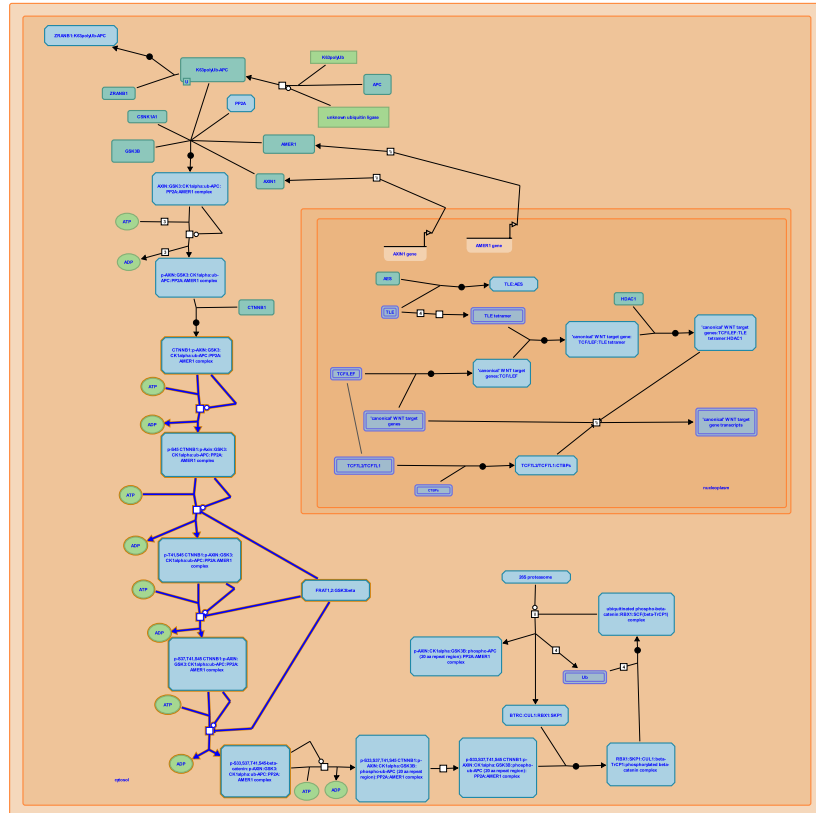


Beta-catenin phosphorylation cascade



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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](https://reactome.org/Textbook).

03/05/2024

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.

The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

Literature references

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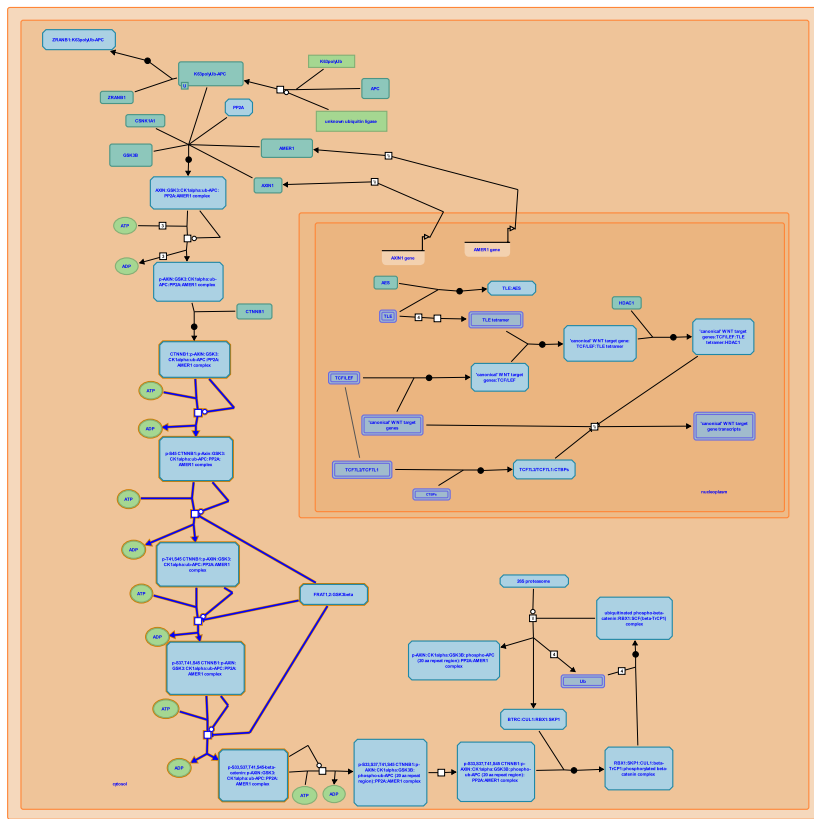
Reactome database release: 88

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

Beta-catenin phosphorylation cascade ↗

Stable identifier: R-HSA-196299

Compartments: cytosol



reactome

Degradation of beta-catenin is initiated following amino-terminal serine/threonine phosphorylation. Phosphorylation of B-catenin at S45 by CK1 alpha primes the subsequent sequential GSK-3-mediated phosphorylation at Thr41, Ser37 and Ser33 (Amit et al., 2002 ; Lui et al., 2002).

Literature references

Andersen, JS., Birman, Y., Mann, M., Ben-Shushan, E., Alkalay, I., Hatzubai, A. et al. (2002). Axin-mediated CKI phosphorylation of beta-catenin at Ser 45: a molecular switch for the Wnt pathway. *Genes Dev*, 16, 1066-76. ↗

Zhang, Z., Baeg, GH., Lin, X., Tan, Y., Li, Y., He, X. et al. (2002). Control of beta-catenin phosphorylation/degradation by a dual-kinase mechanism. *Cell*, 108, 837-47. ↗

Editions

2007-04-03	Authored	Kimelman, D.
2007-04-19	Edited	Matthews, L.
2007-04-27	Reviewed	Pagano, M.

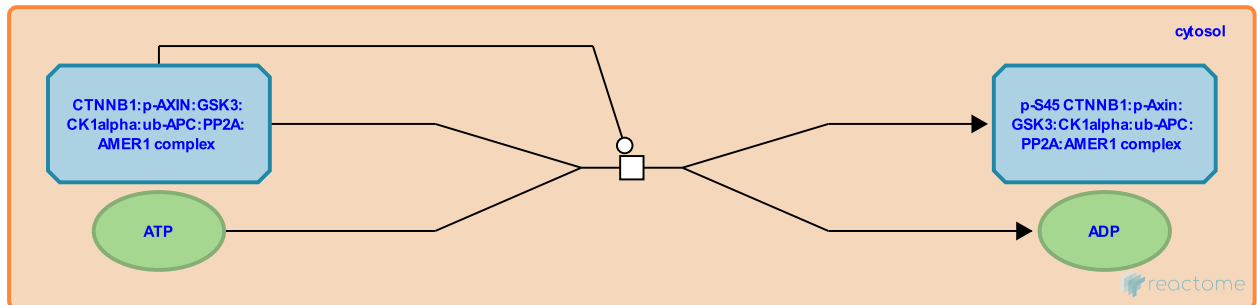
Phosphorylation of beta-catenin at Ser45 by CK1 alpha ↗

Location: [Beta-catenin phosphorylation cascade](#)

Stable identifier: R-HSA-195318

Type: transition

Compartments: cytosol



CK1a binds to Axin and phosphorylates beta-catenin at Ser45 priming GSK3 mediated phosphorylation at the more N-terminal residues (Amit et al., 2002; Liu et al., 2002; Yanagawa et al., 2002).

Followed by: [Phosphorylation of phospho-\(Ser45\) at Thr 41 by GSK-3](#)

Literature references

Andersen, JS., Birman, Y., Mann, M., Ben-Shushan, E., Alkalay, I., Hatzubai, A. et al. (2002). Axin-mediated CKI phosphorylation of beta-catenin at Ser 45: a molecular switch for the Wnt pathway. *Genes Dev*, 16, 1066-76. ↗

Editions

2007-04-03	Authored	Kimelman, D.
2007-04-03	Edited	Matthews, L.
2007-04-27	Reviewed	Pagano, M.
2014-01-22	Revised	Rajakulendran, N.
2014-05-12	Revised	Salahshor, S.

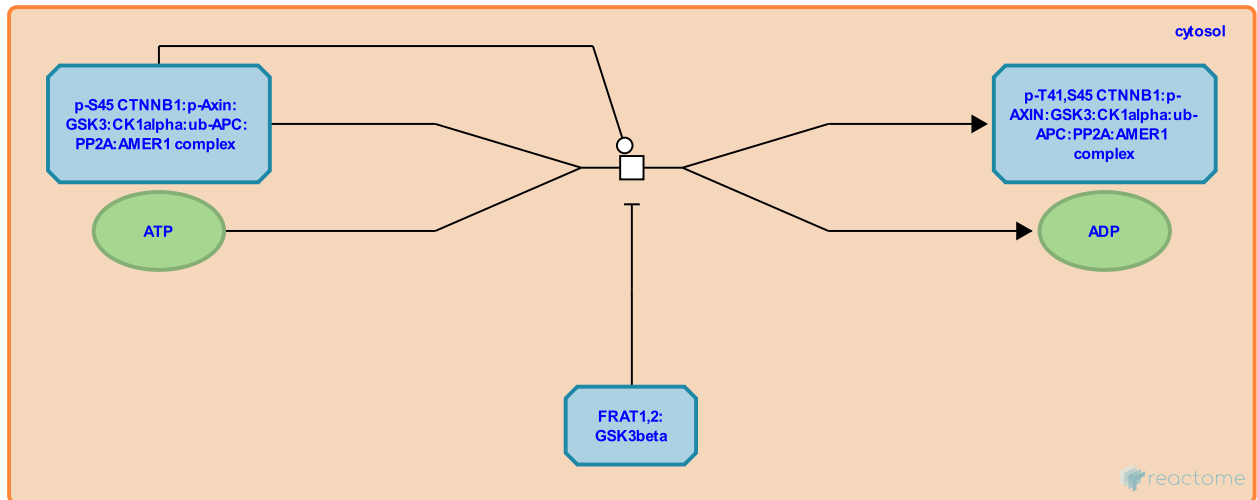
Phosphorylation of phospho-(Ser45) at Thr 41 by GSK-3 ↗

Location: [Beta-catenin phosphorylation cascade](#)

Stable identifier: R-HSA-195287

Type: transition

Compartments: cytosol



Following CKI-mediated phosphorylation at Ser45, beta-catenin is phosphorylated by GSK3 at Thr41.

Preceded by: [Phosphorylation of beta-catenin at Ser45 by CK1 alpha](#)

Followed by: [Phosphorylation of phospho- \(Ser45, Thr41\) beta-catenin at Ser37 by GSK-3](#)

Literature references

Zhang, Z., Baeg, GH., Lin, X., Tan, Y., Li, Y., He, X. et al. (2002). Control of beta-catenin phosphorylation/degradation by a dual-kinase mechanism. *Cell*, 108, 837-47. ↗

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2007-04-27	Reviewed	Pagano, M.
2014-01-22	Revised	Rajakulendran, N.
2014-05-12	Revised	Salahshor, S.

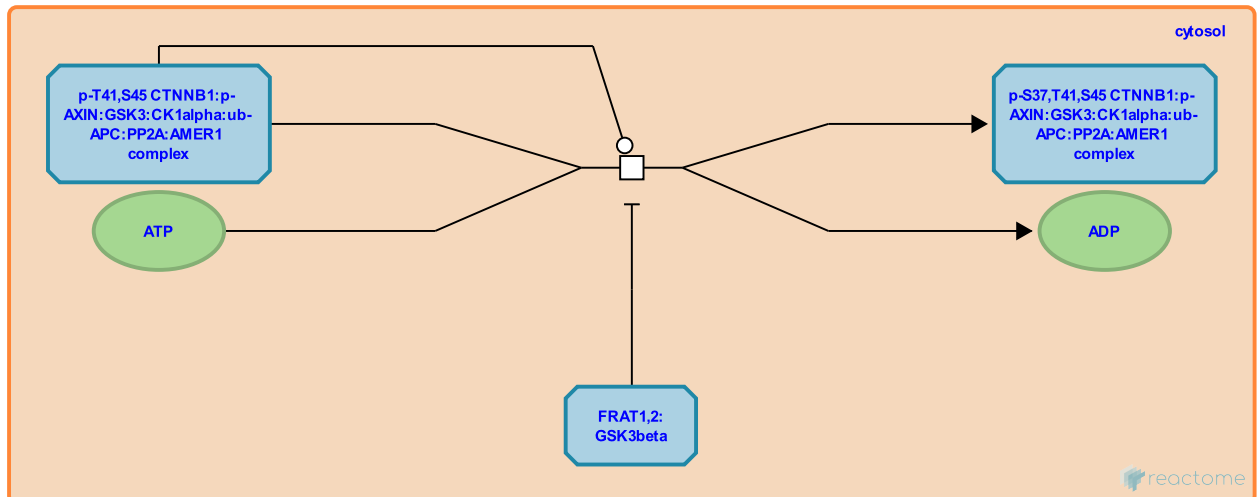
Phosphorylation of phospho- (Ser45, Thr41) beta-catenin at Ser37 by GSK-3 ↗

Location: [Beta-catenin phosphorylation cascade](#)

Stable identifier: R-HSA-195283

Type: transition

Compartments: cytosol



Phospho-(Ser45, Thr41) beta-catenin is phosphorylated by GSK3 at Ser37.

Preceded by: [Phosphorylation of phospho-\(Ser45\) at Thr 41 by GSK-3](#)

Followed by: [Phosphorylation of phospho-\(Ser45,Thr41,Ser37\) at Ser33 by GSK-3](#)

Literature references

Zhang, Z., Baeg, GH., Lin, X., Tan, Y., Li, Y., He, X. et al. (2002). Control of beta-catenin phosphorylation/degradation by a dual-kinase mechanism. *Cell*, 108, 837-47. ↗

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2014-01-22	Revised	Rajakulendran, N.
2014-05-12	Revised	Salahshor, S.

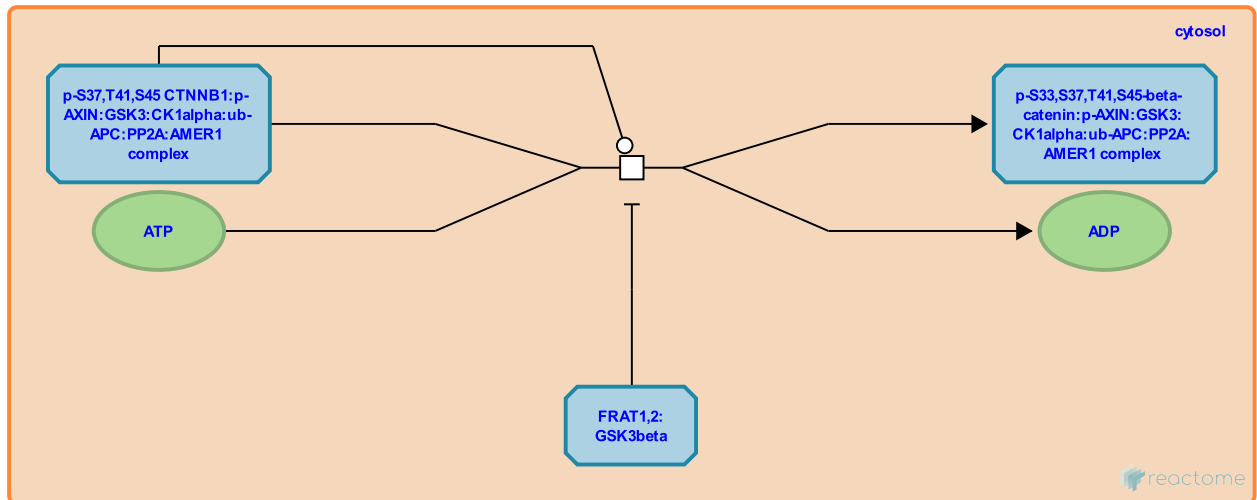
Phosphorylation of phospho-(Ser45,Thr41,Ser37) at Ser33 by GSK-3 [↗](#)

Location: [Beta-catenin phosphorylation cascade](#)

Stable identifier: R-HSA-195300

Type: transition

Compartments: cytosol



Beta-catenin is then phosphorylated at Ser33. Phosphorylated S37 and S33 together with neighboring residues constitute the recognition motif for beta-TrCP.

Preceded by: [Phosphorylation of phospho- \(Ser45, Thr41\) beta-catenin at Ser37 by GSK-3](#)

Literature references

Zhang, Z., Baeg, G.H., Lin, X., Tan, Y., Li, Y., He, X. et al. (2002). Control of beta-catenin phosphorylation/degradation by a dual-kinase mechanism. *Cell*, 108, 837-47. [↗](#)

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Table of Contents

Introduction	1
☒ Beta-catenin phosphorylation cascade	2
↳ Phosphorylation of beta-catenin at Ser45 by CK1 alpha	3
↳ Phosphorylation of phospho-(Ser45) at Thr 41 by GSK-3	4
↳ Phosphorylation of phospho- (Ser45, Thr41) beta-catenin at Ser37 by GSK-3	5
↳ Phosphorylation of phospho-(Ser45,Thr41,Ser37) at Ser33 by GSK-3	6
Table of Contents	7