LI-RADS: Update 2016

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Disclosure of Potential Conflicts of Interest

- Guerbet SA:
  - Patent Agreement
- Bayer AG:
  - Patent Agreement
LI-RADS: Update 2016

- What is LI-RADS (and why is it needed)?
- LI-RADS organizational structure
- Additions to LI-RADS v2017
- Timeline for the future
HCC Management

• Appropriate choice of treatment depends on the accurate diagnosis and staging of HCC on imaging studies

• Treatment decisions often are made in the absence of histologic confirmation
  • AASLD, EASL, APASL, OPTN

• Therefore, accuracy of classifying lesions as HCC or non-HCC on imaging studies is critical to patient management
HCC Management

- Ablation
- Chemoembolization
- Radioembolization (Y-90)
- Resection (non-cirrhotics)
- Orthotopic liver transplantation (OLT)
New OPTN/UNOS Policy for Liver Transplant Allocation:
Standardization of Liver Imaging, Diagnosis, Classification, and Reporting of Hepatocellular Carcinoma

As background for this article, one must consider that, through 2011, 16857 patients were awaiting liver transplantation (LT) (1), while 5618 adults actually received a liver (2). In light of this long-standing organ shortage, evaluating patients and determining those most in need of a liver transplant and allocation of resources are important issues that have changed over time. Patients with hepatocellular carcinoma (HCC) may receive priority on the transplant list if they meet certain criteria.
### Table 3

**OPTN Classification System for Nodules Seen on Images of Cirrhotic Livers**

<table>
<thead>
<tr>
<th>Class and Description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTN class 0</td>
<td>Incomplete or technically inadequate study. Repeat study required for adequate assessment; automatic priority MELD points cannot be assigned on basis of an imaging study categorized as OPTN class 0.</td>
</tr>
<tr>
<td>OPTN class 5</td>
<td>Meets radiologic criteria for HCC. May qualify for automatic exception, depending on stage*</td>
</tr>
<tr>
<td>Class 5A: ≥1 cm and ≤2 cm measured on late arterial or portal venous phase images</td>
<td>Increased contrast enhancement in late hepatic arterial phase AND washout during later phases of contrast enhancement AND peripheral rim enhancement (capsule or pseudocapsule).</td>
</tr>
<tr>
<td>Class 5A-g: same size as OPTN class 5A HCC</td>
<td>Increased contrast enhancement in late hepatic arterial phase AND growth by 50% or more documented on serial CT or MR images obtained ≤6 months apart.</td>
</tr>
<tr>
<td>Class 5B: maximum diameter ≥2 cm and ≤5 cm</td>
<td>Increased contrast enhancement in late hepatic arterial phase AND either washout during later contrast phases OR peripheral rim enhancement (capsule or pseudocapsule) OR growth by 50% or more documented on serial CT or MR images obtained ≤6 months apart (OPTN class 5B-g).</td>
</tr>
<tr>
<td>Class 5T: prior regional treatment for HCC</td>
<td>Describes any residual lesion or perfusion defect at site of prior UNOS class 5 lesion.</td>
</tr>
<tr>
<td>Class 5K: maximum diameter ≥5 cm</td>
<td>Increased contrast enhancement in late hepatic arterial phase AND either washout during later contrast phases OR peripheral rim enhancement (capsule or pseudocapsule).</td>
</tr>
</tbody>
</table>

*Note.—OPTN class number denotes whether an imaging examination is nondiagnostic (OPTN class 0) or the study includes an image that contains at least one treated or untreated HCC (OPTN class 5). OPTN class 5 is further subdivided by adding a capital letter to denote UNOS stage 1 disease (OPTN class 5A), UNOS stage 2 disease (OPTN class 5B), a treated HCC (OPTN class 5T), or HCC beyond acceptable size for transplantation (OPTN class 5K). The g in OPTN class 5A-g and OPTN class 5B-g is used to indicate that growth was used to arrive at the HCC diagnosis. |

* See 3.6.4.4 section A in reference 4.

Radiology 2013; 266:376-382
LI-RADS

• A comprehensive system for standardized interpretation and reporting of CT, MR and US examinations performed on patients at risk for HCC

• Initiated and chaired by Claude Sirlin (UCSD)

• Developed by a large committee with international and multidisciplinary input

• Supported by the ACR
Aims of LI-RADS

• Establish minimum technical parameters for CT, MR, and US HCC surveillance (also encompasses MR-HBA and CEUS)

• Standardize: Terminology
  Interpretation
  Reporting
  Imaging management

• Enhance communication among radiologists, hepatologists, surgeons and pathologists

www.acr.org/LI-RADS
LI-RADS Organization

Steering Committee

ACR Staff

SAR
HCC Disease Focus Panel

Working Groups

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<th>Management</th>
<th>US Surveillance</th>
<th>Rad Path</th>
<th>Tumor Response</th>
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<td>Reporting</td>
<td>CEUS</td>
<td>Outreach &amp; Education</td>
<td>Evidence</td>
<td>Tech &amp; Apps</td>
<td></td>
</tr>
</tbody>
</table>

Do you want to help?

Other possible work groups:
- Integration
- Feedback & Response
LI-RADS Categories

- **LR-1**: Definitely benign
- **LR-2**: Probably benign
- **LR-3**: Intermediate probability for HCC
- **LR-4**: Probably HCC
- **LR-5**: Definitely HCC
- **LR-5V**: Definitely HCC with Tumor in Vein
- **LR-M**: Probably malignant, not necessarily HCC
- **LR-5Treated**: Observation after locoregional treatment

www.acr.org/LI-RADS
Algorithm for CT, MRI with ECA, MRI with HBA

Observation in high-risk patient

- Treated observation
  - LR-Treated

- Untreated observation
  - Definitely benign
    - LR-1
  - Probably benign
    - LR-2
  - Neither definitely nor probably benign
    - Probable malignancy, not specific for HCC
      - LR-M
    - Tumor in vein
      - LR-5V

LI-RADS Table

Count number of features below:

- "Washout" (excluding peripheral "washout")
  - None
    - LR-3
  - One
    - LR-3
  - ≥ Two
    - LR-4

- "Capsule"
  - None
    - LR-3
  - One
    - LR-4
  - ≥ Two
    - LR-5

Threshold Growth

Measure diameter

- Arterial phase hypo-or iso-enhancement
  - < 20\(\text{mm}\)
  - ≥ 20\(\text{mm}\)
  - < 10\(\text{mm}\)
  - 10-19\(\text{mm}\)
  - ≥ 20\(\text{mm}\)

- Arterial phase hyperenhancement (excluding rim enhancement)
  - < 20\(\text{mm}\)
  - ≥ 20\(\text{mm}\)

Apply ancillary features and then tie-breaking rules to adjust category
LI-RADS Ancillary Features

Important ancillary features – malignant (partial list)
• T2 hyperintensity
• Diffusion restriction
• Intrallesional fat
• Transitional or hepatobiliary phase hypointensity

Ancillary features – malignant

LR-1  LR-2  LR-3  LR-4  LR-5

Important ancillary features – benign (partial list)
• Undistorted vessels
• Marked T2 hyperintensity
• Iron accumulation/siderosis
• HBP isointensity

Ancillary features – benign

See LI-RADS website for details
Tie-Breaking Rules

If unsure between two categories: choose the one reflecting greater uncertainty

Thus:
LR-5 vs. LR-4 → LR-4
LR-4 vs. LR-3 → LR-3
LR-2 vs. LR-3 → LR-3
LR-1 vs. LR-2 → LR-2
LR-4 or LR-5 vs. LR-M → LR-M

See LI-RADS website for details
New for LI-RADS v2017

- Ultrasound Surveillance
  Working Group Chair:
  - Aya Kamaya, M.D.

- CEUS
  Working Group Chair:
  - Yuko Kono, M.D.
New for LI-RADS v2017

• **Reporting**
  
  Working Group Chair:
  
  • Mustafa Bashir, M.D.

• **Management**
  
  Working Group Chair:
  
  • Donald Mitchell, M.D.

• **Tumor Response**
  
  Working Group Chair:
  
  • Richard Do, M.D.
LI-RADS Timeline

- LI-RADS v1
- LI-RADS v2013
- LI-RADS v2014
- LI-RADS v2017 (Integration)
- LI-RADS v2020

Tumor Response
US Surveillance
CEUS
Rad Path
Supplementary material


Interim clarifications & corrections every ~ 6 months
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HCC Disease
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- Claude Sirlin, M.D. (Chair)
- Cynthia Santillan, M.D.
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Thank You!

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