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FGF Signaling Regulates Expression of *Tbx2*, *Erm*, *Pea3*, and *Pax3* in the Early Nasal Region

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Abstract

Fgf8 is required for normal development of the nasal region. Here, we have used a candidate approach to identify genes that are induced in chick nasal mesenchyme in response to FGF signaling. Using an explant culture system, we show that expression of the transcription factors *Tbx2*, *Erm*, *Pea3*, and *Pax3*, but not *Pax7*, in nasal mesenchyme is regulated by ectodermal signals in a stage-dependent manner. Using beads soaked in recombinant FGF protein and an FGF receptor antagonist, we furthermore demonstrate that FGF signaling is necessary and sufficient for expression of *Tbx2*, *Erm*, *Pea3*, and *Pax3*, but has no effect on *Pax7* expression. We also show that, within the nasal mesenchyme, competence to respond to FGF signaling is initially widespread and uniform but becomes restricted to regions normally exposed to FGF at later stages of development, coincident with changes in FGF receptor expression. Finally, we provide evidence that FGF8 also regulates *Erm* and *Pea3* expression in the nasal placodes. Together, these results identify *Tbx2*, *Erm*, *Pea3*, and *Pax3* as downstream targets of FGF signaling in the facial area and suggest that these genes may mediate some of the effects of FGF8 during development of the nasal region.

Keywords

Tbx2; *Erm*; *Pea3*; *Pax7*; *Pax3*; *Fgf8*; craniofacial development; patterning; nasal placode; olfactory placode; chick

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