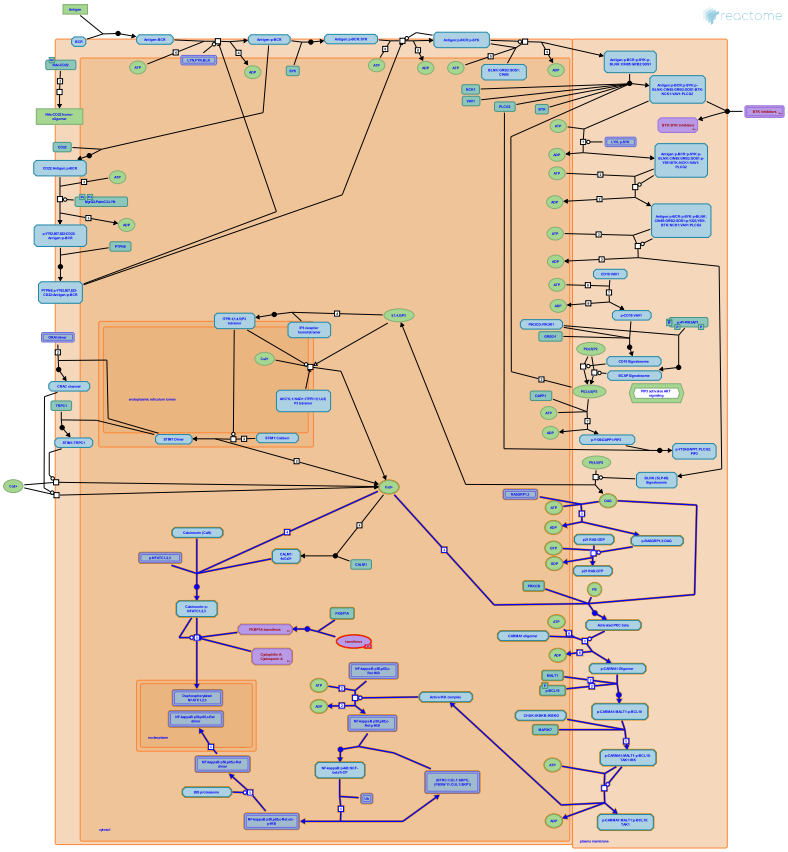
Downstream signaling events of B Cell Receptor (BCR)



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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.
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).

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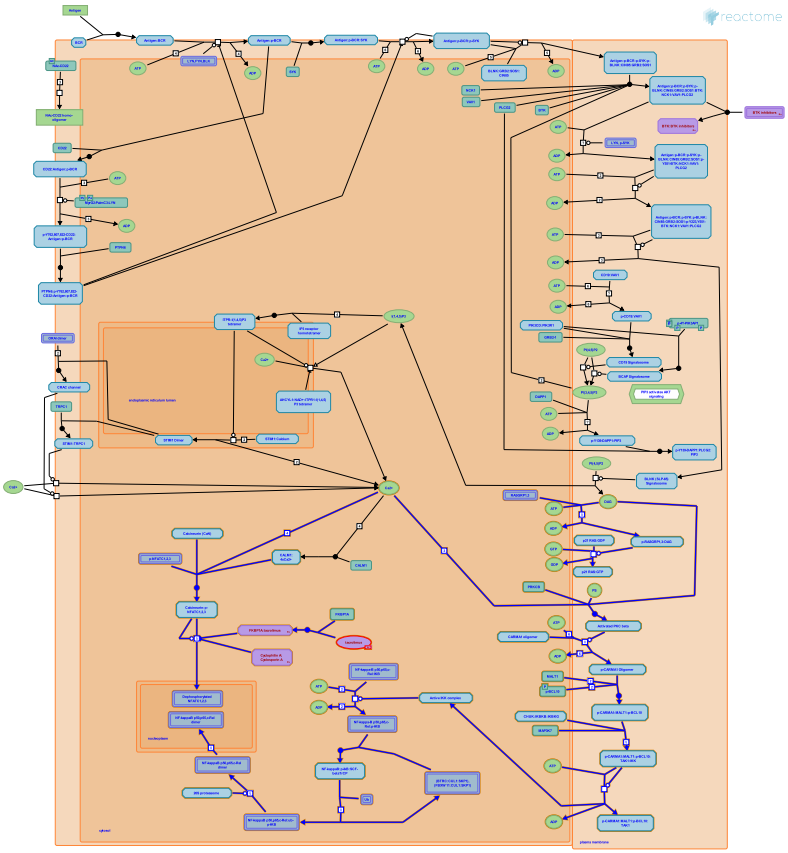
Downstream signaling events of B Cell Receptor (BCR) ↗

Stable identifier: R-HSA-1168372

Compartments: cytosol, nucleoplasm



Second messengers (calcium, diacylglycerol, inositol 1,4,5-trisphosphate, and phosphatidyinositol 3,4,5-trisphosphate) trigger signaling pathways: NF-kappaB is activated via protein kinase C beta, RAS via RasGRP proteins, NF-AT via calcineurin, and AKT via PDK1 (reviewed in Shinohara and Kurosaki 2009, Stone 2006).

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Editions

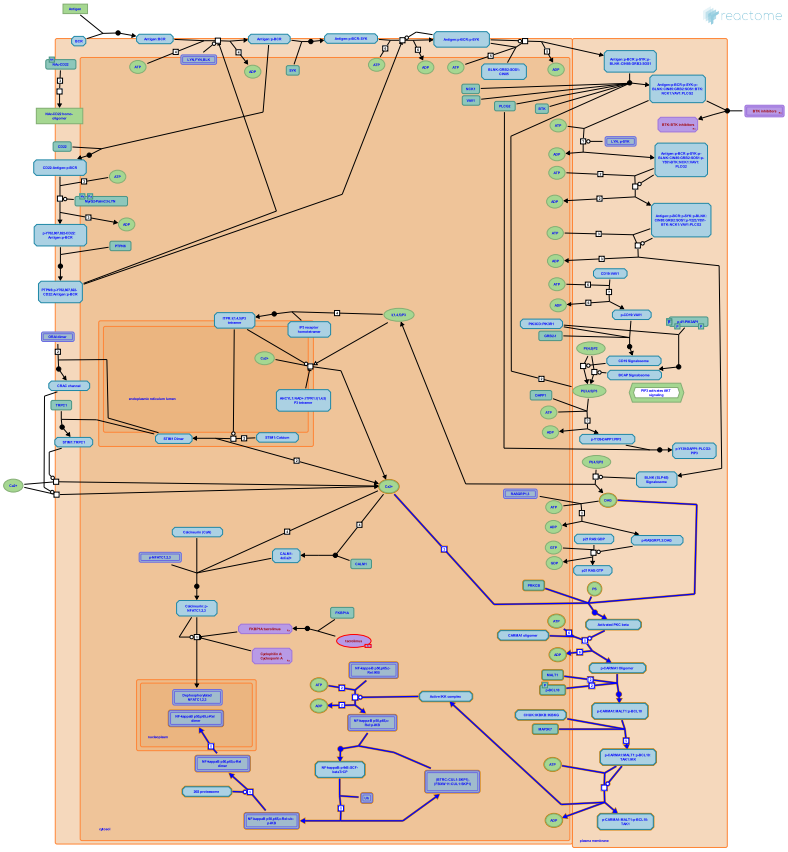
2010-12-09	Authored, Edited	May, B.
2012-02-12	Reviewed	Wienands, J.

Activation of NF-kappaB in B cells ↗

Location: Downstream signaling events of B Cell Receptor (BCR)

Stable identifier: R-HSA-1169091

Compartments: cytosol, nucleoplasm, plasma membrane



DAG and calcium activate protein kinase C beta (PKC-beta, Kochs et al. 1991) which phosphorylates CARMA1 and other proteins (Sommer et al. 2005). Phosphorylated CARMA1 recruits BCL10 and MALT1 to form the CBM complex (Sommer et al. 2005, Tanner et al. 2007) which, in turn, recruits the kinase TAK1 and the IKK complex (Sommer et al. 2005, Shinohara et al. 2005 using chicken cells). TAK1 phosphorylates the IKK-beta subunit, activating it (Wang et al. 2001). The IKK complex then phosphorylates IkB complexed with NF-kappaB dimers in the cytosol (Zandi et al. 1998, Burke et al. 1999, Heilker et al. 1999), resulting in the degradation of IkB (Miyamoto et al. 1994, Traenckner et al. 1994, Alkalay et al. 1995, DiDonato et al. 1995, Li et al. 1995, Lin et al. 1995, Scherer et al. 1995, Chen et al. 1995). NF-kappaB dimers are thereby released and are translocated to the nucleus where they activate transcription (Baeuerle and Baltimore 1988, Blank et al. 1991, Ghosh et al. 2008, Fagerlund et al. 2008).

Literature references

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Editions

2011-01-04	Authored, Edited	May, B.
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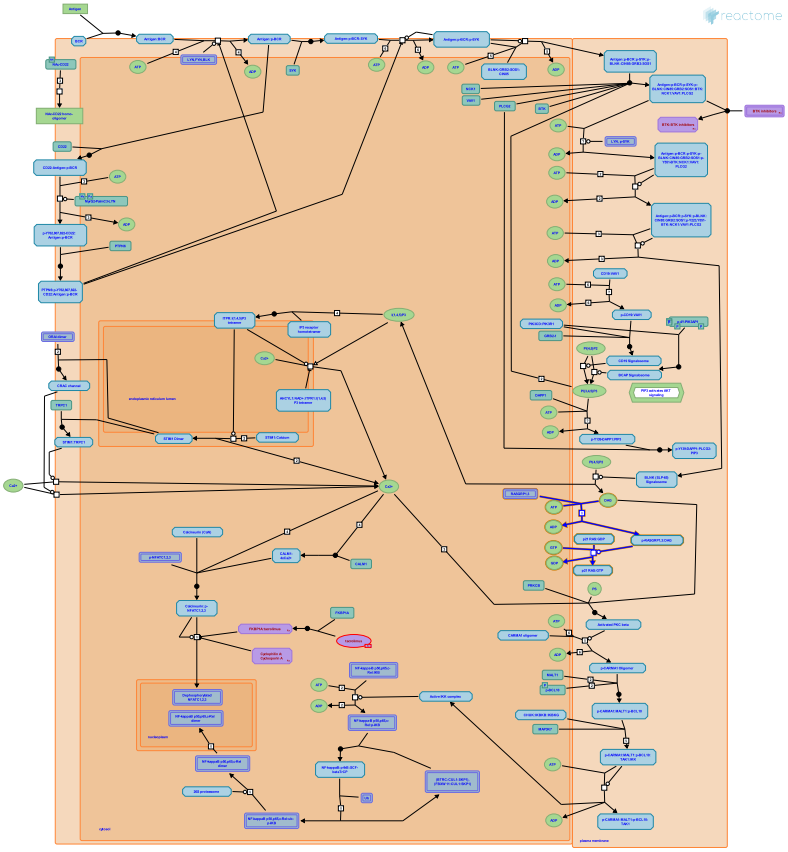
Activation of RAS in B cells ↗

Location: Downstream signaling events of B Cell Receptor (BCR)

Stable identifier: R-HSA-1169092

Compartments: plasma membrane, cytosol



RasGRP1 and RasGRP3 bind diacylglycerol at the plasma membrane (Lorenzo et al. 2001) and are phosphorylated by protein kinase C (Teixeira et al. 2003, Zheng et al. 2005). Phosphorylated RasGRP1 (Roose et al. 2007) and RasGRP3 (Ohba et al. 2000, Yamashita et al. 2000, Rebhun et al. 2000, Lorenzo et al. 2001) then catalyze the exchange of GDP for GTP bound by RAS, thereby activating RAS.

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Editions

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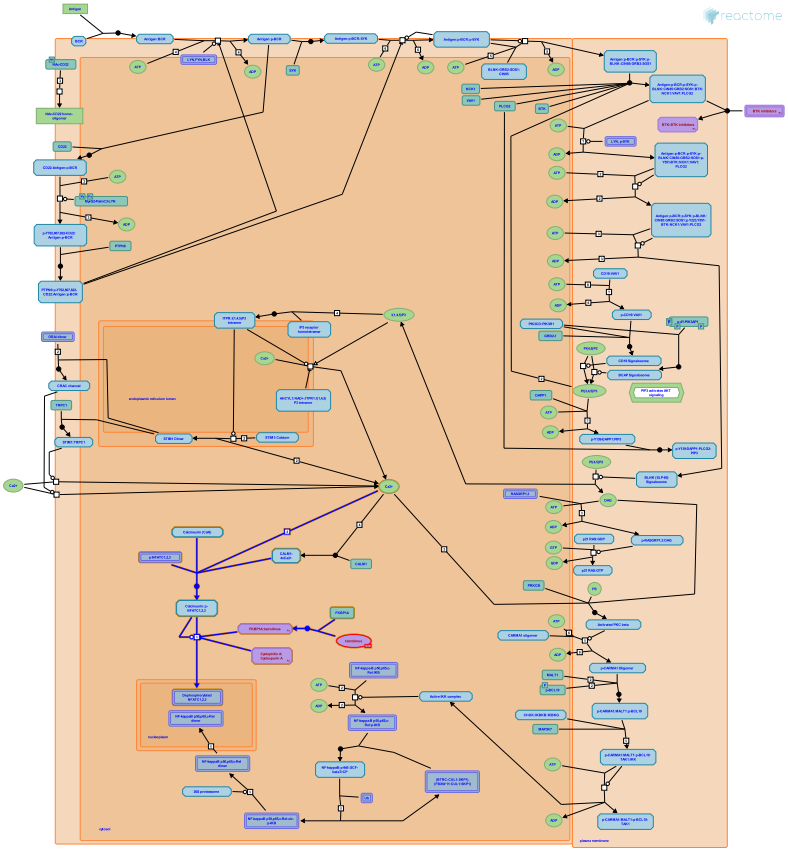
Calcineurin activates NFAT ↗

Location: Downstream signaling events of B Cell Receptor (BCR)

Stable identifier: R-HSA-2025928

Compartments: nucleoplasm, cytosol



Signaling by the B cell receptor and the T cell receptor stimulate transcription by NFAT factors via calcium (reviewed in Gwack et al. 2007). Cytosolic calcium from intracellular stores and extracellular sources binds calmodulin and activates the protein phosphatase calcineurin. Activated calcineurin dephosphorylates NFATs in the cytosol, exposing nuclear localization sequences on the NFATs and causing the NFATs to be imported into the nucleus where they regulate transcription of target genes in complexes with other transcription factors such as AP-1 and JUN. Calcineurin in the target of the immunosuppressive drugs cyclosporin A and FK-506 (reviewed in Lee and Park 2006).

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