Welcome to the Fall 2020 Houston Methodist Hospital Department of Pathology and Genomic Medicine Newsletter: The Laboratory Report. If you have contributions or feedback for upcoming newsletters, please email us.

In this issue:
1. Faculty Accomplishments
2. Updates from the Community
3. Laboratory News
4. Trainee News
5. New Faculty
6. Faculty Appointments & Promotions
7. Office of Academic Development News
8. Departmental Publications

Faculty Accomplishments

Dr. Bertholf Earns ASCP Mastership Award

Roger L. Bertholf, PhD, was awarded Mastership designation by the American Society for Clinical Pathology (ASCP) at their 2020 Virtual Annual Meeting this September. ASCP Mastership is an elite designation that recognizes ASCP members who have made “a significant contribution to pathology through sustained service to the profession and to the Society.”

Dr. Bertholf joined our Department in 2017. He serves as Medical Director of Clinical Chemistry for HMH, is the Program Director of our Clinical Chemistry Fellowship, and is a Professor of Clinical Pathology and Genomic Medicine at the Houston Methodist Academic Institute (HMAI) and Professor of Clinical Pathology and Laboratory Medicine at Weill Cornell Medical College (WCMC).

Amongst his many contributions to the ASCP, Dr. Bertholf has served since 2012 as the editor-in-chief of the ASCP’s journal, Laboratory Medicine. Of his Mastership designation, Dr. Bertholf said: “I have been involved with the ASCP for nearly my entire career, beginning with my first Workshop for Laboratory Professionals in 1993. When I was selected in 2012 as editor of Laboratory Medicine, one of the two scientific journals published by the ASCP, it provided me with an opportunity to make a substantive contribution to the society’s reputation for promoting scholarly activity. Their recognition
of my contributions with the ASCP Mastership Award is among the most professionally
and personally gratifying honors I have received.”

Congratulations, Dr. Bertholf!

Dr. Cykowski Receives Career-First NIH Grant and Career Cornerstone Recognition

Matthew Cykowski, MD, Assistant Professor of Pathology and Genomic Medicine, Assistant Professor of Neurology, and Director of Autopsy, recently received an R01-equivalent NIH award from the National Institute of Neurological Disorders and Stroke (NINDS). The project is titled: "Age-related TDP-43 neuropathology: using disease-driving mechanisms to guide classification" (1 RF1 NS118584-01, 06/2020-05/2025). Dr. Cykowski's application was in response to a September 2019 RFA by the NINDS and National Institute on Aging to investigate mechanisms of TDP-43 pathobiology in common dementias. Dr. Cykowski, along with co-PI Peter Nelson, MD, at the University of Kentucky and a team of scientists at both HMH and the University of Kentucky, will investigate the pathologic and genetic basis of limbic-predominant age-related TDP-43 encephalopathy (LATE), one of the most common pathologic substrates of dementia in older individuals.

In recognition of this first R01-equivalent grant, Dr. Cykowski was the recipient of the Houston Methodist Academic Institute (HMAI) President’s Career Cornerstone Award. The award provides discretionary funding to allow first-time PIs to pursue academic activities, and is active for the duration of the associated NIH grant. Dr. Cykowski was recognized at the October 29th HMAI Town Hall meeting.

Congratulations, Dr. Cykowski!

Dr. Salazar Recognized by NBC News as “Latino Hospital Hero”

Eric Salazar, MD, PhD, was recognized by NBC News in a September feature as a “Latino Hospital Hero." The piece spotlighted Dr. Salazar’s early life in rural South Texas, his educational background, and the work he is currently performing at the forefront of SARS-CoV-2 pandemic research in the form of convalescent plasma treatment for severely ill COVID-19 patients. In the article, Dr. Salazar credits his parents and their work ethic for his successful career. The article quotes a 2018 study by the Association of American Medical Colleges that less than 6% of all active physicians are of Latinx heritage, putting Dr. Salazar in an elite group of medical professionals.

Dr. Salazar currently serves as Co-Medical Director of Transfusion Medicine and Medical Director of Coagulation Laboratories at HMH, and he is an Assistant Professor of
Pathology and Genomic Medicine at the HMAI and Assistant Professor Pathology and Laboratory Medicine at WCMC. Dr. Salazar’s research in the area of convalescent plasma therapy has been featured in numerous journals, including an article in The American Journal of Pathology that represented the first media unicorn (>1 billion unique views) for Houston Methodist Hospital.

Congratulations, Dr. Salazar!

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**Meeting with Surgeon General**

Surgeon General of the United States, Vice Admiral Dr. Jerome M. Adams, met in early October with HMH CEO Dr. Marc Boom, Department members Dr. James M. Musser and Dr. Eric Salazar, Dr. Faisal Masud, and others to discuss convalescent plasma therapy and COVID-19.

**Departmental Media Appearances**

S. Wesley Long, MD, PhD, was featured in articles for Healthline and The Healthy on COVID-19 super spreader events.

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Katherine Perez, PharmD, BCPS-AQ ID, was interviewed by Reuters on the availability and use of remdesivir as a COVID-19 treatment.

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James M. Musser, MD, PhD, was interviewed for a Washington Post exclusive on an mBio article authored by Dr. Musser and his team on mutations in the second wave of the SARS-CoV-2 virus in Houston.

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**Updates from the Community**

**From Andrea Diaz De Vivar, MD, Medical Director, Houston Methodist Baytown Hospital**

Hurricane season is almost over! We are incredibly proud of how everyone, especially our laboratory staff, has responded and prepared as Hurricane Laura threatened our community. Hurricane Laura was expected to make landfall as a Category 4 hurricane near Sabine Pass, approximately 80 miles east of our hospital. We prepared for potentially significant sustained winds and rain that could cause downed power lines and debris in the roads, making safe commuting an issue. In order to maintain social distancing and keep employees safe, some of the private offices were utilized as resting rooms by our great laboratory ride-out team. We were fortunate that Hurricane Laura had very little impact on our area, but we remain alert for potential future storms and actively work on hospital-wide and laboratory-specific contingency plans. Although Tropical Storm Beta threatened us with heavy rain, HMB remained open.

Houston Methodist Baytown earns 4-star rating! Thanks to an amazing group effort and outstanding leadership, HMB moved significantly in ranking and earned a 4-star safety rating from Vizient. The noticeable improvement in all parameters exemplifies the deep commitment toward our patients’ safety. Next milestone: 5 stars!
Laboratory construction project underway at HMB.

Constant growth and development continue at Baytown! Part of the facility master plan includes the new patient parking canopy, part of the parking deck project located between the main hospital building and the OPC, and construction of the five-story med/surg tower (depicted above). On September 14, construction in the laboratory began with Phase 1. This phase includes construction and the relocation of processing, storage, and offices. There will be five phases in total, with Histology being the last part to be built (completion anticipated by April 2023).

From David Alrahwan, MD, Medical Director, Houston Methodist Clear Lake Hospital (HMCL)

The HMCL Laboratory performed a College of American Pathologists (CAP) educational inspection of LabCorp Houston on October 2. Our laboratory was inspected by CAP on November 2.

Barcode scanning for positive patient identification (PPID) will go live at HMCL on December 8. We are excited to introduce another practice to ensure patient safety in our lab.

HMCL is obtaining a new emergency care center (ECC) in Deer Park. The Deer Park ECC will have on-site laboratory services which will go live in December.

From Seema Mullick, MD, Medical Director, Houston Methodist Sugar Land Hospital (HMSL)

HMSL is happy to report that our anatomic and clinical volumes are almost back to normal!

From Hazel Awalt, MD, Medical Director, Houston Methodist The Woodlands Hospital (HMTW)
From Byron Moore, MD, Medical Director, Houston Methodist Willowbrook Hospital (HMWB)

Houston Methodist Willowbrook Pathology Department is looking forward to an expansion of the Anatomic Pathology area. Two more grossing bays will be added to the two existing grossing bays, for a total of four, which will aid in creating a safer and more efficient work flow. We anticipate construction beginning around the New Year.

We have transitioned to using two blood types in order to issue ABO compatible blood. Previously, HMWB used a blood band system, so we are excited to have less patient identification issues while still providing safe blood for our patients.

We have welcomed new Chief Techs for day shift and evening shift: welcome Nora Somuyiwa and Buena Umali!

Lastly, our new Sysmex DI-60 cell imaging analyzer is now active for use on patient specimens (automated CBC analysis with cell imaging).

Laboratory News

HMH Cytology Team Participates in CAP "See, Test, and Treat" Event

Members of the HMH cytology staff took part in the October 17 Liberty/Dayton “See, Test, and Treat” event sponsored by the College of American Pathologists (CAP). Because of COVID-19, the event took place differently than in previous years. All specimens were collected, batched, and sent to the lab at the end of the event. In the interest of social distancing, same-day results were not available; however, all cervical pap smears collected at the event were processed the same day and results were made available in the following days.
Top row (left to right): Denise Russel-Burn, Eric Luna, Rhea Enifo, Melissa Jimenez, Debora Smith, Monica Green, Ivonne Vega, Justus Awolu

Bottom row (left to right): Krystal Robinson, Heather Blailock, Cynthia Renteria, Dr. Dina Mody, Nancy Beltran, Donna Armylagos

CAP “See, Test, and Treat” events provide culturally and linguistically-appropriate cervical and breast cancer screenings to underserved women who might otherwise be unable to access these services. This year’s event provided cervical cancer screenings for 36 women, including two for whom further referrals were made.

Department members who volunteered at the event included: Donna Armylagos, Justus Awolu, Nancy Beltran, Brittany DiPietro, Rhea Enifo, Monica Green, Melissa Jimenez, Cynthia Renteria, Krystal Robinson, Stephanie Simon, Debora Smith, Ivonne Vega, Eric Luna, and Dr. Dina Mody.

HLA Lab Earns ASHI Accreditation

Todd Eagar, PhD, Associate Medical Director of Histocompatibility and Immunogenetics Laboratory, reports that the Laboratory recently was granted approval by the American Society for Histocompatibility and Immunogenetics (ASHI) for the use of Next Generation Sequencing (NGS). NGS has become a mainstay of molecular testing and Human Leukocyte Antigen (HLA) HLA typing. The laboratory applied for accreditation to use NGS-based HLA typing. For their validation studies, lab members typed over 100 samples, including 20 unknown samples, with 100% concordance observed with prior typing results.

HLA typing is performed using a combination of three molecular methods: sequence-specific oligonucleotide probes (SSO), Sanger’s sequencing based typing (SBT), and sequence-specific priming. There are two primary benefits for NGS typing. First, NGS-based typing improves transplant outcomes by providing high-resolution HLA typing for HLA-A, B, C, DRB1, DRB3, DRB4, DRB5, DQA1, DQB1, DPA1, and DPB1. This benefits transplant patients by allowing clinical teams to identify better matched donors. High resolution typing of donors will also allow the laboratory to better assess immune
responses against the donor. Second, NGS increases the efficiency of HLA typing by moving tests to a single platform and by improving the automation of sequence analysis.

ASHI accreditation for NGS testing is the culmination of much hard work on the part of the HLA team. Congratulations to Dr. Eagar, Dr. Nicholas DiPaoloa, Dr. Michael Greenwood, and all of the staff who made this accomplishment possible!

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**Department Members Participate in International Educational Outreach**

Pathology Assistant Monica Lemos, with Surgical Pathology Fellow Ziad El-Zaatari, MD, created and presented an educational lecture via videoconferencing on the challenges of grossing gynecological specimens to a group of pathologists in Mozambique, Africa. The presentation, based on Ms. Lemos’ highly-successful “Atlas of Surgical Pathology Grossing,” gave attendees a wealth of practical tips and knowledge for performing grossing in low-resource settings, and was part of the inaugural session of Project ECHO (Extension for Community Healthcare Outcomes) in Portuguese-speaking regions of Africa.

Dr. Ziad El-Zaatari, Monica Lemos, and Dr. Ekene Okoye with the “Atlas of Surgical Pathology Grossing.”

Spearheaded by Dr. Marcia Edelweiss of Memorial Sloan Kettering Cancer Center, Project ECHO’s Lusophone Africa project provides local healthcare professionals in isolated or research-constrained areas of Portuguese-speaking Africa with the opportunity to interact with colleagues from the United States and around the world to enhance knowledge and learn valuable diagnostic strategies.

Many thanks to Ms. Lemos and Dr. El-Zaatari for their commitment to global pathology education!

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**Department Members Volunteer for COVID-19 Vaccine Trials**

Departmental members S. Wesley Long, MD, PhD, Adrienne Winston, and Sasha M. Pejerrey, PhD, have signed up to be part of the COVID-19 vaccine trial volunteer network for COVID-19 vaccine Phase 3 clinical trials. All three volunteers are in the selection phase for the trials and await selection or enrollment by various vaccine development companies, including Moderna, Pfizer, Astra-Zeneca, and NovaVax.

In addition to his tireless work fighting COVID-19 in the laboratory, Dr. Long has historically been a vaccine advocate: “I’m a big vaccine proponent. I had a one-year vaccine development fellowship in grad school, and have always spoken out in support of vaccines. Everyone knows someone—a family member, neighbor, colleague—who needs protecting by a vaccinated populace.” Dr. Long has been selected for screening by three vaccine trials.

Ms. Winston commented, as she awaits her appointment with Moderna, “I am proud to have the opportunity to effect scientific progress for the good and to potentially assist in a small way in ending the COVID-19 crisis. Vaccines are safe, effective, and necessary for us
to be able to live in the public space; in volunteering for these trials I feel that I am really standing behind my trust in them.”

“I am excited at the possibility to walk the walk for science, vaccines, and a safe way out of the COVID-19 crisis,” said Dr. Pejerrey, who has begun the screening process for Moderna.

If you are interested in volunteering as a COVID-19 vaccine clinical trial participant, please visit https://www.coronaviruspreventionnetwork.org/.

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**Trainee News**

**Trainee Redeployment Manuscript Published in Academic Pathology**

Residents and fellows in our Department’s 2019-20 cohort of trainees, as well as faculty from specialties in both Anatomic and Clinical Pathology, are thrilled to announce the publication of their article “Pathology Trainee Redeployment and Education during the COVID-19 Pandemic: An Institutional Experience” in the September issue of Academic Pathology.

The article was born from the experience of our Department’s trainees and faculty re-entering the laboratories during the first wave of the current COVID-19 pandemic. **Jessica Thomas, MD, PhD,** Associate Medical Director of the Molecular Pathology Diagnostic Laboratory, Program Director of the Molecular Genetic Pathology Fellowship, Associate Program Director for Clinical Pathology in the Pathology Residency Program, Assistant Professor of Clinical Pathology at the HMAI and Weill Cornell, and corresponding author of the article, said that at the beginning of the COVID-19 pandemic, “many AP service lines saw overall decreased case volumes, while the clinical pathology laboratories had multiple efforts in support of Houston Methodist’s COVID-19 response. The Department’s trainee redeployment was an opportunity for our Pathology residents and fellows to be involved in our response to COVID-19. They became involved in a number of activities and projects, including COVID-19-related assay development and validations, the convalescent plasma trial, and informatics and research projects, just to name a few. The COVID-19 virtual seminar series allowed trainees to both learn from each other and share their experiences during redeployment. It was wonderful working closely with the trainees and providing such a valuable educational experience for them during a difficult time.”

**Suzanne Z. Powell, MD,** Vice-Chair for Education, Chief of Neuropathology, Director of the Pathology Residency Program and Neuropathology Fellowship Program, Professor of Pathology at the HMAI and Weill Cornell, and author in the article said, “As the first wave of the COVID-19 pandemic occurred, the Department divided our residents and fellows into two groups, with one working from home and the other in the hospital. Originally planned for exchange after two weeks, the second two-week period began as planned, but quickly escalated to not only bringing all trainees back to the hospital, but with a redeployment plan of trainees to support the COVID-19 response. The case volumes in anatomic pathology had plummeted and a surge in testing for COVID-19 as well as treatment trials were necessary. The manuscript highlighted all of the changes...”
and the adaptability of the trainees and the faculty to meet the needs of the patients of Houston.”

During the first wave of the pandemic, first author and 2019-20 Chief Resident Paloma Monroig-Bosque, MD, PhD, was the trainee responsible for laboratory management. Her duties included rounding to all laboratories and working as needed in each lab. She began to notice many changes and adaptations in practice that were rapidly occurring because of COVID-19. Dr. Monroig-Bosque stated: “I was very proud to see how the trainees were included in every step of the way. The focus and care for our training was impressive. I sought to try to read what people in pathology were doing regarding involving the trainees in the process and absolutely nothing was published. I thought it would be a good idea to publish the stepwise approach we had used in order to possibly help other programs during this continuing pandemic. It was so much work, but we are so proud of it.”

The article is available online now. Congratulations, all!

Follow us on Twitter!

The Residency and Fellowship programs of the Department are excited to announce our new Twitter presence! The new account is a collaborative effort between all of the graduate medical education groups at HMH, and will feature regular news and updates from our Pathology residents and fellows.

Follow, like, and retweet us on Twitter @HMethodistGME for updates!

New Faculty

Our Department welcomed Miguelina de la Garza Bravo, MD, as a staff pathologist at HMH. Dr. de la Garza Bravo received her MD in 2010 from the Instituto Tecnologico y de Estudios Superiores de Monterrey, where she graduated with honors. Upon graduation from medical school, she moved to Houston and completed a two-year postdoctoral research fellowship at MD Anderson Cancer Center. Dr. de la Garza Bravo then completed a combined Anatomical and Clinical Pathology Residency at HMH in 2016, as well as fellowships in Dermatopathology at Baylor College of Medicine and Ophthalmic
Pathology at HMH. She served as Chief Resident (2015-16) and Chief Fellow (2017-18) during her training at HMH. Dr. de la Garza Bravo worked in private practice for two years, including a year as Medical Director of her laboratory. Dr. de la Garza Bravo joined the faculty of HMH in August of this year, and she is very excited to be a part of an outstanding group of pathologists who value each patient and colleague.

Faculty Appointments & Promotions

Andrea Diaz De Vivar, MD, received her faculty appointment as Assistant Professor of Clinical Pathology and Genomic Medicine at the Houston Methodist Academic Institute (HMAI). Dr. Diaz De Vivar joined our Department in March 2019 after having served on the faculty of Baylor College of Medicine and working in private practice. Dr. Diaz De Vivar is the Medical Director of Houston Methodist Baytown Hospital (HMB) and is co-Editor-in-Chief of the Laboratory Report. In addition to her work as Medical Director, Dr. Diaz De Vivar is involved in numerous committees at HMB, and she performs research in the area of gynecologic and obstetric pathology.

Chinnaswamy Jagannath, PhD, received faculty appointments as Professor of Pathology and Genomic Medicine on the Investigation Track at the Houston Methodist Academic Institute (HMAI) and Full Member at the Houston Methodist Research Institute (HMRI). Dr. Jagannath joined our Department in January 2019 as a Senior Scientist in the Center for Molecular and Translational Human Infectious Diseases Research, following over twenty years on the faculty of the University of Texas Health Science Center (UTHSC). With over 40 years’ experience in tuberculosis research, Dr. Jagannath and his laboratory are currently expanding his previous work.

Arthur Zieske, MD, received his faculty appointment as Associate Professor of Clinical Pathology and Laboratory Medicine at Weill Cornell Medical College (WCMC). Dr. Zieske joined our Department 2011, a role in which he immediately became involved in the educational mission of the Department. Dr. Zieske currently serves as Associate Director of the Hematopathology Section, Medical Director of the Medical Hematology Section, Medical Director of the Hematology and Urinalysis sections of the Core Laboratory, and Director of the Emergency Department laboratories at Cinco Ranch and Cypress Branch. Dr. Zieske holds faculty appointments at the
on the roles that autophagy and mycobacterial genetic modulation play in vaccine efficacy against *Mycobacterium tuberculosis* (MTB). His most recent work explores the function of macrophage type in innate immunity and susceptibility to MTB in murine and human models of infection. Dr. Jagannath has served as a reviewer for NIH study sections for over 20 years, and he has appeared in numerous national and international grant review panels over the years.

Houston Methodist Academic Institute and Texas A&M Health Science Center, and he has been a recipient in 2018, 2019, and 2020 of HM Graduate Medical Education Exemplary Faculty Teaching Awards.

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**Weill Cornell Appointments and Promotions**

- **Jian Chen, BM, PhD**  
  Associate Professor of Clinical Pathology and Laboratory Medicine

- **Ekene Okoye, MD**  
  Associate Professor of Clinical Pathology and Laboratory Medicine

- **Randall Olsen, MD, PhD**

- **Michael Thrall, MD**
Meet our New Co-Editors-in-Chief!

The Office of Academic Development (OAD) and *Laboratory Report* editorial staff are pleased to welcome our newest co-editors in chief to the *Laboratory Report* team!

**Andrea Diaz De Vivar, MD**

Dr. Diaz De Vivar joined Houston Methodist Hospital in March 2019 and has been serving as the Laboratory Medical Director at Houston Methodist Baytown Hospital for the last year. Dr. Diaz De Vivar joined our group after working at the Texas Children's Pavilion for Women, CHI St. Luke's Medical Center, and as an Associate pathologist at Brown and Associates. She received her medical degree in 2001 from the Facultad de Ciencias Medicas (School of Medical Sciences) at the Universidad Nacional de Asuncion (National University of Asuncion) in Paraguay.

After moving to the United States, she completed a combined Anatomic and Clinical Pathology residency at Baylor College of Medicine in 2009, a Cytopathology Fellowship at The University of Texas MD Anderson Cancer Center in 2010, and a Surgical Pathology Fellowship at Houston Methodist in 2011. Her special interest is in Gynecologic and Obstetric Pathology. She was honored with the Robert E. Scully Young Investigator Award in 2014 by the International Society of Gynecological Pathologists for authoring the best printed article in the *International Journal of Gynecological Pathology* on her introduction of a new classification system for endocervical adenocarcinoma. Dr. Diaz De Vivar has recently been recertified by the ABP in anatomic pathology, clinical pathology and cytopathology.

Dr. Diaz De Vivar has two sons, Martin (17) and Alejandro (13), and is married to Dr. Juan J. Ibarra, who currently serves as an Assistant Professor of Radiology at MD Anderson Cancer Center. She lives in Bellaire, Texas with her family.

**Mukul Divatia, MD**

Dr. Mukul Divatia received his M.B.B. S. degree with honors from the Maharaja Sayajirao University of Baroda, India in 2002. After completing his pathology residency from the same institution, he undertook a two year fellowship at Tata Memorial Hospital In Mumbai, a sister institute of MD Anderson Cancer Center. Following a brief stint in private practice in his hometown Baroda, he relocated to the United States where he completed a fellowship in Ophthalmic Pathology as well as a residency in Anatomic and Clinical Pathology at the Houston Methodist Hospital,
followed by another fellowship in Genitourinary Pathology at Cedars Sinai Medical Center in Los Angeles where he was also the awarded the Sports Spectacular Distinguished Fellow award for his research. Dr. Divatia moved back to Houston thereafter and has been a faculty member with our department since July 2015. He serves on the editorial board of Archives of Pathology and Laboratory Medicine and is a reviewer for several peer reviewed publications in pathology. Dr. Divatia is an ardent teacher and inveterate student of surgical pathology with a special interest in hepatopathology. When he is not signing out cases, he likes to travel and explore novel cuisines and cultures.

Dr. Diaz De Vivar and Dr. Divatia have graciously agreed to serve as co-editors-in-chief and provide oversight and guidance for this and future publications of the Laboratory Report. Many thanks to our previous editor-in-chief, April Ewton, MD, for her years of service in this role!

OAD Participates in First-Ever HMRI-Sponsored Health Science Practicum

OAD members gave an introduction to technical writing, as well as sharing the diverse ways in which they came to become scientific writers for our Department. Students at the Jones Futures Academy fulfill high school graduation requirements while simultaneously earning an Associate’s degree, with an emphasis on technological skills to ready them for the workforce. Dr. Pejerrey, Ms. Winston, and Dr. McConnell are honored to have been a part of this practicum and look forward to more opportunities in the future to share their work with students across Houston.
Dr. Pejerrey and Ms. Winston ready for the virtual presentation.

The Office of Academic Development (OAD) of the Department of Pathology and Genomic Medicine is available and fully staffed during the current SARS-CoV-2 pandemic to assist department members with editing manuscripts, grants, posters, presentations, and more. Please contact Sasha Pejerrey at spejerrey@houstonmethodist.org or 713.441.5889; Adrienne Winston at awinston@houstonmethodist.org or 713.441.3395; or Heather McConnell at hmcconnell@houstonmethodist.org or 346.238.4346. There is no charge for the OAD’s services, and no project is too big or too small!

If you need help reducing percent overlap within a document for a specific journal requirement, please let us know! We have access to iThenticate and expertise in reducing overlap to whatever percent a particular journal may require.

Faculty Publications


Li M, Liu W, Bauch T, Graviss EA, Arduino RC, Kimata JT et al. Clearance of HIV infection by selective elimination of host cells capable of producing HIV. *Nature Communications.* 2020 Aug 13;11(1). 4051. [https://doi.org/10.1038/s41467-020-17753-w](https://doi.org/10.1038/s41467-020-17753-w)

[https://doi.org/10.1016/j.ajpath.2020.04.014](https://doi.org/10.1016/j.ajpath.2020.04.014)

[https://doi.org/10.1158/1541-7786.MCR-19-1262](https://doi.org/10.1158/1541-7786.MCR-19-1262)

[https://doi.org/10.1097/TP.0000000000003040](https://doi.org/10.1097/TP.0000000000003040)

[https://doi.org/10.1016/j.anndiagpath.2020.151551](https://doi.org/10.1016/j.anndiagpath.2020.151551)

[https://doi.org/10.4103/ijo.IJO_27_20](https://doi.org/10.4103/ijo.IJO_27_20)

[https://doi.org/10.1016/j.thromres.2020.03.016](https://doi.org/10.1016/j.thromres.2020.03.016)

[https://doi.org/10.1016/j.ajpath.2020.05.014](https://doi.org/10.1016/j.ajpath.2020.05.014)

[https://doi.org/10.1182/bloodadvances.2020001949](https://doi.org/10.1182/bloodadvances.2020001949)

[https://doi.org/10.3389/fimmu.2020.01599](https://doi.org/10.3389/fimmu.2020.01599)


