The Leading Edge

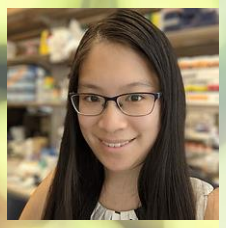
BCDB Newsletter *Spring 2022*

Welcome to our new program administrator, Amy Walker!

Amy's introduction: "I am from the Emory area (a true native). I actually attended Druid Hills High School located on Haygood Dr. I have a BS in Econ from the University of Georgia and an MBA in finance from Georgia State. I am here to support BCDB and MSP students in so many ways that I am still learning, so thanks for your patience! I love interacting with students, that is by far my favorite part of my job! I have been at Emory for over 5 years, I previously was the Program Coordinator for PM&R residents (my office was across Clifton in the Rehab Hospital). I have 3 kids (15, 17, and 19). My oldest is in his 2nd year at Georgia Tech and my 17 year old is deciding before May 1st where to go to college. I love to walk anywhere and everywhere, I walk to work on Tuesdays and Wednesdays which are my days in the office. I also love to read, find new local restaurants, and go on road trips. I am looking forward to getting to know everyone!"

Faculty Spotlight

Dr. David Gorkin joined Emory in 2021. His lab studies the cell's "epigenetic machinery" composed of proteins that read, write, and erase epigenetic information in the form of chemical modifications to the DNA and its associated packaging proteins. More specifically, the lab focuses on a type of epigenetic machinery called chromatin remodelers that control DNA packaging around histone proteins. These chromatin remodelers allow different cell types to achieve highly specialized gene expression programs from a single genetic blueprint and are thus essential for mammalian development. They are also among the most frequently mutated genes in human cancers and neurodevelopmental disorders. Dr. Gorkin's lab uses genomic and single-cell technologies to understand how this epigenetic machinery functions during development and how its malfunction can contribute to disease.



Dr. Shirley Zhang joined Emory in 2021. Her research focuses on the effect of peripheral signals on neurobiology and behavior. Currently, she is studying temporal mechanisms, including sleep and circadian rhythms, that regulate the passage of both endogenous particles and pharmacologic drugs into the brain under both normal conditions of inflammation. She uses fruit flies and cell culture blood-brain barrier models to identify and understand rhythms of molecular flux between the brain and periphery. She also uses mouse and fly models to study the result of those barrier rhythms on behavior and contribution to neurodegeneration.

Dr. Ken Moberg has been at Emory since 2003 and in BCDB since 2004. He has taught many modules in Foundations and served in various seats on the BCDB executive committee over the years. His scientific interests have evolved since coming to Emory. One side of his lab follows his career-long interest in signal transduction mechanisms that control the proliferation and survival of epithelial cells and more recently gut intestinal stem cells. Currently, this work is focused on the Hippo and steroid hormone receptor pathways, and on the fly homolog of the Fbw7 tumor suppressor, which he discovered as a postdoc. The other side of his lab is focused on understanding the molecular roles of a conserved RNA binding protein in brain neurons; this project is entirely the product of a serendipitous conversation over 10 years ago with a colleague in the Biochemistry (now Biology) department. Overall, he is inspired by science that blends phenotypic, cellular, and molecular approaches to uncover the developmental roles of Drosophila proteins that in turn provide insight into why their human orthologs are altered in diseases e.g., cancer and brain dysfunction.

Congratulations to our Program Director Dr. Christine Dunham and DGS Dr. Anita Corbett who were named 2022 fellows for the American Society of Biochemistry and Molecule Biology!

Check out the newest BCDB Student Publications:

- Congratulations to Kristen Easley for her co-author publication in *Sci Rep*! A medium composition containing normal resting glucose that supports differentiation of primary human airway cells. Morgan, R., Manfredi, C., Easley, K.F. et al.Sci Rep. 2022; https://doi.org/10.1038/s41598-022-05446-x.
- Congratulations to Julia de Amorim for her co-first author paper published in *JSPG*! Protecting Black and African Americans from Disproportionate Coal Ash Exposure. Julia de Amorim, L.M. Bradley, Nicholas Harbin, Evelyn Kimbrough. JSPG. 2022; doi:10.38126/JSPG200101.
- Congratulations to Kate Hutchinson for her co-first author paper published in *Curr Genet*! Variable penetrance of Nab3 granule accumulation quantified by a new tool for high-throughput single-cell granule analysis. Hunn, JC*, Hutchinson KM*, Kelley JB, Reines D. Curr Genet. 2022 Mar 17. doi:10.1007/s00294-022-01234-2. Epub ahead of print. PMID: 35301575.
- Congratulations to Heidi Ulrichs for her first author book chapter published in iPSCs – State of the Science! Chapter 7 - Induced pluripotent stem cells for studying genetic autonomic disorders. Ulrichs H, Wu HF, Zeltner N. iPSCs – State of the Science: Academic Pres. 2022. doi:10.1016/B978-0-323-85767-3.00010-4.
- Congratulations to Will McFadden and Lexi Snyder for their co-first author review published in *Retrovirology*! Rotten to the core: antivirals targeting the HIV-1 capsid core. McFadden, W.M., Snyder, A.A., Kirby, K.A., Tedburry, P.R., Raj, M., Wang, Z.Q., Sarafianos, S.G. *Retrovirology*. 2021; 18, 41. doi:10.1186/s12977-021-00583-z.

Get to know our first years

Sarah Webster

Hometown: Munster, Indiana
Undergraduate institution: University of Wisconsin - Madison
Spirit animal: a grizzly bear because they love snacking and the mountains.
Why did you choose Emory's BCDB program? I liked that the students knew the professors well and were comfortable interacting with them on an informal basis

Sara Sagadiev

Hometown: Almaty, Kazakhstan
Undergraduate institution: University of Washington
Spirit animal: Pandas, because, like me, they like to eat and munch on something.
Why did you choose Emory's BCDB program? There is a lot of interdisciplinary research.
Research interests: Virology and immunology

Lauren Askew
MD/PhD student

Hometown: Newport News, Virginia
Undergraduate institution: University of North Carolina at Chapel Hill
Favorite thing about Atlanta: The rooftop bars
Research interests: I'm interested in gastrointestinal development, the microbiome, and the development of therapeutics for GI-related illnesses

Jordan Goldy

Hometown: Clemmons, North Carolina
Undergraduate institution: Western Carolina University
Fun fact: I'm from a really small town, and I grew up on a farm.
Why did you choose Emory's BCDB program? Talking with faculty and students I saw how supportive the people in the program are. That's really important in grad school.

Felipe Takaesu

Hometown: São Paulo, Brazil
Undergraduate institution: The Johns Hopkins University
Fun fact: I got second-place in a pie eating competition in undergrad!
Favorite thing about Atlanta: I love the variety of places that I can go for a run in the city.
Research interests: Regenerative medicine, stem cell reprogramming, and bioinformatics

Hannah Lute

Hometown: Lake Orion, Michigan
Undergraduate institution: Grand Valley State University
Favorite thing about Atlanta: My favorite thing about Atlanta is all of the different small businesses and shopping.
Research interests: Protein structure and drug discovery

Grace Neilson

Hometown: Orem, Utah
Undergraduate institution: Brigham Young University
Spirit animal: Giraffe. They are tall. I am tall. Their name starts with G. My name starts with G.
Favorite thing about Atlanta: How many trees there are. (I'm from the desert.)
Research interests: Virology, biochemistry

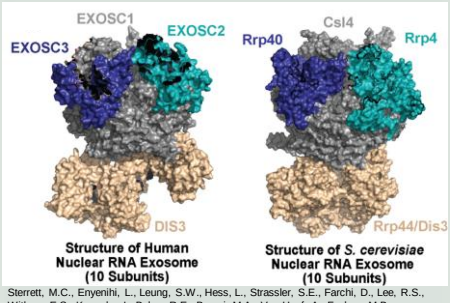
Maria Sterrett provides insight into her recent publication in *RNA*

"Myself and the Corbett lab recently published our manuscript "A Budding Yeast Model for Human Disease Mutations in the EXOSC2 Cap Subunit of the RNA Exosome" in the journal RNA. This story is part of our larger RNA exosome project, which has also been the focus of my thesis work. The RNA exosome is a highly conserved molecular machine that processes and/or degrades nearly every class of RNA within our cells. Recently, mutations in components of this molecular machine have been linked to a collection of distinct tissue specific diseases, now classified as "RNA Exosomopahties". This recent publication assesses one of those RNA exosomopathy linked mutations, *EXOSC2 G198D,* using the budding yeast model system. Our work finds that this RNA exosomopathy mutation, modeled as *rrp4 G226D* in the orthologous yeast RNA exosome, results in distinct functional consequences in the RNA exosome including accumulation of non-coding, pervasive RNA species known as CUTs/SUTs as well as disrupted interactions with an essential RNA helicase Mtr4. These molecular defects could underlie patient pathology and provides a basis for how to assess the distinct functional consequences resulting from each RNA exosomopathy mutation *in vivo*. I am particularly proud of this manuscript as it is not only my first first-authorship publication, but I share authorship with some very talented undergraduate mentees, including my co-first author Liz Enyenihi. Liz was an outstanding undergraduate student in the Corbett lab who is now pursuing her MD/PhD at Harvard University. Furthermore, my fellow BCDB'er, Sarah Strassler, contributed to this publication and helped train several undergraduate authors on how to how to structurally model RNA exosomopathy mutations. This publication represents to me the collaborative nature of our program as well as the commitment to undergraduate education and training that is central to Emory University's Biology Department." *-Maria*

Acknowledgements

Congratulations on a very successful recruitment BCDB! Many thanks to all the faculty, staff, and students who helped with recruitment. Thank you to our recruitment committee -
Drs. **Jen Kwong** (lead), **Guy Benian**, **Anita Corbett**, **Mike Koval**, **Bo Liang**, **Greg Melikian**, **Shashank Shekhar**, **Graeme Conn**, and **Christine Dunham**
and the student leads –
Julia Tanquary, **Kate Hardin**, **Will McFadden**, and **Hannah Hrncir**.
Finally, thank you to our PA **Amy Walker** for her help organizing recruitment events.

This newsletter was written and compiled by Dr. Bo Liang, Paul Zakutansky, and Hannah Hrncir.



Structure of Human Nuclear RNA Exosome (10 Subunits)

Structure of *S. cerevisiae* Nuclear RNA Exosome (10 Subunits)

Sterrett, M.C., Enyenihi, L., Leung, S.W., Hess, L., Strassler, S.E., Farchi, D., Lee, R.S., Withers, E.S., Kremsky, I., Baker, R.E., Basrai, M.A., Van Hoof, A., Fasken, M.B., Corbett, A.H., 2021. A budding yeast model for human disease mutations in the EXOSC2 cap subunit of the RNA exosome complex. RNA 27, 1046–1067.. doi:10.1261/rna.078618.120