# AI IN MEDICINE FOR THE RETINA FELLOW

Two experts in the field weigh in on this hot topic.

BY NIKHIL K. BOMMAKANTI, MD

The release of the AI chatbot ChatGPT (OpenAI) in November 2022 led to a renewed interest in the potential applications of AI in medicine.[1] As of December 16, 2023, a PubMed search for "ChatGPT," "large-language model," and "AI chatbot" yielded 1,942, 330, and 106 results, respectively, likely because chatbots have the potential to assist in several aspects of health care, including patient education, medical training, and administrative tasks, such as generating clinical notes and summarizing treatment courses.[2-5]

As fellows embarking on a career in one of the most dynamic, exciting, and technologically advanced fields in medicine, we would benefit from having a basic understanding of AI and how it may affect the field of retina. I interviewed two experts on this topic: J. Peter Campbell, MD, MPH, an associate professor of Ophthalmology at the Oregon Health & Science University School of Medicine in Portland, and Daniel Shu Wei Ting, MBBS (Hons), M Med (Ophth), FAMS, PhD (UWA), an associate professor and senior consultant at the Singapore National Eye Center in Singapore. Below are their thoughts.

## NIKHIL K. BOMMAKANTI, MD: WHAT SHOULD RETINA FELLOWS KNOW ABOUT AI?

**Dr. Campbell:** AI is a broad topic. It includes, but is not limited to, applications in essentially all imaging devices, electronic health record analytics, patient scheduling, and beyond. It's important to think about each unique AI application based on its indication for use, such as autonomous screening of diabetic retinopathy (DR), detection of Parkinson disease on OCT, and automated quantification of fluid in patients with diabetic macular edema. As a retina specialist, just like with any new imaging modality, you need to take the time to understand what AI can and can't do and be prepared to leverage it as a tool whenever appropriate.

## DR. BOMMAKANTI: WHAT ARE SOME WAYS THAT AI IMPROVES PATIENT CARE IN RETINA?

**Dr. Ting:** Deep-learning algorithms can be used with color fundus photographs to screen for conditions such as DR, AMD, retinopathy of prematurity, and inherited retinal degeneration. OCT segmentation can also help streamline the clinical workflow.

**Dr. Campbell:** The most useful applications will involve assessing disease severity in ophthalmic imaging, such as measuring subretinal and intraretinal fluid in AMD.

There are, of course, many potential "moonshot" applications, such as predicting future systemic disease development from OCT scans. There are also numerous potential ways, when incorporated into the health care system, that AI could improve the efficiency of retina clinic scheduling (such as identifying urgent referrals) that we have yet to optimize. In addition, figuring out how to develop health care systems that can leverage the advantages of autonomous AI could be a game-changer in terms of secondary prevention of retina diseases, such as AMD and DR.

## DR. BOMMAKANTI: WHAT ARE SOME WAYS THAT AI CAN IMPROVE OUR DAY-TO-DAY WORKFLOW?

**Dr. Campbell:** If we ignored reimbursement issues, all of the many inefficiencies built into our system could be avoided. AI is a tool that can probably do some of the things that we typically do every day—and do it better than we can. We need to focus on the uniquely human aspects of patient care and use AI to help us be better at what we do.

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**Dr. Ting:** Large-language models could aid with patient counselling and education. For example, these models could summarize complex notes and help draft letters to general practitioners or other members of a patient's health care team.

### DR. BOMMAKANTI: WHAT ARE SOME OF THE PITFALLS THAT WE SHOULD KNOW ABOUT?

**Dr. Campbell:** I remember when OCT angiography was new, and we as a field published hundreds of papers with new findings, many of which we now realize were wrong based on image artifacts and other issues. AI has several limitations that are important to understand as well.

**Dr. Ting:** AI's limitations include bias, which may lead to worse or inaccurate performance for certain populations of people, and unclear generalizability, meaning that models may not perform as well across diverse populations or conditions. Decisions provided by AI should be interpretable by clinicians who must be able to trust and effectively use the insights. It's important that AI respects patient autonomy and privacy and does not exacerbate health care disparities.

There are also other practical considerations, such as how AI can be integrated into clinical workflows and how it will be reimbursed.

### DR. BOMMAKANTI: WHAT ARE SOME MISUNDERSTANDINGS THAT DOCTORS HAVE ABOUT AI? WHAT ARE SOME BLIND SPOTS THAT ENGINEERS HAVE ABOUT MEDICINE?

**Dr. Ting:** When prompted with these questions, here is what ChatGPT had to say: "Doctors may misunderstand AI as a technology that can fully replace human judgment, not appreciating that AI is designed to augment rather than replace their expertise. They might also underestimate the complexity of AI's decision-making process, expecting it to be infallible, or overestimate the readiness of AI to handle nuanced clinical scenarios.

"Conversely, engineers may have blind spots regarding the variability and complexity of medicine. They might not fully grasp the importance of clinical context and the subtleties of patient interactions, which can be critical for diagnosis and treatment. Additionally, engineers may not always appreciate the regulatory and ethical considerations unique to health care, such as patient consent and the consequences of errors."

### DR. BOMMAKANTI: HOW CAN RETINA FELLOWS WORK EFFECTIVELY WITH COMPUTER SCIENTISTS AND ENGINEERS?

**Dr. Ting:** It's important to be patient, collaborative, and clearly describe the intended clinical uses of AI. Retina specialists can assist computer scientists and engineers by providing insight into patients' perspectives and by troubleshooting the challenges of real-world adoption to make deployment as seamless as possible.

### DR. BOMMAKANTI: ANY LAST THOUGHTS ABOUT AI, RETINA, AND THE FUTURE?

**Dr. Ting:** I'm excited about how AI could be used in medical imaging analysis, drug discovery, and personalized health care.

**Dr. Campbell:** Remember that AI is only the latest hot thing. It will soon be old news when we have the next thing, and we will soon take AI—and what it can do for us—for granted, exactly like we do now with OCT. Nonetheless, I'm excited to see how this will play out and what's next for retina. ■

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