

# LIRADS Tumour Response: What, Why and How. An illustrated guide

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## Introduction

Hepatocellular carcinoma (HCC) accounts for 4.6% of new malignancies in Hong Kong in 2021<sup>1</sup>. Locoregional treatment have the potential to cure patients with HCC. However, viable tumour post therapy has been linked with poorer overall survival. Conversely, overtreatment carries risks of complications<sup>3</sup>. mRECIST can help assess treatment response, but is mostly confined to research studies. Studies have suggested LIRADS for CT/MRI tumour response guidance is similar in prediction of overall survival and can be easier to use<sup>4</sup>.

Studies have shown poorer overall survival in LR-TR viable category, but LR-TR equivocal and non-viable categories shared similar outcomes. There was also suggestion of interobserver variability in assigning categories<sup>5,6</sup>. LIRADS latest update aims to better differentiate patients in LR-TR Viable and LR-TR Equivocal categories, in the nonradiation tumour response arm, by changing to a single feature for evaluation of arterial enhancement and addition of optional ancillary features. We will review the new algorithm with case examples.

## LIRADS Tumour Response Categories

To use the TRA decision tree (figure 1), determine if it is appropriate to apply.

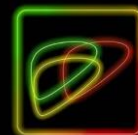
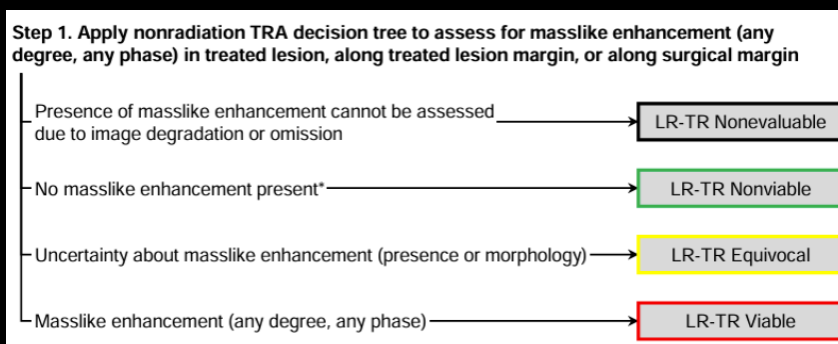
### **Do Not Use if:**

- Scans only non contrast or single post contrast sequence.
- The area in question is outside the treatment zone or surgical margin (should be in treated lesion, along the treated or surgical margin).
- If the patient on systemic therapy only or as well as loco-regional therapy, apply with caution

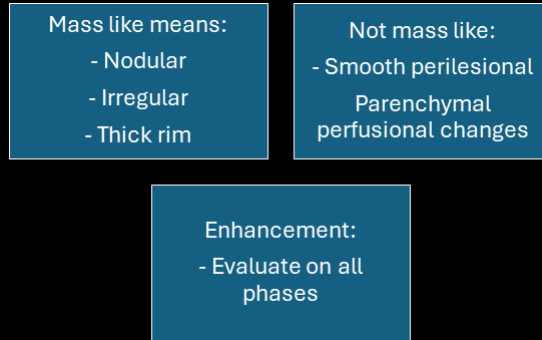
### **When applying:**

1. Determine if there is mass like enhancement
2. Select a category from the below (figure 1)
3. If LR-TR equivocal consider using ancillary features, which are **T2 hyperintensity** or **restricted diffusion** to upgrade category.
4. *May consider applying tie-breaking as final step – choose one with lower certainty*

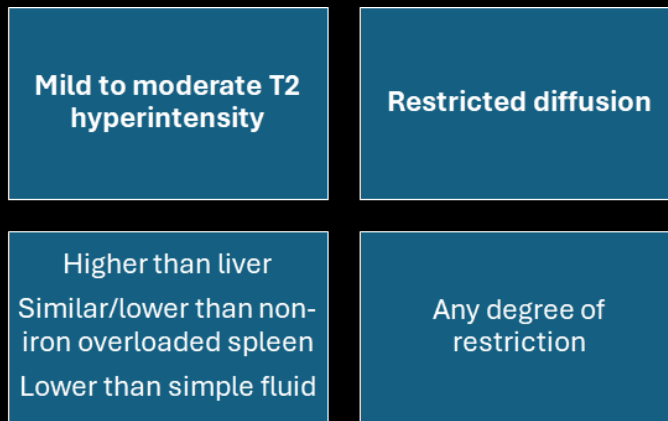
Figure 1



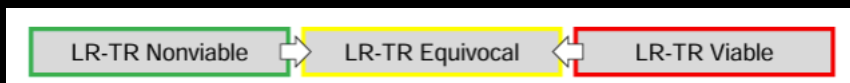
# 1) Is there mass-like enhancement



# 2) Optional Ancillary Features



# 3) Tie Breaking, if Needed



1. Mass-like enhancement?

- Yes - LR-TR viable
- No - LR-TR non-viable
- **Unsure -> step 2**



2. Unsure -> ancillary features at site of uncertain enhancement

T2 high / DWI

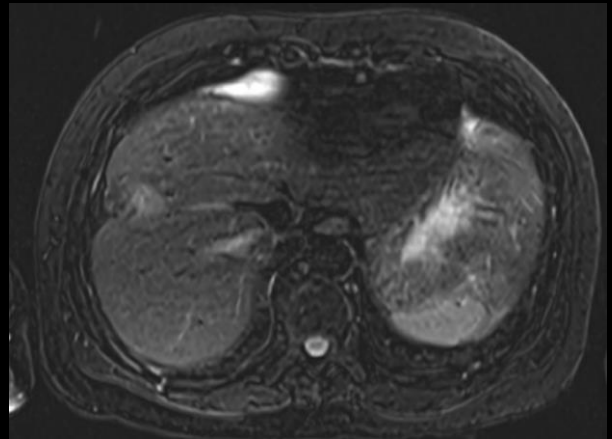
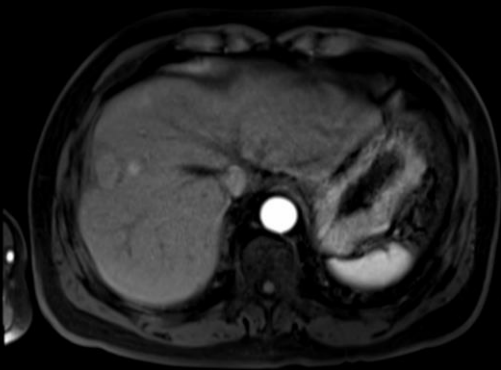


3. LR-TR Equivocal to LR-TR Viable?



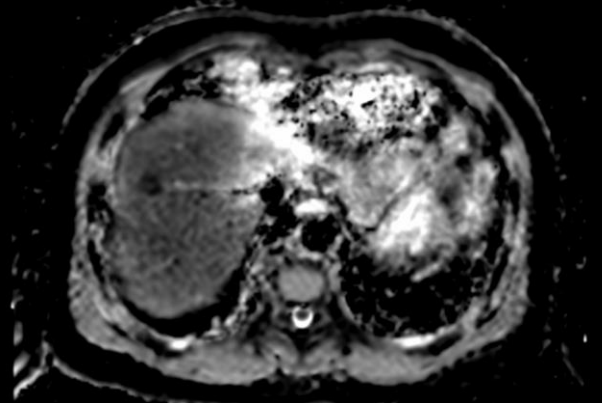
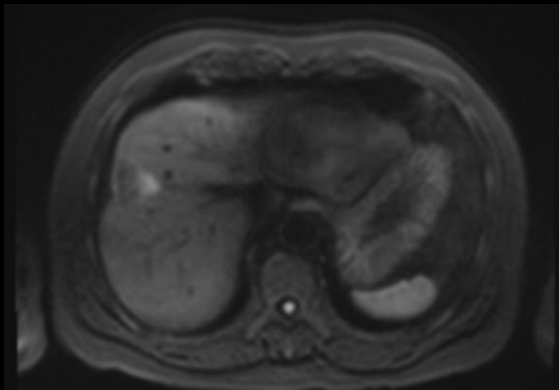
Arterial phase

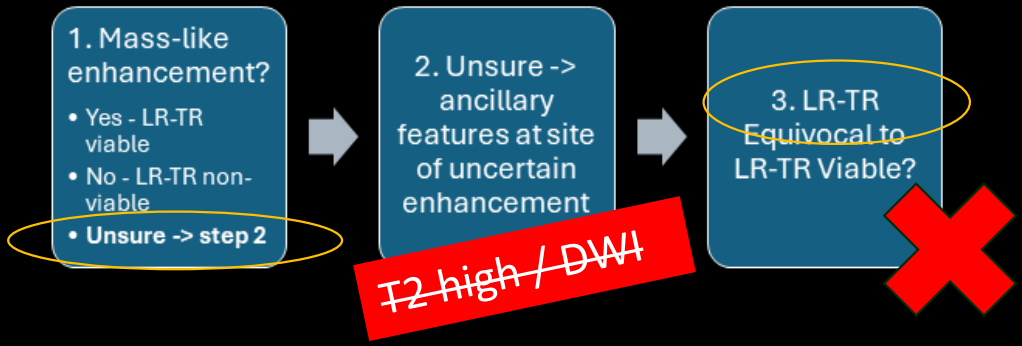
T2 FS



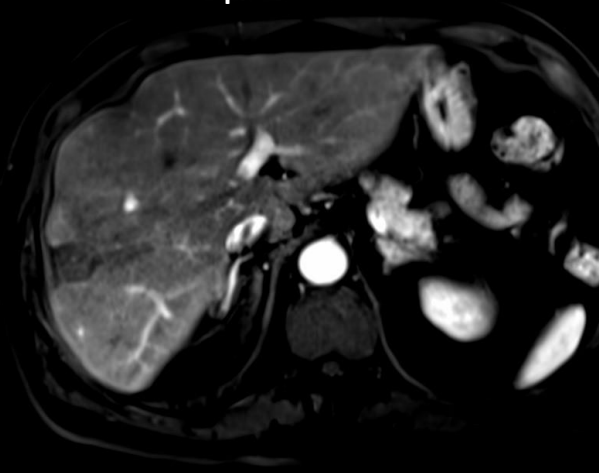
DWI

ADC

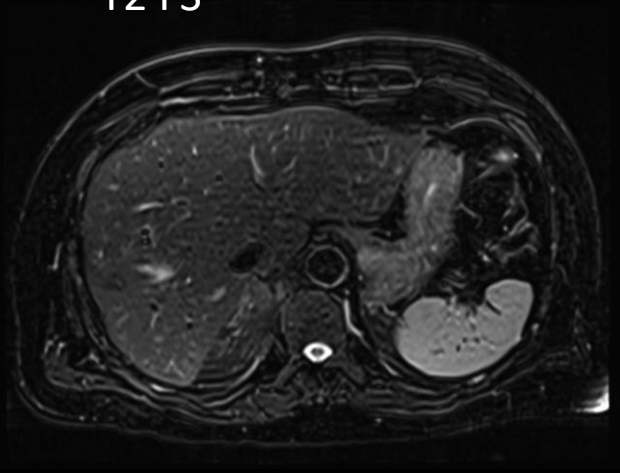




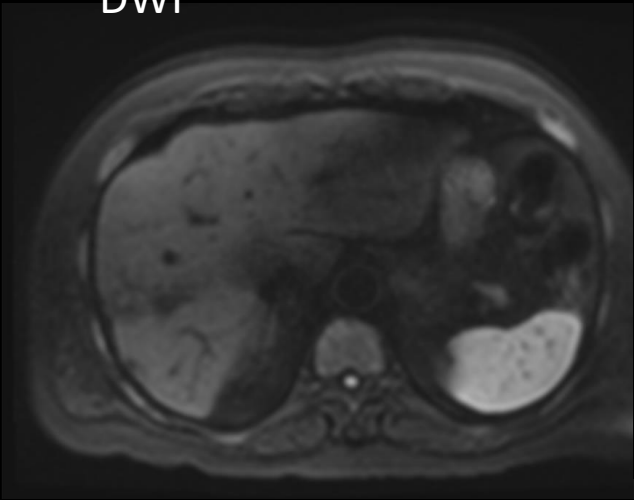
Arterial phase



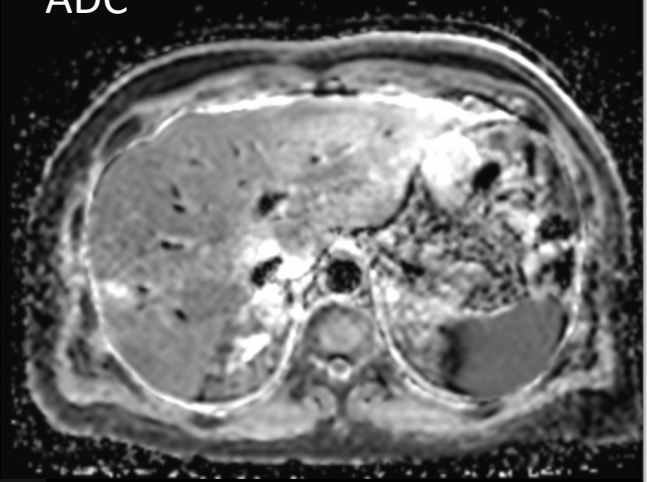
T2 FS



DWI

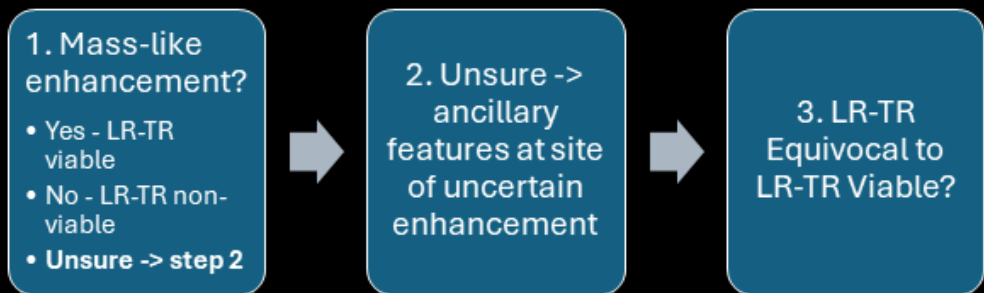


ADC



# Summary

- Decide appropriateness to apply the TRA decision tree
- Assign a category by assessing for mass-like enhancement
- Consider using ancillary features if LR-TR equivocal category to upgrade category.



## References

1 Center of Health Protection - The Government of the Hong Kong Special Administrative Region. Liver Cancer 2022. Center of Health Protection web site, <https://www.chp.gov.hk/en/healthtopics/content/25/52.html>

2 Hsin IF, Hsu CY, Huang HC, Huang YH, Lin HC, Lee RC, Chiang JH, Lee FY, Huo TI, Lee SD. Liver failure after transarterial chemoembolization for patients with hepatocellular carcinoma and ascites: incidence, risk factors, and prognostic prediction. *J Clin Gastroenterol*. 2011 Jul;45(6):556-62. doi: 10.1097/MCG.0b013e318210ff17. PMID: 21666547.

3 Cheng KL, Cheng YM, Chan CY, Wang CC. Predictors of Liver Dysfunction After Transhepatic Arterial Chemo-embolization in Hepatocellular Carcinoma Patients. *Dig Dis Sci*. 2023 Aug;68(8):3467-3472. doi: 10.1007/s10620-023-07984-4. Epub 2023 Jun 2. PMID: 37266712.

4 Youn SY, Kim DH, Choi SH, Kim B, Choi JI, Shin YR, Oh SN, Rha SE. Diagnostic performance of Liver Imaging Reporting and Data System treatment response algorithm: a systematic review and meta-analysis. *Eur Radiol*. 2021 Jul;31(7):4785-4793. doi: 10.1007/s00330-020-07464-7. Epub 2021 Jan 6. PMID: 33409795.

5 Ormiston WEL, Yarmohammadi H, Lobaugh S, Schilsky J, Katz SS, LaGratta M, Velayati S, Zheng J, Capanu M, Do RKG. Post-treatment CT LI-RADS categories: predictors of overall survival in hepatocellular carcinoma post bland transarterial embolization. *Abdom Radiol (NY)*. 2021 Aug;46(8):3738-3747. doi: 10.1007/s00261-020-02775-1. Epub 2020 Sep 24. PMID: 32968863; PMCID: PMC7988305.