

# TWIST1 binds the RUNX2 gene promoter

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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: 88

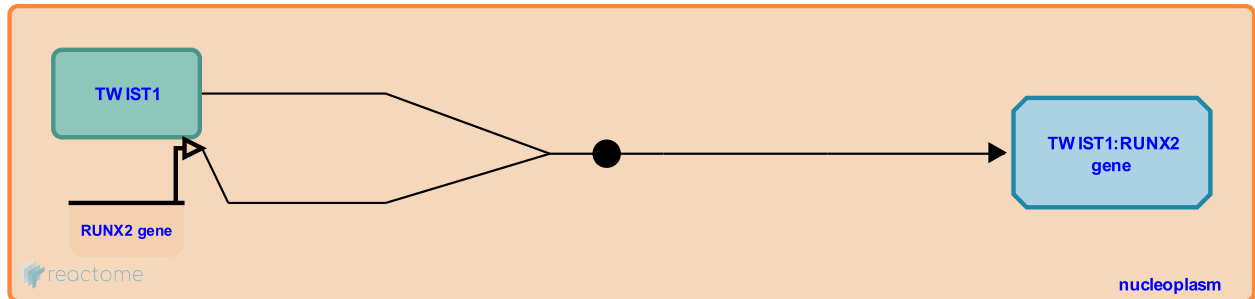
This document contains 1 reaction ([see Table of Contents](#))

## TWIST1 binds the RUNX2 gene promoter ↗

**Stable identifier:** R-HSA-8940032

**Type:** binding

**Compartments:** nucleoplasm



TWIST1 transcription factor binds the proximal P2 promoter of RUNX2. Binding involves the basic helix-loop-helix (bHLH) domain of TWIST1 and E1-box in the P2 promoter of RUNX2 (Yang et al. 2011). TWIST1, a transcriptional target of HIF1A (Yang et al. 2008) and STAT3 (Zhang et al. 2015), induces epithelial-to-mesenchymal transition (EMT) and promotes cancer metastasis (Yang et al. 2004). In zebrafish, Twist-mediated transactivation of *runx2* controls skeletal development and dorsoventral patterning (Yang et al. 2011). Twist proteins also interact with the DNA-binding domain of RUNX2 to modulate its activity during skeletogenesis (Bialek et al. 2004).

### Literature references

Yang, DC., Hung, SC., Tsai, CC., Chen, YH., Yang, MH., Huang, TF. (2011). Hypoxia inhibits osteogenesis in human mesenchymal stem cells through direct regulation of RUNX2 by TWIST. *PLoS ONE*, 6, e23965. ↗

### Editions

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