LTCC multimer transports Ca2+ from extracellular region to cytosol

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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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Literature references

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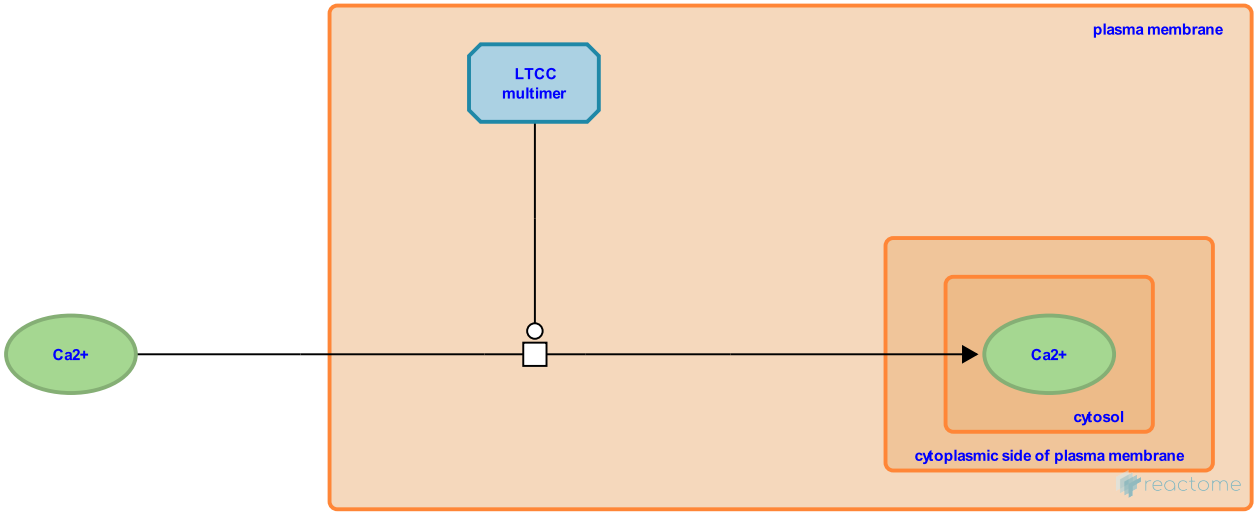
Stable identifier: R-HSA-5577213

Type: transition

Compartments: cytosol, extracellular region, plasma membrane



Voltage-dependent L-type calcium channels (LTCCs) transport Ca2+ into excitable cells. Isoforms CACNA1C, D, F and S form long-lasting (L-type) inward Ca2+ currents (I_{CaL}) and play an important role in excitation-contraction coupling in the heart. LTCCs are multisubunit complexes consisting of alpha-1, alpha-2/delta, beta and gamma subunits in a 1:1:1:1 ratio (Brust et al. 1993). The alpha-2 and delta subunits in these complexes are chains of differing length cleaved from the same gene product (CACNA2D), linked by a disulfide bond (Calderon-Rivera et al. 2012). Pore-forming alpha1 subunits are supported by the auxiliary alpha-2, delta and beta subunits which aid the membrane trafficking of the alpha1 subunit and modulate the kinetic properties of the channel (Klugbauer et al. 2003, Yang et al. 2011). The binding of various gamma subunits to alpha1 subunits may differentially modulate alpha1 subunit function in the heart (Yang et al. 2011). In heart pacemaker cells, phase 0 of the action potential depends upon LTCC-mediated Ca2+ current rather than the fast Na+ current. In cardiac pacemaker cells, phase 1 is due to the closure of LTCCs (and rapid efflux of K+). Specific subunits can form the LTCC in the heart are CACNA1C (pore-forming alpha subunit), CACNA2D2 (alpha-2:delta-2 subunit), CACNB1 and CANCNB2 (either of these beta subunits) and CACNG4, 6, 7 and 8 (any of these gamma subunits).

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Editions

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