

# 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

**Dhindsa Lab, Neurodevelopmental Genetics, Baylor College of Medicine, Houston, TX**

Graduate Student Rotation. Perturb-seq analysis of Histone H3K4 methylase genes linked to neurodevelopmental disorders.

**Oct/2024 – Dec/2024**

**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**

**Aug/2017 – Jul/2019**

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

## Clinical Experience

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

## 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, 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)

3. 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 Ca<sup>2+</sup> 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. Ravanmehr V, **Brock DC**, Dhindsa JS, Hu F, Han A, Li X, Nandigam L, Wang Q, Tran N, Petrovski S, Dhindsa RS. Heterozygous missense variants in VSX2 are associated with retinal detachment. Poster presented at the American Society of Human Genetics (ASHG), Denver, CO (Nov 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 Association for Research in Vision and Ophthalmology (ARVO), Seattle, WA (May 2024).
3. 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).

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 2024 Henry J.N. Taub & James K. Alexander Medical Students Research Symposium at Baylor College of Medicine in Houston, TX (March 2024).
5. **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 29<sup>th</sup> Annual Neuroscience Poster Session at UT Health Houston, Houston, TX (December 2023).
6. 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).
7. **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).
8. 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).
9. **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).
10. **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).
11. **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).
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 NIH Postbac PEP Talks, (Nov 2021).
13. **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).
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 the Association for Research in Vision and Ophthalmology (ARVO), (April 2021).
15. **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).

16. **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).
17. **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).
18. 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).
19. **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).
20. **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).
21. **Brock DC,** Hutto RA, Bisbach CM, Brockerhoff SE. *Ca<sup>2+</sup> Regulation in the Retinal Mitochondria.* Poster presented at the University of Washington Undergraduate Research Symposium, Seattle, WA (May 2018).

## Grants and Awards

### McNair Scholarship

Oct/2024

Scholarship Funds: \$43,500 per year

The Robert and Janice McNair Foundation donates to Baylor College of Medicine's MD/PhD program to support promising trainees. The McNair scholarship provides funding for four years of graduate school and two years of medical school. This allows trainees to undertake more innovative projects and form new connections.

### NIH R13 Grant, Lead Author

Apr/2024

2025 APSA South Regional Conference: Meeting the Needs

National Institute of General Medical Sciences (NIGMS)

Awarded Funding: \$19,200

Awarded Score: 14

Notice of Award: 12/3/2024

Funding to support travel scholarships for undergraduates and MD/PhD students, with a focus on underrepresented groups in medicine

### Henry J.N. Taub Young Investigator Award, Third Place

Mar/2024

Award: \$100

2024 Henry J.N. Taub & James K. Alexander Medical Student Research Symposium

### Gold Humanism Honor Society Service Project Grant

Mar/2024

*Eye Care for Houston's Underserved Communities*

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.

**Knights Templar Eye Foundation Travel Grant****Feb/2024**

Award: \$750

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, Assistant Writer****Oct/2020 – Present**

Proposed Funding: \$100,000

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****Apr/2019**

Award: \$500

University of Washington, recipient and first author

**Levinson Scholarship****Sep/2018 – Jun/2019***Mitochondrial Biogenesis in Zebrafish Cone Photoreceptors*

Scholarship Funds: \$7,000

University of Washington, recipient and first author

## Leadership

**Student Opportunities for Advancement in Research, Baylor College of Medicine****Dec/2024 – Present**

Presenter for how to write research abstracts and design posters

**Future Leaders in Sight (FLIS)****Apr/2024 – Present**

Representative for Baylor College of Medicine

Medical student-led advocacy group for supporting ophthalmology legislation

**Ophthalmology Interest Group, Baylor College of Medicine****Aug/2022 – Present**

Vice President (March 2024 – Present)

Medical Student Representative (March 2023 – March 2024)

**Genetics Interest Group, Baylor College of Medicine****Aug/2022 – Present**

|  |                             |
|--|-----------------------------|
| President (May 2024 – Present)   |                             |
| Outreach Coordinator (September 2023 – May 2024)                           |                             |
| <b>MSTP Student Operating Committee, Baylor College of Medicine</b>        | <b>Aug/2022 – Present</b>   |
| Interview Committee  |                             |
| Seminar Committee  |                             |
| Student volunteer for MSTP recruiting weekend                              |                             |
| APSA Institutional Representative  |                             |
| <b>American Physician Scientists Association</b>                           | <b>Jul/2022 – Present</b>   |
| 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)                  |                             |
| <b>Postbac Committee, NIH, Bethesda, MD</b>                                | <b>Mar/2021 – Mar/2022</b>  |
| Chair  |                             |
| <b>University of Washington Pre-Physician Scientist Club, Seattle, WA</b>  | <b>July/2020 – Jun/2022</b> |
| Founder and Alumni Leader  |                             |
| <b>NIH Bike Club &amp; NIH Hiking Club, Bethesda, MD</b>                   | <b>May/2020 – Jun/2022</b>  |
| Founder and President  |                             |
| <b>University of Washington Undergraduate Research Leader, Seattle, WA</b> | <b>Sep/2018 – Jun/2019</b>  |

## Volunteering and Community Service

|   |                            |
|---|----------------------------|
| <b>Vision Screener, Houston TX</b>  | <b>Nov/2022 – Present</b>  |
| 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   |                            |
| <b>HOMES Clinic, Houston, TX</b>  | <b>Sep/2022 – Present</b>  |
| 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   |                            |
| <b>Office of Intramural Training, Bethesda, MD</b>  | <b>Mar/2022 – Jun/2022</b> |
| Advised MD/PhD applicants on schools lists and personal statements  |                            |
| MCAT Tutor  |                            |
| <b>Silver Spring Village, Silver Spring, MD</b>   | <b>May/2020 – May/2021</b> |
| Delivered food and prescriptions to elderly during the pandemic   |                            |
| <b>Maskeraid and Johns Hopkins University, Baltimore, MD</b>  | <b>Apr/2020 – May/2021</b> |
| Emergency PPE manufacturing and delivery  |                            |

**Montgomery Parks, Bethesda, MD**

Maintained local trails and parks in Montgomery County

**Jan/2020 – Jun/2022**

**Washington Trails Association, Seattle, WA**

Maintained Blanca Lake Trail in the Cascade Mountains

**Jul/2016 – Sep/2018**