



# Structured reports using LI-RADS

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# Disclosures

No relevant financial disclosures.

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No relevant financial disclosures.

... I am a pediatric radiologist



# Outline

Rationale of using LI-RADS

Typical HCC findings

- LI-RADS definitions

- LI-RADS categorization

Case examples

# What is LI-RADS?

**The Liver Imaging Reporting And Data System (LI-RADS) is:**

- A comprehensive system for standardizing the terminology, technique, interpretation, reporting, and data collection of liver imaging
- A dynamic document, to be expanded and refined as knowledge accrues and in response to user feedback
- Designed to improve communication, patient care, education, and research
- Supported and endorsed by the American College of Radiology (ACR)
- Developed by a multidisciplinary, international consortium of diagnostic and interventional radiologists, hepatobiliary surgeons, hepatologists, and hepatopathologists. Contributors include academic and community physicians as well as members in training.

# What is LI-RADS?

**LI-RADS may be used for clinical care, education, or research by:**

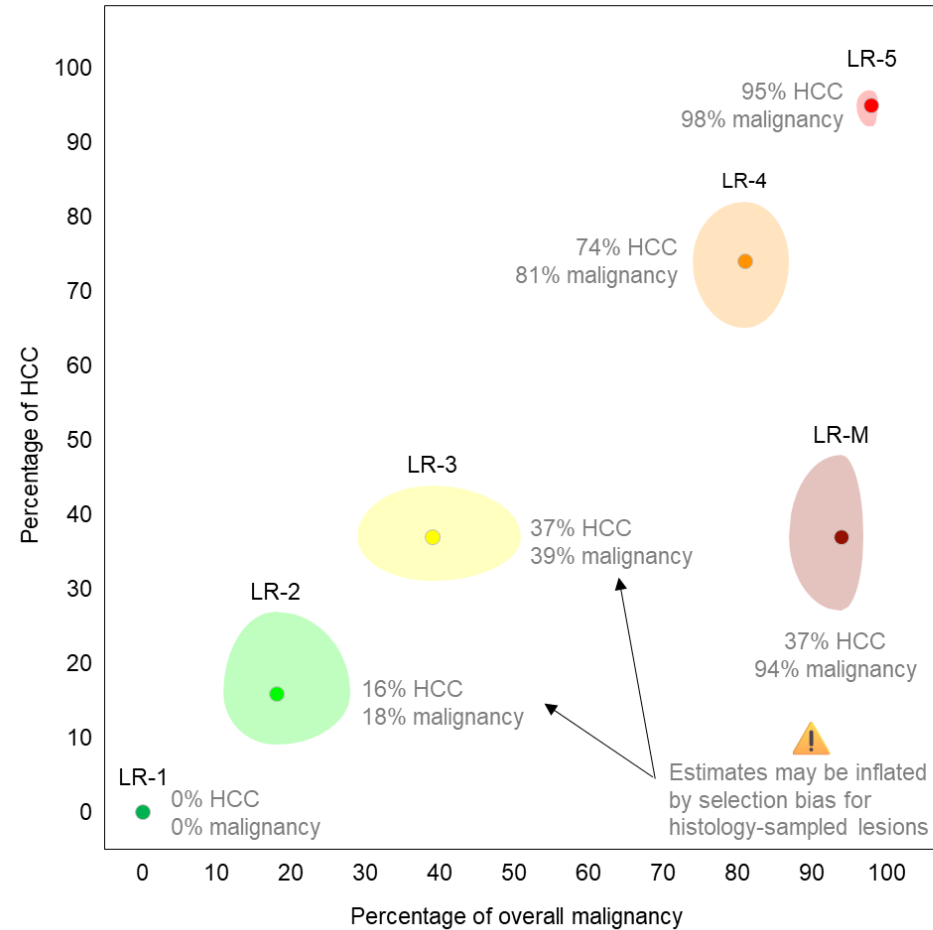
- Community and academic radiologists
- Radiologists in training
- Other health care professionals providing care to patients with liver disease
- Researchers

# LI-RADS® Diagnostic Categories

## Why use LI-RADS?

What is the percentage of HCC and malignancy associated with each LI-RADS category??

The percentage (with 95% confidence intervals) associated with LR-1, LR-2, LR-3, LR-4, LR-5, and LR-M is summarized below:



The above graph represents data from the literature using versions 2014 and 2017. Data using version 2018 are not yet available.

### Reference

CB van der Pol et al. ILCA 2018: 12th Annual Conference of the International Liver Cancer Association. 2018.

# LI-RADS Algorithms



## Ultrasound LI-RADS®

For **surveillance** of HCC

In **cirrhotic and other high-risk** patients

Using **unenhanced ultrasound**

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## CEUS LI-RADS®

For **diagnosis** of HCC

In **cirrhotic and other high-risk** patients

Using **contrast-enhanced ultrasound (CEUS)**

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## CT/MRI Diagnostic LI-RADS®

For **diagnosis and staging** of HCC

In **cirrhotic and other high-risk** patients, including liver transplant candidates with HCC

Using **CT, MRI with extracellular agents (ECA)**, or **MRI with hepatobiliary agents (HBA)**

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## CT/MRI Treatment Response LI-RADS®

For **assessing response of HCC to locoregional treatment**

In **cirrhotic and other high-risk** patients, including liver transplant candidates with HCC

Using **CT, MRI with extracellular agents (ECA)**, or **MRI with hepatobiliary agents (HBA)**





# **CT/MRI LI-RADS<sup>®</sup> v2018 CORE**

Current version: CT/MRI LI-RADS v2018

\* with a separate CT/MRI Treatment Response LI-RADS v2024 expected in late 2024

# When to apply LI-RADS?

Apply in patients at high risk for HCC, namely those with:



- Cirrhosis **OR**
- Chronic hepatitis B viral infection **OR**
- Current or prior HCC

Including adult liver transplant candidates and recipients posttransplant

# When to apply LI-RADS?

## Do not apply in patients:



- Without the above risk factors
- < 18 years old (**N/A in the pediatric population**)
- With cirrhosis due to congenital hepatic fibrosis
- With cirrhosis due to a vascular disorder  
(hereditary hemorrhagic telangiectasia, Budd-Chiari syndrome, chronic portal vein occlusion, cardiac congestion, or diffuse nodular regenerative hyperplasia)

# When to apply LI-RADS?



**Apply for multiphase exams performed with:**

- CT or MRI with extracellular contrast agents (ECA) **OR**
- MRI with hepatobiliary contrast agents (HBA)

# When to apply LI-RADS?



**Do not assign LI-RADS categories for observations:**

- That are path-proven malignancies **OR**
- That are path-proven benign lesions of non-hepatocellular origin such as hemangiomas

## CT/MRI Diagnostic Table

Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
Observation size (mm)		< 20	≥ 20	< 10	10-19	≥ 20
<b>Count additional major features:</b> <ul style="list-style-type: none"> <li>• Enhancing “capsule”</li> <li>• Nonperipheral “washout”</li> <li>• Threshold growth</li> </ul>	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

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*

# LI-RADS CT/MRI Phases

 Arterial phase (AP)  






 Portal venous phase (PVP)

 Delayed phase (DP)

 Transitional phase (TP)

 Hepatobiliary phase (HBP)

## LI-RADS® CT/MRI Phases

<p>Arterial phase (AP)</p>	<p>In LI-RADS, the arterial phase refers to the hepatic arterial phase unless otherwise specified. The arterial phase is a postcontrast injection time range with the following characteristics:</p> <ul style="list-style-type: none"> <li>• Hepatic artery and branches are fully enhanced.</li> <li>• Hepatic veins not yet enhanced by antegrade flow.</li> </ul>
<p>Early AP    Late AP</p> 	<p>Two subtypes:</p> <ul style="list-style-type: none"> <li>• Early AP: Subtype of AP in which portal vein is not yet enhanced.</li> <li>• Late AP: Subtype of AP in which portal vein is enhanced.</li> </ul> <p><i>Late AP</i> is strongly preferred for HCC diagnosis and staging, because the degree of enhancement in HCC usually is higher in the late than in the early AP. Some HCCs may show hyperenhancement only in the late AP.</p>
<p>Extracellular phase (ECP)</p>	<p>Postcontrast phase in which liver enhancement is attributable mainly to extracellular distribution of a contrast agent. Operationally, this refers to:</p> <ul style="list-style-type: none"> <li>• PVP and DP if an extracellular agent or gadobenate is given.</li> <li>• PVP only if gadoxetate is given.</li> </ul>
<p>Portal venous phase (PVP)</p> 	<p>Postcontrast injection time range with the following characteristics:</p> <ul style="list-style-type: none"> <li>• Portal veins are fully enhanced.</li> <li>• Hepatic veins are enhanced by antegrade flow.</li> <li>• Liver parenchyma usually is at peak enhancement.</li> </ul>
<p>Delayed phase (DP)</p> 	<p>Postcontrast phase acquired with extracellular agents or gadobenate after the portal venous phase and with the following characteristics:</p> <ul style="list-style-type: none"> <li>• Portal and hepatic veins are enhanced but less than in PVP.</li> <li>• Liver parenchyma is enhanced but usually less than in PVP.</li> </ul> <p>Typically acquired 2 to 5 minutes after injection.</p>
<p>Transitional phase (TP)</p> 	<p>Postcontrast phase acquired with a hepatobiliary agent after the extracellular phase, before the hepatobiliary phase, and with the following characteristics:</p> <ul style="list-style-type: none"> <li>• Liver vessels and hepatic parenchyma are of similar signal intensity.</li> <li>• Both the intracellular and extracellular pools of the agent contribute substantially to parenchymal enhancement.</li> </ul> <p>Typically acquired 2 to 5 minutes after injection of gadoxetate. Typically not obtained with gadobenate.</p>
<p>Hepatobiliary phase (HBP)</p> 	<p>Postcontrast phase acquired with a hepatobiliary agent where:</p> <ul style="list-style-type: none"> <li>• Liver parenchyma is hyperintense to hepatic blood vessels.</li> <li>• There is excretion of contrast into biliary system.</li> </ul> <p>Typically acquired about 20 minutes after injection with gadoxetate. Typically not obtained with gadobenate. If obtained, typically acquired 1-3 hours after injection with gadobenate.</p> <p>HBP is suboptimal if liver is not more intense than hepatic blood vessels.</p>



# LI-RADS CT/MRI Phases



Arterial phase (AP)

Postcontrast injection time range when

Hepatic artery and branches are fully enhanced.

Hepatic veins not yet enhanced by antegrade flow.

Two subtypes:



Early AP: Subtype of AP in which portal vein is not yet enhanced.

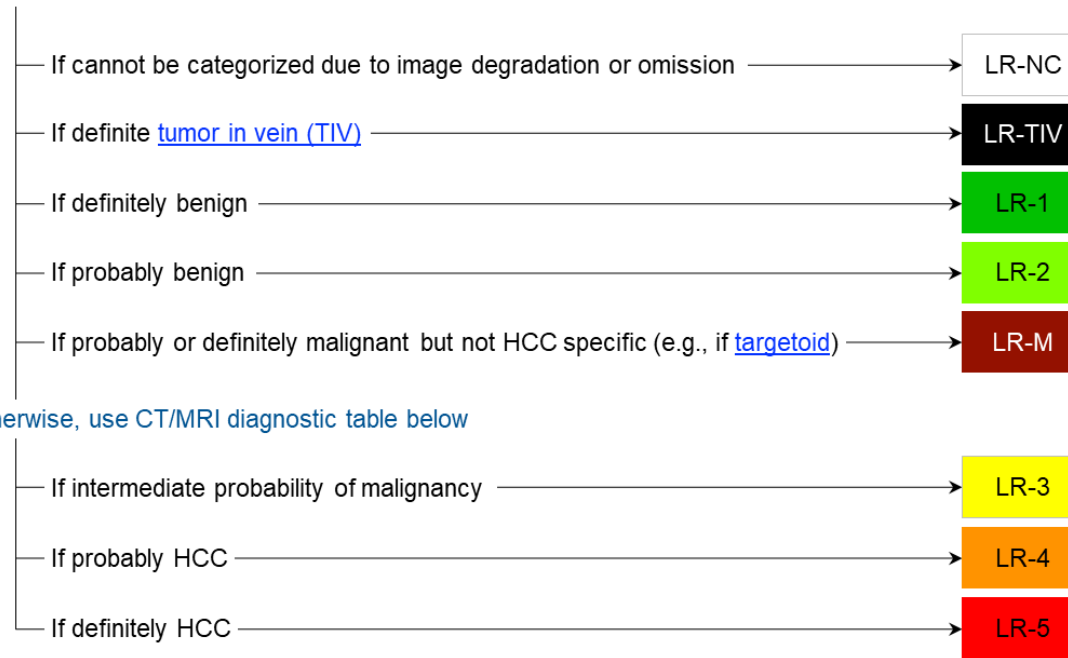


Late AP: Subtype of AP in which portal vein is enhanced.

*Late AP* strongly preferred for HCC diagnosis

# Step 1. Apply CT/MRI LI-RADS® Diagnostic Algorithm

Untreated observation without pathologic proof in [patient at high risk for HCC](#)



## 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



Observations in this cell are categorized based on one additional major feature:

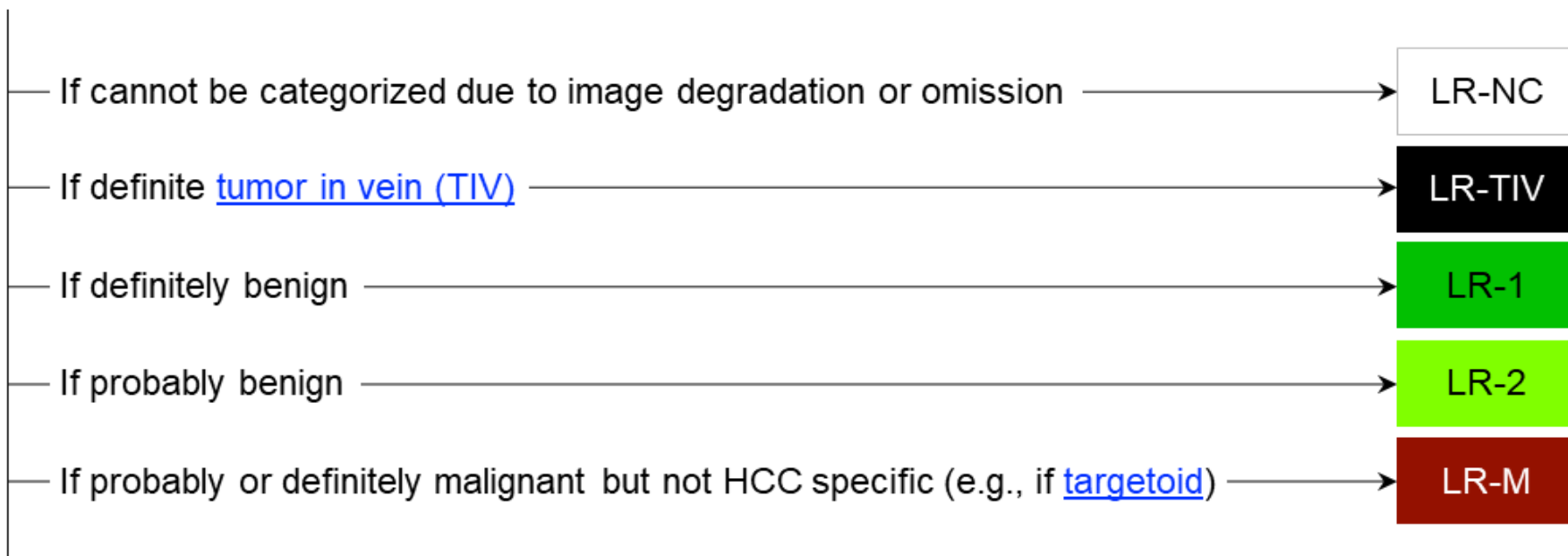
- LR-4 – if enhancing “capsule”
- LR-5 – if nonperipheral “washout” **OR** threshold growth

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

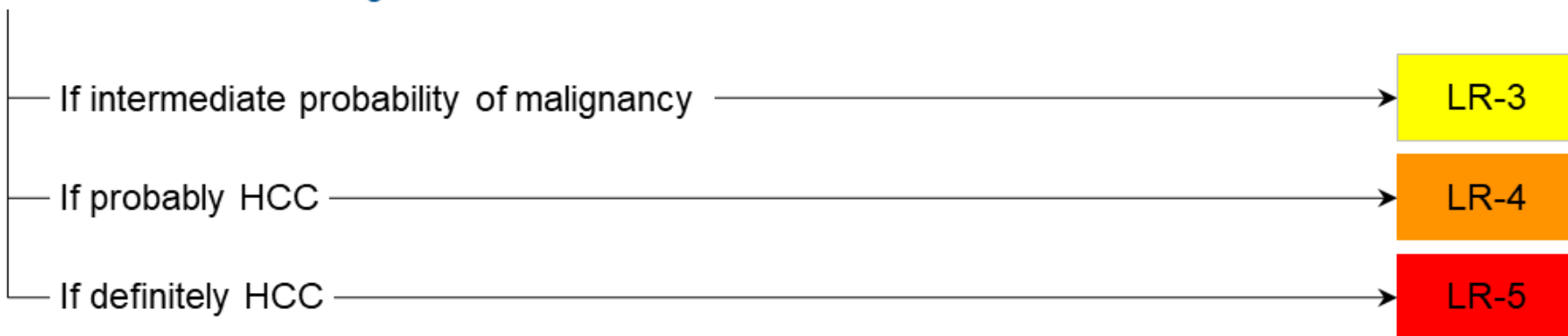


# CT/MRI LI-RADS<sup>®</sup> v2018 CORE

Untreated observation without pathologic proof in [patient at high risk for HCC](#)



Otherwise, use CT/MRI diagnostic table below



# LR-1

## Definite:

- Cyst
- Hemangioma
- Perfusion alteration (e.g., arterioportal shunt)
- Hepatic fat deposition/sparing
- Hypertrophic pseudo-mass
- Confluent fibrosis or focal scar

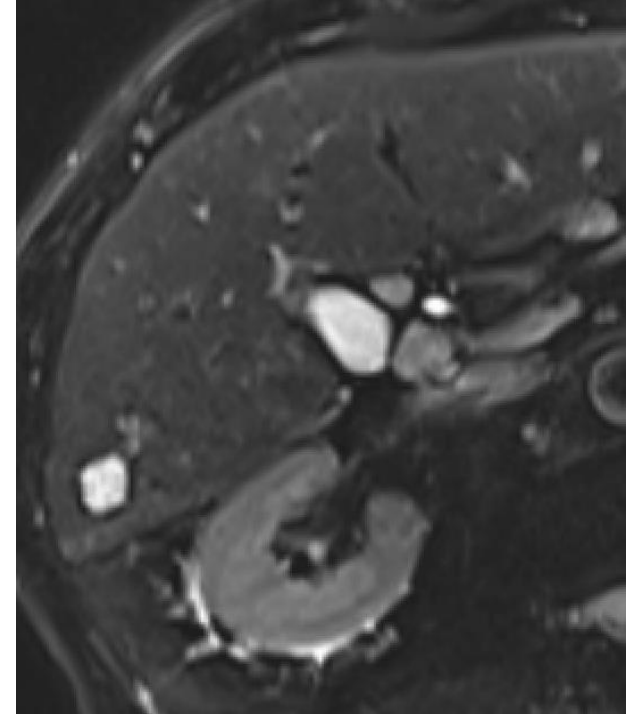
## Spontaneous disappearance

*\*List above not meant to be exhaustive*

# LR-1

## Definite:

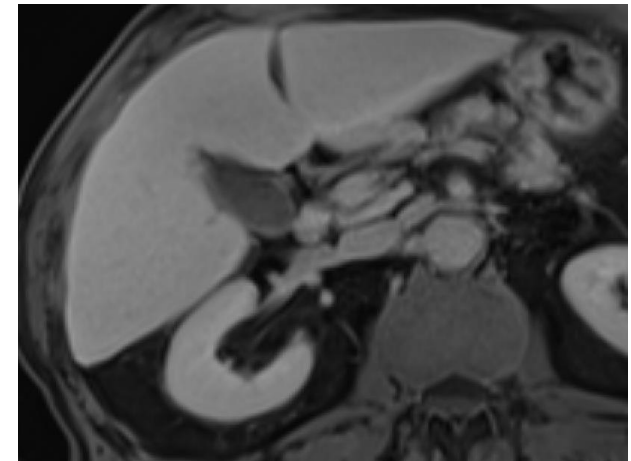
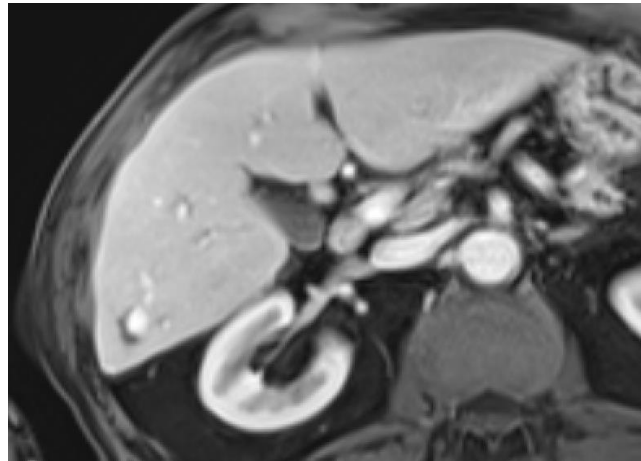
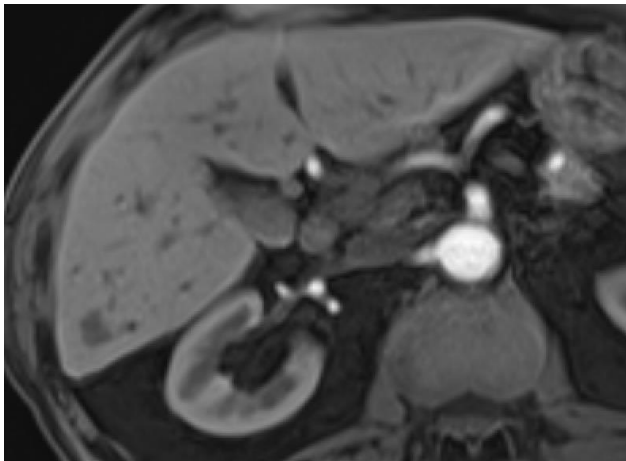
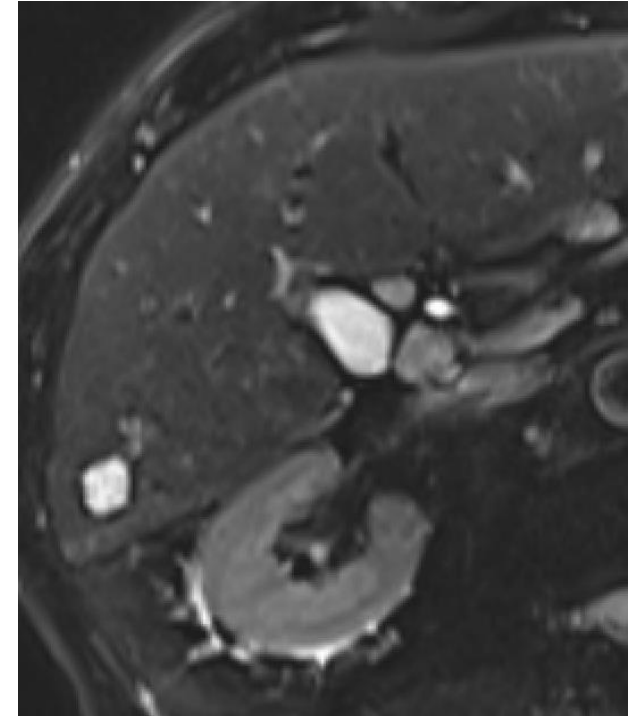
- Cyst
- Hemangioma
- Perfusion alteration (e.g., arterioportal shunt)
- Hepatic fat deposition/sparing
- Hypertrophic pseudo-mass
- Confluent fibrosis or focal scar



# LR-1

## Definite:

- Cyst
- Hemangioma
- Perfusion alteration (e.g., arterioportal shunt)
- Hepatic fat deposition/sparing
- Hypertrophic pseudo-mass
- Confluent fibrosis or focal scar



# LR-2

## Probable:

- Cyst
- Hemangioma
- Perfusion alteration (e.g., arterioportal shunt)
- Hepatic fat deposition/sparing
- Hypertrophic pseudomass
- Confluent fibrosis or focal scar

Distinctive nodule without malignant imaging features (see below)

*\*List above not meant to be exhaustive*

# Distinctive nodule without malignant imaging features

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**Solid nodule < 20 mm distinctive in imaging appearance compared to background nodules AND with no major feature of HCC, no feature of LR-M, and no ancillary feature of malignancy.**

## **Common examples:**

- T1 hyperintense
- T2 hypointense
- Siderotic
- HBP hyperintense
- Any combination of above

No APHE, WO, capsule, or growth  
No feature of LR-M  
No ancillary feature of malignancy

*If  $\geq 20$  mm, categorize as LR-3 or higher depending on imaging features*

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## 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

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*

# LI-RADS Major Imaging Features

-  Non-rim APHE
-  Non-peripheral “washout”
-  Enhancing “capsule”
-  Size
-  Threshold growth

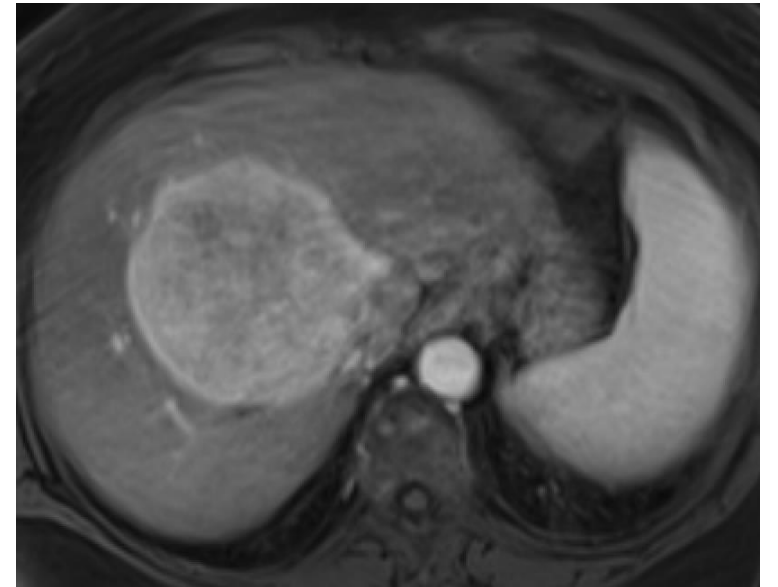
# Non-rim APHE



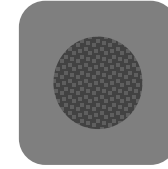
Non-rim-like enhancement

Unequivocally greater in whole or in part than liver

Higher in attenuation / intensity than liver in arterial phase.



# Non-peripheral “washout”



Non-peripheral visually assessed temporal reduction in enhancement relative to composite liver tissue

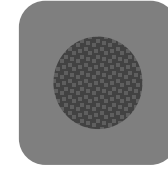
In whole or in part

From earlier to later phase

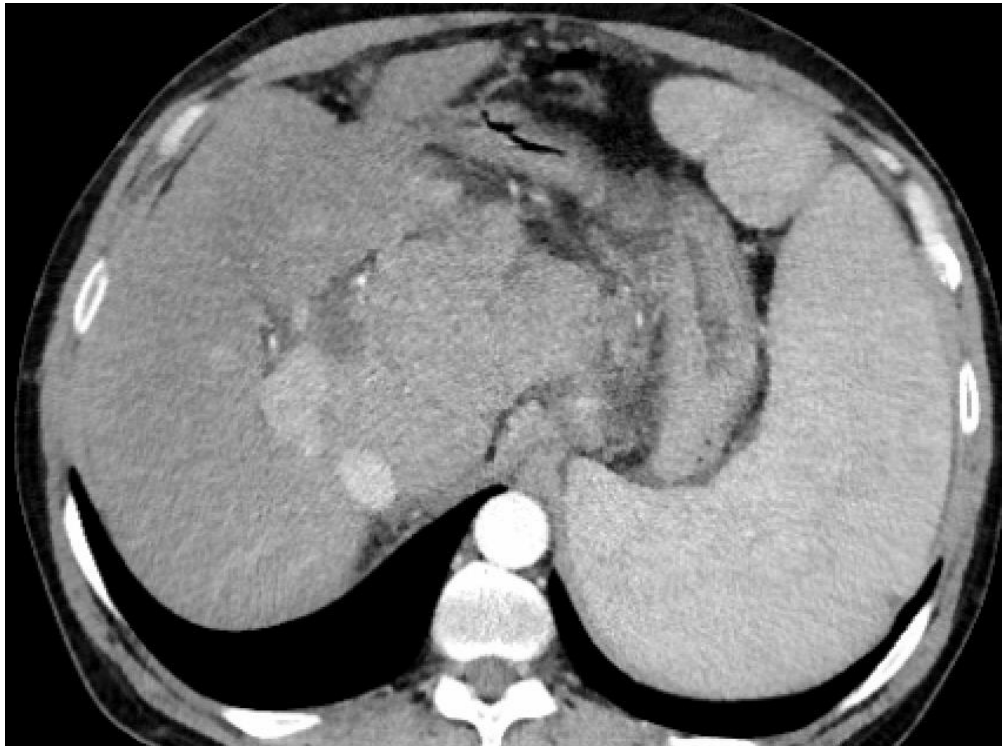
Resulting in hypo-enhancement in the extracellular phase:

- PVP ( with gadoxetate)
- PVP or DP (with ECA or gadobenate)

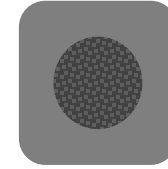
# Non-peripheral “washout”



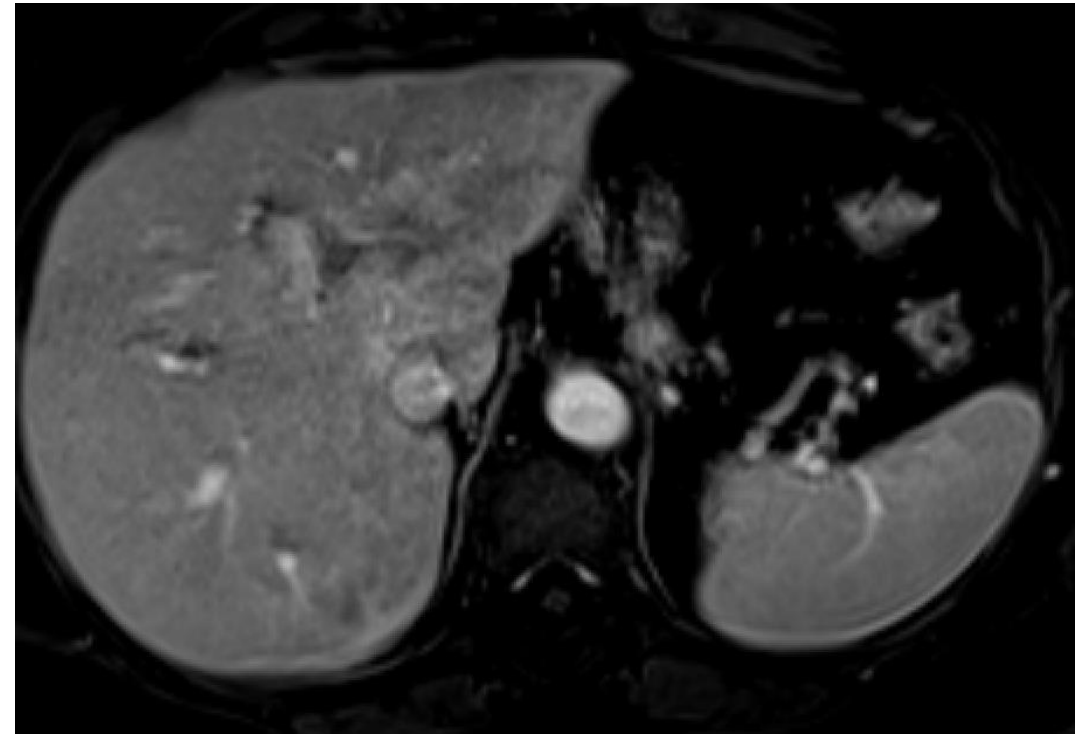
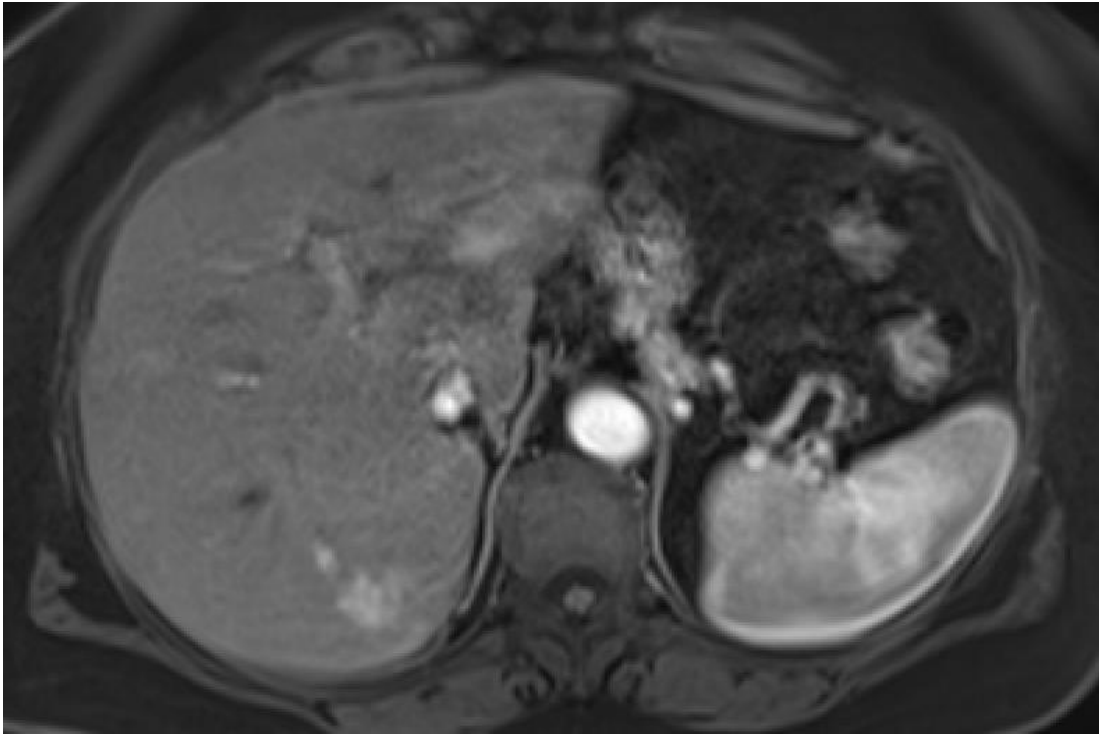
Can apply to any enhancing observation, even if no APHE



# Non-peripheral “washout”



In whole or in part, from earlier to later phase



# Enhancing “capsule”



Smooth, uniform, sharp border

Around most / all of an observation

Unequivocally thicker / more conspicuous than fibrotic tissue  
around background nodules

AND

Visible as an enhancing rim in PVP, DP, or TP.

# Enhancing “capsule”



Smooth, uniform, sharp border

Around most / all of an observation

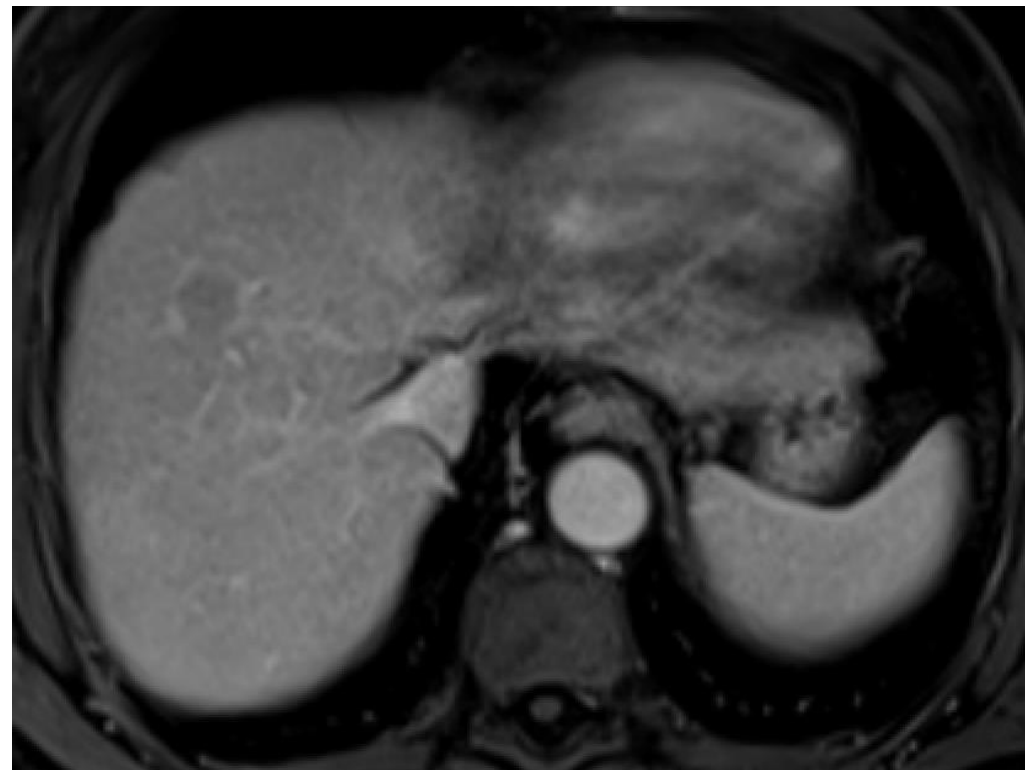
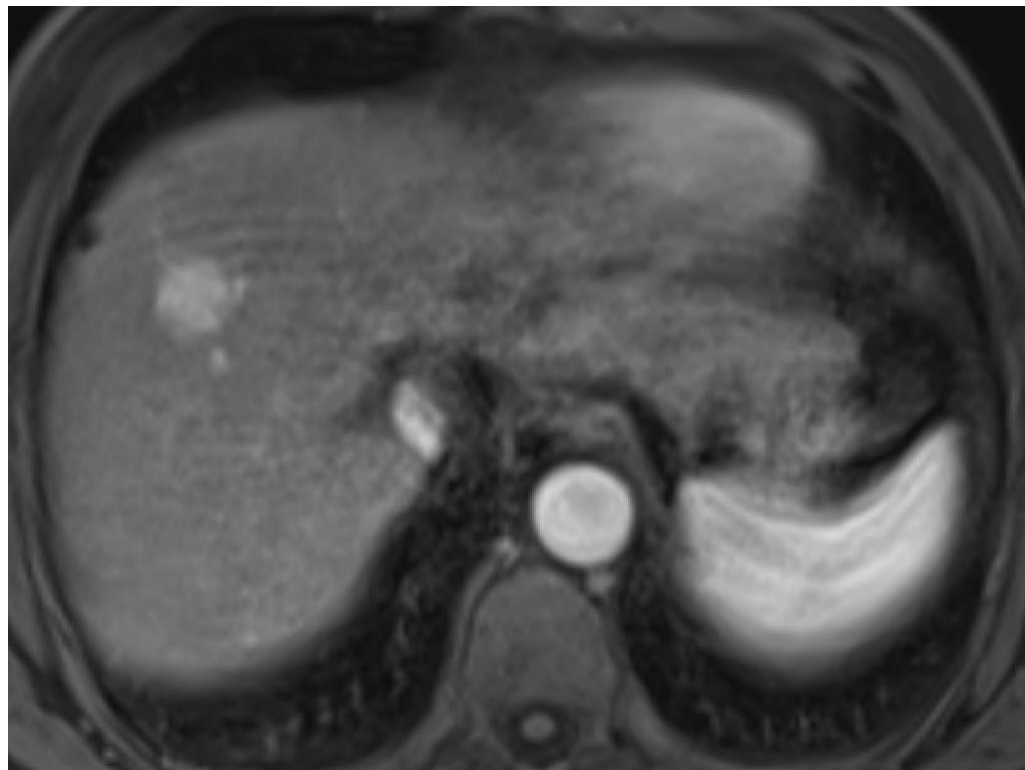
Unequivocally thicker / more conspicuous than fibrotic tissue around background nodules

AND

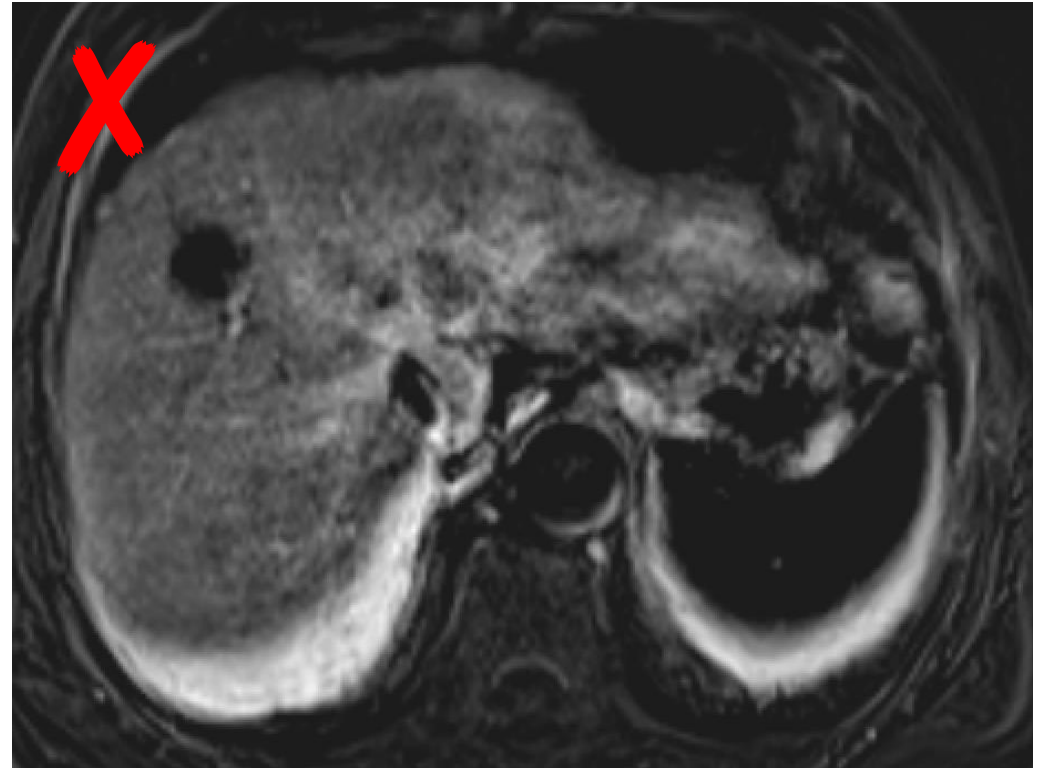
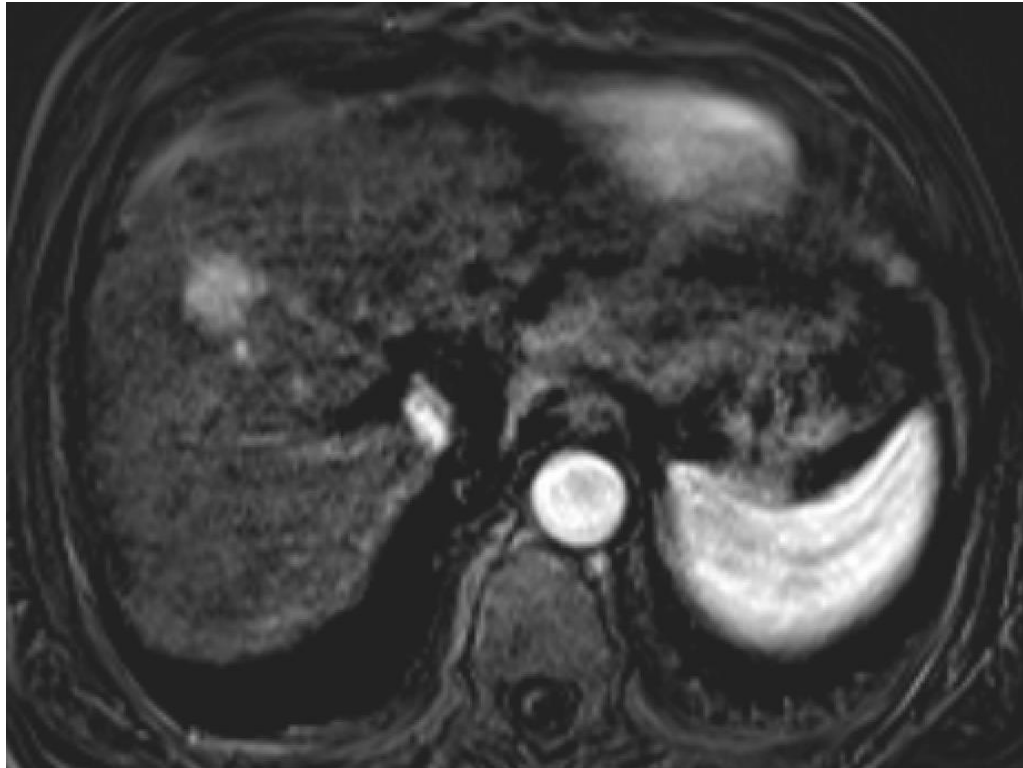
Visible as an enhancing rim in PVP, DP, or TP.



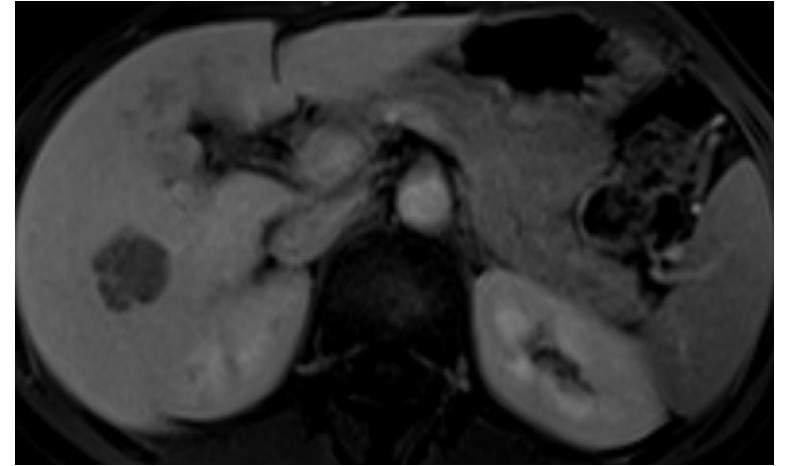
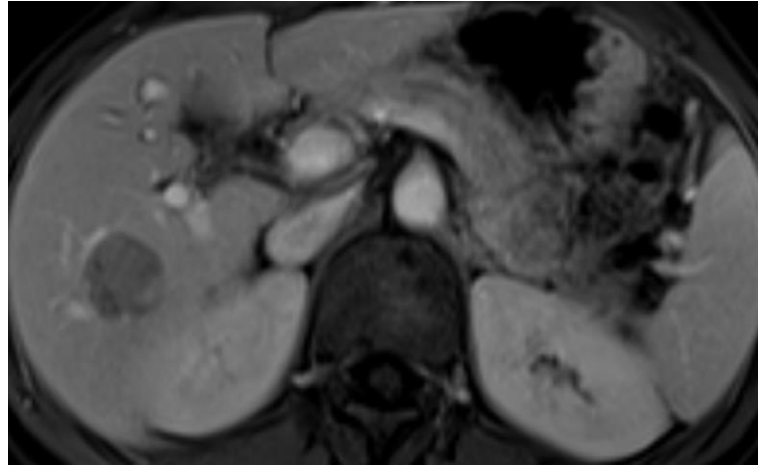
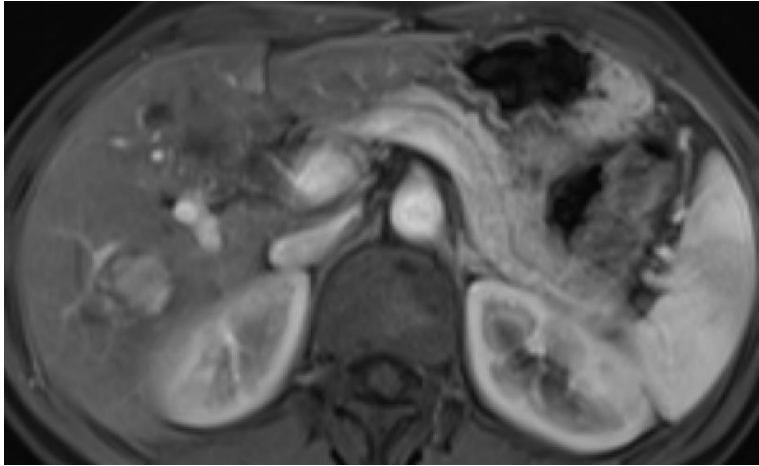
# Enhancing “capsule”



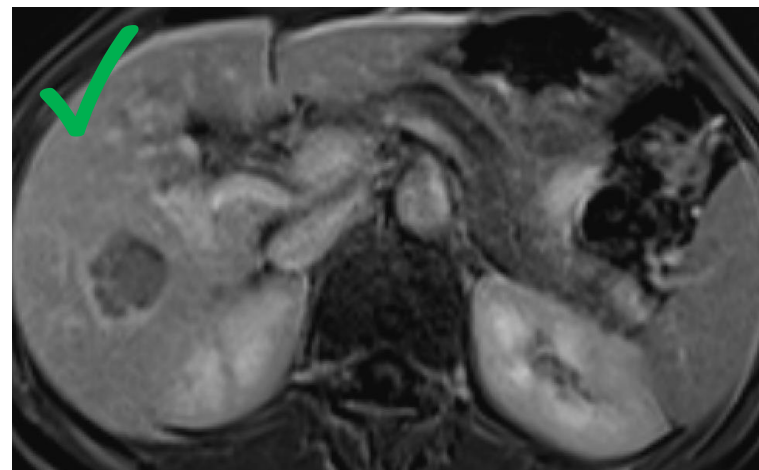
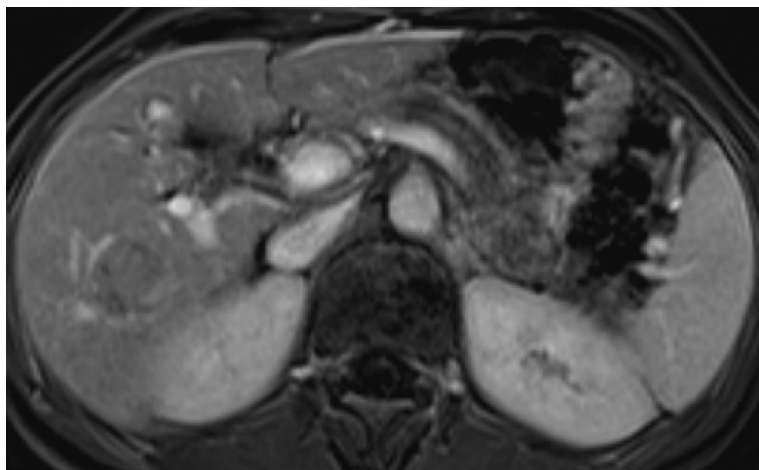
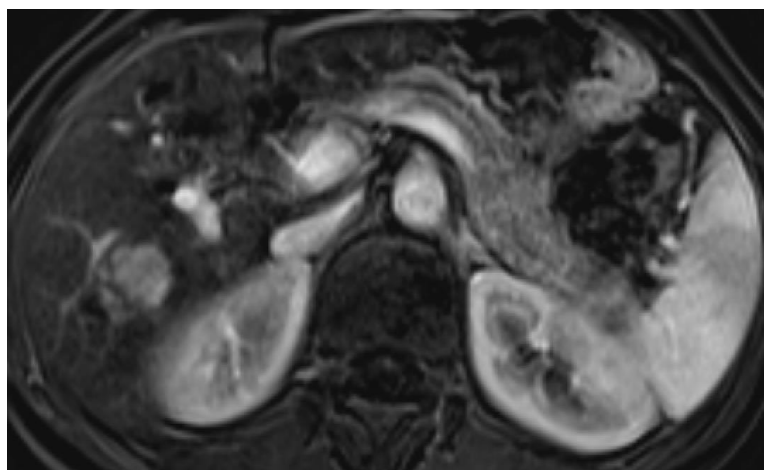
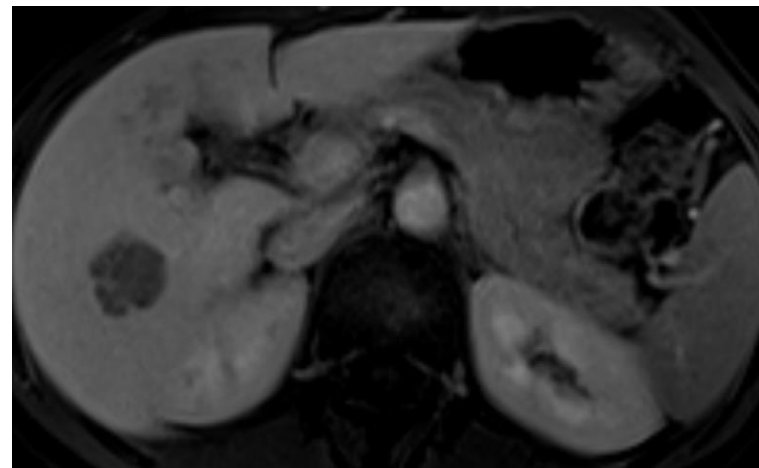
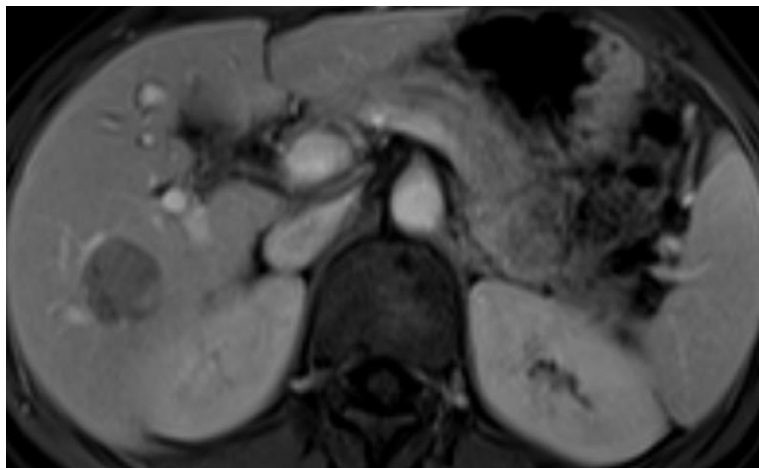
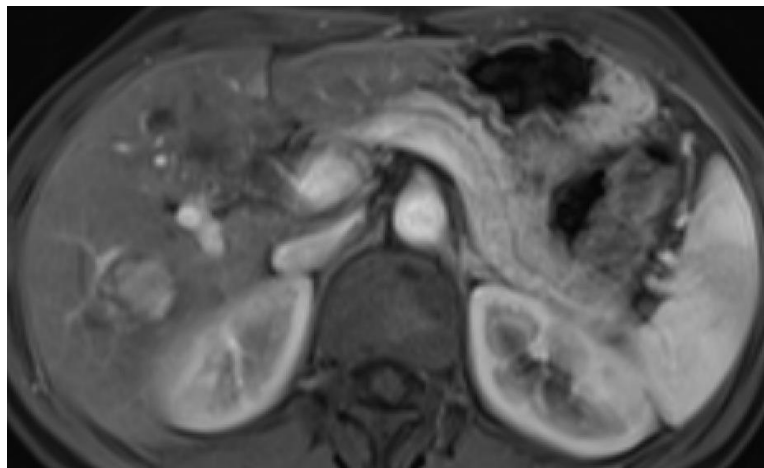
# Enhancing “capsule”



# Enhancing “capsule”



# Enhancing “capsule”



# Size

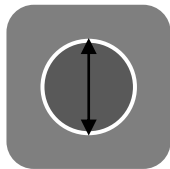


Largest outer-edge-to-outer-edge dimension of an observation

- Include “capsule” in measurement.
- Pick phase, sequence, plane in which margins are clearest.
- Do not measure in arterial phase or DWI if margins are clearly visible on different phase

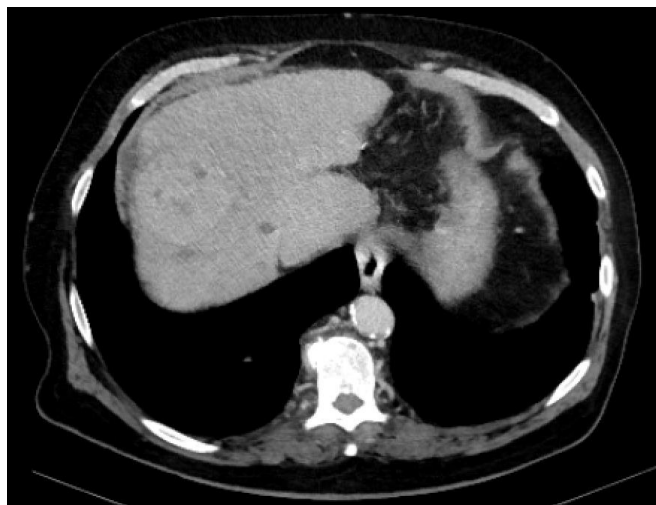
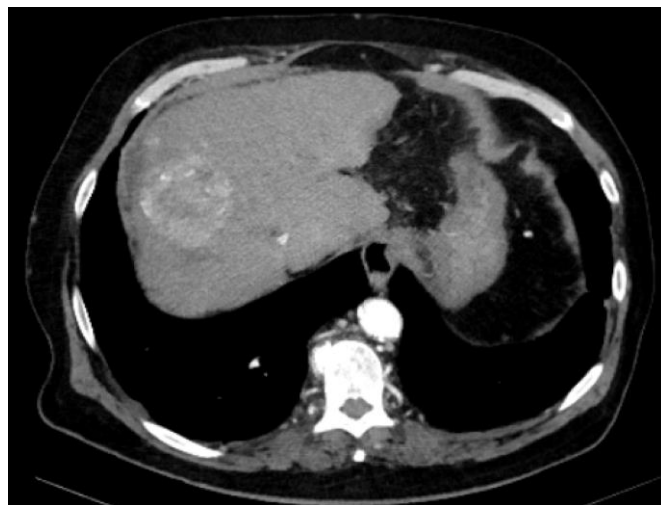
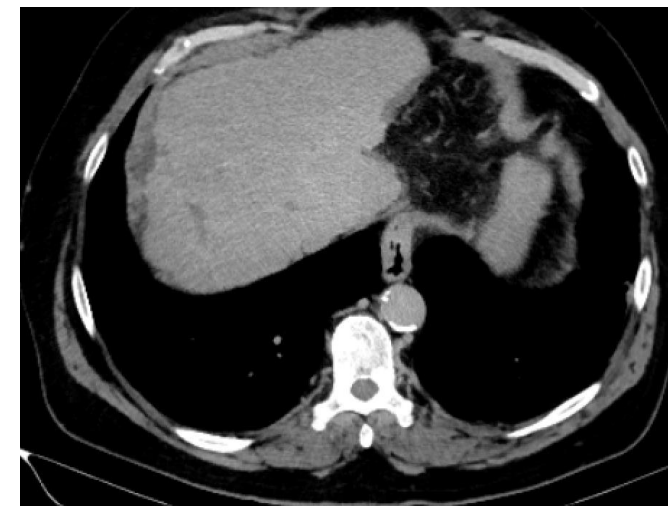
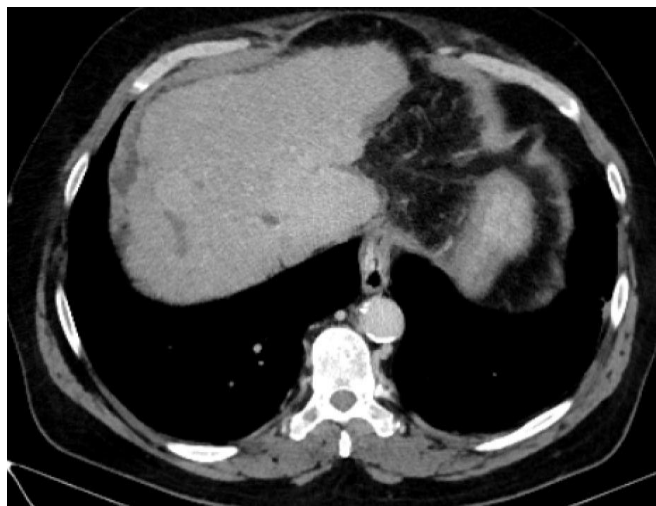
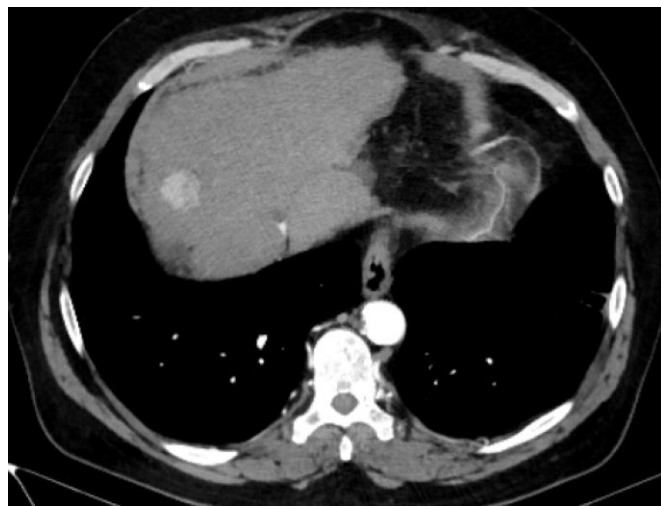
size may be overestimated in arterial phase due to summation with peri-observation enhancement and is not measured reliably on DWI due to anatomic distortion

**Size**



**What difference does it make?**

**1.9 cm versus 5.5 cm**



## CT/MRI Diagnostic Table

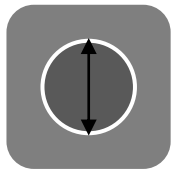
Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
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	One	LR-3	LR-4	LR-4	LR-4 / LR-5	LR-5
	≥ Two	LR-4	LR-4	LR-4	LR-5	LR-5

Observations in this cell are categorized based on one additional major feature:

- LR-4 – if enhancing “capsule”
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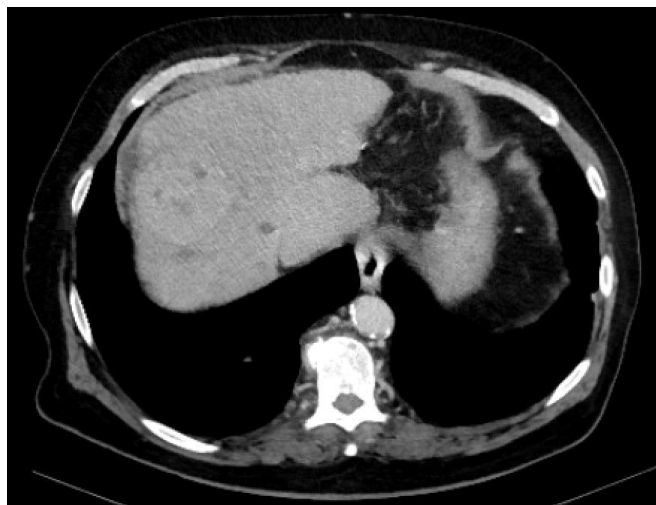
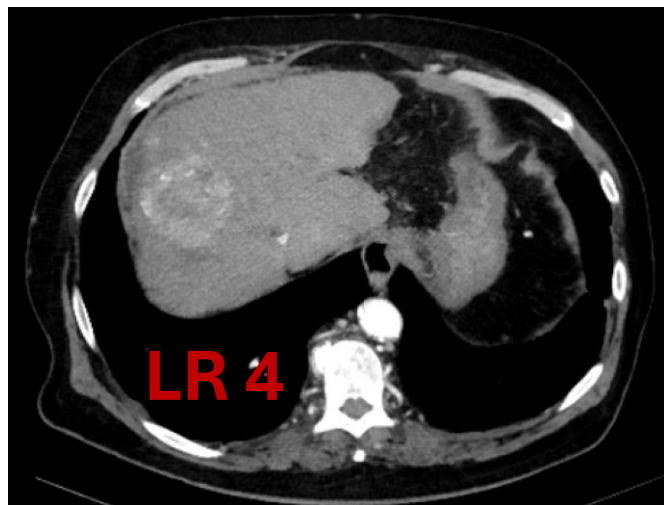
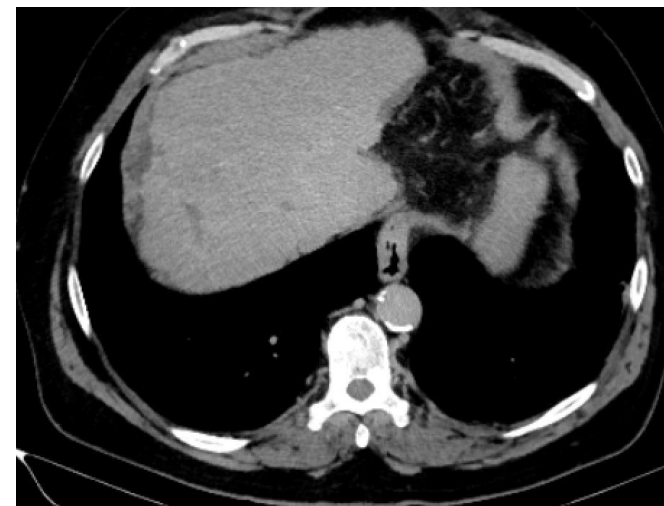
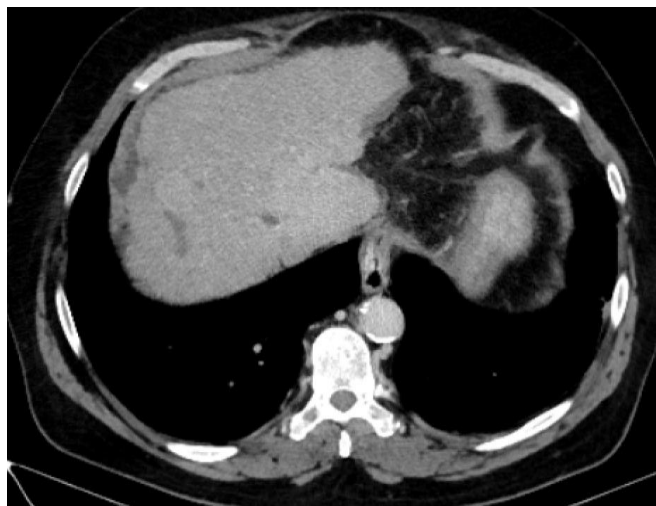
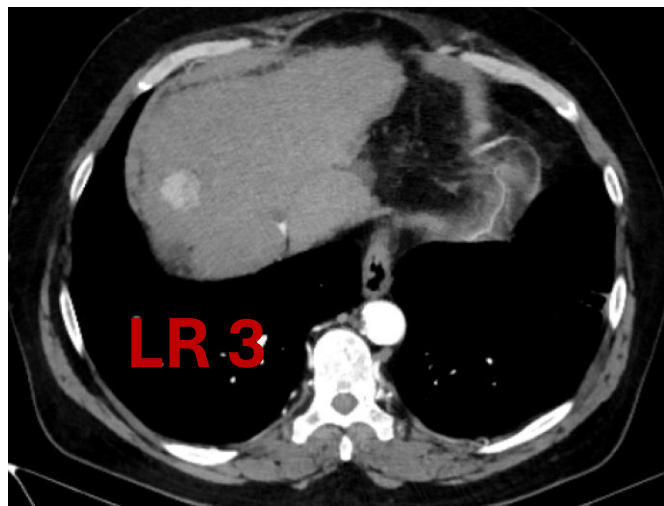
*If unsure about the presence of any major feature: characterize that feature as absent*

**Size**



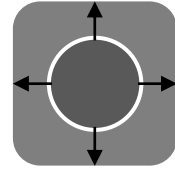
**What difference does it make?**

**1.9 cm versus 5.5 cm**





# Threshold growth

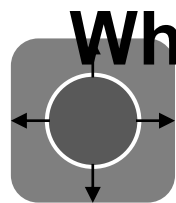


Size increase of a mass by  $\geq 50\%$  in  $\leq 6$  months

Apply threshold growth *only* if:

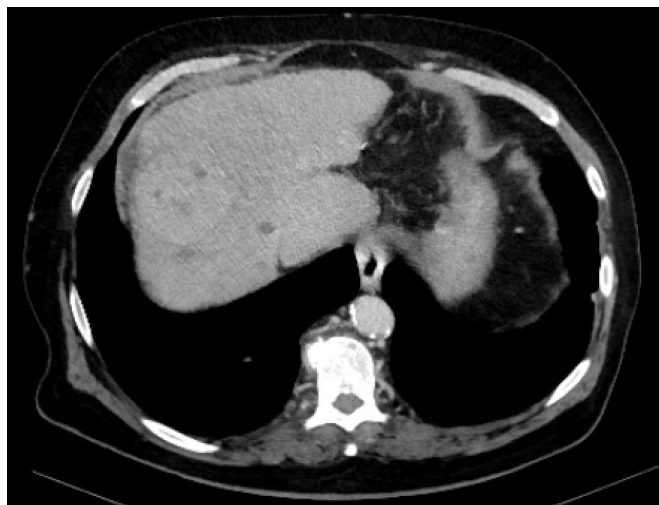
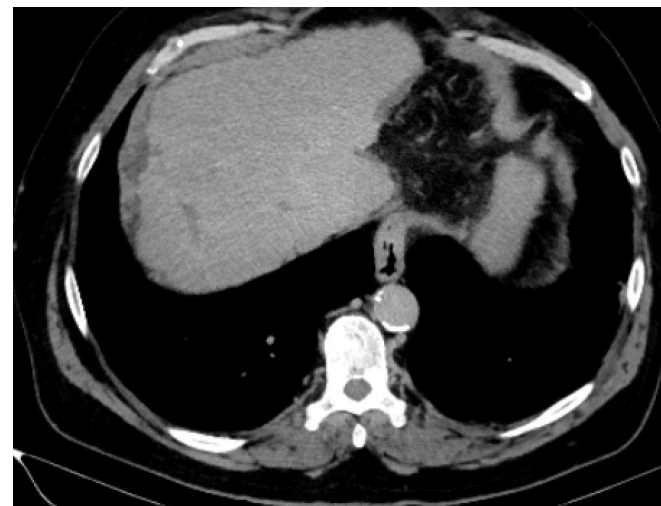
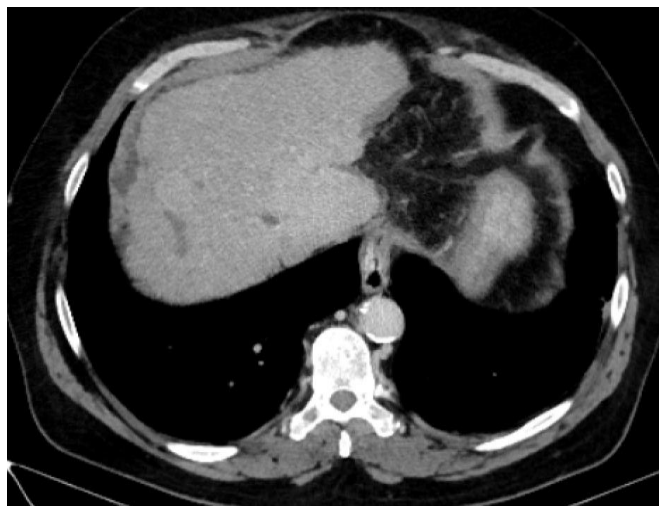
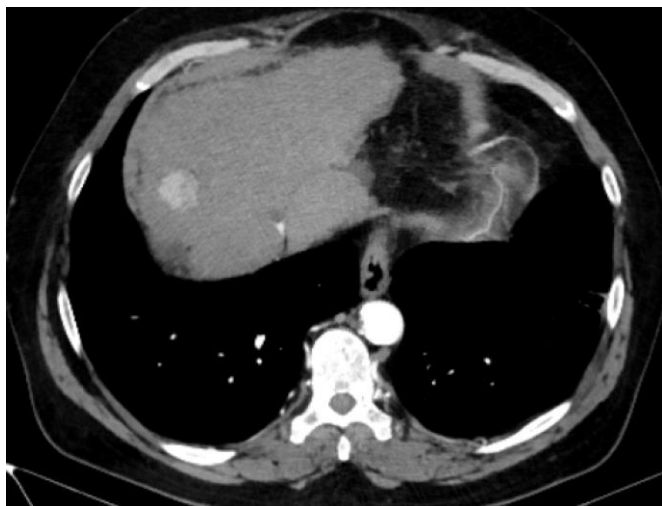
- Unequivocally dealing with a mass:  
do not apply threshold growth if there is a reasonable possibility of a pseudo-lesion (perfusion alteration)
- Available prior CT or MRI of sufficient quality and appropriate technique  
do not assess threshold growth by comparing to prior US or CEUS exams
- Measure on same phase / sequence / plane on serial exams *if possible*

# Threshold growth



What difference does it make?

**<6 m versus 16 m**



## CT/MRI Diagnostic Table

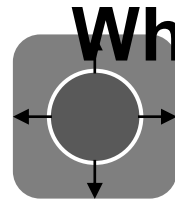
Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
Observation size (mm)		< 20	≥ 20	< 10	10-19	≥ 20
Count additional major features: • Enhancing “capsule” • Nonperipheral “washout” • Threshold growth	None	LR-3	LR-3	LR-3	LR-3	LR-4
	One	LR-3	LR-4	LR-4	LR-4 / LR-5	LR-5
	≥ Two	LR-4	LR-4	LR-4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

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

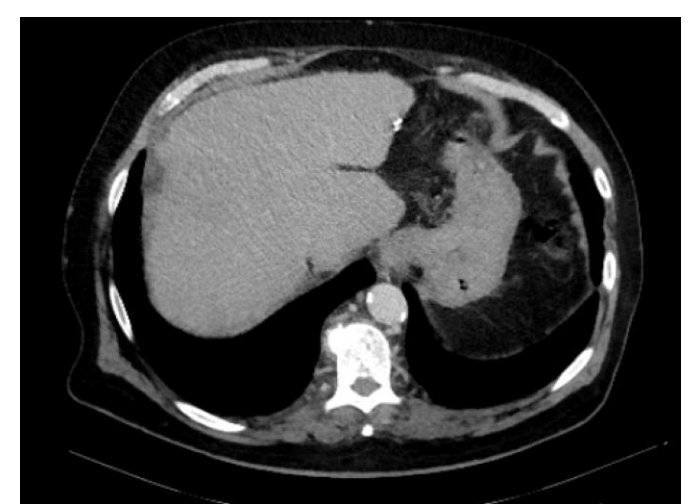
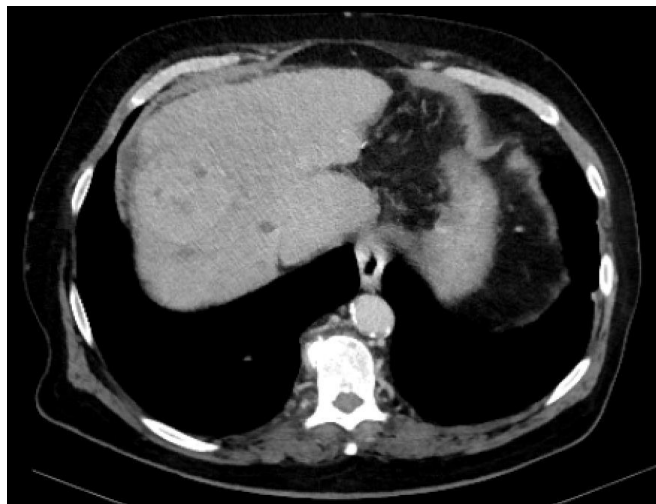
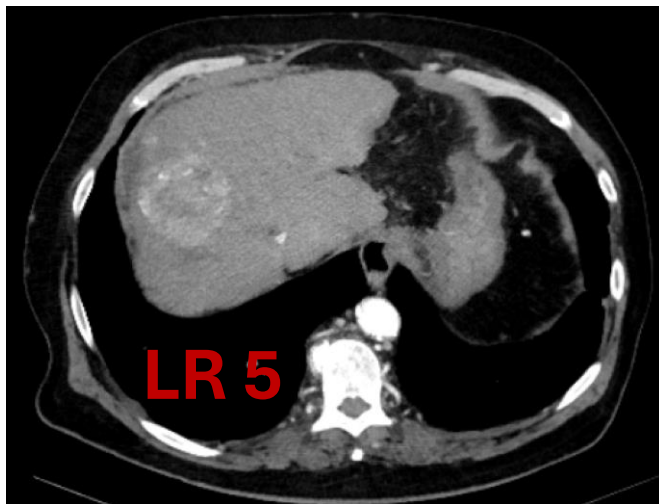
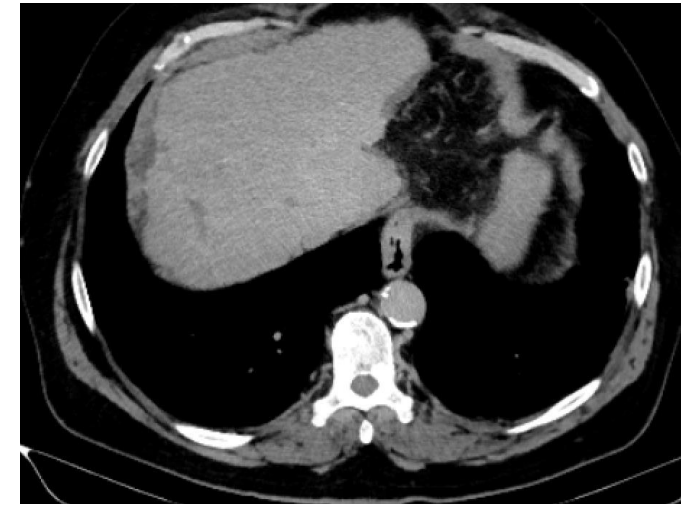
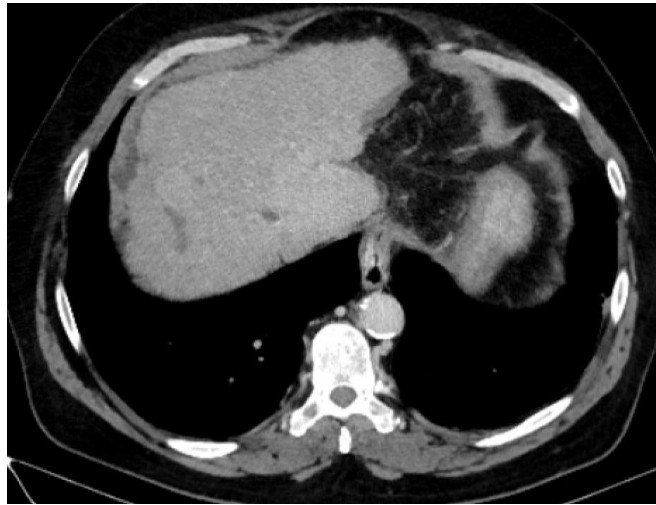
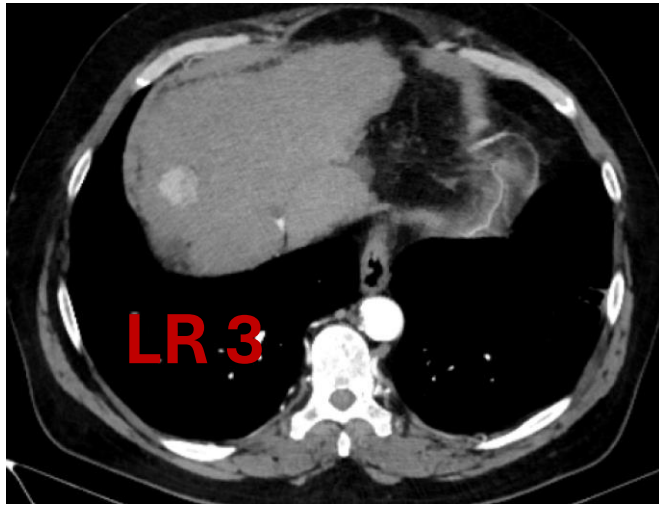
*If unsure about the presence of any major feature: characterize that feature as absent*

# Threshold growth



What difference does it make?

**<6 m versus 16 m**



# LI-RADS Tumor in Vein

Unequivocal enhancing soft tissue in vein, regardless of visualization of parenchymal mass

## Additional clues to diagnosis of tumor in vein:

Imaging features that suggest tumor in vein but do NOT establish it:

- Occluded vein with ill-defined walls
- Occluded vein with restricted diffusion
- Occluded or obscured vein in contiguity with malignant parenchymal mass
- Heterogeneous vein enhancement not attributable to artifact

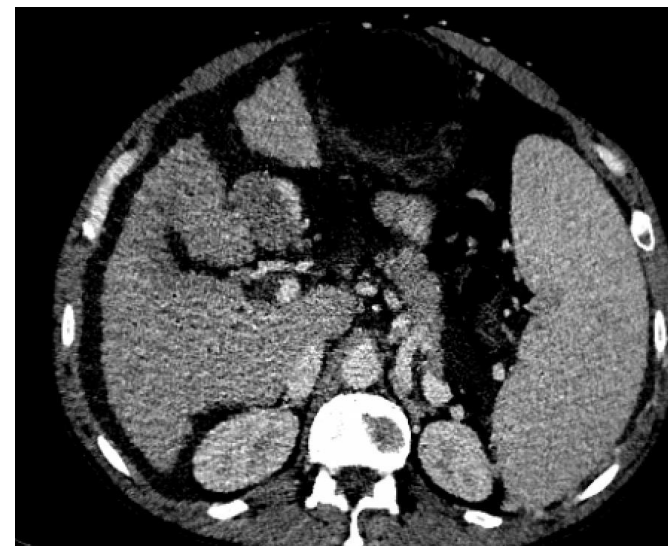
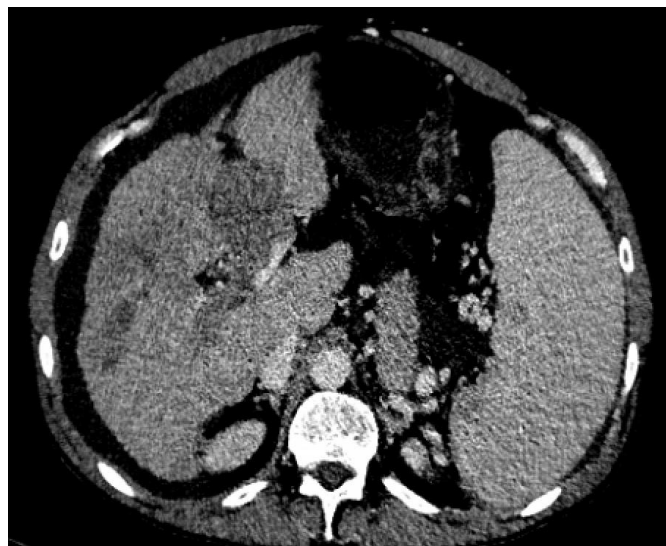
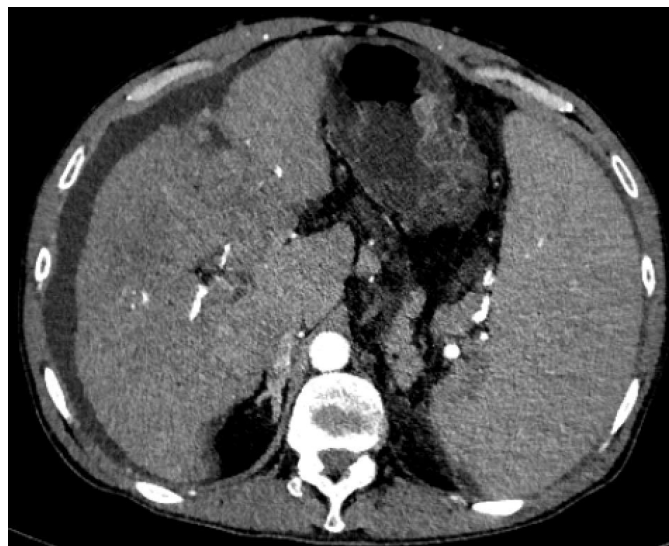
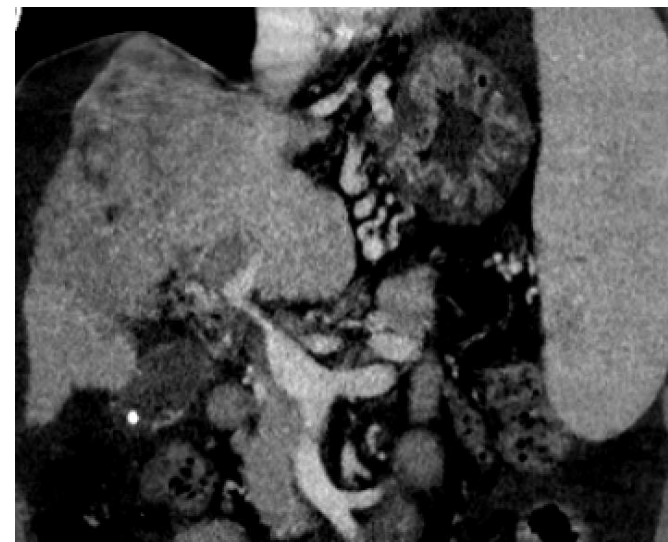
\* If these features are seen, scrutinize vein for *enhancing soft tissue*

# LR-TIV

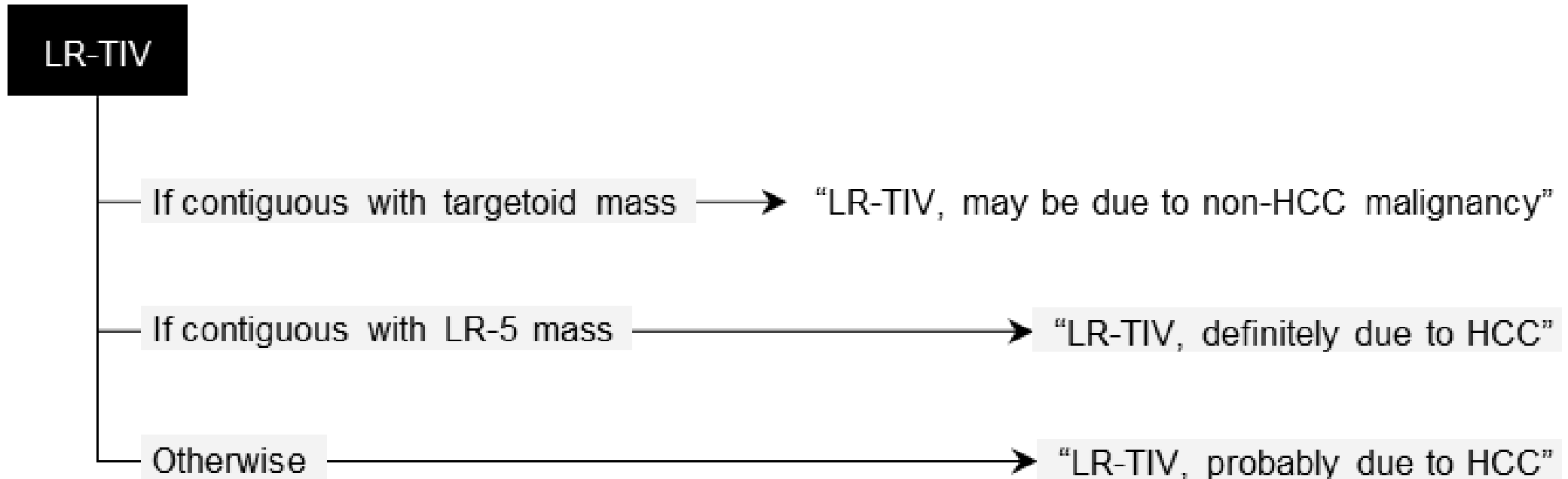
46 yo M

cirrhosis

multicentric HCC



# LI-RADS Tumor in Vein



# LR-M Criteria

Targetoid mass (see below for definition and imaging appearances)

**OR**

Nontargetoid mass with one or more of the following:

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

No tumor in vein  
No LR-5 criteria



# Targetoid – definition

Target-like imaging morphology

Concentric arrangement of internal components

Likely reflects

peripheral hypercellularity

central stromal fibrosis or ischemia.

# Targetoid – definition

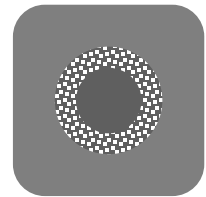
Characteristic of:

- Intrahepatic cholangiocarcinoma (iCCA)
- Combined HCC-cholangiocarcinoma (cHCC-CCA)
- Other non-HCC malignancies
- Can be seen in HCC with atypical appearance.

Targetoid appearance suggests non-HCC malignancy  
but *does not exclude HCC*.

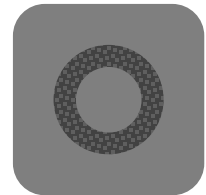
# Targetoid mass – imaging appearance

Targetoid dynamic enhancement:



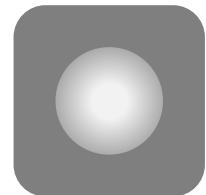
Rim APHE

arterial phase enhancement is most pronounced in observation periphery



Peripheral  
“washout”

apparent washout is most pronounced in observation periphery

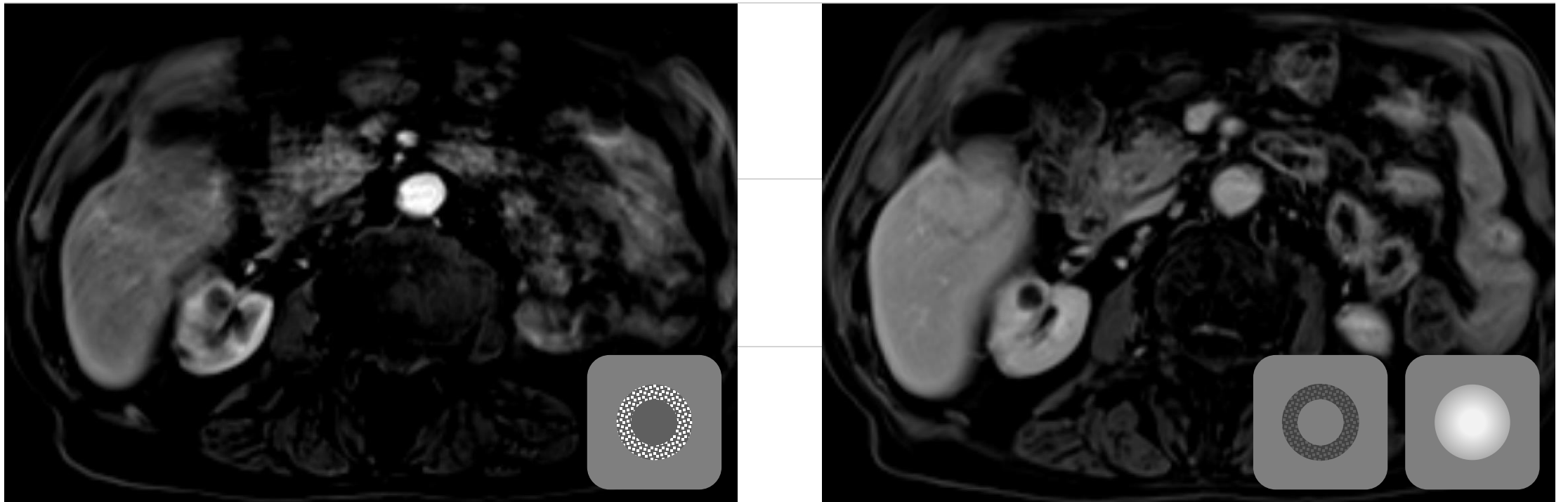


Delayed central  
enhancement

central area of progressive postarterial phase enhancement

# Targetoid mass – imaging appearance

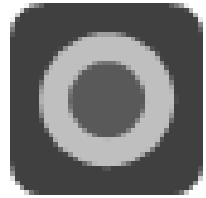
Targetoid dynamic enhancement:



# Targetoid mass – imaging appearance

Targetoid appearance on DWI or TP/HBP:

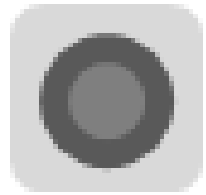
---



Targetoid  
restriction

Concentric pattern on DWI:  
restricted diffusion in periphery  
less restricted diffusion in center

---

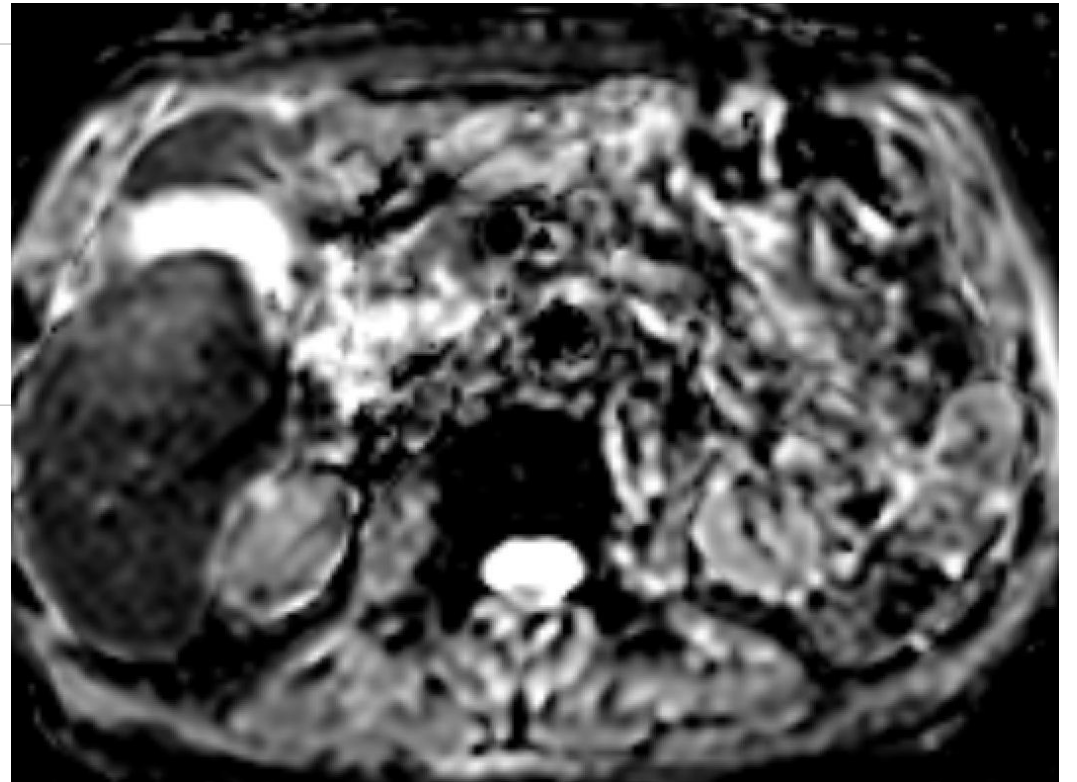
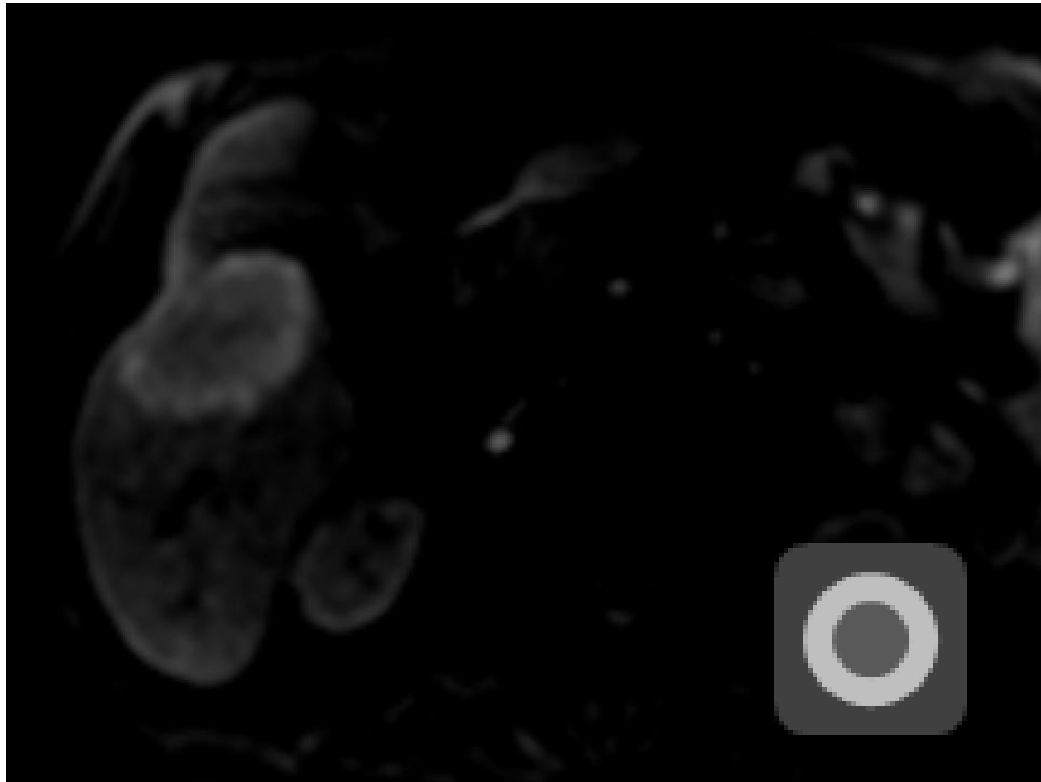


Targetoid TP  
or HBP  
appearance

Concentric pattern in TP or HBP:  
moderate-to-marked hypointensity in  
periphery  
milder hypointensity in center

# Targetoid mass – imaging appearance

Targetoid appearance on DWI or TP/HBP:



## LR-M

If infiltrative appearance → “Probably represents HCC”

If there is at least one imaging feature suggesting hepatocellular origin

- Fat in mass
- Iron in mass
- Blood products in mass
- Nodule in nodule architecture
- Mosaic architecture
- Nonenhancing capsule appearance
- Intrinsic T1 hyperintensity
- HBP hyperintensity > liver (if HBP is adequate)

→ “May represent HCC with atypical features or cHCC-CCA”

If targetoid → “Most likely represents iCCA, cHCC-CCA, or HCC with atypical features”

Otherwise → “Etiology uncertain”



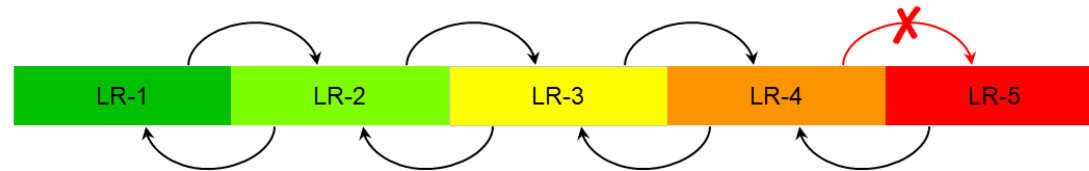
Algorithm above is not exhaustive. It addresses only the more common diagnostic considerations encountered in at-risk patients.

## 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:

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



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

If  $\geq 1$  AF favoring malignancy and  $\geq 1$  AF favoring benignity:  
Do not adjust category

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

### Ancillary features favoring malignancy

#### 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

### Ancillary features favoring benignity

- Size stability > 2 yrs
- Size reduction
- Parallels blood pool
- Undistorted vessels
- Iron in mass, more than liver
- Marked T2 hyperintensity
- Hepatobiliary phase isointensity

*If unsure about presence of any ancillary feature: characterize that feature as absent*



# Ancillary features

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:

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

# LI-RADS Ancillary Imaging Features Favoring Malignancy & The Imaging Modalities in Which They Are Visible

## Ancillary features favoring malignancy, not HCC in particular

Feature	Definition	CT	MRI ECA	MRI HBA
US visibility as discrete nodule	Unenhanced US visibility as discrete nodule or mass corresponding to CT- or MRI-detected observation	+	+	+
Subthreshold growth	Unequivocal size increase of a mass, less than threshold growth.	+	+	+
Corona enhancement	Periobservational enhancement in late arterial phase or early PVP attributable to venous drainage from tumor	+	+	+
Fat sparing in solid mass	Relative paucity of fat in solid mass relative to steatotic liver <b>OR</b> in inner nodule relative to steatotic outer nodule	+ / -	+	+
Restricted diffusion	Intensity on DWI, not attributable solely to T2 shine-through, unequivocally higher than liver and/or ADC unequivocally lower than liver	-	+	+
Mild-moderate T2 hyperintensity	Intensity on T2WI mildly or moderately higher than liver and similar to or less than non-iron-overloaded spleen	-	+	+
Iron sparing in solid mass	Paucity of iron in solid mass relative to iron-overloaded liver <b>OR</b> in inner nodule relative to siderotic outer nodule	-	+	+
Transitional phase hypointensity	Intensity in the transitional phase unequivocally less, in whole or in part, than liver	-	-	+
Hepatobiliary phase hypointensity	Intensity in the hepatobiliary phase unequivocally less, in whole or in part, than liver	-	-	+

# LI-RADS Ancillary Imaging Features Favoring Malignancy & The Imaging Modalities in Which They Are Visible

## Ancillary features favoring HCC in particular

Feature	Definition	CT	MRI ECA	MRI HBA
Nonenhancing “capsule”	Capsule appearance not visible as an enhancing rim. See <a href="#">page 20</a> for definition of enhancing “capsule”.	+	+	+
Nodule-in-nodule architecture	Presence of smaller inner nodule within and having different imaging features than larger outer nodule	+	+	+
Mosaic architecture	Presence of randomly distributed internal nodules or compartments, usually with different imaging features	+	+	+
Fat in mass, more than adjacent liver	Excess fat within a mass, in whole or in part, relative to adjacent liver	+ / -	+	+
Blood products in mass	Intralesional or perilesional hemorrhage in the absence of biopsy, trauma or intervention	+ / -	+	+

+ usually evaluable

– not evaluable

+ / – may or may not be evaluable

# LI-RADS Ancillary Imaging Features Favoring Benignity & The Imaging Modalities in Which They Are Visible

## Ancillary features favoring benignity

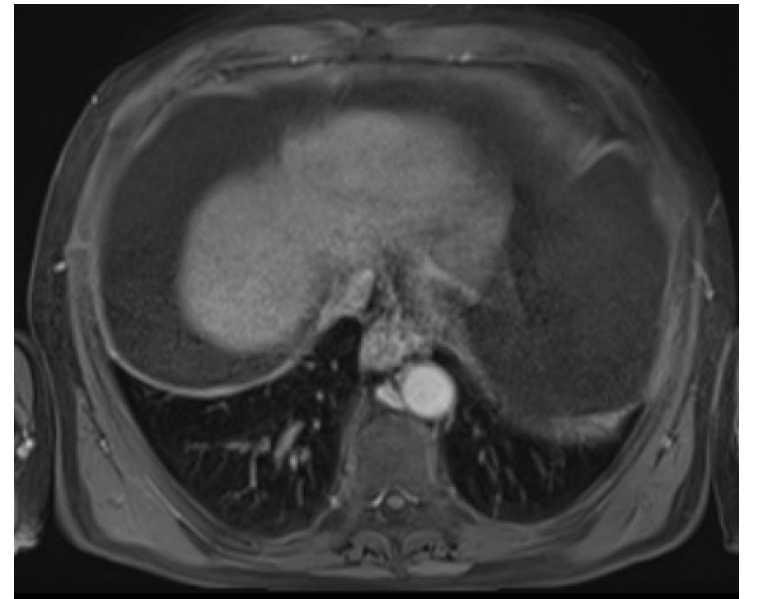
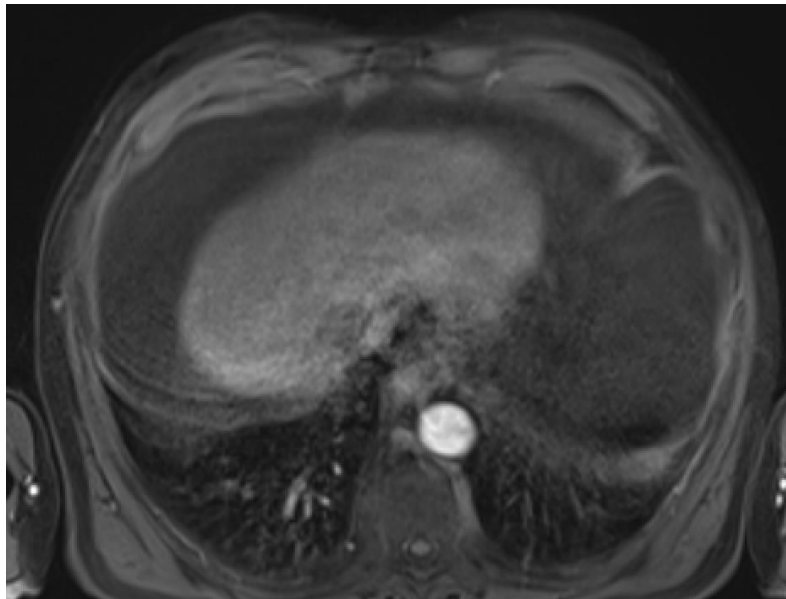
Feature	Definition	CT	MRI ECA	MRI HBA
Size stability $\geq$ 2 years	No significant change in observation size measured on exams $\geq$ 2 years apart in absence of treatment	+	+	+
Size reduction	Unequivocal spontaneous decrease in size over time, not attributable to artifact, measurement error, technique differences, or resorption of blood products	+	+	+
Parallels blood pool enhancement	Temporal pattern in which enhancement eventually reaches and then matches that of blood pool	+	+	+
Undistorted vessels	Vessels traversing an observation without displacement, deformation, or other alteration	+	+	+
Iron in mass, more than liver	Excess iron in a mass relative to background liver	+ / -	+	+
Marked T2 hyperintensity	Intensity on T2WI markedly higher than liver and similar to bile ducts and other fluid-filled structures	-	+	+
Hepatobiliary phase isointensity	Intensity in hepatobiliary phase nearly identical to liver	-	-	+

+ usually evaluable

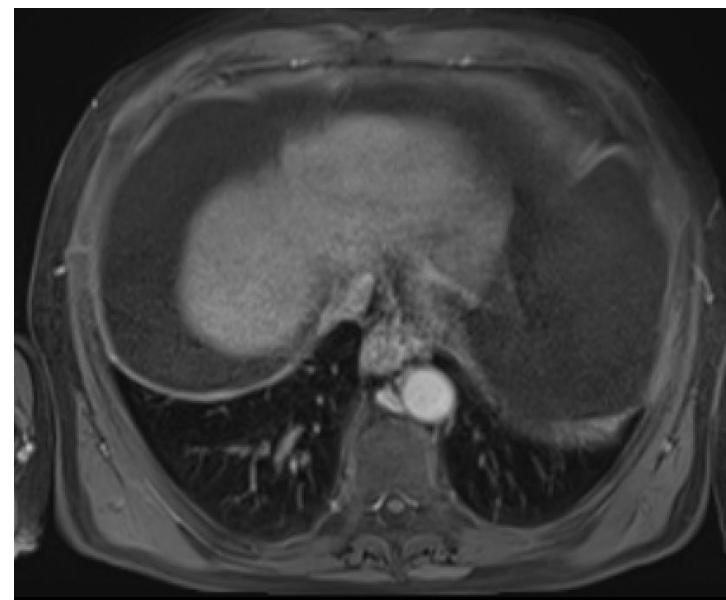
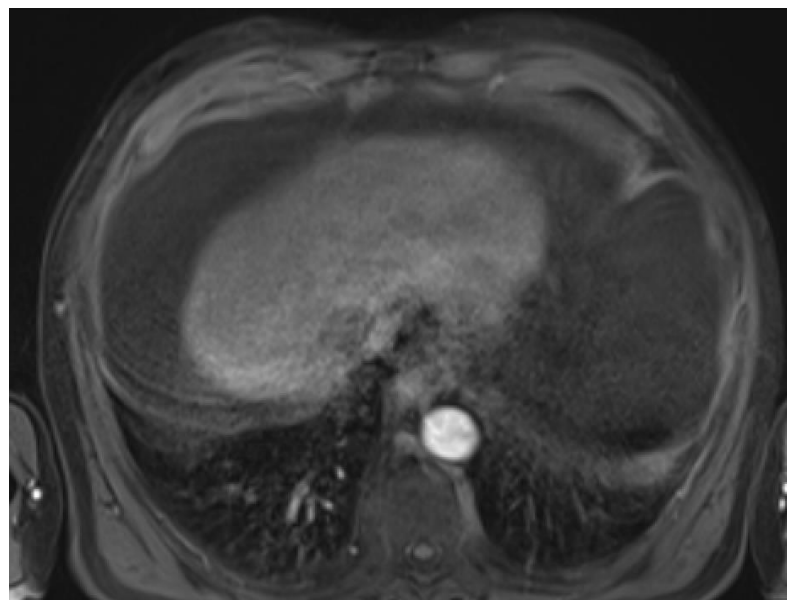
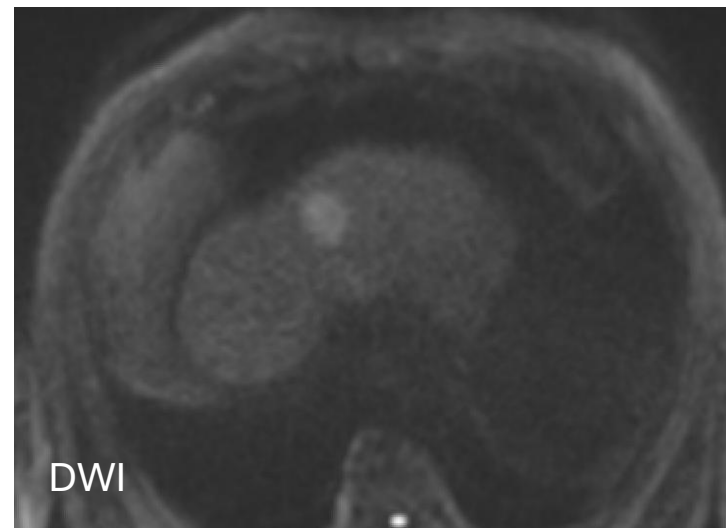
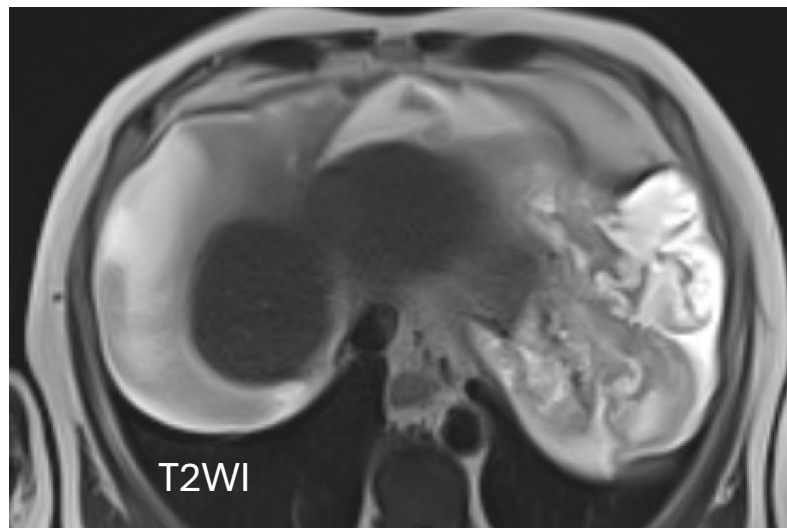
- not evaluable

+ / - may or may not be evaluable

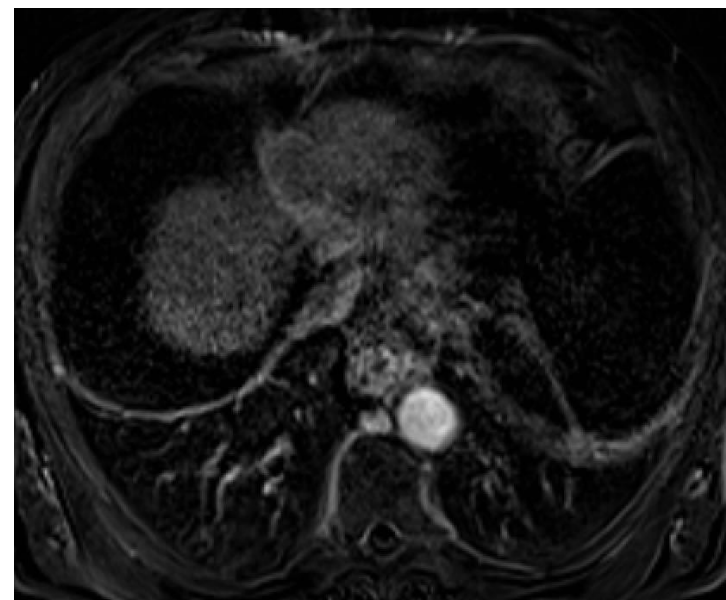
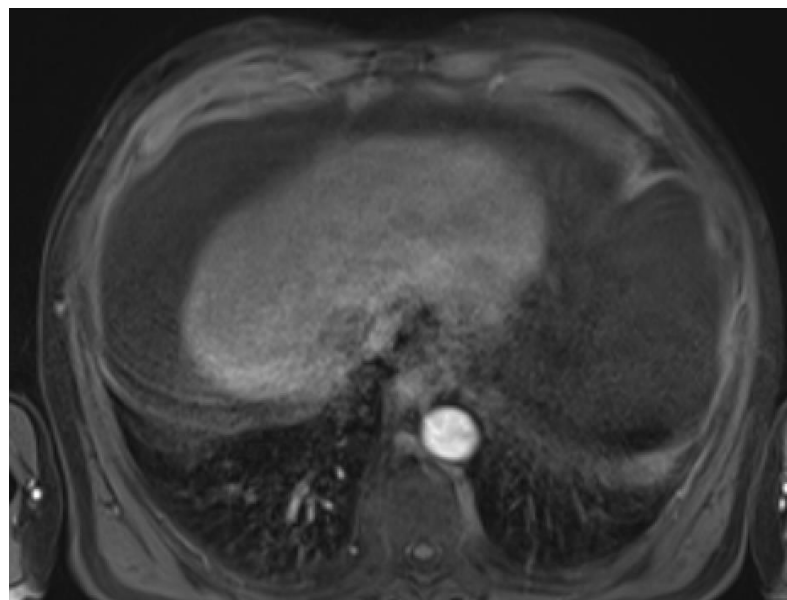
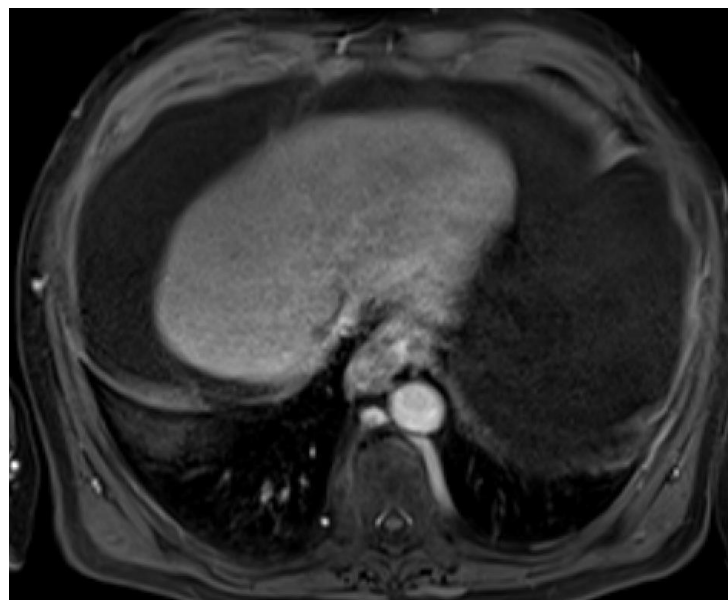
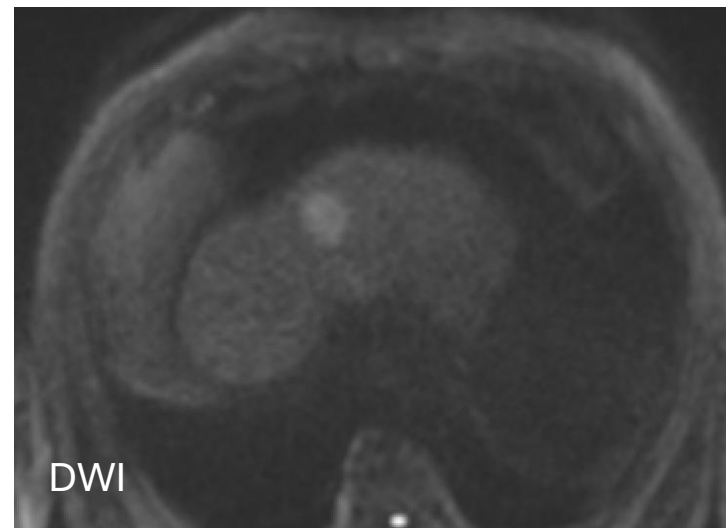
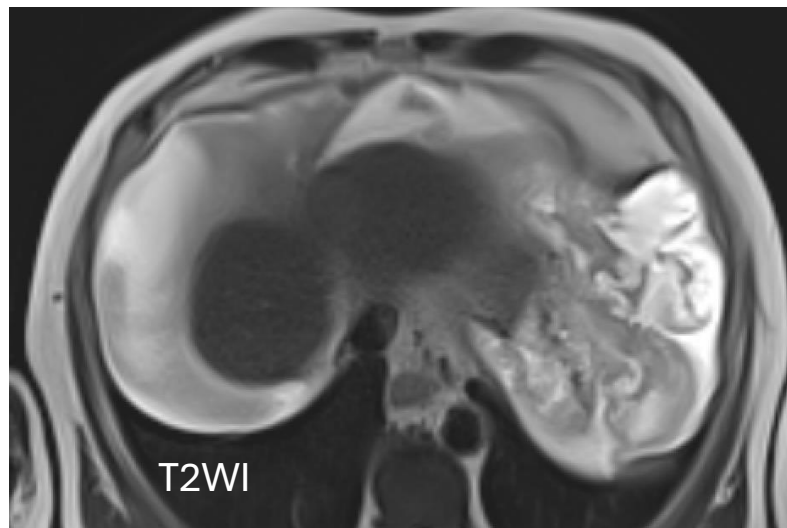
# Ancillary features



# Ancillary features



# Ancillary features

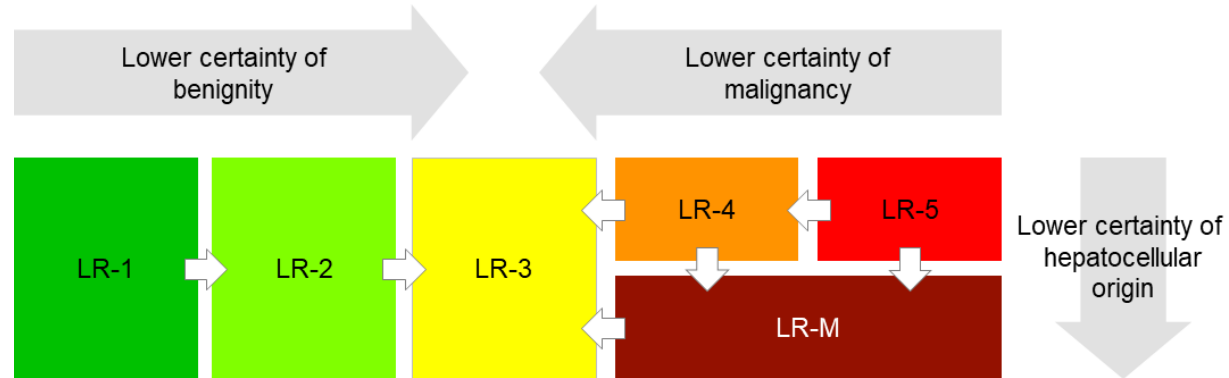


## Step 3. Apply Tiebreaking Rules if Needed

If unsure about presence of TIV, do not categorize as LR-TIV



If unsure between two categories, choose the one reflecting lower certainty



## Step 4. Final Check

After Steps 1, 2, and 3 –

Ask yourself if the assigned category seems reasonable and appropriate

**If YES:** You are done, move on the next observation (if any).

**If NO:** Assigned LI-RADS category may be inappropriate, so reevaluate.



# Take-home messages

- The case for LIRADS – using LIRADS leads to an imaging diagnosis of cancer with great accuracy
- Always remember in what patients to use LIRADS
- Don't be afraid to use LIRADS  
with the table by your side (for beginners, or not only)
- Go back to the guidelines/manual



**Thank you!**

