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Twist Function Is Required for the Morphogenesis of the Cephalic Neural Tube and the Differentiation of the Cranial Neural Crest Cells in the Mouse Embryo

Kenneth Soo^a... Patrick P.L. Tam^{a1}

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Abstract

Loss of *Twist* function in the cranial mesenchyme of the mouse embryo causes failure of closure of the cephalic neural tube and malformation of the branchial arches. In the *Twist*^{-/-} embryo, the expression of molecular markers that signify dorsal forebrain tissues is either absent or reduced, but those associated with ventral tissues display expanded domains of expression. Dorsoventral organization of the mid- and hindbrain and the anterior–posterior pattern of the neural tube are not affected. In the *Twist*^{-/-} embryo, neural crest cells stray from the subectodermal migratory path and the late-migrating subpopulation invades the cell-free zone separating streams of cells going to the first and second branchial arches. Cell transplantation studies reveal that *Twist* activity is required in the cranial mesenchyme for directing the migration of the neural crest cells, as well as in the neural crest cells within the first branchial arch to achieve correct localization. *Twist* is also required for the proper differentiation of the first arch tissues into bone, muscle, and teeth.


Keywords

Twist; dorsoventral patterning; neural tube; neural crest cells; tissue potency; cell migration






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- 1 To whom correspondence should be addressed. Fax: +61 2 9687 2120. E-mail: ptam@cmri.usyd.edu.au.

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