A SIMPLIFICATION OF LI-RADS V2018 THAT IMPROVES SENSITIVITY WHILE MAINTAINING POSITIVE PREDICTIVE VALUE FOR HCC ON GADOXETATE DISODIUM-ENHANCED MRI

Hanyu Jiang, MD; Bin Song, MD; Yun Qin, MD; Meghana Konanur, MD; Yuanan Wu, MD; Matthew DF McInnes, MD PhD; Kyle J. Lafata, PhD; Mustafa Bashir, MD

INTRODUCTION

- Gadexetate disodium (EOB)-enhanced MRI is a first-line diagnostic modality for HCC.
- The integration of LI-RADS in some practices has been hampered in part due to limited diagnostic sensitivity (~62%) and complex ancillary feature system.
- Due to challenges in depicting several Liver Imaging Reporting and Data System (LI-RADS) major features, it has suboptimal diagnostic performance compared with MRI using extracellular contrast agents.
- This study aimed to develop a modified LI-RADS (mLI-RADS) based on EOB-MRI and to compare its performance with the current LI-RADS version 2018 and other established HCC diagnostic algorithms.

METHODS

- Consecutive high-risk patients with LR-3 to LR-5 observations were retrieved from a prospectively-collected cohort and divided into training and testing sets.
- In the training set, the optimal LI-RADS version 2018 features were selected by Random Forest analysis to develop mLI-RADS via decision tree analysis.
- mLI-RADS assigned based on PPV: mLI-RADS 5 PPV > 90%, mLI-RADS 3 PPV < 40%, mLI-RADS 4 PPV 40-90%.
- For the independent testing set, diagnostic performances of mLI-RADS and other established HCC schemes were computed using a generalized estimating equation model and compared with McNemar's test.

FIGURE 1: mLI-RADS decision tree

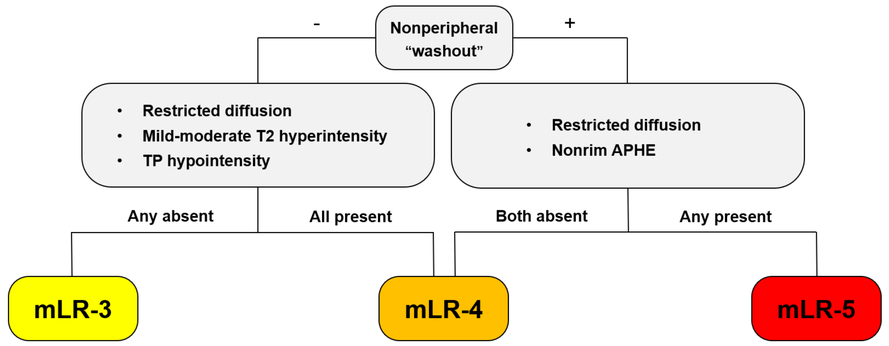
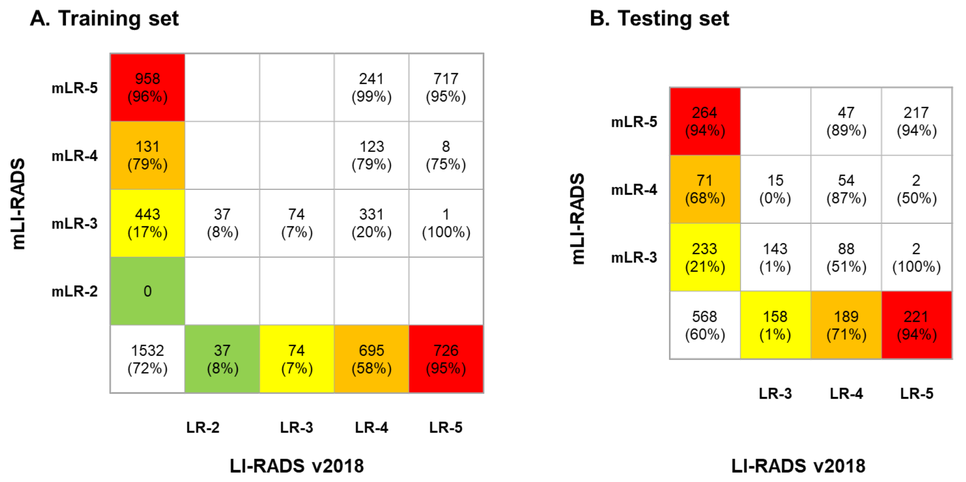


TABLE 1: Testing set diagnostic performances of LI-RADS v2018 and mLI-RADS category 5 for HCC

	PPV	NPV	Sensitivity	Specificity	Accuracy
mLI-RADS	247/264 (94)	208/304 (68)	247/343 (72)	208/225 (92)	455/568 (80)
LI-RADS v2018	208/221 (94)	212/347 (61)	208/343 (61)	212/225 (94)	420/568 (74)
P value	0.56	***<.001***	***<.001***	*0.22*	***<.001***
KLCA guidelines	218/238 (92)	205/330 (62)	218/343 (64)	205/225 (91)	423/568 (74)
P value	0.15	***<.001***	***<.001***	*0.58*	***<.001***

FIGURE 2: pairwise comparisons for category assignments between LI-RADS v2018 and mLI-RADS



RESULTS

- **Five** features were included in mLI-RADS, as opposed to **26** features in LI-RADS v2018.
- mLR-5 was defined as ***nonperipheral "washout"*** coupled with either ***nonrim arterial phase hyperenhancement*** OR ***restricted diffusion***.
- In the testing set, mLI-RADS was more sensitive (72% vs. 61%, P<.001) than LI-RADS v2018, without significant sacrifice in PPV (94% vs. 94%, P =.56) or specificity (92% vs. 94%, P=.22).
- Use of mLI-RADS resulted in category migration of 241 observations among three readers from LR-4 to mLR-5 (99% were HCC) in the training set, and of 47 observations among three readers (89% were HCC) in the testing set.

CONCLUSIONS

- In high-risk patients, the EOB-MRI-based mLI-RADS is simpler as it constitutes only 5 features compared to LI-RADS v2018, which includes as many as 26 features.
- mLI-RADS demonstrated significantly improved diagnostic sensitivity, NPV, and accuracy for HCC than LI-RADS v2018, while maintaining comparably high PPV and specificity.