

Research

Going by the concept that research can happen anywhere, anytime, scientists at AMRF continued to engage in their research activities through virtual meetings, despite the challenges caused by the pandemic. The team could keep the labs, freezers and essential equipment running. 18 publications were brought out. AMRF hopes to explore new avenues for research especially in the areas such as stem cells for age-related macular degeneration, regeneration of retinal pigment epithelium and Acanthamoeba keratitis.

Molecular Genetics

Genetics in ocular disorders are becoming increasingly important for an accurate molecular diagnosis and for the development of novel genotype specific treatments. Molecular Genetics lab currently focuses on the leading cause of inherited retinal dystrophies to understand the molecular mechanism underlying disease pathogenesis in cone-rod dystrophies, retinitis pigmentosa (RP), Stargardt, Leber's congenital amaurosis (LCA), Juvenile X-linked retinoschisis (JXLR) and Leber's hereditary optic neuropathy (LHON).

Preparation of PCR products for Agarose Gel Electrophoresis



LHON is a mitochondrial disorder leading to central vision loss due to selective degeneration of retinal ganglion cells. Mitochondrial Genome Sequencing helped to detect disease causing mutations in 51% of the LHON suspected individuals. In addition, the team uses Next Generation Sequencing (NGS) to understand the role of mito-nuclear cross talk in LHON by focusing the intricate involvement of 1,158 mito-nuclear genes in primary mitochondrial DNA mutation negative patients. Furthermore, a recent five-year prospective study (2015-2019) in the Neuro-ophthalmology Clinic at Aravind Eye Hospital, Madurai estimated the prevalence of LHON at a rate of 1:1689 or 5.92 per 10,000 patients. Leber's Congenital Amaurosis (LCA) is the predominant form of childhood blindness (20%), accounts for 5% of all retinal dystrophies due to degeneration of photoreceptors in the retina. With the involvement of 29 genes, the state of LCA is highly heterogeneous, which is further complicated by sharing common clinical

features with other retinal dystrophies. Therefore, the lab focuses on targeted exome sequencing to detect the causative mutations in the southern Indian LCA patients by using MiSeq for early diagnosis. Based on the results, genotype-phenotype correlation is being performed to determine the association between the identified genes and ophthalmological findings of LCA patients. JXLR is an X-linked recessive genetic disorder leads to schisis in the retinal neural layers. The team uses Sanger sequencing to identify the RS1 gene mutations in the affected individuals. In addition, Whole Exome Sequencing identified a novel homozygous mutation c.G310A in the BEST1 gene, likely to be associated with JXLR. Moreover, the lab offers genetic counselling based on moral and ethical values to provide the best possible solution for people at risk.

Research findings of ocular cancer analysis were translated to patient care. Genetic testing of retinoblastoma patients

helped in the genetic counselling of 38 families during the year. Larger deletion of chromosome 13 beyond the region of RB1 gene was identified for the first time in a unique patient with retinoblastoma, Waardenburg syndrome and Hirschsprung disease. Alteration of genes involved in cell proliferation was identified in the tumour samples of retinoblastoma that serve as potential drug targets. Epigenetic and gene expression studies suggested the role of cancer specific pathways in the process of tumorigenesis of RB.

Proteomics

Research at the Proteomics department focuses on ocular diseases such as fungal keratitis, keratoconus and diabetic retinopathy. A complete array of proteomics approaches are employed to understand the pathological mechanisms underlying these diseases. This is possible through the state-of-the-art proteomics facility equipped with two mass spectrometers and a complete infrastructure to carry out both gel-based and non-gel based proteome analysis. The outcomes of the basic research provide leads for the translational research that strives to improve disease management at a personalized level.

In India, fungal infections contribute to more than 50% of infectious keratitis, with *Fusarium* and *Aspergillus flavus* being the two important etiological agents. In-depth and comprehensive tear proteome analysis lead to the understanding of the

Research scholar in Proteomics performing ELISA immunoassay for serum biomarkers



pathological mechanisms underlying *A. flavus* keratitis. The team's recent *in vitro* studies have proven that the outer most layer of the cornea, the epithelial layer, is capable of engulfing the fungal spores. This is an important finding since the epithelial layer not only protects the cornea from infections but is also involved in clearing the invading pathogen well before the immune cells are recruited to the site of infection.

Although the host immune response plays a significant role in the severity of the ulcer and thereby, the treatment outcome, the current treatment protocol for fungal keratitis primarily targets killing the fungi. Based on the team's previous tear proteome studies, six proteins representing different pathways were shortlisted as indicators of the host inflammatory response. Levels of these proteins were quantified in tears collected from keratitis patients and compared with the levels in tear from healthy individuals. Comparative analysis revealed that all the six proteins were significantly altered during *Fusarium* and *A. flavus* infection. Three of these proteins (complement factor B, alpha-2 macroglobulin, calprotectin) served as indicators of severity of the infection while two other proteins (complement factor H, vimentin) were suggestive of the extent of healing in keratitis patients. Together, these five proteins were able to predict whether a fungal keratitis patient would

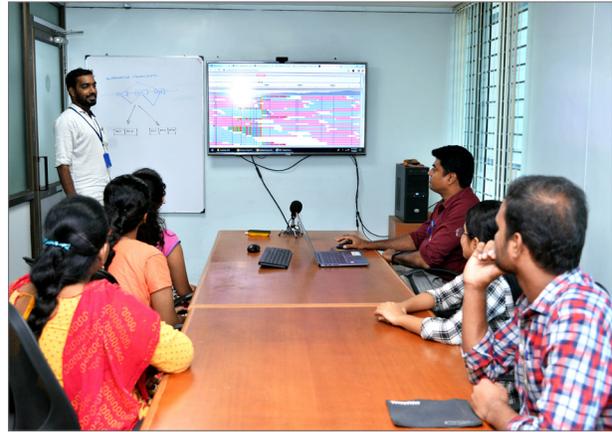
respond or not respond to treatment with 86% sensitivity and 86% specificity. The phase 2 of this study is currently in progress where the level of these five tear biomarkers will be assessed in keratitis patients in *Fusarium*, *A. flavus* and other fungal infections as well.

In diabetic retinopathy (DR), the primary focus had been the identification and validation of prognostic biomarkers – proteins that can predict the onset of DR in type 2 diabetic individuals (T2DM) or that can determine the progression of DR in a NPDR patient. A multitude of proteome approaches were employed to compare the serum proteome profile across the different control (non-diabetic and T2DM) and DR patient groups (NPDR and PDR). Based on this study and reports from other groups, 12 candidate markers were selected for validation in a study cohort of Indian and UK population. Validation of these 12 markers would eventually result in the selection of DR specific biomarkers for which sensors will be developed that are easy to use and sensitive to quantify the markers in the field. In addition to the serum markers, the team is also examining circulating microparticles in blood as a source of biomarkers. Validation of microparticle proteins has led to the identification of a platelet specific integrin protein to be specifically altered during the progression of DR. Additional microparticle proteins are currently being validated as biomarkers.

A novel chemical cross-linker for the treatment of keratoconus has been formulated through an Indo-UK collaborative project involving the Cornea department at Aravind Eye Hospital, AMRF, Aurolab and the University of Liverpool. The chemical cross-linker has shown promising results both in ex vivo pig eyes and human eyes and in vivo rabbit eyes in terms of increasing the stiffness of the cornea with negligible cytotoxicity to the cells of corneal layers. This chemical cross-linker is currently being evaluated as an alternative to conventional UV-A cross-linking treatment. From the above study, a new project has been granted by ICMR to investigate the mechanism of action of the cross-linker in human corneas. Analysis of the modulation of transcripts in the corneal layers by the application of the cross-linker, the effect of cross-linker on the enzyme activity of matrix modulating enzymes and collagen fibril assembly in the cornea are being carried out to achieve the objectives of the new project.

Bioinformatics

Bioinformatics lab primarily uses the next-generation sequencing methods to understand the role of the genome, transcriptome and epigenome on eye disease diagnosis, prognosis and pathogenesis. The lab developed a machine learning model that identifies the pathogenic variants from thousands of variants from genome/exome data of



Discussion underway at the Bioinformatics lab

eye diseases. Further, a machine learning model was trained to distinguish and prioritize the pathogenic variants of eye diseases from other diseases. In tandem, the lab is interested in human small-noncoding RNAs called miRNAs that could be used as diagnostic and prognostic markers for intra-ocular tuberculosis (IOTB) and fungal keratitis. The lab is the first to report that four such miRNAs are identified in IOTB patients and their possible role in tuberculosis pathogenesis via tuberculosis-related pathways. This study identifies that miRNAs as potentially ideal biomarkers in the aqueous humor of IOTB patients.

Ocular Pharmacology

Glucocorticoids (GCs) are widely used in ophthalmology for their anti-inflammatory and immune-modulatory properties. Long-term use induces ocular hypertension (GC-OHT) and glaucoma in susceptible individuals. However, the molecular pathogenesis is not yet fully understood.

As a step towards this goal, a perfusion cultured human anterior segment (HOCAS) ex vivo model system was established to induce GC-OHT experimentally in human cadaveric eyes to determine GC responsiveness and the cultured trabecular meshwork cell strains (cells from tissue of interest) with known GC responsiveness was established in order to identify the dys-regulated miRNAs and genes using RNA Seq technology. A number of dys-regulated miRNA-mRNA pairs were identified in cultured trabecular meshwork cells derived from experimentally induced glucocorticoid-ocular hypertension (GC-OHT) and validated. The miRNA manipulation experiment is underway with mimics and inhibitors to provide the “proof of concept” and its relevance in GC responsiveness. A set of dys-regulated miRNAs may be used as a surrogate marker to determine GC responsiveness prior to treatment and also miRNA based therapeutics are of some

Ocular pharmacology lab



potential use in the management of GC-OHT /glaucoma.

Ocular Microbiology

The research focus of the department is on ocular pathogen epidemiology, host-pathogen interaction and antibiotic resistance mechanisms. Ocular infectious diseases are poorly understood which are highly challenging for diagnosis or treatment. Currently high throughput advanced Next Generation Sequencing (NGS) methods are being employed for the identification of diagnostic markers as well as understanding the pathogens at genome level. Currently, profiling of microRNA in ocular fluids of the ocular tuberculosis patients are in progress for identifying unique microRNAs, which can be explored as diagnostic markers. DNA bar coding and genotyping are routinely employed for the characterization of unidentifiable bacterial and fungal species causing ocular infections.

In addition, pathogenic *Acanthamoeba* species isolated from corneal infections, are cultivated in actively dividing state in a bacteria-free, liquid-culture condition (axenic) to study its interaction with the host cells (human corneal epithelial cells). In this study, *Acanthamoeba* infection induced cellular changes, including cell death and cytokine gene expressions are assessed using biochemical and molecular biology tools.

This study will provide better insight about the differential virulence of pathogens and its ability to induce host response in correlation with severity of keratitis.

Immunology and Stem Cell Biology

Adult Stem cells are primitive cells that divide to repopulate themselves and also to differentiate into the tissue specific cells, thus maintaining the normal function of the tissue throughout life. Understanding the basic biology of these tissue resident stem cells in human eye – their identification, location in specialized micro environment, role in tissue function, changes with ageing and diseased condition are the major thrust of research work in this department. Studies are being carried out on the following stem cells of human eye in relation to specific ocular disease or disorder to develop better cell based therapies for these ocular conditions.

Limbal epithelial stem cells and limbal stem cell deficiency: Extensive studies on limbal epithelial stem cells established a specific method for their identification, a two-step protocol for their enrichment and identified two miRNAs (small non-coding RNAs) to regulate the maintenance of stem cells. Studies have been initiated to evaluate whether these regulators can convert a differentiated corneal epithelial cells to adult stem cells.

Trabecular meshwork stem cells and glaucoma: Previous studies from this

laboratory established that there is a reduction in the trabecular meshwork stem cell content in donor eyes with glaucoma, characterized by a drastic reduction in the trabecular meshwork cells. Studies carried out using a cell loss glaucomatous human organ cultured anterior segment (HOCAS) model indicated that transplantation of cultured trabecular meshwork stem cells aids in restoring the normal intraocular pressure, thus indicating the possibility of establishing a cell based therapy for glaucoma.

Lens epithelial stem cells and cataract: Stem cells for the human lens epithelium were confirmed to be located in the central region of the anterior lens epithelium. In addition, culturing of whole lens with neural retina induced new fibre formation in the equatorial region highlighting their role in the normal maintenance of tissue. Further studies are being carried out to elucidate the role of the lens epithelial stem cells in cataract.

Retinal pigment epithelial stem cells and age related macular degeneration: Preliminary studies on human retinal pigment epithelium has identified that the stem cells with high proliferative potential are located in the peripheral region. Studies are being carried out to evaluate the changes in the stem cell content with ageing and in age related macular degeneration.

Ph.D awarded by Madurai Kamaraj University for the studies carried out at AMRF



Ms. S. Yogapriya

Department of Immunology and Stem Cell Biology

Thesis: *Understanding the role of trabecular meshwork stem cells in the maintenance of tissue homeostasis in normal and glaucomatous human eyes*

Guide : Dr. C. Gowri Priya



Mr. K. Thirumalairaj

Department of Molecular Genetics

Thesis: *Characterization of genetic and transcriptional alterations in retinoblastoma*

Guide : Dr. A. Vanniarajan

Ongoing Projects

Basic Research

- *Pathogenesis of human mycotic keratitis*
- *A prospective multi-centre discovery and validation of diagnostic circulating and urinary biomarkers and development of sensor(s) to detect sight threatening diabetic retinopathy*
- *Proteome profiling of serum microparticles in diabetes and diabetic retinopathy patients: Towards identification and validation of predictive biomarkers*
- *Prediction of treatment outcome in fungal keratitis patients*
- *Development of aptamer-based assays for diagnosis of infectious keratitis and absolute quantitation of proteoform markers of diabetic retinopathy*
- *Screening of an extended family with early onset glaucoma for Myocilin gene mutations*
- *Interaction of pathogenic fungi with human corneal epithelial cells*
- *Understanding the mechanism of action of a novel chemical cross-linker designed to treat keratoconus*
- *Identification of druggable targets for attenuating the progression of pterygium development*
- *Role of retinol binding protein 3 (RBP3) in progression of diabetic retinopathy (DR) and evaluate its potential as a DR biomarker in type 2 diabetes patients*
- *Molecular genetics of ABCA4 gene in autosomal recessive cone rod dystrophy and retinitis pigmentosa*
- *Understanding the molecular mechanisms of chemoresistance in retinoblastoma*
- *Molecular characterization of tumor progression in retinoblastoma*
- *Identification and validation of deregulated cancer pathways in retinoblastoma*

- *Translational genomics of ocular cancers*
- *COE LEAD: Translational genomics of paediatric eye diseases*
- *COE PR-I: Molecular analysis of mitochondrial diseases with ophthalmic manifestations*
- *COE PR-II: Epigenetic mechanisms underlying tumor progression in retinoblastoma*
- *COE PR-III: Functional validation of novel candidate genes using alternate model*
- *COE R&D: Computational methods for whole exome/genome sequencing of paediatric eye diseases*
- *Molecular genetics of juvenile X-linked retinoschisis*
- *Molecular characterization of ocular lymphoma for improved disease prognosis*
- *Targeted modulation of E2F3 and KIF14 pathway in retinoblastoma refractory to existing chemotherapeutic drugs*
- *Characterization and functional evaluation of trabecular meshwork stem cells in glaucoma pathogenesis*
- *Characterization of adult human lens epithelial stem cells in the maintenance of tissue homeostasis throughout life and their functional status in cataractous lens*
- *Understanding the role of trabecular meshwork stem cells in the maintenance of tissue homeostasis in normal and glaucomatous human eyes'*
- *MicroRNAs specific to corneal epithelial stem cells*
- *Characterization of adult human lens epithelial stem cells, their niche and their role in the maintenance of tissue homeostasis*
- *Identification and characterisation of adult human retinal pigment epithelial stem cells*
- *Role of miRNA in the regulation of glucocorticoid receptor (GR) signalling and development of new therapeutics for steroid-induced glaucoma*
- *Diagnostic markers for ocular tuberculosis*
- *Comparative genomics of Methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa ocular isolates from keratitis patients with different clinical outcomes*
- *Role of human corneal MiRNAs in the onset and severity of fungal keratitis*
- *Clinical significance of the type three secretory system, biofilm formation and antibiotic resistance of the Pseudomonas aeruginosa isolated from keratitis patients*

- *Identification of bacterial and fungal pathogens by rDNA gene barcoding in vitreous fluids of endophthalmitis patients*
- *Clinical and demographic study of non-tuberculous mycobacterial ocular infections in south India*
- *Contribution of macrophage migration inhibitory factor (MIF) in the immunopathology of human microbial keratitis and its utility in disease management*
- *Comparative proteomics of extracellular proteins of A.Flavus and Fusarium solaris*
- *Impact of COVID-19 pandemic on medication adherence of patients diagnosed with glaucoma - A telephonic survey.*
- *Comparison of efficacy using ripatec eye drops with PG Analogue and fixed combination drops in lowering intraocular pressure in primary open angle glaucoma*
- *Long term surgical outcomes of glaucoma secondary to ICE syndrome- a retrospective study*
- *Analysis of incidence, clinical presentation, risk factors for secondary pupillary block glaucoma in patients undergoing vitreoretinal surgery*

Clinical Research

Glaucoma

- *Family primary glaucoma evaluation study*
- *Intraocular pressure dynamics after water drinking test and diurnal variation test in glaucoma suspects*
- *Intraocular pressure changes after silicone oil removal in eyes with and without secondary glaucoma*
- *Ocular biometry and choroidal thickness changes after mannitol in vitrectomized and non vitrectomized eyes*
- *To study the long-term efficacy & safety of micro-pulse transscleral cyclophotocoagulation (MP-TSCPC) in eyes with uncontrolled glaucoma*
- *Clinical characteristics and long term treatment outcomes in patients with juvenile glaucoma*
- *Long term surgical outcomes of primary congenital glaucoma in a south Indian population*
- *Clinical and demographic profile of patients presenting with ocular emergencies in the glaucoma outpatient department during the Covid-19 lockdown in a tertiary eye hospital in South India*
- *Retrospective analysis of the comparison between CO2 laser-assisted deep sclerectomy combined with phacoemulsification and conventional trabeculectomy with phacoemulsification*

- *Role of diode CPC in the management of refractory glaucomas : A retrospective study*
 - *Surgical outcomes of superotemporal versus inferonasal placement of Aurolab aqueous drainage implant in refractory pediatric glaucoma*
 - *Retrospective analysis of surgical outcomes of combined procedure of phacoemulsification with Aurolab aqueous drainage implant in eyes with refractory glaucoma and coexistent cataract*
 - *Outcomes of phacoemulsification in adult glaucomatous eyes with pre-existing non-valved Aurolab aqueous drainage implant*
 - *Retrospective analysis of outcomes of various surgical modalities in patients with uveitic glaucoma*
 - *Shared medical appointments-a randomised trial*
 - *The Asia primary tube versus trab study*
 - *Enhancing early glaucoma detection through family screening to reduce glaucoma related blindness*
 - *A comparison of subtenons versus topical anesthesia in trabeculectomy and phacotrabeculectomy surgeries*
 - *A prospective randomised comparative study of efficacy and safety of subtenon injectable 20 Microgram MMC Vs 40 Microgram MMC in trabeculectomy patients*
 - *A prospective randomised study of the safety & efficacy of an ab Interno sulcus technique vs anterior chamber implantation of Aurolab aqueous drainage tube in refractory glaucoma*
 - *Enhancing early glaucoma detection through family screening to reduce glaucoma related blindness*
- Cornea**
- *Steroids and cross-linking for ulcer treatment*
 - *Automated quantitative ulcer analysis study*
 - *Parasitic ulcer pilot study*
 - *Rose bengal electromagnetic activation with green light for infection reduction study*
 - *Seasonal conjunctivitis outbreak reporting for prevention and improved outcomes*
 - *Metagenomic analysis and diagnosis of ulcers rapidly with artificial intelligence: SCUT II screening*
 - *Identification of druggable targets for attenuating the progression of pterygium development*
 - *A prospective observation study of the socio economic, demographic profile, health seeking behaviour, cost implications, clinical features and visual outcomes following a penetrating ocular trauma*
 - *Outcomes of early steroids and corneal collagen crosslinking (CXL) adjuvant*

therapy in bacterial keratitis – a randomised control trial

- *Changes in endothelial specular microscopy findings – a comparison before and after hypotonic corneal collagen cross-linking*
- *To compare femtosecond laser assisted LASIK (femto-LASIK) and photorefractive keratectomy (PRK) in terms of astigmatism correction in patients with ≤ 3.0 D of myopic cylindrical error*

Cataract and IOL

- *Visual performance comparison between phacoemulsification and manual small incision cataract surgery in eyes with senile cataract: a prospective randomised clinical trial*
- *The natural history of intraocular lens in eyes with exfoliation syndrome*
- *Effect of Nd:YAG laser posterior capsulotomy on higher order aberrations*
- *Active sentry versus ozil hand piece – a prospective comparative study*
- *Aravind pseudoexfoliation syndrome*
- *Preoperative cataract surgery visual acuity: trends in a developing country eye care system*
- *Reasons for delay in cataract surgery in patients with advanced cataracts during the COVID-19 pandemic*

Retina and Vitreous

- *A two-arm, randomised, double-masked, multicentre, phase III study assessing the efficacy and safety of Brolucizumab versus Aflibercept in adult patients with visual impairment due to diabetic macular edema*
- *Translating research into clinical and community practice: a multi-state, multi-centre statistical modelling of risk-based stratified and personalised screening for complications of diabetes in India.*
- *A phase III, comparative, double blind, randomised, multi-centric study to compare the efficacy, safety and immunogenicity of sun's Ranibizumab with reference biologic in patients with neovascular age-related macular degeneration (wet AMD)*
- *Evaluate the long term efficacy and safety of Ranibizumab compared with laser therapy for the treatment of infants born prematurely with retinopathy of prematurity*
- *Statistical modelling and risk assessment of type 2 diabetes complications in India*
- *Structured post-marketing surveillance to collect the safety data of intravitreal aflibercept injection in patients of wet age-related macular degeneration during real world clinical practice.*
- *Scope – RoP tele screening study*

- Long-term effects of semaglutide on diabetic retinopathy in subjects with type 2 diabetes (FOCUS Study)
- A multi-centre, randomised, double-masked, active-controlled, comparative clinical study to evaluate the efficacy and safety of MYL-1701P and eylea® in subjects with diabetic macular edema
- A randomised, phase 3, double-masked, parallel group, multi-centre study to compare efficacy and safety of QL1205 versus lucentis in subjects with neovascular ARMD
- A multi-centre, extension study to evaluate the safety and efficacy of MYL-1701P in subjects with diabetic macular edema completed MYL-1701P-3001 study
- A randomised, active-controlled, double-masked, parallel-group, phase 3 study to compare efficacy and safety of CT-P42 in comparison with eylea in patients with diabetic macular edema
- A prospective study with aim of developing machine learning algorithms for patients with glaucoma, retinal pathologies, and normals
- Is chatbot the answer to patient queries during Covid 19 crisis?
- Chatbot as an aid to patients with diabetic retinopathy requiring medical intervention. Is it the answer to all their queries?
- Utility of chatbot in counseling and education of patients undergoing retinal detachment surgery.
- Utility of chatbot in counseling and educating parents of children with retinopathy of prematurity
- Utility of chatbot in counseling and educating parents of children with retinoblastoma.
- Evaluation of performance anxiety in surgeons performing internal limiting membrane peeling
- Evaluation of inner retinal alterations after internal limiting membrane peeling
- Short term study on efficacy of Nepafenac 0.1% in center involving diabetic macular edema with good vision in phakic eyes – a pilot study
- Retinal changes in acute central retinal artery occlusion- a spectral domain optical coherence tomography imaging study
- Clinical presentation and prognostic factors affecting surgical outcomes of secondary macular holes after retinal vein occlusions
- Long term follow up of presumed ocular tuberculosis patients
- Vitrectomy for complications of proliferative diabetic retinopathy in young adults: clinical features and surgical outcomes
- To evaluate the outcome and safety profile of short-term perfluorocarbon liquids tamponade in comparison to buckle-vitrectomy in case of rhegmatogenous retinal detachment associated with choroidal detachment

- *Scleral fixated intraocular lens implantation for refractive rehabilitation in eye with spherophakia*
- *Surgical outcomes in idiopathic epiretinal membranes – Indian insight into ectopic inner foveal layer classification scheme*
- *Treatment of retinopathy of prematurity outside international classification of RoP (ICROP) guidelines*
- *Evaluation of treatment outcomes in APRoP and treatable RoP*
- *To evaluate the effect of COVID-19 pandemic and national lockdown on patient care at a tertiary-care ophthalmology institute*
- *Detachment of internal limiting membrane (ILM) – a novel optical coherence tomography biomarker in central retinal vein occlusion (CRVO) with macular edema*
- *Bilateral central retinal artery occlusion: a retrospective analysis of etiology, presentation and management*
- *Clinical profile and management of cases with ocular perforation secondary to pre-operative local anesthetic injection*
- *Chronic central serous chorioretinopathy with posterior cystoid retinal degeneration: a retrospective analysis of clinical presentation, management and therapeutic role of eplerenone*
- *Cardiorespiratory events associated with vitreoretinal surgeries: causes and outcomes*
- *Influence of systemic disease on visual function of Tamil Nadu state transport corporation drivers*
- *Subjective high-risk patient counselling randomisation project*
- *A study on the differential expression of piwi-interacting RNAs (piRNA) and altered Piwi-like protein interactions in diabetic retinopathy*
- *Comparison of staging of diabetic retinopathy by an offline artificial intelligence with onsite doctor examination and fundus grading by retina specialist*
- *Outcomes of nucleus drop in a tertiary care institution - a retrospective study*
- *Validation of an automated screening of diabetic retinopathy using medios artificial intelligence on a standard fundus camera – a retrospective study*
- *A retrospective study of central serous chorioretinopathy in diabetic retinopathy*
- *A retrospective study of baseline characteristics of patients with cute central serous chorioretinopathy predictive of need for angiography and laser*
- *Improving RoP telemedicine systems in South India*

Uvea

- *A phase III, multi-centre, sham-controlled, randomised, double-masked study assessing the efficacy and safety of intravitreal injections of 440 µg DE-109 for the treatment of active, non-infectious uveitis of the posterior segment of the eye.*
- *Visual prognostic indicators of sarcoid uveitis in a case series of Indian population*
- *Macular edema Nepafenac vs. Difluprednate uveitis trial*

Orbit

- *Identification and validation of deregulated cancer pathways in retinoblastoma*
- *Translational genomics of paediatric eye diseases*
- *Translational genomics of ocular cancers*

Paediatric Ophthalmology and Adult Strabismus

- *Effectiveness of sub-tenon's block in decreasing oculocardiac reflex in paediatric strabismus surgery.*
- *Long term outcomes of paediatric cataract surgery - 10 year follow up study*
- *Comparison of measurement of abnormal head posture by smartphone application vs cervical range of motion (CROM) in ophthalmic disorders*

- *Pre and post training impact analysis among person with visual impairment*
- *Visual impairment in children with multiple disabilities among schools for children with special needs*
- *Yoke prism in children with cortical visual impairment*
- *Impact of online vision therapy in the pandemic*

Health Services Research

- *Impact of electronic medical record implementation on provider and patient satisfaction*
- *Pattern of uptake of training programmes over two decades at an international ophthalmic training institute in India*
- *Estimation of global cataract surgical rate (CSR)*
- *Comprehensive eye care work assessment (CEWA) study in Theni district of Tamil Nadu*
- *Investigating accuracy of a simple, portable refractive error estimation device (ClickCheck™) compared with standard subjective refraction – a diagnostic accuracy study*
- *Impact of a structured mentoring model in enhancing eye care services in the Indian Sub-Continent*
- *Compliance on usage of low vision aids and spectacles and assessment of visual function and quality of life in a southern Indian population.*

- *Diagnostic and economic yield of neuroimaging in neuro-ophthalmology*
- *Evaluating the impact of a field vision assistant on the uptake of vision centre services*
- *An assessment of factors influencing compliance to cataract surgery advice*
- *Evidence based management of out-patient cycle time in a setting with fluctuating demand*
- *Effect of preloaded Capsular Tension Ring (CTR) on clinical outcomes during and after phacoemulsification cataract surgery*
- *To study the safety and efficacy of polyglactin-910 sutures in ophthalmic surgical procedures.*
- *A prospective, open label, observational study to evaluate the safety and surgical performance of Aurolab's round stock surgical blades for making corneal incisions during cataract surgery-*

Aurolab: Clinical trials

- *To study the safety and performance of high refractive index (HRI) cast molded hydrophobic Intra Ocular Lenses (IOLs) with age-related cataract patients.*
- *Study of safety and performance of a new coating on preloaded intraocular lens delivery system meant for 2.2mm incision*
- *To evaluate the efficacy and safety of Aurolab aqueous drainage implant (AADI) on intraocular pressure reduction in paediatric patients with refractory glaucoma*