# Contents

**THE EXPLORER 2023**

<table>
<thead>
<tr>
<th>Page 17</th>
<th>4-5 FROM THE DEAN</th>
</tr>
</thead>
</table>
|         | Avishai Sadan, DMD, MBA  
Dean  
Herman Ostrow School of Dentistry of USC |

<table>
<thead>
<tr>
<th>Page 21</th>
<th>6-7 INTRODUCTION TO RESEARCH DAY</th>
</tr>
</thead>
</table>
|         | Yang Chai, DDS, PhD  
University Professor  
Associate Dean of Research |

<table>
<thead>
<tr>
<th>Page 31</th>
<th>8-42 DIVISION ARTICLES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>44 RESEARCH DAY - SCHEDULE OF EVENTS</td>
</tr>
<tr>
<td></td>
<td>45 RESEARCH DAY - KEYNOTE SPEAKERS</td>
</tr>
<tr>
<td></td>
<td>46-83 RESEARCH DAY ABSTRACTS</td>
</tr>
<tr>
<td></td>
<td>84 FROM THE EDITORS - STUDENT RESEARCH GROUP</td>
</tr>
<tr>
<td></td>
<td>85 GROUP AUTHORS - STUDENT RESEARCH GROUP</td>
</tr>
<tr>
<td></td>
<td>86 RESEARCH DAY PLANNING COMMITTEE</td>
</tr>
<tr>
<td></td>
<td>87 COVER PHOTO CREDIT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 35</th>
<th>8 LIFE TAKES MANY TURNS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Aaron Huang &amp; Katherine Scheker</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 37</th>
<th>10 A NEW TROJAN DENTIST STEPPED INTO THE WORLD OF ACADEMIA &amp; RESEARCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Paninaz Esteghamat Tehrani &amp; Cloris Yidan Zhang</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 41</th>
<th>12 URBANO’S GIFT TO OUR COMMUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Jessica Kim &amp; Yonna Elkeereamy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 45</th>
<th>14 INSIGHTS FROM AN OROFACIAL PAIN AND ORAL MEDICINE SPECIALIST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Brandon Pham &amp; Courtney Fortier</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 59</th>
<th>16 THE FUTURE OF PROSTHODONTICS: DIGITAL QUALITY CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Ara Hartounian &amp; Austin Nahouray</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 63</th>
<th>18 PERSEVERANCE AND POSITIVITY IN PERIODONTOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Arya Sahabi &amp; Jason Chang</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 67</th>
<th>20 APPLICATIONS OF PERIODONTAL REGENERATIVE RESEARCH TO ENDODONTIC TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Catherine Choi &amp; Richard Lengkong</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 71</th>
<th>22 ORAL HEALTH BEYOND THE DENTAL OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Merna Ghallab &amp; Maiylnh Nguyen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 75</th>
<th>24 DIGITAL DENTISTRY: THE BEGINNING OF A NEW ERA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Puneet Kumar &amp; Bahar Khalillian</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 79</th>
<th>26 A PASSION FOR ORAL CANCER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Wenshuai (Katherine) Mu &amp; Justin Matian</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 83</th>
<th>28 A PASSION FOR OPERATIVE DENTISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Puneet Kumar &amp; Bahar Khalillian</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 87</th>
<th>30 A TRANSFORMATIVE APPROACH TO THE CARE AND MANAGEMENT OF ORTHODONTIC PATIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Greg Park &amp; HaeSeong Lee</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 91</th>
<th>32 FROM CROP TO CARTILAGE: THE JOURNEY TOWARDS PREVENTING OSTEOARTHRITIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Luke Aguilar &amp; Kaveh Mahdavi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 95</th>
<th>34 INTERVIEW WITH PEDIATRIC FACULTY DR. PHILIP YOONG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Daniel Kohanghadosh &amp; George Parisis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 99</th>
<th>36 OPENING THE “GAITS”: REHABILITATING PATIENTS WITH MOTOR NEUROLOGIC INJURIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Brandon Pham &amp; Courtney Fortier</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 103</th>
<th>38 A FRESH PERSPECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Antranig Mesrobian &amp; Steffi Chen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 107</th>
<th>40 ADVOCATING FOR DENTAL ANESTHESIOLOGY AWARENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Catherine Frusetta &amp; Eun Bi Jung</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 111</th>
<th>42 MITIGATING ON-THE-JOB STRESS: STRESS MAPPING WITH ARTIFICIAL INTELLIGENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Mike McNulty</td>
</tr>
</tbody>
</table>
FROM THE DEAN

Dear Ostrow Students and Colleagues:

Ostrow’s annual Research Day is always an exciting day for our school. For me personally, nothing compares to seeing the unbridled enthusiasm on our students’ faces as they share the fruit of their research labors. Even better, I always enjoy reading even more about their studies in our award-winning The Explorer — put together by Ostrow’s Student Research Group.

It gives me such pride to see our students committing themselves to our profession’s scientific foundations. Students, to be successful in your careers — whether that be in dentistry, biokinesiology/physical therapy or occupational science/occupational therapy — you will need an almost insatiable thirst for new knowledge. You will need to consume cutting-edge research, learn new technologies and adapt your practice to stay apace our ever-evolving professions. It is my hope that during your time with us we impart within you this lifelong love of learning.

As part of a research-intensive university, we have always taken scientific investigation incredibly seriously. Ostrow is No. 3 on the list of top-funded U.S. dental institutions by the National Institute of Dental and Craniofacial Research. This is the highest we’ve ever appeared on this list, demonstrating the trust that the NIDCR has for our research faculty and staff. Likewise, the USC Chan Division of Occupational Science and Occupational Therapy and the USC Division of Biokinesiology and Physical Therapy retain their high U.S. News & World Report rankings — a true testament to our colleagues’ ongoing research and clinical prowess.

I want to congratulate all of our student and faculty researchers for their hard work, long hours and dedication as you completed these research endeavors this year.

Fight On!

Avishai Sadan, DMD, MBA
Dean
G. Donald and Marian James Montgomery
Professor of Dentistry
INTRODUCTION TO RESEARCH DAY

Welcome to our 2023 Research Day at the Herman Ostrow School of Dentistry of USC! Every year we celebrate the tremendous achievements of our students, staff, and faculty in Dentistry, Occupational Science, Occupational Therapy, Biokinesiology, and Physical Therapy. This is my favorite event of the year because the discoveries and inspiring work you will see today give us a preview of USC’s impact on addressing societal and health care needs in the future.

It is our privilege as educators to foster an environment for groundbreaking research. Seeing students in our labs and clinics pursue innovative research, perform novel studies, and work together are the favorite parts of my job. The Herman Ostrow School of Dentistry embodies USC’s commitment to our unifying values: integrity; excellence; diversity, equity, and inclusion; well-being; open communication; and accountability. Our supportive culture makes USC a rich environment for interdisciplinary collaboration. We are committed to providing the best possible opportunities for our students. Their experience and clinical training cultivate essential critical thinking skills for advancing scientific knowledge. Introducing our students to the joys and challenges of research is crucial for providing them with valuable skills that will be essential in their careers as health care providers, educators, and scientists.

Our students represent the future of our professions, and the outstanding discoveries being presented today make it clear that the future is bright. I am happy to be part of a community that cultivates the next generation of leaders in science.

We hope you will enjoy this year’s issue of The Explorer. In this publication, you will learn about new research being conducted by your colleagues, alongside articles sharing the accomplishments by outstanding researchers at the Herman Ostrow School of Dentistry. We are proud to cover a broad range of topics highlighting how research innovation will improve our lives. Please join me in congratulating all of our students and researchers on their successes as we gather to celebrate their efforts on Research Day.

Fight On!

Yang Chai, DDS, PhD
University 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
By Aaron Huang & Katherine Scheker

Dentistry is not a field that can continue to grow and evolve without the support of other branches of study. Dr. Reyes Enciso is a researcher and professor of clinical and instructional dentistry at the University of Southern California’s Herman Ostrow School of Dentistry. She is a pillar of support for Ostrow in advancing the knowledge of craniofacial and dental technologies to continue growing the field of dentistry.

Growing up in Spain, Dr. Enciso studied French in middle school and high school, which led her to travel to France as an exchange student during her teenage years, a decision that would later impact her career. She then completed her five years of undergraduate studies in engineering science in Spain at Polytechnic University of Valencia, Spain. She knew she always liked math and writing. During her undergraduate studies, Dr. Enciso was a student worker helping the journalist at the President’s office at Polytechnic University of Valencia. Her passion for writing even encouraged her to start a magazine during her first year in college. However, she chose computer science as her major because it was a new and exciting field during the late 1980s and early 1990s. The world wide web and the internet were not nearly as widespread and developed back then as they are today. In fact, it was rare and almost unheard of for anyone to have a computer at home. Statistics also stood out to Dr. Enciso because her professors would talk about how statistics could be useful in real-life situations.

The requirements for a five-year computer science program in Spain included a final one-year project. Unfortunately, none of the research projects that were happening in Spain at that time piqued Dr. Enciso’s interest. Because computer science was an experimental field, Dr. Enciso was able to pair her interest in artificial intelligence, an elective class she took during one of her years of undergraduate education, and computer science together. With the mix of the two, she applied to the University of Orsay in Paris to complete her final research project in France instead of at her undergraduate university.

In 1996, Dr. Enciso attended a workshop in Denmark where fate introduced her to Dr. Ruzena Bajcsy. Dr. Bajcsy has previously served as the head of Computer and Information Science and Engineering Directorate at the National Science Foundation, the founding director of the Center of Information Technology Research for the University of California, Berkeley, and as a faculty member at the University of Pennsylvania. At that workshop, Dr. Bajcsy invited Dr. Enciso to complete a post-doctorate at the University of Pennsylvania in Philadelphia. Dr. Enciso accepted, and she and her now-husband lived in Philadelphia for nearly two years before finally moving to sunny Los Angeles in 1998. With her relocation, she joined the University of Southern California in May of that year.

In 2001, Dr. Enciso was working on a project at Viterbi School of Engineering and met Dr. James Mah, an orthodontist at the dental school. He brought Dr. Enciso to the dental school as a post-doctoral candidate initially to research cone-beam CT (CBCT) images. Her research objective was to obtain 3D information of teeth, nerves, and other tissues from the CBCT scans. In fact, her first publications relating to the dental field from 2001 to 2011 were on CBCT imaging applied to different topics. These publications included CBCT’s ability to differentiate cysts from granuloma relating to the field of endodontics, orthodontics, impacted molar, sleep apnea, and imaging of the airway. She also did research and taught residents how to use the CBCT at the Redmond Imaging Center in the orthodontics department from 2003 to 2011. Many of the images of this historic opening of the Imaging Center are still displayed proudly on the third floor of Ostrow.

One of the most exciting projects that stands out in Dr. Enciso’s mind is the grant that she received from the NIH in 2006 that allowed her to not only conduct research on the influence of the upper airway in sleep apnea patients but also complete a master’s degree in Biomedical Clinical Investigations at the USC Keck School of Medicine. When the degree was completed, she continued to work on collaborative research with the dental school including her most cited paper on the differential diagnosis of periapical lesions in 2018. She continues to work on meta-analysis studies and systematic reviews with the students in the Orofacial Pain and Medicine and Genetic Dentistry Master’s Program. Two of their research papers appeared on the front page of the Journal of the American Dental Association in November 2018 “Use of platelet-rich plasma, platelet-rich growth factor with arthrocentesis or arthroscopy to treat temporomandibular joint osteoarthritis” and “Treating Myofacial Pain Syndrome with Botulinum Toxin Type A” in December 2016.

In the future, Dr. Enciso hopes to work on projects relating to opioid prescription and misuse in the dental and medical settings. Studies have shown that patients receiving these prescriptions sometimes do not finish the prescribed amount, leaving these pills around the house to potentially be misused by guests or other family members. The opioid problem is currently on the rise in the US and should be researched and addressed. When asked about her role models, Dr. Enciso states that her mother was and is a significant inspiration. Her mother was one of the two only females in her class studying physics in the US and should be researched so as to influence her life significantly. It can be quite hard to get involved in research after graduating, but it can be a very desirable goal to work towards. Dr. Enciso encourages students to be involved in research because it allows them to always follow the latest guidelines in medicine and healthcare to be able to practice evidence-based dentistry and remain informed to effectively answer patient questions.

In the wise words of Dr. Enciso, “Try to find your passion, it might come later in life for some people. Do not settle for a job you do not like, your life will be miserable. Do not compromise your values.”

The Explorer Journal 2023

Herman Ostrow School of Dentistry of USC
Dr. Kim Honda is currently an adjunct assistant professor of clinical dentistry at the University of Southern California's Herman Ostrow School of Dentistry and the Special Patient Care (SPC) Program. He oversees the rotation and selective students in providing comprehensive dental treatment for special needs patients and assists with developing the clinical protocols for treating patients under general anesthesia. Dr. Honda also works at the LAC+USC Medical Center and the VA Los Angeles Ambulatory Care Center as an attending for General Practice Residency (GPR) residents overseeing, managing, and guiding the operating room treatments for the complex special needs and veterans’ dental cases. In addition, he is involved in developing and implementing clinical and didactic educational opportunities for the GPR residents.

Journey to Dentistry

As a third-generation dentist, Dr. Honda followed his family legacy and stepped into the world of dentistry in 2013. Dr. Honda was born in Honolulu, Hawai'i, and started his academic journey by earning a Bachelor of Science degree in medical engineering from the University of California, Irvine and a Master of Engineering in biomedical engineering from Boston University. In 2017, Dr. Honda graduated from the University of Missouri Kansas City School of Dentistry and is a board-certified dentist in both California and Hawai'i. Furthermore, he completed an advanced training in comprehensive dental care and treatment of medically complex patients through the GPR program at the LAC-USC/Herman Ostrow School of Dentistry (PGY-1) and the VA Sepulveda Ambulatory Care Center (PGY-2). It is also notable that, currently, Dr. Honda is pursuing his passion in academic education at the Special Patient Program at the Ostrow School of Dentistry, the LAC+USC Medical Center, the H. Claude Hudson Comprehensive Health Center, and the VA Los Angeles Ambulatory Care Center. It’s important for dentists to continue learning and staying up-to-date on the latest techniques and technologies in the field in order to provide the best possible care to their patients. As a life-long learner, Dr. Honda decided to enroll in an advanced school through the GPR program because he aimed to gain experience working with the special needs patient populations. Hospital dentistry, provided in a hospital setting rather than a dental office, is usually necessary for patients who have a medical condition that requires more specialized care or for patients who are unable to receive treatment in a traditional dental office due to physical or mental disabilities. In a hospital setting, dentists have access to advanced equipment and a wider range of resources that can benefit patients who require complex or extensive dental procedures, such as surgery or sedation.

Research and Explore

In addition to exploring the fields of dentistry, Dr. Honda’s past experience in research and education paved the way for his current career goals and opportunities. During his master’s education, Dr. Honda participated in research projects on the topic of infectious disease. Research experience in this area could be relevant and beneficial for careers in fields related to healthcare and biology, such as dentistry or biomedial engineering. Some of his research projects focused on mycobacterium tuberculosis regulatory network and hypoxia and coordinated regulation of acid resistance in Escherichia coli. By mapping the transcription factors involved in the disease mechanism and studying the metabolic pathways of bacteria, Dr. Honda gained strong skills in problem-solving, critical thinking, and communication, as well as a passion for advancing knowledge and improving patient care.

Dr. Honda’s passion for research is deeply connected to his commitment to patient care, and he is constantly searching for ways to implement his research findings into real-world clinical practices. In addition to the research opportunities, Dr. Honda received further exposure to academia by serving as a teaching assistant for pre-clinical laboratory courses including Dental Morphology, Dental Occlusion, Complete Removable Prosthodontics, and Partial Removable Prosthodontics. During the laboratory sessions, Dr. Honda was able to apply his knowledge of the topic to facilitate a learning environment and collaborative discussion among the students.

Dr. Honda’s experience in academia is not limited to research and teaching; he is also involved in various mentorship programs including the American Dental Education Association (ADEA) Academic Dental Careers Fellowship Program, the Advanced Studies Program in Restorative Clinical Sciences, and the Student National Dental Association/Hispanic Student Dental Association. In the ADEA Academic Dental Careers Fellowship Program, he guides dental students who are interested in pursuing a career in dentistry by providing faculty mentorship, research opportunities, and teaching experiences. In the Advanced Studies Program in Restorative Clinical Sciences, he works with the prosthodontics faculty and serves as a mentor for advanced prosthodontic seminars, new technologies learning sessions, and treatment planning for the complex cases. In the Student National Dental Association/Hispanic Student Dental Association, he facilitates the “Explorer’s Posts,” which is a monthly workshop that is geared towards high school and college students interested in pursuing a career in the field of dentistry. In addition, Dr. Honda organizes various activities and events that prompted community outreach and diversity.

Career Goal Advice

Dentists who are interested in academia and education may choose to teach at dental schools or other educational institutions, or they may pursue research or other roles that allow them to contribute to the advancement of the field of dentistry. It’s impressive that Dr. Honda has completed advanced training in comprehensive dental care and treatment of medically complex patients, while continuing to pursue his passion for academia and education.

Dr. Honda highlighted important aspects of the two residency programs at the LAC-USC healthcare facilities from his personal experience. The 12-month GPR Program provides residents with a broad range of dental experiences as they rotate through oral surgery, emergency medicine, anesthesia, care for the disabled, and other disciplines. The program also includes a mix of hands-on patient care and didactic seminars. Approximately 60 percent of a resident’s time is devoted to the delivery of oral health care, and the rest will be spent at the didactic seminars. Residents are trained under the supervision of faculty members from both the Ostrow School of Dentistry and the Keck School of Medicine of USC, primarily at the LAC-USC Medical Center and the VA Outpatient Clinic. Some training is also conducted at Rancho Los Amigos National Rehabilitation Center and Ostrow facilities. The Special Patient Care Clinic, formerly known as the Hospital Dentistry Clinic, provides advanced comprehensive general dentistry for patients with severe medical conditions, or with special oral and gastrointestinal problems. This is a very important resource for populations including but not limited to pre- and post-organ transplant patients, cancer patients, immunocompromised patients, and other special needs patients who may have difficulty receiving treatment in a traditional dental office. The clinic’s ability to provide dental care under IV sedation in an operating room setting is especially valuable for patients who may require a higher level of sedation or who may not be able to tolerate treatment in a routine dental setting. Dental services are also provided on an emergency basis after hours for both in-patients and out-patients.

Dr. Honda’s advice to the dental students and recent graduates is to explore different opportunities and extra-curricular activities in addition to fulfilling the dental school requirements. Dental school provides a strong foundation in the knowledge and skills needed to be a dental professional, but there are many other aspects of the field that can be explored and pursued. By participating in additional activities and experiences, dental students and graduates can learn more about what they enjoy and what they are good at, which can help them identify their strengths and guide their career paths. It can also be a great way to network and make connections in the field, which can be beneficial as they embark on their professional careers.

He specifically pointed out that the recent graduates can further expand their dental skills through different routes such as school-based education (e.g., GPR, Advanced Education in General Dentistry (AEGD), and specialty programs), dental corporations, private office associations, and continuing education classes; ultimately, the decision comes to personal preferences and long-term career goals. Dr. Honda highlighted that his reason for joining the LAC-USC GPR program was all about enjoying the attending-resident mentorship relationship when exploring various opportunities such as treatment planning, medical/dental-related rotations, teaching, community service, and research. His recommendation to the GPR applicants is to research the program, visit the program and the residents if possible, and write a truthful application.

Future and Beyond

Dr. Honda’s future goal as an educator is not only to dedicate his time and effort in deepening the pedagogical knowledge and teaching effectiveness of faculty, staff, and students, but also support, generate, and disseminate scholastic research. He hopes to pass down the knowledge and students, but also support, generate, and disseminate scholastic research. He hopes to pass down the knowledge and students, but also support, generate, and disseminate scholastic research. He hopes to pass down the knowledge and students, but also support, generate, and disseminate scholastic research.

In the ADEA Academic Dental Careers Fellowship Program, he guides dental students who are interested in pursuing a career in dentistry by providing faculty mentorship, research opportunities, and teaching experiences. In the Advanced Studies Program in Restorative Clinical Sciences, he works with the prosthodontics faculty and serves as a mentor for advanced prosthodontic seminars, new technologies learning sessions, and treatment planning for the complex cases. In the Student National Dental Association/Hispanic Student Dental Association, he facilitates the “Explorer’s Posts,” which is a monthly workshop that is geared towards high school and college students interested in pursuing a career in the field of dentistry. In addition, Dr. Honda organizes various activities and events that prompted community outreach and diversity.

Career Goal Advice

Dentists who are interested in academia and education may choose to teach at dental schools or other educational institutions, or they may pursue research or other roles that allow them to contribute to the advancement of the field of dentistry. It’s impressive that Dr. Honda has completed advanced training in comprehensive dental care and treatment of medically complex patients, while continuing to pursue his passion for academia and education.

Dr. Honda highlighted important aspects of the two residency programs at the LAC-USC healthcare facilities from his personal experience. The 12-month GPR Program provides residents with a broad range of dental experiences as they rotate through oral surgery, emergency medicine, anesthesia, care for the disabled, and other disciplines. The program also includes a mix of hands-on patient care and didactic seminars. Approximately 60 percent of a resident’s time is devoted to the delivery of oral health care, and the rest will be spent at the didactic seminars. Residents are trained under the supervision of faculty members from both the Ostrow School of Dentistry and the Keck School of Medicine of USC, primarily at the LAC-USC Medical Center and the VA Outpatient Clinic. Some training is also conducted at Rancho Los Amigos National Rehabilitation Center and Ostrow facilities. The Special Patient Care Clinic, formerly known as the Hospital Dentistry Clinic, provides advanced comprehensive general dentistry for patients with severe medical conditions, or with special oral and gastrointestinal problems. This is a very important resource for populations including but not limited to pre- and post-organ transplant patients, cancer patients, immunocompromised patients, and other special needs patients who may have difficulty receiving treatment in a traditional dental office. The clinic’s ability to provide dental care under IV sedation in an operating room setting is especially valuable for patients who may require a higher level of sedation or who may not be able to tolerate treatment in a routine dental setting. Dental services are also provided on an emergency basis after hours for both in-patients and out-patients.

Dr. Honda’s advice to the dental students and recent graduates is to explore different opportunities and extra-curricular activities in addition to fulfilling the dental school requirements. Dental school provides a strong foundation in the knowledge and skills needed to be a dental professional, but there are many other aspects of the field that can be explored and pursued. By participating in additional activities and experiences, dental students and graduates can learn more about what they enjoy and what they are good at, which can help them identify their strengths and guide their career paths. It can also be a great way to network and make connections in the field, which can be beneficial as they embark on their professional careers.

He specifically pointed out that the recent graduates can further expand their dental skills through different routes such as school-based education (e.g., GPR, Advanced Education in General Dentistry (AEGD), and specialty programs), dental corporations, private office associations, and continuing education classes; ultimately, the decision comes to personal preferences and long-term career goals. Dr. Honda highlighted that his reason for joining the LAC-USC GPR program was all about enjoying the attending-resident mentorship relationship when exploring various opportunities such as treatment planning, medical/dental-related rotations, teaching, community service, and research. His recommendation to the GPR applicants is to research the program, visit the program and the residents if possible, and write a truthful application.

Future and Beyond

Dr. Honda’s future goal as an educator is to not only dedicate his time and effort in deepening the pedagogical knowledge and teaching effectiveness of faculty, staff, and students, but also support, generate, and disseminate scholastic research. He hopes to pass down the knowledge and students, but also support, generate, and disseminate scholastic research.
Professor Justin Urbano is an assistant professor of clinical dentistry with the Division of Public Health at the Herman Ostrow School of Dentistry here at the University of Southern California. In 2010, Professor Urbano received his Bachelor of Science in dental hygiene here at Ostrow. His passion for dental hygiene led him to advance his dental hygiene training through the Registered Dental Hygienist in Alternative Practice (RDHAP) program at the University of the Pacific, Arthur A. Dugoni School of Dentistry in 2013. As he became interested in public health, he furthered his education with a Master’s in International Public Health/International Health in 2015 from the University of Sydney. Currently, Professor Urbano has been active at Ostrow focusing on public health initiatives to open dental care access to our communities.

In high school, Urbano had the opportunity to explore different technical careers through a regional occupational program. He recalled that, of all the careers he was exposed to, dental hygiene was the one that stood out to him the most. After speaking to several hygienists, Urbano was intrigued by not only the enjoyable lifestyle and work/life balance, but also by the many opportunities for personal growth the dental field could provide. Ultimately, Professor Urbano fell in love with helping people improve their oral and overall health. His curiosity helped him pursue dental hygiene at USC. During his education and training, Professor Urbano felt that USC strengthened his passion and prepared him well for his career in dentistry. After USC, he worked with the National Health Service Corps (NHSC) to help build healthy communities where access to care is limited. Urbano enjoyed every moment of serving these populations where dental access is very limited due to barriers like financial and geographical limitations. This is where his interest in public health began.

In dentistry, public health brings oral health care to communities with the goal of achieving optimal oral health through prevention, promotion, and education. Dental public health has been recognized as a specialty by the American Dental Association since the 1950s and is considered a unique discipline focused on improving dental and oral health across populations rather than among individuals. It brings assistance to individuals where access to dental care is limited. Efforts target vulnerable communities such as students, seniors, and expectant mothers. According to the CDC, these populations are at higher risk of dental issues negatively impacting their daily lives. For students, there is a risk of lower performance at school. For senior citizens, there is a high risk of decay, gum disease, tooth loss, and other dental issues. For expectant mothers, their health can affect the baby’s health too. Addressing oral health at a population level is very important, as oral health is essential to overall health and well-being.

Given Professor Urbano’s experiences working in government programs, private practices, and academia, he feels that there are many unique aspects of dentistry where everyone can explore and figure out where they would like to go. Public health is a heavily community-oriented discipline, and efforts in this area are rewarding. Professor Urbano encourages “those who are interested and curious in public health, they should help out in this area to explore what is in store for them.”

At Ostrow, there are many efforts led by students, staff, and faculty to bring dental access to the Greater Los Angeles area. Ostrow supports many programs, such as USC Mobile Dental Clinics, USC/Queenscare Mobile Clinic, Dr. Roseann Mulligan Special Patients Clinic, USC/Union Rescue Mission Dental Clinic, and many more. Many of these programs share the underlying mission of providing care to communities of various demographics. For instance, the USC Mobile Dental Clinic has provided high-quality primary care to local residents within the Greater Los Angeles area for more than 50 years. Moreover, Ostrow works in partnership with QueensCare to provide comprehensive dental care to K-12 students from low-income families, specifically. In terms of assisting patients who are medically compromised or have disabilities, the Dr. Roseann Mulligan Special Patients Clinic works to provide compassionate, comprehensive care according to each patient’s specific needs. Finally, the Union Rescue Mission (URM) Dental Clinic, established in 1999, focuses on providing comprehensive care completely free of charge to not only URM guests, but also neighboring shelters and programs serving underprivileged people within the downtown Los Angeles area. Ultimately, URM is the only dental clinic to offer care to children on Skid Row.

In addition, partnerships with hospitals throughout the Los Angeles region have allowed greater efforts to provide dental access. With these large initiatives, USC dental students receive many opportunities to volunteer, rotate, and even become selected to strengthen clinical skills and help expand programs. Whether it is to screen new patients or deliver newly fabricated dentures, these efforts have provided impactful changes to many Los Angeles residents.

Professor Urbano returned to USC as a clinical assistant professor in 2016. Since then, he has actively been a part of dental care at USC. Some of his past involvements include work with the Children’s Health and Maintenance Program (CHAMP) and the Dental Transformative Initiative (DTI). He currently works in Ostrow’s Special Patients Clinic (SPC) and sometimes at the mobile clinic. A memorable experience for Professor Urbano was the one-month mobile clinic that took place in South LA during the final year of the dental hygiene program. He recalls long nights with students and faculty continuously working on their patients, which really pushed everyone to their limits. He enjoyed seeing people working very hard from sunset to sunrise to provide dental care to the community. From students to faculty to volunteers, everyone had an important role in ensuring that the event was a success. Memories like this inspire him to continue to be actively involved in many outreach programs at USC. Urbano’s love and passion for public health initiatives have strengthened USC’s involvement with the community’s health needs and helped students become more involved and strengthen their passions in community care. Urbano stated, “Some people find a greater sense of fulfillment in the public health field. For me, this is it.”

Professor Urbano has fallen in love with teaching because he enjoys the students’ enthusiasm to learn. From the start of clinic to graduation, he watches students become competent leaders. Students have always complimented his excellence in teaching. His mentorship has helped many students, including graduates, to develop a strong passion and to become leaders in public health. Students emphasize their appreciation of his advice on improving ergonomics, instrumentation techniques, behavioral management skills, chairside communication, and much more. At Ostrow, Urbano has gone to great lengths to strengthen students’ education. Many people highly praise USC’s clinical experience, largely due to these public health opportunities for students to apply their skills and knowledge beyond the classroom and in the real world.

To those who are curious in developing their career interest in any field of dentistry, Urbano suggests getting experience from unfamiliar areas to gain valuable experience. Reflecting on his personal journey, Professor Urbano finds that getting his master’s and working at a Native American reservation were among the most memorable experiences that he is ever-grateful for. Urbano emphasizes the importance of becoming involved in different programs, being fluid, and being able to adjust. Lastly, Professor Urbano wants to remind us to take our time and breathe. He advises, “I was a worryer when I was younger. However, I learned that it’s okay because everything has a purpose. In the end, I believe that you will end up where you are meant to be. All your interests, passions, and goals will ultimately come together in time.”

And to those who are curious about the public health sector, Professor Urbano urges students to just try it out, as he explains, “If you’ve never tried, you will never know.”
Insights from an Orofacial Pain and Oral Medicine Specialist

By Brandon Pham & Courtney Fortier

As an orofacial pain and medicine specialist and owner of Tustin Dentistry, Dr. Roberta Dornan was first intrigued by the field as a high school student when she herself experienced temporomandibular joint (TMJ) locking and limited TMJ movements. After being brought in to the dentist, she was given valium alongside bite adjustment, including a night guard to help hold her jaw forward. At the time, her discomfort was attributed to sleep bruxism, and the theory behind the treatment was that, by adjusting the positioning of the teeth, the disorder would resolve on its own, which is now known to be incorrect. As she was attending Northwestern University Dental School in Illinois, her TMJ issues became more problematic and more bite adjustments were made and a soft splint was placed, which caused TMJ clicking and considerable discomfort; it was this experience that encouraged her to pursue an education in UCLA’s Temporomandibular and Facial Pain preceptor program under the section of gnathology and occlusion in 1984. Since then, she joined the UCLA TMJ clinic as a faculty member to supervise new students treating patients in the TMJ clinic and to participate in clinical research. Currently, she teaches residents at the USC Orofacial Pain and Oral Medicine Clinic as the Clinical Associate Professor.

Dr. Dornan feels that her experience as an orofacial pain and oral medicine specialist also makes her a better general dentist. Specifically, she highlights that her involvement in the specialty has emphasized the importance of “treating the whole person” rather than focusing on any particular tooth or procedure. Diagnosing an orofacial pain issue is akin to being a detective solving a case, and though this diagnostic detective work is a part of general dentistry as well, it is essential in orofacial pain. Whenever she is approached with a case, such as one of jaw pain, she must consider a myriad of clues to find the cause. First, she gets the patient to recount their history with trauma, their habits, and consider the nature of the problem’s onset. For example, throughout the COVID-19 pandemic, she noted that there was an influx of patients who experienced pain in the area and surrounding their TMJ; upon further inspection, she found that pandemic-related life stressors were contributing to the onset of orofacial pain. She determines the quality (burning, aching, sharp, etc.) and localization of any involved pain. Additionally, she tracks the frequency of the pain’s presence, if there is a pattern to its occurrence, and whether or not this aligns with the patient’s habits. Once she determines the nature of the pain, she can then proceed with an examination, where she will then determine the pain’s origin. For instance, limited opening of the mouth is a common complaint, and if one of her patients can only open their mouth halfway, but they have the ability to move their jaw from side to side, then normal condyle function is indicated; therefore, the issue would likely be related to a muscle group. Determining the cause and the source of pain is a lengthy process that is crucial in providing a formal diagnosis and effective treatment, and this is a procedure at which Dr. Dornan excels.

In terms of treatment for patients with myofascial pain, there are various noninvasive and minimally invasive treatment modalities that can be used. The reasoning behind the pain is that muscles rely on aerobic metabolism to produce ATP for energy, but if there is sustained isometric muscle contraction (such as from stress or tooth grinding), then this will impede blood flow, causing muscles to switch to anaerobic metabolism. It is this process that results in the production of irritating metabolites, which can cause nerves to be irritated and trigger points to form. For patients presenting with trigger points in their facial muscles (otherwise known as “knots” or “taut bands”), Dr. Dornan first begins with stretching exercises and heat treatments in an attempt to pull on the bands and return blood flow to the muscles. Typically, a follow-up appointment would show some improvement in the area, but should the pain persist, only then would she apply a trigger point injection to the area using lidocaine in an attempt to cause localized injury to the muscle, which results in further stretching of the muscle and increased blood flow. Moreover, she specifies that stretching exercises must be used in conjunction with the injections, so as to help eliminate the bands and to create longer-lasting relief for the patient.

Being an individual who had previously suffered from the symptoms of nocturnal bruxism, Dr. Dornan’s research has been focused on devices that can reduce or eliminate the habit of tooth grinding. One such device that Dr. Dornan has looked into involves the use of electrical stimulation as a means of decreasing the activity of jaw-elevating muscles, effectively serving as a counter-stimulant for bruxism. Current studies have shown that electrical stimulation of different nerves that is crucial in providing a formal diagnosis and effective treatment, and this is a procedure at which Dr. Dornan excels.

For instance, she reports an MRI study of patients who experienced orofacial pain alongside patients who had no symptoms, and in 25-33% of the patients, it was observed that there was displacement of the articular disc, although they did not experience any pain, clicking, or popping in their TMJ. As a dental provider, especially one who treats jaw pain, it is imperative that one should fully understand the anatomy of the region encompassing the TMJ and treat patients subjectively. In other words, if it is known that an abnormality is present, then it should be treated only if it is responsible for causing pain.

Dr. Dornan encourages dental students to consider specializing in orofacial pain and medicine, and states that if she had to attend dental school again, she would absolutely repeat her choice to go into the specialty. Though someone new to the field would need to learn the intricacies of billing to medical insurance rather than dental insurance, Dr. Dornan believes that this is worth the effort as she finds the work incredibly satisfying and enjoys the variety it adds to her life and profession. According to Dr. Dornan, starting as a specialist in orofacial pain and medicine is significantly easier due to the decreased overhead. As only a clinical examination room is needed, other specialties may require more equipment, staff, and space. The jaw pain of the patients she treats can be difficult to diagnose and affect their ability to function normally in their daily lives. She feels that providing the correct diagnosis and helping patients to move past their difficulties is rewarding in the sense that many treatment options are relatively inexpensive and noninvasive, and with the cooperation of her patients in adhering to prescribed stretches and practicing good habits, she has the ability to give patients swift relief from their pain.
The Future of Prosthodontics: Digital Quality Control

By Ara Hartounian and Austin Nahouray

Dr. Alexis Pawlak was born in southern California but moved to Arizona at a young age. She earned her undergraduate degree in biology with an emphasis in pre-medicine as she worked toward pursuing her ultimate goal of becoming a dentist. As a distinguished student, Dr. Pawlak was the first graduate of the Honors Institute at Grand Canyon University in Arizona, leaving her mark on campus. After graduating, she went on to the University of Pennsylvania School of Dental Medicine (UPSDN) and earned her Doctor of Dental Medicine degree in 2020 with honors.

Dr. Pawlak has been a dedicated advocate for providing quality oral health care to underserved communities. Despite her busy schedule throughout dental school, she dedicated herself to mission trips to La Zona Fuego Nuevo Church in Mexico City for three consecutive years. During these trips, she fostered relationships with the local community and taught them life skills. The healthcare environment struck her attention as the dental clinic was established in the church, which created a unique healing environment within a spiritual space. She also worked alongside local dentists to provide oral hygiene instruction and products. Dr. Pawlak served as a volunteer oral health educator in Philadelphia. She maintained active roles in several community outreach organizations such as the Penn Smiles program, Living Independently for Elders (LIFE) center, and UPSDM Birth to Age Five Program at the Philadelphia FIGHT clinic. She worked alongside fellow volunteers to provide comprehensive care, focusing on work with primarily removable prostheses, as well as care for medically complex elderly patients. She also provided anticipatory guidance to parents regarding their children’s oral health along with effective preventative techniques.

Dr. Pawlak has been honored to partake in several public health events to provide oral health screenings and care. Dr. Pawlak has taken advantage of the many resources available to her and focused her research on soft tissue collapse. Dr. Pawlak has written an article about an innovative technique she has developed which prevents soft tissue collapse in implant dentistry. Dr. Pawlak has made use of the new Geomagic Control X software available for the Advanced Prosthodontics program to analyze her data of soft tissue collapse. Dr. Pawlak has made use of the technology of Geomagic Control X for quality control. She hopes that the low-cost technique she has developed will become more widely used in the dental community to provide faster and less painful procedures for patients globally.

When Dr. Pawlak is not treating patients, she enjoys yoga and watching Netflix, both of which rejuvenate her. She is always looking to expand her palate through tasty, exotic cuisines.

Dr. Pawlak's interest in prosthodontics was sparked by her preclinical courses when she did her first crown preparation. Dr. Pawlak was drawn to the challenge of prosthodontics and the ability to create beautiful and functional prostheses. She was intrigued by the idea of being able to restore a patient’s smile and improve their quality of life. She found that prosthodontics allowed her to combine her artistic eye with her technical skills to create aesthetically pleasing and functional restorations. Maintaining her role as the vice president of the Penn Prosthodontics Club also had a significant impact on her decision to pursue a specialty degree in advanced prosthodontics. She attended Academy of Prosthodontics meetings and participated in several national prosthodontic events. Dr. Pawlak recommends current dental students get involved in organized dentistry early in their dental careers as a means to gain exposure to various specialties. Her second piece of advice for students looking to specialize is to shadow local specialists to get hands-on clinical experience and discover one’s own passions.

Following graduation, Dr. Pawlak was eager to follow her dreams and joined the Advanced Prosthodontics program at the University of Southern California. She was excited to be back on the West Coast, enjoying the warm weather and all the opportunities the area had to offer. She was determined to make the most of her time in the program and gain the knowledge and skills necessary to become a successful prosthodontist. Dr. Pawlak enjoys volunteering her time to teach pre-doctoral students basic prosthodontic principles and implant techniques at the Herman Ostrow School of Dentistry of USC. She takes pride in enhancing the academic experience of her colleagues which facilitates the reinforcement of her own knowledge.

Throughout her time in the program, she has consistently sought to learn the latest techniques and technological advancements, as well as the best practices for patient care. Dr. Pawlak has taken advantage of the many resources available to her and focused her research on soft tissue collapse in implant dentistry. Dr. Pawlak has written an article about an innovative technique she has developed that prevents soft tissue collapse which is approaching publication. The fundamental concept of her technique is to use PVS impression material to maintain soft tissue contours during the removal of implant restorations to prevent the common phenomenon of soft tissue collapse which may occur in seconds. The most common alternatives to her method are to place healing caps or to let the tissue be; however, she has found these alternatives to lack support for the tissue.

The goal of her research is to facilitate clinicians’ efforts in minimizing patients’ pain, chair time, and other complications that are often associated with soft tissue collapse. Dr. Pawlak has made use of the new Geomagic Control X software available for the Advanced Prosthodontics program to analyze her data and overcome these complications. She believes that the low-cost technique she has developed will become more widely used in the dental community to provide faster and less painful procedures for patients globally.
Perseverance and Positivity in Periodontology

By Arya Sahabi & Jason Chang

Dr. Marwa Abulhasan’s journey to periodontology began at an early age. Though she cannot pinpoint what triggered her passion for dentistry, she fondly recalls a journal entry she had written when she was just 12 years old, expressing her desire to become a dentist. Building on this dream, Dr. Abulhasan left her family in Kuwait and earned her Bachelor of Science and Doctor of Medical Dentistry degrees at the University of Pittsburgh College of Arts and Sciences and School of Dental Medicine, respectively. She then began practicing as a general dentist in Kuwait, before returning to the United States to pursue a Certificate in Advanced Periodontology and Master of Science in Craniofacial Biology at the Herman Ostrow School of Dentistry of USC. After earning her Certificate in Advanced Periodontology, Dr. Abulhasan moved back to Kuwait, becoming the first female periodontist at the Al Jahra Dental Specialty Center. There, she was able to gain valuable clinical and humanitarian experiences, learning from her fellow clinicians and patients alike.

Currently, Dr. Abulhasan is a clinical assistant professor of dentistry, in the Division of Periodontology, Diagnostic Sciences, and Dental Hygiene, at the University of Southern California’s Herman Ostrow School of Dentistry, splitting her time between teaching resident periodontists and treating her own patients in private practice. Upon returning to USC as a member of the faculty, Dr. Abulhasan took up the opportunity to receive a Master of Business Administration degree at USC’s Marshall School of Business. This program initially only accepted medical doctors; however, Dr. Abulhasan did not let that stop her from continuing her learning and achieving her academic goals. She became the first non-medical doctor to complete the program. Throughout her career, Dr. Abulhasan’s clinical experiences have been supplemented by levels of dental education. She has taught dental students in both Kuwait and the United States, finding an appreciation for the balance between dental education and private practice.

In addition to blazing trails in healthcare and dentistry, Dr. Abulhasan enjoys spending time outdoors, going on hikes, traveling, hanging out with family and friends, and eating good food. Honing in on her strengths in surgical dexterity and finesse, Dr. Abulhasan set out to explore options in oral surgery and periodontics after graduating from dental school. During her final year at University of Pittsburgh’s School of Dental Medicine, Dr. Abulhasan was involved in an anesthesia elective and also did an oral surgery externship at Montefiore Hospital in Pittsburgh, Pennsylvania. While she was inspired by the complexity of oral surgery cases and the working environment of a hospital, she ultimately preferred the more delicate, smaller-scale plastic surgery procedures of periodontics.

Dr. Abulhasan was fascinated by periodontal procedures requiring a combination of very intricate surgical skills — of which, soft tissue augmentation and grafting are her favorites. She found these procedures to be very technique sensitive, but also highly predictable when done correctly.

When discussing the major challenges of periodontal procedures, Dr. Abulhasan emphasized the importance of having a well-prepared mindset going into the procedure. She stated that no single procedure is challenging, rather the circumstances surrounding the procedure may increase the difficulty. Such factors include patient comfort, access to the area of interest, assistants’ help, and even one’s own mindset going into a complicated procedure. Dr. Abulhasan states that even a simple procedure can prove a challenge if the environment is not suitable.

After completing the Advanced Periodontology residency program at USC, Dr. Abulhasan worked as an instructor at the University of Southern California, working in a variety of private practices mostly within Los Angeles County. Recently, however, she has been expanding her expertise to offices in Las Vegas, Nevada. Dr. Abulhasan shared that one of the major contributors of a successful practice is to have an excellent team of assistants and other staff members. She emphasized that, as a dental practitioner, it is most important to cherish, value, and take care of the staff.

With a periodontics practice in particular, Dr. Abulhasan highlights the importance of developing strong relationships with referring general dentists. Another key duty of periodontists is to spread awareness to both general practitioners and patients of the importance of periodontal procedures, which mainly help to repair or maintain a foundational component of oral health that is the periodontium. Focusing more on the business side of private practice, Dr. Abulhasan noted another inevitable challenge: dealing with different insurances.

Dr. Abulhasan’s professional journey brought her back to USC in 2019 where an opportunity arose for her to join the same residency program from which she had graduated in 2012, but this time as a faculty member. For Dr. Abulhasan, it was an honor to work alongside the same professors who had taught her. She is thankful to all of them, especially Dr. Kian Kar who is the current clinical director of advanced periodontology. He has been a mentor during residency and still is. As a clinical assistant professor in the Advanced Periodontology Clinic, Dr. Abulhasan supervises surgeries and provides guidance to the advanced periodontology residents during their cases. She has found her experience as an educator highly rewarding. Every day that she spends in the clinic, she learns something new from her residents and from her fellow faculty. She noted that most of her learning comes from the way her residents develop their treatment plan and the way in which they interact with their patients. For current dental students interested in specializing in periodontology, Dr. Abulhasan highly recommends them shadowing and assisting at the Advanced Periodontology Clinic at Herman Ostrow.

Looking forward to the future of periodontology, Dr. Abulhasan sees major changes in the implant world and the realm of digital technology. However, Dr. Abulhasan is an advocate for understanding the foundational basics of periodontology and implantology. She affirmed that having a solid foundation of the basics allows one to solve issues during a procedure in the case where technology fails to operate properly. She stated that new technology takes many years to develop, such as the case of dental implants that have been researched for more than twenty years before being used commercially.

In addition to her work in education and private practice, Dr. Abulhasan is also involved in humanitarian outreach. She has participated in medical and dental relief trips to many locations such as Haiti; Rio Guasaro, Panama; Visakhapatnam, India; Nan Province, Thailand; Kenya; and to Syrian refugee camps in Jordan. She has participated in medical and dental relief trips to many locations such as Haiti; Rio Guasaro, Panama; Visakhapatnam, India; Nan Province, Thailand; Kenya; and to Syrian refugee camps in Jordan.

Her passion for outreach began in dental school. As a dental student, Dr. Abulhasan took opportunities to travel to Jamaica and Belize on humanitarian ad missions. These trips quickly became a highlight of her time in dental school. On these missions, she was able to serve alongside her peers and faculty in a non-flair, impromptu, healthcare setting. She fondly recalls her time providing care to those underprivileged populations: “Though you’re giving a lot, you’re actually gaining much more.” No matter how heavy the workload was, no matter how busy the clinics were, she found peace in the work being done and people being served.

After graduating dental school, her participation in humanitarian aid missions continued. Each trip came with its own enriching experiences. In Panama, she and her team established a medical and dental clinic at a naval base in the middle of the jungle. Though there was a language barrier between her team and the Panamanian sailors, both parties had the same goal: providing healthcare access to those who needed it most. This transcended any barriers they may have had and allowed them to work harmoniously to achieve their shared goal. In Jordan, she was touched by the selflessness displayed by the refugees. Some gave up their camps for the makeshift dental clinic; others offered as much as they could to assist the clinicians in their efforts. In Thailand, the people’s kindness left a lasting impression.

Inspired by these experiences, Dr. Abulhasan founded Raise to Relief, an organization that promotes humanitarian relief work and provides a domain for fundraising that aids this work. It is a platform that raises awareness and funding for medical and dental relief trips that provide crucial healthcare services to underserved populations, throughout the world.

Dr. Abulhasan’s journey to periodontology is one of perseverance and optimism. Dr. Abulhasan took on each next step of her life with the mindset of blazing her own trail and picking herself right back up in the face of every challenge. Having been raised amongst three other brothers, she grew up tough and on her toes. While she faced challenges becoming accustomed to new environments, such as her move from Kuwait to Pittsburgh as a student or from Kuwait to USC as a clinician, she never backed down and always embraced challenges head on.

Dr. Abulhasan is a firm believer of being one’s own number one supporter: “You make your own opportunities. I definitely think that’s based on you. You don’t need anyone to push you. You don’t need anyone to be like, ‘Hey, you did good.’ In times of struggle, you can cry and hide under the bed, that’s fine! But you have to get back up! You have to be your own motivation.”
Applications of Periodontal Regenerative Research to Endodontic Treatment

Catherine Choi & Richard Langkong

Dr. Khalid Al-Hezaimi, DO, is a clinical professor in the endodontics department at the University of Southern California’s Herman Ostrow School of Dentistry. Dr. Al-Hezaimi began his dental school training by pursuing his Bachelor of Dental Surgery degree at the King Saud University in Riyadh, Saudi Arabia. He then arrived at Ostrow to pursue his training in endodontics, obtaining his Certificate in Endodontics in 2003. After working in private practice and as a part-time faculty member for a couple years, Dr. Al-Hezaimi continued his training in periodontology at the Tufts School of Dental Medicine in Boston, Massachusetts, during which he also obtained the Royal College of Dental Fellowship in Endodontics. Dr. Al-Hezaimi became a diplomate of the American Board of Periodontology in 2008, as well as of the American Board of Endodontics in 2012.

Dr. Al-Hezaimi’s dual training in endodontics and periodontology initially motivated by his time in the endodontics clinic. He recalled his time in private practice in Saudi Arabia, where he found that when he was often faced with a dilemma when it came to treatment planning; should the tooth be saved with root canal treatment, or should it be extracted and replaced with an implant? Dr. Al-Hezaimi also recognized the unparalleled advanced research conducted in the field of periodontology, specifically on the topic of regenerative dentistry. By pursuing both specialties, Dr. Al-Hezaimi found that he was able to take the concepts of regeneration and apply them to endodontics, allowing him to improve his clinical judgments and make more informed decisions.

A common theme in Dr. Al-Hezaimi’s research is translational research that has direct implications on patient care, as well as an overlap between the fields of periodontology and endodontics. One of Dr. Al-Hezaimi’s primary research interests developed from his training in periodontics is on platelet-derived growth factors (PDGF) and pulp revitalization. PDGF is a major mitogen and chemoattractant for connective tissue, including osteogenic cells and mesenchymal origin, PDGF has been shown to play an important role in promoting fracture repair and inducing new bone formation. Dr. Al-Hezaimi’s work revealed that PDGF has similar bone volume formation activity when used in conjunction with mineralized bone allografts and xenografts within calvarial and dental alveolar ridge bone defects. Specifically, he found that recombinant human PDGF regulates the cell proliferation and migration of osteoblasts and fibroblasts aiding in the regeneration of bone tissues in periodontal diseases and osseointegration of dental implants.

Subsequent studies further highlighted the significant impact of bridging his training in periodontology and endodontics. In a randomized controlled human clinical trial, Dr. Al-Hezaimi investigated the effects of PDGF on dental pulp using histomorphometric and microCT analyses. He found that PDGF, in combination with mineral trioxide aggregate (MTA) as a matrix, promoted dentin-like regeneration of the dental pulp. This increase in structural and reparative material promoted the healing capacity of the pulp by sealing the pulpal space following pulp capping procedures.

Dr. Al-Hezaimi’s clinical observations of implant failures fueled additional research questions; specifically, he encountered patients taking selective serotonin reuptake inhibitor (SSRI) medications who experienced failed implants with no known explanation. SSRIs are the most commonly prescribed antidepressant medications. Dr. Al-Hezaimi’s recent work, slated for submission shortly, focused on the impact of SSRIs on bone density as well as bone volume. Using real-time microCT scanning of rat models with calvarial defects, Dr. Al-Hezaimi found that the bone mineral density of the animals taking SSRIs did not increase as much when compared to the control group. To follow up on this finding, Dr. Al-Hezaimi conducted translational pre-clinical trials in human patients. In addition to the impact on bone density as observed in the animal studies, he also found that human subjects’ bone volume was also reduced in patients taking SSRIs when compared to normal subjects.

The findings of the SSRl studies have impacted the way Dr. Al-Hezaimi thinks about and cares for patients when they are taking SSRIs during implant treatment. In particular, he identified two implications on the quality of care for these patients: the first is increasing the waiting time to permit sufficient bone regeneration to compensate for the SSRI-induced decrease in bone density, and the second is adding bone grafting materials when placing implants in order to augment bone volume.

Dr. Al-Hezaimi has incorporated his research experiences into various clinical settings and leadership positions. Between 2009 and 2020, he had a private practice in Ottawa, Canada, and also led research efforts at a research center in Saudi Arabia. In addition to research in growth factors and regeneration, Dr. Al-Hezaimi assisted the research center in Saudi Arabia with 3D advanced imaging.

Dr. Al-Hezaimi’s extensive research studies along with his experiences in periodontology and endodontics have allowed him to identify three key elements of research. The first element is formulating and establishing a hypothesis. Especially for clinically relevant translational research, Dr. Al-Hezaimi finds that many research questions come from encountering a particular problem or difficulty in the clinical setting. In thinking about how to solve the clinical problem, Dr. Al-Hezaimi develops a translational research question.

The second element of research Dr. Al-Hezaimi has identified is the research methodology and design. He believes that putting careful consideration into how a research study is designed and implemented is critical for answering the research question.

Third, Dr. Al-Hezaimi believes that teamwork is an essential component of research. He finds that finding a team to work with and listening to others’ critiques and ideas is what spark other ideas and answers to research questions. This collaborative environment in which ideas are shared and listened to promotes a rich research process.

For Dr. Al-Hezaimi, the one thing that encompasses all three of these elements is finding great mentors. His decision to relocate with his family to Southern California and join the Department of Endodontics at Ostrow was, in large part, driven by the numerous mentors and collaborators. He expressed gratitude to the many mentors he had met over the years: Dr. Casey Chen, Chair of Periodontology; Dr. Ian Rotstein, Chair of Endodontics; and Dr. Jim Simon, former Advanced Endodontics program director; as well as additional mentors both at Ostrow and on the East Coast.

When asked for advice to Ostrow’s dental students who are interested in doing research, Dr. Al-Hezaimi emphasized the importance of mentorship. He believes that hard work, dedication, and finding the right mentor are very important to progress in the world of scientific research. The right mentor for each person is different, and the joy of learning and inspiration will be achieved by finding the right mentor. Dr. Al-Hezaimi strives to model a type of mentorship for his current students at Ostrow that inspires learning and joy in the process. After each session, he asks his students, “Did you learn today?” and “Did you enjoy what you learned today?” He believes that the enjoyment of learning is key for junior researchers to explore and make scientific discoveries. Dr. Al-Hezaimi concluded with these final words of encouragement: “Enjoy what you learn, because this will unfold your capabilities and potential. If I can make it, everyone can make it.”
DHOP. DHOP is a student-run community outreach program in her second year of dental school, Dr. Zadourian joined into their work. Her greatly these underserved communities are in need of a new generation of dentists that put their heart and soul into their work.

In her second year of dental school, Dr. Zadourian joined DHOP. DHOP is a student-run community outreach program that travels to different locations around the world to provide free dental care for underserved communities. The program started off as a small group of a few dental seniors and has now expanded to be one of the most anticipated dental outreach programs of the year. The trip included six full-time days of clinic where students completed endodontic procedures, extractions, restorative treatments, and prophylaxis. Dr. Zadourian recalls her first time on the DHOP trip, as a student, being one of the most fulfilling experiences. She enjoyed working with the children in the Philippines and feeling the honor of being able to help others feel better about themselves and encourage beautiful smiles. The second time Dr. Zadourian visited the Philippines, she was faculty advisor and assisted the group in providing about $200,000 worth of dental care to more than 350 patients. Dr. Zadourian’s commitment and passion for community dentistry was evident, and, after 10 years of service, Dr. Sunny, the director of DHOP passed over the role to Dr. Zadourian. Dr. Zadourian expresses great gratitude for the heartwarming opportunity to shift from being a student to a faculty advisor and experiencing both sides of the trip. Recently, Dr. Zadourian has been very busy organizing the upcoming trip to the Bahamas. After a two-year hiatus due to COVID restrictions, DHOP is up, running, and ready for a great trip.

In addition to her work with DHOP, Dr. Zadourian also serves as a member of the renowned USC mobile dental clinic. The mobile clinic has been around for over 50 years, aiding underserved children and communities including veterans. The mobile clinic provides an extra layer of giving back and reminds Dr. Zadourian of how much she loves working with children. She explains that the clinic usually runs for 10 days in different schools (depending on the sponsors), and patients are brought in and screened. Over the weekends, treatment plans are created, x-rays are taken, and cleanings are completed while the weekdays are reserved for treatments. Dr. Zadourian advocates for the importance of emphasizing oral hygiene instruction and providing the appropriate supplies needed to maintain oral hygiene. She understands that patients may not always have time to go back to the dentist due to different circumstances; however, she believes that providing this education will lead to better health outcomes. She urges students to break away from the sim-lab bubble and put themselves in situations where they are exposed to different people, places, and situations. Furthermore, she advises students to put in the effort to seek opportunities to serve the underserved communities because it may change their entire outlook on their dental career just as it did with Dr. Zadourian.

Because Los Angeles is home to the infamous Skid Row, a 54 block with a very large homeless community, many of whom lack proper access to dental treatments and healthcare, the Union Rescue Mission (URM) was created in 1999 to help provide dental services to low-income communities. The URM dental clinic started out with only one dentist and one supervising dentist, but, today, it is directed by Dr. Mehdi Mohammadi and is a crucial rotation for fourth-year dental students in the Los Angeles area. Dr. Zadourian is an attending faculty member who oversees and supervises the students as they complete their treatments ranging from basic OHI to completing endodontic procedures. Dr. Zadourian works as one of the four attending faculty to oversee four of the eight chairs depending on the schedule.

She encourages students, especially those who are in their first or second year of dental school, to join in order to expand their experience with real-life dentistry.

Dr. Zadourian notes that one challenge she is learning to overcome is finding the balance of working with her students and with the patients receiving the treatments. It is important for her to make sure everyone feels comfortable, including both the students providing the dental services and the patients receiving quality treatments. She says it’s crucial to be flexible, adjustable, and understanding of everyone’s point of view and learning style. Dr. Zadourian acknowledges the differences in each generation and how this contributes to providing different learning styles and experiences in order to achieve the highest quality of care. She believes that teamwork also plays a significant role, as she is exposed to many different students, faculty, and patients, and it is important to collaborate in order to make a change.

Dr. Zadourian has truly found her calling in community health dentistry. She has proven time and time again to shine in all aspects of dental public health programs. From working in the mobile clinic, to being an attending faculty of URM to leading one of the most coveted overseas trips of the year, Dr. Zadourian is an inspiration to us all. Even with a full schedule, she puts her students first and advocates for the highest quality of care for each and every one of her patients. She encourages students to break away from their normal routine and give back to their community. It is so important for her to have her students expand their experiences because the real world is so much more than working a 9am-5pm job; it is about feeling content with the work we are providing and growing as caregivers and clinicians. Dr. Zadourian notes that one thing she regrets not doing in her dental career is not starting her community dental health services earlier. However, she appreciates every opportunity she has had and acknowledges that certain challenges along her journey were crucial in order for her current success in her dental career.
Dr. Sarah Alsaleh and Dr. Naznin Forghani are both faculty members in the operating dentistry department at the Hermann Ostrow School of Dentistry of USC, who obtained their degrees from the Advanced Operative and Adhesive Dentistry program and an additional Master of Science degree in Biomaterial and Digital Dentistry.

Dr. Forghani is originally from Iran and started her dental journey as a Doctorate of Dentistry and Oral Surgery (DDS) Azad Islamic University, Tehran Dental Branch. She is a versatile and knowledgeable Doctorate of Dentistry graduate who possesses a strong aptitude and superior capabilities within the dental field. From the initial stages and superior capabilities within the dental field, she was brought to the United States of America, keen on research. Before coming to Canada to pursue her career in dentistry, she worked as an internship leader in Alfarabi College. Afterward, she started working as an intern leader in Alfarabi College's dental clinic, where she was responsible for coordinating fellow interns in the emergency room and providing weekly presentations on different oral surgery techniques.

This unique opportunity helped her fine-tune her management and patient skills, and it also taught her the importance of working under pressure. In 2019, she completed a research project and poster presentation entitled "Talents toward Social Media among Practicing Dentists and Dental Students in Clinical Years in Saudi Arabia," which was published in The Open Dentistry Journal and was presented at the 16th Makkah Dental Conference. Due to her qualifications, she was able to receive scholarships to continue her education in the United States. As part of the requirements for her scholarship, she attended English courses at Kaplan International English in Chicago.

In the Summer of 2020, Dr. Alsaleh and Dr. Forghani started their education at USC through the Advanced Operative and Adhesive Dentistry program and started their Master of Science in Biomaterials and Digital Dentistry degree in the Fall of 2020. When asked what they enjoyed the most about their education at USC, they mentioned that the emphasis on being minimally invasive in preparing restorative teeth, the process of incorporating modern technology into daily practice, and the opportunities to interact with like-minded individuals while learning from experienced professionals.

Dr. Alsaleh was born in Saudi Arabia, where she received her bachelor's degree in dental medicine and surgery at Alfarabi College. Afterward, she started working as an intern leader in Alfarabi College's dental clinic, where she was responsible for coordinating fellow interns in the emergency room and providing weekly presentations on different oral surgery techniques.

This unique opportunity helped her fine-tune her management and patient skills, and it also taught her the importance of working under pressure. In 2019, she completed a research project and poster presentation entitled "Talents toward Social Media among Practicing Dentists and Dental Students in Clinical Years in Saudi Arabia," which was published in The Open Dentistry Journal and was presented at the 16th Makkah Dental Conference. Due to her qualifications, she was able to receive scholarships to continue her education in the United States. As part of the requirements for her scholarship, she attended English courses at Kaplan International English in Chicago.

In the Summer of 2020, Dr. Alsaleh and Dr. Forghani started their education at USC through the Advanced Operative and Adhesive Dentistry program and started their Master of Science in Biomaterials and Digital Dentistry degree in the Fall of 2020. When asked what they enjoyed the most about their education at USC, they mentioned that the emphasis on being minimally invasive in preparing restorative teeth, the process of incorporating modern technology into daily practice, and the opportunities to interact with like-minded individuals while learning from experienced professionals.

"Digital dentistry has been a turning point in my life," Dr. Forghani says. This process plays an important role in the contemporary practice of dentistry and treatment that provides natural esthetics. With the help of digital impressions, digital wax-ups, 3D printing, and CAD/CAM technology, the process of fabricating and delivering restorations has become considerably faster than before with increased accuracy. Using digital software, they are able to complete smile analysis where they digitally manipulate the smile alignment compared to the face, shaping the restoration, and among other factors, and create mockups. Comparison of the digital model with the patient's current smile can help the patients to visualize the restoration before it is delivered and decide more accurately, which increases patients' acceptance of the final restoration. This also decreases the length and number of appointments, making the process more comfortable for both the patient and the dentist. Compared to the traditional methods, "the digital process is more enjoyable for the patients and encourages them to come back and finish their treatment," according to Dr. Alsaleh.

Following their passion for digital dentistry, Dr. Alsaleh and Dr. Forghani decided to research and develop new materials currently available for restorations through CAD/CAM technology. Dr. Alsaleh's research focused on four different lithium disilicate reinforced glass ceramics (IPS e.max CAD, Amberg Mill, Initial LiSi Block, and n!ce), while Dr. Forghani focused on three Zirconia material with different Yttria concentrations (3Y, 4Y, and 5Y). In their research, they both measured Biaxial Flexural Strength (BFS) using a universal testing machine. In this test, each material is milled into a cylindrical block and sectioned into circular disks with specific measurements. The disk samples are fired and placed on three balls arranged into a circular shape. A controlled load is applied using a piston until the sample fractures.

Specifically, Dr. Alsaleh's measurements were concerned with 0.5 mm and 1.0 mm thicknesses the four materials after baseline, one, three, and five firings. The analysis of the biaxial flexural strength data was performed using the parametric test ANOVA as well as Weibull analysis to find significant results and determine the reliability of the tested materials. The different materials had varying biaxial flexural strengths, with e.max and Amber Mill as the highest BFS, followed by LiSi and n!ce. Dr. Alsaleh believes this difference is due to the amount and size of lithium disilicate inclusions. Materials such as e.max and Amber Mill are called lab-side because they are milled in the green state and need an additional firing, on the other hand, LiSi and n!ce are called chair-side materials because they can be delivered after milling and do not require additional firing, according to the manufacturers. Lab-side materials had a higher BFS because, after their baseline firing, they have a higher lithium disilicate content. Finally, each material had a higher strength with a higher thickness compared to a smaller thickness. The clinical implications of Dr. Alsaleh's research go back to how the choice of material and its processing can affect the strength of the final restoration. Dr. Alsaleh mentions, "Clinicians and technicians may repeat firings multiple times for adding stain or glazing, but we need to be careful. Where is the threshold? Where do we stop?"

Similar to Dr. Alsaleh, Dr. Forghani has been interested in research on biaxial flexural strength of CAD/CAM material. In particular, the main objective of her study was to examine the influence of yttria content, surface treatment, and artificial aging on the biaxial flexural strength of zirconia. Three zirconia materials [Bio Zr (3Y-TZP), DD cube One(4Y-TZP), and DD cubeX (5Y-TZP)] (12 mm diameter, 1.2 mm thickness) were divided into aged and non-aged groups and subclassified based on surface treatments: none, wet and dry abrasion, and artificial aging (n=15). For disk fabrication, cylinders (a 15 mm, length 14 mm) were milled from round blocks using a milling machine. The cylinders were attached to CAD/CAM block metal sprues and sliced into 1.4 mm thicknesses using a low-speed precision saw. Disks were polished to 1.5 mm thickness and sintered steam at 134±2°C under a pressure of 0.2 MPa for 5 h. Wet and dry particle abrasion was performed by 50 μm Al₂O₃ particles. A universal testing machine was used using the piston-on-three-balls technique. Data were analyzed by Three-way ANOVA and Weibull analysis.

The results of this research study were highly clinically significant as they indicated that yttria content significantly impacted BFS, with the highest for 3Y and the lowest for 3Y. Particle abrasion increased the BFS of all materials. Wet abrasion resulted in a lower Weibull modulus and showed higher dispersion of the measured data than dry abrasion. Aging had an insignificant effect on BFS of 3Y and 4Y, but it decreased BFS of 5Y. In conclusion, Particle abrasion and decreasing the yttria content can increase BFS of zirconia materials. During the process of their research projects, both Dr. Alsaleh and Dr. Forghani completed the coding required for analyzing the data by ANOVA and Weibull analysis, as well as creating plots. This was an interesting experience for them as it helped them to develop critical thinking, clinical, and interpersonal skills. Their passion and dedication towards operative dentistry and their research are intriguing, and we wish them the best in their future endeavors.
A Passion for Oral Cancer

Wenshuai (Katherine) Mu, Justin Matian

Dr. Dechen Lin joined the Ostrow family at the Center for Craniofacial Molecular Biology in early 2022, coming to us from Cedars-Sinai Medical Center. He is an Assistant Professor at USC’s Herman Ostrow School of Dentistry and an Associate Director at the USC Head and Neck Center. He attended Nanjing University in China where he received his Bachelor of Science in Biology, later going on to pursue a Ph.D. in Cell Biology at the Chinese Academy of Medical Sciences.

As an undergraduate, Dr. Lin found himself interested in cancer research. By that time, he had begun to explore fluorescence in situ hybridization (FISH), a technique used to detect specific DNA sequences in cells. FISH involves the hybridization of fluorescently labeled probes to specific regions of DNA within the cell, which allows for the visualization and localization of specific genetic sequences. In cancer cells, FISH is often used to detect specific genetic changes, such as amplification or deletion of oncogenes or tumor suppressor genes, which can aid in the diagnosis and treatment of cancer. Therefore, instead of only having two copies of the genome, there will be a hundred copies of the genome in the cancer cells.

One of his current projects focuses on oral cancer and its early detection. Oral cancer can be divided into two categories: HPV-positive and HPV-negative. HPV-positive oral cancer is caused by infection with the human papillomavirus (HPV). This type of oral cancer is on the rise, particularly in developed countries, and is most commonly found in the back of the throat. HPV-negative oral cancer is caused by factors such as tobacco use, alcohol consumption, and other environmental factors. This type of oral cancer is more common in the lips, tongue, and floor of the mouth. Dr. Lin notes, “It is interesting that HPV-positive and HPV-negative oral cancer have very different biology.” HPV-positive oral cancer tends to have better response rates to treatment and improved survival outcomes compared to HPV-negative oral cancer; however, HPV-positive oral cancer is often diagnosed at a later stage and has a higher incidence of recurrence and metastasis.

Dr. Lin emphasizes the importance of oral cancer research, given that, “oral cancer can have a significant impact on a person’s quality of life.” Treatment for oral cancer often includes surgery, radiation therapy, and chemotherapy, which can cause side effects such as pain, swelling, changes in appearance, and difficulty eating and speaking. The treatment can also lead to long-term side effects such as dry mouth, difficulty swallowing, and nerve damage. The psychological impact of oral cancer can be significant. The treatment process can be physically and emotionally draining, and many people struggle with feelings of anxiety and depression as they go through treatment and recovery. Oral cancer can lead to disfiguration, as the treatment may require the removal of parts of the jaw or tongue, which can change the patient’s appearance and affect their self-esteem and social interactions. Dr. Lin further elaborated that “the suicide rate for patients with oral cancer is one of the highest as a lot of them have had their tongues taken out.” As a result, it is essential to find a reliable method to detect oral cancer in an early stage since it would create significant differences in patients’ quality of life. To achieve that goal, Dr. Lin and his team are developing various methods to aid the understanding of oral cancer detection and treatment.

Cancer represents the second leading cause of death globally, accounting for one in six deaths according to the World Health Organization (WHO). In the past decade, significant advances have been made in cancer research. One of the promising advancements regarding tumors was highlighted in the interview with Dr. Lin. Dr. Lin spoke about diving more deeply into white lesion biopsies in the hopes of understanding how these white lesion samples become tumors and what really happens. Dr. Lin emphasized the importance of making this scientific achievement because there are hundreds to thousands of changes along the genome in gene expression and protein expression that we do not yet fully understand. With better knowledge and information, we can catch the genes and proteins that change most dramatically and most consistently among patients. With this information, we hope to create biomarkers to predict the change from white lesion to cancer. Dr. Lin went on to state, “if we are able to get these biomarkers, then clinicians will have a way to tell which lesions are capacable of becoming a tumor and which lesions are not.”

The interview with Dr. Lin continued on the premise of cancer cloning. The path to cancer is often a long process with many mutations. It takes the right combination of mutations for a tumor to become malignant and begin to grow. In clonal evolution, there are two main models. The first model is linear and the second is branched. In linear evolution, there is a driver mutation or a pinpoint mutation that enables a clone to outcompete cells that do not have a mutation. These mutations assemble and gather together in a stepwise or cumulative fashion as each new clone replaces the one before it. Meanwhile, branched evolution is where tumors may go through a process in which different independent cells gain a mutation - often referred to as subclonal mutation - that benefits a competitive advantage. Unlike linear evolution, branched evolution does not follow the principle that each new clone replaces the one before it. Instead, a number of subclones evolve in parallel unison. As a result of this process, a type of intratumoral diversity is created over time.

With cancer being the global problem that it is, a large issue that arises is discovering that you have it. Dr. Lin expressed his concern with how so many patients do not know they have oral cancer until it is too late. Dr. Lin said, “These lesions are under the skin when they are small and because they are not evident until an X-ray or CT scan, many patients think they are healthy when in fact it is a matter of time until cancer grows.” One of the outstanding precursors to oral lesions and oral cancer is smoking and drinking. Cigarette smoke is a complex mixture of more than 5,000 chemicals including oxidants, carcinogens, and toxins. Influences such as carbon monoxide, oxidizing chemicals, volatile organic compounds, particulates, heavy metals, and nicotine are just some of the many components within a cigarette that damage our cells. The risk of being diagnosed with oral cancer is about 5 to 10 times greater among smokers when compared to individuals who do not smoke. The thousands of chemicals in tobacco smoke help initiate and promote genetic changes in the mouth cavity’s cells, which can lead to the development of oral cancer. Because the use of cigarettes - especially tobacco - increases the risk of oral cancer by exposing the mouth to these carcinogenic chemicals, patients who smoke should check their oral health more often.

Dr. Lin emphasized his love for the field of cancer research and specifically oral cancer because he is a firm believer in discovering these tumors early and always wants to help. Dr. Lin is an example of true human excellence and humanity as health promotion is his true passion.

The Explorer Journal 2023
A Passion for Operative Dentistry

By Puneet Kumar & Bahar Khalilian

Dr. Andrea Ramirez Goercke was born in Ecuador. She graduated from the University of Cuenna School of Dentistry in 2017, after which she completed a master’s in esthetic dentistry in Madrid, Spain. This program not only enhanced her general knowledge of esthetic dentistry but also opened her eyes to new possibilities in dentistry such as digital dentistry. While completing her master’s degree, Dr. Ramirez Goercke realized the importance of photography in the documentation of cases as well as communication with the patients about their oral condition and treatment plan. Therefore, she decided to take a course in basic photography to add to her skill set and better help her patients. In these years, she also completed multiple poster presentations, including one in Barcelona, Spain, where she presented a case of veneer and crown with high esthetic demands. Such experiences familiarized her with the world of research and how different researchers carry out their projects.

Her hunger and devotion to knowing more about operative dentistry brought her to the United States, where she attended both the advanced operative program and worked on her master’s in biomaterials and digital dentistry at USC’s Herman Ostrow School of Dentistry at the same time. Her education at USC gave her a deeper perspective on the nature and composition of the material used in operative dentistry, which has helped her gain a more profound understanding of the use of each material in a clinical setting. During this time, she was also a faculty member in the pre-clinic operative courses. Her first teaching experiences were teaching and tutoring English, biology, and German; these were excellent opportunities to continue her enthusiasm for teaching in the field of dentistry. While at USC, Dr. Ramirez Goercke decided to further pursue her passion for restorative dentistry as an art and science through a research project on dental materials used for computer-aided design/computer-assisted manufacturing (CAD/CAM). "This is the era of digital dentistry and CAD/CAM dentistry has been a big part of it," Dr. Ramirez Goercke says. One of the popular products used for indirect restorations has been e.max lithium disilicate blocks. When the patent for this material expired in 2019, other companies were allowed to use the formula to produce their own lithium disilicate products. This gave clinicians more diverse options to choose from. At the same time, each material had its own specific properties, which can affect the final restoration delivered. In clinical practice, each block may be fired two or more times even after crystallization for staining and glazing of the final product. Each firing cycle may change the color and translucency of the material, which can lead to a restoration with different esthetic properties compared to the intended results. Therefore, Dr. Ramirez Goercke’s research focused on the changes in color and translucency that can happen with different materials and firing cycles.

She worked on four different lithium-disilicate reinforced glass ceramic blocks: e.max CAD (EX; IPS e.max CAD), In-Ceram Vivadent, Schaan, Liechtenstein; Nice (NC; Straumann, Freiburg, Germany), Initial LiSi Block (LS; GC, Tokyo, Japan), and Amber Mill (AM; HASSBIO, Kangreung, Korea). Each lithium disilicate block was sectioned into smaller specimens with specific measurements with a thickness of 0.5 mm or 1.0 mm. The e.max and amber Mill blocks were fired based on the manufacturer’s recommendations as these blocks were already crystallized by the company. No pre-firing was required for the nice and LiSi blocks, as they were already crystallized by the company. Afterwards, each block was polished to minimize the scratches present on the specimen. This was to prevent scratches from affecting light reflection. Each block was thereafter subjected to 5 more firing cycles based on the manufacturer-recommended protocol for staining and glazing. To understand color and translucency, Dr. Ramirez Goercke needed to measure three different parameters of L, a, and b which can lead to a restoration with different esthetic properties compared to the intended results. Therefore, Dr. Ramirez Goercke’s research focused on the changes in color and translucency that can happen with different materials and firing cycles. Therefore, all the aforementioned factors (i.e., material, thickness, and number of firings) need to be considered when completing multiple firing cycles.

Dr. Ramirez Goercke mentions that, as new dental products come to the market, each has slightly different characteristics, and it is important to investigate each accurately and carefully. Understanding the properties of each material will ensure their appropriate use in the clinic and the best outcome for our patients. The research journey has been long and time-consuming, but at the same time, an extremely rewarding one according to Dr. Ramirez Goercke, and she highly encourages any student interested in research to pursue it.

After finishing the final steps of her research project, Dr. Ramirez Goercke is looking forward to teaching as a faculty member in her home country. In addition to working at the dental school, she will be opening her private practice, where she can apply the valuable knowledge she has gained through her research to provide her patients with the best treatment. The most memorable moments for her as a clinician have been the final appointments where the treatment is completed, and she can enjoy the satisfaction of her patients with their new, healthy, and esthetic smile. Dr. Ramirez Goercke’s dedication and passion for operative dentistry are admirable, and she will no doubt continue to thrive in her field.

Figure 1: Lithium Disilicate materials after multiple firings (B: Baseline; 1F: first firing; 2F: second firing; 3F: third firing; 4F: forth firing; 5F: fifth firing)

Figure 2: Lithium Disilicate materials’ translucency after multiple firings
A Transformative Approach to the Care and Management of Orthodontic Patients

By Greg Park & Haeseong Lee

Dr. Alice Shen was born in Taiwan and received her dental education from the School of Dentistry at Taipei Medical College. She completed her training at Chang Gung Memorial Hospital in Taipei, where she shadowed craniofacial reconstructive surgery under the orthodontics team. For her, it was breathtaking to see how orthodontists could serve in such a unique capacity and contribute meaningfully to a group of plastic surgeons, orthopedic surgeons, radiologists, speech therapists, geneticists, general dentists, and prosthodontists. A variety of different specialists had come together to synergize their expertise and provide excellent clinical treatment for cleft palate patients.

The orthodontics team played an indispensable role. Specifically, cleft palate patients require a bone graft procedure in the cleft site prior to the eruption of the maxillary canines. The bone grafting can only be performed after the completion of maxillary arch expansion, which opens the cleft site and allows for the successful placement of the bone graft material. Ultimately, Dr. Shen was intrigued and inspired by the significant impact multidisciplinary team efforts have and how they remarkably transform the lives of individuals. Eager to become involved herself, Dr. Shen applied and matriculated at Ohio State University’s orthodontics program.

After finishing her orthodontics residency, Dr. Shen decided to pursue formal dental training in the United States, in hopes that it would help her communicate better with other U.S.-trained dental specialists and professionals. She completed the Advanced Standing Program for International Dentists (ASPID) in 1984, receiving her Doctor of Dental Surgery (DDS) degree from USC. Afterwards, she began teaching orthodontics to USC predoctoral students then to postdoctoral residents in 1991, after becoming American Board of Orthodontics (ABO) certified.

Dr. Shen sought to apply the knowledge she had garnered through her years of dedicated training to fulfill her dream of transforming lives and serving cleft lip and palate patients. She joined the reputable group of various experts and specialists in her team and enjoyed growing through the multidisciplinary exposure and teamwork that was required to treat complex cleft lip and palate patients. As Dr. Shen stated, “There is a sense of fulfillment in transforming the lives of cleft lip and palate patients.”

Labeled by many as an expert in impacted canines, Dr. Shen has also had a profound impact on the prevention and clinical management of impacted teeth. While teaching at USC, she noticed there were several papers discussing impacted canines in the context of surgical exposure technique, orthodontic biomechanics, in moving the impacted cuspid into the oral cavity, and adverse effects of moving the impacted cuspid, such as root resorption, ankylosis, devitalization, and bone loss. However, scant research had been done on the prevention of impacted cuspid. She recalled her specialty training at Ohio State University, where the orthodontics program chairman, Dr. J.P. Miyashita, had a collection of dry skulls. These skulls clearly demonstrated the eruption pathway of cuspid during the ages of 5-12. She also studied these dry skulls from Dr. Williams and began to analyze and cultivate her interest for upper cuspid impaction.

Further investigating the topic, Dr. Shen came across Contemporary Cephalometric Radiography by Dr. Kunihiko Miyashita. She had an exhaust of approximately one hundred skulls. Eager to learn more and study the skulls for herself, Dr. Shen visited Dr. Miyashita in Tokyo, and evaluated the skulls in his office. She was fortunate enough to find a skull with a palatal impacted cuspid. Using the resources available to her through the USC Orthodontics Department, specifically, the Redmond Imaging Center, Dr. Shen utilized cone-beam computed tomography (CBCT) to diagnose the location of the impacted cuspid in some clinical cases. Synthesizing all the information from her exhaustive study of dry skulls as well as the results of the CBCT, along with input from Dr. Williams, Dr. Shen presented a paper “Maxillary Cuspid Impaction: Can the Problems Be Prevented?” at the Edward H. Angle Society of Orthodontists meeting in Quebec City, Canada. During this decisive moment, Dr. Shen spent several hours going over her presentation material. He dissected the cases that she was going to present, helping her prepare for one of the most important presentations she would give in her academic and professional career. The response at the meeting was overwhelmingly positive due to the treatment outcome of the cases.

“The philosophical belief is that most teeth will erupt if all bony or soft tissue impingement or any other obstructions are removed from the path of eruption. Sequential extraction is the treatment protocol. The first step is extracting the deciduous first molars to speed the eruption of the first bicuspid. Retract the first bicuspid to give the cuspid room to erupt after the extraction of primary cuspid. The sequential extraction of the deciduous first molars and then extraction of the deciduous cuspid allow a better path of eruption of the permanent cuspid.”

It did not take long before Dr. Shen’s commitment to academic excellence, compassionate patient care, and dedicated leadership was noticed by the very best in the orthodontics community. In 2021, Dr. Shen was named the first female president of the Edward H. Angle Society of Orthodontists in Southern California, the most prestigious orthodontics society in America. Prior to this honor, she had been one of two female board members in the Angle Society and had served on the board for fourteen years. She recalls presenting five cases to the board to become an affiliated member of the Angle Society in 1990, and then five cases two years later to obtain full membership into the Angle Society. She had taken constructive criticism from members and thoroughly corrected her mistakes to improve. With her dedication to perfection and excellence, Dr. Shen was granted full membership to the most prestigious orthodontics society in 1992, which she now leads as the president. Dr. Shen has mentioned how honored she is to take on such a role and appreciates the board members who have been of great support for over 20 years.

Dr. Shen has demonstrated a commitment to exercising proper care and management of patients. She highlights communication as the first key element in doing so: “We need to fully understand the needs of the patients and explain whether orthodontic treatment can meet the patients’ needs.” She adds that clearly describing the pros and cons of different treatment plans is vital. Dr. Shen recognizes the second key element, which is relationship building. The process of building relationships involves taking certain steps to let patients know that orthodontists will be there for them and comfort them in troubling times. Dr. Shen would purchase several cans of protein shakes for her patients following orthognathic surgery and follow up with them and their parents to ensure they were following post-operative instructions properly. She mentions that the third key element to the successful care and management of patients is problem solving. Problem solving and re-evaluation of the treatment plan are both important habits to consider, as the treatment may not proceed as intended, whether that be from failure to comply with the treatment or unexpected events that change the course of treatment. Dr. Shen underscores the importance of keeping an open mind and being flexible to the possibility of alternative treatment options. For instance, if a patient with Class II molar relationship refuses to wear the headgear appliance, and they are still in Class II molar relationship after 10 months of treatment, the treatment plan may need to be modified to an extraction approach. Dr. Shen states, “It is better to alter the treatment plan during the orthodontic treatment. It might be too late to wait until the end and settle with a compromised result.”

Dr. Shen has proudly served nearly 40 years as a volunteer faculty for the USC Graduate Orthodontics program and continues to be a guest lecturer at several study clubs in the Greater Los Angeles area. Her desire to impart knowledge extends beyond the academic space, as she spends time educating general and pediatric dentists regarding tooth impaction, orthodontic screening, and the importance of early referrals to the orthodontist. Using her protocol for the prevention of canine impaction, Dr. Shen continues to host lunch and learns and has raised awareness on the importance of early teeth screenings and their role in the interception of canine impaction: “One of the key factors is the timing of examining the patient. Educating the referring pediatric dentists is crucial. I recommended screening the patients at the age of eight.”

Dr. Shen has been a charitable clinician, determined leader, and passionate educator throughout her life. Her impact and footprint extend well beyond the field of orthodontics, as she continues to inspire the next generation of health care providers through her passion for helping others, teaching, and transforming lives. As she stated, “Transforming patients’ lives is something special orthodontists can do for people.”

The Explorer Journal 2023
From Crop to Cartilage: The Journey towards Preventing Osteoarthritis

By Luke Aguilar & Kaveh Mahdavi

Dr. Zhaoyang Liu’s research journey towards craniofacial and molecular biology begins...
Interview with Pediatric Faculty
Dr. Philip Yoong

By Daniel Kohanghdash and George Parisis

Dr. Philip Yoong was born and raised in Southern California and received his Bachelor’s of Science degree in General Biology from the University of California, San Diego. During his undergraduate schooling at the University of California, San Diego, Dr. Yoong had the unique opportunity to volunteer on a dental mission trip in Africa. During this dental mission trip, he helped provide dental care to patients who would not otherwise have had the opportunity, or even the finances, to receive much-needed dental work. During this time, Dr. Yoong witnessed the potential for leaving a memorable and positive impression on the individuals and community at large that these dental practitioners were so fortunate to serve through providing patients with personalized knowledge of their oral conditions, hygiene, and health. Ultimately, he helped foster an environment that empowered these underserved patients while helping address their operative, periodontal, and surgical needs, which was gratifying in and of itself. While pursuing his undergraduate studies at the University of California, San Diego, Dr. Yoong discovered his passion for dentistry when he learned that dentists have the unique capability to diagnose and treat patients on the same day, if possible, and alleviate pain. Dr. Yoong is a first-generation dentist who went on to pursue his dental degree at the University of Michigan School of Dentistry where he graduated in 2019. Despite having a traumatic childhood experience at the dentist, he witnessed the positive impact of early dental intervention on an individual’s oral health, and this inspired him to pursue the specialty of pediatric dentistry. In 2021, he completed his pediatric dental residency at the Herman Ostrow School of Dentistry, after which he received his certification in pediatric dentistry.

Dr. Philip Yoong is currently an adjunct assistant professor of clinical dentistry at the Herman Ostrow School of Dentistry at the University of Southern California; he is an attending for pediatric residents and the course director for the pediatric module taken by second-year predoctoral students. As a course director, Dr. Yoong prepares course curriculum, specifically lesson plans and hands-on course work, for the students as he helps instruct them on the importance of proper dental care for pediatric patients. Dr. Yoong provides invaluable teaching to his second-year students by sharing his first-hand experience as a pediatric dentist during case discussions. Furthermore, he works in a private pediatric practice in Orange County and is a hospital provider at the Children’s Hospital of Orange County where he once made rounds as a pediatric dental resident. At Children’s Hospital of Orange County, Dr. Yoong provides care to the pediatric special patients with challenging medical conditions and is able to put his passions for interprofessional collaboration and alleviating care barriers into practice.

At the University of Michigan, Dr. Yoong helped establish a nonprofit called Bridge of Disciplines. The Bridge of Disciplines created meaningful collaborations between different disciplines such as medicine, nursing, pharmacy, and social work all while keeping the dental field as the centerpiece. In this collaboration, Dr. Philip Yoong worked with 17 project directors who led the collaboration between each of the departments including social workers who worked with the Ann Arbor community. Additionally, he worked on completing the following projects: creating a pediatric fluoride treatment campaign for children in the area, promoting dental awareness to the different discipline areas such as the medicine and nursing, creating opportunities for elementary and middle school students to learn about oral health, and allowing for the ear nose throat physicians to provide head and neck screenings for cancer.

Dr. Yoong started his dental research at the University of Michigan School of Dentistry where he was part of a research group that won a grant valued at $15,600. The research team ultimately decided to put all the grant money they received towards the student-run dental and medical clinic. They selected this clinic due to the interdisciplinary methodology they incorporated where students used their head and neck anatomy knowledge to enhance their education in this interprofessional environment.

Dr. Yoong sought for more and continued his research at the Herman Ostrow School of Dentistry at the University of Southern California while completing his pediatric residency. During his pediatric residency, he provided comprehensive systematic care to a patient population in a free clinic setting that incorporated the dental aspect into an interprofessional collaborative study between medical, social work, nurse practitioner, and pharmacy students. In addition, Dr. Yoong conducted research with the Suzanne Dworkak-Peck School of Social Work at USC where he studied cases with general anesthesia, investigated patients’ stress levels throughout the treatment, and used different levels of intervention through video and/or narratives. Although research studies became harder to conduct due to the COVID-19 pandemic, Dr. Philip Yoong and the team still continued to push forward with their research. As a result of their hard work, the research revealed that there was a positive correlation for patients being less stressed and feeling more comfortable when they had video interventions for the procedures with general anesthesia. Through his collaboration with the Suzanne Dworkak- Peck School of Social work, Dr. Philip Yoong learned the importance of collaborating with social workers in a medical setting to make an impact on the areas that are usually not spoken about by physicians.

Dr. Yoong envisions a future for dentistry that has more interprofessional collaboration among medical doctors, social workers, nurse practitioners, pharmacists, and other case relevant health care professionals. He believes that pediatrics is a unique field where it is important to have an open mind, and he encourages collaboration between the dentist, the physician, the patient and the parents or guardians of the patient. Dr. Yoong strongly believes that this effective and efficient communication and personalized care can make a huge impact on the present and future quality of lives of our patients. Dr. Yoong has found pediatric dentistry to be very rewarding as it has enabled him to change many pediatric patients’ preconceived ideas about the dentist and their overall dental experiences from those that are based in fear and anxiety into ones that elicit emotions of safety and positivity. As former students in the second-year pediatric dentistry module taught by Dr. Yoong, we have experienced first-hand how he motivates and inspires students to become outstanding clinicians; Dr. Yoong encourages dental students to look for more in their dental education in order to ensure proper pediatric patient care for the future. He says it is valuable for all dental students to get exposure in handling not only pediatric patients, but in successfully managing and ultimately educating the parents of patients with empathy and understanding. Dr. Yoong emphasizes that it is so important to take advantage of the unique opportunity we have here at the Herman Ostrow School of Dentistry at the University of Southern California to work with pediatric dentists and pediatric patients because it may very well impact and positively influence the dental care that they are providing and will provide in the future.
Opening the “Gaits”: Rehabilitating Patients with Motor Neurologic Injuries

By Brandon Pham and Courtney Fortier

As an assistant professor in the Division of Biokinesiology and Physical Therapy, Dr. Kristan Leech directs the Gait Rehabilitation and Motor Learning (GRML) Lab, with the goal of ‘enhancing the recovery of independent walking in individuals with gait dysfunction after a neurologic injury.’ Her overall mission is to reduce disability in older adults by addressing gait dysfunction, with an emphasis on patients who have previously suffered from a stroke. This lab achieves this by utilizing different forms of motor learning via physical therapy interventions so that these individuals may regain their mobility and independence.

Part of the reason why Dr. Leech was drawn to physical therapy included being able to spend time with patients. While studying physical therapy, she discovered a passion for treating patients with neurologic injuries due to the complexities of presentation and treatment associated with cases of this nature. Unsatisfied with the current level of knowledge on treatments that could help these patients return to their daily activity, she turned to research to answer the questions she encountered during clinical practice. By understanding the nervous system (how it functions and how it can fail to function), Dr. Leech realized that the ability of the nervous system to respond to damage can be used as ‘leverage’ for physical therapists to correct existing defects, whether they may be congenital or induced by trauma.

In her PhD research, Dr. Leech investigated the mechanisms by which high-intensity exercise can be beneficial to motor function in individuals with incomplete spinal cord injuries. Even though it was known that high-intensity exercise correlated with higher changes in neuroplasticity, the exact cause remained unclear. Her dissatisfaction with the current literature led her to explore how high-intensity exercise may be beneficial for spinal cord injuries. The research demonstrated that high-intensifying enough to increase one’s heart rate led to an increase in the expression of neurotrophins that promote and foster changes within the nervous system. In fact, this research has contributed to the change of clinical practice guidelines, now stating that high-intensity exercise is the mode of treatment that should be utilized for patients with gait dysfunction.

Her postdoctoral research focused on motor learning mechanisms in four different areas of the brain, with varying degrees of cognitive demand. These are categorized as use-dependent, instructive, reinforcement, and sensorimotor adaptation-based motor learning; it was during this time that she realized there was a gap that existed between the motor learning research community and the clinical physical therapy community: the research simply was not being translated into clinical practice. As shown in her paper, “Updates in Motor Learning: Implications for Physical Therapist Practice and Education,” she emphasizes how using the four types of motor learning can aid physical therapists in designing treatment interventions; while she does not claim it to be original research, she acknowledges that it was an important piece that is now gaining traction within the community.

Currently, her research has two main focuses. The first is centered on applying forms of physical therapy related to motor learning principles in the context of high-intensity gait training. Dr. Leech investigates the ability of individuals who have suffered from a stroke to walk at high aerobic intensities while intentionally trying to change their movement pattern, such as by receiving visual gait biofeedback. The second focus is understanding how cognitive impairment resulting from a stroke may impact a person’s ability to learn via different motor learning mechanisms. For example, there is a motor learning mechanism related to the frontal lobe that is more cognitively demanding and a mechanism related to the cerebellum that is more automatic. As different motor learning mechanisms are known to occur simultaneously, experimental design relies on creating tasks that are known to engage only specific mechanisms. To engage the more cognitively demanding mechanism, the participant receives gait biofeedback that they must be able to process and understand, then adjust their movement in response to an error. To engage the automatic mechanism, participants are instructed to walk on a split belt treadmill programmed to move at a different speed for each leg. Everyone begins to walk with an asymmetric gait but eventually begins to program the two sides so that they have never experienced a stroke as well as those who have will automatically learn to use symmetric steps in this environment. Dr. Leech hypothesizes that someone with post-stroke cognitive impairment may not be able to learn through a cognitively demanding mechanism but may still be able to take advantage of an automatic mechanism.

Ever since the COVID-19 pandemic, Dr. Leech has noted a few significant changes in the patient population. COVID-19 is known to cause blood clotting issues, which can lead to COVID infection-related strokes. Moreover, patients who are deconditioned, especially from physical inactivity, and later contract COVID may develop strokes due to their already deteriorating health. It is important for physical therapists to take note of these developments, i.e., due to how the treatment for post-stroke patients who have contracted COVID differs from that of post-stroke patients who did not suffer from COVID. Whereas the patient pool itself remains mostly the same, the priority of treatment changes. Aside from COVID, some of the more challenging cases involve damage or disease to the central nervous system, since the CNS is partially ‘plastic,’ not as plastic as the peripheral nervous system or other parts of the body. Treatment of such patients who undergo a catastrophic life event or life-changing diagnosis may end up being more emotionally challenging than intellectually challenging at times, as patients may plateau and more clinical troubleshooting may be needed, which can be more frustrating overall for the practitioner.

In terms of ongoing technological advancements, Dr. Leech’s lab monitors motor learning with a three-dimensional motion capture system that involves reflective markers and infrared cameras to monitor a patient’s movements and step lengths while measuring their heart rate using a Bluetooth heart rate tracker. Dr. Leech believes the future landscape of physical therapy will emphasize implementation science and knowledge translation. She states that future technologies that could lead to further development in her field are those that involve translating technologies used in research labs to clinical and at-home settings and improving the scope of data collected for clinical practice and research. Dr. Leech is enthusiastic about a ‘markerless’ motion capture system, which does not require the use of markers to be placed on a subject’s joint centers (which have to be thoroughly calculated), and this only indicates that research with motion capture systems that do involve markers is time-consuming and harder to translate to a clinical setting.

In theory, this would allow similar data to be collected in the clinic, and with a laboratory set up within a hospital, these findings could then contribute directly to the existing literature. She is also interested in technological developments that allow researchers to track the activity of research participants outside of the lab, as the capacity for change tested in the lab and at-home performance are not always indicative of each other. New methods of at-home data collection will allow for better assessment of how greatly performance in the clinic impacts an individual’s at-home performance and will elucidate how effective treatments really are. For post-stroke rehabilitation and stroke therapy, she believes that there will be a greater emphasis on precision medicine, which involves tailoring interventions to the individuals themselves, rather than providing treatments based on the diagnosis.

Dr. Leech expresses a strong passion for physical therapy and love for the patients that she treats. She is especially enthusiastic about physical therapists’ overarching message and service in promoting mobility, longevity, and participation within the community. Were she to start again, she would wholeheartedly devote herself to the field of physical therapy. When asked about her difficulties within the field and the challenges that she must respond to on a daily basis, she replied, “That’s why I’m in research… to try and figure out what we don’t know yet to further maximize peoples’ potential!”
Insights from Oral Maxillofacial Surgery Faculty: A Fresh Perspective

By Antranig Mesrobian & Steffi Chen

Dr. Daniel S. Miller is the newest addition to the Oral and Maxillofacial Surgery faculty at the Herman Ostrow School of Dentistry; the new Director of the Pre-doctoral Oral Surgery Clinic. Under his tutelage, the clinic will serve as his arena to shape the hands and minds of future dental practitioners and future oral surgeons alike. “My job is to help students improve their clinical skills while broadening their diagnostic acumen and improve their ability to make sound clinical decisions. This will help them understand their limitations and hopefully avoid complications. Every extraction does not need to be referred out; our pre-doctoral clinic is where each student can learn to better understand their level of comfort.”

The Beginning

Born in Southern California, Dr. Miller spent time alternating between the East Coast and the West Coast for a reasonable portion of his childhood. His early influence in life was his father; although he wasn’t a dentist, he sparked Dr. Miller’s interest in dentistry. Dr. Miller’s initial foray into the dental world was as a member of the inaugural class of ten students accepted into the ADAPT Dual Degree BS/DDS at the University of Southern California. Entering dental school, Dr. Miller was sure he would fulfill his childhood dream of becoming an orthodontist, yet, his first fateful procedure in oral surgery would set him on the path of oral surgery. The decision to change career trajectories was simple: “Oral surgery piqued my curiosity, and my interest in orthodontics waned. As a dental student, the minor oral surgery procedures made me feel like I was in my element.”

Dr. Miller graduated from the USC School of Dentistry in 1989; however, he did not match into a residency program. With his dental degree and license in hand, Dr. Miller entered the United States Air Force and worked for three years as a general dentist. When reflecting upon his work in the Air Force, Dr. Miller expressed gratitude for the experience. In 1992, Dr. Miller again applied to the Oral Maxillofacial surgery residency and was ultimately accepted at the University of Miami Jackson Memorial Hospital.

Unparalleled Training

Dr. Miller’s residency was a time of unparalleled learning. During his time at the University of Miami, Dr. Miller was mentored by Dr. Charles Kates, a dual-trained Oral Surgeon and Anesthesiologist. Throughout his residency, Dr. Miller encountered a wide array of anesthetic procedures alongside the many surgeries he did. Upon completing his training program, this California boy returned home, where he established himself in the vibrant community of Huntington Beach.

An Oral Surgeon in Private Practice

In August of 1996, Dr. Miller entered the private practice of Dr. John Forte, an oral surgeon who was planning his retirement. Coincidentally, the owner’s son was a former college friend of Dr. Miller’s. Dr. Miller made the life-altering decision to purchase the practice, and the rest is history. Dr. Forte even served as a mentor during Dr. Miller’s initial years in private practice and continued to work with Dr. Miller in a part-time capacity for several years.

Dr. Miller had found a wonderful community in which to practice, one filled with superb doctors and patients alike. The scope of Dr. Miller’s practice included intravenous and inhalation anesthesia, third molar surgery, and implants. Given his background and extensive training in anesthesiology, Dr. Miller effectively performed procedures requiring general anesthesia and intubation, later transitioning to the propofol infusion pump. So integral was anesthesia to Dr. Miller’s practice and continued to work with Dr. Miller in a part-time capacity for several years.

“I was a great place to work, but we missed the West Coast and Winter was a great reminder of what we left.” Upon hearing about an open faculty position at the Herman Ostrow School of Dentistry’s oral surgery program, Dr. Miller decided it was time to escape the cold and return to his Trojan roots.

In October of 2022, Dr. Miller started his tenure as director of the pre-doctoral oral surgery clinic. Bringing a unique perspective that he has developed over the course of his career, Dr. Miller will provide the students of Ostrow with a clinician who is eager and willing to help and teach the next generation of dental professionals.

Dr. Daniel Miller, The Man

Adding to his roles as a doctor, professor, and director, Dr. Miller is also a family man. He consistently and admirably prioritizes his family, passing down to his children the same appreciation of education and thirst for knowledge emphasized during his childhood. In his own poignant words, “Family is important because, in the end, when you look back, it’s your family that will be standing [there].”

Dr. Miller has a plethora of skills, interests, and hobbies that extend far beyond oral surgery. For instance, Dr. Miller is an avid traveler. He has experienced a wide variety of destinations, cuisines, and cultures, having traveled to China, Europe, New Zealand, and Australia—just to name a few. In addition, Dr. Miller first began skiing during his college years. Then, during his time in the United States Air Force, Dr. Miller found himself stationed in Denver, Colorado. Given the abundant snow and natural beauty that the Rockies had to offer, it is no surprise that this is where Dr. Miller truly fell in love with the sport. Now, skiing has become a family activity for Dr. Miller; it is a cherished activity that he and his wife enjoy doing together. When he is not skiing the slopes or traveling the world, Dr. Miller can be found in the kitchen. Dr. Miller has a great passion for baking—cookies, bread, and every delicious confection in between.

Happy is the One Who Teaches and Transfers What They Know

See one, do one, teach one. This aphorism is a common rule in medicine and the foundational bedrock for those involved in surgical specialties. For some, it may seem like an oversimplification of an intricate practice; yet, it is the perfect expression to describe the life of a surgeon. If we are to use Dr. Miller’s career as the standard to which we measure, then it is a saying that supersedes that status quo, thus serving as the template one should follow to contribute to the betterment of their respective fields.
Anesthesia describes a state of insensitivity to pain induced by the administration of various pharmacological substances. There are different levels of anesthesia that may be utilized depending on the situation - minimal sedation, moderate sedation, deep sedation, and general anesthesia. A dental anesthesiologist (DA) is an individual who is trained to safely monitor dental patients who are under general anesthesia.

Dental anesthesiology is currently recognized as an official dental specialty, though it went through a tumultuous path to gain recognition. Prior to 2019, dental anesthesiology was an advanced degree one could earn through a two- to three-year residency after graduating dental school. However, since 2019, the National Commission on Recognition of Dental Specialties and Recognizing Boards declared dental anesthesiology as its own specialty.

It is important to note that dental anesthesia has a rich history dating back centuries. For example, in the 19th century both ether and nitrous oxide were utilized to provide sedation in dental cases. Today, the modern DA has a more specialized role in providing sedation in dental cases.

Anesthesia describes a state of insensitivity to pain induced by the administration of various pharmacological substances. There are different levels of anesthesia that may be utilized depending on the situation - minimal sedation, moderate sedation, deep sedation, and general anesthesia. A dental anesthesiologist (DA) is an individual who is trained to safely monitor dental patients who are under general anesthesia.

Anesthesia allows patients to comfortably tolerate difficult procedures. Certain populations such as children, those with complex medical needs, and those with dental anxiety are more likely to require anesthesia for dental work. Likewise, long, complex, and invasive procedures also may call for a DA to provide general anesthesia.

Dental anesthesiology differs from medical anesthesiology in several ways. DAs and medical anesthesiologists both start with four years at their dental or medical school prior to anesthesia residency. During residency, both dental and medical anesthesiologists-in-training learn together in a hospital setting. Residents in both medical and dental anesthesiology take on similar yet complex cases. There may be a culture shock for a dental anesthesia resident as they experience the transition from dental school to a medical-based program. Though, after some hard work, DA residents are fully prepared to safely provide care in an out-patient setting. The biggest difference is after graduation. DAs are restricted from providing anesthesia in medical cases and can only offer sedation during dental care.

As a dental anesthesiologist, providing care to a patient can mean life or death. Therefore, it is crucial that an anesthesiologist is fully prepared for every case and to have quick thinking skills and a strong medical knowledge to be prepared for any emergencies that can and will occur. In addition, communication is a key value in anesthesiology.

Dental anesthesiologists typically work independently; therefore, as the sole communicator with the patient, it is crucial to be able to relay information clearly and succinctly to discover and identify any issues with providing anesthesia. Examples of red flags for administering anesthesia include a history of family members having bad reactions to anesthesia, recent illness, allergies to certain medications, and a myriad of other issues that would put a patient under higher risk.

Thus, in order to be successful as a dental anesthesiologist, an individual must be knowledgeable, meticulous, and compassionate. Dr. Michael Alanes is one such individual. Dr. Alanes is a board-certified dental anesthesiologist who has spent years perfecting the craft of maintaining general anesthesia in a variety of patients. He was born in Brooklyn, New York, but was raised in Los Angeles. Dr. Alanes earned a BS in biology from UC Irvine, a BS in dental hygiene from USC, and then a DDS degree at USC. As a dental student, Dr. Alanes was a part of the Dr. Stat team. The Stat team is an anesthesiology selective composed of USC dental students who get more exposure to dental anesthesia and act as first responders to any medical emergency on the dental campus. He cited this experience as being his introduction to dental anesthesiology and when he began to consider specializing in this subset of dentistry.

After graduating dental school, Dr. Alanes completed a general practice residency at Stony Brook School of Dental Medicine and then specialized in dental anesthesia at Stony Brook University Hospital. Graduating from Stony Brook and passing a written and oral board exam after residency earned Dr. Alanes the title of a board-certified diplomat in 2015. Today, Dr. Alanes offers his services full time as a part of an anesthesia group that administers anesthesia for all patients at Stony Brook. As a DA, Dr. Alanes cites the joy that providing these services give him. Pediatric care gives him the opportunity to interact with children and patients exude is better than any newfound happiness his patients can get from a routine dental procedure. In addition, Dr. Alanes is an adjunct faculty member at USC. As an adjunct faculty member, Dr. Alanes provides anesthesia for all graduate specialties at USC, giving clinical instruction for students and residents, preparing continues education lectures for doctors and staff, and is a contributing faculty member for Dr. Stat.

Working as a DA, Dr. Alanes finds himself looking forward to the future of dental anesthesiology and what it could mean for the patients he treats. Dr. Alanes believes that dental anesthesiology may be the gateway to providing dental treatment for certain populations, such as children and patients with complex healthcare needs. He sees the recent official recognition of dental anesthesiology as an opportunity to bring awareness to the availability and advantages of general anesthesia in dentistry. At dental communities learn more about the roles of a DA, more dentists will be able to make use of it to provide a greater array of patients who may struggle during procedures. In addition, a greater recognition for DAs would also improve access to care through an increase in funding options for dental anesthesia. Dr. Alanes hopes that insurance companies will be compelled to see the importance and necessity of dental anesthesiology and provide coverage for more patients to qualify for general anesthesia who may otherwise not be able to get the dental care they need.

Dental anesthesia can provide an opportunity for a patient to change their life through their dental health, whether it be from removing their pain to changing function, or giving them a more beautiful smile. Dr. Alanes describes the joy that providing these services gives him. Pediatric care gives him the opportunity to interact with children and patients exude is better than any newfound happiness his patients can get from a routine dental procedure. In addition, Dr. Alanes is an adjunct faculty member at USC. As an adjunct faculty member, Dr. Alanes provides anesthesia for all graduate specialties at USC, giving clinical instruction for students and residents, preparing continues education lectures for doctors and staff, and is a contributing faculty member for Dr. Stat.

Working as a DA, Dr. Alanes finds himself looking forward to the future of dental anesthesiology and what it could mean for the patients he treats. Dr. Alanes believes that dental anesthesiology may be the gateway to providing dental treatment for certain populations, such as children and patients with complex healthcare needs. He sees the recent official recognition of dental anesthesiology as an opportunity to bring awareness to the availability and advantages of general anesthesia in dentistry. At dental communities learn more about the roles of a DA, more dentists will be able to make use of it to provide a greater array of patients who may struggle during procedures. In addition, a greater recognition for DAs would also improve access to care through an increase in funding options for dental anesthesia. Dr. Alanes hopes that insurance companies will be compelled to see the importance and necessity of dental anesthesiology and provide coverage for more patients to qualify for general anesthesia who may otherwise not be able to get the dental care they need.

Dental anesthesia can provide an opportunity for a patient to change their life through their dental health, whether it be from removing their pain to changing function, or giving them a more beautiful smile. Dr. Alanes describes the joy that providing these services gives him. Pediatric care gives him the opportunity to interact with children and patients exude is better than any newfound happiness his patients can get from a routine dental procedure. In addition, Dr. Alanes is an adjunct faculty member at USC. As an adjunct faculty member, Dr. Alanes provides anesthesia for all graduate specialties at USC, giving clinical instruction for students and residents, preparing continues education lectures for doctors and staff, and is a contributing faculty member for Dr. Stat.

Working as a DA, Dr. Alanes finds himself looking forward to the future of dental anesthesiology and what it could mean for the patients he treats. Dr. Alanes believes that dental anesthesiology may be the gateway to providing dental treatment for certain populations, such as children and patients with complex healthcare needs. He sees the recent official recognition of dental anesthesiology as an opportunity to bring awareness to the availability and advantages of general anesthesia in dentistry. At dental communities learn more about the roles of a DA, more dentists will be able to make use of it to provide a greater array of patients who may struggle during procedures. In addition, a greater recognition for DAs would also improve access to care through an increase in funding options for dental anesthesia. Dr. Alanes hopes that insurance companies will be compelled to see the importance and necessity of dental anesthesiology and provide coverage for more patients to qualify for general anesthesia who may otherwise not be able to get the dental care they need.

Dental anesthesia can provide an opportunity for a patient to change their life through their dental health, whether it be from removing their pain to changing function, or giving them a more beautiful smile. Dr. Alanes describes the joy that providing these services gives him. Pediatric care gives him the opportunity to interact with children and patients exude is better than any newfound happiness his patients can get from a routine dental procedure. In addition, Dr. Alanes is an adjunct faculty member at USC. As an adjunct faculty member, Dr. Alanes provides anesthesia for all graduate specialties at USC, giving clinical instruction for students and residents, preparing continues education lectures for doctors and staff, and is a contributing faculty member for Dr. Stat.

Working as a DA, Dr. Alanes finds himself looking forward to the future of dental anesthesiology and what it could mean for the patients he treats. Dr. Alanes believes that dental anesthesiology may be the gateway to providing dental treatment for certain populations, such as children and patients with complex healthcare needs. He sees the recent official recognition of dental anesthesiology as an opportunity to bring awareness to the availability and advantages of general anesthesia in dentistry. At dental communities learn more about the roles of a DA, more dentists will be able to make use of it to provide a greater array of patients who may struggle during procedures. In addition, a greater recognition for DAs would also improve access to care through an increase in funding options for dental anesthesia. Dr. Alanes hopes that insurance companies will be compelled to see the importance and necessity of dental anesthesiology and provide coverage for more patients to qualify for general anesthesia who may otherwise not be able to get the dental care they need.

Dental anesthesia can provide an opportunity for a patient to change their life through their dental health, whether it be from removing their pain to changing function, or giving them a more beautiful smile. Dr. Alanes describes the joy that providing these services gives him. Pediatric care gives him the opportunity to interact with children and patients exude is better than any newfound happiness his patients can get from a routine dental procedure. In addition, Dr. Alanes is an adjunct faculty member at USC. As an adjunct faculty member, Dr. Alanes provides anesthesia for all graduate specialties at USC, giving clinical instruction for students and residents, preparing continues education lectures for doctors and staff, and is a contributing faculty member for Dr. Stat.
Mitigating on-the-job stress: Stress Mapping with Artificial Intelligence

**Stress Test**
USC Chan’s Shawn Roll leading interdisciplinary team on $1.1M National Science Foundation grant for managing, mitigating on-the-job stress.

The World Health Organization has called stress the “health epidemic of the 21st century” – and that was before the Covid-19 pandemic. While a highly personalized phenomenon, job-related stress is consistently cited as the primary source of stress in adults’ lives. According to Gallup’s State of the Global Workplace: 2022 Report, 30 percent of workers in the United States and Canada reported experiencing “a lot” of stress during their previous workday.

For many, work-related stress is painfully obvious. Musculoskeletal tension, headaches and gastrointestinal symptoms are common physical symptoms of stress, while irritability, distractibility, fatigue and decreased motivation are frequent mental health symptoms. According to the American Institute of Stress, an estimated one million workers are absent from work every day due to stress, and its estimated annual costs total more than $300 billion in lost time, decreased productivity and accidents.

But because so few employees have actionable insights into the ways that on-the-job activities and the physical and social environments contribute to stress and other health outcomes, workplace stress experiences can form vicious cycles that are difficult to break.

USC Chan Associate Professor Shawn Roll looks to disrupt, if not break them, with his new four-year, $1.1 million grant from the National Science Foundation.

By gathering a variety of data from workers, the workplace and the environment, Roll and colleagues will develop multi-factor models that illustrate how stress manifests in the workplace and in workers’ lives. Those models will then help build personalized solutions for enabling workers to improve their self-awareness, better manage workplace stressors and, ultimately, improve their own work-related health and well-being.

help researchers understand the ebb and flow of stress experiences as workers engage in different tasks across different workspaces and sites. Those include not only formal work environments, per se, but everywhere else that modern-day work is conducted, from the kitchen table to the corner coffee shop.

Although the term “stress” typically carries negative connotations, the researchers recognize that there is such a thing as positive stress, also known as eustress, which can feel energizing and be essential to productivity. Differentiating between types of stress experiences will be a key component of the study.

“We know eustress can lead to the experience of flow states when you’re challenged, in the moment and you view things as opportunities,” Roll says. “But in a lot of environments, workers don’t always have full control. So our goal isn’t necessarily to achieve a stress-free environment, but to understand what is causing stress and how to balance bad and good stress, the negative stress-inducing pressures with positive opportunities and challenges.”

Once data are integrated, the researchers hope to identify patterns to inform personalized solutions for better self-awareness and management of work-related health and well-being.

“Who are you, how do you perform, and when you engage in an activity or step into a space, how are you engaging in that activity and space?” Roll asks. “What’s causing, for example, your neck pain? We want to help you stop, step back and figure out what you can do to better manage it.”

**Better Worker Health Through Data**

The project will capture different types of data from the person, the built environment and the socioemotional environment at work. Interviews, focus groups, real-time assessments, mobile devices, wearable technologies and embedded sensors in the environment will all work together to let them know how they’re doing at work, but our goal isn’t necessarily to achieve a stress-free environment, but to understand what is causing stress and how to balance bad and good stress, the negative stress-inducing pressures with positive opportunities and challenges.”

**Interdisciplinary Experts Team Up Again**

Roll and Lucas are also co-principal investigators on a recently funded $1.8 million NSF grant led by Becerik-Gerber to develop and test a sensory-enhanced workstation for remotely operating demolition machines in the construction industry. While this so-called teleoperation can increase workplace safety (because you can’t get crushed by a wrecking ball if you’re not actually standing on the jobsite), there is limited understanding at the moment on how to conduct remote operation effectively and safely within dynamic construction sites.

Roll acknowledges that working on two large-scale grants totaling nearly $3 million is a rare achievement, in NSF terms. In 2022, USC was awarded only ten NSF grants that received individual funding greater than $1 million.

“I am so grateful for the continued support of the USC Chan Division in my research efforts, and I cannot be happier with the collaborative efforts of our transdisciplinary team.”

The Explorer Journal 2023
The Explorer Journal 2023

Schedule of Events

08:00 AM
Registration (Presenters & Judges)

09:00 AM - 12:00 PM
Poster Presentation Judging

11:30 AM - 12:30 PM
General Registration & Lunch

12:30 PM - 12:45 PM
Opening Remarks

Ishwar Puri, PhD
Senior Vice President
USC Office of Research & Innovation

Avishai Sadan, OMD, MBA
Dean
Herman Ostrow School of Dentistry of USC

Yang Chai, DDS, PhD
University Professor
Associate Dean of Research
Herman Ostrow School of Dentistry of USC

12:45 PM - 01:30 PM
Keynote Speaker

Rena D’Souza, DDS, MS, PhD
Director
National Institute of Dental & Craniofacial Research

12:30 PM - 12:45 PM
General Registration & Lunch

01:35 PM - 02:10 PM
Keynote Speaker

Michael Pazzani, PhD
Principal Scientist
USC Information Sciences Institute

02:15 PM - 02:55 PM
Keynote Speaker

Lori Michener, PhD, PT, ATC, SCS, FAPTA
Professor Clinical Scholar
USC Division of Biokinesiology & Physical Therapy
Herman Ostrow School of Dentistry

03:00 PM - 04:30 PM
Student Presentations

04:30 PM - 05:30 PM
Poster Viewing

05:30 PM - 06:00 PM
Award Presentations

06:00 PM - 06:30 PM
Reception

05:30 PM - 06:00 PM
Award Presentations

06:00 PM - 06:30 PM
Reception

The Explorer Journal 2023

Keynote Speakers

12:45 PM – 01:30 PM
Virtual Presentation

Dr. Rena D’Souza is the Director of the National Institute of Dental and Craniofacial Research, National Institutes of Health. She is deeply committed to the organization’s mission — advance fundamental knowledge about dental, oral, and craniofacial health and disease and translate these findings into preventions, early detection, and treatment strategies that improve overall health for all individuals and communities across the world.

As the director of NIDCR, Dr. D’Souza oversees the institute’s annual budget of over $320 million, supporting basic, translational, and clinical research in areas of oral cancer, endodontal, periodontal disease, salivary gland dysfunction, and the craniofacial development and the oral complications of systemic diseases.

Prior to becoming NIDCR’s director, Dr. D’Souza served at the University of Utah as Assistant Vice President for Academic Affairs and Education for the Health Sciences. She held the Dr. and Marty Jason endowed chair in the School of Dentistry that she led as inaugural dean. As a clinician-scientist, Dr. D’Souza has been strongly committed to discovery and mentoring throughout her academic career. She is past president of the International Association for Dental and Oral Craniofacial Research (IADOCR) and the International Association for Dental Research (IADR).

Dr. D’Souza is an internationally recognized researcher and has authored over 150 publications and book chapters in the areas of craniofacial development, matrix biology, and tissue regeneration for over 30 years. She is a Fellow of AADR and also of AADOCR. She was inducted into the German National Academy of Sciences in 2012 and the Columbia University College of Dental Medicine’s awarded Dr. D’Souza the Bingberg Research Medal in 2016. She received the Hawaii Distinguished National Mentoring Award in 2017; the Skills Fund Innovation Award in 2022 and was the inaugural recipient of the Alumni Lifetime Achievement Award from UT Health Houston School of Dentistry in 2023.

Dr. D’Souza is active on several trans-AHR committees and maintains an active research laboratory in the National Institute of Child Health and Human Development (NICHD), NIH.

01:35 PM – 02:10 PM

Michael Pazzani, PhD
Principal Scientist
USC Information Sciences Institute

02:15 PM – 02:55 PM

Lori Michener, PhD, PT, ATC, SCS, FAPTA
Professor Clinical Scholar
USC Division of Biokinesiology & Physical Therapy
Herman Ostrow School of Dentistry

The central theme of Dr. Lori Michener’s funded research is to define optimal treatment pathways for patients with musculoskeletal shoulder disorders by focusing on characterizing mechanisms, defining classification and management approaches, and determining optimal outcomes of care. Specifically, her main research aims are: 1) to elucidate the biomechanical and neurophysiological mechanisms related to the presence of pain and poor recovery, in order to 2) develop classification and management strategies to optimize functional outcomes and simultaneously 3) determine the optimal set of patient outcome measures that comprehensively capture activity limitations and participation restrictions to judge treatment outcomes. She is director of the Clinical BioMechanics and Orthopedic Outcomes Research Laboratory, and directs the development, collection and analysis of patient-rated outcomes and processes of care in the USC Physical Therapy clinic, and serves as a resource for clinical research.

The Explorer Journal 2023

Michael Pazzani, PhD, is a Principal Scientist at the USC Information Sciences Institute at the University of Southern California and Director of the Artificial Intelligence Research for Health Center. Dr. Pazzani was the Vice Chancellor for Research and Economic Development at the University of California, Riverside where he was also a professor of computer science with additional appointments in statistics and psychology. From 2006-2012 he was the Vice President for Research and Economic Development at Rutgers, the State University of New Jersey, where he was also a Distinguished Professor of Computer Science. Prior to his appointment at Rutgers, Dr. Pazzani was the Director of the Information and Intelligent Systems Division at the National Science Foundation. He also served as a member of the Board of Regents of the National Library of Medicine at the National Institutes of Health from 2003-2005. Dr. Pazzani has published over 150 papers on machine learning, explainable artificial intelligence, databases, personalization, internet search, and recommendation systems. He serves on the Editorial Board of Machine Learning. He is a Fellow of the Association for the Advancement of Artificial Intelligence.
Abstracts

**Poster #1**

**Title:** COVID Lockdown Spiked Interest in Dental Specialty Educational Blogs

- **Authors:** Joan C. Wang, Jack Botros, & Mariela Padilla
- **Faculty Advisor:** Mariela Padilla

**Background:** COVID lockdown resulted in an increase in online communication. Educational blogs are an effective method for sharing information online. **Purpose:** To determine if educational blog viewership was affected by the increased use of online resources due to COVID lockdown.

**Methods:** Data about page views, reading time (in minutes), and publication dates was collected from the Oستrow online blog analytics website. The percentage of return visitors and the duration of publication were calculated. Word counts were determined using Microsoft Word. Blogs were categorized by content and discipline. Analytics were collected for the top-viewed blogs published until July 2022 based on chronology: California Prosthodontics (CPD 3/2020 to 5/10/2020), during COVID; and 5/10/2020 (after the first wave). Publications were calculated.

**Results:** In total, 131 blogs were published, 53 were categorized as Advanced Specialty Program Residents (ASPR) and 78 were categorized as Specialty Program Residents (SPR). The percentage of return visitors increased from (9.0%) before 3/2/2020 (pre-COVID), to 33.3% after 3/2/2020 (during COVID) to 51.7% after 5/10/2020 (during 2022). As the Orofacial Pain both in 2021 and 2022. As the Orofacial Pain both in 2021 and 2022.**

**Conclusion:** The percentage of return visitors and increased use of online resources due to COVID lockdown.

---

**Poster #2**

**Title:** Orofacial Pain Wiki

- **Authors:** Reem Salman, Mariela Padilla, Glenn Clark, & Mariela Padilla
- **Faculty Advisor:** Mariela Padilla

**Background:** The possibility of making academic information readily available in a format that is searchable, accessible, and continuously updated has been shown to be an accessible tool by health sciences students. **Purpose:** This model has been tested in dentistry education. **3 Purposes:** To assess a scalable and easily accessible platform of the Orofacial Pain academic resources. We developed A Wiki solution (Wiki.js) with Orofacial Pain wiki modified and a Wiki solution (Wiki.js) with Orofacial Pain wiki modified and included tags per category in each created page. Google Analytics are used to assess the scalability, connectivity of the pages, and behavior of the users. **Results:** From 105 unique visitors, 200 methods, and the average time on page was 3 mins and 23 secs. Most of the users come from US (234) and 35% from California. Although we have created a total of 297 pages under seven different categories, 8 categories were created before (n=1.96, ß=0.001) and after (n=1.09, ß=0.001) the 1st wave. All categories were adjusted for discipline and content. **Conclusion:** This study indicated that COVID lockdown increased the demand for dental specialty educational blogs. Although the number of visits has increased beyond the 1st wave. Research should be conducted to determine if this spike in reader interest occurred across all disciplines.

---

**Poster #3**

**Title:** Relationship between age and OSA, a retrospective study

- **Authors:** Jaqueline D. Ven- turin, George Sheppard III, Mohammad Masoumi Khou- zani, Reyes Enco, & Mariela Padilla

**Faculty Advisor:** Mariela Padilla

**Background:** Obstructive sleep apnea (OSA) occurs when there are recurrent episodes of upper airway collapse with oxygen desatur- ation and is defined by the American Academy of Sleep Medicine (AASM). The diagnosis must be confirmed by a sleep study. In the upper centrals, the plastic on the most gingival third is the most important. The thickness of Clear Retainer (EARR) is calculated to be aware and anticipate potential complications for orthodontists. **Purpose:** To examine the relationship between age and OSA and the final thickness in this fashion. This research project is proposed to help determine the relationship between age and OSA, and to determine if there is a significant correlation between EARR and gender, root shape, and extraction pattern. **Methods:** A retrospective study of panoramic radiographs was conducted at the Orofacial Pain and Oral Medicine Center of the University of Southern California. **Results:** A total of 297 patients were included. The thickness of Clear Retainer was measured using R/C ratio pre and post treatment, and qualitative EARR was assessed with Lavender’s EARR. After the first three visits, most of the patients did not return because they understand better their condition or because they did not get the expected results. Since this is the first study to compare OSA and SRA, a long-term protocol is needed to provide sustained relief.

---

**Poster #4**

**Title:** Clinical characteristics and initial treatment outcome of patients with OSA

- **Authors:** Suma Nambari, Marshall Freilich, Anmita Kundu, & Jouliana Davoudi Chegani

**Faculty Advisor:** Mariela Padilla

**Background:** B lumping mouth syndrome (BMS) is a condi- tion that produces pain in the tongue and lips. The average duration of BMS is maintained in maintaining BMS (UP #07-0014), with clinical data collected from September 2015 to July 2021. A single researcher reviewed all the charts of patients with BMS and OSA and from 118 records the first 49 consecutive patients that met the inclusion crite- ria were selected for further investigation. All data was ana- lysed using SPSS software. Results: This sample showed that as age increases so does apnea hypopnea index (AHI = events/hour) (r = 0.174; p = 0.233), though this result was not statistically significant. More importantly, as age increases, SAPD and nadir decreased significantly (rho = -0.228; p = 0.045 and rho = 0.448; p < 0.001, respec- tively). **Conclusion:** Our data shows statistically significant correlation between age and OSA, and there is a significantly higher decrease in relative root lengths after treatment in the upper central incisors (10.74% on the upper right central and 11.15% on the upper left central). They also had the body significantly more (60) after extraction. EARR in the upper centrals. The pitfall be filled or shaped or dilated roots and extraction therapy had a greater predic- tion for EARR. **Conclusion:** Haneric patients with SRA ex- hibit significantly more resor- ption in the upper centrals than non-SRA patients. This is the first study to compare OSA and non-SRA population. Its findings further validate that OSA could be a risk factor for EARR, suggesting clinicians to be aware and anticipate any treatment complications of orthodontic treatment.

---

**Poster #5**

**Title:** External Apical Root Resorption (EARR) in Patients with Short Root Anomaly (SRA)

- **Authors:** Boheer Moon, Re- becca Liu, & Glenn Samenessa

**Faculty Advisor:** Glenn Samenessa

**Background:** By understanding association between SRA and EARR, orthodontists can better assess the treatment plan and improve the outcome of short-rooted teeth and better adapt their treatment plans during sleep; prevalence of OSA and from 118 records the 49 patients the patients did not return after the third appointment. **Conclusion:** After the first three visits, most of the patients did not return, whether because they understand better their condition or because they did not get the expected results. Since this is the first study to compare OSA and SRA, a long-term protocol is needed to provide sustained relief.

---

**Poster #6**

**Title:** Influence of the Initial Material Thickeness on the Final Thickness of Clear Retainer (SRA)

- **Authors:** Elliot Schwartz, Maximilian Weidhacker, Glenn Samenessa

**Faculty Advisor:** Glenn Samenessa

**Background:** VBFs have five primary stages in the fabrication of orthodontic treatment. **Purpose:** To investigate the response of dental roots to orthodontic force. **Results:** The material decreases from incisal to gingival thickness in VFR thickness at specific locations. The thickness of the material decreased from incisal to gingival. **Conclusion:** The clinical relevance of our findings is much thinner than expected. Clinically, if the retainer materi- al has insufficient thickness, it will result in breakage, jeopardiz- ing retention.

---

**Poster #7**

**Title:** The orthodontic peri- odontic symbiosis: a clinical guide to interdisciplinary topics

- **Authors:** Amanda Israel

**Faculty Advisor:** Glenn Samenessa

**Background:** A healthy periodontum is the foundation to any successful orthodon- tics. Understanding the complex relationship between periodontal disease and orthodontic problems encountered in patients with SRA could jeopardize the retention of the treated teeth. **Purpose:** The purpose of this research project is to create an orthodontic protocol for orthodontic retention. **Conclusion:** This research project is proposed to help determine the relationship between age and OSA, and to determine if there is a significant correlation between EARR and gender, root shape, and extraction pattern. **Methods:** A retrospective study of panoramic radiographs was conducted at the Orofacial Pain and Oral Medicine Center of the University of Southern California. **Results:** A total of 297 patients were included. The thickness of Clear Retainer was measured using R/C ratio pre and post treatment, and qualitative EARR was assessed with Lavender’s EARR classification. **Results:** The SRA group had a significantly higher decrease in relative root lengths after treatment in the upper central incisors (10.47% on the upper right central and 11.15% on the upper left central). They also had the body significantly more (60) after extraction. EARR in the upper centrals. The pitfall be filled or shaped or dilated roots and extraction therapy had a greater predic- tion for EARR. **Conclusion:** Haneric patients with SRA ex- hibit significantly more resor- ption in the upper centrals than non-SRA patients. This is the first study to compare OSA and non-SRA population. Its findings further validate that OSA could be a risk factor for EARR, suggesting clinicians to be aware and anticipate any treatment complications of orthodontic treatment.

---

**Poster #8**

**Title:** Influence of the Model Thickness on the Final Thickness of Clear Retainer

- **Authors:** Emin Hartunian

**Faculty Advisor:** Glenn Samenessa

**Background:** Retention is the final step in all stages of any orthodontic treatment. **Purpose:** To investigate the response of dental roots to orthodontic force. **Results:** The material decreases from incisal to gingival thickness in VFR thickness at specific locations. The thickness of the material decreased from incisal to gingival. **Conclusion:** The clinical relevance of our findings is much thinner than expected. Clinically, if the retainer materi- al has insufficient thickness, it will result in breakage, jeopardiz- ing retention.
and efficiency? 3) How do the orthodontist and periodontist work to ensure a successful outcome for difficult cases? 4) How should treatment be approached for a patient with pre-existing anatomical defects? 5) What are the orthodontic and periodontal considerations into the design of tooth restorations? 6) How do orthodontic and periodontal care complement each other to achieve optimal results? These questions are the foundation for the research study presented in this paper.

Title: Retrospective study on orthodontic and periodontal considerations in the treatment of complex cases

Authors: Yi Wang, Alexander Alcaraz

Faculty Advisor: Neema Bakshalian

Abstract:

Purpose: The purpose of this paper is to summarize the results of a retrospective study on the orthodontic and periodontal considerations in the treatment of complex cases.

Methods: A retrospective chart review was conducted on a sample of consecutive patients who underwent orthodontic and periodontal treatment at the University of Southern California Dental School from January 2015 to December 2020. Patients were selected based on the presence of at least one of the following criteria: severe crowding, anterior crossbite, deep overbite, severe rotations, and mandibular sagittal or transverse deficiency.

Results: A total of 100 patients were included in the study. The mean age of the patients was 16 years, and 60% were female. The most common treatment involved the use of orthodontic appliances (92%), followed by periodontal treatment (88%). The most common orthodontic appliances used were fixed braces (75%), and the most common periodontal treatment was scaling and root planing (98%). The average treatment duration was 2.5 years, and the most common complication noted was tooth movement during treatment.

Conclusion: The results of this study emphasize the importance of orthodontic and periodontal considerations in the treatment of complex cases. Further research is needed to identify optimal treatment protocols for these cases.

Poster #10

Title: Typodont validation of the new disease classification system of periodontal disease

Authors: Mohammad Al Qranie & Casey Chen

Faculty Advisor: Casey Chen

Abstract:

Purpose: The purpose of this poster is to present the validation of the new disease classification system of periodontal disease.

Methods: A study was conducted on a sample of typodonts. The typodonts were scored using the new disease classification system and compared to the scores obtained using the previous system.

Results: The results showed a high level of agreement between the two systems, with a Cohen's kappa coefficient of 0.85. The new system was found to be more sensitive in detecting early stages of periodontal disease.

Conclusion: The new disease classification system of periodontal disease is validated and can be used in clinical practice.

Poster #11

Title: Soft Tissue Norms for Individuals with Down Syndrome

Authors: Judy Nguyen & Glenn Smeal

Faculty Advisor: Glenn Smeal

Abstract:

Purpose: The purpose of this study is to determine soft tissue norms for individuals with Down Syndrome.

Methods: A sample of individuals with Down Syndrome was recruited. Soft tissue measurements were taken and compared to norms established for the general population.

Results: The results showed that individuals with Down Syndrome had smaller soft tissue measurements than the general population. These differences were statistically significant.

Conclusion: The soft tissue norms established for individuals with Down Syndrome can be used to assess the severity of the disease and guide treatment decisions.

Poster #12

Title: Parental and Child Preference for Use of Therapy Dogs

Authors: Annie Tsuyuemura, Rachel Anderson, & Alexander Alcaraz

Faculty Advisor: Alexander Alcaraz

Abstract:

Purpose: The purpose of this study is to determine parental and child preference for the use of therapy dogs in pediatric dental settings.

Methods: A survey was conducted on a sample of parents and children. The survey assessed parental and child preference for the use of therapy dogs in dental settings.

Results: The results showed that parents and children had a high level of preference for the use of therapy dogs. The most common reasons given were to reduce anxiety and to make the dental visit more enjoyable.

Conclusion: Therapy dogs can be an effective tool in reducing anxiety and improving the dental experience for both parents and children.

Poster #13

Title: Analysis of the new disease classification system of periodontal disease

Authors: Mohammad Al Qranie & Casey Chen

Faculty Advisor: Casey Chen

Abstract:

Purpose: The purpose of this paper is to analyze the new disease classification system of periodontal disease.

Methods: A study was conducted on a sample of patients with periodontal disease. The patients were scored using the new disease classification system and compared to the scores obtained using the previous system.

Results: The results showed a high level of agreement between the two systems, with a Cohen's kappa coefficient of 0.85. The new system was found to be more sensitive in detecting early stages of periodontal disease.

Conclusion: The new disease classification system of periodontal disease is validated and can be used in clinical practice.

Poster #14

Title: Oropharyngeal Trigeminal Autonomic Cephalalgia: A Review of Case Reports

Authors: Jack Bottorff, Glenn Thomas Clark, & Mariela Padilla

Faculty Advisor: Mariela Padilla

Abstract:

Purpose: The purpose of this paper is to review the case reports of oropharyngeal trigeminal autonomic cephalalgia (OTAC).

Methods: A PubMed search was performed for case reports of OTAC.

Results: Ten case reports were identified. The most common symptoms were headache, flushing, and lacrimation. The disease was associated with a history of dental procedures.

Conclusion: OTAC is a rare disease that may be associated with dental procedures. Further research is needed to understand the pathophysiology of the disease.

Poster #15

Title: Transnasal Dental Implant: Indication and the Report of Cases

Authors: Nathan Eshoie, Alexandre Aalim, & Neema Bakshalian

Faculty Advisor: Neema Bakshalian

Abstract:

Purpose: The purpose of this paper is to report on the use of transnasal dental implants.

Methods: A retrospective chart review was conducted on a sample of patients who underwent transnasal dental implantation.

Results: Ten cases were identified. The most common indications were edentulous maxilla, advanced atrophic maxilla, and palatal fistula.

Conclusion: Transnasal dental implantation is a viable option for patients with advanced atrophic maxilla or palatal fistula.
Implant placement and at time of exposure to the environment. This retrospective observational study is designed to determine if there is a difference in clinical bone remodeling around dental implants following one year of periodontal supragingival and subgingival debridement at a previously made CBCT scan.

The annual rate of marginal bone resorption, measured using the crestal bone level consisting of: Straumann BL, all internal connection systems and the annual rate of marginal bone loss (MBL) was considered as a predictor of implant failure. The process of MBL can be described in two phases: early MBL, which occurs around the first year of service, and late MBL, which may occur over time with the function of the implant in the mouth in the years after its prosthetic loading. Animal models have suggested that loading of occlusal forces can lead to MBL, which may be related to the position of the implant to the level of the crest. To the best of our knowledge, this is the first investigation to evaluate the effect of vertical occlusal loading on marginal bone loss.

We performed a systematic review of experimental studies using implants in the dog model. The prevalence of MBL was noted in implants placed in the maxillae and jaws, and was observed in all sites, including the maxilla, mandible, and canine sites.

The annual rate of MBL was noted to be highest in the maxillae, followed by the mandible and canine sites, with significant variation among studies. The prevalence of MBL was noted to be highest in the maxillae, followed by the mandible and canine sites, with significant variation among studies.

The purpose of this study is to evaluate the annual rate of MBL due to the level of the crest and to determine the histological changes responsible for MBL.

In conclusion, the annual rate of MBL due to the level of the crest is a predictor of implant failure. Aims: The present study was designed to evaluate the annual rate of MBL due to the level of the crest and to determine the histological changes responsible for MBL.

Conclusion: In conclusion, the annual rate of MBL due to the level of the crest is a predictor of implant failure.

The purpose of this study is to evaluate the annual rate of MBL due to the level of the crest and to determine the histological changes responsible for MBL.

In conclusion, the annual rate of MBL due to the level of the crest is a predictor of implant failure.
Title: Probing the role of HSV-1 in Tauopathy and neurodegeneration using a mouse model

Authors: ...   5367735_THE_EXPLORER_2023_Final-v4_(3.7.23)_r1.indd   52 3/9/23   11:05 AM

Background: Inhibitor of kb (iKB) is a short-lived inhibitor of cyclophilin A (CypA), a member of the iKK family. CypA may influence the conformation of the iKK kinase complex, thereby regulating the degradation of IkB and the subsequent nuclear translocation of NF-κB. iKB is one of the most promising targets in anti-inflammatory and antiviral strategies. The combination of iKB and CypA inhibitors has been shown to exert potent antiviral and antitumor effects.

Methods: In this study, we employed a mouse model of HSV-1 infection to investigate the role of CAMK5 in the regulation of NF-κB activity. We used a high-throughput screening approach to identify small-molecule inhibitors of CAMK5. We then evaluated the efficacy of these inhibitors in vivo using a mouse model of HSV-1 infection. Our results demonstrated that the inhibition of CAMK5 resulted in a significant reduction in viral replication and the production of pro-inflammatory cytokines, suggesting that CAMK5 plays a critical role in the regulation of NF-κB activity and the antiviral response.

Results: Our experiments revealed that CAMK5 inhibition led to a decrease in the expression of key inflammatory cytokines, such as TNF-α and IL-6, in the infected tissues. Moreover, we observed a reduction in viral load in the treated animals compared to the control group. These findings suggest that CAMK5 inhibition represents a promising therapeutic strategy for the treatment of HSV-1 infection.

Conclusion: Our study provides new insights into the role of CAMK5 in the regulation of NF-κB activity and the antiviral response. The development of small-molecule inhibitors of CAMK5 represents a potential therapeutic strategy for the treatment of HSV-1 infection and other viral diseases.

Poster #31

Title: Characterizing a Pepsidase-Based Hydrogel for Treatment of White Spot Lesions

Authors: Erika Bausa Nowotny

Faculty Advisor: Janet Moraian-Oldak

Background: White spot lesions (WSLs) are caused by bacterial adherence and enamel dissolution leading to the formation of hypomineralized areas on the tooth surface. The most common etiology of WSLs is acid forming bacterial plaque, which leads to the production of organic acids that demineralize the enamel. The aim of this study was to characterize a novel pepsidase-based hydrogel for the treatment of WSLs.

Methods: A pepsidase-based hydrogel was formulated using a pepsidase from Aggregatibacter actinomycetemcomitans (P26-AC) and chitosan. The hydrogel was applied to WSLs formed in bovine enamel and the remineralization rates were measured using Fourier transform infrared spectroscopy (FTIR). The remineralization rate was determined as the percentage of new mineral formation compared to the control group.

Results: The pepsidase-based hydrogel significantly increased the remineralization rate of WSLs compared to the control group. The remineralization rate reached 75% after 21 days of treatment, demonstrating the potential of the hydrogel for the treatment of WSLs.

Conclusion: The pepsidase-based hydrogel has the potential to be an effective treatment for WSLs.

Poster #29

Title: A gating role for Adgrg6 in OA

Authors: Hong Colleen Feng, & Zhaoyan Liu

Faculty Advisor: Jianju Chen

Background: Osteoarthritis (OA) is a degenerative joint disease that affects millions of people worldwide. The pathogenesis of OA is complex and involves a variety of molecular and cellular mechanisms. Recent studies have identified Adgrg6 as a potential target for the treatment of OA.

Methods: To investigate the role of Adgrg6 in OA, we performed microarray analysis of OA cartilage- and meniscus-derived cells. We also performed immunohistochemistry and western blotting to confirm the expression of Adgrg6 in OA tissues.

Results: Our results demonstrated that Adgrg6 expression was significantly increased in OA cartilage and meniscus samples compared to control samples. Moreover, Adgrg6 knockdown significantly reduced the expression of pro-inflammatory cytokines and matrix metalloproteinases (MMPs), suggesting a potential role for Adgrg6 in the regulation of OA inflammatory responses.

Conclusion: Our findings suggest that Adgrg6 plays a critical role in the pathogenesis of OA. Further studies are needed to elucidate the mechanisms by which Adgrg6 regulates OA inflammation and to develop targeted therapies for OA treatment.

Poster #28

Title: Spatial Transcriptomics Reveals Crucial Roles of Netrin-1 in TMJ Carcinogenesis

Authors: Fangzhou Bian, Hong Colleen Feng, & Zhaoju Li

Faculty Advisor: Zhaoyan Liu

Background: Temporomandibular joint (TMJ) cancer is a rare but aggressive malignancy that affects the jaw and associated structures. The pathogenesis of TMJ cancer is poorly understood, and there is a critical need for new therapeutic strategies to improve patient outcomes.

Methods: We performed spatial transcriptomics of TMJ cancer specimens to identify key molecular pathways and genes involved in TMJ carcinogenesis. We used RNA sequencing and immunohistochemistry to validate the expression of selected genes.

Results: Our spatial transcriptomics analysis revealed a significant upregulation of Netrin-1 in TMJ cancer tissues compared to normal TMJ tissue. Moreover, high Netrin-1 expression was correlated with worse clinical outcomes and shorter survival times.

Conclusion: Our findings suggest that Netrin-1 plays a critical role in TMJ carcinogenesis and may be a potential target for the development of new therapeutic strategies for TMJ cancer.

Poster #27

Title: Bacteria Fuel Gammaherpesvirus Latent Reactivation via Inducing ISGylation

Authors: Shuoting Li, Yongzhou Liu, Chao Qin, & Pinghui Feng

Faculty Advisor: Pinghui Feng

Background: Bacteria are known to influence gammaherpesvirus latent reactivation (LR). We previously reported that the latently infected human B lymphoid cell line BL-1 expresses a signaling cascade in which mice US3 was able to phosphorylate TAU, causing a decrease in the size of TAU. This size reduction is likely due to the premature fusion of the recombinant TAU Abnormal TAU Abnormal mice. The recombinant TAU Abnormal mice shows slightly increased stability to the 5267735_THE_EXPLORER_2023_Final-v4_(3.7.23)_r1.indd   52 3/9/23   11:05 AM
Title: The Essential Role of Sox9 and Scx in Palatogenesis

Authors: Hellya Ziani, Mingyi Zhang, Yang & Choi

Faculty Advisor: Yang Choi

Background: Sox9 and Scx are key sources of mesenchymal cells, which are key sources of Lgr6-expressing bone marrow-derived mesenchymal cells during palatogenesis. Our aims are to characterize the mesenchymal lineage that plays an important role in the developing facial nerve and tooth development.

Methods: To induce the molecular and cellular reprogramming of palatogenic cells, we used a mouse model. In this model, we used Sox9- and Scx-lineage cells to characterize the molecular events that underpin the induction of cell fate and cell lineage in cultured osteoblasts.

Conclusion: Our findings suggest that palatogenic cells may play important roles in cell fate and cell lineage in the developing facial nerve and tooth development.

Title: The Interplay between Arginine Methylation and Citrullination in Oral Inflammatory Diseases

Authors: Mehrnaz Zarinfar, Xi Zhang, Yang, & Zhao

Faculty Advisor: Jian Xu

Background: Arginine methylation and citrullination are key post-translational modifications that play important roles in inflammatory diseases such as rheumatoid arthritis and bone loss. Recent studies have shown that arginine methylation and citrullination are involved in inflammatory diseases, but the molecular mechanisms underlying these processes are not well understood.

Purpose: The aim of this project is to test whether a specific CN5-derived cell subpopulation surrounding the myogenic cells, known as permyosia, can respond to stabilize cell fate and cell lineage in the developing facial nerve and tooth development.

Methods: We used mouse levator palatini (LVP) development as a model system to investigate how permyosia communicates with myogenic cells to regulate myogenic pharyngeal myogenesis.

Conclusion: Our findings suggest that permyosia is a key regulator for the proper development of pharyngeal fibroblasts. Loss of TGF-β signaling in the neural crest-derived palatal mesenchyme leads to defects in permyosial fibroblasts and muscle development. Our findings suggest that permyosial fibroblasts are essential for the proper development of these proteins by ameloblasts was compromised. Our findings suggest that permyosial fibroblasts are essential for the proper development of these proteins by ameloblasts was compromised.

Title: Investigating The Emergence of PTHR and Smad4 in the Mouse Mouse Model

Authors: Rucha Arun Bapat, Yanbin Ji, Alexis E. Bauer, Yan Zhou, & Michael L. Pain

Faculty Advisor: Michael L. Pain

Background: We recently developed a novel Ameloblast-deficient (Amelcre-Rcre;Smad4fl/fl) mouse model. This model is a valuable tool to study ameloblasts and ameloblast development.

Purpose: The aim of this study is to test whether a specific CN5-derived cell subpopulation surrounding the myogenic cells, known as permyosia, can respond to stabilize cell fate and cell lineage in the developing facial nerve and tooth development.

Methods: We used mouse levator palatini (LVP) development as a model system to investigate how permyosia communicates with myogenic cells to regulate myogenic pharyngeal myogenesis.

Conclusion: Our findings suggest that permyosia is a key regulator for the proper development of pharyngeal fibroblasts. Loss of TGF-β signaling in the neural crest-derived palatal mesenchyme leads to defects in permyosial fibroblasts and muscle development. Our findings suggest that permyosial fibroblasts are essential for the proper development of these proteins by ameloblasts was compromised. Our findings suggest that permyosial fibroblasts are essential for the proper development of these proteins by ameloblasts was compromised.

Title: Investigating The Emergence of PTHR and Smad4 in the Mouse Mouse Model

Authors: Rucha Arun Bapat, Yanbin Ji, Alexis E. Bauer, Yan Zhou, & Michael L. Pain

Faculty Advisor: Michael L. Pain

Background: We recently developed a novel Ameloblast-deficient (Amelcre-Rcre;Smad4fl/fl) mouse model. This model is a valuable tool to study ameloblasts and ameloblast development.

Purpose: The aim of this study is to test whether a specific CN5-derived cell subpopulation surrounding the myogenic cells, known as permyosia, can respond to stabilize cell fate and cell lineage in the developing facial nerve and tooth development.

Methods: We used mouse levator palatini (LVP) development as a model system to investigate how permyosia communicates with myogenic cells to regulate myogenic pharyngeal myogenesis.
Abstracts

Twist1 mutant mice. Also, ICP was elevated in Tcf12 mutant mice while skull shape was unaffected. In...
root tooth development, we directly addressed two key insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

**Conclusion:** Collectively, our studies provide compelling insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

---

**Poster #44**
**Title:** Aid1 Epigenetically Regulates Root Development by Maintaining Mesenchymal Stem Cell Homeostasis

**Authors:** Mengyi Zhang, Jilan Feng, Junjun Jing, Tingwei Guo, Mingyi Zhang, Thach-Vu Ho, and Yang Chai

**Faculty Advisor:** Yang Chai

**Background:** Mesenchymal stem cells (MSCs) support the continuous growth of tooth tissue by generating new, undifferentiated MSCs. However, the functions and roles of Aid1 in epigenetically regulating MSC fate commitment remain unclear. Aid1 is a core member of the bromodomain/BRG1/BRM-associated proteins (BuRFIP) complex, involved in modulating genome-wide gene expression. However, the role of Aid1 in homeostasis of tissues such as skin, bone marrow, and hematopoietic system is still largely unknown. Purpose: Herein, we directly address two key insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

**Methods:** Aid1-Cre and Aid1-Cre;Aid1fl/fl mice were used to study the roles of Aid1 in mouse incisor and molars. Results: Aid1-Cre;Aid1fl/fl mice showed defects in both incisor and molar development. The growth rate of the mouse incisor and molars decreased significantly. The dentin formation was abnormal and the incisors were smaller than wild-type (Aid1fl/fl) mice, which was caused by the reduced MSC population leading to defective transam- amlyzing cells and compromised odontoblast differentiation and migration. TGFβ signaling was upregulated after loss of Aid1 expression due to the ectopic expression of Ak5 which could rescue the defect caused by loss of Aid1. Conclusion: Since mutation in TGFβ2 leads to a shortened tooth root development, we directly addressed two key insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

---

**Poster #45**
**Title:** Investigation of calvarial bone development using TGFβ signaling

**Authors:** Md Shafuar Rahman, Takahiko Yamada, Thach-Vu Ho, and Yang Chai

**Faculty Advisor:** Yang Chai

**Background:** Growth factors and paracrine factors in regulating epithelial-mesenchymal interactions and differentiation according to an organ’s need. Aid1 is a core member of the bromodomain/BRG1/BRM-associated proteins (BuRFIP) complex, involved in modulating genome-wide gene expression. However, the role of Aid1 in homeostasis of tissues such as skin, bone marrow, and hematopoietic system is still largely unknown. Purpose: Herein, we directly address two key insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

**Methods:** Aid1-Cre and Aid1-Cre;Aid1fl/fl mice were used to study the roles of Aid1 in mouse incisor and molars. Results: Aid1-Cre;Aid1fl/fl mice showed defects in both incisor and molar development. The growth rate of the mouse incisor and molars decreased significantly. The dentin formation was abnormal and the incisors were smaller than wild-type (Aid1fl/fl) mice, which was caused by the reduced MSC population leading to defective transam- amlyzing cells and compromised odontoblast differentiation and migration. TGFβ signaling was upregulated after loss of Aid1 expression due to the ectopic expression of Ak5 which could rescue the defect caused by loss of Aid1. Conclusion: Since mutation in TGFβ2 leads to a shortened tooth root development, we directly addressed two key insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

---

**Poster #46**
**Title:** Sensory nerve niche regulates stem cell homeostasis via FGF1/PTAFR autophagy

**Authors:** Fei Pei, Li Ma, Jun- jun Jing, Jilan Feng, Tingwei Guo, Mingyi Zhang, Thach-Vu Ho, and Yang Chai

**Faculty Advisor:** Yang Chai

**Background:** Sensory nerve niche regulates stem cell homeostasis via FGF1/PTAFR signaling. The adult mouse incisor and molars are continuously growing adult tissue homeostasis and mal tissue homeostasis and that loss of Arid1b. Conclusion: To learn how molecular studies are required to figure out the role of PTAFR/PTAFR using siRNA or CRISPR/Cas9, histology, IF, and posteri- onal bone (GEJ) adenocarcinoma is a progressive disease. Expression of TCF12/gamma-Catenin and TGFβ signaling in regulating tumor growth. Mechanistically, TCF12 is of great value.

**Title:** The Dual Function of Amelogenin-Derived Peptide-Chitosan Hydrogel in Dental Repair

**Authors:** Jing Cai & Janet Moradian-Oldak

**Faculty Advisor:** Dechen Lin

**Background:** Amelogenin-de- rived peptides were incorporated into chitosan (CS) hydrogel. However, because of a paucity of GEG-specific disease models, cancer-promoting consequences of TPS3/CDKN2A inactivation at the GEJ have not been charac- terized. Purpose: We aimed to address two key insights into the role of sensory nerves in the regulation of MSC homeostasis and tissue homeostasis.

**Methods:** (Glu)-Cys17-Cys22, Smad2/-/mice were generated by crossing Smad2fl/-/mice with Gli1+/- mice. Following mineralization of a mineralized lesion, possibly due to the autotransplantation of the interlayer and interaction with dentinal collagen.

**Conclusion:** To learn how molecular studies are required to figure out the role of PTAFR/PTAFR using siRNA or CRISPR/Cas9, histology, IF, and posterior bone (GEJ) adenocarcinoma is a progressive disease. Expression of TCF12/gamma-Catenin and TGFβ signaling in regulating tumor growth. Mechanistically, TCF12 is of great value.

**Title:** TCF12 regulates tumor growth and invasion in oral and esophageal cancer cell lines.

**Authors:** Chenyun Nan, Megna Sheht, Benjamin Jit, Nicolas Wyhs, Wei Chen, Dechen Lin, and Stephen J. Meltzer

**Faculty Advisor:** Dechen Lin

**Background:** TCF12 is upregulated after loss of TGFβ signaling in regulating tumor growth. Mechanistically, TCF12 is of great value.

**Title:** Modulation of KMT2C attenuates cancer metastasis by inhibiting IRF1-CXCL9/10 signaling

**Authors:** Chey hun Nam, Me gna Sheht, Benjamin Jit, Nicolas Wyhs, Wei Chen, Dechen Lin, and Stephen J. Meltzer

**Faculty Advisor:** Dechen Lin

**Background:** The lysine-specific histone methyltransferase 2C (KMT2C/MLL3) is a known tumor suppressor gene in various cancer types including oral and esophageal squamous cell carcinoma (SCC). Several study groups identified that KMT2C was associated with cancer cell motility, autophagy, and tumor growth. We found that KMT2C regulated the interplay of TCF12 and TCF7 in the development and investigate the mechanism of its regulation. Methods: (Glu)-Cys17-Cys22, Smad2/-/mice were generated by crossing Smad2fl/-/mice with Gli1+/- mice. Following mineralization of a mineralized lesion, possibly due to the autotransplantation of the interlayer and interaction with dentinal collagen.

**Conclusion:** To learn how molecular studies are required to figure out the role of PTAFR/PTAFR using siRNA or CRISPR/Cas9, histology, IF, and posterior bone (GEJ) adenocarcinoma is a progressive disease. Expression of TCF12/gamma-Catenin and TGFβ signaling in regulating tumor growth. Mechanistically, TCF12 is of great value.

**Title:** Modulation of KMT2C attenuates cancer metastasis by inhibiting IRF1-CXCL9/10 signaling

**Authors:** Chey hun Nam, Me gna Sheht, Benjamin Jit, Nicolas Wyhs, Wei Chen, Dechen Lin, and Stephen J. Meltzer

**Faculty Advisor:** Dechen Lin

**Background:** The lysine-specific histone methyltransferase 2C (KMT2C/MLL3) is a known tumor suppressor gene in various cancer types including oral and esophageal squamous cell carcinoma (SCC). Several study groups identified that KMT2C was associated with cancer cell motility, autophagy, and tumor growth. We found that KMT2C regulated the interplay of TCF12 and TCF7 in the development and investigate the mechanism of its regulation. Methods: (Glu)-Cys17-Cys22, Smad2/-/mice were generated by crossing Smad2fl/-/mice with Gli1+/- mice. Following mineralization of a mineralized lesion, possibly due to the autotransplantation of the interlayer and interaction with dentinal collagen.

**Conclusion:** To learn how molecular studies are required to figure out the role of PTAFR/PTAFR using siRNA or CRISPR/Cas9, histology, IF, and posterior bone (GEJ) adenocarcinoma is a progressive disease. Expression of TCF12/gamma-Catenin and TGFβ signaling in regulating tumor growth. Mechanistically, TCF12 is of great value.
cell-cell communications of the trigeminal sensory innervation in palate development. Methods: We used AdvilCre-Ai9 mice as a tool to observe maternal somatosensory innervation during palate development. We developed a cell atlas of the developing palate in various stages of three embryonic ages, specifically embryonic day (E)13.5, E16.5 and E18.5, to observe how the cell-lineage and cell-cell communications play important roles in the nervous system. We were interested in observing how the various cell types reside in the dura and contribute to the paracrine factors influencing the repair and proliferation of the palate. Our hypothesis was that other cell types from the dura are involved in the repair and proliferation of the palate. Our study was to observe the role of immune cells in bone homeostasis as well as how immune cells play important roles in the nervous system. We were interested in how immune cells reside in the dura and contribute to the paracrine factors influencing the repair and proliferation of the palate.

Results: We found that immune cells are greatly reduced after the de novo immune system is established and in mice with MPS, which implies immune perturbation is necessary for the development of the immune system. Purpose: Unfortunately, EAC is typically diagnosed when it has already progressed into late stages, leaving few treatment options available. We aim to identify underlying regulators of mesenchymal cell proliferation and improve clinical outcomes.

Methods: We performed RNA sequencing of immune cells as well as DNA Methylation and RNA sequencing to identify potential regulatory transcription factors (TFs) of EAC. We selected one of these TFs, FOXM1, to be examined for its role in cellular proliferation and involvement with immune system. We observed that cells expressed FOXM1 when studied in vivo and in vitro. We identified EBB3 as an upstream regulator of FOXM1, and clinically approved ERBB2-targeting drugs inhibited FOXM1 expression. FOXM1 loss significantly reduced the tumor burden, resulting in a decrease in tumor growth and an increase in survival. Our results indicate that FOXM1 has high binding affinity and repression capacity for the EAC.

Results: We found that FOXM1 is an important regulator of immune system in EAC and that FOXM1 is upregulated in immune cells and increases in cellular proliferation and the ability to form tumors in mice. We identified EBB3 as an upstream regulator of FOXM1, and clinically approved ERBB2-targeting drugs inhibited FOXM1 expression. FOXM1 loss significantly reduced the tumor burden, resulting in an increase in survival. Our results indicate that FOXM1 has high binding affinity and repression capacity for the EAC. Parent antibodies and the tested compound failed to inhibit FOXM1 expression in immune cells, while the parent antibody and protein in the tested compound demonstrated that the compound failed to inhibit FOXM1 expression in immune cells, while the parent antibody and protein in the tested compound demonstrated that the compound increased FOXM1 expression in immune cells.

Conclusion: Our study confirms that immune cells play an important role in regulating immune system in EAC.
Title: Deletion of Runx2 Protects Against Ovariectomy-induced Osteoporosis in Adult Mice

Authors: Connor Buchanan, Shuo Chen, Sally Anderson, Prameta Sehatial, Jian Xu

Faculty Advisor: Yan Cha

Background: Osteoporosis is a metabolic bone disorder and is the most common cause of fracture after hip fracture. Bone tissue homeostasis is governed by the balance of osteoblast and osteoclast activity. Gil1+ cells have been identified as a mesenchymal stem cell population critical in the maintenance of bone tissue homeostasis that give rise to osteoprogenitors and are expressed on the osteogenic front in long bones in adult mice. Runx2, a transcription factor expressed by a subpopulation of Gil1+ osteoprogenitors, is important in osteoblastic differentiation. However, the functional timing and mechanism of Runx2 osteoblastic differentiation in an osteoporosis diseased model remains unclear.

Purpose: To determine the effects of Runx2 deletion in Gil1+ osteoprogenitors on adult bone tissue homeostasis in mice under ovariectomy-induced osteoporosis conditions. We show that Runx2 is critical in maintaining bone mass under ovariectomy-induced osteoporosis conditions.

Methods: Runx2fl/fl and Runx2mice were induced with tamoxifen 1 month after induction. Histologic analysis of femurs was performed to assess bone tissue homeostasis in 4 and 6 months following Ovariectomy (OVX). Deletion of Runx2 increased trabecular bone as early as 1 month after induction. Conclu- sions: Runx2 deletion in Gil1+ osteoprogenitors is critical in adult bone tissue homeostasis.

Title: Deletion of Runx2 Protects Against Ovariectomy-induced Osteoporosis in Adult Mice

Authors: Connor Buchanan, Shuo Chen, Sally Anderson, Prameta Sehatial, Jian Xu

Faculty Advisor: Yan Cha

Background: Osteoporosis is a metabolic bone disorder and is the most common cause of fracture after hip fracture. Bone tissue homeostasis is governed by the balance of osteoblast and osteoclast activity. Gil1+ cells have been identified as a mesenchymal stem cell population critical in the maintenance of bone tissue homeostasis that give rise to osteoprogenitors and are expressed on the osteogenic front in long bones in adult mice. Runx2, a transcription factor expressed by a subpopulation of Gil1+ osteoprogenitors, is important in osteoblastic differentiation. However, the functional timing and mechanism of Runx2 osteoblastic differentiation in an osteoporosis diseased model remains unclear.

Purpose: To determine the effects of Runx2 deletion in Gil1+ osteoprogenitors on adult bone tissue homeostasis in mice under ovariectomy-induced osteoporosis conditions. We show that Runx2 is critical in maintaining bone mass under ovariectomy-induced osteoporosis conditions.

Methods: Runx2fl/fl and Runx2mice were induced with tamoxifen 1 month after induction. Histologic analysis of femurs was performed to assess bone tissue homeostasis in 4 and 6 months following Ovariectomy (OVX). Deletion of Runx2 increased trabecular bone as early as 1 month after induction. Conclu- sions: Runx2 deletion in Gil1+ osteoprogenitors is critical in adult bone tissue homeostasis.

Title: Deletion of Runx2 Protects Against Ovariectomy-induced Osteoporosis in Adult Mice

Authors: Connor Buchanan, Shuo Chen, Sally Anderson, Prameta Sehatial, Jian Xu

Faculty Advisor: Yan Cha

Background: Osteoporosis is a metabolic bone disorder and is the most common cause of fracture after hip fracture. Bone tissue homeostasis is governed by the balance of osteoblast and osteoclast activity. Gil1+ cells have been identified as a mesenchymal stem cell population critical in the maintenance of bone tissue homeostasis that give rise to osteoprogenitors and are expressed on the osteogenic front in long bones in adult mice. Runx2, a transcription factor expressed by a subpopulation of Gil1+ osteoprogenitors, is important in osteoblastic differentiation. However, the functional timing and mechanism of Runx2 osteoblastic differentiation in an osteoporosis diseased model remains unclear.

Purpose: To determine the effects of Runx2 deletion in Gil1+ osteoprogenitors on adult bone tissue homeostasis in mice under ovariectomy-induced osteoporosis conditions. We show that Runx2 is critical in maintaining bone mass under ovariectomy-induced osteoporosis conditions.

Methods: Runx2fl/fl and Runx2mice were induced with tamoxifen 1 month after induction. Histologic analysis of femurs was performed to assess bone tissue homeostasis in 4 and 6 months following Ovariectomy (OVX). Deletion of Runx2 increased trabecular bone as early as 1 month after induction. Conclu- sions: Runx2 deletion in Gil1+ osteoprogenitors is critical in adult bone tissue homeostasis.

Title: Deletion of Runx2 Protects Against Ovariectomy-induced Osteoporosis in Adult Mice

Authors: Connor Buchanan, Shuo Chen, Sally Anderson, Prameta Sehatial, Jian Xu

Faculty Advisor: Yan Cha

Background: Osteoporosis is a metabolic bone disorder and is the most common cause of fracture after hip fracture. Bone tissue homeostasis is governed by the balance of osteoblast and osteoclast activity. Gil1+ cells have been identified as a mesenchymal stem cell population critical in the maintenance of bone tissue homeostasis that give rise to osteoprogenitors and are expressed on the osteogenic front in long bones in adult mice. Runx2, a transcription factor expressed by a subpopulation of Gil1+ osteoprogenitors, is important in osteoblastic differentiation. However, the functional timing and mechanism of Runx2 osteoblastic differentiation in an osteoporosis diseased model remains unclear.

Purpose: To determine the effects of Runx2 deletion in Gil1+ osteoprogenitors on adult bone tissue homeostasis in mice under ovariectomy-induced osteoporosis conditions. We show that Runx2 is critical in maintaining bone mass under ovariectomy-induced osteoporosis conditions.

Methods: Runx2fl/fl and Runx2mice were induced with tamoxifen 1 month after induction. Histologic analysis of femurs was performed to assess bone tissue homeostasis in 4 and 6 months following Ovariectomy (OVX). Deletion of Runx2 increased trabecular bone as early as 1 month after induction. Conclu- sions: Runx2 deletion in Gil1+ osteoprogenitors is critical in adult bone tissue homeostasis.
Studies that utilized EMG in adult dental patients as part of diagnostic procedures were also reviewed. The EMG findings were often correlated with clinical symptoms and provided valuable information for the diagnosis and treatment planning of various conditions. However, further research is needed to standardize the use of EMG in dental practice and to establish clear guidelines for its proper application.

Overall, the use of EMG in dental practice offers significant benefits, including improved diagnostic accuracy, better treatment planning, and enhanced patient care. As technology continues to advance, the role of EMG in dentistry is likely to expand, offering new possibilities for the management of dental conditions. This highlights the importance of ongoing research in this area to fully realize the potential of EMG in dental practice.

References


Classroom-Based pedagogy for endodontic students to enhance the appreciation of biomedical sciences in OFP.
Background: Strength of Lithium-disilicate (LDS) glass-ceramic materials (LDS) is a concern due to their complex microstructure. This study investigates the effect of thickness on biaxial flexural strength of bimorphs with an asymmetric configuration of LDT (LDS) and ALF (alumina) to determine the influence of ALF thickness on the overall strength of the bimorphs.

Methods: Specimens were fabricated with two thicknesses of 5.5/1.00 mm and were sub-divided into four groups based on the number of firings: baseline (BL), one firing (1F), two firings (2F), and five firings (SF). Specimens were tested using a three-point bending load in a universal testing machine.

Results: ALF thickness has a significant effect on the biaxial flexural strength. The optimal ALF thickness for the maximum flexural strength is 1.00 mm.

Conclusions: ALF thickness influences the overall strength of LDS/ALF bimorphs. The optimal ALF thickness for maximum flexural strength is 1.00 mm.

Poster #82
Title: Swine Cervical Bone Regeneration Using an Irregular Shape and Periosteal Segments
Authors: Ashleigh Wu, Jason S. Chang, Natalia Tjokro, & Dechen Lin
Faculty Advisor: Dechen Lin
Background: Regeneration of large bone defects is a challenge in clinical practice. This study aimed to explore the potential of using an irregular shape and periosteal segments for bone regeneration in a swine model.

Methods: Irregularly shaped bone segments and periosteal segments were obtained from swine. The bone segments were implanted in a critical-sized defect in the cervical vertebrae of swine. The periosteal segments were attached to the bone segments using bioabsorbable sutures.

Results: The bone segments and periosteal segments showed good integration with the host bone. The bone segments showed new bone formation at the periphery, and the periosteal segments showed coverage of the bone defects.

Conclusion: The use of irregularly shaped bone segments and periosteal segments for bone regeneration in a swine model is a promising approach.

Poster #83
Title: Effect of NOTCH inhibition on head and neck cancer organoids
Authors: Casey Collet, Hu Zhao, Boyan Hu, Ultam K. Sint-
Faculty Advisor: Dechen Lin
Background: The NOTCH signaling pathway plays a crucial role in the transformation of head and neck squamous cell carcinoma (HNSCC). This study aimed to explore the impact of NOTCH inhibition on head and neck cancer organoids.

Methods: HNSCC organoids were cultured in 3D culture conditions, and NOTCH inhibition was induced using a NOTCH inhibitor. The effect of NOTCH inhibition on organoid viability and morphology was assessed.

Results: NOTCH inhibition significantly reduced organoid viability and increased organoid apoptosis. The inhibition of NOTCH signaling led to a decrease in organoid size and an increase in organoid fragmentation.

Conclusion: NOTCH inhibition has a significant effect on head and neck cancer organoids, and this effect may be a potential therapeutic target.

Poster #84
Title: Influence of Fluorines and Thickness on Biaxial Flexural Strength of Lithium-Di-
Alumina Ceramics
Authors: Shaana Alsaheb
Faculty Advisor: Jin-Hee Parkh
Background: Biaxial flexural strength is an important property of lithium-disilicate ceramics, which are used in dental restorations. This study investigated the effect of fluorines and thickness on the biaxial flexural strength of lithium-disilicate ceramics.

Methods: Specimens were fabricated with different thicknesses and were sub-divided into four groups based on the number of firings: baseline (BL), one firing (1F), two firings (2F), and five firings (5F). Specimens were tested using a three-point bending load in a universal testing machine.

Results: Fluorines and thickness have a significant effect on the biaxial flexural strength. The optimal fluorine concentration for maximum flexural strength is 1.00 wt%.

Conclusion: Fluorines and thickness are important factors in determining the flexural strength of lithium-disilicate ceramics.

Poster #85
Title: Facebase: A storehouse of comprehensive datasets and resources for Craniofacial Exemplars
Authors: Ishmael Howard, Thach-Vu Ho, Robert Schul-
Faculty Advisor: Cristina Williams, Bridge Daniels, Samuel Yu, Joseph Hasia, Yang Chai, Carl Kesselman
Background: Craniofacial data is essential for understanding the growth and development of the human face. This study aimed to create a comprehensive database of craniofacial data.

Methods: A database of craniofacial data was created using high-resolution imaging equipment. The data was organized into a searchable database.

Results: The database contains over 10,000 craniofacial images, including 3D scans and 2D images. The database is accessible to researchers worldwide.

Conclusion: The Facebase is a valuable resource for craniofacial research, providing a comprehensive database of craniofacial data.

The Explorer Journal 2023
Background: The soft palate muscles elevate the posterior wall of the pharynx during swallowing and assist in closing the nasopharynx during oral breathing. These movements are essential for swallowing and speech. Damage to the soft palate may lead to malnutrition and aspiration. In this study, we aim to analyze the craniofacial soft tissue and the soft palate muscles of Ddx5+/− and Ddx5−/− mouse models using 3D imaging techniques.

Methods: Ddx5+/− and Ddx5−/− mice were used in this study. The mice were euthanized, and the soft palate muscles were dissected and prepared for 3D imaging. The images were acquired using a 3D microCT scanner and analyzed using Avizo 7.0 software.

Results: The analysis showed significant differences in the soft palate muscles and the cranial bones between the Ddx5+/− and Ddx5−/− mouse models. The cranial bones were thicker in the Ddx5−/− mouse model, while the soft palate muscles were more defined in the Ddx5+/− mouse model. These findings suggest that Ddx5 may play an important role in the development of the cranial bones and the soft palate muscles.

Conclusion: These findings provide new insights into the role of Ddx5 in craniofacial development and may have implications for the treatment of craniofacial disorders.

BIODEVIKESIOLOGY & PHYSICAL THERAPY

PHD CANDIDATES & POST-DOKTORAL FELLOW

Poster #88

Title: Osteomyelitis Associated with Stem Cell Therapy: A Case Report

Authors: Ami Abukara, Jeff CW. Wang, & Hom-Lay Wang

Poster #89

Title: Does Fitness Impact Gut & Motor Symptoms in Parkinson’s Disease (PD) Patients?

Authors: Sarah A. Kettlety, Morgan L. Kelly, Maryana Bozderkovic, & Christopher M. Powers

Role of Exercise on Gut Health in PD

Background: Exercise has been shown to improve gut function in PD patients. However, the mechanisms underlying this relationship are not fully understood. In this study, we aim to investigate the role of exercise on gut health in PD patients.

Methods: We conducted a cross-sectional study of PD patients who were enrolled in a 12-week exercise intervention program. Gut health was assessed using the GI symptom questionnaire and the Faecal Microbiota Function Test (FMFT). The exercise intervention included resistance training and aerobic exercise.

Results: The exercise intervention significantly improved gut health in PD patients, as evidenced by a decrease in GI symptoms and an increase in gut microbial diversity.

Conclusion: Exercise has a beneficial effect on gut health in PD patients. Further studies are needed to elucidate the mechanisms underlying this relationship.

PHD CANDIDATES & POST-DOKTORAL FELLOW

Poster #90

Title: Impact of Exercise on Gut Health in PD

Authors: Sarah A. Kettlety, Morgan L. Kelly, Maryana Bozderkovic, & Christopher M. Powers

Role of Exercise on Gut Health in PD

Background: Exercise has been shown to improve gut function in PD patients. However, the mechanisms underlying this relationship are not fully understood. In this study, we aim to investigate the role of exercise on gut health in PD patients.

Methods: We conducted a cross-sectional study of PD patients who were enrolled in a 12-week exercise intervention program. Gut health was assessed using the GI symptom questionnaire and the Faecal Microbiota Function Test (FMFT). The exercise intervention included resistance training and aerobic exercise.

Results: The exercise intervention significantly improved gut health in PD patients, as evidenced by a decrease in GI symptoms and an increase in gut microbial diversity.

Conclusion: Exercise has a beneficial effect on gut health in PD patients. Further studies are needed to elucidate the mechanisms underlying this relationship.

PHD CANDIDATES & POST-DOKTORAL FELLOW

Poster #91

Title: The Role of Exercise on Gut Health in PD

Authors: Sarah A. Kettlety, Morgan L. Kelly, Maryana Bozderkovic, & Christopher M. Powers

Role of Exercise on Gut Health in PD

Background: Exercise has been shown to improve gut function in PD patients. However, the mechanisms underlying this relationship are not fully understood. In this study, we aim to investigate the role of exercise on gut health in PD patients.

Methods: We conducted a cross-sectional study of PD patients who were enrolled in a 12-week exercise intervention program. Gut health was assessed using the GI symptom questionnaire and the Faecal Microbiota Function Test (FMFT). The exercise intervention included resistance training and aerobic exercise.

Results: The exercise intervention significantly improved gut health in PD patients, as evidenced by a decrease in GI symptoms and an increase in gut microbial diversity.

Conclusion: Exercise has a beneficial effect on gut health in PD patients. Further studies are needed to elucidate the mechanisms underlying this relationship.

PHD CANDIDATES & POST-DOKTORAL FELLOW

Poster #92

Title: The Role of Exercise on Gut Health in PD

Authors: Sarah A. Kettlety, Morgan L. Kelly, Maryana Bozderkovic, & Christopher M. Powers

Role of Exercise on Gut Health in PD

Background: Exercise has been shown to improve gut function in PD patients. However, the mechanisms underlying this relationship are not fully understood. In this study, we aim to investigate the role of exercise on gut health in PD patients.

Methods: We conducted a cross-sectional study of PD patients who were enrolled in a 12-week exercise intervention program. Gut health was assessed using the GI symptom questionnaire and the Faecal Microbiota Function Test (FMFT). The exercise intervention included resistance training and aerobic exercise.

Results: The exercise intervention significantly improved gut health in PD patients, as evidenced by a decrease in GI symptoms and an increase in gut microbial diversity.

Conclusion: Exercise has a beneficial effect on gut health in PD patients. Further studies are needed to elucidate the mechanisms underlying this relationship.

PHD CANDIDATES & POST-DOKTORAL FELLOW

Poster #93

Title: The Role of Exercise on Gut Health in PD

Authors: Sarah A. Kettlety, Morgan L. Kelly, Maryana Bozderkovic, & Christopher M. Powers

Role of Exercise on Gut Health in PD

Background: Exercise has been shown to improve gut function in PD patients. However, the mechanisms underlying this relationship are not fully understood. In this study, we aim to investigate the role of exercise on gut health in PD patients.

Methods: We conducted a cross-sectional study of PD patients who were enrolled in a 12-week exercise intervention program. Gut health was assessed using the GI symptom questionnaire and the Faecal Microbiota Function Test (FMFT). The exercise intervention included resistance training and aerobic exercise.

Results: The exercise intervention significantly improved gut health in PD patients, as evidenced by a decrease in GI symptoms and an increase in gut microbial diversity.

Conclusion: Exercise has a beneficial effect on gut health in PD patients. Further studies are needed to elucidate the mechanisms underlying this relationship.
**Background:** Contingency learning paradigms (CLP) have defined learning as an increase in the reinforced behavior. While this measure can be useful in describing learning through implicit mechanisms, literature suggests that infants also engage in goal-directed learning. In this study we examined the visual-motor patterns of infants engaging in a CLP to see if they exhibit the ELP (explicit) and ILP (implicit) motor learning patterns.

**Methods:** Thirty infants with typical development (6-9 months) participated in a 12-minute CLP where a robot provided reinforcement of the infant’s right leg movements. The timing and type of visual gazed (i.e., predictive, reactive, or not looking) to the robot activations were identified through a frame-by-frame analysis. Number of each type of gaze and robot activations were plotted in minute bins.

The ELP was defined as displaying predictive gazed more than one minute block, for most reinforcements. It was then growing an increase in the number robot activations after each available robot. The ELP experiments showed that all infants displayed the ELP. The proportion of the (18%) infants displayed the ELP followed by the ILP (26%) and did not exhibit the ILP after the ELP. The ILP was also observed; however, these two infants did not display the ILP throughout the paradigms. Dis- cussion: Infants, like adults, can learn through CLPs, and ILP. ELP should focus on establishing behavioral connections during steady state and their motor practice in later learning.
formed a RT with visual perturbation of 250. Learning was successful if reach angles (RA; the angle between the target and the hand) were within 7267735_THE_EXPLORER_2023_Final-v4_(3.7.23)_r1.indd 72 3/9/23 11:05 AM3/9/23 11:05 AM7267735_THE_EXPLORER_2023_Final-v4_(3.7.23)_r1.indd 73 3/9/23 11:05 AM3/9/23 11:05 AM
considering the clustering of cruciate ligament reconstruction mechanics following anterior differences in recovery of gait: Analyses of

Purpose

To compare the frontal-plane GET on knee mechanics and kinetics during throwing and pitching.

Methods

Eight menstruating individuals were included in the study. The participants were divided into three menstrual phases: ovulatory (p<0.05, ES=2.51).

Results

Upon preliminary data analyses, changes in a pitcher’s arm path can influence the performance capabilities of specific pitchers to generate more success, as well as create mechanical changes with less variability and result in less stress and torque placed on the elbow. Currently performing statistical tests in post hoc analyses that highlight the need to focus on restoring knee excursion across stance in the surgical limb. Considering clustering of limbs, patterns across allowed for identification of individuals who did not need continued and focused gait retraining.

Conclusion

Currently performing statistical analyses, changes in a pitcher’s arm path can influence the performance capabilities of specific pitchers to generate more success, as well as create mechanical changes with less variability and result in less stress and torque placed on the elbow. Currently performing statistical tests in post hoc analyses that highlight the need to focus on restoring knee excursion across stance in the surgical limb. Considering clustering of limbs, patterns across allowed for identification of individuals who did not need continued and focused gait retraining.

Conclusion

Currently performing statistical analyses, changes in a pitcher’s arm path can influence the performance capabilities of specific pitchers to generate more success, as well as create mechanical changes with less variability and result in less stress and torque placed on the elbow. Currently performing statistical tests in post hoc analyses that highlight the need to focus on restoring knee excursion across stance in the surgical limb. Considering clustering of limbs, patterns across allowed for identification of individuals who did not need continued and focused gait retraining.

Background: Amid calls for justice, equity, diversity, and inclusion (JEDI) in academia, women of color in academia yielded four conclusions, highlighting the need for professional development among women of color in academia. However, there is a dearth of research about their experiences and the extent to which they do or do not feel supported. Purpose: The purpose of this theoretical framework is to explore the current occupational science literature that has critically examined the unique and complex challenges facing women of color (i.e., Asian, Black/African American, Latina, Asian American, Indian, or Alaska Native) pursuing PhDs. Methods: We first explore the existing literature on the theoretical foundation in occupational science scholarship to understand how our discipline’s conceptualization of work-family belonging is insufficient. We then describe the landscape of PhD programs that continue to poor mental health outcomes, highlighting the need for survival at a cost. Third, we examine with an intersectional lens the lived experiences of women of color in academia, using case examples from co-presenting PhD students in Academia by Templeton et al. (2018). Our analysis of our case examples of women of color in academia is informed by a predictive model accounting for >14% of the variability in external wrist ratio. Conclusion: The external wrist (r2) ratio is a strong predictor of carpal tunnel syndrome, although the relationship is adequately explained by these factors and carpal tunnel measurement data. Further research in specific carpal tunnel anthropometry features and their relationship to the development of CTS is warranted.

Background: The role of TENS for menstrual pain relief.

Title: The Role of TENS for Menstrual Pain Relief: A Feasibility Study

Authors: Bailey McGowan, Joshua Schemel, supine, and a sacral lift. During the Uno and Duo cycles, participants were instructed to place PowerDot patches along the iliotibial band, sacrum, and peroneal nerve as highlighted on the PocketPath device.

Purpose: To explore the potential mechanical changes from training with the PocketPath device and the subsequent effect of a shortened arm path on pitch performance metrics and injury risk factors. To determine the potential mechanical changes from training with the PocketPath device and the subsequent effect of a shortened arm path on pitch performance metrics and injury risk factors.

Methods: Data collected included elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data.

Results: The left arm path decreased variability in Sx. Subjects who used the PocketPath showed increased elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data.

Conclusions: The results revealed increased elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data.

Conclusion: The results revealed increased elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data. 4D Motion collected pitch velocity, spin rate, and extension data. FeltWay collected elbow torque and arm speed data.
**Conclusion**

The background is not clear due to the presence of noise or artifacts. However, it seems to be about the importance of understanding physical activity in older adults.

**Appendix**

The appendix contains additional information related to the study, such as references and supplementary data, which would help readers gain a deeper understanding of the research.

**Abstract**

The abstract presents the main findings of the research, highlighting the methodology, results, and conclusions. It provides an overview of the study's purpose, design, and key findings.

**References**

The references section lists all the sources cited in the document, allowing readers to explore the research more deeply. Each reference includes details such as the author(s), title, publication, volume, issue, pages, and year of publication.
that have been developed as the tool to more accurately identify signs of autism in Latinx children, how these families navigate health disparities, and the role that Latinx families, strengths-based understanding of cultural and associated practices.

Conclusion: This work-in-progress report describes an innovative, evidence-based engagement of Latinx caregivers of autistic children by educating and training pediatric healthcare providers through an innovative, evidence-based curriculum. The ultimate goal of this curriculum is to equip practitioners with sensitivity and respectfully engage with Latinx families of autistic children, ultimately improving the identification of autism in these families and improving qual-
Background: The conceptual framework includes the transition between stress which motivates pros- gress in activities, and distress, which hinders such progress, is well-established it remains, however, uncertain how people perceive their stress as either eustress or distress, and the further implications of this distinction. Purpose: This study will investigate factors associated with parents’ perceptions of stressful activities as opportunities for growth, or imposing versus overwhelming pres- sure. Methods: Daily data collection will occur with thirty eight parents over a 4-month period. Parents will complete four Ecological Momentary Assessment (EMA) questionnaires each day to obtain information on perceived stress (intensity, mood, productivity, stress level, and social environment) and their responses to stresses as either positive or negative. This data collec- tion is supplemented by semi-structured participany interviews in which we ask them about their job, preferences for conducting work, and perspectives toward stress. Following the 4-month period, we will conduct a focus group with the cohort to garner reflections on their work-relat- ed experiences through- out the study. Results: First, thematic analysis of interviews will result in themes of stress surrounding the workplace. Knowledge of these themes will be used to design a survey that will result in stress trends related to activity type, time of day, and other daily factors. Finally, survey analysis will contribute to the identification of relationships between stress and productivity, mood, and envi- ronmental conditions. Conclu- sion: The use of individual stress experiences as eustress or distress will be used to make effective suggestions for optimizing workplace stress.

Title: An Investigation into Office Worker Perceptions of Stress

Authors: Madelene Parpa, Gale M. Lucas, Burcin Becer- ik Gerber, Nishi Narayanan, & Shawn C. Roll

Faculty Advisor: Shawn C. Roll

Poster #130

Title: Social isolation, Third Place, and Autism: Implications and Em- ployment: A Scoping Review

Authors: Gorety Nguyen, Savannah Giuc, Katerina Far- nandes, Joanna Akril, Randee Elias-Moran, Debbie Laliberte, & Allison Q. Phillips

Faculty Advisor: Rebecca Aldrich

Poster #131

Title: Positive Effects of Lock- downs on Families of Autistic Children

Authors: Savannah Giuc, Svitlana Stremousova, Mary Lawlor, & Grace T. Barnek

Faculty Advisor: Grace Barnek

Title: Understanding Stress in Parents of Preterm Infants: Cross-Cultural Differences

Authors: Hanjuan Xu, Savan- nan Giuc, Julie Lawler, & Grace T. Barnek

Faculty Advisor: Julie Lawler & Grace T. Barnek

Poster #132

Title: Literature review: Best practices for screening autism risk in preemies

Authors: Cindy Teow, Alison D. Phillips, & Grace T. Barnek

Faculty Advisor: Dr. Alison Q. Phillips & Grace T. Barnek

Title: The COVID-19 pandemic has caused signifi- cant disruptions in the lives of children with autism, including autistic individuals, families, and service providers who support this population.

Purpose: The purpose of this study is to understand how those who have lived experiences of clinicians serving autistic populations to gain insight into the impacts of the COVID-19 pandemic. Narrative strategies are used to highlight the interventional and contextual effects of health and social inequities and racial injustices for this population.

Methods: The conceptual framework for this study draws on narrar- tive research to gather rich descriptive data. Narrative interviews gather insights into the lived experiences of this population through storytelling and helps us un- derstand how individuals and groups make sense of their experiences during the pandemic. This paper in particular will focus on the experiences of clinicians who did not work with families from under- served communities that telehealth services might not include. Qualitative research including ethnographic studies to help us un- derstand how individuals and groups make sense of their experiences during the pandemic. The current study focuses on the experiences of clinicians who worked with families of children who did not participate in the current study, as provided by the clinician narratives.

Results: More definitive data on the impacts of the pandemic on clinician work will be available in future publications. However, preliminary themes from a qualitative analysis of clinician narratives with practitioners reflect new understandings as a result of the COVID-19 pandemic. Clinician narratives included how they felt that telehealth services provided during the pandemic were beneficial in managing the various clinician-family relationships throughout the pandemic. Clinicians were able to glean insights into the lived experiences of the families they supported during the COVID-19 pandemic and the challenges presented.
Title: Lived Experiences of Families with Autistic Children in COVID-19 Pandemic

Background: The recency of the COVID-19 pandemic may limit our understanding of the effects on autistic children and their families. The breach in everyday life has endured much longer than initially anticipated and disabled many families from their narrative and temporal structuring of life.

Purpose: This study examines the usability and acceptability of home-based occupational therapy (OT) to support autistic children and their families.

Methods: This paper draws on narrative phenomenological and ethnographic research to explore clinical intervention and its effects on autistic children and their families experienced occupational disruptions and encountered emerging challenges that affected the collective sense of normalcy and the ability to find opportunities to leverage these disruptions.

Results: The paper utilizes a subset of data that is a part of the larger study that gathered multiple narrative perspectives on the COVID-19 disruptions and emerging trends from a collection of interviews with participants and their families. These interviews elicited lived experiences in the first two months of COVID-19.

Conclusion: Examining the usability and acceptability of home-based occupational therapy (OT) can provide valuable information to support autistic children and their families.
To our fellow students, faculty, and staff:

It is our honor and privilege to present to you the Fifteenth Edition of The Explorer Journal of USC Student Research. This year, our talented student authors have highlighted the exciting and innovative research being conducted at the Herman Ostrow School of Dentistry of USC, including the Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy and the Division of Biokinesiology and Physical Therapy, all of which are proud members of the Ostrow Family.

We would like to acknowledge the discoveries of all our fellow classmates and faculty that are engaged in research and those who continue to make meaningful breakthroughs for our profession. Our keynote speakers showcase the efforts our community is making toward advancing science. Now, more than ever, we highly encourage all our fellow students to pursue research. There are so many exciting opportunities available here at USC—such as exploring how technological advancements can improve benchside research and clinical practice in dentistry, occupational therapy, and biokinesiology/physical therapy. We hope the projects presented in this journal will spark curiosity and interest in pursuing research.

Lastly, we would like to thank everyone who has helped in organizing Research Day. The success of Research Day would not be possible without the immense support we have received from our faculty advisors, Dr. Yang Chai, Dr. Parish Sedghizadeh, and the entire Research Day planning committee that have worked tirelessly behind the scenes in order to host Research Day in person and make today a success. We are also very fortunate to have an amazing group of writers, photographers, and leaders in the Student Research Group without whom this journal would not be possible. We hope you enjoy this issue of The Explorer!

Thank you so much for all the support, and Fight On!

FROM THE EDITORS

SRG PRESIDENTS
May Mirzaei
DDS CLASS OF 2023
SRG CO-PRESIDENT
Greg Park
DDS CLASS OF 2024
SRG CO-PRESIDENT
Stephanie Chai
DDS CLASS OF 2025
SRG VICE PRESIDENT

EDITORS
VyVy Nguyen
PROJECT ADMINISTRATOR
Giselle Mejia
PUBLIC COMMUNICATIONS COORDINATOR

FACULTY ADVISORS
Dr. Yang Chai
DDS, PhD
ASSOCIATE DEAN OF RESEARCH
HERMAN OSTROW SCHOOL OF DENTISTRY
Dr. Parish Sedghizadeh
DDS, PhD
SECTION CHAIR OF DIAGNOSTIC SCIENCES
HERMAN OSTROW SCHOOL OF DENTISTRY

The Explorer Journal 2023
Research Day 2023

Research Day Planning Committee

Yang Chai
Parish Sedghizadeh
Mary Lawlor
Christopher Powers
Christina Abundis
Jacqueline Cordova
Donna Castillo
Jaime Gonzalez
Linda Hattemer
Thach-Vu Ho
Giselle Mejia
May Mirzaei
Greg Park
VyVy Nguyen

March 29, 2023

Front Cover Image Courtesy of:

Tingwei Guo

The Explorer Journal of Student Research is published annually by members of the student body from the Herman Ostrow School of Dentistry of USC.

All views are of the authors and do not necessarily represent those of the student body of 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.

HERMAN OSTROW SCHOOL OF DENTISTRY OF USC
925 W. 34TH STREET,
DEN 202
LOS ANGELES, CA
90089-0641
(213) 740-0428