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Message from the Dean

Dear Readers,

At the UCLA School of Dentistry, we place a great deal of importance on academic research. It has always been my goal to ensure that our dental students are exposed to a well-rounded training experience and this includes an introduction to bench and clinical research.

It is the School’s good fortune to have dedicated research faculty and cutting-edge facilities and labs, which support a strong foundation for students to participate in and conduct research. Having these tools readily available is absolutely necessary to nurturing a successful research program. I can say, without a doubt, that the School of Dentistry is one of the leading research-intensive dental schools in the world.

This journal is an excellent representation of how research has influenced our dental students and residents. From the new Restorative Research Program to the student profiles, it is apparent how research helps to open minds and advance careers.

A major milestone that The Explorer editors have successfully covered in this edition was the first annual Clinic Day held on Thursday, October 16. This inaugural event was a celebration of UCLA’s excellence in clinical dentistry and part of a year-long series of activities for the School’s 50th Anniversary Celebration. The program included lectures by our world-renowned faculty members as well as a poster presentation and corresponding competition. I encourage you to take the time to read the abstracts of the posters that were submitted. I trust that you will be just as impressed as I was by the caliber of research that is being conducted at the School.

For me and the research faculty, our greatest accomplishments would be to instill a greater sense of awareness of how important research is to the field of dentistry and becoming a healthcare provider. At one point, new technology and therapeutics started out in a lab. Understanding this concept early in your dental careers will only deem you a more productive, successful clinician and possibly an academic researcher.

Sincerely,

No-Hee Park, DMD, PhD
Dean & Distinguished Professor

Editor’s Note

Dear Readers and UCLA School of Dentistry Community,

We are very excited to bring to you the 9th Edition of The Explorer! Research performed at the UCLA School of Dentistry is consistently acclaimed both nationally and internationally. Every year, students, residents, and faculty present their projects at various renowned conferences, and we aim to share the research that takes place within our community in this publication. We are delighted and honored to bring The Explorer to you again this year to continue the tradition of creating a platform to highlight the innovative proposals made within the UCLA School of Dentistry.

The 9th Edition of The Explorer would not have been possible without the numerous contributions and efforts of all members of our staff. We would like to thank everyone who has helped bring this issue together. We would also like to add our great appreciation and thanks to the continued support from Dean Park to bring this publication to light.

We hope you enjoy this issue as much as we had bringing it together, and we invite you to discover the cutting-edge research that occurs at the UCLA School of Dentistry!

Sincerely,

Rhonda Kalasho and Catherine Kim
The Explorer Editors-in-Chief

The Explorer Staff

Writers and Contributing Editors

Rami Beshai ’15  Mona Derentz ’15  Eric Chen ’16
Thomas Lin ’16  Robert Lee ’16  Sina Banankhah ’17
DavidJourabchi ’17
The Development of a Thriving Restorative Research Program

By Rhonda A. Kalasho ’15

The Section of Restorative Dentistry at UCLA proudly announces the introduction of the Restorative Research Program (RRP), whose elemental purpose is to advance clinical acumen through novel experimentation. Spearheaded by Dr. Richard G. Stevenson III and Dr. Esteban D. Bonilla, the program is devoted to advancing the knowledge and practice of restorative dentistry. Collectively, dental students, pre-dental undergraduates, and faculty of UCLA collaborate on a series of very interesting topics with clinical applications. From investigating the integrity of various dental materials, to evaluating the forte of familiar preparation designs, RRP researchers are exploring the topics that will ultimately further bolster our knowledge of restorative dentistry.

Acclaimed as UCLA’s most prolific faculty, Dr. Stevenson, Chair of the Section of Restorative Dentistry at UCLA, joined UCLA in 1992, and has since then cultivated exceptional rapport among students as a renowned expert and mentor in the field. Dr. Stevenson, Director and mentor of RRP, envisioned the program to be a place where students and faculty could harness their curiosity into productive research efforts. Where ultimately diligence and commitment transfers to the operatory, enhancing patient dental care. The research program currently has five simultaneous studies, and will continue to investigate further topics as the program develops.

Dr. Shane White, holds the title of Advisor and Mentor of RRP. Dr. White is Professor in the Section of Endodontics in the Constitutive & Regenerative Sciences. He has training in both prosthodontics and endodontics, which has proven crucial to the several research projects underway by RRP. Having been awarded several NIH/NIDCR grants, Dr. Whites current research focuses on dental biomaterials. We at UCLA are exceptionally proud of his productive research efforts, having published over 100 research papers.

General Coordinator and mentor of RRP, Dr. Bonilla, has great expectations which may face many new challenges in order to achieve the specific goals of this remarkable research program. As a prosthodontist, lecturer, and scientist in Constitutive & Regenerative Sciences–Dr. Bonilla has authored more than 12 publications. He feels that the greatest contribution a dentist can make to field is through substantive research. Dr. Bonilla received his dental degree in 1982 from National University of San Marcos in Peru. He taught as a Fixed Prosthodontics clinical professor at USC for six years. When he was recruited to UCLA School of Dentistry in 1996 by Dr. Donald Fisher, his goal was to create generations of dentists, who can harmonize an understanding in both the science of dentistry, and clinical competency.

As General Coordinator of RRP, Dr. Bonilla oversees all research efforts. Forethoughtfully, he leads his expertise and substantially contributes his time in the laboratory alongside his students. Surrounded by his pupils he reports, “RRP constitutes a research team made-up of dental students, faculty, and undergraduate students. Our goal is to assess and understand in depth, the different restorative materials, preparation designs and restorative procedures, and take that information to the dental clinic.”

Dr. Sanad Rashed BDS, is a postgraduate in the Advanced Clinical Training Program at UCLA, and has been assigned the project which investigates fracture resistance of ceramic crowns with various composites build-up materials. Working closely with his mentor and investigator, Dr. Bonilla, their initial conclusion has been that the pin retained build-ups had significantly less early failures and had better longevity when compared with other build-up without pins. The build-up with the microhybrid composite resins supported by pins showed the least catastrophic failures of ceramic restorations. His other research projects include investigating the influence of core buildup materials in the retention form on over-prepared teeth, as well as evaluating the microleakage and flexure strength of Class V restorations filled with four different restorative materials and eight different known restorative techniques for Class V lesions. All projects will be submitted to the Journal of Restorative Dentistry.

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Ms. Christine Khabbaz is the research coordinator of the undergraduate dental students. RRP offers volunteer assistant research positions to undergraduate pre-dental students. Dr. Vida Yousefi, Clinical/CAD-CAM Coordinator for RRP, has aided in developing research workshops with active participation of international dentists through ACT in order to promote and prepare research leaders both here and abroad. Dr. Yousefi, has also authored papers herself, and is currently working on a research project with Dr. Bonilla and Dr. Smith. Dr. Yousefi will also be a presenter at this year’s Chicago conference.
Below is a list of RRP’s most current current research projects.

**Title:** Fracture and Microleakage Resistance of Cast Gold and Various CAD/CAM Inlays  
**Authors:** ED. Bonilla DDS, V Yousefi DDS, RG Stevenson DDS, C S Smith DDS, SN White DDS.  
**Abstract:** The purpose of this in-vitro study was to compare the fracture resistance and microleakage of various CAD/CAM restorative materials, including cast gold, when cemented with three different cement types.

**Title:** Influence of Core Buildup Materials in the Retention Form on Over-Prepared Teeth  
**Authors:** C Smith DDS, ED Bonilla DDS, S Rashed DDS, RG Stevenson DDS, R Kalasho DDS, SN White DDS  
**Abstract:** The purpose of this in-vitro study was to compare the retention and resistance form of ceramic crowns with different build-up materials on over-prepared teeth.

**Title:** Comparison of flexure strength and microleakage of extensive Class V restorations  
**Authors:** SS Rashed BDS- MMedSci, ED Bonilla DDS, RG Stevenson, N Almubarak, SN White  
**Abstract:** The purpose of this in-vitro study was to evaluate microleakage and flexure strength of class V restorations filled with eight restorative materials.

**Title:** Effect of Various Materials to Support Undermined Cusps: Strength Comparison  
**Authors:** C. Lopez, N Lim, RG Stevenson, ED Bonilla, SN White  
**Abstract:** The purpose of this investigation in-vitro was to examine the capacity of the tooth and the restorative materials to support the remaining undermined enamel subjected to static and cyclic loading and erratic changes in temperature.

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**...Spotlight Message...**

“The preservation of the biological integrity of the tooth during any restorative procedure will lead proper restoration of the tooth’s function, with excellent predictability on esthetics and great longevity of the restoration”

- Dr. Esteban Bonilla

We at *The Explorer* take much pride in our fellow bruin research contributors, and with great adulation we wish RRP best of luck!
The Development of a Titanium-Zirconium Alloy Narrow-Diameter Dental Implant

By Robert Lee ‘16

Partial or full edentulism is a considerable oral health concern in the adult population because it significantly decreases masticatory function. For many of these cases, implant-supported reconstructions have emerged as the treatment of choice. In order for implants to be used in various clinical situations, implant manufacturers offer a range of different-sized diameter implants, which include standard, narrow, and mini implants. Recently, there has been focus on improving the functionality of the narrow-diameter implant because they can be useful in numerous complex clinical situations, which include narrow interdental spaces, reduced alveolar ridge width, and severe maxillary resorption. The current standard of care for these complex cases is to use standard-diameter implants. However, the bone volume may not be adequate for a standard-diameter implant. Hence, in order to place the standard-diameter implant, bone augmentation procedures are performed to increase the bone volume. The procedures involve bone harvesting and grafting which present increased risks, morbidity, and costs to the patient. Another option for complex cases is to create space through orthodontic procedures that are long and costly. These expensive and extraneous procedures could be prevented by using a narrow-diameter implant.

While there are great benefits to using narrow-diameter implants, they are currently not widely used because there is a clinically significant danger of having a fracture with narrow-diameter implants. By reducing the diameter of the implant, there is a reduced surface area for osseointegration, the attachment of bone to implant. In addition, a narrow-diameter implant has reduced fatigue strength due to the reduced cross-section of the implant and may increase the stress in the crestal bone, consequently increasing the risk of crestal bone loss and implant failure. Thus, narrow diameter implants are subject to a potentially increased risk of failure or occlusal overload in some cases as a result of higher occlusal forces, so the development of narrow-diameter implants with higher fatigue strength and enhanced osseointegration is needed.

The material composition and implant surface characteristics of dental implants are key success factors in modern implantology because both have an important influence on implant strength and osseointegration. Thus, modifying these two characteristics may be able to decrease some of the risks of narrow-diameter implant use. Current dental implants are predominantly made out of titanium (Ti), which is the most successful standard-diameter implants but may be too weak to be used safely in narrow-diameter implants. This reduced mechanical strength inherent in narrow-diameter titanium implants, particularly when exposed to higher loads, can be compensated for by alloying pure titanium with other metals. Thus, initially vanadium (V) and aluminum (Al) were alloyed with titanium (Ti-6Al-4V) which increased the mechanical strength of the dental implant. However, this alloy has decreased biocompatibility and corrosion resistance compared to titanium. In addition, the presence of ionized Al or V in the tissues may inhibit the differentiation of osteoblasts and therefore the development of new bone. Furthermore, because of the biphasic metal structure of this alloy, it may also be difficult to make better surface modifications to enhance osseointegration. Hence, different alloys still need to be explored.

Recently, a titanium-zirconium (TiZr) alloy implant has been developed (Roxolid®, Institut Straumann AG, Basel, Switzerland). Unlike other Ti alloys, such as Ti-6Al-4V alloy, a chemically modified hydrophilic SLA (sand-blasted, large-grit, acid-etched) surface (SLActive®, Institut Straumann AG, Basel, Switzerland) can be produced with TiZr. This surface can compensate for the decreased osseointegration of narrow-diameter implants because it has been shown to enhance osseointegration in the early healing stages compared to the normal SLA. Furthermore, studies have confirmed that TiZr alloy has favorable mechanical strength, corrosion properties, bio-compatibility, and enhanced osseointegration.

Thus, this new TiZr alloy addresses the requirements for more widespread use of narrow-diameter implants, and the higher mechanical strength of the TiZr alloy means that the risk for implant fractures associated with narrow-diameter implants could be minimized.

While initial studies have shown that TiZr implants have excellent survival with minimal bone loss, further studies are still needed. The UCLA School of Dentistry is currently participating as one of the four centers of a multi-center study on TiZr implants. This study is a randomized, controlled clinical trial that is evaluating the crestal bone level change between narrow-diameter and standard-diameter TiZr implants after one year of implantation. This study at UCLA is being led by Dr. Tara Aghaloo, a Professor in the Section of Oral and Maxillofacial Surgery, and Dr. Ting-Ling Chang, a Professor in the Division of Advanced Prosthodontics, at the UCLA School of Dentistry. Dr. Aghaloo is the ideal person to lead the UCLA portion of this multi-center study as she is an expert in bone biology and regeneration strategies at the basic, translational, and clinical levels with over 50 peer-reviewed publications in the field. Furthermore, besides this study on the Roxolid® TiZr implants, she has led several other implant studies.

Aside from conducting research on TiZr implants, Dr. Aghaloo most recently completed a multi-center study on the use of minocycline HCl 1mg microspheres for the treatment of peri-implantitis. She is also working on a study comparing immediate wide-diameter molar implants against standard-diameter implants, together with Dr. Pi-Anfruns in the Implant Center and Dr. Shah in Advanced Prosthodontics. Additionally, Drs. Aghaloo and Pi-Anfruns are working with BioHorizon Implants evaluating the Laser-Lok® implant surface. This surface may help with soft tissue attachment to implants as it contains a series of laser etched precision engineered cell-sized channels onto the implant surface. Current implant surfaces focus solely on bone attachment, so the Laser-Lok® may be the first surface that could enhance both hard and soft tissue attachment. All of these implant studies led by Dr. Aghaloo are performed in the Straumann Surgical Dental Clinic and Dental Implant Center in collaboration with Dr. Joan Pi-Anfruns, Dr. Peter Moy, Dr. Kumar Shah, Dr. Ting-Ling Chang, and Dr. Min Chung.

Dr. Tara Aghaloo is a Professor in the Section of Oral and Maxillofacial Surgery, Assistant Dean of Clinical Research, and Director of the Clinical Research Center at the UCLA School of Dentistry. Dr. Aghaloo decided to pursue a career academia because she loved teaching, research, and desired a lifetime of learning. As an instructor, Dr. Aghaloo, is the Director of the UCLA Dental Student Surgical Track program and has served as the chair and lecturer of several dental student and oral and maxillofacial resident courses. Her vision as a scientist is to pursue complex, multidisciplinary, and collaborative projects that combines engineering, basic science, and clinical principles. Dr. Aghaloo believes that as a clinician scientist, improving patient care is the ultimate goal of research, so she always has this in mind when performing research.
Can you tell us a little about your background?

I was born and raised in Los Angeles. I completed my undergraduate education, and then I did my masters and PhD here; it all happened fairly quickly. I did a brief post-doc at Cal Tech for five or six months, which is pretty fast too and then during that time I applied for professorships and then that’s when I got a few offers and picked Northwestern. That was actually a shock for me because I had never really moved in my life. So, one of my best friends—actually we have known each other since the first grade—was also going to Northwestern for business school at the same time I was going to go and I had a chat with him. I actually had an opportunity to stay in California at a different university and I thought, you know, it’s a good offer, it’s very comfortable and I’m going to be among friends still. He said you know what, one time in your life, you gotta take a one-way ticket, get out of here, and you never know— you might like it. And I was like, impossible. But after I started here, it was phenomenal! I couldn’t have asked for a better place to start my career. In academia, where you start your career is almost everything. To take a very scary experience and turn it into that positive of an experience is amazing.

That’s inspiring! When did you decide to pursue a role in academia and investigate nanoparticles?

It’s funny. I actually wanted to be a lawyer, so I took the LSAT before the GRE. At the last second, I thought, you know, a lot of my friends were going into the legal field and I didn’t know if I was doing it because I wanted it or because everyone else was doing it. So, I thought I’d give my masters a shot and then do law, like IP [Intellectual Property] law, and then I thought, you know, in just a few more years I could do a PhD and then I’ll go to IP law. But then, eventually, I realized the nanotechnology field was a little different. I thought, you know, lets give it a chance. I have some ideas and we could do some cool stuff. And then, I could always go back and do something else. But academia was kind of started with me thinking I should just go for it. And of course, I think my dad had an influence. You know, it’s pretty cool to have an autonomous opportunity to invent whatever you want to do.

Can you describe your research since the beginning of your academic career?

I started my academic career at Northwestern in ’06. At the time, we explored how we can do to improve drug delivery and if there was anything out there we could use to help with drug delivery. Then, in ’07, we published our first paper on nanodiamonds. Now, it’s been about 7 quick years and to watch this particle that’s a waste product evolve from something that carried a drug pretty well that we tried on cells. Then, we used it on tumors that were not responding to routine drugs and growing larger. In fact, some doses of these routine drugs would trigger immediate heart attacks because of their high toxicity. By tagging these same drugs with the diamonds, the tumors were almost obliterated. Not only that, but also every animal survived. Sometimes, we even made it to where the tumors would regress and disappear completely. Now, we’re at the cusp of large animals and potential human studies, it’s been really nice to see this journey. In seven years, this is very fast. It’s transformed into a platform that can largely affect health care.

You mentioned some of your research is already in large animal models. Are you close to clinical trials?

I think within the next 9-12 months, we might be able to have a case to go into Humans. We’ve already met with people that had an experience doing regulatory for pre-humans studies towards human studies. After looking at our data, having visited a phase I human clinical trial center already and having already look at our data, their indications are that once we finish some of these toxicity studies, they’ll set us up.

Assuming these treatments pass clinical trials, will their use in treatments affect the cost of care?

What I like about the diamond is that it’s a new therapy for cancer treatment so there’s a degree of innovation there that commands the ability to go into the clinic and stay there. At the same time, it’s also a waste material and so from an economics of production standpoint, it makes sense. It already exists around the world, being made anyways. We have a way to clean it up, put it onto a drug, and make cancer treatment more effective. So, I think that from an economic standpoint, it makes sense but also from a sustainability standpoint as a treatment method that we think about reimbursement and ability to partner with a pharmco company, I think diamond fits a lot of those parameters. I think drug companies will see it as a viable platform to work with them on. But, from an economics of production standpoint, it also makes sense.

It sounds like you really took advantage of a great opportunity. How did your research and professorship at Northwestern lead to your arrival back to UCLA?

Well, no matter how many friends I had who went to Northwestern or moved out of California, most of my friends were still here. My father is a professor on campus here and is very well-known in his field, micro nanotechnology. Basically, he was a father of the micro-fluidics field. But, he actually pushed for me to stay at Northwestern. He saw just how unique of an experience it was for me. I mean, he saw how supportive they were of my career. In the end [my wife and family] were [in LA], so it made sense to come back and it was a great opportunity. UCLA is such a highly collaborative environment. In fact, I had my first collaborative meeting my second day on campus!

Sounds amazing, we’re grateful to have you back! Do you have any advice for students pursuing a future in research or academia?

Yea, I think that when a student of any health profession has the passion to go and directly impact patient care, which is effectively every student—this is why they’re getting into it. When they’re effectively the tip of the sword, they are there to make people more comfortable and make treatment better. I think that they have an opportunity and also a responsibility to take their talent and not only be a practitioner of the clinic but also change the way, and evolve and innovate the way that that practice is done. I think it’s important for them to really think about what the work that they’re doing, and maybe next year or next 10 years can really change the course of the way things are done.

At UCLA where people are making innovations daily, it’s important for students to come in with that mindset. And, it’s not for everyone—I understand. Some people just want to come in and open a clinic and that’s cool, they’re going to help people that way too! But when you have an opportunity to come in and invent a new material that can someday become the standard of care for people, I think that’s one of the most rewarding experiences possible. So, I encourage students to step outside of their comfort zone and get into something new and to become innovators as this is the perfect place to do it. Right? I stepped out of my comfort zone. I moved from LA weather to Chicago weather and it became the most rewarding professional experience of my life. And, I still collaborate with people there and most of our important findings have been through collaborations with Northwestern and I’m very grateful for that and we’re making new discoveries here as well.
Implants in the Femur of a Mouse

By Rami Beshai '15

My name is Rami Beshai, and I received my Bachelor of Dental Surgery from Faculty of Oral and Dental Medicine at Cairo University, Egypt in 2009. I finished one year of internship at the University Hospitals where I had advanced exposure to the different branches of dentistry. During my internship at the Oral and MaxilloFacial Department, I was exposed to implant dentistry, and under direct supervision, I placed 2 implants replacing #6 and #11. The surgery and restoration were successful and the positive impact of the treatment on the patient’s life was beyond words. Since that moment, my interest in implants started.

I work with Dr. Sil Park, who is my Principal Investigator, in the Weintraub Center for Reconstructive Biotechnology. The project we are currently working on is the femur implant mouse model, which allows us to evaluate the osseointegration of titanium implants quantitatively.

We placed a 0.6mm diameter and 7mm length titanium implant in the intercondylar notch of the femur of a mouse after skin incision and displacement of the quadriceps-patellar complex. These femurs were harvested for 3 weeks for RNA analysis, histological study, push out test and Micro Computed Tomography (μCT), and Scanning Electron Microscopy (SEM) with Energy Dispersive X-ray Spectroscopy (EDS) evaluation.

My part of the project is μCT and SEM/EDS study. The μCT study provides us with various 3-dimensional images and quantitative characteristics of the femur bone. The SEM is one of the most unique instruments I have seen. It involves an enormous amount of ejected electrons and their angle of reflection forms an image by the collector. The instrument at UCLA Young’s Building of Chemistry and Biochemistry can magnify up to 600,000 times! I tried its maximum magnification, and basically anything can be seen but it is still amazing to have the capability to reach such a magnification. The SEM can see details as small as 1nm.

I found that EDS is even more impressive than the SEM itself! To briefly provide more background information, the electron ejected from the instrument hits an electron in the atom with so much power that the secondary electron loses its place in the shell, creating a void. This void needs to get filled, and when it does, it gets filled with an electron from a higher shell with higher energy. In order for that electron to go down and fill the void, it has to lose energy, which happens in the form of x-rays. Each element in the periodic table has a different characteristic x-ray wave length and energy. In fact, each x-ray ejected from different shells of the same atom has different wave length and energy!

One of the limitations of EDS is that its penetrating power is limited. It ranges from 1/2 to 2 microns, depending on the density of the sample and the voltage of the incident beam. This is one of the features that I actually use because if the EDS cannot see much titanium, this means that there is a decent amount of bone formed around the implant. The less titanium the EDS detects, the more bone that is present. It will be the first time that the EDS be used in such experiments. Consequently, we evaluated the topography of implant surface and bone and Implant contact (BIC) ratio using SEM/EDS.

We believe that our femur implant mouse model will be a very useful tool for investigating the effect of any factors on osseointegration such as implant surface, systemic alteration, medications and so on. The femur implant mouse model also can be used to investigate the role of specific genes in osseointegration using a genetically modified mouse. Since we are establishing the baseline data of wild type B6 and BALB/c mouse, any mutant mouse can be used to test the effect of the specific gene alteration on the osseointegration. Until now, everything has been promising, and I am confident that we will establish our Femur implant mouse model successfully quite soon!
In-between the Synergistic Worlds of Professional School and Graduate School, a DDS/PhD Student Finds his Niche

By Eric Chen ‘16

When one thinks about dental school, the words ‘demanding’ and ‘exacting’ may readily come to mind. But what comes to mind when primed with dental school and graduate school? Drake Williams ’17, a second year dental student in the prestigious UCLA DDS/PhD seven-year joint program, knows precisely the answer. “It’s definitely not easy,” he laughs, “but I’m really enjoying it.”

Williams kindly took the time out of his busy schedule – one that consists of the unforgiving didactics of a UCLA second-year dental student, the frantic yet perpetual game of catch-up of a 4th floor pre-clinical laboratory tenant, and the methodological rigor of a PhD candidate – to speak to The Explorer about his research interests and future aspirations. Immediately, he comes off as intellectual yet relaxed, soft-spoken but with a sense of humor, but most of all, undeniably humble.

Born and raised in Rockville, Maryland, Williams left the suburbs of Washington, D.C. for sunny California where he completed his undergraduate studies at UCLA, majoring in Microbiology, Immunology and Molecular Genetics. “The first thing I noticed when moving out here is that there are a lot more people in California. My hometown is in the middle of the farmlands and D.C. Twenty minutes in one direction and you hit the pastures, twenty minutes in the other direction and you hit the big city.” After taking a year off where he worked full-time as a teaching assistant for his alma mater while doing research on the side, Williams elected to remain a Bruin by attending the UCLA School of Dentistry. The rest is history. While serving as a professor at a research university. Dr. Reuben Kim, Associate Professor in the Section of Restorative Dentistry and the Division of Oral Biology and Medicine, was the first to respond. “Dr. Kim’s thesis was on HIV, and I was interested in virology at the time. It really was a great match.” Dr. Kim interviewd Williams and quickly invited him to join the lab. Initially, Williams was only focused on obtaining a PhD; however, after countless interactions with dental students and Dr. Kim, a DDS/PhD himself, he slowly became interested in the clinical aspects of dentistry. By his junior year he decided to apply to dental school, ultimately applying exclusively to DDS/PhD programs during the end of his senior year. Currently a PhD candidate in Dr. Kim’s research laboratory, Williams is beginning his seventh year of research with his longtime mentor and current Principal Investigator, Dr. Reuben Kim.

“When I first came to UCLA I was originally a computer science major. But I wanted to explore biomedical research having done some in high school, so I ultimately switched my major to microbiology.” In finding a laboratory during his freshman year of college, Williams casted a wide net by reaching out to myriad UCLA faculty across various departments. Dr. Reuben Kim, Associate Professor in the Section of Restorative Dentistry and the Division of Oral Biology and Medicine, was the first to respond. “Dr. Kim’s thesis was on HIV, and I was interested in virology at the time. It really was a great match.” Dr. Kim’s response: “Hard work. Investment. Fulfillment.”

Reflecting on his first year-and-a-half at UCLA, Williams recognizes the pivotal moment when he realized he had what it takes to succeed. “I initially had a lot of doubts. School was overwhelming at times. Maybe I didn’t belong here.” But at some point during the winter quarter Systems 1 course, Williams found his niche. Importantly, he credits Dr. Kim for his strength. “Dr. Kim is an incredible mentor. He truly cares about my success. He gives me every opportunity, is very fair, and ensures that his success is also my success. Those are such important qualities to have in a mentor.”

Although only in his second year of the seven-year DDS/PhD track at the UCLA School of Dentistry, Williams is doing quite well in balancing both dental school and graduate school. One day he will balance teaching responsibilities, research, and patient care as a clinician scientist and educator, but for now he’ll be taking classes and seeing patients just like any other UCLA dental student.

“What words come to mind about dental school and graduate school?” The Explorer asked Williams. His response: “What words come to mind about dental school and graduate school?”
Interview with Arina Hartunian, Pediatric Resident at UCLA

Please tell us about your academic and research background?

I graduated from UCLA with a degree in molecular, cellular and evolutionary biology in 2007 and was accepted directly into UCLA School of Dentistry. I was involved in research as an undergraduate and investigated the impacts of hunting on seed dispersal in a Central African Tropical Forest. Dr. Benjamin Chi Wang, my mentor, published my findings as part of his book on the same topic. I graduated in July 2011 with my DDS. While in dental school, I continued my involvement in research and compared composite and amalgam restorations in primary dentition under the mentorship of Dr. Kenneth Burson. In 2012, I completed a GPR program at the West Los Angeles VA Medical Center. The program gave me firsthand experience working with many medically compromised patients. I further continued my dental education with another GPR residency at Rancho Los Amigos, where I dealt with a lot of special needs patients. I am now a second year pediatric dentistry resident at UCLA and part of the graduating class of 2016. I am still involved in research as a dental resident at UCLA.

What is your research topic and who are your faculty supervisors?

My research topic is dental anomalies in patients with craniofacial abnormalities. As you may know, craniofacial abnormalities, such as cleft lip or palate, come with other dental anomalies, for which knowing the prevalence is very important. The significance of prevalence is that it allows the practitioner to develop a norm for anomalies associated with each craniofacial abnormality. I am conducting my research under the mentorship of Dr. Setareh Ghafouri.

Why did you choose this research topic and how does this topic interest you?

I was very interested in treating craniofacial patients as a dental student. In fact, I made the effort and went to a craniofacial rotation while in dental school. Special needs patients usually are complicated cases and their treatment requires a lot of multidisciplinary coordination. As a pediatric dentist, I get to address those issues on time, which I find very interesting.

What do you enjoy most as a resident researcher and what do you hope to accomplish?

I enjoy the fact that I get to produce knowledge and help patients, specifically craniofacial patients, have a better experience visiting their oral care practitioner.

How important is research for your specialty program?

Research is an integral part of the pediatric program at UCLA School of Dentistry. In fact, pediatric residents are only allowed to graduate if they do research, present a poster, and give a presentation at both AAPD and CSPD. Many of our research projects are brought about by Dr. Daniela Silva who constantly encourages us to be in tune with the newest findings in the field.

Do you have any recommendations who are interested in your specialty program?

First, I advise them to make sure that they want to be in this field. If they are not absolutely certain, it may be a good idea to practice for a year after graduating, treat a lot of kids, and see it for themselves. A GPR program would also be very helpful to them in their quest for their passion since it provides training in pediatrics and behavior management techniques. Come to our clinic and observe! Let us know you are interested! Do pediatric research! And finally, ask us for help, we will pave the way for you.

What is your future goal/plan?

To have my own private practice! I also like to serve my community through both non-profit dental work and teaching in an academic environment; teaching is my passion. I know that treating special needs patients is going to be a big part of my career, thanks to my training at the Rancho Los Amigos GPR program.

Interview with Arina Hartunian, Pediatric Resident at UCLA

By Sina Banankhah ’17

Student Profile......

Linda Phi

UCLA Class of 2016

DDS and Masters Candidate

By Mona Derentz ’15

Linda Phi is a third year student in the UCLA School of Dentistry. She was born and raised in Westminster, California, and attended the University of California, Los Angeles as an undergraduate student. During her undergraduate career, she focused her work on Evidence-Based Dentistry (EBD), publishing four articles. Linda was able to use her research background and experience to transition into her research as a dental/masters student. In dental school, she assessed the level of various pro-inflammatory biomarkers in temporomandibular joint disorder (TMD), under the supervision and guidance of Dr. Barkhordarian and Dr. Francesco Chiappelli. Currently she is analyzing pro-inflammatory biomarkers in juvenile idiopathic arthritis (JIA) of the jaw under the supervision of Dr. Messadi and Dr. Diep. The goal of the project is to find less invasive methods to treat JIA. Linda is on track to complete this project by the end of her 3rd year/beginning of fourth year of dental school and we can tell that the future is bright for this dedicated student researcher.

Below is a copy of Linda Phi Abstract, where she is lead author is an exceptional experiment studying the biochemistry of inflammation in patients with TMD.

ABSTRACT

Characterizing the Mechanism of Inflammation by Assessing Pro-Inflammatory Cytokines in Patients with TMD

Linda Phi1, Andre Barkhordarian1, Molly Uyeda1, Francesco Chiappelli1,2

The temporomandibular joint (TMJ) is critical for mastication, speaking, and essentially the overall well-being of the individual. Temporomandibular joint disorder (TMD) is caused by a multitude of factors, including dislocation of the articular disc, rheumatoid arthritis, grinding, clenching, and muscle dysfunctions. Injury to this joint can activate the body’s inflammatory response system, resulting in recruitment of inflammatory mediators, swelling, and pain. The pro-inflammatory cytokines of interest that promote inflammation include the following: IL-1B, IL-6, TNF-α, IL-10, IL-12, and INF-γ. We collected samples of both left and right synovial fluid at the joint as well as whole saliva from six patients with diagnosed TMD. Using enzyme-linked immunosorbent assay (ELISA), we are verified by a dentist specializing in TMD, allowing us to use our gained knowledge in potential treatment of this disorder. We are currently analyzing pro-inflammatory biomarkers in juvenile idiopathic arthritis (JIA) of the jaw under the supervision of Dr. Messadi and Dr. Diep. The goal of the project is to find less invasive methods to treat JIA. Linda is on track to complete this project by the end of her 3rd year/beginning of fourth year of dental school and we can tell that the future is bright for this dedicated student researcher.

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Endodontics resident Yang-Pei Cao received her M.S. degree in the Oral Biology program just recently in March 2014, working on two projects during this time under Dr. Mo Kang. She joins us today to talk about her research.

Q: Can you tell me about the project studying ionizing radiation?

A: In dentistry, you see a lot of irradiated patients. When patients get head & neck cancer, they receive radiotherapy, and these patients usually have very long lives after this, so it’s important to maintain and improve the quality of their dental health. But have you ever wondered if there’s any difference in the dental treatment for this irradiated patient? If we’re talking about root canals: do they still heal as well? For example, patients with diabetes have less healing potential. Most of these patients have their teeth extracted because dentists are afraid to do root canals on them. So we wondered if we could conduct some experiments to explore this area. My research project was composed of 3 parts. The first part asked: does ionizing radiation cause something different? We established that yes it does. The second part asked: does this apply to animals as well? We found that in mice, yes, it does cause DNA damage inside the pulp of the animal cells. The third part: what does irradiation do? We wanted to know if DNA damage occurs in humans as well. We found that DNA damage did occur as a result of irradiation.

Ultimately, we want to translate these findings into the development of preventive medications for real patients that when applied prior to radiation, will protect cell function.

Q: Can you tell us about your other project?

A: My other project involved exploring the effect of nanodiamonds on biofilm.

In the root canal, biofilm causes failure if you don’t remove it, but in the canal there are ishmuces and other areas that you can’t instrument. We use sodium hypochloride or calcium hydroxide to help us out, but this can’t eradicate all of the biofilm. So we were thinking of exploring some new materials like nanomaterials, which are very small - on the nano-scale - and maybe could enter into the ishmuces.

We first thought there could be some mechanical function of these nanodiamonds, but this part didn’t yield any results. But there was something interesting: if we cultured nanodiamonds with bacteria like S. mutans (the main bacteria that causes decay), biofilm still formed, but the next time we came back we just needed to flush it and there was hardly any biofilm left. How it works is bacteria have to attach to a surface first before they form the biofilm. When the nanodiamonds are in there together, the bacteria interact with the nanodiamonds in such a way that they clump all together. That’s why it’s easier for them to be flushed out: they are less adherent to the surface.

This could be very nice to use as an inter-pointment medication if combined with calcium hydroxide. You instrument, there’s something left there, you use something like calcium hydroxide and there may be some bacteria resistant to that. So now you can come back and flush it and it easily comes off.

However, if you culture the bacteria first and the biofilm has formed already and THEN you add the nanodiamonds, nothing happens; but, if you culture the bacteria with the nano-diamonds in the beginning, it becomes much easier to be flushed out.

The ultimate goal is to apply it before the bacteria adheres. This is why it could be a very useful inter-pointment treatment. Something may grow again during this time, so you inhibit this by preventing biofilm attachment. We tried this with S. mutans which forms a very sticky biofilm, but with these nanodiamonds it was very easily flushed away. For the 2nd project, we did these studies on saliva, on saliva biofilm, on bacterial plates and also some on actual tooth surfaces, but it’s so hard to form biofilm on real teeth. The model of how I conduct research is: you identify something that causes a change, you apply that to well to animal studies, and then you try to translate that into clinic - what can we do to prevent this? Right now with this 2nd project, we see that it changes but we don’t know how it works, so this is still in the preliminary stages.

Q: Which project did you like working on more?

A: I liked working on both.

In China, I did research mainly in microbiology. The 2nd project combined tooth morphology with microbiology and materials, and my 1st project combined stem cells with ionizing radiation. These were 2 very different tracks of research, so combining all of these fields of knowledge made me feel very good. Sometimes you don’t get good results from one project so you come back to the second one.

The Master’s program here is mainly for exploration, so we are able to explore many areas. In China where I did research, there were basically 2 research tracks: stem cells & biofilm. So we were sort of limited to just one track. But here at UCLA you are able to explore many tracks.

Q: What was it like working with Dr. Mo Kang?

A: He’s very smart and very generous. He gives you many opportunities to explore your interests. I highly recommend if you’re interested in research to follow him.

Q: I notice a lot of the endodontic residents here do a lot of research in stem cells and a wide variety of fields. Can you talk about balancing the clinical parts and endodontics with the research?

A: I think clinic takes up 60% of my time and research takes up about 10% of my time. The other portion of time is taken up by classes and gaining knowledge, but this knowledge is presented by others, so it’s important to do exploration to produce new knowledge.

For example, with root canal treatment we can wonder how long a case will take to be finished. If a patient comes in with HIV or diabetes, that changes the prognosis. These questions are addressed by papers, but you have doubts for patients that come in with different types of diseases. For example, can we regenerate the pulp for young adults who have received irradiation? Or should we do a root canal? These are interesting questions. Endodontics is an evolving subject. We are trained to be endodontists, but we don’t just do root canals. Endodontists can produce a lot of evidence in our practice of endodontics. If we’re interested in something, we can explore it.
Clinic Day 2014 at UCLA School of Dentistry

“The clinical research and case reports by the students were awesome! It is undeniable that UCLA is producing the future clinical experts and opinion leaders.”

-Dr. Todd Schoenbaum DDS, FACD

Photos provided by Brian Lozano
Gammadelta T cells in oral tissue contribute to the development of ONJ in zoledrone-treated mice

Sina Bananekh, Sil Park, Ichiro Nishimura

Osteonecrosis of the jaw (ONJ) is a rare but severe comorbidity in cancer patients who are treated with anti-resorptive agents such as bisphosphonates. While clinical presentations vary, ONJ predominantly occurs in the oral segment of jawbones. We hypothesized that the close proximity of jawbone to the oral mucosa uniquely allows for the involvement of oral barrier immunity during the pathogenesis of ONJ. This study investigated the potential role of gammadelta T cells in the pathogenesis of ONJ. After maxillary first molar extraction in wild-type and Tcrd-/- mice, we observed that gammadelta T cells were depleted in wild-type mice but not in Tcrd-/- mice. Treatment with a bolus zoledronate (ZOL, 540 μg/kg) injected through the retro-orbital venous plexus without intravenous administration, with no observed adverse effects. Thus, systemic administration of NELL-1 holds promise for future clinical application in the treatment of osteoporotic bone loss.
E-Cigarette (e-cigs), Marijuana, and Cigarette usage among UCLA Dental Patients
Yoonah Danskin, Ashley N Ingram, Diana Messadi

Objective: Despite the recent rise of interest in the use of e-cigs to quit smoking and an increase in the society's public health concern regarding this device, there are few studies that accurately measure the local and national usage of e-cigs. A better understanding of the usage will help us determine how the long term health effects of e-cigs should be studied, as well as how health information regarding e-cigs should be delivered to the general public. This study presents the preliminary results of the usage, knowledge, and perception of e-cigs, marijuana, and tobacco products among UCLA Dental Patients.

Method: A 40 question paper survey was made available for one week to dental patients in the front lobby of the waiting room of the UCLA dental clinic, after approval by UCLA IRB. Each participant was compensated with $5 petty cash by a student researcher upon anonymous submission of the survey. 100 surveys were collected.

Results: 17% of the patients indicated they have used e-cigarette once or more in the past. 23% believed that e-cigs were equally as harmful as conventional cigarettes, 43% were unsure, and 4% believed they were more harmful. 13% indicated they were current Marijuana users, while 38% indicated they had used Marijuana in the past. 12% stated they were current cigarette smokers, 10% had experimented with smoking, and 6% were ex-smokers. 43% had never been told about the negative health effects of using tobacco products by UCLA dental health care providers, while 26% couldn’t remember.

Conclusion: There is a strong evidence of e-cigs, marijuana, and tobacco usage among UCLA dental patients. Smoking counseling should be a fundamental part of the dental curriculum, and dental students must be educated on the effect of e-cigarettes and marijuana on the oral cavity.

Comparison of Alloplastic Materials for Extraction Socket Augmentation
Edwin Eshaghzadeh, Joan Pi-Anfruns, Olga Bezouglaia, Sotirios Tetradis, Peter Moy, Tara Aghaloo

Statement of Problem: The literature lacks comparison among alloplastic bone graft materials for socket augmentation following tooth extraction.

Purpose: To compare the effectiveness of different biomaterials for socket augmentation in the mini pig.

Materials & Methods: Tooth extraction of two molars on the right and left side of both the mandible and maxilla of six (32-36 month old) Yucatan mini-pigs was performed. Socket augmentation was performed with seven alloplastic bone graft materials: Type 1 bovine collagen-15% HA/85% β-TCP (T1-HA-βTCP), Type 1 bovine bone (ABB), bi-phasic calcium phosphate (BCP), 15% HA/85% B-TCP (HA-BTCP), tricalcium phosphate (BCP), HA-coated collagen (HA-c), and HA-calcium carbonate (HA-cc). The biomaterials were randomly assigned and utilized to graft the sockets in the mandible and maxilla of each pig. One socket was used as control in each pig, where no bone graft was placed. Micro-CT analysis of the mandibles and maxillae were conducted at 25µm after four months of healing. 3-D reconstructed images were made to analyze bone volume to tissue volume measurements, buccal-lingual bone width, buccal-lingual bone loss, and vertical bone loss.

Results: Micro-CT analysis showed significant differences between buccal-lingual bone width, buccal-lingual bone loss, and vertical bone loss across the biomaterials. ABB, HA-BCP, and HA-cc were observed to have significantly less buccal-lingual bone width compared to the control. BCP, HA-BCP, and HA-cc had significantly less buccal-lingual bone loss compared to the control. HA-BTCP, HA-c and HAcc had significantly less vertical bone loss compared to the control. Additionally, HA-BTCP was observed to have significantly more bone volume to tissue volume as compared to the control.

Conclusion: Application of bone graft substitutes via socket augmentation should be considered optimal treatment at the time of extraction. ABB, BCP, HA-BCP, HA-c, and HA-cc all displayed significant difference in vertical or horizontal bone measurements when compared to extraction without bone grafting. Socket augmentation may improve bony contours and facilitate implant placement.

UCLA School of Dentistry: Half a Century of Clinical Research Excellence
Pooyan Sadr Eshkevari, Sina Banankhah, David Wong

Statement of Problem: The UCLA School of Dentistry (SOD), founded in 1964, has always had a prime focus on dental and craniofacial research in its fifty years of existence and has contributed significantly to academic dental literature throughout the years. The present study aims to review the scientific production of the UCLA SOD with specific emphasis on clinical research.

Materials and Methods: PubMed articles affiliated with UCLA SOD were categorized based on the affiliation department of the main authors and the study type (Rohrik classification). Also, the SCOPUS profile and IADR history of the school were reviewed. Finally, the NIH data on NIDCR grants received by UCLA between 2002 and 2012 were collected.

Results (As of 15th February 2014): a total number of 967 PubMed indexed articles were traced (19.3 per academic year). 20.7% of these were clinical studies (39 interventional and 161 non-interventional). The rest fell into the categories of epidemiological [observational cohorts (n = 29), case controls (n = 15), or cross-sectional (n = 32)], ethical analyses (n = 2), educational analyses (n = 62), surveys (n = 17), and reviews (n = 217). UCLA has moved from the top 15 dental schools to the top 5 in terms of annual NIDCR grants with a total of 562,238,488 (from 2002 to 2012). Based on UCLA SOD Scopus profile of 2310 documents and 5747 authors, UCLA SOD’s top publishers have been Journal of Prosthetic Dentistry (9.5%), Journal of Oral and Maxillofacial Surgery (2.5%), Journal of Dental Research (2.3%), Journal of Periodontology (2.1%), and Journal of Dental Education (2%). Also, from 114077 IADR abstracts, 2820 (2.5%) are UCLA affiliated.

Conclusions: UCLA SOD has increasingly progressed in clinical research which comprises a significant percentage of the research activity of the school.

Molecular Effect of Alcohol on Osteogenic Potency in DPSCs
Michael Hoang, Jeffrey J Kim, Songtao Shi, Yong Kim

Statement of Problem: Dental pulp stem cells (DPSCs) are proliferative, multipotent adult stem cells that can be affected by stressful extrinsic environments, such as one induced by ethanol. Due to reactive aldehyde byproducts, ethanol exposure leads to changes in DNA and proteins within cells that result in mutagenesis and cell death. Ethanol has been shown to induce the hypermethylation of cell cycle genes and increase expression of DNA methyltransferases in neural stem cells, which affect growth factor signaling and down regulation of associated mRNAs and cell cycle proteins.

Purpose: We hypothesize that genome-wide epigenetic changes, such as alteration of DNA methylation patterns, due to ethanol exposure have detrimental effects on the potency of DPSCs.

Materials and Methods: Early passage DPSCs were isolated from deciduous teeth and subjected to acute and chronic exposure treatments. Results were determined through use of: transcriptomic, DNA methylation array, bioinformatic, and RT-PCR array analysis.

Results: Ethanol treatment led to transcriptomic changes in DPSCs genes in a dosage-dependent manner, global DNA methylation changes, and a combined analysis revealed a correlation between dysregulation of gene expression and epigenetic changes. We identified KDM6B, histone lysine demethylase, one of epigenetic modifiers involved in odontogenic differentiation of mesenchymal stem cells via regulation of BMP, as significantly deregulated by EtOH treatment. Further analysis showed that EtOH treatment significantly reduced osteogenic differentiation of DPSCs with dysregulation of osteogenic marker expression.

Conclusions: We conclude EtOH treatment epigenetically dysregulates the osteogenic potency of DPSCs in a dosage dependent manner, which may have clinical implications in osteoporosis related to alcohol abuse. Additional in-vivo and clinical studies will need to be performed to further validate this claim.
The Effects of Simvastatin in Mandibular vs Long Bone Density  
Armand Keuroghlian, Gary Kirkian, Ana Barroso, Olga Bezouglaia, Yin Tintut, Sotirios Tetradis, Peter Moy, Falvia Pirih, Tara Aghaloo

Statement of Problem: Currently, the literature lacks sufficient evaluation of atherosclerosis and hyperlipidemia and its pharmacological treatment with respect to bone density.

Purpose: Based on the deleterious effects of hyperlipidemia and bone promoting effects of statins, we hypothesize that the decreased bone volume compared to tissue volume caused by hyperlipidemia can be reversed with the use of statins. Our short term goal is to evaluate the difference of mandibular vs long bone density in mice under certain conditions.

Method: C57BL/6J male mice were placed on a control Chow diet (6% fat) or high fat atherogenic diet (1.25% cholesterol, 15.8% fat). The mice were separated into four groups: normal diet, high fat diet, and high fat diet with statins. Injections of 20 mg/kg simvastatin began after 3 months for 3x/week. After 3 months, serum cholesterol levels were determined. Micro-CT analyses of the trabecular area of femurs and mandibles were determined at 12μm.

Results: At 6 week healing time, mice placed on a ND had a long bone trabecular density of 16.58%±1.7 compared to a mandibular density of 43.87%±2.5, while mice placed on a HFD had a long bone density of 12.40%±1.9 compared to a mandibular density of 37.60%±2.6. Mice that were placed on HFD that were later injected with simvastatin had a long bone trabecular density of 15.43%±2.1 compared to a mandibular density of 43.6%±2.9.

Conclusion: This study showed significant bone density difference seen between ND and HFD groups but not seen with ND and HFD treated with simvastatin groups. Therefore mice that are on a high fat diet have a decreased BV/TV but not when treated with simvastatin. Understanding the role of hyperlipidemia in mandibular and long bone density may allow us to account for this variable when deciding the time to restore implants in the human body and may require cholesterol optimization before implant therapy is electively undertaken.

A Review of Phonetic Function Evaluation Methods After Orthodontic Treatment  
Roger Lau, Janine Tran, Alan Nguyen, Stephen Schettler

Statement of Problem: Patients seeking orthodontic treatment may present with speech impairments arising from anatomical defects. Though vast knowledge about linguistic phonetics and articulation exists, its application remains limited in a clinical setting. Evaluation methods of speech improvement in literature are highly variable and not readily interpretable across studies.

Purpose: The purpose of this study is to evaluate how phonetic function is measured across orthodontic and dental literature. By surveying the various methodologies we can determine which metrics are the most appropriate for evaluating clinical claims for speech improvement.

Materials and Methods: A search of the current literature was conducted using the NCBI PubMed database. Specifically, the phrases “Orthodontic Phonetic” and “Phonetic Dentition” yielded 38 and 180 results, respectively. Articles were screened to exclude phonetic impairments arising from a neurological etiology, and those during the course of orthodontic treatment. Particularly, we are interested in the changes in phonetic function after orthodontic treatment in cases where phonetic function was initially deemed ‘atypical’.

Results: The methods used to describe the initial phonetic conditions greatly varied among cases; in general, qualitative assessments were assigned depending on the predisposing craniofacial problem (such as a class III occlusion). Some studies focused on pronunciation of a single discrete consonant sound. Others included a Speech-Language Pathologist to assess audiological discrepancies. Some studies utilized cephalometric data to visually assess the articulation process.

Conclusion: There still exists high variability across studies in regards to how phonetic function is described in the context of dentistry and orthodontics. Incorporation of linguistic principles could help in developing a standardized metric for one’s phonetic condition and range. Clinicians could better treat patients undergoing orthodontic treatment to improve phonetic function. Standard metrics would create the opportunity to collect useful data about phonetic function to use for better assessment and prediction in orthodontic outcomes.

The Prognostic Value of a Low ISQ Value at Implant Placement  
David Lee, Joan Pi-Anfruns, Tara Aghaloo, Peter K Moy

Introduction: Implant stability is an important factor in achieving positive outcomes in the placement of dental implants. There is much debate on the prognostic value of ISQ values at implant placement on long term implant survival. Some authors conclude that ISQ values are not reliable in predicting early implant failure, while others report a correlation between a lower ISQ value at placement and implant failure. The objective of the present study was to elucidate the prognostic value of ISQ values at implant placement on implant survival.

Methods: A total of 224 patients were selected from the patients who visited an oral and maxillofacial surgery center between July 2007 and December 2011. A total of 399 NobelReplace™ tapered Groovy implants were placed in sites that did not undergo sinus lifts, bone grafts, or immediate loading. Implants that failed did not undergo implant loading. An average ISQ was computed from 4 consecutive readings by a single operator using an Osstell instrument at implant placement. Data was analyzed using single factor ANOVA.

Results: Of the 399 implants placed, 8 implants failed in 8 patients. A statistically significant difference was found between implants that survived until follow-up and implants that failed before implant loading (p<0.001). Implants that failed had an average of 15 lower ISQ values at implant placement than implants that survived. An overall ISQ value at implant placement rate of 98.3% was achieved overall.

Conclusion: Implants that failed had significantly lower ISQ values at implant placement than implants that survived until follow-up. A low ISQ value at implant placement can be valuable information in determining the prognosis of an implant.

Effect of Various Materials to Support Undermined Cusps: Strength Comparison  
Natasha Lim, Cristina Lopez, Richard Stevenson, Esteban Bonilla, Shane White

Introduction: Dental restorative materials have been improving and evolving through time in response to the need for enhanced physical and mechanical properties, accessibility and usage. Numerous studies have shown that conservation of tooth structure is the primary factor to producing a higher quality and longer lasting restoration. With materials which mimic the properties of natural tooth structure, it is possible to allow undermined cusps to remain supported by block-outs of high strength, adhesively retained resins and glass ionomers. The purpose of this investigation is to examine the capacity of the tooth and the restorative materials to support the remaining undermined enamel subjected to static and cyclic loading and erratic changes in temperature.

Materials and Methods: Fifty freshly extracted maxillary third molar teeth were obtained and divided into five groups. One was the positive controlled group with sound dentin and no preparation. The second, negative controlled where preparations were done but not restored. The others are as follows: GC (Traditional GC Fuji IX GP (Packable)), UC (Self-Etching Composite (UniCem)) and MC (Microhybrid Composite). Cement bases were placed in each corresponding tooth in the undermined areas. The preparations were made to remove 60% of tooth structure pulpyly and a range of 60-70% lingually simulating an onlay preparation to engage more dentin, and provide adequate space for the final restoration. Thin layers of 0.2-0.5 mm dentin on the occlusal, mesial and distal as well as the entire enamel were remained untouched and unroofed on the buccal side. All teeth were restored with a final restoration, IPS e.max (Ivoclar Vivadent) and were thermocycled.

Expected Results: Undermined cusps, which have been supported with either glass ionomer or composite resin, will retain strength similar to cusps which have not been undermined. Thus, supporting undermined enamel with dentin amalgates may provide the opportunity to conserve tooth structure, maintain occlusal relationships and potentially extend restoration survival.
Oral Delivery of Phenamil Promotes Bone Formation in Ovariectomized Mice
Alan Nguyen, Chia Soo, Peter Totonoz, Kang Ting

**Statement of Problem:** In the US alone, approximately 44 million people over the age of 50 are afflicted by osteoporosis. Worldwide, 9 million new fractures occur annually due to osteoporosis, incurring an economic burden of $17 billion in the US.

**Purpose:** Hip fractures not only present a significant financial burden to the patient, but also increases mortality rates and complications in quality of life. Prevention of osteoporotic onset via oral administration of an agent would thus represent a lucrative prophylaxis. Phenamil, a derivative of FDA-approved diuretic amiloride, has previously been shown *in vitro* to increase osteogenesis. In this study, we evaluate the *in vivo* efficacy of oral administration of phenamil to prevent ovariectomy (OVX)-induced osteoporosis in mice.

**Materials and Methods:** OVX or Sham surgery was performed on wild-type mice (n=40), followed by supplementation of Phenamil (50 mg/kg diet) or control chow. Bone mineral density (BMD) was evaluated weekly by dual-energy X-ray absorptiometry of the lumbar spine and distal femur. Animals were then sacrificed at four weeks post-surgery for further analysis with microComputed Tomography (microCT), histology, histomorphometry, and immunohistochemistry for osteocalcin (OCN), alkaline phosphatase (ALP), and peroxisome proliferator-activated receptor gamma (PPARγ).

**Results:** While a 10.7% decrease in BMD was observed in OVX chow-fed control animals at four weeks, phenamil-fed ones maintained a BMD comparable to Sham-operated, chow-fed animals. Moreover, phenamil-fed, Sham-operated animals exhibited a 11-25% increase in BMD. MicroCT confirmed these findings, revealing significant increases in bone volume and fractional bone volume. Increased staining for OCN and ALP was also observed along bone perimeter in phenamil-fed animals over chow-fed ones.

**Conclusion:** Phenamil is a novel, non-toxic anabolic agent capable of preventing osteoporotic bone loss, and promoting bone formation in non-osteoporotic animals. With persistence through first-pass metabolism, oral administration of phenamil may prove highly translatable for clinical applications.

Individuals with Single White Spots on Enamel had Higher Childhood Stress
Kelly Nguyen, Pardis Rajabi, Hongfei Chen, Sapna Shahrkokhi Rad, Rassilee Shahma, Teresa Seeman, Arun Karlamangla, Rodrigo Lacruz, Shane White

**Introduction:** Growing evidence links early life stress exposure and experience, including socioeconomic status and harsh/chaotic and/or non-nurturing childhood environments, to adverse adult health trajectories such as elevated cardiovascular risk profiles, impaired immune function, increased risks for multiple chronic conditions, as well as decreased overall longevity, consistent with McEwan’s concept of “allostatic load” describing the cumulative wear and tear on physiologic systems during lifetime. An objective immutable record of childhood stressors rather than a subjective history would be crucial in identifying vulnerable individuals early.

**Hypothesis:** Tooth enamel in third molars is a biomarker measure of a person’s stress history from approximately 8 to 11 years of age.

**Methods:** UCLA Oral Surgery Clinic patients who needed third molar extractions from June 2011 were administered a 17-part questionnaire on psychosocial stressors (parental disharmony, socioeconomic status, emotional and physical abuse, and violence exposure) experienced from 8-11 years of age during 3rd molar enamel formation. Their donated third molars were subjected to hard tissue histology, infiltrating with PMM, sectioning using a diamond saw, wafering, mounting on slides, grinding and polishing, imaging and photographing using transmitted polarized light.

**Results:** Patients with white spots differed (p = 0.006) in their childhood stress history composite scores from those individuals that did not have white spots of developmental origin. White spots were common, but we were able to distinguish between those of acquired and developmental origin.

**Conclusion:** Individuals with single white spots on their third molar tooth enamel had significantly higher scores on a composite index representing childhood emotional abuse, physical abuse, parental disharmony, exposure to violence and socioeconomic experience during third molar enamel formation than those without single white spots.

Surgically Assisted Rapid Palato-Maxillary Expansion with/without Pterygomaxillary Disjunction: Systematic Review
Adrien Sangsari, Pooyan Sadr, Ashkan Rashad, Earl Freymiller

**Statement of the Problem:** A consensus in the literature has not been reached on the necessity and stability of pterygomaxillary disjunction in Surgically Assisted Rapid Palatal Expansion (SARPE).

**Purpose:** To evaluate the outcome measures of anterior expansion, posterior expansion, and complications following therapy with or without pterygomaxillary disjunction.

**Materials and Methods:** To January 1, 2014, PubMed, CINAHL, Google Scholar, Cochrane, Scopus and Science Direct were searched. ProQuest and Google Scholar were also searched to overcome possible publication bias. PICOS: The patient population (P) included individuals indicated to undergo SARPE with pterygomaxillary disjunction as the intervention (I) and that without as comparator (C). The evaluated outcomes (O) included amount of anterior expansion and/or posterior expansion, and complications, and the study design (S) included all controlled.

**Results:** 7 articles met the inclusion criteria. A quality assessment tool for quantitative studies, by the Effective Public Health Practice Project (EPHPP), deemed all the articles “weak-moderate” mostly due to their failure to disclose blinding and randomization data and also participation and dropout rate (Kappa > 90% author agreement). The articles were mostly of reliable quality in controlling the confounding factors. Three of the 7 included articles (42.9%) described anterior expansion in their studies. The 3 studies contained a patient population with maxillary transverse deficiency undergoing SARPE therapy with pterygomaxillary disjunction. A comparator population undergoing SARPE therapy without pterygomaxillary disjunction was included in each of the 3 studies. Three of the 7 included articles (42.9%) described posterior expansion in their studies. Three of the 7 included articles (42.9%) described complications associated with SARPE.

**Conclusion:** It seems that anterior expansion and posterior expansion as well as complications do not differ significantly when pterygomaxillary disjunction is performed vs. not performed during SARPE therapy.
Role of osteoclasts and woven bone in ONJ pathogenesis
Drake Winslow Williams, No-Hee Park, Reuben Kim

Statement of Problem: Bisphosphonates (BP) and Denosumab (Dmb) are anti-resorptive drugs commonly prescribed to treat bone disorders like osteoporosis or bone metastases in cancer patients. Long-term, high dose users of these drugs are at increased risk of developing BP- or Dmb-related osteonecrosis of the jaw (BRONJ or DRONJ). However, since the first case in 2003 ONJ pathogenesis by these anti-resorptive drugs remains elusive.

Purpose: To determine the role of osteoclasts and woven bone formation in the etiopathogenesis of drug-induced ONJ by BP and Dmb using BRONJ and DRONJ mouse models.

Materials and Methods: BRONJ (n=10 per group) or DRONJ (n=20 per group) mouse models were established by intravenous administration of zoledronate (ZOL) or anti-RANKL neutralizing antibody twice a week throughout the experiment duration. The right maxillary first molar was extracted after 1 week of pre-treatment and mice were harvested after 3 weeks. Femurs and maxilla were obtained for uCT scan, volumetric analysis (e.g. BV/TV, new bone in the extracted sockets), and histomorphometric analysis (e.g. osteoclast numbers, empty lacunae). Sera were obtained to examine systemic ALP and TRAP-5b levels.

Results: ONJ-like lesions developed in 50% of anti-RANKL-treated mice and in 30% of ZOL-treated mice as determined by the numbers of empty lacunae and the percentage of necrotic bone. In anti-RANKL-treated mice, we observed undetectable levels of serum TRAP and no TRAP-positive osteoclasts in the extracted sockets. In contrast, we found low serum TRAP but a minimal change in the number of TRAP-positive osteoclasts in ZOL-treated mice. The absence of newly formed woven bone in extracted sockets was evident in an ONJ-specific manner from both anti-RANKL-treated and ZOL-treated groups.

Conclusion: Our study suggests that ONJ development by these anti-resorptive drugs is associated with impaired bone resorptive function of osteoclasts and deficient woven bone formation following dental trauma (e.g. dental extractions).

Ligature-Induced Peri-Implantitis and Periodontitis in Mice
Ryan Wong, Sarah Hiyari, Paulo Camargo, Flavia Pirih

Statement of Problem: Peri-implantitis (PI) is an inflammatory condition that includes bone loss around implants. It affects 11%-47% of all implants and can result in implant loss. Peri-implantitis shares some characteristics of periodontitis (PD), such as increased soft tissue inflammation, probing depth, and radiographic bone loss. Unfortunately, there is no solid understanding about the pathophysiology of PI and no effective treatment for it. With the increasing number of implants being placed and the increased incidence of PI, it is crucial to better understand this condition, so it can be prevented and/or treated accordingly.

Purpose: To compare the rate of bone loss of PI and PD utilizing a murine model.

Methods: 4-week-old male mice had their left first, second, and third molars extracted and were allowed to heal for 8 weeks. Titanium implants were then placed and allowed to osseointegrate for 4 weeks. Once implants were osseointegrated, silk ligatures were placed around the head of the implant (left-side) and around the 2nd molar (contralateral side). Control mice did not receive ligatures. Mice were sacrificed at 1 month, 2 months, and 3 months after ligature placement. Linear bone loss was analyzed around the teeth and implants using Dolphin software.

Results: Micro-CT analysis revealed greater bone loss in ligature-induced peri-implantitis compared to ligature-induced periodontitis at 1, 2 and 3 months following ligature placement. In addition, at 3 months, 4 implants (4/10) failed. On the other hand, none of the teeth were lost.

Conclusion: Bone loss occurs more rapidly in implants compared to teeth utilizing a ligature-induced bone loss model. These results suggest that peri-implantitis may be a more aggressive and destructive process than periodontitis. Future studies should focus on understanding the differences between peri-implantitis and periodontitis at a cellular and molecular level.

Chronic Orofacial Pain: Theories and Alternative Treatments
Leena Zurayk, Kevin Lee, Andrew Pham, Igor Spigelman

Statement of Problem: Because pain has such a paramount role in dentistry and in health care as a whole, we will explore alternative solutions to pain management, specifically acupuncture analgesia. This is to address individuals with chronic facial pain suffering the long term cognitive effects of constant nociception and side effects of analgesic drugs. People living with trigeminal neuralgia and temporomandibular disorders typically have relapses of pain even when they are taking conventionally used treatments, leading to poor quality of life. Many methods of pain relief including analgesic drugs and minimally invasive surgeries do not come without complications and common side effects.

Purpose: The aim of this article was to establish through clinical evidence the efficacy of acupuncture as a potential treatment for chronic facial pain symptoms such as temporomandibular joint disorder and trigeminal neuralgia. The effect of acupuncture therapy on TMD and TN will be investigated in comparison to acupuncure placebo therapy and other conventional methods of analgesia therapy.

Materials & Methods: Systematic searches were conducted in online databases. This literature review includes randomized clinical trials (RCTs) of acupuncture as a treatment for TMD and TN compared to sham acupuncture and conventional analgesic medications.

Results: Our review and analysis demonstrate that acupuncture as a symptomatic treatment of chronic facial pain is limited yet promising. The results across studies indicated acupuncture was at least comparable to other conservative dental treatments and do warrant further study.

Conclusion: Because acupuncture has no adverse effects, it would be beneficial as an alternative method of treatment for patients who do not react well to traditional medications or as an adjunct to treatment. Further studies with proper controls and data on both short-term and long-term results would be required to reaffirm beyond a doubt if acupuncture in fact has a therapeutic value in such circumstances.

Dental Treatment Complications in HIV Patients
Viet Le, Clarence Lee, Albert Luan, Ting-Ting Wu

Statement of Problem: HIV/AIDS patients are at a higher risk of dental complications due to their immunosuppressed status. Dental procedures involves both minor and major trauma, which can prove to hinder recovery.

Purpose: To assess whether patients who are HIV positive are at a greater risk of complications from dental procedures such as endodontic treatment, extractions and implants.

Materials and Methods: Research literature reviews involving dental management of HIV/AIDS patient including case reports and guidelines. Examine the degree of invasiveness of dental procedures (in tiers) and the outcome of recovery.

Results: Postoperative complications were low in HIV patients. The patient received antibiotics and treatments to correct the complication.

Conclusion: Across all studies, the postoperative complications were low, which suggests that proper precautions were effective. Furthermore, the risks of invasive oral procedures have minimal effects on HIV/AIDS patients.

Role of osteoclasts and woven bone in ONJ pathogenesis
Drake Winslow Williams, No-Hee Park, Reuben Kim

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Conclusion: Our study suggests that ONJ development by these anti-resorptive drugs is associated with impaired bone resorptive function of osteoclasts and deficient woven bone formation following dental trauma (e.g. dental extractions).
Prevalence of Root Canal Treatment and Periapical Radiolucency in Elders: A Systematic Review
Reza Hamedy, Bita Shakiba, Rikke S Ogawa, Shane N White

Introduction: Neither the prevalence of periapical radiolucency (PARL), a surrogate for disease, nor the prevalence of non-surgical root canal treatment (NSRCT) in elders have been subjected to systematic review. The purpose of this study was to conduct systematic review and meta-analysis of the prevalence of PARL and NSRCT in elders.

Methods: Inclusion/exclusion criteria were used for defined searches in MEDLINE and Cochrane CENTRAL. Title lists were scanned and abstracts read to determine utility; articles meeting the criteria were analyzed. Weighted mean percentages were calculated for prevalence of PARL, NSRCT, and PARL in both teeth with and without NSRCT.

Results: Defined searching produced 3576 titles; 29 prevalence articles were included. Patient samples mostly represented modern populations from countries with very high human development indices. Meta-analyses were performed on up to 74,000 elders’ teeth. For those aged 65+, the prevalence of all teeth with NSRCT was extremely high, 21%; the prevalence of all teeth with PARL was quite high, 7%; the prevalence of PARL in NSRCT teeth was high, 25%; and the prevalence of PARL in untreated teeth was surprisingly high, 4%. In elders, the prevalence of NSRCT and PARL separately increased with age; Whereas, PARL in NSRCT teeth decreased with age.

Conclusions: In comparison to general adult populations, elders had: a much higher prevalence of NSRCT, a higher prevalence of PARL, a lower prevalence of PARL in untreated teeth, and a higher prevalence of PAR in untreated teeth. Teeth saved through NSRCT were preferentially retained by elders.

Orthopedic and Orthodontic treatment of a cleft lip case
Jay Sung, Andreas Dasy, Hiltrud Dasy, Ashley Davis, Won Moon

Introduction: The treatment of cleft lip involves a careful treatment planning, since the developmental defect of the maxilla typically causes a skeletal discrepancy of the jaws that leads to Class III malocclusion and impaired facial esthetics. Therefore the treatment generally includes addressing the transverse and anterior-posterior deficiency of the maxilla. The skeletal correction is challenging in later stages of growth, and therefore often requires surgical intervention in adolescent patients. With the advent of Micro-implants, new treatment modalities have been introduced allowing a successful non-surgical treatment of the maxillary deficiency. The aim of this case report is to evaluate the treatment outcome and effects of an orthopedic maxillary skeletal expansion and protraction using micro-implants followed by fixed orthodontic treatment.

Clinical Report: An Hispanic male patient with a unilateral cleft lip presented to UCLA Orthodontic clinic. The patient had a cleft lip and a depression in the adjacent alveolar ridge. The patient’s dentition showed an anterior crossbite, and a unilateral posterior crossbite as a result of maxillary constriction. The patient’s age was 15Y 6M old, and the CVMS stage was 3 indicating that the patient is past pubertal growth. A Micro-implant assisted rapid palatal expander (MARPE) with Facemask hooks was delivered and orthopedic correction was achieved followed by orthodontic dental correction.

Results: The patient presented an adequate skeletal expansion as well as a significant amount of protraction of the maxilla after the treatment. The dentition was finished in Class I occlusion with stable occlusion.

Discussion: The new treatment approach using a MARPE and facemask therapy was shown to be successful achieving a normal function and esthetics in a cleft lip case. Effective transverse and anterior-posterior orthopedic correction in post-pubertal growth stage were achieved with no significant side effects, compared to the conventional Rapid Palatal Expansion (RPE) or Facemask therapy.

Management of Furcation Involvement: A Clinical Report Demonstrating Successful Therapy
Jessoo Choe, Perry Klokkevold

Statement of Problem: Periodontitis associated furcation involvement of multi-rooted teeth often poses a morphological challenge for debridement of the affected area, leading to a less favorable prognosis. The most significant difficulty with treating furcation defects is the varied anatomy and limited access.

Purpose: This clinical case report includes a review of the literature that evaluates different methods of furcation treatment including non-surgical (e.g. coronal scaling, root planning) and surgical approaches. Clinical cases are presented to illustrate diagnostic criteria, anatomical challenges and to demonstrate techniques for successful treatment of furcation-involved teeth.

Clinical Report: This clinical report presents cases of furcation defects treated with surgery to yield long-term stability and function. Surgical procedures include modified Widman flap and osseous recontouring. Pre-operative and post-operative photographs and clinical measurements are documented to demonstrate the efficacy of surgical treatment.

Results and Discussion: It is reported that the furcation entrance diameter is less than 1.0 mm in 81% of teeth and less than 0.75 mm in 58%. In addition to the limited opening, more than 90% of molar roots present with an interradicular furcation defect which increases the complexity and furcation defects. Consequently, treatment of furcations is one of the most challenging periodontal defects to treat.

Conclusion: Teeth with severe bone loss that involves the furcation can be treated and maintained long-term. The surgical or nonsurgical approach to furcation treatment depends on a numbers of factors. An equally important factor in the long-term prognosis of furcation-involved teeth is daily oral hygiene and professional maintenance care. While treated teeth continue to be at risk for further destruction if not properly maintained, several studies have shown that surgically treated, furcation-involved teeth can be maintained for decades with good oral hygiene and professional maintenance.

Soft tissue augmentation using acellular dermal matrix: a case report
Jeffrey McCullough, Philip Melnick, Perry Klokkevold

Introduction: AlloDerm®, an acellular dermal matrix (ADM), was first introduced as an allogeneic soft tissue replacement in 1994. Since that time, it has been utilized in a variety of reconstructive procedures including burns, abdominal wall, and breast reconstruction. It has also found use in dentistry as a substitute for autogenous connective tissue grafts. ADM undergoes a series of processing steps to remove cellular components, thus removing its antigenicity, while preserving the three dimensional structure of the extracellular matrix (ECM). Because the ECM components (e.g. collagen, vascular channels, fibronectin) remain intact, ADM allows for rapid cell repopulation and revascularization by acting as a biologic scaffold that will ultimately integrate and remodel into the patient’s own tissue. Advantages of ADM include ample tissue availability and elimination of a second surgical site.

Clinical Report: A healthy, 24 year-old female presented with a chief complaint of progressive gingival recession, non-lingeris sensitivity to cold and soreness after brushing. Her medical history was non-contributory and she reported no history of smoking. Intraoral examination revealed a thin gingival biopsy with less than 1 mm of attached tissue on multiple mandibular teeth (#22-28). Root prominences were clearly visible through the gingival mucosa. Intraoral examination revealed a thin gingival biopsy with less than 1 mm of attached tissue on multiple mandibular teeth (#22-28). Root prominences were clearly visible through the gingival mucosa. The purpose of this study was to conduct systematic review and meta-analysis of the prevalence of PARL and NSRCT in elders.

Methods: Inclusion/exclusion criteria were used for defined searches in MEDLINE and Cochrane CENTRAL. Title lists were scanned and abstracts read to determine utility; articles meeting the criteria were analyzed. Weighted mean percentages were calculated for prevalence of PARL, NSRCT, and PARL in both teeth with and without NSRCT.

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Conclusions: In comparison to general adult populations, elders had: a much higher prevalence of NSRCT, a higher prevalence of PARL, a lower prevalence of PARL in untreated teeth, and a higher prevalence of PAR in untreated teeth. Teeth saved through NSRCT were preferentially retained by elders.
**Treatment of Mandibular Subperiosteal Implant in a Completely Edentulous Patient**

Jeff Oyama, Kumar Shah

This case report will discuss a 77 year old female presenting with a recently placed mandibular subperiosteal implant. A 77 year old female first presented to the UCLA School of Dentistry in February of 2014 with a chief complaint of “soreness and pain in my lower jaw.” The patient had a superperiosteal implant substructure placed approximately 1.5 years prior. Following comprehensive exam and treatment planning, the mandibular subperiosteal implant was planned for removal, and existing prostheses modified in the interim. Two endosseous implants will be placed followed by definitive restoration with a maxillary complete denture and mandibular two implant overdenture. This case demonstrates treatment and removal of existing subperiosteal implants, and also the prosthetic considerations involved when treating and planning for edentulous patients with severely resorbed or compromised residual anatomy.

**Dentoskeletal Effects of Mini-Implant Assisted Rapid Palatal Expansion (MARPE) in adolescents and adults**

Kambiz Khalilinejad, Hae Won Choi, Jin Hee Kwak, Won Moon

Introduction: Transverse maxillary deficiency is among the most common craniofacial skeletal dysplasias. While most can be resolved with orthodontic expansion, those with severe deficiency (>5mm) are considered under surgical intervention. In recent years, skeletal anchored Micro-Implant Assisted Rapid Palatal Expansion (MARPE) has gained spotlight as a non-surgical expansion therapy, but with variable dental/skeletal effects depending on the appliance design. This retrospective clinical study introduces a new MARPE design and evaluates its skeletal and dental effects in preadolescent and adult patients.

**Clinical Report or Technique:** 13 MARPE patients were selected (6 male, 7 female; 7 preadolescents (~18 years), 6 adults (>18 years)) from a database of 35 patients treated by a single practitioner, based on the availability and quality of comparable records. Postero-anterior (PA) cephalograms of patients were taken at pre-treatment (T1) and post-treatment (T2; immediately post-expansion). Six linear and six angular dental and skeletal parameters on T1 and T2 PA cephalograms were compared. Statistical analyses were performed using Student’s t-test.

**Results:** MARPE therapy significantly increased skeletal parameters. Significant increases in linear measurements were shown in the nasal floor width (+4.64 mm; SD 2.1), intermolar distance (+8 mm; SD 2.59), and inter- apex distance between central incisors (+5.69 mm; SD 2.7). Significant increases in angular measurements were shown in the interalveolar angle (5°; SD 2.7), inter-nasal-wall angle (3.98°; SD 2.74), inter-maxillary-wall angle (6.88°; SD 2.1), and interincisal angle (-13.38°; SD 11.32). There were no significant changes in the nasal floor width (+4.64 mm; SD 2.1), intermolar distance (+8 mm; SD 2.59), and inter-apex distance between central incisors (+5.69 mm; SD 2.7). Significant increases in angular measurements were shown in the interalveolar angle (5°; SD 2.7), inter-nasal-wall angle (3.98°; SD 2.74), inter-maxillary-wall angle (6.88°; SD 2.1), and interincisal angle (-13.38°; SD 11.32). There were no significant changes in the nasal floor width (+4.64 mm; SD 2.1), intermolar distance (+8 mm; SD 2.59), and inter-apex distance between central incisors (+5.69 mm; SD 2.7). Significant increases in angular measurements were shown in the interalveolar angle (5°; SD 2.7), inter-nasal-wall angle (3.98°; SD 2.74), inter-maxillary-wall angle (6.88°; SD 2.1), and interincisal angle (-13.38°; SD 11.32).

**Discussion:** MARPE successfully achieved maxillary expansion of 6mm on average, without presenting unwanted dental side-effects. In addition, the therapy increased the nasal cavity, which in most cases is in favor of patients with constricted maxilla. Finally, MARPE has shown equal effectiveness in skeletally mature patients with severely resorbed or compromised residual anatomy.

**En-Masse Distalization and Expansion with Micro-Implant Assisted RPE (MARPE)**

Howard Chu, Jinny Kwak, Won Moon

Introduction: The treatments of hyperdivergent class III growing patients with asymmetric dental arches are extremely difficult to treat clinically. This case report aims to present a non-surgical approach to the treatment of a growing Hispanic teenage patient with a class III dolicofacial skeletal pattern, transverse defici, and asymmetric molars using en masse distalization, protraction with TADs along with Micro-Implant Assisted RPE (MARPE).

Clinical Report: A non-surgical approach was taken to treat a 12y5m Hispanic female who presented with a class III skeletal profile (Wits = -2.6mm), dolicofacial pattern (FMA= 32 degrees), 4mm maxillary transverse deficiency at the upper 6’s, and an asymmetric molar classification (Right side class III molars by 3mm; left side class II molars by 4mm). A bi-dimensional bracket system along with a microimplant assisted RPE (MARPE) is being used along with additional TADs to correct the transverse discrepancy and also to improve the asymmetric anterior-posterior relationships.

**Results:** Transverse discrepancy has been achieved with micro-implant assisted RPE (MARPE) and left sided molar classification is now class I and right side molar classification is slightly class II by 1.5mm. The patient is currently still in treatment as the remaining anterior posterior correction needs to be accomplished and further finishing and detailing as well.

**Discussion:** While challenging, transverse discrepancy in a hyperdivergent class III case with asymmetric dental arches was accomplished with micro-implant assisted RPE (MARPE) and TADs. The remaining anterior-posterior correction will be accomplished followed by finishing and detailing of the case. This case may serve as a valuable model in the treatment of similar cases for the improvement of their esthetics and function.

**Periodontal Therapy in Chronic Periodontitis and the importance of Maintenance**

Sherif Warda, Perry Klokkevold, Stephen Levine

Introduction: Periodontitis is a chronic bacterial infection that elicits an inflammatory response resulting in periodontal attachment loss, bone loss and tooth loss. Nearly half of American adults are affected and it is the primary cause of tooth loss in adults. Recent research suggests that periodontitis has a correlation, often bidirectional relationship, with systemic diseases. This case demonstrates the effectiveness of patient education, non-surgical therapy and the importance of daily oral hygiene to control the periodontal biofilm and periodontitis. A literature review will present evidence for the interrelationship between periodontitis and systemic diseases.

**Clinical Report:** An 89 year-old Hispanic male was referred to Periodontics for evaluation and treatment of periodontitis. His medical history was significant for hypertension, hypercholesterolemia and type II diabetes mellitus, which were controlled with Amlodipine, Simvastatin and Glipizide, respectively. Periodontal examination revealed widespread gingival edema and erythema as well as characteristic signs of drug-induced gingival overgrowth. Probing pocket depths were generalized 4-8mm with localized 9-12mm and generalized heavy BOP. Generalized heavy plaque and sub-gingival calculus was present. Tooth mobility was ranged from Grade 1 to 2 with localized Grade 3 (Fig 13, 14). The periodontal diagnosis was Generalized Moderately to localized Severe Chronic Periodontitis influenced by systemic disease and medications. Treatment included patient education, oral hygiene instructions and non-surgical phase 1 therapy to remove calculus and root plane affected root surfaces. Subsequent re-evaluation was done to determine the need for additional therapy.

**Results and Discussion:** Following initial therapy, patient education and improved daily oral hygiene, tissues were pink and firm. Few localized areas of gingival edema persisted. Probing pocket depth measurements were reduced to 3-5mm with localized 7mm (Fig15) and mild BOP. Tooth mobility was reduced to Grade 1 with localized 1+ (Fig13, 15).

**Conclusion:** Non-surgical periodontal therapy, improved oral hygiene and regular periodontal maintenance effectively controls chronic periodontitis and improves health.
Case Report: Management of Anterior Open Bite with Mini-Implants
Peter Lee, Suha Alghamdi, Won Moon

Introduction: Treatment of anterior open bite cases are challenging due to multifactorial etiology and high rate of relapse. With these cases, an accurate diagnosis and determination of the etiology are necessary in order to achieve successful treatment outcome. Careful clinical and radiographic examination is required for determining the key nature of the open bite etiology, skeletal or dentoalveolar, albeit many cases display both characteristics. Depending on the respective etiology, treatment modalities are explored and determined such as orthognathic surgery or orthodontic camouflage. With the advent of mini-implants, skeletally related open-bite cases have been successfully treated with orthodontics only. The aim of this report is to evaluate effects of molar intrusion utilizing micro-implants for treatment of anterior open-bite.

Clinical Report: A 26Y 10M Chinese male patient with a chief complaint of “I have an open bite” presented to UCLA Orthodontic Clinic. He had a convex profile with dolichocephalic pattern and increased lower face height. The patient’s dentition showed open bite from UR4 to UL4 with 5mm of open bite anteriorly. The patient displayed both skeletal and dental characteristics of open bite. Skeletally, patient displayed hyperdivergent mandibular plane (MP-SN: 44.9 deg; MP-FH: 39.2 deg); dentally, patient’s upper incisors were proclined (UI-SN: 120 deg) with forward tongue positioning. Micro-implants were placed posteriorly in upper and lower arches for intrusion, allowing autorotation of the mandible. Results: The patient’s open bite was closed successfully from retroclination of upper incisors (UI-SN: 108.5 deg) and autorotation from molar intrusion (MP-SN: 40.2 deg; MP-FH: 33.9 deg). The dentition was finished in canine Class I occlusion.

Discussion: The etiology of open bite is multifactorial. Our patient of both skeletal and dentally related open bite was successfully treated with molar intrusion mechanics with micro-implants. For successful retention of the treatment outcome, patient will need to undergo myofunctional therapy, controlling forward tongue positioning.
Full-mouth rehabilitation with immediate loaded implants inserted with computer-guided surgery
Nicholas Goetz, L. Gonzaga, N. Patel, W. Martin, Ting-Ling Chang

Introduction: The rehabilitation of the completely edentulous patient with osseointegrated implants is predictable and well documented in the literature. Immediate loading with cross arch stabilization of implant restoration have shown to be a good alternative to decrease treatment time while still maintaining a high success rate when well indicated. The use of computer guided surgery aids the clinician in selection of the optimal implant location based on a prosthetic driven treatment plan, while avoiding precarious anatomic structures and diminishing surgical time. The aim of this poster is to demonstrate a technique for fabrication of a combined soft tissue and hard tissue computer designed and printed guide for the implant placement of an immediately loaded maxillary and mandibular implant supported fixed detachable complete denture.

Case Report and Result: A 55-year-old white female patient reported a five year history of complete edentulism and the inability to wear her maxillary complete denture due to a self reported strong gag reflex. Implant positioning was planned utilizing CoDiagnostiX software. Surgical templates were virtually designed to utilize both soft and hard tissue supports. The final designed surgical templates were then computer 3D printed.

Discussions: The implants placed with the guided surgery technique were loaded with cross arch stabilization in less than 48 hours for both the maxillary and mandibular arches. The chosen loading protocol is based on the ITI implant loading consensus: Immediate loading. According to Parel, S. and Phillips, W. 2011, there appears to be an increase of approximately 5 to 6 times greater risk of implant failure for immediate loading in the maxilla as compared to the mandibular arch. The article suggested possible risk factors to take into account; opposing natural dentition, male gender, lack of bone density, the distal implant site, and parafunction (bruxism) were sufficiently frequent occurrences in failure situations.

Segmental Odontomaxillary Dysplasia: A Case Report
Kaycere C Walton, Gregg W Beaty, Lawrence P Lotzof, Sanjay M Mallya

Introduction: Segmental Odontomaxillary Dysplasia (SOD) is a rare developmental disturbance of unknown etiology. Typically recognized in childhood, it is characterized by unilateral, localized expansion of the maxilla with overlying fibrous gingival hyperplasia, varying combinations of hypodontia, hypoplasia and eruption delays in one or both dentitions, and an inconsistent array of cutaneous findings. Its classic radiographic manifestations are an ill-defined, expansible, granular lesion with ipsilateral maxillary sinus hypoplasia.

Clinical Report: A twelve-year-old male presented with anomalous retained primary molars, missing premolars and delayed eruption of the permanent teeth in the maxillary left quadrant. A commissural lip cleft and delayed eruption of the permanent teeth in the maxillary left quadrant. A commissural lip cleft and delayed eruption of the permanent teeth in the maxillary left quadrant. A commissural lip cleft and delayed eruption of the permanent teeth in the maxillary left quadrant. A commissural lip cleft and delayed eruption of the permanent teeth in the maxillary left quadrant. A commissural lip cleft and delayed eruption of the permanent teeth in the maxillary left quadrant.

Purpose: To better identify and predict the disease progression, we aim to determine whether the subgingival microbiome can be used as a prognosis indicator.

Materials and Methods: We recruited twelve systemically healthy adults with chronic periodontitis, and sampled multiple tooth sites per subject before and after non-surgical initial therapy. Using metagenomic shotgun sequencing, we characterized the dynamic changes of the subgingival microbiome in periodontitis patients before and after treatment at the same tooth sites. At the taxonomic composition level, we revealed that the periodontitis associated microorganisms were significantly shifted from highly correlated at the diseased state to poorly correlated at the resolved state, suggesting that coordinated interactions among the pathogenic microorganisms are essential to disease pathogenesis. At the functional level, we identified disease-associated pathways that were significantly altered in abundance between the two states. Furthermore, using the subgingival microbiome profile, we were able to classify the samples to their clinical states with an accuracy of 81.1%. Follow-up clinical examination of the sampled sites supported the predictive power of the microbiome profile on disease progression.

Conclusion: Our study revealed the dynamic changes in the subgingival microbiome contributing to periodontitis and suggested potential clinical applications of monitoring the subgingival microbiome as an indicator in disease diagnosis and prognosis. This study is dedicated to our beloved colleague, Dr. Susan Kinder Haake.

Dynamic Changes in the Subgingival Microbiome Associated with Periodontitis
Baichen Shi, Renate Lux, Perry Klokevold, Susan Kindler Haake, Huiying Li

Statement of Problem: Periodontitis, a disease affecting about half of American adults, is caused by a shift in the subgingival microbiome of individual tooth sites. Although it can be treated, the disease can reoccur and may progress without symptoms. Without prognostic markers, follow-up examinations are required to assess reoccurrence and disease progression and to determine the need for additional treatments.

Purpose: To better identify and predict the disease progression, we aim to determine whether the subgingival microbiome can be used as a prognosis indicator.

Results: Using metagenomic shotgun sequencing, we characterized the dynamic changes of the subgingival microbiome in periodontitis patients before and after treatment at the same tooth sites. At the taxonomic composition level, we revealed that the periodontitis associated microorganisms were significantly shifted from highly correlated at the diseased state to poorly correlated at the resolved state, suggesting that coordinated interactions among the pathogenic microorganisms are essential to disease pathogenesis. At the functional level, we identified disease-associated pathways that were significantly altered in abundance between the two states. Furthermore, using the subgingival microbiome profile, we were able to classify the samples to their clinical states with an accuracy of 81.1%. Follow-up clinical examination of the sampled sites supported the predictive power of the microbiome profile on disease progression.

Conclusion: Our study revealed the dynamic changes in the subgingival microbiome contributing to periodontitis and suggested potential clinical applications of monitoring the subgingival microbiome as an indicator in disease diagnosis and prognosis. This study is dedicated to our beloved colleague, Dr. Susan Kinder Haake.

Peri-Implants in a Murine Model
Sarah Hiyari, Azadi Naghibi, Paulo Camargo, Flavia Pirih

Introduction/Statement of Problem: Peri-implantitis has a prevalence of 11-47%, involves destruction of peri-implant bone, and may lead to implant loss. A detailed understanding of the pathogenesis of peri-implantitis is lacking.

Purpose: The objective of this study was to develop a murine model of experimental peri-implantitis. Materials and Methods: Machined, smooth surface screw-shaped titanium implants were placed in the healed alveolar bone of the left maxillary molars of C57BL/6J male mice, eight weeks after tooth extraction. Peri-implantitis was induced by securing silk ligatures around the head of the implant fixtures. Implant survival and peri-implant bone levels were analyzed by micro-computed tomography (micro-CT) scans and histology twelve weeks after ligature placement.

Results: Implant survival was 60% (6/10) in implants with ligatures and 100% (8/8) in controls. Micro-CT revealed significantly greater bone loss around the implants that received ligatures and that survived as compared to controls. The radiographic findings were confirmed via histology, toluidine blue staining.

Conclusions: This study describes a murine model of experimental peri-implantitis around screw-shaped titanium implants placed in the edentulous alveolar bone. This model should be a useful tool to dissect pathogenic mechanisms of peri-implantitis and evaluate potential treatment interventions.
Adjunctive Laser Therapy for Periodontitis: Literature Review and Current Techniques
Galya Raz, Perry Klokkevold

Statement of Problem: The clinical effects of adjunctive laser therapy have not been evaluated with respect to different protocols and study designs. As a result, not one adjunctive laser therapy has been identified as yielding the best clinical results.

Purpose: Lasers have been proposed for the treatment of chronic periodontitis for more than three decades. Most often, they are used as adjunctive therapy along with conventional scaling and root planing. The aim of this literature review was to identify the most common methods of adjunctive laser therapy used to treat periodontitis and to assess differences in clinical outcomes.

Materials and Methods: A systematic search of PubMed and manual searches of relevant articles from referenced journals was performed. Articles were included if they contained a test group with laser therapy as an adjunct to conventional scaling and root planing and a control group. Reporting of the number of patients and a follow-up period greater than 6 weeks was required. Methodology was compared and clinical outcomes of protocols were evaluated.

Results: Due to wide variations in lasers and laser protocols used in published studies, direct comparisons were not feasible and identifying superior outcomes is not possible. The results of this literature review found that many of the methods used yielded similar outcomes (i.e. limited clinical significance) suggesting that different lasers and laser protocols may not be pertinent to the clinical results.

Conclusions: Further research must be done to evaluate the long-term results of adjunctive laser therapy as few studies have included extended follow-up. Further investigations should also evaluate the effects of laser therapy on severe and aggressive forms of periodontal disease.

Effect of Locally Applied Aqueous Clindamycin on Implant Survival
Jay Ponto, Howard Park

Dental implant placement can be unsuccessful in the long term due to many factors, including bacterial contamination of the implant site. In this study, survival of dental implants placed by a private practice oral and maxillofacial surgeon was compared before and after the surgeon introduced the application of an aqueous clindamycin rinse to the implant sites immediately prior to insertion of the implant. Data from 2004 to 2012 was assessed for the total number of Nobel Biocare implants placed by the oral and maxillofacial surgery practice and compared to the number of implants that did not survive. Despite decreased mean percentages of clindamycin treated sites requiring implant removal, it was found that there was no significant difference in the implants that were not successful when comparing the non-clindamycin versus clindamycin groups. Additionally, there was no significant difference between the two groups when selecting for implants removed within three months of placement, or implants removed due to a post-operative infection.

Comparison of Fracture Resistance of Ceramic Crowns with Various Composite Build-Up Materials
Sanad S Rashed, Esteban D Bonilla, Richard Stevenson, Christine Khabbaz, Shane N White

In this investigation, various restorative build up procedures were used to develop proper coronal foundations for debilitated posterior teeth. Numerous build up materials and techniques were used for making cores on molar teeth to replace missing tooth structures. These structures had at least two adjacent cusps that had been fractured or were severely compromised by caries or defective restorations. These build up procedures included placing peripheral shelves and pins to hold the cores in place and to resist the dislodgement of the crown restoration during function. A few simple materials and techniques were used to create core foundations which preserved the intrinsic strength of the remaining tooth structure and gave a more predictable final restoration.

Morphological changes in the upper airway with mandibular repositioning appliances
Sun K Kim, T Garguri, RL Merrill, Sanjay Malliya

Statement of Problem: Obstructive sleep apnea (OSA) is a chronic sleep-breathing disorder characterized by partial to complete oropharyngeal airway obstruction during sleep resulting in repeated episodes of apnea/hypopnea. Mandibular repositioning appliances (MRA) are used to manage this disease. These appliances position the mandible anteriorly and are anticipated to increase the upper airway dimensions. However, the precise morphological changes induced by MRA have not been characterized.

Purpose: This pilot study assessed MRA-induced morphological changes in the nasopharyngeal and oropharyngeal airways.

Materials and Methods: CBCT scans were acquired on 12 patients who received MRA to manage mild-moderate OSA or snoring. The scans were acquired without and with the MRA in place. Volumes of the nasopharyngeal- (hard palate to tip of uvula) and oropharyngeal- (tip of uvula to vallecula) airways, and the minimal cross-sectional areas were measured using Dolphin Imaging Software. Appliance-induced changes in these parameters were analyzed.

Result: The baseline median minimum cross-section area was 60mm2 and was increased to 94.5mm2 by the MRA. In all 12 patients, the site of minimal narrowing was located in the nasopharyngeal region. Notably, in 7 patients the MRA caused either a minimal change or a considerable decrease in the nasopharyngeal airway volume. In contrast, the oropharyngeal volume was significantly increased in 9 of the 12 patients (p<0.005). There was no significant correlation between the changes in the nasopharyngeal and oropharyngeal airway volumes.

Conclusion and Discussion: This pilot study demonstrates differential effects of MRA on nasopharyngeal and oropharyngeal airway volumes. This suggests that the effect of the MRA may be more complex than simply pushing the tongue forward, and perhaps the appliance may also induce changes in muscle tone of the palatal muscles. In ongoing studies, we are examining the influence of these alterations on subjective and objective measures of MRA therapy success.

Computational Fluid Dynamic Modeling of OSA in Patient-Specific Airways
Susan M White, Zhengsheng Sun, Jeff D Eldredge, Sanjay Malliya

Statement of Problem: Obstructive sleep apnea (OSA) is a chronic sleep-breathing disorder, characterized by intermittent airway collapse and subsequent oxygen desaturation. As an independent risk factor for many other comorbid conditions, including hypertension and type-2 diabetes, untreated OSA is a major public health concern. The pathophysiology of OSA is not well understood and the appropriate triage of OSA patients for surgery, mandibular-repositioning-appliances (MRA), or continuous-positive-airway-pressure (CPAP), remains controversial.

Purpose: Cone-beam-CT (CBCT) imaging provides excellent morphometric analysis of the upper airway geometry. However, it lacks the ability to demonstrate the location/timing of airway collapse. We explored the use of computational fluid dynamics (CFD) simulations to provide patient-specific airway modeling, and the potential to integrate CFD with fluid-structure-interaction (FSI). This dynamic modeling is being explored for its potential to understand the pathophysiology and guide therapeutic approaches.

Materials and Methods: Our general approach is as follows: 1) imaging of patients, drawn from a pool un

Result: This preliminary study demonstrates: 1) preservation of anatomic integrity throughout our segmentation and post-processing workflow within MATLAB, 2) proof-of-concept patient-specific CFD results of varying morphologies.

Conclusions: Patient-specific CFD modeling utilizing the immersed-boundary technique has been demonstrated. Future goals include validation of static airway analysis results and coupling of the in-house CFD and FSI codes.
Microbiomes Colonized on Artificial Intraoral Dental Materials Affect Oral Health

Tingxi Wu, Xuesong He, Renate Lux, Wenyuan Shi

Statement of Problem: Modern dentistry introduces various artificial dental materials into oral cavity, such as acrylic resin based dentures or titanium based orthodontic devices. The surfaces of these dental apparatus are unprotected and exposed for easy colonization of potential pathogens, which is clinically believed to be associated with various oral diseases, such as denture-related stomatitis/halitosis and ortho-brace-related cavitation/gingivitis, but little microbiological and molecular evidence exists to validate the hypothesis.

Purpose: This study aims to understand how these artificial dental materials may impact oral microbiota and its association with oral diseases and to develop novel therapeutic strategies against these diseases. Microbiota on denture surfaces are the initial focus and the study is being expanded into orthodontic braces.

Materials and Methods: Species-specific PCR detection and high-throughput 454 sequencing technology are used to characterize native and denture plaques collected from various patients for the discovery of possible pathogenic species specifically colonized on denture surfaces and to explore their connections with oral diseases through genetic and molecular studies. In vitro denture biofilm models are established for testing new therapeutic reagents.

Results: Analysis of altered microbial profiles between native and denture plaques led to the discovery of positive association of Candida/Fusobacteria and negative association of Streptococci with denture related stomatitis/halitosis for their inter-species interactions. Genetic detection methods for both Candida and Fusobacteria were established to evaluate the treatment efficacy of various denture cleansers. Similar studies are being conducted for orthodontic braces.

Conclusion: The new surfaces from removable or fixed dental apparatus indeed altered oral microbial flora and increased colonization of some specific pathogens, which lead to various oral diseases. The understanding of microbial virulence factors and the development of in vitro biofilm models are useful tools to address these problems.

Fracture and Microleakage Resistance of Cast Gold and Various CAD/CAM Inlays

Vahidde Yousefi, Esteban D Bonilla, Richard Stevenson, Colby Smith, Shane White

Introduction: The purpose of this in-vitro study was to compare the fracture resistance and microleakage of four different types of restorative material, including cast gold, when cemented with three different cement types. This study helps us to learn about the application of digital dentistry in fabrication of CAD/CAM intracoronal restorations and interpretation and assessment of the behavior of different CAD/CAM restorative materials of different moduli and cements of different modulus. Moreover, it will give us a better understanding of fracture resistance and microleakage of several new CAD/CAM materials and conventional cast gold inlay restorations.

Method and Material: One hundred and twenty freshly extracted human molars were used in this study. Four types of restorative materials: IPS e.max (Ivoclar Vivadent), Vita Enamic (Vident), Lava Ultimate (3M ESPE), and JRV High-Noble gold alloy (Jensen Dental) and three different cements: Panavia (Kuraray), Ketac-Cem (3M ESPE), and Panavia F2.0 (3M ESPE) were used in this study. All inlay preparations were prepared for class II MO inlays. Digital impressions were made for ceramic preparations and fabrication of the restorations were done using CEREC 3 (Sirona). Cast gold inlays were fabricated for gold preparations. All restorations were cemented with each of the cements according to the manufacturer’s instructions. Two-way ANOVA will be used to analyze the simple main effects of restorative material types and cement types, as where as their instructions on strength of bond to tooth-restoration complex. It is estimated that, highest fracture resistance and lowest microleakage will be seen in emax restorations cemented with Panavia.

Pilot Data: Experimental feasibility has been demonstrated.

Expected Results: It is expected that restorative material type, cement type and their interactions will all affect both microleakage and fracture resistance, but in different ways.

Senescing Effects of Ionizing Radiation on Dental Pulp Cells

Yangpei Cao, Wei Chen, Shebli Mehrzarin, Shane White, Robert Schietstl, Mo Kwan Kang

Purpose: The current study investigated the effects of ionizing radiation (IR) on dental pulp cells. It was hypothesized that IR triggers premature senescence in dental pulp, resulting in loss of mineralization potential and enhanced expression of inflammatory cytokines. Understanding the effects of IR in the dental pulp may shed new light on mechanisms of radiation-induced caries and pulpal exposure in patients undergoing radiotherapy. In addition to those caused by xerostomia.

Materials and Methods: Primary dental pulp stromal cells (DPPSCs) were cultured from extracted teeth and exposed to sublethal IR dose (5 Gy). Cell proliferation and a cytotoxic assay of senescence, senescence-associate B-galactosidase (SA-B-Gal), were performed to examine the phenotypic effects of IR. Alkaline phosphatase (ALP) and Alizarin Red S (ARS) staining assessed mineralization of cells after IR. qRT-PCR was done to quantify the expression of proinflammatory cytokines. We also utilized immunostaining for intranuclear p53 in irradiated mice to visualize the DNA damage response (DDR) in DPPSC in vivo. Furthermore, effects of radiomimetic, Yel002, were evaluated.

Results: IR led to premature senescence in DPPSCs, evidenced by enhanced expression of SA-B-Gal and proliferation arrest. ALP activity and ARS were reduced in irradiated cells, indicating loss of odontogenic differentiation. Irradiation also led to induced expression of proinflammatory cytokines, e.g., IL-1β, IL-6, and IL-8. IR exposure to the head and neck led to increased occurrence of intranuclear p53 staining in the pulp stromal cells, indicating occurrence of DDR inside dental pulp. Pretreatment of cells with Yel002 suppressed DDR in cells and suppressed the growth-inhibitory effects of IR.

Conclusions: These findings demonstrated that IR triggers loss of proliferative and odontogenic differentiation of DPPSCs due to induction of premature senescence; and that Yel002 may have beneficial effects in radioprotection of DPPSCs. These findings have clinical implications for all patients who undergo therapeutic head and neck radiation.

Low Brain penetrant cannabinoid receptor agonists for the treatment of cis-platin induced peripheral neuropathy

Yatendra Mulpuri, Igor Spigeiman

Chemotherapy induced peripheral neuropathy (CIPN) is a severe and dose limiting side effect of antineoplastic agents such as cisplatin, paclitaxel and vinca alkaloids. Current medications for pain alleviation often lack efficacy and cause adverse side effects. Preclinical studies have demonstrated the analgesic effectiveness of brain-penetrant cannabinoids (CB) in the treatment of CIPN, but their use may be limited by the psychotropic side effects of central CB1 receptor (CB1R) activation. We recently succeed in the development of several novel cannabinoid receptor (CBR) agonists that do not appreciably cross the blood-brain barrier and which suppressed pain symptoms induced by sciatic nerve injury without central side effects (Mulpuri et al, SFN Abstr. Vol. 37:173.21, 2012). Here we examined one of these compounds (4-{2-[1(E)-1[(4-propynaphthalen-1-yl)-methylidene]-1H-inden-3-yl]ethyl}morpholine, PrNMI) for effectiveness in alleviating the painful symptoms of brain-penetrant cannabinoids (CB) in the treatment of CIPN, but their use may be limited by the psychotropic side effects of central CB1R receptor (CB1R) activation. We recently succeed in the development of several novel cannabinoid receptor (CBR) agonists that do not appreciably cross the blood-brain barrier and which suppressed pain symptoms induced by sciatic nerve injury without central side effects (Mulpuri et al, SFN Abstr. Vol. 37:173.21, 2012). Here we examined one of these compounds (4-{2-[1(E)-1[(4-propynaphthalen-1-yl)-methylidene]-1H-inden-3-yl]ethyl}morpholine, PrNMI) for effectiveness in alleviating the painful symptoms of mechanical and cold allodynia in a rat model of CIPN. Oral administration of PrNMI dosedependently suppressed cisplatin (3 mg/kg, 1/week for 4 wks)-induced mechanical and cold allodynia symptoms with complete symptom suppression at 3 mg/kg. Daily oral administration at 1 mg/kg consecutively for two weeks resulted in similar daily suppression of mechanical and cold allodynia implicating little, if any, tolerance development. Intraplantar PrNMI (0.25 mg/kg) injection completely suppressed CIPN symptoms, suggesting peripheral sensory nerve terminals as the main sites of PrNMI’s anti-allodynic action. PrNMI coadministration with selective CB1R or CB2R blockers revealed mainly CB1R contribution to its analgesic effects. In the central side effects assays, brain penetrant HU-210 exhibited potent side effects at systemic doses that relieve neuropathy symptoms, whereas PrNMI and its analogs showed a complete lack of side effects in tests for catalepsy, hypothermia and motor incoordination. The potency, peripheral selectivity, in vivo efficacy, and absence of CNS side effects of this novel class of CBR agonists point to their potential as a viable treatment for CIPN pain symptoms.
**Gnathodiaphyseal dysplasia: a syndrome associated with florid osseous dysplasia**

Hannah Duong, Miriam Guemes-Aragon, Russel E Christensen, Tracey Tajima, Sanjay M Mallya

**Introduction:** Gnathodiaphyseal dysplasia (GDD) is a rare autosomal dominant syndrome characterized by florid osseous dysplasia (FOD) in the jaws, bone fragility, and diaphyseal cortical thickening and bowing of long bones. It is caused by mutation of the anoctamin 5 (ANO5) gene.

**Clinical and Radiologic Report:** We present a family with previously undiagnosed GDD. A 41-year-old male presented to the Veterans Administration Hospital with Ludwig’s angina and infection in the right posterior mandible. His maxillofacial radiographic examination was sent to UCLA Oral Radiology clinic for consultation. Multiple exuberant well-defined, amorphous radiopaque lesions were present throughout the maxilla and mandible. Both jaws were considerably enlarged with loss of normal trabecular architecture. The findings were suggestive of FOD. These findings, coupled with the patient’s history of a femoral fracture due to minor trauma, prompted the suspicion of GDD. Gene sequencing revealed a novel missense mutation in exon 11 (1067 G to A, predicted amino acid substitution Cys356Tyr), firmly establishing the diagnosis of GDD. The patient’s 21-year-old son had similar findings—radiographic imaging demonstrated comparable findings of maxillary-mandibular FOD.

**Discussion:** GDD is a rare syndrome—the maxillofacial findings are familial FOD. As with other cases of FOD, these patients harbor an increased risk for developing osteomyelitis, as was present in our current case. Little is known about the functional significance of ANO5 mutations with regards to the skeletal manifestations in this syndrome. Given the propensity for long bone fractures, GDD patients have been misdiagnosed with fibrous dysplasia or osteogenesis imperfecta. However, the radiographic manifestations of florid osseous dysplasia should prompt the suspicion of GDD. The diagnosis can be firmly established as in this case by gene sequencing. Our presentation will provide additional information on ongoing molecular studies in our laboratory examining the function of this gene and its significance to sporadically occurring FOD.