Dimeric TGF-beta-1 binds to the receptor

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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. ↗

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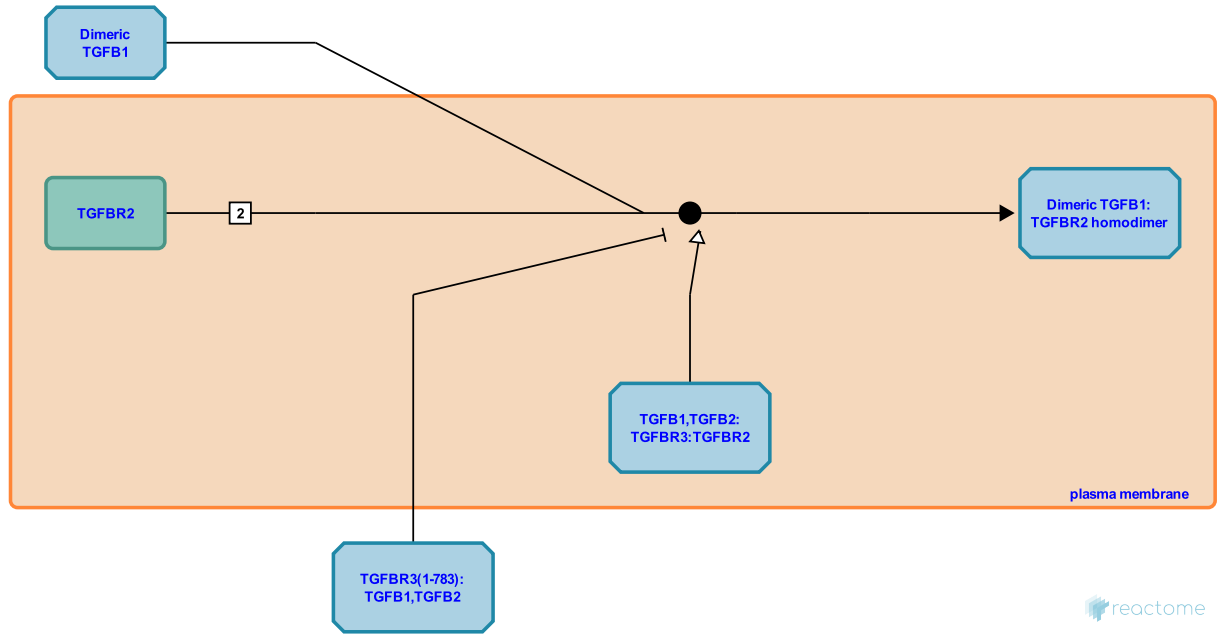
Stable identifier: R-HSA-170861

Type: binding

Compartments: extracellular region, plasma membrane



The mature dimeric TGF-beta-1 (TGFB1) binds with high affinity to its signaling receptor, the type II receptor serine/threonine kinase (TGFBR2) (Wrana et al. 1992, Moustakas et al. 1993, Franzen et al. 1993). While type II receptor can form dimeric complexes in the absence of TGFB1 when overexpressed, it predominantly exists as a monomer on the surface of unstimulated cells under physiological conditions, and dimerization of TGFBR2 is triggered by TGFB1 binding (Zhang et al. 2009). Also, the binding of TGFBR2 with TGFB1 is further facilitated by TGFBR3, which binds primarily with TGFB2 and facilitates the TGFBR2 ligand binding (Lopez-Casillas et al. 1993). This process is inhibited by the soluble form of TGFBR3 created by MMPs. A soluble form of TGBFR3 retains its ligand binding ability and thus inhibits the binding of TGFB ligands in a competitive manner (Lopez-Casillas et al. 1994).

Literature references

Miyazono, K., Schulz, P., Yamashita, H., Ichijo, H., ten Dijke, P., Heldin, CH. et al. (1993). Cloning of a TGF beta type I receptor that forms a heteromeric complex with the TGF beta type II receptor. *Cell, 75*, 681-92. ↗

O'Connor-McCourt, MD., Lodish, HF., Plamondon, J., Henis, YI., Moustakas, A., Lin, HY. (1993). The transforming growth factor beta receptors types I, II, and III form hetero-oligomeric complexes in the presence of ligand. *J Biol Chem, 268*, 22215-8. ↗

Jiang, Y., Chen, YG., Wang, Q., Zuo, W., Xiao, Z., Zhang, W. et al. (2009). Single-molecule imaging reveals transforming growth factor-beta-induced type II receptor dimerization. *Proc. Natl. Acad. Sci. U.S.A., 106*, 15679-83. ↗

Massague, J., Wrana, JL., Carcamo, J., Laiho, M., Attisano, L., Doody, J. et al. (1992). TGF beta signals through a heteromeric protein kinase receptor complex. *Cell, 71*, 1003-14. ↗

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