

Unsupervised machine learning of MRI radiomics features identifies two distinct subgroups with different liver function reserve and risks of post-hepatectomy liver failure in patients with hepatocellular carcinoma

## Supplementary materials

Table S1. The scanning parameters of the gadoxetic acid-enhanced MRI

| Phases              | Flip Angle | Field of View(mm) | Repetition time(ms) | Echo time(ms) | Slice thickness(mm) |
|---------------------|------------|-------------------|---------------------|---------------|---------------------|
| Arterial phase      | 13         | 400×400           | 3.42                | 1.25          | 2.5                 |
| Portal phase        | 13         | 400×400           | 3.42                | 1.25          | 2.5                 |
| Equilibrium phase   | 13         | 400×400           | 3.42                | 1.25          | 2.5                 |
| Hepatobiliary phase | 30         | 400×400           | 3.42                | 1.25          | 2.5                 |

Table S2. List of the 37 reproducible and non-redundant radiomics features used for unsupervised clustering analysis in this study.

|    |  |
|----|--|
| 1  | original_shape_Elongation                          |
| 2  | original_shape_Flatness                            |
| 3  | original_firstorder_10Percentile                   |
| 4  | original_firstorder_90Percentile                   |
| 5  | original_firstorder_Energy                         |
| 6  | original_firstorder_InterquartileRange             |
| 7  | original_firstorder_MeanAbsoluteDeviation          |
| 8  | original_firstorder_Mean                           |
| 9  | original_firstorder_TotalEnergy                    |
| 10 | original_firstorder_Variance                       |
| 11 | original_glcm_Autocorrelation                      |
| 12 | original_glcm_ClusterProminence                    |
| 13 | original_glcm_ClusterShade                         |
| 14 | original_glcm_DifferenceAverage                    |
| 15 | original_glcm_Id                                   |
| 16 | original_glcm_Imc1                                 |
| 17 | original_glcm_InverseVariance                      |
| 18 | original_glcm_JointAverage                         |
| 19 | original_grlm_GrayLevelNonUniformity               |
| 20 | original_grlm_GrayLevelVariance                    |
| 21 | original_grlm_LongRunEmphasis                      |
| 22 | original_grlm_LongRunHighGrayLevelEmphasis         |
| 23 | original_grlm_RunLengthNonUniformityNormalized     |
| 24 | original_grlm_RunVariance                          |
| 25 | original_glszm_GrayLevelVariance                   |
| 26 | original_glszm_HighGrayLevelZoneEmphasis           |
| 27 | original_glszm_LargeAreaEmphasis                   |
| 28 | original_glszm_LargeAreaHighGrayLevelEmphasis      |
| 29 | original_glszm_SizeZoneNonUniformityNormalized     |
| 30 | original_glszm_ZonePercentage                      |
| 31 | original_gldm_DependenceEntropy                    |
| 32 | original_gldm_DependenceNonUniformityNormalized    |
| 33 | original_gldm_DependenceVariance                   |
| 34 | original_gldm_GrayLevelNonUniformity               |
| 35 | original_gldm_LargeDependenceEmphasis              |
| 36 | original_gldm_LargeDependenceHighGrayLevelEmphasis |
| 37 | original_gldm_SmallDependenceHighGrayLevelEmphasis |

27 radiomics features significantly different between subgroup 1 and 2 ( $p < 0.05$ ):

|    |  |
|----|--|
| 4  | original firstorder 90Percentile                   |
| 6  | original firstorder InterquartileRange             |
| 7  | original firstorder MeanAbsoluteDeviation          |
| 8  | original firstorder Mean                           |
| 9  | original firstorder TotalEnergy                    |
| 10 | original firstorder Variance                       |
| 11 | original glcm Autocorrelation                      |
| 13 | original glcm ClusterShade                         |
| 14 | original glcm DifferenceAverage                    |
| 15 | original glcm Id                                   |
| 16 | original glcm Imc1                                 |
| 17 | original glcm InverseVariance                      |
| 18 | original glcm JointAverage                         |
| 19 | original glrlm GrayLevelNonUniformity              |
| 20 | original glrlm GrayLevelVariance                   |
| 21 | original glrlm LongRunEmphasis                     |
| 23 | original glrlm RunLengthNonUniformityNormalized    |
| 24 | original glrlm RunVariance                         |
| 27 | original glszm LargeAreaEmphasis                   |
| 28 | original glszm LargeAreaHighGrayLevelEmphasis      |
| 29 | original glszm SizeZoneNonUniformityNormalized     |
| 30 | original glszm ZonePercentage                      |
| 32 | original gldm DependenceNonUniformityNormalized    |
| 33 | original gldm DependenceVariance                   |
| 34 | original gldm GrayLevelNonUniformity               |
| 35 | original gldm LargeDependenceEmphasis              |
| 37 | original gldm SmallDependenceHighGrayLevelEmphasis |

5 radiomics features significantly different between patients with and without PHLF ( $p < 0.05$ ):

|    |  |
|----|--|
| 2  | original shape Flatness                            |
| 13 | original glcm ClusterShade                         |
| 29 | original glszm SizeZoneNonUniformityNormalized     |
| 32 | original gldm DependenceNonUniformityNormalized    |
| 36 | original gldm LargeDependenceHighGrayLevelEmphasis |

No radiomics features significantly different between patients with significant and non-significant postoperative complications ( $p < 0.05$ ).

1 Radiomics features significantly different between patients with length of hospital stay  $\leq 18$  and  $> 18$  days:

|    | Radiomics features              |
|----|---------------------------------|
| 31 | original_gldm_DependenceEntropy |