Insight - Spring 2021

Dugoni School of Dentistry

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Welcome to the spring 2021 issue of *Insight*, a quarterly 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.

**Pandemic Creates New Research Opportunities**

Restrictions related to the pandemic prevented the Dugoni School from conducting many of its scheduled research projects in 2020, however the school has started new research projects directly related to COVID-19.

- Despite guidelines from government agencies on safe practices in dental clinics, there is little information on production of aerosols under different conditions. Drs. Shika Gupta and Nilou Nadershahi, collaborating with Fatemeh Khatami of Pacific’s Bioengineering Department, have started a project to measure aerosol production under dental procedures such as crown prep and cavitron, using a handheld spectrometer that measures particles up to 10 µm in size.
• Several projects have started to measure the prevalence of SARS-CoV-2 coronavirus in different populations and effect of the pandemic on our patients. Dr. Michelle Brady and Ms. Eve Cuny, using data from the weekly PCR tests of staff, faculty, and students in the building, have joined UCSF to survey the prevalence of coronavirus in the city. Dr. Eric Salmon will use data from the rapid antigen test in the dental clinic to correlate the prevalence of coronavirus in our patients with lifestyle and variables such as use of public transportation. He would also like to determine whether the vaccination status of our patients will change their behavior. Drs. Brady and Dave Chambers have also conducted a patient survey on the perception of dental visit safety.

• Wastewater has been used in the past by universities and wastewater treatment facilities to test for the presence of pathogens such as enteroviruses. Dr. Der Thor and David Vang, collaborating with Dr. Mary Kay Camarillo of Pacific’s Environmental Engineering department, are testing wastewater in the San Francisco campus building for the presence of coronavirus. Water samples are collected from two separate sites: a site that contains water from the entire building (including restrooms), and water used only by patients. Results from the wastewater tests will be compared with results from PCR and rapid-antigen testing, to determine if wastewater tests can be used as an early warning system for outbreaks and to detect new coronavirus strains.

• Several universities and pharmaceutical companies are examining whether drugs approved by the FDA for other ailments can be repurposed to also treat COVID-19 or prevent coronavirus infection. Dr. Nejat Duzgunes and Adria Frazier, in collaboration with Utah State University, have found that an anti-inflammatory liposomal formulation inhibits the replication of SARS-CoV-2 in a cell culture system. The 90% inhibitory concentration of the drug was about 10-fold lower than that of the anti-COVID drug, remdesivir, which was previously approved for use in humans. The goal now is to initiate Phase I clinical trials of the formulation.

• It was recently shown that smoking increases susceptibility of lungs to infection with the coronavirus. Dr. Cassio Silva and Harmony Dakafay are studying effects of smoking on the ability of coronavirus to infect oral epithelial cells, and the ability of coronavirus infection to stimulate an inflammatory response from the oral cells. Preliminary results show that oral cells express the same receptor used by coronavirus to infect lung epithelial cells (ACE2), and that smoking enhances the infection of oral cells by the coronavirus. Along similar lines, Dr. Nan (Tori) Xiao and a postdoctoral researcher working in her group, Dr. Leyla Tahmani, will study if smoking changes expression of ACE2 and signaling pathways in dental pulp stem cells. The results so far suggest that smoking is a risk factor for developing COVID-19 via infection of the oral cavity and may reveal potential targets for therapeutic intervention.

If you have questions about research at the Dugoni School, please contact Dr. David Ojcius, assistant dean for research and chair of the Department of Biomedical Sciences at 415.780.2095 or dojcius@pacific.edu.
Noteworthy Publications

Congratulations to Dugoni School faculty, staff, student and resident researchers involved in the following research publications in the last six months as sourced by Scopus, the abstract and citation database of peer-reviewed literature. Visit the abstract links to learn more.

Galicia, J.C., Guzzi, P.H., Giorgi, F.M., Khan, A.A.
Predicting the response of the dental pulp to SARS-CoV2 infection: a transcriptome-wide effect cross-analysis (2020) Genes and Immunity, 21 (5), pp. 360-363.
View ›

Xiao, N.
Is neurotrophic factor a second language that neuron and tooth speak? (2021) Neural Regeneration Research, 16 (9), pp. 1803-1804.
View ›

Morandini, A.C., Asadi, H.
View ›

Bernal, G., Salazar, C., Sadowsky, S.J.
View ›

Banava, S., Jorquera, J., Iyer, P.
View ›

Santucci, N.M., Jellin, J., Davenport, T.E.
View ›

Düzgünüş, N., Sesievmez, M., Yildirim, M.
Bacteriophage therapy of bacterial infections: The rediscovered frontier (2021) Pharmaceuticals, 14 (1), art. no. 34, pp. 1-16.
View ›

Bhula, A., Husain, M., Chandran, R., Ferreira, L.
View ›

Saghiri, M.A., Karamifar, K., Nath, D., Gutmann, J.L., Sheibani, N.
View ›
Factors influencing classification of frequency following responses to speech and music stimuli (2020) Hearing Research, 398, art. no. 108101.
View ›

View ›

Baumgaertel, S., Palomo, J.M., Zaverdinos, M., Elshebiny, T.
View ›

Enhancement of cell proliferation and motility of mammalian cells grown in co-culture with Pichia pastoris expressing recombinant human FGF-2 (2020) Protein Expression and Purification, 176, art. no. 105724.
View ›

Saghiri, M.A., Asatourian, A., Kazerani, H., Gutmann, J.L., Morgano, S.M.
View ›

Noninvasive temporal detection of early retinal vascular changes during diabetes (2020) Scientific Reports, 10 (1), art. no. 17370.
View ›

View ›

View ›
Saghiri, M.A., Karamifar, K., Fakharzadeh, A., Conte, M., Morgano, S.M.


Cummings, S., Chambers, D.W.

Sun, H.-H., Lin, S.-C., Park, C.M., Elo, J.A.

Hasheminasab, M., Sharifi, R., Mortazavi, M., Javani, A.
Self-regeneration of an extensive bony defect following mandibular resection (2020) Clinical Case Reports, 8 (10), pp. 2025-2028.

Fa, B.A., Interrante, M.A., Castagna, D.M.

Photocytotoxicity of liposomal zinc phthalocyanine in oral squamous cell carcinoma and pharyngeal carcinoma cells (2020) Therapeutic Delivery, 11 (9), pp. 547-556.


Arias, A., Macorra, J.C., Govindjee, S., Peters, O.A.
View ›

Saghiri, M.A., Asatourian, A., Morgano, S.M., Wang, S., Sheibani, N.
View ›

Martel, J., Wu, C.-Y., Peng, H.-H., Ko, Y.-F., Yang, H.-C., Young, J.D., Ojcius, D.M.
View ›

Cbl negatively regulates nlrp3 inflammasome activation through glut1-dependent glycolysis inhibition (2020) International Journal of Molecular Sciences, 21 (14), art. no. 5104, pp. 1-16.
View ›

Peters, O.A., Arias, A., Choi, A.
View ›
Research in the Spotlight

*Predicting the response of dental pulp to SARS-CoV-2 infection*

**What is it?**
A study looking at the effects of COVID-19 infection on the dental pulp.

**What problem does it aim to solve?**
Pulpitis is usually thought to be caused by bacteria, but viruses can cause it too. The coronavirus responsible for the current COVID-19 pandemic, SARS-CoV-2, uses a receptor, ACE2, for entry into cells and a serine protease, TMPRSS2, for priming. The researchers hoped to answer two questions: how does the dental pulp respond to SARS-CoV2 infection, and how does ACE2 and TPMRSS2 expression change during SARS-CoV2 infection?

**How does it work?**
The research team was able to build on their previous study on gene expression in inflamed human pulp, which included sequenced data on 53,000 genes. They used this data to explore expression of ACE2 and TPMRSS2 in inflamed and normal human pulp. Then they used the data and methods described in a recent study on known interactions between SARS-CoV-2 and host tissues by other researchers to predict the genes which will be over- or under-expressed in the dental pulp in the presence of SARS-CoV2.

**What are the real-world implications?**
“*The study results suggest that the dental pulp is vulnerable to SARS-CoV-2 infection, and that the predicted underexpression of ACE2 during SARS-CoV-2 infection in the dental pulp may contribute to worse outcomes of pulpitis.*"

**Source**

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