BIOGRAPHICAL SKETCH

NAME: Kalra, Gagan

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

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
Government Medical College and Hospital, Chandigarh, India	MBBS (Medical degree)	09/2014	09/2020	Medicine
Post Graduate Institute of Medical Education and Research, Chandigarh, India	Clinical/Research Trainee	10/2020	12/2020	Ophthalmology
Cleveland Clinic Cole Eye Institute, Cleveland, OH	Post Doctoral Research Fellow	01/2021	06/2023	Ophthalmic Imaging
UPMC Vision Institute, Pittsburgh, PA	Resident Physician	06/2023	07/2027 (expected)	Ophthalmology

A. Personal Statement

I am driven by the challenge of early disease detection and targeted therapeutics– and whether this capability can reach communities that are most in need. As a medical student in Chandigarh, India, I saw patients present with advanced disease that earlier imaging might have caught, which led me to explore smartphone-based telemedicine with my first mentor, Dr. Parul Ichhpujani.[1] This formative experience brought me to the Cleveland Clinic's Cole Eye Institute, where I a post-doctoral fellowship under Drs. Justis P. Ehlers and Sunil K. Srivastava developing machine learning tools for automated detection of geographic atrophy, hydroxychloroquine toxicity, and ellipsoid zone at-risk regions on SD-OCT, and leading the quantitative image analysis for the PRIME trial – prospective clinical trial for diabetic retiopathy.[2-4] Now a PGY-3 ophthalmology resident at the UPMC Vision Institute, I continue pursuing research in quantitative imaging biomarker investigation with over 40 peer-reviewed publications while serving in an editorial capacity for numerous peer-reviewed journals. With the guidance of giants made available through the Heed Fellowship's Resident Retreat, I hope to forge my academic journey in fellowship and beyond in vitreoretinal disease—bridging the computational work I have done at the bench with the clinical impact I hope to achieve at the bedside.

1. Kalra **G**, Ichhpujani P, Thakur S, Singh RB, Sharma U, Kumar S. A pilot study for smartphone photography to assess bleb morphology and vasculature post-trabeculectomy. Int Ophthalmol. 2021;41:1175-1183.

2. Kalra G, Talcott KE, Kaiser S, Ugwuegbu O, Hu M, Srivastava SK, Ehlers JP. Machine Learning–Based Automated Detection of Hydroxychloroquine Toxicity and Prediction of Future Toxicity Using Higher-Order OCT Biomarkers. Ophthalmology Retina. 2022;6(12):1170-1180.

3. **Kalra G**, Wykoff C, Martin A, Srivastava SK, Reese J, Ehlers JP. Longitudinal Quantitative Ultrawidefield Angiographic Features in Diabetic Retinopathy Treated with Aflibercept from the PRIME Trial. Ophthalmology Retina. 2024;8(2):130-139.

4. **Kalra G**, Williams AM, Commiskey PW, Bowers EMR, Schempf T, Sahel JA, Waxman EL, Fu R. Incorporating video visits into ophthalmology practice: a retrospective analysis and patient survey. Ophthalmology and Therapy. 2020;9(3):549-562.

B. Positions, Scientific Appointments, and Honors

Positions

2023–**present** Resident Physician, Department of Ophthalmology, UPMC Vision Institute, University of Pittsburgh,

Pittsburgh, PA

2021–2023 Post Doctoral Research Fellow, Cleveland Clinic Cole Eye Institute, Cleveland, OH

2020–2020 Short Term Clinical and Research Trainee (Ophthalmology), Post Graduate Institute of Medical Education and Research, Chandigarh, India

2019–2020 Intern, Government Medical College and Hospital, Chandigarh, India

Scientific Appointments

2024–present Guest Editor, BMC Ophthalmology (Springer Nature) – Collection: "Telemedicine in Ophthalmology"

2022–present Peer Reviewer for 17 journals including Ophthalmology retina, Eye, Scientific Reports, PLoS ONE, Journal of Telemedicine and Telecare, BMC Medical Imaging, Clinical Ophthalmology, and others (28 verified reviews per ORCID)

Honors

2023 Ophthalmology Groundbreakers Award – YMDC at AAO 2023

2022 Retina World Congress Poster winner – Podium Presentation

2021 Top 10 Poster Award, American Society of Retina Specialists (ASRS)

2020 First Division Distinction, Government Medical College and Hospital, Chandigarh

2015 Tuition Scholarship for Academic Excellence, Panjab University, Chandigarh

2014 INSPIRE Scholarship for Higher Education (SHE), Ministry of Human Resource and Development, India (99.99th centile nationally)

C. Contributions to Science

1. Machine Learning and AI for Automated Retinal Disease Detection

I developed and validated machine learning and deep learning pipelines for automated detection and quantification of geographic atrophy, hydroxychloroquine retinal toxicity, and ellipsoid zone at-risk regions using spectral-domain optical coherence tomography (SD-OCT). These tools enable earlier detection of subclinical disease and more precise longitudinal monitoring of progression, with potential to transform clinical workflows and clinical trial endpoints in retinal disease.

a. **Kalra G**, Cetin H, Whitney J, Yordi S, Cakir Y, McConville C, Whitmore V, Bonnay M, Reese J, Srivastava SK, Ehlers JP. Automated Identification and Segmentation of Ellipsoid Zone At-Risk Using Deep Learning on SD-OCT for Predicting Progression in Dry AMD. Diagnostics. 2023;13(6):1178.

b. **Kalra G**, Cetin H, Whitney J, Yordi S, Cakir Y, McConville C, Whitmore V, Bonnay M, Lunasco L, Sassine A, Borisiak K, Cohen D, Reese J, Srivastava SK, Ehlers JP. Machine Learning-Based Automated Detection and Quantification of Geographic Atrophy and Hypertransmission Defects Using SD-OCT. J Pers Med. 2023;13(1):37.

c. **Kalra G**, Talcott KE, Kaiser S, Ugwuegbu O, Hu M, Srivastava SK, Ehlers JP. Machine Learning–Based Automated Detection of Hydroxychloroquine Toxicity and Prediction of Future Toxicity Using Higher-Order OCT Biomarkers. Ophthalmology Retina. 2022;6(12):1170-1180.

d. Talcott KE, **Kalra G**, Cetin H, Cakir Y, Whitney J, Budrevich J, Reese JL, Srivastava SK, Ehlers JP. Automated Evaluation of Ellipsoid Zone At-Risk Burden for Detection of Hydroxychloroquine Retinopathy. J Pers Med. 2024;14(5):448.

2. Quantitative Imaging Biomarkers in AMD and Diabetic Retinopathy

I co-developed quantitative analysis of OCT, fluorescein angiography and angiography (OCTA) biomarkers in age-related macular degeneration (AMD) and diabetic retinopathy (DR). I led the imaging analysis for the Intravitreal Aflibercept as Indicated by Real-Time Objective Imaging to Achieve Diabetic Retinopathy Improvement (PRIME) clinical trial and co-authored a comprehensive review that established a standardized framework for OCTA quantitative metrics, now widely cited across the retinal imaging field.

a. **Kalra G**, Zarranz-Ventura J, Chahal R, Bernal-Morales C, Lupidi M, Chhablani J. Optical coherence tomography (OCT) angiolytics: A review of OCT angiography quantitative biomarkers. Surv Ophthalmol. 2022;67(3):740-758.

b. **Kalra G**, Wykoff C, Martin A, Srivastava SK, Reese J, Ehlers JP. Longitudinal Quantitative Ultrawidefield Angiographic Features in Diabetic Retinopathy Treated with Aflibercept from the PRIME Trial. Ophthalmol Retina. 2024;8(2):130-139.

c. **Kalra G**, Sil Kar S, Sevgi DD, Madabhushi A, Srivastava SK, Ehlers JP. Quantitative Imaging Biomarkers in Age-Related Macular Degeneration and Diabetic Eye Disease: A Step Closer to Precision Medicine. J Pers Med. 2021;11(11):1161.

d. Ehlers JP, McConville C, Yordi S, Cetin H, Cakir Y, **Kalra G**, Amine R, Whitney J, Whitmore V, Bonnay M, et al. Correlation Between Blue Fundus Autofluorescence and SD-OCT Measurements of Geographic Atrophy in Dry AMD. Am J Ophthalmol. 2024;266:163-171.

3. Telemedicine and Digital Health Innovation in Ophthalmology

I co-developed and evaluated telemedicine platforms and workflows for ophthalmic care delivery during and beyond the COVID-19 pandemic. I led patient-centered assessments of video visit adoption and accuracy of remote encounters at an academic eye center, contributing foundational evidence supporting the integration of telehealth in ophthalmology practice.

a. **Kalra G**, Williams AM, Commiskey PW, Bowers EMR, Schempf T, Sahel JA, Waxman EL, Fu R. Incorporating video visits into ophthalmology practice: a retrospective analysis and patient survey. Ophthalmol Ther. 2020;9(3):549-562.

b. Williams AM, **Kalra G**, Commiskey PW, Bowers EMR, Rudolph BR, Pitcher MD, et al. Ophthalmology practice during the COVID-19 pandemic: the University of Pittsburgh experience in promoting clinic safety and embracing video visits. Ophthalmol Ther. 2020;9(3):1-9.

c. Schempf T, **Kalra G**, Commiskey PW, Bowers EM, Davis A, Waxman EL, Fu R, Williams AM. Accuracy Assessment of Outpatient Telemedicine Encounters at an Academic Ophthalmology Department. J Acad Ophthalmol. 2022;14(2):e173-e180.

d. **Kalra G**, Ichhpujani P, Thakur S, Singh RB, Sharma U, Kumar S. A pilot study for smartphone photography to assess bleb morphology and vasculature post-trabeculectomy. Int Ophthalmol. 2021;41:1175-1183.

4. Ocular Inflammation, Uveitis, and Rare Ophthalmic Conditions

I contributed to advancing the understanding of inflammatory and rare retinal diseases by developing imaging-based quantitative analysis. I developed automated lesion segmentation tools for predicting paradoxical worsening in tubercular serpiginous-like choroiditis and characterized rare entities including choroidal Langerhans' cell histiocytosis, enriching the literature on diagnostic approaches for complex ocular pathologies.

a. **Kalra G**, Agarwal A, Marchese A, Agrawal R, Bansal R, Gupta V. Automated lesion segmentation and quantification for prediction of paradoxical worsening in patients with tubercular serpiginous-like choroiditis. Sci Rep. 2022;12:3728.

b. **Kalra G**, Fu R, Medina Mendez CA, Errera MH, Waxman EL. Choroidal Mass in a Patient with Undiagnosed Pulmonary Langerhans' Cell Histiocytosis. Ocul Immunol Inflamm. 2023;31(4):1-4.

c. Paez-Escamilla M, Caplash S, **Kalra G**, Odden J, Price D, Marroquin OC, et al. Challenges in posterior uveitis—tips and tricks for the retina specialist. J Ophthalmic Inflamm Infect. 2023;13:29.

d. Agarwal A, **Kalra G**, Agrawal R, Bansal R, Gupta V. Semi-automated quantitative analysis of the middle limiting membrane in tubercular serpiginous-like choroiditis using swept-source OCT. Sci Rep. 2021;11:23879.

5. Ophthalmic Education, Health Equity, and Access to Care

I am committed to improving ophthalmic education and equitable access to eye care. I contributed to studies evaluating research productivity benchmarks in ophthalmology residency training and led community outreach efforts as the Diversity and Inclusion Chair for the Foundation Fighting Blindness and as a volunteer physician for the Guerilla Eye Service, providing free eye care to underserved populations in rural western Pennsylvania.

a. Hang A, Pradeep T, Jessani H, **Kalra G**, Waxman EL, Zhang M, Fu R. Predictive Factors of Research Productivity among Ophthalmology Residents: A Benchmark Analysis. J Acad Ophthalmol. 2022;14(2):e181-e190.

b. Williams AM, Weed JM, Commiskey PW, **Kalra G**, Waxman EL. Prevalence of diabetic retinopathy and self-reported barriers to eye care among patients with diabetes in the emergency department: the DRS-ED study. BMC Ophthalmol. 2022;22:215.

c. Ichhpujani P, **Kalra G**, Kaur R, Chahal R, Kumar S. COVID-19 and ophthalmology: A scientometric analysis. Indian J Ophthalmol. 2021;69(5):1234-1238.

d. **Kalra G**, Ichhpujani P, Thakur S, Sharma U. Ideal illumination for smartphone-based trabeculectomy bleb photography. J Ophthalmic Vis Res. 2021;16(3):424-432.

Complete List of Published Work: https://scholar.google.com/citations?user=4Umak9gAAAAJ

ORCID: 0000-0002-3367-3047 | Google Scholar: 673 citations, h-index: 15, i10-index: 20 | 40+ peer-reviewed publications