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Interactive Case Presentation: Scoring activity and response in CD and UC

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Workshop organised in collaboration with

IOSCAN Intestinal Ultrasound Group of the United States and Canada

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Disclosure

Advisory Board:

Abbvie, Alfasigma, Biogen, Galapagos, Gilead, J&J, Lilly, MSD Sharp & Dome GmbH, Pfizer, Roche, Samsung, Takeda Pharma GmbH

Speaker fee:

Abbvie, Alfasigma, Biogen, Dr. Falk Pharma GmbH, Ferring Arzneimittel GmbH, J&J, Lilly, MSD Sharp & Dome GmbH, Pfizer, Takeda Pharma GmbH

Mio thanks to Mariangela Allocca for supporting with many of her fantastic slides!!

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Ultrasound scoring systems in Crohn's disease

Table 1. IUS scores

IUS score formula	Calculation	BWT	BWS	CDS	i-fat
IBUS-SAS	IBUS-SAS [0 – 100] = 4·BWT [mm] + 15·i-fat + 7·CDS + 4·BWS	Normal ≤ 3 mm Active > 3 mm	0 = Normal 1 = Uncertain 2 = Focal ≤ 3 cm 3 = Extensive > 3 cm	0 = Absent 1 = Short signals 2 = Long signals inside bowel 3 = Long signals inside and outside bowel	0 = Absent 1 = Uncertain 2 = Present
SUS-CD	SUS-CD = BWT + CDS	0 = <3 mm 1 = [3–4.9 mm] 2 = [5–7.9 mm] 3 = ≥8 mm		0 = Absent or single vessels 1 = 2–5 vessels per cm^2 2 = >5 vessels per cm^2	
BUSS	BUSS = 0.75 · BWT [mm] + 1.65 · CDS	Normal ≤ 3 mm Active > 3 mm		0 = Absent 1 = Present	
Simple-US	Simple–US = BWT [mm] + CDS	Normal ≤ 3 mm Active > 3 mm		0 = Absent 1 = 1–2 points per cm^2 2 = 3–5 points per cm^2 3 = more than 5 points and vessels outside the intestinal wall are detected	

Detailed representation of the tested IUS scores. BUSS = Bowel Ultrasound Score; BWS = bowel wall stratification; BWT = bowel wall thickness; CD = Crohn's disease; CDS = colour Doppler signals; i-fat = inflammatory signals at mesentery; IBUS-SAS = International Bowel Ultrasound Segmental Activity Score; IUS = intestinal ultrasound; Simple-US = Simple Ultrasound Score; SUS-CD = Simple Ultrasound Score for Crohn's Disease.

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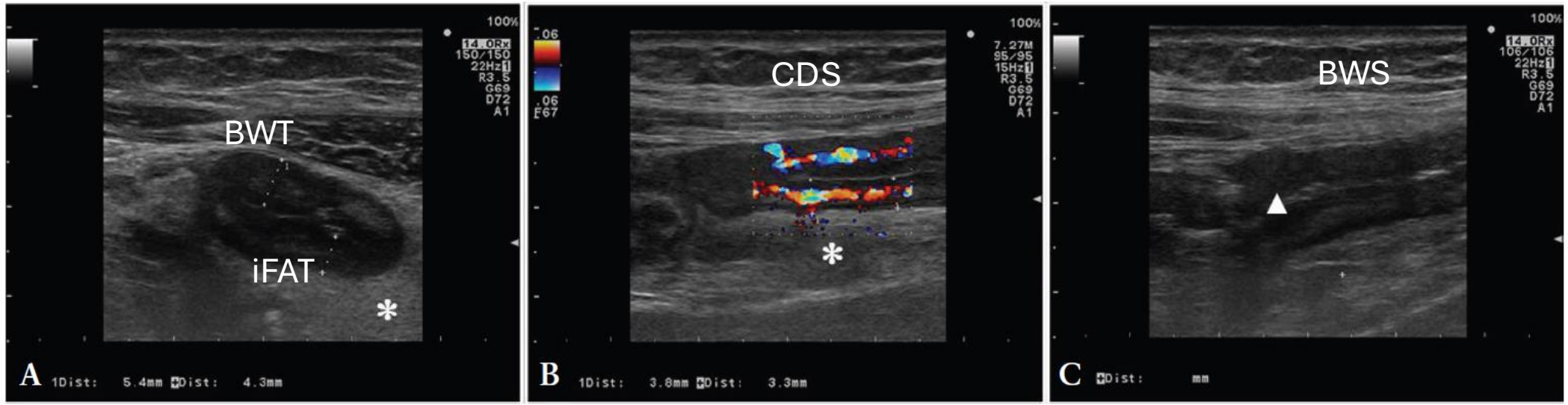
Ultrasound scoring systems in CD: Parameters



IBUS-SAS	*4*BWT + 15*i-fat + 7*CDS + 4*BWS*
SUS-CD	*BWT + CDS*
BUSS	*0.75*BWT + 1.65*CDS*
Simple-US	*BWT + CDS*

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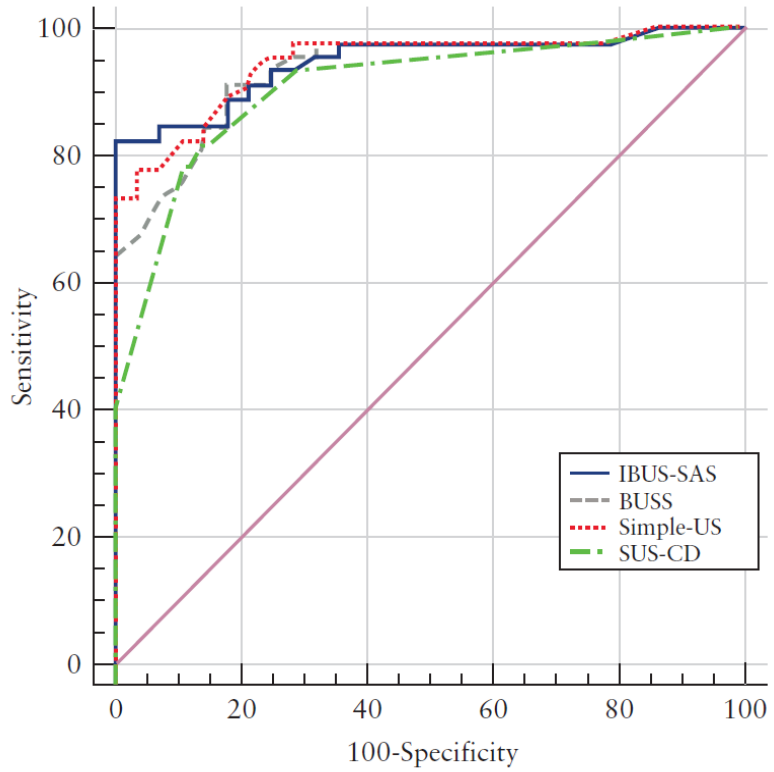
Comparison among scoring systems

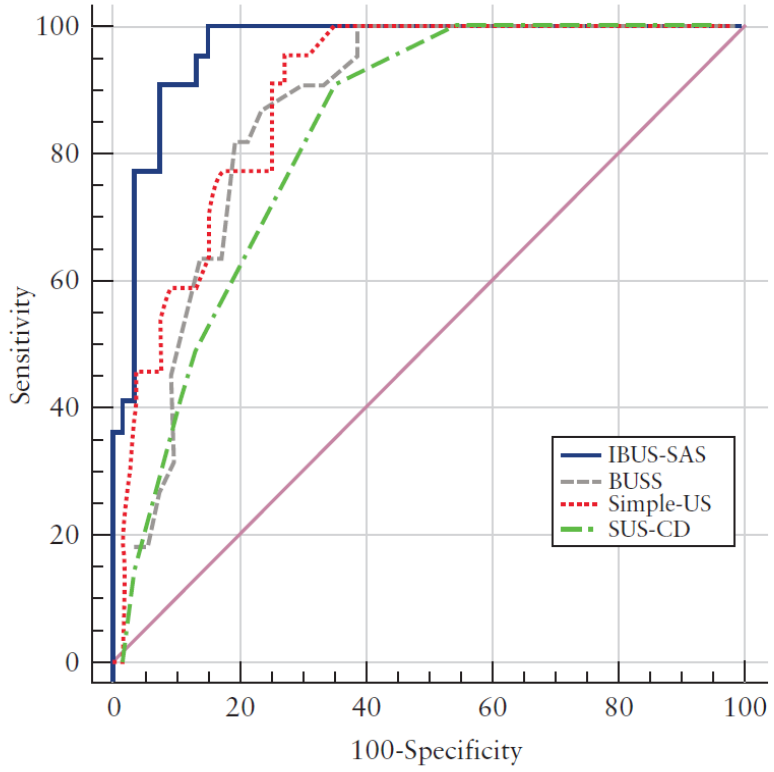
No significant difference
for any endoscopic activity
(SES-CD > 2)

A



Significant superiority of IBUS-SAS
for severe endoscopic activity
(SES-CD ≥ 9; p < 0.005)

B



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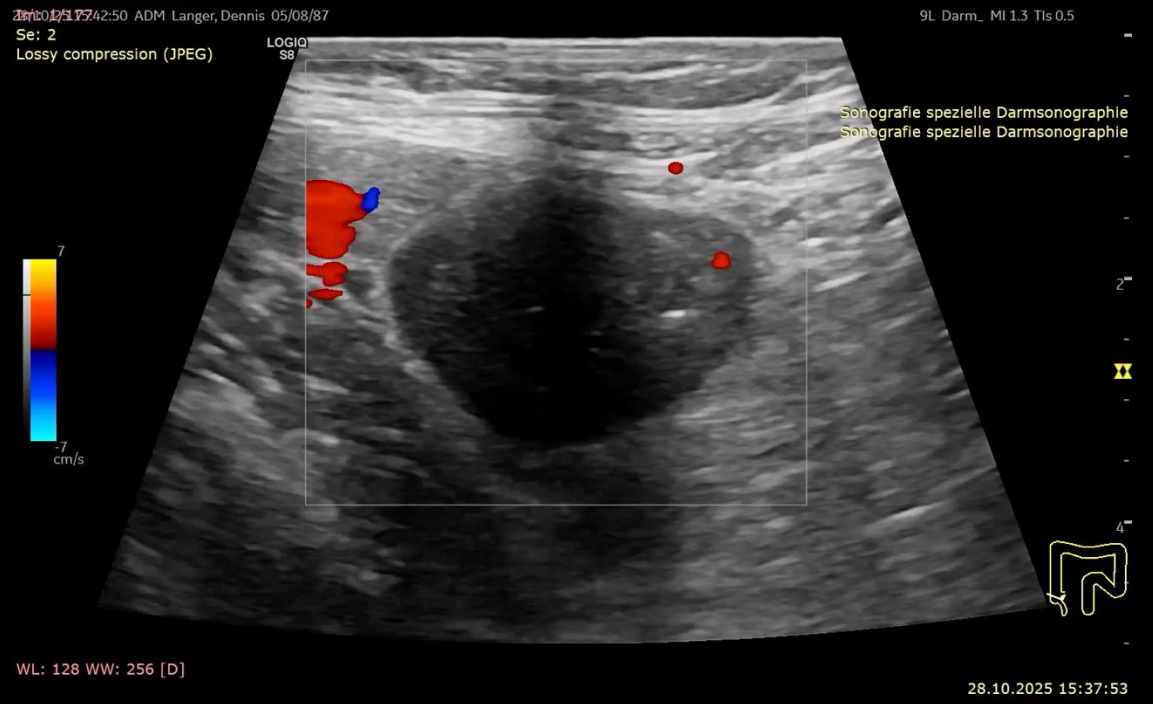
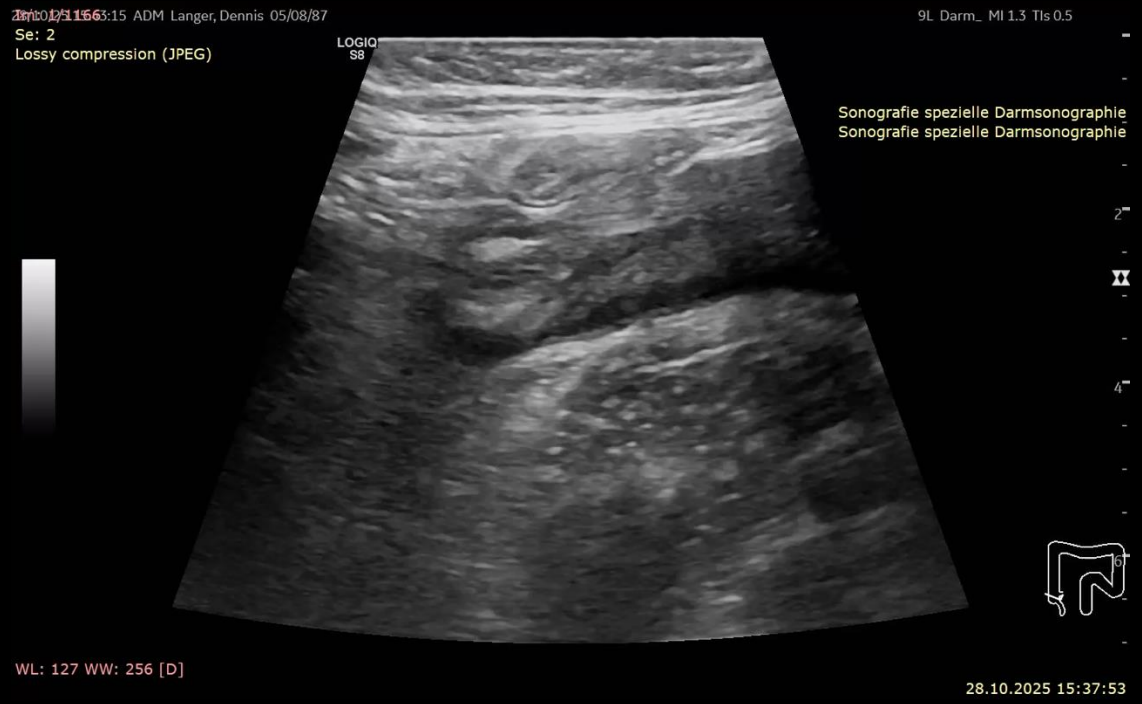
Scoring index for CD	Formula	Reference standard	Cohort No	Validation	Sensitivity to change	Predictive value
SUS-CD (Saevik, JCC 2020)	BWT + CDS	Colonoscopy (SES-CD > 2). Cut-off value ≥ 1 for SES-CD > 2	40	**YES**, internal cohort (N= 124). YES, external cohort (N= 73)	**NOT assessed**	**NOT assessed**
BUSS (Allocca, CGH 2021)	0.75 × BWT (mm) + 1.65 × CDS (1 if present/0 if absent)	Colonoscopy (SES-CD > 2; Rs ≥ 2). Cut-off value > 3.52 for SES-CD > 2	225	**YES**, external cohort (N= 73)	**YES**	**YES**
IBUS-SAS (Novak, JCC 2021)	4 x BWT (mm) + 15 x i-fat + 7 x CDS + 4 x BWS	Visual analogue scale	50	**YES**, external cohort (N= 73)	**YES**	**YES**
Simple US (Ripollés, IBD 2021)	BWT (mm) + CDS	Colonoscopy (SES-CD > 3; Rs > 1). Cut-off value 5.5 for SES-CD > 3	72	**YES**, external cohort (N= 73)	**NOT assessed**	**NOT assessed**

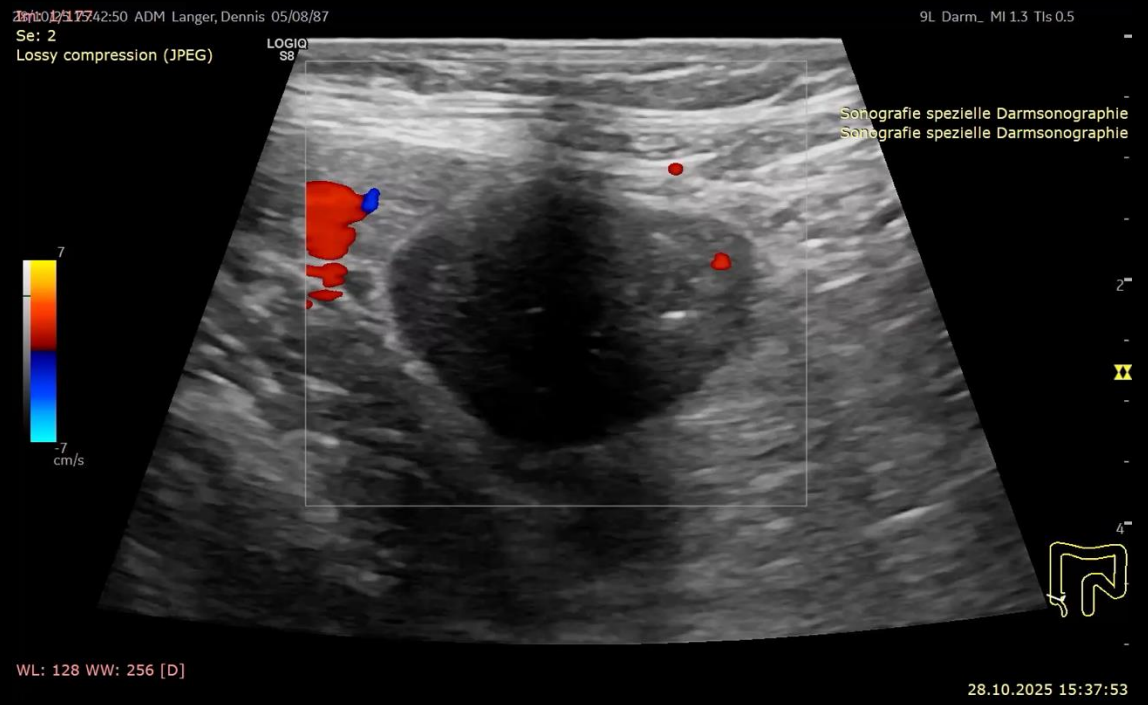
Dennis, 32 years old, Crohn's disease of the ileum, infliximab therapy



Mean BWT 7.5 mm

Dennis, 32 years old, Crohn's disease of the ileum, infliximab therapy



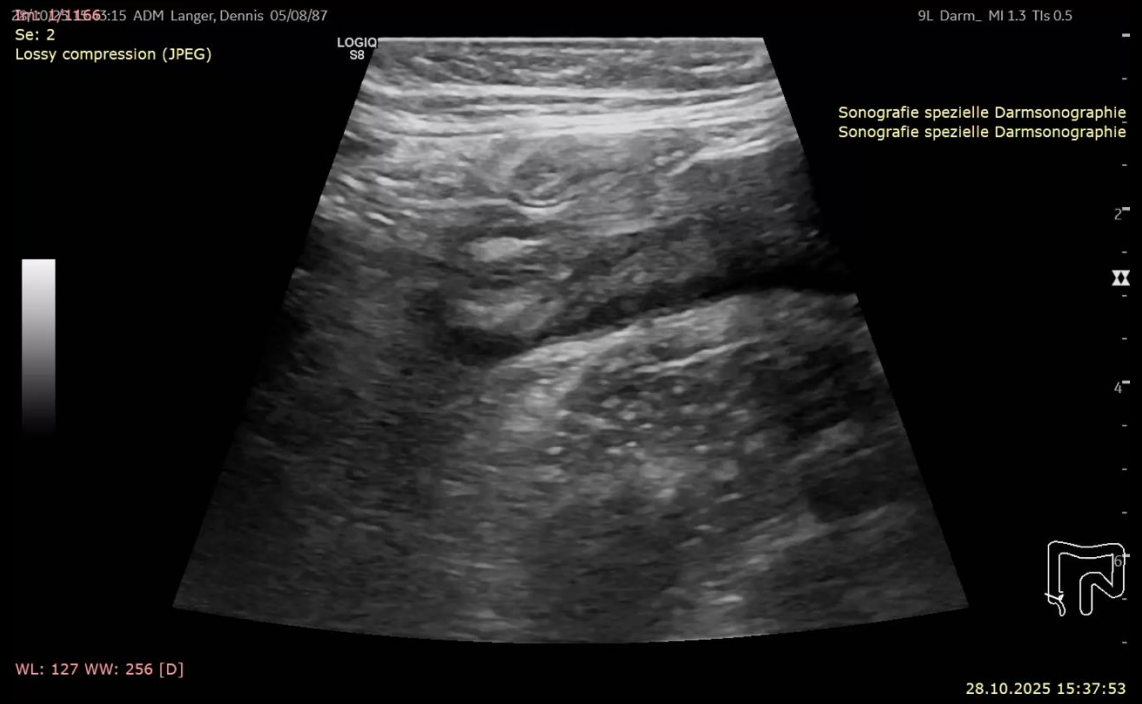


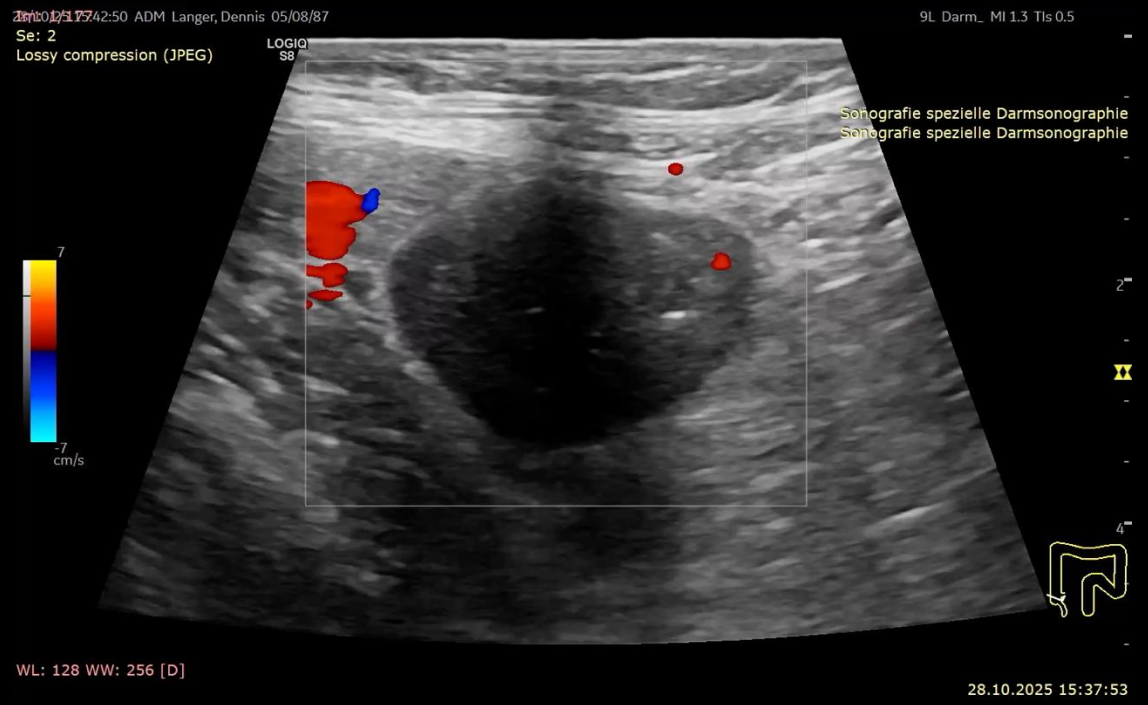
Mean BWT 7.5 mm

IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=

iFAT= 0 absent; 1 uncertain; 2 present
CDS= 0 absent; 1 short signals; 2 long signals; 3 signals in and out
BWS= 0 normal; 1 uncertain; 2 focal $\leq$ 3 cm; 3 extensive > 3 cm

Dennis, 32 years old, Crohn's disease of the ileum, infliximab therapy



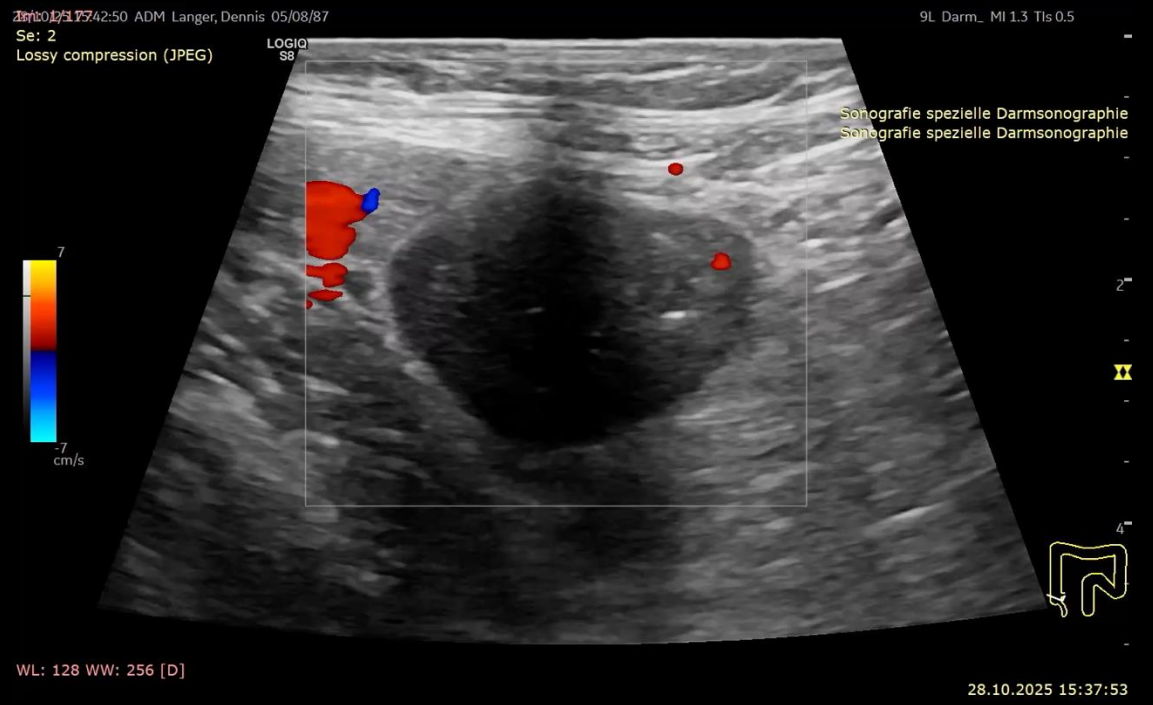


Mean BWT 7.5 mm

IBUS-SAS= (4x7.5 mm) + (15x2) + (7x1) + (4x3)= 79

iFAT= 0 absent; 1 uncertain; 2 present
CDS= 0 absent; 1 short signals; 2 long signals; 3 signals in and out
BWS= 0 normal; 1 uncertain; 2 focal $\leq$ 3 cm; 3 extensive > 3 cm

Dennis, 32 years old, Crohn's disease of the ileum, infliximab therapy

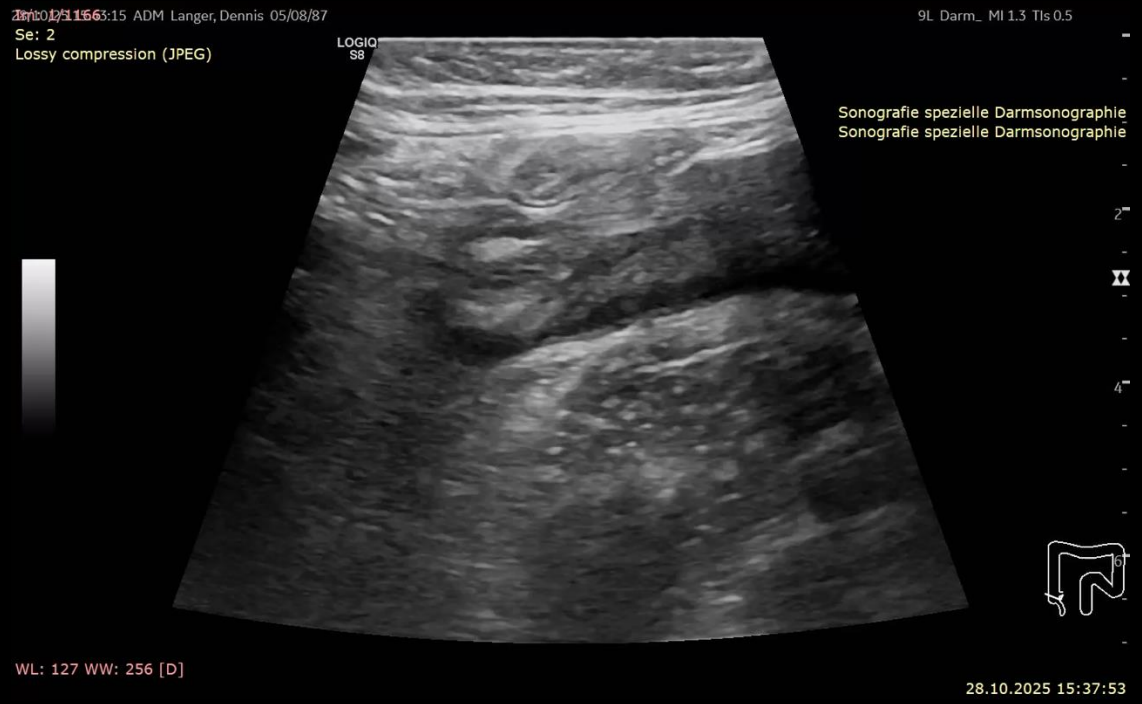


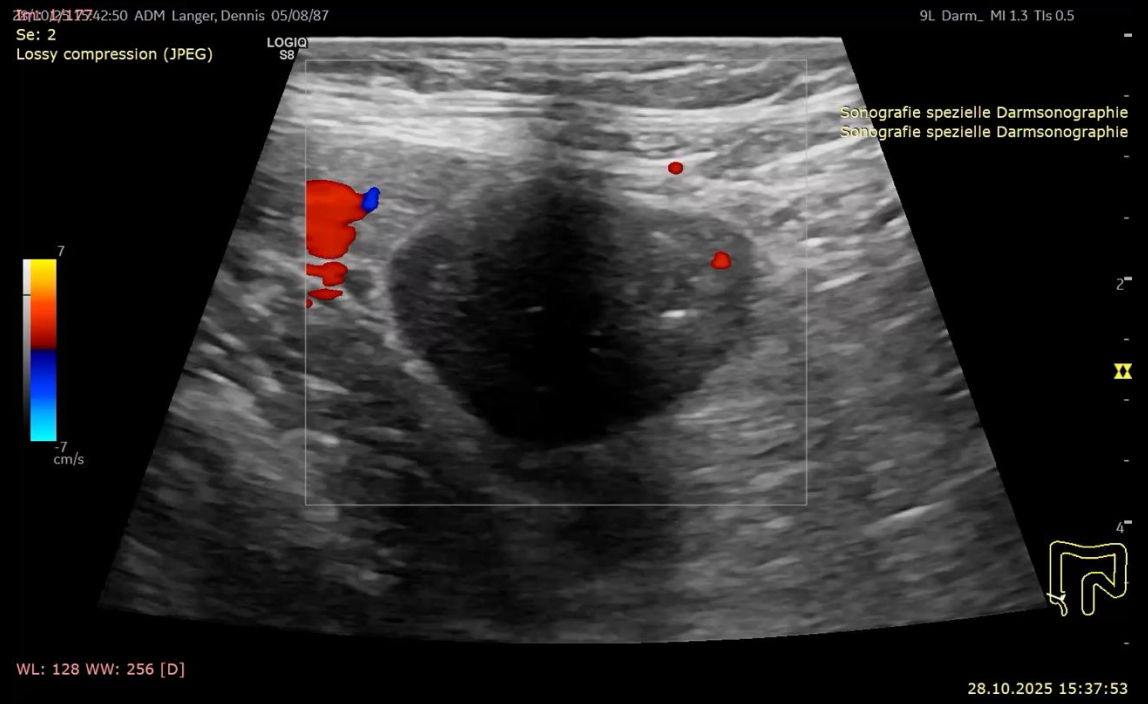
Mean BWT 7.5 mm

BUSS= (0.75xBWT mm) + (1.65xCDS)=

CDS= 0 absent; **1 present**

Dennis, 32 years old, Crohn's disease of the ileum, infliximab therapy



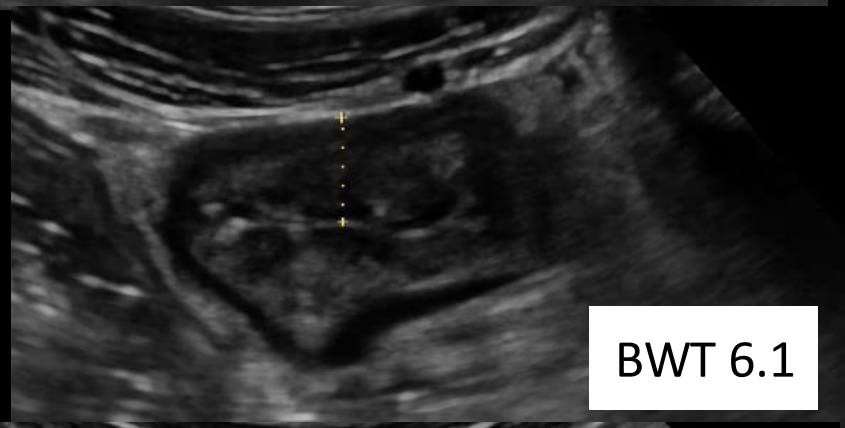


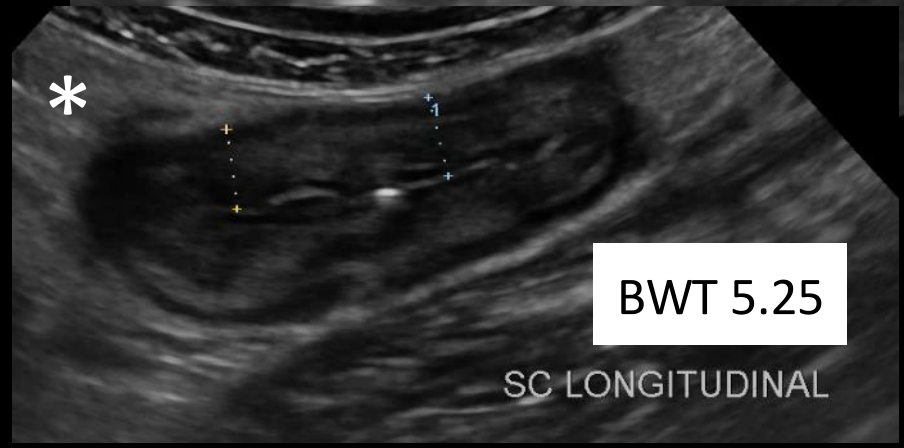
Mean BWT 7.5 mm

BUSS= (0.75x7.5 mm) + (1.65x1)= 7.28

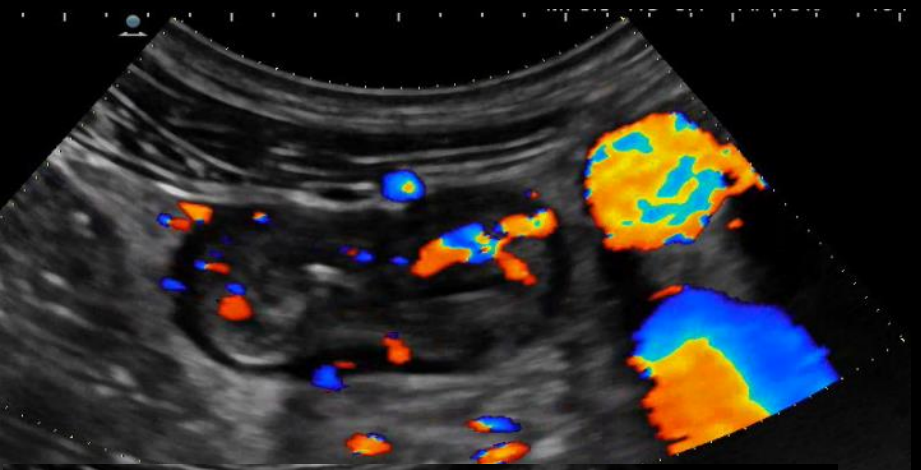
CDS= 0 absent; **1 present**

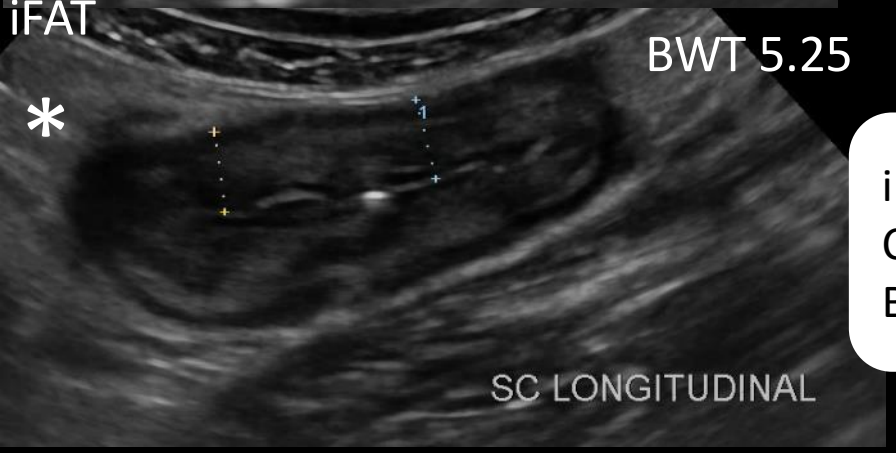
Marco, 24 years old, Crohn's disease localised to the sigmoid colon, steroid dependent





IBUS-SAS score





IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=

iFAT= 0 absent; 1 uncertain; 2 present
CDS= 0 absent; 1 short signals; 2 long signals; 3 signals in and out
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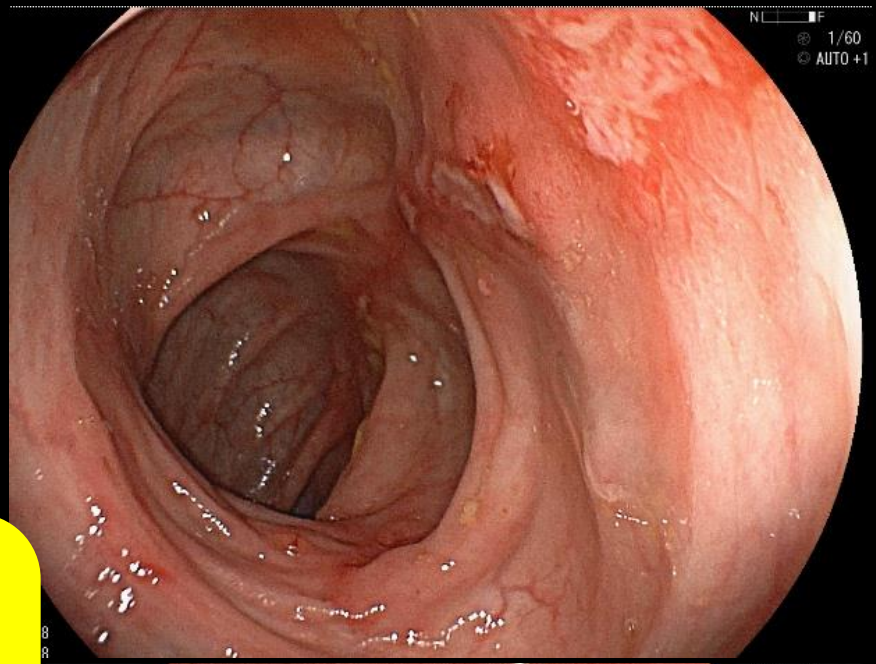
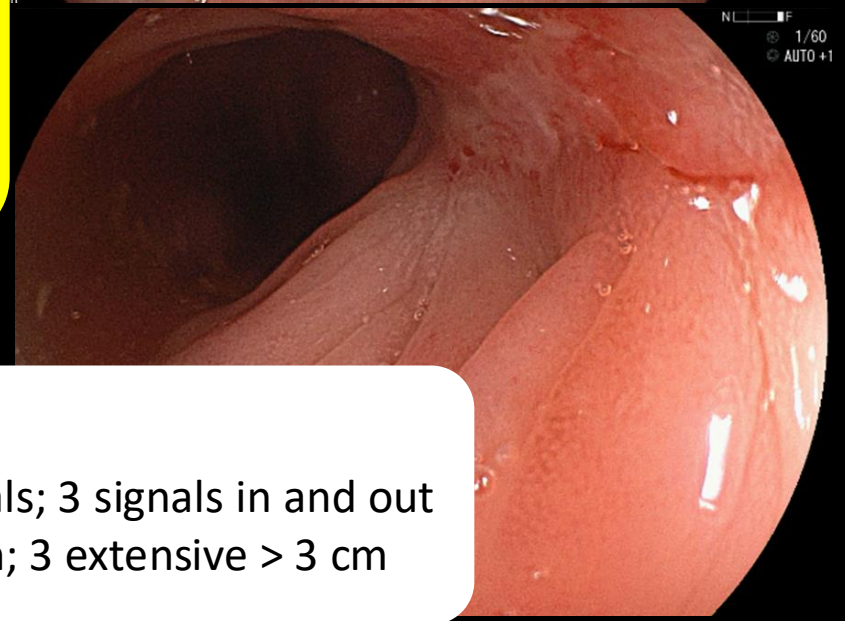
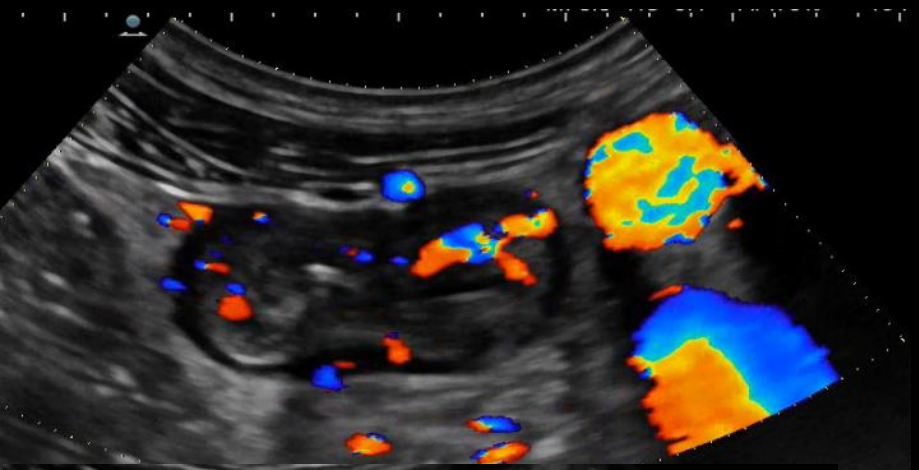
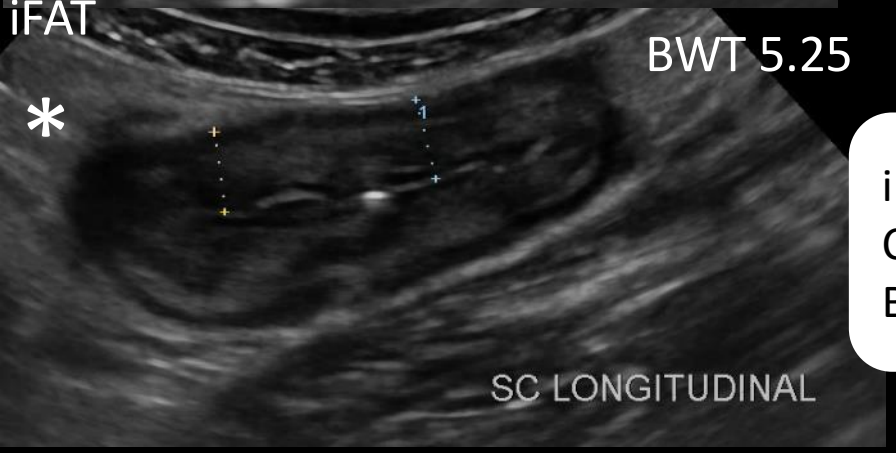




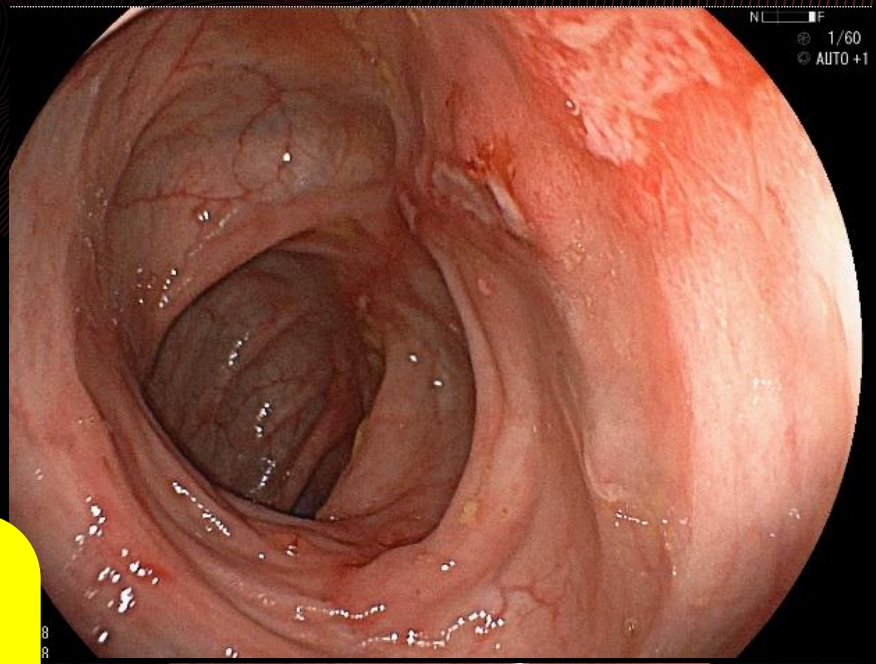
SES-CD= 12

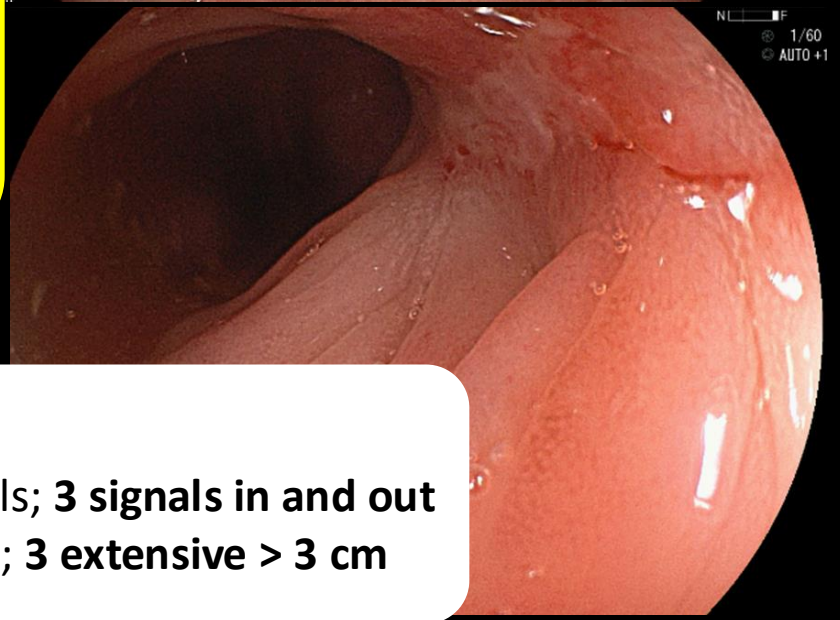
IBUS-SAS score





IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=
(4x5.6) + (15x2) + (7x3) + (4x3)=
85.4





iFAT= 0 absent; 1 uncertain; **2 present**
CDS= 0 absent; 1 short signals; 2 long signals; **3 signals in and out**
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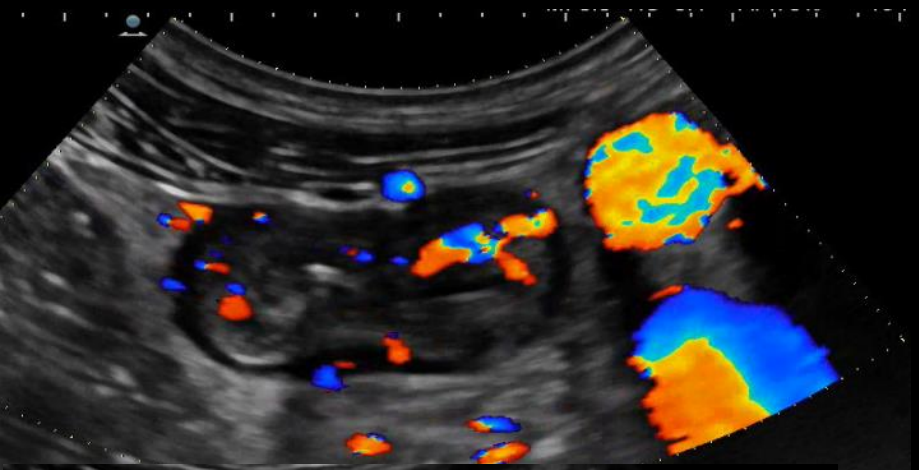
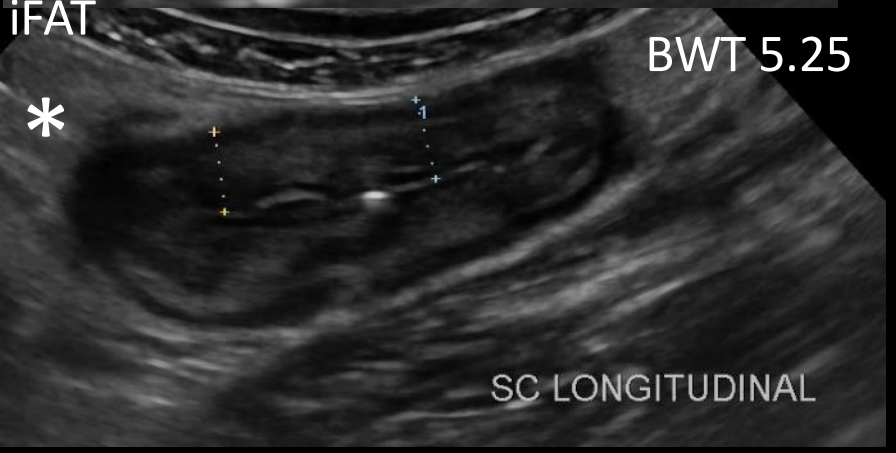
SES-CD= 12

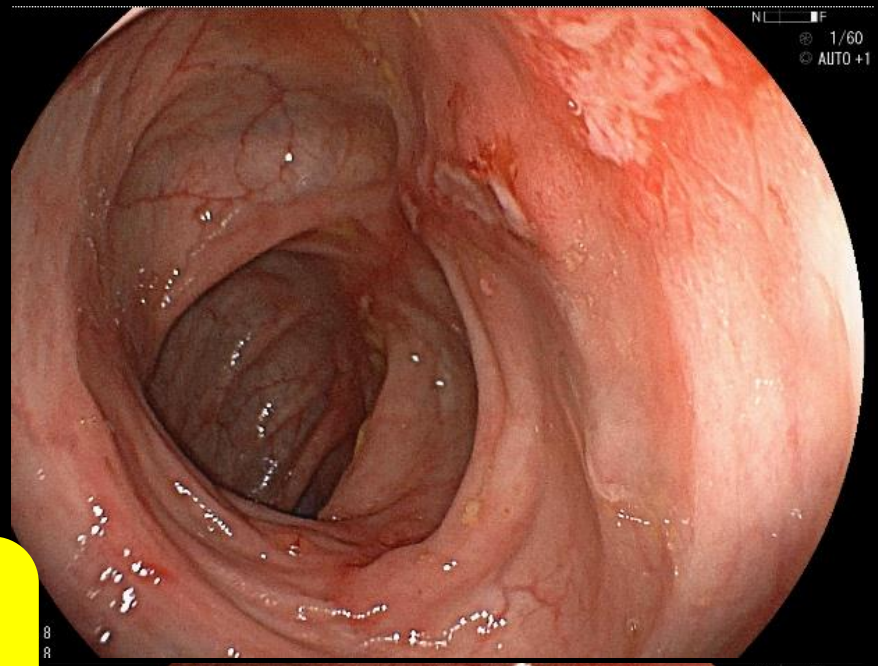


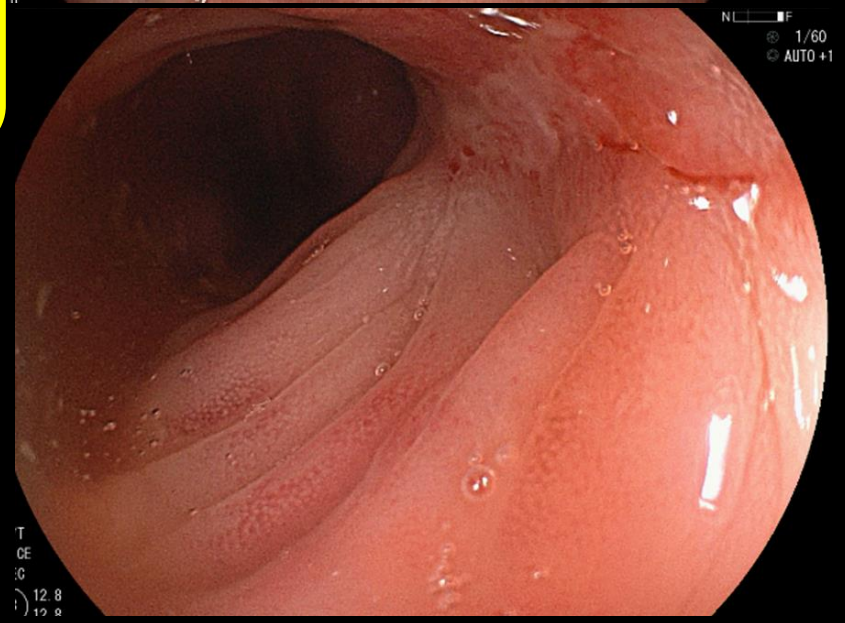


BUSS score

BUSS= (0.75xBWT mm) + (1.65xCDS)=

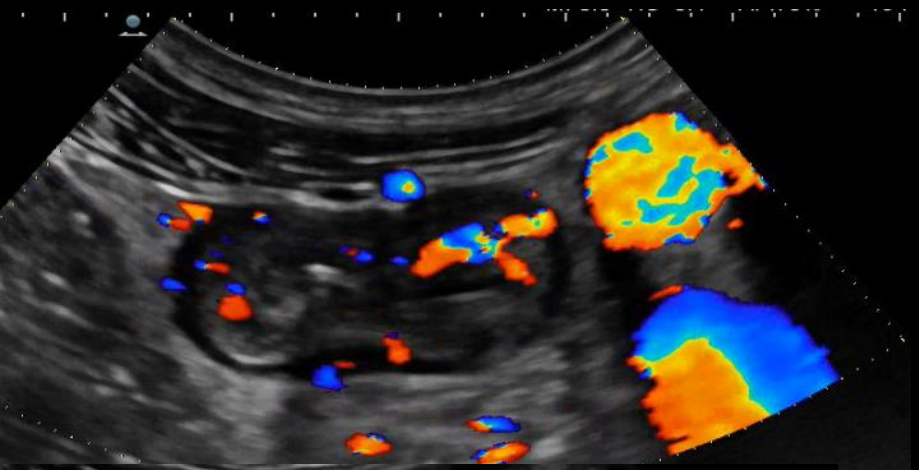
CDS= 0 absent; 1 present

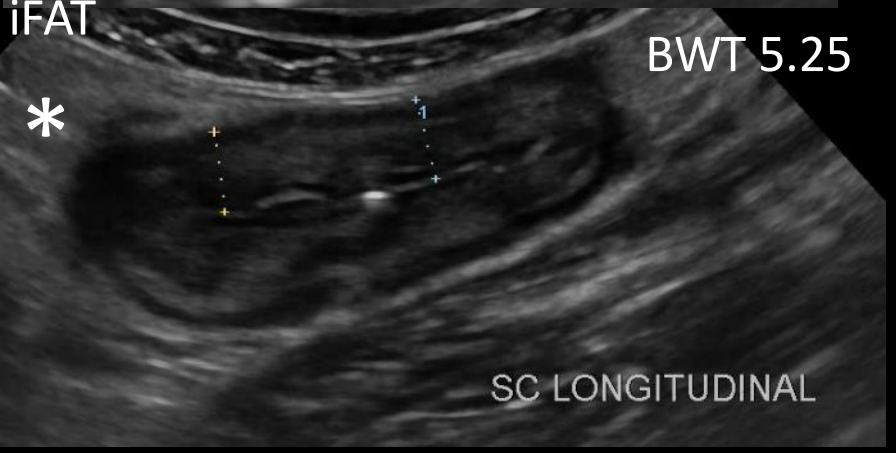




SES-CD= 12

BUSS score

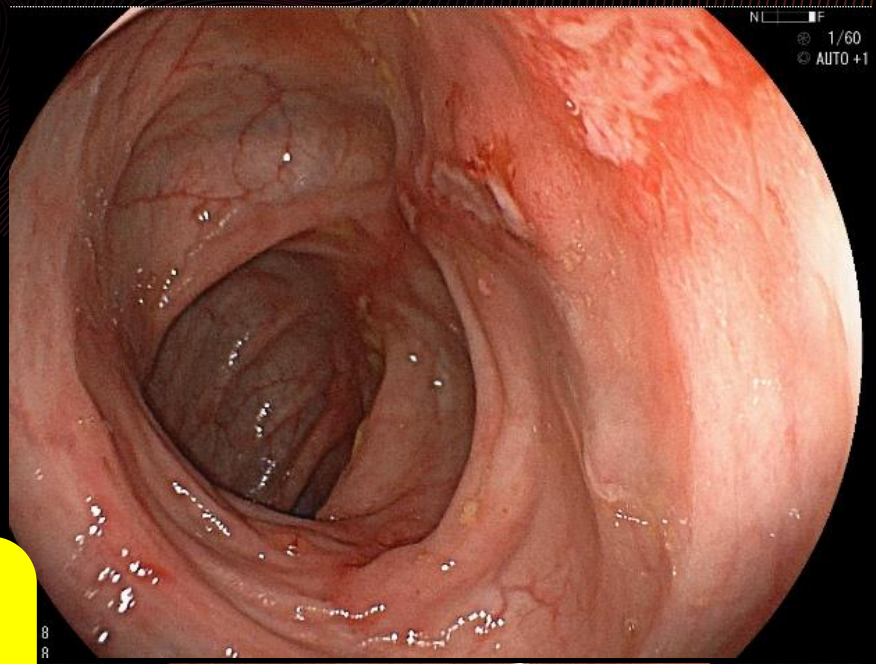


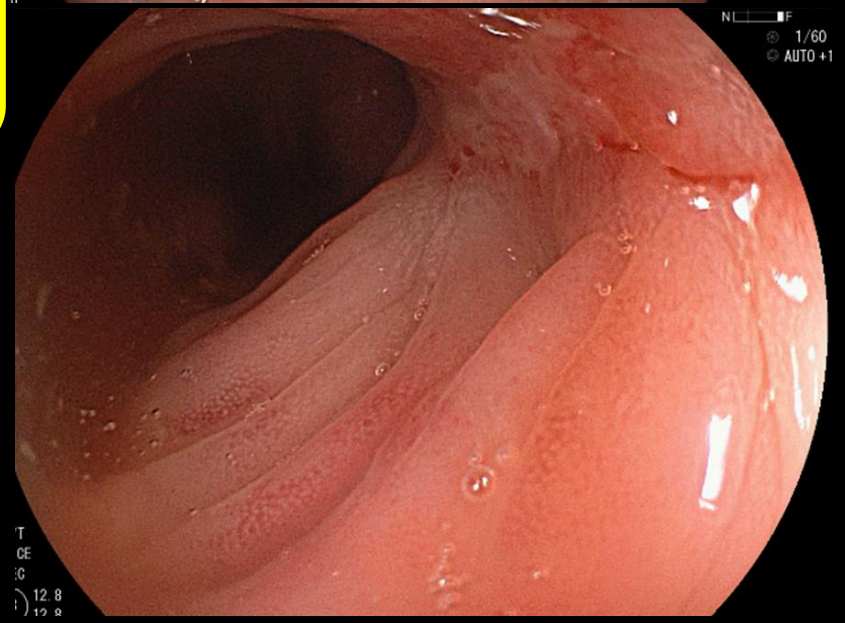


BUSS= (0.75xBWT mm) + (1.65xCDS)=
0.75×5.6 + 1.65x1= 5.85

Cut-off value > 3.52
for SES-CD > 2

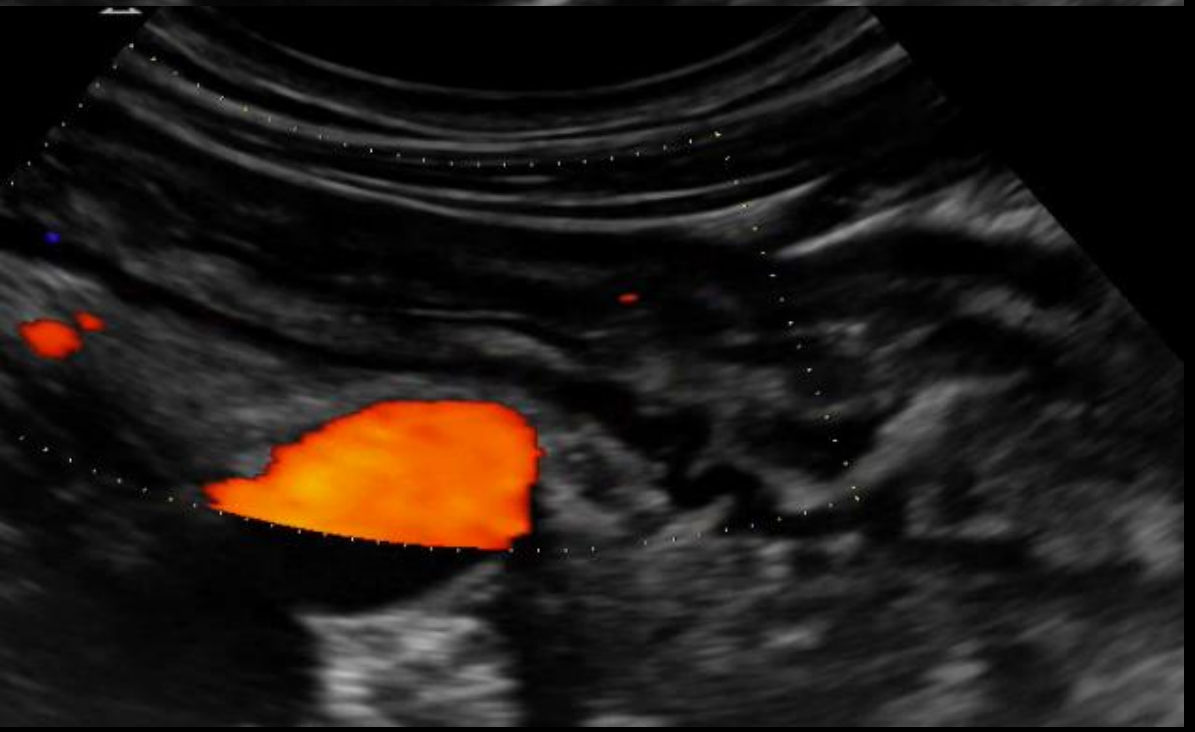
CDS= 0 absent; **1 present**

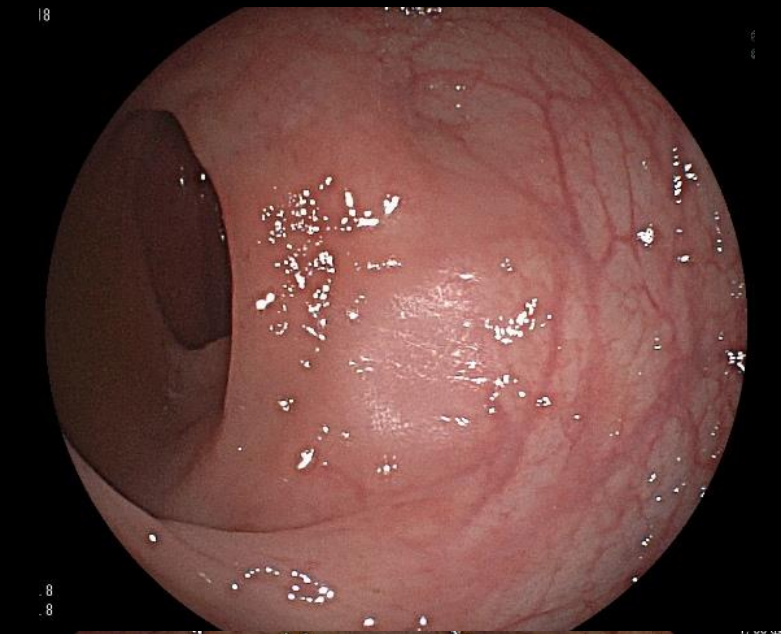


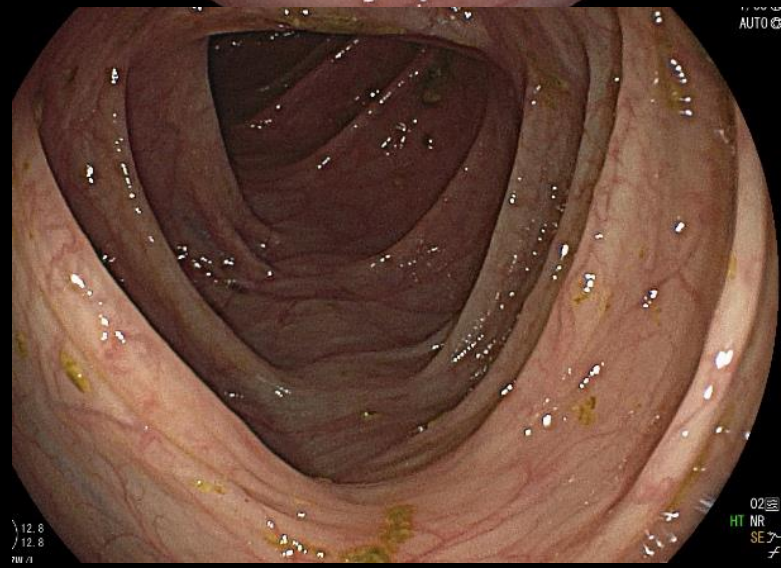


SES-CD= 12

12 Months after starting IFX+AZA

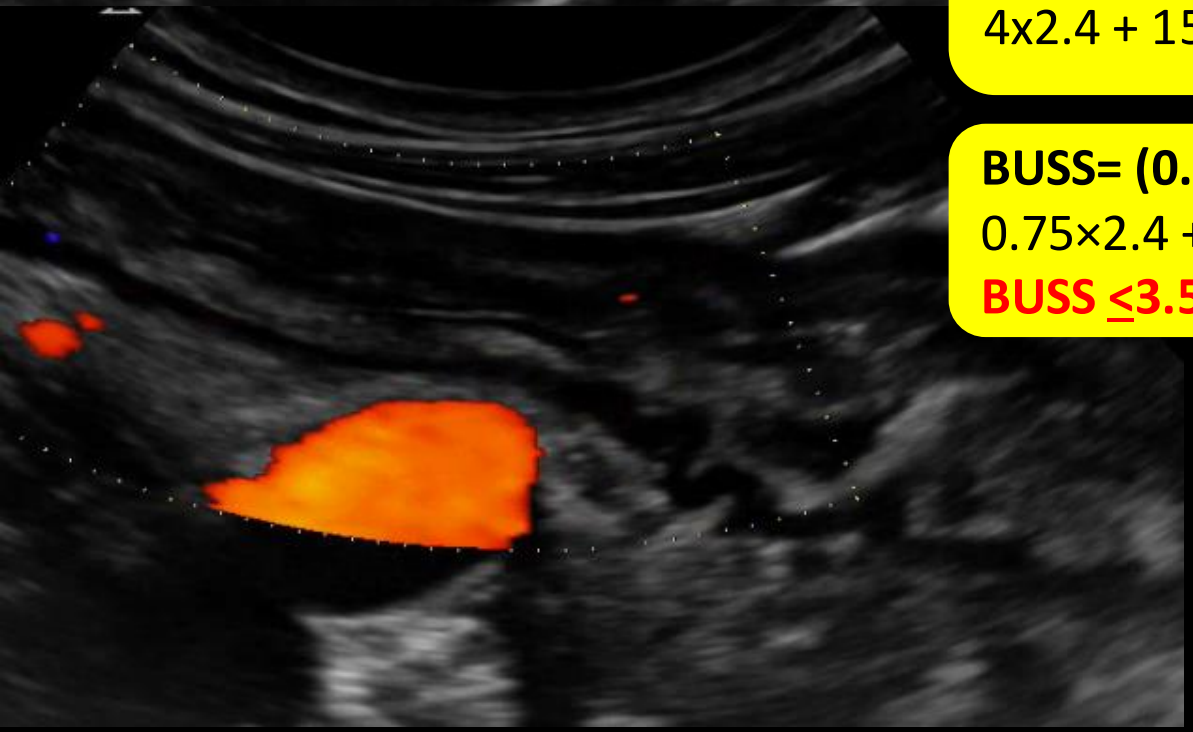






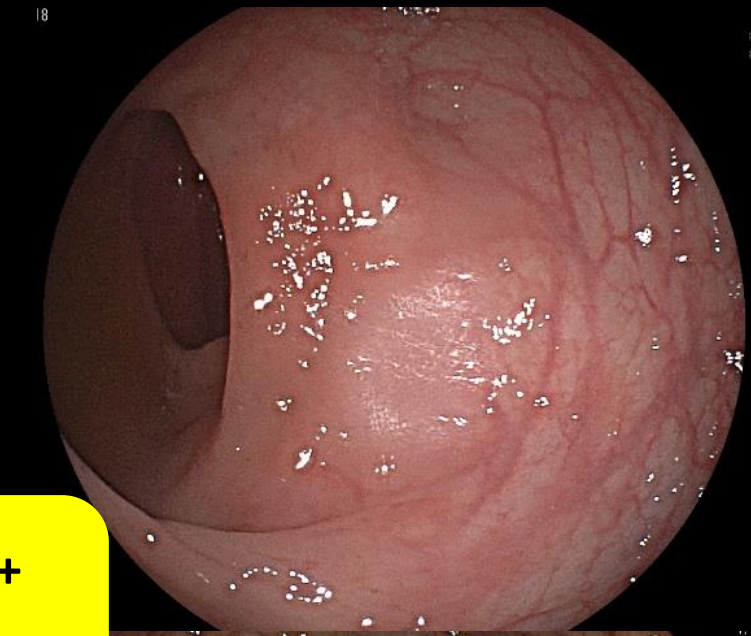
SES-CD= 0

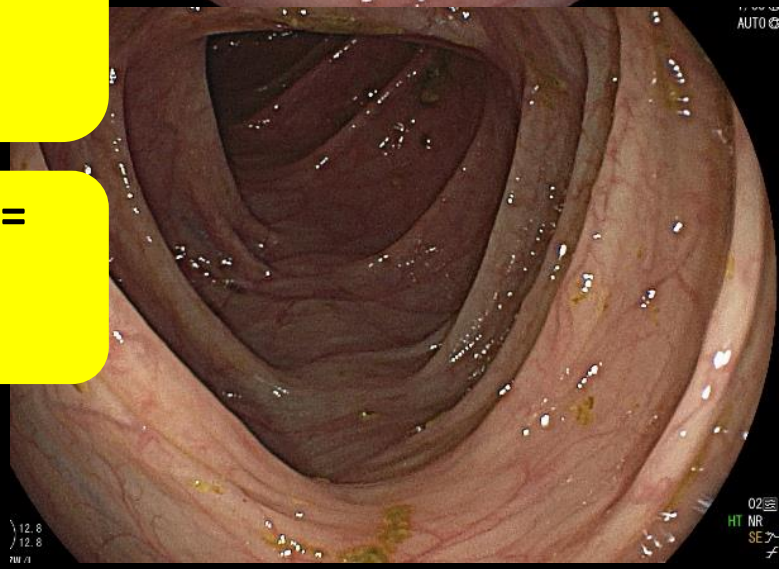
6 Months after starting IFX+AZA



IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=
4x2.4 + 15x0 + 7x0 +4x0= **9.6**

BUSS= (0.75xBWT mm) + (1.65xCDS)=
0.75×2.4 + 1.65x0= **1.8**
BUSS ≤3.52 for SES-CD ≤2





SES-CD= 0

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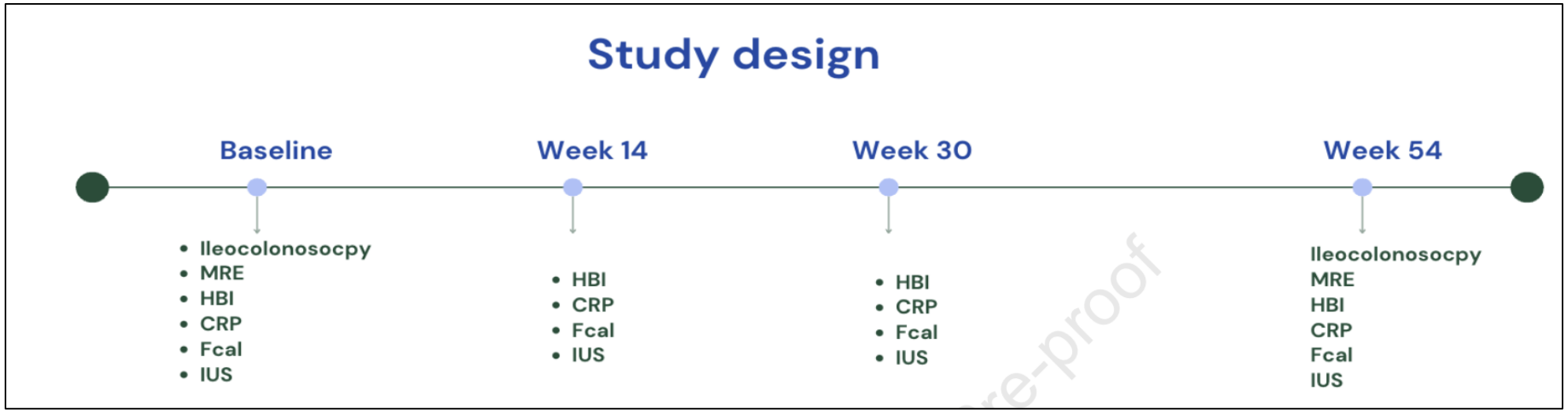
Which is the best timepoint to redo scoring in CD to predict longerterm outcome?

Use of Intestinal Ultrasound in a Tight monitoring approach in Crohn's disease: a multicentre prospective study



Primary outcome:
Predictive value of IUS remission (normalization of bowel wall thickness (BWT), stratification, vascularization and mesenteric fat) → ER at W54 (segmental SES-CD=0).

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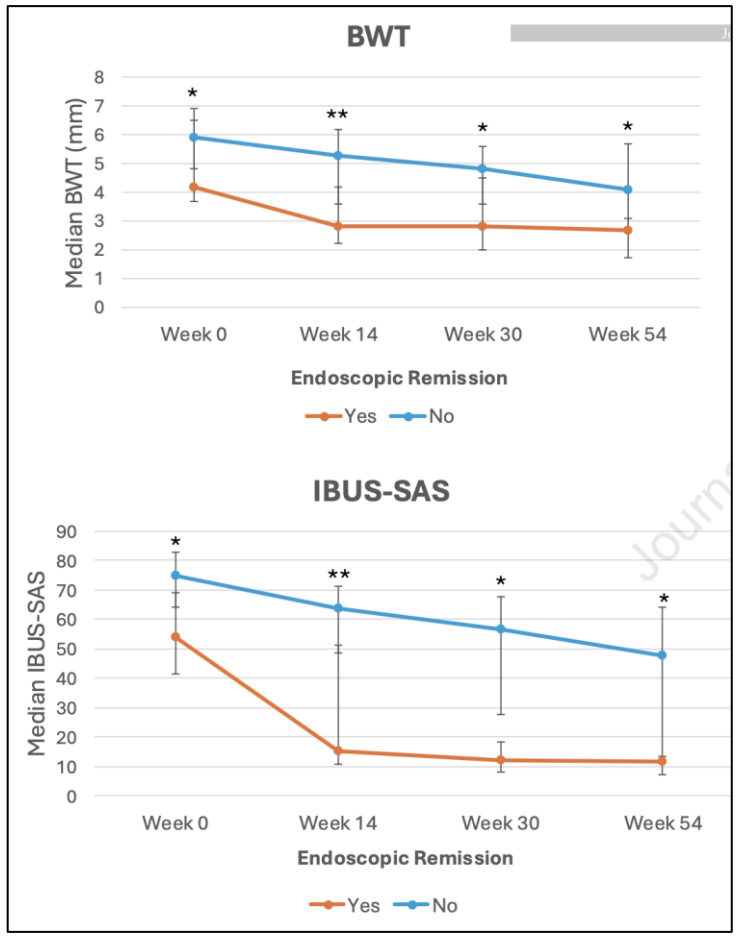
IUS at week 14 → Prediction of Endoscopic remission at week 54



Predictor	AUC (95% CI)	Cut-off Value	Sensitivity	Specificity	PPV	NPV
IBUS-SAS W14	0.861 (0.754-0.950)	56.6	69%	95%	96%	66%
BWT W14	0.802 (0.669-0.920)	2.9 mm	97%	55%	78%	92%

Variables	Multivariable analysis	
	aOR (95% CI)	*p value*
IBUS-SAS < 56.6	19.0 (1.91-189.6)	***0.012***
BWT < 2.9 mm	1.13 (0.10-13.25)	0.92
FCP < 250 µg/g	5.48 (0.43-69.83)	0.19
CRP < 0.5 mg/dL		
HBI < 5		
IUS remission W14	4.10 (0.18-93.30)	0.38
Lab remission W14	0.87 (0.10-7.79)	0.90
IUS + Lab remission W14		

Multivariable analysis:
IBUS-SAS<56.6 at W14 was the only independent predictor for ER (OR 19.0; 95%CI 1.91-189.6; p=0.012

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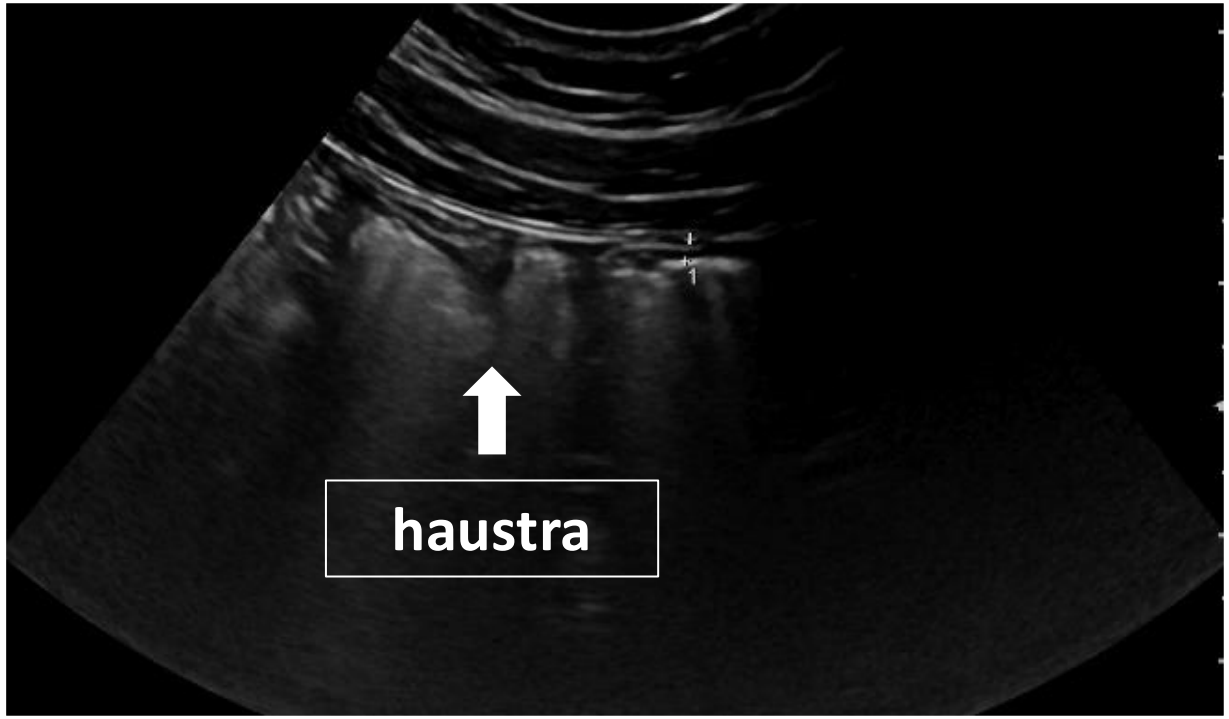
Ultrasound scoring systems in UC

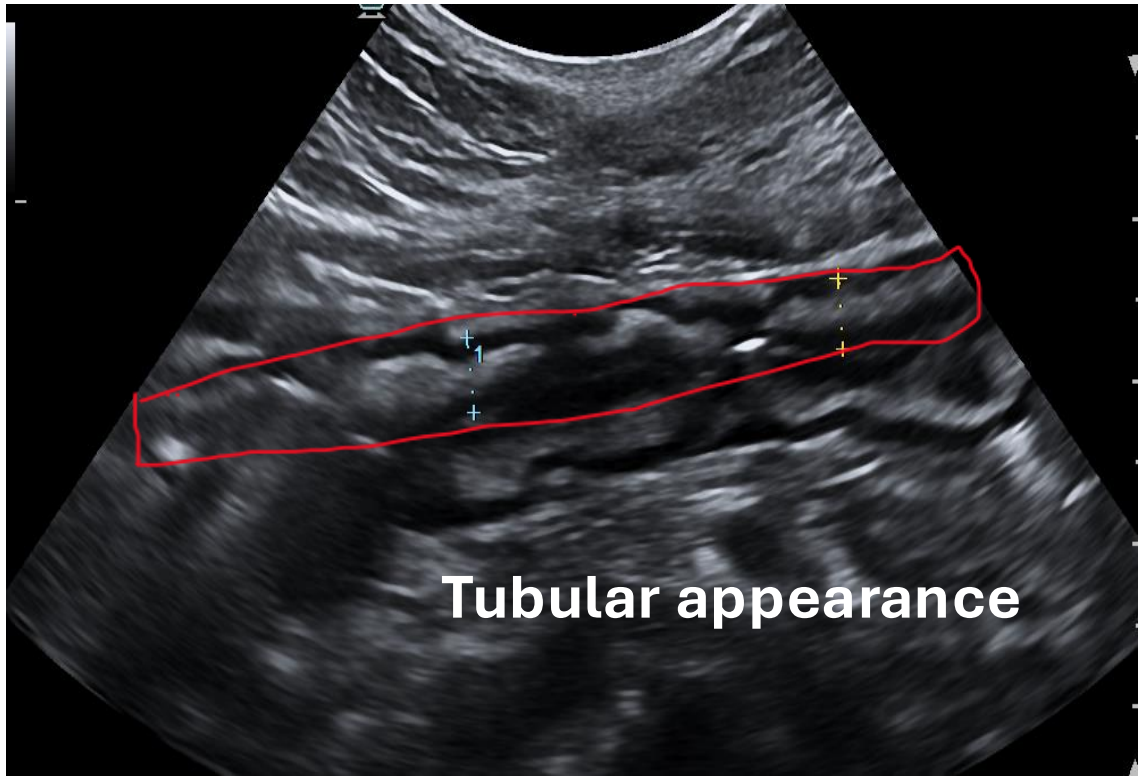
IUS score	Calculation formula	BWT	CDS	BWS	Haustra	iFAT
MUC	1.4 x BWT (mm) + 2 x CDS	Normal ≤ 3 mm Active > 3 mm	0 = Absent 1 = Present			
UC-IUS index	BWT + CDS + Haustra + iFAT	1= > 2 mm 2= > 3 mm 3= > 4 mm	1= Spots 2= Stretches		1= Abnormal	1= present
IBUS-SAS	4 x BWT (mm) + 15 x i-fat + 7 x CDS + 4 x BWS	Normal ≤ 3 mm; Active > 3 mm	0= absent; 1 = short signals; 2 = long signals inside bowel; 3 = long signals inside and outside bowel wall	0= normal; 1= uncertain; 2= focal ≤ 3 cm; 3 = extensive > 3 cm		0= absent; 1= uncertain; 2= present

MUC, Milan Ultrasound Criteria; UC-IUS index, Ulcerative Colitis-Intestinal Ultrasound index; IBUS-SAS

Normal: **haustra** in the colon

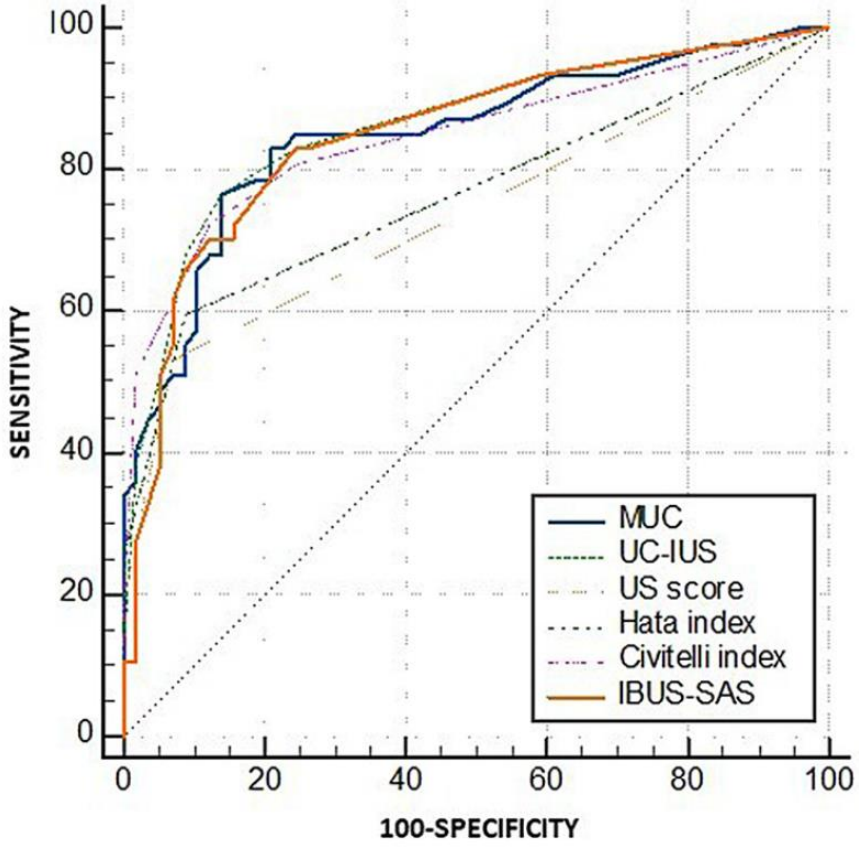


Pathological: the colon takes on a tubular appearance with the loss of the **haustra**

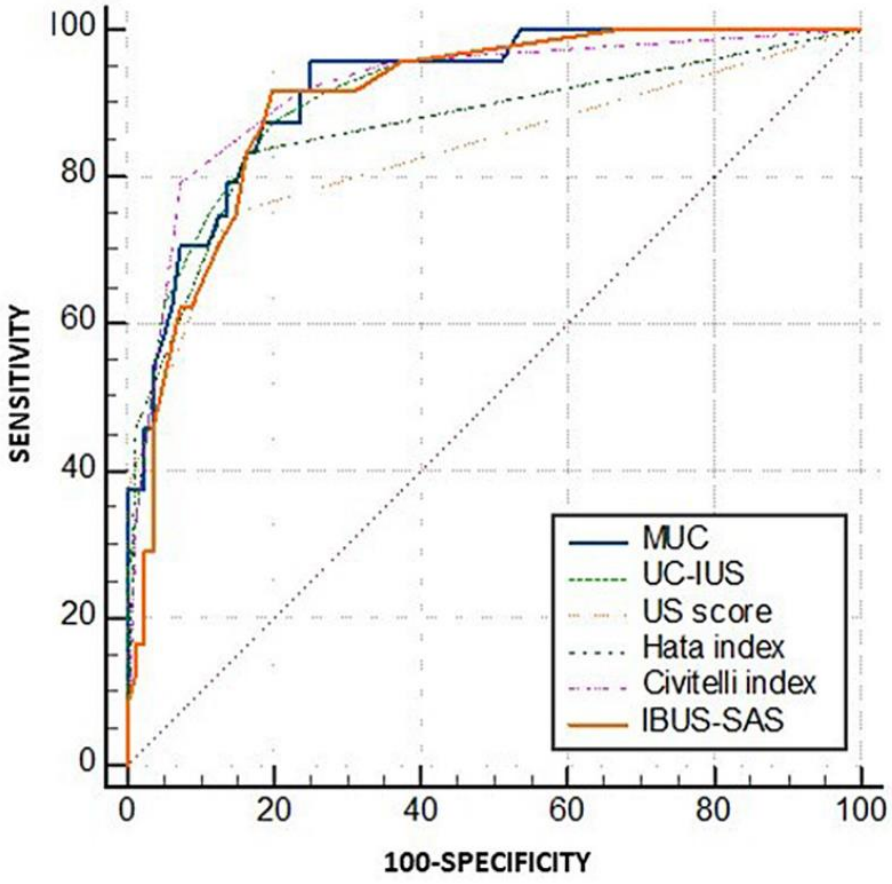


No difference between MUC, IBUS-SAS, UC-IUS

AUC for MES ≥2



AUC for UCEIS ≥5



Innocenti et al. CGH 2024

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Ultrasound scoring systems in UC

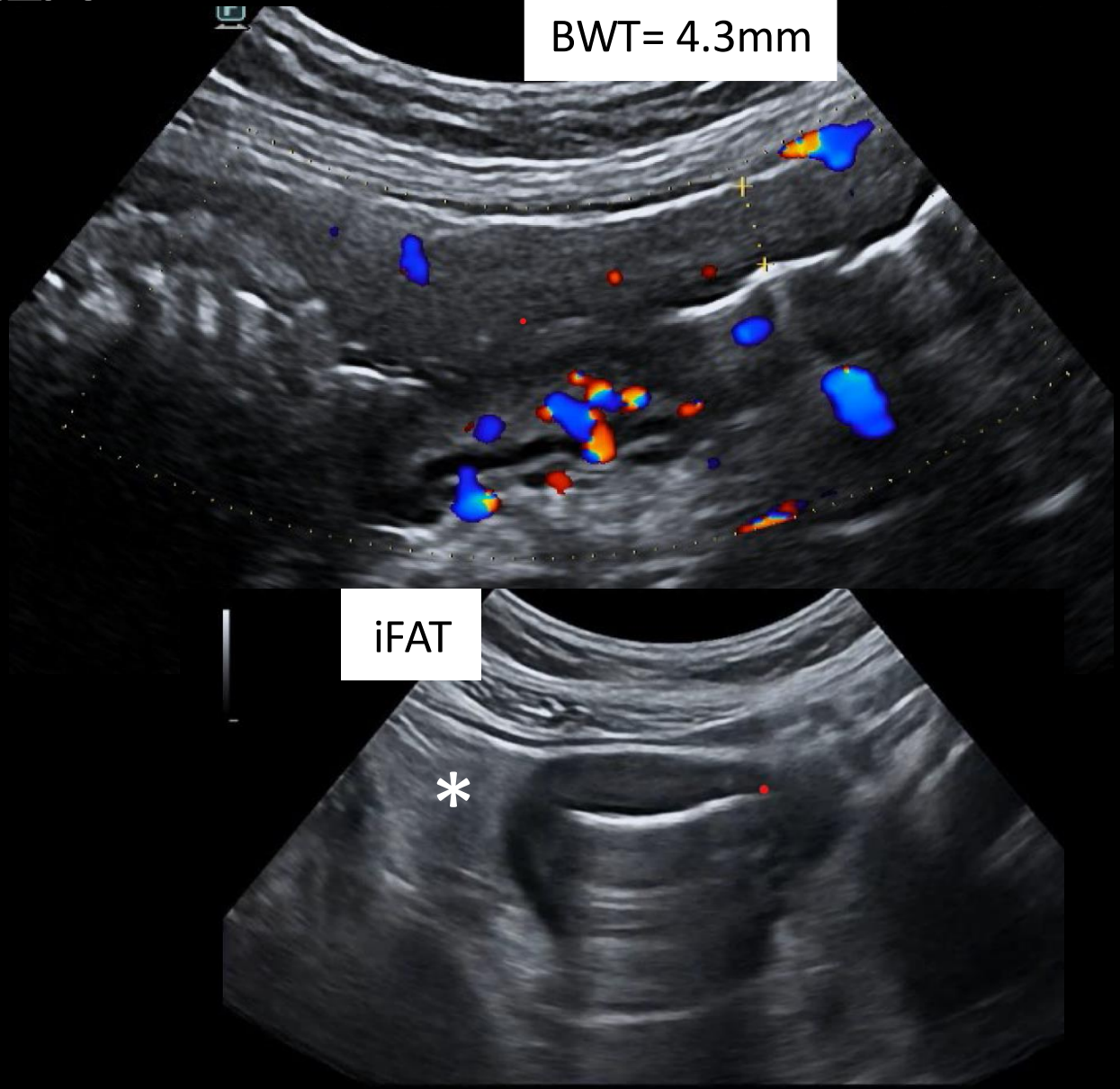
Scoring index for UC	Formula	Reference standard	Cohort N.	Validation	Sensitivity to change	Predictive value
MUC (Allocca, JCC 2018)	1.4 × BWT + 2 × CDS (1 if present, 0 if absent) **(Derived through logistic**	**Colonoscopy** (MES > 1). **Cut-off values:**	53	**YES**, external cohorts	**YES**	**YES**
UC- IUS index (Bots, JCC 2021)						**NOT** ssessed
IBUS-SAS (Novak, JCC 2021; Innocenti, CGH 2024)	4 x BWT (mm) + 15 x I-fat + 7 x CDS + 4 x BWS **(Derived through logistic regression)**	Visual analogue scale	50	**YES**, external cohort	**NOT assessed**	**NOT assessed**

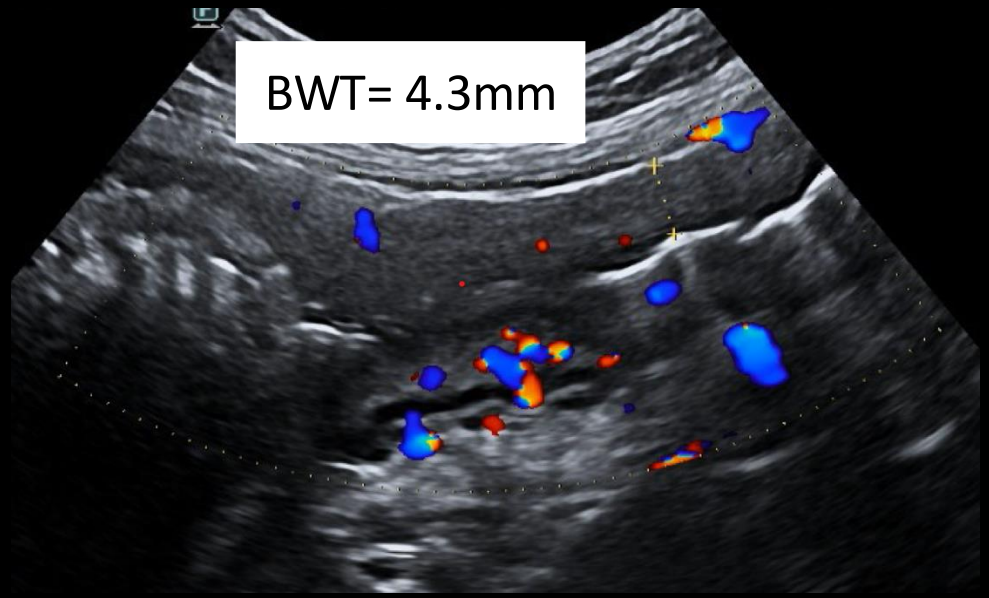
VALIDATION OF THE MILAN ULTRASOUND CRITERIA IN A LARGE MULTICENTER COHORT OF ULCERATIVE COLITIS PATIENTS

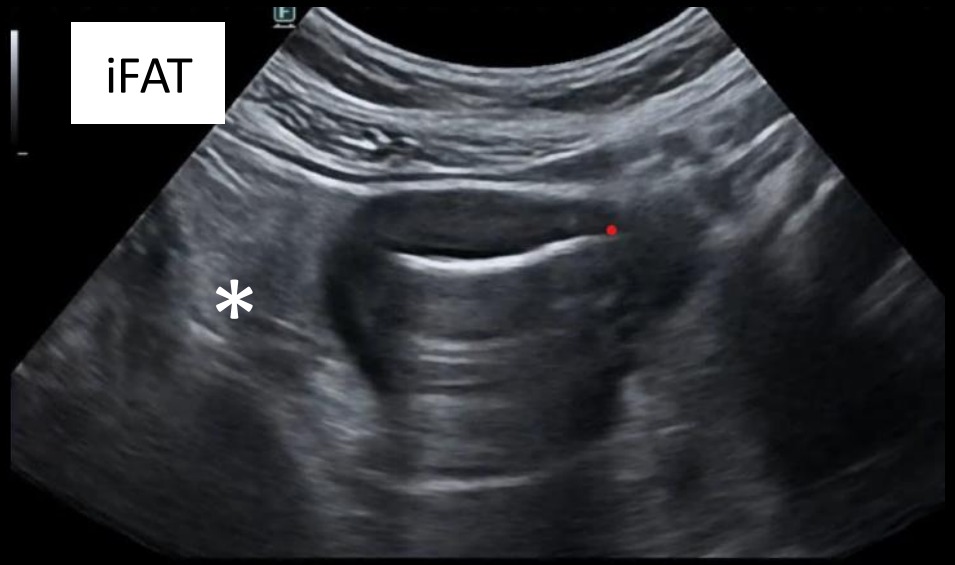
Presentation Number: Sa1493

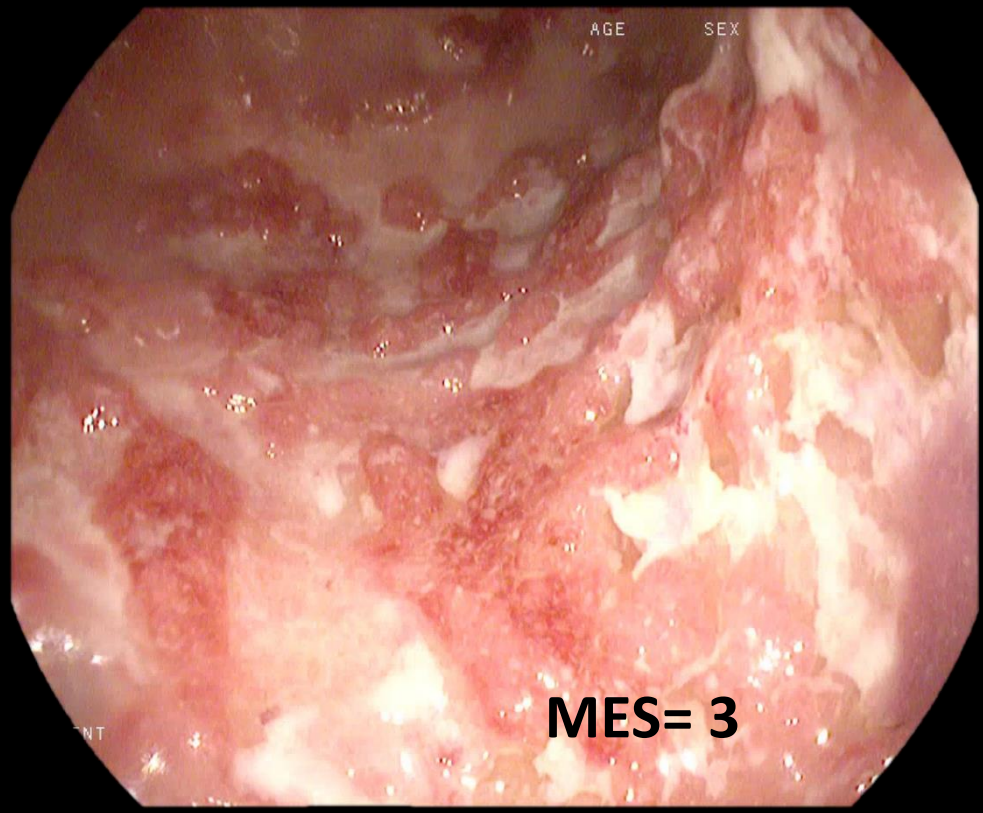
Allocca M at al. DDW 2026

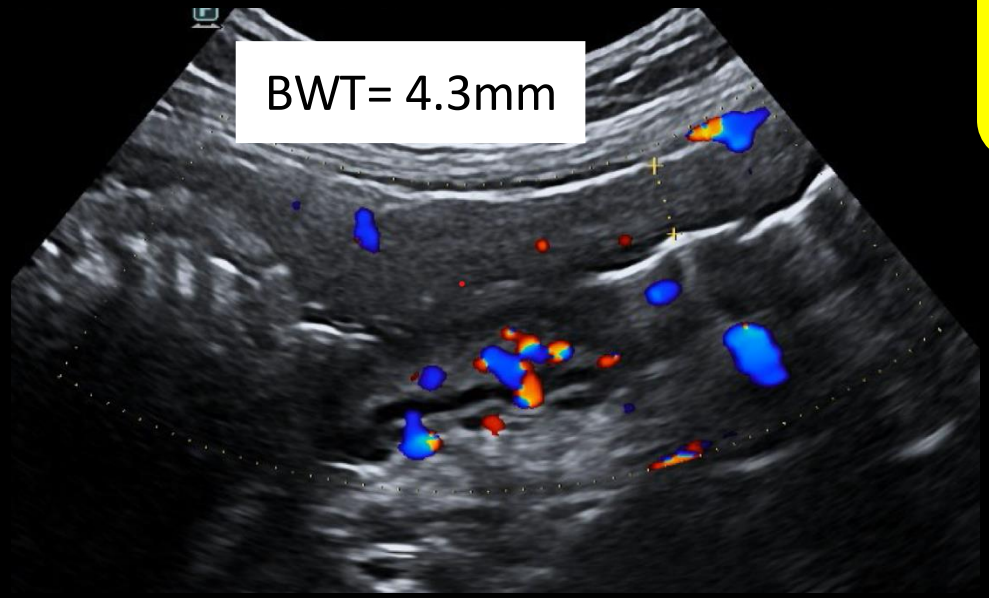
Michela, 40 years old, left side ulcerative colitis, failure to combo therapy with IFX and AZA




BWT= 4.3mm


iFAT
*

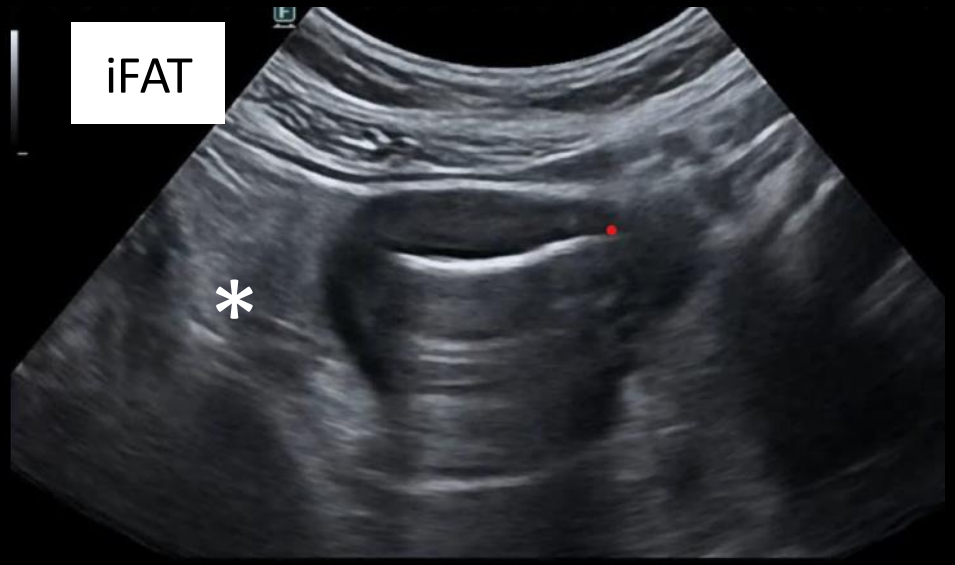

AGE
SEX
MES= 3

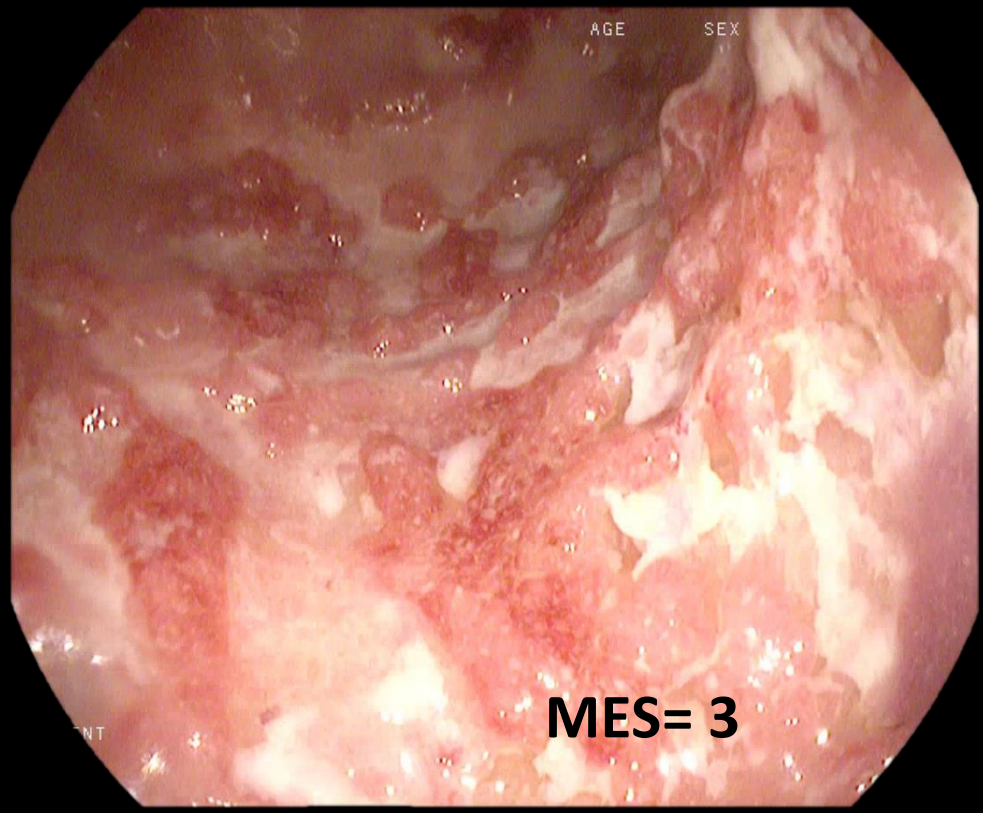


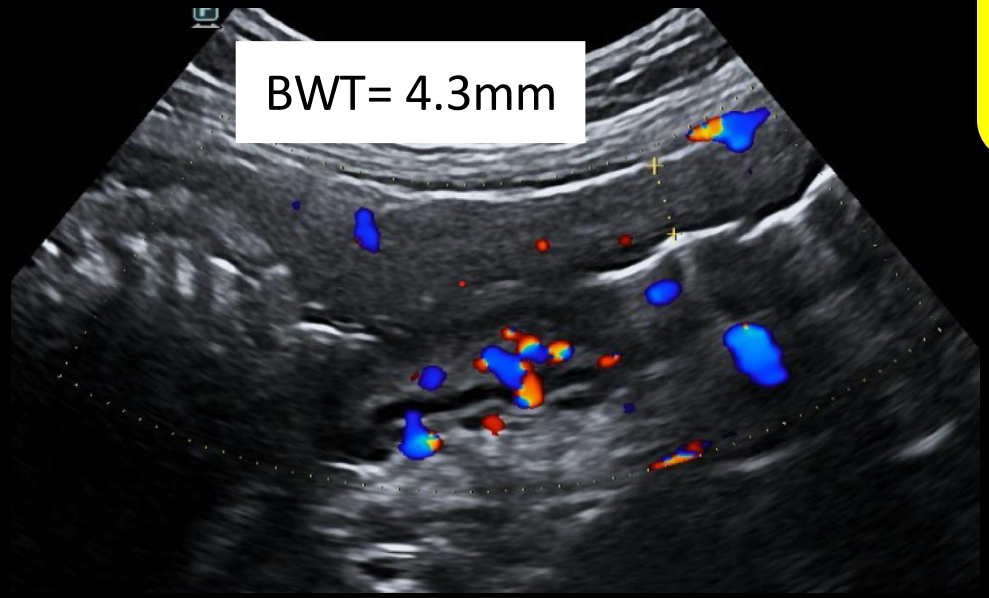
MUC= 1.4xBWT mm + 2xCDS=
(1.4x4.3) + 2=

MUC score

CDS= 0 absent; **1 present**





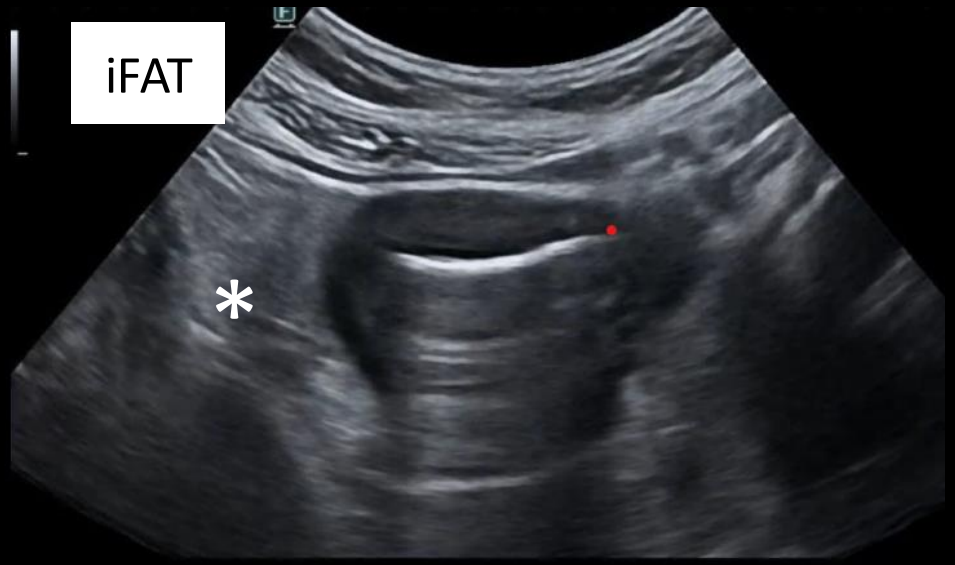


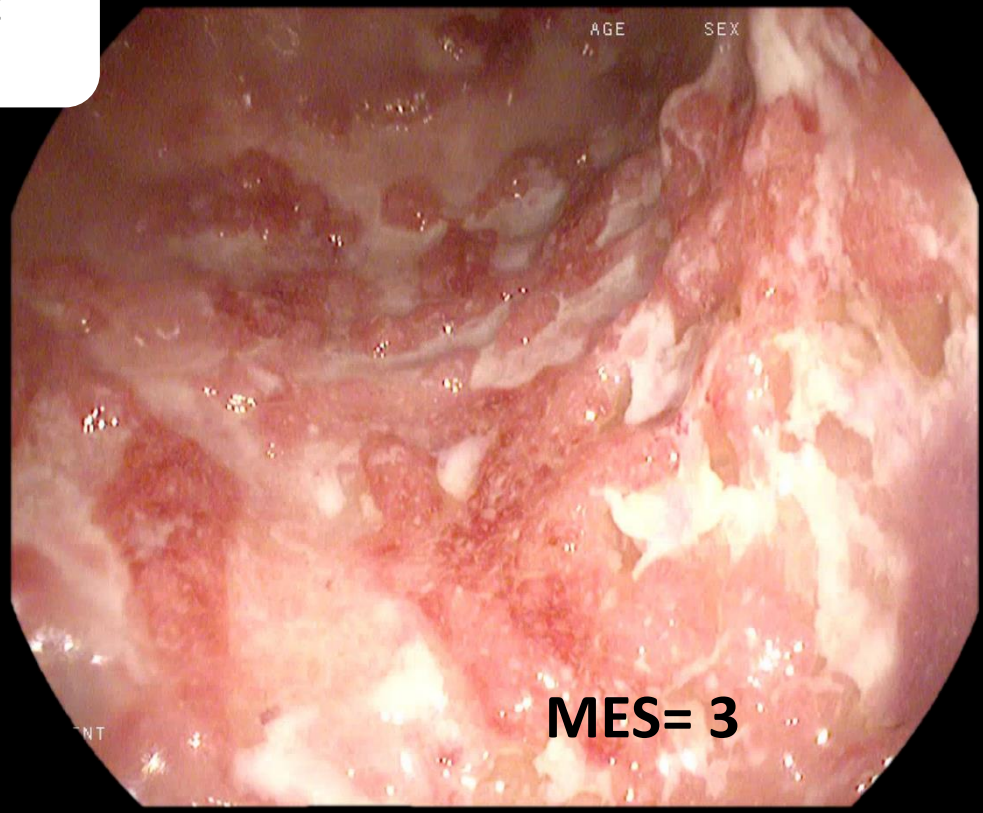
MUC= 1.4xBWT mm + 2xCDS=
(1.4x4.3) + 2= **8**

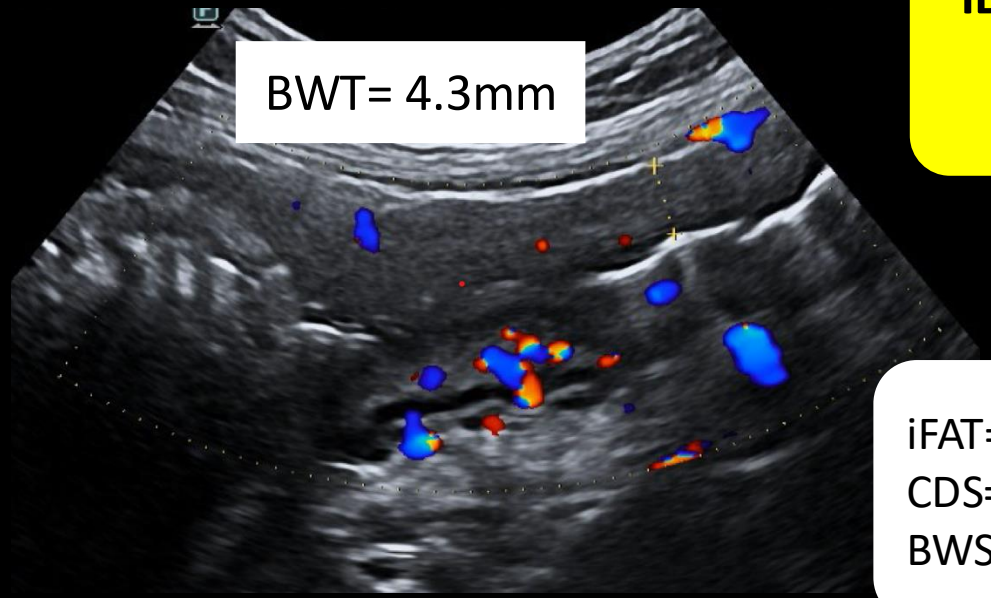
MUC score

MUC >6.2 for MES >1

CDS= 0 absent; 1 present



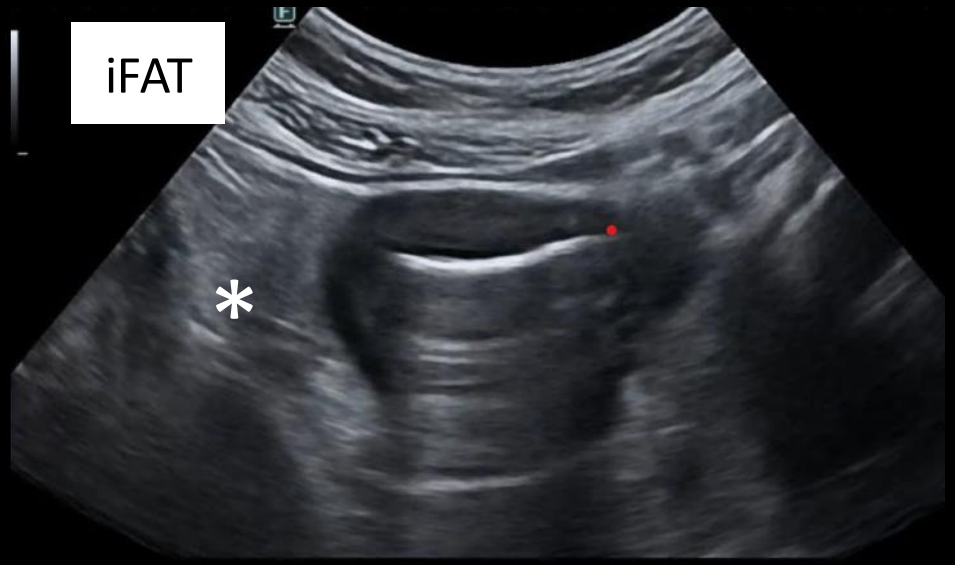


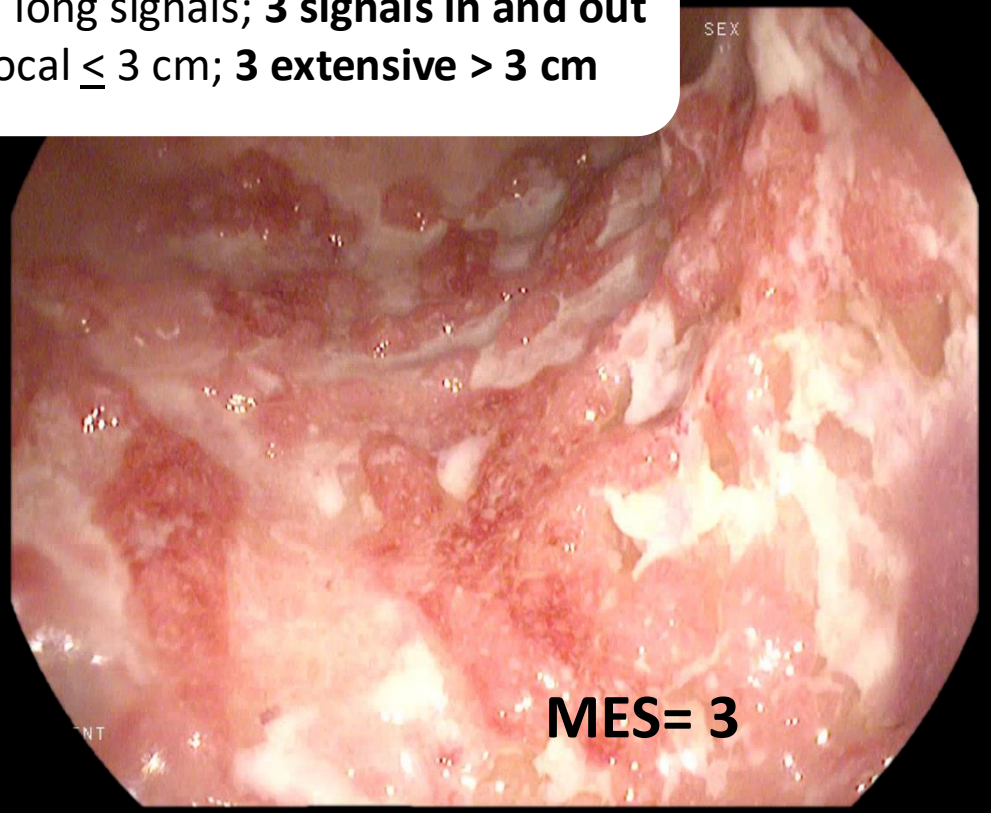


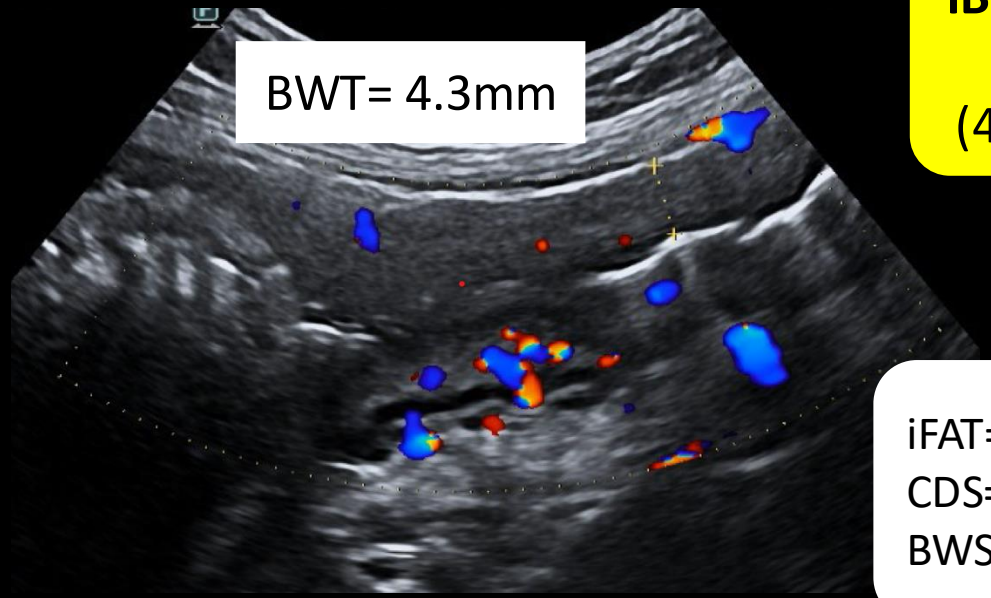
IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=
(4x4.3) + (15x2) + (7x3) + (4x3)=

IBUS-SAS score

iFAT= 0 absent; 1 uncertain; **2 present**
CDS= 0 absent; 1 short signals; 2 long signals; **3 signals in and out**
BWS= 0 normal; 1 uncertain; 2 focal ≤ 3 cm; **3 extensive > 3 cm**



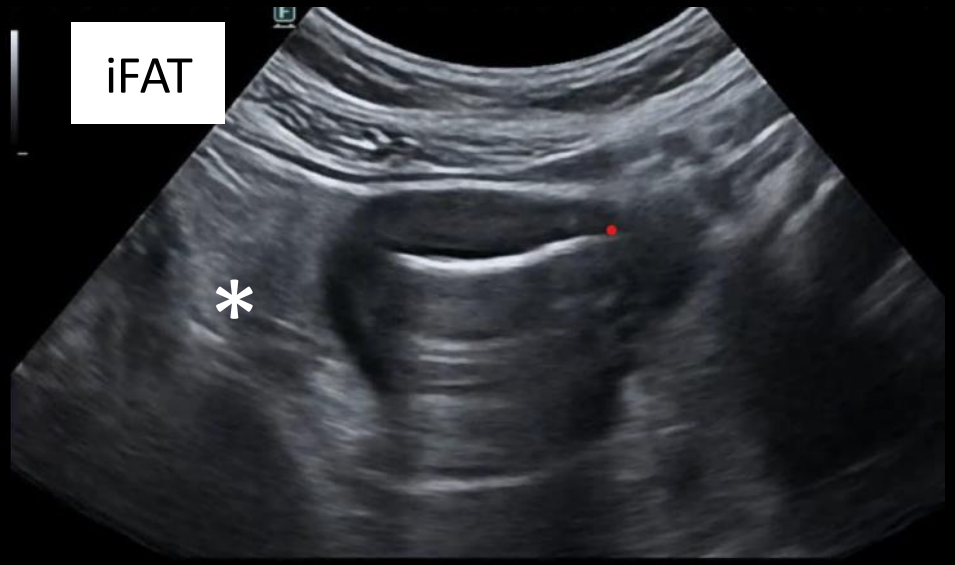


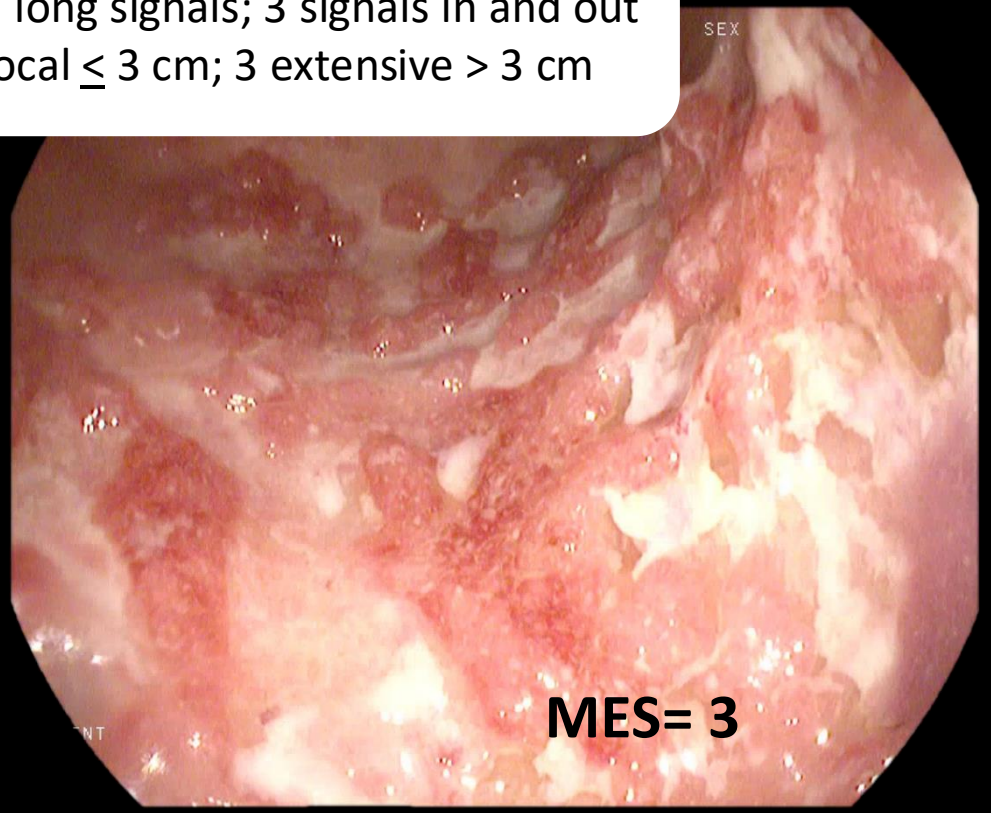


IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=
(4x4.3) + (15x2) + (7x3) + (4x3)= **80.2**

IBUS-SAS score

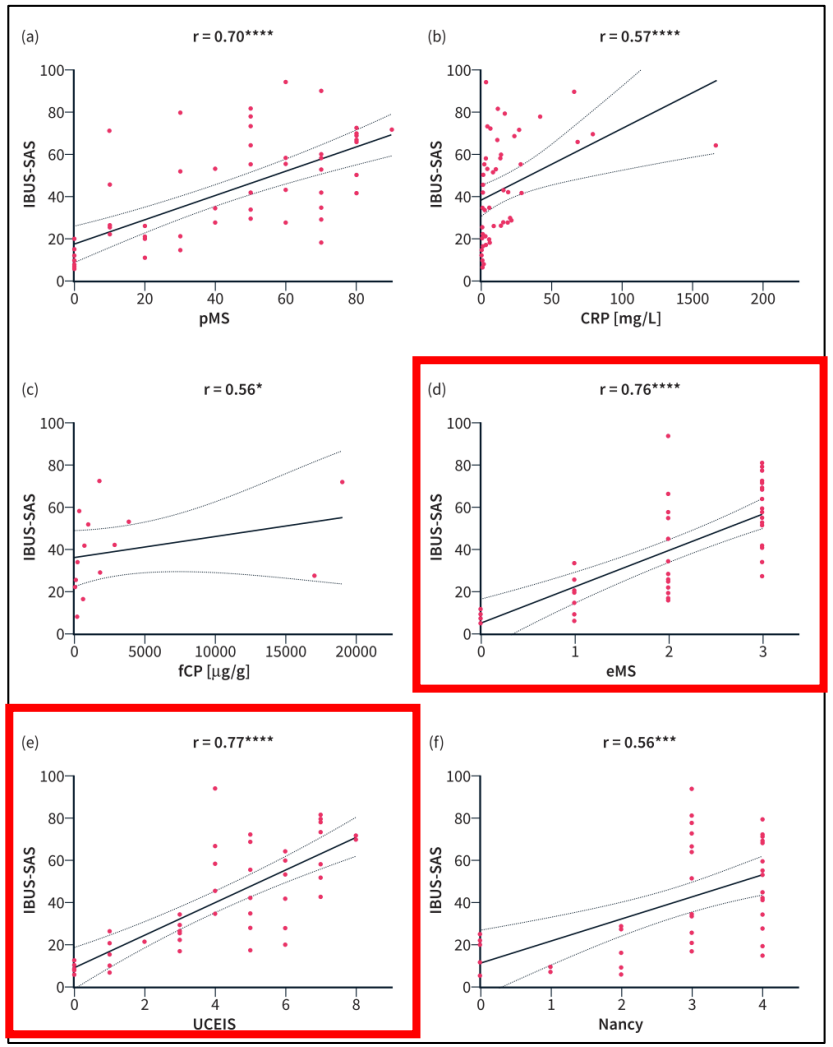
iFAT= 0 absent; 1 uncertain; 2 present
CDS= 0 absent; 1 short signals; 2 long signals; 3 signals in and out
BWS= 0 normal; 1 uncertain; 2 focal ≤ 3 cm; 3 extensive > 3 cm



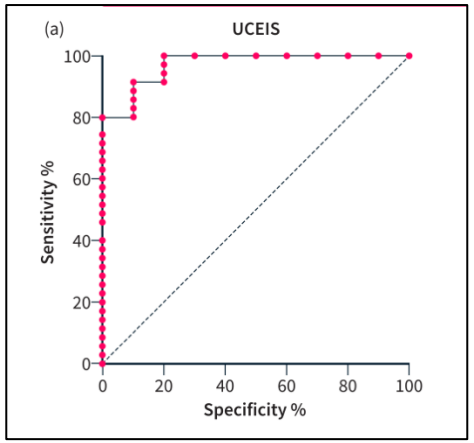


IBUS-SAS Is a Highly Accurate Intestinal Ultrasound Score for Predicting Endoscopic Disease Activity in Ulcerative Colitis

Correlation of the IBUS-SAS



ROC-analysis of the IBUS-SAS



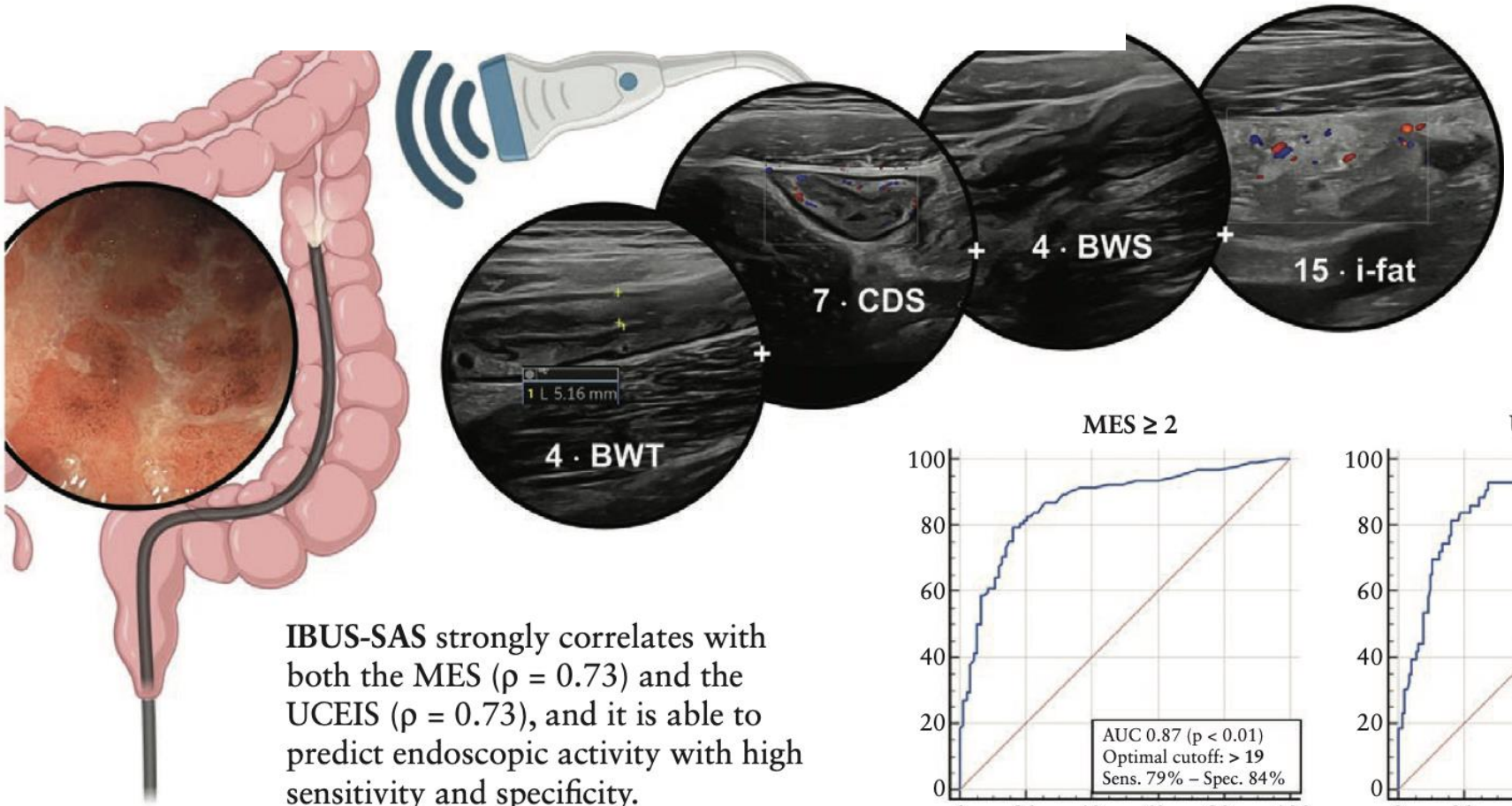
On ROC-analysis, a cut-off of 15.9 was reached with 100% sensitivity and 80.0% specificity for the prediction of endoscopic activity, resulting in a PPV of 94.7% and an NPV of 100%.

TABLE 6 | Proposed IBUS-SAS cut-off values for the discrimination of endoscopic disease activity with the respective sensitivities, specificities, PPV and NPV.

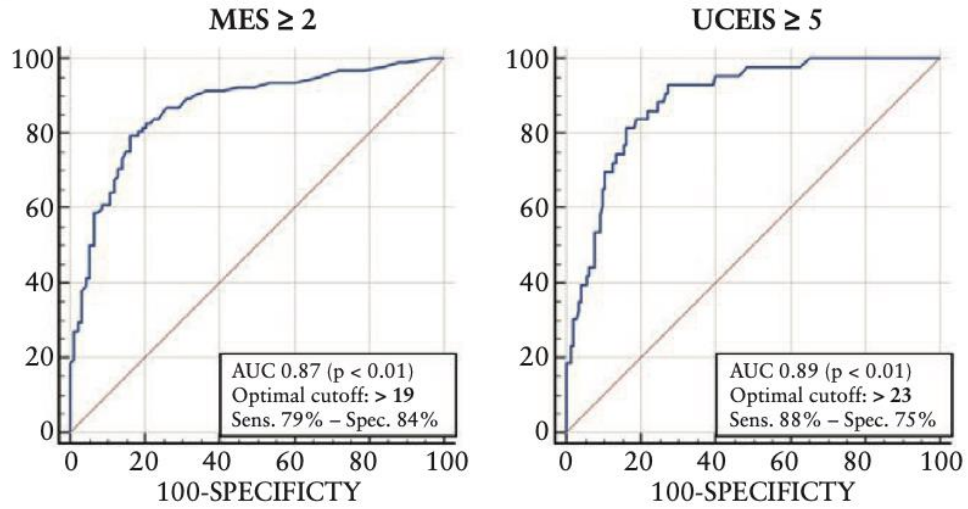
Endoscopic disease activity	Mild	Moderate	Severe
IBUS-SAS cut-off value	15.9	38.4	69.2
Sensitivity	100%	78.3%	66.7%
Specificity	80.0%	81.8%	94.4%
Positive predictive value	94.7%	81.7%	74.9%
Negative predictive value	100%	78.4%	91.9%

Mod. nach Fischer S et al. UEGJ 2025

The use of IBUS-SAS in patients with ulcerative colitis: applicability and comparison with other ultrasound scores



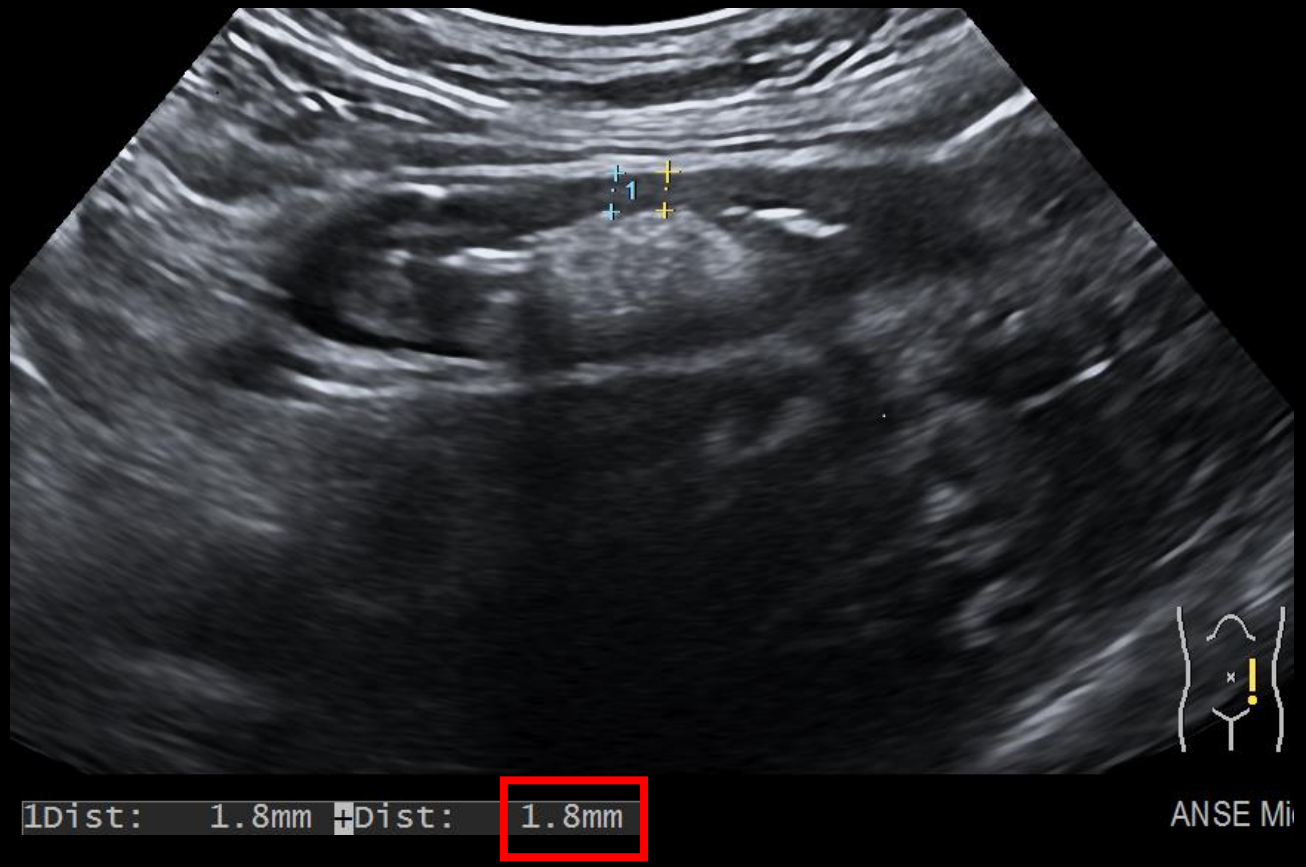
IBUS-SAS strongly correlates with both the MES (ρ = 0.73) and the UCEIS (ρ = 0.73), and it is able to predict endoscopic activity with high sensitivity and specificity.

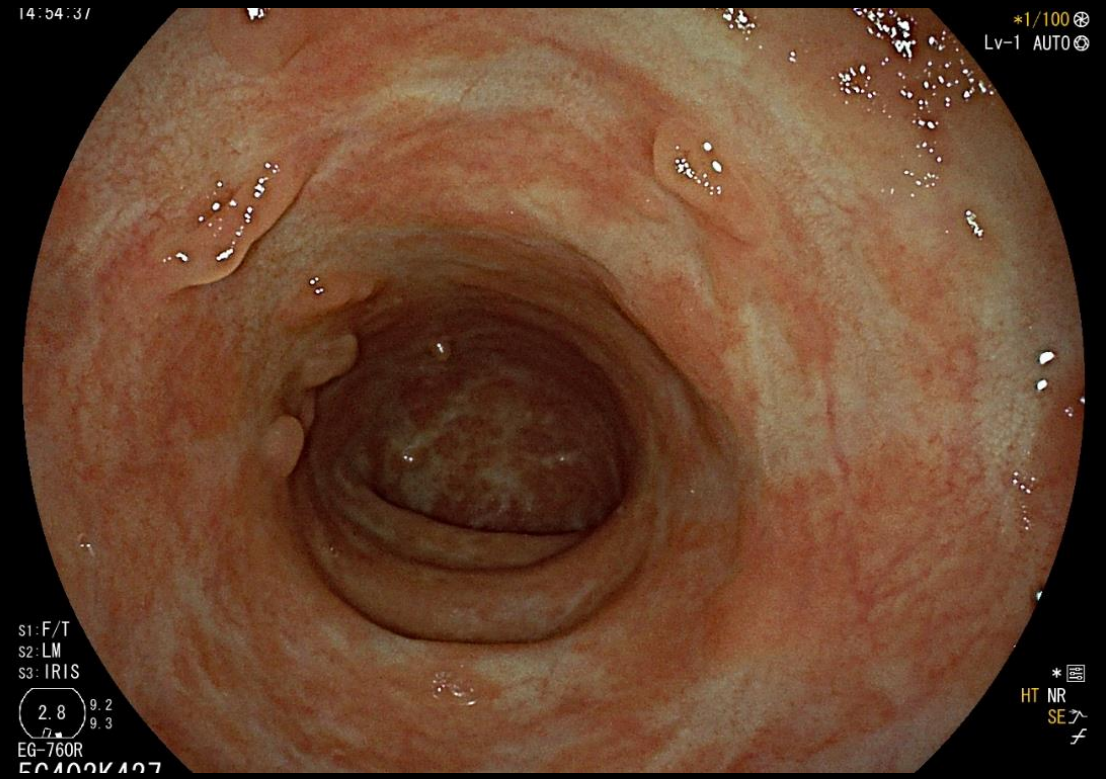


Optimal cutoffs of IBUS-SAS to detect a MES ≥ 2 and an UCEIS ≥ 5 were > 19 (sensitivity 79%, specificity 84%) and > 23 (sensitivity 88%, specificity 75%)

Innocenti T et al. JCC 2025

6 Months after starting ustekinumab therapy





MES= 0

6 Months after starting ustekinumab therapy

MUC= 1.4xBWT mm + 2xCDS=
(1.4x1.8) + 2 x 0=

IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=

MUC
IBUS-SAS

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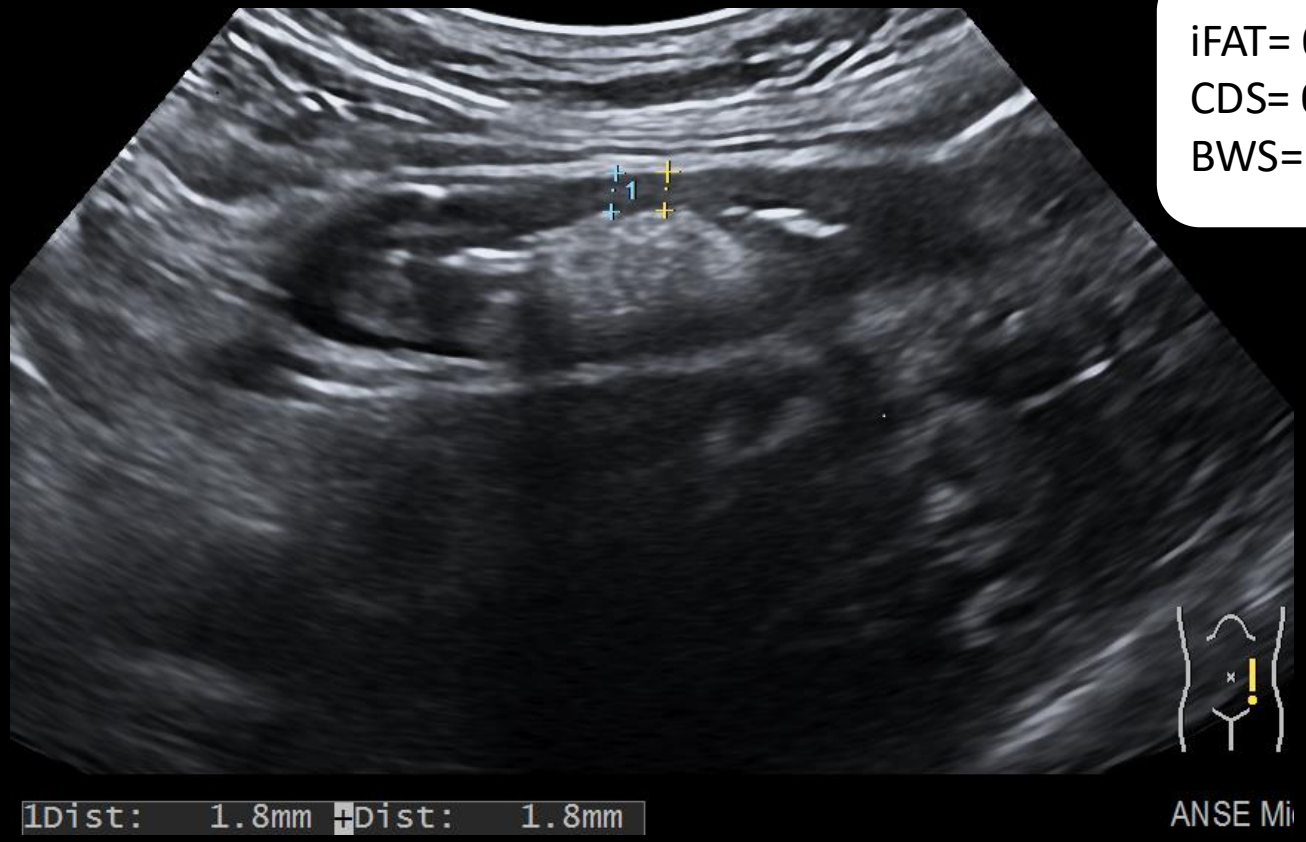

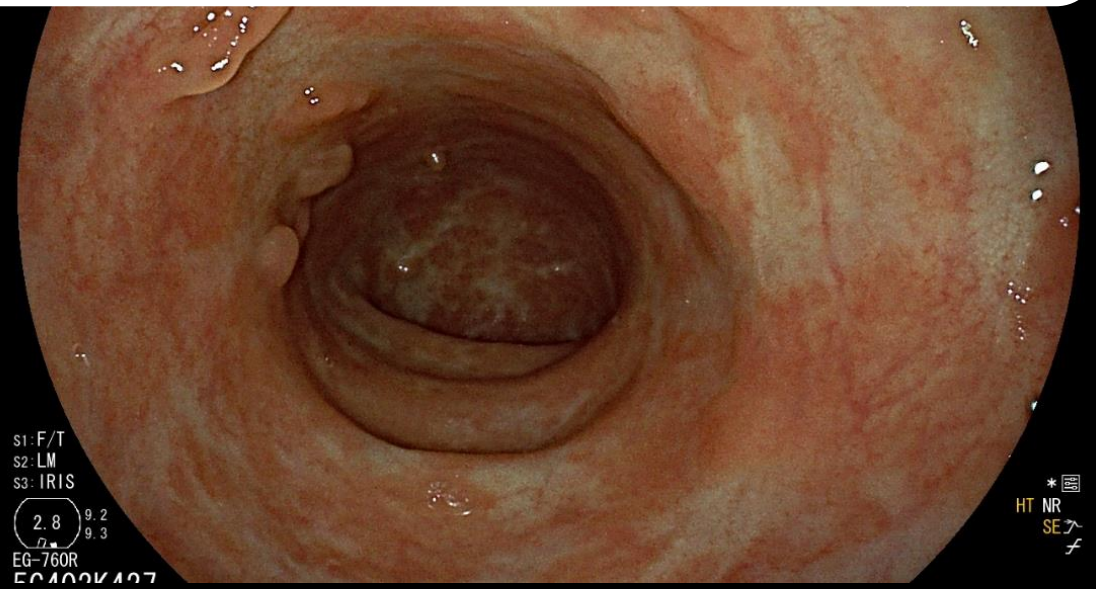

MES= 0

6 Months after starting ustekinumab therapy

MUC= 1.4xBWT mm + 2xCDS=
(1.4x1.8) + 2 x 0= **2.52**
≤6.2 for MES ≤1;
≤4.3 for MES= 0

IBUS-SAS= (4xBWT mm) + (15xiFAT) + (7xCDS) + (4xBWS)=
(4x1.8) + (15x0) + (7x0) + (4x0)= **7.2**

MUC
IBUS-SAS

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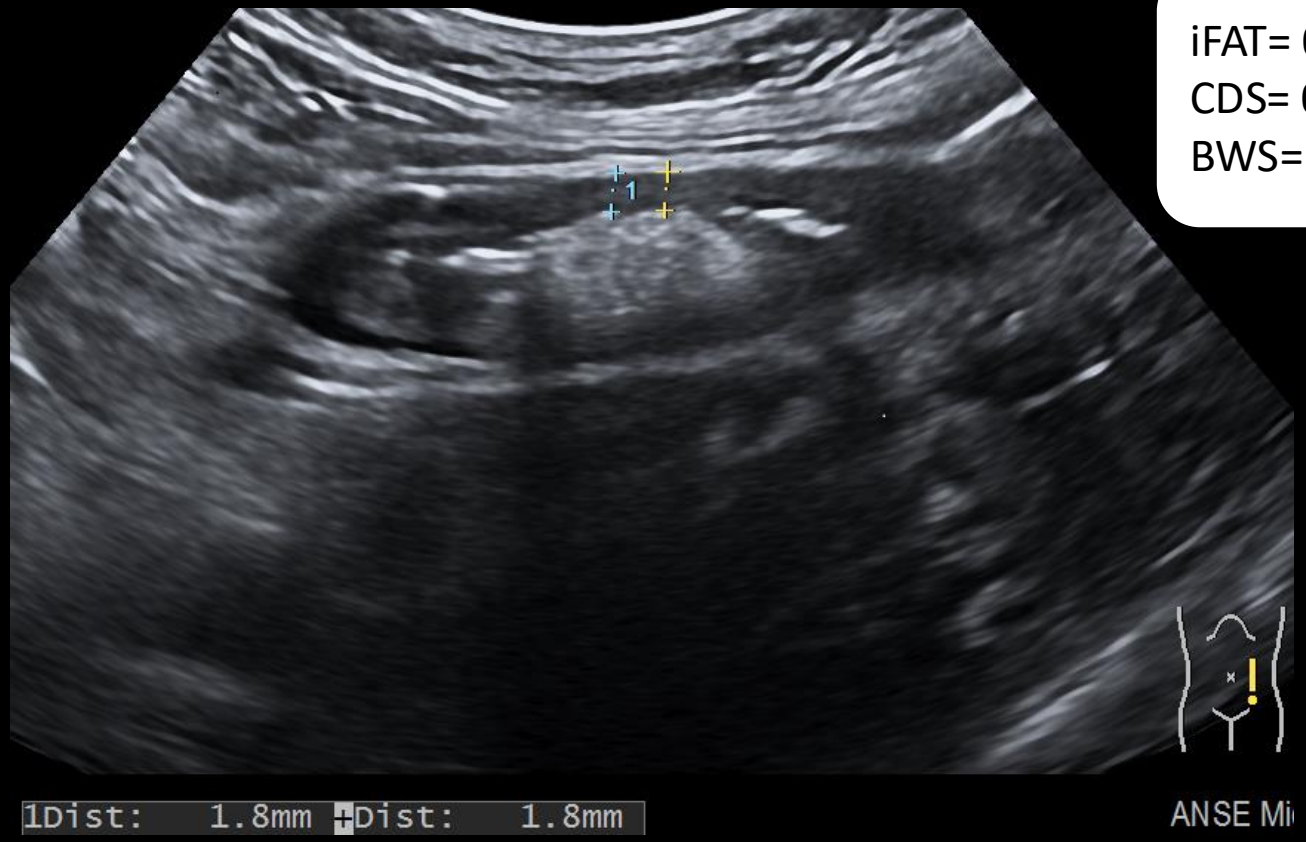

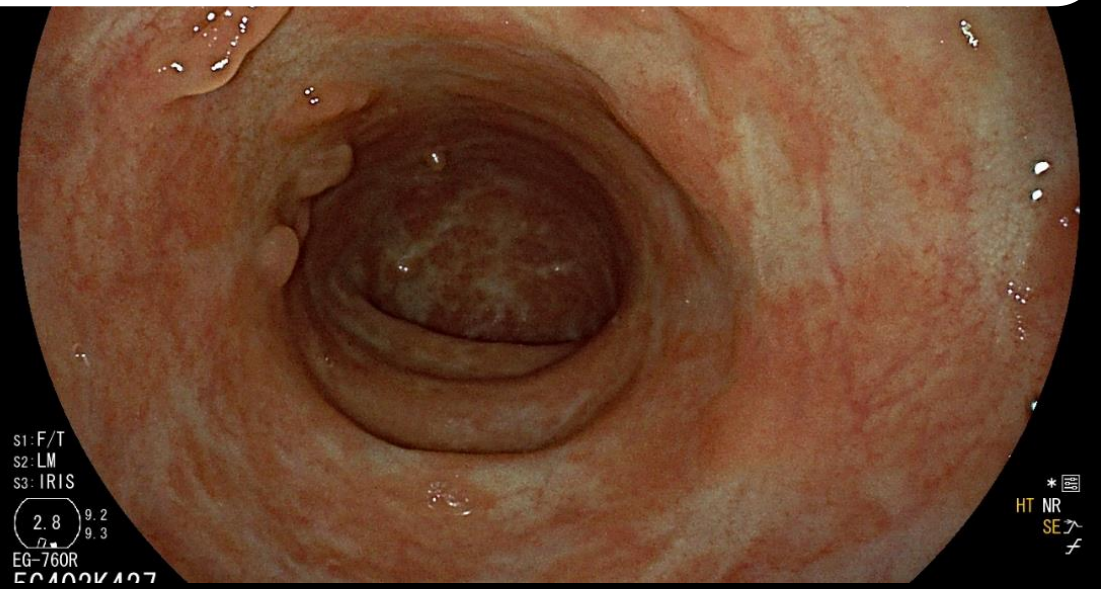

MES= 0

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Which is the best timepoint to redo scoring in UC to predict longer term outcome?

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MUC ≤ 6.2 at week 12 was the only independent predictor for MES ≤ 1 and MES = 0 at reassessment

MUC= 1.4xBWT + 2xCDS

Supplementary Table 1. Influence of non-invasive tools at week 12 on the risk of endoscopic remission (MES = 0) at reassessment

	Univariable analysis		Multivariable analysis	
	OR (95% CI)	*p*	OR (95% CI)	*p*
Parameters				
MUC ≤ 6.2	13.0 (1.40¬120.27)	***0.023***	10.41 (1.09¬99.29)	***0.041***
FC µg/g < 50 50-250 > 250	 4.72 (0.75¬29.70) 0.52 (0.08-3.24)	 ***0.097*** 0.49	 ———	 ———
CRP < 5 mg/dL			———	———
PMS ≤ 2	6.33 (0.69¬57.90)	0.10	———	———

Table 3. Influence of non-invasive tools at week 12 on the risk of endoscopic improvement [MES ≤ 1] at reassessment

Parameter	Univariable analysis		Multivariable analysis	
	OR [95% CI]	*p*	OR [95% CI]	*p*
MUC ≤ 6.2	7.0 [1.84–26.61]	*0.0043*	5.80 [1.49–22.47]	*0.010*
FC, µg/g <50 50–250 >250	6.0 [1.52–23.67] 0.44 [0.07–2.51] 0.30 [0.08–1.12]	*0.010* 0.35 0.074	—	—
CRP < 5 mg/L	2.03 [0.51–8.00]	0.31	—	—
PMS ≤ 2	3.54 [0.97–12.90]	0.054	—	—

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MUC ≤ 6.2 at week 12 was the only independent predictor for MES ≤ 1 and MES = 0 at reassessment

MUC= 1.4xBWT + 2xCDS

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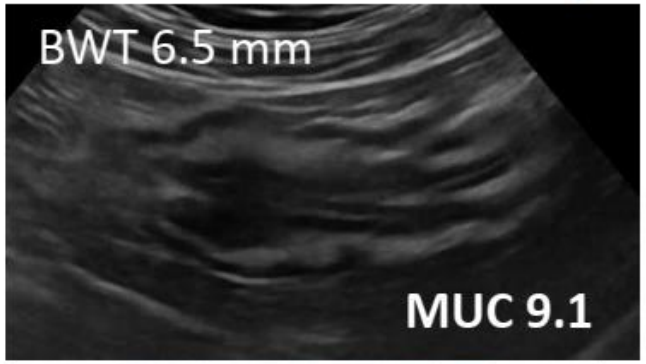
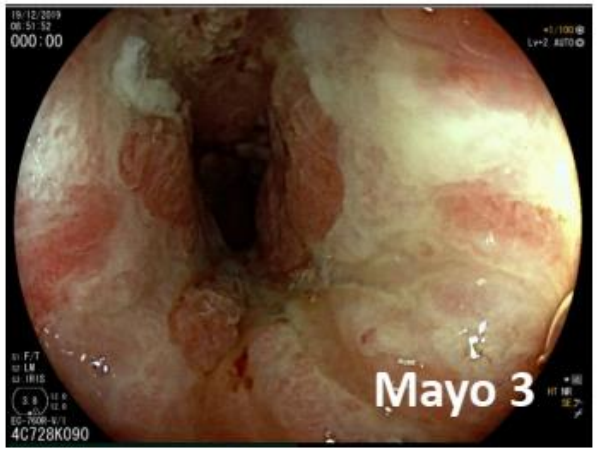
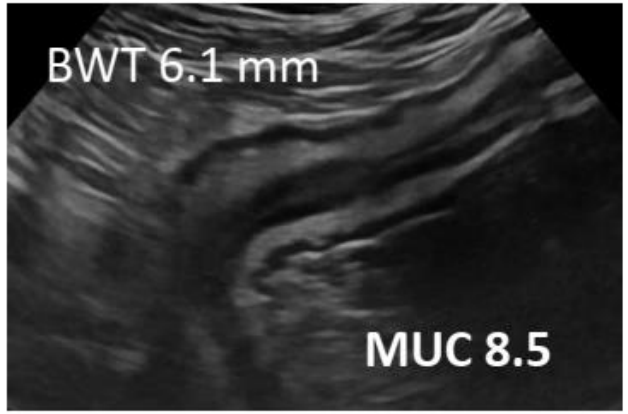
Failure to get ultrasound remission by 12 weeks was associated to failure to get long-term endoscopic remission in ulcerative colitis



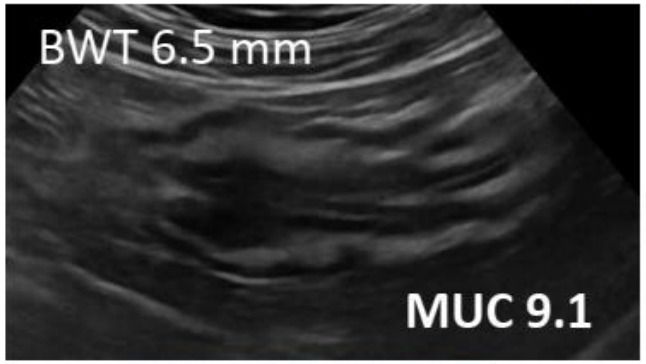


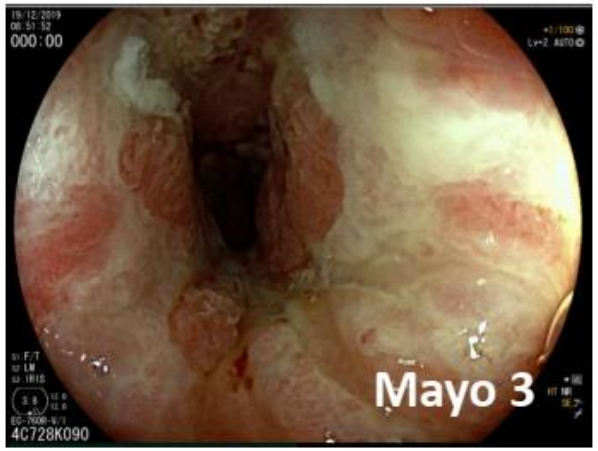


Allocca et al. JCC 2023

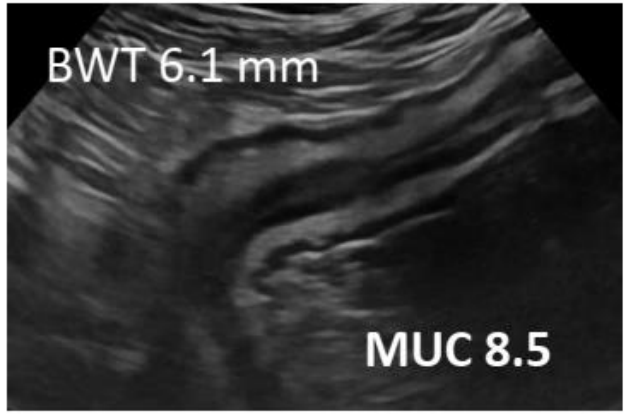
Failure to get ultrasound remission by 12 weeks was associated to failure to get long-term endoscopic remission in ulcerative colitis

Week 0 → Week 12 → Week 24-36





NPV 96%



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Conclusions

- Scoring in daily practice helps to better detect response + predict longer term response
- Most of us won´t be able to calculate the scores without technical support → automatic calculation by US machines or electronic reports needed
- IBUS-SAS score used in the majority of phase 2 and 3 pharma trials in CD and also UC
- BUSS score for CD less complicated, but IBUS-SAS score better differentiates severe CD
- MUC score validated in multi-center trial → DDW2026 Sat1493 and has been shown to predict endoscopic response

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Q&A