

I MEZZI DI CONTRASTO IN ECOENDOSCOPIA

PG, 2-3 Febbraio 2023

EUS aigo Academy

Guido Manfredi

U.O di Gastroenterologia ed Endoscopia Digestiva

ASST CREMA

I MdC di II generazione

microbolle (3μc) d'aria o gas inerte in un involucro lipidico/proteico

Si diluiscono nel sangue senza passare nell'interstizio (a differenza dei MdC di TC e MRI).

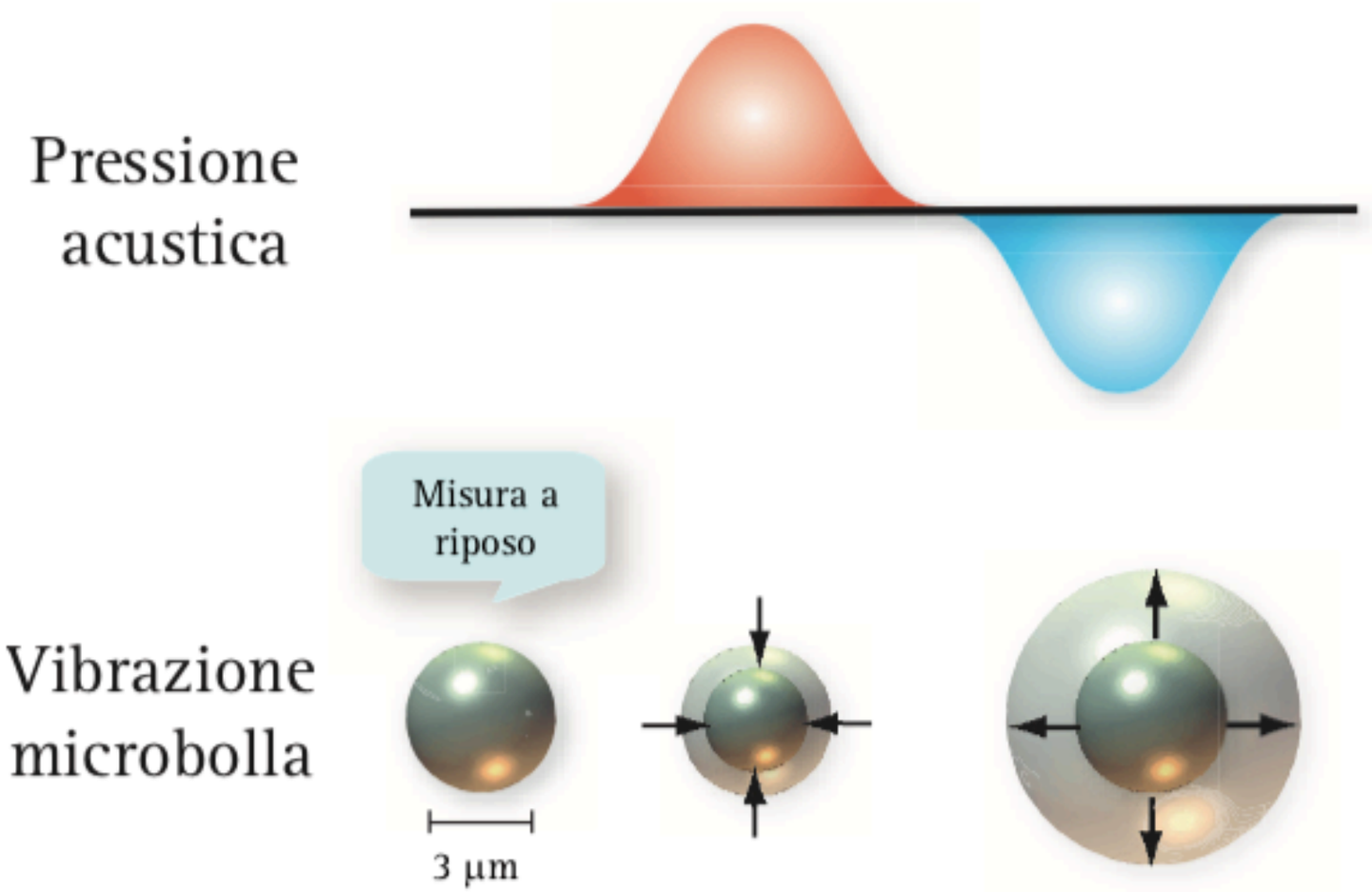
La persistenza nel sangue varia fra 2 e 7 minuti

L'involucro vienemetabolizzato, il gas diffonde nel sangue ed eliminato a livello polmonare.

restano confinati nel sistema vascolare

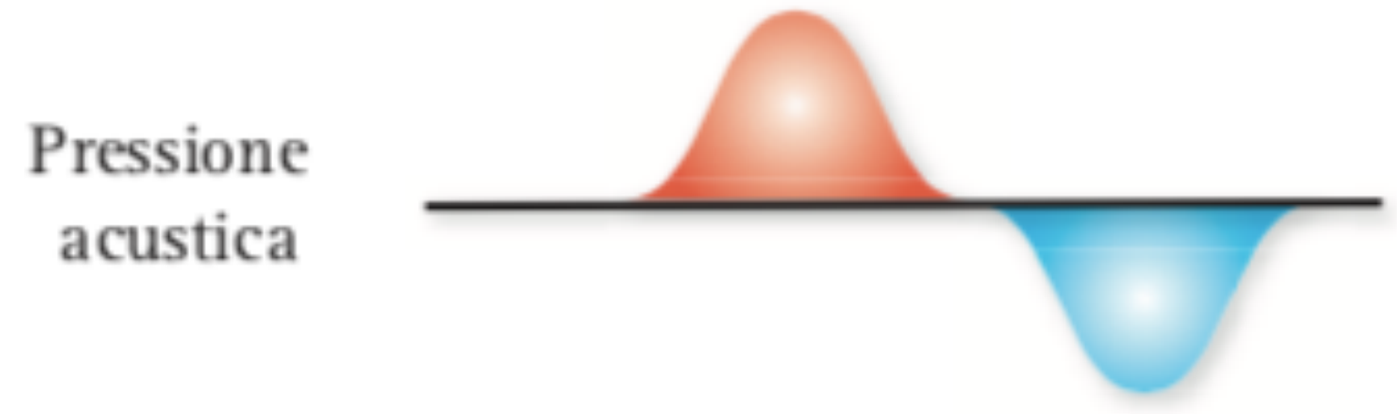
Meccanismo d'azione: potenza acustica e frequenza di risonanza

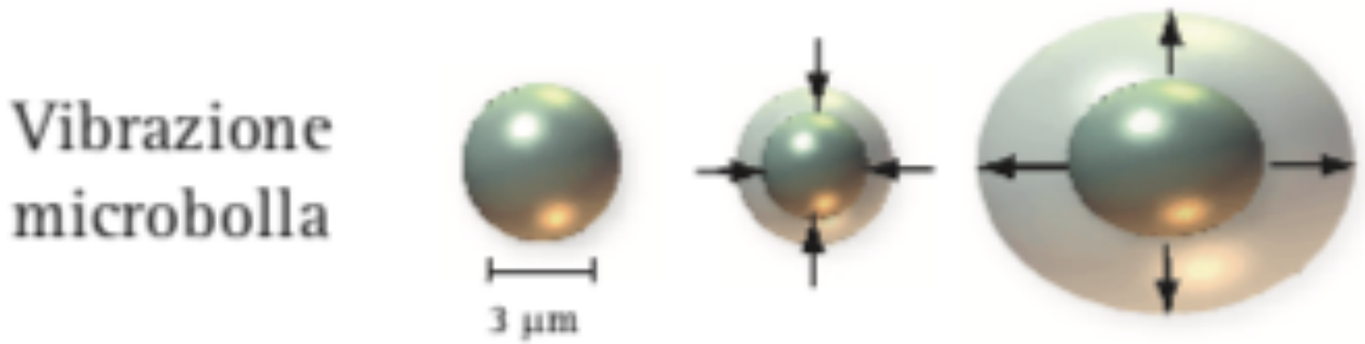
MI<0.1

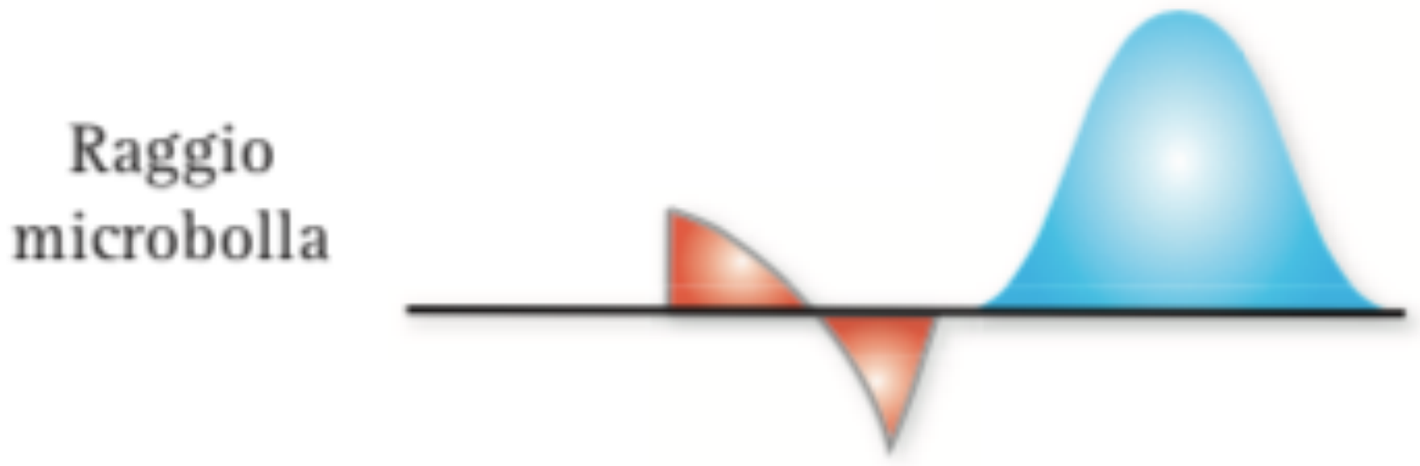


Meccanismo d’azione

MI>0.1 <0.6







Sonovue

Esafloruro di Zolfo con membrana di fosfolipidi

Si presenta come polvere da diluire in fisiologica

Usarlo entro 6 ore (no agenti sterilizzanti)

½ o 1 fiala

Rubinetto a 3 vie e catetere venoso largo (18G)

Controindicazioni

Allergia accertate al MdC ecografico (<0.002%).

No relazione con altri mdc iodati

Cardiopatia ischemica instabile

Gravidanza



Lesioni solide pancreatiche

Fasi vascolari fegato:

- Arteriosa
- Portale
- Tardiva

Fasi vascolari pancreas:

Arteriosa precoce (10-30sec)

Venosa/tardiva (>30sec)

Vascolarizzazione rispetto al parenchima circostante

Lesioni solide pancreatiche: PDAC

L'adenocarcinoma è *quasi* sempre ipovascolare

Improved Differentiation of Pancreatic Tumors Using Contrast-Enhanced Endoscopic Ultrasound

CLINICAL GASTROENTEROLOGY AND HEPATOLOGY 2008;6:590–597

CHRISTOPH F. DIETRICH,* ANDRE IGNEE,* BARBARA BRADEN,[‡,§] ANA PAULA BARREIROS,* MICHAELA OTT,[‖] and MICHAEL HOCKE[¶]

	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Accuracy
Hypovascularity as a sign of ductal adenocarcinoma using CE-EDUS	92% (82%–97%)	100% (89%–100%)	100% (94%–100%)	86% (71%–95%)	95% (88%–98%)
Hypervascularity as a sign of tumors of other origin using CE-EDUS	100% (89%–100%)	92% (82%–97%)	86% (71%–95%)	100% (94%–100%)	95% (88%–98%)
Hypervascularity as a sign of tumors of other origin using CDI	61% (42%–78%)	100% (94%–100%)	100% (82%–100%)	84% (73%–91%)	87% (79%–93%)

Lesioni solide pancreatiche: PDAC

L'adenocarcinoma è *quasi* sempre ipovascolare

Improved Differentiation of Pancreatic Tumors Using Contrast-Enhanced Endoscopic Ultrasound

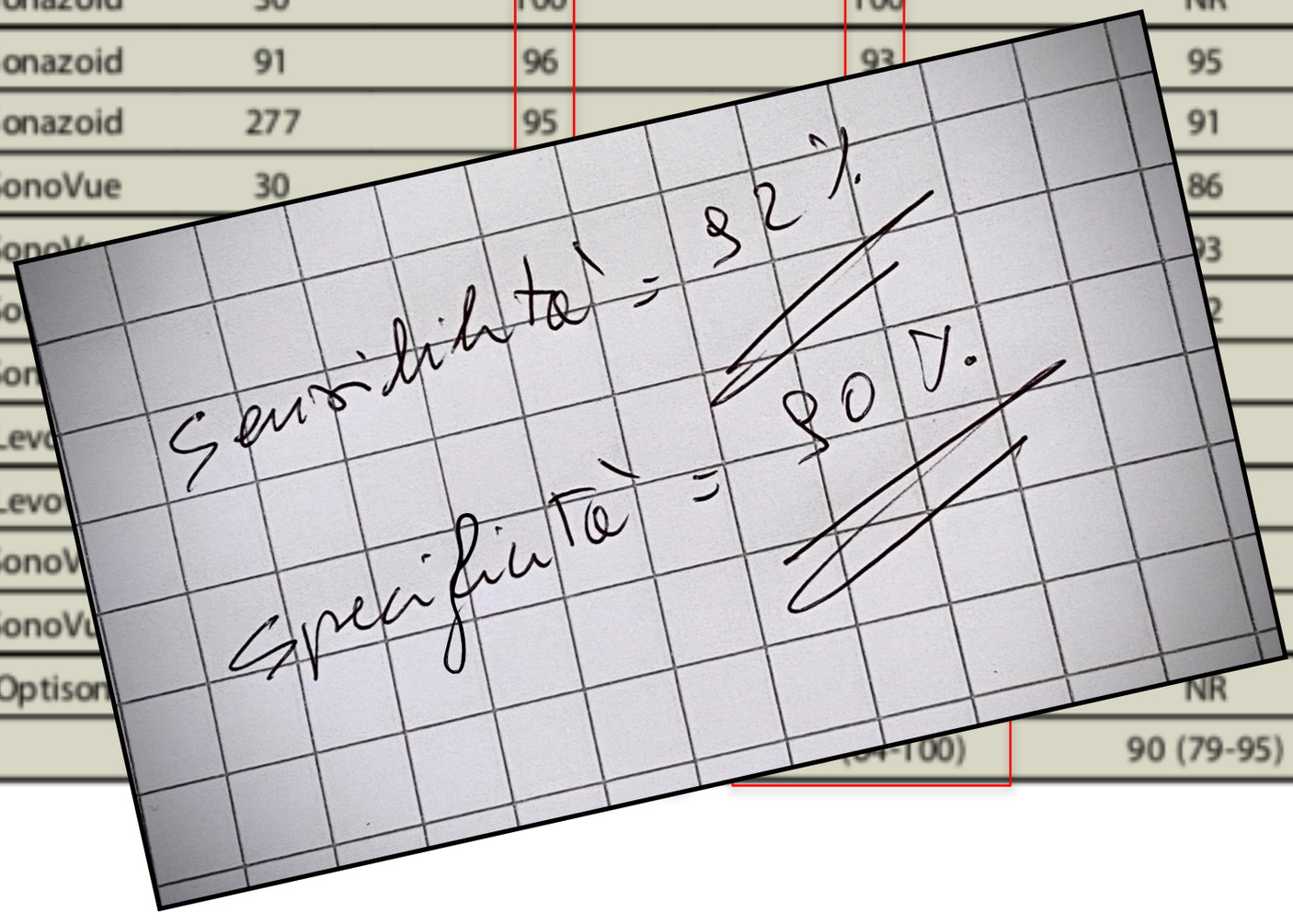
CLINICAL GASTROENTEROLOGY AND HEPATOLOGY 2008;6:590–597

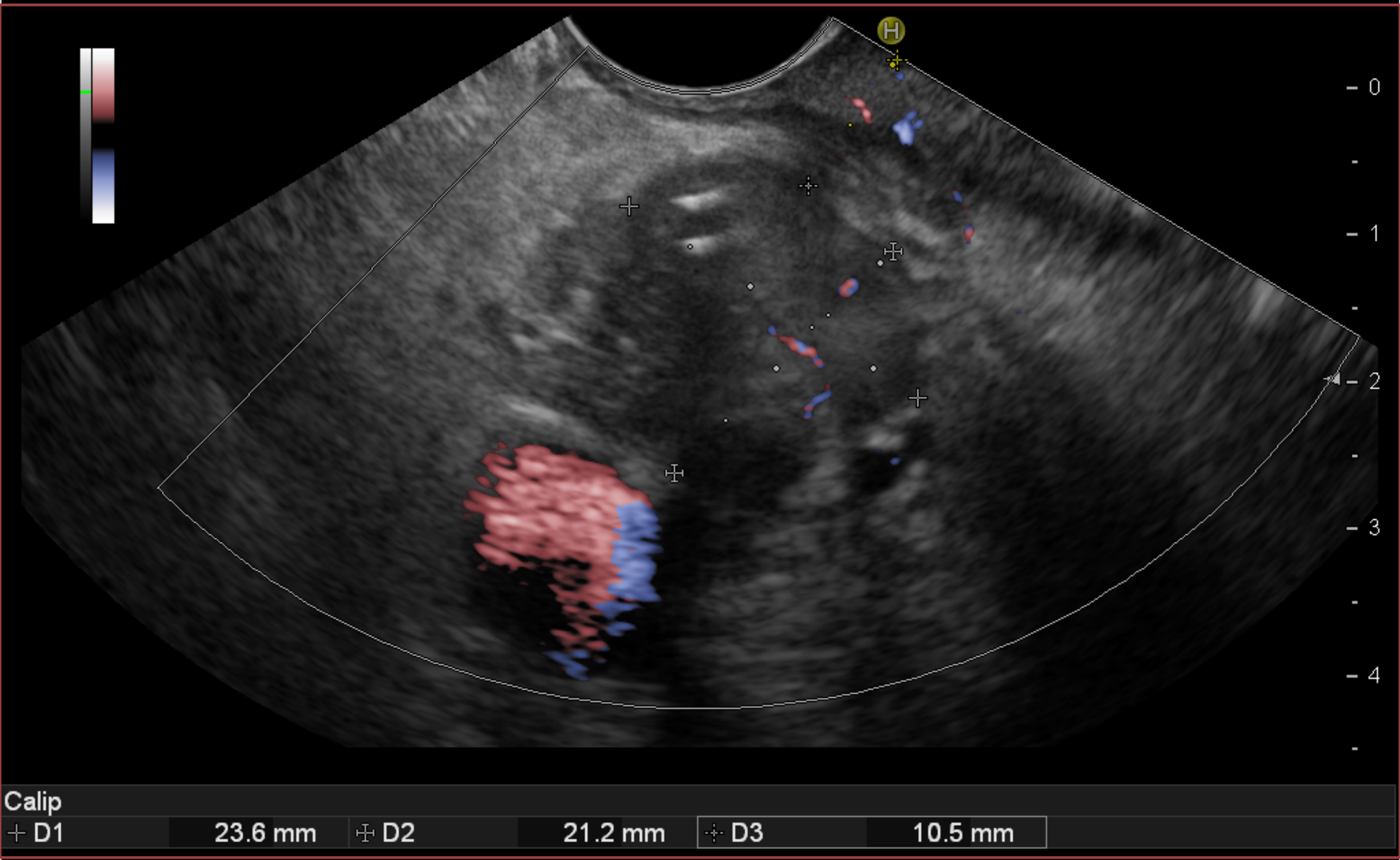
CHRISTOPH F. DIETRICH,* ANDRE IGNEE,* BARBARA BRADEN,‡,§ ANA PAULA BARREIROS,* MICHAELA OTT,‖ and MICHAEL HOCKE¶

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TABLE 2. CH-EUS and CE-EUS for the diagnosis of pancreatic adenocarcinoma

Reference	Design	Technique	UCA	Cases	Sensitivity (%)	Specificity (%)	Accuracy (%)
Săftoiu et al, 2015[36]	PS-M	qCH-EUS	SonoVue	167	88	93	NR
Gincul et al, 2014[14]	PS-M	CH-EUS	SonoVue	100	96	94	95
Park et al, 2014[76]	RS	CH-EUS	SonoVue	90	92	68	84
Lee et al, 2013[77]	PS	CH-EUS	SonoVue	37	93	86	92
Gheonea et al, 2013[40]	PS	qCH-EUS	SonoVue	51	94	89	NR
Figueiredo et al, 2012[78]	PS	CE-EUS+E	SonoVue	47	93	67	79
Hocke et al, 2012[79]	PS	CH-EUS*	SonoVue	58	92	90	NR
Imazu et al, 2010[38]	PS	qCH-EUS	Sonazoid	30	100	100	NR
Matsubara et al, 2011[39]	RS	qCH-EUS	Sonazoid	91	96	93	95
Kitano et al, 2012[15]	PS	CH-EUS	Sonazoid	277	95		91
Seicean et al, 2010[37]	PS	qCH-EUS	SonoVue	30			86
Săftoiu et al, 2010[80]	PS	CE-EUS+E	Sono				93
Fusaroli et al, 2010[21]	PS	CH-EUS	So				2
Napoleon et al, 2010[23]	PS	CH-EUS	Son				
Sakamoto et al, 2008[32]	PS	CE-EUS	Levo				
Dietrich et al, 2008[33]	PS	CE-EUS	Levo				
Hocke et al, 2007[31]	RS	CE-EUS	SonoV				
Hocke et al, 2006[30]	PS	CE-EUS	SonoVu				
Becker et al, 2001[29]	PS	CE-EUS	Optison				NR
Total, median (range)		19 studies				(64-100)	90 (79-95)





Calip

D1	23.6 mm	D2	21.2 mm	D3	10.5 mm

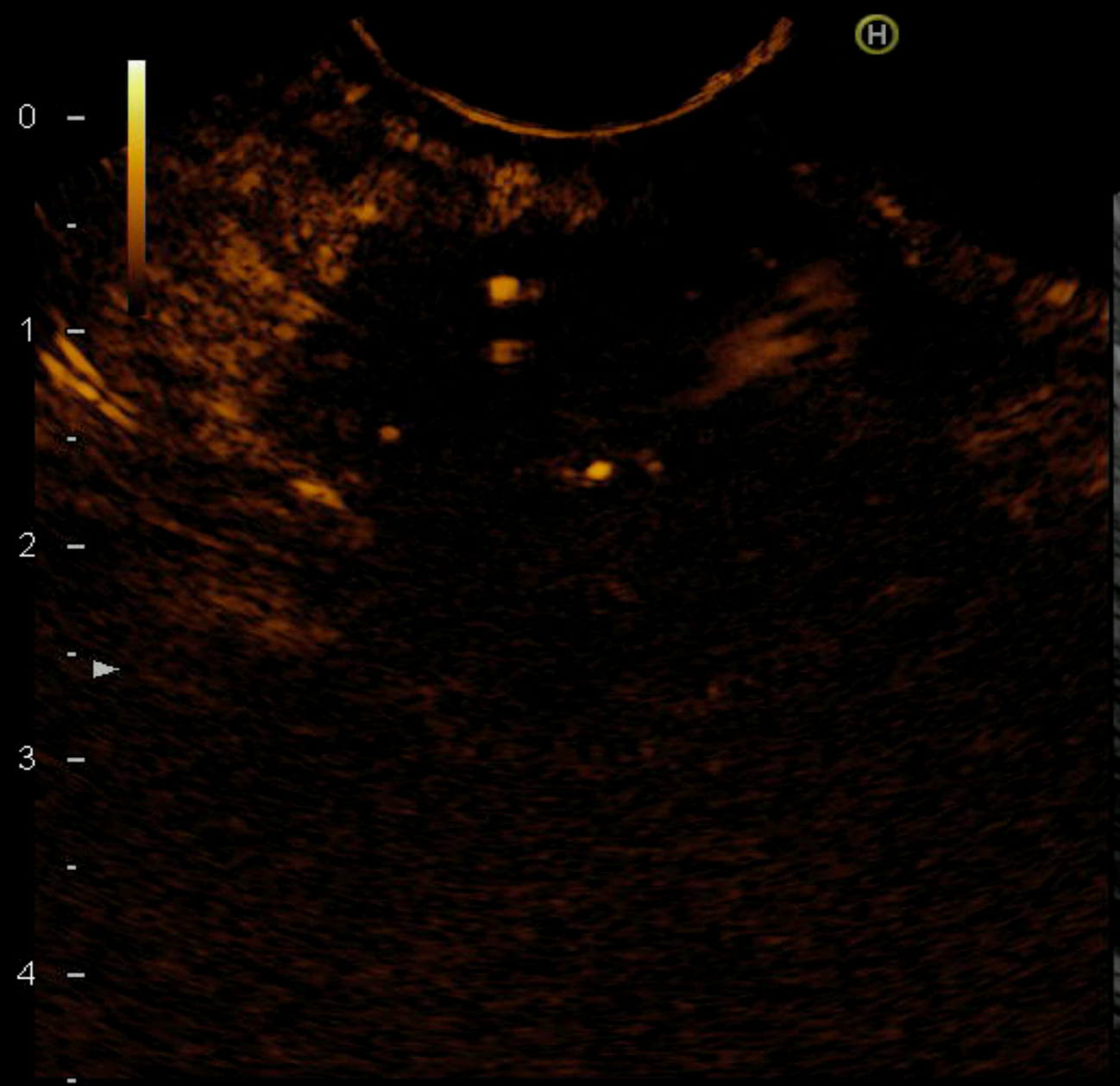
HITACHI

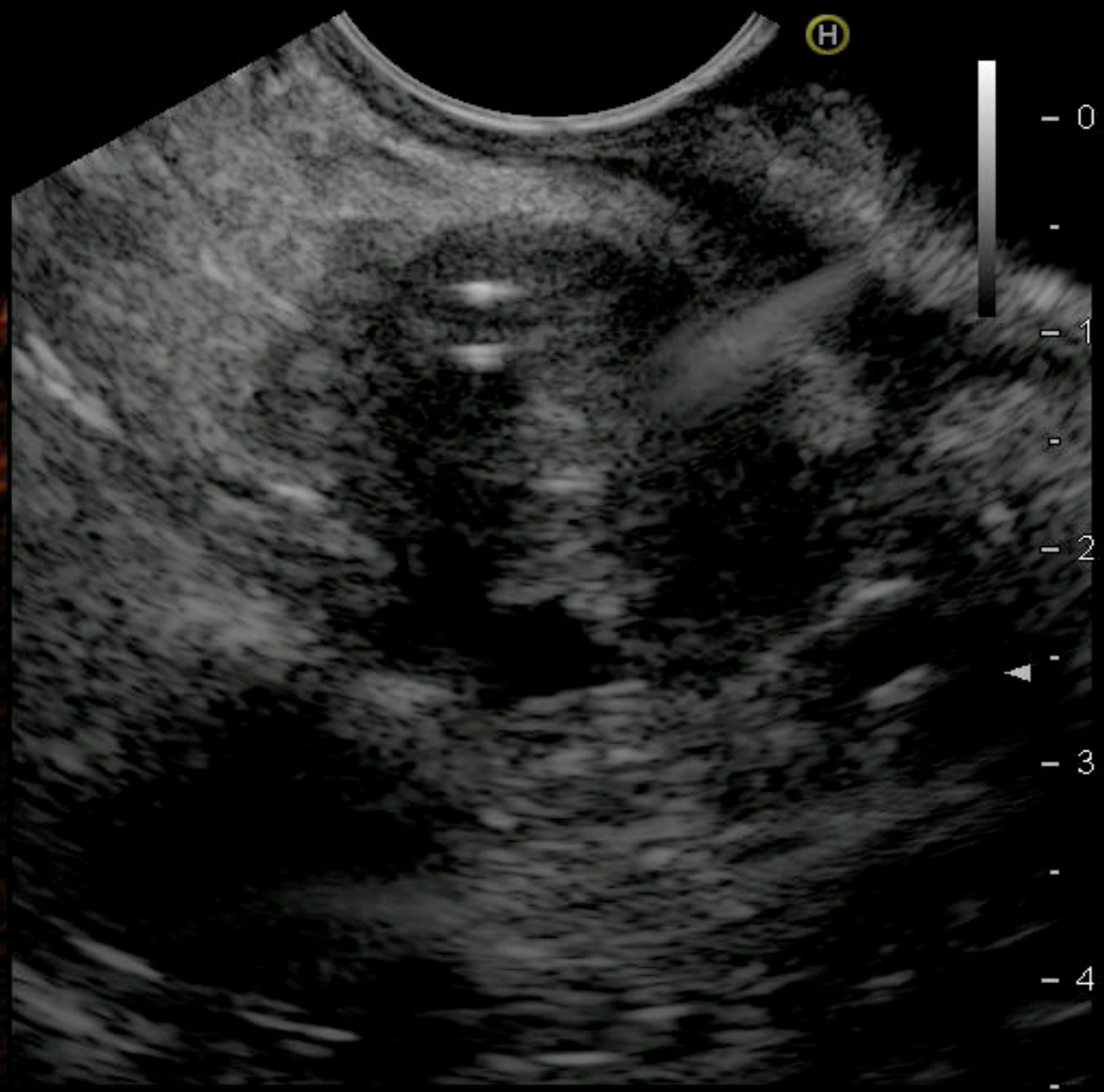
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14-MAY-18 09:54:26

TIS<0.4

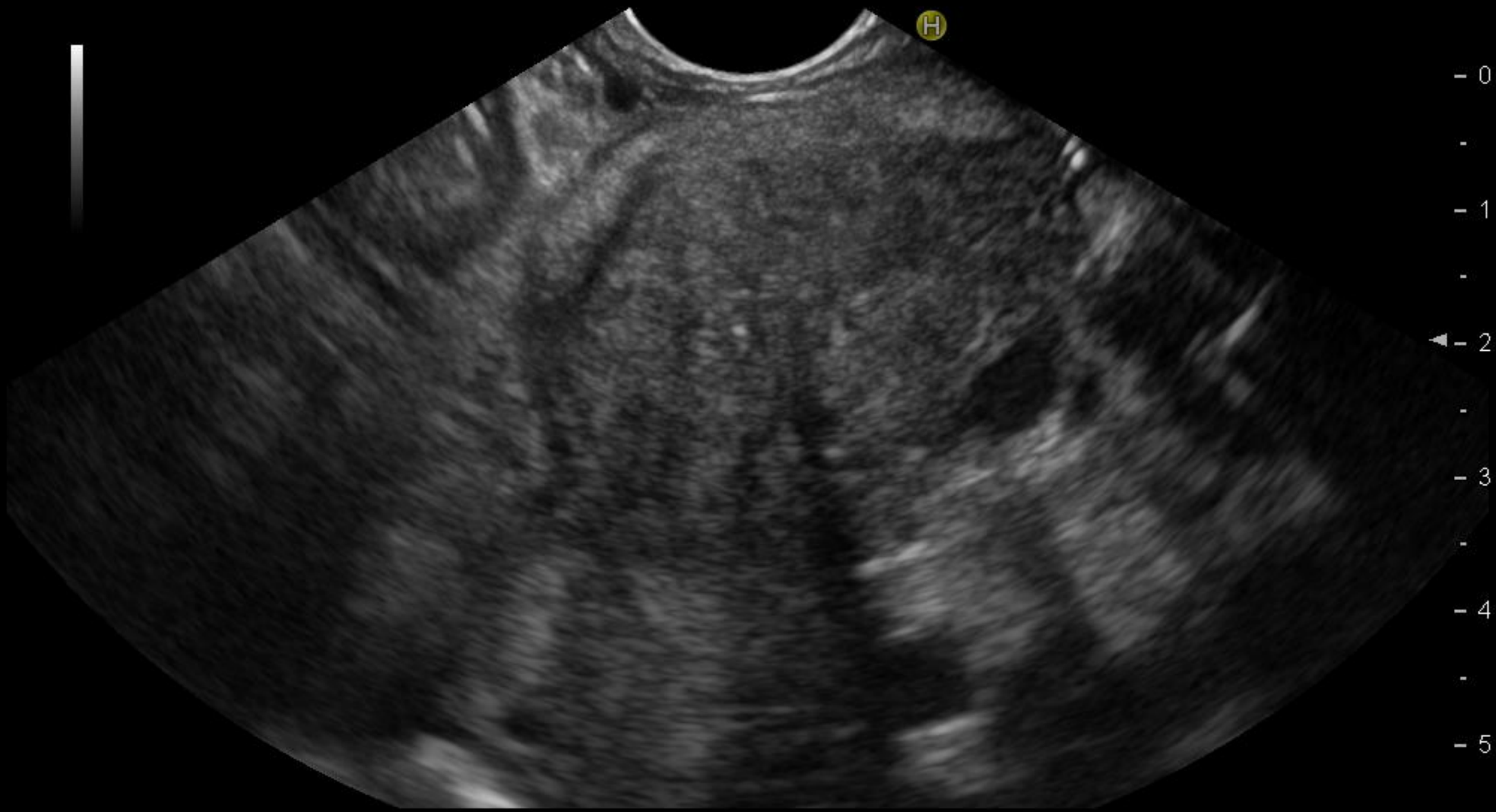
20180508001 75y M



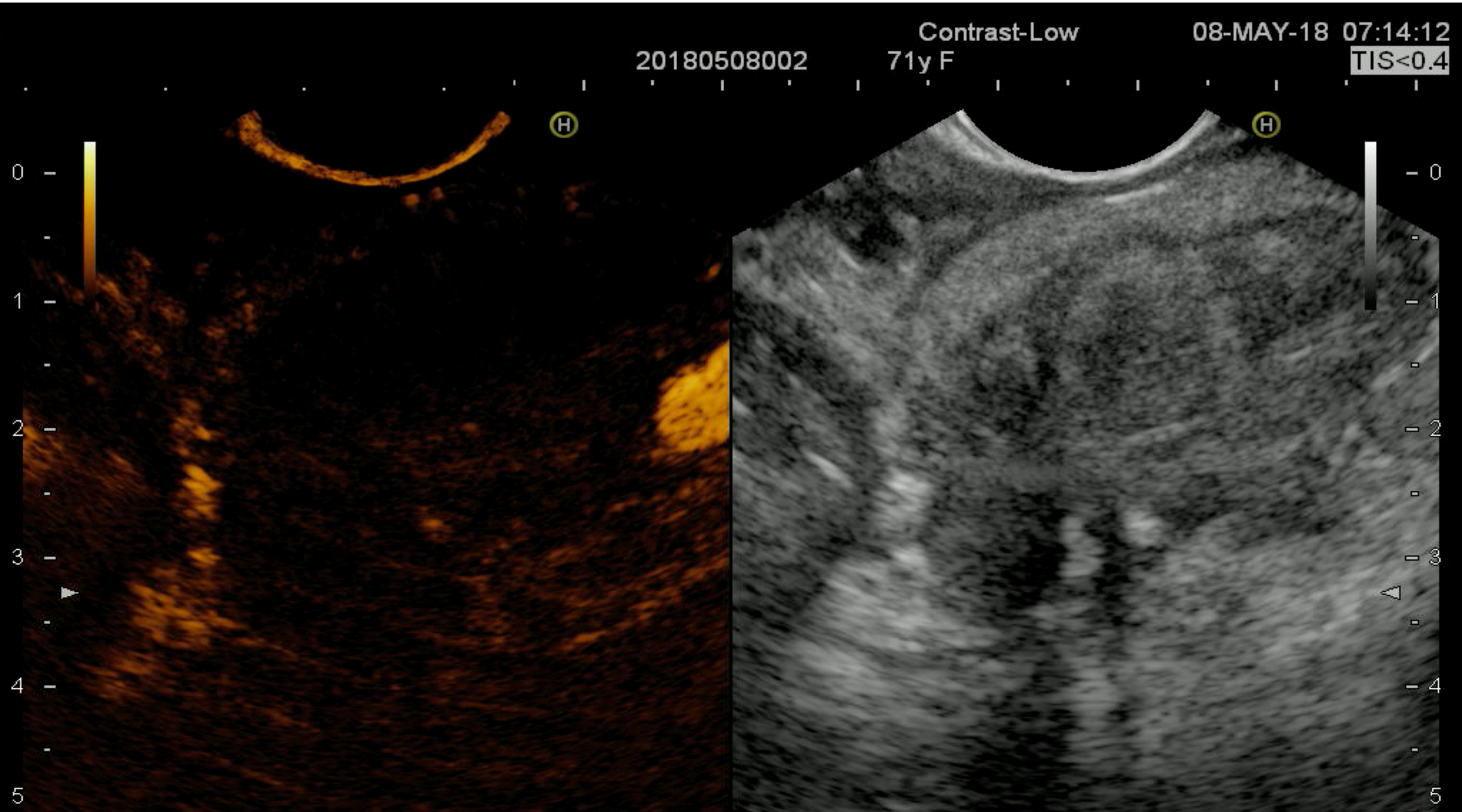


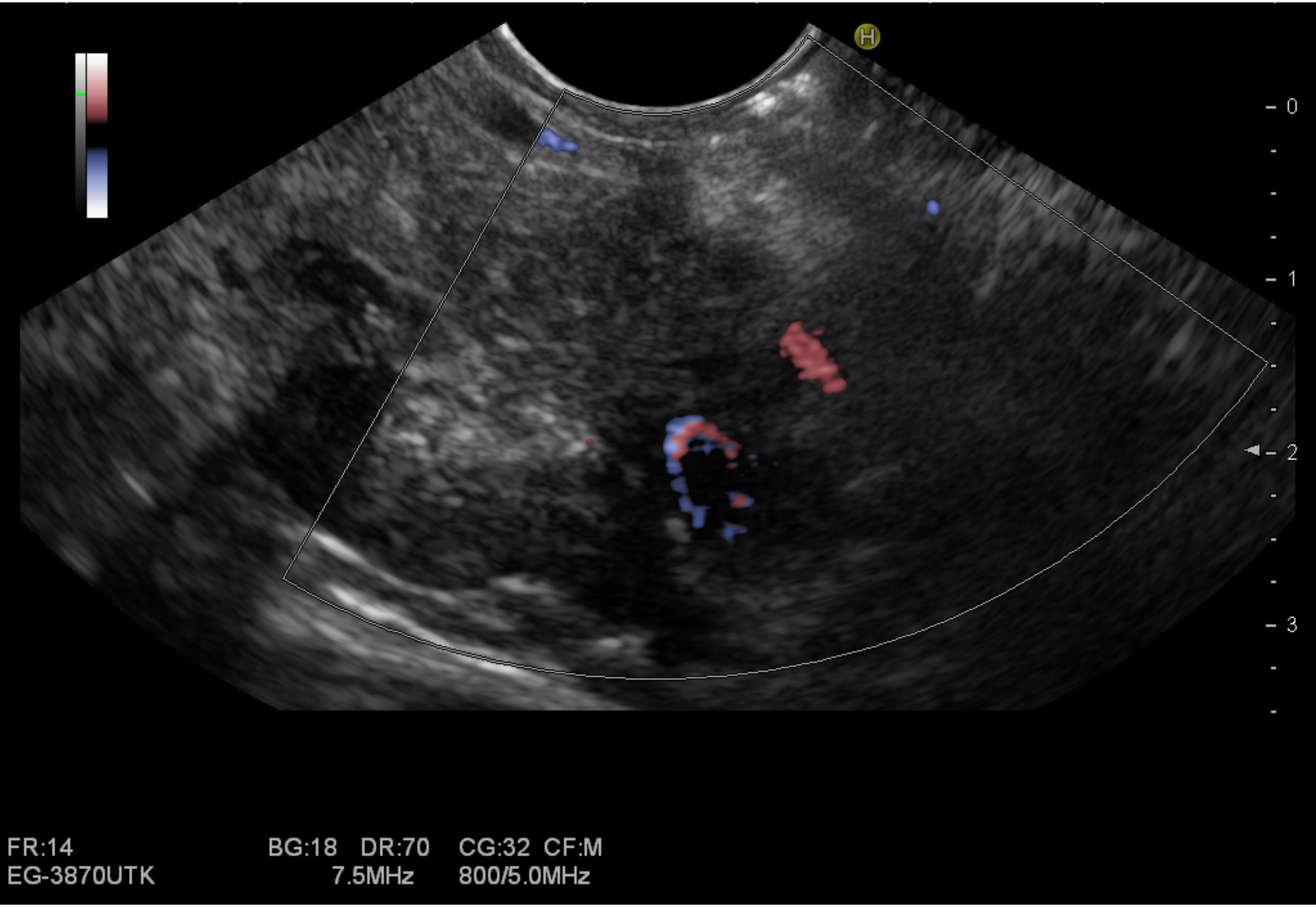
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FR:19 BG:17 DR:65
EG-3870UTK dCHI-W-R

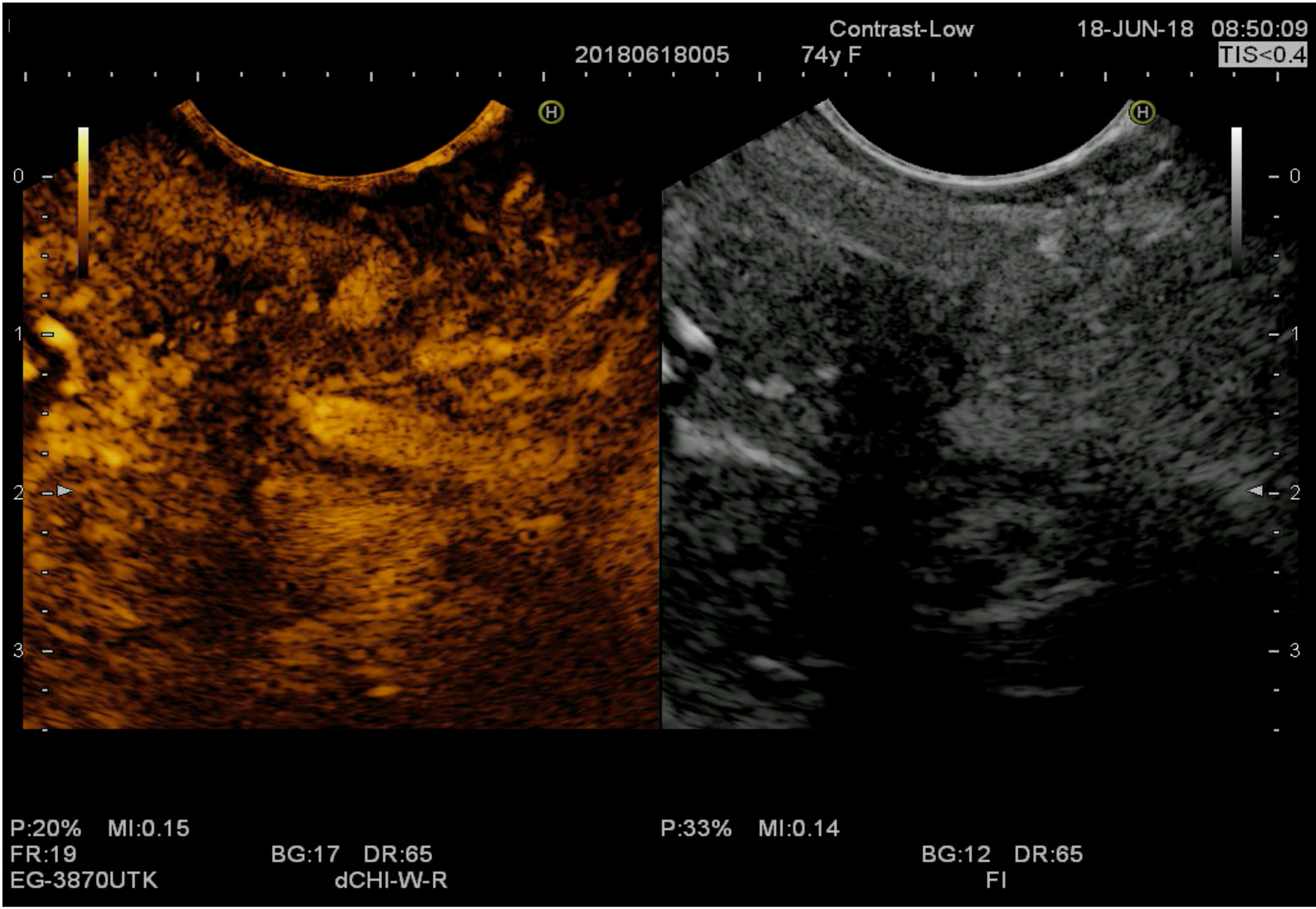
P:36% MI:0.12
BG:14 DR:65
FI



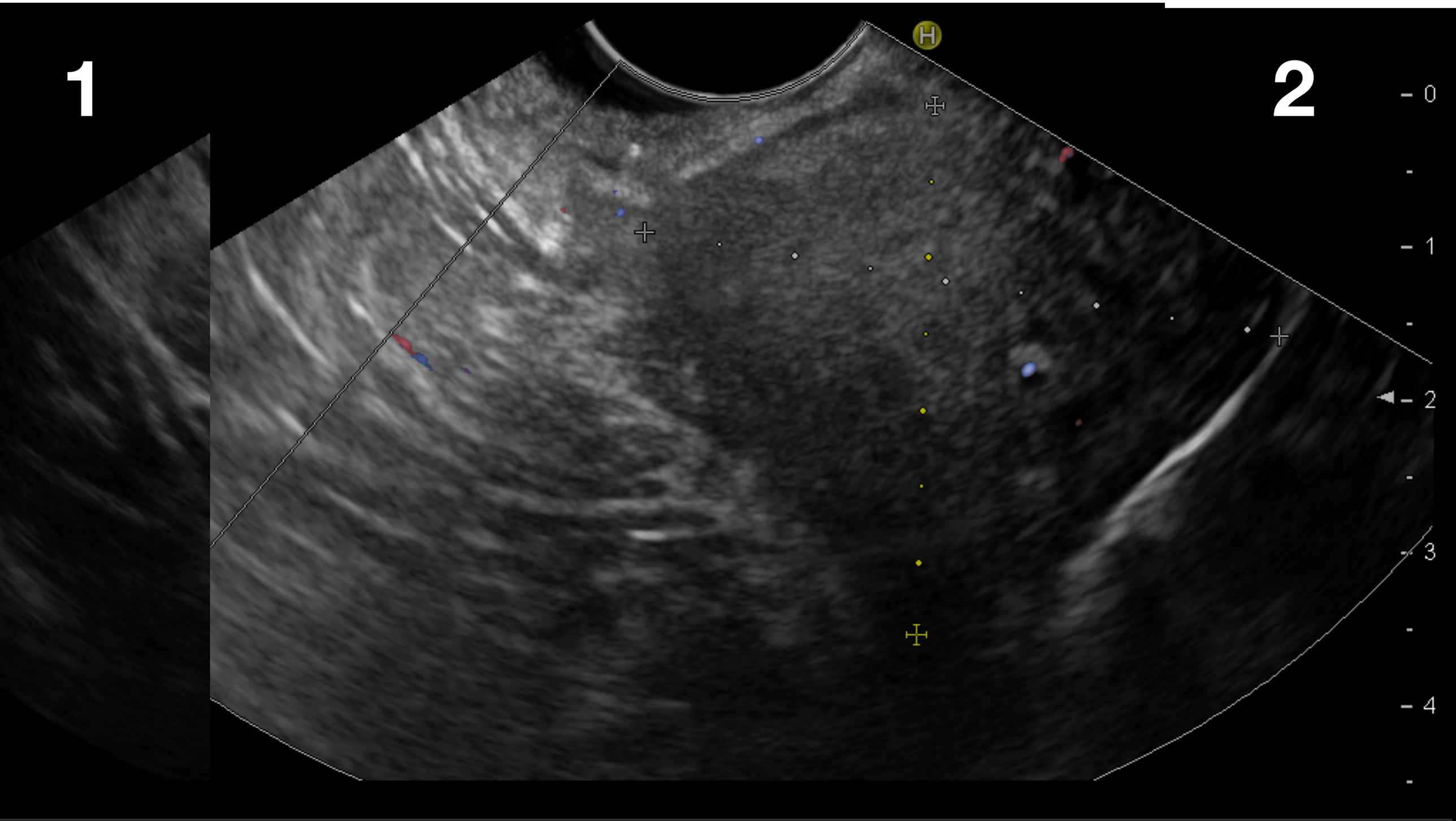
FR:46 BG:25 DR:70
EG-3870UTK 7.5MHz

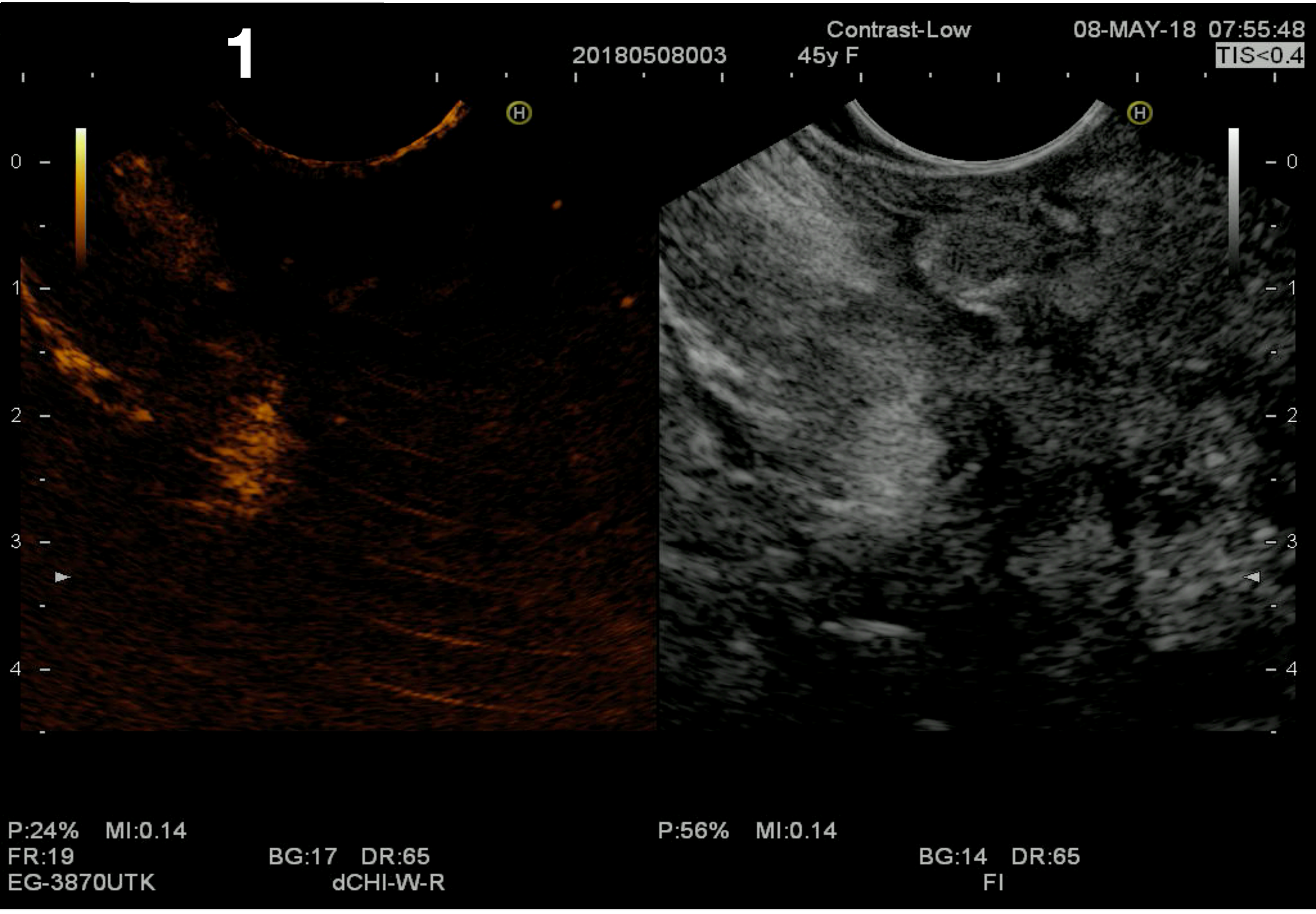

Contrast-Low
08-MAY-18 07:14:12
20180508002
71y F
TIS<0.4
H
H
0
1
2
3
4
5
P:29% MI:0.17
FR:19
BG:17 DR:65
EG-3870UTK
dCHI-W-R
P:56% MI:0.14
BG:20 DR:65
FI

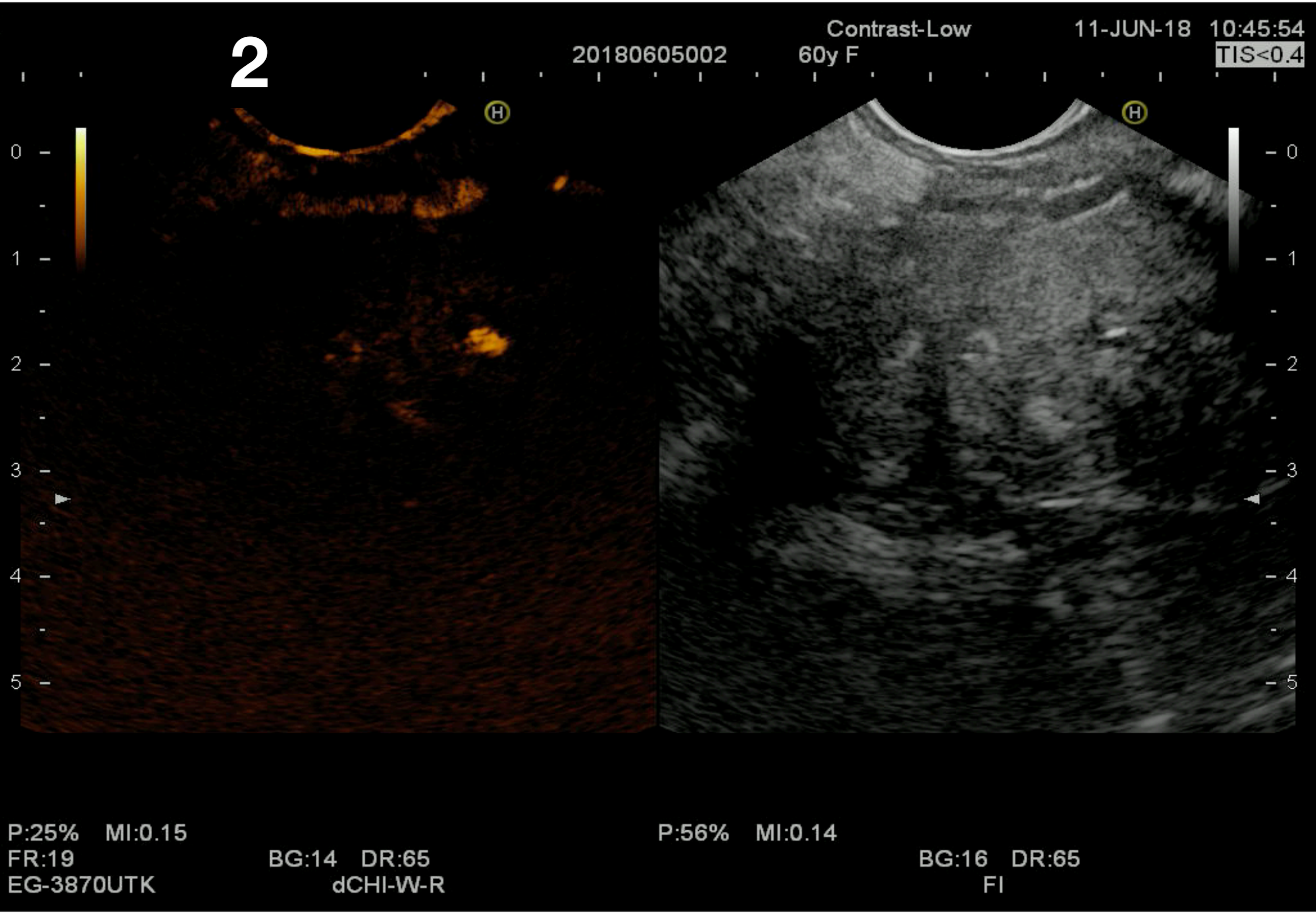

H
0
1
2
3
FR:14
BG:18 DR:70 CG:32 CF:M
EG-3870UTK
7.5MHz
800/5.0MHz


Contrast-Low
18-JUN-18 08:50:09
20180618005
74y F
TIS<0.4
0
1
2
3
P:20% MI:0.15
FR:19
BG:17 DR:65
EG-3870UTK
dCHI-W-R
P:33% MI:0.14
BG:12 DR:65
FI

Non sempre ciò che è ipovascolare è AdenoCA pancreatico….

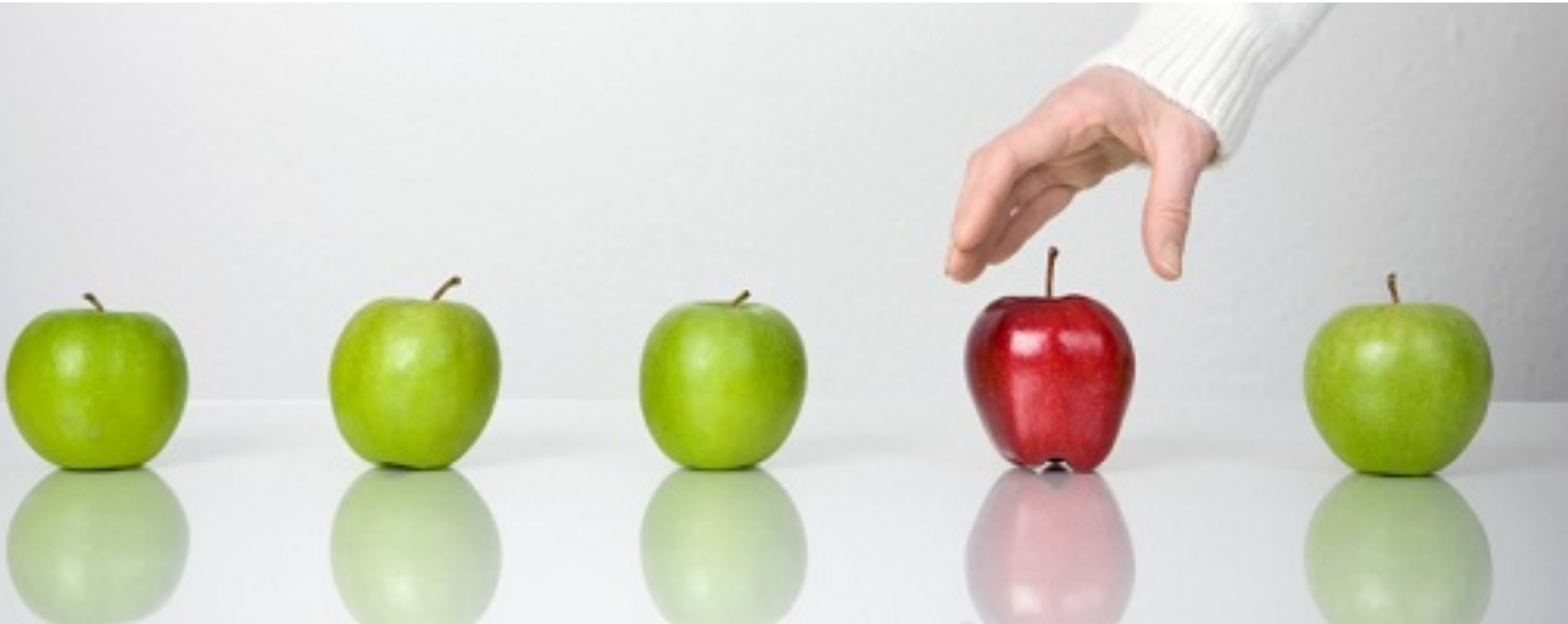



1
20180508003
45y F
Contrast-Low
08-MAY-18 07:55:48
TIS<0.4
H
H
0
1
2
3
4
P:24% MI:0.14
FR:19
BG:17 DR:65
EG-3870UTK
dCHI-W-R
P:56% MI:0.14
BG:14 DR:65
FI


2
20180605002
60y F
Contrast-Low
11-JUN-18 10:45:54
TIS<0.4
P:25% MI:0.15
FR:19
BG:14 DR:65
EG-3870UTK
dCHI-W-R
P:56% MI:0.14
BG:16 DR:65
FI

Sono entrambe ipovascolari

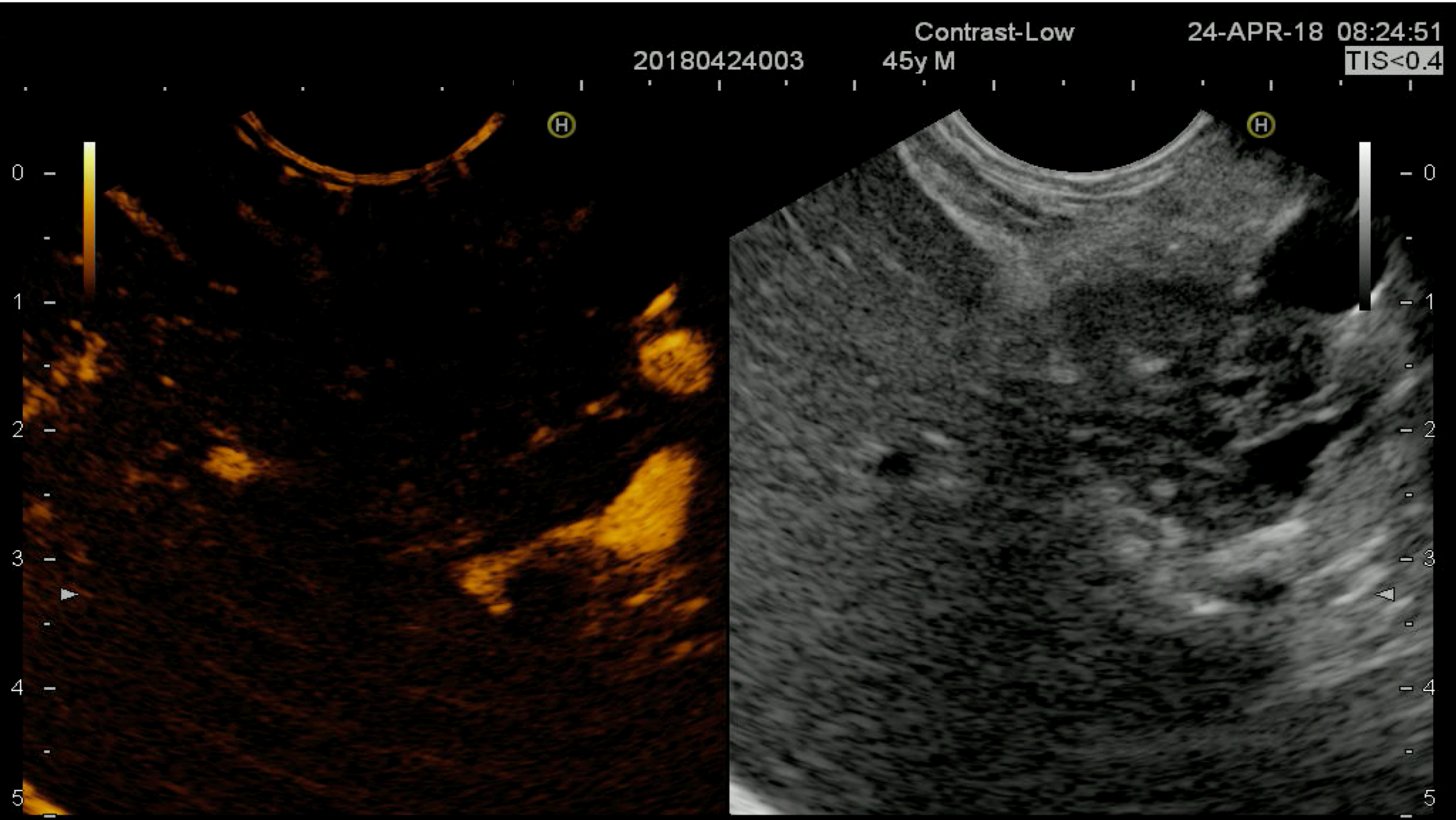
- 1= adenoma pancreatico
- 2= Mesenterite sclerosante



ADK o ....?

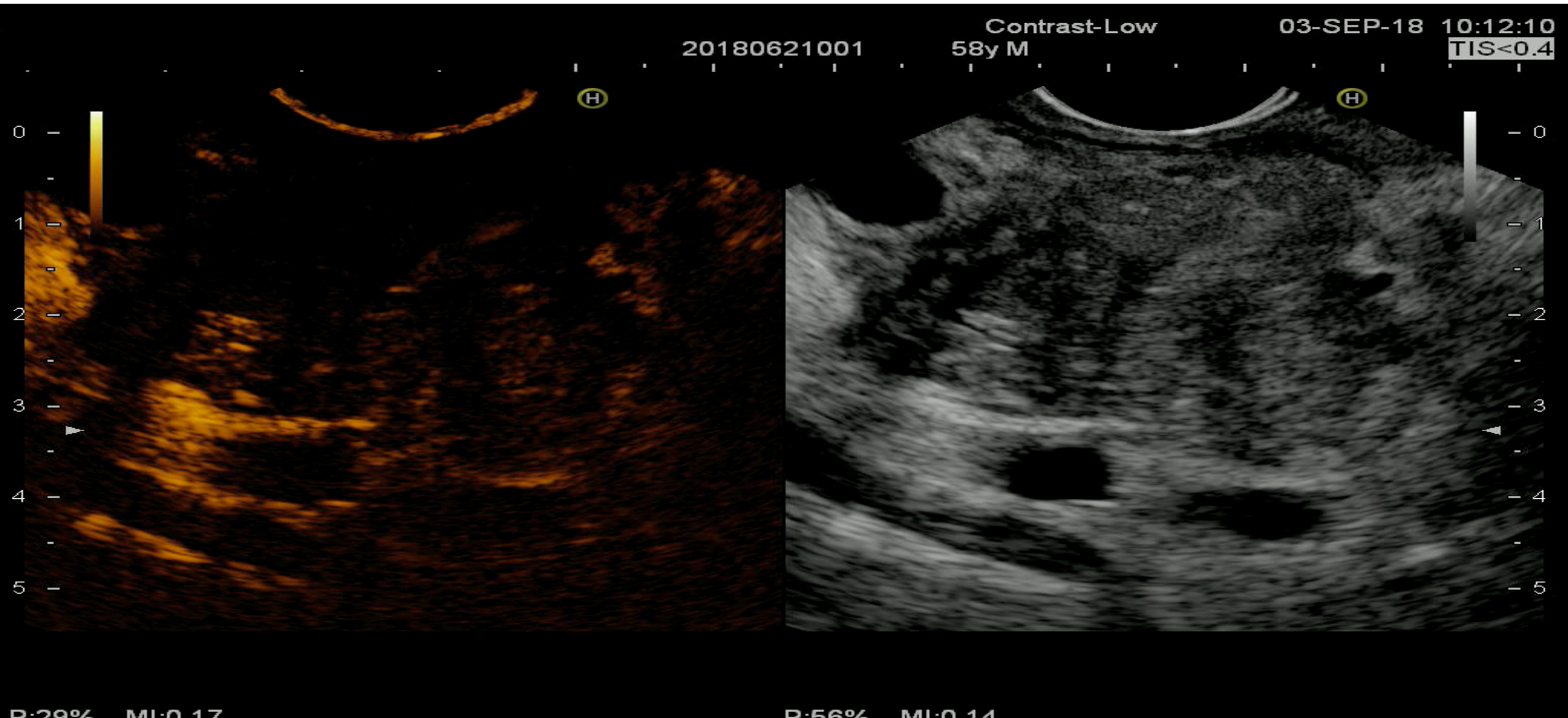


ADK o ....?


Contrast-Low
24-APR-18 08:24:51
20180424003
45y M
TIS<0.4
P:22% MI:0.13
FR:19
BG:14 DR:65
EG-3870UTK
dCHI-W-R
P:52% MI:0.13
BG:15 DR:65
FI

Lesioni solide pancreatiche: mass-forming pancreatitis

- La pancreatite formante massa ha generalmente un pattern isovascolare



Diagnosi Differenziale:
adenoCa vs pancreatite mass-forming

pancreatite → ISOVASCOLARE

tempo | Fibrosi

IPOVASCOLARE



Aree necrotiche/fibrotiche della PA necrotica emorragica: ipovascolari !

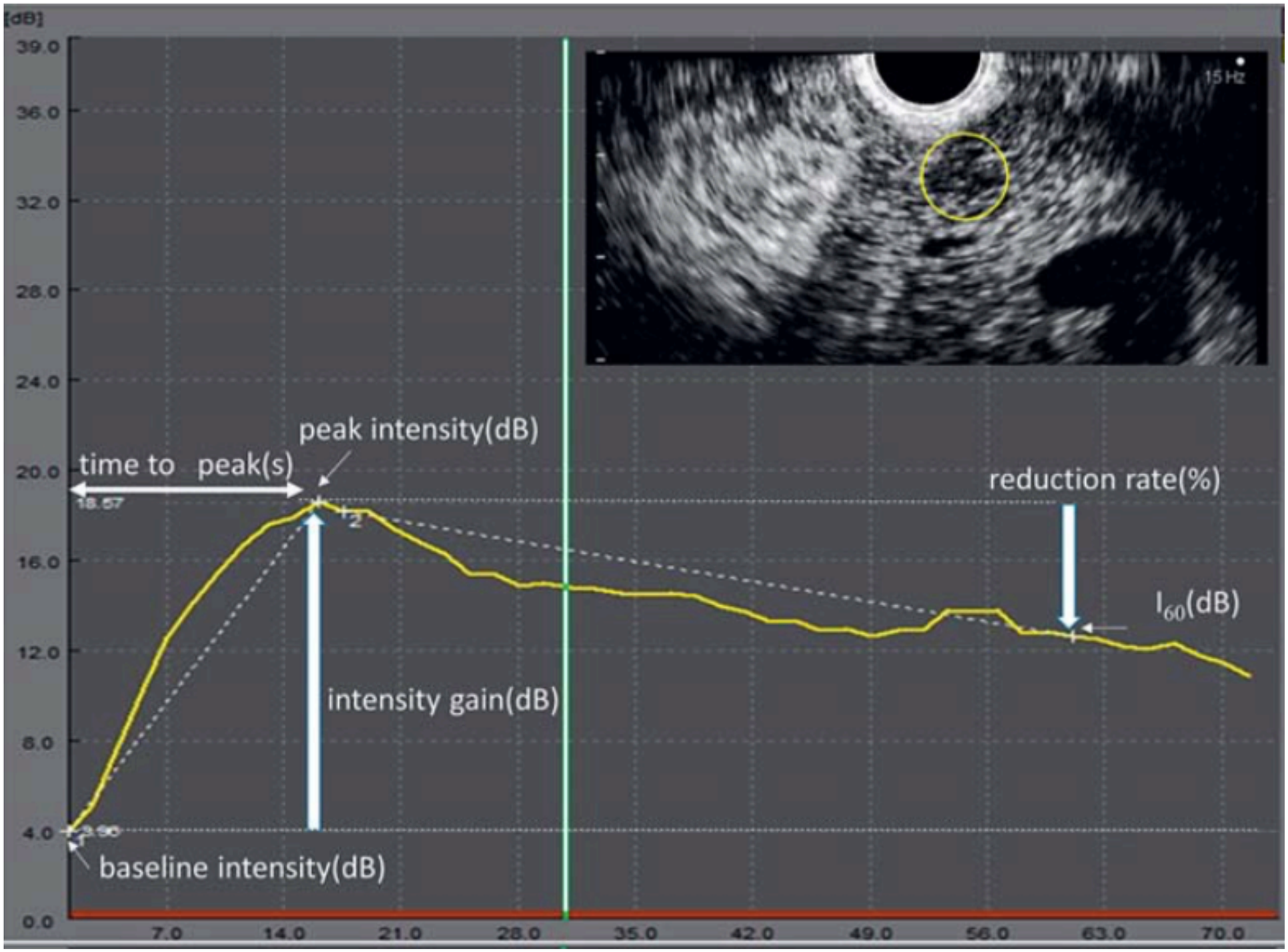
Diagnosi Differenziale:
adenoCa vs pancreatite mass-forming
Analisi quantitativa….

Characterization of Pancreatic Tumors with Quantitative Perfusion Analysis in Contrast-Enhanced Harmonic Endoscopic Ultrasonography

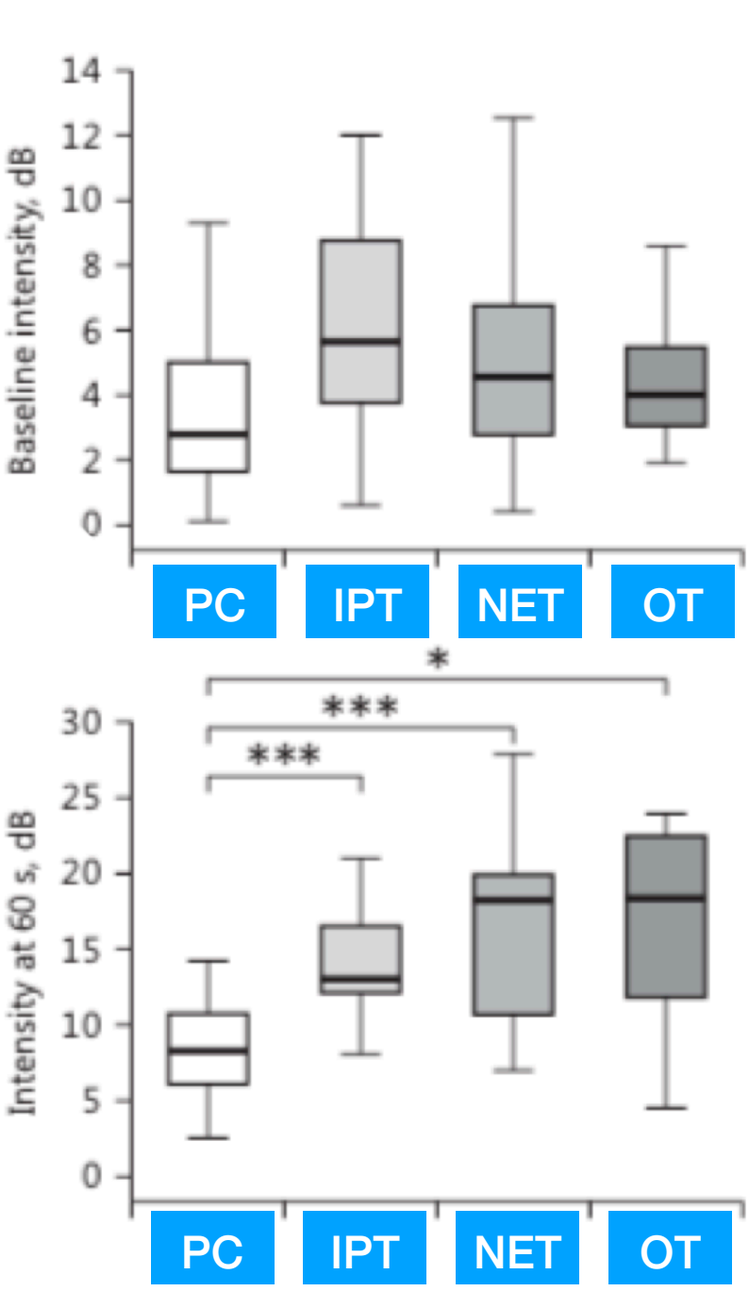
Shunsuke Omoto[a] Mamoru Takenaka[a] Masayuki Kitano[d] Takeshi Miyata[a]

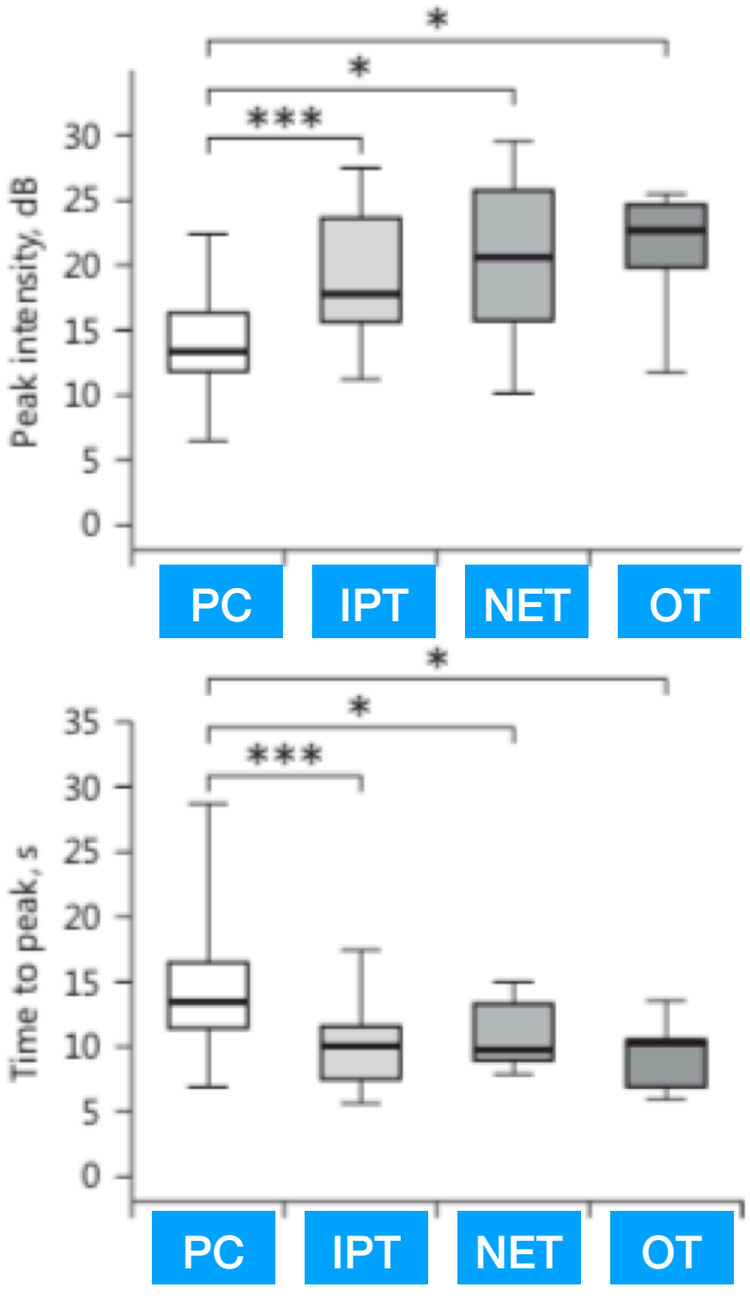
Oncology 2017;93(suppl 1):55–60
DOI: 10.1159/000481231

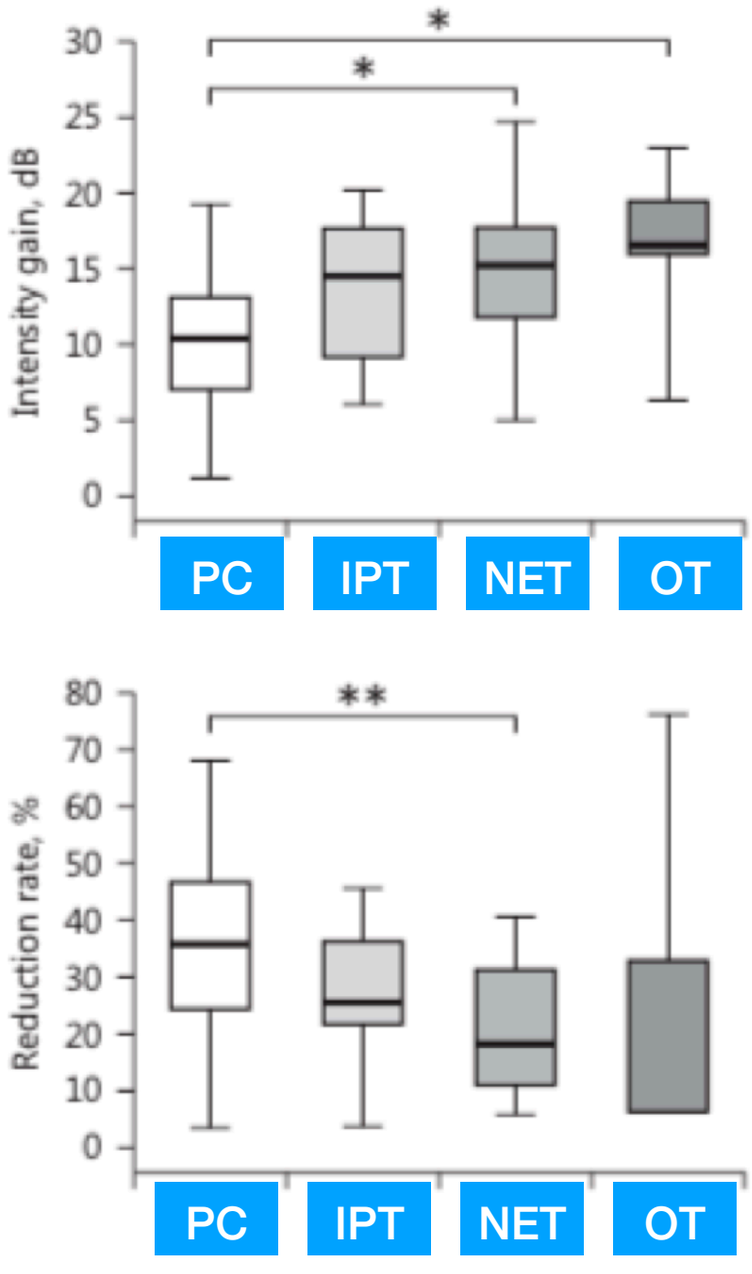
DD PDAC mass-forming pancreatitis: quantitative analisys



Cancro vs Altro: ANALISI QUANTITATIVA

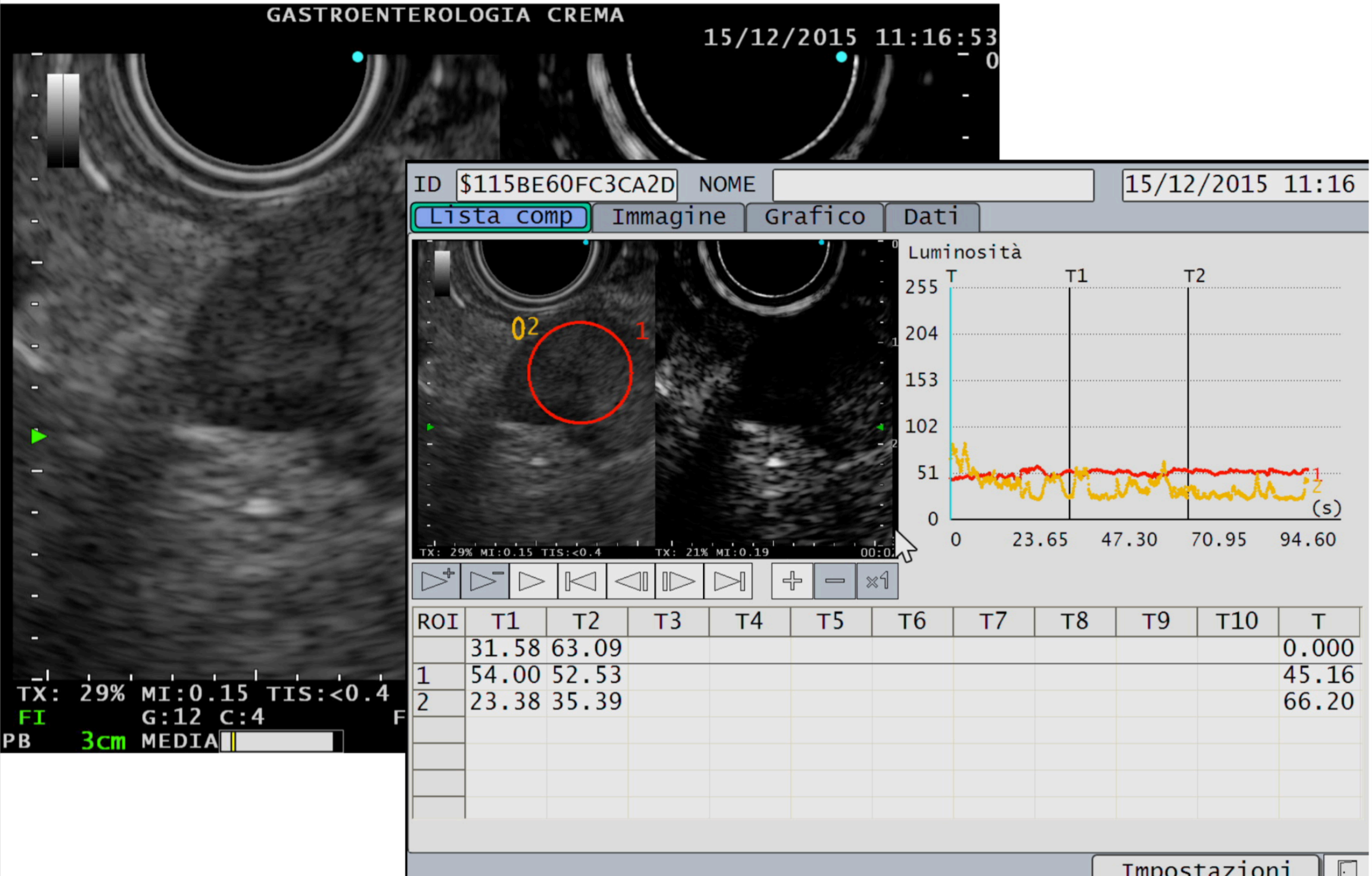






PC	ADK PANCREATICO	NET	NEUROENDOCRINO PANCREATICO
IPT	PSEUDOITUMOR INFIAMMATORIO	OT	ALTRI TUMORI

Quantitative CH-EUS



ROI	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T
	31.58	63.09									0.000
1	54.00	52.53									45.16
2	23.38	35.39									66.20

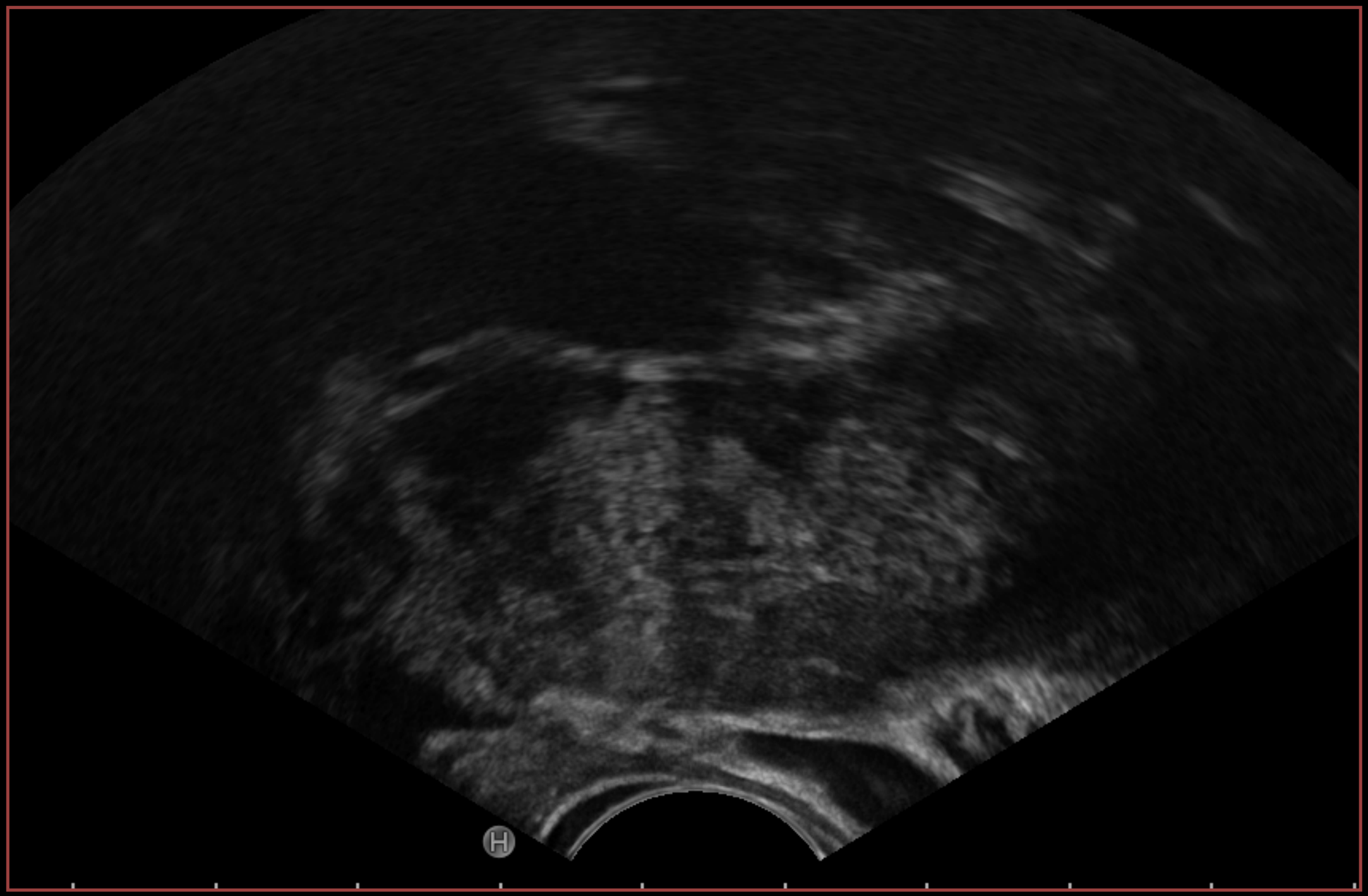
Lesioni solide pancreatiche: AIP

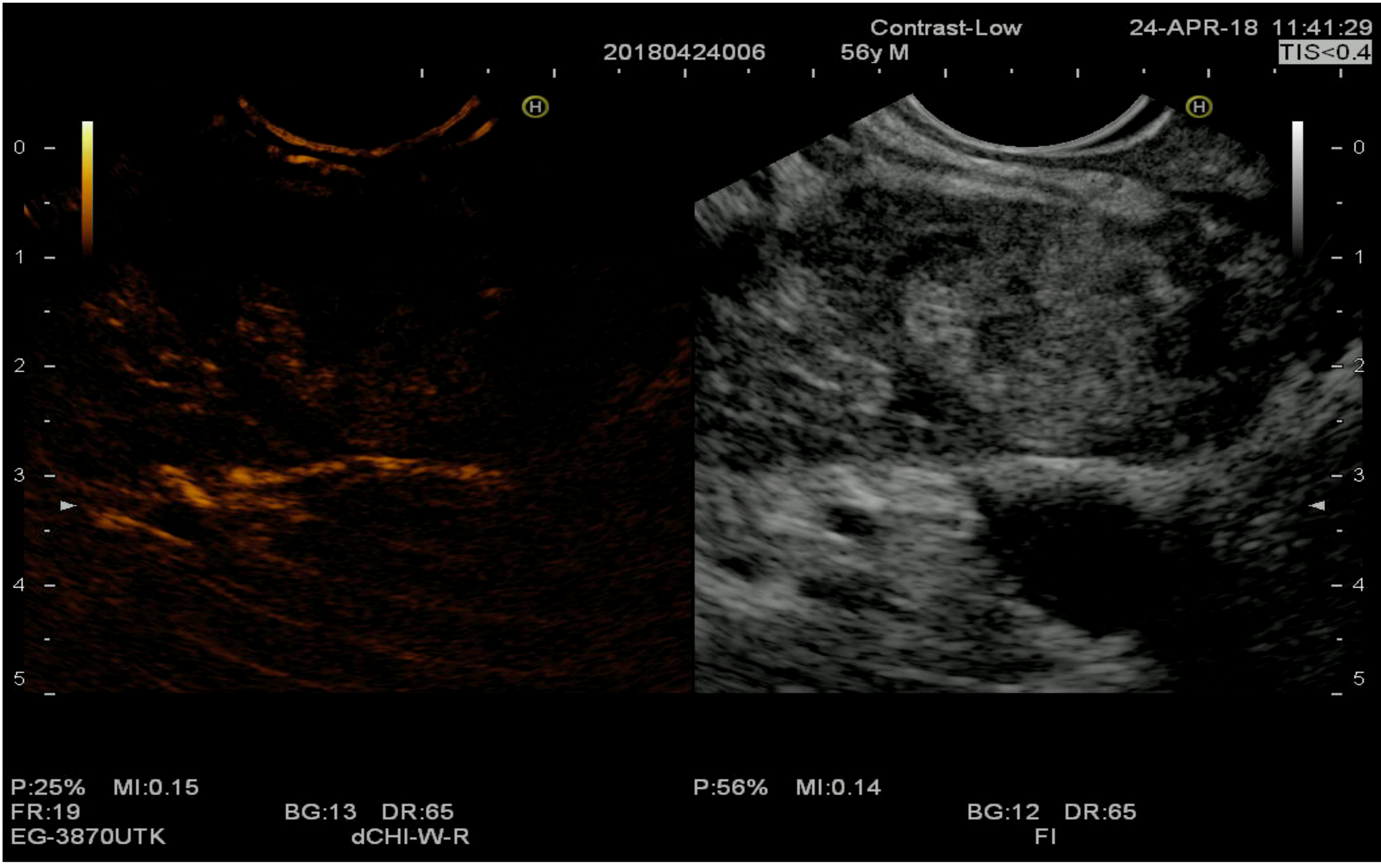
Endoscopic ultrasonography findings in autoimmune pancreatitis

	Pancreas		Extrahepatic bile duct	Gallbladder	Lymph nodes[1]	Peripancreatic vessels
	Diffuse AIP	Focal AIP				
EUS	Gland volume: increased	Gland volume: focal enlargement/s	Caliber: dilated	Wall: diffuse and uniform thickening, "sandwich-pattern"[1]	Volume: enlarged (also substantially)	Loss of interface between pancreas and portal or mesenteric veins[1]
	Echotextu with echo interlobul Gland bor thickened Wirsung:					
	Wirsung wall: thickened[1]	Wirsung wall: thickened[1]				
IDUS				Wall: diffuse and uniform thickening, "sandwich-pattern"; differential diagnosis with cholangiocarcinoma[1]		

- Lento enhancement del mdc
- Rim ipovascolare

World J Gastroenterol 2011 April 28; 17(16): 2080-2085


H


20180424006
56y M
Contrast-Low
24-APR-18 11:41:29
TIS<0.4
H
H
0
1
2
3
4
5
P:25% MI:0.15
FR:19
BG:13 DR:65
EG-3870UTK
dCHI-W-R
P:56% MI:0.14
BG:12 DR:65
FI

Lesioni solide pancreatiche non-ipovascolari

Lesioni solide pancreatiche non-ipovascolari: NET

Contrast Harmonic Echo–Endoscopic Ultrasound Improves Accuracy in Diagnosis of Solid Pancreatic Masses

PIETRO FUSAROLI,* ALESSIA SPADA,‡ MARIA GRAZIA MANCINO,* and GIANCARLO CALETTI*

Table 3. Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, and Accuracy of Standard EUS and CHE–EUS

	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Accuracy
Hypoechoic lesion on standard EUS as a predictor of adenocarcinoma	86% (73%–94%)	18% (8%–34%)	58% (47%–69%)	59% (24%–76%)	57% (50%–64%)
Hypoenhancing lesion on CHE–EUS as a predictor of adenocarcinoma	96% (85%–99%)	64% (47%–78%)	78% (65%–87%)	93% (74%–99%)	82% (74%–85%)
Hyperenhancing lesion on CHE–EUS as an exclusion sign of adenocarcinoma	39% (30%–41%)	98% (92%–100%)	94% (74%–99%)	68% (63%–69%)	72% (65%–74%)
Hyperenhancing lesion on CHE–EUS as a predictor of NET	69% (46%–86%)	90% (87%–94%)	56% (33%–76%)	95% (87%–98%)	88% (81%–93%)

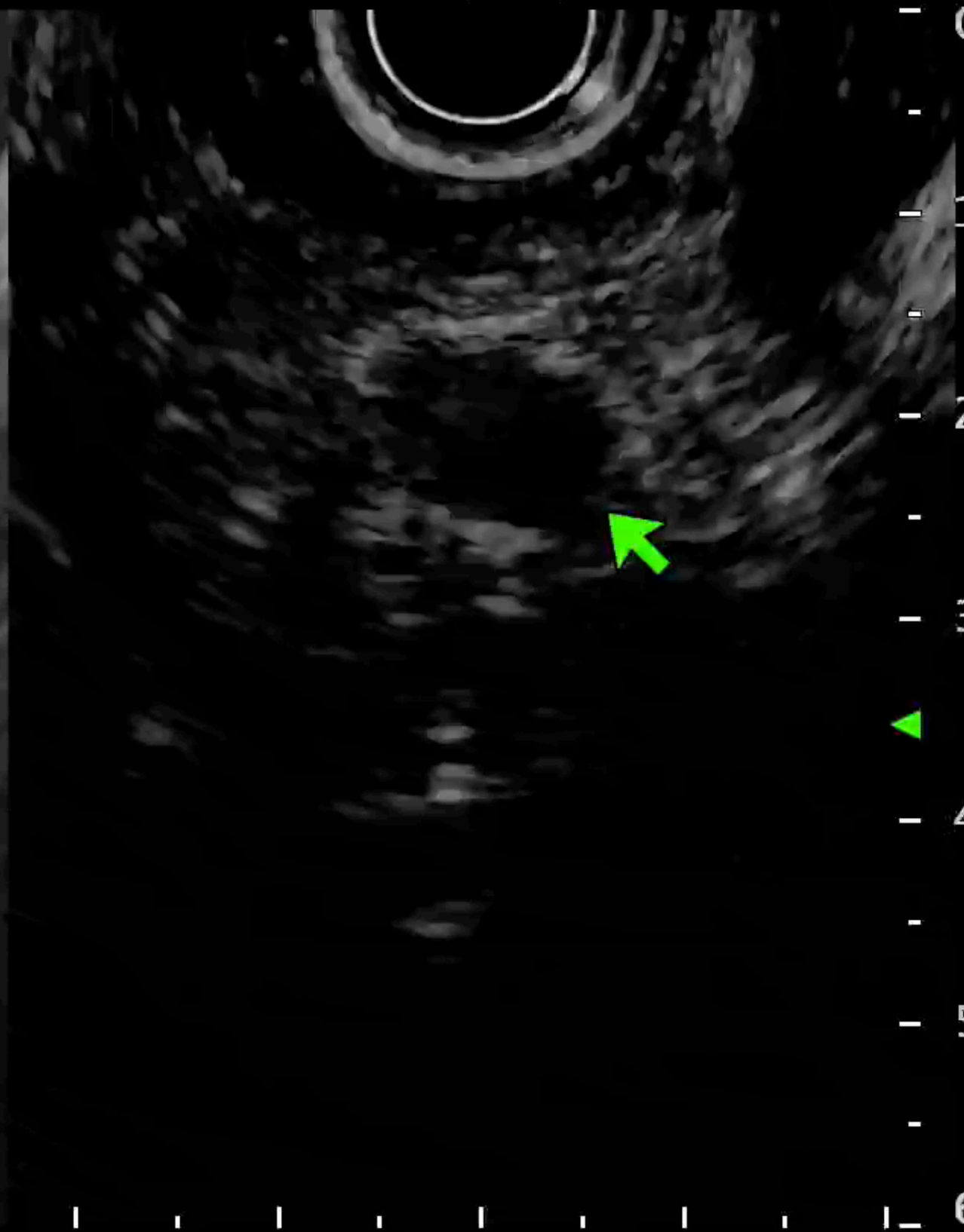
NOTE. Data in parentheses are 95% confidence intervals.

CLINICAL GASTROENTEROLOGY AND HEPATOLOGY 2010;8:629–634

INSULTADD GASTROENTEROLOGIA CREMA

02/08/2019 13:16:33

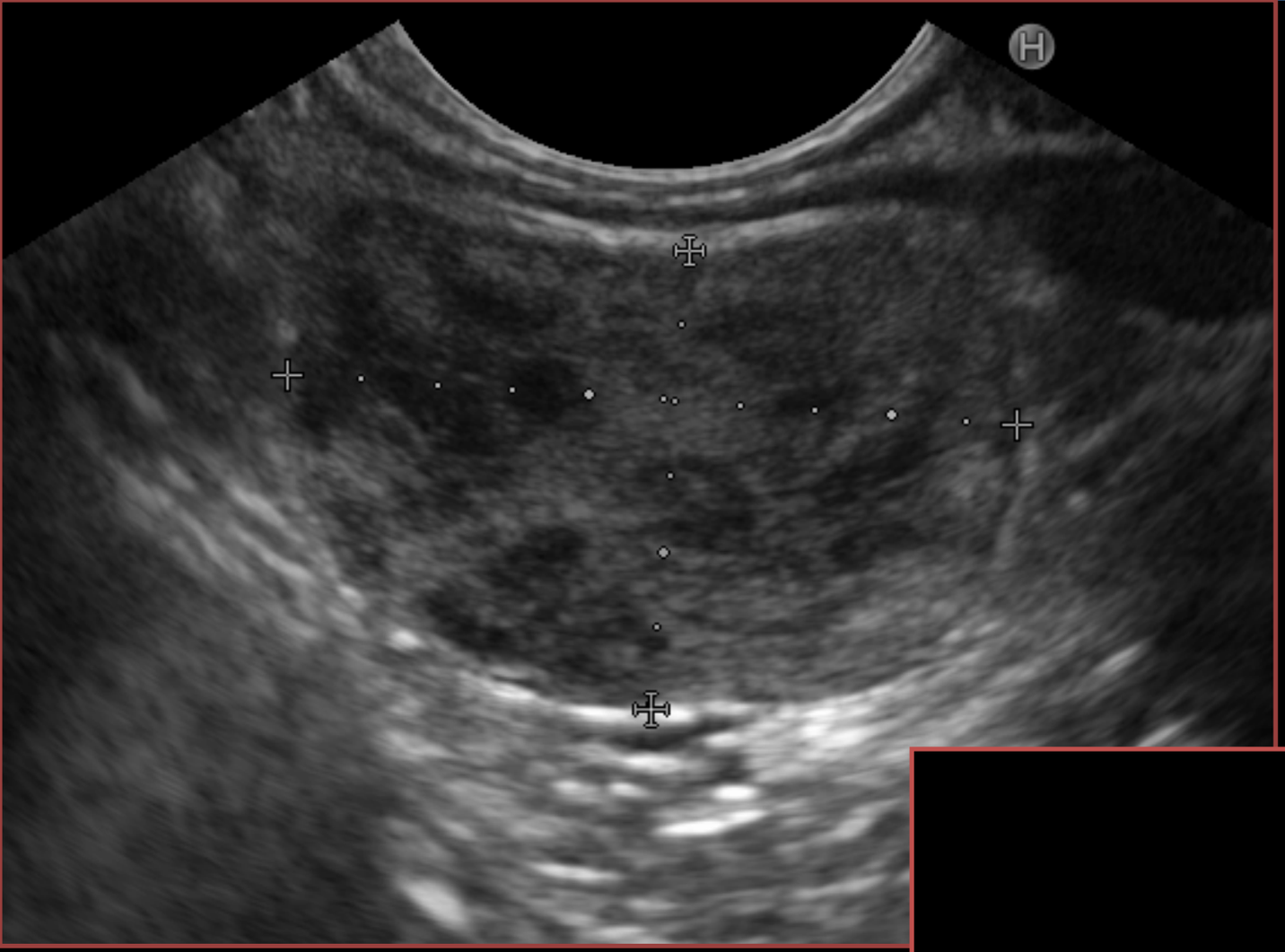


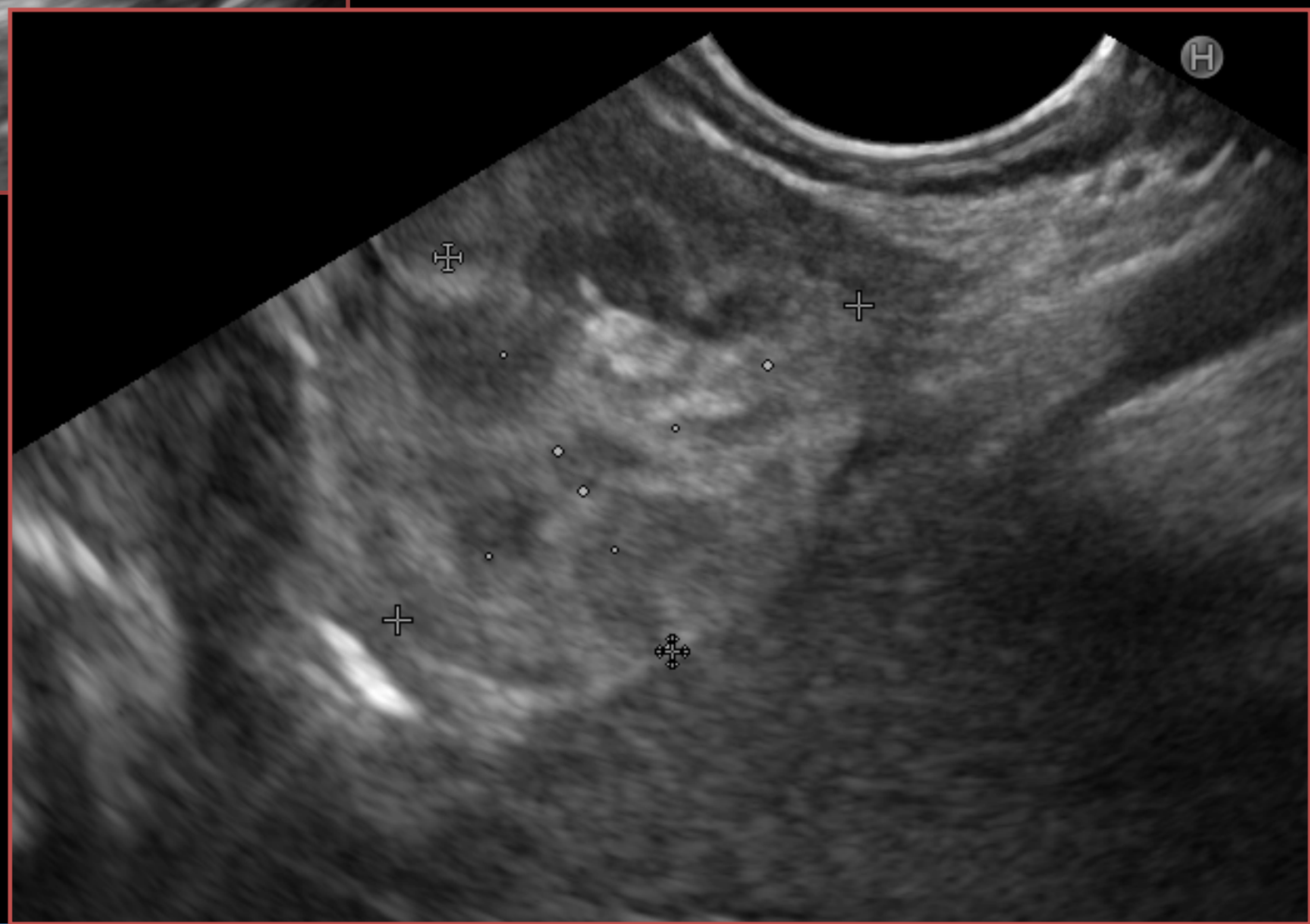


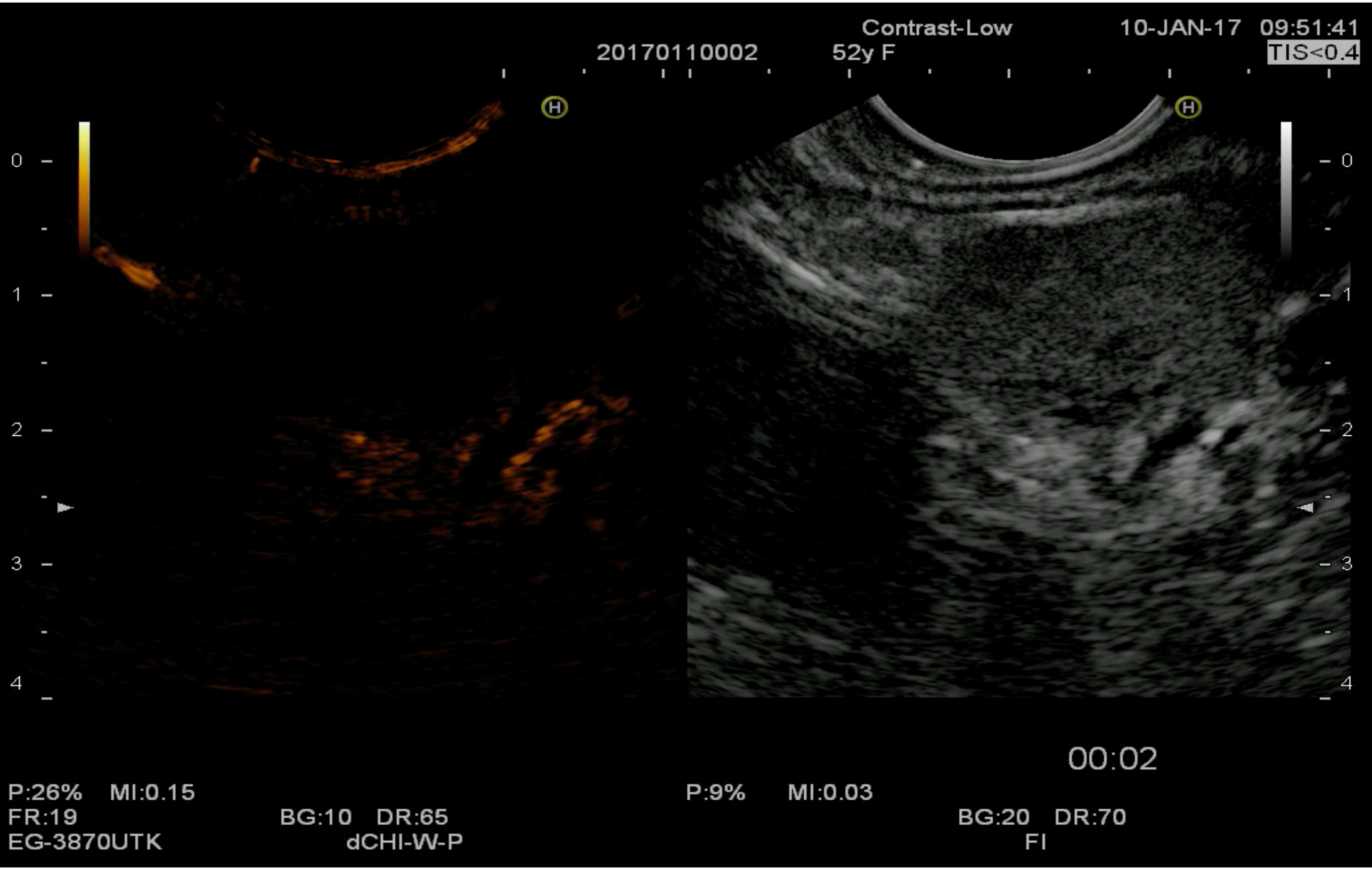
TX: 41% MI:0.15 TIS:<0.4 TX: 38% MI:0.20 00:02

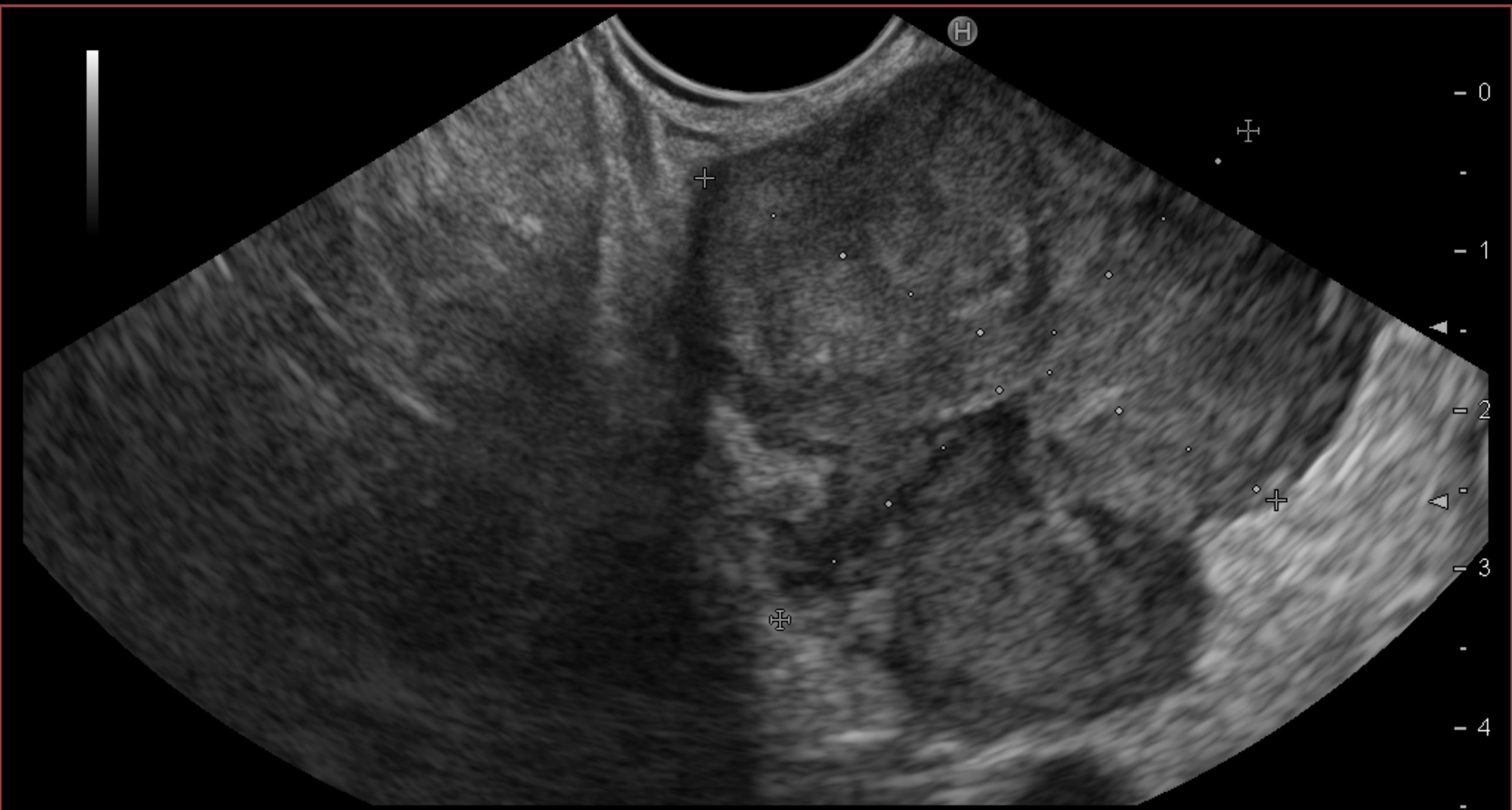
FI G: 9 C:2 FR:20 CH-P CG:10 CC:7

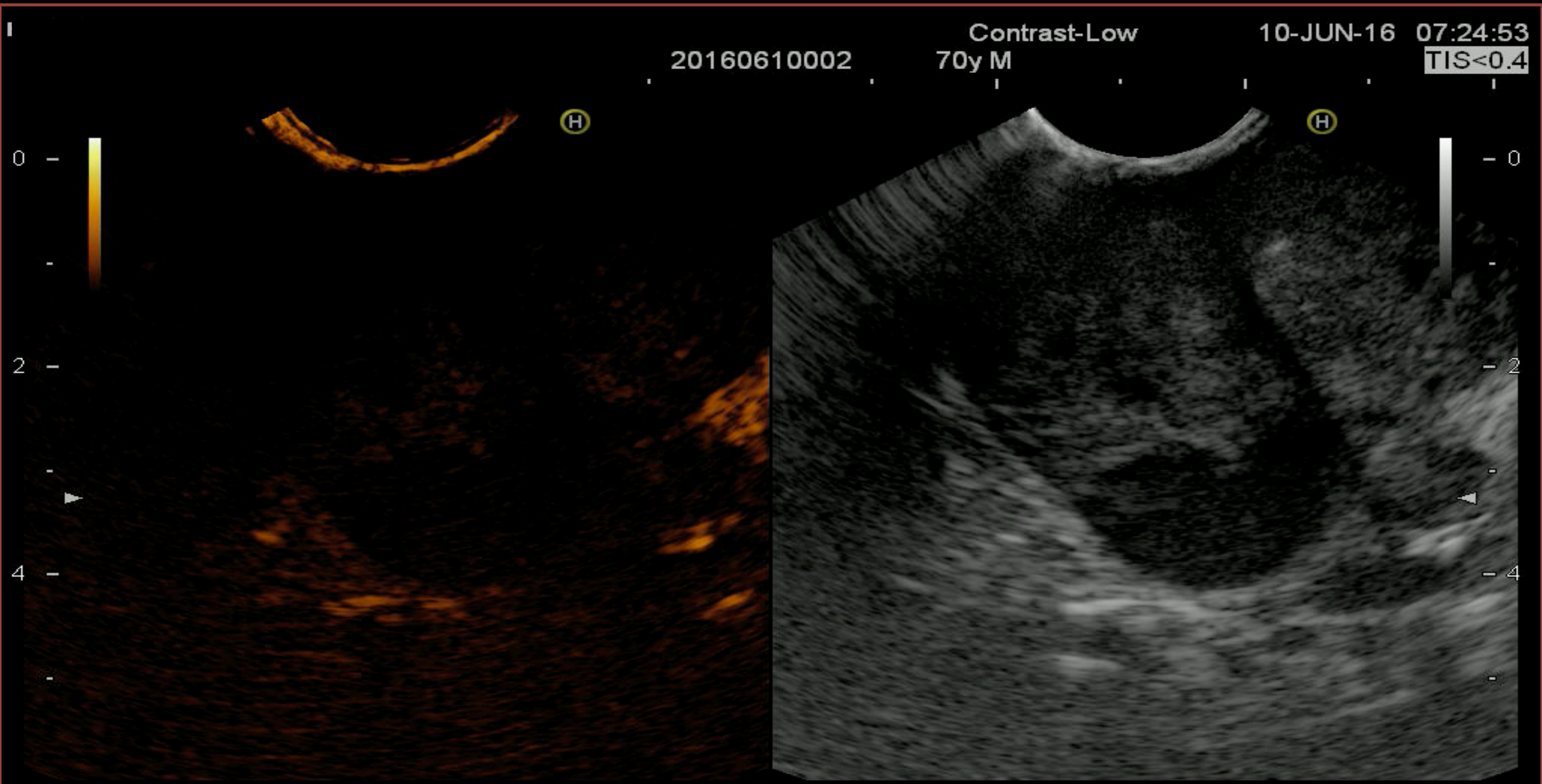
PB 6cm MEDIA CV: 29 US R

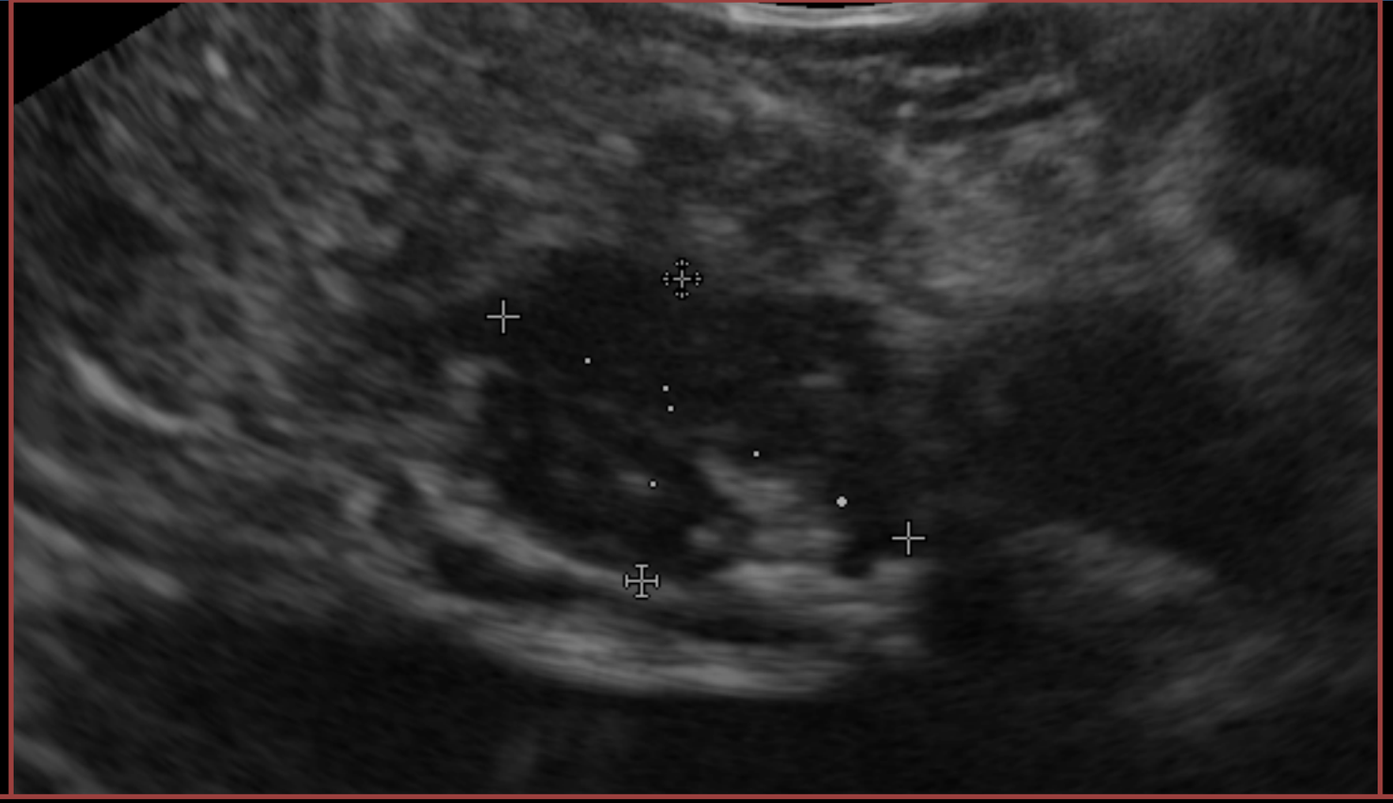





Contrast-Low
10-JAN-17 09:51:41
20170110002
52y F
TIS<0.4
H
H
0
1
2
3
4
00:02
P:26% MI:0.15
FR:19
BG:10 DR:65
EG-3870UTK
dCHI-W-P
P:9% MI:0.03
BG:20 DR:70
FI


H
0
1
2
3
4
Calip
D1
41.4 mm
D2
42.7 mm

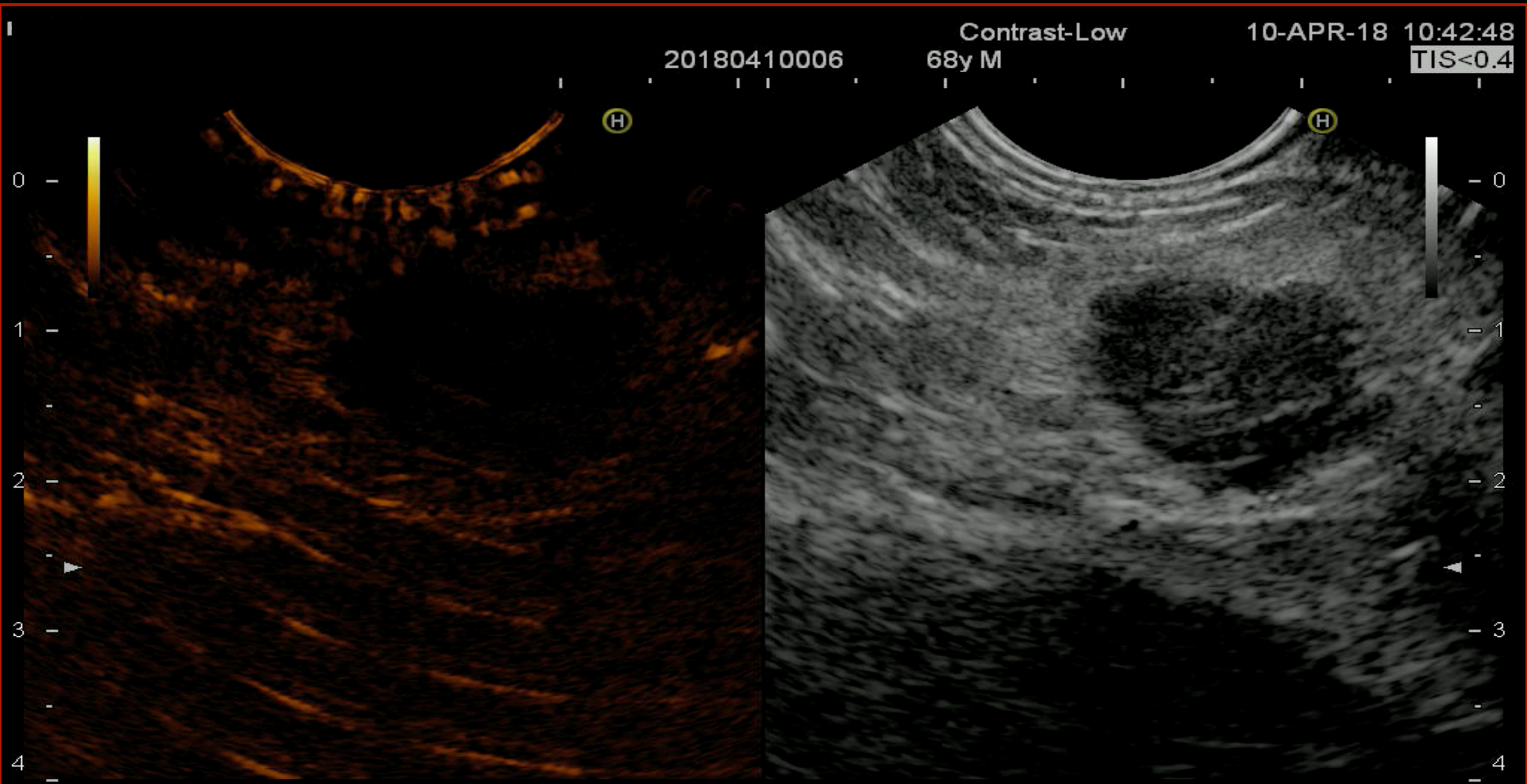

Contrast-Low
10-JUN-16 07:24:53
20160610002
70y M
TIS<0.4
H
H
0
2
4
P:37% MI:0.19
FR:19
BG:10 DR:65
EG-3870UTK
dCHI-W-P
P:12% MI:0.03
BG:20 DR:70
FI

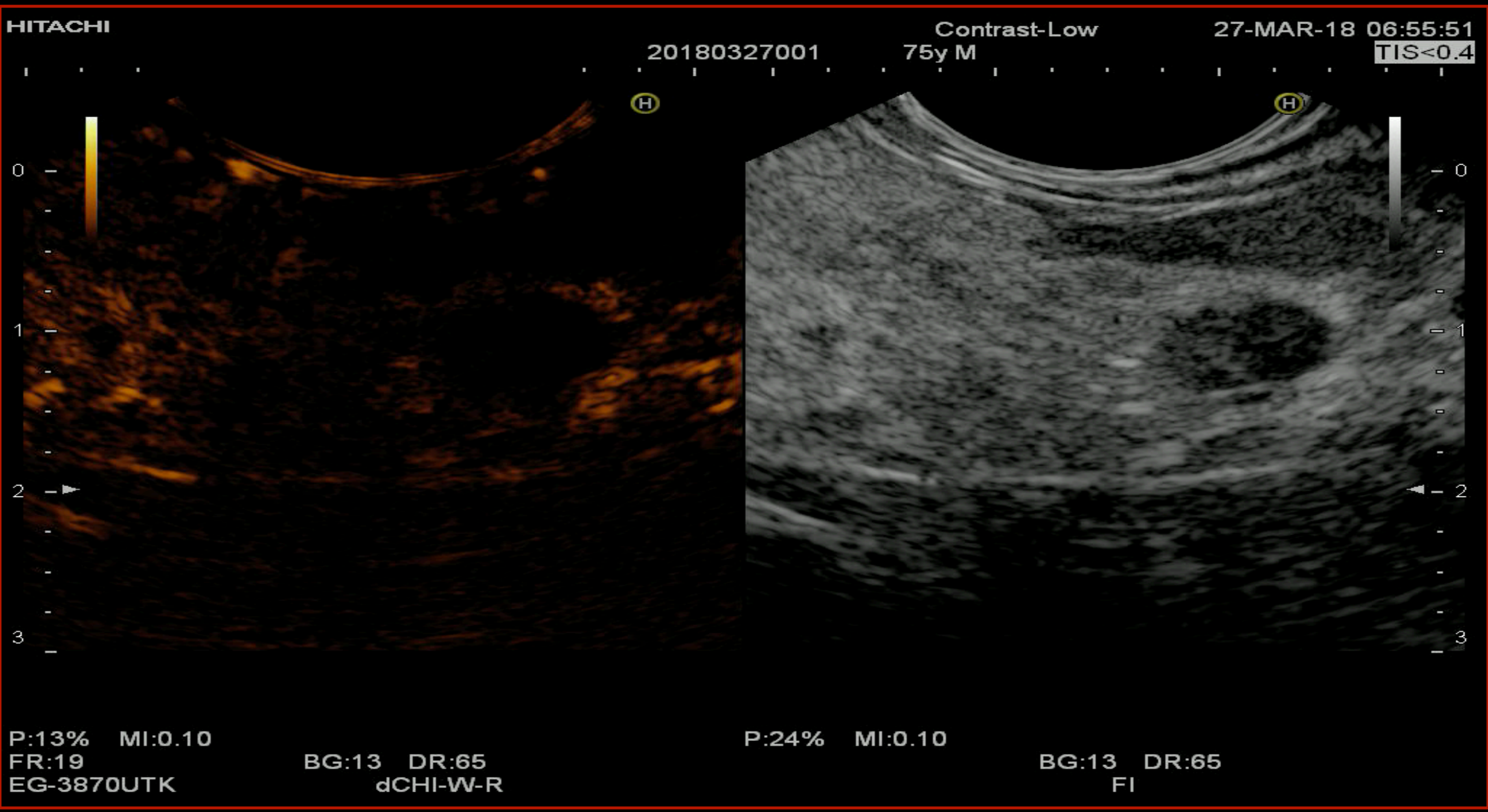


Contrast-Low
14-FEB-17 11:33:36
20170214004
35y F
TIS<0.4

P:27% MI:0.16
FR:19 BG:10 DR:65
EG-3870UTK dCHI-W-P

P:9% MI:0.03
BG:20 DR:70
FI


Contrast-Low
10-APR-18 10:42:48
20180410006
68y M
TIS<0.4
H
H
0
1
2
3
4
P:17% MI:0.12
FR:19
BG:13 DR:65
EG-3870UTK
dCHI-W-R
P:36% MI:0.12
BG:12 DR:65
FI

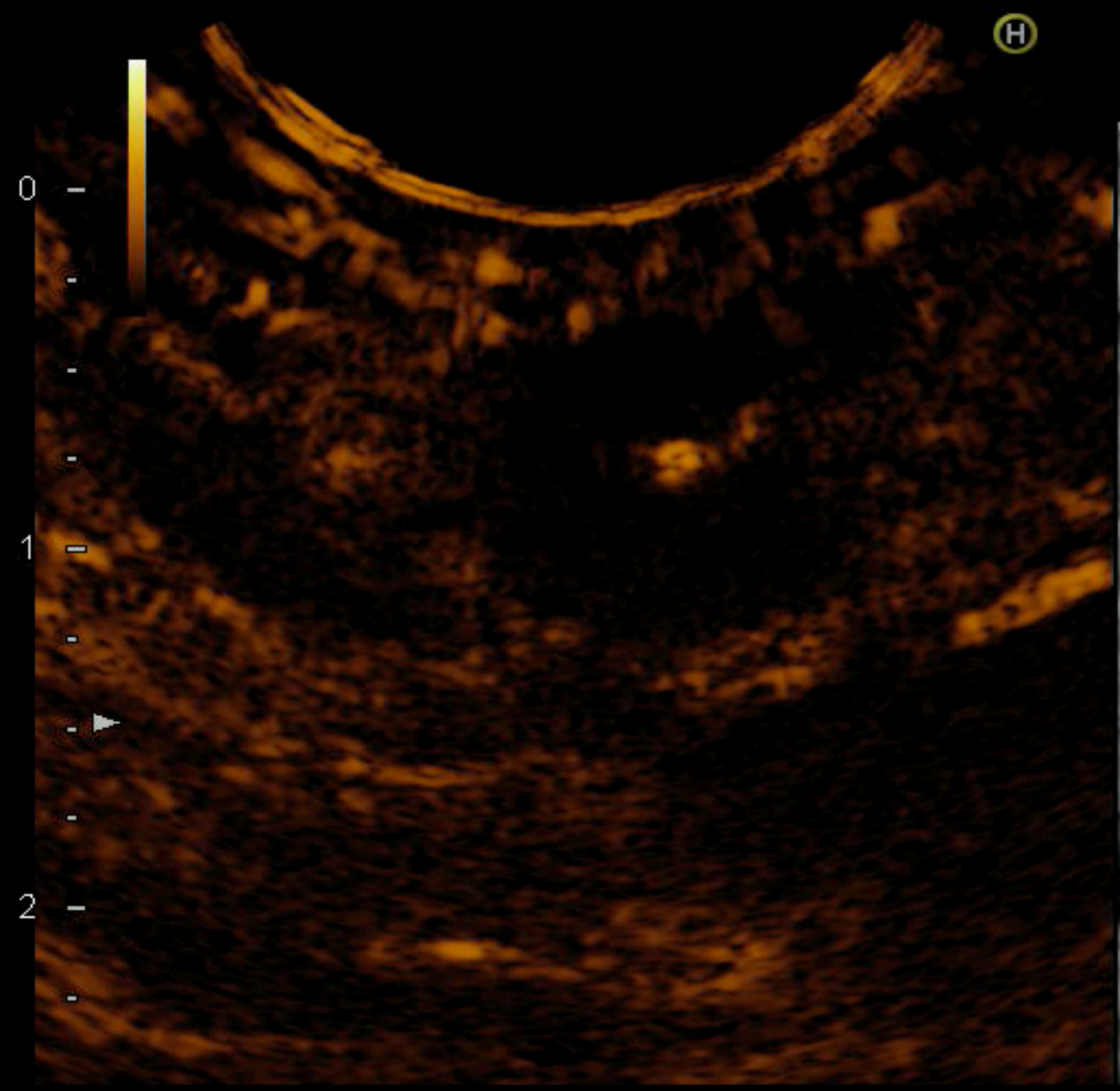

HITACHI
20180327001
75y M
Contrast-Low
27-MAR-18 06:55:51
TIS<0.4
0
1
2
3
P:13% MI:0.10
FR:19 BG:13 DR:65
EG-3870UTK dCHI-W-R
P:24% MI:0.10
BG:13 DR:65
FI

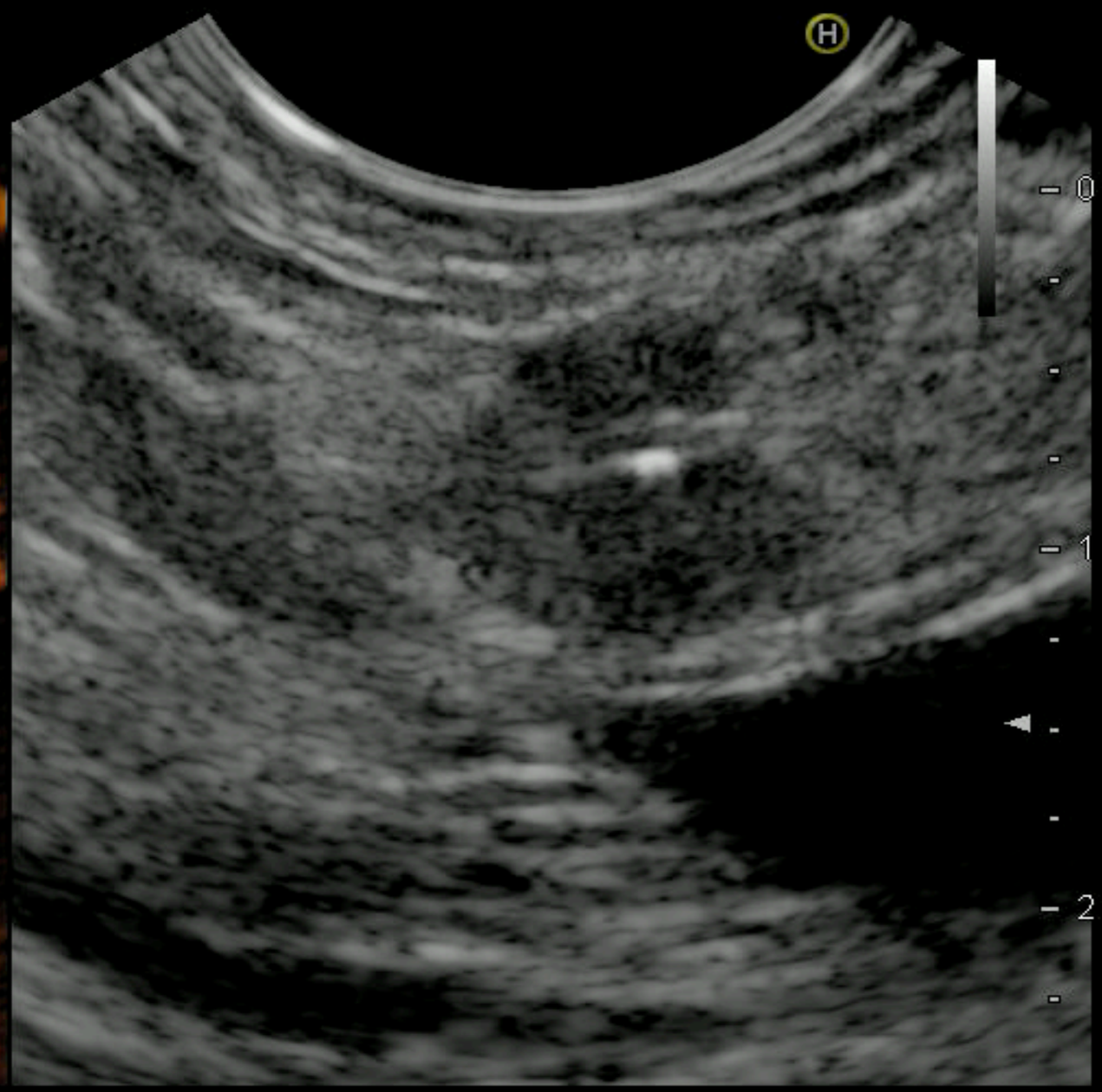
Valutazione Post-RFA



Contrast-Low 11-JUN-18 08:20:24

20171016003 69y F TIS<0.4





P:17% MI:0.12
FR:19 BG:17 DR:65
EG-3870UTK dCHI-W-R

P:25% MI:0.12
BG:13 DR:65
FI

Lesioni cistiche pancreatiche

Vascolarizzazione dei setti, del contenuto (vegetazioni o ispessimenti) e della parete.

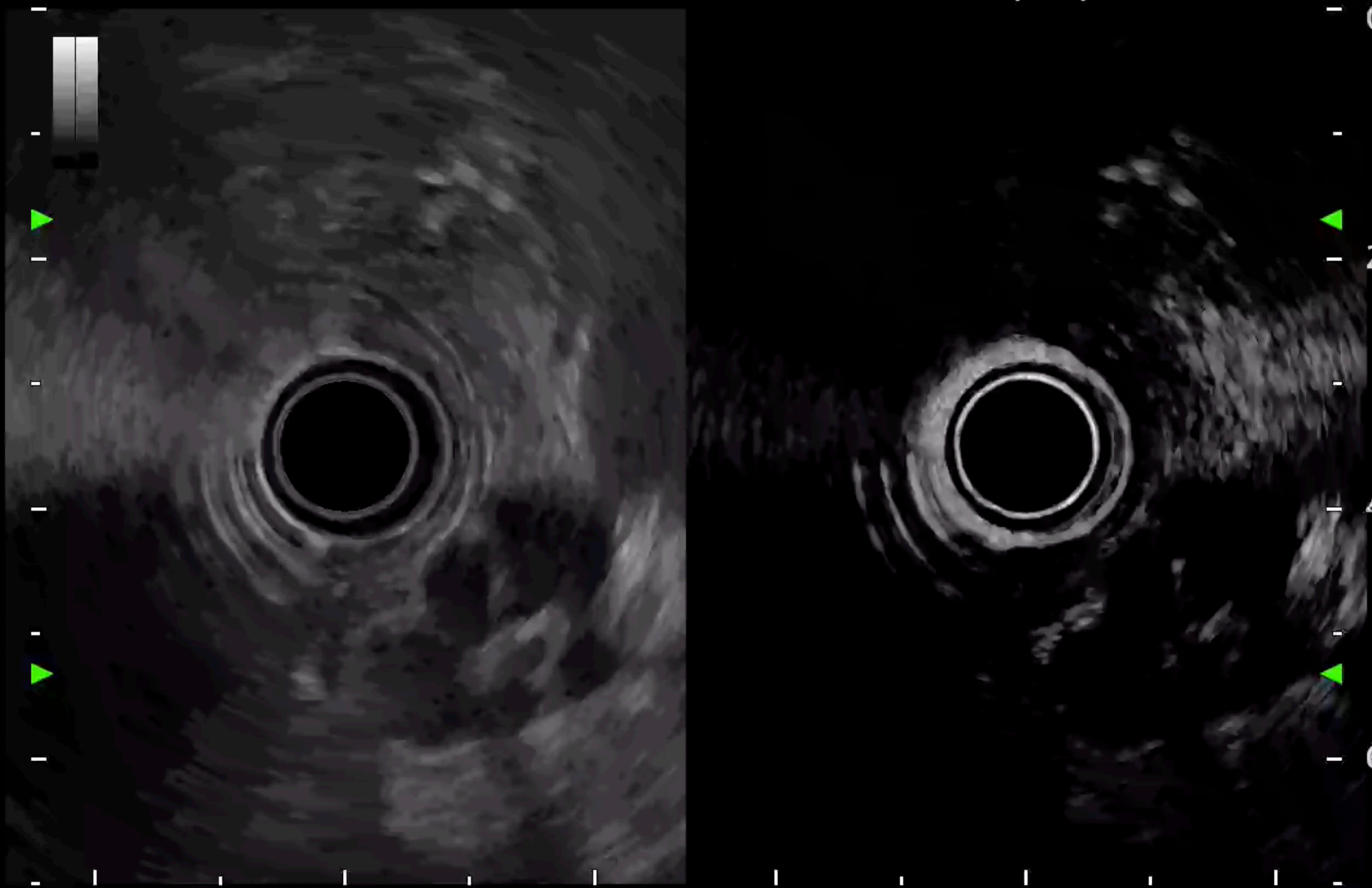
Miglior metodica per individuare e caratterizzare i noduli di parete.

Limiti:

Non implementa l’accuratezza dell’EUS nel distinguere lesioni mucinose da non-mucinose

CISTOADSIER GASTROENTEROLOGIA CREMA

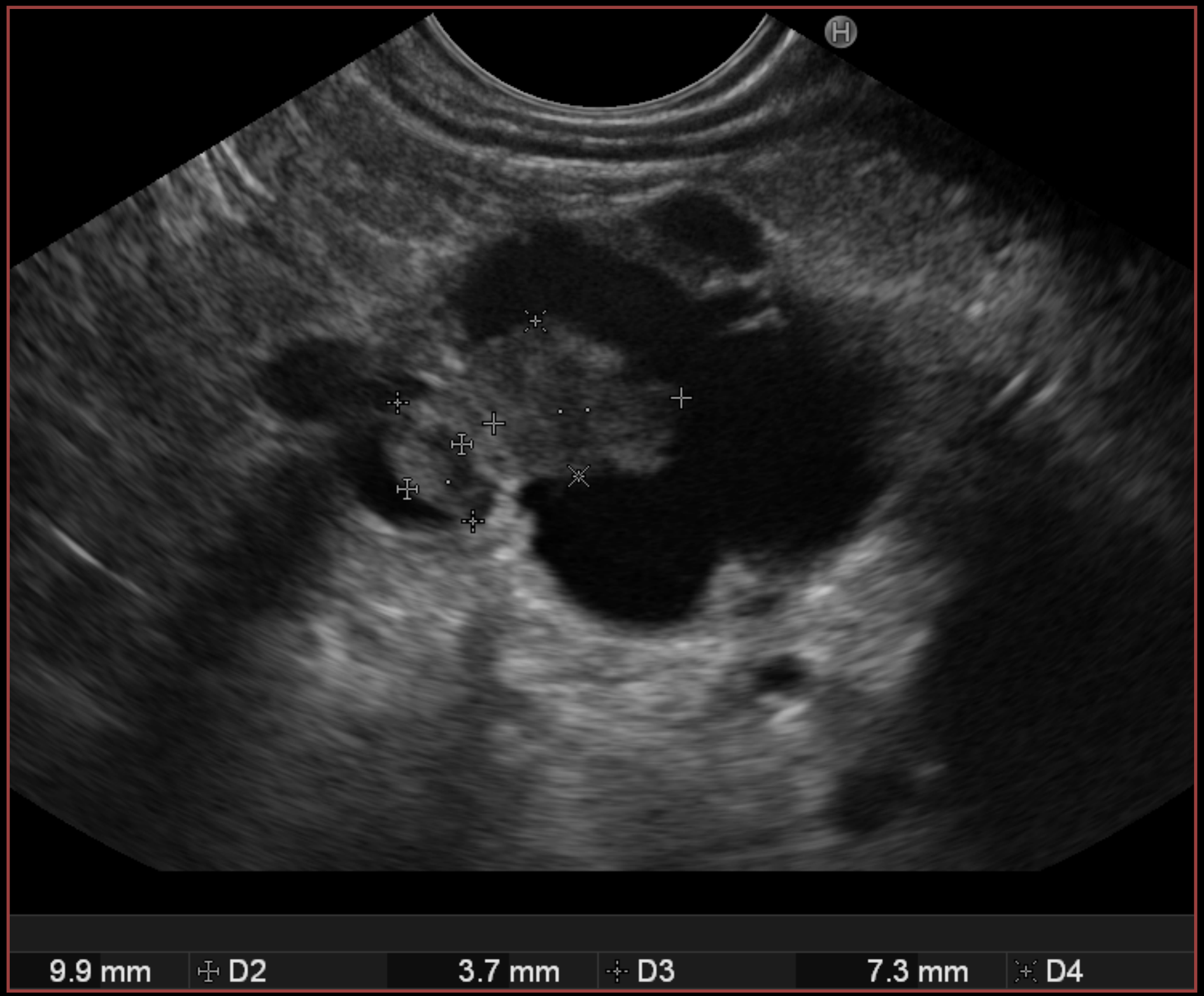
08/11/2018 09:59:15

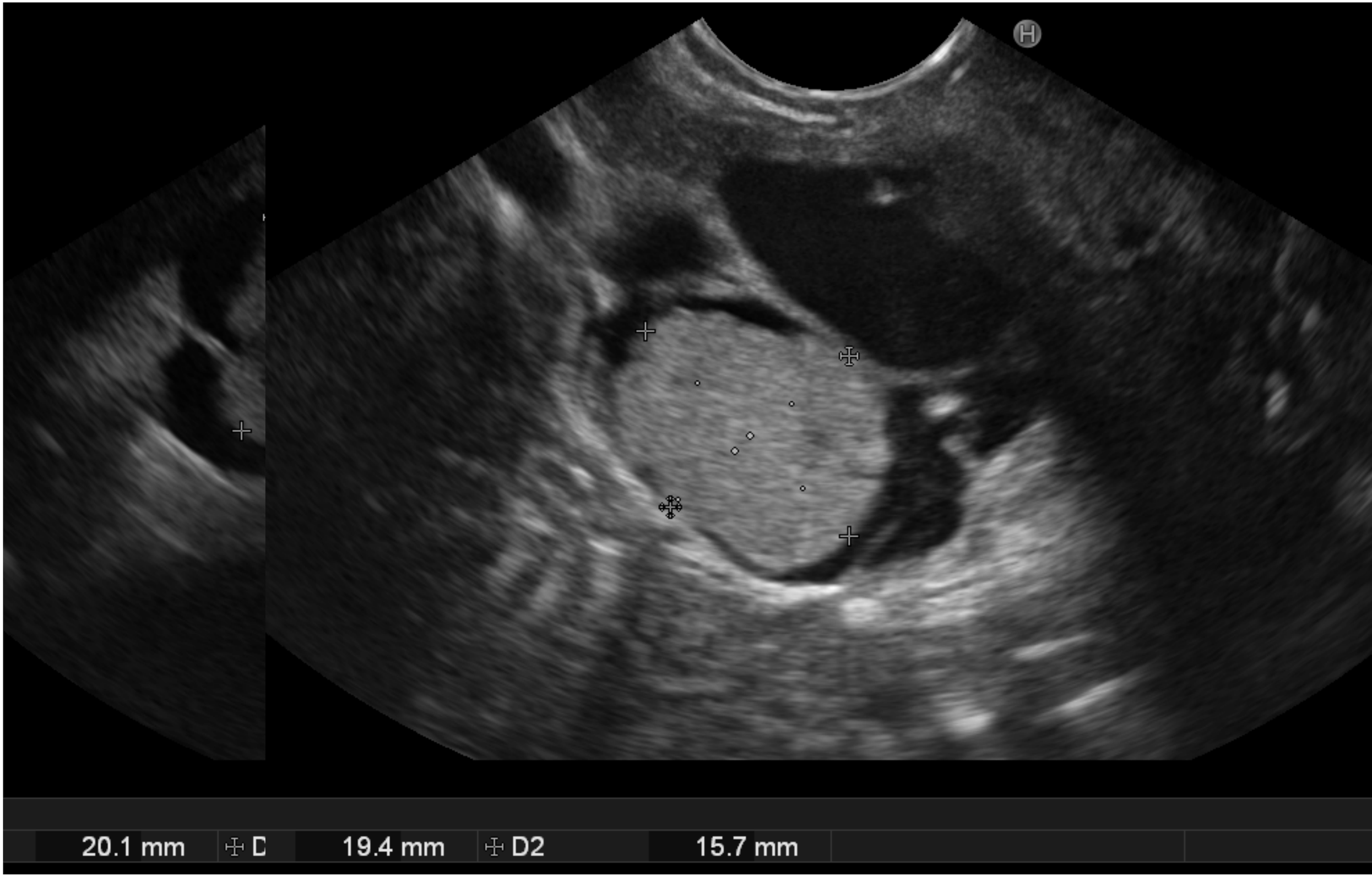


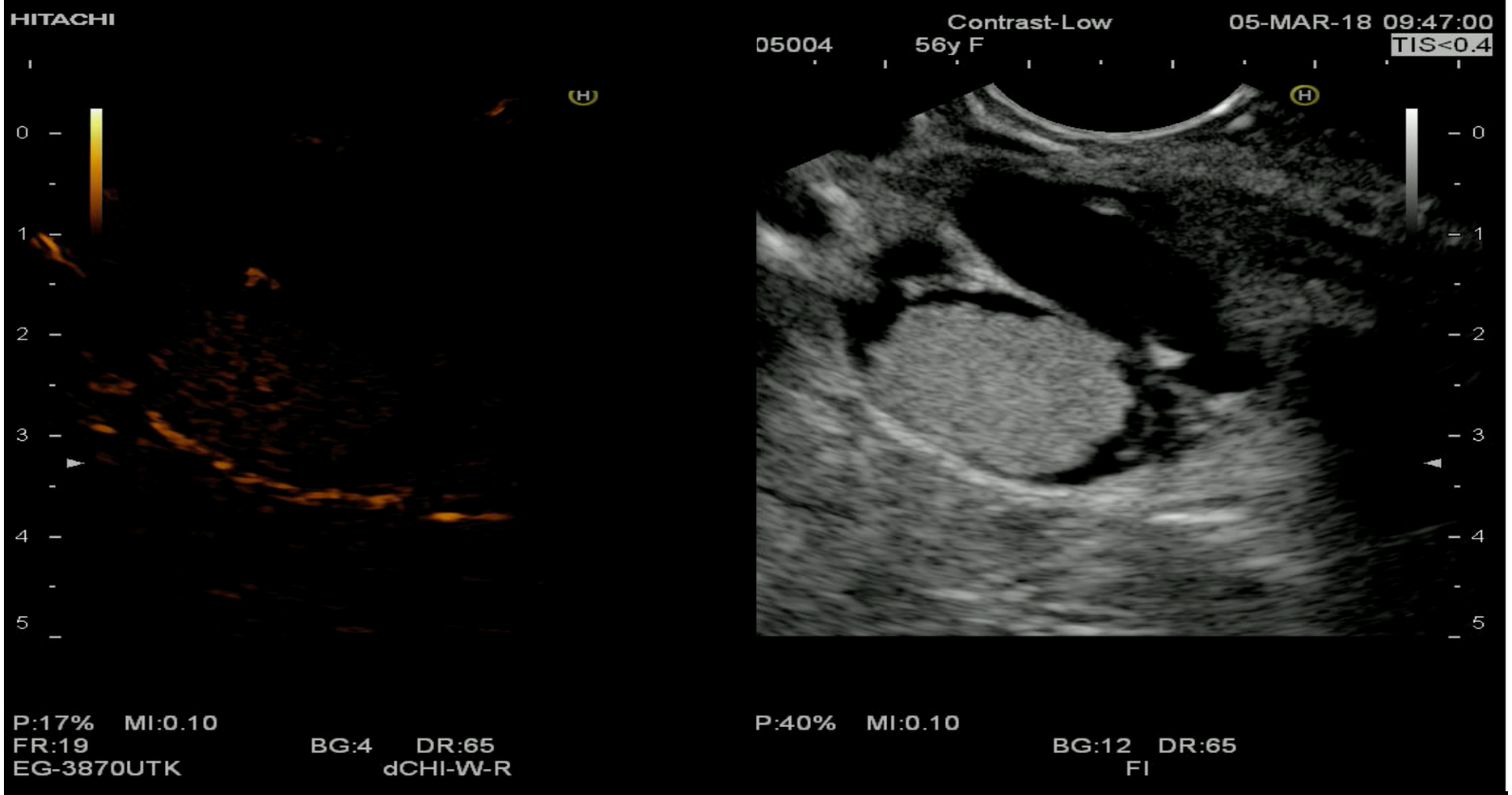
TX: 42% MI:0.15 TIS:<0.4 TX: 34% MI:0.18 02:20

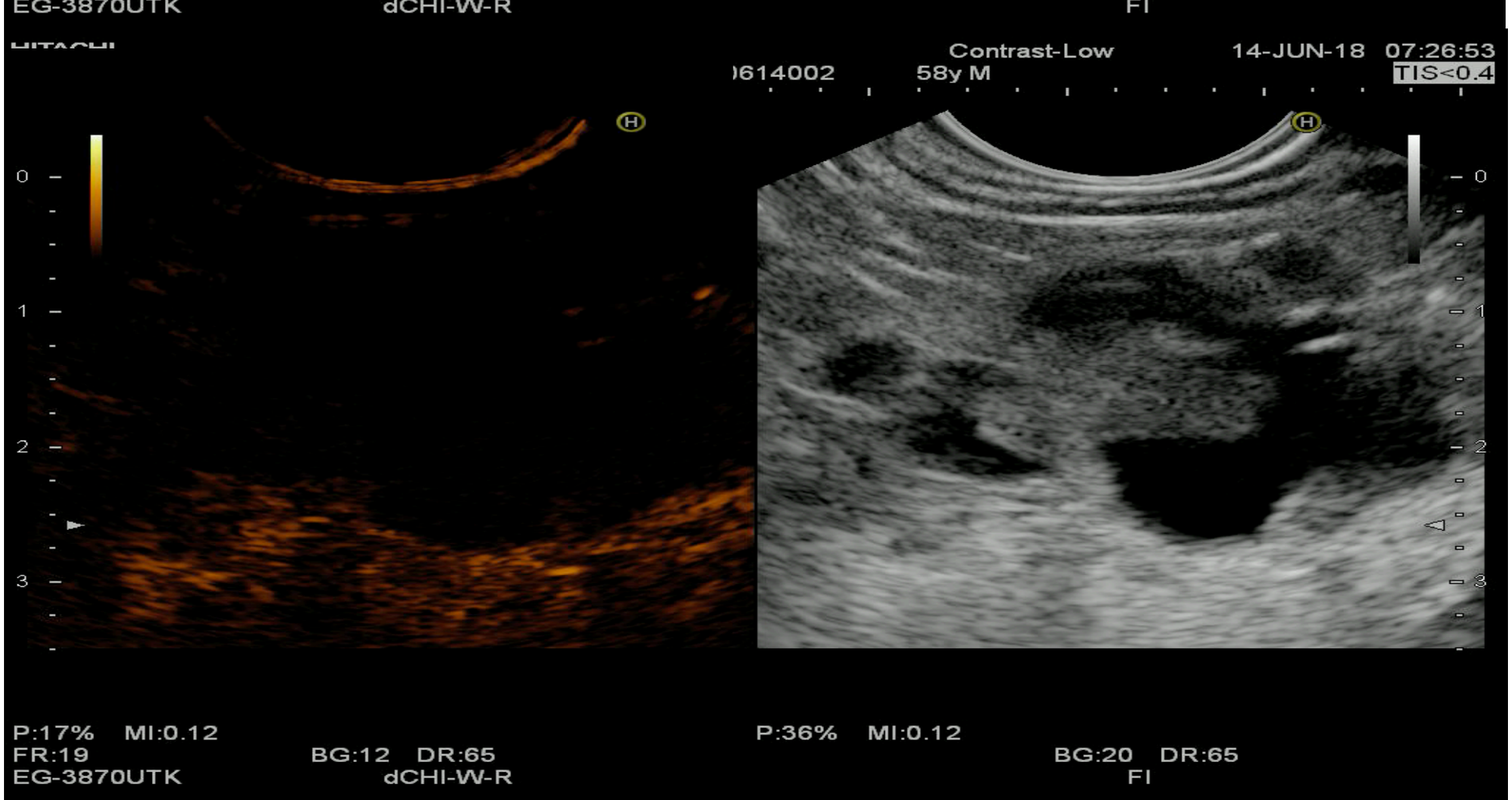
FI G: 9 C:2 FR:20 CH-P CG:10 CC:7

PB 7cm MEDIA CV: 5 US R


H
9.9 mm
D2
3.7 mm
D3
7.3 mm
D4


H
20.1 mm
D
19.4 mm
D2
15.7 mm


HITACHI
Contrast-Low
05-MAR-18 09:47:00
05004
56y F
TIS<0.4
P:17% MI:0.10
FR:19
BG:4 DR:65
EG-3870UTK
dCHI-W-R
P:40% MI:0.10
BG:12 DR:65
FI


Contrast-Low
14-JUN-18 07:26:53
614002
58y M
TIS<0.4
P:17% MI:0.12
FR:19
BG:12 DR:65
EG-3870UTK
dCHI-W-R
P:36% MI:0.12
BG:20 DR:65
FI

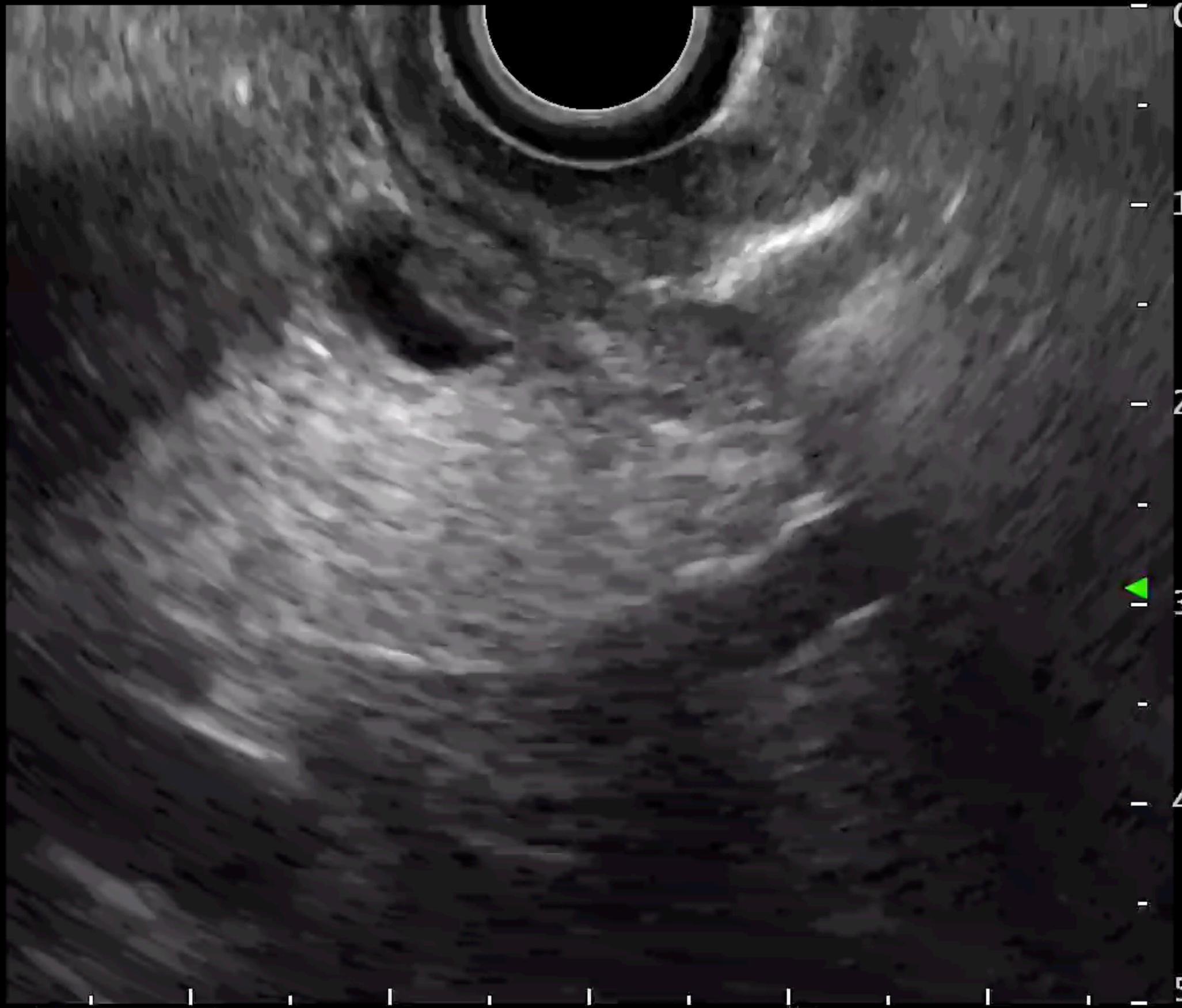
PAPILLACROTT GASTROENTEROLOGIA CREMA

01/02/2018 11:35:57

TX :100%
MI :0.4
TIS:<0.4

THE-P

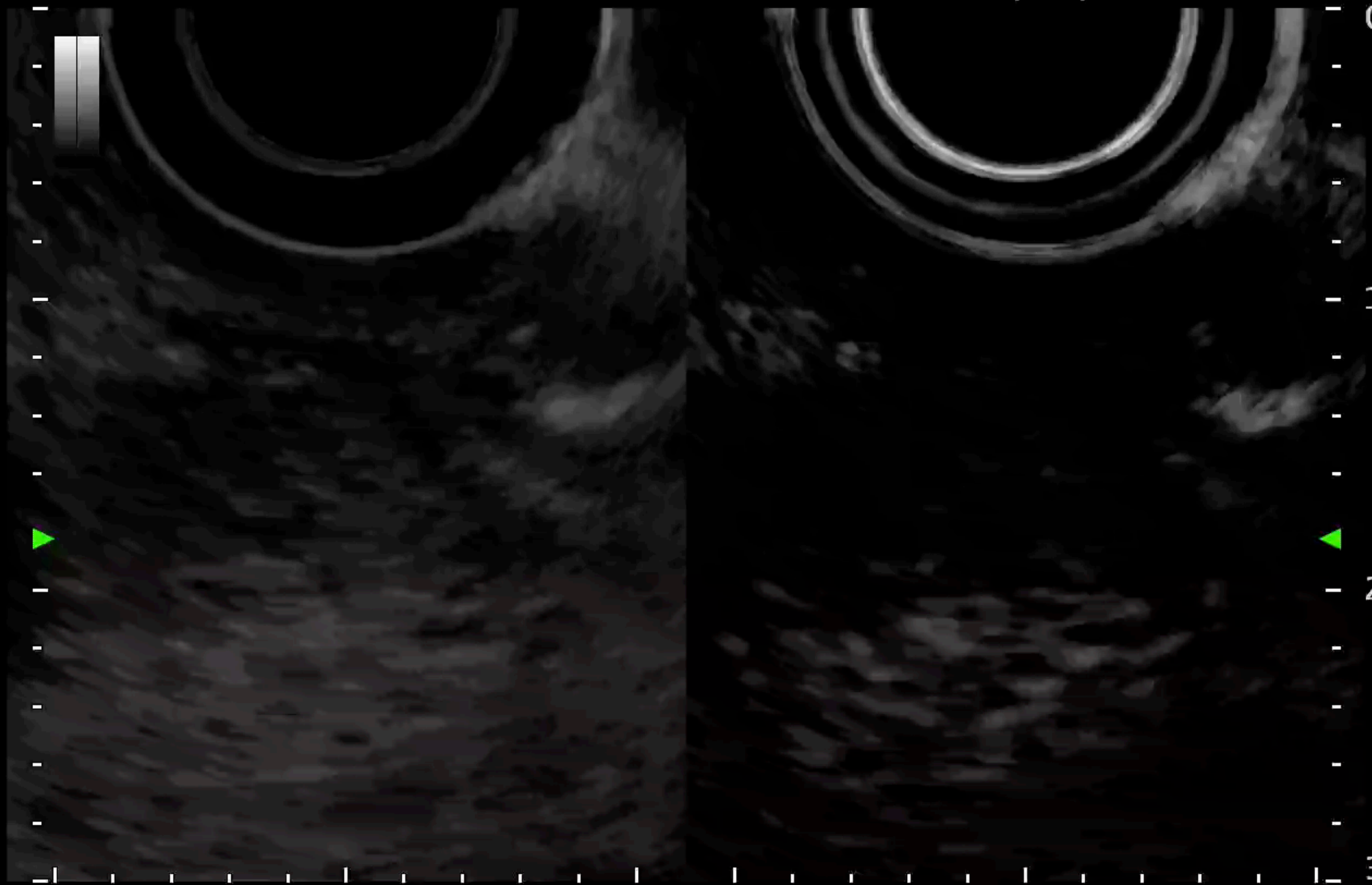
G :13
C : 5



PB 5cm MEDIA CV: 11 US R

PAPILLACROTT GASTROENTEROLOGIA CREMA

01/02/2018 11:40:14



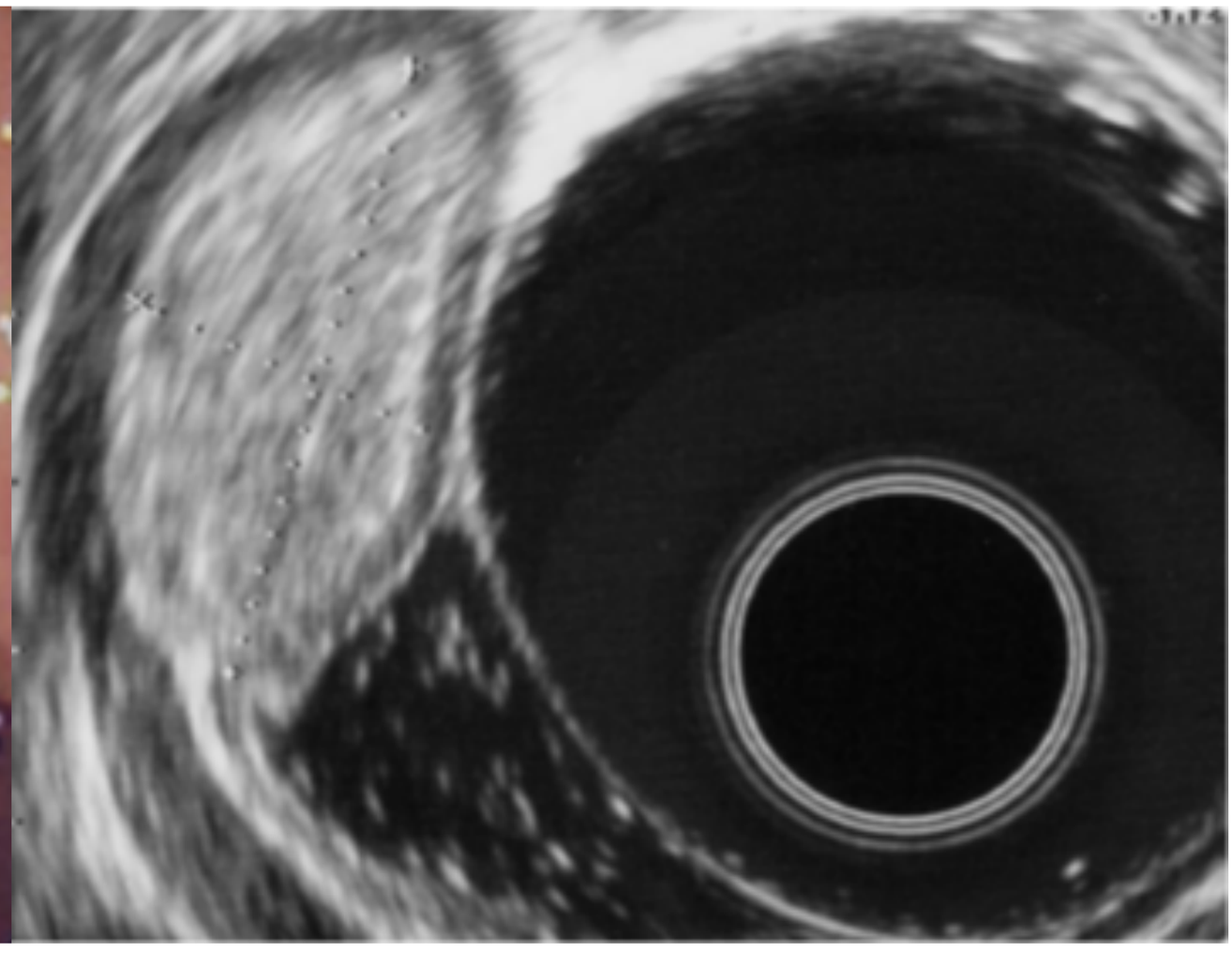
TX: 42% MI:0.15 TIS:<0.4 TX: 29% MI:0.15 00:02

FI G: 1 C:2 FR:20 CH-P CG:11 CC:6

PB 3cm MEDIA CV: 18 US R

Lesioni Sottomucose





LESIONE	STRATO	CARATTERISTICHE
LEIOMIOMA	mucosa/muscol.	ipoecogeno, tondeggiante, marg. netti
LIPOMA	sottomu.	ecogeno, margini lisci
CISTI	variabile	anecogene ovalari
PANCREAS ABERRANTE	sottom. /muscol,	ipoecogeni, misti, dotti?
VARICI	mucosa/sottom.	anecogene, serpiginose, color
POLIPI	mucosa	ispessimento della mucosa
GIST	muscol.	< 3 cm, ipoecogeno, marg. netti > 3cm, lacune cistiche, margini irregolari
LINFOMI	mucosa/sottom./muscol.	ipoecogeno
CARCINOIDI	mucosa/sottom.	ipoecogeno
SARCOMI	muscol.	ipoecogeno, ecostr.irregolare, margini irreg. invasione tissut.

Lesioni sottomucose

- GIST e NET sono quasi sempre ipervascolari

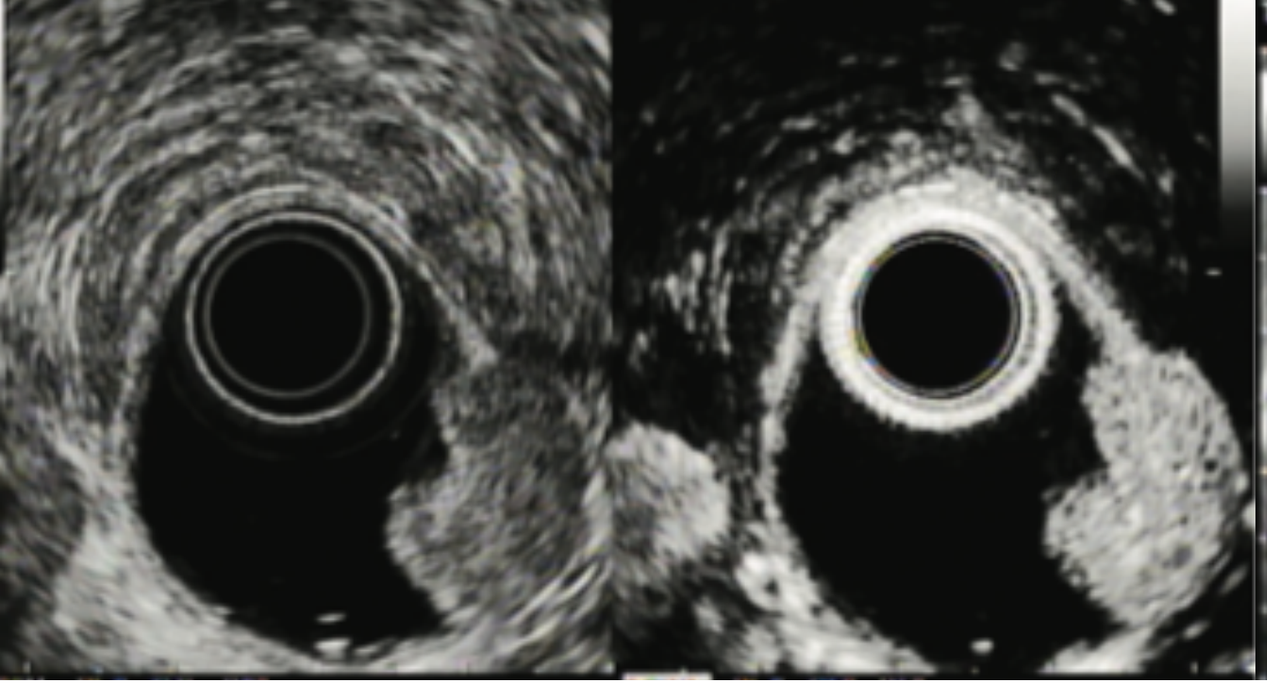
- Se >2cm, possono comparire aree necrotiche

- Lipomi e Leiomiomi sono spesso ipo-avascolari

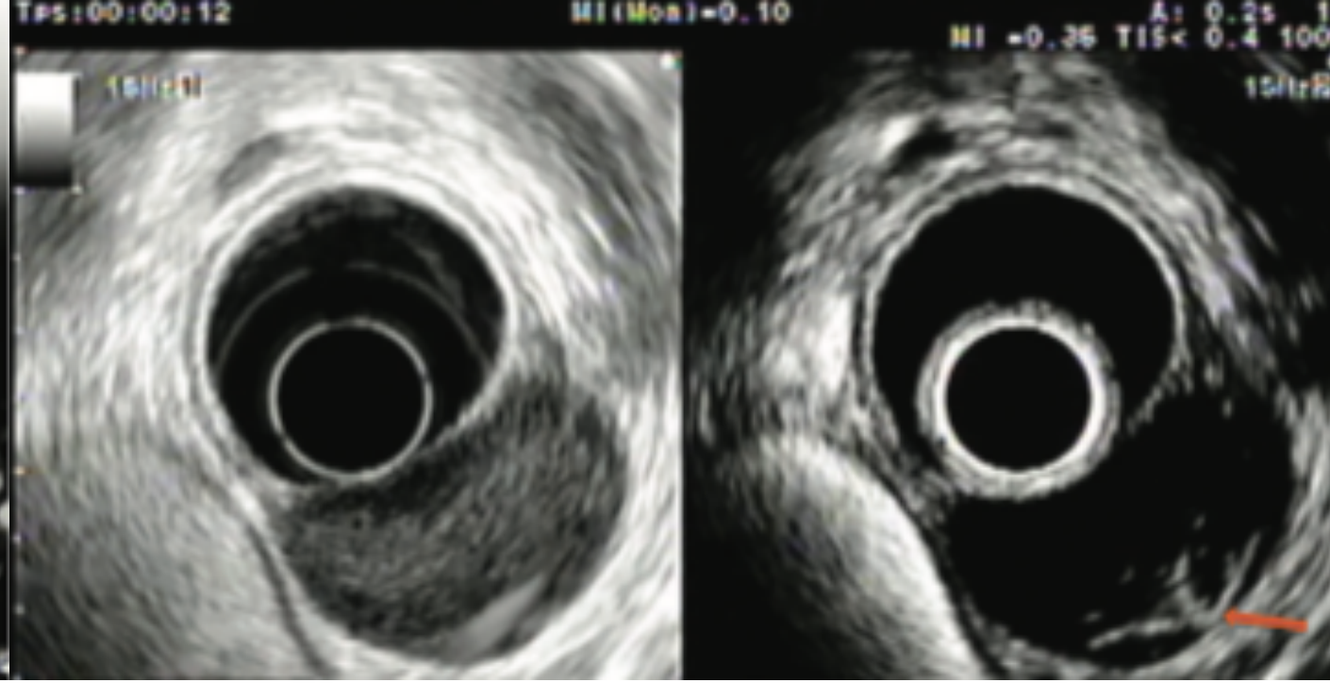
- Caratterizzazione dei GIST:

Alto rischio: vascolarizzazione disomogenea

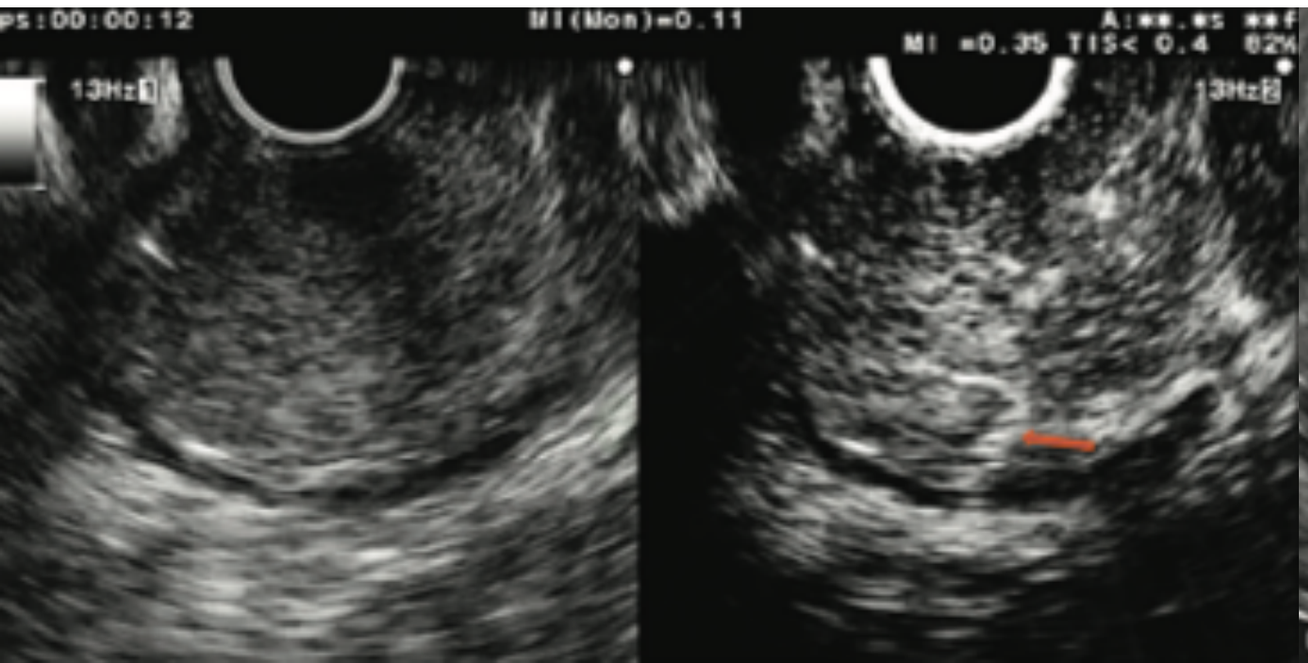
NET



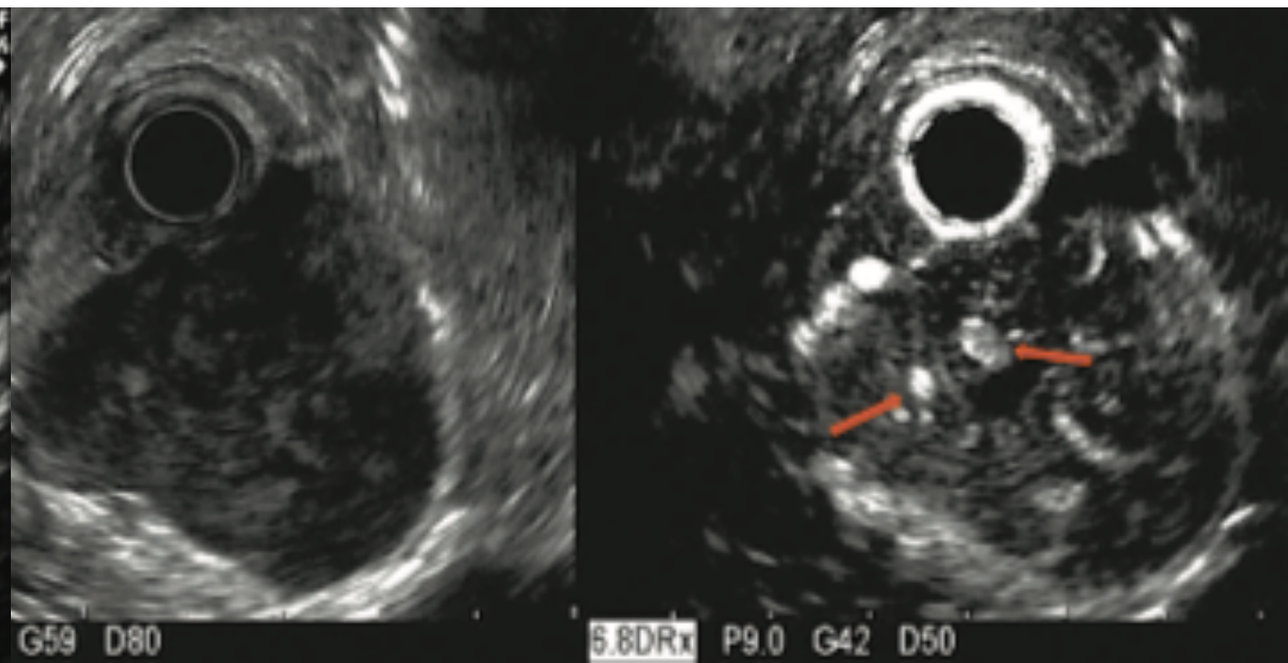
Leiomioma



GIST basso grado

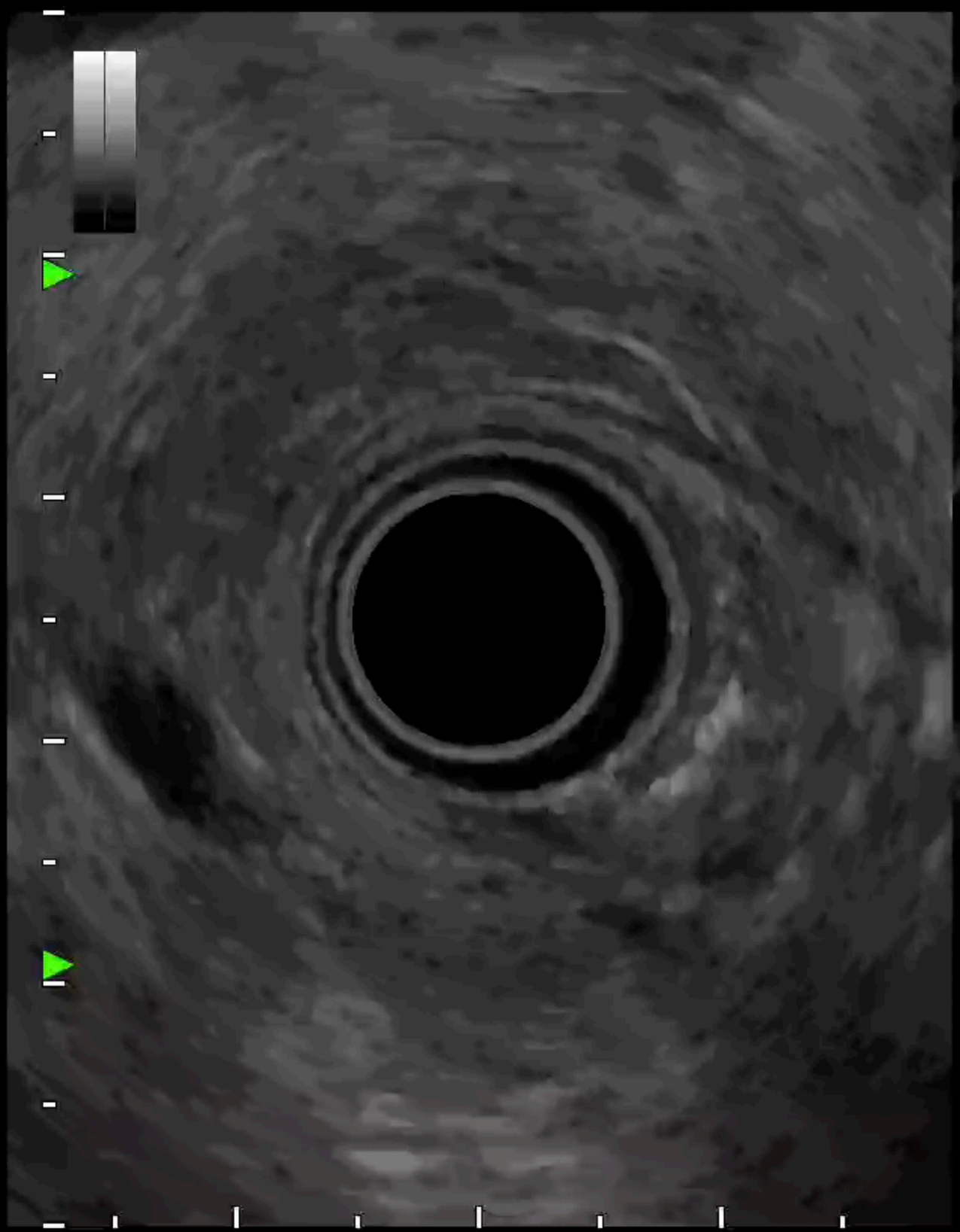


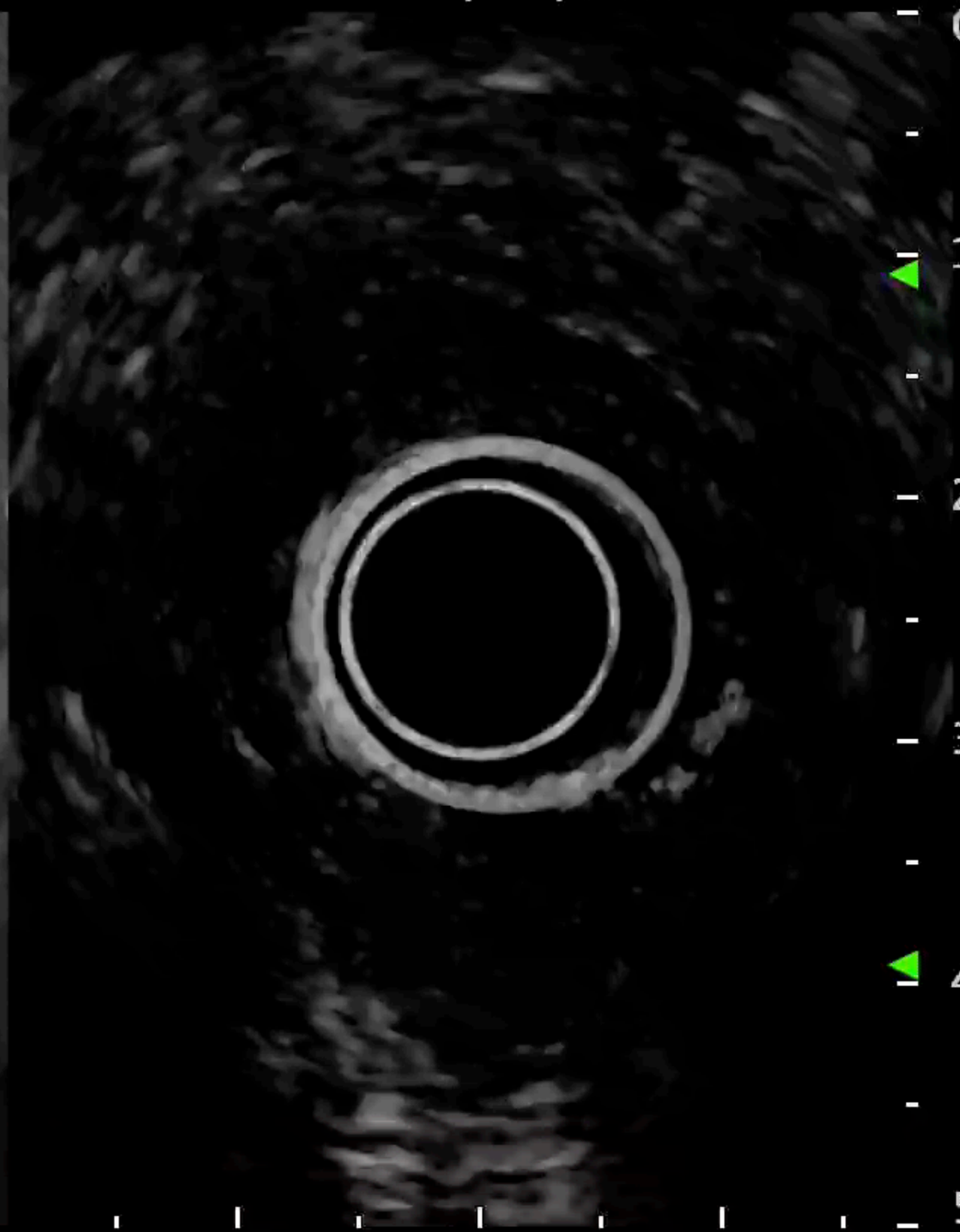
GIST alto grado



SMDUODEN GASTROENTEROLOGIA CREMA

26/02/2019 15:23:23





TX: 45% MI:0.15 TIS:<0.4

FI G: 9 C:2 FR:20

PB 5cm MEDIA

TX: 29% MI:0.15

CH-P CG:10 CC:7

CV: 9 US R

Linfonodi

Caratterizzare la natura dell'adenopatia (benigna vs maligna):

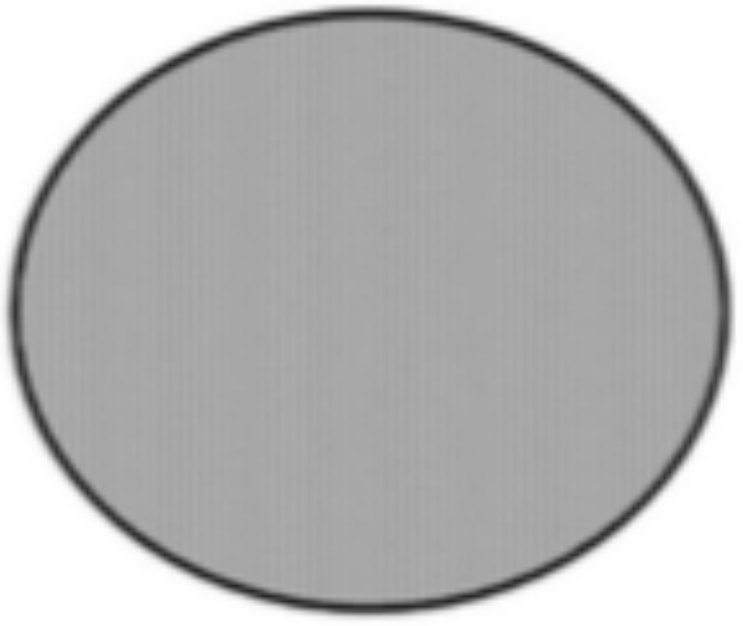
Identificare aree avascolari (necrotiche) da evitare durante l'FNA

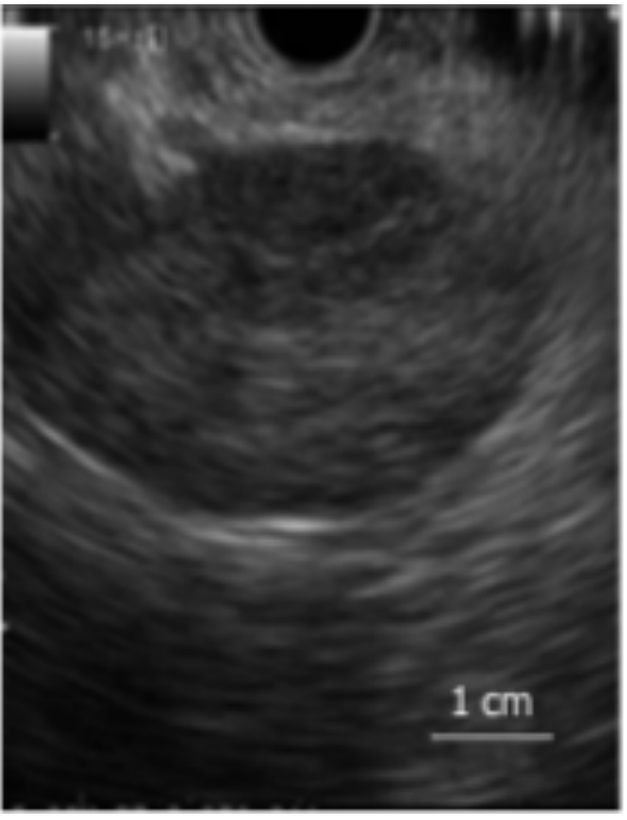
Pattern omogeneo vs disomogeneo

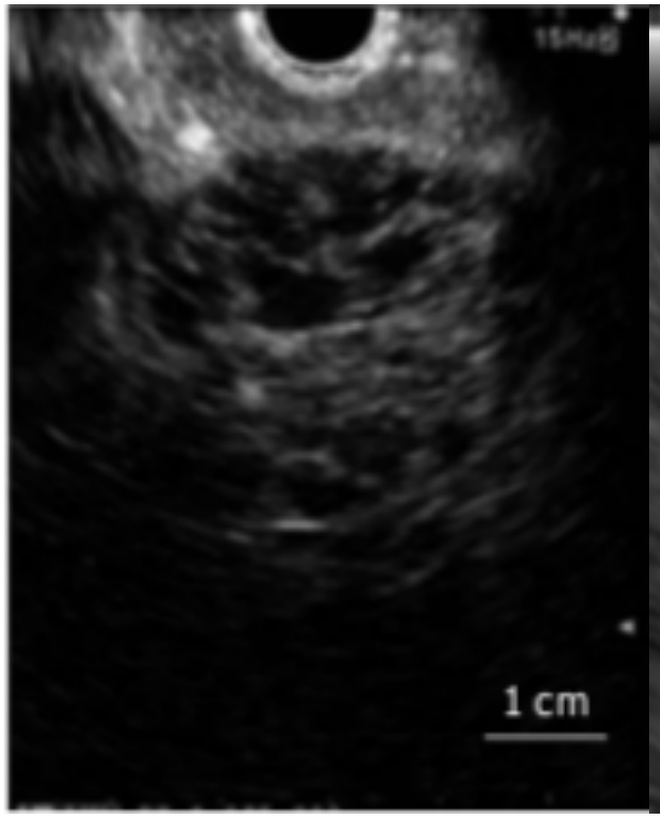
Vaso centrale con vascolarizzazione centrifuga vs irregolare vascolarizzazione periferica centripeta

Scegliere il linfonodo da pungere nel contesto di una catena/ pacchetto






1 cm

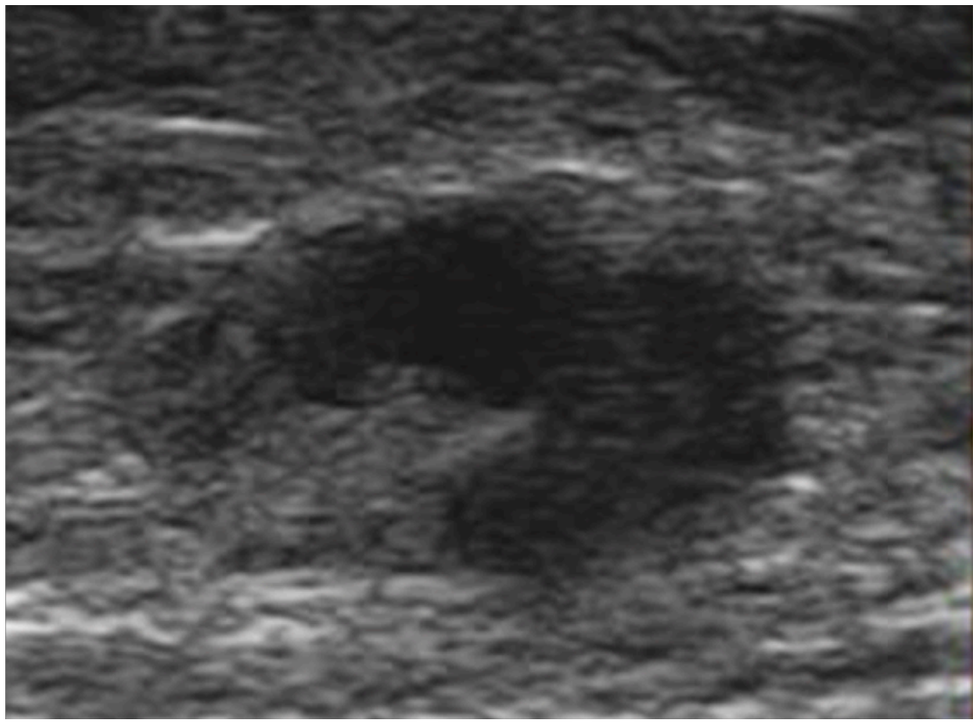

1 cm

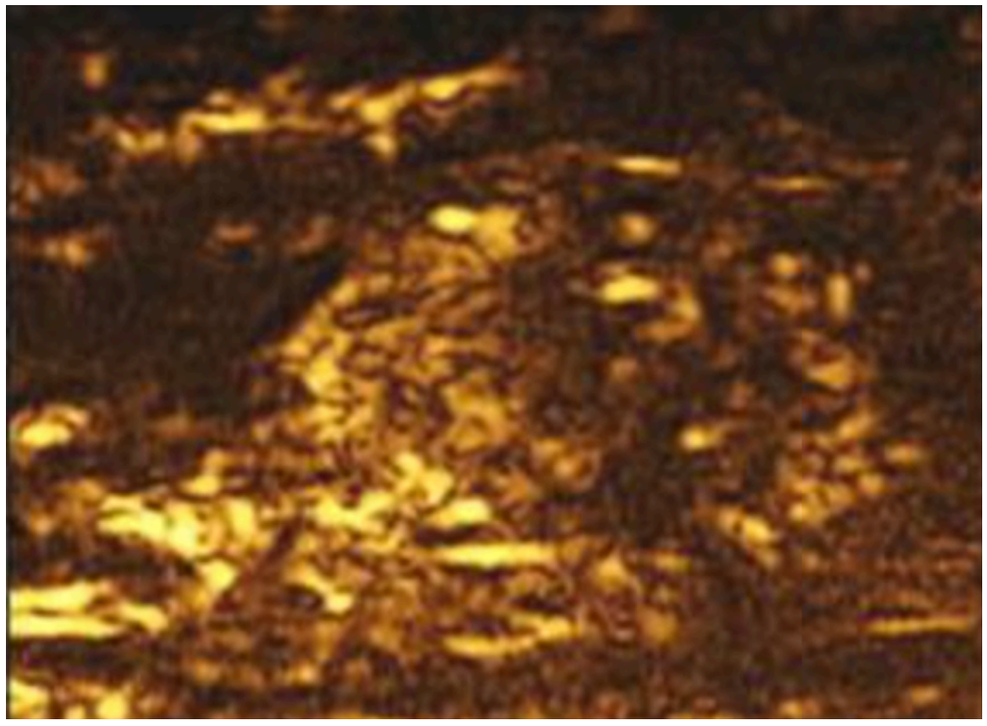

1 cm


1 cm

Fase	Inizio (s)	Fine (s)
Arteriosa	10-20	30-45
Venosa	30-45	Scomparsa delle bolle (4-6 min)

I linfonodi normali e reattivi mostrano un enhancement intenso ed **omogeneo**



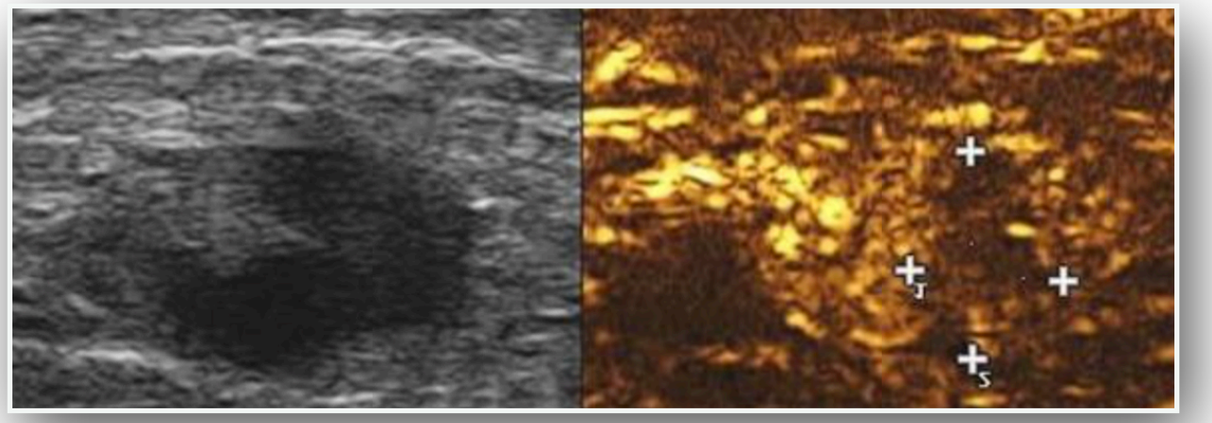


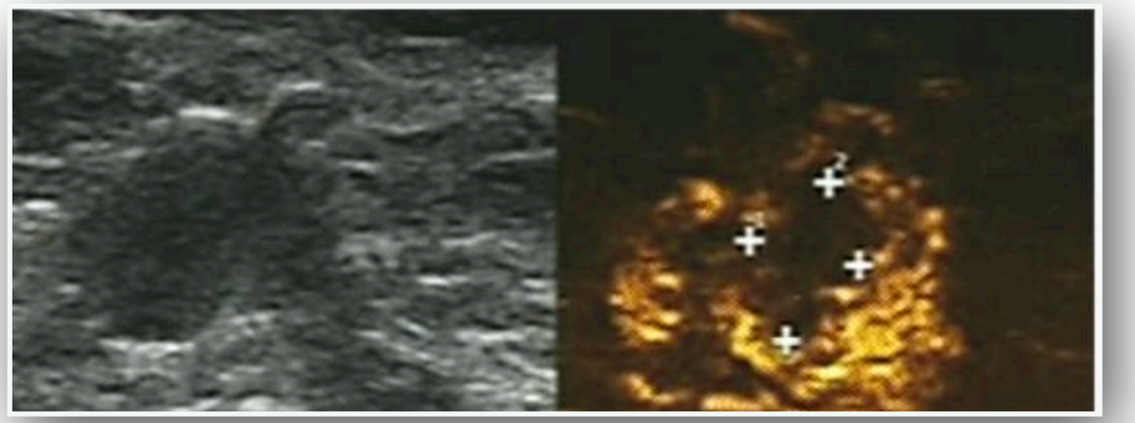
Utile per:
aree colliquate / necrotiche
Per FNA.

Du LW. *Br J Radiol*. 2021

Le metastasi sono **meno vascolarizzate : aree di difetto di perfusione in fase parenchimale** (rapido wash-out).

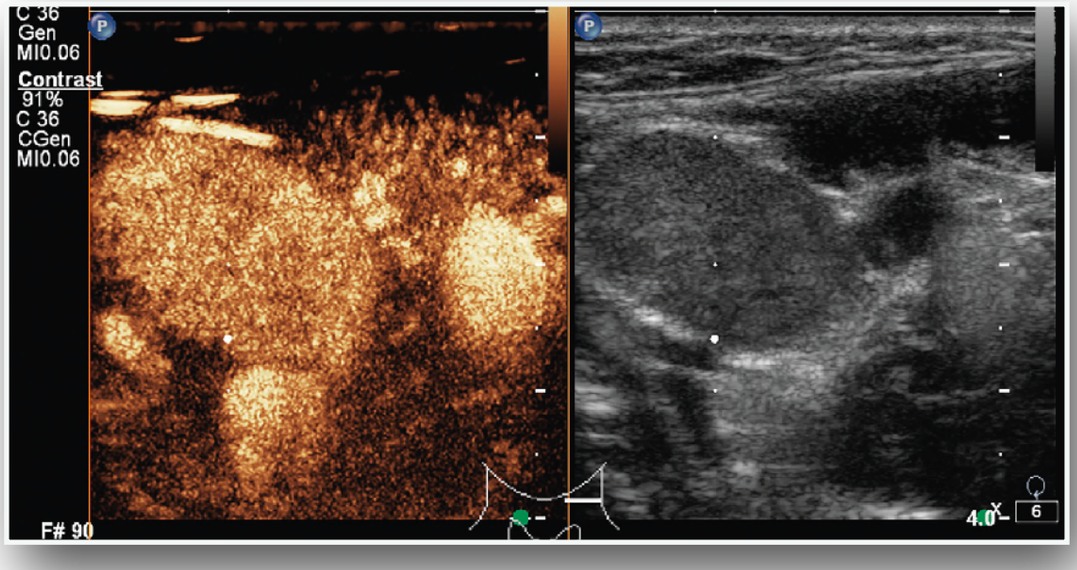
Se l'enhancement è assente: necrosi / infiltrazione neoplastica.





LINFOMI: wash in intenso, disomogeneo, con pattern puntiforme «a tempesta di neve»

Solo nelle forme a più elevata malignità: difetti di riempimento



Xuelei M. *Contrast Media & Molecular Imaging*, 2019.
Du LW. *Br J Radiol*. 2021