

AAO Foundation Award Final Report

Principal Investigator	Sunil Wadhwa
Co-Investigator	
Secondary Investigators	
Award Type	Orthodontic Faculty Development Fellowship Award
Project Title	Transgenic Mouse Model of Temporomandibular Joint Osteoarthritis
Project Year	2006-2009
Institution	University of Connecticut Health Center
Summary/Abstract (250 word maximum)	<p>The National Institute of Dental and Craniofacial Research has estimated that 1% of the American population suffers from temporomandibular joint osteoarthritis (TMJ-OA). The differences between the TMJ and other joints are not well comprehended, resulting in the use of broad assumptions from articular hyaline cartilage to explain or to find appropriate treatments for TMJ-OA. Therefore, the goal of this project was to compare differences and similarities between osteoarthritis of the knee and temporomandibular joint. In order to accomplish this goal, we used biglycan and fibromodulin double deficient mice that develop osteoarthritis in a number of their joints, including the knee and TMJ. We found that similar to the knee, TMJ-OA is characterized by increased chondrocyte hypertrophy and an increase in subchondral bone volume. Furthermore, in the knee we had found that forced treadmill exercise increased the severity of knee-OA. In order to examine if a similar mechanism occurred in the TMJ, we developed an increased and decreased TMJ murine loading models. The decreased loading model consisted of soft diet administration and incisor trimming, which resulted in a significant decrease in chondrocyte maturation markers and condylar cartilage thickness. The increased loading model consisted of forced mouth opening (10-50g) for 1 hour a day for five days that caused an increase in chondrocyte maturation markers. Greater understanding in the differences in TMJ-OA compared to other joints is critical in order to decipher the gender and age predilection of the disease process.</p>

<p>Were the original, specific aims of the proposal realized?</p>	<p>The original Aims of this proposal were Aim 1. Determine if osteoarthritis of the temporomandibular joint fibro- cartilage has similar biomarkers as osteoarthritis of articular hyaline cartilage. Aim 2. Examine changes in apoptosis and proliferation in the superficial articular zone of the mandibular condylar cartilage during osteoarthritis and Aim 3. Determine if decreased mechanical loading can inhibit the progression of TMJ-OA. The majority of the work has been completed for the first and third aims.</p>
<p>Were the results published? If not, are there plans to publish? If not, why not?</p>	<p>Yes, Below is the list of the publications</p> <ol style="list-style-type: none"> 1. Chen J, Kalajzic Z, Barasz J, Xu M, Yeh WC., Wadhwa S, Gender Differences in Young CD-1 Mice to an Altered Functional Tempromandibular Joint Loading Model, Osteoarthritis and Cartilage (Revision) 2. Yeh, WC, Chen J, Gupta T, Barasz J, Kalajzic Z, Drissi H, Hand A, Young M, Nanda R, Wadhwa S, Microarchitectural and Molecular Changes in a Murine TMJ-OA Model, Archives in Oral Biology 2009 Dec;54(12):1091-8. Epub 2009 Nov 6. 3. Chen J, Sorensen K, Gupta T, Kilts T, Young M, Wadhwa S, Altered Masticatory Loading Causes Differential Effects in the Subchondral Bone and Condylar Cartilage in the Mouse Temporomandibular Joint, Osteoarthritis and Cartilage 2008, Sep.11 4. Chen J, Trettel L, Kalajzic Z, Gupta T, Wadhwa S. Altered temporomandibular joint loading. In: McNamara JA Jr, Kapila SD, eds. Temporomandibular Disorders and Orofacial Pain: Separating Controversy from Consensus. Monograph 46, Craniofacial Growth Series, Department of Orthodontics and Pediatric Dentistry and Center for Human Growth and Development, The University of Michigan, Ann Arbor, 2009;451-464. 5. Wadhwa S, Kapila S, TMJ Disorders: Future Innovations in Diagnostics and Therapeutics, Journal of Dental Education 2008

	Aug;72(8):930-47
<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>Yes, Below is the list of the presentations</p> <ol style="list-style-type: none"> 1. International Society of Dental Research Annual Meeting, Miami Fl (2009) 2. American Association of Orthodontist Annual Meeting Denver, Co (2008) 3. Moyer's Symposium, University of Michigan Ann Arbor, Mi (2008) 4. Edward Angle Society of Orthodontists North Atlantic Component Annual Meeting Clare, Ireland (2007) 5. International Society of Dental Research Annual Meeting, New Orleans, La (2007)