# Chapter 7

# The LI-RADS® Observation

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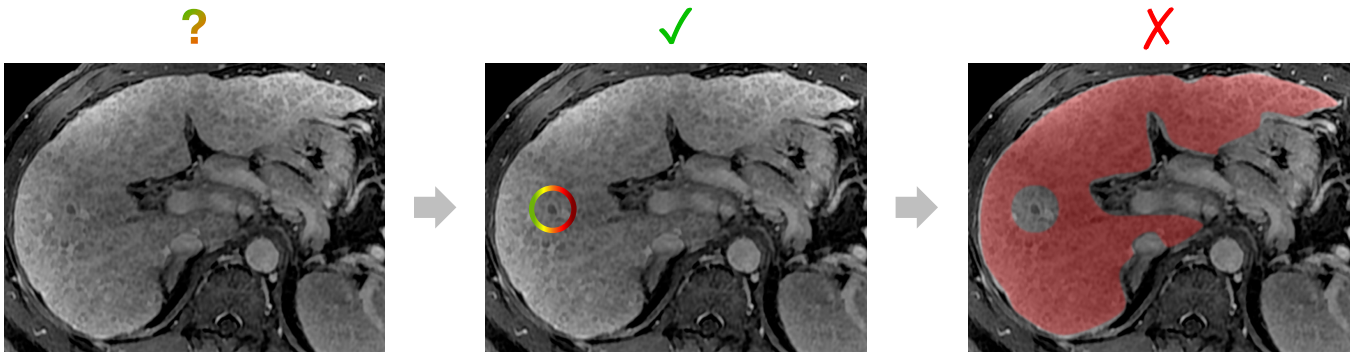
# The LI-RADS® Observation

## Definition

Area distinctive compared to background liver at imaging.




Cirrhotic liver with innumerable nodules and diffuse fibrotic bands :
***do any areas look distinctive?***

There is one distinctive area compared to background liver = LI-RADS calls this an **"observation"**

Background nodules and diffuse fibrotic bands are **not "observations"** since they all look similar – i.e., none are distinctive

An observation may be a true lesion (if there is a corresponding pathologic abnormality) or a pseudolesion (if there is not).

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## Terminology

Observation generically applies to any apparent abnormality detected at imaging.

As a generic term, it is preferred over lesion or nodule, since some observations (e.g. perfusion alterations, artifacts) may represent pseudolesions rather than true lesions or nodules.

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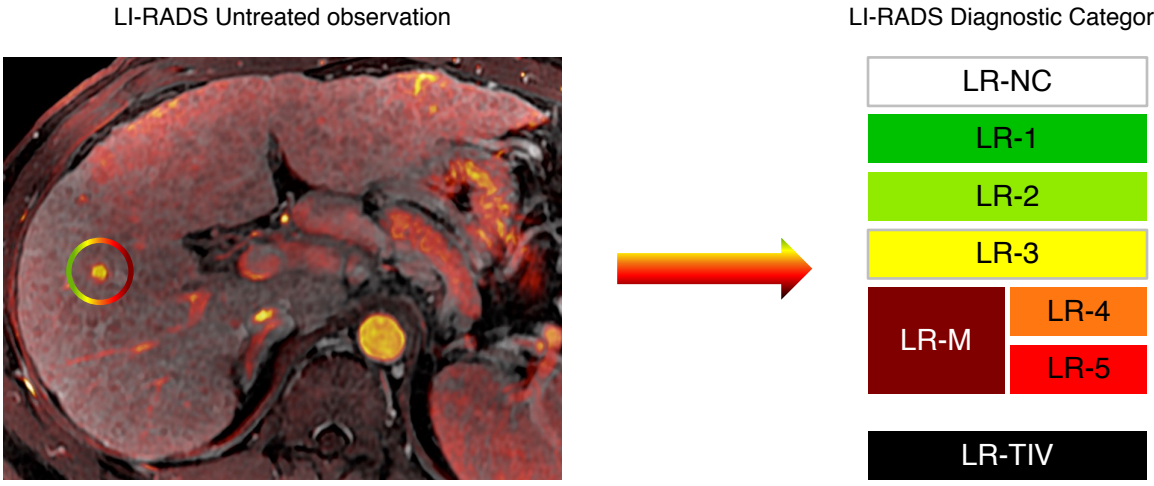
## Usage

For simplicity and consistency, the LI-RADS decision tree and algorithm use the generic term "observation". In clinical practice, however, use of narrower terms may provide clearer and more succinct communication. Radiologists and clinicians may use the narrowest term for which there is certainty. For example, if there is certainty that a particular observation is a solid nodule , then the term "nodule" is acceptable. Similarly, if there is certainty that an observation is a cyst or a hemangioma, then the term "cyst" or "hemangioma", respectively, is acceptable. On the other hand, if there is uncertainty about whether an observation is a true lesion or a pseudolesion, the term "nodule" or "lesion" or "focal liver lesion" is misleading and the term "observation" is preferred. "

# Categorization

**Untreated observations without pathologic proof.** These are categorized LR-1, LR-2, LR-3, LR-4, LR-5, LR-M, LR-TIV. A category of LR-NC is assigned for observations that cannot be meaningfully categorized due to image omission or degradation. If an observation is biopsied, the pathology results may supersede the LI-RADS category




See *Chapter 8* and *LI-RADS diagnostic algorithm* for more information on categorization.

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**Treated lesions.** These are assigned treatment response categories: LR-TR Nonviable, LR-TR Equivocal, LR-TR Viable. A response category of LR-TR Nonevaluable is assigned if treatment response cannot be meaningfully evaluated due to inappropriate imaging technique or inadequate imaging quality.

See *Chapter 8, pages 15-18* and *Chapter 9.*

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**Reporting**

Observations that meet LR-3, LR-4, LR-5, LR-M, or LR-TIV criteria should be reported. Aggregate reporting may be appropriate in some circumstances. LR-1 or LR-2 observations may be reported at radiologist's discretion.

See *Chapter 14* for more information.

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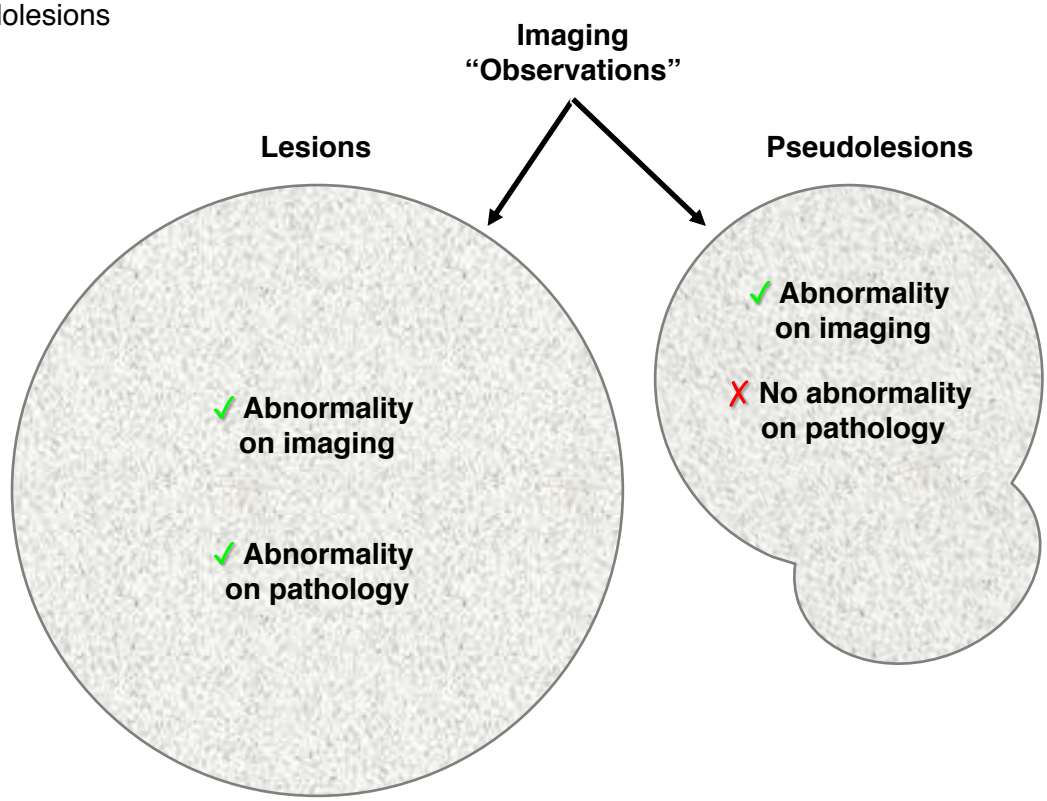
# Observation Types

**There are two main observations types:**

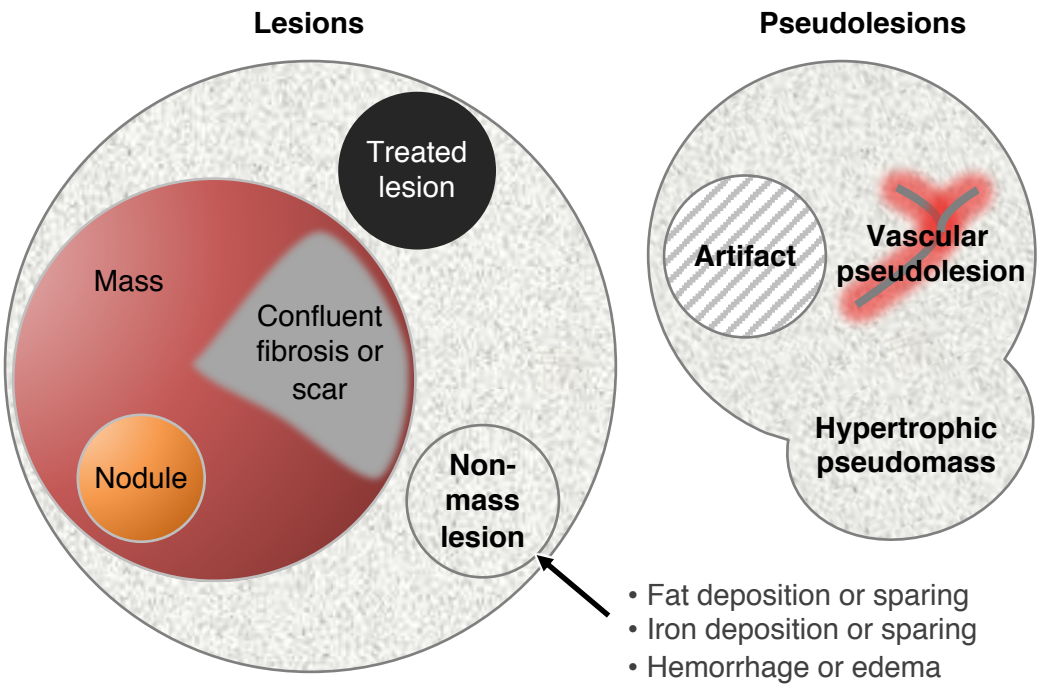
- Lesions
- Pseudolesions




- Lesions have a corresponding abnormality on pathology
- Pseudolesions have n0 corresponding abnormality on pathology

# Observation Types

**Lesions and pseudolesions each have several subtypes**




- These are defined and discussed on the next several pages

# Lesions

### Lesion

Area of parenchyma that is abnormal. It may be a mass or a non-mass lesion.

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### Treated lesion

Lesion treated by locoregional therapy

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### Mass

Space-occupying lesion visible as a defect within hepatic parenchyma:

- Replaces, displaces, compresses, or destroys parenchymal architecture
- May be expansile (most tumors), retractile (confluent fibrosis, some tumors), or diffuse (many poorly differentiated, aggressive tumors)
- May be contained within the liver or exophytic
- May be solid, cystic, or solid and cystic
- May encase, obstruct, invade, or grow into vessels or bile ducts
- May deform the liver surface
- May have circumscribed margin (abrupt transition between lesion and surrounding tissue) or non-circumscribed margin (indistinct transition)

Multiplanar imaging (acquired or reconstructed) may increase the confidence for characterizing an observation as a mass.

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### Nodule

Spherical or ovoid mass < 20 mm.

- At imaging, nodules manifest as distinct, usually circumscribed lesions. The parenchymal displacement, compression, or destruction evident at pathology evaluation may be difficult to appreciate at imaging due to their small size.
- At gross pathology, nodules are classified as vaguely nodular (poorly marginated) vs. distinctly nodular (sharply marginated). This distinction does not apply to imaging, where most detectable nodules appear circumscribed, even those that would be poorly marginated at gross pathology.

# Lesions

### Confluent fibrosis

Macroscopically evident benign process of scarring in the liver parenchyma.

See *Chapter 4.*

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### Focal scar

Macroscopically visible scar limited to a small area of hepatic parenchyma.

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### Non-mass lesion

Macroscopic benign, non-neoplastic, alteration in liver parenchyma:

- Parenchymal fat deposition/sparing
- Parenchymal iron deposition/sparing
- Parenchymal edema, hemorrhage, contusion, infarction

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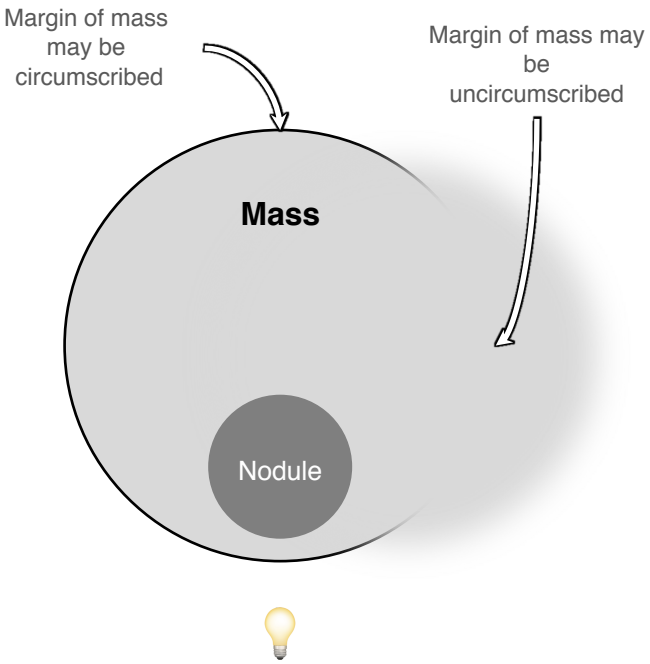
# Mass vs. Nodule

**Mass** = Space-occupying lesion visible as a defect within hepatic parenchyma, which replaces, displaces, compresses, or destroys parenchymal architecture.

Margins may be circumscribed (abrupt transition between lesion and surrounding tissue) or uncircumscribed (gradual transition). Growth pattern may be expansile (most tumors), retractile (confluent fibrosis and some tumors), or diffuse (poorly differentiated tumors).

**Nodule** = Spherical or ovoid mass < 20 mm.

Although they displace, compress, or destroy underlying parenchyma at pathologic evaluation, nodules may not display these characteristics at imaging due to their small size. Margins are usually circumscribed at imaging, even for nodules that would be poorly marginated at gross pathology.




**A nodule is a subtype of mass:**
all nodules are masses,
not all masses are nodules.

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### Rationale for distinction

Nodules may not display the imaging features characteristic of larger (≥ 20 mm) masses – i.e., displacement, compression, or destruction of the parenchymal architecture.

While arbitrary, the nodule size threshold (< 20 mm)

- reflects one of the size thresholds used in the LI-RADS diagnostic table as a major imaging feature of HCC.
- is consistent with the current terminology in the liver imaging and pathology literature, which labels masses measuring < 20 mm as "small".

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### Terminology

- The term “mass” refers to large (≥ 20 mm) masses as well as to nodules.
- The term "nodule" refers specifically to spherical or ovoid masses measuring less than 20 mm.
- The term “nodule” is preferred to "small mass”.
- The term “large mass" is preferred to "large nodule”.
- The term "macronodule" is discouraged to avoid confusion.

# Non-Mass Lesions

| | |
|---|---|
| Parenchymal fat deposition | Focal or regional excess lipid in hepatic parenchyma relative to surrounding liver |
| Parenchymal fat sparing | Focal or regional paucity of lipid in hepatic parenchyma relative to surrounding liver |
| Parenchymal iron deposition | Focal or regional excess iron in hepatic parenchyma relative to surrounding liver |
| Parenchymal iron sparing | Focal or regional paucity of iron in hepatic parenchyma relative to surrounding liver |
| Parenchymal edema | Focal or regional edema in hepatic parenchyma |
| Parenchymal hemorrhage | Focal or regional hemorrhage in hepatic parenchyma. |
| Parenchymal contusion | Focal or regional contusion in hepatic parenchyma. |
| Hepatic infarction | Focal or regional ischemic necrosis of hepatic parenchyma |

# Pseudolesions

### Pseudolesion

Area of parenchyma that appears abnormal at imaging without actual abnormality:

- Vascular pseudolesion
- Hypertrophic pseudomass
- Artifact
- Anatomic structure mistaken for a lesion

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### Vascular pseudolesion

Pseudolesion due to focal or regional perfusion alteration, such as a transient hepatic intensity difference (THID)/transient hepatic attenuation difference (THAD), or arterioportal shunt.

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### Hypertrophic pseudomass

Hypertrophic area of liver surrounded by atrophic, fibrotic liver parenchyma. May have a bulging appearance at imaging and resemble a mass.

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### Artifact

Spurious signal alteration that may be mistaken for parenchymal abnormality.