Global Eye Genetics Consortium

Newsletter #07

Upcoming events

The 40th Asia-Pacific Academy of Ophthalmology Congress

2025 APAO

In Conjunction with
The 83rd Annual Conference of the All India Ophthalmological Society

Recent Events:

The GEGC session at International Society for Eye Research annual meeting (Argentina) was held on 21st October 2024 with focus on genetic research in Pan-America. The session was chaired by Dr. Gyan Prakash (NIH, USA), and Dr. Takeshi Iwata (Tokyo Medical Center, Japan) and speakers were invited from institutes from Pan-America (USA, Chile, Argentina and Brazil) who presented their latest work on eye genetics. Dr. Marcela Ciccioli (Buenos Aires, Argentina) talk focussed on the demographic perspective, genetic architecture, development of national databases, and participation of candidate patients in clinical trials and advanced therapies for inherited retinal diseases (IRDs) in Argentina. Dr. Mônica Barbosa de Melo (Campinas, Brazil) spoke about the Genetic Profile of Congenital and Primary

Open Angle Glaucoma in Brazil. She discussed the progress of research on congenital and primary open-angle glaucoma in Brazil. Next, Dr Marcela Perez (Santiago, Chile) spoke on Stargardt disease (STGD) in Chile, highlighting clinical presentations, genetic analysis, and advanced imaging techniques for better disease characterization. Thereafter, Dr. Takeshi Iwata (Tokyo, Japan) highlighted the importance of international collaborations in advancing research on rare genetic eye diseases, sharing resources, and overcoming challenges in the field. The session was concluded by Dr. Gyan Prakash (Bethesda, United States) who discussed the global opportunities and challenges in genetic eye research, with a focus on how South American countries can play a more active role through participation and collaboration.

This session covered genetic eye disease research across various regions, focusing on inherited retinal diseases, glaucoma, Stargardt disease, AMD, and opportunities for international collaboration. The talks highlight advancements, challenges, and pathways for broader participation in South America.

The Argentinian Council of Ophthalmology and GEGC meeting

GEGC, in collaboration with the Argentinian Council of Ophthalmology, conducted a meeting on October 28th. The theme was "Current Challenges in Eye Genomics Research in Argentina (and Latina America) – A Collaboration with National Eye Institute-NIH". The Universidad de Buenos Aires, Universidad Maimonides, Universidad FASTA, and SOIILA - the Latin-American Ophthalmological Society of Image and Artificial Intelligence, were the other two collaborators for the meeting. The event was chaired by Prof. Dr. David E. Pelayes (Argentina), Dr. Gyan "John" Prakash (USA, NIH), Dr. Amit Mathur (Canada, Waterloo University), Dr. S. Natarajan (India, Aditya Jyot Eye Hospital), and Prof. Dr. Pablo Chiaradia (Argentina)

The first session was on "Global Collaborations in Eye Genomics". Dr. Gyan Prakash (NIH, USA), highlighted the National Eye Institute's (NEI) international initiatives to foster collaborations in eye genomics. He emphasized the importance of global partnerships, such as those within the Global Eye Genetics Consortium, in advancing research and sharing resources to tackle inherited retinal diseases. Dr. Takeshi Iwata (Tokyo Medical Center, Japan) discussed Japan's advancements in eye genomics and the significance of leveraging international collaboration. He presented ongoing research addressing genetic variations in ocular diseases and stressed the role of collective global efforts in decoding complex eye conditions. Dr. Michael Cheetham (NIH, USA – Video Presentation) shared strategies for identifying and engaging international collaborators in eye genomics. He provided insights on navigating funding opportunities, building research networks, and enhancing cross-border scientific exchanges. Dr. Salil Lachke (University of Delaware, USA) introduced iSyTE, an integrated systems tool designed to identify genes critical for eye development and disease. He demonstrated its applications in discovering novel targets for genetic studies and its role in advancing therapeutic approaches for eye conditions. Dr. S. Natarajan (Aditya Jyot Eye Hospital, India) explored the translational aspects of eye genomics research, highlighting how genomic data can be integrated into routine clinical care. He shared case studies demonstrating the benefits of personalized medicine in improving patient outcomes in ophthalmology.

The second session was on "AI and Future Perspectives in Latin America". During this session Jose Mendoza (SOIILA, Peru) discussed the integration of artificial intelligence into ophthalmology, focusing on diagnostic tools and decision-making systems. He highlighted examples of AI-driven applications for retinal imaging and disease prediction, emphasizing their potential to improve accessibility and accuracy in underserved regions. Speaker from Canada provided an update on the role of AI and telemedicine in modern ophthalmology. The talk included case studies showcasing how AI-based platforms and remote consultations are transforming eye care delivery, particularly in remote or resource-limited settings.

Next, Rene Cano (SOIILA, Mexico – Video Presentation) explored the role of biomarkers in understanding macular holes and their connection to AI models. His talk emphasized the potential of machine learning to analyze biomarker data for predicting disease progression and improving clinical management. Following this, Dr. David E. Pelayes (Argentina) presented findings from a real-world data program on diabetic retinopathy in Argentina. He discussed patterns of disease progression, emphasizing the need for robust AI-driven analytics to predict outcomes and optimize treatment strategies. Finally, Dr. S. Natarajan (India) showcased the application of offline AI tools in identifying and managing proliferative diabetic retinopathy. He shared practical insights into using AI for screening, surgery planning, and post-operative care in regions with limited internet connectivity.

Led by moderators, the session synthesized the key takeaways from the talks, focusing on mutual learning opportunities. The discussion delved into addressing research challenges in Latin America, fostering sustainable collaborations, and integrating AI and genomics into clinical practice. The session concluded with actionable steps for participants to advance the field.

Ocular Genetics Trivia

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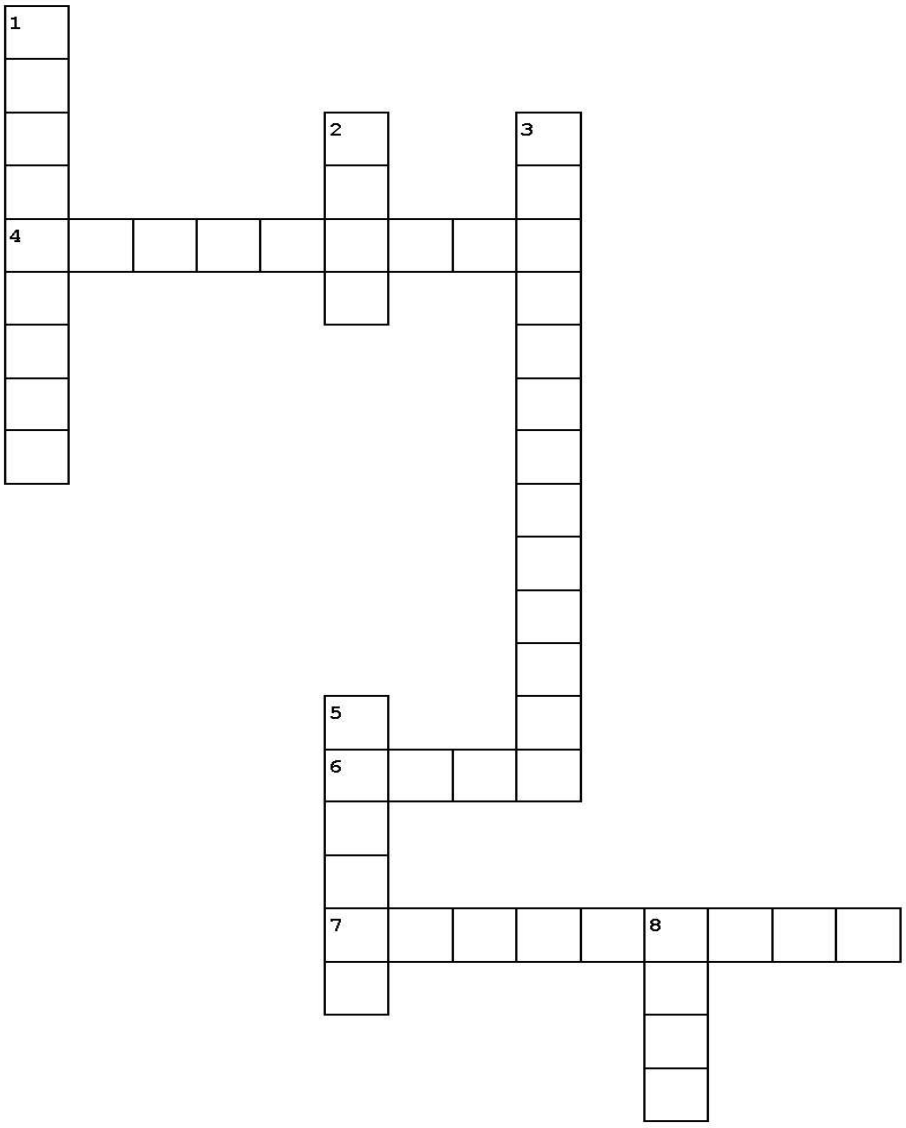

Meet Our Members

Professor Calvin C.P. Pang has made significant contributions to ophthalmology and visual sciences. He was appointed Professor of Ophthalmology and Visual Sciences at CUHK in 2008, where he later received the S.H. Ho Professorship in Visual Sciences in 2010. Serving as Chairman of the Department from 2012 to 2015, he has also been the Director of the Shantou University/CUHK Joint Shantou International Eye Center since 2012. Professor Pang is renowned for pioneering research in molecular genetics and genomics of eye diseases in Hong Kong, as well as studies on pharmacokinetics of green tea catechins and GHRH receptor antagonists in ocular oxidative stress, inflammation, and degeneration. His work extends to risk factors and prevention strategies for childhood eye diseases and myopia, advocating for "health care through children eye care". Professor Pang has delivered over 200 invited lectures globally and received numerous accolades, including the China State Scientific and Technological Progress Award in 2016, the Special Achievement Award from the Chinese Ophthalmological Society in 2017, and the Asia-Pacific Academy of Ophthalmology Senior Achievement Award in 2018. Recognized as a Fellow of the Association for Research in Vision and Ophthalmology (ARVO) in 2018 and honored as the 2020 ARVO Foundation honoree, Professor Pang was conferred as 'Honorary Fellow' of the College of Ophthalmologists of Hong Kong in 2021. In 2022, he received the APAO Outstanding Service in Prevention of Blindness Award and was named one of the top 100 most influential individuals in ophthalmology in "The Ophthalmologist Power List" in 2024. His research encompasses a wide array of areas including molecular genomics, animal models of eye diseases, pharmacokinetics, and the impact of Covid-19 on ophthalmic health. Professor Pang has contributed more than 600 peer reviewed publications in international journals.

Professor Isabelle Audo is a distinguished leader in the field of ophthalmology, currently holding the prestigious position of Professor at Sorbonne University and serving as the Deputy Director of the Institut de la Vision. Alongside Christina Zeitz, she leads the S6-AZ team, dedicated to deciphering molecular pathways involved in eye diseases from gene discovery to therapeutic applications within the genetic department. At Quinze-Vingts National Vision Hospital, Dr. Audo holds dual responsibilities as Head of the Electrophysiology Unit and Pediatric Ophthalmology department. She plays a pivotal role in coordinating the Rare Disease Center REFERET and directing the Biotherapy Axis at CIC1423, focusing on innovative treatment strategies. Dr. Audo's contributions extend globally through her involvement in multiple international working groups and task forces, including Retinal Rare Eye Diseases, Neuro-Ophthalmology Rare Disease, Pediatric Ophthalmology Rare Diseases, and Genetic Diagnostics. Her leadership in Registries & Epidemiology, Research, and National Integration underscores her commitment to advancing scientific understanding and improving patient outcomes nationally and internationally.

Prof Jason Yam is Professor & Undergraduate Division Head at Department of Ophthalmology and Visual Sciences of CUHK, Dean of General Education at Chung Chi College, CUHK, Head of Pediatric Ophthalmology and Strabismus service at Hong Kong Eye Hospital, Head of Ophthalmology Service at Hong Kong Children's Hospital, Editor-in-chief of the College of Ophthalmologists of Hong Kong, Vice President of Hong Kong Ophthalmology Society. He also serves as the Secretary-General of Asia-Pacific Strabismus and Paediatric Ophthalmology Society (APSPOS); Research Committee, Myopia Committee, and Training & Education Committee Chair of International Paediatric Ophthalmology and Strabismus Council (IPOSC); and Council Member of Asia-Pacific Academy of Ophthalmology (APAO); and Council Member of Asia-Pacific Myopia Society (APMS); and Congress President of APAO Congress 2026.

Prof. Jason Yam is PI of Low-concentration Atropine for Myopia Progression (LAMP1), Low-concentration Atropine for Myopia Prevention (LAMP2) study and Hong Kong Children Eye Study (HKCES). He has received funding of more than 100 million USD, and has more than 170 articles in the SCI-indexed journals including JAMA, Lancet Global Health, JAMA Network Open, Ophthalmology etc. LAMP2 study has been selected as one of the China's Important Medical Advancements in 2023".,

Prof. Jason Yam received the National Science Fund for Distinguished Young Scholars 2024 and the Asia Pacific Academy of Ophthalmology De Ocampo Lecture Award 2024. He was named One of the Ten Outstanding Young Persons in Hong Kong in 2019, and was bestowed Hong Kong Humanity Award 2021, and International Myopia Conference Josh Wallman Memorial Lecture 2022, and American Academy of Ophthalmology Secretariat Award 2023. He was listed among World's Top 2% Scientists in the field of Ophthalmology since 2022, and among Top 100 Ophthalmologists in Asia-Pacific Region in 2023.

Prof. Onochie Ike Okoye is a respected consultant ophthalmologist in Nigeria, specializing in low vision rehabilitation, ocular genetics, oculoplastic surgery and bioethics. His commitment to excellence is demonstrated through his fellowship with the National Postgraduate Medical College of Nigeria and the International College of Surgeons. Additionally, he is a member of a couple of international and national professional associations through which he stays engaged with global advancements in ophthalmology, genetics and bioethics.

Beyond his clinical practice, Dr. Okoye plays a crucial role in medical ethics and research at the University of Nigeria Teaching Hospital (UNTH) and the College of Medicine, University of Nigeria (UNN). As a member of the UNTH/UNN Health Research Ethics Committee and the Ethics Committee of the Ophthalmological Society of Nigeria, he ensures that research involving human participants adheres to ethical standards, prioritizing patient rights and welfare. Okoye coordinates two significant research groups: the Bioethics Research Interest Group (BRIG-UNN) and the Low Vision Research Initiative (LVRI-UNN). His leadership in these initiatives fosters collaboration and promotes innovative approaches to pressing health issues in the community. His clinical research experience includes participation in various projects addressing childhood low vision issues, onchocerciasis,

childhood fevers, cataract intervention strategies, and future research involving human biological samples. This diverse background equips him with a comprehensive understanding of both clinical and community health challenges. Since his completion of the ocular genetics fellowship at the Flaum Eye Institute of the University of Rochester NY,USA in 2022, his research interests have centered largely on the intersection of ophthalmic practice/education, ocular genetics and bioethics. Currently, Dr. Okoye focuses on initiating the provision of ocular genetics services at the tertiary level of care in Nigeria and developing curricula for formal medical ethics /professionalism education and ocular genetics education in sub-Saharan Africa. He recognizes the importance of integrating ethical training into medical education at all levels, aiming to prepare future healthcare professionals to navigate complex ethical dilemmas. Dr. Onochie Ike Okoye's contributions to ophthalmology and medical education significantly impact healthcare standards in Nigeria and beyond, inspiring colleagues and students to elevate the quality of patient care in their communities.

Dr. Edward Ryan A. Collantes is a physician-scientist specializing in the genetic and molecular underpinnings of rare diseases, including inherited retinal disorders (IRDs) and early-onset glaucoma. Currently a research scientist at the Broad Institute of MIT and Harvard, he leverages advanced genomic technologies and cellular biology to enhance our understanding and treatment of genetic conditions.

Dr. Collantes began his academic journey at the University of the Philippines Los Baños, where he earned a Bachelor's degree in Biology with a major in Genetics. He then obtained his medical degree from the University of Santo Tomas and completed his ophthalmology residency at Manila Doctors Hospital in the Philippines. Seeking to bridge clinical practice with research, he pursued a postdoctoral fellowship at the Ocular Genomics Institute of Massachusetts Eye and Ear, a teaching hospital of Harvard Medical School.

In his current role, he is involved in pre-clinical assessments of emerging therapeutic approaches, including gene editing technologies, antisense oligonucleotides, and lipid nanoparticle delivery systems, aiming to develop targeted interventions for patients. His work also involves short- and long-read whole-genome sequencing, bioinformatic analysis, and functional assays to identify and evaluate novel genes and variants associated with genetic conditions.
Committed to improving ocular health in his home country, Dr. Collantes actively collaborates with local Filipino ophthalmologists. He spearheads research projects in the Philippines to uncover the genetic underpinnings of IRDs and early-onset glaucoma. Through these initiatives, he aims to enhance genetic testing accessibility, provide personalized care, and ultimately improve patient outcomes.

Beyond his research, Dr. Collantes is deeply involved in community service and patient advocacy. He serves as a medical advisor for rare disease patient support groups in his home country. He is also a founding member of the Philippine Ocular Genetics Interest Group, working to promote education and collaboration among professionals in the field.

Dr. Collantes' dedication to ocular genetics has been recognized through numerous awards, including the David L. Epstein Clinician-Scientist Award from the Association for Research in Vision and Ophthalmology Foundation. His unwavering commitment to bridging innovative research with clinical practice continues to inspire efforts towards combating inherited eye diseases globally.

Dr. Anne Slavotinek, a physician and researcher, is serving as the Director of the Division of Human Genetics and a Professor in the University of Cincinnati Department of Pediatrics. Dr. Slavotinek brings a wealth of knowledge and expertise to her field, with a medical degree (MBBS) from the University of Adelaide, South Australia, earned in 1987, and a PhD from Flinders University, South Australia, completed in 1995.

Dr. Slavotinek's clinical training includes her roles as Registrar and Senior Registrar at renowned institutions such as Churchill Hospital in Oxford and St. Mary's Hospital in Manchester. She further honed her skills during her residency at the National Human Genome Research Institute, part of the National Institutes of Health.

Her research interests encompass a broad spectrum of human genetics, focusing on medical genetics and dysmorphology. Dr. Slavotinek is particularly passionate about developmental eye defects, genomics, and multiple congenital anomaly syndromes. Her work aims to unravel the genetic underpinnings of these conditions, contributing to improved diagnosis and treatment options for affected individuals.

As a leader in her field, Dr. Slavotinek is dedicated to advancing our understanding of human genetics and its implications for health and disease. We are excited to follow her continued contributions and the impact she is making in pediatric genetics and beyond.

Ophthalmic Genetics News

Around the World

Gene Therapy Technique Suppresses VEGF

Researchers from Australia and China, led by Satheesh Kumar and Associate Prof Liu have for the first time used a gene therapy technique to suppress the production of vascular endothelial growth factor (VEGF) in human retinal cells - which is a protein that causes abnormal leaky blood vessels to grow in the retina at the back of the eye – and is the key driver of vision loss in diseases such as diabetic retinopathy and 'wet' or neovascular age-related macular degeneration. The researchers used an RNA editing tool – known as CRISPR Cas13 - with the help of focused ultrasound. The pre-clinical experiment, recently published in the Proceedings of the National Academy of Sciences, targeted the mRNA sequence that instructs cells to produce VEGF. It delivered the RNA editing tool via an AAV viral vector and was tested on a mouse model and human retinal cells derived from stem cells. It showed that the viral vector effectively delivered the treatment to retinal cells, producing a significant reduction in VEGF and slowing disease progression in the mouse model. RNA editing enables researchers to change the genetic instructions that influence how cells behave without permanently altering their DNA, which could allow treatments to be adjusted over time, depending on clinical need. According to the lead investigators, the study shows the potential of RNA editing to develop gene therapies that offer an alternative treatment to the invasive, frequent eye injections that are currently used to treat wet

macular degeneration and diabetic eye disease, given that it would make a difference for people with eye disease who face the prospect of having eye injections every six to 12 weeks for the rest of their lives.

Sources:
1. CERA. Regenerative Medicine Group. RNA editing tool shows potential as a replacement for regular eye injections .https://news.regenerativemedgroup.com/rna-editing-tool-shows-potential-as-a-replacement-for-regular-eye-injections/
2. Kumar S, Hsiao YW, Liu GS, et al. Characterisation of RNA editing and gene therapy with a compact CRISPR-Cas13 in the retina. Proc Natl Acad Sci U S A. 2024 Nov 5;121(45):e2408345121. doi: 10.1073/pnas.2408345121. Epub 2024 Oct 30.
3. MiVision-The Ophthalmic Journal. Gene Editing Suppresses VEGF - mivision. https://mvision.com.au/2024/12/gene-editing-suppresses-vegf/

Novel Targeted Remote-Controlled Genome Editing for Genetically-Related Diseases

In a recent advancement concerning exploiting CRISPR-Cas systems for targeted genome editing, biomedical engineers from the University of Southern California have developed a new toolkit that permits remote-controlled editing to treat certain genetic conditions, including cancers. The team developed a version of CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) which uses an enzyme called Cas9 and responds to ultrasound. It demonstrated how it can be used to clear cancer in mice. CRISPR could be incorporated into virus-delivery vehicles and delivered intravenously to a patient. Then, focused ultrasound pulses can be directed at the desired body part, activating the gene-editing tool. The trick is that the cells are designed to produce the Cas9 enzyme in response to heat, and that heat is induced by ultrasound. Their work with a controllable system has demonstrated a new way to control when and where CRISPR works. To use this tool to fight cancer, the team set CRISPR to target the repeating DNA sequences on the ends of chromosomes. This not only causes cancer cells to die off but triggers an immune response that summons other cells to help finish off the tumors, with another prong of attack coming from specialized CAR T immune cells, primed to attack the protein called CD19, which is expressed in high amounts by certain types of cancers. All (100%) of the mice receiving the CRISPR/CAR T cell therapy survived, clearing their cancers completely. By comparison, mice receiving CAR T cell therapy alone had a survival rate of just 40%.

The work, which is led by Peter Yingxiao Wang, and members of the Wang Lab, including assistant professor of biomedical engineering Longwei Liu, was recently published in Nature Communications. Dr. Wang and his lab have a long history of pioneering focused-ultrasound as part of groundbreaking cancer immunotherapy research using engineered Chimeric Antigen Receptor (CAR) T-cells; they harness ultrasound waves to directly control these CAR T-cells for precision targeting of tumor cells without harming healthy tissue. According to lead investigators, it is a tool that could be applied to a vast range of genetic disorders, diseases, and autoimmune conditions, with this being the first study that provides a very comprehensive, ultrasound-controllable CRISPR toolbox to knock out, activate, or silence a specific gene. Wang said that one of the current disadvantages of CRISPR is that once it is activated and delivered into the body, it can continue its gene-editing function continuously. While the results from this experiment look promising and encouraging, there is no guarantee that the same benefits will extend to human beings. According to the team, future work should focus on improving and extending the technique beyond CAR T cell therapy.

Source
Yiqian Wu et al, Ultrasound Control of Genomic Regulatory Toolboxes for Cancer Immunotherapy, Nature Communications (2024). DOI: 10.1038/s41467-024-54477-7
Eurek Alert! New CRISPR toolkit to allow remote-controlled genome editing. https://www.eurekalert.org/news-releases/1066982

New Atlas. Remote -controlled gene therapy uses ultrasound to kill cancer. https://newatlas.com/cancer/remote-controlled-gene-therapy-ultrasound-kill-cancer

Vitreoretinal Disease Suppression by mRNA-Based Treatment

A study published in Science Translational Medicine highlighted the potential of an mRNA-based treatment as a non-surgical option for proliferative vitreoretinopathy (PVR). The researchers engineered the mRNA to produce a dominant-negative inhibitor of RUNX1 (RUNX1-Trap), targeting the runt-related transcription factor-1 (RUNX1) linked to the disease's cellular changes. The RUNX1-Trap, delivered via polymer-lipidoid complexes or lipid nanoparticles, effectively sequestered RUNX1 in the cytosol and significantly reduced cell proliferation in primary cultures from fibrotic membranes of PVR patients. The findings from in vivo rabbit and mouse models and an ex vivo human explant model underscore the therapeutic potential of mRNA-encoded molecules with dominant-negative properties, suggesting that mRNA-based therapies could extend beyond traditional gene supplementation methods.

Source

O'Hare M, Miller WP et al. An mRNA-encoded dominant-negative inhibitor of transcription factor RUNX1 suppresses vitreoretinal disease in experimental models. Science Translational Medicine,27 Nov 2024, Vol 16.Issue 775

DOI: 10.1126/scitranslmed.adh0994

Eye World Weekly ASCRS. Studies make progress with gene and mRNA-based therapies for retinal conditions.

https://www.eyeworld.org/2024/eyeworld-weekly-december-6-2024/#39633d

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