international bowel ULTRASOUND GROUP

IBUS HYBRID module 1

7-8TH NOVEMBER, 2025
MILAN, ITALY

What's hot in IUS in uncomplicated Crohn's disease

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DISCLOSURE

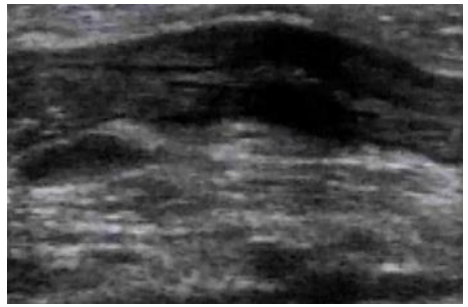
Serve to speaker for Abbvie, Takeda, Johnson & Johnson

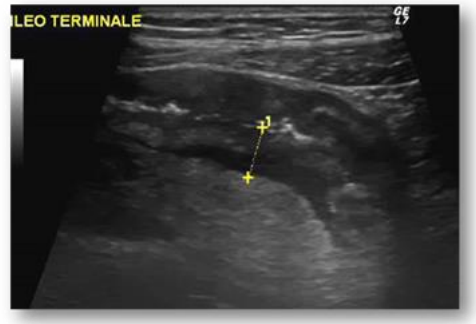
INDICATIONS FOR IUS IN CD PATIENTS

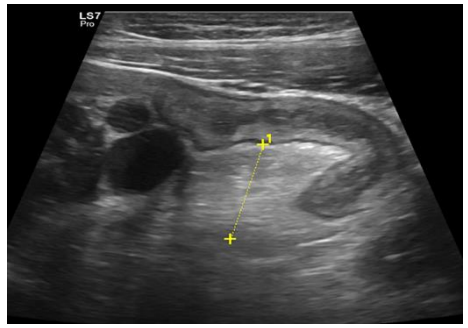
- ✓ **DIAGNOSIS OF THE DISEASE**
- ✓ **ACTIVITY/PROGNOSTIC VALUE**
- ✓ **POST-SURGICAL RECURRENCE**
- ✓ **MONITORING THERAPEUTIC RESPONSE**
- ✓ COMPLICATIONS

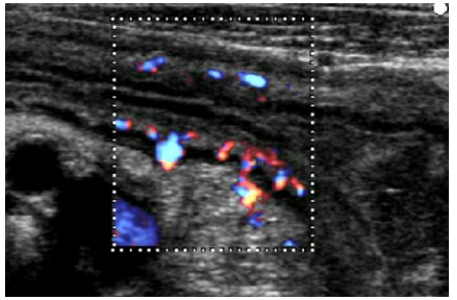
WHICH IUS PARAMETERS CAN HELP US?

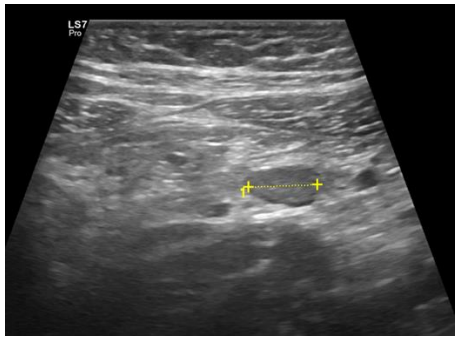
- ✓ Thickness of the wall
- ✓ Wall stratification
- ✓ Vascularization of the wall
- ✓ Creeping fat
- ✓ Mesenteric lymph nodes











IUS IN THE DIAGNOSIS OF CROHN'S DISEASE

Diagnosis of CD was based mainly on the measurement of **bowel wall thickness (BWT)**

Calabrese E, et al. Inflamm Bowel Dis 2016

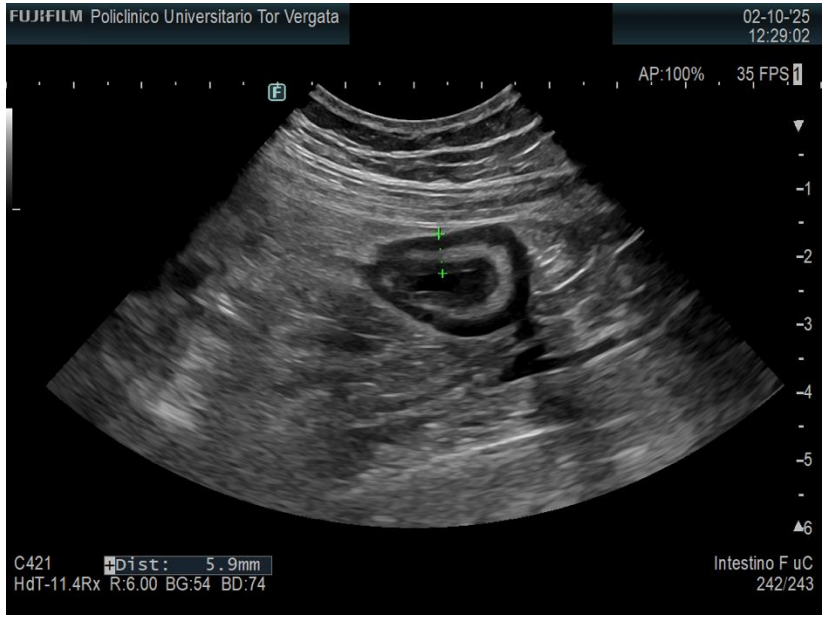
Meta-analysis considers any BWT that exceeds **3–4 mm** shoul be considered pathological

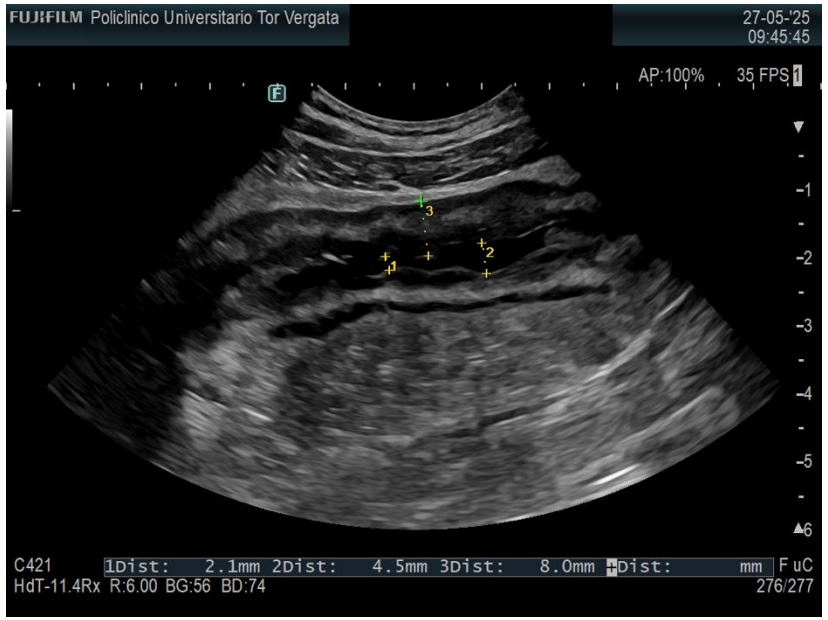
Fraquelli M, et al. Radiology 2005

A threshold of **3 mm** is the recommended cut-off for presence of mural inflammation for both the small and large bowel

A BWT less than **2 mm** is considered to be **normal**

Kucharzik et al. JCC 2022
Nylund K, et al. Ultraschall Med 2017





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Diagnosis in patients with suspicion of CD: comparison of IUS and MRE

Small Bowel CD	Sens.	Spec.	PPV	NPV
MRE	96%	94%	94%	96%
IUS	94%	97%	97%	94%

Colon CD	Sens.	Spec.	PPV	NPV
MRE	78%	94%	90%	86%
IUS	73%	92%	87%	83%

IUS allows the diagnosis of Crohn's disease with a high diagnostic accuracy comparable to MRE for identifying lesions of both the small intestine and the colon

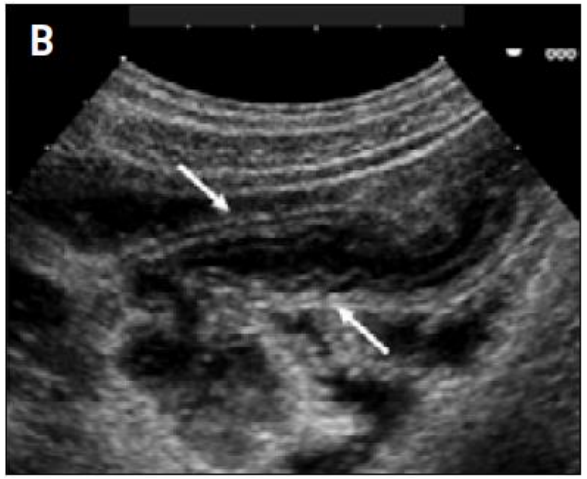
Castiglione F, et al. Inflamm Bowel Dis 2013

Assessment of Disease Location

	Sens.	Spec.
Jejunum	56%	98%
ileum	93%	88%
colon	82%	95%

Calabrese E, et al. Inflamm Bowel Dis 2016

The use of **oral contrast agent** improves distension of the small intestine and has been shown to improve the detection rate particularly in the jejunum

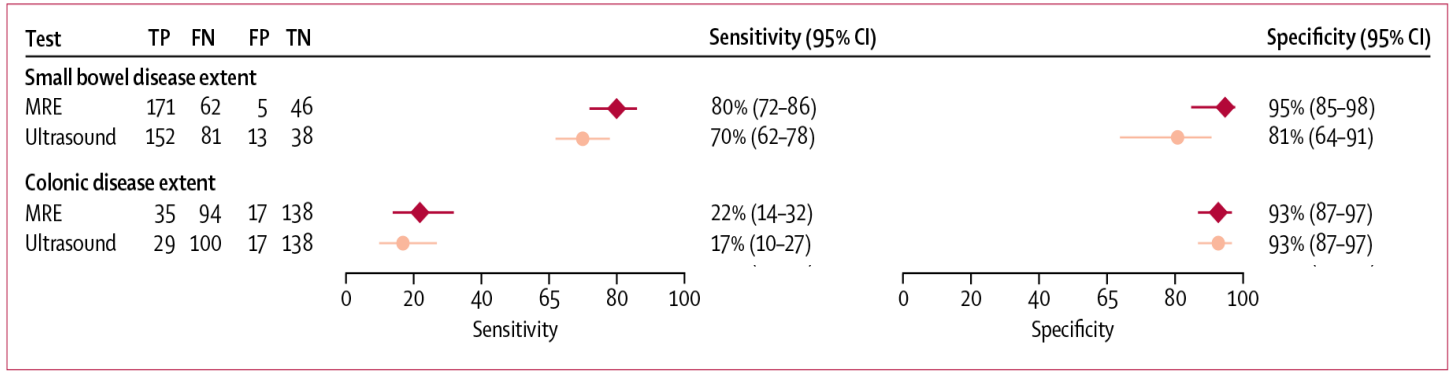


Assessment of Disease Extent

METRIC Study

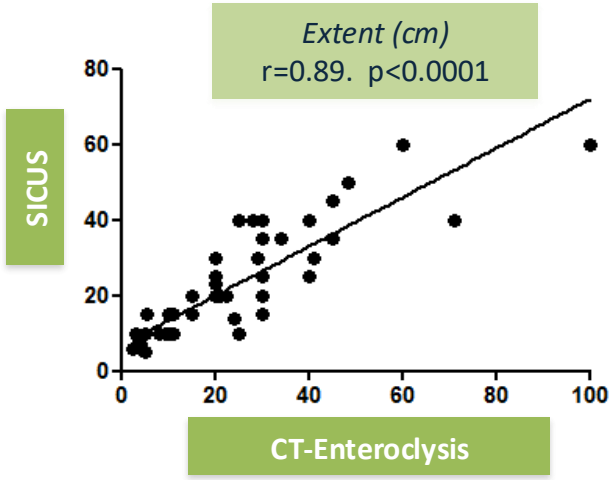
MRE and IUS had no significant difference in the diagnostic accuracy for the extent of colonic disease.

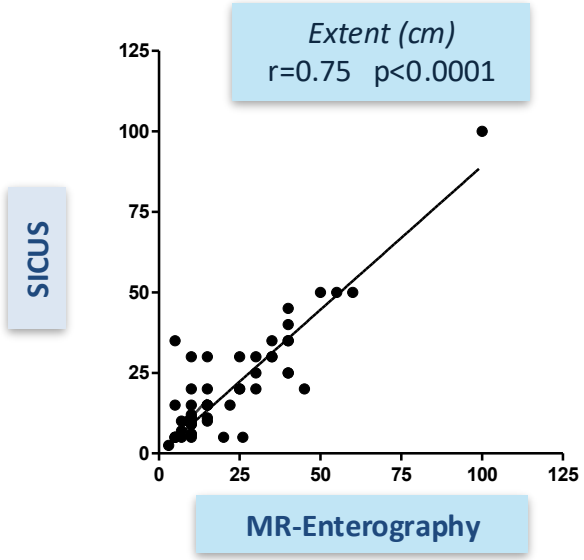
The accuracy of MRE for the lesion extent in the small bowel was significantly greater compare to IUS



Taylor A. et al. Lancet Gastroenterol Hepatol 2018

The diagnostic accuracy of IUS in defining the extent of disease increases significantly when IUS is performed using oral contrast





Calabrese E. et al. CGH 2013

Calabrese E. et al. DDW 2014

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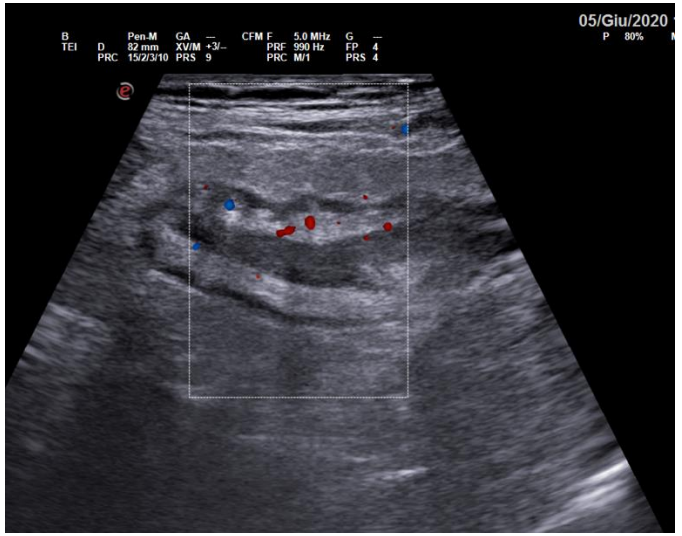
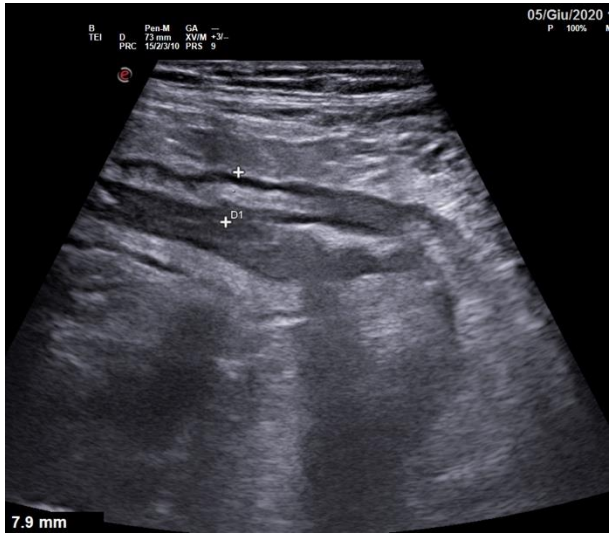
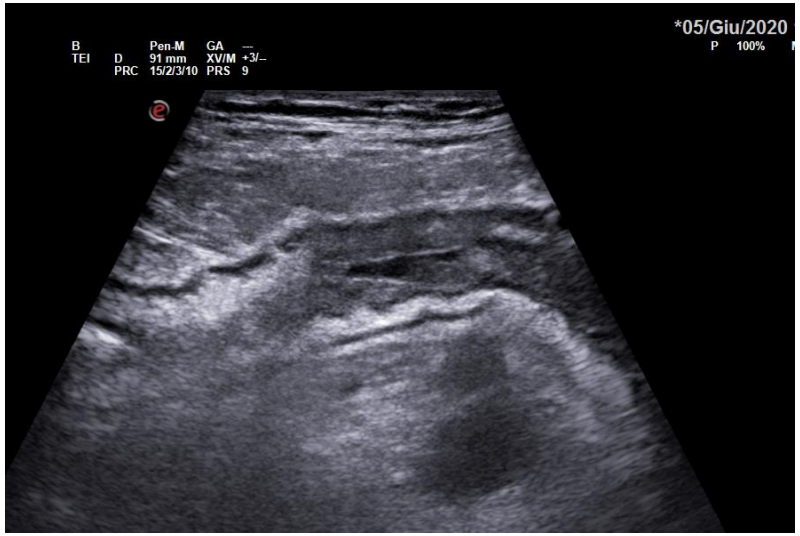
Ileal lesion before and after oral contrast agent

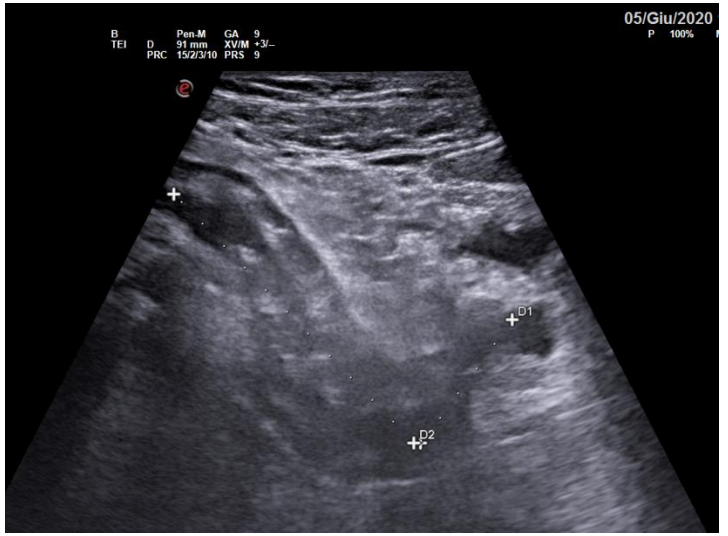
IUS





SICUS





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WHICH PARAMETERS FOR INFLAMMATORY ACTIVITY?

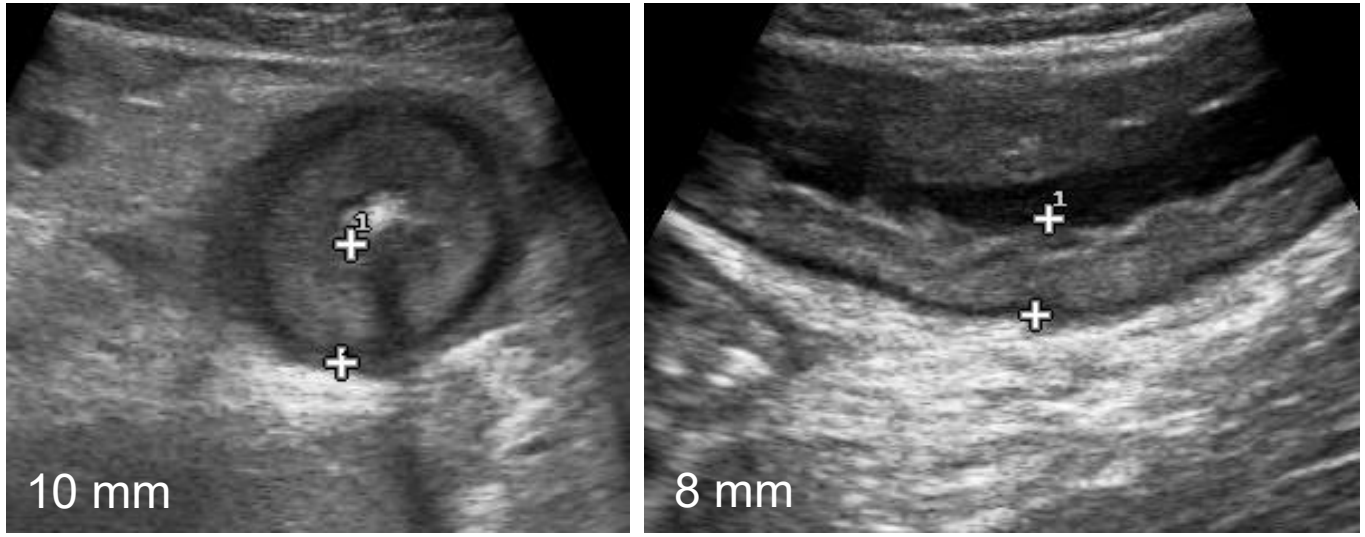
I. Thickness of the wall

II. Wall stratification

III. Vascularization of the wall

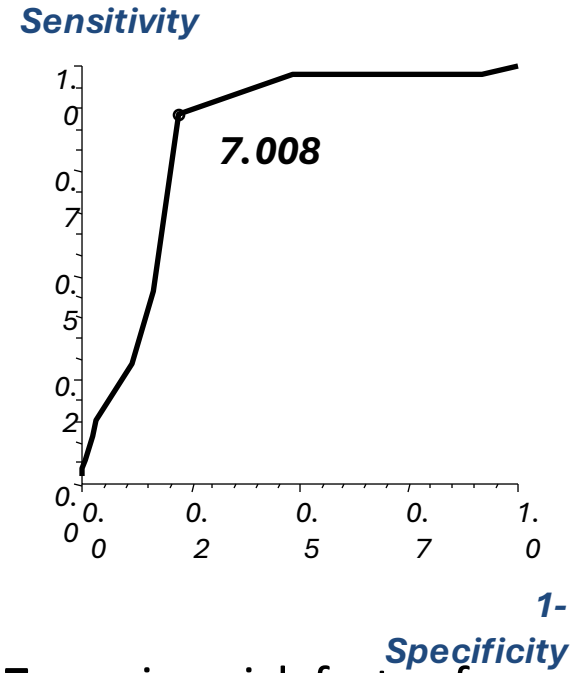
IV. Creeping fat & Mesenteric lymph nodes

BWT is the single strongest predictor of activity



Bowel Wall Thickness at Abdominal Ultrasound and the One-Year-Risk of Surgery in Patients with Crohn's Disease

Fabiana Castiglione, M.D., Ilario de Sio, M.D., Antonio Cozzolino, M.D., Antonio Rispo, M.D., Francesco Manguso, M.D., Giovanna Del Vecchio Blanco, M.D., Elena Di Girolamo, M.D., Luigi Castellano, M.D., Carolina Ciacci, M.D., and Gabriele Mazzacca, M.D.



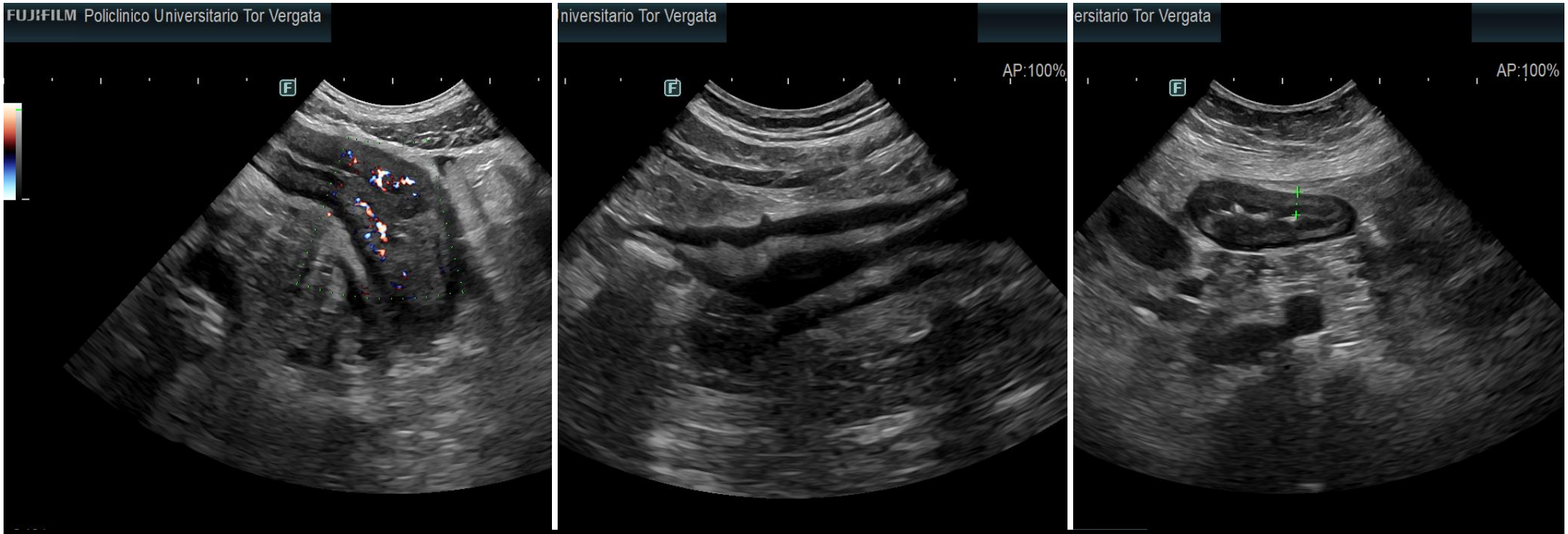
BWT> **7 mm** is a risk factor for surgery (OR=19)

TIPS and TRICK

- Measure wall thickness at the anterior wall of the bowel (or where it is best visible)
- Measure in both longitudinal and transverse orientation, always perpendicular to the lumen, avoiding haustrations and mucosal folds
- Place the calipers at the echo interface between the serosa and proper muscle, to the echo interface between the lumen and mucosa

Castiglione F. Am J Gastroenterol 2004

Maconi G, et al APT 2003



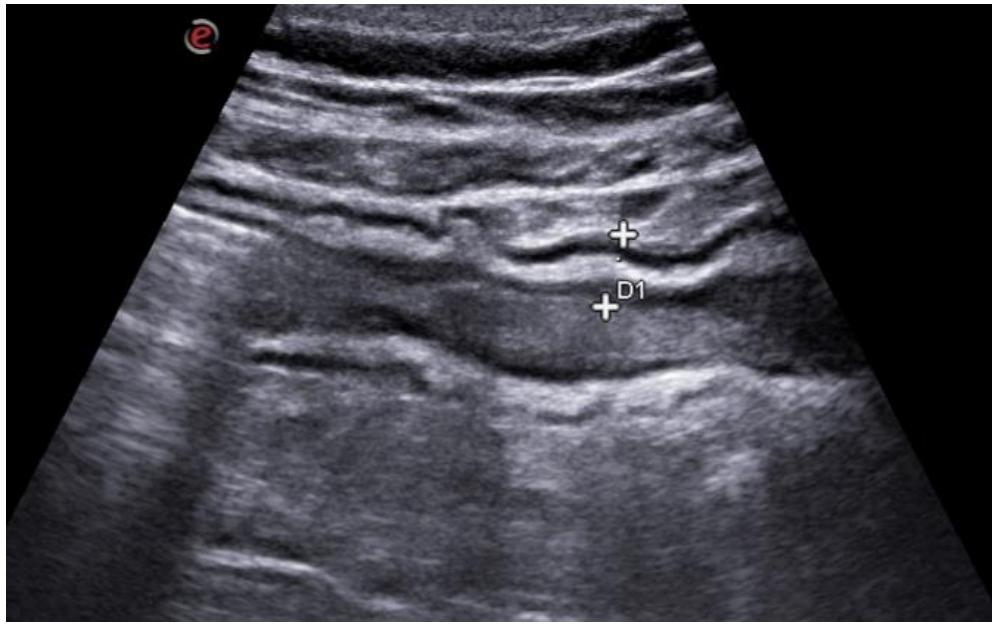
Given the co-existence of acute inflammation and chronic changes in the bowel wall, BWT alone may not best reflect disease activity

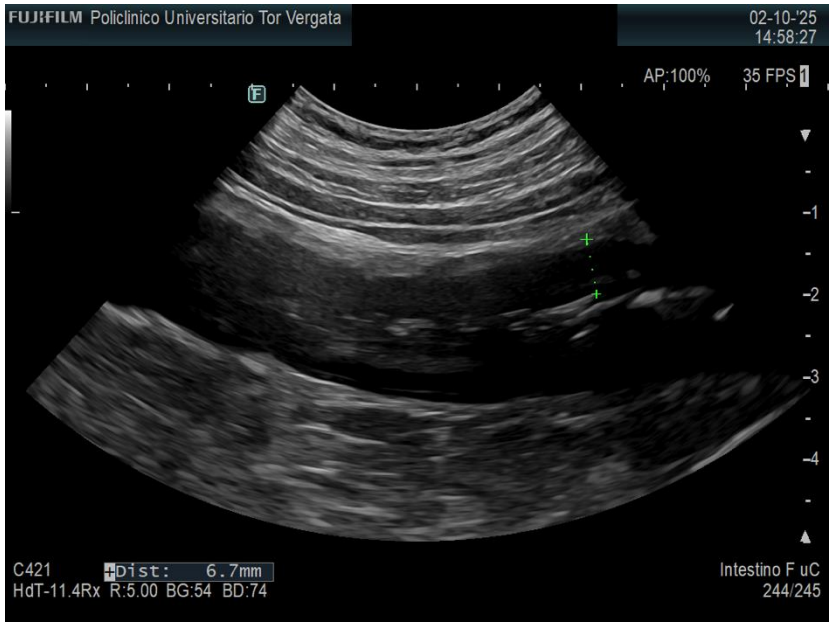
Wall stratification: ACTIVITY & PROGNOSTIC VALUE

IUS may show **preserved stratification** with the five layers visible, or **focal or extensive disruption** stratification (predominantly hypoechoic).

In vitro studies revealed that focal destruction of wall stratification is caused by deep ulcerations, and that the extensively disrupted pattern correlates with increased angiogenesis.

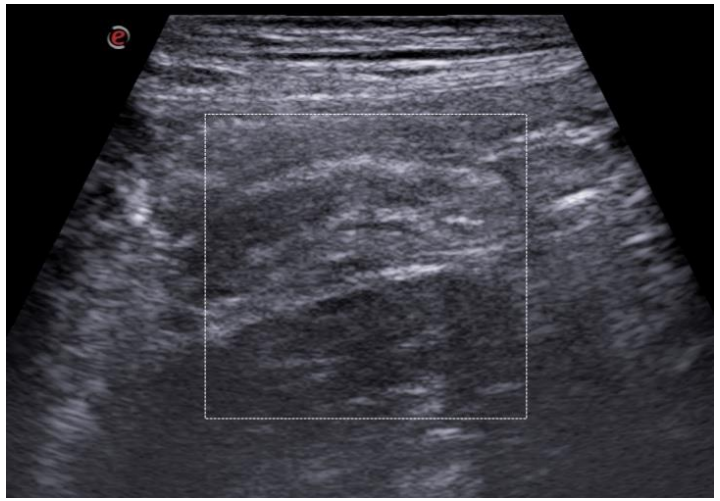
Loss of mural stratification correlates with clinical and biochemical CD activity and with increased risk of surgery





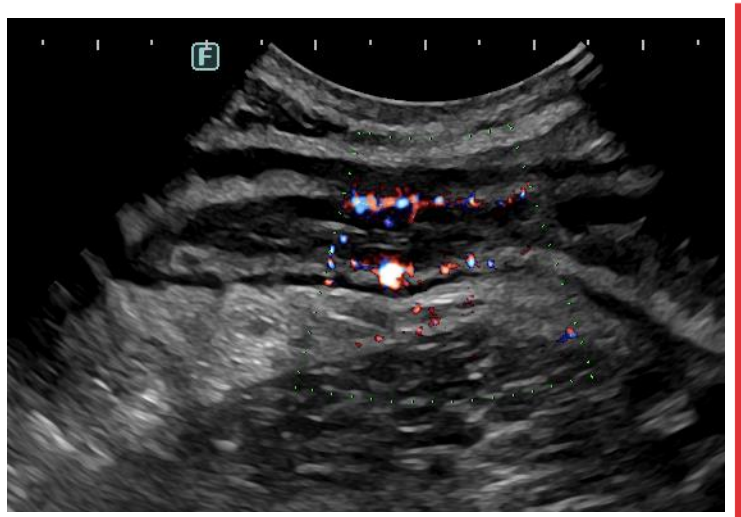
Maconi et al. EFSUMB 2018

Bowel Wall Vasularization: ACTIVITY & PROGNOSTIC VALUE



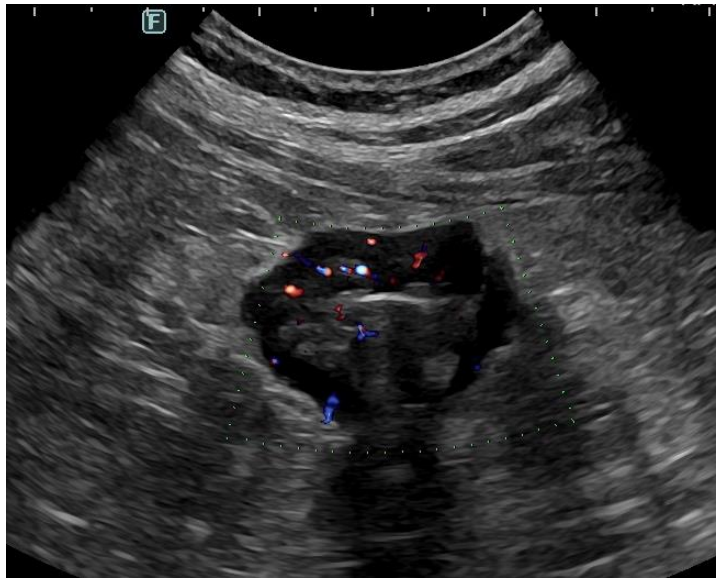
Bowel wall vascularization has excellent correlation with endoscopic and clinical CD activity

Sasaki T, et al. Scand J Gastroenterol 2014
Drews BH, et al. Eur Radiol 2009



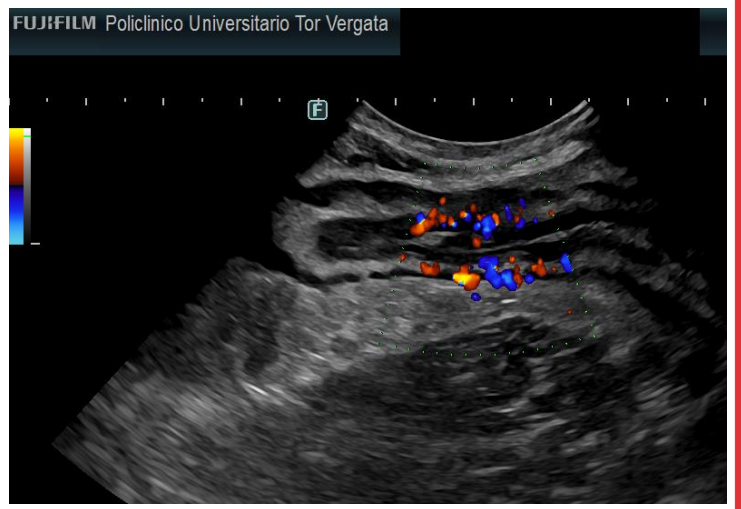
The most widely accepted semi-quantitative parameter for vascularization is the Limberg score.

Maconi et al. EFSUMB 2018



Persistence of increased vascularity despite clinical remission after treatment may suggest an increased risk of relapse

Ripollés T, et al. J Clin Ultrasound 2008



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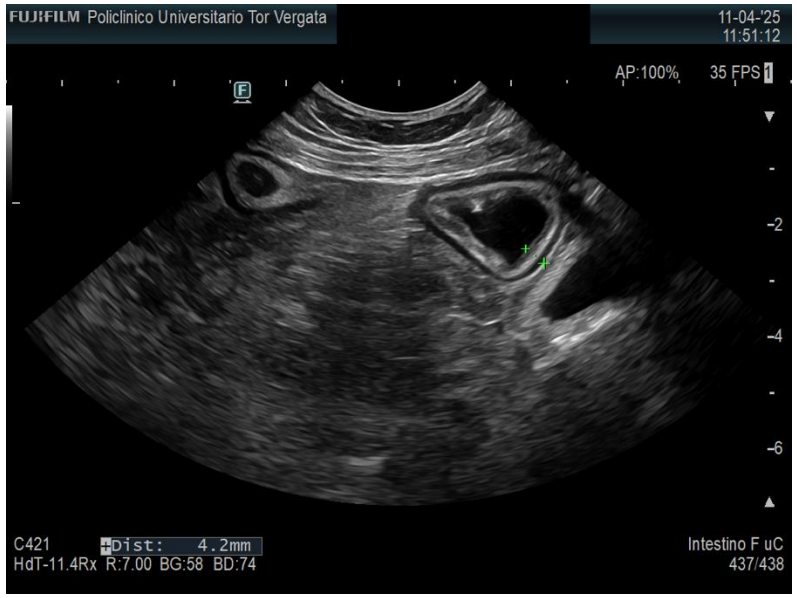
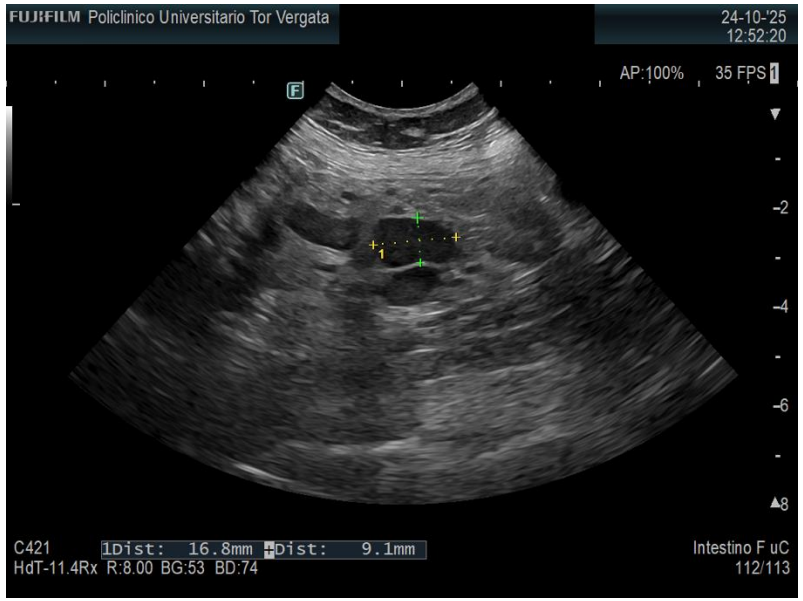
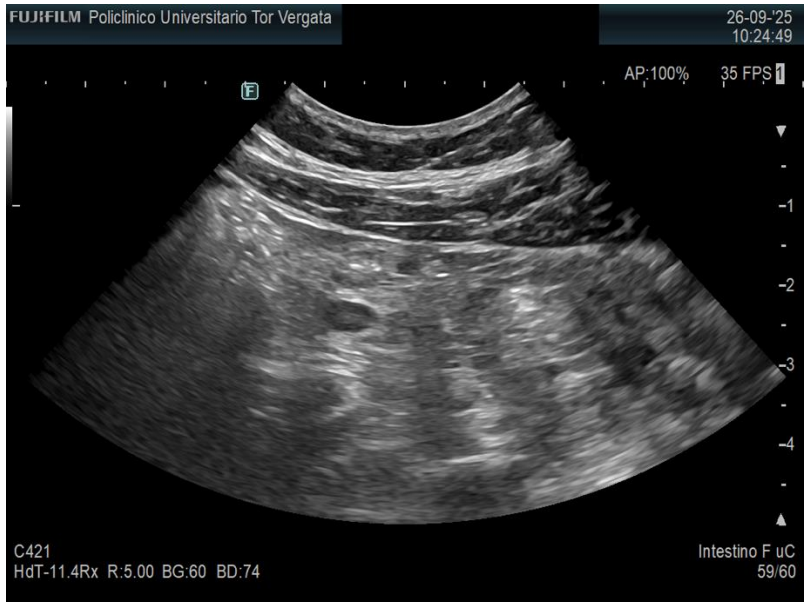
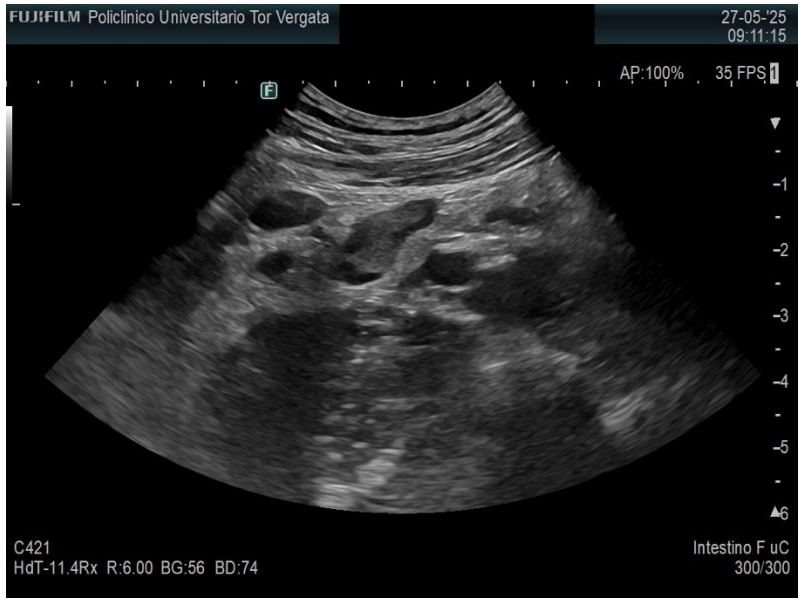
Creeping fat & Mesenteric lymph nodes









Maconi et al. EFSUMB 2018

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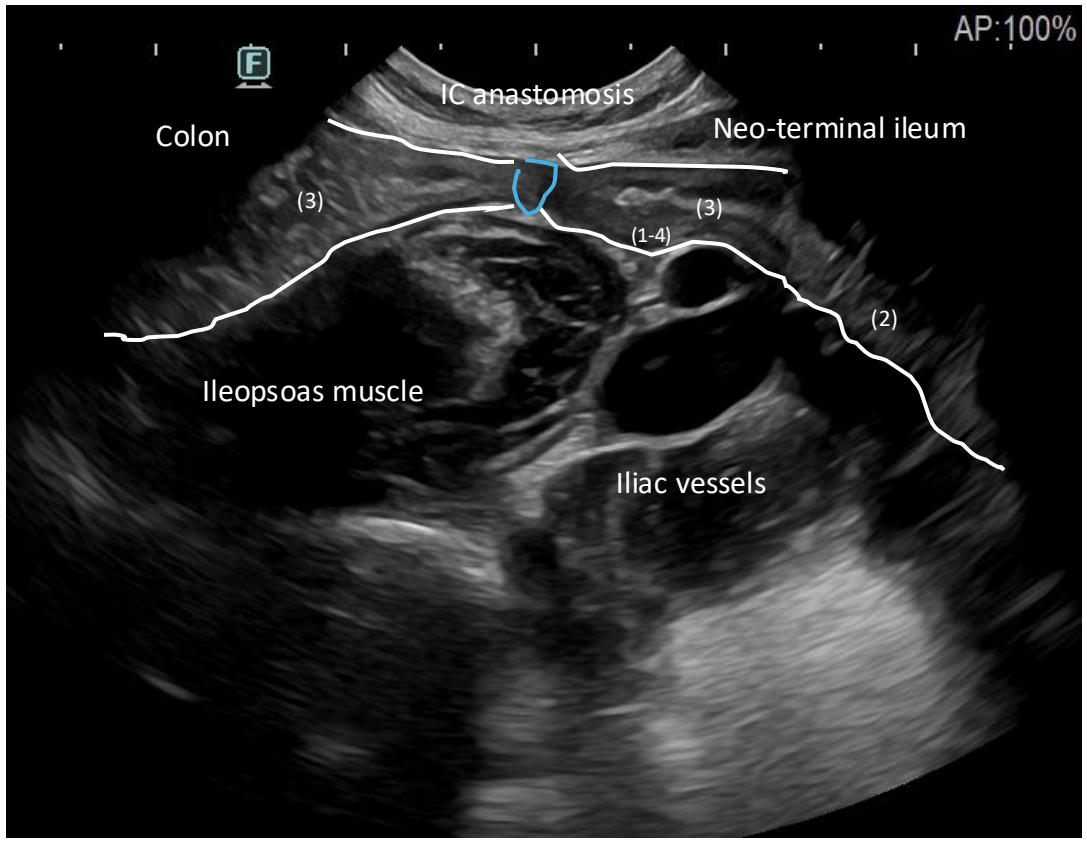
Post Operative Recurrence (POR)

Recommendation 18 In patients with CD who have had ileocaecal resection, we recommend endoscopy 6–12 months after surgery (EL2). Cross-sectional imaging (IUS [EL3] or MRE [EL3]) in combination with FC 3–6 months after surgery (EL3) could be used to detect early recurrence. Small-bowel VCE can be considered as a noninvasive alternative (EL3). (90% agreement)

IUS is a proper tool for the early evaluation of post-surgical recurrence

Kucharzik T. et al. J Crohn Colitis 2025



What do you look for?

- **BWT > 3 mm for at least 4 cm** at the perianastomotic area (1-2)
- Lumen diameter (3)
- Echopattern (4)
- Vascularization (5)
- Loop Dilation (6)
- Mesentery hypetrophy (7)
- Lymph nodes (8)
- Fissure/fistulas (9)
- Abscess (10)
- Free fluid (11)

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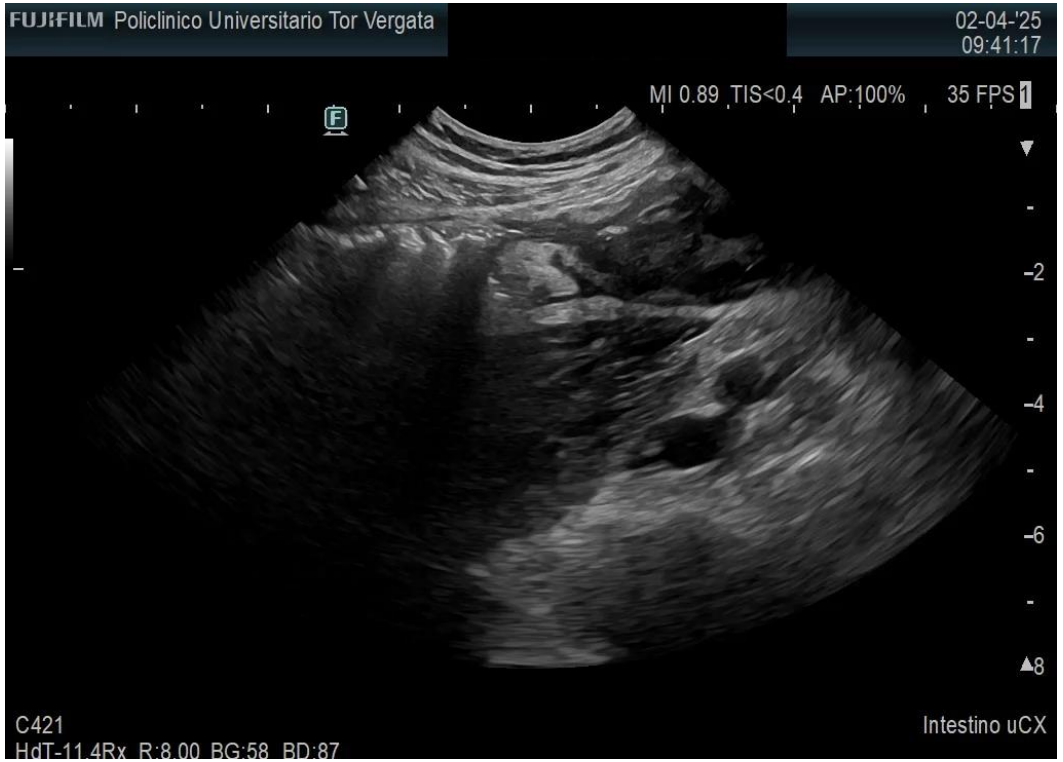
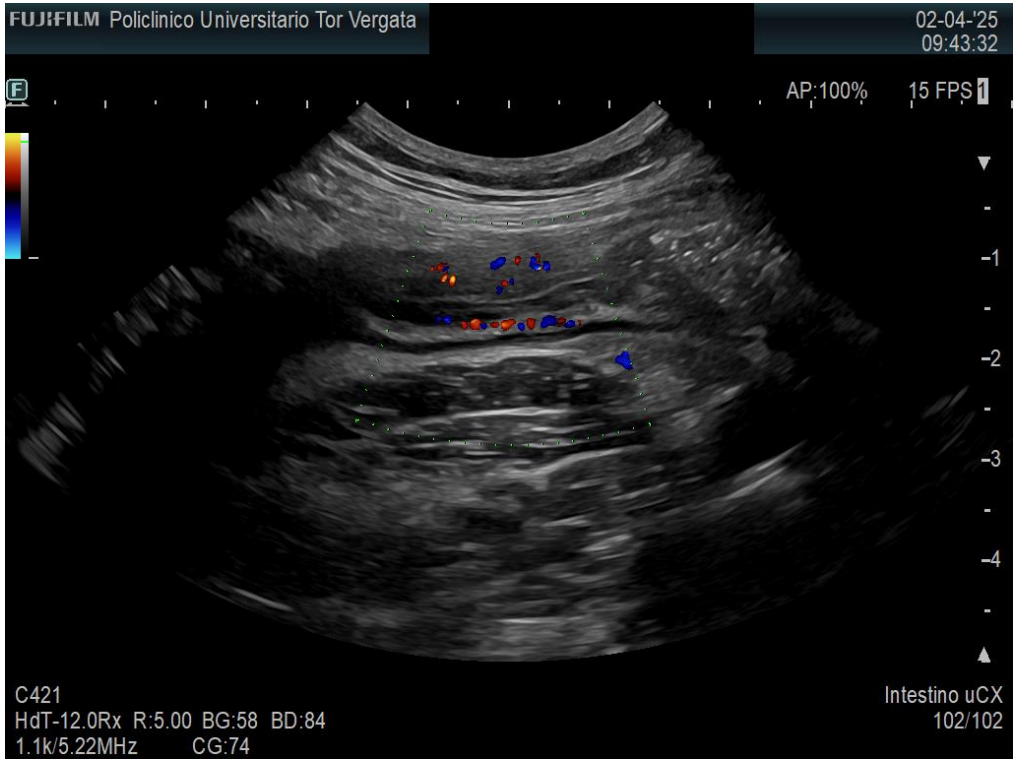
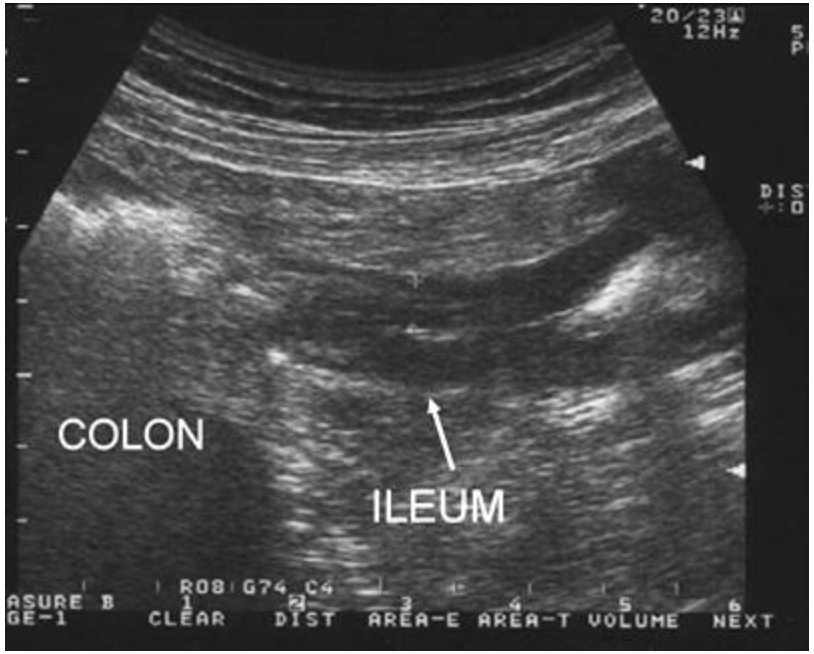




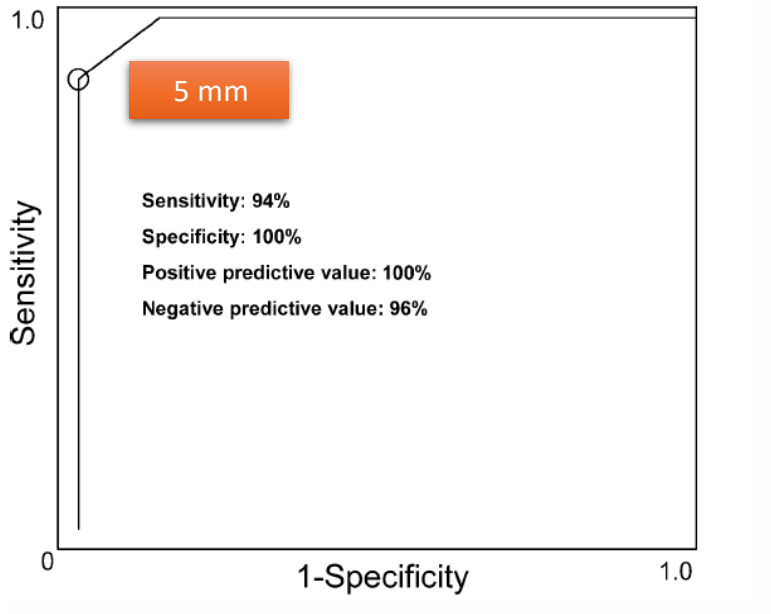
BWT (neo terminal ileum)= 4.5-6.3 mm (n.v.= 3 mm)
Lesion extent: 7 cm
Lumen narrowing without dilation
Increased vascularization: Limberg' score 2

BWT (colon)= 4 mm (n.v.= 3 mm)

IUS FOR DIAGNOSIS AND GRADING OF POST-SURGICAL RECURRENCE (PSR) OF CD



- SENSITIVITY 79%
- SPECIFICITY 95%



BWT ≥ 5 mm is a strong indicator of severe endoscopic PSR.

Rispo A. et al, Inflamm Bowel Dis 2006

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Monitoring disease in CD

ECCO-ESGAR-ESP-IBUS Guideline on Diagnostics and Monitoring of Patients with Inflammatory Bowel Disease:

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The efficacy and acceptability of IUS have led to its official recognition in the monitoring of CD.
In the most recent guidelines, intestinal ultrasound plays an important role:

Recommendation 11 Patients with CD in need of treatment initiation or optimization should be assessed clinically and biochemically (EL1) and by endoscopy (EL1), cross-sectional imaging (IUS or MRE), CE (EL3), or combinations thereof, at baseline. (95% agreement)

Recommendation 12 In patients with CD following treatment initiation or optimization, we recommend early (within 12 weeks) clinical (EL1), biochemical (EL1), and cross-sectional imaging (IUS [EL2] or MRE [EL2]) assessment of response. Endoscopic response assessment should be performed within 12 months (EL1). Results should be interpreted based on prior baseline assessment. (89% agreement)

Recommendation 14 In patients with CD in clinical remission, we suggest proactive monitoring for subclinical inflammation by PROs and objective markers of disease activity (biomarkers and cross-sectional imaging [IUS or MRE]) every 6–12 months (EL3). (86% agreement)

Recommendation 15 When considering elective treatment withdrawal in CD, we suggest assessing biomarkers and endoscopic and transmural remission before a shared decision is made (EL4). (100% agreement)
When considering elective treatment withdrawal in UC, we suggest assessing biomarkers and endoscopic and histological remission before a shared decision is made (EL4). (91% agreement)

Recommendation 16 After treatment withdrawal, patients with IBD should be monitored for early disease recurrence with PROs and objective markers of disease activity (biomarkers, cross-sectional imaging [IUS or MRE]), including an additional early 3-month time point (EL3). (100% agreement)

JCC JOURNAL of CROHN'S and COLITIS

Kucharzik T. et al. J Crohn Colitis 2025

The ability of early IUS to predict response to medical treatment

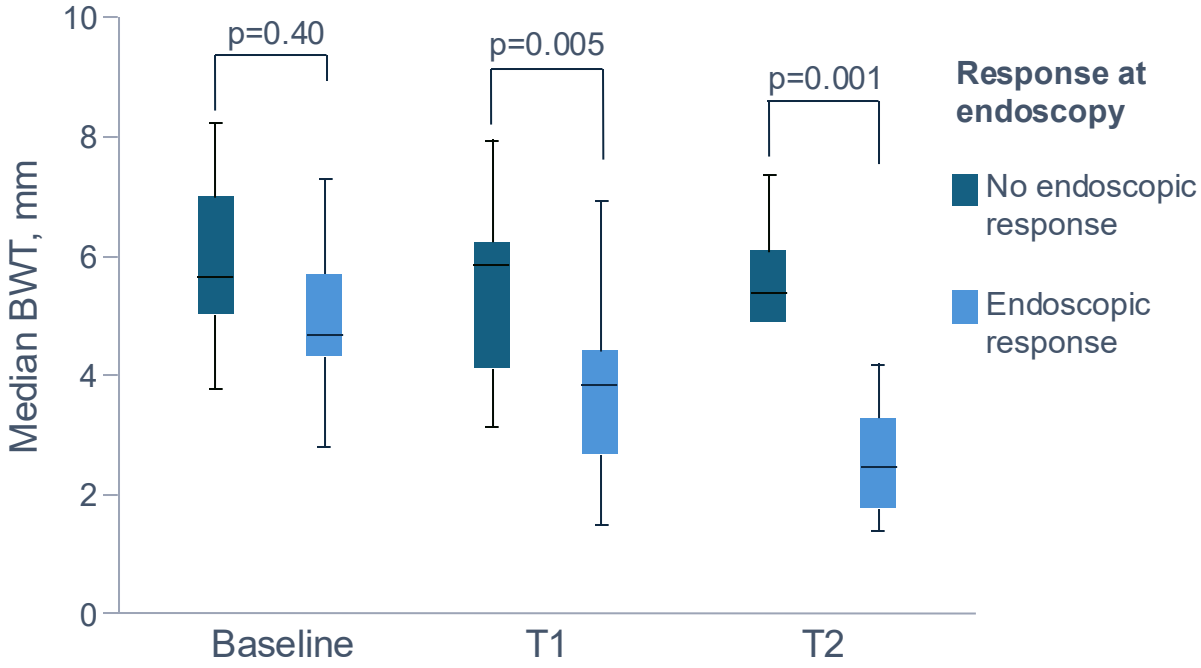
Prospective study of adults CD treated with TNF-α, undergoing ultrasound monitoring

Results:

- Decreases in BWT predicted endoscopic response:
  - At T1, a decrease of 18% (AUROC: 0.77; OR: 10.80, p=0.012)

- A BWT ≤3.2 mm was most accurate to determine endoscopic remission at T2 (AUROC: 0.94; OR: 39.42, p<0.0001)

BWT over time for endoscopic response in the most severe segment



De Voogd F, et al. J Crohns Colitis. 2022

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Early Intestinal Ultrasound Response to Biologic Therapy Predicts Endoscopic Remission in Children with Ileal CD. *Prospective Super Sonic Study*

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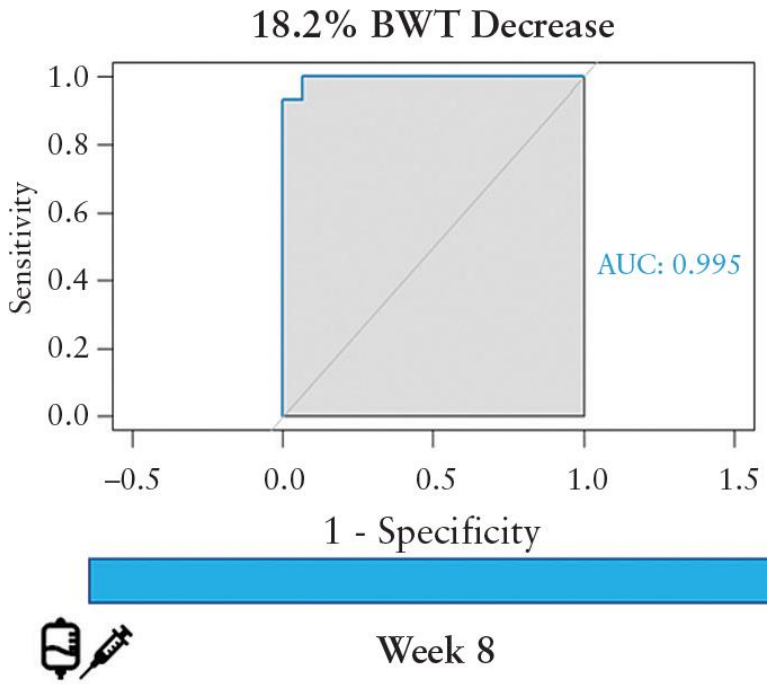
The **primary outcome** of the study was accuracy of optimal IUS cut-points to predict T2T endoscopic remission in the TI [SES-CD ≤ 2] for percentage change in BWT from baseline to week 8.

Results:
44 children were included, 29 [66%] achieved ER.
A **≥18% decrease in BWT** at week 8 predicted ER with an AUROC of 0.99 [95% CI 0.98–1.00], 100% sensitivity, 93% specificity, 97**% positive predictive value,** and 100% negative predictive value.



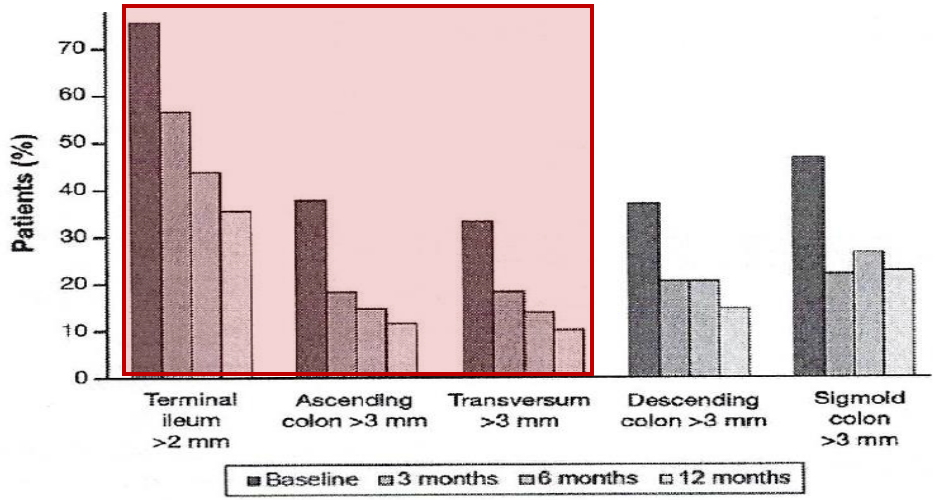
Dolinger M T, et al. JCC 2024

TRUST study: 12-months prospective, multicenter study

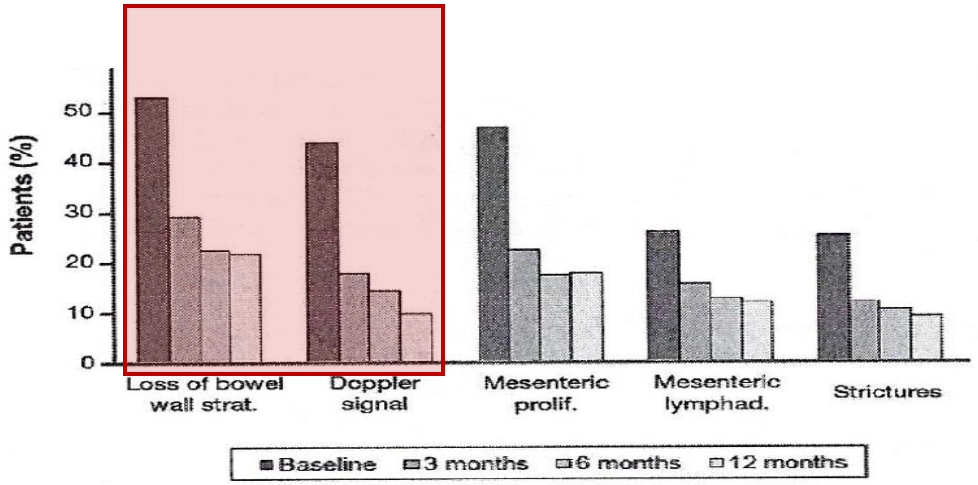
assesses the role of IUS to monitoring treatment response

234 CD patients with an acute flare, treated with advanced therapy

follow up every 3 months by IUS



Bowel Wall Thickening



BW and abdominal changes

Kucharzik et al . CGH 2017

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Which definition of Transmural Healing to use?

Studies evaluating the usefulness of intestinal ultrasound for therapeutic monitoring use **different definitions** for transmural healing, ranging from normalization of wall thickness alone to improvement or normalization of all ultrasound parameters.

Abdominal sonogram was considered normal when the BWT decreased to <3 mm, the color Doppler flow was grade 0 and intra abdominal complications disappeared.

Paredes J M, et al. 2010
Ripolles T, et al. 2016

A decrease in BWT to values lower than 3 mm was diagnostic of TH

Castiglione F, et al.2013
Castiglione F, et al.2017
Castiglione F, et al. 2019

Transmural healing: thickness decreased to ≤ 3 mm and the color Doppler flow was grade 0-1

Paredes J M, et al. 2019

Ultrasound remission was considered when the BWT decreased to < 3 mm, the color Doppler flow was grade 0-1 and the percentage of parietal enhancement increase was less than 46%.

Moreno N, et al. 2014

TH was defined as normalization of all parameters considered using SICUS (i.e. BWT, length of disease and perienteric inflammation, fistulae, phlegmon or abscess)

Zorzi F, et al. 2019

TH was defined as BWT normalisation, colour Doppler signal ≤1, normal echo stratification, and absence of inflammatory fat.

Kucharzik T, et al. 2020

TH was defined as normalization of all BUS parameters

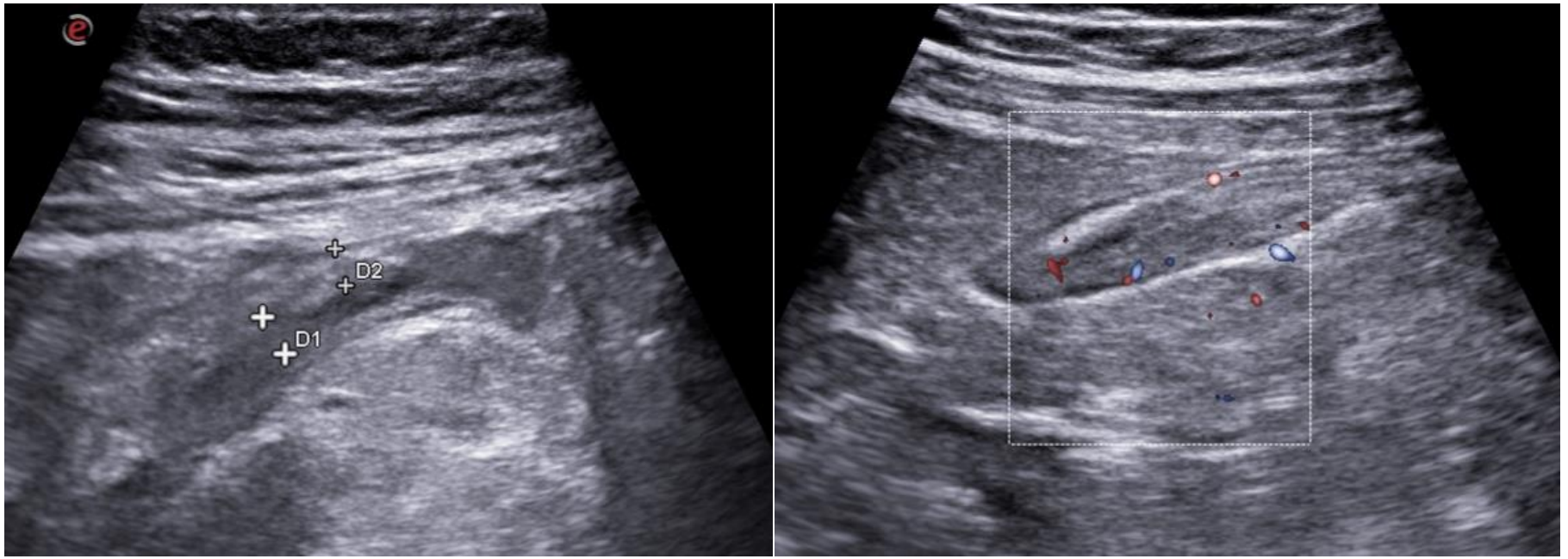
Calabrese E, et al. 2020

TH was defined as BWT decreased to ≤ 3 mm and normalization of the other US parameters

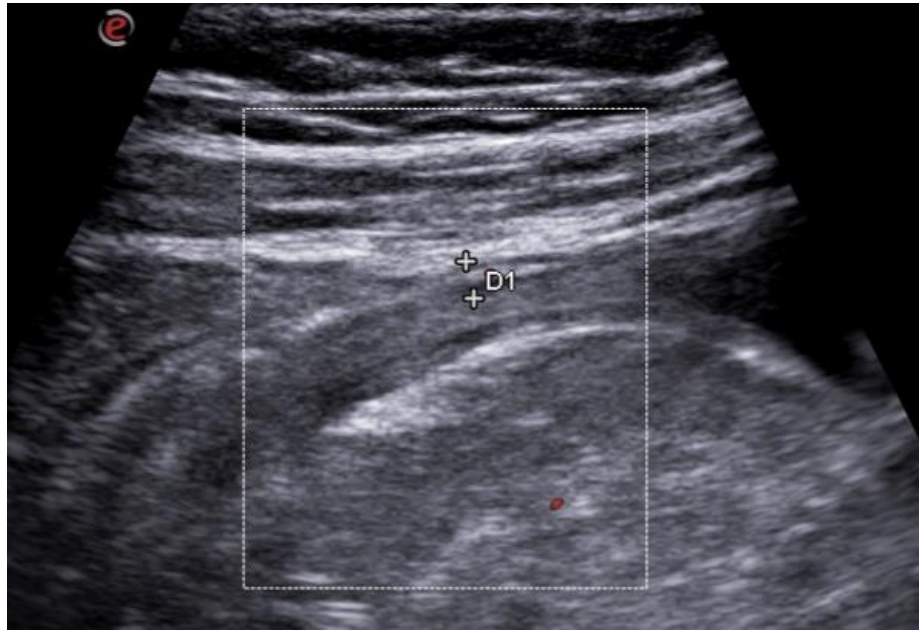
Civitelli F, et al. 2016

Case A: lesions normalization

Baseline IUS



IUS 12 month after TNFs



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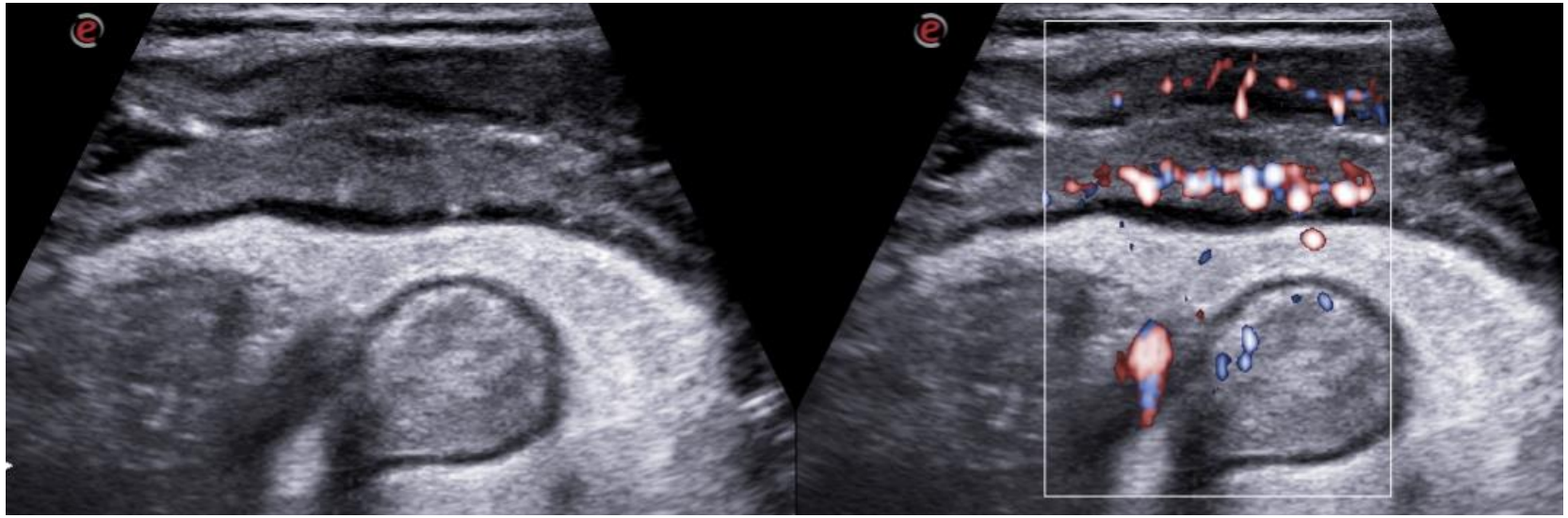
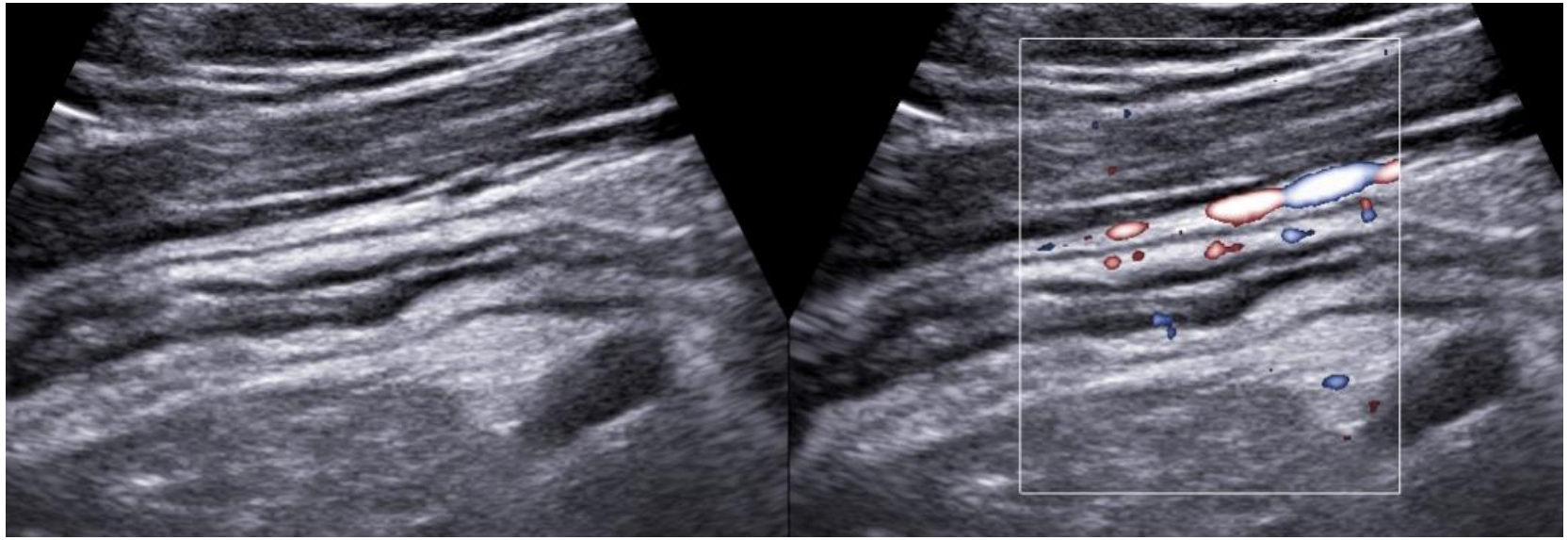
Case B: lesions improvement

Baseline IUS

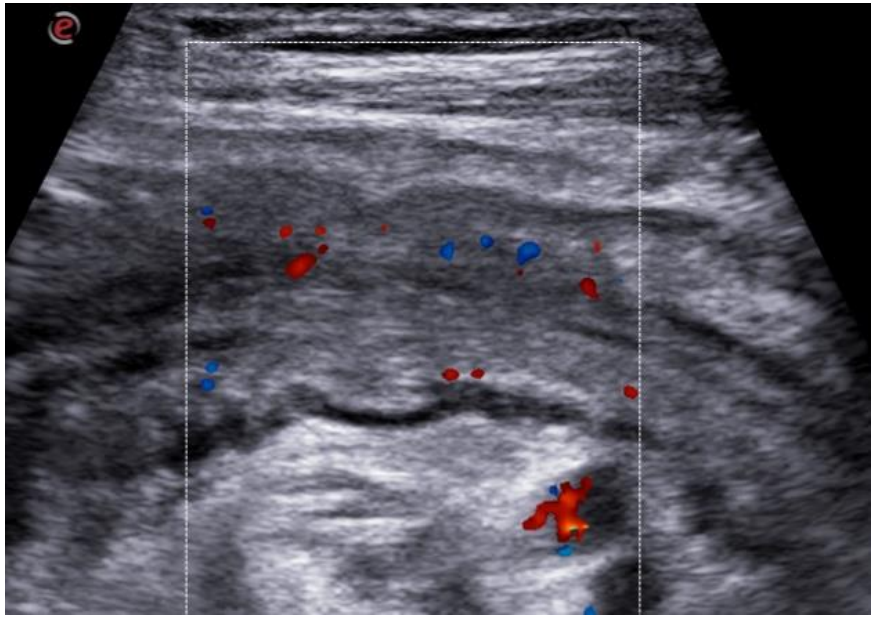


IUS 12 month after TNFs

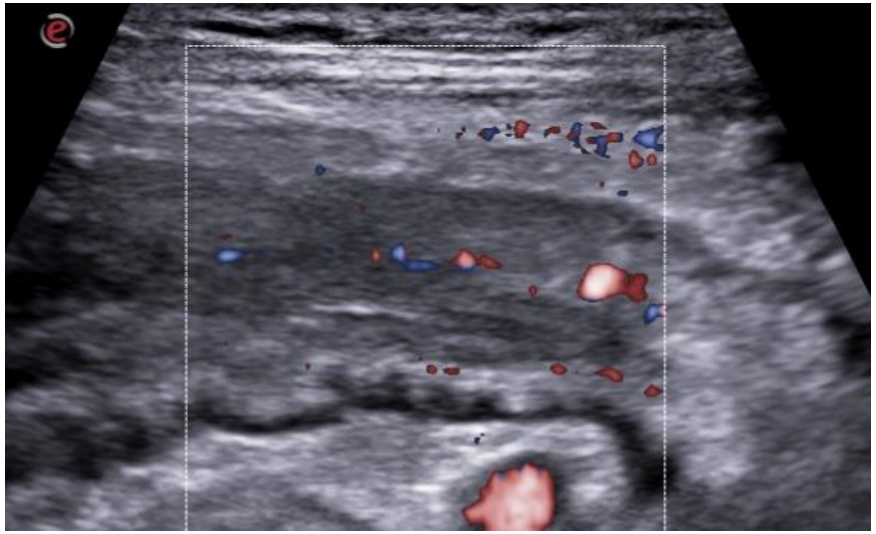


Case C: unchanged lesions

Baseline IUS



IUS 12 month after TNFs



An objective IUS score is needed to make ultrasound fit for use in daily clinical practice

IBUS HYBRID module 1

CD Bowel Ultrasound Scores

IUS score formula	Calculation	BWT	BWS	CDS	i-fat
IBUS-SAS	IBUS-SAS [0 – 100] = 4·BWT [mm] + 15·i-fat + 7·CDS + 4·BWS	Normal ≤ 3 mm Active > 3 mm	0 = Normal 1 = Uncertain 2 = Focal ≤ 3 cm 3 = Extensive > 3 cm	0 = Absent 1 = Short signals 2 = Long signals inside bowel 3 = Long signals inside and outside bowel	0 = Absent 1 = Uncertain 2 = Present
SUS-CD	SUS-CD = BWT + CDS	0 = <3 mm 1 = [3–4.9 mm] 2 = [5–7.9 mm] 3 = ≥8 mm		0 = Absent or single vessels 1 = 2–5 vessels per cm^2 2 = >5 vessels per cm^2	
BUSS	BUSS = 0.75 · BWT [mm] + 1.65 · CDS	Normal ≤ 3 mm Active > 3 mm		0 = Absent 1 = Present	
Simple-US	Simple–US = BWT [mm] + CDS	Normal ≤ 3 mm Active > 3 mm		0 = Absent 1 = 1–2 points per cm^2 2 = 3–5 points per cm^2 3 = more than 5 points and vessels outside the intestinal wall are detected	

All IUS scores showed a significant positive correlation with endoscopy [$p < 0.0001$]

Dragoni G, et all. JCC 2023

Closing Remarks

A careful assessment of core US parameters allows for accurate diagnosis, evaluation of disease activity, and follow-up of patients with uncomplicated Crohn's disease

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7-8TH NOVEMBER, 2025
MILAN, ITALY

Thank you