10-17-2022

Insight - Fall 2022

Dugoni School of Dentistry

UNIVERSITY OF THE PACIFIC
Arthur A. Dugoni School of Dentistry

insight

Autumn 2022 Research and Scholarship

Welcome to the autumn 2022 issue of *Insight*, a newsletter celebrating the accomplishments of our community of scholars. We aim to spotlight insights from people at the Dugoni School working in all areas of scholarship, including clinical or biomedical research, the scholarship of teaching and learning, improvement of the health care system, and professional partnerships that advance the field.

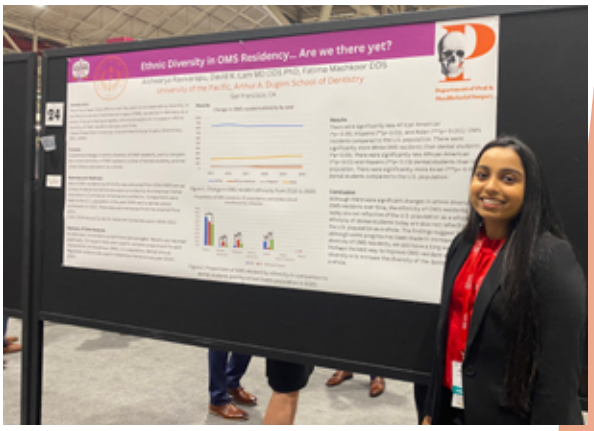
Research Symposium (AADOCR San Francisco Chapter)

November 3, 2022 | 5:30 pm – 9:00 pm | Dorfman Hall

Students, residents, and postdocs from the Arthur A. Dugoni School of Dentistry, UCSF School of Dentistry and Stanford will present their research posters to attendees and judges. Many prizes will be available to presenters, and this event will be a great opportunity to network, exchange ideas, and potentially collaborate. For more information, please email aadocrsymposium@pacific.edu.

Student Wins AAOMS Best Poster Award

The American Association of Oral and Maxillofacial Surgeons (AAOMS) 104th Annual Meeting, Scientific Sessions and Exhibition — the largest gathering of oral and maxillofacial surgeons in the country — was held September 12-17, 2022 in person in New Orleans as well as online. Our very own Aishwarya (Aishu) Ravivarapu, B.S., Doctor of Dental Surgery Candidate (D1), was invited to represent the Dugoni School of Dentistry — and was awarded an AAOMS Best Poster Award for her poster "Ethnic Diversity in OMS Residency… Are We There Yet?" She also presented "Global Interest in Various Obstructive Sleep Apnea Surgical Treatments: A Google Trends Analysis." Congratulations to Student Doctor Aishu Ravivarapu as well as to her research mentor Dr. Fatima Mashkoor!



Research in the Spotlight

CBCT Patterns of Bone Loss and Clinical Predictors for the Diagnosis of Cracked Teeth and Teeth with Vertical Root Fracture

What is it?

"This study aimed to identify clinical and radiographic characteristics of teeth with longitudinal fractures to assist in the diagnosis and differentiation between cracked teeth and teeth with vertical root fracture (VRF)." "The aim of this study was to correlate and compare the location and position of longitudinal fractures associated with cracked teeth and teeth with VRF to the preoperative clinical and radiographic findings using cone-beam computed tomography (CBCT) imaging."

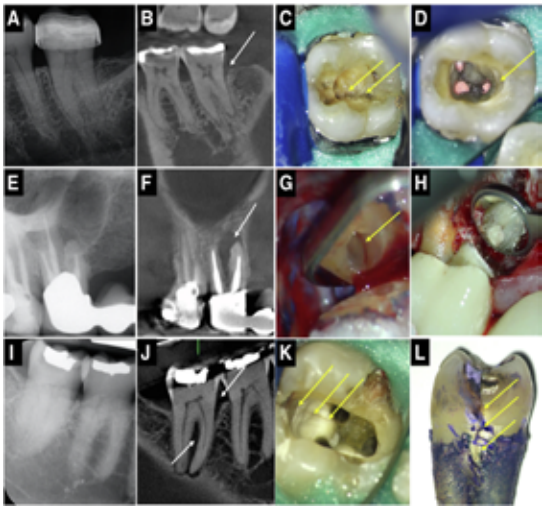


Figure 1. Radiographic presentation of teeth with clinical evidence of longitudinal fractures. (A–D) An angular defect associated with a cracked tooth. (E–H) A J-shaped lesion associated with VRF. (I–L) A combined lesion associated with a cracked tooth.

What problem does it aim to solve?

Not all tooth cracks are the same and they can't all be treated in the same way. However, traditional radiography doesn't always get the full picture. "Cracked teeth are challenging to diagnose because of the difficulty in identifying the location, direction, and extension of the crack line before and during the clinical treatment."

How does it work?

"This evaluation was performed on a subset of the patients diagnosed with cracked teeth or VRF for whom full clinical and radiographic data were present…The radiographic assessment of teeth included PA radiographs and CBCT images. Two independent examiners (a board-certified endodontist and a senior endodontic resident) analyzed the PA radiographs and CBCT Digital Imaging and Communications in Medicine (DICOM) files... PA radiographs showed evidence of bone loss suggestive of a longitudinal fracture in only 9 of 54 cases (16.6%), whereas CBCT imaging showed the same findings in 40 of 54 cases (72%). Of 41 cracked teeth, angular defects were only observed in 4 teeth (9%) using PA radiographs compared with 19 teeth (46%) using CBCT scans. Same findings were also noted among teeth with VRF. Of 13 teeth with VRF, J-shaped and combined defects were observed in 4 teeth using PA radiographs (30%) compared with 12 teeth using CBCT imaging (92%). CBCT imaging had 4.4 times the odds of detecting evidence of bony changes associated with cracks and VRF compared with PA radiographs (odds ratio = 14.3; 95% confidence interval, 36.5–5.58). CBCT scans also showed 100% positive prediction of the root with longitudinal fracture in cases with a J-shaped defect or a combined/irregular bone loss pattern (21/21 teeth) and 84% in cases with angular defects (16/19 teeth)."

What are the real-world implications?

"Within the limitations of this study, we can conclude that CBCT imaging can assist in the preclinical diagnosis of cracked teeth and VRFs through careful observation of the patterns of bone loss. The presence of an angular defect on the preoperative CBCT scan can be a pretreatment predictor for the presence of a crack limited to the crown. However, clinicians should attempt to confirm these findings through visualization of these crack lines under high magnification."

What are the next steps?

"Further clinical studies using CBCT imaging and correlating clinical with radiographic findings should be conducted to further confirm these results."

Source
"CBCT Patterns of Bone Loss and Clinical Predictors for the Diagnosis of Cracked Teeth and Teeth with Vertical Root Fracture", *Journal of Endodontics*, Volume 48, Issue 9, September 2022, Pages 1100-1106, is.gd/ozujed

Authors
Ibrahim Alaugaily BDS, Division of Endodontics, University at Buffalo, School of Dental Medicine, Buffalo, New York, Department of Restorative Dental Sciences, College of Dentistry, King Saud University, Riyadh, Saudi Arabia
Adham A. Azim BDS, Division of Endodontics, University at Buffalo, School of Dental Medicine, Buffalo, New York, Department of Restorative Dental Sciences, College of Dentistry, King Saud University, Riyadh, Saudi Arabia, Department of Endodontics, University of the Pacific, Arthur A. Dugoni School of Dentistry, San Francisco, California

Scoping review of artificial intelligence and immersive digital tools in dental education

Application of augmented reality (AR) in dental plaque detection, helping the dentist distinguish between tartar and the tooth surface. Using a Piezo Scaler, the dentist removes tartar and plaque from the patient's enamel surface. The computer informs the dentist of a critical error when the instrument scrapes beyond the plaque areas

What is it?
Artificial intelligence (AI) and virtual reality are two exciting technologies with many current and potential uses; one of them being dental education.

What problem does it aim to solve?
There is a lack of information about how these new technologies can be used in dental education and how well it works.

How does it work?
Researchers conducted a literature review. Out of 2,377 initial articles retrieved, only 31 turned out to meet the criteria.

What are the real-world implications?
It appears that AI is not being taught or implemented widely in dental schools, although students express interest in learning. Virtual reality (VR), on the other hand is being used more widely in courses on anatomy,

implantology, restoration, surgery and more. Some of the literature suggests that VR is enhancing the student learning experience and boosting confidence and understanding, but there are still unknowns and challenges. "Conclusion: To our knowledge, there are very few comprehensive literature reviews identifying the applications and efficacy of virtual and AI-driven tools in dental education. With limited verifiable evidence, an improved understanding of virtual and AI domains is needed to enable dental students to adapt to changes within and beyond their dental training education."

What are the next steps?
"To increase the scientific value of digital-related research, the scientific community must quickly define guidelines to enhance methodological approaches in order to effectively digitalize dentistry."

Source
"Scoping review of artificial intelligence and immersive digital tools in dental education", *Journal of Dental Education*, Volume 86, Issue 6, Pages 736 – 750, June 2022, is.gd/oyumos

Authors
Mohammad Ali Saghiri BS, MS, DEng, PhD | Biomaterial and Prosthodontic Laboratory, Department of Restorative Dentistry, Rutgers School of Dental Medicine; Department of Endodontics, University of the Pacific, Arthur A. Dugoni School of Dentistry

Julia Vakhnovetsky BS | Biomaterial and Prosthodontic Laboratory, Department of Restorative Dentistry, Rutgers School of Dental Medicine; Sector of Angiogenesis Regenerative Medicine, Dr. Hajar Afsar Lajevardi Research Cluster (DHAL)

Nader Nadershahi DDS, MBA, EdD | University of the Pacific, Arthur A. Dugoni School of Dentistry

Faculty diversity, equity, and inclusion in academic dentistry: Has dental education missed the call of #MeToo?

What is it?
A discussion of sexism and harassment in dental academia, its negative impact, and the steps that could be taken to address the problem.

What problem does it aim to solve?
Sexism and harassment create a hostile environment for women in dental schools, whether as students, faculty, or staff. Unfortunately, dental schools do not have a consistent approach to addressing the problem, and targets of this behavior often don't report for fear of negative consequences, or when they do attempt to report, are met with minimizing responses or dismissal of their experiences.

How does it work?
"Four true anecdotes with identifying details removed are presented and analyzed, followed by strategies and recommendations for dental institutions to put into use."

What are the real-world implications?
"Leaders of dental institutions may not be aware that seemingly benign comments and behaviors contribute to normalizing sexual discrimination and abuse. Some are taking steps to combat the decades of injustice, others are contributing to unhealthy culture, and some deny the existence of cultural problems at their institutions. Because of this, it will take an external force to exert authority over dental institutions to go beyond policies, mandatory training, and climate surveys."

What are the next steps?
"To enact a series of reforms at all levels, from individual departments to organized dentistry, "the latter two aspects of the quality assurance standard are what must be incorporated into the standard on a humanistic environment to assure that dental institutions are held accountable for taking action based on the results of climate surveys. In addition, CODA standards for advanced education programs currently do not include language about creating, maintaining, or evaluating their programs for a humanistic culture. This must be changed."

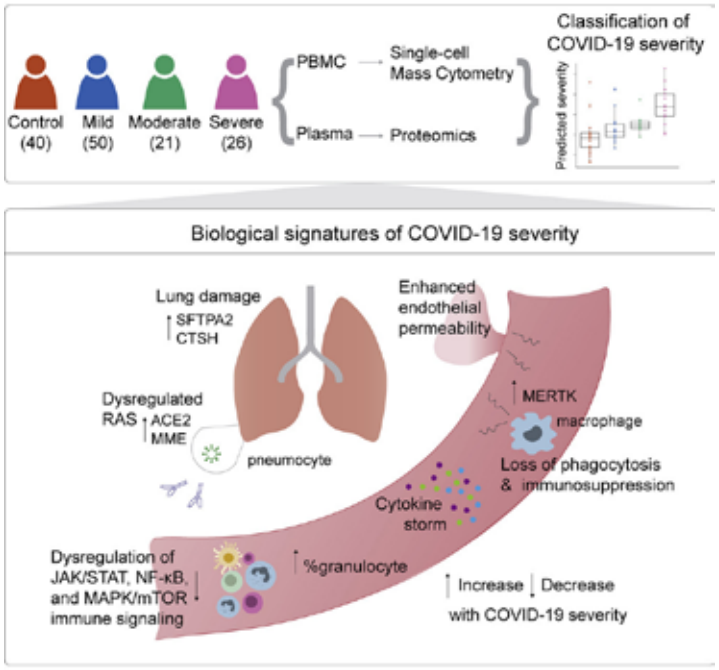
Source
"Faculty diversity, equity, and inclusion in academic dentistry: Has dental education missed the call of #MeToo?", *Journal of Dental Education*, Volume 86, Issue 9, September 2022, Pages 1174-1181, is.gd/wotane

Authors
Pamela Zarkowski JD, MPH, University of Detroit Mercy, Detroit
Michelle Brady BDS, University of the Pacific, Arthur A. Dugoni School of Dentistry,
Sophia G. Saeed DMD, MBA, University of Connecticut School of Dental Medicine, Farmington

Integrated plasma proteomic and single-cell immune signaling network signatures demarcate mild, moderate, and severe COVID-19

What is it?
An investigation to find the immune "signatures" that distinguish different severity levels of COVID-19 illness.

What problem does it aim to solve?
"The immunological mechanisms that differentiate patients with mild, moderate, and severe COVID-19



are poorly understood. Unraveling the underlying immune pathogenesis across the spectrum of COVID-19 presentations is important to both understand the drivers of disease severity as well as to identify clinically relevant biological signatures that could inform therapeutic interventions."

How does it work?
Samples from 97 people who had tested positive for COVID-19 (but hadn't yet received treatment at the time blood was drawn) were compared to each other and to samples drawn before the pandemic from 40 healthy people. "In this cross-sectional study, we combined the mass cytometry analysis of immune cell signaling responses with the high-content proteomic analysis of plasma analytes in blood samples from patients identified with mild, moderate, and severe COVID-19 to establish biological signatures that demarcate COVID-19 clinical manifestations."

What are the real-world implications?
"Two major biological signatures associated with the progression from mild to moderate and severe disease emerged from our integrated analysis: (1) the dampening of NF-κB, MAPK/mTOR, and JAK/STAT intracellular signaling responses in multiple innate and adaptive immune cell subsets, and (2) the mobilization of a proteomic network enriched for elements of the RAS, lung homeostasis, and hemostasis pathways, alongside canonical elements of the cytokine storm signature of severe COVID-19."

What are the next steps?
"The observations identified by this model contribute clinically relevant insights into the status of patient's immune responses during SARS-CoV-2 infection and provide promising severity-specific biological signatures for future validation that may inform decision-making on potential therapeutic targets for the prevention of disease progression."

Source
"Integrated plasma proteomic and single-cell immune signaling network signatures demarcate mild, moderate, and severe COVID-19", *Cell Reports Medicine*, Volume 3, Issue 7, 19 July 2022, 100680, is.gd/ikipud

Authors
Feyaerts, Dorien | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

Hédou, Julien | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

Gillard, Joshua | Section Pediatric Infectious Diseases, Laboratory of Medical Immunology, Radboud Institute for Molecular Life Sciences; Radboud Center for Infectious Diseases, Radboud University Medical Center; Center for Molecular and Biomolecular Informatics, Radboud University Medical Center, Nijmegen, Netherlands

Chen, Han | Department of Microbiology and Immunology, Stanford University School of Medicine

Tsai, Eileen S. | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

Peterson, Laura S. | Division of Neonatal and Developmental Medicine, Department of Pediatrics, Stanford University School of Medicine

Ando, Kazuo | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

Manohar, Monali | Sean N Parker Center for Allergy and Asthma Research, Stanford University

Department of Medicine, Stanford University

Do, Evan | Sean N Parker Center for Allergy and Asthma Research, Stanford University

Department of Medicine, Stanford University
Dhondalay, Gopal K.R. | Sean N Parker Center for Allergy and Asthma Research, Stanford University
Department of Medicine, Stanford University
Fitzpatrick, Jessica | Sean N Parker Center for Allergy and Asthma Research, Stanford University; Department of Medicine, Stanford University
Artandi, Maja | Department of Primary Care and Population Health, Stanford University School of Medicine
Chang, Iris | Sean N Parker Center for Allergy and Asthma Research, Stanford University
Department of Medicine, Stanford University
Snow, Theo T.| Sean N Parker Center for Allergy and Asthma Research, Stanford University
Department of Medicine, Stanford University
Chinthrajah, R. Sharon | Sean N Parker Center for Allergy and Asthma Research, Stanford University
Department of Medicine, Stanford University; Division of Allergy, Immunology and Rheumatology, Department of Pediatrics, Stanford University; Division of Infectious Diseases and Geographic Medicine, Department of Medicine, Stanford University School of Medicine
Warren, Christopher M. |Sean N Parker Center for Allergy and Asthma Research, Stanford University
Department of Medicine, Stanford University
Wittman, Richard |Department of Primary Care and Population Health, Stanford University School of Medicine
Meyerowitz, Justin G. |Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Ganio, Edward A. | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Stelzer, Ina A. | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Han, Xiaoyuan | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Department of Biomedical Sciences, University of the Pacific, Arthur A. Dugoni School of Dentistry, San Francisco, CA, United States
Verdonk, Franck | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Gaudillière, Dyani K | Division of Plastic & Reconstructive Surgery, Department of Surgery, Stanford University School of Medicine
Mukherjee, Nilanjan | Department of Microbiology and Immunology, Stanford University School of Medicine
Tsai, Amy S. | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Rumer, Kristen K. | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Jacobsen, Danielle R. | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Bjornson-Hooper, Zachary B. | Department of Microbiology and Immunology, Stanford University School of Medicine
Jiang, Sizun | Department of Microbiology and Immunology, Stanford University School of Medicine
Saavedra, Sergio Fragoso | Departamento de Neurología, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico City, Mexico

Plan de Estudios Combinados en Medicina (MD/PhD Program), Facultad de Medicina, Universidad Nacional Autónoma de México, Mexico City, Mexico

Valdés Ferrer, Sergio Iván | Departamento de Neurología, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico City, Mexico

Kelly, J. Daniel | Department of Epidemiology and Biostatistics, UCSF, San Francisco, CA, United States

Institute for Global Health Sciences, UCSF, San Francisco, CA, United States

F.I. Proctor Foundation, UCSF, San Francisco, CA, United States

Furman, David | Buck Artificial Intelligence Platform, Buck Institute for Research on Aging, Novato, CA, United States

Stanford 1000 Immunomes Project, Stanford University School of Medicine

Austral Institute for Applied Artificial Intelligence, Institute for Research in Translational Medicine (IIMT), Universidad Austral, CONICET, Pilar, Buenos Aires, Argentina

Aghaeepour, Nima | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine; Division of Neonatal and Developmental Medicine, Department of Pediatrics, Stanford University School of Medicine; Department of Biomedical Data Science, Stanford University School of Medicine

Angst, Martin S. |Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

Boyd, Scott D. | Sean N Parker Center for Allergy and Asthma Research, Stanford University

Department of Medicine, Stanford University; Department of Pathology, Stanford University School of Medicine

Pinsky, Benjamin A. | Department of Pathology, Stanford University School of Medicine; Division of Infectious Diseases and Geographic Medicine, Department of Medicine, Stanford University School of Medicine

Nolan, Garry P. | Department of Pathology, Stanford University School of Medicine

Nadeau, Kari C. | Sean N Parker Center for Allergy and Asthma Research, Stanford University

Department of Medicine, Stanford University; Division of Allergy, Immunology and Rheumatology, Department of Pediatrics, Stanford University; Department of Medicine, Division of Pulmonary, Allergy and Critical Care Medicine, Stanford University

Gaudillière, Brice | Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine; Department of Pediatrics, Stanford University

McIlwain, David R. | Department of Microbiology and Immunology, Stanford University School of Medicine

Recent Publications

Congratulations to Dugoni School faculty, staff, student and resident researchers involved in the following research publications in the last few months.

Saghiri, M.A., Freag, P., Nath, D., Morgano, S.M.
The effect of diabetes on the tensile bond strength of a restorative dental composite to dentin
(2022) Odontology, 110 (4), pp. 648-654.
View › | DOI: 10.1007/s10266-022-00697-6

Cain, L., Brady, M., Inglehart, M.R., Istrate, E.C.
Faculty diversity, equity, and inclusion in academic dentistry: Revisiting the past and analyzing the present to create the future
(2022) Journal of Dental Education, 86 (9), pp. 1198-1209.
View › | DOI: 10.1002/jdd.13013

Mays, K.A., Nadershahi, N.A., Quock, R.L.
HURE leadership pathways: A new landscape of value, intentionality, and belief
(2022) Journal of Dental Education, 86 (9), pp. 1210-1213.
View › | DOI: 10.1002/jdd.12961

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Faculty diversity, equity, and inclusion in academic dentistry: Has dental education missed the call of #Me-Too?
(2022) Journal of Dental Education, 86 (9), pp. 1174-1181.
View › | DOI: 10.1002/jdd.13058

Saghiri, M.A., Vakhnovetsky, J., Dadvand, S., Samadi, E., Linfante, J.C., Conte, M.
Impact of deproteinization methods on the physical and mechanical properties of dentin
(2022) Materialia, 25, art. no. 101551.
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Ghowsi, A., Hatcher, D., Suh, H., Wile, D., Castro, W., Krueger, J., Park, J., Oh, H.
Automated landmark identification on cone-beam computed tomography: Accuracy and reliability
(2022) Angle Orthodontist, 92 (5), pp. 642-654.
View › | DOI: 10.2319/122121-928.1

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Knigge, R.P., Hardin, A.M., Middleton, K.M., McNulty, K.P., Oh, H.S., Valiathan, M., Duren, D.L., Sherwood, R.J.
Craniofacial growth and morphology among intersecting clinical categories
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Pal, S., Sheff, S., Al-Kuhlani, M., Ojcius, D.M., De La Maza, L.M.
Role of TRAIL-R in Primary and Secondary Genital and Respiratory Chlamydia muridarum Infections in Mice
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Policies Supporting Oral Health in Ageing Populations Are Needed Worldwide
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Dolatabadi, N., Boyd, R.L., Oh, H.
Comparison between a human judge and automatic landmark identification on digital models
(2022) American Journal of Orthodontics and Dentofacial Orthopedics, 162 (2), pp. 257-263.
View › | DOI: 10.1016/j.ajodo.2021.08.020

Bosaid, F., Aksel, H., Azim, A.A.
Influence of acidic pH on antimicrobial activity of different calcium silicate based–endodontic sealers
(2022) Clinical Oral Investigations, 26 (8), pp. 5369-5376.
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(2022) Molecules, 27 (13), art. no. 4174.
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Contact *Insight*

Have a suggestion for the next issue of Insight? Contact Dr. David Ojcius, Assistant Dean for Research and CoChair of the Department of Biomedical Sciences, for editorial suggestions or to learn more about how to get involved in research at the Dugoni School. Email: DugoniPubs@pacific.edu