Genetics & Epigenetics Newsletter 2021

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center | UTHealth The University of Texas Health Science Center at Houston

Graduate School of Biomedical Sciences

What's Inside?

Genetics & Epigenetics 2021 Program Retreat

October 22-23, 2021

Visit G&E website for more retreat information.

Onward and Upward: A Bright Future for Graduate Study and You

*by **Jun Wang, PhD***
Assistant Professor, Department of Pediatrics, McGovern Medical School, UTHealth

The year of 2021 rang in with a tough start: the upheaval continued from the COVID-19 pandemic and the unexpected, record-low temperature winter storm hit Texas in February. All of these events happened on top of global, pre-pandemic graduate surveys indicating that graduate study is overwhelmingly stressful. Despite these challenges, we have moved forward by standing together, steady, and strong, adapting to a changing environment and meeting challenges as they arise.

A "new normal" is feasible. With the amazingly rapid development of COVID-19 vaccines that were distributed starting at the end of 2020, after FDA emergency authorization approval, we are optimistic that the "new normal" will be accomplished in the near future. We are very proud that UTHealth and MD Anderson were leaders in distributing the vaccines, first to our faculty, staff, and students, and then to the community. Many in the UTHealth community volunteered at the vaccine hub in the Cooley Center, a different, busy activity that provided a change from their busy work lives. It was a rewarding experience to help get the pandemic under enough control to allow reopening of our buildings and return to in-person work and increased productivity. As we continue to vaccinate, we look forward to an end to the pandemic in the next year, so let us stay cautiously optimistic. While fighting against the coronavirus, we are also actively resisting the social virus: racism. TMC-wide rallies for Black Lives Matter and Stop Asian Hate were the effort and success of many individuals from different institutions at the TMC, including many of us.

Challenges are not roadblocks, and you can turn them into opportunities. We have all faced, and are still facing, challenges during the pandemic: COVID-19 and racism, disruptions of research progress, pressure about publications and funding, and social stress from the loss of in-person activities. However, we have actively and continuously learned how to adapt our lives and research during the pandemic. For me, the work-from-home experience and managing my 9-year-old twins' remote learning increased my stress and affected my mental wellness. However, I have also benefited from the switch to a virtual environment and have given more invited talks, as well as attended more conferences and study sessions in the comfort of my own home, saving time spent travelling. Therefore, when facing new unexpected challenges, do not see them as roadblocks and do not panic. Give yourself time to think, adjust, regroup, and view them as potential academic, professional, and personal growth opportunities.

"We have moved forward by standing together, steady, and strong."

We are all in this together. Graduate study is the foundation of your academic career, providing the freedom and creativity to discover and invent. It is necessary to gain independence during graduate studies, however, the ability to obtain help and support are also important, especially during this unprecedented pandemic. Reflecting on my personal experiences of graduate school, I received important mentoring, guidance, and support from many faculty, staff, and other trainees, which has really helped and shaped my career. As a faculty member, my goal is to return my appreciation by providing guidance, support, and empowerment to our students, the next generation of scientists. Our G&E program faculty and staff are welcoming, ready, and willing to assist you, so please do not hesitate to seek help and guidance. With collective support, we want you to know that **you are not alone**.

From the Director's Desk...

Dear G&E Community:

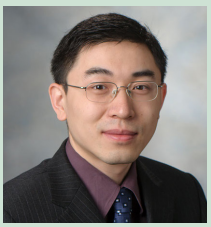
It has been a roller-coaster year. We plunged into the thicket of the pandemic with labs closed and the physical boundary of work and life blurred, when movies mean Netflix, Uber rides are replaced by UberEats, and we become exceptionally good at recognizing identities and non-verbal cues from the top-half of others' faces. Now we are emerging from seemingly endless waves of cases and breathing unfiltered air – a good time to reflect what stays the same despite the changes and what changes are here to stay.

Despite a multi-month gap, lab research has inevitably progressed. Some of us once believed our research would fall apart if we miss lab work for 3 days, and then somewhat disappointedly found out that science moved on in our absence of 3 weeks. How about 3 months and for nearly everyone in a lab? Unimaginable in the past, but a nightmare came true March of 2020. As we stepped back into our labs, it is much appreciated that research is a privilege for those passionate about science and persevering against all odds. At least, the diverse model organisms in G&E labs – yeasts, flies, worms, fishes, frogs, and mice – are immune to SARS-CoV-2 and have largely survived and been waiting for our return. We have learnt to be efficient, compartmentalizing bench versus computer work to finish within our assigned shifts. As a result, post-pandemic research is expected to shift away from endless hours in labs and toward a hybrid mode, leaving more time for creative thinking, reading, and writing.

Despite challenges in virtual learning/teaching/conferencing, G&E remains a well-connected community. We are the first GSBS graduate program to proceed with a successful Zoom retreat – we enjoyed the keynote address, oral and poster presentations, workshops, and fun activities. We also had our Zoom spring symposium including an inspiring talk by Moderna chief scientific officer Dr. Melissa Moore, the arts showcase, lunar new year celebration, GEM student seminars, faculty insight series, student rotation talks, the new historical perspective series, and G&E student-initiated outreach project – the list goes on. We are only missing our traditional summer ice cream social, which is under planning at the time of writing. While spontaneous, multi-lateral interactions are more likely for in-person meetings, we are taking advantage of back-to-back appointments, (scheduling or canceling) last minute meetings, multi-time zone and travel-free conversations, or simply being punctual. Such newfound possibilities and our forced practices with Zoom will complement traditional scientific networking to extend our connections and collaborations in a post-pandemic age. Perhaps someday virtual reality could replace in-person conferences as emails have largely replaced mails – the planet would thank us for less air travel to conferences.

Much excitement awaits this COVID-proof generation of scientists!

Jichao Chen PhD, G&E Director
Francesca Cole PhD, G&E Co-Director



G&E Program Director
Jichao Chen, PhD
Associate Professor, Dept. of Pulmonary Medicine – Research
MD Anderson Cancer Center

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Editorial Assistance: **Elisabeth Lindheim and Jun Wang, PhD**
Website: **https://gsbs.uth.edu/genetics-and-epigenetics**

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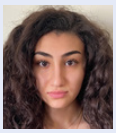
Publication Date: August 2021

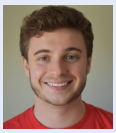
Welcome New G&E Students!

Welcome to G&E!!

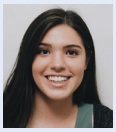
Mary Adeyeye
PhD Advisors, Brendan Lee, MD,PhD & Xiangli Yang, PhD
Department of Molecular and Human Genetics, Baylor College of Medicine (Lee); Department of Pediatrics, McGovern Medical School, UTHealth (Yang)



Lana Al Hasani
MS Advisor, Wenbo Li, PhD
Department of Biochemistry & Molecular Biology, McGovern Medical School, UTHealth

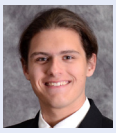


Maxsam Donta
MS Advisor, Pierre McCrea, PhD
Department of Genetics, MD Anderson

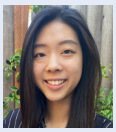


Shannon Erhardt
MS Advisor, Jun Wang, PhD
Department of Pediatrics, McGovern Medical School, UTHealth

Maria Jose Gacha Garay
PhD Advisor, Jichao Chen, PhD
Department of Pulmonary Medicine, MD Anderson



Russell Irwin
MS Advisor, Michael Green, PhD
Department of Lymphoma-Myeloma, MD Anderson



Heather Tsong
PhD Advisor, Andrea Stavoe, PhD
Department of Neurobiology & Anatomy, McGovern Medical School, UTHealth

Brandy Walker
MS Advisor, Rachel Miller, PhD
Department of Pediatrics, McGovern Medical School, UTHealth

Congratulations G&E Graduates!

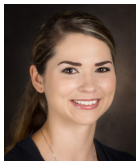
September 2020 to August 2021

Amelie Albrecht, PhD
Advisor: Xuetong Shen, PhD
PhD Thesis: "The functional analysis of a major tyrosine phosphorylation site on actin"
Postdoctoral Fellow, Lab of Fan Liu, PhD, Leibniz-Forschungsinstitut für molekulare Pharmakologie (FMP), Berlin, Germany.

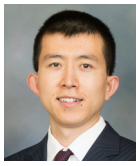
Erin Atkinson, PhD
Advisor: Bin Wang, PhD
PhD Thesis: "NPSD4: A new player in the DNA damage response"
Genetic Counseling Program student, MD Anderson UTHealth Graduate School of Biomedical Sciences, Houston, TX

Ruth Barros De Paula, MS
Advisor: John Tainer, PhD
MS Thesis: "Unveiling global roles of G-quadruplexes and G4-22 in human genetics"
PhD Student, Baylor College of Medicine PhD Program, Houston, TX

Alem Belachew, PhD
Advisor: Michelle Hildebrandt, PhD
PhD Thesis: "Understanding the genetic and clinical determinants of racial/ethnic differences in multiple myeloma (MM) susceptibility and outcomes with a focus on Hispanics"
Director of Client Engagement, saleSEER, Inc., Houston, TX

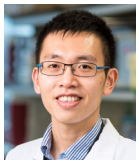


Alexandria Blackburn, PhD
Advisor: Rachel Miller, PhD
PhD Thesis: "A novel role for DYRK1A in kidney development"
Clinical Research Program Coordinator, Department of Investigational Cancer Therapeutics, MD Anderson, Houston, TX



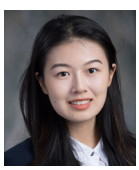
Jianji Chen, PhD
Advisor: Mark Bedford, PhD
PhD Thesis: "Discovery of novel ubiquitin- and methylation-dependent interactions using protein domain microarrays"
Sr. Biomarker Discovery Scientist, IDEXX, Westbrook, ME

Ahmed Emam, MS
Advisor: Bin Wang, PhD
MS Thesis: "Investigating the role of Abro1 in DNA damage-induced immune response"
PhD Student, MD Anderson UTHealth Graduate School of Biomedical Sciences, Houston, TX



I-Lin Ho, PhD
Advisors: Giulio Draetta, MD, PhD and Andrea Viale, MD
PhD Thesis: "Epithelial memory of resolved inflammation limits tissue damage while promoting pancreatic tumorigenesis"
Postdoctoral Fellow, Lab of Andrea Viale, MD, MD Anderson, Houston, TX

Vanja Krneta-Stankic, PhD
Advisor: Rachel Miller, PhD
PhD Thesis: "The role of the Wnt/PCP Formin Daam1 in kidney development"
Postdoctoral Fellow, Lab of Jichao Chen, PhD, MD Anderson, Houston, TX



Zian Liao, MS
Advisor: Wenbo Li, PhD
MS Thesis: Manipulating enhancer RNA activity to study their roles in gene regulation and cancer"
PhD Student, Baylor College of Medicine, Houston, TX

Danielle Little, PhD
Advisor: Jichao Chen, PhD
PhD Thesis: "The lung lineage transcription factor NKX2-1 regulates opposing cell fates in vivo"
Postdoctoral Fellow, Lab of Michael Dyer, PhD, St. Jude Children's Research Hospital, Memphis, TN

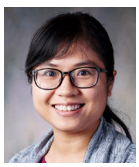
Lorena Maili, PhD
Advisor: Jacqueline Hecht, PhD
PhD Thesis: "Genetic pathway analysis of abnormal facial development in nonsyndromic cleft lip and palate"
Postdoctoral Fellow, Lab of Jacqueline Hecht, PhD, McGovern Medical School, UTHealth, Houston, TX

Sara Martin, PhD
Advisor: Richard Wood, PhD
PhD Thesis: "A disruption of DNA polymerase ζ promotes an innate immune response"
Postdoctoral fellow, Lab of Mitch McVey, PhD, Tufts University, Boston, MA

Shucheng (Anna) Miao, MS
Advisors: Michelle Barton, PhD and Guillermina Lozano, PhD
MS Thesis: "TRIM24 promotes mammary tumor development by upregulating metabolic reducing power"
PhD Student, MD Anderson UTHealth Graduate School of Biomedical Sciences, Houston, TX

Sydney Moyer, PhD
Advisor: Guillermina Lozano, PhD
PhD Thesis: "p53 drives a transcriptional program that elicits a non-cell-autonomous response and alters cell state in vivo"
Postdoctoral Fellow, Lab of William Hahn, MD,PhD, Dana-Farber Cancer Institute, Boston, MA

Odemaris Narváez del Pilar, PhD
Advisor: Jichao Chen, PhD
PhD Thesis: "Regulation of lung mesenchymal cells by epithelial Wnt ligands"
Completing medical school at University of Puerto Rico



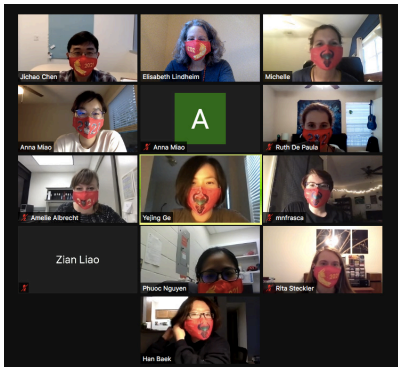
Phuoc Nyguen, MS
Advisor: Wenbo Li, PhD
MS Thesis: "Understanding the Role of ARGLU1 in Regulating IFN Signaling in Breast Cancer"
PhD Student, MD Anderson UTHealth Graduate School of Biomedical Sciences, Houston, TX

Johnathon Rose, PhD
Advisor: Giulio Draetta, MD, PhD
PhD Thesis: "A context-forward in vivo functional genomics platform for target discovery and establishing vulnerability-context in pancreatic cancer"
Postdoctoral Fellow, IACS (Traction Group), MD Anderson, Houston, TX

Melinda Soeung, PhD
Advisors: Giulio Draetta, MD, PhD and Giannicola Genovese, MD, PhD
PhD Thesis: "Understanding the pathogenesis of renal medullary carcinoma"
Postdoctoral Fellow, Lab of Giulio Draetta, MD, PhD, MD Anderson, Houston, TX

Sanjana Srinivasan, PhD
Secondary Area of Research Concentration in G&E
Advisor: Giulio Draetta, MD,PhD
PhD Thesis: "Computational approaches to delineate transcriptional and functional heterogeneity in pancreatic cancer"
Postdoctoral Fellow, IACS (Traction Group), MD Anderson, Houston, TX

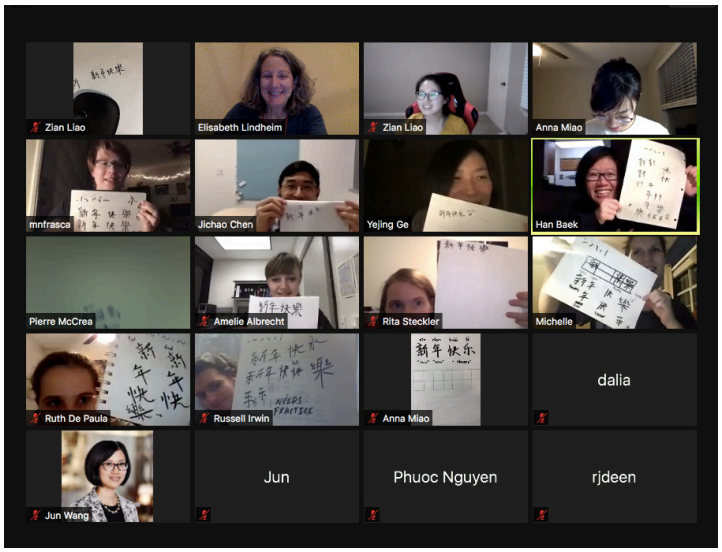
G&E Events Round-Up



Celebrating the Year of the Ox

Anna Miao, Michelle Hildebrandt, PhD and Yejing Ge, PhD organized a fun, virtual Lunar New Year event with activities, a bag of delicious new year's treats and Ox masks delivered prior to the event.

Above: Celebrating the Year of the Ox during the pandemic
Below: Calligraphy demo led by Anna Miao and Zian Liao



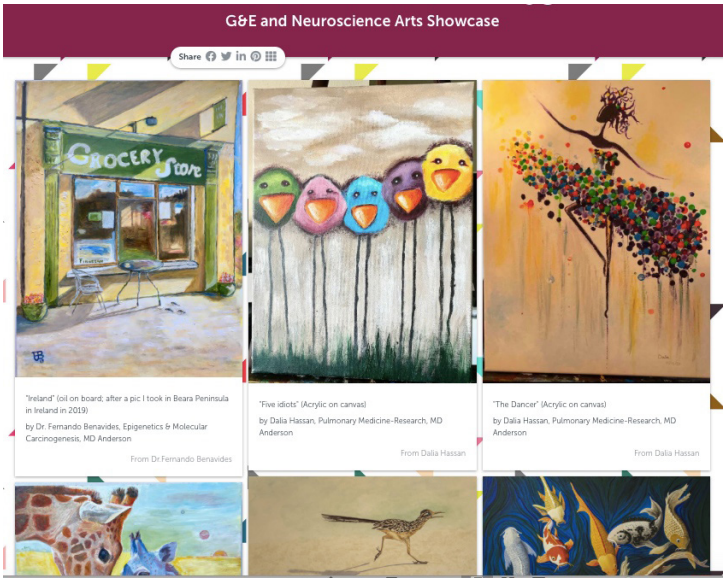
Scavenger hunt treasures

Virtual Scavenger Hunt

The G&E Community Committee organized a virtual scavenger hunt in Spring 2021 that brought students, faculty and staff together for an evening of laughter, fun, and pigtails.

Annual Arts Showcase

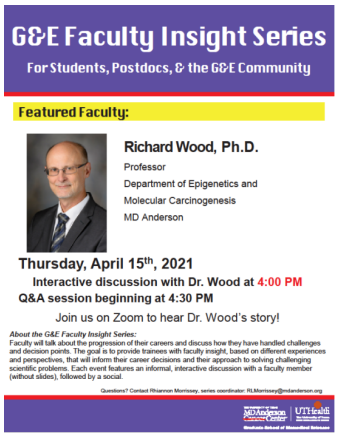
Thanks to creative planning by the student organizing committee, led by Raisa Reyes Castro, the G&E Arts Showcase was held virtually in January. The live kick-off over Zoom featured live poetry reading, live and recorded musical performances, and an art exhibition from over 22 visual artists displayed on a Kudoboard. Jointly held with the Neuroscience program, this annual event celebrates the amazing artistic talents in our program communities.



Images of Kudoboard that displayed our art exhibition

Faculty Insight Series

Faculty talked about the progression of their careers, and how they handled scientific and career challenges, at these informal gatherings where a single faculty member talks informally and interactively with the program community. Last year's series was organized by Rhiannon Morrissey.



GEM Student Seminar Series

The monthly student-run G&E GEM Seminar Series features 20-minute talks by two students on their thesis research, the second Thursday of each month at noon. In June, Hanghui Ye and Tanner Wright took over as series coordinators from Mabel Perez-Oquendo and Melissa Frasca, who led the series with great dedication during the pandemic.

Historical Perspectives of Science Series

This new G&E lecture series was launched in February 2021 and focuses on important discoveries that transformed biology/medicine within approximately the past 100 years. Inaugural organizers included Amelie Albrecht (who initiated the series), Melissa Frasca, Mabel Perez-Oquendo, and Hieu Van, with support from Richard Behringer, PhD.

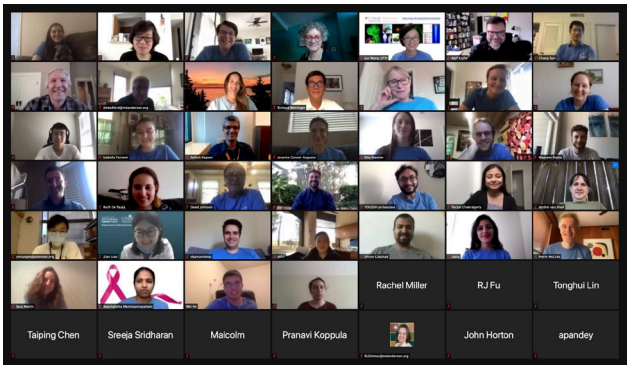
2020 G&E Retreat & 2021 Career Symposium

2020 Retreat Reflections

*By **Jace Aloway**, Retreat Co-Chair*

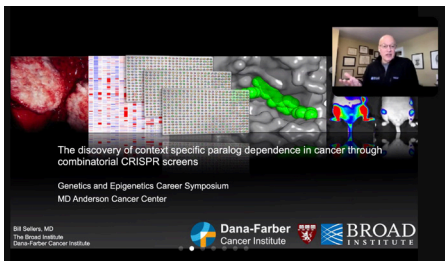
Retreats and conferences are something that many of us feel are the highlights of the year because we get to present our research, catch up with old friends, and meet the new faces in the field. Last year, much of that came to a sudden halt due to Covid-19. The organizing committee for the G&E Program Retreat was faced with cancelling the retreat altogether when the pandemic showed no sign of ending, but we chose instead to move to a virtual format. It was incredible to see how quickly everyone shifted gear to create a new event format. Thankfully, our keynote speaker, Daniel Jarosz, PhD, was able to remain available for a virtual format. I was nervous that the entire event would flop and no one would have fun with it—simply because it was not the event that we look forward to every year. What really convinced me that the event was a success was the cookie decorating contest that Rhiannon hosted. It was a lot of fun for me personally, but more importantly, I got to listen in to the G&E community laughing, talking, and showing off their creations. It was almost like things were back to normal. That same energy seemed to continue through the event, whether it was in Q&A sessions for platform talks or Dr. Cole's amazing cocktail demo. All this to say, thank you to everyone—organizers and participants—who helped make the event such a success!

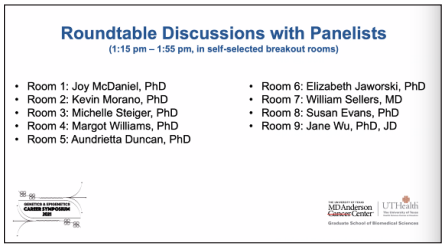
Editor's note: The retreat was November 6-7, 2020, and organized by a student panel: Co-Chairs Amelie Albrecht & Jace Aloway, Jellisa Ewan, Rhiannon Morrissey, Mabel Perez-Oquendo & Jie Ye, with assistance from Ashish Kapoor, MD, PhD, Nidhi Sahni, PhD, Elisabeth Lindheim & Rebecca Deen. It featured trainee talks, poster sessions, breakout session panels, and fun virtual activities. The retreat brings our program community together each fall, usually held overnight, outside of Houston.



2021 G&E Retreat

The annual program retreat will be October 22-23, 2021, and is being planned as a hybrid meeting on campus. The student-led organizing committee, co-chaired by Shannon Erhardt and Sreeja Sridharan, includes Han Bit Baek, Lana Al Hasani, Ruoyu Wang, and faculty advisors, George Eisenhoffer, PhD and Yejing Ge, PhD. All first years are invited! Look for updates on the G&E website.





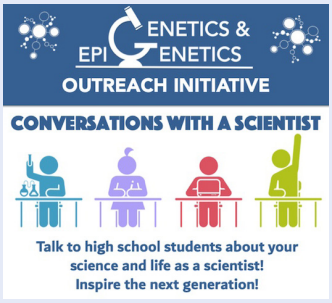
G&E 2021 Virtual Spring Career Symposium

The G&E Career Symposium was held via Zoom on April 23rd, 2021. Students, faculty and other trainees joined virtually for a full day of keynote presentations, career panels, personality assessments, and workshops on CV's, internships, and fellowships. A number of program alumni participated as panelists and workshop leaders. William Sellers, MD, PhD from the Broad Institute, kicked off the symposium with his keynote address on *"The discovery of context specific paralog dependence in cancer through combinatorial CRISPR screens"*. Career panelists representing academia and industry, scientific management, writing and law, provided valuable insight in different breakout rooms. G&E program students participated in a Real Colors Personality Assessment led by Dustin Bennett from MD Anderson's Leadership Institute while postdocs tuned into a "Faculty Search Panel" led by G&E faculty, Ambro van Hoof, PhD and Yejing Ge, PhD. To wrap up the symposium, Melissa Moore, PhD, Chief Scientific Officer, Platform Research at Moderna, Inc. gave an inspiring closing keynote address on her scientific journey and the development of Moderna's Covid-19 vaccine: *"From Academy to Industry and the science behind mRNA-1273"*. The symposium was organized by a student panel co-chaired by Jovanka Gencel Augusto and Melissa Frasca; other student members included Celine Shuet Lin Kong and Ahmed Emam. They were supported by G&E faculty advisors, Timothy McDonnell, MD, PhD and Ambro van Hoof, PhD, and coordinators, Elisabeth Lindheim and Rebecca Deen. *The G&E career symposium is an annual one-day event organized by program students each spring.*

G&E News

Dr. David Johnson to Retire

David Johnson, PhD, Professor in MD Anderson's Department of Epigenetics and Molecular Carcinogenesis (EMC) and Associate Director for Education at Science Park will retire December 2021. Dr. Johnson came to MD Anderson in 1994 as an Assistant Professor and has been deeply engaged in education throughout his career. He was a long-time member of the EMC graduate program before it merged into the Genetics & Epigenetics program (G&E). He served as Program Director for EMC and was Charter Co-Director of G&E. He directly advised 10 PhD students and was a member of 50 PhD and MS Advisory committees and dozens of candidacy exam committees. Dr. Johnson served as VP and President of the GSBS Graduate Faculty 2014-2016, was Chair of the GSBS Executive committee, and served on multiple GSBS standing committees and the MD Anderson Graduate Education Committee. He led and obtained NCI funding for summer programs at Science Park. He has also had a distinguished scientific career studying DNA damage repair and regulation of tumor development. While formally retiring in December, he won't be gone long as he plans to return part-time to finish some grant work. Thank you, Dr. Johnson, for your outstanding dedication to training the next generation of biomedical scientists.

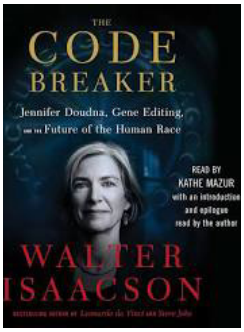


"Conversations with a Scientist": A G&E Outreach Initiative

*by **Jovanka Gencel Augusto***

This initiative aims to promote early interest in science, and to raise awareness about what possibilities exist for careers in science, for high school students from underserved communities. Our goal is also to give practical advice to students who are interested in choosing science as a career. The program was launched in Spring 2021 with Chinquapin Preparatory School. Shannon Erhardt (MS student) and Melissa Frasca (PhD student) kicked off the program as guest speakers in 9th grade Biology and 10th grade Chemistry classes, respectively. They did an amazing job sharing their excitement for science, the story of their career paths, research work, how a day looks like as scientists, and answered student and teacher questions. The students expressed that both learning about a new career path and the speaker's passion for their work were two aspects they most enjoyed about the presentations. A 9th grade biology student said, "The talk was amazing! I learned about a new topic I don't really know about and it was good". And, a 10th grade chemistry student wrote, "I usually am not a big fan of biology and lean towards geology; however, with this presentation I was really engaged in the genetic research and thought it was really interesting". We will continue this program in the fall, so watch for the announcement if you want to inspire high schoolers to become scientists!

Editor's Note: Jovanka created this G&E initiative after talking with an AP Biology class at Chinquapin Prep in January 2021. She is a G&E student in the Lozano lab.



New G&E Library

G&E has a new library with over 35 books on the biomedical sciences, biographies, memoirs, writing, funding, R programming, personal productivity and more. The library is located in Elisabeth Lindheim's office at GSBS in the Mitchell BSRB. Books can be checked-out for at least two weeks. **Click here** to see the book list. Send new book suggestions to elindheim@mdanderson.org. Take advantage of this great new resource!

G&E Director Wins John P. McGovern Award for Outstanding Teaching

GSBS students selected G&E Program director, Jichao Chen, PhD, as the recipient of the 2021 John P. McGovern Award for Outstanding Teaching. "Making a difference in students' training is as important to me as making scientific discoveries", said Chen. Based on a vote by all GSBS students, this award recognizes excellence in teaching based on the educator's knowledge of the subject, enthusiasm for teaching, interest in and understanding of students, encouragement of independent thinking and accessibility to students. Chen has directed the G&E Oral Scientific Presentations course for the past 8 consecutive years, and in 2020 developed a new hands-on bioinformatics course called "Pragmatic Bioinformatics for Bench Scientists" that reached its maximum enrollment in 2020 and 2021. Chen leads an active research program focusing on the normal developmental processes that build the lung and how such processes evolve across species and go awry during lung malformations, injury, and tumorigenesis. He has graduated 3 PhD students and is currently mentoring 6 PhD students. His trainees include 2 F31 fellowship recipients and 1 K99 recipient.

Welcome New G&E Faculty!

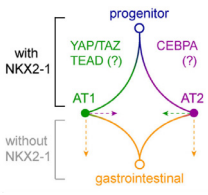
Giannicola Genovese, MD, PhD
Assistant Professor, Department of Genitourinary Medical Oncology-Research, MD Anderson

Research Interests: My laboratory utilizes mouse modeling and functional genomics to understand cancer evolution.

Yonathan Lissanu Deribe, MD, PhD
Assistant Professor, Department of Thoracic & Cardio Surgery-Research and Department of Genomic Medicine, MD Anderson

Research Interests: Chromatin remodeling in cancer; targeted protein degradation as therapeutics

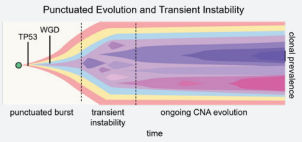
Student Publication Highlights



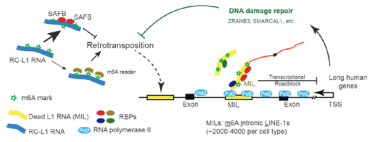
G&E student **Danielle Little, PhD**, from Dr. Jichao Chen's lab, published her work in *Nature Communications* in May of 2021. Her research reported that the cell-type-specific function of transcription factor NKX2-1 is attributed to its differential chromatin binding that is acquired or retained during development in coordination with transcription factor binding partners. Loss of YAP/TAZ resulted in phenotypic conversion between alveolar cell types (AT) associated with a switch of NKX2-1 binding from AT1-specific to AT2-specific DNA sites. *Nkx2-1* mutant AT1 and AT2 cells gain distinct chromatin accessible sites, including those specific to the opposite fate while adopting a gastrointestinal fate. Cumulatively, the lung lineage transcription factor NKX2-1 (1) binding marks cell fate and potential, (2) enables and maintains cellular specification guided by cell-type specific transcription factor partners, and (3) prevents alternative identities within and outside of the lineage *in vivo*. This study sets the groundwork to decipher the roles of lineage transcription factors *in vivo* and sets up an experimental paradigm to further dissect the formation and maintenance of cellular identity.

***Little DR**, Lynch AM, Yan Y, Akiyama H, Kimura S, Chen J. Differential chromatin binding of the lung lineage transcription factor NKX2-1 resolves opposing murine alveolar cell fates in vivo. Nature Communications. 2021;12(1):1-18.*

G&E student **Hanghui Ye**, from Dr. Nicholas Navin's lab, published his research in *Nature* in April of 2021. His research investigates the process of copy number evolution during the expansion of primary breast tumors. They developed a single-cell, single-molecule DNA-sequencing method and performed copy number analysis of 16,178 single cells from 8 human triple-negative breast cancers and 4 cell lines. The results show that breast tumors and cell lines comprise a large milieu of subclones that are organized into a few major superclones. Evolutionary analysis suggests that after clonal TP53 mutations, multiple loss-of-heterozygosity events and genome doubling, there was a period of transient genomic instability followed by ongoing copy number evolution during the primary tumor expansion. By subcloning single daughter cells in culture, they found that tumor cells re-diversify their genomes and do not retain isogenic properties. These data show that triple-negative breast cancers continue to evolve chromosome aberrations and maintain a reservoir of subclonal diversity during primary tumor growth.



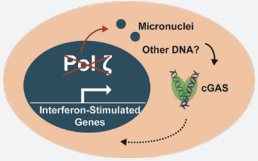
*Minussi DC, Nicholson MD, **Ye H**, Davis A, Wang K, Baker T, et al. Breast tumours maintain a reservoir of subclonal diversity during expansion. Nature. 2021;592(7853):302-8.*



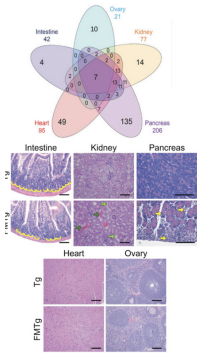
G&E student **Ruoyu Wang**, from Dr. Wenbo Li's lab, published his research in *Cell Research* in June of 2021. His research focused on understanding the interaction between retrotransposable elements and the human genome. In this paper, they profiled m^{6}A deposition on nascent RNAs in human cells by developing a new method called MINT-Seq. They found that many classes of transposable element RNAs, particularly intronic LINE-1s (L1s), are strongly methylated. Notably, they found that m^{6}A positively controls the expression of both autonomous L1s and co-transcribed L1 relics, promoting L1 retrotransposition. Surprisingly, they also showed that m^{6}A-marked intronic L1s preferentially reside in long genes with critical roles in DNA damage repair, where they act as transcriptional "roadblocks" to impede the hosting gene expression, revealing a novel host-weakening strategy by the L1s. Remarkably, their analysis identified thousands of m^{6}A-marked intronic L1s (MILs) in multiple human fetal tissues, enlisting them as a novel category of cell-type-specific regulatory elements that may compromise transcription of long genes and potentially confer their vulnerability in neurodevelopmental disorders. This study proposes that m^{6}A-orchestrated L1–host interaction plays important roles in retrotransposition control and host gene transcriptional regulation.

*Xiong F, **Wang R**, Lee J-H, Li S, Chen S-F, Liao Z, et al. RNA m6A modification orchestrates a LINE-1–host interaction that facilitates retrotransposition and contributes to long gene vulnerability. Cell Research. 2021:1-25.*

G&E student **Sara Martin, PhD**, from Dr. Richard Wood's lab, published her first author publication in *Cell Reports*. Her research delved into a specialized DNA polymerase crucial for normal cellular proliferation, pol ζ. Analysis of genome-wide transcriptional changes uncovered a dramatic increase in expression of interferon-stimulated genes in in pol ζ-deficient cells. Their study also found an increase in micronuclei, a form of chromosomal instability and potential source of cytoplasmic DNA, correlated with the increase of expression of interferon-stimulated genes due to loss of pol ζ. Further, this gene expression signature was dramatically dependent on the cGAS pathway. Inhibition of pol ζ function has been proposed as therapeutic strategy to sensitize cancers to DNA damaging chemotherapeutics. These results suggest that inhibition of pol ζ function could have additional therapeutic applications by harnessing the power of the innate immune system.



***Martin SK**, Tomida J, Wood RD. Disruption of DNA polymerase ζ engages an innate immune response. Cell Reports. 2021;34(8):108775.*



G&E alumna **Sydney Moyer, PhD**, from Dr. Guillermina Lozano's lab, published her work in *Proceedings of the National Academy of Sciences* (PNAS) last September. Her research focused on understanding how p53 functions in a tissue-specific manner. Using a genetically engineered mouse model of p53 activation, mediated by conditional deletion of *Mdm2*, they profiled 13 murine tissues for p53 transcriptional activity following *Mdm2* loss and selected 5 (pancreas, heart, kidney, ovary and intestine) for comprehensive analysis. RNA-sequencing analysis and a comparison with existing ChIP-sequencing data identified a unique p53 signature of seven p53 transcriptional targets that unexpectedly excludes *p21*. The overall transcriptional programs of different tissues provide insight into the downstream pathways that are induced by p53. Their data also provided evidence that the pathology observed by activation of p53 can be non-cell-autonomous. Combined, this study provides a comprehensive profile of the p53 transcriptional response *in vivo*.

***Moyer SM**, Wasylishen AR, Qi Y, Fowlkes N, Su X, Lozano G. p53 drives a transcriptional program that elicits a non-cell-autonomous response and alters cell state in vivo. Proceedings of the National Academy of Sciences. 2020 Sep 22;117(38):23663-73.*

G&E Alumni Success

Atanu Paul, PhD
Scientist, Kymera Therapeutics, Watertown, MA
PhD 2017
Advisor: Bin Wang, PhD
Atanupaul83@gmail.com

Please tell us about yourself and your current job title/role.

I am a scientist in the Oncology division at Kymera Therapeutics – a clinical stage biopharmaceutical company in the Boston area. The major focus of my research at Kymera is to identify and degrade cellular proteins that were once considered undruggable, using a new modality called "targeted protein degradation" (TPD) to improve therapeutic opportunities for cancer patients. While my primary research is in the area of hematological malignancies, I am also exploring other areas of oncology to utilize the TPD platform. My role is to help the oncology division with our pipeline projects, identify and validate novel drug targets and collaborate with cross-functional groups to advance drug candidates for clinical trials.

What made you interested in pursuing a postdoctoral fellowship at Novartis?

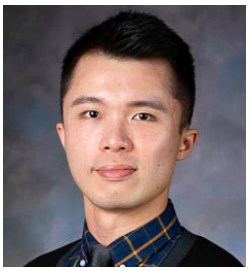
My graduate school training at GSBS inspired me to learn more about the translational work to make an impact in patient lives. I was in the Genetics department at MD Anderson Cancer Center and having the opportunity to see how translational research transforms patient lives motivated me to learn about drug development from an Industry standpoint. But I was keen to pursue my postdoctoral training to become an independent researcher. The fellowship at Novartis gave me that perfect opportunity to learn drug discovery and development at one of the most successful pharmaceutical companies while pursuing my postdoctoral training with cutting-edge technology in a highly collaborative environment.

Can you describe your transition from graduate school to an industry postdoctoral position?

My experience with academia to industry transition was smooth. This is partly because I was in the Discovery Biology postdoctoral program at Novartis. This program functions more like academic research to explore different areas of disease biology to identify and characterize novel target(s) with the goal to publish in peer-reviewed journals. While in industry there is limited access to collaborate with academic labs, Novartis has an outstanding infrastructure, resources, and core facilities to ensure successful completion of postdoctoral projects. Moreover, Novartis offers several courses and interactive workshops on drug discovery and development processes that helped me gain a deep understanding of how molecules are transformed into medicines.

What advice would you give to graduate students looking for postdoctoral fellowship positions in the industry?

Industry postdoc positions are highly competitive. So, I would recommend that students apply as early as possible and to as many positions as possible. Stay up to date with any new postings through LinkedIn and other platforms and, if you know someone internally, ask about the hiring manager and reach out to him/her directly with your resume. Also, if you are selected for the interview, learn in detail about the company from the website/social media platforms about their pipeline, conference presentations, collaboration with other companies, or any recent breakthrough (such as clinical trials), etc. to discuss during the interview process. This will show that you have done your homework and are genuinely interested in the company.



Marco L. Leung, PhD, FACMG
Clinical Director, The Steve and Cindy Rasmussen Institute for Genomic Medicine (IGM), Department of Pathology and Laboratory Medicine, Nationwide Children's Hospital
Assistant Professor, Departments of Pathology and Pediatrics, The Ohio State University College of Medicine
Associate Program Director, ABMGG Clinical Laboratory Genetics and Genomics Fellowship
PhD 2016
Advisor: Nicholas Navin, PhD
marco.leung@nationwidechildrens.org

Please tell us about yourself and your current job title/role.

I am an Assistant Professor of Pathology and Pediatrics at The Ohio State University College of Medicine, and a Clinical Director at the Institute for Genomic Medicine at Nationwide Children's Hospital. I split my time between my clinical duties and academic work. My clinical duties include signing out cases for germline and cancer diseases, guiding the development and validation of genetic testing, supervising the operation of a clinical diagnostic lab in compliance with CAP and CLIA, and communicating laboratory results with referring providers. My academic work includes developing and carrying out my research program, writing manuscripts, giving lectures to students, medical residents and fellows, and projects in professional societies, such as the American College of Medical Genetics and Genomics and the Association for Molecular Pathology.

What made you interested in a career in clinical molecular genetic testing?

When I was in high school, I did not know what I wanted to study in college. I knew that I liked the TV shows that involved forensic testing, which led me to complete my bachelor's degree in Molecular Genetics at the School of Health Professions at MD Anderson. That program exposed me to the clinical diagnostic world. In order to pursue a career in genetic testing, I decided to apply for graduate school, and later the ABMMG clinical molecular genetic fellowship.

Can you describe your experience as an AMBGG Clinical Molecular Genetic Fellow and what qualifications are required for this fellowship?

My fellowship was a huge learning curve for me. With experience only in cancer genetics, I had to learn the basics of germline diseases, interpretation of different prenatal and postnatal testing modalities and their results, and writing clinical reports. Importantly, it gave me a clinical mindset, involving rigorous documentation, testing controls, and regulatory compliance, which are very different from a non-clinical research lab. To pursue the laboratory genetic fellowship, one must have a MD, DO, or PhD with relevant experience in genetics.

Continued on the bottom of the next page.

Congratulations G&E Program Graduates!

GSBS Commencement at Minute Maid Park, May 2, 2021

Clockwise starting in upper left corner:

Vanja Stankic, PhD; Rachel Miller, PhD; Alexandria Blackburn, PhD

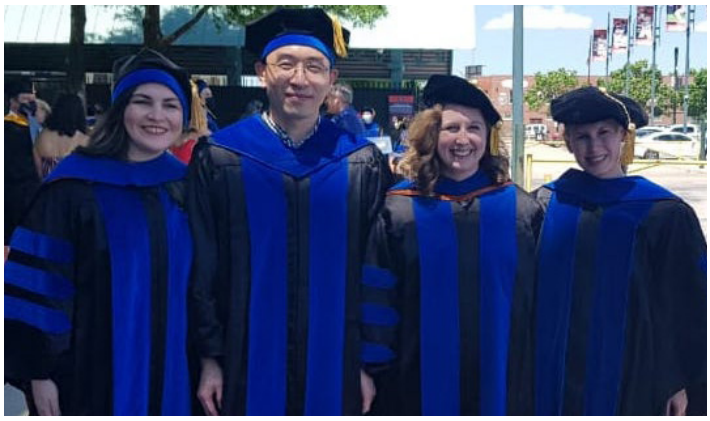
Alem Belachew PhD

Amber Thomas-Gordon, MS; Jan Parker-Thornburg, PhD

Jacqueline Hecht, PhD; Lorena Maili PhD

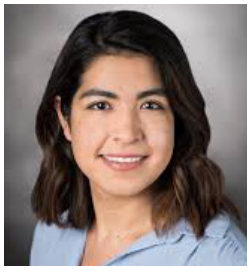
John Rose, PhD; Sanjana Srinivasan, PhD

Odemaris Narváez del Pilar, PhD; Jichao Chen, PhD; Danielle Little, PhD; Margo Cain, PhD



What advice would you give to graduate students interested in pursuing a career in your field?

Once students have decided on what career path to pursue after graduate school, they should acquire the relevant skill sets and make the appropriate connections as soon as possible. For me, I knew I wanted to pursue the ABMGG fellowship prior to graduate school. I joined Nicholas Navin's lab, which positioned me at the forefront of the next generation sequencing world. Nick was very understanding of my goals and supported me going to clinical conferences. In those conferences, I connected with the then-fellows and inquired about their experience in applying for fellowships.



Roxsan Manshouri, PhD
Technology Commercialization Analyst, MD Anderson Cancer Center
PhD 2019
Advisor: Don Gibbons, MD,PhD
rmanshouri@mdanderson.org

Please tell us about yourself and your current job title/role.

I earned my Bachelor of Science in Biology from Texas A&M University. Following my undergraduate education, I received a Master of Science in Biomedical Research and a Doctorate in Genetics and Epigenetics from the University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences. I began at MD Anderson's Office of Technology Commercialization as an intern in the Fall of 2018, prior to joining the team as a Technology Commercialization Analyst the following year. In this role, I evaluate patentability and market potential for inventions arising from MD Anderson faculty. I also assist in license negotiation and various commercialization efforts.

What made you interested in a career as a Tech Commercialization Analyst?

I was introduced to tech transfer during graduate school when Andrew Dennis, the Managing Director of MD Anderson's Technology Commercialization Office, came to present on his career path. I knew early on in my PhD studies that I wanted to be connected to translating scientific discoveries, but the bench was not for me. Tech transfer offices bridge the innovative technologies from academia to industry. The role of the Technology Analyst really resonated with what I was looking for in a career.

Can you describe your transition from graduate school to your current position?

Luckily, during my yearlong internship with the office, a position became available. The internship helped me gain hands-on experience in the field, which made my transition to the Technology Analyst role relatively smooth.

What advice would you give to graduate students who are interested in your career path?

Foremost, I would recommend getting involved in a tech transfer internship program. It's the best way to understand whether the career is the right fit for you. If you are unable to make the commitment to an internship, then try to take a course through AUTM, the Association of University Technology Managers or attend the ATUM annual meeting.

G&E Student & Faculty Awards & Recognitions 2020-2021

Congratulations to our students for their outstanding achievements!

STIPEND SCHOLARSHIPS & FELLOWSHIPS

John and Rebekah Harper Fellowship in Biomedical Sciences, 2021-22
Ruoyu Wang (Wenbo Li, PhD)

Rosalie B. Hite Fellowship
Vahid Bahrambeigi (Advisor, Anirban Maitra, MBBS), 1st year, 2021-22
Jovanka Gencel Augusto (Gigi Lozano, PhD), 3rd year, 2021-22

Sowell-Huggins Fellowship in Cancer Research, 2021-22
Hanghui Ye (Nicholas Navin, PhD)

NIH F31 NRSA Predoctoral Fellowship
Rhiannon Morrissey (Gigi Lozano, PhD), 2nd year, 2021-22

STUDENT AWARDS

American Association for Cancer Research (AACR) - Minority Scholar in Cancer Research Award
Mabel Perez-Oquendo (Don Gibbons, MD,PhD)

American Legion Auxiliary Fellowship in Cancer Research
Safia Essien (George Eisenhoffer, PhD), 2nd year

Dr. John J. Kopchick Fellowship
Archit Ghosh (Kunal Rai, PhD) 1st year
Jovanka Gencel Augusto (Gigi Lozano, PhD)

Dr. John J. Kopchick Research Award
Amelie Albrecht and her advisor, Xuetong Shen, PhD

Genetics & Epigenetics Annual Retreat Poster Competition, Pre-Candidacy/MS Category
Melissa Frasca (Francesca Cole, PhD), 1st Place
Anna Miao (Michelle Barton, PhD & Gigi Lozano, PhD), 2nd Place
Jellisa Ewan (Ambro van Hoof, PhD), 3rd Place

Genetics & Epigenetics Annual Retreat Poster Competition, Post-Candidacy Category
Danielle Little (Jichao Chen, PhD), 1st Place
Erin Atkinson (Bin Wang, PhD), 3rd Place

Genetics & Epigenetics Annual Retreat Oral Presentation Competition
Han Bit Baek (Swathi Arur, PhD), 1st Place
Jace Aloway (Richard Behringer, PhD) and **Celine Shuet Lin Kong** (Jichao Chen, PhD), 2nd Place Tie
Han Bit Baek (Swathi Arur, PhD), People's Choice Award

GSBS Graduate Student Research Day Oral Presentation Competition
Shannon Erhardt (Jun Wang, PhD), 1st Year Bonus Award, Pre-Candidacy Category

GSBS Graduate Student Research Day Oral Presentation Competition
Celine Shuet Lin Kong (Jichao Chen, PhD), 2nd Place, Post-Candidacy Category

Service Awards, cont.

Mogam Science Scholarship
Jiah Yang (Kunal Rai, PhD)

NIH/NCI-Research Supplements to Promote Diversity in Health-Related Research, PA-20-222
Mabel Perez-Oquendo (Don Gibbons, MD, PhD)

Student InterCouncil (SIC) Positive Impact Award – UTHealth
Mabel Perez-Oquendo (Don Gibbons, MD, PhD)

G&E Student Service Awards
Amelie Albrecht
Jace Aloway
Melissa Frasca
Jovanka Gencel Augusto
Celine Shuet Lin Kong
Anna Miao
Rhiannon Morrissey
Mabel Perez-Oquendo
Raisa Reyes Castro

G&E Travel, Virtual Meeting & Course Registration Awards (2020-2021)
Due to the pandemic, only these few awards were requested.

Dalia Hassan (Jichao Chen, PhD) to attend Cold Spring Harbor virtual course on Mouse Engineering, June 2021

Celine Shuet Lin Kong (Jichao Chen, PhD) to attend NAVBO Vascular Biology 2021 conference in Monterey California, October 2021

Mabel Perez-Oquendo (Don Gibbons, MD, PhD) to attend 2021 Virtual Association for Cancer Research (AACR) Annual Meeting

G&E Faculty News & Recognitions 2020-2021

Swathi Arur, PhD
Elected Fellow, American Association for the Advancement of Science, 2020

Jichao Chen, PhD
John P. McGovern Award for Outstanding Teaching, 2021

Francesca Cole, PhD
Andrew Sabin Family Fellow, MD Anderson, 2021

Sharon Dent, PhD
Elected Member, American Academy of Arts and Sciences, 2021

George Eisenhoffer, PhD
Promoted to Associate Professor effective 09/01/2021

Michael Galko, PhD
Elected GSBS Faculty Vice President, 2020-21 and President, 2021-22

Boyi Gan, PhD
Faculty Honoree Award in Research Excellence*, MD Anderson Cancer Center, 2020
*Honor to be highlighted in the Wall of Science at MD Anderson, 2021

Yejing Ge, PhD
Andrew Sabin Family Fellow, MD Anderson, 2021

Michelle Hildebrandt, PhD
Andrew Sabin Family Fellow, MD Anderson, 2021

David Johnson, PhD
D. Dudley and Judy White Oldham Faculty Award, 2021

Han Liang, PhD
Elected Fellow, American Association for the Advancement of Science, 2020
Barnhart Family Distinguished Professorship in Targeted Therapies, MD Anderson Cancer Center, 2020

Guillermina (Gigi) Lozano, PhD
Elected Fellow, American Association for Cancer Research Academy, 2021

Nidhi Sahni, PhD
Promoted to Associate Professor effective 09/01/2021

Jun Wang, PhD
Promoted to Associate Professor effective 09/01/2021
2020 Women Faculty Forum Rising Star Award, McGovern Medical School, UTHealth

Richard Wood, PhD
R. Lee Clark Prize, 2021
Environmental Mutagenesis and Genomics Society Award, 2021

Zhongming Zhao, PhD
General co-chair, 2020 Int'l. Conf. on Intelligent Biology & Medicine. Program committee co-organizer & co-chair, 11th Workshop on Integrative Data Analysis in Systems Biology with 2020 IEEE Int'l Conf. on Bioinformatics & Biomedicine

Three G&E Faculty Named Andrew Sabin Family Fellows

On July 30th, 2021, MD Anderson announced the 10 early-career faculty members named to the 2021 class of Andrew Sabin Family Fellows. Four of the 10 are GSBS faculty members, and three of those four are G&E faculty: Francesca Cole, PhD, Yejing Ge, PhD, and Michelle Hildebrandt, PhD. Each researcher will receive $100,000 over two years. Congratulations!

To Our Colleagues from Smithville: Welcome to Houston!

For the last four years, the G&E program spanned two campuses, 125 miles apart – the Texas Medical Center and MD Anderson's Science Park in Smithville. This summer, our colleagues in Smithville and the Department of Epigenetics and Molecular Carcinogenesis (EMC) are moving to Houston where most are setting up their labs in MD Anderson South Campus Research Buildings 3 and 4, along with three core facilities. Here we feature four additional labs as a companion to ***last year's newsletter*** *which highlighted some of the labs and the cores. We warmly welcome all of our EMC department friends and colleagues relocating to Houston this summer!*

The Sahni Lab (SCRB3, 4th Floor)

"Our research takes a systems-based approach to study the biology of human cancer. That is, rather than studying individual biological components or isolated pathways, we use mathematical and computational approaches to define entire networks regulating the fundamental cellular and organismal processes underlying the genetic and epigenetic aberrations that contribute to cancer heterogeneity and that allow tumors to evade treatment. Our methods integrate data from high throughput experimental platforms with large scale computational genomics to address fundamental problems in cancer biology. Long-term, we are focused on identifying novel biomarkers and drug targets that can be translated into more effective means to diagnose and treat human cancers, an area marked for rapid growth as personalized and precision medicine come to the forefront." - ***Nidhi Sahni, PhD***

Lab Members: *Kara M. Cirillo, Raymond Zou, Sharad Awasthi, PhD; Sueda Cetinkaya, Sumanta Ghosh, PhD; Yang Li, PhD*

The Wood Lab (SCRB4, 4th Floor)

"My lab at MD Anderson was established in 2008. We study the mechanisms of genome stability, including biochemical mechanisms for repairing cross-links that form between DNA strands and the DNA polymerases that help cells tolerate DNA damage. It is important to understand the mechanisms of DNA repair in detail, because this process is a front-line defense against the mutations that cause cancer. Mammalian cells have numerous strategies for repair of DNA damage and devote many hundreds of genes and proteins to DNA repair. Moreover, the aim of many cancer therapies is to disable tumor DNA by using DNA-damaging radiation and drugs. Research in our lab ranges from fundamental biochemical studies and proteomics to cellular biology."
- Richard Wood, PhD

Lab Members: *Denisse Carvajal, PhD; Megan Lowery, Mélanie Prodhomme, PhD; Sarita Bhetawal, Yuzhen Li, PhD*

The Cole Lab (SCRB4, 4th Floor)

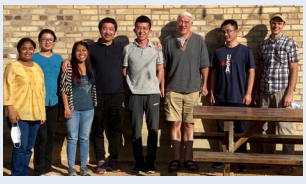
"A fundamental question in chromosome and reproductive biology is how cells ensure crossovers between each homolog. My laboratory uses a multidisciplinary approach to answer fundamental questions about the mechanisms of meiotic recombination and how these systems go awry in mammals. We have developed unique assays that can assess the frequency, distribution, and timing of specific recombination pathways. We combine these assays with extensive mouse genetics, cytological analysis, and modern genomics to provide a holistic and mechanistic view of meiotic recombination. My approach is motivated by the knowledge that we can gain significant insight into DNA repair by recombination leading to novel approaches to mitigate reproductive failure and for the prevention and treatment of diseases of DNA repair like cancer."
- Francesca Cole, PhD

Lab Members: *Aastha Pandey, PhD; Isabella Ferranti, Julie Ontiveros, Laskmi Paniker, PhD; Melissa Frasca, Parijat Chakraborti, PhD; Tolkappiyan Premkumar*

The Bedford Lab (SCRB4, 4th Floor)

"Since starting my research group at MD Anderson in 2000, I have taken a four-pronged approach to studying the biological roles of arginine methyltransferases (PRMTs). First, we generated mouse models of the different PRMTs (knockouts and gain-of-function mice) to provide genetically tractable systems for further studies. Second, we set up different screening approaches to identify the specific substrates of these enzymes. Third, we developed a protein domain microarray platform that can be used to identify proteins that "read" the methylated protein motifs. Finally, good PRMT inhibitors were recently developed by Pharma and these drugs are entering clinical trials. We are evaluating the in vivo efficacy of these compounds in mouse transgenic and PDX models."
- Mark Bedford, PhD

Lab Members: *Cari Sagum, Ishita Rehman, PhD; Sabrina Stratton, Swarna Manickavinayaham, PhD; Tanner Wright, Yalong Wang, PhD*



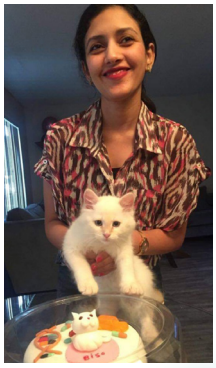
Other EMC Department Labs Moving to Houston:

Marcelo Aldaz Lab, Blaine Bartholomew Lab, Shawn Bratton Lab, Taiping Chen Lab, Sharon Dent Lab, Kevin McBride Lab, Ellen Richie Lab, and Han Xu Lab. All labs are in SCRB4, except the Chen lab, which is in BSRB.

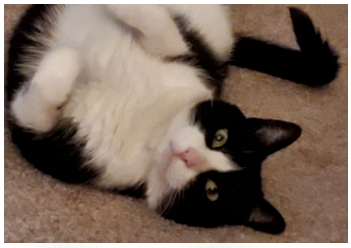
EMC Core Facilities Moving to Houston:

Protein Array and Analysis Core, Recombinant Antibody Production Core, Flow Cytometry and Cellular Imaging Core. All cores are in SCRB3.







Life Outside of Lab