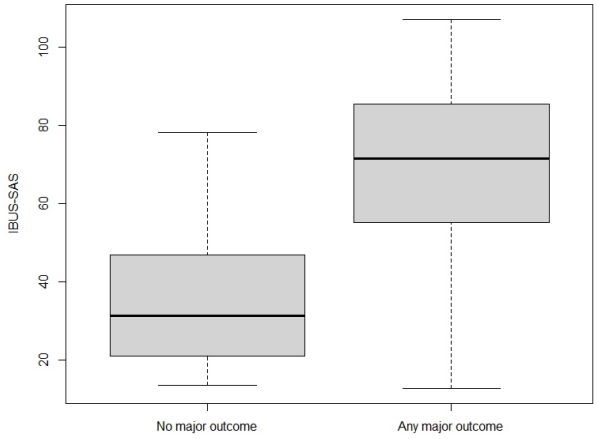
with a high score indicating severe disease activity. The score incorporates bowel wall thickness (BWT), bowel wall stratification, colour Doppler signal, and inflammatory fat. In this abstract, we report our preliminary results after including patients for six months.

Results: IBUS-SAS at diagnosis was available in 60 patients. 32 patients were diagnosed with Crohn's disease (ileal: 7, colonic: 19, ileocolonic: 6) and 28 patients were diagnosed with ulcerative colitis (UC) or unclassified IBD (proctitis: 1, left-sided colitis: 8, extensive colitis: 19). The mean IBUS-SAS at diagnosis was 51.1, with a mean BWT of 5.2 mm. Major clinical outcomes were initiation of biologic therapy, n=12 (20.0%), IBD-related bowel resection, n=5 (8.3%), IBD-related hospitalisation, n=19 (31.7%). The mean IBUS-SAS at diagnosis was 66.2 among patients with the combined endpoint of any of these disease outcomes during follow-up vs. 34.7 for no major outcomes (*p<0.001*), see *Figure 1*. Additionally, we found that all patients with an IBUS-SAS above 80 at diagnosis had been hospitalised and started on systemic steroids. So far, 20 patients had an IUS follow-up scan after three months showing a mean IBUS-SAS reduction by 17.0 points (*p=0.008*).

Figure 1. Association between IUS score at diagnosis and major outcomes



Major outcomes: IBD related surgery, biologic therapy, or hospitalisation

Conclusion: We present data on the predictive value of early IUS in new-onset IBD. IUS activity at diagnosis of IBD seems to have the capability to predict short term disease outcome. At diagnosis, high IBUS-SAS is associated with major disease events such as starting biological therapy, IBD-related bowel resection, and IBD-related hospitalisation. Furthermore, response to treatment is reflected by a decrease in IBUS-SAS after three months.

DOP11

Early intestinal ultrasound predicts endoscopic response to anti-inflammatory treatment and shows drug-specific response to biologicals and tofacitinib in Ulcerative Colitis

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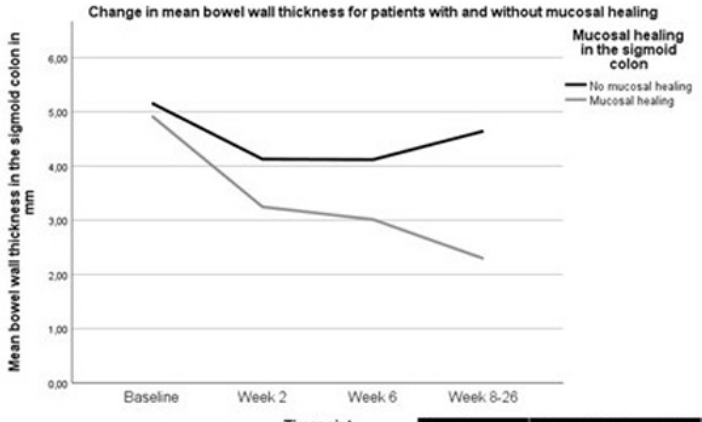
Background: Objective evaluation of treatment response is the gold standard in ulcerative colitis (UC). In this setting, intestinal ultrasound (IUS) is a non-invasive alternative to endoscopy. Recent studies showed change in IUS parameters after treatment initiation but studies with an endoscopic reference standard are scarce. The aim of this study was to evaluate early change of IUS parameters and determine cut-off values for endoscopic endpoints in UC patients starting anti-inflammatory treatment.

Methods: In this longitudinal prospective study consecutive patients with moderate-severe UC (baseline endoscopic Mayo score (EMS)≥2) starting an anti-inflammatory treatment were included. Clinical scores, biochemical parameters and IUS parameters were collected at baseline, after 2 (T1), 6 (T2) and 8–26 weeks (T3) around time of the second sigmoidoscopy/colonoscopy. IUS parameters were measured as previously established[1]. Endoscopic remission (ER) and mucosal healing (MH) were evaluated in the sigmoid and defined as EMS=0 and EMS≤1, respectively. The ultrasonographist and endoscopist were blinded for the outcomes of endoscopy and IUS, respectively.

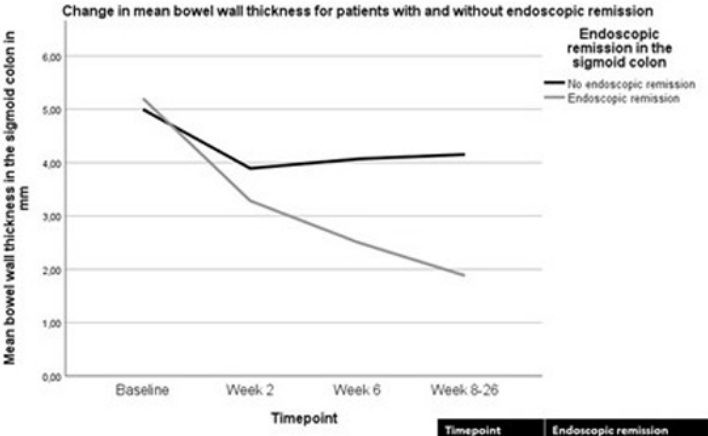
Results: 51 consecutive patients were included (Table 1) of whom 31 underwent a second endoscopy (MH: n=15 (45%), ER: n=9 (27%)). Two additional patients underwent colectomy and were considered non-responders. 18 patients did not undergo second endoscopy due to the COVID-19 pandemic (n=2), refusal (n=5), loss to follow-up (n=1) or treatment escalation because of clinical deterioration confirmed by IUS and biomarkers before second endoscopy was performed (n=10). Bowel wall thickness (BWT) was significantly lower from T2 onwards in patients reaching MH (p=0.026) and ER (p=0.002) at T3 (Fig 1). A significant decrease in BWT was already visible at T1 in patients receiving infliximab (p=0.001) or tofacitinib (p=0.007), but not in patients treated with vedolizumab (p=0.11) (Fig 2). Most accurate BWT cut-off values at T3 to determine MH and ER were 3.52 mm (AUROC: 0.95, 95% CI: 0.86–1.00, p<0.0001, sens: 91%, spec: 91%) and 2.98 mm (AUROC: 0.94, 95% CI: 0.85–1.00, p=0.001, sens: 87%, spec: 100%), respectively. Other IUS parameters at T3 did not improve association with MH or ER. IUS parameters at T2 that predict MH and ER are demonstrated in Table 2.

Baseline	n = 51
Female; n (%)	28 (55%)
Age at inclusion; median (IQR), years	38 (18-72)
Montreal classification in UC patients	
E2 (left-sided colitis)	25 (47%)
E3 (pancolitis)	26 (49%)
Medication started at baseline	
Corticosteroids	40 (78%)
Aminosalicylates in combination with another drug	29 (57%)
Aminosalicylates monotherapy	2 (4%)
Immunomodulators	
-Thiopurin combination therapy with infliximab	9 (18%)
-Thiopurin monotherapy	3 (6%)
-Methotrexate combination therapy with infliximab	2 (4%)
Biologicals	
-Infliximab	18 (35%)
-Adalimumab	1 (2%)
-Vedolizumab	12 (24%)
-Ustekinumab	2 (4%)
Tofacitinib	12 (24%)
Ciclosporin	1 (2%)
Clinical and biochemical parameters in median (IQR)	
Simple Clinical Colitis Activity Index	9.00 (6.00-12.00)
Lichtiger score	11.00 (8.00-14.00)
C-reactive protein (mg/L)	8.40 (2.15-30.35)
Haemoglobin in mmol/L	7.70 (6.75-8.90)
Leukocyte count in 10^9/L	8.80 (6.40-11.40)
Thrombocyte count 10^{12}/L	344 (274-457)
Albumin in g/L	40.00 (34.00-43.00)
Fecal calprotectin in µg/g	1755 (739-4348)

Table 1

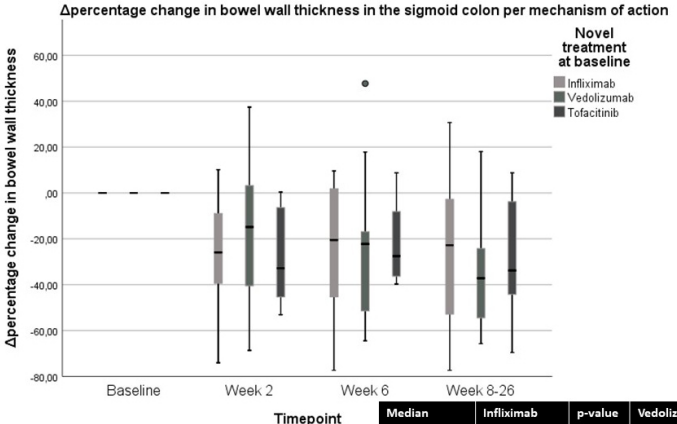


Timepoint	Mucosal healing (mean±SD)	No mucosal healing (mean±SD)	p-value
Baseline	4.92 ± 1.52	5.16 ± 1.04	0.62
Week 2	3.43 ± 1.28	4.13 ± 1.20	0.15
Week 6	3.08 ± 1.23	4.12 ± 1.26	**0.041**
Week 8-26	2.37 ± 0.80	4.64 ± 1.42	**<0.0001**



Timepoint	Endoscopic remission (mean±SD)	No endoscopic remission (mean±SD)	p-value
Baseline	5.20 ± 1.66	5.00 ± 1.12	0.74
Week 2	3.58 ± 1.23	3.89 ± 1.22	0.56
Week 6	2.55 ± 1.25	4.07 ± 1.11	**0.005**
Week 8-26	1.96 ± 0.48	4.15 ± 1.51	**0.001**

Fig 1



Median Δpercentage BWT [IQR]	Infliximab	p-value	Vedolizumab	p-value	Tofacitinib	p-value
ΔT0-T1	-26% [-43- -6]	**p=0.001**	-14% [-43- 5]	p=0.11	-33% [-46- -5]	**p=0.007**
ΔT0-T2	-23% [-50- 4]	**p=0.019**	-22% [-52- -16]	**p=0.04**	-28% [-38- -0,5]	**p=0.028**
ΔT0-T3	-23% [58-0]	**p=0.009**	-37% [-57- -17]	**p=0.008**	-33% [-50- -2]	**p=0.013**

Fig 2

Table 2

IUS parameter at week 6	Univariable analysis				Multivariable analysis	
	Mucosal healing at T3		Endoscopic remission at T3		Mucosal healing at T3	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
BWT (per 1 mm increase)	0.48 (0.24-0.96)	**0.038**	0.30 (0.11-0.76)	**0.01**	0.66 (0.17-2.60)	0.55
Presence of hyperaemia	0.16 (0.03-0.83)	**0.028**	0.06 (0.004-0.85)	0.055	0.06 (0.004-0.85)	**0.038**
Loss of colonic haustrations	0.15 (0.03-0.81)	**0.028**	0.24 (0.02-3.95)	0.14	0.24 (0.02-3.95)	0.32
Loss of wall layer stratification	0.61 (0.09-4.37)	0.62			7.73 (0.38-156.90)	0.18
Presence of fatty wrapping	0.38 (0.06-2.52)	0.31			3.93 (0.19-80.96)	0.38

Conclusion: BWT and Colour Doppler Signal 6 weeks after start of treatment are associated with and could predict MH and ER. In addition, treatment response patterns at IUS are drug-specific. Furthermore, we have provided accurate BWT cut-off values for endoscopic outcomes. In a point-of-care setting, (early) treatment evaluation with IUS could guide treatment decision in UC in order to optimize treatment response.

Reference

1. Bots et al, JCC, 2021

DOP12

Non-invasive assessment of intestinal inflammatory activity in Ulcerative Colitis by Multispectral Optoacoustic Tomography (MSOT)

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Background: In order to guide therapy in Ulcerative Colitis (UC), repeated determination of intestinal inflammatory activity is essential. Endoscopy is the standard procedure to assess inflammation in UC. However innovative methods for non-invasive, uncomplicated and risk free estimation of inflammatory activity are needed as bowel preparation, patients discomfort and risk of procedural complications limit the (frequent) use of colonoscopy. Multispectral optoacoustic tomography (MSOT) is a promising new method to measure inflammation in UC. Using short and harmless impulses of NIR-lasers, it allows for determination of a specific hemoglobin-signal in the bowel-wall and therefore inflammatory activity in affected bowel segments. However, its informative value in UC has not been evaluated so far.

Methods: In 34 patients with confirmed UC, clinical activity parameters (e.g. clinical Mayo-Subscore, B-mode-sonography, C-reactive protein, white blood count) were collected and MSOT of the sigmoid was performed within 2 weeks before/after endoscopy. For MSOT, a commercially available clinical MSOT-system (Acuity Echo, iThera Medical, Munich) was used with sequential analysis of collected data on an external desktop PC. Finally, clinical data, ultrasound findings (Limberg) and MSOT-parameters (single wavelenghts 760 nm, 800 nm, 900 nm; multispectral signals hb, hbO2, hbT) were correlated with endoscopic findings (Mayo endoscopic Subscore, MES).

Results: We found strong and significant correlation between MES and MSOT parameters 800 nm (Spearman r = 0,6599; p < 0,0001) and HbO2 (Spearman r = 0,6695; p < 0,0001), superior to sonographic evaluation of the inflammatory activity in affected bowel segments (Spearman r = 0,4914; p = 0,0023). Simultaneously these MSOT parameters demonstrated excellent sensitivity and specifity in distinguishing moderately to highly active (MES 2,3) from inactive and mild disease (MES 0,1) (800nm: AUROC 0,9063 (p < 0,0001); sensitivity = 93,75 %, specificity = 88,89 %; HbO2: AUROC 0,9063 (p < 0,0001); sensitivity = 100 %, specificity = 88,89 %).

Conclusion: MSOT is a promising approach to non-invasively assess intestinal inflammation in UC and therefore monitor anti-inflammatory therapy in these patients. Further studies are required to validate these findings.

DOP13

The Arborisation index: An MRI-based measure of mesenteric hyperaemia in Crohn's Disease

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Background: Robust and sensitive therapeutic targets are key in effective management of Inflammatory Bowel Disease[1]. Mesenteric hyperaemia is a recognized sign of active disease and in cross-sectional image is described as the comb sign. Although it is subjectively described, no automated quantitative MRI-based measures have been developed.

We aim to develop an automated methodology using contrast-less time of flight (TOF) Magnetic resonance angiography (MRA).

Methods: A MATLAB algorithm was developed to track the vessels on a 3D maximum intensity projection of a TOF MRA data set and calculate an arborization Index which is the number of branching points in the intrabdominal vessels (figure 1). 2D TOF scans were acquired in the transverse plane between the top of the hip joint and L4 vertebra using a 3T Ingenia Wide bore scanner (Philips, The Netherlands). The primary outcome was a comparison of the arborization index between Crohn's disease (CD) and healthy volunteers (HV) groups. A planned sub-analysis was undertaken across CD and HV matched for BMI to investigate the effect of visceral fat on the arborization index. Repeated measures were undertaken to evaluate the variability of the quantification method. No contrast agents were used for the TOF MRA scans. Biological variations within each group and test-retest repeatability were assessed using the coefficient of variation (CV). Statistical analysis with unpaired, two-tailed t-tests were conducted and differences were considered significant when the p-value ≤0.05. All absolute values are presented as mean ±standard deviation (SD).