Expression of PPARGC1A (PGC-1alpha)

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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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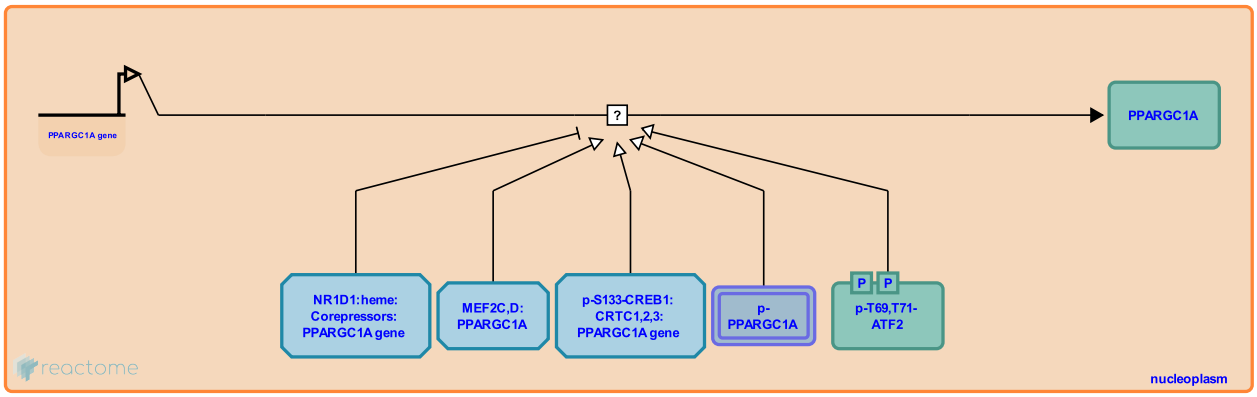
Stable identifier: R-HSA-1368140

Type: uncertain

Compartments: nucleoplasm

Inferred from: Expression of Ppargc1a (Pgc-1alpha) (Mus musculus)



The PPARGC1A gene is transcribed to yield mRNA and the mRNA is translated to yield PPARGC1A protein (Larrouy et al. 1999, Knutti et al. 2000, Pilegaard et al. 2003). PPARGC1A protein is located in the nucleus where it coactivates transcription.
As inferred from mouse homologs in liver (Herzig et al. 2001) and brown adipose tissue (Cao et al. 2004), phosphorylated CREB enhances expression of PPARGC1A (PGC-1alpha) (Handschin et al. 2003, Yoshioka et al. 2009). CRTC proteins (TORC proteins) coactivate the activation by CREB (Wu et al. 2006). CREB is phosphorylated in response to cAMP
As inferred from mouse, phosphorylated ATF2 binds the PGC-1alpha promoter and enhances expression (Cao et al. 2004, Akimoto et al. 2005, Wright et al. 2007, Akimoto et al. 2008). Intracellular calcium acting via p38 MAPK is believed to activate (phosphorylate) ATF2.
As inferred from mouse, MEF2C or MEF2D with PGC-1alpha activate expression of PGC-1alpha (Handschin et al. 2003).
NR1D1 (REV-ERBA) binds heme and the promoter of the PGC-1alpha (PPARGC1A) gene. The REV-ERBA:heme complex recruits the corepressors NCoR and HDAC3 and represses transcription.
PGC-1alpha (PPARGC1A) enhances expression of its own gene in mouse (Jager et al.2007) and in rat hepatocytes (Lin et al. 2003)

Literature references

Saltin, B., Pilegaard, H., Neufer, PD. (2003). Exercise induces transient transcriptional activation of the PGC-1alpha gene in human skeletal muscle. *J Physiol, 546*, 851-8. ↗

Kralli, A., Kaul, A., Knutti, D. (2000). A tissue-specific coactivator of steroid receptors, identified in a functional genetic screen. *Mol Cell Biol, 20*, 2411-22. ↗

Andreelli, F., Langin, D., Laville, M., Vidal, H., Larrouy, D. (1999). Cloning and mRNA tissue distribution of human PPARgamma coactivator-1. *Int J Obes Relat Metab Disord, 23*, 1327-32. ↗

Editions

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