

AI matches or outperforms human specialists in retina and glaucoma management, study finds

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A large language model (LLM) artificial intelligence (AI) system can match, or in some cases outperform, human ophthalmologists in the

diagnosis and treatment of patients with glaucoma and retina disease, according to research from New York Eye and Ear Infirmary of Mount Sinai (NYEE).

The provocative study, published February 22, in *JAMA Ophthalmology*, suggests that advanced AI tools, which are trained on vast amounts of data, text, and images, could play an important role in providing decision-making support to ophthalmologists in the diagnosis and management of cases involving glaucoma and retina disorders, which afflict millions of patients.

The study matched the knowledge of ophthalmic specialists against the capabilities of the latest generation AI system, GPT-4 (Generative Pre-Training–Model 4) from OpenAI, designed to replicate human-level performance.

Within medicine, sophisticated AI tools are seen as potentially revolutionizing diagnosis and treatment tools through the accuracy and comprehensiveness of their LLM-generated responses. Ophthalmology, with its high volume of often complex patients, could be a particularly fertile field for AI, giving specialists more time to practice evidence-based medicine.

"The performance of GPT-4 in our study was quite eye-opening," says Andy Huang, MD, an ophthalmology resident at NYEE, and lead author of the study. "We recognized the enormous potential of this AI system from the moment we started testing it and were fascinated to observe that GPT-4 could not only assist but in some cases match or exceed, the expertise of seasoned ophthalmic specialists."

For the human side of its study, the Mount Sinai team recruited 12 attending specialists and three senior trainees from the Department of Ophthalmology at the Icahn School of Medicine at Mount Sinai.

A basic set of 20 questions (10 each for glaucoma and retina) from the American Academy of Ophthalmology's list of commonly asked questions by patients was randomly selected, along with 20 deidentified patient cases culled from Mount Sinai-affiliated eye clinics.

Responses from both the GPT-4/AI system and human specialists were then statistically analyzed and rated for accuracy and thoroughness using a Likert scale, which is commonly used in [clinical research](#) to score responses.

The results showed that AI matched or outperformed human specialists in both accuracy and completeness of its medical advice and assessments. More specifically, AI demonstrated superior performance in response to glaucoma questions and case-management advice, while reflecting a more balanced outcome in retina questions, where AI matched humans in accuracy but exceeded them in completeness.

"AI was particularly surprising in its proficiency in handling both glaucoma and retina patient cases, matching the accuracy and completeness of diagnoses and treatment suggestions made by human doctors in a clinical note format," says Louis R. Pasquale, MD, FARVO, Deputy Chair for Ophthalmology Research for the Department of Ophthalmology, and senior author of the study.

"Just as the AI application Grammarly can teach us how to be better writers, GPT-4 can give us valuable guidance on how to be better clinicians, especially in terms of how we document findings of patient exams."

While emphasizing that additional testing is needed, Dr. Huang believes this work points to a promising future for AI in [ophthalmology](#). "It could serve as a reliable assistant to eye specialists by providing diagnostic support and potentially easing their workload, especially in complex

cases or areas of high patient volume," he explains.

"For patients, the integration of AI into mainstream ophthalmic practice could result in quicker access to expert advice, coupled with more informed decision-making to guide their treatment."

More information: Assessment of a Large Language Model's Responses to Questions and Cases About Glaucoma and Retina Management, *JAMA Ophthalmology* (2024).

Provided by The Mount Sinai Hospital

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