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Standardized Documentation and Reporting – Tips for Central Reading

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IBUSXP - Masterclass and certification for the experienced IUS performer

Berlin, Germany - october, 2nd – 3rd 2025

Disclosures

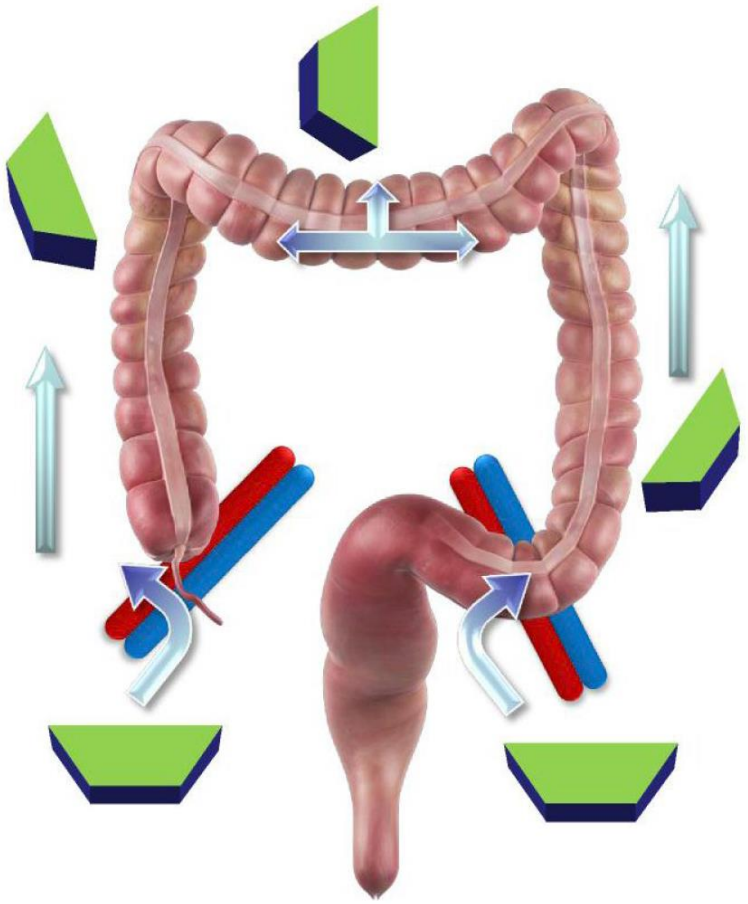
Consultancy

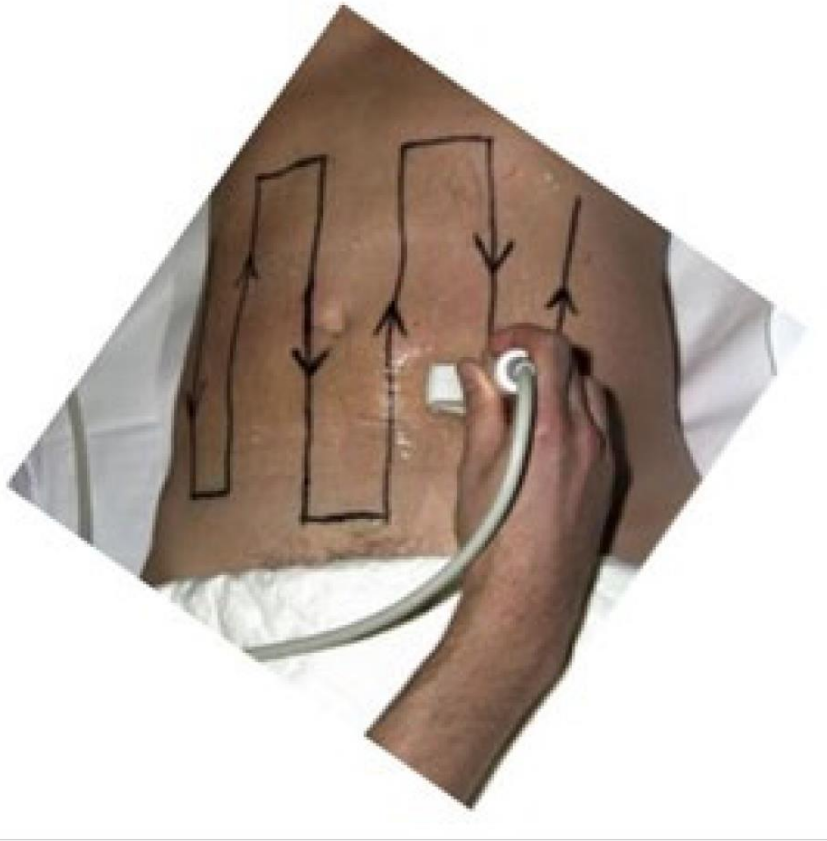
Abbvie, Amgen, Biogen, Boehringer, Celltrion, Celgene, Hospira, MSD Sharp & Dome GmbH, Mundipharma, Dr. Falk Pharma GmbH, Galapagos, Gilead, Janssen, Lilly, MSD Sharp & Dome GmbH, Novartis, Takeda Pharma GmbH

Speakers honoraria

Abbvie, Amgen, Celltrion, Celgene, Dr. Falk Pharma GmbH, Ferring Arzneimittel GmbH, Galapagos, Janssen, MSD Sharp & Dome GmbH, Pfizer, Roche, Takeda Pharma GmbH, Vifor

IUS technique for a standardized complete evaluation of colon and terminal ileum (*left*) and small bowel (*right*).





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ECCO Topical Review

OXFORD

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ECCO Topical Review

ECCO-ESGAR Topical Review on Optimizing Reporting for Cross-Sectional Imaging in Inflammatory Bowel Disease

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IUS: Assessment and reporting of inflammation

Current practice position 3

The number and anatomical location of intestinal segments with imaging findings of mural inflammation should be reported, including skip lesions. An estimate of the total affected length and length of all individual pathological areas of the small bowel is preferred. Segment(s) exhibiting the most severe mural inflammation should be reported in detail to guide therapeutic decision making

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Key quality indicators for a good report (1)

Table 1: Key quality indicators for a good report in cross-sectional imaging

Pre-procedure features

- Indication
- Disease characteristics [phenotype, current symptoms, current and former treatment, surgical history]
- Fasting period

Technical features

- Modality/Machine specification [MRE/CTE, IUS]
- Probes [IUS, PUS, EAUS]
- Device settings
- **Specific features for MRE/CTE**
  - Oral contrast volume ingested for MRI or CT enterography [minimum 500 ml]
  - Bowel distension [optimal/suboptimal/insufficient]
  - Antiperistalsis drugs administered, dose and route of administration
  - Scan coverage [in case of MRI/CT, this should include an abdominal and pelvic examination, including perianal area]
  - Missing segment(s) due to previous surgery
- **Specific features for IUS**
  - Use of i.v. contrast medium [type, volume]
  - Use of oral contrast [type, volume]

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Key quality indicators for a good report (2)

Intra-procedure features*

- Examination extent [point of care examination or complete bowel/abdominal scan]
- Technical limitations
  - Intestinal gas or faeces [MRE/CT, IUS]
  - Motion artefacts [MRE/CT]:
    - Peristaltic motility
    - Breathing
    - Foreign bodies [e.g., prosthesis]
  - Body status
    - Obesity [IUS]
    - Lack of fat space between bowels [MRI]
- Disease activity [optional activity scores]#
- Complications of disease#
- Extraintestinal findings
- Examination quality/diagnostic confidence

Post-procedure features

- Conclusion [including treatment response, if any]
- Follow-up
- Imaging storage location

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Relevant findings for inflammation/complications that should be described

Table 2. Relevant findings for assessing inflammation and complications

Findings to be assessed on a segment basis	Extension/ localization of the disease	Overall interpretation
Abnormal bowel: - Thickness* - Ulceration(s) - Oedema† - Vascularization - Perienteric inflammatory changes Adjunctive techniques: - Motility - Restricted diffusion **Complications** - Stricture§ - Fistula and/or sinus¶ - Mesenteric mass/abscess** - Vascular complications†∞††	Terminal or neo-terminal ileum‡ Distal ileum‡ Proximal small bowel‡ Individual colonic segments	**Initial diagnosis** - No evidence of active disease - Evidence of active disease ± complications **Follow-up examination** Treatment response - Transmural remission - Significant transmural response - Stable disease - Progression of disease Status of complications

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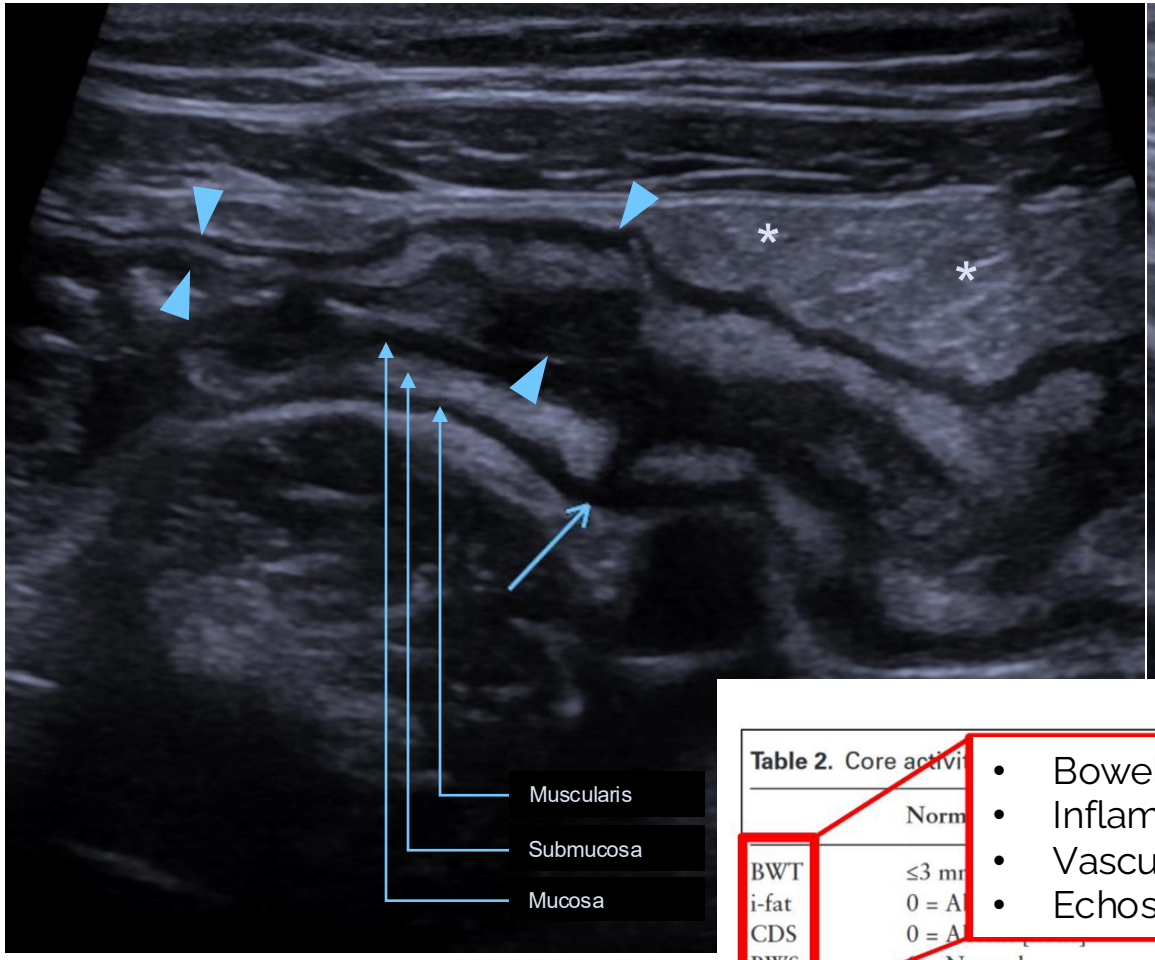
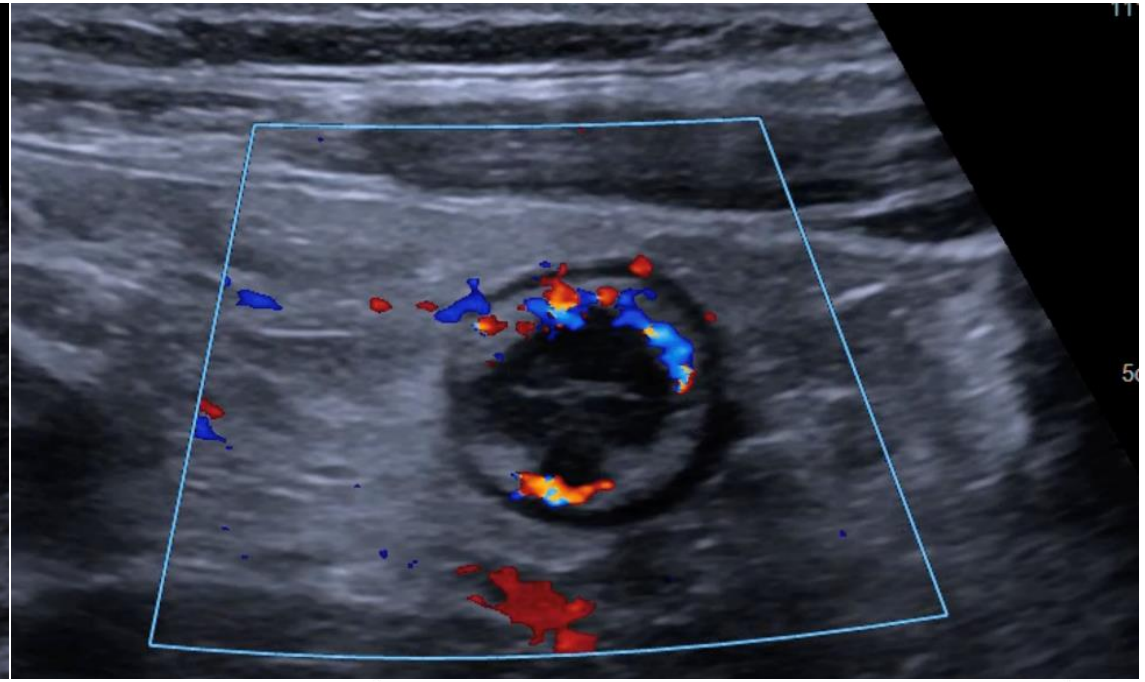
IUS parameters that need to be determined





- Bowel wall thickness
- Inflammatory fat
- Vascularization
- Echostratification

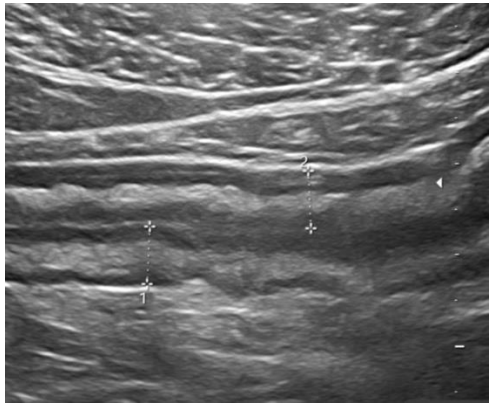
Table 2. Core activi

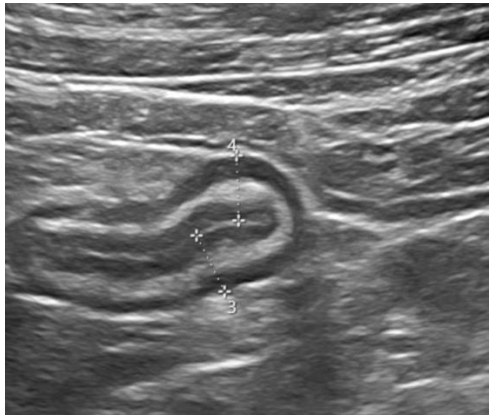
	Norm			
BWT	≤3 mr			
i-fat	0 = Al			
CDS	0 = Al			inside bowel — 3 = Long signals inside & outside bowel
BWS	0 = Normal	1 = Uncertain	2 = Focal [≤ 3 cm]	3 = Extensive [>3 cm]

BWT, bowel wall thickness; i-fat, inflammatory fat; CDS, colour Doppler signal; BWS, bowel wall stratification; NA, not applicable.

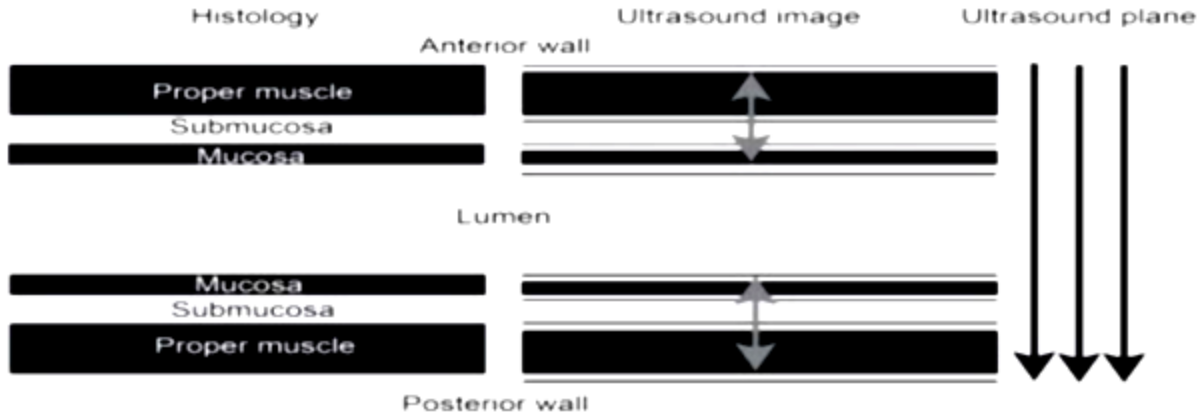
Novak K et al. *JCC* 2021

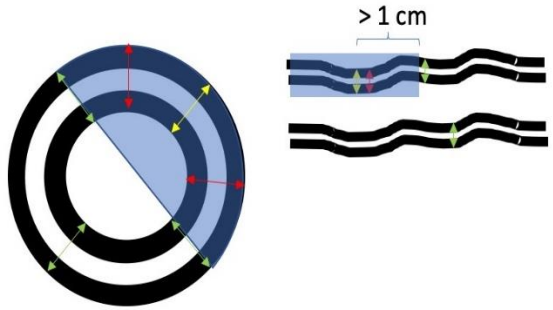
Bowel wall thickness





Segment with the most prominent pathology
2x transversal + 2x longitudinal/4





Interobserver variablity
k = 0.72-1

Fraquelli M et al. Dig Liver Dis 2008

k = 0.96

Novak K et al. JCC 2021

Bowel wall thickness – Standardized measurement

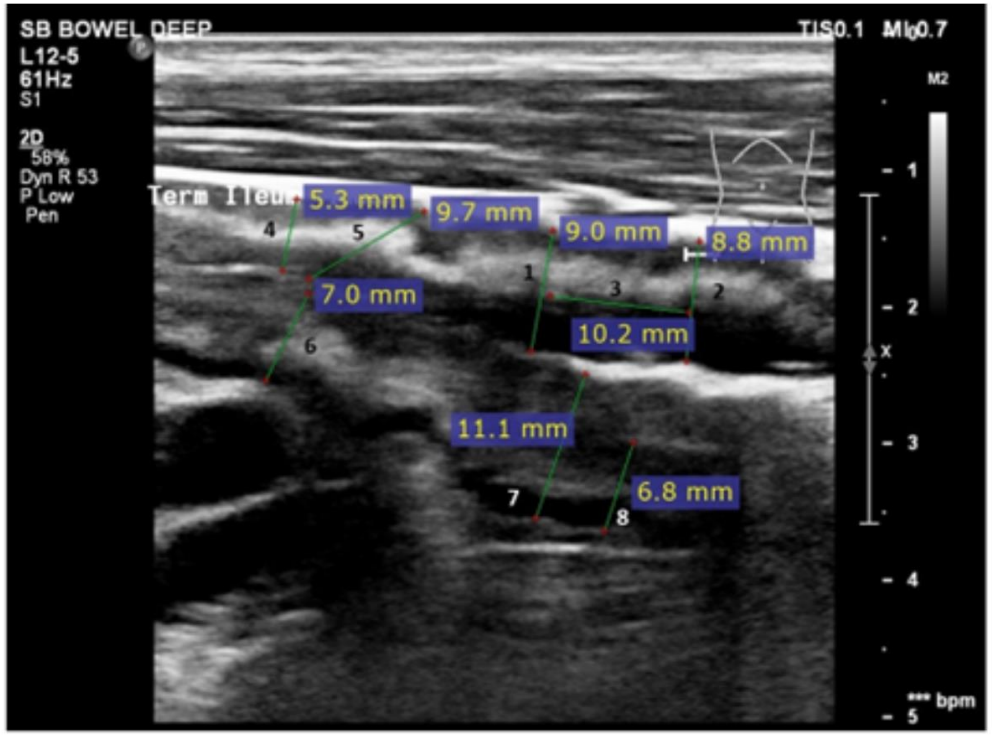


Figure 2: Number 1 and 2 are correct measurements with proper distance between measurements (3). 4 is incorrect as this is not the thickest part. 5 is wrong as it is not the thickest part and not perpendicular to the wall. 6 is incorrect as this is not the thickest part and the dorsal wall is suboptimal. 7 and 8 are incorrect as these are performed at the dorsal wall with the luminal-mucosal interphase hampered by air artifacts.

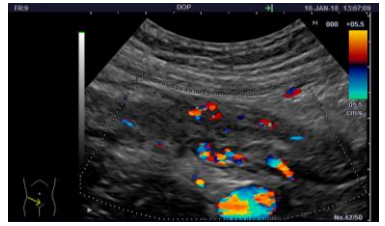
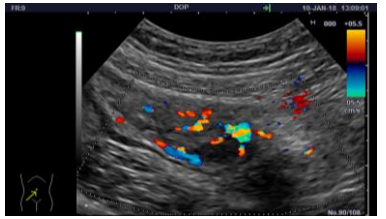
Vascularization - Doppler signal

set velocity range: 5-7 cm/s

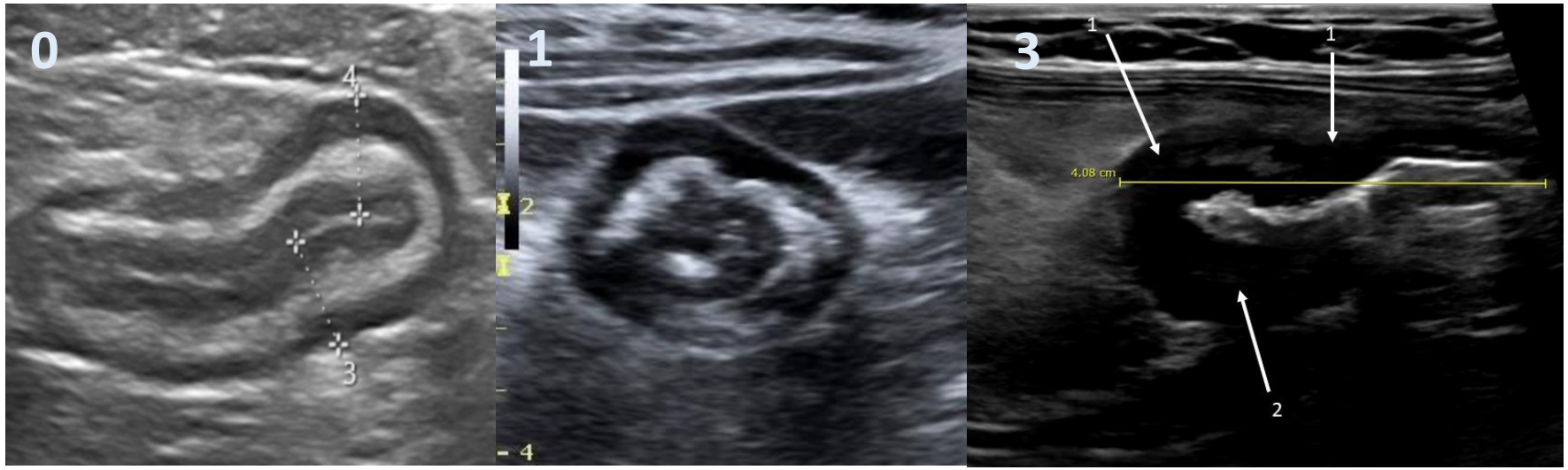
0 – absent
1 – short signals
2 – long signals inside bowel
3 – long signals inside & outside bowel

ICC = 0.62

Novak K et al. JCC 2022

	Longitudinal scan	Transversal scan
CDS 0		
CDS 1		
CDS 2		
CDS 3		

Echostratification



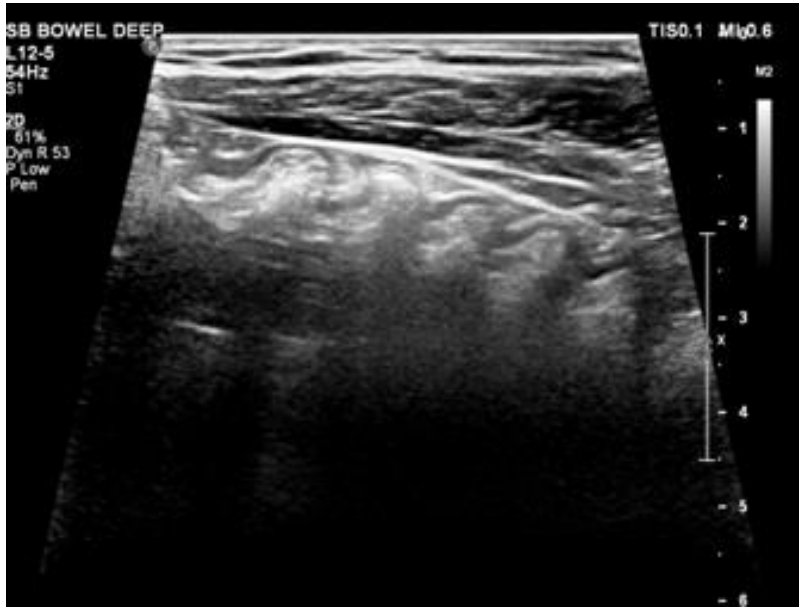
Categories

0: Normal/preserved echostratification
1: Uncertain
2: Focal discruption (< 3 cm)
3: Extensive disruption (> 3 cm)

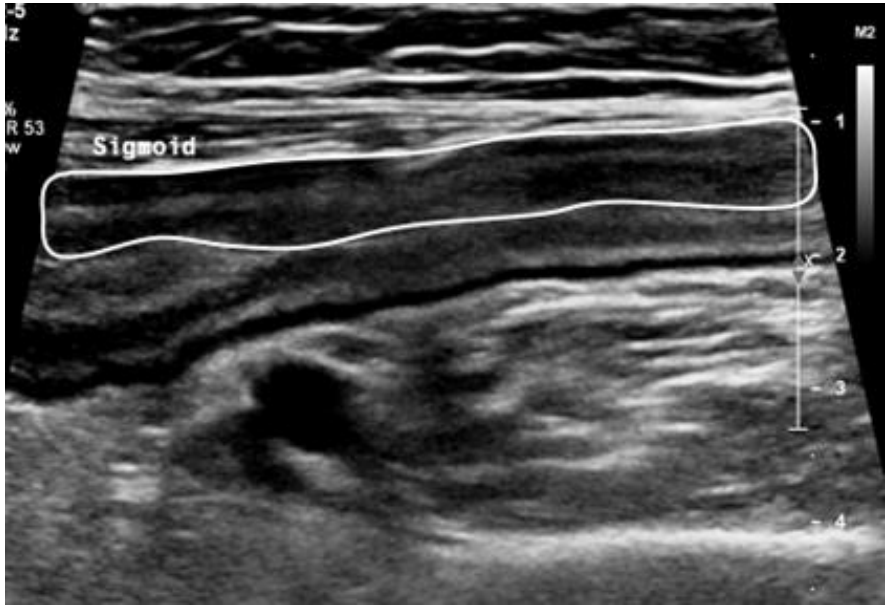
ICC = 0.50

Novak K et al. JCC 2021

Haustration

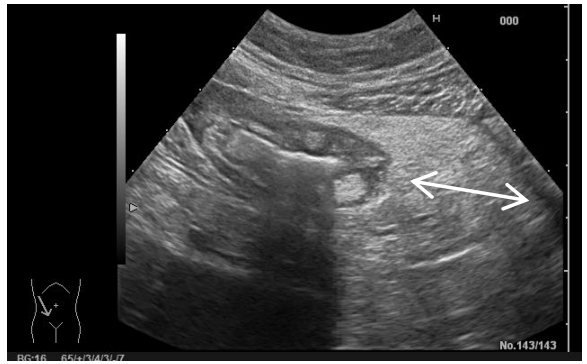
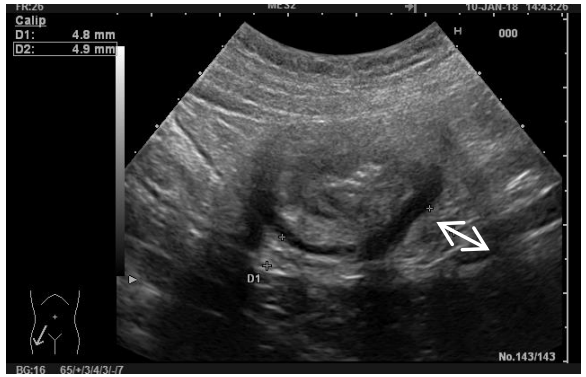


Preserved stratification



Loss of stratification

Inflammatory mesenteric fat

	Longitudinal scan	Transversal scan
Present		
Absent		

Categories

0: absent
1: uncertain
2: present

k = 0.14-0.69

Fraquelli M et al. Dig Liver Dis 2008

s = 0.43

Calabrese E et al. IBD 2018

ICC = 0.51

Novak K et al. JCC 2021

Motility

Normal motility -
small bowel

Dysmotility
in small bowel CD

Absent peristalsis
in Crohn's ileitis (L1B1)

Scoring of CD Disease Activity – IBUS SAS-Score

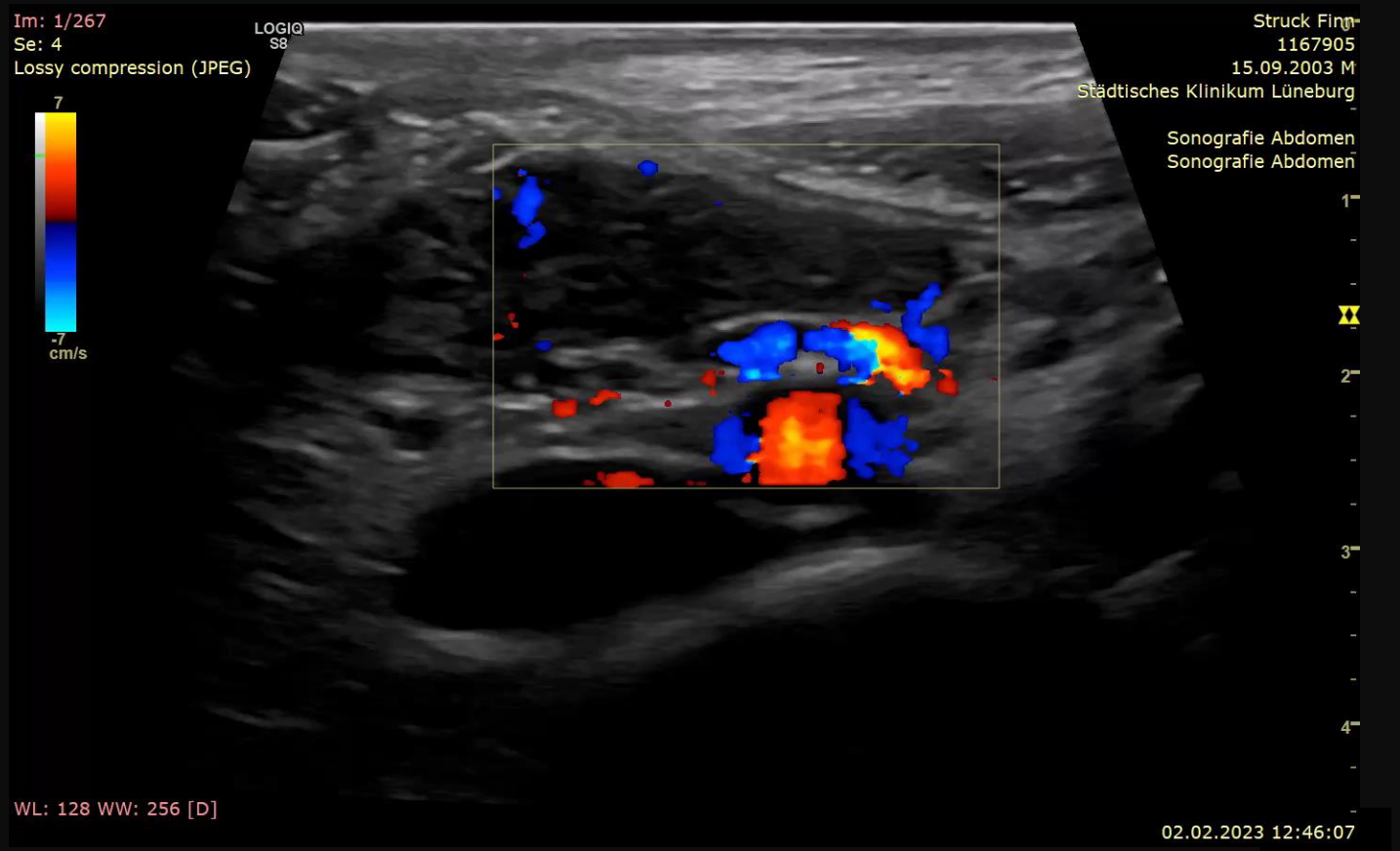
Active CD L1B1

- BWT (8 mm)
- Vascularization (CDS 2)
- Echostratification (extensive=3)
- Mesenteric fat (present=2)

IBUS SAS-Score: 88

IBUS – SAS (0–100) = 4 · BWT + 15 · i-fat + 7 · CDS + 4 · BWS

Scoring of UC Disease Activity – Milan US Criteria (MUC Score)



Active UC E3

- BWT (4.2 mm)
- Vascularization (CDS 3)

MUC Score

1.4 x BWT + 2 x BWF
(Bowel Wall Flow 0-1)
1.4x4.2 +2x1=7.9

Active UC: MUC Score > 6.2

IUS Scores

Table 3 Intestinal ultrasound scoring systems for disease activity in Crohn's disease and ulcerative colitis

Scoring index	Disease	Formula	Strengths	Limitations	Further research questions
Simple IUS score. Novak *et al*[103]	CD	(0.0563 × BWT1) + (2.0047 × BWT2) + (3.0881 × BWT3) + (1.0204 × Doppler1) + (1.5460 × Doppler2)	Validated	Ultrasonographers and endoscopists were not blinded. Needs to be validated in external cohorts.	Future studies should use MRE as a reference. Future research should focus on establishing scores that are validated against endoscopy and/or MRE in multiple centres through central reading. Responsiveness should be assessed with clear definitions for response and
Simple IUS score. Saevik *et al* 2021[104]	CD	BWT × 1.053 + (colour Doppler × 1.934) + (fatty wrapping × 1.275) +(stratification × 1.225) + 0.242 or simply summarising the numerical	Validated. Good inter-rater reliability.	Needs to be evaluated in external cohorts. Sensitivity to change not assessed.	
UC IUS Index. Bots *et al*[39]	UC	Point-based index with four parameters graded on a 7-point scale: BWT, Doppler signal, abnormal haustration, fat wrapping.	Not validated. Strong correlation with the Mayo endoscopic subscore (p=0.830; p<0.001). Moderate-to-substantial inter-rater agreement.	The coefficient from the multivariable analysis have not been used for the score. Instead, an arbitrary grading system (a 7-point scale) was used. Needs to be validated in external cohorts.	Validity to assess treatment response needs to be assessed. Assessment of rectum needs to be included.

BWF, bowel wall flow; BWT, bowel wall thickness; CD, Crohn's disease; IUS, intestinal ultrasound; MRE, magnetic resonance enterography; UC, ulcerative colitis; US, ultrasound.

Recommendation 40

We suggest routinely using validated cross-sectional imaging indices to assess and monitor disease activity and therapeutic response in patients with IBD [EL5]. AGREEMENT 89%

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Scoring template – Crohn's Disease

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2. Scoring template

2.1 Crohn's disease

	SC	DC	TC	AC (incl. coecum)	TI/NTI	SB
Reader confidence 1 not confident – 5 very confident						
Segmental scan quality 1 insufficient – 5 excellent						
Bowel wall thickness 4 measurements per segment: 2x longitudinal, 2x cross-sectional						
Vascularization (modified Limberg score) (0) No CDS (1) Single spots (2) Long stretches inside wall (3) Long stretches inside and outside wall						
Bowel wall stratification (0) Normal (1) Uncertain (2) Focal disruption (3) Extensive disruption						
Inflammatory mesenteric fat (0) Absent (1) Present (2) Uncertain						
Haustrations (0) Preserved (1) Absent					NA	NA
Most affected segment						
Segmental Disease Severity VAS (VAS 0-100 linear scale to indicate)						
Total Disease Severity VAS (VAS 0-100 linear scale to indicate)						

Scoring template – Ulcerative Colitis

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2.2 Ulcerative colitis

	SC	DC	TC	AC (incl. coecum)
Reader confidence 1 not confident – 5 very confident				
Segmental scan quality 1 insufficient – 5 excellent				
Bowel wall thickness 4 measurements per segment: 2x longitudinal, 2x cross-sectional				
Submucosal layer thickness 2 measurements				
Vascularization (modified Limberg score) (0) No CDS (1) Single spots (2) Long stretches inside wall (3) Long stretches inside and outside wall				
Bowel wall stratification (0) Normal (1) Uncertain (2) Focal disruption (3) Extensive disruption				
Inflammatory mesenteric fat (0) Absent (1) Present (2) Uncertain				
Haustrations (0) Preserved (1) Absent				
Most affected segment				
Segmental Disease Severity VAS (VAS 0-100 linear scale to indicate)				
Total Disease Severity VAS (VAS 0-100 linear scale to indicate)				

Technical and image quality requirements for trials (Central Reading)

- The **same machine, probes, and IUS settings** should be used for the same patient at each visit
- Each bowel segment (affected and unaffected) should be recorded on three separate 5-10s cineloops (longitudinal, cross-sectional and CDI); if several recordings have been made, the best three cineloops should be chosen by the investigator for upload
- Additional still images can be accepted if cineloops are not of sufficient quality according to the investigator
- **Cineloops** should be covering bowel, mesentery and possible lymph nodes. Loops should **start (if possible) at the non-inflamed part** of the bowel distal/rectal of the affected bowel segment, should **cover the affected bowel segment** and should **end at the non-inflamed part** proximal/oral to the affected bowel segment

Technical and image quality requirements for trials (Central Reading)

- Every cineloop (and image) should have an **annotation** stating the segment being evaluated (preferred option) and/or alternatively a body marker illustrating the probe position.
- **Optimization for each bowel segment** by adjusting depth, gain and focus as often as needed is key
- The **velocity range of the color Doppler** should be set in a consistent and low flow range (from **-/+5-7 cm/s**)
- Ensure that the **Doppler box encompasses the complete wall + ≥ 1 cm** of the surrounding mesentery
- Record the **Doppler cineloop in the plane (cross-sectional or longitudinal) where it is most severe**, if no difference ideally use the cross-sectional plane as the mesenteric fat and thus vessels extending into the surroundings are best represented here

Complications - stenosis

Stenosis - IUS criteria

- Increased bowel wall thickness
- Stiff bowel wall, loss of motility
- Narrowing ot the lumen
- Prestenotic dilatation (> 2.5 cm)

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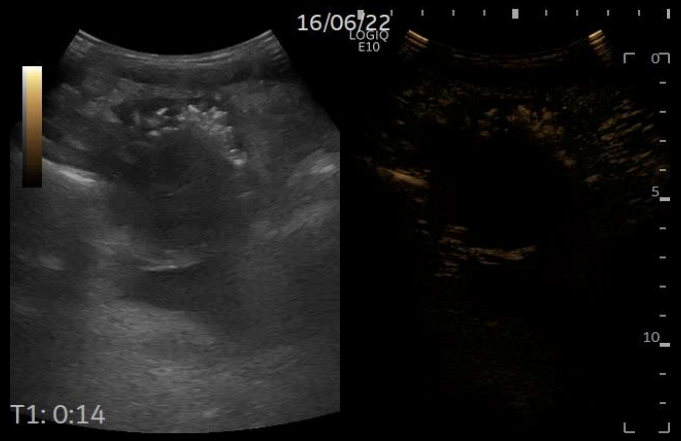
Describe your findings!
Complications – abscess/fistula



IUS criteria - abscess

- Hypo- or anechoic lesion with fluid and gaseous artefacts
- Posterior echo enhancement
- Irregular margins
- Frequently surrounded by mesenteric fat
- **CEUS:** absence of vascularization in the mass

IUS criteria - fistula

- Hypo- or anechoic extension from bowel wall filled with fluid and/or gaseous artefacts
- Irregular margins
- Frequently surrounded by mesenteric fat

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Relevant findings for inflammation/complications that should be described

Table 2. Relevant findings for assessing inflammation and complications

Findings to be assessed on a segment basis	Extension/ localization of the disease	Overall interpretation
Abnormal bowel: - Thickness* - Ulceration(s) - Oedema† - Vascularization - Perienteric inflammatory changes Adjunctive techniques: - Motility - Restricted diffusion **Complications** - Stricture§ - Fistula and/or sinus¶ - Mesenteric mass/abscess** - Vascular complications†∞††	Terminal or neo-terminal ileum‡ Distal ileum‡ Proximal small bowel‡ Individual colonic segments	**Initial diagnosis** - No evidence of active disease - Evidence of active disease ± complications **Follow-up examination** Treatment response - Transmural remission - Significant transmural response - Stable disease - Progression of disease Status of complications

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Monitoring disease activity

Current practice position 9

For follow-up examinations, reporting should focus on changes from the previous examination and should be categorized as transmural remission or significant transmural response, stable disease, or progression of inflammation. Changes in responsive features, including BWT, colour Doppler signal, BWS [IUS], ulcers, oedema [MRE], and perienteric inflammatory changes, should guide treatment response categorization.

Categories

- Transmural remission (BWT ≤ 3 mm + CDS 0)
- Significant transmural response
- Stable disease
- Progression of inflammation

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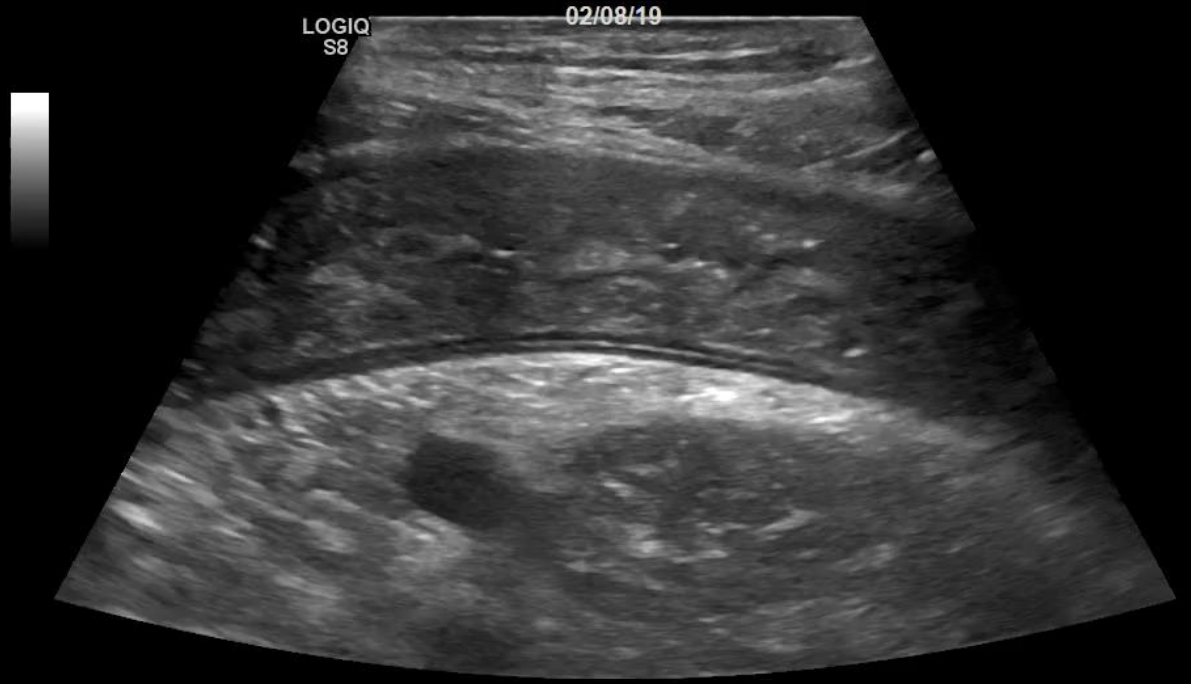
Ilvemark J et al *JCC* 2022

Monitoring IBD - Acute Severe UC, E2, cyclosporin induction i.v.



BWT 8.5 mm; MUC-Score: 13.9

after 2 weeks

BWT 3.8 mm; MUC-Score: 7.32

Significant transmural response in sigmoid colon 2 weeks after treatment induction with decrease of MUC Score and restitution of haustration

Standardised documentation:

- Select and save **representative images** and **cine loops** that accurately depict IUS findings
- **Annotate** (label or body marker) the identified structures appropriately to facilitate interpretation and documentation
- Describe the steps involved in **storing ultrasound images and cine loops**, including data security and retrieval considerations
- Recall the standard terminology and abbreviations used in documenting intestinal ultrasound findings and construct a **well-structured IUS report**

Standardized IUS documentation is suggested in guidelines

Recommendation 56

All cross-sectional imaging (IUS, MRE and CT) reporting should include an indication, scan quality, and any uncertainties in interpretation. The description of all segments examined should be reported in detail and images stored and available in an electronic patient file. We recommend using a picture archiving and communication system (PACS) for digital storage. [EL3] AGREEMENT 94%

ECCO-ESGAR-ESP-IBUS Diagnostic Guideline *JCC* 2025

CASE 1

INDICATIONS and DISEASE CHARACTERISTICS

- 24y old man, ulcerative colitis since 2019, mesalamine-refractory, steroid-refractory, azathioprine-induced pancreatitis
- 8-10 loose stools, blood, abdominal cramps, urgency
- lab results: Hb 9.2 mg/dl, WBC 14.3x10^9/l, CRP 167 mg/dl, fCalpro: >800 mg/kg

INTRA-PROCEDURE FEATURES

- Point of care examination. No technical limitation. Normal body status

Fasting period: 6h

Examination quality: good

Diagnostic confidence: high confidence

Image storage location: cine loops and images stored in PACS

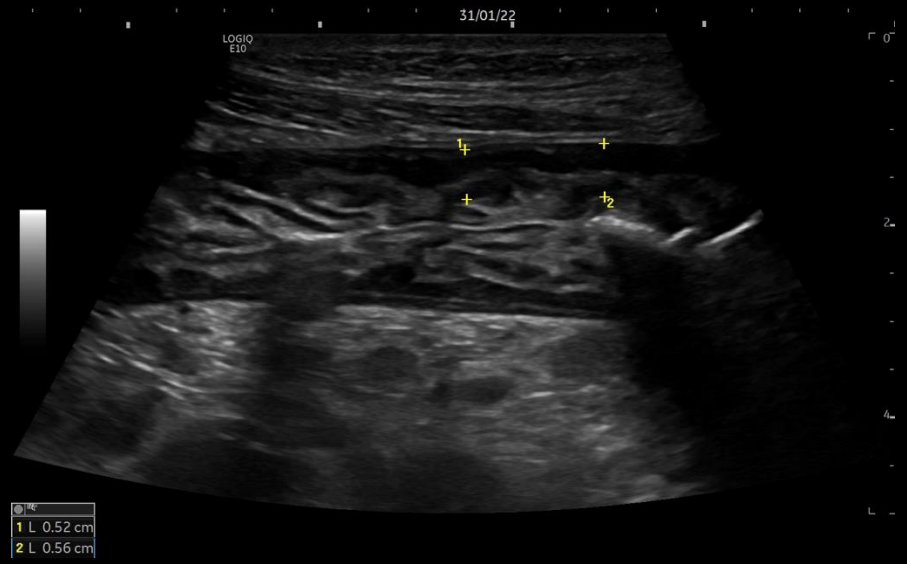
Examiner: Torsten Kucharzik

IUS machine: GE Logiq E10; Probe: L2-9 MHz

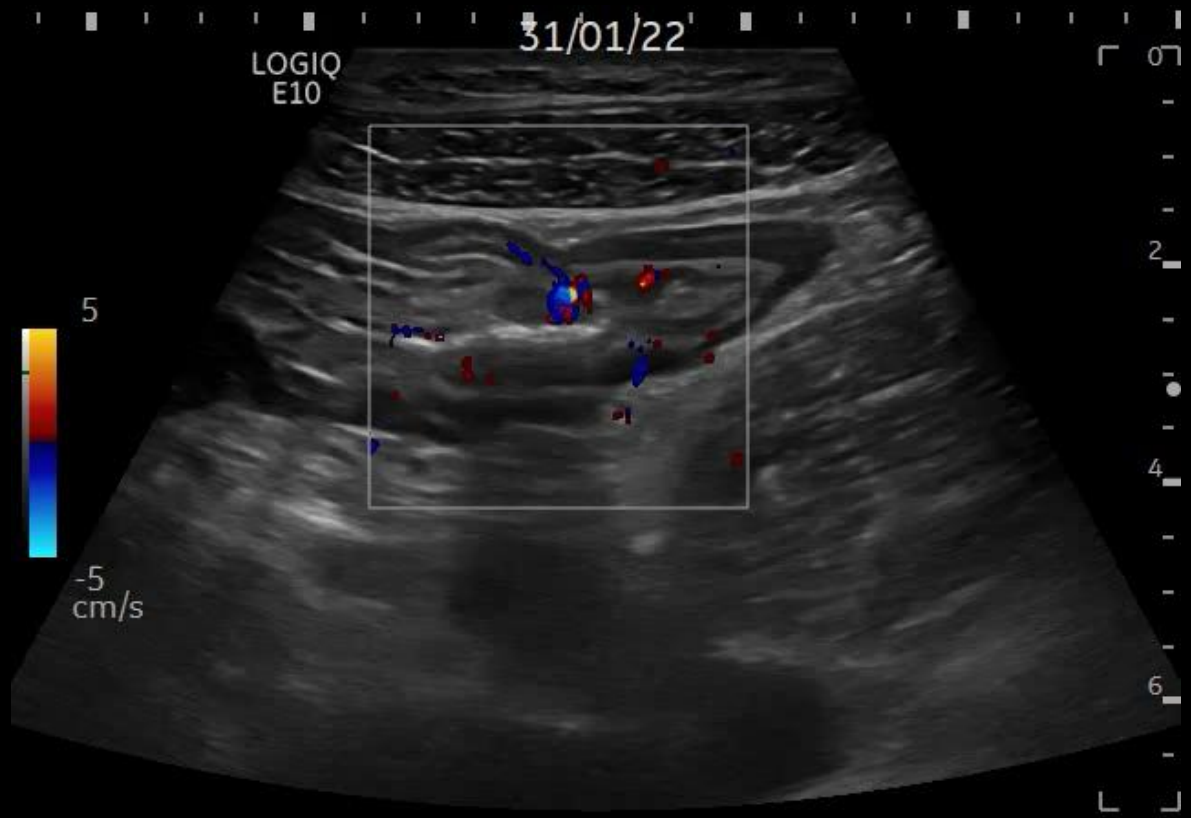
Case 1: 24y old man with ulcerative colitis

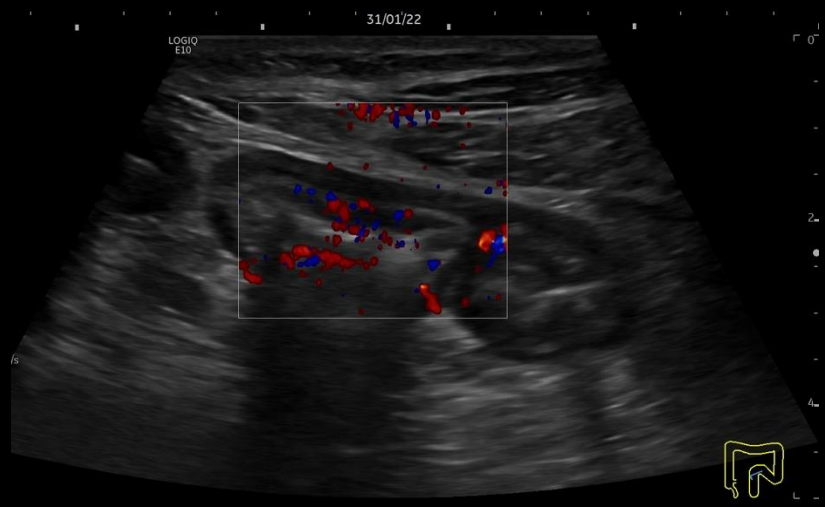
- Please describe what you see and consider how to report your findings!
- Disease activity? What are the relevant parameters to look at?
- Disease extension?
- Additional findings?

24y old man with ulcerative colitis

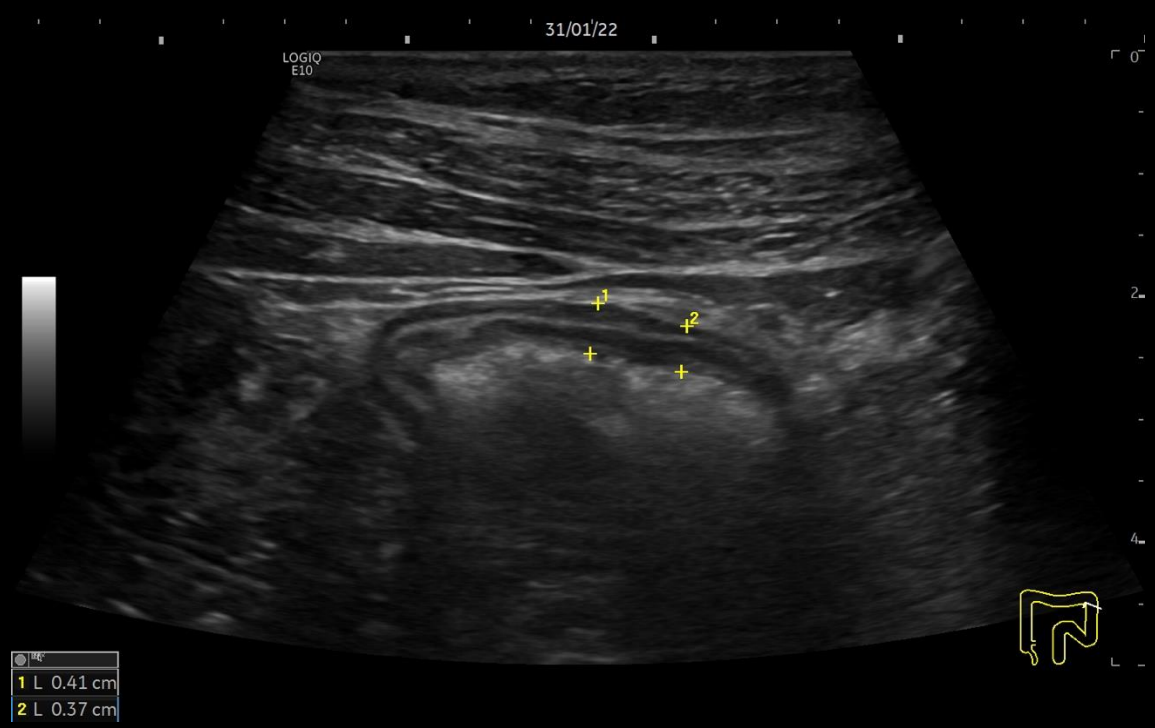


24y old man with ulcerative colitis



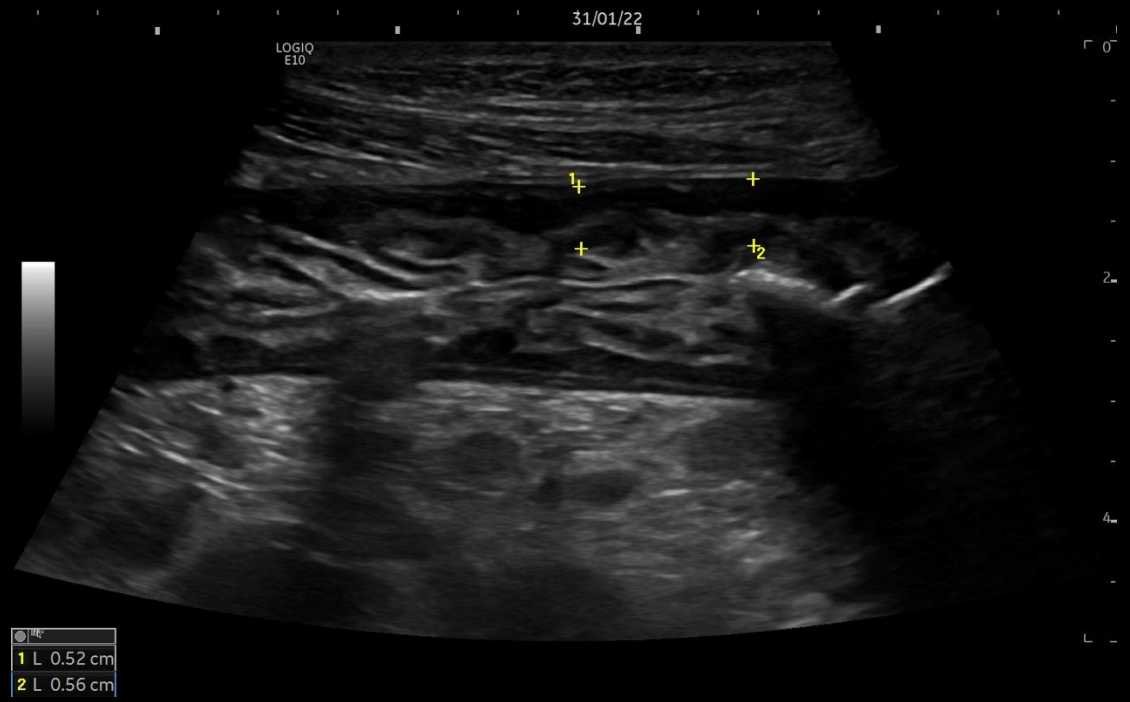


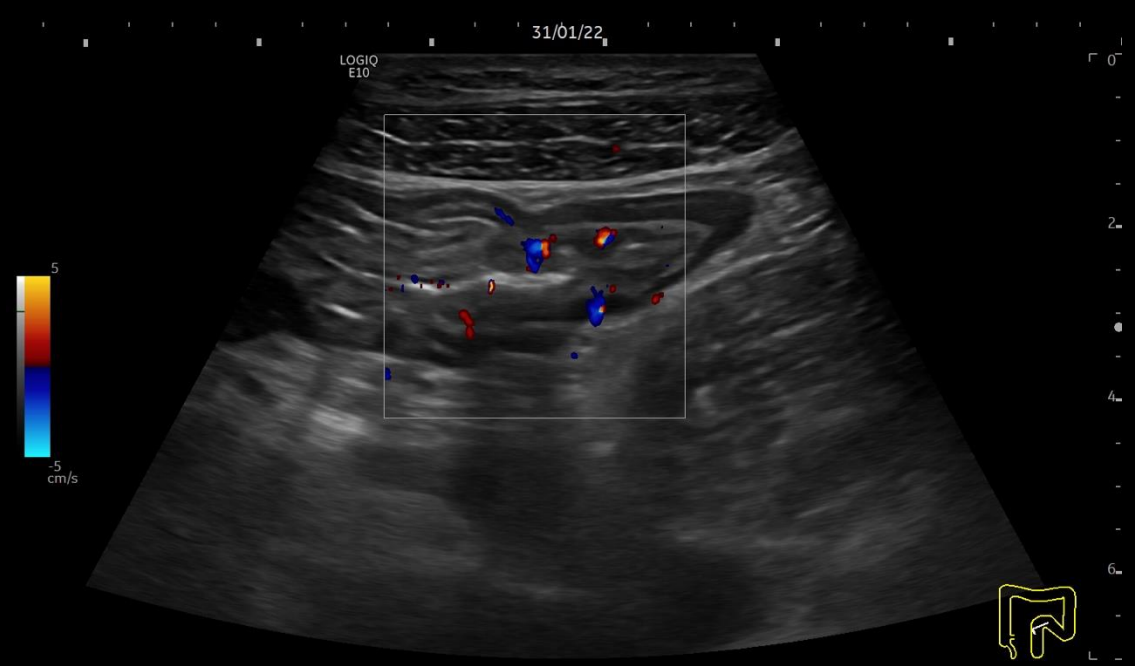
24y old man with ulcerative colitis



24y old man with ulcerative colitis

24y old man with ulcerative colitis





IUS Report - 24y old man with ulcerative colitis

IUS REPORT

INDICATIONS and DISEASE CHARACTERISTICS

24y old man, ulcerative colitis since 2019, mesalamine-refractory, steroid-refractory, azathioprine-induced pancreatitis.

8-10 loose stools, blood, abdominal cramps, urgency

INTRA-PROCEDURE FEATURES

Point of care examination. No technical limitation. Normal body status

Fasting period: 6h

Examination quality: good

Diagnostic confidence: high confidence

Image storage location: cine loops and images stored in PACS

Examiner: Torsten Kucharzik

IUS machine: GE Logiq E10; Probe: 2-9 MHz

RESULTS

BWT: sigmoid colon 5.4 mm, descending colon 4.5 mm, transverse colon 4.5 mm, ascending colon 1.9 mm, TI 1.8 mm

Vascularisation (IBUS CDS Score): rectum: NA, sigmoid colon: 3, descending colon: 3, transverse colon: 3, ascending colon: 0; TI: 0, ileum: 0, jejunum: 0: duodenum: 0

Echostratification: Colon: normal; small bowel: normal

Mesenteric fat: sigmoid colon; descending colon: present (2); transverse colon, ascending colon, TI: absent (0)

Additional findings: Pseudopolyps, loss of haustration in left colon, free fluid, mesenteric lymph nodes

Activity Score: MUC Activity Score (1.4 x CWT (mm) + 2 x CWF): 1.4x5.4+2=**9.56**

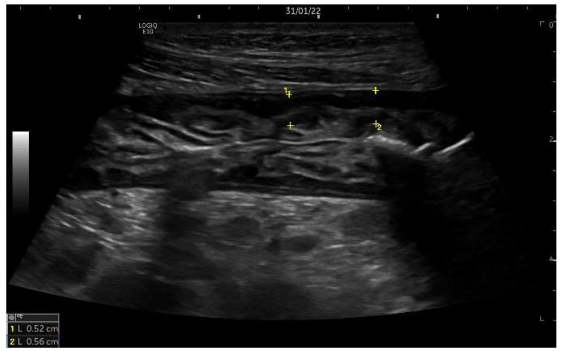
Complications of disease: None

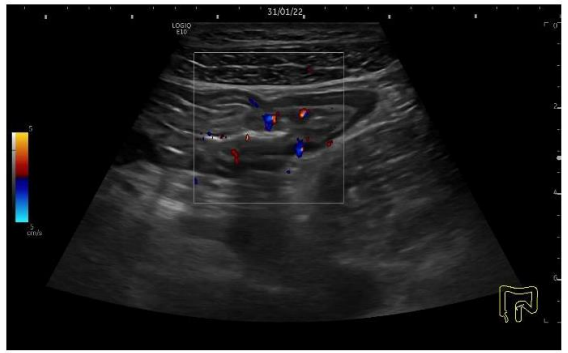
DESCRIPTION: Markedly increased BWT in the left sided colon until right transverse colon with increased vascularisation, preserved echostratification, increased mesenteric fat, mesenteric lymphadenopathy, pseudopolyps, partial abrogated haustration in the left colon and free fluid

IUS DIAGNOSIS: Acute Severe Ulcerative Colitis, E3

RECOMMENDATIONS: Suggested IUS follow up in 2 weeks

IMAGES:





CASE 2

INDICATIONS and DISEASE CHARACTERISTICS

- 22y old man, Crohn's disease L1B1 since 2017, steroid-refractory, azathioprine-failure
- 3-4 stools, abdominal cramps right lower quadrant, temp 37.9°C

lab results: Hb 10.2 mg/dl, CRP 67 mg/dl, fCalpro: >800 mg/kg.

INTRA-PROCEDERE FEATURES

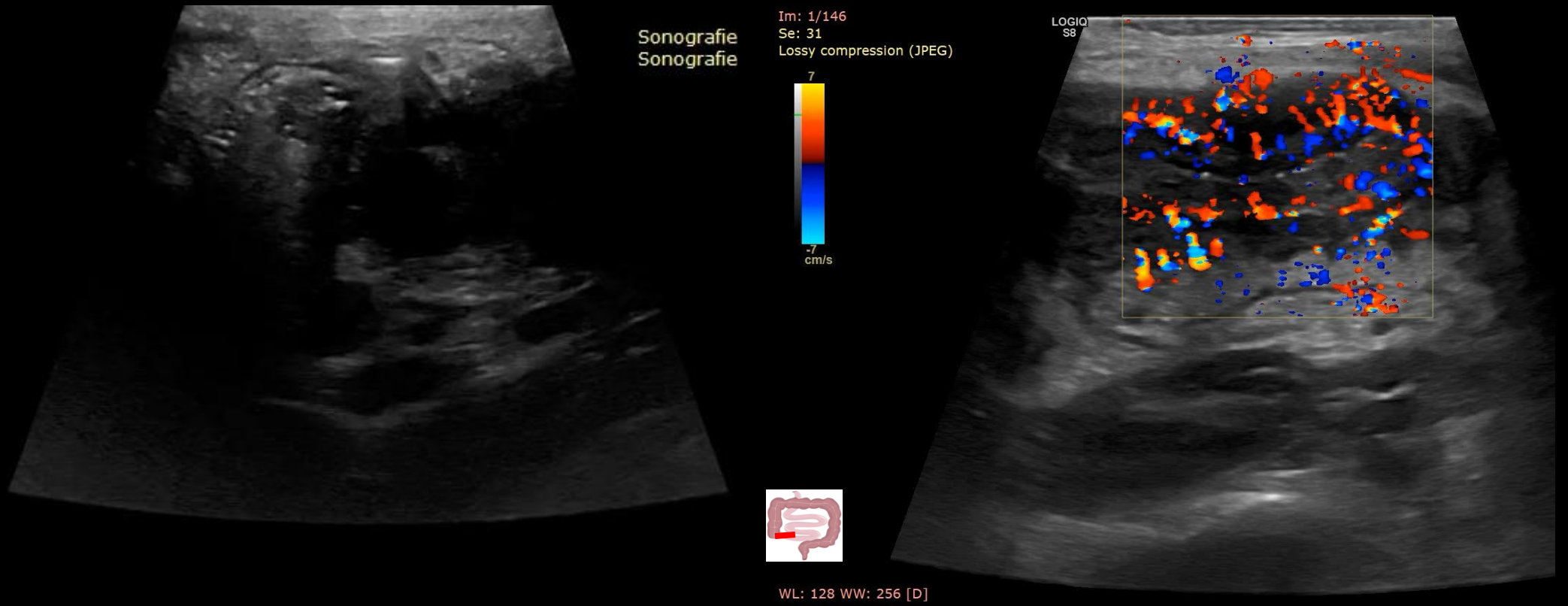
- Point of care examination. No technical limitation. Normal body status

Fasting period: 4h
Examination quality: good
Diagnostic confidence: high confidence
Image storage location: cine loops and images stored in PACS
Examiner: Torsten Kucharzik
IUS machine: GE Logiq S8, GE Logiq E10; Probes: C1-6 MHz, L2-9 MHz

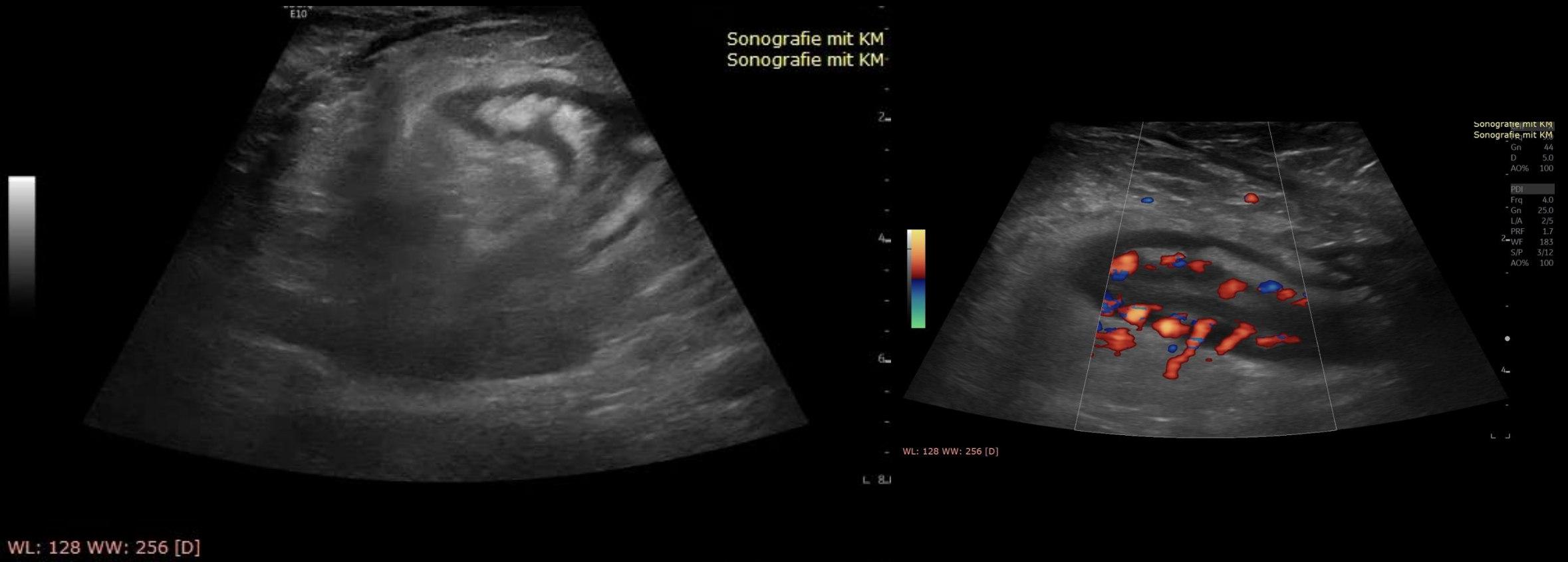
22y old man with Crohn‘s ileitis

- Please describe what you see and consider how to report your findings!
- Disease activity? What are the relevant parameters to look at?
- Disease extension?
- Additional findings?

22y old man with Crohn‘s ileitis

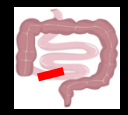


22y old man with Crohn‘s ileitis



22y old man with Crohn‘s ileitis – abscess or phlegmone?

22y old man with Crohn‘s ileitis – abscess or phlegmone?



WL: 128 WW: 256 [D]

IUS Report - 22y old man with Crohn‘s ileitis

IUS REPORT

INDICATIONS and DISEASE CHARACTERISTICS

22y old man, Crohn’s disease L1B1 since 2017, steroid-refractory, azathioprine-failure.

3-4 stools, abdominal cramps right lower quadrant, temp 37.9°C;

lab results: Hb 10.2 mg/dl, CRP 67 mg/dl, fCalpro: >800 mg/kg.

INTRA-PROCEDERE FEATURES

Point of care examination. No technical limitation. Normal body status

Fasting period: 4h

Examination quality: good

Diagnostic confidence: high confidence

Image storage location: cine loops and images stored in PACS

Examiner: Torsten Kucharzik

IUS machine: GE Logiq E10; Probe: 2-9 MHz

RESULTS

BWT: sigmoid colon 2.5 mm, descending colon 2.5 mm, transverse colon 2.2 mm, ascending colon 2.0 mm, TI 9.2 mm

Vascularisation (IBUS CDS Score) : rectum: NA, sigmoid colon: 1, descending colon: 1, transverse colon: 1, ascending colon: 1; TI: 3, ileum: 3, jejunum: 0: duodenum: 0

Echostratification: TI: completely abrogated; ileum: partially abrogated; colon: present

Mesenteric fat: TI and ileum: present (2); sigmoid colon; descending colon; transverse colon, ascending colon: absent (0)

Extension: TI/ileum: 18 cm length

Additional findings: free fluid, mesenteric lymph nodes; **CEUS:** (2.5 ml SonoVue) phlegmone, blind ending fistula, no absess

Complications: blind ending fistula TI, sinus tracks TI, no abscess, no stenosis

Activity Score: IBUS – SAS CD Score (0–100) = 4 · BWT + 15 · i-fat + 7 · CDS + 4 · BWS;

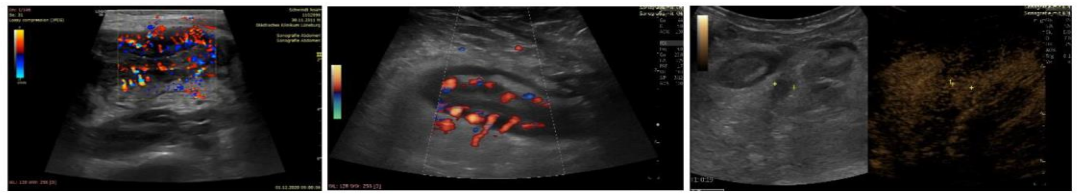
4x9.2+15x2 +7x3+4x3=**99,8**

DESCRIPTION: Markedly increased BWT in the terminal ileum, with markedly increased vascularisation, abrogated echostratification, increased mesenteric fat, abrogated motility, mesenteric lymphadenopathy, phlegmonre, sinus tracks, blind ending fistula and free fluid

IUS DIAGOSIS: Highly active penetrating Crohn’s disease L1B3 with blind ending fistula and sinus tracks in the TI

RECOMMENDATIONS: Suggested IUS follow up in 4 weeks

IMAGES



Thank You!!!