

Daniel C. Brock

MD/PhD Student at Baylor College of Medicine Medical Scientist Training Program (MSTP)

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Interests: Genomics, neurodegeneration, inherited retinal diseases, epigenetics, and splicing.



Education

Baylor College of Medicine, Houston, TX

Medical Scientist Training Program

PhD in Genetics & Genomics

Jul/2022 – Present

University of Washington, Seattle, WA

B.S. with Honors and Distinction

Biochemistry, Molecular Cellular & Developmental Biology

Aug/2015 – Jul/2019

Research Positions

Zoghbi Lab, Alzheimer's Disease Section, Baylor College of Medicine, Houston, TX

Graduate Student Rotation. Computational and bench work analysis of Tau splicing to promote splicing of aggregation-resistant isoforms.

Jul/2024 – Sep/2024

Chen Lab, Human Genetics Section, Baylor College of Medicine, Houston, TX

Medical Student. Analyzing computational tools to predict pathogenic variants for autosomal dominant inherited retinal diseases.

May/2023 – Apr/2024

Swaroop Lab, Retinal Development Genetics & Therapy Section, NEI-NIH, Bethesda, MD

Postbac IRTA Fellow. Uncovering the role of diet in the epigenetic and transcriptomic aging process in the retina.

Apr/2020 – Jun/2022

Kaplan Lab, Pediatric Oncology Branch, NCI-NIH, Bethesda, MD

Postbac CRTA Fellow. Genetically engineering mesenchymal stem cells with extracellular matrix remodeling enzymes to target the tumor microenvironment of pancreatic cancer.

Sep/2019 – Apr/2020

Brockerhoff Lab, Department of Biochemistry, University of Washington, Seattle, WA

Undergraduate Research Assistant. Measuring calcium flux in the retinal photoreceptor mitochondria. Tracking circadian gene expression changes in zebrafish cone photoreceptors.

Aug/2017 – Jul/2019

Clinical Experience

Neurology Core Clerkship, Baylor College of Medicine, Houston, TX Texas Children's Hospital – Consult Service Baylor St. Lukes Medical Center – ICU	May/2024 – Jun/2024
Psychiatry Core Clerkship, Baylor College of Medicine, Houston TX Texas Children's Hospital – Inpatient Psychiatry Consults Baylor Psychiatry Clinic – Outpatient Psychiatry	Apr/2024 – May/2024
Surgery Core Clerkship, Baylor College of Medicine, Houston, TX Texas Children's Hospital – General Surgery Ben Taub Hospital – Cardiothoracic Surgery	Feb/2024 – Apr/2024
Internal Medicine Core Clerkship, Baylor College of Medicine, Houston, TX Ben Taub Hospital Michael E. DeBakey VA Medical Center Baylor St. Luke's Medical Center – Pulmonology	Jan/2024 – Feb/2024
Shadowing: Baylor College of Medicine, Houston, TX Tim Stout, MD, PhD – Ophthalmology: 50 hours Reid Sutton, MD – Medical Genetics: 15 hours	Sep/2022 – June/2023
Shadowing: NIH, Bethesda, MD Henry Masur, MD – Infectious Diseases: 15 hours Rosandra Kaplan, MD – Pediatric Oncology: 12 hours Les Folio, MD – Radiology: 32 hours Emily Chew, MD – Ophthalmology: 20 hours	Oct/2019 – Jun/2022
Sorrow Lab, Clinical Research Division, Fred Hutch, Seattle, WA Summer Volunteer Intern. Monitoring the mental and physical health of elderly acute myeloid leukemia patients. 700 hours	May/2016 – Nov/2016
University of Washington Medical Center, Seattle, WA Helped transport patients between various units, delivered gifts, and stocked hospital supplies. 252 hours	Dec/2015 – May/2017

Publications

- Giarmarco M, Seto J, **Brock D**, Brockerhoff S. Spatial detection of mitochondrial DNA and RNA in tissues. *Frontiers in Cell and Developmental Biology*. 2024;12. [doi:10.3389/fcell.2024.1346778](https://doi.org/10.3389/fcell.2024.1346778)
- Brock DC**, Wang M, Hussain HMJ, Rauch DE, Marra M, Pennesi ME, Yang P, Everett L, Ailan RS, Colbert J, Porto FBO, Matynia A, Gorin MB, Koenekoop RK, Lopez I, Sui R, Zou G, Li Y, Chen R. Comparative analysis of in-silico tools in identifying pathogenic variants in dominant inherited retinal diseases. *Human Molecular Genetics*. Published online March 7, 2024:ddae028. [doi:10.1093/hmg/ddae028](https://doi.org/10.1093/hmg/ddae028)
- Mondal AK*, **Brock DC***, Rowan S*, Yang ZH, Rojulpote KV, Smith KM, Francisco SG, Bejarano E, English MA, Deik A, Jeanfavre S, Clish CB, Remaley AT, Taylor A, Swaroop

- A. *Equal Contribution. Selective transcriptomic dysregulation of metabolic pathways in liver and retina by short- and long-term dietary hyperglycemia. *iScience*. 2024;27(2). [doi:10.1016/j.isci.2024.108979](https://doi.org/10.1016/j.isci.2024.108979)
4. Yang ZH, Gorusupudi A, Lydic TA, Mondal AK, Sato S, Yamazaki I, Yamaguchi H, Tang J, Rojulpote KV, Lin AB, Decot H, Koch H, **Brock DC**, Arunkumar R, Shi ZD, Yu ZX, Pryor M, Kun JF, Swenson RE, Swaroop A, Bernstein PS, Remaley AT. Dietary fish oil enriched in very-long-chain polyunsaturated fatty acid reduces cardiometabolic risk factors and improves retinal function. *iScience*. 2023;26(12):108411. [doi:10.1016/j.isci.2023.108411](https://doi.org/10.1016/j.isci.2023.108411)
 5. Smith AJ, Advani J, **Brock DC**, Nellissery J, Gumerson JD, Dong L, Aravind L, Kennedy B, Swaroop A. GATD3A, a mitochondrial deglycase with evolutionary origins from gammaproteobacteria, restricts the formation of advanced glycation end products. *BMC Biology*. 2022;20(1):68. [doi:10.1186/s12915-022-01267-6](https://doi.org/10.1186/s12915-022-01267-6)
 6. Cleghorn WM, Burrell AL, Giarmarco MM, **Brock DC**, Wang Y, Chambers ZS, Du J, Kollman JM, Brockerhoff SE. A highly conserved zebrafish IMPDH retinal isoform produces the majority of guanine and forms dynamic protein filaments in photoreceptor cells. *Journal of Biological Chemistry*. 2022;298(1). [doi:10.1016/j.jbc.2021.101441](https://doi.org/10.1016/j.jbc.2021.101441)
 7. Giarmarco MM, **Brock DC**, Robbins BM, Cleghorn WM, Tsantilas KA, Kuch KC, Ge W, Rutter KM, Parker ED, Hurley JB, Brockerhoff SE. Daily mitochondrial dynamics in cone photoreceptors. *Proceedings of the National Academy of Sciences*. 2020;117(46):28816-28827. [doi:10.1073/pnas.2007827117](https://doi.org/10.1073/pnas.2007827117)
 8. Hutto RA, Bisbach CM, Abbas F, **Brock DC**, Cleghorn WM, Parker ED, Bauer BH, Ge W, Vinberg F, Hurley JB, Brockerhoff SE. Increasing Ca²⁺ in photoreceptor mitochondria alters metabolites, accelerates photoresponse recovery, and reveals adaptations to mitochondrial stress. *Cell Death & Differentiation*. 2020;27(3):1067-1085. [doi:10.1038/s41418-019-0398-2](https://doi.org/10.1038/s41418-019-0398-2)

Presentations

1. **Brock DC**, Wang M, Hussain HMJ, Rauch DE, Marra M, Pennesi ME, Li Y, Chen R. *Comparative Analysis of in-silico Tools for Identifying Pathogenic Variants in Autosomal Dominant Inherited Retinal Diseases*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), Seattle, WA (May 2024).
2. Rauch DE, Wang M, Hussain HMJ, **Brock DC**, Li Y, Marra M, Pennesi ME, Tang P, Everett L, Lopez I, Koenekoop R, Collantes ER, Bolinao JG, Chen R. *Using Machine Learning to Assess the Pathogenicity of In-frame Indel Variants in IRD Patients*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), Seattle, WA (May 2024).
3. **Brock DC**, Wang M, Hussain HMJ, Rauch DE, Marra M, Pennesi ME, Li Y, Chen R. *Comparative Analysis of in-silico Tools for Identifying Pathogenic Variants in Autosomal Dominant Inherited Retinal Diseases*. Poster presented at the 2024 Henry J.N. Taub & James K. Alexander Medical Students Research Symposium at Baylor College of Medicine in Houston, TX (March 2024).
4. **Brock DC**, Wang M, Hussain HMJ, Rauch DE, Marra M, Pennesi ME, Li Y, Chen R. *Comparative Analysis of in-silico Tools for Identifying Pathogenic Variants in Autosomal*

- Dominant Inherited Retinal Diseases*. Poster presented at the 29th Annual Neuroscience Poster Session at UT Health Houston, Houston, TX (December 2023).
5. Mondal AK, **Brock DC**, Gumerson J, Yang ZH, Rojulpote KV, Kun J, Tang J, Kiang K, Nellissery J, Remaley A, Chew EY, Swaroop A. *Diet- and sex-related responses in the aging retina identified by multi-omics approach*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), New Orleans, LA (May 2023).
 6. **Brock DC**, Rowan S, Mondal AK, English M, Taylor A, Swaroop A. *Nrf2 Knockout Mice Exhibit High Glycemic Index Diet Associated Transcriptomic Alterations in Liver and Retina*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), Denver, CO (May 2022).
 7. Mondal AK, **Brock DC**, Gumerson J, Jiang K, Nellissery J, Chew E, Swaroop A. *Diet, Aging, and Retinal Homeostasis*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), Denver, CO (May 2022).
 8. **Brock DC**, Rowan S, Mondal AK, Taylor A, Swaroop A. *Nrf2 Knockout Mice Exhibit High Glycemic Associated Transcriptomic Alterations in the Retina*. Poster Presented at the NIH Postbac Poster Day, Bethesda, MD (April 2021).
 9. **Brock DC**, Rowan S, Mondal AK, Taylor A, Swaroop A. *Nrf2 Knockout Mice Exhibit High Glycemic Diet Associated Transcriptomic Alterations in the Retina*. Presented at the American Physician Scientist Association South Regional Conference at the South Texas Medical Scientist Training Program, (March 2022).
 10. **Brock DC**, Mondal AK, Jiang K, Nellissery J, Gumerson J, Swaroop A. *Dietary Factors such as the Western and Mediterranean Diet Modulate Aging in the Mouse Retina*. Presented at the APSA West Regional Conference at Oregon Health & Science University, (Jan 2022).
 11. **Brock DC**, Mondal AK, English M, Geiser L, Rowan S, Taylor A, Swaroop A. *Transcriptomic alterations in Nrf2 knockout mice reveal susceptibility to retinal degeneration in response to a high glycemic diet*. Presented at the NIH Postbac PEP Talks, (Nov 2021).
 12. **Brock DC**, Mondal AK, English M, Geiser L, Rowan S, Taylor A, Swaroop A. *Transcriptomic alterations in Nrf2 knockout mice reveal susceptibility to retinal degeneration in response to a high glycemic diet*. Presented at the 2021 Focus on Fellows Retreat at the National Eye Institute, (Oct 2021).
 13. **Brock DC**, Smith AJ, Advani J, Nellissery J, Gumerson J, Swaroop A. *Function of the Novel Mitochondrial Deglycase Enzyme GATD3A in the Mouse Retina*. Virtual poster presented at the Association for Research in Vision and Ophthalmology (ARVO), (April 2021).
 14. **Brock DC**, Smith AJ, Advani J, Nellissery J, Gumerson J, Swaroop A. *Function of the Novel Mitochondrial Deglycase Enzyme GATD3A in the Mouse Retina*. Virtual poster presented at Postbac Poster Day at the NIH, Bethesda, MD (April 2021).
 15. **Brock DC**. *A Multi-Omics Study of how Dietary Choices Modulate the Epigenome of Aging Mouse Retinas*. Virtual talk given at the Postbac Seminar Series at the NIH, Bethesda, MD (Feb 2021).
 16. **Brock DC**, Sowder ME, Ju W, Kaplan RN. *Understanding Common Signaling Axes in Osteosarcoma to Target Tumor Cells and the Microenvironment*. Virtual poster presented at Postbac Poster Day at the NIH, Bethesda, MD (April 2020).
 17. Giarmarco MM, **Brock, DC**, Cleghorn WM, Tsantilas KA, Rutter KM, Robbins BM, Kuch KC, Ge W, Evans A, Parker E, Hurley HB, Brockerhoff SE. *A day in the life of a*

photoreceptor: Mitochondrial dynamics support daily energy demands. Poster presented at the University of Washington Biochemistry Retreat, Bainbridge Island, WA (Sep 2019).

18. **Brock DC**, Giarmarco MM, Cleghorn WM, Tsantilas KA, Kuch KC, Ge W, Brockerhoff SE. *Circadian Mitochondrial Dynamics in Zebrafish Cone Photoreceptors*. Poster presented at the University of Washington Undergraduate Research Symposium, Seattle, WA (May 2019).
19. **Brock DC**, Giarmarco MM, Cleghorn WM, Tsantilas KA, Ge W, Brockerhoff SE. *Mitochondrial Biogenesis in Zebrafish Cone Photoreceptors*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), Vancouver, BC (April 2019).
20. **Brock DC**, Hutto RA, Bisbach CM, Brockerhoff SE. *Ca²⁺ Regulation in the Retinal Mitochondria*. Poster presented at the University of Washington Undergraduate Research Symposium, Seattle, WA (May 2018).

Volunteering and Community Service

Vision Screener, Houston TX

Nov/2022 – Present

Conduct vision screenings for Houston's underserved population with Prevent Blindness Texas. Screening locations include:

Dia De La Mujer Latina

Casa Maria Clinic

HOMES Clinic

OpenGate Homeless Ministries

Refugee Health Fair

HOMES Clinic, Houston, TX

Sep/2022 – Present

Volunteer student-run clinic serving Houston's homeless population

Associate Director of Research

Manager and Clinical Student

Organizer for HOMES Ophthalmology Clinic

Organizer of the Biannual Health Fair in November, 2023

Office of Intramural Training, Bethesda, MD

Mar/2022 – Jun/2022

Advised MD/PhD applicants on schools lists and personal statements

MCAT Tutor

Silver Spring Village, Silver Spring, MD

May/2020 – May/2021

Delivered food and prescriptions to elderly during the pandemic

Maskeraid and Johns Hopkins University, Baltimore, MD

Apr/2020 – May/2021

Emergency PPE manufacturing and delivery

Montgomery Parks, Bethesda, MD

Jan/2020 – Jun/2022

Maintained local trails and parks in Montgomery County

Washington Trails Association, Seattle, WA

Jul/2016 – Sep/2018

Maintained Blanca Lake Trail in the Cascade Mountains

Leadership

Ophthalmology Interest Group, Baylor College of Medicine Vice President (March 2024 – Present) Medical Student Representative (March 2023 – March 2024)	Aug/2022 – Present
Genetics Interest Group, Baylor College of Medicine President (May 2024 – Present) Outreach Coordinator (September 2023 – May 2024)	Aug/2022 – Present
MSTP Student Operating Committee, Baylor College of Medicine Interview Committee Seminar Committee Student volunteer for MSTP recruiting weekend	Aug/2022 – Present
American Physician Scientists Association Organizer for the 2025 APSA South Regional Conference (Present) Co-chair, Technology Committee (April 2023 – Present) Peer mentor for undergraduates (August 2022 – Present) Social media manager for Twitter (July 2022 – April 2023)	Jul/2022 – Present
Postbac Committee, NIH, Bethesda, MD Chair	Mar/2021 – Mar/2022
University of Washington Pre-Physician Scientist Club, Seattle, WA Founder and Alumni Leader	July/2020 – Jun/2022
NIH Bike Club & NIH Hiking Club, Bethesda, MD Founder and President	May/2020 – Jun/2022
University of Washington Undergraduate Research Leader, Seattle, WA	Sep/2018 – Jun/2019

Grants and Awards

NIH R13 Grant, Lead Author <i>2025 APSA South Regional Conference: Meeting the Needs</i> National Institute of General Medical Sciences (NIGMS) Awarded Score: 14 Proposed Funding: \$20,000 Funding will primarily support travel scholarships for undergraduates and MD/PhD students, with a focus on underrepresented groups in medicine.	Sep/2024
Henry J.N. Taub Young Investigator Award, Third Place Award: \$100 2024 Henry J.N. Taub & James K. Alexander Medical Student Research Symposium	Mar/2024
Gold Humanism Honor Society Service Project Grant <i>Eye Care for Houston's Underserved Communities</i> Award: \$500 Baylor College of Medicine Gold Humanism Honors Society Funding used to purchase reading glasses, sunglasses, and eyedrops to donate at local Harris County healthfairs.	Mar/2024

Knights Templar Eye Foundation Travel Grant Award: \$750 Association for Research in Vision and Ophthalmology (ARVO)	Feb/2024
Distinction in Clinic Management HOMES Clinic	Jan/2024
NIH Outstanding Poster Award National Eye Institute	May/2022
Second Place Poster Award APSA South Regional Conference, South Texas MSTP	Mar/2022
Office of Dietary Supplements Grant, Assistant Writer Proposed Funding: \$100,000 Assisted with writing a research grant with Anupam Mondal in the Swaroop Lab.	Oct/2020 – Present
Cum Laude University of Washington	Jun/2019
Distinguished Research in Biochemistry Award University of Washington	Jun/2019
Undergraduate Research Travel Award Award: \$500 University of Washington, recipient and first author	Apr/2019
Levinson Scholarship <i>Mitochondrial Biogenesis in Zebrafish Cone Photoreceptors</i> Scholarship Funds: \$7,000 University of Washington, recipient and first author	Sep/2018 – Jun/2019