

MOLECULAR MECHANISMS OF EARLY TOOTH DEVELOPMENT

[M. BEI](#), [V. GUPTA](#), [L. RAJ](#), [A. DATTA](#)

Cutaneous Biology Research Center, Massachusetts General Hospital,
Harvard Medical School, Charlestown MA 02129.

INTRODUCTION: Transcription factors play important roles during cell fate determination and expression of tissue-specific genes that are necessary for normal organ development. Our previous studies revealed that the transcription factor encoded by the *Msx1* homeobox gene plays an important role in tooth development¹. Genetic studies in both humans and mice indicate that loss-of-function of *Msx1* gene affects early tooth formation. Epistasis and functional analysis, using the genetically engineered *Msx1* mouse mutants, revealed an *Msx1*-controlled genetic hierarchy, where several families of growth and transcription factors are involved².

METHODS: To further understand the role of *Msx1* during early tooth morphogenesis, using genomic and high-throughput technologies, we identified novel genes and pathways whose function is important to early tooth morphogenesis. In addition, we tested the hypothesis that *Msx1*'s activity, as a repressor or activator, is modulated by interactions with tooth specific partners.

RESULTS: We have found that *Msx1* protein interacts in vitro and in vivo with several transcription factors in a context dependent manner.

DISCUSSION & CONCLUSIONS: The fundamental understanding of how *Msx1* regulatory protein functions will provide valuable insight on the transcriptional mechanism regulating tooth development.

REFERENCES: ¹ M. Bei (1998) *Development* 125: 4326-4333. ² M. Bei (2000) *Development* 127: 4711-4718.

ACKNOWLEDGEMENTS: This work was supported by grants from the NIH (Research Career Award) and from Harvard Medical School (Scholars in Medicine Award) to MB.