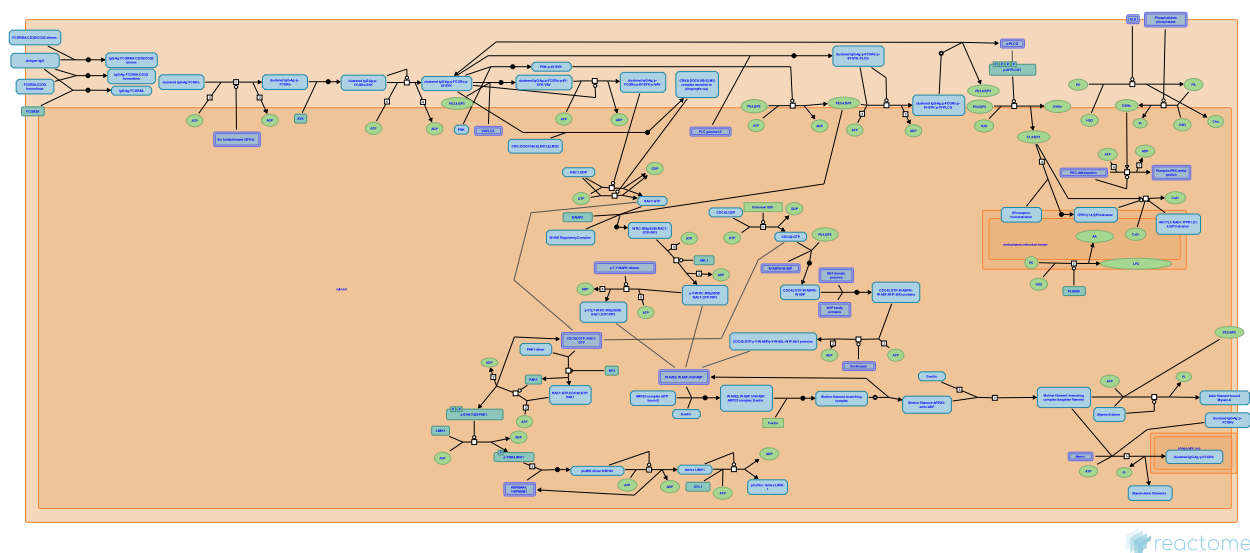


Fcgamma receptor (FCGR) dependent phagocytosis



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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/page/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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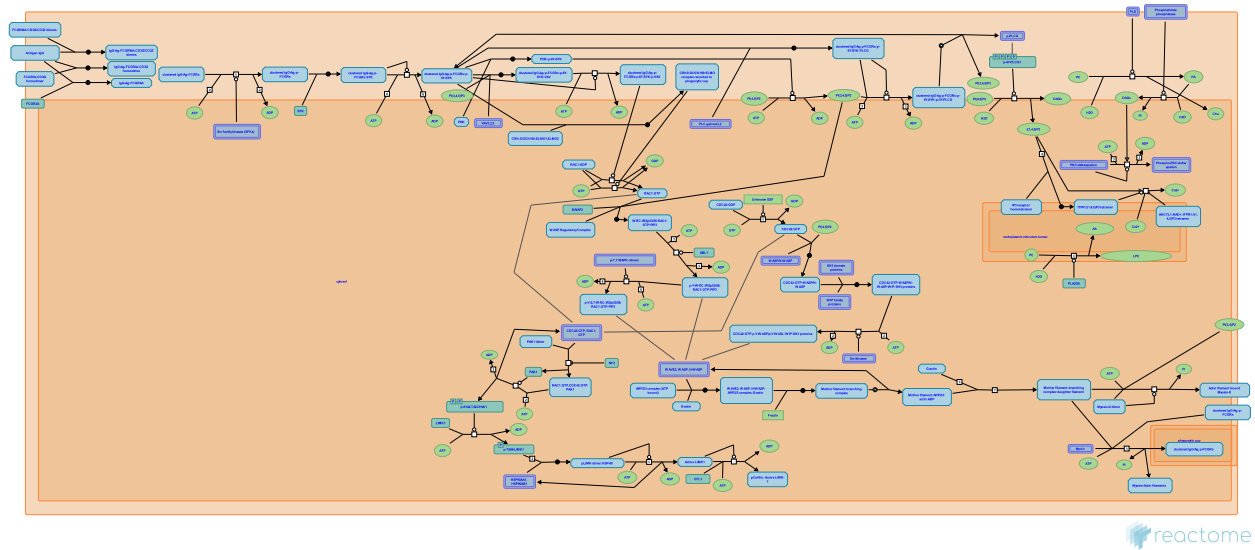
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Reactome database release: 88

This document contains 4 pathways ([see Table of Contents](#))

Fc gamma receptor (FCGR) dependent phagocytosis ↗

Stable identifier: R-HSA-2029480



Phagocytosis is one of the important innate immune responses that function to eliminate invading infectious agents. Monocytes, macrophages, and neutrophils are the professional phagocytic cells. Phagocytosis is a complex process involving the recognition of invading foreign particles by specific types of phagocytic receptors and the subsequent internalization of the particles. Fc gamma receptors (FCGRs) are among the best studied phagocytic receptors that bind to Fc portion of immunoglobulin G (IgG). Through their antigen binding F(ab) end, antibodies bind to specific antigen while their constant (Fc) region binds to FCGRs on phagocytes. The clustering of FCGRs by IgG antibodies on the phagocyte initiates a variety of signals, which lead, through the reorganisation of actin cytoskeleton and membrane remodelling, to the formation of pseudopod and phagosome. Fc gamma receptors are classified into three classes: FCGR1, FCGR2 and FCGR3. Each class of these FCGRs consists of several individual isoforms. Among all these isoforms FCGR1, FCGR2A and FCGR3A, are able to mediate phagocytosis (Joshi et al. 2006, Garcia Garcia & Rosales 2002, Nimmerjahn & Ravetch 2006).

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Editions

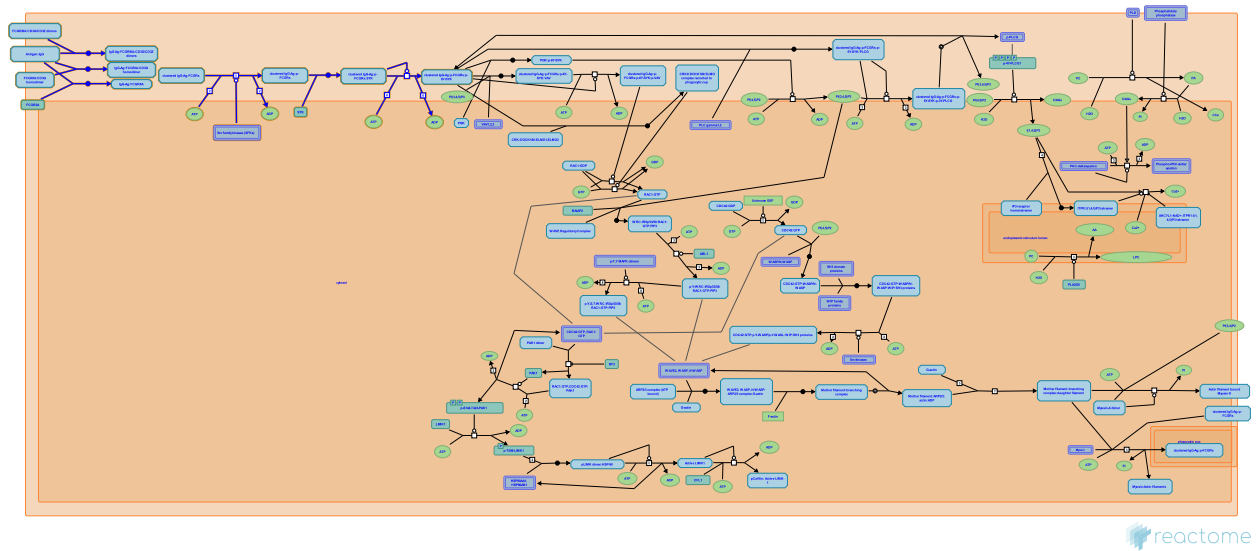
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2012-05-15	Reviewed	Rosales, C.

FCGR activation

Location: Fcgamma receptor (FCGR) dependent phagocytosis

Stable identifier: R-HSA-2029481

Compartments: plasma membrane, cytosol



Cross-linking of FCGRs with IgG coated immune complexes results in tyrosine phosphorylation of the immuno tyrosine activation motif (ITAMs) of the receptor by membrane-bound tyrosine kinases of the SRC family. The phosphorylated ITAM tyrosines serve as docking sites for Src homology 2 (SH2) domain-containing SYK kinase. Recruitment and activation of SYK is critical for FCGR-mediated signaling in phagocytosis, but the exact role of SYK in this process is unclear. Activated SYK then transmits downstream signals leading to actin polymerization and particle internalization.

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Rosales, C., García-García, E. (2002). Signal transduction during Fc receptor-mediated phagocytosis. *J Leukoc Biol*, 72, 1092-108. [↗](#)

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Editions

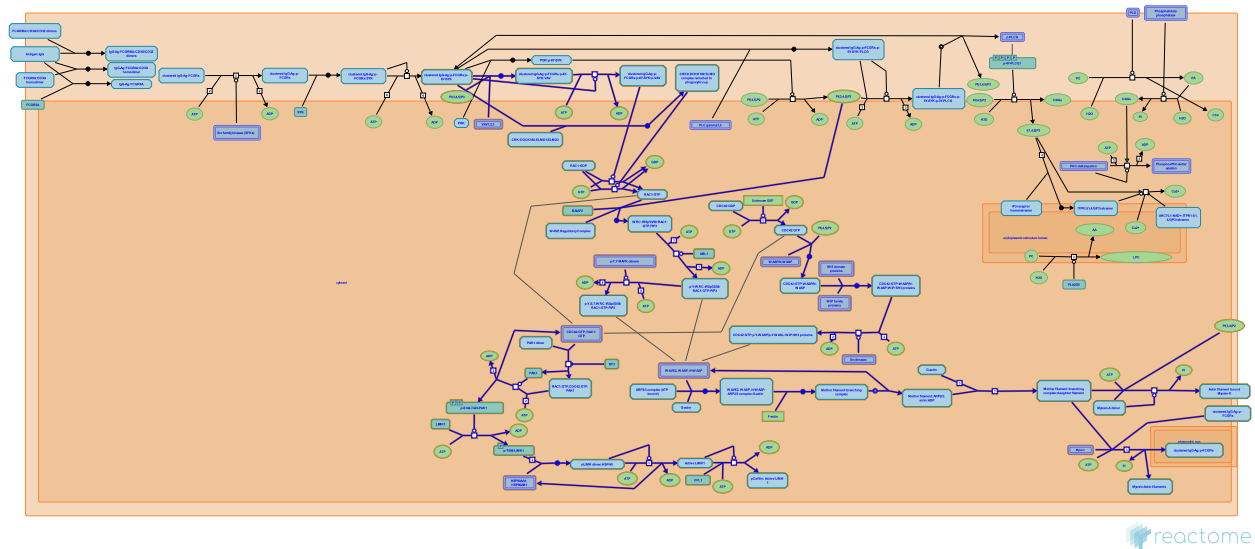
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Regulation of actin dynamics for phagocytic cup formation ↗

Location: Fcγ receptor (FCGR) dependent phagocytosis

Stable identifier: R-HSA-2029482

Compartments: cytosol, extracellular region, plasma membrane



The actin cytoskeleton is fundamental for phagocytosis and members of the Rho family GTPases RAC and CDC42 are involved in actin cytoskeletal regulation leading to pseudopod extension. Active RAC and CDC42 exert their action through the members of WASP family proteins (WASP/N-WASP/WAVE) and ARP2/3 complex. Actin filaments move from the bottom toward the top of the phagocytic cup during pseudopod extension.

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Editions

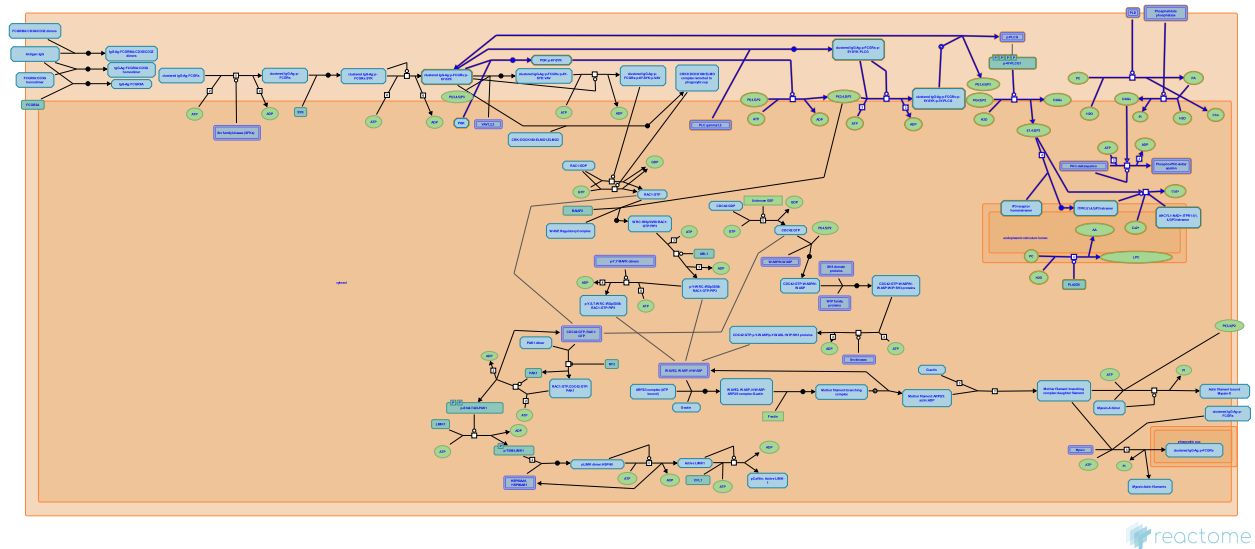
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Role of phospholipids in phagocytosis ↗

Location: Fcγ receptor (FCGR) dependent phagocytosis

Stable identifier: R-HSA-2029485

Compartments: plasma membrane, cytosol



Phospholipases play an integral role in phagocytosis by generating essential second messengers. An early step in phagocytic signaling is the association of PIP2 and IP3 with the phagocytic cup. These are formed by the activity of phosphoinositol kinases and phospholipases. PI3K has been shown to accumulate at phagocytic cups and converts PI (4,5)P2 to PI (3,4,5)P3. These phosphoinositides are capable of binding and increasing the activity of proteins that regulate the actin cytoskeleton. Phospholipases are lipid modifying enzymes that produce lipid mediators such as diacylglycerol (DAG), arachidonic acid (AA) and IP3. Phospholipases PLA, PLC and PLD have been shown to be involved in antibody (IgG) mediated phagocytosis. The PLC product IP3 stimulates release of calcium from the endoplasmic reticulum. This Ca²⁺ concentration increase is greatest in the cytoplasm surrounding the phagocytic cup. Calcium is involved in the various stages of phagosome formation, including phagocytic ingestion and phagosome maturation.

Literature references

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