

Molecular characterization of TGF- β mechanism in embryonic rescue for the secondary palate with overexpression of Smad2

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Cleft palate is a common birth defect in the human population. In analyses of non-syndromic cleft palate, a linkage to TGF- β 3 has been shown. Signalling of TGF- β is mediated in the cell through Smad2. The aim of this study was to understand the mechanism of palatal fusion in the rescue mice compared to wild-type. The heads of embryos at age (E14.5) of rescued, Smad2 overexpression and wild-type models were embedded in paraffin after genotyping and fixation. Serial 7 micron sections were studied for detection of apoptosis and epithelial mesenchymal transition using immunohistochemistry. Images were captured with confocal laser microscope. Activation of Smad2 was studied with phospho-Smad2 antibody, and the level of Smad2 in each embryo normalized with immunoblotting. We observed that TGF- β 3 null mice developed a secondary palatal cleft while the TGF- β 3 null mice that had also inherited the K14-Smad2 gene had fusion of the secondary palate. The effect of the K14-Smad2 expression was analyzed in the medial edge epithelium of the rescue mice; the MEE had a much higher ratio of cells with cleaved caspase, a marker of apoptosis, than in the control fused palates. The increase in apoptosis was correlated with increased p-Smad2 in the same cells while p-Smad2 in the control mice with normal palatal fusion was not associated with high levels of apoptotic MEE. We concluded that Smad2 overexpression might rescue the cleft in the secondary palate of mice by increasing apoptosis of epithelial cells in the middle seam. Thus the mechanism of rescue is not identical to the events that normally occur during palatal fusion.

Biography

Husein A. Alomer is a faculty member in Prince Abdul Rahman Advanced Dental Institute for Higher Studies in Dentistry. He is a member of supervisors committee of resident in postgraduate – Saudi Board Program. Also, he is a consultant in restorative dentistry in Royal clinic- Prince Sultan Military Medical City-Medical Services. He was a faculty member visitor in The University of British Columbia-Vancouver- Canada since 2009 to 2012. His research interest is the studying of signals and mechanisms affect and enhance the molecular pathways in oral diseases. He would like to establish a research part to be combined with the Saudi Board Program.

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