than in UC and more common in CD *F*'s than CD *M*'s. A novel finding is that a high proportion of patients with UC exhibit continued growth, suggesting delayed BA is common in UC. These data highlight the need for prospective longitudinal studies to examine BA progression and statural growth in patients with CD and UC.

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Faecal calprotectin and plasma cytokines in the prediction of early postoperative Crohn's disease recurrence

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Background: Unravelling the pathogenic mechanisms that lead to postoperative recurrence (POR) in CD and having surrogate predictive markers to identify patients at risk of early recurrence remains a challenge. The aim of this prospective study was to characterise the profile of the immune response in patients with early POR, to identify predictive biomarkers and to develop a non-invasive predictive tool for its clinical application in CD patients after surgery.

Methods: Sixty-one patients who had undergone intestinal resection for CD were prospectively included and followed up for 24 months. Blood and stool samples were obtained before surgery and at different time-points during postoperative follow-up, to determine fecal calprotectin (FC) levels and plasma cytokines (IL-1β, IL-2, IL-6, IL-10, IL-12p70, IL-13, TNFα, IFNγ). Morphological recurrence was assessed by ileocolonoscopy (Rutgeerts score) or MR enterography (Sailer's Index) within the first year. FC levels were determined by ELISA. Plasma cytokines were assessed using a multiplex bead immunoassay, based on the Luminex platform. Statistical analysis was performed using the R software (version 3.3.2). The p-values <0.05 have been considered statistically significant.

Results: Among the 61 patients, 27 (44.3%) (41 [18–72] years old) had morphological recurrence during follow-up. 88.5% of the patients had received treatment for the prevention of POR (9.8% mesalazine, 54.1% azathioprine, and 24.6% biological therapy). The majority of patients (73.8%) had an ileal disease. FC values were significantly associated with the POR risk over time, whether it be assessed by endoscopy or MRE. ROC curve for FC gave an AUC of 0.88 (CI 0.75–0.96). Recurrence was best predicted by FC of 160 μg/g at 6 months after surgery (85% S, 70% E, 26% PPV, 98% NPV). Plasma cytokine profile showed two different patterns between patients with early recurrence and those who remain in remission. Patients who developed POR displayed higher IL-13 plasma levels pre-surgery, as well as higher IL-6 and IFN-γ levels at 6 months after surgery compared with non-recurred patients. The combination of FC, IL-6, and IFN-γ levels at 6 months post-surgery gave an AUC of 0.90 for predicting an early recurrence.

Conclusions: FC is a useful early non-invasive marker for predicting POR in CD. Values lower than 160 μg/g at 6 months have a high NPV to rule out early lesions. Patients who develop early recurrence have significantly higher plasma levels of IL-13 pre-surgery, as well as IL-6 and IFN-γ at 6 months after surgery. Combined values of FC, IL-6 and IFN-γ levels at 6 months post-surgery constitutes a prognostic index with high predictive capacity for assessing the risk of early recurrence.

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Automated digital calculation of endoscopic inflammation in ulcerative colitis: Results of the red density study

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Background: The evaluation of the endoscopic inflammation in ulcerative colitis (UC) using MAYO endoscopic subscore (MES) or ulcerative colitis endoscopic index of severity (UCEIS) is subjective leading to high inter-observer variability, mainly in the lower ranges of the scores. Histological inflammation is predictive for relapse in UC even in patients with endoscopic remission. An operator-independent endoscopic tool that correlates with histological inflammation would improve therapeutic decisions in UC. We aimed to develop an objective real-time digital endoscopic tool for the evaluation of UC that correlates with histology.

Methods: The red density (RD) score (Pentax Medical) calculates the degree of redness based on digital extraction of the intensity and distribution of red pixels in high definition white light (WL) endoscopic images. The RD algorithm was further refined by integrating computerised vessel pattern recognition and multiple regression analysis including the RD histogram and Robarts histological index (RHI). RD provides a continues numeric scale from 0 to 255. To test the RD score, sequential patients with UC with planned endoscopy in two tertiary IBD centres (Belgium and Japan) were included. WL and RD images were collected according to a standardised protocol. All WL images were evaluated at random for MES and UCEIS by 2 blinded central readers. In case of discordance between the readers a consensus decision provided the final endoscopic scoring. Standardised biopsies were taken in the most inflamed area of the images. Biopsies were evaluated using the Geboes score and RHI.

Results: In total 46 patients providing 100 images were included. The RD score was stable and reproducible in the same patient. Distribution of the MES, UCEIS and RHI was skewed to the lower ranges of the different scores. There was an interobserver variability of $\kappa = 0.71$ and $\kappa = 0.65$ for the MES and UCEIS, respectively, after first central reading. Using the Spearman correlation test, RD showed a moderate correlation with the final consensus MES ($r = 0.58$) and UCEIS ($r = 0.56$). Using the Pearson correlation test, RD correlates strongly with the RHI ($r = 0.65$) (Figure 1).

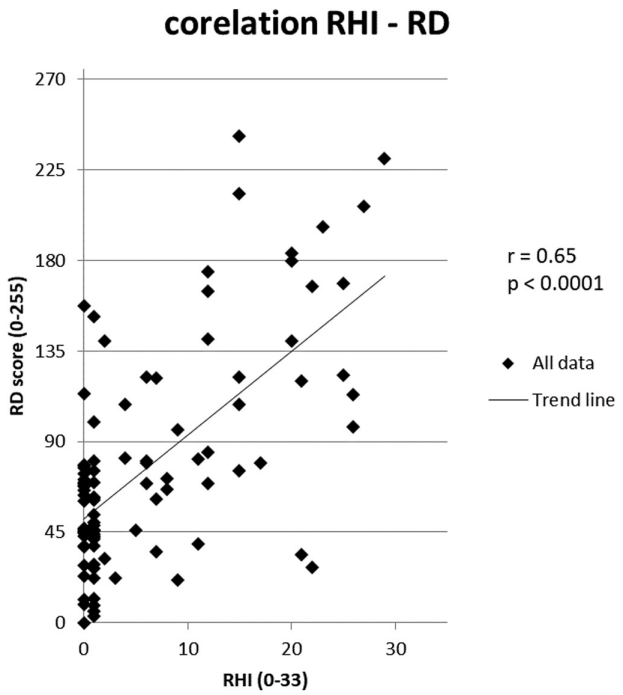

Figure 1. scatter plot showing correlation between Robarts histological index (RHI) and Red density score (RD), $r = 0.65$, $p < 0.0001$.

Conclusions: The evaluation of endoscopic inflammation using the RD score is feasible, reproducible and has a strong correlation with histology. This provides an independent objective tool for the evaluation of endoscopic inflammation in patients with UC. The strong correlation with histology provides also prognostic potential of RD.

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Crohn's disease: What can we expect from the course of the disease?

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Background: Crohn's disease is a chronic and progressive disease that changes its behaviour over time. Transmural inflammation in Crohn's disease (CD) leads to stricturing or penetrating complications. The aims of this study were to evaluate the frequency of the long-term progression of CD phenotypes and need for surgery and to determine the main factors associated with this evolution.

Methods: Retrospective study was conducted with prospective follow-up. Patients included had a minimum follow-up of 12 months. Medical records were reviewed. Montreal classification was assessed at the moment of the diagnosis and at the end of the follow-up period.

Results: Included 290 patients, 53.8% female. The mean age at diagnosis was 31.9(±11.92) years and the mean follow-up was 113(±74.7) months. The behaviour at presentation was inflammatory in 64.5%, stricturing in 23.4%, penetrating 12.1%, and perianal disease was present in 18.6%. Behaviour at the end of follow-up was inflammatory in 51.4%, stricturing in 30.3%, and penetrating in 18.3%, perianal disease was identified in 20%. Globally, we observed a change in behaviour in 46 patients (15.9%); from inflammatory to stricturing in 30 patients, stricturing to penetrating in 7 patients, and inflammatory to penetrating in 9 patients. Cumulative probability of being complication phenotype free in 5, 10, and 20 years: 90.6%; 81.9%, and 69%. Ileocolic localisation (60.9% vs. 45.1%; $p = 0.049$), age at the diagnosis <16 (8.7% vs. 2%; $p = 0.017$), and less time exposed to biological therapy (15.9 months vs. 41.32 months; $p < 0.001$) were the factors associated with changing phenotype. Regarding surgery, 70 (24.1%) were submitted to intestinal resection, of those 34.3% were at diagnosis. For the remaining patients the mean time for surgery after diagnosis was 52.3 ± 55.9 months. Cumulative probability of being surgery free in 5, 10, and 20 years: 78.1%, 74.8%, and 66%, respectively. Smoking status (42.9% vs. 24.8%; $p = 0.004$), stricturing behaviour (47.1% vs. 15.9%; $p < 0.001$), penetrating behaviour (42.9% vs. 2.3%; $p < 0.001$) and higher number of hospitalisations in the first year of diagnosis (51.5% vs. 8.3%; $p < 0.001$) were more frequently observed in patients submitted to surgery. Patients submitted to surgery were less treated with biological therapy (5.7% vs. 25.9%; $p < 0.001$).

Conclusions: In our cohort, we observed behaviour progression in about one-sixth of patients. The most frequent change in behaviour was to stricturing pattern. Stricturing and penetrating behaviour, higher number of hospitalisations in the first year of diagnosis, smoking status, age at diagnosis <16, and Ileocolic localisation were factors associated with an unfavourable clinical evolution.

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The value of faecal biomarkers for screening small bowel inflammation in patients with Crohn's disease

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Background: The value of faecal biomarkers for screening small bowel inflammation in patients with Crohn's disease (CD) remains to be elucidated. This prospective study was to evaluate the utility of faecal biomarkers for detecting small intestinal inflammation.

Methods: One hundred twenty-two consecutive patients with a diagnosis of CD in the small intestine were screened for eligibility. Computed tomography enterography (CTE) was undertaken to evaluate small-bowel inflammation followed by colonoscopy to confirm no large bowel involvement. Seventy eligible patients with inflammation confined to the small intestine were included. Faecal samples were collected for assaying calprotectin, lactoferrin, and haemoglobin. For assessing the degree of small-bowel inflammation, a semi-quantitative scoring system (CTE0, normal; CTE1, mild; CTE2, moderate; CTE3, severe) was applied.

Results: The median calprotectin, lactoferrin, and haemoglobin levels were significantly higher in patients with small bowel inflammation, CTE scores 1–3 ($n = 42$) vs. 0 ($n = 28$): calprotectin, 330 vs. 40 ng/ml, $p < 0.0001$; lactoferrin, 14 vs. 3 ng/ml, $p < 0.0001$; haemoglobin, 29.5 vs. 6.5 ng/ml, $p = 0.005$. There was strong positive relationship between the faecal biomarkers and CTE score: calprotectin, $p < 0.0001$; lactoferrin, $p < 0.0001$; haemoglobin, $p = 0.0004$. A cut-off value of 140 ng/ml for calprotectin had a sensitivity of