

ADDITIONAL MATERIAL

Table S1. Eligible and not eligible participants

Units Selected from Sampling Frame	N
Respondent, total	1121
Respondent not eligible	
Experienced a stroke	17
Unable to determine eligibility	
Missing mtDNA haplogroup information	452
Missing covariates	47
Missing MMSE	0
Missing BC estimates	23
Respondent screened and eligible, total	582

Table S2. Differences in exposure and outcome between eligible participants and participants without haplogroup information.

Variables	Eligible participants (582)	Participants without haplogroup information (452)
BC_baseline - mean(SD)[NA]	0.59 (0.28) [0]	0.49 (0.31) [419]
MMSE - mean(SD) [NA]	26.89 (1.73) [0]	26.77 (2) [32]
MMSE ≤ 25 N(%) [NA]	232 (18.59%) [0]	165 (19.71%) [32]

Table S3. Distribution of MMSE performance by mitochondrial clusters and haplogroups.

Haplotypes	MMSE≤25	MMSE>26
Cluster 1 (J or T)		
Haplogroup J	26 (11.2%)	88 (8.7%)
Haplogroup T	26 (11.2%)	92 (9.1%)
Cluster 2 (H or V)		
Haplogroup H	23 (10.0%)	80 (7.9%)
Haplogroup V	98 (42.2%)	429 (42.2%)
Cluster 3 (K or U)		
Haplogroup K	24 (10.3%)	97 (9.5%)
Haplogroup U	14 (6.0%)	117 (11.5%)
Cluster 4 (I, W or X)		
Haplogroup I	10 (4.3%)	57 (5.6%)
Haplogroup W	2 (0.9%)	16 (1.6%)
Haplogroup X	9 (3.9%)	40 (3.9%)

Table S4. Chi-Square Test of Association.

Variables	MMSE (binary)	mtDNA Haplogroups
	p-value	p-value
Age	<.0001	0.6336
Education	<.0001	<.0001
First Language	0.0001	0.003
Computer Experience	<.0001	0.0002
Physical Activity (MET-hr/week)	<.0001	0.0648
Alcohol (drinks/day)	0.0204	0.0055
Diabetes	0.0278	0.0389
Consumed Dark Fish (times/week)	0.4965	0.0002
Smoking Status	0.0784	<.0001
BMI (Kg/m²)	0.2749	0.0221
Hypertension	0.1804	0.0322
Ethnicity	0.0049	<.0001
MtDNA Haplogroups	0.2645	.

Table S5. Effect of clusters on the low MMSE.

Effect	OR ^{a,b}	95% CI ^{a,b}
Cluster 1	1.22	(0.78-1.91)
Cluster 2	Ref.	.
Cluster 3	0.84	(0.52-1.36)
Cluster 4	1.00	(0.52-1.91)

^a Adjusted for age, education, matrilineal ethnicity, first language, computer experience, smoking, body mass index (BMI), physical activity, alcohol intake, diabetes, hypertension, dark fish consumption, percentage of the participant's census tract that is nonwhite, percentage of residential census tract adults with a college degree, indicator for first cognitive assessment, indicator for whether the participant was a part-time resident of the greater Boston area.

^b Cluster 2 was taken as reference group.

Table S6. Effect for doubling in Black Carbon (BC) concentration on the natural scale on the low MMSE score, overall and by mitochondrial clusters.

BC effect in:	OR^a	95% CI^a	OR for the interaction term^{a,b}	95% CI for the interaction term^{a,b}
All participants	1.22	(0.95-1.56)		
Cluster 1	1.62	(0.90-2.91)	1.48	(0.77-2.86)
Cluster 2	1.10	(0.79-1.53)	Ref.	.
Cluster 3	0.97	(0.60-1.58)	0.89	(0.50-1.57)
Cluster 4	2.70	(1.30-5.59)	2.46	(1.10-5.48)

^a Odds ratios (ORs) and 95% Confidence Intervals (CIs) adjusted for age, education, matrilineal ethnicity, first language, computer experience, smoking, body mass index (BMI), physical activity, alcohol intake, diabetes, hypertension, dark fish consumption, percentage of the participant's census tract that is nonwhite, percentage of residential census tract adults with a college degree, indicator for first cognitive assessment, indicator for whether the participant was a part-time resident of the greater Boston area.

^b ORs and 95% CIs for the interaction term between clusters and BC concentration. The ORs express the modification of the relative odds for low MMSE associated with a doubling in BC concentrations for each of the clusters relative to the most common cluster, i.e. Cluster 2, taken as reference.

Table S7. Effect for doubling in BC concentration on the natural scale on the low MMSE score by individual haplogroups.

BC effect in:	OR^a	95% CI^a	OR for the interaction term^{a,b}	95% CI for the interaction term^{a,b}
Cluster 1				
Haplogroup J	3.04	(1.18;7.86)	2.89	(1.04;8.01)
Haplogroup T	0.88	(0.39;2.00)	0.84	(0.35;2.01)
Cluster 2				
Haplogroup H	1.40	(0.65;3.04)	1.33	(0.58;3.05)
Haplogroup V	1.05	(0.74;1.50)	Ref.	.
Cluster 3				
Haplogroup K	0.91	(0.53;1.57)	0.87	(0.46;1.63)
Haplogroup U	1.43	(0.56;3.60)	1.35	(0.51;3.61)
Cluster 4				
Haplogroup I	3.68	(0.92;14.73)	3.49	(0.83;14.78)
Haplogroup X	2.55	(1.05;6.20)	2.42	(0.93;6.28)
Haplogroup W	4.15	(0.53;32.73)	3.94	(0.49;31.41)

^a Odds ratios (ORs) and 95% Confidence Intervals (CIs) adjusted for age, education, matrilineal ethnicity, first language, computer experience, smoking, body mass index (BMI), physical activity, alcohol intake, diabetes, hypertension, dark fish consumption, percentage of the participant's census tract that is nonwhite, percentage of residential census tract adults with a college degree, indicator for first cognitive assessment, indicator for whether the participant was a part-time resident of the greater Boston area.

^b ORs and 95% CIs for the interaction term between mtDNA haplogroups and BC concentration. The ORs express the modification of the relative odds for low MMSE associated with a doubling in BC concentrations for each of the mtDNA haplogroup relative to the most common haplogroup, i.e. haplogroup V, taken as reference.

Table S8. Effect for doubling in Black Carbon (BC) concentration on the natural scale on low MMSE score, overall and by mitochondrial clusters, adjusted for age and age and education.

BC effect in:	Age				Age and Education			
	OR ^a	95% CI ^a	OR for the interaction term ^{a,b}	95% CI for the interaction term ^{a,b}	OR ^c	95% CI ^c	OR for the interaction term ^{c,b}	95% CI for the interaction term ^{c,b}
All participants	1.26	(1.00;1.58)			1.18	(0.94;1.48)		
Cluster 1	1.77	(0.99;3.18)	1.62	(0.84;3.14)	1.57	(0.87;2.83)	1.50	(0.78;2.91)
Cluster 2	1.09	(0.81;1.48)	Ref.	.	1.04	(0.78;1.40)	Ref.	.
Cluster 3	1.10	(0.69;1.74)	1.00	(0.57;1.75)	1.00	(0.62;1.62)	0.96	(0.55;1.68)
Cluster 4	2.16	(1.00;4.66)	1.97	(0.86;4.51)	2.18	(1.01;4.71)	2.09	(0.92;4.77)

^a Adjusted for age

^b Cluster 2 was taken as reference group.

^c Adjusted for age and education.

Table S9. Effect for doubling in Black Carbon (BC) concentration on the natural scale on low MMSE score, overall and by mitochondrial clusters, adjusted for age and age and education.

BC effect in:	Age adjusted				Age and education adjusted			
	OR ^a	95% CI ^a	OR for the interaction term ^{a,b}	95% CI for the interaction term ^{a,b}	OR ^c	95% CI ^c	OR for the interaction term ^{c,b}	95% CI for the interaction term ^{c,b}
Cluster 1								
Haplogroup J	2.43	(1.14;5.19)	2.23	(0.97;5.11)	2.47	(1.02;5.99)	2.41	(0.93;6.21)
Haplogroup T	1.29	(0.5;3.31)	1.18	(0.44;3.2)	1.00	(0.42;2.38)	0.98	(0.39;2.46)
Cluster 2								
Haplogroup H	1.12	(0.51;2.45)	1.02	(0.44;2.4)	1.18	(0.59;2.35)	1.15	(0.53;2.47)
Haplogroup V	1.09	(0.78;1.52)	Ref.	.	1.03	(0.74;1.42)	Ref.	.
Cluster 3								
Haplogroup K	0.91	(0.55;1.52)	0.83	(0.45;1.53)	0.87	(0.53;1.44)	0.85	(0.47;1.55)
Haplogroup U	1.95	(0.81;4.69)	1.78	(0.7;4.57)	1.67	(0.65;4.29)	1.63	(0.61;4.4)
Cluster 4								
Haplogroup I	2.84	(0.73;10.96)	2.60	(0.65;10.44)	3.02	(0.77;11.86)	2.94	(0.72;12.02)
Haplogroup X	1.93	(0.68;5.54)	1.77	(0.59;5.34)	2.00	(0.73;5.46)	1.95	(0.68;5.61)
Haplogroup W	2.51	(0.92;6.85)	2.30	(0.80;6.60)	2.43	(0.87;6.82)	2.37	(0.81;6.96)

^a Adjusted for age

^b Haplogroup V was taken as reference.

^c Adjusted for age and education.

Table S10. Effect of clusters on the change of MMSE.

Effect	Estimate ^{a,b}	95% CI ^{a,b}
Cluster 1	-0.11	(-0.58;0.36)
Cluster 2	Ref.	.
Cluster 3	-0.01	(-0.44;0.43)
Cluster 4	-0.09	(-0.58;0.40)

^a Adjusted for age at the baseline, difference of age between the cognitive assessment and the baseline assessment, education, matrilineal ethnicity, first language, computer experience, smoking, body mass index (BMI), physical activity, alcohol intake, diabetes, hypertension, dark fish consumption, percentage of the participant's census tract that is nonwhite, percentage of residential census tract adults with a college degree, indicator for first cognitive assessment, indicator for whether the participant was a part-time resident of the greater Boston area.

^b Cluster 2 was taken as reference group.

Table S11. Effect for doubling in Black Carbon (BC) concentration on the natural scale on the change of MMSE score, overall and by mitochondrial clusters.

BC effect in:	Estimate ^a	95% CI ^a	Estimate for the interaction term ^{a,b}	95% CI for the interaction term ^{a,b}
All participants	0.13	(-0.11;0.37)		
Cluster 1	-0.09	(-0.58;0.40)	-0.21	(-0.78;0.35)
Cluster 2	0.12	(-0.16;0.41)	Ref.	.
Cluster 3	0.31	(-0.49;1.11)	0.18	(-0.66;1.03)
Cluster 4	0.16	(-0.27;0.58)	0.03	(-0.47;0.53)

^a Adjusted for age at the baseline, difference of age between the cognitive assessment and the baseline assessment, education, matrilineal ethnicity, first language, computer experience, smoking, body mass index (BMI), physical activity, alcohol intake, diabetes, hypertension, dark fish consumption, percentage of the participant's census tract that is nonwhite, percentage of residential census tract adults with a college degree, indicator for first cognitive assessment, indicator for whether the participant was a part-time resident of the greater Boston area.

^b Cluster 2 was taken as reference group.

Table S12. Effect for doubling in BC concentration on the natural scale on the change of MMSE score by individual haplogroups.

BC effect in:	Estimate^a	95% CI^a	Estimate for the interaction term^{a,b}	95% CI for the interaction term^{a,b}
Cluster 1				
Haplogroup J	-0.09	(-0.54;0.37)	-0.15	(-0.70;0.39)
Haplogroup T	-0.24	(-1.38;0.90)	-0.31	(-1.50;0.88)
Cluster 2				
Haplogroup H	0.83	(-0.22;1.87)	0.76	(-0.31;1.83)
Haplogroup V	0.07	(-0.23;0.36)	Ref.	.
Cluster 3				
Haplogroup K	0.91	(-0.37;2.20)	0.85	(-0.47;2.17)
Haplogroup U	-0.30	(-0.90;0.30)	-0.36	(-1.01;0.28)
Cluster 4				
Haplogroup I	1.02	(-0.01;2.05)	0.96	(-0.12;2.03)
Haplogroup X	-0.16	(-1.06;0.75)	-0.22	(-1.17;0.72)
Haplogroup W	0.40	(-0.01;0.81)	0.34	(-0.15;0.83)

^a Adjusted for age at the baseline, difference of age between the cognitive assessment and the baseline assessment, education, matrilineal ethnicity, first language, computer experience, smoking, body mass index (BMI), physical activity, alcohol intake, diabetes, hypertension, dark fish consumption, percentage of the participant's census tract that is nonwhite, percentage of residential census tract adults with a college degree, indicator for first cognitive assessment, indicator for whether the participant was a part-time resident of the greater Boston area.

^b Haplogroup V was taken as reference.