



Title: Advancing Diagnosis of Retinopathy of Prematurity: A Web-Based AI Solution

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Presentation Type: Oral

subject: Other subject

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Purpose : Retinopathy of Prematurity (ROP) is a leading cause of blindness in children, making timely diagnosis essential for effective treatment. In this study, we introduce Novin Salamat Pars' Retinopathy of Prematurity Computer-Aided Diagnosis (NSP ROP CAD), which employs artificial intelligence (AI) technology. This web-based AI model is designed to automatically classify the stages of ROP and has been validated across three independent databases of retinal fundus images. Our goal is to create an automated, user-friendly platform that facilitates image analysis and supports clinical decision-making, allowing users to engage with the model without requiring extensive technical knowledge.

Methods : We evaluated the performance of our AI-based system using three independent databases of color fundus images. The model was integrated into a comprehensive graphical user interface (GUI) and a web-based platform tailored for clinical environments. The GUI includes automated tools for image enhancement, annotation, and classification of ROP stages, as well as the generation of diagnostic reports in PDF format. Furthermore, the platform enables visualization of key retinal regions used by the model for decision-making, enhancing interpretability.

Results : Our system, evaluated using three distinct databases, demonstrated strong performance across all datasets, achieving an overall accuracy of 85%, a precision of 86%, a sensitivity of 85%, and an F-score of 85%. The evaluation using multiple datasets enhances the model's robustness in various clinical scenarios. Additionally, the intuitive GUI streamlined the analysis of ROP images by providing tools for automated classification, anatomical segmentation, and image annotation, facilitating practical application in clinical workflows.

Conclusion : This study highlights the potential of a web-based AI model for diagnosing ROP. Validated across multiple datasets, this model demonstrates its utility in clinical settings. Integration of an explainable AI component, along with a user-friendly interface, ensures both the reliability of the model and its accessibility for healthcare providers. These advancements can significantly improve early detection and management of ROP, ultimately enhancing patient outcomes in real-world clinical environments.



Title: Investigating the preclinical effect of transplantation of Very Small Embryonic-like Cells (VSEL) on the repair of the trabecular meshwork layer in Glaucoma

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subject: Other subject

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Purpose : Glaucoma is a leading cause of irreversible blindness characterized by the degeneration of retinal ganglion cells, often associated with elevated intraocular pressure (IOP). The trabecular meshwork (TM) plays a critical role in regulating IOP through aqueous humor outflow. This study investigated the potential of Very Small Embryonic-like Cells (VSELS) to repair the TM layer and restore its functionality in a glaucoma mice model.

Methods : VSELS, with their pluripotent characteristics, were isolated and characterized from human umbilical cord blood. A glaucoma model was induced in mice by elevating IOP through corticosteroid modification of aqueous humor drainage. Following the establishment of elevated IOP, VSELS were transplanted into the TM region. Post-transplantation, we assessed changes in the morphology and function of the TM layer using histological analysis, intraocular pressure measurements, and immunohistochemical staining for cellular markers.

Results : Our results demonstrate that the transplantation of VSELS facilitates significant repair of the trabecular meshwork, leading to a reduction in IOP and improvement in aqueous outflow. Enhanced expression of endothelial like cells, myofibroblasts, and monocytes and TM-specific markers was observed, indicating VSELS' potential to stimulate regenerative processes.

Conclusion : This preclinical study highlights the promising therapeutic potential of VSEL transplantation in the management of glaucoma, offering insights into novel regenerative strategies aimed at restoring TM integrity and function in the future clinical trials.



Title: Substrate engineering using naturally biomimicking corneal cell topography for keeping stemness of corneal limbal epithelial-stem cells

Abstract ID: 74

Presentation Type: Oral

subject: Biochemistry/ Molecular Biology/Retinal Cell Biology

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Purpose : Substrate engineering is one of the attractive fields of changing cell behavior and fate.

Methods : Here, a cell-imprinted substrate was prepared using the natural topography of rabbit cornea's limbal epithelial stem cell (LESC). The LESCC cells were re-cultivated on a topography mold (Imprinted PDMS), on FLAT PDMS, and the control group. Ultimately, an alkaline burn model was created on a rabbit's cornea, and the effectiveness of cell-imprinted molds as implants for healing corneal wounds was examined in a live setting.

Results : The in vitro results showed that Imprinted PDMS kept LESCC cells in a state of stemness with high expression of β -NP63 and ABCG2 genes (stemness-associated genes) compared to the other two groups and low Cytokeratin 3, 12 expression (as differentiation-related genes). In vivo studies showed a more significant number of cells and the expression of the ABCG2 gene in the Imprinted PDMS group, while higher expressions of the β -NP63 gene and more stratification were observed in the control group (no treatment). Histological studies showed the Imprinted PDMS group had normal morphology with fully organized collagens.

Conclusion : The results suggested that LESCC cell imprinting could be an excellent substrate for LESCC expansion and preserve their stemness for cell therapy.



Title: Automated Horizontal Strabismus Detection and Classification Using Deep Learning-based Analysis of Facial Images

Abstract ID: 98

Presentation Type: Oral

subject: Strabismus/ Neuro-Ophthalmology

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Purpose : Strabismus, or eye misalignment, is a common condition affecting individuals of all ages. Early detection and accurate classification are essential for proper treatment and avoiding long-term complications. This research presents a new deep-learning-based way of automatically identifying and classifying strabismus from facial images

Methods : Our method utilizes convolutional neural networks (CNNs) to achieve high accuracy in both binary classification (strabismus vs. normal) and multi-class classification (eight-class deviation angle of two types: esotropia and exotropia). The dataset (for binary classification) consisted of 4257 facial images, including (1599 normal and, 2658 strabismus cases) and 480 strabismic and 142 non-strabismic (for multi-class classification) labeled based on ophthalmologist measurements using the Alternate prism cover test (APCT) or Modified Krimsky test (MK). Five-fold cross-validation was employed, and performance was evaluated using sensitivity, accuracy, F1-score, and recall metrics

Results : The proposed deep-learning model achieved an accuracy of 86.38% for binary classification and 92.7% for multi-class classification

Conclusion : . These results demonstrate the potential of our approach to assist healthcare professionals in early strabismus detection and treatment planning, ultimately improving patient outcomes



Title: Preparation and characterization of hyaluronic acid-cyclosporine A nano micelles as novel treatment for Dry Eye

Abstract ID: 12

Presentation Type: Oral

subject: Physiology/Pharmacology

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Purpose : Investigating the efficacy of hyaluronic acid (HA) - cyclosporine A (CyA) nano-micelles, a novel drug delivery system, in rabbit models of dry eye syndrome (DES).

Methods : After characterization of HA-CyA nano-micelles by evaluating particle size, zeta potential, critical micelle concentration (CMC), morphology, and enzymatic-triggered CyA release in the presence of esterase, in vitro toxicity and irritancy were confirmed by hen's egg chorioallantoic membrane and MTT using human corneal epithelial cells, respectively. Ocular toxicity of nano-micelle was investigated by clinical examinations, histology, and TUNEL assay. Experimental model of dry eye was induced by topical 1.0% atropine sulfate followed after 15 min by treatment with HA, Restasis (CyA) and nano-micelle in individual groups, three times a day for 7 days. In addition to performing Schirmer's test and tear break-up time test (TBUT), occurrence of superficial punctate keratopathy (SPK) was also investigated in the study groups. Using ELISA, the amounts of tear TNF- α and interleukin1- β were measured. Histopathological examinations of corneoscleral tissues along with conjunctiva were also performed.

Results : A nano-micelle was designed with particle size of 67 nm, polydispersity index of 0.221, zeta potential of -13.98 mV, and 88% release rate in-vitro. It was not toxic in in-vitro and in-vivo investigations. TBUT values and tear volume were decreased in untreated group while these indices improved significantly in groups treated with nano-micelle in a promising manner. Nano-micelle increased mean tear volume from 4.83 to 11.50 mm (P=.0001) and mean TBUT values from 16 s to 32.5 s (P=.0001) compared with untreated group. In contrast to presence of severe SPK in untreated eyes, no significant dotted staining was observed in nano-micelle and Restasis groups. The most reduction of tear TNF- α and interleukin1- β was observed in nano-micelle treated eyes. Histopathological examinations disclosed a saw-tooth appearance of irregular corneal epithelium in HA and untreated eyes, a finding that was not observed in nano-micelle and Restasis groups. Immunohistochemical investigations disclosed lowest expression of TNF- α and interleukin1- β in micelle group.

Conclusion : These outcomes propose that HA-CyA nano-micelle has a therapeutic effect in rabbit model of dry eye and might be a potential treatment for DES.



Title: Therapeutic Effects of Bevacizumab and Triamcinolone on Proliferation of ARPE-19 Cells Under Hyperglycemic Stress

Abstract ID: 5

Presentation Type: Oral

subject: Retina and Retinal Cell Biology

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Purpose : Diabetic retinopathy (DR) is a complication of chronic hyperglycemia characterized by progressive damage to the retinal microvasculature, leading to pathological changes such as microaneurysms, hemorrhages, retinal ischemia, and neovascularization. Intra-vitreous injections of agents targeting key pathways in retinal pathology have become standard therapeutic approaches. This study evaluates the effects of Bevacizumab and Triamcinolone, both individually and in combination, on the proliferation of a hyperglycemic ARPE-19 cell line model.

Methods : The human retinal pigment epithelial cell line (ARPE-19) was cultured in Dulbecco's Modified Eagle's Medium (DMEM): F12, supplemented with 10% fetal bovine serum (FBS) and 1% penicillin/streptomycin, and maintained at 37°C in a 5% CO₂ environment. Upon reaching confluency, the cells were incubated under either normoglycemic (NG, 5.5 mM) or hyperglycemic (high glucose, 30 mM) conditions. After 72 hours, ARPE-19 cells were plated at a density of 10⁴ cells per well and divided into eight groups. The experimental groups included: Control (normal and high glucose), Bevacizumab (1.25 mg/0.05 mL), Triamcinolone (4 mg/0.1 mL), and a combination of both drugs (Bevacizumab + Triamcinolone). Cell viability was evaluated using the MTT assay after 24 and 48 hours of treatment.

Results : Elevated glucose levels significantly increased cell numbers at both 24 hours and 48 hours ($p < 0.001$). Neither Bevacizumab nor Triamcinolone affected cell numbers in the normal glucose group at either time point. However, the combination of both drugs significantly reduced cell numbers ($p < 0.01$) in the high glucose-treated group at 24 hours. After 48 hours, both Triamcinolone and the combination therapy resulted in a significant reduction in cell numbers compared to the high glucose control group ($p < 0.05$ and $p < 0.01$, respectively).

Conclusion : The combination of Bevacizumab and Triamcinolone effectively reduces the proliferation of ARPE-19 cells under hyperglycemic conditions. While reducing the proliferation of RPE cells may mitigate complications associated with diabetic retinopathy, such as epiretinal membrane formation and inflammation, careful consideration is necessary to avoid impairing retinal function and increasing oxidative stress susceptibility.



Title: Delivery of htsFLT01 to Y79 Cells Using MiRGD Peptide and Graphene Quantum Dots

Abstract ID: 15

Presentation Type: Oral

subject: Retina and Retinal Cell Biology

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Purpose : Retinoblastoma is a prevalent intraocular malignancy in children. Vascular Endothelial Growth Factor (VEGF) serves as a key proangiogenic factor secreted by nearly all solid tumors. The htsFLT01 fusion protein effectively neutralizes both mouse and human VEGF and PlGF. MiRGD peptides, containing the iRGD motif, enhance tissue penetration by binding to αv integrins in cancerous tissues. Graphene Quantum Dots (GQDs) have emerged as promising agents in bio-imaging due to their biocompatibility, low cytotoxicity, and tunable fluorescence properties.

Methods : In this study, htsFLT01 plasmids were prepared using the Favorgen Maxi preparation kit. MiRGD peptides were purified through Ni-NTA chromatography, followed by desalting via dialysis. GQDs were synthesized via the hydrothermal method using citric acid and urea, and their absorption and emission wavelengths (330 nm and 440 nm, respectively) were confirmed via BioTek Cytation. The functional surface groups of GQDs were characterized by FTIR, and their size and charge were analyzed using Dynamic Light Scattering (DLS). Gel retardation assays demonstrated stable complex formation, further confirmed by agarose gel electrophoresis with ethidium bromide staining.

Results : Initial DLS results indicated the zeta potentials of GQDs, MiRGDs, and the complexes to be -23 mV, +6 mV, and +11 mV, respectively. Preliminary cell culture experiments were conducted on Y79 human retinoblastoma cells maintained in RPMI 1640 medium with 10% FBS and 1% penicillin/streptomycin under standard incubation conditions.

Conclusion : Future experiments will focus on optimizing the nano-complex treatment's dosage and timing through MTT assays, followed by molecular analyses including apoptosis, flow cytometry and real-time PCR.



Title: The relationship of macular vessel density and foveal avascular zone with pulse wave velocity and central blood pressure in healthy adults: Persian cohort study

Abstract ID: 92

Presentation Type: Oral

subject: Retina and Retinal Cell Biology

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Purpose : To evaluate the correlation of macular vessel density (VD) and foveal avascular zone (FAZ) parameters measured on optical coherence tomography angiography (OCTA) with systemic arterial stiffness using pulse wave velocity (PWV), pulse wave analysis, arterial age, and central blood pressure (CBP) measurements in healthy subjects.

Methods : In a comparative, cross-sectional, observational study, healthy adults who participated in the PERSIAN Cohort study at Mashhad University of Medical Sciences were included in this study. The study involved using a spectral domain OCTA device to obtain 3 × 3 and 6 × 6 mm scans of the macular superficial capillary plexus (SCP) VD, deep capillary plexus (DCP) VD, and FAZ vascular analysis. Additionally, we used the SphygmoCor XCEL System (AtCor, Itasca, IL) to analyze systemic vascular parameters like CBP and PWV.

Results : The study included 296 healthy participants with a mean age of 39.2 ± 6.7 years, and 152 subjects (51.3%) were female. Female participants were found to have higher DCP VD and FAZ area values. Age showed a negative correlation with SCP and DCP VDs. PWV showed a negative correlation with parafoveal DCP VDs, but no correlation was observed between macular VDs and aortic diastolic and systolic pressures.

Conclusion : In conclusion, age was found to have a negative impact on macular SCP and DCP VDs. In addition, higher arterial stiffness was found to correlate with a lower parafoveal DCP VD value. These findings suggest macular OCTA parameters may be used as early markers of systemic arterial disease.



Title: Stage Detection in Retinopathy of Prematurity using Deep Learning for Ridge Segmentation

Abstract ID: 95

Presentation Type: Oral

subject: Retina and Retinal Cell Biology

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Purpose : Retinopathy of Prematurity (ROP) is a retina disorder that mainly impacts preterm infants with lower weights and potentially leading to scarring and retina detachment. The diagnosis of ROP consists of 5 stages where early stages are critical for determining treatment choices. Stages 1-3 and normal retinas are more subtly classified by the existence, size, and shape of the demarcation line (or ridge, in later stages). Although human experts can readily recognize advanced stages of ROP, diagnosing the earlier stages (i.e. stages 1-3) is significantly influenced by inter-experts variabilities. Low-quality images characterized by focusing issues, contrast deficiencies, and uneven illumination negatively influence the accuracy of the diagnosis based on ROP images. In recent years, considerable efforts have been conducted to automate diagnosis of ROP through artificial intelligence to make the process more objective and accurate. In this study, we focus on segmentation of demarcation line, which is crucial landmarks in ROP diagnosis, through deep learning.

Methods : An encoder/decoder convolutional neural network (CNN) based on a modified UNet structure was utilized for the purpose of demarcation line segmentation. We used a pre-processing algorithm to enhance the contrast of the images and correct for uneven illumination artifacts. This study included 425 ROP images of 95 infants with the average birth weight of 1305 ± 427 gr and average gestational age of 29.3 ± 3 weeks. Using a GUI, an expert labeled the areas of demarcation lines in each image by creating a binary mask covering the demarcation line. By augmenting the dataset using geometric transformations, and cropping and resizing the images to 512×512 pixels, we obtained a dataset of 1700 images. To train our network, we utilized two subsets of 1350 and 350 images and their associated binary masks as training and validation data respectively.

Results : The proposed model underwent testing on 40 images from a different set of images and achieved a segmentation accuracy of 0.85 in terms of F1 contour matching score (BF).

Conclusion : Our research shows that using deep learning for segmentation of demarcation lines, provide a prerequisite for the automated diagnosis of ROP severity and enables reliable detection of the disease in its initial phases.



Title: Advanced AI-Driven Clinical Decision Support for Retinal Disease Screening with Ultra-Wide-Field Fundus Imaging

Abstract ID: 29

Presentation Type: Oral

subject: Imaging

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Purpose : Retinal diseases pose a significant threat to visual health, with early detection crucial for preventing irreversible vision loss. Despite advancements in imaging technology, many regions still lack access to specialized ophthalmic care, leading to delays in diagnosis. Ultra-wide-field (UWF) imaging, including color fundus and autofluorescence modalities, provides comprehensive retinal views, enhancing disease detection. This study aims to develop an AI-based system for screening retinal diseases using UWF imaging, leveraging deep learning (DL) techniques to classify retinal images as normal or abnormal, offering a scalable and efficient solution for clinical decision support.

Methods : The study utilized a dataset of 10,440 UWF color and autofluorescence images from 2,610 patients, collected over a 15-month period at Dr. Farvardin's Eye Clinic. These images were captured using the OPTOS P200DTx/A10650 device and were carefully curated to remove artifacts such as operator interference or eyelid obstruction, ensuring high-quality data for training the AI models. Convolutional neural networks (CNNs), including DenseNet121, ResNet18, and InceptionResNetV2, were applied to classify images into normal or abnormal categories. Transfer learning was used to fine-tune pre-trained models for retinal disease detection. A combined decision-making approach was employed to optimize model performance by integrating predictions from multiple networks. Models were evaluated based on accuracy, sensitivity, and specificity.

Results : The CNN models achieved significant classification performance, with the 4-channel input model, combining UWF color and autofluorescence images(as 4-channel), yielding superior accuracy compared to 3-channel models. DenseNet121 demonstrated the highest performance in detecting retinal abnormalities, with a promising AUROC. The combined decision-making approach achieved the best performance overall, with a sensitivity of 90%, specificity of 90%, and an accuracy of 89%. The system successfully classified retinal images, facilitating early detection of pathological changes, including diabetic retinopathy, macular degeneration, and other retinal diseases.

Conclusion : The integration of deep learning with UWF imaging offers a promising tool for improving retinal disease screening, especially in underserved areas with limited access to ophthalmologists. This AI-driven approach can significantly enhance diagnostic accuracy and provide an efficient, scalable solution for the timely detection and management of retinal conditions.



Title: Development and Validation of Machine Learning Classifiers for Predicting Treatment-Needed Retinopathy of Prematurity

Abstract ID: 59

Presentation Type: Oral

subject: Imaging

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Purpose : To design and evaluate various supervised machine-learning models for identifying premature infants who require treatment based on demographic data and clinical findings from screening examinations.

Methods : We conducted a retrospective review of medical records for infants screened for retinopathy of prematurity (ROP) at our clinic over the past decade. We extracted demographic and clinical data, including eleven features: sex, maternal education, paternal education, birth weight, gestational age, ROP stage, zone of retinal involvement, age at examination, weight at examination, and CPR. We developed and assessed several classifiers: logistic regression (LR), decision tree (DT), support vector machine (SVM), naïve Bayes (NB), K-nearest neighbors (KNN), XGBoost, and artificial neural networks (ANN). The target variable was defined as whether the neonate received any treatment during the follow-up period.

Results : Our analysis included data from 9,692 infants. Among the machine learning models evaluated, the logistic regression model achieved the highest accuracy at 97%. The KNN, XGBoost, SVM, and ANN models also demonstrated strong performance, with accuracies of 96%. In terms of sensitivity (recall), the NB model exhibited the lowest false negative rate, indicating the highest sensitivity.

Conclusion : In the context of premature neonates, accurately diagnosing those who require treatment is crucial. Therefore, from a clinical perspective, prioritizing a model with the lowest false negative rate may be more beneficial than selecting one based solely on the highest accuracy. While AI can enhance decision-making processes by providing real-time risk assessments, these tools must be used to augment—not replace—clinical judgment. Clinicians must remain involved in interpreting model outputs and making final treatment decisions based on a holistic understanding of each patient’s unique circumstances.



Title: Radiomics-Based Assessment of OCT Angiography Images for Identifying Vascular Leakage through Quantitative Vessel Characteristics in Diabetic Retinopathy Patients

Abstract ID: 69

Presentation Type: Oral

subject: Imaging

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Purpose : To utilize radiomics analysis to extract quantitative vessel characteristics from OCTA images to facilitate the detection of leakage sources that are otherwise undetectable.

Methods : A total of 87 DR patients were prospectively evaluated between 2022 and 2023. Radiomics features—including vessel density, branch number, tortuosity, texture analysis, vessel pixel count, box fractal dimension, wavelet fractal dimension, vessel length, branch points, perfusion density, vessel intensity, vessel diameter, perfused capillary density, and signal voids—were extracted using advanced image processing techniques. These quantitative characteristics were then analyzed to identify patterns associated with vascular leakage.

Results : Preliminary findings indicate that specific radiomic features correlate with the presence of vascular leakage. Notably, certain extracted features effectively highlight leakage-prone areas not readily visible in standard OCTA images. Vessel connectivity, perfusion density, signal voids and width variation are among the most impressive features.

Conclusion : This study underscores the potential of radiomics analysis to enhance the diagnostic capabilities of OCTA imaging. Quantitative assessment of vascular characteristics may improve the identification of vascular leakage. By integrating radiomics analysis with OCTA imaging, this study presents a novel approach to detecting vascular leakage source in DR patients. The quantitative assessment of vessel characteristics not only enhances understanding of vascular pathology but also holds promise for improving diagnostic accuracy in clinical practice.



Title: Quantitative analysis of novel eyelid contour-based indices of blepharoptosis

Abstract ID: 77

Presentation Type: Oral

subject: Imaging

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Purpose : To investigate novel indices for characterizing eyelid contour in patients with blepharoptosis.

Methods : The study had a total of 106 subjects who were categorized into four distinct groups: control (no ptosis), mild ptosis, moderate ptosis, and severe ptosis. The study employed image processing techniques to compute three indices, namely the Upper Nasal Index (UNI), Upper Temporal Index (UTI), and Upper Lid Contour Circularity Index (ULCCI), using full-face digital photographs.

Results : A total of 106 participants were divided into four groups: control (no ptosis), mild ptosis, moderate ptosis, and severe ptosis. The mean and inter-eye ratio values for all three indices were significantly different between the groups, with $p < 0.001$ for all three comparisons. Pairwise comparisons revealed that UNI values were significantly different between the control and mild ($p = 0.008$), moderate ($p < 0.001$), and severe ($p < 0.001$) groups. Similarly, UTI values were significantly different between the control and moderate ($p < 0.001$) and severe ($p < 0.001$) groups, but not between the control and mild groups ($p > 0.05$). ULCCI values were significantly different between the control and moderate ($p = 0.006$) and severe ($p = 0.001$) groups, but not between the control and mild groups ($p > 0.05$). The inter-eye ratio was significantly different between the control and mild ($p = 0.005$), moderate ($p < 0.001$), and severe ($p < 0.001$) groups for UNI, between the control and moderate ($p < 0.001$) and severe ($p < 0.001$) groups for UTI, and between the control and severe ($p < 0.001$) groups for ULCCI.

Conclusion : This study used three unique indicators (UNI, UTI, and ULCCI) to identify normal eyes from different severity levels of ptosis. Overall, the results of this study suggest that there is a significant association between mild, moderate, and severe ptosis and UNI, UTI, and ULCCI indices. The ratios of the upper nasal segment of the eye to the upper nasal circle allowed UNI to discriminate all ptosis grades from the control group.



Title: Investigation of Subcutaneous Retinoblastoma Tumor in a Mouse Model Following htsFLT01 Chimeric VEGF Receptor Therapy

Abstract ID: 10

Presentation Type: Oral

subject: Genetics

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Purpose : Retinoblastoma, a rapidly progressing pediatric retinal cancer caused by RB1 gene mutations, is characterized by angiogenesis, which drives tumor growth and metastasis. Anti-angiogenic therapies targeting vascular endothelial growth factor (VEGF) and placental growth factor (PLGF) hold promise for treatment. This study evaluates the efficacy of the htsFLT01 chimeric construct, delivered via lentiviral (LV) particles, in suppressing angiogenesis in a retinoblastoma mouse model.

Methods : The htsFLT01 construct was cloned into a pLenti vector through PCR amplification with Nhe I restriction sites, followed by transfection into HEK293T cells to generate high-titer LV particles. Y79 retinoblastoma cells will be injected subcutaneously into mice to establish xenografted tumors, which will be subsequently transduced with LV-htsFLT01 particles. Tumor angiogenesis and therapeutic efficacy will be assessed via real-time PCR, western blotting, immunohistochemistry, and histological analysis.

Results : Plasmid quality and PCR amplification were confirmed via gel electrophoresis. Sequencing will validate the identity of the construct. Successful production of high-titer LV particles enables effective tumor transduction, which is expected to demonstrate reduced angiogenesis and tumor growth.

Conclusion : This study establishes a robust xenograft model and demonstrates the feasibility of using htsFLT01-based gene therapy to inhibit tumor angiogenesis, providing a foundation for novel anti-angiogenic strategies in retinoblastoma treatment.



Title: Developing chimeric AAV viruses for intravitreal delivery of RPGR for X-linked Retinitis Pigmentosa gene therapy

Abstract ID: 97

Presentation Type: Oral

subject: Genetics

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Purpose : The most common form of X-linked retinitis pigmentosa is caused by mutations in the RPGR gene, leading to photoreceptor degeneration and loss of vision. The aim of this study is to evaluate the photoreceptor transduction efficacy of a capsid-engineered AAV2-RPGR virus for intravitreal injection in mouse eyes and compare it with the subretinal injection of the AAV8-RPGR.

Methods : We synthesized the codon-optimized human RPGRORF15 gene cloned into an AAV vector with a CMV promoter. The RPGRORF15 expression was analysed by transfection into cells followed by Western blotting using an anti-RPGR antibody. The transgene was then cloned into an AAV vector under control of the photoreceptor-specific promoter GRK1. AAV2-(7m8) and AAV8 capsid vectors were used to introduce tyrosine to phenylalanine (Y-F) and threonine to valine (T-V) mutations. To evaluate the function of mutant AAVs, we also produced an AAV shuttle plasmid encoding an EGFP reporter. The wild-type and tyrosine mutant AAV2-(7m8) and AAV8 viruses were produced and purified from cell lysates by heparin affinity chromatography or PEG precipitation and stored for injection into mouse eyes.

Results : The transduction efficiency of mutant and wild-type AAV vectors carrying the CMV promoter and the EGFP reporter were initially analysed in cells. Purified AAV8 and AAV2 viruses were then injected into subretinal and intravitreal spaces of mouse eyes, respectively. Fundus photographs from mouse eyes transduced with the [Y-F]-[T-V] mutant or wild-type AAV2(7m8) and AAV8 expressing the GFP reporter and the fluorescent intensities of the prepared retina flat mounts demonstrated that capsid modifications resulted in an increase in retinal cells transduction compared to the control AAVs. We next tested the efficacy and specificity of AAV variants carrying GRK1-RPGRORF15 delivered to mouse eyes via intravitreal and subretinal injections. Both AAVs showed comparably strong and specific transduction efficiencies specifically in photoreceptors.

Conclusion : we developed AAVs with chimeric capsids capable of penetrating into the retina via delivery to the eye vitreous. The RPGR transgene packaged in this chimeric AAV could be specifically expressed in photoreceptor cells after intravitreal injections. This will allow us to design gene therapy clinical trials for the X-linked-RP using the less invasive intravitreal delivery method, in future.



Title: PedRetina Explorer: A Cloud-Based AI Tool for Optimizing Diagnosis and Treatment in Pediatric Retinoblastoma

Abstract ID: 18

Presentation Type: Poster

subject: Other subject

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Purpose : Retinoblastoma, the most common intraocular tumor in children, requires timely diagnosis and treatment to prevent severe outcomes like vision loss or eye enucleation. The PedRetina Explorer is a cloud-based tool designed to improve understanding of retinal responses to chemotherapy. It provides a user-friendly interface that allows ophthalmologists to quickly search for and access relevant patient cases, streamlining the process for diagnosis and treatment.

Methods : Initially, we conducted a comprehensive literature review of pertinent articles in pediatric ophthalmology and artificial intelligence to establish the project's foundation. Subsequently, we collaborated with experts to develop advanced algorithms designed to predict retinal responses in children based on historical cases. We then implemented the PedRetina Explorer search engine, which includes custom filters and data visualization tools. Extensive testing and validation were carried out to ensure the accuracy and reliability of the search engine, involving medical professionals and utilizing diverse datasets.

Results : Traditionally, physicians have depended on manual searches through Electronic Health Records and Picture Archiving and Communication Systems, which can be time-consuming and inefficient. While existing search tools, such as radiology-based Case-Based Reasoning systems and oncology platforms like OncoSearch, offer some functionalities, these tools primarily focus on adult cancers or molecular profiling, leaving a significant gap for solutions tailored to pediatric needs. PedRetina Explorer addresses these gaps by integrating machine learning-based search capabilities that combine retinal images with clinical reports using advanced algorithms. This system enables quick and relevant retrieval of historical cases, empowering doctors to effectively match similar patient profiles, treatments, and outcomes. The incorporation of vector-based databases and natural language processing models bridges the divide between imaging data and textual information, enabling precise queries for swift decision-making. As a cloud-based platform, PedRetina Explorer provides global access with secure authorization, positioning itself as a transformative tool for enhancing patient care in pediatric retinal oncology.

Conclusion : PedRetina Explorer is an innovative tool that analyzes case data to assist physicians in decision-making, research, and improving pediatric retinal chemotherapy. With continuous learning and regular updates, it enhances treatment outcomes while maintaining its relevance.

Title: Thermosensitive injectable hydrogel based on Pluronic F127- Polysaccharide containing Melphalan and Topotecan for Retinoblastoma Treatment

Abstract ID: 19

Presentation Type: Poster

subject: Other subject

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Purpose : Chemotherapy is the standard treatment for retinoblastoma, often utilizing a triadic regimen. A novel approach for managing vitreous seeds in this condition is super-selective intra-arterial chemotherapy. For intravitreal injections, the recommended dosage of Melphalan is approximately 20 µg, as higher doses can cause severe toxicity, including cataracts, vitreous hemorrhage and subretinal hemorrhage. Additionally, Topotecan has proven effective for retinoblastoma. Studies suggest that combining intravitreal Topotecan and Melphalan may enhance treatment efficacy and reduce the number of necessary injections, offering promise for better management of vitreous seeds. Moreover, hydrogels are being explored to diminish the side effects of conventional chemotherapy and lesser the frequency of injections.

Methods : In this study a thermosensitive hydrogel was prepared under sterile conditions by mixing Pluronic F127 with polysaccharide at 4°C overnight for complete dissolution. The hydrogel's internal structure was examined using scanning electron microscopy (SEM), while the sol-gel transition was assessed with the inverted tube method. In vitro degradation was evaluated via the gravimetric method. Rheological properties were determined through frequency and temperature sweep tests. For drug loading, Melphalan was incorporated into Pluronic F127 micelles using thin-film hydration. The Melphalan concentration in micelles was measured using UV-Vis spectrophotometry, and drug loading content (DLC) was calculated. The cytotoxic effects of Melphalan and Topotecan, both individually and in combination, were evaluated on Y79 cells using the MTS assay.

Results : The Pluronic F127-Polysaccharide hydrogels were successfully synthesized, demonstrating a consistent sol-to-gel transition at body temperature. Scanning electron microscopy revealed an interconnected, porous microstructure. In vitro degradation showed that hydrogels degraded over six days, suitable for controlled drug delivery. Rheological tests confirmed elastic behavior ($G' > G''$), indicative of shape retention. The DLC of Melphalan was 9.25%. When combined, Melphalan and Topotecan exhibited synergistic cytotoxic effects, increasing cell death in Y79 retinoblastoma cells compared to individual drug treatments.

Conclusion : These results suggest that Pluronic F127-Polysaccharide hydrogels hold potential for effective and sustained intravitreal drug delivery. Future research will aim to confirm their preclinical significance in improving retinoblastoma treatment.



Title: Minimally invasive and sustained delivery of Bevacizumab to the posterior segment of the eye by hydrogel microneedle patch for diabetic retinopathy treatment

Abstract ID: 25

Presentation Type: Poster

subject: Other subject

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Purpose : Diabetic retinopathy (DR) is a significant global health concern characterized by the formation of abnormal blood vessels in the retina, which can lead to severe visual impairments and even blindness. Currently, intravitreal injection of anti-vascular endothelial growth factor (anti-VEGF) drugs such as Bevacizumab (BZ) is a standard treatment aimed at inhibiting the formation of the new blood vessels. However, this method is invasive and may not be suitable for all patients due to its associated risks and discomfort. In recent years, microneedle (MN) patches have emerged as a promising alternative for minimally invasive intraocular drug delivery. These patches offer several advantages, including painless application, effective drug penetration, and flexibility to administer varying doses without the invasiveness of traditional injection methods. This innovative approach could revolutionize treatment for DR by providing a more patient-friendly option while improving therapeutic efficacy.

Methods : MN molds were created by micromolding using polydimethylsiloxane (PDMS) as the substrate. Then, hyaluronic acid (HA) solution was mixed with BZ and casted into the PDMS molds, which were then centrifuged and allowed for gelation and drying at room temperature for 48 hours. Once dried, the HA hydrogel MN patches were carefully removed from the molds and characterized using digital microscopy. Additionally, mechanical tests were conducted using texture analyzer to evaluate the penetration capabilities of the microneedles array patches within sclera tissue.

Results : MN patches were intact after removing from mold. Mechanical tests were carried out using texture analyzer and showed that the MN patch could tolerate about 58 N force, which is properly enough regarding that the required force for penetration into sclera is 1.005 N.

Conclusion : This innovative MN technology represents a safer and more patient-friendly option for managing ocular conditions.

Title: Anti-Tumor Potential of htsFLT01/MiRGD Nano Complex: An In Vitro and In Vivo Study

Abstract ID: 3

Presentation Type: Poster

subject: Anatomy & Pathology/ Oncology

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Purpose : The anti-angiogenic gene htsFLT01 is a novel therapeutic gene designed to inhibit the growth of blood vessels in neovascularized pathologic angiogenesis situations like CNV, retinoblastoma and other solid tumors. The htsFLT01 gene produces a protein called sFLT01, which acts as a decoy receptor for VEGF. The MiRGD complex, comprised of histone H1 motifs for DNA compression and neutralizing its negative charge, the Gp41 motif from HIV for crossing the endosome membrane, and the NLS motif of the SV40 virus for nuclear membrane crossing, was utilized.

Methods : The htsFLT01 gene had been previously designed and constructed. The MiRGD peptide was expressed and purified using Ni-NTA affinity chromatography in the E. coli expression strain C41 (DE3). Cell viability and toxicity of the nanoparticles were determined through MTT assays in MCF7 cell cultures. Following transfection with the htsFLT01/MiRGD Nano complex at N/P = 14, conditioned medium and cell lysate were collected, and the expression of htsFLT01 protein was examined. Additionally, an expression analysis of key genes involved in the apoptosis pathway, obtained from previous studies, was conducted. To proceed with in vivo drug testing, 4-week-old female BALB/C mice were inoculated with cancer cells (4T1), following by the htsFLT01/MiRGD Nano complex locally injection into the cancerous mice. Histological analyses, including hematoxylin-eosin staining and immunofluorescence studies of tumors, were conducted.

Results : The MiRGD nanocarrier was successfully produced and purified. It effectively delivered its contents to MCF7 breast cancer cells using the iRGD targeting moiety. Protein analysis revealed intracellular production and extracellular secretion of htsFLT01 protein. Also, the results showed the very low toxicity of the htsFLT01/MiRGD complex compared to the htsFLT01/PEI complex. The function of the htsFLT01/MiRGD complex culminated to an increase in the expression of FADD, Cas8, and p53 genes in the apoptosis pathway in vitro. The histological results revealed decrease in angiogenesis and cell division, suppressed expression of VEGF, VEGFR, and CD31 protein, and increased apoptosis and necrosis of cancer cells in the treated mouse model



Conclusion : The htsFLT01/MiRGD nanocomplex as a novel anti-angiogenic therapy represented promising inhibition of tumor growth. It may serve as a novel medical approach for solid tumor management specially to control metastasis and invasion.



Title: Development of a Synthetic Bioadhesive Enriched with Retinal Pigment Epithelial Cells Secretum for Treating Retinal Detachment

Abstract ID: 21

Presentation Type: Poster

subject: Biochemistry/ Molecular Biology/Retinal Cell Biology

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Purpose : Retinal detachment (RD) remains a significant challenge in ophthalmic surgery, often leading to severe vision loss. Current treatments, including pars plana vitrectomy (PPV), exhibit variable success rates with initial retinal reattachment ranging from 74% to 96.3%. However, the loss of photoreceptor cells is a critical factor in post-surgical vision deterioration, underscoring the need for innovative solutions. This research addresses the inefficiencies of existing treatments and proposes a novel approach: the development of a regenerative adhesive based on polyethylene glycol (PEG) enriched with retinal pigment epithelial cells (RPE) cells secretum. This adhesive aims to enhance retinal reattachment via physical sealing while promoting photoreceptor cell recovery, thereby improving long-term visual outcomes.

Methods : Our methodology involved the preparation of four groups of PEG adhesives with varying molar ratios of end groups NH₂:NHS (1:1, 1:1.5, 1:2, 1:3). Adhesion properties were measured using a lap shear test, while mechanical elasticity was assessed through compression testing and comparison of the Young's modulus with that of the retina. Hydrogel biodegradation was also investigated and the group exhibiting the longest degradation time (9 days; NH₂:NHS = 1:2) selected for further study. To evaluate the protective effect of RPE condition media (RPECM), an LDH test was conducted, confirming its efficacy. Consequently, the protein release from the condition media-loaded hydrogel was measured using the BCA Assay.

Results : Preliminary results indicated that the PEG adhesive enriched with RPE secretum exhibited promising characteristics, including robust adhesive properties (\approx 129 kPa), mechanical compatibility with retinal tissue ($E \approx$ 8.5 kPa), and minimal inflammatory response. These findings suggested that the PEG- RPECM adhesive could offer a significant advancement in the treatment of RD, providing a dual benefit of mechanical support and biological regeneration.

Conclusion : This study highlights the potential of integrating cell-free regenerative therapies with modern synthetic bioadhesives to recapitulate complex ocular conditions, aiming to restore and preserve vision in patients suffering from retinal detachment.



Title: Cell-Penetrating Peptides for Targeted Delivery of Anti-VEGF Agents in Ocular Diseases

Abstract ID: 42

Presentation Type: Poster

subject: Biochemistry/ Molecular Biology/Retinal Cell Biology

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Purpose : Cell-penetrating peptides (CPPs), also referred to as protein-transduction domains (PTDs), have emerged as a potent non-viral strategy to enhance drug delivery, particularly for anti-VEGF molecules in ocular diseases such as age-related macular degeneration (AMD) and diabetic retinopathy. These short peptides facilitate the translocation of therapeutic agents across cellular membranes while preserving their functional integrity. Critical factors in the design of CPPs include peptide sequence, structure, internalization efficiency, endosomal escape mechanisms, stability, and toxicity. By reducing systemic exposure and drug-associated side effects, CPPs minimize the risks typically associated with high-dose treatments.

Methods : Ocular drug delivery is inherently challenging due to anatomical and physiological barriers, including the blood-aqueous and blood-retina barriers, which impede drug access to target tissues. CPPs address these challenges by enhancing drug bioavailability and transport across these barriers via non-invasive or minimally invasive routes, such as topical applications and intravitreal injections. Notable CPPs evaluated for ocular applications include VP22, HIV-TAT, peptide for ocular delivery (POD), and nucleolin-binding peptide (NBP).

Results : POD has demonstrated efficacy in delivering both small and large molecules to the posterior eye segment, successfully targeting the retinal pigment epithelium (RPE), photoreceptors, ganglion cells, sclera, and choroid through topical administration. Topical CPP-drug complexes, such as those involving bevacizumab and ranibizumab, have shown comparable effectiveness to intravitreal injections in reducing choroidal neovascularization (CNV) in animal models. In this study, we utilized a chimeric recombinant MiRGD peptide as a CPP, incorporating functional motifs such as histone H1, HIV glycoprotein 41 (Gp41), a nuclear localization signal (NLS) from simian virus 40 (SV40), and the cyclic Internalized RGD (iRGD) peptide to deliver the novel anti-angiogenic molecule htsFLT01 (hinge-truncated sFLT01) to the mouse retina. The results demonstrated significant inhibition of vascular development in the retinal capillary plexus layers.

Conclusion : In conclusion, CPP-based delivery systems offer a promising advancement for ocular therapeutics, combining improved efficacy, targeted delivery, and enhanced safety profiles to address unmet needs in the treatment of ocular diseases.



Title: Designing and fabrication of a bacterial nanocellulose film induced with corneal mimicking topography as a substrate for corneal wound cell therapy

Abstract ID: 99

Presentation Type: Poster

subject: Biochemistry/ Molecular Biology/Retinal Cell Biology

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Purpose : In 1997, it was proposed that a small amount of limbal tissue containing limbal epithelial stem cells (LESC) could be cultured, expanded, and then transplanted into patients with LESCs deficiencies. However, challenges in limbal epithelial stem cell culture, cell sheet preparation, and delivery to corneal defects remain. Histological examinations have shown that the surface and area where LESCs proliferate and differentiate into epithelial cells are unique. The limbal epithelial ring has a distinct topography, whereas differentiated epithelial cells are located on a flat surface

Methods : In this study, we prepare bacterial cellulose from *Acetobacter xylinum* bacteria by culturing them in optimized media. We induce a cornea-mimicking topography through lithography or other techniques, which is then printed onto the bacterial cellulose following an optimized protocol. We perform various morphological and biomechanical evaluations of the topography-induced bacterial cellulose (Topo-BC) using tests such as scanning electron microscopy (SEM), tensile and suture retention tests, swelling assessments, atomic force microscopy (AFM), biodegradation analysis, and observations of morphological changes during biodegradation and transparency.

Results : We then examine LESCs behaviors on Topo-BC in vitro to determine its potential as a carrier for maintaining stemness, promoting proliferation, and facilitating differentiation of LESCs. For this purpose, MTT assays are conducted at 1, 3, and 7 days of culture on standard plates, bacterial cellulose (BC), and Topo-BC. LESCs adhesion and distribution after 3 and 7 days of culture on the substrates are assessed using SEM and DAPI staining. The effects of topography on the expression of stemness, limbal, and epithelial genes are evaluated through reverse transcription polymerase chain reaction (RT-PCR). Furthermore, Topo-BC seeded with LESCs is applied to corneal defects in rabbits that have experienced corneal failure due to chemical burns (HCl models), in order to histologically and molecularly assess the healing of corneal wounds.

Conclusion : At the conclusion of this study, we anticipate that our topographical bacterial nanofibrous cellulose will provide a suitable substrate for LESCs culture, sheet formation, and effective LESCs delivery in vivo. This construct may be used independently or seeded with LESCs as a stem cell delivery carrier for addressing various corneal defects.



Title: Risk factors and common organisms in bacterial keratitis in a tertiary center in Iran, a retrospective study

Abstract ID: 72

Presentation Type: Poster

subject: Clinical/ Epidemiologic Research

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Purpose : To report the range of isolated microorganisms and identify the underlying factors contributing to infectious keratitis in a 12-year period at a referral center in Tehran.

Methods : Methods: This retrospective study reviewed the medical records of patients diagnosed with infectious keratitis from 2009 to 2021. A total of 867 patients were admitted, with corneal scrapping performed for 414 of them. Fortified empiric antibiotic eye drops were initiated for all patients, while surgical intervention was carried out for a total of 376 patients during their hospitalization.

Results : Trauma being identified as the most prevalent risk factor (21.9%). The primary microorganisms responsible for corneal ulcers were *Pseudomonas aeruginosa*. *Staphylococcus aureus* was the predominant microorganism cultured in patients under 50 years old, while *Pseudomonas aeruginosa* was the most common in patients over 50 years old. Tarsorrhaphy was carried out on 23.6% of the patients. Other surgical procedures were performed on a total of 44.6% of the patients, with tectonic graft and corneal patch graft being the most common surgeries.

Conclusion : This research highlights the significance of trauma as the primary predisposing factor and *Pseudomonas aeruginosa* as the predominant cultured microorganism in adult microbial corneal ulcer cases in Iran. Furthermore, we emphasize the necessity of surgical procedures in cases of bacterial keratitis.



Title: Impact of Mini Scleral and corneal RGP Contact Lenses on Quality of Life in Keratoconus Patients

Abstract ID: 8

Presentation Type: Poster

subject: Cornea & Refractive

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Purpose : To evaluate the effect of mini scleral contact lenses and corneal rigid gas permeable (RGP) keratoconus lenses on the quality of life (QoL) of patients with keratoconus (KCN), using self-reported data from the Contact Lens Impact on Quality of Life (CLIQ) Questionnaire.

Methods : Between January 2023 and May 2023, a total of 124 consecutive keratoconus patients who used either mini scleral or corneal RGP contact lenses were assessed using the CLIQ questionnaire. Demographic and clinical characteristics, including age, sex, visual acuity and keratometric (K) values, were recorded for all participants.

Results : The study population had a mean age of 28.7 ± 7.2 years. Among the participants, 61 were mini scleral lens users. Both groups were comparable in terms of age, sex, and mean K values ($P=0.1$, $P=0.8$, and $P=0.1$, respectively). The mean CLIQperson score was significantly higher in the mini scleral contact lens group (56.7 ± 5.6) compared to the corneal RGP lens group (43.5 ± 6.2 ; $P \leq 0.01$). Additionally, the CLIQperson measure showed a positive correlation with K values and visual acuity. When stratified by visual acuity, eyes with visual acuity of 20/20 to 20/25 had a mean CLIQperson score of 52.12 ± 6.6 , whereas eyes with visual acuity of 20/32 or worse had a mean score of 41.4 ± 5.3 ($P \leq 0.01$).

Conclusion : The findings indicate that mini scleral contact lens users report a higher quality of life compared to users of corneal RGP lenses. This suggests that mini scleral lenses may offer greater satisfaction and comfort for keratoconus patients.



Title: Early clinical outcomes of keratoplasty using donor corneas preserved in Sinasol (Zisol) versus Optisol-GS

Abstract ID: 30

Presentation Type: Poster

subject: Cornea & Refractive

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Purpose : To compare early clinical outcomes of keratoplasty with the use of corneas preserved either in Sinasol (ZiSol) (made by TiamPharma, Tehran, Iran) or Optisol-GS media.

Methods : Fifty-two penetrating keratoplasty (PKP) using 20 donor corneas stored in Optisol-GS and 32 donor corneas stored in ZiSol were performed along with 29 Descemet stripping automated endothelial keratoplasty (DSAEK) using 23 Optisol-GS and 6 ZiSol-stored donor corneas by random assignment. Corrected distance visual acuity (CDVA) and corneal edema grade measurements were made at 1 week, 1 month, 3 months and 6 months post-keratoplasty. Microbial infection and suture related complications during 6 months post-keratoplasty and successful graft attachment at 6 months post-DSAEK were documented. Graft re-epithelialization time after PKP was estimated by the surgeons.

Results : No statistically significant differences in clinical outcomes of keratoplasty using corneas stored in the two media were found during 6 months after transplantation. Final CDVA was comparable in the ZiSol and Optisol-GS groups (0.52 logMAR post-PKP and 0.56 logMAR post-DSAEK in ZiSol group vs. 0.41 post-PKP and 0.63 logMAR post-tDSAEK in Optisol-GS group, $P=0.390$ and $P=0.679$). Postoperative corneal edema grade between the two media groups were not different significantly and graft clarity was observed 92.1 % and 95.3% in ZiSol and Optisol-GS groups, respectively. Complete graft re-epithelialization time was reported 7 days after transplantation almost in the all cases of both groups and was not significantly different (96.9% and 100% in ZiSol and Optisol-GS groups, respectively, $P>0.999$). Although, microbial infection occurred in the two ZiSol-stored corneas (6.3%) post-PKP, but it failed to cause significant difference statistically ($P=0.517$). Suture related complications were similar in ZiSol and Optisol-GS groups (15.6% vs. 15%, respectively, $P>0.999$). Post-DSAEK successful graft complete attachment was observed in the 100% of ZiSol-stored corneas and 87% of Optisol-GS-stored corneas without significant difference ($P>0.999$).

Conclusion : The clinical outcomes of Keratoplasty were comparable at 6 months for donor corneas stored in ZiSol and Optisol-GS.



Title: Evaluating the therapeutic effect of Wharton's jelly-derived mesenchymal stem cells (WJ-MSCs)-derived exosomes in patients with severe dry eye

Abstract ID: 34

Presentation Type: Poster

subject: Cornea & Refractive

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Purpose : Exosomes derived from Wharton's jelly-derived mesenchymal stem cells (WJ-MSCs) have multiple capabilities in various biological fields. The aim of this study was to evaluate the safety and efficacy of exosome eye drops in a 3-month clinical study for the treatment of dry eye disease (DED).

Methods : In this study, we examined 11 patients (22 eyes) with moderate to severe dry eye disease. The patients were administered exosome eye drops every six hours for three months, in addition to their previous medical treatments for dry eye disease. The effectiveness of this method was validated using visual parameters such as uncorrected visual acuity (UCVA), best corrected visual acuity (BCVA) and intraocular pressure (IOP), tear meniscus height (TMH), non-invasive break-up time (niBUT), Schirmer test, Ocular Surface Inflammatory Risk Evaluation (OSIE), redness, meibography and OSDI questionnaire, before and after the three-month of exosome eye drop use

Results : None of the patients showed any side effects during the use of exosome. The mean±SD of niBUT, Schirmer test, and OSDI, changed from 3.74±2.90s to 6.21±2.81s, 5.86±4.62mm to 8.27±3.75mm, and 33.11±14.50 to 23.52±11.59 respectively. Furthermore, the Ocular Surface Inflammatory Risk Evaluation (OSIE), eye redness, and meibography parameters were decreased in all patients. Additionally, there was a significant improvement in TMH

Conclusion : The application of exosomes derived from Wharton's jelly-derived mesenchymal stem cells shows potential in the reduction of dry eye syndrome. It is recommended that further research be conducted to develop a more effective exosome-based ophthalmic treatment



Title: Therapeutic Keratopigmentation: Cosmetic and Functional Outcomes and Complications.

Abstract ID: 46

Presentation Type: Poster

subject: Cornea & Refractive

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Purpose : To assess safety, efficacy and complications of therapeutic femtosecond laser assisted (FA) and manual automated (MA) keratopigmentation (KTP) using micronized mineral pigments.

Methods : KTP was performed in 85 eyes of 85 patients with moderate to severe visual disabilities (range: 20/80 to NLP) related to various etiologies causing corneal scar or iris abnormalities. 36 eyes were treated by FA-KTP, 46 eyes by MA-KTP and 3 eyes using combined MA and FA-KTP. The cosmetic outcome, patient satisfaction, stability of pigmentation, and presence of any related complications are reported. The mean follow-up period was 10.8 months (range: 1-53 months).

Results : 48 males and 37 females were included. The mean age was 37.8 ± 14.25 (range: 14-77). In total, 68 of 85 patients (80%) reported cosmetic satisfaction within the follow-up period. 74% of MA-KTP group (34 out of 46 patients), 86% of FA-KTP group (31 out of 36 patients) and 100% of combined group (3 patients) were satisfied with their cosmetic outcome. 12 eyes of MA-KTP (26%) and 5 eyes of FA-KTP group (14%) required additional KTP procedures due to color fading and cosmetic unsatisfaction. Post-operative symptoms were photophobia (28%), tearing (24%) and pain (8%). Photophobia and tearing were more common in MA-KTP group. Post-operative complications were dry eye (6%), delayed epithelial healing (2%) and microbial keratitis (1%).

Conclusion : FA-KTP and MA-KTP using micronized mineral pigments are safe and efficient surgical techniques for the management of cosmetic and visual disturbances caused by iris abnormalities and cosmetic issues related to corneal scars.



Title: Infectious keratitis following photorefractive keratectomy: A 13-year study at a tertiary center.

Abstract ID: 52

Presentation Type: Poster

subject: Cornea & Refractive

Alireza Attar¹ *

1. *Poostchi Ophthalmology Research Center, Department of Ophthalmology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran*

Purpose : Infectious keratitis is a rare but devastating complication following photorefractive keratectomy (PRK) that may lead to visual impairment. This study assessed the clinical features, treatment strategies, and outcomes of post-PRK infectious keratitis

Methods : This retrospective study was conducted on patients with post-PRK infectious keratitis presenting to Khalili Hospital, Shiraz, Iran, from June 2011 to March 2024. The study was conducted in two stages: the first stage assessed the incidence of post-PRK infectious keratitis among patients who underwent PRK at our center, while the second stage included all patients with post-PRK infectious keratitis, regardless of where their PRK was performed. The following data were collected: demographics, post-surgery presentation time, risk factors, culture results, treatments, follow-up duration, complications, and corrected distance visual acuity (CDVA) at admission and the last follow-up.

Results : Forty-two patients (42 eyes) with a mean age of 28.74 years (male-to-female ratio of 1.2:1) were included. Among 38,938 PRK procedures performed at our center, the incidence of keratitis was estimated to be 0.018%. The odds of keratitis during the COVID-19 pandemic were 7.05 times higher than outside this timeframe. Gram-positive bacteria were the most commonly isolated pathogens in microbiological studies. Early-onset infections were primarily caused by *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Pseudomonas aeruginosa*, whereas fungi and *Acanthamoeba* more frequently caused late-onset infections. All patients received broad-spectrum antibiotic therapy, followed by adjusted treatment based on microbial results. Cases developing endophthalmitis and those not responding to treatment or having non-resolving corneal scars required further interventions, such as penetrating keratoplasty and deep vitrectomy. The mean follow-up duration was 40.81 months, and 97.6% of cases experienced CDVA improvement at follow-up.

Conclusion : This long-term study found a post-PRK keratitis rate of 0.018%, with gram-positive bacteria as the most common pathogens. Prompt management and regular follow-up assessments are essential for achieving satisfactory outcomes.



Title: Trends in macular and optic nerve head vessel density following myopic photorefractive keratectomy

Abstract ID: 53

Presentation Type: Poster

subject: Cornea & Refractive

Alireza Attar¹ *

1. *Poostchi Ophthalmology Research Center, Department of Ophthalmology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran*

Purpose : We aimed to apply Optical Coherence Tomography Angiography (OCTA) to comprehensively assess changes in the optic nerve head (ONH) and macular perfusion before and after the myopic photorefractive keratectomy (PRK).

Methods : A total of 26 myopic patients eligible for PRK were included based on specific criteria, with meticulous exclusion criteria in place to minimize potential confounders. Participants underwent OCTA assessments of the ONH and macula using the Spectralis OCT (Heidelberg) before, as well as at 1 and 3 months after PRK. MATLAB software was utilized for image analysis.

Results : The average age at the time of surgery was 31.3 ± 5.82 years with 26.9% of participants being male. The mean intraocular pressure before the surgery was 15.84 ± 2.46 mmHg. Significant alterations were observed in macular vessel density, emphasizing regional variations in vascular response. Regarding Large vessel density (LVD), there was a significant decrease in Superficial Vascular Complex (SVC) (from 24.21% to 18.67%, $P=0.011$) and deep vascular complex (DVC) (from 26.93% to 21.81, $P=0.003$) between before surgery and 3 months later. Similarly, in Capillary Vessel Density (CVD), significant changes were observed between before surgery and 3 months later in SVC (from 18.22% to 21.16%, $P=0.004$) and DVC (from 16.89% to 21.44%, $P=0.002$). In comparison to the macula, vascular densities were more stable overtime in optic nerve head. In both LVD and CVD, only DVC had significant decrease between before surgery and 3 months after ($P=0.008$, and 0.038 respectively).

Conclusion : While PRK appears to maintain the integrity of certain ocular structures, alterations in macular and optic nerve head perfusion post-PRK suggest potential effects on retinal blood supply. Long-term monitoring is crucial to understand the implications of these changes, particularly in the context of conditions such as diabetes



Title: Comparative Analysis of Anterior Segment Measurements: A Study Between IOLMaster 700 and Sirius Devices

Abstract ID: 56

Presentation Type: Poster

subject: Cornea & Refractive

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2. *Shahid Beheshti University Of Medical Sciences*

Purpose : To evaluate the agreement between the IOLMaster 700 swept-source optical coherence tomography (SS-OCT) biometer and the Sirius Scheimpflug-Placido topographer for measuring anterior segment parameters in healthy eyes

Methods : In this prospective study, 112 healthy eyes of 112 patients underwent anterior segment measurements using both the IOLMaster 700 and Sirius devices. Central corneal thickness (CCT), anterior chamber depth (ACD), keratometry readings (K1, K2, and average), white-to-white (WTW) distance, and cylinder measurements were compared between the two devices. Agreement was assessed using paired t-tests and Bland-Altman analyses.

Results : No significant differences were found between the two devices for CCT, ACD, average keratometry, K2, and cylinder measurements ($p > 0.05$). However, the IOLMaster 700 provided significantly lower K1 values at the 3mm zone compared to the Sirius (mean difference: -0.14 ± 0.51 D; $p = 0.005$) and yielded significantly smaller WTW measurements compared to the Sirius horizontal visible iris diameter (HVID) (mean difference: -0.11 ± 0.48 mm; $p = 0.018$).

Conclusion : The IOLMaster 700 and Sirius devices demonstrate good overall agreement for most anterior segment parameters in healthy eyes, except for K1 measurements at the 3mm zone and WTW values. Clinicians should be aware of these differences when using the devices interchangeably in clinical practice.



Title: Dry Eye Signs and Ocular Surface Changes After Sleeve Gastrectomy

Abstract ID: 61

Presentation Type: Poster

subject: Cornea & Refractive

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1. *Baghiatollah University of Medical Sciences, Tehran, Islamic Republic of Iran*
2. *Shahid Beheshti University Of Medical Sciences*

Purpose : This study aimed to assess ocular surface health in patients undergoing sleeve gastrectomy, focusing on the incidence of dry eye symptoms, ocular surface health indices, and related parameters preoperatively and at one and three months postoperatively.

Methods : Thirty-three patients (84.8% female, mean age 39.94 ± 10.70 years) were included. Preoperative medical history revealed that 6.1% had diabetes, 21.2% had hypertension, and 15.2% had prior contact lens use; none were smokers. Ocular assessments included tear break-up time (TBUT), Schirmer test scores, corneal staining, and the Ocular Surface Disease Index (OSDI).

Results : Postoperative TBUT analysis showed a significant increase in dry eye signs in the left eye, with 90.9% of patients experiencing symptoms at three months, up from 51.5% preoperatively ($p < 0.001$). TBUT prevalence rose from 48.5% preoperatively to 87.9% at three months ($p < 0.001$). Schirmer test scores followed a similar trend, with 93.9% of patients in the left eye and 90.9% in the right eye showing dry eye disease three months post-surgery, compared to 66.7% and 69.7% preoperatively, respectively. Tear meniscus height (TMH) scores did not significantly change in the left eye ($p = 0.086$), but did show significant changes in the right eye ($p = 0.016$). Corneal staining increased substantially from 24.2% pre-surgery to over 60% at three months postoperatively ($p < 0.001$ for both eyes). Pre-surgery, 42.4% of patients were symptom-free but developed symptoms postsurgery, while only one patient (3%) with preoperative symptoms experienced resolution. This difference was significant ($p = 0.001$). OSDI scores also worsened, from a mean of 1.62 preoperatively to 2.45 at three months ($p < 0.001$).

Conclusion : Sleeve gastrectomy is associated with a significant increase in dry eye disease and ocular surface changes over three months. These findings suggest a need for close monitoring and possible preventive measures for ocular health in patients undergoing this procedure, as notable increases in ocular discomfort and tear film instability were observed postoperatively.



Title: Evaluation of the Relationship Between COVID-19 Severity and Dry Eye Disease in SARS-CoV-2 Infected Patients

Abstract ID: 62

Presentation Type: Poster

subject: Cornea & Refractive

Seyed Hashem Daryabari¹ *, Seyyed Morteza Hosseini Imeni²

1. *Baghiatollah University of Medical Sciences, Tehran, Islamic Republic of Iran*
2. *Shahid Beheshti University Of Medical Sciences*

Purpose : This cross-sectional study investigates the occurrence and severity of dry eye disease (DED) among individuals who have previously contracted COVID-19.

Methods : The study involved 76 participants who had recovered from COVID-19. Both subjective and objective assessments, including the Ocular Surface Disease Index (OSDI) questionnaire, tear break-up time (TBUT), Schirmer test, and corneal staining, were utilized to evaluate the presence of DED.

Results : The participants, with a mean age of 54.55 ± 10.61 years, exhibited a significant incidence of DED postCOVID-19, with a considerable number showing moderate to severe symptoms. The study found that individuals with a history of ICU admission and those who underwent oxygen therapy or non-invasive ventilation were at a higher risk of developing DED.

Conclusion : COVID-19 may serve as a contributing factor to the development of DED, especially in those who experienced moderate to severe illness. Additional research is necessary to understand the mechanisms underlying this connection and to develop effective strategies for the prevention and treatment of DED in patients recovering from COVID- 19.



Title: Designing, fabrication, and characterization of a bilayer wound dressing made from decellularized amniotic membrane coated with emulsion based PCU Silk electrospun for Drug delivery and cornea tissue engineering

Abstract ID: 78

Presentation Type: Poster

subject: Cornea & Refractive

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Purpose : Effective communication between immune and corneal epithelial-forming cells is crucial for successfully healing chemical corneal defects. In this study, for the first time, we fabricated an emulsion-based (EM) electrospun core-shell mat using Betamethasone Dipropionate (BD) loaded polycarbonate urethane-Silk (EM) as a system for inducing M1/M2 polarization in macrophages and promoting corneal epithelial regeneration, both in vitro and in vivo.

Methods : In this study, BD-loaded EM solution was electrospun directly onto a decellularized human amniotic membrane (AM) to engineer an ultrathin bilayer membrane (AM/EM) and conducted a comprehensive characterization of its biomechanical properties, and biocompatibility. In vitro, we examined the influence of the BD-loaded AM/EM on the polarization of macrophages through nitric oxide assays, phagocytosis tests, and real-time polymerase chain reaction (PCR). For in vivo assessment, we utilized histological evaluations, and real-time PCR to determine the impact of the BD-loaded AM/EM on cornea regeneration in a chemical corneal burn defect model.

Results : The culture of macrophages on the BD-loaded AM/EM led to increased production of IL-10, upregulation of CD206, Arg1 gene expression, and enhanced phagocytic capacity for apoptotic thymocytes. Concurrently, it reduced the secretion of TNF- α and nitric oxide (NO), downregulated the expression of CD86, and NOS2 genes, and decreased macrophage phagocytosis of yeast. These results indicated the polarization of macrophages toward an M2-like phenotype. In vivo, the presence of the BD-loaded AM/EM resulted in enhanced cornea recapitalization at the defect site, as compared to the control defect. Additionally, various inflammatory factors, including IL-1 β , IL-10, TNF-alpha, MMP9, VEGF, and COL1A2 were investigated through quantitative real-time RT-PCR. AM/EM 6%BD group showed histologically alleviated signs of corneal inflammation and regeneration compared with another group, which decreased IL-1 β , TNF-alpha, and MMP9 expression. Notably, AM/EM 6%BD treatment significantly suppressed neovascularization and enhanced the anti-inflammatory function of BD during the acute phase of ocular inflammation.

Conclusion : In conclusion, this immunomodulatory effect, coupled with its biocompatibility and biomechanical properties resembling natural cornea, positions the BD-loaded AM/EM as an attractive candidate for further exploration in the field of cornea tissue engineering and regenerative medicine.



Title: Evaluation of Pilocarpine Eye Drops at Various Concentrations for Presbyopia Management: A Comparative Study and A Brief Review of Treatment Options "

Abstract ID: 96

Presentation Type: Poster

subject: Cornea & Refractive

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Purpose : This study evaluated the efficacy and safety of pilocarpine eye drops at 1%, 1.25%, and 1.5% concentrations for managing presbyopia. Key outcomes included uncorrected near visual acuity (UNVA), near point of accommodation (NPA), intraocular pressure (IOP), and contrast sensitivity.

Methods : A randomized, double-masked trial involved 200 participants (aged 40+) divided into four groups: pilocarpine 1%, 1.25%, 1.5%, and a control. Drops were administered twice daily for 30 days. Visual acuity was assessed with a Snellen near chart, and secondary measures included NPA (cm), IOP (mmHg), and contrast sensitivity (%). Data were analyzed using ANCOVA and repeated measures analysis.

Results : Significant improvements in near visual acuity were observed in all pilocarpine groups, with 1.5% showing the largest gains ($p < 0.001$). NPA improved substantially across all treatment groups. IOP was notably reduced in the 1% group, while higher concentrations showed stable IOP. Contrast sensitivity also improved significantly in all pilocarpine-treated groups compared to control.

Conclusion : Pilocarpine, especially at 1.5%, proved effective for presbyopia management, enhancing UNVA and contrast sensitivity without significant IOP elevation. These findings suggest pilocarpine is a promising pharmacological alternative for non-invasive presbyopia correction. Further research is needed to optimize long-term use and evaluate broader applicability.



Title: Personalized Keratoconus Treatment Through AI-Driven 3D Lenticule Optimization

Abstract ID: 100

Presentation Type: Poster

subject: Cornea & Refractive

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3. *Translational Ophthalmology Research Center, Tehran University of Medical Sciences, Tehran, Iran*

Purpose : Keratoconus, a progressive corneal ectasia, poses significant challenges in vision restoration due to its highly individualized presentation. Traditional treatment approaches, including fixed-shape stromal lenticules, often fail to adequately address the unique topography and biomechanical properties of the cornea. This project aims to overcome these limitations by developing a 3D application powered by AI and advanced Pentacam indices. The tool is designed to assist ophthalmologists in predicting and customizing stromal lenticules tailored to each patient's specific corneal profile, optimizing visual and structural outcomes.

Methods : Keratoconus, a progressive corneal ectasia, poses significant challenges in vision restoration due to its highly individualized presentation. Traditional treatment approaches, including fixed-shape stromal lenticules, often fail to adequately address the unique topography and biomechanical properties of the cornea. This project aims to overcome these limitations by developing a 3D application powered by AI and advanced Pentacam indices. The tool is designed to assist ophthalmologists in predicting and customizing stromal lenticules tailored to each patient's specific corneal profile, optimizing visual and structural outcomes.

Results : Preliminary evaluations demonstrate the application's potential to improve preoperative planning by offering data-driven lenticule customization. The integration of predictive analytics with interactive 3D modeling provides a more individualized approach, surpassing traditional fixed-shape lenticule methods.

Conclusion : This innovative AI-driven approach presents a transformative tool for keratoconus management, enhancing both surgical precision and visual outcomes. Ongoing refinement of the model, incorporating additional imaging and genetic data, aims to further personalize and optimize treatment strategies.



Title: The COVID-19 pandemic and the abrupt changes in the reported cases of Acute Acquired Comitant Esotropia

Abstract ID: 28

Presentation Type: Poster

subject: Strabismus/ Neuro-Ophthalmology

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1. *Poostchi Ophthalmology Research Center, Department of Ophthalmology, Shiraz Medical School, Shiraz University of Sciences, Shiraz, Iran*

Purpose : Purpose: To report the changes in the Acute Acquired Comitant Esotropia (AACE) cases before and after the COVID-19 era. Design: Retrospective

Methods : Methods: Records of all patients diagnosed with AACE from 2016 to 2023 were gathered. The AACE ratio was calculated as the number of operated AACE cases divided by the total number of operated esotropia cases. The total number of AACE cases and AACE ratio for each year were reported. Patients were categorized by age into two groups: Group A (≤ 12 years) and Group B (>12 years), and their demographic characteristics were compared.

Results : Results: A total number of 160 AACE cases, including 118 male individuals, were identified. We observed a slow-increasing pattern in the total number of AACE and the AACE ratio since 2016 that sharply increased with the beginning of the COVID-19 era in 2020. Interestingly, both the total number and the AACE ratio decreased after emerging from the COVID-19 lockdown years. Over 89% of our participants fell into Group A. Hyperopia was more common among Group A cases, whereas myopia was more frequently seen in Group B (p-value <0.001). Esotropia was larger, and diplopia was less frequently recorded in Group A compared to Group B (p-values < 0.001).

Conclusion : Conclusions: Despite the worldwide increasing trend of AACE cases, the total number of cases spiked noticeably in 2020, followed by a decrease after the COVID-19 lockdown period. This suggests a potential link between lifestyle changes during lockdown years, physical and psychosocial stress induced by COVID-19, and the occurrence of AACE.
Keywords: Esotropia, Acute Acquired Comitant Esotropia, COVID-19, Strabismus



Title: Y-split recession of lateral rectus with and without medial rectus recession in the management of exotropic Duane retraction syndrome with significant overshoot and retraction

Abstract ID: 93

Presentation Type: Poster

subject: Strabismus/ Neuro-Ophthalmology

Hadi Farvardin¹ , Hajar Farvardin¹ , Majid Farvardin¹ *, Fatemeh Safari¹ , Farima Safari¹

1. *Poostchi Ophthalmology Research Center, Department of Ophthalmology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran.*

Purpose : To compare the effectiveness of two surgical approaches in the management of exotropic Duane retraction syndrome (DRS) cases with significant overshoot and retraction.

Methods : A retrospective analysis was conducted on patients with exotropic DRS who experienced significant overshoot and globe retraction. Patients with incomplete medical records or previous strabismus surgery were excluded. Overshoot and retraction were graded on a scale of 1 to 3. Surgical outcomes were assessed based on exotropia correction, head turn correction, leash correction, and globe retraction correction.

Results : Twenty-one patients with unilateral type III exotropic DRS were included in the study. The Y-split recession of the lateral rectus muscle (LR) group comprised 13 patients who underwent Y-split recession of the LR alone and the Y-split recession of LR + ipsilateral MR recession group consisted of 8 patients who underwent Y-split LR recession combined with medial rectus (MR) recession. The average of exotropia and head turn correction was higher in the Y-split recession of LR group (15.76 prism diopters [PD], 18.46°) compared with the Y-split recession of LR + ipsilateral MR recession group (11.12 PD, 12.12°). On the other hand, the Y-split recession of the LR + ipsilateral MR recession group exhibited higher mean correction grades for leash and retraction (2.63 and 2.5, respectively) compared to the Y-split recession of LR group (2.31 and 1.92, respectively).

Conclusion : Both surgical approaches showed promising results in managing exotropic DRS cases with significant overshoot and retraction. Y-split LR recession combined with MR recession could possibly be a better surgical option in cases where severe retraction and overshoot are the main issues. Further investigations with larger sample sizes are necessary to validate these findings and determine the optimal surgical approach.



Title: Optimizing Extracellular Vesicle Therapy for Retinal Ganglion Cell Protection Following Optic Nerve Injury

Abstract ID: 44

Presentation Type: Poster

subject: Visual Neuroscience

Leila Satarian¹ *

1. *Department of Stem Cells and Developmental Biology, Cell Science Research Center, Royan Institute for Stem Cell Biology and Technology, ACECR, Tehran, Iran.*

Purpose : Extracellular vesicles (EVs) derived from various mesenchymal stromal cells (MSCs) show significant potential for protecting retinal ganglion cells (RGCs). However, the effective source of MSC-derived EVs and EV subpopulation for nerve regeneration still need more study.

Methods : The EVs derived from various sources of MSCs including human clonal bone marrow (cBM), dental pulp (DP), and trabecular meshwork (TM). MSC-EVs were isolated through high-speed (20K) and ultracentrifugation (110K) methods. The functionality of the EVs were then assessed in mouse model with optic nerve crush (ONC) injury.

Results : All ultracentrifuged MSC-EVs improved the optomotor response. The TM-EVs exhibited a lower survival rate for Brn3a-positive RGCs. Due to the compliance with GMP standards of clonal MSC-EVs, we proceeded with these EVs. Retrograde tracing of RGCs and visual behavior indicated that both 20K and 110K subpopulations of cBM-EVs were effective. Anti-apoptotic indicators, the p-AKT/AKT and p-PI3K/PI3K ratios were upregulated after cBM-EV-20K in the retina and optic nerve. Furthermore, procaspase and caspase levels, the apoptotic markers were reduced in EV-treated animals.

Conclusion : Increased restoration of visual behavior and the levels of p-AKT/AKT and p-PI3K/PI3K ratios through cBM-EV-20K may be responsible for the degenerating RGCs protection afforded by multi-trophic factors within EVs. This could be a significant advancement towards potentially employing cBM-EVs in the healing of injured optic nerves.



Title: Ensemble-Based Augmentation AI Framework for Enhanced Glaucoma Detection Using Deep Learning Models

Abstract ID: 23

Presentation Type: Poster

subject: Glaucoma

Zahra Fathollahi¹ *

1. *Novin Pars emerging intelligent health technologies, Shiraz, Iran.*

Purpose : Glaucoma is a leading cause of irreversible blindness, particularly in adults over 40. Early detection is crucial to prevent vision loss; however, manual screening methods are time-intensive and require trained specialists. Automated diagnostic systems powered by artificial intelligence (AI) offer a promising alternative. This study introduces an AI-based system for glaucoma detection using fundus images to improve diagnostic accuracy and efficiency.

Methods : The system incorporates advanced preprocessing and ensemble learning techniques. Preprocessing steps, including contrast enhancement, brightness balancing, and noise reduction, were applied to improve image quality. The optic nerve head (ONH) region, comprising the optic cup and disc, was segmented and cropped to highlight critical features such as the cup-to-disc ratio (CDR), retinal nerve fiber layer (RNFL) thinning, and optic disc notching, key indicators of glaucoma. An ensemble of three deep learning models with complementary strengths was used. The models classified fundus images as No Referable Glaucoma (NRG) or Referable Glaucoma (RG), with performance assessed using accuracy, sensitivity, specificity, and area under the receiver operating characteristic curve (AUROC).

Results : The system demonstrated strong performance in detecting glaucoma: Training Datasets • SMDG Dataset (12,316 images: 7,549 NRG, 4,767 RG): Accuracy of 91.3%, sensitivity of 87.2%, specificity of 93.4%, and AUROC of 0.97. • JUSTRAIG Dataset (7,895 images: 4,750 NRG, 3,145 RG): Accuracy of 90.9%, sensitivity of 87.1%, specificity of 92.8%, and AUROC of 0.96. External Validation Datasets • EyePACS Light (8,000 images: 4,000 NRG, 4,000 RG): Accuracy of 86.3%, sensitivity of 86.2%, and specificity of 86.5%. • GAMMA (66 images: 43 NRG, 23 RG): Accuracy of 93.9%, sensitivity of 95.6%, and specificity of 93.0%.

Conclusion : This AI-based system effectively identifies glaucomatous changes in fundus images, demonstrating high sensitivity and specificity. Automating the screening process reduces the workload for ophthalmologists and enables early diagnosis, particularly in resource-limited settings. Its robust performance across diverse datasets underscores its potential for clinical integration, helping prevent vision loss and improve outcomes.



Title: Ocular Biometric and Corneal Biomechanical Changes Following Ahmed Glaucoma Valve Implantation in Neovascular Glaucoma

Abstract ID: 50

Presentation Type: Poster

subject: Glaucoma

Alireza Attar¹ *

1. *Poostchi Ophthalmology Research Center, Department of Ophthalmology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran*

Purpose : To evaluate the impact of Ahmed glaucoma valve (AGV) implantation on ocular biometric and corneal biomechanical parameters in neovascular glaucoma (NVG) patients.

Methods : This prospective study included 18 eyes of 18 NVG patients undergoing AGV implantation. Biometrical parameters, including anterior chamber depth(ACD), axial length(AL) and keratometric values in addition to corneal biomechanical indices(deformation amplitude, peak distance, applanation lengths and velocities) , were assessed preoperatively and three months postoperatively. Statistical analysis evaluated changes and correlations between parameters

Results : The mean age of the subjects was 57.44 (± 10.325). The mean preoperative IOP was 36.65(± 12.3) mmHg, which was reduced to 15.5(± 2.64) mmHg post-operatively (p value < 0.001). Axial length (AL) decreases from 23.42 ± 0.76 to 23.21 ± 0.76 (P < 0.001). Postoperatively, although corneal Keratometry and central corneal thickness significantly decreased (p value $< .001$), anterior chamber depth showed an increase in amount, which was significant (p value=.037). The Peak distance increased from 3.33 ± 0.72 mm preoperatively to 3.66 ± 0.78 mm, postoperatively, (p =0.004) and deformation amplitude also increased from 0.58 ± 0.18 mm to 0.72 ± 0.22 mm (P =0.001). No significant change in preoperative measures of applanation length 1, applanation length 2, applanation velocity 1, and applanation velocity 2 with the amount of these variables postoperatively (All P-values > 0.05).

Conclusion : AGV implantation induces significant ocular biometric and corneal biomechanical changes in NVG patients. Understanding these alterations is vital for optimizing treatment strategies and clinical outcomes in NVG management.



Title: Antibacterial effect of new phage for treatment of Pseudomonas aeruginosa Keratitis in an animal model

Abstract ID: 73

Presentation Type: Poster

subject: Immunology/Microbiology

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3. *Shahid Beheshti University Of Medical Sciences*

Purpose : Pseudomonas aeruginosa is one of the common bacterial agents in keratitis and is resistant to drugs. Due to the difference in the mechanism of action of antibacterial compounds, phage therapy can be a therapeutic candidate to deal with drug-resistant infections.

Methods : The purpose of this study is to isolate, identify, and investigate the antimicrobial ability of a phage sample to treat keratitis caused by P. aeruginosa. The isolated phage belongs to the Straboviridae family and the Caudoviricetes order.

Results : The anti-biofilm effect of phage was observed on clinical isolates. IC₅₀ of phage (on human corneal epithelial cell) were determined as 10⁻¹. The synergistic effect of ciprofloxacin and phage in the form of eye drops was observed in the improvement of keratitis caused by P. aeruginosa.

Conclusion : The results obtained in this study indicated that phage can be effective in controlling bacterial keratitis infection. However, combined antibiotic and phage treatment have a synergistic effect



Title: COMPARISON OF TOPICALLY ADMINISTERED BEVACIZUMAB AND PROPRANOLOL IN TREATMENT OF CORNEAL NEOVASCULARIZATION IN RABBITS

Abstract ID: 11

Presentation Type: Poster

subject: Physiology/Pharmacology

Hesam Hedayati gudarzi¹ *

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Purpose : Objective: To compare the effect of topical bevacizumab with topical propranolol for treatment of the corneal neovascularization (CNV) in a rabbit model of corneal injury.

Methods : Methods: Corneal neovascularization was induced by 3 sutures of the cornea in 30 rabbits (30 corneas). Two weeks after neovascularization all sutures were removed then rabbits were randomly divided into 3 groups: Group 1 received topical propranolol (10 mg/mL), group 2 received topical bevacizumab (10 mg/mL), and group 3 received only topical normal saline drops as the control group, in the right eye three times a day for two weeks. Photographs of CNV were obtained before drug administration and at 1 and 2 weeks after intervention. The images were analyzed using the NIH ImageJ software (version 1.37c).

Results : Results: The mean percentage of CNV area was considered as 100 % before the treatment. At the 1-week and, 2 week intervals post treatment the mean percentage of CNV area in Propranolol, Bevacizumab and saline groups were 78.01 ± 4.16 , 75.64 ± 4.32 and 93.33 ± 4.57 and 65.72 ± 4.15 , 61.45 ± 6.18 and 84.96 ± 5.21 , respectively. After one and two weeks treatment, the neovascularization area in Propranolol and Bevacizumab groups was regressed more than saline group significantly ($P < 0.0001$). But there was no significant difference between Propranolol and Bevacizumab groups ($P = 0.315$, $P = 0.123$).

Conclusion : Conclusion: Topical administration of propranolol reduces corneal neovascularization in the short term, as topical bevacizumab does but the efficacy of long term treatment needs more investigations. key Words: Corneal Neovascularization, Propranolol, Bevacizumab, Topical



Title: Evaluation of a Modified Sutureless Technique for Scleral Fixation of One-Piece Posterior Chamber Intraocular Lens: A Retrospective Study

Abstract ID: 49

Presentation Type: Poster

subject: Physiology/Pharmacology

Alireza Attar¹ *

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Purpose : This study presents the one-year outcomes of a modified technique for transscleral suture fixation of a posterior chamber intraocular lens (PCIOL) in aphakic eyes.

Methods : A retrospective chart review was conducted on 45 patients who underwent transscleral suture fixation of a foldable one-piece PCIOL through scleral pockets. Preoperative data and follow-up data for a minimum of 12 months were collected for all patients.

Results : The mean preoperative and postoperative uncorrected distance visual acuity (UDVA) in LogMAR was 0.54 ± 0.25 and 2.49 ± 0.54 , respectively ($P < 0.01$). The mean preoperative and postoperative best-corrected visual acuity (BCVA) in LogMAR was 0.45 ± 0.24 and 0.52 ± 0.22 , respectively ($P < 0.01$). The mean endothelial cell loss was 110.46 ± 11.5 cells/mm². Postoperative complications included transient corneal edema (17.7%), transient elevated intraocular pressure (22.2%), and non-significant vitreous hemorrhage (11.1%). No severe complications were observed.

Conclusion : The modified technique provides stable PCIOL placement in aphakic eyes with long-term follow-up.



Title: Tomographic optical-angiographic imaging changes following treatment of patients with diabetic retinopathy

Abstract ID: 9

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Diabetic Retinopathy is one of the most common causes of vision loss in working age group. While the widely accepted treatment for proliferative diabetic retinopathy and diabetic macular edema are panretinal photocoagulation (PRP) and intravitreal anti vascular endothelial growth factor (Anti-VEGF) injections, they may induce undesired complications. In this randomized clinical trial, we compared different treatment modalities in terms of clinical and anatomical changes.

Methods : This study is a double-blinded randomized clinical trial conducted on 90 patients with proliferative diabetic retinopathy and diabetic macular edema referred to the Kermanshah University of Medical Sciences ophthalmology department from March 2020 to March 2022. The patients were randomly assigned to one of three therapeutic intervention groups: A: Pan Retinal Photocoagulation (PRP) treatment with full-dose 1500 laser spots alongside monthly Intravitreal Bevacizumab (IVB) injection. B: PRP treatment with half-dose 750 laser spots alongside bimonthly IVB injection. C: PRP treatment with half-dose 750 laser spots alongside bimonthly Intravitreal Triamcinolone (IVT) injections and IVB injections. Patients were compared through changes in best corrected visual acuity (BCVA), optical coherence tomography (OCT) and OCT angiography (OCTA) changes at baseline and 3-month and 6-month follow up visits.

Results : in all groups the best corrected visual acuity (BCVA), central macular thickness (CMT), and OCTA parameters including foveal avascular zone (FAZ), flow area, macular vascular density, and optic nerve head vascular density improved clinically and statistically significant (P value < 0.05) in the 3- and 6-month follow up visits. While the parameters did not show statistically significant difference at the baseline between groups, but at the 3- and 6-month follow up visits the central macular thickness (CMT) was statistically better in the IVB/TA group compared the other 2 groups. Other parameters including BCVA and OCTA parameters did not show statistically significant difference in groups 2 and 3 compared to the first group.

Conclusion : This study showed that in combination therapy, halving the treatment dose could be noninferior to the standard treatment but adding IVTA did not improve the results significantly.



Title: Identifying Key Genes in Primary and Secondary Angiogenesis of Diabetic Retinopathy: A Network-Based Approach to Uncover Alternative Angiogenic Pathways.

Abstract ID: 13

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Diabetes mellitus is a complex and chronic disease that significantly impacts various organ systems, with diabetic retinopathy (DR) being one of its most serious complications. DR is characterized by pathological alterations in the retinal vasculature, including the development of fragile, abnormal blood vessel branches, which may lead to severe retinal damage and vision loss. As a leading cause of blindness, DR is a critical public health concern and often precipitates other ocular complications. The progression of DR involves multiple interconnected biological processes, including inflammation and angiogenesis. However, a comprehensive understanding of the molecular and protein pathways contributing to DR is still lacking. To address this gap, our study focused on constructing and analyzing a protein interaction and co-expression network with the goal of identifying pivotal genes and pathways implicated in the disease

Methods : In this study, we utilized a variety of databases, including the STRING and DISGENET databases, to collect comprehensive data on gene interactions and associations. We employed the Cytoscape program, which is essential for constructing both physical and co-expression networks. This methodology enhances our understanding of the intricate relationships between genes and their roles in biological processes. Furthermore, we focused on the PI3K/AKT/mTOR signaling pathway as a key angiogenic pathway in diabetic retinopathy (DR) by applying k-means clustering algorithms.

Results : Our research identified FN1, CXCL2, CCNL1, and TGF4 as significant candidate genes that may play a crucial role in angiogenesis related to diabetic retinopathy (DR).

Conclusion : These findings provide important insights into alternative angiogenic pathways, highlighting the complexity of the mechanisms involved in diabetic retinopathy. By understanding these pathways, we may be able to develop targeted therapeutic interventions that specifically address the underlying processes of angiogenesis in this condition, potentially improving treatment outcomes for patients suffering from diabetic retinopathy.



Title: Exploring the Genotypic Differences Between Diabetic and Non-Diabetic Human Retinal Pigment Epithelial Cells

Abstract ID: 20

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Investigating genotypic alterations in human retinal pigment epithelium (hRPE) can offer valuable insights into mechanisms underlying diabetic retinopathy (DR) and opens a therapeutic avenue for future treatment of DR. This study is the first investigation into the genotypic profile of diabetic hRPE cells.

Methods : Human donor eye globes were provided from Central Eye Bank of Iran and categorized into five groups including proliferative DR (PDR), moderate to severe non-proliferative DR (NPDR), mild NPDR, patients with diabetic mellitus without DR, and a healthy control group. Each group included three eye samples. Total RNA was extracted from hRPE cells and real-time RT-PCR was performed to evaluate the relative expression of eight reference genes (ABCA4, ABCA2, C3AR, C5AR, EIF5A, NOX4, XBP1).

Results : NOX4 showed highest expression in PDR cases which was significantly different from healthy controls ($p=0.005$), patients with DM without DR ($p=0.023$), and mild NPDR cases ($p=0.001$). Additionally, samples with moderate to severe NPDR exhibited significantly higher expression compared to mild NPDR ($p=0.017$). The highest level of ABCA4 was also observed in PDR cases, exhibiting significant differences from moderate to severe NPDR cases ($p=0.021$) and healthy controls ($p=0.006$). Regarding XBP1 the highest level was detected in PDR cases, which was significantly higher than healthy controls ($p=0.024$). Our analysis revealed no significant differences in the expression levels of C3aR, C5aR SLC2A1, ABCA2, and EIF5A levels across the five groups.

Conclusion : This report underscores the vital roles of oxidative stress, lipid metabolism, and ER stress in the development of DR, as demonstrated by higher expression of NOX4, ABCA4, and XBP1 in more advanced stages. Results of this study enhance our understanding of the pathological processes involved in DR. Additional in-depth studies on the mechanisms underlying RPE injury may offer new insights into the pathogenesis of DR and guide strategies for effective treatment.



Title: Detecting Diabetic Retinopathy from Fundus Images Using Artificial Intelligence

Abstract ID: 27

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Diabetic retinopathy (DR) is a major cause of vision impairment worldwide, affecting nearly 4 million individuals as of 2022. Early detection of DR is crucial to prevent irreversible vision loss. However, traditional manual screening methods are time-consuming and limited by the number of available ophthalmologists. Automated diagnostic systems leveraging artificial intelligence (AI) have shown promise in addressing these limitations. In this study, we present an AI-based system for detecting DR in fundus images, which aims to enhance diagnostic accuracy while reducing the workload for healthcare professionals.

Methods : Two publicly available datasets including the Kaggle EyePACS and the Messidor-2 were used. Fundus images were first pre-processed then the retinal region was cropped, and the images were resized to 224×224 pixels for consistency with major deep learning architectures. An ensemble learning model was developed to integrate multiple convolutional neural networks (CNNs) architectures using a soft voting for detecting DR. The system classified cases into two categories: No Diabetic Retinopathy (No DR) and more-than-mild Diabetic Retinopathy (mtmDR). Performance was assessed based on accuracy, sensitivity, specificity, and the area under the receiver operating characteristic (AUROC) curve.

Results : The Messidor-2 and EyePACS datasets included 1,748 and 88,702 fundus images, respectively. Based on the Messidor-2 dataset, the developed AI system achieved an accuracy of 90.2%, with a sensitivity of 89.7%, a specificity of 90.4%, and an AUROC score of 0.97. On the EyePACS dataset, the system demonstrated an accuracy of 86.1%, a sensitivity of 80.4%, a specificity of 90.1%, and an AUROC of 0.92. Misclassifications were from moderate stage which 24.7% patients in this group classified as no DR, while mistakes for severe and proliferative DR cases were 2.29% and 2.83% respectively. When compared to previous methods, the model showed competitive performance.

Conclusion : The proposed AI-based system has demonstrated strong performance in detecting DR, showing high sensitivity and specificity across datasets. Unlike traditional diagnostic tools, this system functions autonomously, reducing the need for intervention by ophthalmologists. This advancement has the potential to enhance the efficiency of DR screening, especially in resource-limited areas, and to alleviate the workload on healthcare professionals.



Title: Comparison of the combined internal limiting membrane peeling and macular detachment technique with the internal limiting membrane peeling and inverted flap surgical technique in the treatment of large macular holes

Abstract ID: 36

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : To contrast the functional and anatomical results of using Macular Detachment with radial retinotomies and subretinal BSS injection, combined with inverted Internal Limiting Membrane (ILM) peeling and flap, (MD+iILM peeling) with the surgical approach of only ILM peeling and inverted flap (iILM peeling) for treating large, first-time Macular Holes (MHs).

Methods : After receiving ethical approvals, this clinical trial was conducted on patients who had a macular size larger than 400 microns and had not received treatment before. Patients were randomly assigned to two groups: pars plana vitrectomy (PPV) with ILM peeling and inverted flap (iILM) technique and PPV with combined iILM and macular detachment (MD) technique. Visual acuity and success rate of MH closure were compared between the two groups before and after the surgeries.

Results : 16 patients were randomly assigned to the iILM and 14 patients to the MD+iILM groups. The success rate of MH closure in iILM and MD+iILM groups were respectively 0.87% and 100% but it was not significant. The visual acuity was improved in both groups significantly on basis LogMAR (from 0.994 to 0.837 in iILM group and from 1.093 to .714 in MD+iILM group, P value< 0.05). there was no major complications during or after the surgery, aside from the development of some cataracts.

Conclusion : The new MD+iILM surgical method was as successful as the previous iILM surgical method which was considered the gold standard to treat MHs. This surgical approach with a high anatomical and functional success rate can be considered as a good treatment method in large macular holes surgeries.



Title: Correlation of retinal nerve fiber layer thickness (RNFL) and arterial blood gas profile with visual outcome in methanol induced optic neuropathy: a retrospective analysis with 12- month follow-up

Abstract ID: 48

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Methanol-induced optic neuropathy (MTON) poses a serious threat with notable mortality and enduring visual complications. This study aimed to uncover the correlation between paraclinical findings, imaging modalities, and visual prognosis in acute methanol poisoning survivors. The objective was to contribute to the understanding of determinants for chronic visual changes, assess treatment efficacy, and predict visual loss.

Methods : Conducted as a prospective longitudinal cohort study during a mass methanol poisoning outbreak, 61 patients were included, and ethical principles were rigorously followed. The study spanned from March 2018 to April 2019, utilizing patient records from Ali Asghar Hospital in Shiraz. The treatment protocol involved interventions for acid-base and electrolyte control, hemodialysis, ethanol administration, and pharmaceuticals. Follow-up examinations occurred 12 months after discharge, including ophthalmologic exams and advanced imaging tools.

Results : Over the 12-month follow-up, retinal nerve fiber layer thickness (RNFLT) exhibited significant reductions in all regions, with the superior region experiencing the most pronounced loss. Arterial blood pH on admission displayed strong negative correlations with primary RNFLT, while serum bicarbonate and anion gap showed varied associations. Visual acuity, assessed by LogMAR, demonstrated improvement, with 90.2% of patients experiencing recovery. However, 9.8% faced persistent visual challenges.

Conclusion : This study provides crucial insights into the visual complications of methanol poisoning, emphasizing the association between metabolic acidosis and enduring visual impairment. The decline in RNFLT, particularly in the superior region, underscores the vulnerability of optic nerve axons. While the majority exhibited visual recovery, ongoing monitoring is imperative for those facing persistent challenges. The study contributes to effective intervention strategies and aids in predicting long-term visual outcomes in MTON survivors.



Title: Conscious Sedation/Monitored Anesthesia Care Versus General Anesthesia for Vitreoretinal Surgery

Abstract ID: 51

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Anesthesia choice in ophthalmic surgery is crucial for patient comfort and surgical success. This study compares monitored anesthesia care (MAC) with general anesthesia (GA) for vitreoretinal surgery, aiming to assess safety, efficacy, and patient outcomes.

Methods : This was a prospective clinical trial that included forty patients undergoing vitreoretinal surgery. Patients were divided into MAC and GA groups. Anesthesia quality, surgical outcomes, anesthesia time, surgery time and recovery time were compared between two groups using standardized criteria and statistical analysis.

Results : MAC provided comparable analgesia, immobilization, and hemodynamic stability to GA, with no reported complications. All patients in both groups had successful surgery. Anesthesiologist favored MAC for its hemodynamic control, while surgeons showed no preference. MAC exhibited shorter anesthesia time than GA with lower anesthetics. These findings support the use of MAC in vitreoretinal surgery, especially for patients at risk of complications from GA.

Conclusion : Moderate sedation with MAC offers a safe and effective alternative to GA for vitreoretinal surgery, with similar outcomes, reduced anesthesia time, and lower drug doses. Further research with larger cohorts is warranted to validate these results and refine anesthesia protocols.



Title: Crocin supplementation in central serous chorioretinopathy: a pilot randomized double-blind trial

Abstract ID: 54

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Central serous chorioretinopathy (CSCR) is a condition that can impair vision due to serous retinal detachment. Crocin, a carotenoid derived from saffron, has demonstrated antioxidant and anti-inflammatory effects in various retinal diseases, but its potential role in managing CSCR is not well-documented.

Methods : This pilot randomized, double-blind, placebo-controlled trial included 40 patients with CSCR who were randomly assigned to receive crocin (n=20) or placebo (n=20) for eight weeks. Visual acuity, anatomical parameters assessed via optical coherence tomography (OCT), and adverse events were recorded at baseline and post-intervention.

Results : Baseline characteristics, including age, weight, body mass index, and gender distribution, were comparable between groups ($p > 0.05$ for all). The crocin group showed a significantly greater improvement in mean Early Treatment Diabetic Retinopathy Study (ETDRS) letter score compared to the placebo group (4.27 ± 3.63 vs. 0.57 ± 7.23 , $p = 0.024$). Additionally, 20%, 40%, and 80% of crocin-treated patients achieved gains of 10, 5, and 1 ETDRS letters, respectively, versus 7%, 21%, and 29% in the placebo group ($p = 0.316$, $p = 0.280$, and $p = 0.005$, respectively). Although the crocin group exhibited greater reductions in subretinal fluid height, central macular thickness, and choroidal thickness, these differences were not statistically significant ($p > 0.05$). No adverse events related to the interventions were reported in either group.

Conclusion : This pilot study suggests that crocin supplementation may enhance visual acuity in patients with CSCR. However, the lack of statistically significant differences in anatomical outcomes highlights the need for larger trials to confirm these findings.



Title: Comparison of Visual and Anatomical Outcomes of Intravitreal Triamcinolone Acetonide Injection Versus Bevacizumab in Patients with Bulky Diabetic Macular Edema

Abstract ID: 82

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Diabetic macular edema (DME) is one of the most common causes of vision impairment in patients with diabetic retinopathy. Current treatments include intravitreal injections of anti-VEGF agents (e.g., bevacizumab) and corticosteroids (e.g., triamcinolone acetonide). This study aimed to compare the visual and anatomical outcomes, specifically the reduction in central macular thickness (CMT) and improvement in visual acuity (VA), in patients with Bulky DME and CMT ≥ 500 microns treated with triamcinolone or bevacizumab.

Methods : This randomized controlled trial (RCT) included 57 patients (79 eyes) with refractory DME and baseline CMT ≥ 500 microns. Patients were randomly assigned to receive either triamcinolone acetonide (2 mg) or bevacizumab (1.25 mg). Outcomes, including CMT (measured by OCT) and VA (measured by LogMAR), were assessed at baseline, and every months for 6 months post-treatment. Statistical analyses were performed using independent t-tests and repeated measures ANOVA.

Results : In this study, both triamcinolone acetonide and bevacizumab were effective in reducing central macular thickness and improving visual acuity in patients with Bulky diabetic macular edema (DME >500 microns). However, in the triamcinolone group, the reduction in macular thickness and improvement in visual acuity were marginally greater than in the bevacizumab group. The differences observed in both macular thickness and visual acuity ($p=0.047$ and $p=0.048$) were statistically significant but borderline. These results suggest that both treatments are effective options for patients with Bulky DME, but triamcinolone may offer a slight advantage in reducing macular thickness and improving visual acuity.

Conclusion : While both triamcinolone and bevacizumab were effective for Bulky DME, triamcinolone demonstrated a borderline superiority in reducing central macular thickness (CMT) and improving visual acuity (VA). Specifically, the reduction in CMT and improvement in VA were slightly greater in the triamcinolone group. These findings suggest that both treatments are viable options for Bulky DME, but triamcinolone may offer a slight advantage. Treatment choice should be tailored to individual patient needs, considering the potential risks and benefits of each therapy.



Title: Evaluating the influence of panretinal photocoagulation and intravitreal bevacizumab on optic disc circulation in patients with diabetic retinopathy

Abstract ID: 83

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : This retrospective study aimed to assess changes in the optic disc vasculature one and three months after treatment with either panretinal photocoagulation (PRP) or intravitreal bevacizumab (IVB) in individuals with diabetic retinopathy

Methods : A total of 50 eyes from 29 patients with diabetes, none of whom had severe complications, were included in this comparative case series. Of these, 28 eyes from 15 patients were assigned to the PRP group, while 22 eyes from 14 patients were treated with biosimilar bevacizumab (Stivant® CinnaGen Co., Iran). Optical coherence tomography angiography (OCTA) was utilized to assess optic disc vascular density (VD) and retinal nerve fiber layer (RNFL) thickness

Results : The mean age of the enrolled patients was 62.1 ± 8.3 years (40 to 78 years). During follow-up, whole disc VD, inside disc VD and peripapillary VD decreased significantly in the PRP group at month 1 ($p=0.032$, $p=0.32$, and $p=0.016$, respectively) and month 3 ($p=0.004$, $p=0.001$ and $p=0.011$, respectively). There was an insignificant and slight increase for these parameters in the IVB group. ($p>0.05$ for all) A comparison of two treatment arms based on mean whole disc VD, inside disc VD, and peripapillary VD changes revealed a significant difference at month 1 ($p=0.009$, $p=0.019$, and $p=0.002$, respectively) and month 3 ($p=0.002$, $p=0.015$, and $p=0.009$, respectively). Peripapillary RNFL thickness increased in the PRP group at month 1 ($p=0.002$) and then decreased at month 3 ($p=0.001$). During three months of follow-up, the peripapillary RNFL thickness decreased significantly in the IVB group ($p=0.001$). Peripapillary RNFL thickness changes were significantly different between treatment groups at month 1 and month 3. ($p=0.001$ for both) The RNFL changes during the study did not significantly correlate with peripapillary VD changes in each group ($p=0.231$ and $p=0.372$, for PRP and IVB group, respectively)

Conclusion : This study demonstrated that IVB and PRP treatments produced distinct short-term microvascular changes in the optic nerve of diabetic retinopathy patients. PRP treatment led to a significant reduction in vascular density in the optic disc and peripapillary region over 3 months, with an initial increase in RNFL thickness followed by a decrease



Title: Nailfold capillaroscopy in patients with macular telangiectasia referred to Torfeh , Imam Hussein and Negah hospitals in 1401 and 1402

Abstract ID: 84

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : Background: Nailfold videocapillaroscopy (NVC) is a non-invasive diagnostic method to examine the microvasculature. This article focuses on the existence of choroidoretinal vasculopathy which is seen in Macular telangiectasia (MacTel).

Methods : Objectives: The aim of this study was to investigate nailfold capillaroscopy in patients with MacTel. To the best of our knowledge, there is no study which evaluated NVC findings in MacTel in the literature. Through capillaroscopy, we seek to determine whether systemic vascular changes are present in patients with macular telangiectasia.

Results : Method: The study protocol involved 18 patients with MacTel who met the inclusion criteria and 20 age- and sex-matched healthy controls. Videocapillaroscopy device was used for the capillaroscopy assessment.

Conclusion : Results: The mean age was 13 female, 5 male was 67.56 ± 7.38 years in the patient group and 20 age and sex matched controls were 56.90 ± 7.17 years. The age and gender were statistically similar in the patient and control groups. The frequencies of capillaroscopic findings including capillary ectasia, aneurysm, micro-hemorrhage, avascular area, tortuosity and neo-formation were also determined and found to be higher in the patient group; however these changes were not statistically significant. Conclusions: This is the first study in which nailfold capillary assessment was performed in patients with MacTel. There was no significant difference in the results of capillaroscopy.



Title: Relationship Between Anthropometric Indices and Optical Coherence Tomography Angiography of Macula in Healthy Adults: PERSIAN Cohort Study

Abstract ID: 89

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : To evaluate the association between optical coherence tomography angiography (OCTA) measured macular vessel density (VD) and fovea avascular zone (FAZ) parameters and several body composition parameters and anthropometric indices, using data from a large population-based cohort of seemingly healthy adults.

Methods : A cross-sectional observational study utilized data from 424 participants in the PERSIAN Cohort Study. OCTA scans, with dimensions of 3×3 mm and 6×6 mm, were employed to assess macular VD in the superficial capillary plexus (SCP), deep capillary plexus (DCP), and parameters of the FAZ. Body composition was evaluated through bio-impedance analysis with the InBody 770 analyzer. The relationships between OCTA metrics and anthropometric indices were analyzed using multiple regression and correlation techniques.

Results : The study population had a mean age of 39.3 ± 7.7 years, with 47% identifying as male. The results indicated that males displayed higher SCP VD at the fovea. A noteworthy positive correlation was found between foveal SCP VD and factors such as skeletal muscle mass, basal metabolic rate, and waist-hip ratio. In contrast, the whole-image DCP VD and FAZ areas were negatively correlated with total body water, fat-free mass, and muscle mass.

Conclusion : The findings suggest that macular microvasculature is influenced by age, sex, and various anthropometric characteristics. These results highlight the potential of OCTA in evaluating systemic health and vascular status through retinal imaging. Further research is needed to investigate these findings' underlying mechanisms and clinical applications.



Title: Macular Optical Coherence Tomography Findings in Patients with Methanol Toxicity: A Cross-Sectional Study

Abstract ID: 90

Presentation Type: Poster

subject: Retina and Retinal Cell Biology

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Purpose : To evaluate the course of Optical Coherence Tomography (OCT) changes in methanol toxicity (MT) cases.

Methods : This cross-sectional study included MT patients referred to two tertiary referral toxicology centers in southeast Iran between March 2021 and March 2022. The diagnosis of MP was based on harmful methanol serum concentrations or strong clinical suspicion. The participants' retinal and choroidal thickness were evaluated by OCT, and the results were compared with those of the normal population reported in other studies.

Results : A total of 39 patients, with an average age of 33.79 ± 11.18 years and mean methanol serum level of 46.38 ± 35.8 mg/dL, were included in the study. The mean choroidal thickness of the right and left eyes was 403.84 ± 67.6 μ m and 387.1 ± 57.8 μ m, respectively. The mean foveal thickness of the right and left eyes was 258.33 ± 8 μ m and 260 ± 24 μ m, respectively. These measurements were significantly higher than the average thickness observed in the healthy population ($P < 0.05$). Thickness of the macula in all six partitions increased, and the retinal nerve fiber layer (RNFL) and choroid exhibited substantial augmentation in thickness ($P < 0.05$). No notable association was found between the quantity of methanol consumed and the rise in macular thickness. Analysis of VBG parameters showed a correlation between BCVA (logMAR) and pH in both eyes (OS: $r = -0.489$, $p = 0.029$; OD: $r = -0.561$, $p = 0.010$). No association was found between bicarbonate (HCO_3), PCO_2 , and BCVA.

Conclusion : MT led to thickening of the retina, an increase in RNFL, notable choroidal alterations, and a decline in visual acuity. The concentration of methanol in blood serum did not significantly correlate with these changes in visual acuity.



Title: Effect of Superficial Keratotomy on Reducing Postoperative Pain Following Conjunctival Flap Surgery: A Double-Blind Randomized Controlled Trial

Abstract ID: 38

Presentation Type: Poster

subject: Ophthalmic Plastic and Reconstructive Surgery

Nasser Karimi¹ *

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Purpose : To determine if adding superficial keratotomy to the standard conjunctival flap method reduces postoperative pain.

Methods : In this double-blind randomized trial (ClinicalTrials.gov, NCT05494931), patients undergoing conjunctival flap surgery for prosthesis fitting, were assigned to either the control group (classical Gunderson method) or the intervention group (classical method plus superficial corneal neurotomy). Randomization used balanced quadruple blocks. Pain scores were measured using a visual analog scale (0-10) at 6, 24, and 48 hours postoperatively. The assessor was blinded to group assignment. Initial sample size was 16 patients, with an interim analysis planned after 9 patients. Successful prosthesis fixation, surgical complications, and need for reoperation were recorded during follow-up visits and calls.

Results : Pain scores were significantly lower in the intervention group (N=5) compared to the control group (N=4) at 6 hours (1.0 vs 8.0, P=0.02), 24 hours (1.0 vs 2.5, P=0.02), and 48 hours (0.0 vs 2.5, P=0.04). No significant differences in age, sex, education, ethnicity, previous ocular surgeries, or smoking history were found between groups. Median horizontal and vertical corneal diameters were similar (10.5 mm and 9 mm; P = 0.80 and P = 0.25, respectively). No flap retractions occurred during follow-up (median 7 months), but one control group patient developed small peripheral buttonholes that did not require surgical revision.

Conclusion : Superficial corneal neurotomy effectively reduces pain following conjunctival flap surgery, with no observed complications.



Title: Enhancing Optical Coherence Tomography Angiography Feature analysis for Detection of Parkinson's Disease by Designing a Computer-Aided Diagnosis System: A Machine Learning-Based Approach

Abstract ID: 17

Presentation Type: Poster

subject: Imaging

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Purpose : Neurological disorders are a major cause of global disability, with Parkinson's disease (PD) being the fastest growing, affecting 6.2 million people in 2015. PD is caused by the early loss of dopamine-producing neurons, leading to motor and non-motor symptoms that can appear years before diagnosis. Since there are no definitive diagnostic tests for PD, identifying early, non-invasive biomarkers is crucial. Optical Coherence Tomography Angiography (OCTA), a retinal imaging technique, shows promise as it reflects changes in the central nervous system. Although OCTA has revealed retinal microvascular changes in PD, its diagnostic potential is still being investigated. This study used machine learning to analyze OCTA images, aiming to classify PD patients from normal population.

Methods : Data from 92 participants (52 with PD and 40 controls) and 175 eye images were examined. Most PD participants (85%) were in the early stages of the disease (Hoehn and Yahr Stages 1 and 2), making them ideal for studying early non-motor features, including ocular changes. After image pre-processing to enhance the quality of the images, region growing and thresholding algorithms were used to segment the FAZ area and vessels, respectively. Then, related features such as vessel density and FAZ parameters were extracted to learn the Machine Learning (ML) models. Several ML models were trained to distinguish PD patients from healthy controls, with XGBoost (XGB) and Gradient Boosting performing best.

Results : XGB achieved 74% accuracy and 85% sensitivity in independent test dataset. Ensemble methods improved performance further, achieving 80% accuracy and 100% sensitivity, effectively detecting nearly all PD cases. Receiver Operating Characteristic (ROC) analysis confirmed the reliability of XGB and ensemble models, highlighting their potential as diagnostic tools for early PD detection.

Conclusion : This study demonstrates how OCTA and advanced machine learning can provide valuable biomarkers, paving the way for improved diagnosis and management of Parkinson's disease.



Title: Deep Learning-Powered Smartphone Application for Diagnosing Common Eye Diseases

Abstract ID: 22

Presentation Type: Poster

subject: Imaging

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Purpose : To develop a smartphone-based application with trained deep learning algorithms to diagnose and manage common eye diseases, including dry eye disease, conjunctival nevus, strabismus, and keratoconus, just with smartphone camera without requiring additional hardware.

Methods : The application employs convolutional neural networks (CNNs) as the core of its deep learning model. A large dataset of labeled eye images was collected and preprocessed, focusing on disease-specific features. These images were captured using a Samsung A71 smartphone by one expert person. A validation study was conducted comparing the app's performance to diagnoses made by expert ophthalmologists.

Results : The deep learning model demonstrated a diagnostic accuracy of over 95% for each targeted eye diseases, aligning closely with the performance of ophthalmologists. The application successfully identified key features of dry eye disease, conjunctival nevus, strabismus, and keratoconus in various testing scenarios. Its ease of use and reliability make it a practical tool for both clinicians and patients.

Conclusion : This deep learning-powered application serves as a crucial third party between ophthalmologists and patients, enabling continuous eye care. Its high diagnostic accuracy and accessibility ensure that patients are promptly identified and managed, reducing the neglect or delayed treatment. By providing reliable diagnostic support directly through a smartphone anytime and anywhere, the app helps ophthalmologists monitor patients and maintain consistent treatment plans, fostering better long-term outcomes. This innovation bridges the gap between specialized care and patients, empowering both clinicians and individuals to actively engage in managing eye health.



Title: High-Resolution Visualization of Ocular Structures: Clearing Mouse Eye Tissue Using the Free-of-Acrylamide Clearing Technique (FACT)

Abstract ID: 24

Presentation Type: Poster

subject: Imaging

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Purpose : High-resolution visualization of ocular structures and cellular interactions is essential for enhancing our understanding and treatment of eye diseases. Advanced imaging techniques, particularly 3D imaging, allow researchers to capture detailed spatial information of ocular tissues, providing insights into their complex architecture and pathology. This research aims to address the need for improved visualization by utilizing advanced tissue-clearing techniques, specifically the Free-of-Acrylamide Clearing Tissue (FACT) method.

Methods : We initially applied the FACT protocol to eye tissues from C57BL/6 mice, dividing them into five groups: 1) Intact, 2) 10% H₂O₂ for 3 hours at 55°C, 3) 2% SDS for 48 hours at 37°C, 4) 2% SDS for 72 hours at 37°C, and 5) 4% SDS for 48 hours at 37°C. Retinal morphometry was performed using cryostat sectioning and DAPI staining, and image analysis was conducted via ImageJ. Tubulin protein (TUJ1) was assessed to evaluate protein presence in retinal tissue and the optic nerve. Additionally, SDS-PAGE was performed on samples from all groups to confirm protein preservation. We also utilized GFP-expressing zebrafish to assess the preservation of fluorescent vessels.

Results : The findings revealed a significant decrease in the length of the outer nuclear layer in the 2% SDS-treated group ($p < 0.0001$). In contrast, no significant morphological changes were noted in the retinal layers treated with 4% SDS for 48 hours at 37°C compared to intact samples. Immunostaining for TUJ1 indicated that protein components remained stable following the clearance process, and SDS-PAGE results were comparable between cleared and intact groups. Importantly, GFP fluorescence was successfully preserved in the samples.

Conclusion : The FACT protocol exhibited varying effects of SDS treatments on ocular tissue morphology. Notably, the 4% SDS group demonstrated minimal adverse effects, suggesting a reduced impact on tissue integrity compared to the 2% SDS treatment. Furthermore, the retention of fluorescence in the mouse retina post-clearing highlights the effectiveness of the FACT protocol in maintaining cellular integrity, thereby enhancing visualization of ocular structures. This technique holds significant promise for 3D imaging applications using light sheet microscopy.



Title: Revolutionizing Age-Related Macular Degeneration Detection Using Artificial Intelligence

Abstract ID: 31

Presentation Type: Poster

subject: Imaging

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Purpose : Age-related macular degeneration (AMD) is a leading cause of vision loss among individuals over the age of 50, with a projected global prevalence of 288 million cases by 2040. The condition manifests in both dry and wet forms, significantly impairing central vision and adversely affecting daily activities and quality of life. Early detection is vital to mitigate disease progression; however, traditional diagnostic methods can be resource-intensive and depend heavily on the availability of specialists. This study introduces an artificial intelligence (AI)-driven system for the automated detection of AMD in fundus images, aimed at enhancing diagnostic accuracy, improving efficiency, and increasing accessibility for patients.

Methods : The AI system employs convolutional neural networks (CNNs), a state-of-the-art deep learning architecture, to detect hallmark features of AMD, including drusen, retinal pigment epithelium changes, and neovascular signs. The model was trained using a dataset of over 19,000 fundus images representing various AMD stages and imaging conditions. Preprocessing steps like resizing, augmentation, and normalization ensured consistency across diverse inputs. Performance was evaluated using accuracy, sensitivity, specificity, and AUROC, on both internal and external validation datasets: RFMiD and ODIR.

Results : On the internal dataset, the model achieved an accuracy of 88.8%, sensitivity of 85.3%, specificity of 91.6%, and an AUROC of 0.94. For external validation, the model performed as follows: on the RFMiD dataset, sensitivity was 83.5%, specificity was 70%,



accuracy was 78.2%, and an AUROC of 0.89; on the ODIR dataset, sensitivity was 95.8%, specificity was 97.4%, accuracy was 96.6%, and an AUROC of 0.98.

Conclusion : The proposed AI-driven system provides an accurate, efficient, and automated solution for AMD detection using images from various fundus devices, with external validation ensuring the robustness of its performance. By reducing the workload on ophthalmologists and enabling early diagnosis, this system has the potential to enhance clinical decision-making and patient outcomes. Future work will focus on integrating multimodal imaging and expanding detection capabilities for other retinal pathologies, further advancing AI-assisted eye care.



Title: Gender and Age Variations in Choroidal Vasculature in Healthy Subjects: Comparison between Choroidal Vascular Density and Vascular Index

Abstract ID: 47

Presentation Type: Poster

subject: Imaging

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Purpose : To evaluate the significance of age and gender on Choroidal vascular index (CVI) and choroidal vascular density (CVD), using optical coherence tomography angiography (OCTA) in normal subjects.

Methods : This was a cross-sectional study of 164 eyes of 82 normal healthy children and adults aged 5–97 years who performed macular 3x3mm scans using OCTA. The automation of the segmentation of choriocapillaris plexus (CCP) was determined by employing the incorporated software algorithm. The software employed calculated the VD as the relative flow density (expressed in percentage) in the binary reconstructed images in the capillary plexuses. Also, to determine the vascular status of the choroid, the choroidal vascular index (CVI) was calculated by dividing the luminal area (LA) by the total circumscribed sub-foveal choroidal area using the Sonoda method.

Results : A statistically meaningful relationship was detected between age and CVD. Foveal choriocapillaris vascular density (CVD), parafoveal CVD and parafoveal DVD had a decreasing course during the life course. However, there was no significant difference in choroidal vascular index between age groups. All ages showed a value of around 70% (P=0.225). FAZ revealed relatively minor changes across age groups. CVD, parafoveal DVD, and parafoveal CVD) showed statistically significant differences between males and females, with males consistently exhibiting higher VD levels than females in these parameters. However, there was no significant difference in the choroidal vascular index of males and females.

Conclusion : OCTA analysis demonstrated higher sensitivity in revealing age and gender differences in comparison with CVI analysis. The male participants had higher VD than the female participants in all measured. CVD is known to be influenced by age.



Title: Safety and Feasibility of Tele-Screening for Retinopathy of Prematurity

Abstract ID: 58

Presentation Type: Poster

subject: Imaging

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Purpose : To evaluate the use of remote reading of digital retinal photographs in the diagnosis of severe (treatment-warranted) retinopathy of prematurity (ROP) during longitudinal screening for ROP in NICUs not accessing bedside ophthalmology exam.

Methods : According to ROP standard timelines, infants were examined longitudinally, over a series of examinations, by digital photography using the RetCam-120 Digital Retinal Camera (Massie Research Laboratories Inc., Dublin, CA) from July 2020 to April 2021. Images were transferred in a web-based route to ROP reading center in a tertiary ophthalmology hospital to be interpreted by trained vitreoretinal surgeons. Treatment warranted ROP was defined as the presence of plus disease or the presence of any stage 3 ROP. Treatment with intravitreal bevacizumab was done in NICU. All patients were examined bedside after discharge from NICU at the referral ROP center.

Results : A total number of 2537 exams were done for 1213 patients (1-11, median 2). The mean birth age of the patients was 30 weeks (24-41) and the mean birth weight was 1351 grams (550-4900). Severe (treatment-warranted) ROP was diagnosed in 100 eyes (53 patients) during admission in NICU. The mean birth age of the treatment-warranted patients was 27 weeks (25-30) and the mean birth weight was 992 grams (550-1700). Intravitreal injection of bevacizumab was performed in NICU. In the final bedside clinical exam in the referral ophthalmic center, no case of advanced ROP was recognized. Tele-screening had a 100% sensitivity in diagnosing treatment-needed ROP.

Conclusion : This study showed that longitudinal remote reading of digital photographs using the RetCam-120 system has excellent sensitivity in detecting treatment-warranted ROP.



Title: RPEGENE-Net: A Multi-Resolution Deep Learning Framework for Predicting Gene Expression from Microscopy Images of Retinal Pigment Epithelium (RPE) Cells

Abstract ID: 76

Presentation Type: Poster

subject: Imaging

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Purpose : Aim: To develop a deep learning framework, RPEGENE-Net, capable of predicting gene expression profiles of retinal pigment epithelium (RPE) cells using live-cell microscopy images.

Methods : Methods: A dataset of live-cell images of RPE cells, treated with various drug regimens and captured at magnifications of 40x, 100x, 200x, and 400x, was used. Gene expression of six key genes (α -SMA, ZEB1, TGF- β , CD90, β -catenin, Snail) and treatment classes (aflibercept, bevacizumab, dexamethasone, aflibercept + dexamethasone, and untreated control) were analyzed. Twelve deep learning architectures were evaluated for regression and classification tasks. Preprocessing steps included normalization, patch extraction, and data augmentation. DenseNet121 was fine-tuned through a two-stage training process, incorporating multi-resolution imaging data for robust prediction.

Results : Results: DenseNet121 outperformed all other models in predicting gene expression and classifying treatment types. For the regression task, it achieved the highest Pearson correlation coefficient (PCC) values across almost all six genes: α -SMA (0.79), ZEB1 (0.84), TGF- β (0.83), CD90 (0.83), β -catenin (0.83), and Snail (0.86). The average mean absolute error (MAE) and average root mean square error (RMSE) on test dataset were 0.0244 and 0.1228, respectively. The R^2 scores ranged from 0.50 (α -SMA) to 0.74 (TGF- β), indicating strong alignment between predicted and actual gene expression values. A multi-level approach, combining data from 40x, 100x, 200x, and 400x magnifications yielded higher R^2 scores for almost all genes compared to single-magnification models. For the classification task, DenseNet121 achieved F1 score, precision, recall, and accuracy of 0.98, with a specificity of 0.99.

Conclusion : Conclusions: RPEGENE-Net provides a simple, cost-effective method to predict gene expression from live-cell images, with potential applications in experimental studies, RPE transplantation quality control, and broader cell-based research. Multi-magnification imaging enhances model performance, supporting its utility as a scalable tool for diverse gene expression studies.



Title: Involvement of ER stress in Dry Age-Related Macular Degeneration

Abstract ID: 41

Presentation Type: Poster

subject: Genetics

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Purpose : Age-related macular degeneration (AMD) is a neurodegenerative disease and a leading cause of irreversible blindness in adults over 50 years old. Clinically, AMD is classified into two forms: dry AMD and wet AMD, with approximately 90% of cases being the dry type. The molecular mechanisms underlying dry AMD remain incompletely understood. Endoplasmic Reticulum (ER) stress has been implicated in numerous diseases, including AMD, based on in vitro and animal model studies. This study is the first to utilize human donor eyes to investigate the expression of ER stress markers and apoptotic pathways in the retinas of dry AMD patients compared to healthy donors.

Methods : Human donor eyes were obtained from the Iranian Eye Bank and classified into three groups: Dry AMD-diagnosed individuals (≥ 50 years, $n=14$), Elderly healthy donors (≥ 50 years, $n = 10$) as the age-matched controls, and Young healthy donors (≤ 40 years, $n = 10$) for assessment of the age-associated changes. RNA was extracted from the macular region of the retina, and quantitative real-time PCR (qRT-PCR) was conducted to evaluate the expression of GADD153, GRP78, BAX, BCL-2, PTEN, and CASPASE3.

Results : Retinal tissue from AMD patients exhibited significantly elevated expression of ER stress markers (GADD153 and GRP78) and apoptotic genes (BAX and CASPASE3) compared to both young and elderly healthy donors. No significant differences were observed in the expression of PTEN and BCL-2 between the dry AMD group and the healthy controls.

Conclusion : The findings suggest that ER stress is a critical contributor to the development and progression of dry AMD. Targeting ER stress pathways may present a promising therapeutic strategy to prevent retinal cell death and subsequent vision loss in patients with dry AMD.



Title: Whole Exome Sequencing Reveals Novel Genetic Variants in Patients with Atypical Non-Syndromic Retinitis Pigmentosa

Abstract ID: 43

Presentation Type: Poster

subject: Genetics

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Purpose : Retinitis Pigmentosa is the main cause of hereditary blindness. This group of clinically and genetically heterogeneous group of disorders often starts with night blindness, and ultimately leads to complete blindness. The classic triad of RP, retinal bone-spicule pigmentation, blood vessel attenuation, and waxy disc pallor is absent in atypical cases, and that even hardens the definite clinical diagnosis in these cases.

Methods : We conducted whole exome sequencing on eight unrelated patients with atypical non-syndromic Retinitis Pigmentosa manifestation in ophthalmologic findings to identify causative genetic variants. Sanger sequencing was used to confirm variants and analyze segregation within families

Results : Three novel variants were identified: MAK:c.768delA, RP1:c.4743delA, and RPE65:c.95-2A>G. Additionally, we observed known variants associated with atypical RP, emphasizing the importance of genetic testing for accurate diagnosis.

Conclusion : Our findings expand the genetic spectrum of Retinitis Pigmentosa, particularly in atypical cases. The identification of both novel and non-novel variants highlights the importance of Whole Exome Sequencing in accurate diagnosis and possible personalized treatment.



Title: In vitro assessment for the efficacy of gene augmentation therapy using lentiviral vectors expressing ABCA4

Abstract ID: 70

Presentation Type: Poster

subject: Genetics

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Purpose : Inherited retinal diseases (IRDs) are the leading cause of blindness worldwide. Based on the results of genetic analysis on a cohort from a recently established national registry, defects in the ATP-binding cassette, sub-family A, and member 4 (ABCA4) gene are relatively common causes of IRDs among Iranian patients. The goal of this study is to develop a novel gene augmentation therapy using lentiviral vectors to target IRDs caused by mutations in the ABCA4 gene.

Methods : The subcloned pCLX-UBI-ABCA4-GFP vector was extracted from Stb13-transformed bacteria using a maxi-plasmid extraction kit. To produce lentiviral particles, three lentiviral vectors, including the transfer vector containing the gene of interest (pCLX-UBI-ABCA4-GFP) and two helper vectors (psPAX2 and pCAG-VSVG), were used for the co-transfection of Lenti-X™ 293T cells. The resulting lentivirus was harvested and concentrated using the Takara Lenti-X™ Concentrator kit. After confirming the efficacy of produced lentiviral particles in the transduction of control cells, retinal pigment epithelium (RPE) cells were isolated from a donated human eye globe and cultured in vitro. Upon confirming the identity of RPE cells using immunocytochemistry (ICC), these cells were transduced using concentrated virus particles. Flow cytometry analysis and real-time PCR (qPCR) were employed to assess green fluorescent protein (GFP) and ABCA4 expression levels in transduced RPE cells, respectively.

Results : Flow cytometry analysis of the transduced RPE cells showed that a considerable percentage of these cells were positive for GFP expression. Real-time PCR analysis demonstrated an increase in ABCA4 expression in the lentivirus-treated group compared to the non-treated control group at the in vitro level. These results indicated that the produced lentivirus worked properly.

Conclusion : The present study proposed a new gene augmentation approach to target IRDs caused by mutation at the ABCA4 gene. The findings of this investigation showed that delivering the targeted gene to retinal cells is highly successful. As a result, this system will be studied in the following stage using lab animals and in vivo settings.