

**Table S1** Study characteristics and diagnostic data of different imaging modalities for predicting MVI

Authors by modality	Patients/tumors	MVI-/MVI+	Predictors	Sensitivity (%) (95% CI)	Specificity (%) (95% CI)	AUC (95% CI)	Reference
<b>MRI</b>							
Zhao <i>et al.</i> 2018	51	33/18	Irregular shape, $D$ value $\leq 1.16 \times 10^{-3}$ mm <sup>2</sup> /s	94.4 (70.6–99.7)	63.6 (45.1–79.0)	0.790	(71)
Li <i>et al.</i> 2022	29	13/16	OSS-pLSL	93.8 (67.8–99.7)	76.9 (46.0–93.8)	0.900 (0.780–1.000)	(22)
Yang <i>et al.</i> 2022	134	90/44	Coronal enhancement, mosaic architecture, nonsmooth tumor margins, peritumoral hypointensity on HBP	93.2 (80.3–98.2)	71.1 (60.5–79.9)	0.784	(45)
Wei <i>et al.</i> 2019	135	80/55	$D$ value $\leq 0.868 \times 10^{-3}$ mm <sup>2</sup> /s	78.2 (64.6–87.8)	75.0 (63.8–83.7)	0.815 (0.740–0.877)	(68)
Kim <i>et al.</i> 2009	70	35/35	Peritumoral enhancement	74.3 (56.4–86.9)	82.9 (65.7–92.8)	NM	(19)
Nishie <i>et al.</i> 2014	61	36/25	Peritumoral hypointensity on HBP	72.0 (50.4–87.1)	80.6 (63.4–91.2)	NM	(58)
Cao <i>et al.</i> 2019	74	36/38	MK $\geq 0.86 \times 10^{-3}$ mm <sup>2</sup> /s	68.4 (51.3–82.5)	75.0 (57.8–87.9)	0.770 (0.660–0.860)	(65)
Xu <i>et al.</i> 2014	109	70/39	ADC <sub>mean</sub> $\leq 1.227 \times 10^{-3}$ mm <sup>2</sup> /s	66.7 (49.7–80.4)	78.6 (66.8–87.1)	0.711, (0.606–0.816)	(62)
Kim <i>et al.</i> 2012	104	44/60	Peritumoral hypointensity on HBP	38.3 (26.4–51.8)	93.2 (80.3–98.2)	0.658 (0.558–0.748)	(57)
<b>CT</b>							
Reginelli <i>et al.</i> 2018	101	69/32	Nonsmooth tumor margins, incomplete capsule	88.5(80.2–93.9)	88.0 (79.7–93.6)	0.881 (0.798–0.937)	(11)
Chou <i>et al.</i> 2014	102	42/60	Nonsmooth tumor margins	81.7 (71.9–91.5)	88.1 (78.3–97.9)	0.843 (0.773–0.914)	(46)
Yang <i>et al.</i> 2017	56	19/37	Normalized iodine concentration at AP (40 kVp) $\geq 0.188$	81.1 (64.3–91.4)	78.9 (53.9–93.0)	0.871	(73)
Banerjee <i>et al.</i> 2015	157	112/45	RVI	75.6 (60.1–86.6)	93.8 (87.1–97.2)	NM	(54)
<b>PET</b>							
Hyun <i>et al.</i> 2018	158	82/76	Tumor-to-normal liver SUV ratio, tumor size, AFP	85.5 (75.6–92.6)	54.9 (43.4–65.9)	0.756	(80)
Kornberg <i>et al.</i> 2009	42	25/17	Tumor <sub>SUVmax</sub> /normal <sub>SUVmean</sub> >1	82.3 (55.8–95.3)	92.0 (72.5–98.6)	NM	(25)
Kornberg <i>et al.</i> 2012	91	54/37	Tumor <sub>SUVmax</sub> /normal <sub>SUVmean</sub> >1	81.1 (64.3–91.4)	90.7 (78.9–96.5)	NM	(79)
Kobayashi <i>et al.</i> 2016	60	51/9	Tumor <sub>SUVmax</sub> $\geq 3.2$	77.8 (40.2–96.1)	74.5 (60.1–85.2)	0.712 (0.493–0.932)	(78)
Cheung <i>et al.</i> 2011	58	29/29	Tumor <sub>SUVmax</sub> /normal liver <sub>SUVmean</sub> >1.2	55.2 (36.0–73.0)	69.0 (49.0–84.0)	NM	(82)
Lee <i>et al.</i> 2013	191	114/77	Tumor <sub>SUVmax</sub> /normal <sub>SUVmean</sub> >1	45.5 (34.2–57.2)	83.9 (75.5–89.9)	NM	(83)
<b>US</b>							
Wang <i>et al.</i> 2022	56	39/17	Irregular shape, unclear boundary, incomplete capsule, wash out enhancement pattern, nonsmooth tumor margins	94.1 (69.2–99.7)	64.1 (47.2–78.3)	0.849 (0.749–0.949)	(47)
Xu <i>et al.</i> 2022	74	41/33	Tumor size	81.8 (63.9–92.4)	58.5 (42.2–73.3)	0.775 (0.668–0.881)	(23)
Xu <i>et al.</i> 2022	74	41/33	Hardness of tumor-adjacent tissues	72.7 (54.2–86.1)	65.9 (49.3–79.4)	0.718 (0.600–0.836)	(23)
<b>Radiomics</b>							
Tong <i>et al.</i> 2022	82	25/57	CT-based radiomics classifier, clinical factors (age, gender, AFP, tumor stage, Eastern Cooperative Oncology Group score)	94.7 (84.5–98.6)	80 (58.7–92.4)	0.945	(88)
Shi <i>et al.</i> 2022	29	10/19	<sup>18</sup> F-FDG PET-based radiomics classifier, radiologic features (Tumor SUV <sub>max</sub> , hypovascular arterial phase enhancement pattern on MRI, nonsmooth tumor margins)	94.7 (71.9–99.7)	69.2 (38.9–89.6)	0.953 (0.883–1.000)	(48)
Chong <i>et al.</i> 2021	106	76/30	MRI-based radiomics classifier, clinicoradiologic risk factors (AFP, TBIL, peritumoral enhancement, incomplete capsule, nonsmooth tumor margins)	93.3 (76.5–98.8)	85.5 (75.2–92.2)	0.920 (0.861–0.979)	(86)
Yao <i>et al.</i> 2018	43	22/21	US-based radiomics classifier	91.0 (70.0–99.0)	100.0 (85.0–100.0)	0.980 (0.930–0.990)	(96)
Xu <i>et al.</i> 2019	145	96/49	CT-based radiomics classifier, clinicoradiologic risk factors (AFP, AST, peritumoral enhancement, extrahepatic growth pattern, nonsmooth tumor margins, incomplete capsule, RVI)	89.8 (77.0–96.2)	79.2 (69.4–86.5)	0.828	(49)
Yang <i>et al.</i> 2019	62	43/19	MRI-based radiomics classifier, clinicoradiologic risk factors (AFP, peritumoral enhancement, nonsmooth tumor margins)	89.5 (65.5–98.2)	81.4 (66.1–91.1)	0.861 (0.750–0.970)	(87)
Zhong <i>et al.</i> 2022	77	41/36	US-based nomogram (tumor size, echogenicity, tumor shape, peritumoral enhancement, enhancement level on PVP)	77.8 (60.4–89.3)	70.7 (54.3–83.4)	0.789 (0.681–0.874)	(95)
Peng <i>et al.</i> 2018	120	46/74	CT-based radiomics signature, clinicoradiologic risk factors (nonsmooth tumor margins, RVI, and AFP)	75.7 (64.3–84.9)	80.4 (66.1–90.6)	0.844 (0.774–0.915)	(89)
Jiang <i>et al.</i> 2022	141	97/44	MR-based nomogram (nonsmooth tumor margins, ADC, internal artery, peritumoral hypointensity on HBP, tumor multifocality, and AFP)	52.3 (36.9–67.3)	88.9 (76.7–95.4)	0.800 (0.707–0.874)	(84)

MVI, microvascular invasion; MRI, magnetic resonance imaging; CT, computed tomography; PET, positron emission tomography; US, ultrasound; AUC, area under the curve; CI, confidence interval; OSS-pLSL, octahedral shear strain–percentage of low-shear-strain length; HBP, hepatobiliary phase; MK, mean kurtosis; ADC, apparent diffusion coefficient; AP, arterial phase; RVI, radiogenomic venous invasion; AFP, alpha-fetoprotein; <sup>18</sup>F-FDG, <sup>18</sup>F-fluorodeoxyglucose; SUV, standardized uptake value; SUVmax, maximum standardized uptake value; SUVmean, mean standardized uptake value; TBIL, total bilirubin; AST, aspartate aminotransferase; PVP, portal venous phase; NM, not mentioned.