



international bowel
ULTRASOUND GROUP

Intestinal Ultrasound in Ulcerative Colitis

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Module 1

Seattle, WA, USA

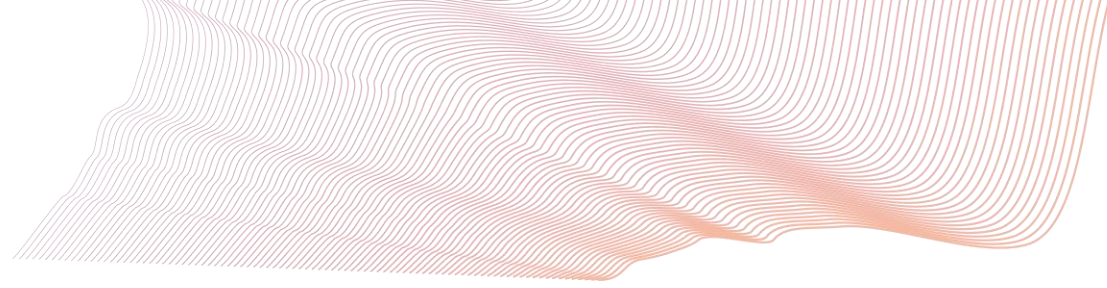
October 16, 2026



Stanford
MEDICINE

Children's Health

Center for IBD
and Celiac Disease

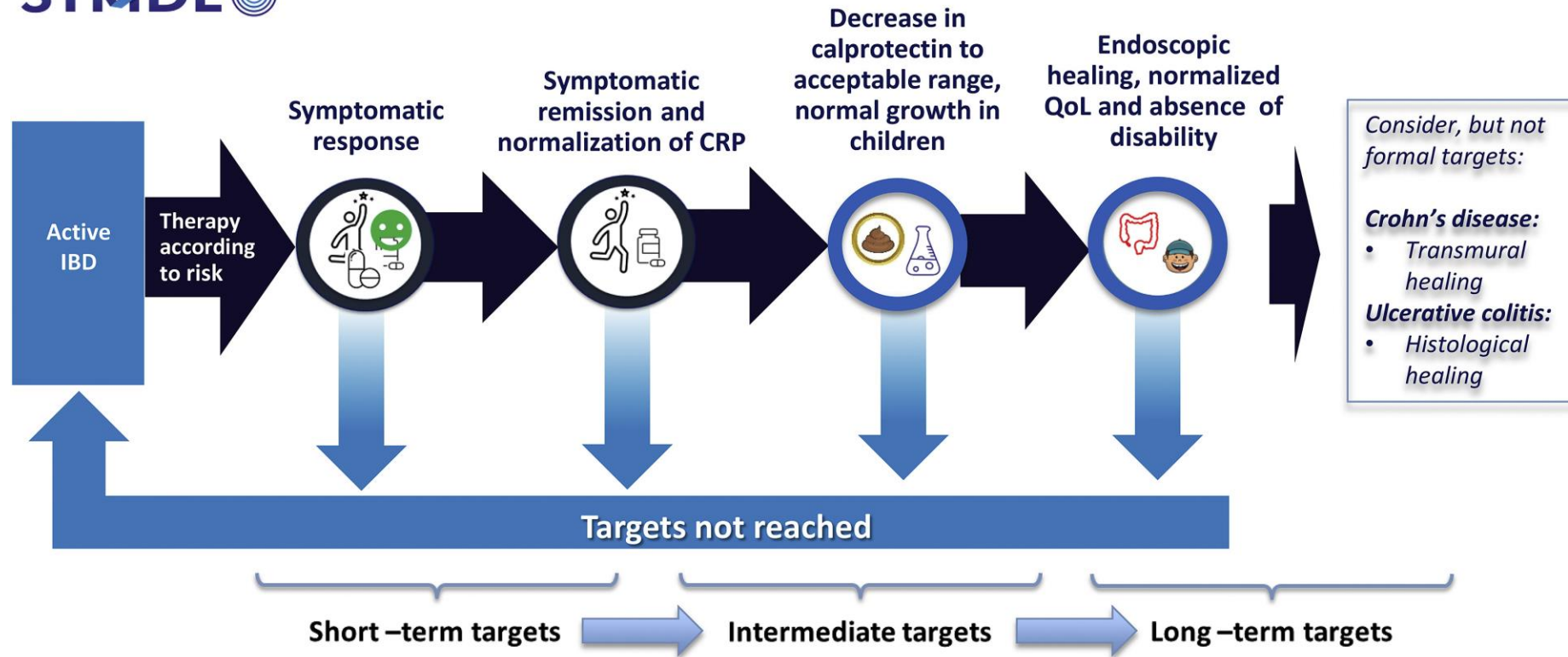


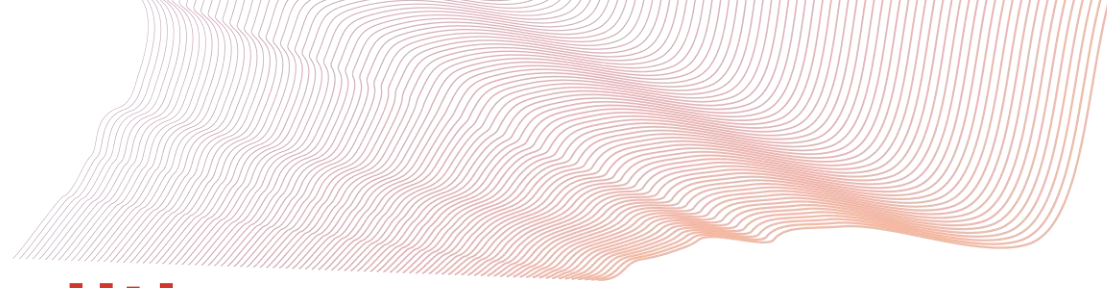
Thank you to all contributors who helped create this presentation:

Dr. Federica Furfaro
Dr. Frauke Petersen
Dr. Kayal Vizhi

Intended learning outcomes (ILOs)

1. Correctly measure bowel wall thickness (BWT) .
2. Evaluate performance of IUS for UC against established reference standards.
3. Define different IUS response and remission definitions used in UC assessment and explain how they can be used to predict and monitor disease activity over time.





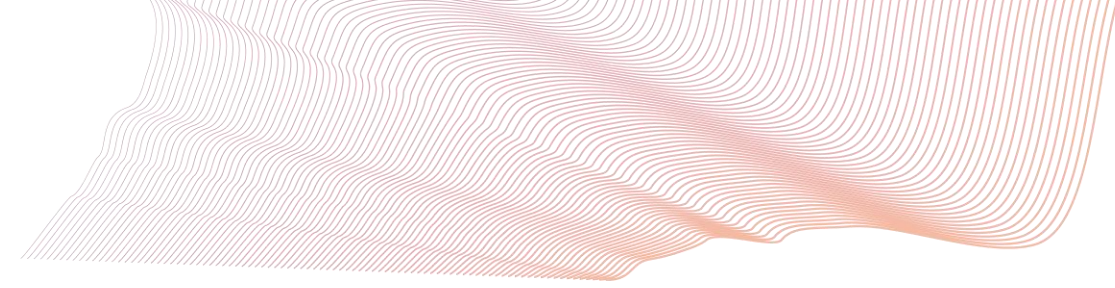
IUS Parameters – Ulcerative colitis

Mural findings

- **Bowel wall thickness**
- **Bowel wall stratification**
- **Colour doppler activity**
- Small intestinal motility
- **Large intestine – loss of haustrae**

Extra-mural findings

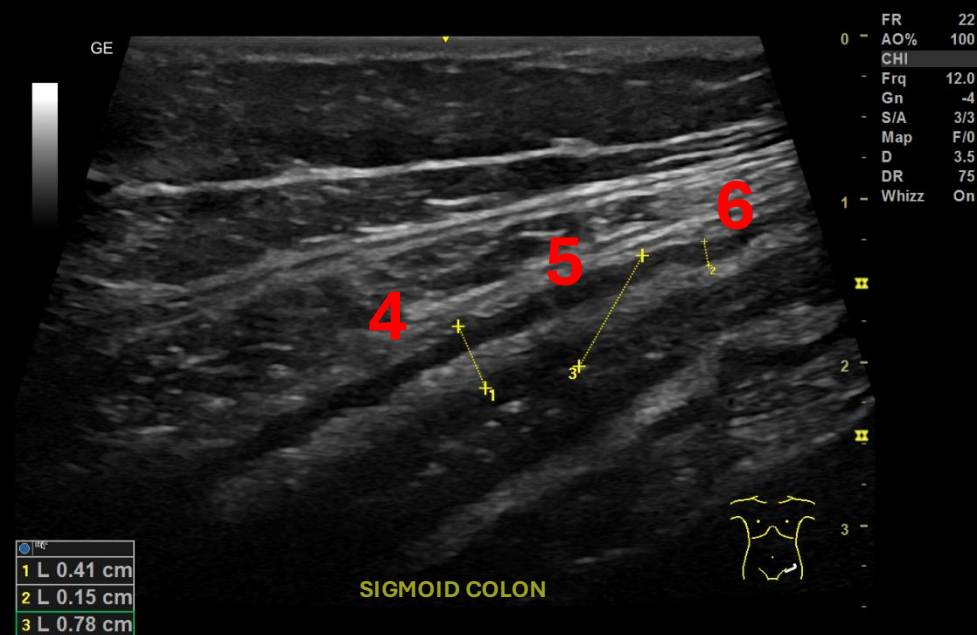
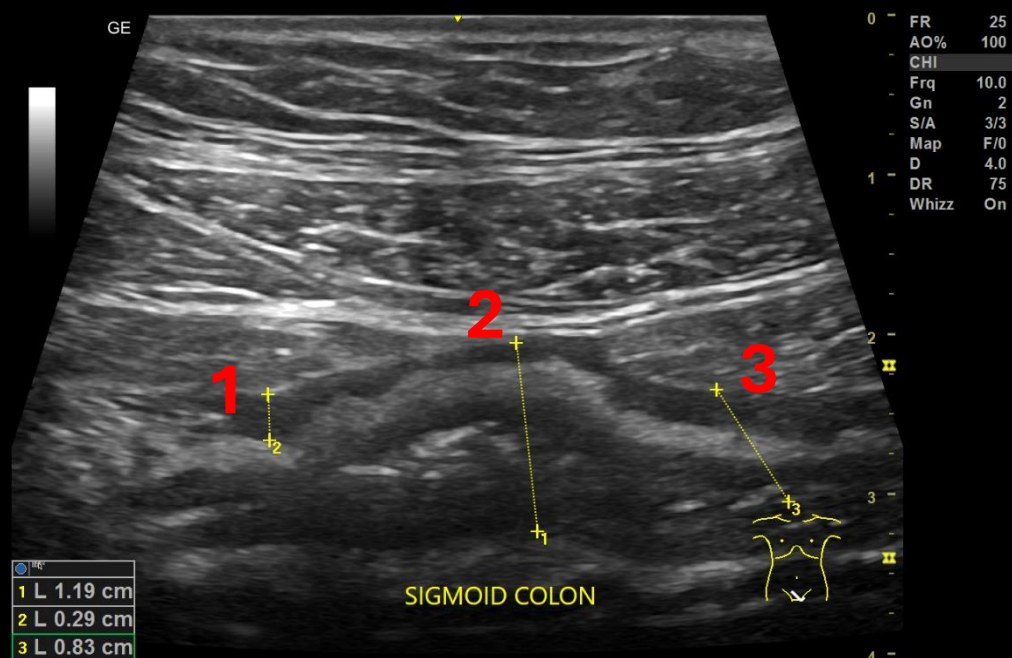
- **Proliferation of Inflammatory Mesenteric Fat**
- Lymph Nodes
- Free Fluid



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

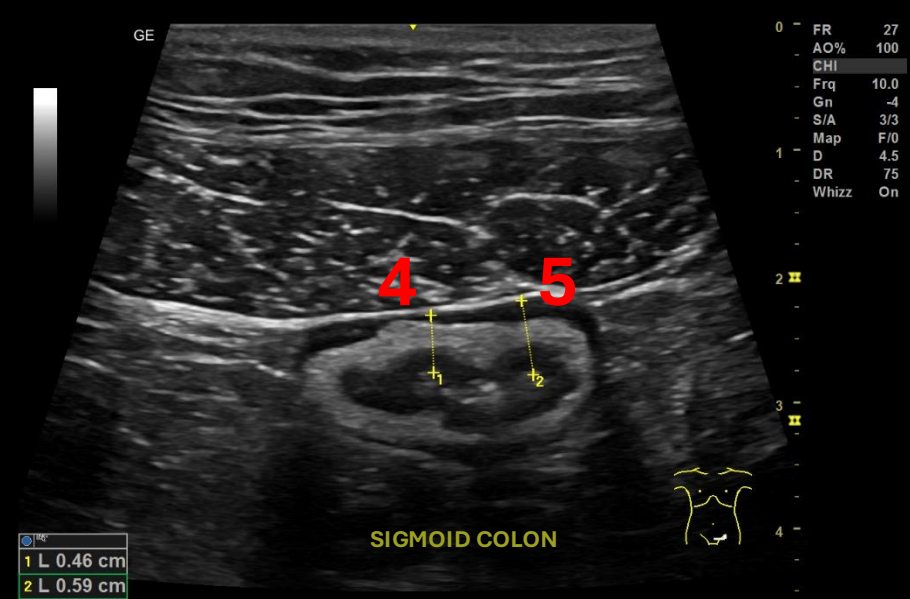
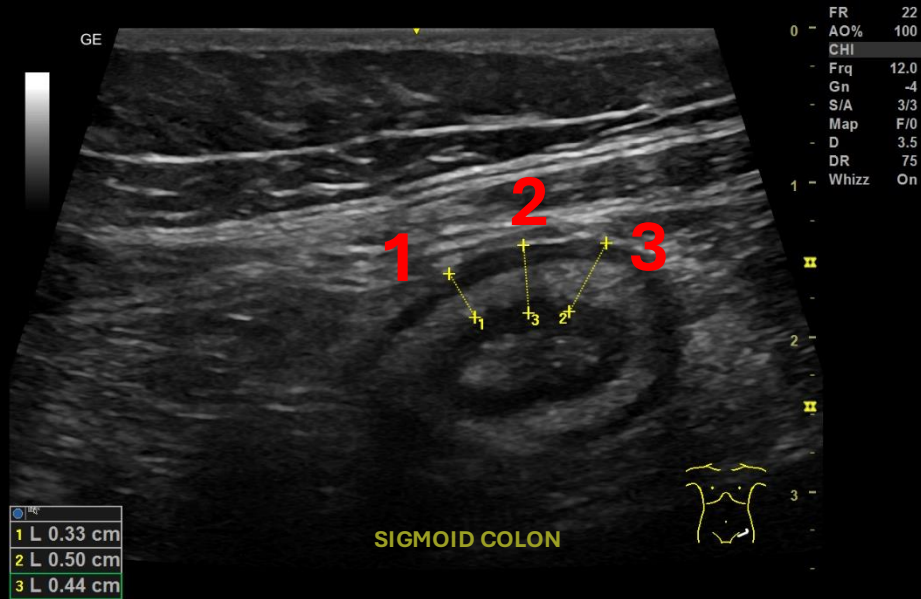


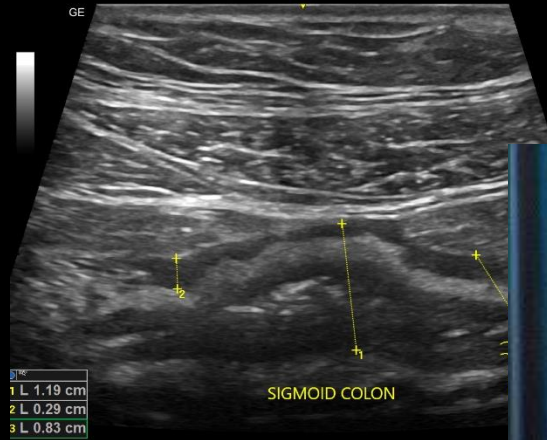
Are the measurements correct?



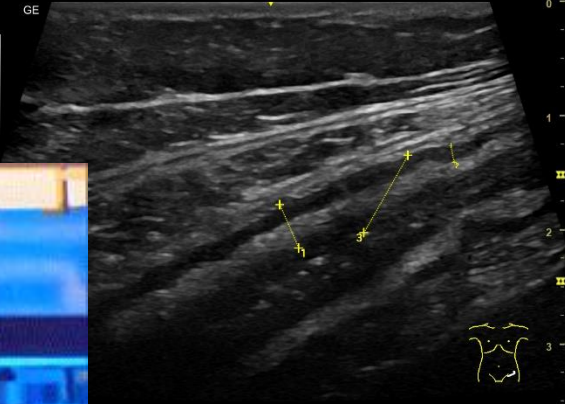


Which pair of measurements correct?

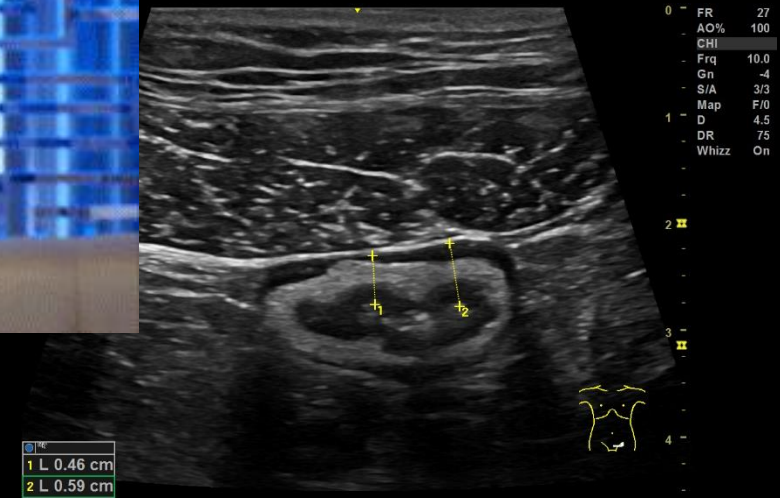
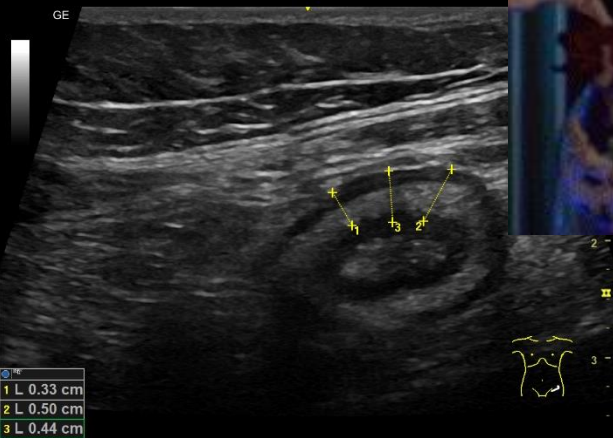




0 - FR 25
- AO% 100
- CHI
- Frq 10.0
- Gn 2
- S/A 3/3
- Map F/0
- D 4.0
1 - DR 75
- Whizz On



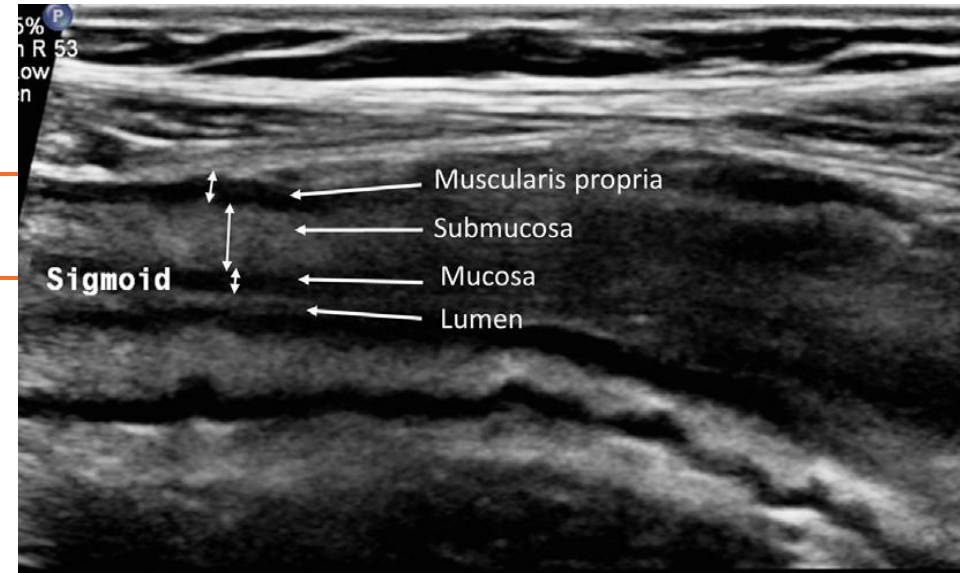
0 - FR 22
- AO% 100
- CHI
- Frq 12.0
- Gn -4
- S/A 3/3
- Map F/0
- D 3.5
- DR 75
1 - Whizz On



0 - FR 27
- AO% 100
- CHI
- Frq 10.0
- Gn -4
- S/A 3/3
- Map F/0
1 - D 4.5
- DR 75
- Whizz On

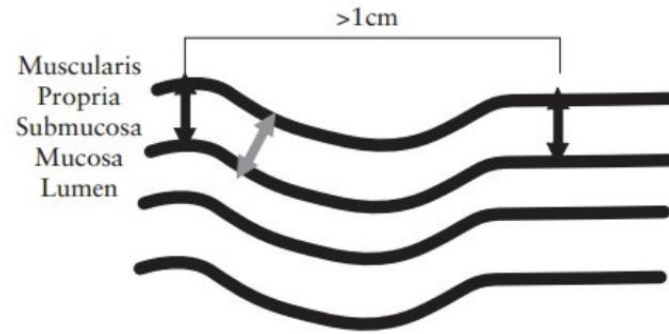
Measuring Bowel Wall Thickness

- From the lumen-mucosa interface up to the muscularis propria-serosa interface
- Top of the haustra
- Measurement of BWT was defined as **the mean of four measurements** [to the nearest 0.1 mm] **at the thickest part of the segment**



Measuring Bowel Wall Thickness

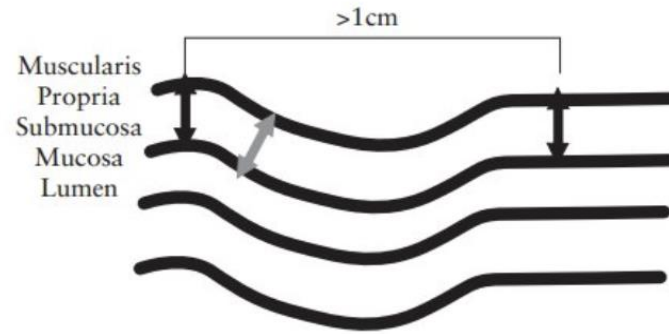
- **Longitudinal Plane**
 - Two measurements
 - 1 cm apart



Measuring Bowel Wall Thickness

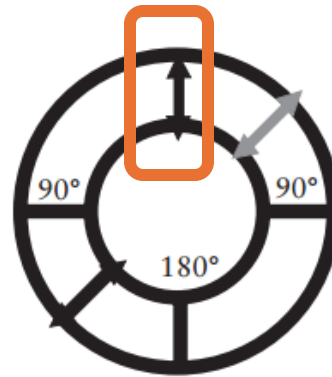
➤ Longitudinal Plane

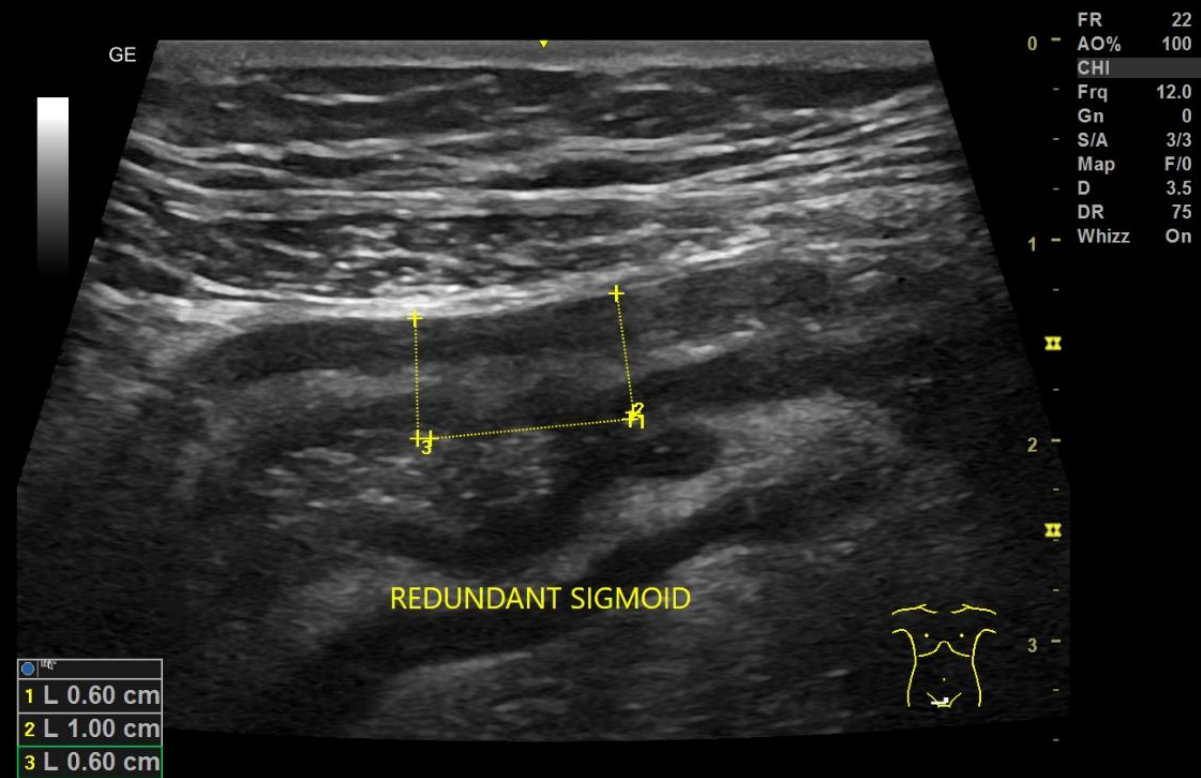
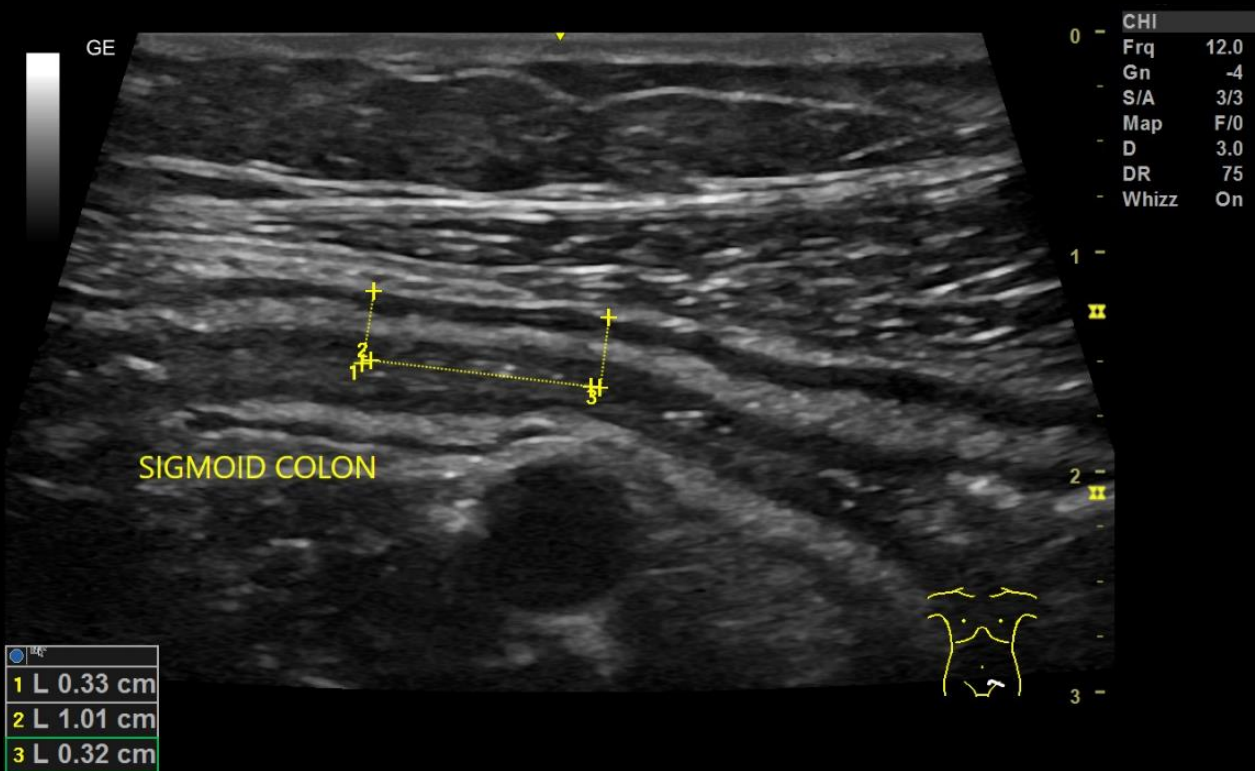
- Two measurements
- 1 cm apart

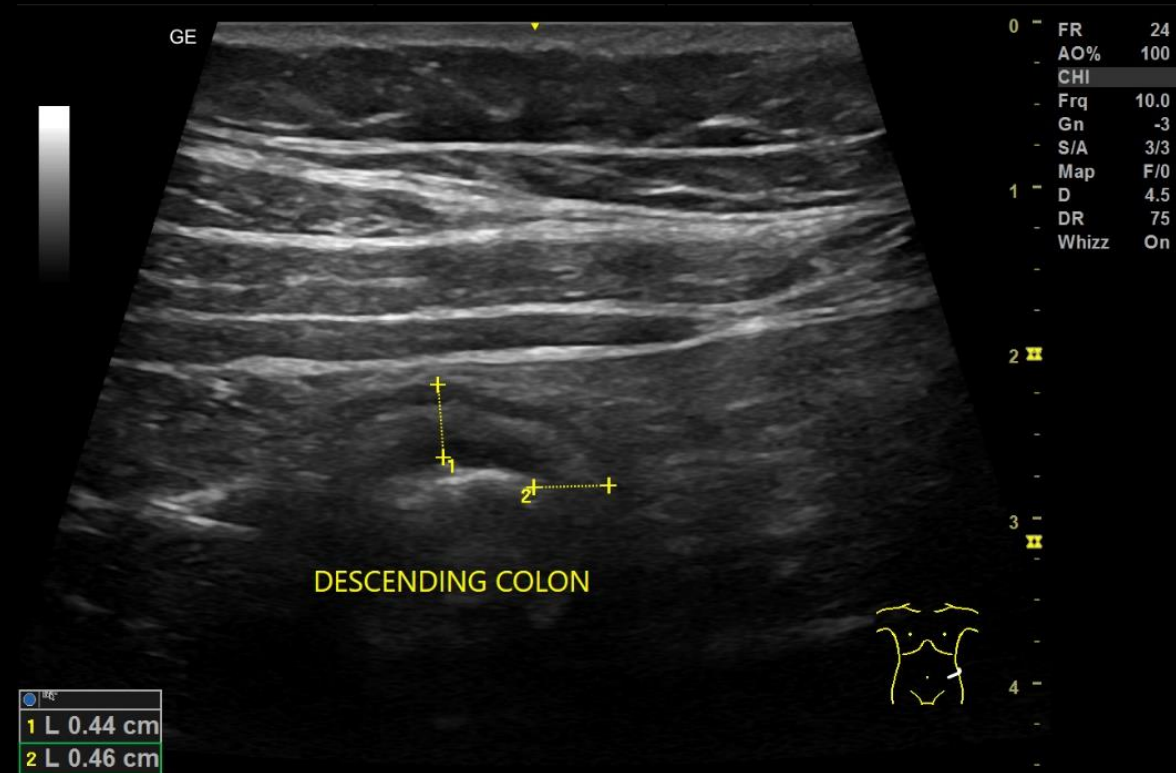
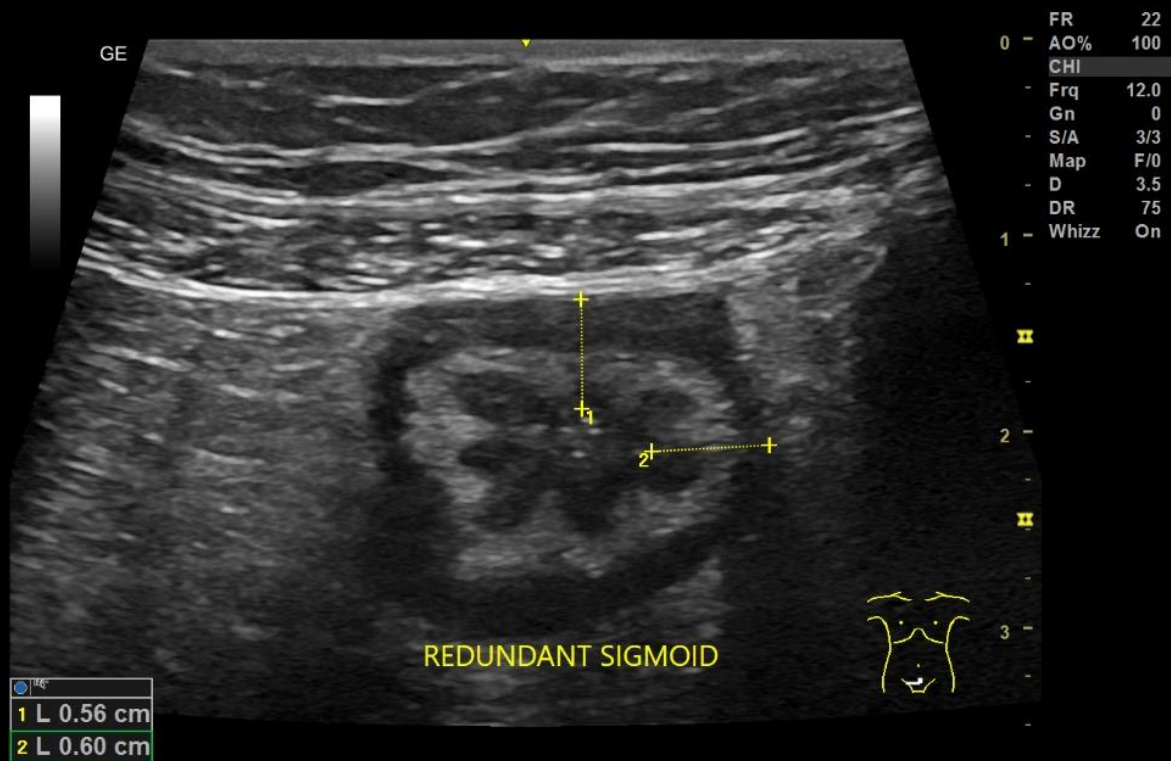


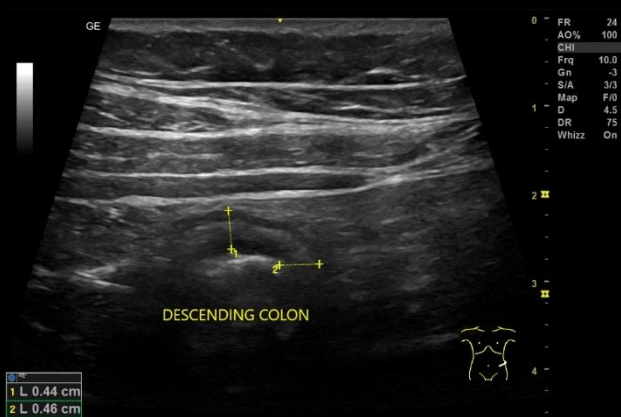
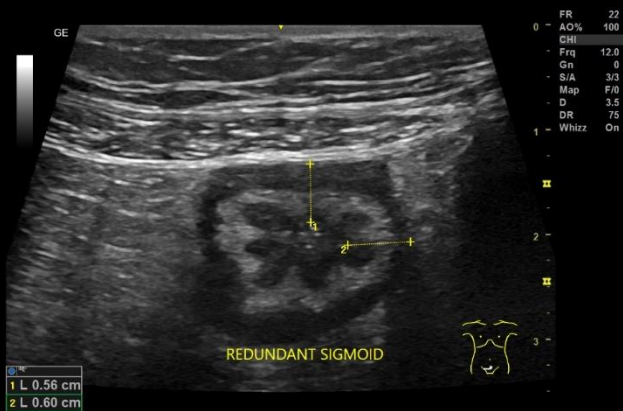
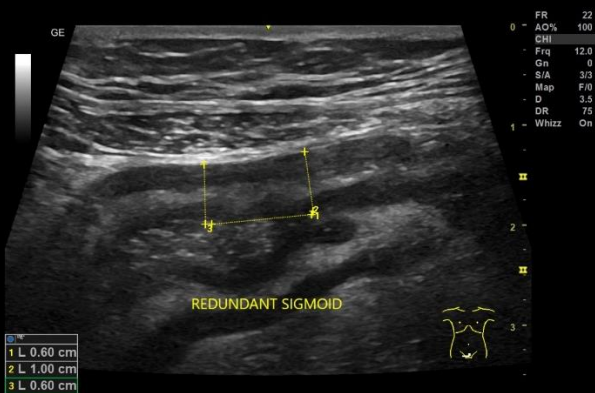
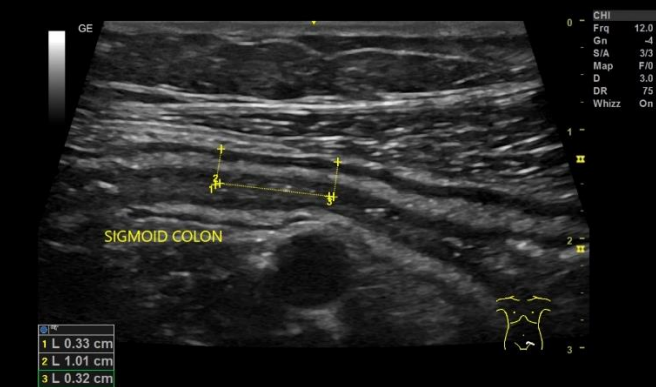
➤ Cross-sectional Plane

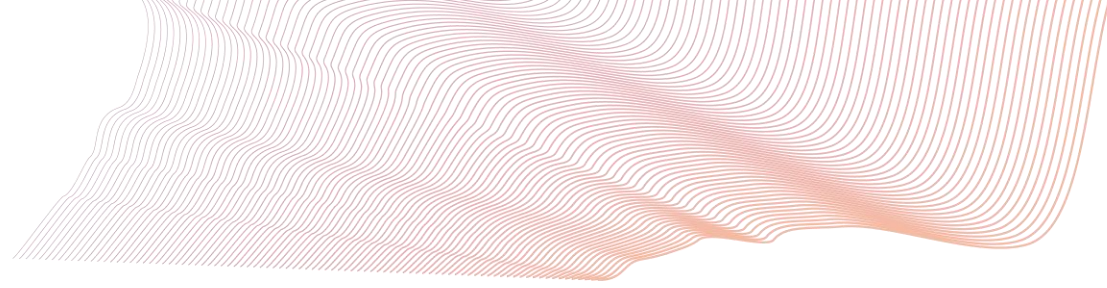
- Two measurements
- **Minimum of 90° apart**









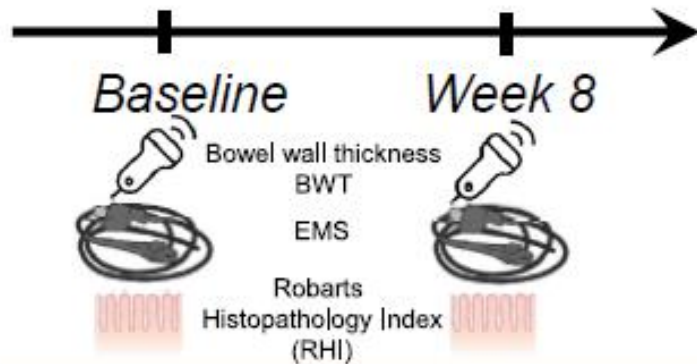


How does IUS perform in UC?

Intestinal ultrasound is accurate to determine endoscopic response and remission in patients with moderate to severe ulcerative colitis

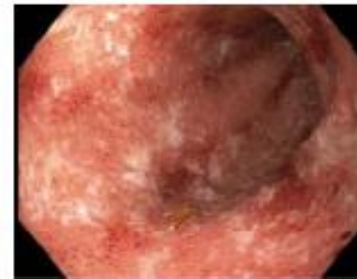
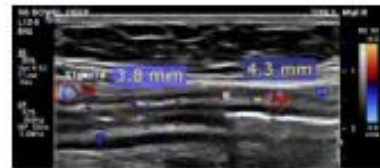
Cohort and design

 $n=30$ starting tofacitinib
 endoscopic Mayo score (EMS) ≥ 2



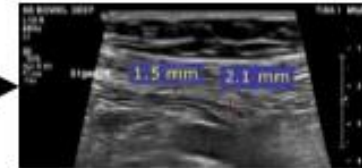
Results

Baseline



 = 26
score

Week 8

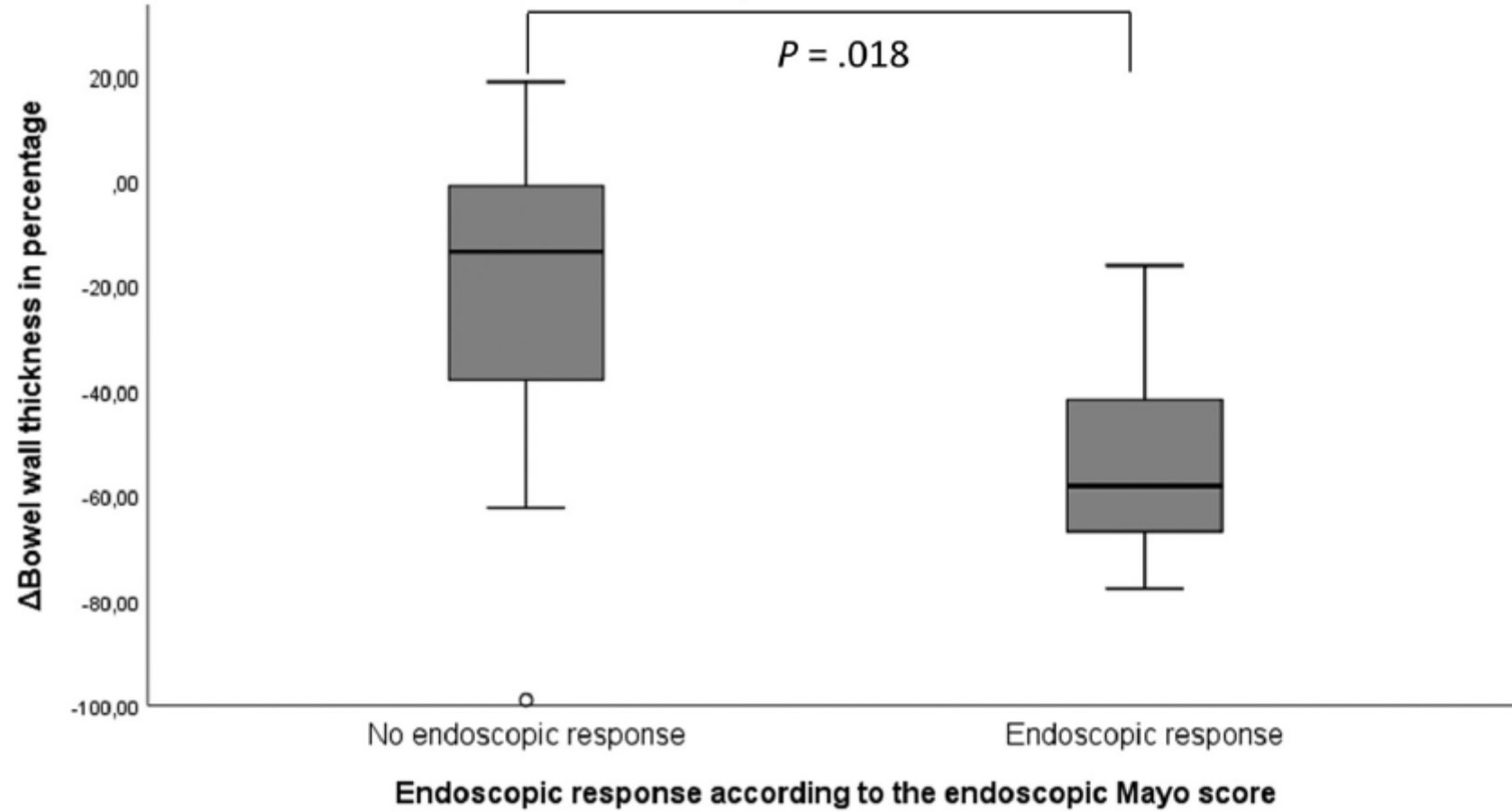


 = 1
score

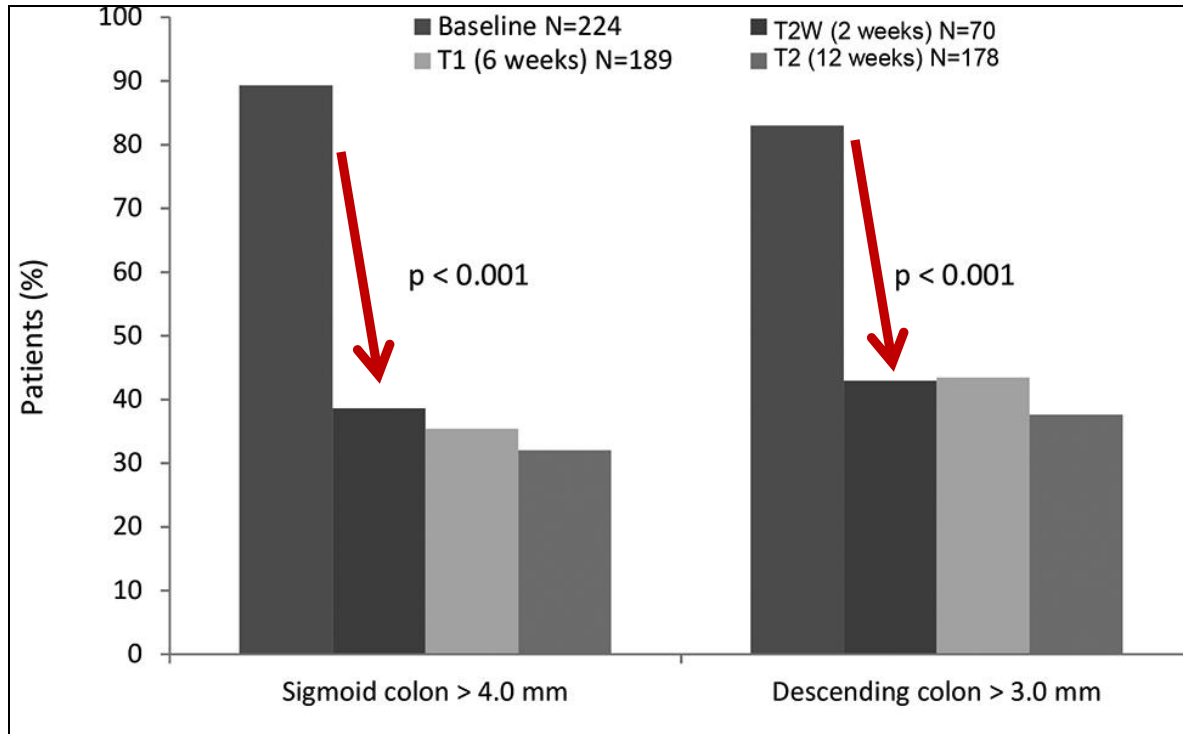
Remission EMS=0	} BWT 2.8 mm
Improvement EMS ≤ 1	
	} 3.9 mm
Response EMS ≥ 1 decrease	} 32% decrease
$p=0.49$: RHI vs BWT Gastroenterology	



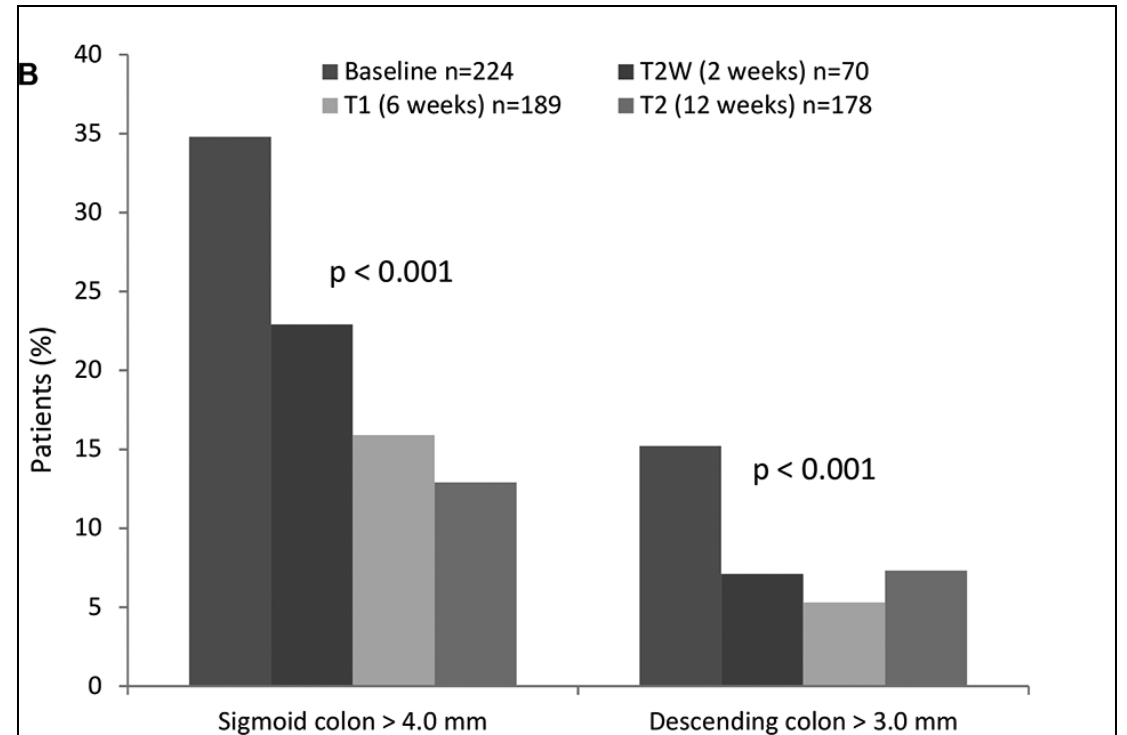
A Boxplot for Δ percentage bowel wall thickness in the sigmoid colon for patients with and without endoscopic response



TRUST & UC Study



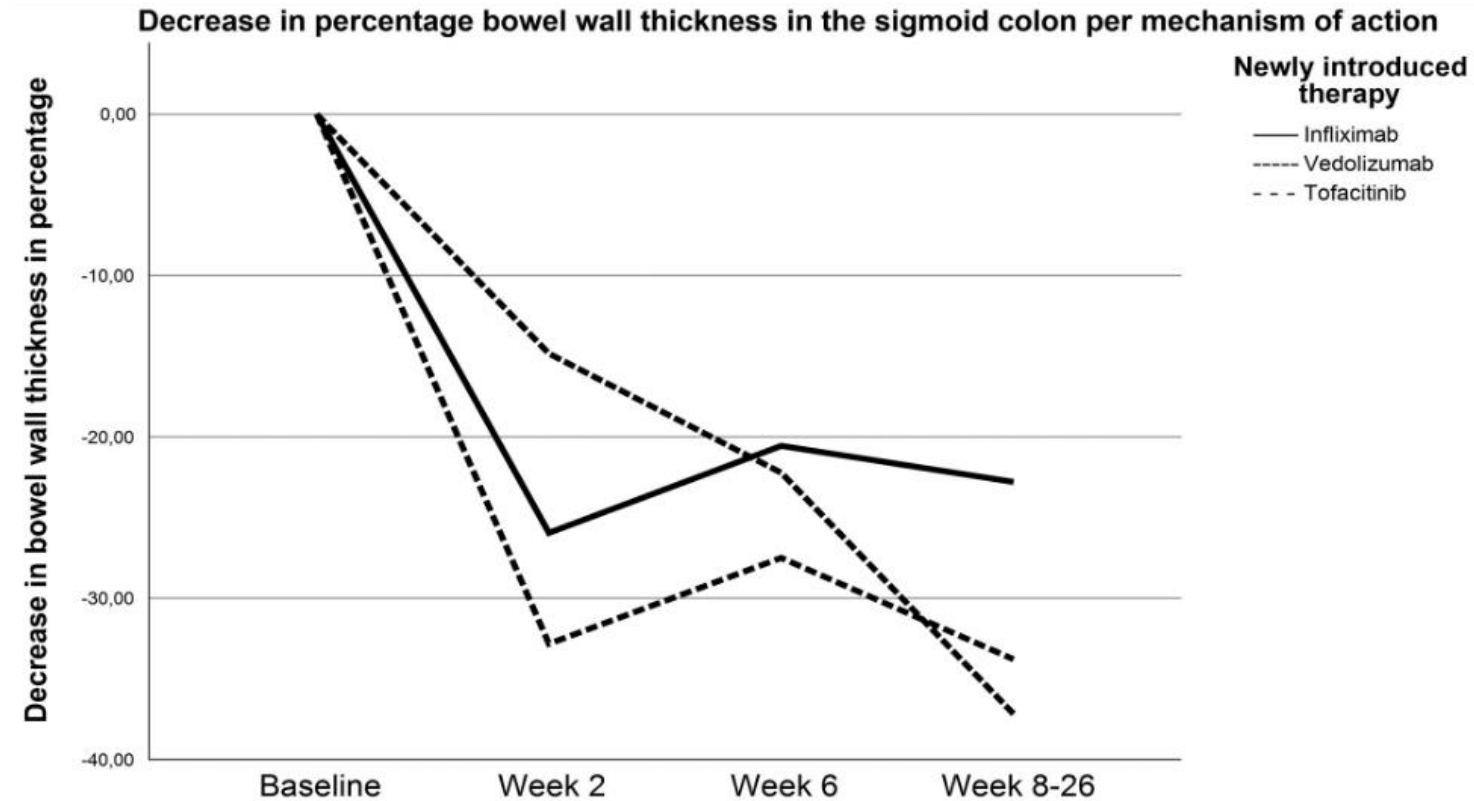
Percentage of patients
with BWT > 4mm



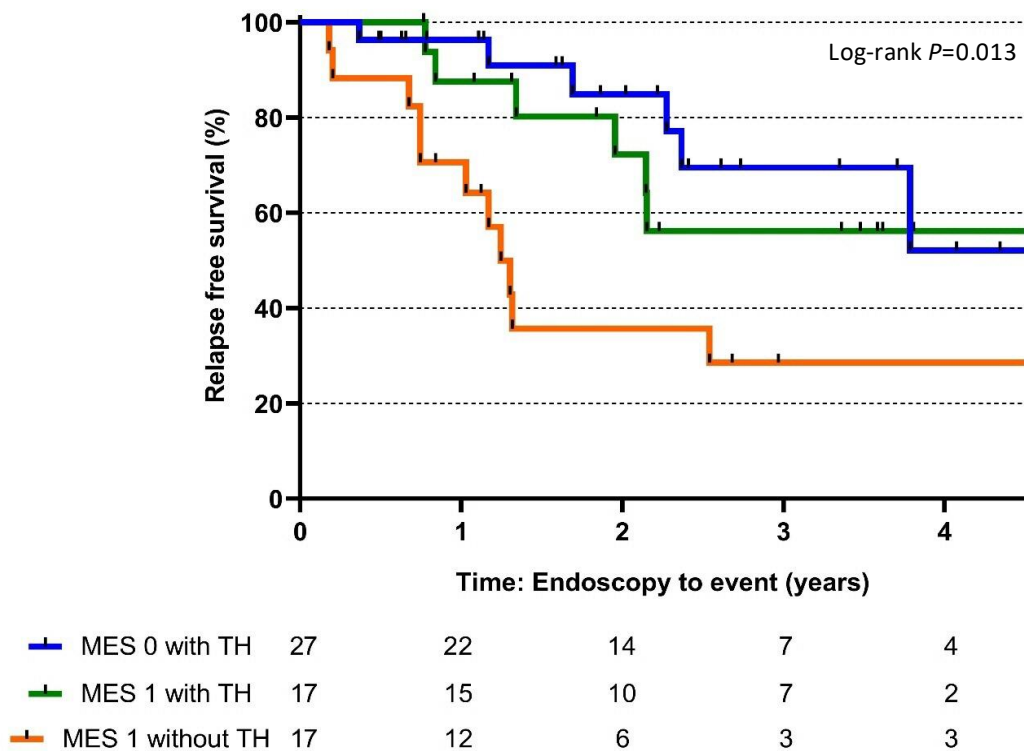
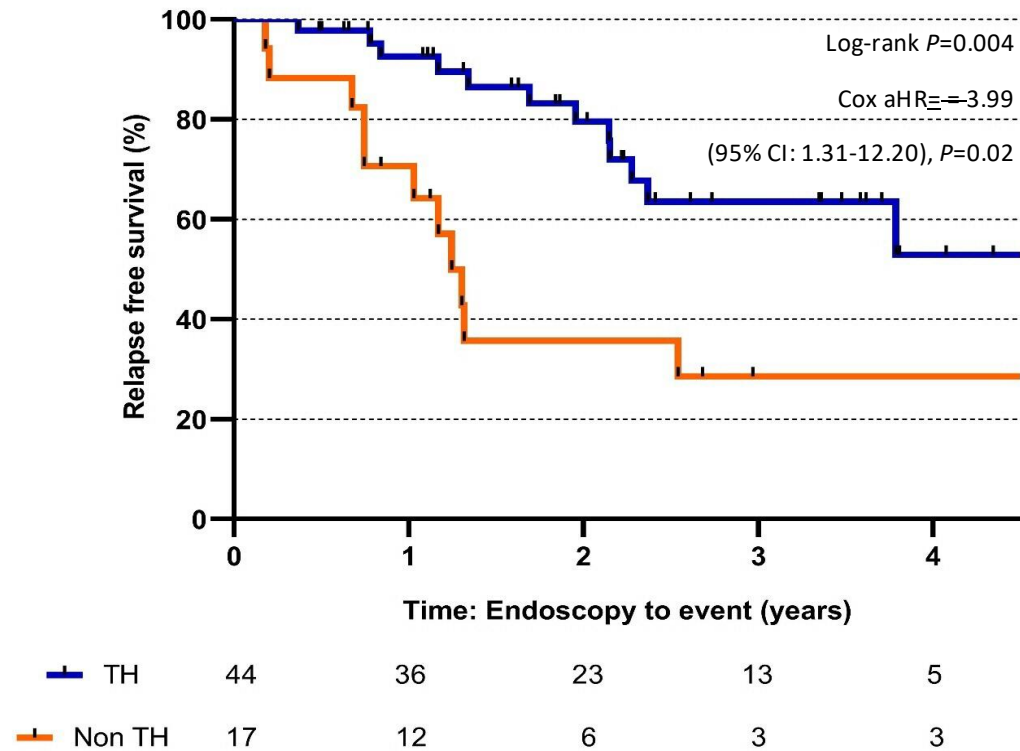
Percentage of patients with
increase Doppler signals

Therapy-Specific Response Rates

- Prospective longitudinal study
- UC patients (n=51)
- Active UC (EMS ≥ 2)
- IUS protocol:
 - Baseline
 - Week 2
 - Week 6
 - Week 8-26 (+ flex sig/colo)



Transmural Healing Improves Long-term Outcomes Compared to Mucosal Healing Alone: the CENTRAL Study



IUS is Superior to Endoscopic Mayo to Predict Colectomy

Consecutive adult
UC patients



At recruitment



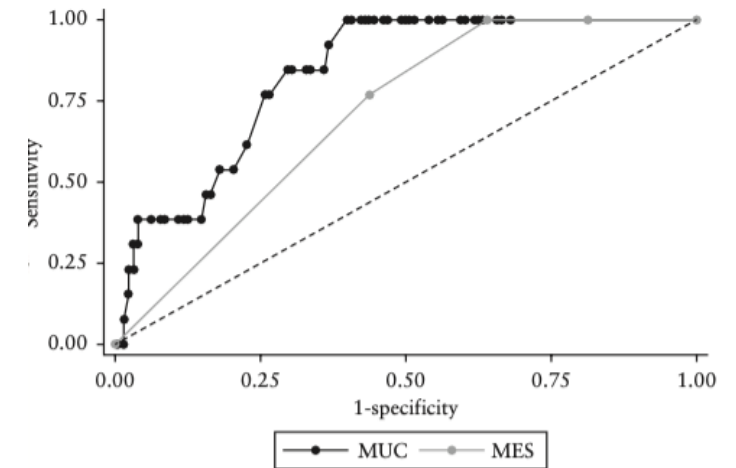
Mayo
endoscopic
score (MES)



Milan ultrasound
criteria (MUC)

21.8 ± 14.6
months

Colectomy risk



MUC > MES

MUC = 1.4 × bowel wall thickness (mm) + 2 × bowel wall flow

+ bowel wall flow [BWF] = 1

- BWF = 0

Therapy Responsiveness (CD and UC)

➤ Transmural Response

- Reduction in BWT:

- $>25\%$

or

- >2.0 mm

OR

- >1.0 mm **AND** ↓ 1pt color Doppler reduction

➤ Transmural Healing

- BWT:

- $\text{BWT} \leq 3.0$ mm (ADULT)

AND

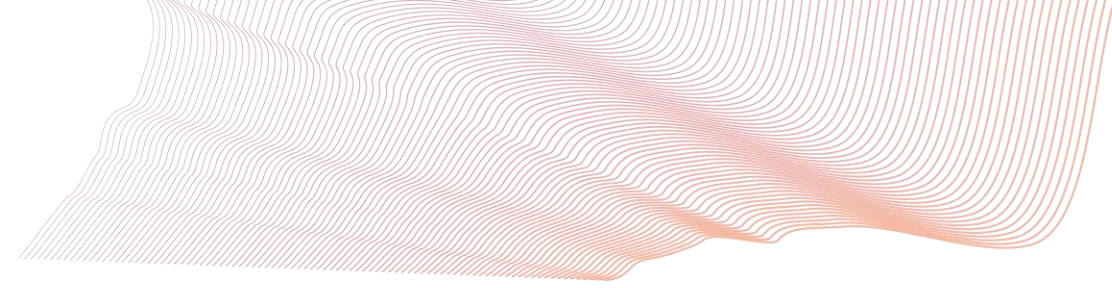
- Normal (0) color Doppler signal

Scoring systems

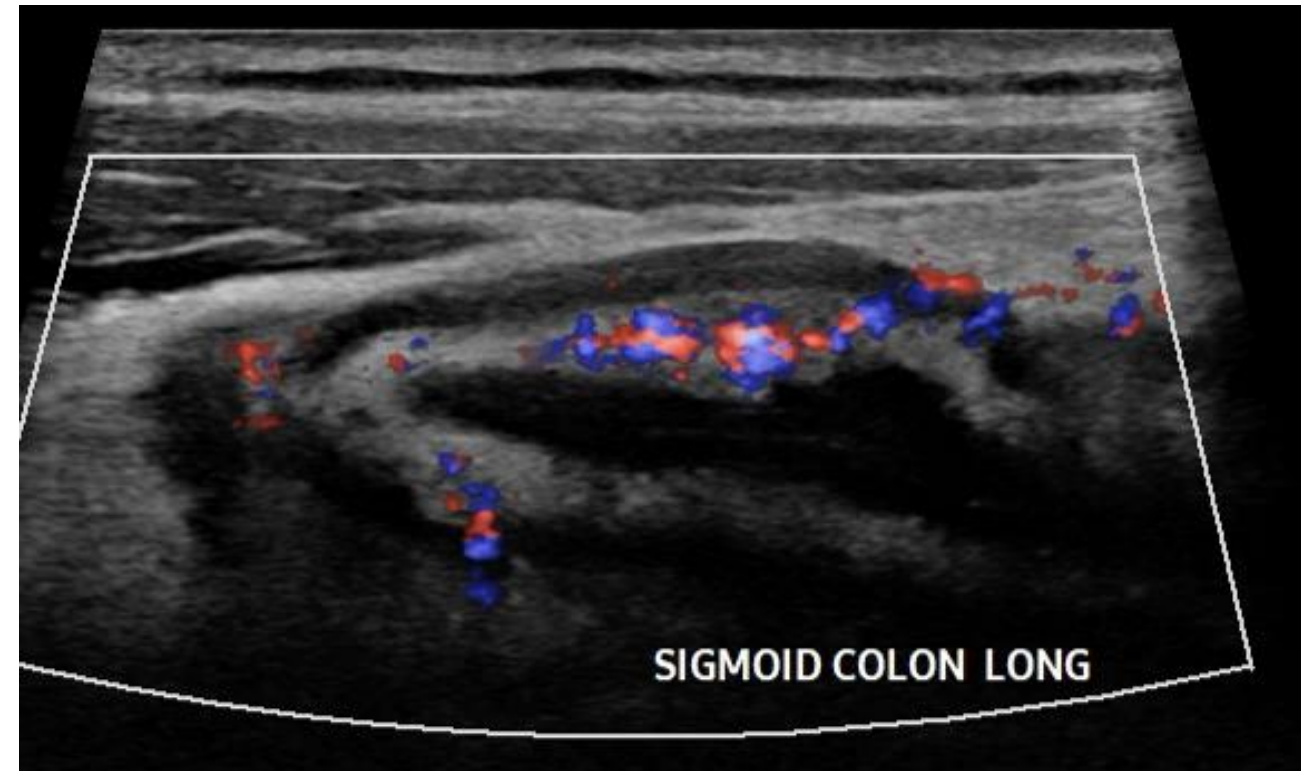
Scores	Reference	Indices used	Severity Grades	Index Calculation	Outcomes
Ulcerative colitis					
MUC	Colonoscopy	BWT CDF	Active disease (Mayo endoscopic score ≥ 2): MUC ≥ 6.3 points	$1.4 \text{ BWT} + 2 \times \text{CDF}$	MUC ≥ 6.3 points (sensitivity 71%, specificity 100%) to Detect endoscopic active disease
UC-IUS	Colonoscopy	BWT CDF Abnormal haustrations Fat wrapping	Continuous score ranging from 0 to 7 points	Bowel wall thickness (> 2 mm: 1; > 3 mm: 2; > 4 mm: 3) Doppler signal (Spots: 1; Stretches: 2) Abnormal haustrations: 1 Fat wrapping: 1	Strong correlation with endoscopic Mayo score ($\rho = 0.83$, $p < 0.001$) and UCEIS index ($\rho = 0.759$, $p < 0.001$)

16 y/o M with pancolonic UC

- Day of admission:
 - o 8 liquid, mostly bloody stools/day
 - o Moderate abdominal pain
 - o Night-time stools
 - o **PUCAI 75**
- Hgb 9.0 g/dL
- CRP 11.6 mg/L
- Alb 2.6 g/dL
- C diff/ GI PCR (-)
- FCP >8000

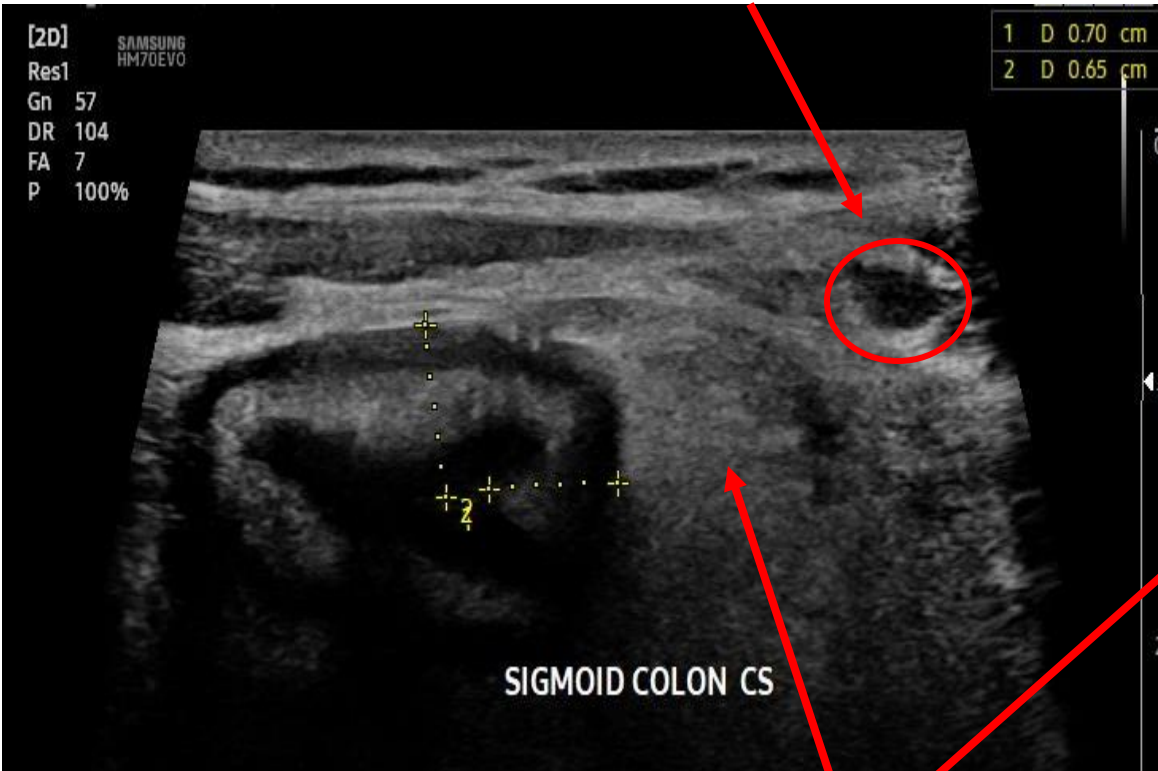


Admission Day 1- Starts IV steroids and UPA

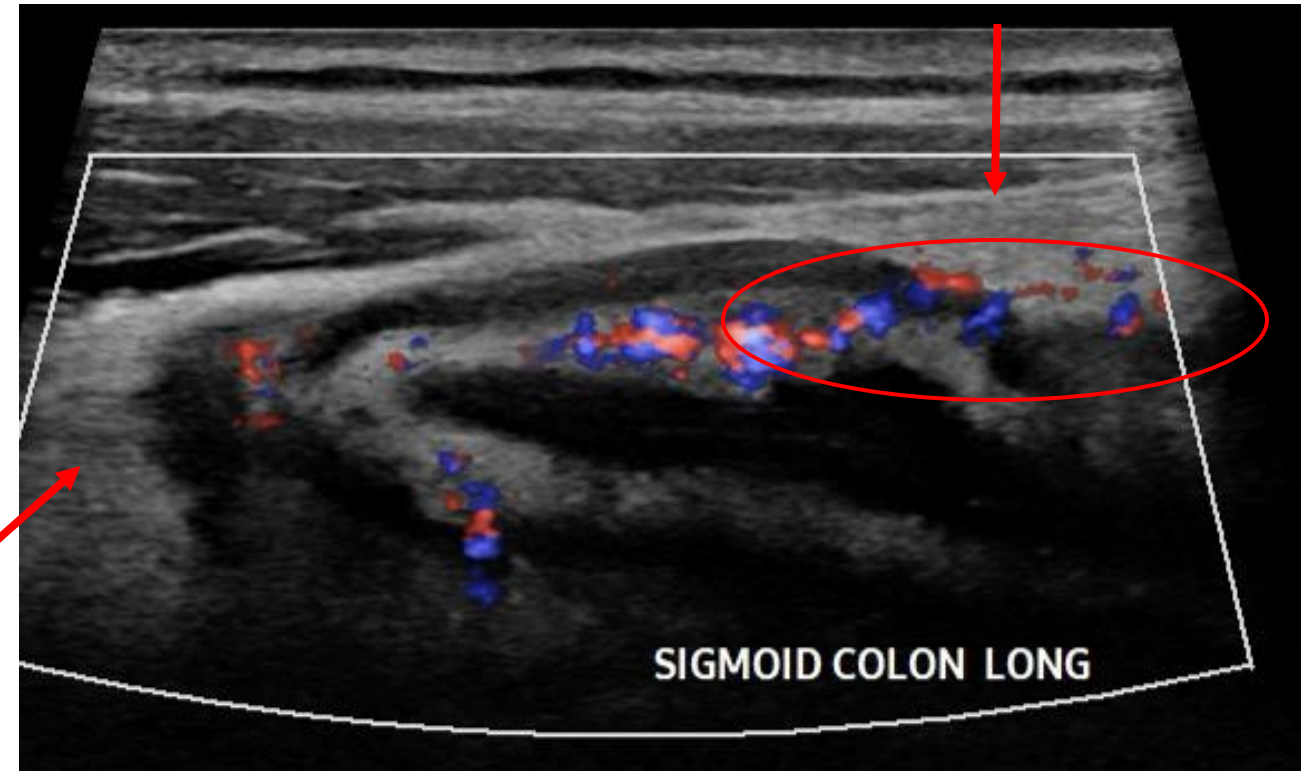


Admission Day 1

Reactive LN

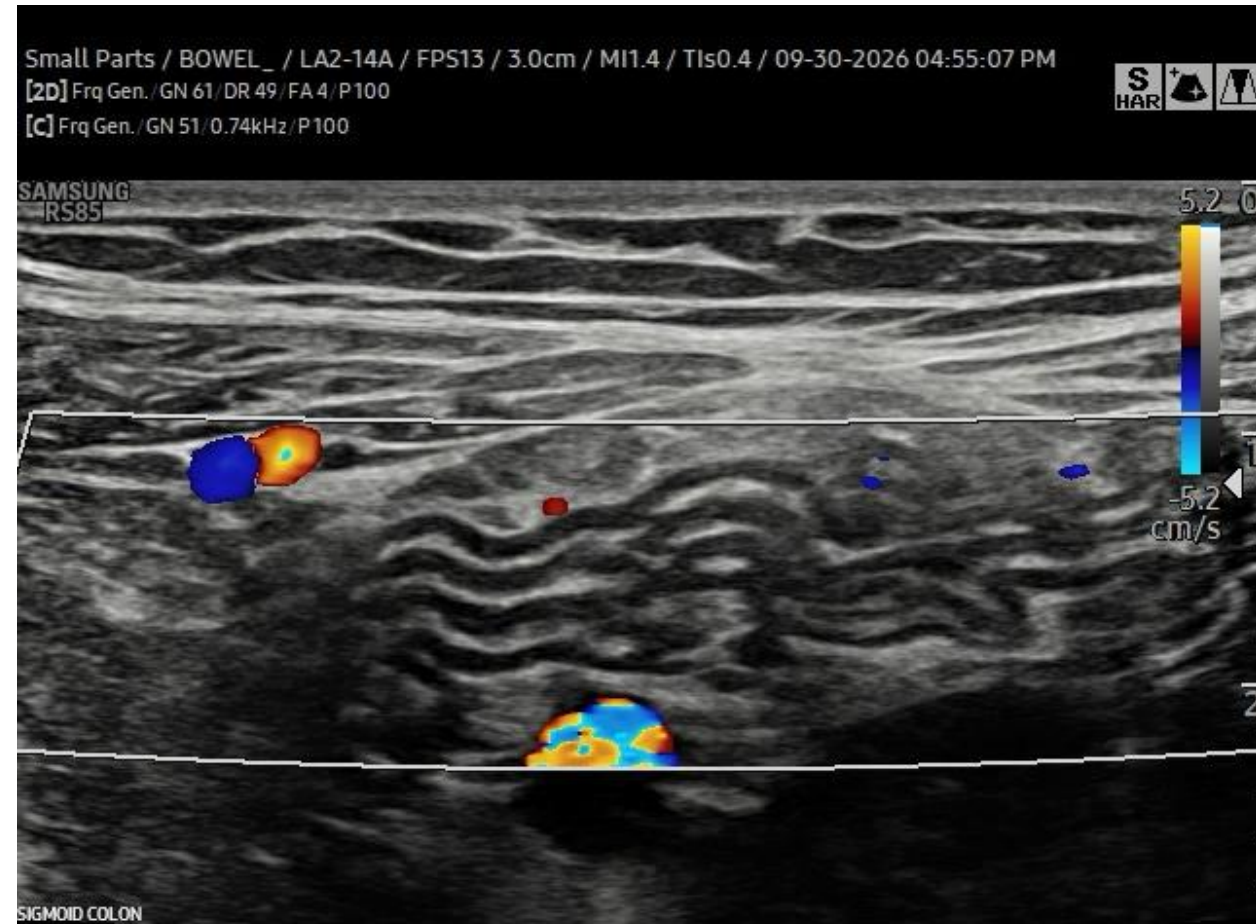


Loss of haustra



Admission Day 3

- Started IV Steroids + Upadacitinib on admission
- PUCAI 15
- CRP <0.3 mg/L
- Albumin 3.1 g/dL



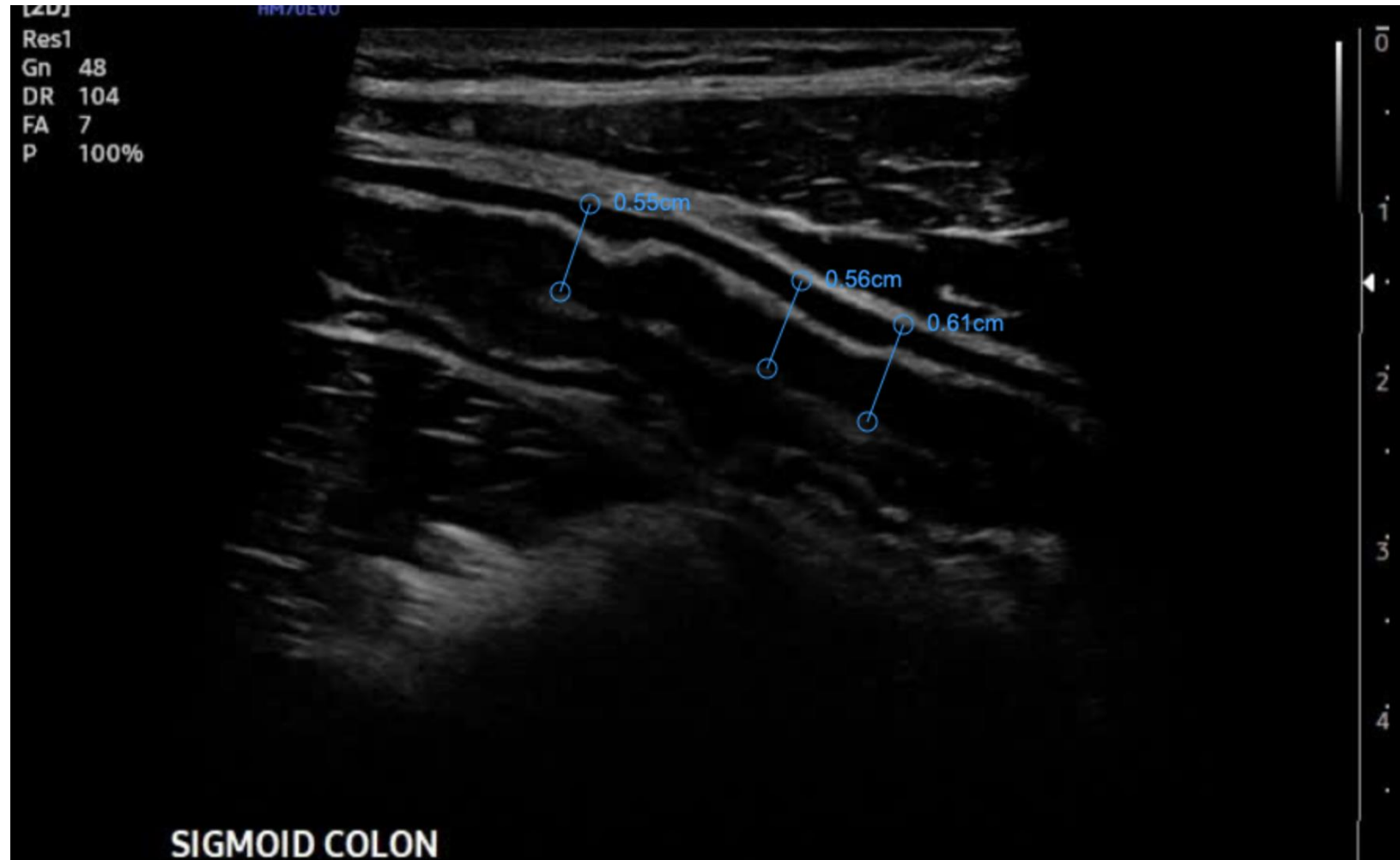
Discharge follow-up

- 2-weeks post discharge
- UPA 45 mg daily
- Weaning prednisone
- Clinical remission!
- CRP <0.3 mg/L
- Albumin 3.6 g/dL



Case #2: 13 y/o F with extensive UC

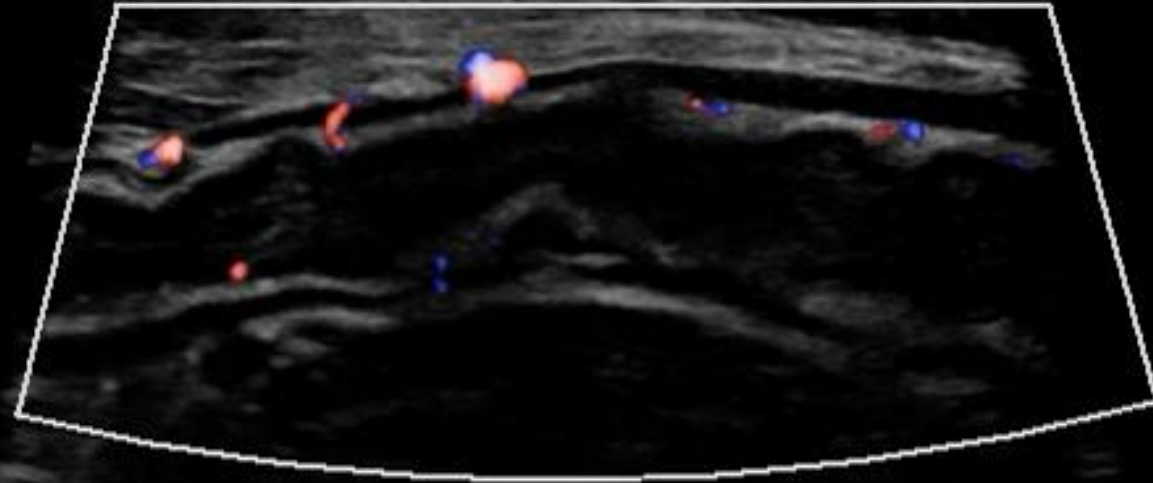
- Non-responsive to 5-ASA
- Moderate clinical disease
- Starting USTE





Res1
Gn 48
DR 104
FA 7
P 100%

[S-Flow]
Gen
Gn 54
PRF 1.0kHz
P 100%



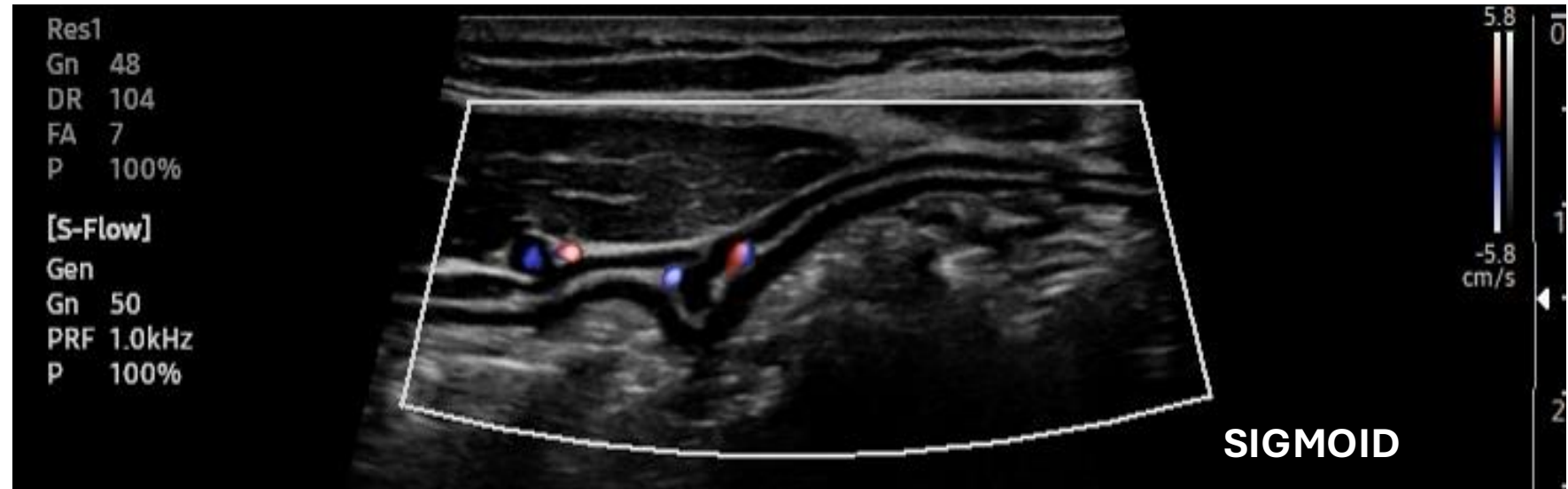
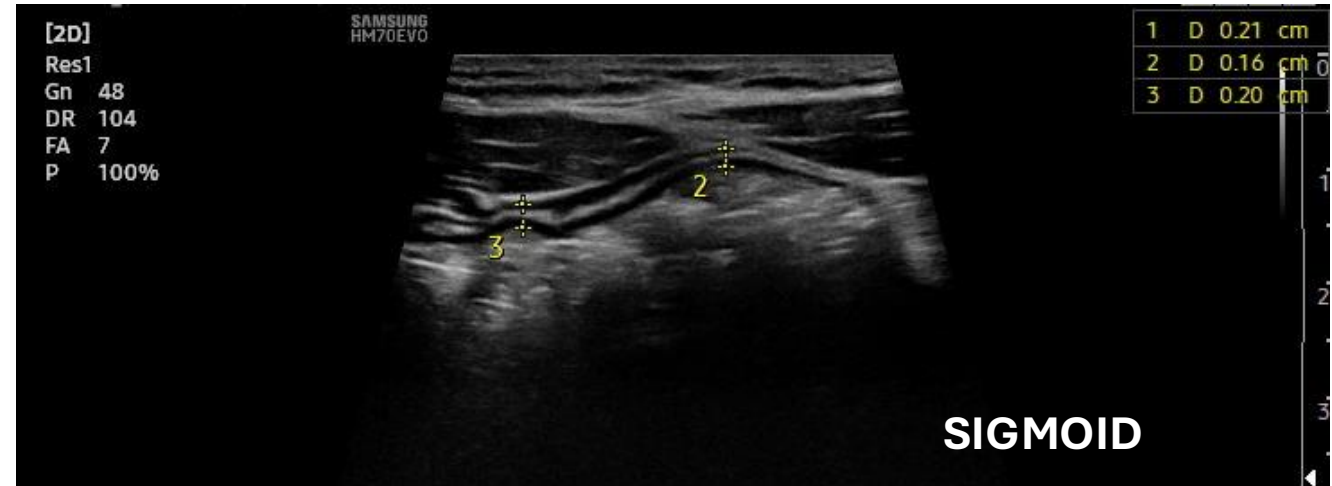
5.8
-5.8
cm/s

SIGMOID COLON

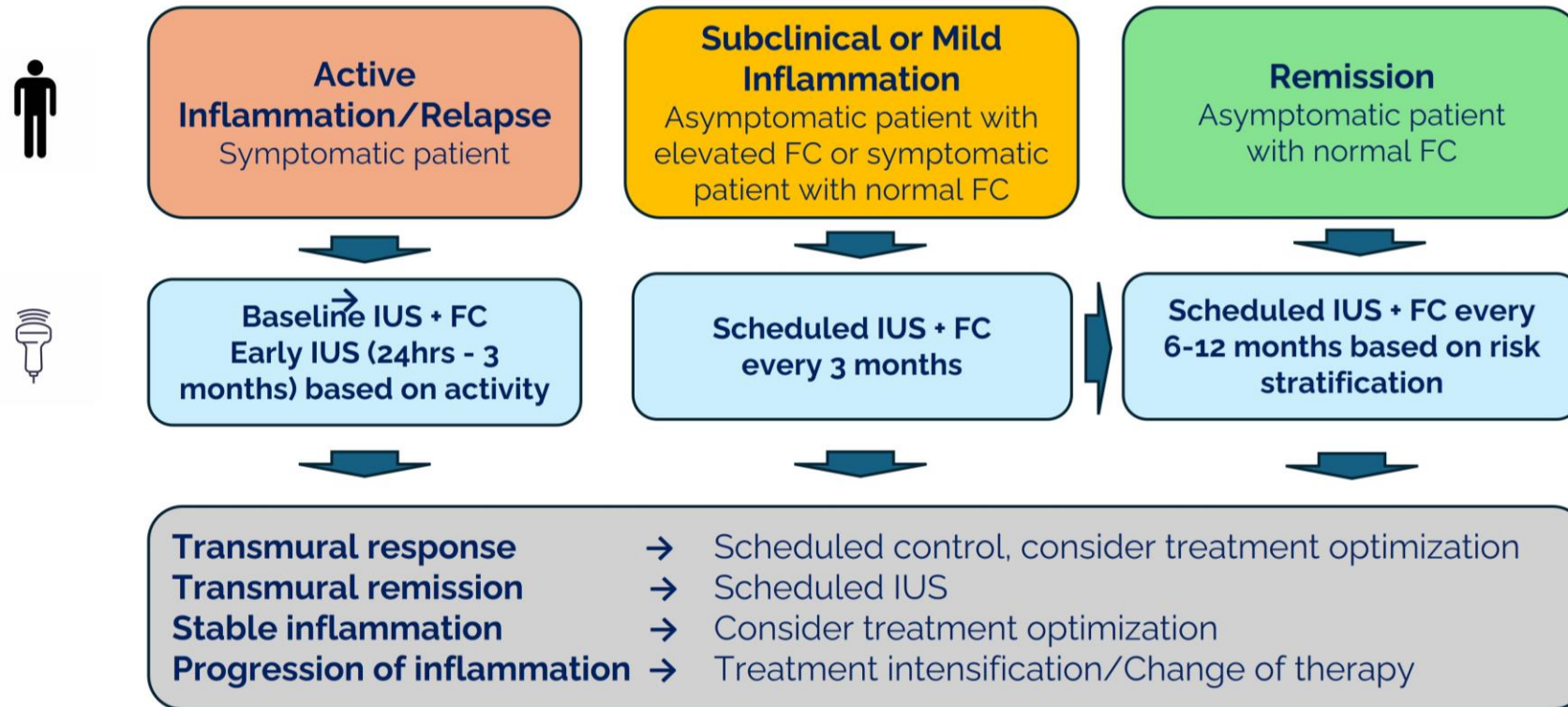
0
1
2
3
4
5

Case #2: 12-week follow-up

- USTE 90 mg q8wk
- Mild abdominal pain, rare blood in stool
- Serum labs normal



Proposed diagnostic algorithm for non-invasive monitoring in Ulcerative Colitis



FC: fecal calprotectin
IUS: intestinal ultrasound
PoC: point of care



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Thank you!