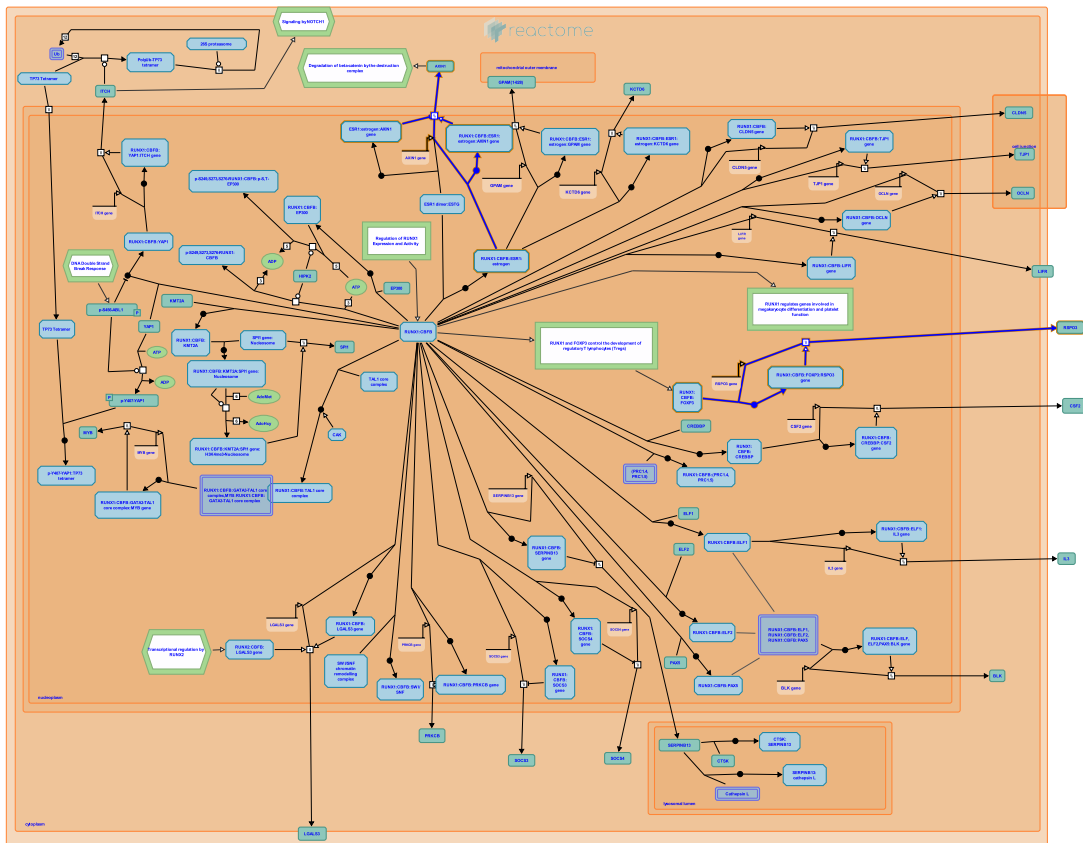


# RUNX1 regulates transcription of genes involved in WNT signaling



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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/textbook/).

03/05/2024

## 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.

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

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- Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics*, 33, 3461-3467. [↗](#)
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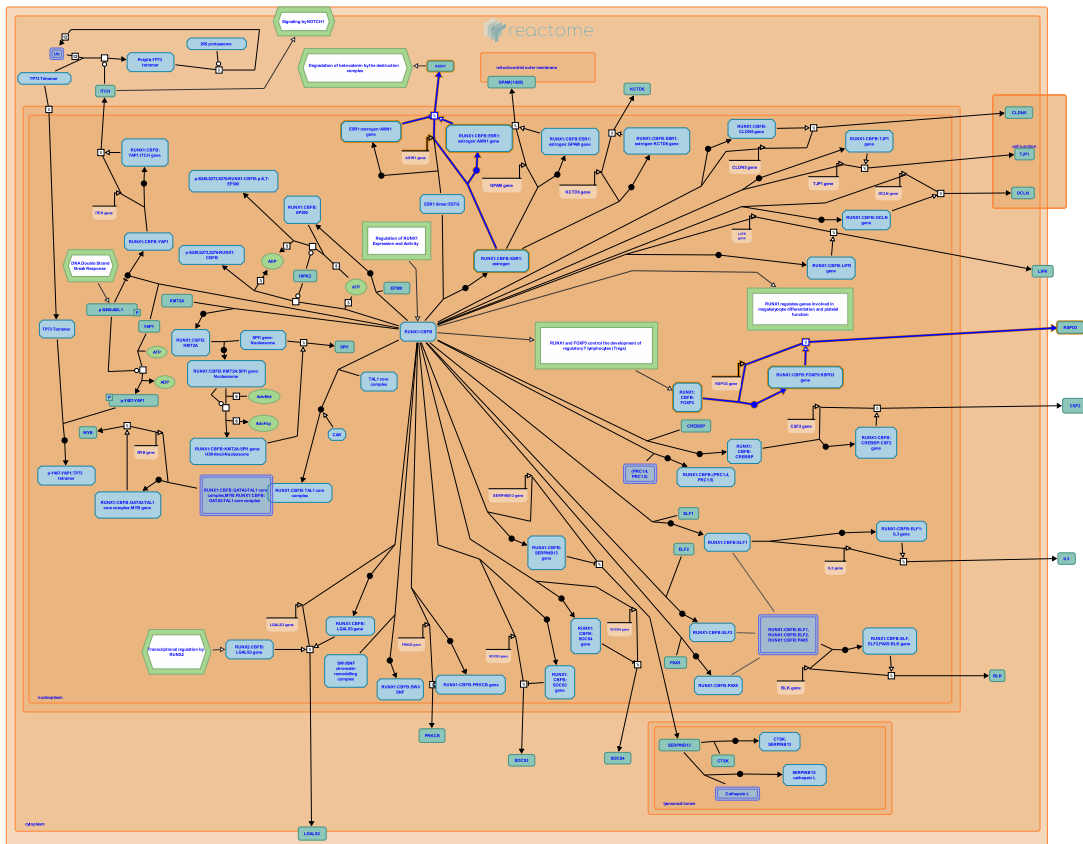
Reactome database release: 88

This document contains 1 pathway and 4 reactions ([see Table of Contents](#))

# RUNX1 regulates transcription of genes involved in WNT signaling ↗

Stable identifier: R-HSA-8939256

Compartments: nucleoplasm



The RUNX1:CBFB complex directly regulates transcription of at least two components of WNT signaling. In association with its co-factor FOXP3, the RUNX1:CBFB complex stimulates transcription of the RSPO3 gene, encoding a WNT ligand that is implicated as a breast cancer oncogene (Recouvreux et al. 2016). In association with the activated estrogen receptor alpha (ESR1), the RUNX1:CBFB complex stimulates the expression of AXIN1, which functions as a regulator of WNT signaling (Stender et al. 2010).

## Literature references

Kraus, WL., Stender, JD., Benner, C., Charn, TH., Kim, K., Chang, KC. et al. (2010). Genome-wide analysis of estrogen receptor alpha DNA binding and tethering mechanisms identifies Runx1 as a novel tethering factor in receptor-mediated transcriptional activation. *Mol. Cell. Biol.*, 30, 3943-55. ↗

Castilla, LH., Rubinstein, N., Grasso, EN., Echeverria, PC., Rocha-Viegas, L., Recouvreux, MS. et al. (2016). RUNX1 and FOXP3 interplay regulates expression of breast cancer related genes. *Oncotarget*, 7, 6552-65. ↗

## Editions

2016-09-14	Authored	Orlic-Milacic, M.
2016-12-20	Reviewed	Ito, Y., Chuang, LS.
2017-05-09	Edited	Orlic-Milacic, M.

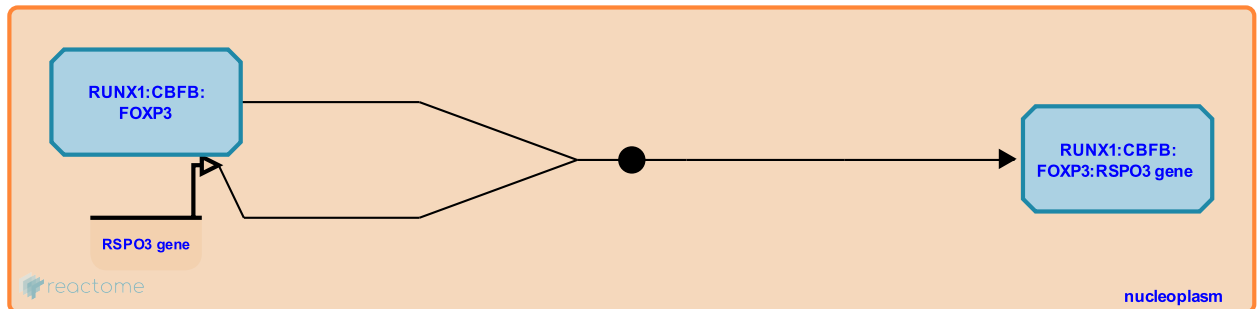
## RUNX1 and FOXP3 bind the RSPO3 gene promoter ↗

**Location:** [RUNX1 regulates transcription of genes involved in WNT signaling](#)

**Stable identifier:** R-HSA-8877879

**Type:** binding

**Compartments:** nucleoplasm



The complex of the RUNX1:CBFB heterodimer and FOXP3 binds the promoter of the RSPO3 gene, which encodes a WNT ligand (Recouvreux et al. 2016).

### Literature references

Castilla, LH., Rubinstein, N., Grasso, EN., Echeverria, PC., Rocha-Viegas, L., Recouvreux, MS. et al. (2016). RUNX1 and FOXP3 interplay regulates expression of breast cancer related genes. *Oncotarget*, 7, 6552-65. ↗

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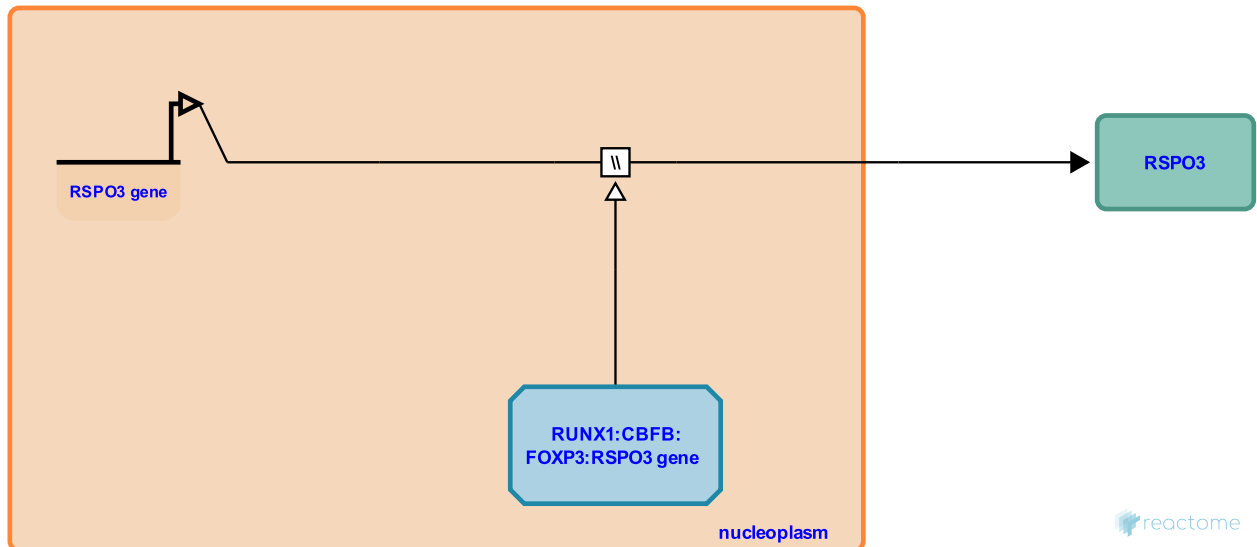
## RUNX1 and FOXP3 stimulate the RSPO3 gene expression ↗

**Location:** [RUNX1 regulates transcription of genes involved in WNT signaling](#)

**Stable identifier:** R-HSA-8877884

**Type:** omitted

**Compartments:** nucleoplasm, extracellular region



Binding of the RUNX1:CBFB complex and FOXP3 to the promoter of the RSPO3 gene stimulates RSPO3 transcription. RSPO3 functions as a WNT ligand and is a known breast cancer oncogene (Recouvreur et al. 2016).

### Literature references

Castilla, LH., Rubinstein, N., Grasso, EN., Echeverria, PC., Rocha-Viegas, L., Recouvreur, MS. et al. (2016). RUNX1 and FOXP3 interplay regulates expression of breast cancer related genes. *Oncotarget*, 7, 6552-65. ↗

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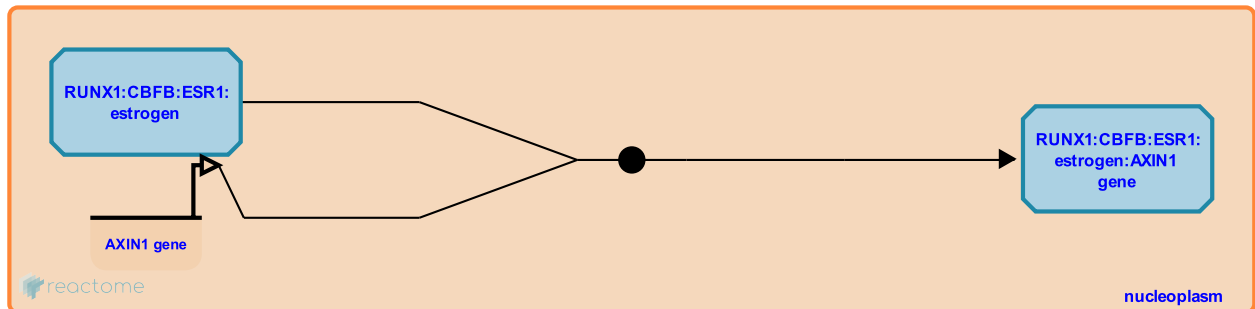
## RUNX1 and ESR1 bind the AXIN1 gene ↗

**Location:** [RUNX1 regulates transcription of genes involved in WNT signaling](#)

**Stable identifier:** R-HSA-8932084

**Type:** binding

**Compartments:** nucleoplasm



RUNX1 and ESR1, which are known to form a complex (Stender et al. 2010), cooperatively bind to adjacent Runx binding sites and estrogen response elements, respectively, in the second intron of the AXIN1 gene (Chimge et al. 2016).

### Literature references

Chimge, NO., Groshen, S., Tripathy, D., Schones, DE., Liang, C., Ellis, MJ. et al. (2016). RUNX1 prevents oestrogen-mediated AXIN1 suppression and  $\beta$ -catenin activation in ER-positive breast cancer. *Nat Commun*, 7, 10751. ↗

### Editions

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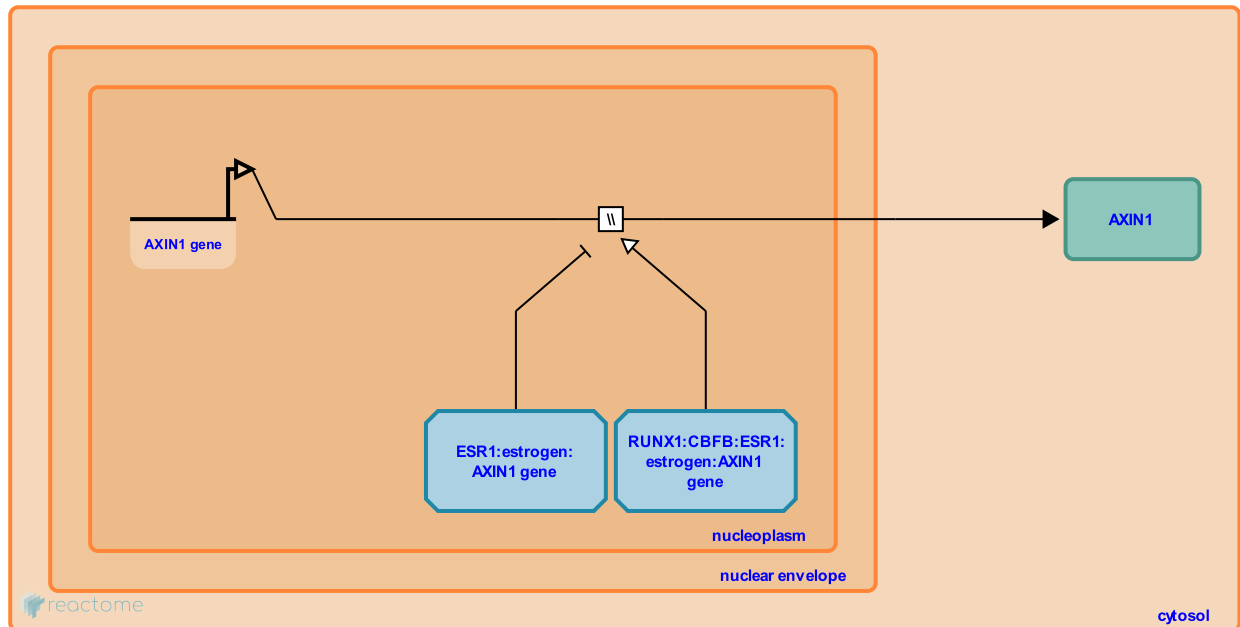
## AXIN1 gene expression is inhibited by ESR1 and stimulated by RUNX1 [↗](#)

**Location:** [RUNX1 regulates transcription of genes involved in WNT signaling](#)

**Stable identifier:** R-HSA-8932076

**Type:** omitted

**Compartments:** nucleoplasm, cytosol



Transcription of the AXIN1 gene, which encodes a component of the beta-catenin (CTNNB1) destruction complex, is inhibited by binding of the activated estrogen receptor alpha (ESR1) to estrogen response elements in the second intron of AXIN1 (Chimge et al. 2016).

The AXIN1 gene expression is stimulated by cooperative binding of RUNX1 and estrogen receptor alpha (ESR1) to adjacent RUNX1 binding sites and estrogen response elements in the second intron of AXIN1 (Chimge et al. 2016).

### Literature references

Chimge, NO., Groshen, S., Tripathy, D., Schones, DE., Liang, C., Ellis, MJ. et al. (2016). RUNX1 prevents oestrogen-mediated AXIN1 suppression and  $\beta$ -catenin activation in ER-positive breast cancer. *Nat Commun*, 7, 10751. [↗](#)

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