Supplementary

Table S1 Dual-Energy head and neck CTA scanning protocol

Parameter	A Tube	B Tube
KV	80	140
mAs	200	100
Pitch	1.1	1.1
Rotation Speed (s/r)	0.28	0.28
Rotation Time (s)	0.5	0.5
Reconstruction Thickness (mm)	0.6/0.6	0.6/0.6
Convolution Kernel	Br40	Br40

KV (Kilovolt): This refers to the voltage applied across the X-ray tube during scanning. A higher KV (140) is typically used for denser tissues, while a lower KV (80) is used for less dense tissues. The KV setting helps to control the X-ray energy level. mAs (Milliampere-Seconds): This is a measure of the total X-ray exposure during the scan. The mAs setting determines the number of X-ray photons generated, and thus the image quality and patient dose. Tube A uses 200 mAs, and Tube B uses 100 mAs, which typically correlates to the different scanning needs for the respective KV settings. Pitch: This is the ratio of the table movement per rotation of the X-ray tube to the total width of the X-ray beam. A pitch of 1.1 means that the table moves forward by 1.1 times the beam width during each rotation. This parameter influences image quality, resolution, and scan time. Rotation Speed (s/r): The rotation speed refers to how quickly the X-ray tube and detector complete a single rotation around the patient. A value of 0.28 seconds per rotation (s/r) means that the system completes one full rotation in 0.28 seconds. Faster rotation speeds are used for quicker scans. Rotation Time (s): This indicates the time it takes to complete one full rotation of the X-ray tube. In this protocol, the rotation time is 0.5 seconds, which suggests a relatively fast scan. Reconstruction Thickness (mm): This refers to the thickness of the image slices that will be reconstructed from the scan data. The value "0.6/0.6" indicates that two slice thicknesses (0.6 mm) are being used for the scan. This helps improve image resolution and provides detailed images for diagnostic purposes. Convolution Kernel: This refers to the mathematical algorithm used to reconstruct the raw scan data into a usable image. The kernel "Br40" is a specific type of convolution kernel used for soft tissue imaging, and it influences the clarity and sharpness of the final images. The "Br40" kernel is designed to optimize the detail in soft tissues, such as those found in the head and neck. CTA, computed tomography angiography.

Table S2 Cranial MRI DWI sequence scanning protocol

Parameters	GE 3.0T (SIGNA Architect)	Toshiba 1.5T (Vantage elan)
TR (ms)	3966	3291
TE (ms)	75.9	100
Slice Thickness/Spacing (mm)	5.0/1.5	6.0/1.0
FOV (mm)	240×240	240×240
b Value (s/mm^2)	1000	800

TR (repetition time) (ms): TR refers to the time between successive pulse sequences applied to the same slice. It is measured in milliseconds (ms). A shorter TR leads to a faster scan and influences image contrast. In this case, GE 3.0T uses a TR of 3,966 ms, and Toshiba 1.5T uses a TR of 3291 ms. The GE scanner has a longer TR, which may affect scan time and image contrast. TE (Echo Time) (ms): TE is the time between the application of the radiofrequency pulse and the peak of the signal induced by that pulse. It affects image contrast as well. A longer TE allows for more signal decay, which may reduce image quality. GE 3.0T has a TE of 75.9 ms, while Toshiba 1.5T has a slightly longer TE of 100 ms. Slice Thickness/Spacing (mm): This parameter refers to the thickness of the image slices and the gap between them. A thinner slice allows for more detailed imaging, but may require more scan time. GE 3.0T uses a slice thickness of 5.0 mm with a spacing of 1.5 mm, while Toshiba 1.5T uses a slightly thicker slice of 6.0 mm with a spacing of 1.0 mm. This difference may impact the resolution and quality of the images. FOV (Field of View) (mm): FOV refers to the size of the area that is being scanned. A larger FOV captures a broader area, while a smaller FOV focuses on a more specific region. Both scanners use a FOV of 240 × 240 mm, which ensures that both scanners cover the same area. b Value (s/mm^2): The b value is a parameter that determines the degree of diffusion weighting applied during the scan. A higher b value increases sensitivity to diffusion and is used to obtain higher contrast images, particularly useful for detecting restricted diffusion in tissues such as in stroke or tumor imaging. GE 3.0T uses a b value of 1000 s/mm^2, while Toshiba 1.5T uses a slightly lower b value of 800 s/mm^2. The higher b value in the GE scanner may provide better differentiation of diffusion in certain tissues. MRI, magnetic resonance imaging; DWI, diffusion-weighted imaging.

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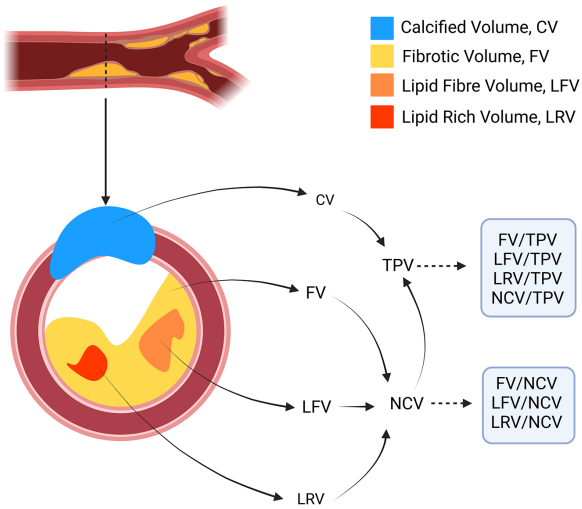

Figure S1 Illustration of plaque component analysis. TPV, total plaque volume; CV, calcified plaque volume; NCV, non-calcified plaque volume; LRV, lipid-rich volume; FV, fibrotic volume; LFV, lipid-fibre volume; LRV/TPV, lipid volume to total plaque volume; LRV/NCV, lipid volume to non-calcified plaque volume; FV/TPV, fibrous volume to total plaque volume; FV/NCV, fibrous volume to non-calcified plaque volume; LFV/TPV, lipid-fibre volume to total plaque volume; LFV/NCV, lipid-fibre volume to non-calcified plaque volume; NCV/TPV, non-calcified plaque volume to total plaque volume.

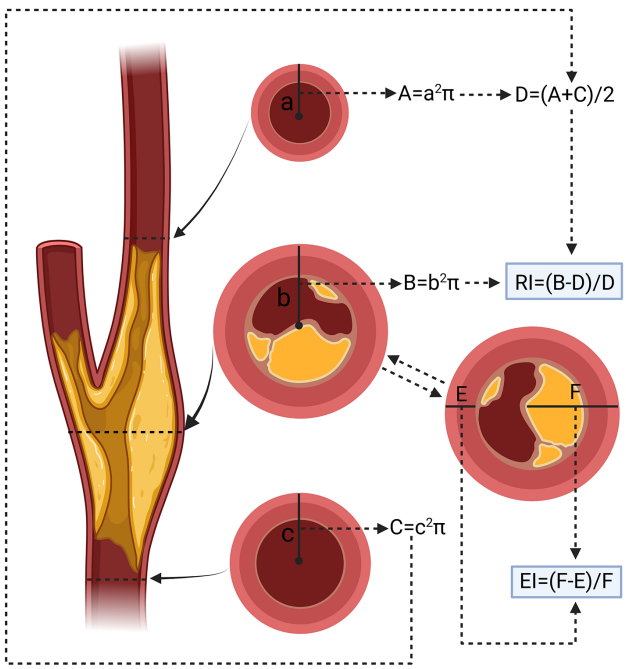

Figure S2 Schematic diagram for the measurement of reconstruction index (RI) and eccentricity index (EI). A: Distal plaque-free external membrane area (calculated as $A=\pi a^2$, where "a" is the radius of the outer boundary). B: Total external membrane area of the plaque (calculated as $B=\pi b^2$, where "b" is the radius of the outer boundary). C: Proximal plaque-free external membrane area (calculated as $C=\pi c^2$, where "c" is the radius of the outer boundary). D: Reference external membrane area (calculated as $D=(A+C)/2$). RI, Reconstruction Index (calculated as $RI=(B–D)/D$). E: Minimum wall thickness. F: Maximum wall thickness. EI, Eccentricity Index (calculated as $EI=(F–E)/F$)

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