Supplementary Material

1. CT parameters:

Scanning parameters: tube voltage of 120 kV, tube current of 200–210 mA, and slice thickness of 2.0 mm. An anionic contrast medium (Omnipaque 350; GE Healthcare, Chicago, IL), administered at a dose of 1.5 mL/kg body weight, was injected intravenously using a power injector at a rate of 3 mL/s.

2. Rad-score

Feature selection methods:

1. ANOVA
2. Pearson
3. Mutual Information
4. L1 Based
5. Tree Based
6. Recursive

3. Machine-learning methods:

1. Logistic Regression
2. SVM
3. Linear SVC
4. Decision Tree
5. Random Forest
6. Ada Boost
7. Gradient Boosting
8. XG Boost
9. Bernoulli NB
10. Gaussian NB
11. K Nearest Neighbors
12. Linear Discriminant Analysis
13. SGD

14. Multilayer Perceptron

Finally, L1 Based + Logistic Regression was used to build Rad-score.

The features included in Rad-score:

Feature	coef
gradient_firstorder_Kurtosis_peri	0.6166
log-sigma-1-0-mm-3D_gldm_DependenceVariance_peri	-0.401
log-sigma-3-0-mm-3D_glcm_MaximumProbability	0.3038
log-sigma-1-0-mm-3D_glszm_SmallAreaLowGrayLevelEmphasis	0.1421
square_firstorder_MeanAbsoluteDeviation_peri	-0.3832
log-sigma-2-0-mm-3D_glszm_LargeAreaHighGrayLevelEmphasis	-0.5773
wavelet-LLH_gldm_DependenceNonUniformityNormalized_peri	0.0448
wavelet-HHL_firstorder_Median_peri	0.2852
exponential_firstorder_Kurtosis	-0.2848
lbp-2D_firstorder_10Percentile_peri	-0.1124
wavelet-LHH_firstorder_Skewness_peri	-0.1883
original_shape_Elongation	-0.1055
exponential_firstorder_Range	-0.0459
wavelet-HHH_glszm_ZoneEntropy_peri	0.162
wavelet-HHH_glszm_SmallAreaEmphasis_peri	-0.1188
wavelet-LLH_glszm_SizeZoneNonUniformityNormalized_peri	-0.1055
wavelet-LHL_glcm_ClusterShade_peri	0.0357
wavelet-LHH_firstorder_Median_peri	-0.1832
wavelet-HHH_firstorder_Skewness_peri	-0.0526
lbp-3D-m1_firstorder_Range	0.0083

(note：those with "_peri" were extracted from the peritumoral area)

4. The combined model

the formula = 1 / {1 + EXP [− (−5.233 + 0.927 × CEA + 0.492 × cT-stage + 0.377 × cN-stage + 5.361 × Rad-score)]}