The University of Iowa Department of Orthodontics "Advancing Orthodontics, One Smile at a Time"



College of Dentistry and Dental Clinics

Dear Alumni and Friends,

Your Department of Orthodontics continually strives to provide the best orthodontic education in the world to our residents and top-tier care to our patients. Also, as members of a research university, we are involved in groundbreaking studies. Examples of recent national funding received by our researchers are included in this issue. We are forever in debt to you for your support.

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Iowa Society of Orthodontists meeting 2019



The University of Iowa orthodontic faculty provided a series of clinical and basic science lectures to members of the ISO in October.



Dr. Shankar Venugopalan discusses molecular biology as a basis for orthodontic tooth movement.





(left to right) Drs. Kirk Davies, John Hermanson, Stephanie Combs, Jason Schmidt, Clay Parks

American Association of Orthodontists Foundation (AAOF) AWARD FUNDING

In the MSO constituency, **U Iowa ranks #1** with AAOF Awards in dollar amount of \$430,000



All over the US, U Iowa ranks 6th with AAOF Awards in dollar amount.

1	U Michigan	\$692,000
2	UCSF	\$615,000
3	UCLA	\$540,000
4	U Washington	\$495,000
5	U Connecticut	\$485,000
6	U Iowa	\$430,000

NIH Awards Dr. Aline Petrin Grant Totaling Almost \$700K

Dr. Petrin's project draws on a powerful approach to the study of epigenetics and disease using discordant monozygotic twins to detect key epigenetics factors that play a causal role in orofacial clefts. The twin approach allows researchers to control for confounding factors, including genetic background, environmental exposure, age, gender, and other such effects, and thereby uncover epigenetic risk factors that are invisible to conventional genomewide association studies and sequencing methods. Dr. Petrin and her mentors have successfully applied this twin approach to oralfacial clefts (OFCs), and they have discovered the first causal gene for Van der Woude syndrome, the most common syndromic form of OFCs.

Dr. Petrin's project expands on this work. She hypothesizes that aberrant DNA methylation plays an important role in the etiology of OFCs and she, with the support of her mentors, gathered the largest (to date) set of monozygotic twins in which one has a nonsyndromic OFC and the other does not to characterize genome-wide differentially methylated regions that can impact the risk for orofacial clefts. Her two primary research aims are to:

- determine genome-wide methylation patterns in DNA samples from monozygotic twins discordant for OFCs
- explore the genetic-epigenetic interactions involved in the etiology of OFCs.

Dr. Petrin expressed her gratitude for the grant and the support she has received from the college: "I am truly honored to receive this award and thankful for the support I have received from the Department of Orthodontics, the Iowa Institute for Oral Health Research, and the College of Dentistry. This award is a wonderful opportunity to leverage my knowledge of craniofacial genetics into the proposed epigenetic studies. I feel incredibly lucky for having a team of outstanding researchers and clinicians involved in the project and I will take this opportunity to further develop my line of research and skills as a mentor and educator."



Dr. Petrin

Dr. Moreno

Dr. Aline Petrin (Iowa Institute for Oral Health Research) has been awarded a 5-year careerdevelopment NIH K01 grant totaling almost \$700,000 for her project, "A Twin Approach for Genome-Wide Differential DNA Methylation in Orofacial Clefting." Dr. Petrin developed the proposal as a post-doctoral researcher with support from the college's R90/T90 training grant. Dr. Lina Moreno is Dr. Petrin's mentor.

ITI Awarded \$50,000 to Dr. Shankar Rengasamy Venugopalan and His Team

The International Team of Implantology (ITI) has awarded **Dr. Shankar Rengasamy Venugopalan**, **Dr. Satheesh Elangovan**, and **Dr. Erliang Zeng** \$50,000 to study the epigenetic mechanisms leading to peri-implantitis. The principal investigator of this grant Dr. Shankar Rengasamy Venugopalan is an Associate Professor in the Department of Orthodontics. The co-investigators are Dr. Satheesh Elangovan, Professor in the Department of Periodontics and Dr.Erliang Zeng, Associate Professor in the Division of Biostatistics and Computational Biology.

Peri-implantitis, like periodontitis, is characterized by loss of alveolar bone beyond the physiological limits, which make them an irreversible condition and a complex problem to tackle. Currently, no single clinical strategy is available that can be utilized to treat peri-implantitis in a predictable manner. The epigenetic modifications plays a significant role in the development of human diseases such as cancer, neurological disorders, and autoimmune diseases. However, its role in peri-implantitis is not well characterized. Dr. Rengasamy Venugopalan and his team, with the grant funding from ITI will study the epigenetic mechanisms underlying peri-implant pathologies using advanced next-generation sequencing technology. Understanding the epigenetic mechanisms behind peri-implantitis may help to develop novel and predictable preventive or therapeutic approaches.



If you have news you would like to share, then please contact Tom or Sue; tom-southard@uiowa.edu, sue-wollrab@uiowa.edu

Dr. Kyungsup Shin Receives \$20K Grant from the American Association of Orthodontists Foundation



The American Association of Orthodontists Foundation (AAOF) awarded **Dr. Kyungsup Shin** (Orthodontics) a \$20K grant for his project "Fracture Energy Assessment Using CBCT: a pilot study for predicting risk of Post-Traumatic Craniofacial deformities." Dr. Shin's Co-Investigators

are Dr. Donald Anderson (College of Medicine), Dr. Veeratrishul Allareddy (OPRM), and Dr. Xian Jin Xie (Biostatistics and Computational Biology).

Temporomandibular disorders are when injury or inflammation of the temporomandibular joint (the joint at the back of the jaw) causes pain in the area. About 60–70% of the general population are afflicted with the disorder, and it is particularly challenging to effectively treat without early diagnosis and treatment.

Dr. Shin's project is investigating whether cone beam computed tomography (CBCT) can be used to determine how likely it is for disorders to develop as a result of a traumatic event. Post-traumatic osteoarthritis is one of the most challenging degenerative joint disorders, and the degree of trauma plays an important role in the development of the disorder.

Thus, Dr. Shin is using CBCT to determine the degree of trauma—that is, the objective fracture energy, and how that energy is distributed over different anatomical regions of the mandible. The method has been used previously in determining the fracture energy in long-bone (i.e., leg) fractures, and Dr. Shin believes it may be useful for trauma to the jaw as well.

Dr. Shin and the Department of Orthodontics also received another subcontract grant from the University of Alabama at Birmingham to continue studying "Anterior Openbite Malocclusions in Adults: Recommendations, Treatment, and Stability."