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PEER-REVIEW REPORT

Name of journal: *World Journal of Gastroenterology*

Manuscript NO: 109802

Title: Multimodal artificial intelligence technology in the precision diagnosis and treatment of gastroenterology and hepatology: Innovative applications and challenges

Provenance and peer review: Invited Manuscript; Externally peer reviewed

Peer-review model: Single blind

Reviewer's code: 08570526

Position: Peer Reviewer

Academic degree and professional title: Researcher

Reviewer's Country/Territory: China

Author's Country/Territory: China

Manuscript submission date: 2025-05-21

Reviewer chosen by: AI Editor

Reviewer accepted review: 2025-05-22 09:29

Reviewer performed review: 2025-05-22 10:54

Review time: 1 Hour

Content to be reviewed	Does the manuscript's content fall within the scope of the journal? Yes Is there any Key Word that is not included in the manuscript title? No Do authors' affiliations correspond to the content of the manuscript? Yes Does the Abstract contain the contents of each part of the manuscript (IMRaD)? Yes
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Are the Key Words complete? **Yes**

Is the content of the Introduction adequate? **Yes**

Is the content of the Materials and Methods complete?
Yes

Is the description of the experiments clear and
complete? **Yes**

Are the experimental data presented in the
manuscript's biostatistics content reliable? **Yes**

Are the experimental data of the Results true and
reliable? **Yes**

Are the quality and resolution of the images up to
standard? **Yes**

Do the selection and design of the figures and tables
follow the principles of necessity and clarity? **Yes**

Is there any duplication between various parts of the
manuscript and between the main text and the content
presented in the figures and tables? **No**

Are the figures and tables numbered consecutively in
the order in which they appear in the manuscript? **Yes**

Is the content of the Discussion reasonable? **Yes**

Is the Conclusion reasonable? **Yes**

Are all references necessary and reasonable? **Yes**

Do authors omit important references? **No**

Are all references related to the topic of the
manuscript? **Yes**

Do authors only cite their own earlier publications? **No**

Is the manuscript's text correct, concise, and clear? **Yes**

Will the manuscript's content be of interest to readers?
Yes

Are additional experiments needed for the study? **No**



	Does the research scope comply with ethics? Yes
Scientific quality	Grade A (Excellent)
Novelty of this manuscript	Grade A (Excellent)
Creativity or innovation of this manuscript	Grade A (Excellent)
Scientific significance of the conclusion in this manuscript	Grade A (Excellent)
Language quality	Grade A (Excellent)
Does this manuscript describe a study of the existing knowledge system?	Yes
Does this manuscript report a revolutionary innovation?	No
Does this manuscript report an unconventional innovation?	No
Conclusion	Accept
Re-review	Yes
Peer-reviewer statements	Peer-Review: Onymous
	Conflicts-of-Interest: No

SPECIFIC COMMENTS TO AUTHORS

This manuscript presents a comprehensive, well-structured, and highly relevant review of the current landscape and future directions of multimodal artificial intelligence (AI) in the precision diagnosis and treatment of gastrointestinal and hepatobiliary diseases. The authors successfully integrate technical depth with clinical applicability, offering a holistic perspective on how multimodal AI – including endoscopy, radiology, pathology, genomics, proteomics, and natural language processing (NLP) – can transform clinical workflows and improve patient outcomes.



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The manuscript's strengths are numerous. It demonstrates exceptional breadth, covering a wide range of AI modalities and clinical domains, while also maintaining clarity and depth in its explanations. Each section is thoughtfully developed and clearly written, with well-chosen examples from recent literature that effectively illustrate the state-of-the-art. The inclusion of specific model types (e.g., Vision Transformers, graph neural networks, LSTM), application scenarios (e.g., immunotherapy prediction, liver transplantation, recurrence monitoring), and integration strategies (e.g., federated learning, digital twins) shows the authors' in-depth understanding of both AI and medical practice.

Moreover, the authors go beyond merely summarizing existing studies. They provide a critical synthesis that highlights not only the technical progress but also real-world barriers—such as data heterogeneity, model interpretability, and ethical or regulatory issues. The proposed solutions, including the development of cross-institutional data-sharing platforms, interpretable AI frameworks, and dynamic clinical validation systems, are both timely and pragmatic.

The manuscript is also notable for its multidisciplinary accessibility. It avoids excessive technical jargon while maintaining academic rigor, making it suitable for readers ranging from medical professionals to data scientists. The figures are useful and clearly complement the text. The writing is fluent, concise, and well-polished, with minimal if any language issues.

I did not identify any major or minor issues requiring revision. This article makes a valuable contribution to the field and will serve as a helpful reference for researchers and clinicians seeking to understand and implement AI solutions in gastroenterology



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and hepatology.

Recommendation: Accept without revision.



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Peer-review model: Single blind

Reviewer's code: 08457068

Position: Peer Reviewer

Academic degree and professional title: MD, Senior Researcher

Reviewer's Country/Territory: Pakistan

Author's Country/Territory: China

Manuscript submission date: 2025-05-21

Reviewer chosen by: AI Editor

Reviewer accepted review: 2025-05-22 10:27

Reviewer performed review: 2025-05-27 11:38

Review time: 5 Days and 1 Hour

Content to be reviewed	Does the manuscript's content fall within the scope of the journal? Yes Is there any Key Word that is not included in the manuscript title? Yes Do authors' affiliations correspond to the content of the manuscript? Yes Does the Abstract contain the contents of each part of the manuscript (IMRaD)? Yes Are the Key Words complete? No
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Is the content of the Materials and Methods complete?

Yes

Is the description of the experiments clear and complete? **Yes**

Are the experimental data presented in the manuscript's biostatistics content reliable? **No**

Are the experimental data of the Results true and reliable? **No**

Are the quality and resolution of the images up to standard? **No**

Do the selection and design of the figures and tables follow the principles of necessity and clarity? **Yes**

Is there any duplication between various parts of the manuscript and between the main text and the content presented in the figures and tables? **Yes**

Are the figures and tables numbered consecutively in the order in which they appear in the manuscript? **Yes**

Is the content of the Discussion reasonable? **Yes**

Is the Conclusion reasonable? **Yes**

Are all references necessary and reasonable? **Yes**

Do authors omit important references? **Yes**

Are all references related to the topic of the manuscript? **Yes**

Do authors only cite their own earlier publications? **No**

Is the manuscript's text correct, concise, and clear? **Yes**

Will the manuscript's content be of interest to readers?
Yes

Are additional experiments needed for the study? **No**

Does the research scope comply with ethics? **Yes**



Scientific quality	Grade B (Very good)
Novelty of this manuscript	Grade B (Very Good)
Creativity or innovation of this manuscript	Grade B (Very Good)
Scientific significance of the conclusion in this manuscript	Grade B (Very Good)
Language quality	Grade C (Good)
Does this manuscript describe a study of the existing knowledge system?	Yes
Does this manuscript report a revolutionary innovation?	No
Does this manuscript report an unconventional innovation?	No
Conclusion	Minor revision
Re-review	Yes
Peer-reviewer statements	Peer-Review: Anonymous
	Conflicts-of-Interest: No

SPECIFIC COMMENTS TO AUTHORS

The manuscript presents a comprehensive review of the applications of multimodal artificial intelligence (AI) in the diagnosis and treatment of gastrointestinal and liver diseases. The scope of the article is impressive, covering a wide array of AI technologies, including endoscopic image analysis, radiomics, pathology, and multi-omics data integration, along with discussions on ethical challenges, standardization, and clinical translation. However, despite the manuscript's broad scope and rich content, several limitations and areas for improvement should be addressed to strengthen its scientific rigor and clinical relevance.



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Firstly, while the paper is well-organized and detailed, it lacks critical assessment of the limitations within cited studies. For instance, many of the performance metrics reported (e.g., AUCs, NPVs) come from studies that rely heavily on retrospective, single-center datasets. The review would benefit from explicitly stating the inherent biases and limitations associated with such data sources, including overfitting risks and lack of ethnic diversity, which constrain the generalizability of AI models across populations and healthcare systems (Section 2.1.2, page ~15).

Secondly, the manuscript frequently uses highly technical jargon and acronyms (e.g., TTb, TLS, ViT, CNN-SASM) without adequate explanation or glossary. This might limit accessibility for clinicians or non-specialist readers. Definitions and brief explanations upon first use would enhance clarity.

Thirdly, the text occasionally reads like a promotional document rather than a critical scientific review. Many of the AI technologies are presented with high optimism and performance metrics, yet real-world implementation and limitations are often understated. For example, while it is mentioned that endoscopic AI can increase early detection rates of gastric cancer, there is insufficient discussion of false positive rates, patient anxiety, workflow burden, or the costs of implementation (Section 2.1.1, page ~13). A more balanced view discussing these downsides would improve the objectivity of the review.

Moreover, the article does not sufficiently address regulatory and ethical implications of AI deployment in clinical settings. Although these are mentioned in Section 4, the discussion lacks depth regarding data privacy laws, liability in case of misdiagnosis by AI, or frameworks for explainability. Given the sensitivity of patient data and the black-box nature of many deep learning models, this omission is significant.

Another critical limitation is the over-reliance on quantitative metrics (AUC, sensitivity, specificity) to evaluate AI models. Clinical utility and integration are not thoroughly



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discussed. It would be useful to include case studies or examples of AI applications in real-world clinical workflows, highlighting barriers such as clinician acceptance, integration into electronic medical records, or procedural delays.

Additionally, although the article makes multiple references to multimodal integration, it often discusses individual modalities in isolation. For instance, Sections 2.1.2 and 2.1.3 describe CT/MRI and pathology image models separately, without delving into how these modalities can be meaningfully combined for synergistic decision-making. Providing concrete examples of multimodal fusion (e.g., radiomics + omics + clinical data in a unified model) would enhance the manuscript's coherence and innovation narrative.

literature was selected or assessed. Inclusion and exclusion criteria, search databases, and time frames are not described, which limits reproducibility and transparency. A PRISMA-style flow diagram or methodological appendix would be beneficial.

Finally, while the manuscript is lengthy and exhaustive, there is some redundancy, especially in the discussions of AI applications in gastric and colorectal cancers. Streamlining repetitive content and grouping similar themes might improve readability.