

AAO Foundation Award Final Report

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Award Type	Biomedical Research
Project Title	The Effects of Mechanical Stimulation on Osteopontin Expression
Project Year	1996
Institution	Children's Hospital / Harvard School of Dental Medicine
Summary/Abstract	<p>Application of mechanical stimulation on bone cells has been shown to be very important on the maintenance of overall bone phenotype. Osteopontin (Opn) is an important bone protein known to mediate both bone resorption and bone apposition through its RGD binding domain. Preliminary studies on our laboratory have indicated that Opn is highly affected by any combinations of mechanical forces placed on the tissue on the in vivo and the in vitro levels. This present study has investigated the nature of Opn as a mediator of early changes on bone cell phenotype after the onset of mechanical stimulation. The results indicated that Opn mRNA follows a specific time course of response that can be correlated with the times of single stimulations. The mechanism by which this response occurs appears to depend on specific molecular events involving gene-protein interactions. Our initial observations were followed by tranfection assays in which we modified and reintroduced the Opn gene on the cultured bone cells to find that only our largest promoter gene fragments contained the necessary information to elicit the stimulatory gene expression response seen in wild type cultures. Further study is warranted to determine the exact sequences responsible for this regulation. Ultimately, these genetic manipulations of key genes in bone physiology allied with clinical orthodontic mechanotherapy will potentially allow for the enhancement of bone remodeling making our treatments faster, more predictable and with less side effects, such as pain and relapse.</p>