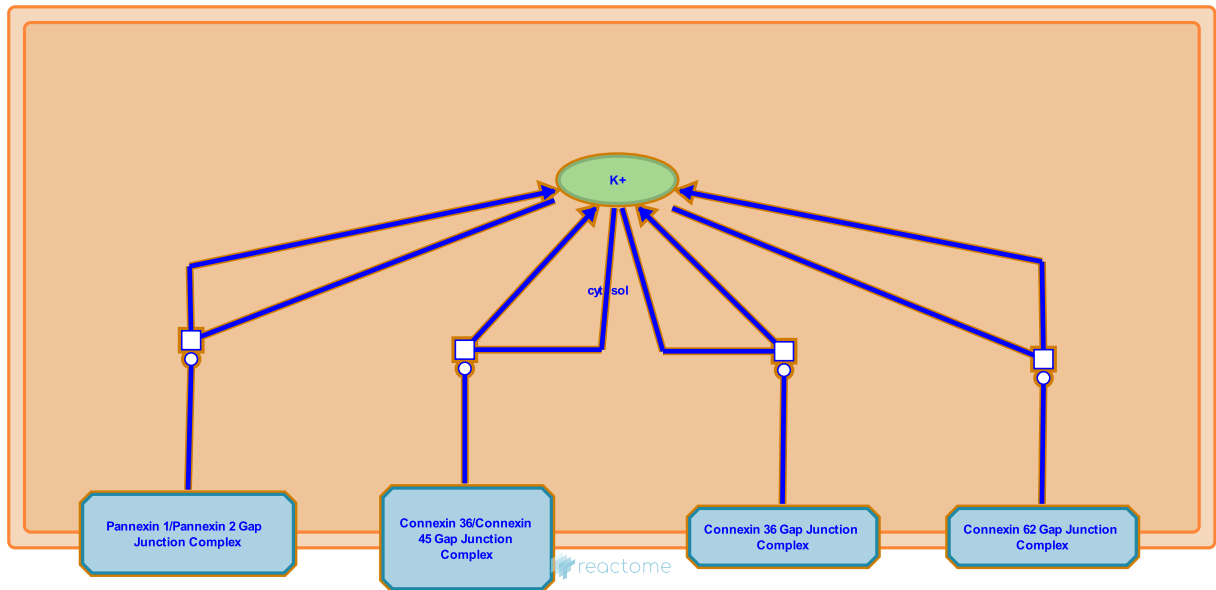


Electric Transmission Across Gap Junctions



Gillespie, ME., Joshi-Tope, G., Rush, MG.

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

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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/).

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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).

Literature references

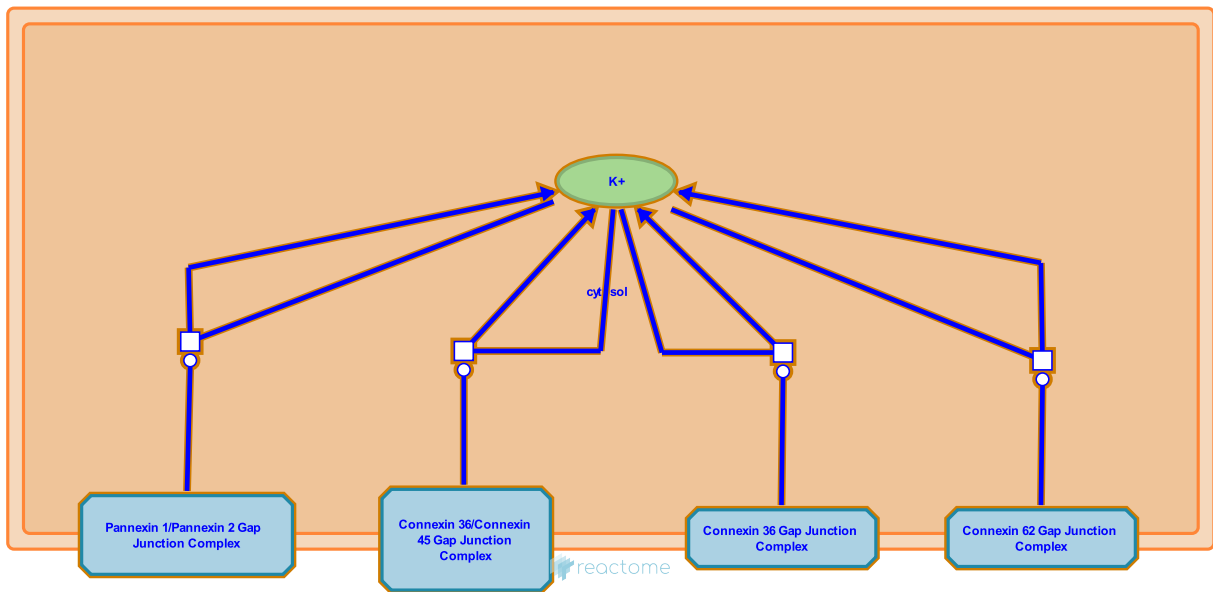
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- Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics*, 33, 3461-3467. [↗](#)
- Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, 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: 88

This document contains 1 pathway and 4 reactions ([see Table of Contents](#))

Electric Transmission Across Gap Junctions ↗

Stable identifier: R-HSA-112303



Electrical synapses are found in all nervous systems, including the human brain. The membranes of the two communicating neurons come extremely close at the synapse and are actually linked together by an intercellular specialization called a gap junction. Gap junctions contain precisely aligned, paired channels in the membrane of the pre- and postsynaptic neurons, such that each channel pair forms a pore. Electrical synapses thus work by allowing ionic current to flow passively through the gap junction pores from one neuron to another. Because passive current flow across the gap junction is virtually instantaneous, communication can occur without the delay that is characteristic of chemical synapses.

Editions

2004-04-22	Authored	Joshi-Tope, G.
2008-01-11	Reviewed	Rush, MG.
2009-03-11	Edited	Gillespie, ME.

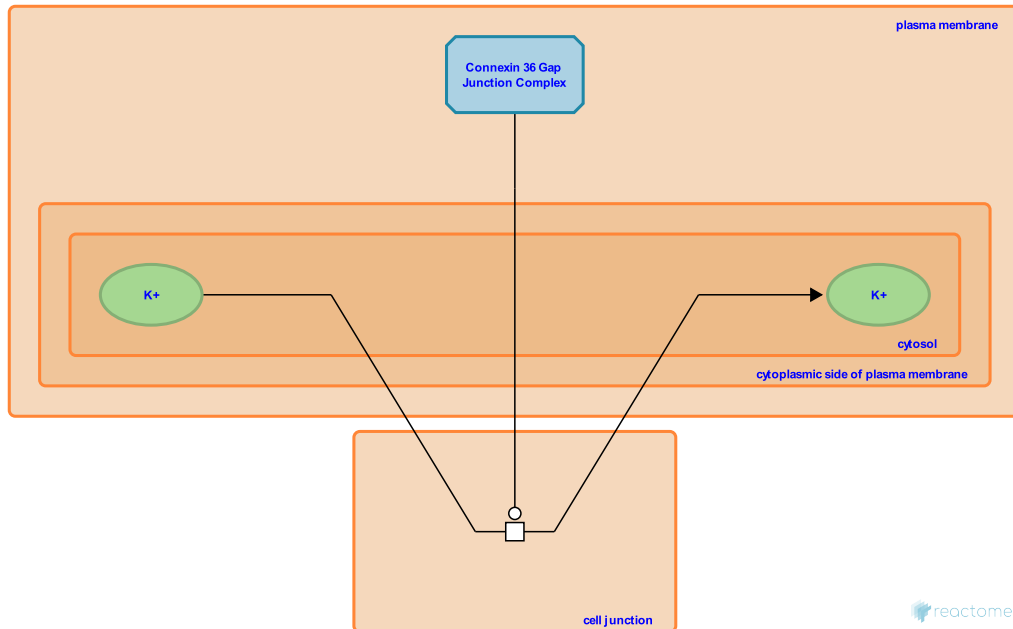
Connexin 36 mediated neuronal gap junction communication [↗](#)

Location: [Electric Transmission Across Gap Junctions](#)

Stable identifier: R-HSA-375342

Type: transition

Compartments: cell junction



In this electrical synapse the current generated in the presynaptic cell spreads to the postsynaptic cell through an ion channel composed of two hemi-channels composed of six Connexin 36 proteins each.

Literature references

Mudo, G., Trovato-Salinaro, A., Hurd, YL., Condorelli, DF., Belluardo, N. (1999). Structure, chromosomal localization, and brain expression of human Cx36 gene. *J Neurosci Res*, 57, 740-52. [↗](#)

Editions

2008-01-11	Reviewed	Rush, MG.
2009-02-23	Authored	Gillespie, ME.
2009-03-11	Edited	Gillespie, ME.

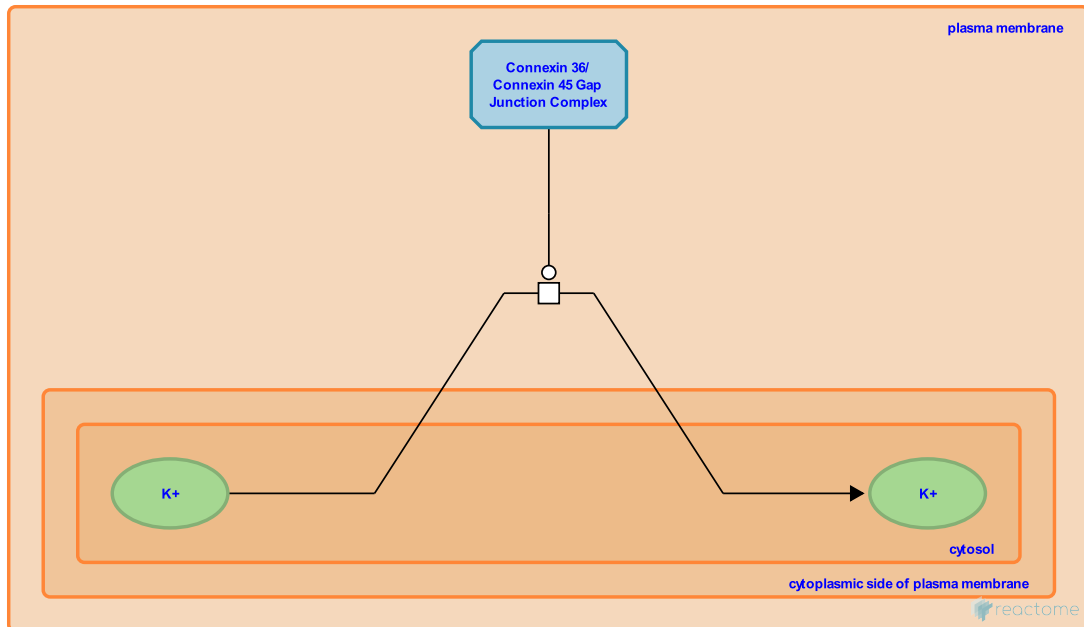
Connexin 45/Connexin 36 mediated neuronal gap junction communication [↗](#)

Location: [Electric Transmission Across Gap Junctions](#)

Stable identifier: R-HSA-375330

Type: transition

Compartments: plasma membrane



In this electrical synapse the current generated in the presynaptic cell spreads to the postsynaptic cell through an ion channel composed of two hemi-channels composed of six Connexin 45 proteins on one hemi-channel and six Connexin 36 proteins on the second.

Literature references

Sasse, P., Maschke, S., de Sevilla Müller, LP., Janssen-Bienhold, U., Dobrowolski, R., Eiberger, B. et al. (2010). Neuronal connexin-36 can functionally replace connexin-45 in mouse retina but not in the developing heart. *J. Cell. Sci.*, 123, 3605-15. [↗](#)

Rogiers, V., Menezes, GB., Leybaert, L., Mennequier, G., Dagli, ML., Decrock, E. et al. (2014). Connexin and pannexin (hemi)channels in the liver. *Front Physiol*, 4, 405. [↗](#)

Editions

2008-01-11	Reviewed	Rush, MG.
2009-02-23	Authored	Gillespie, ME.
2009-03-11	Edited	Gillespie, ME.

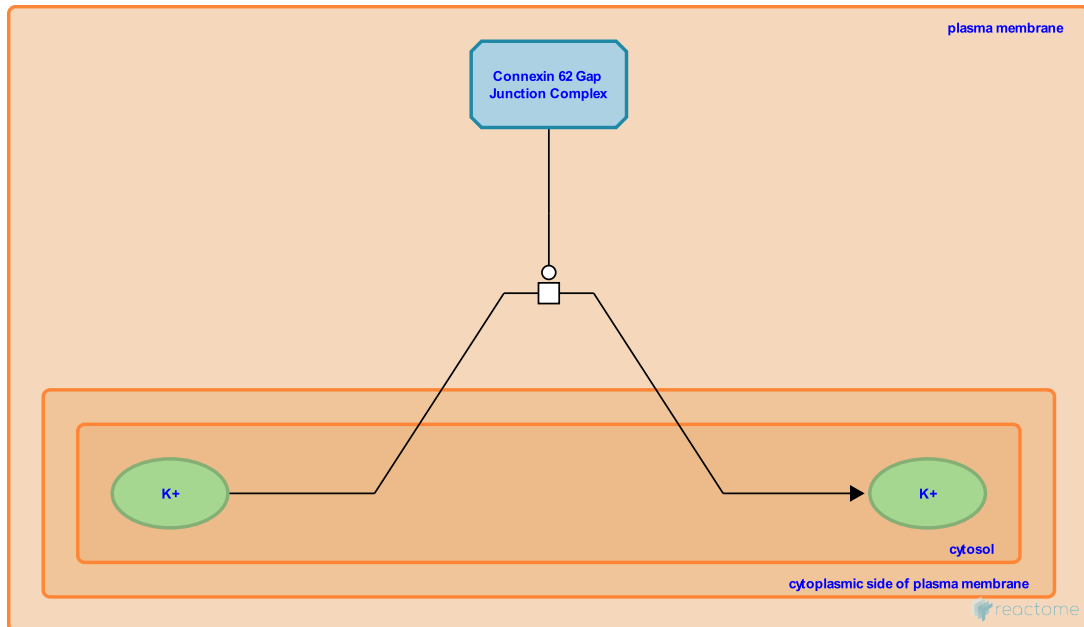
Connexin 62 mediated neuronal gap junction communication [↗](#)

Location: [Electric Transmission Across Gap Junctions](#)

Stable identifier: R-HSA-375340

Type: transition

Compartments: plasma membrane



In this electrical synapse the current generated in the presynaptic cell spreads to the postsynaptic cell through an ion channel composed of two hemi-channels composed of six Connexin 62 proteins each.

Literature references

Söhl, G., Eiberger, J., Willecke, K., Nielsen, PA. (2003). Expression profiles of the novel human connexin genes hCx30.2, hCx40.1, and hCx62 differ from their putative mouse orthologues. *Cell Commun Adhes*, 10, 27-36. [↗](#)

Editions

2008-01-11	Reviewed	Rush, MG.
2009-02-23	Authored	Gillespie, ME.
2009-03-11	Edited	Gillespie, ME.

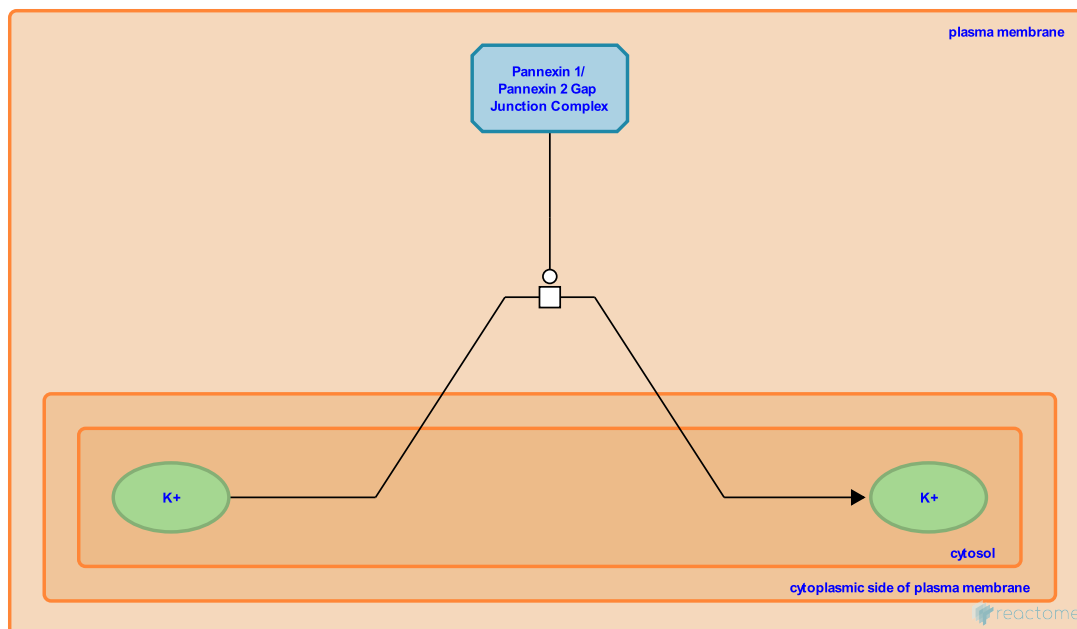
Pannexin 1/Pannexin2 mediated neuronal gap junction communication ↗

Location: [Electric Transmission Across Gap Junctions](#)

Stable identifier: R-HSA-375339

Type: transition

Compartments: plasma membrane



In this electrical synapse the current generated in the presynaptic cell spreads to the postsynaptic cell through an ion channel composed of two hemi-channels composed of six Pannexin 1 proteins on one hemi-channel and six Pannexin 2 proteins on the second.

Literature references

Bruzzone, R., Herb, A., Barbe, MT., Hormuzdi, SG., Monyer, H. (2003). Pannexins, a family of gap junction proteins expressed in brain. *Proc Natl Acad Sci U S A*, 100, 13644-9. ↗

Editions

2008-01-11	Reviewed	Rush, MG.
2009-02-23	Authored	Gillespie, ME.
2009-03-11	Edited	Gillespie, ME.

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