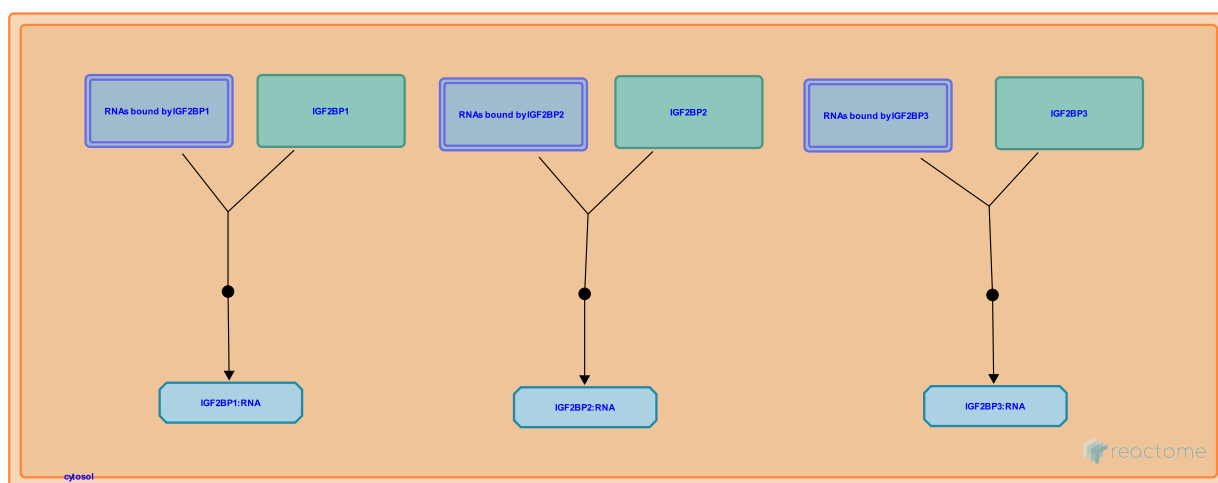


Insulin-like Growth Factor-2 mRNA Binding Proteins (IGF2BPs/IMPs/VICKZs) bind RNA



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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/page/faq).

07/05/2024

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.

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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. [↗](#)

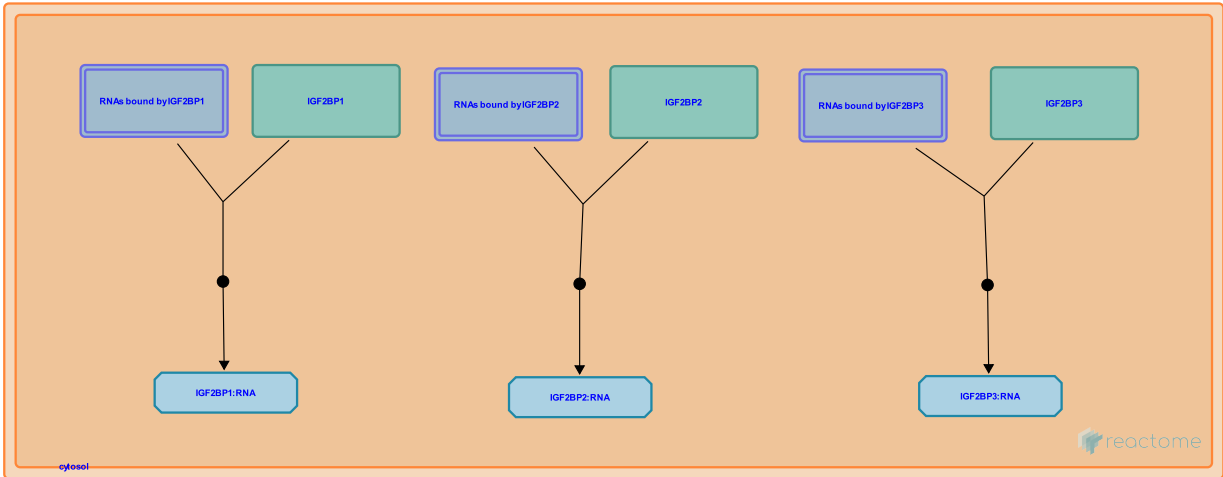
Reactome database release: 88

This document contains 1 pathway and 3 reactions ([see Table of Contents](#))

Insulin-like Growth Factor-2 mRNA Binding Proteins (IGF2BPs/IMPs/VICKZs) bind RNA ↗

Stable identifier: R-HSA-428359

Compartments: cytosol



Insulin-like Growth Factor-2 mRNA Binding Proteins (IGF2BPs) bind specific sets of RNA and regulate their translation, stability, and subcellular localization. IGF2BP1, IGF2BP2, and IGF2BP3 bind about 8400 protein-coding transcripts. The target RNAs contain the sequence motif CAUH (where H is A, U, or, C) and binding of IGFBPs increases the stability of the target RNAs.

Literature references

Nielsen, J., Wewer, UM., Christiansen, J., Johnsen, AH., Lykke-Andersen, J., Nielsen, FC. (1999). A family of insulin-like growth factor II mRNA-binding proteins represses translation in late development. *Mol Cell Biol*, 19, 1262-70. ↗

Nielsen, J., Christiansen, J., Nielsen, FC. (2001). A family of IGF-II mRNA binding proteins (IMP) involved in RNA trafficking. *Scand J Clin Lab Invest Suppl*, 234, 93-9. ↗

Yisraeli, JK. (2005). VICKZ proteins: a multi-talented family of regulatory RNA-binding proteins. *Biol Cell*, 97, 87-96. ↗

Rubinstein, AM., Maizels, Y., Oberman, F., Rand, K., Yisraeli, JK. (2007). VICKZ proteins mediate cell migration via their RNA binding activity. *RNA*, 13, 1558-69. ↗

Wewer, UM., Hansen, TV., Christiansen, J., Borup, R., Jønson, L., Vikesaa, J. et al. (2006). RNA-binding IMPs promote cell adhesion and invadopodia formation. *EMBO J*, 25, 1456-68. ↗

Editions

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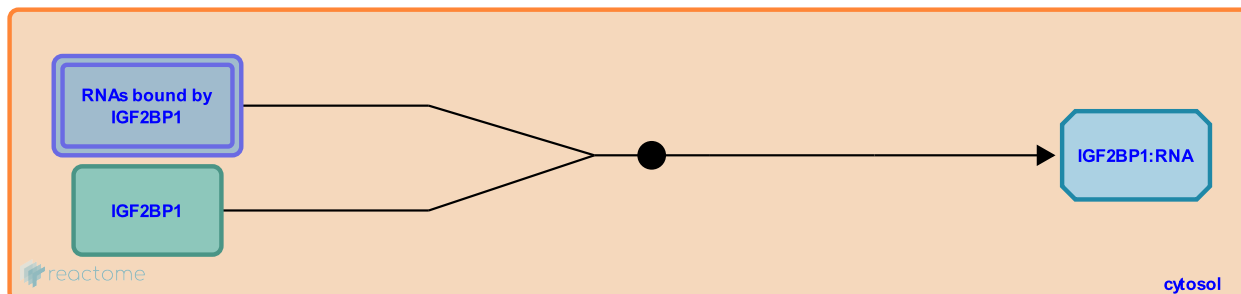
IGF2BP1 binds specific RNAs ↗

Location: [Insulin-like Growth Factor-2 mRNA Binding Proteins \(IGF2BPs/IMPs/VICKZs\) bind RNA](#)

Stable identifier: R-HSA-428296

Type: binding

Compartments: cytosol



Insulin-like Growth Factor mRNA Binding Factor-1 (IGF2BP1, also known as ZBP1, CRD-BP, IMP1, and VICKZ1) binds several specific RNAs containing the sequence motif CAUH (where H is A, C, or U). Binding causes stabilization and subcellular localization of the RNA.

Isoforms of IGF2 mRNA containing leader-3 are bound by IGF2BP1 at the 5' UTR, repressing translation (other isoforms of IGF2 are constitutive).

ZBP1 (IGF2BP1) uses its third and fourth KH domains to recognize the first 28 nts of the 3' UTR of Beta actin mRNA. The KH domains are arranged as an anti-parallel pseudo-dimer that specifically recognize a bipartite element located in this RNA sequence.

MYC (c-MYC) and Beta-TRCP1 mRNAs are bound at sites termed Coding Region Determinants (CDRs) in the open reading frame of the message. Binding of the MYC mRNA shields it from degradation and increases its half-life

The CD44 mRNA is bound at the 3' UTR.

IGF2BP1 also binds the non-coding, imprinted H19 RNA.

Literature references

Nielsen, J., Wewer, UM., Christiansen, J., Johnsen, AH., Lykke-Andersen, J., Nielsen, FC. (1999). A family of insulin-like growth factor II mRNA-binding proteins represses translation in late development. *Mol Cell Biol*, 19, 1262-70. ↗

Weidensdorfer, D., Schierhorn, A., Lederer, M., Hüttelmaier, S., Köhn, M., Baude, A. et al. (2009). Control of c-myc mRNA stability by IGF2BP1-associated cytoplasmic RNPs. *RNA*, 15, 104-15. ↗

Mahaira, L., Teixeira, MR., Trangas, T., Papadopoulou, A., Dafni, U., Ioannidis, P. et al. (2003). CRD-BP: a c-Myc mRNA stabilizing protein with an oncofetal pattern of expression. *Anticancer Res*, 23, 2179-83. ↗

Nielsen, J., Christiansen, J., Nielsen, FC. (2001). A family of IGF-II mRNA binding proteins (IMP) involved in RNA trafficking. *Scand J Clin Lab Invest Suppl*, 234, 93-9. ↗

Yisraeli, JK. (2005). VICKZ proteins: a multi-talented family of regulatory RNA-binding proteins. *Biol Cell*, 97, 87-96. ↗

Editions

2009-07-05	Authored, Edited	May, B.
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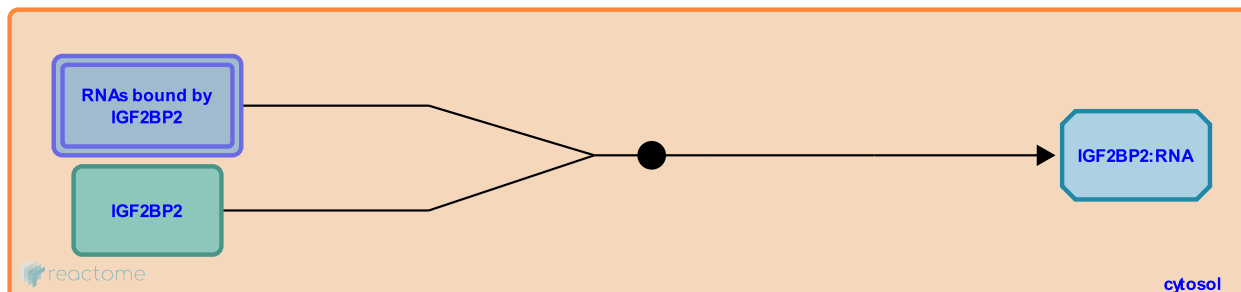
IGF2BP2 binds specific RNAs ↗

Location: [Insulin-like Growth Factor-2 mRNA Binding Proteins \(IGF2BPs/IMPs/VICKZs\) bind RNA](#)

Stable identifier: R-HSA-428293

Type: binding

Compartments: cytosol



Insulin-like Growth Factor mRNA Binding Factor-2 (IGF2BP2, also known as IMP2 and VICKZ2) binds several specific RNAs containing the sequence motif CAUH (where H is A, C, or U). Binding causes stabilization and subcellular localization of the RNA.

Isoforms of IGF2 mRNA containing leader-3 are bound by IGF2BP2 at the 5' UTR, repressing translation (Other isoforms of IGF2 are constitutive).

IGF2BP2 may be a causal factor in type 2 diabetes.

Literature references

Nielsen, J., Wewer, UM., Christiansen, J., Johnsen, AH., Lykke-Andersen, J., Nielsen, FC. (1999). A family of insulin-like growth factor II mRNA-binding proteins represses translation in late development. *Mol Cell Biol*, 19, 1262-70. ↗

Nielsen, J., Christiansen, J., Nielsen, FC. (2001). A family of IGF-II mRNA binding proteins (IMP) involved in RNA trafficking. *Scand J Clin Lab Invest Suppl*, 234, 93-9. ↗

Yisraeli, JK. (2005). VICKZ proteins: a multi-talented family of regulatory RNA-binding proteins. *Biol Cell*, 97, 87-96. ↗

Schäfer, SA., Nijpels, G., Groenewoud, MJ., Maassen, JA., Heine, RJ., Fritsche, A. et al. (2008). Variants of CDKAL1 and IGF2BP2 affect first-phase insulin secretion during hyperglycaemic clamps. *Diabetologia*, 51, 1659-63. ↗

Hansen, T., Nielsen, F., Kolte, A., Christiansen, J. (2009). IGF2 mRNA-binding protein 2 - biological function and putative role in type 2 diabetes. *J Mol Endocrinol*. ↗

Editions

2009-07-05	Authored, Edited	May, B.
2010-05-30	Reviewed	Singer, RH., Chao, JA.

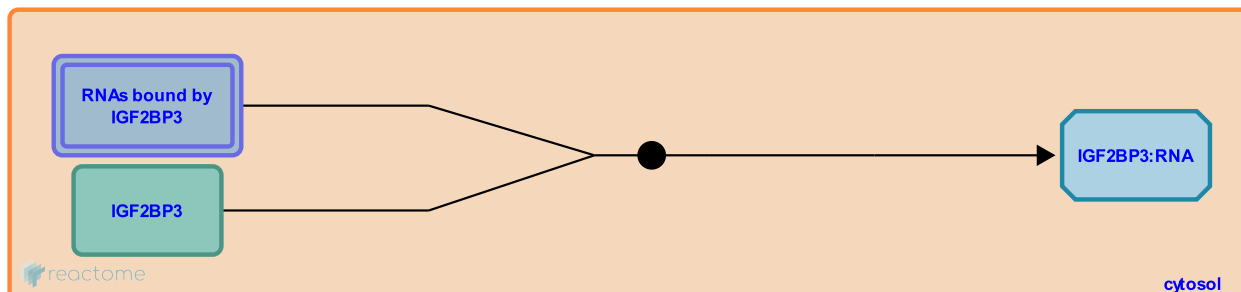
IGF2BP3 binds specific RNAs ↗

Location: [Insulin-like Growth Factor-2 mRNA Binding Proteins \(IGF2BPs/IMPs/VICKZs\) bind RNA](#)

Stable identifier: R-HSA-428287

Type: binding

Compartments: cytosol



Insulin-like Growth Factor mRNA Binding Factor-3 (IGF2BP3, also known as IMP3 and VICKZ3) binds several specific RNAs containing the sequence motif CAUH (where H is A, C, or U). Binding causes stabilization and subcellular localization of the RNA.

Isoforms of IGF2 mRNA containing leader-3 are bound by IGF2BP3 at the 5' UTR, repressing translation (other isoforms of IGF2 are constitutive).

Literature references

Nielsen, J., Wewer, UM., Christiansen, J., Johnsen, AH., Lykke-Andersen, J., Nielsen, FC. (1999). A family of insulin-like growth factor II mRNA-binding proteins represses translation in late development. *Mol Cell Biol*, 19, 1262-70. ↗

Nielsen, J., Christiansen, J., Nielsen, FC. (2001). A family of IGF-II mRNA binding proteins (IMP) involved in RNA trafficking. *Scand J Clin Lab Invest Suppl*, 234, 93-9. ↗

Yisraeli, JK. (2005). VICKZ proteins: a multi-talented family of regulatory RNA-binding proteins. *Biol Cell*, 97, 87-96. ↗

Wewer, UM., Hansen, TV., Christiansen, J., Borup, R., Jønson, L., Vikesaa, J. et al. (2006). RNA-binding IMPs promote cell adhesion and invadopodia formation. *EMBO J*, 25, 1456-68. ↗

Landthaler, M., Tuschl, T., Ulrich, A., Ascano M, Jr., Hausser, J., Khorshid, M. et al. (2010). Transcriptome-wide identification of RNA-binding protein and microRNA target sites by PAR-CLIP. *Cell*, 141, 129-41. ↗

Editions

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