Supplementary Table 1 Number of radiomics features extracted and features retained after intraclass correlation coefficient-least absolute shrinkage and selection operator-recursive feature elimination screening

Volume of interest	Extract features			Intraclass correlation coefficient-least absolute shrinkage and selection operator-recursive feature elimination		
	A	D	P	A	D	P
Tumor	1515	1515	1515	0	2	0
5 mm	1507	1507	1507	1	2	0
10 mm	1507	1507	1507	0	5	5

A: Arterial phase; D: Delay phase; P: Portal phase.

Supplementary Table 2 Number of deep learning features extracted and features retained after intraclass correlation coefficient-least absolute shrinkage and selection operator-recursive feature elimination screening

Volume of interest	Extract features			Intraclass correlation coefficient-least absolute shrinkage and selection operator-recursive feature elimination		
	A	D	P	A	D	P
Tumor	512	512	512	1	1	5
5 mm	512	512	512	2	0	1
10 mm	512	512	512	1	4	3

A: Arterial phase; D: Delay phase; P: Portal phase.

Supplementary Table 3 Radiomics and deep learning features correlation coefficient

Features	Correlation coefficient
P1_wavelet-HHL_ngtdm_Busyness	0.033398762

P1_square_glcm_JointEnergy	-0.023499908
P_5mm_wavelet-HLL_ngtdm_Coarseness	0.060487742
P_5mm_squareroot_gldm_SmallDependenceLowGrayLevelEmphasis	0.061123732
A_5mm_wavelet-LLL_gldm_SmallDependenceLowGrayLevelEmphasis	-0.02418803
P_10mm_wavelet-HLL_ngtdm_Coarseness	-0.0164699
P_10mm_original_glszm_LowGrayLevelZoneEmphasis	-0.052474014
P_10mm_original_ngtdm_Coarseness	0.03518581
P_10mm_logarithm_glszm_LargeAreaLowGrayLevelEmphasis	-0.002809895
P_10mm_logarithm_ngtdm_Coarseness	-0.048427045
D_10mm_wavelet-HLH_ngtdm_Contrast	0.135022456
D_10mm_square_glszm_ZonePercentage	-0.03190719
D_10mm_exponential_glrlm_RunLengthNonUniformity	0.013457585
D_10mm_gradient_gldm_DependenceVariance	0.085979836
D_10mm_gradient_ngtdm_Coarseness	-0.137762561
A1_feature_4	0.12221727
D1_feature_194	0.001820541
P1_feature_43	0.21827365
P1_feature_223	-0.161949554
P1_feature_282	-0.126645124
P1_feature_379	-0.161115118
P1_feature_383	-0.082443521
A_5mm_feature_246	-0.110616231
A_5mm_feature_476	0.14049538
P_5mm_feature_280	0.038772508
A_10mm_feature_460	-0.075959647
D_10mm_feature_66	0.030576862

D_10mm_feature_354	0.215736307
D_10mm_feature_367	-0.086324526
D_10mm_feature_390	-0.081376583
P_10mm_feature_101	0.091800361
P_10mm_feature_131	-0.055967378
P_10mm_feature_282	0.072123736

A: Arterial phase; D: Delay phase; P: Portal phase.

Supplementary Table 4 The performance comparison of different models

Volume of interest	Model	Train				Validation			
		Accuracy	AUC	NPV	PPV	Accuracy	AUC	NPV	PPV
The tumor-only model	SVM	0.716	0.771 (0.738-0.805)	0.516	0.849	0.701	0.744 (0.691-0.797)	0.538	0.805
	LR	0.710	0.771 (0.739-0.802)	0.694	0.720	0.701	0.745 (0.695-0.795)	0.731	0.683
	RF	0.935	0.986 (0.937-1.000)	0.887	0.968	0.687	0.727 (0.661-0.793)	0.692	0.683
	KNN	0.690	0.757 (0.724-0.789)	0.532	0.796	0.731	0.750 (0.700-0.801)	0.654	0.780
	XGBoost	0.929	0.991 (0.939-1.000)	0.839	0.989	0.716	0.726 (0.653-0.799)	0.654	0.756
	LightGBM	0.781	0.821 (0.795-0.846)	0.742	0.806	0.701	0.717 (0.677-0.757)	0.692	0.707
The 5 mm peri-tumor model	SVM	0.645	0.688 (0.671-0.704)	0.258	0.903	0.642	0.682 (0.661-0.703)	0.154	0.951
	LR	0.632	0.689 (0.675-0.704)	0.694	0.591	0.642	0.684 (0.665-0.703)	0.769	0.561
	RF	0.671	0.728 (0.708-0.748)	0.419	0.839	0.627	0.709 (0.679-0.738)	0.423	0.756
	KNN	0.645	0.687 (0.669-0.705)	0.484	0.753	0.642	0.700 (0.674-0.727)	0.462	0.756
	XGBoost	0.935	0.991 (0.945-1.000)	0.887	0.968	0.687	0.647 (0.583-0.710)	0.462	0.829
	LightGBM	0.768	0.857 (0.824-0.891)	0.629	0.860	0.746	0.713 (0.665-0.761)	0.577	0.854
The 10 mm peri-tumor model	SVM	0.735	0.795 (0.758-0.832)	0.435	0.935	0.701	0.779 (0.722-0.835)	0.346	0.927
	LR	0.697	0.794 (0.768-0.821)	0.726	0.677	0.761	0.779 (0.738-0.819)	0.769	0.756
	RF	0.942	0.991 (0.939-1.000)	0.919	0.957	0.657	0.708 (0.632-0.784)	0.538	0.732

	KNN	0.723	0.802 (0.776-0.829)	0.548	0.839	0.776	0.803 (0.763-0.842)	0.577	0.902
	XGBoost	0.935	0.990 (0.936-1.000)	0.919	0.946	0.687	0.746 (0.661-0.831)	0.538	0.780
	LightGBM	0.852	0.932 (0.886-0.978)	0.790	0.892	0.701	0.735 (0.659-0.810)	0.538	0.805
The tumor-peri-	SVM	0.755	0.779 (0.743-0.815)	0.500	0.925	0.672	0.760 (0.704-0.816)	0.346	0.878
tumor 5 mm model	LR	0.710	0.784 (0.749-0.820)	0.677	0.731	0.701	0.771 (0.716-0.826)	0.654	0.732
	RF	0.774	0.867 (0.832-0.903)	0.565	0.914	0.657	0.759 (0.707-0.812)	0.385	0.829
	KNN	1.000	1.000 (0.922-1.000)	1.000	1.000	0.687	0.766 (0.720-0.813)	0.423	0.854
	XGBoost	0.935	0.987 (0.934-1.000)	0.887	0.968	0.701	0.774 (0.696-0.853)	0.654	0.732
	LightGBM	0.748	0.854 (0.827-0.880)	0.452	0.946	0.701	0.750 (0.711-0.789)	0.385	0.902
The tumor-peri-	SVM	0.794	0.863 (0.816-0.910)	0.597	0.925	0.731	0.836 (0.765-0.907)	0.538	0.854
tumor 10 mm model	LR	0.781	0.862 (0.821-0.904)	0.774	0.785	0.761	0.841 (0.777-0.904)	0.692	0.805
	RF	0.794	0.893 (0.863-0.923)	0.565	0.946	0.731	0.794 (0.750-0.838)	0.423	0.927
	KNN	0.787	0.869 (0.832-0.907)	0.645	0.882	0.746	0.829 (0.776-0.883)	0.538	0.878
	XGBoost	0.890	0.957 (0.924-0.990)	0.839	0.925	0.672	0.796 (0.749-0.844)	0.577	0.732
	LightGBM	0.813	0.911 (0.878-0.944)	0.645	0.925	0.746	0.804 (0.755-0.853)	0.538	0.878
The model that	SVM	0.813	0.888 (0.837-0.939)	0.694	0.892	0.776	0.891 (0.815-0.968)	0.615	0.878
incorporates	LR	0.826	0.887 (0.848-0.926)	0.855	0.806	0.821	0.893 (0.836-0.950)	0.769	0.854
features from all	RF	0.852	0.942 (0.892-0.993)	0.774	0.903	0.791	0.868 (0.795-0.941)	0.654	0.878

regions—tumor,	5	KNN	0.813	0.907 (0.861-0.954)	0.710	0.882	0.791	0.895 (0.826-0.964)	0.654	0.878
mm, and 10 mm		XGBoost	0.890	0.973 (0.938-1.000)	0.887	0.892	0.746	0.880 (0.828-0.932)	0.615	0.829
		LightGBM	0.832	0.924 (0.890-0.958)	0.726	0.903	0.776	0.899 (0.850-0.948)	0.615	0.878

AUC: Area under the receiver operating characteristic curve; KNN: K-nearest neighbors; LightGBM: Light gradient boosting machine; LR: Logistic regression; NPV: Negative predictive value; PPV: Positive predictive value; RF: Random forest; SVM: Support vector machine; XGBoost: Extreme gradient boosting.