



Nasjonalt Senter for Gastroenterologisk Ultrasonografi

National Centre for Ultrasound in Gastroenterology
Haukeland University Hospital, Bergen, Norway

Ultralyd abdomen for gastroenterologer



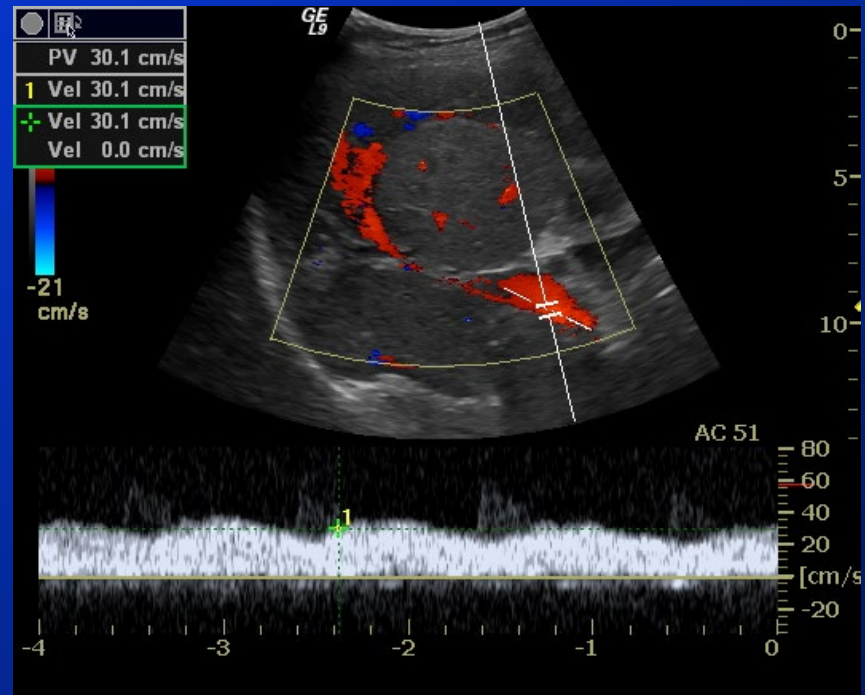
Prof. Odd Helge Gilja
Institutt for klinisk medisin
Universitetet i Bergen





The Ultrasound Tool-box

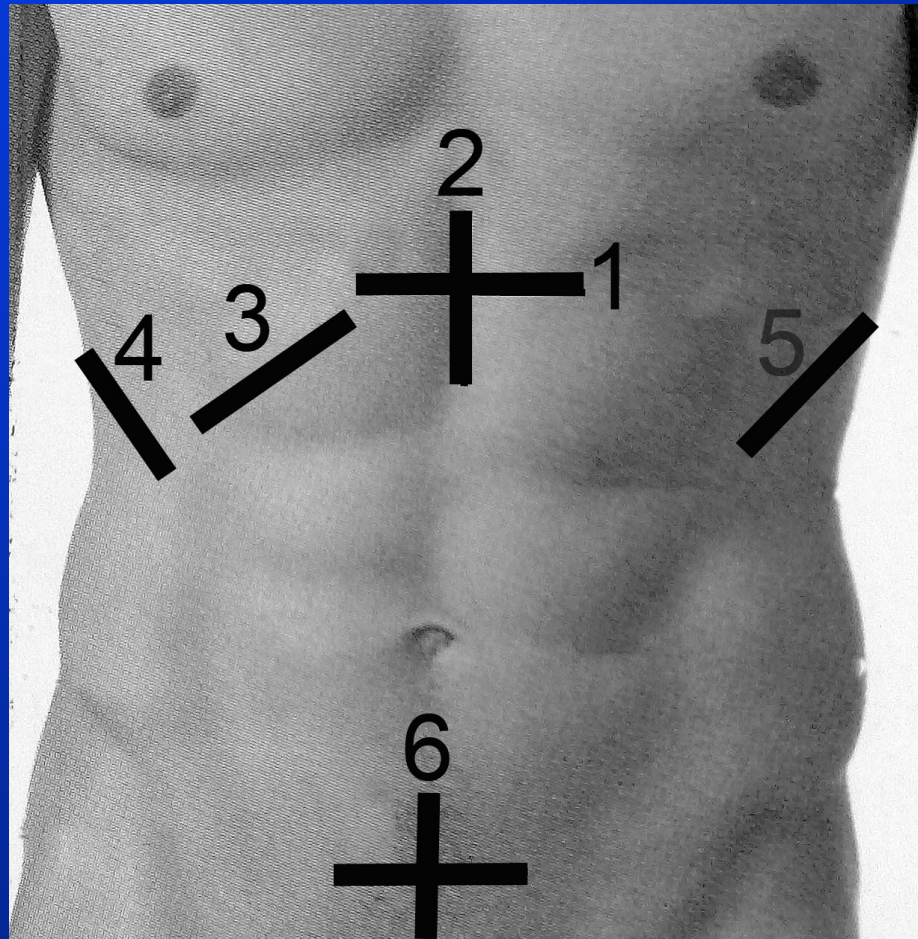
- Ultrasound of liver
 - B mode
 - B-Flow
 - Doppler
 - Color Doppler
 - Pulsed Doppler
 - Elastography
 - Strain imaging
 - Shear wave
 - Contrast-US (CEUS)
- US-guided liver biopsy (Menghini and Pistol)
- US-guided ablation techniques
- Sonoporation therapy





6+

En systematisk ultralydundersøkelse av abdomen





3 kliniske scenarioer

- 1. I akuttmottak
 - Du tar imot en pasient med akutte smerter i øvre del av magen
- 2. På sengeposten
 - Du har en pasient med diare og magesmerter. Er det IBD eller IBS ?
- 3. På medisinsk poliklinikk
 - Du skal undersøke en icterisk pasient med forhøyede leverenzymmer



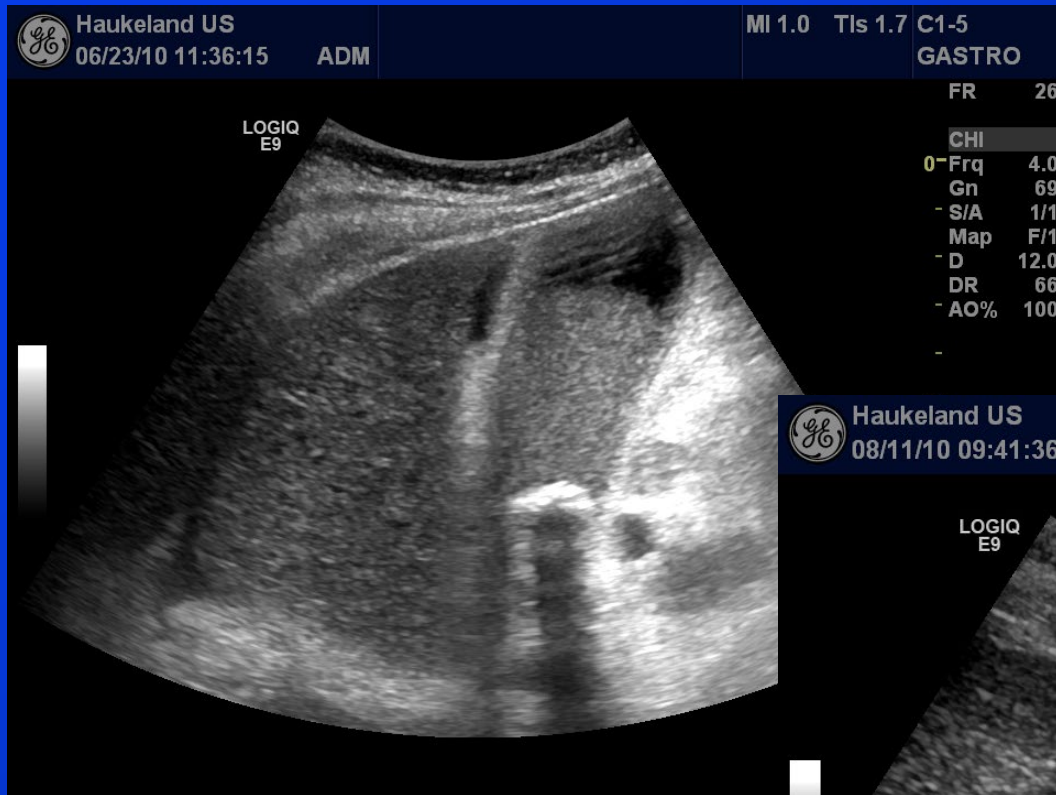
Smerter i magen

- Kvinne 41 år
- Overvektig
- Anfall med smerter under høyre costalbue
- Kommer typisk timer etter måltid



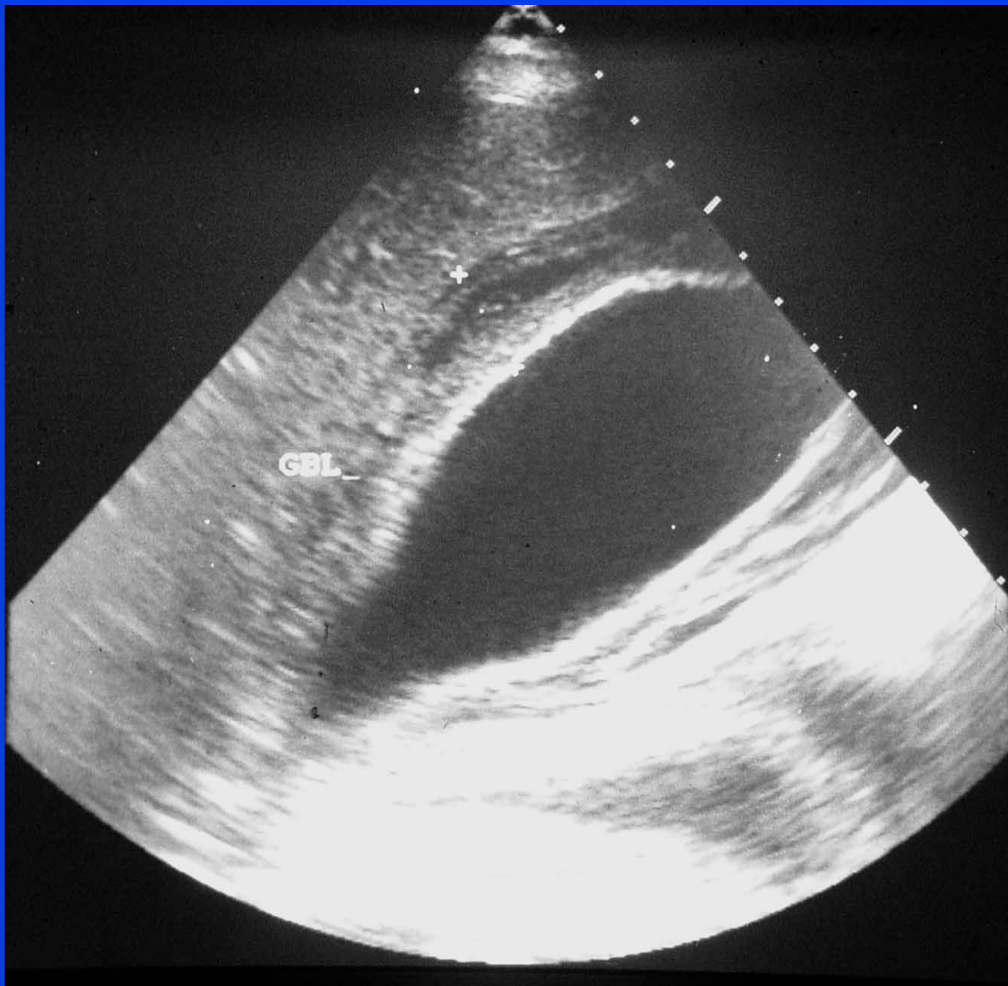


Gallestein





Cholecystitt



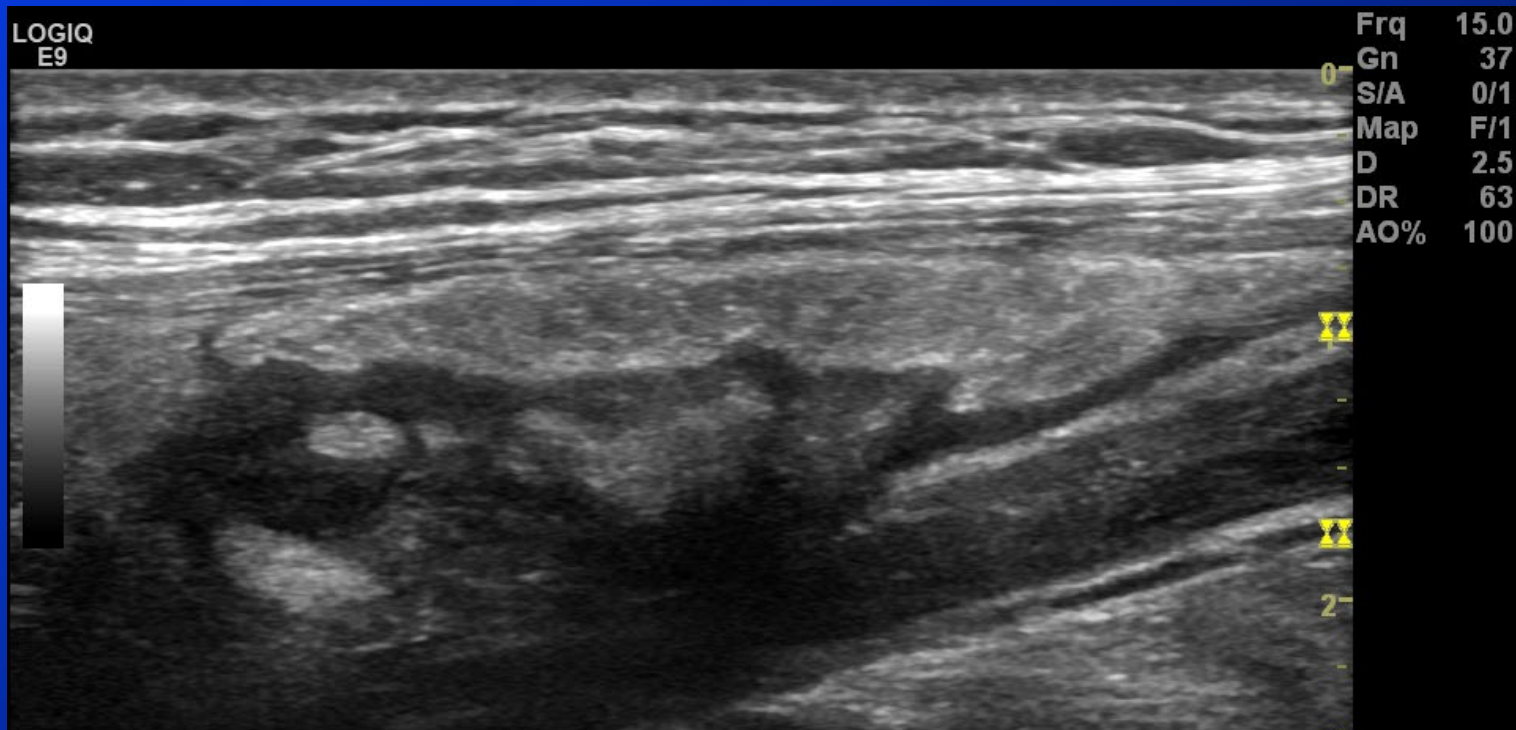
Kriterier:

1. Dilatert galleblære (>4 cm)
2. Fortykket vegg (>4 mm)
3. Stein
4. Smerter ved probe-trykk



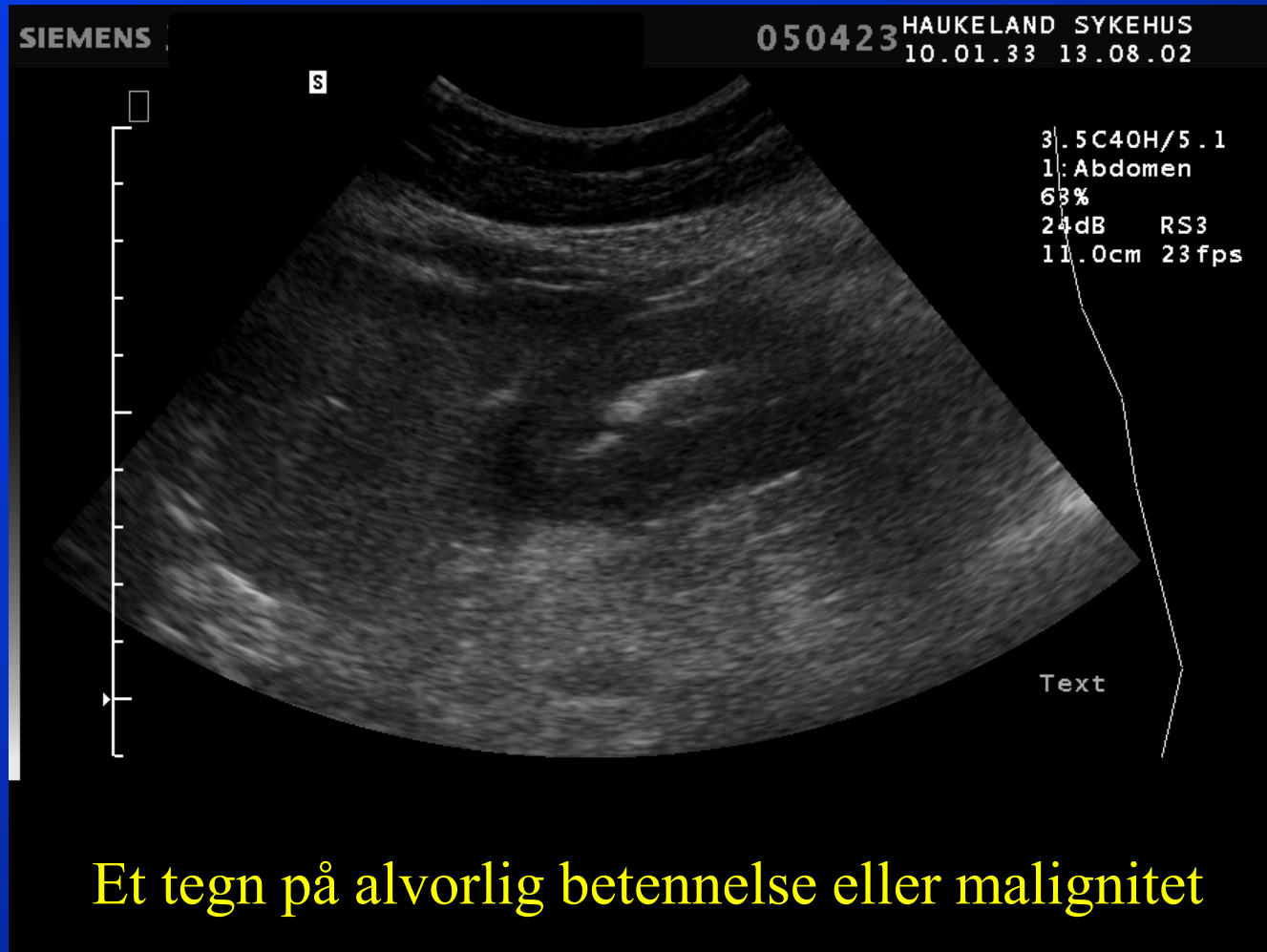
Abdominal masse/oppfyllning

- Mann 21 år , vekttap
- Anfall med smerter i høyre fossa iliaca
- Kommer typisk 2 timer etter måltid
- Kan palpere en «pølse» på hø side av navlen





"Pseudo-Kidney Sign" (Target Lesion)





IBS or IBD?

In ileum



Normal ileum motility
Note thin wall

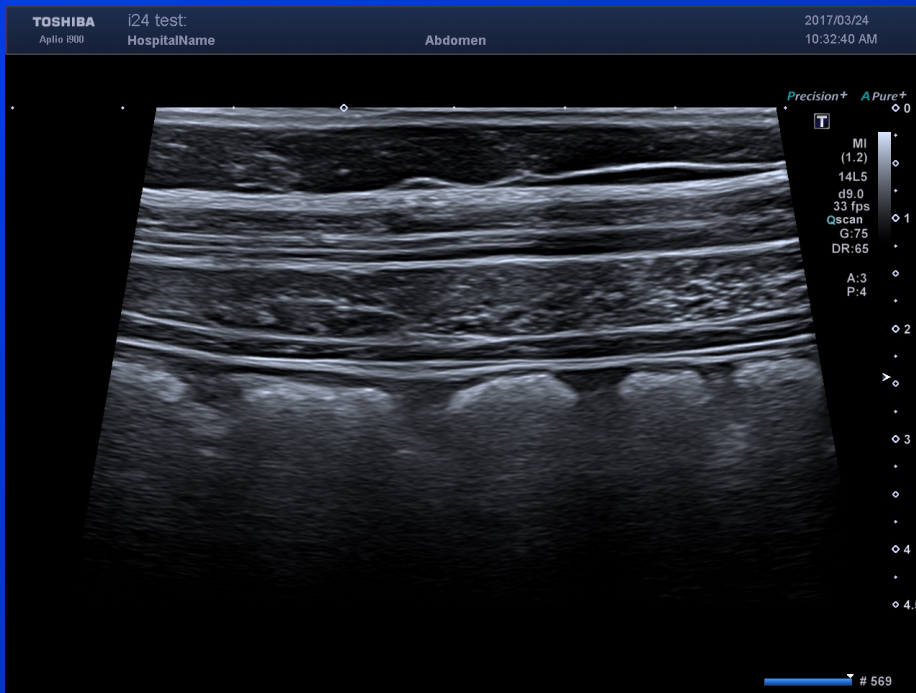


Dysmotility and thickened wall
In Crohn's disease

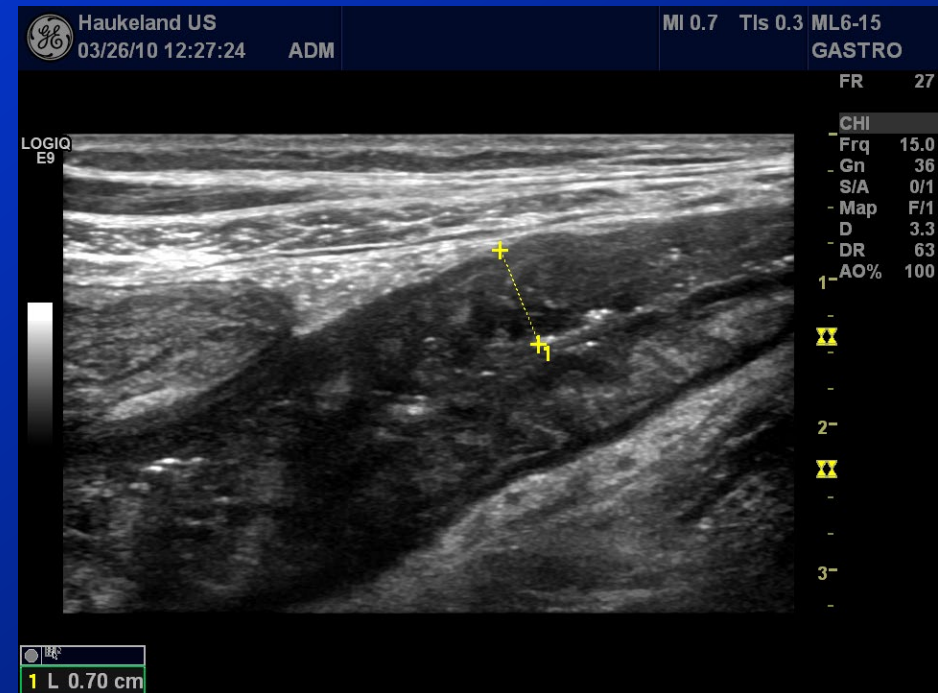


IBS or IBD?

In colon



Normal descending colon



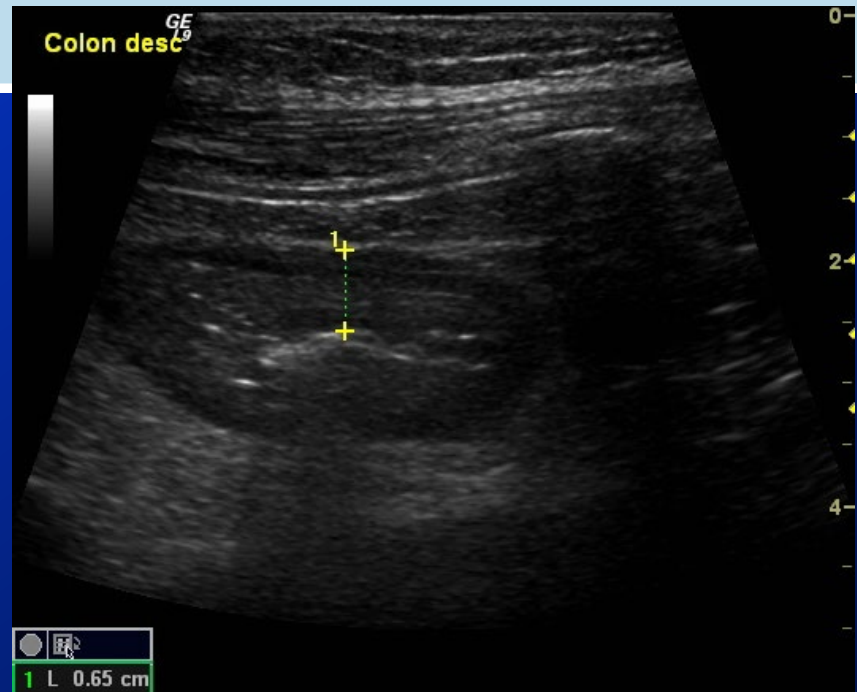
Thickened GI wall, loss of haustration, and dearranged wall layers in ulcerative colitis



New EFSUMB Guidelines on GIUS

Recommendations:

1. For a complete examination of the bowel both a low and high resolution probe are needed, LoE 5, GoR C, Strong consensus 13/13
2. A probe with a frequency above 5 MHz should be used when measuring wall thickness, LoE 4, GoR B, Strong consensus 13/13





RECOMMENDATION

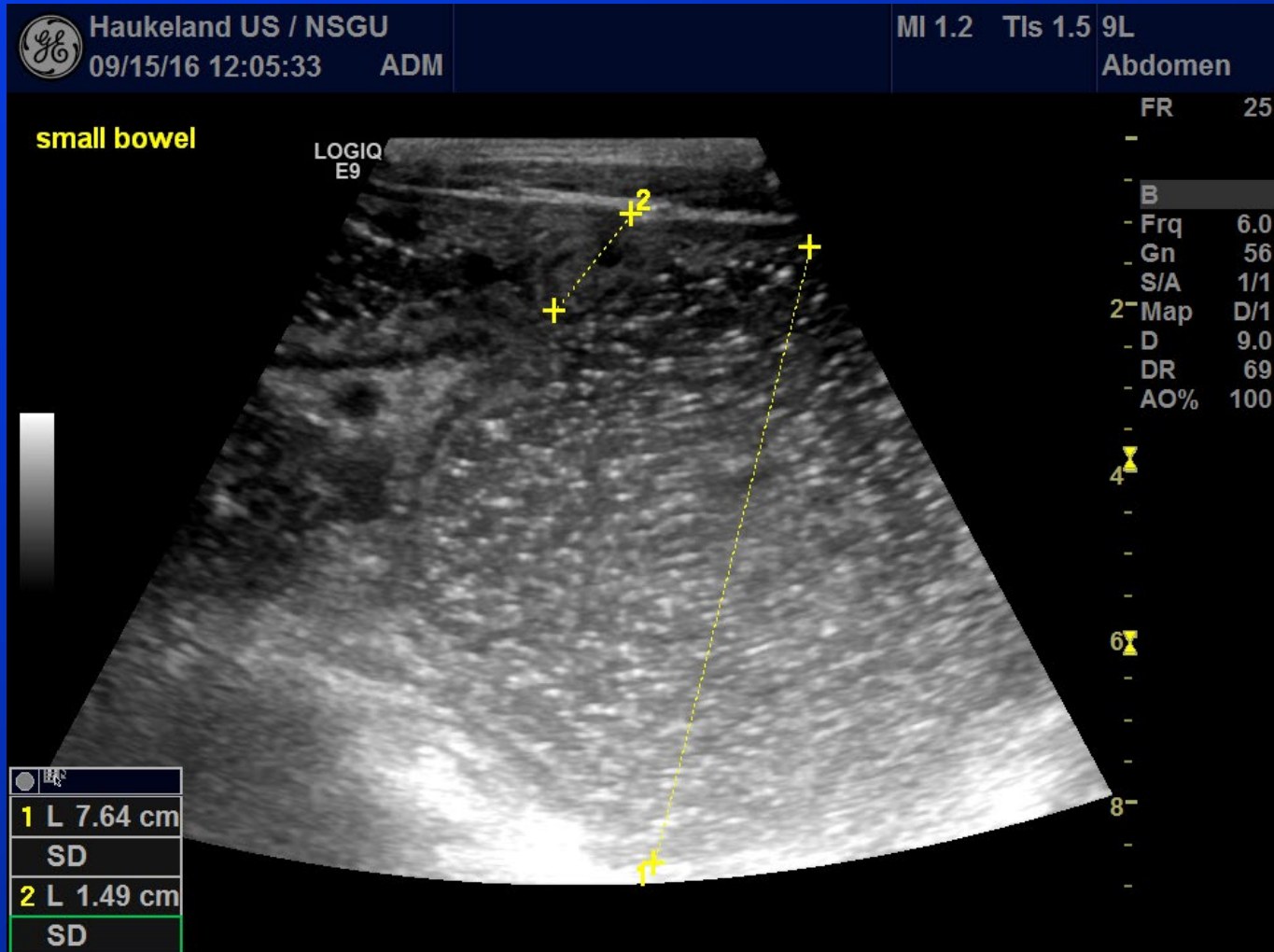
9. Semi-quantitative assessment of bowel wall vascularity using color Doppler techniques is useful to evaluate Crohn's disease activity [LoE 2b, GoR B]

Consensus levels of agreement: A+ 16/17; A- 1/17





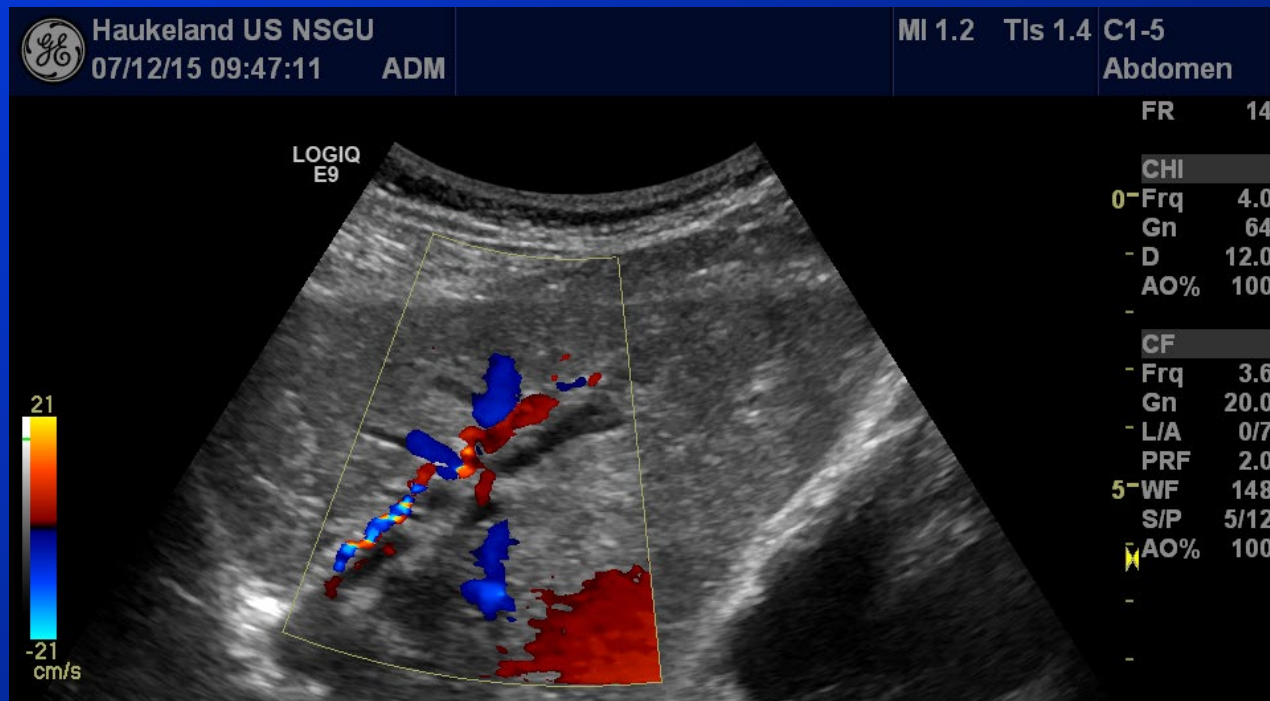
Ung mann 17 år abdominale smerter og diare





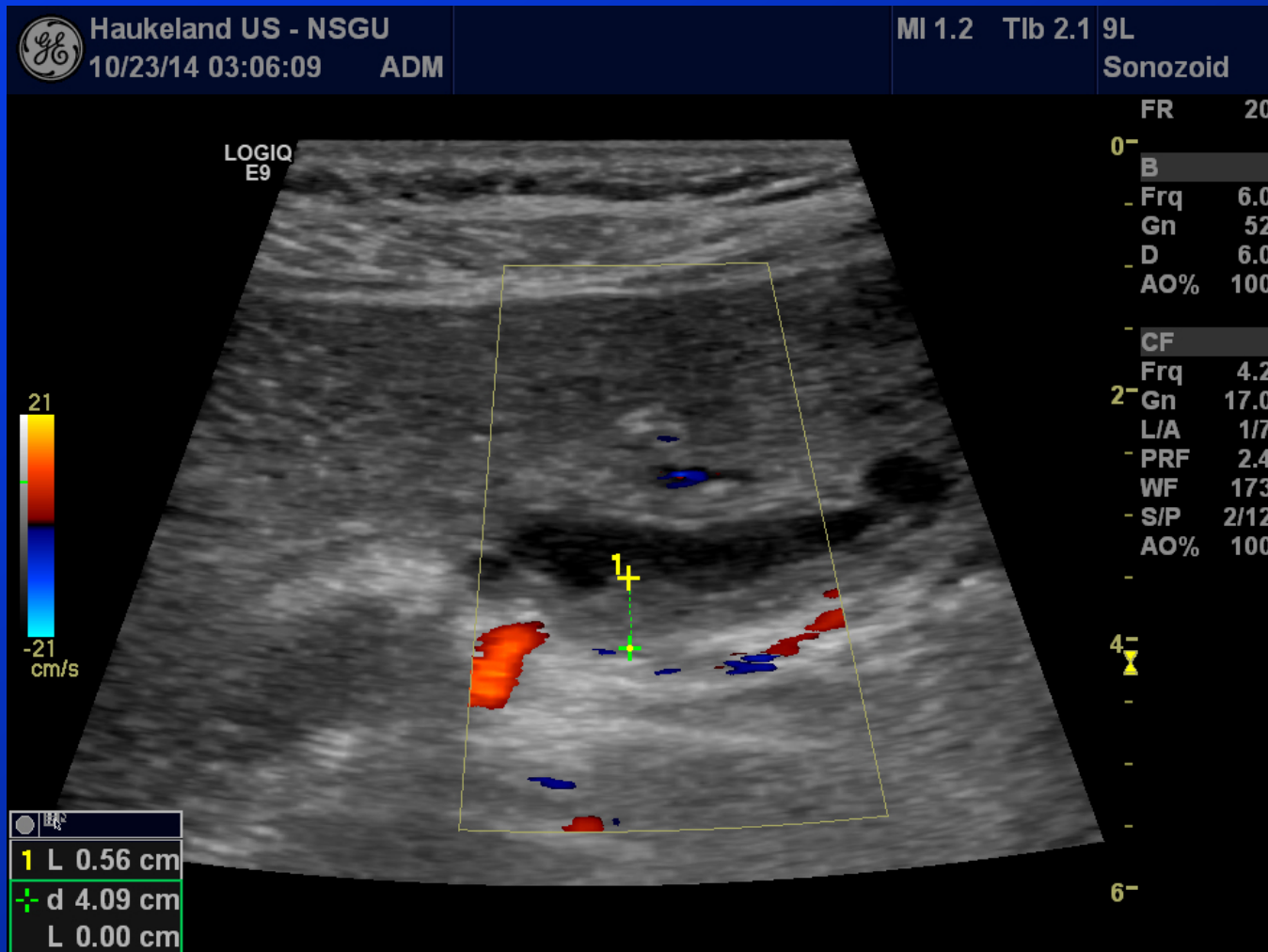
Icterus og forhøyede leverenzymmer

- Kvinne 35 år
- Kjent ulcerøs kolitt, blitt slappere, har kløe
- Blitt gul på øyet og i huden



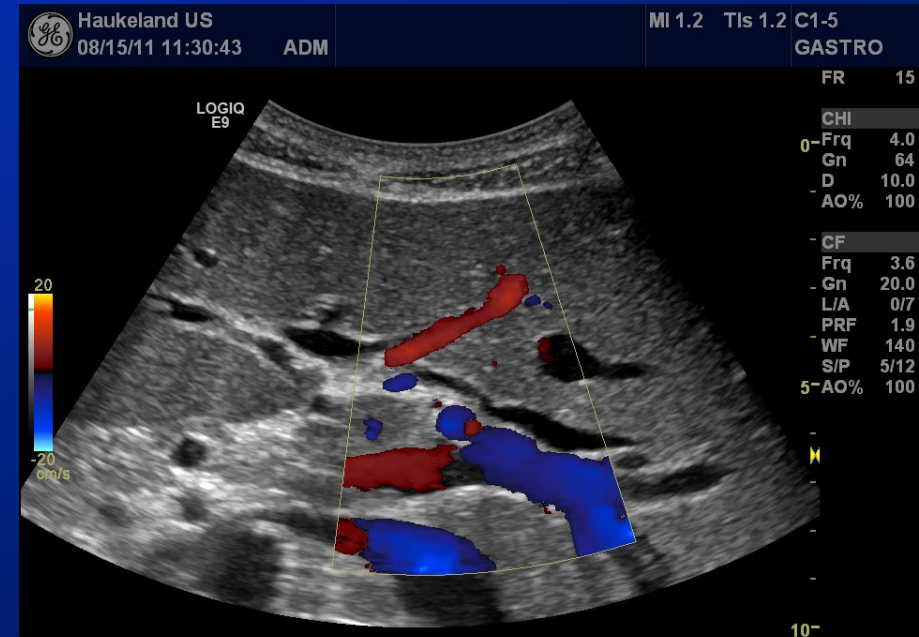
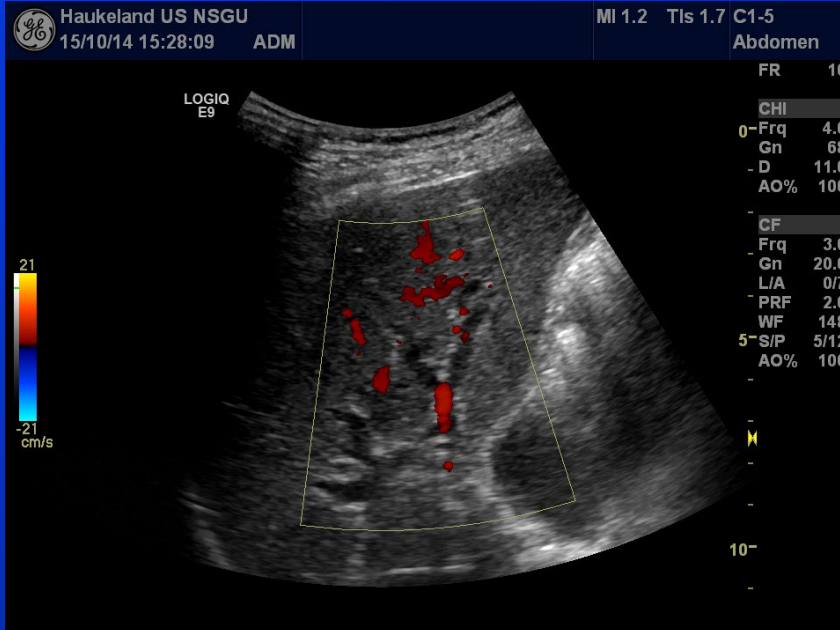
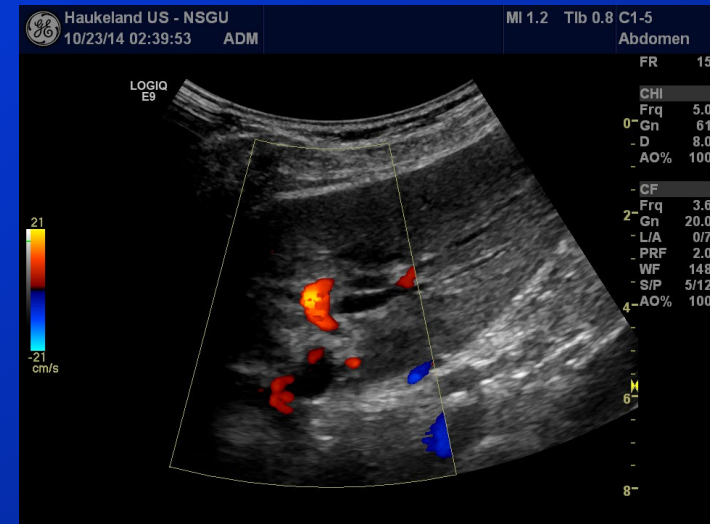
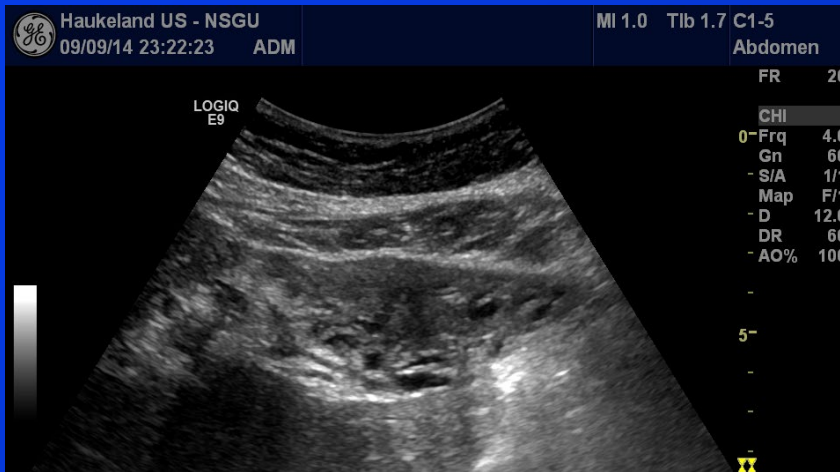


Dilaterte intrahepatiske galleganger, periductal fibrosis og fortykket vegg i galleganger





PSC: Primær Scleroserende Cholangitt



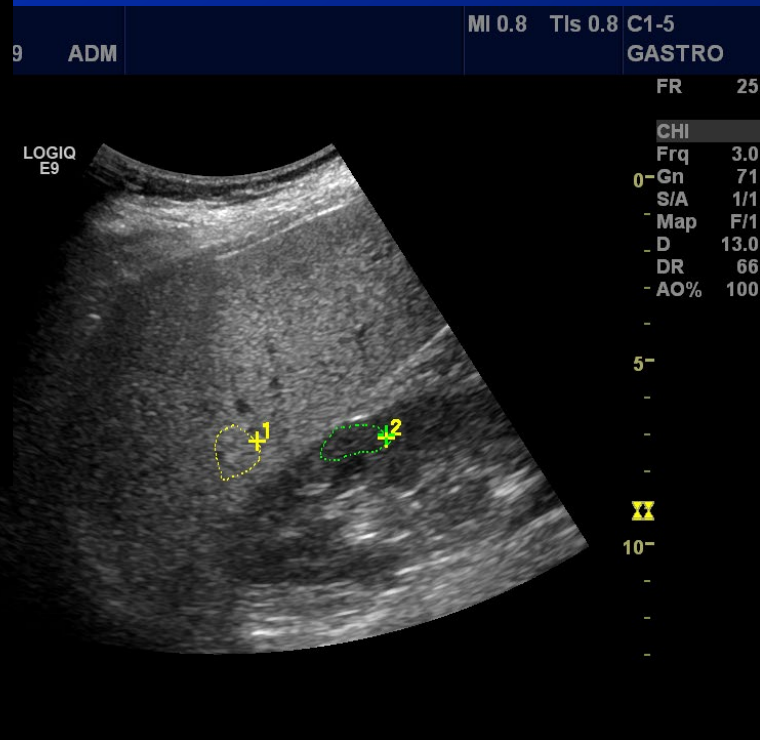
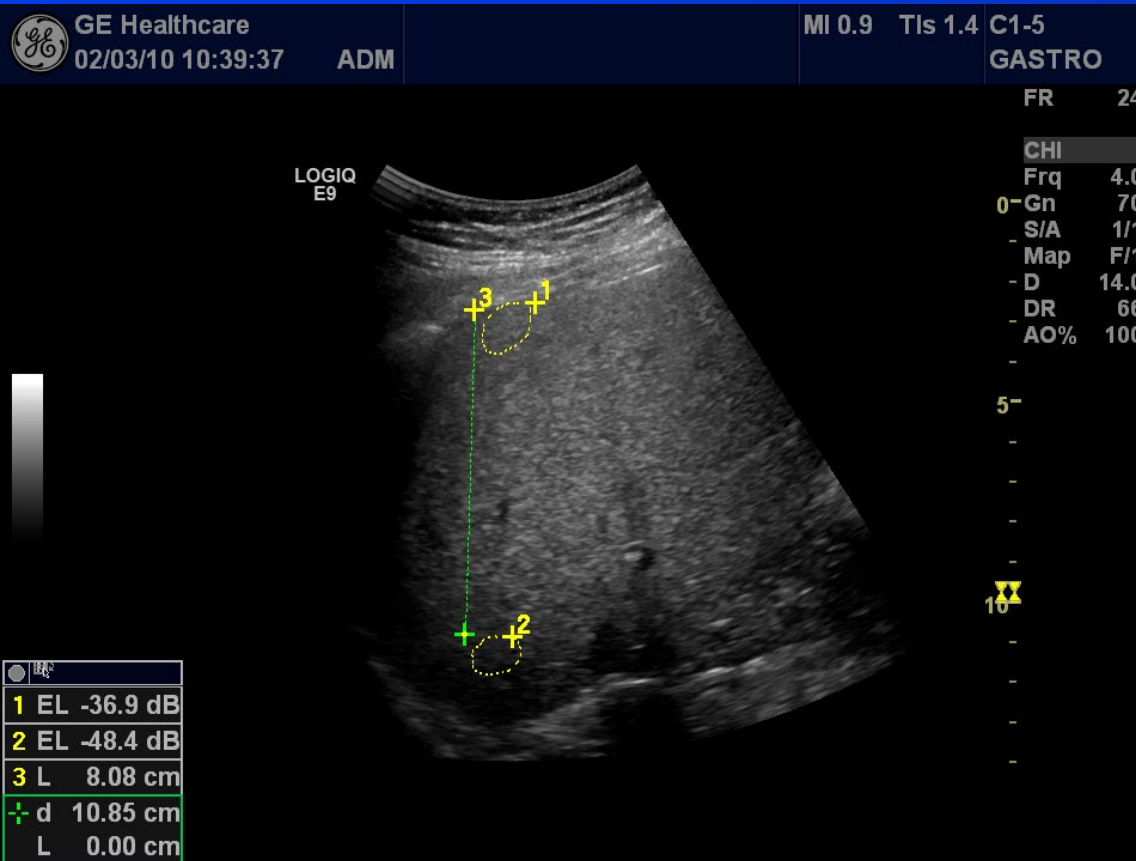


Litt om lever- diagnostikk med ultralyd

Fra
blikk-diagnose
til
avanserte kontrast-undersøkelser



Steatose – Ett blikk er nok !



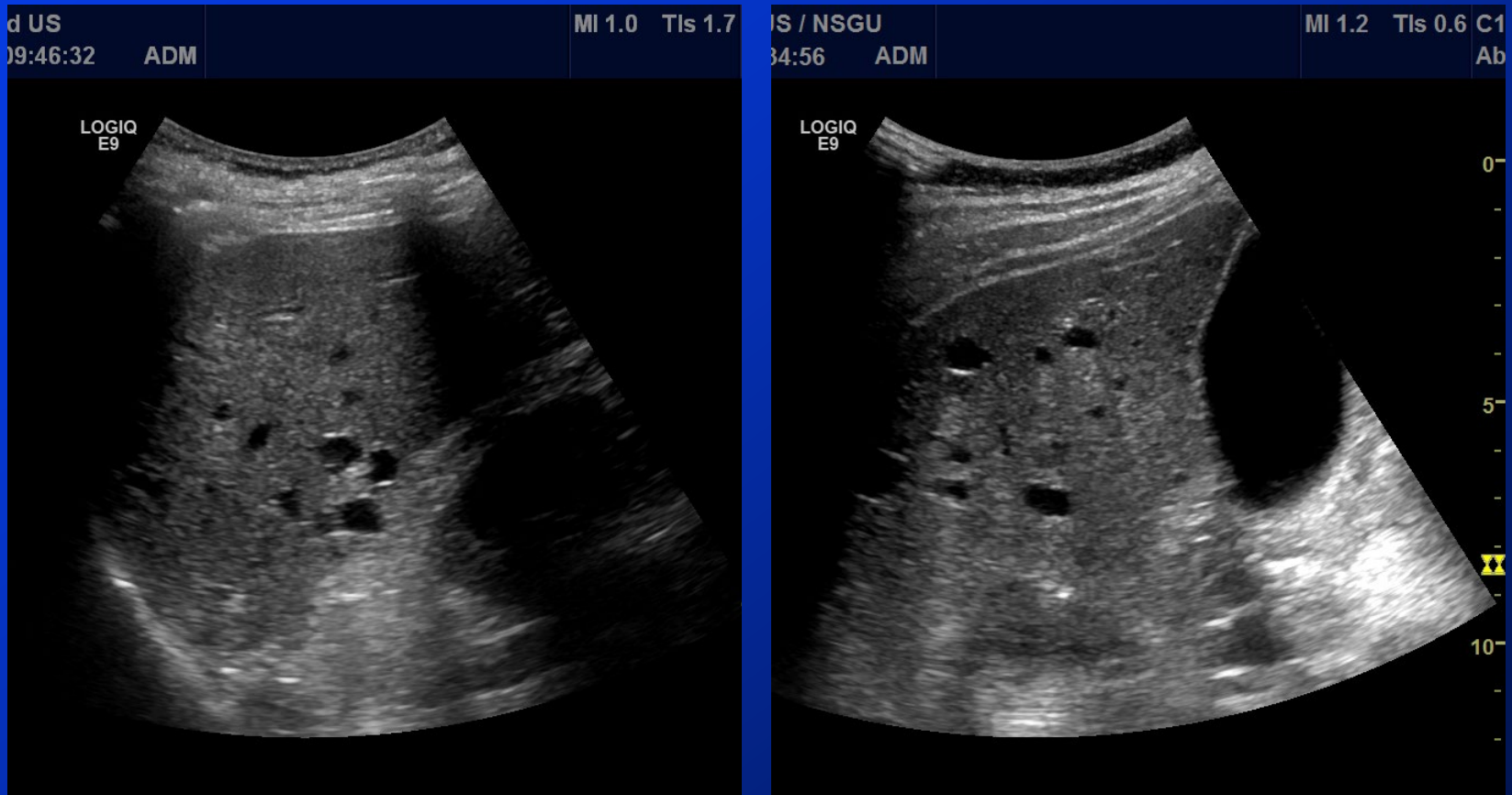


Fettlever kan brukes til mye...





Ultralyd er bedre enn CT på små cyster

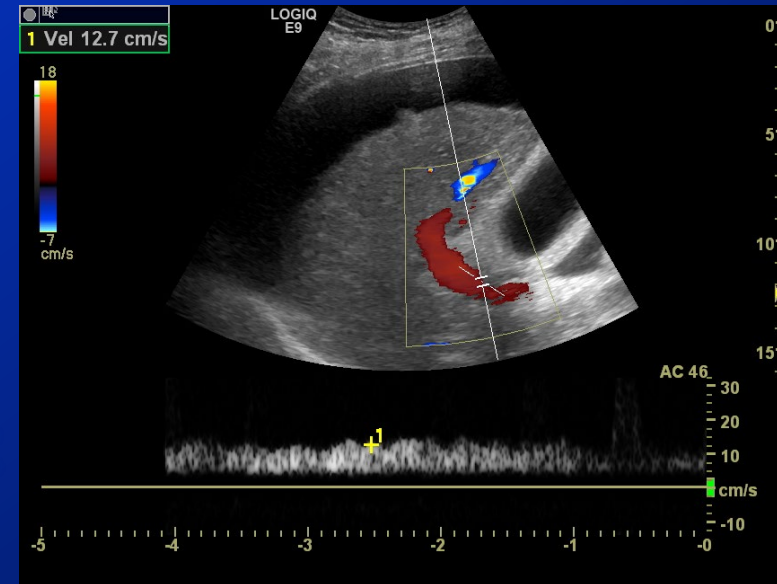


Blikk-diagnose



US better than CT

- Small and complex cysts
- Flow evaluation
 - Portal vein thrombosis
 - Budd-Chiari
- Cirrhosis evaluation
 - Global liver assessment
 - Portal HT
 - TIPS

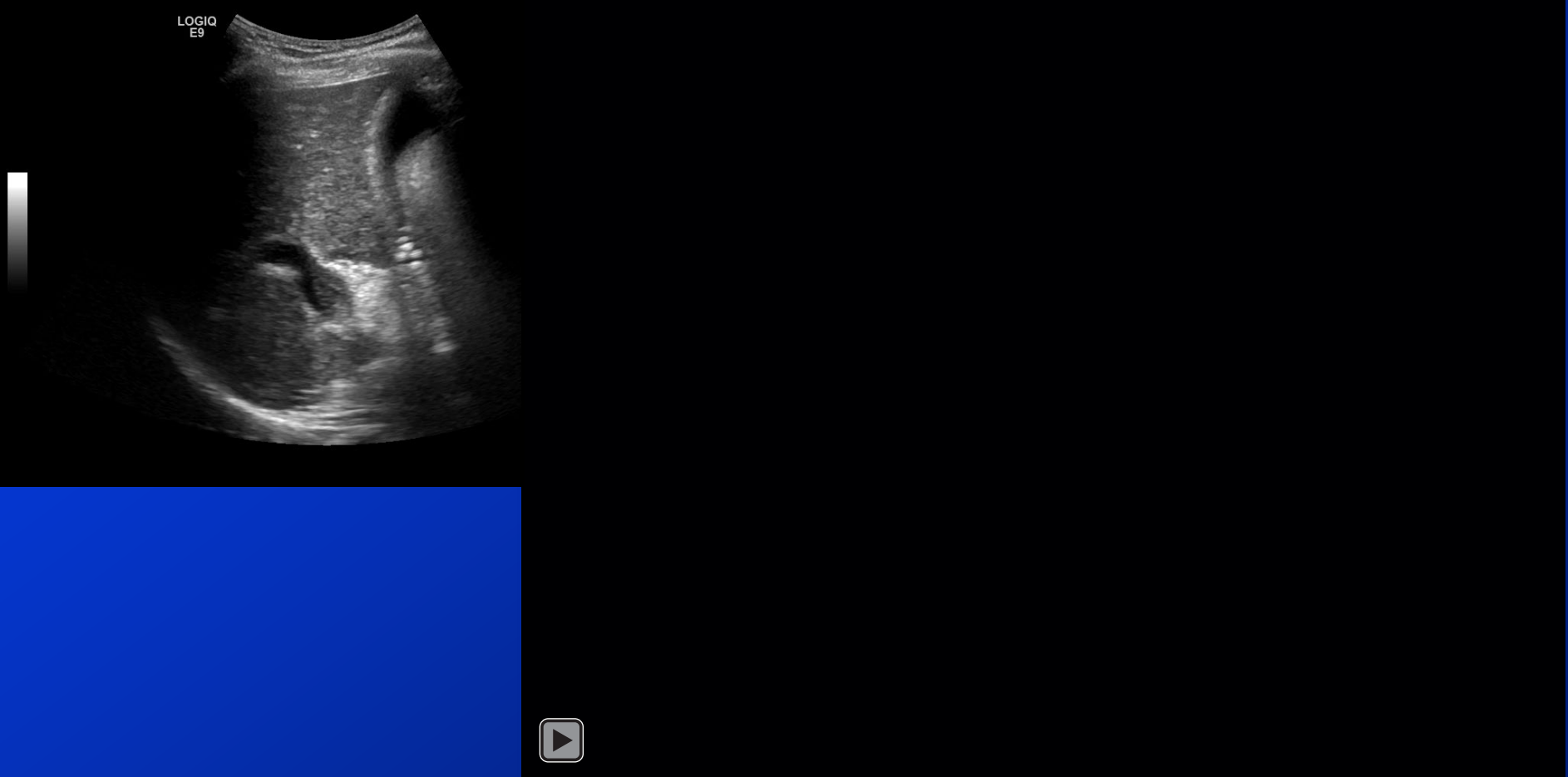




Color Doppler flow in real-time

GE Haukeland US 06/02/10 11:21:28 ADM MI 0.9 TIs 1.4 C1-5
GASTRO
EP 24

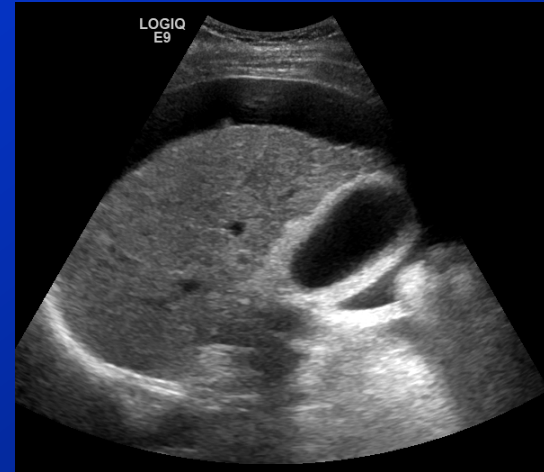
LOGIQ
E9





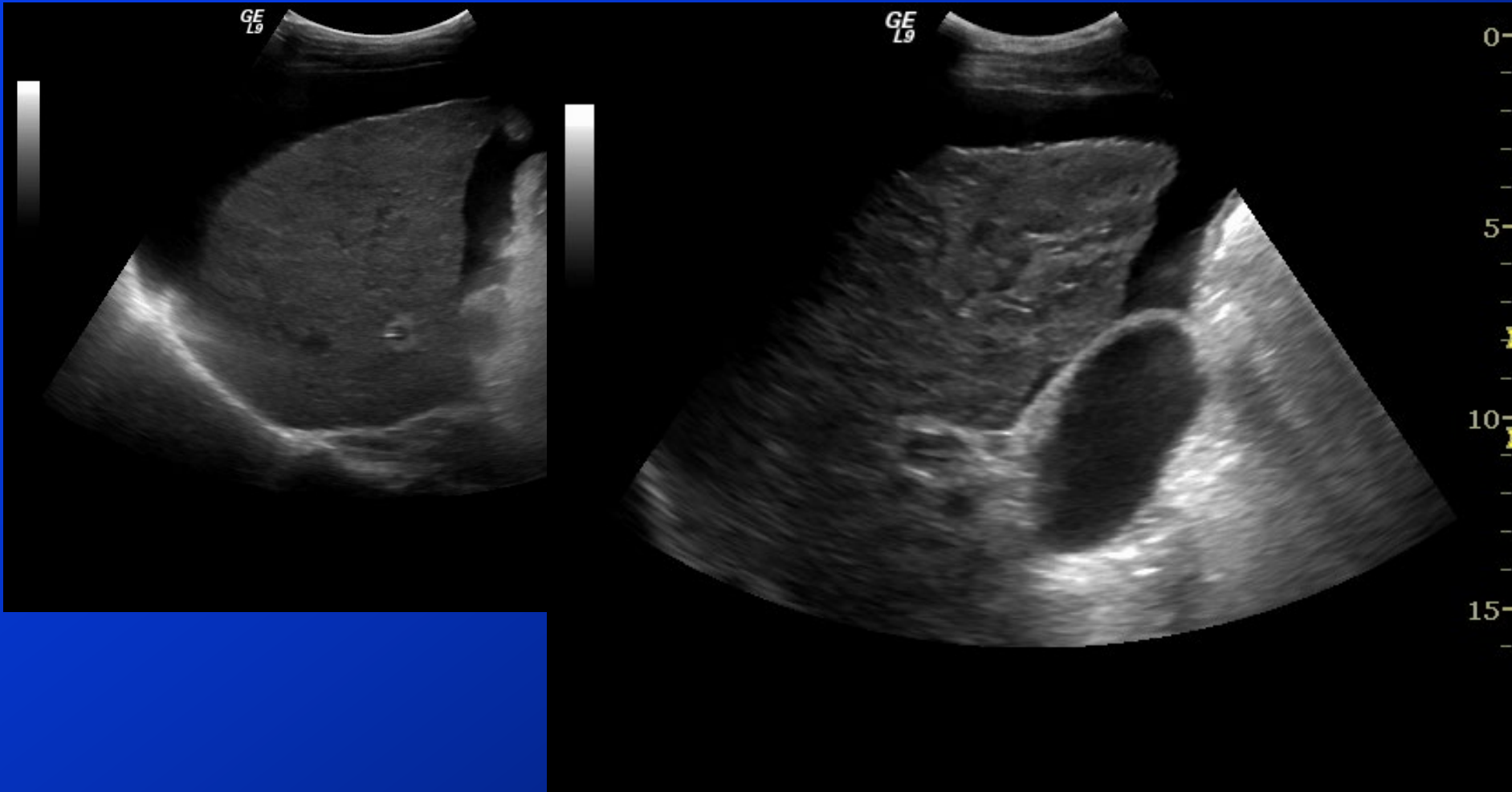
Ultrasound in the evaluation of cirrhotic livers

- Size of liver
- Size of left lobe and caudate lobe
- Capsule smoothness
- Ascites
- Echogenicity, homogeneity, nodularity, focal lesions
- Bile ducts and gallbladder
- Diameter of portal vein (+ splenic vein and spleen size)
- Doppler measurements:
 - Color and pulsed Doppler of portal and hepatic veins
 - Doppler of hepatic artery (TX)
- Elastography, mainly right lobe
- CEUS
- **US-guided biopsy and ablation procedures**





Liver cirrhosis





Vena Porta

GE Haukeland US 09/29/10 09:20:35 ADM MI 1.2 TIs 1.7 C1-5 GASTRO

FR 24

CHI

0-Frq 5.0

Gn 64

-S/A 1/1

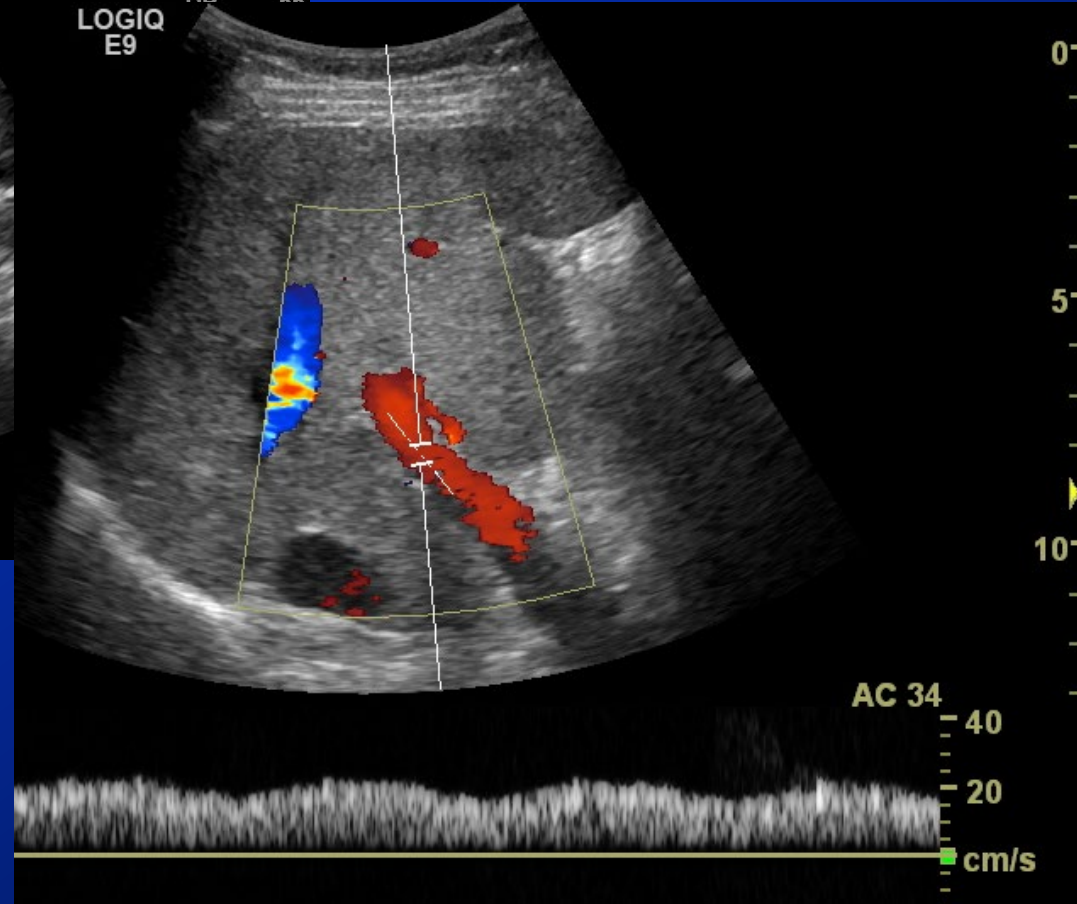
Map F/1

-D 12.0

DP 66

LOGIQ
E9

LOGIQ
E9





New Elasto-Guidelines 2017

Guidelines & Recommendations

29 recommendations

 Thieme

EFSUMB Guidelines and Recommendations on the Clinical Use of Liver Ultrasound Elastography, Update 2017 (Long Version)

EFSUMB-Leitlinien und Empfehlungen zur klinischen Anwendung der Leberelastographie, Update 2017 (Langversion)

Authors

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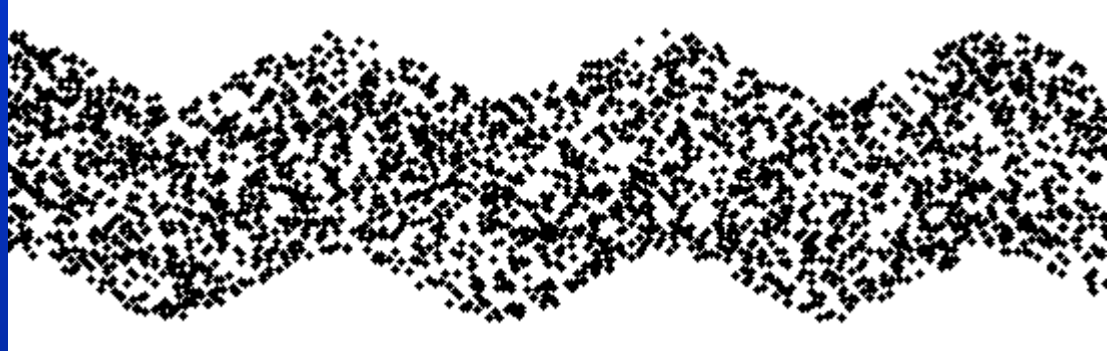
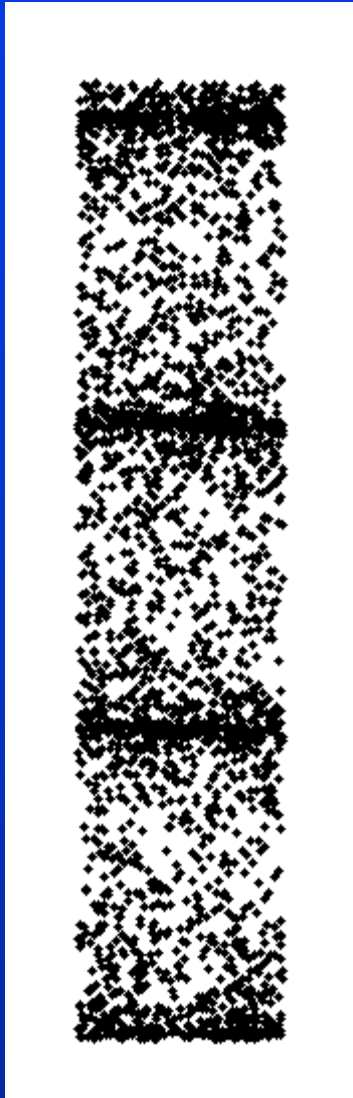


Longitudinal and Shear Waves

Ultrasound
Wave

$$c_l = \sqrt{\frac{K}{\rho}}$$

$c_l \sim 1540$ m/s
in tissue



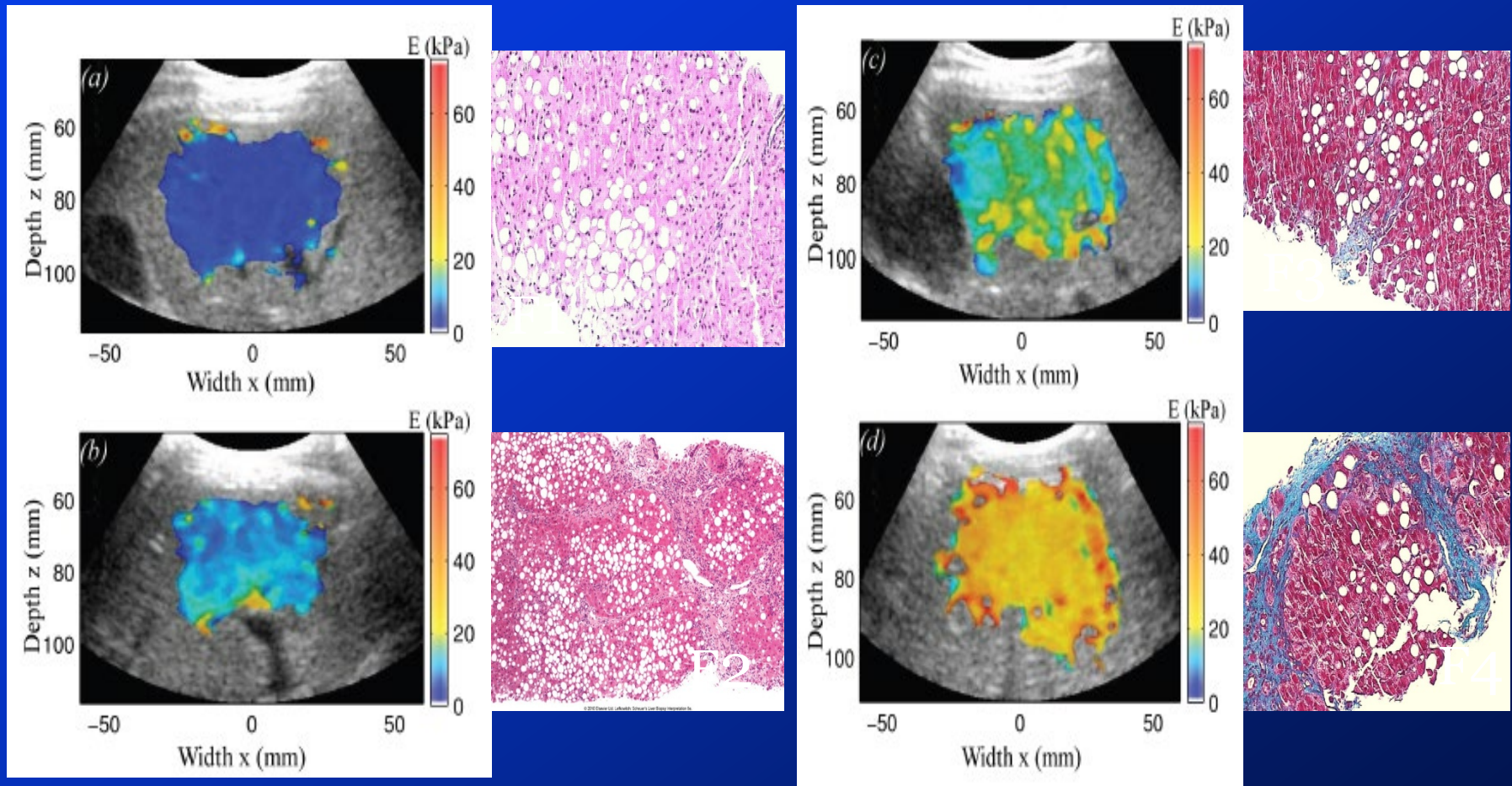
Shear Wave

$$c_t = \sqrt{\frac{E}{3\rho}}$$

$c_t = 1-10$ m/s in tissue



Shear Wave Elastography compared to histological findings and Liver Fibrosis



Ultrasound Med Biol. 2011 Sep;37(9):1361-73. Epub 2011 Jul 2011 Noninvasive in vivo liver fibrosis evaluation using supersonic shear imaging: a clinical study on 113 hepatitis C virus patients. Bava E, Gennisson JL, Couade M, Bercoff J, Mallet V, Fink M, Badel A, Vallet-Pichard



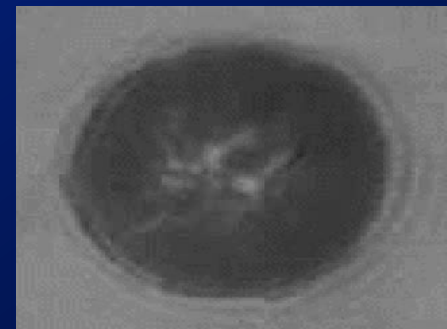
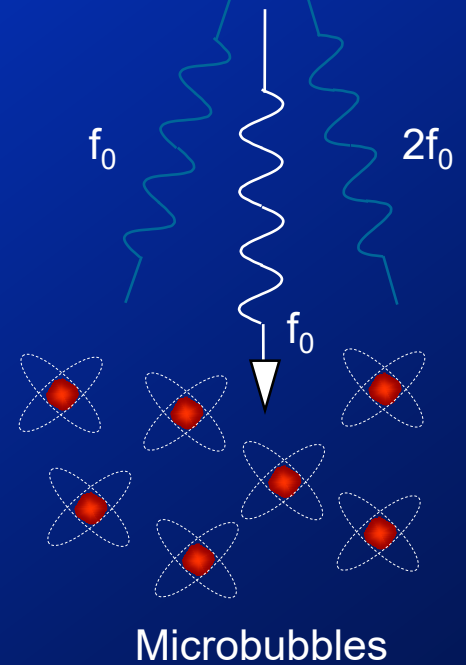
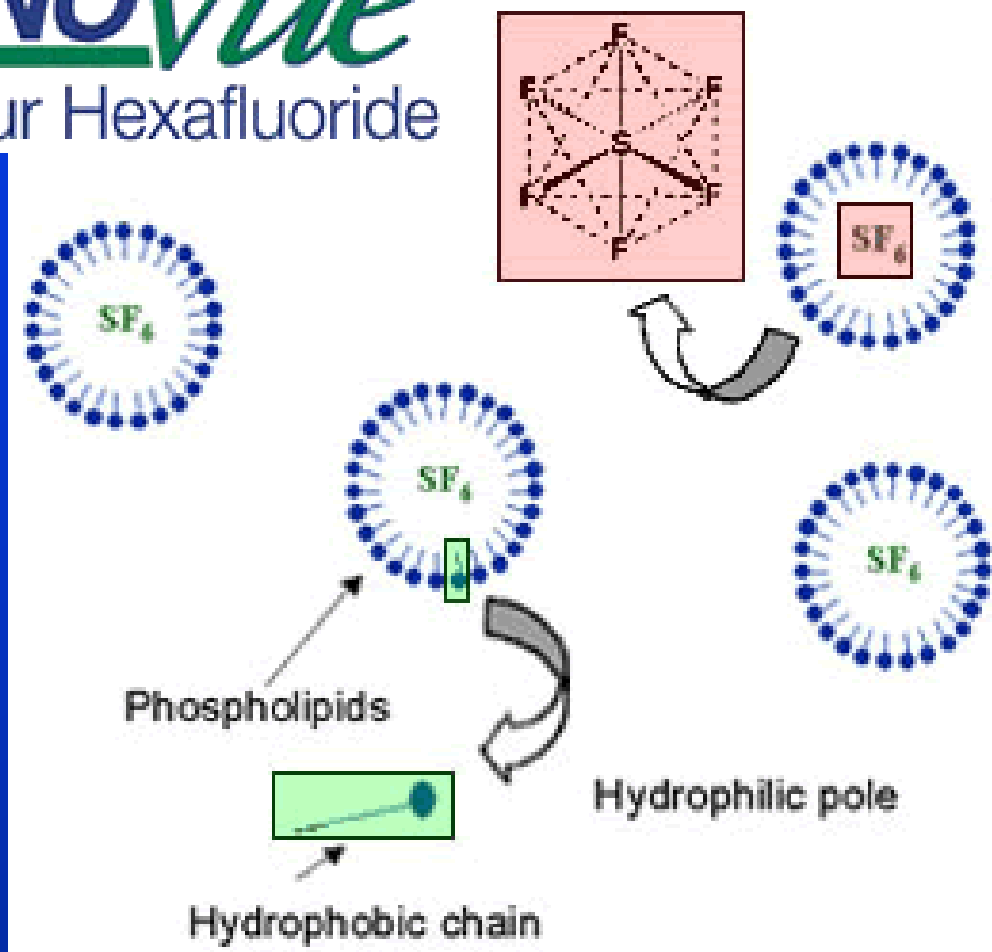
Ultrasound elastography

- Correlates well with histology regarding fibrosis
- Easy to perform
- Prolongs the US exam only with 2 min
- Provides valuable information to the clinician
- CT does not give data on liver stiffness
- MR elastography has low availability, is expensive and time consuming



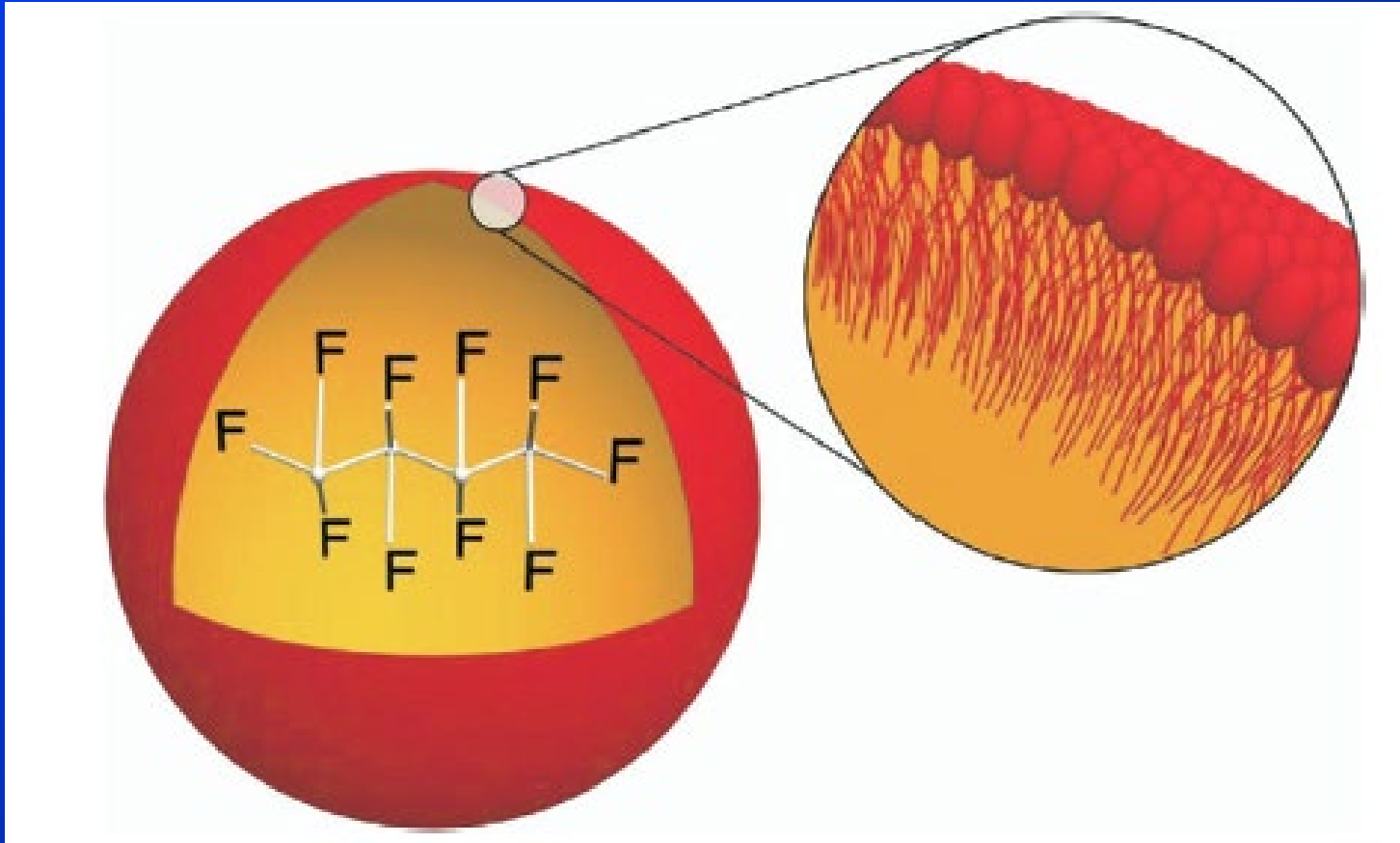
CEUS

SONOVue
Sulphur Hexafluoride





Sonazoid



- Membrane is hydrogenated egg phosphatidylserine sodium (1)
- The gas is perfluorobutane (PFB)



Kontrastforsterket UL Indikasjoner - Lever

- Karakterisering av fokale lesjoner
 - FNH, hemangiomer, adenomer
 - HCC, CCC
- Deteksjon av små fokale lesjoner
 - metastaser
- Ved cirrhose/kron. hepatitt: Nodule karakterisering
- Guiding av biopsi taking
- Guiding av intervensjon,- f.eks ablasjon



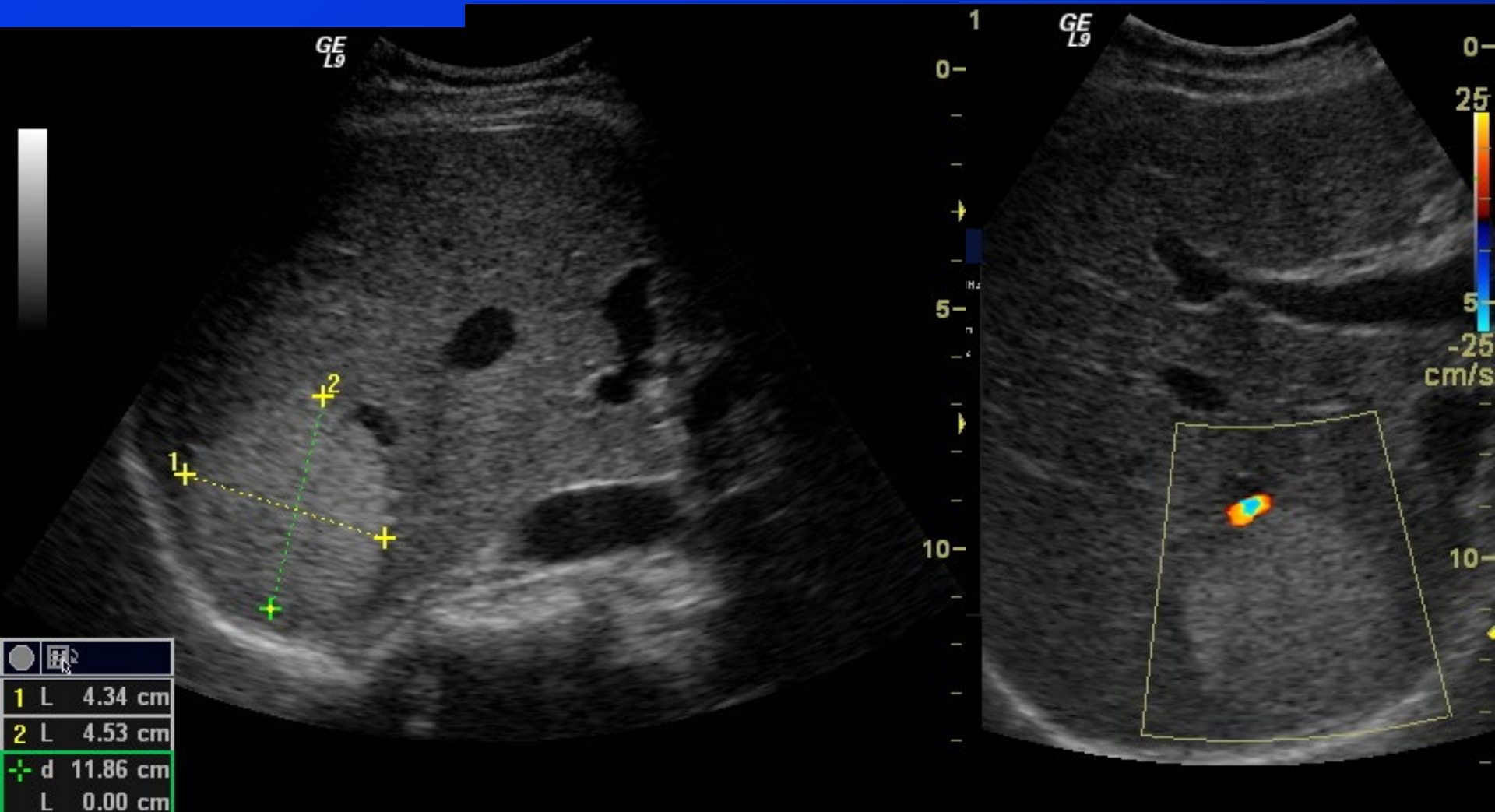
3 (4) Phases in liver perfusion

- Arterial phase
 - 0-30 sec.
- Portal phase
 - 30-120 sec.
- Sinusoidal phase
 - 2-4 min
- Post-vascular phase
 - 4-30 min



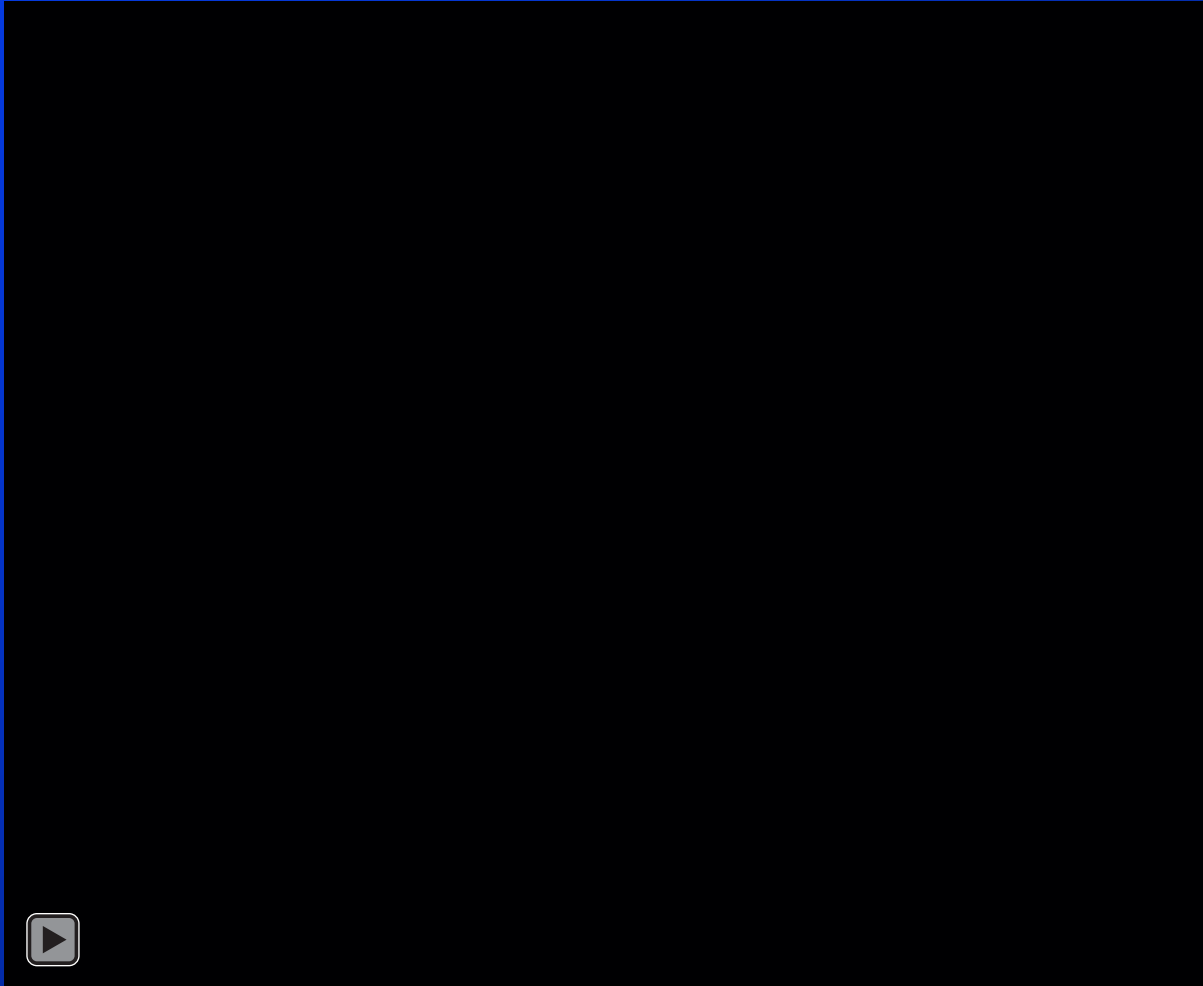


Referral from the CT-lab Haemangioma ?





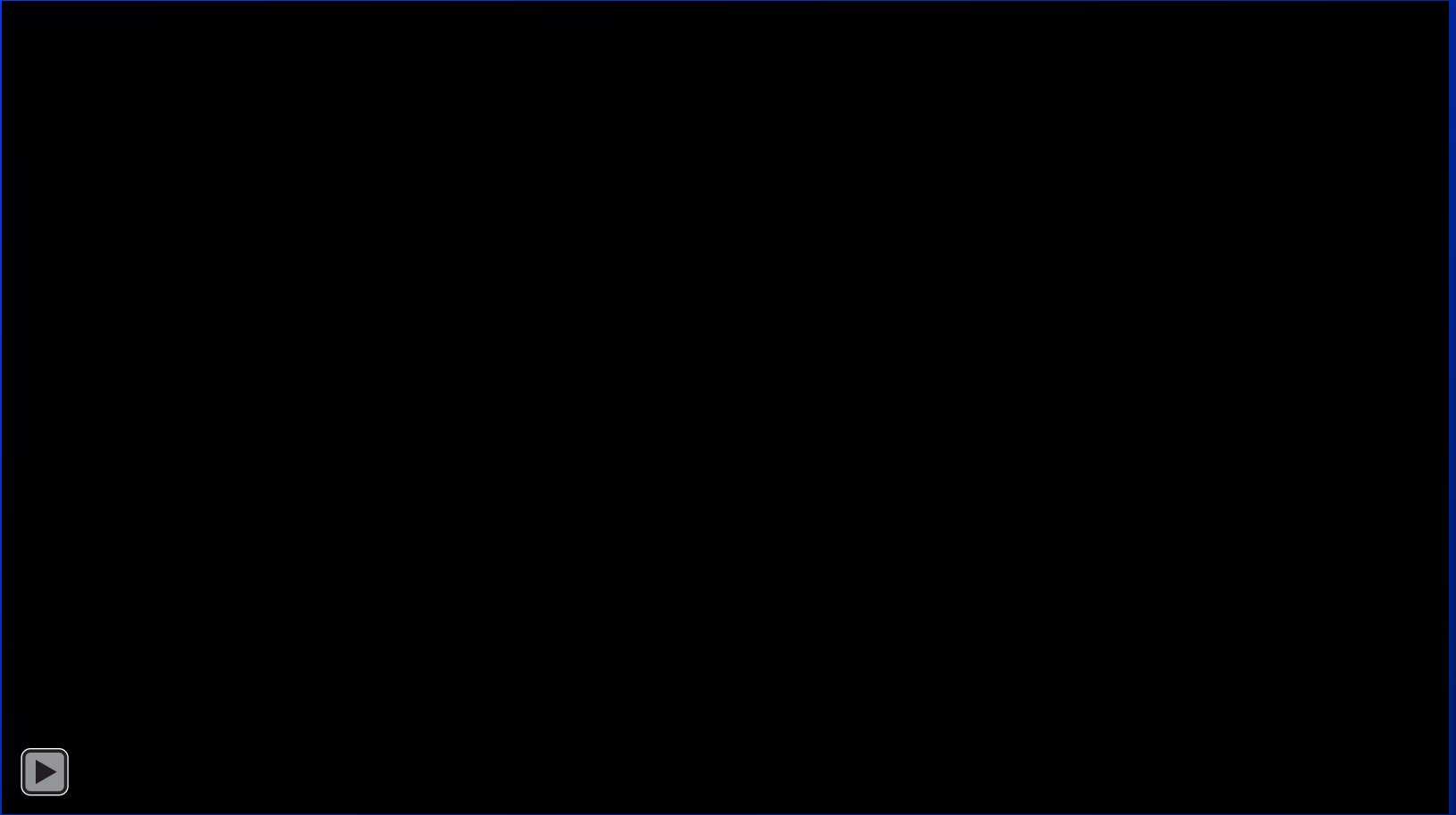
Peripheral Globular Enhancement



...with slow sentripetal filling



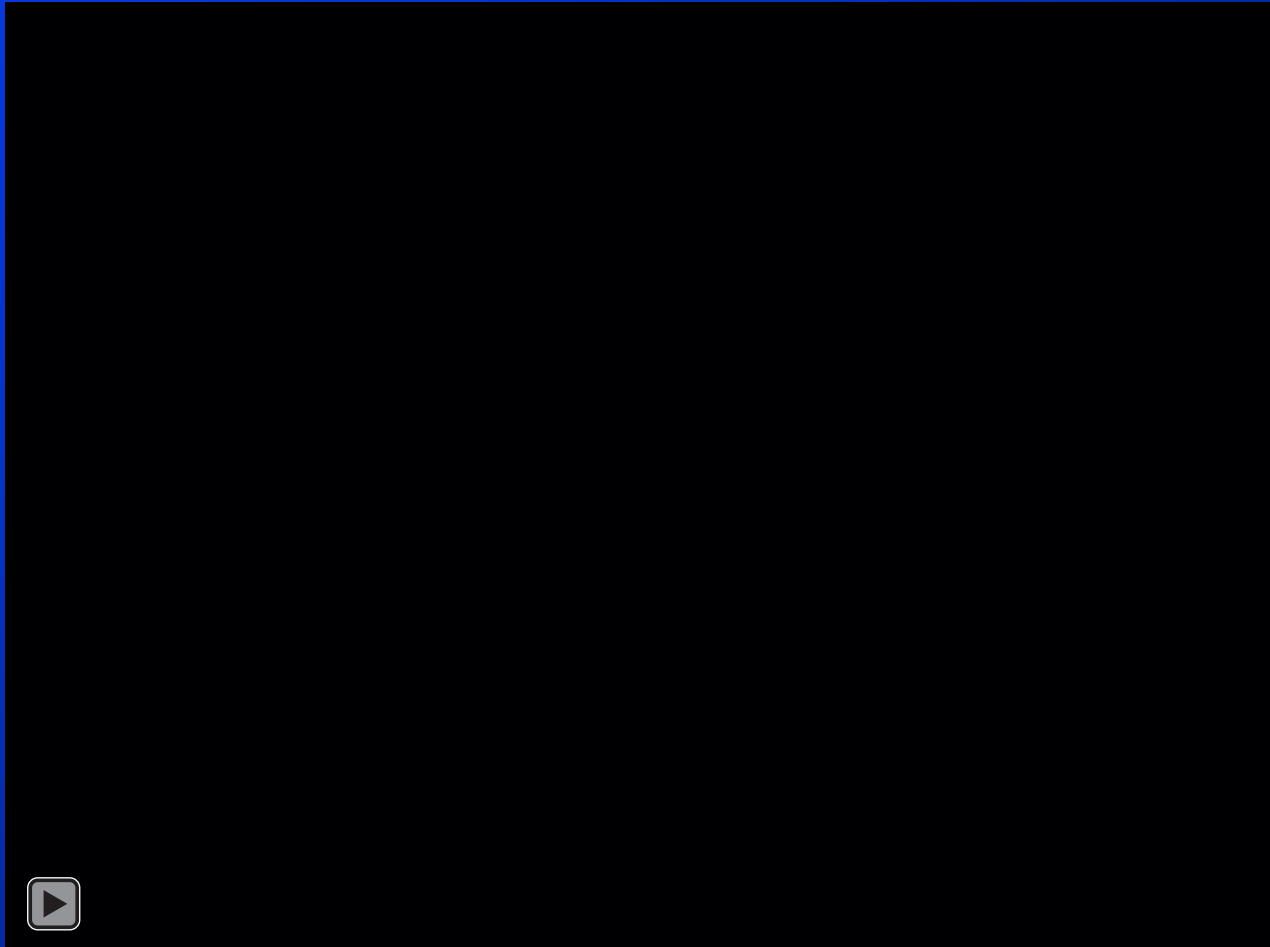
CEUS – Focal Nodulær Hyperplasi





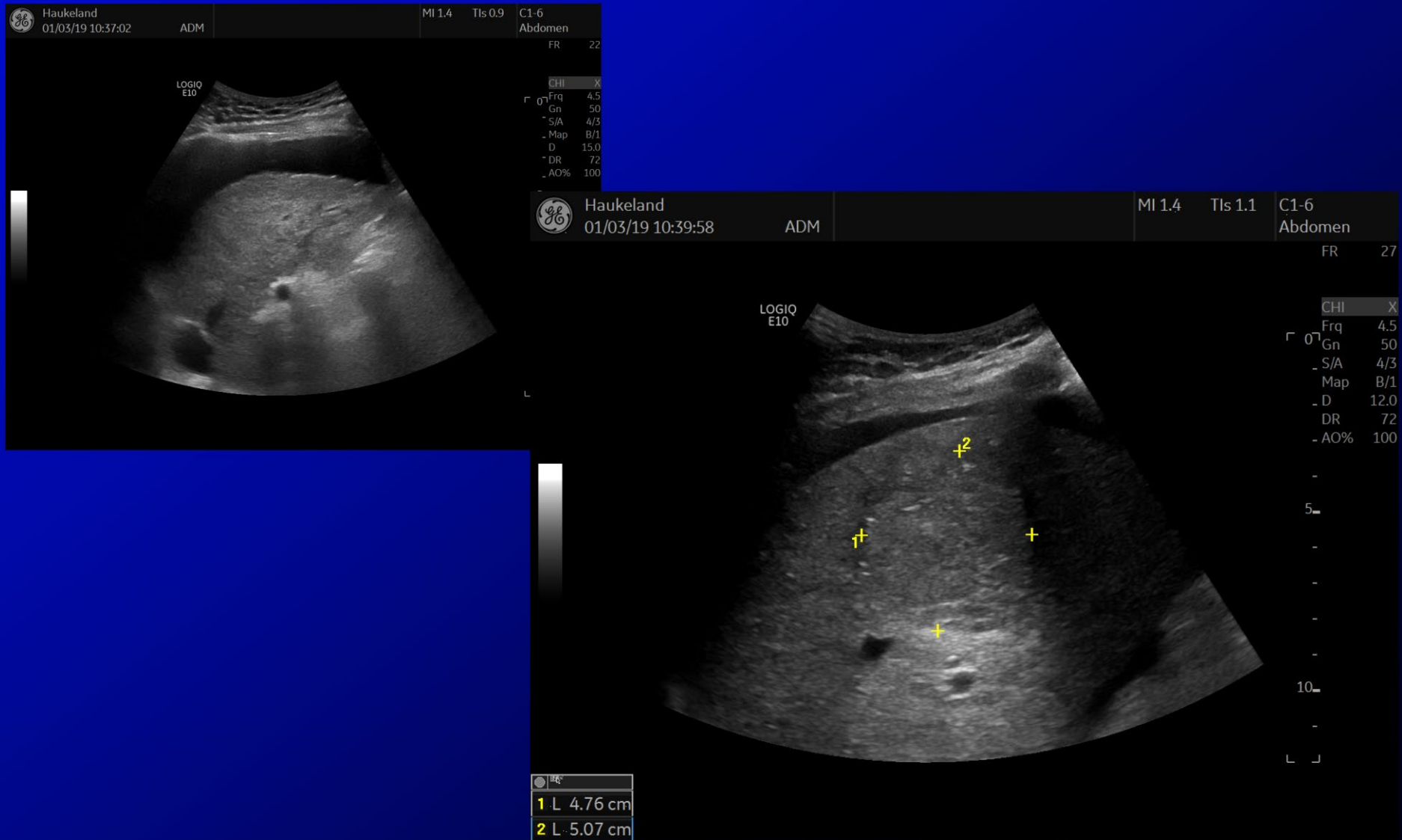
Liver Metastasis ?

After contrast injection in late phase



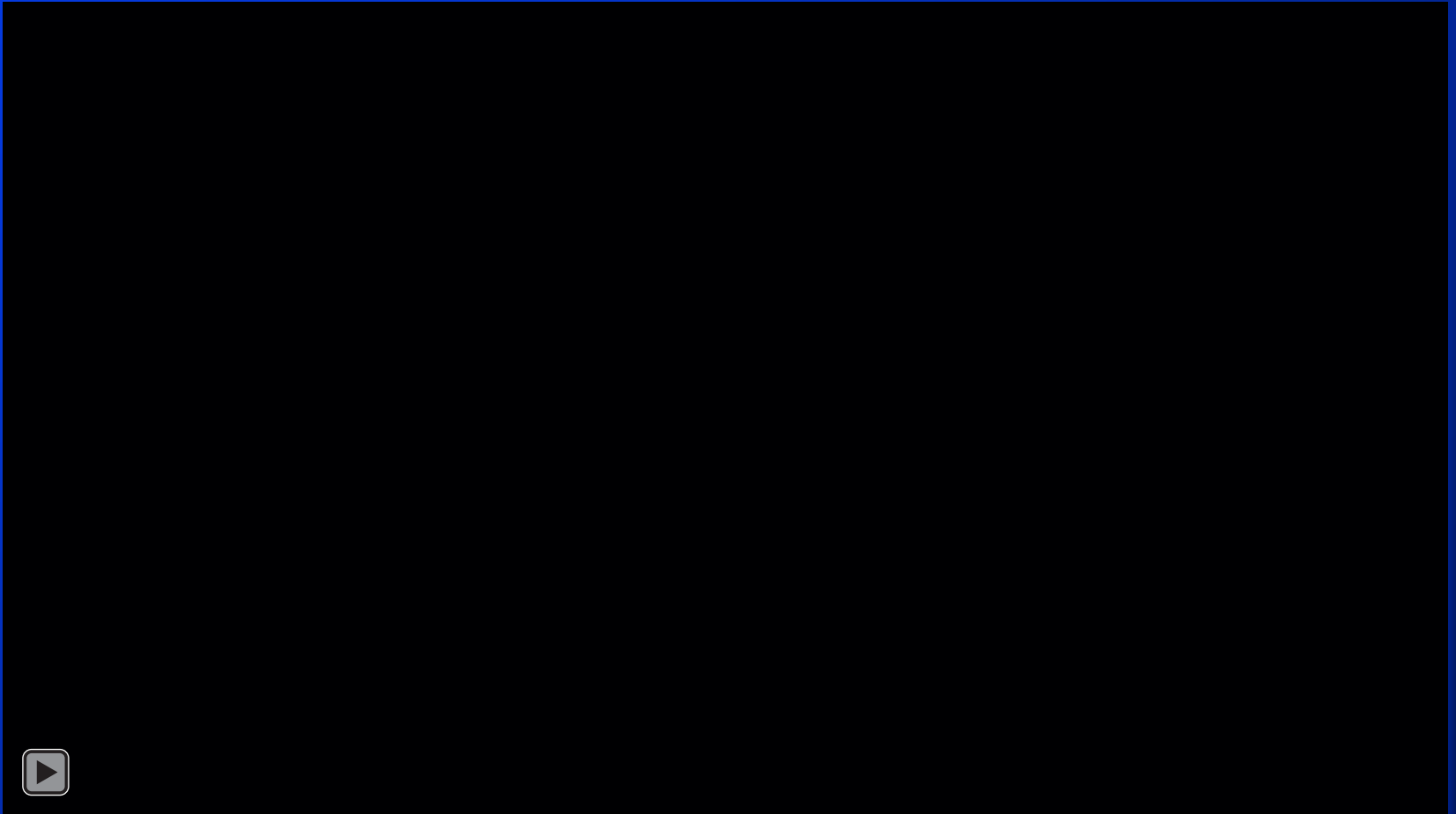


A patient with cirrhosis





CEUS of tumor





FNH versus HCC



FNH

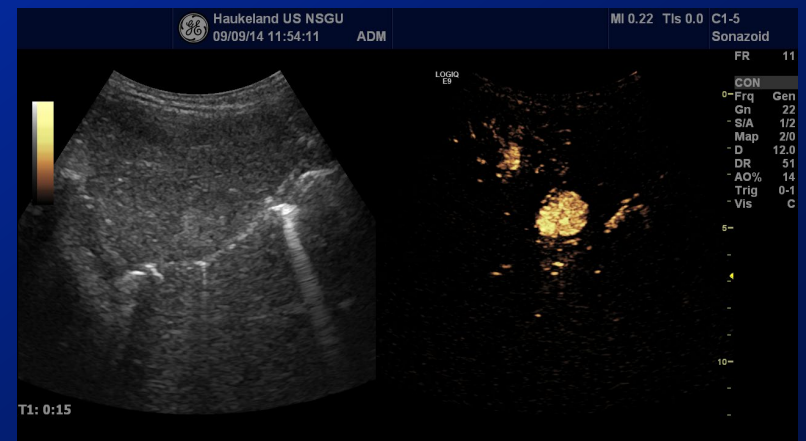
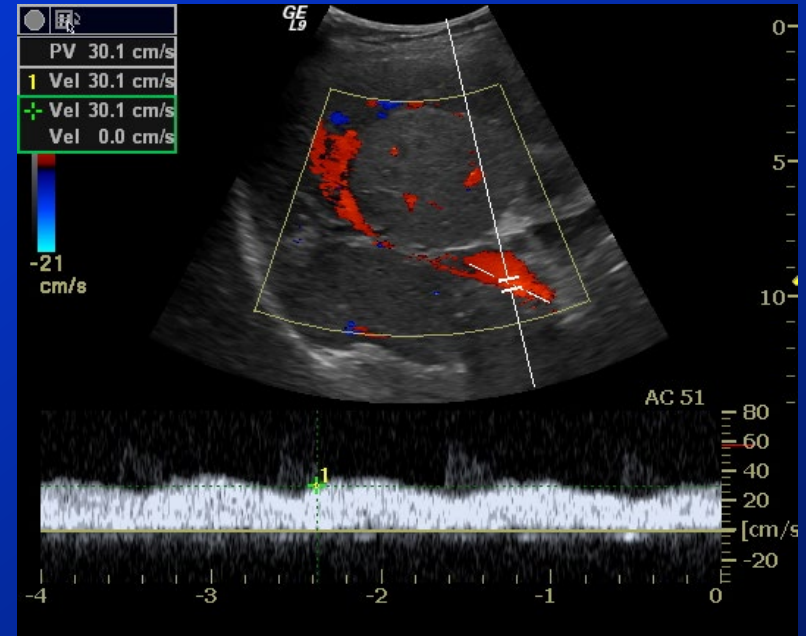


HCC



One stop shopping

- US B-mode
- Doppler
 - Color flow
 - Pulsed Doppler
- Elastography
 - Shear wave
 - Strain imaging
- CEUS
- US-guided biopsy





<https://helse-bergen.no/nasjonal-kompetansetjeneste-for-gastroenterologisk-ultralyd>

Systematisk ultralydundersøkelse av abdomen 6+

En systematisk ultralydundersøkelse av abdomen

Det finnes flere måter å utføre en undersøkelse av de abdominale organer på. Det viktigste er at man lærer en systematisk rekkefølge å skanne de ulike organsystemer på slik at man sikrer at ikke noe blir oversett.

Herunder presenterer senterleiar Prof. dr. med Odd Helge Gilja 6+, et skjema som er velegnet for systematisk ultralyd av abdomen.

Intro 1



Intro 1 from Haukeland University Hospital on Vimeo.

Google «NSGU» !

Vår nye prosjektleder:



Tina Merethe Veberg



Svein Ødegaard
Odd Helge Gilja
Knut Matre

INNFORING I ABDOMINAL ULTRASONOGRAFI