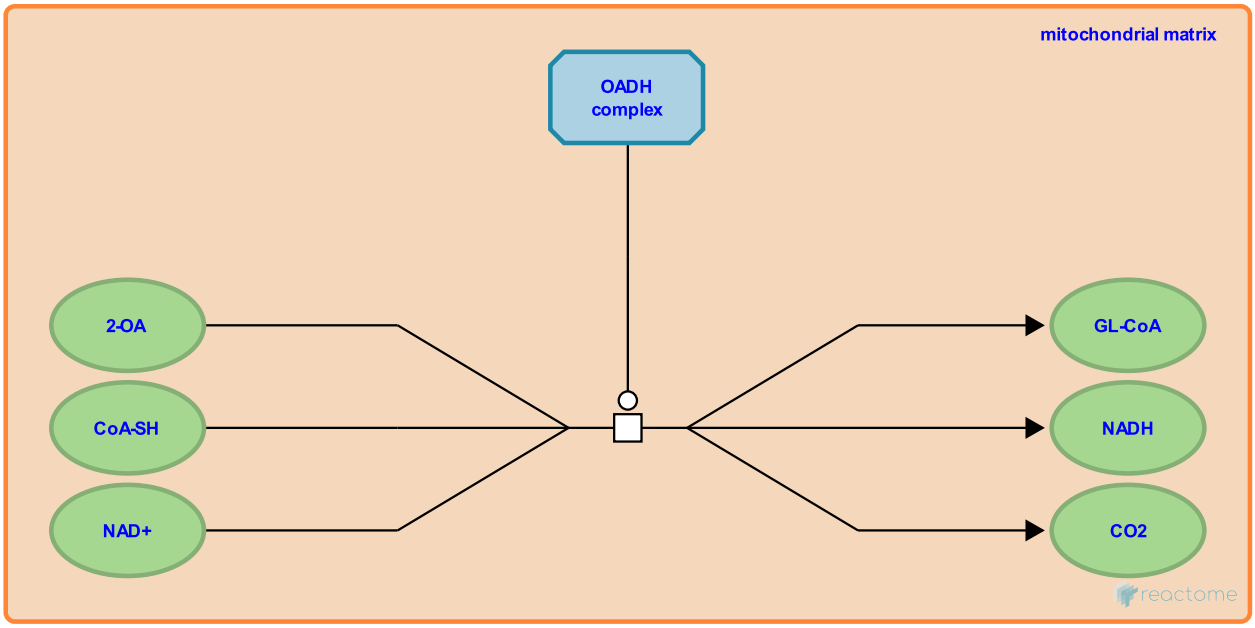
alpha-ketoadipate + CoASH + NAD+ => glutaryl-CoA + CO2 + NADH + H+ ↗

Stable identifier: R-HSA-71037

Type: transition

Compartments: mitochondrial matrix



The mitochondrial alpha-ketoglutarate dehydrogenase complex catalyzes the reaction of alpha-ketoadipate, CoASH, and NAD+ to form glutaryl-CoA, CO2, and NADH. The enzyme complex contains multiple copies of three different proteins, E1 (OGDH), E2 (DLST), and E3 (DLD), each with distinct catalytic activities (Reed and Hackert 1990; Zhou et al 2001). The reaction starts with the oxidative decarboxylation of alpha-ketoadipate catalyzed by E1alpha and beta (alpha ketoglutarate dehydrogenase). Lipoamide cofactor associated with E1 is reduced at the same time. Next, the glutaryl group derived from alpha ketoglutarate is transferred to coenzyme A in two steps catalyzed E2 (dihydrolipolyl transacetylase). Finally, the oxidized form of lipoamide is regenerated and electrons are transferred to NAD+ in two steps catalyzed by E3 (dihydrolipoyl dehydrogenase). The biochemical details of this reaction have been worked out with alpha ketoglutarate dehydrogenase complex and subunits purified from bovine tissue (McCartney et al. 1998). While all of the human proteins are known as predicted protein products of cloned genes, direct experimental evidence for their functions is available only for E3 (DLD) (Brautigam et al. 2005).

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Editions

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