Results: We found that subjects who later developed UC had lower albumin levels and subject who later developed CD had higher levels of CRP compared with the controls. Multi-variate conditional logistic regression with albumin, calprotectin and CRP showed a lower risk for developing IBD and UC with higher albumin levels (OR 0.789; CI 0.691–0.901 respective OR 0.773; CI 0.657–0.909). Higher CRP levels were associated with increased risk of developing CD (OR 1.314; CI 1.060–1.630). Adding BMI or smoking in the logistic regression model similar results was found. Serum calprotectin levels in the prediagnostic period in patients with IBD did not differ from controls.

Conclusions: This nested case–control study show that subjects who later develop IBD have signs of low-grade systemic inflammation years before the diseases become clinical. CRP and albumin was more sensitive to detect low-grade systemic inflammation than calprotectin.

Ulcerative colitis	Case	Control	*p*-value	*N* case/ control
Median age, years	50 (40–60)	50 (40–60)	0.859	70/139
Median lag-time to diagnosis, years	5.3 (2.6–7.3)	na	na	70/na
Gender, women	61%	55%	0.766	70/139
Median BMI, kg/m^2	25 (23.2–27.5)	25.6 (23.1–27.8)	0.815	70/138
Smoking	30%	20%	0.162	65/128
Median albumin, g/l	37.8 (35.7–39.1)	38.5 (36.6–39.8)	0.025*	65/139
Median calprotectin, µg/l	671 (496–947)	693 (494–910)	0.925	65/137
Median CRP, mg/l	1.08 (0.46–2.70)	0.94 (0.49–2.52)	0.688	65/139

Basal characteristics for patients with ulcerative colitis and matched controls. Statistics: Mann–Whitney and χ^2 test.

Crohn's disease	Case	Control	*p*-value	*N* Case/ control
Median age, years	50 (40–57)	50 (40–60)	0.861	26/52
Median lag-time to diagnosis, years	4.7 (2.5–8.1)	na	na	26/na
Gender, women	46%	50%	0.936	26/52
Median BMI, kg/m^2	26.1 (23.1–30.4)	25.3 (22.9–28.4)	0.433	26/52
Smoking	35%	17%	0.176	22/42
Median albumin, g/l	37.0 (35.5–39.0)	38.0 (36.1–40.3)	0.074	26/52
Median calprotectin, µg/l	757 (520–1043)	640 (464–925)	0.369	26/52
Median CRP, mg/l	2.51 (0.34–8.71)	0.83 (0.31–2.10)	0.018*	26/52

Basal characteristics for patients with Crohn's disease and matched controls. Statistics: Mann–Whitney and χ^2 test.

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Automated real-time endoscopic scoring based on machine learning in ulcerative colitis: Red Density reliability and responsiveness study.

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Background: Endoscopic scoring in ulcerative colitis (UC) is subjective and has poor correlation with histological scoring. Histological remission predicts favourable long-term outcome in UC. Operator-independent automated digital scoring of endoscopic and histological inflammation in UC could provide an objective and predictive evaluation of remission. The aim of this study was to test the operating properties of the Red Density (RD) score (responsiveness and reliability).

Methods: The RD system uses machine learning (ML) to calculate a score based on real-time automatic extraction of pixel data from endoscopic images. This ML algorithm incorporates colour data and vascular pattern recognition. In this prospective study, consecutive patients with UC presenting at the IBD outpatient clinic with symptoms suggestive of a flare were included. At baseline and 8–14 weeks after treatment escalation we recorded endoscopic (Red Density score, Ulcerative colitis endoscopic index of severity [UCEIS], Mayo endoscopic subscore [MES]), clinical (total Mayo, PRO-2), histological data (Robarts histological index [RHI], Geboes score) and C-reactive protein. Investigators were blinded for the RD score. Correlation was tested between RD and clinical, biochemical, endoscopic, and histological scores (Spearman's rank correlation). Responsiveness was significant if standard effect size >0.8.

Results: Ten patients had two consecutive visits (M/F 4/6, median age 39 years IQR 36–48). At baseline all patients had active endoscopic disease (median (IQR) UCEIS 4.5 (2.5–5); MES 2 (1.3–2)). Nine patients had a change in their endoscopic score after treatment compared with baseline. The median delta in UCEIS and MES was 3 (IQR 2–4) (p = 0.009) and 1 (IQR 1–2) (p = 0.008), respectively. A significant number of patients achieved clinical, endoscopic and histological remission after treatment (all $p < 0.03$). Median RD score decreased significantly from baseline (166 to 58; p = 0.01) (Figure 1). RD correlated moderate with clinical outcomes (r >0.65, p = 0.001), and strong with both endoscopic ($r > 0.75$, $p < 0.0001$), and histological scores ($r > 0.75$, $p < 0.0001$). The standardised effect size for RD was 1.22.

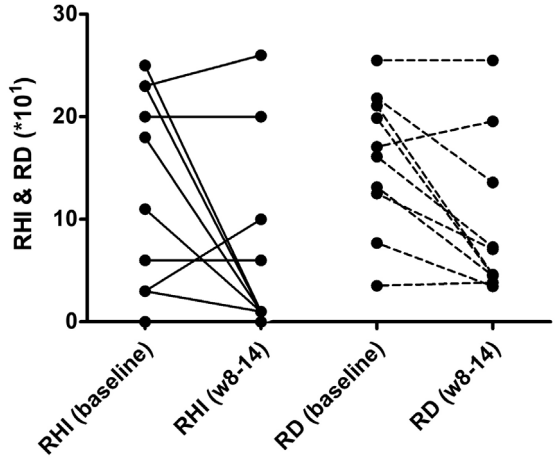

Figure 1. Evolution histological and Red Density score. RHI, Robarts histological index; RD, Red Density; w, week.

Conclusions: The automated digital endoscopic Red Density score correlates strongly with endoscopic, histological scores in UC. Red Density demonstrates an excellent sensitivity to change after treatment escalation. Red Density is an ideal operator-independent digital tool for the evaluation of endoscopic and histological disease activity in UC.

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MRI is predictive of, and anti-TNF treatment changes, the clinical course of Crohn's disease strictures

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Background: Strictures are the most common Crohn's disease (CD) complication but their natural history is unknown. There is a need to characterise inflammation and fibrosis, predict prognosis, and understand the impact of drug therapy.

Methods: Patients with a CD stricture diagnosed over a 5-year period with ≥12-month follow-up were reviewed for their clinical course, response to drug therapy, CRP, need for endoscopic dilatation, hospitalisation and surgery. Magnetic resonance enterography (MRE) scans at time of stricture diagnosis were reviewed blindly for disease extent and inflammation. Magnetic Resonance Index of Activity (MaRIA) score was calculated.

Results: Characteristics of stricture patients: 136 patients: 77 had 1 and 59 had ≥2 strictures. Median age at stricture diagnosis was 40. Thirty-four per cent had previous CD surgery. Fifty-seven per cent were *de novo* small bowel strictures, 33% anastomotic, and 10% colonic strictures. At stricture diagnosis, 28% of patients were already on anti-TNF therapy. Treatment: Median follow-up for those not requiring surgery was 41 months (IQR 26–56). Forty-six per cent of patients came to surgery for their stricture after a median of 6 months (IQR 2–11). Clinical and drug predictors of surgery: Hospitalisation due to obstruction predicted surgery (OR 2.7; p = 0.03) while anti-TNF therapy started at stricture diagnosis was associated with a reduced risk of surgery (p = 0.049). MRE predictors of outcome: On multiple logistic regression analysis MRE characteristics associated with increased risk for surgery were proximal bowel dilatation ≥30 mm diameter (OR 3.1; p = 0.005), bowel wall thickness at stricture (OR 2.5 for ≥10 mm; p = 0.01), and stricture length (OR 2.5 for >5 cm; p = 0.01). Eighty-one per cent of patients with all three adverse MRE features required surgery vs. 17% if none were present (p < 0.001; Figure 1). Accuracy for these three MRE variables combined for the prediction of future surgery was high (AUC 0.77). On univariate analysis mesenteric fat inflammation (p = 0.001), stricture bowel wall oedema (p = 0.002), MaRIA score (p < 0.001), and associated fistula (p = 0.02) were significant for surgical risk.

Conclusions: MRE findings are highly predictive of future surgery. Three simple findings (pre-stricture dilatation, bowel wall thickness, stricture length) are strongly predictive of subsequent surgery. These MRI findings predict future disease course and can identify patients who may benefit from treatment intensification. Anti-TNF therapy is associated with a reduced risk of surgery if commenced at stricture diagnosis, and appears to alter the natural history of this complication.

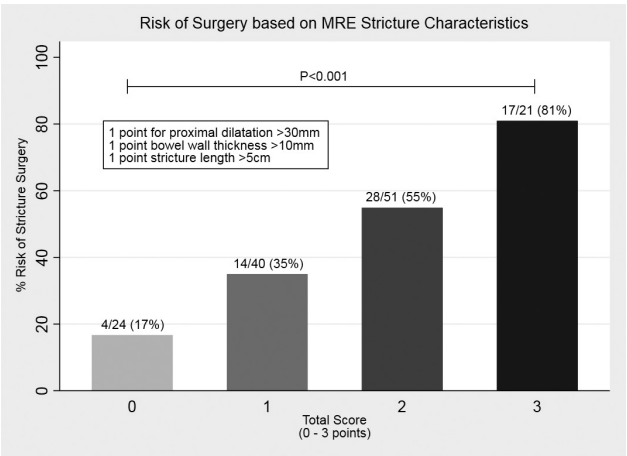

Figure 1