## Supplementary Materials

### Supplementary Text 1. Clinical Characteristics.

The clinical characteristics of this study include the following parameters:

1. demographics characteristics: age, gender, HBV infection; diabetes mellitus (DM);
2. laboratory variables: alanine aminotransferase (ALT), serum albumin (ALB), prothrombin time (PT), international normalized ratio (INR), glutamyl transpeptidase (GGT), total bilirubin (TBIL), platelet count (PLT), serum creatinine (Scr), aspartate aminotransferase (AST);
3. clinical grading parameters: albumin-bilirubin (ALBI) grade (1:score<=-2.60, 2:-2.60<score<=-1.39, 3:-1.39<score), Child-Pugh, Eastern Cooperative Oncology Group Performance Status (ECOG-PS, 0:score=100, 1:80<score<100, 2:score=<80) and Barcelona Clinic Liver Cancer (BCLC) staging.
4. radiological characteristics: tumor diameter, tumor location (right, left, or across), tumor number, cirrhosis (present or absent), fusion lesions (present or absent), hepatocellular carcinoma (HCC) capsule (absent, unintegral, integral, or breakthrough), intratumoral necrosis (absent or present) and arterial peritumoral enhancement (absent or present).

The radiological characteristics were independently evaluated by two physicians.

### Supplementary Text 2. Training of Deep Learning.

#### Data Preparation

**Crop ROI**: For each patient, we selected the slice with the largest Region of Interest (ROI) as the representative image. To reduce complexity and minimize background noise in our algorithmic analysis, we retained only the smallest bounding rectangle encompassing the ROI, expanded by an additional 5 pixels. This decision was guided by recent research highlighting the significance of peritumoral regions.

**Data Augmentation**: We standardized the intensity distribution across RGB channels using Z-score normalization. These normalized images were then utilized as inputs for our model. During the training phase, we implemented real-time data augmentation strategies, including random cropping, horizontal flipping, and vertical flipping. For test images, we restricted processing to normalization only.

#### Deep Learning Signature

**Transfer Learning**: In this study, we evaluated the performance of prominent networks such as ResNet50, ResNet18, and DenseNet121 to enhance traditional CNN-based models. Comparative analyses were conducted to identify the most suitable algorithm for our specific research requirements.

**Hyperparameters**: To ensure the model's effectiveness across various patient populations with notable variability, we implemented transfer learning by initializing the model with pre-trained weights from the ImageNet database. A critical aspect of our approach was the meticulous adjustment of the learning rate to foster better generalization across datasets. We employed the cosine decay learning rate strategy, defined as follows:

In this equation, sets the minimum learning rate, establishes the maximum learning rate, and denotes the number of epochs in the iterative training process. Other essential hyperparameters include the use of Stochastic Gradient Descent (SGD) as the optimizer and softmax cross-entropy as the loss function.

Supplementary Table 1. Preoperative clinical characteristics of patients who underwent hepatectomy or TACE were divided into train data and test data groups.

| Features | hepatectomy | | | TACE | | |
| --- | --- | --- | --- | --- | --- | --- |
| Train data(n=208) | Test data(n=70) | *p*-value | Train data(n=78) | Test data(n=53) | *p*-value |
| Survival time (days), (Median [Q1, Q3]) | 502[246.25~1127.25] | 563[304.25~999] | 0.743 | 205.5[118.75~307.25] | 254[137~367] | 0.364 |
| Survival mode, No.(%) |  |  | 0.723 |  |  | 0.541 |
| Survival | 99 (47.6%) | 35 (50.0%) |  | 63 (80.8%) | 45 (84.9%) |  |
| Non-Survival | 109 (52.4%) | 35 (50.0%) |  | 15 (19.2%) | 8 (15.1%) |  |
| Child Pugh class, No.(%) |  |  | 0.709 |  |  | 0.206 |
| A | 187 (89.9%) | 64 (91.4%) |  | 62 (79.5%) | 37 (69.8%) |  |
| B | 21 (10.1%) | 6 (8.6%) |  | 16 (20.5%) | 16 (30.2%) |  |
| ECOG PS, No.(%) |  |  | 0.764 |  |  | 0.446 |
| 0 | 43 (20.7%) | 13 (18.6%) |  | 13 (16.7%) | 5 (9.4%) |  |
| 1 | 157 (75.5%) | 53 (75.7%) |  | 61 (78.2%) | 46 (86.8%) |  |
| 2 | 8 (3.9%) | 4 (5.7%) |  | 4 (5.1%) | 2 (3.8%) |  |
| Gender, No.(%) |  |  | 0.262 |  |  | 0.963 |
| Male | 176 (84.6%) | 63 (90.0%) |  | 66 (84.6%) | 45 (84.9%) |  |
| Female | 32 (15.4%) | 7 (10.0%) |  | 12 (15.4%) | 8 (15.1%) |  |
| HBV infection, No.(%) |  |  | 0.831 |  |  | 0.954 |
| Absent | 45 (21.6%) | 16 (22.9%) |  | 18 (23.1%) | 12 (22.6%) |  |
| Present | 163 (78.4%) | 54 (77.1%) |  | 60 (76.9%) | 41 (77.4%) |  |
| DM, No.(%) |  |  | 0.925 |  |  | 0.300 |
| Absent | 188 (90.4%) | 63 (90.0%) |  | 72 (92.3%) | 46 (86.8%) |  |
| Present | 20 (9.6%) | 7 (10.0%) |  | 6 (7.7%) | 7 (13.2%) |  |
| ALBI grade, No.(%) |  |  | 0.127 |  |  | 0.847 |
| 1 | 99 (47.6%) | 43 (61.4%) |  | 19 (24.4%) | 13 (24.5%) |  |
| 2 | 103 (49.5%) | 25 (35.7%) |  | 55 (70.5%) | 36 (67.9%) |  |
| 3 | 6 (2.9%) | 2 (2.9%) |  | 4 (5.1%) | 4 (7.5%) |  |
| Cirrhosis, No.(%) |  |  | 0.789 |  |  | 0.324 |
| Absent | 152 (73.1%) | 50 (71.4%) |  | 55 (70.5%) | 33 (62.3%) |  |
| Present | 56 (26.9%) | 20 (28.6%) |  | 23 (29.5%) | 20 (37.7%) |  |
| Tumor location, No.(%) |  |  | 0.182 |  |  | 0.863 |
| Left | 74 (35.6%) | 23 (32.9%) |  | 14 (17.9%) | 8 (15.1%) |  |
| Right | 120 (57.7%) | 46 (65.7%) |  | 39 (50.0%) | 26 (49.1%) |  |
| Across | 14 (6.7%) | 1 (1.4%) |  | 25 (32.1%) | 19 (35.8%) |  |
| BCLC, No.(%) |  |  | 0.770 |  |  | 0.745 |
| A stage | 104 (50.0%) | 38 (54.3%) |  | 21 (26.9%) | 12 (22.6%) |  |
| B stage | 48 (23.1%) | 16 (22.9%) |  | 22 (28.2%) | 18 (34.0%) |  |
| C stage | 56 (26.9%) | 16 (22.9%) |  | 35 (44.9%) | 23 (43.4%) |  |
| Fusion lesions, No.(%) |  |  | 0.530 |  |  | 0.789 |
| Absent | 131 (63.0%) | 47 (67.1%) |  | 32 (41.0%) | 23 (43.4%) |  |
| Present | 77 (37.0%) | 23 (32.9%) |  | 46 (59.0%) | 30 (56.6%) |  |
| HCC capsule, No.(%) |  |  | 0.007 |  |  | 0.151 |
| Absent | 68 (32.7%) | 10 (14.3%) |  | 30 (38.5%) | 17 (32.1%) |  |
| Integral | 89 (42.8%) | 44 (62.9%) |  | 10 (12.8%) | 15 (28.3%) |  |
| Unintegral | 34 (16.3%) | 8 (11.4%) |  | 30 (38.5%) | 15 (28.3%) |  |
| HCC capsule breakthrough | 17 (8.2%) | 8 (11.4%) |  | 8 (10.3%) | 6 (11.3%) |  |
| Intratumoral necrosis, No.(%) |  |  | 0.271 |  |  | 0.501 |
| Absent | 71 (34.1%) | 29 (41.4%) |  | 25 (32.1%) | 20 (37.7%) |  |
| Present | 137 (65.9%) | 41 (58.6%) |  | 53 (67.9%) | 33 (62.3%) |  |
| Arterial peritumoral enhancement, No.(%) |  |  | 0.448 |  |  | 0.647 |
| Absent | 91 (43.8%) | 27 (38.6%) |  | 25 (32.1%) | 15 (28.3%) |  |
| Present | 117 (56.2%) | 43 (61.4%) |  | 53 (67.9%) | 38 (71.7%) |  |
| Tumor number, No.  (Median [Q1, Q3]) | 1[1~2] | 1[1~2] | 0.897 | 2[1~6] | 2[1~6] | 0.782 |
| Tumor diameter (mm) (Median [Q1, Q3] and Mean ± SD) | 5.57[3.8~7.925] | 5.35[3.192~8.075] | 0.449 | 10.57 ± 3.87 | 9.15 ± 3.83 | 0.041 |
| Age (years) (Median [Q1, Q3]) | 58.5[49~66] | 55[48.25~64] | 0.236 | 63[50.25~70.75] | 60[53~68] | 0.835 |
| PLT (109/L),  (Median [Q1, Q3]) | 133.5[95.25~184.5] | 142[109.25~207.25] | 0.057 | 153[118~213] | 150[100~209] | 0.540 |
| AST(U/L), (Median [Q1, Q3]) | 46.05[30.225~68.125] | 44.6[31~66.5] | 0.962 | 84[50.75~140] | 71[45~106] | 0.3281 |
| ALT(U/L), (Median [Q1, Q3]) | 36[23~62.25] | 35[25~56.65] | 0.986 | 39[25.25~63] | 42[27~67] | 0.486 |
| GGT(U/L), (Median [Q1, Q3]) | 63[33.925~146.25] | 59.5[38.15~111.3] | 0.759 | 203[108.25~321.075] | 178[105~389] | 0.955 |
| ALB(g/L), (Median [Q1, Q3] and Mean ± SD) | 39.85[36.675~43] | 41.45[37~44.8] | 0.083 | 37.491 ± 5.288 | 36.37 ± 5.684 | 0.257 |
| TBIL (μmol/L),  (Median [Q1, Q3]) | 16.7[12.7~24.2] | 15.05[12.3~22.025] | 0.143 | 20.25[14.7~29.3] | 22.2[14.3~30.6] | 0.807 |
| Scr (μmol/L),(Median [Q1,Q3]) | 67.25[56.375~75.55] | 69.05[61.175~77.65] | 0.0921047 | 66.4[56.375~75] | 68.2[60~79.7] | 0.395 |
| PT (sec) (Median [Q1, Q3]) | 13.8[13.2~14.3] | 13.65[12.925~14.575] | 0.5891559 | 13.9[13.4~14.6] | 14.1[13.3~14.9] | 0.575 |
| INR (Median [Q1, Q3]) | 1.07[1.02~1.13] | 1.07[0.992~1.128] | 0.3895821 | 1.09[1.03~1.16] | 1.09[1.018~1.172] | 0.722 |

TACE, transarterial chemoembolization; BCLC, Barcelona Clinic Liver Cancer; HCC, hepatocellular carcinoma; ALB, albumin; ALBI, albumin-bilirubin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CNLC, China Liver Cancer Staging; ECOG-PS, Eastern Cooperative Oncology Group performance status; GGT, Glutamyl transpeptidase; HBV, hepatitis B virus; DM, diabetes mellitus; INR, international normalized ratio; PLT, platelet count; PT, prothrombin time; Scr, serum creatinine; and TBIL, total bilirubin.

Supplementary Table 2. Univariate and multivariable analysis of clinical features for hepatectomy.

| Characteristics | Univariate | | Multivariate | |
| --- | --- | --- | --- | --- |
| *p-*value | HR(95% CI) | *P-*value | HR(95% CI) |
| BCLC stage\* | <0.001 | 1.781 (1.491-2.110) | 0.011 | 1.351(1.081-1.680) |
| Child Pugh class | 0.002 | 1.967(1.280-3.000) | 0.560 | 1.161(0.701-1.930) |
| ECOG PS | 0.266 | 1.178(0.886-1.551) |  |  |
| Gender | 0.644 | 0.906 (0.596-1.380) |  |  |
| HBV infection | 0.722 | 0.938 (0.657-1.341) |  |  |
| DM | 0.398 | 1.232(0.762-1.980) |  |  |
| ALBI grade\* | <0.001 | 1.981(1.511-2.592) | 0.009 | 1.693(1.139-2.518) |
| Cirrhosis\* | 0.075 | 1.336(0.980-1.813) | 0.015 | 1.552(1.090-2.207) |
| Tumor location | 0.186 | 1.234(0.915-1.580) |  |  |
| Fusion lesions | <0.001 | 2.625(1.931-3.561) | 0.263 | 1.29(0.824-2.030) |
| HCC capsule | 0.015 | 1.236(1.042-1.451) | 0.245 | 1.11(0.929-1.342) |
| Intratumoral necrosis | 0.002 | 1.694(1.218-2.357) | 0.835 | 1.04(0.707-1.541) |
| Arterial peritumoral enhancement | 0.002 | 1.687(1.215-2.319) | 0.336 | 1.19(0.833-1.710) |
| Tumor number | <0.001 | 1.266(1.174-1.361) | 0.086 | 1.09 (0.989-1.200) |
| Age | 0.860 | 0.991(0.986-1.012) |  |  |
| PLT | 0.232 | 1 (0.999-1.000) |  |  |
| AST | 0.113 | 1 (1.000-1.000) |  |  |
| ALT | 0.92 | 1.000 (0.999-1.000) |  |  |
| GGT | 0.004 | 1.000(1.000-1.000) | 0.772 | 1.000(0.999-1.000) |
| ALB | <0.001 | 0.946(0.921-0.971) | 0.974 | 1.000(0.961-1.040) |
| TBIL | 0.904 | 1.000(0.998-1.000) |  |  |
| Scr | 0.105 | 0.992 (0.982-1.000) |  |  |
| PT | 0.26 | 1.020(0.985-1.060) |  |  |
| INR | 0.099 | 2.980(0.813-10.901) | 0.426 | 1.890(0.394-9.070) |
| Tumor diameter\* | <0.001 | 1.180(1.131-1.240) | 0.002 | 1.110(1.041-1.191) |

ALB, serum albumin; ALBI, albumin-bilirubin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CNLC, China Liver Cancer Staging; ECOG-PS, Eastern Cooperative Oncology Group performance status; GGT, Glutamyl transpeptidase; HBV, hepatitis B virus; DM, diabetes mellitus; INR, international normalized ratio; PLT, platelet count; PT, prothrombin time; Scr, serum creatinine; and TBIL, total bilirubin.\*Indicates that *p*-values for characteristics are less than 0.05 in both one-way and multifactor COX regressions.

Supplementary Table 3. Univariate and multivariable analysis of clinical features for TACE.

| Characteristics | Univariate | | Multivariate | |
| --- | --- | --- | --- | --- |
| *p-*value | HR(95% CI) | *p-*value | HR(95% CI) |
| BCLC stage\* | 0.028 | 1.354 (1.032-1.771) | 0.01 | 1.441 (1.090-1.901) |
| Child Pugh class | 0.298 | 1.301(0.795-2.110) |  |  |
| ECOG PS | 0.730 | 0.921 (0.578-1.471) |  |  |
| Gender | 0.903 | 1.041(0.538-2.021) |  |  |
| HBV infection | 0.410 | 0.802 (0.475-1.360) |  |  |
| DM | 0.909 | 0.956 (0.441-2.072) |  |  |
| ALBI grade | 0.028 | 1.542(1.051-2.270) | 0.582 | 1.221(0.598-2.501) |
| Cirrhosis\* | 0.095 | 1.494(0.933-2.38) | 0.049 | 1.64 (1.000-2.692) |
| Tumor location\* | 0.066 | 1.321(0.982-1.77) | 0.026 | 1.44 (1.05-1.990) |
| Fusion lesions | 0.528 | 1.150 (0.741-1.801) |  |  |
| HCC capsule | 0.83 | 0.977 (0.791-1.211) |  |  |
| Intratumoral necrosis | 0.261 | 0.759 (0.469-1.231) |  |  |
| Arterial peritumoral enhancement | 0.781 | 1.070 (0.666-1.722) |  |  |
| Tumor number | 0.317 | 1.050 (0.955-1.150) |  |  |
| Age | 0.644 | 0.996 (0.979-1.010) |  |  |
| PLT | 0.498 | 1.000 (0.998-1.000) |  |  |
| AST | 0.526 | 1.000(1.000-1.000) |  |  |
| ALT | 0.811 | 1.000 (0.999-1.000) |  |  |
| GGT | 0.013 | 1.000 (1.000-1.000) | 0.099 | 1.000(1.000-1.000) |
| ALB | 0.046 | 0.964(0.929-0.999) | 0.681 | 0.986(0.921-1.059) |
| TBIL | 0.879 | 0.999(0.987-1.012) |  |  |
| Scr | 0.774 | 0.999(0.992-1.018) |  |  |
| PT | 0.753 | 0.972(0.817-1.163) |  |  |
| INR | 0.771 | 0.774(0.138-4.332) |  |  |
| Tumor diameter | 0.339 | 1.03 (0.971-1.090) |  |  |

ALB, serum albumin; ALBI, albumin-bilirubin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CNLC, China Liver Cancer Staging; ECOG-PS, Eastern Cooperative Oncology Group performance status; GGT, Glutamyl transpeptidase; HBV, hepatitis B virus; INR, international normalized ratio; PLT, platelet count; PT, prothrombin time; Scr, serum creatinine; and TBIL, total bilirubin.\*Indicates that *p*-values for characteristics are less than 0.05 in both one-way and multifactor COX regressions.

Supplementary Table 4. Metric results for Deep Learning Radiomics Signature.

| Cohort | ModelName | Accuracy | AUC | 95% CI | Sensitivity | Specificity | PPV | NPV |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| train | ResNet50 | 0.766 | 0.866 | 0.815-0.917 | 0.724 | 0.877 | 0.940 | 0.543 |
| test | ResNet50 | 0.767 | 0.793 | 0.675-0.912 | 0.787 | 0.667 | 0.922 | 0.385 |
| train | DenseNet121 | 0.670 | 0.798 | 0.732-0.864 | 0.599 | 0.860 | 0.919 | 0.445 |
| test | DenseNet121 | 0.656 | 0.748 | 0.602-0.894 | 0.627 | 0.800 | 0.940 | 0.300 |
| train | ResNet18 | 0.761 | 0.782 | 0.717-0.848 | 0.803 | 0.649 | 0.859 | 0.552 |
| test | ResNet18 | 0.600 | 0.771 | 0.651-0.891 | 0.533 | 0.933 | 0.976 | 0.286 |

AUC, area under the curve; PPV, Positive Predictive Value, NPV - Negative Predictive Value.

Supplementary Table 5. Metrics in training and testing cohorts for predicting the risk of survival which treated with TACE.

| Signature | Accuracy | AUC | 95% CI | Sensitivity | Specificity | PPV | NPV | Survival | Cohort |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Clinical | 0.731 | 0.766 | 0.707 - 0.824 | 0.819 | 0.621 | 0.728 | 0.735 | 1 Year | Train |
| DLRadiomics | 0.777 | 0.833 | 0.783 - 0.882 | 0.889 | 0.638 | 0.753 | 0.822 | 1 Year | Train |
| Combined | 0.792 | 0.840 | 0.792 - 0.888 | 0.868 | 0.698 | 0.781 | 0.810 | 1 Year | Train |
| Clinical | 0.745 | 0.817 | 0.737 - 0.896 | 0.639 | 0.878 | 0.867 | 0.662 | 1 Year | Test |
| DLRadiomics | 0.718 | 0.779 | 0.693 - 0.865 | 0.738 | 0.694 | 0.750 | 0.680 | 1 Year | Test |
| Combined | 0.764 | 0.834 | 0.759 - 0.910 | 0.705 | 0.837 | 0.843 | 0.695 | 1 Year | Test |

DLRadiomics, Deep learning radiomics.

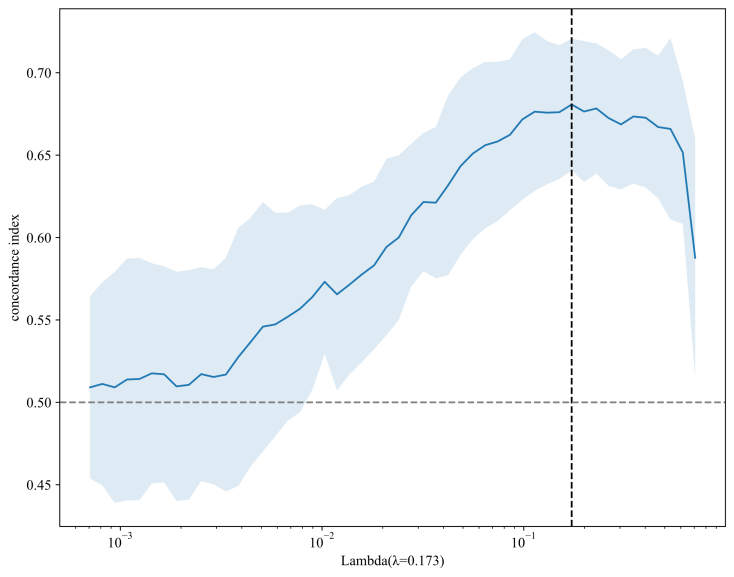
Supplementary Table 6. Metrics in training and testing cohorts for predicting the risk of survival which treated with hepatectomy.

| Signature | Accuracy | AUC | 95% CI | Sensitivity | Specificity | PPV | NPV | Survival | Cohort |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Clinical | 0.743 | 0.689 | 0.605 - 0.773 | 0.874 | 0.467 | 0.776 | 0.636 | 1 Year | Train |
| DLRadiomics | 0.802 | 0.812 | 0.746 - 0.878 | 0.921 | 0.550 | 0.812 | 0.767 | 1 Year | Train |
| CombinedT0 | 0.786 | 0.836 | 0.776 - 0.897 | 0.811 | 0.733 | 0.866 | 0.647 | 1 Year | Train |
| Clinical | 0.683 | 0.743 | 0.662 - 0.824 | 0.727 | 0.656 | 0.563 | 0.797 | 3 Years | Train |
| DLRadiomics | 0.786 | 0.864 | 0.806 - 0.923 | 0.764 | 0.800 | 0.700 | 0.847 | 3 Years | Train |
| CombinedT0 | 0.828 | 0.877 | 0.820 - 0.934 | 0.745 | 0.878 | 0.788 | 0.849 | 3 Years | Train |
| Clinical | 0.723 | 0.797 | 0.689 - 0.904 | 0.750 | 0.719 | 0.308 | 0.945 | 5 Years | Train |
| DLRadiomics | 0.795 | 0.874 | 0.781 - 0.967 | 0.812 | 0.792 | 0.394 | 0.962 | 5 Years | Train |
| CombinedT0 | 0.839 | 0.896 | 0.828 - 0.965 | 0.750 | 0.854 | 0.462 | 0.953 | 5 Years | Train |
| Clinical | 0.742 | 0.879 | 0.796 - 0.963 | 0.660 | 1.000 | 1.000 | 0.484 | 1 Year | Test |
| DLRadiomics | 0.758 | 0.843 | 0.726 - 0.960 | 0.745 | 0.800 | 0.921 | 0.500 | 1 Year | Test |
| CombinedT0 | 0.839 | 0.861 | 0.755 - 0.967 | 0.872 | 0.733 | 0.911 | 0.647 | 1 Year | Test |
| Clinical | 0.800 | 0.798 | 0.656 - 0.940 | 0.600 | 0.900 | 0.750 | 0.818 | 3 Years | Test |
| DLRadiomics | 0.844 | 0.849 | 0.720 - 0.978 | 0.667 | 0.933 | 0.833 | 0.848 | 3 Years | Test |
| CombinedT0 | 0.822 | 0.891 | 0.796 - 0.986 | 0.667 | 0.900 | 0.769 | 0.844 | 3 Years | Test |
| Clinical | 0.324 | 0.520 | 0.206 - 0.833 | 0.667 | 0.294 | 0.077 | 0.909 | 5 Years | Test |
| DLRadiomics | 0.297 | 0.559 | 0.220 - 0.898 | 0.667 | 0.265 | 0.074 | 0.900 | 5 Years | Test |
| CombinedT0 | 0.486 | 0.618 | 0.386 - 0.849 | 0.667 | 0.471 | 0.100 | 0.941 | 5 Years | Test |

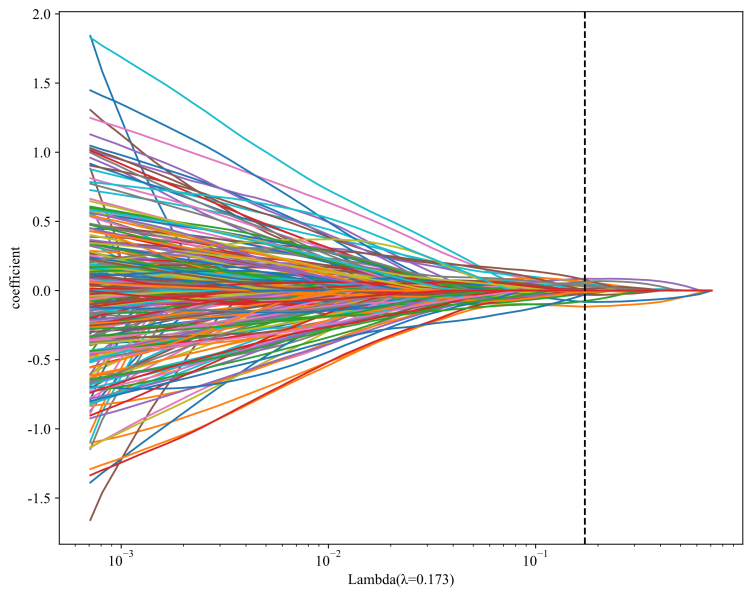
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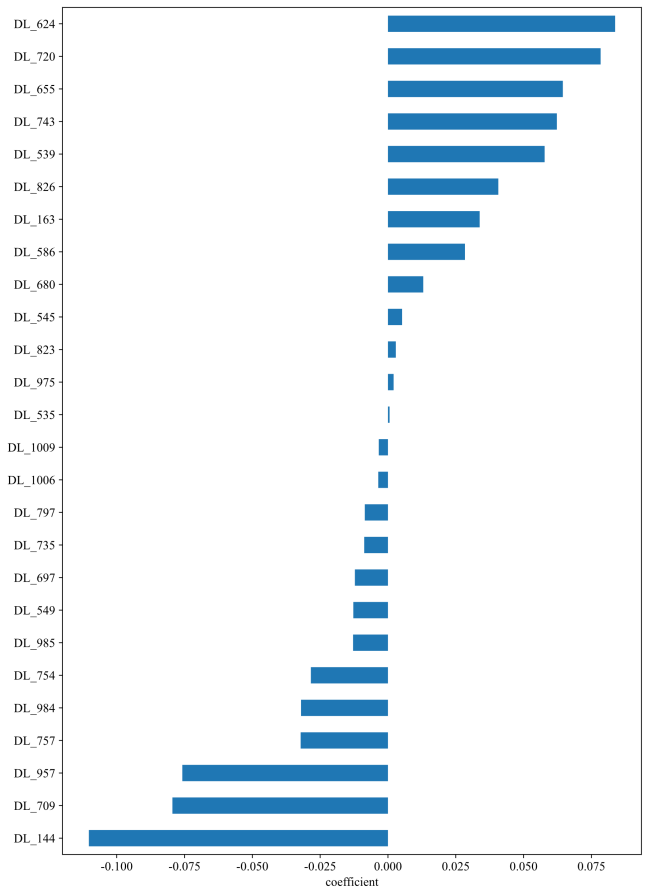
Supplementary Fig. 1. ROC results for DL-Based Radiomics of different model. (A) ROC curves of three convolutional neural network models—ResNet50, DenseNet121, and ResNet18—on the training cohort. (B) ROC curves of three convolutional neural network models—ResNet50, DenseNet121, and ResNet18—on the test cohort.



Supplementary Fig. 2. Perform LASSO Cox regression model using 10-fold cross-validation with DLRadiomics features and observe the dynamic change in the C-index with different regularization parameters λ values .



Supplementary Fig. 3. Regularization trajectories of feature coefficients with varying λ values in LASSO Cox regression model.



Supplementary Fig. 4. The final prognostic signatures, determined at the optimal regularization parameter (λ =0.173), included 26 DLRadiomics features with varying coefficients.

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Supplementary Fig. 5: ROC Curves in Training and Testing Cohorts for Time-Dependent Analysis. These curves evaluate the models' performance in predicting survival time treated with TACE. (A) ROC curves for the training cohort in predicting 1-year outcomes. (B) ROC curves for the test cohort in predicting 1-year outcomes.

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Supplementary Fig. 6: ROC Curves in Training and Testing Cohorts for Time-Dependent Analysis. These curves evaluate the models' performance in predicting survival time treated with hepatectomy. (A) ROC curves for the training cohort in predicting 1-year outcomes. (B) ROC curves for the test cohort in predicting 1-year outcomes. (C) ROC curves for the training cohort in predicting 3-year outcomes. (D) ROC curves for the test cohort in predicting 3-year outcomes. (E) ROC curves for the training cohort in predicting 5-year outcomes. (F) ROC curves for the test cohort in predicting 5-year outcomes.