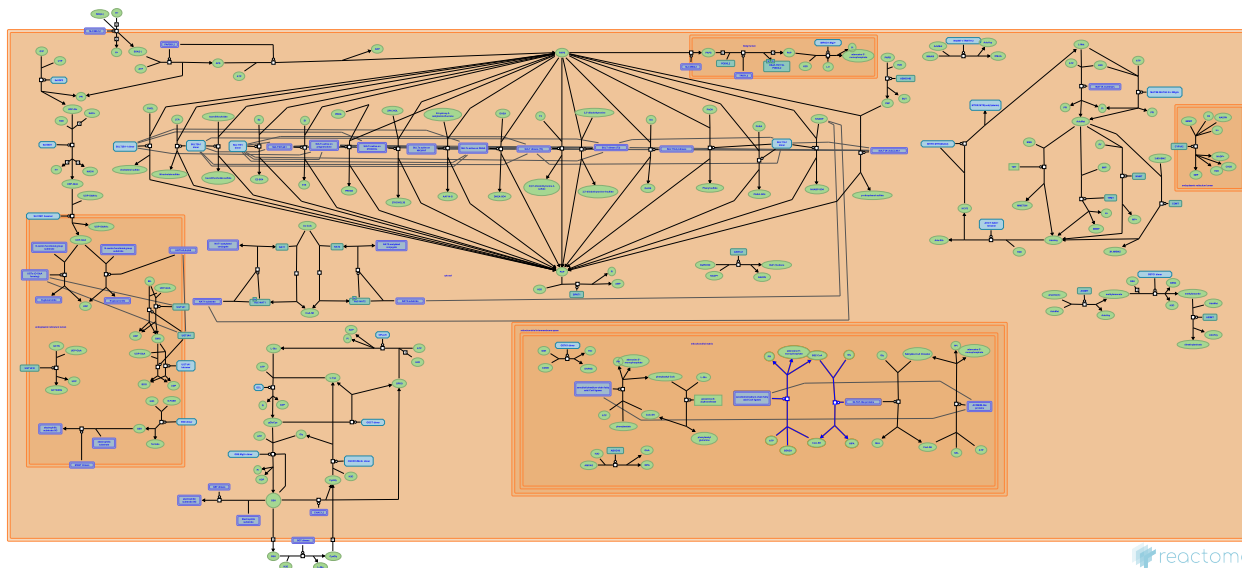


# Conjugation of benzoate with glycine



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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. [↗](#)

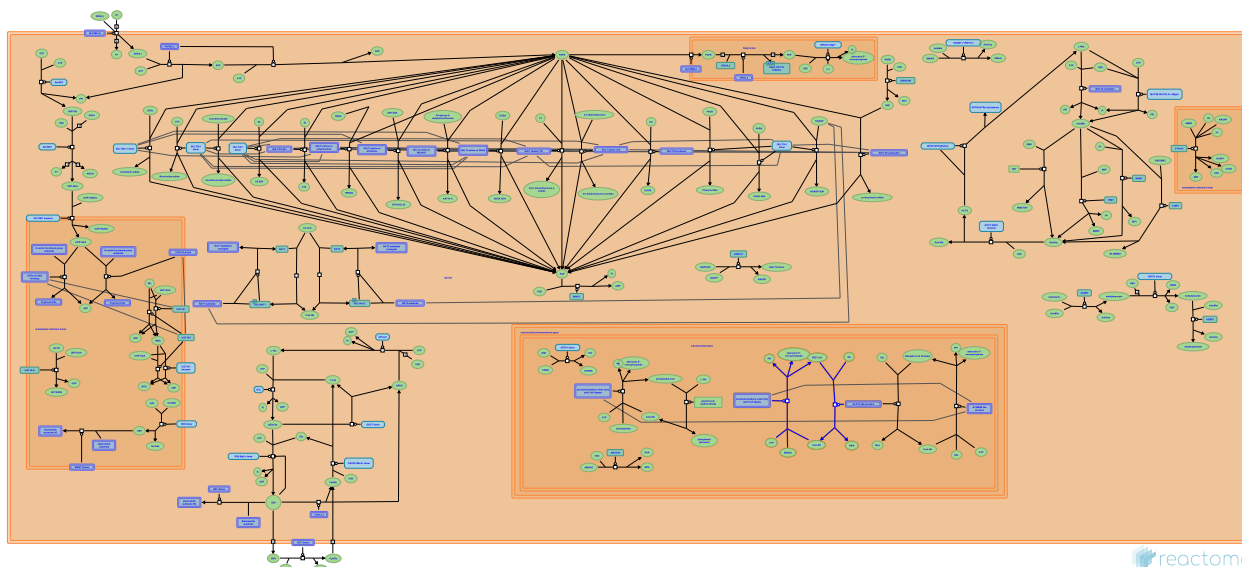
Reactome database release: 70

This document contains 1 pathway and 2 reactions ([see Table of Contents](#))

## Conjugation of benzoate with glycine ↗

**Stable identifier:** R-HSA-177135

**Compartments:** mitochondrial matrix



Benzoic acid, widely used as a food preservative, is converted to hippuric acid by activation and conjugation with glycine. This was one of the first detoxification pathways discovered, and was formerly exploited clinically as an alternative means of nitrogen excretion in patients with urea cycle defects (Brusilow and Horwich 2001).

### Literature references

Scriver, CR., Beaudet, AL., Valle, D., Sly, WS. (2001). Urea cycle enzymes, *The Metabolic and Molecular Bases of Inherited Disease*, 8th ed. *McGraw Hill*, 1909-1963.

### Editions

2004-11-30	Authored	Jassal, B.
2006-03-23	Edited	D'Eustachio, P.

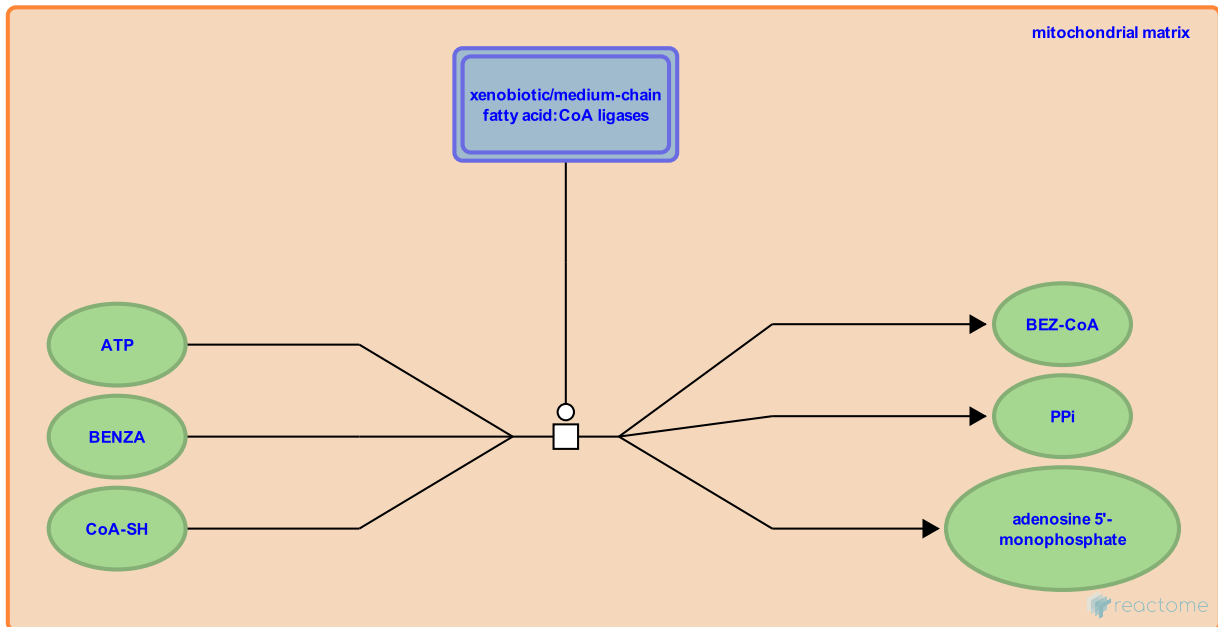
**benzoate + Coenzyme A + ATP => benzoyl-CoA + AMP + pyrophosphate** ↗

**Location:** [Conjugation of benzoate with glycine](#)

**Stable identifier:** R-HSA-159443

**Type:** transition

**Compartments:** mitochondrial matrix



Benzoate and ATP react with coenzyme A to form benzoyl CoA, AMP, and pyrophosphate (Vessey et al. 1999, 2003). Two human CoA ligases have been characterized that catalyze this reaction efficiently in vitro: acyl-CoA synthetase medium-chain family member 1 (BUCS1) (Fujino et al. 2001) and xenobiotic/medium-chain fatty acid:CoA ligase (Vessey et al. 2003). Their relative contributions to benzoate metabolism in vivo are unknown.

**Followed by:** [benzoyl-CoA + glycine => benzoyl glycine \(hippuric acid\) + Coenzyme A](#)

## Literature references

Vessey, DA., Lau, E., Kelley, M., Warren, RS. (2003). Isolation, sequencing, and expression of a cDNA for the HXM-A form of xenobiotic/medium-chain fatty acid:CoA ligase from human liver mitochondria. *J Biochem Mol Toxicol*, 17, 1-6. ↗

Vessey, DA., Kelley, M., Warren, RS. (1999). Characterization of the CoA ligases of human liver mitochondria catalyzing the activation of short- and medium-chain fatty acids and xenobiotic carboxylic acids. *Biochim Biophys Acta*, 1428, 455-62. ↗

## Editions

2005-03-10	Authored	Jassal, B.
2008-05-28	Reviewed	D'Eustachio, P.

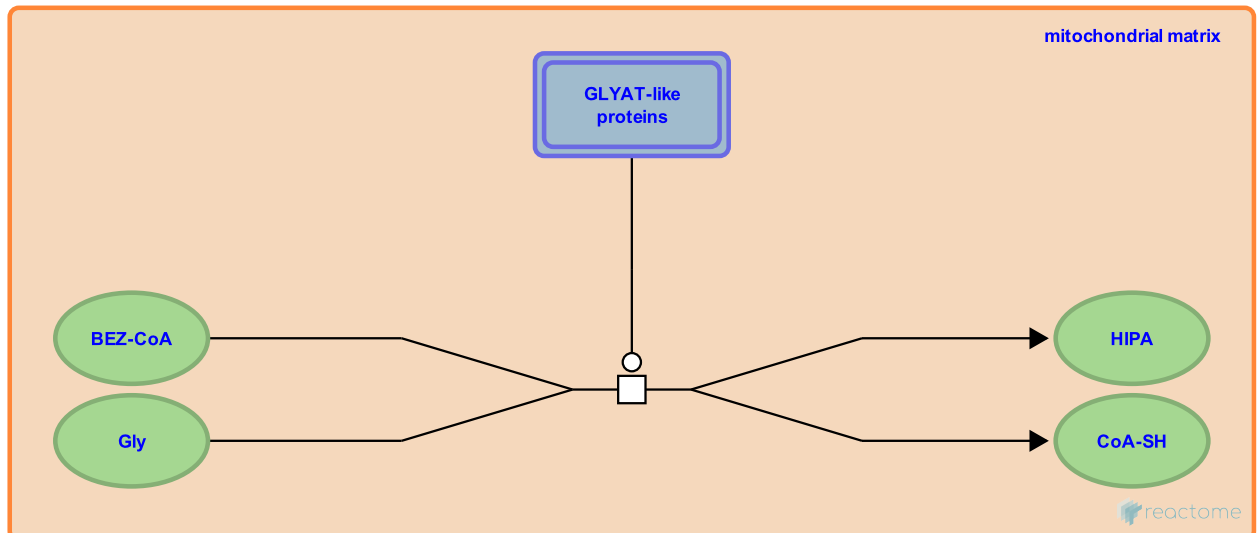
**benzoyl-CoA + glycine => benzoyl glycine (hippuric acid) + Coenzyme A** ↗

**Location:** [Conjugation of benzoate with glycine](#)

**Stable identifier:** R-HSA-159566

**Type:** transition

**Compartments:** mitochondrial matrix



Benzoyl CoA and glycine react to form benzoyl glycine (hippuric acid) and Coenzyme A (Mawal and Qureshi 1994).

**Preceded by:** [benzoate + Coenzyme A + ATP => benzoyl-CoA + AMP + pyrophosphate](#)

### Literature references

Webster, LT., Siddiqui, UA., Lucas, SV., Strong, JM., Mieryl, JJ. (1976). Identification of separate acyl- CoA:glycine and acyl-CoA:L-glutamine N-acyltransferase activities in mitochondrial fractions from liver of rhesus monkey and man. *J Biol Chem*, 251, 3352-8. ↗

Mawal, YR., Qureshi, IA. (1994). Purification to homogeneity of mitochondrial acyl coa:glycine n-acyltransferase from human liver. *Biochem Biophys Res Commun*, 205, 1373-9. ↗

### Editions

2008-05-28

Reviewed

D'Eustachio, P.

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