Calpain activation

Orlic-Milacic, M., Shah, K.

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

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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

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics, 18*, 142. ↗

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. ↗
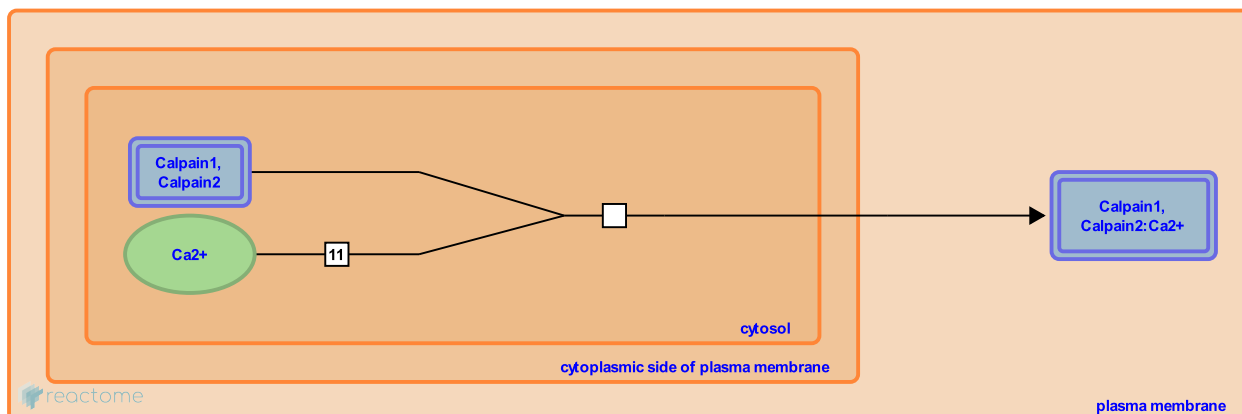
Reactome database release: 88

This document contains 1 reaction (see Table of Contents)

Calpain activation ↗

Stable identifier: R-HSA-8863008

Type: transition

Compartments: cytosol

Binding of calcium ions to the calpain dimer composed of the calpain catalytic subunit of 80 kDa and a calpain regulatory subunit of 30 kDa enables conformation change that results in formation of a functional catalytic center and also promotes relocalization of the calpain complex to the plasma membrane (Lin et al. 1997, Strobl et al. 2000, Schad et al. 2002). Calpain complexes involving the neuronally expressed mu-calpain (CAPN1) and m-calpain (CAPN2) catalytic subunits (Lee et al. 2000) are shown in this activation reaction.

Literature references

Friedrich, P., Schád, E., Jékely, G., Farkas, A., Tompa, P. (2002). A novel human small subunit of calpains. *Biochem. J. , 362*, 383-8. ↗

Strobl, S., Braun, M., Nakagawa, K., Masumoto, H., Bode, W., Suzuki, K. et al. (2000). The crystal structure of calcium-free human m-calpain suggests an electrostatic switch mechanism for activation by calcium. *Proc. Natl. Acad. Sci. U.S.A., 97*, 588-92. ↗

Peng, J., Kwon, YT., Friedlander, RM., Lee, MS., Li, M., Tsai, LH. (2000). Neurotoxicity induces cleavage of p35 to p25 by calpain. *Nature, 405*, 360-4. ↗

Carson, M., Wang, KK., Mäki, M., DeLucas, LJ., Jin, L., Takano, E. et al. (1997). Crystal structure of calcium bound domain VI of calpain at 1.9 A resolution and its role in enzyme assembly, regulation, and inhibitor binding. *Nat. Struct. Biol., 4*, 539-47. ↗

Editions

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