international bowel ULTRASOUND GROUP

Intestinal Ultrasound in Children and Pregnancy

Thanks to Mike Dolinger!!

Jacob Bjerrum
MD, PhD, DMSc
Copenhagen Intestinal Ultrasound, CIUS
Herlev Hospital, Denmark

IBUS Module 1 Workshop

Copenhagen, Denmark – December 2025

Disclosures

Personal fees: Johnson and Johnson, Tillotts, and Pfizer

Agenda and Learning Objective

- **Ground Rules for IUS in Pediatric IBD**
  - Disease Activity – pediatric IBD patients, small adults or ?
  - Response to Treatment
  - Transmural Remission

- **Feasability of IUS During Pregnancy**

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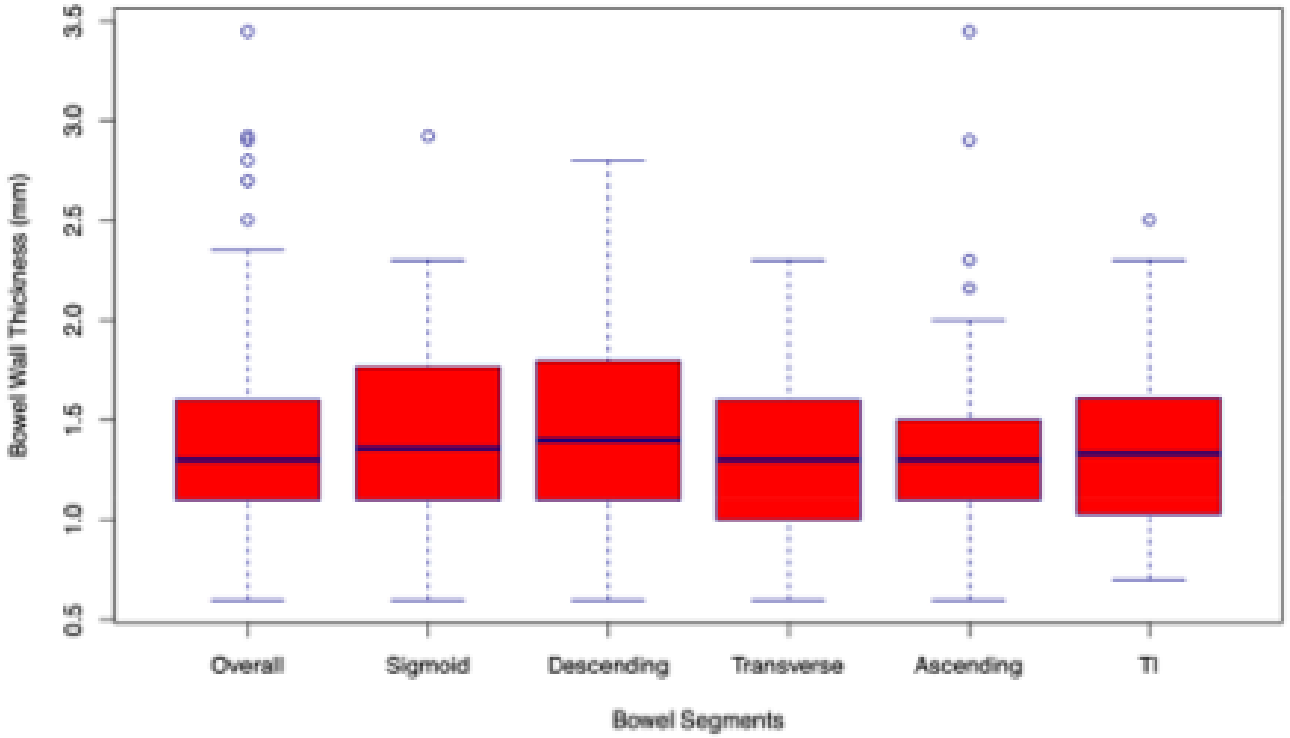
DOI: 10.1002/jpn3.70049

ORIGINAL ARTICLE
Gastroenterology: Inflammatory Bowel Disease
J Pediatr Gastroenterol Nutr. 2025;81:53–61.

Defining normal bowel wall thickness in children with inflammatory bowel disease in deep remission: A multicenter study on behalf of the pediatric committee of the International Bowel Ultrasound Group (IBUS)

Amelia Kellar[1] | Mallory Chavannes[2] | Hien Q. Huynh[3] | Illya Aronskyy[4] | Bryan Lei[5] | Jennifer C. deBruyn[6] | Justin Kim[3] | Michael T. Dolinger[7]



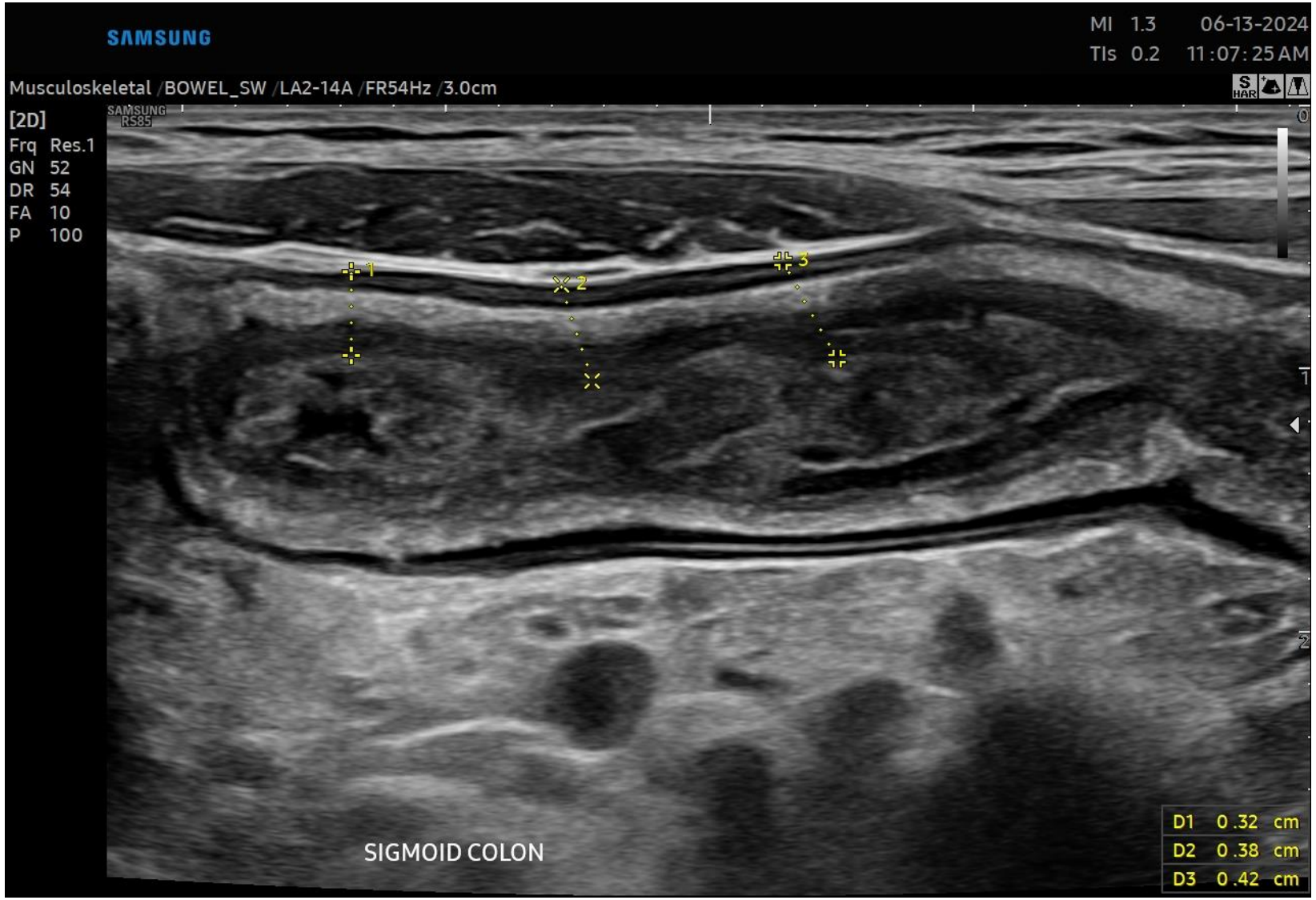
Multicenter, retrospective pediatric study including 98 children with IBD, who underwent IUS after achieving sustained deep remission (mucosal healing and/or transmural healing on MRE, and steroid-free clinical remission for ≥6 months)

Median BWT=1.4 mm with no difference in BWT between bowel segments

BWT was < 2.5 mm in 99% of bowel segments

Mildly Increased BWT Can Represent Severe Inflammation in Young Children

3-4 mm BWT can Equal Mayo 3 Colitis in Young Children



Hyperemia is more Profound than BWT in Severe Colitis in Young Children

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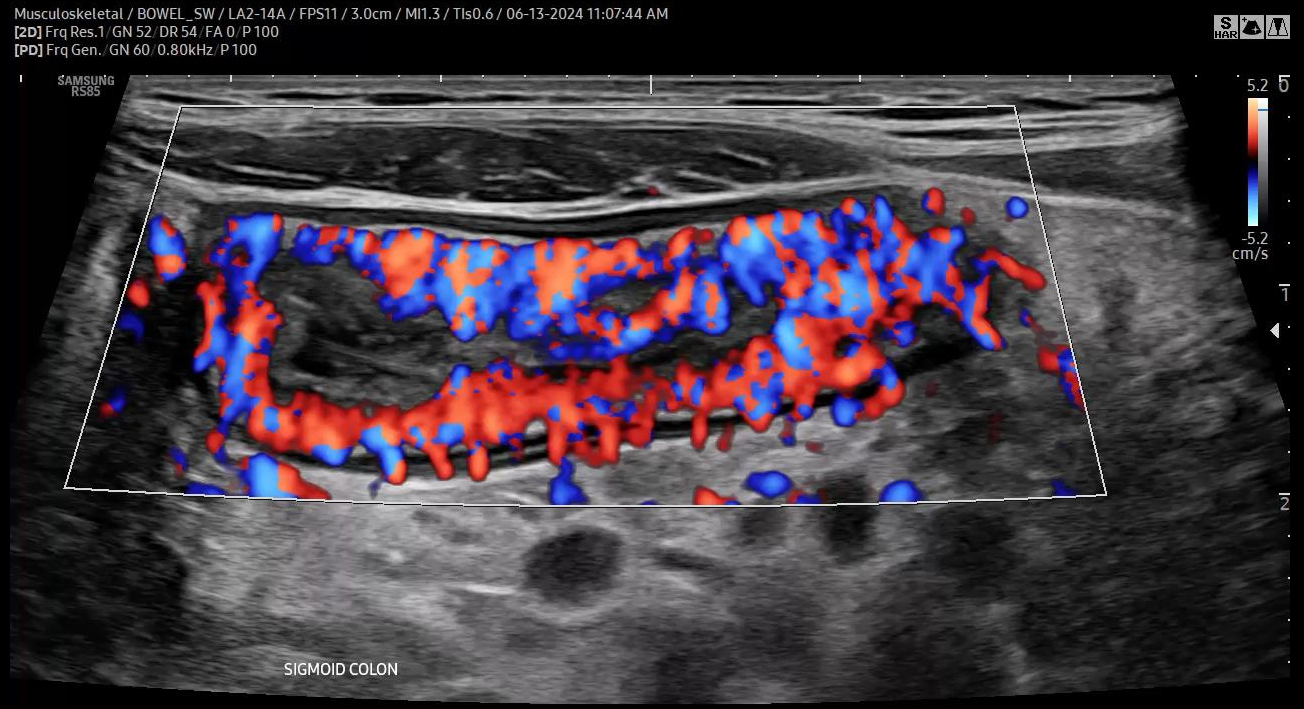

Lymphadenopathy is Present Often in Young Children

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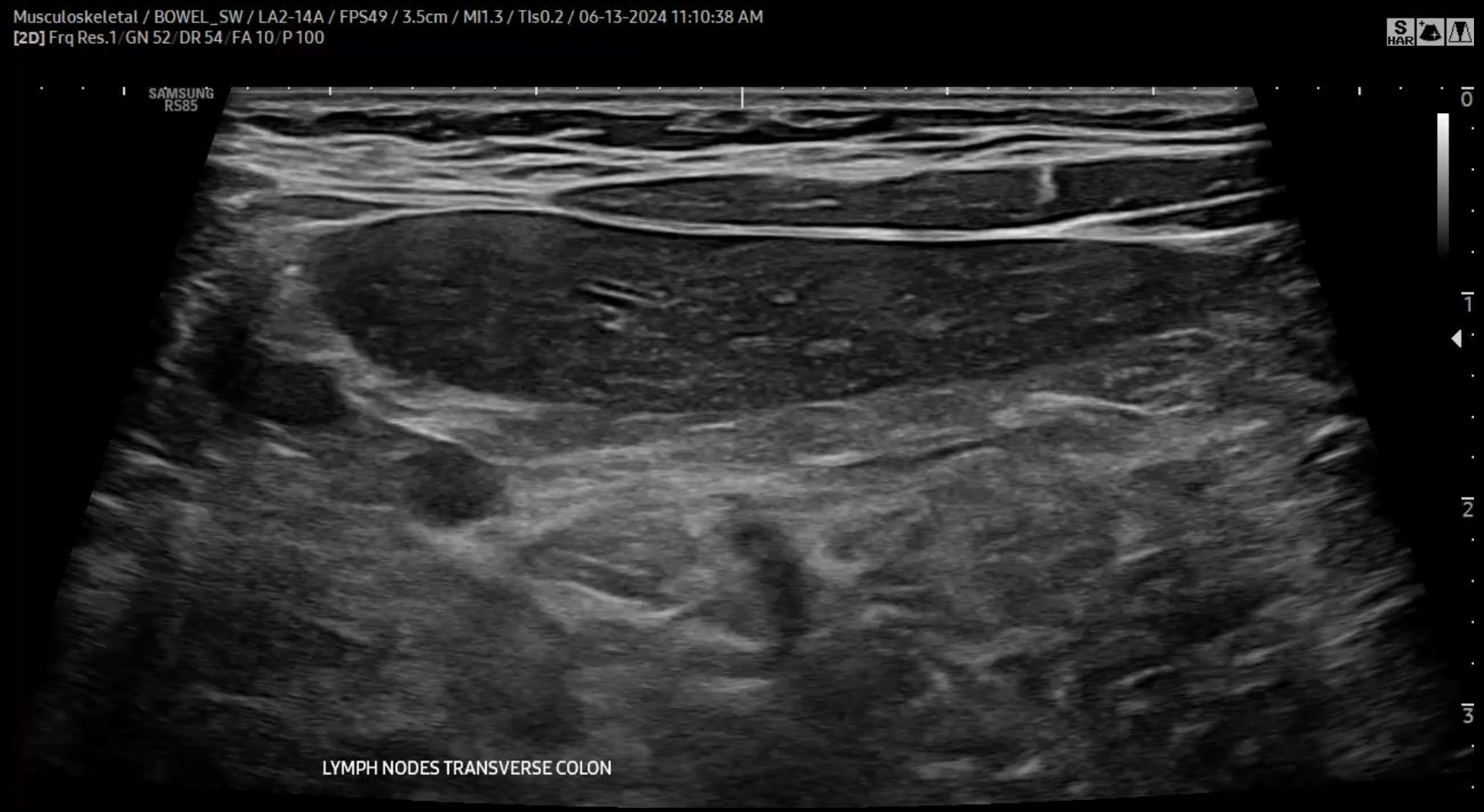

Agenda and Learning Objective

- **Ground Rules for IUS in Pediatric IBD**
  - Disease Activity – pediatric IBD patients, small adults or ?
  - Response to Treatment
  - Transmural Remission

- **Feasability of IUS During Pregnancy**

Journal of Crohn's and Colitis, 2024, 18, 1002–1011
https://doi.org/10.1093/ecco-jcc/jjad216
Advance access publication 23 December 2023
Original Article

Early Intestinal Ultrasound Response to Biologic Therapy Predicts Endoscopic Remission in Children with Ileal Crohn's Disease: Results from the Prospective Super Sonic Study

Michael Todd Dolinger, Illya Aronskyy, Amelia Kellar, Elizabeth Spencer, Nanci Pittman, Marla C. Dubinsky

Table 1. Baseline characteristics.

Clinical characteristics	T2T endoscopic remission [*N* = 29]	No T2T endoscopic remission [*N* = 15]	*p*-Value
Female, *N* [%]	9 [31]	8 [53]	0.197
Age, years, median [IQR]	14 [13–16]	13 [11–17]	0.7011
Disease duration, months, median [IQR]	2 [1.5–5.8]	25.5 [3.3–40.2]	*0.040*
CD characteristics			
Lower gastrointestinal involvement, *N* [%]			
L1: Ileal	29 [100]	15 [100]	–
Upper gastrointestinal involvement, *N* [%]	7 [24]	3 [20]	1.00
Perianal involvement, *N* [%]	1 [3]	1[7]	1.00
Behaviour phenotype, *N* [%]			
Non-stricturing, non-penetrating	29 [100]	15 [100]	1.00
Previous biologic therapy, *N* [%]			
0	22 [76]	7 [47]	0.092
1	5 [17]	7 [47]	0.071
2	2 [7]	1 [6]	1.00
Biologic therapy initiated, *N* [%]			
Infliximab	12 [41]	2 [13]	0.089
Adalimumab	7 [24]	2 [13]	0.695
Ustekinumab	10 [35]	11 [74]	*0.025*
Concomitant steroids, *N* [%]	8 [28]	6 [40]	0.500
Baseline PCDAI, median [IQR]	20 [20–30]	35 [30–50]	*0.017*
Baseline CRP, mg/L, median [IQR]	8.5 [1–22.1]	23.1 [8.7–39.4]	0.057
Baseline TI IUS parameters			
Bowel wall thickness, mm, median [IQR]	4.4 [4.0–5.2]	5.9 [5.3–6.3]	*0.004*
Hyperaemia on colour Doppler signal, *N* [%]	28 [97]	15 [100]	1.00
Modified Limberg score [0–III], *N* [%]			
0	1 [3]	0 [0]	1.00
I	9 [31]	2 [13]	0.281
II	8 [28]	3 [20]	0.722
III	11 [38]	10 [67]	0.112
Loss of bowel wall stratification, *N* [%]	22 [76]	12 [80]	1.00
Presence of inflammatory fat, *N* [%]	13 [45]	13 [87]	*0.010*
Presence of lymphadenopathy, *N* [%]	6 [21]	6 [40]	0.284

PCDAI, Pediatric Crohn's Disease Activity Index; CRP, C-reactive protein; IUS, intestinal ultrasound; IQR, interquartile range.

Prospective, single-centre, longitudinal, cohort study of children <18 years old with active TI CD only [defined as ileocolonoscopy SES-CD ≥ 4 for the TI segment] initiating biological treatment.

The primary outcome was accuracy of optimal IUS cut-points to predict T2T endoscopic remission at 1 year in the TI [SES-CD ≤ 2] for
(1) percentage change in BWT from baseline to week 8,
(2) absolute change in BWT from baseline to week 8, and
(3) absolute BWT at week 8.

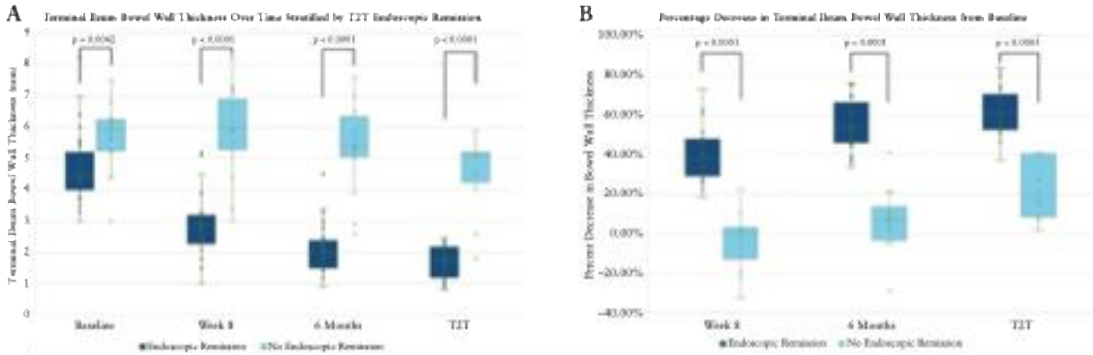

Table 4. Accuracy of week 8 TI BWT cut-points and current BWT, PCDAI, and CRP norms to predict T2T endoscopic remission.

Week 8 cut-point	AUROC [95% CI]	Sensitivity [%]	Specificity [%]	PPV [%]	NPV [%]
≥18% Decrease in BWT	0.99 [0.98–1.0]	100	93	97	100
≥20% Decrease in BWT	0.95 [0.88–1.0]	97	93	97	93
≥25% Decrease in BWT	0.95 [0.89–1.0]	90	100	100	83
≥1.0 mm Absolute decrease in BWT	0.99 [0.98–1.0]	100	93	97	100
≥2.0 mm Absolute decrease in BWT	0.69 [0.53–0.82]	38	100	100	44
Absolute BWT ≤5.2 mm	0.96 [0.90–1.0]	100	80	91	100
Absolute BWT ≤3.0 mm	0.79 [0.69–0.90]	66	93	95	58
PCDAI < 10	0.75 [0.61–0.89]	76	73	85	61
CRP ≤ 5 mg/L	0.61 [0.47–0.76]	73	55	83	40

BWT, bowel wall thickness; PCDAI, Pediatric Crohn's Disease Activity Index; CRP, C-reactive protein; AUROC, area under the receiver operating curve; NPV, negative predictive value; PPV, positive predictive value.

Journal of Crohn's and Colitis, 2025, 19(3), jjaf075
https://doi.org/10.1093/ecco-jcc/jjaf075
Advance access publication 2 May 2025
Original Article

Early intestinal ultrasound response to biologic and small molecule therapy is accurate to predict treat-to-target endoscopic outcomes in children with ulcerative colitis: results from the prospective super sonic-UC study

Michael Todd Dolinger,[1,*] Illya Aronskyy,[1] Elizabeth A. Spencer,[1] Nanci Pittman,[1] Marla C. Dubinsky[1]

Table 1. Baseline characteristics.

Characteristics	Overall cohort ($n = 42$)	Endoscopic remission/ improvement ($n = 30$)	No endoscopic remission/ improvement ($n = 12$)	*P*-value
Age, years, median [IQR]	14 [12–17]	14.5 [12–17]	13.5 [10.3–16]	.37
Sex, female, *n* (%)	23 (55)	15 (50)	8 (67)	.34
Disease duration, years, median [IQR]	1.4 [0.3–3.0]	1.1 [0.3–3.0]	2.0 [0.8–2.8]	.51
Paris classification, *n* (%)				
E2: Left-sided UC	7 (17)	5 (16)	2 (17)	1.00
E3: Extensive	13 (31)	11 (37)	2 (17)	.22
E4: Pancolitis	22 (52)	14 (47)	8 (67)	.25
S1: Ever severe	15 (36)	8 (27)	7 (58)	.06
Baseline Biologic or small molecule therapy, *n* (%)				
Infliximab	12 (29)	8 (27)	4 (33)	.69
Adalimumab	1 (2)	1 (3)	0 (0)	.56
Ustekinumab	11 (26)	9 (30)	2 (17)	.28
Vedolizumab	8 (19)	7 (23)	1 (8)	.39
Tofacitinib	5 (12)	2 (7)	3 (25)	.11
Upadacitinib	3 (7)	1 (3)	2 (17)	.14
Ozanimod	2 (5)	2 (7)	0 (0)	.39
Previous biologics, *n* (%)				
None	25 (59)	20 (67)	5 (42)	.15
1	5 (12)	3 (10)	2 (17)	.57
2	9 (22)	5 (16)	4 (33)	.25
3	3 (7)	2 (7)	1 (8)	.88
Previous anti-TNF exposure, *n* (%)	17 (41)	10 (33)	7 (58)	.15
Concomitant steroids at baseline, *n* (%)	33 (79)	23 (77)	10 (83)	.65
Colonoscopy at baseline, *n* (%)				
MES 2	20 (48)	18 (60)	2 (17)	*.01*
MES 3	22 (52)	12 (40)	10 (83)	*.01*
Baseline BWT, mm, median [IQR]	4.8 [3.9–5.6]	4.2 [3.8–5.5]	5.6 [4.8–6.0]	*.01*
Baseline CRP, mg/L, median [IQR]	2.7 [0.5–8.3]	2.4 [0.6–6.2]	3.3 [0.5–25.4]	.40
Baseline FC, mcg/g, median [IQR]	993 [436–2529]	1042 [420–3329]	889 [640–2155]	.95
Baseline PUCAI, median [IQR]	52.5 [40–65]	50 [40–64]	62.5 [54–71]	.02

Abbreviations: BWT, bowel wall thickness; CRP, C-reactive protein; FC, fecal calprotectin; IQR, interquartile range; MES, Mayo endoscopic score; PUCAI, Pediatric Ulcerative Colitis Activity Index; UC, ulcerative colitis
*Bold and italic values indicate statistical significance.

Prospective, single-center, longitudinal, cohort study of children <18 years old with active moderate-to-severe UC (defined as a MES ≥2) starting biologic or small molecule Therapy.

The primary outcome of the study was the accuracy of optimal sigmoid colon BWT IUS cut-points to predict and detect T2T ER, EI, and endoscopic response for
(1) percentage change in sigmoid colon BWT from baseline to week 8,
(2) absolute change in sigmoid colon BWT from baseline to week 8, and
(3) absolute sigmoid colon BWT at week 8 and at T2T.

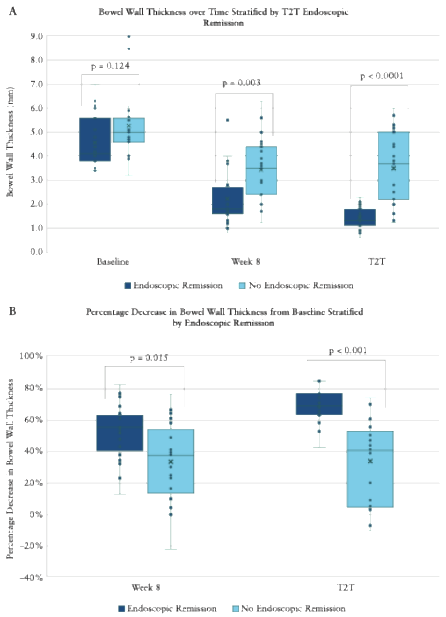

Table 5. Logistic regression analysis with forward selection of week 8 measures associated with T2T endoscopic outcomes.

Week 8 measure	Endoscopic remission		Endoscopic improvement		Endoscopic response	
	OR [95% CI]	*P*-value	OR [95% CI]	*P*-value	OR [95% CI]	*P*-value
BWT ≤2.7 mm	6.4 [1.8–27.0]	*.007*	11.7 [2.5–86.8]	*.005*	7.6 [1.6–56.8]	*.020*
BWT Decrease ≥64% from Baseline	5.0 [1.4–19.9]	*.016*	10.0 [2.1–73.8]	*.008*	6.7 [1.4–49.3]	*.029*
MUC ≤ 6.2	5.5 [1.3–28.5]	*.026*	19.5 [4.1–124.3]	*.0005*	10.1 [2.2–59.3]	*.005*
MUC < 6.0	5.7 [1.5–25.3]	*.015*	20.0 [4.0–155.9]	*.0008*	12.0 [2.4–91.6]	*.005*
Absolute IBUS-SAS ≤37.4	5.5 [1.3–28.5]	*.026*	10.0 [2.3–52.1]	*.003*	10.1 [2.2–59.3]	*.005*
IBUS-SAS decrease ≥64% from baseline	5.7 [1.5–25.3]	*.015*	11.0 [1.8–214.1]	*.030*	7.9 [1.3–155.4]	.062
Absolute CUCI ≤2	1.9 [0.4–10.3]	.436	3.3 [0.6–16.9]	.148	2.3 [0.4–12.1]	.320
CUCI decrease ≥25% from baseline	8.6 [1.9–63.3]	*.012*	27.0 [5.3–193.6]	*<.0001*	12.6 [2.6–77.0]	*.003*
Absolute MLS ≤1	2.4 [0.5–12.9]	.267	4.6 [0.98–23.7]	.053	3.6 [0.7–18.2]	.113
Presence of abnormal BWS	0.42 [0.08–1.86]	.267	0.4 [0.08–1.9]	.242	0.54 [0.11–3.0]	.453
Presence of lymphadenopathy	0 [N/A]	.994	0 [N/A]	.994	0 [N/A]	.995
Presence of inflammatory fat	0.18 [0.035–0.75]	*.026*	0.1 [0.02–0.44]	*.003*	0.10 [0.02–0.46]	*.005*
Absolute FC ≤250 ug/g	2.9 [0.8–11.6]	.113	3.8 [0.8–27.8]	.118	2.7 [0.6–20.1]	.246
Absolute FC ≤177 ug/g	4.5 [1.1–23.6]	*.049*	0 [N/A]	.992	0 [N/A]	.992
FC decrease ≥78% from baseline	3.9 [1.2–17.1]	.056	8.4 [1.4–163.8]	.055	6.2 [0.98–120.7]	.103

Abbreviations: BWS, bowel wall layer stratification; BWT, bowel wall thickness; CRP, C-reactive protein; IBUS-SAS, International Bowel Ultrasound Group Segmental Activity Score; FC, fecal calprotectin; MLS, modified Limberg score; MUC, Milan Ultrasound Criteria; PUCAI, Pediatric Ulcerative Colitis Activity Index; T2T, treat to target.
*Bold and italic values indicate statistical significance.

Journal of Crohn's and Colitis, 2025, 19(3), jjaf075
https://doi.org/10.1093/ecco-jcc/jjaf075
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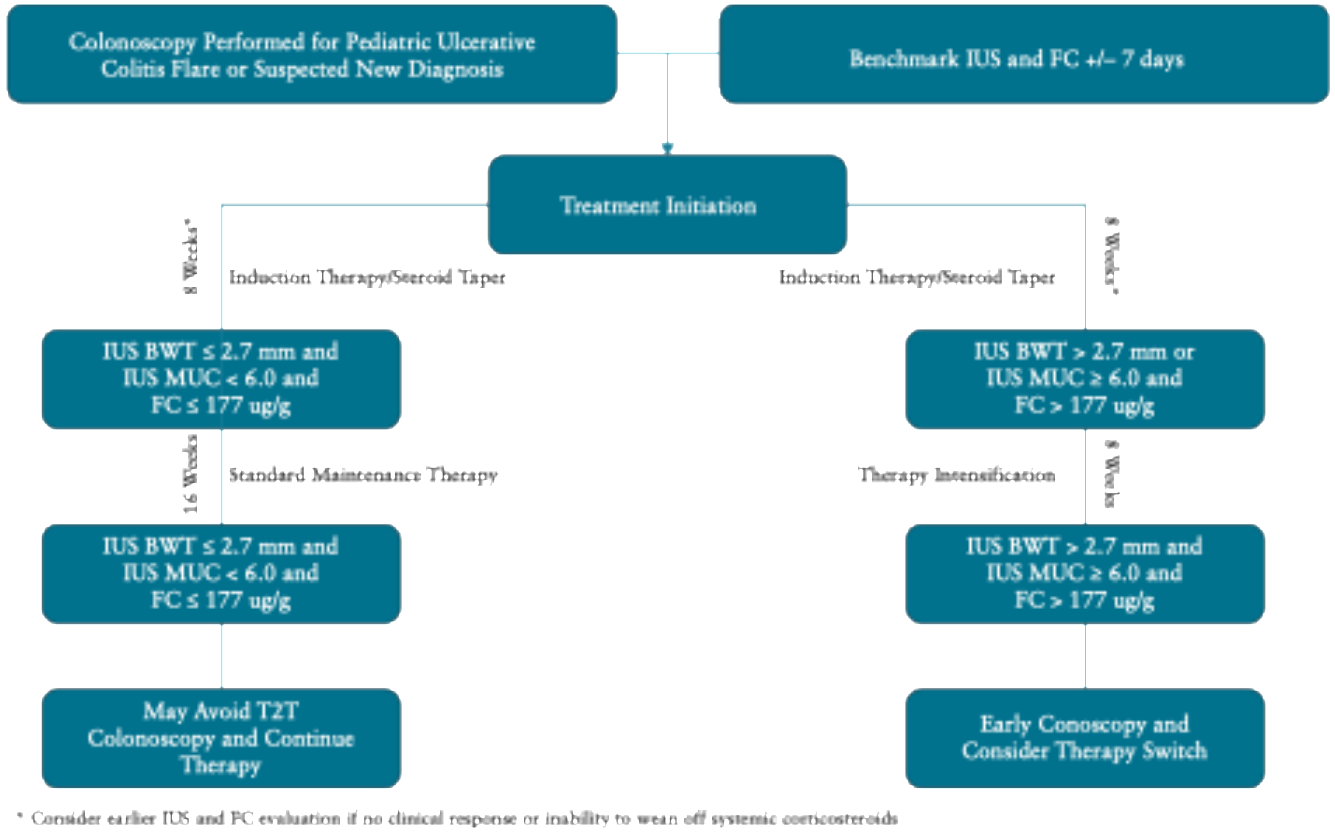


* Consider earlier IUS and FC evaluation if no clinical response or inability to wean off systemic corticosteroids

Take Home IUS Points in Pediatrics

- **BWT cut-off for ANY inflammation in children is likely <2.5 mm**
- **High degree of certainty for normal bowel when BWT <1.5 mm**
- **Early changes (8 weeks) in BWT after treatment are highly predictive of endoscopic outcomes**

Agenda and Learning Objective

- **Ground Rules for IUS in Pediatric IBD**
  - Disease Activity – what parmeters are we looking for
  - Response to Treatment
  - Transmural Remission
- **Feasibility of IUS During Pregnancy**

Inflammatory Bowel Diseases, 2022, **28**, 1045–1052
https://doi.org/10.1093/ibd/izab216
Advance access publication 15 September 2021
Original Research Articles - Clinical

Intestinal Ultrasound to Evaluate Treatment Response During Pregnancy in Patients With Inflammatory Bowel Disease

Floris De Voogd, MD,* Harshad Joshi, MD,† Elsa Van Wassenaer, MD,‡ Steven Bots, MD,* Geert D'Haens, MD, PhD,* and Krisztina Gecse, MD, PhD*

From the *Amsterdam University Medical Center, Department of Gastroenterology and Hepatology, University of Amsterdam, Amsterdam, the Netherlands
†Sir H. N. Reliance Hospital and Research Centre, Mumbai, India
‡Amsterdam University Medical Center, Department of Pediatric Gastroenterology, Emma Children's Hospital, University of Amsterdam, Amsterdam, the Netherlands.

Address correspondence to: Floris de Voogd, Amsterdam UMC, Locatie AMC: Amsterdam UMC Locatie AMC, Meibergdreef 9, 1105 AZ, Amsterdam, The Netherlands (f.a.devoogd@amsterdamumc.nl).

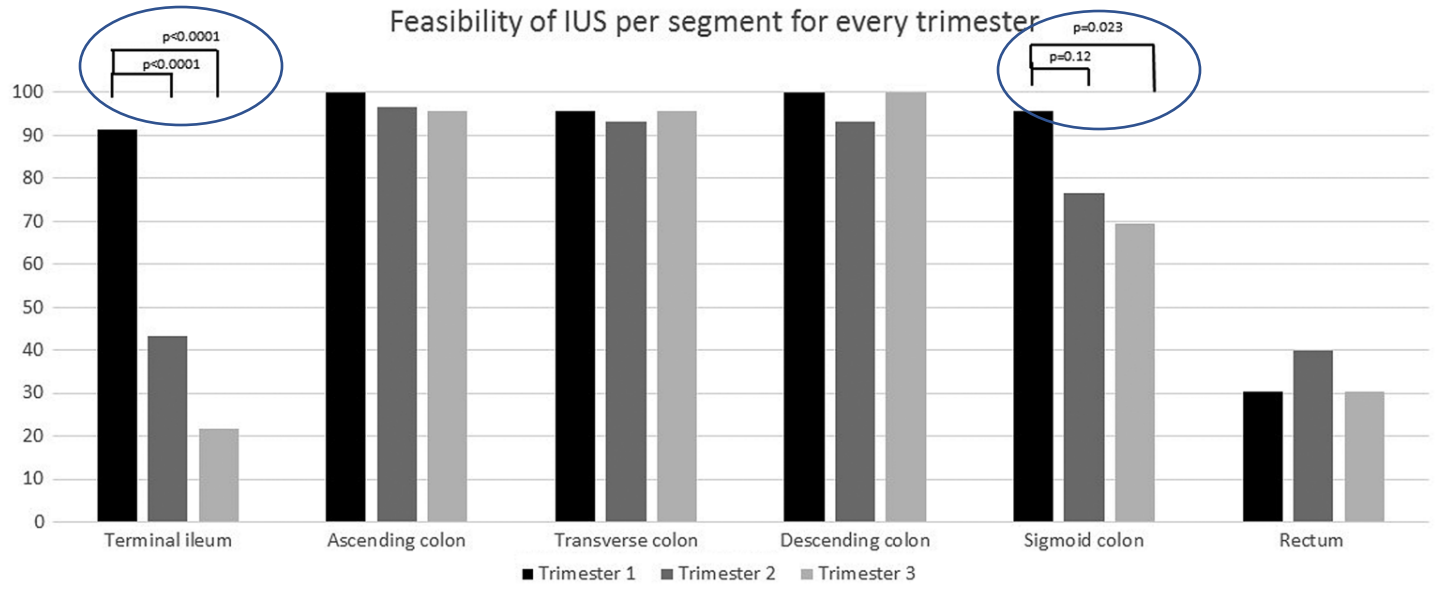


Figure 1. Feasibility per trimester per segment.

Conclusion IUS is feasible and accurate throughout pregnancy, although visualization of the sigmoid and TI decreases in the third trimester. IUS provides objective information on disease activity, extent, and treatment response, even during second and third trimester, and offers a noninvasive strategy to closely monitor patients during pregnancy.

Table 2. Baseline characteristics

Age (years; mean ± SD)	29.87 ± 4.96
Disease (number of patients/percentages)	
Crohn's Disease	22 (58%)
Ileal (L1)	4 (18%)
Colonic (L2)	5 (23%)
Ileocolonic (L3)	13 (59%)
Ulcerative colitis	16 (42%)
Proctitis (E1)	3 (19%)
Left-sided (E2)	7 (44%)
Pancolitis (E3)	6 (37%)
Previous surgery for Crohn's Disease	
Treatment at baseline	7 (32%)
No medication	5 (13%)
Corticosteroids	2 (5%)
Aminosalicylates	12 (32%)
Thiopurines	11 (29%)
Anti-TNF-α	15 (39%)
Vedolizumab	4 (11%)
Ustekinumab	3 (7.9%)
Clinical remission at start of pregnancy (HBI < 4 or SCCAI < 3)	32 (84%)
Weeks pregnant at baseline (median and range)	11 (5–33)

Abbreviations: SD, standard deviation; IBD, inflammatory bowel disease; TNF-α, tumor necrosis factor; HBI, Harvey-Bradshaw Index; SCCAI, Simple Clinical Colitis Activity Index.

IUS Monitoring is Feasible During Pregnancy except for the Ileum in Trimester 3

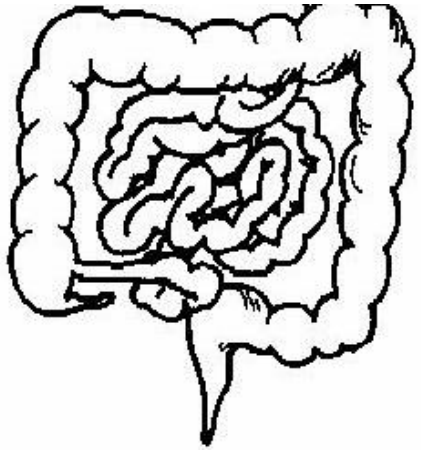
Adequate views Obtained, n (%)	Trimester 1 Weeks 4-13 (n=39)	Early trimester 2 Weeks 14-19 (n=28)	Late trimester 2 Weeks 20-26 (n=51)	Trimester 3 Weeks 27-33 (n=9)
Sigmoid colon	39/39(100%)	28/28 (100%)	47/51 (92%)	9/9 (100%)
Descending colon	38/39 (97%)	28/28 (100%)	49/51 (96%)	9/9 (100%)
Transverse colon	39/39 (100%)	27/28 (96%)	49/51 (96%)	7/9 (78%)
Ascending colon	37/38 (97%)	28/28 (100%)	51/51 (100%)	9/9 (100%)
Terminal ileum	37/39 (95%)	25/28 (89%)	**30/51 (59%)**	**0/9 (0%)**

Flanagan E et al., *J Crohns Colitis*, 2020

Case Presentation

36 y/o 14 week GA via IVF

Ulcerative pancolitis Dx age 14



Flare symptoms for 1 month

Initial Visit

36 y/o 14 week GA via IVF

VDZ q8w

Mesalamine

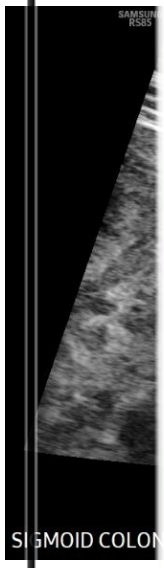
Prednisone 35 mg

Mild-Moderate symptoms

IUS Findings at Week 14

Gastroenterology 2025;169:647–662

Active Inflammatory Bowel Disease on Intestinal Ultrasound During Pregnancy Is Associated With an Increased Risk of Adverse Pregnancy and Neonatal Outcomes Independent of Clinical and Biochemical Disease Activity



- ↑ Bowel wall thickness >6mm
- Hyperemia
- ↑ Preterm & low birth weight delivery
- ↑ Preeclampsia
- ↑ Neonatal special/intensive care unit admission

Agreement between assessment activity tools

FCP ✓ HBI/SCCAI

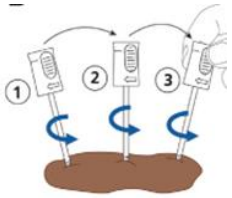
minimal in T1 (0.29) & T2 (0.29), none in T3 (0.07)

IUS ✓

minimal in T1 (0.35) & none in T2 (0.08)

Gastroenterology

Admission to the Hospital



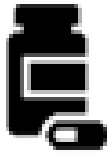
3940 (µg/g)

CRP = 3.2 g/dL
ESR = 25 mm/hr
Albumin = 3.2 g/dL

Methylprednisolone

Infliximab 5 mg/kg

Clinical Response at Week 2



Prednisone 40 mg daily

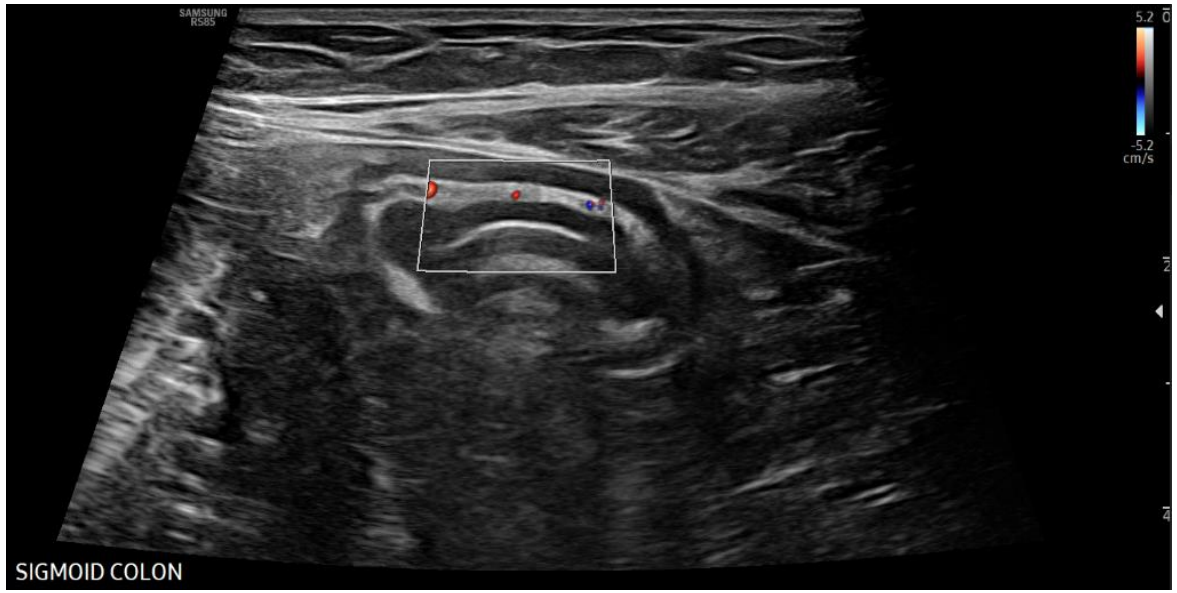
Infliximab 5 mg/kg
2 weeks later

CRP 0.1 mg/dL
IFX > 34 µg/mL

IUS Response at Week 5, GA Week 19

Flare During Prednisone Taper at GA Week 23

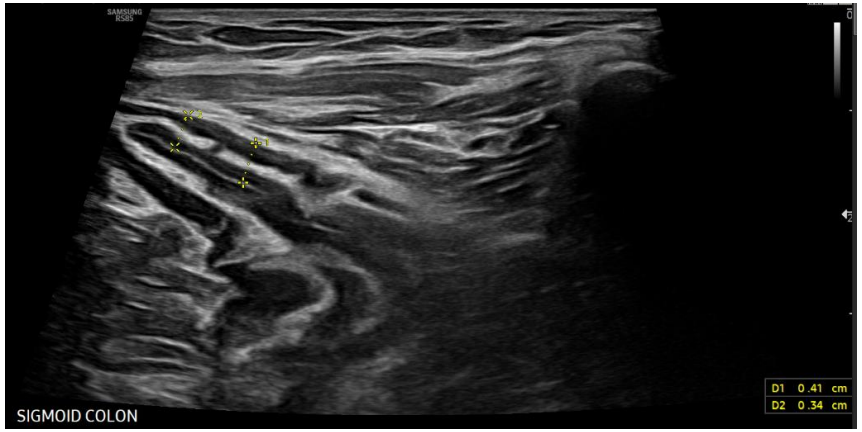
IFX wk 6 = 18.2 µg/mL

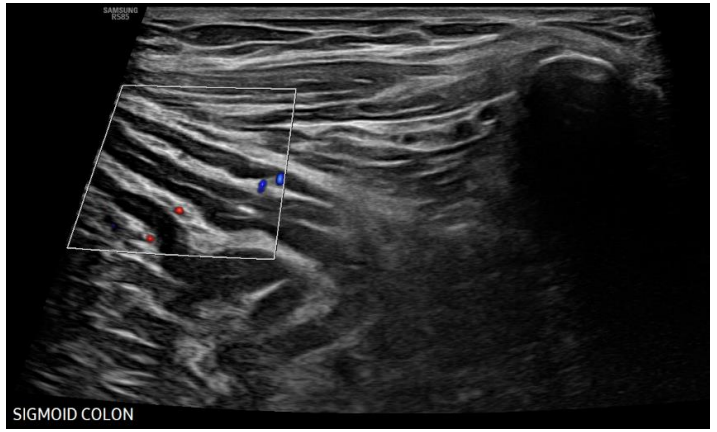


Treatment Escalation Based on IUS

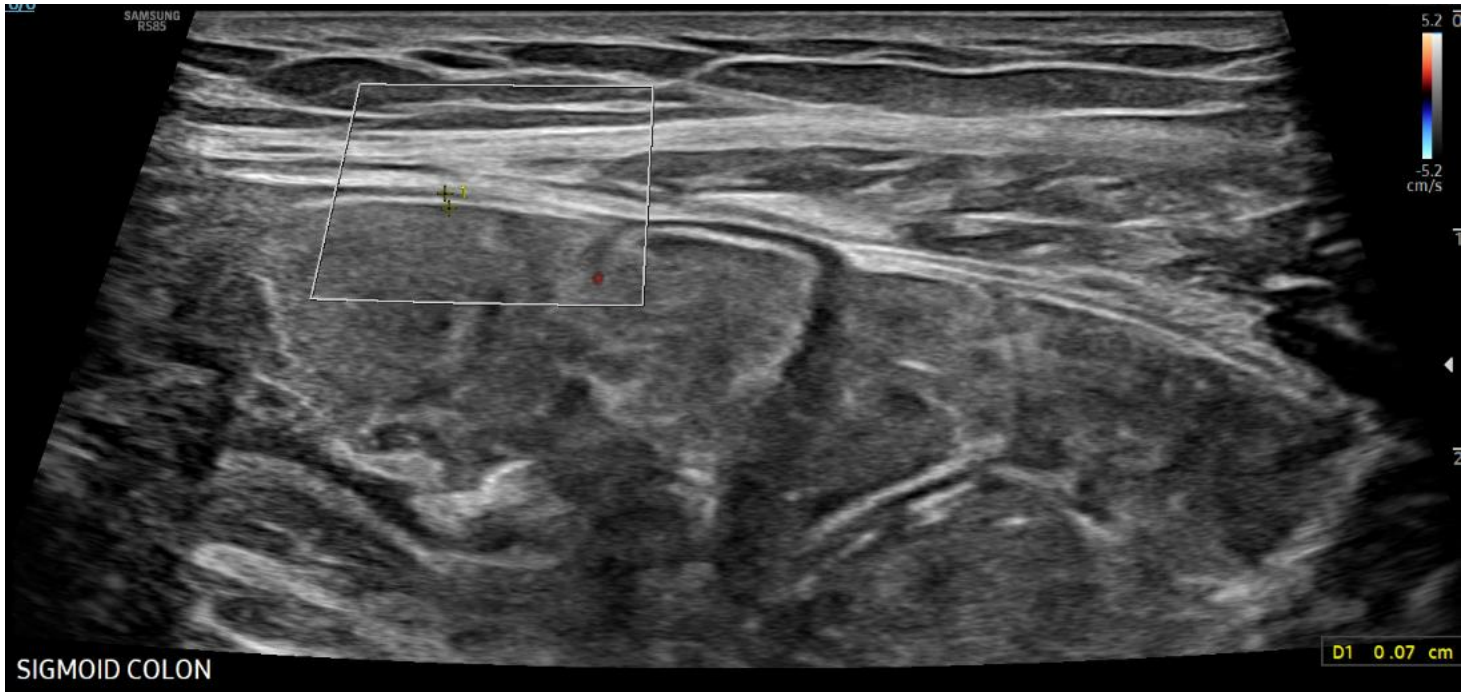
10 mg/kg every 4 weeks

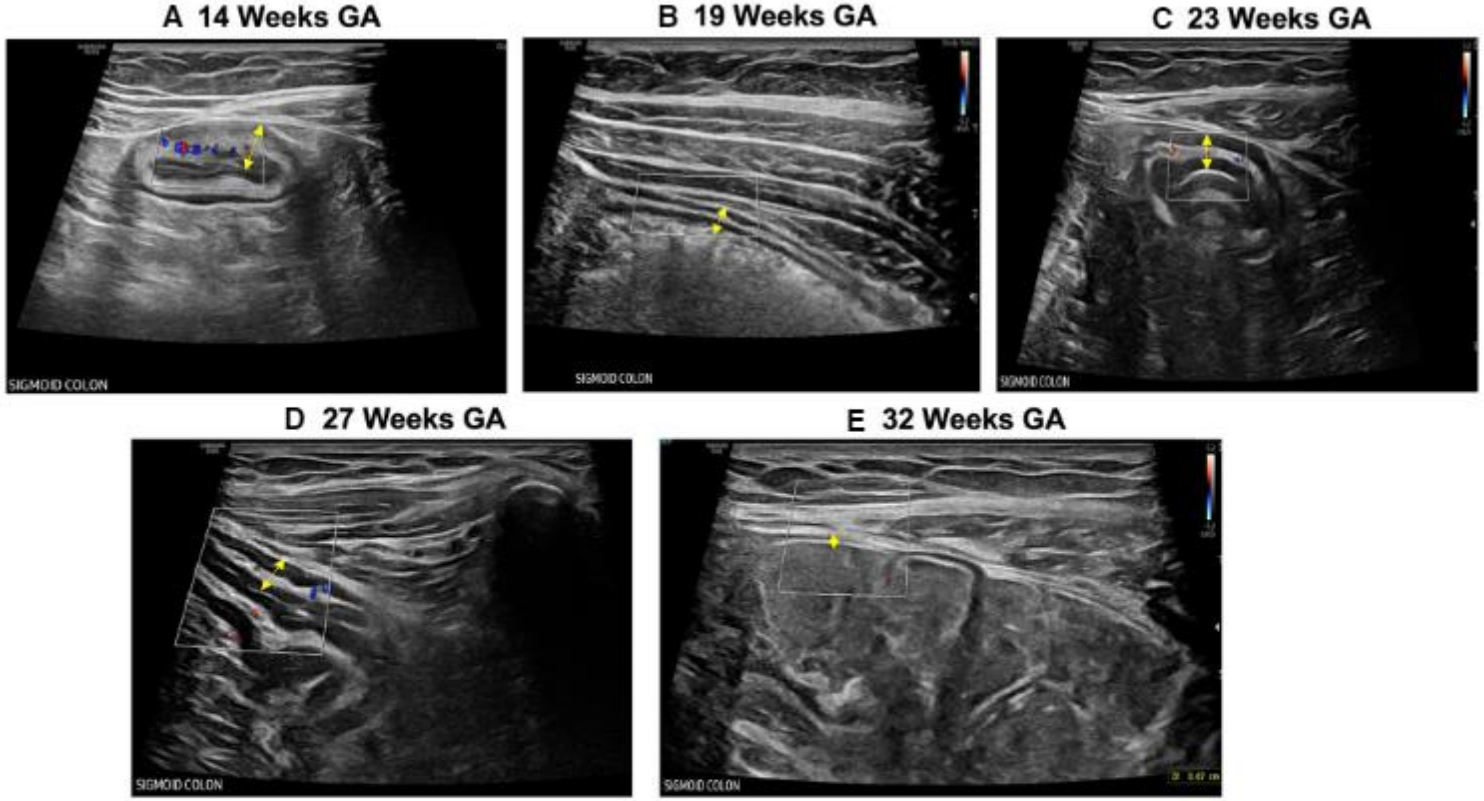
IUS GA wk 27





Transmural Remission at Week 32





GA=Gestational Age

A. Significantly increased bowel wall thickness with diffuse hyperemia
B. Normal bowel wall thickness with absence of hyperemia
C. Increased bowel wall thickness with mild hyperemia (less than A)
D. Subtly increased bowel wall thickness with mild hyperemia (improved from C)
E. Complete normalization of bowel wall thickness with absence of hyperemia

Gottlieb ZS et al., *Dig Dis Sci*, 2022

Journal of Crohn's and Colitis, 2023, **17**, 1–27
https://doi.org/10.1093/ecco-jcc/jjac115
Advance access publication 25 August 2022
ECCO Guideline/Consensus Paper

European Crohn's and Colitis Guidelines on Sexuality, Fertility, Pregnancy, and Lactation

DURING PREGNANCY

- Discuss risk/benefit of drug maintenance during pregnancy
- Establish a plan for delivery and mode of delivery
- Monitor with faecal calprotectin and intestinal ultrasound if available
- Monitor for adequate weight gain during pregnancy
- Discuss risk/benefit of drug maintenance during lactation
- Discuss safety of vaccination in the children
- Discuss management plan with family doctor and/or obstetrician

Journal of Crohn's and Colitis, 2025, **19**(7), jjaf107
https://doi.org/10.1093/ecco-jcc/jjaf107
Advance access publication 31 July 2025
Ecco Guideline/Consensus Paper

ECCO-ESGAR-ESP-IBUS Guideline on Diagnostics and Monitoring of Patients with Inflammatory Bowel Disease: Part 2

Recommendation 43: We recommend faecal calprotectin testing every trimester to monitor disease activity in pregnant women with IBD [EL2]. Agreement 92%

Recommendation 44: In pregnant women with features of active IBD, we suggest IUS or MRE [without use of gadolinium] to evaluate the bowel [EL3]. Endoscopy should be reserved for situations where IUS or MRE are insufficient to make a therapeutic decision [EL5]. Agreement 100%

Intestinal Ultrasound in Pregnancy and Children

Questions ?

Jacob Bjerrum
MD, PhD, DMSc
Copenhagen Intestinal Ultrasound, CIUS
Herlev Hospital, Denmark

IBUS Module 1 Workshop

Copenhagen, Denmark – December 2025