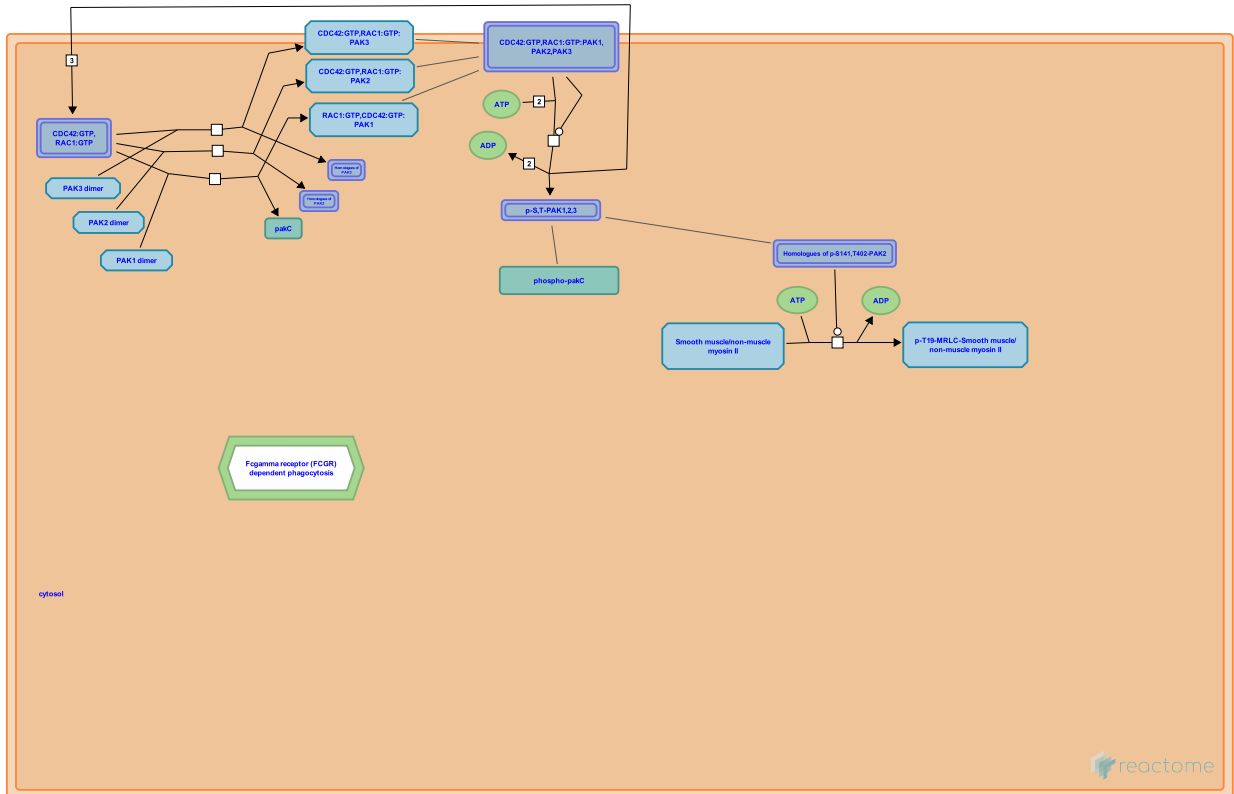


# RHO GTPases activate PAKs



European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

The contents of this document may be freely copied and distributed in any media, provided the authors, plus the institutions, are credited, as stated under the terms of [Creative Commons Attribution 4.0 International \(CC BY 4.0\) License](https://creativecommons.org/licenses/by/4.0/). For more information see our [license](https://creativecommons.org/licenses/by/4.0/).

## 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

- Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics*, 18, 142. [↗](#)
- Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics*, 33, 3461-3467. [↗](#)
- Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res*, 46, D649-D655. [↗](#)
- 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. [↗](#)

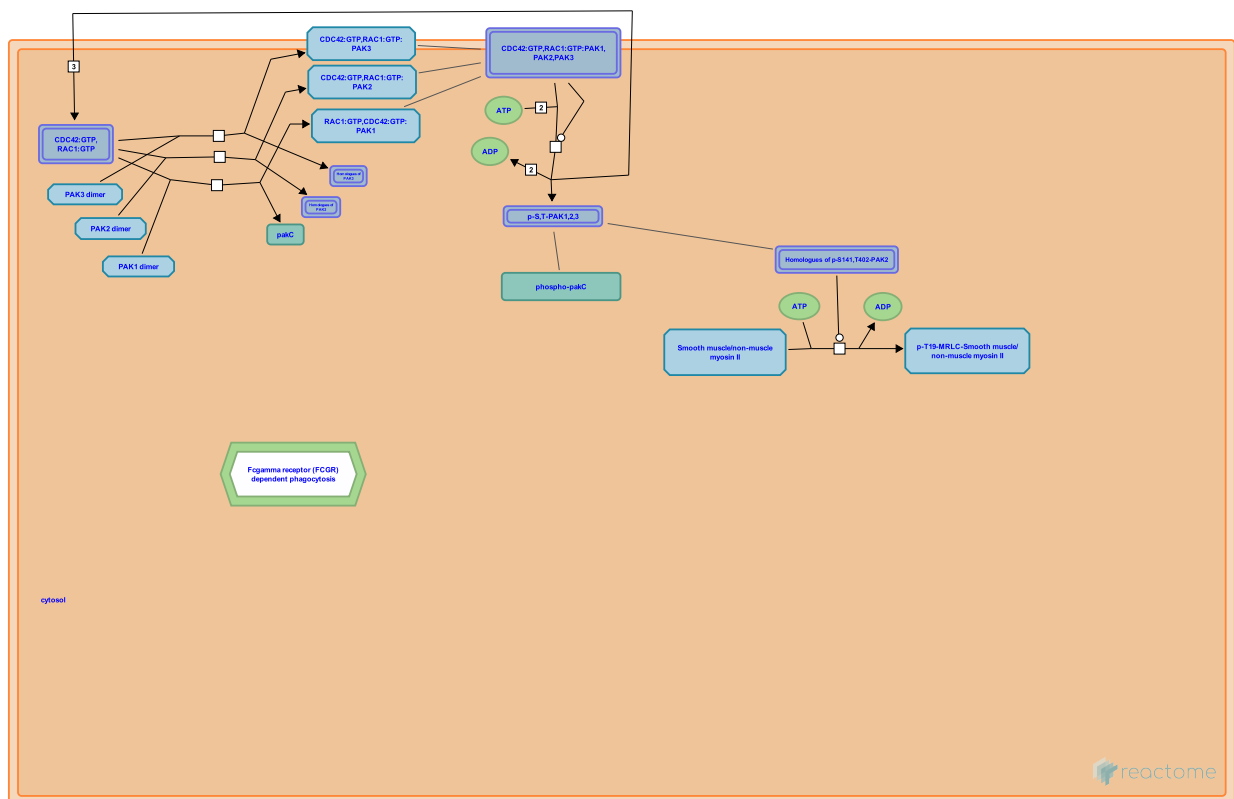
Reactome database release: 74

This document contains 1 pathway and 5 reactions ([see Table of Contents](#))

## RHO GTPases activate PAKs ↗

Stable identifier: R-DDI-5627123

Inferred from: RHO GTPases activate PAKs (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

## RAC1 and CDC42 activate PAK1 ↗

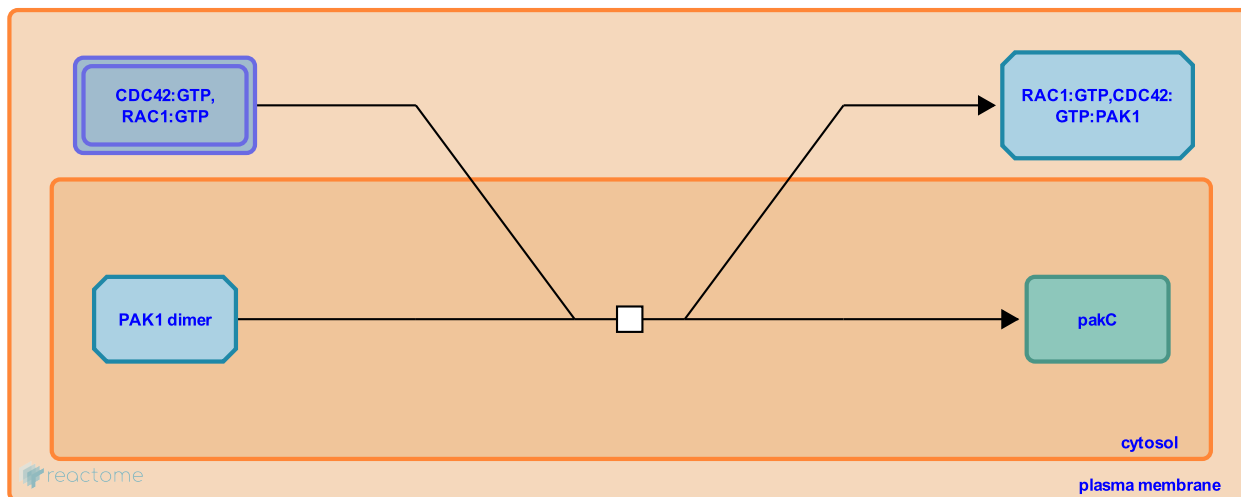
**Location:** [RHO GTPases activate PAKs](#)

**Stable identifier:** R-DDI-2029456

**Type:** transition

**Compartments:** cytosol, plasma membrane

**Inferred from:** [RAC1 and CDC42 activate PAK1 \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

**Followed by:** [Autophosphorylation of PAK1,2,3](#)

## RAC1 and CDC42 activate PAK2 ↗

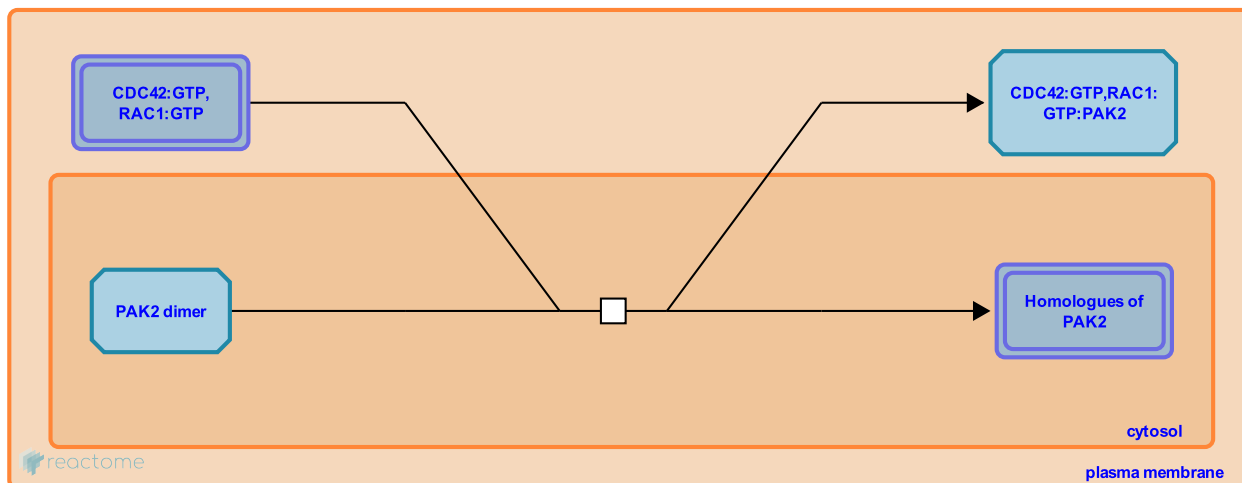
**Location:** [RHO GTPases activate PAKs](#)

**Stable identifier:** R-DDI-8981931

**Type:** transition

**Compartments:** cytosol, plasma membrane

**Inferred from:** [RAC1 and CDC42 activate PAK2 \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

**Followed by:** [Autophosphorylation of PAK1,2,3](#)

## RAC1 and CDC42 activate PAK3 ↗

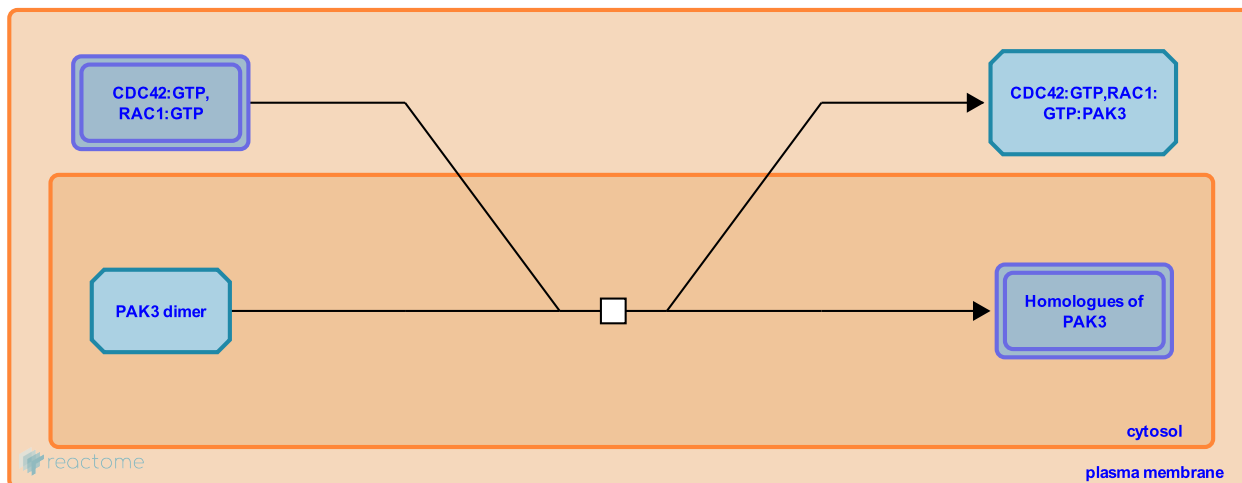
**Location:** [RHO GTPases activate PAKs](#)

**Stable identifier:** R-DDI-8981926

**Type:** transition

**Compartments:** cytosol, plasma membrane

**Inferred from:** [RAC1 and CDC42 activate PAK3 \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

**Followed by:** [Autophosphorylation of PAK1,2,3](#)

## Autophosphorylation of PAK1,2,3 ↗

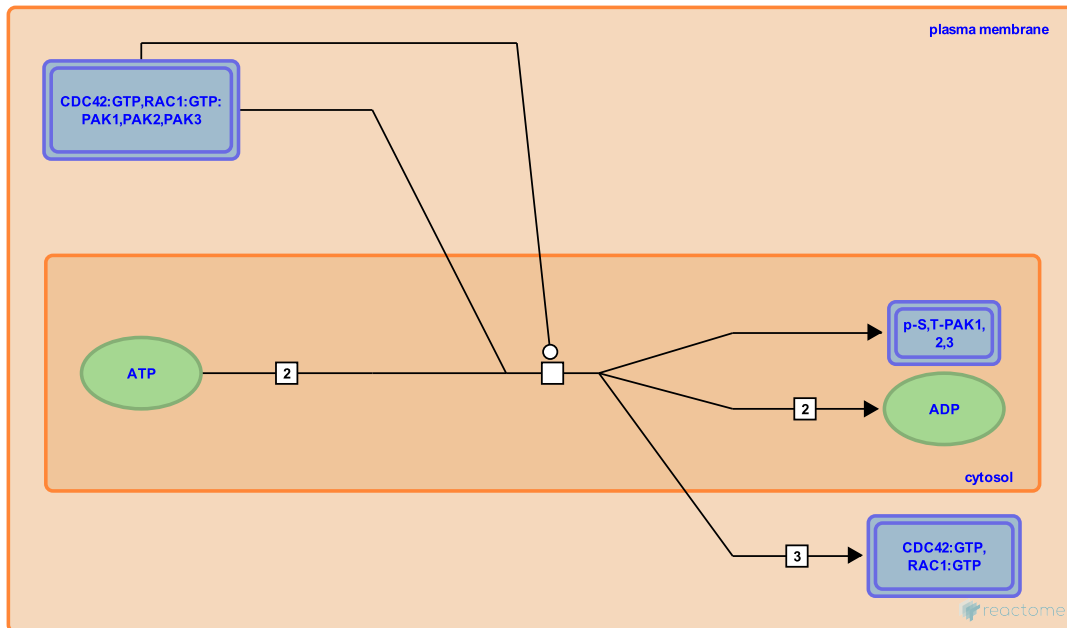
**Location:** RHO GTPases activate PAKs

**Stable identifier:** R-DDI-5627775

**Type:** transition

**Compartments:** cytosol, plasma membrane

**Inferred from:** Autophosphorylation of PAK1,2,3 (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

**Preceded by:** RAC1 and CDC42 activate PAK1, RAC1 and CDC42 activate PAK2, RAC1 and CDC42 activate PAK3

**Followed by:** PAK2 phosphorylates myosin regulatory light chain (MRLC)

## PAK2 phosphorylates myosin regulatory light chain (MRLC) ↗

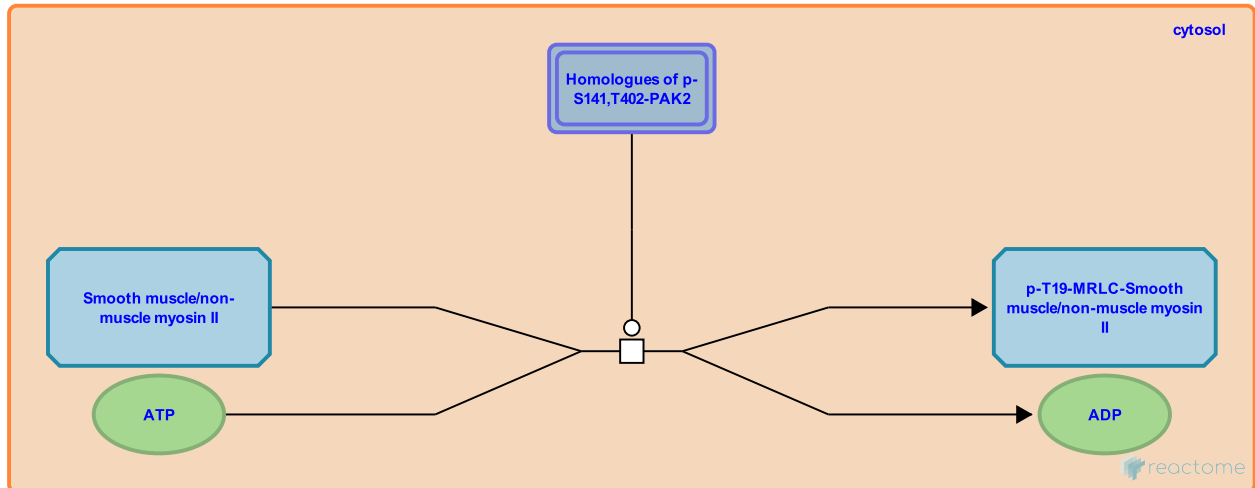
**Location:** [RHO GTPases activate PAKs](#)

**Stable identifier:** R-DDI-5668932

**Type:** transition

**Compartments:** cytosol

**Inferred from:** [PAK2 phosphorylates myosin regulatory light chain \(MRLC\) \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

**Preceded by:** [Autophosphorylation of PAK1,2,3](#)



# Table of Contents

Introduction	1
❏ RHO GTPases activate PAKs	2
↳ RAC1 and CDC42 activate PAK1	3
↳ RAC1 and CDC42 activate PAK2	4
↳ RAC1 and CDC42 activate PAK3	5
↳ Autophosphorylation of PAK1,2,3	6
↳ PAK2 phosphorylates myosin regulatory light chain (MRLC)	7
Table of Contents	8