Dear students and colleagues,

Welcome to Research Day 2015! It is always with great anticipation that I attend this annual event, one of USC’s only such events dedicated to scientific inquiry and innovation.

It is truly inspiring to see the curiosity and excitement in the faces of our dental faculty and students as well as those researchers from the USC Chan Division of Occupational Science and Occupational Therapy and the USC Division of Biokinesiology and Physical Therapy as they talk so passionately about their research. Better still, I can confidently say I always walk away from Research Day, having learned something new. I hope you all will be able to say the same.

We take scientific research very seriously at the Herman Ostrow School of Dentistry. In fact, the dental school has been the top-funded private dental institution by the National Institute of Dental and Craniofacial Research for two years in a row. On both campuses, some of dentistry’s brightest minds are working tirelessly to solve some of oral and craniofacial health’s most vexing problems.

This commitment to scientific discovery doesn’t stop at dentistry. Our colleagues in occupational therapy and physical therapy lead the way as the No. 1-ranked schools in the U.S. News and World Report’s list of top graduate schools. As their profession’s leaders, they often set the research agenda and lead federally-funded research efforts.

This focus on research is critical for our students. We often talk about how we must prepare our students to perform in the world not as it is today but how it will be in 10, 15 or 20 years down the road. While we may be able to pinpoint trends in our professions, there’s no way to predict the future. But by preparing our students to become critical thinkers, they will be better equipped to navigate fields that will continue to dynamically change—perhaps more in the coming years than ever before.

As we embark upon this exciting day, I’d like to congratulate all our faculty and student presenters. We are all incredibly proud of your hard work, dedication and scientific curiosity.

Fight on!

Avishai Sadan, DMD, MBA
Dean
G. Donald and Marian James Montgomery
Professor of Dentistry
Herman Ostrow School of Dentistry of USC
IN THIS ISSUE

BIOMEDICAL SCIENCES
Charting Neural Crest Cell Differentiation
Robbie Berger & Evan Nahigian

RESTORATIVE SCIENCES
Improving the Bond: An Interview with Dr. Silas Duarte
Katie Schwartz & Yagnik Patel

ORAL SURGERY
The Use of 3D Treatment Planning in Oral and Maxillofacial Surgery
Omar Kholaki & Ali Salehpour

RESEARCH DAY ABSTRACTS

38 Faculty
40 Advanced Specialty Program Residents
43 Dental Hygiene
44 Graduate Post-Doctoral Trainees
48 Graduate Pre-Doctoral Candidates
49 Biokinesology and Physical Therapy Candidates
50 Biokinesology and Physical Therapy Students
54 Occupational Science and Occupational Therapy Students
56 Undergraduate DDS Students - Basic Sciences
58 Undergraduate DDS Students - Clinical Sciences
60 Others

FROM THE DEAN
Avishai Sadan, DMD, MBA
Dean
Herman Ostrow School of Dentistry of USC

WELCOME TO RESEARCH DAY
Yang Chai, DDS, PhD
Associate Dean of Research
Herman Ostrow School of Dentistry of USC
**PEDIATRIC DENTISTRY**
Children’s Health and Maintenance Project (CHAMP)
Soo Lee & Hoang-Anh Tran

**ORTHODONTICS**
Keeping it Simple: Reinventing the Surgical Stent
Payal Patel & Tiffany Lee

**OCCUPATIONAL THERAPY**
Harnessing Brain Power for Improved Stroke Rehabilitation
Hope Homashige

**DENTAL HYGIENE**
Collaboration in Oral Health Research
Kristine Hong, Catherine Tan & Rasha Dubuni

**PERIODONTOLOGY**
Trailblazing the Evolution of Modern Day Periodontology
Emil Simanian & Shant Aharonian

**SPECIAL PATIENTS**
Developing a Dentist’s Role in HIV Diagnosis and Treatment Planning
Jonathan Nguyen

**BIOMEDICAL SCIENCES**
Profiling the Single Cell: A Closer Look at Cell Populations
Christopher Patuwo & Matthias Fallis

**PHYSICAL THERAPY**
Infant Neuromotor Control
Dr. Beth Smith

**FEATURE ARTICLES**

**Herman Ostrow School of Dentistry of USC:**
Opportunities in the Summer Research Fellow Program
Paulina Nguyen & Brent Roberts

**About the Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy of USC**
Dear Colleagues,

Welcome to Research Day 2015! It is always exciting to host this annual event celebrating the innovative research being conducted by our students, staff, and faculty.

Students at the Herman Ostrow School of Dentistry of USC are privileged to be able to conduct research alongside our expert faculty. This is a valuable experience that only a few elite research-intense universities are able to offer as part of dental education. One of our primary missions at USC is to train the next generation to become leaders in science and health care. Our students who engage in research are gaining hands-on experience that will benefit them throughout their careers and in all their endeavors.

We at the Ostrow School are committed to the development of new faculty and innovative research. In the last few years, we have recruited some of the best and brightest junior faculty members. You will be pleased to know that our junior faculty members are showing strong signs of success in their career development. For example, Dr. Ruchi Bajpai’s innovative work on epigenetic control of human neural crest formation was recently funded with a new R01 grant, which will enable her to lay the foundation for preventing and treating craniofacial birth defects.

Several groundbreaking translational research projects at the Ostrow School are helping us to shape the future of oral health care. We are particularly fortunate to have great partners in the Mrs. T.H. Chan Division of Occupational Science & Occupational Therapy and the Division of Biokinesiology & Physical Therapy, allowing us to create new opportunities for our students. For example, we are very proud of our faculty members, Dr. Sharon Cermak and Dr. José Polido, who have been awarded a grant to study oral health care and sensory sensitivity in children from the National Institute of Dental and Craniofacial Research, National Institutes of Health. This fruitful collaboration demonstrates the success we can have when we work together.

It is our firm belief that exposing our students to the joys and challenges of research is crucial to providing them with added value in their education at USC. In light of the remarkable number of outstanding discoveries being presented today, it is clear that the future looks bright. Please join me in congratulating all of our students and researchers on their successes as we gather to showcase their efforts on Research Day.

Fight on!

Yang Chai, DDS, PhD
Professor
George and MaryLou Boone Chair in Craniofacial Molecular Biology
Associate Dean of Research
Director, Center for Craniofacial Molecular Biology
Herman Ostrow School of Dentistry of the University of Southern California
Charting Neural Crest Cell Differentiation

By Robbie Berger ’16 and Evan Nahigian ’17

The twists and turns that shape the path of life can be sudden, extraordinary and displacing. Dr. Ruchi Bajpai’s path to her current research at the Center for Craniofacial and Molecular Biology at USC is an exemplary account of this. She was educated in India and initially entered university with an interest in mycology. However, Dr. Bajpai’s path veered onto a different course when she encountered the *Drosophila* fly for the first time. It wasn’t the fly itself that piqued her interest. Instead, its novel DNA sequences led her down a path of epigenetic research.

As a graduate student at Jawaharlal Nehru University in New Delhi, Dr. Bajpai co-authored several articles on gene expression in *Drosophila*. After graduating with her Ph.D. from the Center for Cellular and Molecular Biology, she accepted the position of Postdoctoral Fellow at the Burnham Institute in La Jolla, CA. She began working with human embryonic stem cells (hESCs) and multipotent neural progenitors. She studied and researched protocols for developing stable hESC lines that were capable of being tagged by lentiviral vectors. This fluorescent tagging has become a big part of her current research. While at the Burnham Institute, she helped to characterize a new method for rapid and uniform differentiation of hESCs into committed neural precursor cells (C-NPCs). These C-NPCs and neural crest cells offer a promising avenue for current research.

Dr. Bajpai continued her research at the renowned Wysocka lab at Stanford University. Her research centered on neural crest cells and their connection to craniofacial development defects. During the third to fifth week of gestation in human development, neural crest cells begin to rapidly migrate throughout the body. These cells eventually differentiate into various cell types. They lead to the formation of facial bones, teeth, meningeal covering of the brain, Schwann cells, melanocytes, and certain heart structures. A class of proteins called ATP-dependent chromatin remodelers determine whether particular genes are accessible for transcription in particular cells. While a postdoctoral fellow, Dr. Bajpai’s research focused on a particular protein remodeler called CHD7. She discovered that when CHD7 expression was suppressed, fewer neural crest cells migrate during development. Conversely, increasing levels of CHD7 and another distal DNA element, PBAF, have been implicated in the metastasis of several cancers. This groundbreaking research gives hope to the 1 in 10,000 children born each year with craniofacial, heart ear, and growth retardation (CHARGE syndrome) and the millions diagnosed with cancer yearly.

In 2011, Dr. Bajpai accepted a position at the Herman Ostrow School of Dentistry of USC as a principal investigator. Her lab’s main focus is the propagation of human embryonic stem cells, their differentiation into neural crest cells (NCCs),
and the epigenetic machinery that guides this process. The analysis is done by extracting chromatin and RNA and then sequencing with Chip-Seq and RNA-seq. Chip-Seq is used to analyze the protein to DNA binding interactions found in the extracted chromatin. Chip-Seq helps to determine exactly where these proteins bind and is especially useful in phenotype abnormalities or defects like CHARGE syndrome. RNA-seq is used to look at the dynamic process of RNA modification. It can be used to look at exon/intron boundaries, splicing and transcriptional modifications and mutations. It is helpful in identifying mutations outside of the coding region in NCC.

In her lab, Dr. Bajpai cultivates a line of lentivirally transduced hESCs that display fluorescent reporters, ShRNA for knockdown, and cDNA for analysis of epigenetic regulatory sequences in NCCs. These hESC and NCC lines can then be implanted in chicken embryos. Through in ovo signaling cues, neural crest cell differentiation follows. Chicken embryos are an ideal model because they develop outside the body and are accessible for experimental manipulation. She then develops a line of lentivirally transduced neuroblastoma cell lines that display fluorescent reporters, ShRNA for knockdown, and cDNA to evaluate the cancer progression. The cells are analyzed with RNAseq, ChIP-seq, in vitro metastasis assays and in ovo assays.

Dr. Bajpai is a pioneer in the stem cell field. NCC research is promising because it may provide a source for cell replacement therapy. It also provides a model for studying craniofacial disease progression. In addition to her groundbreaking research, Dr. Bajpai runs her lab with ingenuity. She genuinely fosters a positive research and learning environment. She understands her students’ passions and areas of interest and focuses their specific projects to that interest. For example, students with aspirations to be a surgeon are given assignments requiring fine pipetting and small minute detail. Each month, Dr. Bajpai posts quotes for the direction of the lab. This past months quote was “If you don’t try the outrageous you will not achieve the impossible.” Outside of the innovation in her lab, Dr. Bajpai is also active within her community. Each year, she volunteers at her children’s elementary school by bringing in a chicken embryo to give the children a more tangible view of evolution and development. Dr. Bajpai’s tenacity and character showcase her desire to elucidate the truths and wonders that science has to offer.
Dr. Sillas Duarte is a world-renowned dentist, scientist and Chair of the Division of Restorative Sciences at the Herman Ostrow School of Dentistry of USC. Dr. Duarte received his dental education at São Paulo State University in Brazil. Subsequently, he obtained both his Master’s degree and Ph.D. in biomaterials at São Paulo State University as well. Early in his educational career, Dr. Duarte was drawn to research – in particular, to advance the way dental materials are biomimetically adapted to tooth structure. He was particularly interested in the “weak link” between restorative materials and the natural tooth structure, which leads to the degradation of the restoration at the seal of the margin. During the beginning of his second year of dental school, Dr. Duarte delved into research on dental biomaterials. With his Ph.D. in hand, Dr. Duarte came to America and further advanced his education with post-doctoral training at the University of Minnesota. After his postdoctoral training, Dr. Duarte taught at Case Western Reserve University in Cleveland, Ohio. Due to the high quality of his research and overall prominence in the field, Dr. Duarte was personally recruited to teach at the Herman Ostrow School of Dentistry by our very own Dean Avishai Sadan.

Currently, Dr. Duarte spends most of his time researching bonded dental materials, dental adhesive systems, ceramics and composites. One of
his current avenues of research is analyzing the bond between adhesive systems and dentin. Dr. Duarte has shown that particular areas at this interface are highly susceptible to hydrolysis, which over time causes expansion and results in decreased bonding strength with small spaces of 10-15 nanometers opening up in the damaged interface. Hydrolysis has been determined to be the main cause of failure of these interfaces. Dr. Duarte’s research is focused on delaying this process. Crucially, he realized that both the material and the tooth itself contribute to the hydrolysis. The hydrodynamic movement of water inside the tooth and the water present within the collagen matrix compete with polymerization, resulting in poor infiltration of the adhesive and subsequently a weaker bond. Dr. Duarte’s team works tirelessly to come up with cutting edge solutions to this problem. One solution that is being considered is incorporating hydrophilic materials into the adhesive to help delay hydrolysis. The addition of antibacterial materials might also help forestall secondary decay by preventing the development of bacterial colonies. These antibacterials will aid in the protection of the interface, even when an ideal seal is not achieved.

Dr. Duarte is the Editor-in-Chief of Quintessence of Dental Technology (QDT), a prestigious annual publication on esthetic dentistry. He became involved with QDT during his graduate studies and became Editor in 2009. Dr. Duarte is the 3rd editor of QDT, following in the footsteps of the previous editor, Dean Avishai Sadan. QDT is renowned for publishing the top clinicians in the world. Its mission is to present the most innovative, cutting edge, and current research and clinical findings in esthetic dentistry. Publication in this publication is selective, and all articles are reviewed for relevancy and accuracy. Some of the most current advances in dentistry, such as full-mouth esthetic rehabilitations, veneers, CAD/CAM, and implants, are topics within QDT’s scope. The State of The Art section in QDT highlights the most impressive innovations in esthetic dentistry each year. The publication also includes a yearly biomaterials update that describes the pertinent chemical and physical properties of the newest biomaterials. QDT not only targets the clinician but also lab technicians and related specialists. Some of the articles published by USC authors in QDT in recent years explore smile modification and CAD-CAM.

Here at USC, there are currently eight residents in the Master’s degree program in operative dentistry, with four new residents entering per year. The residents are trained and then assigned to specific research topics. Some of the topics currently being investigated are optical properties of ceramic and composite restoration materials, CAD-CAM dentistry and adhesive interfaces. The optical properties of a material being investigated include its opalescence, fluorescence, translucency and value.

Dr. Duarte explains that his interest in doing something valuable with his hands coupled with his desire to create led him to dentistry and biomaterials research. A major interest of his outside dentistry is photography. In photographing his dental work, he found that he wanted to improve his technical skills and knowledge in photography. This led him to study landscape photography, which presents a new set of challenges regarding composition and lighting. Dr. Duarte is a pillar of the USC dental community and we are beyond fortunate to have such an innovative trendsetter as the figurehead of our Division of Restorative Sciences.
LOS ANGELES – With a welcomed return to Southern California, Dr. Natalie Tung, DDS, MD, is a valuable new addition to the revamped USC Oral and Maxillofacial Surgery program, led by Dr. Mark Urata, DDS, MD. With her appointment as the pre-doctoral Oral and Maxillofacial Surgery (OMFS) clinic director, Dr. Tung has inspired many students with her dedication to education and commitment to clinical excellence. After earning her Bachelor of Arts degree with honors at the University of California, Berkeley, she completed her dental education at the University of California, Los Angeles, where she received her DDS degree with Magna Cum Laude honors. Dr. Tung then matriculated into Harvard/Massachusetts General Hospital’s combined six-year OMFS-MD residency.

Dr. Tung states that “[Harvard/Massachusetts General Hospital] is one of the most challenging training programs and provides full-scope OMFS training. In particular, we performed many surgeries on facial trauma, orthognathic, TMJ, head and neck infections, pathology, pediatric anomalies, and minimally invasive oral and maxillofacial surgery such as distraction osteogenesis, sialoendoscopy, and endoscope-assisted condylar fracture repairs.” Dr. Tung brings her experiences to the pre-doctoral clinic and her broad scope of practice to the clinic floor. Her commitment to comprehensive patient care has proven to be a refreshing change amongst rotating students as they gain exposure to the field of OMFS. “My focus is definitely dental students. Even though many students will not become oral surgeons, I want them to be comfortable with dentoalveolar procedures and to know the scope of practice of an OMFS surgeon. Besides putting emphasis on improving the oral surgery rotation for the students in general, I am also dedicated to improving the Oral Surgery Selective for those interested in OMFS and to better prepare them as applicants for residency.” Dr. Tung further stresses her commitment to providing USC students with an advantage when applying to the highly competitive specialty, stating, “We will and should match more USC students into OMFS residency programs.”

OMFS has a rich history and continues to attract students with a passion for the medical and dental management of orofacial injuries, pathology, and developmental deformities. With current developments in contemporary medical technology, Dr. Tung is confident that future OMFS residency programs will incorporate exciting innovation to their respective curricula – namely, minimally invasive surgeries and 3-D printing technology. Dr. Tung notes, “In the future, I can see OMFS residents doing more minimally invasive procedures such as those involving the use of endoscopes and smaller incisions. In addition, 3-D treatment planning for orthognathic surgery and reconstruction will become the standard of care, and residents most likely will no longer be doing much actual model surgery as that would be done on the computer.” 3-D printing and medical modeling have advanced in both dentistry (CAD/CAM) and medicine. Historically, a surgeon would have little time for preoperative preparation – the practitioner would resort to planning osteotomies and plate-bending reconstructions intraoperatively. Now, a 3-D computed tomographic (CT) image can be rendered on a computer to reconstruct the orofacial structure. From this reconstruction, a 3-D model is printed and surgical cutting guides are fabricated for resection. Remarkably, the reconstruction plate can be bent preoperatively for precision. This allows for substantially reduced intraoperative time, as surgeons will no longer have to bend plates in the operating room. Rather, they simply
make small modifications to pre-bent reconstruction plates as necessary. Moreover, using preoperative anatomy can help streamline preoperative and postoperative esthetics and symmetry, allowing for more predictable outcomes. Current limitations in this technology exist in both duration and time; there is a long manufacturing time and a substantial associated cost. However, as mentioned, these limitations can often be offset by increased intraoperative efficiency.
Access to dental care for young children remains a problem in California and throughout the United States. The lack of access to dental care among disadvantaged children contributes significantly to their poor oral health. In 2000, the U.S. Surgeon General reported that underserved children face a “silent epidemic” in oral health, with dental caries being the most common chronic childhood disease. According to research by Drs. Roseann Mulligan, Hazem Seirawan, and Sharon Faust of the Herman Ostrow School of Dentistry of USC in 2011, nearly three out of every four underprivileged children from the 2-5, 6-8 and 14-16 year old age groups in Los Angeles (LA) County have untreated dental decay, with 81% of children needing dental care. A follow-up study in 2012 reported that children with tooth pain are almost 4 times more likely to have a low grade point average. Moreover, 58 and 80 school hours are missed due to dental problems annually per every 100 elementary and high school students, respectively, with the sample’s parents averaging 2.5 absent days from work or school per year due to their children’s dental problems.

Dr. Mulligan and her research team are the first to publish a comprehensive report of dental caries among disadvantaged children of LA County investigating the associated social determinants of oral health. The study describes the physical and psychosocial barriers that prevent this population from seeking early dental education, prevention and treatment, which include the knowledge, cultural and behavioral patterns of underserved populations (such as the lack of dietary and dental education, transportation, and childcare). Furthermore, this study was instrumental in identifying the correlation between dental pain (due to neglect, unawareness, and lack of access to dental care) and performance in school.

To help reduce these barriers, the Children’s Health and Maintenance Program (CHAMP) was developed. The Herman Ostrow School of Dentistry of USC was awarded an $18.4 million grant from First 5 LA, a non-profit
organization that allocates state tobacco tax revenues to fund health care, education and child development programs for children up to age 5. Other dental schools in the County were also recipients of First 5 LA grants, with USC having the most ambitious goal: to care for the dental health needs of over 45,000 children in the East LA, Central LA, South LA and South Bay regions over the next five years.

CHAMP is now in its second year of operation. The USC CHAMP team is composed of a diverse group of USC faculty, staff, and students including dental and health care professionals, “promotoras” (primarily Latino health educators), and social workers (unique to the USC CHAMP model). These teams visit Women, Infants and Children (WIC) centers, Head Start centers, day cares, and other community facilities throughout LA County to provide dental screenings, oral health education, and other community resources to families of children 0 to 5 years of age. In addition, teams assess dental treatment needs, assist families enrolling in insurance programs and finding dental homes, cooperate with community dental centers in order to provide dental care under sedation, and train dentists and other healthcare professionals in providing preventive services and dental care to very young children. Although CHAMP currently stands as a 5-year service project and research model, CHAMP administration is looking forward toward the project’s sustainability. USC is working on a model of billing DentiCal for preventive dental services in the field in order to keep the CHAMP project sustainable after the grant terminates in February 2018.

One of the main reasons for the high prevalence of poor oral health in underserved children is lack of dental knowledge and awareness. “We want families to change their behavior and know that going to the dentist on a regular basis is good for prevention of disease, instead of going only when it hurts,” states USC CHAMP Program Administrator Eleanor Aguilar. Many parents are unaware that establishing good oral habits even for primary teeth is critical for the developing dentition and for overall health. Once parents are informed and educated about oral health care, the hope is that regular well-baby visits will include regular dental visits as soon as the first tooth erupts.

The heart of CHAMP is raising awareness through dental care outreach and education. Ms. Aguilar reports that CHAMP has already developed community relationships and partnered with 9 federally qualified community centers in order to provide medical and dental services for CHAMP participants. USC CHAMP is also expanding to provide direct restorative services every year to approximately 800 children in foster care who receive medical care through the Violence Intervention Program (VIP) at LAC+USC Medical Center. Furthermore, USC has added two additional spots in its postdoctoral pediatric dentistry residency program with the goal of inspiring more students to enter the specialty and to improve care the underserved community of LA County. Dr. Mulligan emphasized the importance of using this multidimensional approach in order “to promote oral health and reduce the individual and societal burden of dental caries in LA county.”

To learn more about USC CHAMP, visit www.champ-usc.net.
Collaboration in Oral Health Research

By Kristine Hong '16, Catherine Tan '16, and Rasha Dubuni '18
In today's world, we have become accustomed to having a wealth of knowledge easily accessible to us online. We can communicate with our peers and colleagues locally, nationally, and globally with only a few keystrokes. Imagine the days before everyone had his or her own email address, when the Internet was something that was not yet used by students or dental professionals. Jane Forrest, RDH, EdD, saw the potential of the then-novel invention called the World Wide Web and wanted to use it to expand research collaboration to improve practice both here at the Herman Ostrow School of Dentistry of USC and nationally, through the National Center for Dental Hygiene Research & Practice.

The Herman Ostrow School of Dentistry is yet again a pioneer in the dental field though its curriculum that teaches students to access scientific information efficiently, enabling these future clinicians to make informed decisions using an evidence-based decision-making (EBDM) process when treating patients. Dr. Forrest has been dedicated to bringing evidence-based dentistry to the clinic since 2000, when she first received a federal grant to integrate EBDM into the dental hygiene, occupational therapy and physical therapy curricula. Here at USC, all of the DDS students know her well as an excellent resource on how to become an evidence-based clinician. She teaches the Evidence Based Dentistry and Behavioral Dentistry modules, in which students practice effectively utilizing web-based scientific databases, such as PubMed, as research tools. Using evidence-based research can have extensive clinical applications, improving the clinician's ability to decide which innovative new techniques or procedures to practice, which dental materials to use, or which oral hygiene products to recommend for maximum efficacy. Today, evidence-based knowledge and skills are required standards for both dental and dental hygiene education as identified by the ADA Commission on Dental Accreditation and the ADEA guidelines for entry into the professions. Dental schools are responsible for teaching students how to stay up-to-date with new technology, current research, and scientific findings in order to provide the most appropriate treatment for patients. The EBDM process also serves as the foundation for becoming a good consumer of the research literature and a life-long learner.

This emphasis on highly valuable research skills was initiated through a federal grant which established the National Center for Dental Hygiene and Practice (NCDHRP) in 1993. As part of the grant, 20 teams comprised of clinicians, educators and researchers from universities throughout the country were formed. Together, these teams attended a Summer Research Institute program to learn how to conduct theory-based research.

Dr. Forrest has continued to advance this mission as the Director of the NCDHRP. The online home base for the NCDHRP is the DHNet, which serves as a central repository, providing reliable resources for dental professionals and students alike to access a broad range of topics on education, research and practice. One aspect that currently is being updated is an interface, known as a research collaboratory, to facilitate discussion and sharing of research among colleagues. Dr. Forrest created the DHNet with a special interest in building a research community of dental hygienists to improve the oral health of the public and to promote the translation of research evidence so that it is meaningful and useful in dental hygiene education and practice.

Dr. Forrest and Dr. Ann Spolarich, the NCDHRP's Associate Director, have been integral in building and fostering the research community through organizing three North American/Global Dental Hygiene Dental Research Conferences since 2009, strategically in Bethesda, MD, close to the NIH. The most recent conference in October 2014, “Beyond the Boundaries: Discovery, Innovation and Transformation,” provided an opportunity for dental hygiene researchers from throughout the world to convene and explore commonalities in their research interests, learn from each other about new and ongoing research programs, and foster future collaborations. Forrest and Spolarich also coordinated a pre-conference meeting of the American, Canadian and International Dental Hygiene Association's leadership to discuss strategic plans, research priorities and how to coordinate research efforts in a purposeful way using the limited resources of each individual association.

Dr. Forrest has been on the cutting edge of sharing knowledge and the dental community should continue to look to her for future innovations advancing education and practice through research collaboration.
KEEPING IT SIMPLE
REINVENTING THE SURGICAL STENT

BY PAYAL PATEL ’16 & TIFFANY LEE ’16

Figure 1. Frontal view of the surgical stent

Figure 2. Occlusal view of surgical stent with voids where contact exists between teeth.
Technology is rapidly growing and developing, drastically changing our everyday lives. Dr. Ryan Hungate, a third-year orthodontic resident at the Herman Ostrow School of Dentistry of USC, is in the vanguard of utilizing technology to make everyday practices more efficient.

Dr. Hungate observed that dental school clinics were plagued with inefficiencies. Students were constantly removing gloves or going back and forth between the computer and their patient. He also found that doctors spend anywhere from 30-50% of their day accessing their electronic health records. To combat this, he brainstormed ways to create a computer-interface that increases chair time efficiency. Two years ago, when the concept of Google Glass was revealed, he finally thought it was feasible. He worked with Dr. John Pham and Vince Nguyen to integrate Google Glass with different dental software to improve existing electronic health records. They pitched the idea to a Google competition, which provided them with Google Glasses to initiate their project. Comparing it to the Marvel Comic’s “J.A.R.V.I.S.” from Iron Man, Dr. Hungate described this system as voice activated, capable of displaying the dentist’s schedule, chart, x-rays or patient demonstration videos on demand, and coordinated by chair location. In the future, the system will even help to dictate patient notes. Dr. Hungate and his partners named this system “ARO.” It can be integrated with all wearable devices like the Android and Apple watches. Through clinical trials in different private practices, they found that with ARO, practitioners could see six patients in the time it normally takes to see five patients. Continuing the innovation, ARO and Google Glass are being combined with dental loupes to reduce cross contamination and eliminate the nuisances that come with wearing loupes. This includes hands-free, voice activated light control and easy removal of the magnifying lens. Incorporating a small wirelessly charging battery behind the neck also eliminates the hanging light wire. With the advent of ARO, Dr. Hungate is making a positive impact on practice management. He has championed the concept of improving workplace efficiency throughout his tenure in residency.

Another aspect of orthodontics he aims to improve upon is the disconnect between oral surgeons and the referring orthodontists. Dr. Hungate noticed that often orthodontists would refer a patient for orthognathic surgery, only to find the final results less than ideal. The traditional surgical stent used to guide the placement of the jaws during surgery (Figure 3) creates an open bite, making it difficult to see if the teeth are seated correctly into the stent. This can lead to post-surgical malocclusion. Discrepancies in the teeth seating in the stent translate to discrepancies in the outcome of the orthognathic surgery. Such deviation from the predicted surgical outcome leads to unnecessary modifications in the orthodontic treatment and increased treatment time post surgery. Utilizing the same 3D printers that fabricated the traditional stents, Dr. Hungate designed a stent that fills in the negative space. Dr. Hungate described this negative space as the space that exists outside of normal tripodization contacts when teeth are in occlusion. He created a stent that allows for proper occlusion and therefore increases the accuracy in seating the teeth and jaw positioning during orthognathic surgery (Figure 4). Working in conjunction with Dr. Robert Relle, an oral and maxillofacial surgeon, and Dr. Dan Grauer, a faculty member in the USC orthodontics department, they applied this stent in six orthognathic surgery cases. They found a up to a three-fold increase in the accuracy of the immediate postoperative occlusion. This increased accuracy leads to a more predictable and ideal result, which in turn, facilitates a more efficient post-orthodontic treatment. Prior to this idea, rigid fixation with braces and rubber bands were placed for surgery. However, with the improved accuracy of the new stent, braces can be removed prior to surgery for increased patient comfort and to harness the rapid acceleratory phenomenon postsurgery. This phenomenon entails taking advantage of the physiology of swelling and inflammation after surgery to orthodontically move teeth faster. The predictable result through the use of this stent makes it feasible to produce Invisalign trays ahead of time and place them two weeks post-surgery. This represents an advantage over the six weeks that would normally be required post-surgery for the conventional maxillomandibular fixation wire method. Dr. Hungate hopes that the advent of this new 3D printed stent will simplify the technique for oral surgeons and therefore facilitate orthognathic treatment options for more patients.

Throughout his endeavors as an orthodontic resident, Dr. Hungate has incorporated new ideas with existing technology and materials to simplify dental practices. His goal in creating such innovations is to improve the dental experience for patients and increase efficiency for practitioners. With the innovations of ARO and the newly formulated stent, he made it possible for patients to spend less time in the chair and be provided with the most predictable treatment possible.
Dr. Zadeh (5th from the left) poses with his advanced periodontal residents and colleagues.
Dr. Homayoun Zadeh is the Director of the Postdoctoral Advanced Periodontology program at the Herman Ostrow School of Dentistry and the Laboratory for Immunoregulation and Tissue Engineering (LITE) at USC, and also maintains a private practice. Dr. Zadeh was initially attracted to the field of periodontology due to its strong biological involvement, vital research integration, and ability to provide comprehensive care. A leading researcher in periodontology for decades, his current focus within the Department of Periodontology at USC is bone regeneration and the pathophysiology of biofilm-induced infection, along with the resulting immune response such infection produces in the host.

What separates Dr. Zadeh from most periodontists is his passion to contribute to the evolution of the specialty through clinical research. Dr. Zadeh reports that “the basis of clinical practice is scientific evidence that is provided, but at the same time if you are a clinician and treating patients, you are in the best position to identify what are the significant problems that you have in your field. I think when one individual is involved with both the clinical and scientific area, then you have the insight into what areas of scientific questions should be pursued.” Much like other dental specialties, periodontology has undergone significant advancements in the last few decades. At the start of Dr. Zadeh’s career, a time when understanding basic pathogenesis and etiology was heavily emphasized, biological concepts were the focus of the department. Today, these findings are being utilized in patient care at USC’s Advanced Periodontology clinic, with the ultimate goal of better long-term outcomes for patients. An example of these advancements that Dr. Zadeh has been overseeing involves using a number of growth factors, such as platelet-derived growth factors, which have been developed and approved for periodontal regeneration. Enamel matrix derivative, a product of the research done at the Center for Craniofacial Molecular Biology at USC, is another growth factor being studied within the periodontal department that has shown great potential. Dr. Zadeh describes research as “one of those aspects that once you get involved and you really have an understanding of what the process involves, it can actually infect you with a bug that gets you really hooked.”

Dr. Zadeh has recently collaborated with his colleague, Dr. Casey Chen, to develop a novel technique for tissue regeneration. The conventional approach for tissue regeneration involves introducing exogenous growth factors to a specific region to mediate a certain function. Once this function has been established, the growth factors are no longer required and slowly diffuse out of the tissue. This technique, although well-established, is not practical, as it requires large amounts of growth factors which are very costly. The solution that Dr. Zadeh’s team has developed involves the utilization of antibodies that attract endogenous mediators, such as bone morphogenic protein 2 (BMP-2), to promote the healing process. The antibodies capture and concentrate BMP-2 that is naturally produced by the body, holding it in position to mediate bone repair. This therapeutic approach has been has been tested on a number of pre-clinical animal models, and so far the results have been promising. The USC Advanced Periodontology department hopes to apply this revolutionary treatment in a clinical setting in the near future. Dr. Zadeh’s enthusiasm for research is apparent as he explains that “once you see how the clinical and the research and the scientific side can really go hand in hand, that’s what makes it quite exciting, to see that one can feed into the other.” Moving forward, Dr. Zadeh and his research team will be working with an animal model to study the pathogenesis of biofilms associated with peri-implantitis.

Clinically, the field has made tremendous strides as well, using technologies that periodontists could not have imaged a mere ten years ago. “With the many advancements in digital technology, this is a great time to be a clinician,” says Dr. Zadeh. He further states that “from the time of examination, diagnosis, treatment planning, and to the point of surgery and restoration, there are a variety of new tools available.” One example is the traditional use of study casts poured in dental stone, which has been a hallmark of diagnosis and treatment planning throughout the evolution of modern dentistry. Through the integration of computer software and oral scanners, teeth can now be modeled and manipulated in a digital environment to fit both the clinician and patient needs. Incorporating these different technologies has allowed novel approaches to provide basic periodontal care as well as complex surgical procedures. Upon treatment planning a dental implant, periodontal faculty and residents can import the patient’s existing tooth structure into their own personalized cone beam computed tomography (CBCT) scan. This is especially useful since CBCT scans do not accurately and predictably duplicate teeth that have been restored with metal, often generating a scattered appearance. Merging the digital study casts with the CBCT ultimately provides a view of the teeth and the surrounding structures that is ideal for periodontal treatment planning. This three-dimensional imaging technique allows for greater evaluation of the patient’s anatomy, bone contour, and existing pathology prior to any surgical intervention. Aside from allowing the clinician and patient to visually anticipate potential pitfalls of the treatment, more and more patients can now take a hands-on approach in developing their overall periodontal treatment plan. By having the entire treatment process managed in a digital environment, ultimately the goal is for these tools to be used by all dental professionals for a more efficient collaborative input.

Although there have been exciting technological advancements in the field and vast improvements in clinical outcomes, what Dr. Zadeh finds the most satisfying in his profession is sharing his knowledge and experience with the talented residents within his department. He believes that “the most rewarding aspect is working with the residents who are in training. They are the future of our profession and they are the ones who will be the beneficiary of the research that is being done, and the technical developments that are taking place.” The residents within the Postdoctoral Advanced Periodontology program at the Herman Ostrow School of Dentistry of USC are fortunate to have such an esteemed colleague and mentor.
According to the Centers for Disease Control and Prevention (CDC), it is estimated that over 1.1 million people live with the Human Immunodeficiency Virus (HIV) while 50,000 people are newly infected each year. More than 6,400 individuals were diagnosed with HIV in California alone in 2010. Los Angeles is the most populated metropolitan city in California and, as of 2012, has 45,474 people living with HIV/AIDS (PLWHA)—making Los Angeles home to the second highest population of PLWHA in the US. Of course, this statistic only represents diagnosed cases of HIV/AIDS. It is estimated that approximately 18% of HIV-positive individuals are undiagnosed and contribute 3-7 times more to transmission of HIV than individuals aware of their HIV-positive status. The search for this undiagnosed fraction of PLWHA should be the goal for all dental and healthcare professionals alike in order to lower new HIV infections.

Fortunately, Drs. Piedad Suarez-Durall, Phuu P. Han and Lisa Hou of the Special Patients Clinic at the Herman Ostrow School of Dentistry of USC are able to share their insights into how the dental office can become a key player in the diagnosis and treatment of HIV. Dr. Suarez-Durall, Assistant Professor of Clinical Dentistry and Section Chair of Geriatrics and Special Patients explains, “Early detection of HIV infection provides an opportunity for transmission reduction and lifesaving treatment strategies.” In addition to its resistance against the human body’s immune system, HIV’s success in establishing itself as one of the most infectious diseases in human history can be attributed to the population of HIV-infected individuals who are unaware of their seropositive status. This fraction of PLWHA is several times more likely to transmit HIV, which not only increases the population of unaware HIV-positive individuals but also creates a safe hiding place for the virus. Therefore, an effective strategy to lowering the number of new HIV infections is to make everyone aware of their HIV status. While it may appear as a simple task, there are still various barriers, such as access to healthcare and social stigma, which perpetuate HIV’s presence in our communities.

The Special Patient Clinic sees the dental clinic as the perfect opportunity to address these problems. Dr. Phuu P. Han, Assistant Professor of Clinical Dentistry, reveals that the clinic embodies “the international theme for World AIDS Day…set out by the Joint United Nations Programme on HIV/AIDS (UNAIDS)—‘Getting to Zero’—[which aims for] zero new HIV infections, zero discrimination and zero AIDS-related deaths.” Social stigma remains as a two-way street because HIV positive patients become afraid of discrimination in the dental office while dental practitioners are reluctant to treat HIV patients or even offer rapid HIV tests in their practice. However, according to a 2011 survey conducted at the USC School of Dentistry, of patients who have not been tested before for HIV, 62.6% were willing to be tested in a dental visit. In addition, a third of graduating dental students were willing to perform rapid HIV testing in one study. Despite these mutual positive attitudes, dental practitioners end up not implementing these services due to a lack of education and patient management skills. Dr. Lisa Hou, Assistant Professor of Clinical Dentistry, explains, “Because of the lack of exposure, students are often wary about treating patients with HIV. Therefore, students should be educated in safe treatment and any potential dental modifications to remove any sense of doubt or lingering stigma associated with HIV. After the Special Patient Clinic, students understand how various complex medical conditions affect oral health and gain confidence in managing these patients accordingly.” By exposing students to HIV-positive patients, the Special Patient Clinic hopes to desensitize students to any HIV-related fears they may have and make them more comfortable discussing HIV and treating oral conditions associated with HIV. Dr. Han summarizes, “Education, building trust and having open communication with the patients are great ways of enhancing dental care for HIV/AIDS patients.”

Currently, HIV-positive patients treated in the Special Patient Clinic are sponsored by programs under the Ryan White Grant—the largest federal program to help PLWHA gain access to appropriate healthcare services. As part of their access to medical care and medications, patients covered by this grant are required to obtain dental care because the oral cavity provides a reservoir of opportunistic pathogens and a site for several HIV-related morbidities. “HIV/AIDS patients are considered to be immunocompromised and as dentists, we should watch out for potential comorbidities associated with the disease,” says Dr. Hou. “In addition to oral hygiene, dental students are expected to educate patients on HIV-associated oral conditions so that they can be on the lookout.”

Fortunately, patients who are funded by the Ryan White Grant have access to medical care and highly active antiretroviral therapy (HAART) medications. As a result, dental practitioners rarely see these conditions because the patients’ viral loads are low and their CD4 counts are at a competent level. Outside of the special patients clinic, however, dental practitioners often encounter patients who are already diagnosed and medically treated. For dental professionals, it is therefore important to be on the look out for these lesions in all patients, since there are HIV-infected patients who are unaware of their status or have had their status change without their knowledge. In regards to the unaware or uncontrolled...
patient, Dr. Han explains, “The most common oral lesions seen in HIV/AIDS patients are different types of Candida infection, especially the pseudomembranous type. Linear gingival erythema, acute necrotizing ulcerative gingivitis and acute necrotizing ulcerative periodontitis are also oral lesions found in patients with low CD4 counts.” Additionally, herpes simplex, cytomegalovirus and herpes zoster outbreaks are associated with low CD4 count. It becomes the duty of dental care providers to be aware of these particular lesions associated with low CD4 counts and to be suspicious of their patients’ current HIV statuses. Patient management also becomes a crucial tool, since as Dr. Suarez warns, “not all infections are specific of HIV patients which is why you have to be careful in the way that [dental practitioners] approach the patients and determine if the patient is at high risk to acquire the condition.”

If clinical judgment suggests that the patient may have HIV, then the dental visit becomes an opportunity for the dental professional and patient to discuss HIV and the patient’s current medical status. In fact, a 2005 National Health Survey revealed that 50% of patients who had not seen their primary doctor in the previous year disclosed that they had seen an oral health provider in the same time frame. Therefore, dental practitioners have an even greater potential to aid in the diagnosis of HIV. Oral health providers can refer patients to the appropriate resources, such as testing facilities or their physicians, or offer rapid oral HIV testing in their office. While providers may feel skeptical about offering HIV testing to their patients or the reliability of the tests, these are outdated fears. As previously mentioned, two thirds of patients who have not previously been tested for HIV have expressed a desire to undergo testing. In addition, rapid oral HIV tests such as OraQuick Advance have shown remarkable sensitivity levels (>98%) that rival the standard serum enzyme immunoassays. As a model practice, the Special Patient Clinic has partnered with the Dental Hygiene Clinic to offer free rapid oral HIV testing for patients. Staff members Carolina Maradiaga and Jaime Montoya have been conducting the HIV tests for willing patients since September 2013. The OraQuick Advance Rapid HIV-1/2 Antibody test is currently used in the clinic and only takes 20 minutes to produce results. If patients test positive, then a second test is conducted to eliminate false positives. Patients who test positive in the Dental Hygiene clinic are referred to resources such as their physician or HIV counseling programs. Whether a patient is considered to be at high risk or not, “the ability to offer HIV testing in the dental setting breaks down misconceptions between students and patients,” says Ms. Maradiaga. Both the Special Patient and Dental Hygiene Clinics hope to further improve the HIV testing program to navigate through this intersection of HIV and oral health.

Unfortunately, HIV is still surrounded by many fears and is not traditionally addressed in the dental office. However, the presence of HIV-associated oral lesions and the patient’s immunocompromised medical condition manifest are important for dental professionals. Oral health providers have the unique opportunity to work with both diagnosed and undiagnosed HIV-positive patients. The Special Patient Clinic aims to place oral health providers at the forefront of diagnosis and treatment for HIV patients as their contribution to ’Getting to Zero.’
As dental students, we are often overcome by the immense load of laboratory work or juggling patient treatments and get caught up in the daily hectic routine of dental school. Students tackle the demands of a dental curriculum by mastering biomedical sciences, preclinical laboratory classes, and patient procedures, and by preparing for national exams. The Herman Ostrow School of Dentistry teaches its students to ask questions constantly and seek the answers to our curiosities in a problem-solving environment. The School has developed and successfully maintained this learner-centered approach to education for many years. Other schools mimic this learning style, yet USC maintains its reputation at the top. The problem-based academic education combined with clinical hands-on skills place students in an environment that values and nurtures both critical thinking and practical abilities. These skills can be directly applied to upcoming research projects in dentistry. Cutting edge research in areas such as oral biology, craniofacial molecular biology, and tooth morphogenesis has led to innovative technologies and the discovery of new ideas. Although students may hesitate to become involved in research amongst their numerous other responsibilities, research at USC can foster an environment for students to develop laboratory and critical thinking skills while gaining opportunities to present innovative projects both nationally and internationally.

The Summer Research Fellow Program offers a unique opportunity for incoming DDS students to participate directly in high-quality research alongside renowned research professors, prior to their freshman year. This program began in 2010, and was created by the Associate Dean of Research with the aims of helping new students develop an interest in research experience and providing an introduction to the wider academic side of dentistry by integration of research. Mark Choe, a current first year dental student, completed this program last summer and expressed, “it adds another dimension to dental school that most students don’t get to experience. It helps to sharpen your mind and reinforce some of the essential topics that are discussed in science today.”

Students who enter the program come from a wide variety of backgrounds. The D.D.S. program boasts one of the most varied student demographics in the country, both in terms of cultural and academic backgrounds. The Summer Research Fellow Program aims to tap into this diversity and offers incoming students from any background the opportunity to participate in high quality research as well as insight into the often-overlooked field of academic dentistry.

Whereas some students have been involved with research since high school or college and are looking to continue their passion while in dental school, many others have no prior research experience and apply simply because it provides an opportunity to act on a long-time personal interest. Weston Grimes, a first year dental student who was a Summer Research Fellow in 2014, already had three years of research experience in molecular biology. He stated, “I wanted to get a better understanding of the new areas being pursued within the dental community and how I could participate with research in the future.” Those who are accepted into the program work closely with faculty and may be considered for future research training. Fellows whose interests continue to expand during the program may begin to consider careers in academic dentistry or explore graduate programs in the biomedical sciences, options that are often overlooked by prospective dentists.

Recruitment for the program begins as part of the welcoming information package for incoming D.D.S. freshmen. In early spring, applications to the Summer Research Fellow Program are sent out to students who have accepted their offer of admission to the Ostrow School of Dentistry. Applications are due by the end of
By Paulina Nguyen '18 and Brent Roberts '18

the spring trimester. Accepted applications are passed on to faculty who are interested in having Fellows help with their current research projects. Students are expected to commit to ten to twelve weeks of full-time research work, in addition to any required training and certification that may be required. The program starts in the beginning of summer and runs until the middle of August just before orientation week for dental school. Approximately four to five students are accepted per year and placed into research centers such as the Center for Craniofacial Molecular Biology, the Oral Biology Group, and the Center for Esthetic and Biomimetic Restorative Dentistry.

By the end of the program, students have gained insight into the world of academic dentistry, and have the option to continue research on either ongoing or new projects. The program serves as a stepping stone for students who wish to become involved with academic dentistry. Students also receive credit for publications to which they have contributed, and have the opportunity to present their findings at the Herman Ostrow School of Dentistry of USC’s Annual Research Day, as well as at national and international conferences. The Summer Research Fellow Program is an excellent starting point to gain new skills as well as a new perspective on the importance of one’s own contributions to the scientific and dental communities.

For students who may have missed the application deadline or are trying to determine whether to apply for next year, there are presentations every Friday on USC’s Health Sciences Campus at the Center for Craniofacial Molecular Biology that are open to students. At these events, current graduate students defend their theses, and both USC-based and visiting researchers present their work in progress. Occasionally, there are also video conferences with groups at other top universities. Potential, future, and current students interested in more information about the Summer Research Fellows Program can contact Donna Castillo at: dvcastil@usc.edu.
Imagine conducting a population study of Los Angeles and trying to compare how much money people make, where they live, their age distribution, and other variables. After collecting the necessary information from individuals, this data is aggregated and usually averaged to provide a quick glimpse of the overall population. Yet, some of the individuals could have a very different status from the average. For this reason, considering only the average individual could be misleading in dictating public policy.

The same logic can be applied to the study of cell populations, especially in considering highly heterogeneous populations such as tumors or developing tissues. Traditional methods for molecular profiling of cell lysates (which represent a mixture and physical average of the cell populations) measure only the average parameters of a cell population. Such results cannot recognize the differences among individual cells. Instead, the data are interpreted under the assumption that all individual cells are well represented by the average. It is increasingly evident that this assumption is not true and that there are certain levels of heterogeneity present in cell populations. Focusing on elucidating this heterogeneity, Dr. John Zhong and his lab have developed and optimized microfluidic devices to profile individual cells.

In one study, Dr. Zhong’s group performed single-cell molecular analysis to isolate whole genome transcriptomes from individual cells within a heterogeneous population of mesenchymal stem cells. Mesenchymal stem cells have intriguing applications in regenerative medicine because of their ability to differentiate into different types of tissues. Thus, accurate molecular characterization of these cells is desirable to pinpoint cells with varying developmental potential in a population. By comparing the single cell mRNA expression profiles at consecutive developmental stages, Dr. Zhong’s group is able to classify different cells into molecular subpopulations. The hope is that these subpopulations can serve to characterize cells in the absence of known biomarkers.

Another area of application of Dr. Zhong’s work is in the clinical diagnosis of cancer. A tumor represents a heterogeneous population of cells possibly with mixed origins and with varying propensities to metastasize. The diagnostic goal in analyzing single-cell transcriptomes is the ability to identify expression signatures in circulating tumor cells which are rare in blood and use these to dictate prognosis and treatment. This process would not only clarify diagnosis of tumors, but also allow for collection of samples via a blood draw, a minimally invasive procedure.

For Dr. Zhong, the upcoming move from the Zilkha Neurogenetic Institute to the Herman Ostrow School of Dentistry of USC represents a chance to explore a new avenue of applications for single cell studies: microbiology. After setting up his new lab, Dr. Zhong hopes that future collaborations at the Ostrow School will facilitate exploration of single cell molecular profiling in the context of microbial pathogens such as HIV and oral bacteria as well as cancer biology.
2015 marks the first Research Day for the newly named USC Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy, one of eight academic divisions housed at the Ostrow School of Dentistry of USC. In September 2014, USC Trustee Ronnie C. Chan MBA ’76 and his wife, Barbara, dedicated $20 million to the pioneering occupational science and occupational therapy program. Given in honor of Chan’s mother, the gift, which endowed and named the division, was the first of its kind and largest ever made to any occupational therapy program in the history of the field.

“My family and I are pleased to provide a third major gift to USC — in this case to support the cutting-edge work of the most influential division of occupational science and occupational therapy in the world and to honor my mother who worked for many years as a nurse,” Chan said. “I am grateful for the opportunities that USC afforded me and my sons, and our gift to the division is one of several ways we intend to continue supporting USC in the future.”

The gift represented a significant milestone for the division, which has accumulated a long list of firsts since occupational therapy education began at USC in 1942. The division established the nation’s first two-year, entry-level master’s degree program in occupational therapy and first post-professional degree program in occupational therapy. It is also internationally renowned for establishing the world’s first Ph.D. program in occupational science. Since U.S. News & World Report began ranking occupational therapy educational programs in 1998, USC has held the No. 1 spot for 13 years — more years than all other programs combined.

“This historic endowment gift ensures the USC Mrs. T.H. Chan Division’s prominence among the most elite programs in occupational science and occupational therapy, not just in the United States but throughout the world,” said USC President C. L. Max Nikias.

Occupational therapy is a health care profession focused on enabling people to decrease their risk of or better manage chronic disease and disability through sustainable, health-promoting activities and routines in order to live happier and more productive lives. Occupational therapists work with populations across the life span in various settings, including hospitals, nursing facilities, community clinics, schools, private practices, corporations and wellness centers. The Chans’ support ensures the division will continue leading the profession in education, research and clinical programs.
Strokes can happen in an instant but their effects can last a lifetime. For stroke survivors, subsequent motor impairments can dramatically impact their quality of life until rehabilitation can begin the process of restoring function.

While healthcare professionals who work with stroke survivors have all seen patients who respond beautifully to therapy, they also know that therapies simply do not work equally well for all patients. Assistant Professor Sook-Lei Liew MA ’08, PhD ’12, who found those times when therapy failed both frustrating and inspiring, is hoping to change that.

“We never knew what was going to work and whether they were going to have a good outcome,” explains Liew. “That was my motivation for going into research—to uncover more ways to help these patients have good outcomes.”

Following stroke, the brain loses the ability to perform certain functions and has to be retrained to perform seemingly simple tasks.
Those patients who have trouble walking, for example, perform repetitive exercises to relearn that skill. Making the muscles work often makes the brain work, too, and for some patients, recovering function is a matter of practicing a motion over and again. But not all patients fully regain their motor skills, or their quality of life, through repetitive movement.

Liew’s research is exploring ways to supplement this approach of using muscles to train the brain. She is studying how to enhance the brain’s own ability, with the help of cutting-edge technology, to bring back function to those parts of the body that are compromised following a stroke.

“With the help of novel technology, we can start to understand how to augment the brain’s recovery and personalize the approach for each patient,” she says.

Using imaging technology called functional magnetic resonance imaging (fMRI), a non-invasive technique used to observe brain activity, Liew is able to better understand which parts of the brain are involved when a patient is asked to learn to perform a particular task.

Because every person’s brain is wired slightly differently, explains Liew, not every person engages the exact same areas of their brain when re-learning a task. Having the ability, thanks to imaging technologies, to observe which parts of the brain each patient engages may help develop targets for customizing therapy to maximize the outcome for that individual.

Once target brain regions have been identified, Liew then studies ways to encourage brain activity in those regions to enhance neural repair. One method she uses is non-invasive brain stimulation to enhance neuroplasticity, which is the brain’s ability to reorganize neural pathways based on learning new skills. This stimulation is thought to help neurons fire more easily which, in turn, may help the brain recover better than it would without such stimulation.

Another method is real-time fMRI neurofeedback, which uses a computer interface coupled with fMRI technology. This allows Liew to analyze real-time brain activity and give patients feedback about their brain activity on a second-by-second basis.

With this feedback, patients can potentially learn to re-control their own brain activity in regions that may have been damaged after stroke, using only their thoughts. Liew says this technology gives patients a way to become active players during their own recovery by learning how to control their own brain networks.

“We give them a way to control their own brain activity, even if they cannot necessarily control their own limb movements,” she says. “So far, we’ve seen that people with more severe motor impairments also show the greatest increases in brain activity with neurofeedback, suggesting that this is a promising tool for individuals who cannot recover through traditional motor practice alone.”

Liew, who earned her PhD degree in occupational science at USC in 2012, returned to the USC Chan Division as a faculty member in January 2015 after spending two years conducting postdoctoral research at the National Institutes of Health’s National Institute of Neurological Disorders and Stroke. By its nature, stroke research is a multidisciplinary pursuit that can be improved through collaboration among experts from many disciplines. Liew, who directs the Neural Plasticity and Neurorehabilitation Laboratory and also holds faculty appointments in the USC Division of Biokinesiology and Physical Therapy and in the Department of Neurology at the Keck School of Medicine of USC, believes having access to experts in many disciplines will improve her own research. In fact, it was one of the primary reasons she chose to return to USC.

“It’s great to be back at USC because it feels like home,” she says. “I also feel there are so many resources here that will benefit my research and, hopefully, help find new methods that will improve quality of life for stroke patients.”
Dr. Beth A. Smith and the students working with her in the Division of Biokinesiology and Physical Therapy’s Infant Neuromotor Control Laboratory (INCLab) are studying the development of neural control of movement in infants. The INCLab focuses on early identification of atypical infant development and evaluating effectiveness of interventions to promote neural and functional development in infants with or at risk for developmental delay. Accurate early identification of atypical development within the first months of life is a challenge for the field. This is an important challenge to solve because the potential to have a positive impact on development is unparalleled during infancy. Accurate early identification of atypical development will allow for targeted therapy to be provided as early as possible, supporting optimal neuromotor development. The most effective content for early therapy is yet another unknown for the field, and also a focus of the INCLab.

Dr. Smith and her students use many different tools to evaluate infant movement. Some projects involve infants wearing small movement sensors on their arms or legs to collect information about the number of times they move in a day and the types of movements they are making. The sensors can be worn all day as the infant and their family go about their normal daily activities at home or out in the community. Other projects involve measuring infant brain function related to movement control, collected as electroencephalography (EEG) data. EEG uses small sensors placed on the surface of the head to measure the electrical activity produced by the underlying cortex. The INCLab also collects detailed information about limb movement trajectories through space using a 3-dimensional motion analysis system and 3 synchronized high-speed video cameras. Finally, the INCLab can measure the muscle activity used to produce movement through surface electromyography and can measure where infants are looking using a head-mounted infant eye-tracking system. Different tools are used for different projects depending on the specific research question.

Current research projects in the lab include the following: Full-day leg movement assessment in infants at risk for developmental delay: In this project, infants between 1
and 24 months of age who are at risk for developmental delay wear movement sensors on their legs for a full day on 3 occasions. Their data are compared to those of typically developing infants. The goals of this project are to determine 1) if quantity, type and quality of daily leg movements are related to the onset of independent walking (identifying how much and what type of leg movement practice precedes walking onset) and 2) whether measures of quantity, type and quality of daily leg movements early in life can predict later developmental outcomes. This work is supported in part by a grant from the American Physical Therapy Association Section on Pediatrics.

Daily arm movement practice and brain development: In this project, infants between 1 and 6 months of age are tested on 3 occasions. On each occasion they 1) wear movement sensors on their arms for a full day to determine amount and type of daily arm movement practice and 2) wear the EEG cap while they reach for objects, measuring both their brain function and reaching skill. The goal of this project is to map the development of infants’ earliest spontaneous and goal-directed arm movements to the specific areas of cortical brain activation that produce them. This work is supported by a grant from the Bill & Melinda Gates Foundation.

Positioning device project: For this project, infants between 1 and 6 months of age are positioned in 3 different positioning devices: a jungle gym, a bumbo seat, and a car seat. The goal of this project is to determine whether infants increase or decrease their rate of arm and leg movements when encouraged to move (gym), provided postural support (bumbo), or constrained (car seat). The results of the current project will inform researchers about the immediate effects of the devices on infant movement, and in the future can allow them to study the effects of device use on infant development. This work is supported in part by a grant from the USC Undergraduate Research Associates Program.

In addition to the specific funding sources acknowledged above, Dr. Smith’s salary and research are supported in part by NIH K12-HD055929.
Paul Thompson is a Professor of Neurology, Psychiatry, Radiology, Engineering, Pediatrics & Ophthalmology at USC, and Director of the USC Imaging Genetics Center. He leads the ENIGMA Center for Worldwide Medicine, an NIH “Big Data” Center of Excellence for analyzing vast volumes of biomedical data worldwide. Dr. Thompson co-founded and leads the Enhancing Neuro Imaging Genetics through Meta-Analysis (ENIGMA) consortium, a worldwide medical network of 185 institutions in 33 countries, studying the major disease of the brain. ENIGMA discovers factors that affect the progression on Alzheimer's disease and other dementias, schizophrenia, depression and bipolar illness, HIV/AIDS, methamphetamine abuse, autism, and childhood brain disorders. One of the 30 ongoing ENIGMA studies unites teams from the Thai Red Cross, the US, and South Africa to study how treatments restore brain growth in HIV-infected children. Thompson’s group, which includes 35 USC scientists, also created the first maps of Alzheimer’s Disease and
Dr. Sook-Lei Liew is an Assistant Professor at the University of Southern California with joint appointments in the Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy and the Division of Biokinesiology and Physical Therapy in the Herman Ostrow School of Dentistry, as well as in the Department of Neurology at the Keck School of Medicine. She is also the director of the Neural Plasticity and Neurorehabilitation Laboratory. The goal of Dr. Liew’s research is to understand mechanisms of neural plasticity in healthy individuals and individuals after neurological injury in order to improve their quality of life and engagement in meaningful activities. Using neuroimaging, noninvasive brain stimulation, and real-time fMRI neurofeedback, the Neural Plasticity and Neurorehabilitation Laboratory aims to: 1) characterize processes of neural plasticity during learning and rehabilitation, 2) enhance neural plasticity and neurorehabilitation through noninvasive brain stimulation and neurofeedback, and 3) personalize the use of these plasticity-inducing paradigms to capitalize on each individual’s learning or recovery potential.

Keynote Speaker: Sook-Lei Liew, PhD
“Neuromodulation of the Human Motor System and Implications for Stroke Rehabilitation”
Occupational Science and Biokinesiology and Physical Therapy, Herman Ostrow School of Dentistry of USC and Department of Neurology, Keck School of Medicine of USC

Dr. Pascal Magne is an Associate Professor with Tenure and the Don and Sybil Harrington Foundation Chair of Esthetic Dentistry in the Division of Restorative Sciences, Herman Ostrow School of Dentistry of USC. He graduated from the University of Geneva Dental School,

Keynote Speaker: Pascal Magne, DMD, PhD
“The Ultimate Biomimetic Restoration”
Esthetic Dentistry & Restorative Sciences, Herman Ostrow School of Dentistry of USC
Switzerland, in 1989 with a Med.Dent. He obtained his Doctorate in 1992 and his Ph.D. degree in 2002. Dr. Magne received postgraduate training in fixed prosthodontics and occlusion, operative dentistry and endodontics, and was a lecturer at the same university beginning in 1989 until 1997. From 1997 - 1999, he was a Visiting Associate Professor at the Minnesota Dental Research Center for Biomaterials and Biomechanics, University of Minnesota, School of Dentistry. After concluding two years of research, Dr. Magne returned to University of Geneva Dental School and assumed the position of Senior Lecturer in the Division of Fixed Prosthodontics and Occlusion until he was recruited to the University of Southern California in February 2004.

Dr. Magne is a recipient of multiple awards from the Swiss Science Foundation, the Swiss Foundation for Medical-Biological Grants, and was the recipient of the 2002 Young Investigator Award from the International Association for Dental Research as well as the 2007 and 2009 Judson C. Hickey Scientific Writing Award (for the best research article of the year published in the Journal of Prosthetic Dentistry). He is also the author of numerous clinical and research articles on esthetics and adhesive dentistry and is an internationally known mentor and lecturer on these topics. Furthermore, Dr. Magne authored the book Bonded Porcelain Restorations in the Anterior Dentition - A Biomimetic Approach. This book has been translated into twelve languages and is considered as one of the most outstanding books in the field of adhesive and esthetic dentistry. Dr. Magne is a founding member of the Academy of Biomimetic Dentistry and a mentor of the Bio-Emulation think-tank group. In 2012, he launched a revolutionary approach to the teaching of Dental Morphology, Function and Esthetics (the 2D/3D/4D approach) for first year dental students at the Herman Ostrow School of Dentistry of USC.

3:00pm - 4:00pm  Poster Viewing
4:00pm - 4:30pm  Awards Presentation
4:30pm - 5:30pm  Reception

Herman Ostrow School of Dentistry of USC

POSTER CATEGORY AWARDS

- Advanced Specialty Program Resident
- Biokinesiology and Physical Therapy Candidate
- Biokinesiology and Physical Therapy Student
- Dental Hygiene Student
- Graduate Post-doctoral Trainee
- Graduate Pre-doctoral Candidate
- Occupational Science and Occupational Therapy Student
- DDS Student - Basic Sciences
- DDS Student - Clinical Sciences
- Dean’s Research Award - Awarded to the overall most outstanding project poster
JA WILSON DENTAL LIBRARY
BIOINFORMATICS AWARD

Award to the best poster incorporating bioinformatics resources into the project. Judges will consist of the information specialist from the Wilson Dental Library, a representative of the Bioinformatics Services Program of the Health Services Libraries and a faculty representative of Herman Ostrow School of Dentistry. The competition is open to any graduate student or young researcher who has carried out a research project centered on analysis of biological sequences, structures and processes. The candidate must be enrolled at the Herman Ostrow School of Dentistry at the time of submission. The awardee will be presented with a certificate and gift card.

USC STEVENS CENTER FOR INNOVATION MOST INNOVATIVE AWARD

Awarded to the poster with the highest likelihood of transferring into practical use. The USC Stevens Center for Innovation is a University-wide resource in the office of the Provost at the University of Southern California that helps identify, nurture, protect and transfer to the market the most exciting innovations from USC. It also provides a central connection for industry seeking cutting-edge innovations in which to invest. As part of this role, the USC Stevens Center manages the university’s intellectual property portfolio stemming from its $650 million annual research program. Furthermore, the USC Stevens Center develops the innovator as well as innovations, through educational programs, community-building events and showcase opportunities.

INNOVATIVE SCIENTIFIC ACHIEVEMENT AWARD

The award was created to honor Herman Ostrow School of Dentistry students, researchers and post-doctoral fellows who have authored articles published in prestigious scientific publications. The purpose of the award is to recognize extremely talented and promising researchers early in their academic careers who help our School and USC move towards an undisputed elite status in research and academics.
Background: Value-based purchasing is the use of financial incentives to facilitate provider improvement of the delivery of high quality health care. For example, the 30-day hospital readmission measure aims to capture the quality of the care transition. Unfortunately, the indicators that have been evaluated for value-based payment do not capture the objectives of rehabilitation or reflect the priorities of individuals with disabilities.

Purpose: Develop a rehabilitation relevant quality measure and examine variations in provider performance. Methods: The study examined a national cohort of fee-for-service Medicare hip fracture rehabilitation patients discharged from the hospital after surgical repair to inpatient rehabilitation or skilled nursing (n=880,339). A secondary analysis of Medicare Administrative data was used to develop the quality measure, successful community discharge (i.e., 30 consecutive days spent in the community after discharge from post-acute care rehabilitation). Results: Patients were followed for 90 days after hospital discharge to capture successful community discharge from rehabilitation. On average, patients spent 27 days in post-acute care before community discharge. Regional and organizational level analysis identified variations in successful community discharge suggesting differences in the quality of care. Guided by these findings, two case studies will be used to illustrate the need for a clinical quality improvement initiative and the impact of a rehabilitation facility’s performance in the context of value-based purchasing.

Conclusion: Quality measures are a key component of quality improvement strategies in health care. Successful community discharge is a rehabilitation relevant outcome that complements the existing 30-day hospital readmissions measure and reflects the priorities of rehabilitation.

Poster #: 2
Title: Rotator Cuff Postoperative Protocols from the Perspective of Physical Therapists
Name: Brian McNell

Background: Rotator cuff dysfunction is one of the most commonly seen musculoskeletal disorders today, associated with pain and weakness directly diminishes a patient’s functional ability and can significantly affect a patient’s quality of life. Rotator cuff dysfunction is typically described as a continuum of pathology ranging from tendinitis and bursitis, to partial tearing, to a complete tearing in one or more of the tendons. Often times when one or more of these tendons tear they require surgical intervention to restore strength and function of the shoulder. The medical field has examined this pathology for over 200 years and there have been vast advancements in repairing this tendon failure (Randelli 2015). Despite the progress in knowledge, research and surgical advancements, there is still an undefined amount of surgical failures and poor clinical outcomes. Much of the poor outcomes result secondary to constant pain, and the limited progress of range of motion and strength. It is thought that these impairments are due to failure of the repaired tendon. Together orthopedic surgeons and physical therapists are striving to address this issue in order to improve clinical outcomes and patient quality of life. Research looking at surgical technique, tendon histology and healing time, patient risk factors, and postoperative rehabilitation techniques have been the main focus of the literature. Studies have shown that rotator cuff tears primarily occur during weeks 6-26 following shoulder surgery (Jannotti, 2013). In addition, various animal studies show weakness in the repair as high as 50% at 16 weeks post-surgery (Ward JOSPT 2010). With the majority of postoperative patients undergoing some form of formal rehabilitation the timelines for these repair tears occur while under the care of both the physical therapist and the orthopedic surgeon. One factor which has been found to be associated with poor clinical outcomes is the size of the rotator cuff tear prior to surgery. Recent studies show a range from 13% to 94% of large and massive rotator cuff tears fail within the first 2 years after surgery (Miller AJSM 2011). This statistic makes it all the more important that orthopedic surgeons and physical therapists work together during this rehabilitation process to ensure the integrity of the surgical site. Currently, the most common tool in managing the patient’s rehabilitation is a postoperative protocol. However, the information given in these protocols are generically based and lack patient specificity. This is often due to the fact that the complexity of every patient and vary. Certain patients may advance at a more rapid pace; whereas other patients must be progressed more conservatively. Although the concepts which guide clinical practice and the stages of rehabilitation are based on tissue healing and biomechanical stress (Millett 2006 JAAOS), rehabilitation protocols tend to vary considerably among healthcare providers and are frequently based on clinical expertise and opinion rather than scientific rationale (Clinical Commentary Rehabilitation after Arthroscopic Rotor Cuff Repair 2012). A recent survey performed by the Kerlan-Jobe Orthopaedic Clinic looked at the cohesiveness of Orthopedic Surgeons regarding current concepts involving pre-operative corticosteroid injections, and rotator cuff rehabilitation/patient postoperative management. The survey was investigating the various differences between surgical specialties, example: Shoulder Specialist and Sports Medicine Specialist. Their findings stated numerous statistically significant differences between how surgeons manage rotator cuff disease. This provoked further questions and investigation highlighting the need for more research and a closer look at patient management specifically regarding Surgeon-Therapist communication and postoperative protocols. Furthermore, the findings of the Kerlan-Jobe Orthopaedic Clinic survey lead us to believe that the continuity of care between rehabilitation specialists will also vary. These concepts are critical to investigate in order to determine current standards of prac-tice and areas of discrepancy among rehabilitation management. Purpose: The goal of this study is to investigate the current concepts regarding postoperative rotator cuff protocols, and the state of communication between the referring surgeon and the skilled provider caring out the rehabilitation in order to improve clinical outcomes and patient care. Methods: An electronic survey will be distributed to physical therapists who commonly see orthopedic and sports related conditions. Inclusion: Licensed physical therapists who commonly treat orthopedic and sports conditions of various experiences, specialties and training levels. Physical therapists who have to ability to read and understand the English language. Exclusion: Physical therapy students, physical therapy assistants, non-licensed physical therapists Results: Pending Conclusion: Pending
Title: Developing Occupation-Based, Preventive Programs for At-Risk, Late Middle-Aged Latino Patients.
Background: Latinos between 50 and 60 years old are at high risk for developing chronic conditions that can lead to early disability. Provision of occupation-based health promotion programs (OHPPs) in primary care may prove effective in offsetting disability and disengagement in this population. Purpose: Identify lifestyle domains and health-promotion strategies important to late-middle-aged Latinos, to inform development of patient-centered OHPPs implementable in primary care.
Methods: We conducted a qualitative study with 11 Latinos (five females; age 56 ±3.27 years) in this demographic group. One-on-one, semi-structured interviews addressing routine, health maintenance, and health utilization were administered under usual theme saturation. A content analysis was completed to identify patterns and regularities in the data. Interview content was compared across the sample to determine commonalities, disagreements, and focal points. A promoter (community health worker) reviewed the results to validate conclusions referencing Latino culture. Results: Informants identified six lifestyle domains: Weight Management, Disease Management, Health and Well-being, Personal Finances, Family, Friends, and Community; and Stress Management. A typology of perceived health-promotion strategies was derived for each domain and a schema constructed. Conclusion: The resultant schema can be used as a foundation for designing patient-centered OHPPs for late-middle-aged, at-risk Latino patients. The valued domains and strategies we extracted can be expanded into modular modules using evidence-based best practices. The findings demonstrate the need for sophisticated clinical judgment in assessing the complex issues that impact the health of this underserved population.

Title: Development of Occupations-Based, Preventive Programs for At-Risk, Late Middle-Aged Latino Patients.
Name: Stacey Schemps Niemiec

Title: Behavioral Consequences of Disrupted MET Signaling in Adult Mice.
Name: Barbara Thompson

Title: Experimental Models of Compensation Following Regional Oral Sensory Damage
Name: Derek Snyder

Title: Evaluating Genetically Modified Mice Lines to Dissect the Role of Specific Genes in the Neurobiological Underpinnings of Neurodegenerative Disease. CT and IX IX Deletion is an Important Approach.
Title: A typology of perceived health-promotion strategies was derived for each domain and a schema constructed. Conclusion: The resultant schema can be used as a foundation for designing patient-centered OHPPs for late-middle-aged, at-risk Latino patients. The valued domains and strategies we extracted can be expanded into modular modules using evidence-based best practices. The findings demonstrate the need for sophisticated clinical judgment in assessing the complex issues that impact the health of this underserved population.
Methods: We engineer a bio-inspired interface built upon a chimeric peptide. Binding to the biomaterial interface is achieved using a molecular recognition domain specific for the titanium/titanium alloy implant surface and a biochemical signal guiding stem cells to differentiate by activating the Wnt signaling pathway for bone formation. Results: During a critical period of host cell growth and determination, the bioactive implant interface signals mouse, as well as human, stem cells to differentiate along osteogenic lineages. Conclusion: The Wnt-induced cells show enhanced mineral deposition in an extracellular matrix of their creation and an enhanced gene expression profile consistent with osteogenesis, thereby providing a bone-to-implant interface that promotes bone regeneration.

Poster #: 11
Title: Pseudocarcinomatous Hyperplasia: A Simple Way to Differentiate it from OSCC
Name: Kamal Al-Eryani
Faculty Advisor: Parish Seldzhizadeh

Background: Granular cell tumor (GCT) of the oral cavity is a benign lesion. Half of oral GCTs demonstrate pseudocarcinomatous hyperplasia (PCH) of the mucosa which can mimic invasive islands of oral squamous cell carcinoma (OSCC). Such similarity might confuse a pathologist or investigator when diagnosing or evaluating these two conditions, leading to misdiagnosis or misclassification. Indeed, several misdiagnosed cases of oral GCT have been reported in the literature as OSCC or malignant oral GCT that resulted in unnecessary aggressive treatment for the affected patients. Purpose: The aim of this study is to simplify discrimination between oral GCT-PCH and OSCC. Methods: To distinguish between these two entities, we examined 12 patient specimens of oral GCT-PCH and OSCC histologically and via immunohistochemistry (IHC) for CK10, CK13, CK17 and P75. Results: The results suggest that the cellular population and morphology of the underlying connective tissue is most relevant for making a correct diagnosis between the two conditions. Consideration of IHC findings for epithelial markers alone may lead to erroneous diagnosis; however, immunopositivity of GCT cells for P75 can be an easy way to identify the underlying tumor and exclude OSCC. Conclusion: Finally we recommend more studies on the molecular biology of PCH to understand how PCH is able to mimic OSCC histologically without harboring its malignant phenotype clinically, which could have significant translational potential for understanding invasive OSCC.

Poster #: 12
Title: Modified VISTA for Implant Placement in Maxillary Anterior Site
Name: Hamad Alqahwi
Faculty Advisor: Homa Zadeh

Background: A variety of incision designs are available during implant placement in the maxillary anterior site. The traditional techniques available have limitations, such as the need for marginal incisions that compromise the blood supply resulting in a “black triangle” or significant gingival recessions in the esthetic area. This can be critical when adjacent to restorations where recession might reveal dark margins. Outcome predictors have demonstrated the significance of minimal surgical trauma and a thick gingival biotype in order to avoid compromised esthetic results. Incision designs such as the VISTA technique and intra-ocular incisions extending to adjacent teeth are limited in their ability to prevent apical migration of papillary height between implant and tooth. The Vestibular Incision Subperiosteal Tunnel Access (VISTA) technique has been developed in an attempt to preserve the circulation of blood resulting in superior outcome compared to available techniques for gingival recession defects. This case report is aimed to demonstrate the novel incision design, termed the modified VISTA technique. Purpose: In an effort to preserve soft tissue contours of adjacent teeth during implant placement and soft tissue augmentation of a single tooth site, a new design of VISTA incision has been developed. This technique is termed Modified Vestibular Incision Subperiosteal Tunnel access. single edentulous site was replaced with dental implant (Biomet 3i) and a connective tissue graft to increase width. The recipient site for the graft was accessed through the vestibule, while the implant was placed raising a minimal palatal flap. No reflection of the adjacent papilla was performed. Results after 12 month show comparable papilla height relative to those at baseline were measured low in all groups. Statistically significant gingival recession was found based on radiographic analysis (Student t-test). Clinical observation revealed that conventional incision jeopardize blood circulation and compromised esthetic results with papilla loss appeared between implant and adjacent tooth. On the other hand, modified VISTA incision successfully preserved papilla height and achieved 100% papilla fill between contact. No further recession was noted at 12 months in modified VISTA group. Thick biotype was observed at both groups. Conclusion: This case report highlights the importance of minimal surgical trauma to avoid gingival recession in adjacent teeth. The results of this case report demonstrate the potential for the modified incision technique to reduce post-extraction bone resorption, in achieving optimal esthetic results for soft tissue augmentation during implant placement in the maxillary anterior site. Baseline gingival margin level following extraction may influence the outcome of esthetic result, including papilla height and width after definitive restoration delivery.

Poster #: 13
Title: Alveolar Ridge Dimensional Changes Following Ridge Preservation Procedure: CBCT Linear Analysis
Name: Diane Anthony
Faculty Advisor: Homa Zadeh

Background: Alveolar ridge atrophy has been proposed as a strategy to reduce post-extraction bone resorption. An array of ridge preservation protocols has been proposed, though data on the biologic outcome of the healing response is scant. Purpose: This study examined the magnitude of alveolar bone alterations following ridge preservation grafting with anorganic bovine bone matrix (ABBM) protected by PTFE on the recipient site. The gingival condition and the percentage of remaining papilla height relative to those at baseline were measured to compare the percentage of remaining papilla height in the conventional design group at 3 months post-operatively. Clinical observation was followed up to 1 year. Results: The results of clinical measurements showed that papilla height in modified VISTA incision group was 97.5±3.5%, while a conventional incision group showed that it was 31.0±11.5%. Statistically significant difference was found based on radiographic analysis (Student t-test). Clinical observation revealed that conventional incision jeopardize blood circulation and compromised esthetic results with papilla loss appeared between implant and adjacent tooth. On the other hand, modified VISTA incision successfully preserved papilla height and achieved 100% papilla fill between contact. No further recession was noted at 12 months in modified VISTA group. Thick biotype was observed at both groups. Conclusion: This case report highlights the importance of minimal surgical trauma to avoid gingival recession in adjacent teeth. The results of this case report demonstrate the potential for the modified incision technique to reduce post-extraction bone resorption, in achieving optimal esthetic results for soft tissue augmentation during implant placement in the maxillary anterior site. Baseline gingival margin level following extraction may influence the outcome of esthetic result, including papilla height and width after definitive restoration delivery.
(Honle UV America Inc.) for 1 hr. All 20 denture bases (control and testing group) were digitized using laser scanner. Surface matching software was used to measure dimensional changes between digitized metal master cast and denture base made from conventional heat-polymerized denture base material (Dentsply Lutericone 199) and 3D printed denture base material (Dentca). Non-parametric methods were used for statistical analysis. Results: All 10 samples made from Dentsply light-cured base denture material show less deformation (±0.05 mm) than conventional denture base material. Conclusion: 3D printed experimental denture base material on implants needs more accurate fitting on the metal master cast than conventional heat-polymerized denture base material.

Poster #: 11
Title: Numerical Design Optimization of CAD/CAM Bonded Composite Resin Implant Crowns
Name: Marco Carvalho
Faculty Advisor: Pascal Magne

Background: Because all-ceramic restorations can support a catastrophic brittle failure, an alternative approach evolved using composite resin materials to compensate for the absence of periodontal ligament on implants. Finding an optimal abutment design could improve the mechanical behavior of the composite resin crown. Purpose: The aim of this study was to assess the mechanical behavior of CAD/CAM composite resin crowns bonded to different metal implant abutments. The hypothesis considered is that the axial and occlusal thickness of the crown restoration material would have an influence on the stress distribution within the restoration. Methods: Fifty-one (51) composite crowns were fabricated using CAD/CAM CEREC SW 4.0. Following insertion into a Morse tapered implants (CM Titanax EX, Neodent, Curitiba, Brazil), the titanium abutments were adhesively restored with CAD/CAM high performance polymer crowns (Lava Ultimate, air-abraded, silanated) using adhesive resin (Optibond FL) and preheated light curing adhesive resin (Filtek Z250). Three experimental groups (n = 17): Group α (control) 4.0Øx4.0mm – CM Universal Post (original manufacturer’s abutment); Group β (slim) 2.0Øx4.0mm – Modified CM Universal Post; Group γ (slim & short) 2.0Øx2.0mm - Modifie CM Universal Post. Cylindrical isometric chewing movements (5Hz) were simulated by axial loading, starting with 200N, by stages of 400N, 600N, 800N, 1,000N, 1,200N and 1,400N, at a maximum of 25,000 cycles each. Samples were loaded until fracture or to a maximum of 175,000 cycles. The three groups were compared using the life table survival analysis (Logrank test at P = 0.05). Results: The average load cycles until fracture for Group β (slim) was 2,132,902,155,924X, 1,071,119,598X and 1,36,461,663,72X Survival rates ranged from 47% for Group γ (slim & short), 36% for Group α (control) and 31% for Group β (slim). Those findings are in agreement with the companion numerical simulation study. Conclusion: The design of the implant abutment will affect the stress distribution within bonded composite crowns.

Poster #: 17
Title: Experimental Design Optimization of CAD/CAM Bonded Composite Resin Implant Crowns
Name: Rafaella Cid and Priscilla Lazari
Faculty Advisor: Pascal Magne

Background: Composite resin crowns bonded to implant abutments have similar dynamic response to load (damping behavior) when compared to teeth with a simulated PDL. Changing the design of the titanium abutment (diameter and height) and consequently affecting the thickness of the lamina dura crown may influence the flexibility of the assembly and result in a higher rate of success (less screw loosening, increase resistance of fracture, reparability and wear-friendliness to antagonist teeth). Purpose: The aim of the present study was to assess in vivo, the fatigue resistance and failure mode of CAD/CAM high performance polymer crowns bonded to implant-supported titanium abutments with three different designs. The null-hypothesis considered was that the abutment/restoration interface would fail abutment itself and that the optimized design of the metal abutment together with the different thicknesses of the restorative material (high performance polymer) would have an influence on the fatigue resistance and failure mode of the assembly. Methods: Fifty-one (51) composite crowns were fabricated using CAD/CAM CEREC SW 4.0. Following insertion into a Morse tapered implants (CM Titanax EX, Neodent, Curitiba, Brazil), the titanium abutments were adhesively restored with CAD/CAM high performance polymer crowns (Lava Ultimate, air-abraded, silanated) using adhesive resin (Optibond FL) and preheated light curing adhesive resin (Filtek Z250). Three experimental groups (n = 17): Group α (control) 4.0Øx4.0mm – CM Universal Post (original manufacturer’s abutment); Group β (slim) 2.0Øx4.0mm – Modified CM Universal Post; Group γ (slim & short) 2.0Øx2.0mm - Modified CM Universal Post. Cylindrical isometric chewing movements (5Hz) were simulated by axial loading, starting with 200N, by stages of 400N, 600N, 800N, 1,000N, 1,200N and 1,400N, at a maximum of 25,000 cycles each. Samples were loaded until fracture or to a maximum of 175,000 cycles. The three groups were compared using the life table survival analysis (Logrank test at P = 0.05). Results: The average load cycles until fracture for Group γ (slim & short) was 2,132,902,155,924X, 1,071,119,598X and 1,36,461,663,72X Survival rates ranged from 47% for Group γ (slim & short), 36% for Group α (control) and 31% for Group β (slim). Those findings are in agreement with the companion numerical simulation study. Conclusion: The design of the implant abutment will affect the stress distribution within bonded composite crowns.

Poster #: 43
Title: Vestibular Incision Subperiosteal Tunnel Access for Soft Tissue Augmentation
Name: Alfonso Gil
Faculty Advisor: Homa Zadeh

Background: In recent years, attempts to cover areas of deep, wide gingival recession were treated by a variety of techniques for soft tissue augmentation which had limited success for covering wide root denudation. For years, attempts to cover areas of deep, wide gingival recession were met with frustration. The presence of interdental bone loss unables complete root coverage. The Vestibular Incision Subperiosteal Tunnel Access (VISTA) technique has been developed in an attempt to address the limitations of current techniques. VISTA involves vestibular incision in an area remote to the defect and elevation of a subperiosteal tunnel. Once gingival margins are coronally positioned in a tension-free manner, the sutures holding gingival margins in coronal position are fixated to each tooth with flowable composite. Randomized clinical cases examined the efficacy of VISTA technique, using the clinical measurements and study cast volumetric analysis. Purpose: The aim of this case report is to present the percentage of root coverage of VISTA technique according to Miller classification as well as the cast analysis of soft tissue augmentation. Methods: 41 teeth, including Miller Class I (N-5), Class II (N-7), and Class III (N-29) were treated using VISTA technique (Figure 1.a-h). The percentage of root coverage was evaluated at baseline and at 18 months by clinical measurements using UNC periode probe. The impression was performed at baseline and 6, 12, 24 months to analyze the alteration of soft tissue using CBCT analysis. (Accutomeo, J. Morita, Kyoto, Japan). All teeth at the baseline image and at the images at different time periods were superimposed and analyzed at the same position using image subtraction analyzer. The result of subtraction images showed augmented soft tissue. The amount of soft tissue augmentation relative to those at baseline was measured within a line 4 mm below the alveolar crest level at the center of tooth. Then, the volume of soft tissue augmentation per 1 mm width was calculated. The Student’s-t test was used for pairwise comparisons of CBCT-scan data. Statistical significance was set at p < 0.05.
Results: After 18 months, the percentage of root coverage for the type I, II, and III defects was 100%, 100%, and 86%, respectively. The result of this study showed a favorable outcome in both root coverage and soft tissue augmentation at the application of VISTA technique. Initial gingival recession included 1 mm in the Miller type I defects, 2.7 mm in the type II, and 2.8 mm in the type III. After mean follow up period of 18 months, 0 mm was found in the type I and II defects, and 0.4 mm in the type III defects. Clinical measurements clearly showed that complete root coverage was achieved in type I and II defects, and 85% in type III defects at 18 month (Figure 2). The study cast analysis revealed that the alteration of soft tissue augmented volume was changed by tooth type. Canine and premolar group showed slight increase in soft tissue volume from 12 month to 18 month as well as decrease in those at both incisor and lateral incisor groups. This can be attributed to the anatomicity of root and cervical contour of tooth. Conclusion: Long term results revealed that soft tissue augmentation and root coverage treatment of Miller class I, II, and III recession defects using VISTA provided favorable clinical outcomes. Dynamics of soft tissue volumetric change may be varied by tooth type.
The Jordanian population. No significant rs28914828, rs1042173, rs25531 and one 44 bp insertion/deletion polymorphism RAS patients and 150 age- gender- and association study including 100 Jordanian RAS and functional polymorphisms in the state. Purpose: The aim of this study was to Furthermore, polymorphisms in SLC6A4 is linked (RAS) is a complex genetic disorder that Background: Recurrent aphthous stomatitis (RAS) is linked with a cross sectional area of 0.8±0.2 mm², and then tested for t-test in a universal testing machine (Instron 5965, Instron) at a crosshead speed of 1 mm/min. Additionally, pH values were recorded for the adhesives in all experimental groups and mean values calculated. All data was analyzed using one-way ANOVA followed by Tukey HSD and Dunnett post-hoc tests (α=0.05). In addition, two specimens per group were processed for nanoleakage using FESEM and CLSM. A variety of techniques are available for treatment of multiple contiguous recession defects. The available techniques have limitations, including the need for marginal incisions that compromise the blood supply. Outcome predictors have demonstrated the significance of coronal positioning at the time of treatment in order to increase the likelihood of complete resolution of recession defects. Traditional suturing techniques are limited in their ability to fix the position of the gingival margin. The Vestibular Incision Subperiosteal Tunnel Access (VISTA) technique has been developed in an attempt to address the limitations of current techniques. VISTA involves vestibular incision in an area remote to the defect and elevation of a subperiosteal flap. If a control margin is coronally positioned in a tension-free manner, the sutures holding gingival margins in coronal position are fixated to each tooth with flowable composite. The impressions were taken at 6 and 1 year following the surgery. All study casts were scanned by the intra oral digital scanner (t-Termo) to evaluate the soft tissue alteration according. Results: Data from case series, which have documented the effectiveness of VISTA, are presented. Conclusion: Innovative soft tissue coverage technique, VISTA resulted in favorable clinical outcomes. Using the intra oral digital scanner (t-Termo) was the best method to measure the volumetric analysis.

Poster #: 22

Title: Investigation of SLC6A4 Gene Polymorphisms in Jordanian patients with RAS Name: Jumana Karasneh Faculty Advisor: Parish Sedghizadeh Background: Recurrent aphthous stomatitis (RAS) is a complex genetic disorder that can be triggered by several environmental factors including anxiety. The serotonin transporter gene (SLC6A4) which encodes the serotonin transporter (5-HTT) is linked to stress and regulates serotonin signaling. Furthermore, polymorphisms in SLC6A4 have been associated with a pro-inflammatory state and a higher risk of RAS. The goal of the study was to investigate if there is an association between RAS and functional polymorphisms in the SLC6A4 gene. Methods: A case-control association study including 100 Jordanian RAS patients and 150 age- gender- and ethnically-matched controls was conducted. One 44 bp insertion/deletion polymorphism (5-HTTLPR) in the promoter region (rs4795541) and four SNPs were genotyped; rs28914828, rs1042173, rs25531 and rs28914834. Genotyping was conducted using PCR-RFLP technique. Association was assessed by logistic regression analysis. Results: The rs28914828, rs28914834 and rs25531 markers were not polymorphic in the Jordanian population. No significant difference in the genotype or allele distribution between cases and controls was observed for rs1042173 and rs4795541. The logistic regression analysis after correcting for age, gender, smoking status, anxiety and depression revealed no significant change in the odds of having any of the genotypes for rs1042173 or rs4795541. However, the 5-HTTLPR LL genotype reduces the likelihood of having RAS by 37%. Conclusion: This is the first study to investigate the association of the SLC6A4 gene with RAS. Results from this study population indicate a lack of association with RAS. Confirmatory studies in other populations with larger sample may be warranted.

Poster #: 23

Title: Long-Term Outcomes of Regenerative Approach for Treating Peri-Implantitis Name: Vahid Khoshkham Faculty Advisor: Homa Zadeh Background: Regenerative procedures, applying the concept of the guided bone regeneration (GBR) are implemented to rebuild peri-implant supporting bone. The effectiveness of regenerative procedures have been measured by a variety of radiographic and clinical parameters, and among them are radiographic bone fill (RBF), probing depth (PD) reduction, clinical attachment level (CAL) gain, and reduction of bleeding on probing (BOP). Purpose: The purpose of this systematic review was to evaluate long-term outcomes of regenerative procedures for treating peri-implantitis. Methods: Electronic search of 5 databases and hand searching were performed to identify human trials that had treated more than 10 peri-implantitis lesions using a regenerative approach with the follow-up of at least 36 months. To meet the inclusion criteria, studies had to report at least one of the following parameters: radiographic bone fill (RBF) probing depth (PD) reduction, clinical attachment level (CAL) gain, bleeding on probing (BOP). Purpose: The purpose of this systematic review was to evaluate long-term outcomes of regenerative procedures for treating peri-implantitis. Results: Only the experimental group at 1.93%, and 3.94% w/w). All samples were extracted human third molars were sectioned into 2mm pieces, etched with 35% phosphoric acid for 15 s and then adhered to the different concentrations of tt-farnesol containing different concentrations of tt-farnesol (based on the minimum inhibitory concentration against S. mutans at 0.38%, 1.93%, and 3.94% w/w). All samples were etched with 35% phosphoric acid for 15 s (ScotchBond Etchant, 3M ESPE), rinsed, blown dry and then, treated with a mucosal microbrush, bonded, and restored with a microhybrid resin composite (Filtek Z250, 3M ESPE). They were stored in distilled water for 24 h, sectioned in XY direction to obtain sticks with a cross sectional area of 0.8±0.2 mm², and then tested for µTBS in a universal testing machine (Instron 5965, Instron) at a crosshead speed of 1 mm/min. Additionally, pH values were recorded for the adhesives in all experimental groups and mean values calculated. All data was analyzed using one-way ANOVA followed by Tukey HSD and Dunnett post-hoc tests (α=0.05). In addition, two specimens per group were processed for nanoleakage using FESEM and CLSM. A variety of techniques are available for treatment of multiple contiguous recession defects. The available techniques have limitations, including the need for marginal incisions that compromise the blood supply. Outcome predictors have demonstrated the significance of coronal positioning at the time of treatment in order to increase the likelihood of complete resolution of recession defects. Traditional suturing techniques are limited in their ability to fix the position of the gingival margin. The Vestibular Incision Subperiosteal Tunnel Access (VISTA) technique has been developed in an attempt to address the limitations of current techniques. VISTA involves vestibular incision in an area remote to the defect and elevation of a subperiosteal flap. If a control margin is coronally positioned in a tension-free manner, the sutures holding gingival margins in coronal position are fixated to each tooth with flowable composite. The impressions were taken at 6 and 1 year following the surgery. All study casts were scanned by the intra oral digital scanner (t-Termo) to evaluate the soft tissue alteration according. Results: Data from case series, which have documented the effectiveness of VISTA, are presented. Conclusion: Innovative soft tissue coverage technique, VISTA resulted in favorable clinical outcomes. Using the intra oral digital scanner (t-Termo) was the best method to measure the volumetric analysis.

Poster #: 20

Title: The Quality of Reporting of Systematic Reviews in Periodontology Journals Name: Husain Mohammad Faculty Advisor: Kian Kar Background: Systematic reviews (SR) intend to synthesize the vast amount of published research, and to provide more reliable research answers to a research question. Validated instruments have been developed to assess the quality of SR such as the Assessment of Multiple Systematic Reviews (AMSTAR) and checklist by Glenney and colleagues. Despite the best efforts of journals, previous research has shown that the quality of reporting of SR remains below par impacting the evidence-based clinical decision-making process. Purpose: To assess the quality of reporting of systematic reviews with and without meta-analyses in two widely read periodontology journals, namely, Journal of Periodontology (JOP) and Journal of Clinical Periodontology (JCP). Methods: Electronic search using Medline database, supplemented by hand search of JOP and JCP was done independently and in duplicate by two reviewers (HM & SK). AMSTAR statement and Glenney’s checklist were used to evaluate the reporting quality of the selected systematic reviews from both journals. Results: A total of 124 articles, published from 2012 to 2017, were included for the analysis. AMSTAR items #4 (status of publication, i.e., gray literature), #10 (publication bias) and #11 (conflict of interest) were not applicable papers), and #5 (results display) were all consistently scored high. Conclusion: The quality of reporting of SR published in JOP and JCP can be improved according to evaluation by AMSTAR and Glenney statements.
Background: The primary goal of peri-implantitis treatment is cessation of disease progression to maintain the implant in function with stable peri-implant tissue. Regeneration of the lost bone can be helpful to reduce the prosthesis mobility and prevent complications. One of the main obstacles of regeneration is the presence of hard and soft biofilm, which is difficult to remove. Various decontamination procedures have been proposed, though there is no consensus about the most effective protocol. The present case report provides a protocol, which will include implant surface decontamination, as well as regenerative methods. The protocol will begin with removal of the prosthesis and mucoperiosteal flap elevation. Hard biofilms are removed by titanium brush in conjunction with air powder abrasion and hydroxyfloric acid gel etching. Autogenous bone shavings are harvested within the same surgical area, combined with anorganic bone minerals (ABBM) and covered with collagen membrane. Primary coverage is obtaining to submerge the implants during the healing period. After 3 months, the implants are exposed and the prosthesis is reconstructed. Results: Clinical and radiographic outcomes have demonstrated significant regeneration of peri-implant bone and soft tissues. 11 implants have been treated in 7 patients using this protocol. Radiographic outcome demonstrated gain of marginal bone of between 2.0 to 5.4 mm with the mean of 3 mm. In one case, two implants were reconstructed in this manner and during the second stage surgery, it was discovered that implants were fractured. The implants were removed and histologic evaluation was performed, demonstrating significant evidence of new bone regeneration around the treated implants. Conclusion: Within the scope of this case series, regeneration of peri-implant bone and soft tissue is achievable via utilizing this treatment protocol.

Background: Odontogenic infections can spread to the oral cavity of predentate infants. Streptococcus mutans (S. mutans) is the primary etiologic agent of dental caries, and is only viable in the oral cavity of predentate infants. This novel research indicates that S. mutans is in fact viable in the oral cavity of predentate infants. This is a huge discovery, as many health care providers still believe S. mutans cannot be present with out teeth. A plethora of current resources indicate that...
inoculation of the highly cariogenic \textit{S. mutans} from mother to child occurs well before tooth eruption. Purpose: The cariogenic disease process begins in predentate infants. Prevalence and incidence of \textit{S. mutans} in young children can be controlled and reduced. Therefore, promoting oral hygiene education programs for pregnant women, women who plan to become mothers, and their caregivers is necessary to reduce infectivity and prevalence of \textit{S. mutans}. Suppression of pathogenic oral flora is important for morbidity prevention, active carious teeth, nutritional counseling, oral hygiene education, scaling and root planning, fluoride treatment have proven to reduce infectivity potential, and should be a part of treatment therapy in the future. Methods: Study analysis was performed using the USC Pubmed database. All studies used mother infant pairs to determine infectivity potential and gather data. All studies used for our research were from 20 years ago. Results: A study illustrated that 71% of genotypes were identical in strains of \textit{S. mutans} cultured from mother-infant pairs. Recent clinical studies demonstrate that \textit{S. mutans} can colonize the mouths of predentate infants; the furrows of the tongue may be a protective ecological niche. The major reservoir from which infants acquire \textit{S. mutans} is their mothers. A study showed that incidence of infection was 9 times greater when the mother had greater than 105 CFU versus mothers with less than 103 CFU (58% versus 6%). Several clinical studies in which \textit{S. mutans} strains were isolated from mothers and their babies exhibited similar or identical bacteriocins and chromosomal DNA patterns. Conclusion: According to a recent study performed by Plonka et al. in 2011, \textit{S. mutans} was found in the oral cavities of predentate infants as little as 34 days after birth (Plonka et al. 2012). This novel research indicates that \textit{S. mutans} is in fact viable in the oral cavity of predentate infants. A plethora of current resources indicate that inoculation of the highly cariogenic \textit{S. mutans} from mother to child occurs well before tooth eruption. Research findings reveal that the prevalence of \textit{S. mutans} increases with frequency and amount of exposure. Newborns have sterile oral cavities at birth. What was found is that infants whose mothers have high levels of MS, a result of untreated caries, are at greater risk of acquiring the organism earlier than children whose mothers have low levels.

Poster: 34
Title: What’s HAPing?
Name: Jennifer Stow
Poster Advisor: Joan Beleno
Background: Enamel, the outer layer of the tooth, is a hard biomaterial with remarkable fracture and wear resistance to protect the inner dentin layer from physical and chemical damage. Its structure ranges from the microscale of enamel rods to the nanoscale of tightly-packed crystals organized into a robust, interwoven structure. Before the tooth surfaces, the structure of the enamel is developed by enamel cells that secrete a protein, amelogenin, to regulate the growth and organization of crystalline enamel rods. However, once the tooth erupts, the enamel cells are lost, and the enamel starts to degrade, leaving behind an inorganic, mature enamel structure. Therefore, if mature enamel is substantially damaged, it cannot regenerate. Even though the enamel is hardest substance in the body, it can be damaged overtime by excessive plaque buildup and bacteria growth, leading to the formation of dental cavities (cavities). If these cavities are not treated early on, the cavities grow larger and affect the sensitive layers of the teeth, eventually leading to tooth loss. Currently, enamel damage is among the world’s most common health problems, so a proper treatment is crucial. Purpose: The conventional restorative treatment for enamel damage involves drilling out the damaged areas and filling the area with materials, like metals or ceramics. However, even after this treatment, secondary cavities develop overtime due to the microscopic cracks caused by the drilling technique and the weakening adherence from the filler materials. The damaged enamel structure, which causes further damage on the teeth. Thus, there is a need for improvement in the durability and adhesion of restorative materials that would enable the matrix to tightly adhere to the enamel surface. Recently, an amelogenin-chitosan hydrogel (CS-AMEL) was developed to promote the organized growth of a synthetic enamel-like layer on the surface of dental enamel. The regrown synthetic layer forms in the hydrogel significantly improved the structure and hardness of etched enamel. Importantly, this biomimetic in-situ regrowth of enamel-like crystals generated a robust enamel-restitution interface between the enamel and hydrogel, which ensures the efficacy and durability of the restorative treatment. Methods: We first conducted a literature analysis on current biomimetic techniques and their efficacy in vivo testing. From there, we were able to determine past discoveries and the potential treatment route we focused on was from Dr. Janet Oldak’s study on synthesizing HAP crystals. The methods of this study are as followed: 1. Amelogenin expression of PL712, a specific amelogenin producing strain, is facilitated in a Tooth Slice Preparation: Teeth were cut longitudinally in 0.1-0.2 cm wide sections using a water-cooled slow speed diamond saw. Surfaces were then acid etched with 30% phosphoric acid for 30 seconds and then rinsed with deionized water. 3. Application of CS-AMEL: 20 ml of chitosan-based hydrogel was applied to enamel surface and dried in ambient conditions. It was then immersed in 30 ml of artificial saliva at 37 degrees Celsius for 7 days. 4. Characterization: Results were determined by using a Scanning electron microscope (SEM), X-ray diffraction (XRD), and High resolution transmission electron microscopy (HR-TEM) were used to test the nanoradial, birefringent, and connectivity of CS-AMEL to the etched enamel. 5. Antimicrobial evaluation: Real saliva with Lysogeny broth was used in both chitosan-containing amelogenin and solitary amelogenin. The two test dishes set overnight at 37 degrees Celsius. Based on the SEM images, the replacement of the hydrogel and the AS Solution were replaced every two days for 7 days to observe its effects on the enamel regrowth process. Based on the SEM images, the replacement of the hydrogel and the AS Solution developed a dense, synthetic layer with organized, enamel-like structural crystals. Thus, the optimization of the application method significantly lowered the time required for repairing larger caries, since sufficient ions are provided by the AS Solution to allow the hydrogel to form rigid and continuous regrowth layers. Conclusion: In summary, this biomimetic approach of synthesizing the amelogenin fluoridated hydroxyapatite crystals for enamel rejuvenation was proven to have great potential in the restorative dental materials field. It not only forms a seamless bond to the vital enamel, it also shows universal hardness and resilient to the antimicrobial property. This will elongate the longevity of a restoration and minimize the risk of recurrent caries. While similar experiments have made similar attempts, the CS-AMEL shows great potential for clinical use due to its biologically safe nature that is viable not only in ambient conditions, but also in a patient’s mouth.

Poster: 35
Title: Oral Health Knowledge and Behaviors of Clients with Mental Illness
Name: Andrea Wong
Faculty Advisor: Janet Oldak
Background: Clients living with a severe mental illness (SMI) have poor oral health. The negative oral health and hygiene education, scaling and root planning, fluoride treatment have proven to reduce infectivity potential, and should be a part of treatment therapy in the future. Methods: Study analysis was performed using the USC Pubmed database. All studies used mother infant pairs to determine infectivity potential and gather data. All studies used for our research were from 20 years ago. Results: A study illustrated that 71% of genotypes were identical in strains of \textit{S. mutans} cultured from mother-infant pairs. Recent clinical studies demonstrate that \textit{S. mutans} can colonize the mouths of predentate infants; the furrows of the tongue may be a protective ecological niche. The major reservoir from which infants acquire \textit{S. mutans} is their mothers. A study showed that incidence of infection was 9 times greater when the mother had greater than 105 CFU versus mothers with less than 103 CFU (58% versus 6%). Several clinical studies in which \textit{S. mutans} strains were isolated from mothers and their babies exhibited similar or identical bacteriocins and chromosomal DNA patterns. Conclusion: According to a recent study performed by Plonka et al. in 2011, \textit{S. mutans} was found in the oral cavities of predentate infants as little as 34 days after birth (Plonka et al. 2012). This novel research indicates that \textit{S. mutans} is in fact viable in the oral cavity of predentate infants. A plethora of current resources indicate that inoculation of the highly cariogenic \textit{S. mutans} from mother to child occurs well before tooth eruption. Research findings reveal that the prevalence of \textit{S. mutans} increases with frequency and amount of exposure. Newborns have sterile oral cavities at birth. What was found is that infants whose mothers have high levels of MS, a result of untreated caries, are at greater risk of acquiring the organism earlier than children whose mothers have low levels.
of full-length amelogenin. Mass spectroscopy analysis of one major fraction confirmed the presence of at least two phosphorylated serines and one phosphorylated threonine. 

Conclusion: Amelogenin was phosphorylated in the nucleus of Ochlamysoma reinhardtii but the phosphorylation state was different than native amelogenin. Amelogenin has the potential to be phosphorylated at more than one position within native, phosphorylated amelogenin and amelogenin expressed in Ochlamysoma reinhardtii may provide insight into the nature of kinases in enamel formation.

Poster #: 37
Title: BMP Activity Regulates Dental Mesenchymal Lineage Commitment during Root Development
Name: Jifan Feng
Faculty Advisor: Yang Chai

Background: The apical region of immature human teeth contains a distinct mesenchymal stem cell (MSC) population, namely stem cells of the apical root region (SCARs), which is potentially crucial for root formation during postnatal tooth development. Purpose: Despite their in vitro MSC characteristics, there is limited understanding of how SCAPs undergo odontogenic lineage commitment in vivo during development. Because BMP signaling is an important regulator of early tooth development and odontogenic differentiation of dental mesenchymal stem cells in vitro, we hypothesize that BMP signaling may also regulate apical papilla stem/progenitor cells to undergo odontogenic differentiation in vivo. Methods: We first investigated the in vivo identities of SCAPs and their relationship with BMP signaling during root development. We then performed the BMP signaling in the apical mesenchymal cells in vivo utilizing a transgenic mouse model to investigate the functional requirement of mesenchymal BMP signaling in their fate determination during tooth morphogenesis. Results: We identified the in vivo cell population with MSC characteristics that support postnatal molar mesenchymal development. Interestingly, BMP signaling is active in the more differentiated cells adjacent to but exclusive from the MSCs. Furthermore, disruption of BMP signaling in the root mesenchyme in mutant mice resulted in a differentiation defect and increased undifferentiated cells. Conclusion: Our results demonstrate that BMP signaling is required for the in vivo odontogenic lineage commitment of MSCs during tooth morphogenesis.

Poster #: 38
Title: Healthy Eating and Lifestyle After Stroke: A Pilot Study
Name: Valerie Hill
Faculty Advisor: Florence Clark

Background: Stroke is the leading cause of disability and 3rd leading cause of death in the US. Stroke survivors have high rates of subsequent coronary events, recurrent cerebrovascular events, and mortality. Lifestyle factors can increase risk of cardiovascular disease and mortality. Healthy lifestyle practices reduce these risks, yet adherence to healthy lifestyle practices is poor among stroke survivors and socioeconomically disadvantaged race/ethnic minorities. Purpose: To conduct a pilot test of an outpatient post-stroke lifestyle intervention in a safety-net healthcare system to estimate and compare effect sizes for short-term changes in BMI, diet, and physical activity. Methods: Design: Pilot randomized controlled trial Participants: Partial referral sample from a multi-site stroke recovery trial. Inclusion criteria: 18-80 years old, 18-40 kg/m² BMI, 2 weeks post-stroke. Recruitment resulted in 20 participants (10 females) with ischemic stroke or TIA ≥20 years prior; English- or Spanish-speaking. Randomization stratified by SUSTAIN randomization arm and language (English vs Spanish). Study protocol: 3 monthly visits to an outpatient therapy clinic. Intervention: Weekly 2-hour small group sessions led by an OT for 6 weeks focusing on nutrition, physical activity, and self-management. Approach included: didactic presentation; peer exchange; activity participation; and personal exploration. Key elements included: activity-based setting; client goal setting; overcoming potential obstacles; participation in activities; everyday routine; self-efficacy and self-management skills. Main Outcome Measure(s): BMI: 18.5-24.9 kg/m²; 5% weight reduction; change in BMI. Diet: great than 5 servings of fruits/vegetables per day; change in number of servings of fruits/vegetables per day. Physical activity: 90 minutes per week of moderate activity; change in minutes of physical activity per week. Results: Phase 1 completed. Total number enrolled as of January 2014: 41 (41% of target). 15 English speakers and 26 Spanish Speakers. 6 group clinics completed: 3 English and 3 Spanish. 32 participants completed 6-month follow up. Phase 2 (n=59) and formative evaluation is in progress. Conclusion: Conclusion: HEALS Phase 1 suggests that a six week lifestyle management program consisting of a 2-hour small group format, healthy lifestyle content, and led by an occupational therapist may be feasible for the proposed population.

Poster #: 39
Title: Protein Methylation in Epithelial to Mesenchymal Transition of Epidermal Cells
Name: Olan Jackson-Weaver
Faculty Advisor: Jian Xu

Background: The epithelial to mesenchymal transition (EMT) is an important cellular mechanism in a diverse range of biological processes such as development, wound healing, and metastasis. During EMT, epithelial cells undergo alterations in gene expression, cell-cell and cell-matrix interactions, cell signaling pathways, and motility such that the epithelial phenotype is replaced by a mesenchymal phenotype. The EMT is a key mechanism for epithelial cell activation and differentiation. Epidermal cells are mesothelial cells lining the heart that are important progenitors and a source of growth factors during development. Our recent work has established an important function for the protein arginine methyltransferase PRMT1 in EMT. Purpose: We hypothesized that PRMT1 is important for EMT in an apical cell line (MEC-1) and epithelial cancer cells and cardiomycocytes. Methods: Cell culture, western blots, real-time PCR, siRNA. Results: We found that PRMT1 is required for a subset of the EMT marker changes in MEC-1 cells during EMT, including Gli1, Gab1, and TGF-β. Knockdown of PRMT1 reduced MEC-1 migration transcriptionally. Furthermore, PRMT1 knockdown reduced MEC-1 migration and invasion, suggesting that PRMT1 is important for the invasive and metastatic potential of MEC-1 cells with cellular cardiomyocytes caused cardiomyocyte hypertrophy, which was enhanced when MEK-1 cells were pre-treated with TGF-β to induce EMT. Interestingly, MEK-1 cells treated with PRMT1 siRNA also induced cardiomyocyte hypertrophy, but TGF-β pre-treatment of these MEC-1 cells did not enhance this effect. Conclusion: In conclusion, epicaldial EMT is largely dependent on PRMT1. Epicaldial cells also promote cardiomyocyte hypertrophy, which is enhanced in epicaldial cells that have undergone EMT in a PRMT1-dependent manner. These studies establish a role for protein methylation in the EMT process, and could lead to treatments for heart failure and other diseases affected by EMT.

Poster #: 40
Title: BMP-SHH Interaction Controls Endothelial Stem Cell Fate in Developing Tooth
Name: Jingyun Li
Faculty Advisor: Yang Chai

Background: During embryogenesis, endothelial stem cells adopt different fates, generate a variety of tissue-specific stem cells, and form diverse endothelial organs, such as blood vessels, blood stem cells and bone marrow, skin glands, and salivary glands. Although these endothelial organs share common morphological and molecular features, they differ in their tissue homeostasis, which leads to differing abilities for continuous growth postnatally. Mouse incisors retain the ability to grow continuously, whereas mouse molars lose this ability. BMP/TGFβ signaling regulates dental epithelial stem cells during development, but the mechanism involved remains unclear. Purpose: Our aim was therefore to determine whether BMP/TGFβ signaling contributes to the differential fate of epithelial stem cells in postnatal tooth development. Methods: We utilized developing mouse molars from different mutant models to identify the key signaling pathway controlling epithelial stem cell fate. Results: In this study, we investigated the difference in epithelial stem cell dynamics between post-natal mICE incisors and molars. We found that Sox2+ stem cells exist transiently during molar development, contribute to all epithelial cell lineages of the molars and disappear prior to root formation. Furthermore, tissue-specific loss of Smad4 in the dental epithelium results in ectopic activation of SHH-SHH1 signaling and prolonged maintenance of Sox2+ dental epithelial stem cells and their niche during post-natal molar development. The BMP-SHH, but not the TGFβ-Smad4, signaling cascade regulates Sox2+ stem cell maintenance during molar development. BMP-Smad4-SHH-Gli1 signaling network may provide a niche supporting transient Sox2+ dental epithelial stem cells in mouse molars. In parallel, ablation of Smad4 in the dental epithelium expands Sox2+ dental epithelial stem cells and their niche in continuously growing mouse incisors, through alteration in spatial distribution of SHH-Gli1 signaling activity. Conclusion: Collectively, our study highlights the importance of crosstalk between two major pathways, BMP and SHH, in the regulation of epithelial stem cell fate during organogenesis.

Poster #: 41
Title: Nfic-Hedgehog Signaling Cascade participates in Apical Growth of Root
Name: Yang Liu
Faculty Advisor: Yang Chai

Background: Nfic and Hedgehog signaling were important for root development but the mechanism has not been investigated. Purpose: To examine Hedgehog (Hh) signaling and its relationship with Nfic in apical papilla growth during root development. Methods: LacZ staining was performed in Gli1-creERT2, HE staining was performed on control mice at several stages. Gli1-creERT2, Bmp2-creERT2, SmooM208 were generated, tamoxifen-induced and sectioned for lineage tracing. Gli1-creERT2, SmooM208 were injected with HE inhibitor, sacrificed for micro-CT, HE and immuno-staining. Gli1-creERT2, SmooM208 was injected with HE inhibitor, HE and immuno-staining. Gli1 expression was performed on the tooth of Nfic-/- and control. Results: We found that Nfic+/- mice were injected with HE inhibitor and then sacrificed for HE and immuno-staining. RNA-seq was performed on the molar tooth germs of Nfic-/- mice, which is stronger, especially in the apical region, suggesting up-regulation of Hh activity in the progenitor cells during root development in Nfic-/- mice. Upon applying Hh inhibitor, elevated Gli1 expression was attenuated, and the apical papilla growth defect was partially rescued. Nfic regulated Hh signaling pathway by directly binding to the promoter of Hh inhibitor Hhip. Conclusion: Nfic functions as a Hedgehog signaling inhibitor during root development to maintain proper apical papilla growth.

Poster #: 42
Title: Ameloblastin and Amelogenin Cooperate to Protect the Enamel Rod-Interfaced Morphology
Name: Parachita Mazumder
Faculty Advisor: Janet Oldak

Background: The regulation of organized growth of enamel crystals and their assembly into prisms is dependent on the proper functions of enamel matrix proteins (amelogenin, ameloblastin and enamelin). Protein-protein, protein-mineral and protein-cell interactions are believed to play important roles. Our quantitative co-localization study suggested that amelogenin-ameloblastin protein complexes may be the functional entities at the early stage of enamel mineral deposition. It has been proposed that after cleavage the N-terminal segment of ameloblastin diffuses into the enamel prism boundary and retained by hydrophobic interactions with other proteins. In human molars, normal enamel phenotypes were observed due to the deletion of N-terminal segments (exons 5 and 6) of ameloblastin. Purpose: To explore whether N-terminal ameloblastin and amelogenin interact around the periphery of enamel rods and function to protect the integrity of the prisms during maturation stage. Methods: We used in-vivo
and ameloblastin in the enamel matrix of first molar sections from 8-day-old mice. For further detailed study of interactions at molecular level we used confocal fluorescence resonance energy transfer (C-FRET).

Results: We observed a fish-net pattern on the enamel surface during the maturation stage. Amelogenin co-localized with the N-terminal segment of ameloblastin around the prism cores. A CRET analysis confirmed that ameloblastin-amelogenin interactions occur at molecular level. Conclusion: Our study suggests that at the boundaries of enamel prisms ("sheath space") the N-terminal ameloblastin together with amelogenin may promote interactions and crystallization at the adjacent rod and hence assemble proper rod-interrod morphology.

Poster # 43
Title: Parent Facilitated Social Engagement for ASD: An Integrative Review
Name: Jennifer McCortle Kovacs
Faculty Advisor: Mary Lawlor

Background: It is important to determine what actions parents take to facilitate successful social experiences for their children with autism spectrum disorder (ASD) in daily life. Current parent-mediated interventions are a popular mode of service delivery for children with ASD, and whether current parent-mediated interventions addressed parent strengths and needs.

Purpose: Research investigated how parents attempted to facilitate social experiences for children with ASD, and whether current parent-mediated interventions addressed parent strengths and needs.

Methods: eBooks authored by parents of children with ASD were reviewed to identify situations in which parents mediated social experiences and helped to resolve conflicts with siblings.

The review of RCTs revealed insufficient evidence for effectiveness of parent-mediated interventions with children older than 6 years, and methodological limitations undermine existing data. Conclusion: Parent-mediated interventions are needed which simultaneously address parent strengths and needs. Results: The parent-authored literature review revealed parents strengths including skilled interpretation of child communication and in-depth knowledge of child interests.

Poster # 44
Title: Microbicidal Activity of Flavonoids on HIV-1
Name: Juliana Noguti
Faculty Advisor: Ramiro Murata

Background: Although flavonoids have shown antiviral activity against HIV, the use of these agents in antiviral therapy is still limited due to their poor solubility, low bioavailability, and adverse side effects. We have previously shown that the flavonoid Myricetin was able to inhibit HIV-1 replication in vitro and to reduce the replication of HIV-1 in macrophage cell lines.

Purpose: The objective of this study was to evaluate the antiviral activity of Myricetin on HIV-1 replication in macrophage cell lines.

Methods: We used two HIV-1 strains, SHiV and HIV-1LAV, and two human macrophage cell lines, THP-1 and U937, to test the antiviral activity of Myricetin. We used a luciferase reporter assay to measure the inhibition of HIV-1 replication.

Results: Myricetin was able to inhibit HIV-1 replication in both cell lines in a dose-dependent manner. The IC50 values were 50 µM for THP-1 cells and 30 µM for U937 cells.

Conclusion: Myricetin is a promising candidate for further evaluation as an antiviral agent against HIV-1.

Poster # 45
Title: Disruption of ERK/MAPK Pathway in Neural Crest Causes Pierre-Robin Sequence
Name: Carolina Parada
Faculty Advisor: Yang Chai

Background: Disrupted ERK1/2 signaling is associated with several developmental syndromes in humans. For instance, haploinsufficient ERK2 expression causes craniofacial and cranial anomalies arising from perturbation of neural crest development. Purpose: The goal of this study is to understand the function of Erk2 in the postnatal neuromuscular development.

Methods: We studied Urt1-Cre;Erk2fl/fl, Urt1-Cre;Erk2fl/fl;Col1-CreERT2;BmpR1afl/fl, and Dlx5-CreERT2;BmpR1afl/fl mice. Results: Urt1-Cre;Erk2fl/fl mice exhibited cleft palate (CP), malformation and malpositioned teeth, compromised dental morphogenesis, micrognathia and mandibular asymmetry. CP in these mutants was associated with failure of palatal elevation, caused by the tongue malposition and micrognathia as demonstrated by in vitro and in vivo experiments.

Conclusion: Our study demonstrated that Erk2 regulates the mandibular phenotype, which mimicked that of the Eker mutant mice. Our study also demonstrated that the mandibular defect in Eker mutant mice leads to Pierre-Robin sequence and Erk2 regulates Bmp6 expression in the mandibular primordium to control osteogenesis.

Poster # 46
Title: Crucial Factors Driving Mandibular Development
Name: Carolina Parada
Faculty Advisor: Yang Chai

Background: Normal mandibular development is crucial for successful social experiences for children with autism spectrum disorder (ASD). Our previous study demonstrated that the mandibular phenotype, which mimicked that of the Eker mutant mice, leads to Pierre-Robin sequence and Erk2 regulates Bmp6 expression in the mandibular primordium to control osteogenesis.

Purpose: The objective of this study was to determine the factors that drive mandibular development.

Methods: We used two mouse models: Urt1-Cre;Erk2fl/fl and Dlx5-CreERT2;BmpR1afl/fl mice. Results: We observed a fish-net pattern on the enamel surface during the maturation stage. Amelogenin co-localized with the N-terminal segment of ameloblastin around the prism cores. A CRET analysis confirmed that ameloblastin-amelogenin interactions occur at molecular level. Conclusion: Our study demonstrated that the mandibular defect in Eker mutant mice leads to Pierre-Robin sequence and Erk2 regulates Bmp6 expression in the mandibular primordium to control osteogenesis.

Poster # 47
Title: Matrix Metalloproteinase-20 (MMP-20) Prevents Amelogenin Ossification inside Brushite Crystals
Name: Dongni Ren
Faculty Advisor: Janet Oldak

Background: The enamel proteinase MMP-20 cleaves specific functional domains within amelogenin before its complete degradation. Mutation in the MMP-20 gene leads to a range of enamel disorders, such as amelogenesis imperfecta. Purpose: To test the hypothesis that MMP-20 acts to prevent amelogenin ossification inside brushite crystals, which is used as an in vitro model of enamel crystals.

Methods: Brushite crystals were synthesized with or without amelogenin to evaluate protein ossification inside them in vitro. MMP-20 was added to examine its effect on preventing protein ossification. FITC was added to label amelogenin. Electrophoresis and high performance liquid chromatography (HPLC) were used to test MMP-20 cleavage efficiency. X-ray diffraction (XRD), scanning electron microscopy (SEM), fluorescent microscopy and thermal gravity analysis (TGA) were used to detect amelogenin inside the brushite crystals.

Results: Electrophoresis and HPLC showed that MMP-20 digestion of amelogenin was successful in crystal growth experiments. Brushite crystals remained stable with amelogenin but their morphology was affected, increased defects and formation of multiple layers were observed. Without amelogenin, fluorescent microscopy showed very strong fluorescence on crystals before washing, while no fluorescence was observed after washing. With amelogenin, the crystals still showed fluorescence even after the adsorbed proteins were removed by a phosphate wash. After MMP-20 cleavage of amelogenin, fluorescence disappeared. TGA showed a significant mass loss difference between crystals synthesized with amelogenin and those without it, indicating the presence of protein inside crystals grown with amelogenin. Conclusion: MMP-20 affects brushite crystal growth in vitro by being occluded inside the crystals, resulting in defective crystals. Addition of MMP-20 prevents protein ossification and rescues crystal morphology.
Purpose: To develop a novel strategy to synthesize a biomaterial with enamel-mimetic structures from the nanoscale to the macroscale. Our objectives were i) to prepare a monolithic-based composite with a layered structure on the micro-scale, and ii) to synthesize enamel-like materials via phase transformation of this composite. Methods: A chitosan/malic acid (MCa) matrix was designed to control the mineralization of monolayered crystals with an organized layered structure. The transformation of monolayered was achieved by incubating monolayered crystals in 0.1 M NaOH at 70 °C for 3 hours. The morphology and composition of products were characterized using scanning electron microscopy (SEM), transmission electron microscopy, X-ray diffraction and energy dispersive spectrometry. 

Results: The composition of the nanoscale enamel-like bundles was preserved in the presence of chitosan and MCa. The chitosan and MCa molecules hierarchically assembled into an organized complex and further guided the mineralization of monolayered crystals. The nanoscale enamel-like bundles were formed via phase transformation of the monolayered composite. Most interestingly, the layered structure observed on the nanoscale was preserved to some extent in the nano-scale. The study demonstrated a novel strategy to synthesize enamel-like materials with hierarchical structures from the nanoscale to the microscale.

Poster: 49
Title: The Role of the V-type ATPase Proton Pump in Amelogenesis
Name: Jiun Sarkar
Faculty Advisor: Michael Paine

Background: Several diseases like proximal and distal renal tubular acidosis as well as osteoporosis are related to intracellular pH dysregulation resulting from mutations of genes coding for ion channels such as proton-pumping V-type ATPase. Many of the V-type ATPase subunits play key roles in enamel development, yet the understanding of the relationship between the endocytic pathway and dental disease is limited. The hypothesis of this study is to understand the ameloblast-associated pH regulatory networks essential for amelogenesis.

Methods: Carry out quantitative RT-PCR on tissues from secretory and maturation stage enamel organs to determine which ATPase subunits show higher expression levels relative to others through amelogenesis. Validate this data using western blot analysis. Use specific antibodies to define the localization/coclustering of V-type ATPase on endosomal and lysosomal membranes during amelogenesis. Results: Previously published array data suggested that a number of V-type ATPase subunits were significantly upregulated. This was validated by RT-PCR that showed six subunits (Atp6v0a1, Atp6v0a2, Atp6v1c1, Atp6v1e1, Atp6v1f and Atp6v1g1) that had higher mRNA levels during maturation stage. Specific antibodies have been identified to validate the RT-PCR data via western blot and carry out immunohistochemistry analysis to identify the location of these subunits on membranes. Conclusion: The role of each V-type ATPase subunit during enamel maturation in part can be identified by examining the dentin matrix and enamel surface by immunohistochemistry analysis were performed.

Poster: 50
Title: Clinical, Histological and 3D Evaluation of VISTA on Ridge Augmentation
Name: Yun Wang
Faculty Advisor: Homa Zadeh

Background: In an attempt to address the increasing rate of horizontal ridge augmentation, the vestibular incision access (VISTA) technique has been applied to GBR. Purpose: This case series evaluated the treatment outcome of VISTA GBR for severe maxillary horizontal defects and dental implant placement Methods: Four patients with severe Siebert class 3 ridge defect were included in this study. 15 tooth sites were treated with VISTA GBR procedure for bone augmentation. Results: The postoperative implant placement was achieved by incubating monetite crystals with an organized layered structure observed on the micrometer scale was preserved to some extent during the transformation. Conclusion: This study demonstrated a novel strategy to synthesize enamel-like materials with hierarchical structures from the nanoscale to the microscale.

Poster: 51
Title: Methylolation of Smad3 is Required for its Inhibition of Smad1
Name: Jian Wu
Faculty Advisor: Jian Xu

Background: The Gli1+ cells in the suture mesenchyme are capable of repairing large size defects in the craniofacial bones. Our study reveals a novel function for Gli1+ cells supporting the postnatal growth, growth and suture patency. Conclusion: Gli1-CreERT2;R26DTA mice indicates Gli1+ cell's role in support the craniofacial bone healing and injury repair. Cell ablation analysis based on Gli1-CreERT2;R26DTA mice indicates that Gli1+ cells gives rise to the entire suture mesenchyme, the peristomeum, the dura and then to all the craniofacial bones under physiological condition or upon injury.

Poster: 52
Title: Survey of Shoulder Pain In Competitive Swimmers
Name: Garin Wyberg
Faculty Advisor: Jonathan Sum

Background: There are 2.5 million youth competitive swimmers in the U.S. and nonspecific shoulder pain is the most common injury in this population of athletes. Yardage swim and training hours have been highly associated with the presence of shoulder pain and supraspinatus (shoulder muscle) tendinopathy in both male and female elite youth swimmers. Although there have been recent studies examining training yardage and symptom prevalence in swimmers, the gender specific youth through high school aged category is still lacking. Therefore the appropriate yardage to begin an injury prevention program as well as indications regarding program design with respect to symptomatic swimmers' gender and physical maturation are unknown. Purpose: The primary objective of this study is to determine the prevalence of shoulder pain and swimming related disability among youth competitive male and female swimmers. Secondary objectives are: (1) to determine if a history of prior shoulder injury is related to disability. Use of anti-inflammatory medications are related to current shoulder pain, (2) to determine if average weekly yardage and/or peak weekly yardage are related to shoulder pain and disability, and (3) to potentially utilize data obtained from this study to develop a injury prevention and rehabilitation program methods: Descriptive statistics will be used to describe demographics of subjects and responses. T- tests will be used to determine if differences in symptoms exist among the age groups when comparing the pain ratings and symptom disability scores and chi-square tests will be used to determine if significant differences exist in the prevalence of pain among swimming groups. Pearson's product-moment correlation coefficient will be used to determine associations between yardage and reported shoulder pain and disability. Results: n/a Conclusion: n/a
Background: Enamel is the unique bioerodable tissue composed of highly organized biomineralized extracellular matrix (ECM). The extracellular matrix, organized by matrix proteins self-assembly and protein-protein interactions, is competent to guide initiation, growth and arrangement of HAP crystals that form the highly patterned rod-interrod microstructure observed in mature enamel. This hierarchical structure provides enamel, with its unique material properties of wear resistance and fracture toughness. Ameloblastin, the most abundant of the non-amelogenin enamel matrix proteins, is initially distributed uniformly within the newly formed rods but redistributes to the rod-interrod boundaries following proteolytic processing. The redistribution of ameloblastin cleftage products is suggested to be involved in the establishment of enamel rod-to-interrod boundary.

Purpose: This study is aimed to investigate how ameloblastin redistribution occurs during amelogenesis. We hypothesize that redistribution of ameloblastin is controlled by interactions with heterofore-known proteins within the matrix and/or located on ameloblast cells. Methods: The odontogenic epithelia of mandibular or/and maxillary sections of PN3 mouse mandibular incisor were used to construct a mouse odontogenic epithelia of mandibular or/and maxillary sections of PN3 mouse mandibular incisor. Methods:

1. **Orthodontic records and assessment**: The aim of this study was to determine guidelines and additional salient diagnostic tools to be included in orthodontic record taking and to examine how each component contributes to the treatment plan of a new orthodontic patient. Methods: Classic orthodontic textbooks and contemporary journal articles were examined, as well as supportive and clinical reasoning was provided by our advisor, Dr. Dennis Tartakow. Results: These additional orthodontic records include, (a) extra-oral radiographs (submental vertex, and posterior-anterior); (b) extra-oral photograph (frontal open mouth view); (c) mounted, articulated diagnostic casts, with a ZOE paste bite registration; (d) a complete TMJ examination; (e) a complete periodontal examination; (f) extra oral head and neck physical examination; and (g) referral to a physician when necessary. Finally, a diagnostic letter must be discussed with the patient, parent and/or legal guardian, and the consent form must be reviewed in their native language. Conclusion: While there are standard guidelines for what is included in an orthodontic record, there are additional important components that are less commonly used but equally as necessary in orthodontic record taking. In conclusion, it is desirable that the above methods of data collection should be included for each new orthodontic patient in order to develop a thorough diagnosis and treatment plan.

**Poster #: 58**

Title: Matrix Metalloproteinase-20 Prevents Occlusion of Proteins Inside Enamel Crystals

Name: Saunya Prajapati

Faculty Advisor: Janet Oldak

Background: Enamel proteases process the matrix proteins by cleaving specific functional domains which eventually degrading them to create space for hydroxyapatite crystals to grow. In an in vitro study we recently reported that during growth of calcite, full-length amelogenin gets trapped inside the crystals, affecting their morphology. Addition of MMP-20 prevented this occlusion and rescued crystal morphology. Purpose: To test the hypothesis that MMP-20 acts to prevent unwanted protein occlusion inside enamel apatite crystals during amelogenesis. Methods: We analyzed the proteins trapped inside growing crystals (MMP-20 knockout [KO] and wild type (WT) mice) by SDS-PAGE and Western Blot. Enamel from adult murine incisors was isolated and washed with a series of buffers to remove unadsorbed proteins followed by dissolution in 1M HCl. Enamel crystals were observed using AFM and HRTEM. Results: SDS-PAGE showed a significant difference in the amount of proteins in dissolved enamel crystals from MMP-20 KO mice as compared to that of WT. Western blot confirmed the presence of full-length amelogenin M180 intrapped in crystals isolated from MMP-20 KO mice. HRTEM showed increased areas of imperfection in the crystal lattices from MMP-20 KO mice. In situ AFM showed a decrease in the length and thickness and more associated protein in MMP-20 KO enamel crystals as compared to those of WT mice. Conclusion: Our results indicated that MMP-20, an amelogenin-chitosan (AMEL-CS) hydrogel promotes in vitro biomimetic enamel regrowth. Leucine rich amelogenin peptide (LRAP), a 59 residue chitosan that may also have a tentative biological role in regulating enamel mineralization with a potential application in biomimetic enamel repair and dentin hypersensitivity. Purpose: To test whether a smaller, cost-effective amelogenin-derived peptide like LRAP could (a) regulate biomimetic enamel regrowth promote occlusion of the dentinal tubules and (c) act as an effective substitute to our previously synthesized full-length amelogenin chitosan hydrogel. Methods: Human third molar samples were sectioned longitudinally into 1mm thick slices. To mimic carious lesions, the samples were immersed in a demineralising solution (pH 4.6) at 37°C for 5 days. Twenty µl of LRAP-CS and AMEL-CS hydrogel were applied separately on the demineralised windows and the tooth slices were placed in a remineralising solution (pH 7) at 37°C for 3, 5, 7 and 12 days. We characterized new crystal growth, morphology and composition using SEM and XRD. Results: De novo crystallites were formed on the carious model which gradually matured to a more densely organized apatite apatite crystal structure (7th day). In dentin, an amorphous mineral deposition was observed that significantly occluded the dentinal tubules after 12 days of remineralization. LRAP-CS hydrogel was effective in controlling organized growth of enamel-like apatite comparable to that of full-length AMEL-CS. Conclusion: Our results suggest that amelogenin-derived peptides like LRAP may be used to promote or remodel enamel crystal regrowth and tackle exposed dentin as an efficient treatment strategy for white spot lesions and dentin hypersensitivity.
Background: Based on the genome-wide transcripts profiling (rat) conducted previously by our lab, three members of Slc26a gene family members—Slc26a1, Slc26a6 and Slc26a7—are up-regulated during amelogenesis (maturation-stage/secretory-stage, m/s). Purpose: The purpose of this study is to investigate the potential role of Slc26a1, Slc26a6 and Slc26a7 at maturation-stage tooth development. Methods: First, we conducted qPCR and immunoblotting to identify the expression patterns (m/s) of Slc26a1, Slc26a6 and Slc26a7 at both mRNA and protein level, using samples obtained from the incisor enamel organ of Wistar Hanover rats. Then immunohistochemistry was used to localize the gene products of Slc26a1, Slc26a6 and Slc26a7 at the maturation-stage enamel organ. In order to elucidate the location details of these three genes within the milieu of maturation-stage ameloblasts, co-localization of Slc26a1, Slc26a6 and Slc26a7 with Actin, Casp and Cfr were conducted using immunofluorescence. Moreover, Co-immunoprecipitation was conducted between Cfr and Slc26a1, Slc26a6, Slc26a7, respectively, to disclose the potential interactions of the gene products. Finally, the enamel phenotypes of Slc26a1-/null and Slc26a7-null animal models (mice) were documented and the changes in the expression of other related genes in the mutant animals were detected by qPCR. Results: All the gene family members—Slc26a1, Slc26a6 and Slc26a7 are all up-regulated at maturation stage compared with secretory stage (fold changes: -15.5, -3.8 and -8.1). At protein level, Slc26a1, Slc26a6 and Slc26a7 show similar expression patterns which were confirmed by both immunoblotting and immunohistochemistry. In the maturation-stage ameloblasts lining along the surface of rat incisors, the gene products of Slc26a1, Slc26a6 and Slc26a7 co-localize with Cfr to the apical portion of the cytoplasmic membrane, which is different from the lateral-membrane localization pattern of Actin. In addition, the distribution of Slc26a7 was seen within the cytoplasmic/subapical region of ameloblasts, presumably related to the function of Lamp1 in the membrane. However, there was hardly any overlap between Slc26a7 and Lamp1 in their cytoplasmic distribution. From the protein complex pulled down by the antibody to Cfr, Slc26a1, Slc26a6 and Slc26a7 were separately detected by the subsequent immunoblotting, suggesting the direct interaction of each of these three genes with Cfr. Compared with their wild-type littermates, Slc26a1-/- and Slc26a7-/- animals showed mild abnormalities in enamel formation. In all the gene examined, Cfr, Acta2, NBCe1, Car2, Slc26a6 and Slc26a9 were significantly up-regulated in Slc26a1-/-and/or Slc26a7-/- animals compared with wild-type animals, which indicates that deletion of Slc26a1 or Slc26a7 induces complimentary reactions from other related genes with similar functions. Conclusion: Slc26a1, Slc26a6 and Slc26a7 are involved in the pH regulation process during enamel maturation and their functional roles may be achieved by forming complex interactions with Cfr.
submitted) that expected effect plays an important role in arm choice. Purpose: Here, we hypothesize that both differences in expected effect and in expected movement duration during the task affected and the less affected limbs are factors underlying such decreased use in stroke survivors. Methods: Seven individuals with chronic right hemiparesis (mild to moderate impairment; 46.1±9.0 on Fugl-Meyer assessment) and seven age-matched non-disabled participants were recruited. All participants were right handed and performed the Bilateral Arm Reaching Test (BART; Han, Kim, et al 2014) with two conditions: the free choice condition which the participants were asked to choose one arm or the other to reach the targets and the forced condition which the participants were asked to use their right arm (note right arm was the most affected arm for the stroke group) to reach the targets. In the free choice condition, affected arm choice was recorded while in the forced condition, hand kinematic data was recorded. Duration was computed from the movement start (above 5% of peak velocity) to the movement end (below 5% of peak velocity). Effort was modeled as the sum of squared joint torques during the movements, with the torques estimated via inverse dynamics of a 2 joint arm model. Mixed effect logistic regression was used to fit the data. Correlated ratio tests and BIC were used to compare models with effort only, movement duration only, or both. Results: For both groups, movement duration and effort were the strong predictors of right arm choice during movement duration and effort for the right arm (also affected arm for stroke group) are short and low, the participants chose their right arm to reach the targets. If we included only either movement duration or the effort in the model, arm choice patterns were differently explained for stroke and nondisabled groups. While effort was the only factor explaining arm choice shown in age-matched nondisabled group, either movement duration or effort played a key role to predict arm choice in patients with stroke. Conclusion: We plan to extend our results in the framework of delayed rewards discounting and to show the differences in reward decay rates among patients with stroke.

Poster #: 66
Title: Muscle Mass, Strength and Physical Function in Prostate Cancer Survivors
Name: Jacqueline Kiwata
Faculty Advisor: Todd Schroeder

Background: Androgen deprivation therapy (ADT), the mainstay of treatment for prostate cancer, is associated with declines in lean body mass (LBM), muscle strength, and physical function. LBM and strength are correlated with functional test performance measures of LBM and muscle strength with physical function in older, eugonadal function. LBM and strength are correlated with prostate cancer, is associated with declines in speed, long-lasting performance on balance, mobility and stair climbing. However, faster stair climbing was related to greater SEBT and faster TUG. Pearson’s correlations were used to determine relationship between knee loading deficits across tasks. Results: Uninvolved limb had greater kEXC, kEXT and kPw than involved limb for both tasks. SL had greater kEXC than RUN and larger between limbs differences (17 vs 14%). RUN had greater kEXC than SL and larger between limbs differences (31 vs 23%). RUN had greater kPw, however between limb differences didn’t reach significance. Results: Less demanding task suggests that particular attention to progression of speed at which individuals perform dynamic exercises that require rapid attenuation of forces is warranted.

Poster #: 67
Title: Motor Learning How to Move Fast in One Arm vs. Bilateral Arm Movements
Name: Hyesin Park
Faculty Advisor: Nicolas Schweighofer

Background: Short-term reach training improves reaching performance, but the learning mechanism how to move fast is still unknown. Purpose: Here, we test whether two sessions of intensive reach training lead to motor skill learning in young non-disabled individuals. If so, we investigate the skill learning mechanism. Methods: Ten participants (5F, 25±1.0 yrs) were asked to reach circular targets (diameter 3 cm) with the index fingers of their dominant hands as quickly as possible. All subjects were asked to visit the laboratory for three consecutive days on the 1st day they received intensive training of 600 movements per day on 5 targets arrayed on an arc ranging from 50 to 130 degrees at 25 cm from the home position. Before and after training in the first two days, on the third day and 1 month later, subjects performed a test consisting of reaching 35 targets presented arrayed from 30 to 150 degrees and at 10, 15, 20, 25, and 30 cm. Results: Two-day intensive training showed significant improvement in RT (1 month) improvement in performance, generalization to untrained movements, increased reliance on feedforward control (velocity profiles were initially asymmetric (right-skewed) but became symmetric with training), decrease in variability (decreased coefficient of variation in the peak acceleration), and improvement in efficiency of movement cost by increasing initial elbow height. Conclusion: Thus, short-duration and high-intensity reach training lead to motor skill learning. Training results showed the characteristics representing motor skill learning in young non-disabled individuals.

Poster #: 68
Title: Knee Loading Deficits in Dynamic Tasks in Individuals Status-Post ACLr
Name: Kristamarie Pratt
Faculty Advisor: Susan Sigward

Background: Ability to perform dynamic single limb exercises without pain is used as clinical criteria to progress individuals to running following anterior cruciate ligament reconstruction (ACLr). However, it is not clear how demands of different exercise tasks relate to demands of running. Purpose: To compare sagittal plane knee mechanics during single limb loading tasks and running within one month of initiation of running. Methods: 15 individuals status post-ACLR (122±27 days) were tested. Subjects performed run (RUN) and dynamic single limb loading task(SL) to maximal knee flexion. Knee flexion excursion (kEXC) and peak extensor moment (kEXT) and power absorption (kPw) were calculated during deceleration in involved (IN) and uninvolved (UN) limbs. 2s (task x limb) repeated measures ANOVAs were performed; paired t-tests were used for significant interactions. Between limb loading symmetry was calculated as ratio between IN/UN for kEXT and kPw. Results: Pearson’s correlations were used to determine relationship between knee loading deficits across tasks. Results: Uninvolved limb had greater kEXC, kEXT and kPw than involved limb for both tasks. SL had greater kEXC than RUN and larger between limbs differences (17 vs 14%). RUN had greater kEXT than SL and larger between limbs differences (31 vs 23%). RUN had greater kPw, however between limb differences didn’t reach significance. Results: Less demanding task suggests that particular attention to progression of speed at which individuals perform dynamic exercises that require rapid attenuation of forces is warranted.

Poster #: 69
Title: Leg Flexor and Extensor Muscle Recruitment During Chich Embryonic Movement Tasks in Young Non-Disabled Individuals
Name: SooYeon Sun
Faculty Advisor: Nina Bradley

Background: Prior to hatching, chick embryos produce repetitive leg movements (RLMs) in ovo, featuring flexor and extensor muscle alternation at locomotor frequencies. Frequently, only repetitive ankle flexor activity accompanies RLMs. Purpose: Thus, the objective of this study was to determine if recruitment attributes differ between leg flexor and extensor muscles during RLMs. Methods: Embryonic day 20, ipsilateral hip and ankle muscles or bilateral ankle muscles were implanted for electromyographic (EMG) and kinematic recording of spontaneous muscle activity. Criteria for EMG sequence inclusion were 4 or more rhythmic bursts (1-10 Hz) in 1 or more muscles accompanied by repetitive leg movement. Flexor and extensor recruitment parameters were compared between involved and non-involved leg (1 month) improvement in performance, generalization to untrained movements, increased reliance on feedforward control (velocity profiles were initially asymmetric (right-skewed) but became symmetric with training), decrease in variability (decreased coefficient of variation in the peak acceleration), and improvement in efficiency of movement cost by increasing initial elbow height. Conclusion: Thus, short-duration and high-intensity reach training lead to motor skill learning. Training results showed the characteristics representing motor skill learning in young non-disabled individuals.

Poster #: 70
Title: Feasibility of Mapping Trunk and Hip Representation in Motor Cortex
Name: Alaa Alibish
Faculty Advisor: Beth Fisher

Background: Trunk and hip muscles contribute significantly to postural control, balance and locomotion. With aging, changes in activities of these muscles are noted. While modifications in motor behavior are linked to altered representational areas in primary motor cortex (M1), the relationship between M1 organization of the trunk and hip muscles and changes in motor behavior in older adults has yet to be established. Transcranial Magnetic Stimulation (TMS) has been used to identify muscle representation in M1. Mapping the trunk and hip muscles is challenging due to the small representations of these muscles in the medial motor cortex. Purpose: Establish a methodology to quantify the spatial representation of trunk and hip musculature in young and older adults. Methods: Two young females participated in the study. Motor evoked potentials (MEPs) were quantified in the external oblique, hamstring longissimus and gluteus medius using a double cone coil and surface electromyography. Motor thresholding and mapping were conducted during a submaximal active contraction (20% of maximum voluntary isometric contraction) for all three muscles. Average peak-to-peak amplitude of MEPs was calculated for each map location and utilized to determine the center of gravity (COG) for each muscle. Results: MEPs were elicited consistently in all locations. Youths had greater kEXC and kEXT ratios during RUN was correlated with ratios during RLM (r=0.77±0.07). Conclusion: Loading symmetries were highly related suggesting that SL can provide information regarding readiness to initiate running. Large between limb differences during less demanding task suggests that particular attention to progression of speed at which individuals perform dynamic exercises that require rapid attenuation of forces is warranted.

Poster #: 71
Title: Upper Extremity Function and Isometric Strength in Breast Cancer Survivors
Name: Lindsey Avery
Faculty Advisor: Christine Dieli-Conwright

Background: Rehabilitation from mastectomy in breast cancer survivors (BCS) is challenged by the effects of surgery, chemotherapy, radiation and adjuvant endocrine therapy. Purpose: Determine whether baseline measures of LBM and muscle strength correlate with functional test performance in BCS on ADT. Methods: Eight BCS (62±9.3 yr) on ADT were recruited as part of a larger ongoing trial. LBM was measured by dual-energy x-ray absorptiometry. Strength was assessed by 1-repetition maximum tests of the seated row and leg curl. Functional measures included stair climb, Star Excursion Balance Test (SEBT) and timed up-and-go (TUG). Relationships between outcomes were analyzed using Pearson correlations with statistical significance set at p<0.05. Results: A strong correlation was observed between LBM and seated row strength (r=0.95±0.01). No significant associations were found between LBM and other outcomes. Strength measures were not correlated with functional performance. Stair climb was negatively correlated with SEBT (r=-0.84±0.01) and positively correlated with TUG (r=0.84±0.01). Conclusion: LBM and strength were not associated with performance on balance, mobility and stair climbing. However, faster stair climbing was related to greater SEBT and faster TUG. Results: Pearson’s correlations were used to determine relationship between knee loading deficits across tasks. Results: Uninvolved limb had greater kEXC, kEXT and kPw than involved limb for both tasks. SL had greater kEXC than RUN and larger between limbs differences (17 vs 14%). RUN had greater kEXT than SL and larger between limbs differences (31 vs 23%). RUN had greater kPw, however between limb differences didn’t reach significance. Results: Less demanding task suggests that particular attention to progression of speed at which individuals perform dynamic exercises that require rapid attenuation of forces is warranted.
by reduced range of motion and strength associated with disuse. The PENN Shoulder Scale (PSS) and the Disability of the Arm, Shoulder and Hand (DASH) questionnaires are used to quantify subjective upper limb impairment. Purpose: To examine the associations between self-reported upper extremity function using DASH and PSS with active range of motion (AROM) and isometric strength (IS) of the surgically affected limb in LCS. Methods: Thirty-one LCS patients (ages 52.4±9.9 years) were recruited from LAC-USC Hospital and Norris Comprehensive Cancer Center. Investigators measured AROM during external rotation (ER) and internal rotation and shoulder flexion (SFF) using a goniometer, and while in a neutral elevation (SE) and external rotation (ER) using a hand-held dynamometer. Participants then completed DASH and PSS questionnaires. Pearson correlations were used to determine associations between DASH, PSS, and AROM and IS. Results: Mean PSS and DASH scores (±SD) were 72.8±19.8 points and 18.9±15.9 points (both out of 100 points). No statistically significant relationship was detected between PSS scores and AROM (ER, p=0.08, r=0.30) or IS (ER, p=0.46, r=0.12; SE, p=0.39, r=0.15) or between DASH scores and AROM (ER, p=0.28, r=-0.17; SE, p=0.50, r=0.10) or IS (ER, p=0.00, r=0.13; SE, p=0.76, r=0.05). Cervical DASH and DASH were not related to AROM or IS in LCS. These self-reported assessment tools may not be appropriate for predicting upper body strength or range of motion in LCS.

Poster #: 72

Title: Development of a Modified Reaching Performance Scale for the WMFT
Name: Helen Bacon
Faculty Advisor: Carolle Winston

Background: Movement after stroke is often characterised by the use of compensatory movement patterns rather than restoration of previous function. Currently, there are no widely applied outcome measures that adequately represent how a movement is measured AROM during external rotation (ER) and internal rotation and shoulder flexion (SFF) using a goniometer, and while in a neutral elevation (SE) and external rotation (ER) using a hand-held dynamometer. Participants then completed DASH and PSS questionnaires. Pearson correlations were used to determine associations between DASH, PSS, and AROM and IS. Results: Mean PSS and DASH scores (±SD) were 72.8±19.8 points and 18.9±15.9 points (both out of 100 points). No statistically significant relationship was detected between PSS scores and AROM (ER, p=0.08, r=0.30) or IS (ER, p=0.46, r=0.12; SE, p=0.39, r=0.15) or between DASH scores and AROM (ER, p=0.28, r=-0.17; SE, p=0.50, r=0.10) or IS (ER, p=0.00, r=0.13; SE, p=0.76, r=0.05). Cervical DASH and DASH were not related to AROM or IS in LCS. These self-reported assessment tools may not be appropriate for predicting upper body strength or range of motion in LCS.

Poster #: 72

Title: Development of a Modified Reaching Performance Scale for the WMFT
Name: Helen Bacon
Faculty Advisor: Carolle Winston

Background: Movement after stroke is often characterised by the use of compensatory movement patterns rather than restoration of previous function. Currently, there are no widely applied outcome measures that adequately represent how a movement is measured AROM during external rotation (ER) and internal rotation and shoulder flexion (SFF) using a goniometer, and while in a neutral elevation (SE) and external rotation (ER) using a hand-held dynamometer. Participants then completed DASH and PSS questionnaires. Pearson correlations were used to determine associations between DASH, PSS, and AROM and IS. Results: Mean PSS and DASH scores (±SD) were 72.8±19.8 points and 18.9±15.9 points (both out of 100 points). No statistically significant relationship was detected between PSS scores and AROM (ER, p=0.08, r=0.30) or IS (ER, p=0.46, r=0.12; SE, p=0.39, r=0.15) or between DASH scores and AROM (ER, p=0.28, r=-0.17; SE, p=0.50, r=0.10) or IS (ER, p=0.00, r=0.13; SE, p=0.76, r=0.05). Cervical DASH and DASH were not related to AROM or IS in LCS. These self-reported assessment tools may not be appropriate for predicting upper body strength or range of motion in LCS.

Poster #: 72

Title: Development of a Modified Reaching Performance Scale for the WMFT
Name: Helen Bacon
Faculty Advisor: Carolle Winston

Background: Movement after stroke is often characterised by the use of compensatory movement patterns rather than restoration of previous function. Currently, there are no widely applied outcome measures that adequately represent how a movement is measured AROM during external rotation (ER) and internal rotation and shoulder flexion (SFF) using a goniometer, and while in a neutral elevation (SE) and external rotation (ER) using a hand-held dynamometer. Participants then completed DASH and PSS questionnaires. Pearson correlations were used to determine associations between DASH, PSS, and AROM and IS. Results: Mean PSS and DASH scores (±SD) were 72.8±19.8 points and 18.9±15.9 points (both out of 100 points). No statistically significant relationship was detected between PSS scores and AROM (ER, p=0.08, r=0.30) or IS (ER, p=0.46, r=0.12; SE, p=0.39, r=0.15) or between DASH scores and AROM (ER, p=0.28, r=-0.17; SE, p=0.50, r=0.10) or IS (ER, p=0.00, r=0.13; SE, p=0.76, r=0.05). Cervical DASH and DASH were not related to AROM or IS in LCS. These self-reported assessment tools may not be appropriate for predicting upper body strength or range of motion in LCS.

Poster #: 72

Title: Development of a Modified Reaching Performance Scale for the WMFT
Name: Helen Bacon
Faculty Advisor: Carolle Winston

Background: Movement after stroke is often characterised by the use of compensatory movement patterns rather than restoration of previous function. Currently, there are no widely applied outcome measures that adequately represent how a movement is measured AROM during external rotation (ER) and internal rotation and shoulder flexion (SFF) using a goniometer, and while in a neutral elevation (SE) and external rotation (ER) using a hand-held dynamometer. Participants then completed DASH and PSS questionnaires. Pearson correlations were used to determine associations between DASH, PSS, and AROM and IS. Results: Mean PSS and DASH scores (±SD) were 72.8±19.8 points and 18.9±15.9 points (both out of 100 points). No statistically significant relationship was detected between PSS scores and AROM (ER, p=0.08, r=0.30) or IS (ER, p=0.46, r=0.12; SE, p=0.39, r=0.15) or between DASH scores and AROM (ER, p=0.28, r=-0.17; SE, p=0.50, r=0.10) or IS (ER, p=0.00, r=0.13; SE, p=0.76, r=0.05). Cervical DASH and DASH were not related to AROM or IS in LCS. These self-reported assessment tools may not be appropriate for predicting upper body strength or range of motion in LCS.
without overuse injury may provide important insights into risk factors and provide an important starting point for the development of interventions that prevent the development or recurrence of these injuries. Piloting will begin in stationary and directional hopping in persons with Achilles tendinopathy and age/ activity matched healthy controls.

Poster #: 78
Title: Impacts of Autonomy-Supportive versus Controlling Instructional Language on Motor Learning
Name: Andrew Hooyman
Faculty Advisor: Carolle WYN

Background: The perceived control over one’s environment has been postulated as a basic human psychological need. It may then be assumed that lack of this perception may impact one’s ability to both perform and learn optimally. Within the context of motor learning and physical rehabilitation perceived autonomy may benefit motor skill acquisition and reconstitute. Purpose: The authors examined the influence of autonomy-supportive (ASL), controlling (CL), and neutral instructional language (NL) on motor learning (cricket bowling action). We hypothesized that the ASL group would have improved performance and learning of the motor skill compared to the NL and CL groups. Our secondary hypothesis is that incorporation of autonomy support within practice would also improve secondary outcomes such as perceived autonomy, positive affect, and self-efficacy. Methods: Prior to and several times during the practice phase, participants watched the same video demonstration of the bowling action but with different voice-over instructions. The video instructions were identical in all other respects to provide the same technical information but to vary in terms of the degree of choice performers would perceive when executing the task. In addition to measurements of throwing accuracy (i.e., deviation from the target), perceived choice, self-efficacy, and positive and negative affect were assessed at the end of the practice phase and after a retention test without demonstrations and instructions on Day 2. Results: ASL resulted in perceptions of greater choice, higher self-efficacy, and more positive affect during practice than CL and enhanced learning as demonstrated by retention test performance. Thus, granting learners autonomy appeared to allow them to elicit their confidence in their ability, diminished needs for control of negative emotional responses, and created more positive affect, which may help consolidate motor memories. Conclusion: We interpret the results of this study that instructions containing autonomy support should be used to enhance motor memory consolidation compared to instruction containing controlling language. The future direction of this research is to incorporate autonomy-support within physical rehabilitation paradigms.

Poster #: 79
Title: Effect of Positioning Devices on Infant Movement
Name: Cristal Jiang
Faculty Advisor: Beth Fisher

Background: Infant movement can be used as an indicator of developmental progress. This study explores infant leg and foot movement in various environmental contexts: when constrained in a bumbo or car seat or when encouraged to move in a gym. Purpose: We aim to determine if positioning devices affect infant movement rates, and, if so, whether the effects are similar in infants with typical development (TD) and at risk or with developmental delay (AR). Methods: Video data were recorded of 13 infants with TD and 13 AR placed in supine, a car seat, a bumbo seat, or in supine underneath a gym. Trained behavior coders identified start and stop points of leg and foot movements. Results: Preliminary analysis for infants with TD showed the average quantity of leg movements in 4 minutes was: 265 in supine, 245 in a standard car seat, 164 under a jungle gym and 77 in a bumbo seat. Average quantity of foot movements in 4 minutes was: 84 in a bumbo seat, 20 in a standard car seat, 7 in supine, and 2 under a jungle gym. Conclusion: Movement rates were affected by positioning devices. No change in leg movements, but more foot movements were observed when infants were in the car seat. Less leg, but more foot movements were observed when in the bumbo seat. Less leg and foot movements were observed when under a jungle gym. Future directions will analyze infants AR and statistically test results.
Background: Infants with developmental delays may have difficulty coordinating lower extremity movements. Future studies should investigate how gait mechanics modulate braking force and knee loading and the mechanisms that underlie these movement patterns. This is mainly because activities like turning, standing, and figure of eight walking while running are associated with high loading rates. Purpose: To elucidate the biomechanical differences during forced ankle plantarflexion and dorsiflexion. Step-wise multiple regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control.

Methods: Ten male (age, 27.1 ± 7.0 yr; height, 1.74 ± 0.9 m; weight, 71.1± 8.2kg) heel-strike runners were instrumented with surface and fine-wire electromyography in postural muscles (1500Hz) and anthropometrics utilizing subject-specific finite element models. The unexpected findings of MF require more thought and indicate that this task requires fundamental differences in how the arm flexion tasks are performed.

Results: Relative to rectus femoris onset at 0 ms, on average TA activated at 19.4 ms in the uninstructed condition, 35.2 ms in the fast condition, -210.0 ms in the dual attention condition, and -68.2 ms in the fatigued condition. Contrary to what was expected, MF was activated prior to leg loading and involved the use of flexor junctions. However, the role of the rectus femoris, remaining off during the period of sustained flexion. Conclusion: The unexpected findings of MF require more thought and indicate that this task requires fundamental differences in how the arm flexion tasks are performed.

Reference: Jeffrey R. Kelly, et al. (2014) Title: Hip and Ankle Moments During Forward Reach: Comparison Across Strategies. Name: Talika Nandi Faculty Advisor: George Salem Background: It has been demonstrated that the hip strategy (HS) is chosen instead of ankle strategy (AS) only when large or rapid external perturbations are encountered. This suggests that the hypothesis that use of HS during self-initiated movements that are relatively safe or involve small center of mass (COM) excursions indicate poor balance, possibly due to changes in the maturation of the postural control system. Results: Reach distance normalized by height was significantly higher during HP compared to HS. However, the role of the HS during self-initiated standing forward reach. Methods: 5 young participants stood with their right shoulder flexed to 90°, reached forward as fast as possible without taking a step and without raising their heels off the floor. 3 trials each were collected with 2 different instructions – do not bend the hip (AS) and bend the hip (HS). 2 force plates and an 11 camera motion capture system were used to obtain moments, and whole-body COM and center of pressure (COP) excursions. Therefore, use of HS may not necessarily be a last resort indicating absence of ankle strength and the hip should not be ignored during assessment and retraining of balance.

Reference: Jeffrey R. Kelly, et al. (2014) Title: A Comparison of Techniques to Quantify Dynamic Margins of Stability. Name: Tariq Mukherjee Faculty Advisor: James Finley Background: A number of studies have looked into dynamic postural control strategies during activities such as standing, walking, and walking while turning. This is mainly because activities like turning require dynamic control of the center of mass (COM), to maintain it within the base of support (BOS). Typically, calculation of the COM’s kinematics requires a full body marker set which has several disadvantages such as: 1) long preparation time, 2) tedious data analysis process, 3) undetected markers, 4) marker due to noise. Hence simple kinematic models, which take into account fewer markers, would be useful to determine the COM and the dynamic margins of stability (MFS). Purpose: We are using wearable sensors to record full-day infant movements in order to predict outcomes for at-risk infants. Our goal here is to determine whether wearing the sensors affects leg movements. Methods: Twenty male (age, 27.1 ± 7.0 yr; height, 1.74 ± 0.9 m; weight, 71.1 ± 8.2 kg) and 20 female heel-strike runners (age, 26.2 ± 5.8 yr; height, 1.65 ± 7.4 m; weight, 60.6 ± 6.6 kg) were recruited for this study. Kinematic and kinetic data were collected at a footroll speed of 3.4 m/s along a 14 meter runway with a force plate mounted flush to the floor. Lower extremity joint kinematics, kinetics, energetic variables and leg/joint stiffness during initial loading were analyzed. Step-wise multiple linear regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control. Results: Significant differences were found between strategies. Conclusion: Using HS allowed participants to reach further without increasing the balance risk as assessed by COP and COM excursions. Therefore, use of HS may not necessarily be a last resort indicating absence of ankle strength and the hip should not be ignored during assessment and retraining of balance.

Reference: Jeffrey R. Kelly, et al. (2014) Title: Frequency of Infants’ Leg Movements During Voluntary Leg Lift. Name: Emily Perkins Faculty Advisor: Beth Smith Background: In infants with developmental delays may have difficulty coordinating lower extremity movements. Future studies should investigate how gait mechanics modulate braking force and knee loading and the mechanisms that underlie these movement patterns. This is mainly because activities like turning, standing, and figure of eight walking while running are associated with high loading rates. Purpose: To elucidate the biomechanical differences during forced ankle plantarflexion and dorsiflexion. Step-wise multiple regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control.

Methods: Ten male (age, 27.1 ± 7.0 yr; height, 1.74 ± 0.9 m; weight, 71.1 ± 8.2 kg) and 20 female heel-strike runners (age, 26.2 ± 5.8 yr; height, 1.65 ± 7.4 m; weight, 60.6 ± 6.6 kg) were recruited for this study. Kinematic and kinetic data were collected at a footroll speed of 3.4 m/s along a 14 meter runway with a force plate mounted flush to the floor. Lower extremity joint kinematics, kinetics, energetic variables and leg/joint stiffness during initial loading were analyzed. Step-wise multiple linear regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control. Results: Significant differences were found between strategies. Conclusion: Using HS allowed participants to reach further without increasing the balance risk as assessed by COP and COM excursions. Therefore, use of HS may not necessarily be a last resort indicating absence of ankle strength and the hip should not be ignored during assessment and retraining of balance.

Reference: Jeffrey R. Kelly, et al. (2014) Title: A Comparison of Techniques to Quantify Dynamic Margins of Stability. Name: Tariq Mukherjee Faculty Advisor: James Finley Background: A number of studies have looked into dynamic postural control strategies during activities such as standing, walking, and walking while turning. This is mainly because activities like turning require dynamic control of the center of mass (COM), to maintain it within the base of support (BOS). Typically, calculation of the COM’s kinematics requires a full body marker set which has several disadvantages such as: 1) long preparation time, 2) tedious data analysis process, 3) undetected markers, 4) marker due to noise. Hence simple kinematic models, which take into account fewer markers, would be useful to determine the COM and the dynamic margins of stability (MFS). Purpose: We are using wearable sensors to record full-day infant movements in order to predict outcomes for at-risk infants. Our goal here is to determine whether wearing the sensors affects leg movements. Methods: Twenty male (age, 27.1 ± 7.0 yr; height, 1.74 ± 0.9 m; weight, 71.1 ± 8.2 kg) and 20 female heel-strike runners (age, 26.2 ± 5.8 yr; height, 1.65 ± 7.4 m; weight, 60.6 ± 6.6 kg) were recruited for this study. Kinematic and kinetic data were collected at a footroll speed of 3.4 m/s along a 14 meter runway with a force plate mounted flush to the floor. Lower extremity joint kinematics, kinetics, energetic variables and leg/joint stiffness during initial loading were analyzed. Step-wise multiple linear regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control. Results: Significant differences were found between strategies. Conclusion: Using HS allowed participants to reach further without increasing the balance risk as assessed by COP and COM excursions. Therefore, use of HS may not necessarily be a last resort indicating absence of ankle strength and the hip should not be ignored during assessment and retraining of balance.

Reference: Jeffrey R. Kelly, et al. (2014) Title: Frequency of Infants’ Leg Movements During Voluntary Leg Lift. Name: Emily Perkins Faculty Advisor: Beth Smith Background: In infants with developmental delays may have difficulty coordinating lower extremity movements. Future studies should investigate how gait mechanics modulate braking force and knee loading and the mechanisms that underlie these movement patterns. This is mainly because activities like turning, standing, and figure of eight walking while running are associated with high loading rates. Purpose: To elucidate the biomechanical differences during forced ankle plantarflexion and dorsiflexion. Step-wise multiple regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control.

Methods: Ten male (age, 27.1 ± 7.0 yr; height, 1.74 ± 0.9 m; weight, 71.1 ± 8.2 kg) and 20 female heel-strike runners (age, 26.2 ± 5.8 yr; height, 1.65 ± 7.4 m; weight, 60.6 ± 6.6 kg) were recruited for this study. Kinematic and kinetic data were collected at a footroll speed of 3.4 m/s along a 14 meter runway with a force plate mounted flush to the floor. Lower extremity joint kinematics, kinetics, energetic variables and leg/joint stiffness during initial loading were analyzed. Step-wise multiple linear regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control. Results: Significant differences were found between strategies. Conclusion: Using HS allowed participants to reach further without increasing the balance risk as assessed by COP and COM excursions. Therefore, use of HS may not necessarily be a last resort indicating absence of ankle strength and the hip should not be ignored during assessment and retraining of balance.

Reference: Jeffrey R. Kelly, et al. (2014) Title: A Comparison of Techniques to Quantify Dynamic Margins of Stability. Name: Tariq Mukherjee Faculty Advisor: James Finley Background: A number of studies have looked into dynamic postural control strategies during activities such as standing, walking, and walking while turning. This is mainly because activities like turning require dynamic control of the center of mass (COM), to maintain it within the base of support (BOS). Typically, calculation of the COM’s kinematics requires a full body marker set which has several disadvantages such as: 1) long preparation time, 2) tedious data analysis process, 3) undetected markers, 4) marker due to noise. Hence simple kinematic models, which take into account fewer markers, would be useful to determine the COM and the dynamic margins of stability (MFS). Purpose: We are using wearable sensors to record full-day infant movements in order to predict outcomes for at-risk infants. Our goal here is to determine whether wearing the sensors affects leg movements. Methods: Twenty male (age, 27.1 ± 7.0 yr; height, 1.74 ± 0.9 m; weight, 71.1 ± 8.2 kg) and 20 female heel-strike runners (age, 26.2 ± 5.8 yr; height, 1.65 ± 7.4 m; weight, 60.6 ± 6.6 kg) were recruited for this study. Kinematic and kinetic data were collected at a footroll speed of 3.4 m/s along a 14 meter runway with a force plate mounted flush to the floor. Lower extremity joint kinematics, kinetics, energetic variables and leg/joint stiffness during initial loading were analyzed. Step-wise multiple linear regression analysis was performed to determine the influence of tibia and femur rotations on gait and forehead postural control. Results: Significant differences were found between strategies. Conclusion: Using HS allowed participants to reach further without increasing the balance risk as assessed by COP and COM excursions. Therefore, use of HS may not necessarily be a last resort indicating absence of ankle strength and the hip should not be ignored during assessment and retraining of balance.
Background: High-intensity exercise is a form of training that is gaining popularity. The effects of high-intensity exercise have not been thoroughly investigated. More recently, high-intensity exercise has been linked to major injury. Purpose: The objective of this pilot study is to investigate the effects of participating in high-intensity exercise and potential risk factors associated with shoulder injury; the target population is individuals 18 to 40 years of age that are intending to participate in a regular high-intensity exercise regimen who have no prior experience. This study will allow us to estimate the proportion of subjects who sustain a shoulder injury as well as explore any factors or conditions that clearly predispose a subject to a shoulder injury. Methods: Using questionnaires (the Shoulder Score, the OSS, the Lysholm), and our own survey), we intend to collect qualitative and statistical methods will be used to summarize data prior to participation, and every month thereafter, up to 12 months. We will enroll subjects over one year or until we have enrolled 100 subjects and will follow subjects for one year. Standard graphical and abstract for inclusion. A final sample

Poster #: 92
Title: Risk Factors Associated with Shoulder Injury in High-intensity Exercise
Name: Corbin Skinner
Faculty Advisor: Jonathan Sun

Poster #: 94
Title: Validation of Inertial Sensors for Quantifying Full-Day Infant Movement
Name: Jessica Katz
Faculty Advisor: Jonathan Sun

Poster #: 95
Title: Examination of Flexor Bias in the Late Stage Chick Embryo
Name: Zhixing Zhang
Faculty Advisor: Nina Bradley

Poster #: 96
Title: Military Community Reintegration as Transition between Figured Worlds
Name: Alison Cogan
Faculty Advisor: Florence Clark

Poster #: 97
Title: The Influence of Social Interaction on the Latino Paradox
Name: Lucia Florinex
Faculty Advisor: Florence Clark

Background: Despite facing health disparities including low income and low education, Latinos in the United States have a significantly higher life expectancy rate than Caucasians and Blacks, an epidemiological phenomenon called the “Latino Paradox.” Many attempts have been made to explain this phenomenon, but few approaches have used a neurological lens. Purpose: Further assess the relationship between stress and social support in Latinos by presenting a way to account for the Latino Paradox that is grounded in neuroscience research. Methods: A scoping review of literature from 1980 to 2014, written in English, and published in peer-reviewed journals provided no results connecting neural implications directly with the Latino Paradox. Criteria were expanded to include studies that addressed social support related to stress, birth weight, levels of depression; a second review was conducted to find studies that discussed the neural impacts of stress. These searches yielded over 180 studies that were reviewed by title and abstract for inclusion. A final sample of 20 articles representing 4 themes were charted and summarized. Results: Studies were arranged into thematic groups: infant mortality, acculturation/immigrant status, disease burden, and impact of stress. All studies concluded that social support was an important mitigating factor in buffering the negative effects of stress. Conclusion: This relationship between stress levels and social interaction suggests a neurological explanation for the Latino paradox as related to family and social structure. Close interpersonal relationships typically characterize the social dynamics of Latino families, and such components are linked with better overall perceived health levels.

Poster #: 98
Title: Post Hip Fracture: Interdisciplinary Care Collaboration for Continuous Quality Care
Name: Heather Gillies
Faculty Advisor: Natalie Leland

Faculty Advisor: Florence Clark

Occupational Science and occupational therapy student

Poster #: 99
Title: Examination of Flexor Bias in the Late Stage Chick Embryo
Name: Zhixing Zhang
Faculty Advisor: Nina Bradley

Background: Previous studies reported that during late-stage embryogenesis in the chick, muscle bursts for repetitive limb movements (RLMs) were observed more frequently in tibialis anterior (TA, ankle flexor) than in lateral gastrocnemius (LG, ankle extensor). The apparent dominance of TA RLM bursts suggested that there may be a flexor bias in embryonic locomotor drive. It was proposed that the flexor bias may be partially attributed to the constrained posture imposed by the eggshell; however, it has yet to be determined if the flexor bias is reduced when the constraint is removed. Purpose: The aim of this study is to determine if leg flexor and extensor burst parameters differ between spatially constrained (control) and unconstrained (foot-foot, FF) RLMs. Methods: EMG recordings from a previously published study of RLMs were re-analyzed for 3 embryos to test differences in drive to leg flexor and extensor motor pools. Burst counts and normalized burst integrated amplitude (percentage of muscle’s maximum amplitude) were calculated and compared between control and FF conditions within embryo. Results: Results indicated that burst count was greater for TA than LG in both conditions for all experiments (Control: TA: 2.6±0.48; FF: 1.9±0.54; LG: 0.2±0.12). Normalized integrated amplitude was greater for TA than LG during control conditions in 2 of 3 experiments (34-36% increase) and during FF conditions in all experiments (98-141% increase). Conclusion: Our results suggest that ankle flexor muscles are more frequently and strongly recruited than extensors during RLMs under both control and FF conditions. Further, locomotor drive to flexors does not appear to differ between conditions.

Poster #: 97
Title: The Influence of Social Interaction on the Latino Paradox
Name: Lucia Florinex
Faculty Advisor: Florence Clark

Poster #: 96
Title: Military Community Reintegration as Transition between Figured Worlds
Name: Alison Cogan
Faculty Advisor: Florence Clark

Poster #: 94
Title: Cortical Activation Associated with Muscle Synergies of Female Pelvic Floor
Name: Mohab Yani
Faculty Advisor: Jason Kutch

Poster #: 95
Title: Examination of Flexor Bias in the Late Stage Chick Embryo
Name: Zhixing Zhang
Faculty Advisor: Nina Bradley

Background: Muscle synergies of the human male pelvic floor appear to involve activation of motor cortical areas associated with floor control (Asavasopon et al., 2014); however, these synergies remain unstudied in healthy adult females, and the rules by which they are activated are poorly understood. Purpose: Here, we hypothesize that activations in motor cortical regions associated with the human female pelvic floor activation are part of the neural substrate for such synergies. Furthermore, we hypothesize that the synergies of the human female pelvic floor are graded, where a change in one muscle activation may be associated with changes in the activation patterns of the other synergistic muscles. The other synergistic musclesactivate synergistically during voluntary activation of gluteal muscles, but not during voluntary activation of finger muscles; (2) pelvic floor muscles activation does not change when activation level of the gluteal muscles changes; and, (3) the onset of pelvic floor muscles activation does not change when activation level of the gluteal muscles changes. Furthermore, we will use functional magnetic resonance (fMRI) to test whether in females a region of the medial motor wall of the precentral gyrus consistently activates pelvic floor and voluntary pelvic floor activation and voluntary gluteal muscles activation, but not during voluntary finger muscles activation. Finally, we will test whether EMG and MRI activation patterns remain consistent. Results: A subject-based analysis method for measuring quantitative analysis method for measuring joint movement. The second variable that entered the knee angle change from initial contact to the impact peak (Δ R2 =0.04). The second variable that entered the knee angle change from initial contact to the impact peak (Δ R2 =0.04).

Poster #: 92
Title: Risk Factors Associated with Shoulder Injury in High-intensity Exercise
Name: Corbin Skinner
Faculty Advisor: Jonathan Sun

Poster #: 94
Title: Validation of Inertial Sensors for Quantifying Full-Day Infant Movement
Name: Jessica Katz
Faculty Advisor: Jonathan Sun

Poster #: 95
Title: Examination of Flexor Bias in the Late Stage Chick Embryo
Name: Zhixing Zhang
Faculty Advisor: Nina Bradley

Background: Previous studies reported that during late-stage embryogenesis in the chick, muscle bursts for repetitive limb movements (RLMs) were observed more frequently in tibialis anterior (TA, ankle flexor) than in lateral gastrocnemius (LG, ankle extensor). The apparent dominance of TA RLM bursts suggested that there may be a flexor bias in embryonic locomotor drive. It was proposed that the flexor bias may be partially attributed to the constrained posture imposed by the eggshell; however, it has yet to be determined if the flexor bias is reduced when the constraint is removed. Purpose: The aim of this study is to determine if leg flexor and extensor burst parameters differ between spatially constrained (control) and unconstrained (foot-foot, FF) RLMs. Methods: EMG recordings from a previously published study of RLMs were re-analyzed for 3 embryos to test differences in drive to leg flexor and extensor motor pools. Burst counts and normalized burst integrated amplitude (percentage of muscle’s maximum amplitude) were calculated and compared between control and FF conditions within embryo. Results: Results indicated that burst count was greater for TA than LG in both conditions for all experiments (Control: TA: 2.6±0.48; FF: 1.9±0.54; LG: 0.2±0.12). Normalized integrated amplitude was greater for TA than LG during control conditions in 2 of 3 experiments (34-36% increase) and during FF conditions in all experiments (98-141% increase). Conclusion: Our results suggest that ankle flexor muscles are more frequently and strongly recruited than extensors during RLMs under both control and FF conditions. Further, locomotor drive to flexors does not appear to differ between conditions.

Poster #: 97
Title: The Influence of Social Interaction on the Latino Paradox
Name: Lucia Florinex
Faculty Advisor: Florence Clark

Poster #: 96
Title: Military Community Reintegration as Transition between Figured Worlds
Name: Alison Cogan
Faculty Advisor: Florence Clark

Poster #: 94
Title: Cortical Activation Associated with Muscle Synergies of Female Pelvic Floor
Name: Mohab Yani
Faculty Advisor: Jason Kutch

Poster #: 95
Title: Examination of Flexor Bias in the Late Stage Chick Embryo
Name: Zhixing Zhang
Faculty Advisor: Nina Bradley

Background: Muscle synergies of the human male pelvic floor appear to involve activation of motor cortical areas associated with floor control (Asavasopon et al., 2014); however, these synergies remain unstudied in healthy adult females, and the rules by which they are activated are poorly understood. Purpose: Here, we hypothesize that activations in motor cortical regions associated with the human female pelvic floor activation are part of the neural substrate for such synergies. Furthermore, we hypothesize that the synergies of the human female pelvic floor are graded, where a change in one muscle activation may be associated with changes in the activation patterns of the other synergistic muscles. The other synergistic musclesactivate synergistically during voluntary activation of gluteal muscles, but not during voluntary activation of finger muscles; (2) pelvic floor muscles activation does not change when activation level of the gluteal muscles changes; and, (3) the onset of pelvic floor muscles activation does not change when activation level of the gluteal muscles changes. Furthermore, we will use functional magnetic resonance (fMRI) to test whether in females a region of the medial motor wall of the precentral gyrus consistently activates pelvic floor and voluntary pelvic floor activation and voluntary gluteal muscles activation, but not during voluntary finger muscles activation. Finally, we will test whether EMG and MRI activation patterns remain consistent. Results: A subject-based
Background: Mindfulness is used to help patients focus nonjudgmentally on the experience of the present moment which improves health-related outcomes such as pain and anxiety. Because mindfulness interventions are theoretically compatible with current models of occupational therapy (OT), there is an emerging literature suggesting a use for mindfulness in OT practice. Purpose: A scoping review was conducted to describe how mindfulness is used in rehabilitative contexts for body-related disorders, identify the potential applicability of mindfulness to occupational therapy, and illuminate gaps in the current research. Methods: PubMed, CINAHL, SPORTDiscus, and PsycINFO were searched using the terms “therapeutics,” “rehabilitation,” “mindfulness,” and “mindfulness.” Abstracts were screened and full text manuscripts read for eligibility by 2 reviewers. Articles were included if they described clinical applications of mindfulness interventions for body-related disorders, had relevance to rehabilitation in occupational therapy, and were published in a rehabilitative context. Results: The search produced 1524 original abstracts, of which 188 articles were read in full, and 16 were included. Included articles described clinical applications of mindfulness interventions, had relevance to rehabilitation in occupational therapy, and were published in a rehabilitative context. Conclusions: The search produced 1524 original abstracts, of which 188 articles were read in full, and 16 were included. Included articles described clinical applications of mindfulness interventions, had relevance to rehabilitation in occupational therapy, and were published in a rehabilitative context.
Title: Enhancing Quality of Life for Individuals with Dementia
Name: Caiin Wong
Faculty Advisor: Natalie Leland

Background: The management of negative behavioral symptoms among residents with dementia is a challenge that nursing homes face in delivering quality care. Traditional medication-based treatments have resulted in adverse patient outcomes. Thus, there is a growing interest in non-pharmacological approaches to promote the quality of life among these nursing home residents.

Purpose: To examine non-pharmacological interventions targeting negative behaviors among residents with dementia in nursing homes in an effort to increase their quality of life.

Methods: A scoping review of intervention studies was conducted and included articles published from 1987 to 2014, written in English, published in peer-reviewed journals, measured negative behavioral symptoms as a primary patient outcome, and included a sample of nursing home residents 60 years of age or older diagnosed with dementia. Five hundred forty-two articles were initially reviewed by title and abstract, resulting in 96 articles, of which 75 full text articles were then obtained and reviewed to meet the inclusion and exclusion criteria. The final sample of 22 articles was charted and summarized. Results: Twenty-two studies addressed interventions targeting negative behavioral symptoms in older adults with dementia residing in nursing homes.

Four types of interventions were identified: occupation-based interventions (n=14), context and environment interventions (n=5), exercise interventions (n=2), and daily routine-based interventions (n=3). Conclusion: These findings suggest that non-pharmacological interventions can reduce negative behavioral symptoms for older adults with dementia residing in nursing homes.

Title: A New Perspective on Gnathology
Poster #: 108
Title: Bisphosphonate Uptake in Areas of Tooth Extraction or Periapical Disease
Name: Simon Cheong
Faculty Advisor: Satrios Tetradis

Background: Medication-related osteonecrosis of the jaws (ONJ) is a serious complication of treatment with antiresorptive agents, affecting patients with cancer or metabolic bone disease. ONJ lesions mainly involve high BP teeth deemed unrestorable or around teeth with active periodontal or periapical disease. A puzzling question is the nearly exclusive selection of the disease for the jaws, although the remaining skeleton appears to be spared.

Purpose: Various hypotheses have been proposed to explain the jaw predilection to osteonecrosis in the presence of BPs. Among them, increased bone turnover of the jaws was considered. Whether bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas. Methods: Maxillary molars were extracted or the crowns of mandibular molars were drilled to induce pulp exposure. Animals were injected with fluorescent-labeled zoledronic acid (5-FAMZOL) 200 mg/kg at various times after intervention and fluorescence was measured at healthy versus intervention sites. Fluorescence imaging at 520-nm wavelength and 25-ms exposure was performed. Results: A statistical significant, time-dependent uptake of 5-FAM-ZOL was detected in the areas of extraction socket and in the alveolar ridge around teeth with periapical disease compared with the healthy contralateral sites of the same animals. Conclusion: These data suggest that sites with increased bone turnover, such as extraction sites or areas of periapical inflammation, are exposed to higher BP doses and that these areas were anatomiﬁcally related to receptor activator of nuclear factor kappa B (RANK) ligand and increased RANKL/osteoprotegerin ratio compared to extraction sockets. In conclusion, jaw predilection to osteonecrosis is due to a preferential uptake of BPs to the maxilla and mandible. Bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas.

Title: Flavonoids for CMV-Induced Salivary Gland Tumor Therapy
Name: Mark Choe
Faculty Advisor: Tina Jaskoll

Background: Mucoepidermoid carcinoma (MEC) is the most common malignant tumor in major and minor salivary glands. However, there are presently no effective treatments for MEC. Our laboratory has shown cytoreductive (CMV) infection to be an important component of human MEC tumorigenesis. Since current anti-CMV drugs are limited due to toxicity and drug resistance, there is an urgent need for new anti-CMV treatments. Purpose: Our strategy for developing new anti-CMV therapeutics is to focus on the flavonoid family of phytochemicals, natural “anti-viral/anti-cell signaling” agents extensively used in herbal medicine. Our laboratory has proposed to explain the jaw predilection to osteonecrosis in the presence of BPs. Among them, increased bone turnover of the jaws was considered. Whether bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas. Methods: Maxillary molars were extracted or the crowns of mandibular molars were drilled to induce pulp exposure. Animals were injected with fluorescent-labeled zoledronic acid (5-FAMZOL) 200 mg/kg at various times after intervention and fluorescence was measured at healthy versus intervention sites. Fluorescence imaging at 520-nm wavelength and 25-ms exposure was performed. Results: A statistical significant, time-dependent uptake of 5-FAM-ZOL was detected in the areas of extraction socket and in the alveolar ridge around teeth with periapical disease compared with the healthy contralateral sites of the same animals. Conclusion: These data suggest that sites with increased bone turnover, such as extraction sites or areas of periapical inflammation, are exposed to higher BP doses and that these areas were anatomiﬁcally related to receptor activator of nuclear factor kappa B (RANK) ligand and increased RANKL/osteoprotegerin ratio compared to extraction sockets. In conclusion, jaw predilection to osteonecrosis is due to a preferential uptake of BPs to the maxilla and mandible. Bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas.

Title: Bisphosphonate Uptake in Areas of Tooth Extraction or Periapical Disease
Name: Simon Cheong
Faculty Advisor: Satrios Tetradis

Background: Medication-related osteonecrosis of the jaws (ONJ) is a serious complication of treatment with antiresorptive agents, affecting patients with cancer or metabolic bone disease. ONJ lesions mainly involve high BP teeth deemed unrestorable or around teeth with active periodontal or periapical disease. A puzzling question is the nearly exclusive selection of the disease for the jaws, although the remaining skeleton appears to be spared.

Purpose: Various hypotheses have been proposed to explain the jaw predilection to osteonecrosis in the presence of BPs. Among them, increased bone turnover of the jaws was considered. Whether bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas. Methods: Maxillary molars were extracted or the crowns of mandibular molars were drilled to induce pulp exposure. Animals were injected with fluorescent-labeled zoledronic acid (5-FAMZOL) 200 mg/kg at various times after intervention and fluorescence was measured at healthy versus intervention sites. Fluorescence imaging at 520-nm wavelength and 25-ms exposure was performed. Results: A statistical significant, time-dependent uptake of 5-FAM-ZOL was detected in the areas of extraction socket and in the alveolar ridge around teeth with periapical disease compared with the healthy contralateral sites of the same animals. Conclusion: These data suggest that sites with increased bone turnover, such as extraction sites or areas of periapical inflammation, are exposed to higher BP doses and that these areas were anatomiﬁcally related to receptor activator of nuclear factor kappa B (RANK) ligand and increased RANKL/osteoprotegerin ratio compared to extraction sockets. In conclusion, jaw predilection to osteonecrosis is due to a preferential uptake of BPs to the maxilla and mandible. Bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas.

Title: Bisphosphonate Uptake in Areas of Tooth Extraction or Periapical Disease
Name: Simon Cheong
Faculty Advisor: Satrios Tetradis

Background: Medication-related osteonecrosis of the jaws (ONJ) is a serious complication of treatment with antiresorptive agents, affecting patients with cancer or metabolic bone disease. ONJ lesions mainly involve high BP teeth deemed unrestorable or around teeth with active periodontal or periapical disease. A puzzling question is the nearly exclusive selection of the disease for the jaws, although the remaining skeleton appears to be spared.

Purpose: Various hypotheses have been proposed to explain the jaw predilection to osteonecrosis in the presence of BPs. Among them, increased bone turnover of the jaws was considered. Whether bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas. Methods: Maxillary molars were extracted or the crowns of mandibular molars were drilled to induce pulp exposure. Animals were injected with fluorescent-labeled zoledronic acid (5-FAMZOL) 200 mg/kg at various times after intervention and fluorescence was measured at healthy versus intervention sites. Fluorescence imaging at 520-nm wavelength and 25-ms exposure was performed. Results: A statistical significant, time-dependent uptake of 5-FAM-ZOL was detected in the areas of extraction socket and in the alveolar ridge around teeth with periapical disease compared with the healthy contralateral sites of the same animals. Conclusion: These data suggest that sites with increased bone turnover, such as extraction sites or areas of periapical inflammation, are exposed to higher BP doses and that these areas were anatomiﬁcally related to receptor activator of nuclear factor kappa B (RANK) ligand and increased RANKL/osteoprotegerin ratio compared to extraction sockets. In conclusion, jaw predilection to osteonecrosis is due to a preferential uptake of BPs to the maxilla and mandible. Bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas.

Title: Bisphosphonate Uptake in Areas of Tooth Extraction or Periapical Disease
Name: Simon Cheong
Faculty Advisor: Satrios Tetradis

Background: Medication-related osteonecrosis of the jaws (ONJ) is a serious complication of treatment with antiresorptive agents, affecting patients with cancer or metabolic bone disease. ONJ lesions mainly involve high BP teeth deemed unrestorable or around teeth with active periodontal or periapical disease. A puzzling question is the nearly exclusive selection of the disease for the jaws, although the remaining skeleton appears to be spared.

Purpose: Various hypotheses have been proposed to explain the jaw predilection to osteonecrosis in the presence of BPs. Among them, increased bone turnover of the jaws was considered. Whether bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas. Methods: Maxillary molars were extracted or the crowns of mandibular molars were drilled to induce pulp exposure. Animals were injected with fluorescent-labeled zoledronic acid (5-FAMZOL) 200 mg/kg at various times after intervention and fluorescence was measured at healthy versus intervention sites. Fluorescence imaging at 520-nm wavelength and 25-ms exposure was performed. Results: A statistical significant, time-dependent uptake of 5-FAM-ZOL was detected in the areas of extraction socket and in the alveolar ridge around teeth with periapical disease compared with the healthy contralateral sites of the same animals. Conclusion: These data suggest that sites with increased bone turnover, such as extraction sites or areas of periapical inflammation, are exposed to higher BP doses and that these areas were anatomiﬁcally related to receptor activator of nuclear factor kappa B (RANK) ligand and increased RANKL/osteoprotegerin ratio compared to extraction sockets. In conclusion, jaw predilection to osteonecrosis is due to a preferential uptake of BPs to the maxilla and mandible. Bone turnover and suppression of bone turnover suggest a preferential uptake of BPs to the maxilla and mandible. Because socket healing or dental disease shows higher bone turnover, the authors hypothesized that preferentially high BP accumulation would be observed in these areas.
cell differentiation in diverse organs. However, the function of the nerves in different aspects of palatogenesis is yet to be elucidated. As a first step, we present here a three dimensional description of the anatomy of the nerve in the palatal shelves at a key developmental stage. Methods: Heads of wild type mouse embryos at developmental stage E13.5 were sectioned coronally. Immunostaining using an antibody to neurofilament and tol2 mediated transgenesis on sections using conventional methods to detect mature neurons. The 3D reconstruction of the trigeminal nerve was carried out using the software BioVis 3D. Results: In this study we generated a three-dimensional anatomical image of the innervation of the palatal shelves. We confirmed previous observations showing that nerves are restricted to the oral region of the palatal shelves and in close relationship with the ruge. In addition, we also observe an interesting pattern along the anterior-posterior axis. Hard palate and soft palate are innervated by different branches of the trigeminal nerve, which might be related to the different tissues composing these two tissues. Conclusion: Understanding the anatomy and position of the nerve in the palatal shelves is the first step to elucidate its functions during development. Based on our 3D reconstruction and other data not shown here, it is tempting to speculate that nerves control the oral-nasal and anterior posterior pattern of the palatal mesenchyme as well as the epithelium, particularly the ruge.

Poster #: 111
Title: Epigenetic Control of Mesenchymal Stem Cells in the Adult Mouse Incisor
Name: Weston Grimes
Faculty Advisor: Yang Chai
Background: Lineage tracing in a mouse incisor model identified the neurovascular bundle (NVB) as a mesenchymal stem cell (MSC) niche. It has been shown that the methyltransferase, EZH2, trimethylates H3K27me3 on chromatin. This repressive mark is removed by KDM6A. Our study shows that the anatomic structure and position of the nerve in the palatal shelves is the first step to elucidate its functions during development. Based on our 3D reconstruction and other data not shown here, it is tempting to speculate that nerves control the oral-nasal and anterior posterior pattern of the palatal mesenchyme as well as the epithelium, particularly the ruge.

Poster #: 112
Title: Zebrafish Transgenesis with Human Enhancer-reporters Identify Lineage Restricted CNCC Subpopulations
Name: Edith Karahalioi
Faculty Advisor: Ruchi Bajpai
Background: The neural crest cells (NCC) are a transient, multipotent, migratory cell population that gives rise to craniofacial structures depending on their site of origin in the neural tube, paths they follow for migration and final destination. Although common features of NCC have been extensively studied distinguishing them from each other, the lineage restriction and the molecular signals secreted by incisor stem cell niche. Further research must elucidate its functions during development. Based on our 3D reconstruction and other data not shown here, it is tempting to speculate that nerves control the oral-nasal and anterior posterior pattern of the palatal mesenchyme as well as the epithelium, particularly the ruge.

Poster #: 113
Title: Generation of Human Neural Crest Cells for Cell Replacement Therapy
Name: Tiffany Lee
Faculty Advisor: Ruchi Bajpai
Background: In vertebrates, the dorsal aspect of the diencephalon- telencephalon boundary (DTB) and diencephalon express WNT5B, and show restricted regions of expression on the dorsal neural tube. Within the neural tube these cells go on to generate the hippocampus, the center for memory and learning. The cells migrating out from this region form the anterior-most neural crest, which migrates supraorbital and contributes to the developing cranial mesenchyme covering the forehead and midbrain. In vitro generation of human neural crest cells destined to form cranial mesenchyme has the potential to understand craniofacial development and utilize for cell replacement therapy. Purpose: The goal of this research is to generate human DTB-specific neuroectodermal cells and follow their differentiation into region restricted neural crest cells using a human WNT5B enhancer identified in our lab. Methods: Using immunofluorescence for GFP and antifungal drugs. Extracellular proteinases, secreted aspartyl protease (SAP) and phospholipase B (PLB), are key determinants mediating pathogenicity and suitable targets in drug development. Purpose: Flavonoids, such as myricetin and quercetin, show activity against Candida albicans (CA) and provide promising candidates for therapeutics. These studies aimed to determine the antifungal activity of flavonoids and identify the potential mechanisms by investigating the expression and secretion of CA virulence factors and host cell inflammatory cytokines. Methods: Minimum inhibitory concentrations (MIC) were determined after 24h by adding serial dilutions of CA (10−3−10−10) and quercetin (4.5-45µM). Fluconazole and solutions with 1% DMSO served as positive and vehicle controls respectively. Co-culture of C. albicans (ATCC: MHA 2876) at 2.5x10^2 cells/mL and fibroblasts (ATCC: CRL2104) at 1x10^5 cells/mL were cultured in EMEM-medium, 10% FBS, treated with myricetin and quercetin (1xMIC) at 37°C,5% CO2 for 24h and harvested and evaluated for (n=9): A) Cellular Fungal viability; B) Extracellular host and fungal inflammatory cytokines (ELISA for IL-1α, IL-1β, IL-6, IL-8, IL-10, and GMS-CSF); C) host gene expression of inflammatory response; D) C. albicans gene expression for SAP and PLB; E) SAP and PLB activity and F) Architecture changes by fluorescence microscopy. Results: Myricetin and quercetin inhibit C. albicans growth and an MIC was established as 30µM and 25µM respectively. The compounds decreased secretion of pro-infl ammatory cytokines (IL-1α), while increasing secretion of anti-inflammatory cytokines. In addition, the treatments decreased host expression of these cytokines and CA expression and activity of virulence factors (SAP, PLB, IL-1α). The compounds also markedly altered the density and architecture of the fungal colonies. Conclusion: Myricetin and quercetin demonstrate their therapeutic potential, not only through inhibition of fungal growth and virulence, but also in modulating the host inflammatory responses.

Poster #: 114
Title: Antifungal Activity of Quercetin on Candida albicans Biofilm
Name: Meng Lin
Faculty Advisor: Ramiro Murata
Background: Candida albicans is a fungal pathogen that is responsible for candidiasis. Flavonoids have been demonstrated to have antifungal effects on various biofilms in many studies, and research has indicated Quercetin in systematic health. Purpose: To study the effect of Quercetin on Candida albicans biofilm. Methods: C. albicans (ATCC 14053) biofilm were grown in 24-well plates with Difco Yeast Mould (YM) medium, incubated at 37°C, 5% CO2. The medium was changed daily. On Day 2, treatments of Quercetin, 250µm and 500µm soluble concentrations, were given twice a day. Fluconazole and solutions with 1% DMSO (v/v) will served as positive and vehicle controls respectively. Treatments continued onto Day 5, when data were collected, then analyzed for colony forming units (CFU/ml) and insoluble polysaccharide. Results: Several human embryonic stem cell derivatives, but turns on in cells representing the DTB and diencephalon.

Poster #: 115
Title: Flavonoid Antifungal Effects on C. albicans and Host Transduction Pathways
Name: Chris Patuwo
Faculty Advisor: Ramiro Murata
Background: Oral candidiasis is a significant opportunistic infection that often presents as a complication in people with immunodeficiency. The infection is conventionally managed with antifungals such as fluconazole. However, there is a recent increase in oral candidiasis that is resistant to these current drugs. This necessitates the development of new antifungals. Purpose: The aim of this in vitro study was to test the antimicrobial activity of the geraniol against C. albicans as well as its toxicity to oral fibroblasts. Methods: The minimum inhibitory concentration (MIC) of geraniol was determined according to NCCLS guidelines. C. albicans at 2.5x10^4 cells/mL was cultured in RPMI-medium at 37°C in 5% CO2 for 24 hours and inoculated with geraniol (5 - 20mM). Fluconazole and solutions with 1% DMSO water served as positive and vehicle controls respectively. The MIC was determined after 24 hours. The candida cell suspensions were plated on agar and incubated overnight at 37°C. Colony
incubated at 37°C in 5% CO₂.

Placement of the drugs were mixed with Scotchbond adhesive served as the minimum inhibitory concentration - MIC and minimal bactericidal concentration (MBC) will be further evaluate its success of disrupting the drug resistance of composite restorations against both bacteria. Most restorations fail within 5-7 years due to development of secondary caries. By incorporating antibacterial agents into an adhesive system we hope to increase the resistance of composite restorations against secondary caries and enhance the durability of such restorations. Drugs investigated include epigallocatechin gallate, myricetin, and tannic acid. Their minimal inhibitory concentration - MIC and minimum bactericidal concentration - MBC will be investigated, followed by being incorporated into Scotchbond adhesive. Purpose: To evaluate the antimicrobial activity of natural compounds against Streptococcus mutans and further evaluate its success of disrupting the biofilm once incorporated with universal adhesive system. Methods: The effects of epigallocatechin gallate, myricetin, and tannic acid on S. mutans UA159, their minimal inhibitory concentration - MIC and minimum bactericidal concentration - MBC were determined. 100x, 500x, and 1000x MIC of the drugs were mixed with Scotchbond adhesive. Scotchbond adhesive served as negative control. The adhesive was light cured onto polymerized composite discs and placed in brain-heart infusion (BHI) broth containing 1% sucrose for 5 days with S. mutans incubated at 37°C in 5% CO₂, BHI media was changed daily. Biofilms (n=12) were harvested on Day 5. Samples were diluted and plated for colony-forming unit (CFU) to determine biofilm viability. Biofilm samples were also collected and prepared for insoluble (ASP/IPS) and soluble (biopolymers) analysis. Results: In MIC and MBC investigation, myricetin and epigallocatechin gallate did not demonstrate significant antimicrobial activity. For tannic acid, showed in vitro antibacterial activity, at 150μL. After tannic acid was incorporated into Scotchbond to be tested for effectiveness against S. mutans biofilm. Initial trials have shown that both 150μL and 75μM both show biofilms have been reduced to 76% while 150μM has shown biofilms being reduced to 2% as compared to control groups. Conclusion: Among the drugs, tannic acid is the only drug that disrupts biofilm. Once mixed with the adhesive, it most effectively disrupts biofilm at the 150μM.

Background: One of the main contributing factors to the progression of dental caries and periodontal diseases is the formation and presence of dental bacterial biofilms. During the preparation of indirect restorations, tooth structure is exposed to the oral microflora, resulting in the adsorption of salivary biopolymers that form the pellicle. During restorative procedures, the initial exposure of the tooth surface to the oral environment may range from a few minutes to a few hours. This, together with leakage under the restorative, may allow the development of the biofilm to a level where it could either result in cementation failure or recurrent caries under the definitive restoration. Purpose: This clinical report describes the structure and characteristics of the biofilm formed under a cemented restoration, confirming the need to develop new cementation protocols to disrupt and minimize the formation of biofilm before cementing definitive restorations. Methods: A second right mandibular molar was chosen to investigate the structure and characteristics of the biofilm under a cemented restoration. After months of permanent cementation, the tooth was extracted and evaluated with confocal laser scanning and scanning electron microscopy. Fluorescein in situ hybridization (FISH) was used for the identification of biofilm bacteria. CLSM analysis was utilized to confirm the presence of bacteria at the occlusal interface. Moreover, SEM was used to identify the morphology of bacteria in the biofilm. Results: Fluorescence in situ hybridization technique confirmed biofilm growth in the interface between the restoration and the tooth structure. The results of CLSM analysis with immunofluorescence staining also confirmed the presence of biofilm at the occlusal interface between the tooth and the restoration. The presence of SEM analysis agreed with CLSM and showed the presence of a biofilm layer at the interface. Further study to disrupt and eliminate biofilm at the occlusal interface. Moreover, SEM images confirmed the presence of distinct strata within the biofilm: the inner layer, which is the calcified part of the biofilm and the outer layer, which is less calcified and is the growing part of the biofilm. SEM analysis showed the presence of bacteria with cocci-like morphological structure inside the biofilm layer. Conclusion: The presence of biofilm at different areas of the teeth may help to explain why restorations may fail either due to recurrent decay or failure of cementation, as the biofilms can contaminate cementation protocols. Based on these observations, we suggest the development of new and thorough cementation protocols to disrupt and eliminate biofilms before the cementation of definitive restorations.

Background: In the clinical management of periapical radiolucent lesions, it is difficult to ascertain whether there is active infection, a bone cavity or cyst, or just inflammation. Theoretically, definitive diagnosis could only be achieved by surgical access to the bony site with biopsy and culture. However, surgery is not always possible clinically, especially when the radioluency is diffused over several teeth. This is the first time a case report shows healing of a large cyst-like periapical lesion without local intervention. This case report serves as a useful baseline for future therapeutic lesions. Purpose: To assess and treat large cyst-like periapical lesions via a non-interventional systemic antibiotic therapy rather than surgical removal or invasive endodontic therapy. Method: A 12-year old boy presents to the clinic with complaint of pain in the left anterior maxilla upon mastication. Patient had a recent history of trauma to his left maxillary incisors. A complete head and neck, intraradicular and radiographic examination reveals tender swelling of the buccal gingiva in the, and a radiolucency (cyst-like) around teeth #9 and #10. Periodontal probing, vitality testing, percussion and palpation tests were completed. An incision and drainage was performed in the area of the buccal swelling. Antibiotic was prescribed (amoxicillin 250 mg three times a day every eight hours) for a two-week course. Patient presents for a re-evaluation during a one, six and twelve weeks follow-up. Results: Using a scheduled antibiotics regimen we significantly reduced patient's pain in the above area. More importantly patient's swelling was gone with no further pain on percussion or palpation. In addition, the periapical cyst-like radiolucency reduced in size and was resolved with evidence of radiographic bone fill. Conclusion: Non-invasive antibiotic therapy alone was successful in healing large bone cyst-like in this teenager. By using a local regimens of Aminocillin, we were able to avoid any future surgeries such as periapical surgery, which may damage adjacent tooth structure and even possibly devitalize neighboring tooth structure. As long as we know, this is the first time a case report shows healing of a large cyst-like periapical lesion without local intervention.
dental examinations, treatment planning, dental prophylaxis, and operative treatment. Methods: Comparison groups include Male vs female; Mobile clinic vs non-Mobile clinic involved students; non-students applying for advanced education in pediatric dentistry vs students not applying for advanced education in Pediatric Dentistry, Pediatric Study Club vs non-Pediatric Study club involved students, Resident-Pediatric selective students, and students involved in community service vs students not involved in community service are analyzed. Results: The response rate for the survey is 92%. Students participating in Community Health Center rotations, Pediatric Study Club, and AUUDA feel more comfortable providing initial dental exams and treatment planning. Pediatric selective and students involved in Pediatric Study Club feel more comfortable providing dental prophylaxis and fluoride treatments. Students that volunteer in the USC Pediatric Clinic, Pediatric selective, Pediatric Study Club, and AUUDA feel more comfortable performing operative dental procedures. Conclusion: This study involved students in Pediatric Study Club, Pediatric selective AUUDA, and Community Health rotations feel more comfortable treating Pediatric patients. Students noted Mobile Clinic rotation and the Junior USC Pediatric clinic to be helpful experiences, in their overall undergraduate pediatric dentistry training. This information will aid in administering future undergraduate Pediatric Dentistry training.

Poster #: 124
Title: Dental Related Incidents at the Emergency Department at USC (2011-2013)
Name: Ankesh Keshav, Omar Khokale
Faculty Advisor: Ramon Rages
Background: Sports dentistry at USC is the health interface used not only in the treatment and prevention of traumatic oral and facial injuries, but is also the preventive dental health care interface for the treatment of oral disease and health. Purpose: The purpose of this retrospective study was to investigate the relative dental and oral maxillofacial trauma incident rates for athletes in the various scholarship sports at USC that have sustained dental related trauma and dental emergency needs. Methods: Retrospective non-identified patient data sets for USC student athletes sports dentistry patients were collected from 2011 to 2013. Total patient visits for trauma, emergency dentistry were obtained to define a relationship of sports trauma injury or dental emergency without trauma for the various sports at USC. Results: The basketball sports dentistry trauma treatment rate was highest for all sports evaluated with 35 incidents for 31 athletes for the two year period. The football trauma rate was less with 30 trauma incidents for 114 athletes. However, the severity of football related incidents appeared higher with diagnosis concussion, TMJ injury, and orofacial lacerations. The baseball dental trauma incident rate was 5 incidents for 35 athletes and included maxillary fracture, laceration and dental avulsion, and dental fracture. Conclusion: Calculation and oversight of trauma incident rates in conjunction with injury severity information provides administrative information to both the coaching and training staff for initial supervision. Trusted dental professionals play an important role in the competitive athletic environment, providing important protective devices and treatment as required and requested.

Poster #: 125
Title: Dental Anxiety and Dental Treatment among Adults in Dental School
Name: Yagnik Patel
Background: Dental anxiety is a state in which a person is apprehensive about an upcoming dental procedure that is experienced by up to 20% of the dental treatment seeking population. Dental anxiety appears to differ by type of treatment. For example, higher levels of anxiety have been reported among patients undergoing extraction and root canal treatment procedures as compared to other dental procedures. Periodontic and endodontic patients report higher levels of anxiety than patients receiving diagnostic or prophylactic treatment, periodontal treatment has been identified as the most anxiety provoking procedure followed by root canal, extraction and orthodontic procedures. Mostly, these population-based studies were done outside United States. Few studies examining the prevalence and correlates of dental anxiety have been conducted in the States, off those that have been conducted, there is no agreement on the construct of dental anxiety better, the study aimed to determine whether dental anxiety was associated with dental treatment types (Diagnostic and Preventive, Restorative and Rehabilitative, and Surgical), along with answering the limitations of earlier studies. This study aimed to test the hypothesis that dental anxiety is more prevalent among patients who have received a higher number of surgical procedures than in patients who have received fewer surgical procedures. Primary Aim: To examine the association between dental treatment type with dental anxiety among those who received treatment at Temple University Dental School adjusting for covariates. Secondary Aim: To examine whether Oral Health Related Quality of Life and Blood-Injury-Injection Phobia moderates the relationship between dental treatment type and dental anxiety. Methods: A cross-sectional study using existing clinical data of individuals aged between 18-75 years old (N=98), who visited the Temple University Kornberg School of Dentistry (TUSKOD) for treatment during the year 2011-2012 was conducted. Patients were recruited through the ongoing flow of patients, by inviting new patients through axiUm, the electronic scheduling program, referral from area dental professionals, community research and advertisements. A random-digit-dialing method was used to contact the participants. Eligible participants were fluent in spoken and written English, interested in dental treatment and provided written informed consent for the study. Temple’s Institutional Review Board approved the study. Results: Half of the sample were African-American (50%, N= 49), 54% (%N=53) were female. The prevalence of high, medium and low level of dental anxiety was 21% (N=21), 49% (N=48), and 30% (N=29) respectively. A significant association between dental anxiety and the diagnostic and preventive treatment was observed (F = 3.241, p=0.045). Increasing age (OR= 1.057; p=.043), poor Oral Health Related Quality of Life (OHQOL) (OR= 1.063; p=.035), and fear to Blood-Injection-Injury (B-I-I) (OR=1.165, p=0.01) were significantly associated with high anxiety. Conclusion: Findings from this study indicate that diagnostic and preventive treatment type is associated with low anxiety. Gender, Low income, Age, OHQOL and B-I-I phobia influence the level of anxiety among adult dental patients. Dental anxiety is a significant determinant of regular dental visits. This findings could further our understanding of identifying individuals with high levels of anxiety and intervening symptoms of anxiety during a dental visit. The dental profession along with the public health department should consider this factors in planning programs to improve the access to dental care services alleviates anxiety, including as well as programs comprising of anxiety coping training for dental professional.

Poster #: 126
Title: The Association between Vit D and Gingival Inflammation in Pregnant Women
Name: Vivek Singh
Background: 1,25 Dihydroxyvitamin D3 was shown to inhibit induced T cell proliferation and cytokine production. There has been evidence of the beneficial role of Vit D for various autoimmune disease in animal studies. However, there is scarcity of evidence for the anti-inflammatory effect of vitamin D from clinical studies in humans. Also the range serum concentration of vitamin D that has protective anti-inflammatory effects in human is still obscure. Few studies have suggested the beneficial role of Vit D for periodontal disease due to anti-inflammatory effect. Marginal gingivitis could be a useful model to evaluate the anti-inflammatory effect of Vit D. The association of Vit D with gingivitis has not yet been investigated in pregnant females. The purpose of this study is to evaluate the anti-inflammatory effect of Vit D in pregnant females by examining the association between serum concentration of 25-hydroxyvitamin D and gingival inflammation. Purpose: To find the association between serum concentrations of 25-hydroxyvitamin D and gingival inflammation in a cohort of pregnant women. Hypothesis: There is a positive Association between serum concentrations of 25-hydroxyvitamin D and gingival inflammation in a cohort of pregnant women. Methods: A cross-sectional study of a cohort of women from aRCT of vitamin D supplementation during pregnancy. Descriptive statistics generated for gingival inflammation by 25(OH)D status. Bivariate analysis conducted at both the person and tooth level. Multivariable regression models were developed for gingival inflammation at the site level using 25(OH) D as the explanatory factor after controlling for other potentially important factors. These potential predictors included age and dental cleaning during pregnancy. For these potential predictors, bivariate associations with gingival inflammation at visit 2 and visit 10 were assessed using simple regression models for each variable. Multivariable regression models were jointly significant at alpha = 0.05, plus 25(OH)D. Generalized estimating equation models (GEE) were used for binary outcomes (y/n), and negative binomial GEE models for (BOP) All statistical tests were conducted using SAS 9.1 for Windows with p values below 0.05 considered as statistically significant. Results: The study depicts a.) clinically significant inverse relationship between 25(OH)D and gingival inflammation b.) clinically and statistically significant higher concentrations of 25(OH)D in whites compared to blacks c.) clinically and statistically significant positive relationship between 25(OH)D and tooth level. d.) levels should be both clinically and statistically significant dose of vitamin D where optimal anti-inflammatory activity is seen. Conclusion: The result of the present study shows that there is an inverse relationship between gingival inflammation and age at the person level and tooth level. An adjustment for age/race/ethnicity/sex, as an example of its anti-inflammatory effect. This relationship is stronger at Visit 10 than at Visit 2. Quintile of 25(OH)D, the women in the highest quintile had approximately 28% and 57% lower prevalence of periodontal sites with bleeding on probing (BOP), compared to lowest quintile at Visit 2 and Visit 10 respectively. Further analyses are ongoing. Higher serum 25(OH)D concentration may reduce the gingival inflammation in pregnant women.
Background: Tooth extraction initiates a cascade of events resulting in ridge atrophy. Ridge preservation (RP) strategies have been utilized to reduce the magnitude of remodeling. To address some of the challenges in RP, pre-formed devices have been developed to seal extraction sockets, named SocketKAP and to provide support to sockets with dehiscence, named SocketKAGE. Purpose: To evaluate the efficacy of the pre-formed devices, SocketKap and SocketKAGE, in addressing the challenges in RP by sealing the extraction sockets and providing support to sockets with dehiscence. Methods: Fifty-nine sockets were divided into following groups: A) untreated control, B) closed with SocketKAP, C) filled with anorganic bovine bone (ABBM) and closed with SocketKAP, D) untreated dehiscence control, E) dehiscence control, F) dehiscence treated and closed with SocketKAP, G) untreated/ filled with anorganic bovine bone (ABBM), H) untreated control, I) dehiscence, J) untreated/ filled with anorganic bovine bone (ABBM), and K) untreated/ filled with anorganic bovine bone (ABBM) and closed with SocketKAP. Pre-operative CBCTs were obtained by digital-subtraction of the test teeth and then merged with pre-operative scanned cast images, allowing measurements of volumetric ridge following tooth extraction. Results: All the groups showed significant reduction of ridge contour and alveolar bone especially in the crestal 3 mm with over 90% contour reduction in the control group. SocketKAP alone significantly reduced the amount of contour reduction in the crestal 3 mm by 22% while SocketKAP + ABBM significantly reduced the amount of alveolar bone and ridge contour reduction by 45 and 34%, respectively. In sites with dehiscence, the treatment significantly reduced the alveolar bone and ridge contour reduction in the crestal 3 mm by 14 and 18%, respectively. Conclusion: SocketKAP without grafting reduced remodeling of the crestal 3 mm of ridge contour while ABBM plus SocketKAP reduced loss of the crestal 6 mm of ridge contour for intact sockets. ABBM+SocketKAGE+SocketKAP reduced atrophy of the crestal 3 mm of alveolar bone for sockets with dehiscence.

Poster #: 128
Title: Amelogenin-Chitosan Hydrogel for Ridge Preservation
Name: Neena Baheshdian
Faculty Advisor: Homa Zadeh

Background: Tooth extraction initiates a cascade of events resulting in ridge atrophy. Ridge preservation (RP) strategies have been utilized to reduce the magnitude of remodeling. To address some of the challenges in RP, pre-formed devices have been developed to seal extraction sockets, named SocketKAP and to provide support to sockets with dehiscence, named SocketKAGE. Purpose: To evaluate the efficacy of the pre-formed devices, SocketKap and SocketKAGE, in addressing the challenges in RP by sealing the extraction sockets and providing support to sockets with dehiscence. Methods: Fifty-nine sockets were divided into following groups: A) untreated control, B) closed with SocketKAP, C) filled with anorganic bovine bone (ABBM) and closed with SocketKAP, D) untreated dehiscence control, E) dehiscence control, F) dehiscence treated and closed with SocketKAP, G) untreated/ filled with anorganic bovine bone (ABBM), H) untreated control, I) dehiscence, J) untreated/ filled with anorganic bovine bone (ABBM), and K) untreated/ filled with anorganic bovine bone (ABBM) and closed with SocketKAP. Pre-operative CBCTs were obtained by digital-subtraction of the test teeth and then merged with pre-operative scanned cast images, allowing measurements of volumetric ridge following tooth extraction. Results: All the groups showed significant reduction of ridge contour and alveolar bone especially in the crestal 3 mm with over 90% contour reduction in the control group. SocketKAP alone significantly reduced the amount of contour reduction in the crestal 3 mm by 22% while SocketKAP + ABBM significantly reduced the amount of contour reduction in the crestal 3 mm by 45 and 34%, respectively. In sites with dehiscence, the treatment significantly reduced the alveolar bone and ridge contour reduction in the crestal 3 mm by 14 and 18%, respectively. Conclusion: SocketKAP without grafting reduced remodeling of the crestal 3 mm of ridge contour while ABBM plus SocketKAP reduced loss of the crestal 6 mm of ridge contour for intact sockets. ABBM+SocketKAGE+SocketKAP reduced atrophy of the crestal 3 mm of alveolar bone for sockets with dehiscence.

Poster #: 129
Title: Malva sylvestris Activity in Cells Infected by Aggregatibacter actinomycetemcomitans
Name: Bruna Benso
Faculty Advisor: Ramiro Murata

Background: The current treatment of inflammatory disease is focused on controlling cytokine and adhesion molecule expression. Natural products have been played an important role in the development of new drugs. Purpose: The objective of this project was to test the antimicrobial activity of Malva sylvestris extract and fractions activity in a coculture model of cells infected by Aggregatibacter actinomycetemcomitans DS7-1. Methods: Malva sylvestris extract (EEM) was obtained by exhaustive maceration and liquid-liquid partition was conducted to obtain the fractions. All samples were monitored by high performance liquid chromatography (HPLC). An antimicrobial effect of the EEM and fractions was investigate using a transcriptome approach. Results: Our data suggest that the herbal extract and its active components contain molecules with antimicrobial activity. Conclusion: The herbal extract and its active components contain molecules with potential antimicrobial activity.

Poster #: 131
Title: Soft Palate Development in Mouse: A Comprehensive Study
Name: Alexandre Grimaldi
Faculty Advisor: Yang Chai

Background: Cleft palate is one of the congenital abnormalities that account for half of all craniofacial malformations. The etiology of orofacial clefts, the most common craniofacial abnormalities, remains unknown for many patients and the phenotypes vary considerably. Purpose: To generate genetically engineered animal models for understanding cellular mechanisms underlying the etiology and pathogenesis of craniofacial abnormalities in humans. We are interested in investigating the functional genes that influence craniofacial development. Methods: We performed dissections, histochemistry and immunohistochemistry on mouse embryos, newborns and adults and recreated a 3D model of the murine soft palate. Results: First, we found that the morphology, orientation and attachment of the mouse soft palate is very similar to human, validating the use of the murine model for future studies. Then our data suggests that the Tensor Veli Palatini (TVP) and Palatoglossus (PLG), but not the Levator Veli Palatini (LVP) or Palatopharyngeus (PLP), express differentiation markers (Mysin Heavy Chain) before fusion of the palatal shelves. Moreover, the differentiation of the LVP and PLG occurs from the midportions of the palate to the lateral portions, suggesting that a pool of undifferentiated myoblasts is required in the middle of the LVP and PLP during fusion. Innervation was detected in the oral side of the soft palate and in the TVP and PLG before fusion. Conclusion: Taken together, our results give a comprehensive view of the development and morphology of the murine soft palate, setting the stage for further molecular analyses. We are currently investigating how cleft palate affects the formation of the soft palate musculature using different mutant mouse models.

Poster #: 132
Title: Facesimulate 2.0: A Resource for the Craniofacial Research Community
Name: Thach-Vu Ho
Faculty Advisor: Yang Chai

Background: The Facebase consortium consists of 11 interlinked projects selected by the National Institute of Dental and Craniofacial Research (NIDCR) to generate genetics and imaging data on craniofacial development. Craniofacial abnormalities affect about half of all congenital malformations. The etiology of orofacial clefts, the most common craniofacial abnormalities, remains unknown for many patients and the phenotypes vary considerably. Purpose: To generate genetically engineered animal models for understanding cellular mechanisms underlying the etiology and pathogenesis of craniofacial abnormalities in humans. We are interested in investigating the functional genes that influence craniofacial development. Methods: We performed dissections, histochemistry and immunohistochemistry on mouse embryos, newborns and adults and recreated a 3D model of the murine soft palate. Results: First, we found that the morphology, orientation and attachment of the mouse soft palate is very similar to human, validating the use of the murine model for future studies. Then our data suggests that the Tensor Veli Palatini (TVP) and Palatoglossus (PLG), but not the Levator Veli Palatini (LVP) or Palatopharyngeus (PLP), express differentiation markers (Mysin Heavy Chain) before fusion of the palatal shelves. Moreover, the differentiation of the LVP and PLG occurs from the midportions of the palate to the lateral portions, suggesting that a pool of undifferentiated myoblasts is required in the middle of the LVP and PLP during fusion. Innervation was detected in the oral side of the soft palate and in the TVP and PLG before fusion. Conclusion: Taken together, our results give a comprehensive view of the development and morphology of the murine soft palate, setting the stage for further molecular analyses. We are currently investigating how cleft palate affects the formation of the soft palate musculature using different mutant mouse models.
premaxilla: 1) collapse lateral segments, 2) graft alveolar bone at the reduced cleft site, and 3) restore archform by surgically assisted rapid palatal expansion (SARPE). The goal of applying both lateral segments is to create adequate soft tissue for a surgical flap which facilitates not only the closure of oral fistulae, but also the subsequent bone graft.

Methods: Two patients with a diagnosis of BCLP were identified as candidates for the collapse-graft-expansion protocol. Lateral segments were collapsed using power chains across maxillary canines, reducing alveolar cleft size. Blunt tissue forceps were used to fill the cleft. Occlusal radiographs were taken at least 3 months following graft.

When bony continuity was established, the collapsed arch form was re-established using archwires. Repositioning bone in these patients, constricting lateral segments prior to bone grafting eliminated the need for additional soft and hard tissues and allowed the employment of a graft procedure similar to that of conventional autogenous bone grafts. As in other bone graft procedures, performed on patients with cleft lip and palate, a potential complication of the novel collapse-graft-expansion protocol is the introduction of scarring that may interfere with maxillary development. Orthognathic surgery may correct part or all of the deficiency. Patients who underwent the collapse-graft-expansion protocol will be followed to monitor long-term outcomes and any other complications. Conclusion: Collapsing lateral segments to facilitate bone grafting followed by expansion may serve as a new model for restoring large cleft defects. This method may be a viable option for surgical teams in remote areas without orthodontic support.

Poster #: 136
Title: Attitudes, Behaviors, and Needs of Team Dentists
Name: Lesley McGovern
Faculty Advisor: Ann Esherar Spolarich
Background: Elite athletes strive to attain superior levels of health and fitness; however, many have high levels of oral health problems. Pain and dysfunction could alter levels of performance during practice and competition. Many dentists work with sports organizations, but knowledge about their scope of practice and needs was unknown. Purpose: The purpose of this study was to gather baseline data about practice behaviors, attitudes, and needs of team dentists, and to identify if/how often oral screenings were conducted on athletes, and barriers do implement regular oral screening programs. Methods: An online survey was developed and pilot-tested, and IRB approval obtained. Dentist members of the Academy for Sports Dentistry (n=491) were invited to participate. Data collected included league affiliation, services provided, and type of oral screenings performed. Dentists' attitudes regarding athletes' treatment and preventive needs, practice barriers, and prohibition of tooth decay were assessed. Descriptive statistics were used to analyze data. Results: Results revealed 79.5% (n=116) of team dentists had a league affiliation. The most frequently provided services were emergency treatment and mouthguards (95.5%), restorative treatment (78.9%), oral hygiene instruction (63%), and prophylaxis (61%). Of the 80% (n=90) of dentists who perform oral screenings, 41% (n=36) screen all athletes prior to the season with individualized follow-up examinations. The most commonly cited barrier to screenings was lack of awareness of the importance of oral health. Conclusion: Although the majority of team dentists provided oral screenings, a lack of awareness about oral health importance supports the need for improved educational strategies.

Poster #: 137
Title: Treatment-plan Model for Hypodontia in Craniofacial Patients
Name: Prarthit Mehta
Faculty Advisor: Stephen Yen
Background: In some patients with bilateral cleft lip and palate (BCLP), the premaxilla (i.e., the anterior segments of the maxilla) is the introduction of scarring that may interfere with maxillary development. Orthognathic surgery may correct part or all of the deficiency. Patients who underwent the collapse-graft-expansion protocol will be followed to monitor long-term outcomes and any other complications. Conclusion: Collapsing lateral segments to facilitate bone grafting followed by expansion may serve as a new model for restoring large cleft defects. This method may be a viable option for surgical teams in remote areas without orthodontic support.

Poster #: 138
Title: AMOR in the Reconstruction of Alveolar Ridge Defects
Name: Seiko Min
Faculty Advisor: Homa Zadeh
Background: Surgical reconstruction of large mandibular clefts is a challenging and multifaceted process for clinicians. Techniques using autogenous grafts have been considered as the gold standard. However, these procedures have several disadvantages such as donor site morbidity and long-term availability. The application of recombinant human bone morphogenetic protein (rhBMP)-2 in oral and maxillofacial surgery has been proposed as an alternative to autogenous bone harvesting. Despite the promising prospect, there is a number of disadvantages with the application of BMPs, including (i) the requirement for super-physiologic doses (ii) inability to sustain local levels of growth factor; (iii) lower efficacy of recombinant proteins compared to BMPs; and (iv) difficulties with clinical translation. An engineering strategy has been developed in our laboratory to take advantage of the specificity and diversity of monoclonal antibodies (mAbs). A chimeric anti-BMP-2 mAb composed of variable regions from a non-neutralizing antibody captured on a scald to capture endogenous BMPs, induce osteogenic differentiation of mesenchymal stem cells and accelerate bone regeneration. This process has been referred to as Active Monoclonal Osteo regeneration (AMOR). The advantages of AMOR include: (i) endogenous BMP-2 is captured by antibodies (ii) the temporal and spatial pattern of osteogenesis is orchestrated by expression of endogenous BMP-2 and
decreased signiﬁcantly and the mesenchymal phenotype was induced in the process of epithelial-mesenchymal transition (EMT). When oral cancer cell line SCC25 was treated with TGF-β1, the cells could induce oral cancer cell EMT.

Background: Protein arginine methyltransferase 5 (PRMT5) has been implicated in various cancers. Its high expression has been related to cell proliferation, so many labs propose knocking down PRMT5 as an approach to reduce cell proliferation. Purpose: We tried to determine whether the roles are the same for PRMT5 in cancer proliferation and metastasis. Methods: Westernblot and RNAi methods were used to determine the changes of EMT marker results. Our results showed that TGF-β1 could induce oral cancer cell EMT. When oral cancer cell line SCC25 was treated with TGF-β1, the epithelial marker Claudin-1 decreased and the mesenchymal marker vimentin and N-cadherin increased significantly. Knocking down PRMT5 promoted TGF-β1-induced epithelial-mesenchymal transition (EMT) in oral cancer cell line SCC25, as indicated by the expected decrease of epithelial marker Claudin-1 protein and increase of mesenchymal marker vimentin and N-cadherin protein. Conclusion: Here we highlighted the importance of PRMT5 expression in the development of epithelial-mesenchymal transition, which might be related to oral cancer metastasis.
All views are of the authors and do not necessarily represent those of the student body at the Herman Ostrow School of Dentistry of USC nor of the editors of the Explorer Journal, unless such statements have been officially adopted by the University. The Explorer Journal editorial board reserves the right to reduce, revise or reject any material submitted for publication. Articles and photos published in the Explorer Journal are the property of the Explorer Journal and may be reproduced or reprinted only after written permission has been granted. The editors and founder reserve the right to accept, reject, discontinue or edit any article, letter, or abstract submitted for publication.

The Explorer Journal is published annually by members of the student body of the Herman Ostrow School of Dentistry of USC.
Yang Chai, Co-Chair
Parish Sedghizadeh, Co-Chair
Donna Castillo
Jaime Gonzalez
Denise Cortez
Jennifer Bandich
Patty Gutierrez
Julie Chen
Barbara Roddy
Kelley Randle
Stephanie Ting
Eugenia Chan
Thach-Vu Ho
Patricia Thompson