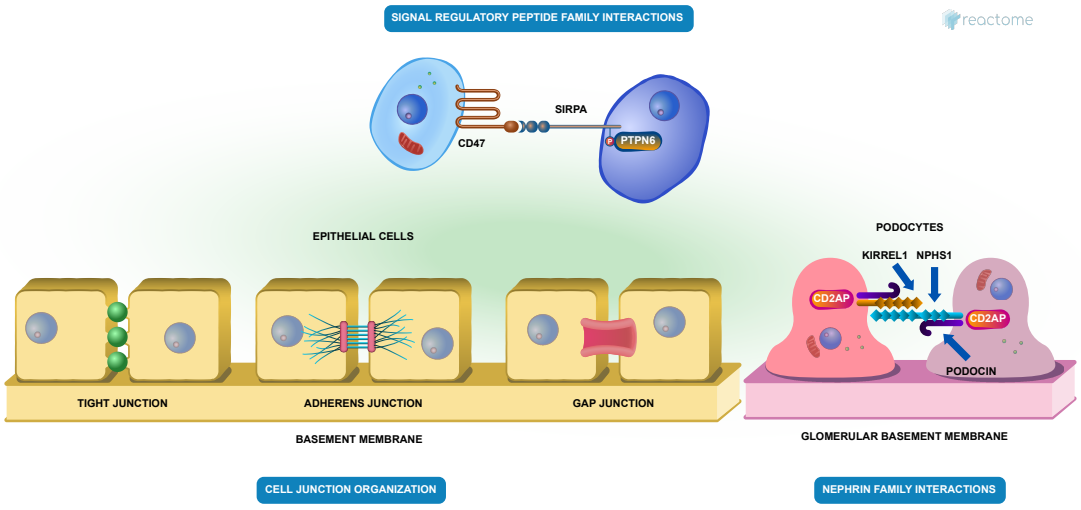
# Cell-Cell communication

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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.

04/05/2024

# 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).

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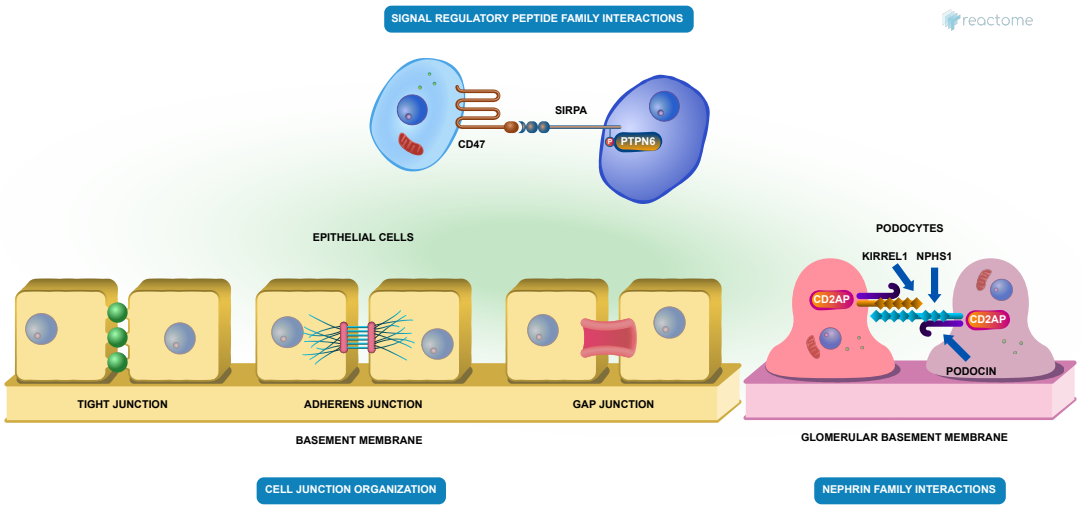
Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res, 46*, D649-D655. ↗

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. ↗

## Cell-Cell communication ↗

**Stable identifier:** R-HSA-1500931




Cell-to-Cell communication is crucial for multicellular organisms because it allows organisms to coordinate the activity of their cells. Some cell-to-cell communication requires direct cell-cell contacts mediated by receptors on their cell surfaces. Members of the immunoglobulin superfamily (IgSF) proteins are some of the cell surface receptors involved in cell-cell recognition, communication and many aspects of the axon guidance and synapse formation-the crucial processes during embryonal development (Rougon & Hobert 2003).

Processes annotated here as aspects of **cell junction organization** mediate the formation and maintenance of adherens junctions, tight junctions, and gap junctions, as well as aspects of cellular interactions with extracellular matrix and hemidesmosome assembly. **Nephrin protein family interactions** are central to the formation of the slit diaphragm, a modified adherens junction. Interactions among members of the **signal regulatory protein family** are important for the regulation of migration and phagocytosis by myeloid cells.

## Literature references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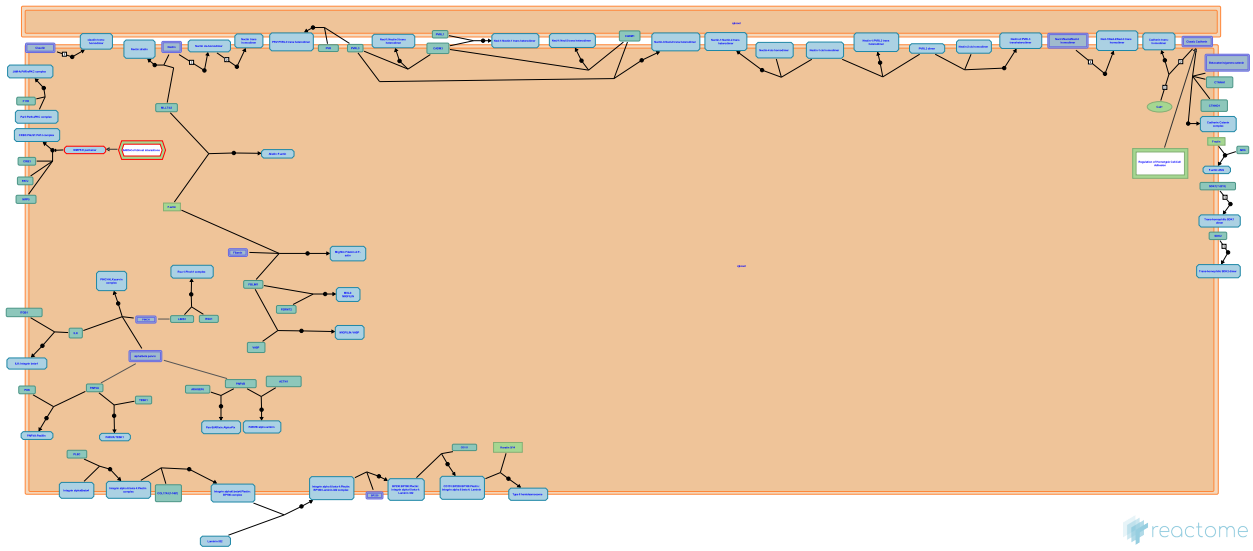
## Editions

| | | |
|---|---|---|
| 2011-08-23 | Authored, Edited | Garapati, P V. |

## Cell junction organization ↗

**Location:** Cell-Cell communication

**Stable identifier:** R-HSA-446728




Cell junction organization in Reactome currently covers aspects of cell-cell junction organization, cell-extracellular matrix interactions, and Type I hemidesmosome assembly.

## Editions

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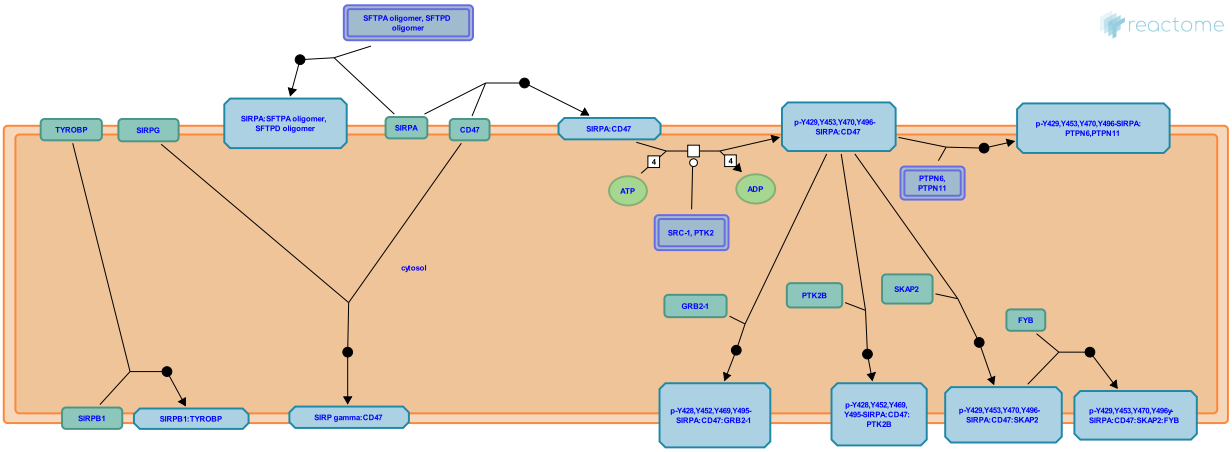
|---|---|---|
| 2009-11-17 | Edited | Matthews, L. |

## Signal regulatory protein family interactions ↗

**Location:** Cell-Cell communication

**Stable identifier:** R-HSA-391160

**Compartments:** plasma membrane




Signal regulatory protein alpha (SIRPA, SHPS1, CD172a) is a transmembrane protein expressed mostly on myeloid cells. CD47, a widely expressed transmembrane protein, is a ligand for SIRP alpha, with the two proteins constituting a cell-cell communication system. The interaction of SIRPA with CD47 is important for the regulation of migration and phagocytosis. SIRPA functions as a docking protein to recruit and activate PTPN6 (SHP-1) or PTPN11 (SHP-2) at the cell membrane in response to extracellular stimuli. SIRPA also binds other intracellular proteins including the adaptor molecules Src kinase-associated protein (SKAP2 SKAP55hom/R), Fyn-binding protein/SLP-76-associated phosphoprotein (FYB/SLAP-130) and the tyrosine kinase PYK2. SIRPA also binds the extracellular proteins, surfactant-A (SP-A) and surfactant-D (SP-D).
The SIRP family members SIRPB and SIRPG show high sequence similarity and similar extracellular structural topology, including three Ig domains, but their ligand binding topology might differ. SIRPB is expressed on myeloid cells, including monocytes, granulocytes and DCs. It has no known natural ligand. SIRPG can bind CD47 but with lower affinity than SIRPA.

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## Editions

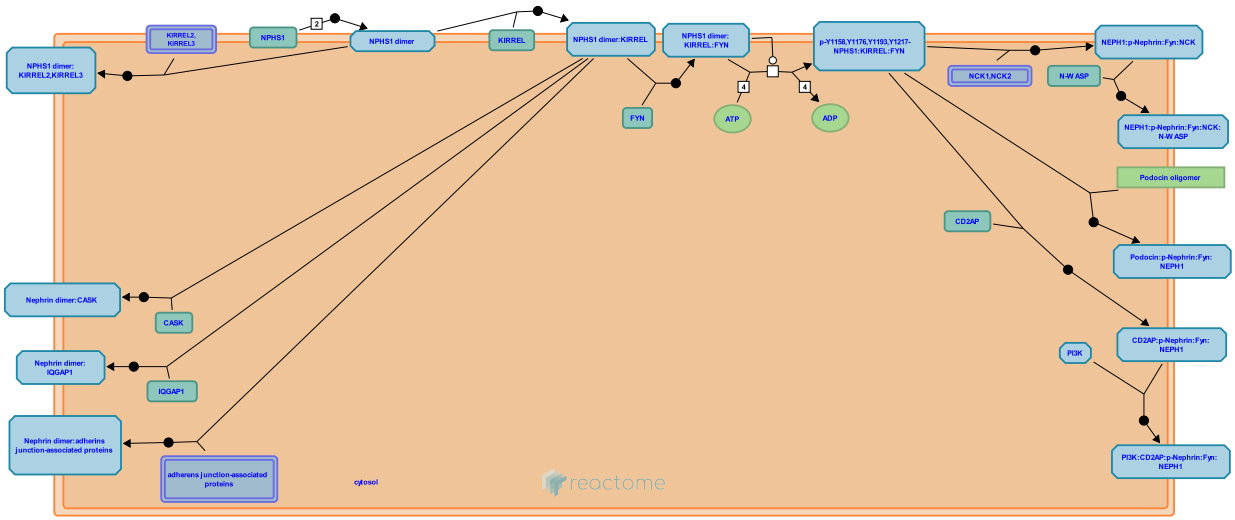
| | | |
|---|---|---|
| 2009-02-12 | Authored, Edited | Garapati, P V. |
| 2010-05-20 | Reviewed | Barclay, AN. |

## Nephrin family interactions ↗

**Location:** Cell-Cell communication

**Stable identifier:** R-HSA-373753

**Compartments:** plasma membrane




Nephrin (NPHS1) is a member of the Super-IgG-Molecule family and is most prominently expressed in kidney podocytes. It is a major if not the most important structural component of the slit diaphragm, a modified adherens junction in between these cells. NPHS1 has an extracellular domain that contains eight distal IgG like domains and one proximal fibronectin type III domain, a transmembrane domain and a short intracellular domain. NPHS1 molecules show both homophilic and heterophilic interactions. Among heterophilic interaction partners, slit diaphragm proteins such as Kin of IRRE-like protein 1 (KIRREL, Nephrin-like protein 1, NEPH1), KIRREL3 (NEPH2) and KIRREL2 (NEPH3) were shown to stabilize the slit diaphragm structure. Intracellularly Podocin (NPHS2), CD2 associated protein (CD2AP) and adherins junction associated proteins like IQGAP, MAGI, CASK and spectrins all interact with NPHS1. Hence it seems to play a major role in organizing the molecular structure of the slit diaphragm itself and via its binding partners links it to the actin cytoskeleton. NPHS1 tyrosine phosphorylation by the Src kinase FYN initiates the PI3K-AKT signaling cascade, which seems to promote antiapoptotic signals.

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|---|---|---|
| 2008-02-26 | Authored | de Bono, B., Garapati, P V. |
| 2010-03-01 | Edited | Garapati, P V. |
| 2010-05-20 | Reviewed | Huber, TB., Grahammer, Florian. |

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