

VISION RESEARCH FOUNDATION

New No.41 (Old No.18), COLLEGE ROAD, CHENNAI – 600 006



**ANNUAL REPORT & RESEARCH ACTIVITIES
2021-22**



VISION RESEARCH FOUNDATION

Date : 18th August 2022

The Members of the Vision Research Foundation

NOTICE

NOTICE IS HEREBY GIVEN TO THE MEMBERS OF VISION RESEARCH FOUNDATION THAT THE 38TH ANNUAL GENERAL MEETING OF VISION RESEARCH FOUNDATION WILL BE HELD ON MONDAY, THE 12TH SEPTEMBER 2022 AT 5.00 P.M. AT THE VRF BOARD ROOM IN THE 2ND FLOOR OF KAMALNAYAN BAJAJ RESEARCH CENTRE, VISION RESEARCH FOUNDATION, NEW NO.41 OLD NO.18, COLLEGE ROAD, CHENNAI – 600006. THE AGENDA FOR THE MEETING IS GIVEN BELOW.

AGENDA

1. To consider and adopt the Annual Report of the Hon. Secretary for the year 2021-22.
2. To consider and adopt the Audited Income and Expenditure Account for the year ended March 31, 2022 and the Balance Sheet as at that date together with the Report of the Auditors thereon.
3. To appoint statutory auditors for the financial year 2022-23 and to fix their remuneration.
4. To appoint the following Member to the Board of Management in the vacancy caused by his retirement, who is eligible for re-appointment:

Name	Category of Membership
Dr. T S Surendran	Honorary Member

Kindly make it convenient to attend the meeting.

**DR S BHASKARAN
HON. SECRETARY**

Note:

Explanatory statement for Item 4 of the Agenda is attached.



VISION RESEARCH FOUNDATION

Explanatory Statement

Refer Item No 4 of the Agenda

Dr. T S Surendran was appointed to the Board of Management for a period of three years at the 35th Annual General Meeting held on 14th September 2019.

His term of appointment expires at the end of the Annual General Meeting on 12th September 2022. As per 16(xiv) of the Bye-laws of the Foundation read with Section 15 (5) of the Tamil Nadu Societies Registration Act 1975, he is eligible for reappointment to the Board of Management.



VISION RESEARCH FOUNDATION

BOARD OF MANAGEMENT

Dr Ronnie Jacob George	President
Dr S Bhaskaran	Honorary Secretary

Members of the Board

Dr J Biswas	Member
Mr Homi C H Bhabha	Member
Dr H N Madhavan	Member
Mr R Rajagopal	Member
Dr T S Surendran	Member
Dr S Suresh	Member
Mr V Vaidyanathan	Member
Dr L Vijaya	Member

Director – Research	Dr. Ronnie Jacob George
Deputy Director – Research Manager	Dr. S Krishnakumar Mrs. Manjula R

Auditors	M/s S Viswanathan LLP Chartered Accountants, Chennai
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Bankers	HDFC Bank, Chennai – 600 034 Indian Overseas Bank, Chennai – 600 006 State Bank of India, Chennai –600 034 State Bank of India, New Delhi.
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Registered Office	New No.41, Old No.18, College Road Chennai – 600 006
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VISION RESEARCH FOUNDATION

INSTITUTIONAL REVIEW BOARD (ETHICS COMMITTEE) MEMBERS

Chairman

Prof. H N Madhavan, M.D, Ph.D, FAMS, FICPATH
Director-Microbiology (Retd)
Medical Research Foundation

Member-Secretary

Dr. Ronnie Jacob George, M.S, D.O, D.N.B
President & Director-Research
Vision Research Foundation

Members

Dr. Bakulesh M. Khamar, M.S (Oph)
Prof of Ophthalmology (Retd.)
Gujarat University.

Dr. Manjula Datta , M.D D.C.H, M.Sc.
Epidemiol.(Ca), FRCP(Ed)
Scientific Director, Aspire

Dr. S Krishnakumar, M.D,
Deputy Director- Research
Vision Research Foundation

Dr. T S Surendran, D.O, M.Phil, FRCSEd
Vice Chairman, Medical Research Foundation

Prof. N Vizheenathan, M.A, Ph.D, Siromani, D.Litt
Professor & Head, Dept. of Sanskrit (Retd)
University of Madras.

Mrs. Radhika Krishnan, B.Sc, B.L
Advocate, Chennai.

Lion G V Raman, B.Com. FCA
Executive Chairman
Shriram Group of Companies

Dr. Rama Shankar Verma, M.Sc, M.Phil, Ph.D
Professor, Dept. Of Biotechnology (Retd.)
Indian Institute of Technology Madras.

Mrs. Sujatha Viswanath, M.Com
Chennai.

Mrs. Nalini Ravindran, B.Sc, M.A, M.Phil
Chennai.



VISION RESEARCH FOUNDATION

RESEARCH CELL COMMITTEE MEMBERS

Dr. Ronnie Jacob George
Dr. H N Madhavan
Dr. L Vijaya
Dr. S Krishnakumar
Dr. Sumita Agarkar
Dr. J Biswas
Dr. R R Sudhir
Dr. Prema Padmanabhan
Dr. N Angayarkanni

INSTITUTIONAL COMMITTEE FOR STEM CELL RESEARCH MEMBERS (under Registration Process)

Prof. Dr. Rama Shankar Verma
Dr. H.N. Madhavan
Mrs. Radhika Krishnan
Dr. S Arumugam
Prof. N. Veezhinathan
Dr. Ronnie Jacob George
Dr. Rama Rajaram
Dr. Rosy Vennila
Dr. Bakulesh M Khamar

INSTITUTIONAL BIOLOGICAL SAFETY COMMITTEE MEMBERS

Dr. S Krishnakumar
Dr. Srujana Chitipothu
Dr. S Sripriya
Dr. Sharada Ramasubramanyan



VISION RESEARCH FOUNDATION

ANNUAL REPORT FOR THE YEAR 2021-22

Report of the Hon. Secretary to the Members of the Foundation

I am pleased to present the 38th Annual Report of Vision Research Foundation together with the Audited Accounts for the year ended 31st March 2022.

Financial Performance :

The financial performance of the Foundation for the year 2021-22 is summarized below :

	Rs. In Lakhs	
PARTICULARS	2021-22	2020-21
INCOME		
Donations	169.23	147.07
Interest & Other Income	52.95	64.72
Research Grant	375.59	358.21
Total Income	597.77	570.00
EXPENDITURE	718.06	743.30
Deficit before Depreciation	120.30	173.30
Loss on Discarded Assets	-	0.42
Depreciation	96.10	117.55
Net Deficit	216.40	291.26

The donations received during the year were Rs.169.23 lakhs as compared to Rs. 147.07 lakhs in the previous year and the research grant amounting to Rs.375.59 lakhs against Rs.358.21 lakhs during the last financial year. The gross total income for the year under review was Rs.597.76 lakhs. The total expenditure before providing depreciation was Rs.718.06 lakhs resulting in a cash deficit of Rs.120.30 lakhs. After considering depreciation for the year, there was a net deficit of Rs.216.40 lakhs, which was carried over to the capital fund account.

The non-recurring grant of Rs.35.36 lakhs received from Government Funding Agencies was accounted under capital fund account.



VISION RESEARCH FOUNDATION

Cash Flow

Description	Rs. In Lakhs	
	2021-22	2020-21
Source		
Opening Cash Balance	1,158.81	1,340.19
Cash Flow from operations	-120.30	-173.30
Grant for equipment	34.05	11.87
Increase / Decrease in Current Liabilities	17.59	-53.39
Total Sources	1,090.15	1,125.37
Applications		
Investment	6.29	7.72
Increase/Decrease in Current Assets	17.46	-41.15
Total Applications	23.75	-33.43
Closing Cash Balance	1,066.40	1,158.81

The foundation received a sum of Rs.375.59 lakhs as research grants, during the year under review as per the details given below :

Research Grants – Basic Science	Rs. in Lakhs	
	2021-22	2020-21
1. Council of Science & Industrial Research	8.74	4.86
2. Indian Council of Medical Research	87.11	86.48
3. Department of Biotechnology	109.56	67.02
4. Department of Science & Technology	18.28	14.89
5. Fellowship Programme	72.30	106.31
6. Moorfields Eye Hospital, NHS Foundational Trust	75.81	48.28
7. Medgenome Labs Ltd	0.59	3.49
8. Ngee Ann Polytechnic	0.79	0.68
9. The Glaucoma Foundation	.00	6.51
10. Others	1.16	7.29
Total	374.34	345.81
Clinical Science	1.25	12.40
Grand Total	375.59	358.21



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CSR Fund

The Foundation received Rs.50.00 lakhs donation from the Sanmar Group CSR Trust during the year towards financial support for Advanced Molecular Biology Infrastructure for Eye Disease Research at Vision Research Foundation.

Research Activities:

Research activities during the financial year were satisfying. A number of projects were submitted to the various national and international funding agencies during the year.

During the financial year, 12 projects were successfully completed and one of the projects submitted to the funding agencies has been technically approved.

Meetings:

During the year, the meetings of the Board of Management and Institutional Review Board (Ethics Committee)/Research Sub-Committee were conducted virtually.

Manpower Details:

<u>Manpower</u>	<u>As on 31st Mar 2022</u>	<u>As on 31st Mar 2021</u>
Scientists	15	18
Part-time Scientists	61	49
Executives	4	7
Project Staff	40	39
Staff	14	14

Conclusion:

I would like to take this opportunity to place on record my gratitude for all the guidance extended to me by Dr. S S Badrinath, Founder Member; Dr. Ronnie Jacob George, President & Director – Research; and Dr. S Krishnakumar, Deputy Director – Research; and all the members of the Board of Management, and members of the sub-committees of Vision Research Foundation.



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I would like to mention that the achievements and awards received by the scientists, details of completed projects and ongoing projects, and the articles published in the national and international journals are given separately. Due to the Covid 19, many international/national conferences were held virtually and our scientists participated in the virtual meetings and the details are also given separately.

My thanks are also due to the Auditors, M/s. S Viswanathan LLP particularly to their partners, Mr. Chella K Srinivasan and Mr. R M Narayanan for their active and invaluable support and our Bankers, HDFC Bank Ltd, Indian Overseas Bank and State Bank of India for their support and co-operation.

I would like to thank the Internal Auditors, M/s. Sundar, Ranganath & Srinivasan, Chartered Accountants, for their active support in conducting internal audit of the Foundation.

Mr. S Narayan, Manager, played an active role in managing the finance and administrative activities of the Foundation. I thank him for his help and assistance.

The Board of Management place on record their appreciation of the invaluable contribution made by the Research Scientists, Consultants, para-medics and other employees to the continued success of the institution.

Dr S Bhaskaran
Hony. Secretary
Vision Research Foundation



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HONOURS & AWARDS

- ❖ Ms. Ishwarya S. received the Best Oral Presentation Award on "Association of Lifetime Ocular UV exposure with Pseudo-exfoliation syndrome - A hospital-based study" at Second IVI International Optometry Conference - Eye Health in a Changing World held in September 2021.
- ❖ Ms. Ishwarya S. received the Best Poster Award for her poster presentation on "Evaluating the effect of ocular UV exposure as a major causative risk factor and risk modelling for pseudoexfoliation syndrome" at the Indian Eye Research Group (IERG) Annual Meeting 2021 held in October 2021.
- ❖ Ms. Ishwarya S. and Ms. Nishath Fathima won the Second Prize (with team) for iQUEST quiz at the Indian Eye Research Group (IERG) Annual Meeting 2021 held in October 2021.
- ❖ Ms. Vidya Pradeep received the PhD degree from Sastra University, at the Graduation Ceremony on 5th March 2022 for her thesis entitled "Generation of corneal epithelial cells from noncorneal autologous source for the treatment of bilateral limbal stem cell deficiency" under the supervision of Dr. S Krishnakumar.
- ❖ Mr. A Samdani was conferred his doctoral degree from Sastra University at the Graduation Ceremony on 5th March 2022 for his PhD thesis entitled "Design and Development of automated computational pipelines for intermolecular recognition of kinases pertaining to structure-based drug design and validation" done under the Guidance of Dr. V Umashankar
- ❖ Ms. Ishwarya S. received the Young Scientist Award at the 72nd Indian Association of Occupational Health - OCCUCON 2022 in January 2022 for the best oral presentation on "*Impact of ultra-violet radiation and air pollution on ocular health with emphasis on cataract and pterygium among outdoor workers*".
- ❖ Ms. Lakshmi B was conferred her doctoral degree from Anna University at the Graduation Ceremony of Sankara Nethralaya held at Sri. V.D. Swami Auditorium on 5th March 2022 for her thesis entitled, "Identification of systemic risk factors and genetic biomarkers for intravitreal steroid induced ocular hypertension" under the guidance of Dr. Sailaja Elchuri.
- ❖ Dr. Amit Chatterjee, received the "Prof. S. Krishnamoorthy Endowment Award for the year 2021" for the best outgoing Ph.D. student in the Graduation Ceremony of Sankara Nethralaya held at Sri V.D.Swami Auditorium on 5th March 2022.



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- ❖ Ms. Lakshmi B received the Swarnalatha Punshi Best Researcher Award in Basic Science for the year 2021 for her research paper entitled "Whole-genome sequencing unravels novel genetic determinants and signaling pathways associated with intravitreal triamcinolone-acetonide induced ocular hypertension" in the Graduation Ceremony of Sankara Nethralaya held at Sri V.D.Swami Auditorium on 5th March 2022.



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RESEARCH PUBLICATIONS

International Journals:

- ❖ Rahini Rajendran, Dhandayuthapani Sudha, Subbulakshmi Chidambaram, Hemavathy Nagarajan, Umashankar Vetrivel and Jayamuruga Pandian Arunachalam, "Retinoschisis and Norrie disease: a missing link" , *BMC Research Notes*, 14(1), 1-7, 26 May 2021.
- ❖ Alam MS, Mukherjee B, Krishnakumar S, "Clinical profile and management outcomes of lacrimal drainage system malignancies". *Orbit*. 2021 May 21:1-8.
- ❖ Nderitu P, do Rio JMN, Rasheed R, Raman R, Rajalakshmi R, Bergeles C, Sivaprasad S & SMART India Study Group. "Deep learning for gradability classification of handheld, non-mydratic retinal images." *Sci Rep*. 2021 May 4;11(1):946.9
- ❖ Tatsuya Nakagawa, Naoki Okumura, Naoya Hanada, Prema Padmanabhan, Sailaja Elchuri, Amit Chatterjee, Narayanan Janakiraman, Gajanan Sathe, Vivek Ghose, Theofilos Tourtas, Ursula Schlötzer-Schrehardt, Friedrich E Kruse, Noriko Koizumi. "Proteomic analysis of TCF4 knock-out corneal endothelial cells derived from the patients with Fuchs endothelial corneal dystrophy." *Invest. Ophthalmol. Vis. Sci*. Jun 2021;62(8):827.
- ❖ Iyer Mahalaxmi, Tiwari S, Renu K, Pasha MY, Pandit S, Singh B, Raj N, Krothapalli S, Kwak HJ, Balasubramanian V, Jang SB, G DK, Utpal A, Narayanasamy A, Kinoshita M, Subramaniam Mohana Devi, Nachimuthu SK, Roy A, Valsala Gopalakrishnan A, Ramakrishnan P, Cho SG, Vellingiri B. "Environmental survival of SARS-CoV-2 - A solid waste perspective." *Environ Res*. 2021 Jun.
- ❖ Frudd K, Sivaprasad S, Raman R, Krishnakumar S, Revathy YR, Turowski P, "Diagnostic circulating biomarkers to detect vision-threatening diabetic retinopathy: Potential screening tool of the future?" *Acta Ophthalmol. E.pub* 2021 Jul 16.
- ❖ Mahalaxmi I, Jayaramayya K, Venkatesan D, Subramaniam Mohana Devi, Renu K, Vijayakumar P, Narayanasamy A, Gopalakrishnan AV, Kumar NS, Sivaprakash P, Sambasiva Rao KRS, Vellingiri B. "Mucormycosis: An opportunistic pathogen during COVID-19." *Environ Res. Epub* 2021 Jul 6.
- ❖ Bagewadi S, Parameswaran Sowmya, Krishnakumar S, Sethuraman S, Subramaniam Anuradha, "Tissue engineering approaches towards the regeneration of biomimetic scaffolds for age-related macular degeneration". *A.J Mater Chem B*. 2021 Aug 4;9(30):5935-5953.



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- ❖ Swetha Rajasekaran, Jalal Siddiqui, Jessica Rakijas, Brandon Nicolay, Chenyu Lin, Eshan Khan, Rahi Patel, Robert Morris, Emanuel Wyler, Myriam Boukhali, Jayashree Balasubramanyam, R. Ranjith Kumar, Capucine Van Rechem, Christine Vogel, Sailaja V. Elchuri, Markus Landthaler, Benedikt Obermayer, Wilhelm Haas, Nicholas Dyson & Wayne Miles "*Integrated multi-omics analysis of RB-loss identifies widespread cellular programming and synthetic weaknesses*". *Commun Biol* 4, 977 Aug 2021.
- ❖ Baranasic, Damir, Matthias Hörtenhuber, Piotr J. Balwierz, Tobias Zehnder, Abdul Kadir Mukarram, Chirag Nepal, Csilla Várnai, Yavor Hadzhiev, Ada Jimenez-Gonzalez, Nan Li, Joseph W Wragg, Fabio M D'Orazio, Noelia Díaz, Benjamín Hernández-Rodríguez, Zelin Chen, Marcus H. Stoiber, Michael J. Dong, Irene Stevens, Samuel E. Ross, Anne E. Eagle, Ryan Martin, Pelumi Obasaju, S. Rastegar, Alison C. McGarvey, Wolfgang Kopp, Emily Chambers, Dennis Wang, Hyejeong Kim, Rafael D. Acemel, Silvia Naranjo, Maciej Lapiński, Vanessa Chong, **Sinnakaruppan Mathavan**, Bernard Peers, Tatjana Sauka-Spengler, Martin Vingron, Piero Carninci, Uwe Ohler, Scott Allen Lacadie, Shawn M. Burgess, Cecilia Winata, Freek van Eeden, Juan M. Vaquerizas, José Luis Gómez-Skarmeta, Daria Onichtchouk, Ben Brown, Ozren Bogdanović, Monte Westerfield, Fiona C. Wardle, Carsten O. Daub, Boris Lenhard and Ferenc Müller. "*Integrated annotation and analysis of genomic features reveal new types of functional elements and large-scale epigenetic phenomena in the developing zebrafish.*" *Nature Genetics* 10 August 2021.
- ❖ Hemavathy Natarajan, Umashankar Vetrivel "*Deciphering the structural and functional impact of missense mutations in Egr1-DNA interacting interface: an integrative computational approach*", *J Biomol Struct Dyn* . 2021 Aug 17;1-13.
- ❖ Srinivasan Sangeetha, Sobha Sivaprasad, Rajalakshmi R, Anjana RM, Malik RA, Kulothungan V, Raman Rajiv, Muna Bhende. "*Retinal structure-function correlation in type 2 diabetes.*" *Eye (Lond)*. 2021 Aug 30.
- ❖ Mohana Devi S, Abishek Kumar B, Mahalaxmi I, Balachandar V. "*Leber's hereditary optic neuropathy: Current approaches and future perspectives on Mesenchymal stem cell-mediated rescue.*" *Mitochondrion*. 2021 Sep; 60:201-218.
- ❖ Hussain A, Gopalakrishnan A, Muthuvel B, Hussaindeen JR, Angayarkanni N, Sivaraman V, "Retraction notice to "Young adults with myopia have lower concentrations of neuromodulators-dopamine and melatonin in serum and tear" *Exp. Eye Res.* 2021 Oct;209:108795.



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- ❖ S. Mohana Devi, Aswathy P Nair, I. Mahalaxmi, V. Balachandar. "Mitochondrial function and epigenetic outlook in Leber's Hereditary Optic Neuropathy (LHON)." *Neurology Perspectives*. Volume 1, Issue 4, Oct-Dec 2021; 220-232.
- ❖ Vignesh Menta, Shweta Agarwal, Ujjalkumar Subhash Das, Laxmi Moksha, Gurumurthy Srividya, Amrutha M Anandan, Bhaskar Srinivasan, Geetha Iyer, Thirumurthy Velpandian, Narayanasamy Angayarkanni, "Ocular surface sphingolipids associate with the refractory nature of vernal keratoconjunctivitis: newer insights in VKC pathogenesis", *Br J Ophthalmol*. 2021 Oct 20
- ❖ Agarwal M, S G, Iyer G, KrishnaKumar S, "Bilateral Ocular Rosai-Dorfman Disease Presenting as Diffuse Anterior Scleritis with Multiple Enlarging Epibulbar Masses." *Ocul Immunol Inflamm*. 2021 Oct 18:1-4.
- ❖ Ganesan S, Agarwal AAK, Subramanian K "A rare case of Panophthalmitis due to cobra bite" *Eur J Ophthalmol*. 2021 Oct 8.
- ❖ Mahalaxmi I, Subramaniam Mohana Devi, Gopalakrishnan AV, Vellingiri B. "Dysfunction in Mitochondrial Electron Transport Chain Complex I, Pyruvate Dehydrogenase Activity, and Mutations in ND1 and ND4 Gene in Autism Spectrum Disorder Subjects from Tamil Nadu Population, India." *Mol Neurobiol*. 2021 Oct;58(10):5303-5311.
- ❖ Meethal NSK, Mazumdar D, Morshchavka S, Robben J, van der Steen J, George R, Pel JJM. "A haploscope based binocular pupillometer system to quantify the dynamics of direct and consensual Pupillary Light Reflex" *Sci Rep*. 2021 Oct 26;11(1):21090.
- ❖ Khan R, Raman S, Karamcheti SKM, Srinivasan S, Sharma A, Surya J, Bhende M, Ramasamy K, Verma A, Raman R. "Comparison of Two Ultra-Widefield Cameras With High Image Resolution and Wider View for Identifying Diabetic Retinopathy Lesions." *Transl Vis Sci Technol*. 2021 Oct 4;10(12):9.
- ❖ Ravi R, Kumaraswamy A, Chauhan P, Subramaniam Rajesh B. "Exogenous administration of hydrogen sulfide alleviates homocysteine induced inflammation in ARPE-19 cells." *Exp Eye Res*. 2021 Nov;212:108759.
- ❖ Wenjie Liu, Sruthi Priya Mohan, Nareshkumar Ragavachetty Nagaraj, Shyam Sundar Jaganathan, Yi Wen, Sharada Ramasubramanyan, Joseph Irudayaraj, "Epigenetic alterations associated with dexamethasone sodium phosphate through DNMT and TET in RPE cells." *Mol Vis* 2021 Nov 20;27:643-655.



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- ❖ Alam S, Banerjee P, Krishnakumar S. "A rare case of congenital piloleiomyoma of the eyelid." *Orbit*. 2021 Dec; 40(6):518-520.
- ❖ Srilekha Sundaramurthy, Selvakumar A, Dharani V, Soumitra N, Mani J, Thirumalai K, Periyasamy P, Mathavan S, Sripriya S. "Prevalence of primary mutations in Leber hereditary optic neuropathy: A five-year report from a tertiary eye care center in India." *Mol Vis*. 2021 Dec 11;27:718-724.
- ❖ Ravi Ramya, Subramaniam Rajesh Bharathidevi, "Paraoxonase 2 protects against the CML mediated mitochondrial dysfunction through modulating JNK pathway in human retinal cells." *Biochim Biophys Acta (BBA) Gen Subj*. Jan 2022.
- ❖ M Aloysius Dhivya, K N Sulochana, S R Bharathi Devi "High glucose-induced inflammation is inhibited by copper chelation via rescuing mitochondrial fusion protein 2 in retinal pigment epithelial cells." *Cell Signal*. Epub 2022 Jan 6.
- ❖ Manohar Rebecca, Krishnamoorthy Sripriya, M Bharathselvi, B Shantha, Lingam Vijaya, Narayanasamy Angayarkanni. "Increased Desmosine in the lens capsules is associated with augmented elastin turnover in Pseudoexfoliation syndrome", *Exp Eye Res*. 2022 Feb.
- ❖ Srinivasan S, Sivaprasad S, Munusamy G, Rajalakshmi R, Anjana RM, Malik RA, Kulothungan V, Raman R, Bhende M. "Zone-wise examination of optical coherence tomography features and their correspondence to multifocal electroretinography in eyes with nonproliferative diabetic retinopathy." *Graefes Arch Clin Exp Ophthalmol*. 2022 Mar;260(3):827-837.
- ❖ Rajesh K Joshi, Sandeep R Pai, Hemavathy Nagarajan, Umashankar Vetrivel, "Identification of potentially bioactive compounds from *Blumea lacera* essential oil by gas chromatography-mass spectroscopy and molecular docking studies for targeting inflammatory bowel disease." *Nat Prod Res*. 2022 Jan 10;1-5.

National Journals:

- ❖ Koka K, Singh P, Nisar SP, Alam MS, Backiavathy V, Scott JX, Krishnakumar S, Mukherjee B. "Role of pre-operative percutaneous embolization in orbital alveolar soft part sarcoma - An experience from a tertiary eye-care center." *Indian J Ophthalmol*. 2021 Oct;69(10):2796-2801.



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- ❖ Mohan S, Chawla G, Surya J, Raman R. "*Intravitreal anti-vascular endothelial growth factor with and without topical non-steroidal anti-inflammatory in centre-involving diabetic macular edema.*" Indian J Ophthalmol. 2021 Nov;69(11):3279-3282.
- ❖ Srinivasan S, Sivaprasad S, Rajalakshmi R, Anjana RM, Malik RA, Kulothungan V, Raman R, Bhende M. "*Assessment of optical coherence tomography angiography and multifocal electroretinography in eyes with and without nonproliferative diabetic retinopathy.*" Indian J Ophthalmol. 2021 Nov;69(11):3235-3240.
- ❖ Dhanashree Ratra, Daleena Dalan, Nandini Prakash, Kuppan Kaviarasan, Sadagopan Thanikachalam, Undurti N Das, Narayansamy Angayarkanni, "Quantitative analysis of retinal microvascular changes in prediabetic and diabetic patients". Indian J Ophthalmol 2021 Nov;69(11):3226-3234.
- ❖ Banerjee P, Koka K, Alam MS, Subramanian N, Biswas J, Krishnakumar S, Mukherjee B, "*The spectrum and clinicopathological correlation of eyelid lesions: Twenty years' experience at a tertiary eye care center in South India*", Indian J Ophthalmol. 2021 Dec.
- ❖ Alam MS, Banerjee P, Krishnakumar S. "*The effect of direct cell injury inflicted by cryotherapy on eyelid sebaceous gland carcinoma cells: An ex-vivo experimental study.*" Indian J Ophthalmol. 2022 Feb;70(2):630-633.

Book Chapters:

- ❖ Green synthesis of nanomaterials for Eye Cancer research with focus on Retinoblastoma, Sailaja V Elchuri Janakiraman Narayanan, Strategies toward Green Deal Implementation – Water and Raw Materials, Energia PAN – Publishing House ISBN: 978-83-961960-2-6.
- ❖ Natarajan S.N., Gnanasekaran H., Kandeegan S., Srilekha S., Sripriya S. (2022). An Overview on the Genetic Etiology, Testing, and Therapeutic Options for Retinitis Pigmentosa. In: Nema H.V., Nema N. (eds) Genetics of Ocular Diseases. Springer, Singapore.

Accepted for Publication:

- ❖ M.Bharathselvi, K.Coral, K.N.Sulochana "*Simultaneous determination of homocysteine, cysteine, glycine, glutamic acid, methionine, and taurine in human plasma by using reverse phase – high performance liquid chromatography with fluorescence detector.*" Annals of Clinical and Laboratory Research.



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- ❖ Badrinarayanan L, Rishi P, George R, Isaac N, Rishi E; Sankara Nethralya Vitreo-Retinal group (SNVR). *Incidence, risk factors, treatment and outcome of ocular hypertension following intravitreal steroid injections: A comparative study. Ophthalmologica.*



VISION RESEARCH FOUNDATION

COMPLETED PROJECTS

- ❖ Prospective Multicenter discovery and validation of diagnostic circulating and urinary biomarkers and development of sensor(s) to detect sight threatening diabetic retinopathy [Dr. S. Krishnakumar]
- ❖ Nuclease-resistan aptamer-nanoparticle conjugate against B7-H3 as targeted therapy and imaging in retinoblastoma. [Dr. S. Krishnakumar]
- ❖ Biological Investigation and Degradation Behaviour of Bioglass based artificial cornea material. [Dr. S. Krishnakumar]
- ❖ Development of Cell based systematic evolution of ligands by exponential enrichment (cell-SELEX) for Retinoblastoma [Dr. S. Krishnakumar]
- ❖ Biomechanical effect of Chemotherapeutic drugs on retinoblastoma tumor cells. [Dr. J Narayanan]
- ❖ Proteomics and Phosphoproteomics of FUCHS Endothelial Cells. [Dr. Sailaja Elchuri]
- ❖ SMART INDIA (Statistical Modelling and Risk Assessment of Type 2 diabetes complications in India) Study. [Dr. Rajiv Raman]
- ❖ Evaluating the effect of ocular UV exposure as a major causative factor in a risk model for pseudoexfoliation syndrome in Indian population [Dr. Rashima Asokan]
- ❖ Unraveling the genetic architecture of diabetic retinopathy in the South Indian population. [Dr.S Mathavan]
- ❖ To identify circulating biomarkers for responders and non-responders to anti-VEGF in macular degeneration. [Dr.S Mathavan]
- ❖ A novel molecular screening approach for the clinical and molecular characterization of Usher syndrome patients in India. [Dr.S Sripriya]
- ❖ Mitochondrial genome landscape analysis in an Indian cohort of Lebers Hereditary Optic Neuropathy (LHON) patients negative to primary mutation (G3460A, G11778A, T14484C). [Dr. S. Srilekha]

Individual Fellowship:

- ❖ Clinical phenotype guided selection and screening of candidate genes in Leber Congenital Amaurosis patients and Genetic Analysis of X-Linked



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Recessive Retinitis Pigmentosa families from India. [Dr.S Srilekha Mentor : Dr. S Sripriya]

- ❖ Development of Myelin oligodendrocyte glycoprotein (MOG) cell-based assay for the detection of antibodies against MOG for differential laboratory diagnosis of optic neuritis. [Dr.P.Durgadevi; Mentor: Dr. K. Lily Therese]
- ❖ Deciphering if impaired autophagy and mitochondrial dysfunction contribute to ECM modifications in primary glaucoma. [Ms. Nikhala Shree; Mentor: Dr. S.R. Bharathidevi]
- ❖ To delineate the role of copper in mediating inflammation in diabetic retinopathy [Ms. Aloysius Dhivya; Mentor: Dr. S.R. Bharathidevi]
- ❖ Investigator inflammatory machinery in glia and the role of miRNA on exposure to HIV Tat protein. [Mr. D Durairaj; Mentor: Dr. Nivedita Chattarjee]



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ONGOING PROJECTS

- ❖ Metabolomic biomarker identification from serum of non-infectious and infectious Uveitis patients [Dr.Jyotirmay Biswas]
- ❖ Fluorescent Nanoprobes for Squamous cell carcinoma. A step towards developing a rapid tool for Margin clearance. [Dr. Krishnakumar S]
- ❖ Ocular Biological Senescence evaluation and science study (OBSESS) [Dr. Nivedita Chattarjee]
- ❖ Controlling immunosuppressive properties of T regulatory cells with retinal glia: implications for tubercular uveitis [Dr. Nivedita Chattarjee]
- ❖ Smart Polycaprolactone (PCL) Peptide Composite nanofibres for sustained release of 5 Fluoro uracil to modulate wound healing in glaucoma surgery [Dr.Narayanan]
- ❖ Injectable self-assembled bruch's membrane mimetic nanofibers for retinal pigment epithelium. [Dr.Sowmya Parameswaran]
- ❖ RNA guided Nucleases targeted genome editing for retinitis Pigmentosa [Dr. Sowmya Parameswaran]
- ❖ Generation of oligodendrocytes from induced pluripotent stem cells: A step towards cell based therapy for demyelinating diseases [Dr. Sowmya Parameswaran]
- ❖ Artificial Intelligence for Affordable Screening and Prediction of Diabetic Retinopathy in the Framework of Big Data (Dr.Rajiv Raman)
- ❖ Impact of ultra-violet radiation and air pollution on ocular health with emphasis on cataract and pterygium among outdoor workers. [Dr.Sharada Ramasubramanyan]
- ❖ Genome-wide Transcriptome profiling of Human Retinal Cells under diabetic milieu under the context of Egr-1 expression towards deciphering alternative pathways mediating Retinal Angiogenesis. [Dr.Sharada Ramasubramanyan]
- ❖ Evaluation of novel cell-penetrating peptide inhibitors targeting Neuronal Protein 3.1 (P311) in ocular fibrosis using 3D model of Tenon' capsule fibroblasts [Dr. Sharada Ramasubramanyan]



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- ❖ Epitranscriptomics of N6-methyl adenosine (m6A) occupied mRNAs in hypoxia-Induced retinal endothelial cells: Implications in intraocular vascular diseases. [Dr. Sharada Ramasubramanyan]
- ❖ To delineate the role of Zinc alpha 2 glycoprotein as a novel target in diabetic retinopathy [Dr. S. R. Bharathidevi]
- ❖ To decipher the therapeutic potential of paraoxonase in modulating pericyte loss in relevance to diabetic retinopathy. [Dr. S. R. Bharathidevi]
- ❖ Does Hyperglycemia Alter Copper Homeostasis in Diabetic Retinopathy? [Dr. S R Bharathidevi]
- ❖ To identify circulating biomarkers for responders and non-responders to anti-VEGF therapy in proliferative diabetic retinopathy (PDR) [Dr.Sinnakarppan Mathavan]
- ❖ Mesenchymal stem cell mitochondrial transfer effectively protects mutant Leber's Hereditary Optic Neuropathy (LHON) cells from mitochondrial damage: Molecular and epigenetic screening of LHON patients. [Dr. S Mohana Devi]
- ❖ Screening of mitochondrial transfer and epigenetic markers in Leber's hereditary optic neuropathy (LHON) cells for its protective effect from mitochondrial dysfunction. [Dr. S Mohana Devi]
- ❖ Analysis of protective effect of Mesenchymal stem cell mitochondrial transfer on mutant Leber's Hereditary Optic Neuropathy (LHON) cells from mitochondrial damage. [Dr. S Mohana Devi]
- ❖ In Search of the causative genetic/ molecular events in Bardet Biedl Syndrome patients excluded for mutations in candidate genes.[Dr.S Sripriya]
- ❖ A study on the DNA methylation pattern of the ocular quantitative trait loci/ genes in primary open angle glaucoma [Dr.S Sripriya]
- ❖ Rational Design of novel peptide inhibitors targeting DNA-Topoisomerase-II-Beta through virtual screening of combinatorial peptide libraries and in vitro validation of anticancer efficacies [Dr.Srujana Chitipothu]



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Individual Fellowship:

- ❖ Longitudinal assessment of retinal structural and functional changes in individuals with diabetes, with and without diabetic retinopathy. Wellcome Trust/DBT Early Career Fellowship [Dr Sangeetha Srinivasan; Supervisor: Dr Muna Bhende]
- ❖ A study on genetic regulatory region in DIO3 gene for possible correlation with varying clinical severity in LCA patients. [Dr. N N Srikrupa; Mentor: Dr.S. Sripriya]
- ❖ Development of a novel serological "point -of - care device" to detect AQP-4 antibodies for the differential laboratory diagnosis of neuromyilitisoptica (NMO). [Dr. M. Vimalin Jeyalatha; Mentor: Dr. K. Lily Therese]
- ❖ Delineating the importance of Neddylation, an ubiquitin-like molecule in maintenance of blood retinal barrier integrity and its function. [Ms. Sruthi Priya Mentor: Dr. Sharada Ramasubramanyan]
- ❖ Profiling the promoter methylation status of the candidate genes for ocular quantitative traits in primary glaucoma patients. [Ms. Sukanya K; Mentor: Dr. S. Sripriya]
- ❖ Downstream functional analysis and validation of single nucleotide polymorphism associated with Triamcinolone-acetonide and Dexamethasone-induced ocular hypertension among Indian subjects. [Ms.Lakshmi B; Mentor: Dr.Srujana Chitipothu]
- ❖ Modeling cancers associated with RB1 mutation using human induced pluripotent stem cells [Ms. Ambily Vincent; Mentor: Dr. Sowmya Parameswaran]
- ❖ Molecular and epigenetic screening of Leber's Hereditary Optic Neuropathy(LHON) [Ms. Aswathy P Nair; Mentor: Dr. S Mohana Devi]
- ❖ Studying HIV Mediated Changes at Blood Retinal Barrier on an in vitro Model [Ms. Kamini Khatak; Mentor: Dr. Nivedita Chattarjee]
- ❖ In silico conformational analysis and design of inhibitors targeting LIM kinases in cancer" [Ms.Hemavathy N; Mentor – Dr.Srujana Chitipothu & Dr.J.Jeyakanthan Alagappa University]



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PARTICIPATION IN CONFERENCES

- ❖ Dr. S. Srilekha attended ARVO 2021 Annual Meeting in online from 1st to 7th May 2021 and presented a poster titled "Complete mitochondrial genome sequencing in individuals with Leber hereditary optic neuropathy negative for the common pathogenic mitochondrial DNA mutations".
- ❖ Ms. Hemavathy Nagarajan attended the CHARMM-GUI CECAM school *Centre Européen de Calcul Atomique et Moléculaire* from 5th to 10th September 2021.
- ❖ Ms. Ishwarya S attended the virtual conference, Second IVI International Optometry Conference - Eye Health in a Changing World from 9th to 11th September 2021 and gave a oral presentation on "To assess the association of lifetime ocular UV exposure and its impact on the risk of development of pseudoexfoliation (XFS)".
- ❖ Dr. N Angayarkanni, Dr. Sharada Ramasubramanyan, Dr. S R Bharathi Devi, Dr. Srujana Chitipothu, Dr. A.V. Kavitha, Dr. Vimalin Jeyalatha, Dr.S.Srilekha, Dr. N N Srikrupa, Ms. B Lakshmi, Ms. M. Sruthi Priya, Ms. Ramya Ravi, Ms. Nikhala Shree S, Ms. Rebecca Manohar, Ms. Aswathy P Nair, Ms. Lakshmi Priyanka AL, Ms. Rizza AN, Ms. Suganya Kandeegan, Ms. Harshavardhini.G, Ms. Hemavathy Nagarajan, Ms.Barathi L and Ms. Harinee R attended the virtual meeting of 27th Indian Eye Research Group (IERG) – ARVO 2021 held at LV Prasad Eye Institute, Hyderabad from 7th to 10th October 2021. Dr. N Angayarkanni chaired 3 keynote sessions on 08.10.2021.

In the conference, the oral presentations were made by Dr.N.Angayarkanni on "Metabolites relevant to pathogenesis of AMD impair phagocytosis machinery in the ARPE-19 cells: mitigating effect of active principles"; Ms.Nikhala Shree on "Anti-glaucoma medications lowered decorin and altered profibrotic proteins in human tenon's fibroblast"; Ms. Ramya on "Paraoxonase 2 protects against the cml mediated mitochondrial dysfunction through modulating JNK signalling pathway in human retinal microvascular endo- thelial cells"; Ms. Sruthi Priya on "Effect of neddylation inhibition by MLN4924 on hypoxia induced retinal angiogenesis"; Ms. Rebecca Manohar on "Elastin interacting partners are differentially expressed in pseudoexfoliation syndrome"; Ms. L Barathi on "In silico identification of putative alternatives to ocular chemotherapeutic agents: high-throughput virtual screening and molecular dynamics studies of natural product inhibitors targeting human DNA topoisomerase II beta";



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Dr.A.V Kavitha on "A pilot study on comparative analysis of minimum inhibitory concentration (MIC) and mutant prevention concentration (MPC) of conjunctival bacterial isolate to fluoroquinolones"; Dr. Srikrupa N N on "Whole exome sequencing identifies slc6a6 as novel candidate gene in Leber congenital amaurosis" and Ms. Harshavardhini.G on "A spectrum of candidate and mitochondrial gene mutations in Usher syndrome patients from India".

Poster presentations were made by Dr. Sharada Ramasubramanyan on "Evaluating the combined effect of ocular UV exposure with genetic predisposition and other environmental factors in etiopathogenesis for pseudoexfoliation syndrome in Indian Population"; Dr. Bharathi Devi on "Estimation of Serum Hydrogen Sulfide in Age Related Macular Degeneration"; Dr. Vimalin Jeyalatha on "Bacteriological Profile of Anaerobic Flora Isolated From Conjunctiva: A One Year Review At A Referral Eye Care Center"; Ms. Harinee R on "Microbiological profile of canaliculitis and their antibiotic susceptibility patterns: a 11-year review at a referral eye care center"; Dr. A.V. Kavitha on "A Pilot study on Comparative analysis of MIC (Minimum Inhibitory Concentration) and MPC (Mutant Prevention Concentration) of conjunctival isolates to fluoroquinolones against Staphylococcal species"; Dr. S. Srilekha on "Common Mutations in SAG and GRK1 gene in Oguchi disease patients from India"; Ms. Aswathy P Nair on "Analysis Of Epigenetic Modifications in Leber's Hereditary Optic Neuropathy (LHON)"; Ms. Lakshmi Priyanka AL on "Genetic association analysis of Single Nucleotide Polymorphism (SNP) with Polypoidal Choroidal Vasculopathy (PCV) in Indian population"; Ms. Rizza AN on "Whole-genome sequencing of South Indian consanguineous families for type 2 diabetic retinopathy" and Ms. Suganya Kandeegan on "Exome sequencing and analysis of rare coding variants in a Primary Angle Closure Glaucoma family with Autosomal Dominant inheritance".

- ❖ Ms. Lakshmi B, Ms. Hemavathy Nagarajan and Ms. Barathi attended the OMICS 2021-13th Annual Meeting of Proteomics Society - India International Virtual Symposium on OMICS in Redefining Modern Biology at CCMB, Hyderabad from 21st to 23rd October 2021 and

Ms. Lakshmi made an oral presentation on "Whole genome sequencing identifies novel variants associated with Triamcinolone-acetonide-induced ocular hypertension".

- ❖ Dr. Srikrupa N N attended the International webinar on "Science of Health and Well-being" at Dr. MGR Janaki College of Arts and Science for Women, Chennai, on 30th October 2021 and made an oral presentation on "Genes, health and well(ness)-being Connecting the dots".



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- ❖ Ms. Hemavathy Nagarajan attended the webinar, the Protein DataBank 50th Anniversary Symposium in Asia on 24th November 2021 held at Japan. She made an online presentation on "Deciphering the conformational transitions of LIMK2 active and inactive states through microsecond molecular dynamics simulation studies".
- ❖ Dr. Sailaja V. Elchuri attended the "2nd International Conference on Strategies toward Green Deal Implementation - Water, Raw Materials & Energy" and gave a oral presentation on "COVID 19 Pandemic and Eye diseases" on 8th & 10th December 2021.
- ❖ Dr. Nivedita Chatterjee attended the Indian Academy of Neuroscience, 2021 conference at IISER, Kolkata from 16th to 19th December 2021 and gave an oral presentation on "Aging at the retina: role of Muller glia".
- ❖ Ms. Hemavathy Nagarajan participated in the Faculty Development Program/Workshop on "Element of Next Generation Sequencing" Virtually organised by *Amrita School of Biotechnology* from 3rd to 14th January 2022.
- ❖ Dr. Nivedita Chatterjee delivered an invited lecture on "Elevated Glucose Transporter-1 expression in retinal Muller glia is a potential driver of accelerated aging at the retina" at the Indo US Science and Technology Forum, Neuron Glia Interactions in ocular Development and Diseases at L.V. Prasad Eye Institute from 9th to 14th January 2022.
- ❖ Ms. Ishwarya S participated in the virtual conference, 72nd Indian Association of Occupational Health (IAOH) National Conference of Occupational Health OCCUCON 2022 from 21st to 23rd January 2022 and made an oral presentation on "Impact of ultra-violet radiation and air pollution on ocular health with emphasis on cataract and pterygium among outdoor workers".
- ❖ Dr. J. Narayanan made an oral presentation through Webinar on "Mechanoresponsive role of β -catenin in keratoconus epithelium" at the Departmental seminar series (DOVS) organized by University of Melbourne on 8th March 2022.



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DISTINGUISHED VISITORS

- ❖ Dr. Abishek Anand, Asst. Professor, IGIMS Patna visited the biochemistry lab on 03rd November 2021 to observe the facility.
- ❖ Dr. J. Jeyakanthan, Professor & Head, Department of Bioinformatics, Alagappa University, Karaikudi, Tamilnadu, visited our Foundation on 11th December, 2021 and discussed about collaboration in field of ocular infectious agents and bio-informatics, especially with drug resistance.
- ❖ Dr. Undurti N Das, MD, DSc, FAMS, FICP, FRSC, President & CEO, UND Life Sciences and Editor-in Chief, Lipids in Health and Diseases visited the biochemistry lab on 21st December 2021.
- ❖ Dr. R. Lakshmi Narayanan, Asst. Professor, SERI, Singapore visited our biochemistry laboratory on 24th December 2021.
- ❖ Dr. M. Krishnan, Vice-Chancellor, Madurai Kamaraj University, Madurai, visited our genetics laboratory.