**Shane Peter D'Souza, PhD**
Curriculum Vitae, CV
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## EDUCATION

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|---|---|
| 2018 – 2023 | Cincinnati Children's Hospital Medical Center (CCHMC)<br>University of Cincinnati, OH<br>**Doctor of Philosophy (PhD)** in Molecular & Developmental Biology<br>Thesis Advisor: Richard A. Lang, PhD.<br>GPA: 4.0 |
| 2014 – 2018 | University of Kentucky, KY<br>**Bachelor of Science (BS)** in Biology (Honors)<br>GPA: 4.0 |

## RESEARCH EXPERIENCE

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|---|---|
| 2023 – Present | **Postdoctoral Research Fellow (Cincinnati Children's Hospital Medical Center)**<br>Division of Pediatric Ophthalmology<br>The Visual System Group, Abrahamson Pediatric Eye Institute |
| 2019 – 2023 | **PhD Candidate (Cincinnati Children's Hospital Medical Center)**<br>Divisions of Pediatric Ophthalmology & Developmental Biology<br>The Visual System Group, Abrahamson Pediatric Eye Institute<br>Center for Chronobiology |
| 2018 – 2019 | **Graduate Research Assistant (Cincinnati Children's Hospital Medical Center)**<br>Division of Developmental Biology |
| 2017 – 2018 | **Undergraduate Research Assistant (UKY College of Medicine)**<br>Department of Molecular & Cellular Biochemistry (Doug Andres Lab) |
| 2015 – 2016 | **Undergraduate Research Assistant (UKY College of Arts & Sciences)**<br>Department of Biological Sciences (Randal Voss Lab) |

## CURRENT RESEARCH PROJECTS

- Sensory-sculpted local circuits within the retina via transient communication between disparate photoreceptors
- Early visual experience drives neonatal homeostatic communication via short-lived ipRGC-to-pulvinar connectivity
- Project Anisotropy: A unified spatial atlas of retinal cell classes and types across mammals illuminates evolutionary diversification of homologous cell type.

- BrainBuildR: A toolkit to visualize and characterize central nervous system neurons using a microscopy-to-omic atlas framework.
- Divergent photopigment biophysics revealed by a shallow artificial neural-network architecture.

## FUNDING

### Funding Applications

**NIH NEI 1R01EY034456** – Melanopsin-dependent light-evoked development of rod photoreceptors [Funded].

> **Role**: Senior/Key personnel. All data, aims, and majority of the grant were generated by me as a graduate student between 2021-2022.

**NIH DP5DE032920 Early Independence Award** – Visual adaptations prior to eye-opening [Not discussed]. Score distributions: Significance (2,5,1) | Investigators (1,2,1) | Innovation (2,3,1) | Approach (2,7,2) | Environment (3,1,1).

> **Role:** PI/PD. Responsible for data, writing, etc.

**NIH DP5OD0379216 Early Independence Award** – The earliest visual experience in development of dim-light visual circuits [Not discussed].

Score distributions: Significance (5,4,3) | Investigators (1,1,3) | Innovation (3,3,1) | Approach (6,6,5) | Environment (4,3,3).

> **Role:** PI/PD. Responsible for data, writing, etc.

**Albert J. Ryan Pre-Doctoral Fellowship (2021-2022)** – University of Cincinnati

## PUBLICATIONS

**Peer Reviewed Publications | bioRxiv Preprint Versions**

**Retina & Visual Systems |**

Dyer B, Ok SY, Brown RL, Lang RA, **D'Souza SP***. (2024). Defining spatial nonuniformities of all intrinsically photosensitive retinal ganglion cell (ipRGC) types using an improved *Opn4cre* mouse line. (*Cell Reports Methods*). https://doi.org/10.1016/j.crmeth.2024.100837. Preprinted version:

> Dyer B, Ok SY, Brown RL, Lang RA, **D'Souza SP***. (2024). A new *Opn4cre* recombinase mouse line to interrogate the function of intrinsically photosensitive retinal ganglion cells (ipRGCs). *bioRxiv*. Doi: https://doi.org/10.1101/2024.04.16.589750

**D'Souza SP***, Upton BA, Eldred KC, Glass I, Nayak G, Grover K, Ahmed A, Nguyen MT, Hu YC, Gamlin P, Lang RA*. (2024). Developmental control of rod number via a light-mediated excitatory retrograde pathway from intrinsically photosensitive retinal ganglion cells. (*Dev. Cell*). https://doi.org/10.1016/j.devcel.2024.07.018. Preprinted version:

- **D'Souza SP***, Upton BA, Eldred KC, Glass I, Grover K, Ahmed A, Nguyen MT, Gamlin P, Lang RA*. (2023). Developmental adaptation of rod photoreceptor number via photoreception in melanopsin (Opn4) retinal ganglion cells. *bioRxiv*. 2023.08.24.554675; doi: https://doi.org/10.1101/2023.08.24.554675

Liang JH, Akhanov V, Ho A, Tawfik M, **D'Souza SP**, Cameron MA, Lang RA, Samuel MA*. Dopamine signaling from ganglion cells directs layer-specific angiogenesis in the retina. Curr Biol. 2023 Sep 25;33(18):3821-3834.e5. doi: 10.1016/j.cub.2023.07.040. Epub 2023 Aug 11. PMID: 37572663.

Linne C, Mon KY, **D'Souza SP**, Jeong H, Jiang X, Brown DM, Zhang K, Vemaraju S, Tsubota K, Kurihara T, Pardue MT, Lang RA*. Encephalopsin (OPN3) is required for normal refractive development and the GO/GROW response to induced myopia. Mol Vis. 2023 May 14;29:39-57. PMID: 37287644.

Gonzalez LS, Fisher AA, **D'Souza SP**, Cotella EM, Lang RA, Robinson JE*. Ventral striatum dopamine release encodes unique properties of visual stimuli in mice. Elife. 2023 Apr 17;12:e85064. doi: 10.7554/eLife.85064. Epub ahead of print. PMID: 37067979.

**D'Souza SP**, Swygart DI, Wienbar SR, Upton BA, Zhang KX, Mackin RD, Casasent AK, Samuel MA, Schwartz GW, Lang RA*. Retinal patterns and the cellular repertoire of neuropsin (Opn5) retinal ganglion cells. *J Comp Neurol*. 2021 Nov 7. doi: 10.1002/cne.25272. PMID: 34743323

Jiang X, Pardue MT, Mori K, Ikeda S, Torii H, **D'Souza SP**, Lang RA, Kurihara T*, Tsubota K*. Violet Light Suppresses Lens-induced Myopia via Neuropsin (OPN5) in mice. *Proc Natl Acad Sci U S A*. 2021 June;118 (22) e2018840118; DOI: 10.1073/pnas.2018840118. PMID: 34031241

**D'Souza SP***, Lang RA. Retinal Ganglion Cell Interactions Shape the Developing Mammalian Visual System. *Development*. 2020 December 147 (23). doi: 10.1242/dev.196535. PMID: 33288502

**Corresponding author*

**Neuroscience & Physiology** |

Haddad HK, Mercado-Reyes JI, Mustafá ER, D'Souza SP, Chung CS, Nestor RRM, Olinski LE, Martinez Damonte V, Saskin J, Vemaraju S, Raingo J, Kauer JA, Lang RA, Oancea E. Hypothalamic opsin 3 suppresses MC4R signaling and potentiates Kir7.1 to promote food consumption. Proc Natl Acad Sci U S A. 2025 Feb 25;122(8):e2403891122. doi: 10.1073/pnas.2403891122. Epub 2025 Feb 14. PMID: 39951488; PMCID: PMC11874419.

Gaitonde KD, Andrabi M, Burger CA, **D'Souza SP**, Vemaraju S, Koritala BSC, Smith DF, Lang RA*. Diurnal regulation of metabolism by Gs-alpha in hypothalamic QPLOT neurons. PLoS One. 2023 May 4;18(5):e0284824. doi: 10.1371/journal.pone.0284824. PMID: 37141220.

Upton BA, Nayak G, Schweinzger I, **D'Souza SP**, Vorhees CV, Williams MT, Earl BR, Lang RA*. Comprehensive Behavioral Analysis of Opsin 3 (Encephalopsin)-Deficient Mice Identifies Role in Modulation of Acoustic Startle Reflex. eNeuro. 2022 Sep 29;9(5):ENEURO.0202-22.2022. doi: 10.1523/ENEURO.0202-22.2022. PMID: 36041828

Upton BA, **D'Souza SP**, Lang RA. QPLOT Neurons-Converging on a Thermoregulatory Preoptic Neuronal Population. *Front Neurosci*. 2021 May 4;15:665762. doi: 10.3389/fnins.2021.665762. PMID: 34017237

Zhang XK, **D'Souza SP**, Upton BA, Kernodle S, Vemaraju S, Nayak G, Gaitonde KD, Holt AL, Linne CD, Smith AN, Petts NT, Batie M, Tiwari D, Buhr ED, Van Gelder RN, Gross C, Sweeney A, Sanchez-Gurmaches J, Seeley RJ, Lang RA*. Violet-Light Suppression of Thermogenesis by Opsin 5 Hypothalamic Neurons. *Nature*. 2020 Sep;585(7825):420-425. doi: 10.1038/s41586-020-2683-0. PMID: 32879486

**Circadian & Other |**

Gaspar LS, Pyakurel S, Xu N, **D'Souza SP**, Koritala BSC*. 2025. Circadian Biology in Obstructive Sleep Apnea Associated Cardiovascular Disease. *Journal of Molecular and Cellular Cardiology*. {Accepted}.

Yi JS, Díaz NM, D'Souza SP, Buhr ED. The Molecular Clockwork of Mammalian Cells. Semin Cell Dev Biol. 2021 Mar 30:S1084-9521(21)00044-6. doi: 10.1016/j.semcdb.2021.03.012. Epub ahead of print. PMID: 33810978.

Nayak G, Zhang XK, Vemaraju S, Odaka Y, Buhr ED, Holt-Jones A, Kernodle S, Smith AN, Upton BA, **D'Souza SP**, Zhan JJ, Diaz N, Nguyen MT, Mukherjee R, Gordon SA, Wu G, Schmidt R, Mei X, Petts NT, Batie M, Rao S, Hogenesch JB, Nakamura T, Sweeney A, Seeley RJ, Van Gelder RN, Sanchez-Gurmaches J, Lang RA*. Adaptive Thermogenesis in Mice Is Enhanced by Opsin 3-Dependent Light Sensing. *Cell Rep*. 2020 ;30(3):672–686.e8. doi:10.1016/j.celrep.2019.12.043. PMID: 31968245

**Corresponding author*

**Preprints and Prepared Manuscripts**

Grytz R*, El Hamdaoui M, Yamashita T, **D'Souza SP**, Allah MK, Inanici M, Lang RA*. Indigo light supplementation suppresses myopia in a near-primate: An explanation for the myopia boom. Submitted to *Nature*.

Nissar SO, Zhang XK, Andrabi M, Mon KY, Reyes JIM, **D'Souza SP***, Shah V*. Development of a mouse model of glucocorticoid-induced adrenal insufficiency (AI) and elevated intracranial pressure. Submitted to *Investigative Ophthalmology & Visual Sciences*.

Dyer B, Rice M, Upton BA, Zhang XK, Lang RA, Petts N, **D'Souza SP*.** Emergent biophysical properties of a photopigment GPCR in neonatal behavior. *In preparation*.

** Corresponding author*

**Scientific Schematics / Figure Design**

Enriquez JR, McCauley HA, Zhang KX, Sanchez JG, Kalin GT, Lang RA, Wells JM. (2022). A dietary change to high-fat diet initiates a rapid adaptation of the intestine. *Cell Rep*. 2022 41: 111641. doi: 10.1016/j.celrep.2022.111641 [Figure 1A; mouse].

Ali A, Canaday LM, Feldman HA, Cevik H, Moran MT, Rajaram S, Lakes N, Tuazon JA, Seelamneni H, Krishnamurthy D, Blass E, Barouch DH, Waggoner SN. Natural killer cell immunosuppressive function

requires CXCR3-dependent redistribution within lymphoid tissues. *J Clin Invest*. 2021 Jul 27:146686. doi: 10.1172/JCI146686. Epub ahead of print. PMID: 34314390 [Figure 7/Graphical Abstract].

## Community & Outreach

### Peer Reviewer (Journals)

- *Development* (Company of Biologists)
- *Neural Regeneration Research* (Publishing House of Neural Regen. Research, China)
- *Frontiers in Neuroscience* (Frontiers)
- *Journal of Photochemistry & Photobiology, B: Biology* (Elsevier)
- *Investigative Ophthalmology & Visual Science (IOVS;* ARVO)
- *Plos Biology* (PloS)
- *Scientific Reports* (Springer Nature Publishing Group)
- *Communications Biology* (Springer Nature Publishing Group)

### Community & Outreach

- Poster Judge: Summer Undergraduate Research Fellowship (SURF) Scholar's Day Poster Session (July 2024)
- Poster Judge: Graduate Student Research Forum (GSRF) at the University of Cincinnati College of Medicine (October 2023)
- Poster Judge: Summer Undergraduate Research Fellowship (SURF) Scholar's Day Poster Session (August 2023)

## FELLOWSHIPS, AWARDS, & HONORS

### Fellowships

- Albert J. Ryan Predoctoral Fellowship (2021-2022) – University of Cincinnati

### Honors & Awards

- Cincinnati Children's Hospital Akeson Research Excellence Award (2022)
- 29$^{th}$ Annual MDB Graduate Program Research Symposium (2022)- Outstanding 5$^{th}$ Year Talk Award
- 28$^{th}$ Annual MDB Graduate Program Research Symposium (2021)- Outstanding 4$^{th}$ Year Talk Award
- 27$^{th}$ Annual MDB Graduate Program Research Symposium (2020)– Outstanding 3$^{rd}$ Year Talk Award
- Akeson Travel Award (2019) – To present at Society for Neuroscience Annual Meeting (Fall 2019).
- Scholar in Biological Sciences (Departmental Graduation Honors, 2018)
- Summa cum laude (4.0 cGPA, 2018)
- Department of Biology Undergraduate Teaching Award (2018)
- UK Portraits of the Mind Neuroscience Competition (2018)
- UK Student Employee of the Year 2018 {*nomination}*
- University of Kentucky Dean's List (2014 – 2018)
- International Student Ambassador Scholarships (2014 – 2018)

- Bluegrass Academic Scholarship (2014 – 2018)
- David & Lauri Perry Scholarship (2015 – 2018)
- International Student Tuition Scholarship (2017 – 2018)

## PRESENTATIONS, SEMINARS, & POSTERS

### Presentations & Seminars

(Upcoming) Distinguished Vision Research Seminar Series. December 2025. Emory University, Georgia Institute of Technology, Georgia State & Atlanta VA Joint Seminar.

Developmental Neuroscience Research Talk Series. April 2024. *"Photosensitive retinal ganglion cells shape vocal output of neonatal mice"*. Cincinnati, OH

Pediatric Ophthalmology Departmental Research Meeting. March 2024. "*Diverse spatial non-uniformities in ganglion cell photoreceptors*". Cincinnati, OH

Cincinnati Circadian Conference (C3). September 2023. "*Sensory-evoked communication in neonates via an ipRGC pathway*". Cincinnati, OH.

Developmental Neurobiology Seminar Series. February 2023. "*Retinal adaptations to the visual world prior to eye-opening*". Cincinnati, OH.

CCHMC 29th Annual Molecular & Developmental Biology Graduate Program Symposium. September 2022. "*Visual-Experience Regulates Rod Abundance through Intrinsically Photosensitive Retinal Ganglion Cells*". Cincinnati, OH.

The Gordon Research Seminar. August 2022. "*Sensory-Evoked Immature Rod Pruning via Transient Excitatory Signaling with Photoreceptive Retinal Ganglion Cells".* Southbridge, MA.

The Non-Visual Opsin Symposium. July 2022. "*The Temporal History of Photoreception Shapes Developmental Trajectories Among Disparate Circuits."* Seattle, WA. {Invited but could not attend due to COVID-19 diagnosis}

FASEB: Retinal Neurobiology and Visual Processing - Datablitz. June 2022. "*An Excitatory Signaling Axis from ipRGCs Regulates Immature Rod Pruning Prior to Eye-Opening"*. Southbridge, MA.

CCHMC 4th Annual Ophthalmology Research Symposium. October 2021. "*Defining Neuropsin (Opn5) Retinal Ganglion Cells and Their Phototransduction Motifs in the Mammalian Retina*". Cincinnati, OH.

CCHMC 28th Annual Molecular & Developmental Biology Graduate Program Symposium. September 2021. "*Defining Neuropsin (Opn5) Retinal Ganglion Cells and Their Phototransduction Motifs in the Mammalian Retina*". Cincinnati, OH.

CCHMC 3rd Annual Ophthalmology Research Symposium. October 2020. "*Luminance Shapes the Developing Retina Through ipRGC Signaling"*. Cincinnati, OH.

CCHMC 27th Annual Molecular & Developmental Biology Graduate Program Symposium. September 2020. "*Luminance Patterns the Retina through Intrinsically Photosensitive Retinal Ganglion Cells (ipRGCs)"*. Cincinnati, OH.

UC Ophthalmology 25th Annual Research Symposium & Conference. April 2020. "*Early Luminance & Light History Pattern the Murine Retina through Intrinsically Photosensitive Retinal Ganglion Cells (ipRGCs)"*. Cincinnati, OH.

CCHMC 2nd Annual Ophthalmology Research Symposium. October 2019. *"Melanopsin in Adaptive Retinal Development in Mammals"*. Cincinnati OH.

Chronobiology, Vascular Biology, and Visual Systems Group Combined Seminar Series. July 2019. Cincinnati Children's Hospital Medical Center. *"Light as a Mediator of Retinal Neurogenesis: Insights from the Role of Melanopsin (Opn4) During Development"*. Cincinnati, OH.

**Posters & Accepted Abstracts**

Nuutila J[1], **D'Souza S[1]**, Lanzotti A, Lang RA, Ala-Laurila P. June 2024. *Melanopsin-driven signals do not contribute to the absolute sensitivity of visually-guided behavior in mice.* Vision 2024: Building Bridges in Visual Ecology (Buxted Park, UK).

Upton BA, Zhang XK, Ontaneda D, Lang RA, **D'Souza S.** September 2023. *Defining a Transient ipRGC Circuit that Shapes Developing Vocalizations in Mice.* National Postdoctoral Fellow Week (Cincinnati, OH).

Upton BA, Zhang XK, Ontaneda D, Lang RA, **D'Souza S.** September 2023. *Defining a Transient ipRGC Circuit that Shapes Developing Vocalizations in Mice.* Cincinnati Circadian Conference (C3; Cincinnati, OH).

Lang RA, **D'Souza S**, Zhang XK, Upton BA, Vemaraju S, Buhr E, Rao S, Sweeney A, Nakamura T, Sanchez-Gurmachez J, Kurihara T, Pardue MA, Van Gelder R. March 2023. *Atypical Opsins Inside and Outside the Eye.* International Society for Eye Research (ISER) 2023 (Gold Coast, Australia).

**D'Souza S**, Upton BA, Zhang XK, Lang RA. August 2022. *An Excitatory Signaling Axis from ipRGCs Regulates Immature Rod Pruning Prior to Eye-Opening*. Gordon Research Conference: Visual System Development (Southbridge, MA).

**D'Souza S**, Upton BA, Zhang XK, Lang RA. August 2022. *An Excitatory Signaling Axis from ipRGCs Regulates Immature Rod Pruning Prior to Eye-Opening*. FASEB Conference on Retinal Neurobiology and Visual Processing. (Southbridge, MA).

**D'Souza S,** Swygart DI, Wienbar SR, Upton BA, Zhang XK, Mackin RD, Casasent AK, Samuel MA, Schwartz GW, Lang RA. July 2021. *"Retinal Patterns and the Cellular Repertoire of Neuropsin (Opn5) Retinal Ganglion Cells"*. Retinal Circuits Symposium. (Virtual)

Kurihara T, Jiang X, Pardue MT, Ikeda S, Torii H, **D'Souza S**, Lang RA, Tsubota K. June 2021. "*Violet light suppresses lens-induced myopia via neuropsin (Opn5) in mice*. ARVO Annual Meeting 2021 (Virtual).

Jacob R†, **D'Souza S,** Lang RA. April 2020. *"Encephalopsin (Opn3) is transiently expressed in Opn5+ retinal ganglion cells and regulates retinal clock dynamics"*. University of Cincinnati Undergraduate Scholarly Showcase (Cincinnati, OH).

Zhang XK, **D'Souza S**, Upton BA, Borra VJ, Vonberg AD, Kernodle S, Holt AJ, Sweeney AM, Seeley RJ, Sanchez-Gurmaches J, Nakamura T, and Lang RA. January 2020. "*Violet sensitive preoptic area neurons that express*

*Opsin 5 regulate thermogenesis and energy metabolism"*. ENDO2020 – The Endocrine Society (San Francisco, CA). {Cancelled due to COVID-19}

**D'Souza S,** Nguyen MT, Lang RA. September – September 2019. *"Melanopsin (Opn4) regulates retinal neuron diversity during fetal development."* CCHMC Developmental Biology Symposium (Cincinnati, OH)

Zhang XK, Upton BA, **D'Souza S,** Kernodle S, Holt-Jones A, Vemaraju S., Nayak G, Mocko JA, Petts NA, Batie M, Tiwari D, Gross G, Sweeney A, Sanchez-Gurmaches J, Seeley RJ, Lang RA. Oct 2019. "*Hypothalamic Opn5 Regulates Thermogenesis in Mammals*". Society for Neuroscience Annual Meeting (Chicago, IL).

**D'Souza S,** Nguyen MT, Lang RA. September 2019. *"Melanopsin (Opn4) regulates retinal neuron diversity during fetal development."* Society for Neuroscience Annual Meeting (Chicago, IL).

Zhang XK, Upton BA, **D'Souza S,** Kernodle S, Holt-Jones A, Vemaraju S., Nayak G, Mocko JA, Petts NA, Batie M, Tiwari D, Gross G, Sweeney A, Sanchez-Gurmaches J, Seeley RJ, Lang RA. June 2019. "*Hypothalamic Opn5 Regulates Thermogenesis in Mammals*". CCHMC Developmental Biology Symposium (Cincinnati, OH).

Zhang XK, Upton BA, **D'Souza S,** Kernodle S, Holt-Jones A, Vemaraju S., Nayak G, Mocko JA, Petts NA, Batie M, Tiwari D, Gross G, Sweeney A, Sanchez-Gurmaches J, Seeley RJ, Lang RA. May 2019. "*Hypothalamic Opn5 Regulates Thermogenesis in Mammals*". 34th Annual MD/PhD National Student Conference (Denver, CO).

Hassoun E†, **D'Souza S**, Zhang KZ, Upton BA, Lang RA. July 2019. *Primate Opsin Evolution Reflects Circadian Activity, Climate, and Vision-Related Selective Pressures*. Summer Undergraduate Research Fellowship (SURF) Capstone Poster Competition (Cincinnati, OH).

**D'Souza SP**, Mir S, Andres DA. April 2018. "*Rin GTPase Regulates Neuronal Apoptosis"* National Conference on Undergraduate Research (NCUR) (Oklahoma City, OK)

**D'Souza SP**, Mir S, Andres DA. April 2018. "*Rin GTPase Regulates Neuronal Apoptosis"*. University of Kentucky Showcase of Undergraduate Scholars (Lexington, KY).

Allen AJ, Bryant NC, Davis MA, **D'Souza SP**, Gifford AL, Hinds SJ, Karimi SA, Lee RB, Martinie KA, Penna CA, Pierce II DA, Renton AD, Voss SR. 2015. "*Inhibition of TGF Signaling Blocks Salamander Tail Regeneration.*" University of Kentucky Showcase of Undergraduate Scholars. Lexington, KY.

Allen AJ, Bryant NC, Davis MA, **D'Souza SP**, Gifford AL, Hinds SJ, Karimi SA, Lee RB, Martinie KA, Penna CA, Pierce II DA, Renton AD, Voss SR. 2015. "*Inhibition of TGF Signaling Blocks Salamander Tail Regeneration."* 13th International Limb Development and Regeneration Conference. Saint Petersburg, FL. (Presented by S. Randal Voss, PhD).

†*indicates undergraduate author and/or mentee.*

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**Methods and Technical Experience**

**Wet Lab:**

- Cell culture (Immortalized cells & Primary neurons)
- Micro/Nano-liter scale microsurgical inoculation (Viral and plasmid injections into eye)

- Plasmid and AAV viral payload design
- Neonatal and adult mouse behavioral assays (Forced Swim Test, pup locomotion, etc.)
- Biological communication recording and analysis (Ultrasonic vocalization)
- Immunofluorescence and fluorescent *in situ* hybridization (RNAScope)

**Informatics:**

- Bulk RNA Seq and Single-cell RNA Seq
- Statistical analyses of multivariate, multi-type data
- Spatial and point-pattern analyses in microscopy
- Proficient in R but can perform tasks in Python and MATLAB

## Mentorship and Teaching Experience

### Mentorship

- Sheikh Ozair Nissar (Neurosurgeon, CCHMC; 2025-present)
- Ayden King* (University of Cincinnati, OH; Master's in Computer Science; 2024-present)
- Brannen Dyer (University of Cincinnati, OH; Undergraduate; 2023-2025)
- Anvi Loka (University of Cincinnati, OH; Undergraduate; 2023)
- Joshua Nworie (University of Cincinnati, OH; Undergraduate Junior; 2021)
- Dahianna Ontaneda (OH, High School - BRIMS student; 2021)
- Abdulla Ahmed (University of Cincinnati, OH; Undergraduate – Neuroscience Major, 2020-2021)
- Michelle Noh* (University of Cincinnati, OH; Medical Student; Summer 2020)
- Reena Jacob (University of Cincinnati, OH; Undergraduate Senior – Biology Major; 2019-2020)
- Erika Hassoun* (University of Louisville, KY; Undergraduate Sophomore – SURF student; 2019)

*co-mentored with other lab members

### Teaching Experience - Graduate (University of Cincinnati & Cincinnati Children's Hospital Medical Center)

- Guest lecturer: Development & Diseases of the Eye (Spring 2024)
- MDB Program Interview Mouse Lab (Demo) – Retinal Anatomy and Dissection (Fall 2019 – Spring 2020)
- Assisted with Graduate Student Journal Club introduction (Fall 2019)
- Course tutor for GNTD7001 (Principles of Molecular & Cellular Biology; Fall 2019 – Graduate)

### Teaching Experience - Undergraduate (University of Kentucky)

Head Undergraduate Instructional Assistant (UIA)
**Department of Chemistry** (2017 – 2018)

- Managed 7 undergraduate instructional assistants (UIAs) for CHE 295 & CHE 297. Held and led weekly teaching assistant meetings. Conducted group day activities for 100+ students enrolled in organic chemistry I & II.

Undergraduate Instructional Assistant (UIA)
**Department of Chemistry** (2015 – 2018)

- CHE 295 – Organic Chemistry Workshop I (2 sections)
- CHE 297 – Organic Chemistry Workshop II (6 sections)

Undergraduate Grading Assistant (UGA)
**Department of Chemistry** (2016 – 2018)

- CHE 230 – Organic Chemistry I Lecture (2 semesters)
- CHE 232 – Organic Chemistry II Lecture (1 semester)

Undergraduate Instructional Assistant (UIA) for the Biology Learning Center
**Department of Biology** (2016 – 2018)

- BIO 148 through 155 – Introductory Biology I & II w/ Lab
- BIO 303 – Introduction to Evolution
- BIO 304 – Principles of Genetics
- BIO 315 – Introduction to Cell Biology
- BCH 401G – Fundamentals of Biochemistry

## Society Memberships & Elections

**Graduate**
Society for Neuroscience (SFN)

**Undergraduate**
Honor Society Memberships & Elections

- The National Honor Society of Phi Kappa Phi (ΦΚΦ, 2018)
- The Honor Society of Phi Beta Kappa (ΦΒΚ, 2018)

## Extra-Academic Activities

- National Weather Service (NWS) Storm Spotter – Wilmington, OH service area (2024-)