TFAP2 (AP-2) family regulates transcription of cell cycle factors

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30/08/2020
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 4 reactions (see Table of Contents)
TFAP2 (AP-2) family regulates transcription of cell cycle factors

Stable identifier: R-HSA-8866911


Literature references


Editions

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TFAP2A homodimer binds CDKN1A (p21) gene

**Location:** TFAP2 (AP-2) family regulates transcription of cell cycle factors

**Stable identifier:** R-HSA-8865244

**Type:** binding

**Compartments:** nucleoplasm

TFAP2A (AP-2 alpha) transcription factor binds two AP-2 response elements in the promoter of the CDKN1A (p21) gene, the proximal site being TP53 (p53) independent, while the distal site is in the vicinity of the p53 response element (Zeng et al. 1997, Williams et al. 2009, Scibetta et al. 2010).

**Followed by:** CDKN1A gene expression is stimulated by TFAP2A and repressed by TFAP2C

**Literature references**


Williams, CM., Scibetta, AG., Friedrich, JK., Canosa, M., Berlato, C., Moss, CH. et al. (2009). AP-2gamma promotes proliferation in breast tumour cells by direct repression of the CDKN1A gene. EMBO J., 28, 3591-601.

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TFAP2C homodimer binds MYC and KDM5B

Location: TFAP2 (AP-2) family regulates transcription of cell cycle factors

Stable identifier: R-HSA-8865265

Type: binding

Compartments: nucleoplasm

TFAP2C (AP-2 gamma) transcription factor homodimer can form a complex with MYC transcription factor and histone demethylase KDM5B (Wong et al. 2012).

Followed by: TFAP2C homodimer binds the CDKN1A (p21) gene promoter

Literature references


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TFAP2C homodimer binds the CDKN1A (p21) gene promoter

**Location:** TFAP2 (AP-2) family regulates transcription of cell cycle factors

**Stable identifier:** R-HSA-8865280

**Type:** binding

**Compartments:** nucleoplasm

TFAP2C (AP-2 gamma) transcription factor, in cooperation with MYC and histone demethylase KDM5B binds the proximal AP-2 response element in the promoter of the CDKN1A (p21) gene (Williams et al. 2009, Scibetta et al. 2010, Wong et al. 2012).

**Preceded by:** TFAP2C homodimer binds MYC and KDM5B

**Followed by:** CDKN1A gene expression is stimulated by TFAP2A and repressed by TFAP2C

**Literature references**


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**CDKN1A gene expression is stimulated by TFAP2A and repressed by TFAP2C**

**Location:** TFAP2 (AP-2) family regulates transcription of cell cycle factors

**Stable identifier:** R-HSA-8865256

**Type:** omitted

**Compartments:** nucleoplasm

The CDKN1A gene encodes cyclin dependent kinase inhibitor also known as p21 or WAF1 which can induce G1 cell cycle arrest.

Binding of TFAP2A (AP-2 alpha) transcription factor to the CDKN1A promoter results in the activation of CDKN1A expression in a TP53 (p53) independent manner, which may be important during development and differentiation (Zeng et al. 1997, Williams et al. 2009, Scibetta et al. 2010).

Binding of TFAP2C (AP-2 gamma) transcription factor to the proximal AP-2 response element in the CDKN1A promoter (Scibetta et al. 2010) results in repression of CDKN1A transcription. TFAP2C may recruit histone deacetylases, such as HDAC2 to the CDKN1A promoter (Williams et al. 2009). TFAP2C cooperates with its interaction partners MYC and KDM5B in repression of the CDKN1A gene transcription. The mechanism may involve KDM5B-mediated removal of activating histone methylation mark at H3K4 from nucleosomes at the CDKN1A promoter. In the absence of TFAP2C, MYC can recruit KDM5B to the CDKN1A promoter via an AP-2 independent MYC-binding site, but this results in a lower level of CDKN1A gene repression. TFAP2C-mediated repression of CDKN1A transcription promotes G1/S transition (Wong et al. 2012). In contradiction, it has been reported that TFAP2C may induce, instead of repress CDKN1A transcription (Li et al. 2006).

**Preceded by:** TFAP2A homodimer binds CDKN1A (p21) gene, TFAP2C homodimer binds the CDKN1A (p21) gene promoter

**Literature references**


Williams, CM., Scibetta, AG., Friedrich, JK., Canosa, M., Berlato, C., Moss, CH. et al. (2009). AP-2gamma promotes proliferation in breast tumour cells by direct repression of the CDKN1A gene. EMBO J., 28, 3591-601.

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