

Daniel C. Brock

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

Daniel.Brock@bcm.edu

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Interests: Genetics, bioinformatics, neurodegeneration, retinal degeneration, gene editing, nutrition, and precision medicine.



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

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

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

May/2023 – Dec/2023

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

Surgery Core Clerkship, Baylor College of Medicine, Houston, TX

Texas Children's Hospital – General Surgery

Ben Taub Hospital – Cardiothoracic Surgery

Feb/2024 – Present

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| 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 |
| Sorrer 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

1. **Brock DC**, Wang M, Hussain HMJ, Rauch DE, Marra M, Pennesi ME, Yang P, Everett L, Ajlan 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)
2. 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)
3. 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)
4. 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)
5. 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)

6. 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)
7. 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 Differ*. 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 2024 Henry J.N. Taub & James K. Alexander Medical Students Research Symposium at Baylor College of Medicine in Houston, TX (March 2024).
2. **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).
3. **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).
4. Mondal AK, **Brock DC**, Gumerson J, Jiang K, Nellissery J, Chew E, Swaroop A. *Retinal responses to aging and nutrition*. Poster presented at the Association for Research in Vision and Ophthalmology (ARVO), Denver, CO (May 2022).
5. **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).
6. **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).
7. **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).
8. **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).
9. **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).

10. **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).
11. **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).
12. **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).
13. **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).
14. 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).
15. **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).
16. **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).
17. **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

Conducted vision screenings for Houston's underserved population
OpenGate Homeless Ministries
Dia De La Mujer Latina
HOMES Ophthalmology Clinic

HOMES Clinic, Houston, TX

Sep/2022 – Present

Volunteer Student-run Clinic serving Houston's homeless population
Manager and Clinical Student
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

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

Student Operating Committee, Baylor College of Medicine **Aug/2022 – Present**
Interview MD/PhD applicants
Arrange group discussions and second look
Organizer for the 2025 APSA South Regional Conference

American Physician Scientists Association **Jul/2022 – Present**
South Regional Conference Organizer (October 2023 – Present)
Co-chair, Technology Committee (April 2023 – Present)
Social media manager for Twitter (July 2022 – April 2023)
Peer mentor for undergraduates

Postbac Committee, NIH, Bethesda, MD **Mar/2021 – Mar/2022**
Chair

University of Washington Pre-Physician Scientist Club, Seattle, WA **July/2020 – Jun/2022**
Founder and Alumni Leader

NIH Bike Club, NIH Hiking Club, NIH Movie Club, Bethesda, MD **May/2020 – Jun/2022**
Founder and President

University of Washington Undergraduate Research Leader, Seattle, WA **Sep/2018 – Jun/2019**

Grants and Awards

Henry J.N. Taub Young Investigator Award, Third Place **Mar/2024**
2024 Henry J.N. Taub & James K. Alexander Medical Students
Research Symposium

Gold Humanism Honor Society Service Project Grant (\$500) **Mar/2024**
“Eye Care for Houston’s Underserved Communities”
Baylor College of Medicine Gold Humanism Honors Society

Knights Templar Eye Foundation Travel Grant (\$750) **Feb/2024**
Association for Research in Vision and Ophthalmology (ARVO)

Distinction in Clinic Management **Jan/2024**
HOMES Clinic

NIH Outstanding Poster Award **May/2022**
National Eye Institute

Second Place Poster Award **Mar/2022**

APSA South Regional Conference, South Texas MSTP

Office of Dietary Supplements Grant (\$100k)

Oct/2020 – Present

Assisted with writing a research grant with Anupam Mondal in the Swaroop Lab.

Cum Laude

Jun/2019

University of Washington

Distinguished Research in Biochemistry Award

Jun/2019

University of Washington

Undergraduate Research Travel Award (\$500)

Apr/2019

University of Washington, recipient and first author

Levinson Scholarship (\$7000)

Sep/2018 – Jun/2019

University of Washington, recipient and first author