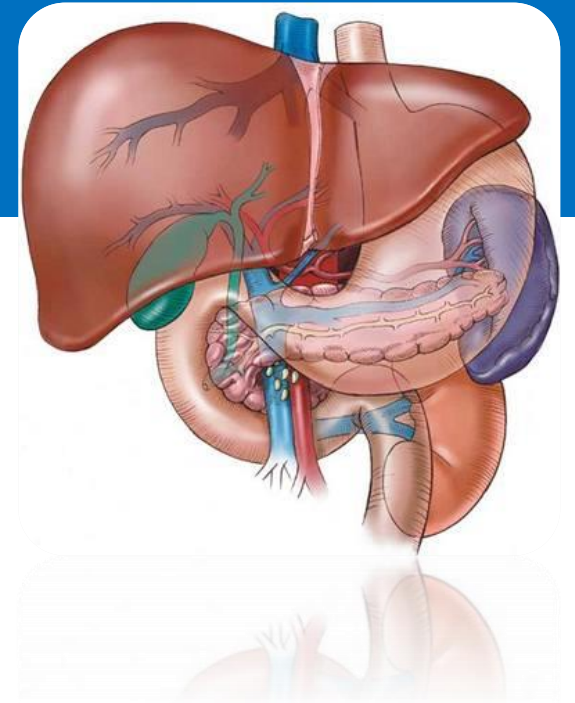


Praktický přístup k ložiskovým lézím jater na základě pokynů a doporučení

H.Petrášová, T. Andrašina, Š. Bohatá, V. Válek jr,

Klinika radiologie a nukleární medicíny FN Brno a LF MU

Bez konfliktu zájmu v daném tématu



GUIDELINES

Clinical Practice Guidelines



JOURNAL
OF HEPATOLOGY



EASL Clinical Practice Guidelines: Management of hepatocellular carcinoma[☆]

European Association for the Study of the Liver^{*}

Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) in the Liver – Update 2020

WFUMB in Cooperation with EFSUMB, AFSUMB, AIUM, and FLAUS

Aktualisierte Leitlinien und Empfehlungen für die gute klinische Praxis für CEUS der Leber

ACG Clinical Guideline: The Diagnosis and Management of Focal Liver Lesions

Jorge A. Marrero, MD¹, Joseph Ahn, MD, FACP² and K. Rajender Reddy, MD, FACP³ on behalf of the Practice Parameters Committee of the American College of Gastroenterology

Focal liver lesions (FLL) have been a common reason for consultation faced by gastroenterologists. The increasing and widespread use of imaging studies has led to an increase in detection of incidental findings. It is important to consider not only malignant liver lesions, but also benign solid and cystic liver lesions including hemangioma, focal nodular hyperplasia, hepatocellular adenoma, and hepatic cysts, in the differential diagnosis of FLL. In this ACG practice guideline, the authors provide an evidence-based approach to the diagnosis and management of FLL.

Am J Gastroenterol advance online publication, 19 August 2014; doi:10.1038/ajg.2014.213

Hepatic Incidentalomas

Richard M. Gore, MD^{*}, Geraldine M. Newmar, MD, Kiran H. Thakrar, MD, Uday K. Mehta, MD, Jonathan W. Berlin, MD

KEYWORDS

• Incidentaloma • Hepatic cyst • Bile duct hamartoma • Hepatic hemangioma • Focal nodular hyperplasia • Hepatic adenoma • Liver metastases • Liver CT

CEUS LI-RADS[®] v2017 CORE

(For CEUS with Pure Blood Pool Agents)

Untreated observation visible on precontrast US and without pathologic proof
in **patient at high risk for HCC**

CLINICAL PRACTICE GUIDELINES | VOLUME 65, ISSUE 2, P386-398, AUGUST 2016

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EASL Clinical Practice Guidelines on the management of benign liver tumours

European Association for the Study of the Liver (EASL)

Published: April 12, 2016 • DOI: <https://doi.org/10.1016/j.jhep.2016.04.001> • [Check for updates](#)

Guideline > J Ultrasound. 2019 Mar;22(1):41-51. doi: 10.1007/s40477-018-0343-0.

Epub 2018 Dec 22.

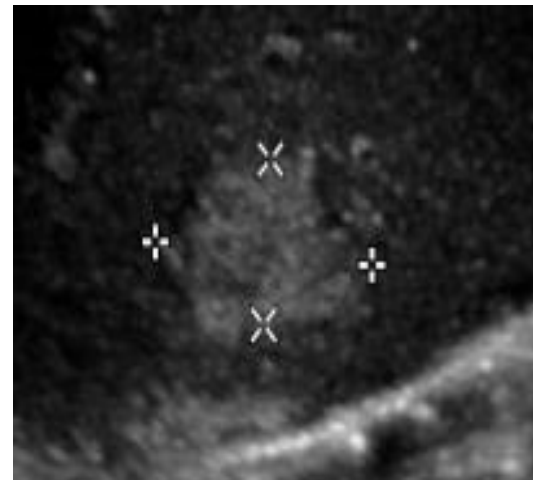
SIUMB guidelines and recommendations for the correct use of ultrasound in the management of patients with focal liver disease

Gianpaolo Vidili¹, Ilario De Sio², Mirko D'Onofrio³, Paoletta Mirk⁴, Michele Bertolotto⁵,
Cosima Schiavone⁶; SIUMB experts committee

INCIDENTALOMY JATER

- Náhodně nalezené léze na UZ, CT, MR či jiné zobrazovací metodě bez klinických projevů léze samotné
 - Bolesti břicha, dyspeptické potíže, anémie, dispenzarizace, jiné
 - Množství takovýchto náhodných nálezů v játrech stoupá
- Většina incidentalomů je BENIGNÍ povahy
 - Stanovení dg jako prevence následného agresivního managementu
 - Modalita bezpečná, dostupná, jednoduše proveditelná, efektivní

• **BENIGNÍ vs. MALIGNÍ**



KLINICKÁ ANAMNÉZA

- Věk, pohlaví
- **Cirhóza nebo chronické jaterní onemocnění (HBV, HBC)**
- **Onkologická anamnéza, nález nebo podezření na něj**
- **Low-risk pacient (věk!):**
 - bez známé malignity
 - nejsou známky dysfunkce jater
 - žádné jaterní rizikové faktory † (hepatitis, nonalcoholic steatohepatitis, alcoholism, sclerosing cholangitis, primary biliary cirrhosis, choledochal cysts, hemochromatosis and other hereditary hepatic conditions, and anabolic steroid use.)

INCIDENTALOM

```
graph TD; A[INCIDENTALOM] --> B[PACIENT BEZ ONKOLOGICKÉ ANAMNÉZY]; A --> C[ONKOLOGICKÝ PACIENT]; A --> D[CIRHÓZA]
```

**PACIENT BEZ
ONKOLOGICKÉ
ANAMNÉZY**

**ONKOLOGICKÝ
PACIENT**

CIRHÓZA

ZDRAVÝ vs. ONKOLOGICKÝ

- **Léze do 15mm** – obvyčejně příliš malé na klasifikaci

- Pacient bez onkologické anamnézy

- solitární ložisko do 15mm je BENIGNÍ

- Pacient s onkologickou anamnézou

- 12-50% maligní
- Čím více ložisek, tím větší pravděpodobnost malignity (>5 ložisek = 76%)

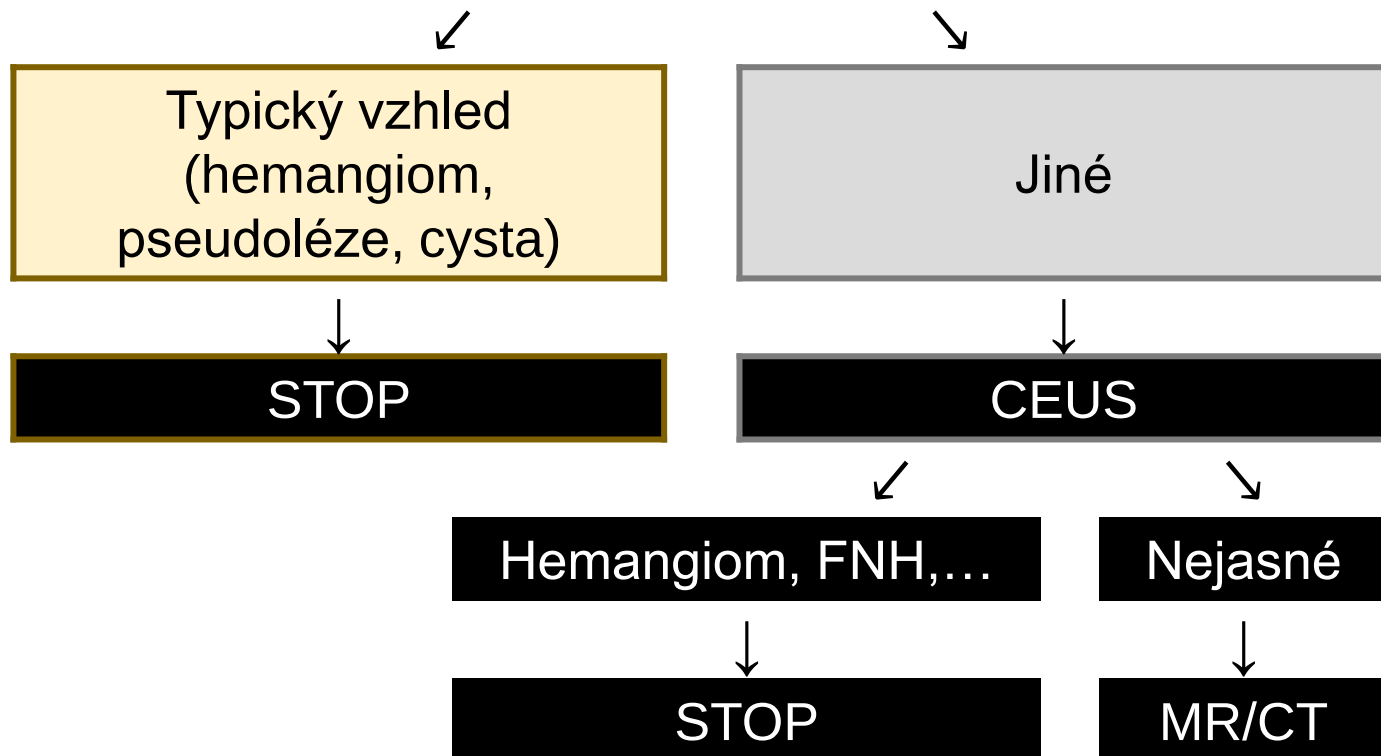
1 Jones EC et al: The frequency and significance of small (less than or equal to 15 mm) hepatic lesions detected by CT. Am J Roent 1992;158: 535-539.

2 Schwarz LH et al: Prevalence and Importance of Small Hepatic Lesions Found at CT in Patients with Cancer. Radiology 1999;210:71-74.

3 Robinson PJ et al: Small 'indeterminate' lesions on CT of the liver: a follow-up study of stability. Brit J Rad 2003; 76:866-874.

BEZ ONKOLOG. ANAMNÉZY

INCIDENTALOM



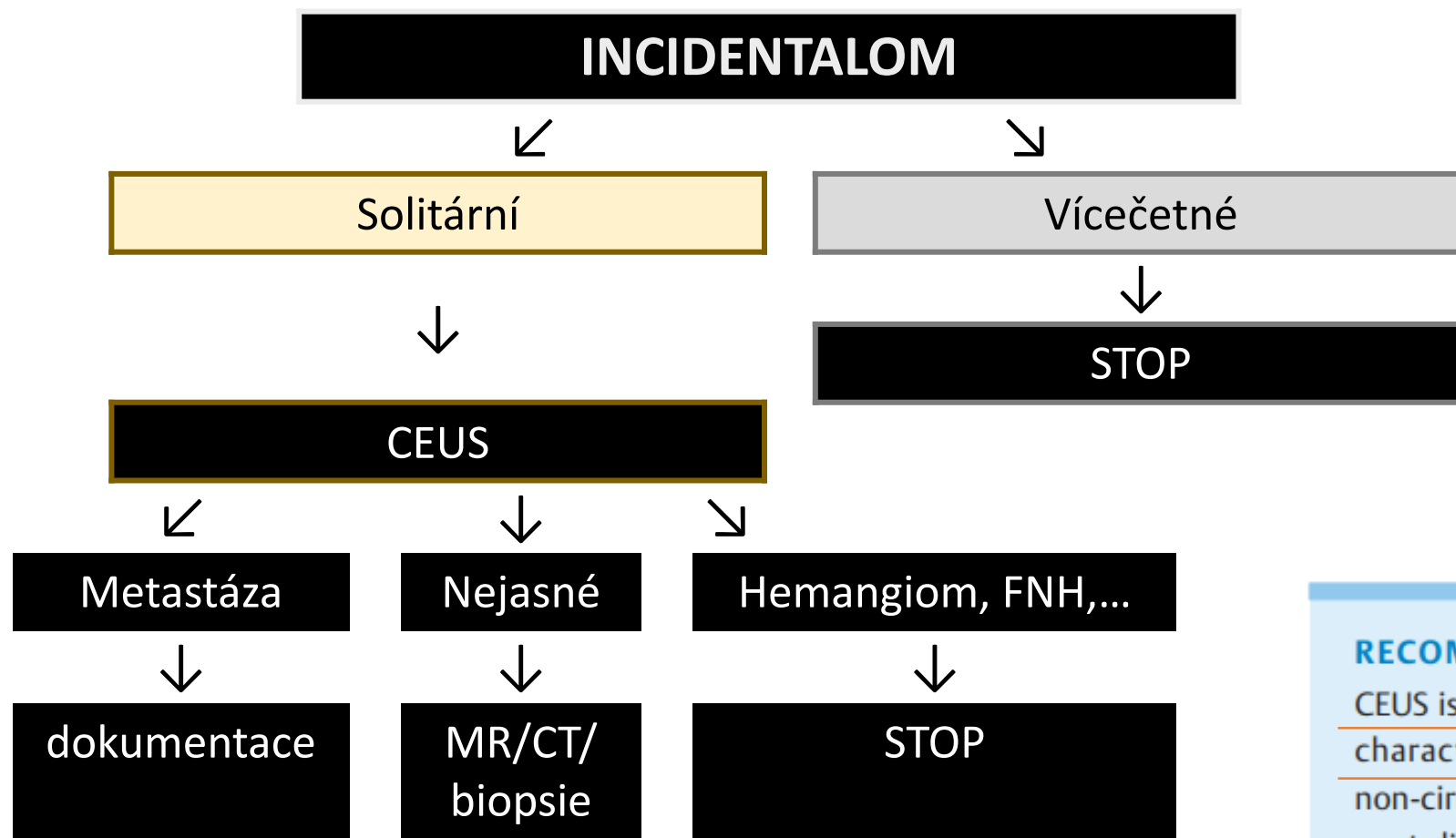
RECOMMENDATION 10

CEUS is recommended as the first-line imaging technique for the characterization of incidentally detected, indeterminate FLL at US in patients with non-cirrhotic liver and without a history or clinical suspicion of malignancy (LoE 1, strong recommendation) (Pro 30, Abs 2, Against 0).

Uncertain diagnosis (DD needed)

- adenoma (vs FNH and Malignant lesion)
- cholangiocarcinoma (vs metastasis or HCC)

S ONKOLOG. ANAMNÉZOU



RECOMMENDATION 11

CEUS is suggested as the first-line imaging technique for the characterization of FLL detected with US in patients with non-cirrhotic liver with a history or clinical suspicion of malignant disease (LoE 2, weak recommendation) (Pro 31, Abs 0, Against 0).

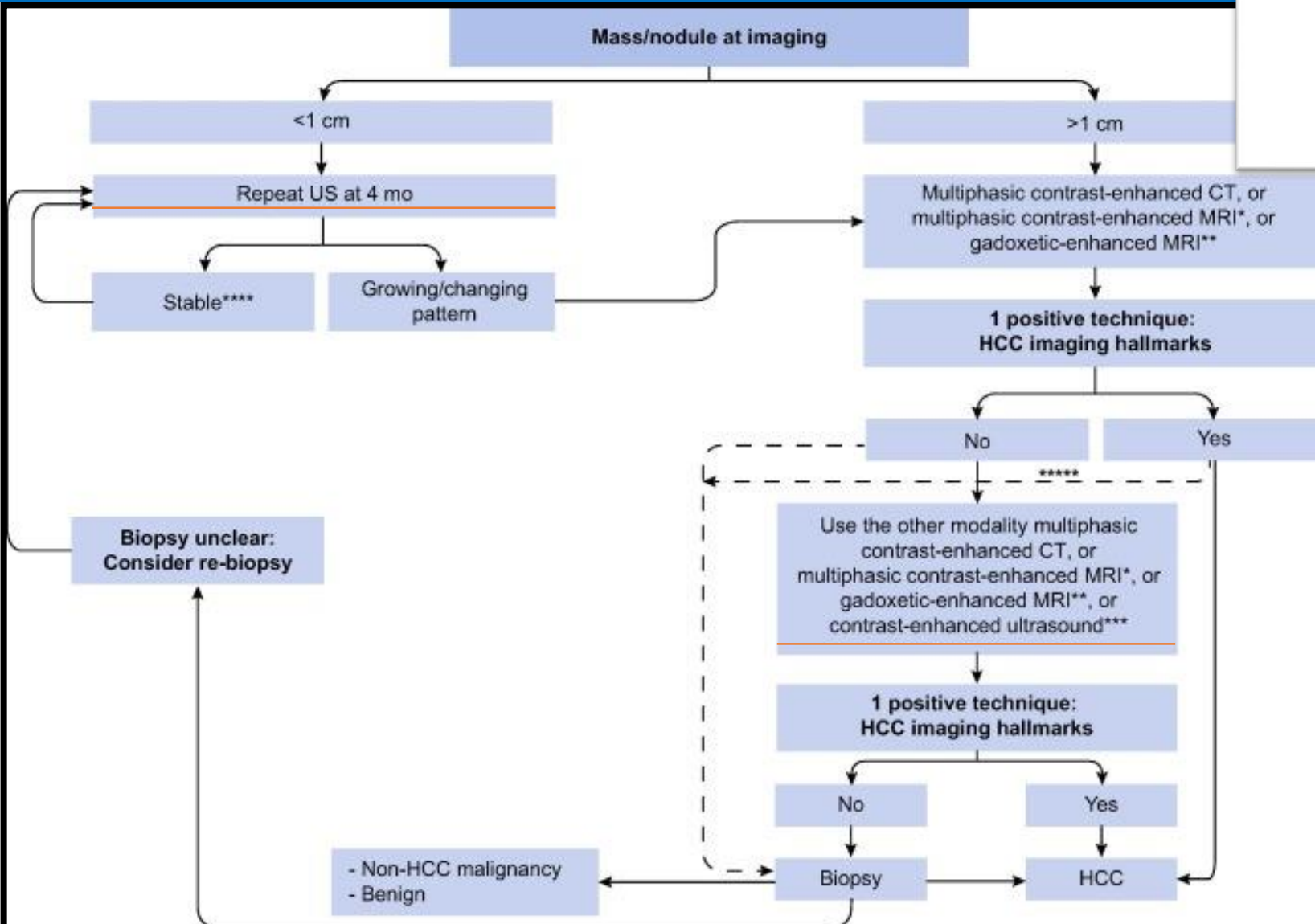
LOŽISKO V CIRHÓZE

Clinical Practice Guidelines

EASL EUROPEAN ASSOCIATION FOR THE STUDY OF THE LIVER **JOURNAL OF HEPATOLOGY**

EASL-EORTC Clinical Practice Guidelines: Management of hepatocellular carcinoma

European Association for the Study of the Liver*,
European Organisation for Research and Treatment of Cancer



UZ vs. CEUS

UZ - přesnost 70-80% v stanovení dg.

CEUS - ↑↑↑

DEGUM study (Germany) CEUS (n=1349) Se 95.8%, Sp 83.1%, Acc 90.3%

STIC study (France) Se 79%, Sp 88% for differentiating between benign and malignant lesions vy CEUS

[Published: 17 July 2017](#)

Contrast enhanced ultrasound for focal liver lesions: how accurate is it?

[Richard G. Barr](#) 

[Abdominal Radiology](#) **43**, 1128–1133 (2018) | [Cite this article](#)

Contrast-Enhanced Ultrasound (CEUS) For The Evaluation Of Focal Liver Lesions – A Prospective Multicenter Study Of Its Usefulness In Clinical Practice

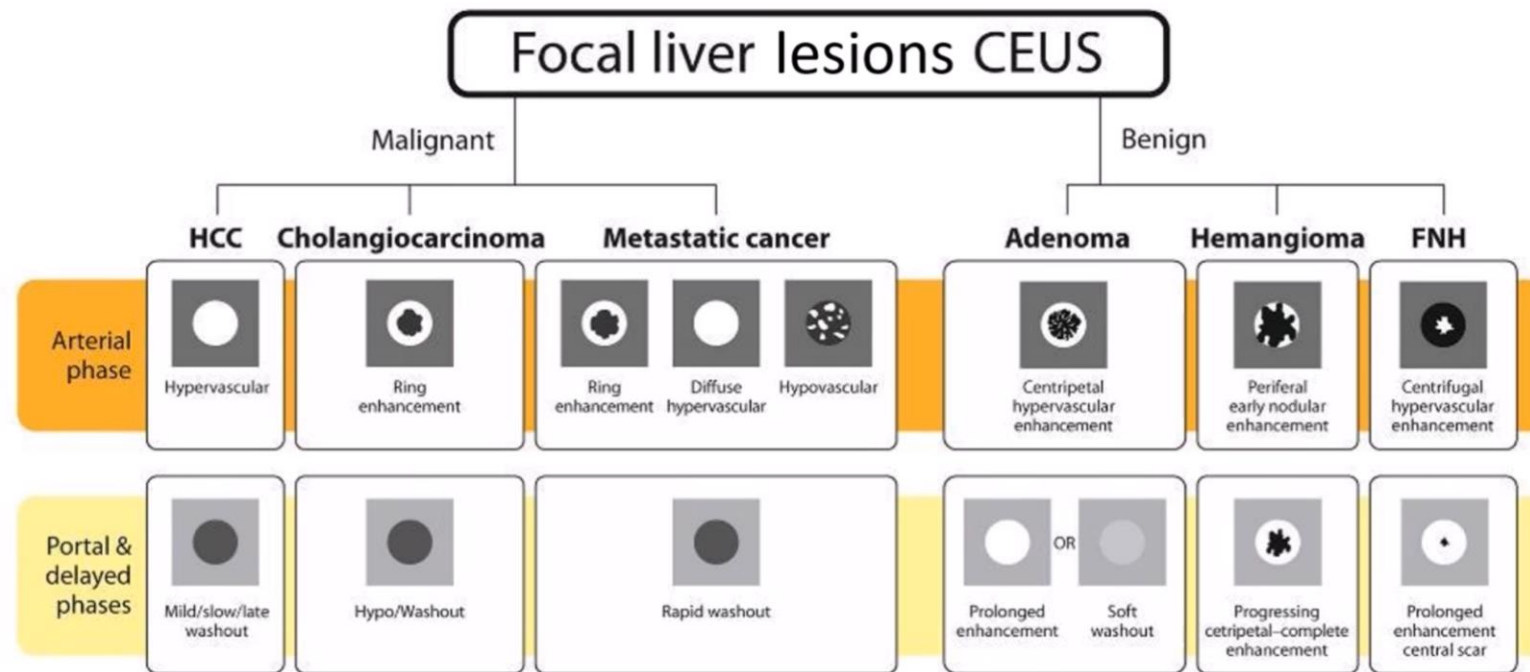
Kontrastverstärkte Sonografie zur Bewertung von fokalen Leberläsionen – eine prospektive Multizenter-Studie und deren Nutzen in der klinischen Praxis

I. Sporea , R. Badea , A. Popescu , Z. Spârchez , R. L. Șirli , M. Dănilă , L. Săndulescu , S. Bota , D. P. Calescu , D. Nedelcu , C. Brisc , L. Ciobâca , L. Gheorghe , M. Socaciu , A. Martie , S. Ioanițescu , A. Tamas , C. T. Streba , M. Iordache , I. Simionov , M. Jinga , A. Anghel , C. Cijevschi Prelipcean , C. Mihai , S. M. Stanciu , D. Stoicescu , E. Dumitru , C. Pietrareanu , D. Bartos , R. Manzat Saplacan , I. Pârvulescu , R. Vădan , G. Smira , L. Tuță , A. Săftoiu

[> Author Affiliations](#)

Conclusion: CEUS represents a useful method in clinical practice for differentiating between malignant and benign FLLs detected on standard ultrasonography, and the results of this study are in concordance with previous multicenter studies: DEGUM (Germany) and STIC (France).

CEUS: BENIGNÍ vs. MALIGNÍ



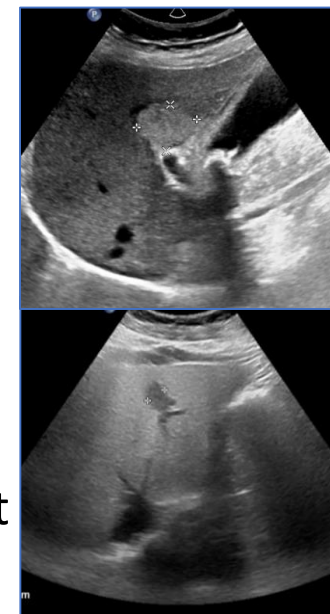
PVP a DP:

- přetrvávající syčení hyper/iso = benigní
- wash-out/hypo = maligní

- In patients with a normal or healthy liver, a hyperechoic lesion is very likely to be a liver haemangioma. With typical radiology (homogeneous hyperechoic, sharp margin, posterior enhancement, and absence of halo sign) in a lesion less than 3 cm, ultrasound is sufficient to establish the diagnosis (**evidence level II-2, grade of recommendation 1**)
- In oncology patients or those with underlying liver disease, contrast enhanced imaging (CEUS, CT or MRI) is required (**evidence level II-2, grade of recommendation 1**)
- The diagnosis by contrast enhanced imaging is based on a typical vascular profile characterized by peripheral and globular enhancement on arterial phase followed by a central enhancement on delayed phases. MRI provides additional findings such as lesion signal on T1-, T2- weighted sequences, and diffusion imaging (**evidence level II-2, grade of recommendation 1**)
- Due to its benign course, imaging follow-up is not required for typical haemangioma (**evidence level II-2, grade of recommendation 1**)
- Pregnancy and oral contraceptives are not contraindicated (**evidence level III; grade of recommendation 2**)
- Conservative management is appropriate for typical cases (**evidence level II-2, grade of recommendation 1**)
- In the presence of Kasabach-Merrit syndrome, growing lesions or lesions symptomatic by compression - refer to benign liver tumour MDT (**evidence level III, grade of recommendation 1**)

EASL Clinical Practice Guidelines on the management of benign liver tumours[☆]

European Association for the Study of the Liver (EASL)*



Nejčastější solidní benigní tumor jater

Incidence 6-20% dospělých

10% mnohočetných

Subkapsulárně/periferně, přiléhajíc k jaterním žilám

Krví vyplněné prostory vystlané endotelem

Zvykle asymptomatický, u velkých rozměrů možný mass-efekt

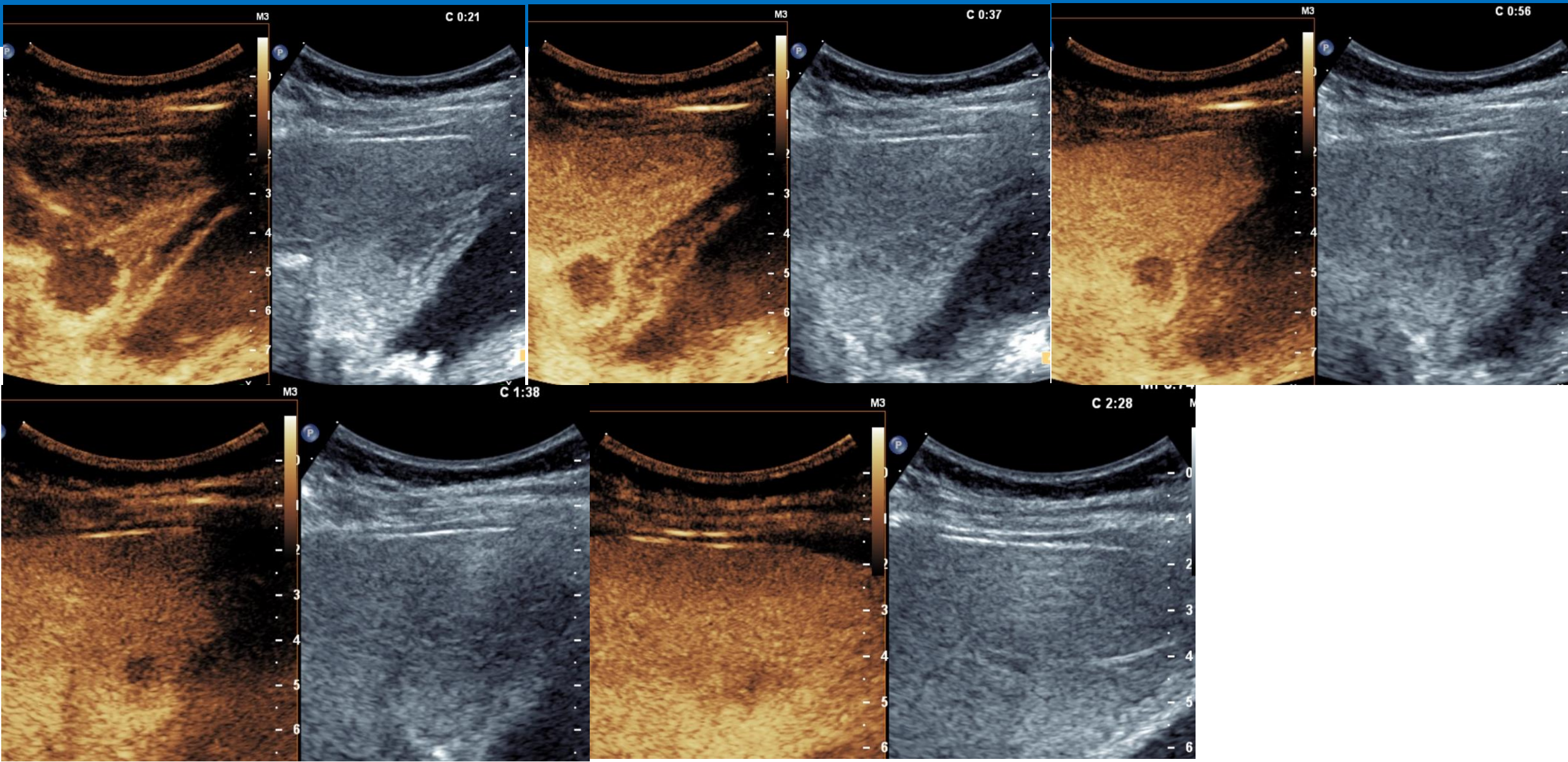
Kapilární - drobné vaskulární lakuny oddělené jemnými fibrózními septy, pomalý tok, velikosti do 3cm

B mode : homogenní, 70% hyperechogenní, 30% hypo- / heterogenní, okrouhlý/oválný, hladce konturovaný, bez periferního halo lemu, dorzální akust. zesílení

Flash-filling hemangioma – rychlé homogenní nasycení, APHE (jako AORTA), iso-/hyperechogenní

Kavernózní – cévní lakuny a široké stroma – pomalý a pozdní intralezionální efflux, nodulární periferní sycení AP a PVP, progresivní plnění, DP kompletní/inkompletní hyperechogenní

HEMANGIOM



HEMANGIOM

- Atypický hemangiom

-fibrotizovaný, kalcifikovaný, trombozovaný, AV shunty, wash-out

CEUS:

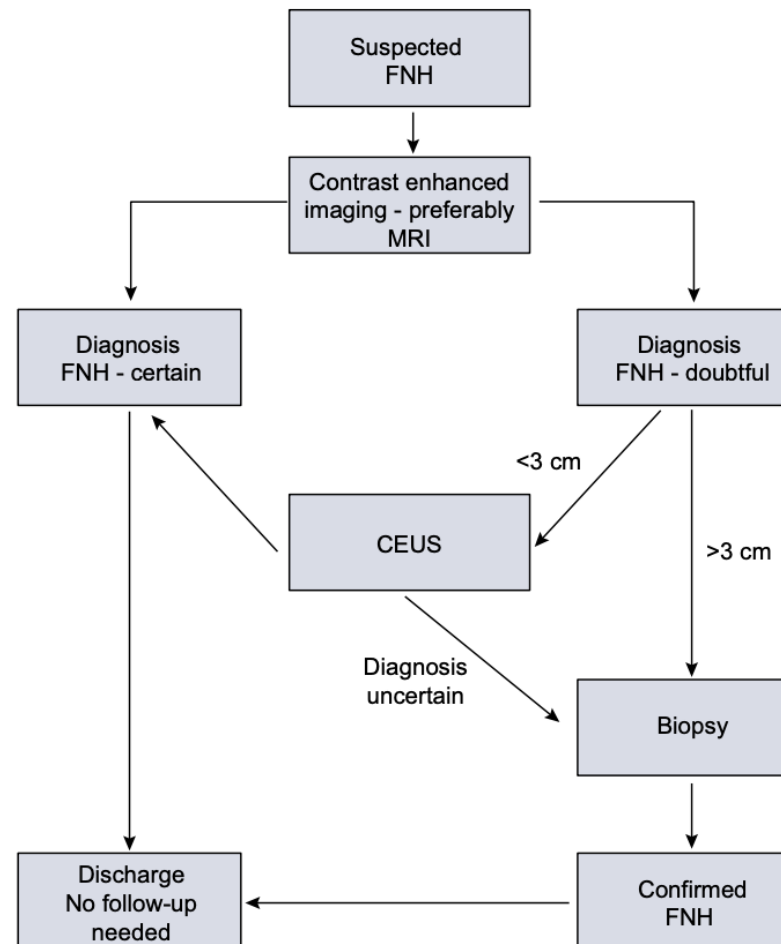
- absence nodulárního sycení

- hypoechogenní ve všech postkontrastních fázích

- no enhancement

EASL Clinical Practice Guidelines on the management of benign liver tumours[☆]

European Association for the Study of the Liver (EASL)*

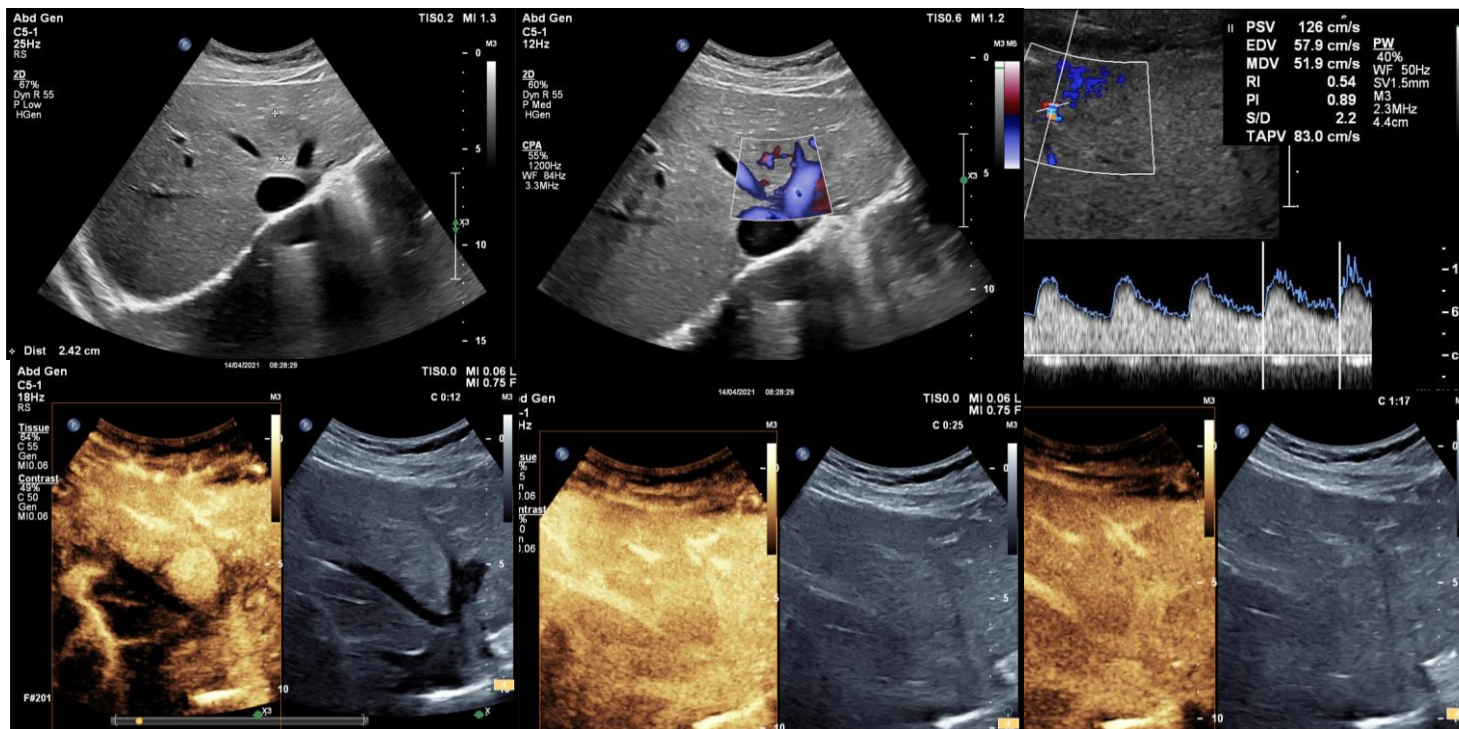


Focal nodular hyperplasia

- CEUS, CT, or MRI can diagnose FNH with nearly 100% specificity when typical imaging features are seen in combination (**evidence level II-2, grade of recommendation 1**)
- MRI has the highest diagnostic performance overall. The highest diagnostic accuracy by CEUS is achieved in FNH less than 3 cm (**evidence level II-2, grade of recommendation 1**)
- For a lesion typical of FNH follow-up is not necessary, unless there is underlying vascular liver disease (**evidence level III, grade of recommendation 2**)
- Treatment is not recommended (**evidence level II-3, grade of recommendation 2**)
- If imaging is atypical, or the patients is symptomatic, refer to a benign liver tumour MDT (**evidence level III, grade of recommendation 1**)

Hyperplastická
pseudotumorózní odpověď
normálních hepatocytů v
okolí kongenitálně
abnormální drobné
intraparenchymové arterie
Ž : M = 4:1
80% solitární
8% benigních FLL
> 3cm – centrální jizva
Ohraničená, homogenní
léze, iso-hypoechogenní,
loukoťovité uspořádání cév,
nizkoodporová art. křivka

- CEUS - centrifugální časné syčení v AP, PVP a DP – isoechogenní, accuracy > 90%

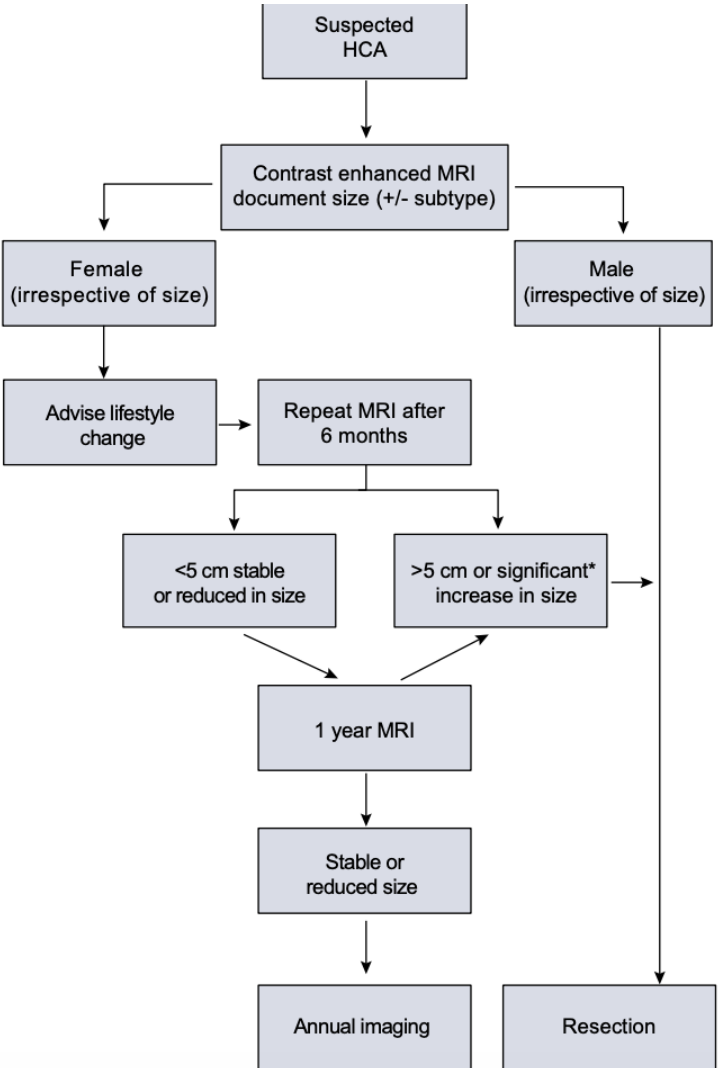


- Dif. Dg. adenom ! – washout
- !!! Dif. Dg. Fibrolamelární HCC – nehomogenní, >5cm, KALCIFIKACE, lymfadenopatie

- MRI is superior to all other imaging modalities and due to its intrinsic properties to detect fat and vascular spaces it offers an opportunity to subtype HCA up to 80% (**evidence level II-2, grade of recommendation 1**)
- The positive identification of HNF-1 α HCA or inflammatory HCA is achievable with MRI with >90% specificity. By contrast, identification of β -catenin activated HCA and its distinction with unclassified HCA and hepatocellular carcinoma is not possible by any imaging technique (**evidence level II-2, grade of recommendation 1**)
- Treatment decisions are based on gender, size and pattern of progression (**evidence level III, grade of recommendation 2**)
- Upon HCA diagnosis, lifestyle changes such as discontinuation of OCP as well as weight loss should be advised (**evidence level II-2, grade of recommendation 1**)
- HCA resection is recommended irrespective of size in men and in any instance of proven β -catenin mutation (**evidence level II-3, grade of recommendation 2**)
- In women, a period of 6 months observation after lifestyle change is advised and resection is indicated for nodules equal or greater than 5 cm and those continuing to grow (**evidence level II-3, grade of recommendation 2**)
- In women, lesions less than 5 cm should be reassessed at 1 year, and annual imaging adopted thereafter (**evidence level III, grade of recommendation 2**)
- A bleeding HCA with haemodynamic instability should be embolized and residual viable lesion on follow-up imaging is an indication for resection (**evidence level III, grade of recommendation 2**)

EASL Clinical Practice Guidelines on the management of benign liver tumours[☆]

European Association for the Study of the Liver (EASL)*



Vzácný

Ž:M = 8:1

80% solitární

> 10 – adenomatóza

Asociace s HAK, hormon. th., metabolická on., DM

Normální hepatocyty, absence portálních a biliárních struktur

Signifikantní mn. glykogenu a tuku

Komplikace adenomu - 15-40% krvácení v rámci ložiska (cystické okrsky, hrubé kalcifikace), 5% ruptura adenomu se subkapsulárním hematodem nebo hemoperitoneem, 1-3% maligní transformace

UZ – ohraničené ložisko, heterogenita u větších lézí (nekrózy, hemoragie), variabilní echogenita

Color Doppler – nespecifický, velké cévy perilezionálně, velké žíly centrálně

ADENOM

- CEUS homogenní silné příp. heterogenní sycení u regres. změn v AP, centripetální. PVP a DP – iso / lehce hypo

CYSTA

- Hepatální
- Biliární

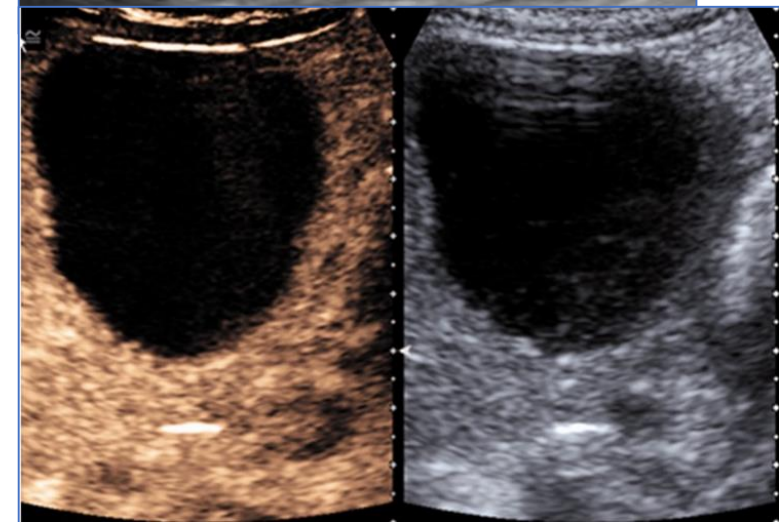
Solitární

Polycystická onemocnění

Simplexní – jednoduchá dg.

Zesílená stěna, hemoragický obsah – CEUS

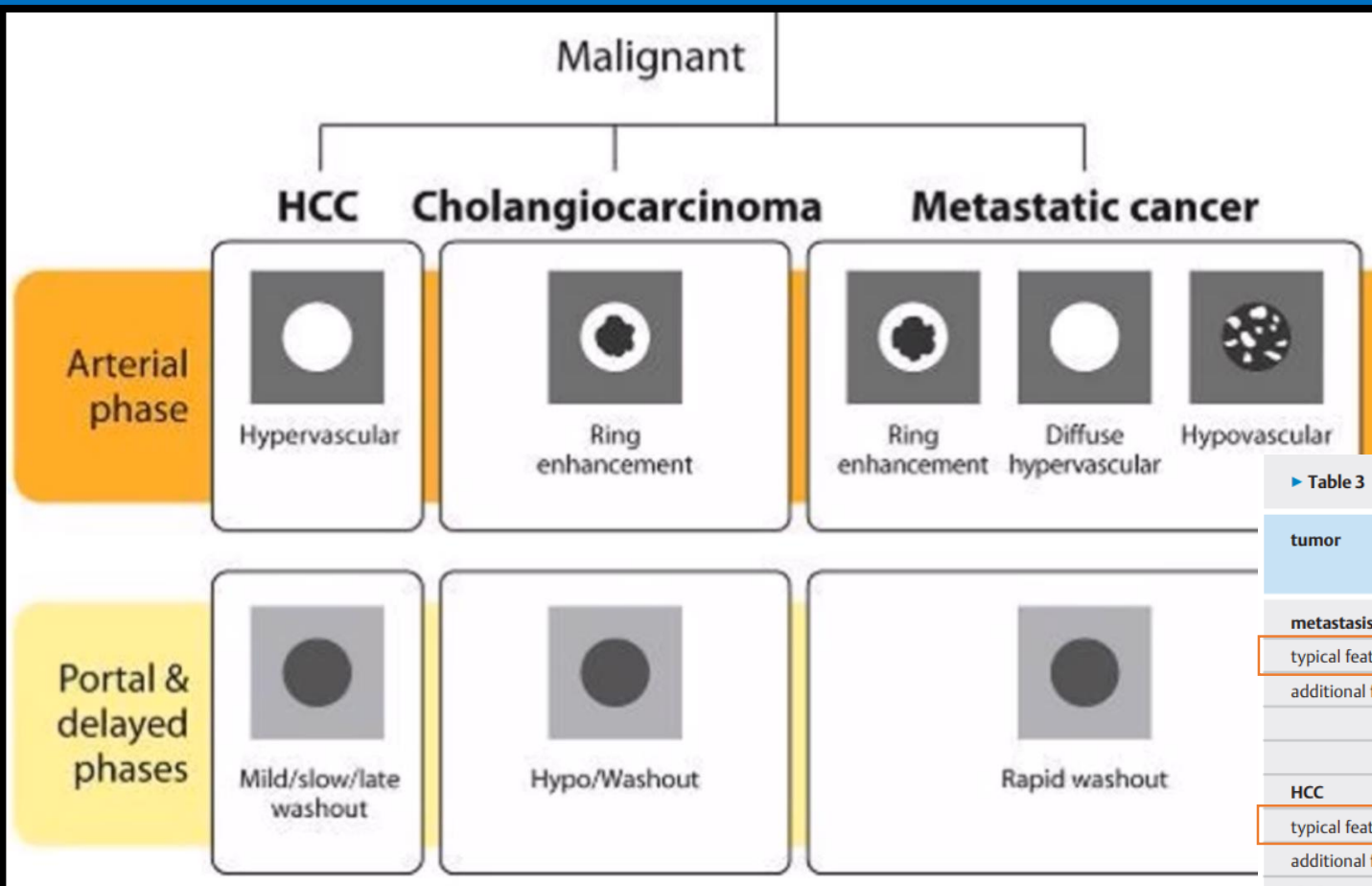
Hydatidové cysty (periferní kalcifikace)



PSEUDOLÉZE focal fatty / fatty sparing

- Onko pacienti – CEUS – isoechogenní postkliv, typické lokalizace (žlučník, IV,V segment, v blízkosti cév)

CEUS MALIGNÍCH FLL



► **Table 3** Enhancement patterns of malignant focal liver lesions in the non-cirrhotic liver.

tumor	arterial phase (10–30 s)	portal venous phase (20–120 s)	late phase (120–300 s)	post vascular phase (> 10 min)
metastasis				
typical features	rim-enhancement	hypoenhancing	hypo/nonenhancing	hypo/nonenhancing
additional features	complete enhancement	nonenhancing regions	nonenhancing regions	nonenhancing regions
	hyperenhancement			
	nonenhancing regions			
HCC				
typical features	hyperenhancing	isoenhancing	hypo/nonenhancing	hypo/nonenhancing
additional features	nonenhancing regions	nonenhancing regions	nonenhancing regions	nonenhancing regions
cholangiocarcinoma				
typical features	rim-like hyperenhancement,	hypoenhancing	hypo/nonenhancing	hypo/nonenhancing
	central hypoenhancement			
additional features	nonenhancing regions	nonenhancing regions	nonenhancing regions	nonenhancing regions
	inhomogeneous hyperenhancement			

METASTÁZY

- UZ - haló sign, terčovité uspořádání
- CEUS - Se 93.1%, Sp 100%, PPV 100%, NPV 91.3%
- Multiple enhancement patterns (dle primum)
- **Periferní prstenčité sycení (typický pro non hepatocellular cancer)/** difuzní sycení AP
- Rychlý washout během PVP (do 60s) a DP
- ! Any lesion on CEUS showing PVP, DP hypoenhancement or washout are suspected to be malignant

tumor	arterial phase (10–30 s)	portal venous phase (20–120 s)	late phase (120–300 s)	post vascular phase (> 10 min)
metastasis				
typical features	rim-enhancement	hypoenhancing	hypo/nonenhancing	hypo/nonenhancing
additional features	complete enhancement	nonenhancing regions	nonenhancing regions	nonenhancing regions
	hyperenhancement			
	nonenhancing regions			

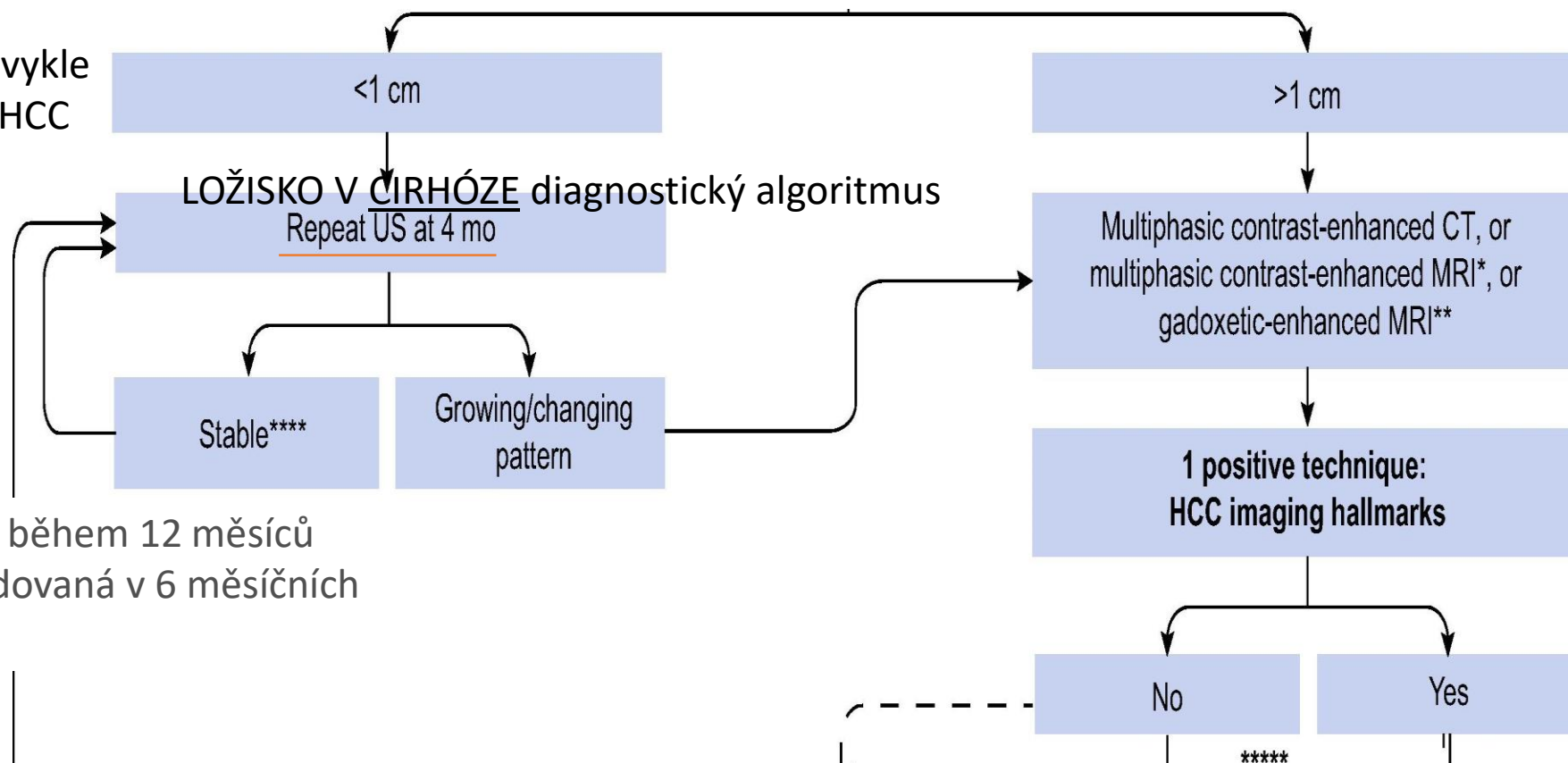
LOŽISKO V CIRHÓZE diagnostický algoritmus EASL I



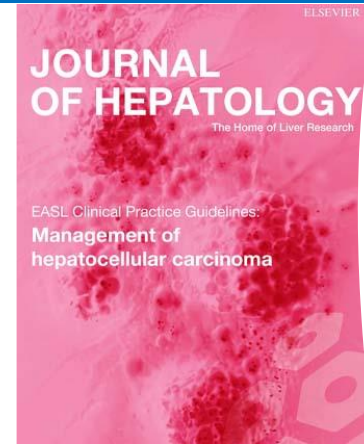
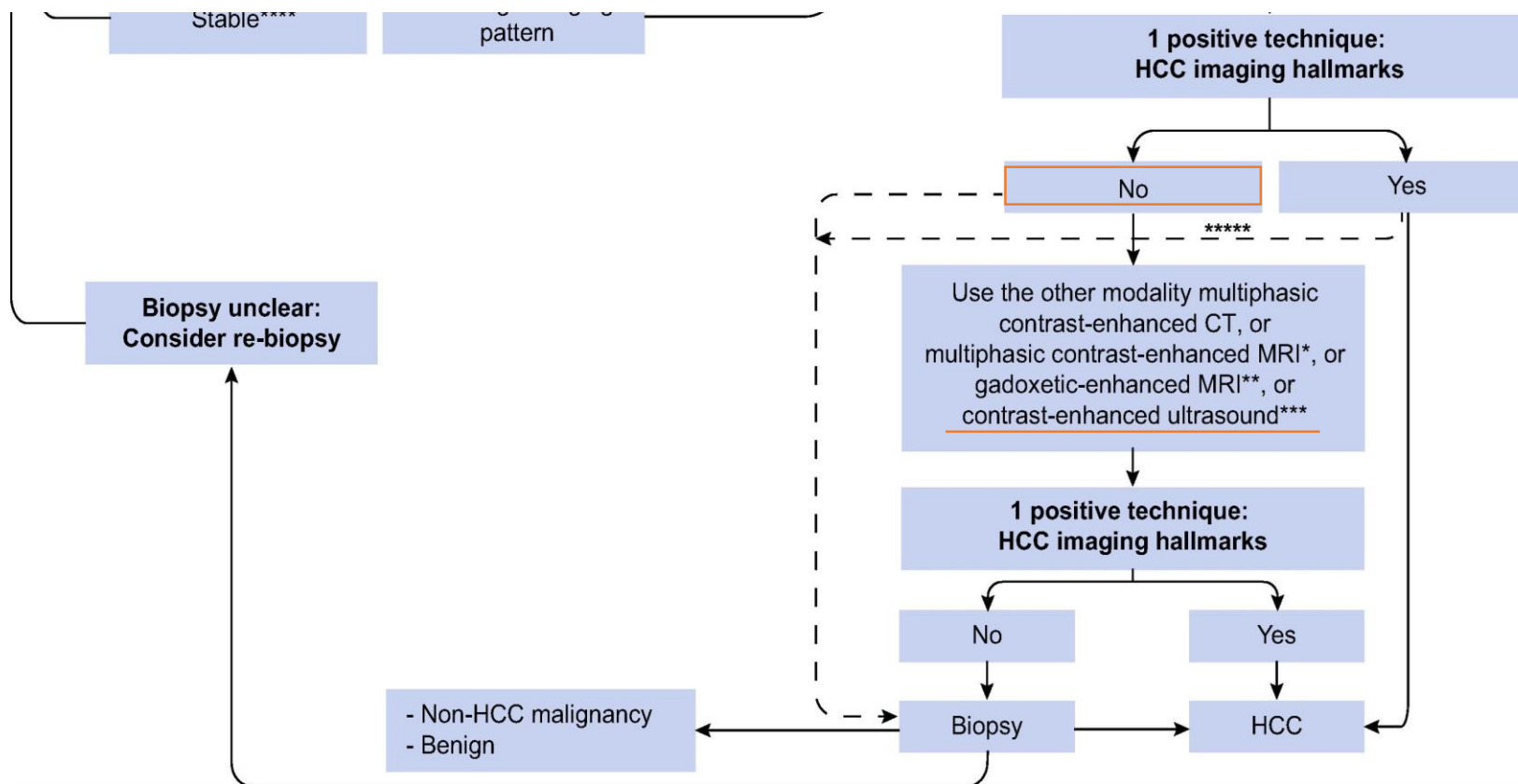
Pacient s cirhózou – sledován á 6 měsíců

většina uzlů <1 cm není maligních
počáteční růst je obvykle pomalý, i v případě HCC

léze <1 cm stabilní během 12 měsíců
může být opět sledovaná v 6 měsíčních intervalech

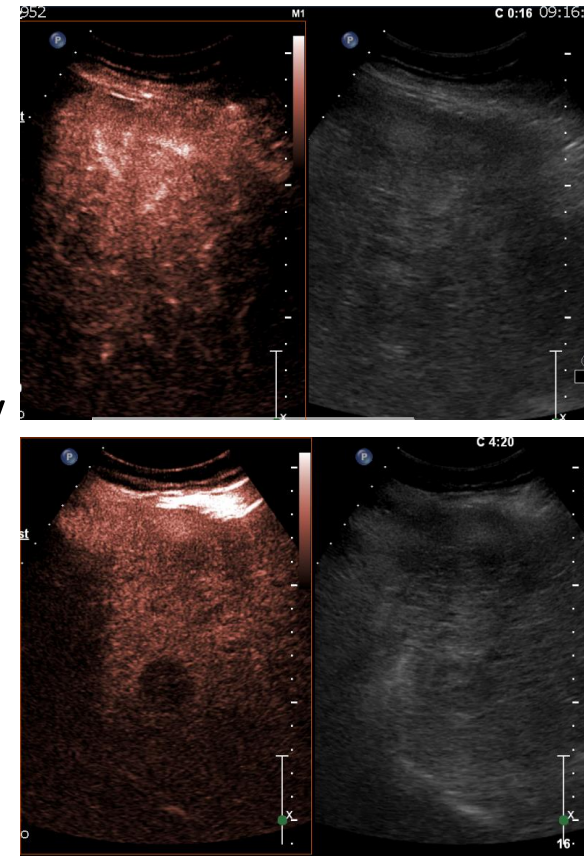


LOŽISKO V CIRHÓZE diagnostický algoritmus EASL II



CEUS u HCC dle EASL

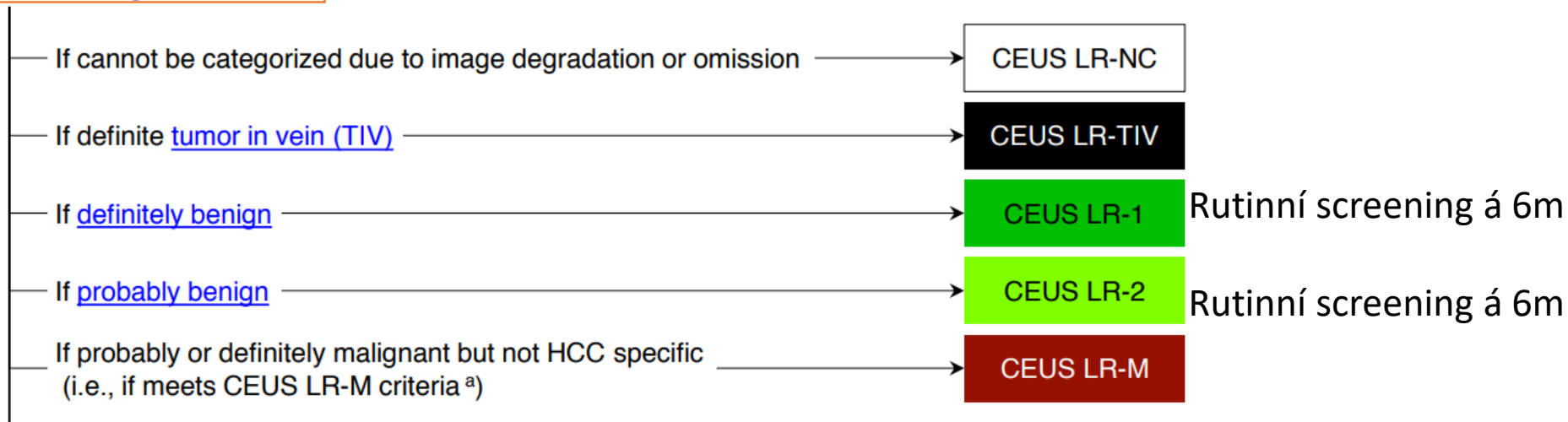
- Použití CEUS bylo v předchozích pokynech EASL zpochybněno kvůli potenciálnímu riziku chybné diagnózy v případě CC. Charakteristika APHE s následným vymýváním při CEUS totiž není specifický pro HCC a vyskytuje se přibližně u 50 % mass-forming CC u cirhózy.
- V návaznosti na tyto zprávy následné studie prokázaly, že k nástupu vymývání dochází dříve než 60 s po podání kontrastu u naprosté většiny CC (50 až 85 %) zatímco u HCC je toto pozorováno zřídka a že intenzita vymývání v portální fázi je u CC výraznější než u HCC.
- To vedlo k upřesnění definice typického znaku pro HCC při CEUS, kterým by tedy měla být **APHE následovaná pozdním (> 60 s) vymýváním mírného stupně**.
- Tato nová kritéria CEUS pro HCC již byla přijata v Itálii (Italian Association for the Study of the Liver) a American College of Radiology v USA.



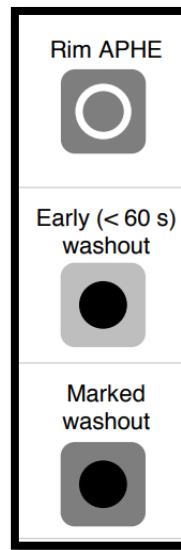
CEUS LI-RADS algoritmus I

Step 1. Apply CEUS LI-RADS[®] Diagnostic Algorithm

Untreated observation visible on precontrast US and without pathologic proof in patient at high risk for HCC



- a. CEUS LR-M criteria – any of following:
- rim APHE **OR**
 - early (< 60 s) washout **OR**
 - marked washout



CEUS LI-RADS algoritmus II

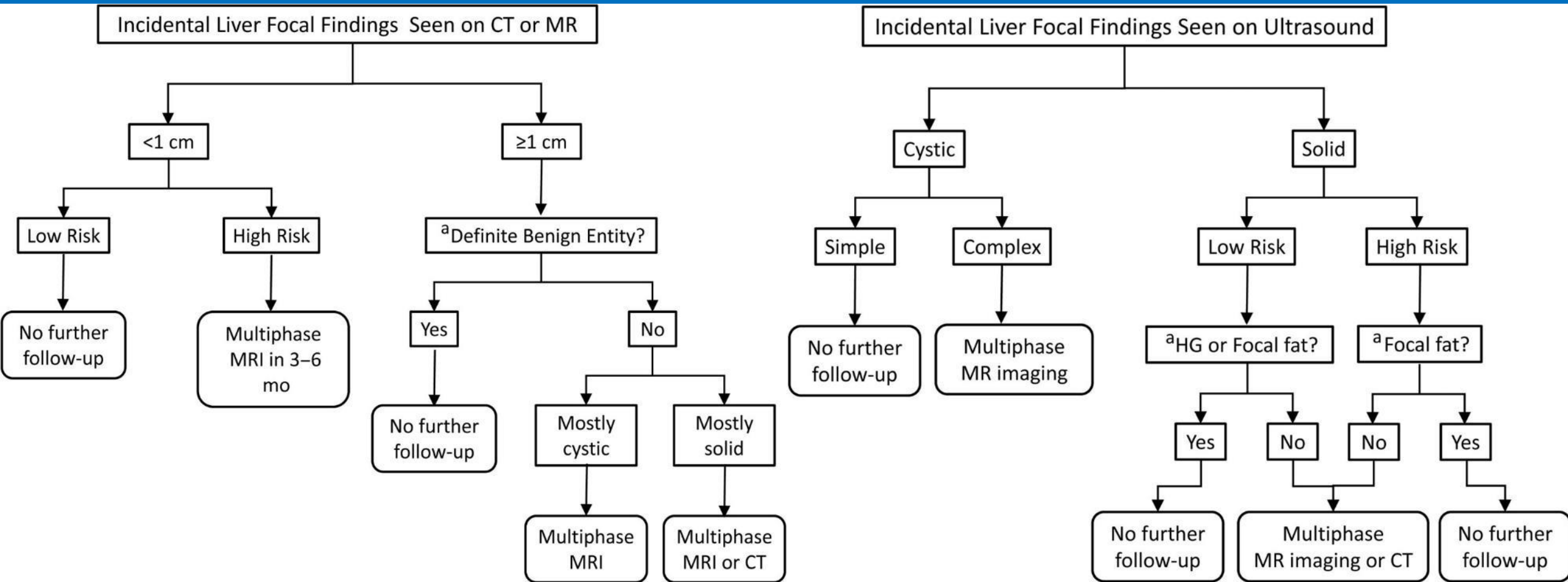
CEUS Diagnostic Table

Arterial phase hyperenhancement (APHE)	No APHE		APHE (not rim ^b , not peripheral discontinuous globular ^c)	
Nodule size (mm)	< 20	≥ 20	< 10	≥ 10
No washout of any type	CEUS LR-3	CEUS LR-3	CEUS LR-3	CEUS LR-4
Late and mild washout	CEUS LR-3	CEUS LR-4	CEUS LR-4	CEUS LR-5
	CT/MR/CEUS ≤ 6 měsícu		MDT konsenzus	
			Dg HCC MDT Th.	

		Washout Onset ^a	
		Early (< 60 s)	Late (≥ 60 s)
Washout Degree ^b	Marked	Typical of ICC and metastases	Suggests malignancy in general, not specific for any particular type
	Mild	Suggests malignancy in general, not specific for any particular type	Typical of HCC and HCC precursor nodules



Radiology Clinics of North America



Searleman A.C., Aganovic L., Santillan C.S. Incidental Liver Findings on Cross-sectional Imaging. *Radiol Clin N Am.* 2021;59(4):569-590.

doi:[10.1016/j.rcl.2021.03.007](https://doi.org/10.1016/j.rcl.2021.03.007)

TECHNIKA CEUS vyšetření

How to perform Contrast-Enhanced Ultrasound (CEUS)

Christoph F. Dietrich , Michalakis Averkiou , Michael Bachmann Nielsen , Richard G. Barr , Peter N. Burns , Fabrizio Calliada , Vito Cantisani , Byung Choi , Maria C. Chammas , Dirk-André Clevert , Michel Claudon , Jean-Michel Correas , Xin-Wu Cui , David Cosgrove , Mirko D'Onofrio , Yi Dong , JohnR. Eisenbrey , Teresa Fontanilla , Odd Helge Gilja , Andre Ignee , Christian Jenssen , Yuko Kono , Masatoshi Kudo , Nathalie Lassau , Andrej Lyshchik , Maria Franca Meloni , Fuminori Moriyasu , Christian Nolsøe , Fabio Piscaglia , Maija Radzina , Adrian Saftoiu , Paul S. Sidhu , Ioan Sporea , Dagmar Schreiber-Dietrich , Claude B. Sirlin , Maria Stanczak , Hans-Peter Weskott , Stephanie R. Wilson , Juergen Karl Willmann , Tae Kyoung Kim , Hyun-Jung Jang , Alexandar Vezeridis , Sue Westerway

Kontrastní preset, Nízký MI,

Side by side zobrazení, Kontrastní-mód velmi tmavý

Sonda stabilně na lézi

Vyšetření v reálném čase (detekce APHE, které můžeme na CT a MRI minout špatným načasováním)

Nahrávání video smyčky !

CEUS washout - uvést jeho nástup (časný vs pozdní) a stupeň (mírný vs. silný)

Vascular phases and their typical timing

- Arterial phase (AP): usually occurs from about 10-20 s to 30-45 s after contrast injection.
- Portal venous phase (PVP): lasts from about 30-45 s to 2 min after contrast injection.
- Late phase (LP): lasts from end of PVP until there is unequivocal clearance of microbubbles from the circulation at about 4-6 min.

RECOMMENDATION 1

Intravenous use of UCAs in adult populations is safe (LoE 2) (Pro 28, Abs 0, Against 0).

RECOMMENDATION 2

Intravenous use of UCAs in pediatric populations is safe (LoE 3) (Pro 28, Abs 0, Against 0).

Safety considerations

UCAs can be administered safely in various applications with minimal risk to patients [4, 7–11]. They are not excreted through the kidneys and can be safely administered to patients with renal insufficiency with no risk of contrast-related nephropathy or nephrogenic systemic fibrosis. There is no additional need for biochemical assessment or fasting prior to injection, and there is no evidence of any effect on thyroid function, as UCAs do not contain iodine [2, 3]. UCAs have a very low rate of anaphylactoid-type reactions (1/7000 patients, corresponding to 14/100 000, or 0.014%) [7, 11–13] significantly lower than the rate with current iodinated computed tomography (CT) agents (35–95/100 000 patients, 0.035–0.095%) [14] and gadolinium-based contrast agents at 4/64 (6.3%) [15]. Serious anaphylactoid-type reactions to UCAs are observed in approximately 1/10 000 exposures, 0.01% [5, 11].

UCAs can be safely administered in patients with renal insufficiency (CEMRI), and for this reason play a complementary problem-solving role for indeterminate FLLs. Unlike CT and MR agents, microbubbles are not excreted by the kidneys. With the exception of Sonazoid, UCAs are purely intravascular agents. Therefore, CEUS should be considered as the first contrast imaging modality in patients with renal insufficiency. UCAs can be safely administered

CEUS/CT/MR - cost-effectiveness analysis



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ORIGINAL ARTICLE

Prospective Study

Contrast-enhanced ultrasonography in the evaluation of incidental focal liver lesions: A cost-effectiveness analysis

Miriama Smajerova, Hana Petrasova, Jirina Little, Petra Ovesna, Tomas Andrasina, Vlastimil Valek,
Eva Nemcova, Barbora Miklosova

RESULTS

The total cost of the diagnostic process using CEUS for all enrolled patients with FLLs was 75884 USD. When the expenses for additional CT and MRI examinations performed in inconclusive cases were added, the total cost was 90540 US dollar (USD). If all patients had been examined by CT or MR as the first-line method, the costs would have been 78897 USD or 384235 USD, respectively. The difference between the cost of CT and CEUS was 3013 USD (4%) and that between MRI and CEUS was 308352 USD (406.3%). We correctly described 97.06% of benign or malignant lesions, with 96.99% sensitivity and 97.09% specificity. Positive predictive value was 94.16% and negative predictive value was 98.52%. In cases with 4 and more lesions, malignancy is significantly more frequent and inconclusive findings significantly less frequent ($P < 0.001$).

CONCLUSION

While the costs of CEUS and CT in evaluating FLLs are comparable, CEUS examination is far more cost-effective in comparison to MRI.

Smajerova M & Petrasova H & Little J & Ovesná P & Andrasina T & Valek V & Nemcova E & Miklosova B. (2016). Contrast-enhanced ultrasonography in the evaluation of incidental focal liver lesions: A cost-effectiveness analysis. World Journal of Gastroenterology. 22. 8605..

TAKE HOME MESSAGE

- CEUS – relevantní, pokud má léze typický obraz
- - v případě netypických nálezů – CT, MR
- CEUS je indikován u:
 - charakteristika incidentalomů
 - u pacientů s + OA jako alternativní metoda k CT a MR
 - při kontraindikaci provedení CT, MR,
 - při kontraindikaci podání jód. k.l., Gd k.l.
 - inkonkluzivní CT a MR
- Operator – dependent
- Patient – dependent
- Difficult anatomic locations
- Strategie došetřování dle typů pacienta:
 - Cirhóza
 - Onkologická anamnéze
 - Bez onkologické anamnézy

Multiparametrický ultrazvuk – nadstavbové možnosti ultrazvukového vyšetření jako CEUS a oba typy elastografie, v kombinaci s konvenčními technikami jako B-mode, color a Doppler UZ

V případě kooperace pacienta, dostupných možností a experienced radiologist – great method

RECOMMENDATION 4

CEUS is recommended in patients with inconclusive findings at CT or MR imaging (LoE 2, strong recommendation) (Pro 30, Abs 0, Against 1).

RECOMMENDATION 5

CEUS should be considered as first contrast imaging modality in patients with renal insufficiency (LoE 5, strong recommendation) (Pro 31, Abs 0, Against 0).

CT				MRI						CEUS					
	Arterial phase	Portal venous phase	Delayed phase		T2	T1 precontrast	T1 arterial phase	T1 portal venous phase	T1 hepatobiliary phase		Grayscale	Early arterial phase	Late arterial phase	Portal venous phase	Late phase
Venous malformation				Venous malformation						Venous malformation					
Infantile hemangioma				Infantile hemangioma						Infantile hemangioma					
Congenital hemangioma				Congenital hemangioma						Congenital hemangioma					
Focal nodular hyperplasia				Focal nodular hyperplasia						Focal nodular hyperplasia					
Hepatocellular adenoma (HNF1 α , inflammatory, & β -catenin)				Hepatocellular adenoma (HNF1 α and inflammatory)						Hepatocellular adenoma (HNF1 α)					
Regenerative nodule				Hepatocellular adenoma (β -catenin)						Hepatocellular adenoma (inflammatory)					
Dysplastic nodule				Regenerative nodule						Regenerative nodule					
Hepatic cyst				Dysplastic nodule						Dysplastic nodule					
Hepatoblastoma				Hepatic cyst						Hepatic cyst					
Hepatocellular carcinoma				Hepatoblastoma						Hepatoblastoma					
Fibrolamellar hepatocellular carcinoma				Hepatocellular carcinoma						Hepatocellular carcinoma					
Undifferentiated embryonal sarcoma				Fibrolamellar hepatocellular carcinoma						Fibrolamellar hepatocellular carcinoma					
Metastasis				Undifferentiated embryonal sarcoma						Undifferentiated embryonal sarcoma					
				Metastasis						Metastasis					



Děkuji
za pozornost

Ekonomické hledisko CEUS u ložiskových lézí jater

Achieving Optimal Diagnostic Yield Using Real-Time CEUS | [Published: 15 February 2008](#)

Economic assessment of contrast-enhanced ultrasonography for evaluation of focal liver lesions: a multicentre Italian experience

[Laura Romanini](#) , [Matteo Passamonti](#), [Luca Aiani](#), [Paolo Cabassa](#), [Giuseppina Raieli](#), [Ilaria Montermini](#), [Alberto Martegani](#), [Luigi Grazioli](#) & [Fabrizio Calliada](#)

[European Radiology Supplements](#) **17**, 99–106 (2007) | [Cite this article](#)

Conclusion

The routine use of CEUS for the characterization of FLLs provides significant cost savings, both for the NHS and for the hospital.