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IUS in Pediatrics & Pregnancy

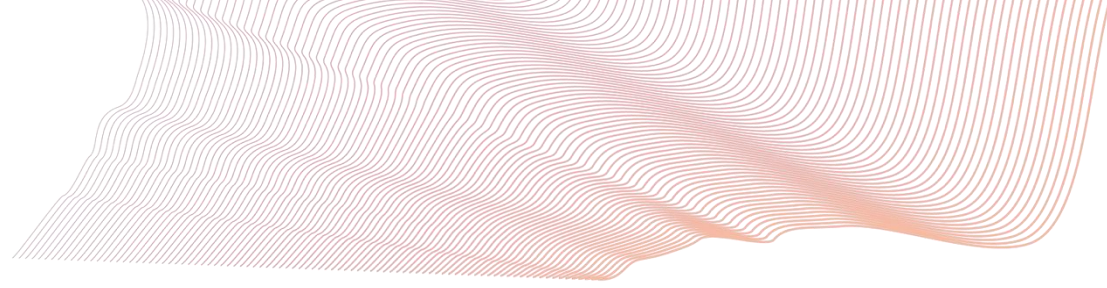
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Panama City, Panama, August 18th – 19th, 2026

No Disclosures



Intended Learning Outcomes (ILO):

The items marked with a heart represent the mandatory minimum knowledge required for beginners.

By the end of this session, the learner will be able to:

Pediatrics

1. Explain the benefits and limitations of using intestinal ultrasound (IUS) in pediatric clinical practice. ♥
2. Compare and contrast IUS inflammation cut-offs in pediatric versus adult populations.

Pregnancy

3. Discuss the anatomical challenges during pregnancy that impact the performance and interpretation of IUS. ♥
4. Evaluate the effectiveness of IUS relative to standard care imaging modalities during pregnancy. ♥

The Paediatric Paradigm Shift

IUS offers superior, real-time diagnostic yield while entirely eliminating the physiological and psychological trauma of standard imaging. It is positioned to replace T2T ileocolonoscopy in children.

High Burden



- ⚠ Ionising radiation
- ⚠ Mandatory sedation/anaesthesia
- ⚠ Intense bowel preparation
- ⚠ Fear
- ⚠ Pain

Zero Burden



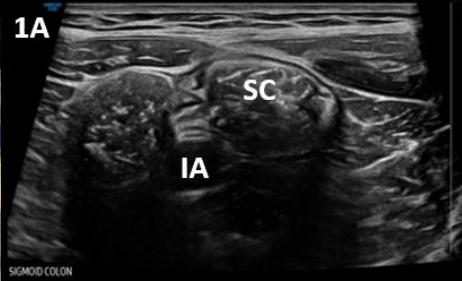
- ✓ Zero radiation
- ✓ No sedation
- ✓ No prep
- ✓ Pain-free
- ✓ Superior image quality

Evaluating IBD Monitoring Tools

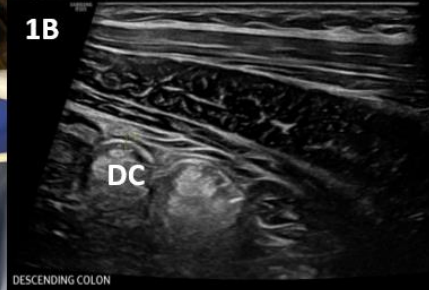
Modality	Invasiveness (Lower is Better)	Accessibility / Speed	Transmural Evaluation	Paediatric Suitability
Colonoscopy	● Highly invasive	● Slow prep	○ No transmural eval	○ Low paediatric suitability
CRP & Stool Calprotectin	● Non-invasive	● Delayed results/25% non-producers	○ No transmural eval	● High suitability
CT Scan	● Radiation/invasive	● Fast	● Excellent transmural	○ Radiation risk in children
MRI	● Non-invasive	○ Expensive/ Unavailable/Delayed	● Excellent transmural	● Motion artifact/long duration in children
Intestinal Ultrasound (IUS)	● Non-invasive	● Immediate/Bedside	● Excellent transmural	● Optimal paediatric suitability



1A



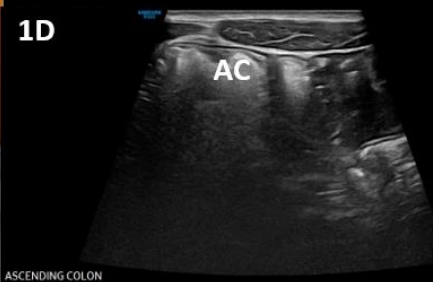
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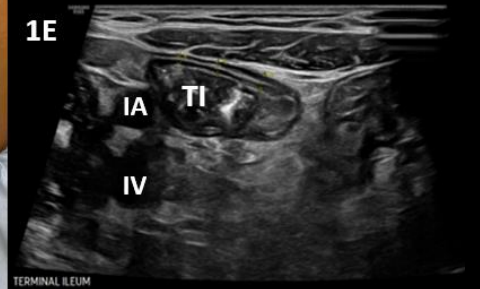
1C



1D



1E



(Kellar A et al., on behalf of IBUS pedcomm, *JPGN*)



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Unique Considerations in VEO-IBD

Adult Rules Do Not Apply



Adult Normal Bowel Wall Thickness:

~ up to 3.0 mm

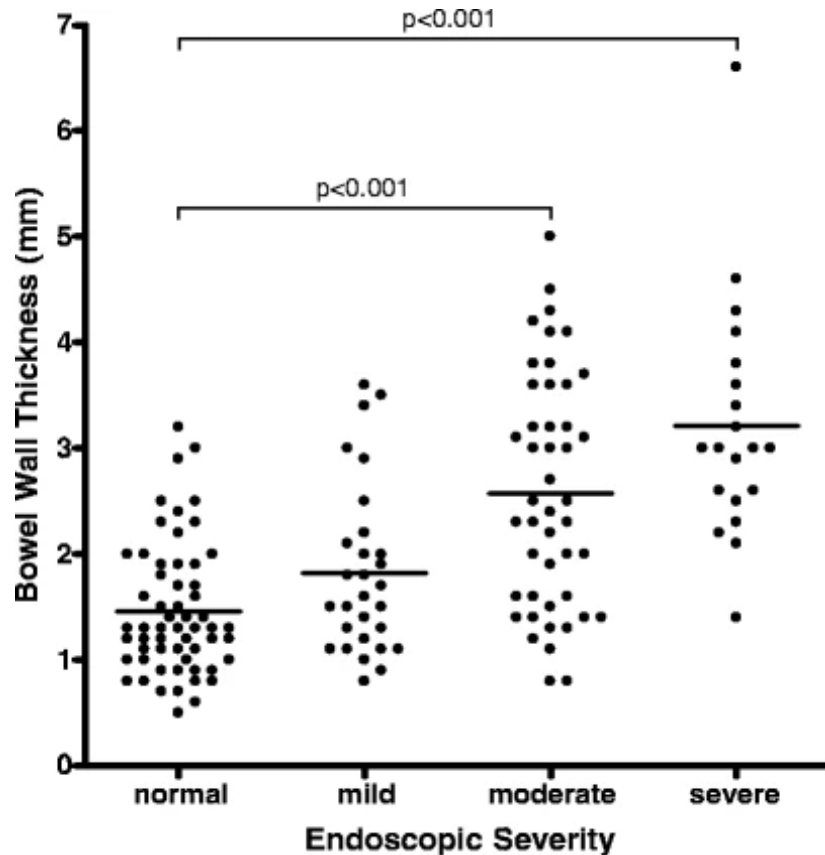


Paediatric-specific normalised values are essential.

< 2.0 mm

Extrapolating adult normal values to children masks early-stage inflammation.

BWT Increases With Worsening Endoscopic Inflammation in Children

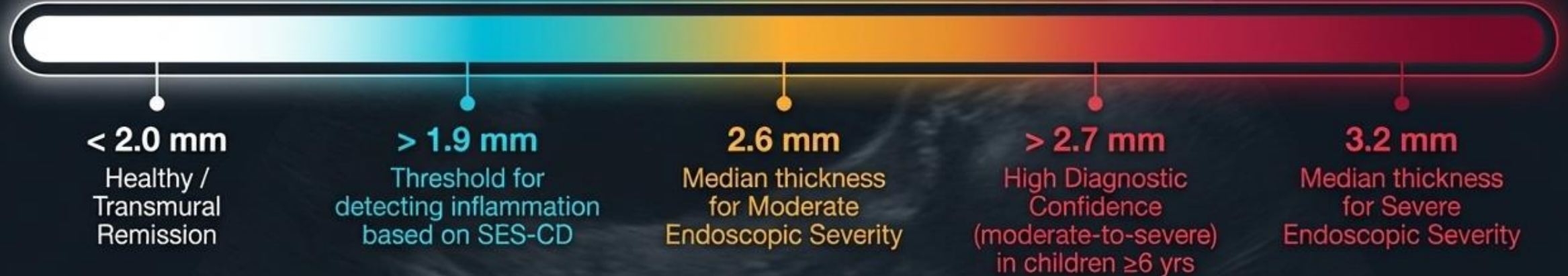


(Bremner AR et al., Pediatr Radiol 2006)

- Prospective cohort
- 33 children with IBD undergoing IUS & endoscopy
- 153 bowel segments analyzed
- BWT was significantly less in normal bowel vs moderate/severe segments

Defining Inflammation: The BWT Cut-Off Spectrum

Diagnostic Confidence Heatmap

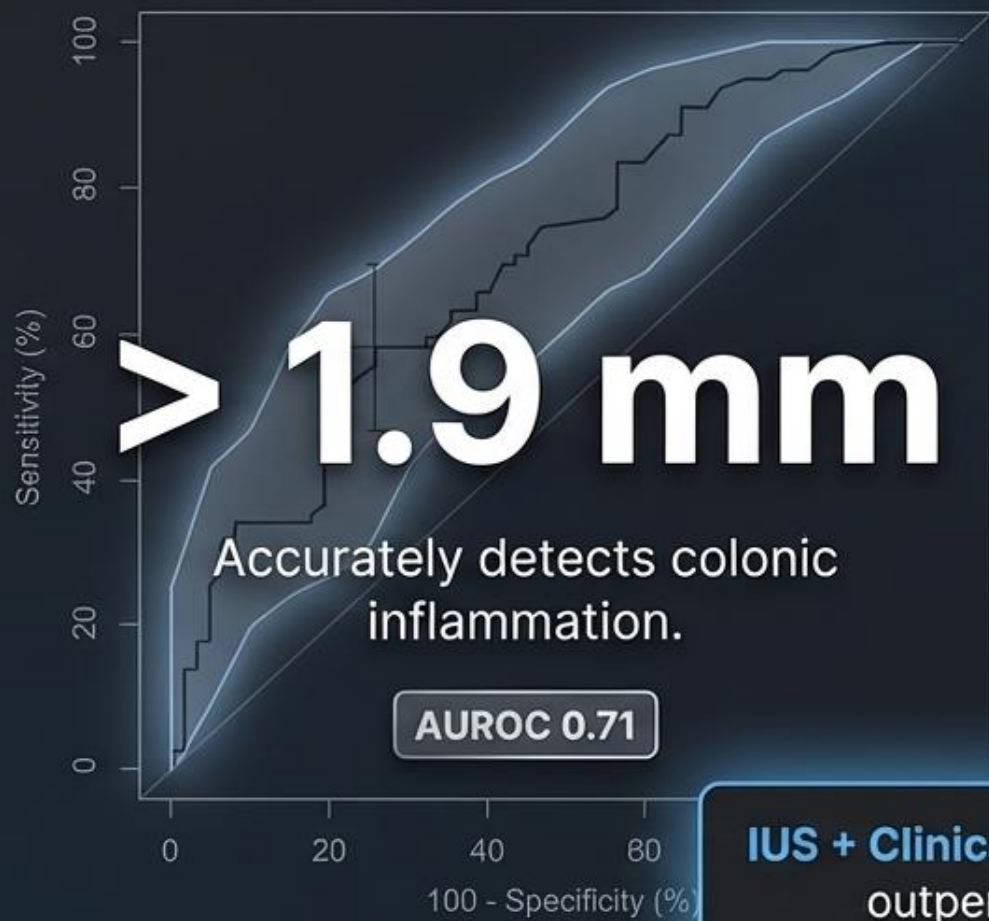


Clinical Caveat

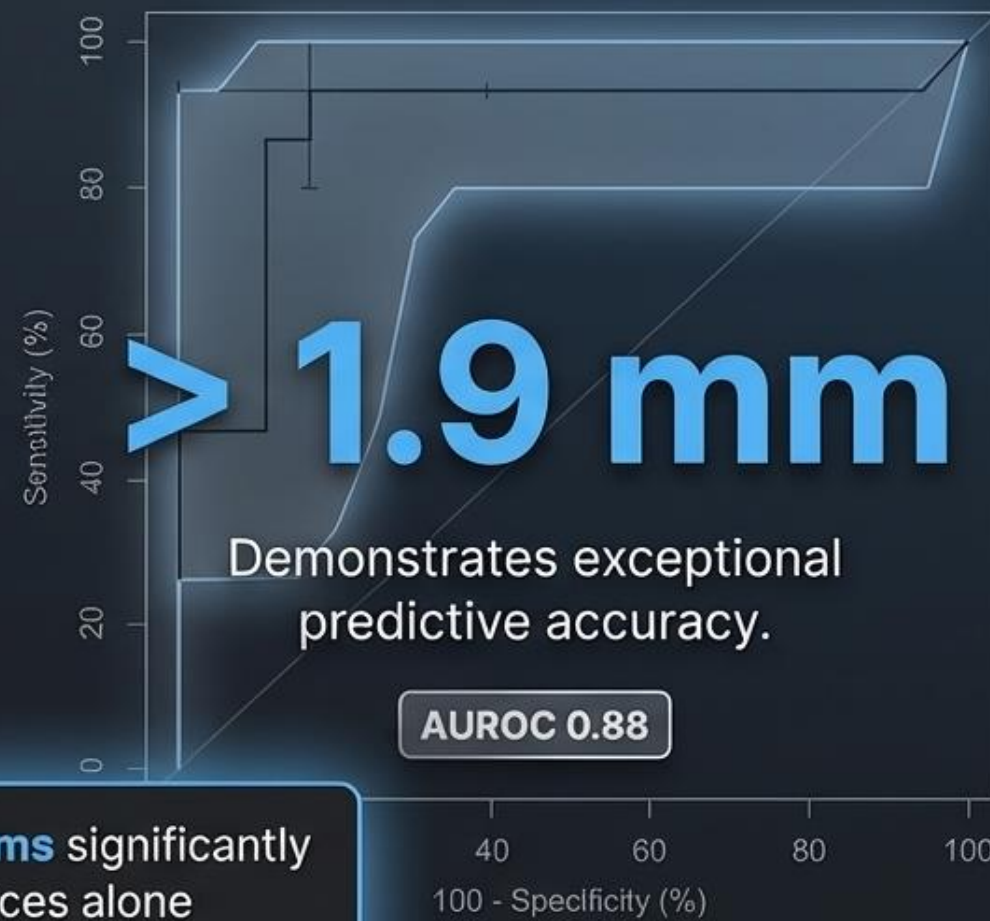
IUS accuracy is highly reliable for moderate/severe cases in older children, but shows limited diagnostic confidence (AUC 0.667) in children under 6 years old.

Pinpointing Inflammation: Clinical Cut-Offs

Colon (UC/CD)



Terminal Ileum (CD)



IUS + Clinical Symptoms significantly outperforms indices alone (Predicting CD Activity: **0.90** vs 0.71).

Accuracy of IUS to Detect Segmental Inflammation Based on SES-CD ≥ 6 in the Colon

- 82 patients
- 323 bowel segments

Segmental IUS Score or Parameter	Cut-Point 	AUROC [95% CI]	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
BWT (mm)	≥ 3.6	0.950 [0.92-0.98]	89	93	62	99
MLS	≥ 1	0.916 [0.86-0.97]	89	88	50	98
SUS-CD	≥ 2	0.941 [0.90-0.98]	92	90	54	99
SUAS-CD	≥ 4.11	0.959 [0.93-0.99]	95	92	59	99
IBUS-SAS	≥ 22.2	0.957 [0.93-0.99]	95	91	58	99
SPAUSS	≥ 3	0.946 [0.90-0.99]	92	91	58	99
BUSS	≥ 3.3	0.955 [0.92-0.99]	95	90	54	99

Accuracy of IUS to Detect Segmental Inflammation Based on SES-CD ≥ 4 in the TI

Segmental IUS Score or Parameter	Cut-Point 	AUROC [95% CI]	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
BWT (mm)	≥ 4.3	0.874 [0.79-0.96]	80	91	80	91
MLS	≥ 1	0.835 [0.74-0.93]	84	73	58	91
SUS-CD	≥ 2	0.885 [0.80-0.96]	88	77	63	94
SUAS-CD	≥ 4.11	0.899 [0.83-0.97]	92	79	66	96
IBUS-SAS	≥ 24.6	0.895 [0.82-0.97]	92	79	66	96
SPAUSS	≥ 3	0.893 [0.82-0.97]	92	79	66	96
BUSS	≥ 3.9	0.888 [0.81-0.97]	88	81	67	94

IUS is Accurate to Detect Inflammation in Children with UC

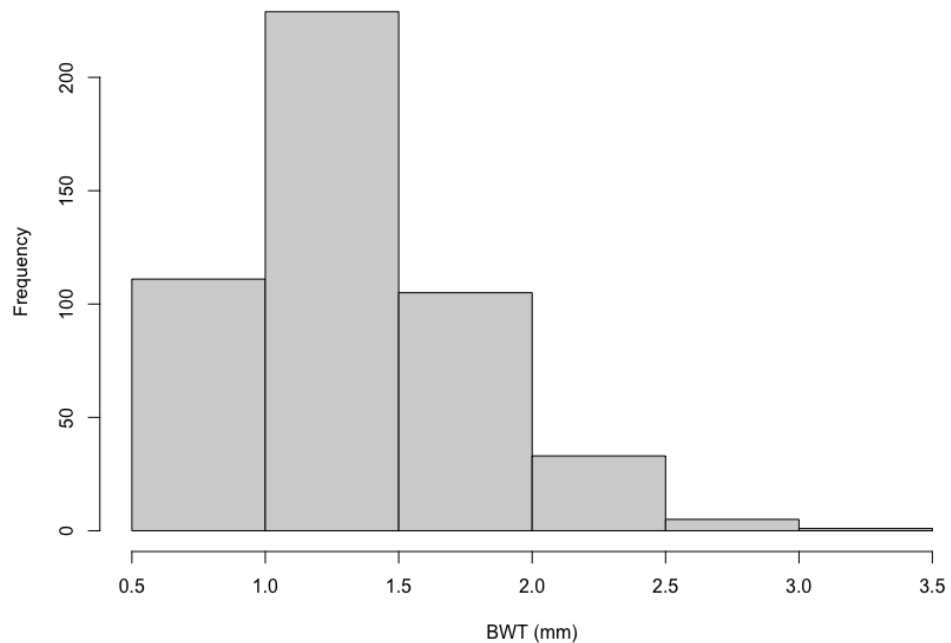
	Mayo Endoscopic Subscore 0	Mayo Endoscopic Subscore 1	Mayo Endoscopic Subscore 2	Mayo Endoscopic Subscore 3
BWT, mm				
Ascending colon	1.46 (1.23-1.65)	3.09(1.67-3.09)	2.18 (1.44-3.59)	3.33 (2.49-4.09)
Transverse colon	1.71 (1.46-2.06)	1.58 (1.09-3.14)	2.82 (2.48-3.73)	3.69 (2.81-4.60)
Descending colon	1.79 (1.43-2.19)	1.54 (1.46-2.36)	2.62 (1.91-3.39)	3.73 (2.73-4.37)
Doppler signal				
Ascending spots	2 (12)	0	3 (38)	4 (50)
Ascending stretches	1 (6)	1 (50)	0	4 (50)
Transverse spots	2 (14)	0	4 (50)	3 (33)
Transverse stretches	1 (7)	1 (25)	0	4 (44)
Descending spots	2 (18)	0	3 (38)	4 (33)
Descending stretches	0	1 (25)	0	5 (42)
Abnormal haustrations				
Ascending colon	0	0	0	1 (13)
Transverse colon	0	0	2 (25)	4 (44)
Descending colon	0	0	2 (25)	7 (58)
Abnormal wall layer stratification				
Ascending colon	1 (6)	0	0	1 (13)
Transverse colon	1 (7)	0	1 (13)	2 (22)
Descending colon	1 (9)	0	0	2 (17)
Fat wrapping				
Ascending colon	1 (6)	1 (50)	1 (13)	3 (38)
Transverse colon	1 (7)	1 (25)	2 (25)	2 (22)
Descending colon	0	1 (25)	1 (13)	6 (50)

- 35 patients
- Cut off >1 for UC-IUS and Civitelli to detect Mayo ≥ 2
- UC-IUS > Civitelli

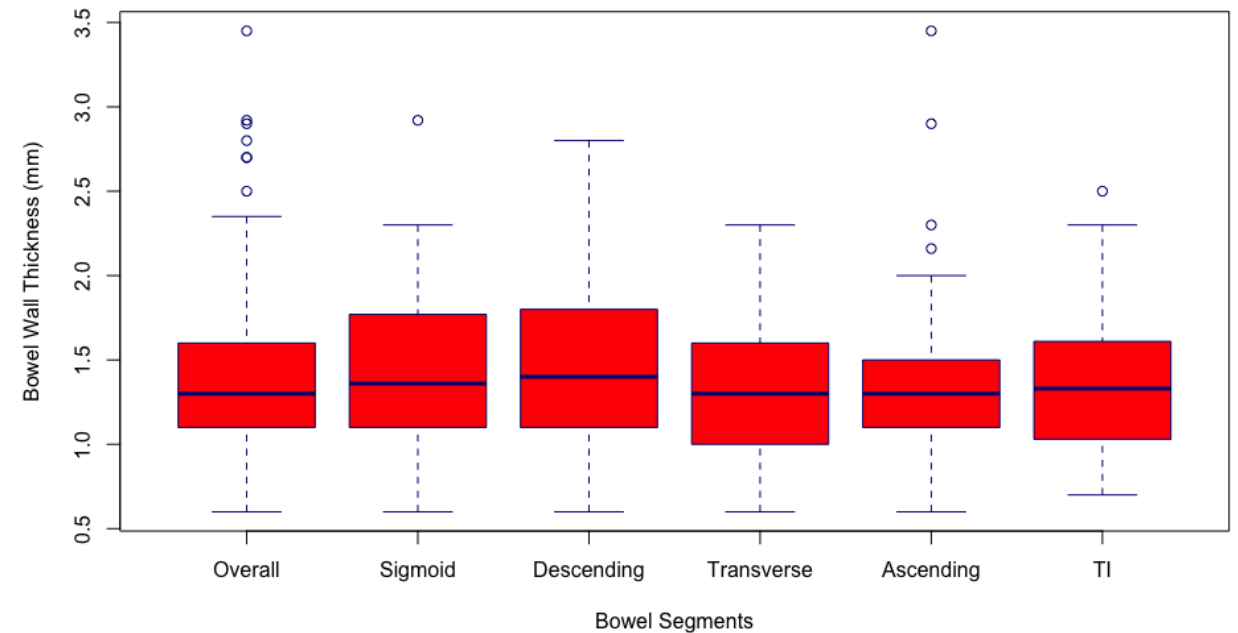
Median BWT 1.4mm in Children with IBD with Transmural Remission

Analysis of 98 children & 484 bowel segments on IUS with IBD in sustained deep remission with mucosal healing

Histogram of BWT (mm)

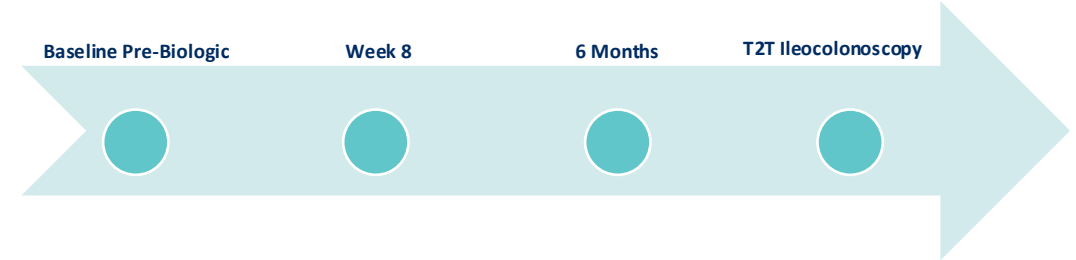


BWT measurements by bowel segments



20% ↓ in BWT at W8 Predicts T2T Endoscopic Remission in Children with Ileal CD

- 44 children
- Ileal CD and biologic therapy



Week 8 Variable	Cut-Point	AUROC [95% CI]	Sens. (%)	Spec. (%)	PPV (%)	NPV (%)
% Decrease in BWT (mm)	≥ 18.2	0.995 [0.98-1.00]	100	93	97	100
Absolute Decrease in BWT (mm)	≥ 1	0.993 [0.98-1.00]	100	93	97	100
Absolute BWT (mm)	≤ 5.2	0.957 [0.90-1.00]	100	80	91	100
% Decrease in PCDAI	≥ 45.5	0.667 [0.49-0.84]	72	64	81	53
Absolute Decrease in PCDAI	≥ 20	0.574 [0.40-0.75]	48	80	82	44
Absolute PCDAI	≤ 15	0.759 [0.58-.094]	83	67	83	67
% Decrease in CRP	≥ 83.5	0.486 [0.31-0.67]	45	67	72	39
Absolute Decrease in CRP (mg/L)	≥ 8.6	0.409 [0.22-0.60]	100	13	69	100
Absolute CRP (mg/L)	≤ 13.8	0.676 [0.56-0.86]	100	33	74	100

(Dolinger M et al., *J Crohn's Colitis*, 2023)

IUS Parameters Predicting Endoscopic Outcomes are Different in Children with UC vs. CD

Week 8 Measure	Cut-Point	AUROC [95% CI]	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
% Decrease in BWT	≥ 43	0.72 [0.56-0.88]	76	67	70	74
Absolute Decrease in BWT (mm)	≥ 1.1	0.59 [0.41-0.78]	95	38	61	88
Absolute BWT (mm)	≤ 2.6	0.77 [0.63-0.92]	67	71	70	68
% Decrease in IBUS-SAS	≥ 64	0.74 [0.59-0.90]	62	81	77	68
Absolute Decrease in IBUS-SAS	≥ 11.4	0.65 [0.48-0.83]	100	38	62	100
Absolute IBUS-SAS	≤ 33.3	0.73 [0.58-0.88]	81	48	61	72
% Decrease in Civitelli index	≥ 25	0.71 [0.56-0.86]	90	48	63	83
Absolute Decrease in Civitelli index	≥ 1.0	0.72 [0.57-0.87]	90	48	63	83
Absolute Civitelli index	≤ 1.0	0.67 [0.51-0.84]	81	52	63	73

Week 8 Measure	Cut-Point	AUROC [95% CI]	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
% Decrease in PUCAI	≥ 52	0.64 [0.46-0.81]	76	57	64	70
Absolute Decrease in PUCAI	≥ 27.5	0.66 [0.49-0.82]	62	53	57	58
Absolute PUCAI	≤ 25.0	0.63 [0.46-0.81]	76	57	64	70
% Decrease in CRP	≥ 49	0.69 [0.53-0.86]	71	76	75	72
Absolute Decrease in CRP (mg/L)	≥ 3.9	0.69 [0.52-0.86]	38	90	79	59
Absolute CRP (mg/L)	≤ 3.6	0.58 [0.40-0.76]	86	38	58	73
% Decrease in Calpro	≥ 78	0.64 [0.47-0.82]	57	81	75	65
Absolute Decrease in Calpro (ug/g of faeces)	≥ 347	0.62 [0.45-0.80]	81	52	63	73
Absolute Calpro (ug/g of faeces)	≤ 171	0.63 [0.36-0.81]	43	90	81	61

(Dolinger M, et al. oral presentation at DDW 2024)

Integrating IUS into care improves prediction of disease activity

 Cross-sectional study | N=92 Paediatric Patients (<18 yrs) | 136 IUS Exams | Goal: Evaluate IUS + clinical indices vs. clinical indices alone.

Predicting Biochemical Disease Activity

Crohn's Disease (CD)

0.71 (Indices Alone)

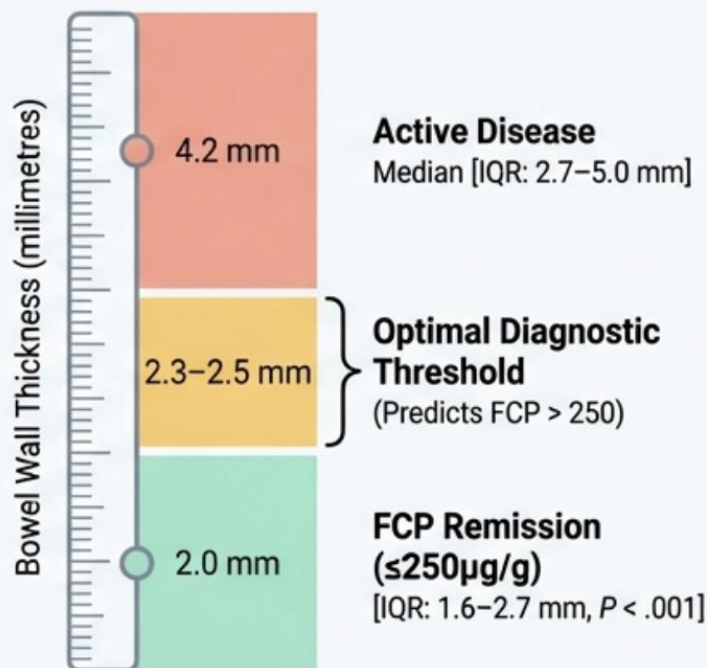
0.90 (Indices + IUS) [$P = .004$]

Ulcerative Colitis (UC)

0.83 (Indices Alone)

0.92 (Indices + IUS) [$P = .067$]

BWT as a Biomarker for Inflammation



Clinical Implications

Accelerated Decisions

IUS + clinical symptoms was superior to shPCDAI alone in predicting CD activity, and potentially superior to PUCAI for UC.

Treat-to-Target

Incorporating IUS into routine visits enables immediate, point-of-care validation of disease activity without waiting for delayed lab results.

BWT cut-offs for children

- 144 IUS examinations in 133 children b/t 2019-2024 within 30 days before to 7 days after colonoscopy
- ROC to predict inflammation

Excellent for moderate-to-severe inflammation in older children; limited accuracy for children under 6 or mild cases

Diagnostic Confidence Heatmap

High Confidence

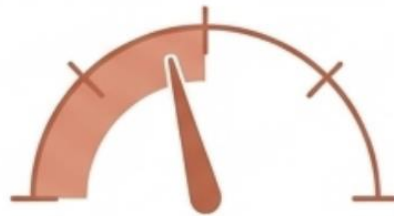


Patient Profile: ≥ 6 Years Old with Moderate/Severe Inflammation

Data: Excellent Accuracy (**AUC 0.907**)

Clinical Note: Using the 0.27 cm cutoff detects 85% of moderate/severe inflammation.

Low Confidence (Mild Disease)

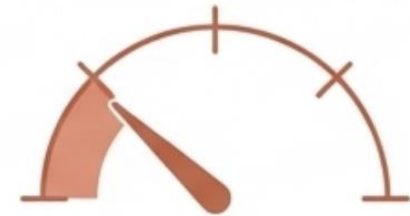


Patient Profile: ≥ 6 Years Old with Mild Inflammation

Data: Poor Accuracy (**AUC 0.690**)

Clinical Note: Using the 0.27 cm cutoff detects only 43% of mild inflammation.

Low Confidence (Age Limitation)



Patient Profile: All Children < 6 Years Old

Data: Limited Accuracy (**AUC 0.667**)

Clinical Note: IUS shows limited overall utility in this specific age demographic.

Take Home Points for IUS in Pediatrics

Linear transducer is your friend



Anatomy can be different – same anatomy in less space!



BWT cut-off for ANY inflammation in pre-pubertal children likely 2mm



BWT cut-off for moderate-to-severe inflammation likely similar to adult ($>3.5\text{mm}$)



If BWT $<1.5\text{mm}$, high degree of certainty that it's normal!



Early changes in BWT after treatment are highly predictive of endoscopic outcome



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IUS in Pregnancy

IUS is the Ideal Monitoring Tool During Pregnancy Except for Ileal and Post-Op CD Beginning Late 2nd Trimester

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%)

Case Presentation: High-Risk Gestation



Patient Profile

Age: 36-year-old female

Gestation: 14 weeks Gestational Age (GA) via IVF

History: Ulcerative Pancolitis (diagnosed at age 14)

Current Status

Presentation: Experiencing active flare symptoms for the past 1 month.

Current Regimen: Mesalamine, Prednisone 35 mg, and Vedolizumab (VDZ) q8w.



14 weeks

Minimum BWT 3.1-max 6.9mm with submucosal
prominence and hyperemia

Gestational Week 14: Acute Presentation

Biochemical Reality



Faecal Calprotectin: 3940 $\mu\text{g/g}$
CRP: 3.2 g/dL

IUS Findings



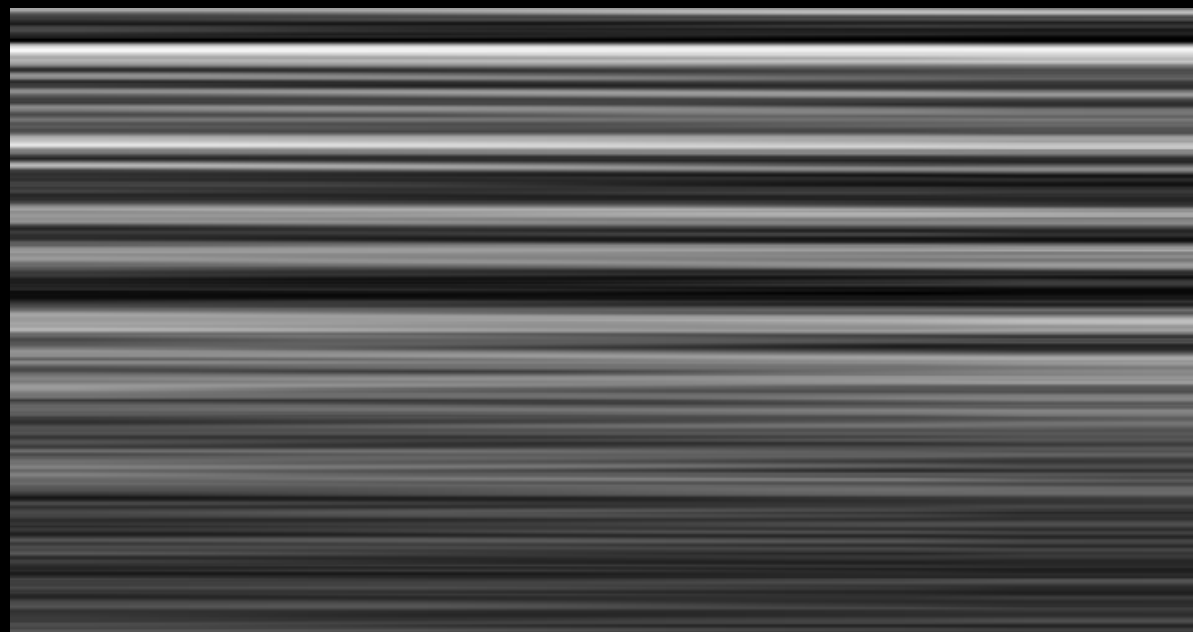
Sigmoid colon BWT measured at an alarming 6.9 mm.

Clinical Action

Immediate hospital admission. Initiation of IV Methylprednisolone and Infliximab (IFX) 5 mg/kg.



19 weeks



Weeks 19 to 23: The Taper and the Flare

The False Dawn

- Clinical response achieved.
- CRP drops to 0.1 mg/dL.
- IFX levels $> 34 \mu\text{g/mL}$.



Week
19

The Relapse

- Flare occurs during Prednisone taper.
- IFX levels drop to $18.2 \mu\text{g/mL}$.



Week
23

Crucially, IUS immediately detects the morphological relapse, showing increased BWT again before waiting for delayed lab confirmations.



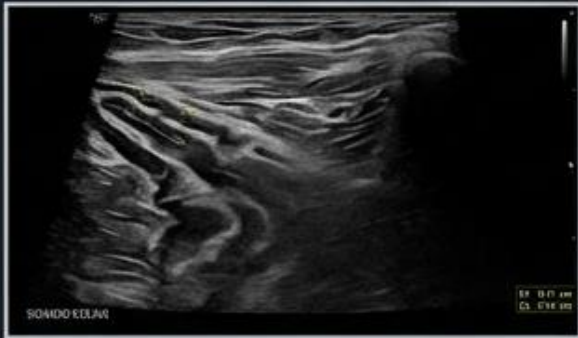
23 weeks



BWT 3-4mm with submucosal prominence and mild
hyperemia

Weeks 27 to 32: IUS-Guided Escalation

Immediate Action



Based on immediate IUS feedback, treatment is escalated to Infliximab 10 mg/kg every 4 weeks.

Week
27

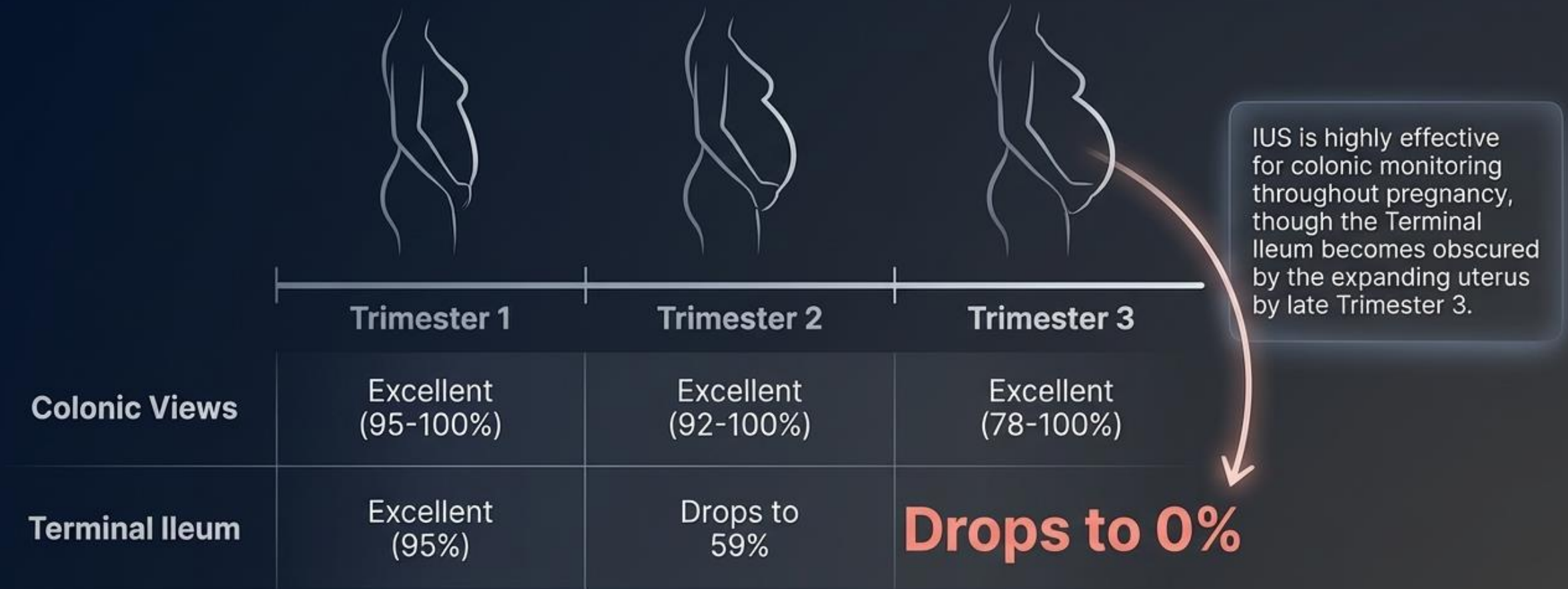
Remission Secured



Week
32

Outcome: The aggressive, point-of-care Treat-to-Target strategy succeeds. IUS confirms Transmural Remission, securing a safe clinical environment for the third trimester.

Pregnancy: The Ideal Monitoring Window (With One Caveat)





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Q&A