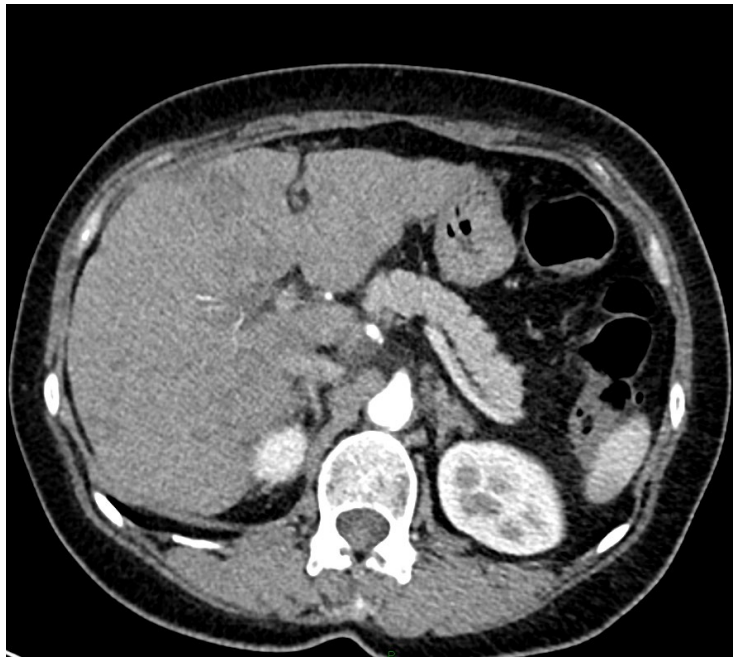
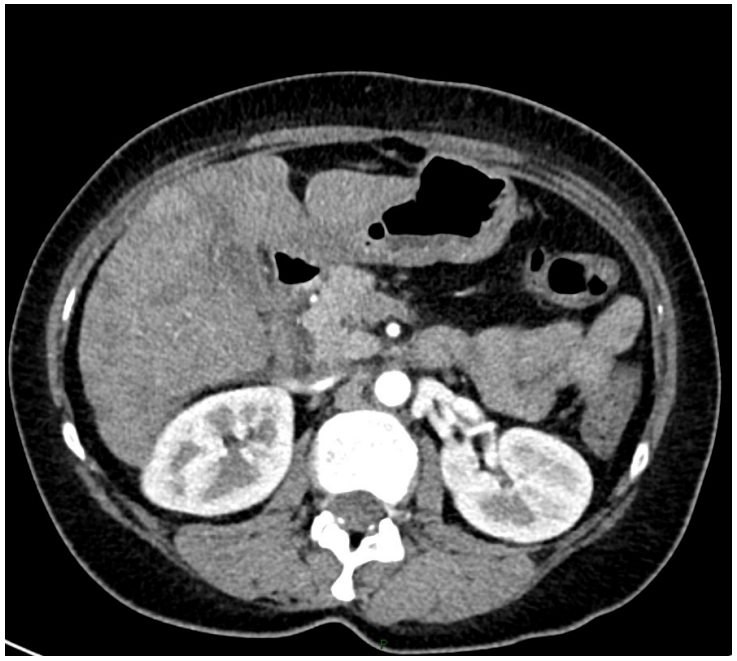
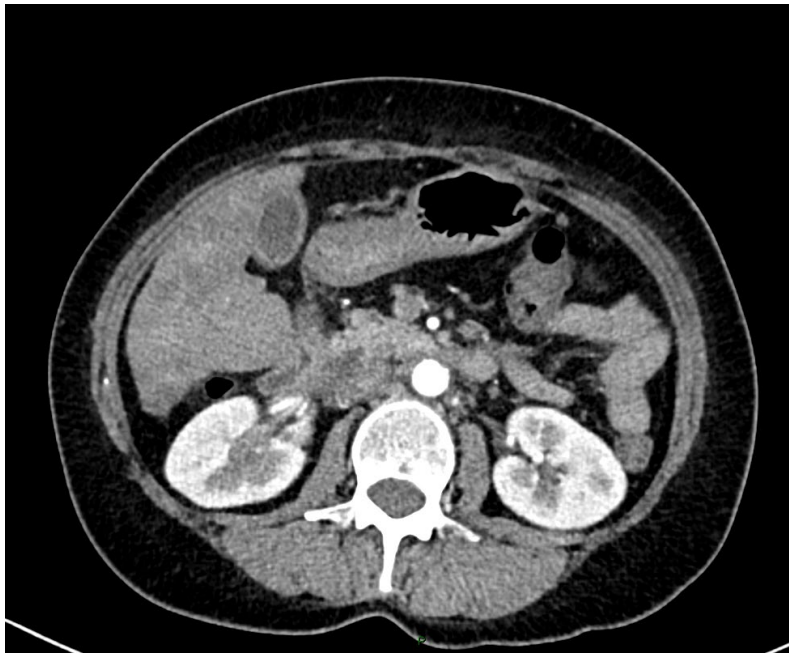
Case 1:

- W, 52 years old, regular CT scans
- AST, ALT↑
- CT scan: 31/03/2023
- Follow-up CT scan: 21/12/2023

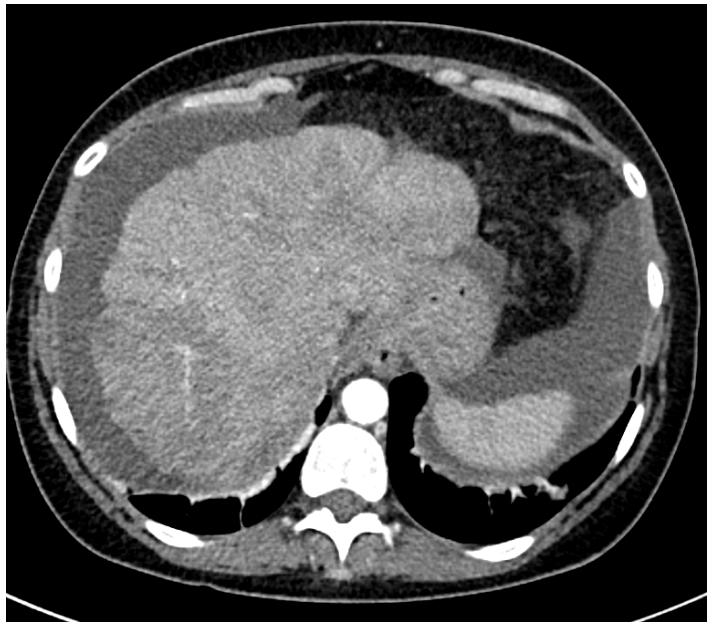
31/03/2023

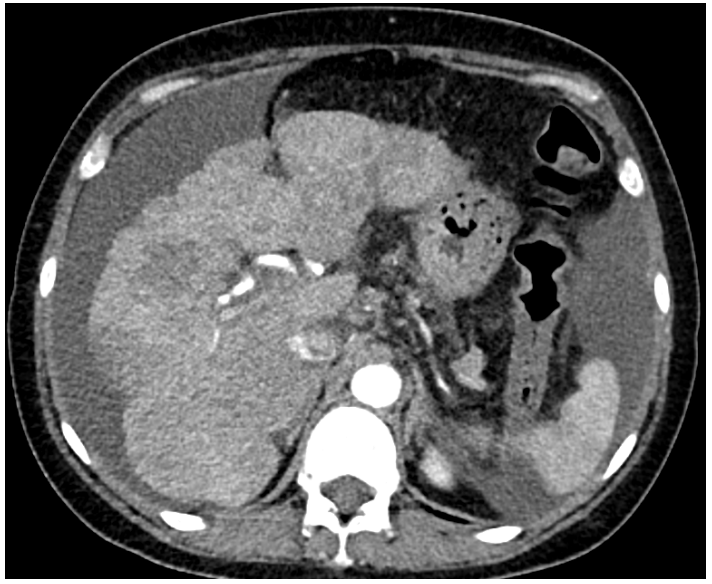


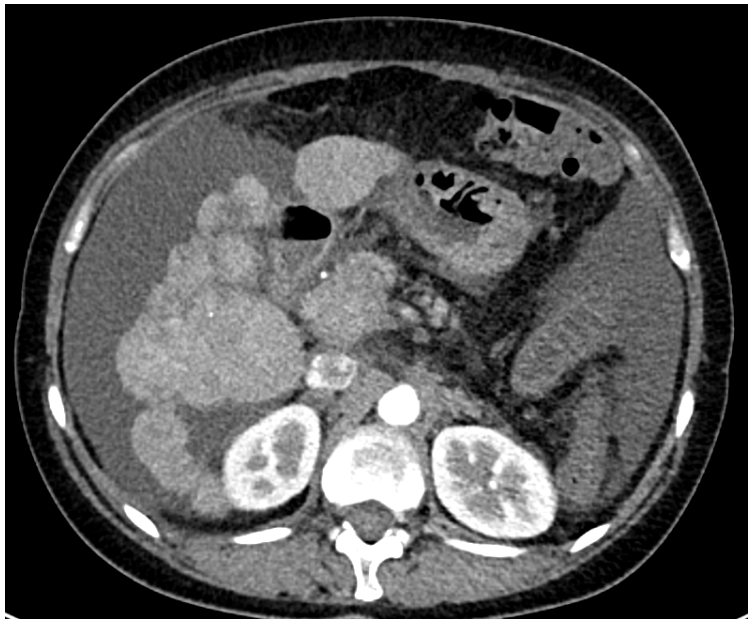




21/12/2023







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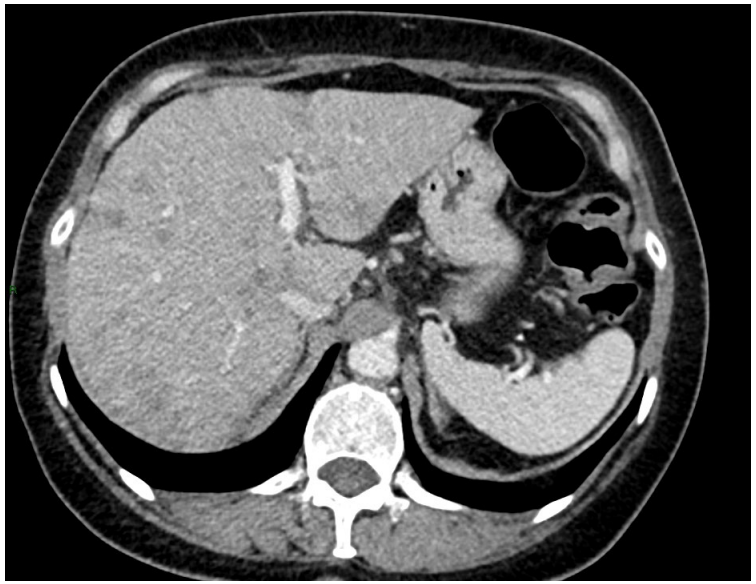

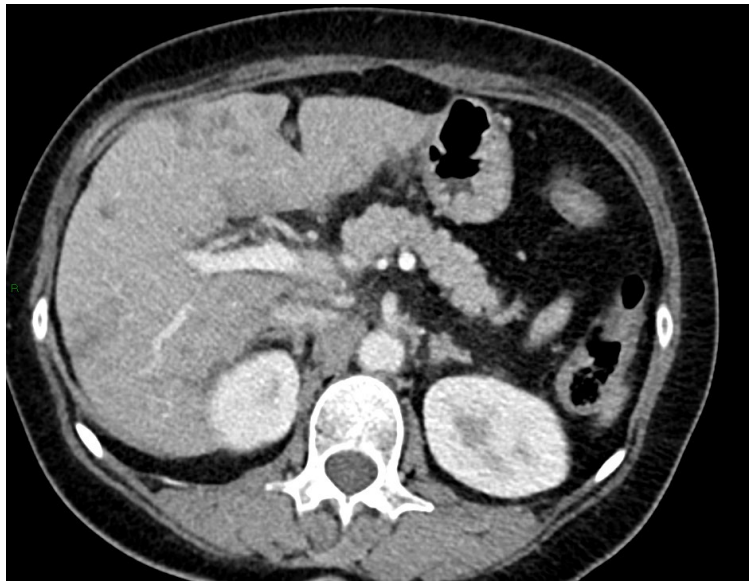

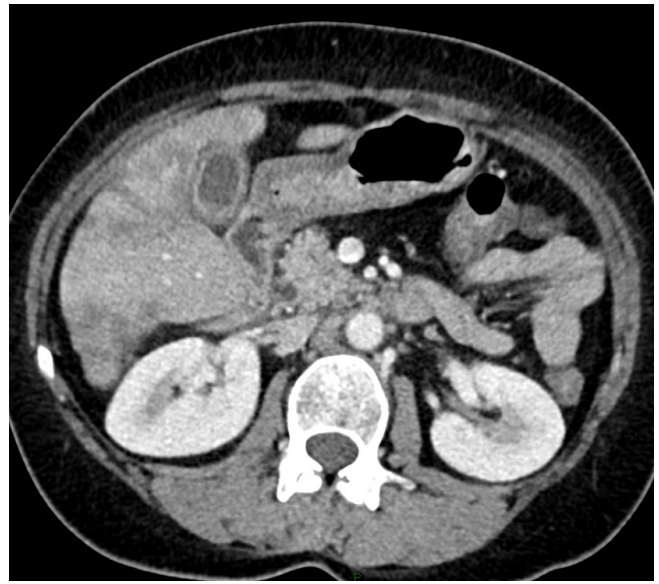

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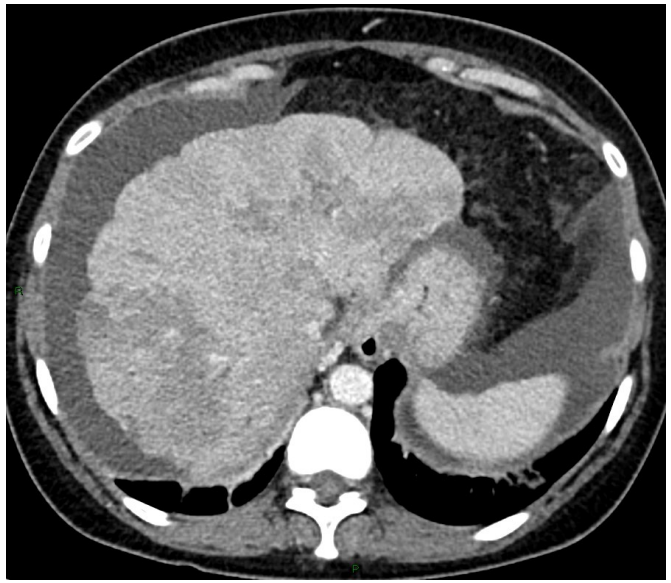
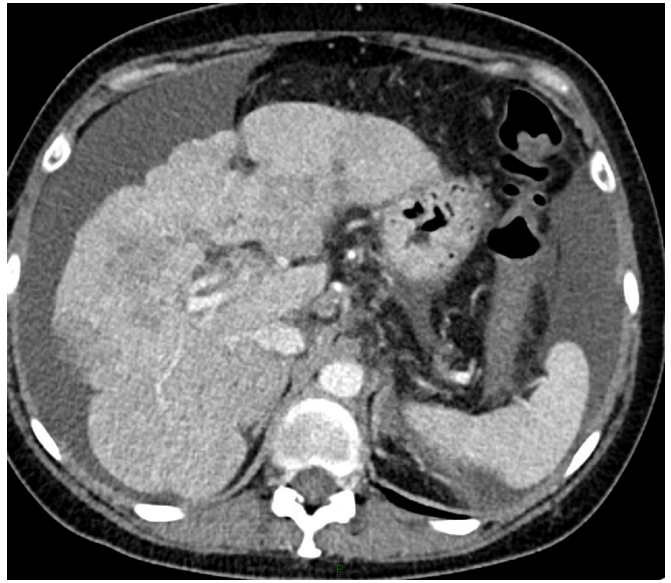
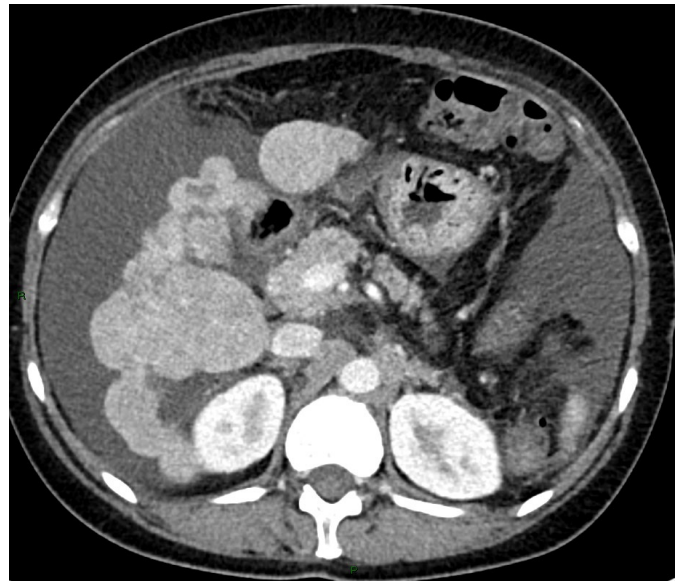






A. Multicentric Hepatocellular carcinoma

B. Diffuse Hepatocellular carcinoma

C. Liver cirrhosis with large, confluent dysplastic nodules

D. Acute alcoholic hepatitis

E. Can not tell, I would need more information regarding the medical history and physical examination

- Not every focal liver lesion in the cirrhotic liver is HCC

&

- Not every liver which looks cirrhotic is, actually, cirrhotic!

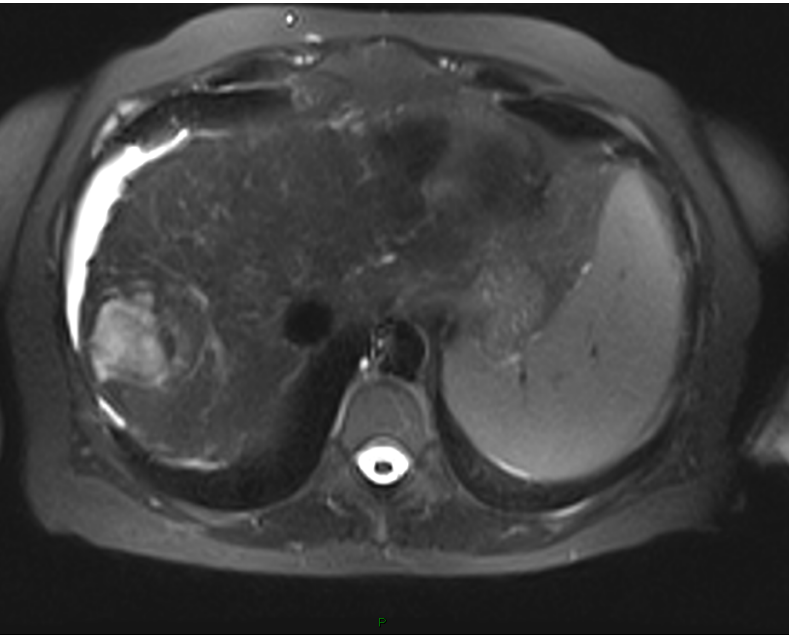
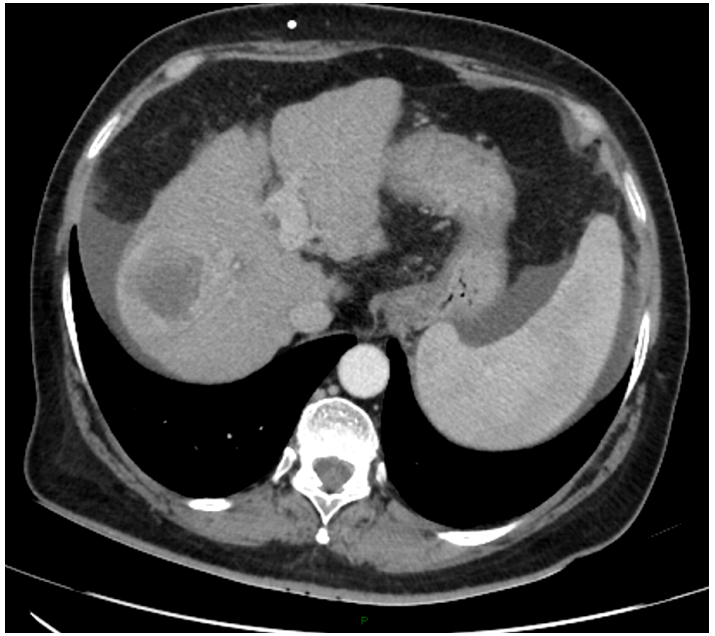
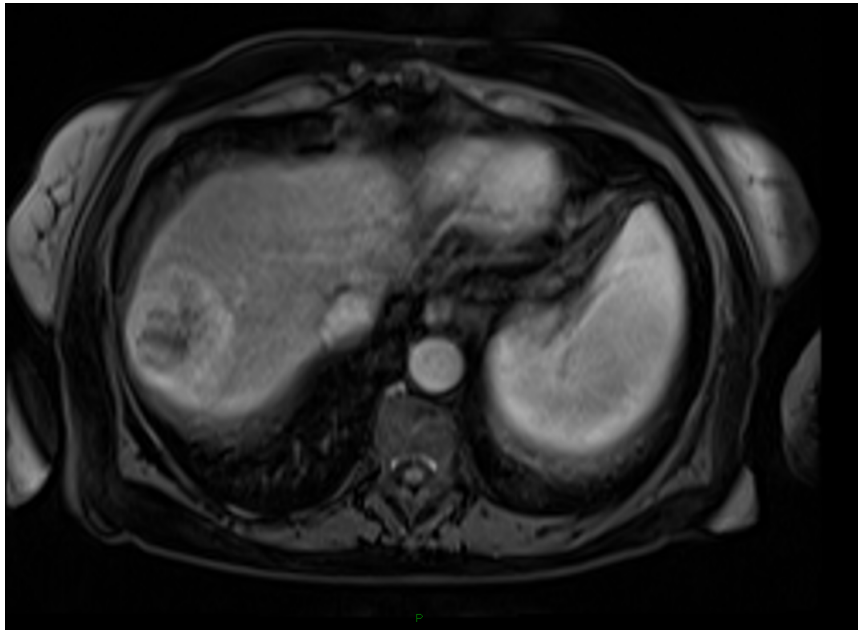
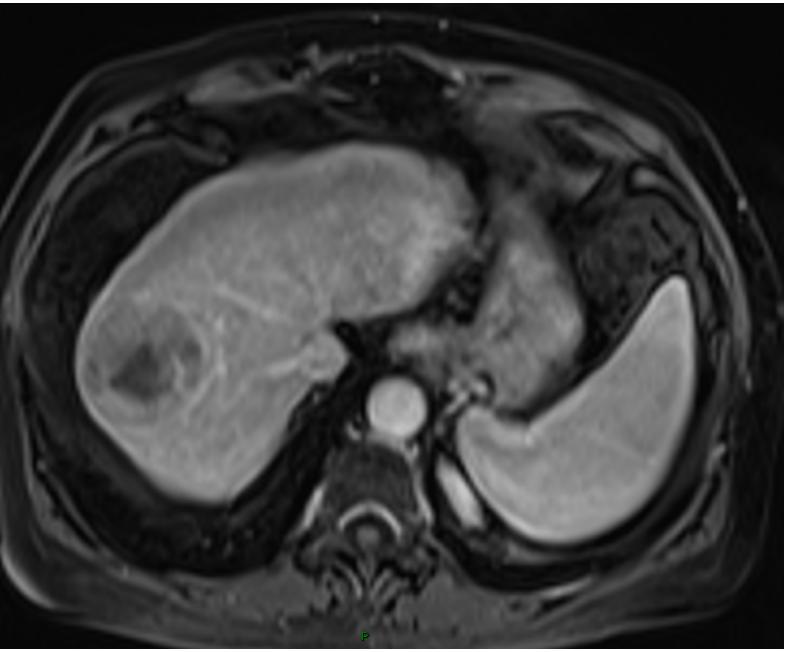
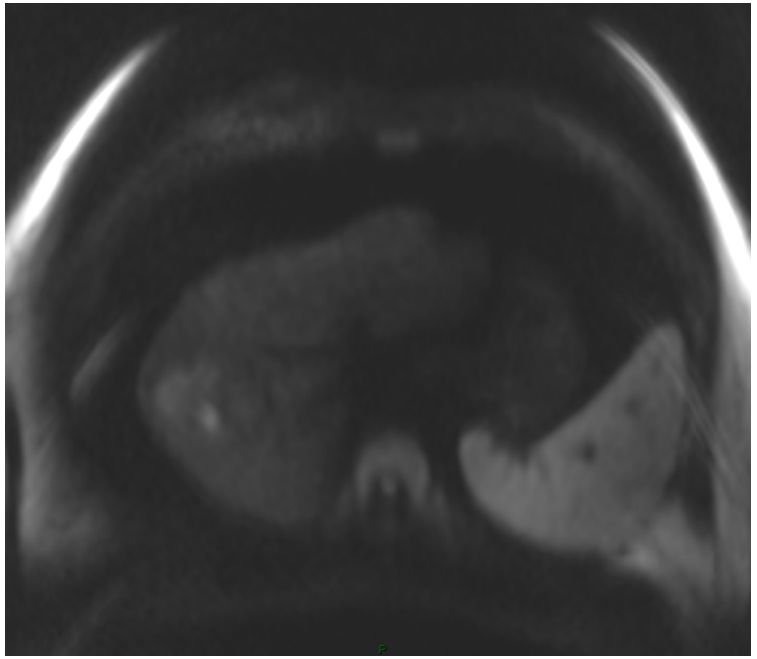
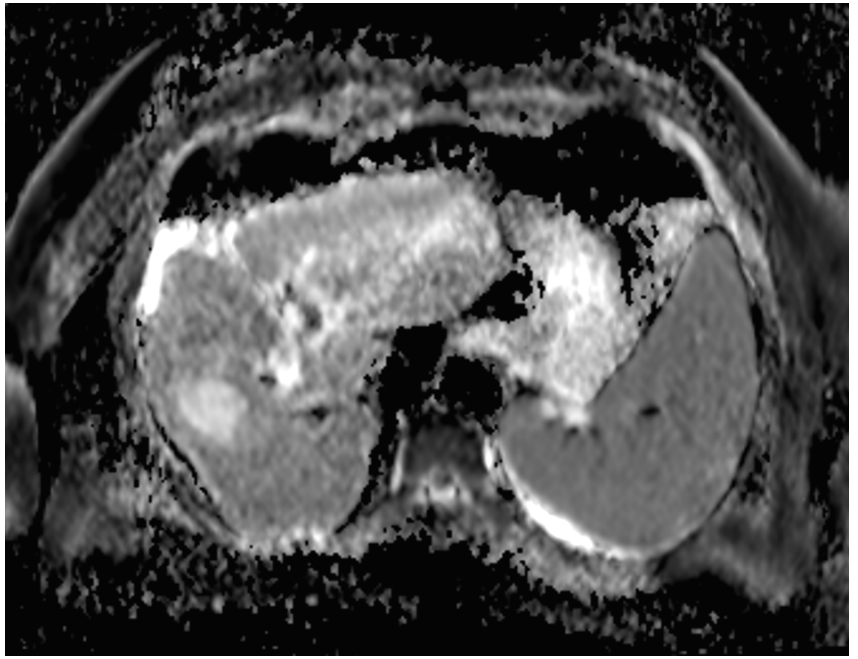
- Patient with triple negative breast cancer, since 03/2022
- Undergoing chemo- and imunotherapy for breast cancer
- Bone, brain and liver metastases
- Multiple relapses of cancer. Now the patient is on the 3rd line of treatment

Pseudocirrhosis:

- Occurs in the setting of liver metastases, particularly in breast cancer, but in other forms of cancers, too
- The aspect of the liver, on imaging, is similar to that of a cirrhotic liver
- Due to fibrotic changes, both in the liver metastases and in the surrounding liver, following chemotherapy
- It can lead to liver failure and portal hypertension

Case 2:

- W, 61 years old
- History of chronic hepatitis C infection
- Decompensated chronic liver disease with thrombocytopenia and ascites
- US: FLL, strongly suspicious of HCC in the right lobe of the liver

- Rim enhacement is an ancillary finding favouring **malignancy**, not HCC in particular
- LI-RADS M
- … But the biopsy proven diagnosis was HCC

LR-M Criteria

Targetoid mass (see below for definition and imaging appearances)

OR

Nontargetoid mass with one or more of the following:

- Infiltrative appearance. See *page 28*.
- Marked diffusion restriction. See manual (pending).
- Necrosis or severe ischemia. See manual (pending).
- Other feature that in radiologist's judgment suggests non-HCC malignancy (specify in report). See manual (pending).

No tumor in vein
Not meeting LR-5 criteria

Targetoid, definition

Target-like imaging morphology. Concentric arrangement of internal components.
Likely reflects peripheral hypercellularity and central stromal fibrosis or ischemia.

Characteristic of

- Intrahepatic cholangiocarcinoma (iCCA)
- Combined HCC-cholangiocarcinoma (combined HCC-CCA or cHCC-CCA)
- Other non-HCC malignancies

Can be seen in HCC with atypical appearance.
Therefore, targetoid appearance suggests non-HCC malignancy but does not exclude HCC.

Targetoid mass, imaging appearance on various phases or sequences

Targetoid dynamic enhancement:

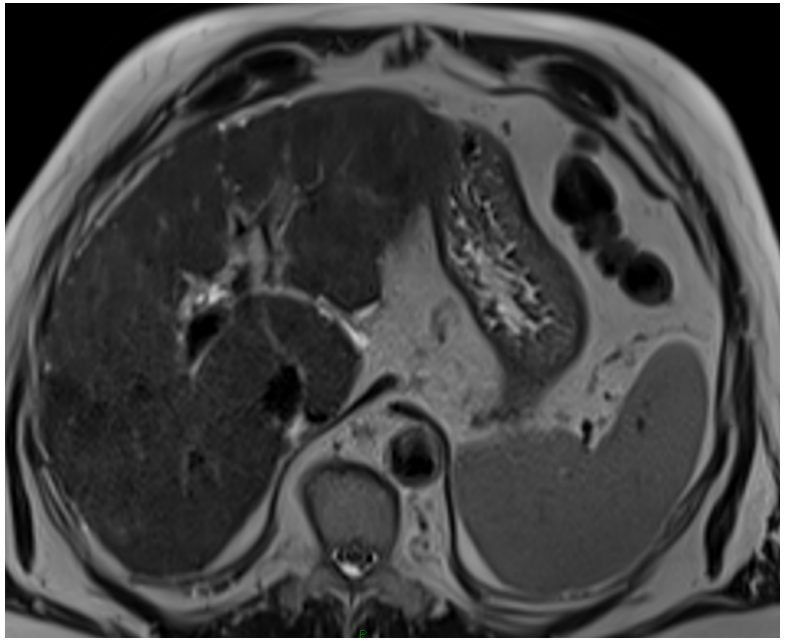
Rim APHE	Spatially defined subtype of APHE in which arterial phase enhancement is most pronounced in observation periphery
Peripheral "washout"	Spatially defined subtype of "washout" in which apparent washout is most pronounced in observation periphery
Delayed central enhancement	Central area of progressive postarterial phase enhancement

Targetoid appearance on DWI or TP/HBP:

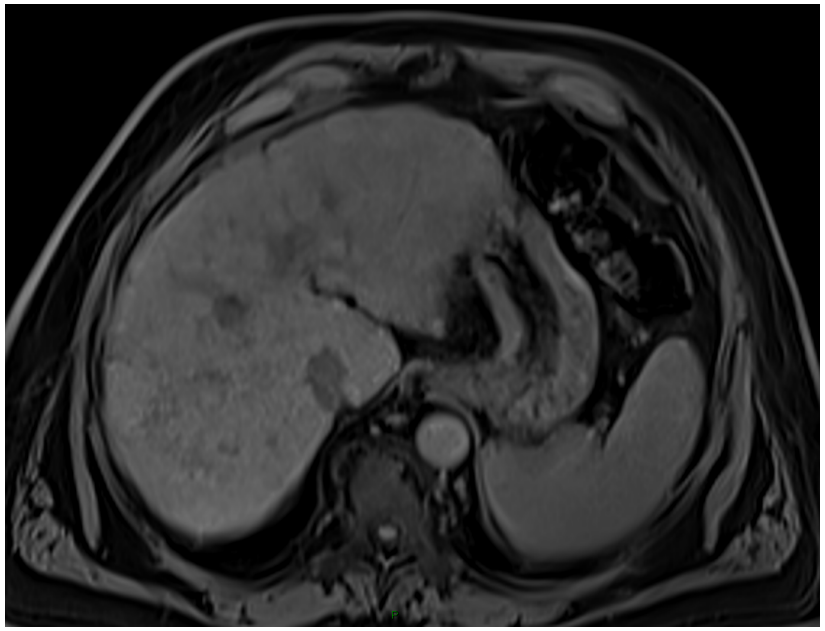
Targetoid restriction	Concentric pattern on DWI characterized by restricted diffusion in observation periphery with less restricted diffusion in observation center

Case 3:

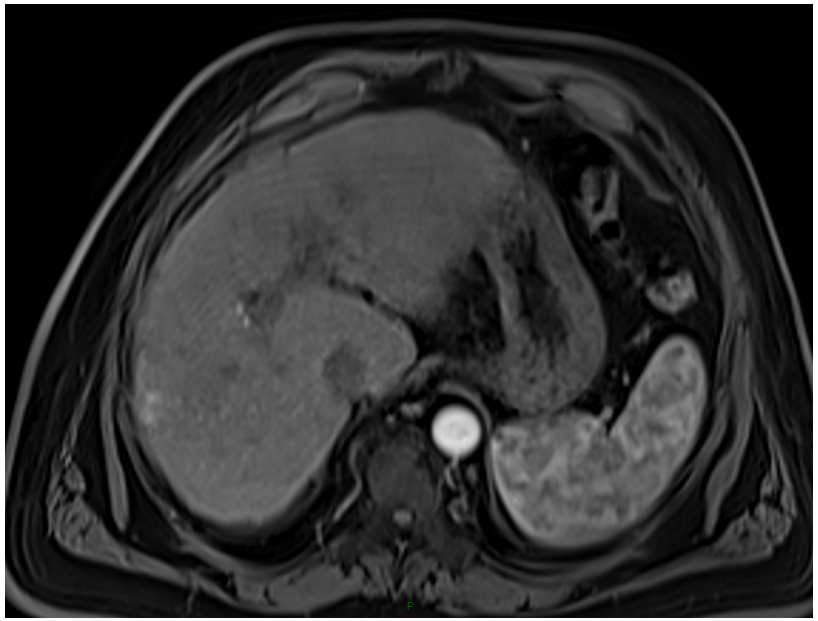
- 62 years old male
- Toxic & viral liver cirrhosis
- Follow-up MRI



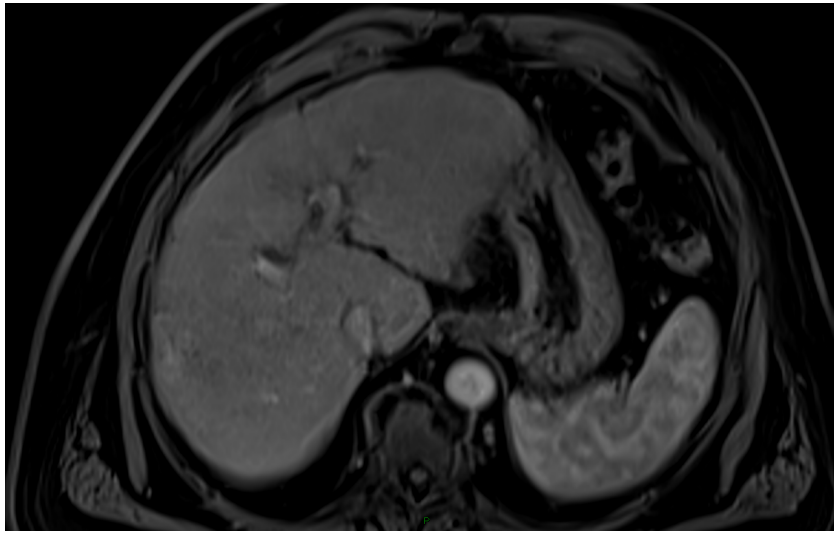
T2



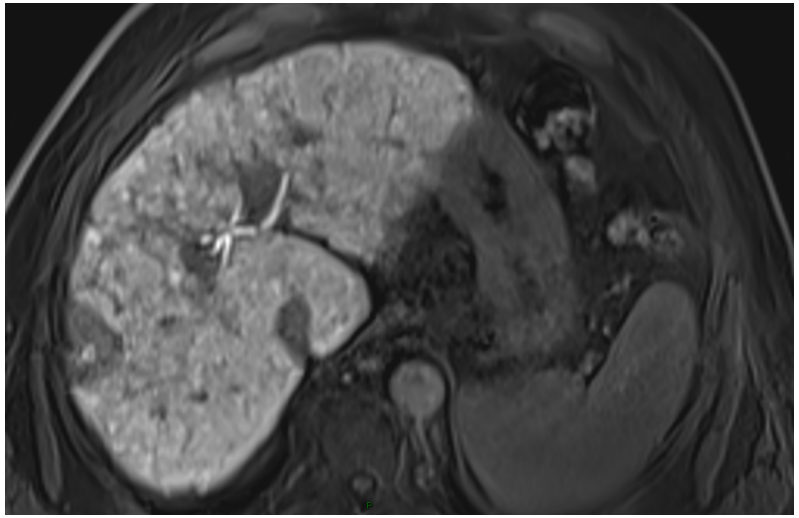
T1



T1 arterial phase



T1 portal phase



T1- HBP

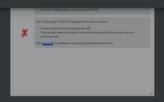
A. LI-Rads 1

B. LI-Rads 2

C. LI-Rads 3

D. Li-Rads 4

E. Li-Rads 5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12

If probably or definitely malignant but not HCC specific (e.g., if targetoid) → LR-M

Otherwise, use CT/MRI diagnostic table below

If intermediate probability of malignancy → LR-3

If probably HCC → LR-4

If definitely HCC → LR-5

CT/MRI Diagnostic Table

Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
Observation size (mm)		< 20	≥ 20	< 10	10-19	≥ 20
Count additional major features: • Enhancing "capsule" • Nonperipheral "washout" • Threshold growth	None	LR-3	LR-3	LR-3	LR-3	LR-4
	One	LR-3	LR-4	LR-4	LR-4 / LR-5	LR-5
	≥ Two	LR-4	LR-4	LR-4	LR-5	LR-5

LR-4 / LR-5

Observations in this cell are categorized based on one additional major feature:
- LR-4 – if enhancing "capsule"
- LR-5 – if nonperipheral "washout" **OR** threshold growth

If unsure about the presence of any major feature: characterize that feature as absent

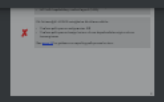
OPTN users in USA: see *page 15* for conversion of LI-RADS® categories to OPTN Classes

Step 2. Optional: Apply Ancillary Features (AFs)

Ancillary features may be used **at radiologist discretion** for:
Improved detection, increased confidence, or category adjustment

For **category adjustment** (upgrade or downgrade), apply ancillary features as follows:

≥ 1 AF favoring malignancy: upgrade by 1 category up to LR-4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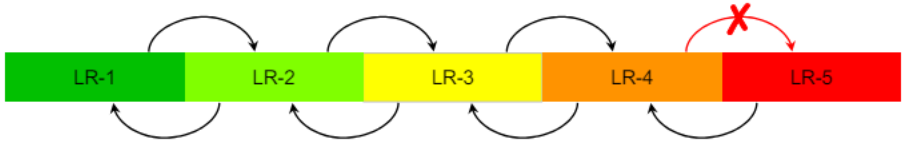
Step 2. Optional: Apply Ancillary Features (AFs)

Ancillary features may be used **at radiologist discretion** for:
Improved detection, increased confidence, or category adjustment

For **category adjustment** (upgrade or downgrade), apply ancillary features as follows:

≥ 1 AF favoring malignancy: upgrade by 1 category up to LR-4
(Absence of these AFs should not be used to downgrade)



≥ 1 AF favoring benignity: downgrade by 1 category
(Absence of these AFs should not be used to upgrade)

If ≥ 1 AF favoring malignancy and ≥ 1 AF favoring benignity:
Do not adjust category

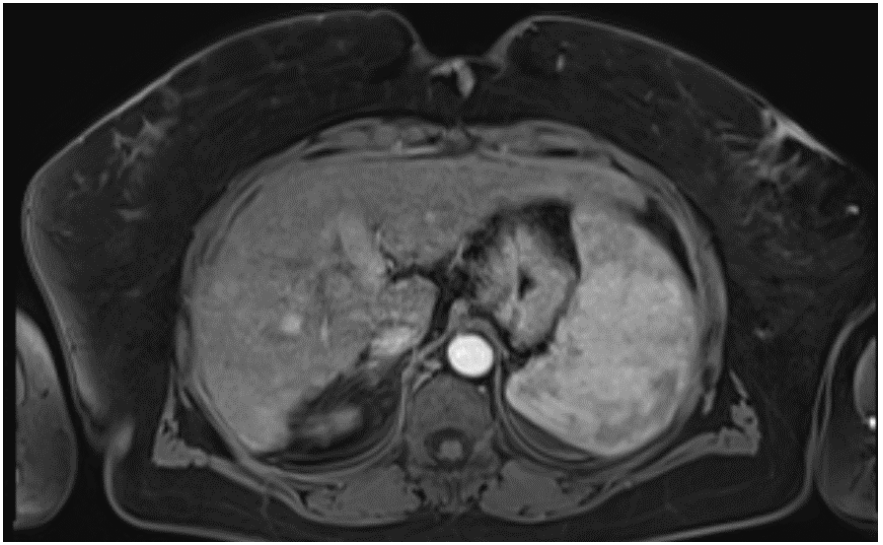
Ancillary features cannot be be used to upgrade to LR-5

Ancillary features favoring malignancy	Ancillary features favoring benignity
Favoring malignancy in general, not HCC in particular • US visibility as discrete nodule • Subthreshold growth • Restricted diffusion • Mild-moderate T2 hyperintensity • Corona enhancement • Fat sparing in solid mass • Iron sparing in solid mass • Transitional phase hypointensity • Hepatobiliary phase hypointensity **Favoring HCC in particular** • Nonenhancing "capsule" • Nodule-in-nodule • Mosaic architecture • Blood products in mass • Fat in mass, more than adjacent liver	• Size stability > 2 yrs • Size reduction • Parallels blood pool • Undistorted vessels • Iron in mass, more than liver • Marked T2 hyperintensity • Hepatobiliary phase isointensity

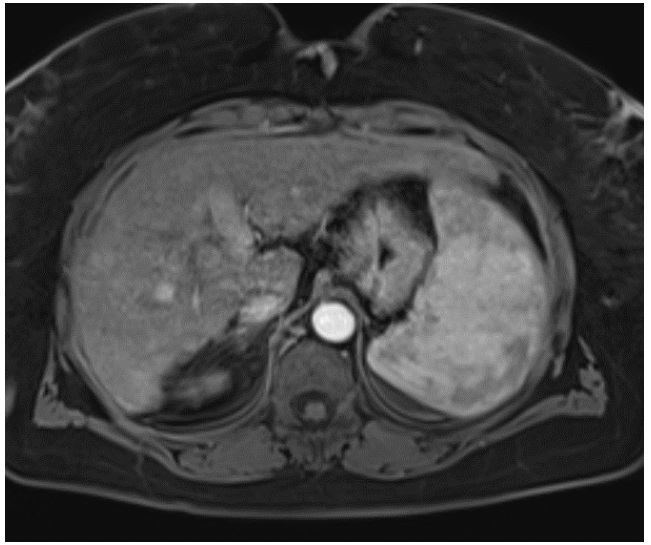
Case 4:

- W, 59 years old
- HVC liver cirrhosis
- Follow-up MRI

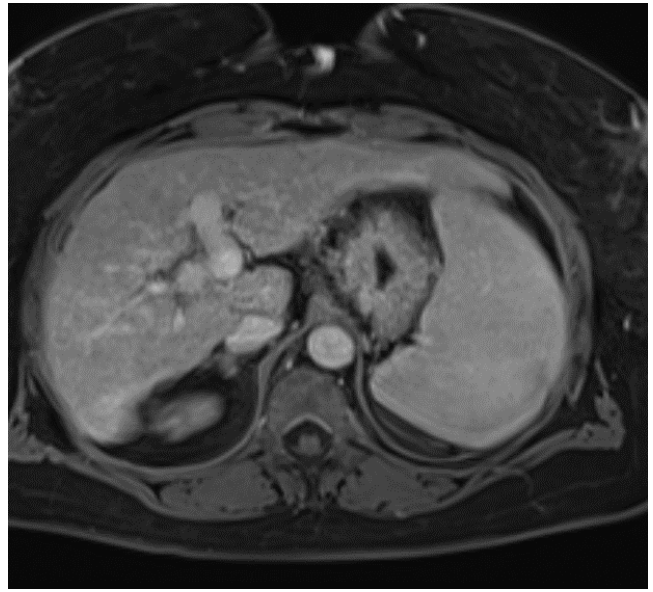
20/02/2024



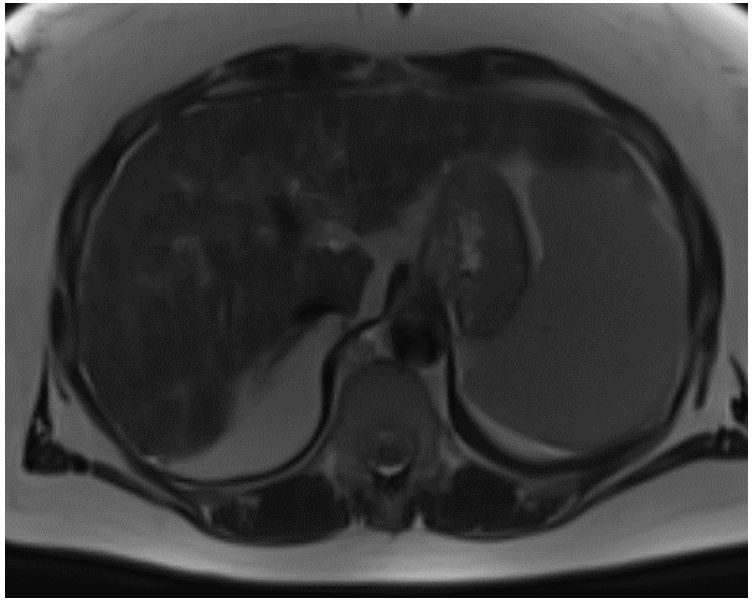
Arterial phase



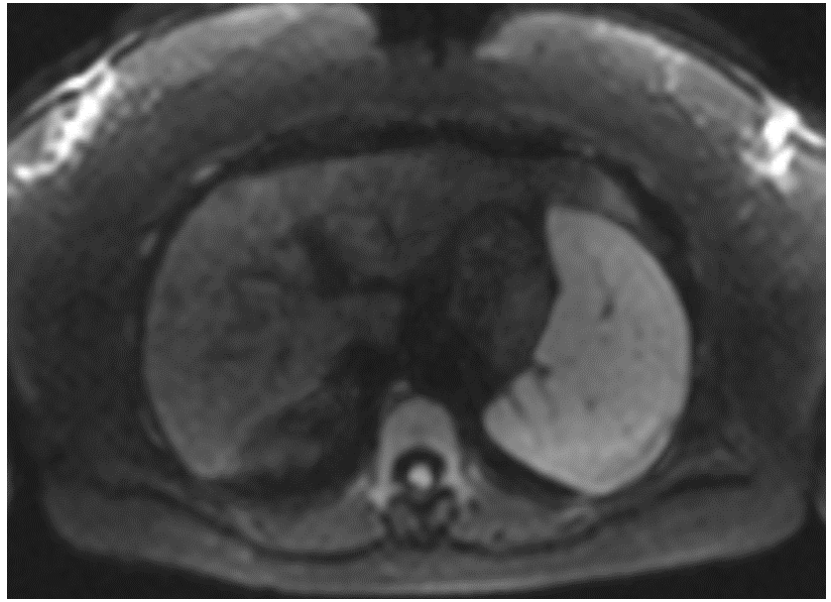
Arterial phase



Portal phase



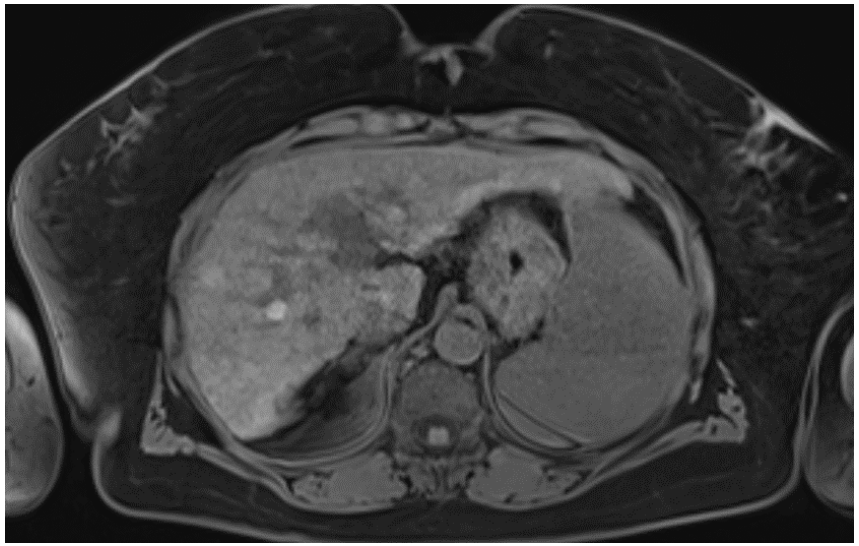
T2 WI



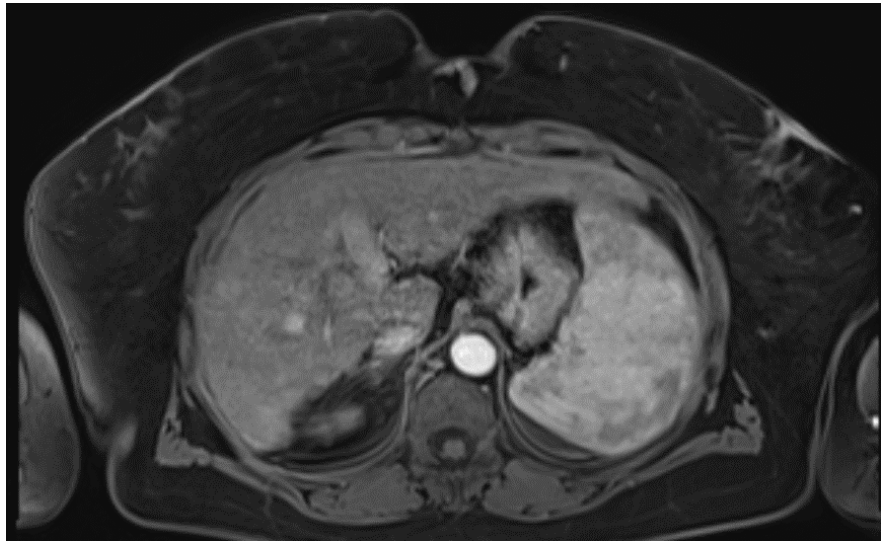
Diffusion

… Can you make a diagnosis or do you want to see more images?

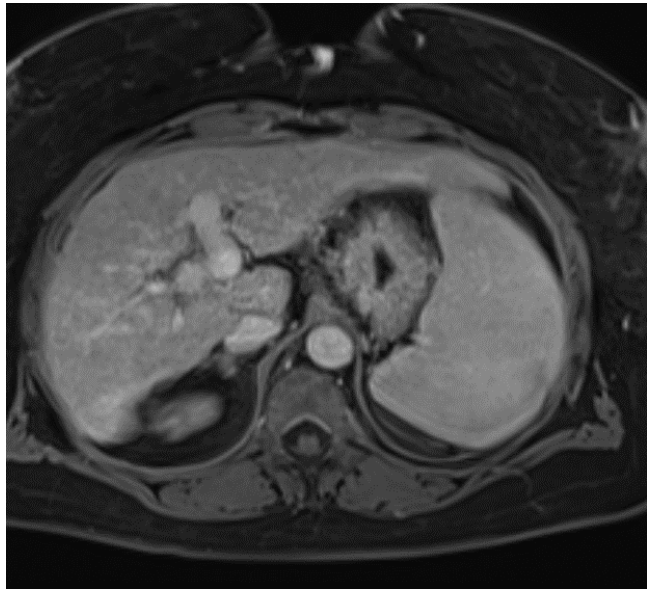
20/02/2024



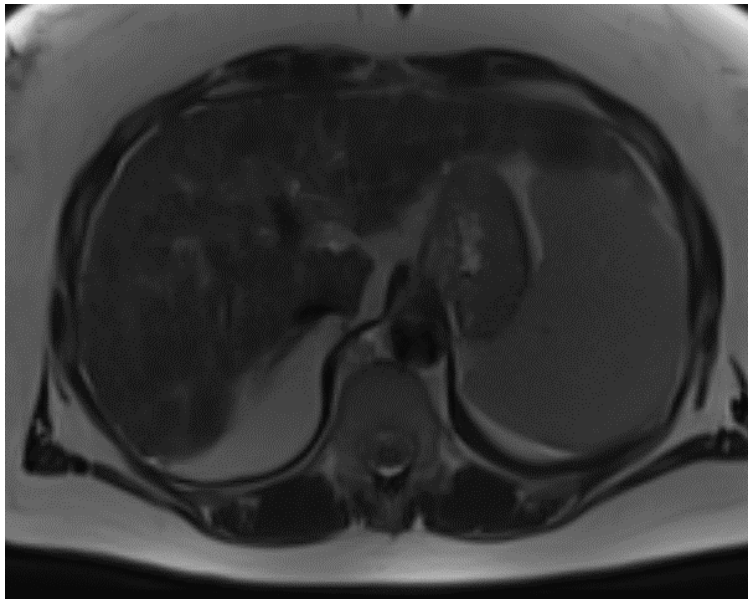
Unenhanced T1



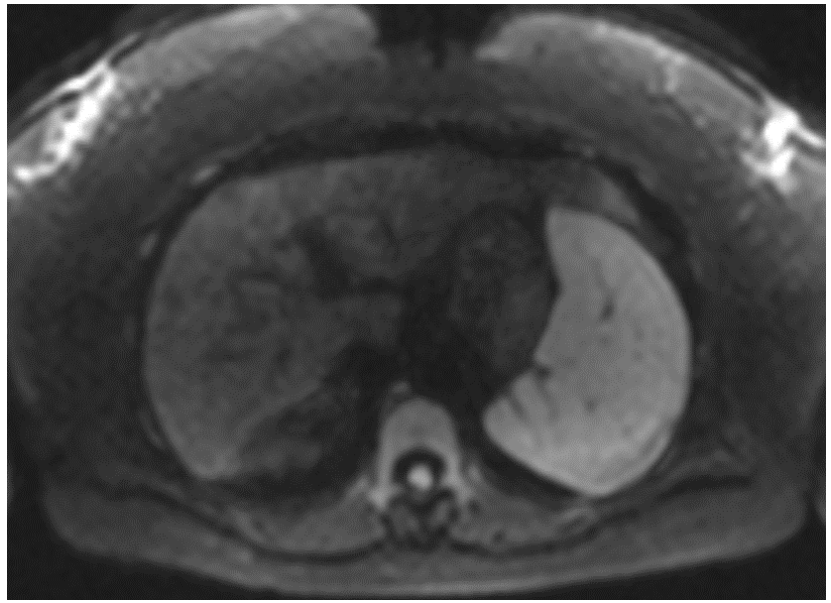
Arterial phase



Portal phase



T2 WI



Diffusion

Delayed Phase Pitfalls

In the early stages of hepatocarcinogenesis, the portal venous blood supply to the nodule decreases before the arterial neovascularization is sufficient to result in arterial phase hyperenhancement [12]. As a result, 10–20% of HCCs do not show arterial phase hyperenhancement and are visible only in the portal venous or delayed phase [13, 14]. Therefore, it is imperative to recognize that early HCC may be best seen in the portal venous and delayed phases and that review of portal venous and delayed phase images may reveal an early HCC [15]. Most portal venous and delayed phase hypoenhancing nodules are not HCCs, however; the differential diagnosis includes regenerative and dysplastic nodules. Another delayed phase pitfall is that delayed enhancing fibrosis around regenerative or dysplastic nodules may be mistaken for a capsule appearance, potentially causing false-positive interpretation of these benign lesions as HCC. Similarly, enhancing fibrosis can create the perception of washout in a nodule when this imaging feature is absent, potentially causing misdiagnosis.

Heavily T2-Weighted Imaging Pitfalls

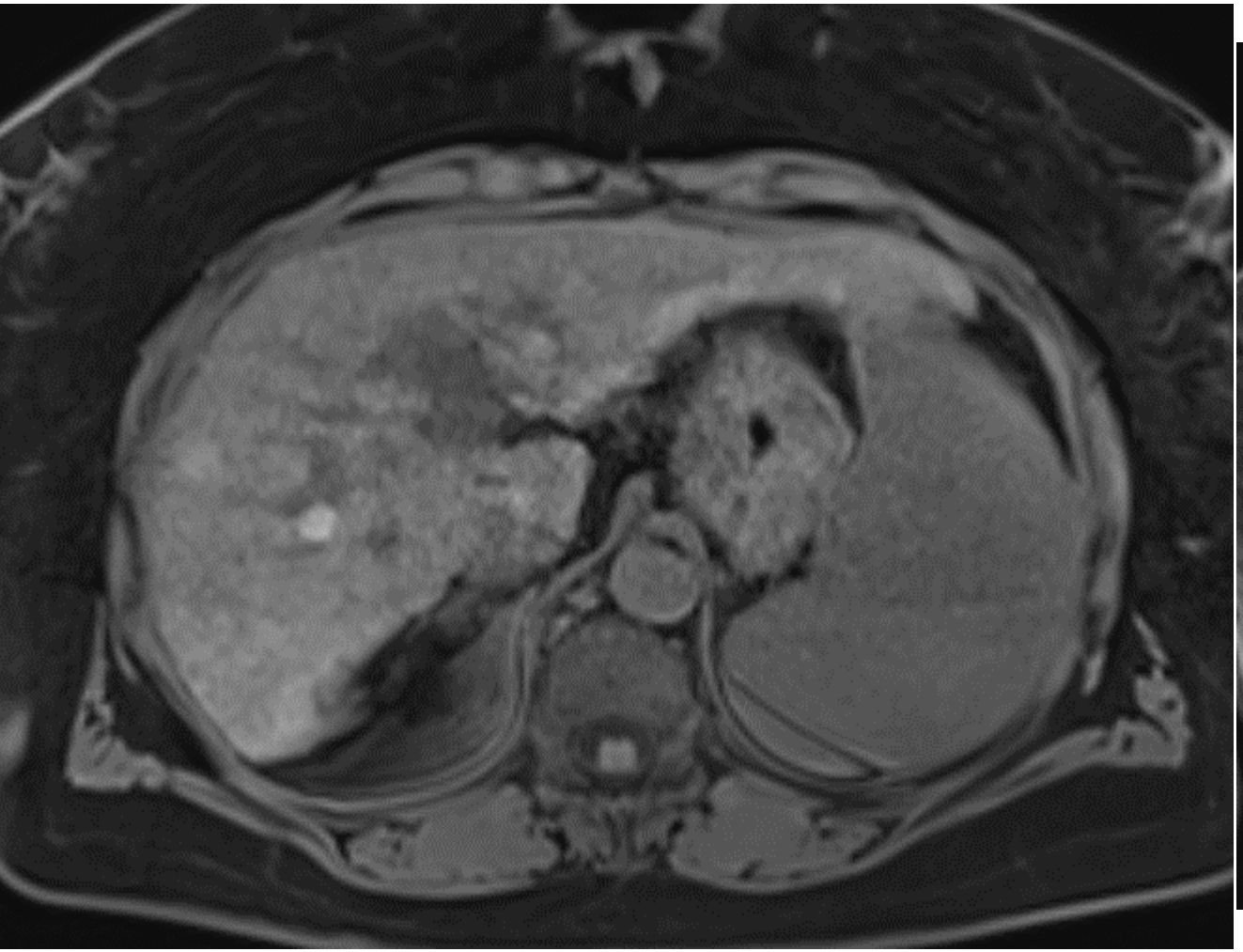
Some benign hepatic lesions, such as hemangiomas and cysts, typically appear markedly hyperintense compared with background liver on T2-weighted images, and this relative hyperintensity is accentuated on heavily T2-weighted images with longer TE. A sequence may be considered heavily T2-weighted when the TE is at least 140 ms [16]. Malignant hepatic lesions appear slightly hyperintense on T2-weighted images, and the degree of relative hyperintensity often decreases with the prolonged TE, to the point at which lesions may appear nearly isointense on heavily T2-weighted images [17] (Fig. 2). Therefore, heavily T2-weighted images may not depict malignant solid lesions that would otherwise be discernible on routine T2-weighted images [18]. Thus, to improve detection of malignant hepatic lesions, heavily T2-weighted sequences should not be used as the sole T2-weighted sequence for screening of patients with chronic liver disease.

Elsayes KM, Chernyak V, Morshid AI, et al. Spectrum of pitfalls, pseudolesions, and potential misdiagnoses in cirrhosis. *AJR* 2018; 211:87–96

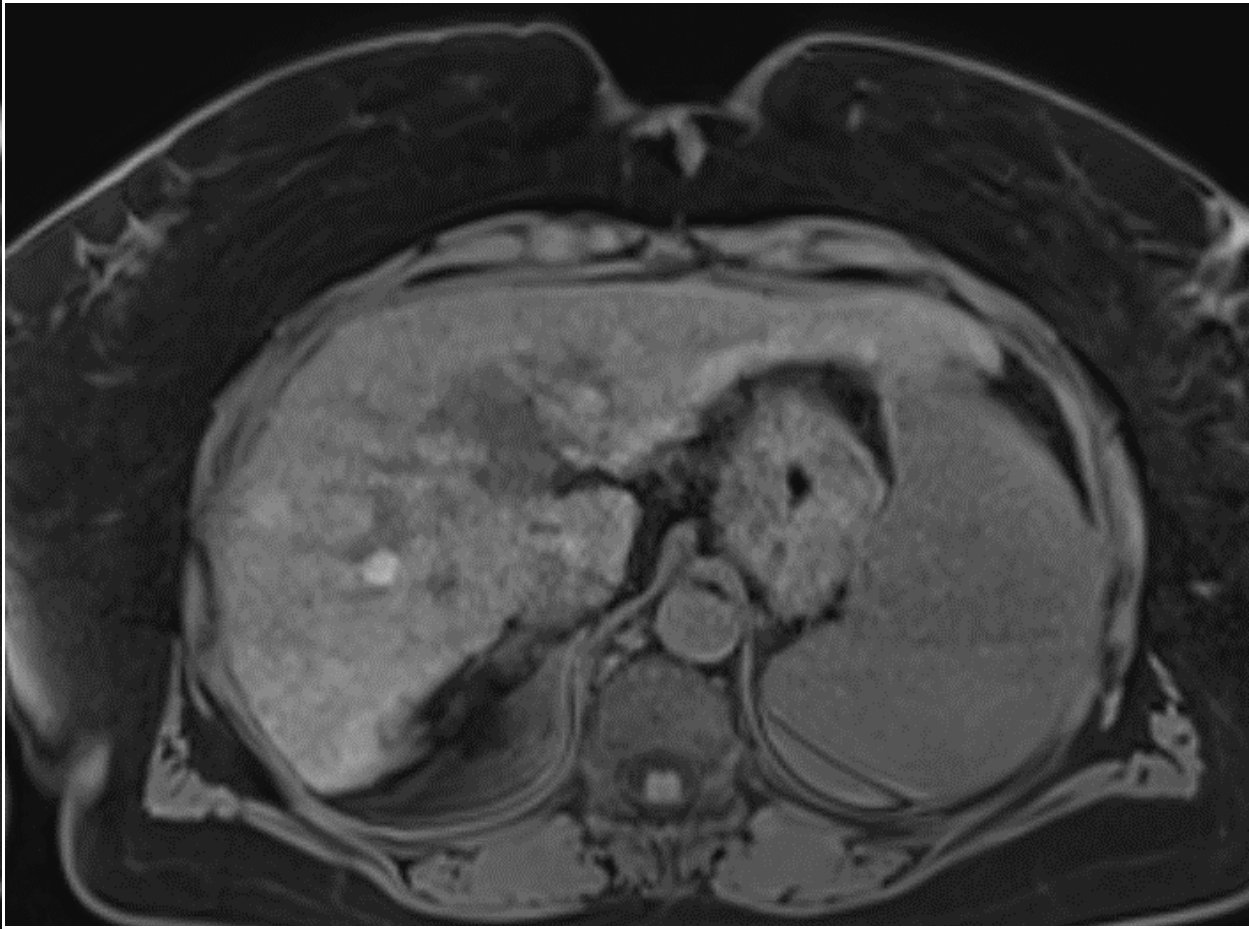
… Can you make a diagnosis or do you want to see more images?

Always ask for older examinations!

29/08/2022



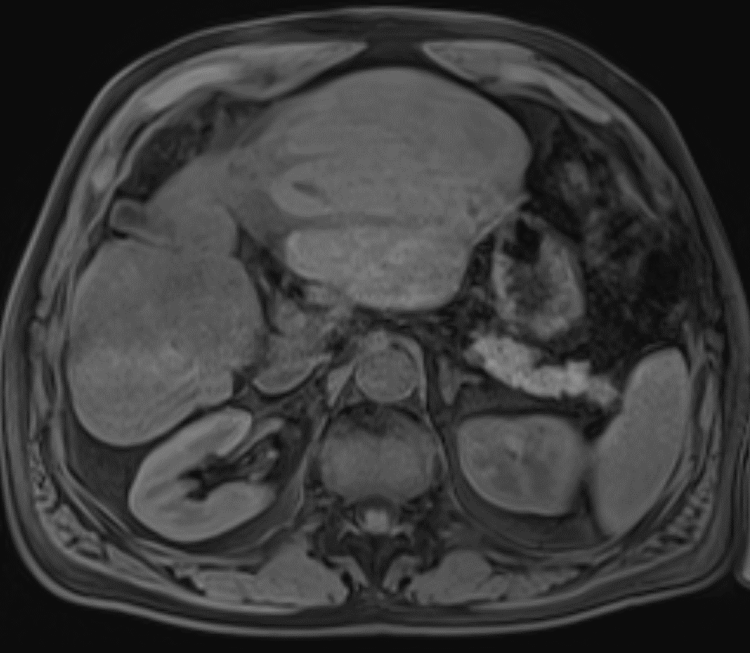
20/02/2024



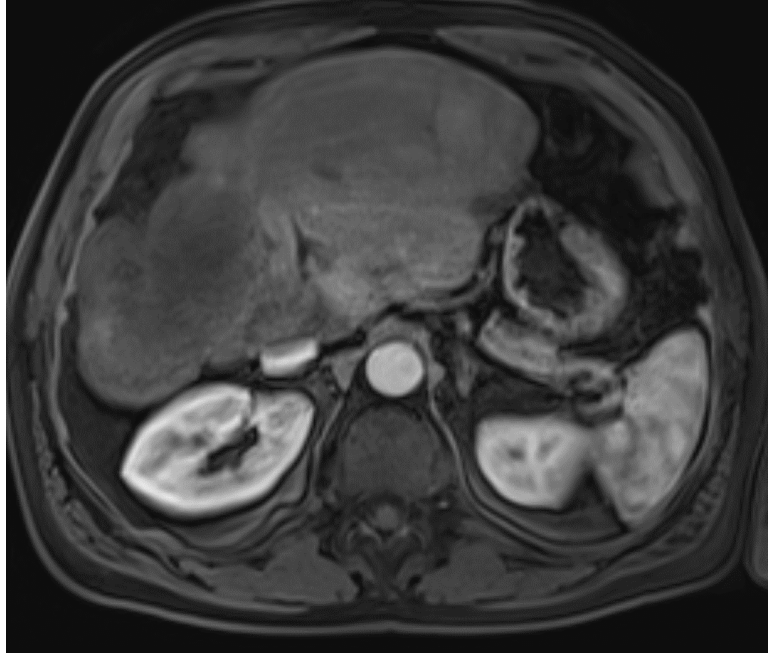
Size stability over more than 2 years is a ancillary feature favoring **benignity**

Case 5:

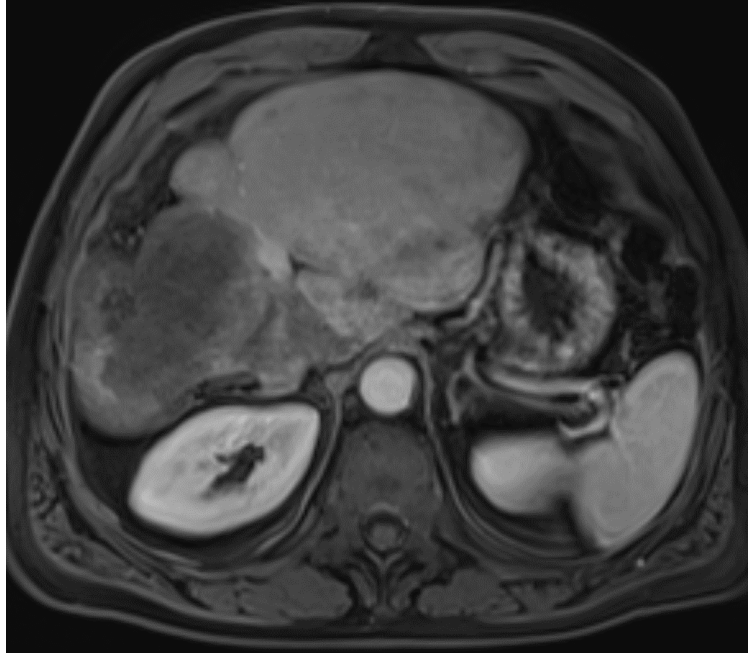
- 54 years old, male
- HBV cirrhosis
- The diagnosis was made a couple of years ago, the patient neglected his disease, did not show up for medical investigations



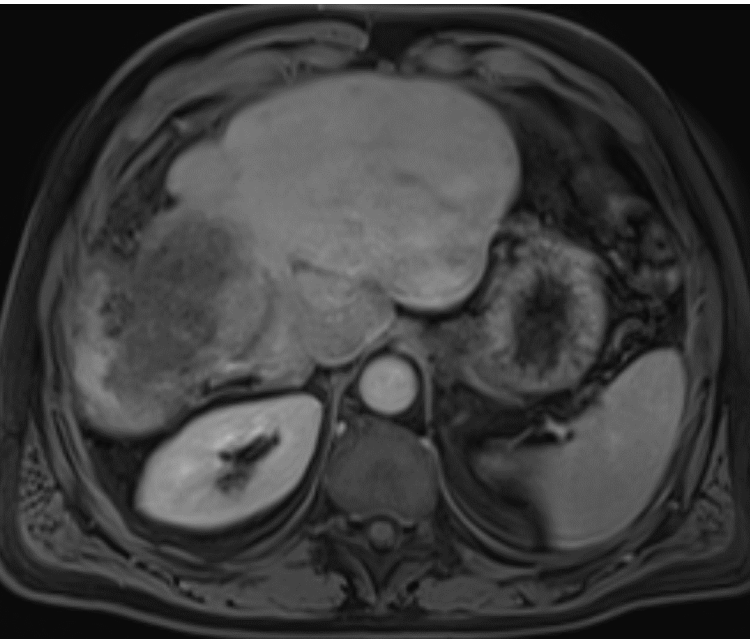
T1



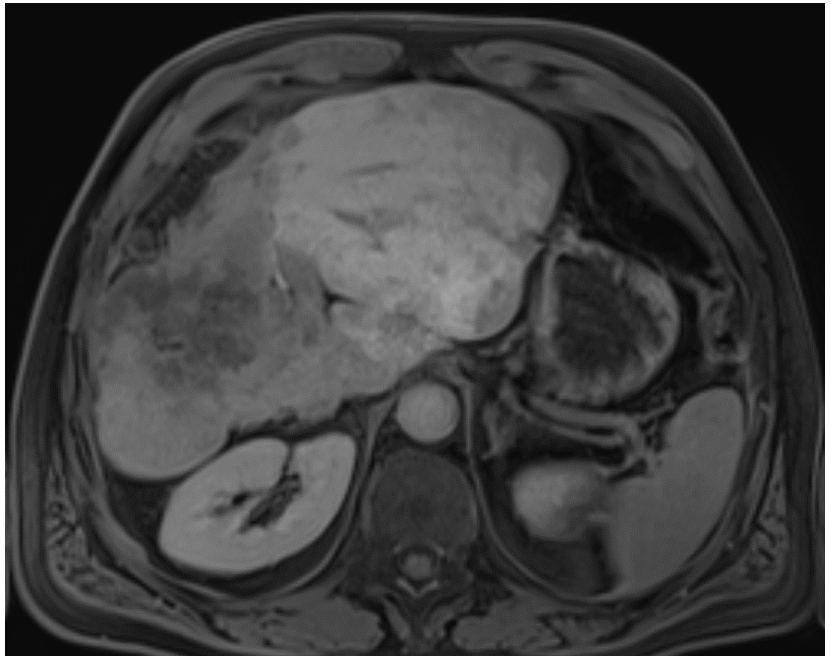
Arterial phase



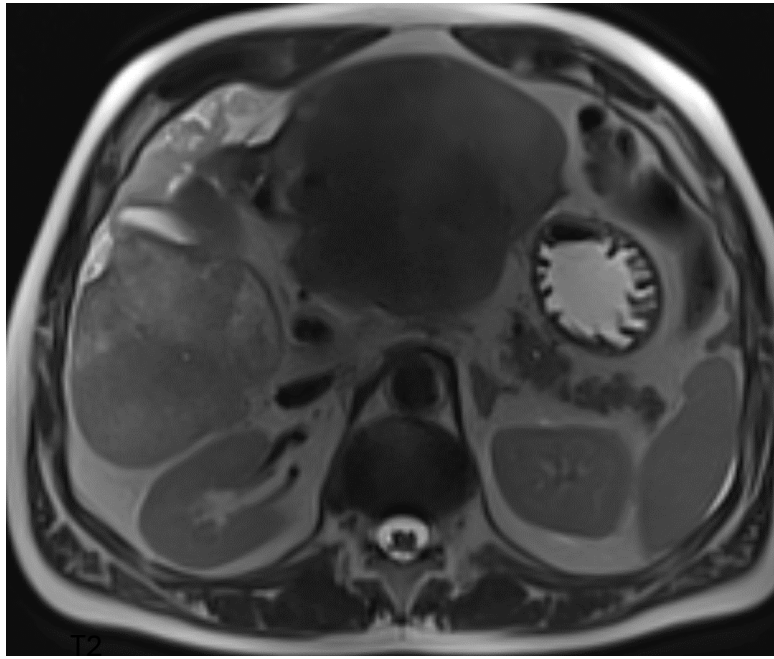
Venous phase



Late phase



HBP



T2

A. HCC

B. Cholangiocarcinoma

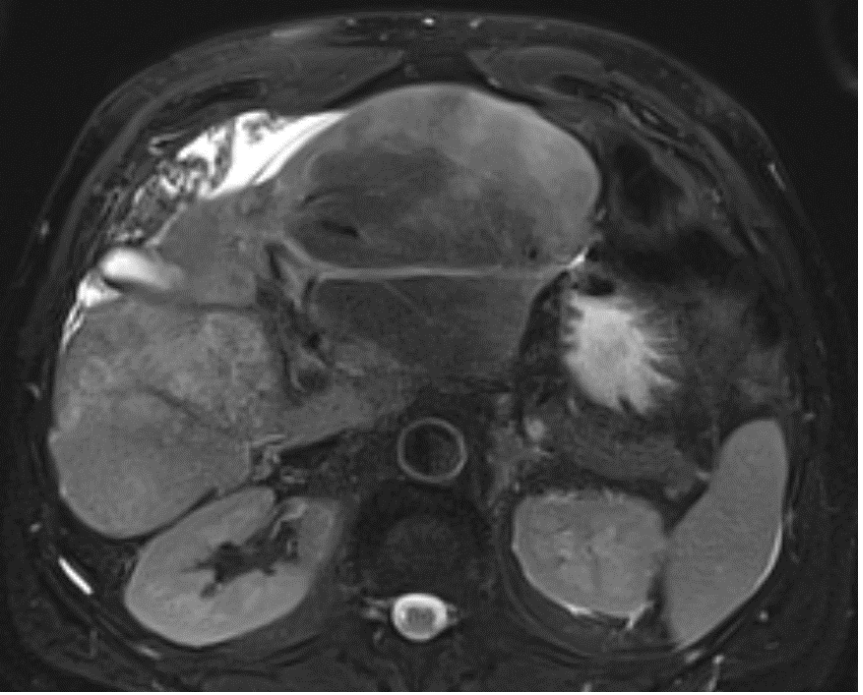
C. Dysplastic nodule

D. Fibrotic hemangioma

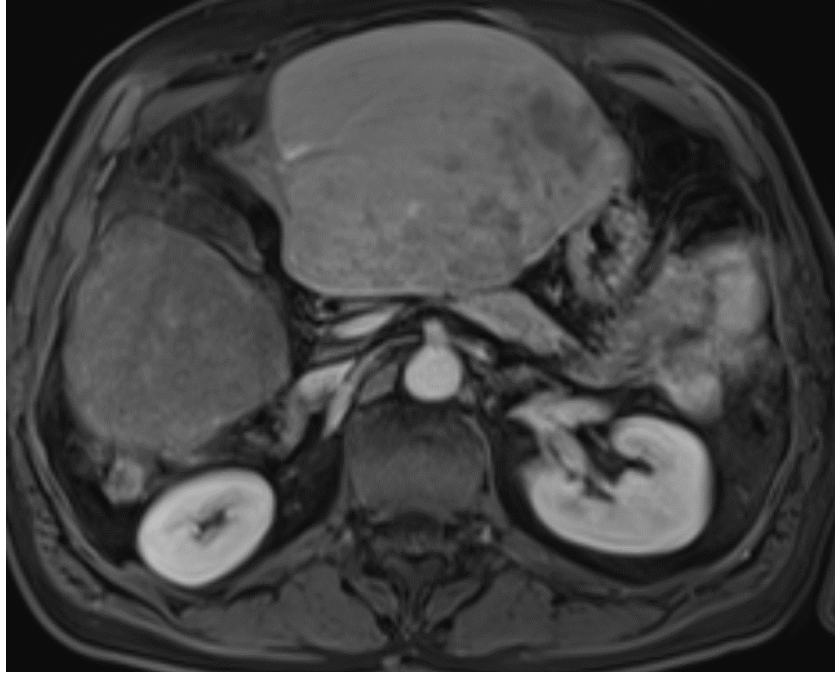
E. Something else

Hepatic epitelioid hemangioendothelioma:

- Multiple hypoattenuating lesions in both hepatic lobes
- Lesions may be confluent and form larger masses
- Subcapsular lesions may lead to capsular retraction
- Hypointense on T1
- Heterogenously hyperintense on T2
- **White target sign on T2**: large hyperintense core surrounded by a peripheral, slightly hyperintense halo (not present in our case)
- May present with target type enhancement



T2



T1 venous phase