Rajalekshmy "Raji" Shyam

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Education and training

Roosevelt University, Chicago, IL	B.S. in Biology with Honors	May 2009
University of Utah, Salt Lake City, UT	Ph.D. in Neurobiology and Anatomy	Dec 2017
Indiana University, Bloomington, IN	Post-doctoral fellow	Oct 2017-Dec 2022

Professional Appointments

Assistant Professor	University of Iowa	Aug 2025-
Assistant Professor	Indiana University Bloomington	Jan 2023- July 2025
Post-Doctoral Fellow	Indiana University Bloomington	Oct 2017-Dec 2022
Graduate Research Assistant	University of Utah	Aug 2011-May 2017
Lab-Technician	University of Illinois Chicago	June 2009-Apr 2011
Intern	University of Illinois Chicago	May 2008-May 2009

Awards and Honors

- Emerging Vision Scientist, Alliance for Eye and Vision Research (AEVR) (2024)
- Dean's Alumni Award: College of Science, Health & Pharmacy, Roosevelt University (2024)
- Members in Training Best Poster Award in Cornea, ARVO (2021)
- NEI Travel Grant, ARVO (2019)
- Member of Franklin Honor Society for academic achievement, Roosevelt University, Chicago (2009)
- Graduate fellowship, University of Utah (2011-2017)
- Departmental Honors – Department of Biology, Roosevelt University, Chicago (2009)
- Student Employee of the year – Roosevelt University, Chicago (2009)
- Awarded membership in Sigma Xi scientific research society (2008)
- Student Excellence in Scientific Research Award – Roosevelt University, Chicago (2008)
- Full tuition scholarship from Roosevelt University Honors Program (2007-2009)

Grants

Active

- PI – Cornea Research Foundation of America Grant (Sep 2024- 2025)
- PI – Indiana CTSI Core Pilot Grant (June 2024-2026)
- PI - NEI K99/R00 Pathway to Independence Award (Sep 2021-2026)

Completed

- Co-PI - Faculty Research Support Program—Seed Funding (June 2023- 2024)
- PI - Knights Templar Eye Foundation Career Starter Grant (July 2019 - 2021)
- Trainee - NIH-NCATS/Indiana CTSI TL1 Post-Doctoral Training Grant
- Trainee -Ruth Kirschstein NIH T-32 Vision Training Grant

Publications

Google Scholar profile - https://scholar.google.com/citations?user=o3ZQECAAAAAJ&hl=en
Pubmed profile - https://pubmed.ncbi.nlm.nih.gov/?term=rajalekshmy+shyam
*denotes corresponding author, #denotes equal authorship

1) Murugan, S., Campos, V., Ghag, S.A., Ng, M., **Shyam, R*.** Characterization of a novel mouse model for Fuchs Endothelial Corneal Dystrophy. *Investigative Ophthalmology and Visual Science*. April 2024, PMID: 38587441

2) **Shyam, R.***, Shu, D.Y., Zuniga-Sanchez, E., Vasudevan, D*. Editorial: Molecular mechanisms in ocular development and disease. *Frontiers in Cell and Developmental Biology*. June 2023. PMID: 37457294.

3) Liton, P.B., Boesze-Battaglia, K., Boulton, M.E., Boya, P., Ferguson, T., Ganley, I.G., Kauppinnen, A., Laurie, G.W., Mizushima, N., Morishita, H., Russo, R., Sadda, J., **Shyam, R**., Sinha, D., Thompson, D.A., Zacks, D.N. Autophagy in the eye: from physiology to pathophysiology. *Autophagy Reports*. March 2023. PMID: 37034386

4) **Shyam, R.***, Ogando, D.G., Bonanno, J.A. Mitochondrial ROS in Slc4a11 KO Corneal Endothelial Cells Lead to ER Stress. *Front. Cell Dev. Biol*., April 2022. PMID: 35557943

5) **Shyam, R.***, Ogando, D.G., Kim, E.T., Murugan, S., Choi, M., Bonanno, J.A. Rescue of the CHED mouse model by AAV-mediated Slc4a11 replacement. *Ophthalmology Science*, March 2022. PMID: 36051248

6) Bonanno, J.A., **Shyam, R**., Choi, M., Ogando, D.G. The H^+ Transporter SLC4A11: Roles in Metabolism, Oxidative Stress and Mitochondrial Uncoupling. *Cells*, 2022. PMID: 35053313.

7) **Shyam, R.***, Ogando, D.G., Choi, M., Liton, P.B., Bonanno, J.A. Mitochondrial ROS Induced Lysosomal Dysfunction and Autophagy Impairment in an Animal Model of Congenital Hereditary Endothelial Dystrophy. *Investigative Ophthalmology and Visual Sciences*, 2021. PMID: 34533563

8) Ogando, D.G., **Shyam, R**., Kim, E.T., Wang, YC, Liu, C.Y., Bonanno, J.A. Inducible Slc4a11 knockout triggers corneal edema through perturbation of corneal endothelial pump. *Investigative Ophthalmology and Visual Sciences*, 2021. PMID: 34190974

9) Li, S., **Shyam, R**., Ogando, D.G., Bonanno, J.A. Bicarbonate activates glycolysis and lactate production in corneal endothelial cells by increased pHi. *Experimental Eye Research*, 2020. PMID: 32818510

10) Ogando, D.G., Choi, M., **Shyam, R**., Li, S., Bonanno, J.A. Ammonia sensitive SLC4A11 mitochondrial uncoupling reduces glutamine induced oxidative stress. *Redox Biology*, 2019. PMID: 31254733

11) **Shyam, R.**, Gorusupudi, A., Nelson, K., Horvath, M.P, Bernstein, P.S. RPE65 has an additional function as the lutein to *meso*-zeaxanthin isomerase in vertebrates. *Proceedings of the National Academy of Sciences,* 2017. PMID: 28874556

12) **Shyam, R.**, Vachali, P.P., Nelson, K., Gorusupudi, A., and Bernstein, P.S. All three Class B Scavenger receptor proteins function as carotenoid transporters for all three macular carotenoids in the primate eye. *Archives of Biochemistry and Biophysics*, 2017. PMID: 28947101

13) Gorusupudi, A.#, **Shyam, R**.#, Li, B., Vachali, P.P., Subhani, Y., Nelson, K., Bernstein, P.S. Developmentally regulated production of *meso*-zeaxanthin in chicken retina and retinal pigment epithelium/choroid. *Investigative Ophthalmology and Visual Sciences*, 2016. PMID: 27082300

14) Bernstein, P.S, Li, B., Vachali, P.P., Gorusupudi, A., **Shyam, R**., Hendriksen, B., and Nolan, J. Lutein, zeaxanthin, and *meso*-zeaxanthin: The basic and clinical science underlying carotenoid-based nutritional interventions against ocular disease. *Progress in Retinal Eye Research*, 2015. PMID: 26541886

15) Qiu, Y., Shen, X., **Shyam, R.,** Yue, B.Y.J.T. and Ying, H. Cellular processing of myocilin. *PLoS One*, 2014. PMID: 24732711

16) Turturro, S., Shen, X., **Shyam, R.,** Yue, B.Y.J.T., and Ying, H. Effects of mutations and deletions in the human optineurin gene. *Springer Plus*, 2014. PMID: 24683533

17) Shen, X., Ying, H., Park, J-S., Qiu, Y., **Shyam, R.**, Chi, Z-L., Iwata, T., and Yue, B.Y.J.T. Processing of optineurin in neuronal Cells. Journal of Biological Chemistry, 2011. PMID: 21059646

18) **Shyam, R.**, Shen, X., Yue, B.Y.J.T., and Wentz-Hunter, K. K. Wnt gene expression in human trabecular meshwork cells. *Molecular Vision*, 2010. PMID: 20111673

19) Koga, T., Shen, X., Park, J-S., Qiu, Y., Park, B-C., **Shyam, R**., and Yue, B.Y.J.T. Differential effects of myocilin and optineurin, two glaucoma genes, on neurite outgrowth. *American Journal of Pathology*, 2010. PMID: 24683533

20) Park, B-C., Ying, H., Park, -S., Shen, X., Qiu. Y, **Shyam, R.,** and Yue, B.Y.J.T. Impairment of protein trafficking upon overexpression and mutation of optineurin. *PLoS One*, 2010. PMID: 20634958

Manuscript under review

1) Murugan, S., Pattan, H.F., **Shyam, R.***, Tankam, P*. *In vivo* longitudinal evaluation of Descemet's membrane thickness in wild-type and FECD mouse models. *Co-corresponding authors.

Completed manuscript in preprint server

1) Murugan, S., Ghag, S.A., Campos, V.S., Price, M.O, Price, F.A., **Shyam, R***. Proteasomal Dysfunction as a Central Mechanism in Fuchs Endothelial Corneal Dystrophy Pathogenesis. https://www.biorxiv.org/content/10.1101/2025.04.11.648416v1.abstract

Seminars

Sep 2025	Department of Veteran Affairs, Iowa City, IA (*Invited Speaker*)
Aug 2025	Session Chair, Midwest Eye Research Symposium, University of Iowa
Mar 2025	Neuroscience and Mental Health Institute, University of Alberta (*Invited Speaker*)
Mar 2025	Guest Lecturer, OPHTH 601, University of Alberta.
Feb 2025	Department of Anatomy and Cell Biology, University of Iowa (*Invited Speaker*)
Oct 2024	Corneal Endothelium session, International Society for Eye Research Meeting, Buenos Aires, Argentina *(Invited speaker)*
Mar 2024	Responsible Conduct of Research Seminar Series, Indiana University, Bloomington (*Invited speaker*)
Dec 2023	Guest lecturer, Dr. Shroff's Charity Eye Hospital, New Delhi, India.
Dec 2023	Keynote speaker, OptoExcellence, Optometry and Vision Science Conference, New Delhi, India.
Sept 2023	Oxyopia Presentation, Indiana University School of Optometry Alumni weekend.
Aug 2023	Association for Ocular Pharmacology and Therapeutics Biennial Meeting, Indianapolis *(Invited speaker)*
Mar 2023	Responsible Conduct of Research Seminar Series, Indiana University, Bloomington (*Invited speaker*)
Feb 2023	ARVO ADVANCE Research Career Development Conference (*Invited speaker*)
Nov 2022	Indiana University Post-doctoral Association, PhD Career Diversity Symposium
May 2022	Autophagosomes, Lysosomes and Other- somes: Their Role in Ocular

	Tissues Homeostasis, ARVO 2022 *(Invited speaker)*
Apr 2022	Dept. of Ophthalmology, Moran Eye Center, University of Utah *(Invited Speaker)*
Apr 2022	Dept. of Ophthalmology, Univ. of Florida, Gainesville; virtual *(Invited Speaker)*
Apr 2022	Dept. of Ophthalmology, Emory University, Atlanta; virtual *(Invited Speaker)*
Mar 2022	Responsible Conduct of Research Seminar Series, Indiana University, Bloomington *(Invited Speaker)*
Mar 2022	School of Optometry, Indiana University, Bloomington *(Invited Speaker)*
Jan 2020	Keynote speaker, Knights Templar Eye Foundation Indiana chapter annual meeting

Service

International

Member, ARVO Advocacy and Outreach Committee (May 2023-2026)

NIH Early career reviewer for NEI study section (BDE) - June 2025

Organizer and Moderator, ARVO Special Interest Group. "Setting up a lab as a new PI - challenges and perspectives." June 2025

Editor, Special Issue of Frontiers in Cell and Developmental Biology

Issue title - Mechanisms in ocular development and disease (June 2023)

Journal Reviewer - Experimental Eye Research, Journal of Visualized Experiments, Journal of Ocular Pharmacology and Therapeutics, Translational Vision Science & Technology, Experimental Biology and Medicine, PLoS One, Investigative Ophthalmology and Visual Science, Cell Death and Discovery, JCI Insight

Regional

Mentoring at Indiana University School of Optometry

Post-doctoral mentor to Dr. Hsuan-Yeh Pan (Oct 2024-)
Post-doctoral mentor to Dr. Viviane Campos (2023-2024)
Ph.D mentor to Subashree Murugan and Sachin Ghag (2023-)
Master's thesis mentor to Matthew Ng (2023-2024)

- Ph.D. student, Subashree Murugan, successfully defended her dissertation titled "Novel Discoveries in Fuchs Endothelial Corneal Dystrophy (Nov 2024)
- Ph.D. student, Subashree Murugan, received Mike Ezell Fellowship from the American Academy of Optometry (June 2024)
- Ph.D. student, Sachin Ghag, received Sigma Xi Grant in Aid of Research (June 2024)
- Subashree Murugan presented a talk at the Corneal Endothelium session at ARVO 2024. Viviane Campos presented a poster at the same meeting.
- Subashree Murugan, won best presentation award at the Heartland Vision Research Symposium (Aug 2023)
- Post-doc, Dr. Viviane Campos, won a travel grant to attend AOPT conference in Indianapolis (Aug 2023)

Teaching

Indiana University School of Optometry

- Course director, Ocular Biology-V540 (Fall 2023, Fall 2024).
- Lecturer for Ocular Biology under Dr. Joseph Bonanno (Fall 2022)
- Facilitator for the course Problem Based Learning (Spring 2022, Fall 2022, Spring 2024)
- Lecturer for Ocular Biology session under Dr. Chia-Yang Liu(Fall 2021).

- Trainee facilitator under Dr. William Swanson for the course Problem Based Learning (Fall 2021).

Community Outreach

- Co-organizer for a webinar to "demystify the K99/R00 grant application for NEI applicants."
  - This event was organized entirely through social media interactions in November 2021. It was attended by over 65 participants. https://k99webinar.github.io/

- Organizer for weekly Journal Club at Indiana University School of Optometry (2018-2021)

- Participated at Girls in Engineering Math and Science event (GEMS), Bloomington, IN (2021). Presented an overview of my experiences as a scientist and explained eye diseases to middle school girls of the Monroe County school district.

- Participated at the Indiana University Annual Science Fest (2018, 2019, 2022).
  - Helped organize the events for the School of Optometry. Explained various parts of the eye to school children from Indiana.

- Volunteer for BioEyes at the University of Utah (2016, 2017)
  - Helped in setting up zebrafish tanks in schools of low-income neighborhoods in and around Salt Lake City. Helped children visualize development of zebrafish embryos.