

EXPLORATIONS

in Dental Research

Winter Issue 2018

Research and Clinical Excellence Day Recap

Predoctoral category:

1st- Hailey Taylor (PI: Benjamin Chaffee, DDS, MS)

2nd- Wilson Ng (PI: Cynthia Darling, PhD), Brett Parks (PI: Yvonne Kapila, PhD), Rae Sesanto (PI: Diane Barber, PhD)

3rd- Vida Bao (PI: Elizabeth Mertz, PhD, MA) Hoorshad Fathi-Kelly (PI: Stefan Habelitz, PhD)

Turn to **page 3** to see the rest of the results from RCED

Written by: Eric Hsu, Anne Marie Jeng,
Jonathan Han



A Tribute to Dean Featherstone

Written by Anne Marie Jeng '20

"My research highlights at UCSF.

Wow, where do I start?", opened John D.B. Featherstone M.Sc., Ph.D., as he pondered my first interview question.

With over twenty-two years of service to the University of California, San Francisco, School of Dentistry (UCSF SOD), it is no easy task to pinpoint key moments of

accomplishment. Despite the many accolades collected over his career as a distinguished scientist and dean, Dr. Featherstone remains sensible,

approachable, and ever-true to his passion for dental cariology research and desire to improve people's health. He first arrived at UCSF in 1995 as a faculty member, after leaving his role as a department chair at the Eastman Dental Center, University of Rochester.

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PRESIDENT'S *Message*



Fellow John C. Greene Society members,

I would like to first thank all faculty and students who helped make JGS successful this past year. 2017 was a year of many firsts. Former JGS President Linda Kim along with students Jacob Simon and Hoorshad Fathi traveled to Capitol Hill to advocate for dental research, establishing precedent for future advocacy trips by JGS. Weekly journal club and the JGS elective series showcased both the scientific and clinical aspects of dentistry to students. Christian Santa Maria successfully organized a case study workshop highlighting challenging orthodontic cases with Dr. Sunil Kapila. None of these events or achievements would be possible without support and participation from faculty and students alike.

This past summer, 23 students were selected to participate in the UCSF Summer Dental Student Research Fellowship. In this special program, students completed novel research projects under the mentorship of a faculty member. Results from the summer were presented at Research and Clinical Excellence day in the form of poster presentations and oral presentations. The program would not have been possible without support from its sponsors including the UCSF School of Dentistry, our dean of research Dr. Thomas Lang, chair of the Summer Research Fellowship Program Dr. Lisa Chung, Roger Mraz, Dean Perry, Dr. John Featherstone, and many more whom we would like to extend our gratitude to.

As chapter president, my goal for JGS is to be the primary resource for dental student research at UCSF. Through various programs such as our annual advocacy trip, journal club, research seminars, and case study workshops, we hope to provide opportunities for student engagement in research to enrich their dental school education. Our website will continually be updated with new research opportunities and has resources to help students find faculty mentors. Our award winning newsletter "Explorations" as well as other helpful links is also available on our website.

Lastly, next year's AADR conference will be held in Fort Lauderdale, Florida. We encourage that all students involved in research attend the AADR conference and participate in the activities there such as poster or oral presentations. It will be a great opportunity to share your work, learn more about what is going on in dental research, and to network with researchers from across the nation.

Please contact me if you have any suggestions or feedback. With each coming year, I would like JGS to grow in its capacity as the premier student dental research organization here at UCSF School of Dentistry.

Sincerely,

A handwritten signature in black ink that reads "Duy Bui". The signature is fluid and cursive.

Duy Bui | John Greene Society



Graduate Category

- 1st- Sarah Anne Wong (PI: Ralph Marcucio, PhD)
- 2nd- Shaun Abrams, PhD (PI: Jeremy Reiter, PhD)
- 3rd- Devon Cooper, DMD (PI: Brent Lin, DDS)

Postdoctoral Category

- 1st- Sarah Engelberth, PhD (PI: Stefan Habelitz, PhD)

Research Associate Category

- 1st- Ruchi Goyal (PI: Stefan Habelitz, PhD)

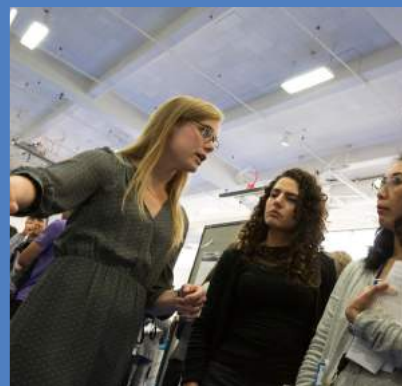


Hailey Taylor, winner of this year's Research and Clinical Excellence Day, took her research abroad to Ghana and Ecuador to examine the effects of Silver Nitrate therapies on oral health in children. Silver Nitrate is a treatment used to prevent tooth decay, in which the practitioner uses a small brush to paint on the compound to the patient's teeth. Silver serves as an antimicrobial agent which will strengthen the tooth's dentin, while nitrate serves as an active ingredient that stops tooth decay. Silver Nitrate is commonly utilized on the UCSF clinic floor to prevent recurrent caries in hard to clean areas such as subgingival regions below the margin of crowns.

Hailey's study in Ghana consisted of two groups: one group which received a Silver Nitrate intervention, and another group which did not. After applying the compound, she waited a year before assessing the effects of Silver Nitrate on caries. What she found was an arrested caries rate of 70% in the treatment population. The same experiment was performed in Ecuador under Hailey's supervision. The study amongst the Ecuadorian population yielded nearly identical results to the cohort in Africa. These results suggested that Silver Nitrate was a highly effective intervention for arresting of dental caries.

Furthermore, Hailey examined the change in the microbiota environment in the same group of children. She found a higher level of *Streptococcus mutans*, an organism highly associated with caries, in children who were not treated with Silver Nitrate. Children who were treated with Silver Nitrate showcased an oral microbial composition almost identical to that of children with good oral health. These findings further reaffirmed the efficacy of Silver Nitrate as a therapy to treat dental caries.

Upon graduation, Hailey hopes to continue her research investigating preventive and efficient treatment practices in underserved regions of the world. Her work in Ecuador and Ghana showcases how a simple and cost effective treatment can provide enormous benefits to populations with low access to care.



A Tribute to Dean Featherstone

(continued from cover page)

With his joint degrees in chemistry and mathematics, as well as a doctorate in chemistry with an emphasis on the chemistry of dental caries, Dr. Featherstone set out for nothing less than a world-wide change in how the caries disease was managed. He and his team became heavily involved in many clinical studies, trials, and outcomes research. They took on a wide spectrum of research topics surrounding dental cariology, microbiology, saliva content, caries prediction and assessment, the mechanisms of fluoride on tooth remineralization, and lasers as a tool to remove and inhibit caries. Over years of relentless investigation and research, Dr. Featherstone and his team were able to collect essential pieces of data and develop the current prevailing approach for assessing and preventing the spread of dental decay—Caries management by risk assessment (CAMBRA).

“When I first entered dental research in 1974, no one fully understood the ways caries worked,” says Dr. Featherstone. “Caries prediction and risk assessment was only a dream. But we really put together a plan during the late 1990s and early 2000s to set out and prove our ideas were correct. Through our work, we’ve dramatically reduced the amount of caries and implemented real caries risk assessment.”

While Dr. Featherstone and his team will always retain the distinction of developing CAMBRA, he credits his colleagues to have made possible the many other research breakthroughs in his career. Early into his start at UCSF, he and his collaborators, including Stuart A. Gansky, in UCSF’s Center to Address Disparities in Oral Health led a clinical trial on the application of fluoride varnish on infants. The huge success of this trial later served as the basis for a nation-wide health policy change allowing physicians and dentists alike to apply fluoride varnish on children.

“It’s been extremely satisfying to see how my research impacted the world. When I first started on my dental research career, the mechanisms of action of fluoride in preventing and reversing dental caries was largely unknown. We’ve been involved in many laboratory studies, and subsequent clinical studies and trials where we’ve been able to prove in real people that our ideas worked.”



Dr. John Featherstone presenting on CAMBRA in Japan



Dr. Featherstone's lab group in 2010



Student Banquet with DACA students



Dr. Featherstone and his instructional successor Dr. Peter Rechmann

Under Dr. Featherstone's leadership, the SOD has excelled in research and continues to rank first in the National Institutes of Health funding for the past 25 years. His work to expand scholarship programs at the School and to create an Associate Dean for Diversity and Inclusion position have allowed recruitment of underrepresented minorities who may not have otherwise had the opportunity to attend UCSF.

"One of the biggest things I will miss when I step down from my position is interacting with the amazing student leadership and major scholarship holders. It's been a pleasure seeing them develop and getting their feedback. The scientists here also all carry on in their work in such an amazing fashion. I can't take credit except for supporting the whole research enterprise within the school."



JGS board members with Drs. Featherstone and Rechmann

Dr. Featherstone's involvement with the student body as the dental cariology instructor to the first and second year dental students will also be missed. Following his departure in December, his instructional responsibilities will be transferred to Peter Rechmann, DMD, Ph.D. As for his research legacy, his work will continue through UCSF scientists Benjamin Chaffee, Ling Zhan, Peter Rechmann and others in their investigation to further the outcomes research and understanding the microbiology and lasers treatment of dental caries.

Dr. Featherstone's prominent career in research has left an impact that extends beyond UCSF and into the world. The School is grateful to have had the leadership of such an eminent individual and wishes Dr. Featherstone all the best in his future endeavors.

A word from the students...

"Attending your classes has always been a favorite. Thanks for putting the effort to making learning so fun and for all your service to the school."

"Thanks for being so open and welcoming to all the students."

"Your love for adventure is inspiring. You will be greatly missed."

"I will miss hearing about your amazing travel stories! Hope you have many more great adventures, both near and far!"

Happy Retirement, Dean Featherstone!

"I'll be sure to miss you at the Halloween Costume contests."

"Your humor and travel stories are the highlight of your lectures. Hope you have an exciting retirement filled with many adventures!"

Catching Up with: Christofer Hatzis



Second year dental student Christofer Hatzis had the opportunity to intern at Invisalign this summer. We discussed his experience this past summer.

*Interview with Christofer Hatzis '20
Interview by Eric Hsu '20*

Currently, 10 million patients utilize orthodontic appliances around the world. Out of this population, 4 million people use Invisalign. However, there is an estimated 300 million people who are in need of orthodontic treatment. Align corporation has been highly focused on research and development in order to expand its Invisalign product line to provide better access to care for this population. With a current budget of \$100 million dollars for research and development, there were no shortage of projects for Christofer to work on. His main areas of concentration were new product development and analysis of current Invisalign products versus traditional orthodontic appliances. One project he undertook investigated the force delivery of Invisalign versus traditional wire and bracket system. Christofer made the extensive commute from San Francisco to San Jose every day during his summer between D1 and D2 year, but said it was well worth it. He expanded his knowledge of orthodontics and got an inside look at the intersection of dentistry and technology. During his time with Align, the company moved to their new headquarters that boasted a modern Silicon Valleyesque workspace with catered meals, bottomless snacks, and an open collaborative workspace.

Along with performing research, Christofer served as a liaison between dentists, engineers, and corporate leaders within the company. He reviewed numerous orthodontic literature and presents his findings to business executives in order for them to understand the dental implications of a project. His expertise was important, as many of the decisions that are made based off his presentations have a long-term trickle-down effect in the production of Align products.

Invisalign products are designed in California, and patient's scans/impressions are sent directly to a treatment planning facility in Costa Rica. At the treatment planning facility, dental lab technicians create 3D files of the patient's dental arch and develop a subsequent treatment plan. The treatment plan consists of a series of stages (aligners) that progressively move the dentition into the desired position. The stages are then 3D printed and fabricated in Juarez, Mexico. It is important to note that Align is the largest 3D printing operation in the world. The processing and production of Invisalign products is a costly and highly invested process. There are many facets of the design process that demand attention to detail, and complex algorithms to recognize any discrepancies.

Align corporation is attempting to expand its research projects outside of its own campus and collaborate with dental schools. Align's University Program offers 4 grants worth \$25,000 each. Currently, the majority of participants in the program are orthodontic residents, however Invisalign hopes to include dental students as well. In order to apply for this grant, dental students must find a principle investigator who is interested in collaborating on the project and submit a proposal via email to ResearchAwards@aligntech.com by March 2nd, 2018. For students seeking further information about the program, please view the Invisalign website, <https://learn.invisalign.com/researchawards>, or email Invisalign at ResearchAwards@aligntech.com for more information. .

Getting to Know the Mentors of the Year

with Dr. Chelsea Bahney and Sarah Wong

Written by Jonathan Han '21

Tell me a little bit about yourself, your lab, and your research.

Dr. Bahney: The laboratory is located at the Orthopaedic Trauma Institute (OTI) at the Zuckerberg San Francisco General Hospital. Generally, we are working on bone and cartilage regeneration. A few years ago, our group discovered that the textbook model of fracture repair was inaccurate and that cartilage gives rise directly to bone during regeneration, rather than undergoing programmed cell death as described. This is exciting because it has both changed our fundamental understanding of the molecular and cellular mechanisms of fracture healing, and provided new places to therapeutically intervene. My laboratory takes a “developmental engineering” approach, where we aim to therapeutically manipulate this pathway based on our new model of normal healing using biologically modified scaffolds to deliver cells or novel drug targets.

Sarah: I am in my final year (4th year) of my PhD in the PhD/DDS program at UCSF. The bulk of my research is looking at the role of canonical wnt signaling in bone fracture repair, but I also am looking at the role of innervation in fracture repair and different fracture models, specifically craniofacial repair and how that compares to other bone repair.



Sarah, as a DDS/PhD can you give me your thoughts on the relationship between research and clinical application?

Sarah: It's hard to think about doing research without clinical implications. Sometimes it may seem like researchers just want to figure out how things work, but to me you can't have one without the other. Research does help to satisfy our curiosity to understand the world around us, but I feel like science is much more powerful when you can apply it. Research is not only understanding the world, but figuring out how to make it a better place. The OTI (Orthopaedic Trauma Institute) where I work is a great example of how basic science research and clinical practice can connect really well. Right underneath us, one floor down, is where the clinicians are. We can ask the orthopaedic surgeons questions about our research and if those things manifest themselves in their practice. We inform them of our findings and they give us insight on good questions to pursue.



Dr. Bahney how many times have you had a student from the dental school for the summer research fellowship and how has your experience been so far?

Dr. Bahney: With the exception of maybe one year, I think I have had a student every year since 2010! The best part of the summer research fellowship is the reciprocal learning that happens. I have had great experiences mentoring the UCSF dental summer students! Each year they come in eager to learn and dedicated to working hard for the summer and learning. While I have a passion for bone and cartilage regeneration in the axial skeleton and Orthopaedic Surgery, I really don't understand the clinical needs and problems in dentistry. Consequently, while I aim to share what we have learned about fracture healing and cartilage regeneration, I really enjoy learning about how our research could be translated into improving dental patient care/outcomes.

Sarah, have you had any mentees before Michael?

Sarah: Michael [Nguyen] (D2) was my first student from the School of Dentistry, but I have mentored 4 students before. The interesting thing is that students come from different programs that have different requirements. For example, the Summer Dental Research Fellowship at UCSF requires students to write a proposal and make a presentation. It is very organized. Other programs are a bit more lax and only require a small presentation at the end. Not only are there many differences between all of the programs, but also each student individually. Every person learns differently so it has been a great learning experience for me in terms of how to cater my mentoring to different types of students. I'm really grateful to Ralph [Marcucio] and Chelsea [Bahney] for trusting and allowing me to mentor the incoming students.



What is your favorite part about being a mentor?

Dr. Bahney: As a mentor, I strive to inspire scientific curiosity. This involves feeling empowered to brainstorm, learning to ask important questions, and then how to approach developing and testing a hypothesis that can be applied to improving people's health. I truly love biomedical science and engineering because of the creativity it allows and the sense of doing something important. Mentoring is rewarding when I can see this passion become contagious! Importantly, I also recognize that most dental students will not continue with basic science, so with this summer experience I hope to create a positive experience that allows our future dentists to appreciate research as their clinical careers progress.

Sarah: Seeing students' presentations at the end is always fun because it serves as the capstone for their entire internship. It is a good method to discern whether the students understood the project or not by the end of it. But my favorite part of mentoring is seeing that "Aha" moment a student has when you're explaining something. It's the most rewarding when they not only understand but also have a desire to ask more questions and talk about it in greater depth. To me that is one of the most exciting things, to see students engage in research and go beyond the techniques to really becoming invested in understanding a project and bringing it to the next level.

How did you feel winning mentor of the year?

Dr. Bahney: Winning mentor of the year this year was quite an honor, but really just speaks to the lab culture and Team Science environment we foster at the Orthopaedic Trauma Institute (OTI). At the OTI we have a great group of 3 collaborative interdisciplinary SOD/OCS faculty now (Ralph Marcucio, Nathan Young, and myself) that are dedicated to supporting student research and education, along with a cumulative group of about 12 PhD candidates, master students, post-docs, and research professionals. Mentor of the year is really a shared honor between this whole group and Michael Nguyuen (D2), who fully integrated himself into the group with a positive and tireless energy.

Sarah: To be honest, I didn't know I could win mentor of the year! I've attended Research and Clinical Excellence Day before and usually it's the professors that win the award. I felt very honored and very humbled to receive the award. There are a lot of great mentors out there and I'm sure many of them deserve the award just as much if not more than I did.

Do you have any tips for students planning to do research?

Dr. Bahney: I think the key is to be open to thinking very differently in the lab than in dental school. It is not class; we don't want you to memorize something. In the lab, it is not about learning what is in the textbook, but about learning things that will lead to writing a new textbook. So, we use the "textbook" as a foundation to ask questions and solve new problems. Unlike in class where there is just so much information to "cram in", during the summer it is important to learn a few key concepts really deeply so that you can learn how to build something new from that key idea. That is the fun part. The more tedious part is learning the laboratory techniques that enable new discoveries.

Sarah: I would suggest to try and get the safety training done before the fellowship so you can get started as soon as possible. You only have 8 weeks or so which is not a lot of time. Another thing I suggest is to try to be involved in as many parts of the project as possible. You get a better understanding of the project if you see it from start to finish, or as many steps as you can. This may mean coming in before the summer to observe certain parts of the project. Other than that, reading the literature and understanding the "why?"s of your project is very important. Lastly, throughout the fellowship try to think about what the next step of the research is, even if the fellowship ends before the next part.

Favorite Food?

Dr. Bahney: Oh gosh, we spend a lot of time talking about food in the lab...really no specific favorites, but somehow students have figured out that dark chocolate is a great addition to lab meetings or any one-on-one meeting!

Sarah: I unabashedly love carbs in any form, rice noodles, potatoes, bread. As for ethnic cuisine, I feel like a traitor because I'm Chinese but I would have to choose Thai food.

Favorite activity after a day or week in lab?

Dr. Bahney: I have two young kids, so that answer is a bit different these days than 6 years ago. In college, I used to race freestyle skiing, do a lot of mountain biking, camping, and loved climbing the 14ers in Colorado. These days, when not working, I tend to be taking kids to Cal Academy of Science, out biking in Golden Gate Park, or to a park. In "me time", I like to get to the gym or cook. I find that exercise, outdoor time, and a glass of wine and good food are key to giving the brain the break it needs to be productive and creative.

Sarah: I love being outdoors and being in nature. I feel blessed to live close to Golden Gate park and if I get out before the sun goes down I'll try to take a stroll through the park. I also do arts and crafts at home like adult coloring books, a bit of painting, and putting some puzzles together.



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pictured)
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Newsletter Editors Notes

With the fall quarter underway, we have the privilege of adding our new member to the JGS Explorations Newsletter team. Please welcome our new Junior Newsletter Editor Jonathan Han (21'). He offers a diverse portfolio of research, writing, and graphic design experience. We are excited to have such strong addition join us and know he will be a great asset this upcoming year.

Our goal is to be the voice of research for the UCSF School of Dentistry. If there are any research projects or stories you would like to share, please get in contact with us! We are always looking to showcase ongoing or new projects within our dental community. We hope you enjoyed our winter newsletter and stay tuned for our next issue in the spring!

Junior Newsletter Editor:
Jonathan Han ('21)

Best,
JGS 2017 Newsletter Editors in Chief
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