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Regulation of Nodal Signalling and Mesendoderm Formation by TARAM-A, a TGFβ-Related Type I Receptor

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Abstract

Nodal signalling is essential for many developmental events during vertebrate development, including the establishment of left–right asymmetry, of dorsoventral axis of the central nervous system, and endoderm and mesoderm formation. The zebrafish TGFβ-related type I receptor, TARAM-A (Tar), is expressed in the prospective mesendodermal territory and, when activated, can transfate early blastomeres into endoderm, suggesting that Nodal and Tar may represent similar signalling pathways. We have analysed the functional relationships between those two pathways in zebrafish. We first demonstrate that *tar* and the zebrafish *nodal* genes *cyc* and *sqt* functionally interact. We also show that a dominant-negative isoform of Tar, TarMR, interferes specifically with the function of Cyc and Sqt *in vitro*, but does not interfere with the function of BMP2, another TGFβ-related molecule. TarMR interferes also with Nodal signalling *in vivo* since it enhances the phenotype of embryos with weakened Nodal signalling. Overexpression of *tarMR* in wild-type embryos interfered with the formation of endoderm-derived structures. Conversely, overexpression of *tar* enlarged the presumptive mesendodermal region at the onset of gastrulation. Together, our results point to Tar as an essential factor for endoderm formation and an important modulator of Nodal signalling, potentially representing one of the Nodal receptors.

Keywords

zebrafish; nodal; endoderm; signalling; dominant-negative

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