

Incisal edge



MONKEY
WRENCH
EDITION

FALL 2020



NSRG National Student
Research Group

AADR American Association
for Dental Research

Student Research Group
University of Texas Health Science
Center at Houston School of Dentistry

In This Issue

ABOUT THE THEME

To have a “monkey wrench thrown” into your plans means to have them grind to a halt. As a description of 2020, it is perhaps still an understatement.

Webex and weather woes aside, student researchers at UTSD have found creative solutions to unprecedented problems. After all, troubleshooting is at the heart of research.

Meet



PRESIDENT
Victor Vinh '21



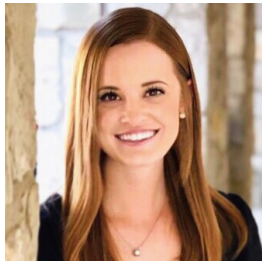
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**GOVERNMENT
AFFAIRS AND
ADVOCACY**
Hannah Balcezak
'24



HISTORIAN
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'24

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Welcome to the inaugural issue of *Incisal Edge*, brought to you by UTSD's Student Research Group! A play on "the cutting edge," the title stands for the intersection of dentistry, research, and storytelling.

I am so excited to introduce the writers who worked so hard to make this first edition a reality! We are represented by one D4, two D2s, and two D1s. Check out our guest column "Overall Health", where our colleague from the medical school writes about an interplay between oral and overall health.

Working on this project, it became obvious that there was no way to talk about this semester without mentioning the pandemic. If your year is anything like mine, then it has been one filled with distraction and setback. With social distancing rules in place, writing remained one of the few exercises available to me, one that made me feel well and productive. My hope is that reading this newsletter can be as much a source of positivity as it was in creating it.

This newsletter has been months in the making, involving several people behind the pages. Please see the back cover for my best attempt to recognize all contributors.

I will sign off with a quote from the movie *First Reformed* (2017).

"I have decided to keep a journal. Not in a word program or digital file, but in longhand. Writing every word out so that every inflection of penmanship, every word chosen, scratched out, revised, is recorded."

EDITOR-IN-CHIEF

Ryan Lee '23

A Letter From the Editor

Want to get involved? *Incisal Edge* is always looking for interested writers! We also want to hear from you!

Please send requests and feedback to ryanlemminglee@gmail.com



Access at IncisalEdgeDigital.wordpress.com

A STAR of the south

VICTOR VINH
SRG president '21



LEORA TRUONG ('21) has been an active student researcher since the summer of her incoming first year at UTSD. She has served as the Advocacy representative for the local chapter of Student Research Group. On the national level, she was elected the Southwest B Regional Representative for the American Association for Dental Research (AADR). She is currently a Member-at-Large for AADR.

In February 2020, she presented her work with Dr. Dharini van der Hoeven in the annual Star of the South conference. The project was titled “Assessing the Role of Sphingomyelin Biosynthetic Pathway in EGFR Localization and Function.” Here, Leora T. shares her experience with the conference, and about taking third place in the Dental Student category.

What is Star of the South and what does it offer to dental students?

“Star of the South is a dental conference hosted by the Greater Houston Dental Society. I’m pretty sure it’s the biggest dental conference in Houston. It’s good for meeting people and networking. From a student perspective, you can walk around to see the different services and products available to us once we graduate. It’s a look into the future.”

What do students do there?

“The students who participate are usually there to present their research. You can talk to other classmates, residents,

academics, and practicing dentists. It’s nice because everyone there is related to dentistry in some aspect. Even if your research doesn’t apply directly to people, in the end we all share a common purpose to be exposed to different sectors of dentistry.”

What do you mean by different sectors?

“There are so many different subjects and types of research. For example, clinicians can give different perspectives on how you can apply research to a more clinical setting. Some people have different backgrounds and may ask you different questions, or make connections with your project that you had never even thought of. It shines a light on how your research matters to people in different ways.”

What is your project about, and why does this topic interest you?

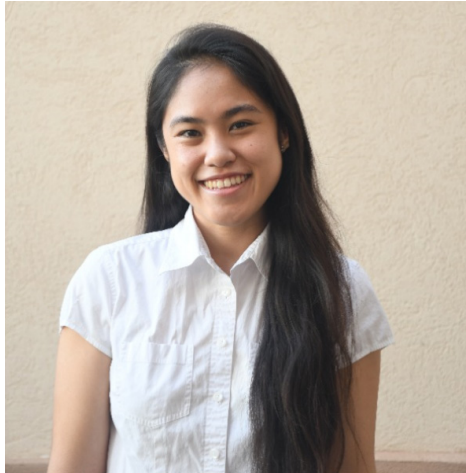
“We looked at the effects of novel therapeutics using the *C. elegans* nematode model as we had previously established that it was efficacious in the treatment of oral cancer cell populations. And so we wanted to test it *in vivo* as well.

“Coming from the stance of someone who is not in the field of pharmacology, it’s cool to see how a drug is identified as potentially efficacious for the treatment of a condition. And also watching that drug go through different tests to determine whether it would be a viable option to bring to clinical trials. It’s just cool to be part of that process.”

What is the most challenging part of your research?

“As a dental student, you don’t live on your schedule, and your *C. elegans* don’t live on your schedule. So you have to try to orchestrate your experiments, and estimate the timeline so that you will be available for the next step. You have to take advantage whenever you’re not in clinic or you’re not in class.

“A lot of times the *C. elegans* don’t behave as we wanted, and the experiment ended up at a time when I wasn’t available. So at times I wasn’t there for parts of my experiment even though I wanted to be.”



Leora Truong took third place in the 2020 Star of the South in the Dental Student category

You took third place in the Dental Student category. How did it feel to win something?

“When you win an award, it’s nice to know that all the people who heard your research presentation – observers, judges, peers, and the rest – understood it and found it to have significance. Doing basic sciences research, it is nice to feel validated by both clinicians and other basic scientists.”

As a current fourth year, how do you feel about your research looking back on it? What advice would you give to interested students?

“I’ve been able to stay with the same project for all four years and watch it grow as I become more involved in it. And I have developed a bond with the people I worked with.

“In terms of advice, don’t be afraid to approach someone if you’re curious about their research. For me, I am interested in ortho, but I didn’t necessarily do my research in the Orthodontics department. So don’t feel too tethered to one particular subsection of research. It’s still research at the end of the day. And if you’re more passionate about it, you will be more involved with your own project.” ■



Dr. Dharini van der Hoeven, PhD, is Associate Professor in the Department of Diagnostic and Biomedical Sciences

*“[Any research] is still research at the end of the day. And if you’re more **passionate** about it, you will be more involved with your own project.”*

Battling the coronavirus with SALIVARY GLANDS

ASHLEY MATTHEW

Writer '23



PROFESSOR AND DIRECTOR of Clinical / Translational Research Dr. Cindy Farach-Carson is a determined problem solver. Her most recent challenge is about the onset of the SARS-CoV-2 (COVID-19) pandemic, which has affected research initiatives at UTSD. With over 15 years of experience in bioengineering and salivary gland tissue background, Dr. Farach-Carson's team was awarded funding by the Dental Trade Alliance. This generous grant of \$25,000 will provide a survey of the prevalence of latent SARS-CoV-2 in oral tissues in order to test the premise that oral tissues can serve as an infection reservoir.

The mysterious virus

Back in March of 2020, more than a dozen USS *Theodore Roosevelt* sailors tested positive for coronavirus. The aircraft carrier subsequently went into quarantine, and only allowed back onboard people who tested negative. Despite the precaution, a surprising second wave broke out in the presumably sterile ship.

This event not only raised questions about the behavior of the virus itself, but as to how testing and precautions should

be conducted. Dr. Farach-Carson hypothesizes that the virus can hide within oral tissues, specifically the salivary glands. This would allow SARS-CoV-2 to bypass a positive result until it is able to spread within the body once again. Interestingly, the salivary glands themselves are rich in the angiotensin-converting enzyme 2 (ACE-2) receptors. This is the protein that provides an entry point for the coronavirus to infect a wide range of human cells.

ACE-2 receptors are present in all people, but their quantity varies among individuals depending on various factors. Dr. Farach-Carson will look for polymorphisms that are associated with ACE-2 in different populations. In addition, her laboratory has samples of minor salivary glands, parotid gland, tonsils, and tongue scrapings from negative COVID-19 subjects. She will test to see if the virus can be found harboring within these tissues. The overall goal of this project is to offer better insight to diagnosis, disease monitoring, transmission, and treatment of COVID-19 on the basis of using oral tissues.

Dr. Farach-Carson believes that knowledge is power when it comes to fighting this pandemic. "We need to change the way we look at our relationship with viruses. They

have always been there. The more we know about the virus and its capabilities, where it hides and reproduces, the better we can design ideal practices to deal with it.”

Quenching a dry mouth

In this same year, Dr. Farach-Carson and collaborator Dr. Simon Young were awarded a grant to study stem cell therapy for xerostomia using minor salivary glands. Xerostomia is a problem for patients who receive head and neck radiation therapy for their cancers. In collaboration with the Department of Oral and Maxillofacial Surgery, minor salivary glands will be harvested from patients who have their lower lip mucosa incised. This specific project combines engineering and biology in hopes the harvested cells can be used as a viable tissue source post-radiation therapy. The vision is for patients at the time of surgery to remove a normal piece of tissue and isolate it. Once the cells have been expanded and the radiation therapy has been completed, the patient will receive their healthy cells back.

The grant will also allow Dr. Farach-Carson and Dr. Young to explore the idea of working with nerve cells to control the amount of salivary production and flow. This project has progressed through multiple stages of animal models, starting with rats and now mini pigs, which is expected to take a year for completion. The ultimate goal is to conduct human trials.

From principles to practice

Dr. Farach-Carson enjoyed learning about how and why things work the way that they do. “My profession has given me the flexibility to raise my children and easily balance work and home life. I like how my work focuses on things that will make life better clinically,” she said.



Dr. Cindy Farach-Carson, PhD, is Professor and Director of Clinical / Translational Research

“We need to change the way we look at our relationship with viruses.”

She has a strong passion for translational research. This type of research involves applying basic principles to techniques and tools to address current critical medical needs specifically designated to improve health outcomes. “We are currently collaborating with graduate and undergraduate students online and offline. Someone who is interested in assisting our laboratory doesn’t always have to be hands-on in the lab, but can work around the project itself.”

Here at the dental school there are numerous opportunities for everyone to get involved in. Research is an interdisciplinary collaboration between engineers, doctors, and more. Interested students can start small by assisting with bioinformatics and conducting gene arrays.

“If folks are interested in a specific type of research or undertaking we will certainly try to find ways for them to be involved,” explains Dr. Farach-Carson. “I want students to have the ability to do research, yet also provide the opportunity to follow one’s passions.” ■

“The more we know about the virus... the better we can design ideal practices to deal with it.”

SNOOZE or LOSE

A research spotlight

RYAN LEE

Editor-in-chief '23



A GOOD NIGHT'S SLEEP improves learning, but ironically the people who need sleep the most may not be getting enough. In a professional program such as a dental school, students are tasked with learning in the day and studying in the evening. Sacrifices are made and one of the first to go is sleep. But it is under these high pressure situations that makes dental students a particularly interesting group to study, says Dr. Alan Myers. He is the Principal Investigator of an ongoing research project. The study monitors students' sleep patterns and correlate them to exam performance. In the team is collaborator Dr. Cameron Jeter and student investigator Parnian Salehi ('23). The three of them talk about the process of this research.

What is the timeline of events for this project?

AM: "The interest started about a year and a half ago when I started brainstorming ideas for the Dean's Academy Small Grants Award. Each year, Dean Valenza awards money to several faculty to support educational research. I came up with some ideas that fell under more of neurosciences and psychiatry, and I thought there's no better partner than Dr. Jeter. We applied and are grateful for receiving an award in the 2019 cycle."

CJ: "We saw that there were maybe only a handful of published papers on how sleep affects academic performance among dental students, and interestingly these were all done in international countries. And so we wanted to be one of the first to do it in the United States, and with the added benefit of technology of using smartwatches and cell phones."

PS: "How I came about joining the team was a little bit different, because I didn't come from the Student Research Group at the school. I actually came from the Academic Dental Careers Fellowship Program, and the program has different requirements. One of them is research involvement and you end up picking a faculty mentor. I picked Dr. Jeter and then we matched."

"We decided that I will be the student voice of the research. For example, I made suggestions with the timing on when students are going to take the surveys."

To Dr. Myers: As a pharmacist, what unique perspective do you bring to a sleep study?

“In pharmacy school we took many exams at 6:30 AM before classes started for the day. I learned to appreciate the value of a good night’s sleep before early morning exams.”

To Dr. Jeter: As collaborator, what are the benefits of collaboration in research?

“Collaboration is essential. Not only to have the proper expertise of individuals contributing to a project, but also because any one project often is simply too much work for one person to get done. You have to divide and conquer.”

To Parnian S: Tell us more about your fellowship, and why is research part of the requirement?

“I’m really interested in entering the academic aspect of dentistry, but how will I know if I will even like it? And this is where this program comes into play. What academia means to me is either research or teaching, and this program has both of those things.”

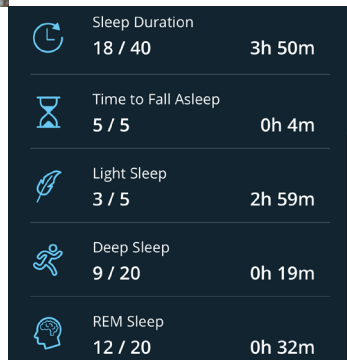
Intuitively, we know that sleep is good for us. What is the connection between this intuition and the research?

PS: “I’ve been a student all my life. Often I look at a question I got

“It’s not just about the number of minutes in bed. It’s about the all-important number of sleeping minutes per phase of sleep.”



Parnian Salehi is a student researcher and part of the Academic Dental Careers Fellowship



An example of sleep data, from an anonymous participant

Dr. Alan Myers, PharmD, PhD, RPh, is a pharmacist and Associate Professor in the Department of Diagnostic and Biomedical Sciences



Dr. Cameron Jeter, PhD, is a neuroscientist and Associate Professor in the Department of Diagnostic and Biomedical Sciences

wrong on a test after taking it, and it’s almost like I’m looking at it with a completely fresh pair of eyes. And I realize it’s because I didn’t have enough sleep last night.”

CJ: “The basics of how the brain learns is we first have to acquire new information either by hearing or seeing. That information is quickly forgotten if it isn’t converted from our short-term memory into long-term memory. That transition is called memory consolidation. Then finally to actually use that memory later, you have to recall the information.

“What is interesting in this three-step process, is that acquisition and recall are done during wakefulness. And we know from sleep science that consolidation is done while we’re sleeping and eating. Specifically during the rapid eye movement phase of sleep. And so because when we’re cycling through light and deep sleep, it’s not just about the number of minutes in bed. It’s about the all-important number of sleeping minutes per phase of sleep.”

COVID-19 has caused many disruptions this year. How has the virus affected this project, and are any of these unexpectedly advantageous?

AM: “How we recruited students was different because we couldn’t go in front of the class anymore and talk face-to-face. Parnian helped immensely with recruiting participants. Overall, it was really just making adaptations to the process, something common among all research projects.

“The pandemic was never anything we had thought about. This one has a significant presence, obviously. But our research will provide data from a unique teaching setting. Thus, we will have novel insight to this particular situation should it ever happen again.” ■

DIABETES

AND

periodontal disease

AN INTERSECTION IN HEALTH

DANIEL NGO
Guest writer '22



Diabetes is a complex, multisystemic disease that affects over 34 million Americans. Most of these people are affected by type 2 diabetes mellitus (T2DM), which is characterized by hyperglycemia and insulin resistance. Physicians use a patient's HbA1c levels as a measurement of long-term glucose control, and fasting plasma glucose for the short-term. T2DM has been associated with numerous health problems and comorbidities, including hypertension, chronic kidney disease, cardiovascular disease and more. Additionally, diabetes is associated with impaired wound healing due to factors such as vascular insufficiency and decreased neutrophil adherence, chemotaxis, and phagocytosis. These problems are likely directly related to hyperglycemia.

Periodontitis is an inflammatory disease affecting the gingiva and characterized by loss of supportive connective tissues, including the periodontal ligament and alveolar bone. Although the exact mechanism for this tissue destruction is not completely understood, it is associated with an increased amount of pathogenic gram-negative bacteria.

These diseases have consistently been shown to have a two-way relationship. A 2018 systemic review by Nascimento et al. shows that diabetes increases the risk of progression of periodontitis by 86%. Another 2016 review and meta-analysis by Teshome et al. shows that patients who received periodontal therapy have reductions in HbA1c levels. In a typical healthy individual, periodontal disease can be slowed by the production of inflammatory factors of the immune system. However through impaired wound healing and hyperglycemia, diabetes likely creates an optimal environment for bacteria to persist and destroy the periodontium. Conversely, periodontitis may increase metabolic complications in diabetics including exacerbated insulin resistance, hypoglycemia, ketoacidosis, and coma. With such a strong link between the two diseases, there is a need for integrated care involving both dentists and physicians.

What dentists can do

Dr. Nikola Angelov is Professor and Chair of the Periodontics Department at UTSD. He discussed some areas where dentists can take lead on caring for patients

with or at risk for diabetes. Dentists can help identify at risk patients by recognizing commonly related problems such as burning mouth syndrome, xerostomia, and periodontitis. According to the American Diabetes Association, over 7 million people had undiagnosed diabetes in 2018. Dr. Angelov noted that a thorough dental exam has helped dentists refer patients to physicians for suspected diabetes and metabolic syndrome. A dentist's ability to recognize diabetes early on and provide specific skills for the overall treatment plan could lead to better outcomes and management.

He also noted the importance of developing a good dental treatment plan with the primary goal of managing diabetes and blood glucose levels. "While major regenerative and elective procedures are not recommended, patients with uncontrolled diabetes can greatly benefit from dental treatments such as patient education, extraction of hopeless teeth, recontouring of defective restorations, and mechanical instrumentation, among others."

Bridging the gap

Currently, there is somewhat of a disconnect between dentistry and medicine. Dr. Angelov said we need to work to bridge this gap.

"The key to all of us being successful in treating diabetic patients is effective communication and understanding of both diabetes and periodontal diseases as complex major inflammatory conditions. The implementation of structured and targeted interprofessional education into our schools can go a long way in helping both dentists and medical professional in better understanding the details of the real two-way relationship that exists between diabetes and periodontitis."

On a systemic level, better incorporation of dentists into the treatment team would allow dentists to better treat their patients. It would improve access to important medical information such as laboratory results and relevant complications. Physicians could also make stronger recommendations for dental exams every six months, as they already do for yearly diabetic foot screenings

Both publicly and professionally, dental and medical health care are often treated as two separate entities. However as demonstrated here, there is a lot of overlap between the two fields. Looking at the relationship between diabetes and periodontal disease helps inform both dentists and physicians about the need for integrated health care. This can provide a starting point for collaboration. ■

OVERALL HEALTH

Welcome to our guest column, where we feature an article written by a student from McGovern Medical School. Following UTSD's vision, the guest writer takes on a topic that connects oral and overall health. The goal of this column is to make the connection ever more salient here in the Texas Medical Center.

Daniel Ngo is a medical student ('22) at McGovern Medical School working towards a scholarly concentration in medical education. He is passionate about improving healthcare standards and accessibility and improving the overall quality of medical training. If he can provide help somewhere, he'll be there. He loves photography, food, and music, and you can probably catch him doing something with all three in his free time.

"With such a strong link between the two diseases, there is a need for **integrated care** involving both dentists and physicians."

Dr. Nikola Angelov, DDS, MS, PhD, is Professor and Chair of the Department of Periodontics and Dental Hygiene



A starter guide to student research: **SUMMER RESEARCH PROGRAM**

ALI ALSHABEEB
Writer '24



Many dental students are interested in research, but they do not know where to start. Which school year is the best time to do it? Does the project have to be dental related? How much workload does it take, considering other academic commitments?

While students can volunteer to do research at any time of the year, UTSD's Summer Research Program (SRP) is a good starting point. SRP lays out a timeline for your research project and hosts various activities to enhance the research experience. It is designed with the intent of creating as low a barrier of entry as possible. With no prior experience required, all interested students are welcome to apply.

An advocate for student research, Ali Al Hatem ('23) is one of the best people to ask about SRP. He has four years of experience working with his faculty mentor Dr. Ransome van der Hoeven. His most recent project is about the drug metformin, a medication for type 2 diabetes patients.

Why should dental students participate in research, and what are the benefits of SRP?

"I view research as an avenue for advancing my knowledge in the science behind what I do in dentistry. Every material, procedure, drug, and recommendation we give our patients is based on research and experiments. Those who do research will gain a deeper insight and appreciation for being a clinician as they know the work that went into getting us to where we are today.

"The summer research program will reward you with a stipend and give you the opportunity to present your research at local, national, and potentially international level conferences. These include Star of the South, American Association for Dental Research, and International Association for Dental Research, respectively."

Let's say someone is interested in research, but has no idea what to do. How can they get started?

"Start by simply asking yourself which field would you be interested in. Is it microbiology, craniofacial development, biomaterials, or something else? Based on the available research projects, identify which ones you

may be interested in from your field of interest.

“Do not be afraid to email the faculty to further ask them about their project. It is important to recognize if you are going to truly enjoy working on this project or not before you commit to it. Look up related past publications and works by the faculty to get to know about the nature of their work and get a glimpse of what it is going to look like. Do your ‘research’ before choosing a project.

“Additionally, joining the Student Research Group is a great

“UTSD is part of one of the *largest* medical centers in the world.... We are *at the heart* of vast resources and experienced faculty who can support our research.”

tool to learn about research from speakers and why it is important to do research. You can ask fellow students who have done research in your field of interest what their projects are about, too.”

How exactly does the Summer Research Program work?

“An email is typically sent out in the spring semester advertising the Summer Research Program. It lists available research projects and their respective mentors, and also stipend information. The program typically extends from the middle of May to the end of July.

“The main contacts for summer research are Dr. Gena Tribble and Ms. Auco Dang. They are the Student Research Coordinator and Research Coordinator, respectively. Once you have decided what project you want to take on, go ahead and submit your application!”

A different year

UTSD officially went into pandemic protocol during March 2020 in response to the coronavirus. SRP subsequently moved online and could no longer support in-person research. Like everyone else, Ali A. H. and his mentor were motivated to adapt their existing projects.

“This year presented a new challenge for us where we could not conduct the experiments in person. But at the same time, it allowed us to concentrate on analyzing all the data we acquired over the past few years,” he said. “We used online databases to explore protein-protein interactions in our model organism *Caenorhabditis elegans* and their homologs in humans.

“Once we are able to get back to conducting our



Dr. Ransome van der Hoeven, PhD, is Assistant Professor in the Department of Diagnostic and Biomedical Sciences



Ali Al Hatem ('23) has four years of experience in the Summer Research Program

experiments, we will use the plan we created this summer to help us identify the protein we are looking for.”

Why research matters

UTSD is part of one of the largest medical centers in the world. In other words, we are at the heart of vast resources and experienced faculty who can support our research. Because knowledge is power, the skills acquired from research can help students become better clinicians and inspire successful careers in academia. Ultimately, research is a way to open new doors. ■

COMMON

symptoms OF

online learning

OMKAR PATEL

Writer '24



SINCE THE GLOBAL COVID-19 PANDEMIC broke out, many people have had to rely more on technology to safely attend work and classes. Classes were moved online, and this transition came with a unique set of challenges for students and professors alike.

A team of researchers at our school seized the situation as a learning opportunity. This project is led by Principal Investigator Dr. Vuvi Nguyen and Co-Investigator Dr. Tulsi Patel. They along with collaborators Dr. Carolyn Huynh and Dr. Richard Halpin decided to survey students and professors about their experiences with online learning.

Taking classes online

Dr. Nguyen was inspired by conversations with students about the generational differences in learning between Millennials and Gen Z. According to Dr. Nguyen, different age cohorts learn differently. For example, tech-savvy groups may learn better in a virtual environment.

Dr. Nguyen was able to offer an interesting preview into her ongoing study. From the faculty perspective, she said that many had difficulty transitioning to online learning. In just a few weeks they had to move all their content online and learn how to use WebEx. From the student perspective, she saw that many students initially loved the idea of online learning. In the first week, students were happy that they could wake up later than if they had in-person classes. However after one month, her team was finding that students actually developed a mixed view of online learning. Students missed seeing people and felt distracted at home.

Student Nicole Moore ('24) shared her experience that seems to confirm Dr. Nguyen's hunch. "I love how convenient virtual classes are, and how I can sleep more and just roll out of bed," Moore said. But she also brought to light some drawbacks.

"I feel like it is isolating. Being a social person, I want to talk to professors. I now spend all day in my bedroom by myself."

Doing research online

In addition to virtual classes, extracurricular activities like research were moved online. This especially impacted the students and research mentors in the Summer Research Program, which began in June. Moore researched silver diamine fluoride in primary dentin under the mentorship of Dr. Daniel Harrington and Dr. Juliana Barros.

Moore expressed that her project worked well online because she was mainly analyzing microscopy images, but said that it was hard to work from home. She also explained that the initial learning curve was high, not because her project was overly difficult, but because she did not know what to expect. Moore had done research during her undergraduate years, but was used to it being in-person and hands-on. While it was not what she had initially expected, she said that it ended up being a positive experience.



Student Nicole Moore ('24) is a student researcher in the 2020 Summer Research Program

“I feel like [online learning] is isolating. Being a social person, I want to talk to professors. I now spend all day in my bedroom by myself.”

Entering school online

First year students are having an especially difficult time because they have not had much of a chance to interact with each other since beginning dental school. In fact, Dean Valenza's town hall on September 16 was the first time students in the class of 2024 were in the same room together.

Despite all the challenges that come with virtual learning, we should be thankful for the supportive community that UTSD has nurtured. The past few months have shown that students and professors are continuously finding creative ways to stay connected and engaged. As we think about the difficult road ahead, we know that our sense of togetherness will make us through. ■



Dr. Vuvi Nguyen, MS, PhD, is Assistant Professor in the Department of Diagnostic and Biomedical Sciences

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