

Online Table 1: Search strategy

Data Base	Search Terms
Ovid (MEDLINE)	((radiom* or radiog*) and glioma and (IDH or "isocitrate dehydrogenase" or "1p19q" or "1p/19q")).mp. [mP =title, abstract, full text, caption text]
Scopus	TITLE-ABS-KEY ((radiom* OR radiog*) AND glioma AND (IDH OR "isocitrate dehydrogenase" OR "1p19q" OR "1p/19q"))
Web of Science	ALL FIELDS: ((radiom* OR radiog*) AND glioma AND (IDH OR "isocitrate dehydrogenase" OR "1p19q" OR "1p/19q"))

Online Table 2: Radiogenomic pipeline features for included studies

First Author and Year	No. of Lesions	Imaging Sequences and Segmentation Method	Radiomic Feature and Selection Method	ML Classifier, Genetics, and WHO Grade
Fukuma 2019 ²²	n = 164	T2WI, FLAIR, pre- and postcontrast T1WI; manual tracing of T2WI images by surgical neuro-oncologist in 3D; location via MNI space coregistration	61 Intensity histograms, morphology or shape-based features 3 Locations 4000 texture deep learning-based features Feature selection not detailed	SVM IDH1/2 and 1p19q status WHO II/III
Gühr 2020 ²³	n = 26	T2WI, ADC; ROI-based	13 ADC intensity histogram features No ML for feature selection	No ML IDH1/2 status WHO II/III
Jakola 2018 ²⁵	n = 25	FLAIR; manual segmentation blinded, by 2 radiologists	Texture: GLCM No ML for feature selection	No ML IDH1/2 and 1p19q status WHO II/III
Kim 2020 ²⁶	n = 127	T2WI, FLAIR, pre- and postcontrast T1WI, ADC; dynamic susceptibility contrast perfusion (cerebral blood volume); semi-automated; ROI-based with SPM	Morphology or shape Intensity histogram Texture: GLCM, GLRLM SVM-RFE	Linear predictor using logistic regression IDH1 status WHO II/III
Li 2017 ²⁸	n = 151	FLAIR; CNN-based segmentation	Morphology or shape Texture: GLCM, GLRLM, GLSZM, NGTDM Wavelet 16,384 CNN deep-learned features Student t test and F-score selection method	SVM IDH1 status WHO II/III
Lu 2018 ²⁹	n = 108	FLAIR and postcontrast T1WI; semi-automated segmentation using region-growing algorithm and manual adjustment by neuroradiology researcher and 2 experienced neuroradiologists	57 Morphology or shape intensity histograms, and texture: GLCM, GLRLM Binary pattern, wavelet Student t test selection method	6 SVM models: linear, quadratic, cubic, fine Gaussian, medium Gaussian, and coarse Gaussian 3-Ensemble learning approaches: bootstrap-aggregated (bagged) tree algorithm, decision tree, and RUBBoost algorithm with decision tree IDH1 and 1p19q status WHO II/III
Park 2020 ³⁰	n = 168	T2WI, FLAIR, postcontrast T1WI, DTI; semiautomated segmentation by 2 neuroradiologists and voxel-intensity threshold on FLAIR images	18 Intensity histograms Texture: GLCM, GLRLM, GLSZM Student t test, recursive feature elimination	Random forest IDH1/2 status WHO II/III

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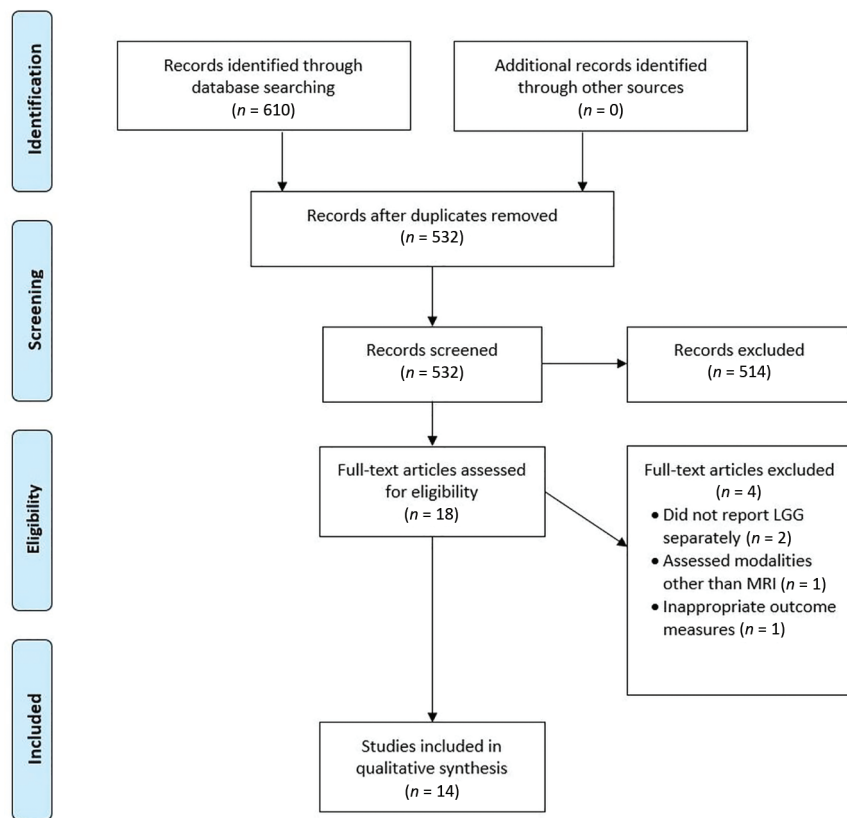
Online Table 2: Continued

First Author and Year	No. of Lesions	Imaging Sequences and Segmentation Method	Radiomic Feature and Selection Method	ML Classifier, Genetics, and WHO Grade
Ren 2019 ³¹	n = 57	FLAIR, ASL-derived CBF, ADC, eADC, manual segmentation by contiguous slices by 2 neuroradiologists	28 Intensity histograms Texture: GLCM, GLRLM, GLSZM, NGTDM, GLGCM SVM-RFE	SVM IDH1 status WHO II/III
Yu 2017 ³³	n = 110	FLAIR; CNN segmentation, automated anatomic labelling atlas for location	116 Location AVOIs Improved genetic algorithm	SVM IDH1 status WHO II/III
Zhou 2017 ³⁵	n = 165	T2WI, FLAIR, pre- and postcontrast T1WI; manual segmentation by 2 neuroradiologists	42 Intensity histograms Texture: GLCM, GLGCM, GLRLM, GLSZM, NGTDM SVM-RFE	SVM IDH1 and 1p19q status WHO II/III
Zhang 2018 ³⁴	n = 103	T2WI, FLAIR, pre- and postcontrast T1WI; 1 axial image with largest cross-sectional tumor area	65 Intensity histograms Texture: GLCM, GLGCM, GLRLM, GLSZM, NGTDM SVM-RFE	SVM IDH1/2 status WHO II/III
Han 2020 ³⁸	n = 277	T2-weighted; manual segmentation by 2 oncologic neurosurgeons, covering T2-weighted peripheral edema	64 Morphology or shape histogram intensity, Texture: GLRLM, GLSZM, NGTDM Variance threshold	Logistic regression modeling IDH1 and 1p19q status WHO II/III
Kocak 2020 ²⁷	n = 107	Pre- and postcontrast T1WI, T2WI; manual segmentation 1–2 mm from the lesion contour	Intensity histogram Texture: GLCM, GLRLM Autoregressive Haar wavelet Collinearity and feature selection (ReliefF)	Adaptive boosting, kNN, Naive Bayes neural network, random forest, stochastic gradient descent, and SVM IDH1 and 1p19q status WHO II/III
Shofty 2018 ³²	n = 47	T2WI, FLAIR, postcontrast T1WI; manually selecting a middle section, Talairach space for location	39 Morphology or shape, location, intensity-based statistic features Principal component analysis	6 SVM, 6 kNN, 5 ensemble classifiers 1p19q status WHO II

Note: —kNN indicates k-nearest neighbor; SVM-RFE, support vector machine-recursive feature elimination; GLCM, gray-level co-occurrence matrix; GLRLM, gray-level run length matrix; IBSI, image biomarker standardisation initiative; MNI, Montreal Neurological Institute; SPM, statistical parametric mapping; GLSZM, Gray Level Size Zone; NGTDM, Neighborhood Gray Tone Difference Matrix; ASL, arterial spin-labeling; AVOIs, anatomical volume of interest; GLGCM, gray level gradient co-occurrence matrix; eADC, exponential ADC.

Online Table 3: Radiomics quality score for included studies

Author and Year	Fukuma 2019 ²²	Gilhr 2020 ²³	Han 2020 ³⁸	Jakola 2018 ²⁵	Kim 2020 ²⁶	Kocak 2020 ²⁷	Li 2017 ²⁸	Lu 2018 ²⁹	Park 2020 ³⁰	Ren 2019 ³¹	Shofty 2018 ³²	Zhang 2018 ³⁴	Zhou 2017 ³⁵	Yu 2017 ³³
Image protocol quality	0	1	1	1	1	1	1	0	1	1	1	0	0	0
Multiple segmentations	1	0	1	0	1	0	1	0	0	1	0	1	0	0
Phantom study on all scanners	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imaging at multiple time points	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Feature reduction or adjustment for multiple testing	3	0	3	0	3	3	3	3	3	3	3	3	3	3
Multivariable analysis with nonradiomic features	0	0	1	0	0	0	1	0	0	0	0	0	1	1
Detect and discuss biologic correlates	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cutoff analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Discrimination statistics	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calibration statistics	1	0	0	0	0	1	0	0	0	0	0	1	1	1
Prospective study registered in trial data base	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Validation	2	2	2	-5	4	2	2	2	0	0	2	2	-5	-5
Comparison with criterion standard	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Potential clinical utility	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cost-effectiveness analysis	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Open science and data	0	1	0	0	0	1	1	1	0	0	0	1	3	0
Total points	12	9	13	2	14	13	14	11	9	10	11	14	8	5



ONLINE FIG 1. PRISMA flowchart of search performed on the April 18, 2020.

	Risk of Bias				Applicability Concerns		
	Patient Selection	Index Test	Reference Standard	Flow and Timing	Patient Selection	Index Test	Reference Standard
Fukuma 2019	+	+	+	+	+	+	+
Gahr 2020	+	+	+	+	+	+	+
Han 2020	-	+	+	+	+	+	+
Jakola 2018	+	+	+	+	+	-	+
Kim 2019	+	+	+	+	+	+	+
Kocak 2020	+	+	+	+	+	+	+
Li 2017	?	+	+	+	?	+	+
Lu 2018	+	+	+	+	+	+	+
Park 2020	+	+	+	+	+	+	+
Ren 2019	?	+	?	+	+	?	+
Shoffy 2017	+	+	+	+	+	+	+
Yu 2017	+	+	+	?	+	+	+
Zhang 2018	+	+	+	+	+	+	+
Zhou 2017	+	?	+	+	+	+	+

- High
? Unclear
+ Low

ONLINE FIG 2. QUADAS-2 of included studies from Review Manager 5.3 (<https://review-manager.software.informer.com/5.3/>).