

AAO Foundation Award Final Report

Principal Investigator	Haitao Li
Co-Investigator	None
Secondary Investigators	None
Award Type	Orthodontic Faculty Development Fellowship Award
Project Title	Expression and Function of Numb in Tooth Development
Project Year	2012-2013
Institution	Nova Southeastern University
Summary/Abstract (250 word maximum)	<p>NUMB is a multifunctional protein implicated to function in self-renewal and differentiation of progenitors in several tissues. To characterize the transcripts and to analyze the expression pattern of NUMB in odontogenesis, we isolated 2 full-length clones for NUMB from mouse dental pulp mRNA. One novel sequence contained 200 bp insertion in the phosphotyrosine binding domain (PTB). Confocal microscopy analysis showed strong NUMB expression in human dental pulp stem cells (hDPSC) and preameloblasts. Western blot analysis indicated that NUMB isoforms were differentially expressed in various dental tissues. Immunohistochemical analysis showed that in postnatal mouse tooth germs, NUMB was differentially expressed in the preameloblasts, odontoblasts, cervical loop region, and in the dental pulp stem cells during development. Interestingly, overexpression of NUMB in HAT-7, a preameloblast cell line, had dramatic antagonizing effects on the protein expression level of activated Notch 1. Further analysis of the Notch signaling pathway showed that NUMB significantly downregulates sonic hedgehog (Shh) expression in preameloblasts. Therefore, we propose that NUMB maintains ameloblast progenitor phenotype at the cervical loop by downregulating the activated Notch1 protein and thereby inhibiting the mRNA expression of Shh.</p>
Were the original, specific aims of the proposal realized?	Yes
Were the results published? If not,	Yes, the manuscript was submitted on January 6, 2013; Revised May

<p>are there plans to publish? If not, why not?</p>	<p>2, 2013; Accepted May 13, 2013; In printing June 7, 2013. The paper titled " Expression and Function of NUMB in Odontogenesis" was published on BioMed Research International, vol. 2013, Article ID 182965, 11 pages, 2013. doi:10.1155/2013/182965.The link for the paper is: http://www.hindawi.com/journals/bmri/2013/182965/</p>
<p>Have the results of this proposal been presented? If so, when and where? If not, are there plans to do so? If not, why not?</p>	<p>Part of this work was presented at AADR 2010 and AAO 2011.</p>
<p>To what extent have you used, or how do you intend to use, AAOF funding to further your career?</p>	<p>This funding from Orthodontic Faculty Development Fellowship Award mainly was used as my salary supplement. I also used it in purchasing orthodontic text books, payment of my professional memberships, as well as the expenses for meetings I attended that were unable to be reimbursed. The funding helps me maintain focus on my professional goal and supports me in gaining clinical knowledge and research skills. My research project was recently published on BioMed Research International and my appreciation towards AAOF was acknowledged in the manuscript.</p>