Regulation of gene expression by Hypoxia-inducible Factor

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20/07/2020
**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.

The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

**Literature references**


Reactome database release: 73

This document contains 1 pathway and 7 reactions (see Table of Contents)
Regulation of gene expression by Hypoxia-inducible Factor

Stable identifier: R-HSA-1234158

Compartments: nucleoplasm


Literature references


Editions

2011-03-09 Author, Edited May, B.

2012-05-19 Reviewed Rantanen, K.
HIF-alpha translocates from cytosol to nucleus

**Location:** Regulation of gene expression by Hypoxia-inducible Factor

**Stable identifier:** R-HSA-1234161

**Type:** omitted

**Compartments:** cytosol, nucleoplasm

HIF-alpha is translocated into the nucleus (Kallio et al. 1998, Depping et al. 2008, Chachami et al. 2009). Importin 4 and importin 7 (Chachami et al. 2009) as well as the importin alpha/beta pathway (Depping et al. 2008) appear to be capable of interacting with HIF-alpha. During hypoxia HIF-alpha accumulates in the nucleus where it associates with CBP and p300 (Kallio et al. 1998).

**Followed by:** HIF-alpha binds ARNT (HIF1-beta) forming HIF-alpha:ARNT

**Literature references**


**Editions**

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https://reactome.org
HIF-alpha binds ARNT (HIF1-beta) forming HIF-alpha:ARNT

**Location:** Regulation of gene expression by Hypoxia-inducible Factor

**Stable identifier:** R-HSA-1234171

**Type:** binding

**Compartments:** nucleoplasm


**Preceded by:** HIF-alpha translocates from cytosol to nucleus

**Followed by:** Expression of HIGD1A, Formation of HIF:CBP:p300 complex at promoters

**Literature references**


**Editions**

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https://reactome.org
Formation of HIF:CBP:p300 complex at promoters

Location: Regulation of gene expression by Hypoxia-inducible Factor

Stable identifier: R-HSA-1234167

Type: omitted

Compartments: nucleoplasm


Preceded by: HIF-alpha binds ARNT (HIF1-beta) forming HIF-alpha:ARNT

Followed by: Expression of VEGFA, Expression of Erythropoietin (EPO), Expression of Carbonic Anhydrase IX (CA9)

Literature references


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Expression of Carbonic Anhydrase IX (CA9)

Location: Regulation of gene expression by Hypoxia-inducible Factor

Stable identifier: R-HSA-1235035

Type: omitted

Compartments: nucleoplasm, plasma membrane

The gene encoding carbonic anhydrase IX (CA9) is transcribed to yield mRNA and the mRNA is translated to yield protein. Hypoxia-inducible factor binds the promoter of CA9 and enhances expression of CA9.

Preceded by: Formation of HIF:CBP:p300 complex at promoters

Literature references


Editions

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Expression of VEGFA

Location: Regulation of gene expression by Hypoxia-inducible Factor

Stable identifier: R-HSA-1235037

Type: omitted

Compartments: nucleoplasm, extracellular region

The VEGFA (VEGF) gene is transcribed to yield mRNA and the mRNA is translated to yield protein. Hypoxia-inducible factor binds the VEGF promoter, recruits p300 and CBP, and enhances transcription.

Preceded by: Formation of HIF:CBP:p300 complex at promoters

Literature references


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Expression of Erythropoietin (EPO)

Location: Regulation of gene expression by Hypoxia-inducible Factor

Stable identifier: R-HSA-1235070

Type: omitted

Compartments: nucleoplasm, extracellular region

The EPO gene is transcribed to yield mRNA and the mRNA is translated to yield protein. Transcription of EPO is enhanced by Hypoxia-inducible factor, which binds to the EPO promoter.

Preceded by: Formation of HIF:CBP:p300 complex at promoters

Literature references


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Expression of HIGD1A

Location: Regulation of gene expression by Hypoxia-inducible Factor

Stable identifier: R-HSA-8932184

Type: omitted

Compartments: nucleoplasm, mitochondrial inner membrane

The HIGD1A (RCF1A, HIG1) gene is transcribed to yield mRNA and the mRNA is translated to yield protein (Ameri et al. 2015). Expression of HIGD1A is transactivated by HIF in response to hypoxia (Ameri et al. 2015).

Preceded by: HIF-alpha binds ARNT (HIF1-beta) forming HIF-alpha:ARNT

Literature references


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