UCLA NSRG SPRING 2025 ED.

THE EXPLORER

Journal of Dental Student and Faculty Research

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The Explorer Editorial Team

Theodore Kao, Editor-In-Chief, Class of 2025

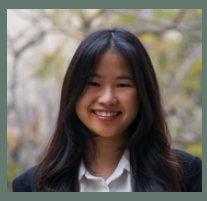
Theodore Kao, originally from Taiwan, is currently completing the PPID program at UCLA, and continue his training in a 6-year OMFS residency in Chicago. He enjoys tennis, outdoor activities, and traveling in his free time. He deeply appreciates the opportunities to learn from mentors who continue to inspire and shape his professional journey.

Anthony (Tony) Nguyen, Editor-In-Chief, Class of 2025

Tony Nguyen, a proud three-time Bruin, grew up in Yucaipa, California. He enjoys exploring the diverse food scene in Los Angeles and aspires to give back to his community through a career in dentistry.

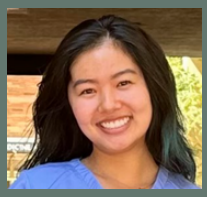
Angie Julieth Jaramillo, Contributing Editor, PPID Class of 2026

Originally from Ecuador, Angie is an internationally trained dentist passionate about serving underserved communities. With a minor in psychology, she values connecting with patients and plans to pursue orthodontics after graduation. In her free time, she enjoys pole fitness, Pilates, and trying new recipes.



Aurelia Chen, Contributing Editor, Class of 2028

Aurelia grew up in Arcadia and graduated from UC Irvine in 2024 with a B.S. in Biological Sciences. A foodie at heart, she enjoys making hojicha lattes, exploring new cafes, and staying active through the gym and sports. She's passionate about mentoring pre-dental students and volunteering at health fairs.



Malia Shitabata, Contributing Editor, Class of 2028

Malia Shitabata grew up in Palos Verdes, CA. She attended UCLA for undergraduate, and is thrilled to be a double Bruin attending UCLA for dental school. In her free time, she enjoys singing, exploring cafes, and amusement parks.

Muhammad Rashid, Contributing Editor, Class of 2028

Muhammad Rashid grew up in Northern California and earned degrees in Biology and English from San Jose State University. Outside of dentistry, he serves as a religious leader in the Muslim community and enjoys snowboarding and mountain biking.

Sei Jin Kim, Contributing Editor, Class of 2028

Sei Jin was born and raised in South Korea. She attended Saint Louis University where she studied Health Management. In her free time, she enjoys photography, traveling, and playing the piano. She hopes to make a meaningful impact on her community through dentistry, service, and research.

Tammy Lu, Contributing Editor, Class of 2028

Tammy Lu grew up in Walnut, California, and completed her undergrad at UCLA. She enjoys playing with her dog and exploring new foods and activities with friends. As a dental student, she looks forward to health fairs and building her clinical skills to serve the community.

Sharon Kim, Layout Designer, Class of 2027

Sharon was born in Kansas and raised in South Korea. She attended UCLA for her undergrad and for her Master's program. In her free time, she enjoys to knit, sow teddy bears, and play Nintendo Switch games. Sharon wants to give back to the community through health fair events and dental mission trips.

A Letter from the Editors

Dear Readers,

It is our distinct honor to welcome you to the 15th edition of The Explorer: Journal of Dental Student and Faculty Research at the UCLA School of Dentistry. Each year, this publication serves as a reflection of the creativity, perseverance, and intellectual curiosity that define our academic community. We are thrilled to share with you an exciting collection of research articles that represent the exceptional work being done by our students and faculty across a broad spectrum of oral health topics.

This publication would not be possible without the collaborative efforts of our editorial team. We are sincerely grateful to our fellow editors, writers, and designer, whose talent and dedication brought this journal to life. We are especially thankful to our faculty advisor, Dr. Yvonne Hernandez-Kapila, whose steadfast support and guidance have been invaluable throughout the editorial process.

The research showcased in this journal speaks not only to the scientific rigor of our contributors but also to their deep-rooted commitment to improving patient care and advancing the dental profession. Whether focused on basic science, clinical innovation, or public health impact, each project included in this edition was selected for its originality, relevance, and potential to shape the future of dentistry.

As you explore the pages ahead, we hope you find inspiration in the innovative ideas and hard-earned discoveries presented. May this issue remind us all of the importance of inquiry, mentorship, and the collective pursuit of knowledge that drives our profession forward.

With gratitude,
Anthony Nguyen
Theodore Kao
Editors-in-Chief
The Explorer Journal

A Letter from Dr. Yvonne Kapila

Dear Readers,

I am very excited to announce the release of the next edition of The Explorer! Under the leadership of our Editor-in-Chiefs and National Student Research Group leaders, Anthony, Nguyen and Theodore Kao, this next edition will focus on research within the school.

As we prepare for the start of the next academic year and look towards our 60th Anniversary celebration as a school plus our accreditation in 2026, this is a good time to reflect on our research community's accomplishments over the past several years and highlight our upcoming activities for the year. The UCLA School of Dentistry has an outstanding record of grant funding. The annual amount of extramural funding for the school has consistently hovered at $20 million or above since FY2016/2017 with the bulk of that funding coming from the National Institutes of Health. The school has remained steadily in the top 10 of research funded dental schools for more than a decade. This funding has enabled faculty to be productive in research, which is highlighted by their discoveries showcased in a high number of publications from 2018 to 2024 ranging from ~150 to over 250 publications per year with over ~10-20 very high impact publications per year in that time frame. This productivity and recognition have enabled the school to establish recognized areas of research excellence in Cancer Diagnostics and Therapeutics, Craniofacial Biology and Bioengineering, Infection and Inflammation, and Health Services and Clinical Research. Please visit our website for more highlights on our areas of Research excellence.

https://dentistry.ucla.edu/research/areas-of-discovery

Our students contribute to this research excellence and are featured in many of these publications. To enable our students to formally engage in research, the school created the Dental Student Research Fellowship Program this past year. This fellowship program is a gateway for UCLA dental students interested in scientific explorations to participate in mentored research with a wide range of exciting research topics under investigation at the School of Dentistry.

https://dentistry.ucla.edu/research/research-opportunities/dental-research-fellowship-program

The school locally highlights its research discoveries through the annual Research and Clinical Excellence Day celebration.

https://dentistry.ucla.edu/announcement/research-and-clinical-excellence-day-2025-features
https://dentistry.ucla.edu/news-article/expanded-research-and-clinical-excellence-day
https://www.facebook.com/media/set/?vanity=UCLADentistry&set=a.950713647055506

Nationally, our research community highlights its discoveries throughout various scientific and professional presentation platforms including the American Association for Dental, Oral, and Craniofacial Research (AADOCR)/International Association for Dental Research (IADR) annual meetings.

https://dentistry.ucla.edu/announcement/award-winning-duo-punctuates-robust-school-of-dentistry

Recent research highlights for our school this past year and for our Six Decades of Transformative Excellence can be found in the following links. Our faculty were recently in the news; Drs. Honghu Liu, Yvonne Hernandez-Kapila, and Elbert Tom recently spoke to prominent news outlets on topics ranging from an environmental disaster, to the oral microbiome, to advanced oral hygiene procedures.

https://dentistry.ucla.edu/news-article/faculty-in-the-news-august-2024
https://www.dailynews.com/2024/08/02/ucla-launches-deep-health-study-of-residents-impacted-by-aliso-canyon-gas-leak/
https://dentistry.ucla.edu/news-article/dr-honghu-liu-and-ucla-peers-to-study-health-effects-of
https://dentistry.ucla.edu/press-release/206m-nih-grant-establishes-school-of-dentistry-led
https://www.today.com/health/deep-dental-cleaning-rcna165159

Research is fundamental to the field of Dentistry. The school as a whole has always anchored itself on research, discovery, innovation, and scholarship. Our scientists and clinician scientists that are federally funded and have a reputation as leaders help move their respective fields forward. Our dental students, residents, research fellows and trainees are taught and educated by professors who are leaders in their fields and our trainees themselves also contribute to scholarship and discovery. This makes a real difference and is truly inspirational. Researchers carry out research that is impactful at a national and global level making UCLA a national and global leader.

Sincerely,

Yvonne Hernandez-Kapila

At the Crossroads of Oral and Systemic Health: Exploring Bacterial Virulence with Dr. Hung Ton-That

By: Muhammad Rashid

Few areas of scientific research are as central to our understanding of oral disease as microbiology. Oral microbes—particularly bacteria—are not only the primary agents of dental and periodontal disease, but they are increasingly implicated in systemic conditions affecting the neural, cardiovascular, and digestive systems. While the causal relationship between pathogenic bacteria and human disease is well established, the molecular mechanisms that drive bacterial pathogenicity remain incompletely understood. These mechanisms which contribute to bacterial survival, proliferation, and adverse host impacts —collectively known as virulence factors — are the focus of Dr. Hung Ton-That's research at the UCLA School of Dentistry.

Throughout his distinguished career, Dr. Ton-That has investigated both Gram-positive and Gram-negative bacterial species, examining processes such as pili assembly, biofilm formation, and bacterial signaling cascades. His work is not only advancing our fundamental understanding of oral microbial pathogenesis but also holds promise for the development of targeted molecular therapies for diseases rooted in microbial dysbiosis.

Dr. Ton-That's journey into research began at UCLA, where he worked as an undergraduate lab assistant under the mentorship of the late Dr. Olaf Schneewind—a pioneer in the study of *Staphylococcus aureus*. At the time, Dr. Schneewind was studying sortase, an enzyme involved in cell wall anchoring. This early exposure to microbiological research sparked Dr. Ton-That's fascination with the scientific process and led him to pursue a PhD focused on the biochemistry of bacterial cell wall formation.

A pivotal moment in his research trajectory came during his postdoctoral training, when he discovered that sortase also plays a key role in pilus assembly in Gram-positive bacteria, including *Corynebacterium* and the oral pathogen *Actinomyces*. His work demonstrated that sortase-mediated pilus formation is essential for bacterial co-aggregation and biofilm development in *Actinomyces*, which has major implications for oral health. Targeting these molecular pathways, he posited, could provide novel strategies to disrupt biofilm formation and halt the progression of oral diseases.

Another major focus of Dr. Ton-That's research is Fusobacterium nucleatum—a key pathogen implicated in colorectal cancer, oral squamous cell carcinoma, and adverse pregnancy outcomes. Initially attracted by the organism's genetic tractability, his lab developed a robust suite of genetic tools to study F. nucleatum in detail. This enabled the exploration of enzymatic pathways and immune evasion mechanisms relevant to disease. In a recent study, Dr. Ton-That's team identified the msrAB gene locus as encoding a microbial defense mechanism that helps Fusobacterium survive oxidative stress, resist immune attack, and adhere to and invade host tissues.

In addition to his research, Dr. Ton-That is actively involved in academic leadership. As the newly appointed Chair of the Division of Oral and Systemic Disease at UCLA, he is dedicated to cultivating a collaborative and research-focused environment. He has launched faculty-led seminars and regular meetings to foster intellectual exchange and mentorship among faculty and students. His leadership also extends to expanding research training through nationally recognized initiatives such as the T90 and K12 programs.

Dr. Ton-That's commitment to academic diversity is informed by his own experience as a first-generation immigrant. He is a strong advocate for inclusion in science and education and has consistently led highly diverse research teams throughout his academic career. His efforts to support and mentor researchers from all backgrounds reflect his belief that diversity drives innovation in science.

When asked what traits are essential for success in research, Dr. Ton-That highlighted passion as the most important. He explained that research is a long-term and demanding pursuit—one that requires genuine curiosity and a sustained love for discovery. For dental students, in particular, balancing research with clinical training can be challenging, but he encourages those with a true interest to consider dual-degree programs as a way to pursue both paths. Above all, he emphasized the importance of integrity in research, noting that producing reproducible and reliable data is the cornerstone of meaningful scientific advancement.

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A Career Rooted in Research: Dr. Chang's path to Endodontics and Academia

By. Anthony Nguyen

Growing up in South Korea, Dr. Insoon Chang never imagined her future would be shaped thousands of miles away in Texas. It was at the University of Texas at Austin that she first cultivated a deep interest in science, exploring research topics ranging from Drosophila genetics to superconductors and breast cancer. These early academic experiences sparked a strong curiosity about biomedical research, particularly as it relates to human health. At the beginning of her academic journey, Dr. Chang discovered a specific passion for dental research. This led her to pursue a Master's degree in Oral Biology at UCLA under the mentorship of Dr. Cun-Yu Wang, where she focused on bone and cancer biology. Her growing enthusiasm for both dentistry and scientific inquiry ultimately drove her to enroll in UCLA's dual-degree DDS/PhD program. As the only student in her class to transition directly into academia after graduation, she demonstrated a rare and profound commitment to education and discovery.

Although she is now recognized as a passionate and dedicated endodontist, Dr. Chang did not initially intend to pursue the specialty. In fact, endodontics wasn't even on her radar during dental school. However, after gaining experience in private practice, she began seeking a more focused and intellectually stimulating scope of care, something less broad, more precise, and better aligned with her scientific mindset. With thoughtful reflection and mentorship from figures such as Dr. Kang and Dr. Wang, Dr. Chang came to realize that endodontics offered exactly that.

As a clinician-scientist, Dr. Chang continues to bridge the gap between bench and chairside through her active research lab, which currently focuses on three major projects. The first examines the clinical and biological implications of overfilling and sealer extrusion in endodontic procedures.

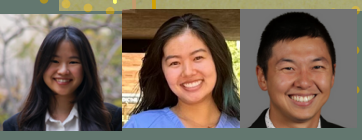
Her team is investigating the biocompatibility of extruded sealers to determine whether these materials support or impair periapical tissue healing. Her second project evaluates the potential for minced pulp tissue to serve as a niche for dental pulp stem cells in tissue-based regenerative endodontics. Lastly, her third line of research explores the failure of apical bone resorption to heal in patients with uncontrolled diabetes, specifically whether hyperglycemia impairs local stem cell populations or alters immune responses in a way that disrupts osteoblast and osteoclast activity.

Dr. Chang's transition into teaching occurred naturally during her residency. However, just as she was finding her stride in the classroom, the COVID-19 pandemic struck. "I had to figure out how to teach through COVID before I could even learn how to teach in person," she recalls. Despite the challenges, teaching proved to be deeply fulfilling. "It's incredibly rewarding to have a strong impact on students and help them develop solid endodontic skills," she reflects.

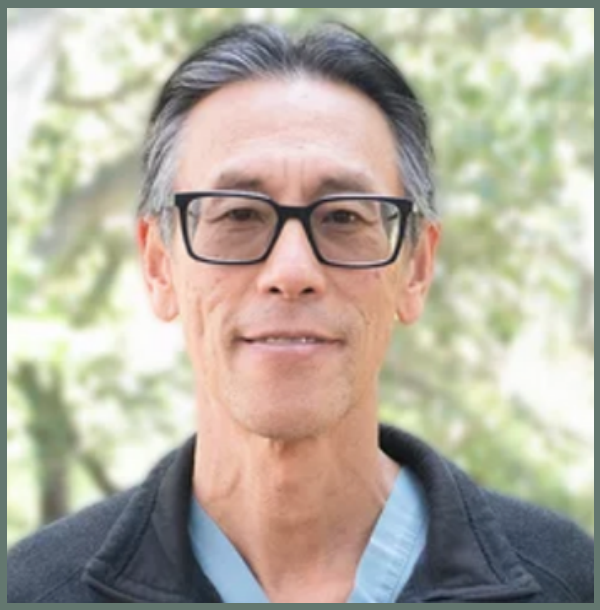
Though accomplished, Dr. Chang is honest about the uncertainty that often accompanies forging a nontraditional path. "Many students are struggling and unsure about what to do with their lives," she says. Her advice is reassuring: there is nothing wrong with not specializing. "If you focus on what's right for you, your experiences and background will begin to get you noticed. Everything you do shapes who you are. Being yourself is enough. Eventually, people will see the real you, not just the image you think you need to project."

Dr. Chang strongly encourages dental students to pursue externships in private practice. "It's important to see what real-life dentistry looks like outside of school," she says. "That experience helps you decide whether general dentistry or a specific specialty is truly the right path for you."

Establishing Excellence in Special Patient Care: The Intersection of Medicine and Dentistry



By:Aurelia Chen, Malia Shitabata, Theodore Kao



Each year, the UCLA Special Patient Care Clinic sees over 3,000 patients. As one of the most renowned programs in the nation under Dr. Eric Sung's leadership, which also houses the General Practice Residency (GPR) program, the Special Patient Care Clinic has become the answer to many families and vulnerable patients within Greater Los Angeles who face numerous barriers accessing oral healthcare, including provider willingness, finances, and patient accommodation. However, 30 years ago, the program looked very different and has undergone several transformations since then due to the contributions of Dr. Sung.

Dr. Sung is the inaugural holder of the Momentum Endowed Chair in Special Patient Care, and currently serves as the Vice Chair of the Division of Advanced Prosthodontics and as a Professor of Clinical Dentistry. At the beginning of his dental journey, his decision to pursue dentistry was inspired by his uncles—both dentists—and ultimately led him to earn his DDS at UCLA's School of Dentistry. After finishing the GPR at UCLA in 1992, Dr. Sung stayed as part time faculty and also began working at Children's Hospital Los Angeles. Throughout the week, he treated medically complex patients seeing mostly adults at UCLA and children with genetic disorders in East Hollywood.

"This is where my career really took off," Dr. Sung said. "This is something I really enjoyed–the integration of medicine and dentistry and special needs."

As his medical and dental repertoire grew, Dr. Sung considered what improvements could be made within the clinic. At the time, the Special Patient Care program had a limited scope and practice of treatments under sedation, which Dr. Sung sought to change. The opportunity came after a contract with City of Hope saw an influx of patients with head and neck radiation, bone marrow transplants, and chemotherapy needs.

"That's when I knew this was something I really developed a niche in," Dr. Sung said. He continued to gain experience and immerse himself in learning by engaging with physicians at City of Hope.

"I didn't have much of a mentor. There just wasn't something like that 30 years ago when it came to medically complex stuff," Dr. Sung said. "That's something I continue to do to this day. I learn from all around me, whether it's from students, faculty, or colleagues."

Over the years, Dr. Sung continued to shape and refine the people and space around him. His most recent achievement was the approval of a $4.2 million grant to further expand the clinic from 6 to 14 patient chairs and adding 2,300 square feet to the existing space. Some advancements he has made included implementing a part time social worker as well as leading research projects which help propel the dental community forward.

Coming from a clinical background, Dr. Sung's research projects explore a wide variety of topics aimed at improving clinical outcomes and the patient's experience. He primarily focuses on the intersection between medicine and dentistry, such as treating patients with cardiovascular disease, liver disease, and additional special needs. Dr. Sung thrives in the interdisciplinary space, often collaborating with professionals from different areas ranging from cardiologists, oncologists, social work, prosthodontics, and more in both clinical practice and through research. His research has even expanded to evaluating sedation techniques using artificial intelligence (AI) as a teaching model while augmenting patient monitoring. In collaboration with Dr. Reeva Mincer, Dr. Sung was able to assess how AI can be used to reduce ambient noise when evaluating clear breath sounds from a precordial stethoscope during open airway sedations, thus improving clarity of the sounds and enhancing the learning experience of dental residents, assistants, and attendings in the hospital dentistry setting.

Looking toward the future of research in special care in dentistry, Dr. Sung hopes to expand upon teaching within dentistry and methods of improving patient care. He acknowledges the challenges in conducting research within this realm as there can be a wide range of manifestations of a given condition, barriers to oral health care, and other confounding variables that are difficult to account for and standardize. However, his outlook on research within patient care remains optimistic. "When the opportunity comes, you see new things and new conditions," Dr. Sung said. "You always try to spread the knowledge."

Dr. Sung concluded the interview with a few thoughtful words of advice for students embarking on their own dental journey. As someone who has walked the same path in years prior, he emphasized the importance of "dipping your toes in the water," taking the first step, and consistently dedicating a little bit of time to exploring new and unfamiliar areas. Whether shadowing at the Special Patient Care Clinic, volunteering at the Special Olympics, or dedicating extra time to understand more complex cases and patient needs, navigating through this space will grow easier through exposure and experience.

"I don't look at special needs as a special patient population because they have the same feelings, fears, and physical issues as anyone else. It's no different," Dr. Sung shared. He explained that what matters is your willingness to engage, continue learning, and being open to where the journey may lead. With time, dedication, and an open heart, the path will become clearer, and the impact you make will be profound.

Novel Dentifrice: Improving At-Home Care for Periodontitis Patients

By: Tammy Lu

As a female pioneer in periodontics, Dr. Joan Otomo-Corgel has worn many different hats in her career and continues to impact the field of dentistry. She is a visionary whose career has been defined by leadership, innovation, and commitment to public health. Her journey began at the UCLA School of Dentistry, where her fascination with the microscopic world of oral biology quickly expanded into a broader realization: dentistry was not just about individual patients, but entire communities. This revelation led her to pursue a Master of Public Health in Behavioral Sciences and Health Education at UCLA, bridging clinical practice with a deep understanding of population health.

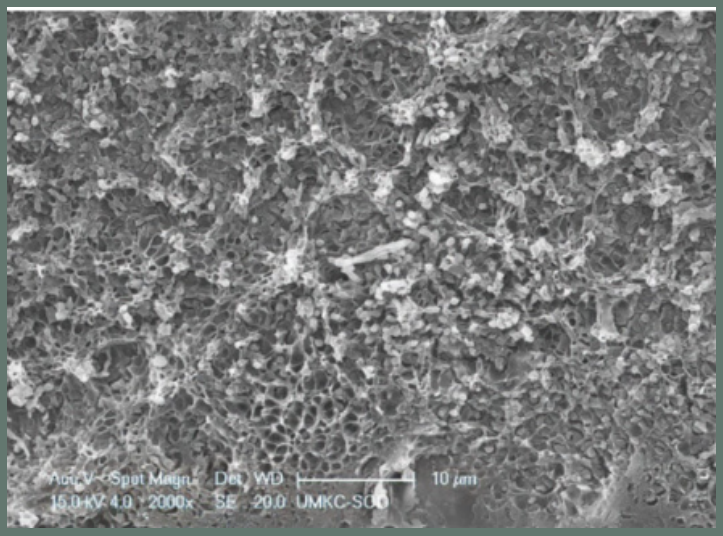
After earning her dental degree, Dr. Otomo-Corgel further honed her skills during a general practice residency at the West LA VA Medical Center. Here, Dr. Otomo-Corgel's public health training was faced with real-world applications. After noticing a pattern of oral surgery patients suffering from osteoradionecrosis, she took the initiative to collaborate with the oncology and radiology departments to develop a comprehensive head and neck radiation screening protocol and create patient education brochures. During her GPR residency, she was drawn to the synergy between medicine and dentistry in periodontics, which ultimately led her to pursue a periodontics residency. Dr. Otomo-Corgel's impact reaches not only patients' periodontal health but also on a larger scale. Today, as the Secretary of the California Association,

Dr. Otomo-Corgel strives to implement policies that integrate systemic health into dental health, advocates for Medicare coverage of medically necessary dental procedures, and develops insurance policies for practicing dentists.

Dr. Otomo-Corgel's research centers around improving conditions for patients with periodontitis. She identified that while periodontal maintenance therapy is essential for long-term periodontal health, it is imperative for patients to maintain adequate oral hygiene between these visits. Thus, an at-home dentifrice with clinical-grade benefits would be highly beneficial for periodontal patients. In her recent clinical trial, Dr. Otomo-Corgel investigated the effect of a novel dental gel on probing depths and inflammation when it is used as a home care dentifrice in Stage I and II periodontitis patients. A six-month double-blind clinical study randomized 65 subjects with Stage I and II periodontitis to a novel dental gel containing 2.6% EDTA as a home care dentifrice and a commercially available anti-gingivitis dentifrice with 0.454% stannous fluoride as the positive control dentifrice.

EDTA is well-known in dentistry for its ability to chelate calcium ions, disrupting bacterial cell walls and destabilizing biofilms. It was found that subjects using the novel dentifrice experienced significant probing depth reductions of 1.18 mm (from 4.27 mm at baseline to 3.09 mm at 6 months) and decreased gingival inflammation. Meanwhile, subjects using the positive control dentifrice experienced probing depth reductions of 0.93 mm (from 4.23 mm at baseline to 3.30 mm at 6 months) as well as decreased gingival inflammation. Both groups displayed significant improvements in periodontal clinical parameters, which may have been attributed to the mechanical disruption of plaque biofilm and the antiplaque properties of the active ingredients in the positive control group. Despite these properties, the novel dental gel displayed higher efficacy.

In a subsequent study, Dr. Otomo-Corgel continued her commitment to increasing the effectiveness of patient-delivered oral hygiene regimens. She investigated the effect of a novel stannous fluoride-containing (0.454%) dentifrice with 2.6% EDTA as an anti-tartar agent compared to other commercially available fluoride-containing dentifrice to reduce plaque index and gingival index over a three-month study period. A double-blind, randomized controlled clinical study evaluated plaque, gingival inflammation, and sulcular bleeding in 150 patients using these dentifrices containing: 0.454% stannous fluoride and 2.6% EDTA (D1), 0.24% sodium fluoride (C), and 0.454% stannous fluoride (D2-D4). It was found that all subjects in the study demonstrated statistically significant improvements in all measures over the three months. However, subjects using D1 showed statistically and significantly greater reductions in all periodontal parameters compared to all other commercially available dentifrices tested. In this case, the decreased biofilm accumulation is not a result of chemical anti-microbial properties limited to stannous fluoride, but the electrostatic repulsion of bacteria from the tooth surface from the addition of EDTA. By investigating the effectiveness of various dental gels, Dr. Otomo-Corgel's work elucidates new methods for periodontal patients to improve their health at home.



***Description**: Residual biofilm post-treatment with scaling and root planing with the addition of EDTA. The honeycomb appearance of the extracellular polymeric matrix denotes the loss of structural integrity and loss of embedded microbes.*

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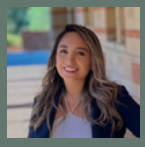
Unlocking the Secrets of Salivary RNA: Dr. Karolina Kaczor-Urbanowicz's Quest for Non-Invasive Diagnostics

By Angie Julieth Jaramillo



Imagine a world where a simple saliva sample could diagnose cancer, detect systemic diseases, and revolutionize personalized medicine. This vision is at the core of Dr. Karolina Elżbieta Kaczor-Urbanowicz's pioneering research in salivary extracellular RNA (exRNA) sequencing. As a researcher at UCLA's School of Dentistry, Dr. Kaczor-Urbanowicz is transforming our understanding of saliva's diagnostic potential, using cutting-edge bioinformatics and next-generation sequencing (NGS) to redefine precision medicine.

Breaking Barriers in Salivary RNA Analysis

For years, scientists struggled to extract meaningful RNA data from saliva due to the high presence of microbial RNA and low yield of human exRNA. Traditional RNA sequencing (RNA-Seq) pipelines, designed for plasma, urine or cerebrospinal fluid samples, proved ineffective in saliva. Dr. Kaczor-Urbanowicz recognized this challenge and took a bioinformatics-driven approach to improve salivary next- generation sequencing, and bioinformatic analysis of RNA-Seq datacomputational analysis techniques.

Her research led to the development of optimized RNA-Seq pipelines specifically designed for saliva. These pipelines separate human and bacterial RNA more effectively, improving the accuracy of diagnostic biomarker detection. By refining these methodologies, her work has set a new standard for processing RNA-Seq data in saliva, opening doors to non-invasive diagnostics for diseases such as oral cancer, pancreatic cancer, gastric cancer, Sjögren's syndrome and TMJ disorders.

Discovering New RNA Biomarkers

One of the most exciting aspects of Dr. Kaczor-Urbanowicz's work is the discovery of previously unknown small RNA species in saliva, particularly tRNA-derived RNA fragments (tRFs). These molecules, once thought to be mere byproducts of RNA degradation, may play crucial regulatory roles in disease processes. Her findings suggest that tRFs could serve as early indicators for systemic conditions, providing a new class of salivary biomarkers with immense diagnostic potential.

Additionally, her studies have shown that ribosomal RNA (rRNA) depletion significantly enhances the detection of human RNA in saliva, a crucial breakthrough in increasing sequencing sensitivity. This advancement has doubled the accuracy of salivary RNA sequencing, allowing for more precise identification of disease-related genetic signatures.

The Future of Saliva-Based Precision Medicine

Dr. Kaczor-Urbanowicz envisions a future where a saliva test could replace invasive biopsies and blood tests for diagnosing complex diseases. Her work is paving the way for clinical applications of salivary RNA biomarkers, bringing us closer to real-time, non-invasive health monitoring. As a member part of the Extracellular RNA Communication Consortium (ERCC), she has been contributing to build a global repository of exRNA data, ensuring that salivary diagnostics become a staple in modern medicine.

Her research is not just groundbreaking—it's transformative. With her innovations, we are on the brink of a new era in disease detection, where the future of personalized medicine is as simple as spitting into a test tube.

"Saliva is the most accessible and underutilized biofluid," Dr. Kaczor-Urbanowicz explains. "By unlocking its secrets, we can revolutionize healthcare."

Looking Ahead

With ongoing research into salivary microbiomes, exRNA functions, and biomarker validation, Dr. Kaczor-Urbanowicz continues to push the boundaries of what saliva can reveal. Her work is a testament to the power of interdisciplinary science, combining dentistry, bioinformatics, and molecular biology to reshape the landscape of medical diagnostics.

As research accelerates, one thing is clear — Dr. Kaczor-Urbanowicz is leading the charge toward a future where a simple saliva sample holds the key to unlocking human health.

What inspired you to pursue research in salivary RNA and non-invasive diagnostics?

"The primary motivation behind my research into salivary RNA and non-invasive diagnostics stems from recognizing that traditional blood tests can be quite invasive and intimidating, particularly for children. As a parent and an orthodontist who regularly cares for young patients, I have observed firsthand the distress that these invasive procedures can cause. Witnessing this anxiety in young patients, especially those battling serious conditions like cancer, inspired me to pursue the development of less invasive diagnostic methods. Specifically, my goal has been to create a reliable, non-invasive tool capable of detecting cancer early, thereby significantly improving patient comfort and clinical outcomes."

What challenges did you face when starting your research journey, and how did you overcome them?

"One of the initial challenges was selecting a research area that aligned closely with my personal interests like development of salivaomics (proteomics, transcriptomics, etc.) biomarkers and addressed broader healthcare needs, such as cancer diagnostics or specialized fields like urinary diseases. Another key challenge was finding a mentor who was not only supportive but also committed to active collaboration, teaching, and ongoing guidance. Additionally, it was crucial to effectively pair students, PhD candidates, and postdoctoral researchers within the laboratory setting to foster an engaging and passionate environment. This careful matching helped everyone feel genuinely involved and motivated about their projects, ultimately enabling students like me to achieve meaningful results and actively contribute to the healthcare community."

About Her Work & Innovations

What has been the most surprising discovery in your research on salivary RNA?

"Saliva pr3. esents unique challenges for RNA sequencing analysis compared to other biofluids such as blood, plasma, urine or cerebrospinal fluid. This difficulty primarily arises from saliva's high bacterial RNA content and low human RNA yield, requiring additional preprocessing steps beyond the standard RNA-Seq sequencing pipelines used for more sterile biofluids. During our ERCRC meetings, it became evident that these extra steps were essential to control for microbial and confounding factors. This complexity significantly increased the difficulty of our analysis but ultimately enabled a more informative and nuanced interpretation of the salivary RNA-Seq data."

Growing Roots, Growing Futures: Unlocking the Power of Vital Pulp Therapy in Children with Dr. Abigail Baldwin

By: Seijin Kim

Combining the analytical mindset of an engineer with a heartfelt dedication to patient care, Dr. Abigail Baldwin exemplifies the qualities of a promising researcher and future endodontist. She is currently a second-year resident in the endodontics program at the UCLA School of Dentistry. Originally from Seattle, Dr. Baldwin earned her undergraduate degree in biomedical engineering from Dartmouth College as she was drawn to the problem-solving and innovative nature of the field. She was captivated by the blend of problem-solving and hands-on procedures within the field of dentistry, features that resonated with her engineering background.

The field's emphasis on innovation appealed to her engineering background. At the same time, her desire for meaningful patient interactions and the opportunity to make tangible differences led her to pursue a career in dentistry at Harvard School of Dental Medicine. Dr. Baldwin found her true calling in endodontics through shadowing her two supportive endodontist mentors. She found the specialty's ability to alleviate pain and preserve the functionality of natural teeth deeply gratifying, especially knowing that endodontists are often a patient's last hope of saving their compromised teeth, while also being fascinated by the research and innovations within endodontics.

Beyond her clinical expertise, Dr. Baldwin is making strides in her research within this field, aiming to improve long-term outcomes for pediatric patients. At UCLA School of Dentistry's annual Research and Clinical Excellence Day, she was recently awarded first place in the Resident Category for her research on "Characteristics and Outcomes of Teeth Treated with Vital Pulp Therapy." Identifying a critical gap in care for young patients, she dedicates her research to preserving the natural permanent teeth of children. Under the mentorship of Dr. Nadia Chugal, the Chair and Program Director of Endodontics at UCLA, Dr. Baldwin's research delves into the root development of immature permanent teeth treated with vital pulp therapy (VPT) in a younger patient cohort.

VPT is an endodontic procedure used to treat teeth with pulpitis when the pulp remains alive and functional. It offers a conservative alternative to more invasive procedures, such as root canal therapy, which is typically used for necrotic pulp. VPT involves indirect pulp capping, direct pulp capping, partial pulpotomy, or complete pulpotomy with bioceramic materials, followed by permanent restoration. The bioceramic materials allow the vital pulp of developing teeth to recover and stimulate apical closure and dentinogenesis of the roots. VPT has been performed for many years, but its specific characteristics and long-term outcomes, particularly in developing permanent teeth, are understudied.

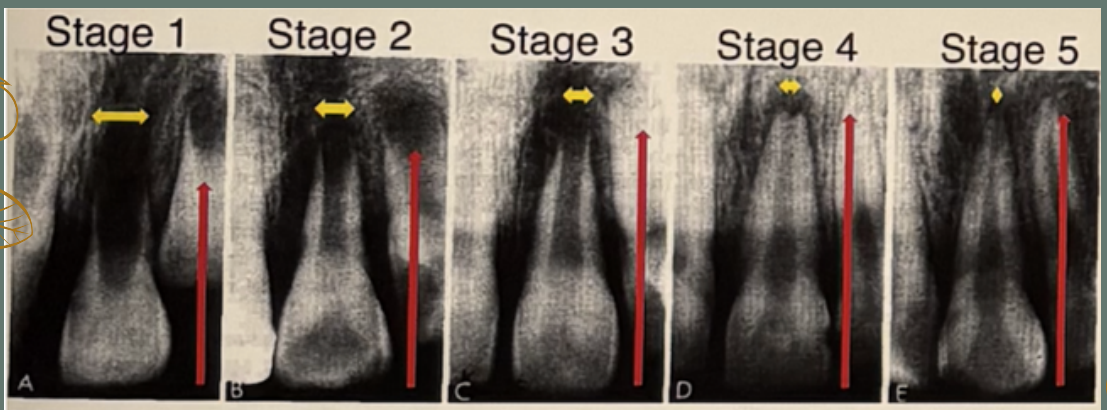


Figure 1: Cvek Classification Stage of Root Development (SRD). Yellow arrows demonstrate apical closure, while red arrows demonstrate an increase in root length.

Dr. Baldwin's retrospective cohort study examining the clinical and radiographic outcomes demonstrated that VPT supports continuous root development over time. This was evidenced by later follow-up visits showing significant conversion to higher stages of root development as roots became thicker and longer with apical closure (Figure 1). Her study also indicated that VPT is primarily performed on molar teeth, particularly mandibular first molars, in young patients, with deep pulpotomy and direct pulp capping identified as the most commonly utilized procedures.

These findings highlight the lasting impact of VPT as it can change the trajectory of a young patient's oral health. By preserving teeth vitality and promoting continued roots development, VPT strengthens immature permanent teeth, making them more resilient, stable, and better prepared for future dental interventions. This proactive approach not only defers the need for more invasive procedures but also significantly improves the prospects for lifelong oral health. While VPT has been used for years in academic institutions like UCLA School of Dentistry, it remains underutilized by endodontists in private practice settings. Dr. Baldwin aims to raise awareness of its benefits, hoping to make VPT a more common option for pediatric patients. She recently presented her findings at the American Association of Endodontists Annual Meeting, where she shared her insights with leaders in the field, who may find opportunities to utilize VPT more in their practices. Her research paves the way for broader adoption of VPT, offering young patients a stronger start and a healthier future.

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