Editorial

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AI in gastrointestinal endoscopy: enhancing precision, preserving the human touch

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Artificial intelligence (AI) has been around since the 1950s; it refers to a computer's ability to do certain cognitive tasks in a way that is similar to a human brain.[1,2] Recent years have seen the use of AI to assist in diagnosis across a variety of medical domains, made possible by the remarkable progress in this area.[3] As professionals in the field strive to enhance the precision of diagnoses, the efficacy of treatments, and patient outcomes, the integration of AI has emerged as a promising new frontier in medical research and therapy.[4] Diagnostic endoscopy may provide a lot of information when diagnosing gastrointestinal (GI) disorders. Endoscopists continue to play a crucial role in diagnosis and therapy. AI has been used by the field of gastrointestinal endoscopy to tackle these difficulties.[5] Given the rapid advancements in AI, surgical robots and AI-assisted systems may soon be able to conduct intricate endoscopic treatments for bile duct stones, early-stage gastrointestinal cancer, and other illnesses affecting the gastrointestinal tract.[6,7]

Lui et al. showed that AI can accurately identify esophageal and gastric cancers (with a pooled Area under the curve (AUC) >.88). AI successfully detected stomach neoplasms using an area under the curve, with a combined sensitivity of 92.1% and specificity of 95.0%.[8] The 7,037 White light imaging (WLI) photos and biopsy data were collected by Lin et al.[9] from 14 hospitals. The images were classified as Atrophic gastritis (AG), non-Atrophic gastritis (non-AG), or Gastric intestinal metaplasia (GIM) based on the pathology report. AI training cohort for developing the convolutional neural network (CNN) model (TrsNet) was used. The AI model's sensitivity for diagnosing GIM was 97.9% and its specificity was 97.5%. According to Yan et al.,[10] an AI model was trained to detect GIM using 2,357 Narrow-band imaging (NBI) and Magnifying endoscopy-narrow-band imaging (ME-NBI) pictures taken from 416 patients. Not only was the model 88.8% accurate, but it was also 91.9% sensitive and 86.0% specific. While AI models fared better than human experts, their results were close. Testing results for the NBI and ME-NBI AI models were combined. Wong et al.[11] introduced a framework for training a wide learning system with multiscale attention. The diagnostic accuracy of this method for GIM was 93.2%. Expert endoscopists were pitted against the AI model in a diagnostic test, and the results showed that AI could hold its own. Colonoscopies have been shown to significantly enhance the incidence of adenoma and polyp identification, according to numerous research studies.[12-15]

AI offers tremendous potential for revolutionizing gastrointestinal endoscopy, but we need large-scale, multi-center clinical trials to evaluate how accurate AI systems are at diagnosing.

To confidently utilize endoscopy-based AI systems in general practice, more developments in AI technology are required to provide a strong basis. Use of raw video for CNN as a specific class of deep neural networks, training or testing may make endoscopic examinations more lifelike and enable real-time assessment. This will enhance the model's accuracy by simulating real-life endoscopic scenarios. Additionally, current CNN-based models need to include patient risk categorization. Consequently, fewer individuals will get an incorrect diagnosis, and AI-based models will perform even better, particularly with high-risk populations.[16,17] Although this trend is encouraging, there are still a lot of obstacles that must be overcome before broad adoption can occur. Standardized regulation is necessary due to a lot of variation in AI models and training data. Furthermore, potential drawbacks with current AI models include increased amount of false positive findings, longer procedures, endoscopists' dependency on the software, and overall expenditures.[18]

Future studies should concentrate on improving clinically useful applications, large real-world datasets, and the "explainability" of AI results to physicians and patients. Collaborative efforts between researchers, physicians, and AI specialists are necessary to fully use the potential of AI and multimodal imaging in gastroenterology for game-changing advancements in monitoring, diagnosis, and treatment.

Although useful, these technologies are unlikely to replace human decision-makers in gastrointestinal endoscopy. Patients' symptoms, medical history, and general health must be understood to make complicated and nuanced endoscopic decisions. AI and other automated systems may not be able to analyze findings efficiently or manage spontaneous endoscopic issues that demand quick analysis and adaptive decision-making. In the end, many people would trust other humans over a machine valuing the human's input rather than the machine.

Due to inconsistent inputs, imprecise outputs, or unusual events, AI and comparable systems struggle to digest data and find patterns consistently. Endoscopic technology needs a physician, regardless of how effectively machine learning works alone. Coupled with human skill, it may improve medical diagnosis. In conclusion, though technological advancements have made gastrointestinal endoscopy more accurate and precise, the most crucial aspect will always be the invaluable knowledge and experience of the physicians doing the procedures. Future success in the field will depend on our ability to integrate human judgment with technological capacity.

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