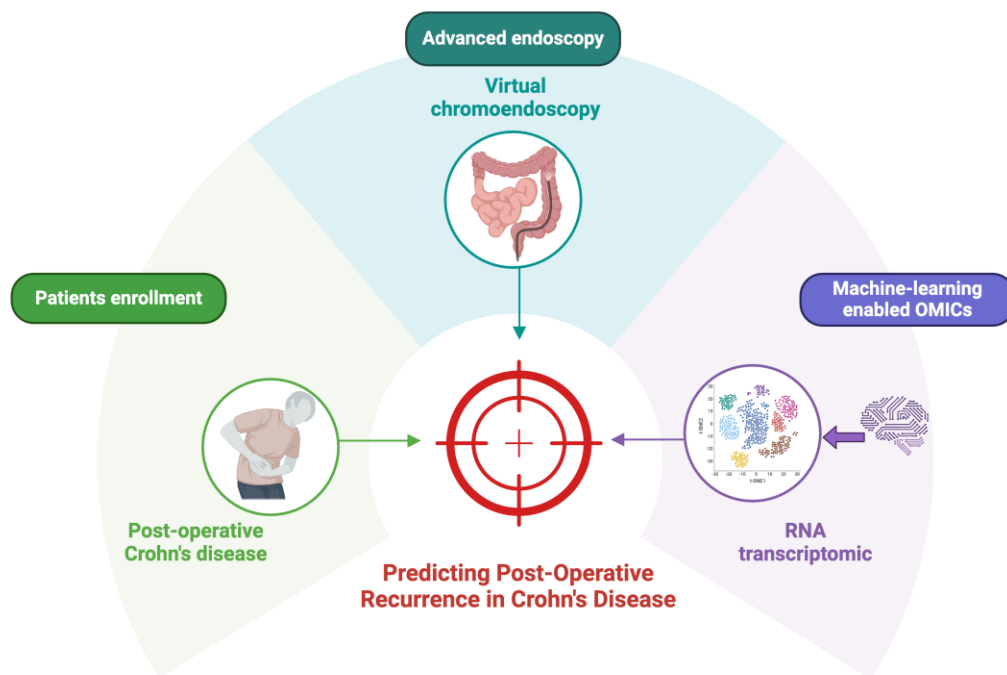


Title: Predicting Post-Operative Recurrence In Crohn's Disease Through Advanced Imaging And Machine Learning-Enabled OMICs

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Research field: Inflammatory Bowel Disease, Advanced Imaging, OMICs, Machine Learning, Precision Medicine



Main abstract: Up to 70% of patients with Crohn's disease (CD), an inflammatory immune-mediated disorder affecting the entire gastrointestinal tract, undergo surgery during their lifetime. However, surgery is non-curative, with up to 50% of patients experiencing disease recurrence and about one-third requiring repeat surgery. Therefore, novel tools are urgently needed to identify and stratify high-risk patients who could benefit from early treatment to prevent recurrence and repeated surgery.

This project aims to identify novel tools to predict early post-operative recurrence in CD, paving the way for personalised management. Patients aged 18 to 75 with an established diagnosis of CD who have undergone surgery within three months before study entry or have surgery planned will be enrolled in an ongoing international multicentre study coordinated by University College of Cork, Ireland. Based on their faecal calprotectin levels obtained approximately three months post-surgery, patients will undergo advanced endoscopy using virtual chromoendoscopy 3 or 6 months after surgery. During the index colonoscopy, early mucosal and vascular changes will be assessed, and biopsies will be

taken to evaluate disease activity. Additional intestinal biopsies will be collected for OMIC analysis, namely bulk RNA sequencing, and single-cell sequencing will be performed for a small subset of patients at the University College of Cork, Ireland. These advanced techniques hold promise, as they can comprehensively characterise molecular signatures associated with postoperative recurrence. Patients will be clinically followed for 24 months after index colonoscopy to assess long-term clinical outcomes, with an endoscopic reassessment within 18 months from index colonoscopy. Advanced endoscopy features predictive of early CD recurrence will be evaluated. A machine-learning model will also be employed to identify OMIC features that can forecast recurrence at the University College of Cork ,Ireland

Techniques: virtual chromoendoscopy, RNA transcriptomic, machine-learning