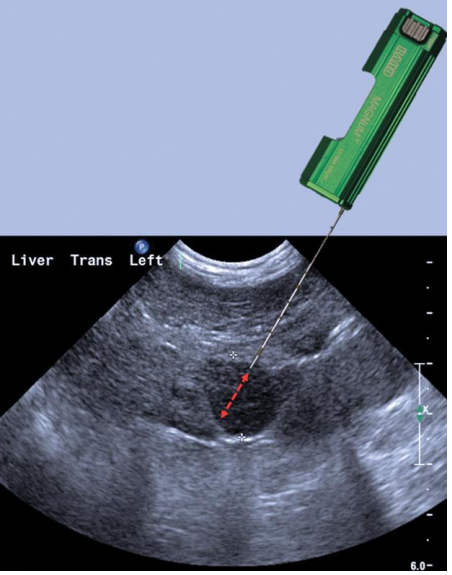


Original Article

Thieme

Biopsy of Liver Target Lesions under Contrast-Enhanced Ultrasound Guidance – A Multi-Center Study

Biopsie von Leber-Zielläsionen unter kontrastverstärkter Ultraschall-Führung – eine multizentrische Studie

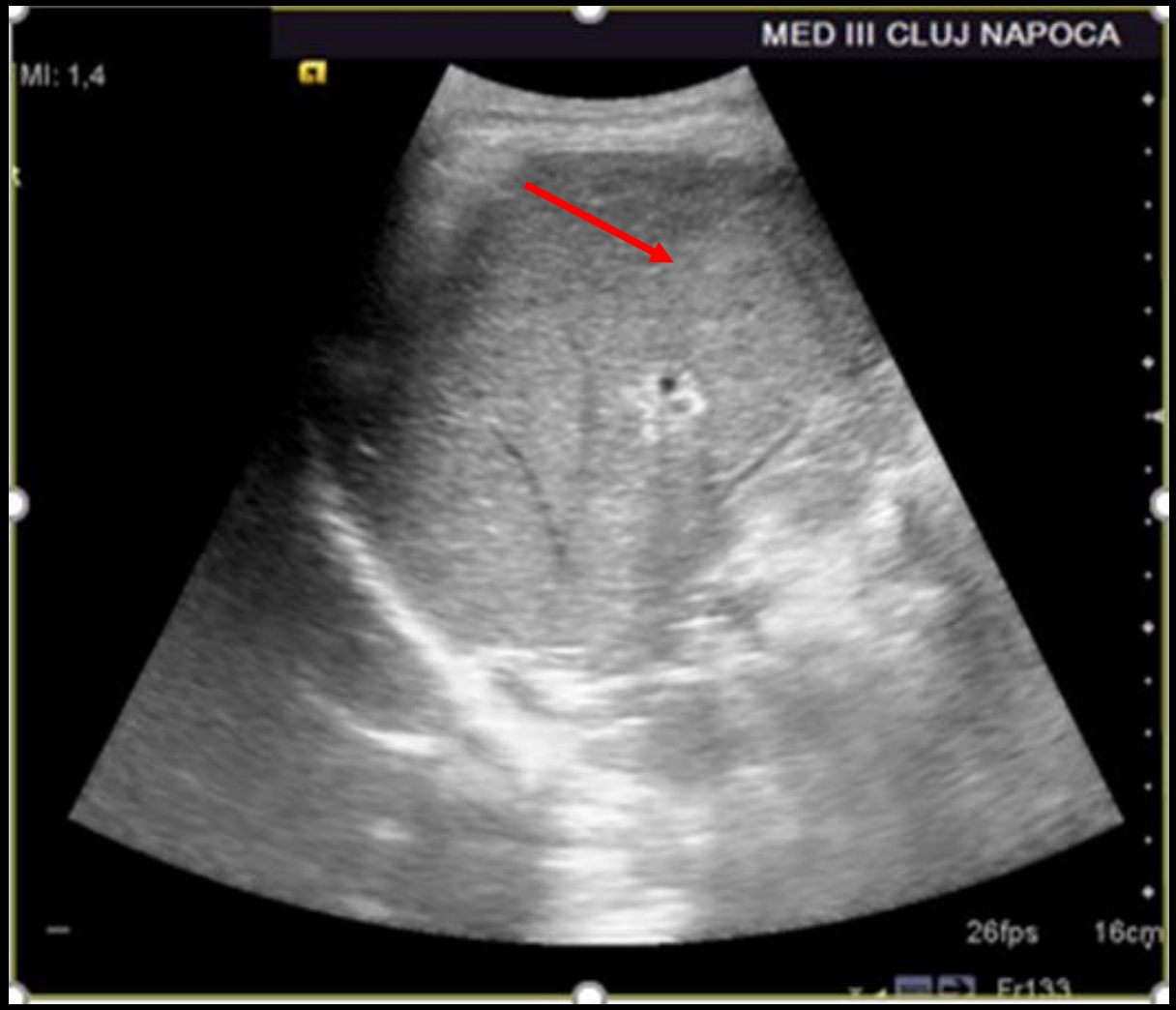
Authors

Giampiero Francica[1], Maria Franca Meloni[2], Ilario de Sio[3], Fulvia Terracciano[4], Eugenio Caturelli[5], Laura Riccardi[6], Paola Roselli[5], Maddalena Diana Iadevaia[3], Mariano Scaglione[7], Giovanni Lenna[8], Jason Chiang[2], Maurizio Pompili[6]

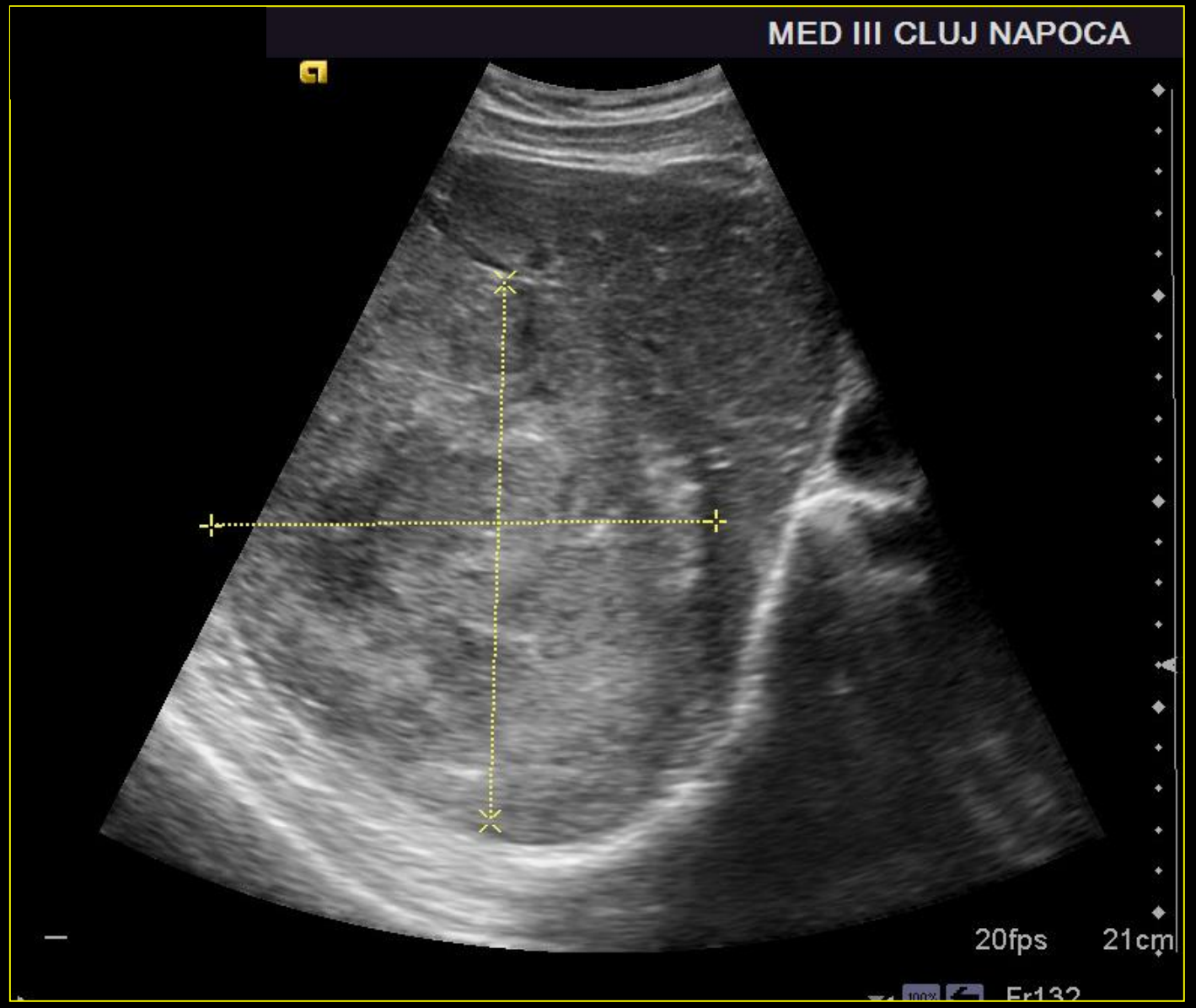
Pompilia Radu, MD, PhD

70 years old man with a isoechogenic lesion

52 years old woman with poor visible hepatic lesion

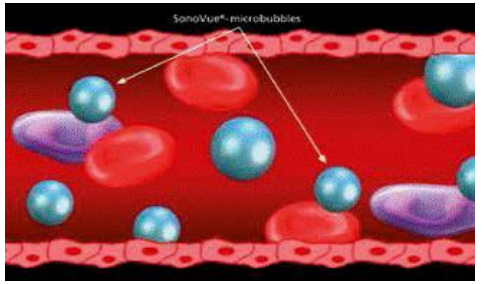


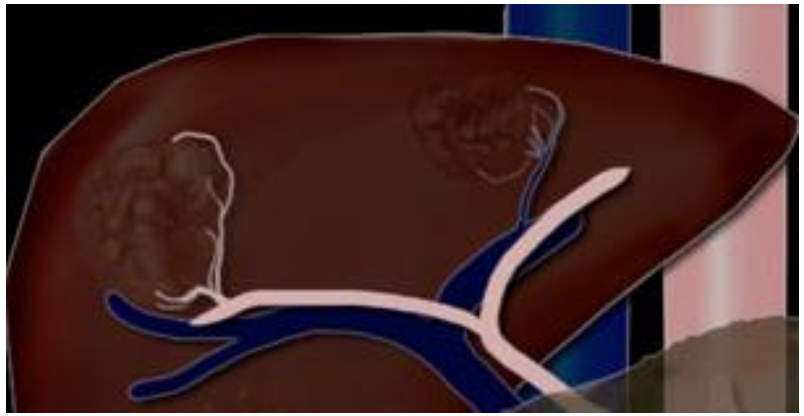
63 years old man diagnosed with cirrhosis and with a large hepatic tumor



CEUS

- SonoVue: stabilised sulphur hexafluoride microbubbles surrounded by a phospholipid shell





phase	start (s)	end (s)
arterial	10 – 20	30 – 45
portal venous (PV)	30 – 45	120
late	> 120	bubble disappearance (approx. 4 – 6 min)

❖Ceus allows:

✓ the vascular characterization of lesions-> according to their pattern, we can establish the nature of the lesions.

✓ the delimitation of the avascular, necrotic areas from the viable, vascularized regions of the lesions.

Guidelines & Recommendations

Thieme

The EFSUMB Guidelines and Recommendations for the Clinical Practice of Contrast-Enhanced Ultrasound (CEUS) in Non-Hepatic Applications: Update 2017 (Long Version)

Die EFSUMB-Leitlinien und Empfehlungen für den klinischen Einsatz des kontrastverstärkten Ultraschalls (CEUS) bei nicht-hepatischen Anwendungen: Update 2017 (Langversion)

Authors

Paul S. Sidhu[1], Vito Cantisani[2], Christoph F. Dietrich[3], Odd Helge Gilja[4], Adrian Saftoiu[5], Eva Bartels[6], Michele Bertolotto[7], Fabrizio Calliada[8], Dirk-André Clevert[9], David Cosgrove[10], Annamaria Deganello[1], Mirko D'Onofrio[11], Francesco Maria Drudi[12], Simon Freeman[13], Christopher Harvey[14], Christian Jenssen[15], Ernst-Michael Jung[16], Andrea Sabine Klauser[17], Nathalie Lassau[18], Maria Franca Meloni[19], Edward Leen[20], Carlos Nicolau[21], Christian Nolsoe[22], Fabio Piscaglia[23], Francesco Prada[24], Helmut Prosch[25], Maija Radzina[26], Luca Savelli[27], Hans-Peter Weskott[28], Hessel Wijkstra[29]

RECOMMENDATION 68

CEUS can be helpful in avoiding necrotic tissue or identifying perfused tissue in the biopsy of tumors (LoE 2b, GoR C). Strong consensus (19/0/0, 100 %)

RECOMMENDATION 69

CEUS can be helpful in identifying biopsy targets inconspicuous on US (LoE 2b, GoR C). Strong Consensus (17/0/2, 100 %)

Procedure	Grade	Remarks
CEUS-guided biopsy		
From perfused areas to avoid necrosis	B	Diagnostic accuracy: 10%–15% increase Feasibility: 94%–100%
Poorly visualized/invisible lesions	A	Success rate: 86%–100%
Additional benefits	B	For focal liver lesion characterization to avoid biopsy: grade A

A very limited number of studies have investigated the value of CEUS guided procedures

Original Article

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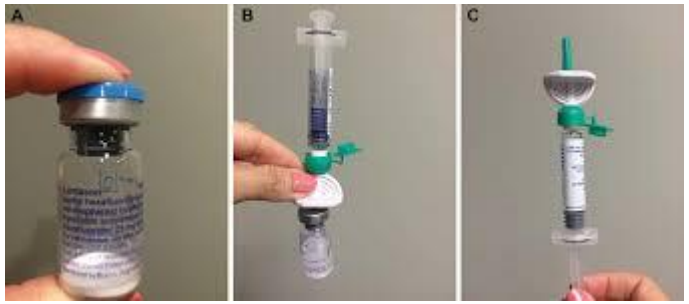
Authors

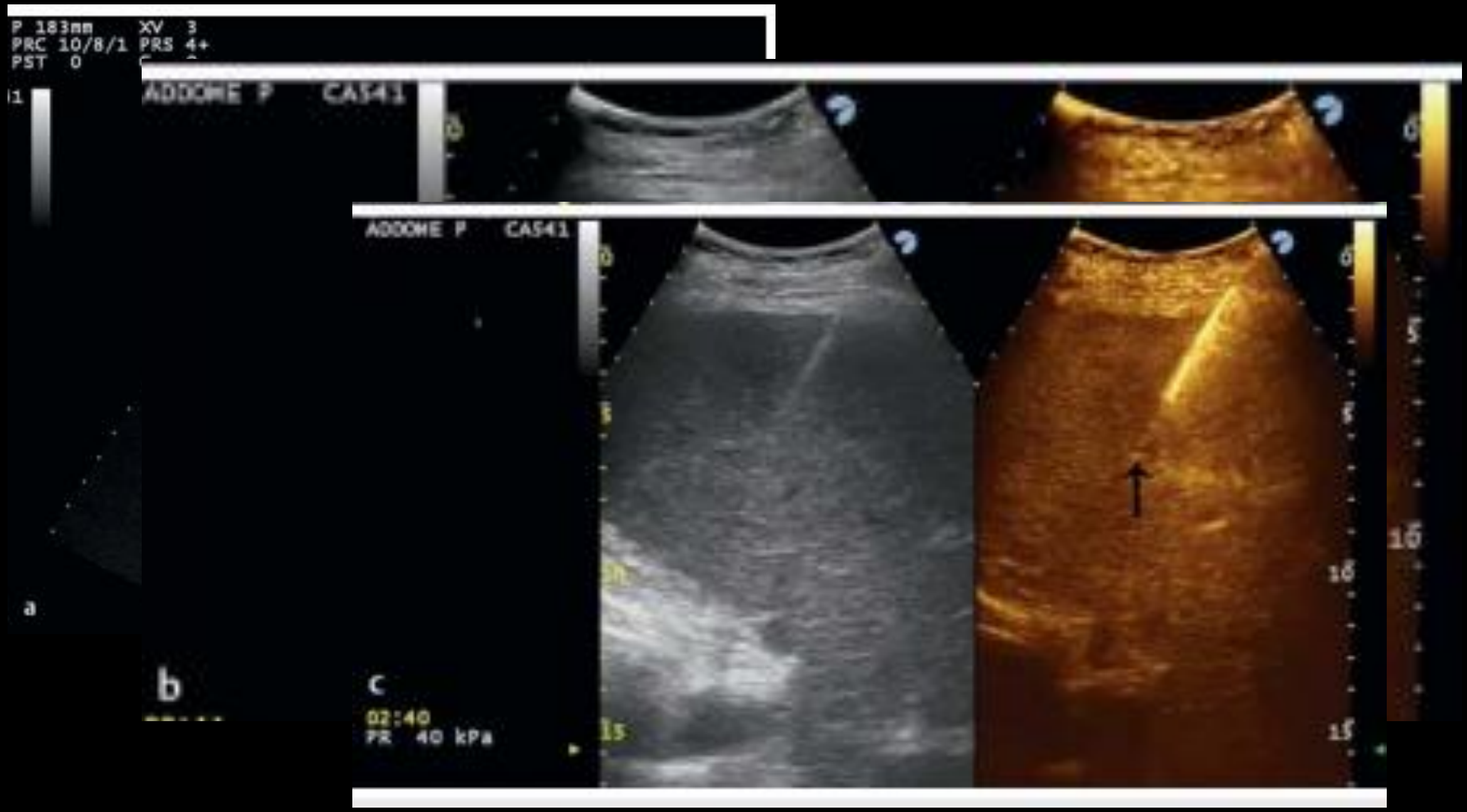
Giampiero Francica[1], Maria Franca Meloni[2], Ilario de Sio[3], Fulvia Terracciano[4], Eugenio Caturelli[5], Laura Riccardi[6], Paola Roselli[5], Maddalena Diana Iadevaia[3], Mariano Scaglione[7], Giovanni Lenna[8], Jason Chiang[2], Maurizio Pompili[6]

Aim: To retrospectively analyse the impact of contrast-enhanced ultrasound (CEUS) guided biopsy of hepatic lesion.

Patients and method

- Retrospective study between 2005 and 2016;
- 6 centers;
- US equipment with a dedicated software for contrast-specific imaging;
- Cutting needles: Biomol 18 – 20 G, Hospital Service Italy, Rome, Italy ; Full-Opty 20 G Sterylab, Rho, Italia; Surecut 18 – 19G, TSK, Japan) or aspiration needles (Chiba needles 20 – 22 g, Hospital Service Italy, Rome, Italy)
- The biopsy procedures were performed during: the late arterial, portal or late phases after contrast agent injection.

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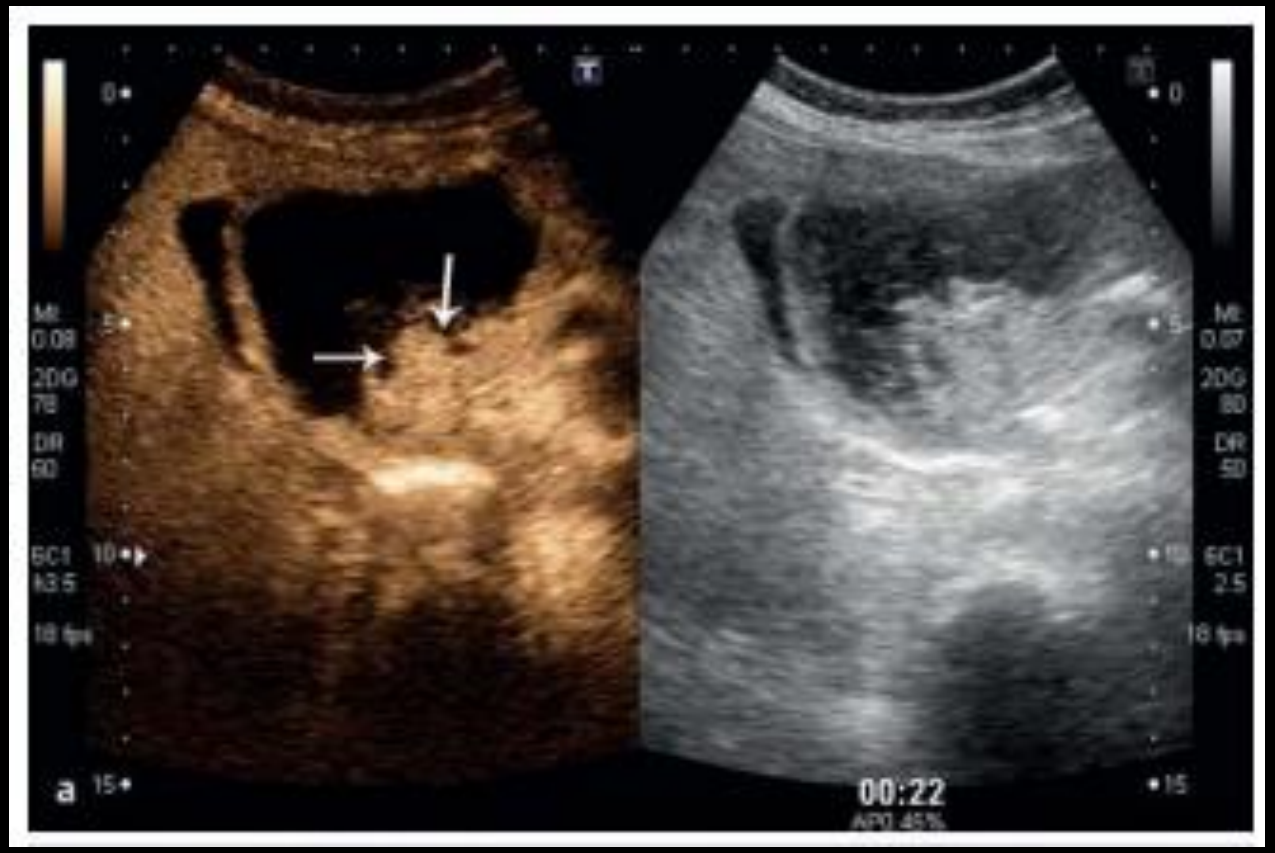
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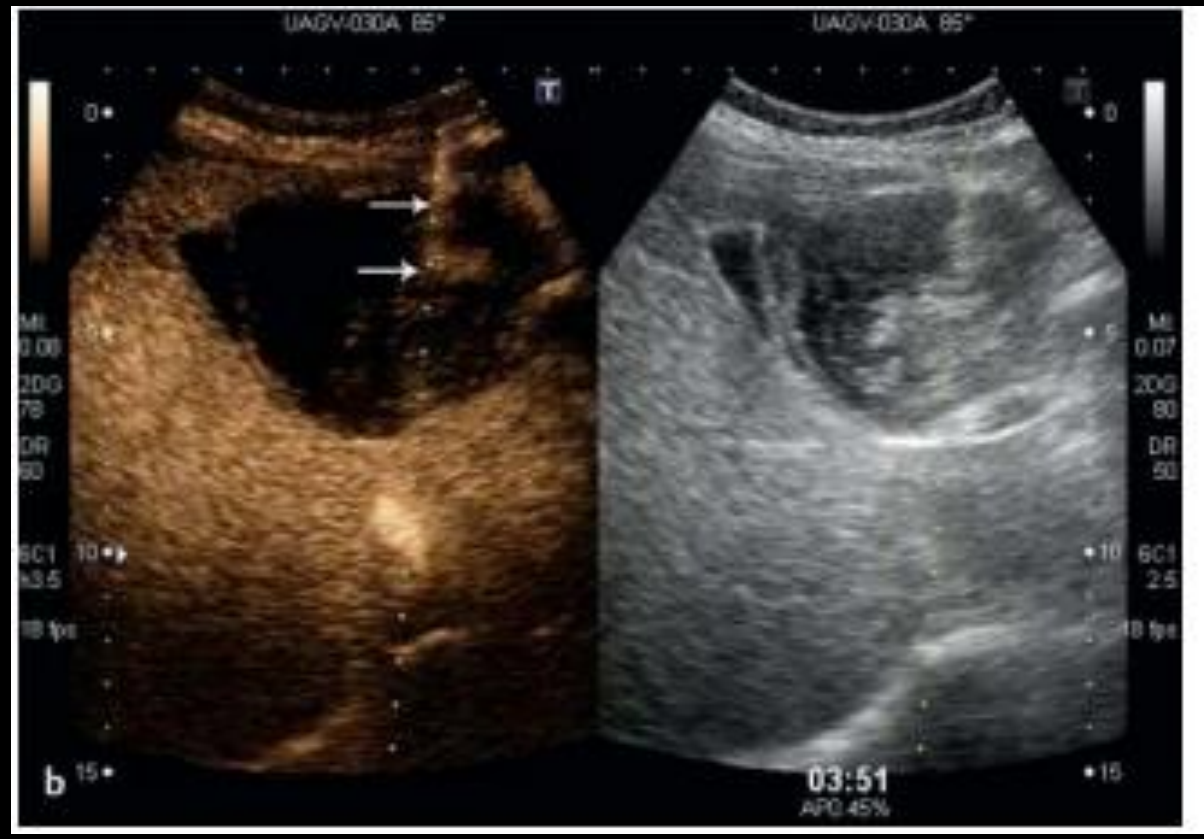
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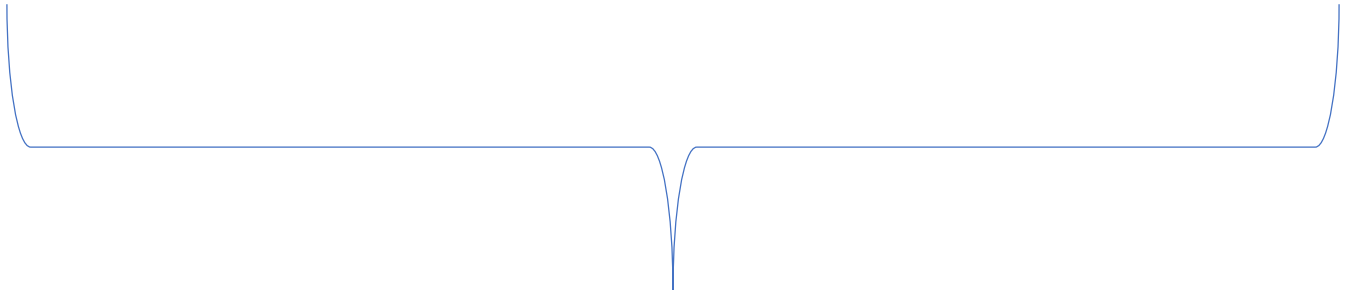
Indications for CEUS-guided biopsy were:

a) Not visible hepatic lesions on B mode US but visible on CT or MRI exam: 28 (27.2%)
b) Poor visible hepatic lesion: 34 (33%).
c) Complex hepatic lesions with necrotic and non-necrotic areas: 41 (39.8%).



26 (25%) of 103 had a non-diagnostic results at previous US-LB

Results:

✓3818 patients underwent LB. Among them, 103 (2.8%) received a CEUS-guided biopsy.

✓ A single dose (2.4ml) of UC was used in 69 patients (67%) whereas two or three doses were necessary in 34 patients (33%).

✓ A single needle pass was used in 64 patients (62%). Two passes were used in 37 patients (36%) and 3 passes were needed in the remaining 2 cases (1.9%)

✓ The diagnostic accuracy was 99%.

✓ No major complications.

▶ **Table 1** Baseline characteristics of patients studied.

No. of patients	**103**
Male/female	68 M / 35 F
Median age yrs (range)	69 (31 – 89)
Liver targets	
No.	103
Median size mm (range)	20 (8 – 55)
Segment	No.
1	2
2	5
3	8
4	20
5	26
6	17
7	18
8	7

Discussion:

- Benign ≠ malignant focal liver lesions is crucial in determining prognosis and patient management.
- FLL can be characterized to a certain extent based on US, CEUS, CT, MRI
- Histological pathology remains the diagnostic gold standard.
- US is the preferred modality for image guided liver lesion biopsy.
- CEUS vs. US: normal liver (98% vs. 82%), in cirrhotic patients (95% vs. 75%) (*Spârchez Z et al. Med Ultrason. 2015)*
- Accuracy of LB with pre CEUS vs LB without pre CEUS: 95% vs 87% and for lesions ≤ 2.0 cm (97.1% vs 78.8%) (*Wu W et al. AJR 2006)*

Eur Radiol (2010) 20: 2047–2056
DOI 10.1007/s00330-010-1757-z

ULTRASOUND

Soon Ho Yoon
Kyoung Ho Lee
So Yeon Kim
Young Hoon Kim
Jee Hyun Kim
Sang Hyub Lee
Tae Kyoung Kim

Real-time contrast-enhanced ultrasound-guided biopsy of focal hepatic lesions not localised on B-mode ultrasound

- CEUS guidance was necessary in 44 out of 531 liver lesions referred for biopsy (8.3%).
- lesions not confidently visible on B-mode US.
- Procedural success rate : 86%

Original papers

Med Ultrason 2015, Vol. 17, no. 4, 456-463
DOI: 10.11152/mu.2013.2066.174.prc

Prospective comparison between real time contrast enhanced and conventional ultrasound guidance in percutaneous biopsies of liver tumors.

Zeno Spârchez[1,2], Pompilia Radu[1], Gabriel Kacso[3], Mihaela Spârchez[4], Teodor Zaharia[1], Nadim Al Hajjar[5]

[1]Institute for Gastroenterology and Hepatology, [2]3rd Medical Department, [3]Oncology Department, [4]2nd Pediatric Department, [5]3rd Surgical Department, "Iuliu Haţieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

- randomized to US- or CEUS-guided biopsy 178 patients with lesions clearly detected on conventional sonography.
- Procedural success rate 97.6%

Original Article

Contrast enhanced ultrasound guided biopsies of liver lesions not visualized on standard B-mode ultrasound—preliminary experience

Sasan Partovi[1*], Ziang Lu[2*], Rivka Kessner[1], Alice Yu[2], Yasmine Ahmed[1], Indravadan J. Patel[1], Dean A. Nakamoto[1], Nami Azar[1]

- 26 with FLL not well visualized on B-mode US
- Procedural success rate : 88.5%

Second attempt after an unsuccessful biopsy:

- In this study 25% of patients needed a second biopsy
  - ✓CEUS – LB: correct sampling in 100% of these cases.

- US-LB: correct sampling for histological diagnosis in less than 40% of cases (*Brunetti E Gastroenterol 2000, Caturelli E, Cardiovasc Interv Radiol 2002)*

- CEUS-LB: increases the chance of a correct sampling for histological diagnosis: 100% (*Spârchez Z et al. Med Ultrason. 2015)*

Study limitations:

- retrospective study;
- different approaches (free-hand, lateral devices, dedicated probes);
- different kinds of needles were used in the participating centers to perform the biopsy.

Conclusion

❖CEUS can be used as an aid in challenging US-guided biopsy of focal liver lesions, such as:

✓Poorly visualized or invisible lesions in B mode;

✓Big lesions which can be partially necrotic (sampling of non-necrotic areas);

✓ After unsuccessful sampling (biopsy performed using the standard ultrasound technique).

Limits of CEUS guided biopsy

➢CEUS-guided biopsy increases :

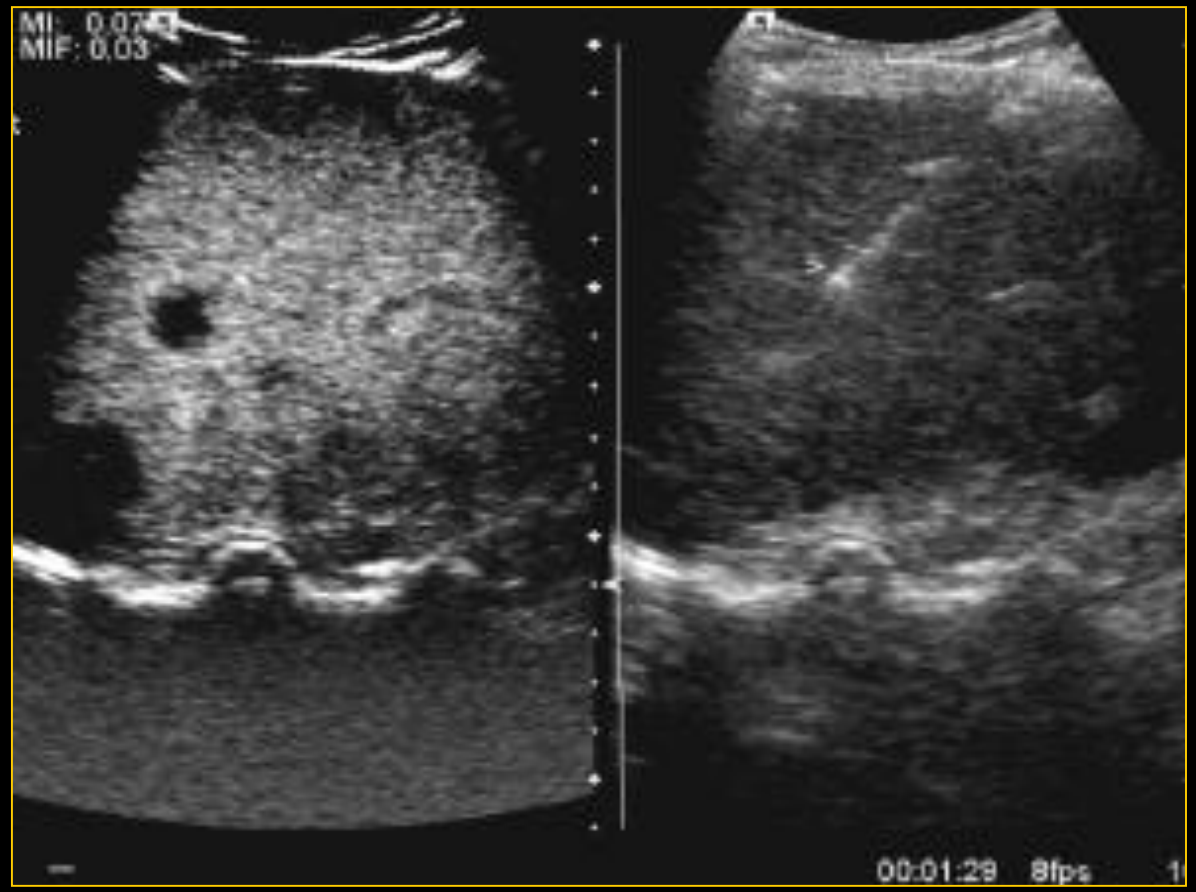
- the technical difficulty (especially if the target lesion is small and/or deeply located)

✓needle visibility in the CEUS image is suboptimal;

✓the needle movement produces a liniar echogenic cloud

- the cost of the CEUS-guided biopsy.

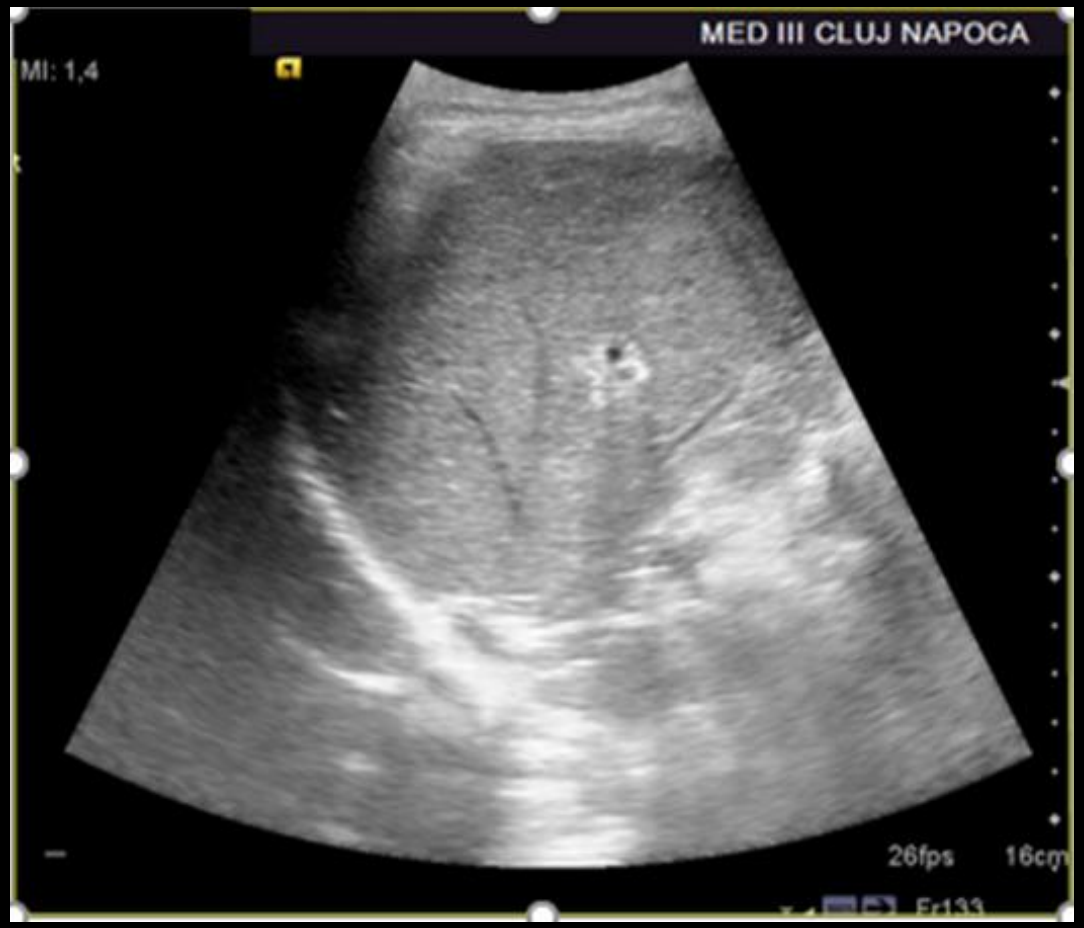
➢learning curve.

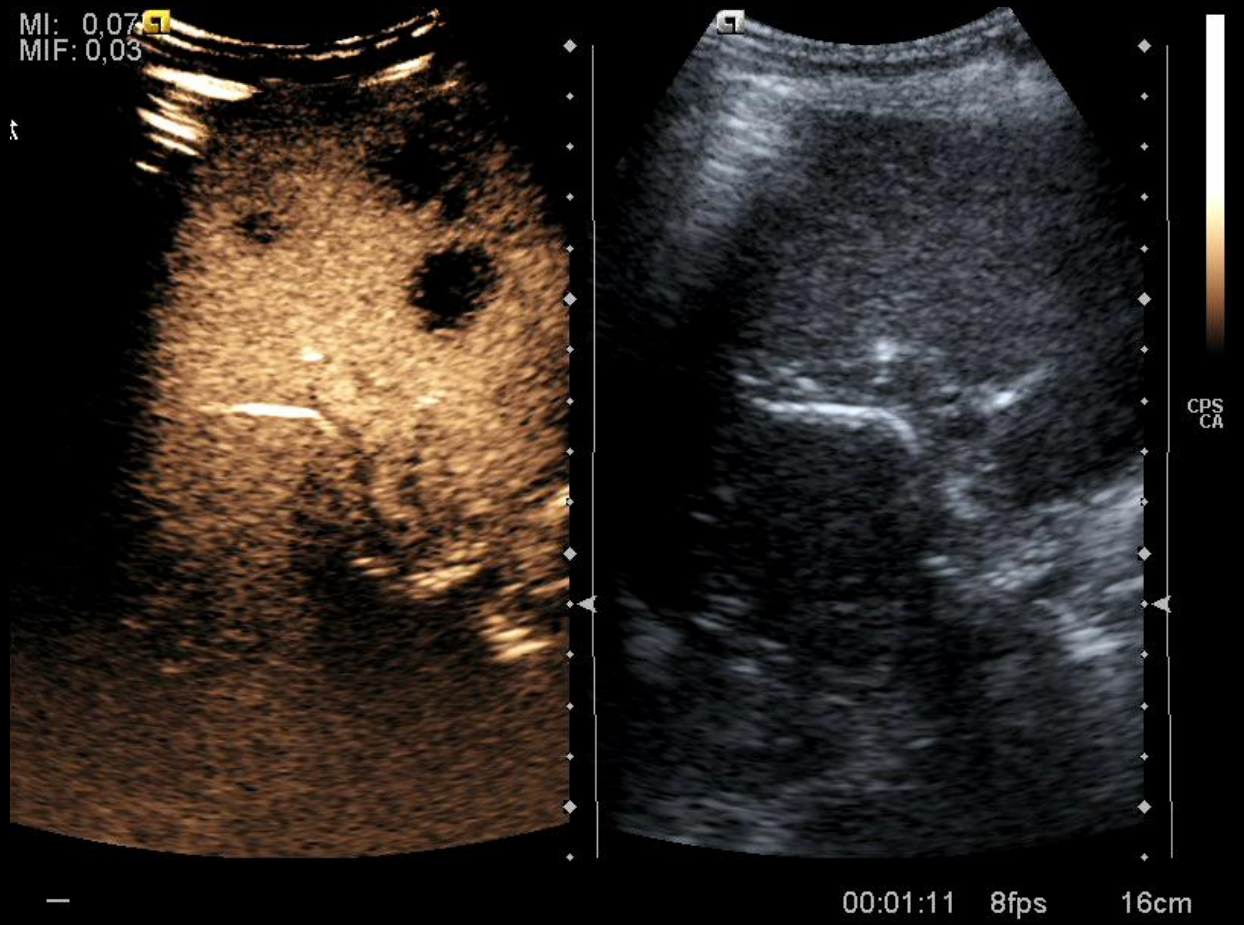


Courtesy Prof. Z. Sparchez

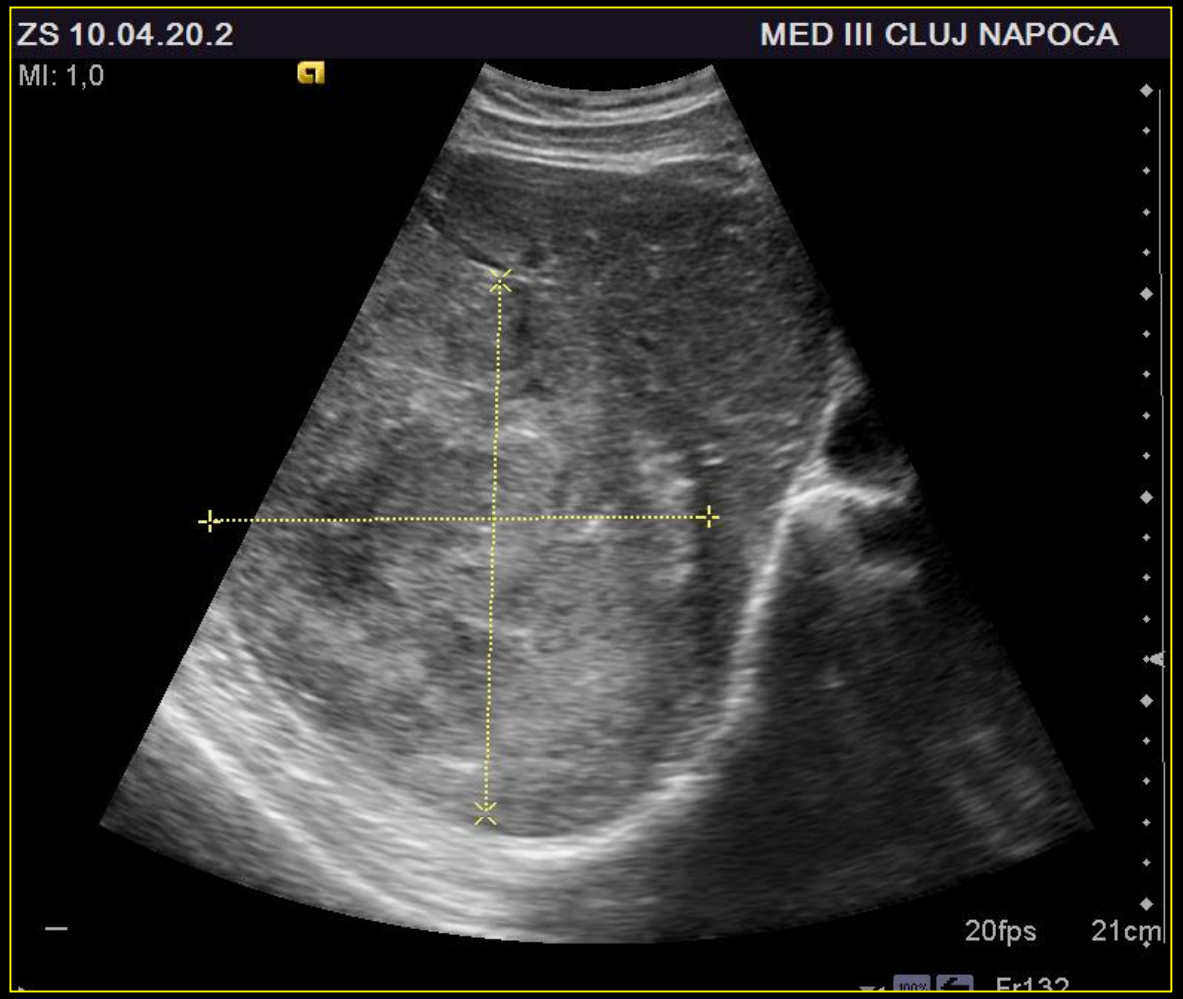
Back to practice…..

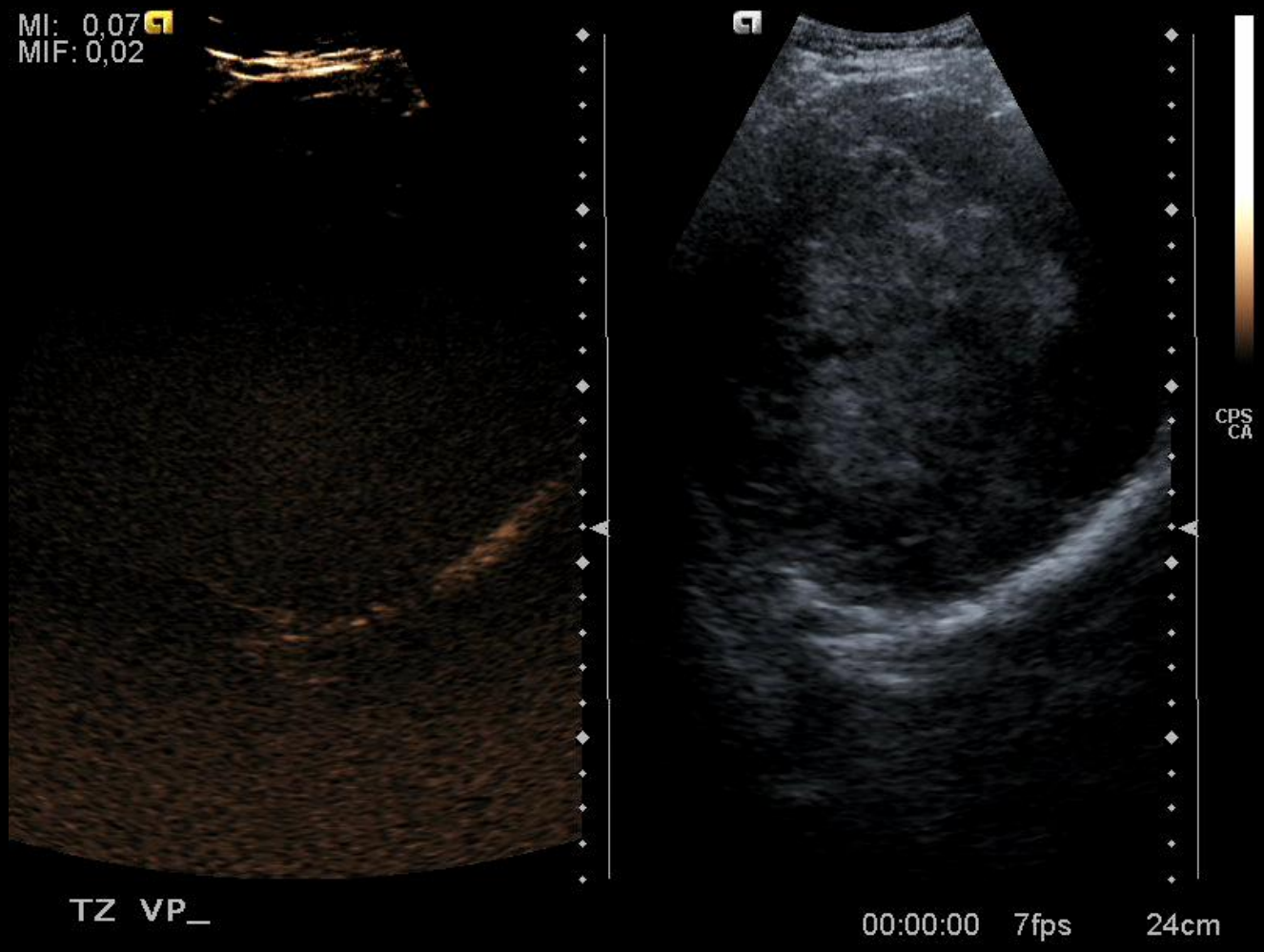
Case 1: **No clear lesion is seen in intercostal US scanning of the right liver lobe in a 48 years old woman with a tumoral mass of the pancreatic head.**





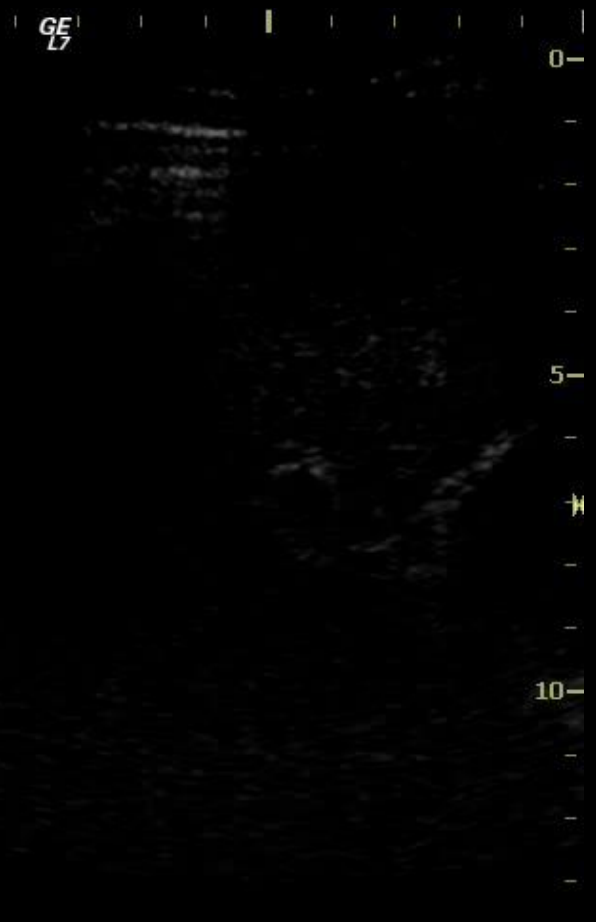
Case 2: **63 years old man diagnosed with cirrhosis and with a large hepatic tumor**

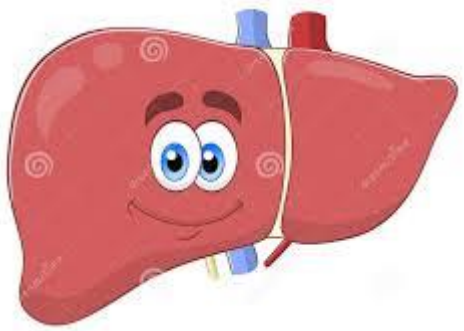




Histology : hepatocellular carcinoma

Case 3: 70 years old man with a isoechogenic lesion in seg V





Thank you for your attention!