

Daniel C. Brock

Postbac Research Fellow, Neurobiology Neurodegeneration & Repair Laboratory, lab of Anand Swaroop, NEI-NIH

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Interests: Genetics, bioinformatics, neurodegeneration, mitochondria, aging, nutrition, and precision medicine.



Education

University of Washington, Seattle, WA

B.S. with Honors and Distinction

Biochemistry, Molecular Cellular & Developmental Biology

cGPA: 3.80, sGPA: 3.78

MCAT: 524 (132, 129, 132, 131)

Aug/2015 – Jul/2019

Research Positions

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.

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.

Brockhoff 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.

Apr/2020 – Present

Sep/2019 – Apr/2020

Aug/2017 – Jul/2019

Clinical Experience

Shadowing: Clinical Center, 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 (virtual): ~20 hours

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

University of Washington Medical Center, Seattle, WA

Helped transport patients between various units, delivered gifts, and stocked hospital supplies. 252 hours

Oct 2019 – Present

May/2016 – Nov/2016

Dec/2015 – May/2017

Publications

1. 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*, 20 (1), 68. <https://doi.org/10.1186/s12915-022-01267-6>
2. Cleghorn WM, Burrell AL, Giarmarco MM, **Brock DC**, Wang Y, Chambers ZS, Du J, Kollman JM, Brockerhoff SE. (Nov 2021). A highly conserved zebrafish IMPDH retinal isoform produces the majority of guanine and forms dynamic protein filaments in photoreceptor cells. *Journal of Biological Chemistry*, 298 (1), 101441. <https://doi.org/10.1016/j.jbc.2021.101441>
3. Giarmarco MM, **Brock DC**, Robbins BM, Cleghorn WM, Tsantilas KA, Kuch KC, Ge W, Rutter KM, Parker ED, Hurley JB, Brockerhoff SE. (Nov 2020). Daily mitochondrial dynamics in cone photoreceptors. *Proceedings of the National Academy of Sciences of the United States of America*, 117(46), 28816–28827. <https://doi.org/10.1073/pnas.2007827117>
4. Hutto RA, Bisbach CM, Abbas F, **Brock DC**, Cleghorn WM, Parker ED, Bauer BH, Ge W, Vinberg F, Hurley JB, Brockerhoff SE. (Aug 2019). Increasing Ca²⁺ in photoreceptor mitochondria alters metabolites, accelerates photoresponse recovery, and reveals adaptations to mitochondrial stress. *Cell Death & Differentiation*, 27(3), 1067–1085. <https://doi.org/10.1038/s41418-019-0398-2>

Presentations

1. **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*. Future presentation at Association for Research in Vision and Ophthalmology (ARVO), (May 2022).
2. Mondal AK, **Brock DC**, Gumerson J, Jiang K, Nellissery J, Chew E, Swaroop A. *Retinal responses to aging and nutrition*. Future presentation at Association for Research in Vision and Ophthalmology (ARVO), (May 2022).
3. **Brock DC**, Rowan S, Mondal AK, Taylor A, Swaroop A. *Nrf2 Knockout Mice Exhibit High Glycemic Associated Transcriptomic Alterations in the Retina*. Future presentation at the Postbac Poster Day at the NIH, Bethesda, MD (April 2021).
4. **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).
5. **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).
6. **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).

7. **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).
8. **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).
9. **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).
10. **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).
11. **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).
12. 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).
13. **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).
14. **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).
15. **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

Office of Intramural Training , Bethesda, MD	Mar 2022 – Present
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 – Present
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

Postbac Committee , Bethesda, MD Chair	Mar 2021 – Mar 2022
University of Washington Pre-Physician Scientist Club , Seattle, WA Founder and Alumni Leader	July 2020 – Present
NIH Bike Club, NIH Hiking Club, NIH Movie Club , Bethesda, MD Founder and President	May 2020 – Present
NIH Postbac Seminar Series , Bethesda, MD Co-chair	
University of Washington Undergraduate Research Leader , Seattle, WA	Sep 2018 – Jun 2019

Grants and Awards

Second Place Poster Award , APSA South Regional Conference, South Texas MSTP	March 2022
Office of Dietary Supplements Grant (\$100k), assisted with writing a research grant with Anupam Mondal in the Swaroop Lab.	Oct 2020 – Present
Cum Laude , University of Washington	June 2019
Distinguished Research in Biochemistry Award , University of Washington	June 2019
Undergraduate Research Travel Award (\$500), University of Washington, recipient and first author	April 2019
Levinson Scholarship (\$7000), University of Washington, recipient and first author	Sep 2018 – Jun 2019