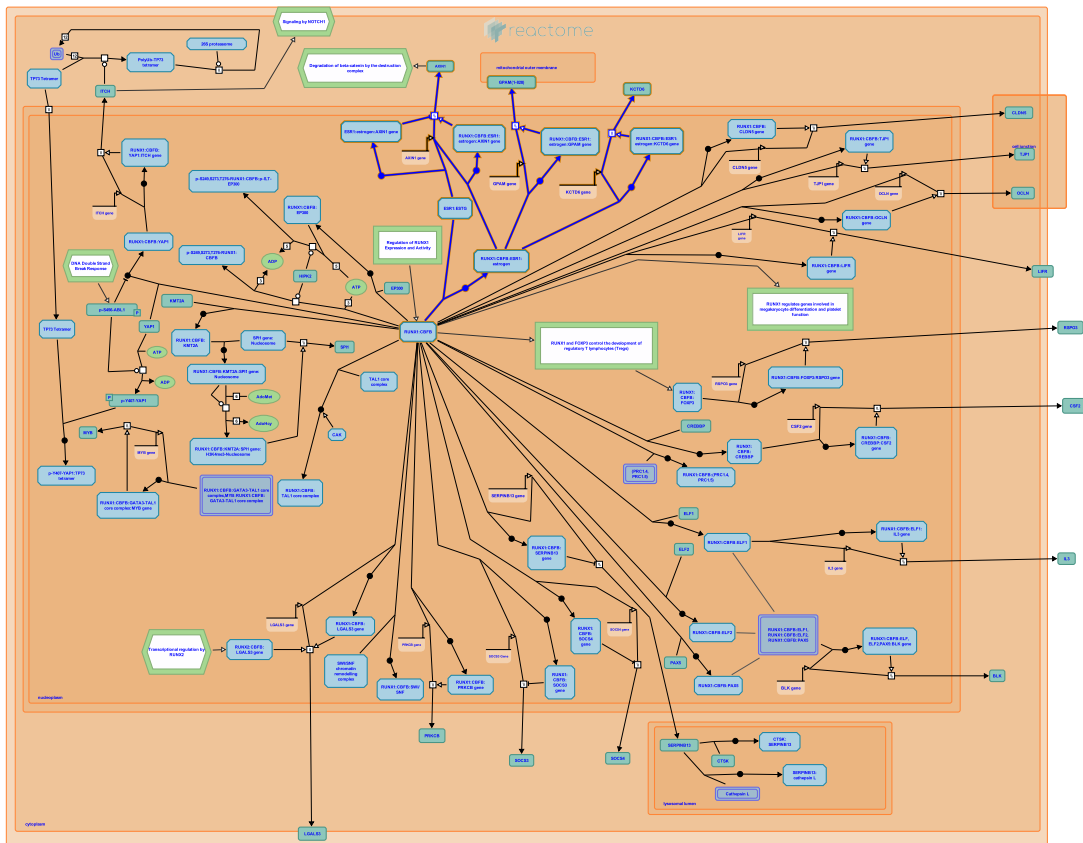


RUNX1 regulates estrogen receptor mediated transcription



Chuang, LS., Ito, Y., Orlic-Milacic, M.

European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

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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

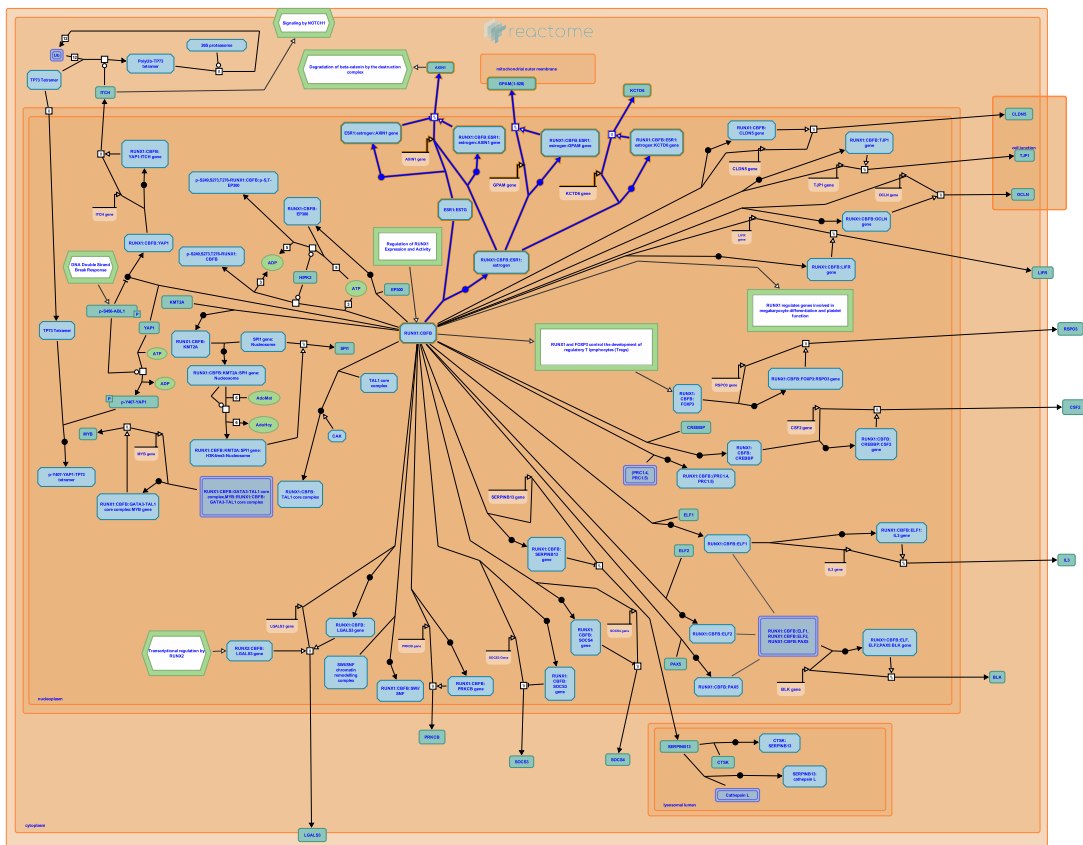
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Reactome database release: 74

This document contains 1 pathway and 8 reactions ([see Table of Contents](#))

RUNX1 regulates estrogen receptor mediated transcription ↗

Stable identifier: R-HSA-8931987



The RUNX1:CBFB complex can associate with the activated estrogen receptor alpha (ESR1) through direct interaction between RUNX1 and ESR1. The RUNX1:CBFB complex is thus involved in transcriptional regulation of estrogen responsive genes, including GPAM, KCTD6 and AXIN1 (Stender et al. 2010). High GPAM expression correlates with better overall survival in breast cancer (Brockmoller et al. 2012).

Literature references

Brockmüller, SF., Bucher, E., Müller, BM., Budczies, J., Hilvo, M., Griffin, JL. et al. (2012). Integration of metabolomics and expression of glycerol-3-phosphate acyltransferase (GPAM) in breast cancer-link to patient survival, hormone receptor status, and metabolic profiling. *J. Proteome Res.*, 11, 850-60. ↗

Stender, JD., Kim, K., Charn, TH., Komm, B., Chang, KC., Kraus, WL. 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. ↗

Editions

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

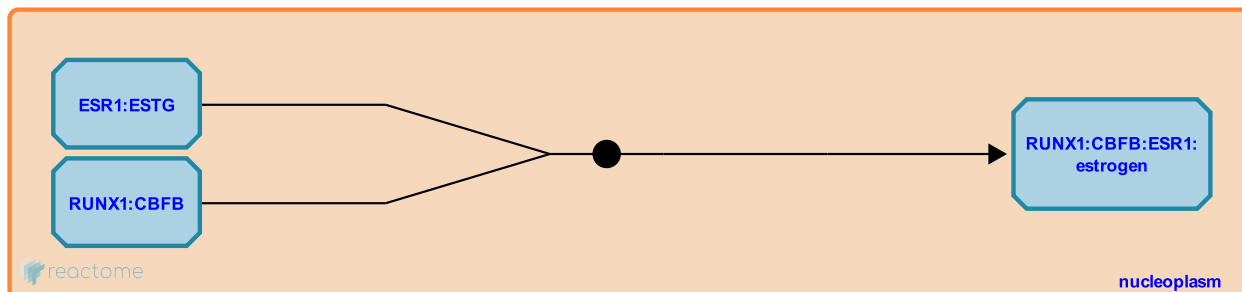
RUNX1 binds ESR1 ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

Stable identifier: R-HSA-8931981

Type: binding

Compartments: nucleoplasm



The RUNX1:CBFB complex binds the estrogen receptor alpha (ESR1). The interaction between RUNX1 and ESR1 is significantly enhanced upon ESR1 activation by estrogens (Stender et al. 2010).

Followed by: [RUNX1 and ESR1 bind the GPAM gene enhancer](#), [RUNX1 and ESR1 bind the KCTD6 gene enhancer](#), [RUNX1 and ESR1 bind the AXIN1 gene](#)

Literature references

Stender, JD., Kim, K., Charn, TH., Komm, B., Chang, KC., Kraus, WL. 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. ↗

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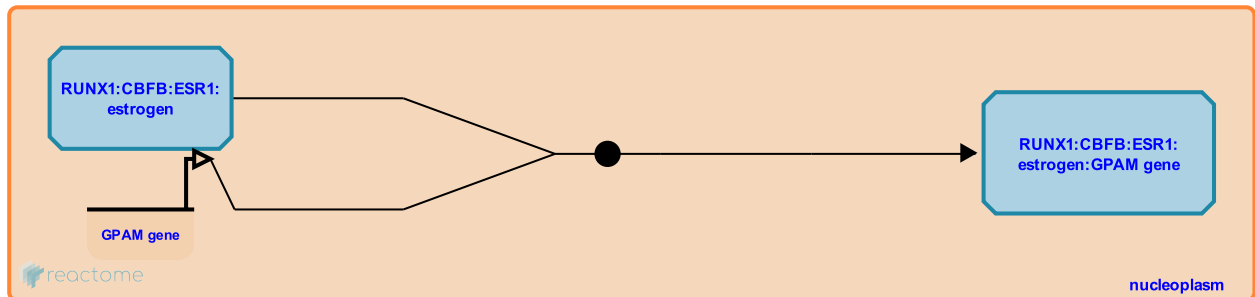
RUNX1 and ESR1 bind the GPAM gene enhancer ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

Stable identifier: R-HSA-8932021

Type: binding

Compartments: nucleoplasm



RUNX1 and ESR1 cooperatively bind to the enhancer of the GPAM gene, which contains both estrogen response elements and RUNX1 binding sites (Stender et al. 2010).

Preceded by: [RUNX1 binds ESR1](#)

Literature references

Stender, JD., Kim, K., Charn, TH., Komm, B., Chang, KC., Kraus, WL. 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. ↗

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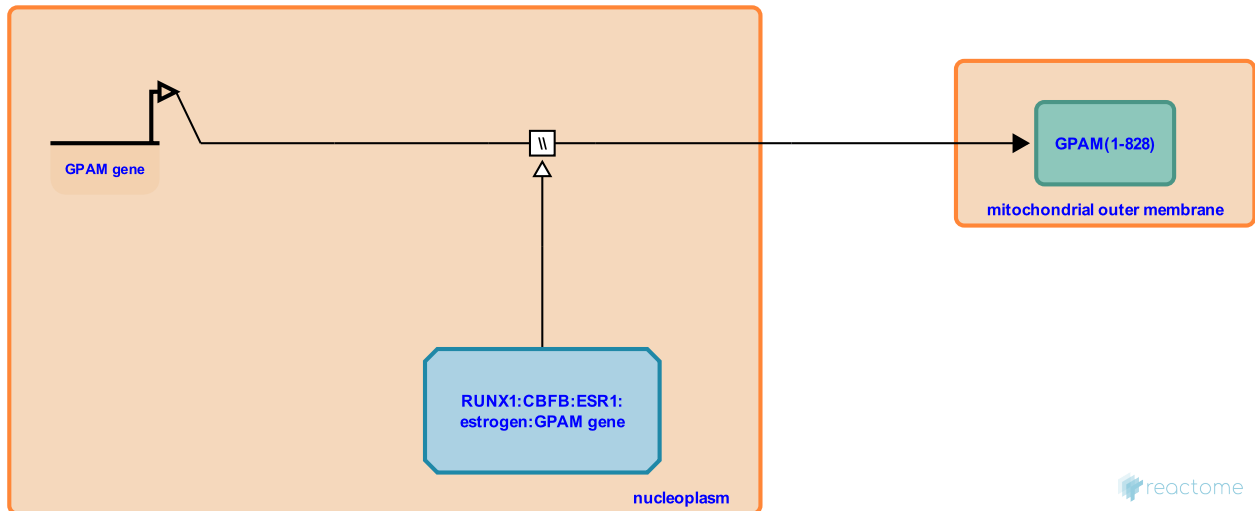
GPAM gene expression is stimulated by RUNX1 and ESR1 ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

Stable identifier: R-HSA-8932020

Type: omitted

Compartments: nucleoplasm, mitochondrial outer membrane



GPAM gene expression is cooperatively stimulated by RUNX1 and ESR1, which form a complex and bind the GPAM gene enhancer (Stender et al. 2010). GPAM encodes a glycerol-3-phosphate acyltransferase whose high expression correlates with better overall survival in breast cancer (Brockmoller et al. 2012).

Literature references

Stender, JD., Kim, K., Charn, TH., Komm, B., Chang, KC., Kraus, WL. 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. ↗

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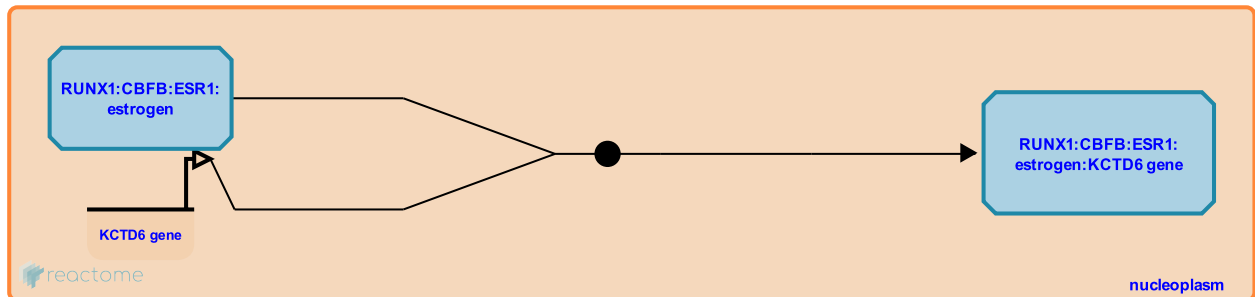
RUNX1 and ESR1 bind the KCTD6 gene enhancer ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

Stable identifier: R-HSA-8932037

Type: binding

Compartments: nucleoplasm



RUNX1 and ESR1 cooperatively bind the KCTD6 gene enhancer, which contains both estrogen response elements and RUNX1 response elements (Stender et al. 2010).

Preceded by: [RUNX1 binds ESR1](#)

Followed by: [KCTD6 gene expression is stimulated by RUNX1 and ESR1](#)

Literature references

Stender, JD., Kim, K., Charn, TH., Komm, B., Chang, KC., Kraus, WL. 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. ↗

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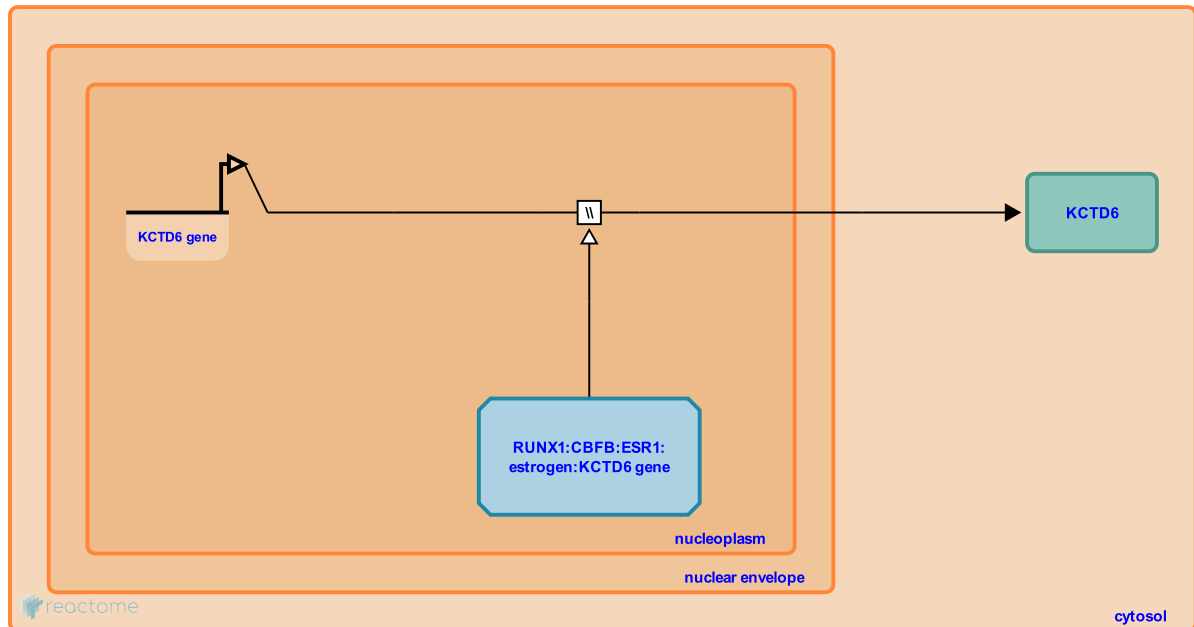
KCTD6 gene expression is stimulated by RUNX1 and ESR1 ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

Stable identifier: R-HSA-8932033

Type: omitted

Compartments: nucleoplasm, cytosol



RUNX1 and ESR1, which form a complex that binds to the KCTD6 gene enhancer, cooperatively stimulate the expression of the KCTD6 gene (Stender et al. 2010).

Preceded by: [RUNX1 and ESR1 bind the KCTD6 gene enhancer](#)

Literature references

Stender, JD., Kim, K., Charn, TH., Komm, B., Chang, KC., Kraus, WL. 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. ↗

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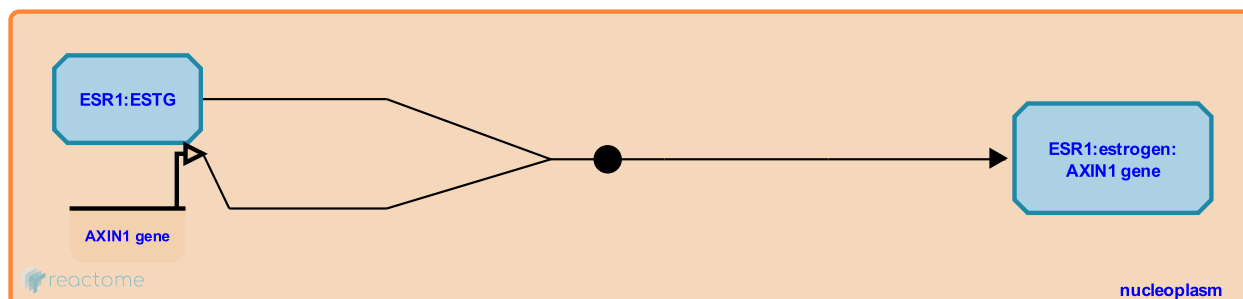
ESR1 binds the AXIN1 gene ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

Stable identifier: R-HSA-8932070

Type: binding

Compartments: nucleoplasm



Estrogen receptor alpha (ESR1) binds to estrogen response elements in the second intron of the AXIN1 gene (Chimge et al. 2016).

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

Literature references

Chimge, NO., Little, GH., Baniwal, SK., Adisetiyo, H., Xie, Y., Zhang, T. et al. (2016). RUNX1 prevents oestrogen-mediated AXIN1 suppression and β -catenin activation in ER-positive breast cancer. *Nat Commun*, 7, 10751. ↗

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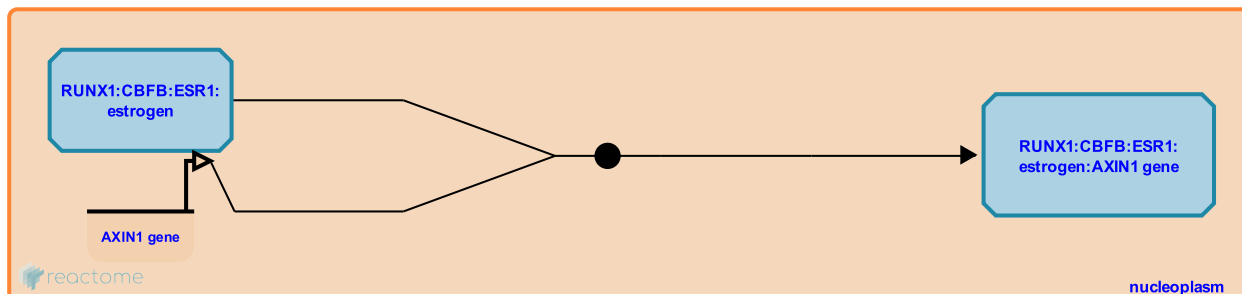
RUNX1 and ESR1 bind the AXIN1 gene ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

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).

Preceded by: [RUNX1 binds ESR1](#)

Literature references

Chimge, NO., Little, GH., Baniwal, SK., Adisetiyo, H., Xie, Y., Zhang, T. et al. (2016). RUNX1 prevents oestrogen-mediated AXIN1 suppression and β -catenin activation in ER-positive breast cancer. *Nat Commun*, 7, 10751. ↗

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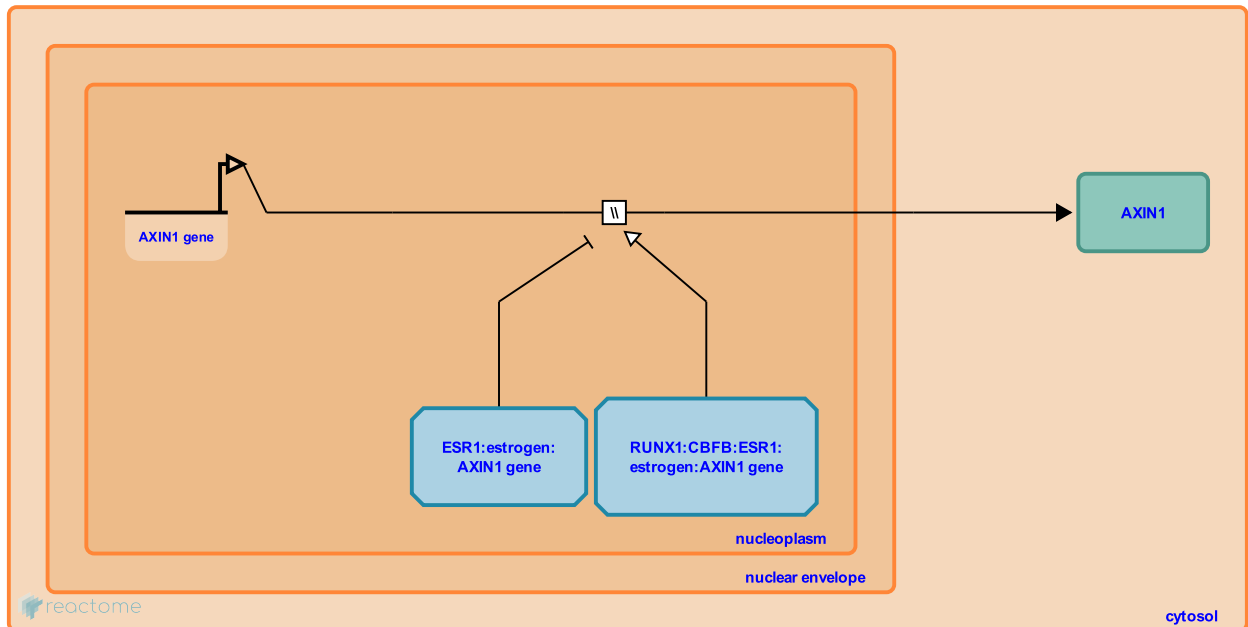
AXIN1 gene expression is inhibited by ESR1 and stimulated by RUNX1 ↗

Location: [RUNX1 regulates estrogen receptor mediated transcription](#)

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).

Preceded by: [ESR1 binds the AXIN1 gene](#)

Literature references

Chimge, NO., Little, GH., Baniwal, SK., Adisetiyo, H., Xie, Y., Zhang, T. et al. (2016). RUNX1 prevents oestrogen-mediated AXIN1 suppression and β -catenin activation in ER-positive breast cancer. *Nat Commun*, 7, 10751. ↗

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