Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
Observation, lesion, pseudolesion, mass, nodule	N/A	Observation, lesion, pseudolesion, mass, nodule are a group of related but non-identical terms. The terms are related hierarchically. Observation is a broad term that encompasses all the other terms in this group. Lesion and pseudolesion are types of observations. A mass is a type of lesion. A nodule is a type of mass. The most specific term can be used depending on context and user preference. For example, if an observation is thought to be a true lesion, then either the term “lesion” or the term “observation” may be used. If there is uncertainty about whether an observation is a true lesion or a pseudolesion, the term “observation” is preferable.	11/2019			
Lesion	An observation that represents a pathologic abnormality.	May be a mass or a non-masslike lesion. See *mass* for examples of mass. Examples of non-masslike lesions: • Non-masslike fat deposition or sparing • Non-masslike iron deposition or sparing The term “lesion” should not be used interchangeably with the term “observation”. A lesion is a type of observation. Although all lesions are observations, not all observations are lesions. If there is uncertainty about whether an observation represents a pathologic abnormality (i.e., a true lesion), the term “observation” is preferred over the term “lesion”.	11/2019	FLL, focal liver lesion	General radiology term	US, CEUS, CT, MRI
Mass	Space-occupying lesion that distorts or destroys parenchyma.	Examples include: • Malignant neoplasms • Benign neoplasms • Hemangiomas • Cysts • Confluent fibrosis • Treated lesions May be of any size or shape: • Round or oval • Geographic • Irregular • Diffuse • Confluent	11/2019		General radiology term	US, CEUS, CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
		• “Infiltrative” or “permeative” If a mass is either oval or round in shape, it is considered a nodule. For such observations, either the term “nodule” or “mass” may be used, depending on context, user preference, and size. If a mass is geographic or irregular in shape or has a diffuse, confluent, or infltrative appearance, the term “nodule” does not apply.				
Non-masslike (adjective)	Not having the properties of a mass; without distorting or destroying parenchyma.	May apply to lesions or pseudolesions Examples include: • Non-masslike fat deposition or sparing • Non-masslike iron deposition or sparing • Non-masslike APHE • Non-masslike heterogeneous enhancement	11/2019		General radiology term	US, CEUS, CT, MRI
Nodule	Spherical or oval mass.	A nodule is a type of mass that is either round or oval in shape, and not a cyst or abscess. If a mass is geographic or irregular in shape or has a diffuse, confluent, or infltrative appearance, the term “nodule” does not apply. While there is no strict size cutoff, the term “nodule” is often reserved for small masses, generally ≤ 2 cm.	11/2019		General term	US, CEUS, CT, MRI
Observation	Area distinctive compared to liver at imaging.	Observation is a broad term that includes lesion and pseudolesion. May be a true lesion (if it corresponds to a pathologic abnormality) or a pseudolesion (if it does not correspond to a pathologic abnormality).	11/2019	Lesion or pseudolesion	General term	US, CEUS, CT, MRI
Perfusion alteration	Non-masslike change in blood supply to an area of the liver.	Often seen as a non-masslike area of hyperenhancement in the arterial phase with isoenhancemeent on postarterial phases. May be of any size. Usually geographic, occasional round or oval in shape. Often peripherally located. May be caused by or be associated with a mass. May be mistaken for a nodule, especially if round or oval in shape, or for an infiltrative mass, especially if heteroegeneous.	11/2019	THID, THAD, THED, AP shunt, perfusional abnormaility, perfusion anomaly, vascular pseudolesion	General term	CT, MRI
Pseudolesion	An observation that does not represent a pathologic abnormality.	May be mistaken for a true lesion. Examples include: • Round or oval perfusion alterations • Some artifacts such as ghosting artifacts from aorta	11/2019		General term	US, CEUS, CT, MRI
Treated lesion	Lesion treated by any therapy.	Lesions can be treated by mass	11/2019		General term	CEUS, CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
		, resection, systemic therapy, or a combination. LI-RADS provides guidance on assessing treatment response or recurrence after locoregional therapy or resection. See LI-RADS Manual, Chapter 9.				
Locoregional therapy	A therapy that targets a specific lesion or part of the liver without physically removing it.	Examples include: • Ablative therapy • Transcatheter therapy • External beam radiation Surgical resection physically removes part of the liver and is not considered locoregional therapy. Systemic administration of chemotherapeutic or biologic agents is also not considered locoregional therapy.	11/2019			
Parenchymal distortion	Parenchymal area ≥ 10 mm seen on ultrasound with one or more of the following characteristics: • Ill-defined area of heterogeneity • Refractive edge shadows • Loss of normal hepatic architecture	Parenchymal distortion may represent a malignant neoplasm such as HCC with infiltrative appearance or heterogeneous parenchyma due to underlying severe cirrhosis. Loss of normal hepatic architecture includes loss of visualization of normal portal triads or hepatic veins. Parenchymal distortion when identified on surveillance ultrasound is categorized US-3 Positive by US LI-RADS.	11/2019		General term, US	US
Hyperechoic	Echogenicity more than background liver.	This definition applies to observations, which should be compared to background liver.	11/2019	Echogenic	General term, US	US, CEUS
Hypoechoic	Echogenicity less than background liver.	This definition applies to observations, which should be compared to background liver.	11/2019		General term, US	US, CEUS
Isoechoic	Echogenicity equal to background liver.	This definition applies to observations, which should be compared to background liver.	11/2019		General term, US	US, CEUS
Loss of expected portal triads or hepatic veins	Poor or absent visualization of the portal triads or hepatic veins in a geographic area of the liver.	Loss of portal triads or hepatic veins is a type of parenchymal distortion. This finding is distinct from poor visualization due to ultrasound beam attenuation caused by severe steatosis.	11/2019		General term, US	US, CEUS
Refractive shadowing	Linear shadows from the lateral edges of an observation. Observation may be well-defined or ill-defined.	In some infiltrative tumors, refractive shadows may be the best sonographic finding to indicate its presence.	11/2019		General term, US	US, CEUS
Severe parenchymal heterogeneity	Heterogeneous parenchymal echogenicity severe enough to decrease visibility of focal nodules.	In some cases of severe cirrhosis, innumerable regenerative nodules and fibrosis obscure or diminish visibility of focal discrete nodules.	11/2019		General term, US	US, CEUS
Imaging phase	A time range after intravenous contrast injection with characteristic changes in	Examples include: • Arterial phase	11/2019			

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
	enhancement of liver parenchyma, vessels, and for some agents, bile ducts.	• Portal venous phase • Delayed phase • Late phase • Transitional phase • Hepatobiliary phase The transitional phase and hepatobiliary phase are unique to hepatobiliary agents. The delayed phase is unique to extracellular agents. The late phase is unique to blood pool agents such as those used in CEUS. The postarterial phase is a broad term that refers to all phases after the arterial phase.				
Arterial phase (AP)	A postcontrast phase when: • Hepatic artery and branches are fully enhanced **AND** • Hepatic veins are not yet enhanced by antegrade flow	On CEUS: AP usually occurs from about 10-20 s to 30-45 s after contrast injection. On CEUS: AP usually starts around 10-15 seconds after injection, and lasts for 10-20 seconds. On CT and MRI: the AP is divided into two temporal subtypes: • Early AP: Subtype of AP in which portal vein is minimally or not yet enhanced. • Late AP: Subtype of AP in which portal vein enhanced to greater extent than the liver In late AP, majority of the portal vein lumen should be opacified - trickle or wisp of enhancement is not sufficient. Enhancement may or may not be homogeneous, depending on timing and degree of admixture with splenic or SMV inflow.	11/2019	Early phase, angiographic phase	Imaging phase	CEUS, CT, MRI
Early arterial phase (AP)	Subtype of AP in which portal vein is minimally or not yet enhanced.		11/2019	Early phase, angiographic phase	Imaging phase	CT, MRI
Late arterial phase (AP)	Subtype of AP in which portal vein is enhanced to a greater extent than the liver		11/2019		Imaging phase	CT, MRI
Portal venous phase (PVP)	A postarterial phase when: • Portal veins are fully and maximally enhanced **AND** • Hepatic veins are enhanced by antegrade flow	On CEUS: PVP lasts from about 30-45 s to 2 min after contrast injection. On CEUS: PVP usually starts around 30-45 seconds, lasts for 90-100 seconds, for up to 2 minutes after injection. On CT and MRI: PVP lasts from about 50 s to 80 s after contrast injection. Regardless of modality, liver parenchyma usually is at peak enhancement.	11/2019	Early postarterial phase Portal dominant phase	Imaging phase	CEUS, CT, MRI
Late phase (LP)(CEUS)	A postarterial phase on CEUS images acquired after the portal venous phase when portal and hepatic veins are enhanced but less than in portal venous phase.	LP lasts from end of PVP until there is clearance of microbubbles from the circulation at about 4-6 min. Liver parenchyma is enhanced but usually less than in portal venous phase.	11/2019		Imaging phase	CEUS

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
Postarterial phase	Broad term that refers to all phases after the arterial phase.	On CEUS: the postarterial phase is divided into the portal venous phase and the late phase. On CT and MRI with ECA: the postarterial phase is divided into the portal venous phase and delayed phase. On MRI with gadoxetate disodium: the postarterial phase is divided into the portal venous phase, transitional phase, and hepatobiliary phase. On MRI with gadobenate dimeglumine: the postarterial phase is divided into the portal venous phase, delayed phase, and hepatobiliary phase. A transitional phase does occur but is rarely acquired.	11/2019	Venous phase, late phase	Imaging phase	CEUS, CT, MRI
Early washout (CEUS)	Washout on CEUS in which onset is within 60 seconds from contrast injection.	Early washout is usually marked in degree. See "marked washout" for definition.	11/2019		Imaging feature, LR-M (CEUS)	CEUS
Late washout (CEUS)	Washout on CEUS in which onset is after 60 seconds from contrast injection.		11/2019		Imaging feature, major (CEUS)	CEUS
Marked washout (CEUS)	Pronounced washout on CEUS in which the observation becomes black or "punched out" within 2 minutes from contrast injection.	See "washout (CEUS)" for definition of CEUS washout.	11/2019		Imaging feature, LR-M (CEUS)	CEUS
Mild washout (CEUS)	Washout on CEUS in which the observation does not become black or punched out within 2 minutes from contrast injection.	If the observation becomes black or "punched out" after 2 minutes then the degree of washout is still considered mild.	11/2019		Imaging feature, major (CEUS)	CEUS
Continuous imaging	Acquisition of images in real time.	On US and CEUS, typically 10-20 frames/second. CT and MRI can also acquire images in real time, but this is not commonly performed with these modalities.	11/2019		Technical term	US, CEUS
Intermittent imaging (CEUS)	A series of brief CEUS image acquisitions, each lasting a few seconds and repeated at intervals of about 30 to 60 seconds without any imaging in between.		11/2019		Technical term	CEUS
Extracellular agents (ECAs)	Intravenous contrast agents with a predominant extracellular distribution.	For CT, examples of FDA-approved agents (2019) include: For MRI, examples of FDA-approved agents (2019) include:	11/2019	Extracellular fluid contrast agents	Type of contrast agent	CT, MRI
Hepatobiliary agents (HBAs)	Intravenous contrast agents with sufficient hepatobiliary excretion to allow hepatobiliary phase (HBP) imaging in addition to multiphase or dynamic extracellular imaging.	Applies to gadoxetate disodium and gadobenate dimeglumine.	11/2019	Hepatocellular agents, biphasic agents	Type of contrast agent	MRI
Blood pool agents (BPAs)	Intravenous contrast agents that distribute mainly or only in the vascular space.	Blood pool agents remain in the blood with little or no distribution in the interstitial space.	11/2019	Intravascular contrast agents	Type of contrast agent	CEUS, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
		Applies mainly to CEUS microbubble agents. Can also apply to iron-based or protein-binding Gd-based MR agents with prolonged vascular dwell times, such as gadofosveset trisodium and ferumoxytol, respectively. Neither of these agents is approved for liver imaging in the United States.				
Multiphase imaging	Acquisition of images at two or more different phases after intravenous contrast injection.	Common examples include acquisition of: • AP, PVP, and DP • AP, PVP, TP, and HBP Differs from dynamic contrast-enhanced imaging where images are acquired continuously over minutes to enable perfusion analysis. Multiphase imaging is not synonymous with dynamic contrast-enhanced (DCE) perfusion imaging where images are acquired continuously over minutes to enable perfusion analysis.	11/2019		Technical term	CEUS, CT, MRI
Postarterial extracellular phase (ECP)	A broad term referring to: • PVP and DP, if an extracellular agent or gadobenate is given • PVP only, if gadoxetate is given	During the postarterial extracellular phase, enhancement of the liver is mainly due to extracellular distribution of a contrast agent. Does not apply to blood pool agents.	11/2019		Imaging phase (CT/MRI)	CT, MRI
Delayed phase (DP)	A postarterial phase when: • Portal and hepatic veins are evenly and fully enhanced **AND** • Liver parenchyma is enhanced but usually less than portal and hepatic veins	Typically acquired 2 to 5 minutes after injection of an extracellular agent or gadobenate dimeglumine. Does not apply to MRI performed with gadoxetate disodium (the term “transitional phase” is used for images acquired 2 to 5 minutes after injection).	11/2019	Interstitial phase, equilibrium phase, late dynamic phase, late venous phase	Imaging phase (CT/MRI with extracellular agents/MRI with gadobenate dimeglumine)	CT, MRI with ECA, MRI with gadobenate dimeguline
Transitional phase (TP)	Postarterial phase acquired with an intravenous hepatobiliary contrast agent when liver vessels and hepatic parenchyma are of similar signal intensity, which occurs between the portal venous and hepatobiliary phase.	During this phase, enhancement of the liver is due to both extracellular and intracellular distribution of a hepatobiliary contrast agent. Typically acquired 2 to 5 minutes after injection of gadoxetate disodium. This phase is acquired almost exclusively with gadoxetate disodium. While TP exists with gadobenate, it is rarely, if ever, acquired.	11/2019	Interstitial phase, equilibrium phase, late dynamic phase are often misused to indicate the transitional phase but they are not true synonyms for the transitional phase.	Imaging phase (MRI, MRI with HBA, MRI wth gadoxetate disodium)	MRI with gadoxetate disodium. (While the TP does occur with gadobenate dimeglumine, TP images are usually not acquired with this agent)
Hepatobiliary phase (HBP)	Postcontrast phase acquired with an intravenous hepatobiliary agent when liver parenchyma is intended to be hyperintense to hepatic blood vessels.	The HBP is typically acquired about 20 minutes after injection with gadoxetate. If obtained with gadobenate, HBP is acquired 1-3 hours after injection. Excretion of contrast into the biliary tree may or may not be present.	12/2019	Hepatocellular phase	Imaging phase (MRI, MRI with HBA)	MRI with gadoxetate disodium or gadobenate dimeglumine

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
Arterial phase hyperenhancement (APHE)	Enhancement in arterial phase greater than liver, resulting in brightness greater than liver. APHE has two subtypes: • Rim APHE • Nonrim APHE	APHE can be seen in the entire observation or only in part(s) of the observation. Enhancement from hypo on precontrast to iso on arterial phase does not qualify as APHE.	11/2019	Arterial hypervascularity, hypervascularity in arterial phase, increased contrast enhancement in hepatic arterial phase, increased contrast enhancement in late hepatic arterial phase, hypervascularity, high attenuation area in arterial phase, contrast uptake in arterial phase, wash in	Imaging feature, general	CEUS, CT, MRI
Nonrim arterial hyperenhancement (nonrim APHE)	Subtype of APHE in which APHE is **NOT** most pronounced in periphery of observation.	Nonrim APHE can be seen in the entire observation or only in part(s) of the observation. Enhancing part(s) must be brighter than liver in arterial phase. Nonrim APHE includes diffuse and homogeneous (uniform), diffuse and heterogeneous (non-uniform), scattered (patchy, spotty), nodule-in-nodule, or mosaic enhancement.	11/2019	Arterial hypervascularity, hypervascularity in arterial phase, increased contrast enhancement in hepatic arterial phase, increased contrast enhancement in late hepatic arterial phase, hypervascularity, high attenuation area in arterial phase, contrast uptake in arterial phase, wash in	Imaging feature, major	CEUS, CT, MRI
Washout appearance (“washout”)	Reduction in enhancement over time relative to liver following some degree of arterial phase enhancement, resulting in postarterial extracellular phase hypoenhancement relative to liver: • For ECA and gadobenate: hypoenhancement in PVP, DP, or both • For gadoxetate: hypoenhancement in PVP only. Hypointensity in TP or HBP does not qualify as “washout” “Washout” has two subtypes: • Peripheral “washout” • Nonperipheral “washout”	“Washout” can be assessed qualitatively relative to liver parenchyma. It does not require quantitative measurements. “Washout” can be seen in the entire observation or only in part(s) of the observation. Can apply to any observation, as long as some arterial phase enhancement occurs, even if not APHE. Completely nonenhancing observations (e.g., cysts) cannot be characterized as having “washout”. If APHE is present, the areas with APHE and “washout” do not need to coincide. If the liver parenchyma visually consists of both nodules and fibrosis, then compare to composite liver tissue (i.e., a visual average of the nodules and fibrosis).	11/2019	Washout; venous/portal venous/delayed/late phase hypoenhancement, hypoattenuation, or hypointensity; deenhancement	Imaging feature, general (CT, MRI)	CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
Washout (CEUS)	Reduction in enhancement over time relative to background liver, following some degree of arterial phase enhancement, resulting in hypoenhancement relative to background liver. CEUS washout is divided by degree into mild vs. marked and by onset into late vs. early.	CEUS washout is true washout. Hence, CEUS uses the term washout, not the terms “washout” or washout appearance. Washout can be seen in the entire observation or only in part(s) of the observation. Can apply to any enhancing observation, even if no APHE, but some arterial phase enhancement must occur. Completely nonenhancing observations (e.g., cysts) cannot be characterized as having washout. If APHE is present, the areas with APHE and washout do not need to coincide. Washout with CEUS is different from “washout” on CT/MRI, since the microbubbles used in CEUS are blood pool agent. As a result, washout on CEUS is thought to represent true washout.	11/2019		Imaging feature, other (CEUS)	CEUS
Nonperipheral washout appearance (nonperipheral “washout”)	Subtype of “washout” in which apparent washout is **NOT** most pronounced in observation periphery.	Can apply to any enhancing observation, even if no APHE. Nonperipheral “washout” can be seen in the entire observation or only in part(s) of the observation.	11/2019	Washout; venous/portal venous/delayed/late phase hypoenhancement, hypoattenuation, or hypointensity; deenhancement	Imaging feature, major (CT, MRI)	CT, MRI
Capsule appearance (“capsule”)	Smooth, uniform, sharp border around most or all of an observation, thicker or more conspicuous than fibrotic tissue around background nodules. “Capsule” has two subtypes: • Enhancing “capsule” • Nonenhancing “capsule”	A “capsule” detected on imaging may reflect a: • True histologic tumor capsule **OR** • Pseudocapsule Pseudocapsule and true capsule cannot be distinguished on imaging. A border visible only as an enhancing rim in the HBP should not be characterized as a “capsule”.	11/2019	Capsule, pseudocapsule, tumor capsule, tumor pseudocapsule, fibrous capsule, fibrous pseudocapsule	Imaging feature, general	
Enhancing capsule appearance (enhancing “capsule”)	Subtype of “capsule” visible as an enhancing rim in PVP, DP, or TP.	If a “capsule” is visible as an enhancing rim on PVP, DP or TP images AND as a nonenhancing rim on other images, characterize as enhancing “capsule”, **NOT** as nonenhancing “capsule”. A border visible only as an enhancing rim in the HBP should not be characterized as a “capsule”.	11/2019	Capsule, tumor capsule, pseudocapsule, fibrous capsule, capsular enhancement, delayed enhancing rim	Imaging feature, major	CT, MRI
Size	Largest outer-edge-to-outer-edge dimension of an observation.	Include “capsule” in measurement. Pick phase, series, and plane in which margins are clearest.	11/2019	Diameter, dimension, long axis	Imaging feature, general Imaging feature, major	US, CEUS, CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
		Do not measure in arterial phase or DWI if margins are clearly visible on different series. The LI-RADS definition of “size” correspons to the definition of the longest diameter in RECIST. LI-RADS prefers “size” rather than “diameter” as observations may not be spherical.				
Growth	Size increase of a mass that cannot be attributed only to artifact, technique differences, measurement error, or interval hemorrhage. On CT and MRI, growth has two subtypes: • Threshold growth • Subthreshold growth	There is no minimum size increase to qualify as growth. Rather, this is determined by the user’s judgement.	11/2019	Interval growth, progression, size increase, diameter increase	Imaging feature, general	US, CEUS, CT, MRI
Threshold growth	Size increase of a mass by ≥ 50% in ≤ 6 months.	Measure on same phase, sequence, and plane on serial exams if possible. Apply threshold growth *only* if the observation is a mass. Do not apply threshold growth if there is a reasonable possibility that the observation is a pseudolesion such as a perfusion alteration. Apply threshold growth *only* if there is a prior CT or MRI exam of sufficient quality and appropriate technique to gauge if growth has occurred. Do not assess threshold growth by comparing to prior US or CEUS exams.	11/2019	Growth by 50% or more, size increase by 50% or more	Imaging feature, major	CT, MRI
Targetoid	Target-like imaging morphology. The center and periphery of a mass have different imaging characteristics.	The presence of targetoid appearance suggests iCCA or other non-HCC malignancy, but it does not exclude HCC.	11/2019	Target-like, target appearance	Imaging feature, LR-M	CT, MRI
Rim arterial phase hyperenhancement (rim APHE)	Subtype of APHE in which arterial phase enhancement is most pronounced in observation periphery.	Rim APHE is a subtype of targetoid morphology. The presence of rim APHE suggests iCCA or other non-HCC malignancy, but it does not exclude HCC. Rim APHE can be smooth or irregular. It can vary in thickness.	11/2019	Peripheral APHE, ring APHE, targetoid APHE, APHE in target pattern, rim enhancement	Imaging feature, LR-M	CEUS, CT, MRI
Peripheral washout appearance (peripheral "washout")	Subtype of “washout” in which apparent washout is most pronounced in observation periphery.	Peripheral "washout" is a subtype of targetoid morphology. The presence of peripheral “washout” suggests iCCA or other non-HCC malignancy, but it does not exclude HCC.	11/2019	Peripheral washout; venous/portal venous/delayed/late phase peripheral hypoenhancement, peripheral hypoattenuation, or hypointensity; peripheral deenhancement	Imaging feature, LR-M	CT, MRI
Delayed central enhancement	Area of postarterial phase enhancement most pronounced in the inside rather than in the periphery of the lesion.	Delayed central enhancement is a subtype of targetoid morphology. The area of delayed enhancement in a lesion may be central, eccentric, or heterogeneous, but not peripheral. The presence of delayed central enhancement suggests iCCA or other non-HCC malignancy, but it does not exclude HCC.	11/2019	Sustained central enhancement, concentric progressive enhancement, centripetal progressive enhancement	Imaging feature, LR-M	CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
Targetoid restriction	Concentric pattern on DWI characterized by restricted diffusion in observation periphery with less restricted diffusion in observation center.	The presence of targetoid restriction suggests iCCA or other non-HCC malignancy, but it does not exclude HCC. See “restricted diffusion” for definition.	11/2019	Peripheral restriction, DWI target sign/appearance, targetoid diffusion	Imaging feature, LR-M	MRI
Targetoid transitional phase (TP) or hepatobiliary phase (HBP) appearance	Concentric pattern in TP or HBP characterized by moderate-to-marked hypointensity in observation periphery with milder hypointensity in center.	The presence of targetoid TP or HBP appearance suggests iCCA or other non-HCC malignancy, but it does not exclude HCC.	11/2019	HBP/TP cloud, HBP/TP target sign/appearance	Imaging feature, LR-M	MRI
Enhancing soft tissue in vein	Presence of enhancing soft tissue in vein, regardless of visualization of parenchymal mass.	Enhancing soft tissue in vein establishes the diagnosis of tumor in vein and in LI-RADS is categorized LR-TIV. If there is any doubt about the presence of enhancing soft tissue in vein, the LI-RADS category LR-TIV should NOT be assigned. Tumor in vein and enhancing soft tissue in vein are related but not identical terms: • Tumor in vein is a LI-RADS category • Enhancing soft tissue in vein is the imaging criterion for tumor in vein	11/2019	None	Imaging feature, LR-TIV	CEUS, CT, MRI
US visibility as nodule	Unenhanced US visibility as discrete nodule or mass corresponding to CT- or MRI-detected observation.		11/2019	US detectability as discrete nodule, sonographic visibility as discrete nodule,sonographic visibility as nodule	Imaging feature, ancillary feature favoring malignancy, not HCC in particular	CEUS, CT, MRI
Subthreshold growth	Size increase of a mass, less than threshold growth. Any of the following: • Size increase < 50% over any time period • Any size increase over time interval > 6 months • A new mass of any size		11/2019	Subthreshold diameter increase, subthreshold size increase, growth less than threshold	Imaging feature, ancillary feature favoring malignancy, not HCC in particular	CT, MRI
Corona enhancement	Periobservational enhancement in late arterial phase or early PVP. The enhancement is contiguous with and surrounds all or part of the observation.	Usually lobulated and may vary in thickness. Corona enhancement is thought to represent venous drainage from arterialized tumor.	11/2019	Corona, perilesional staining	Ancillary feature favoring malignancy, not HCC in particular	CT, MRI
Fat sparing in solid mass	Paucity of fat in solid mass relative to steatotic liver: CT (All of the following): • The observation is a solid mass • The liver has attenuation < 40 HU	The CT criteria apply to both pre-contrast and post-contrast images, although the sensitivity is higher on pre-contrast. If using fat-suppressed compared to non-fat-suppressed images for assessing this feature, make sure the two sets of images have similar or identical weighting.	11/2019	Lesional fat sparing	Ancillary feature favoring malignancy, not HCC in particular	CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities

	• The observation has greater attenuation than liver
	
	MRI (All of the following):
	
	• The observation is a solid mass
	
	AND
	
	• Compared to liver, the mass has any of the following:
	
	  • Less signal loss on OP compared to IP
	  • Lower fat signal on fat-only images
	  • Lower fat fraction on fat-fraction maps
	  • Less signal loss on fat-suppressed compared to non-fat-suppressed images					

Restricted diffusion	Intensity on DWI higher than liver **AND** ADC similar to or lower than liver.	Thought to reflect restriction of random motion of water molecules by cell membranes or other physical barriers. Should be assessed on DW images acquired with at least moderate diffusion weighting ($b \geq 400$ s/mm^2). Appears hypointense or isointense to liver on grayscale ADC map.	11/2019	Impeded diffusion, diffusion restriction, high DWI signal	Imaging feature, Ancillary feature favoring malignancy in general, not HCC in particular	MRI
Mild-moderate T2 hyperintensity	Intensity on T2WI higher than liver and similar to or less than non-iron-overloaded spleen.	In patients without a spleen, intensity should be less than fluid-filled structures.	11/2019	Slightly bright T2, mild-moderate T2 signal	Imaging feature, ancillary feature favoring malignancy, not HCC in particular	MRI

Iron sparing in solid mass	Paucity of iron in solid mass relative to iron-overloaded liver:
	
	MRI:
	
	• The observation is a solid mass
	
	AND
	
	• The liver has any of the following:
	
	  • Lower signal intensity on second echo (longer TE) compared to first echo (shorter TE) on dual-echo gradient-echo sequence
	  • Abnormally low signal intensity on T2W images
	  • Abnormally high R2* value on R2* maps (if obtained)
		Cannot be reliably characterized on US or CT.
		
		Use caution in applying this feature if OP has a longer TE than IP.
			11/2019	Lesional iron sparing, iron resistance	Imaging feature, ancillary feature favoring malignancy, not HCC in particular	MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
	AND • The observation has none of the above features or has the features to a lesser degree than liver					
Transitional phase (TP) hypointensity	Intensity in the transitional phase less than liver.	Transitional phase hypointensity can be seen in the entire observation or only in part(s) of the observation. Does not qualify as washout appearance.	11/2019	Transitional phase hypoenhancement	Imaging feature, ancillary feature favoring malignancy, not HCC in particular	MRI with gadoxetate disodium
Hepatobiliary phase (HBP) hypointensity	Intensity in the hepatobiliary phase less than liver.	Hepatobiliary phase hypointensity can be seen in the entire observation or only in part(s) of the observation. Does not qualify as washout appearance.	12/2019	Hepatobiliary phase hypoenhancement, hepatobiliary phase “defect”	Imaging feature, ancillary feature favoring malignancy, not HCC in particular	MRI with gadoxetate disodium or gadobenate dimeglumine
Nonenhancing capsule appearance (nonenhancing “capsule”)	Subtype of “capsule” that does not show enhancement on any image.	Nonenhancing “capsule” may be seen as follows: • Precontrast CT: hypoattenuating • Precontrast T1WI: hypointense • T2WI: hypo- or hyperintense • DWI: hyperintense • Contrast-enhanced T1WI: nonenhancing • HBP: hypointense	11/2019	Nonenhancing distinctive rim	Imaging feature, ancillary feature favoring HCC in particular	CT, MRI
Nodule-in-nodule appearance	Presence of a smaller inner nodule within a larger outer nodule or mass.	The inner nodule differs in imaging features from the outer nodule or mass. It may be: • Peripherally or centrally located within the outer nodule • Small relative to the outer nodule or almost as large as the outer nodule • Round, oval, or irregular in shape Nodule-in-nodule appearance is a type of mosaic appearance.	11/2019	Nodule-in-nodule pattern, nodule-in-nodule architecture	Imaging feature, ancillary feature favoring HCC in particular	CEUS, CT, MRI
Mosaic appearance	Presence of any combination of internal nodules, compartments, or septations, within a mass.	The internal nodules or compartments differ in imaging features from each other. If there is a single inner nodule within a mass, the term nodule-in-nodule may be used.	11/2019	Mosaic pattern, mosaic architecture	Imaging feature, ancillary feature favoring HCC in particular	CEUS, CT, MRI
Fat in mass, more than adjacent liver	Greater amount of fat within a mass relative to adjacent liver: CT:	If using fat-suppressed compared to non-fat-suppressed images for assessing this feature, make sure the two sets of images have similar or identical weighting. Use caution in applying this feature if OP has a longer TE than IP.	11/2019	Steatotic nodule, intralesional fat, fatty lesion, fat deposition, fatty metamorphosis, and intralesional fatty metaplasia	Ancillary feature favoring HCC in particular	CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities

	ALL of the following:
	
	• The observation is a mass
	• The mass or part of the mass has attenuation < -10 HU
	• The liver has attenuation ≥ mass
	
	MRI:
	
	ALL of the following:
	
	• The observation is a mass
	• The mass or part of the mass has any of the following compared to liver:
	
	  • Greater signal loss on OP compared to IP
	  • Greater fat signal on fat-only images
	  • Greater fat fraction on fat-fraction maps
	  • Greater signal loss on fat-suppressed compared to non-fat-suppressed images					

Blood products in mass	Hemorrhage inside a lesion in the absence of biopsy, trauma or intervention. CT: • Amorphous areas of intermediate or hyperattenuation precontrast without any enhancement after contrast injection MRI: **BOTH** of the following: • Amorphous or geographic areas of high signal on T1WI, that do not lose signal on opposed phase or fat-suppressed images • No enhancement postcontrast	There may be signal loss on 2nd echo of a dual-gradient-echo sequence or high signal on R2* map. Signal on T2WI is variable. Older blood products (hemosiderin) have low signal intensity on T1W, T2W, and T2*W images. Blood products typically are amorphous or geographic in shape, are heterogeneous in signal intensity, and do not enhance. If the entire mass has homogeneous mild-to-moderate T1-hyperintensity or if the T1-hyperintense areas enhance, this should not be interpreted as blood products. This feature does not apply to hemorrhagic/proteinaceous cysts.	11/2019	Hematoma, hemorrhage, methemoglobin, hemosiderin	Ancillary feature favoring HCC in particular	CT, MRI
Size stability ≥ 2 years	No significant change in observation size measured on exams ≥ 2 years apart in absence of treatment. Practically, this means that there is **either** • No measurable change in size	There are no strict criteria for change in size that may be due to artifact, technique differences, or measurement error. Rather, this is determined by the user's judgement.	11/2019	Stable size, unchanged size, stable diameter, unchanged diameter	Ancillary feature favoring benignity	CT, MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
	OR • A change in size so small that the change may be due to artifact, technique differences, or measurement error					
Size reduction	Spontaneous decrease in size over time, that cannot be attributed only to artifact, technique differences, measurement error, or resorption of blood products.		11/2019	Decreased size, shrinkage, regression	Ancillary feature favoring benignity	CT, MRI
Parallels blood pool enhancement	Temporal pattern in which enhancement eventually reaches and then matches that of blood pool.	In general, the following blood vessels represent the blood pool in each phase: • Arterial phase: aorta or hepatic artery • Portal venous phase: portal vein • Delayed, transitional, and hepatobiliary phase: portal vein or hepatic vein Characteristic of hemangioma or vascular malformations.	11/2019	Following signal/attenuation/brightness/enhancement of blood pool on all phases	Ancillary feature favoring benignity	CT, MRI
Undistorted vessels	Vessels traversing an observation without displacement, deformation, or other alteration.	Characteristic of perfusion alteration	11/2019	Lack of mass effect on vessels	Ancillary feature favoring benignity	CT, MRI

Iron in mass, more than liver	Excess iron in a mass relative to background liver.
	
	MRI:
	
	ALL of the following:
	
	• The observation is a mass
	• The observation has any of the following:
	
	  • Greater signal loss on second echo compared to first echo of the dual phase gradient echo sequences
	  • Markedly low signal on T2W images
	  • Abnormally high R2* value on R2* maps
	
	• The liver has none of the above features or has the features to a lesser degree than the observation
			11/2019	Siderotic nodule	Ancillary feature favoring benignity	CT, MRI

Marked T2 hyperintensity	Intensity on T2WI greater than non-iron-overloaded spleen.	Characteristic imaging feature of cysts and some hemangiomas. If spleen is iron overloaded, then compare to fluid-filled structures such as bile ducts, simple cysts, or cerebrospinal fluid.	11/2019	T2 bright, high T2 signal intensity, fluid signal, lightbulb T2 bright	Ancillary feature favoring benignity	MRI

Term	Definition	Comment	Date approved	Synonyms (their use is generally less preferred)	Type of term	Applicable modalities
Hepatobiliary phase (HBP) isointensity	Uniform intensity in hepatobiliary phase identical or nearly identical to liver.	Favors benignity if HBP enhancement of liver parenchyma is adequate.	11/2019	HBP isoenhancement, occult in HBP	Ancillary feature favoring benignity	MRI with gadoxetate disodium or gadobenate dimeglumine
Peripheral discontinuous nodular enhancement	Areas of enhancement that in the early postcontrast phases are round or globular in shape and distributed discontinuously along the periphery of a lesion and that in subsequent phases expand, and approximately parallel the blood pool in brightness.	As the areas of enhancement expand they may coalesce to become continuous and they may no longer appear round or globular. Characteristic imaging feature of non-sclerosed hemangiomas.	11/2019	Peripheral discontinuous globular enhancement, peripheral discontinuous puddles of enhancement, peripheral discontinuous puddling	Imaging feature, general	CEUS, CT, MRI