Supporting Information

Artificial Intelligence and Radiomics – Fundamentals, Applications, and Challenges in Immunotherapy

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Radiomics Quality Score	
Metric	Point Value
Image Protocol Quality	
Well-documented imaging protocols	1
Used public imaging protocols	1
Multiple Segmentation	
Segmentations by independent radiologists with calculation of an intra-class coefficient or similar metric	1
Phantom Study	
Performed phantom studies on all scanners used	1
Multiple Time Points	
Took images at multiple time points and analyzed feature robustness to temporal variation	1
Feature Reduction	
Performed feature reduction or made adjustments for multiple testing to reduce possibility of overfitting	3
Multivariable Analysis	
Performed multivariable analysis with non-radiomics features	1
Biological Correlate	
Detected and discussed phenotypic implications of radiomic features	1
Cut-Off Analysis	
Performed cut-off analyses and determined risk groups	1
Discrimination Statistics	
Reported discrimination statistics/ statistical significance	1
Applied a resampling method	1
Calibration Statistics	
Reported calibration statistics/ statistical significance	1
Applied a resampling method	1
Prospective Study	
Utilized a prospective cohort	7
Validation	
Used a validation dataset from the same institute as training	2
Used a validation dataset from another institute	3
Used validation datasets from two different institutes	4
Validated a previously published signature	4
Used datasets from three different institutes	5
Gold Standard	
Compared results to the current gold standard method	2
Clinical Utility	
Performed a decision curve analysis	2
Cost Analysis	
Performed a cost-effectiveness analysis	1
Open Science and Data	
Used or published open-source scans	1
Used or published open-source region of interest segmentations	1
Used or published open-source code	1
Used or published open-source radiomic features	1

Table S1

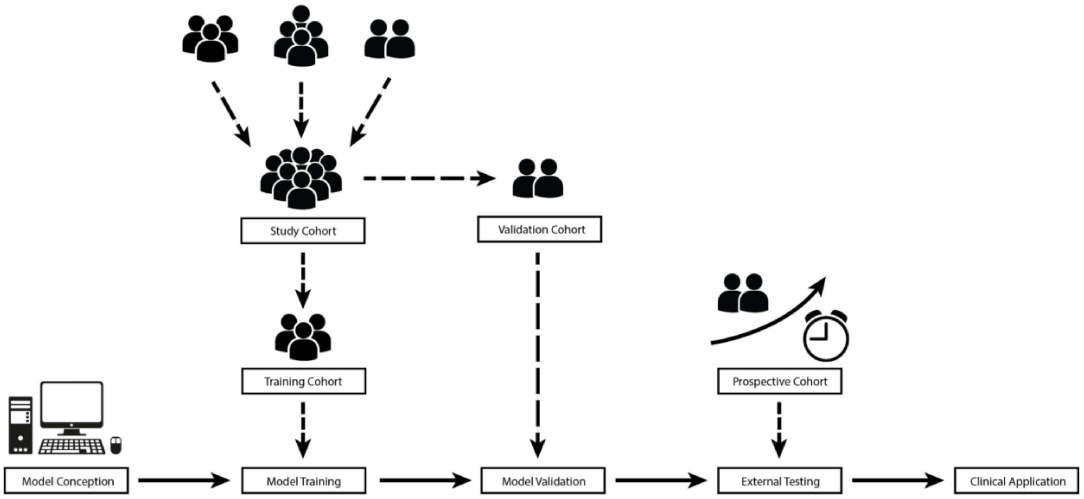

Figure S2: An idealized workflow for radiomics model training, validation, and testing. The gold-standard model development strategy should utilize a multi-center patient population, clearly delineate training and validation sets, and test final model performance on an external, prospective cohort.

Table S3

	Prognosis			Treatment Response			Immune Environment*			Tumor Phenotype+		
	Test Set	Validation Set	Training Set	Test Set	Validation Set	Training Set	Test Set	Validation Set	Training Set	Test Set	Validation Set	Training Set
Individual												
n	4	11	11	5	11	4	3	5	2	1	9	3
mean	0.730	0.777	0.816	0.761	0.830	0.805	0.764	0.767	0.873	0.840	0.831	0.764
median	0.704	0.750	0.821	0.810	0.810	0.804	0.760	0.753	0.873	0.840	0.834	0.750
Combined												
studies		26			20			10			13	
aggregate pts.°		3249			2377			1801			4141	
mean		0.787			0.808			0.787			0.816	
median		0.771			0.810			0.760			0.834	
IQR		0.711 - 0.875			0.785 - 0.860			0.727 - 0.848			0.790 - 0.848	

* Immune Environment (Examining immune cell (e.g. CD8+, CD4+, CD3, T-helper 1/2, B-cells, Natural Killer Cells, among others) infiltration of primary tumor)

+ Tumor Phenotype (Tumor PD-L1 expression or microsatellite instability)

° Aggregate patients from all studies reporting performance of a radiomics model in each category