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Supplementary material for : Ex Vivo Thrombus MR Imaging Features and Patient Clinical Data Enable Prediction of Acute Ischemic Stroke Etiology

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SUPPLEMENTARY MATERIAL

Ex Vivo Thrombus MR Imaging Features and Patient Clinical Data Enable Prediction of Acute Ischemic Stroke Etiology

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Supplemental Table I. Summary of clinical details for each patient cohort

Patient cohort	Training (n = 49)	Validation (n = 11)
Age (mean \pm SD)	72 \pm 15	75 \pm 16
Sex, female	20 (41%)	4 (36%)
Etiology		
Large artery atherosclerosis	8 (16%)	5 (45%)
Cardioembolism	41 (84%)	6 (55%)
Atrial fibrillation	34 (83%)	5 (83%)
Infective endocarditis	2 (6%)	0 (0%)
Cardiomyopathy	2 (6%)	0 (0%)
Left ventricular thrombus	1 (2%)	0 (0%)
Mechanical prosthetic valve	2 (6%)	1 (17%)
Number of thrombi	76	18
Large artery atherosclerosis	15 (20%)	8 (44%)
Cardioembolism	61 (80%)	10 (56%)
IV tPA	18 (37%)	5 (45%)
Occlusion site		
ICA	3 (7%)	0 (0%)
ICA + MCA M1	9 (18%)	3 (27%)
MCA M1	20 (41%)	6 (55%)
MCA M1 + M2	3 (6%)	1 (9%)
MCA M2	9 (18%)	1 (9%)
Vertebrobasilar	5 (10%)	0 (0%)
EVT technique		
Stent	43 (88%)	11 (100%)
Aspiration	6 (12%)	0 (0%)
Prior stroke	10 (20%)	2 (18%)
Hypertension	34 (69%)	8 (73%)
Diabetes	6 (12%)	3 (27%)
Obesity	2 (4%)	0 (0%)
Smoking, past 5 years	5 (10%)	4 (36%)
Hyperlipidemia	23 (47%)	7 (64%)
Coronary artery disease	10 (20%)	5 (45%)
Cardiac valve disease	4 (8%)	1 (9%)
Chronic kidney disease	0 (0%)	2 (18%)

EVT indicates endovascular therapy; ICA, internal carotid artery; IV tPA, intravenous recombinant tissue plasminogen activator; MCA, middle cerebral artery.

Supplemental Table II. Texture features examined for model inclusion in this study

Texture type	Texture name
Global	Variance Skewness Kurtosis
Gray-level co-occurrence matrix (GLCM)	Energy Contrast Correlation Homogeneity Variance Sum Average Entropy Autocorrelation
Gray-level run-length matrix (GLRLM)	Short Run Emphasis (SRE) Long Run Emphasis (LRE) Gray-Level Non-uniformity (GLN) Run-Length Non-uniformity (RLN) Run Percentage (RP) Low Gray-Level Run Emphasis (LGRE) High Gray-Level Run Emphasis (HGRE) Short Run Low Gray-Level Emphasis (SRLGE) Short Run High Gray-Level Emphasis (SRHGE) Long Run Low Gray-Level Emphasis (LRLGE) Long Run High Gray-Level Emphasis (LRHGE) Gray-Level Variance (GLV) Run-Length Variance (RLV)
Gray-level size zone matrix (GLSZM)	Small Zone Emphasis (SZE) Large Zone Emphasis (LZE) Gray-Level Non-uniformity (GLN) Zone-Size Non-uniformity (ZSN) Zone Percentage (ZP) Low Gray-Level Zone Emphasis (LGZE) High Gray-Level Zone Emphasis (HGZE) Small Zone Low Gray-Level Emphasis (SZLGE) Small Zone High Gray-Level Emphasis (SZHGE) Large Zone Low Gray-Level Emphasis (LZLGE) Large Zone High Gray-Level Emphasis (LZHGE) Gray-Level Variance (GLV) Zone-Size Variance (ZSV)
Neighbourhood gray-tone difference matrix (NGTDM)	Coarseness Contrast Busyness Complexity Strength

Supplemental Table III. Clinical details of CE and LAA stroke patients within the training cohort

Characteristic	CE (n = 41)	LAA (n = 8)	P value
Age (years)	74 ± 15	61 ± 10	0.028
Sex, female	18 (44%)	2 (25%)	0.32
Prior stroke	8 (20%)	2 (25%)	0.73
Prior TIA	2 (5%)	1 (13%)	0.41
Hypertension	30 (73%)	4 (50%)	0.19
Diabetes	5 (12%)	1 (13%)	0.98
Hyperlipidemia	19 (46%)	4 (50%)	0.85
Coronary artery disease	10 (24%)	0 (0%)	0.12
Cardiac valve disease	4 (10%)	0 (0%)	0.36
Peripheral artery disease	3 (7%)	0 (0%)	0.43
Smoking, past 5 years	2 (5%)	3 (38%)	0.005
Obesity	1 (2%)	1 (13%)	0.19
Infection, past 30 days	2 (5%)	0 (0%)	0.52
Antiplatelets	15 (37%)	4 (50%)	0.48
Anticoagulants	10 (24%)	0 (0%)	0.12
IV tPA	14 (34%)	4 (50%)	0.40
Hemorrhagic transformation	12 (29%)	5 (63%)	0.07
TICI score:			0.84
0	1 (2%)	0 (0%)	
1	2 (5%)	0 (0%)	
2A	2 (5%)	0 (0%)	
2B	10 (24%)	3 (38%)	
3	26 (63%)	5 (63%)	
Arrival NIHSS	18 (15 - 22)	9 (5 - 9)	0.36
Occlusion side:			0.78
Right	21 (51%)	3 (38%)	
Left	16 (39%)	4 (50%)	
Unknown	4 (10%)	1 (13%)	
Occlusion site:			0.56
ICA	3 (7%)	0 (0%)	
ICA + MCA M1	7 (17%)	2 (25%)	
MCA M1	18 (44%)	2 (25%)	
MCA M1 + M2	3 (7%)	0 (0%)	
MCA M2	6 (15%)	3 (38%)	
Vertebrobasilar	4 (10%)	1 (13%)	
EVT passes	1 (1 - 2)	1 (1 - 1)	0.81
EVT duration (minutes)	46 (29 - 66)	86 (67 - 131)	0.41
Triglycerides (mM/L)	1.2 (0.9 - 1.6)	1.9 (1.5 - 5.8)	0.008
Cholesterol (mM/L)	3.5 (3.0 - 4.2)	4.4 (4.4 - 5.9)	0.33
HDL (mM/L)	1.0 (0.8 - 1.2)	0.9 (0.7 - 1.2)	0.26
LDL (mM/L)	1.9 ± 0.7	2.8 ± 1.0	0.53
Glucose (hemoglobin A1c; %)	5.6 (5.3 - 5.9)	6.6 (6.2 - 7.6)	0.28
Leukocytes (10 ⁹ /L)	8.3 (7.0 - 10.4)	9.2 (7.6 - 10.8)	0.49
Troponin (ng/L)	23 (8 - 49)	9 (5 - 25)	0.26
Left atrial volume index (mL/m ²)	38 (32 - 48)	25 (19 - 30)	0.076
Left atrial enlargement	30 (73%)	1 (13%)	0.049
Left ventricular diameter (cm)	4.6 ± 0.8	4.5 ± 0.7	0.825
Left ventricular hypertrophy	13 (32%)	1 (13%)	0.188
Left ventricular ejection fraction	51 ± 13	67 ± 5	0.002
Wall motion abnormalities	15 (37%)	0 (0%)	0.018
Diastolic dysfunction	7 (17%)	2 (25%)	0.703

EVT indicates endovascular therapy; HDL, high-density lipoprotein; ICA, internal carotid artery; IV tPA, intravenous recombinant tissue plasminogen activator; LDL, low-density lipoprotein; MCA, middle cerebral artery; NIHSS, National Institutes of Health stroke scale; TIA, transient ischemic attack; and TICI, thrombolysis in cerebral infarction.