Metabolism of vitamins and cofactors

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This is just an excerpt of a full-length report for this pathway. To access the complete report, please download it at the Reactome Textbook.

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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**


Reactome database release: 83

This document contains 4 pathways (see Table of Contents)

[https://reactome.org](https://reactome.org)
Vitamins are a diverse group of organic compounds, classified according to their solubility, either fat-soluble or water-soluble, that are either not synthesized or synthesized only in limited amounts by human cells. They are required in small amounts in the diet and have distinct biochemical roles, often as coenzymes (cofactors). The physiological processes dependent on vitamin-requiring reactions include many aspects of intermediary metabolism, vision, bone formation, and blood coagulation, and vitamin deficiencies are associated with a correspondingly diverse and severe group of diseases. Metabolic pathways for water-soluble B group and C vitamins, and for fat-soluble vitamins A, D and K are annotated in Reactome, covering processes that convert dietary forms of these molecules into active forms, and that regenerate active forms of vitamin cofactors consumed in other metabolic processes.
Vitamins are a diverse group of organic compounds, required in small amounts in the diet. They have distinct biochemical roles, often as coenzymes, and are either not synthesized or synthesized only in limited amounts by human cells. Vitamins are classified according to their solubility, either fat-soluble or water-soluble. The physiological processes dependent on vitamin-requiring reactions include many aspects of intermediary metabolism, vision, bone formation, and blood coagulation, and vitamin deficiencies are associated with a correspondingly diverse and severe group of diseases.

Water-soluble vitamins include ascorbate (vitamin C) and the members of the B group: thiamin (vitamin B1), riboflavin (B2), niacin (B3), pantothenate (B5), pyridoxine (B6), biotin (B7), folate (B9), and cobalamin (B12). Metabolic processes annotated here include the synthesis of thiamin pyrophosphate (TPP) from thiamin (B1), the synthesis of FMN and FAD from riboflavin (B2), the synthesis of nicotinic acid (niacin - B3) from tryptophan, the synthesis of Coenzyme A from pantothenate (B5), features of the metabolism of folate (B9), the uptake, transport, and metabolism of cobalamin (B12), and molybdenum cofactor biosynthesis.
Vitamins A, D, E, and K are classified as fat-soluble. Metabolic pathways by which dietary precursors of vitamins A (Harrison 2005) and K (Shearer et al. 2012) are converted to active forms are annotated here. The conversion of 7-dehydrocholesterol is converted to active vitamin D (Dusso et al. 2005) is annotated as part of metabolism of steroids. (Vitamin E (tocopherol) is available in active form from the diet.)

**Literature references**


Many proteins depend for their activity on cofactors, associated ions and small molecules. This module contains annotations of processes involved in the synthesis of cofactors, either de novo or from essential molecules consumed in the diet (vitamins), as well as regeneration of active forms of cofactors (Lipmann 1984).

**Literature references**


**Editions**

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