

Table S1 Results of the voxel-based comparisons of microvascular indices between the participant groups

Group analysis	Cluster size	Cluster location	BA	Talairach coordinates	Z score
ADC					
CN<AD					
	665	Lt Parahippocampal Gyrus		-28.42,-5.31,-25.98	4.037
		Lt Temporal Lobe Sub-Gyral		-32.71,-2.14,-14.95	3.273
		Lt Uncus	28	-24.23,-12.06,-29.26	3.191
	868	Rt Temporal Lobe Sub-Gyral		51.72,-42.76,-6.56	3.940
		Rt Fusiform Gyrus		42.12,-44.59,-16.35	3.672
		Rt Superior Temporal Gyrus		47.36,-37.32,10.1	3.340
	881	Rt Parahippocampal Gyrus	27	18.35,-37.52,-1.22	3.895
		Rt Amygdala		25.56,-6.77,-13.05	3.741
	305	Rt Middle Temporal Gyrus	21	50.64,-4.85,-19.2	3.812
		Rt Temporal Lobe Sub-Gyral		46.47,-11.68,-21.27	3.311
	194	Lt Cerebellum Declive		-9.43,-70.39,-10.21	3.795
	216	Rt Superior Temporal Gyrus	22	46.22,-16.31,-2.79	3.734
	213	Rt Inferior Parietal Lobule	40	54.11,-45.64,22.94	3.603
		Rt Superior Temporal Gyrus		45.78,-52.46,20.8	3.435
	95	Rt Middle Temporal Gyrus		54.6,-24.21,-8.8	3.560
	98	Lt Superior Occipital Gyrus	19	-36.37,-81.29,30.19	3.493
		Lt Angular Gyrus	39	-46.06,-72.85,30.83	3.351
	75	Rt Frontal Lobe Sub-Gyral		33.33,10.97,36.06	3.488
	93	Rt Brainstem		11.65,-12.42,-12.47	3.440
	135	Lt Middle Temporal Gyrus	39	-41.65,-76.5,10.29	3.423
		Lt Middle Occipital Gyrus		-41.51,-76.86,-0.55	3.394
	55	Lt Posterior Cingulate		-15.2,-61.01,9.5	3.305
BVf					
CN<AD					
	236	Lt Precentral Gyrus		-30.74,-16.29,43.2	3.640
		Lt Parietal Lobe Sub-Gyral		-36.34,-30.37,43.13	3.164
	68	Lt Frontal Lobe Sub-Gyral		-18.45,-23.38,57.6	3.595
	152	Lt Thalamus Pulvinar		-13.68,-23.02,10.42	3.581
		Lt Thalamus Ventral Lateral Nucleus		-17.89,-13.74,16.64	3.494
	59	Rt Cerebellum Pyramis		24.16,-79.52,-33.48	3.552
mVD					
CN>AD					
	639	Lt Medial Frontal Gyrus	10	-11.8,45,-7.42	4.108
	318	Rt Medial Frontal Gyrus		7.51,59.09,6.4	4.016
	440	Rt Medial Frontal Gyrus		10.44,52,-7.74	3.939
		Rt Frontal Lobe Sub-Gyral		13.23,41.07,-11.43	3.379
	165	Rt Middle Frontal Gyrus		33.98,48.69,-3.6	3.908
	134	Lt Cingulate Gyrus		-6.77,32.93,29.35	3.701
	85	Lt Medial Frontal Gyrus		-7.83,58.65,11.5	3.385
VSI					
CN>AD					
	1668	Lt Medial Frontal Gyrus	10	-9.02,49.18,-6.98	4.865
		Inter-Hemispheric Corpus Callosum		0.53,24.59,-1.04	4.143
		Rt Anterior Cingulate		7.46,40.93,4.68	3.737
	347	Lt Cerebellum Tuber		-43.92,-61.78,-24.84	4.208
	448	Lt Cerebellum Declive		-16.27,-84.68,-22.49	4.102
	191	Lt Cingulate Gyrus	24	-1.59,-4.13,47.55	4.002
	245	Lt Cingulate Gyrus	32	-9.55,31.54,29.18	3.930
	302	Rt Medial Frontal Gyrus		7.51,59.09,6.4	3.745
	98	Rt Corpus Callosum		12.59,-37.66,14.89	3.634
	73	Rt Middle Frontal Gyrus		39.51,32.02,-6.43	3.387
MvWI					
CN<AD					
	664	Rt Frontal Lobe Sub-Gyral		29.16,2.74,33.86	3.990
		Rt Middle Frontal Gyrus		30.5,10.6,40.03	3.785
	173	Lt Extra-Nuclear		-21.69,-2.86,-8.07	3.841
	376	Lt Parietal Lobe Sub-Gyral		-28.02,-53.77,36.99	3.691
	204	Lt Middle Frontal Gyrus		-29.35,-12.24,44.96	3.567
	65	Rt Precentral Gyrus		21.76,-21.19,62.54	3.516
	117	Rt Medial Frontal Gyrus		8.44,43.37,37.36	3.401
	118	Lt Extra-Nuclear		-25.98,-22.92,-4.64	3.352
	52	Rt Temporal Lobe Sub-Gyral		49.26,-2.05,-18.96	3.244
GMV					
CN>AD					
	2207	Rt Caudate Tail		32.14,-34.6,6.95	4.953
		Rt Thalamus		29.45,-29.87,1.95	4.934
	1477	Lt Thalamus		-26.04,-27.93,-1.51	4.403
		Lt Parahippocampal Gyrus	27,28	-20.38,-27.17,-9.45	4.264
	203	Rt Medial Frontal Gyrus	8	12.54,36.95,40.42	4.105
	227	Rt Cuneus	17	23.69,-76.61,4.18	4.099
	111	Lt Superior Temporal Gyrus	13	-44.43,-45.43,19.49	3.980
	530	Rt Middle Temporal Gyrus	21	50.43,-27.41,-9.63	3.830
		Rt Temporal Lobe Sub-Gyral	20	46.43,-17.96,-19.61	3.696
		Rt Inferior Temporal Gyrus	20	50.56,-25.1,-18.87	3.475
	598	Rt Temporal Lobe Sub-Gyral	39	30.39,-61.97,27.3	3.803
		Rt Precuneus	7	20.6,-61.04,32.62	3.740
	89	Lt Insula	13	-34.37,26.97,14.36	3.443
		Lt Middle Frontal Gyrus	10	-32.91,34.34,11.03	3.234
WMV					
CN>AD					
	472	Lt Cerebellum Tuber		-16.22,-87.5,-27.26	4.677
	245	Lt Superior Frontal Gyrus	6	-7.18,23.91,59.12	3.810
	661	Lt Cerebellum Tuber		-46.64,-57.74,-27.66	3.783
		Lt Cerebellum Cerebellar Tonsil		-42.33,-59.38,-39.9	3.641
		Lt Cerebellum Culmen		-45.22,-49.23,-28.18	3.387

Rt, right; Lt, Lt; BA, Brodmann area. P=0.001 without multiple comparison and 50 voxels, age as covariates. CN, cognitively normal; AD, Alzheimer's disease; ADC, apparent diffusion coefficient; BVf, blood volume fraction; mVD, mean vessel diameter; VSI, vessel size index; MvWI, microvessel-weighted imaging; GMV, gray matter volume; WMV, white matter volume.

Table S2 Results of the voxel-based multiple regression analyses between microvascular indices and age

Group analysis	Cluster size	Cluster location	BA	Talairach coordinates	Z score	
ADC						
(+) Age	18063	Lt Corpus Callosum		-10.55,27.57,-2.3	5.070	
		Rt Extra-Nuclear		32.46,-8.46,-10.39	4.877	
		Rt Lateral Ventricle		35.16,-17.26,-7.12	4.835	
	6966	Lt Superior Temporal Gyrus	38	-31.1,15.92,-26.72	4.869	
		Lt Middle Temporal Gyrus		-49.21,-0.88,-27.27	4.644	
		Lt Temporal Lobe Sub-Gyral		-38.13,-2.47,-25.88	4.599	
	888	Lt Precuneus		-29.48,-59.75,40.46	4.757	
		Lt Inferior Parietal Lobule	40	-36.42,-54.25,42.21	3.613	
		Lt Angular Gyrus		-37.71,-61.72,32.02	3.295	
	637	Rt Insula	13	43.52,14.45,0.08	4.602	
	1440	Lt Anterior Cingulate		-1.08,36.61,20.34	4.251	
		Lt Medial Frontal Gyrus	6,9	-16.48,34.37,29.33	3.965	
	268	Lt Cerebellum Culmen		-42.47,-46.29,-24.7	3.338	
	261	Lt Middle Temporal Gyrus		-56.45,-35.95,-14.5	3.811	
	224	Lt Inferior Parietal Lobule		-45.96,-30.93,34.8	3.809	
		Lt Supramarginal Gyrus		-44.61,-39.45,35.37	3.802	
	65	Lt Cerebellum Pyramis		-23.08,-82.33,-31.84	3.660	
	593	Lt Cerebellum Declive		-30.16,-76.48,-19.24	3.616	
		Lt Middle Temporal Gyrus		-40.15,-62.01,6.28	3.599	
		Lt Occipital Lobe Sub-Gyral		-37.21,-64.92,-7.46	3.545	
	66	Rt Middle Temporal Gyrus		45.21,2.95,-26.66	3.561	
	78	Lt Precentral Gyrus	6	-40.31,-6.94,34.47	3.543	
	175	Rt Cerebellum Declive		47.65,-59.86,-19.05	3.396	
Rt Cerebellum Tuber			51.9,-52.37,-23.68	3.302		
101	Lt Middle Frontal Gyrus	9	-37.36,25.84,30.87	3.384		
	Lt Precentral Gyrus		-36.07,20.98,37.18	3.337		
BVf (+) Age						
95	Rt Lateral Ventricle		29.61,-17.23,-7.21	3.691		
58	Rt Middle Temporal Gyrus		61.55,-37.83,-14.03	3.618		
102	Lt Cerebellum Tuber		-27.28,-77.11,-27.36	3.499		
98	Rt Middle Frontal Gyrus		37.71,35.88,26.33	3.477		
100	Lt Middle Occipital Gyrus		-23.72,-89.83,16.09	3.458		
	Lt Cuneus	18	-14.04,-90.14,18.92	3.145		
80	Rt Frontal Lobe Sub-Gyral		44.63,15.15,21.78	3.425		
57	Lt Cuneus	17	-2.71,-95.35,-0.3	3.382		
51	Rt Temporal Lobe Sub-Gyral		27.63,-70.92,22.8	3.344		
50	Lt Cingulate Gyrus	24,32	-5.48,12.96,31.54	3.251		
ΔR2						
(+) Age	3980	Rt Extra-Nuclear		28.08,14.62,13.34	4.263	
		Rt Insula		32.21,2.02,12.22	4.110	
		Rt Lentiform Nucleus Putamen		25.4,-2.49,0.87	4.019	
	439	Rt Superior Temporal Gyrus		50.43,-13.27,-5.14	4.187	
		Rt Middle Temporal Gyrus		60.01,-30.75,0.13	3.555	
	98	Lt Middle Occipital Gyrus		-30.71,-85.99,20.38	3.881	
	393	Lt Frontal Lobe Sub-Gyral		-19.22,15.48,20.73	3.829	
	192	Rt Frontal Lobe Sub-Gyral		31.98,5.78,31.49	3.825	
	130	Lt Extra-Nuclear		-22.16,-40.53,16.73	3.788	
		Lt Lateral Ventricle		-30.36,-46.43,5.22	3.487	
	162	Lt Lateral Ventricle		-35.68,-28.2,-8.01	3.775	
		Lt Lateral Ventricle		-27.27,-18.07,-10.96	3.422	
		Lt Lateral Ventricle		-34.16,-13.58,-13.35	3.365	
	96	Lt Cerebellum Declive		-1.04,-67.24,-13.82	3.769	
	93	Rt Inferior Frontal Gyrus		40.92,29.48,-9.35	3.767	
	53	Lt Middle Temporal Gyrus	21	-64.91,-25.91,-1.53	3.702	
	142	Lt Lateral Ventricle		-5.4,-2.89,20.58	3.696	
		Lt Corpus Callosum		-9.64,-10.25,23.86	3.396	
		Lt Lateral Ventricle		-2.55,4.47,17.27	3.358	
	144	Lt Cerebellum Culmen		-2.54,-48.85,0.06	3.682	
	325	Rt Middle Frontal Gyrus		36.39,36.41,20.95	3.627	
		Rt Middle Frontal Gyrus		43.31,32.05,22.01	3.623	
		Rt Frontal Lobe Sub-Gyral		40.46,24.69,25.32	3.577	
	300	Rt Frontal Lobe Sub-Gyral		21.51,37.97,-8.88	3.624	
		Rt Frontal Lobe Sub-Gyral		22.9,22.85,-12.99	3.598	
		Rt Frontal Lobe Sub-Gyral		18.77,46.5,-9.47	3.466	
	77	Lt Insula	40	-48.45,-23.37,15.21	3.586	
	199	Lt Inferior Frontal Gyrus		-32.65,33.93,-8.83	3.505	
		Lt Frontal Lobe Sub-Gyral		-21.52,25.88,-13.45	3.234	
		Lt Frontal Lobe Sub-Gyral		-14.6,21.52,-12.4	3.212	
	63	Rt Posterior Cingulate	31	18.02,-66.03,16.34	3.452	
	75	Lt Frontal Lobe Sub-Gyral		-35.8,16.09,15.11	3.447	
143	Rt Corpus Callosum		4.22,-18.7,23.3	3.428		
	Rt Lateral Ventricle		15.33,-37.93,17.61	3.372		
	Lt Extra-Nuclear		-1.28,-26.54,17.06	3.300		
68	Rt Temporal Lobe Sub-Gyral		47.4,-43.91,5.42	3.374		
Q(+) Age						
665	Rt Corpus Callosum		4.24,-26.83,19.82	3.867		
		Rt Lateral Ventricle		15.33,-37.93,17.61	3.780	
	116	Rt Superior Temporal Gyrus	38	52.09,12.04,-18.92	3.858	
		Rt Middle Temporal Gyrus		54.59,-11.9,-4.93	3.767	
	246	Rt Superior Temporal Gyrus		51.88,-1.84,-6.73	3.321	
		Lt Middle Frontal Gyrus		-37.14,38.45,17.2	3.747	
	75	Rt Inferior Frontal Gyrus		21.6,18.05,-21.57	3.693	
	436	Rt Temporal Lobe Sub-Gyral		46.11,-30.8,1.24	3.643	
		Rt Lateral Ventricle		37.94,-25.52,-9.21	3.366	
	136	Lt Extra-Nuclear		-23.27,19.08,12.9	3.359	
93	Lt Inferior Frontal Gyrus	47	-24.31,12.05,-16.16	3.326		
mVD						
(-) Age	286	Rt Medial Frontal Gyrus		7.7,23.45,-18.59	3.846	
		Rt Inferior Frontal Gyrus	47	21.54,23.12,-15.69	3.293	
	359	Lt Corpus Callosum		-3.63,24.61,-1.11	3.785	
	71	Lt Frontal Lobe Sub-Gyral		-20.11,47.97,-8.63	3.529	
	104	Rt Frontal Lobe Sub-Gyral		21.53,43.56,-8.35	3.382	
Rt Anterior Cingulate			13.13,45.87,-2.87	3.250		
MvWI(+) Age						
9841	Rt Lentiform Nucleus Putamen		21.33,2.38,-5.5	5.009		
		Rt Extra-Nuclear		21.03,0.16,17.26	4.119	
	1478	Lt Middle Frontal Gyrus		-39.79,53.09,11.79	4.607	
		Lt Superior Frontal Gyrus		-35.78,51.9,23.9	3.967	
		Lt Inferior Frontal Gyrus		-45.19,44.65,-2.62	3.437	
	9722	Lt Caudate Head		-13.43,13.09,1.69	4.485	
		Lt Superior Temporal Gyrus		-52.15,10.27,-11.4	4.317	
		Lt Insula	13	-41.21,-14.33,-5.43	4.176	
	854	Lt Middle Frontal Gyrus		-36.02,14.52,31.17	3.718	
	276	Rt Brainstem		12.93,-26.92,-8.41	3.680	
	118	Lt Middle Frontal Gyrus	6	-30.71,-5.11,44.26	3.613	
	213	Rt Temporal Lobe Sub-Gyral		47.45,-43.52,1.41	3.536	
	110	Lt Thalamus	Pulvinar	-9.47,-25.45,6.21	3.510	
	177	Rt Middle Frontal Gyrus	6	32.99,9.89,61.62	3.507	
	74	Lt Superior Frontal Gyrus	8	-19.38,48.58,42.78	3.491	
	205	Rt Inferior Temporal Gyrus		41.81,-71.57,0.01	3.488	
		Rt Middle Temporal Gyrus	37	44.55,-64.99,4.73	3.242	
	67	Rt Lingual Gyrus	18	7.16,-84.71,-8.58	3.463	
	54	Lt Cerebellum Declive		-20.33,-60.64,-22.98	3.416	
	56	Rt Middle Frontal Gyrus		42.33,36.46,-8.67	3.406	
	71	Rt Corpus Callosum		4.45,22.73,17.77	3.385	
	97	Lt Temporal Lobe Sub-Gyral		-37.13,-34.17,-4.54	3.321	
	66	Lt Parietal Lobe Sub-Gyral		-36.13,-43.91,22.93	3.313	
	59	Lt Thalamus Anterior Nucleus		-5.27,-6.04,9.47	3.306	
	50	Lt Medial Frontal Gyrus		-6.25,24.4,-13.34	3.273	
	53	Lt Insula	13	-41.35,10.66,13.15	3.224	
	GMV(-) Age					
	2996	Lt Superior Frontal Gyrus	10	-11.77,55.75,-6.86	5.325	
		Lt Middle Frontal Gyrus	10	-20.41,61.7,19.24	3.891	
	2822	No Gray Matter found		-8.95,5.34,-25.1	3.969	
		Lt Parahippocampal Gyrus	Hippocampus	-27.22,-14.04,-13.73	3.856	
		Lt Parahippocampal Gyrus	28	-14.73,-8.64,-11.65	3.551	
	87	Rt Inferior Frontal Gyrus	9	54.36,21.53,23.45	3.840	
404	Lt Cuneus	18	-11.16,-78.87,14.18	3.811		
	Lt Posterior Cingulate	30	-11.04,-65.64,8.68	3.518		
938	Rt Cerebellum Culmen		38.04,-48.53,-24	3.775		
1391	Rt Inferior Frontal Gyrus	47	13.25,9.29,-23	3.682		
	Rt Superior Temporal Gyrus	38	31.4,7.18,-31	3.680		
	Rt Uncus	28	13.35,4.48,-31.56	3.505		
232	Lt Parahippocampal Gyrus	19,30	-20.59,-54.77,-1.26	3.645		
77	Rt Thalamus Pulvinar		5.69,-36.39,11.74	3.567		
132	Lt Cingulate Gyrus	24	-6.88,12.42,32.36	3.468		
	Lt Anterior Cingulate	24	-6.76,21.59,25.13	3.128		
233	Rt Parahippocampal Gyrus	35	21.48,-23.02,-24.57	3.418		
	Rt Cerebellum Culmen		21.33,-33.72,-16.12	3.273		
69	Lt Superior Temporal Gyrus	38	-36.69,12.47,-24.89	3.254		
WMV (-) Age						
1028	Lt Parahippocampal Gyrus		-38.31,-34.42,-21.25	4.856		
	Lt Fusiform Gyrus		-39.77,-41.79,-17.92	4.238		
88	Lt Middle Temporal Gyrus		-41.81,-74.04,23.58	3.879		
1485	Lt Superior Frontal Gyrus		-21.74,52.58,11.59	3.836		
	Lt Medial Frontal Gyrus		-7.86,51.11,11.69	3.534		

Rt, right; Lt, Lt; BA, Brodmann area (+) indicates the positive correlation; (-) indicates the negative correlation. P=0.001 without multiple comparison and 50 voxels. CN, cognitively normal; AD, Alzheimer's disease; ADC, apparent diffusion coefficient; BVf, blood volume fraction; Q, mean vessel density; mVD, mean vessel diameter; MvWI, microvessel-weighted imaging; GMV, gray matter volume; WMV, white matter volume.

Table S3 Results of comparisons of apparent diffusion coefficient (ADC), $\Delta R2$, $\Delta R2^*$, gray matter volume (GMV), and white matter volume (WMV) between the participant groups in specific brain areas and results of association between each microvascular index and the disease group and age

Microvascular Index	ROI	CN	AD	*P-value/ z-value	#F/p (group-p/age-p)
ADC $\times 10^3$ (mm ² /s)	Hippocampus	1.128(1.076 to 1.208)	1.374 (1.261 to 1.431)	<0.001*/3.382	F=21.220/p<0.001* (0.004*/0.009*)
	Parahippocampal Gyrus	1.082 (1.057 to 1.100)	1.238 (1.209 to 1.266)	<0.001*/ 3.710	F=22.764/p=<0.001* (0.001*/0.035*)
	Precuneus	1.038 (0.995 to 1.096)	1.115 (1.068 to 1.183)	0.017*/ 2.397	F=4.574/p= 0.024* (0.093/0.304)
	Caduate	1.354 (1.289 to 1.433)	1.404 (1.295 to 1.540)	0.577/ 0.558	F=2.800/p=0.086 (0.463/0.034*)
	Corpus callosum	1.413 (1.382 to 1.445)	1.573 (1.480 to 1.655)	0.005*/ 2.791	F=5.807/p=0.011* (0.067/0.226)
	Globus Pallidus	0.669 (0.645 to 0.740)	0.755 (0.681 to 0.847)	0.020*/ 2.331	F=2.210/p= 0.137 (0.102/0.960)
	Lateral Ventricle	1.661 (1.620 to 1.688)	1.775 (1.699 to 1.831)	0.024*/ 2.265	F=11.920/p=<0.001* (0.659/0.001*)
	Putamen	0.723 (0.657 to 0.757)	0.754 (0.723 to 0.935)	0.094/ 1.674	F=1.277/p= 0.302 (0.305/0.683)
	Thalamus	1.099 (1.044 to 1.124)	1.142 (1.010 to 1.192)	0.224/ 1.215	F=1.190/p= 0.326 (0.739/0.166)
	GMV70	1.008 (0.949 to 1.056)	1.120 (1.034 to 1.202)	0.033*/ 2.134	F=5.060/p=0.017* (0.398/0.053)
	WMV70	0.962 (0.924 to 0.993)	1.077 (0.988 to 1.124)	0.012*/ 2.528	F=1.062/p= 0.366 (0.172/0.302)
	WMHI	1.124 (1.095 to 1.252)	1.200 (1.111 to 1.291)	0.412/ 0.821	F=4.584/p=0.024* (0.158/0.182)
$\Delta R2$ (1/s)	Hippocampus	0.477 (0.044 to 0.755)	0.389 (0.046 to 1.132)	0.922/ 0.099	F=6.084/p=0.009* (0.122/0.003*)
	Parahippocampal Gyrus	0.350 (-0.021 to 0.764)	-0.005 (-0.347 to 0.848)	0.577/ 0.558	F=3.721/p=0.043* (0.062/0.016*)
	Precuneus	0.500 (0.070 to 0.985)	0.335 (0.018 to 0.971)	0.670/ 0.427	F=2.687/p=0.094 (0.178/0.032*)
	Caduate	0.361 (0.042 to 1.171)	0.395 (-0.067 to 1.734)	0.818/ 0.230	F=0.084/p=0.919 (0.702/0.746)
	Corpus callosum	0.381 (-0.050 to 0.649)	-0.019 (-0.366 to 1.100)	0.622/ 0.492	F=4.621/p=0.023* (0.103/0.007*)
	Globus Pallidus	0.382 (-0.136 to 0.799)	0.335 (-0.247 to 1.050)	0.870/ 0.164	F=1.089/p=0.357 (0.577/0.164)
	Lateral Ventricle	0.427 (0.015 to 0.898)	0.434 (0.095 to 1.079)	0.870/ 0.164	F=4.273/p=0.029* (0.250/0.010*)
	Putamen	0.375 (-0.207 to 0.742)	0.172 (-0.445 to 1.143)	0.922/ 0.099	F=2.094/p=0.151 (0.422/0.058)
	Thalamus	0.696 (0.290 to 1.013)	0.441 (-0.004 to 1.306)	0.622/ 0.492	F=0.284/p=0.756 (0.462/0.647)
	GMV70	0.379 (-0.026 to 0.924)	0.635 (-0.005 to 1.049)	0.974/ 0.033	F=2.983/p=0.075 (0.201/0.025*)
	WMV70	0.370 (-0.046 to 0.902)	0.039 (-0.385 to 0.863)	0.412/ 0.821	F=3.396/p=0.055 (0.091/0.019*)
	WMHI	0.606 (0.019 to 0.819)	0.139 (0.008 to 0.861)	0.577/ 0.558	F=2.726/p=0.091 (0.237/0.031*)
$\Delta R2^*$ (1/s)	Hippocampus	2.516 (1.210 to 4.763)	2.666 (1.768 to 3.360)	0.922/ 0.099	F=0.016/p=0.984 (0.898/0.977)
	Parahippocampal Gyrus	1.824 (0.778 to 3.384)	1.800 (1.060 to 2.357)	0.718/ 0.361	F=0.205/p=0.817 (0.532/0.687)
	Precuneus	1.877 (0.924 to 2.368)	1.457 (1.183 to 2.777)	0.922/ 0.099	F=0.218/p=0.806 (0.614/0.536)
	Caduate	2.378 (0.478 to 2.957)	1.357 (0.104 to 3.127)	0.577/ 0.558	F=0.701/p=0.509 (0.921/0.366)
	Corpus callosum	2.061 (0.381 to 2.402)	1.529 (1.340 to 2.492)	0.870/ 0.164	F=0.139/p=0.871 (0.623/0.681)
	Globus Pallidus	1.203 (0.458 to 3.624)	2.504 (0.561 to 4.794)	0.341/ 0.952	F=0.896/p=0.425 (0.239/0.269)
	Lateral Ventricle	2.143 (0.938 to 2.975)	1.613 (1.183 to 2.548)	0.577/ 0.558	F=0.995/p=0.388 (0.970/0.247)
	Putamen	1.350 (0.629 to 3.016)	1.294 (0.878 to 2.984)	0.974/ 0.033	F=0.066/p=0.936 (0.906/0.728)
	Thalamus	1.837 (0.920 to 2.712)	2.434 (1.164 to 3.327)	0.412/ 0.821	F=0.619/p=0.549 (0.280/0.528)
	GMV70	2.042 (1.070 to 2.837)	2.043 (1.533 to 2.802)	0.670/ 0.427	F=1.063/p=0.365 (0.906/0.218)
	WMV70	1.546 (1.023 to 2.004)	1.491 (1.036 to 2.095)	0.768/ 0.295	F=0.097/p=0.908 (0.917/0.770)
	WMHI	1.081 (0.600 to 1.734)	1.027 (0.378 to 2.059)	0.870/ 0.164	F=0.165/p=0.849 (0.856/0.729)
GMV (mm ³)	Hippocampus	0.420 (0.395 to 0.444)	0.282 (0.259 to 0.352)	<0.001*/ 3.447	N/A
	Parahippocampal Gyrus	0.392 (0.356 to 0.430)	0.295 (0.282 to 0.343)	<0.001*/ 3.316	N/A
	Precuneus	0.296 (0.275 to 0.308)	0.257 (0.242 to 0.288)	0.028*/ 2.200	N/A
	Caduate	0.307 (0.271 to 0.317)	0.300 (0.250 to 0.336)	0.533/ 0.624	N/A
	Corpus callosum	0.111 (0.104 to 0.117)	0.115 (0.107 to 0.121)	0.450/ 0.755	N/A
	Globus Pallidus	0.157 (0.144 to 0.173)	0.157 (0.130 to 0.170)	0.412/ 0.821	N/A
	Lateral Ventricle	0.148 (0.143 to 0.159)	0.140 (0.125 to 0.146)	0.039*/ 2.068	N/A
	Putamen	0.326 (0.311 to 0.373)	0.332 (0.291 to 0.354)	0.670/ 0.427	N/A
	Thalamus	0.341 (0.306 to 0.375)	0.320 (0.287 to 0.362)	0.309/ 1.018	N/A
WMV (mm ³)	Hippocampus	0.197 (0.190 to 0.232)	0.190 (0.153 to 0.210)	0.158/ 1.412	N/A
	Parahippocampal Gyrus	0.188 (0.169 to 0.213)	0.176 (0.144 to 0.191)	0.123/ 1.543	N/A
	Precuneus	0.214 (0.192 to 0.253)	0.214 (0.191 to 0.240)	0.768/ 0.295	N/A
	Caduate	0.160 (0.148 to 0.176)	0.171 (0.155 to 0.192)	0.375/ 0.886	N/A
	Corpus callosum	0.368 (0.332 to 0.427)	0.368 (0.332 to 0.427)	0.450/ 0.755	N/A
	Globus Pallidus	0.436 (0.412 to 0.521)	0.483 (0.384 to 0.516)	0.974/ 0.031	N/A
	Lateral Ventricle	0.245 (0.223 to 0.261)	0.236 (0.213 to 0.273)	0.670/ 0.427	N/A
	Putamen	0.288 (0.276 to 0.341)	0.306 (0.275 to 0.320)	0.622/ 0.492	N/A
	Thalamus	0.197 (0.191 to 0.255)	0.228 (0.191 to 0.249)	0.577/ 0.558	N/A

*, P-value by Mann-Whitney U-test and data are listed as median (95% CI for the median). #, F and P-values by multiple regression analysis with modeling as each microvascular index = participant group + age. CN, cognitively normal; AD, Alzheimer's disease; ROI, region-of-interest; GMV70, 70% gray matter volume; WMV70, 70% white matter volume; WMHI, white matter hyperintensity.

Table S4 Results of correlation analyses between apparent diffusion coefficient (ADC), $\Delta R2$, $\Delta R2^*$, gray matter volume (GMV), and white matter volume (WMV) and age or mini-mental state examination (MMSE) scores in specific brain areas

ROIs	Microvascular	ADC $\times 10^3$ (mm ² /s) rho/P value	$\Delta R2$ (1/s) rho/ P value	$\Delta R2^*$ (1/s) rho/ P value	GMV (mm ³) rho/P value	WMV (mm ³) rho/P value
	Index Variable					
Hippocampus	[†] age	0.701/<0.001*	0.560/0.007*	0.031/0.891	-0.654/0.001*	-0.634/0.002*
	MMSE	-0.305/0.178	-0.004/0.985	-0.100/0.667	0.276/0.226	0.550/0.010
Parahippocampal Gyrus	[†] age	0.714/<0.001*	0.384/0.077	0.093/0.680	-0.652/0.001*	-0.669/<0.001*
	MMSE	-0.248/0.278	0.086/0.713	-0.121/0.601	0.252/0.271	0.595/0.004
Precuneus	[†] age	0.452/0.035*	0.378/0.083	0.162/0.472	-0.242/0.290	-0.262/0.251
	MMSE	0.056/0.809	0.104/0.652	0.085/0.716	0.321/0.157	0.488/0.025
Caudate	[†] age	0.461/0.031*	0.260/0.243	-0.140/0.534	-0.122/0.598	-0.080/0.731
	*MMSE	0.045/0.848	-0.157/0.497	-0.109/0.638	-0.078/0.736	0.419/0.059
Corpus Callosum	[†] age	0.587/0.004*	0.508/0.016*	-0.021/0.926	-0.371/0.098	-0.402/0.071
	MMSE	-0.055/0.811	-0.040/0.864	-0.145/0.530	-0.085/0.715	0.604/0.004
Globus Pallidus	[†] age	0.514/0.014*	0.313/0.157	-0.077/0.734	-0.195/0.397	-0.320/0.158
	*MMSE	-0.022/0.925	-0.136/0.558	-0.209/0.363	0.053/0.819	0.355/0.114
Lateral Ventricle	[†] age	0.734/<0.001*	0.509/0.016*	-0.159/0.479	-0.447/0.042*	-0.435/0.049*
	MMSE	-0.080/0.730	-0.031/0.894	-0.185/0.423	0.088/0.704	0.557/0.009
Putamen	[†] age	0.343/0.119	0.394/0.070	0.035/0.879	-0.119/0.608	-0.398/0.074
	*MMSE	-0.045/0.840	-0.201/0.382	0.053/0.820	0.099/0.670	0.382/0.088
Thalamus	[†] age	0.474/0.026*	0.216/0.335	-0.051/0.822	-0.275/0.227	-0.148/0.521
	*MMSE	-0.135/0.561	-0.132/0.567	-0.206/0.371	-0.203/0.377	0.401/0.072
GMV70	[†] age	0.562/0.007*	0.481/0.023*	0.304/0.170		
	*MMSE	-0.063/0.787	0.009/0.968	-0.180/0.434		
WMV70	[†] age	0.490/0.021*	0.345/0.116	0.201/0.371		
	*MMSE	-0.214/0.352	-0.055/0.811	-0.411/0.064		
WMHI	[†] age	-0.159/0.479	0.358/0.102	0.153/0.498		
	*MMSE	-0.352/0.117	-0.059/0.798	-0.083/0.720		

[†]age: Rank correlation analysis (Spearman's coefficient /P value). *MMSE: Partial correlation analysis (rho/P value) with age as a covariate. GMV and WMV: partial correlation analysis (rho/P value) with both age and TIV as covariates. GMV70, 70% gray matter volume; WMV70, 70% white matter volume; WMHI, white matter hyperintensity.

Table S5 Results of paired comparisons of apparent diffusion coefficient (ADC), $\Delta R2$, $\Delta R2^*$ among 70% gray matter volume (GMV70), 70% white matter volume (WMV70), and WMHI ROIs in the cognitive normal (CN) or Alzheimer's disease (AD) participants

Microvascular Index	CN (P value)			AD (P value)		
	GMV70 vs. WMV70	GMV70 vs. WMHI	WMV70 vs. WMHI	GMV70 vs. WMV70	GMV70 vs. WMHI	WMV70 vs. WMHI
ADC $\times 10^3$	0.005*	<0.001*	0.001*	0.206	0.175	0.024*
DeltaR2	0.278	0.520	0.966	0.278	0.765	0.102
DeltaR2star	0.024*	0.024*	0.465	0.007*	0.005*	0.413

P value by Wilcoxon rank test analysis. WMHI, white matter hyperintensity.