

AI MODELS FOR QC AND NON-MUCOSAL FEATURE DETECTION IN HISTOLOGICAL PINCH BIOPSIES OF INFLAMMATORY BOWEL DISEASE

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A deep learning system was developed to identify muscularis mucosa, blood, and tissue fragmentation in colorectal biopsy whole slide images to improve quality control and guide histological assessment in inflammatory bowel disease.

KEY POINTS

- The AI models accurately distinguished muscularis mucosa and blood in whole slide images despite their similar appearance and quantified these features relative to total tissue content in 129 patients with IBD.
- Muscularis mucosa accounted for $11.6\% \pm 10.9\%$ of the biopsy section area across 594 whole slide images, and the model provided visual reference for identifying crypt shortfall and sample orientation.
- A tissue fragmentation score was introduced and quantified across 317 biopsies, demonstrating effectiveness as a metric for identifying degraded tissue sections.
- The pipeline has the potential to offer guidance including re-cut recommendations to enhance evaluation of sample adequacy in IBD by assessing key biopsy features often overlooked by other quality control systems.
- This work is most relevant to pathologists and clinical teams involved in IBD histological assessment and quality control of colorectal biopsies.

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