IMPRESSIONS

DRIVING RESEARCH INNOVATION FORWARD

WINTER 2024

THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Dentistry

A message from the Dean *pro tem*

Over the past year, the Faculty has come together to celebrate its 60th anniversary, offering a unique opportunity to reflect on where we started and how far we have come. In this edition of *Impressions* magazine, we focus on the incredible research within the Faculty and the impressive stories of those on the path to discovery.

In 2023, all of us at UBC Dentistry were saddened by the passing of Dr. George Beagrie. As a former Dean (1978-1988), his vision of incorporating extensive research programs into dental schools was an essential driver in getting us where we are today—a Faculty with a solid and productive research program that is recognized globally. Under his leadership, the Faculty created a more welcoming, supportive atmosphere that attracted several young researchers who enjoyed lengthy and productive research careers.

We must continue to have a steadfast leader at the helm to drive our research program forward. In November 2023, I appointed Dr. Hannu Larjava as Associate Dean of Research. Under his guidance, the Faculty's researchers have restructured and formed four new research themes.

On January 28, 2025, the Faculty will host its annual Research Day. Brought forth by former Dean Charles Shuler (2007-2017), this initiative highlights current research accomplishments and showcases innovative and groundbreaking projects via oral and poster presentations by our undergraduate and graduate students, postdoctoral research fellows, research associates, visiting scientists and faculty members.

Students are at the heart of UBC Dentistry as they train to become the next generation of oral healthcare professionals and researchers. To celebrate our students and our 60th anniversary, we established the new UBC Faculty of Dentistry 60th Anniversary Student Wellness Fund, highlighting the importance of students' physical, emotional and mental health. This initiative will provide financial resources to support our students and open a meaningful dialogue around the real-time issues they face.

I am also enthusiastic about the Canadian Dental Care Plan (CDCP), which we have recently started participating in by submitting claims for our patients. This is an opportunity to increase access to care for our patients and educational opportunities for our students. The CDCP has opened a line of communication with the Honourable Mark Holland, Minister of Health, who visited the Faculty for a tour of our facilities and conversation with faculty and students in the summer. We also have been in close communication with the other nine Canadian dental schools to ensure the CDCP implementation goes as smoothly as possible.

As you read through this magazine, I hope you can appreciate the impressive research and collaborations taking place throughout the Faculty and join us in celebrating the impact our work continues to have on the dental community and beyond.

Leading the Faculty through its 60th anniversary celebrations has been an honour. I look forward to all we can achieve together to continue the great legacy of UBC Dentistry.

DR. ANDREA ESTEVES
Dean *pro tem* and Clinical Professor

We acknowledge that UBC's Vancouver campus is situated within the ancestral and unceded territory of the xʷməθkʷəy̓əm (Musqueam) people.

A message from the Associate Dean of Research

I am pleased to be part of this issue of *Impressions* magazine, which, for the first time, is entirely focused on research.

My journey into the world of research started when I was a dental student, during which time I became interested in basic science and realized that my passion for dentistry and research could co-exist. I went on to complete a PhD and specialty training in periodontics and have spent more than three decades researching the mechanisms behind wound healing and periodontitis.

Since joining the UBC Faculty of Dentistry in 1993, I have had the privilege of being part of our growing research program, which has become a defining feature of what makes us one of the top dental schools in the country. The work happening here continues to have a direct impact on the dental profession, oral healthcare and overall health and wellness.

As part of our ongoing evolution, UBC Dentistry researchers came together this year to establish four themes highlighting our diverse research enterprise, which spans basic science to clinical and translational research. These themes are craniofacial development and preclinical disease models; clinical research; public health and education research; and matrix biology, infection, immunity and biomaterials research. The division of these themes is fluid, as many investigators collaborate across themes and identify their research focus in multiple areas.

In this issue of *Impressions*, you will read about advances in oral cancer research, how digital technology is changing the future of oral healthcare and why studying the role of immune cells in craniofacial development could improve fetal health. You will also hear from our graduate students, who continue to drive innovation as they train to become the next generation of oral healthcare leaders. Of course, these are only a few highlights—with more than 40 active researchers, there are too many incredible stories to fit into these pages!

None of what we do here would be possible without the support of our dedicated research team—Ingrid Ellis, Manager of Research Administration and Angela Tether, Research Grant Facilitator.

Our research directly impacts clinical practice and is only possible because of funding. However, as the research landscape changes, securing the funding our investigators need to keep doing important work has become increasingly challenging. That's why the Faculty established the Dentistry Research Fund. Donations to this fund directly support researchers and allow them to keep thinking big. Thank you for considering a gift to this fund.

The Faculty's commitment to research is stronger than ever, and I am grateful to lead this community of innovative thinkers who continue to move the field of oral healthcare forward. I hope you enjoy learning about some of the inspiring research taking place here at UBC Dentistry!

DR. HANNU LARJAVA
Associate Dean of Research
Professor and Chair, Division of Periodontics

Canada Research Chairs: Driving Innovation Forward

The Canada Research Chairs Program is a national initiative to improve excellence in research in Canada and provides salary support to Chairs so they can focus on their research programs. UBC Dentistry is proud to have an incredible history of both Tier 1 and Tier 2 Chairs, the former awarded to outstanding researchers who are leaders in their field and the latter to exceptional emerging researchers.

Dr. Chris Overall was the Faculty's first Tier 1 Canada Research Chair (2001-2022) and is now our first UBC Distinguished University Scholar. He is one of the world's leading experts on a family of enzymes called proteases. During his time as Chair, he innovated new proteomic techniques that led to a revolution in understanding the targets and roles of proteases in biology and disease. His studies have revealed unexplored layers of complexity in immune cell signalling and the pathobiology of COVID-19, reported in over 250 publications, with over 100 cited more than 100 times. Recognition of Dr. Overall's impact includes being elected as a Fellow of the Royal Society of Canada and receiving many prestigious international awards.

Dr. Dieter Brömme is concluding his term as Tier 1 Canada Research Chair in Proteases and Diseases, which he has held for 21 years. His work examines how proteases—enzymes that break down structural and regulatory proteins—destroy tissues and how they can be stopped. His work could lead to new treatments for degenerative and inflammatory disorders, many of which are caused by excessive protease activity. His laboratory is currently exploring the almost completely ignored reverse hydrolysis activity of lysosomal proteases (i.e., the formation of peptide bonds), which has the potential to shed light on various aspects of autoimmunity and aging.

Dr. Joy Richman, pediatric dentist and researcher, was awarded our newest Tier 1 Canada Research Chair in Craniofacial and Dental Development in 2023. Her research is focused on understanding the causes of craniofacial abnormalities and the basis of lifelong tooth replacement in experimental models. Dr. Richman's studies will one day reduce anomalies such as cleft lip, provide treatments that prevent tooth loss and lead to stem cell therapies to regenerate teeth.

Dr. Jessica Rosin was awarded the Tier 2 Canada Research Chair in Immune Regulation of Developmental Programs in 2022, and studies the contribution of macrophages and osteoclasts to craniofacial morphogenesis in the developing embryo. Both Drs. Richman and Rosin made history by being the first female Tier 1 and Tier 2 Chairs in the UBC Faculty of Dentistry, respectively.

RESEARCH THEME

Clinical Research

Studies under this theme are used to improve diagnosis and treatment of dental and craniofacial disorders. The theme includes the following 16 researchers:

Fernanda Almeida
Diego Ardenghi
Ross Bryant
Nancy Ford
Mohamed Gebril
Renata Grazziotin
Denise Laronde
David MacDonald
Ian Matthew
Ben Pliska
Catherine Poh
Sid Vora
Chris Wyatt
Ed Yen
Lewei Zhang
Bing Zou

Shaping the future of oral cancer diagnosis and care

After 10 years of working as a dentist, Dr. Catherine Poh was ready for a new challenge. She enrolled in UBC Dentistry's PhD program and became passionate about oral cancer research. Her thesis looked at identifying biomarkers to help determine when precancerous cells were at a high risk of developing into cancer.

Dr. Poh went on to complete her oral pathology residency training. Today, she runs a robust oral cancer research program where she studies the full spectrum of the disease—from the cellular level all the way to treatment.

"The mortality of oral cancer is quite high—about 50 per cent of people diagnosed with it will die within five years—and knowing this motivates me to continue doing my research," says Dr. Poh. "In the past, there was a 'let's wait and see' mentality when it came to precancer but today, we're much more proactive about early intervention and treatment."

Research from Dr. Poh's laboratory resulted in a breakthrough way of removing oral cancer via surgery. In the past, cancer would reoccur in roughly one in three patients who underwent surgery to remove cancerous oral lesions. Dr. Poh discovered how to use fluorescence visualization technology—an imaging technique—to help surgeons more accurately remove oral cancer, drastically reducing the cancer reoccurrence rate while also sparing more normal tissue in the mouth.

Today, Dr. Poh's team is working on what she calls an oral "pap smear," with the goal of implementing a regular oral screening program, similar to existing screening for cervical cancer. The oral "pap smear" test works by brushing a lesion suspected of being precancerous. The smear is sent to a centralized lab and scanned to determine if there's a high chance it is precancerous, in which case a biopsy would be ordered.

"The goal is to catch precancerous cells as soon as possible," says Dr. Poh. "There are many specialists in Vancouver but not many throughout the rest of BC, so we want to make this type of care accessible to everyone. We have built a mobile outreach clinic to provide access and a standard of care to those in rural and remote communities. We are also developing a telehealth program for oral cancer and precancer screening to empower clinicians so their patients can access care closer to home."

Dr. Catherine Poh

UBC Dentistry is home to many researchers like Dr. Poh who are advancing the field of oral cancer. One is Dr. Denise Laronde, who is studying oral cancer screening and early detection in general and high-risk populations, developing models to predict oral cancer progression and translating this knowledge into clinical practice. Dr. Laronde is the Director of the BC Oral Cancer Prevention Program and a Distinguished Associate Scientist at the BC Cancer Research Institute, where UBC Dentistry Professor Dr. Lewei Zhang is a founding member and Chief Oral Pathologist.

Using digital technology to change the future of dentistry

When the global pandemic first hit, the UBC Geriatric Dentistry Program (GDP) could no longer see patients in person. The team provides oral healthcare to seniors in Vancouver, so they pivoted to telephone and Zoom consultations, instructing patients and their families on using smartphones to take pictures of their mouth.

This new approach was so effective that it sparked the idea of creating a teledentistry platform. Over the past three years the ToothPortal app has been developed thanks to a generous $1 million gift from the Tai Hung Fai Charitable Foundation Limited. It is being tested in two long-term care facilities in Vancouver.

"Using teledentistry could truly transform the way we deliver healthcare to seniors, which is important considering our aging population," says Dr. Chris Wyatt, Director of the GDP.

The app is easy to use and accessible to clinicians, patients and family members. It collects patient information, including photos, as part of an initial assessment, allowing the dental team to schedule appointments and prepare before a patient arrives. The pre-collection of information promotes time management and efficiency for both patient and practitioner. For example, a photo of a broken tooth could allow the dental team to book an extraction, eliminating the need for an initial in-person appointment to confirm that the tooth is broken.

While the app was designed with seniors in mind, teledentistry has the potential to have an impact well beyond this population.

"Our goal is to increase everyone's access to oral healthcare, and teledentistry has incredible potential to do this while making the process of seeing a dental team more seamless for both patients and practitioners," says Dr. Wyatt.

The evolution of sleep apnea research

In 2001, Dr. Fernanda Almeida left her home in Brazil to join the UBC Faculty of Dentistry as a PhD student researching sleep apnea.

Over the past few decades, researchers have discovered that many factors beyond an increase in weight can lead to sleep apnea, including neuromuscular medical conditions and an imbalance between bone size and soft tissues of the craniofacial region. A breakthrough treatment for the disorder came in the 1980s with the creation of the continuous positive airway pressure (CPAP) machine. Since then, several oral appliances have been developed as treatment options, including one by the late UBC Dentistry alum and professor Dr. Alan Lowe, who was Dr. Almeida's PhD supervisor.

Much of Dr. Almeida's research is focused on better understanding patient preference and adherence to sleep apnea treatments. One of her team's recent studies gave participants the autonomy to choose between using their CPAP machine, oral appliance or neither on a nightly basis. Patients often experience stress and anxiety around using treatments. This study looked at whether giving patients the freedom to select a treatment option without any specific direction would increase adherence.

The results were astounding; participants used at least one treatment option significantly more often compared to other long-term studies. Several participants also showed decreased blood pressure (a side-effect of sleep apnea).

"We've moved towards incorporating patients' needs and values into sleep apnea treatment, and this study shows that when people have the autonomy to choose their treatment option without feeling stressed or pressured, they're more likely to actually use it," says Dr. Almeida. "In the past, we were focused on making sure patients didn't stop breathing at all during the night. Now, we're much more focused on ensuring the patient feels better and is doing well. Maybe their breathing overnight isn't perfect, but if they feel well rested and their blood pressure is a bit lower, then that's still a success."

STUDENT RESEARCHER SPOTLIGHT

Dr. Ahmed Elsayyad

Dr. Ahmed Elsayyad is pursuing a Master's in Craniofacial Science with a diploma in prosthodontics. His research is being supervised by Dr. Mohamed Gebril.

What got you interested in prosthodontics?

I received my dentistry degree in Egypt and fell in love with prosthodontics early on. I feel this specialty truly changes lives. Sometimes, patients lose their teeth and don't smile—a prosthodontist can improve this and give them newfound confidence.

What inspired you to join UBC Dentistry?

I completed my Master's in Prosthodontics in Egypt and decided I wanted to live abroad in Canada. I had to get recertified in North America to do this, so I enrolled in the Master's program at UBC Dentistry. I knew that UBC had one of the most prestigious prosthodontics specialty programs in Canada, and I was drawn to the program because of its strong digital dentistry component.

Research is an important component of your Master's specialty. What is your research focused on?

My research is looking at digital dentistry and prosthodontics. Specifically, I'm using a digital scan to record the mouth and create digital implant impressions. The scanner is essentially a small camera that goes inside the patient's mouth and is optimized, aided by a novel scanning tool, for patients with full arch implants—in other words, patients who don't have any teeth and have a bridge to support their entire jaw.

What is the goal of this research?

The goal is to reduce time in the chair for the patient, and to make them more comfortable. Traditionally, implants require putty material, which can be uncomfortable. Using this digital technology will reduce the number of visits required, saving time for both the patient and the prosthodontist.

Why are you interested in digital dentistry?

The field of digital dentistry is rapidly advancing. The progress we've made in just the last five years is astounding. I like this area because it moves quickly and profoundly impacts the dental profession.

What do you hope to do after graduation?

I really enjoy clinical practice and academics, so I hope to continue doing both! It feels like the best of both worlds.

What are you most proud of during your graduate studies journey so far?

The American College of Prosthodontists has a prestigious grant that is awarded to five students every year. North America has over 47 prosthodontics programs, so the competition is stiff. I was very proud to receive this grant last year to use for my research project!

RESEARCH THEME

Craniofacial Development and Preclinical Disease Models

Researchers in this theme are focused on fundamental research and are studying the craniofacial development of embryos, including the impact of genetics and the surrounding environment, to develop models that will help diagnose and treat developmental diseases from cleft palate to autism. These five researchers collaborate with others to ensure that what they learn in the laboratory can be translated into clinical practice:

Daniel Graf
Mary MacDougall
Joy Richman
Jessica Rosin
Charles Shuler

How studying immune cells can improve fetal health

Immune cells play a critical role in brain development, but little research has been done on how these cells impact cranium development. Exciting new research from Dr. Jessica Rosin's laboratory is showing just how important immune cells are in this process.

Dr. Rosin and her team work at the cellular level to explore the unique intersection between neuroscience and oral health. They want to understand how immune cells communicate with other cells during pregnancy to result in normal fetal development of the face and brain. Their recent work shows that when specific immune cells are removed from a fetal environment, neural crest cells are disrupted. These cells are critical in craniofacial development, so any disruption to the neural crest cells can affect how the fetus' skull, face and mouth grow. The team also found that the sex of the fetus can influence how development is affected when immune cells are absent.

This work has implications beyond the lab. While it's known that having good oral health is important for pregnant women, there is little research on how infections such as gingivitis and periodontal disease impact craniofacial and brain development in a growing baby. Researchers can improve prenatal care by better understanding the role immune cells play in fetal development and how these cells are implicated in oral disease.

"Women are often told to take care of their oral health when they're pregnant, but it's not very clear exactly how their oral health is affecting the fetus," says Dr. Rosin. "We want to highlight the importance of oral healthcare for pregnant women so we can equip them with the best possible knowledge, and the only way to do this is by understanding biology at the cellular level. Whether you're looking at the mouth, the brain, the heart, or any other part of the body, if we don't understand how it developed, there's no way to diagnose, let alone cure or prevent, any type of related disease."

Dr. Jessica Rosin

Craniofacial, Oral and Dental Disorders

Dr. Daniel Graf is Director of the Craniofacial, Oral and Dental Disorders (CODED) research group at UBC Dentistry. This group will collaborate with many areas including Medical Genetics and Pediatrics and seeks to build broad engagement with patient advocates and affected individuals. The aim is to make rare craniofacial disorders a focal point of research within the Faculty.

Dr. Graf's research focuses on craniofacial development and growth, particularly cartilage, bone and teeth. His laboratory seeks to better understand developmental and acquired craniofacial disorders and leverage knowledge from these studies to better comprehend common skeletal disorders such as osteoarthritis.

STUDENT RESEARCHER SPOTLIGHT

Dr. Isra Ibrahim

PhD student Dr. Isra Ibrahim is part of Dr. Joy Richman's lab and is studying cleft lip.

What is the focus of your PhD research project?

The problem my research is tackling is cleft lip, which is one of the most common birth defects. Our lab is trying to understand normal lip development at the cellular level so we can determine what molecular mechanisms result in abnormal development and increase the risk of orofacial clefting.

I'm specifically looking at small Rho GTPAses, which are signalling proteins and how they are involved in lip development. We are also investigating human genes that regulate these proteins and contribute to an increased risk of cleft lip.

If we can discover how someone develops cleft lip, we can eventually treat or prevent it, which would greatly improve these kids' physical and psychological health.

What sparked your interest in this area?

I have a dental degree from my home country of Sudan. After completing my general practice residency, I did clinical studies on dental anomalies in cleft lip and palate patients and got really interested in orofacial clefting.

I moved to Texas and did an MSc in Oral Biology with Dr. Kathy Svoboda, where I worked on palate fusion. This was my first experience with lab bench work, and it was great to learn the biology and genetics of this condition since there isn't much funding in Sudan for basic science. I met Dr. Richman when she gave a talk at Texas A&M University, and I was excited when she invited me to join her lab as a PhD student.

Why did you decide to come to UBC Dentistry?

Dr. Joy Richman is a leading researcher in Canada studying cleft lip, so I was excited at the opportunity to work with her! UBC Dentistry has an amazing research program, and I love the diversity of people I get to work with.

What advice would you give to dentistry students considering a career in research?

Be open to trying new things! I never thought I would end up in research, but after trying it, I found that I actually enjoyed it. It's also great how research improves your problem-solving skills and allows you to challenge yourself in new ways. Making new discoveries is very exciting.

Also, as a student mom, I appreciate how research gives me the flexibility to create my own schedule and find that work-life and family balance. I am grateful for an understanding supervisor and a supportive husband.

Where do you hope your PhD leads you?

I've always enjoyed teaching. I've had the opportunity to teach dental students in Sudan as well as undergraduates throughout my PhD and it's been a rewarding experience. In addition to teaching, I hope to continue with research in orofacial clefting once I graduate.

RESEARCH THEME

Public Health and Education Research

Studies under this theme focus on preventing and controlling dental and craniofacial diseases, promoting oral health and advancing oral health education, curriculum development and educational policy. The theme includes the following 16 researchers:

Jolanta Aleksejūnienė
Salima Alibhai
Mario Brondani
Luana Carvalho
Leeann Donnelly
Anuja Doshi
Zul Kanji
Carrie Krekoski
Vince Lee
Kavita Mathu-Muju
Shimae Soheilipour
Randa Soussou
Rana Tarzemany
Nick Tong
HsingChi von Bergmann
Eli Whitney

Bridging gaps in community healthcare

Early in his research career, someone asked Dr. Mario Brondani what area he hoped to be remembered for.

"I don't have just one area because I'm comfortable with at least three—there is so much out there I want to explore!" he says.

Dr. Brondani started his career as a dentist in Brazil and became interested in seniors' oral healthcare after visiting a long-term care home close to his practice. He went on to complete a Master's in Gerontology before moving to Vancouver and continuing his education with a Master's in Public Health and a PhD at UBC Dentistry.

Today, Dr. Brondani has found success in studying many different disciplines within dentistry, including geriatrics, public health and dental education. Recently, his focus has been on populations who face barriers to accessing dental care, such as refugees, gender minorities, homeless people and those living with HIV/AIDS.

"The overarching goal of this research is to help marginalized groups access the oral healthcare that best fits their needs," says Dr. Brondani. "For example, if someone is missing a back tooth but they're not in pain and aren't having trouble chewing, then oral healthcare for them might mean preventing more tooth decay but doesn't necessarily mean replacing that tooth."

His research is not about telling people what they need but about working directly with communities to understand what helps them most.

"We want to graduate the best possible oral healthcare professionals," says Dr. Brondani. "To do that, you first need to understand what oral health means to different communities, and then you bring that knowledge into the education curriculum and invite those community members to come in and teach students themselves."

Dr. Mario Brondani

Transforming dental education

Dr. HsingChi von Bergmann wanted to be a physicist, but after starting graduate studies in astronomy, she realized it wasn't a good fit.

With a keen interest in science education, she switched gears and enrolled in a curriculum and instruction graduate program with a focus on science education. In 2010, she joined the Faculty as an education specialist to conduct and mentor educational research activities and to enhance teaching capacity and students' educational experiences.

Dr. von Bergmann played a leading role in revamping the DMD curriculum, which involved separating dental and medical school courses (before this, the first two years of the DMD and MD school curriculum were combined) and incorporating more clinical time.

"Changing an educational program requires a lot of serious considerations and must be evidence-based," she says.

Prompted by the global pandemic, Dr. von Bergmann's current research focuses on how instructors should use multimedia, digital technology and AI to teach dental students.

Dr. von Bergmann is also exploring student wellness and has worked closely with postdoctoral research fellow Dr. Tala Maragha to define 12 tips that all dental schools should implement to prioritize the wellbeing of their students.

"Our research shows that wellbeing is more complex than just mental health; it also involves physical health, social connections and having strong support systems," says Dr. von Bergmann. "Dental schools should adapt their teaching to be effective for new generations and should listen to student input to ensure their learning experience is centred on wellbeing."

Research in action: Achieving better health through integrated care

After completing her dental hygiene degree at UBC, Dr. Leeann Donnelly returned to work with the Geriatric Dentistry Program. She enjoyed this experience so much that she started graduate studies looking at seniors in long-term care and quickly fell in love with research.

Today, Dr. Donnelly's work is focused on integrated care and understanding how oral health doesn't operate in a silo. She is leading the UBC arm of the EFry Health Centre, an exciting project over a decade in the making that is a direct product of her research.

The Centre is built on an integrated care model and serves more than 200 patients—primarily vulnerable women, children and families—through holistic, trauma-informed and culturally safe healthcare.

A dental clinic on the first floor is serviced by UBC dental and dental hygiene students who rotate through, receiving educational instruction from UBC Dentistry faculty while providing restorative, preventative and emergency oral health services to patients. The clinic was made possible thanks to generous support from donors, including Sinclair Dental, who provided gifts-in-kind and GreenShield, who donated over $300,000 in funding.

"At EFry, we work mostly with vulnerable people, but this model of having community health centres focused on integrated care can work for all populations; it just requires reimagining how we work together," says Dr. Donnelly. "Integrated care is person-centred, so we're not just focused on dentistry. Instead, it's about practitioners working together to address individual needs."

Along with the dental clinic, the Centre is home to numerous healthcare providers, including physicians, nurses, dieticians and social workers, who provide patients with one-stop access to care. Research shows that an integrated approach leads to better health outcomes and benefits practitioners, who can easily collaborate with other experts to help patients receive the best possible care.

"The other piece of this research is making sure our students have a good understanding of how to work with different populations after graduation," says Dr. Donnelly. "Whether they're in private practice or at a community healthcare centre, I hope they take what they learn at UBC Dentistry and apply it to their work so they can help make oral healthcare accessible and holistic for everyone."

For more information about our new clinic and teaching and learning opportunities, please contact Dr. Leeann Donnelly, Director of Community Engagement, at ldonnelly@dentistry.ubc.ca.

STUDENT RESEARCHER SPOTLIGHT

Vanessa Johnson

Vanessa Johnson graduated from UBC Dentistry's dental hygiene program in 2020 and returned to do a PhD with Dr. Leeann Donnelly.

What inspired you to go into research?

A few different experiences led me to research. In my fourth year of the dental hygiene program, we did community rotations. I learned a lot about oral health disparities in marginalized populations and how to work with them, which was truly a transformational experience.

I also spent one summer studying the prevalence of dental providers and physicians in northern and rural communities in BC. A physician from a remote community had reached out to UBC Dentistry's Dr. Donnelly and Dr. Mathu-Muju because he was seeing high rates of dental disease and wanted to support his community.

We created a research project looking at how many dental providers there were in the area—it turns out there were about three times fewer dental professionals than there were physicians—and how physicians could potentially make a difference in rural oral health disparities. I reviewed existing data, which showed that physicians and nurses in the United States were doing oral health promotion and prevention in areas with a shortage of oral healthcare professionals.

I got to present this research at a conference, and that's where I really caught the research bug—it was the first time I saw what it was truly like to be a researcher. I realized that research can affect policy, which in turn can significantly impact society.

I graduated in 2020 and went into clinical practice but always kept in touch with Dr. Donnelly, and started my graduate studies shortly after.

What is the focus of your PhD project?

My project began during the global pandemic. The dental hygiene program works closely with marginalized populations who have barriers to accessing oral healthcare. I started by studying how the pandemic had impacted their experience in accessing this care.

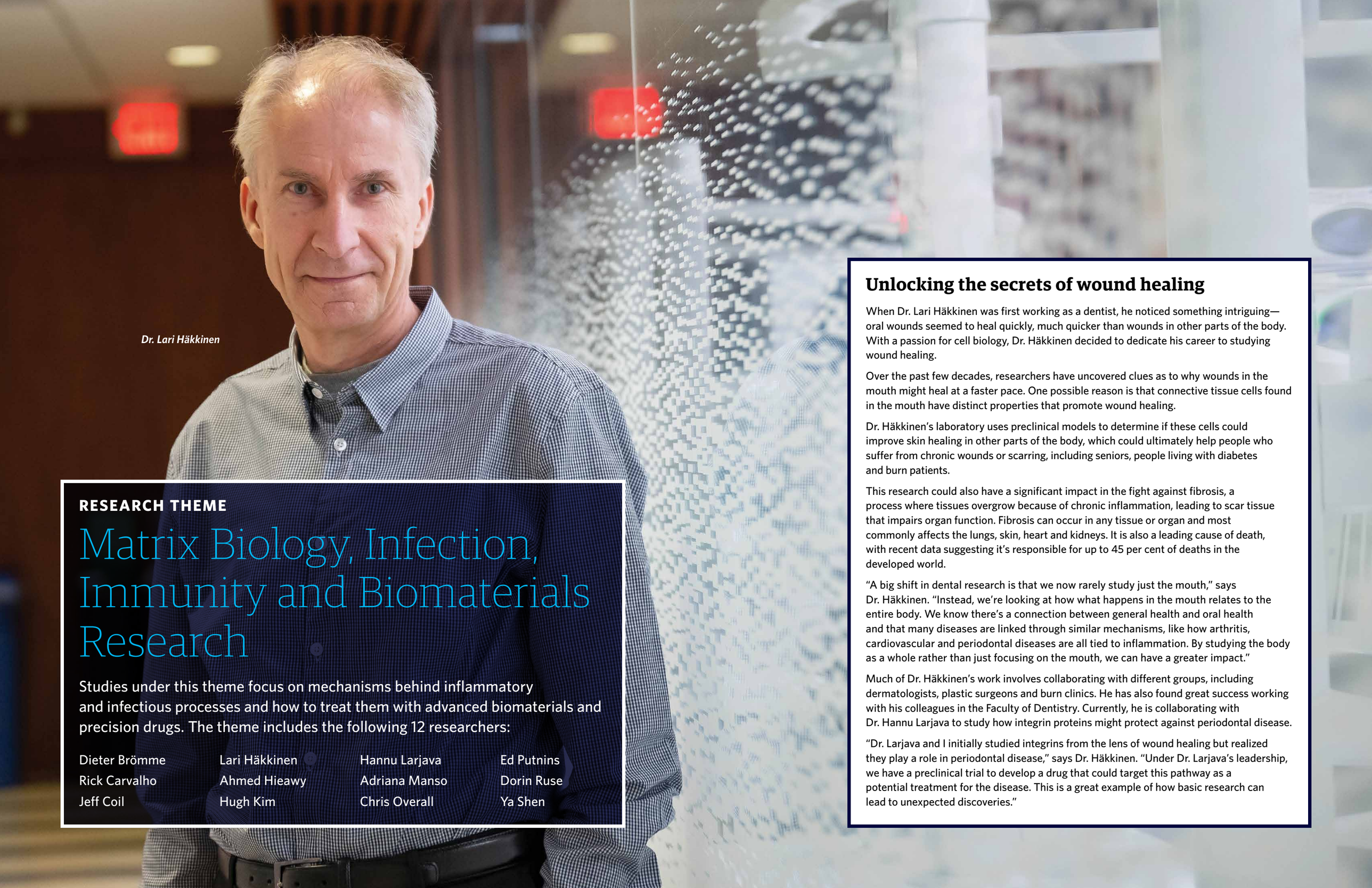
Through this work, I discovered that these community members were having an exceptionally hard time accessing oral healthcare, and that many were left with questions like how to sign up for dental benefits. We developed an oral health helpline and ran it as a pilot project for two years. Anyone could call the helpline and a UBC dental hygiene student or I would pick up the phone and answer their questions.

The next part of the project, which I'm currently working on, is talking to students and faculty about potentially integrating the helpline into the education curriculum.

How will this oral health helpline make a difference?

I hope it will make it easier for underserved populations to navigate the oral healthcare system and be a direct source of information for them. A helpline like this is fairly new to BC; we have telehealth for pharmacy, nursing, and physicians, but nothing quite like it for oral healthcare.

I also hope it will help students better understand barriers these populations face so they can graduate from school better equipped to help everyone in their communities.



Dr. Lari Häkkinen

RESEARCH THEME

Matrix Biology, Infection, Immunity and Biomaterials Research

Studies under this theme focus on mechanisms behind inflammatory and infectious processes and how to treat them with advanced biomaterials and precision drugs. The theme includes the following 12 researchers:

Dieter Brömme
Rick Carvalho
Jeff Coil
Lari Häkkinen
Ahmed Hieawy
Hugh Kim
Hannu Larjava
Adriana Manso
Chris Overall
Ed Putnins
Dorin Ruse
Ya Shen

Unlocking the secrets of wound healing

When Dr. Lari Häkkinen was first working as a dentist, he noticed something intriguing—oral wounds seemed to heal quickly, much quicker than wounds in other parts of the body. With a passion for cell biology, Dr. Häkkinen decided to dedicate his career to studying wound healing.

Over the past few decades, researchers have uncovered clues as to why wounds in the mouth might heal at a faster pace. One possible reason is that connective tissue cells found in the mouth have distinct properties that promote wound healing.

Dr. Häkkinen's laboratory uses preclinical models to determine if these cells could improve skin healing in other parts of the body, which could ultimately help people who suffer from chronic wounds or scarring, including seniors, people living with diabetes and burn patients.

This research could also have a significant impact in the fight against fibrosis, a process where tissues overgrow because of chronic inflammation, leading to scar tissue that impairs organ function. Fibrosis can occur in any tissue or organ and most commonly affects the lungs, skin, heart and kidneys. It is also a leading cause of death, with recent data suggesting it's responsible for up to 45 per cent of deaths in the developed world.

"A big shift in dental research is that we now rarely study just the mouth," says Dr. Häkkinen. "Instead, we're looking at how what happens in the mouth relates to the entire body. We know there's a connection between general health and oral health and that many diseases are linked through similar mechanisms, like how arthritis, cardiovascular and periodontal diseases are all tied to inflammation. By studying the body as a whole rather than just focusing on the mouth, we can have a greater impact."

Much of Dr. Häkkinen's work involves collaborating with different groups, including dermatologists, plastic surgeons and burn clinics. He has also found great success working with his colleagues in the Faculty of Dentistry. Currently, he is collaborating with Dr. Hannu Larjava to study how integrin proteins might protect against periodontal disease.

"Dr. Larjava and I initially studied integrins from the lens of wound healing but realized they play a role in periodontal disease," says Dr. Häkkinen. "Under Dr. Larjava's leadership, we have a preclinical trial to develop a drug that could target this pathway as a potential treatment for the disease. This is a great example of how basic research can lead to unexpected discoveries."

What platelets can teach us about oral diseases

For Dr. Hugh Kim, having a career in research wasn't something he had anticipated—he always planned on being a dentist. After finishing dental school, he enrolled in UBC Dentistry's MSc in Craniofacial Science program to specialize in periodontics. Dr. Kim joined UBC Professor Emeritus and prolific researcher Dr. Donald Brunette's laboratory, which sparked his interest in fundamental research.

He decided to carry on with a PhD at the University of Toronto, followed by a postdoctoral research fellowship at Harvard University, where he studied platelets, which formed the basis of his current research.

"I fell in love with basic research because you get to probe at questions in a lot of detail," says Dr. Kim. "It's looking at something in a pin-pointed way that helps you get to the crux of how things work."

Dr. Kim's laboratory focuses on the biochemistry of platelets—cells found in the blood that form clots to stop bleeding and help wounds heal. These small cells also play a key role in inflammation.

The Kim lab is looking to better understand how biochemical signals are interpreted by the platelet's structural framework—also known as the cytoskeleton—and how these signals can affect platelet function. The team is especially interested in tiny particles within platelets called granules. In response to a cut, platelets change shape, and the molecules stored in the granules are released into the bloodstream. Understanding how these granules are secreted will help researchers develop new therapies for bleeding disorders, as well as other medical conditions including heart attacks and strokes that result from unwanted blood clots.

This research is also highly relevant for inflammatory diseases such as arthritis and periodontitis.

"Periodontitis evolves through chronic inflammation, so by studying platelets, we can hopefully find better targets to treat this disease and move away from gum surgery and other invasive mechanical treatments," says Dr. Kim. "My team is also looking at how platelets interact with other cells so we can fully understand diseases like periodontitis."

Dr. Hugh Kim

The Faculty has long-standing research excellence in biomaterials, which falls under this research theme. Dr. Adriana Manso leads the UBC Advancing Multifunctional Dental Biomaterials (AMDB) Research Excellence Cluster, which includes Drs. Ricardo Carvalho, Ya Shen and Leeann Donnelly along with other UBC researchers. The AMDB cluster has engaged over 100 principal investigators worldwide to prevent, mitigate and repair the effects of highly prevalent oral diseases by developing and enhancing dental biomaterials while addressing oral health inequity and accessibility.

Also under this theme is Dr. Ya Shen, who is a leader in UBC's endodontics research. Her laboratory has a long history of researching endodontic instruments, oral biofilms and root canal disinfection.

RESEARCH FELLOW SPOTLIGHT

Dr. Yasin Tabatabaei

Postdoctoral research fellow Dr. Yasin Tabatabaei is studying mechanisms of autoimmune diseases in Dr. Dieter Brömme's lab.

Tell us a bit about what led you to a career in research.

After completing my undergraduate degree in pharmacy, I became interested in drug discovery, chemistry and molecular mechanisms of disease.

I moved to the United Kingdom to pursue an MSc in analytical chemistry and a PhD in organic chemistry at the University of Manchester. My PhD aimed to determine new avenues of drug discovery using enzymes. I then went to the University of Alberta, working closely with a pharmaceutical company to develop and synthesize new antibiotics to fight superbugs. We successfully synthesized several antibiotic drug candidates as part of that project before I moved to UBC in 2021 to work on an exciting project at the interface of immunology and biochemistry in Dr. Brömme's laboratory.

What is the focus of your postdoctoral research?

I study the molecular mechanisms behind autoimmune diseases. These diseases arise when the immune system mistakenly targets the body's own cells. One promising area of research is looking at the role of proteases, such as cathepsins, in this process.

Cathepsins are crucial players in the immune response. When a foreign substance enters the body, cathepsins and other proteases break it down into smaller fragments known as antigens. The immune system then recognizes these antigens, which produce antibodies to combat the perceived threat.

We hypothesize that cathepsins might also generate new antigens that could mistakenly trigger an autoimmune response. By studying how cathepsins function and interact with other proteins, we hope to discover whether they contribute to the misidentification of self versus non-self. This will shed light on the molecular origins of autoimmune diseases.

Why is this work important?

The goal is to develop safer and more efficient therapeutics and diagnostic tools against autoimmune disorders. To do this, we first need to understand the mechanism behind what causes these disorders.

Why did you decide to come to UBC Dentistry?

My PhD research focused on an enzyme in the cathepsin family. Given Dr. Brömme's expertise in the role of cathepsins in human health and disease, joining his team was a natural fit. This project also provided the perfect opportunity to merge my passion for understanding the fundamental mechanisms of diseases with my background in organic chemistry.

Where do you hope your postdoctoral research leads you?

My goal is to continue my research and eventually open my own laboratory. I am interested in working at the intersection of immunology and chemistry. I hope to develop new diagnostic tools and therapeutics for immunotherapy, a field I find particularly exciting and challenging, but that has received little attention in drug discovery.

A Message to Our Alumni Community

Over the past year, we've recognized six decades of the UBC Faculty of Dentistry, which has given us a special opportunity to reflect on the past and look to our future.

We now have over 3,700 members in our UBC Dentistry alumni family who span the globe. As part of our 60th anniversary celebrations, we featured stories from many alumni who have shared their inspirational and heartfelt journeys—a testament to the profession and the lifelong connection shared between classmates and colleagues. Thank you to everyone who has participated. We are excited to continue this initiative and want to hear from you! Please reach out to communications@dentistry.ubc.ca if you would like to share your story with us.

This past year, we also had the opportunity to reflect on the incredible impact our donor community continues to have with the celebration of a new lifetime donor recognition installation unveiled in the patient reception area of the clinic.

The installation allowed us to reach out to each donor who has generously supported the Faculty with a major gift and to pose the fundamental question of why they support UBC Dentistry. The response from our alumni, friends of the Faculty and corporate partners was overwhelming. A shared passion for helping students, research and community outreach were collective themes amongst responses along with the desire to make a difference—thank you!

As we close out the year, the new UBC Faculty of Dentistry 60th Anniversary Student Wellness Fund has brought the importance of students' physical, emotional and mental health to the forefront. This initiative will not only provide financial resources to support our students but will also open a meaningful dialogue around the real-time issues that our students face every day. This fund will be a continued focus for the Faculty and the student-led committee, who are eagerly developing a strategic plan of action to maximize impact.

New research discoveries at UBC Dentistry can improve quality of care and patient outcomes and impact all of us. We're so proud of the incredible work taking place! As you read this magazine, I encourage you to realize your impact and influence within the Faculty and the broader dental community. You are fundamental to our ongoing success as mentors, educators, alumni, donors, advocates and supporters.

Thank you for being part of our story.

JANE MERLING
Assistant Dean, Development, Alumni & Communications

We greatly value the investment of our Alumni Partners and encourage you to reach out to them for their expertise!

ADVICE. INSURANCE. INVESTMENTS. CDSPI
Dentsply Sirona
HEAPS & DOYLE
MADAISKY POLLOCK
MNP ACCOUNTING CONSULTING TAX
PROTEC dental
Scotiabank. Healthcare+
Sinclair Dental / Dentaire™

Putting student wellbeing first

Between studying, practicing in the clinic, working and family commitments, dental students sometimes forget to take care of themselves. That's why, as part of the Faculty's 60th anniversary celebrations, we established a student wellness fund available to all UBC Dentistry students.

The UBC Faculty of Dentistry 60th Anniversary Student Wellness Fund is managed by the Faculty's embedded counsellor and guided by an advisory group of students, faculty and staff. The group is developing a framework for guidance on how to best use the fund, so that it has the most sustainable impact.

Two incredible partners, Madaisky Pollock LLP and Broadreach Strategic Planning Inc., have generously donated $50,000 in match funding to support students. This means any gift received by the end of the year will have double the impact—one act of kindness helps even more students!

Encouraging students to prioritize their wellbeing will help them not only today, but into their future as the next generation of oral healthcare professionals. Please consider making a gift.

Solving Mysteries: How Dr. Kevin Ko is Making a Difference in Cancer Care

After graduating from UBC Dentistry, Kevin Ko, DMD 2011, continued his education. He completed his doctor of medicine degree with two residencies, one in oral and maxillofacial pathology and a second in anatomic pathology, followed by a fellowship in dermatopathology. Today, Dr. Ko works as a pathologist at the BC Cancer Agency.

Why did you become an oral pathologist?

The first two years of my DMD degree were with medicine students, which I really enjoyed, so early on, I thought about a career that intersected dentistry and medicine. In my fourth year, I spent time in UBC Dentistry Professor Dr. Catherine Poh's lab, which sparked my interest in research and cancer, so specializing in oral pathology felt like an ideal fit.

What does your day-to-day look like?

I receive biopsies from dentists across the province and review them under a microscope. I specialize in the oral cavity and skin, so the first question I'm trying to answer is whether the biopsy is cancer, precancer (also known as dysplasia) or neither.

Is it challenging to diagnose dysplasia?

Yes! It can be very hard to diagnose, which is why I started doing research. The P53 gene is a tumour suppressor, so our team of oral pathologists added a P53 stain to our biopsy analysis. If a dysplasia biopsy has a P53 mutation, there's a good chance it will develop into cancer, regardless of what the cells look like under the microscope.

We added this stain in 2022 and have been collecting data to determine its effectiveness at diagnosing dysplasia that's high-risk of becoming cancer. So far, the results look promising, and we've published a few papers on this, so we'll continue collecting data for the next several years.

What inspired you to do this research?

I have an obligation to patients. In school, if you get 90 per cent on a test, that's considered amazing. But in oral pathology, if I'm only getting 90 per cent of my diagnoses correct, many people will suffer from my mistakes. A test like P53 will help me do my job and improve patient diagnosis and care.

I currently have a few more P53 research projects on the go. We've also noticed that some oral lesions become cancer despite not having a P53 mutation, which means other gene mutations are involved, so we've started asking research questions about that too.

What do you enjoy most about being an oral pathologist?

Oral pathologists have a direct impact on patient care. The report from a pathologist is considered a final diagnosis, so in many ways, my work dictates patient treatment.

I also love that my job is like solving mysteries—most of what I do isn't textbook, it's problem-solving. One time, there was a young patient whose teeth kept falling out. He saw multiple specialists, and the biopsy was non-conclusive. One evening, I was eating Cheetos, and the orange colouring made me think of vitamin C. I called the patient's physician and told him to run a test for vitamin C deficiency, and it turned out the patient had scurvy, causing his teeth to fall out. It took me six months to figure that out. I have a pile of cases deemed medical mysteries, but I'm optimistic I'll solve them one day!

Do you have a favourite memory of your time spent at UBC Dentistry?

The day I passed my complex amalgam restoration. I think most DMD students would agree it's one of the hardest restorations, and I was so happy to pass it!

What are you looking forward to in the future?

I hope to make dysplasia grading—determining how likely it is that dysplasia will develop into cancer—and cancer diagnosis better. Oral pathology isn't a common career path, so it would be ideal if grading and diagnosing oral lesions were easy for all pathologists. I hope that some of the research I'm doing will help with this.

Your Generosity in Action

Annual support from alumni, friends, foundations and corporate partners is vital to the success of UBC Dentistry. Your contribution directly supports exceptional education, research and service to our community—thank you!

In 2023-24, your giving had a significant impact in five key areas.

Equipment and Supplies

Having top-grade equipment and clinical supplies ensures UBC Dentistry offers the best possible learning and teaching environment for students and clinical educators.

Community

UBC Dentistry extends beyond the classroom and laboratory in support of underserved populations through outreach and community development efforts.

Research

We foster visionary research that advances knowledge and translates discoveries to improve the oral health and well-being of individuals and communities.

Capital Projects

Capital projects are critical to UBC Dentistry's success and allow for new and innovative state-of-the-art educational learning environments.

Student Awards and Bursaries

Awards provide the opportunity to recognize outstanding academic achievement and student leadership, while bursaries offer financial assistance to those in need.

UBC Dentistry Research Fund

We hope this issue of *Impressions* magazine has provided an opportunity for you to recognize and appreciate the incredible research taking place at UBC Dentistry! When you give to the Dentistry Research Fund, you directly support ground-breaking research that drives dental innovation forward. Please consider a gift to the Dentistry Research Fund today!

Dentistry by the Numbers

Students *(current enrollment)*

252
Doctor of Dental Medicine

93
Dental Hygiene (entry to practice)

77
Dental Hygiene (degree completion)

83
Graduate Programs

11
Postgraduate Dental Residents

Faculty and Staff

94
Full-time Faculty

493
Part-time Clinical Faculty

111
Clinic and Administrative Staff

Alumni

2,348
DMD

1,039
Dental Hygiene

342
Graduate Programs

Lifelong learning at UBC

As dental professionals, staying current on the latest advancements and best practices is essential. UBC Continuing Dental Education offers excellent evidence-based programs to expand and enrich your knowledge and skills. Choose from a variety of learning opportunities, including hands-on programs, study clubs, online courses and the much-loved "Travel and Learn" programs in Hawaii and Whistler. Visit **dentistry.ubc.ca/cde**

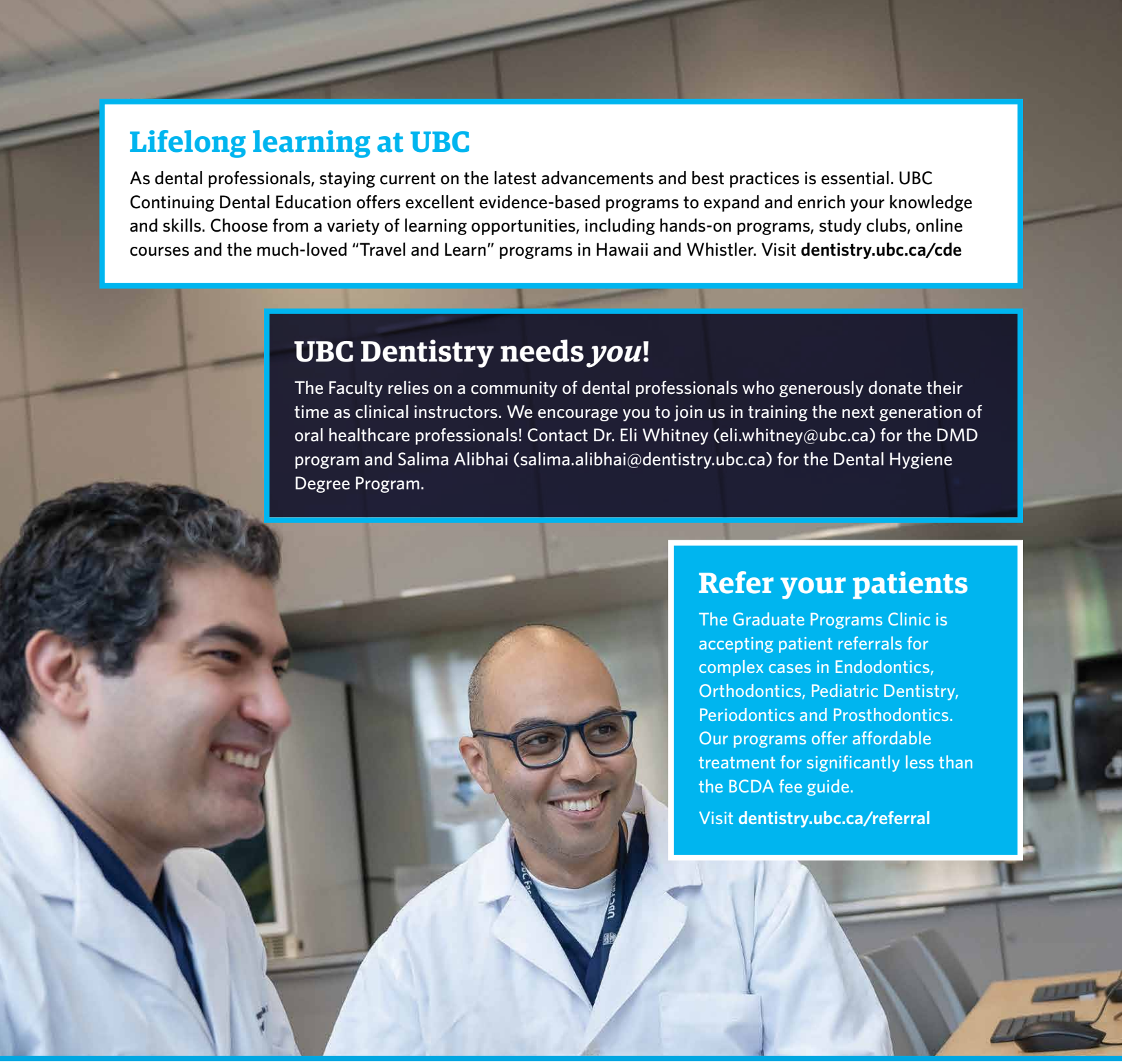
UBC Dentistry needs *you*!

The Faculty relies on a community of dental professionals who generously donate their time as clinical instructors. We encourage you to join us in training the next generation of oral healthcare professionals! Contact Dr. Eli Whitney (eli.whitney@ubc.ca) for the DMD program and Salima Alibhai (salima.alibhai@dentistry.ubc.ca) for the Dental Hygiene Degree Program.

Refer your patients

The Graduate Programs Clinic is accepting patient referrals for complex cases in Endodontics, Orthodontics, Pediatric Dentistry, Periodontics and Prosthodontics. Our programs offer affordable treatment for significantly less than the BCDA fee guide.

Visit **dentistry.ubc.ca/referral**



UPDATE YOUR ADDRESS

Stay informed about upcoming alumni events, the latest news, and exclusive offers.

Scan the code or email **alumni@dentistry.ubc.ca**