Supplementary Table 1 List of included Radiomic Features

Feature Family (count)

Morphological (29)	IntensityHistogram(23)	IntensityVolumeHistogram(7)	GrayLevelCooccurenceMatrix(25)	IntensityDirect(9)
Volume	Mean	VolumeIntFract_10	JointMaximum	GlobalEntropy
ApproximateVolume	Variance	VolumeIntFract_90	JointAverage	GlobalMean
SurfaceArea	Skewness	IntensityVolFract_10	JointVariance	GlobalMedian
SurfaceToVolumeRatio	Kurtosis	IntensityVolFract_90	JointEntropy	InterQuartileRange
Compactness1	Median	VolumeFractionDiff	DifferenceAverage	Kurtosis
Compactness2	Min	IntensityFractDiff	DifferenceVariance	Skewness
SphericalDisproportion	P10	AreaUnderIVHCurve	DifferenceEntropy	P25
Sphericity	P90		SumAverage	P75
Asphericity	Max		SumVariance	
CentreOfMassShift	Mode		SumEntropy	
Maximum3DDiameter	InterQuartileRange		AngularSecondMoment	
MajorAxisLength	Range		Contrast	
MinorAxisLength	MeanAbsoluteDeviation		Dissimilarity	
LeastAxisLength	RobustMeanAbsoluteDeviation		InverseDifference	
Elongation	MedianAbsoluteDeviation		InverseDiffNorm	
Flatness	CoefficientOfVariation		InverseDiffMoment	
VolumeDensity_AABB	QuartileCoefficientOfDispersion		InverseDiffMomentNorm	
AreaDensity_AABB	Entropy		InverseVariance	
VolumeDensity_OMBB	Uniformity		Correlation	
AreaDensity_OMBB	MaximumHistogramGradient		AutoCorrelation	
VolumeDensity_AEE	MaximumHistogramGradientGL		ClusterTendendcy	
AreaDensity_AEE	MinimumHistogramGradient		ClusterShade	
VolumeDensity_MVEE	MinimumHistogramGradientGL		ClusterProminence	
AreaDensity_MVEE			InformationMeasureCor1	
VolumeDensity_CH			InformationMeasureCor2	
AreaDensity_CH				
IntegratedIntensity				
MoransIIndex				
GearysCMeasure				

A detailed description of radiomic features included in each family is reported in IBSI reference manual (Zwanenburg A, Leger S, Vallières M, Löck S. Image biomarker standardisation initiative. arXiv preprint arXiv:1612.07003).

Supplementary Table 2 Pre-processing of Radiomic Features

T2-weighted Images

Feature Family	Count	Interpolation	Re-segmentation	Intensity Discretization
Morphology	29	-	-	-
Intensity Histogram	23	3D (2x2x2 mm^3)	-	Fixed Bin Number (32)
Intensity Volume Histogram	7	3D (2x2x2 mm^3)	-	Fixed Bin Number (32)
GrayLevelCooccurenceMatrix*	25	3D (2x2x2 mm^3)	-	Fixed Bin Number (64)

ADC maps

Feature Family	Count	Interpolation	Re-segmentation	Intensity Discretization
Intensity Direct	9	-	Range: [0.25-3]$\times10^{-3}$ mm^2/s	Fixed Bin Size (0.1$\times10^{-3}$ mm^2/s)

*Aggregation method: 3D average; Directions: [0 1 2 3 4 5 6 7 8 9 10 11 12]. A detailed description of radiomic features included in each family is reported in IBSI reference manual (Zwanenburg A, Leger S, Vallières M, Löck S. Image biomarker standardisation initiative. arXiv preprint arXiv:1612.07003).

Supplementary Table 3. Values of the most significant features for separation of Warthins' and Malignant Tumors

	Warthins' Tumors		Malignant Tumors		
	Median	IQR	Median	IQR	P value*
P25 of ADC($\times$ 10^{-6} mm^2/s)	911	190	1058	379	0.054
VolumeDensity AEE	1.29	0.07	1.26	0.10	0.011
VolumeDensity CH	0.82	0.09	0.78	0.12	0.025

P values refer to Mann-Whitney tes

Supplementary Table 4. Values of most significant features for differentiating Benign vs Warthins' Tumors

	Benign Tumors		Warthins' Tumor		
	Median	*IQR*	*Median*	*IQR*	*P value**
Median ADC (× 10⁻⁶ mm²/s)	1715,50	660,50	1069,00	324,88	<0,001
Skewness ADC (× 10⁻⁶ mm²/s)	-0,03	1,04	0,48	0,74	0,021
Mean ADC (× 10⁻⁶ mm²/s)	1702,93	641,20	1142,26	361,11	<0,001
ADC P25 (× 10⁻⁶ mm²/s)	1506,88	612,00	911,00	189,75	<0,001
ADC P75 (× 10⁻⁶ mm²/s)	1859,50	692,88	1409,25	434,19	0,001
Mean T2	15,82	5,61	14,46	5,12	0,050
Skewness T2	-0,16	0,91	0,78	0,94	0,040
Median T2	16,00	7,00	14,00	6,00	0,080
P90 of T2	23,50	7,00	21,00	8,00	0,085
RobustMeanAbsoluteDeviation	3,35	1,58	2,56	1,27	0,077
MaximumHistogramGradient	6,50	20,25	18,00	32,13	0,065
MinimumHistogramGradient	-7,25	15,25	-16,00	18,63	0,058
MinimumHistogramGradientGL	19,00	13,00	14,00	6,75	0,069
AreaDensity AABB	0,62	0,02	0,66	0,08	0,019
VolumeDensity AEE	1,26	0,07	1,29	0,07	0,048
VolumeDensity_CH	0,78	0,06	0,82	0,09	0,061
AreaUnderIVHCurve	0,49	0,18	0,45	0,17	0,050
JointAverage	32,64	14,15	26,90	9,58	0,023
DifferenceAverage	8,89	4,33	6,81	2,01	0,047
DifferenceVariance	64,97	47,37	40,31	23,85	0,058
SumAverage	64,56	26,82	53,80	19,16	0,021
Contrast	150,54	136,31	85,25	59,18	0,067
Dissimilarity	8,89	4,33	6,81	2,01	0,047
InverseDifference	0,21	0,06	0,25	0,04	0,032
InverseDiffNorm	0,89	0,04	0,91	0,02	0,034
InverseDiffMoment	0,13	0,05	0,16	0,04	0,034
InverseDiffMomentNorm	0,97	0,03	0,98	0,01	0,058
InverseVariance	0,13	0,04	0,16	0,04	0,047
AutoCorrelation	1089,46	884,45	795,49	465,05	0,025
ClusterShade	-838,35	4825,44	1886,75	2160,23	0,058

* P values refer to Mann-Whitney test

Supplementary Table 5. Values of most significant features for differentiating Benign vs Malignant Tumors

	Benign Tumors		Malignant Tumors		
	Median	*IQR*	*Median*	*IQR*	*P value**
median ADC ($\times 10^{-6}\,mm^2/s$)	1716	661	1179	435	<0,001
skewness ADC	-0.03	1.04	0.69	1.06	0.001
mean ADC ($\times 10^{-6}\,mm^2/s$)	1703	641	1230	441	<0,001
P25 of ADC ($\times 10^{-6}\,mm^2/s$)	1507	612	1058	379	<0,001
P75 of ADC ($\times 10^{-6}\,mm^2/s$)	1860	693	1358	463	<0,001
Mean T2	15.8	5.6	12.8	4.1	0.008
Skewness T2	-0.16	0.91	0.56	1.08	0.009
Median T2	16.00	7.00	12.00	4.00	0.008
P10 of T2	9.00	3.00	6.50	4.00	0.007
P90 of T2	23.50	7.00	20.00	9.00	0.038
Mode T2	16.0	10.0	10.5	5.0	0.012
MaximumHistogramGradientGL	12.0	8.5	8.0	6.0	0.052
MinimumHistogramGradientGL	19.00	13.00	13.00	5.50	0.009
AreaDensity AEE	1.58	0.15	1.68	0.21	0.009
IntensityVolFract 90	10.00	3.00	7.50	4.00	0.007
AreaUnderIVHCurve	0.49	0.18	0.40	0.13	0.008
JointAverage	32.6	14.1	25.5	9.1	0.013
SumAverage	64.6	26.8	51.1	18.3	0.012
AutoCorrelation	1089	884	731	486	0.013
ClusterShade	-838	4825	1494	4187	0.024

* P values refer to Mann-Whitney test

Confusion Matrix

TP	FP
FN	TN

TP = true positive; FP = false positive; TN = true negative; FN = false negative;

1) Warthin's versus Malignant tumors

Training Cohort

28	2
4	11

Validation Cohort

18	3
2	4

2) Benign versus Warthin's tumors

Training Cohort

11	1
2	23

Validation Cohort

6	1
1	16

3) Benign versus Malignant tumors

Training Cohort

27	6
5	18

Validation Cohort

17	1
3	16

Box-and-whisker plots of the relevant features included in the models

Figure 1. Box-and-whisker plots of the two features included in the predictive model for discriminating Warthin's versus malignant tumors: the 25th percentile (P25) of ADC and the morphological feature Volume Density AEE (Approximate Enclosing Ellipsoid) from T2-w images. P-values refer to the Mann-Whitney test.
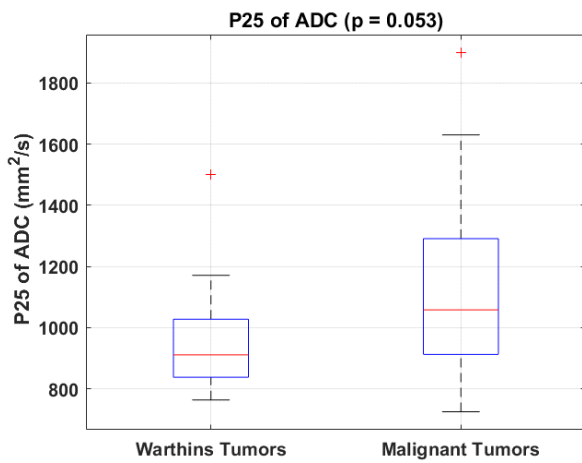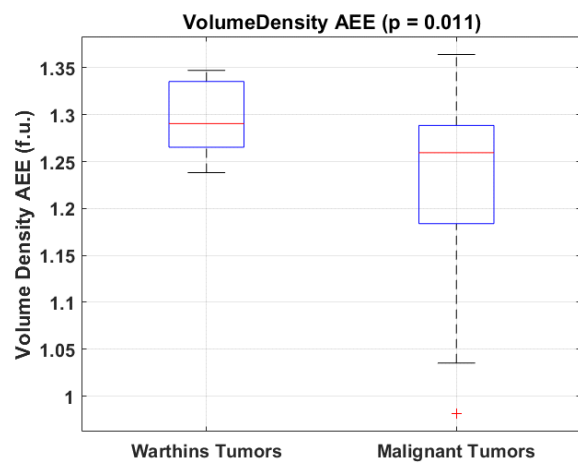
a   b

Figure 2. Box-and-whisker plots of the three features included in the predictive model for discriminating benign versus Warthins' tumors: P25 of ADC (a), Volume Density AEE(Approximate Enclosing Ellipsoid) (b) and the Minimum Histogram Gradient (c) from T2-w images. P-values refer to the Mann-Whitney test.
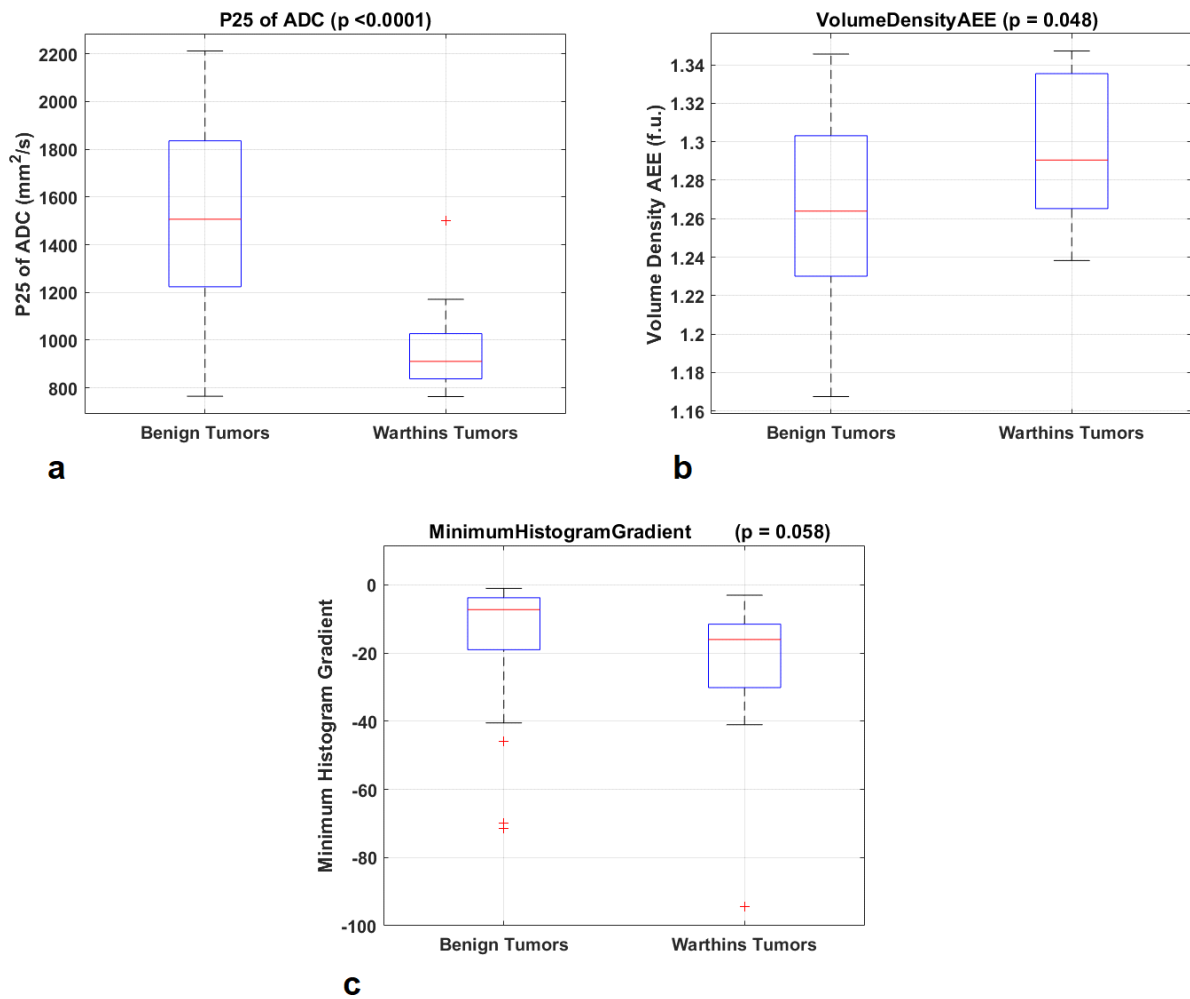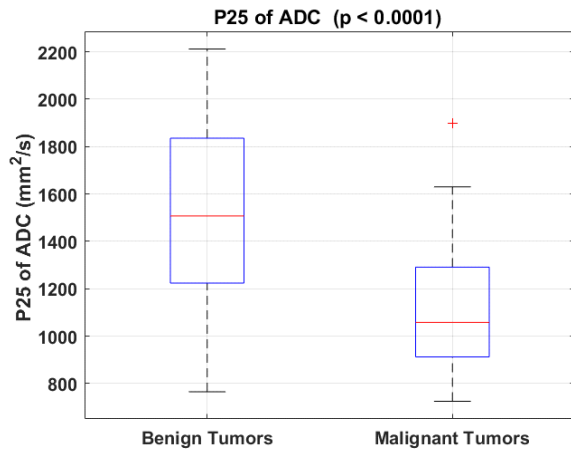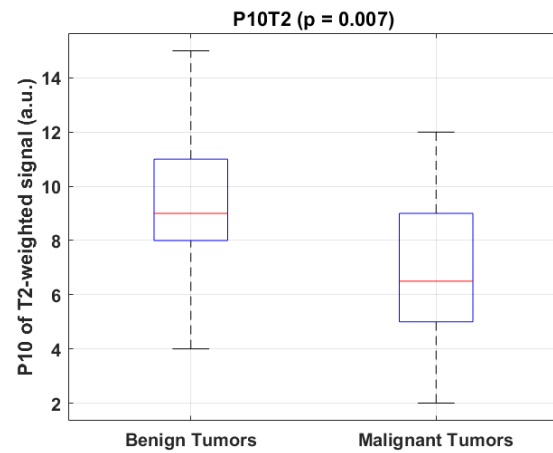
Figure 3. Box-and-whisker plots of P25 of ADC and P10 of T2-w signal included in the predictive model for discriminating benign versus malignant tumors. P-value refers to the Mann-Whitney test.