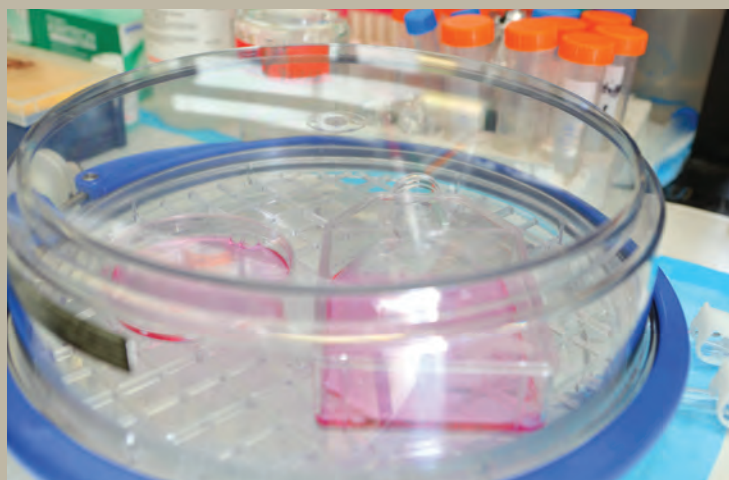


# RESEARCH SPOTLIGHT

## TRANSLATING SCIENCE TO PRACTICE

### Discovery Across Disciplines

The Penn Dental Medicine research enterprise spans scientific disciplines to translate new knowledge into clinical therapies that are expanding our understanding of disease and advancing patient care. In 2020, faculty and research staff throughout the School continued to move research and scholarship forward across their respective fields and beyond. On the pages that follow, we highlight some of these research and scholarly activities for 2020.



# \$16.4M

Awarded  
for research  
in FY20

### Funding by Investigators

Among the Penn Dental Medicine faculty, following are the total funds (direct and indirect) spent by each principal investigator in the 2020 calendar year.

FACULTY/DEPARTMENT	2020 TOTAL
Dr. Kelly Jordan-Sciotto, Basic & Translational Sciences	\$2,502,748
Dr. George Hajishengallis, Basic & Translational Sciences	\$1,633,917
Dr. Henry Daniell, Basic & Translational Sciences	\$1,619,397
Dr. Dana T. Graves, Periodontics	\$1,594,011
Dr. Pat Corby, Oral Medicine	\$1,377,979
Dr. Hyun (Michel) Koo, Orthodontics/COH/Pediatrics	\$975,530
Dr. Claire H. Mitchell, Basic & Translational Sciences	\$942,484
Dr. Hydar Ali, Basic & Translational Sciences	\$886,690
Dr. Esra Sahingur, Periodontics	\$817,911
Dr. Thomas Sollecito, Oral Medicine	\$733,044
Dr. Kathleen Boesze-Battaglia, Basic & Translational Sciences	\$592,433
Dr. Bruce J. Shenker, Basic & Translational Sciences	\$585,359
Dr. Gary H. Cohen, Basic & Translational Sciences	\$576,839
Dr. Joan Gluch, Community Oral Health	\$379,679
Dr. Chider Chen, Oral & Maxillofacial Surgery	\$369,428
Dr. Temitope Omolehinwa, Oral Medicine	\$365,985
Dr. Geelsu Hwang, Preventive & Restorative Sciences	\$332,698
Dr. Yan Yuan, Basic & Translational Sciences	\$281,578
Dr. Yu Zhang, Preventive & Restorative Sciences	\$207,885
Dr. Shuying (Sherri) Yang, Basic & Translational Sciences	\$177,821
Dr. Flavia Teles, Basic & Translational Sciences	\$137,169
Dr. Anh Le, Oral & Maxillofacial Surgery	\$118,980
Dr. David Hershkowitz, Preventive & Restorative Sciences	\$97,796
Dr. Robert P. Ricciardi, Basic & Translational Sciences	\$92,255
Dr. Kang Ko, Periodontics	\$84,605
Dr. Nataliya Balashova, Basic & Translational Sciences	\$49,398
Dr. Mark S. Wolff, Preventive & Restorative Sciences	\$40,061

## Scholarly Impact

The impact of faculty publications measured by the h index\* is presented for a selection of faculty within both the clinical departments and the Department of Basic & Translational Sciences for the past five years. Career h-indexes are also included.

### CLINICAL DEPARTMENTS

FACULTY	SCOPUS H-INDEX	
	LIFETIME	5-YEAR
Dr. Hyun (Michel) Koo, Orthodontics/COH/Pediatrics	54	29
Dr. Yu Zhang, Preventive & Restorative Sciences	41	22
Dr. Dana Graves, Periodontics	67	20
Dr. Chider Chen, Oral Surgery	29	18
Dr. Geelsu Hwang, Preventive & Restorative Sciences	24	17
Dr. Yuan Liu, Preventive & Restorative Sciences	18	16
Dr. Eric Stoopler, Oral Medicine	16	16
Dr. Chenshuang Li, Orthodontics	13	12
Dr. Bekir Karabucak, Endodontics	19	12
Dr. Anh D. Le, Oral Surgery	40	11
Dr. Qunzhou Zhang, Oral Surgery	29	11
Dr. Thomas Sollecito, Oral Medicine	19	11
Dr. Rabie Shanti, Oral Surgery	16	11
Dr. Betty Hajishengallis, Pediatrics	14	11
Dr. Patricia Corby, Oral Medicine	20	10
Dr. Frank C. Setzer, Endodontics	17	10
Dr. Mark S. Wolff, Preventive & Restorative Sciences	28	9
Dr. Markus B. Blatz, Preventive & Restorative Sciences	27	9
Dr. Esra Sahingur, Periodontics	13	9
Dr. Rodrigo Neiva, Periodontics	26	7
Dr. Jonathan Korostoff, Periodontics	23	7
Dr. Mel Mupparapu, Oral Medicine	17	7
Dr. Elliot V. Hersh, Oral Surgery	28	6
Dr. Manjunatha Benakanakere, Periodontics	13	6
Dr. Joseph P. Fiorellini, Periodontics	33	5
Dr. Martin S. Greenberg, Oral Medicine	24	5
Dr. Fusun Ozer, Preventive & Restorative Sciences	22	5
Dr. Chun-Hsi Chung, Orthodontics	18	5
Dr. Syngcuk Kim, Endodontics	32	4
Dr. Sunday O. Akintoye, Oral Medicine	23	4
Dr. Francis Mante, Preventive & Restorative Sciences	17	4
Dr. Hellen Teixeira, Orthodontics	13	4
Dr. Lee Ryan Carrasco, Oral Surgery	11	4
Dr. Eric Granquist, Oral Surgery	6	4
Dr. Su-Min Lee, Endodontics	4	4

Dr. Hyeran Helen Jeon, Orthodontics	4	4
Dr. Helen E. Giannakopoulos, Oral Surgery	6	3
Dr. Katherine France, Oral Medicine	3	3
Dr. Neeraj Panchal, Oral Surgery	3	3
Dr. Peter D. Quinn, Oral Surgery	15	2
Dr. Najeed Saleh, Preventive & Restorative Sciences	8	2
Dr. Eugene Ko, Oral Medicine	4	2
Dr. Takako Tanaka, Oral Medicine	4	2
Dr. Eva Anadioti, Preventive & Restorative Sciences	3	2
Dr. Joan Gluch, Community Oral Health	3	2
Dr. Nipul Tanna, Orthodontics	3	2
Dr. Temitope Omolehinwa, Oral Medicine	2	2
Dr. Ya-Hsin Yu, Endodontics	2	2
Dr. Rochelle G. Lindemeyer, Pediatrics	4	1
Dr. Thomas R. Berardi, Oral Medicine	2	1
Dr. Yu Cheng Chang, Periodontics	1	1
Dr. Uri Hangorsky, Periodontics	1	1
Dr. Steven Wang, Oral Surgery	1	1

### DEPARTMENT OF BASIC & TRANSLATIONAL SCIENCES

FACULTY	SCOPUS H-INDEX	
	LIFETIME	5-YEAR
Dr. George Hajishengallis	59	30
Dr. Henry Daniell	70	25
Dr. Claire Mitchell	36	15
Dr. Kathleen Boesze-Battaglia	29	13
Dr. Shuying (Sheri) Yang	21	12
Dr. Tetsuhiro Kajikawa	13	11
Dr. Gary Cohen	65	9
Dr. Hydar Ali	37	9
Dr. Flavia Teles	21	9
Dr. Yan Yuan	31	7
Dr. Kelly Jordan-Sciotto	24	7
Dr. Bruce Shenker	35	6
Dr. Nataliya Balashova	16	6
Dr. Faizan Alawi	19	5
Dr. Cagla Akay Espinoza	15	4
Dr. Xiaofei Li	13	4
Dr. Robert P. Ricciardi	32	3

\* The h-index was developed by J.E. Hirsch, Department of Physics, UCSD and attempts to measure the impact of an individual's publications. As an example, an h-index of 20 means there are 20 publications that have 20 citations or more each in journals covered by the Scopus database.

## 2020 High Impact Original Articles: Clinical Sciences

Within the School's clinical departments, following is a selection of original research articles with Penn Dental Medicine faculty as first or senior authors published in 2020 in journals with high impact factors.\*

AUTHORS	ARTICLES	IMPACT FACTOR	JOURNAL	DEPARTMENT
Paula AJ, Hwang G, <b>Koo H.</b>	Dynamics of bacterial population growth in biofilms resemble spatial and structural aspects of urbanization.	12.1	<i>Nat Commun.</i>	Orthodontics/Pediatrics/ Community Oral Health
<b>Li, C.</b> , Zheng, Z., Ha, P., Jiang, W., Berthiaume, E.A., Lee, S., Mills, Z., Pan, H., Chen, E.C., Jiang, J., Culiati, C.T., Zhang, X., Ting, K., Soo, C.	Neural EGFL like 1 as a potential pro-chondrogenic, anti-inflammatory dual-functional disease-modifying osteoarthritis drug	10.3	<i>Biomaterials</i>	Orthodontics
Kim D, Barraza JP, Arthur RA, Hara A, Lewis K, Liu Y, Scisci EL, Hajishengallis E, Whiteley M, <b>Koo H.</b>	Spatial mapping of polymicrobial communities reveals a precise biogeography associated with human dental caries.	9.4	<i>Proc Natl Acad Sci U S A</i>	Orthodontics/ Pediatrics/ Community Oral Health
Chang, T.-H., Shanti, R.M., Liang, Y., Zeng, J., Shi, S., Alawi, F., Carrasco, L., Zhang, Q., <b>Le, A.D.</b>	LGR5+ epithelial tumor stem-like cells generate a 3D-organoid model for ameloblastoma	6.3	<i>Cell Death and Disease</i>	Oral & Maxillofacial Surgery
Li, Y., Mooney, E.C., Xia, X.-J., Gupta, N., <b>Sahingur, S.E.</b>	A20 Restricts Inflammatory Response and Desensitizes Gingival Keratinocytes to Apoptosis	5.1	<i>Frontiers in Immunology</i>	Periodontics

## 2020 High Impact Review Articles

Following is a selection of review articles with Penn Dental Medicine faculty as first or senior authors published in 2020 in journals with high impact factors.\*

AUTHORS	ARTICLES	IMPACT FACTOR	JOURNAL	DEPARTMENT
<b>Graves, D.T.</b> , Ding, Z., Yang, Y.	The impact of diabetes on periodontal diseases	7.7	<i>Periodontology 2000</i>	Periodontics
<b>Hajishengallis G.</b>	New developments in neutrophil biology and periodontitis	7.7	<i>Periodontology 2000</i>	Basic & Translational Sciences
Chen, C., Zhang, Q., Yu, W., Chang, B., <b>Le, A.D.</b>	Oral Mucositis: An Update on Innate Immunity and New Interventional Targets	4.9	<i>Journal of Dental Research</i>	Oral & Maxillofacial Surgery
<b>Hersh, E.V.</b> , Moore, P.A., Grosser, T., Polomano, R.C., Farrar, J.T., Saraghi, M., Juska, S.A., Mitchell, C.H., Theken, K.N.	Nonsteroidal Anti-Inflammatory Drugs and Opioids in Postsurgical Dental Pain	4.9	<i>Journal of Dental Research</i>	Oral & Maxillofacial Surgery
<b>Teles, F.R.F.</b> , Alawi, F., Castilho, R.M., Wang, Y.	Association or Causation? Exploring the Oral Microbiome and Cancer Links	4.9	<i>Journal of Dental Research</i>	Basic & Translational Sciences
<b>Li, C.</b> , Zheng, Z.	Identification of novel targets of knee osteoarthritis shared by cartilage and synovial tissue	4.6	<i>International Journal of Molecular Sciences</i>	Orthodontics

\* The Impact Factor identifies the frequency with which an average article from a journal is cited in a particular year. This number can be used to evaluate or compare a journal's relative importance to others in the same field. Journal impact factors are reported in Clarivate Analytics InCites™ Journal Citation Reports®. The JCR, 2017, was used for these figures.

## 2020 High Impact Original Articles: Basic & Translational Sciences

Within the School's Department of Basic & Translational Sciences, following is a selection of original research articles with Penn Dental Medicine faculty as first or senior authors published in 2020 in journals with high impact factors.\*

AUTHORS	ARTICLES	IMPACT FACTOR	JOURNAL
Li X, Colamatteo A, Kalafati L, Kajikawa T, Wang H, Lim JH, Bdeir K, Chung KJ, Yu X, Fusco C, Porcellini A, De Simone S, Matarese G, Chavakis T, De Rosa V, <b>Hajishengallis G.</b>	The DEL-1/ $\beta$ 3 integrin axis promotes regulatory T cell responses during inflammation resolution	11.9	<i>J Clin Invest</i>
Park, J., Yan, G., Kwon, K.-C., Liu, M., Gonnella, P.A., Yang, S., <b>Daniell, H.</b>	Oral delivery of novel human IGF-1 bioencapsulated in lettuce cells promotes musculoskeletal cell proliferation, differentiation and diabetic fracture healing	10.3	<i>Biomaterials</i>
<b>Daniell, H.</b> , Mangu, V., Yakubov, B., Park, J., Habibi, P., Shi, Y., Gonnella, P.A., Fisher, A., Cook, T., Zeng, L., Kawut, S.M., Lahm, T.	Investigational new drug enabling angiotensin oral-delivery studies to attenuate pulmonary hypertension	10.3	<i>Biomaterials</i>
Yuan, G., Yang, S., Liu, M., <b>Yang, S.</b>	RGS12 is required for the maintenance of mitochondrial function during skeletal development	6.3	<i>Cell Discovery</i>
Ryan SK, Gonzalez MV, Garifallou JP, Bennett FC, Williams KS, Sotuyo NP, Mironets E, Cook K, Hakonarson H, Anderson SA, <b>Jordan-Sciutto KL.</b>	Neuroinflammation and EIF2 signaling persist despite antiretroviral treatment in an hiPSC tri-culture model of HIV infection.	6.0	<i>Stem Cell Reports [Internet]</i>

## FY20 Patents Awards

The following patents were awarded to Penn Dental Medicine faculty in fiscal year 2020 as part of their research activities.

PATENT TITLE	INVENTOR
Cellulose Digestion Via Plant Expressed Enzymes (utility)	Dr. Henry Daniell
Expression of Beta-Mannanase in Chloroplasts and its Utilization in Lignocellulosic Woody Biomass Hydrolysis (utility)	Dr. Henry Daniell
Plastid expressed cholera toxin b subunit-exendin 4 to treat type 2 diabetes (national phase)	Dr. Henry Daniell
Compositions and Methods for Suppression of Inhibitor Formation Against Coagulation Factors in Hemophilia Patients by Oral Delivery of Antigens Bioencapsulated in Plant Cells (continuation)	Dr. Henry Daniell
Methods of Treating or Preventing Periodontitis and Diseases Associated with Periodontitis (continuation)	Dr. George Hajishengallis
Iron Oxide Nanoparticles and Methods of Use Thereof (utility)	Dr. Hyun (Michel) Koo



## 2020 New Grant Awards

In 2020, the following new grants above \$50,000 were awarded to Penn Dental Medicine faculty.

*The Impact of Oral Health on Metabolism and Persistent Inflammation in HIV Patients on Antiretroviral Therapy (OHART)*

Principal Investigator: Dr. Temitope Omolehinwa, Dept. of Oral Medicine (NIH; Total Award \$3,751,317, 5 years)

*Affordable Oral Delivery of Human Therapeutic Proteins Bioencapsulated in Plant Cells*

Principal Investigator: Dr. Henry Daniell, Dept. of Basic & Translational Sciences (NIH; Total Award \$3,060,826, 4 years)

*A. Actinomycetemcomitans Cdt Induces Pro-Inflammatory Innate Immune Responses*

Principal Investigator: Dr. Bruce Shenker, Dept. of Basic & Translational Sciences (NIH MPI R01; Total Award \$2,611,952, 5 years)

*Novel Roles of GRK2 and beta-arrestin2 on mast cell-mediated allergy and Inflammation*

Principal Investigator: Dr. Hydar Ali, Dept. Basic & Translational Sciences (NIH; Total Award; \$2,424,003, 5 years)

*Postdoctoral Training in General, Pediatric, and Public Health Dentistry*

Principal Investigator: Dr. David Hershkowitz, Dept. of Preventive & Restorative Sciences (HRSA; Total Award \$2,104,043, 5 years)

*IL-22, Immune Plasticity, and Autotherapy in the Periodontium*

Principal Investigator: Dr. George Hajishengallis, Dept. of Basic & Translational Sciences (NIH; Total Costs: \$1,928,205, 5 years)

*Recycling of Metabolites from Ingested Outer Segments Supports Visual Function*

Principal Investigator: Dr. Kathleen Boesze Battaglia, Dept. of Basic and Translational Sciences (NIH-Competing Continuation; Total Award \$1,835,279, 4 years)

*Aging and dysfunction of progenitor niches: Role of Del-1*

Principal Investigator: Dr. George Hajishengallis, Dept. of Basic & Translational Sciences (NIH; Total Costs: \$1,684,470, 5 years)

*Affordable Covid-19 Treatment and Mass Vaccination*

Principal Investigator: Dr. Henry Daniell, Dept. of Basic & Translational Sciences (NIH; Total Award \$823,192, 9 months)

*Automated Device for Dental Biofilm Removal Using Robotics*

Principal Investigator: Dr. Hyun Koo, Professor, Dept. of Orthodontics, Divs. of Community Oral Health/Pediatric Dentistry (Proctor & Gamble; Total Award \$800,000, 2 years)

*Therapeutic Potential of Gingival mesenchymal Stem Cell-derived Extracellular Vesicles Enriched with MFG-E8 in Peripheral Nerve Regeneration*

Principal Investigator: Dr. Anh Le, Dept. of Oral and Maxillofacial Surgery (NIH; Total Award \$446,250, 2 years)

*Optimization of a Stapled-Peptide that Specifically Targets HSV-1 for Treating Herpes Ocular Keratitis*

Principal Investigator: Dr. Robert Ricciardi, Dept. of Basic & Translational Sciences (NIH through Fox Chase Cancer Center; \$360,000, 2 years)

*High Performance Antibacterial Fluoride-Releasing Dental Materials*

Principal Investigator: Dr. Hyun Koo, Dept. of Orthodontics, Divs. of Community Oral Health/Pediatric Dentistry (Subaward to LSU/NIH; Total Award \$275,066 2 years)

*A one-year randomized, double-blind, active-controlled multi-center phase 2 clinical trial to assess the safety and the anti-caries efficacy of nonfluoride dentifrices with 1.5%, 4.0% and 8.0% arginine in comparison with 0.24% sodium fluoride (1100 ppm F) dentifrice*

Principal Investigator: Dr. David Hershkowitz, Dept. of Preventive & Restorative Sciences (Colgate; Total Award \$267,352, 2 years)

*Demonstration of OTC Naproxen Sodium's (Aleve's) Anti-inflammatory Action in Dental Implant Surgery Patients*

Principal Investigator: Dr. Elliot Hersh, Dept. of Oral and Maxillofacial Surgery (Bayer Health Care LLC; Total Award \$203,362, 1 year)

*Bone Pathology in Kingella Kingae Infections*

Principal Investigator: Dr. Nataliya Balashova, Dept. of Basic & Translational Sciences (NIH; Total Award \$162,355, 2 years)

*A Stepped-Care Approach to Treating Dental Fear: A Sequential, Multiple Assignment, Randomized Trial for Cognitive-Behavioral Treatment via Mobile App and Evidence-Based Collaborative Care*

Principal Investigator: Dr. Mark Wolff, Dept. of Preventive & Restorative Sciences (NIH; Total Award \$123,049, 2 years)

*Chemical and Metabolic Impact of L-arginine on Candida Albicans within Mixed-Species Community containing Cariogenic and Arginolytic Bacteria*

Principal Investigator: Dr. Hyun Koo, Dept. of Orthodontics, Divs. of Community Oral Health/Pediatric Dentistry (Colgate Palmolive Co.; Total Award \$121,500, 1 year)

*Identification of PDLSCs natural stimulators for periodontal regeneration*

Principal Investigator: Dr. Chider Chen, Dept. of Oral and Maxillofacial Surgery (Colgate; Total Award \$120,000, 1 year)

*Prospective Clinical Evaluation of Posterior Single-tooth Zirconia Ceramic Restorations*

Principal Investigator: Dr. Markus Blatz, Dept. of Preventive & Restorative Sciences (Ivoclar Vivadent Inc.; Total Award \$62,402, 1 year)

