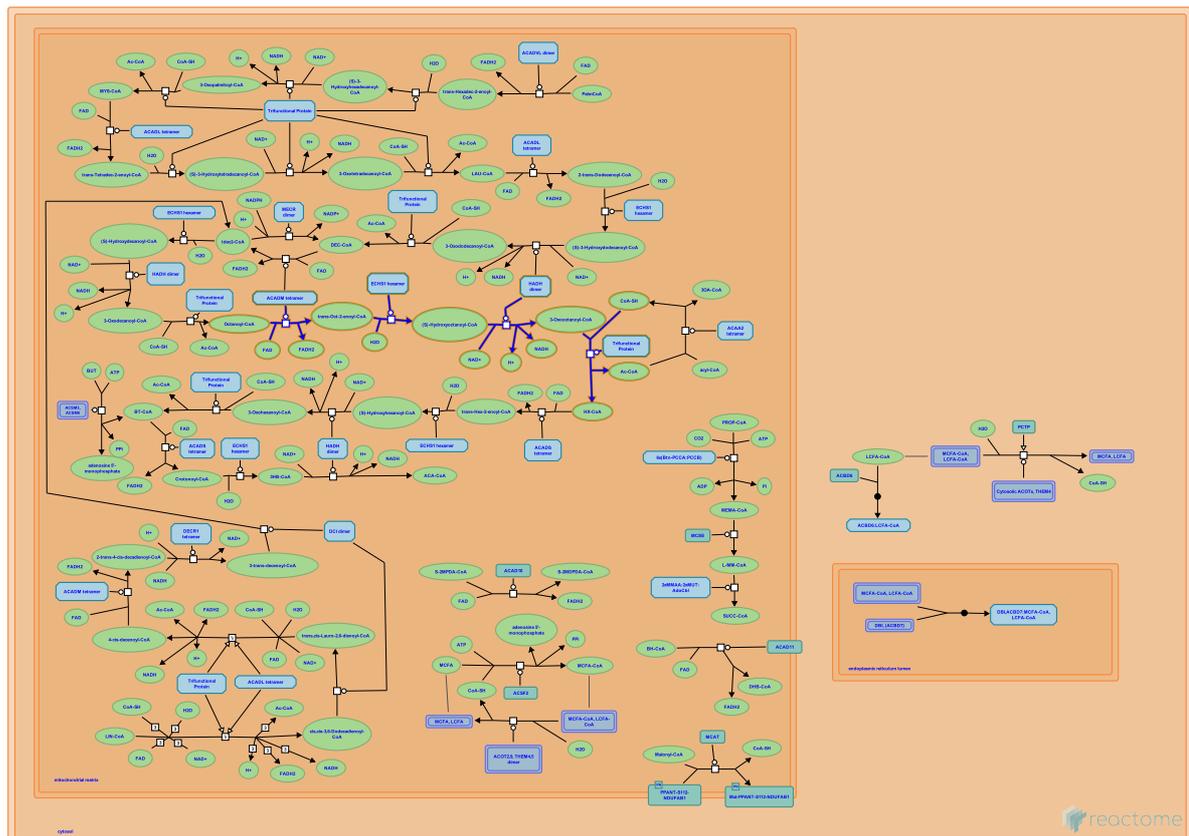


Beta oxidation of octanoyl-CoA to hexanoyl-CoA



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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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- 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. [↗](#)

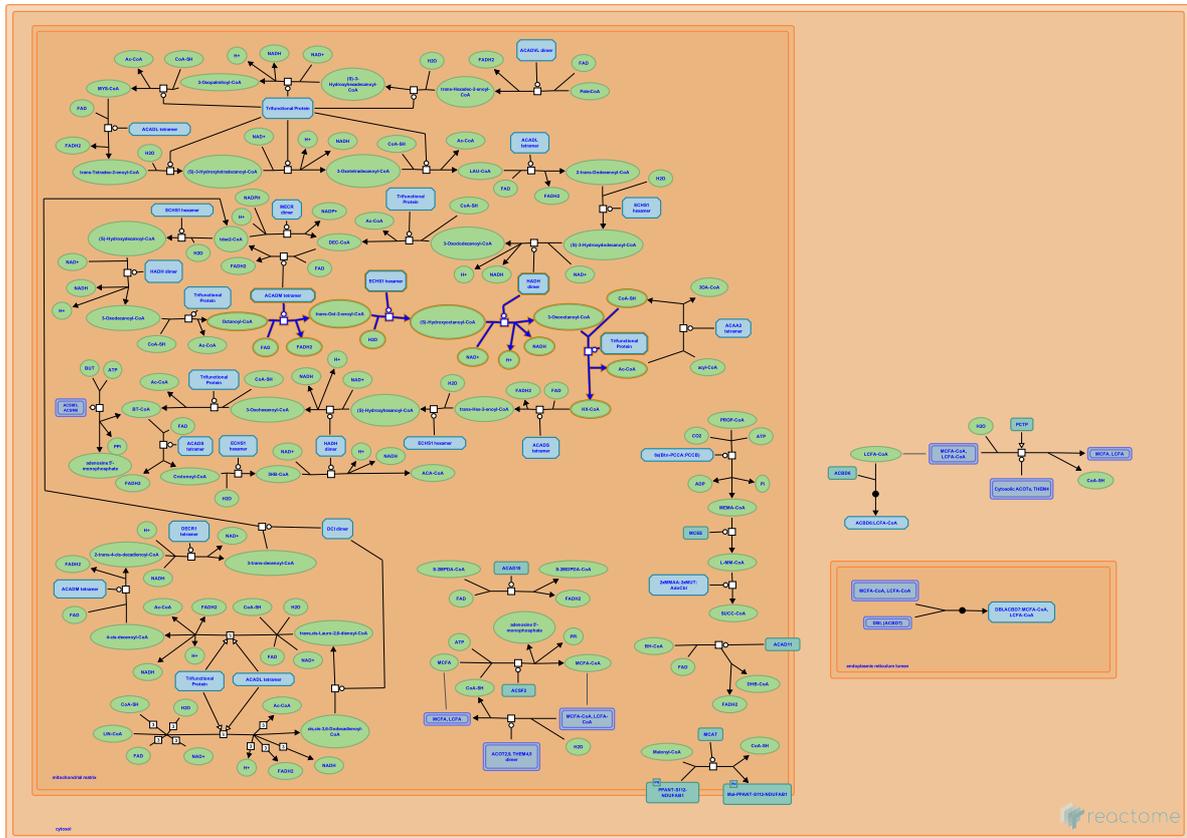
Reactome database release: 70

This document contains 1 pathway and 4 reactions ([see Table of Contents](#))

Beta oxidation of octanoyl-CoA to hexanoyl-CoA ↗

Stable identifier: R-HSA-77348

Compartments: mitochondrial matrix



The fifth pass through the beta-oxidation spiral picks up where the last left off with the saturated fatty acid octanoyl-CoA and produces hexanoyl-CoA. Four enzymatic steps are required starting with MCAD CoA dehydrogenase (Medium Chain) activity, followed by the enoyl-CoA hydratase activity of crotonase, the 3-hydroxyacyl-CoA dehydrogenase activity of the short chain 3-hydroxyacyl-CoA dehydrogenase (SCHAD), and completed by the ketoacyl-CoA thiolase activity, present in the mitochondrial membrane associated tripartite protein.

Literature references

Scriver, CR., Beaudet, AL., Valle, D., Sly, WS. (2001). Mitochondrial fatty acid oxidation disorders, *The Metabolic and Molecular Bases of Inherited Disease*, 8th ed. McGraw Hill, 2297-2326.

Editions

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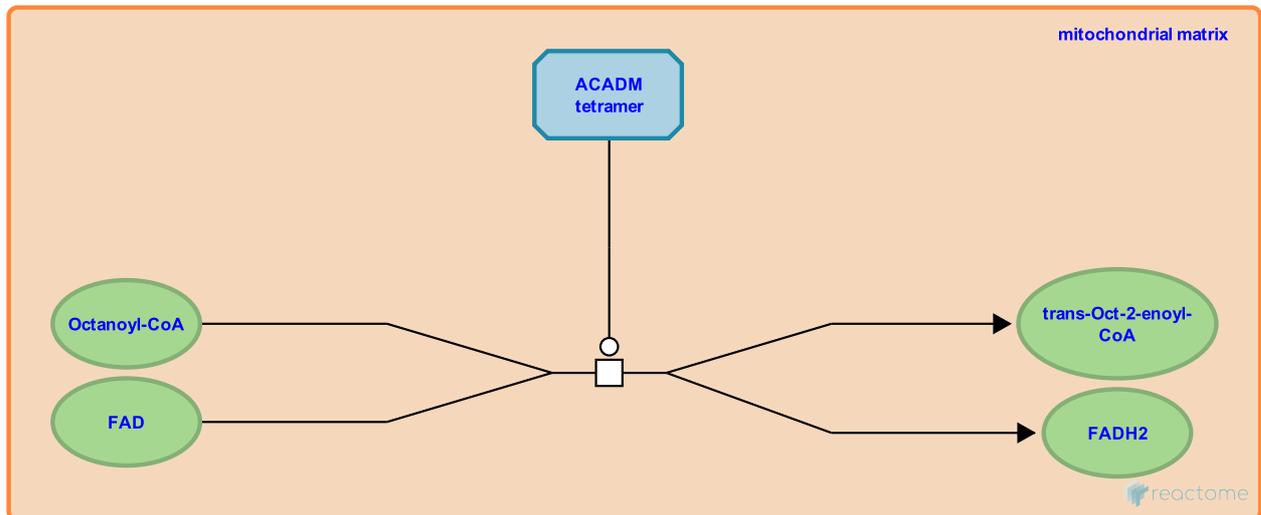
Octanoyl-CoA+FAD<=>trans-Oct-2-enoyl-CoA+FADH2 ↗

Location: [Beta oxidation of octanoyl-CoA to hexanoyl-CoA](#)

Stable identifier: R-HSA-77338

Type: transition

Compartments: mitochondrial matrix



At the beginning of this reaction, 1 molecule of 'Octanoyl-CoA', and 1 molecule of 'FAD' are present. At the end of this reaction, 1 molecule of 'FADH2', and 1 molecule of 'trans-Oct-2-enoyl-CoA' are present.

This reaction takes place in the 'mitochondrial matrix' and is mediated by the 'acyl-CoA dehydrogenase activity' of 'MCAD acyl-CoA dehydrogenase homotetramer'.

Followed by: [trans-Oct-2-enoyl-CoA+H2O<=>\(S\)-Hydroxyoctanoyl-CoA](#)

Literature references

Crane, FL., Beinert, H. (1956). On the mechanism of dehydrogenation of fatty acyl derivatives of coenzyme A. II. The electron-transferring flavoprotein. *J Biol Chem*, 218, 717-31. ↗

Finocchiaro, G., Ito, M., Tanaka, K. (1987). Purification and properties of short chain acyl-CoA, medium chain acyl-CoA, and isovaleryl-CoA dehydrogenases from human liver. *J Biol Chem*, 262, 7982-9. ↗

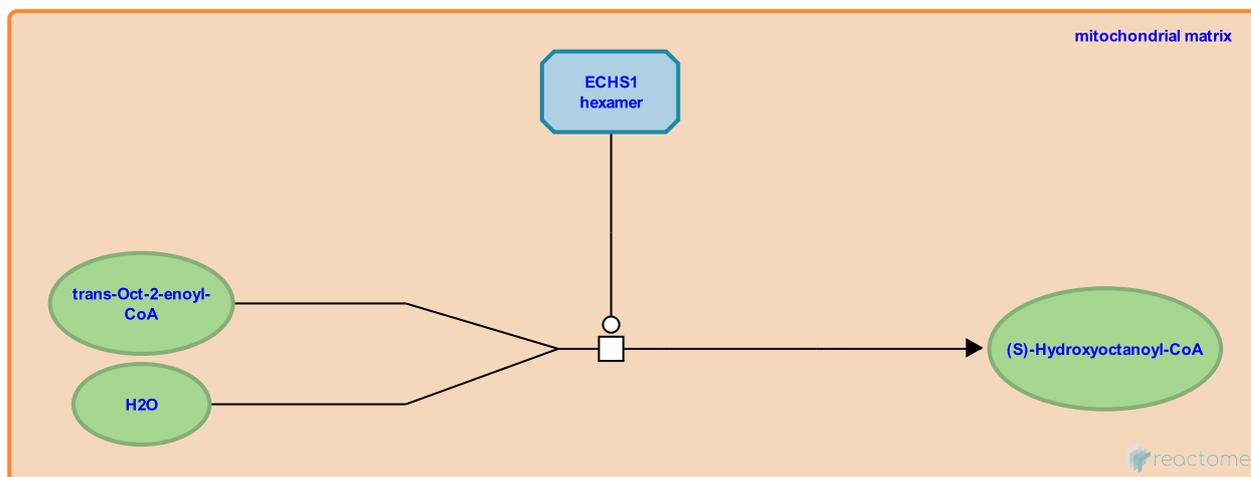
trans-Oct-2-enoyl-CoA+H2O<=>(S)-Hydroxyoctanoyl-CoA ↗

Location: [Beta oxidation of octanoyl-CoA to hexanoyl-CoA](#)

Stable identifier: R-HSA-77333

Type: transition

Compartments: mitochondrial matrix



At the beginning of this reaction, 1 molecule of 'H2O', and 1 molecule of 'trans-Oct-2-enoyl-CoA' are present. At the end of this reaction, 1 molecule of '(S)-Hydroxyoctanoyl-CoA' is present.

This reaction takes place in the 'mitochondrial matrix' and is mediated by the 'enoyl-CoA hydratase activity' of 'enoyl-CoA hydratase hexamer'.

Preceded by: [Octanoyl-CoA+FAD<=>trans-Oct-2-enoyl-CoA+FADH2](#)

Followed by: [\(S\)-Hydroxyoctanoyl-CoA+NAD<=>3-Oxoctanoyl-CoA+NADH+H](#)

Literature references

Stern, JR., Del Campillo, A. (1956). Enzymes of fatty acid metabolism. II. Properties of crystalline crotonase. *J Biol Chem*, 218, 985-1002. ↗

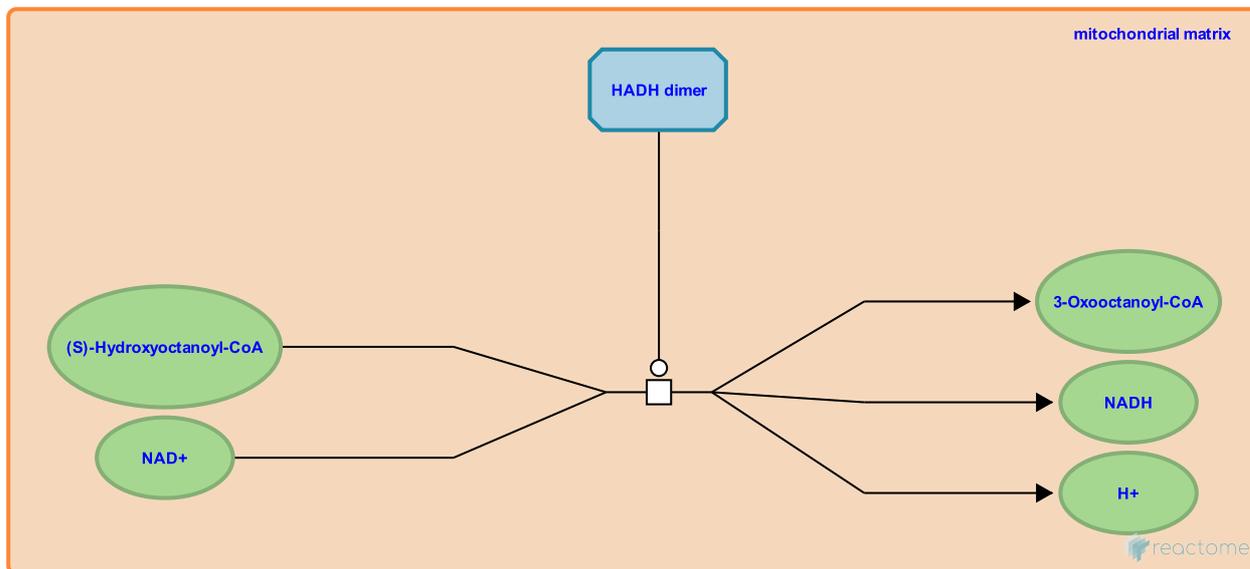
(S)-Hydroxyoctanoyl-CoA+NAD<=>3-Oxoctanoyl-CoA+NADH+H [↗](#)

Location: [Beta oxidation of octanoyl-CoA to hexanoyl-CoA](#)

Stable identifier: R-HSA-77331

Type: transition

Compartments: mitochondrial matrix



At the beginning of this reaction, 1 molecule of 'NAD+', and 1 molecule of '(S)-Hydroxyoctanoyl-CoA' are present. At the end of this reaction, 1 molecule of '3-Oxoctanoyl-CoA', 1 molecule of 'H+', and 1 molecule of 'NADH' are present.

This reaction takes place in the 'mitochondrial matrix' and is mediated by the '3-hydroxyacyl-CoA dehydrogenase activity' of 'short chain 3-hydroxyacyl-CoA dehydrogenase homodimer'.

Preceded by: [trans-Oct-2-enoyl-CoA+H2O<=>\(S\)-Hydroxyoctanoyl-CoA](#)

Followed by: [3-Oxoctanoyl-CoA+CoA-SH<=>Hexanoyl-CoA](#)

Literature references

Vredendaal, PJ., van den Berg, IE., Malingré, HE., Stroobants, AK., Olde Weghuis, DE., Berger, R. (1996). Human short-chain L-3-hydroxyacyl-CoA dehydrogenase: cloning and characterization of the coding sequence. *Biochem Biophys Res Commun*, 223, 718-23. [↗](#)

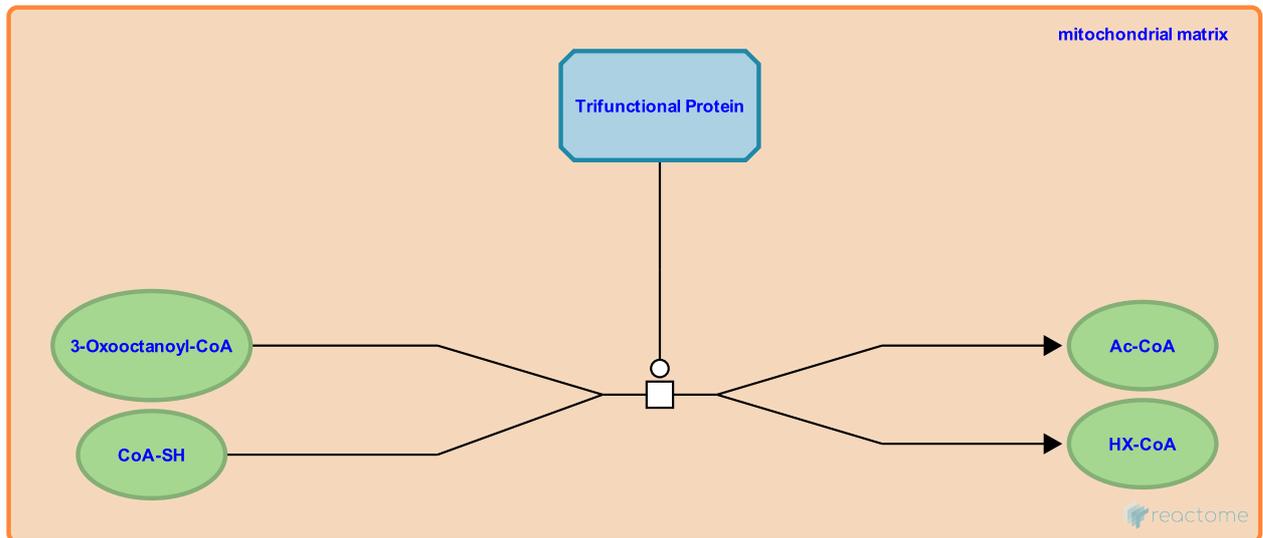
3-Oxo-octanoyl-CoA+CoA-SH<=>Hexanoyl-CoA ↗

Location: [Beta oxidation of octanoyl-CoA to hexanoyl-CoA](#)

Stable identifier: R-HSA-77329

Type: transition

Compartments: mitochondrial matrix



At the beginning of this reaction, 1 molecule of '3-Oxo-octanoyl-CoA', and 1 molecule of 'CoA' are present. At the end of this reaction, 1 molecule of 'Hexanoyl-CoA', and 1 molecule of 'Acetyl-CoA' are present.

This reaction takes place in the 'mitochondrial matrix' and is mediated by the 'transferase activity' of 'Trifunctional Protein'.

Preceded by: [\(S\)-Hydroxyoctanoyl-CoA+NAD<=>3-Oxo-octanoyl-CoA+NADH+H](#)

Literature references

Carpenter, K., Pollitt, R.J., Middleton, B. (1992). Human liver long-chain 3-hydroxyacyl-coenzyme A dehydrogenase is a multifunctional membrane-bound beta-oxidation enzyme of mitochondria. *Biochem Biophys Res Commun*, 183, 443-8. ↗

Table of Contents

Introduction	1
☒ Beta oxidation of octanoyl-CoA to hexanoyl-CoA	2
↳ Octanoyl-CoA+FAD \rightleftharpoons trans-Oct-2-enoyl-CoA+FADH ₂	3
↳ trans-Oct-2-enoyl-CoA+H ₂ O \rightleftharpoons (S)-Hydroxyoctanoyl-CoA	4
↳ (S)-Hydroxyoctanoyl-CoA+NAD \rightleftharpoons 3-Oxoctanoyl-CoA+NADH+H	5
↳ 3-Oxoctanoyl-CoA+CoA-SH \rightleftharpoons Hexanoyl-CoA	6
Table of Contents	7