



Interactive cases using LIRADS

Vlad Bura

Emergency Children's Hospital, Cluj-Napoca
Regina Maria Cluj Hospital

Case 1

38 yo F

25 mm lesion

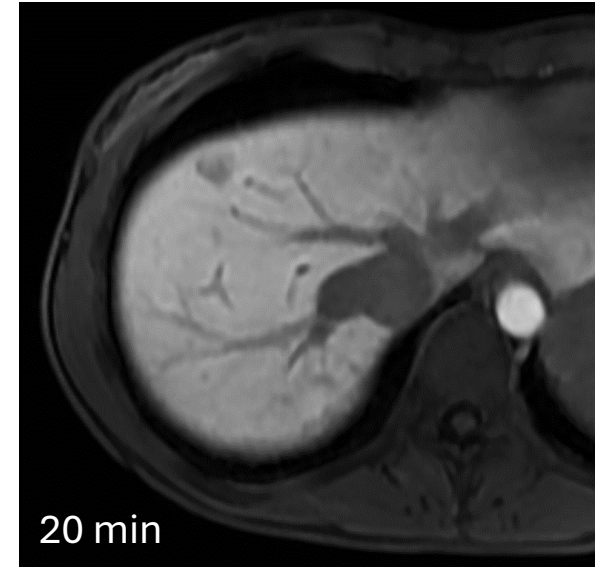
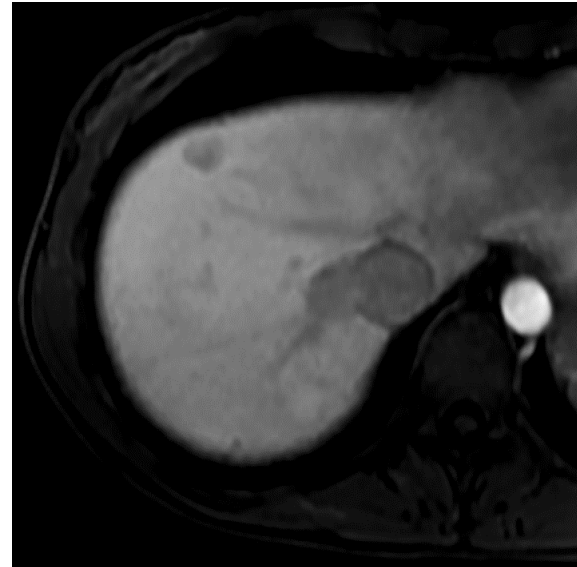
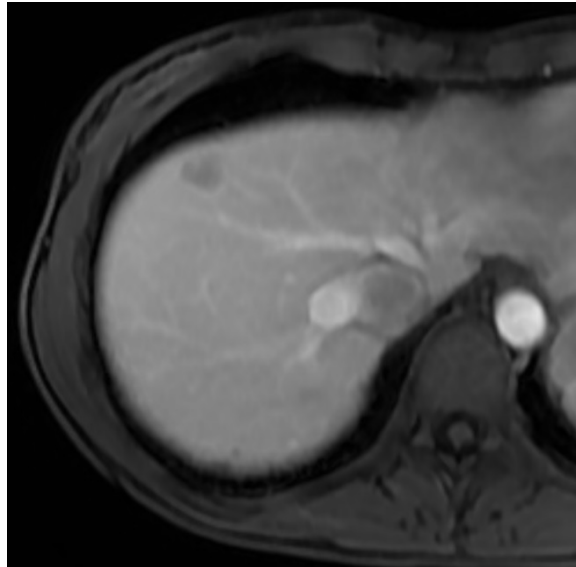
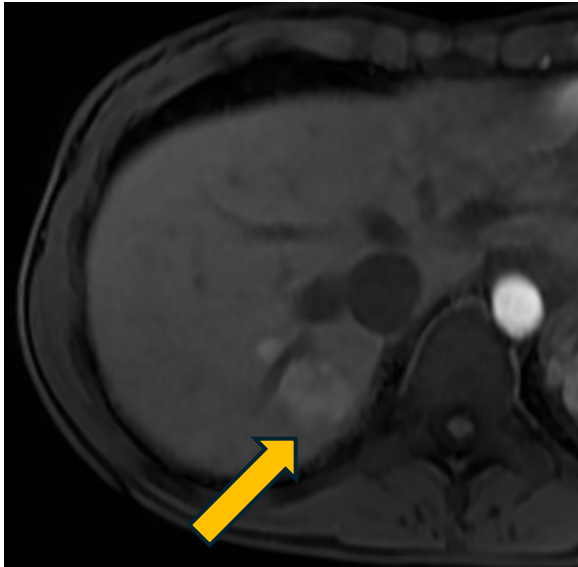
LIRADS 4

LIRADS 5

LIRADS 3

LIRADS 2

?



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)

Case 1

38 yo F

Chronic HepB infection

25 mm lesion

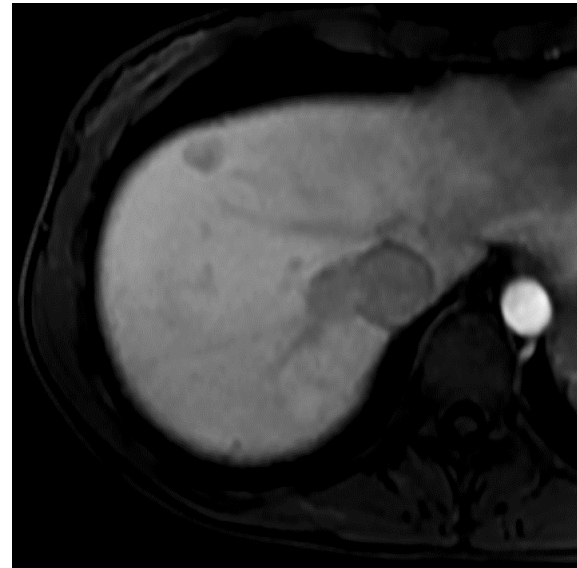
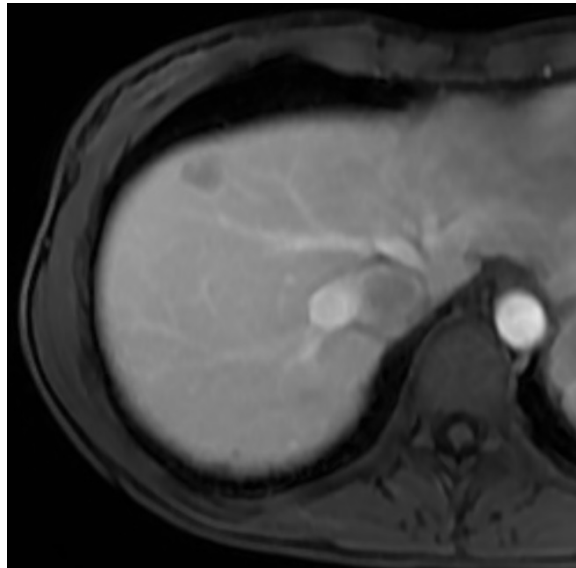
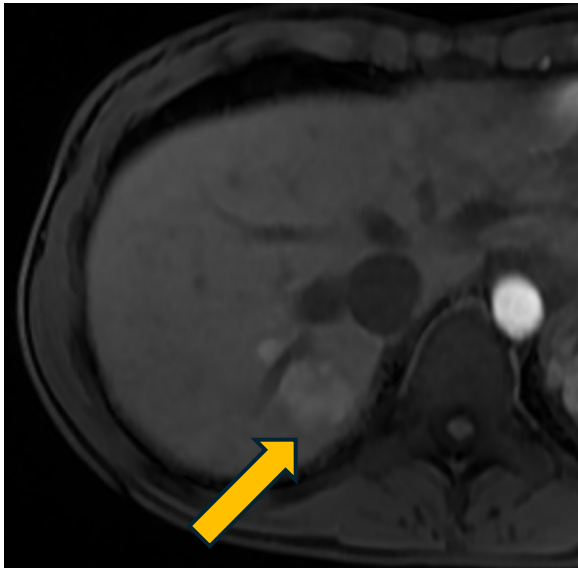
LIRADS 4

LIRADS 5

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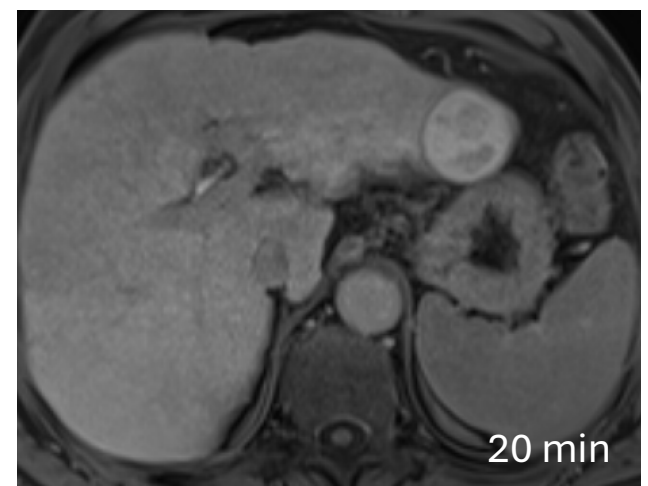
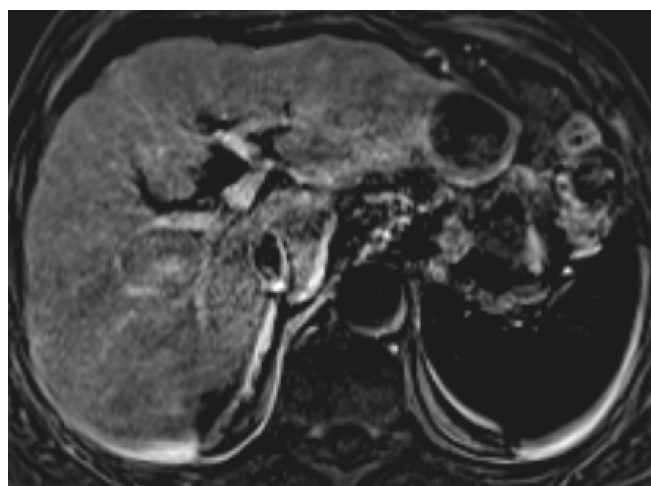
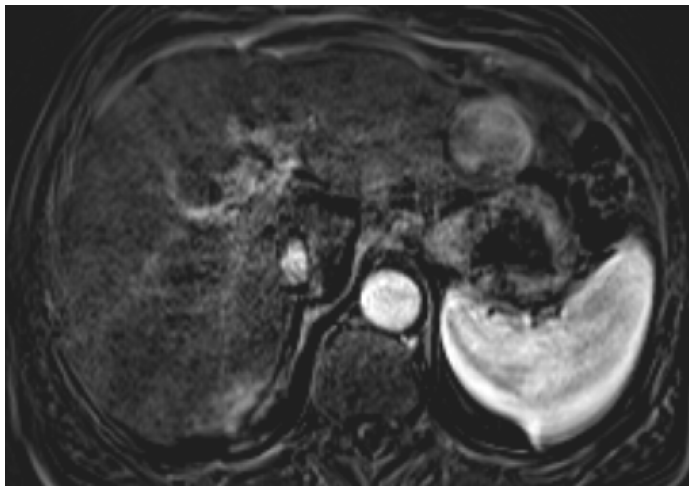
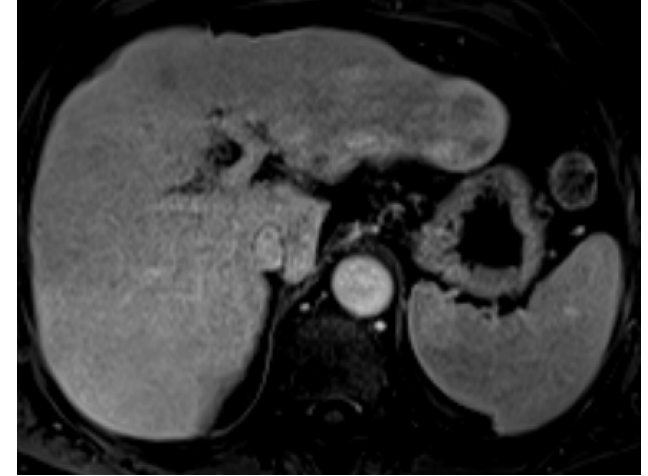
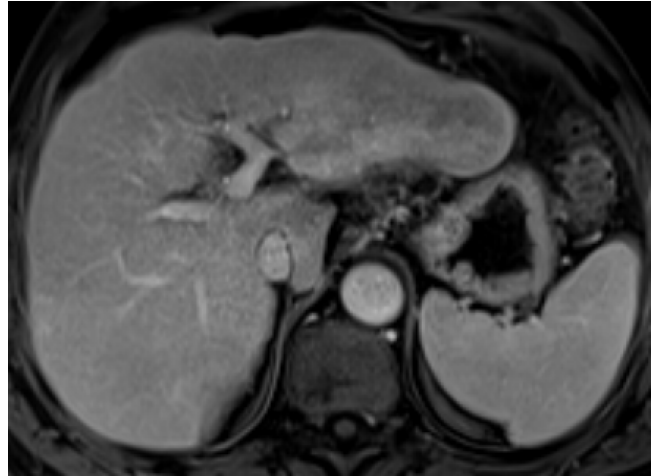
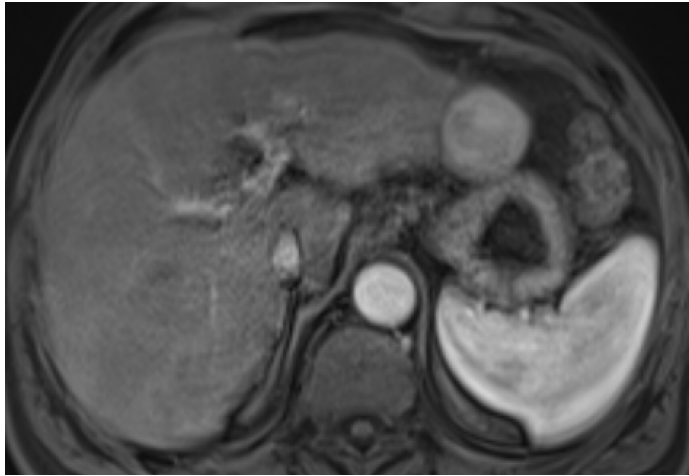
Case 2

- 78 yo M
- Cirrhosis

Case 2

78 yo M

Cirrhosis



Case 3

62 yo F

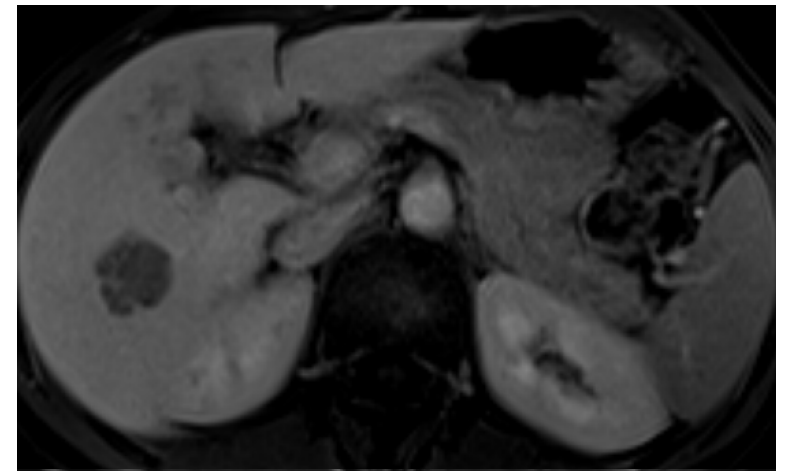
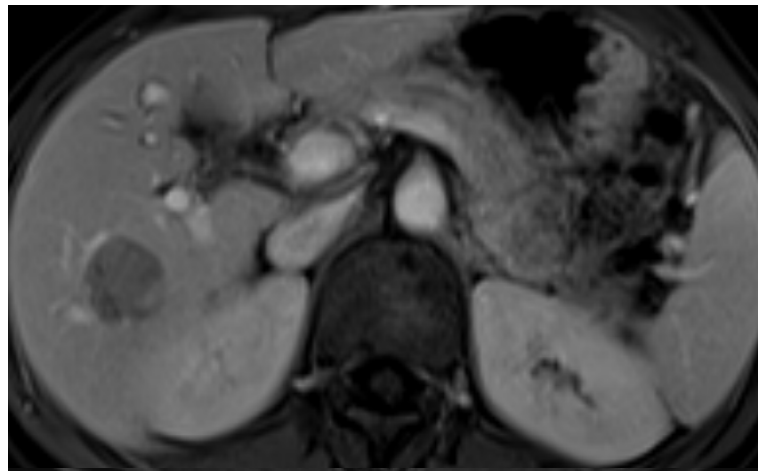
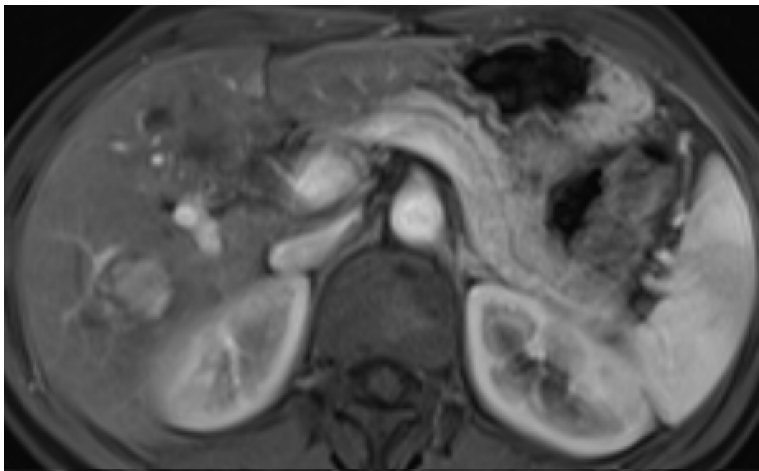
Cirrhosis

3.7 cm lesion

Capsule

?

No capsule



Case 3

62 yo F

Cirrhosis

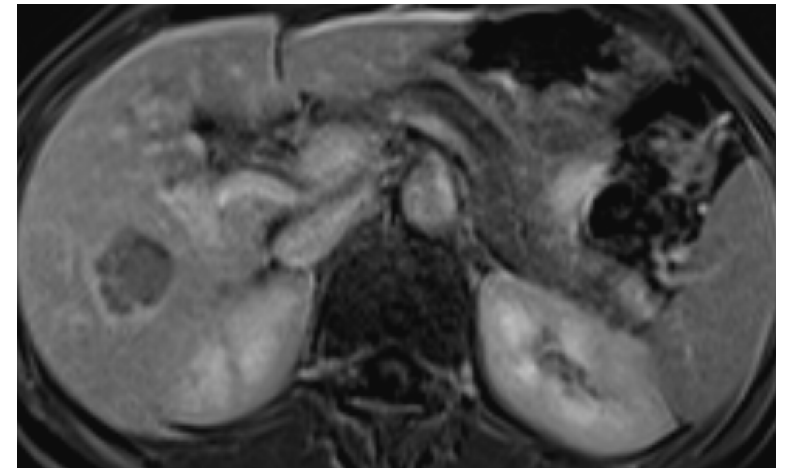
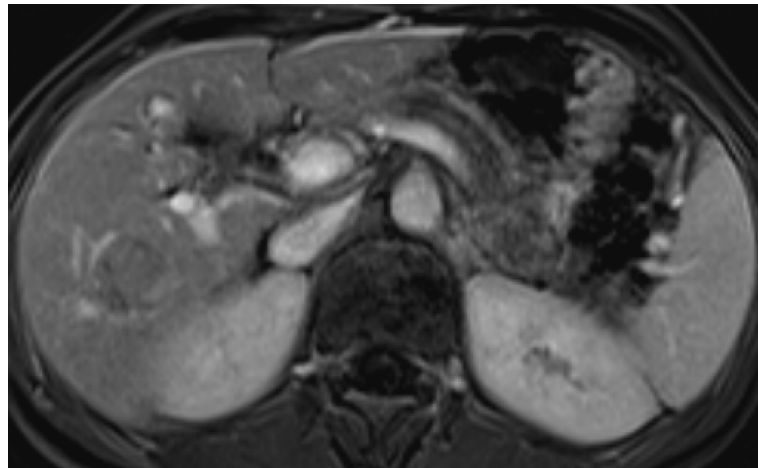
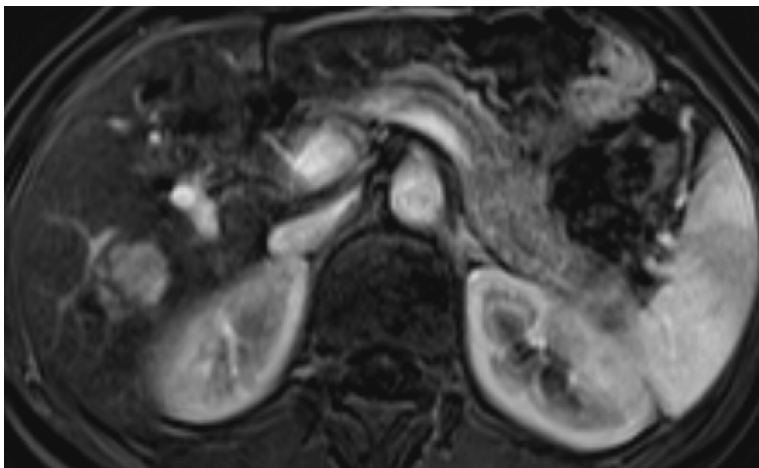
3.7 cm lesion

Subtraction images

Capsule

?

No capsule



Case 3

62 yo F

Cirrhosis

3.7 cm lesion

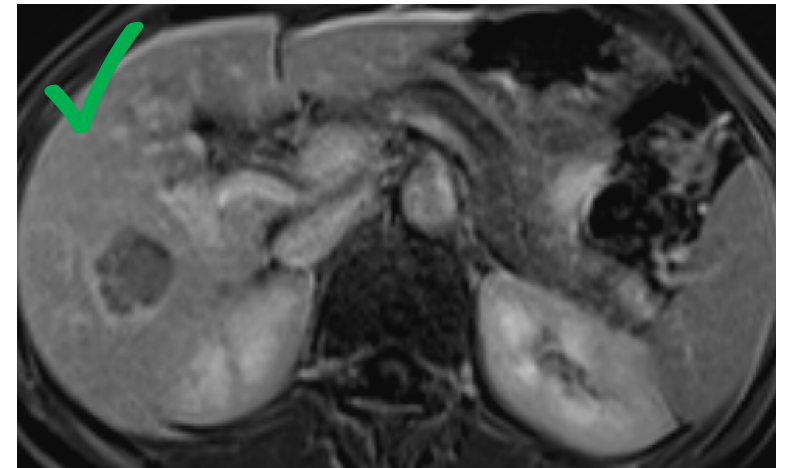
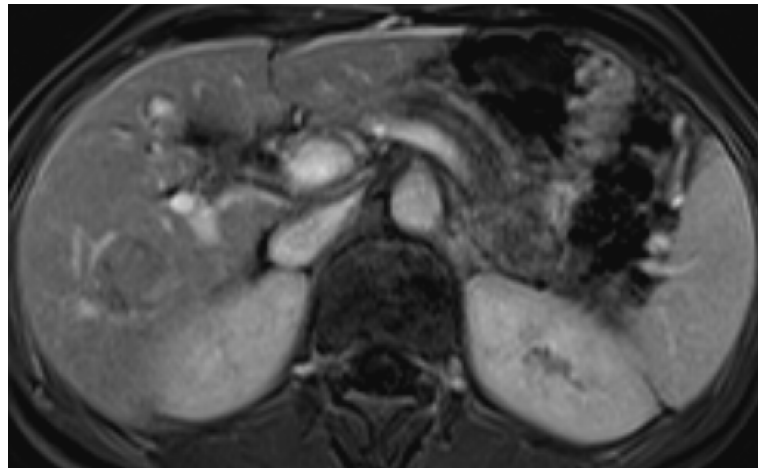
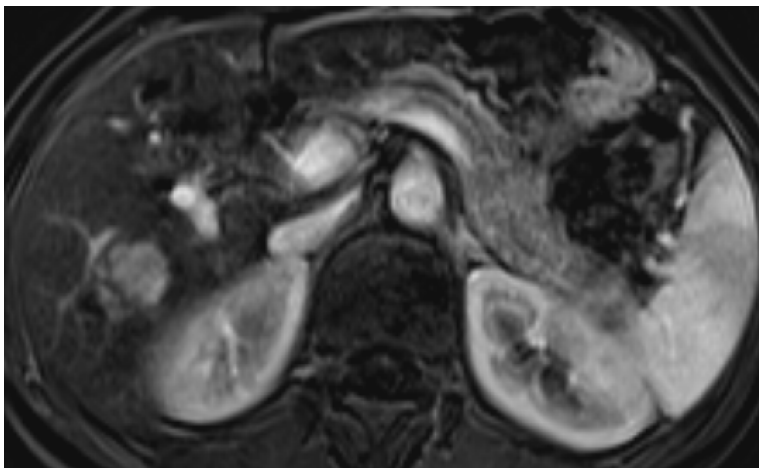
Subtraction images

Capsule

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No capsule

**Does it make a difference
for LIRADS?**



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: <ul style="list-style-type: none"> • 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

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Case 3 – companion case

49 yo M

Cirrhosis

2.2 cm lesion

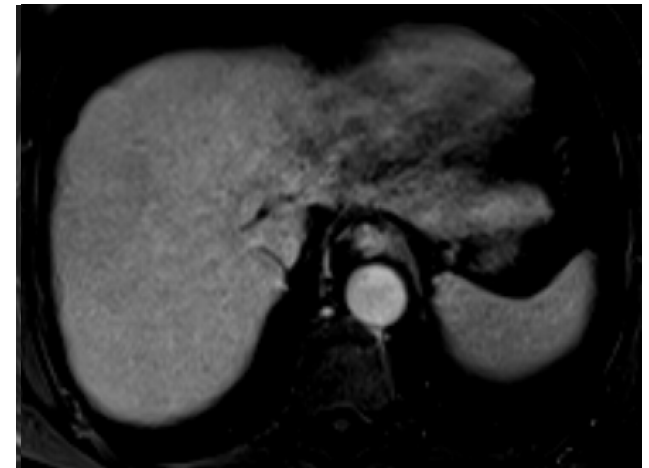
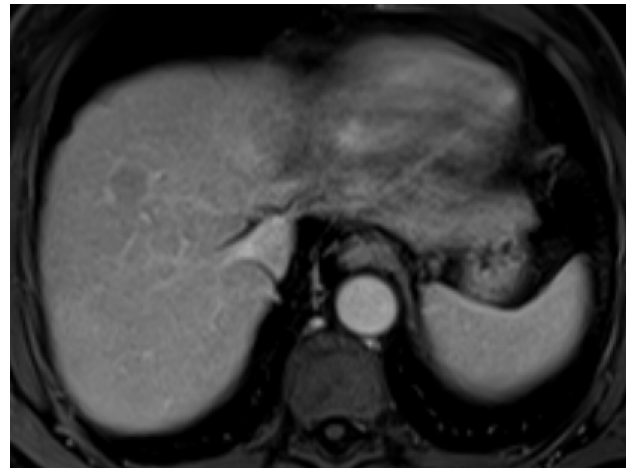
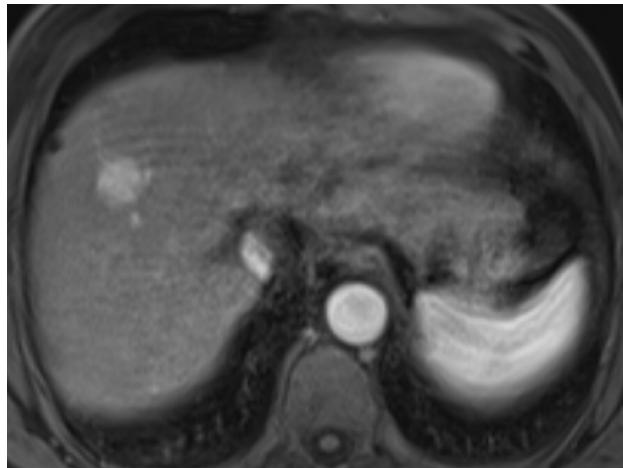
LIRADS 4

LIRADS 5

LIRADS 3

Need subtraction images

?



Case 3 – companion case

49 yo M

Cirrhosis

2.2 cm lesion

LIRADS 4

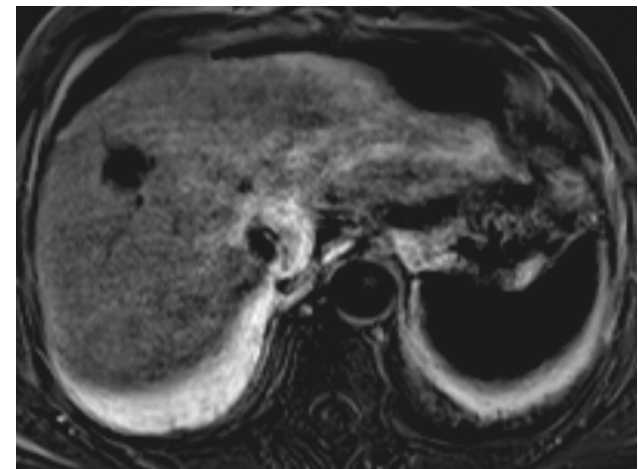
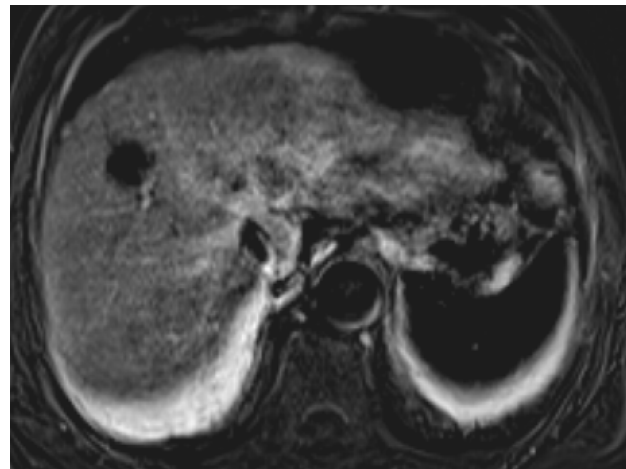
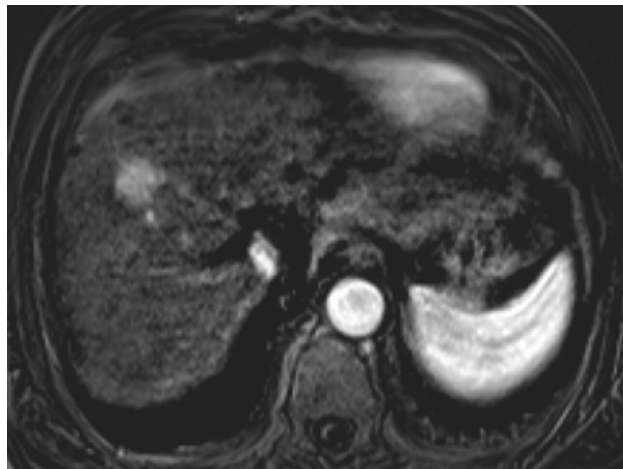
LIRADS 5

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Need subtraction images

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Do you, really?



CT/MRI Diagnostic Table

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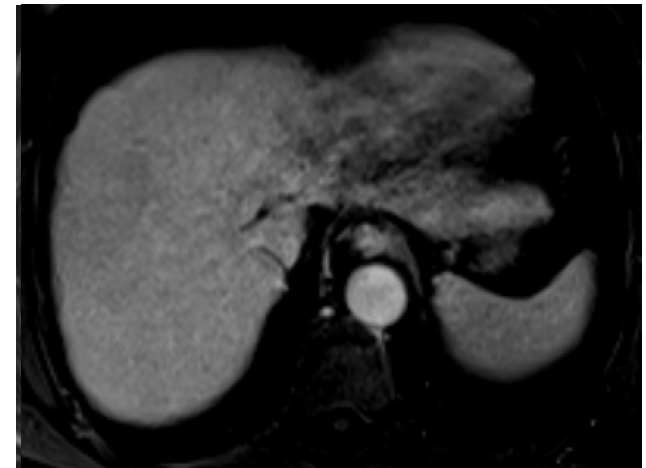
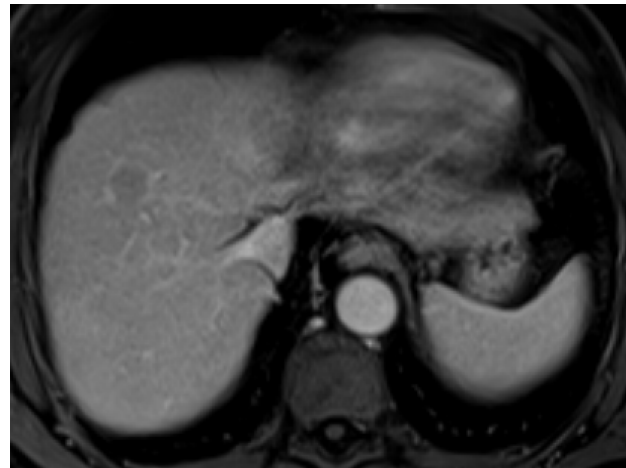
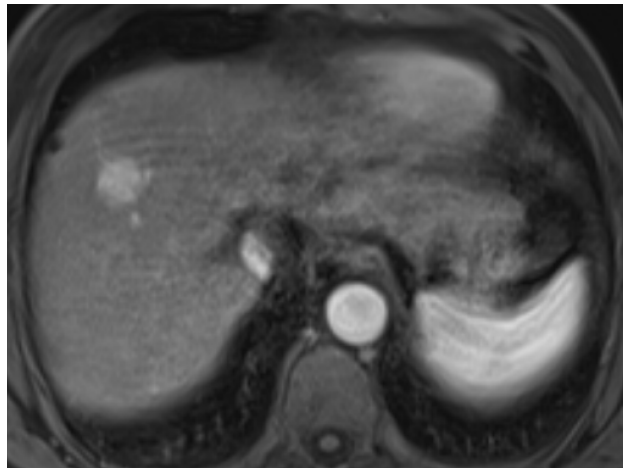
LIRADS 4

LIRADS 5

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LIRADS 3

Need subtraction images



Case 4

65 yo M

Cirrhosis and HCC (biopsied)

Large lesion

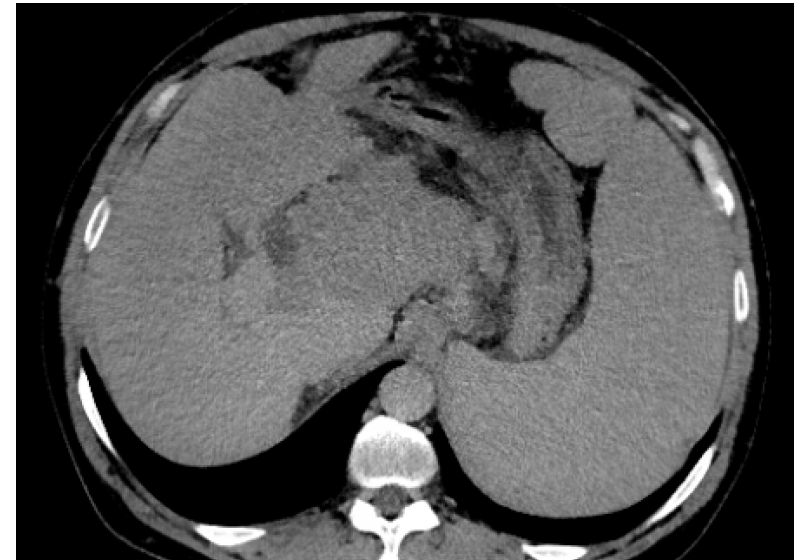
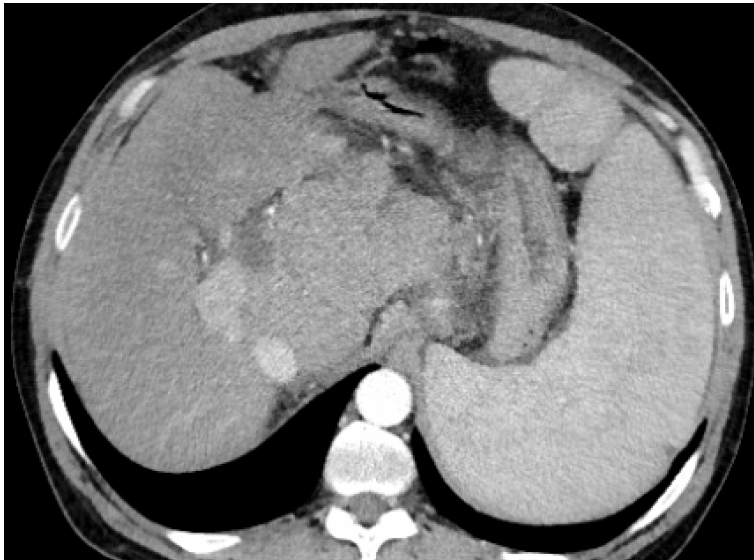
LIRADS 4

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LIRADS 2

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Case 4

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Cirrhosis and HCC (biopsied)

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LIRADS 4

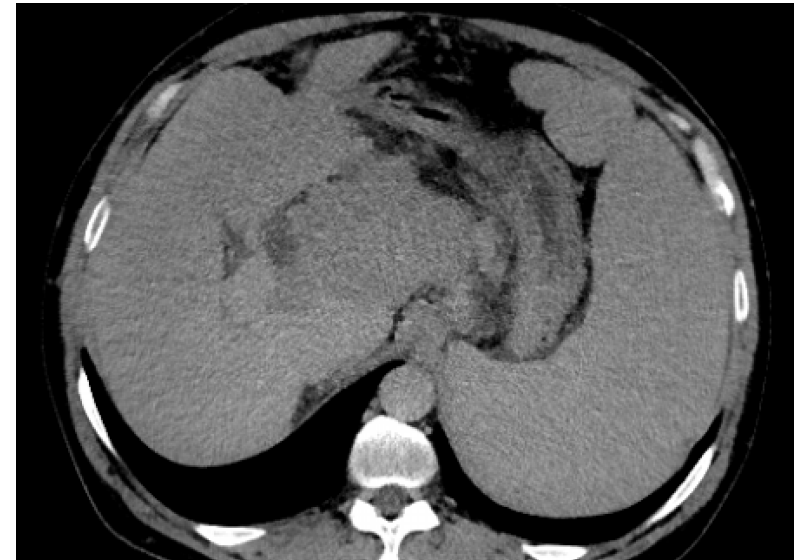
LIRADS 5

LIRADS 3

LIRADS 2

No LIRADS score

?



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

Case 4

65 yo M

Cirrhosis and HCC (biopsied)

Large lesion

LIRADS 4

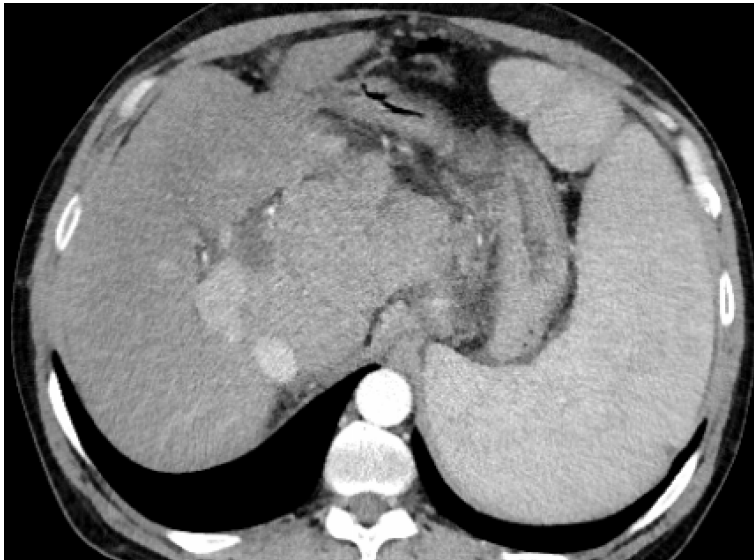
LIRADS 5

LIRADS 3

LIRADS 2

No LIRADS score

?



Case 5

56 yo M

Cirrhosis

1.9 cm lesion

No prior imaging

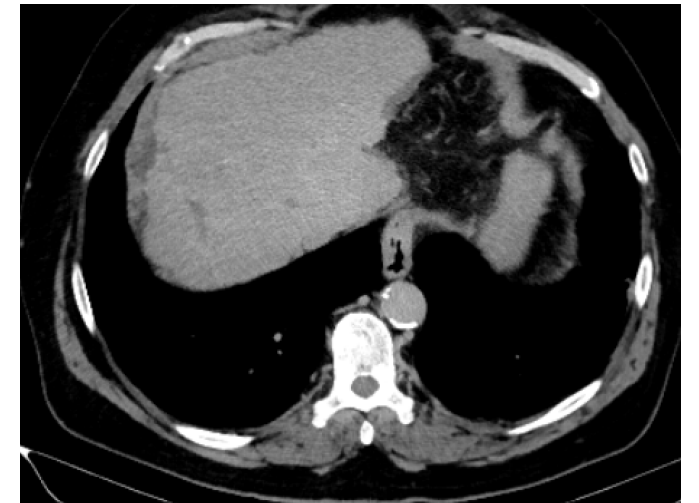
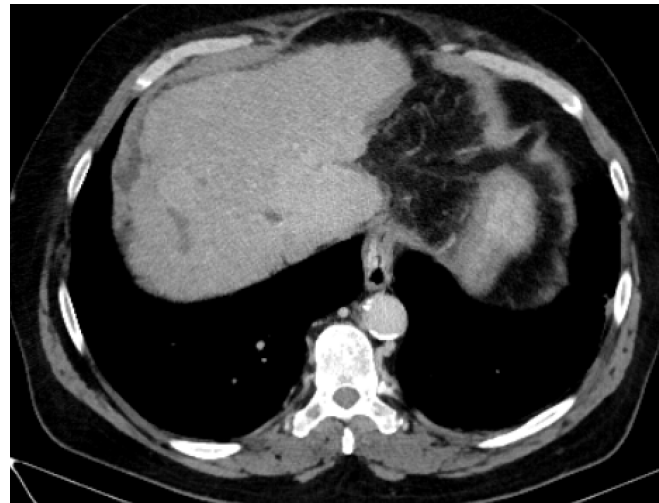
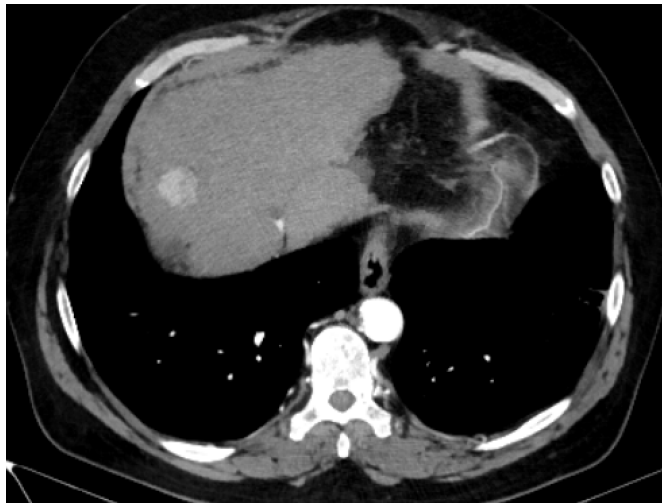
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Cirrhosis

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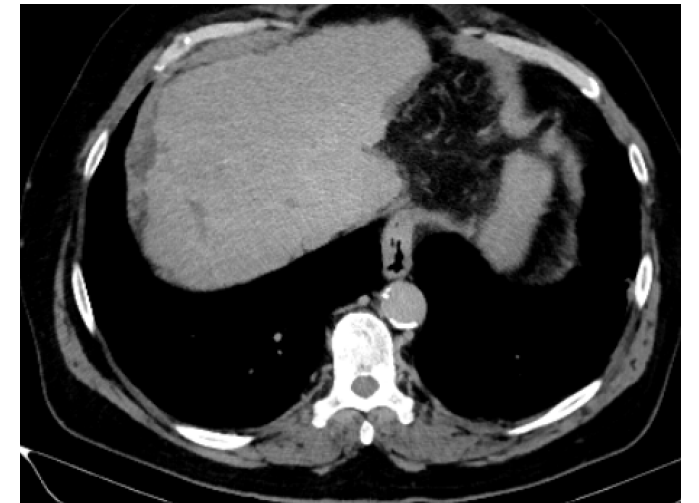
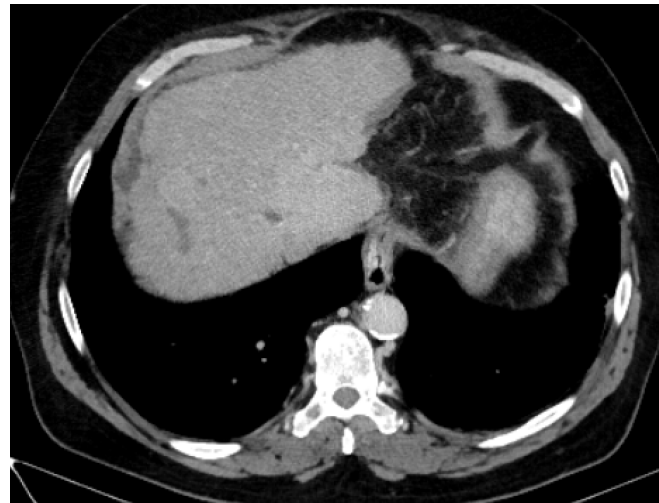
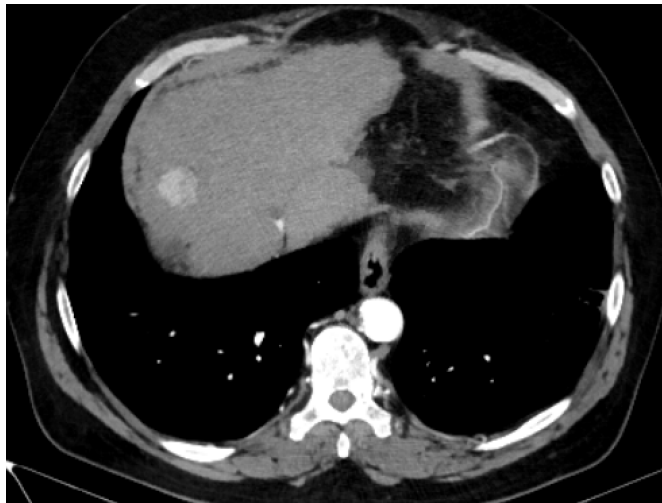
LIRADS 4

LIRADS 5

LIRADS 3

LIRADS 2

?



Case 5

56 yo M

Cirrhosis

5.5 cm lesion

No prior imaging

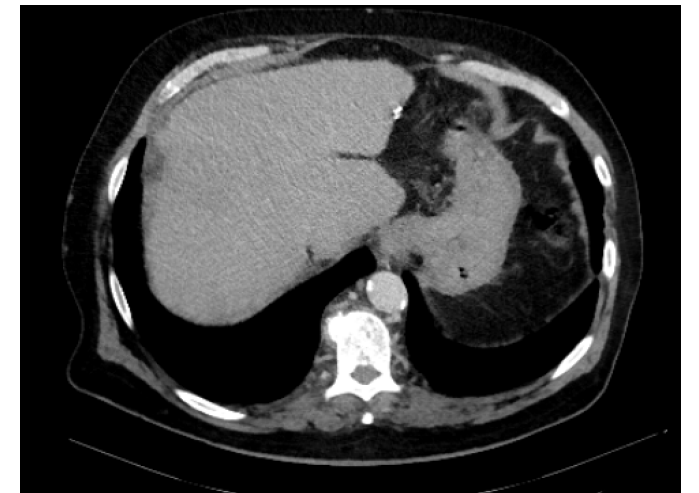
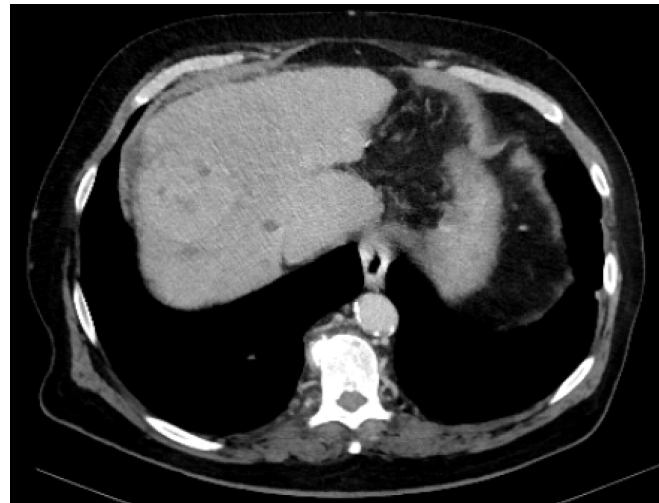
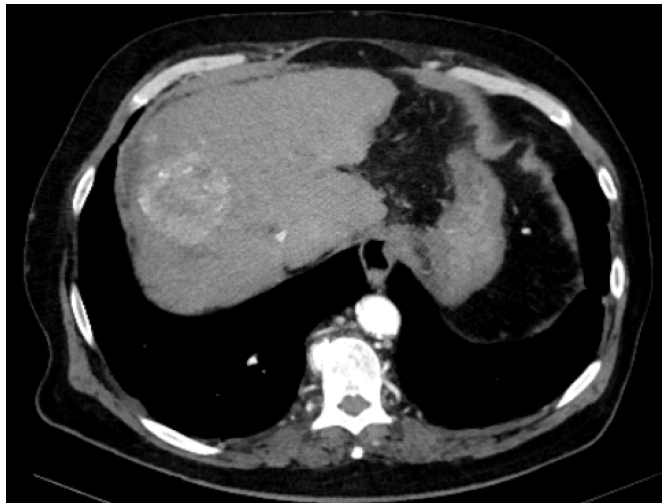
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Case 5

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Cirrhosis

5.5 cm lesion

No prior imaging

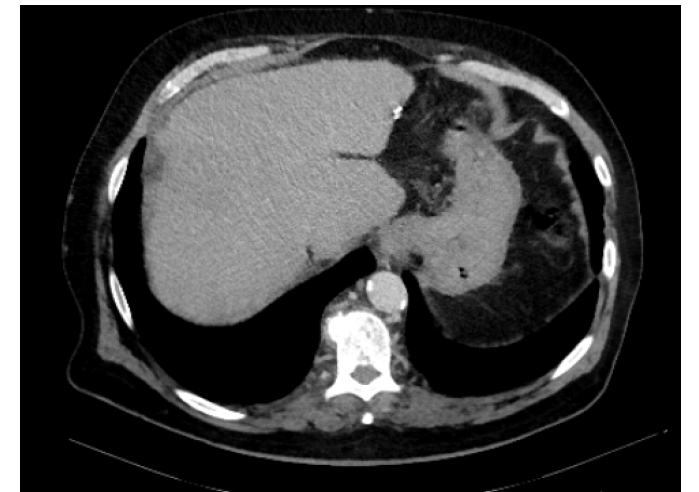
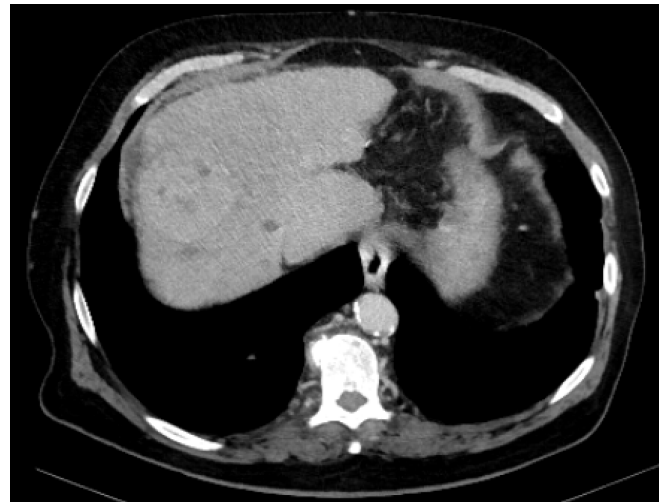
LIRADS 4

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LIRADS 2

?



Case 5

56 yo M

Cirrhosis

5.5 cm lesion

With prior imaging <6 months, 3.5 cm -> 5.5 cm

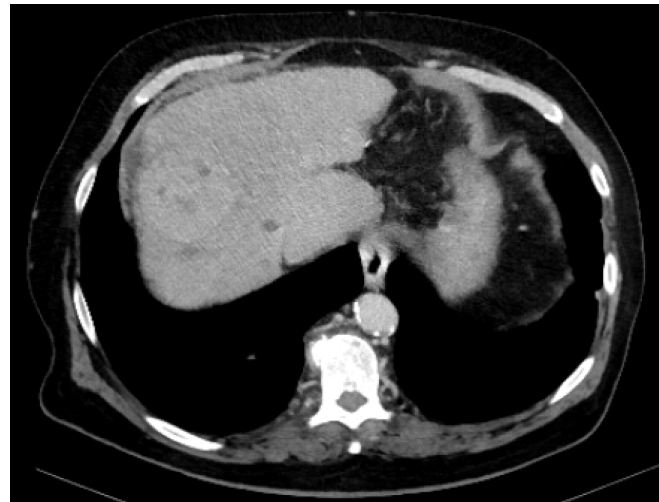
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Cirrhosis

5.5 cm lesion

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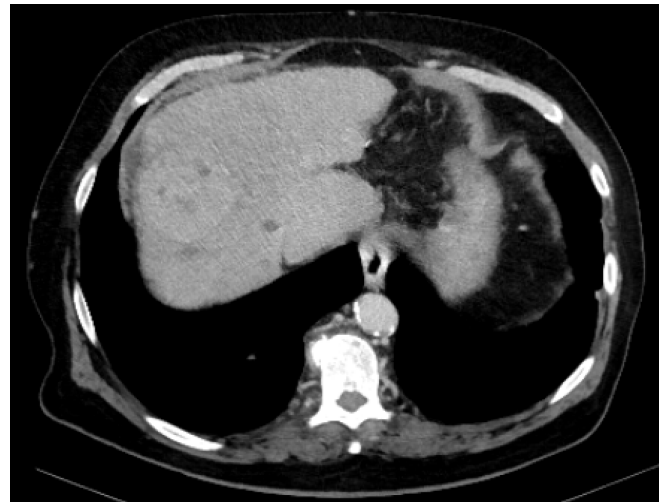
LIRADS 4

LIRADS 5

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LIRADS 2

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Case 5

56 yo M

Cirrhosis

5.5 cm lesion

With prior imaging <6 months, 1.9 cm -> 5.5 cm

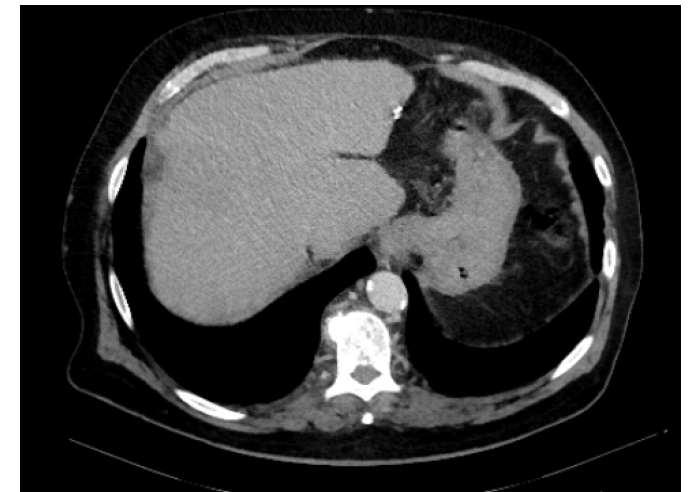
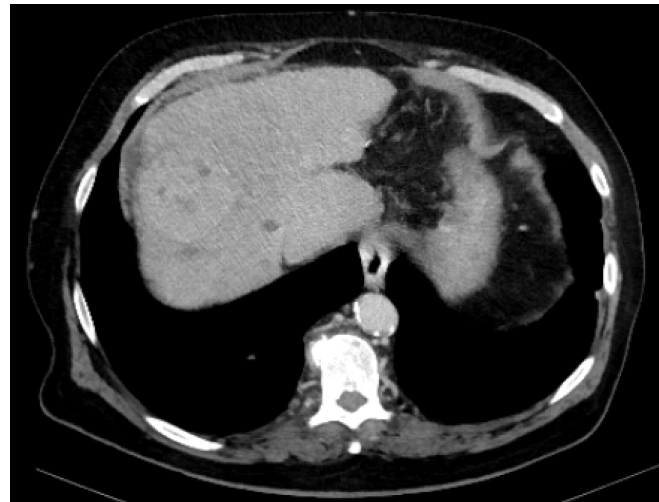
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Cirrhosis

5.5 cm lesion

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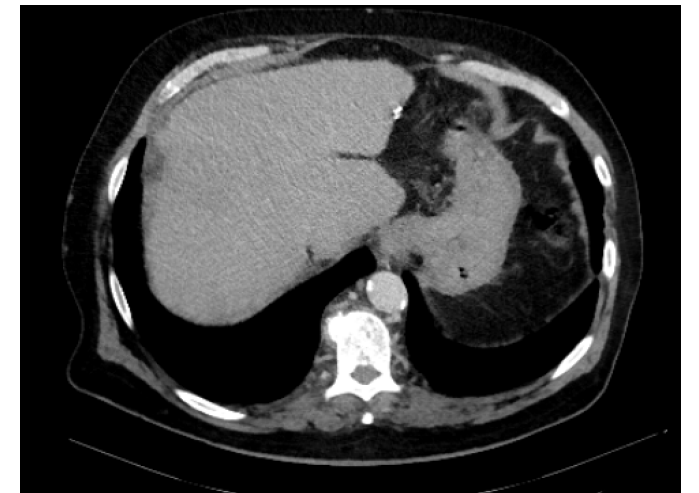
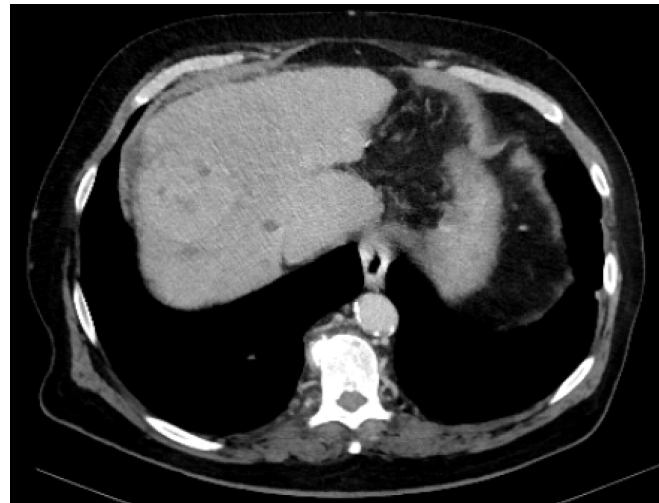
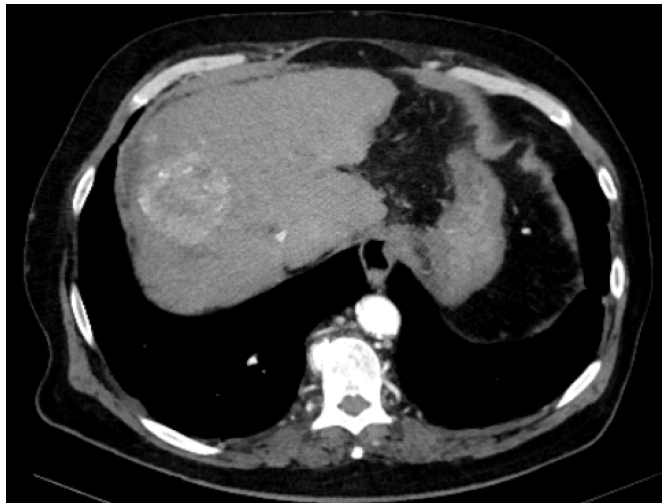
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Case 5

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5.5 cm lesion

With prior imaging 16 months, 1.9 cm -> 5.5 cm

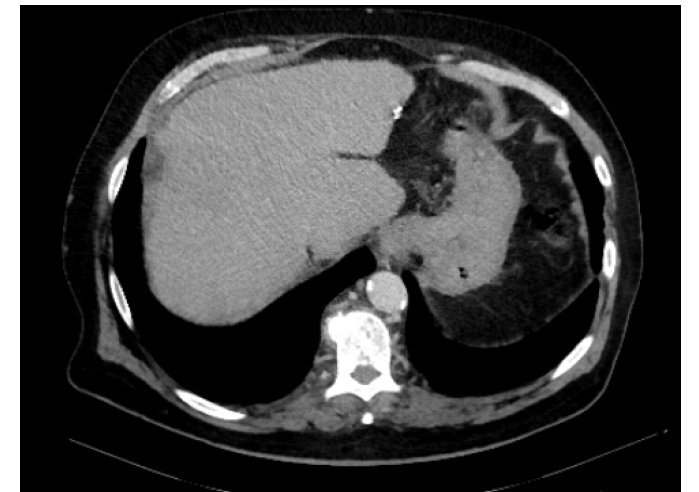
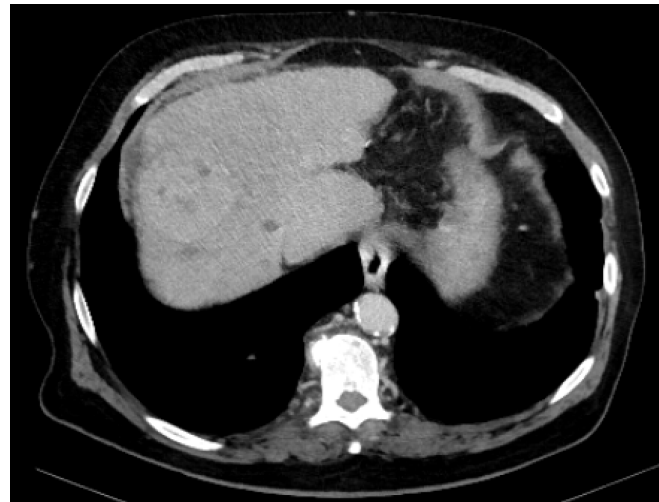
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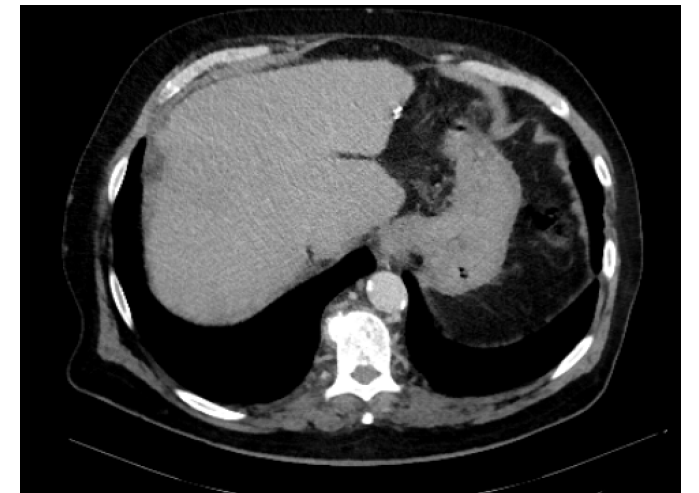
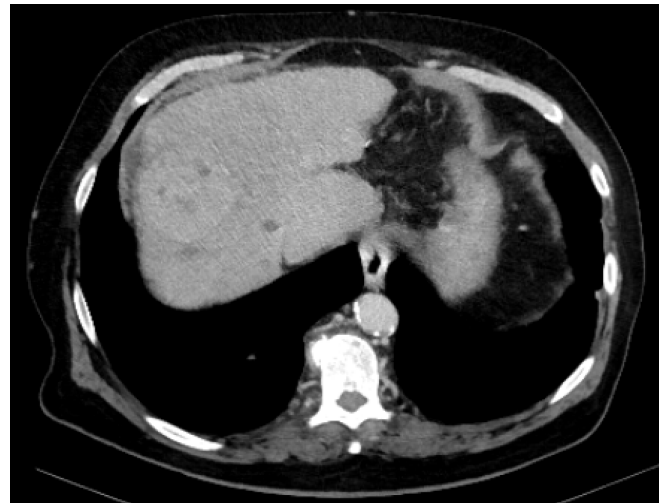
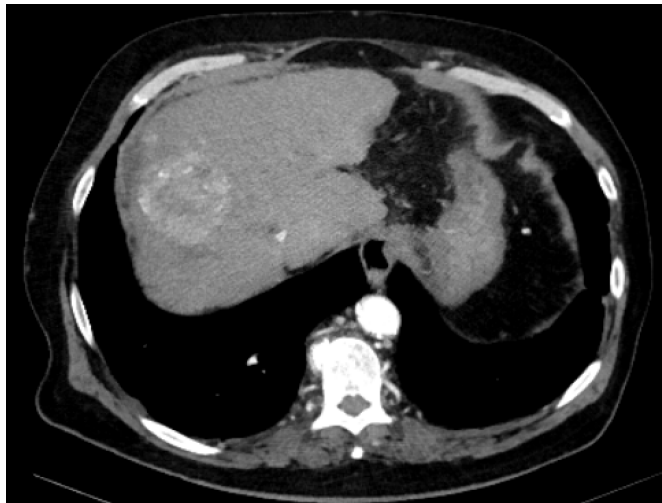
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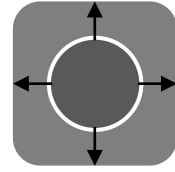
LIRADS 3

LIRADS 2

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Threshold growth



Size increase of a mass by $\geq 50\%$ in ≤ 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*

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

Case 6

54 yo M

Cirrhosis

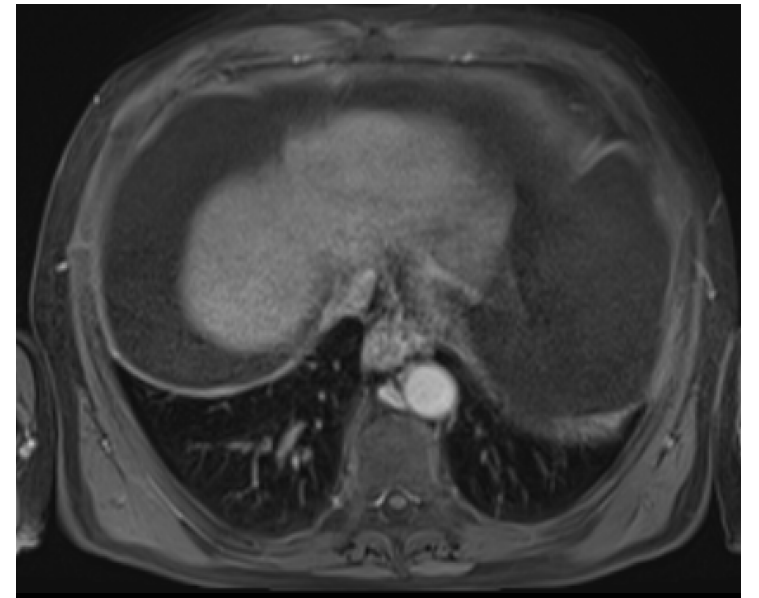
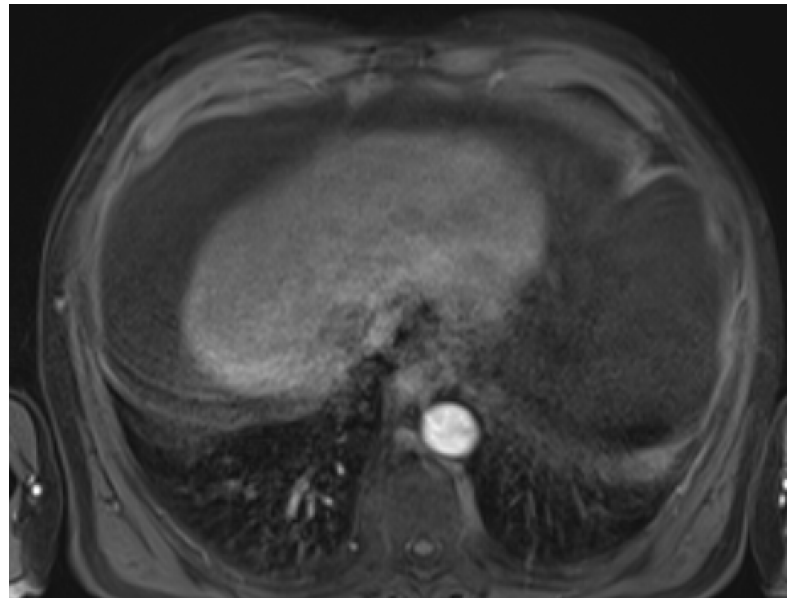
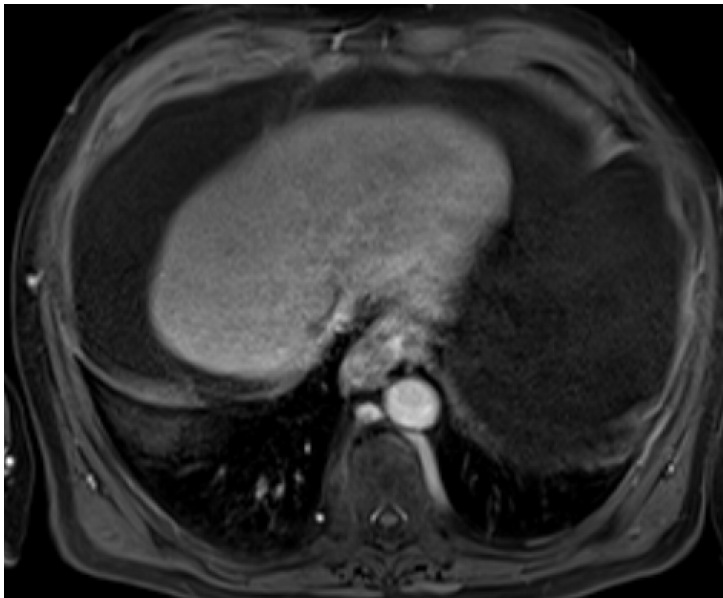
LIRADS 4

LIRADS 5

LIRADS 3

LIRADS 2

?



Case 6

54 yo M

Cirrhosis

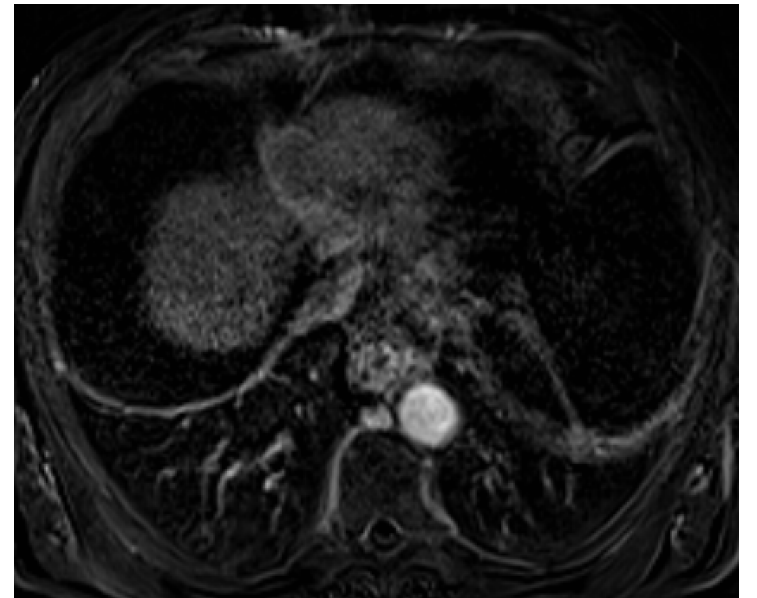
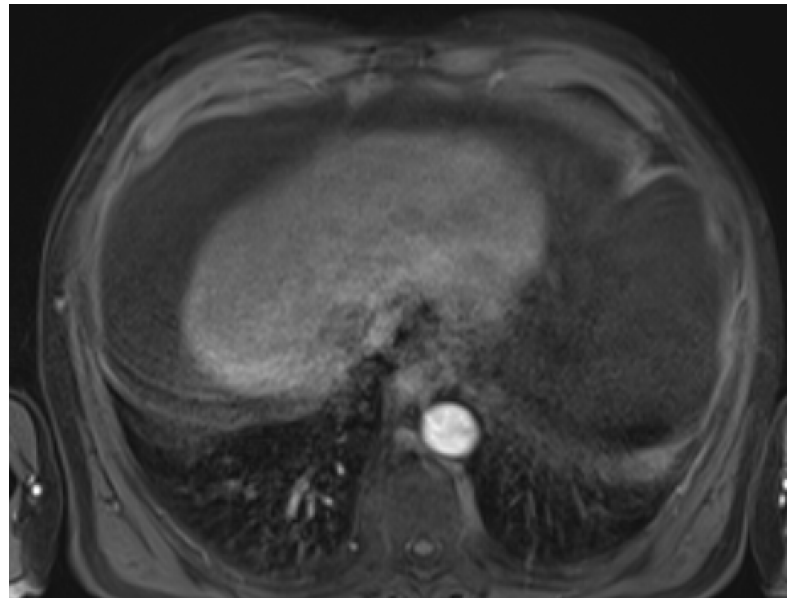
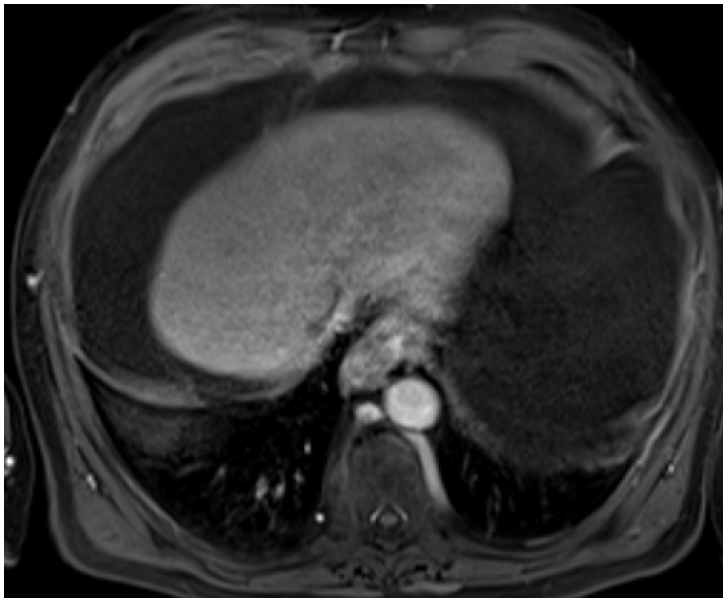
LIRADS 4

LIRADS 5

LIRADS 3

LIRADS 2

?



CT/MRI Diagnostic Table

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

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Case 6

54 yo M

Cirrhosis

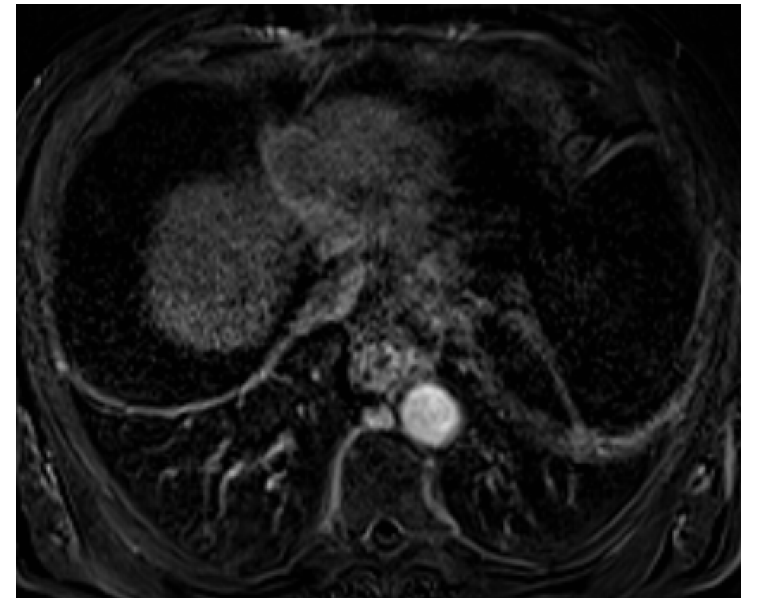
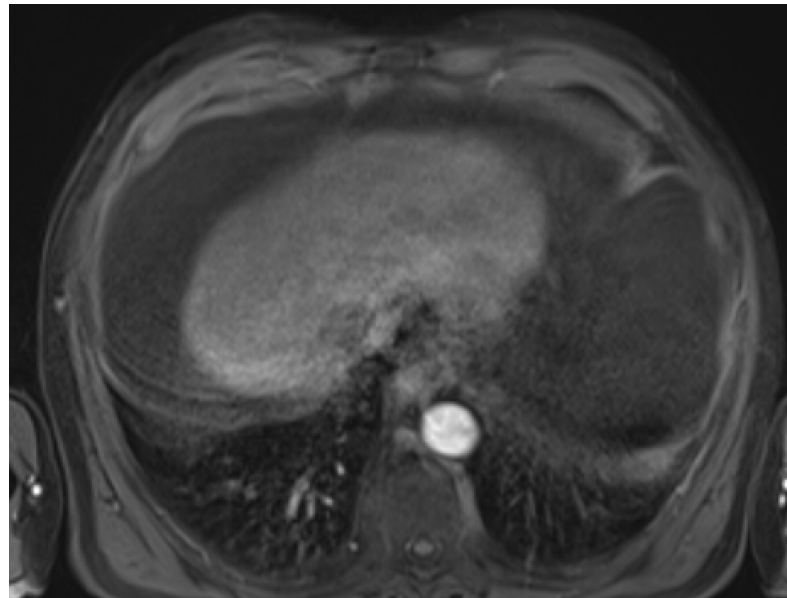
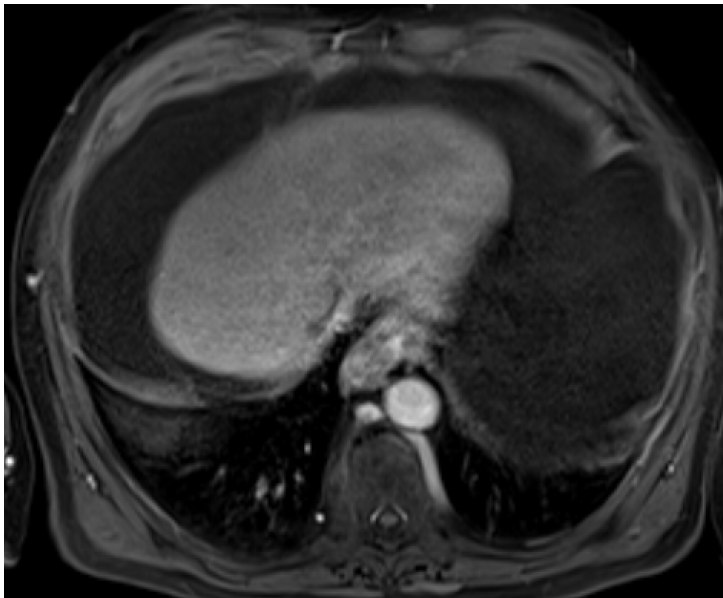
LIRADS 4

LIRADS 5

LIRADS 3

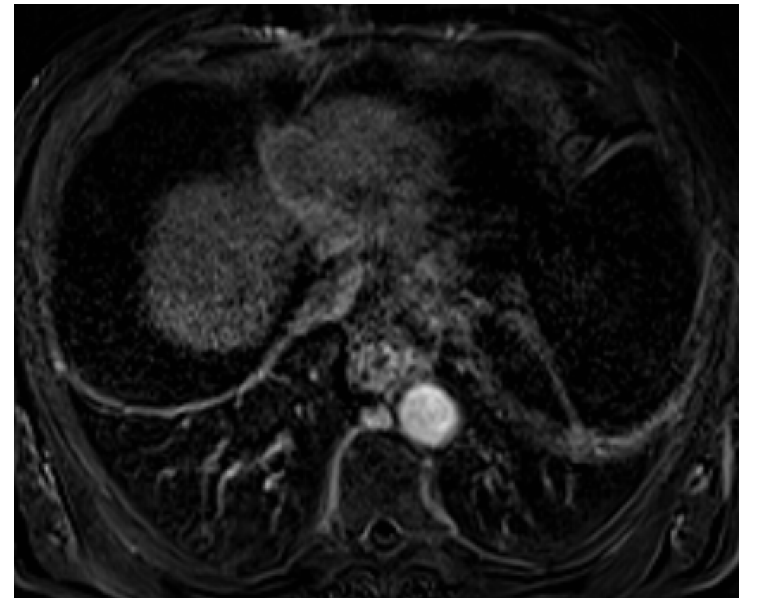
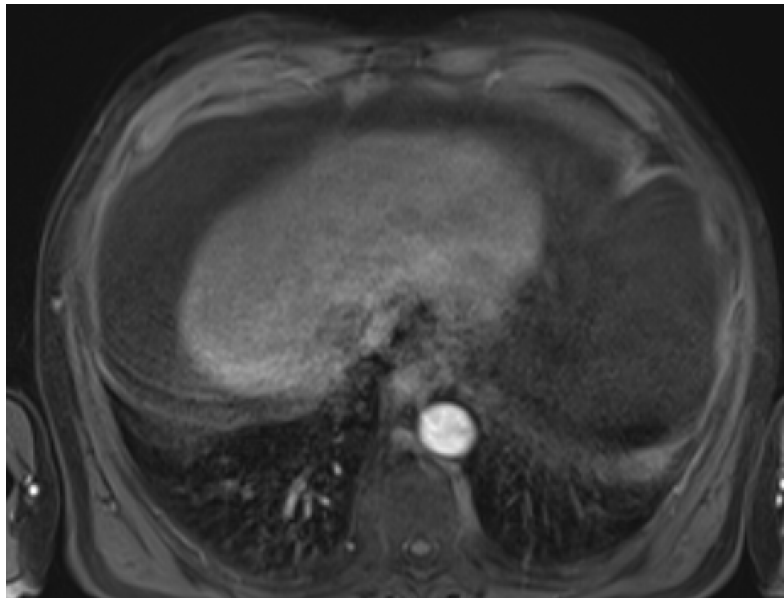
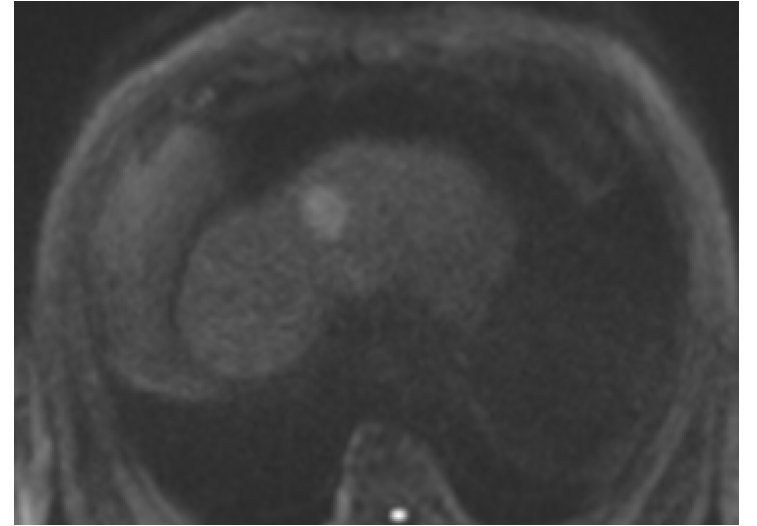
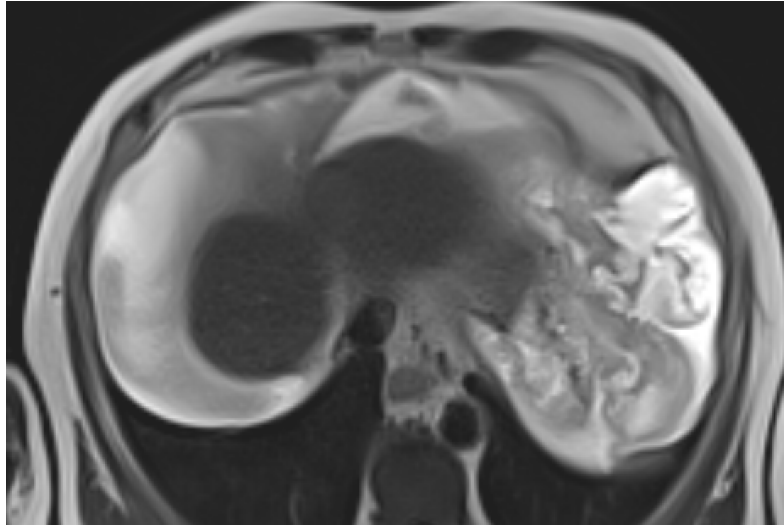
LIRADS 2

?

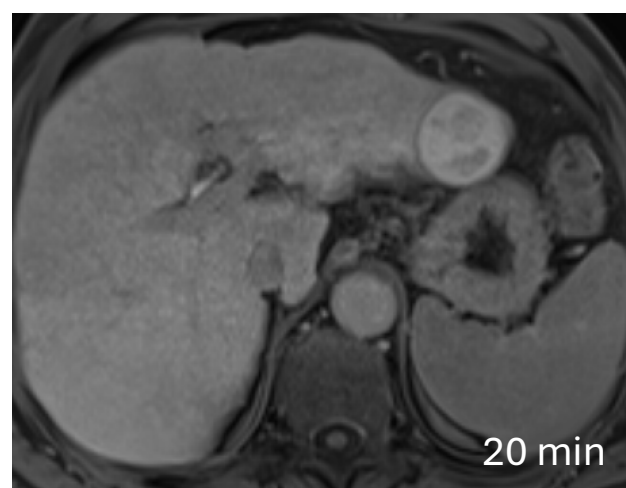
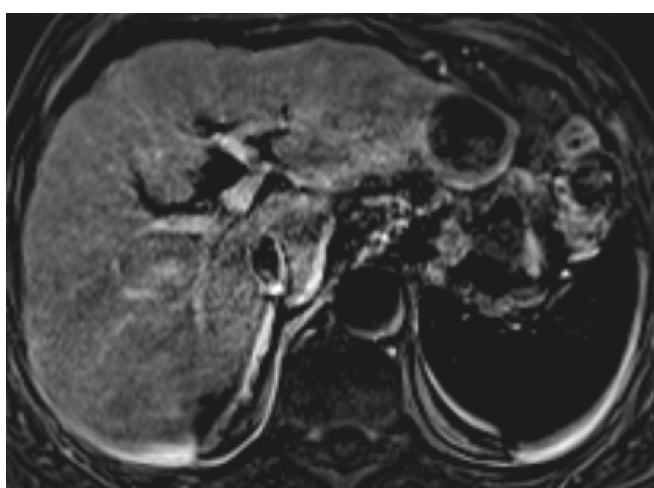
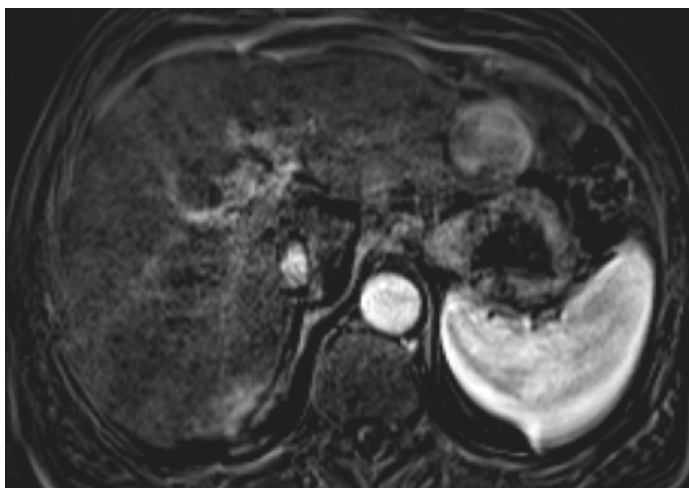
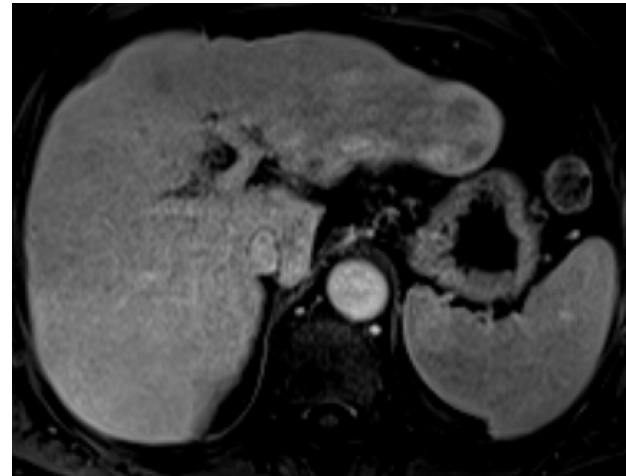
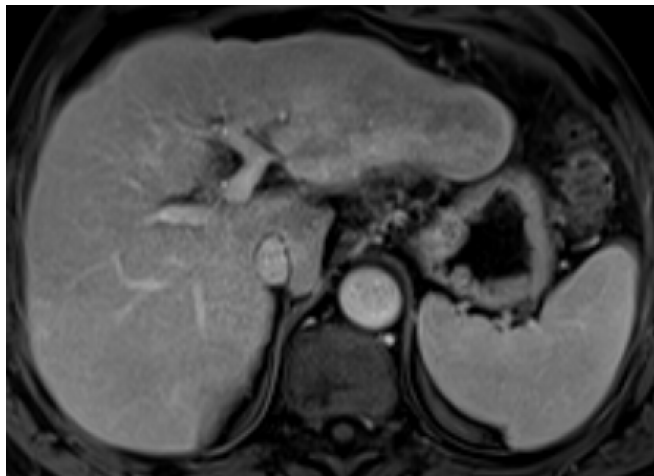
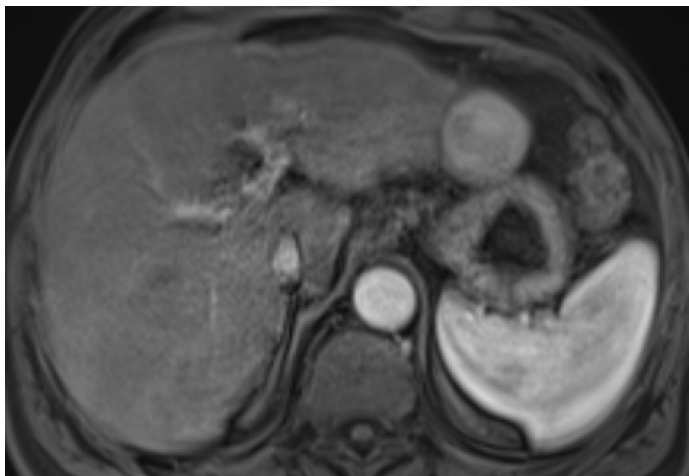


Case 6

What about DWI?



Case 7

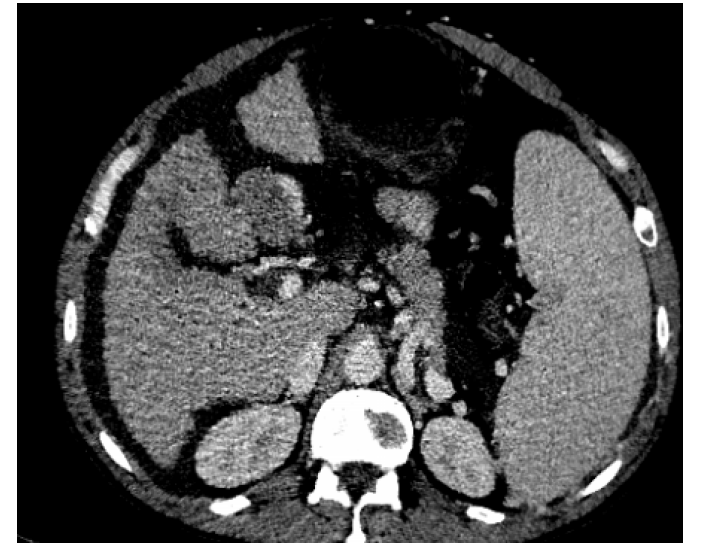
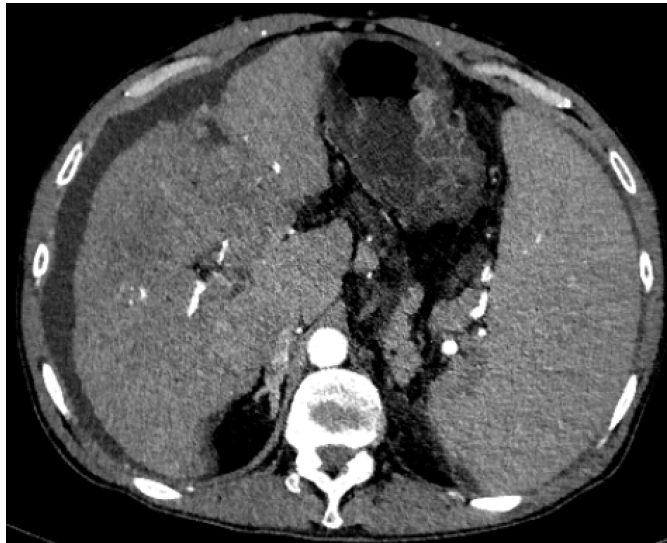
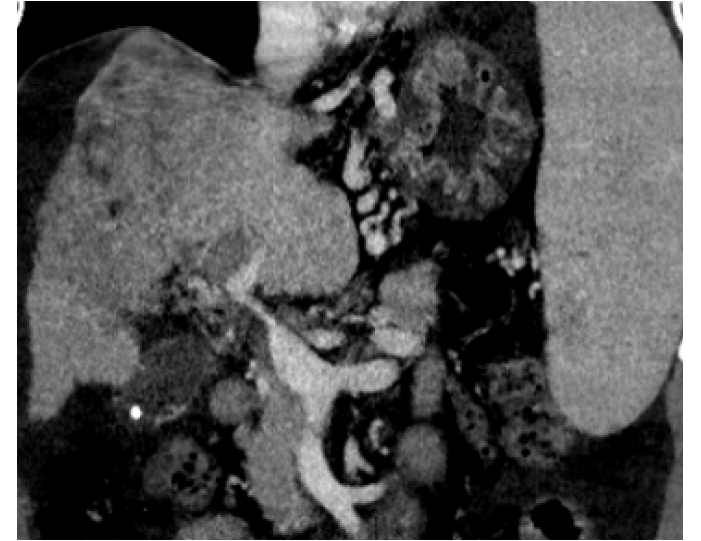


Case 8

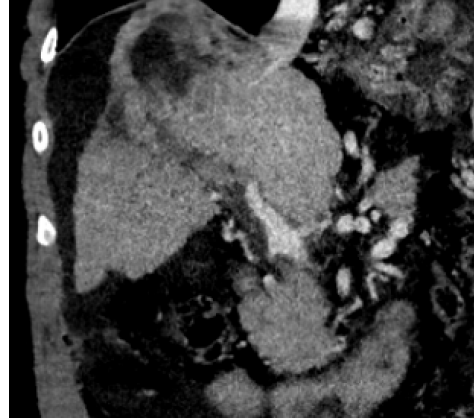
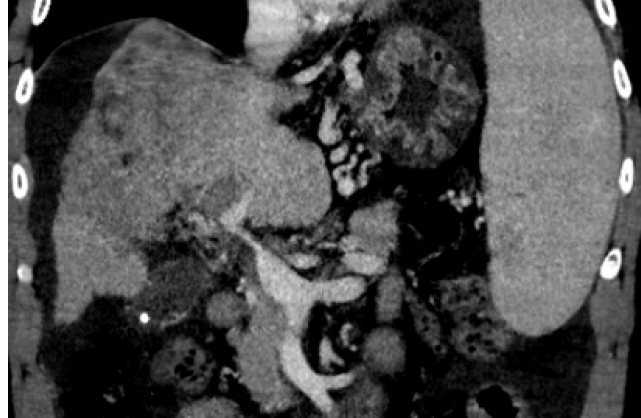
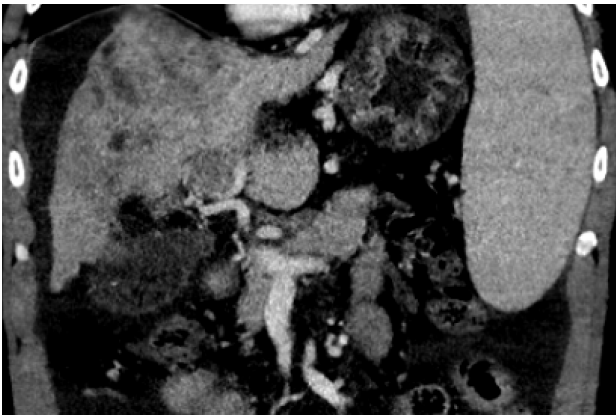
46 yo M

cirrhosis

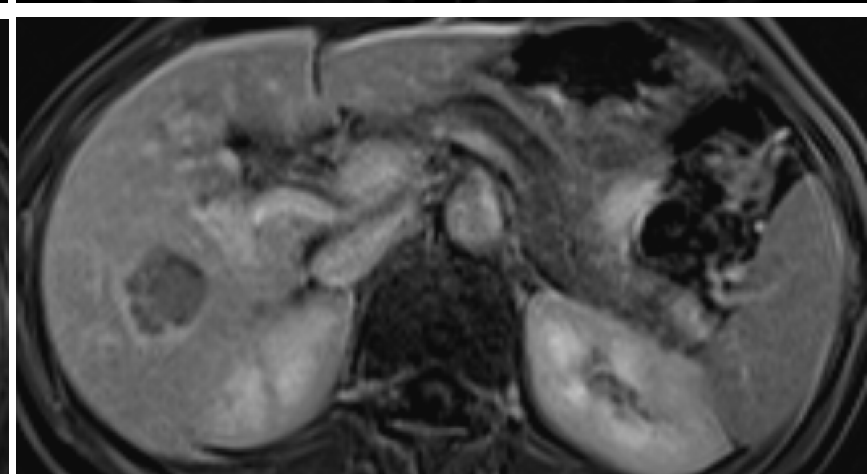
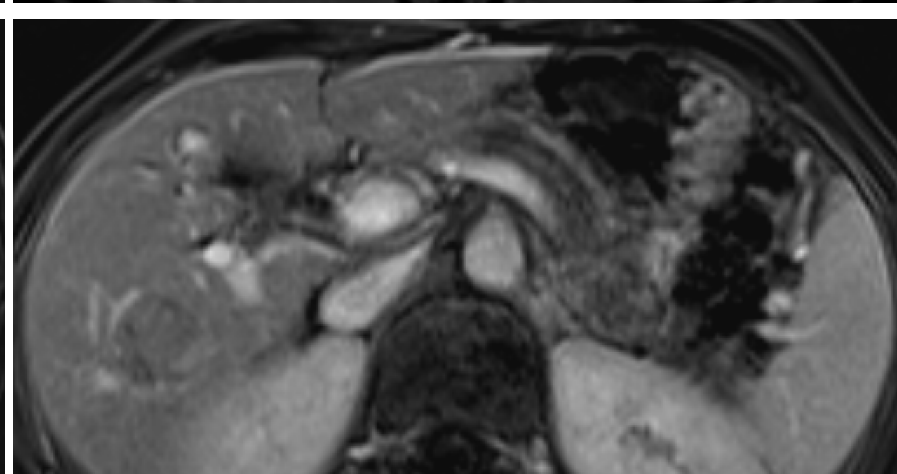
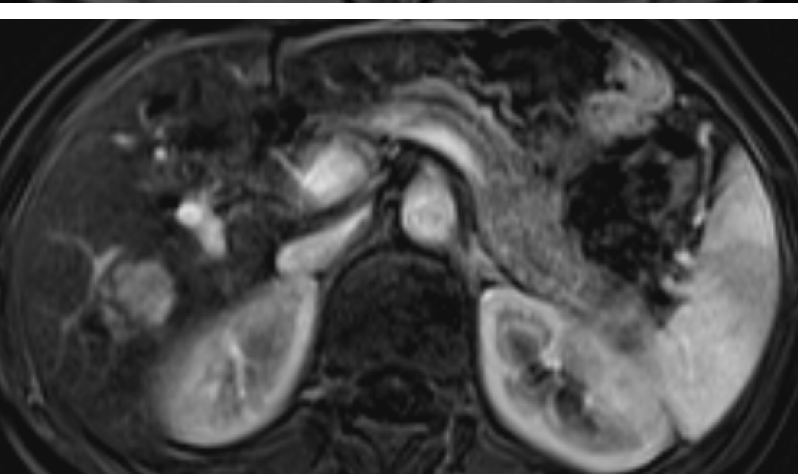
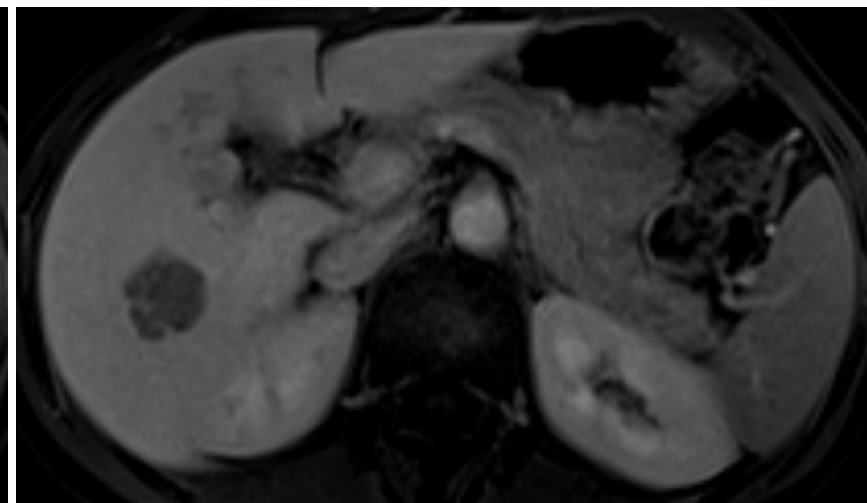
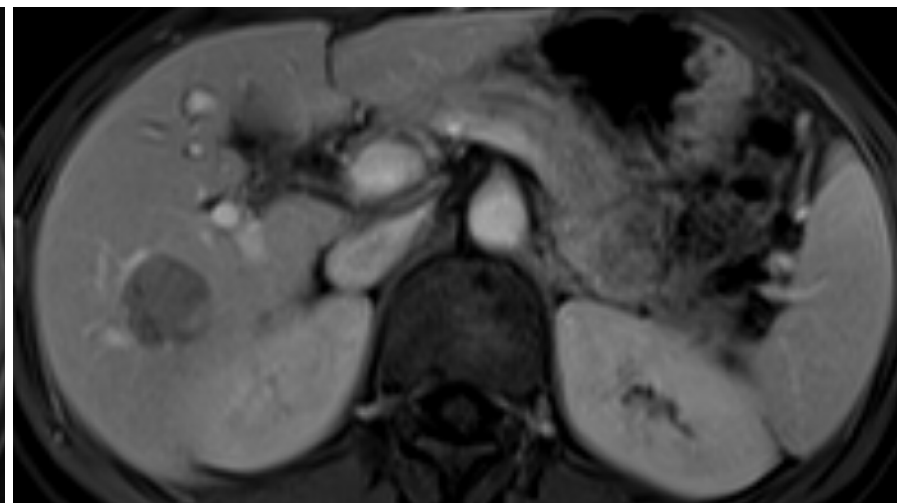
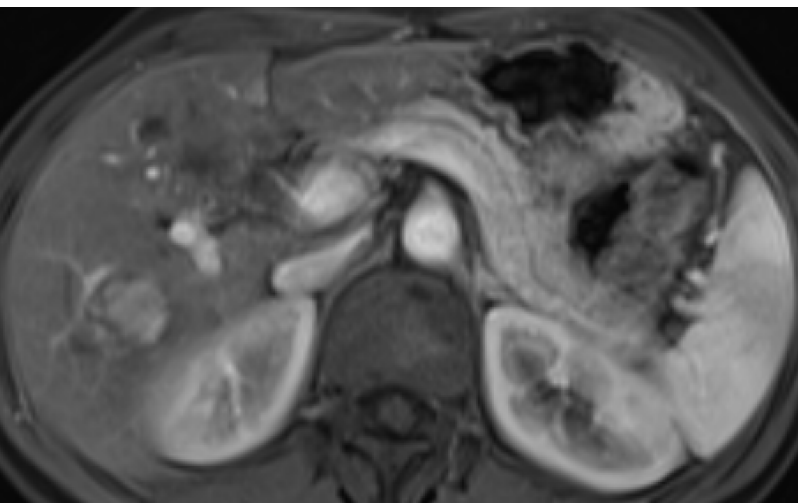
multicentric HCC



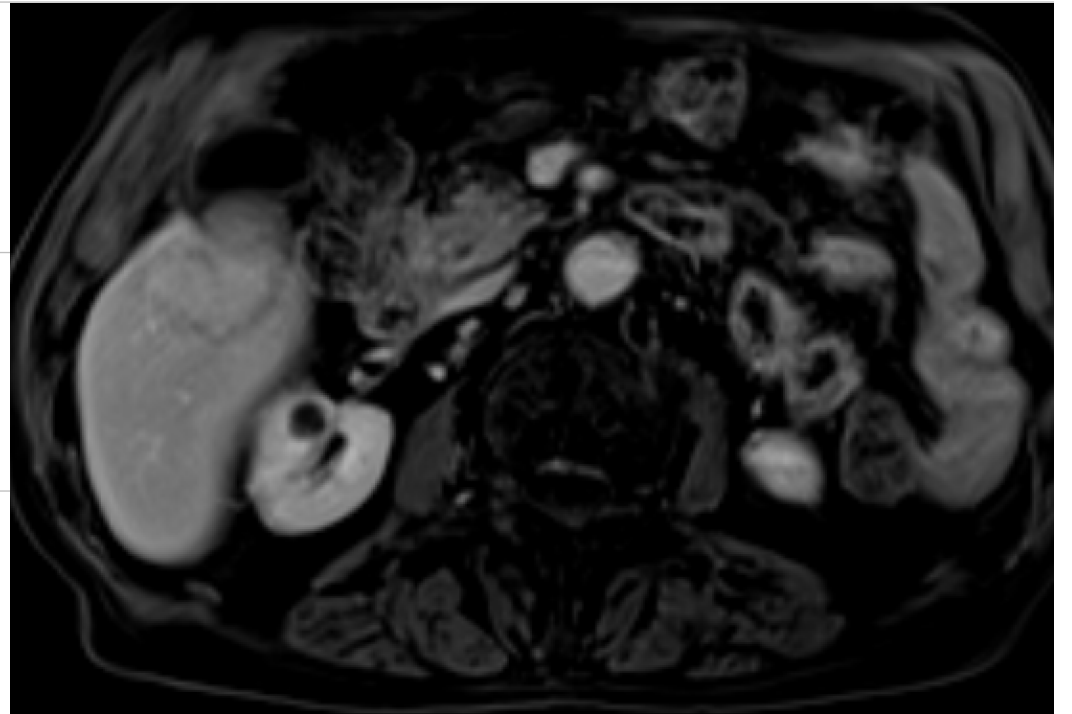
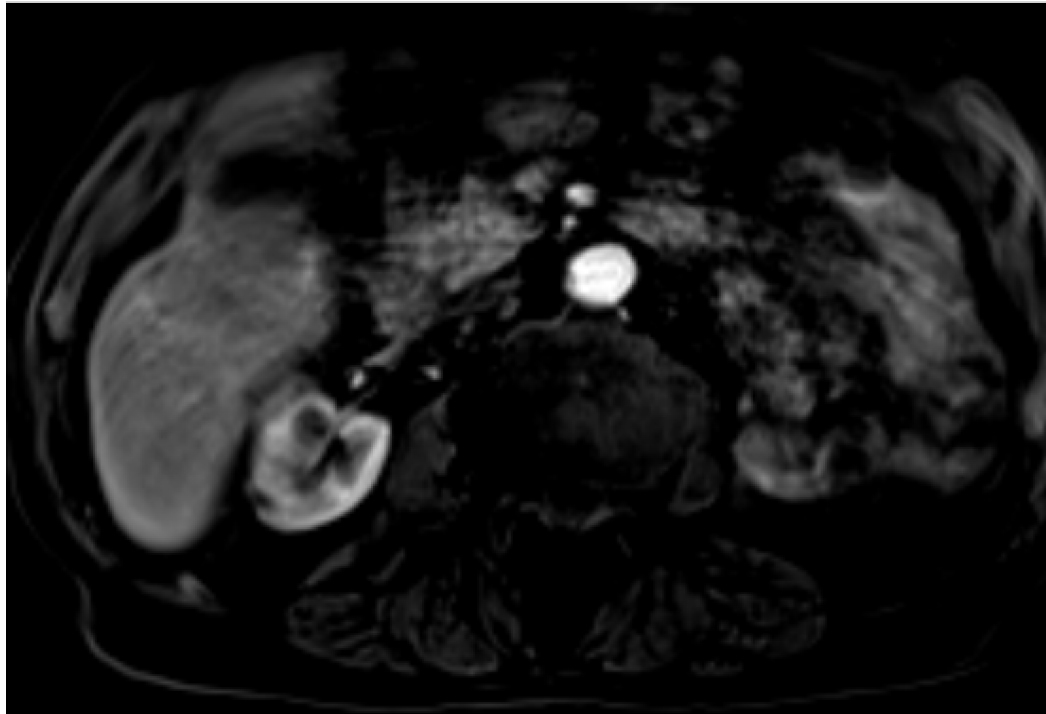
Case 8



Case 9

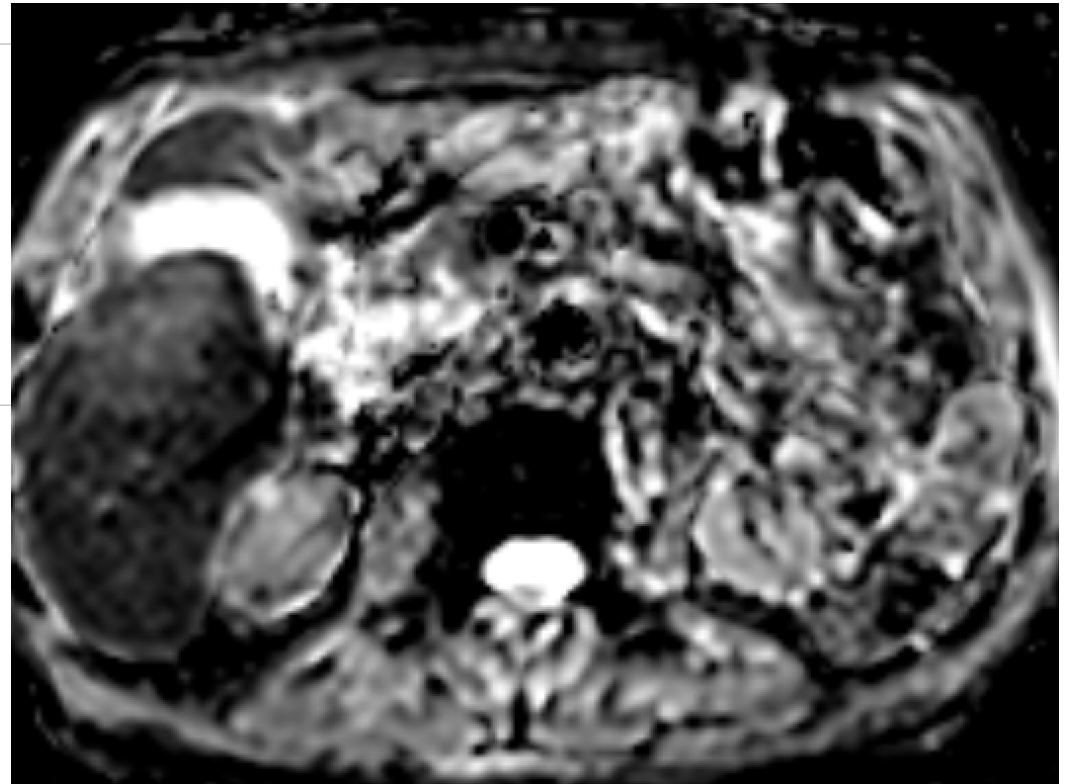
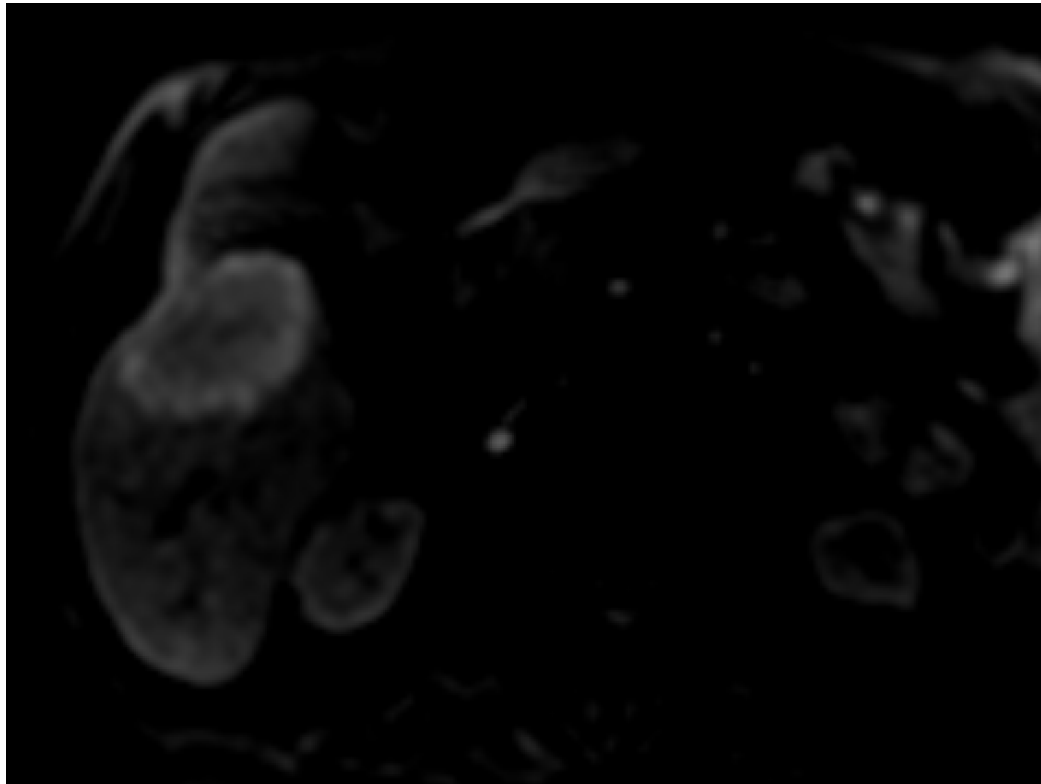


Case 10



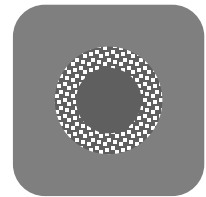
Case 10

DWI



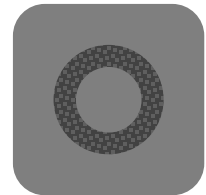
Targetoid mass – imaging appearance

Targetoid dynamic enhancement:



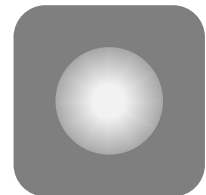
Rim APHE

arterial phase enhancement is most pronounced in observation periphery



Peripheral
“washout”

apparent washout is most pronounced in observation periphery

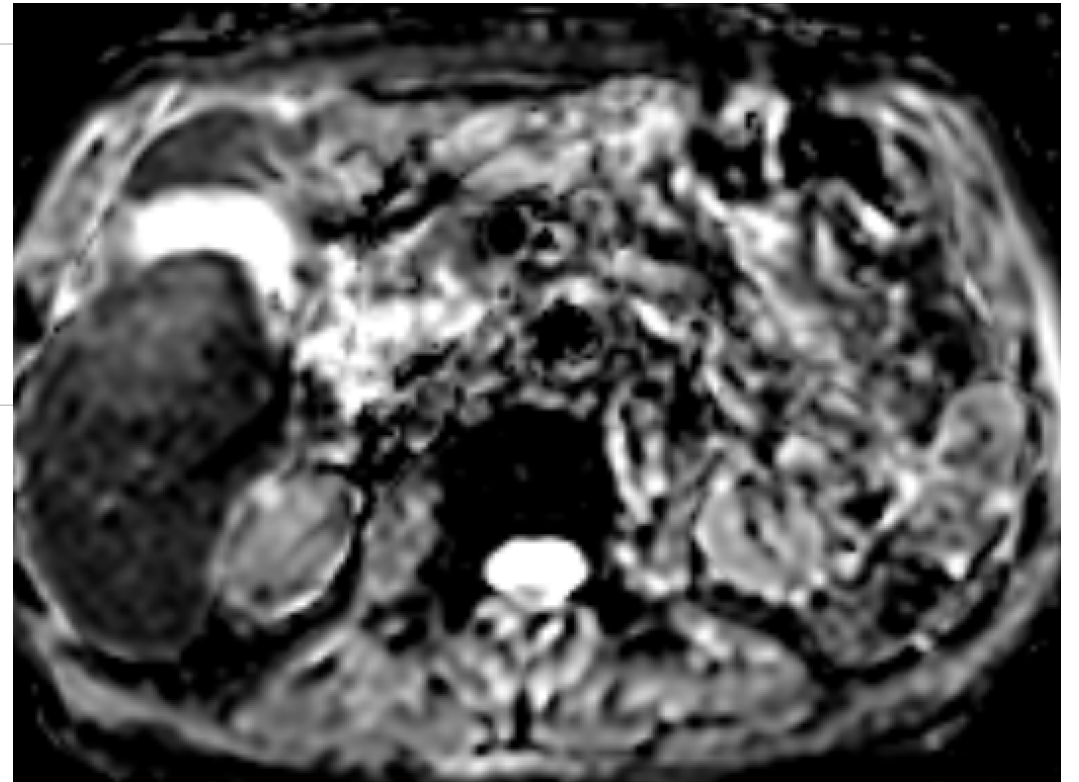
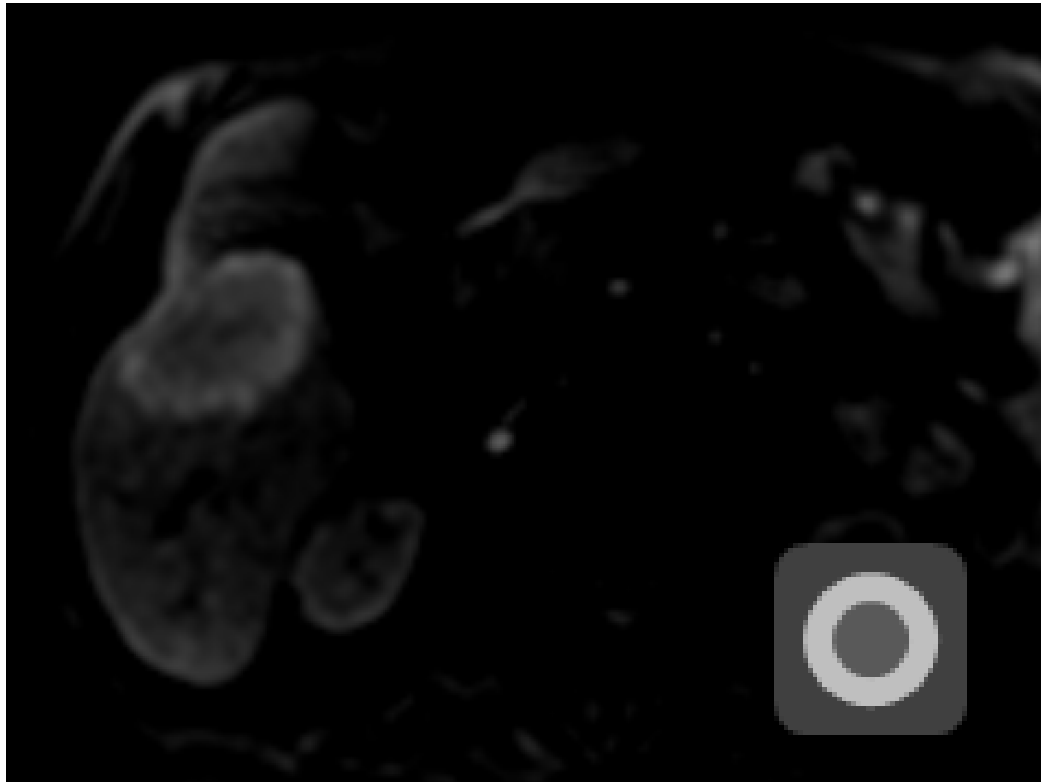


Delayed central
enhancement

central area of progressive postarterial phase enhancement

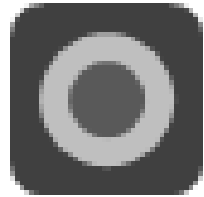
Targetoid mass – imaging appearance

Targetoid appearance on DWI or TP/HBP:



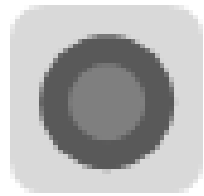
Targetoid mass – imaging appearance

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