

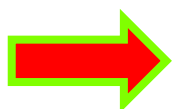


Meeting

**Scuola di Specializzazione
in Radiodiagnostica**



CT/MRI LI-RADS® v2018 CORE



Liver Imaging Reporting And Data System

• US senza mdc →

• CEUS →

• **CT/MR con ECA/HBA** →

trat



Ultrasound LI-RADS® v2017

In collaboration with the LI-RADS Steering Committee, the Ultrasound LI-RADS workgroup developed and refined a standardized system (ACR US LI-RADS® or US LI-RADS®) for technique, interpretation, reporting, and data collection for screening and surveillance ultrasound exams in patients at risk for developing HCC.

Core

The Ultrasound or US LI-RADS Core document is a 24-page hyperlinked document that covers everything needed to apply US LI-RADS® Screening and Surveillance algorithm. It includes US LI-RADS Screening and Surveillance categories, a visualization scoring system, technical recommendations for performing a screening and surveillance ultrasound exam, key concepts of screening and surveillance versus diagnostic tests, and definition of the LI-RADS population.

Download

US LI-RADS® v2017 CORE

Category	Concept	Definition
US LI-RADS	US LI-RADS v2017	US LI-RADS v2017
Screening	Screening	Screening
Surveillance	Surveillance	Surveillance
Population	Population	Population

CARCINOMA EPATOCELLULARE (HCC)

- Il più comune tumore maligno epatico primitivo
- Terza causa di morte per cancro nel mondo
- Caratteristiche peculiari nelle acquisizioni dinamiche



Possibilità di fare diagnosi radiologica
(No biopsia)

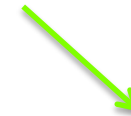
PROTOCOLLI DI ACQUISIZIONE

TC

- Basale (se il paziente ha subito trattamenti locoregionali)
- Fase arteriosa tardiva
- Fase portale
- Fase tardiva

RM

- Sequenze basali T1-pesate in fase e fuori fase
- Sequenze T2-pesate
- Immagini pesate in diffusione
- Sequenze T1-pesate multifasiche



ECA

- Basale
- Fase arteriosa tardiva
- Fase portale
- Fase tardiva

HBA

- Basale
- Fase arteriosa tardiva
- Fase portale
- Fase di transizione (2-5')
- Fase epatospecifica



CT/MRI LI-RADS® v2018 CORE

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

Do not apply in patients:



- Without the above risk factors
- < 18 years old
- With cirrhosis due to congenital hepatic fibrosis
- With cirrhosis due to a vascular disorder such as hereditary hemorrhagic telangiectasia, Budd-Chiari syndrome, chronic portal vein occlusion, cardiac congestion, or diffuse nodular regenerative hyperplasia



CT/MRI LI-RADS® v2018 CORE

Diagnostic Categories

LR-NC

Not categorizable
(due to image omission or degradation)

LR-1

Definitely benign

LR-2

Probably benign

LR-3

Intermediate probability of malignancy

LR-M

LR-4

Probably HCC

LR-5

Definitely HCC

LR-TIV

Tumor in vein

Probably or definitely malignant,
not necessarily HCC



Rim APHE



Peripheral
"washout"



Delayed central
enhancement





CT/MRI LI-RADS® v2018 CORE

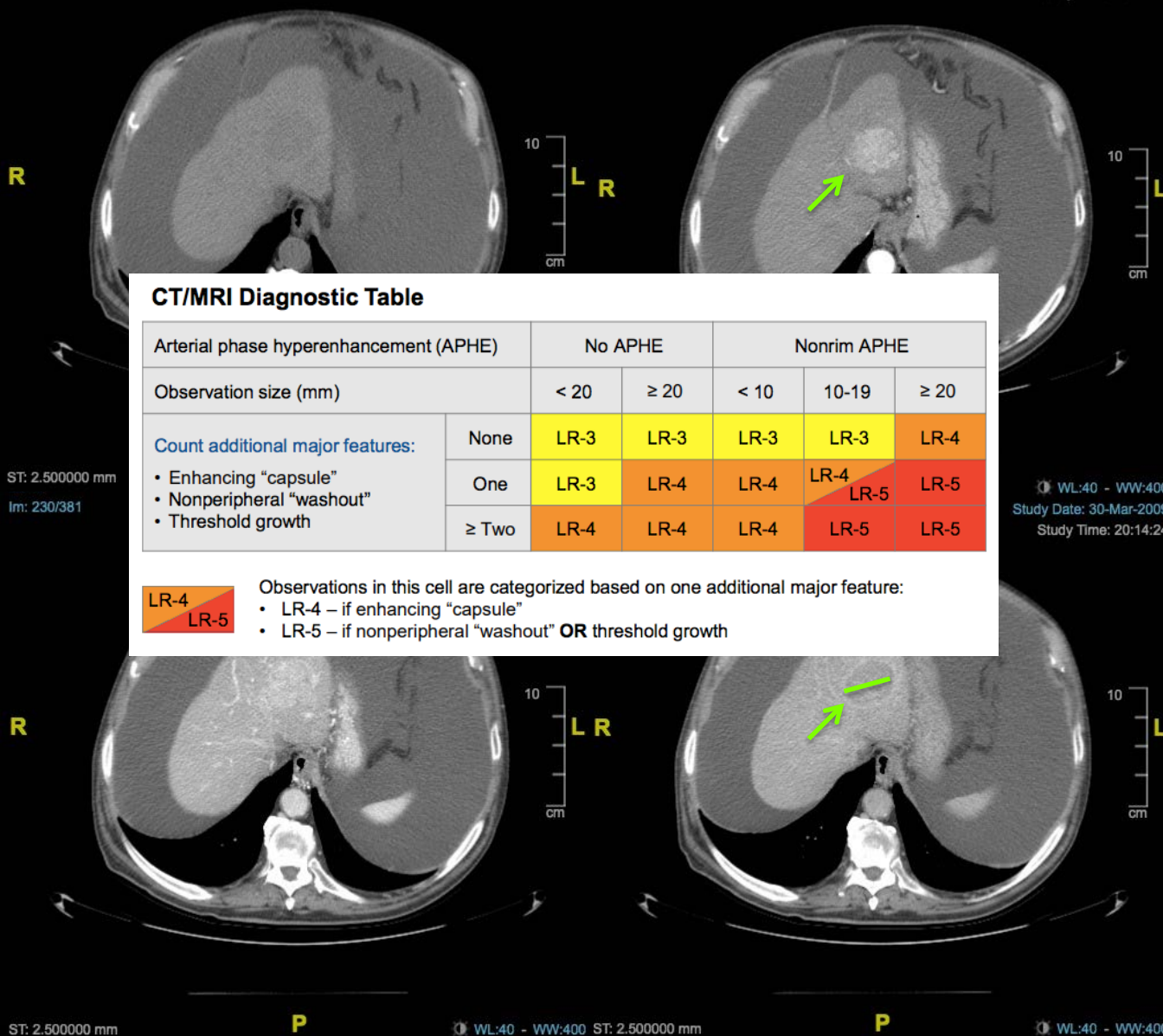
CT/MRI Diagnostic Table

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



CT/MRI Diagnostic Table

Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
		< 20	≥ 20	< 10	10-19	≥ 20
Observation size (mm)						
Count additional major features:	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

STEP 1: wash-in arterioso
Sì/No

STEP 2: dimensioni <10mm
10-19mm
>20mm

STEP 3: criteri maggiori:
- Capsula?
- Wash-out?
- Crescita?

Nessuno / uno **≥ due**

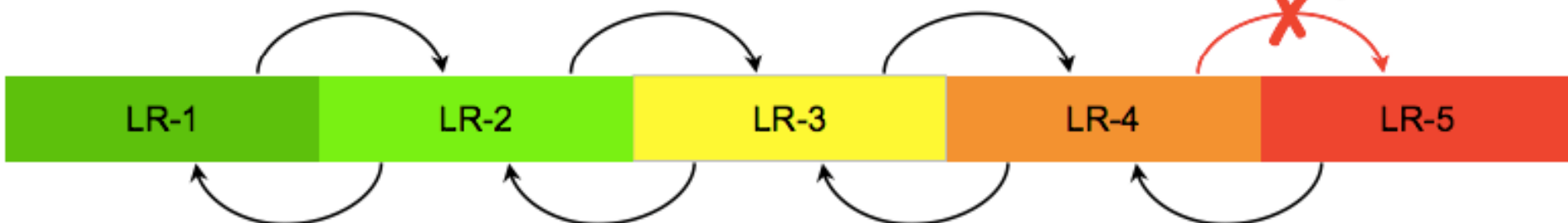
LR 5



CT/MRI LI-RADS® v2018 CORE

CRITERI ANCILLARI

≥ 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



CT/MRI LI-RADS® v2018 CORE

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



CT/MRI LI-RADS® v2018 CORE

CRITERI DISCRIMINANTI

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

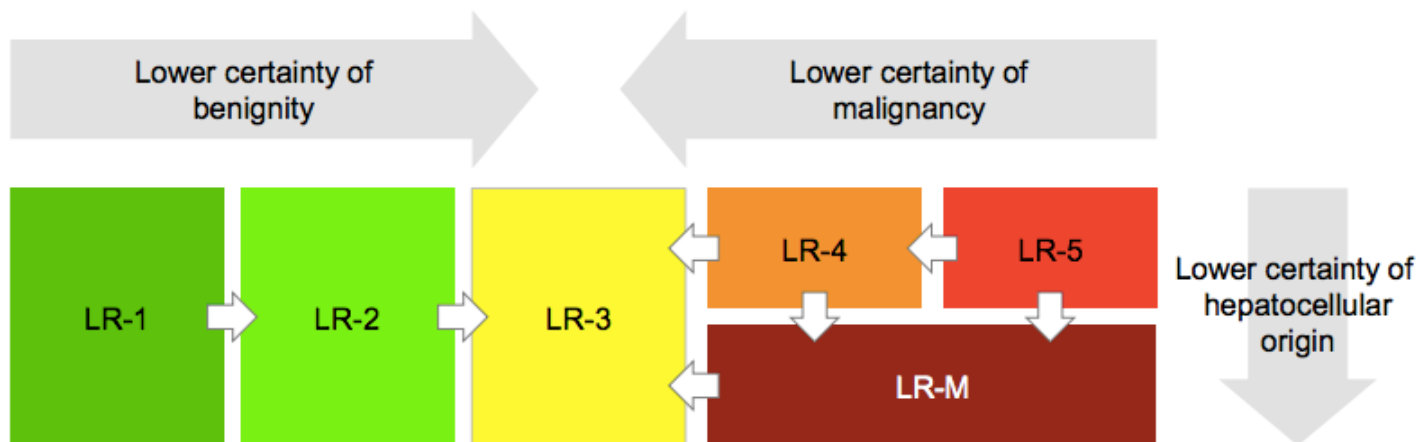


Tumor in vein

LR-TIV

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

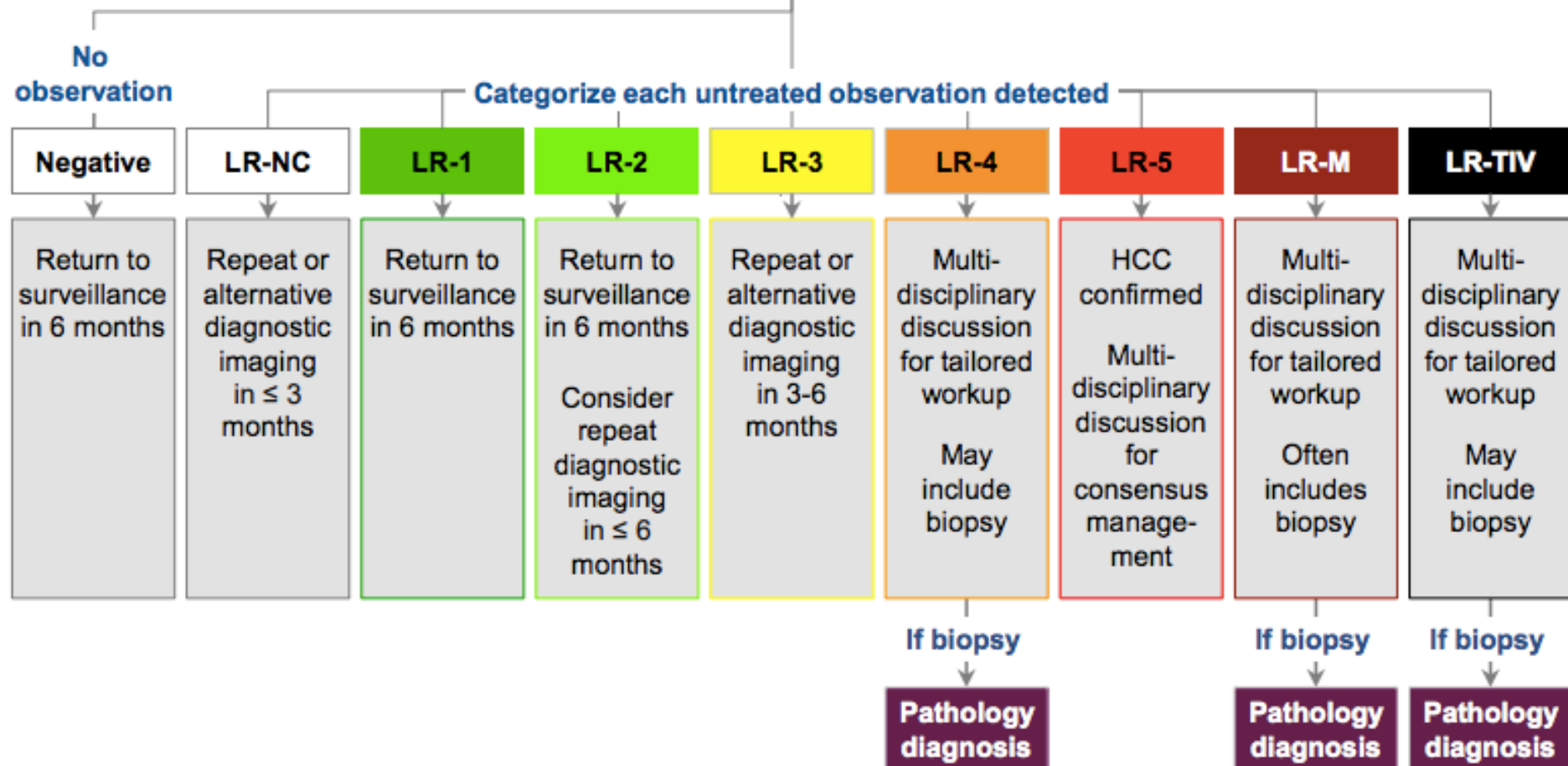
If unsure between two categories, choose the one reflecting lower certainty

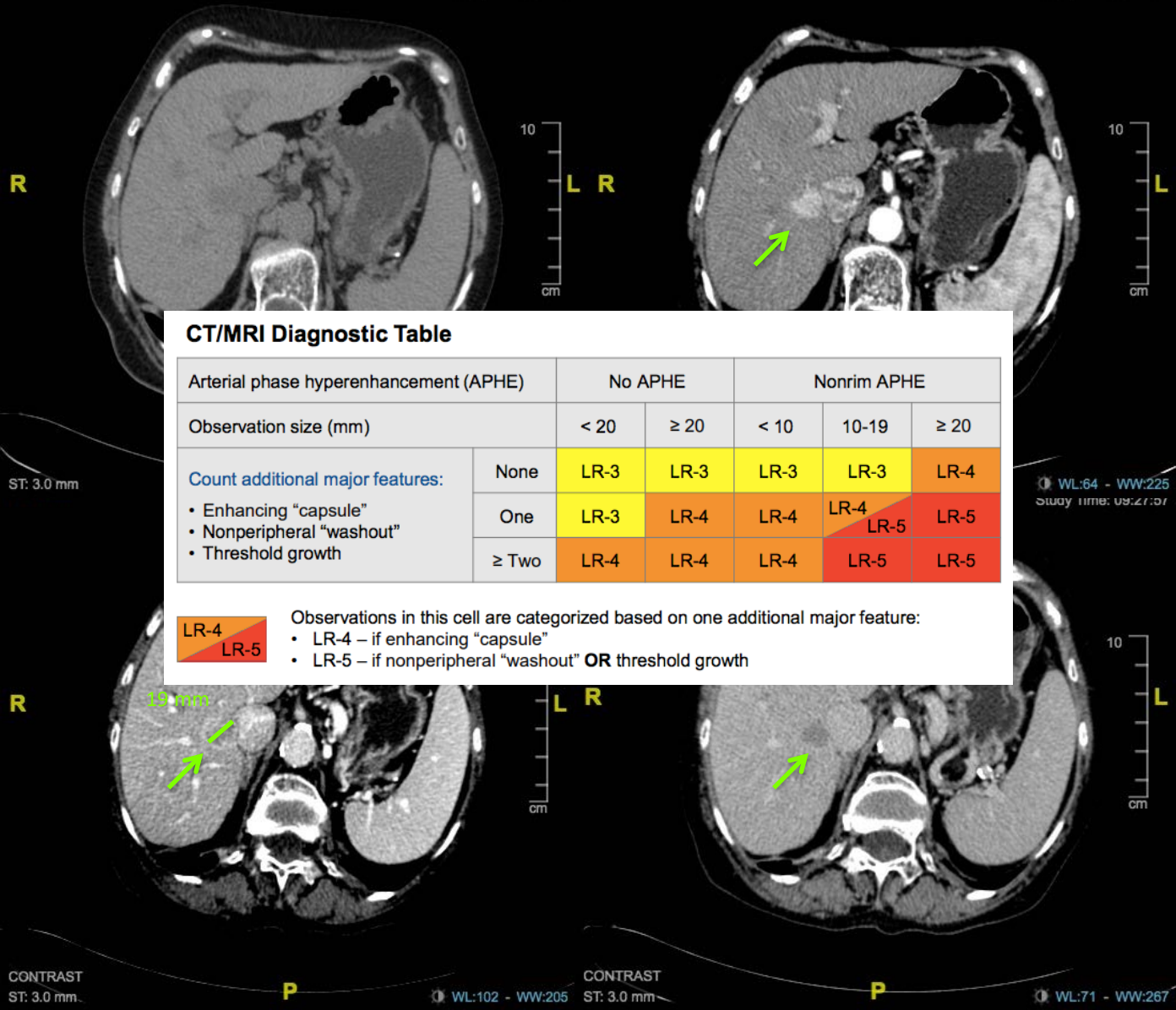




CT/MRI LI-RADS® v2018 CORE

Multiphase CT or MRI





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:	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

STEP 1: wash-in arterioso
 Sì/No

STEP 2: dimensioni
 <10mm
 10-19mm
 >20mm

STEP 3: criteri maggiori:

- Capsula?
- Wash-out?
- Crescita?

Nessuno / uno / ≥ due

LR 5

STEP 1: wash-in arterioso
 Sì/No

STEP 2: dimensioni <20mm
 ≥20mm

STEP 3: criteri maggiori:
 - Capsula?
 - Wash-out?
 - Crescita?

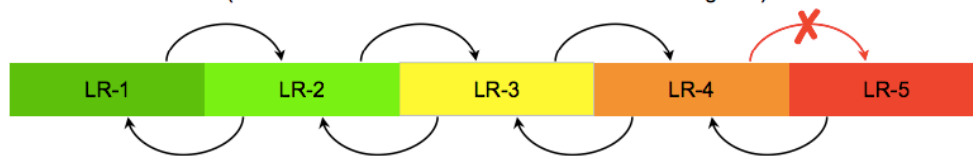
Nessuno / uno / ≥ due

CT/MRI Diagnostic Table

Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
		< 20	≥ 20	< 10	10-19	≥ 20
Observation size (mm)						
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

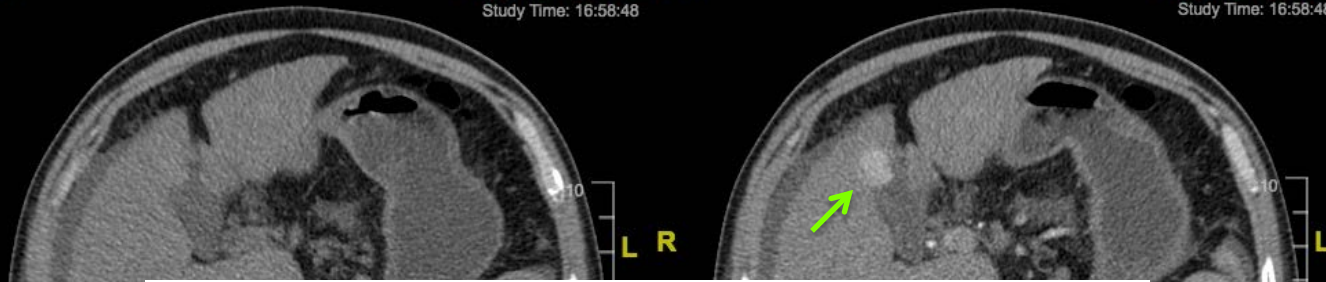
≥ 1 AF favoring malignancy: upgrade by 1 category up to LR-4
 (Absence of these AFs should not be used to downgrade)



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

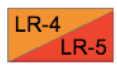
If ≥ 1 AF favoring malignancy and ≥ 1 AF favoring benignity:
 Do not adjust category

LR 3



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

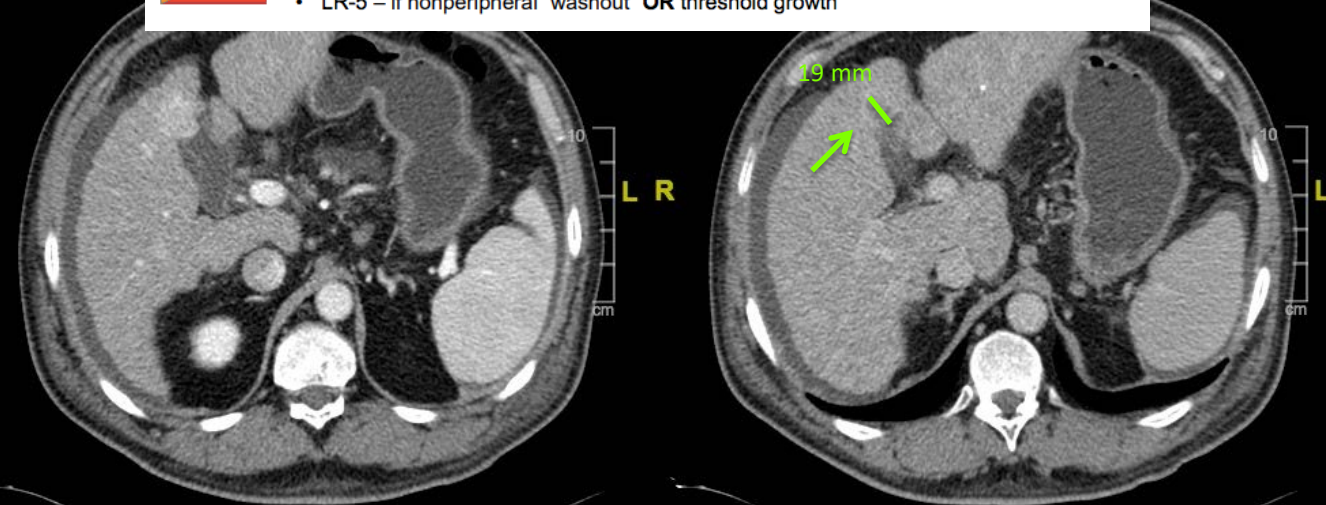
STEP 1: wash-in arterioso
Sì/No

STEP 2: dimensioni
<10mm
10-19mm
>20mm

STEP 3: criteri maggiori:
- Capsula?
- Wash-out?
- Crescita?

Nessuno / uno / ≥ due

LR 4





CT/MRI LI-RADS® v2018 CORE

Treatment Response Categories

LR-TR Nonevaluable	Treated, Response not evaluable (due to image omission or degradation)
LR-TR Nonviable	Treated, Probably or definitely not viable
LR-TR Equivocal	Treated, Equivocally viable
LR-TR Viable	Treated, Probably or definitely viable



CT/MRI LI-RADS® v2018 CORE

CT/MRI Treatment Response Table

No lesional enhancement



Response Category	Criteria
LR-TR Nonviable	<ul style="list-style-type: none"> No lesional enhancement OR Treatment-specific expected enhancement pattern
LR-TR Equivocal	Enhancement atypical for treatment-specific expected enhancement pattern and not meeting criteria for probably or definitely viable
LR-TR Viable	Nodular, masslike, or thick irregular tissue in or along the treated lesion with any of the following: <ul style="list-style-type: none"> Arterial phase hyperenhancement OR Washout appearance OR Enhancement similar to pretreatment

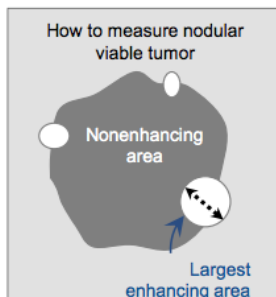
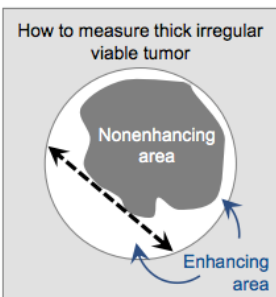
Posttreatment APHE



Posttreatment "washout"



Posttreatment enhancement similar to pretreatment



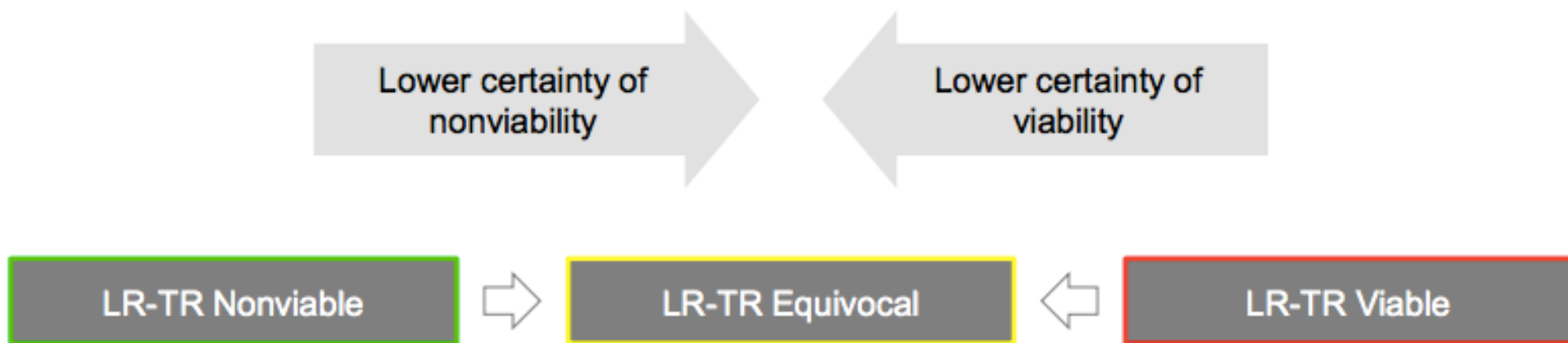
Size of equivocally, probably, or definitely viable tumor

Longest dimension through enhancing area of treated lesion, not traversing nonenhancing area



CT/MRI LI-RADS® v2018 CORE

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





CT/MRI LI-RADS[®] v2018 CORE

Treated observations

Multiphase CT or MRI

Categorize each treated observation detected

LR-TR Nonevaluable

Continue monitoring in ≤ 3 months with:

- Same modality, **OR**
- Different modality

LR-TR Nonviable

Continue monitoring in ≤ 3 months with:

- Same modality, **OR**
- Different modality

LR-TR Equivocal

Continue monitoring in ≤ 3 months with:

- Same modality, **OR**
- Different modality

LR-TR Viable

Multi-disciplinary discussion for consensus management

Often includes retreatment



Grazie per l'attenzione!

