www.elsevier.com/locate/developmentalbiology

The Bmp signaling pathway regulates development of left-right asymmetry in amphioxus

Vladimir Soukup, Zbynek Kozmik

PII: S0012-1606(17)30153-7
DOI: https://doi.org/10.1016/j.ydbio.2017.12.004
Reference: YDBIO7642

To appear in: *Developmental Biology*

Received date: 3 March 2017
Revised date: 5 December 2017
Accepted date: 5 December 2017

Cite this article as: Vladimir Soukup and Zbynek Kozmik, The Bmp signaling pathway regulates development of left-right asymmetry in amphioxus, *Developmental Biology,* https://doi.org/10.1016/j.ydbio.2017.12.004

The Bmp signaling pathway regulates development of left-right asymmetry in amphioxus

Authors:
Vladimir Soukup#* & Zbynek Kozmik

Institute of Molecular Genetics, The Czech Academy of Sciences, Videnska 1083, 14220 Prague, Czech Republic
current address: Department of Zoology, Faculty of Science, Charles University in Prague, Vinicna 7, 12844 Prague, Czech Republic

*Correspondence to: soukup@natur.cuni.cz

Abstract

Establishment of asymmetry along the left-right (LR) body axis in vertebrates requires interplay between Nodal and Bmp signaling pathways. In the basal chordate amphioxus, the left-sided activity of the Nodal signaling has been attributed to the asymmetric morphogenesis of paraxial structures and pharyngeal organs, however the role of Bmp signaling in LR asymmetry establishment has not been addressed to date. Here, we show that Bmp signaling is necessary for the development of LR asymmetric morphogenesis of amphioxus larvae through regulation of Nodal signaling. Loss of Bmp signaling results in loss of the left-sided expression of *Nodal*, *Gdf1/3*, *Lefty* and *Pitx* and in gain of ectopic expression of *Cerberus* on the left side. As a consequence, the larvae display loss of the offset arrangement of axial structures, loss of the left-sided pharyngeal organs including the mouth, and ectopic development of the right-sided organs on the left side. Bmp inhibition thus phenocopies inhibition of Nodal signaling and results in the right isomerism. We conclude that Bmp and Nodal pathways act in concert to specify the left side and that Bmp signaling plays a fundamental role during LR development in amphioxus.