Name: Dr. Inderjeet Kaur

Date of Birth: May 19, 1973

Employment

Role	Organisation	Dates
Research Scientist	LVPEI, Hyderabad, India	01/09/2005 to Present
Visiting Scientist	MEEI, Boston, USA	01/09/2009 to 3/04/2010
Visiting Scientist	NEI, Bethesda USA	15/03/2005 to 3/04/2005
Postdoctoral research associate	LVPEI, Hyderabad, India	01/08/2003 to 31/08/2005
Assistant Professor	Guru Nanak Dev University, Amritsar	01/08/2000 to 30/09/2005

Education

Degree	Organisation	Dates
Ph.D	Guru Nanak Dev University, Amritsar	1998-2003
M.Sc (Forensic Sciences)	Punjabi University, Patiala, India	2012-2014
B.Sc (Life sciences)	Panjab University, Chandigarh, India	1993-1995

Honors And Awards

I. **2003** **DBT Postdoctoral Research Fellowship** India
II. **2004** **JSPS-DST Travel fellowship** under Indo-Japan Cooperative science program
III. **2005** **AMJAD RAHI PRIZE** for best paper presentation. 14th Annual meeting of Indian Eye Research Group, Hyderabad
IV. **2007** **Young Investigator Award (MERIT) in Basic Sciences**, ASIA-ARVO meeting on Research in Vision and Ophthalmology, Singapore March 2007
V. **2007** **ARVO International Travel fellowship grant** for attending ASIA-ARVO meeting on Research in Vision and Ophthalmology, Singapore March 2007
VI. **200**9 **DST International travel Grant** for attending the ARVO meeting May 2-7, 2009.
VII. **2010 International Society for Eye Research (ISER) Travel fellowship** (USA), for attending the International Congress on Eye Research at Montreal, Canada July 2010.
VIII. **2011 DBT Crest Award (Cutting Edge Research Enhancement and Scientific Training Award)** for advanced training in Proteomics and Transcriptomics at Mass Eye and Ear Infirmary, Harvard University, Boston, USA from October 2011-March 2012
IX. **2011 B M Birla Science Medal (Biological Sciences)**
X. **2013 Member, Editorial Board for Journal of Genetics, Indian academy of Sciences**
XI. **2013 Member, ARVO Networking committee**
XII. **2015 Treasurer, Indian Society of Human Genetics**
XIII. **2015** Inaugural **ARVO Communicator Ribbon**, Denver, Colorado, May 2015.
XIV. 2017 **Coordinator,** Translational Research Program Committee APAO, Hong Kong

XV. **2013 Member, Editorial Board for Indian Journal of Ophthalmology**
XVI. 2018 **Associate Editor** Journal Of Genetics, India
XVII. 2019 **Member** ARVO International Chapter Committee
XVIII. 2022 **Secretary** Indian Society of Human Genetics
XIX. 2022 **Member** Diversity Initiative committee, ARVO, USA

Personal Statement:
I have been primarily trained to study the genetic underpinning for various Mendelian and non-Mendelian ocular diseases using OMICS technology and complex eye diseases with a sole aim to identify biomarker that can aid in early diagnosis and better prognosis. My laboratory has been involved in understanding the molecular mechanisms in neovascularization, neuroinflammation and neurodegeneration for retinal vascular diseases (AMD, ROP, DR and Uveitis), the major blinding conditions in the developing world. Over 50 students have been trained in our lab and 7 PhD have been awarded. We have established a high throughput transcriptomics and protein profiling, exosome isolation and primary neuron glia culture facility at the institute for carrying out systematic and detailed analysis of underlying molecular mechanisms that regulate the neovascularization, neuroinflammation and neurodegeneration in the retina under disease stress particularly hypoxia.

Significant achievements and selected publications:

1. **Biomarker identification for Retinopathy of Prematurity**: Our systematic investigations using genomics, transcriptomics and proteomics on a potentially blinding complication of premature birth, Retinopathy of Prematurity (ROP) identified a strong genetic component for this disease and revealed a novel role of microglia mediated complement activation and inflammation in the pathogenesis of ROP (9, 10). Further, we successfully demonstrated that tear MMP 2&9 levels could serve as potential biomarkers for disease progression. Based on our research findings, we in collaboration with IITH have developed a nano-sensor based device for monitoring the levels of inflammatory markers in the tears samples of preterm born babies for disease prediction and progression.

1. Kumar S, Patnaik S, Joshi M B, Sharma N, Kaur T, Jalali S, Kekunnaya R, Mahajan A, Chakrabarti S, **Kaur I*.** Arachidonic acid metabolism regulates the development of retinopathy of prematurity among preterm infants. ***Journal of Neurochemistry***, 2024. 00, 1–17. https://doi.org/10.1111/jnc.16190

2. Venugopal D, Vishwakarma S, Sharma N, **Kaur I*.** and Samavedi S, Evaluating the protective effects of dexamethasone and electrospun mesh combination on primary human mixed retinal cells under hyperglycemic stress. ***International Journal of Pharmaceutics***, 2024, *651*, p.123768.

3. Ghosh, T.N., Rotake, D., Kumar, S., **Kaur, I***. and Singh, S.G., 2023. Tear-based MMP-9 detection: A rapid antigen test for ocular inflammatory disorders using vanadium disulfide nanowires assisted chemi-resistive biosensor. ***Analytica Chimica Acta***, *1263*, p.341281.

4. Kumar S, Joshi MB, **Kaur I***. Protocol and Methods Applicable to Retinal Vascular Diseases. In ***Lipidomics: Methods and Protocols*** 2023 Jan 19 (pp. 71-78). New York, NY: Springer US.

5. Kaur, T., Sharma, N., Jakati, S., Bagga, N., Mitra, S., Bhargavi K, K., Jalali, S. and **Kaur, I*** 2023. Role of maternal, fetal and placental histopathology factors in the pathogenesis of retinopathy of prematurity. ***bioRxiv***, pp.2023-02.

6. Dhyani V, Kumar S, Manne SR, Kaur I, Jana S, Russell S, Sarkar R, Giri L. Three-dimensional tracking of intracellular calcium and redox state during real-time control in a hypoxic gradient in microglia culture: Comparison of the channel blocker and Reoxygenation under ischemic shock. ***ACS Chemical Neuroscience***. 2023 May 9;14(10):1810-25.

7. Kaur T, Patnaik S, Kumar S, **Kaur I***. Molecular mechanisms in the pathogenesis of retinopathy of prematurity (ROP). In ***Genetics of Ocular Diseases*** 2022 Feb 7 (pp. 101-123). Singapore: Springer Nature Singapore.

8. Venugopal D, Vishwakarma S, **Kaur I*** Samavedi S. Electrospun meshes intrinsically promote M2 polarization of microglia under hypoxia and offer protection from hypoxia-driven cell death. ***Biomedical Materials***. 2021 Jun 29;16(4):045049.

9. Patnaik, S., Rai, M., Jalali, S., Agarwal, K., Badakere, A., Puppala, L., Vishwakarma, S., Balakrishnan, D., Rani, P.K., Kekunnaya, R…& **Kaur I*.** 2021. An interplay of microglia and matrix metalloproteinase MMP9 under hypoxic stress regulates the opticin expression in retina. ***Scientific reports,*** *11*(1), p.7444.

10. Patnaik S, Jalali S, Joshi MB, Satyamoorthy K, **Kaur I***. Metabolomics applicable to retinal vascular diseases. ***Metabolomics: Methods and Protocols***. 2019:325-31.

11. Rathi S, Jalai S, Patnaik SB, Shahulhameed S, Musada GR, Balakrishnan D, Rani PK, Kekunnaya R, Chhablani PP, Swain S, Giri L, Chakrabarti S, **Kaur I***. Aberrant microglia-mediated complement activation and inflammation in the pathogenesis of retinopathy of prematurity. ***Front Immunol*** 2017; 8: 1868.

12. Rathi S, Jalali S, Musada GR, Patnaik S, Balakrishnan D, Hussain A, **Kaur I***. Mutation spectrum of NDP, FZD4 and TSPAN12 genes in Indian patients with retinopathy of prematurity. ***British Journal of Ophthalmology***. 2018 Feb 1;102(2):276-81.

Corresponding author

2. **<u>Understanding the molecular mechanisms involved in the pathogenesis of Diabetic retinopathy</u>**: Our lab also has a keen interest in investigating the underlying molecular mechanisms in DR using human biological samples (vitreous humor, retina, retinal membranes, tear, and aqueous humor) by analysing the global transcriptome and proteome profiling. Our transcriptomics and proteomics analysis of DR has shown a novel involvement of CFH and C3Bα interactions and dysregulated autophagy in the pathogenesis of DR. Further, by studying short RNA in the exosomes extracted from the vitreous and blood samples of the patients, we have identified novel miRNA and LncRNA for DR and are currently studying their role in the regulation of gene expression.

1. Sharma S, Belenje A, Takkar B, Narula R, Rathi VM, Tyagi M, Rani PK, Narayanan R, **Kaur I***. Tear Protein Markers for Diabetic Retinopathy and Diabetic Macular Edema–Towards an Early Diagnosis and Better Prognosis. In ***Seminars in Ophthalmology*** 2024 Apr 22 (pp. 1-11).
2. Kulshrestha P, Sharma S, Vishwakarma S, Ali MJ, Dave TV, Kaur I. Quality and applicability of cadaveric donor eyes for molecular biology research: An Indian experience. ***Indian Journal of Ophthalmology***. 2024 Jul 1;72(7):962-7.

3. Venugopal D, Vishwakarma S, **Kaur I***, Samavedi S. Electrospun fiber-based strategies for controlling early innate immune cell responses: towards immunomodulatory mesh designs that facilitate robust tissue repair. ***Acta Biomaterialia***. 2023 Jun 1;163:228-47.
4. Saha D, Vishwakarma S, Gupta RK, Pant A, Dhyani V, Sharma S, Majumdar S, **Kaur I,** Giri L. Non-prophylactic resveratrol-mediated protection of neurite integrity under chronic hypoxia is associated with reduction of Cav1. 2 channel expression and calcium overloading. ***Neurochemistry International***. 2023 Mar 1;164:105466.
5. Sehgal P, Mathew S, Sivadas A, Ray A, Tanwar J, Vishwakarma S, Gyan Ranjan, KV Shamsudheen, Rahul C Bhoyar, Abhishek Pateria, Elvin Leonard, Lalwani M, Vats A, Pappuru RR, Tyagi M, Jakati S, Sengupta S, Binukumar BK, Chakrabarti C, **Kaur I** et al. LncRNA VEAL2 regulates PRKCB2 to modulate endothelial permeability in diabetic retinopathy. ***The EMBO Journal***. 2021 Aug 2;40(15):e107134.
6. Vishwakarma S, Gupta RK, Jakati S, Tyagi M, Pappuru RR, Reddig K, Hendricks G, Volkert MR, Khanna H, Chhablani J, **Kaur I*.** Molecular assessment of epiretinal membrane: activated microglia, oxidative stress and inflammation. ***Antioxidants***. 2020 Jul 23;9(8):654.
7. Shahulhameed S, Vishwakarma S, Chhablani J, Tyagi M, Pappuru RR, Jakati S, Chakrabarti S**,** ***Kaur I****. A Systematic Investigation on Complement Pathway Activation in Diabetic Retinopathy. ***Front Immunol***. 2020;11:154.
8. Shahulhameed S, Swain S, Jana S, Chhablani J, Ali MJ, Pappuru RR, Tyagi M, Vishwakarma S, Sailaja N, Chakrabarti S, Giri L, **Kaur I*.** A Robust Model System for Retinal Hypoxia: Live Imaging of Calcium Dynamics and Gene Expression Studies in Primary Human Mixed Retinal Culture. ***Front Neurosci***. 2019;13:1445.
9. Spoorthy D, Manne SR, Dhyani V, Swain S, Shahulhameed S, Mishra S, **Kaur I**, Giri L, Jana S. Automatic Identification of Mixed Retinal Cells in Time-Lapse Fluorescent Microscopy Images using High-Dimensional DBSCAN. Conf Proc ***IEEE Eng Med Biol Soc***. 2019 Jul;2019:4783-4786.
10. Gupta RK, Kaur I, Nag TC, Chhablani J. Diagnostic Electron Microscopy of Retina. In ***Seminars in Ophthalmology*** 2018 Jul 4 (Vol. 33, No. 5, pp. 700-710).

3. **<u>Genomics and proteomics of AMD</u>**: AMD is one of major causes of irreversible vision loss among the elderly. Our research has provided a model to identify individuals at risk much before they are diagnosed with the disease. Our approach has been a combination of SNP based microarrays and genome wide association study (GWAS) that has led to the devising of molecular diagnostics for predictive testing.

1. Yang P, Iejima D, Mao Nakayama, Suga A, Noda T, **Kaur I**, Das T et al. "Binding of Gtf2i-β/δ transcription factors to the ARMS2 gene leads to increased circulating HTRA1 in AMD patients and in vitro." ***Journal of Biological Chemistry*** 296 (2021): 100456.
2. Garland DL, Fernandez-Godino R, ***Kaur I,*** Speicher KD, Harnly JM, Lambris JD, Speicher DW, Pierce EA. Mouse genetics and proteomic analyses demonstrate a critical role for complement in a model of DHRD/ML, an inherited macular degeneration. ***Hum Mol Genet***. 2014 Jan 1;23(1):52-68.
3. **Kaur I**, Cantsilieris S, Katta S, Richardson AJ, Schache M, Pappuru RR, Narayanan R, Mathai A, Majji AB, Tindill N, Guymer RH, ***Chakrabarti S***, Baird PN. Association of the del443ins54 at the ***ARMS2*** locus in Indian and Australian cohorts with Age-Related Macular Degeneration. ***Mol Vis*** 2013; 19: 820-826.

4. Thakkinstian A, McEvoy M, Chakravarthy U, ***Chakrabarti S***, McKay GJ, Ryu E, Silvestri G, **Kaur I**, Francis P, Iwata T, Akahori M, Arning A, Edwards A, Seddon J, Attia J. The Association Between Complement Component 2/Complement Factor B Polymorphisms and Age-Related Macular Degeneration: A HuGE Review and Meta-Analysis. ***Am J Epidemiol*** 2012; 176: 361-372.
5. **Kaur I**, Rathi S, ***Chakrabarti S*.** Variations in ***TIMP3*** are associated with age-related macular degeneration. ***Proc Natl Acad Sci, USA*** 2010; 107: E112-113.
6. **Kaur I,** Katta S, Reddy RK, Narayanan R, Mathai A, Majji AB, ***Chakrabarti S***. The Involvement of Complement Factor B and Complement Component C2 in an Indian Cohort with Age-Related Macular Degeneration. ***Invest Ophthalmol Vis Sci*** 2010; 51:59-63.
7. **Kaur I,** Katta S, Hussain A, Hussain N, Mathai A, Narayanan R, Hussain A, Reddy R, Majji AB, Das TP, ***Chakrabarti S***. Variants in the 10q26 gene cluster ***(LOC387715*** and ***HTRA1)*** exhibit enhanced risk of age-related macular degeneration along with ***CFH*** in Indian patients. ***Invest Ophthalmol Vis Sci*** 2008;49:1771-1776.
8. **Kaur I**, Ghanekar Y, Chakrabarti S. Understanding the genetics of age-related macular degeneration: some insights into the disease pathogenesis. ***Int J Hum Genet*** 2008: 8: 161-169.[3]
9. Hussain N, Ghanekar Y, **Kaur I**. The Future Implications and Indications of AntiVEGF Therapy in Ophthalmic Practice. ***Indian J Ophthalmol*** 2007;55: 445-50.[11]
10. **Kaur I**, Hussain A, Hussain N, Das TP, Pathangay A, Mathai A, Hussain A, Nutheti R, Nirmalan PK, Chakrabarti S. Analysis of *CFH*, *TLR4* and *APOE* polymorphisms in India suggests the Tyr402His variant of *CFH* to be a global marker for age-related macular degeneration. ***Invest Ophthalmol Vis Sci*** 2006; 47: 3729-3735.

4. **<u>Understanding the genomic basis of rare eye diseases</u>**: I have been actively contributing to the understanding of the molecular genetics of rare eye diseases with varied presentation and identified unique gene/ rare variants which could be helpful for genetic diagnosis and counselling.

1. Kulshrestha P, Goel P, Murthy S, Tyagi M, Basu S, Gogri P, Kaur I. Exploring the involvement of the alternative complement pathway in non-infectious uveitis pathogenesis. ***Frontiers in Immunology***. 2023 Dec 8;14:1222998.
2. Senthil S, Sharma S, Vishwakarma S, **Kaur I***. A novel mutation in the aspartate beta-hydroxylase (ASPH) gene is associated with a rare form of Traboulsi syndrome. ***Ophthalmic Genetics***. 2021 Jan 2;42(1):28-34.
3. Ramappa M, Gandhi U, Chaurasia S, Kabra M, Kaur I, Mittal R, Mishra DK, Chakrabarti S, Edward DP. Peters anomaly in Nail-Patella syndrome: a case report and clinico-genetic correlation***. Cornea***. 2021 Nov 1;40(11):1487-90.
4. Konda N, Kaur I, Garg P, Chakrabarti S, Willcox MD. Toll-like receptor gene polymorphisms in patients with keratitis. ***Contact Lens and Anterior Eye***. 2021 Jun 1;44(3):101352.
5. Ali MJ, Patnaik S, Kelkar N, Ali MH, **Kaur I***. <u>Alteration of Tear Cytokine Expressions in Primary Acquired Nasolacrimal Duct Obstruction - Potential Insights into the Etiopathogenesis.</u> ***Curr Eye Res***. 2020 Apr;45(4):435-439. doi: 10.1080/02713683.2019.1665186.

6. Musada GR, Hameed S, Jalali S, Chakrabarti S, **Kaur I***. Mutation Spectrum of the *Frizzled-4*, *TSPAN12* and *ZNF408* Genes in Indian FEVR Patients. ***BMC Ophthalmology***2016; 16: 90.
7. Musada GR, Jalali S, Hussain A, Chevuru A, Gaddam P, Chakrabarti S, **Kaur I***. Mutation spectrum of the Norrie Disease Pseudoglioma (*NDP*) gene in Indian FEVR patients. ***Mol Vis*** 2016, 22: 491-502.
8. Das D, **Kaur I**, Ali MJ, Biswas NK, Das S, Kumar S, Honavar SG, Maitra A, ***Chakrabarti S***, Majumder PP. Exome sequencing reveals the likely involvement of ***SOX10*** in uveal melanoma. ***Optom Vis Sci*** 2014; 91: e185-192.
9. Ramappa M, Chaurasia Sunita, ***Chakrabarti S***, **Kaur I**. Clinical spectrum of congenital corneal anesthesia in Southern India. ***JAAPOS*** 2014; 18: 427-432.
10. ***Chakrabarti S***, Ramappa M, Chaurasia S, **Kaur I**, Mandal AK. ***FOXC1*** -associated phenotypes in humans may not always exhibit corneal neovascularization. ***Proc Natl Acad Sci, USA*** 2012: 109: E1509.
11. **Kaur I***, Hussain A, Naik MN, Murthy R, Honavar SG. Mutation spectrum of fork-head transcriptional factor gene (FOXL2) in Indian Blepharophimosis Ptosis Epicanthus Inversus Syndrome (BPES) patients. ***Br J Ophthalmol***. 2011 Jun;95(6):881-6. doi: 10.1136/bjo.2009.177972. Epub 2011 Feb 16. PubMed PMID: 21325395.

e) **Genomics of Glaucomas:** In collaboration with Dr Subho Chakrabarti and his team I was involved in understanding the molecular basis of Glaucomas (PCG and POAG)

1. Sayyad Z, Vishwakarma S, Dave TV, Naik MN, Radha V, **Kaur I**, Swarup G. Human primary retinal cells as an in-vitro model for investigating defective signalling caused by OPTN mutants associated with glaucoma. ***Neurochemistry International***. 2021 Sep 1;148:105075.
2. Rathi S, Danford I, Gudiseva HV, Verkuil L, Pistilli M, Vishwakarma S, **Kaur I**, Dave TV, O'Brien JM, Chavali VR. Molecular genetics and functional analysis implicate CDKN2BAS1-CDKN2B involvement in POAG pathogenesis. ***Cells***. 2020 Aug 21;9(9):1934.
3. Choudhari NS, Khanna RC, Marmamula S, Mettla AL, Giridhar P, Banerjee S, Shekhar K, Chakrabarti S, Murthy GV, Gilbert C, Rao GN. Fifteen-year incidence rate of primary angle closure disease in the Andhra Pradesh Eye Disease Study. ***American journal of Ophthalmology***. 2021 Sep 1;229:34-44.
4. Khanna RC, Marmamula S, Pendri P, Mettla AL, Giridhar P, Banerjee S, Shekhar K, Chakrabarti S, Murthy GV, Gilbert C, Rao GN. Incidence, incident causes, and risk factors of visual impairment and blindness in a rural population in India: 15-year follow-up of the Andhra Pradesh eye disease study. ***American journal of Ophthalmology***. 2021 Mar 1;223:322-32.
5. Labelle-Dumais C, Pyatla G, Paylakhi S, Tolman NG, Hameed S, Seymens Y, Dang E, Mandal AK, Senthil S, Khanna RC, Kabra M, **Kaur I**, John SWM, Chakrabarti S, Nair KS. Loss of PRSS56 function leads to ocular angle defects and increased susceptibility to high intraocular pressure. ***Dis Model Mech***. 2020 Mar 9;. doi: 10.1242/dmm.042853. [Epub ahead of print] PubMed PMID: 32152063.
6. Kabra M, Zhang W, Rathi S, Mandal AK, Senthil S, Pyatla G, Ramappa M, Baneijee S, Shekhar K, Marmamula S, Mettla AL, **Kaur I**, Khanna RC, Khanna H, ***Chakrabarti S***. Angiopoietin receptor ***TEK*** interacts with ***CYP1B1*** in primary congenital glaucoma. ***Hum Genet*** 2017; 136: 941-949.
7. de Melo MB, Mandal AK, Tavares IM, Ali MH, Kabra M, de Vasconcellos JP, Senthil S, Sallum JM, **Kaur I**, Betinjane AJ, Moura CR, Paula JS, Costa KA, Sarfarazi M, Paolera MD, Finzi S, Ferraz VE, Costa VP, Belfort R Jr., ***Chakrabarti S***. Genotype-phenotype correlations in ***CYP1B1*** -associated primary congenital glaucoma patients representing

two large cohorts from India and Brazil. ***PLoS One*** 2015;10:e0127147.
8. Azmanov DN, Dimitrova S, Florez L, Cherninkova S, Draganov D, Saat R, Juan M, Arostegui JI, Ganguly S, Soodyall H, ***Chakrabarti S***, ***et al. LTBP2*** and ***CYP1B1*** mutations and associated ocular phenotypes in the Roma/Gypsy founder population. ***Eur J Hum Genet*** 2011; 19: 326-333.
9. ***Chakrabarti S***, Ghanekar Y, Kaur K, **Kaur I**, Mandal A, Rao KN, Parikh RS, Thomas R, Majumder PP. A polymorphism in the ***CYP1B1*** promoter is functionally associated with primary congenital glaucoma. ***Hum Mol Genet*** 2010; 19: 4083-4090.
10. Rao KN, **Kaur I**, ***Chakrabarti S***. Lack of association of three POAG susceptible loci with primary glaucomas in an Indian population. ***Proc Natl Acad Sci, USA*** 2009: 106: E125-126.
11. ***Chakrabarti S***, Rao KN, **Kaur I**, Parikh RS, Mandal AK, Chandrasekhar G, Thomas R. The ***LOXL1*** Gene Variations are not associated with primary open angle and primary angle closure glaucomas. ***Invest Ophthalmol Vis Sci*** 2008; 49: 2343-2347.
12. Chakrabarti S, Kaur K, ***Kaur I***, Mandal AK, Parikh RS, Thomas R, Majumder PP. Globally, CYP1B1 mutations in primary congenital glaucoma are strongly structured by geographic and haplotype backgrounds. ***Invest Ophthalmol Vis Sci.*** 2006 Jan;47(1):43-7. doi: 10.1167/iovs.05-0912. PubMed PMID: 16384942.

A complete list of publication can be seen at

https://www.ncbi.nlm.nih.gov/myncbi/1nGU9I8EkbPAb/bibliography/public/

https://scholar.google.com/citations?hl=en&user=LuEJW80AAAAJ

ORCID ID (or similar): https://orcid.org/0000-0003-3660-5039