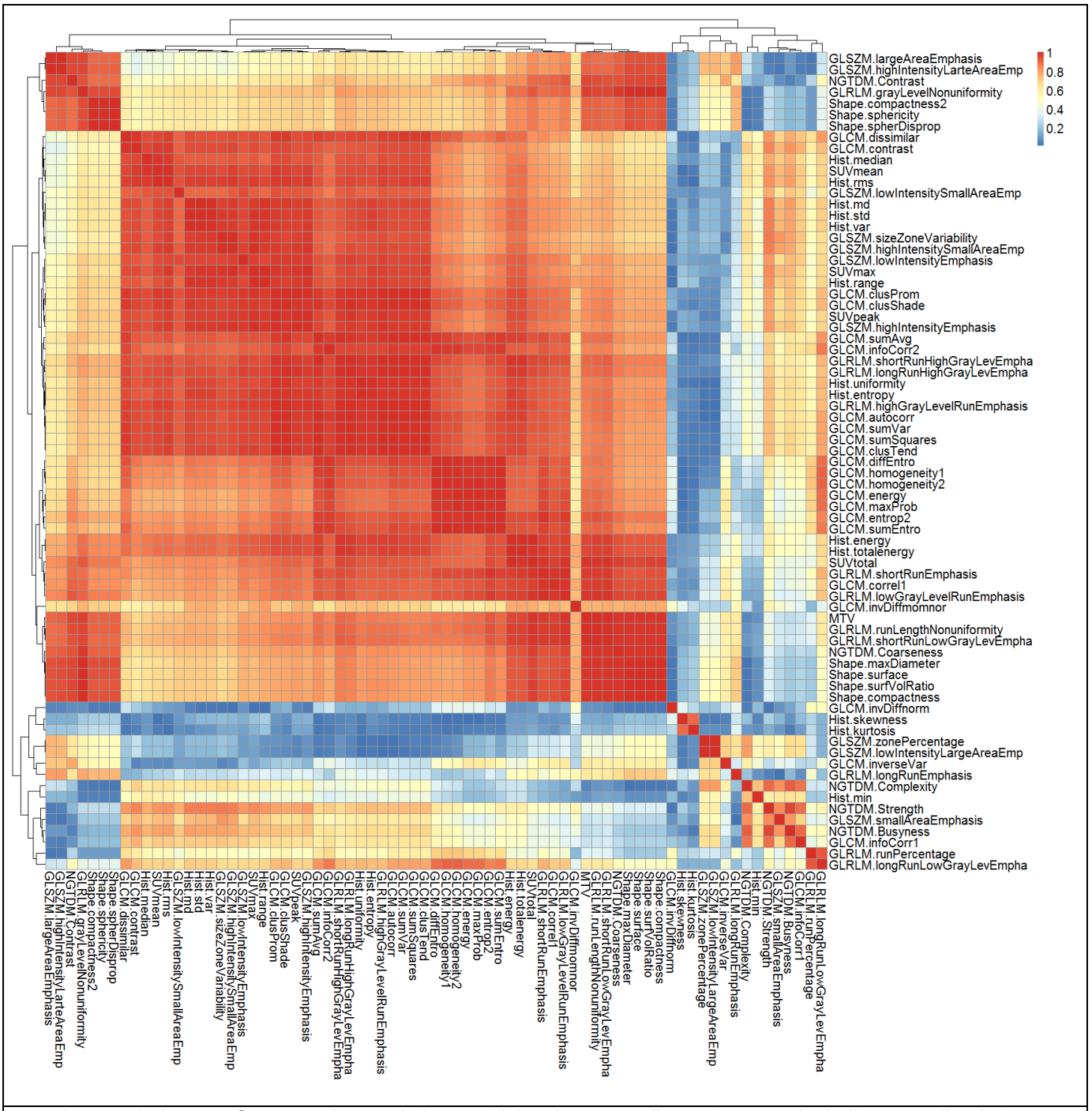
Supplemental Table 1. Features derived from PET images

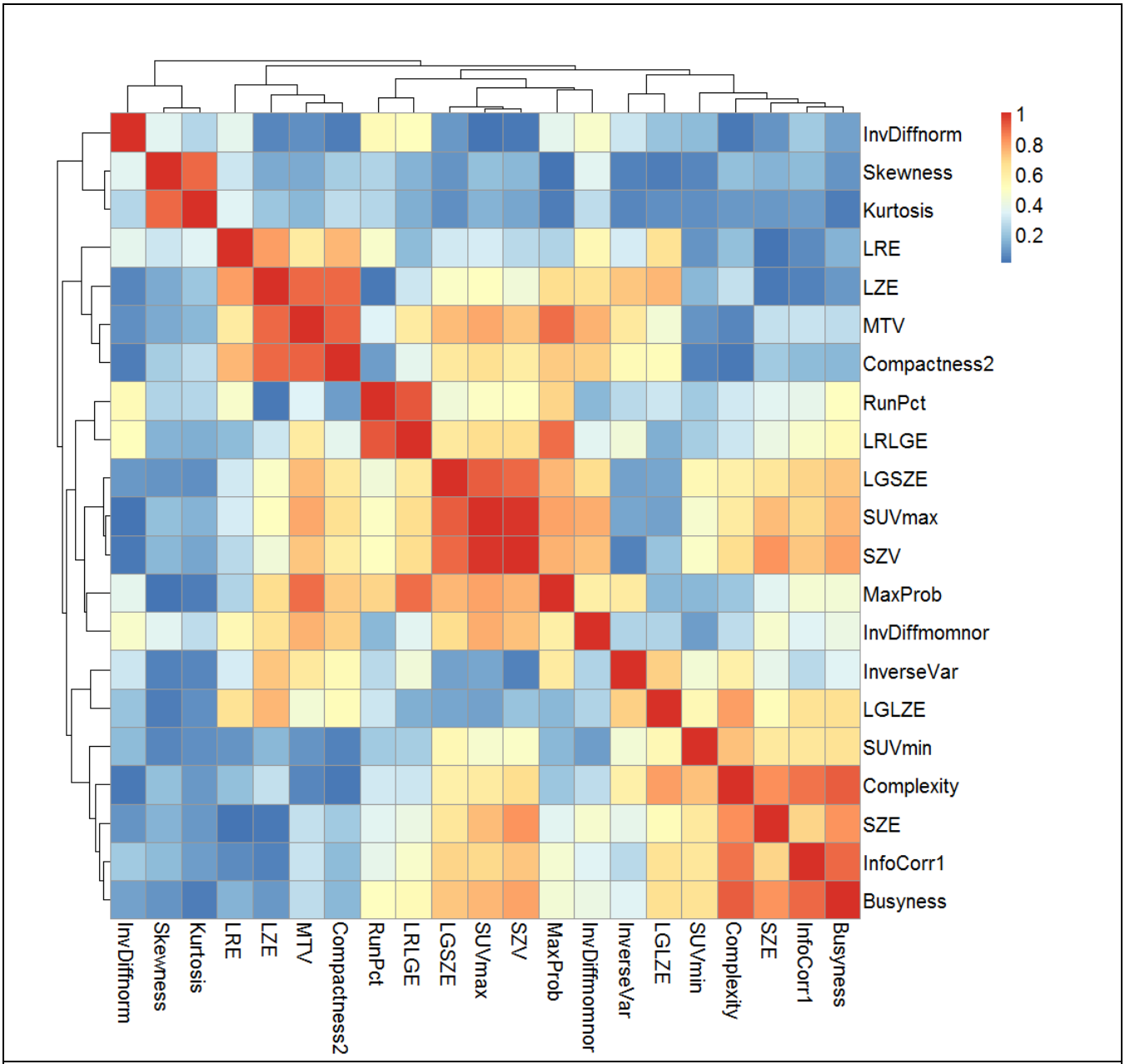
Type	Features
5 Conventional SUV measures	Metabolic Tumor Volume (MTV)
	SUVmax
	SUVmean
	SUVpeak
	SUVtotal (or Total glycolysis lesion)
7 Shape	Maximum Diameter (Dmax)
	Surface Area (SA)
	Surface to Volume Ratio (SVR)
	Sphericity
	Spherical Disproportion
	Compactness × 2
13 Histogram	Minimum
(Hist)	Range
	Standard Deviation (STD)
	Variance
	Median
	Skewness
	Kurtosis
	Entropy
	Uniformity
	Energy
	Root Mean Square (RMS)
	Total Energy
	Mean Absolute Deviation (MAD)
22 Gray Level Cooccurrence Matrix	Autocorrelation
(GLCM)	Contrast
	Correlation
	Cluster Prominence
	Cluster Shade
	Dissimilarity
	Energy
	Entropy
	Homogeneity × 2
	Maximum Probability
	Sum of Square
	Sum Average
	Sum Variance
	Sum Entropy
	Difference Entropy
	Information Measure of Correlation × 2
	Normalized Inverse Difference
	Normalized Inverse Difference Moment
	Inverse Variance
	Cluster Tendency
11 Gray Level Run Length Matrix	Short Run Emphasis
(GLRLM)	Long Run Emphasis
	Gray Level Nonuniformity

	Run Length Nonuniformity
	Run Percentage
	Low Gray Level Run Emphasis
	High Gray Level Run Emphasis
	Short Run Low Gray Emphasis
	Short Run High Gray Emphasis
	Long Run Low Gray Emphasis
	Long Run High Gray Emphasis
10 Gray Level Size Zone Matrix	Small Zone Emphasis
(GLSZM)	Large Zone Emphasis
	Size Zone Variability
	Zone Percentage
	Low Gray Zone Emphasis
	High Gray Zone Emphasis
	Low Gray Small Zone Emphasis
	High Gray Small Zone Emphasis
	Low Gray Large Zone Emphasis
	High Gray Large Zone Emphasis
5 Neighborhood Gray Tone Difference Matrix	Coarseness
(NGTDM)	Contrast
	Busyness
	Complexity
	Strength

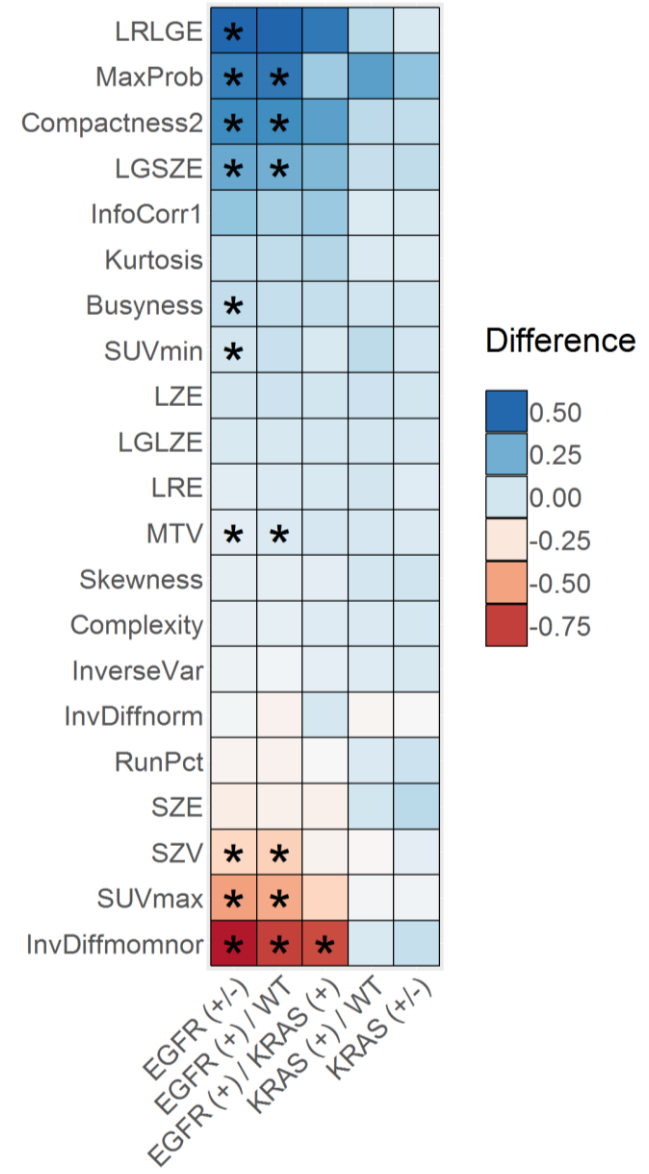
Supplemental Table 1. Five commonly used imaging measures and sixty-eight radiomic features. Gray=image gray level intensity. Compactness and Information Measure of Correlation were computed using two different methods.



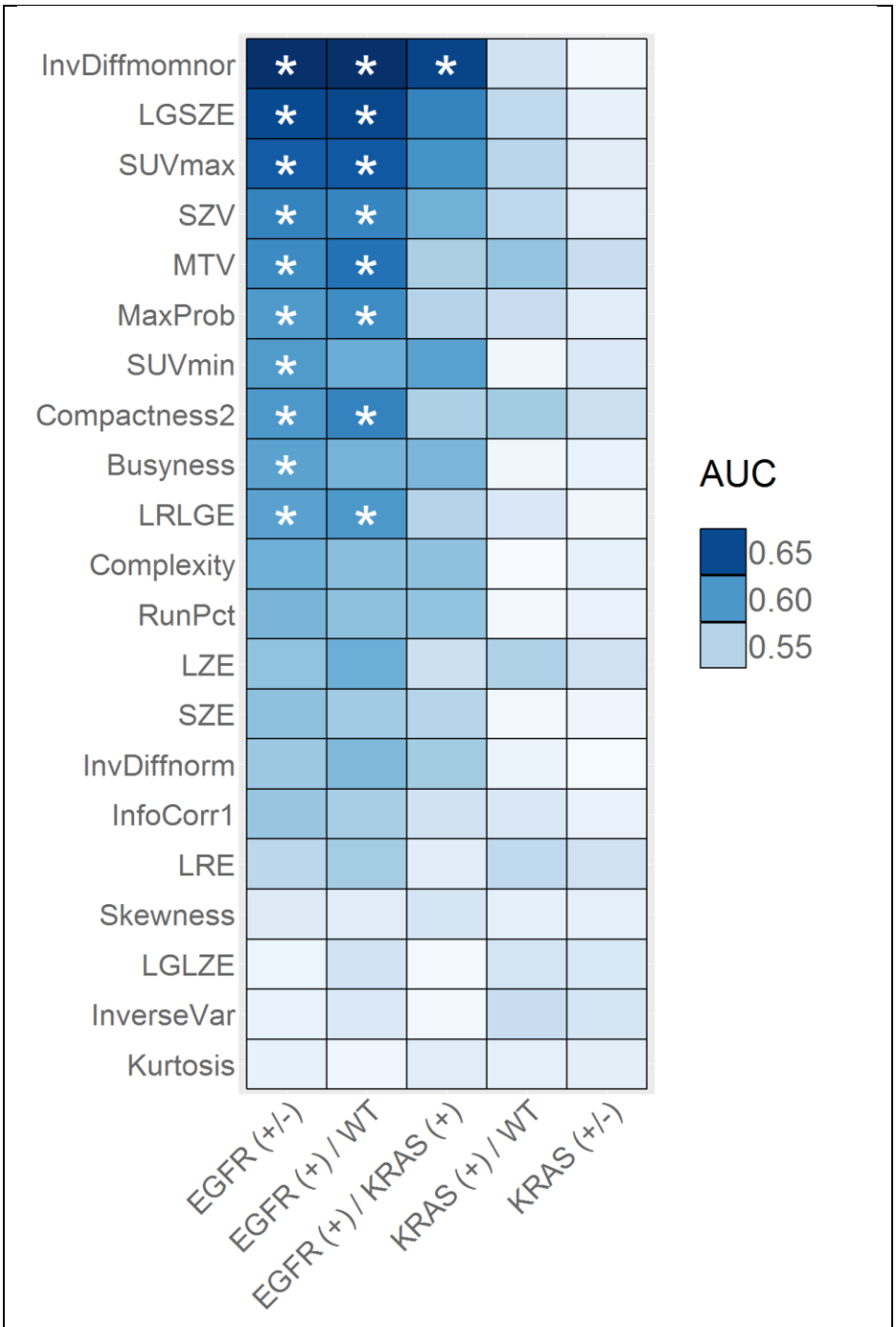
Supplemental Figure 1. Spearman's correlation coefficient between all PET features, including 68 radiomic features and five conventional features.



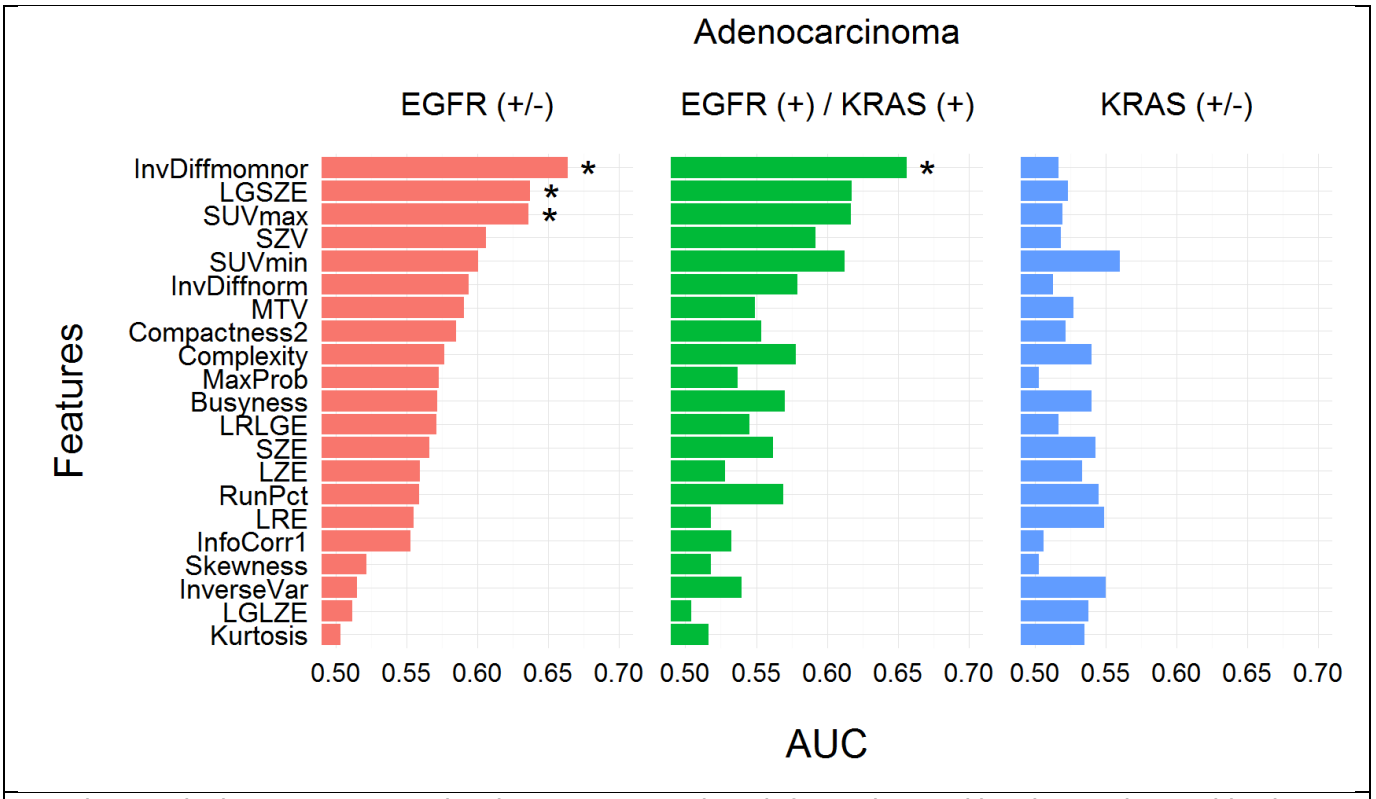
Supplemental Figure 2. Spearman's correlation coefficient between 21 PET features. Conventional features=Metabolic tumor volume (MTV) and SUV_{max}. Shape-based feature = Compactness, Histogram-based features = SUV_{min}, Skewness, Kurtosis, Maximum Probability (MaxProb). GLCM-based features=Information Measure of Correlation (InfoCorr), Normalized Inverse Difference (InvDiffnorm), Normalized Inverse Difference Moment (InvDiffmomnor), Inverse Variance (InverseVar). RLM-based features=Long Run Emphasis (LRE), Run Percentage (Run Percentage), Long Run Low Gray Emphasis (LRLGE). SZM-based features= Small Zone Emphasis (SZE), Large Zone Emphasis (LZE), Size Zone Variability (SZV), Low Gray Small Zone Emphasis (LGSZE), Low Gray Large Zone Emphasis (LGLZE). NGTDM-based features =Busyness and Complexity.



Supplemental Figure 3. Comparison of PET features between mutation statuses. The Wilcoxon rank-sum test was used to determine if there was a significant difference in the PET features. $FDR_{Wilcoxon}<0.10$ is indicated by *. The values of all PET features were normalized using a z-transformation. Entries in the column of EGFR+ vs EGFR–, EGFR+ vs KRAS+, and KRAS+ vs KRAS- represent the difference of the median values of the transformed measures. For example, in column EGFR+ vs EGFR–, the entry values <0 indicates that the median value of the PET feature for EGFR+ is lower than EGFR–.



Supplemental Figure 4. Performance of the PET features in mutation status prediction assessed by the area under the receiver operating curve (AUC). * indicates $FDR_{Noether} \leq 0.10$.



Supplemental Figure 5. Area under the ROC curve (AUC) for patients with adenocarinoma histology. * indicates that the AUC is significantly greater than a random guess (>0.5) assessed with Noether's test ($FDR_{Noether} \leq 0.10$).