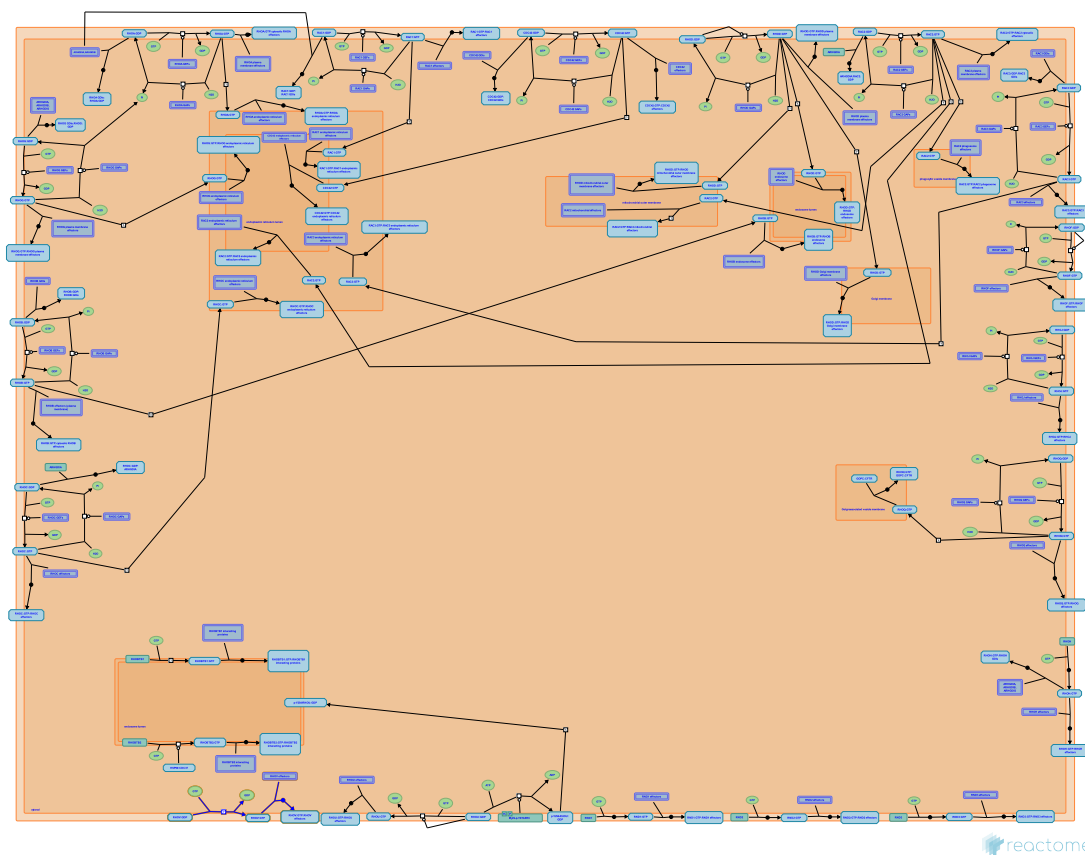


RHOV GTPase cycle



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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).

05/05/2024

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.

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Literature references

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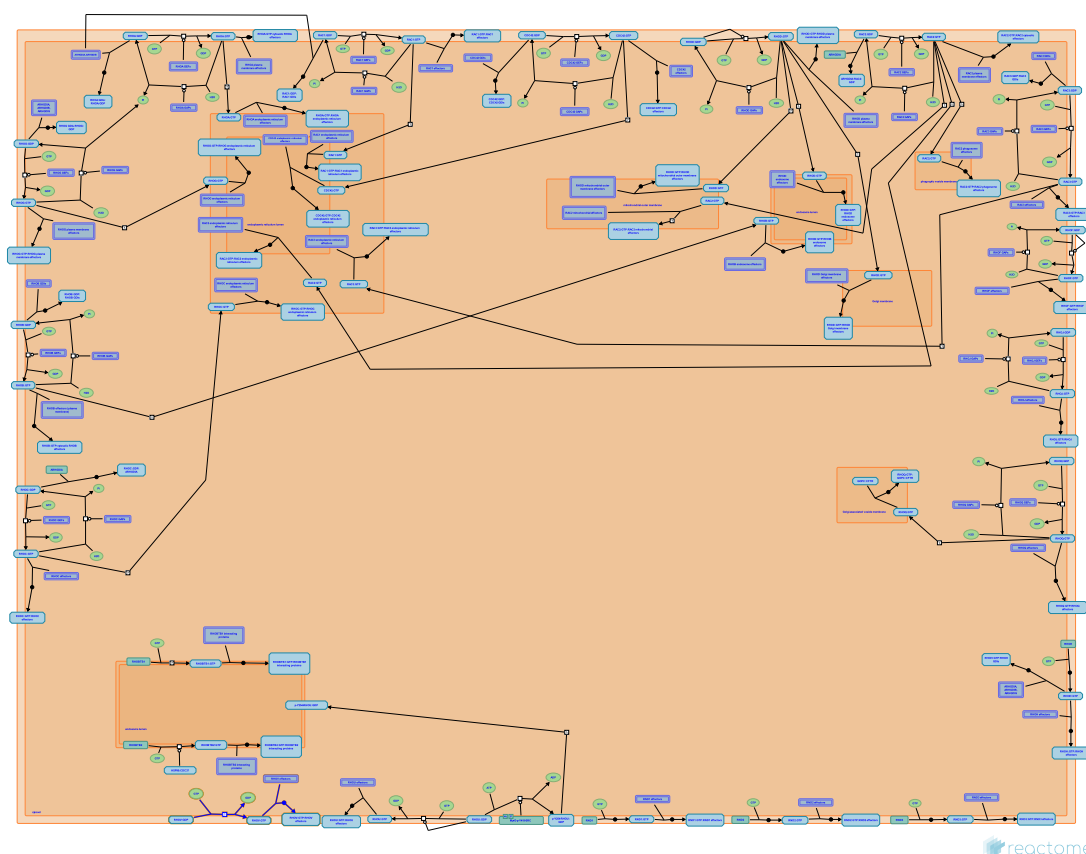
Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology*, 14, e1005968. [↗](#)

Reactome database release: 88

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

RHOV GTPase cycle ↗

Stable identifier: R-HSA-9013424



RHOV (also known as Chp) is an atypical RHO GTPase that is thought to be constitutively active due to its high intrinsic guanine nucleotide exchange activity. No guanine nucleotide exchange factors (GEFs) nor GTPase activator proteins (GAPs) that act on RHOV have been identified. RHOV is expressed at very low levels. The expression of RHOV is detected during embryonic development in fish (Tay et al. 2010), frog (Guémar et al. 2007) and chicken (Notarnicola et al. 2008). RHOV is involved in neural crest formation, where its expression is induced downstream of WNT signaling. RHOV is thought to regulate cell adhesion, as its zebrafish orthologue is required for proper localization of E-cadherin and beta-catenin at adherens junctions. RHOV activates JNK and induces apoptosis in rat pheochromocytoma cell line PC12 (Shepelev et al 2011) and in macrophages (Song et al. 2015).

RHOV gene overexpression is a molecular marker of human lung adenocarcinoma (Shepelev and Korobko 2013, Shukla et al. 2017, Ma et al. 2020, Zhang et al. 2020), where RHOV is likely to act as an oncogene (Chen et al. 2021).

For review, please refer to Faure and Fort 2015, and Hodge and Ridley 2020.

Literature references

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Editions

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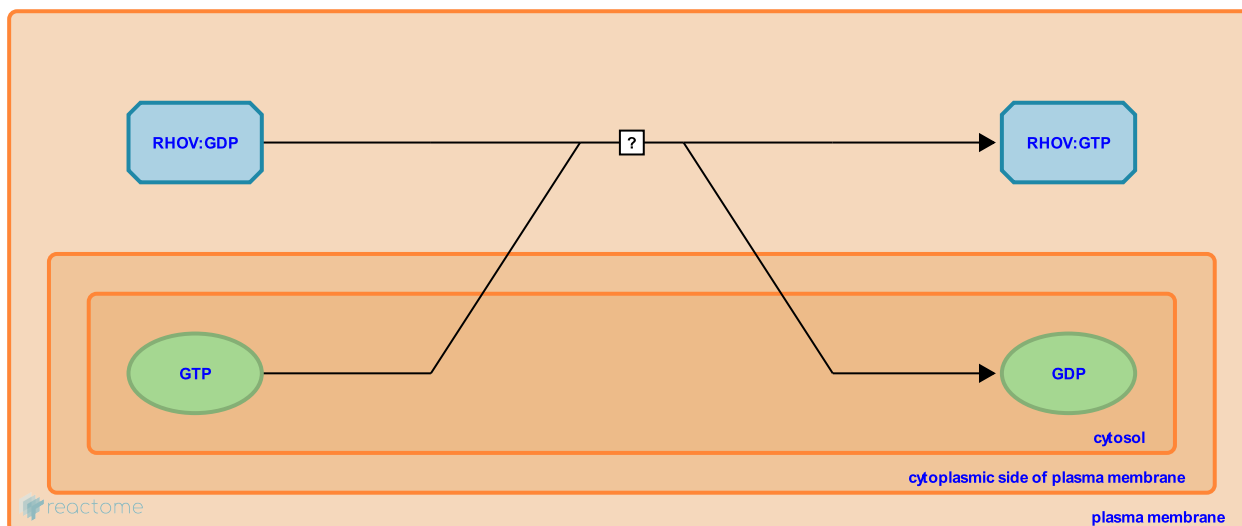
RHOV binds GTP ↗

Location: [RHOV GTPase cycle](#)

Stable identifier: R-HSA-9018798

Type: uncertain

Compartments: plasma membrane, cytosol



RHOV can bind both GTP and GDP, and interacts with effectors when in active, GTP-bound state (Aronheim et al. 1998, Shepelev and Korobko 2012). It should be noted that the binding of both GTP and GDP has never been experimentally confirmed for RHOV in a proper biochemical way. All the assumptions for GTP and GDP binding are inferred from the use of G40V/Q89L “active, GTPase deficient” and S45N “inactive” mutants. Based on the sequence similarity between RHOV and RHOU, it is assumed that RHOV possesses high intrinsic guanine nucleotide exchange activity, but this has not been experimentally confirmed.

Followed by: [RHOV binds effectors at the plasma membrane](#)

Literature references

Aronheim, A., Belisle, B., Cohen, A., Abo, A., Fritsch, A., Broder, YC. (1998). Chp, a homologue of the GTPase Cdc42Hs, activates the JNK pathway and is implicated in reorganizing the actin cytoskeleton. *Curr. Biol.*, 8, 1125-8 . ↗

Shepelev, MV., Korobko, IV. (2012). Pak6 protein kinase is a novel effector of an atypical Rho family GTPase Chp/RhoV. *Biochemistry Mosc.*, 77, 26-32. ↗

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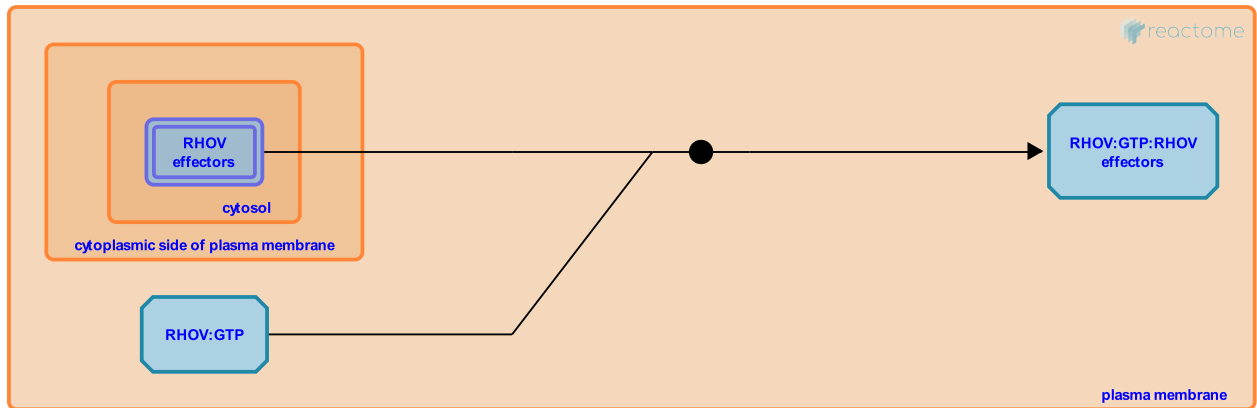
RHOV binds effectors at the plasma membrane [↗](#)

Location: [RHOV GTPase cycle](#)

Stable identifier: R-HSA-9018794

Type: binding

Compartments: plasma membrane, cytosol



In its active GTP bound form, RHOV activates the following effectors:

PAK1 (Weisz Hubsman et al. 2007; Bagci et al. 2020)

PAK2 (Aronheim et al. 1998; Bagci et al. 2020)

PAK6 (Shepelev and Korobko 2012)

The functional consequences of the interaction have only been established for RHOV and PAK1 (Weisz Hubsman et al. 2007).

The following candidate RHOV effectors were identified in the high throughput screens by Aspenström et al. 2004 and Bagci et al. 2020; the biological roles of these interactions have not been characterized:

ARHGEF7 (Bagci et al. 2020)

CCP110 (Bagci et al. 2020)

CDC42 (Bagci et al. 2020)

CEP97 (Bagci et al. 2020)

CLTC (Bagci et al. 2020)

DEPDC1B (Bagci et al. 2020)

DLG5 (Bagci et al. 2020)

DST (Bagci et al. 2020)

EPHA2 (Bagci et al. 2020)

GIT1 (Bagci et al. 2020)

GIT2 (Bagci et al. 2020)

IQGAP1 (Bagci et al. 2020)

MAP3K11 (Aspenström et al. 2004)

MAP3K21 (Bagci et al. 2020)

MYH11 (Bagci et al. 2020)

MYL12B (Bagci et al. 2020)

MYO6 (Bagci et al. 2020)

NCK1 (Bagci et al. 2020)

NCK2 (Bagci et al. 2020);

PAK4 (Aspenström et al. 2004; Bagci et al. 2020: weak interaction)

PARD6A (Aspenström et al. 2004)

PARD6B (Bagci et al. 2020: weak interaction)

PEAK1 (Bagci et al. 2020)

SH3RF1 (Bagci et al. 2020)

SPTAN1 (Bagci et al. 2020)

SPTBN1 (Bagci et al. 2020)

TPM3 (Bagci et al. 2020)

TPM4 (Bagci et al. 2020)

TXNL1 (Bagci et al. 2020)

USP9X (Bagci et al. 2020)

VANGL1 (Bagci et al. 2020)

WASL (Aspenström et al. 2004; Bagci et al. 2020)
WDR6 (Bagci et al. 2020)
ZNF512B (Bagci et al. 2020)

Active RHOV does not bind the following putative effector proteins which do bind active RHOU:

HGS (Bagci et al. 2020)
PAK3 (Bagci et al. 2020)
STAM (Bagci et al. 2020)
STAM2 (Bagci et al. 2020)
WWP2 (Bagci et al. 2020)

Preceded by: [RHOV binds GTP](#)




Literature references

- Aronheim, A., Belisle, B., Cohen, A., Abo, A., Fritsch, A., Broder, YC. (1998). Chp, a homologue of the GTPase Cdc42Hs, activates the JNK pathway and is implicated in reorganizing the actin cytoskeleton. *Curr. Biol.*, 8, 1125-8 . [↗](#)
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- Shepelev, MV., Korobko, IV. (2012). Pak6 protein kinase is a novel effector of an atypical Rho family GTPase Chp/RhoV. *Biochemistry Mosc.*, 77, 26-32. [↗](#)

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