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New Progress toward Validation of LI-RADS Version 2018

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Conflicts of interest are listed at the end of this article.

See also the article by Kim et al in this issue.

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The Liver Imaging Reporting and Data System (LI-RADS) was developed with the support of the American College of Radiology to standardize interpretation and reporting of imaging of hepatocellular carcinoma (HCC) in patients at high risk (1). The system is made of algorithms to be applied during surveillance with US (US LI-RADS), diagnosis (CT/MRI LI-RADS and contrast-enhanced CT/MRI LI-RADS), and treatment assessment of HCC.

When using the CT/MRI LI-RADS algorithm, each liver observation (ie, an area of the liver that appears different from the surrounding parenchyma) is assigned a category of risk of being HCC on the basis of a combination of major and ancillary features. The five diagnostic categories range from LR-1 (definitely benign) to LR-5 (definitely HCC). Two additional categories are LR-TIV, including observations with features of tumor in vein, and LR-M, including observations suspicious for malignancy but not necessarily HCC. Following the first release in 2011, refined versions were developed in 2013, 2014, and 2017.

A few months ago, LI-RADS version 2018 was released (1). Modifications to version 2017 had become necessary to guarantee congruity with the recently published American Association for the Study of Liver Disease (AASLD) clinical practice guidance for the diagnosis, staging, and management of HCC (2). The integration of LI-RADS into the AASLD guidelines represents a major step toward the unification of imaging systems for HCC (1). LI-RADS version 2018 includes some substantial changes compared with prior versions: *(a)* Observations measuring between 10 and 20 mm with arterial phase hyperenhancement and washout are now categorized as LR-5 regardless of the presence of enhancing capsule or threshold growth; *(b)* elimination of the category LR-5us; and *(c)* a simplified definition of threshold growth, now set as a diameter change of 50% or more in 6 or fewer months.

Multiple studies exploring the diagnostic accuracy of the LI-RADS system are now available. A systematic review of the percentage of HCC and overall malignancy for each LR category was recently published (3). This review, based on results of 17 retrospective studies including 2760 patients and 3556 lesions, showed that 94% of the observations categorized as LR-5 are HCC, while 93% of the observations categorized as LR-M are malignant. The studies included in this review were performed by using the CT/MRI LI-RADS version 2014 and version 2017. There is, however, a gap in knowledge regarding the diagnostic performance of the recently released version 2018.

In this context, the study by Kim et al (4) in this issue of *Radiology* is timely reporting on the diagnostic performances of LR-5 and LR-M in LI-RADS version 2018 for distinguishing HCC from other malignancy (OM). This was a case-control study including 55 patients with OM and 165 patients with HCC. All patients had cirrhosis, and all lesions were histologically proven. The OMs were combined HCC and cholangiocarcinoma (CCA) (cHCC-CCA) (n = 31), intrahepatic cholangiocarcinoma (n = 16), metastatic adenocarcinoma (n = 7), and angiosarcoma (n = 1). Kim and colleagues report the LR-5 classification had a sensitivity of 74% and a specificity of 89% for the diagnosis of HCC.

The most specific LR-5 feature was the presence of an enhancing capsule. On the other hand, the application of the LR-M criteria allowed a correct diagnosis of OM in 89% (49 of 55) of the cases. The most sensitive LR-M feature was the presence of rim arterial phase hyperenhancement. Interestingly, the six OMs classified as LR-5 were cHCC-CCAs. As previously reported (5), cHCC-CCAs may manifest with imaging features typical of HCC, thus decreasing the sensitivity of the LR-M category and the specificity of the LR-5 category. The specificity of the LR-M category for the diagnosis of OM was only 48% because 86 (52%) of 165 HCCs showed imaging features typical of LR-M. This number is larger than what has previously been reported (36% in the systematic review by van der Pol [3]), likely because of the large number of cHCC-CCAs included in this study (31 of 55).

The LR-M category was designed to include malignancies of non-hepatocellular origin and to preserve the high specificity of the LR-5 for diagnosing HCC. In LI-RADS version 2018, an observation is categorized as LR-M if it appears as a targetoid mass or a non-targetoid mass with at least one of the following features: infiltrative appearance, marked diffusion restriction, necrosis or severe ischemia, or other features that may suggest non-HCC malignancy such as capsular retraction and biliary dilation (6). In a similar study performed by using LI-RADS version 2014, Fraum et al (5) showed that the LR-5 category had a sensitivity of 58.8%–61.8% and specificity of 83.3%–92.9% for the diagnosis of HCC, whereas the LR-M category had a sensitivity of 64.3%–81.0% and a specificity of 86.0%–92.6% for the diagnosis of other malignancies.

The results in this article are timely and represent a first important step toward the validation of LI-RADS

version 2018. There were also some limitations to the current study. The case-control design may have resulted in an overestimation of the sensitivity because the proportion of non-HCC malignancies was larger than what would be encountered in clinical practice. The results on the diagnostic performance of LR-5 and LR-M category may have also been affected by the inclusion of only pathologically proven lesions and the exclusion of benign lesions. Finally, the authors evaluated the performance of category LR-5 and LR-M without strictly applying the LI-RADS algorithm (ie, decision tree and diagnostic table), likely explaining the suboptimal specificity (89%) of the LR-5 category in this study. Finally, the diagnostic value of ancillary features in distinguishing HCC and OM was not evaluated. Other studies, preferably ones with a prospective and multicenter design, are necessary to further assess the accuracy of LI-RADS version 2018 and to determine the probability of malignancy associated with each LR category.

In conclusion, I congratulate the authors on their timely study. The results will likely strengthen the use of LI-RADS in patients at risk for HCC and will possibly lead to further refinement of the system.

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