ARVO EDUCATION COURSE

Saturday, May 3, 2025
8am – 5pm, MST
Salt Palace Convention Center
Salt Lake City, Utah

The New Era of Uveitis: Embracing Modern Technology

Course organizers

Chairperson: Vishali Gupta, MD
Course Coordinators: Rupesh Vijay Agrawal, MD, FRCS, MMed, Esen K. Akpek, MD, David S. Chu, MD, Phoebe Lin, MD, PhD, Careen Y. Lowder, MD, PhD, Quan Dong Nguyen, MD MSc, FARVO and Carlos E. Pavesio, FRCOphth, MD

Decoding multimodal imaging and artificial intelligence for daily uveitis practice

Moderators: David S. Chu, MD and Vishali Gupta, MD
10:30 – 12:05pm

This session will highlight the advances in the field of imaging as well as integration of Artificial intelligence in our practice and patient management.

Presentations		
10:30 AM	**Imaging outcomes in clinical trials** This review will focus on imaging outcomes that have been used in clinical trials, their pitfalls and advantages, as well as considerations for future clinical trial imaging outcomes in uveitis.	Phoebe Lin, MD, PhD
10:45 AM	**Minimal Imaging Set in Non-Infectious Posterior Uveitis (Guidelines by IUSG)** The Standardization of Uveitis Nomenclature (SUN) Working Group developed classification criteria for common uveitides entities based on clinical features and systemic test results using a modified Delphi approach. However SUN did not extensively address multimodal imaging (MMI) features for disease activity, or complications. In response to the growing role of MMI in posterior uveitis diagnosis and management, the International Uveitis Study Group (IUSG) launched the Multimodal Imaging for Uveitis (MUV) project to explore MMI's effectiveness and potentially create guidelines for its use in diagnosing and managing specific uveitides. The MUV committee initially focused on diseases where diagnosis heavily depends on imaging, as systemic tests may not be sufficient. Five conditions were selected: multiple evanescent white dot syndrome (MEWDS), Acute Posterior Multifocal Placoid Pigment Epitheliopathy (APMPPE), Multifocal Choroiditis/Punctate Inner Choroidopathy (MFC/PIC), Serpiginous Choroiditis (SC), and Birdshot Chorioretinopathy (BCR). These are typically categorized as white dot syndromes	Vishali Gupta, MD

	(WDS), but after consultation, the committee adopted the term non-infectious posterior uveitis (NIPU) for the purposes of the study. Multimodal imaging incorporates various imaging techniques, some of which are time-consuming, invasive, or require costly equipment. Consequently, MMI's widespread use is often limited to centers with the necessary resources, making it an impractical solution for all clinicians. To address this, one goal of the MUV project was to simplify the MMI approach, aiming to standardize imaging practices and reduce the number of imaging methods needed for diagnosis, monitoring, and complication detection in NIPU. The MUV team created a minimum imaging set (MIS) for each disease based on expert reviews, case studies, and existing literature, to help clinicians effectively diagnose and track disease activity with a limited set of imaging techniques. The MIS recommendations were put to the test during a live validation exercise at the INFLAMMATIO meeting in Singapore in November 2024. Experts presented their findings, discussed the results, and validated the proposed imaging sets. These results shall be discussed during the presentation	
11:00 AM	**Machine learning in Uveitis Imaging** Advances in artificial intelligence (AI) and in silico modeling are transforming our understanding of retinal diseases. However, sophisticated AI models require large datasets, which are often lacking in rare diseases such as uveitis. This presentation explores strategies to overcome these limitations and demonstrates how AI can be leveraged in orphan diseases like uveitis. One key application is predicting the development of secondary choroidal neovascularization (CNV) in multifocal choroiditis (MFC) and punctate inner choroidopathy (PIC) using transfer learning and AI-driven imaging analysis. Additionally, AI is used to investigate molecular mimicry as a potential driver of ocular autoimmunity. Using a cloud-based, pretrained AI platform, longitudinal data from 208 eyes with MFC/PIC were analyzed to identify biomarkers predictive of secondary CNV. The findings enable early intervention and optimized patient stratification, helping to determine which patients may benefit from immunomodulatory therapy to prevent complications and which are unlikely to develop secondary CNV. Beyond prediction, AI is also instrumental in uncovering the underlying mechanisms of autoimmune inflammation in uveitis. In silico modeling is applied to explore molecular mimicry mechanisms, with structural and sequence homology analyses performed between microbial proteins (e.g., *Mycobacterium tuberculosis*, SARS-CoV-2) and ocular proteins to identify potential cross-reactive epitopes that may drive immune dysregulation. Computational docking and antigenicity predictions further support the hypothesis of pathogen-induced autoimmunity in ocular disease. This presentation underscores the transformative role of AI and computational modeling in ocular inflammatory diseases, providing novel insights into disease	Marion Ronit Munk, MD, PhD

	mechanisms and predictive analytics. By integrating advanced imaging analysis with molecular immunology, AI can enhance early detection, enable personalized treatment strategies, and facilitate drug target discovery in uveitis and retinal inflammatory disorders.	
11:15 AM	**Uveitis chatbot for physicians and patients** Uveitis, a complex and potentially sight-threatening intraocular inflammatory condition, presents diagnostic and management challenges due to its diverse etiologies and the global shortage of uveitis specialists. This presentation will introduce UveAItis, a novel AI-powered chatbot designed to assist both patients and physicians in navigating uveitis diagnosis, treatment recommendations, and patient education. Built using a retrieval-augmented generation (RAG) model powered by GPT-4o, UveAItis integrates peer-reviewed uveitis literature and the Standardization of Uveitis Nomenclature (SUN) criteria to enhance diagnostic precision and accessibility. We will discuss the development process of UveAItis, including its curated knowledge base derived from 1,421 peer-reviewed uveitis studies, the integration of natural language processing techniques, and its web-based user interface. The chatbot was evaluated against leading large language models (LLMs), demonstrating 80% diagnostic accuracy—surpassing ChatGPT-4o and other general-purpose AI models. Additionally, UveAItis provided superior patient education, achieving higher correctness, completeness, and readability scores compared to widely used medical websites. This talk will highlight key findings from the validation studies, including the chatbot's effectiveness in diagnosing prototypical uveitis cases and its ability to provide reliable treatment recommendations. We will also explore its role in bridging the gap in uveitis care, particularly in regions with limited access to specialists. The discussion will address the implications of AI-driven tools in ophthalmology, ethical considerations, and future directions for AI-assisted uveitis management.	Rupesh Vijay Agrawal, MD, FRCS, MMed
Case study		
11:30 AM	**Case Study: Illustrating the utility of multimodal imaging** Multimodal imaging incorporates a diverse number of imaging modalities including fundus fluorescein angiography (FFA), indocyanine green angiography (ICGA), optical coherence tomography (OCT), and OCT angiography (OCTA). They provide a detailed visualization of both anatomic and pathophysiologic alterations in various eye structures. Posterior pole uveitis is a heterogeneous group of autoimmune and autoinflammatory diseases with overlapping clinical presentations. Using multimodal imaging, it is possible to distinguish key clinical features with relevance to the diagnosis and management of many entities, particularly those affecting the outer retina, RPE/choriocapillaris and choroid. Using the proposed classifications of the Multimodal Imaging in Uveitis (MUV) initiative of the International Uveitis Study Group (IUSG), key distinguishing features will be outlined.	Marc ' D de Smet, MD CM PhD FRCSC, FARVO

Debate: AI vs. human interpretation of Imaging		
AI in Imaging Interpretation: Do I trust?		
11:40 AM	**Yes. I trust AI in imaging interpretation.** AI imaging is revolutionizing healthcare by redefining diagnostic precision and operational efficiency. The FDA's approval and clearance processes underscore their reliability through rigorous evaluation, confirming these tools meet stringent clinical standards—evident in groundbreaking applications such as: IDx-DR(autonomous diabetic retinopathy detection), ProFound AI(30% fewer mammogram false positives), and Paige Prostate(70% reduction in prostate biopsy errors). Solutions such as Viz.aicut stroke treatment delays by 52 minutes via rapid CT analysis, while GI Genius boosts colonoscopy polyp detection by 14%, preventing missed cancers. AI systems like OsteoDetect(wrist fractures) and DermEngine (melanoma) match or exceed human performance, enabling equitable care in rural and urban settings. Free from fatigue and continuously improving with data, AI standardizes diagnoses, accelerates workflows, and drives a shift toward data-driven, globally accessible medicine.	Yasir Jamal Sepah, MBBS
11:50 AM	**No. I don't trust AI in imaging interpretation.** Despite advances in artificial intelligence (AI) for medical imaging, significant risks undermine its clinical reliability. This talk outlines six critical reasons to distrust AI in radiology: Invisible Errors: Automated scoring systems fail to detect life-threatening mistakes, such as misclassifying malignant tumors, because evaluation metrics prioritize linguistic patterns over clinical validity. Lack of Clinical Judgment: AI analyzes pixels but cannot integrate patient history, symptoms, or lab results, leading to context-blind errors (e.g., flagging stable benign nodules as suspicious). Over-Reliance Risks Harm: Unchecked AI may miss subtle findings (e.g., early-stage cancer), delaying care while fostering false confidence. Baked-In Bias: Models trained on non-diverse data exacerbate disparities, underperforming for underrepresented groups (e.g., misdiagnosing TB in elderly Asian women). Failure in Ambiguity: AI excels only in textbook cases, faltering with rare diseases or complex presentations where radiologists' expertise is vital. Black Box Accountability: Unexplainable decisions—such as mislabeling a brain bleed—erode trust and prevent error correction. The talk argues that AI's limitations in accuracy, context, equity, and transparency make it unfit for autonomous use. Rigorous human oversight must remain central to safe imaging interpretation.	David S. Chu, MD
12:00 PM	**Debate: Voting & Concluding Remarks**	Vishali Gupta, MD

*Presenters and presentations are subject to change without notice.