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The Explorer

Journal of Dental Student and Faculty Research

UCLA

School of
Dentistry

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THE EXPLORER TEAM

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A LETTER FROM DEAN KREBSBACH

Dear Readers,

As you may know, a significant part of my career has been dedicated to research and to be a part of one of the highest regarded research universities in the world is an honor and privilege. I have had the opportunity to meet several of our bright and talented dental students this past year, and they have shared their research passions and what they hope to achieve in their future endeavors. Research will always hold value and provide fulfillment in your career. Research opens doors to new therapies and methods to improve the oral health of the world—the cornerstone of our mission.

In this issue of *The Explorer*, you can read about several of our faculty members who have made it their goal to integrate research into their clinical practice. This is a perfect example of what it means to use research to move the field forward in order to provide better care for the greater population. You can also read about how nanomedicine and nanodiamonds are being used in cutting-edge dental research. Lastly, you can read the research abstracts that were presented at our annual Research Day, which is the school's opportunity to showcase projects by our talented dental students, residents, and master's and doctoral degree candidates.

I hope that the students in the Class of 2019 continue to incorporate research into their careers and practices. I also encourage the rest of our current dental students to continue to explore new avenues of research.

Sincerely,

Paul H. Krebsbach, DDS, PhD
Dean and Professor



A LETTER FROM THE EDITORS



Dear Readers,

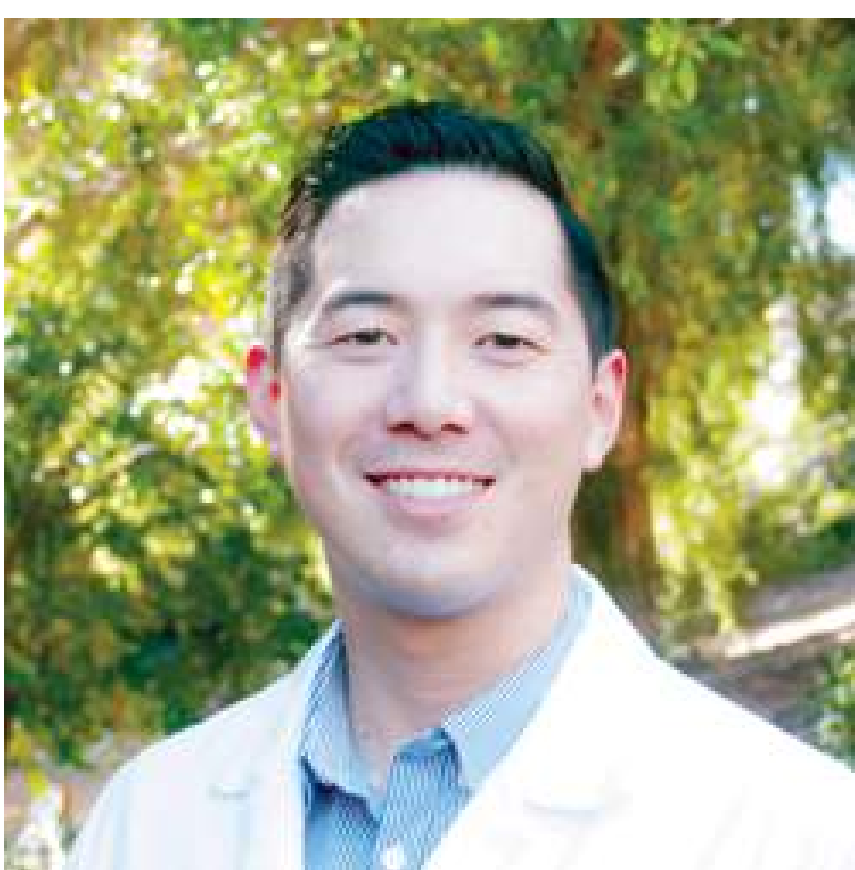
We are extremely proud and excited to present you the 12th Edition of *The Explorer* Journal of Dental Student and Faculty Research. The UCLA School of Dentistry spearheads numerous dental and oral biological research projects, with funding exceeding over \$23 million this past academic year. With the sheer amount of time and effort put into these projects by our very own students, faculty, staff, and etc., we hope that this journal provides a peek into the groundbreaking developments and advancements that happen daily at the UCLA School of Dentistry.

We would like to thank our wonderful team of authors, editors, and designers for their amazing work throughout the year and making this issue possible. Along with their hard work, we would like to extend our gratitude towards Dean Paul Krebsbach for his unending support towards research programs at the university and for his dedication to continually push ourselves to strive for excellence. We are excited to see how much the community clinics evolve under his supervision.

Last but not least, we want to wish everyone the best of luck to everyone with a new academic year coming up. Everyone's efforts, both academically and clinically, do not go by unnoticed and inspire us. Go Bruins!

Sincerely,

Kevin Kang
Arash Panah
Nicole Lee
The Explorer Editors-in-Chief



DR. MARC HAYASHI



Written by Kimi Low '19

In recent years, restorative dentistry has shifted largely towards adhesive dentistry -- which focuses on the ability to bond to enamel and dentin surfaces. Adhesive dentistry can be difficult to properly achieve due to its many steps and demand for an isolated operative environment. Thus, there is a need to educate clinicians on the fundamental concepts of adhesive dentistry to ensure reliable clinical outcomes with composites.

Dr. Marc Hayashi is an assistant clinical professor, teaching in the Section of Restorative Dentistry. He received his DMD in 2009 from the University of Pennsylvania School of Dental Medicine and joined UCLA in 2013. Dr. Hayashi enjoys teaching and strives to enhance the student experience as a pre-clinical lecturer and clinic floor faculty.

In the preclinical setting, Dr. Hayashi recognizes that it can be difficult to assess the quality of the placement of bonding agent. Additionally, he realized the need for an interactive method of learning rather than a solely traditional, lecture based

learning style. In order to bridge the gap between the discrepancy in knowledge and the ability to perform quality adhesive restorations, he utilized a shear bond strength test to help provide real-time feedback for students to learn & self-evaluate their performance.

The shear bond strength test is conducted by an *Ultratester* unit that shears off composite bonded on a tooth mounted in a resin block at the speed of 1 mm per minute. The results are given in megapascals (MPa), where 1 MPa is equal to 135 pounds per square inch. The goal was for students to achieve 17 MPa or above.

Following the *Miller's Pyramid of Clinical Competence*, third and fourth year dental students were first equipped with the knowledge ("knows") through a lecture given by Dr. Hayashi. This lecture reviewed bonding agent components, the different classifications of agents, an overview of the shear bond test, and how to make a sample preparation. Then, students were instructed to create three specimens: the first prepared as the student currently does for composites, the second prepared following the manufacturer's instruction closely, and

the third with a clinical variable. This exercise helps students demonstrate their knowledge and refine their technique after receiving the objective measurement ("knows how"). The next step would assess student performance on live patient care.

Overall, the mean bond strength value increased from the first and second specimens. The fourth years yielded a statistically significant increase. Dr. Hayashi attributes this to the fourth year's immersion in clinic, which may have caused fewer opportunities to engage in adhesive procedures, thus leading to their first specimen with lower valued mean bond strengths. Through a retrospective pre-post survey, students indicated that their confidence in performing bonding procedures increased after the workshop. In addition, they rated the activity as an enjoyable way to learn adhesive dentistry.

In the future, he hopes that dental schools will adopt this model of active learning to increase critical thinking skills for dental students. Through the shear bond strength test, students will be able to quantitatively understand, then be able to self-assess their skill level and work towards competence in adhesive dentistry.

More information on this research will be published in his paper titled *"Enhancing Student Learning and Skill with Dental Bonding Utilizing a Shear Bond Strength Test"* that will be published in the *Journal of Dental Education* this summer.

- RESIDENT SPOTLIGHT -

DR. SOMA LARI



Written by Gregory Chan '19

“Research has always been a major part of my education, even as an undergraduate major at UCLA working in Dr. Benjamin Wu’s lab. It took me from engineering to dental school and allowed me to transition more easily into dentistry and then periodontics.”

For Dr. Soma Lari, research has always been a part of education and her clinical training: “I just couldn’t ever escape it!” After graduating from UCLA as a bioengineering major, Dr. Lari received her DMD from Western University and returned to UCLA for her residency. She is currently a third-year periodontics resident and a finalist for the Volpe Prize, an international research competition highlighting the best research in periodontology.

Under the mentorship of Dr. Flavia Pirih in the Section of Periodontics, Dr. Lari has been evaluating the use of a novel therapeutic drug to treat periodontitis. Previous work in the Pirih lab identified genes potentially associated with periodontitis. These genome-wide association studies are typically used to identify associations between single-nucleotide polymorphisms (SNPs) and major human diseases. Several of the genes that were discovered to be associated with periodontitis encoded chemokines that initiated an inflammatory response through the CXCR3 receptor.

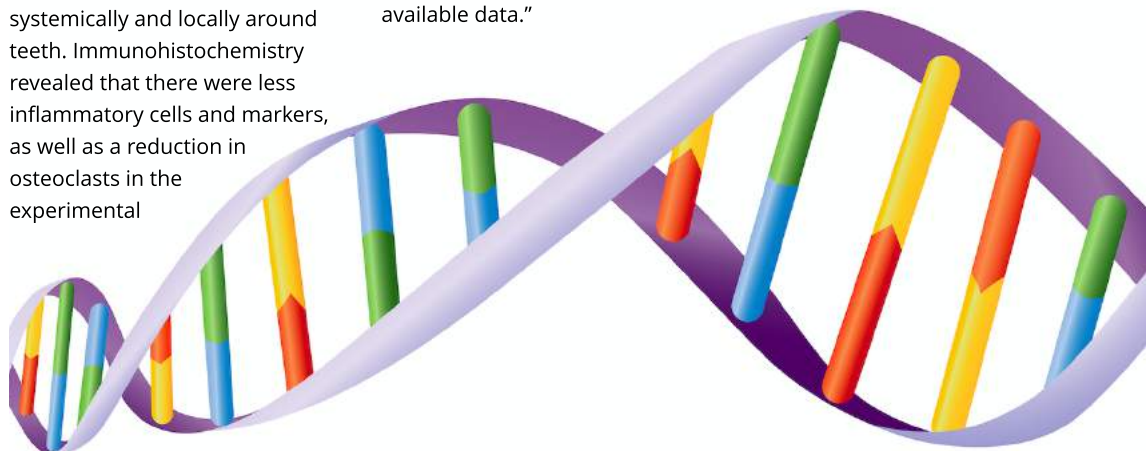
The CXCR3 chemokine receptor has been shown to be involved in systemic diseases such as type 1 diabetes, multiple sclerosis, and atherosclerosis. As part of the study evaluating the role that this receptor has in the progression of periodontitis, Dr. Lari investigated the use of a CXCR3 receptor antagonist known as AMG-487.

In Dr. Lari’s experiment, mice were given injections of AMG-487 either systemically, or locally with nanoparticles, and then compared to a control group. After inducing periodontitis in the mice, the amount of bone loss was compared between the groups through microCT analysis. There was nearly 50% less bone loss in the groups given the CXCR3 receptor antagonist, both systemically and locally around teeth. Immunohistochemistry revealed that there were less inflammatory cells and markers, as well as a reduction in osteoclasts in the experimental

groups given the receptor antagonist.

These promising results highlight a potential therapeutic target to treat periodontitis and reduce the bone loss associated with the disease. The results are also a small insight into the connection between periodontal disease and systemic health, as inflammation is a major shared factor influencing both. The CXCR3 receptor is expressed on T-cells and NK cells, and plays a role in the cellular response in many other inflammatory systemic diseases as well.

As she is preparing to graduate, Dr. Lari has had no regrets about her time here at UCLA. “It was three years well spent!” Dr. Lari plans on opening her own practice, teaching part-time, and possibly pursuing an MBA in the future. Reflecting back on her journey and how research has shaped her education, she is thankful for the opportunities she has had: “it gave me the tools to think independently and not rely on other people’s opinions - research allows me to be confident that the treatment I give my patient is evidence-based and on the best available data.”



DR. CHRISTINE HONG



Written by Richard Song '19

MAKING A LEAP IN CLEFT LIP/PALATE CRANIOFACIAL REGENERATION USING NANODIAMOND HYDROGEL TECHNOLOGY

In dentistry, there are clinicians who treat patients with contemporary knowledge and sciences, and then there are researchers who are responsible for discovering newer state of the art technology for better patient management. Very few people have the time, resources and ambition to be both a clinician and a scientist, but Dr. Hong, a board-certified orthodontist and tenured faculty at the UCLA School of Dentistry, has the distinction of being a professor and the program director of the pre-doctoral Orthodontic curriculum, a renown researcher in the field of craniofacial regeneration, and the doctor of a thriving Orthodontics practice which sees on average 75 patients per day.

When asked what motivates her to do so much, she replied, "The goal has always been to improve orthodontics. In practice, I see so many things that can be improved, so many deficiencies and challenges that cannot be rectified with traditional orthodontics. As a hybrid clinician-researcher, I want to be able to address the problems that my patients face, rather than relying on others to come up with solutions for me."

As the best example of an approach to start from a clinically important question to bringing a solution back chairside, Dr. Hong explains the thought-process behind her latest research invention: injectable estrogen-nanodiamond hydrogels. Currently, patients suffering from cleft lip/palate (CLP) must undergo numerous medical interventions, including orthodontic appliances for palatal expansion, to help develop normal speech, functional occlusion and optimal esthetics. While these appliances are effective, CLP patients have a diminished capacity for bone formation and often experience regression. In order to prevent this relapse, Dr. Hong and her team investigated the use of 17 β -estradiol (E2), a form of estrogen which has been shown to build bone while slowing bone breakdown. However, while E2 has strong osteogenic potential, it comes with its own host of problems. Systemically injected estrogen leads to numerous unwanted side effects, particularly in males, and locally injected estrogen in the palate is taken up too rapidly for any measurable effect. To solve this dilemma, Dr. Hong and her team ingeniously synthesized E2-nanodiamond complexes in photo-cross-linkable hydrogel (E2/ND/G). The idea was that the nanodiamonds would work to surround the active agent of E2, releasing E2 slowly and allowing for long-term effects to take place, while the hydrogel (G) would function to deliver these bioactive molecules in a minimally invasive manner and facilitate the attachment of E2 to the defect structure.

Clinical trials on rats showed immense promise. Intraoral self-activated palatal expanders were initially used in rats to achieve palatal expansion. After seven days, the amount of palatal expansion attained was recorded by measuring the distance between the maxillary central incisors of rats before and after palatal expansion. Rats were then divided into control, E2 only and E2/ND/G groups. Consistent with clinical findings in CLP patients, the relapse ratios were found to be 40% in the control group, 30% in the E2 only group, and only 13% in the E2/ND/G group, which amounts to an incredible three fold decrease compared to the control group. When hematoxylin and eosin (H&E) staining was used to assess the midpalatal suture of all 3 groups, the E2/ND/G group demonstrated advanced suture organization, interdigitation, neovascularization, and a three fold increase in osteoblasts compared to the control group. Furthermore, there were no remnants of ND and G particles found in the midpalatal suture and no harmful effects on rats were seen. Although more studies will have to be done, preliminary data suggests a very favorable result in reducing post treatment relapse in CLP patients.

When asked what about research is so exciting, Dr. Hong responded, "The process of coming up with an idea, designing the experiment and then seeing if your prediction will come true is the most thrilling part of research. Cleft lip and palate is the second most common birth defect in the U.S., and for me to be able to help these people doing what I love endears me greatly." It is precisely this overwhelming drive to help her patients, combined with her go-getter attitude, passion and work-ethic that has allowed Dr. Hong to establish herself as one of the leading orthodontist and scientist in the world today.

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DR. DEAN HO

TAKING DRUG DELIVERY TECHNOLOGY TO A NEW ERA

Written by Kevin Kang '20



Nanodiamonds - microscopic, biocompatible, and durable – possess such unique mechanical and technical properties that they are becoming widely coveted in the medical community. In essence, nanodiamonds are carbon-based particles around four to five nanometers, resemble the shape of a soccer ball, and have an extremely high surface area that allows them to create intense, multiple bonds with various molecules. Their ability to enter cells, chemically stable form, and capability to bind to multiple drugs, make nanodiamonds a perfect medium for drug-delivery transport and opens up exciting doors in the biomedical field. Inspired by their potential to combat life-threatening diseases such as cancer, Dr. Dean Ho has long observed nanodiamonds and has revolutionized the field.

Dr. Dean Ho is a former professor in the Division of Oral Biology and Medicine at the UCLA School of Dentistry and him and his colleagues were actually one of the firsts to demonstrate the translational potential of nanodiamonds as chemotherapeutic delivery agents. Dr. Ho also pioneered the use of artificial intelligence and its application towards personalized and precision medicine. Using this platform known as personalized phenotypic medicine (PPM) to give optimal

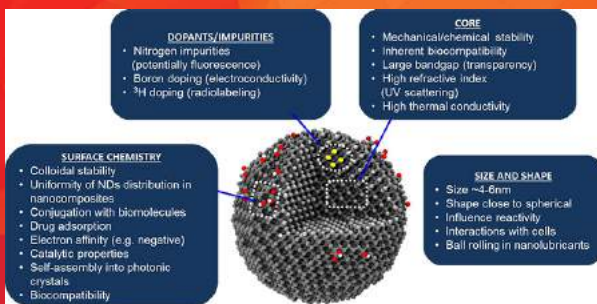


doses of medicine to each patient, he has advanced the use of nanodiamonds by utilizing a combination therapy of drugs.

Dr. Ho's unprecedented work has been highlighted in renowned news platforms such as The Economist, Forbes, Nature, CNN, and the Washington Post. Now, with the ultimate goal of implementing nanodiamonds in clinical trials, Dr. Ho finds himself working in Singapore. Dr. Ho wishes to not only use nanodiamonds for combination therapy in cancer but also for a widespread use including dental conditions such as osteonecrosis or for recurrent bacterial infections in root canals. Specifically, other projects that Dr. Ho and his colleagues have looked at were the use of nanodiamonds for therapeutic delivery of estradiol to enhance bone regeneration and the use of nanodiamond modified gutta percha with amoxicillin in root canals. The projects have shown promising results and further stress the potential of nanodiamonds for all systemic conditions.

The road is still long for these tiny particles to be used traditionally, but Dr. Ho has made significant strides in the nanodiamond field and their potential is becoming more and more recognized. The problem with choosing the right dosage of multiple drugs without harming the patient has bogged the medical field for decades, but nanodiamonds may be just the solution. While Dr. Dean Ho's presence will be missed in the halls and classrooms of UCLA dental school, his work and achievements, much like nanodiamonds, will have a lasting impact.

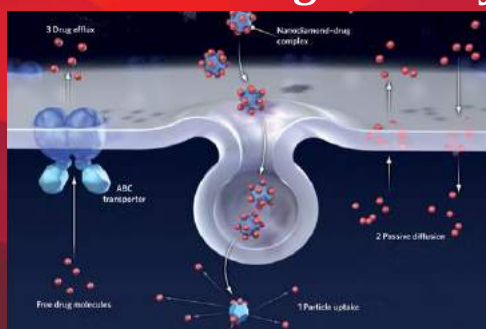
Nanodiamond Structure



Nanodiamonds have a favorable structure that allow it to form complexes with drugs.

Nanodiamonds and Drug Delivery

Nanodiamonds can enter the cell through multiple methods - endocytosis, diffusion of the free drug molecules across the cell membrane, or through transporter



PREDOC STUDENT SPOTLIGHT

STUDENTS TAKE THE LEAD IN RESTORATIVE RESEARCH



Written by Arash Panah '21

Ever been forced to go back to the dentist due to a filling that came apart? The answer is yes for most people. Though genetic factors or life habits such as smoking, drinking, or a strong occlusion contribute to the failure of dental restorations, a gifted hand and the right restorative material can go a long way in preventing this according to Drs. Bonilla and Hayashi.

Dr. Hayashi is currently an Assistant Clinical Professor at UCLA School of Dentistry. Prior to this, he joined UCLA in 2013 as a lecturer in the Section of Restorative Dentistry, as well as in Special Patient Care with the UCLA General Practice Residency (GPR) program. He is also the UCLA Liaison for the Western LA Dental Society, as well as being actively involved in research at the school. Dr. Bonilla is also a lecturer in Restorative Dentistry and a

long-standing research faculty member, with over 20 years of service with UCLA School of Dentistry. The pair are cofounders of the Restorative Research Program (RRP) at the school, aiming to advance clinical acumen with their experimentation and collaboration between faculty and student researchers.

The research team conducts studies to investigate the mechanical and

biochemical properties of dental materials as well as the interaction at the interface level between biomaterials and tooth structures. From investigating the integrity of various dental materials to evaluating the forte of familiar preparation designs, RRP's researchers are exploring the topics that will further bolster our knowledge of restorative dentistry. For students involved in the research program, it not only allows them to practice their hand skills, but to understand how different dental materials and techniques are tested to be used in clinical application.

Teresa Nguyen, a 3rd year dental student, has said that through the program she has gotten "a lot of practice prepping teeth, understanding materials, that has become second nature to her now". She is currently a student researcher of an ongoing project comparing the effects of various adhesive systems on shear bond strength between glass ionomers, resin modified glass ionomers, and composites. With her experience on this project, she cites that it has "helped reinforce concepts learned in pre-clinic" and eased her transition into the clinic.



For 3rd year dental student Nhi Le, her participation in the Restorative Research Program has allowed her to collaborate with faculty toward the program's goal of understanding materials such as bonding agents and composites and techniques used to apply them. Through her work on a study comparing two composite placement techniques on large class II preparations, she states that she's "developed a better understanding of techniques



taught in class" and feels that she is "contributing to developments in restorative dentistry". She believes the results and findings from their research could be immediately applied into clinic and patient care.

Both of the projects described above are two examples of ongoing work in the RRP with Drs. Hayashi and Bonilla as principal investigators. Active involvement of

students is a central philosophy of of their lab, and they have plans to expand their lab to include even more students in pursuit of their research goals. This includes not just assigning student researchers to already planned projects, but also pursuing student-initiated ideas. With this unique vision, the RRP encourages creative thinking and innovation from student researchers by providing the platform to not just follow, but lead the projects alongside their PI.



DR. MO KANG

ORAL CANCER AND ENDODONTIC RESEARCH ALL IN ONE LABORATORY



Written by Brian Lunt '19

Few people might claim to be as deeply Bruin as Dr. Mo Kang. After graduating Granada Hills high school in the San Fernando Valley Dr. Kang moved south through the Sepulveda pass, where he began as an undergrad at UCLA. He is now a quintuple Bruin, having received his B.S., M.S., Ph.D., D.D.S. and Endodontic certificate all at UCLA. Since then he has been full-time UCLA SOD faculty, conducting multiple lines of research, teaching and practicing endodontics.

Dr. Kang began research in the lab of former Dean No-Hee Park, studying oral cancer, which he continues to this day. The current focus is a particular enzyme, Grainyhead-like 2 (GRHL2), which appears promising in targeted cancer therapy. Normal, healthy cells have a region of their DNA, the telomere, that shortens with each cell division. The telomere is regulated by the enzyme telomerase, which is regulated by GRHL2. Cancer cell lines, however, become immortalized as GRHL2 and telomerase are upregulated and telomeres length is maintained without shortening. Ablating GRHL2 abrogates telomerase and many other cellular targets of GRHL2, causing loss of cellular immortality and cell death. While Dr. Kang's research in epithelial cancer biology focuses on cancers of the oral cavity, it applies generally. Chemoradiation therapies have

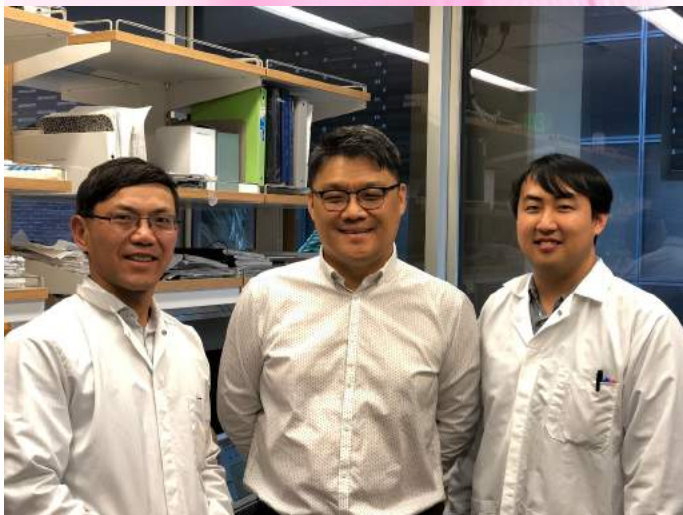
been the gold standard in cancer treatment for decades, but Dr. Kang predicts we may soon see exciting changes in the standard anticancer regimen. He added, "this is a very exciting time for cancer therapeutics research, and that also applies to oral cancer."

A second line of research in Dr. Kang's lab focuses on the hot topic of regenerative endodontics. Last year a Japanese laboratory became the first to successfully regenerate a functional pulp using harvested pulpal mesenchymal stem cells. While impressive, the methods were not feasible for clinical practice, but Dr. Kang thinks his lab could bridge the gap between laboratory and clinical practice. By careful removal of inflamed pulp, chairside preparation and re-insertion to the instrumented canal system he has gotten results that could be done in a clinical setting. If you wonder, is it really normal pulp? Dr. Kang says "we have shown robust stem cells that migrate outcome out of the pulp toward the tooth surface and create new dentinal tubule processes." Dr. Kang and fellow UCLA researchers published a tooth-slice model study earlier this year in the *Journal of Endodontics* and are embarking on clinical trials in the Jack Weichman Endodontics Clinic at UCLA for pulp-tissue grafting approaches for tissue regeneration.

" This was the first time ever in publication that nanodiamonds have been placed in the human body. Nanodiamond is a big field, dealing with diverse implications for drug delivery in many different disciplines of medicine and dentistry."

Dr. Kang has also collaborated productively with other groups in the UCLA SOD: Dr. Dean Ho, Professor in the Division of Oral Biology and Medicine (and quadruple Bruin), and Dr. Eric Sung, Professor in the Division of Advanced Prosthodontics, in antibiotic delivery via nanodiamond impregnated gutta percha (NDGP). In a recent article published in the *Proc. Natl. Acad. Sci. USA*, the collaborative group demonstrated insertion of NDGP in human subjects as part of conventional endodontic therapy. As Dr. Kang describes, "NDGP can be functionalized with antimicrobial substance, such as amoxicillin, which kills the root canal bugs on contact, without releasing the drug into the surrounding tissues." This was the first time ever in publication that nanodiamonds have been placed in the human body. Nanodiamond is a big field, dealing with diverse implications for drug delivery in many different disciplines of medicine and dentistry. As such, the article made a large impact and was highlighted by the Director of the National Institutes of Health, Dr. Francis Collins, in his personal blog.

So, what is down the road for oral cancer and endodontics? Dr. Kang: "Nanodiamonds could have an impact very soon in clinical endodontic practice. We just need to prove the efficacy of the material. [But] I don't want to put a timeline. It is not just a matter of advancing the science but also changing the way we practice. Definitely the technology is advancing rapidly. Translating that to the patient is difficult to predict and partially may depend on how practitioners embrace new technology." We will look forward to these changes in our future practice.



From R to L: Dr. Wei Chen: Adjunct Assistant Professor, Section of Endodontics; Dr. Mo Kang: Professor, Chair of the Division of Constitutive and Regenerative Sciences, Chair of the Section of Endodontics, Jack A. Weichman Chair in Endodontics; Dr. Jaeyoung Lee: Postdoctoral Fellow, Section of Endodontics.



2019 Research Day Abstracts

Comparison of Biofilm Formation on Two Different Implant Overdenture Attachment Surfaces

Sara Zadmehr

Objectives: Bacterial colonization is a major factor in implant failures such as peri-implantitis. Here, we compared bacterial attachment, biofilm formation, and community profiles of the attached microorganisms on two different implant surface materials, titanium carbon nitride (TiCN) and titanium nitride (TiN), in the presence of salivary and blood components at different time points.

Methods: Sterilized TiN and TiCN coated discs were placed into 24-well culture plates and inoculated with a diverse oral microbial community grown anaerobically at 37 °C

in a modified rich medium (50% SHI medium with 25% saliva +/- 0.5% mannose and +/- 0.5% sucrose) developed to support the majority of microorganisms from human saliva samples. Initial attachment of cells and biofilm formation were evaluated at three different time points (Day 1, Day 3, Day 7). Biomass accumulation on the respective discs was evaluated with the crystal violet assay and SEM imaging. Diversity of attached bacterial species was assessed via denaturing gradient gel electrophoresis.

Results: Significantly more bacteria attached to and formed biofilm on TiN compared to TiCN discs at all time points. Bacterial diversity of the biofilms observed on both surfaces was very similar to each other.

Conclusions: Implant material coating with TiCN exhibited a significant reduction in bacterial attachment as well as subsequent biofilm formation compared to TiN. This anti-biofilm surface property of TiCN has a strong potential to improve outcome of implant placement.

Nasal Airway Assessment Secondary to Rapid Palatal Expansion

Kevin Kang

Objectives: Nasal airway obstruction is highly prevalent with potential etiologies manifesting in functional, anatomical, and pathophysiological factors. Small changes in the internal nasal valve (INV) can lead to significant changes in airflow resistance and affect nasal function. As such, we hypothesize that midpalatal disjunction via Rapid Palatal Expansion (RPE) can increase the internal nasal valve angle and improve nasal airflow. The aim of this study is to demonstrate RPE as a valid treatment modality for nasal airway obstruction by evaluating preoperative and postoperative objective parameters of the internal nasal valve and correlate the subjective outcome using Nasal Obstruction Symptom Evaluation (NOSE) scores.

Methods: After institutional Review Board approved at UCLA, a prospective cohort study included subjects undergoing RPE from June 2018 to December 2018 with nasal obstruction symptom in an orthodontic office setting. The internal nasal valve parameters and amount of diastema and suture opening on expansion were measured using Invivo6™ Software (version 6.0.3) on reformatted cone beam computed tomography. Inter-rater reliability of all pre and post-expansion parameters was measured. NOSE score was used for subjective patient-reported outcome measurement. Correlation between objective and subjective outcomes were evaluated using Spearman correlation analysis.

Results: Of 150 patients, 41 patients (28 females and 13 males) met the inclusion criteria. All parameters had a significant change ($p < 0.0001$) after expansion. NOSE score decreased by a mean of 3.80 ± 2.76 , INV angle increased by a mean of 2.06 ± 1.11 degrees, INV surface area increased by a mean of 15.42 ± 8.78 mm², diastema increased by a mean of 2.07 ± 1.55 mm, suture increased by a mean of 3.48 ± 1.06 mm upon average maxillary expansion of 6.34 mm. No significant correlation was observed between the NOSE score change and measure variables.

Conclusions: RPE widens the internal nasal valve angle and surface area improves nasal obstruction symptom.



Analyzing Parallelism and Asymmetry Following Maxillary Skeletal Expansion in Non-Growing Patients

Layla Fijany

Objectives: To evaluate the magnitude, parallelism, and asymmetry of expansion in non-growing patients using micro-implant assisted maxillary skeletal expanders.

Methods: A retrospective study on a sample of 31 non-growing patients with an average age of 20.4 years with Cone Beam Computed Tomography images taken before and after expansion using Maxillary Skeletal Expander (MSE) were assessed for skeletal expansion at three landmarks bilaterally: Anterior Nasal Spine (ANS), Posterior Nasal Spine (PNS) and Zygomaticomaxillary suture (ZMA).

Results: Average magnitude of total expansion was 4.98 mm at the Anterior Nasal Spine (ANS), and 4.77 mm at the Posterior Nasal Spine (PNS) which showed statistical significance using a paired t-test ($p < 0.01$). MSE treatment resulted in 95.7% parallel expansion in the anterior-posterior dimension. The sample was divided into symmetric ($n=15$) and asymmetric ($n=16$) based on the difference in expansion at the ANS. The 16 asymmetric patients exhibited a magnitude of at least 1.1mm asymmetry at the ANS. Among the 31 samples, all but one patient presenting with a right side unilateral crossbite exhibited more expansion on the right side compared to the non-crossbite side. Similarly, all but one patient presenting with a left side unilateral crossbite exhibited more expansion on the left side compared to the non-crossbite side, indicating a possible relationship.

Conclusions: Maxillary Skeletal Expander can be used to achieve significant parallel skeletal expansion in non-growing patients. MSE Expansion is not always symmetric in the transverse plane, with 52% of the patients achieving statistically significant asymmetric expansion. Among the asymmetric patients, on average one half of ANS moved more than the contralateral one by 2.22mm. Patients presenting with crossbite on one side, exhibited more expansion on the same side compared to the non-crossbite side.

Internal Nasal Valve Angle Change Secondary to Miniscrew-assisted Rapid Palatal Expander

Michael Nedjat-Haeim

Objectives: Anatomically, the roof of the mouth is the floor of the nose and midpalatal disjunction can potentially affect the anatomy and physiology of the nasal cavity. Therefore, we propose that the miniscrew-assisted rapid palatal expander (MARPE) can enlarge the internal nasal valve angle. MARPE ensures expansion of the underlying nasal bone and width of the nasal floor, therefore changes in the internal nasal valve angle may be great.

Methods: The INV angle was measured in pre-op and post-op CT scans using Invivo6™ Software (version 6.0.3) in patients who underwent MARPE from January 2014 to June 2018.

Results: Twenty-nine patients between the ages of 14 and 32 who received MARPE had their left and right internal nasal valve angles measured. All items tested had a significant changes ($P < 0.0001$).

Conclusions: MARPE enhanced the INV angle.



Effects of Miniscrew-assisted Rapid Palatal Expander on Nasal Septum Deviation

Julia Peng

Objectives: Nasal septum deviation can present with airflow obstruction and lead to a diminished lifestyle. Severe cases can require surgical treatments such as septoplasty or rhinoplasty and complications can arise. The midpalatal junction and roof of the mouth can potentially affect the anatomy of the nasal cavity such as the nasal airway width. Through maxillary expansion, the miniscrew-assisted rapid palatal expander can expand the nasal floor and increase the transverse dimension of the nasal cavity, thereby rectifying nasal septum deviation. In essence, this study will evaluate preoperative and postoperative parameters of the septum and evaluate MARPE as an applicable treatment modality for nasal septum deviation.

Methods: Following Institutional Review Board approval at UCLA, a prospective cohort study included subjects undergoing MARPE from January 2014 to June 2018 with available before and after expansion cone beam computed tomography in an orthodontic office setting. 29 patients (16 females and 13 males) met the inclusion criteria. The nasal airway width and nasal septum deviation was measured using Invivo6™ Software (version 6.0.3). Inter-rated reliability of all pre- and post-expansion parameters was measured. Significant changes in the nasal septal deviation was evaluated using paired T-test with significance set at p-value <0.05.

Results: Of the 29 patients, 21 patients showed a decrease in nasal septum deviation. All variables tested had a significant change ($P < 0.005$). Nasal airway width increased by a mean of 1.51mm. Septal deviation decreased by a mean of 0.27 ± 0.66 mm.

Conclusions: MARPE can aid in correcting nasal septum deviation.

Socioeconomic and racial/ethnic disparities in access to orthodontic treatment

Delaram Salamati, Elnaz Sharif

Objectives: The aim of this literature review was to assess the disparity in utilization of orthodontic services among different racial, ethnic, and socioeconomic groups including medicaid enrolled children in the United States.

Methods: Research terms and database used: Pubmed, Google Scholar, ADA, Cochrane from 2000. Research terms: "disparity", "orthodontic treatment", "orthodontic care", "orthodontic service", "Medicaid", "socioeconomic status" We also hand-searched the reference list of cited publications for the further relevant researches.

Results: From the articles, reviewed, it was found that children from lower socioeconomic status and those without private health insurance were less likely to report an orthodontic visit in the United States. Also, in regards to the Medicaid insured children, the lack of uniformity that exists among Medicaid orthodontic programs in different states creates disparities in seeking orthodontic care despite the demonstrated need. Moreover, states continue to alter criteria for funded care. Low reimbursement, failed appointments, and loss of coverage during orthodontic treatment has been reported as major barriers to receive a comprehensive orthodontist care. Although some controversies exist about disparities in different racial groups in seeking orthodontic treatment, various studies suggested that substantial disparities have been reported for Black and Hispanic children.

Conclusion: Disparity in access and utilization of orthodontic treatment exists among children of different ages and with various race, socioeconomic status, and insurance type in the United States. The greatest contributory factor in receiving orthodontic treatment is attributed to barrier to access due to lack of accepted criteria for determining orthodontic necessity that renders treatment eligibility, lack of providers that accept Medicaid, and disharmony between the distribution of providers and population in need in designated geographic locations. Future studies that account for confounding variables such as geographic location, age, race, and insurances are required in order to evaluate the disparity in receiving orthodontic treatment among children.