Can the CT texture analysis of colorectal liver metastases predict the response to first-line cytotoxic chemotherapy?

SUPPLEMENTARY TABLES

Supplementary Table 1 Univariable associations of response with radiomic features coded as pseudo-continuous variables (1st tertile equal to 1; 2nd tertile equal to 2; 3rd tertile equal to 3) ordered by *P* value.

	OR (95%CI)	*P value*
Minimum histogram gradient intensity	3.82 (1.26 to 15.3)	*0.02*
Discretised intensity skewness	0.33 (0.11 to 0.86)	*0.02*
Long run low grey level emphasis	3.01 (1.16 to 9.26)	*0.02*
Low grey level count emphasis	3.01 (1.16 to 9.26)	*0.02*
Low grey level run emphasis	3.01 (1.16 to 9.26)	*0.02*
Skewness	0.33 (0.11 to 0.86)	*0.02*
Volume at intensity fraction 10%	0.33 (0.11 to 0.86)	*0.02*
Short run low grey level emphasis	2.83 (1.08 to 8.81)	*0.03*
Dependence count energy	0.38 (0.12 to 1.02)	*0.06*
Cluster prominence	2.34 (0.94 to 6.61)	*0.07*
Cluster shade	0.43 (0.15 to 1.07)	*0.07*
Dependence count entropy	2.34 (0.94 to 6.61)	*0.07*
High dependence low grey level emphasis	2.34 (0.94 to 6.61)	*0.07*
90th discretised intensity percentile	0.46 (0.17 to 1.11)	*0.09*
High dependence high grey level emphasis	2.01 (0.84 to 5.34)	*0.12*
Run percentage	0.50 (0.19 to 1.20)	*0.12*
Normalised homogeneity	2.03 (0.78 to 5.91)	*0.15*
Normalized dependence count non uniformity	0.50 (0.17 to 1.30)	*0.16*
Normalised inverse difference	1.88 (0.77 to 5.06)	*0.17*
10th discretised intensity percentile	0.54 (0.20 to 1.31)	*0.18*
Area cm²	1.86 (0.76 to 4.95)	*0.18*
Complexity	0.54 (0.20 to 1.31)	*0.18*
Contrast GLCM	0.54 (0.20 to 1.31)	*0.18*
Contrast NGTDM	0.54 (0.20 to 1.31)	*0.18*
Correlation	1.86 (0.76 to 4.95)	*0.18*
Difference average	0.54 (0.20 to 1.31)	*0.18*
Difference entropy	0.54 (0.20 to 1.31)	*0.18*
Dissimilarity	0.54 (0.20 to 1.31)	*0.18*
Global intensity peak	0.54 (0.20 to 1.31)	*0.18*
Grey level non uniformity GLRLM	1.86 (0.76 to 4.95)	*0.18*

Grey level non uniformity NGLDM	1.86 (0.76 to 4.95)	*0.18*
High dependence emphasis	1.86 (0.76 to 4.95)	*0.18*
Information correlation 1	0.54 (0.20 to 1.31)	*0.18*
Information correlation 2	1.86 (0.76 to 4.95)	*0.18*
Integrated intensity	1.86 (0.76 to 4.95)	*0.18*
Intensity based energy	1.86 (0.76 to 4.95)	*0.18*
Inverse variance	1.86 (0.76 to 4.95)	*0.18*
Large distance low grey level emphasis	1.86 (0.76 to 4.95)	*0.18*
Large zone emphasis	1.86 (0.76 to 4.95)	*0.18*
Large zone high grey level emphasis	1.86 (0.76 to 4.95)	*0.18*
Least axis length cm	1.86 (0.76 to 4.95)	*0.18*
Low dependence emphasis	0.54 (0.20 to 1.31)	*0.18*
Low dependence high grey level emphasis	0.54 (0.20 to 1.31)	*0.18*
Low grey level zone emphasis GLDZM	1.86 (0.76 to 4.95)	*0.18*
Low grey level zone emphasis GLSZM	1.86 (0.76 to 4.95)	*0.18*
Normalised run length non uniformity	0.54 (0.20 to 1.31)	*0.18*
Normalised zone size non uniformity	0.54 (0.20 to 1.31)	*0.18*
Number of voxels	1.86 (0.76 to 4.95)	*0.18*
Number of voxels of positive value	1.86 (0.76 to 4.95)	*0.18*
RECIST cm	1.86 (0.76 to 4.95)	*0.18*
Run length non uniformity	1.86 (0.76 to 4.95)	*0.18*
Short run emphasis	0.54 (0.20 to 1.31)	*0.18*
Short run high grey level emphasis	0.54 (0.20 to 1.31)	*0.18*
Small zone emphasis	0.54 (0.20 to 1.31)	*0.18*
Volume at intensity fraction 90%	0.54 (0.20 to 1.31)	*0.18*
Volume cm³	1.86 (0.76 to 4.95)	*0.18*
Volume computed from mask cm³	1.86 (0.76 to 4.95)	*0.18*
Volume density aligned bounding box	0.54 (0.20 to 1.31)	*0.18*
Volume of the positive part cm³	1.86 (0.76 to 4.95)	*0.18*
Zone size variance	1.86 (0.76 to 4.95)	*0.18*
Long run emphasis	1.77 (0.76 to 4.47)	*0.19*
Homogeneity	1.72 (0.69 to 4.65)	*0.24*
Small distance emphasis	0.58 (0.22 to 1.46)	*0.25*
Zone distance entropy	1.52 (0.62 to 3.90)	*0.36*
Busyness	1.50 (0.62 to 3.83)	*0.37*
Cluster tendency	1.50 (0.62 to 3.83)	*0.37*
Coarseness	0.67 (0.26 to 1.61)	*0.37*
Dependence count non uniformity	1.50 (0.62 to 3.83)	*0.37*
Dependence count variance	1.50 (0.62 to 3.83)	*0.37*
Difference variance	0.67 (0.26 to 1.61)	*0.37*
Discretised interquartile range	0.67 (0.26 to 1.61)	*0.37*
Flatness	1.50 (0.62 to 3.83)	*0.37*
Grey level non uniformity GLDZM	1.50 (0.62 to 3.83)	*0.37*
Grey level non uniformity GLSZM	1.50 (0.62 to 3.83)	*0.37*

High grey level zone emphasis GLDZM	0.67 (0.26 to 1.61)	*0.37*
High grey level zone emphasis GLSZM	0.67 (0.26 to 1.61)	*0.37*
Intensity histogram coefficient of variation	1.50 (0.62 to 3.83)	*0.37*
Inverse difference	1.50 (0.62 to 3.83)	*0.37*
Joint Entropy	0.67 (0.26 to 1.61)	*0.37*
Joint average	0.67 (0.26 to 1.61)	*0.37*
Large zone low grey level emphasis	1.50 (0.62 to 3.83)	*0.37*
Major axis length cm	1.50 (0.62 to 3.83)	*0.37*
Maximum 3D diameter cm	1.50 (0.62 to 3.83)	*0.37*
Minimum histogram gradient	0.67 (0.26 to 1.61)	*0.37*
Normalised grey level non uniformity GLRLM	1.50 (0.62 to 3.83)	*0.37*
Normalised zone distance non uniformity	0.67 (0.26 to 1.61)	*0.37*
Small distance high grey level emphasis	0.67 (0.26 to 1.61)	*0.37*
Small zone high grey level emphasis	0.67 (0.26 to 1.61)	*0.37*
Strength	0.67 (0.26 to 1.61)	*0.37*
Sum average	0.67 (0.26 to 1.61)	*0.37*
Sum entropy	1.50 (0.62 to 3.83)	*0.37*
Sum variance	1.50 (0.62 to 3.83)	*0.37*
Surface to volume ratio	0.67 (0.26 to 1.61)	*0.37*
Zone distance non uniformity	1.50 (0.62 to 3.83)	*0.37*
Zone percentage GLDZM	0.67 (0.26 to 1.61)	*0.37*
Zone percentage GLSZM	0.67 (0.26 to 1.61)	*0.37*
Zone size entropy	1.50 (0.62 to 3.83)	*0.37*
Zone size non uniformity	1.50 (0.62 to 3.83)	*0.37*
Number of compartments	1.57 (0.46 to 5.81)	*0.47*
Run length variance	1.40 (0.56 to 3.67)	*0.47*
Uniformity	1.38 (0.56 to 3.58)	*0.48*
Volume density oriented bounding box	1.38 (0.56 to 3.58)	*0.48*
Number of grey levels	0.73 (0.28 to 1.80)	*0.49*
Area density enclosing ellipsoid	1.26 (0.53 to 3.14)	*0.60*
Maximum histogram gradient intensity	1.27 (0.51 to 3.28)	*0.61*
10th intensity percentile	0.82 (0.33 to 1.98)	*0.65*
90th intensity percentile	0.82 (0.33 to 1.98)	*0.65*
Area under the IVH curve	0.82 (0.33 to 1.98)	*0.65*
Asphericity	1.22 (0.51 to 3.03)	*0.65*
Compactness 1	0.82 (0.33 to 1.98)	*0.65*
Compactness 2	0.82 (0.33 to 1.98)	*0.65*
Discretised intensity kurtosis	1.22 (0.51 to 3.03)	*0.65*
Discretised intensity variance	1.22 (0.51 to 3.03)	*0.65*
Entropy	1.22 (0.51 to 3.03)	*0.65*
Grey level variance NGLDM	1.22 (0.51 to 3.03)	*0.65*
Intensity histogram median absolute deviation	0.82 (0.33 to 1.98)	*0.65*
Intensity histogram quartile coefficient of dispersion	0.82 (0.33 to 1.98)	*0.65*
Intensity histogram robust mean absolute deviation	0.82 (0.33 to 1.98)	*0.65*

Intensity based coefficient of variation	1.22 (0.51 to 3.03)	*0.65*
Joint maximum	1.22 (0.51 to 3.03)	*0.65*
Kurtosis	1.22 (0.51 to 3.03)	*0.65*
Large distance emphasis	1.22 (0.51 to 3.03)	*0.65*
Local intensity peak	0.82 (0.33 to 1.98)	*0.65*
Max value	1.22 (0.51 to 3.03)	*0.65*
Maximum histogram gradient	1.22 (0.51 to 3.03)	*0.65*
Minor axis length cm	1.22 (0.51 to 3.03)	*0.65*
Quartile coefficient of dispersion	1.22 (0.51 to 3.03)	*0.65*
Small zone low grey level emphasis	0.82 (0.33 to 1.98)	*0.65*
Sphericity	0.82 (0.33 to 1.98)	*0.65*
Standard deviation	1.22 (0.51 to 3.03)	*0.65*
Variance	1.22 (0.51 to 3.03)	*0.65*
Volume fraction difference between intensity fractions	1.22 (0.51 to 3.03)	*0.65*
Zone distance variance	1.22 (0.51 to 3.03)	*0.65*
Area density convex hull	1.21 (0.52 to 2.88)	*0.66*
Area density oriented bounding box	1.21 (0.52 to 2.88)	*0.66*
Autocorrelation	0.84 (0.35 to 1.95)	*0.68*
High grey level count emphasis	0.84 (0.35 to 1.95)	*0.68*
High grey level run emphasis	0.84 (0.35 to 1.95)	*0.68*
Spherical disproportion	1.13 (0.45 to 2.87)	*0.80*
Intensity range	1.12 (0.45 to 2.81)	*0.81*
Run entropy	1.12 (0.45 to 2.81)	*0.81*
Volume density enclosing ellipsoid	1.12 (0.45 to 2.81)	*0.81*
Discretised intensity standard deviation	1.10 (0.46 to 2.65)	*0.82*
Discretised intensity uniformity	1.10 (0.46 to 2.65)	*0.82*
Grey level variance GLRLM	1.10 (0.46 to 2.65)	*0.82*
Intensity based mean absolute deviation	1.10 (0.46 to 2.65)	*0.82*
Intensity based median absolute deviation	1.10 (0.46 to 2.65)	*0.82*
Normalised grey level non uniformity NGLDM	1.10 (0.46 to 2.65)	*0.82*
Small distance low grey level emphasis	0.90 (0.36 to 2.24)	*0.82*
Intensity histogram mean absolute deviation	0.91 (0.38 to 2.17)	*0.83*
Intensity based interquartile range	0.91 (0.38 to 2.17)	*0.83*
Mean discretised intensity	0.92 (0.38 to 2.19)	*0.84*
Discretised intensity entropy	0.92 (0.40 to 2.12)	*0.85*
Intensity histogram mode	1.02 (0.45 to 2.33)	*0.95*
Normalised grey level non uniformity GLDZM	1.01 (0.43 to 2.36)	*0.99*
Normalised grey level non uniformity GLSZM	1.01 (0.43 to 2.36)	*0.99*
Age at appearance	1.00 (0.41 to 2.44)	*1.00*
Angular second moment	1.00 (0.41 to 2.44)	*1.00*
Area density aligned bounding box	1.00 (0.41 to 2.44)	*1.00*
Centre of mass shift cm	1.00 (0.41 to 2.44)	*1.00*
Energy	1.00 (0.41 to 2.44)	*1.00*
Grey level variance GLDZM	1.00 (0.41 to 2.44)	*1.00*

Grey level variance GLSZM	1.00 (0.41 to 2.44)	*1.00*
Intensity at volume fraction 10%	1.00 (0.41 to 2.44)	*1.00*
Intensity at volume fraction 90%	1.00 (0.41 to 2.44)	*1.00*
Intensity fraction difference between volume fractions	1.00 (0.41 to 2.44)	*1.00*
Intensity mean value	1.00 (0.41 to 2.44)	*1.00*
Intensity median value	1.00 (0.41 to 2.44)	*1.00*
Intensity based robust mean absolute deviation	1.00 (0.41 to 2.44)	*1.00*
Inverse elongation	1.00 (0.41 to 2.44)	*1.00*
Joint variance	1.00 (0.41 to 2.44)	*1.00*
Large distance high grey level emphasis	1.00 (0.41 to 2.44)	*1.00*
Long run high grey level emphasis	1.00 (0.41 to 2.44)	*1.00*
Low dependence low grey level emphasis	1.00 (0.41 to 2.44)	*1.00*
Min value	1.00 (0.41 to 2.44)	*1.00*
Quadratic mean	1.00 (0.41 to 2.44)	*1.00*
Thresholded area intensity peak 50	1.00 (0.41 to 2.44)	*1.00*
Thresholded area intensity peak 75	1.00 (0.41 to 2.44)	*1.00*
Volume density convex hull	1.00 (0.41 to 2.44)	*1.00*