Does *bmp6* play a role in zebrafish (*Danio rerio*) tooth development?

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Recently divergent post-glacial lake and marine dwelling populations of the threespine stickleback (*Gasterosteus aculeatus*) became geographically isolated after the last ice age. Though these isolated populations are still considered to belong to the same species, there has been rapid diversification including at least one freshwater population with a change in tooth phenotype (Peichel, 2005; Miller et al., unpublished). To determine the genotypic basis for this observed change in tooth phenotype, Miller et al. used quantitative trait locus (QTL) analysis to identify the gene coding for bone morphogenic protein 6 (Bmp6) as a candidate gene possibly involved in the evolution of supernumerary teeth. In addition, Miller et al. has studied *bmp6* mRNA expression in supernumerary threespine sticklebacks and has proposed that *bmp6* over-expression during late developmental stages may facilitate the development of extra teeth (Miller et al., unpublished). Studies in mouse and other vertebrates have identified a possible inhibitory role of Bmp proteins, Bmp2 and Bmp4, during early states of tooth development (Mustonen, Tümmers et al. 2002; Wise and Stock, 2010); however, there has not been a systematic investigation of Bmp6’s role during relatively late stages of tooth development.

The accessibility of the developing zebrafish (*Danio rerio*) pharyngeal dentition makes it an ideal system to continue efforts to identify and characterize genes involved in vertebrate tooth development. We studied the role of (Bmp6) during late stages of zebrafish tooth development. More specifically, we over-expressed Bmp6 protein by performing Bmp6-coated bead implantations localized to one side of the midline of the pharyngeal region in 4-5 day-old zebrafish embryos. Over-expression of Bmp6 via Bmp6-coated bead implantations resulted in some individuals exhibiting more teeth on the side in which a bead was implanted; however, these findings were not statistically significant (Fisher’s Exact Test; p > 0.05). Nevertheless, increasing sample size in both experimental and control groups may allow us to characterize the role of Bmp6 more rigorously. In addition, we are working to create a stable transgenic *D. rerio* line in which individuals contain a gene coding for a Bmp6::GFP fusion protein downstream of an inducible heat shock promoter. This approach may allow us to explore the effects of *bmp6* over-expression at progressively later developmental stages when implanting beads may be too invasive.

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**References:**


