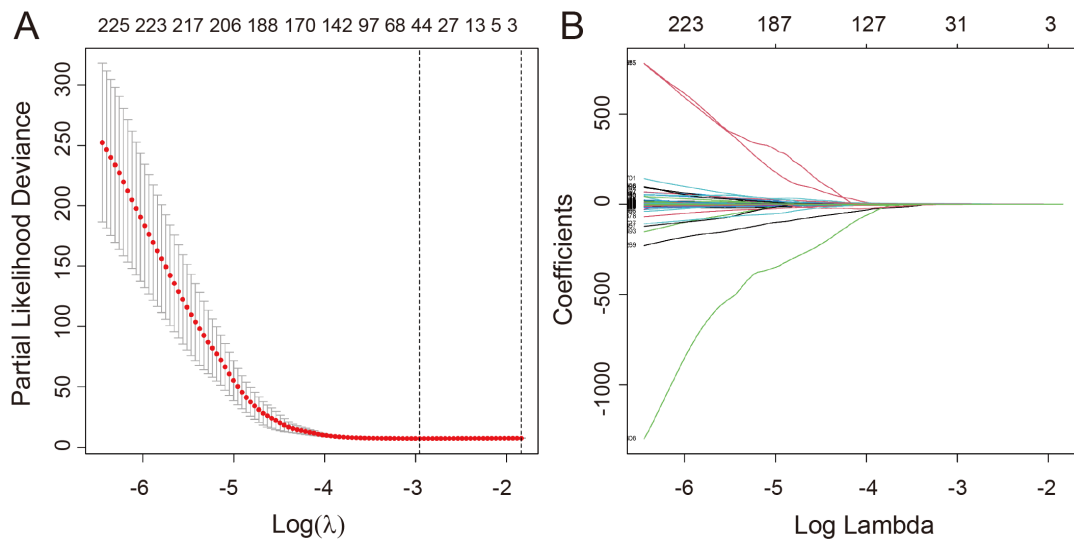


Supplementary material



Supplementary Figure 1 Radiomics feature selection using the LASSO Cox regression model. A: Based on the log (lambda) and partial likelihood deviance, the dotted line is displayed at the minimum log (lambda) represents the optimal number of predictors; B: LASSO coefficients of total 31 radiomics features. Nonzero coefficients were determined based on the optimal log (lambda).

Supplementary Table 1 Early recurrence related contrast-enhanced CT features

Features	<i>n</i>	Phase	Coefficients
Original _ firstorder _ Kurtosis	A33	Arteria	0.0024110286605
		1	4083
log-sigma-4-0-mm-3D_gldm_LargeDependenceEmphasis	A170	Arteria	0.0010393501753
		1	8724
log-sigma-4-0-mm-3D_ngtdm_Busyness	A209	Arteria	3.2926549844385
		1	6e-07
wavelet-LLH _ firstorder _ Energy	A216	Arteria	-0.002789507949
		1	27153
wavelet-LLH _ glcm_Imc2	A246	Arteria	-0.745176233146
		1	374
wavelet-LLH _ glszm _Small Area Low Gray Level Emphasis	A298	Arteria	0.4027655951734
		1	88
wavelet-LHH _ gldm _Dependence Variance	A445	Arteria	0.0231318849625
	A498	1	246
wavelet-HLL _ firstorder _ Kurtosis	A507	Arteria	0.0014940628406
wavelet-HLL _ firstorder _ Skewness	A568	1	7344
wavelet-HLL _ glszm _High Gray Level Zone Emphasis	A572	Arteria	-0.010561849199
	A577	1	0747
wavelet-HLL _ glszm _ Low Gray Level Zone Emphasis	A667	Arteria	0.1075908927743
	A845	1	91
wavelet-HLL _ glszm _Small Area Low Gray Level Emphasis	A846	Arteria	-1.570122802355
	A859	1	55e-07
wavelet-HLH _ glszm _Size Zone NonUniformity Normalized	V8	Arteria	-0.206364983031
	V15	1	861
wavelet-HHH _ glszm _Gray Level NonUniformity Normalized	V43	Arteria	0.4823357882873
	V110	1	76

wavelet-HHH _ glszm _Gray Level	V153	Arteria	2.8268457939404
Variance	V154	1	8
wavelet-HHH _ glszm _ Zone	V164	Arteria	-5.910559371699
Variance	V204	1	95e-06
diagnostics _Image-interpolated	V205	Arteria	-8.959650865588
_Minimum	V229	1	36e-10
original _shape _Elongation	V406	Portal	0.2925147182470
original _firstorder _Skewness	V446	Portal	67
original _ glszm _ Size Zone	V526	Portal	-1.234100663332
NonUniformity Normalized	V764	Portal	07
log-sigma-4-0-mm-3D_glcm_Imc1	V947	Portal	0.0236512673356
log-sigma-4-0-mm-3D_glcm_Imc2		Portal	836
log-sigma-4-0-mm-3D_gldm_Dependence Entropy		Portal	0.0622209829350
		Portal	435
log-sigma-4-0-mm-3D_glszm_SmallAreaEmphasis		Portal	-0.039535837270
		Portal	5624
log-sigma-4-0-mm-3D_glszm_SmallAreaHighGrayLevel Emphasis		Portal	0.1593415968460
		Portal	25
wavelet-LLH _ firstorder _ Skewness		Portal	0.0867595218277
wavelet-LHH _ firstorder _ Kurtosis		Portal	089
wavelet-LHH _ gldm _ Dependence Variance		Portal	0.8955620509525
			73
wavelet-HLL_glcm_Imc2			0.0087289288012
wavelet-HHL _ glszm_ Small Area Low Gray Level Emphasis			5978
			-0.018712445447
wavelet-HHL _ glszm _ Small Area Low Gray Level Emphasis			2297
			0.0086234454495
			3026
			0.0232703178647

521
-0.110126477083
458
-0.089812776244
2921
0.3011959179772
13

Radiomics score calculation formula:

Radiomics score = $0.00241102866054083 \times \text{Original_firstorder_Kurtosis}$
+ 0.00103935017538724
 $\times \text{log-sigma-4-0-mm-3D_gldm_LargeDependenceEmphasis}$
+ $3.29265498443856e-07 \times \text{log-sigma-4-0-mm-3D_ngtdm_Busyness}$
+ $-0.00278950794927153 \times \text{wavelet-LLH_firstorder_Energy}$
+ $-0.745176233146374 \times \text{wavelet-LLH_glcm_Imc2}$
+ $0.402765595173488 \times \text{wavelet-LLH_glszm_Small Area Low Gray Level Emphasis}$
+ $0.0231318849625246 \times \text{wavelet-LHH_gldm_Dependence Variance}$
+ $0.00149406284067344 \times \text{wavelet-HLL_firstorder_Kurtosis}$
+ $-0.0105618491990747 \times \text{wavelet-HLL_firstorder_Skewness}$
+ $0.107590892774391 \times \text{wavelet-HLL_glszm_High Gray Level Zone Emphasis}$
+ $-1.57012280235555e-07 \times \text{wavelet-HLL_glszm_Low Gray Level Zone Emphasis}$
+ $-0.206364983031861 \times \text{wavelet-HLL_glszm_Small Area Low Gray Level Emphasis}$
+ $0.482335788287376 \times \text{wavelet-HLH_glszm_Size Zone NonUniformity Normalized}$
+ $2.82684579394048 \times \text{wavelet-HHH_glszm_Gray Level NonUniformity}$

Normalized

+ -5.91055937169995e-06 × wavelet-HHH _ glszm _ Gray Level Variance
+ -8.95965086558836e-10 × wavelet-HHH _ glszm _ Zone Variance
+ 0.292514718247067 × diagnostics _ Image-interpolated _ Minimum
+ -1.23410066333207 × original _ shape _ Elongation
+ 0.0236512673356836 × original _ firstorder _ Skewness
+ 0.0622209829350435 × original _ glszm _ Size Zone NonUniformity

Normalized

+ -0.0395358372705624 × log-sigma-4-0-mm-3D_glcm_Imc1
+ 0.159341596846025 × log-sigma-4-0-mm-3D_glcm_Imc2
+ 0.0867595218277089 × log-sigma-4-0-mm-3D_gldm_Dependence Entropy
+ 0.895562050952573 × log-sigma-4-0-mm-3D_glszm_SmallAreaEmphasis
+ 0.00872892880125978 ×
log-sigma-4-0-mm-3D_glszm_SmallAreaHighGrayLevel Emphasis
+ -0.0187124454472297 × wavelet-LLH _ firstorder _ Skewness
+ 0.00862344544953026 × wavelet-LHH _ firstorder _ Kurtosis
+ 0.0232703178647521 × wavelet-LHH _ gldm _ Dependence Variance
+ -0.110126477083458 × wavelet-HLL_glcm_Imc2
+ -0.0898127762442921 × wavelet-HHL _ glszm_ Small Area Low Gray Level
Emphasis
+ 0.301195917977213 × wavelet-HHL _ glszm _ Small Area Low Gray Level
Emphasis

Radiomics and clinical combined model:

Radiomics and clinical combined model risk score = 1.3718 × radiomic score
+ 0.4537 × serum AFP (0: ≤ 200 ng/mL, 1: > 200 ng/mL)

Usage of contrast medium

Arterial-phase (AP) imaging was performed by the usage of contrast medium.
And the trigger is automatically located in lower border of thoracic aorta,

threshold: 180HU. A delay of 5 seconds before image acquisition. The portal venous phase (VP) started on 30s delay after the end of AP scanning. The CECT scanning parameters were 120 kVp, automatic tube current modulation (mA), Noise Index: 8, and 1.25 mm interval.