

**SUPPLEMENTAL Table 1** Radiomics features ( $n=480$ ) based on the IBSI

Group	Amount	Name	Aggregation methods*
Morphology	22	Volume, approximate volume, surface, surface to volume ratio, compactness 1, compactness 2, spherical disproportion, sphericity, asphericity, center of mass shift, maximum 3D diameter, major axis length, minor axis length, least axis length, elongation, flatness, volume density axis-aligned bounding box, area density axis-aligned bounding box, volume density approximate enclosing ellipsoid, integrated intensity, Moran's I index, Geary's C measure	3D
Local intensity	2	Local intensity peak, global intensity peak	3D
Intensity-based statistics	18	Mean, variance, skewness, kurtosis, median, minimum, 10th percentile, 90th percentile, maximum, Interquartile range, range, Mean absolute deviation, Robust mean absolute deviation, Median absolute deviation, Coefficient of variation, Quartile coefficient, Energy, Root mean square	3D
Intensity-volume histogram	6	Volume at intensity fraction 10, volume at intensity fraction 90, intensity at volume fraction 10, intensity at volume fraction 90, difference volume at intensity fraction, difference intensity at volume fraction	3D
Intensity histogram	24	Mean, variance, skewness, kurtosis, median, minimum, 10th percentile, 90th percentile, maximum, mode, Interquartile range, range, Mean absolute deviation, Robust mean absolute deviation, Median absolute deviation, Coefficient of variation, Quartile coefficient, Entropy, Uniformity, Energy, Maximum histogram gradient, Maximum histogram gradient grey level, Minimum histogram gradient, Minimum histogram gradient grey level	3D
Texture features based on grey level co-occurrence matrix	25x6= 150	Joint maximum, joint average, joint variance, joint entropy, difference, average, difference variance, difference entropy, sum average, sum variance, sum entropy, angular second moment, contrast, dissimilarity, inverse difference, inverse difference normalized, inverse difference moment, inverse difference moment normalized, inverse variance, Correlation, autocorrelation, cluster tendency, cluster shade, cluster prominence, first measure of information correlation, second measure of information correlation	2Davg 2DDmrg 2DWmrg 2Dvmrg 3Davg 3DWmrg
Texture features based on grey level run length matrix	16x6= 96	Short run emphasis, long run emphasis, 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, Grey level non uniformity, Grey level non uniformity normalized, Run length non uniformity, Run length non uniformity normalized, Run percentage, Grey level variance, Run length variance, Run entropy	2Davg 2DDmrg 2DWmrg 2Dvmrg 3Davg 3DWmrg
Texture features based on grey level size zone matrix	16x3= 48	Small zone emphasis, Large zone emphasis, Low grey level zone emphasis, High grey level zone emphasis, Small zone low grey level emphasis, Small zone high grey level emphasis, Large zone low grey level emphasis, Large zone high grey level emphasis, Grey level non uniformity, Grey level non uniformity normalized, Zone size non uniformity, Zone size non uniformity normalized, Zone percentage, Grey level variance, Zone size variance, Zone size entropy	2Davg 2Dvmrg 3D
Texture features based on grey level distance zone matrix	16x3= 48	Small distance emphasis, Large distance emphasis, Low grey level zone emphasis, High grey level zone emphasis, Small distance low grey level emphasis, Small distance high grey level emphasis, Large distance low grey level emphasis, Large distance high grey level emphasis, Grey level non uniformity, Grey level non uniformity normalized, Zone distance non uniformity, Zone distance non uniformity normalized, Zone percentage, Grey level variance, Zone distance variance, Zone	2Davg 2Dvmrg 3D

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		distance entropy	
Texture features based on neighborhood grey tone difference based matrix	5x3= 15	Coarseness, contrast, busyness, complexity, strength	2Davg 2Dvmrg 3D
Texture features based on neighboring grey level dependence based features	17x3= 51	Low dependence emphasis, High dependence emphasis, Low grey level count emphasis, High grey level count emphasis, Low dependence low grey level emphasis, Low dependence high grey level emphasis, High dependence low grey level emphasis, High dependence high grey level emphasis, Grey level non uniformity, Grey level non uniformity normalized, Dependence count non uniformity, Dependence count non uniformity normalized, Dependence count percentage, Grey level variance, Dependence count variance, Dependence count entropy, dependence Count Energy	2Davg 2Dvmrg 3D

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\* 2D = averaged over slices

2Davg = averaged over slices and directions

2DDmrg = per slice and merged by direction

2Dvmrg = merged over all slices

2Dwmrg = per slice with full merging

3D = a single 3D volume matrix

3Davg = averaged over 3D volume directions

3Dwmrg = 3D volume with full merging

**SUPPLEMENTAL TABLE 2** Conventional PET features and BRAFV600 mutation association per organ region

	<b>BRAFV600</b> <i>n</i> =35 100 lesions	<b>BRAF wild-type</b> <i>n</i> =35 79 lesions	<i>p</i> -value
<b>Lymph nodes</b>	37 lesions	32 lesions	
SUV <sub>max</sub>	15.2 (6.4)	19.8 (13.7)	0.734
SUV <sub>peak</sub>	15.2 (6.4)	19.8 (13.7)	0.912
SUV <sub>mean</sub>	10.1 (4.2)	13.2 (9.1)	0.686
TLG <sub>target</sub> †	179.5 (283.2)	178.5 (219.0)	0.517
<b>Lung</b>	5 lesions	13 lesions	
SUV <sub>max</sub>	10.7 (3.7)	10.2 (6.0)	0.959
SUV <sub>peak</sub>	8.3 (3.0)	7.9 (4.5)	0.926
SUV <sub>mean</sub>	7.1 (2.6)	6.9 (4.1)	0.903
TLG <sub>target</sub> †	187.8 (339.6)	33.5 (30.9)	0.232
<b>Liver</b>	17 lesions	10 lesions	
SUV <sub>max</sub>	12.1 (3.0)	14.2 (12.6)	0.661
SUV <sub>peak</sub>	10.0 (2.7)	12.2 (10.9)	0.530
SUV <sub>mean</sub>	8.1 (2.0)	9.7 (9.1)	0.656
TLG <sub>target</sub> †	250.4 (500.0)	236.2 (223.9)	0.339
<b>Bone</b>	13 lesions	6 lesions	
SUV <sub>max</sub>	11.2 (3.6)	10.5 (2.2)	0.927
SUV <sub>peak</sub>	9.2 (2.9)	8.1 (1.7)	0.708
SUV <sub>mean</sub>	7.7 (2.5)	6.6 (1.4)	0.613
TLG <sub>target</sub> †	53.9 (34.3)	57.7 (55.7)	0.717
<b>Subcutaneous</b>	11 lesions	8 lesions	
SUV <sub>max</sub>	13.8 (4.2)	11.7 (5.7)	0.274
SUV <sub>peak</sub>	10.6 (3.7)	8.1 (3.6)	0.202
SUV <sub>mean</sub>	9.2 (2.8)	7.7 (3.7)	0.248
TLG <sub>target</sub> †	200.9 (517.8)	23.9 (15.1)	0.116
<b>Other‡</b>	15 lesions	10 lesions	
SUV <sub>max</sub>	13.2 (6.2)	12.6 (8.1)	0.981
SUV <sub>peak</sub>	11.1 (5.7)	9.8 (7.0)	0.853
SUV <sub>mean</sub>	8.7 (4.1)	8.5 (5.7)	0.951
TLG <sub>target</sub> †	285.6 (406.6)	93.6 (156.0)	0.275

Displayed as mean (standard deviation)

†TLG<sub>target</sub>: TLG based on target lesions only

‡Lesions in (*n*=amount of lesions): adrenal glands (*n*=8), peritoneum (*n*=6), pancreas (*n*=2), gall bladder (*n*=1), stomach (*n*=1), intestine (*n*=2), anal canal (*n*=1), intra-orbital (*n*=1), seminal vesicle (*n*=1) and spleen (*n*=2).

No analysis was performed for intramuscular lesions (2 lesions only)

**SUPPLEMENTAL TABLE 3A** Conventional PET features binary logistic regression

<b>Selected feature name</b>	<b><i>p</i>-value</b>
SUV <sub>max</sub>	0.179
SUV <sub>peak</sub>	0.154
SUV <sub>mean</sub>	0.963
TLG <sub>target</sub>	0.037
MATV	0.053

**SUPPLEMENTAL TABLE 3B** Method 1 binary logistic regression

<b>Selected feature name</b>	<b><i>p</i>-value</b>
asphericity	0.669
center of mass shift	0.966
elongation	0.484
flatness	0.533
area density AABB	0.935
volume density AEE	0.500
Moran's I	0.991
Geary's C	0.758
stat kurtosis	0.065
stat Coefficient of variation	0.747
volume at intensity fraction 90	0.619
difference volume at intensity fraction	0.183
IH mode	0.724
IH Coefficient of variation	0.024
IH Quartile coefficient	0.090
GLCM 2Davg correlation	0.870
GLCM 2Davg cluster shade	0.358
GLCM 2DDmrg first measure of information correlation	0.114
GLCM 2Dmrg first measure of information correlation	0.605
GLCM 2Dvmrg correlation	0.902
GLCM 2Dvmrg cluster shade	0.108
GLCM 2Dvmrg first measure of information correlation	0.734
GLDZM 2Davg Grey level variance	0.119

**SUPPLEMENTAL TABLE 3C** Method 2 binary logistic regression

<b>Selected feature name</b>	<b><i>p</i>-value</b>
GLCM 2Davg cluster shade	0.551
GLCM 2DD mrg first measure of information correlation	0.534
GLCM 2Dvmrg second measure of information correlation	0.745
difference volume at intensity fraction	0.384
IH mode	0.738
center of mass shift	0.510
GLCM 2Dvmrg cluster shade	0.397
stat kurtosis	0.049
elongation	0.424
stat Quartile coefficient	0.286
Geary's C	0.865
GLDZM 2Davg Grey level variance	0.206
flatness	0.361
GLCM 2Dmrg first measure of information correlation	0.824
volume at intensity fraction 90	0.622
GLCM 2Dvmrg first measure of information correlation	0.642
IH Quartile coefficient	0.128
area density AABB	0.867
Moran's I	0.536
volume density AEE	0.958
IH Coefficient of variation	0.035
ngldm 2Davg dependence Count Energy	0.848
sphericity	0.555
GLDZM 2Dmrg small distance emphasis	0.129
SUV peak	0.515
Volume50	0.343

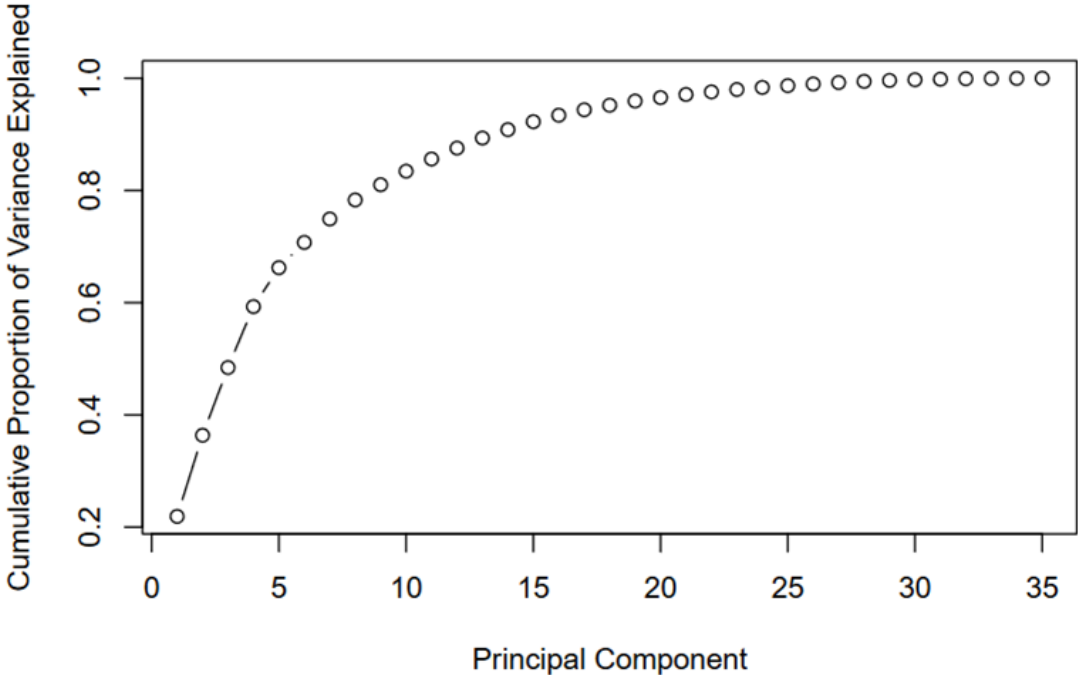
**SUPPLEMENTAL TABLE 3D** Method 3 binary logistic regression

<b>Selected feature name</b>	<b><i>p</i>-value</b>
stat Quartile coefficient	0.102
GLCM 2Dvmrg first measure of information correlation	0.025
GLCM 2Dvmrg second measure of information correlation	0.599
GLCM 3DWmrg first measure of information correlation	0.217
IH skewness	0.308
GLCM 2Davg cluster shade	0.558
GLCM 2Davg correlation	0.571
IH Coefficient of variation	0.255
asphericity	0.274
stat Coefficient of variation	0.090
Surface to volume ratio	0.035
GLCM 2DDmrg second measure of information correlation	0.030
GLCM 2Dvmrg cluster shade	0.674
GLCM 2DDmrg first measure of information correlation	0.008
GLCM 2Dvmrg correlation	0.013
Maximum histogram gradient grey level	0.674
stat kurtosis	0.029
ngtdm 2Davg coarseness	0.444
Moran's I	0.404
flatness	0.603

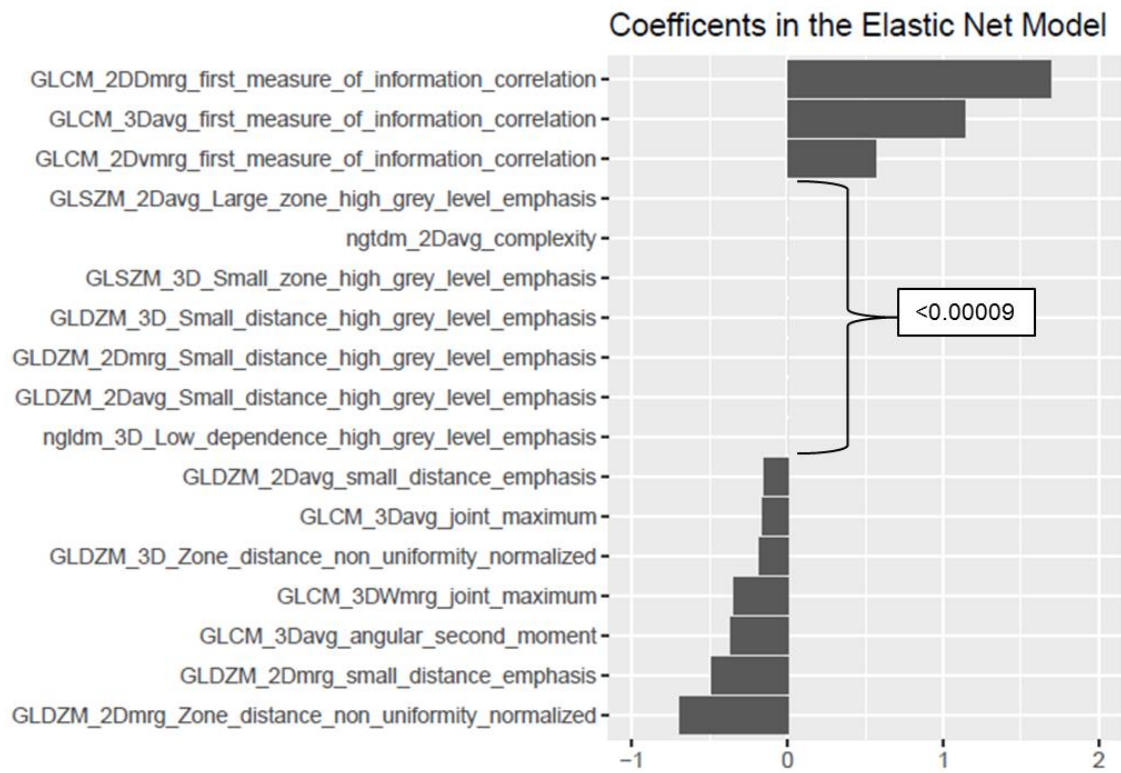
**SUPPLEMENTAL TABLE 3E** Method 4 binary logistic regression

<b>Selected feature name</b>	<b><i>p</i>-value</b>
IH Entropy	0.562
GLCM 2Davg joint entropy	0.055
GLCM 2Davg inverse difference moment	0.200
GLCM 3Davg inverse difference moment normalized	0.340
GLCM 2Davg difference entropy	0.344
GLCM 2Davg sum average	0.894
GLCM 2Davg sum entropy	0.194
GLRLM 2Davg High grey level run emphasis	0.665
GLRLM 2Davg short run emphasis	0.214
GLSZM 2Dvmrg Zone percentage	0.446

Supplemental Figure 1 PCA: % data variance explained by  $n$  principal components



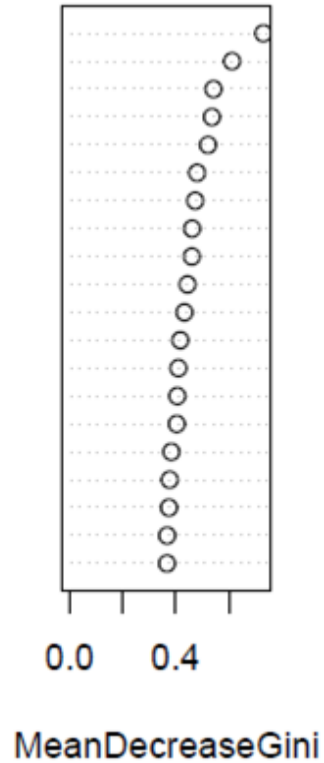
Supplemental Figure 2 Method 5 selected most influential features





**Supplemental Figure 3** Method 6 most influential features\*

Moran's I  
 GLDZM 3D Zone distance non uniformity normalized  
 GLDZM 2Davg Large distance emphasis  
 GLDZM 3D small distance emphasis  
 GLDZM 2Dmrg Large distance emphasis  
 GLCM 2DDmrg first measure of information correlation  
 GLDZM 2Dmrg Zone distance non uniformity normalized  
 ngtdm 2Dmrg busyness  
 center of mass shift  
 ngtdm 3D contrast  
 GLDZM 2Dmrg small distance emphasis  
 GLCM 3Davg second measure of information correlation  
 ngtdm 3D strength  
 IH kurtosis  
 ngtdm 2Dmrg strength  
 stat skewness  
 stat Quartile coefficient  
 GLDZM 2Davg Zone distance variance  
 GLCM 2DDmrg second measure of information correlation  
 ngtdm 3D busyness



\*Features listed from most influential to least influential – first twenty most influential listed