MODIFIED RECIST FOR HCC

mRECIST

mRECIST was developed to adapt RECIST v1.1 to the particularities of Hepatocellular Carcinoma (HCC).

SPECIFICITIES OF HCC

A lack of tumor shrinkage despite reported improvement in survival due to intra-tumoral necrosis.

Pathologic changes inherent to the cirrhotic process at the origin of possible misinterpretation.

Frequent development of benign ascites and pleural effusion that would be considered progression per RECIST 1.1.

mRECIST CRITERIA AND KEY DIFFERENCES

THE PRINCIPLES USED TO DETERMINE TUMOR RESPONSE ARE LARGELY UNCHANGED FROM RECIST V1.1

VIABLE TUMOR CONCEPT

Tumor showing enhancement in the arterial phase of ceCT/ceMRI.

2 TYPES OF INTRAHEPATIC LESIONS

- A typical intrahepatic HCC lesion: a lesion that shows intra-tumoral (i.e., non-rim-like) arterial enhancement on ceCT/ceMRI => Lesion measured with the longest viable tumor diameter.
- An atypical intra-hepatic HCC lesion: a non-enhancing lesion (i.e., lesion that does not show the intra-tumoral arterial enhancement pattern)=> Lesion measured with the longest overall tumor diameter (irrespective of the presence of internal areas of necrosis).

SUM OF DIAMETER

Based on measurements of viable tumor diameter (intra-hepatic lesions with typical features) and measurements of overall tumor diameter (intra-hepatic lesions with atypical features and extra-hepatic lesions).

ASCITES AND PLEURAL EFFUSION

Should not be considered as tumor lesions unless associated with unequivocal neoplastic peritoneal or pleural nodules or when cytological confirmation of their malignant nature is available.

PORTAL VEIN THROMBOSIS

Should always be considered as a non-target lesion. If present, a complete disappearance of enhancement inside the malignant portal vein thrombus is required to be considered equivalent to CR.

NEW HEPATIC LESIONS

- Unequivocal if LD ≥10mm and if the nodule shows non-rim-like hypervascularisation in the arterial phase with non-peripheral washout in the portal venous or the delayed phase.
- Otherwise equivocal, unless associated with unequivocal evidence of malignancy such as vascular invasion. Equivocal lesions can be diagnosed as HCC if either a change in enhancement pattern (when ≥10mm) or an interval growth ≥10mm in subsequent scans.

Sources: Lencioni R, Llovet JM. Modified RECIST (mRECIST) assessment for hepatocellular carcinoma. Semin Liver Dis. 2010 Feb;30(1):52-60. doi: 10.1055/s-0030-1247132. Epub 2010 Feb 19. PMID: 20175033.

Llovet JM, Lencioni R. mRECIST for HCC: Performance and novel refinements. J Hepatol. 2020 Feb;72(2):288-306. doi: 10.1016/j.jhep.2019.09.026. PMID: 31954493.

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mRECIST

KEOSYS Medical Imaging

BASELINE ASSESSMENT
4 STEP PROCESS

STEP 01

Select up to 2 intra-hepatic Target Lesions

- Target Lesions ≥10mm.
- Priority should be given to typical intra-hepatic lesions.

STEP 02

Select extra-hepatic Target Lesions

- LD≥10mm for non nodal lesions, SA≥15mm for nodal lesions except porta hepatic lymph node that must have SA≥20mm).
- Total number of Target Lesions (intra- and extra-hepatic) must not exceed 5, max 2 per organ.

STEP 03

Measure All Target Lesions

- Typical intra-hepatic lesions: measure the longest viable tumor diameter (avoiding major areas of necrosis).
- Atypical intra-hepatic lesions, non-nodal extra-hepatic lesions: measure the longest overall tumor diameter (irrespective of the presence of internal necrosis).
- Nodal extra-hepatic lesions: measure the SA diameter.
- Baseline SOD: sum of viable tumor diameters and/or longest overall diameters.

STEP 04

Identify all other tumor lesions

- Identify as Non-Target Lesions, including malignant portal vein thrombosis, if present.

FOLLOW-UP ASSESSMENT
MEASURE ALL TARGET LESIONS AND QUALITATIVELY ASSESS NON-TARGET LESIONS

The longest viable tumor diameter of typical intra-hepatic Target Lesions may or may not be located in the same scan plane in which the baseline longest viable tumor diameter was measured.

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Lesion	Response	
TL	CR	• All extra-hepatic and atypical intra-hepatic TLs have disappeared • Intratumoral arterial enhancements in typical intrahepatic TLs have disappeared • Nodal TL ≤10mm
	PR	30% reduction in SOD compared to baseline
	SD	no PR, no PD
	PD	20% increase in SOD compared to nadir (smallest sum recorded) + 5mm increase in SOD in absolute value
NTL	CR	• All extra-hepatic and atypical intra-hepatic NTLs have disappeared • Intratumoral arterial enhancement in typical intra-hepatic NTLs have disappeared • Nodal NTL ≤10mm
	NON CR / NON PD	Persistence of at least 1 NTL
	PD	Unequivocal progression of existing NTL
NL	The appearance of an unequivocal new lesion will trigger an overall response of PD	

Overall Time Point Response

TL	NTL	NL	OVERALL RESPONSE
CR	CR	No	CR
CR	Non-CR/Non-PD or NE	No	PR
PR	CR, Non-CR/Non-PD or NE	No	PR
SD	CR, Non-CR/Non-PD or NE	No	SD
NE	CR, Non-CR/Non-PD or NE	No	NE
PD	Any	Yes or No	PD
Any	PD	Yes or No	PD
Any	Any	Yes	PD

TOP TIPS

- **Check all available scans. Absence of intratumoral enhancement may be due to a mistiming of the arterial phase.**
- **A change from hypervascularity to hypovascularity does not represent tumor necrosis. Only areas that show complete absence of contrast enhancement can be assumed to represent necrotic tissue.**

ACRONYM KEY

TL = Target Lesion
NTL = Non Target Lesion
NL = New Lesion
CR = Complete Response
PR = Partial Response
PD = Progressive Disease
SD = Stable Disease
NE = Non-Evaluable
SOD = Sum of the Diameters
LD = Long Diameter
SD = Short Axis

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