

# Daniel C. Brock

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

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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**

**May/2023 – Dec/2023**

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

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

**Apr/2020 – Jun/2022**

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

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

**Sep/2019 – Apr/2020**

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

**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

**Neurology Core Clerkship, Baylor College of Medicine, Houston, TX**

**May/2024 – Jun/2024**

Texas Children's Hospital – Consult Service  
Baylor St. Lukes Medical Center – ICU

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

## 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, Aylan 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)
- 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. **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 29<sup>th</sup> 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, Robbings 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. *Ca<sup>2+</sup> 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 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 of the Biannual Health Fair in November, 2023

Organizer for HOMES Ophthalmology Clinic

### 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

### 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)

### MSTP Student Operating Committee, Baylor College of Medicine

Aug/2022 – Present

Interview MD/PhD applicants  
Organize group discussions and recruiting weekend

<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)	
Social media manager for Twitter (July 2022 – April 2023)	
Peer mentor for undergraduates (August 2022 – Present)	
<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, NIH Hiking Club, NIH Movie 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>

## Grants and Awards

<b>Henry J.N. Taub Young Investigator Award, Third Place (\$100)</b>	<b>Mar/2024</b>
2024 Henry J.N. Taub & James K. Alexander Medical Students Research Symposium	
<b>Gold Humanism Honor Society Service Project Grant (\$500)</b>	<b>Mar/2024</b>
“Eye Care for Houston’s Underserved Communities” Baylor College of Medicine Gold Humanism Honors Society	
<b>Knights Templar Eye Foundation Travel Grant (\$750)</b>	<b>Feb/2024</b>
Association for Research in Vision and Ophthalmology (ARVO)	
<b>Distinction in Clinic Management</b>	<b>Jan/2024</b>
HOMES Clinic	
<b>NIH Outstanding Poster Award</b>	<b>May/2022</b>
National Eye Institute	
<b>Second Place Poster Award</b>	<b>Mar/2022</b>
APSA South Regional Conference, South Texas MSTP	
<b>Office of Dietary Supplements Grant (\$100k)</b>	<b>Oct/2020 – Present</b>
Assisted with writing a research grant with Anupam Mondal in the Swaroop Lab.	
<b>Cum Laude</b>	<b>Jun/2019</b>
University of Washington	
<b>Distinguished Research in Biochemistry Award</b>	<b>Jun/2019</b>
University of Washington	
<b>Undergraduate Research Travel Award (\$500)</b>	<b>Apr/2019</b>
University of Washington, recipient and first author	
<b>Levinson Scholarship (\$7000)</b>	<b>Sep/2018 – Jun/2019</b>
University of Washington, recipient and first author	

