

**Table S1** Gd-EOB-DTPA-enhanced MRI radiomic features extracted from the volumetric of interest of hepatocellular carcinoma

Category	Features
Histogram features (n=19)	Mean, standard deviation, max frequency, mode, minimum, maximum, the 5th percentile, the 10th percentile, the 25th percentile, the 50th percentile, the 75th percentile, the 90th percentile, skewness, kurtosis, entropy, AUC low, s-sDlowest, s-sDav distribution width, histogram width
Shape features (n=10)	Area, volume, surface area, compactness1, compactness2, volume diameter, spherical disproportion, sphericity, surface volume ratio, elongation
Texture features (n=23×4)	Entropy (H), energy, correlation, inverse difference moment normalized, cluster shade, cluster prominence, cluster tendency, auto correlation, dissimilarity, homogeneity1, homogeneity2, inverse difference normalized, inverse variance, max probability, variance, grey level nonuniformity, run length nonuniformity, low grey level run emphasis, high grey level run emphasis, short run low grey level emphasis, short run high grey level emphasis, long run low grey level emphasis, long run high grey level emphasis

Texture features (23×4) were extracted from four GLRLMs and four GLCMs, when the direction angle  $\theta$  of matrix was set to 0°, 45°, 90° and 135° respectively. Gd-EOB-DTPA, gadolinium-ethoxybenzyl diethylenetriamine pentaacetic acid; MRI, magnetic resonance imaging.

**Table S2** Intraclass correlation coefficients (ICC) for Gd-EOB-DTPA-enhanced MRI radiomic features based on the arterial phase and hepatobiliary phase between two radiologists

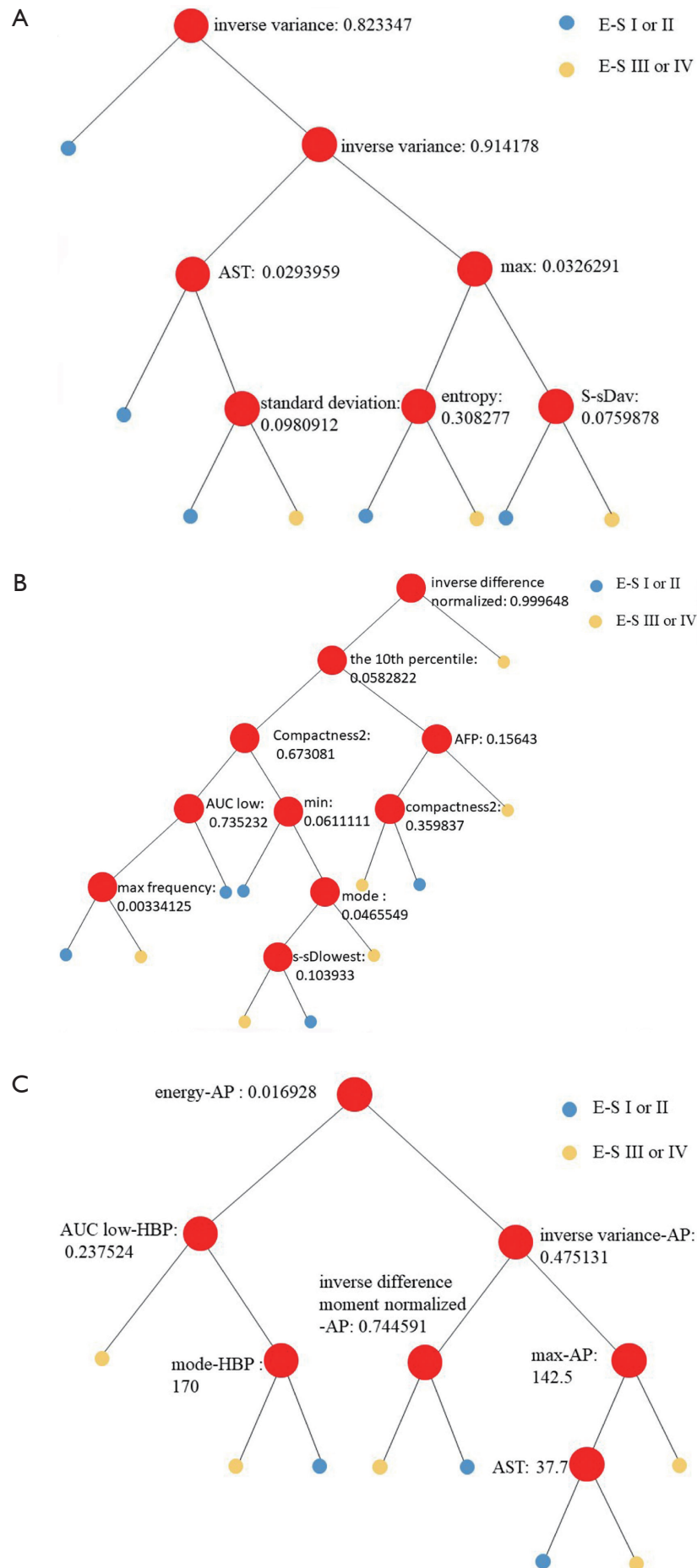
Radiomic features	ICC (arterial phase)	ICC (hepatobiliary phase)
Mean	1.000	1.000
Standard deviation	0.998	0.959
Max frequency	1.000	1.000
Mode	0.999	1.000
Minimum	0.961	0.990
Maximum	0.999	0.997
The 5th percentile	0.999	0.999
The 10th percentile	1.000	1.000
The 25th percentile	1.000	1.000
The 50th percentile	1.000	1.000
The 75th percentile	1.000	0.999
The 90th percentile	1.000	0.998
Skewness	0.911	0.970
Kurtosis	0.840	0.964
Entropy	1.000	0.987
AUC low	0.638*	0.944
S-sDlowest	0.993	0.999
S-sDav distribution width	0.894	0.997
Histogram width	0.980	0.962
Area	1.000	1.000
Volume	1.000	1.000
Surface area	1.000	1.000
compactness1	0.999	0.995
compactness2	0.513*	0.757
Volume diameter	1.000	1.000
Spherical disproportion	0.928	0.922
Sphericity	0.290*	0.428*
Surface volume ratio	0.921	0.986
Elongation	1.000	1.000
Entropy (H)	0.999	0.995
Energy	0.999	0.998
Correlation	0.998	0.994
Inverse difference moment normalized	1.000	1.000
Cluster shade	0.655*	0.990
Cluster prominence	0.930	0.851
Cluster tendency	0.971	0.930
Auto correlation	0.999	0.999
Dissimilarity	0.996	0.992
Homogeneity1	0.999	0.999
Homogeneity2	0.990	0.982
Inverse difference normalized	0.992	0.987
Inverse variance	0.999	1.000
Max probability	0.999	0.999
Variance	0.972	0.932
Grey level nonuniformity	1.000	1.000
Run length nonuniformity	1.000	1.000
Low grey level run emphasis	1.000	1.000
High grey level run emphasis	0.999	0.999
Short run low grey level emphasis	1.000	1.000
Short run high grey level emphasis	0.999	0.999
Long run low grey level emphasis	1.000	1.000
Long run high grey level emphasis	0.999	0.999

\*, ICC <0.750. Gd-EOB-DTPA, gadolinium-ethoxybenzyl diethylenetriamine pentaacetic acid; MRI, magnetic resonance imaging.

**Table S3** The differences of clinical parameters and Gd-EOB-DTPA-enhanced MRI radiomic features based on arterial phase and hepatobiliary phase between low-grade and high-grade tumors

Clinical parameters and radiomic features	P value (arterial phase)	P value (hepatobiliary phase)
AFP	<0.001*	<0.001*
CEA	0.850	0.850
CA19-9	0.448	0.448
ALT	0.419	0.419
AST	0.020*	0.020*
Mean	<0.001*	<0.001*
Standard deviation	<0.001*	0.001*
Max frequency	0.008*	0.003*
Mode	<0.001*	<0.001*
Minimum	<0.001*	<0.001*
Maximum	<0.001*	<0.001*
The 5th percentile	<0.001*	<0.001*
The 10th percentile	<0.001*	<0.001*
The 25th percentile	<0.001*	<0.001*
The 50th percentile	<0.001*	<0.001*
The 75th percentile	<0.001*	<0.001*
The 90th percentile	<0.001*	<0.001*
Skewness	0.003*	0.234
Kurtosis	0.017*	0.852
Entropy	<0.001*	0.001*
AUC low	/	0.025*
S-sDlowest	0.001*	<0.001*
S-sDav distribution width	<0.001*	0.117
Histogram width	<0.001*	0.001*
Area	0.256	0.044*
Volume	0.410	0.058
Surface area	0.280	0.023*
compactness1	0.497	0.120
compactness2	/	0.027*
Volume diameter	0.195	0.019*
Spherical disproportion	0.162	0.415
Sphericity	/	/
Surface volume ratio	0.542	0.210
Elongation	0.233	0.040*
Entropy (H)	<0.001*	<0.001*
Energy	<0.001*	<0.001*
Correlation	<0.001*	<0.001*
Inverse difference moment normalized	<0.001*	<0.001*
Cluster shade	0.076	0.010*
Cluster prominence	<0.001*	<0.001*
Cluster tendency	<0.001*	<0.001*
Auto correlation	<0.001*	<0.001*
Dissimilarity	<0.001*	<0.001*
Homogeneity1	<0.001*	<0.001*
Homogeneity2	<0.001*	<0.001*
Inverse difference normalized	0.003*	0.001*
Inverse variance	<0.001*	<0.001*
Max probability	<0.001*	<0.001*
Variance	<0.001*	<0.001*
Grey level nonuniformity	0.005*	0.002*
Run length nonuniformity	0.446	0.068
Low grey level run emphasis	<0.001*	<0.001*
High grey level run emphasis	<0.001*	<0.001*
Short run low grey level emphasis	<0.001*	<0.001*
Short run high grey level emphasis	<0.001*	<0.001*
Long run low grey level emphasis	<0.001*	<0.001*
Long run high grey level emphasis	<0.001*	<0.001*

/, intraclass correlation coefficients <0.750; \*, P<0.05. Gd-EOB-DTPA, gadolinium-ethoxybenzyl diethylenetriamine pentaacetic acid; MRI, magnetic resonance imaging; AFP, alpha fetoprotein; CEA, carcinoembryonic antigen; CA19-9, carbohydrate antigen 19-9; ALT, alanine aminotransferase; AST, aspartate transaminase.



**Figure S1** Decision tree of selecting clinical parameters and MRI radiomic features for the arterial phase (A), hepatobiliary phase (B), and combined arterial and hepatobiliary phase prediction models (C).

## Supplement I

Standard deviation:

$$\text{standard\_deviation} = \left\{ \frac{1}{N-1} \sum_{i=1}^N [X(i) - \bar{X}]^2 \right\}^{\frac{1}{2}}$$

Maximum:

The maximum gray value  
maximum = max (X)

Entropy:

$$\text{entropy} = \sum_{i=1}^{N_i} p(i) \log_2 p(i)$$

S-sDav distribution width:

Histogram width at one-half peak of the gray value histogram

Inverse variance:

$$\text{inverse\_variance} = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{P(i, j)}{|i-j|^2}, i \neq j$$

Max frequency:

The maximum frequency of gray values

Mode:

Gray value of the highest peak of gray histogram

Minimum:

The minimum gray value  
minimum = min (X)

The 10th percentile:

The gray value is at 10%, when the gray value is arranged from small to large.

S-sDlowest:

The gray value of the first frequency digit 5 that appears along the positive direction of the x-axis

AUC low:

After removing the highest and lowest 1% gray value, the proportion of gray value lower than 25% gray value

Compactness2:

$$\text{compactness}_2 = 36\pi \frac{V_2}{A^3}$$

Inverse difference normalized (IDN):

$$\text{IDN} = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{P(i, j)}{1 + \left( \frac{|i-j|}{N} \right)}$$

Energy:

$$\text{energy} = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} [P(i, j)]^2$$

Inverse Difference Moment Normalized (IDMN):

$$\text{IDMN} = \sum_{i=1}^{N_g} \sum_{j=1}^{N_g} \frac{P(i, j)}{1 + \left( \frac{|i-j|^2}{N^2} \right)}$$