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Summary

AI-DRIVEN PROBE CONFOCAL LASER ENDOMICROSCOPY ENABLES AUTOMATED ASSESSMENT OF INTESTINAL BARRIER IMPAIRMENT IN IBD

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Colorectal | IBD

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An externally validated artificial intelligence system for probe-based confocal laser endomicroscopy achieved 73.3% accuracy in automated detection of intestinal barrier impairment in IBD across two international centers.

KEY POINTS

- The AI algorithm detected overall barrier impairment with 73.3% accuracy and 89.7% sensitivity in the external validation cohort of 101 videos from 68 IBD patients.
- The system assessed both epithelial barrier features (villi/crypt architecture, goblet cells) and vascular barrier features (vessel architecture, fluorescein leakage) with AUC values ranging from 0.71 to 0.79 for most components in the validation cohort.
- Performance was slightly lower for villi/crypts architecture (0.58 AUC) and goblet cells (0.73 AUC) in the validation cohort, reflecting the more challenging assessment of these features with pCLE.
- The model achieved moderate to substantial agreement with expert assessment for most features, supporting reduction of interobserver variability in pCLE interpretation.
- This is the first independent, externally validated AI platform for automated quantification of epithelial and vascular barrier dysfunction in IBD, offering an objective tool to monitor barrier healing as a therapeutic endpoint.

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