BIOGRAPHICAL SKETCH

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NAME: Bing X. Ross

eRA COMMONS USER NAME (credential, e.g., agency login): BINGR1

POSITION TITLE: Heed Fellowship

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Fujian Medical College, Fuzhou, China	M.D.	09/2004	07/2009	Clinical medicine
Sun Yat-sen University, Guangzhou, China	M.S.	09/2009	07/2012	Ophthalmology
Wayne State University, Detroit, MI	Ph.D.	09/2012	08/2016	Ophthalmology, Visual and Anatomical Sciences
University of Michigan, Ann Arbor, MI	Postdoctoral	10/2016	06/2021	Ophthalmology and Visual Science
Kresge Eye Institute, Detroit, MI	Pre-residency fellow	07/2021	06/2023	Ophthalmology
Kresge Eye Institute, Detroit, MI	Residency	07/2023	Present	Ophthalmology

A. Personal Statement

I am a physician-scientist in training with a focused commitment to advancing translational research in visual science. My long-term goal is to develop independent, mechanism-driven research programs that inform therapeutic strategies for vision-threatening conditions.

My research training spans basic, translational, and clinical investigation. During my Master's training, I evaluated biomaterials for conjunctival reconstruction, establishing an early foundation in translational ophthalmic research. As a predoctoral trainee under Dr. Fu-Shin Yu, I investigated innate immune responses in Pseudomonas aeruginosa keratitis and identified a pathogenic role for IL-24 in suppressing protective mucosal immunity. This work contributed to a broader understanding of host-pathogen interactions and highlighted potential risks of IL-24–targeted therapies in immunocompromised populations.

During my postdoctoral training with Dr. David Zacks, I established and led a novel research direction within the laboratory examining immune-mediated mechanisms of photoreceptor degeneration following retinal detachment. In collaboration with microglia specialists, I identified HMGB1 as a key damage-associated molecular signal driving microglial activation and demonstrated a protective role for HMGB1 and HIF-1α in

photoreceptor survival. This work resulted in successful NIH R01 funding, reflecting both scientific merit and my capacity to lead innovative, collaborative research initiatives.

In parallel with clinical training, I have maintained an active and productive research program, contributing to multiple peer-reviewed publications spanning clinical outcomes research and mechanistic translational studies. My work includes studies on intraocular lens fixation outcomes, uveitis care models, metabolic regulation in retinal endothelial cells, and fibrotic signaling in proliferative vitreoretinopathy (PVR). I have also generated preliminary data supporting an upcoming grant application focused on PVR pathogenesis.

In addition to my research accomplishments, I have demonstrated sustained leadership and mentorship by training technicians, students, and junior trainees in experimental design, technical methodologies, and scientific communication. These experiences have strengthened my ability to independently conceptualize, execute, and disseminate research.

Collectively, my background has prepared me to transition to an independent physician-scientist career. The Heed Fellowship will provide critical support to further develop my independent research program and accelerate my progression toward becoming a leader in vision science.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2023-Present Ophthalmology residency, Kresge Eye Institute, Detroit, MI.

2021-2023 Pre-residency fellow, Kresge Eye Institute, Detroit, MI.

2016-2021 Postdoctoral researcher, University of Michigan, Ann Arbor, MI.

2012-2016 Graduate researcher, Wayne State University, Detroit, MI.

2009-2012 Graduate researcher, Zhongshan Ophthalmic Center, Guangzhou, China

Honors

2025 Top Poster Presentation, 1st place. Kresge Eye Institute Clinical Conference

2022 Top Poster Presentations, 2nd place. Vision Research Workshop, Wayne State University

2017-2018 NEI Vision Research Institutional Training Grant (NIH T32)

2016 Graduate Student Professional Travel Award

2004-2008 Outstanding student scholarship (top 10%), Medical School

C. Contributions to Science

1. Biomaterials and Ocular Surface Reconstruction (Master's Training)

I contributed to translational studies evaluating biomaterials used in ocular reconstruction. Using gadolinium-enhanced MRI, I demonstrated that a modified evisceration technique promotes fibrovascular ingrowth into Medpor implants while reducing complications. I also investigated the immunogenicity and efficacy of a novel conjunctival scaffold, providing insight into host responses to allogeneic biomaterials. I played a leading role in study coordination, data analysis, and manuscript preparation.

a. Huang D., Xu B., Yang Z., **Xu B.**, Lin X., Yang X., Zhao J. Fibrovascular Ingrowth into Porous Polyethylene Orbital Implants (Medpor) after Modified Evisceration. *Ophthalmic Plastic & Reconstructive Surgery*. 2015;31(2):139-44. PMID: 25025383.

b. Huang D., **Xu B.**, Yang X., Xu B., Zhao J. Conjunctival Structural and Functional Reconstruction using Acellular Bovine Pericardium Graft (Normal GEN®) in Rabbits. *Graefes Archive for Clinical and Experimental Ophthalmology.* 2016;254(4):773-83. PMID: 26626771.

2. Innate Immune Regulation in Microbial Keratitis (Pre-doctoral Training)

My predoctoral work defined key mechanisms of innate immune dysregulation in corneal infection. I demonstrated that IL-24 exacerbates Pseudomonas aeruginosa keratitis by suppressing early mucosal immunity, identifying a previously unrecognized pathogenic pathway with translational relevance to immunomodulatory therapies. I also contributed to studies on ISG15, further advancing understanding of host defense mechanisms in ocular infection.

a. **Ross B.X.**, Gao N., Cui X., Standiford TJ., Xu J., Yu FX. IL-24 Promotes *Pseudomonas aeruginosa* Keratitis in C57BL/6 Mouse Corneas. *The Journal of Immunology*. 2017;198(9):3536-47. PMID: 28330899

b. Dong C., Gao N., **Ross B.X.**, Yu FX. ISG15 in Host Defense against *Candida albicans* Infection in a Mouse Model of Fungal Keratitis. *Investigative Ophthalmology & Visual Science.* 2017;58(7):2948-2958. PMID: 28599020

3. Immune-Mediated Photoreceptor Degeneration (Post-doctoral Training)

As a postdoctoral fellow, I independently initiated and led a research program investigating immune responses in retinal detachment. I identified HMGB1 as a critical damage-associated molecular pattern released by stressed photoreceptors that drives microglial activation and migration. I further demonstrated that HMGB1 and HIF-1α play protective roles in photoreceptor survival. This work established a new conceptual framework for immune regulation in retinal degeneration and contributed to successful NIH R01 funding, underscoring my ability to lead innovative, hypothesis-driven research.

a. **Ross, B.X.,** Jia, L., Kong, D., Wang, T., Yao, J., Hager, H.M., Abcouwer, S.F., Zacks, D.N. Hypoxia-inducible Factor-1α (HIF-1α) in Rods is Neuroprotective Following Retinal Detachment. Investigative Ophthalmology & Visual Science. 2022, October; 63(11): 7. Cited in PubMed; PMID: 36223101.

b. **Ross, B.X.,** Jia, L., Kong, D., Wang, T., Hager, H.M., Abcouwer, S.F., Zacks, D.N. Conditional Knock out of High-Mobility Group Box 1 (HMGB1) in Rods Reduces Autophagy Activation after Retinal Detachment. Cells, 2021, August; 8(10): 2010. Cited in PubMed; PMID: 34440779.

c. **Ross B.X.,** Choi J., Yao Y.J., Hager H.M., Abcouwer S.F., and Zacks D.N. Loss of High-Mobility Group Box 1 (HMGB1) Protein in Rods Accelerates Rod Photoreceptor Degeneration After Retinal Detachment. Investigative Ophthalmology & Visual Science. 2020, May; 61(5): 1-12. Cited in PubMed; PMID: 32460314.

d. Kiang L., **Ross B.X.,** Yao Y.J., Shanmugam S., Andrews C.A., Hansen S., Besirli C.G., Zacks D.N., and Abcouwer S.F. Vitreous Cytokine Expression and a Murine Model Suggest a Key Role of Microglia in the Inflammatory Response to Retinal Detachment. Investigative Ophthalmology & Visual Science. 2018, Jul; 59(8): 3767-3778. Cited in PubMed; PMID: 30046818.

5. Translational and Clinical Research in Ophthalmology (Residency Training)

I have led and collaborated on clinically relevant translational research addressing unmet needs in ophthalmology. My work includes characterization of calcific degeneration in hydrophilic intraocular lenses, demonstrating that intraocular environments may promote bone mineralization–like processes. Additionally, I am contributing to a spatial transcriptomics–based study of proliferative vitreoretinopathy (PVR) to define molecular drivers of fibrosis and identify therapeutic targets. I have generated preliminary data to support future independent funding in this area, reflecting my transition toward research independence.

a. **Ross, B.X.,** Rios, A., Patwa, D., Benenati, B., Tomsak, R.L. A Case of Recurrent Painful Ophthalmoplegic Neuropathy Triggered by Strenuous Activity. Neuro-Ophthalmology. 2026. https://doi.org/10.1080/01658107.2026.2625322.

b. Ward, C., Perera, S., Mei, Z., **Ross, B.X.,** De Alwis Goonatilleke, M., Ayoubi, M., Xiao, Y., Ault, A., Westrick, J., Linz, T., Lin, X. Characterizing Microscopic Calcification Deposits on Acrylic Intraocular Lenses. Analyst, 2026,151, 1467-1476.

c. Trivedi, V., Lee, S., Lee, P.S., Me, R., You, Q., Im, J., **Ross, B.X.,** Tran, D.V., Le, K.H., Malbin, B., Lin, X. Comparative Analysis of Effective Lens Position and Refractive Outcomes in Scleral-Fixated versus Intracapsular Intraocular Lenses. Clin Ophthalmol. 2024 Dec 25;18:3949–3955. Cited in PubMed; PMID: 39737363

d. Gregory, A., Yumnamcha, T., Shawky M., Eltanani, S., Naghdi A., **Ross B.X.,** Lin, X., Ibrahim, A.S. The Warburg effect alters amino acid homeostasis in human retinal endothelial cells: implication for proliferative diabetic retinopathy. Scientific reports. 2023 Sep 25;13(1):15973. Cited in PubMed; PMID: 37749155.

e. **Ross, B.X.,** Habhab, S., Syeda, S., Baiyasi, A., Benchaala, I., Okeagu, C., Barbosa, J., Im, J., Le, K., Lin, X. Patient Clinical Outcomes in Standalone Versus a Combined Ophthalmology-Rheumatology Uveitis Clinic. Ophthalmic inflammation and infection. 2022 Nov 7;12(1):36. Cited in PubMed; PMID: 36344850.

Complete List of Published Work in My Bibliography:

https://orcid.org/0000-0001-9630-1120

D. Scholastic Performance

Graduate Course Work (Ph. D.)

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
2012	Molecular Biology	A-	2013	Scholar writing: Nonnative English Speaker	A
2012	Cell Biology	B+			
2013	Neuroanatomy	A			
2013	Biomedical immunology	A-			
2013	Human Gross Anatomy	A			
2014	Mechanisms of Ocular Disease 1	A			
2014	Molecular Mechanisms of Bacterial Pathogenesis	A			
2014	Advanced Topics in Pharmacology	A-			