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Infliximab Exposure Associates With Radiologic Evidence of Healing in Patients With Crohn's Disease

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Title: Infliximab Exposure Associates With Radiologic Evidence of Healing in Patients With Crohn's Disease

Short title: Pharmacodynamics of Infliximab in radiological healing.

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Abbreviations

CD Crohn's disease

CDAI Crohn's disease activity index

CDEIS Crohn's Disease Endoscopic Index of Severity

CR	central readers
ICC	Intraclass correlation
IQR	interquartile range
IV	intravenously
PEG	polyethylene glycol
ROC	Receiver operating characteristics
MaRIA	Magnetic Resonance Index of Activity
MRE	magnetic resonance enterography
TAILORIX	randomized controlled trial investigating tailored treatment with infliximab for active luminal Crohn's disease
UC	ulcerative colitis

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Abstract:

Background & Aims: Higher infliximab trough levels are associated with clinical and endoscopic remission in patients with Crohn's disease (CD). We investigated pharmacodynamic features of infliximab and radiological healing.

Methods: We performed a substudy of the TAILORIX trial (patients with active luminal CD in Europe, treated with infliximab), analyzing baseline and week 54 magnetic resonance enterography (MRE) data. MREs were scored using the MaRIA score by blinded central readers. Radiologic response and remission were defined, based on MaRIA criteria in all segments, as scores below 11 and 7, respectively. We collected data on infliximab trough levels, biomarkers, and endoscopic endoscopy findings. Our primary aim was to evaluate pharmacodynamic features associated with radiologic response and remission, based on MRE assessments at baseline and at 54 weeks after initiation of infliximab therapy.

Results: We analyzed data from 36 patients (50% female; median age 35.7 years; interquartile age range, 25.6–48.6 years; median disease duration, 1.5 months; interquartile duration range, 0.6–22.4 months). At week 54 of treatment, 36.4% of patients had a radiologic response, 30.3% of patients were in remission, and 71% had endoscopic features of remission. At baseline, there was a correlation between the CD endoscopic index of severity and MaRIA scores ($\kappa=0.46$; $P=.008$), but we found no correlation at week 54 ($\kappa=0.06$; $P=.75$). Radiologic remission correlated with infliximab trough level at week 14 ($P=.049$) when the infliximab trough level cut-off value was set at 7.8 $\mu\text{g/ml}$ (area under the curve, 0.74; 75% sensitivity; 86% specificity; 90% negative predictive value; 57% positive predictive value). Radiologic response correlated with infliximab trough levels at week 14 ($P=.048$) when the infliximab trough level cut-off value was set at 7.8 $\mu\text{g/ml}$ (area under the curve, 0.73; 70% sensitivity; 90% specificity; 86% negative predictive value; 78% positive predictive value) and with continuous pharmacologic evidence of response (infliximab trough levels above 5.0 $\mu\text{g/ml}$ at all time points) ($P=.034$).

Conclusions: In a substudy of data from the TAILORIX trial of patients with active luminal CD, we identified a relationship between exposure to infliximab and radiologic evidence of outcomes.

Keywords: biomarker, prognostic factor, anti-TNF agent, response to therapy, TAILORIX

What You Need to Know:

BACKGROUND: Increased exposure to infliximab results in higher rates of endoscopic healing in patients Crohn's disease (CD). Radiologic remission, determined by magnetic resonance enterography, associates with long-term outcomes but is difficult to achieve.

FINDINGS: Radiologic remission was achieved in approximately one third of patients with luminal CD treated with infliximab. An infliximab trough level of 7.8 µg/ml at the end of induction therapy associated with radiologic response and remission.

IMPLICATIONS FOR PATIENT CARE: Radiologic healing is a difficult but achievable for patients with luminal CD. Monitoring trough levels of infliximab can guide treatment, and optimizing dosing during induction therapy could improve long-term outcomes.

Introduction:

Crohn's disease (CD) is an inflammatory disease that affects the gastrointestinal tract over a variable extent. The major clinical characteristic that discriminates CD from ulcerative colitis (UC) is the transmural nature of the inflammation.¹ The current gold standard to assess disease activity in CD is endoscopy.² The regression of intraluminal lesions (i.e. endoscopic remission) is associated with favorable long term outcomes in CD.³ Over the last decades newer modalities to assess also this transmural aspect of disease activity in CD emerged.⁴ Magnetic resonance enterography (MRE) provides an assessment of the luminal, mural and extra-luminal manifestation of CD. Disease activity scores have been developed to systematically assess the severity of inflammation on MRE.^{5, 6} It has been documented that as early as week 2 after the start of infliximab improvement in disease activity based on MRE can be detected.⁷ Only a minority of patients achieves complete disappearance of inflammatory lesions on MRE during maintenance therapy with infliximab.⁷ Radiological response has also been associated with better outcomes in CD patients, and recent evidence suggests that radiological healing might be the ultimate therapeutic goal in CD.⁸⁻¹¹ It is well established that there is a clear exposure-response relationship for infliximab with higher

infliximab trough levels being associated with endoscopic remission.¹² Currently no data are available on the effect of infliximab on radiological remission in patients with CD.

The aim of this study was therefore to evaluate for the first time the pharmacodynamics of infliximab in radiological response and remission in patients with CD based on MRE assessments at baseline and at 54 weeks after initiation of infliximab therapy using the data of the TAILORIX study.¹³

Methods:

Patient population

The multicenter (27 centers in Belgium, France and the Netherlands) *randomized controlled trial investigating tailored treatment with infliximab for active luminal Crohn's disease*

TAILORIX aimed to explore the role of tailored treatment with infliximab in biological naïve patients with active luminal CD.¹³ In total 167 patients were screened and 122 patients, with moderate to severely active CD (Crohn's disease activity index (CDAI) 220-450), were started on infliximab in combination with an immunomodulator. Patients were randomized at week 14 after standard induction regimen (infliximab 5mg/kg week 0-2-6) to receive one of three regimens of monitoring-based dosage adjustments, based on clinical symptoms only or on a combination of clinical symptoms, CRP-levels, fecal calprotectin levels, and infliximab trough levels.

At week 0, 12, and 54, patients underwent a pre-scheduled ileocolonoscopy. The endoscopic activity of disease was scored blindly based on the Crohn's Disease Endoscopic Index of Severity (CDEIS).¹⁴ MRE's were performed in a priori selected centers (n=5). Selection was based on ability to perform high quality MRE and recruitment potential. Patients consented separately to participate in the MRE substudy. These patients (representing of >50% of the

total number of included patients per selected site) underwent an MRE at week 0 and week 54 or at the early termination visit. For the current analysis all patients with at least one MRE in the TAILORIX study were included, irrespective of treatment group to which the patients were assigned in the study. Clinical, biochemical, endoscopic and pharmacological data from the TAILORIX trial were available for these patients.

Magnetic resonance imaging methodology

MRE was performed in 5 of the 27 participating centers. The MRE was preferentially performed at the same day as the ileocolonoscopy. The patient had nil per mouth on the day of the examination. Forty five minutes before the MRE the patient ingested ≈ 1500 ml of polyethylene glycol (PEG) 4000 (or 3350), with in addition oral ingestion of 500 ml water or PEG 15 minutes prior to examination. At the start of the examination 0.5 mg of glucagon was administrated intravenously (IV) just prior to IV injection of gadolinium. The patient was placed in procubitus position with a phased array body coil. Following sequences were performed: Coronal and axial true fast imaging with steady-state precession (true FISP) sequence, with breath hold, without fat suppressed and with a slice thickness of 5 mm and a skip of 0 mm. Coronal true FISP sequence, with breath hold, with fat suppression and with a slice thickness of 5 mm and a skip of 0 mm. Coronal and axial T2 weighted images using single shot fast spin echo sequence with a slice thickness of 5 mm and a skip of 0 mm. Coronal 3-Dimensional T1-weighted gradient echo sequence with breath hold with a slice thickness of 2-3 mm. Sixty seconds after injection of gadolinium (0.1 mmol/kg), coronal and axial gadolinium enhanced 3D gradient echo sequence with breath hold, with a slice thickness of 2-3 mm were acquired. Axial 2-dimensional T1-weighted gradient echo sequence after injection of the gadolinium with a slice thickness of 5 mm and a skip of 0 mm.

The images were archived on a Data on Picture Archiving and Communication System and compact disk.

Magnetic resonance enterography central reading

All MRE images were de-identified. The MRE studies were centrally reviewed by 6 different central readers (CR) as prespecified in the protocol, all of them having more than 10 years of experience in abdominal imaging. The MRE studies were assigned randomly to the different CR. Every CR was blinded to patient data and clinical information. Every CR scored ≈ 24 MRE studies randomly, in this way all MREs were randomly scored twice by two different CRs.

The MREs were scored using the Magnetic Resonance Index of Activity (MaRIA).⁵ The MaRIA index was calculated using the previously published formula: $1.5 \times \text{wall thickening (mm)} + 0.02 \times \text{RCE (relative contrast enhancement)} + 5 \times \text{oedema} + 10 \times \text{ulcers}$.^{5, 15} Global MaRIA score is based on terminal ileum and all colonic segments. For the calculation of the MaRIA index an electronic clinical research form was used that automatically calculated the score. The threshold for discrepancy between two readers was set at a difference of 1.5 points in the MaRIA index per segment, if active disease was present (MaRIA ≥ 7 in at least one segment). If there was a discrepancy between two CR in at least one segment (independent of any discrepancy in the global MaRIA index) then the images were adjudicated by a third independent CR (JR). In case no adjudication was needed then the mean of the scores of the two CR was used. The global MaRIA was the sum of the mean scores per segment (in case no adjudication was needed) and/or the adjudicated scores per segment. Global radiological response and remission were defined as MaRIA score in all segments < 11 and < 7 , respectively in patients with active radiological disease at baseline. Segmental radiological

response and remission were defined as MaRIA score in one segments <11 and <7 respectively.¹⁶

Statistical analysis

Statistical analysis was done using SPSS 26.0 (IBM Corp, Armonk, NY, USA) and Graphpad Prism 5.01 (GraphPad Software, San Diego, and CA, USA). Continuous variables with non-normal distribution are described as medians with inter quartile range (IQR). Categorical variables are described as percentages. For time independent evaluation of continuous variables we used the Mann Whitney test, and for categorical variables the chi-square tests (univariate analysis). Correlation with outcomes was based on patients with radiological active disease at baseline (extrapolated for missing MRE baseline) and available MRE at week 54 (n=31). The Wilcoxon signed-rank test was performed to test differences between two measurements at different time points in the same patient. Intraclass correlation (ICC) (two way random model and absolute agreement type) was used to test the inter-rater reliability of a continuous score (MaRIA score).¹⁷ For this we categorized the continuous values (severe partial MaRIA ≥ 11 ; active partial MaRIA <11 ; inactive partial MaRIA <7). Results of ICC analysis were classified as very good (coefficients, 0.81-1.00), good (0.61-0.80), moderate (0.41-0.60), fair (0.21-0.40), and poor (<0.21). Two-tailed p-value < 0.05 is considered as statistically significant. No correction for multiple testing was applied. Receiver operating characteristics (ROC) curves were used to determine cut off values of continuous variables.

Results:

Patient population

In total 36 of the 122 patients (30%) in the TAILORIX trial had at least 1 MRE. The majority (31/36) had both a baseline and week 54 MRE, these patient were analyzed in the PD analysis to assess correlation between drug exposure and outcomes over time. Two patients had no baseline MRE, 2 patients had a MRE at the moment of early termination (week 26 and week 32 respectively) and 1 patient had no week 54 MRE. The patient characteristics are presented in table 1. As per inclusion criteria of the TAILORIX trial, all patients had moderate to severely active CD and active endoscopic lesions at baseline.

Magnetic resonance enterography results

From the 69 MRE included in the study, in total 53 MRE had discrepancy between the two CR in at least one segment based on the prior established threshold. A total of 123 segments (123/414 or 29,7%) therefore needed adjudication. Of these segments 53% had inactive disease and 47% had active disease of which 60% had severe disease. The ileal (n=27; 63% active disease) and the sigmoidal segments (n=28; 68% inactive disease) needed most adjudications. There was no difference in the number of studies with discrepancy between baseline (n=27) and week 54 (n=24). Overall based on the ICC analysis the reliability of the scoring of the different readers was moderate to good at baseline. At week 54 the correlation was only good in the ileum and rectum table 2.

The radiological response and remission rate at week 54 was 36.4% and 30.3% respectively. The results of the final MaRIA scores per segment are shown in supplementary data 1 a-b. There was a significant decrease in the median global MaRIA score from baseline to the end of the study from 53 (IQR: 42-73) to 43 (IQR: 28-53) ($p=0.001$).

In patients with active disease at baseline, the segmental radiological remission rate in the ileum was only 25%. The segmental radiological remission rates were higher in the colonic

segments (70% ascending, 80% transverse, 87% descending, 75% sigmoid and 44% rectum) (supplementary data 1 c). In all segments apart from the rectum there was a significant decrease in median segmental MaRIA score at week 54 compared to baseline

Correlation between radiology and endoscopy

Endoscopic remission (CDEIS<3) was achieved in a much higher proportion of patients (71%) than radiological remission. There was a correlation between the global MaRIA and the CDEIS (continuous variables) at baseline ($\kappa=0.46$; $p=0.008$). At week 54 no correlation was seen between the CDEIS and the global MaRIA score ($\kappa=0.06$; $p=0.75$). The reason for the absence of any correlation at week 54 was the floor phenomenon that was seen in patients with endoscopic remission (CDEIS <3) that still had high MaRIA scores (figure 1). When correlating endoscopic and radiological remission (categorical variables) in patients at week 54 no association was seen neither when using CDEIS < 3 ($p=0.107$) nor CDEIS < 4 ($p=0.06$) as definition of endoscopic remission.

Pharmacodynamics of infliximab and radiologic response and remission

Radiological remission at week 54 was correlated with infliximab trough levels at week 14 ($p=0.049$). Based on a ROC analysis an infliximab trough level value of 7.8 $\mu\text{g/ml}$ at week 14 was identified as cut off to predict radiological remission over time (area under the curve 0.74; sensitivity 75% and specificity 86%; negative predictive value 90% and positive predictive value 67%) (figure 2a). Radiologic response at week 54 was correlated with infliximab trough levels at week 14 ($p=0.048$) and with continuous pharmacological response (infliximab trough levels >5.0 $\mu\text{g/ml}$ at all timepoints) ($p=0.034$). A ROC based infliximab trough level cut off value of 7.8 $\mu\text{g/ml}$ was identified (area under the curve 0.73; sensitivity 70% and specificity 90%; negative predictive value 86% and positive predictive value 78%)

for being predictive for radiological response (figure 2b). There was a numerical but not statistically significant difference in infliximab trough levels at W54 among patients with or without radiologic remission ($p=0.13$) (supplementary data 2). When looking at the infliximab trough levels per quartile at week 14, patients in the highest quartile had the highest radiologic response ($p=0.03$) and remission ($p=0.06$) rate at week 54 (figure 3). Comparing patients with both endoscopic and radiological remission (median infliximab trough level 8.5 IQR 4.6-10.4) to patients with only endoscopic remission (median infliximab trough level 5.8 IQR 2.7-6.5) a numerical but no statistically significant difference was seen in the infliximab trough levels at week 14 ($p=0.095$), no difference was seen at week 54 ($p=0.35$). A subgroup of 21 patients had dose escalation during maintenance therapy with infliximab. In this subgroup continuous pharmacological response (infliximab >7 $\mu\text{g/ml}$ at all timepoints) was associated with radiological response ($p=0.039$) and remission ($p=0.019$). No difference was seen in the radiological remission ($p=0.59$) or response ($p=0.76$) rates comparing patients with or without dose adjustments during maintenance.

Discussion:

This substudy of the prospective TAILORIX study shows that radiological remission and response can be achieved with infliximab in patients with early luminal CD, although to a much lower extent than endoscopic remission. Infliximab trough level at the end of induction (week 14) of 7.8 $\mu\text{g/ml}$ was associated with both endoscopic response and remission. A continuous high infliximab exposure (infliximab >5 $\mu\text{g/ml}$ at all time points) was associated with radiological response. This is the first study to confirm the exposure-response relationship of infliximab for radiological remission. Previously an observational cross sectional study showed association between adalimumab levels and bowel wall

thickness based on intestinal ultrasound.¹⁸ Several studies have shown the exposure-response relationship for infliximab with endoscopic remission. A post-hoc analysis of the Active Ulcerative Colitis Trials 1 & 2 showed that infliximab levels of 5.1 µg/ml and 6.7 µg/ml at week 14 were associated with endoscopic improvement and remission at week 30, respectively.¹⁹ Also infliximab maintenance trough levels ≥ 7.5 µg/ml are associated with long term endoscopic response in UC.²⁰ Although proactive therapeutic drug monitoring is not supported by robust evidence at this stage^{12, 13, 21-23}, our results do suggest that optimal induction dosing could improve the outcomes of the patient. Moreover, in patients with dose adjustments a maintenance infliximab trough levels of > 7 µg/ml was associated with radiological remission. Since radiological remission is more difficult to achieve than endoscopic remission higher drug-exposure might be needed to reach this target.

At baseline there was a correlation between the endoscopic and radiological disease activity which is in line with prior observations for MaRIA and other MRE scores.²⁴ At week 54 however, there was a striking disconnect between endoscopic and radiological remission suggesting that radiological remission is a more difficult target to reach. Less than half of the patients with endoscopic remission achieved radiological remission. Data suggest that radiological healing implies favorable clinical long term outcomes.⁸⁻¹⁰ Although it might be difficult to discriminate chronic bowel damage from active disease on MRE²⁵, this is not applicable to our cohort. With a median disease duration of 1.5 months we don't expect a high burden of bowel damage. Other studies showed better correlation between endoscopic and radiological remission. In the original development cohort of the MaRIA score an optimal correlation was seen between MaRIA and CDEIS ($r = 0.82$, $p < 0.001$), but 74% of this cohort had active endoscopic disease. Furthermore the scoring methodology was not the same in the original MaRIA paper compared to the methodology used in the

current study (different CDEIS calculation, blinding of the endoscopist, number of radiologists involved). Better correlation is also seen when using less robust scoring of radiological remission like in the pediatric ImageKids study²⁶ in which the definition of radiological remission was based on a visual analogue scale indicating the radiologist global assessment. In this study there was a match of endoscopic and radiological remission in 69% of the patients and only a minority of the patients had persisting radiological signs of disease activity in absence of endoscopic lesions (6%). Efforts have been made to minimize the limitations of the current MaRIA score leading to a more simplified version that correlates strongly with the CDEIS.²⁷ Of note, there is clear difference in radiological healing rate according to the location of the disease. Colonic segments have higher radiological healing rates than the active disease located in the ileum. This findings are in line with what is seen in this cohort on an endoscopic level (unpublished data, Riviere et al UEGW 2019).

Our study has several strengths. First, a robust methodology for the central reading of the MREs was applied, with random allocation of the MRE's to 6 experienced radiologists. A low threshold was set for the need for adjudication resulting in an optimal scoring. Second, this is a unique cohort of patients with prospectively collected clinical, pharmacological, endoscopic and radiological data. Our study also has some limitations. The patient cohort was relatively small with only 36 patients included of which 31 with baseline and week 54 MRE; however this is counter-balanced by the fact that we used objective endpoints such as the infliximab trough levels and radiological healing in luminal CD. Of note, different dose adjustment regimens were possible in the TAILORIX trial. In this study however all patients had an identical induction regimen with infliximab. Furthermore we focused not on the dosing as such but on the effective drug-exposure based on the infliximab trough levels. Third, MREs were performed on the different MR systems with variable performance. This

could indeed influence the quality of the scoring and the inter-rater variability. Additionally it is striking that the inter-rater variability was mainly high in the colonic segments. That can be explained by poorer performance of radiological scoring in the colon compared to the ileum. By using a stringent protocol for the imaging and a balanced central reading methodology we could minimize the impact of this variance. Although one could argue that the correlation between endoscopic and radiological disease activity might be better when applying more thorough CR training and optimizing the MRE sequences, in particular T2-fat sat. Finally, we found no significant association between the infliximab trough level at week 14 and the endoscopic outcome. For this comparison between the target trough levels for the different outcomes is not possible.

In conclusion, this is the first prospective study indicating the exposure-response relationship for infliximab for radiological response and remission in luminal CD. Adequate infliximab trough levels at the end of induction are associated with beneficial radiological outcomes at 1 year. The target of radiological remission is achievable but to a lower extend compared to endoscopic remission.

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Table 1: Patient characteristics of the patients include in the TAILORIX trial with at least 1 MRE and the total evaluable TAILORIX cohort ¹² and infliximab exposure data during of the MRE cohort (CDAI Crohn's disease activity index; IQR interquartile range)

	MRI TAILORIX Cohort n=36	Total TAILORIX Cohort n=116 ¹²
Median age (IQR)	35.7 year (25.6-48.6)	30 year (22-45)
Median disease duration (IQR)	1.5 months (0.6-22.4)	7 months (1-78)
Gender distribution (M/F)	18/18	58/68
Median baseline C-reactive protein (IQR)	22 mg/L (7.8-34.3)	20.0 mg/L (9.0–36.5)
Median baseline faecal calprotectin (IQR)	1501 µg/g (780-1800)	1,462.5 µg/g (726–1800)
Median CDAI (IQR)	282 (246-321)	280 (236-321)

Dosing regimen ¹³ (%)	Dosing regimen 1: 39% Dosing regimen 2: 33% Control group: 27.8%	Dosing regimen 1: 36.9% Dosing regimen 2: 30.3% Control group: 32.8%
Median yearly infliximab dose per body weight (only in patients reaching week 54) (IQR)	55.31 mg/kg/year (44.9-67.8)	
Median infliximab trough level week 14 (IQR)	5.8 µg/ml (3-8)	
Median infliximab trough level week 54 (IQR)	6.5 µg/ml (4-11)	
infliximab trough levels >2 µg/ml at any time point (%)	24/36 (67)	
infliximab trough levels >3 µg/ml at any time point (%)	19/36 (53)	
infliximab trough levels >5 µg/ml at any time point (%)	9/36 (25)	
infliximab trough levels >7 µg/ml at any time point (%)	4/36 (11)	
Need for dose adjustment (%)	21/36 (58)	

Table 2: Intraclass Correlation (ICC) for between the two random readers Results of ICC analysis were classified as very good (coefficients, .81-1.00), good (.61-.80), moderate (.41-.60), fair (.21-.40), and poor (<.21).

Segment	Week 0	Week 54
Ileum	0.746 (p<0.0001)	0.671 (p=0.002)
Ascending colon	0.792 (p<0.0001)	0.249 (p=0.231)
Transverse colon	0.751 (p<0.0001)	0.434 (p=0.076)
Descending colon	0.514 (p=0.021)	0.177 (p=0.311)
Sigmoid colon	0.602 (p=0.004)	-0.133 (p=0.626)
Rectum	0.726 (p=0.001)	0.688 (p=0.002)

Figure legend:

Figure 1: Correlation between the CDEIS and MaRIA score at baseline ($\kappa = 0.46$; $p=0.008$) and week 54 ($\kappa = 0.06$; $p=0.75$); trend line (full line) 95% confidence interval (dotted line)

Figure 2: Receiver operating characteristics curve indicating a Infliximab trough level cut off value of 7.8 $\mu\text{g/ml}$ at week 14 being associated with (a) radiological remission at week 54 (area under the curve 0.74; sensitivity 75% and specificity 86%; negative predictive value 90% and positive predictive value 67%); (b) with radiological response at week 54 (area under the curve 0.73; sensitivity 70% and specificity 90%; negative predictive value 86% and positive predictive value 78%).

Figure 3: Radiological remission (a) and response (b) at week 54 per infliximab trough level quartile at week 14. Significantly higher radiological response rate for the highest quartile ($p=0.03$).

Supplementary data 1: Evolution of the radiological activity over time (a) boxplot of the segmental MaRIA score at baseline, (b) boxplot of the segmental MaRIA score at week 54 (one dot per patient, bars=mean with standard error of the mean), (c) evolution of the number of patients with active disease per segment (MaRIA score ≥ 7) and the evolution in median segmental MaRIA score from baseline to week 54 in patients with active segmental disease (decrease all $p < 0,02$; except rectum $p=0.16$). (MRE: magnetic resonance enterography; IQR: inter quartile range)

Radiological active disease at baseline (n)	28	10	10	8	12	9
Radiological active disease at week 54 (n)	21	3	2	1	3	4
Median MaRIA w0 (IQR)	22 (18-29)	16 (15-19)	21 (16-29)	22 (19-26)	18 (14-24)	13 (9-17)
Median MaRIA w54 (IQR)	18 (7-24)	5 (4-8)	5 (5-16)	5 (4-6)	5 (4-7)	9 (5-17)

Supplementary data 2: Infliximab trough level at week 54 in patient with and without radiological remission at week 54 ($p=0.13$) (one dot per patient, bars=mean with standard error of the mean).

What You Need to Know:

BACKGROUND: Increased exposure to infliximab results in higher rates of endoscopic healing in patients Crohn's disease (CD). Radiologic remission, determined by magnetic resonance enterography, associates with long-term outcomes but is difficult to achieve.

FINDINGS: Radiologic remission was achieved in approximately one third of patients with luminal CD treated with infliximab. An infliximab trough level of 7.8 µg/ml at the end of induction therapy associated with radiologic response and remission.

IMPLICATIONS FOR PATIENT CARE: Radiologic healing is a difficult but achievable for patients with luminal CD. Monitoring trough levels of infliximab can guide treatment, and optimizing dosing during induction therapy could improve long-term outcomes.