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AI shows promise for precision inflammatory bowel disease management

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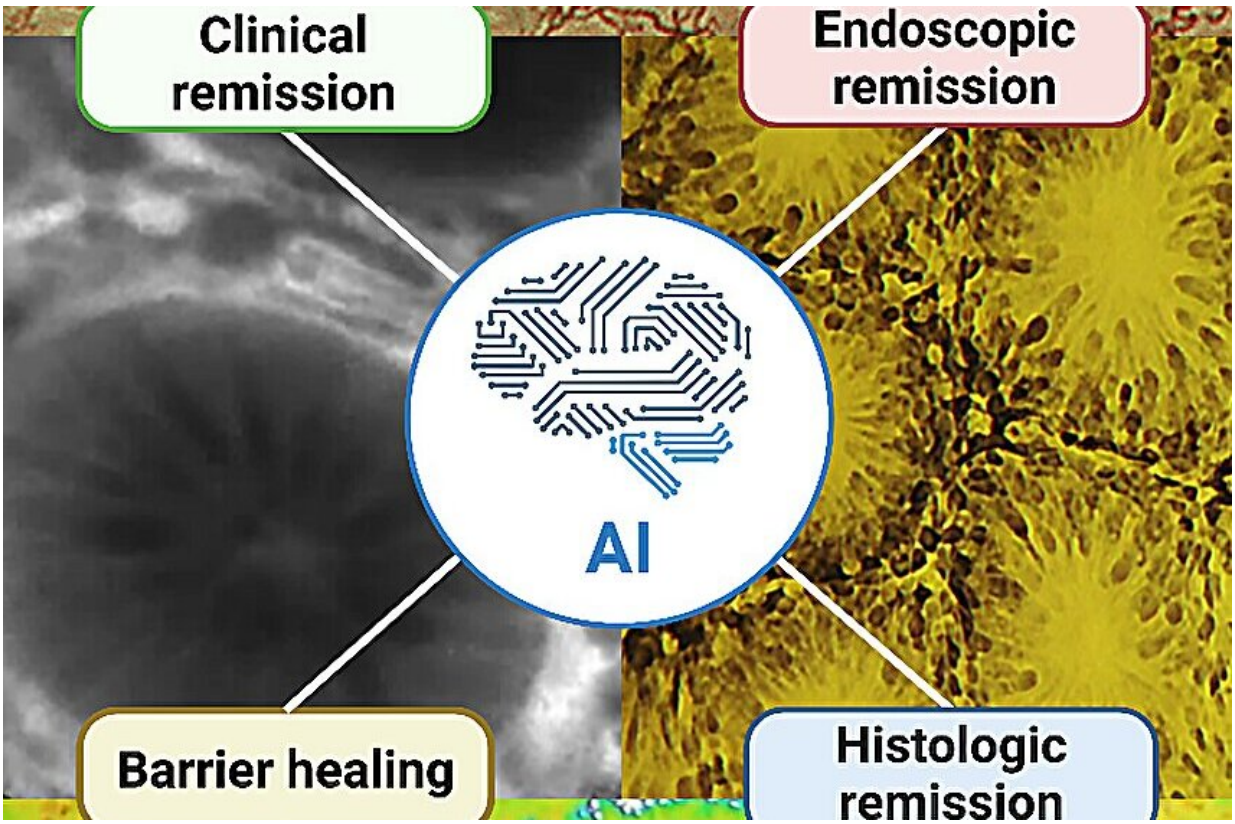

Advanced endoscopic technologies, including virtual chromoendoscopy (top), Cellvizio confocal laser endomicroscopy (middle left), Olympus high-magnification endocytoscopy (middle right), and the Red density-Pentax algorithm (bottom). These tools, integrated with artificial intelligence, promise to standardize the assessment of remission and healing in Inflammatory Bowel Disease, enhancing the prediction of therapy responses and outcomes. Created with BioRender.com. Credit: Yasuharu Maeda, Ilaria Ditonno, Miguel Puga-Tejada, Irene Zammarchi, Giovanni Santacroce, Subrata Ghosh, Marietta

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Inflammatory bowel diseases (IBD), such as Crohn's disease and ulcerative colitis, are chronic conditions that significantly impact patients' quality of life. While significant advancements have been made in treatment options, pursuing long-term disease remission remains a challenge.

Recent breakthroughs in endoscopic technologies, artificial intelligence (AI), and digital pathology offer promising solutions to address this unmet need, according to a paper published in the journal *eGastroenterology*.

Historically, endoscopic remission has been the primary therapeutic goal in IBD. However, the limitations of traditional white light endoscopy in accurately assessing mucosal inflammation and distinguishing between mild, patchy inflammation and quiescent disease have hindered the effectiveness of treatment strategies.

Advanced endoscopic techniques, including dye-based chromoendoscopy, virtual chromoendoscopy, and ultra-high magnification endoscopy, have revolutionized the evaluation of IBD. These technologies provide more detailed and accurate assessments of mucosal architecture, vascular patterns, and subtle inflammatory changes. Additionally, they enable the real-time investigation of the intestinal barrier, offering valuable insights into disease activity and potential treatment targets.

The integration of AI with endoscopy has further enhanced the diagnostic capabilities of these techniques. AI-powered algorithms can analyze endoscopic images and videos, providing objective and

standardized assessments of disease activity, predicting clinical outcomes, and stratifying patients for personalized treatment.

Beyond endoscopy, AI has also demonstrated significant potential in analyzing histological samples. Digital pathology, which involves digitizing glass slides for computer-assisted analysis, enables AI algorithms to accurately assess histological inflammation, identify markers of disease activity, and even predict treatment responses.

By combining advanced endoscopy, AI, and digital pathology, health care providers can now achieve a deeper understanding of IBD. This leads to more accurate diagnoses, personalized treatment plans, and improved patient outcomes. These advancements represent a significant step forward in the management of IBD and offer hope for patients seeking long-term remission.

While AI-enabled technologies offer immense promise, several challenges remain to be addressed before their widespread adoption in clinical practice. These include ensuring the reliability and robustness of AI algorithms, addressing data privacy concerns, and establishing clear guidelines for their use.

By overcoming these challenges, AI can revolutionize the management of IBD and usher in a new era of precision medicine.

More information: Yasuharu Maeda et al, Artificial intelligence-enabled advanced endoscopic imaging to assess deep healing in inflammatory bowel disease, *eGastroenterology* (2024). DOI: 10.1136/egastro-2024-100090

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