SUPPLEMENTARY MATERIAL

Supplemental Methods

Below more detailed information regarding the experimental parameters are included, as well as added discussion regarding choice of imaging parameters and analysis procedures.

Extended explanation of MRI protocol

Patients were scanned at 3.0T (Philips, Best, The Netherlands) using body coil transmission and 8-channel SENSE reception. Patients were fitted with a nasal cannula to measure end-tidal CO_2 ($EtCO_2$) levels and a non-rebreathing mask to supply medical grade room air (~21% O_2, ~79% N_2) or a carbogen mixture (5% CO_2, 95% O_2); other patient vitals (e.g., blood oxygen saturation, heart rate, and blood pressure) were monitored by a respiratory therapist. Carbogen administration, as opposed to 5% CO_2 / balanced room air, was required as a conservative safety measure by the medical director for respiratory therapy at our hospital to ensure that the fraction inspired O_2 (FiO_2) would not decrease, which could exacerbate stroke risk in subacute patients. Similar requirements may not be uncommon in other hospitals until appropriate randomized safety trials using hypercarbic normoxic gas mixtures in this population are completed. Confounds resulting from this hypercarbic hyperoxic (i.e., carbogen) challenge are summarized in the Discussion.

All volunteers underwent a multimodal imaging protocol consisting of the following scans: (i) T_1-weighted (MPRAGE: 1 x 1 x 1 mm^3; TR/TE = 8.9/4.6 ms; duration = 3 min 47 s), (ii) T2-weighted FLAIR (0.9 x 0.9 x 1 mm^3; TR/TE = 11000/120 ms; multishot turbo spin echo inversion recovery; duration = 1 min 39 s), and (iii) BOLD (3.5 x 3.5 x 3.5 mm^3; anterior-posterior / right-left field-of-view = 220 x 220 mm; head-foot field-of-view approximately 135 mm; TR/TE=2000/35 ms), and (iv) in a subgroup (n=57) of patients hypercarbic hyperoxic CBF-weighted pseudo-continuous ASL (pCASL; 3.5 x 3.5 x 7 mm^3; TR/TE/post-labeling delay: 4500/11/1525 ms; 17 slices; ascending acquisition; 1600 ms Hanning labeling pulse train; 90 mm labeling offset).

Angiographic imaging

Location and degree of vessel stenosis was determined from clinical angiographic (DSA) imaging data, if DSA was performed within 60 days of BOLD imaging. Briefly, DSA was performed in the neuroangiography suite using a Philips Allura Xper biplane neuro X-ray system with the patient in the supine position. Selective arterial catheterizations were performed in multiple projections using nonionic, water-soluble intra-arterial contrast.

Stenosis classification

Stenosis degree of major intracranial vessels and cervical vessels were classified by a board-certified neuroradiologist (MKS; experience=13 years) using clinically-acquired angiography. Stenosis was measured by DSA, when available, if acquired within 60 days of BOLD. If DSA was not available, stenosis was measured on CTA (acquired within 60 days of BOLD). If no DSA or CTA was available performed within 60 days of BOLD, stenosis was measured by MRA. Stenosis degree was classified as the ratio of the width of the stenosed lumen (measured in the plane with the most severe stenosis) to the width of the normal distal vessel. If there was no normal distal vessel, the stenosed lumen was measured against the normal lumen proximal to the stenosis.

In patients with clinically-confirmed idiopathic moyamoya disease, mSS was calculated separately in right and left hemispheres. Suzuki's six-stage classification for moyamoya disease was designed to track vascular changes longitudinally wit serial angiograms. Modifications to the Suzuki classification have been made so that the score can be applied to individual cases. The mSS includes the following five stages of anterior circulation disease severity: stage 0, no evidence of vessel disease; stage I, mild-to-moderate stenosis around the carotid bifurcation with absent or slightly developed ICA moyamoya; stage II, severe stenosis around the carotid bifurcation or occlusion of either the proximal anterior cerebral artery or MCA with well-developed ICA moyamoya; stage III, occlusion of both the proximal anterior cerebral artery and MCA with well-developed ICA moyamoya disease (few of either the ACA or MCA branches or both are faintly opacified in antegrade fashion through the meshwork of ICA moyamoya); and stage IV, complete occlusion of both the proximal anterior cerebral artery and MCA with an absent or small amount of ICA moyamoya.

BOLD analysis

MRI data were analyzed using in-house Matlab (Mathworks, Natick, MA, USA) code and routines available from the FMRIB software library, FSL. First, affine motion correction, linear slice-time correction, and spatial smoothing (FWHM = 3 mm with Gaussian kernel) were applied. Subsequently, functional data were co-registered to a standard atlas (Montreal Neurological Institute, MNI; spatial resolution = 4 mm isotropic) to enable spatial comparison across subjects. Regions of interest were defined based on the Harvard/Oxford cortical and subcortical atlases, which were resampled to the 4 mm MNI space (**Supplemental Figure I**).

BOLD signal changes were calculated using the last 90s of each stimulus duration only, which allowed 90s for the tissue signal to plateau. Z-statistics were calculated. The z-statistic as well as the t-statistic are standard statistical measures for reporting effect size in fMRI data post-processing analysis. Briefly, the carbogen waveform was used in the FSL design matrix and a corresponding parameter estimate image was calculated, which corresponded to how strongly that stimulus fits the data. Next, the parameter estimate map was converted to a t-statistic image by normalizing by the standard error. The t-image was then transformed into a z-statistic. Higher z-statistics indicate better fits, and therefore a marker of increased CVR. The potential relevance of the z-statistic is that it reduces the CVR sensitivity to signal variance, which may be high, especially in regions with large vessels.

Importantly, the z-statistic is a measure of the precision of the CVR estimate. The z-statistic and t-statistic maps were calculated according to the above procedure on a voxel-by-voxel basis for each patient, using the 15 min time course. The time course itself contains 360 data points and the quantity of data points is identical for each patient and voxel. Approximately 180 of these data points were acquired during hypercarbic stimulation and approximately 180 during baseline room air breathing. As such, $n >> 30$ and conversion of the t-statistic map to a z-statistic map was statistically appropriate, as these data can be approximated by a normal distribution given the sample size. For completeness, both z-statistic and t-statistic maps are presented in Figure 3.

ASL analysis

All CBF quantification was performed in Matlab (Mathworks, Natick, MA, USA). Surround subtractions were performed for the label and control images within each block and averaged. CBF maps were quantified in absolute units (mL/100g/min) for both room air and carbogen

inhalation by applying a two-compartment perfusion model and solving for CBF by using a constrained non-linear optimization routine in Matlab (fmincon):

$$\Delta M = \frac{2M_0 f \alpha}{\lambda} \begin{Bmatrix} \frac{\exp(-\delta R_{1a})}{R_{1app}} \left[\exp\left(\min(\delta - w, 0)\, R_{1app}\right) - \exp\left((\delta - \tau - w) R_{1app}\right)\right] + \\ \frac{1}{R_{1a}} \left[\exp\left((\min(\delta_a - w, 0) - \delta_a) R_{1a}\right) - \exp\left((\min(\delta - w, 0) - \delta)\, R_{1a}\right)\right] \end{Bmatrix} \quad [1],$$

where ΔM is the difference magnetization (control signal – label signal), M_0 is the equilibrium magnetization of tissue, f is CBF (ml/g/s), α=0.85 is labeling efficiency for pCASL, λ = 0.9 ml/g is the blood-tissue water partition coefficient, δ = 1.5s is the tissue transit time (estimated here for patients with steno-occlusive disease), $R_{1a} = 0.59s^{-1}$ is the mean longitudinal relaxation rate of arterial blood water at 3.0T, R_{1app} = unperfused tissue R_1 ($0.77s^{-1}$) + f/λ, w = the post-labeling delay, which began at 1.525s for the first slice and increased by 0.03s for each subsequent slice (to account for the duration of the single-shot echo-planar-imaging readout), τ = 1.6s the labeling pulse train duration, and δ_a = 0.5s is the arterial transit time (i.e., approximate time for labeled arterial water to reach the imaging plane). It should be noted that a range of R_1 values are reported in the literature, and the value chosen here is an approximation. During carbogen administration $R_{1a} = 0.73s^{-1}$, as the R_1 of arterial blood water decreases due to the physiological effects of hyperoxia, and δ = 1.425s as the tissue transit time reduces by approximately 5% due to carbogen-associated vasodilation. These values were determined from prior work in which ASL data at multiple post-labeling delays was acquired during administration of different gas stimuli.

ASL images were transformed to standard space (4 mm isotropic resolution) by applying the same affine transformation matrix calculated from the BOLD images. CBF change with carbogen relative to baseline CBF (i.e., $\Delta CBF/CBF_0$) maps were calculated and preserved for comparison with BOLD $\Delta S/S_0$ maps.

Statistical analysis

Descriptive statistics, including means, standard deviations, and ranges for continuous parameters, as well as percent and frequency for categorical parameters, were evaluated. Investigations for outliers (two standard deviations beyond group mean) and assumptions for statistical analysis, e.g., normality and homoscedasticity were made.

To summarize the extent of all data, boxplots were used in many of the figures. The top and bottom lines of the boxplot depict the 75th and 25th percentile of the data, respectively, with the whiskers extending out to all data not determined to be outliers. The red line depicts the median of all data. Overlaid on the boxplot are the data points for each patient. Points that extend beyond the whiskers met outlier criteria as defined above.

For the multivariate analysis (**Table 2** in manuscript text), the following procedure was followed. The lateralizing CVR analysis was repeated to assess which additional known stroke risk factors contribute to the lateralizing CVR measurements. This was performed using a general linear model (GLM) analysis, separately for patients with atherosclerotic and non-atherosclerotic (i.e., moyamoya) disease. First, we have included **Supplementary Tables II** and **III** which include more detailed patient information, including: (i) age, (ii) race, (iii) medications (anti-platelet and anti-coagulant), (iv) exercise (using a surrogate indicator of body mass index), (v) cardiovascular disease, (vi) smoking history, (vii) diabetes history, (viiii) vessel stenosed, and for moyamoya patients (ix) modified Suzuki Score (mSS). Owing to the different nature of

disease for these two groups, atherosclerotic and non-atherosclerotic patients were analyzed slightly differently in the GLM analysis:

a. For atherosclerotic patients, an unpaired two-tailed t-test was performed between CVR in affected and contralateral brain hemispheres and this t-value was used in the GLM as the dependent variable (Y) and a marker of asymmetric CVR. Given the sample size, to avoid overfitting we included three predictors in the design matrix, and we chose predictors based on the highest risk factors for stroke reported in the Framingham study: age (continuous), smoking history (dichotomous), and diabetes (dichotomous). Cardiovascular disease was not used as this was present in approximately 94% of patients, and as such would not provide enough variability between subjects to add additional information. A GLM, described by:

$$Y=\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \qquad [2]$$

was applied where Y=t-statistic between CVR in affected and less-affected hemispheres, β_0 is the intercept, X_1=age, X_2=smoking, and X_3=diabetes. β values represent the parameters to be estimated. The results (t-statistics, β values, and corresponding P values) are reported in **Table 2** (in manuscript text).

b. Given the further classification by mSS in each hemisphere in moyamoya patients, the GLM analysis for moyamoya patients was performed slightly differently. Here, brain hemisphere CVR (z-statistic) was used as the independent variable (29 patients * 2 hemispheres = 58 values) and the following predictors were used in the GLM: mSS, age, smoking, and diabetes. Note that an additional predictor (for a total of four) was added for moyamoya patients given the increased sample size.

Safety

Patient charts were evaluated by a board-certified neurologist (LCJ) for evidence of new ischemic events after the BOLD scan, which are included in **Table IV**. Additionally, questionnaires were administered by a stroke research nurse immediately after and approximately one-year after the BOLD scan. The questionnaire used for safety monitoring is included on the following pages.

Postscan Information

Study ID _____

Means of contact
☐ Phone
☐ In person

Date of contact _____

Any adverse events because of the BOLD scan?
☐ Yes
☐ No

If yes, please describe. _____

Person providing information _____

Person's relationship to patient _____

BOLD Follow-up

Study ID _____

Date of follow-up _____

Has the patient had any adverse events since last contact?
- ☐ Yes
- ☐ No

Describe _____

Modified Rankin Scale
- ☐ No symptoms at all.
- ☐ No significant disability despite symptoms.
- ☐ Slight disability, unable to carry out all previous activities but able to look after own affairs.
- ☐ Moderate disability requiring some help, but able to walk without assistance.
- ☐ Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
- ☐ Severe disability; bedridden, incontinent, and requiring constant nursing care and attention
- ☐ Dead

Date of Death _____

Cause of Death _____

Barthel Index Scale TOTAL Score (0-100) _____

Person providing information _____

Person's relationship to patient _____

	ii.132	Atherosclerotic	66	M	White/NH	28.1	Y	N	Y
	ii.33	Atherosclerotic	64	M	White/NH	32.8	Y	N	Y
	ii.34	Atherosclerotic	72	F	White/NH	32.6	N	N	Y
	ii.35	Atherosclerotic	75	F	African American	32.9	Y	Y	N
	ii.36	Atherosclerotic	71	M	White/NH	Not Available	Y	N	Y
	ii.37	Atherosclerotic	73	F	White/NH	48.7	Y	N	Y
	ii.38	Atherosclerotic	38	F	White/NH	42.9	Y	N	Y
	ii.39	Atherosclerotic	62	M	White/NH	26.7	Y	N	Y
	ii.40	Atherosclerotic	51	M	White/NH	23.2	Y	N	Y
	ii.41	Atherosclerotic	38	F	White/NH	24.5	N	Y	N
	ii.42	Atherosclerotic	69	M	African American	23.7	Y	N	Y
	ii.43	Atherosclerotic	35	F	White/NH	19.9	Y	N	N
	ii.44	Atherosclerotic	51	M	White/NH	29.0	Y	N	Y
	ii.45	Atherosclerotic	40	F	African American	42.1	N	N	Y
	ii.46	Atherosclerotic	47	M	White/NH	28.2	Y	N	Y
	ii.47	Atherosclerotic	70	F	White/NH	28.7	Y	N	Y
	ii.48	Atherosclerotic	80	M	White/NH	24.2	Y	N	Y
	ii.49	Atherosclerotic	45	F	White/NH	38.4	Y	Y	Y
	ii.50	Atherosclerotic	71	F	White/NH	30.2	Y	N	Y
	ii.51	Atherosclerotic	49	M	White/NH	32.0	Y	N	Y
	ii.52	Atherosclerotic	45	M	White/NH	38.9	Y	Y	Y
	ii.53	Atherosclerotic	71	F	White/NH	20.4	N	N	Y
Other	ii.54	IC and Cervical Stenosis	53	F	White/NH	29.2	N	N	Y
	ii.55	Severe Cervical stenosis	72	M	White/NH	33.7	Y	N	Y
	ii.56	Stenosis possibly caused by tumor	68	M	White/NH	26.2	Y	N	Y
	ii.57	IC and Cervical Stenosis	52	F	White/NH	29.2	N	N	Y
	ii.58	AVM, Chronic headache, Seizures	53	F	White/NH	27.6	Y	N	Y

Table I. Summary of patient demographic information for blood oxygenation level-dependent (BOLD) and cerebral blood flow (CBF) cerebrovascular reactivity (CVR) comparison study. Cardiovascular risk factors include atrial fibrillation, coronary heart disease, and/or congestive heart failure. BMI=body mass index. NH=not Hispanic. Note that since the purpose of this study was only to compare BOLD and CBF CVR contrast, the small subgroup of patients with non-IC stenosis (e.g., 'Other' category) were included.

	Age (yrs)	Sex	Race	BMI	Anti-platelet (Y/N)	Anti-coagulant (Y/N)	Cardiovascular Risk Factors (Y/N)	Diabetes (Y/N)	Smoking (Y/N)	Presence of Infarct (Y/N)	Location of IC Stenosis (L = left, R = right)
iii.1	74	M	White/NH	28.3	Y	N	Y	Y	Y	Y	L vertebral
iii.2	49	F	White/NH	21.2	Y	N	Y	N	Y	Y	L M1
iii.3	64	F	White/NH	26.6	Y	N	Y	N	Y	N	L ICA; L P1
iii.4	35	F	White/NH	19.9	Y	N	N	N	N	Y	L ICA; L M1
iii.5	62	F	African American	29.6	N	N	Y	Y	N	Y	R ICA
iii.6	51	M	White/NH	29	Y	N	Y	N	Y	Y	L M2
iii.7	69	M	White/NH	22.1	Y	N	Y	N	N	Y	L M2
iii.8	57	M	White/NH	26.0	N	N	Y	N	Y	Y	L ICA, L M1
iii.9	40	F	African American	42.1	N	N	Y	N	N	Y	R M1
iii.10	67	M	White/NH	28.4	Y	Y	Y	Y	N	Y	L ICA
iii.11	52	F	White/NH	29.2	N	N	Y	N	Y	N	R M1
iii.12	47	M	White/NH	28.2	Y	N	Y	Y	Y	Y	LM1
iii.13	70	F	White/NH	28.7	Y	N	Y	Y	N	N	R M1
iii.14	80	M	White/NH	24.2	Y	N	Y	Y	N	Y	L ICA
iii.15	45	F	White/NH	38.4	Y	Y	Y	N	Y	Y	L M1
iii.16	49	M	White/NH	32.0	Y	N	Y	N	Y	Y	R M1
iii.17	45	M	White/NH	38.9	Y	Y	Y	Y	Y	Y	L ICA, L M1
iii.18	71	F	White/NH	20.4	N	N	Y	N	Y	Y	R M1
iii.19	64	F	White/NH	22.1	Y	N	Y	N	Y	N	Basilar
iii.20	72	M	African American		Y	N	Y	N	Y	Y	R ICA, R vertebral
iii.21	69	M	White/NH	27.1	Y	N	Y	N	N	Y	L ICA, L M2
iii.22	72	F	White/NH	32.6	N	N	Y	N	N	Y	R M1
iii.23	64	M	White/NH	32.8	Y	N	Y	N	N	Y	L ICA
iii.24	72	F	White/NH	32.6	N	N	Y	N	N	Y	R M1
iii.25	75	F	African American	32.9	N	N	N	Y	N	Y	R P1
iii.26	71	M	White/NH		Y	N	Y	N	Y	N	L vertebral
iii.27	73	F	White/NH	48.7	Y	N	Y	N	N	Y	R M1
iii.28	38	F	White/NH	42.9	Y	N	Y	Y	Y	Y	L M1
iii.29	51	M	White/NH	23.2	Y	N	Y	N	N	Y	R M1
iii.30	38	F	White/NH	24.5	N	Y	N	N	N	Y	R M1
iii.31	69	M	African American	23.7	Y	N	Y	Y	Y	Y	R M1

Table II. Summary of patient demographic information for atherosclerotic patients in the lateralizing disease study.Cardiovascular risk factors include atrial fibrillation, coronary heart disease, and/or congestive heart failure. NH=not Hispanic.

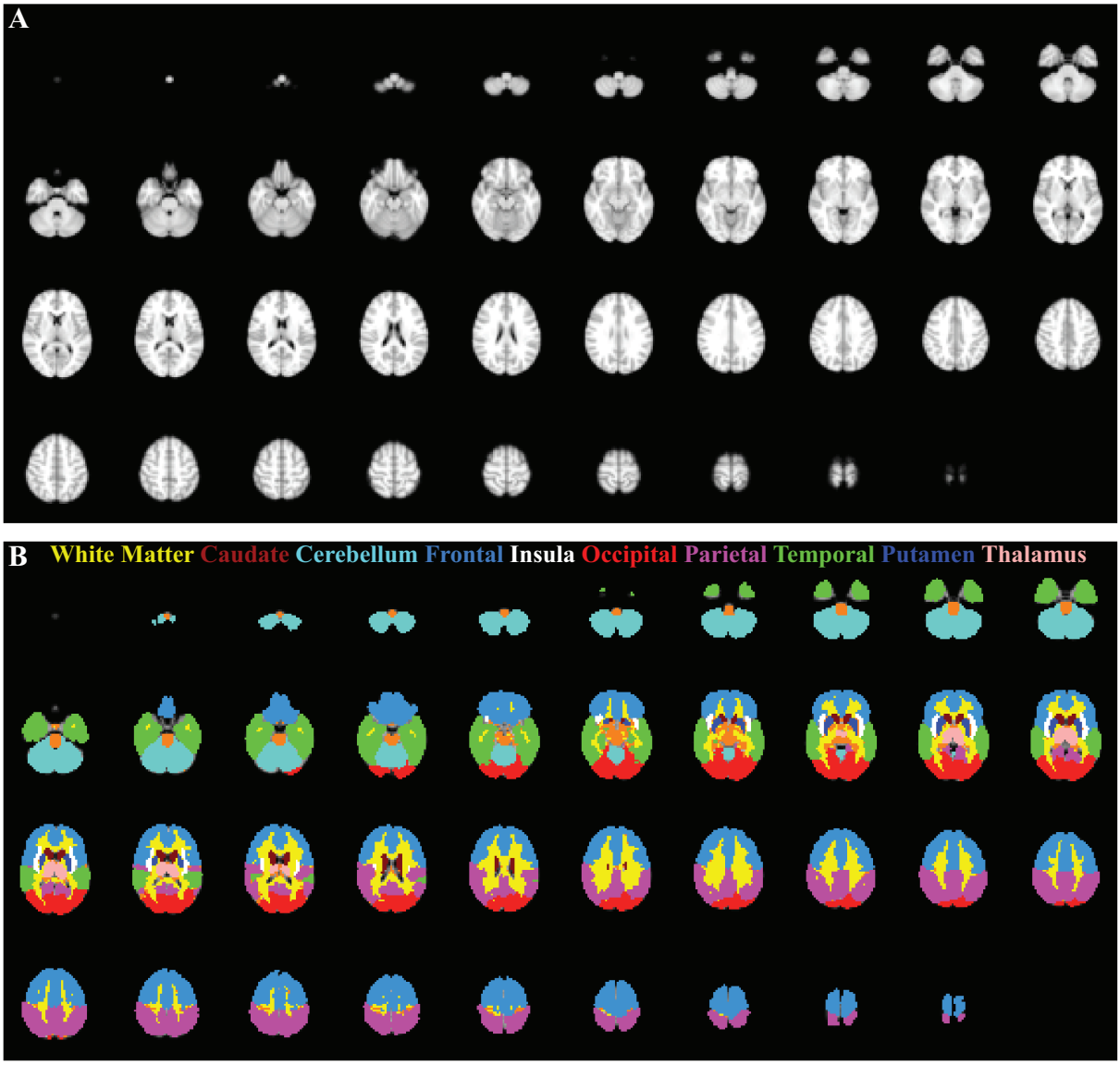
	Age	Sex	Race	BMI	Anti-platelet (Y/N)	Anti-coagulant (Y/N)	Cardiovascular Risk Factors (Y/N)	Diabetes (Y/N)	Smoking (Y/N)	Presence of Infarct (Y/N)	mSS Right	mSS Left
iii.32	33	F	White/NH	27.0	Y	N	N	N	N	Y	0	1
iii.33	47	F	White/NH	20.7	Y	N	Y	N	Y	Y	1	2
iii.34	48	F	White/NH	36.1	Y	N	N	Y	N	N	2	1
iii.35	28	F	White/NH	35.0	Y	N	Y	Y	N	Y	4	4
iii.36	36	F	White/NH	35.7	Y	N	Y	N	Y	Y	4	4
iii.37	50	F	Asian	24.9	Y	N	Y	Y	N	Y	2	2
iii.38	28	F	Asian	23.6	N	N	N	N	N	Y	3	4
iii.39	33	F	White/NH	24.0	Y	N	Y	N	N	Y	0	3
iii.40	26	M		23.4	Y	N	Y	N	N	Y	1	1
iii.41	20	M	Asian	24.1	Y	N	N	N	N	Y	2	3
iii.42	59	F	African American	42.9	Y	N	Y	N	N	Y	4	3
iii.43	69	F	Asian	26.1	Y	N	Y	N	N	N	2	1
iii.44	43	M	White/NH	41.6	Y	N	Y	N	Y	N	3	4
iii.45	49	F	White/NH	22.0	N	N	N	N	N	N	2	3
iii.46	45	F	White/NH	40.2	Y	N	Y	Y	N	Y	2	1
iii.47	51	M	African American	31.7	Y	N	Y	N	Y	Y	3	1
iii.48	59	M	White/NH	25.4	Y	N	N	N	N	Y	4	3
iii.49	47	F	White/NH	23.0	Y	N	N	N	N	Y	4	4
iii.50	25	F	White/NH	31.8	Y	N	Y	N	N	Y	1	3
iii.51	32	F	White/NH	24.9	N	N	Y	N	N	N	3	3
iii.52	57	F	White/NH	25.4	Y	N	Y	N	N	N	0	2
iii.53	36	M	White/NH	22.1	Y	N	Y	N	N	Y	3	4
iii.54	33	F	White/NH		Y	N	N	N	N	N	3	4
iii.55	51	F	African American	34.2	Y	N	Y	Y	Y	Y	2	2
iii.56	50	F	White/NH	29.1	Y	N	Y	N	Y	Y	2	2
iii.57	58	F	African American	28.8	Y	N	Y	N	N	Y	4	3
iii.58	24	M	African American	24.4	Y	N	N	N	N	Y	0	2
iii.59	31	F	Asian	24.9	Y	N	Y	N	N	Y	3	2
iii.60	44	F	White/NH	33.7	Y	N	Y	Y	N	N	4	4

Table III. Summary of patient demographic information for moyamoya patients in the lateralizing disease study.Cardiovascular risk factors include atrial fibrillation, coronary heart disease, and/or congestive heart failure. NH=not Hispanic.

ID	Diagnosis	Patient description	Clinical interpretation	Modified Rankin Scale	Barthel Index Scale TOTAL Score (0-100)
iv.1	Atheroscler otic	Nausea, dizziness, speech disturbance	Possible TIA	No significant disability despite symptoms.	100
iv.2	Moyamoya	Seen for possible TIA, expressive aphasia for 2-3 hours, evaluated in ED and discharged home.	Possible TIA	Moderate disability requiring some help, but able to walk without assistance.	80
iv.3	Moyamoya	TIA 12/31/2012, could not see well and had difficulty walking, lasting about 2 hours; similar episodes occur about twice a month.	New TIA	Slight disability, unable to carry out all previous activities but able to look after own affairs.	100
iv.4	Moyamoya	Numbness and tingling right hand 2 - 3/week lasting less than a minute each time	Possible TIA	No symptoms at all.	100
iv.5	Atheroscler otic	Hospitalized for a new stroke. Ongoing, occasional left hand weakness and some loss of left hand sensation.	New Stroke	No significant disability despite symptoms.	100
iv.6					
iv.7	Moyamoya	Neurology visit for possible seizures causing visual disturbances	Not cerebrovascular (remote effects of stroke)	Slight disability, unable to carry out all previous activities but able to look after own affairs.	100
iv.8	Moyamoya	Seen in ED for headache and seizure	Not cerebrovascular (remote effects of stroke)	No significant disability despite symptoms.	100
iv.9	Atheroscler otic	Frequent headaches, started when she had the stroke	Not cerebrovascular	No significant disability despite symptoms.	100
iv.10	Moyamoya	Headaches. Stress causes 'chirping sounds' in her head	Not cerebrovascular	No significant disability despite symptoms.	100
iv.11	Moyamoya	Fatigue	Not cerebrovascular	Slight disability, unable to carry out all previous activities but able to look after own affairs.	100
iv.12	Moyamoya	Intermittent seizures despite anticonvulsants	Not cerebrovascular (remote effects of stroke)	Slight disability, unable to carry out all previous activities but able to look after own affairs.	100
iv.13	Atheroscler otic	Aortic valve replacement 10/21/2013	Not cerebrovascular	No symptoms at all.	100
iv.14	Atheroscler otic	Pacemaker inserted	Not cerebrovascular	Slight disability, unable to carry out all previous activities but able to look after own affairs.	100
iv.15	Atheroscler otic	Left internal carotid artery angiogram with stent placement	Treatment for carotid stenosis	No significant disability despite symptoms.	100
iv.16	Atheroscler otic	Intermittent dizziness	Not cerebrovascular	Slight disability, unable to carry out all previous activities but able to look after own affairs.	100
iv.17	Other	Headache/shooting pains in head.	Not cerebrovascular	No symptoms at all.	100
iv.18	Atheroscler otic	Fell probably due to syncope vs shortness of breath or 'legs gave out."	Not cerebrovascular	Slight disability, unable to carry out all previous activities but able to look after own affairs.	70
iv.19	Atheroscler otic	Severe nosebleed. Per patient, probably due to dental surgery rather than any sort of cardiovascular issue. Patient was on both aspirin and clopidogrel at the time of nosebleed. Aspirin dose was reduced.	Not cerebrovascular	No symptoms at all.	100
iv.20	Moyamoya	Headaches, memory problems	Not cerebrovascular (remote effects of stroke)	No significant disability despite symptoms.	100
iv.21	Moyamoya	Seizure requiring ED visit	Not cerebrovascular (remote effects of stroke)	Slight disability, unable to carry out all previous activities but able to look after own affairs.	90
iv.22	Atheroscler otic	Undergoing chemotherapy for multiple myeloma	Not cerebrovascular	Slight disability, unable to carry out all previous activities but able to look after own affairs.	90

Table IV. Patients reporting complications at long-term follow-up.TIA=transient ischemic attack. AVR=aortic valve replacement.

Supplementary Figures



Supplementary Figure I. Brain regions that were the target of the quantitative analysis the lateralizing disease study. (A) T_1-weighted anatomical atlas and (B) regions used in quantitative analysis, all of which were derived from the Harvard-Oxford Cortical and Sub-cortical atlases. Total gray matter included cerebellar, frontal, occipital, temporal, and parietal gray matter.