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# IUS in non complicated UC


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Kuwait City, Kuwait, November 21st – 22nd ,2025

# Disclosure

I have received honoraria from Amgen, Ferring, Innovis, Takeda, Abbvie

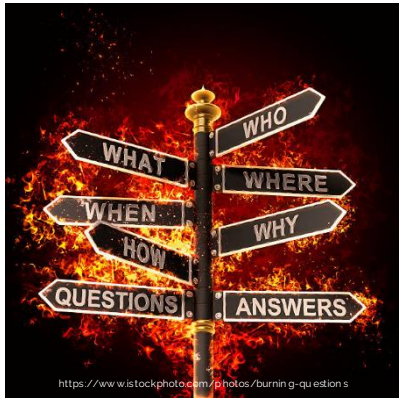
How to measure bowel wall thickness (BWT) according to standard and research criteria?

How do different IUS parameters respond to effective treatment in UC?

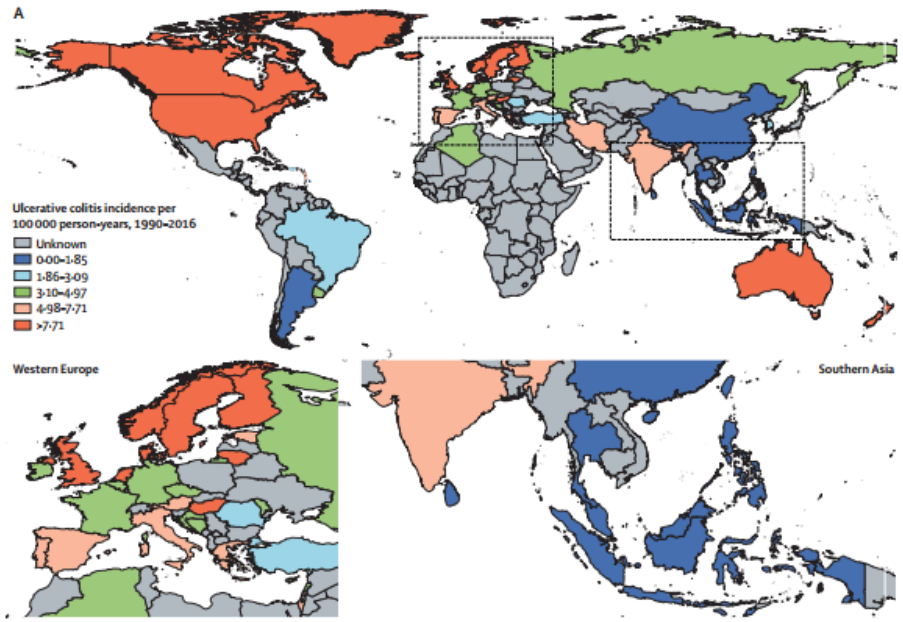
What is the diagnostic and monitoring performance of IUS for UC assessment vs established reference standards (endoscopy, cross-sectional imaging, histology)?

What are the definitions of IUS response and remission used in UC assessment?

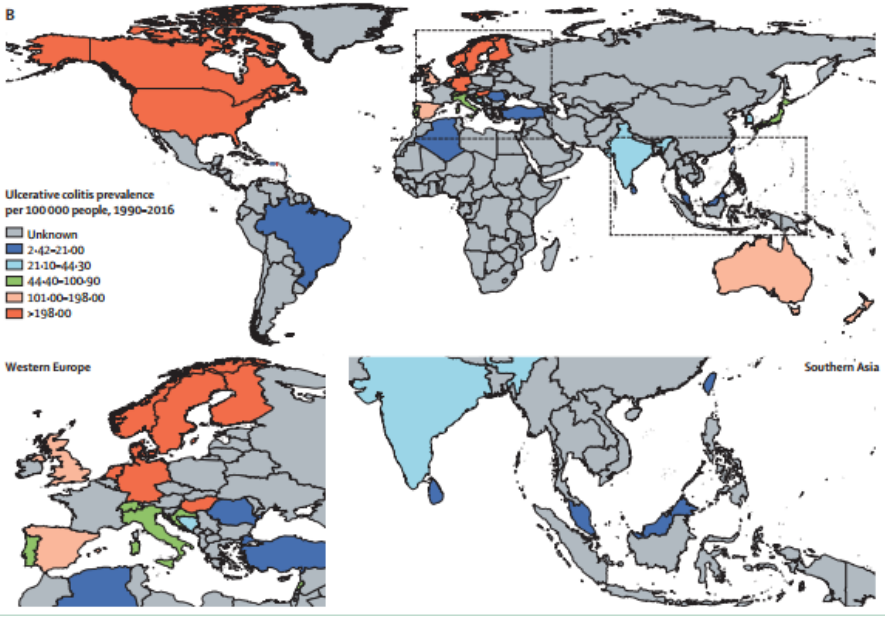
How they can be used to predict and monitor disease activity over time?



## INCIDENCE




## PREVALENCE




*In **2023, the prevalence of ulcerative colitis** was estimated to be **5 million cases** around the world*

Catherine Le Berre et al. Lancet 2023

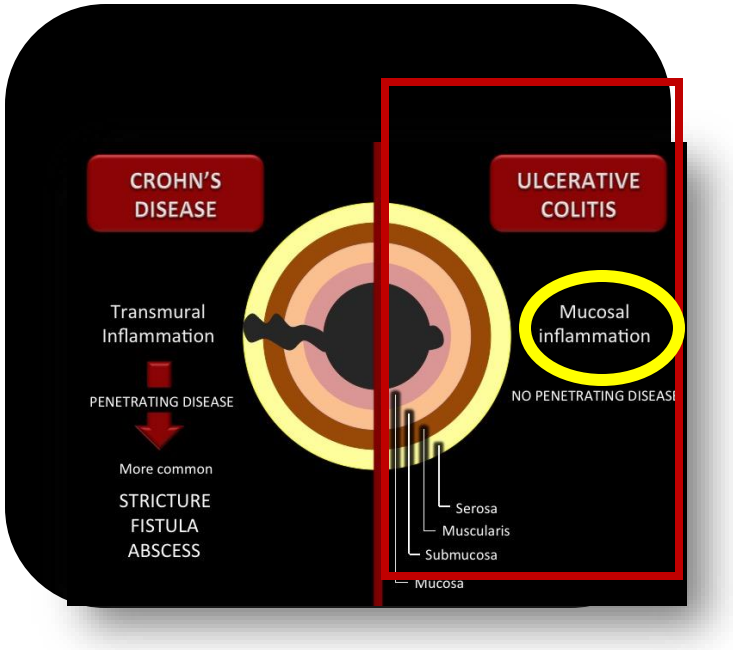
https://www.flaticon.com/free-icon/medical-school_17774352

Review > Lancet. 2017 Apr 29;389(10080):1756-1770. doi: 10.1016/S0140-6736(16)32126-2. Epub 2016 Dec 1.

# Ulcerative colitis

Ryan Ungaro [1], Saurabh Mehandru [2], Patrick B Allen [3], Laurent Peyrin-Biroulet [4], Jean-Frédéric Colombel [5]

*Ulcerative colitis is a chronic disease* ***affecting the colonic mucosa*** *that most commonly presents with blood in the stool and diarrhea….*



**1989**

J Clin Ultrasound. 1989 Jan;17(1):25-31. doi: 10.1002/jcu.1870170106.

## Diagnosis of acute ulcerative colitis and colonic Crohn's disease by colonic sonography

B Limberg [1]

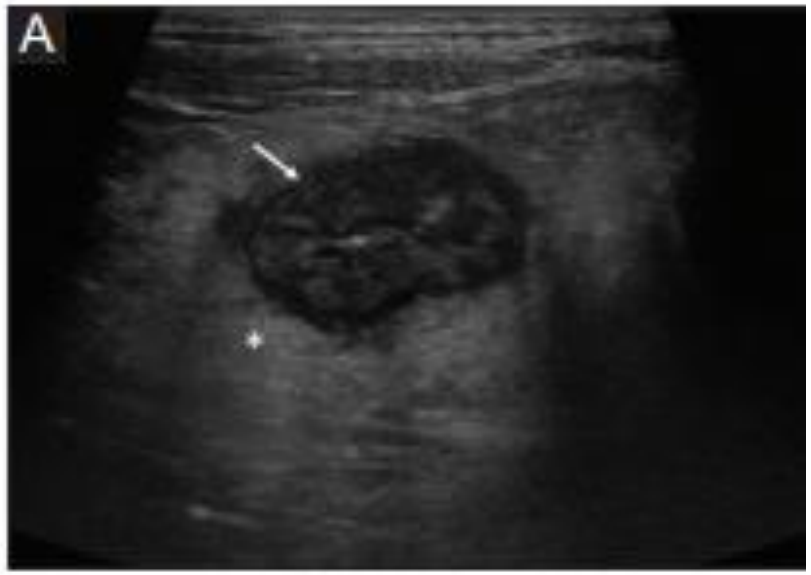
**1999**

Scand J Gastroenterol. 1999 Nov;34(11):1103-7. doi: 10.1080/003655299750024904.

## Ultrasonography in the evaluation of extension, activity, and follow-up of ulcerative colitis

G Maconi [1], S Ardizzone, F Parente, G Bianchi Porro


**Sigmoid Colon**
**Crohn's Disease**




**Sigmoid Colon**
**Ulcerative Colitis**

Torsten Kucharzik et al. Annals of Gastroenterology, 2017.

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*Review*

# Leaving behind the Mucosa: Advances and Future Directions of Intestinal Ultrasound in Ulcerative Colitis

**Alberto Barchi [1,†], Arianna Dal Buono [2,†], Ferdinando D'Amico [1,3], Federica Furfaro [1], Alessandra Zilli [1], Gionata Fiorino [1], Tommaso Lorenzo Parigi [1], Laurent Peyrin-Biroulet [4,5,6,7,8,9], Silvio Danese [1] and Mariangela Allocca [1,*]**

Editorial > Gastroenterology. 2022 Dec;163(6):1485-1487. doi: 10.1053/j.gastro.2022.10.005. Epub 2022 Oct 9.

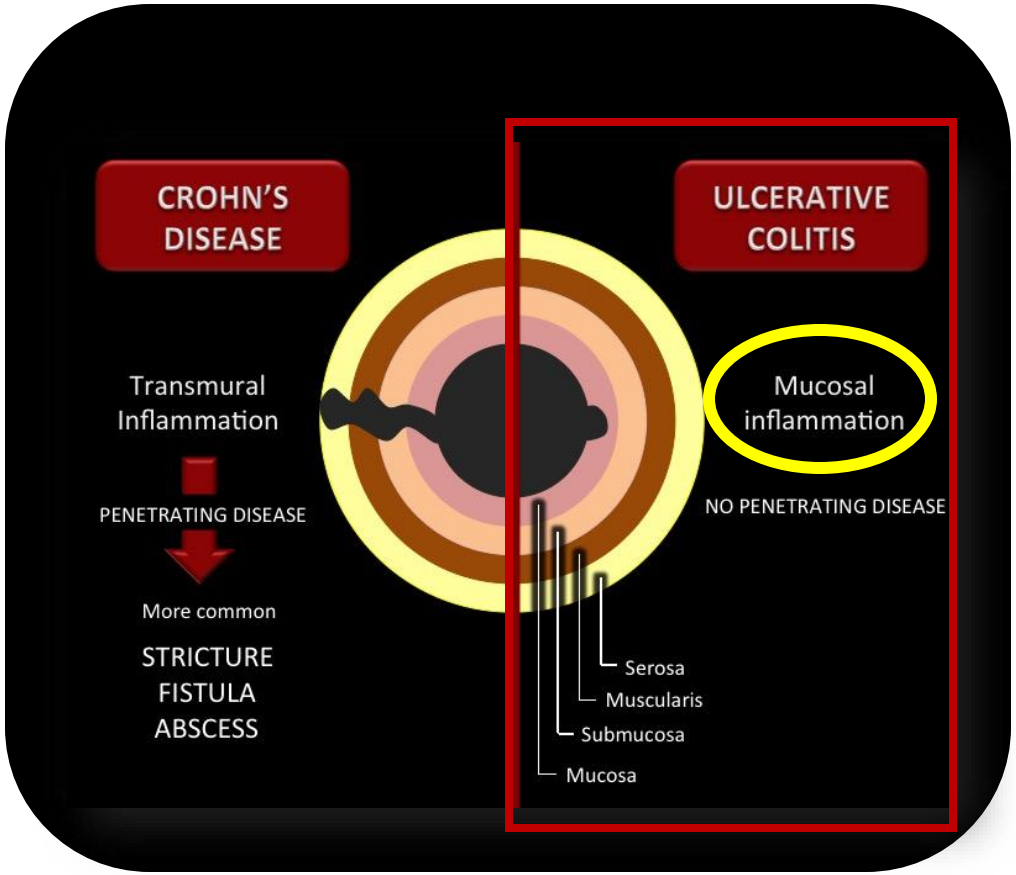
# The Use of Intestinal Ultrasound in Ulcerative Colitis-More Than a Mucosal Disease?

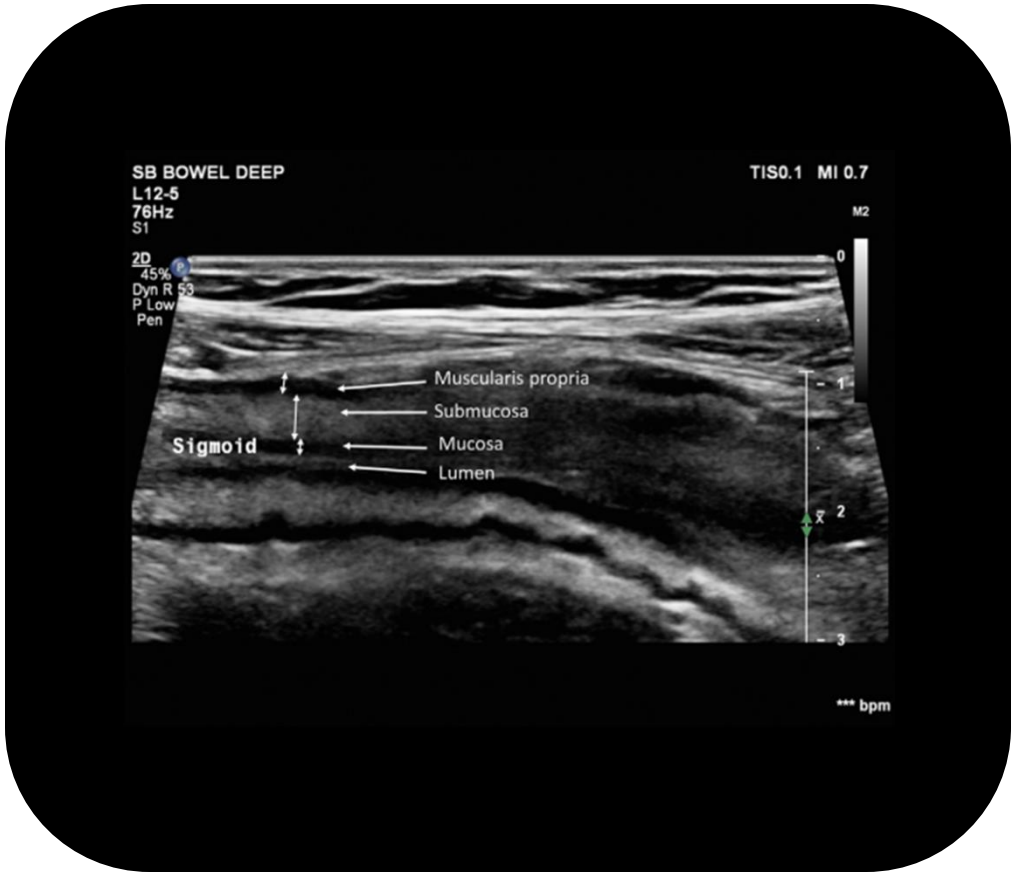
Carolina Palmela [1], Christian Maaser [2]

Review > Lancet Gastroenterol Hepatol. 2025 Oct 28:S2468-1253(25)00263-8. doi: 10.1016/S2468-1253(25)00263-8. Online ahead of print.

# Ulcerative colitis: moving beyond the mucosal dogma

Elisabeth Eggermont [1], Krisztina Gecse [2], Noa Krugliak Cleveland [3], Frauke Petersen [4], João Sabino [1], André D'Hoore [5], Torsten Kucharzik [4], Mariangela Allocca [6], Gabriele Bislenghi [7], Kerri Novak [8], Gert De Hertogh [9], Christian Maaser [10], Bram Verstockt [11]

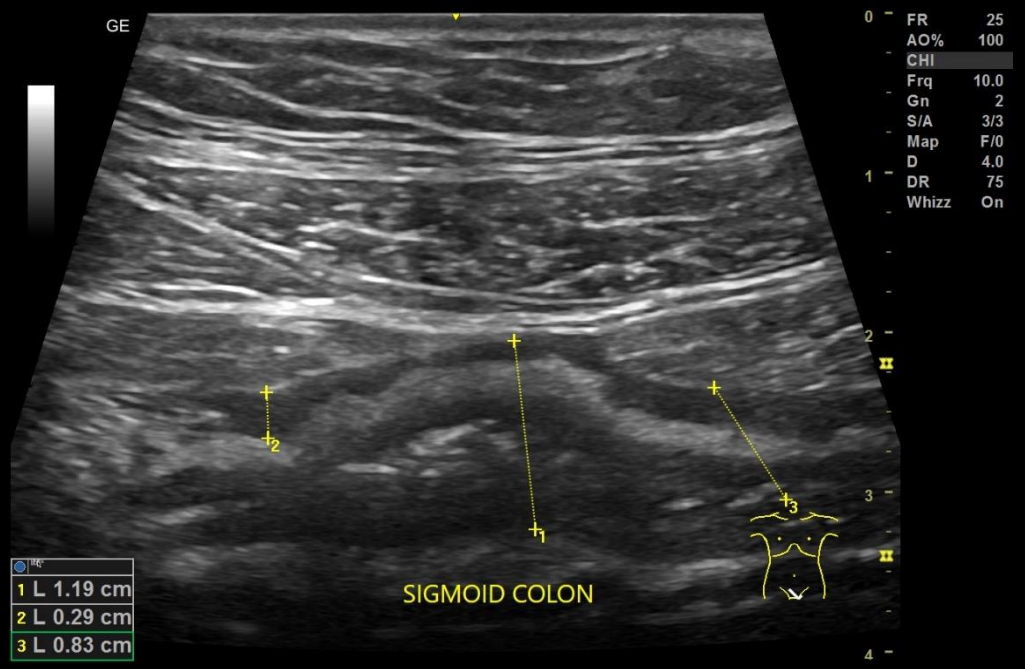


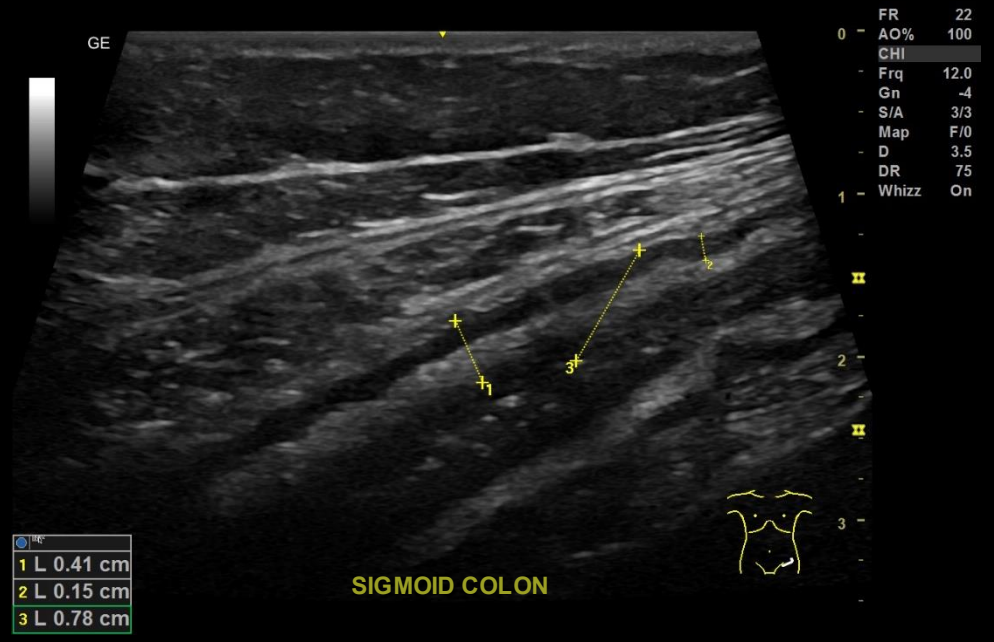




https://epos.myesr.org/poster/esr/ecr2017/C-2270/findings%20and%20procedure%20details

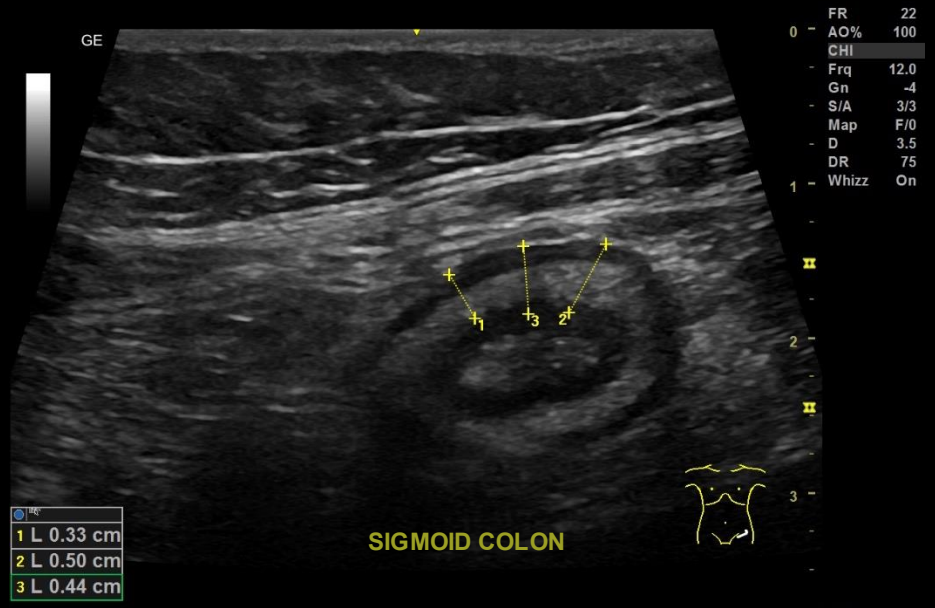
Floris de Voogd et al. Gastroenterology 2022

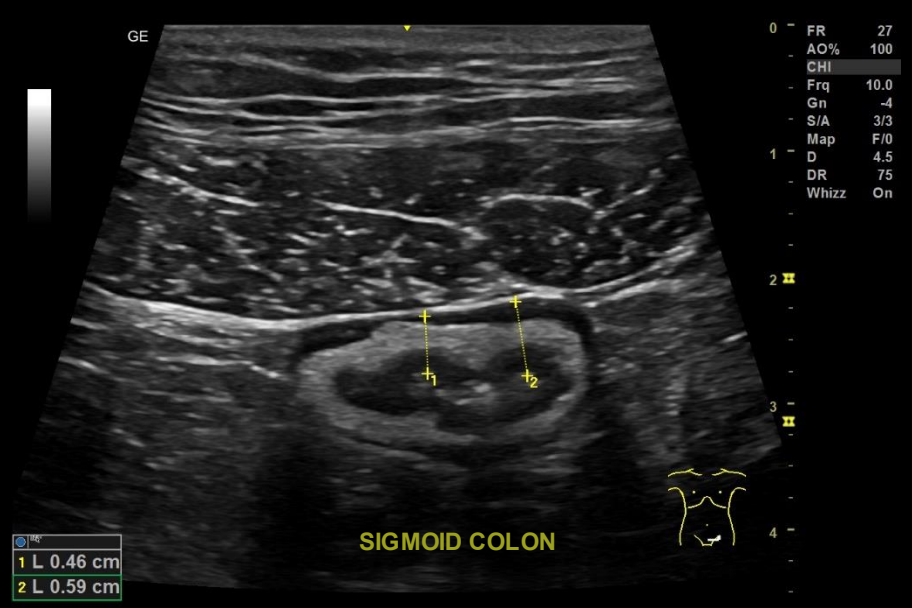
# How to measure bowel wall thickness (BWT) according to standard and research criteria?




Courtesy of Dr. Marios Katsaros, Hippokration General Hospital, Thessaloniki, Greece




Courtesy of Dr. Marios Katsaros, Hippokration General Hospital, Thessaloniki, Greece


Courtesy of Dr. Marios Katsaros, Hippokration General Hospital, Thessaloniki, Greece

https://mindofaformerchef.com/tikka-masala-butter-chicken-zac-vs-liz/

Observational Study > J Crohns Colitis. 2021 Aug 2;15(8):1284-1290.
doi: 10.1093/ecco-jcc/jjaa267.

# A Reliability Study: Strong Inter-Observer Agreement of an Expert Panel for Intestinal Ultrasound in Ulcerative Colitis

Floris De Voogd [1], Rune Wilkens [2], Krisztina Gecse [1], Mariangela Allocca [3], Kerri Novak [4], Cathy Lu [4], Geert D'Haens [1], Christian Maaser [5]

- BWT was measured from the lumen–mucosa interface up to the muscularis propria–serosa interface
- Intestinal folds were avoided within the measurements
- **Measurement of BWT was defined as the mean of four measurements** [to the nearest 0.1 mm] **at the thickest part of the SC**

Observational Study > J Crohns Colitis. 2021 Aug 2;15(8):1284-1290.
doi: 10.1093/ecco-jcc/jjaa267.

# A Reliability Study: Strong Inter-Observer Agreement of an Expert Panel for Intestinal Ultrasound in Ulcerative Colitis

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- **Two** measurements in a **longitudinal scan plane with at least 1 cm between** the two measurements
- **Two** measurements in a **cross-sectional scan plane** with a **minimum of 90°** between the two measurements

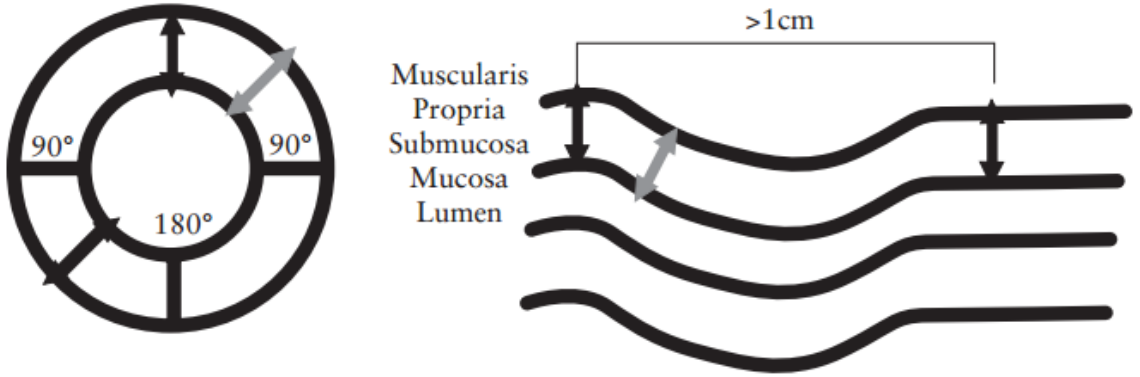
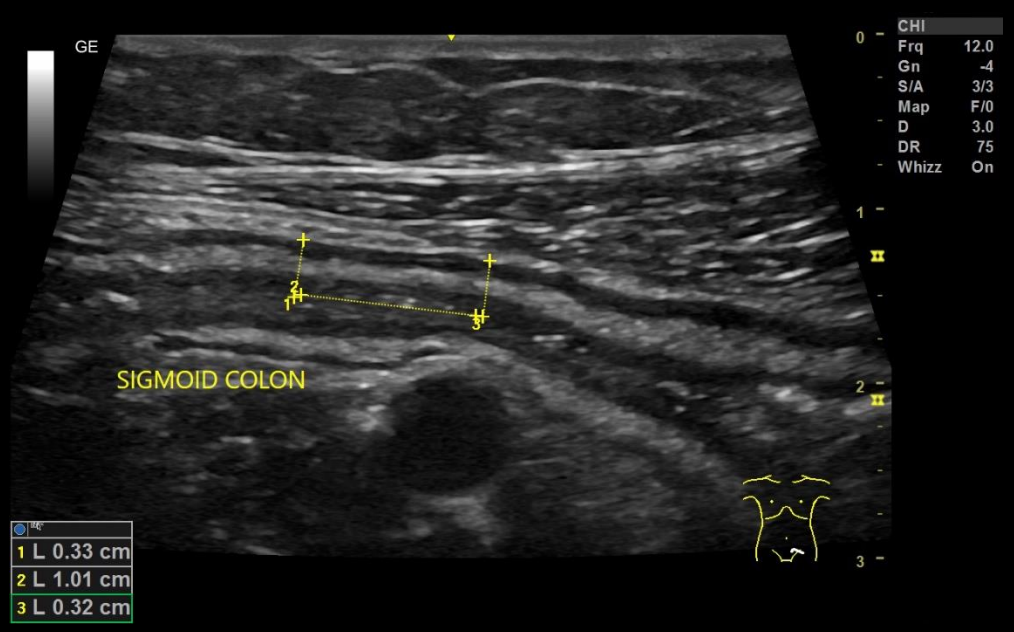
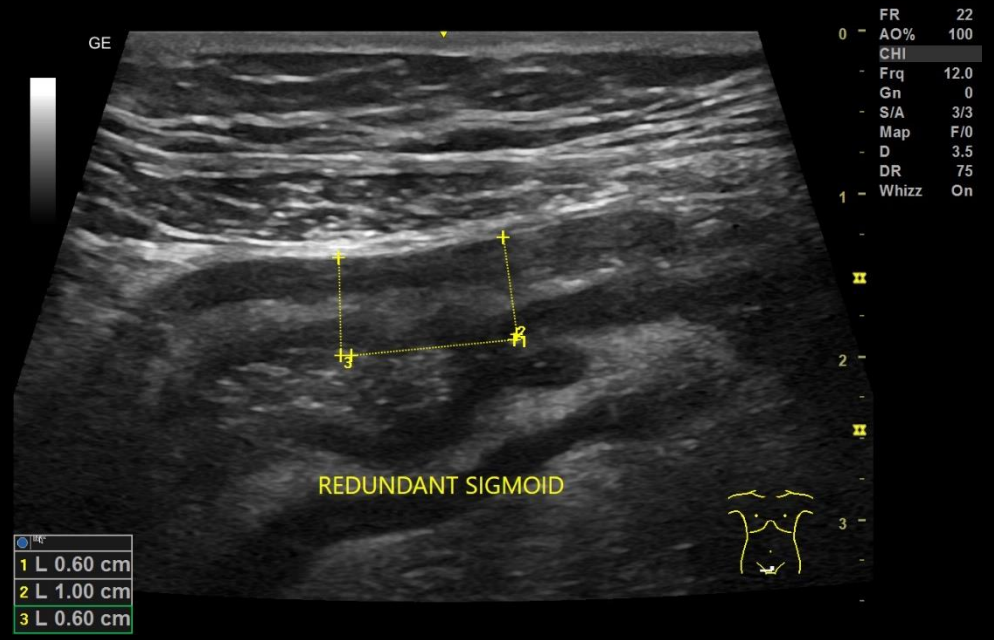
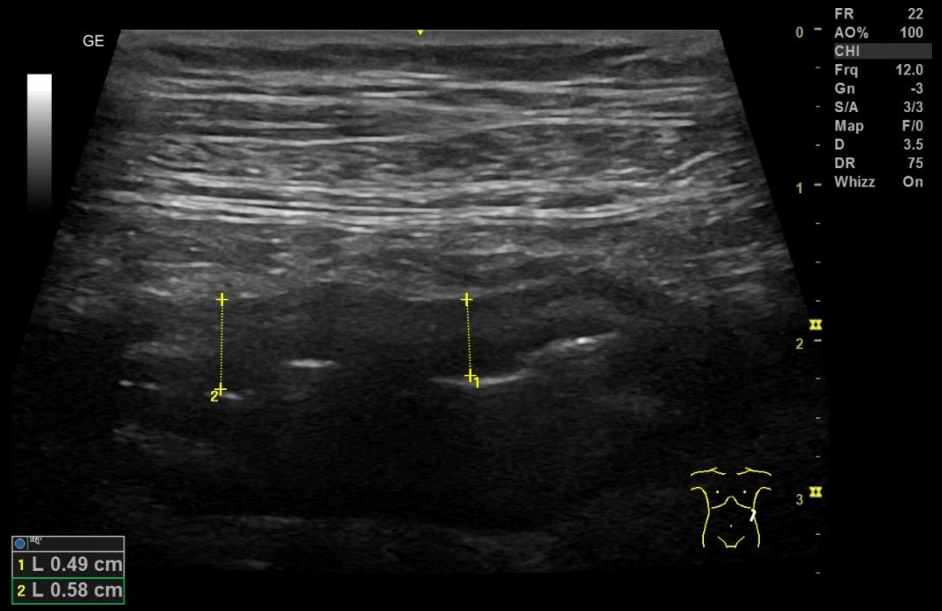



**Figure 1.** The black arrow indicates the first correct measurement, grey arrow indicates incorrect second measurement, and black arrow indicates correct second measurement.




Courtesy of Dr. Marios Katsaros, Hippokration General Hospital, Thessaloniki, Greece

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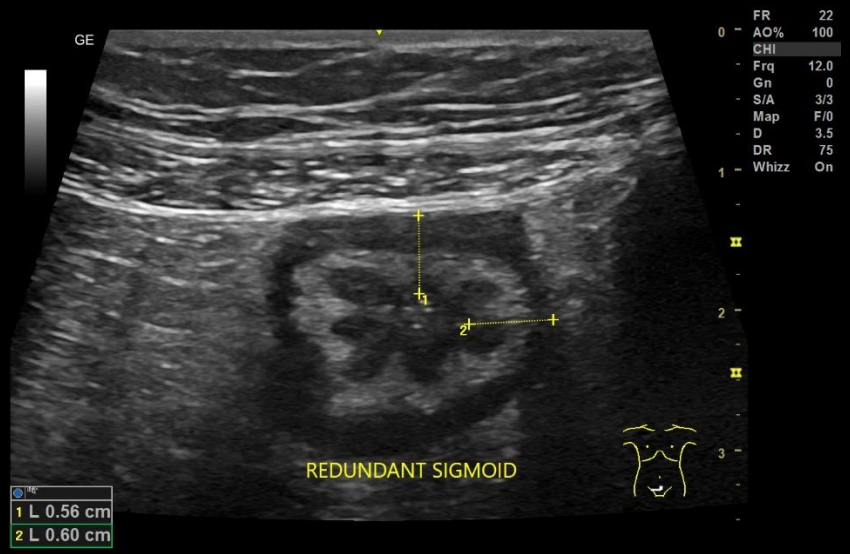
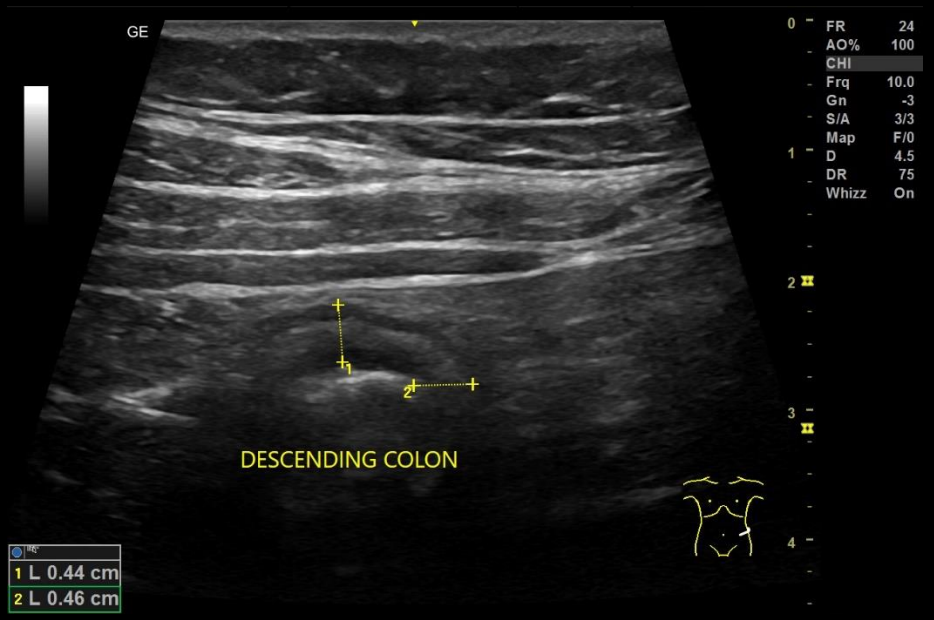
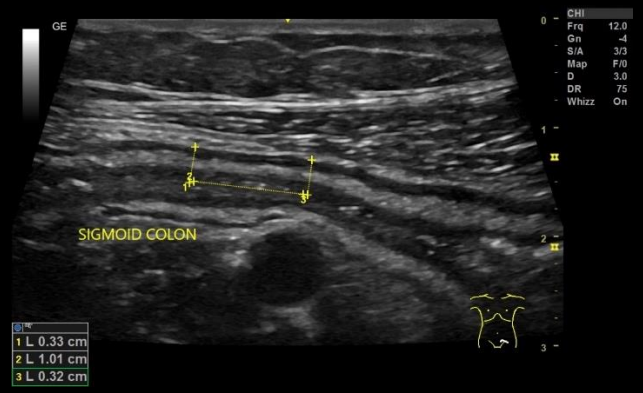
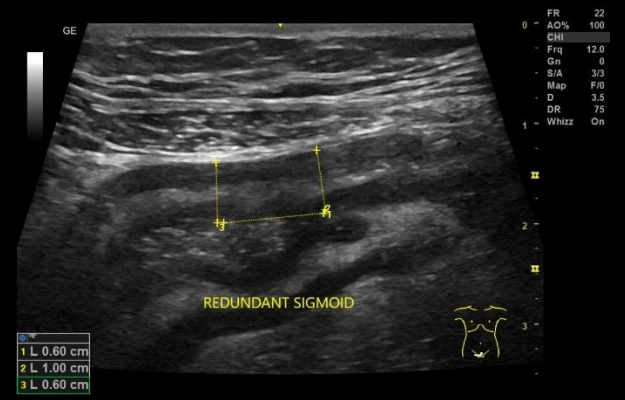


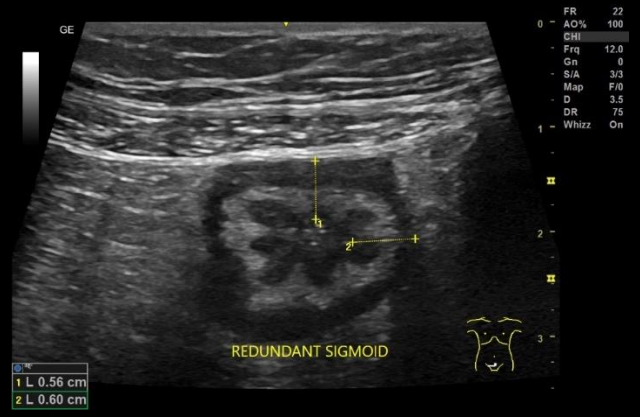



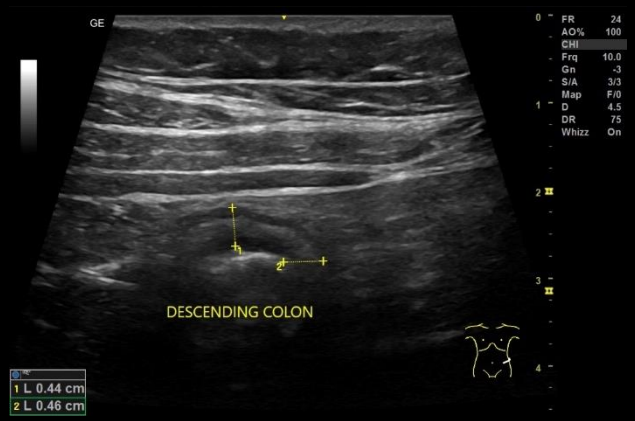

Courtesy of Dr. Marios Katsaros, Hippokration General Hospital, Thessaloniki, Greece








Courtesy of Dr. Marios Katsaros, Hippokration General Hospital, Thessaloniki, Greece

https://tenor.com/el/search/gordon-ramsay-happy-gifs

# How do different IUS parameters respond to effective treatment in UC?

**B**owel **W**all **T**hickness
**C**olour **D**oppler **S**ignal
**B**owel **W**all **S**tratification
Loss of Haustration
**I**nflammatory **F**at
Presence of Lymph nodes

Observational Study > Gut. 2020 Sep;69(9):1629-1636. doi: 10.1136/gutjnl-2019-319451. Epub 2019 Dec 20.

# Intestinal ultrasound for monitoring therapeutic response in patients with ulcerative colitis: results from the TRUST&UC study

Christian Maaser [1], Frauke Petersen [2], Ulf Helwig [3], Imma Fischer [4], Alexander Roessler [5], Stefan Rath [5], Dorothee Lang [5], Torsten Kucharzik [6];
German IBD Study Group and the TRUST&UC study group;
German IBD Study Group and TRUST&UC study group

- **224 UC patients** with a diagnosis of a proctosigmoiditis, left-sided colitis or pancolitis currently in **clinical relapse** (defined as short clinical colitis activity index ≥5) were enrolled consecutively
- **Primary endpoint**: the proportion of patients with **normalization of BWT** in patients with **clinical response** (decrease in SCCAI by ≥3 points) at **week 12** as compared with baseline
- **Secondary endpoints**: the correlation of SCCAI with FC and BWT and the **correlation of BWT with FC at week 12**

Observational Study > Gut. 2020 Sep;69(9):1629-1636. doi: 10.1136/gutjnl-2019-319451. Epub 2019 Dec 20.

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**Table 2** Normalisation of BWT (mm) at T2 (week 12) versus clinical response; $X^2$ test

| | Sigmoid colon | | Descending colon | |
|---|---|---|---|---|
| | BWT normalisation | No BWT normalisation | BWT normalisation | No BWT normalisation |
| Clinical response at T2 | % (n) | % (n) | % (n) | % (n) |
| Yes | 90.5 (95) | 68.5 (50) | 96.4 (80) | 68.4 (65) |
| No | 9.5 (10) | 31.1 (23) | 3.6 (3) | 31.2 (30) |
| | P<0.001 | | P<0.001 | |

**Table 4** Normalisation of BWT at T2 (week 12) vs normalised FC; $X^2$ test

| | Sigmoid colon | | Descending colon | |
|---|---|---|---|---|
| | BWT normalisation | No BWT normalisation | BWT normalisation | No BWT normalisation |
| Calprotectin <250 µg/g at T2 | % (n) | % (n) | % (n) | % (n) |
| Yes | 48.9 (23) | 22.2 (6) | 50.0 (21) | 25.0 (8) |
| No | 51.1 (24) | 77.8 (21) | 50.0 (21) | 75.0 (24) |
| | P=0.023 | | P=0.029 | |

Observational Study > Gut. 2020 Sep;69(9):1629-1636. doi: 10.1136/gutjnl-2019-319451. Epub 2019 Dec 20.

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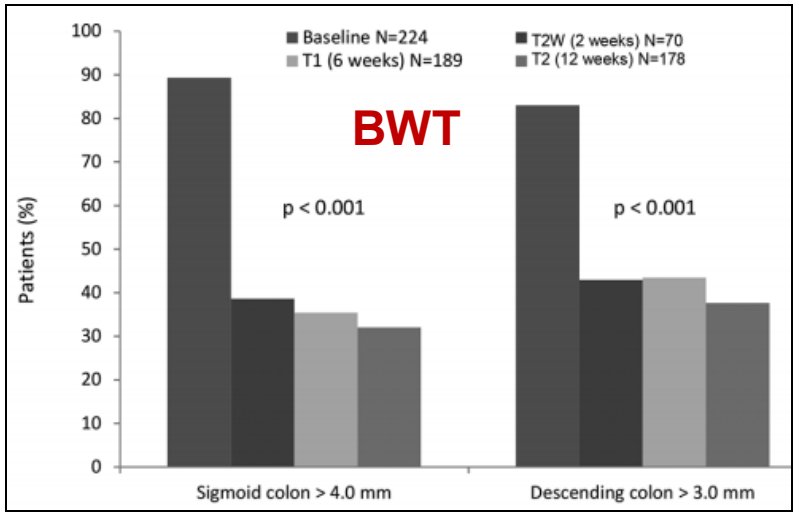
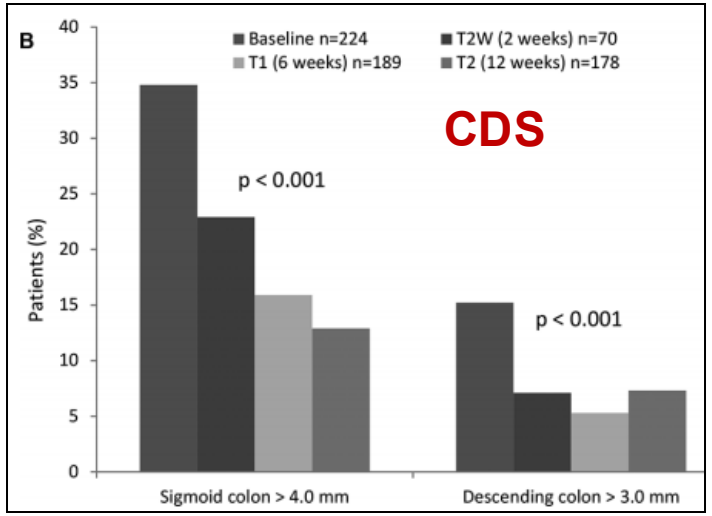
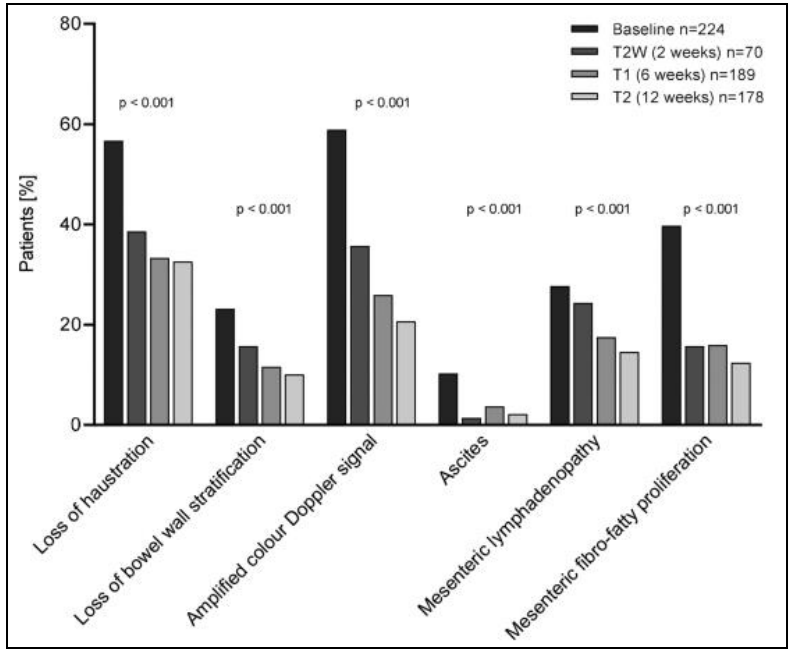
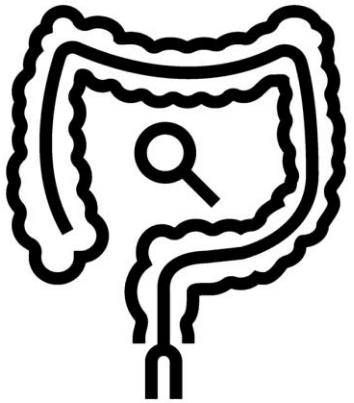


What is the diagnostic performance of IUS for ulcerative colitis assessment vs established reference standards (e.g., endoscopy, cross-sectional imaging, histology)?

Vs



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https://www.vecteezy.com/vector-art/33064054-colonoscopy-examination-line-icon-vector-illustration

Meta-Analysis > Clin Gastroenterol Hepatol. 2021 May;19(5):908-921.e6.
doi: 10.1016/j.cgh.2020.07.067. Epub 2020 Aug 7.

# Accuracy of Ultrasound for Evaluation of Colorectal Segments in Patients With Inflammatory Bowel Diseases: A Systematic Review and Meta-analysis

Shintaro Sagami [1], Taku Kobayashi [2], Yusuke Miyatani [1], Shinji Okabayashi [3], Hajime Yamazaki [4], Toshihiko Takada [3], Kenji Kinoshita [5], Mariangela Allocca [6], Reiko Kunisaki [7], Pradeep Kakkadasam Ramaswamy [8], Manabu Shiraki [9], Toshifumi Hibi [1], Yuki Kataoka [10]

**Bowel wall thickness ≥ 3 mm** identified **colorectal segments** with **inflammation** with
**86.4%** pooled **sensitivity** (95% CI, 76.1%–92.7%) and
**88.3%** pooled **specificity** (95% CI, 58.1%–97.6%).
In **rectum** only, bowel wall thickness **≥ 3 mm** identified **inflammation** with
**74.5% sensitivity** (95% CI, 53.0%–88.3%) and
**69.5% specificity** (95% CI, 33.6%–91.1%).

Practice Guideline > J Crohns Colitis. 2025 Jul 3;19(7):jjaf106. doi: 10.1093/ecco-jcc/jjaf106.

# ECCO-ESGAR-ESP-IBUS Guideline on Diagnostics and Monitoring of Patients with Inflammatory Bowel Disease: Part 1

Torsten Kucharzik [1], Stuart Taylor [2], Mariangela Allocca [3], Johan Burisch [4 5 6], Pierre Ellul [7], Marietta Iacucci [8], Christian Maaser [9], Pamela Baldin [10], Gauraang Bhatnagar [11], Shomron Ben-Horin [12], Dominik Bettenworth [13], Mallory Chavannes [14], Ann Driessen [15], Emma Flanagan [16], Frederica Furfaro [17], Giovanni Maconi [18], Konstaninos Karmiris [19], Amelia Kellar [20 21], Isabelle De Kock [22], Konstantinos Katsanos [23], Uri Kopylov [24], Cathy Lu [25], Olga Maria Nardone [26], Nurulamin M Noor [27], Kerri Novak [28], Paula Borralho Nunes [29], Patrick van Rheenen [30], Jordi Rimola [31], Francesca Rosini [32], David Rubin [33], Martina Scharitzer [34], Jaap Stoker [35 36], Mathieu Uzzan [37], Stephan Vavricka [38], Bram Verstockt [39], Rune Wilkens [40], Nina Zidar [41], Alessandra Zilli [42], Henit Yanai [43 44], Roger Feakins [45 46]

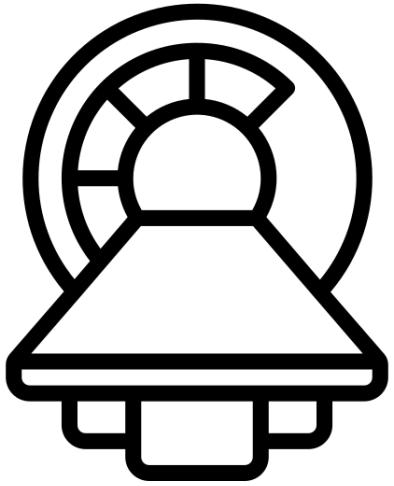
## Initial diagnosis

### Recommendation 1

The diagnosis of Crohn's disease and **ulcerative colitis** is based on a combination of clinical symptoms, laboratory tests, endoscopy, histology, and imaging (EL5).

**We recommend ileocolonoscopy with biopsies combined** with imaging evaluation with **intestinal ultrasound**, magnetic resonance enterography, or both as **first-line examinations** in patients with suspected IBD (EL5). (94% agreement)

Vs



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https://www.flaticon.com/free-icon/mri_4712483

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WJMA World Journal of Meta-Analysis

Submit a Manuscript: https://www.f6publishing.com World J Meta-Anal 2024 September 18; 12(3): 97210

DOI: 10.13105/wjma.v12.i3.97210 ISSN 2308-3840 (online)

SYSTEMATIC REVIEWS

# Role of intestinal ultrasound in ulcerative colitis: A systematic review

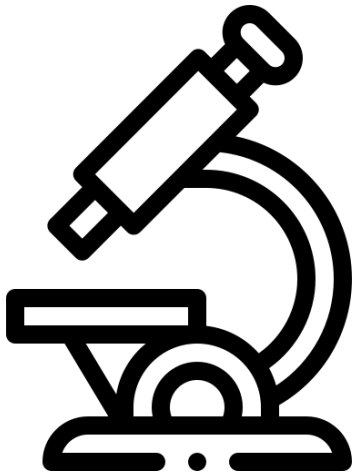
Partha Pal, Mohammad Abdul Mateen, Kanapuram Pooja, Nandhakumar Rajadurai, Rajesh Gupta, Manu Tandan, Nageshwar Reddy Duvvuru

**Table 9 Summary of studies comparing intestinal ultrasound and magnetic resonance enterography**

| Ref. | Study type | Number of patients | Follow-up duration | Comparator | IUS parameters | Gold standard | Results |
|---|---|---|---|---|---|---|---|
| Kamel *et al*[56] | Prospective | 40 (14 UC, 26 CD) | Cross-sectional | Bowel ultrasound and MRE | BWT, CDS, mesenteric fat and lymph nodes, complications | MRE and colonoscopy | Accuracy of IUS (in IBD): 85% ileum, 70% large bowel, 100% correlation with MRI/colonoscopy with respect to active disease (in IBD) (no separate analysis for UC) |
| Ziech *et al* [8] | Prospective | 28 suspected IBD pediatric | Cross-sectional | MR colonography | BWT, CDS, BWS, i-fat, haustrations, lymph nodes, motility | MR colonography | Sensitivity IUS: 55%; MR colonography: 57%; Specificity IUS: 100%; MR colonography: 75%; cannot effectively differentiate UC and CD unless terminal ileum is involved |
| Barber *et al*[71] | Retrospective | 53 children | Cross-sectional | MRE | Scoring based on METRIC trial | Combined consensus score based imaging and clinical scores | Clinical correlation of IUS score (0.657) > MRE score (0.598). Agreement for IUS scoring: Lin coefficient 0.95 > MRE 0.60 |

CD: Crohn's disease; UC: Ulcerative colitis; MRE: Magnetic resonance enterography; CTE: Computed tomography enterography; TI: Terminal ileum; BWT: Bowel wall thickness; BWS: Bowel wall stratification; AUC: Area under the curve; IBUS-SAS: International bowel ultrasound segmental activity score; HR-US: High resolution ultrasound.

Vs



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https://www.flaticon.com/free-icon/microscope_3113816

Inflamm Bowel Dis. 2024 Feb 1;30(2):190-195. doi: 10.1093/ibd/izad043.

## Composite Assessment Using Intestinal Ultrasound and Calprotectin Is Accurate in Predicting Histological Activity in Ulcerative Colitis: A Cohort Study

Thomas M Goodsall [1 2], Alice S Day [2 3], Jane M Andrews [2 3], Andrew Ruszkiewicz [4], Christopher Ma [5 6], Robert V Bryant [2 3]

IUS activity - MUC
Histological activity – NHI
Endoscopic activity - MES
**Histological activity demonstrated a significant linear association with overall IUS activity (coefficient 0.14; 95% CI, 0.03-0.25; P = .011**
A **composite of IUS and FC** showed the greatest association (1.31; 95% CI, 0.43-2.18; P = .003) and **accurately predicted histological activity in 88% of cases (P = .007), with**
**sensitivity of 88%**
**specificity 80%,**
**positive predictive value 95%,**
**negative predictive value 57%**

## P355 Correlation of Intestinal Ultrasound with histological activity in patients with Ulcerative Colitis FREE

M Katsaros, MD, M Kalogirou, A Katsoula, P Paschos, E Katsiki, O Giouleme

*Journal of Crohn's and Colitis*, Volume 18, Issue Supplement_1, January 2024, Pages i748–i750, https://doi.org/10.1093/ecco-jcc/jjad212.0485
**Published:** 24 January 2024

45 patients
IUS activity - MUC
Endoscopic activity - EMS
Histological activity - NHI > 1.

**Strong correlation between MUC** and **NHI [ρ: 0.811 (p< 0.001)].**

**MUC optimal cut-off value of 5.67,**
**sensitivity of 97.1%**
**specificity of 90%**
**[(AUC: 0.973, 95% CI: 0.918-1.000, (p<0.0001)]**
**in predicting histological activity (NHI>1)**, in patients with UC.

Comparative Study > Aliment Pharmacol Ther. 2020 Jun;51(12):1373-1383.
doi: 10.1111/apt.15767. Epub 2020 May 7.

# Transperineal ultrasound predicts endoscopic and histological healing in ulcerative colitis

Shintaro Sagami [1], Taku Kobayashi [1], Kanako Aihara [2], Misaki Umeda [2], Hiromu Morikubo [1 3], Mao Matsubayashi [1 3], Hiroki Kiyohara [1 3], Masaru Nakano [1 3], Makoto Ohbu [4], Toshifumi Hibi [1]

**53** consecutive adults with **UC** who required **colonoscopy** were included and **TPUS** was performed in combination with **transabdominal ultrasound** within a week before or after colonoscopy with rectal biopsy.

MES ≤1 //endoscopic healing
Histological healing // Geboes score <2.1, Robarts histopathology index ≤6, and Nancy index ≤1

**Excellent correlation** was confirmed between **colonoscopy** and t**ransabdominal ultrasound** in all **segments except for the rectum.**

**BWT** in the **rectum (TPUS) ≤4 mm** predicted endoscopic (AUC = 0.90) and **histological (AUC = 0.87-0.89) healing**

***Transperineal ultrasound predicts endoscopic and histological healing of the rectum.***

What is the monitoring performance of IUS for ulcerative colitis assessment vs established reference standards (e.g., endoscopy, cross-sectional imaging, histology)?

# Tight control

# Treat to target

PRO'S
Pmayo
SCCAI

Calprotectin
CRP, ESR


Endoscopy
Histology

CT
MRI

Accuracy // Accessibility // Cost // Invasive // Repeatability // Preparation // Radiation // Patient preferences

https://pngtree.com/free-png-vectors/gold-standard

Practice Guideline > J Crohns Colitis. 2025 Jul 3;19(7):jjaf106. doi: 10.1093/ecco-jcc/jjaf106.

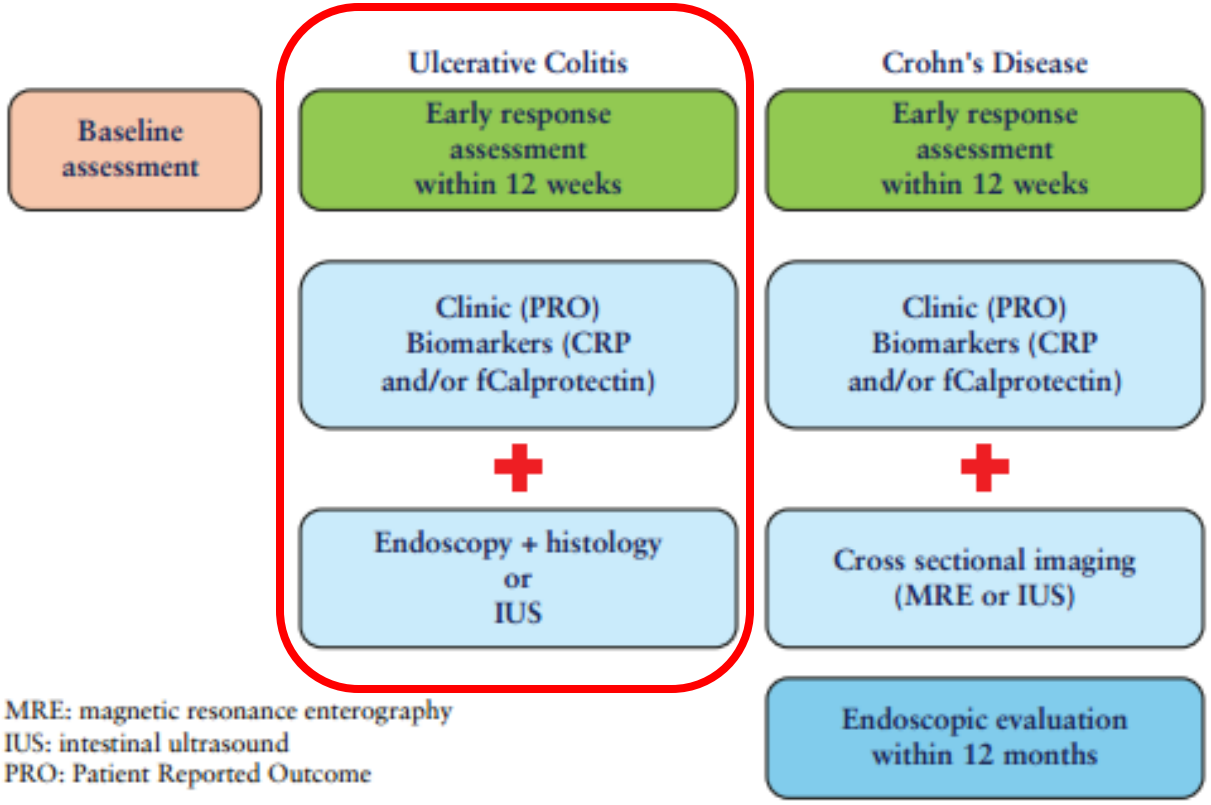
# ECCO-ESGAR-ESP-IBUS Guideline on Diagnostics and Monitoring of Patients with Inflammatory Bowel Disease: Part 1

Torsten Kucharzik [1], Stuart Taylor [2], Mariangela Allocca [3], Johan Burisch [4 5 6], Pierre Ellul [7], Marietta Iacucci [8], Christian Maaser [9], Pamela Baldin [10], Gauraang Bhatnagar [11], Shomron Ben-Horin [12], Dominik Bettenworth [13], Mallory Chavannes [14], Ann Driessen [15], Emma Flanagan [16], Frederica Furfaro [17], Giovanni Maconi [18], Konstaninos Karmiris [19], Amelia Kellar [20 21], Isabelle De Kock [22], Konstantinos Katsanos [23], Uri Kopylov [24], Cathy Lu [25], Olga Maria Nardone [26], Nurulamin M Noor [27], Kerri Novak [28], Paula Borralho Nunes [29], Patrick van Rheenen [30], Jordi Rimola [31], Francesca Rosini [32], David Rubin [33], Martina Scharitzer [34], Jaap Stoker [35 36], Mathieu Uzzan [37], Stephan Vavricka [38], Bram Verstockt [39], Rune Wilkens [40], Nina Zidar [41], Alessandra Zilli [42], Henit Yanai [43 44], Roger Feakins [45 46]

## 4. Monitoring disease

### 4.1. Monitoring disease in UC

**Recommendation 8** In patients with UC requiring treatment initiation or optimization, we recommend early (within 12 weeks) clinical (EL1), biochemical (EL1), and endoscopic (EL1) or ultrasonographic (EL2) response assessment. Results should be interpreted based on prior baseline assessment. (92% agreement)




MRE: magnetic resonance enterography
IUS: intestinal ultrasound
PRO: Patient Reported Outcome

J Crohns Colitis. 2023 Nov 8;17(10):1579-1586. doi: 10.1093/ecco-jcc/jjad071.

# Early Intestinal Ultrasound Predicts Long-Term Endoscopic Response to Biologics in Ulcerative Colitis

Mariangela Allocca [1], Cecilia Dell'Avalle [2], Federica Furfaro [1], Alessandra Zilli [1], Ferdinando D'Amico [1 3 4], Laurent Peyrin-Biroulet [5 6], Gionata Fiorino [1 7], Silvio Danese [1]


**Primary objective**: IUS improvement (defined as **MUC ≤ 6.2)** at **week 12 predicted endoscopic improvement** at reassessment (**defined as MES ≤ 1**).

**A reduction of ≥2 of the MUC at week 12 predicted**
**MES ≤ 1** sensitivity of 89% [95% CI 65–98]
specificity of 77% [95% CI 59–90]
[AUROC 0.806, 95% CI 0.667–0.904]
**MES = 0** sensitivity of 100% [95% CI 59–100]
specificity of 62% [95% CI 46–76]
[AUROC 0.816, 95% CI 0.680–0.912

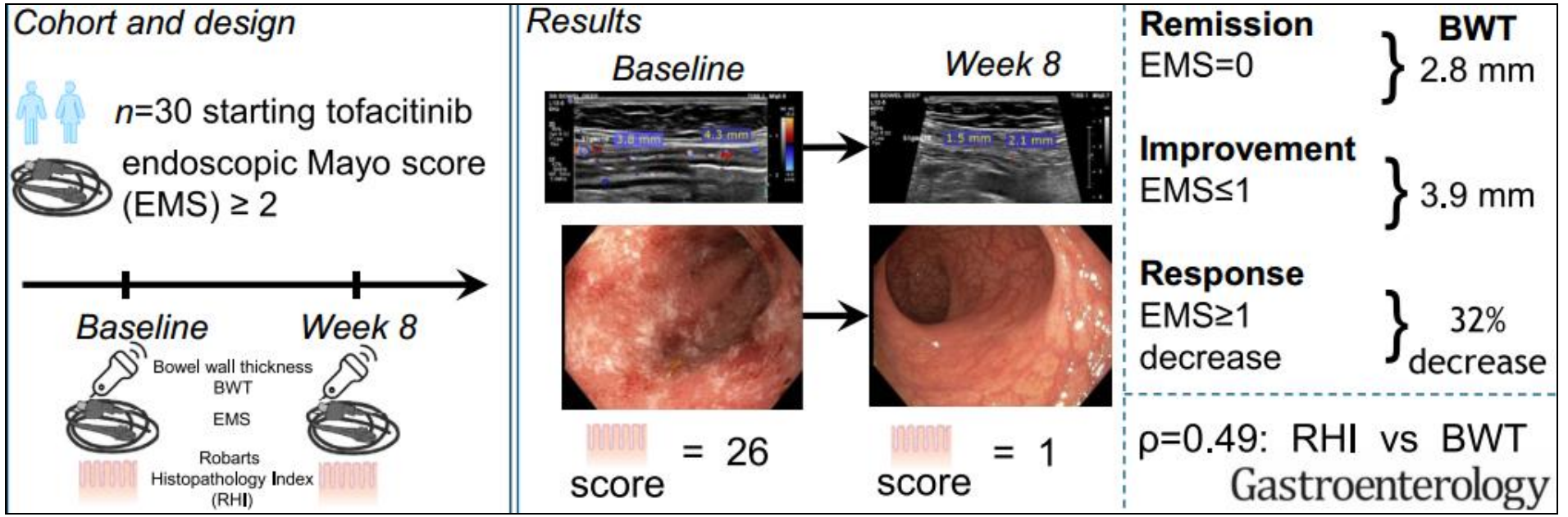
**MUC ≤ 4.3** best cut-off value to determine **endoscopic remission [MES = 0].**
Sensitivity 100% [95% CI 59–100]
Specificity 76% [61–88],
[AUROC 0.876, 95% CI 0.750–0.952].

***Ultrasound improvement after the induction period may predict long-term endoscopic response.***

Gastroenterology. 2022 Dec;163(6):1569-1581. doi: 10.1053/j.gastro.2022.08.038. Epub 2022 Aug 24.

# Intestinal Ultrasound Is Accurate to Determine Endoscopic Response and Remission in Patients With Moderate to Severe Ulcerative Colitis: A Longitudinal Prospective Cohort Study

Floris de Voogd [1], Elsa A van Wassenaer [2], Aart Mookhoek [3], Steven Bots [4], Sara van Gennep [4], Mark Löwenberg [4], Geert R D'Haens [4], Krisztina B Gecse [5]




**CONCLUSION:** IUS, importantly **BWT** as the **single most important parameter**, is **highly accurate** to **detect treatment response** when evaluated **against endoscopic outcomes**

› Gastroenterology. 2022 Dec;163(6):1569-1581. doi: 10.1053/j.gastro.2022.08.038.
Epub 2022 Aug 24.

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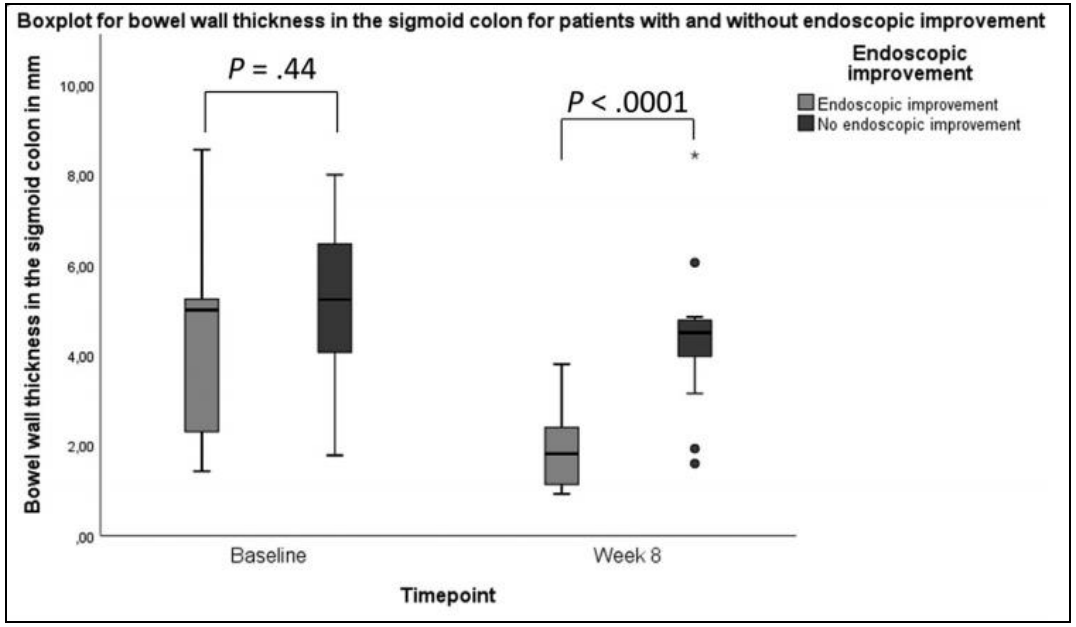


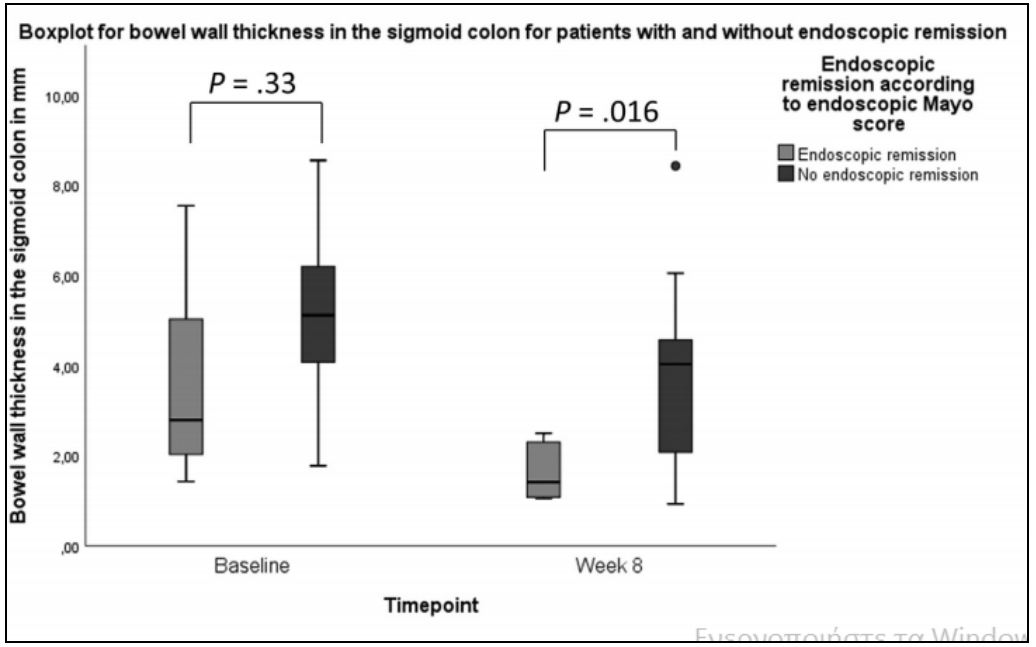

Practice Guideline > J Crohns Colitis. 2025 Jul 3;19(7):jjaf106. doi: 10.1093/ecco-jcc/jjaf106.

# ECCO-ESGAR-ESP-IBUS Guideline on Diagnostics and Monitoring of Patients with Inflammatory Bowel Disease: Part 1

Torsten Kucharzik [1], Stuart Taylor [2], Mariangela Allocca [3], Johan Burisch [4 5 6], Pierre Ellul [7], Marietta Iacucci [8], Christian Maaser [9], Pamela Baldin [10], Gauraang Bhatnagar [11], Shomron Ben-Horin [12], Dominik Bettenworth [13], Mallory Chavannes [14], Ann Driessen [15], Emma Flanagan [16], Frederica Furfaro [17], Giovanni Maconi [18], Konstaninos Karmiris [19], Amelia Kellar [20 21], Isabelle De Kock [22], Konstantinos Katsanos [23], Uri Kopylov [24], Cathy Lu [25], Olga Maria Nardone [26], Nurulamin M Noor [27], Kerri Novak [28], Paula Borralho Nunes [29], Patrick van Rheenen [30], Jordi Rimola [31], Francesca Rosini [32], David Rubin [33], Martina Scharitzer [34], Jaap Stoker [35 36], Mathieu Uzzan [37], Stephan Vavricka [38], Bram Verstockt [39], Rune Wilkens [40], Nina Zidar [41], Alessandra Zilli [42], Henit Yanai [43 44], Roger Feakins [45 46]

**Recommendation 9** In patients with UC in stable remission, we suggest using PROs, biomarkers (such as FC and CRP) IUS or combinations thereof to monitor for disease relapse based on risk stratification. (EL3) (94% agreement)

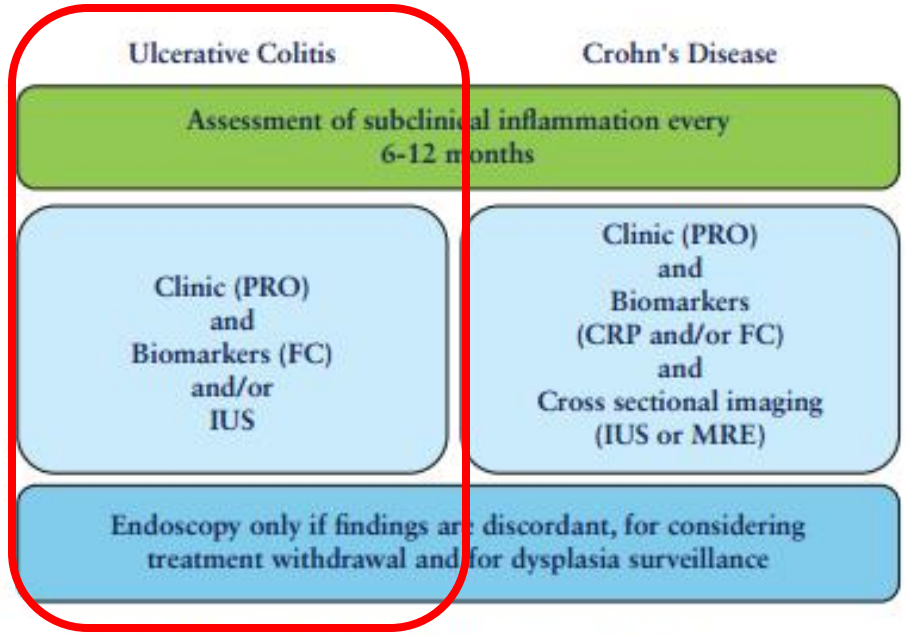


**Figure 3.** Monitoring of inflammatory bowel disease (IBD) in clinical remission.

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# Bedside Intestinal Ultrasound Performed in an Inflammatory Bowel Disease Urgent Assessment Clinic Improves Clinical Decision-Making and Resource Utilization

Joëlle St-Pierre, MD, PhD,[*] Maxime Delisle, MD,[*] Hengameh Kheirkhahrahimabadi, MD,[†] Thomas M Goodsall, MBBS, MClinEpid,[‡,§] Robert V Bryant, MBBS, MSc,[‡,§] Britt Christensen, MBBS, MPH, PhD,[¶] Rose Vaughan, MBBS,[¶] Aysha Al-Ani, MBBS,[¶] Richard J.M. Ingram, MD,[*] Joan Heatherington, MN, NP,[*] Dan Carter, MD,[‖] Cathy Lu, MD, MSc,[*] Christopher Ma, MD, MPH,[*,**] and Kerri L. Novak, MD, MSc[*]; on behalf of the International Bowel Ultrasound Group

Prospective, multicenter, international, observational cohort study
**158 patients**, 78% Crohn's disease, and 47% were on biologic therapy.
**IUS** identified **active inflammation in 65%** of patients, and **strictures in 14%.**

**Clinical assessment with IUS in 57% of patients, led to an acute change in IBD-specific medications** and **avoided or delayed the need for urgent endoscopy in 86%**

| Outcome measures | Combined population ($n$ = 158) | |
|---|---|---|
| | US only, $n$ = 128 | US and SIG, $n$ = 30 |
| Corticosteroid start/continued ($n$, %) | 13 (10) | 1 (3) |
| Immunosuppression start/optimization ($n$, %) | 31 (24) | 3 (10) |
| Biologic start/optimization ($n$, %) | 64 (50) | 3 (10) |
| JAK inhibitor start/optimization ($n$, %) | 0 (0) | 3 (10) |
| De-escalation of therapy ($n$, %) | 5 (4) | 0 (0) |
| Surgical consultation ($n$, %) | 4 (3) | 0 (0) |

| Resource utilization | Combined population ($n$ = 158) | |
|---|---|---|
| | US only, $n$ = 128 | US and SIG, $n$ = 30 |
| Avoided urgent endoscopy ($n$, %) | 110 (86) | 24 (80) |
| Further outpatient investigations ($n$, %) | 83 (65) | 14 (47) |
| Fecal calprotectin | 31 (24) | 3 (10) |
| Other biochemical investigation[a] | 21 (16) | 5 (17) |
| Formal imaging[b] | 16 (13) | 2 (7) |
| Planned nonurgent endoscopy[c] ($n$, %) | 17 (13) | 4 (13) |

# What are the definitions of IUS response and remission used in UC assessment?

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J Crohns Colitis. 2022 May 10;16(4):554-580. doi: 10.1093/ecco-jcc/jjab173.

# Defining Transabdominal Intestinal Ultrasound Treatment Response and Remission in Inflammatory Bowel Disease: Systematic Review and Expert Consensus Statement

Johan F K F Ilvemark [1], Tawnya Hansen [2], Thomas M Goodsall [3 4], Jakob B Seidelin [1], Heba Al-Farhan [5], Mariangela Allocca [6 7], Jakob Begun [8], Robert V Bryant [9], Dan Carter [10], Britt Christensen [11], Marla C Dubinsky [12], Krisztina B Gecse [13], Torsten Kucharzik [14], Cathy Lu [15], Christian Maaser [16], Giovanni Maconi [17], Kim Nylund [18 19], Carolina Palmela [20], Stephanie R Wilson [21], Kerri Novak [15], Rune Wilkens [22 23]

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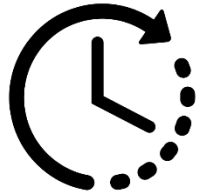
3.3.2.2. Response rate in intestinal ultrasound is dependent on:

3.3.2.2.1. class of drug (5-aminosalicylate [5-ASA] vs. steroids vs. immunosuppressants vs. Biologics); [InA. 1, Unc. 3, App. 13]

3.3.2.2.2. disease duration [new-onset vs. long-term established disease]; [InA. 0, Unc. 2, App. 15]

3.3.2.2.3. histological composition of a pathological segment [active inflammation only vs. fibrotic only vs. combined].



3.3.2.3. Response time is generally shorter in ulcerative colitis compared with Crohn's disease. [InA. 0, Unc. 1, App. 16]

3.3.2.4. In responders, colonic disease tends to respond faster with respect to reduced bowel wall thickness than small bowel disease. [InA. 0, Unc. 2, App. 15]

## 3.5. Ulcerative colitis

### 3.5.1. Response definition and timing of assessment in ulcerative colitis

3.5.1.1. Treatment response in ulcerative colitis is identified by reduction of bowel wall thickness [continues measurements] [>25%] or [>2.0 mm] or [>1.0 mm and one colour Doppler signal reduction]. [InA. 0, Unc. 3, App. 15]

3.5.1.2. Ideal assessment of intestinal ultrasound response within the first year of treatment initiation/escalation/change is at baseline, Week 14 ± 2, and between Weeks 26–52 + intestinal ultrasound depending on elevated faecal calprotectin or symptoms or clinical suspicion of flare. [InA. 0, Unc. 2, App. 14]

3.5.1.3. After treatment initiation, response should be measured in all segments that were affected at baseline. [InA. 0, Unc. 0, App. 14]

**REDUCTION of Bowel Wall Thickness**
[>25%] or
[>2.0 mm] or
[>1.0 mm and one CDS reduction]

**TREATMENT Initiation/Escalation/Change**
baseline
Week 14 ± 2
between Weeks 26–52

J Crohns Colitis. 2022 May 10;16(4):554-580. doi: 10.1093/ecco-jcc/jjab173.

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3.5.2.1. Transmural remission in ulcerative colitis of the large bowel is defined by bowel wall thickness ≤3 mm with normal/0 colour Doppler signal. [InA. 0, Unc. 1, App. 17]

3.5.2.2. In some patients, sigmoid colon may contain an enlarged muscularis propria [outer hypoechoic layer—typical in diverticular disease], allowing for bowel wall thickness up to 4 mm without resembling active inflammation. [InA. 3, Unc. 1, App. 13]

3.5.2.3. Transmural remission in ulcerative colitis should be assessed after treatment initiation [regardless of treatment] at Week 14 ± 2. [InA. 0, Unc. 2, App. 16]

3.5.2.4. Transmural remission in ulcerative colitis may occur already at Week 4 but with increasing likelihood up to Week 12 [potentially 1 year]. [InA. 1, Unc. 3, App. 14]

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J Crohns Colitis. 2025 Feb 4;19(2):jjaf011. doi: 10.1093/ecco-jcc/jjaf011.

## Systematic review on definitions of intestinal ultrasound treatment response and remission in inflammatory bowel disease

Mariangela Allocca [1], Ferdinando D'Amico [1], Gionata Fiorino [2], Vipul Jairath [3], Torsten Kucharzik [4], Laurent Peyrin-Biroulet [5 6], Silvio Danese [1]

### Intestinal ultrasound response definitions

Decrease in bowel wall thickness ranging from 0.5 to 2.5 mm from baseline[8,18,24,28,30,32,38,46,59]

Decrease in bowel wall thickness of 25% from baseline[9,16,60]

Decrease in color Doppler signals of 1 grade from baseline[8,16,18,24,28,37,38,59]

Ultrasonographic activity scores for CD:
- IBUS-SAS, International Bowel Ultrasound Segmental Activity Score < 25[39]
- BUSS, Bowel Ultrasound Score ≤ 1.2 points from baseline[41]

Ultrasonographic activity scores for UC:
- MUC, Milan Ultrasound Criteria ≤ 2 points from baseline[51]

CEUS, contrast-enhanced ultrasound: reduction in mural enhancement ≥ 20% from baseline[24]

J Crohns Colitis. 2025 Sep 28;19(9):jjaf170. doi: 10.1093/ecco-jcc/jjaf170.

## International consensus on the use of intestinal ultrasound in inflammatory bowel disease trials

Mariangela Allocca [1], Vipul Jairath [2], Bruce E Sands [3], David T Rubin [4], Bénédicte Caron [5], Valérie Laurent [6], Kerri Novak [7], Remo Panaccione [8], Peter Bossuyt [9], David H Bruining [10], Axel Dignass [11], Iris Dotan [12 13], Joel Fletcher [14], Mathurin Fumery [15], Federica Furfaro [1], Jonas Halfvarson [16], Ailsa Hart [17], Taku Kobayashi [18], Noa Krugliak Cleveland [4], Torsten Kucharzik [19 20], Andrea Laghi [21], Peter L Lakatos [22 23], Rupert W Leong [24], Edward V Loftus [25], Edouard Louis [26], Fernando Magro [27], Pablo A Olivera [28 29], Shaji Sebastian [30], Britta Siegmund [31], Stephan R Vavricka [32], Stephanie R Wilson [33], Jaap Stoker [34], Jordi Rimola [35], Laurent Peyrin-Biroulet [5], Silvio Danese [1]

**Table 4.** Approved statements for intestinal ultrasound in ulcerative colitis clinical trials.

| No. | Proposed statements | Agreement, % (*n*/*N*) |
|---|---|---|
| | **Statements for intestinal ultrasound (IUS) response assessments** | |
| | ***Parameters of IUS that should be assessed to evaluate response*** | |
| 1 | Bowel wall thickness (BWT) | 100 (17/17) |
| 2 | Color Doppler imaging signals (CDS) | 100 (17/17) |
| 3 | Bowel wall stratification (BWS) | 87.5 (14/16) |
| 4 | Thickening of submucosal layer | 81.25 (13/16) |
| 5 | Inflammatory mesenteric fat (IFAT) | 75 (12/16) |
| 6 | Extent of disease | 88.2 (15/17) |
| | ***Improvement in IUS parameters compared to baseline, indicating ultrasound response*** | |
| 7 | Percentage reduction in BWT ≥25 % compared to baseline | 87.5 (14/16) |
| 8 | Reduction of 1 grade in CDS compared to baseline | 75 (12/16) |
| 9 | Decrease in CDS from grade 3 to grade 2 or from grade 2 to grade 0 or 1 | 81.2 (13/16) |
| 10 | Reduction of 1 category (from extensive disruption to focal disruption) in BWS compared to baseline | 81.2 (13/16) |
| 11 | Ultrasound response should be defined as a ≥25% reduction in BWT from baseline if improvement is limited to a single parameter | 93.7 (15/16) |
| 12 | Ultrasound response should be defined by the reduction in BWT ≥25% and reduction of 1 grade in CDS | 81.2 (13/16) |
| | **Statements for response evaluation time points** | |
| 1 | Ultrasound response should be measured after the start of treatment at 8 weeks | 80 (12/15) |
| 2 | Ultrasound response should be measured after the start of treatment at 12-16 weeks | 93.7 (15/16) |
| 3 | The timing to assess ultrasound response should be determined by the type of treatment | 75 (12/16) |
| | **Statements for IUS response assessments by advanced IUS techniques** | |
| 1 | Ultrasound response should NOT be measured using CEUS (contrast-enhanced ultrasound) | 78.9 (15/19) |
| 2 | Ultrasound response should NOT be measured using small-intestine contrast ultrasonography (SICUS) | 89.4 (17/19) |
| 3 | Ultrasound response should NOT be measured using ultrasound elastography (UE) | 100 (19/19) |
| | **Statements for IUS response assessments by ultrasound scores** | |
| 1 | Ultrasound response should be determined by a decrease in Milan Ultrasound Criteria (MUC) ≥2 points from baseline[9] | 91.6 (11/12) |

J Crohns Colitis. 2025 Feb 4;19(2):jjaf011. doi: 10.1093/ecco-jcc/jjaf011.

## Systematic review on definitions of intestinal ultrasound treatment response and remission in inflammatory bowel disease

Mariangela Allocca [1], Ferdinando D'Amico [1], Gionata Fiorino [2], Vipul Jairath [3], Torsten Kucharzik [4], Laurent Peyrin-Biroulet [5 6], Silvio Danese [1]

| Intestinal ultrasound remission definitions |
|---|
| Bowel wall thickness ≤ 3 mm[10,18,20,21,24–26,28,29,33,35,36,38,40,59,61] |
| Color Doppler signal = 0–1[18,21,24,28,38,59] |
| Simplified: normalization of bowel wall thickness and color Doppler signal[60] |
| Extended: normalization of bowel wall thickness and at least two additional parameters among color Doppler signal, bowel wall stratification, and absence of inflammatory fat[60] |
| Complete: normalization of all four parameters[60] |
| Ultrasonographic activity scores for CD:<br>• IBUS-SAS, International Bowel Ultrasound Segmental Activity Score ≤ 32.5[39]<br>• BUSS, Bowel Ultrasound Score ≤ 3.52[41] |
| Ultrasonographic activity scores for UC:<br>• MUC, Milan Ultrasound Criteria ≤ 6.2 (for MES = 0–1)[51]<br>• MUC, Milan Ultrasound Criteria ≤ 4.3 (for MES = 0)[51] |
| CEUS, contrast-enhanced ultrasound: percentage of increase of enhancement < 46%[21] |

J Crohns Colitis. 2025 Sep 28;19(9):jjaf170. doi: 10.1093/ecco-jcc/jjaf170.

## International consensus on the use of intestinal ultrasound in inflammatory bowel disease trials

Mariangela Allocca [1], Vipul Jairath [2], Bruce E Sands [3], David T Rubin [4], Bénédicte Caron [5], Valérie Laurent [6], Kerri Novak [7], Remo Panaccione [8], Peter Bossuyt [9], David H Bruining [10], Axel Dignass [11], Iris Dotan [12 13], Joel Fletcher [14], Mathurin Fumery [15], Federica Furfaro [1], Jonas Halfvarson [16], Ailsa Hart [17], Taku Kobayashi [18], Noa Krugliak Cleveland [4], Torsten Kucharzik [19 20], Andrea Laghi [21], Peter L Lakatos [22 23], Rupert W Leong [24], Edward V Loftus [25], Edouard Louis [26], Fernando Magro [27], Pablo A Olivera [28 29], Shaji Sebastian [30], Britta Siegmund [31], Stephan R Vavricka [32], Stephanie R Wilson [33], Jaap Stoker [34], Jordi Rimola [35], Laurent Peyrin-Biroulet [5], Silvio Danese [1]

| | Statements for IUS remission assessments | |
|---|---|---|
| 1 | Ultrasound remission is defined by normalization of BWT and of all other IUS parameters | 86.6 (13/15) |
| 2 | Ultrasound remission is defined by normalization of BWT and CDS = 0/1 | 86.6 (13/15) |
| | **Statements for remission evaluation time points** | |
| 1 | Ultrasound remission should be measured after the start of treatment at 12-16 weeks | 87.5 (14/16) |
| 2 | Ultrasound remission should be measured after the start of treatment at 24-36 weeks | 81.2 (13/16) |
| 3 | Ultrasound remission should be measured after the start of treatment at 48-52 weeks | 94.1 (16/17) |
| | **Statements for IUS remission assessments by ultrasound scores** | |
| 1 | Ultrasound remission should be determined by the MUC ≤6.2 points for MES ≤1[9] | 76.9 (10/13) |
| 2 | Ultrasound remission should be determined by the MUC < 4.3 points for MES = 0[9] | 76.9 (10/13) |

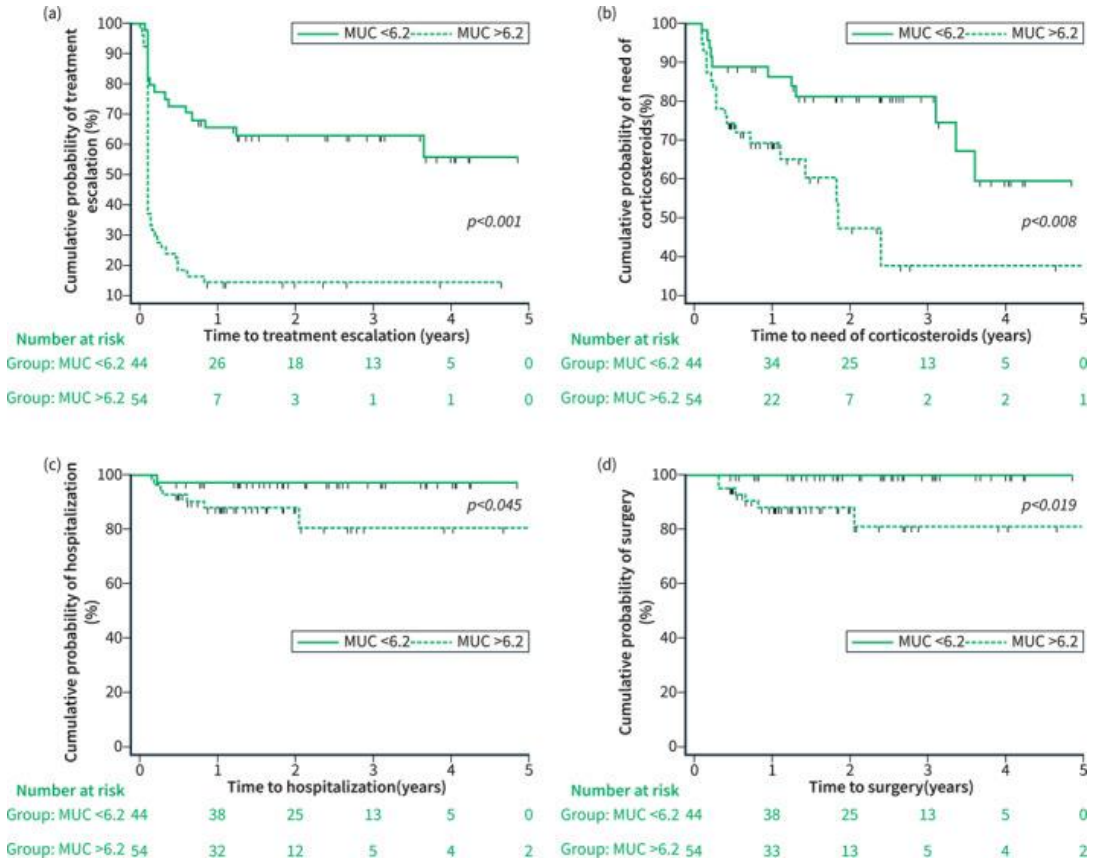
How they can be used to predict and monitor disease activity over time?

Observational Study > United European Gastroenterol J. 2022 Mar;10(2):190-197.
doi: 10.1002/ueg2.12206. Epub 2022 Mar 1.

# Predictive value of Milan ultrasound criteria in ulcerative colitis: A prospective observational cohort study

Mariangela Allocca [1], Cecilia Dell'Avalle [2], Vincenzo Craviotto [3], Federica Furfaro [3], Alessandra Zilli [1], Ferdinando D'Amico [1 2], Stefanos Bonovas [2 3], Laurent Peyrin-Biroulet [4], Gionata Fiorino [1], Silvio Danese [1]

- **98 UC** patients were **followed up** for a median time of **1.6 years**
- **MUC and MES significantly correlated** at baseline ($\rho = 0.653$; $p < 0.001$)
- **UC-related negative course** (need for corticosteroids, or treatment escalation, or hospitalization, or need for colectomy: a composite outcome)
- **MUC ≤ 6.2 at baseline vs MUC > 6.2** lower cumulative probability of treatment escalation, need of corticosteroids, hospitalization and colectomy - **($p < 0.05$ for all outcomes)**



Inflamm Bowel Dis. 2023 Nov 27:izad274. doi: 10.1093/ibd/izad274. Online ahead of print.

# Early Intestinal Ultrasound Predicts Clinical and Endoscopic Treatment Response and Demonstrates Drug-Specific Kinetics in Moderate-to-Severe Ulcerative Colitis

Floris A de Voogd [1], Steven J Bots [1], Elsa A van Wassenaer [2], Maria de Jong [1], Maarten J Pruijt [1], Geert R D'Haens [1], Krisztina B Gecse [1]

**51** UC **patients** with endoscopic disease activity (**EMS ≥2**) starting anti-inflammatory treatment.
**W0 – Endoscopy, IUS, Clinical Scores, Biomarkers**
**W2 - IUS, Clinical Scores, Biomarkers**
**W6 - IUS, Clinical Scores, Biomarkers**
**W8-W26 - Endoscopy, IUS, Clinical Scores, Biomarkers**
Endoscopic remission (EMS = 0), improvement (EMS ≤1), response (decrease in EMS ≥1), and clinical remission (Lichtiger score ≤3) were assessed and correlated with common IUS parameters.

**W6 - BWT ≤3.0 mm** (OR, 25.13; 95% C.I, 2.01-3.14; P = 0.012) and **CDS 0 (OR**, 0.35; 95% C.I, 0.14-0.88; P = 0.026) *predicted endoscopic remission and improvement,* respectively.
**W6 - Submucosal layer thickness** *predicted endoscopic remission* (OR, 0.09; P = 0.018) and improvement (OR, 0.14; P = 0.02).

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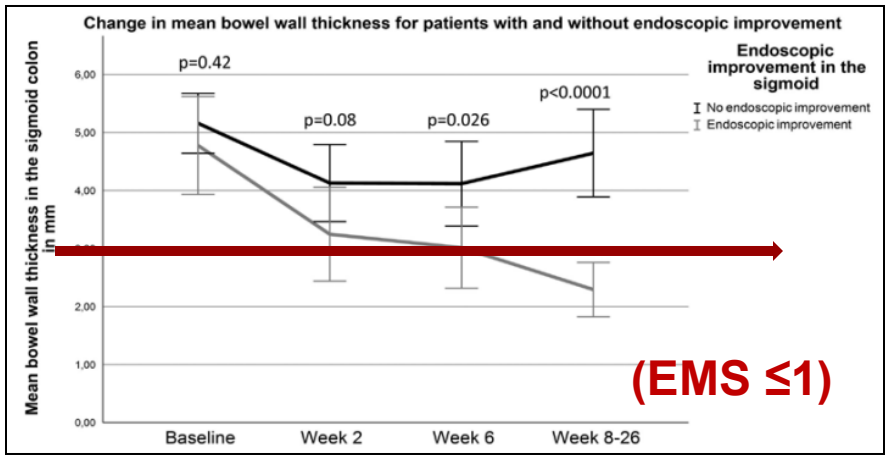


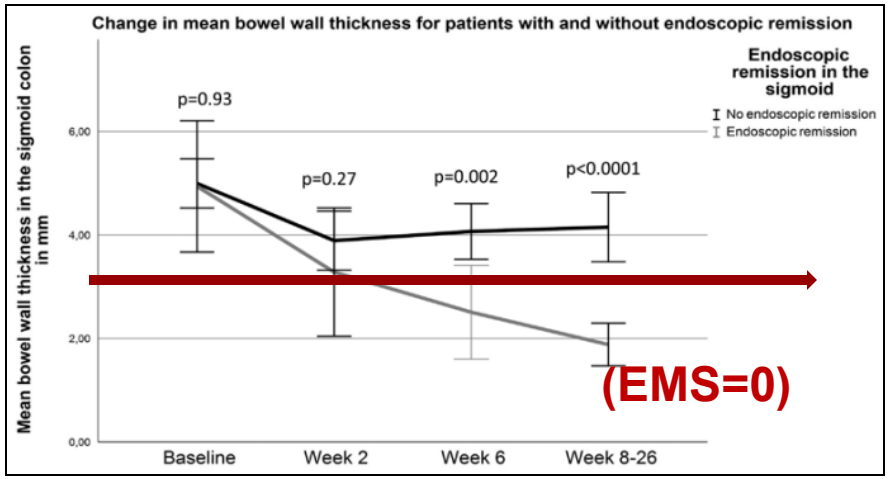


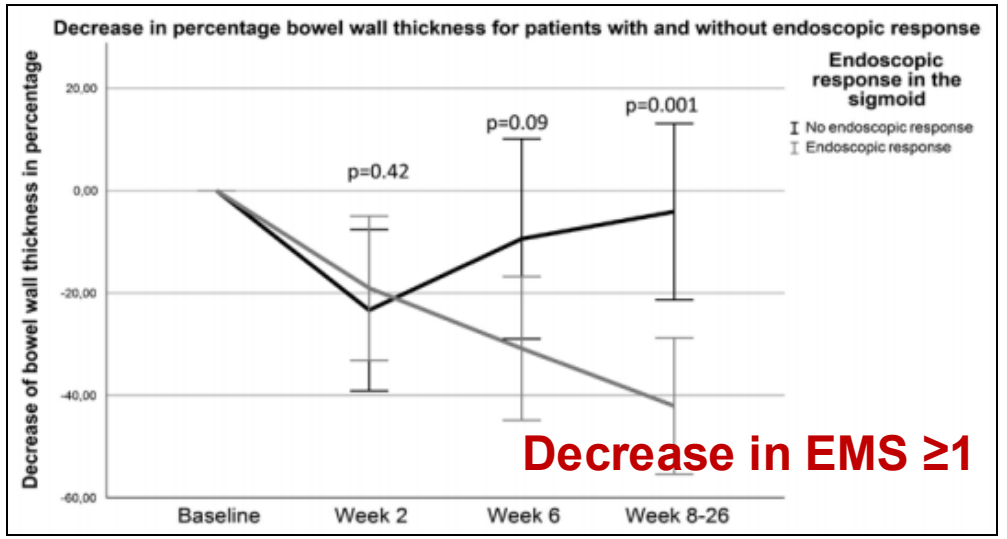

Observational Study > J Crohns Colitis. 2022 Nov 23;16(11):1725-1734.
doi: 10.1093/ecco-jcc/jjac083.

## Early Intestinal Ultrasound Predicts Intravenous Corticosteroid Response in Hospitalised Patients With Severe Ulcerative Colitis

Johan F K F Ilvemark [1], Rune Wilkens [2], Peter Thielsen [1], Anders Dige [3], Trine Boysen [4], Jørn Brynskov [1], Jacob Tveiten Bjerrum [1], Jakob Benedict Seidelin [1]

**56 pts with ASUC** were included in the final analysis
**At 48 ± 24 h**, a **significant difference** between **responders** and **non-responders** was **identified** in both
absolute BWT [median 3.1 mm vs 4.9 mm; p <0.0001],
absolute reduction [-1.9 mm vs -0.2 mm; p <0.001],
relative reduction [-35.9% vs -4.1%; p <0.0001]
A **≤20% reduction had a sens of 84.2% and a spec of 78.4% for determining non-response [AUC 0.85]**

*Changes in bowel wall thickness, after 48 ± 24 h following intravenous corticosteroid treatment in hospitalized patients with severe ulcerative colitis, identify responders with high accuracy and might be used as an early marker to guide accelerated rescue therapy*

## P614 Reduction of bowel wall thickness and doppler signals as early as 36 hours predicts corticosteroid response in a multi-centre prospective cohort of Acute Severe Ulcerative Colitis: USUC Study including the GENIUS cohort

Y K An, R Fernandes, N Lindsay, E Khoo, H Pham, K F Wong, L Thin, T Goodsall, R V Bryant, E Wright, R Smith, A Friedman, J Begun,
Gastroenterology Network of Intestinal Ultrasound (GENIUS)

*Journal of Crohn's and Colitis*, Volume 17, Issue Supplement_1, February 2023, Pages

**32 consecutive patients with ASUC**
**CS responders** demonstrated a **significant reduction** in width of the **muscularis propria** (p=0.02) and **submucosal** (p=0.006) layer, **but not the mucosal** (p=0.61) layer
An absolute BWT reduction of <1.40mm (Sn 63%, Sp 75%, AUROC 0.76) or a
**relative reduction of <20%**
(**Sn 81%, Sp 75%,** AUROC 0.78) **predicted CS non-response** and **need** for **rescue therapy** well.
A reduction in BWT and the absence of CDS at SV2 further enhanced the predictive capability of GIUS (Sn 81.3%, Sp 87.5%, AUC 0.91)

*This study demonstrates the predictive utility of early GIUS in the management of ASUC.*

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Observational Study > J Crohns Colitis. 2022 Nov 23;16(11):1725-1734.
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> J Crohns Colitis. 2024 Jun 28:jjae101. doi: 10.1093/ecco-jcc/jjae101. Online ahead of print.

## Early intestinal ultrasound in severe ulcerative colitis identifies patients at increased risk of 1-year treatment failure and colectomy

Johan F K F Ilvemark [1 2], Rune Wilkens [2 3], Peter Thielsen [1 2], Anders Dige [4], Trine Boysen [2 5], Jørn Brynskov [1 2], Jacob T Bjerrum [1 2], Jakob B Seidelin [1 2]

**56 Pts ASUC** starting IV corticosteroids
**IUS** was performed
**before TRT**
**48±24 hours**, **6±1 days**, and **3 months after TRT** initiation.

After 48±24h:
**No patient with a BWT < 3mm needed a colectomy, p=0.04**.
BWT ≥ 4mm increased risk of colectomy p=0.03,
BWT ≥ 3mm increased risk of intervention p=0.03.

*BWT assessed at 48h post i.v corticosteroid initiation in patients hospitalized with ASUC may identify patients with an increased risk of short- and long-term colectomy and predict a more aggressive short-term disease course.*

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https://research-groups.usask.ca/ibdresearchcollaborative/people/kerri-novak.php

https://www.shbmedicalimaging.com/dr-g-bhatnagar

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***"Perform IUS ...Transform lives"***