Signaling by NODAL


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


Reactome database release: 71

This document contains 2 pathways and 9 reactions (see Table of Contents)
Signaling by NODAL

Stable identifier: R-HSA-1181150

Compartments: cytosol, extracellular region, nucleoplasm, plasma membrane

Signaling by NODAL is essential for patterning of the axes of the embryo and formation of mesoderm and endoderm (reviewed in Schier 2009, Shen 2007). The NODAL proprotein is secreted and cleaved extracellularly to yield mature NODAL. Mature NODAL homodimerizes and can also form heterodimers with LEFTY1, LEFTY2, or CERBERUS, which negatively regulate NODAL signaling. NODAL also forms heterodimers with GDF1, which increases NODAL activity. NODAL dimers bind the NODAL receptor comprising a type I Activin receptor (ACVR1B or ACVR1C), a type II Activin receptor (ACVR2A or ACVR2B), and an EGF-CFC coreceptor (CRIPTO or CRYPTIC). After binding NODAL, the type II activin receptor phosphorylates the type I activin receptor which then phosphorylates SMAD2 and SMAD3 (R-SMADs). Phosphorylated SMAD2 and SMAD3 form hetero-oligomeric complexes with SMAD4 (CO-SMAD) and transit from the cytosol to the nucleus. Within the nucleus the SMAD complexes interact with transcription factors such as FOXH1 to activate transcription of target genes.

Literature references


Editions

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<tr>
<td>2011-08-25</td>
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Cleavage of NODAL proprotein

Location: Signaling by NODAL

Stable identifier: R-HSA-1181152

Type: transition

Compartments: extracellular region

Inferred from: Cleavage of Nodal proprotein (Mus musculus)