An optimal METRIC for imaging in small bowel Crohn's disease

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Cross-sectional imaging has an essential role in the diagnostic workup and follow-up of Crohn's disease given its ability to visualise the entire gastrointestinal tract and to assess both transmural and extramural disease manifestations, such as abscesses or fistulas. Management in Crohn's disease has evolved beyond the control of clinical symptoms towards a treat-to-target strategy, which involves monitoring of therapeutic response through objective interval assessments to avoid long-term complications.[1] In this regard, cross-sectional imaging is particularly helpful in the follow-up of patients with small bowel disease, in whom endoscopy is less feasible or is not possible.

The imaging modality of choice is largely centre-specific and depends on local expertise, cost, and access. Nevertheless, with increasing awareness of radiation exposure, expert consensus statements recommend radiation-free techniques such as magnetic resonance enterography (MRE) and ultrasound as first-line imaging tests.[2,3] Both MRE and ultrasound are widespread imaging techniques used for small bowel Crohn's disease assessment and have a similar ability to detect Crohn's disease presence and inflammatory activity. However, most studies comparing these techniques were done in a single centre, included small numbers of patients, and applied various study designs and reference standards.[4]

METRIC is the first large-scale, multicentre, prospective study (n=284) directly comparing the diagnostic accuracy of MRE and ultrasound for the presence, extent, and activity of Crohn's disease in newly diagnosed patients and patients with relapsing Crohn's disease.[5] For this purpose, all patients had MRE and ultrasound, and a diagnostic test comparison was performed against a consensus panel reference standard. This panel incorporated all relevant information obtained during a 6-month follow-up period (including clinical, biochemical, and endoscopic data) to judge whether MRE and ultrasound had adequately diagnosed small bowel disease extent (primary outcome) and were accurate in terms of disease location and activity (secondary outcomes). MRE had a higher accuracy than ultrasound for the extent and activity of small bowel Crohn's disease. However, this result was not the case for colonic disease, in which the overall diagnostic accuracy for MRE and ultrasound was lower than for small bowel disease.

A major advance in the assessment of Crohn's disease has been the validation of MRE-based disease activity scores, such as the Magnetic Resonance Index of Actvity score and the (extended) London index.[6,7] The METRIC study includes established criteria, such as wall thickness, mural oedema, and bowel wall enhancement, to assess disease activity, but no validated MRE scoring system was used. Indeed, because most scoring systems are time consuming and require trained practitioners, routine radiological practice generally uses visual assessment only. However, a more objective assessment of disease activity and treatment response should be pursued and is indispensable in a clinical trial setting. An emerging technology, radiomics, enables automated quantification of many imaging features from medical images, such as intensity-based and textural properties.[8] Radiomics has proven to be useful in clinical oncology but has not yet been thoroughly investigated for Crohn's disease.[8]

The METRIC study investigators[5] correctly state that disease location and extent are important to determine the therapeutic strategy (eg, the option of an ileocaecal resection for limited terminal ileal disease *vs* medical therapy for ileocolonic or extended small bowel disease). However, correct differentiation between inflammatory and fibrotic strictures to initiate stage-adjusted therapy is even more important. Indeed, a predominantly inflammatory stricture is expected to respond to medical treatment, whereas a fibrotic stricture usually requires surgery. Unfortunately, current imaging techniques, including standard MRE, do not have validated diagnostic accuracy for distinction between active inflammation and fibrosis in Crohn's disease.[2,9,10] New imaging tools, such as magnetisation transfer MR, shear wave velocity ultrasound, and photoacoustic imaging, seem capable of measuring intestinal fibrosis and are being further explored.[3,4] Identification of high-risk patients who are expected to require surgery not only has substantial clinical implications but will also facilitate clinical trial design for antifibrotic therapy, with several promising candidate therapies in the development pipeline.[9]

In summary, although the METRIC study obviously has some limitations (eg, the absence of a standardised imaging protocol, image interpretation only by expert

radiologists, and potential bias of the consensus panel), this pragmatic trial provides compelling data to support MRE as the first-line imaging tool for detecting disease presence and activity in patients with small bowel Crohn's disease. Future research should particularly focus on the ability of imaging techniques to adequately monitor therapy and to predict responsiveness to anti-inflammatory therapy in these patients.

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1 Bouguen G, Levesque BG, Feagan BG, et al. Treat to target: a proposed new paradigm for the management of Crohn's disease. *Clin Gastroenterol Hepatol* 2015; **13:** 1042–50.

2 Gomollón F, Dignass A, Annese V, et al. ECCO, 3rd European evidence-based consensus on the diagnosis and danagement of Crohn's disease 2016: Part 1: diagnosis and medical management. *J Crohns Colitis* 2017; **11:** 3–25.

3 Panes J, Bouhnik Y, Reinisch W, et al. Imaging techniques for assessment of inflammatory bowel disease: joint ECCO and ESGAR evidence-based consensus guidelines. *J Crohns Colitis* 2013; **7:** 556–85.

4 Kopylov U, Yung DE, Engel T, et al. Diagnostic yield of capsule endoscopy versus magnetic resonance enterography and small bowel contrast ultrasound in the evaluation of small bowel Crohn's disease: systematic review and meta-analysis. *Dig Liver Dis* 2017; **49:** 854–63.

5 Taylor SA, Mallett S, Bhatnagar G, at al. Diagnostic accuracy of magnetic resonance enterography and small bowel ultrasound for the extent and activity of newly diagnosed and relapsed Crohn's disease (METRIC): a multicentre trial. *Lancet Gastroenterol Hepatol* 2018; published June 15. http://dx.doi.org/10.1016/S2468-1253(18)30161-4.

6 Rimola J, Rodriguez S, Garcia-Bosch O, et al. Magnetic resonance for assessment of disease activity and severity in ileocolonic Crohn's disease. *Gut* 2009; **58:** 1113–20.

7 Steward MJ, Punwani S, Proctor I, et al. Non-perforating small bowel Crohn's disease assessed by MRI enterography: derivation and histopathological validation of an MR-based activity index. *Eur J Radiol* 2012; **81:** 2080–88.

8 Larue RTHM, Defraene G, De Ruysscher D, et al. Quantitative radiomics studies for tissue characterization: a review of technology and methodological procedures. *Br J Radiol* 2017; **90:** 20160665.

9 Higgins PDR. Measurement of fibrosis in Crohn's disease strictures with imaging and blood biomarkers to inform clinical decisions. *Dig Dis* 2017; **35:** 32–37.

10 Wilkens R, Hagemann-Madsen RH, Peters DA, et al. Validity of contrast-enhanced ultrasonography and dynamic contrast-enhanced MR enterography in the assessment of transmural activity and fibrosis in Crohn's disease. *J Crohns Colitis* 2018; **12:** 48–56.Restiber itiant, sitas essi dolut hitin re sequate scitate mporpore preperibus.