

## Appendix 1 MR imaging acquisition

Detailed parameters of the protocols included 3D time-of-flight MRA (TOF-MRA), 2D black-blood T2WI and diffusion weighted imaging as follow as follow: (I) 3D time-of-flight MRA (TOF-MRA): repetition time/echo time (TR/TE), 22/3.6 ms; field of view (FOV), 210×190 mm<sup>2</sup>; flip angle, 18°; acquired resolution, 0.55×0.55×0.55 mm<sup>3</sup>, acquisition time, 4.4 min; (II) 2D black blood (BB) T2WI: TR/TE, 2400/50 ms; FOV, 130×130 mm<sup>2</sup>; matrix, 320×320; in-plane resolution, 0.40×0.40 mm<sup>2</sup>; slice thickness, 2.0 mm, acquisition time, 3.4 min; (III) axial DWI: b-value, 0 and 1,000 mm<sup>2</sup>/s; FOV, 230×230 mm; section thickness, 5 mm; and matrix, 192×192, acquisition time, 1 min.

**Table S1** Inter-observer reproducibility in assessing plaque involvement in vessel segments

Vessel segment	Kappa (95% CI) <sup>†</sup>	Kappa (95% CI) <sup>‡</sup>
Right CCA Bifurcation	0.975 (0.954–1.000)	0.987 (0.961–1.000)
Left CCA Bifurcation	0.975 (0.951–1.000)	0.987 (0.962–1.000)
Right EICA	0.960 (0.905–1.000)	0.977 (0.932–1.000)
Left EICA	0.962 (0.911–1.000)	0.955 (0.892–1.000)
Right IICA	0.797 (0.698–0.896)	0.928 (0.788–1.000)
Left IICA	0.900 (0.829–0.972)	0.823 (0.582–1.000)
Right ICA-T	0.925 (0.865–0.984)	0.911 (0.810–1.000)
Left ICA-T	0.881 (0.804–0.967)	0.906 (0.800–1.000)
Right M1	0.961 (0.907–1.000)	0.918 (0.758–1.000)
Left M1	0.959 (0.879–1.000)	0.918 (0.758–1.000)
Right M2	0.953 (0.899–1.000)	0.975 (0.926–1.000)
Left M2	0.986 (0.958–1.000)	0.969 (0.909–1.000)
Right A1	0.972 (0.934–1.000)	0.97 (0.927–1.000)
Left A1	0.985 (0.956–1.000)	0.953 (0.900–1.000)
Right A2	0.953 (0.861–1.000)	0.973 (0.920–1.000)
Left A2	0.930 (0.833–1.000)	0.974 (0.924–1.000)
Right P1	0.952 (0.904–0.999)	0.969 (0.927–1.000)
Left P1	0.917 (0.856–0.978)	0.955 (0.905–1.000)
Right P2	0.977 (0.932–1.000)	0.959 (0.903–1.000)
Left P2	0.955 (0.892–1.000)	0.958 (0.901–1.000)
BA	0.955 (0.892–1.000)	0.879 (0.745–1.000)
Right V4	0.970 (0.929–1.000)	0.958 (0.900–1.000)
Left V4	0.972 (0.934–1.000)	0.942 (0.862–1.000)

<sup>†</sup>, assessment for young patients; <sup>‡</sup>, assessment for middle-aged and older patients. CCA, common carotid artery; EICA, extracranial internal carotid artery; IICA, intracranial internal carotid artery; ICA-T, terminal internal carotid artery; IICA-T; M1, M1 segment of the middle cerebral artery; M2, M2 segment of the right middle cerebral artery; A1, A1 segment of the anterior cerebral artery; A2, A2 segment of the anterior cerebral artery; P1, P1 segment of the posterior cerebral artery; P2, P2 segment of the posterior cerebral artery; BA, basilar artery; V4, V4 segment of the vertebral artery.

**Table S2** Inter-observer reproducibility in the assessment of plaque features

Variables	Inter-observer agreement (95% CI) <sup>†</sup>	Inter-observer agreement (95% CI) <sup>‡</sup>
Degree of stenosis	0.962 (0.941–0.975)	0.983 (0.975–0.989)
Plaque area	0.934 (0.868–0.963)	0.926 (0.890–0.951)
Plaque burden	0.867 (0.810–0.908)	0.950 (0.926–0.966)
Arterial remodeling ratio	0.828 (0.750–0.882)	0.923 (0.885–0.948)
Eccentric index	0.975 (0.964–0.983)	0.950 (0.926–0.966)
Plaque volume	0.958 (0.931–0.973)	0.996 (0.993–0.997)
Plaque length	0.934 (0.904–0.955)	0.965 (0.946–0.977)
Intraplaque hemorrhage	0.881 (0.767–0.995)	0.931 (0.855–1.000)
Circular involvement	0.866 (0.771–0.962)	0.920 (0.850–0.994)

<sup>†</sup>, assessment for young patients; <sup>‡</sup>, assessment for middle-aged and older patients.

**Table S3** Plaque involvement in vessel segments among patients with atherosclerotic stroke or TIA

Affected vessel segment	Young group (n=145)	MOP group (n=99)	18–35 years (n=45)	36–45 years (n=100)	P value†	P value‡
Right CCA Bifurcation	40 (31.8)	38 (45.8)	9 (24.3)	31 (65.2)	0.040	0.249
Left CCA Bifurcation	49 (37.4)	39 (48.1)	12 (32.4)	37 (39.4)	0.123	0.461
Right EICA	31 (21.4)	32 (32.3)	8 (17.8)	23 (23.0)	0.055	0.478
Left EICA	34 (23.5)	33 (33.3)	6 (13.3)	28 (28.0)	0.089	0.054
Right IICA	83 (57.2)	91 (91.9)	14 (31.1)	69 (69.0)	<0.001	<0.001
Left IICA	83 (57.2)	93 (93.9)	20 (44.4)	63 (63.0)	<0.001	0.037
Right ICA-T	78 (55.7)	80 (89.9)	17 (38.6)	61 (63.5)	<0.001	0.006
Left ICA-T	82 (57.8)	81 (89.0)	20 (45.5)	62 (63.3)	<0.001	0.047
Right M1	111 (76.6)	92 (92.9)	31 (68.9)	80 (80.0)	0.001	0.144
Left M1	131 (90.3)	93 (93.9)	40 (88.9)	91 (91.0)	0.315	0.690
Right M2	45 (31.0)	72 (72.7)	12 (26.7)	33 (33.0)	<0.001	0.446
Left M2	58 (40.0)	78 (78.8)	16 (35.6)	42 (42.0)	<0.001	0.464
Right A1	39 (27.9)	29 (32.6)	12 (27.3)	27 (28.1)	0.445	0.917
Left A1	40 (28.2)	46 (50.5)	14 (31.8)	26 (26.5)	0.001	0.517
Right A2	11 (7.6)	24 (24.2)	4 (8.9)	7 (7.0)	<0.001	0.691
Left A2	15 (10.3)	26 (26.3)	4 (8.9)	11 (11.0)	0.001	0.699
Right P1	48 (34.8)	53 (60.9)	15 (33.3)	33 (35.5)	<0.001	0.804
Left P1	53 (38.4)	51 (59.3)	18 (40.0)	35 (37.6)	<0.001	0.789
Right P2	26 (17.9)	54 (54.5)	6 (13.3)	20 (20.0)	<0.001	0.333
Left P2	26 (17.9)	59 (59.6)	7 (15.6)	19 (19.0)	<0.001	0.617
BA	57 (39.3)	83 (83.8)	10 (22.2)	47 (47.0)	<0.001	0.005
Right V4	52 (35.9)	62 (63.3)	13 (28.9)	39 (39.0)	<0.001	0.240
Left V4	66 (45.5)	76 (76.8)	20 (44.4)	46 (46.0)	<0.001	0.862

Data are presented as n (%). †, comparison between young patients and middle-aged and older patients; ‡, comparison between patients aged 18–35 years and aged 36–45 years. CCA, common carotid artery; EICA, extracranial internal carotid artery; IICA, intracranial internal carotid artery; ICA-T, terminal internal carotid artery; IICA-T; M1, M1 segment of the middle cerebral artery; M2, M2 segment of the right middle cerebral artery; A1, A1 segment of the anterior cerebral artery; A2, A2 segment of the anterior cerebral artery; P1, P1 segment of the posterior cerebral artery; P2, P2 segment of the posterior cerebral artery; BA, basilar artery; V4, V4 segment of the vertebral artery.

**Table S4** Comparison of affected vessel segment ratios between young and MOP groups

Variables	Unadjusted OR (95% CI)	P value	Adjusted OR* (95% CI)	P value
Total AVSR	0.002 (0.000–0.010)	<0.001	0.002 (0.000–0.010)	<0.001
Anterior AVSR	0.001 (0.000–0.009)	<0.001	0.002 (0.000–0.010)	<0.001
Posterior AVSR	0.046 (0.019–0.113)	<0.001	0.052 (0.019–0.137)	<0.001

\*, adjusted for hypertension, diabetes, coronary heart disease and low-density lipoprotein. OR, odds ratio; CI, confidence interval; AVSR, affected vessel segments ratio, the proportion of the number of affected vessel segments/the total number of vessel segments within a single patient.