

Supplement

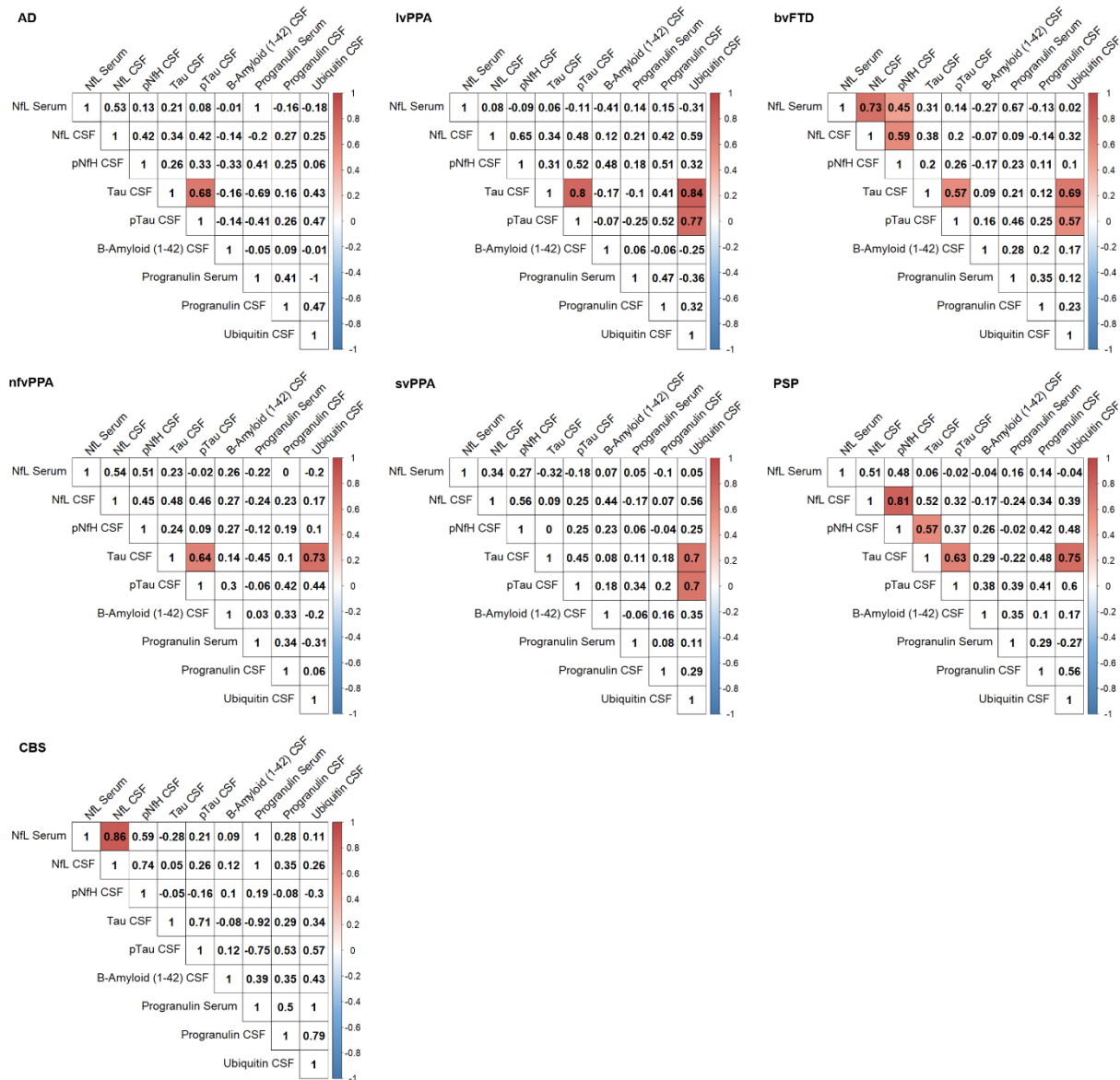


Figure S1: Partial Spearman correlations between serum and CSF biomarkers. Age corrected correlation coefficients, represented as Spearman’s ρ of biomarkers for all patient cohorts, i.e., AD, IvPPA, bvFTD, nvPPA, svPPA, PSP and CBS, separately. Colored cells show significantly correlated markers. Blue color denotes negative correlation and red positive correlation. Significance: $p < 0.05$. AD Alzheimer’s disease, bvFTD behavioral variant frontotemporal dementia, CBS corticobasal syndrome, CSF cerebrospinal fluid, IvPPA logopenic variant primary progressive aphasia, NfL neurofilament light chain, nvPPA non-fluent variant primary progressive aphasia, pNFH phosphorylated neurofilament heavy chain, PSP progressive supranuclear palsy, pTau phosphorylated tau protein, svPPA semantic variant primary progressive aphasia.

Table S1: Study centers and MRI scanners.

Study center	MRI scanner	N
Friedrich Wilhelms University Bonn, Psychiatry	3 T Siemens Magnetom Skyra	19
University Hospital Erlangen, Psychiatry	3 T Siemens Magnetom TIM TRIO, 1.5 T Siemens Magnetom Sonata/Espreo	23
University Hospital Göttingen, Psychiatry	3 T Siemens Magnetom Trio/Sonata	29
University Hospital Hamburg-Eppendorf, Psychiatry	3 T Siemens Magnetom Skyra, 1.5 T Philips Avanto	19
University Hospital Homburg/Saar, Neurology	3 T Siemens Magnetom Skyra, 1.5 T Siemens Symphonie	33
Max Planck Institute for Human Cognitive & Brain Science & University Hospital Leipzig, Cognitive Neurology	3 T Siemens Magnetom Verio	36
Technical University Munich, Psychiatry, Klinikum r. d. Isar	3 T Siemens Verio/Philips Avanto	68
LMU Munch, Neurology	3 T GE Signa HdX, 8-channel head coil, 1.5 T Siemens Magnetom Symphony	17
University Hospital Tübingen, Neurology	3 T Siemens Magnetom Skyra	5
University Hospital Ulm, Neurology	3 T Magnetom ALLEGRA, 3 T Magnetom PRISMA, 1.5 T Magnetom Symphony	137
University Hospital Würzburg, Psychiatry	3 T Siemens TIM TRIO	28
University Hospital Rostock	3 T Siemens Magnetom Verio	14

N: Number of participants included, T: Tesla.

Table S2: Number of individual genetic diagnoses and percentage of all monogenic cases (N=42).

Mutation	N	Percentage of all mutation carriers (%)
<i>C9orf72</i>	22	52
<i>GRN</i>	11	26
<i>MAPT</i>	4	10
<i>TBK1</i>	3	7
<i>TARDBP</i>	1	2
<i>Presenilin</i>	1	2

C9orf72: chromosome 9 open reading frame 72, *GRN*: progranulin, *MAPT*: microtubule associated protein tau, N: number of participants with (likely) pathogenic variants in the respective gene, *TARDBP*: TAR DNA binding protein, *TBK1*: TANK-binding kinase 1.

Table S3: Number of genetically tested participants and number of genetically solved individuals per clinical group.

	Healthy	AD	lvPPA	bvFTD	nfvPPA	svPPA	PSP	CBS
Total N of each group	33	63	28	128	57	44	49	26
N of genetically tested participants and percentage of group (%)	25 (76)	47 (75)	26 (93)	114 (89)	40 (70)	39 (89)	27 (55)	19 (73)
N of mutations and percentage of tested participants (%)	0 (0)	2 (4)	2 (8)	28 (25)	6 (15)	3 (8)	0 (0)	1 (5)

AD: Alzheimer's disease, bvFTD: behavioral variant frontotemporal dementia, CBS: corticobasal syndrome, lvPPA: logopenic variant primary progressive aphasia, N: Number of participants, nfvPPA: non-fluent variant primary progressive aphasia, PSP: progressive supranuclear palsy.

Table S4: Absolute numbers of genetic diagnoses per clinical group.

Disease gene	AD	lvPPA	bvFTD	nfvPPA	svPPA	PSP	CBS
<i>C9orf72</i>	1	1	18	0	1	0	1
<i>GRN</i>	0	0	6	4	1	0	0
<i>MAPT</i>	0	0	2	1	1	0	0
<i>TBK1</i>	0	1	1	1	0	0	0
<i>TARDBP</i>	0	0	1	0	0	0	0
<i>Presenilin</i>	1	0	0	0	0	0	0

AD: Alzheimer's disease, bvFTD: behavioral variant frontotemporal dementia, CBS: corticobasal syndrome, lvPPA: logopenic variant primary progressive aphasia, nfvPPA: non-fluent variant primary progressive aphasia, PSP: progressive supranuclear palsy. Abbreviations for genes see note to Table S16.

Table S5: Brain areas used for volumetric analyses.

Other	Temporal	Subcortical
Insula	Superior temporal gyrus GM/WM	Hippocampus
Cerebellum GM/WM	Middle temporal gyrus GM/WM	Amygdala
Frontal	Inferior temporal gyrus GM/WM	Caudate
Superior frontal gyrus GM/WM	Parahippocampal gyrus GM/WM	Putamen
Middle frontal gyrus GM/WM	Lingual gyrus GM/WM	Accumbens
Inferior frontal gyrus GM/WM	Fusiform gyrus GM/WM	Pallidum
Precentral gyrus GM/WM	Occipital	Thalamus
Middle orbitofrontal gyrus GM/WM	Superior occipital gyrus GM/WM	Brainstem
Lateral orbitofrontal gyrus GM/WM	Middle occipital gyrus GM/WM	
Gyrus rectus GM/WM	Inferior occipital gyrus GM/WM	
Parietal	Cuneus GM/WM	
Postcentral gyrus GM/WM	Limbic	
Superior parietal gyrus GM/WM	Cingulate gyrus GM/WM	
Supramarginal gyrus GM/WM		
Angular gyrus GM/WM		
Precuneus GM/WM		

Subcortical areas were taken from the Harvard-Oxford atlas for subcortical structures (Makris et al., 2006; Frazier et al., 2005; Desikan et al., 2006; Goldstein et al., 2007), whereas all other areas were extracted from the Laboratory of NeuroImaging probabilistic brain atlas (Shattuck et al., 2008). All areas are given for left and right hemisphere respectively, resulting in a total of 114 brain areas, GM: gray matter, WM: white matter. Note, that the brainstem includes midbrain, pons and medulla oblongata.

Table S6: Removed biomarker outliers per biomarker and cohort.

	Healthy	AD	lvPPA	bvFTD	nfvPPA	svPPA	PSP	CBS
NfL serum	1	-	1	1	-	1	1	1
NfL CSF	-	2	-	1	1	1	-	-
pNfH CSF	-	1	-	2	1	1	1	-
Tau CSF	-	2	-	2	-	1	1	1
ptau CSF	-	2	-	2	-	-	1	-
β-amyloid (1-42)	-	1	-	-	-	-	-	-
Progranulin serum	-	-	-	-	1	-	-	-
Progranulin CSF	-	-	1	1	-	1	1	-
Ubiquitin CSF	-	1	-	1	-	-	-	-

bvFTD: behavioral variant frontotemporal dementia, CSF: cerebrospinal fluid, lvPPA: logopenic variant primary progressive aphasia, NfL: neurofilament light chain, pNfH: phosphorylated neurofilament heavy chain, ptau: phosphorylated tau, svPPA: semantic variant primary progressive aphasia.

Table S7: Significant results of correlation between age and brain volumes.

Region	p value	Spearman's ρ
Other		
CBL R/L GM	<0.0001	-0.35
CBL R/L WM	<0.0001	-0.33
Frontal		
PrCG R GM	<0.0001	-0.27
PrCG L GM	<0.0001	-0.29
SFG R WM	0.0317	-0.18
MFG R WM	0.0032	-0.21
MFG L WM	0.0079	-0.20
Parietal		
PoCG R GM	<0.0001	-0.26
PoCG L GM	<0.0001	-0.27
Temporal		
STG R GM	0.0014	-0.22
STG L GM	0.0040	-0.21
PHG R GM	0.0007	-0.23
PHG L GM	0.0091	-0.20
LING R GM	<0.0001	-0.33
LING L GM	<0.0001	-0.30
FFG R/L GM	<0.0001	-0.28
MTG R WM	0.0046	-0.20
MTG L WM	0.0321	-0.18
ITG R WM	0.0171	-0.19
PHG R WM	0.0009	-0.22
PHG L WM	0.0004	-0.23
FFG R WM	0.0001	-0.25
FFG L WM	<0.0001	-0.31
Occipital		
CUN R GM	<0.0001	-0.27
CUN L GM	0.0015	-0.22
SOG R GM	0.0034	-0.21
MOG R GM	0.0213	-0.19
IOG R GM	<0.0001	-0.28
IOG L GM	<0.0001	-0.27
MOG L WM	0.0196	-0.19

Subcortical

HP R	0.0005	-0.23
HP L	<0.0001	-0.25
AMYG R	0.0082	-0.20
AMYG L	0.0334	-0.18
PAL R	0.0068	-0.20
PAL L	0.0027	-0.21
THL R/L	<0.0001	-0.26

Table S8: Means and standard deviations of biomarker levels for patient cohorts.

Biomarkers in pg/ml	AD	lvPPA	bvFTD	nfvPPA	svPPA	PSP	CBS
NfL serum ¹	23.60 ± 11.90	24.83 ± 15.03	30.10 ± 18.57	45.77 ± 24.74	29.72 ± 12.68	34.88 ± 18.18	28.08 ± 12.89
NfL CSF	1529.86 ± 687.17	1708.94 ± 865.73	2529.47 ± 1765.98	3005.03 ± 1463.94	3127.67 ± 1512.68	2471.61 ± 1379.18	2128.12 ± 1085.52
pNfH CSF	375.48 ± 217.00	380.95 ± 194.67	452.11 ± 299.57	671.68 ± 398.96	364.54 ± 174.81	633.62 ± 343.13	530.92 ± 263.42
Tau CSF	624.72 ± 251.04	534.58 ± 332.44	356.86 ± 205.86	403.46 ± 218.89	350.31 ± 106.77	285.01 ± 175.99	338.88 ± 167.34
ptau CSF	77.04 ± 28.33	73.76 ± 58.85	49.39 ± 21.28	47.19 ± 19.59	45.17 ± 15.81	38.35 ± 17.68	49.50 ± 25.57
β-amyloid CSF	476.49 ± 166.37	656.89 ± 293.21	835.31 ± 308.61	880.58 ± 287.51	845.43 ± 325.32	841.15 ± 249.40	787.56 ± 232.98
Progranulin serum	116.40 ± 40.91	126.75 ± 53.02	143.17 ± 51.91	122.40 ± 41.68	109.10 ± 41.06	113.93 ± 62.16	155.20 ± 52.19
Progranulin CSF	3.65 ± 1.44	3.55 ± 1.61	3.63 ± 1.33	3.72 ± 1.51	3.30 ± 1.12	3.53 ± 1.34	4.00 ± 1.45
Ubiquitin CSF	36.75 ± 10.18	41.84 ± 12.26	33.35 ± 11.34	38.07 ± 15.35	34.12 ± 15.82	31.90 ± 9.10	30.78 ± 11.38

¹ Reference measurement for serum NfL from healthy cohorts: 14.85 ± 6.97 pg/ml.

AD: Alzheimer's disease, bvFTD: behavioral variant frontotemporal dementia, CBS: corticobasal syndrome, CSF: cerebrospinal fluid, lvPPA: logopenic variant primary progressive aphasia, NfL: neurofilament light chain serum, nfvPPA: non-fluent variant primary progressive aphasia, pNfH: phosphorylated neurofilament heavy chain, PSP: progressive supranuclear palsy, ptau: phosphorylated tau.

Table S9: Significant pairwise permutation ANCOVA statistics for biomarker concentrations.

NfL Serum			
Contrasts	F statistic	p value	Hedges g
Healthy(33)-AD(37)	$F_{1,63}=15.18$	0.0045	0.79
Healthy(33)-lvPPA(23)	$F_{1,53}=11.96$	0.0120	0.86
Healthy(33)-bvFTD(92)	$F_{1,122}=21.31$	0.0011	0.90
Healthy(33)-nfvPPA(33)	$F_{1,53}=55.26$	<0.0001	1.73
Healthy(33)-svPPA(29)	$F_{1,59}=36.65$	<0.0001	1.46
Healthy(33)-PSP(41)	$F_{1,71}=37.77$	<0.0001	1.31
Healthy(33)-CBS(21)	$F_{1,51}=28.91$	<0.0001	1.31
AD(37)-nfvPPA(33)	$F_{1,67}=28.42$	<0.0001	1.19
AD(33)-PSP(41)	$F_{1,75}=11.23$	0.0350	0.70
lvPPA(23)-nfvPPA(33)	$F_{1,53}=14.06$	0.0115	0.96
bvFTD(92)-nfvPPA(33)	$F_{1,122}=15.42$	0.0056	0.78
nfvPPA(33)-svPPA(29)	$F_{1,59}=11.49$	0.0288	0.81
nfvPPA(33)-CBS(21)	$F_{1,51}=11.16$	0.0384	0.86
NfL CSF			
AD(43)-bvFTD(66)	$F_{1,106}=12.33$	0.0111	0.68
AD(43)-nfvPPA(37)	$F_{1,77}=32.19$	<0.0001	1.22
AD(43)-svPPA(24)	$F_{1,64}=34.41$	<0.0001	1.47
AD(43)-PSP(28)	$F_{1,68}=14.16$	0.0040	0.88
lvPPA(16)-svPPA(24)	$F_{1,37}=11.25$	0.0284	1.06
pNfH CSF			
AD(50)-nfvPPA(48)	$F_{1,95}=20.79$	<0.0001	0.91
AD(50)-PSP(33)	$F_{1,80}=20.11$	0.0012	1.00
bvFTD(84)-nfvPPA(48)	$F_{1,129}=13.29$	0.0078	0.66
svPPA(28)-PSP(33)	$F_{1,58}=15.42$	0.0015	1.03
Tau CSF			
AD(50)-bvFTD(83)	$F_{1,130}=44.97$	<0.0001	1.19
AD(50)-nfvPPA(46)	$F_{1,93}=32.19$	<0.0001	0.96
AD(50)-svPPA(29)	$F_{1,76}=31.08$	<0.0001	1.29
AD(50)-PSP(32)	$F_{1,79}=44.31$	<0.0001	1.48
AD(50)-CBS(17)	$F_{1,64}=19.07$	0.0012	1.21
lvPPA(19)-PSP(32)	$F_{1,48}=11.97$	0.0193	0.98
pTau CSF			
AD(50)-bvFTD(83)	$F_{1,130}=41.67$	<0.0001	1.15
AD(50)-nfvPPA(47)	$F_{1,94}=38.18$	<0.0001	1.24
AD(50)-svPPA(29)	$F_{1,76}=31.14$	<0.0001	1.29
AD(50)-PSP(32)	$F_{1,79}=47.94$	<0.0001	1.53
AD(50)-CBS(18)	$F_{1,65}=12.96$	0.0130	0.98
lvPPA(19)-PSP(32)	$F_{1,48}=9.72$	0.0238	0.88

B-Amyloid 1-42 CSF

AD(51)-lvPPA(19)	$F_{1,67}=10.60$	0.0418	0.86
AD(51)-bvFTD(85)	$F_{1,133}=57.15$	<0.0001	1.33
AD(51)-nfvPPA(46)	$F_{1,94}=71.12$	<0.0001	1.69
AD(51)-svPPA(30)	$F_{1,78}=48.85$	<0.0001	1.57
AD(51)-PSP(33)	$F_{1,81}=63.95$	<0.0001	1.76
AD(51)-CBS(18)	$F_{1,66}=36.89$	<0.0001	1.64

Results of permutation ANCOVA with age as covariate giving F statistics, permutation p values and effect sizes represented as hedges g for significant pairwise serum NfL comparisons. The first column shows the respective two groups tested with sample sizes in brackets.

Table S10: Means and standard deviations of brain volumes for all cohorts.

Region	Healthy Mean \pm SD	AD Mean \pm SD	lvPPA Mean \pm SD	bvFTD Mean \pm SD	nvPPA Mean \pm SD	svPPA Mean \pm SD	PSP Mean \pm SD	CBS Mean \pm SD
Other								
INS R	7.97 \pm 0.63	7.10 \pm 0.72	7.02 \pm 0.98	6.59 \pm 1.00	7.10 \pm 0.85	6.84 \pm 1.08	7.09 \pm 0.73	7.04 \pm 0.76
INS L	8.20 \pm 0.55	7.15 \pm 0.81	6.99 \pm 0.90	6.90 \pm 0.89	7.13 \pm 0.96	6.40 \pm 0.73	7.36 \pm 0.74	7.17 \pm 0.59
CBL R GM	45.33 \pm 4.51	44.01 \pm 4.57	44.65 \pm 2.78	44.04 \pm 5.11	44.16 \pm 4.12	45.47 \pm 4.93	41.21 \pm 4.74	43.90 \pm 3.86
CBL L GM	42.72 \pm 4.34	41.56 \pm 4.25	42.49 \pm 2.75	41.57 \pm 4.80	42.18 \pm 4.06	43.44 \pm 4.63	39.53 \pm 4.05	41.89 \pm 3.99
CBL R WM	11.41 \pm 1.31	11.56 \pm 1.28	11.84 \pm 1.38	12.03 \pm 1.40	11.41 \pm 1.37	12.14 \pm 1.31	10.80 \pm 1.69	11.33 \pm 1.25
CBL L WM	11.65 \pm 1.34	11.71 \pm 1.26	12.07 \pm 1.29	12.30 \pm 1.35	11.70 \pm 1.36	12.43 \pm 1.33	11.06 \pm 1.65	11.55 \pm 1.32
Frontal								
SFG R GM	27.06 \pm 2.02	24.39 \pm 2.18	24.03 \pm 3.61	22.56 \pm 3.77	24.17 \pm 2.62	24.74 \pm 2.74	24.61 \pm 2.60	23.59 \pm 2.61
SFG L GM	26.88 \pm 1.93	23.92 \pm 2.30	23.28 \pm 3.52	22.35 \pm 3.36	23.15 \pm 2.97	23.97 \pm 3.01	24.29 \pm 2.73	23.43 \pm 2.71
MFG R GM	21.04 \pm 1.56	18.17 \pm 2.35	18.25 \pm 3.18	17.20 \pm 3.32	18.33 \pm 2.32	19.09 \pm 2.37	19.07 \pm 2.31	18.38 \pm 3.05
MFG L GM	21.44 \pm 1.54	18.13 \pm 2.17	17.66 \pm 2.46	17.72 \pm 3.14	17.59 \pm 2.82	18.83 \pm 3.25	19.44 \pm 2.19	18.51 \pm 2.71
IFG R GM	11.97 \pm 1.18	10.61 \pm 1.13	10.47 \pm 1.71	9.72 \pm 2.03	10.28 \pm 1.37	10.96 \pm 1.47	10.47 \pm 1.45	10.57 \pm 1.23
IFG L GM	11.56 \pm 1.27	10.09 \pm 1.15	9.63 \pm 1.56	9.41 \pm 1.72	9.43 \pm 1.83	10.08 \pm 1.69	9.84 \pm 1.36	9.83 \pm 1.02
PrCG R GM	10.82 \pm 1.24	10.18 \pm 1.50	9.80 \pm 1.76	9.67 \pm 1.51	9.49 \pm 1.53	10.31 \pm 1.58	9.33 \pm 1.45	9.04 \pm 1.27
PrCG L GM	11.79 \pm 1.43	10.79 \pm 1.50	10.21 \pm 1.62	10.42 \pm 1.54	9.86 \pm 1.79	10.91 \pm 1.69	9.96 \pm 1.43	9.40 \pm 1.53
OFGmid R GM	5.51 \pm 0.55	4.86 \pm 0.53	4.89 \pm 0.84	4.50 \pm 0.89	5.08 \pm 0.63	4.80 \pm 0.71	5.06 \pm 0.62	5.05 \pm 0.64
OFGmid L GM	5.25 \pm 0.57	4.61 \pm 0.55	4.49 \pm 0.77	4.34 \pm 0.85	4.71 \pm 0.68	4.45 \pm 0.75	4.84 \pm 0.59	4.91 \pm 0.58

Region	Healthy Mean ± SD	AD Mean ± SD	lvPPA Mean ± SD	bvFTD Mean ± SD	nfvPPA Mean ± SD	svPPA Mean ± SD	PSP Mean ± SD	CBS Mean ± SD
Frontal								
OFGlat R GM	2.76 ± 0.31	2.43 ± 0.28	2.46 ± 0.37	2.23 ± 0.48	2.46 ± 0.34	2.45 ± 0.35	2.47 ± 0.32	2.54 ± 0.31
OFGlat L GM	3.14 ± 0.36	2.67 ± 0.36	2.53 ± 0.42	2.44 ± 0.51	2.59 ± 0.42	2.54 ± 0.44	2.66 ± 0.38	2.73 ± 0.38
REC R GM	1.69 ± 0.26	1.53 ± 0.22	1.53 ± 0.24	1.38 ± 0.31	1.57 ± 0.21	1.47 ± 0.28	1.62 ± 0.21	1.61 ± 0.20
REC L GM	1.60 ± 0.18	1.43 ± 0.18	1.42 ± 0.21	1.35 ± 0.25	1.47 ± 0.20	1.33 ± 0.21	1.54 ± 0.20	1.52 ± 0.16
SFG R WM	16.40 ± 1.79	15.65 ± 2.04	16.14 ± 1.99	15.47 ± 2.45	15.36 ± 1.94	16.82 ± 1.80	16.31 ± 2.10	15.22 ± 2.04
SFG L WM	15.60 ± 1.60	14.92 ± 1.79	14.98 ± 1.95	14.84 ± 2.12	14.02 ± 1.84	15.63 ± 1.92	15.31 ± 2.12	14.46 ± 2.08
MFG R WM	22.72 ± 2.13	20.79 ± 2.55	21.39 ± 2.61	20.31 ± 3.86	20.86 ± 2.51	22.63 ± 2.35	21.30 ± 2.71	21.05 ± 2.36
MFG L WM	23.55 ± 2.28	21.19 ± 2.49	21.51 ± 2.44	21.35 ± 3.74	20.59 ± 3.11	22.88 ± 3.19	22.03 ± 2.74	21.97 ± 2.58
IFG R WM	8.65 ± 0.93	8.12 ± 0.89	8.15 ± 0.94	7.83 ± 1.32	7.90 ± 0.96	8.71 ± 1.00	8.09 ± 1.19	8.06 ± 0.97
IFG L WM	8.49 ± 0.98	8.05 ± 0.96	8.03 ± 1.17	7.85 ± 1.30	7.54 ± 1.13	8.49 ± 1.19	8.00 ± 0.99	7.94 ± 1.14
PrCG R WM	12.18 ± 1.25	12.36 ± 1.75	12.92 ± 1.70	12.66 ± 1.60	12.45 ± 1.40	13.10 ± 1.21	12.73 ± 1.95	11.60 ± 1.98
PrCG L WM	12.52 ± 1.30	12.71 ± 1.68	13.05 ± 1.74	13.00 ± 1.69	12.46 ± 1.58	13.44 ± 1.42	12.97 ± 2.09	11.75 ± 2.35
OFGmid R WM	2.15 ± 0.29	2.00 ± 0.23	2.11 ± 0.37	1.92 ± 0.35	1.99 ± 0.23	2.05 ± 0.21	2.03 ± 0.22	2.04 ± 0.23
OFGmid L WM	2.72 ± 0.32	2.54 ± 0.28	2.63 ± 0.37	2.51 ± 0.42	2.50 ± 0.30	2.56 ± 0.34	2.62 ± 0.30	2.59 ± 0.29
OFGlat R WM	0.95 ± 0.16	0.85 ± 0.14	0.83 ± 0.14	0.81 ± 0.17	0.82 ± 0.14	0.87 ± 0.15	0.82 ± 0.12	0.86 ± 0.13
OFGlat L WM	1.06 ± 0.17	0.96 ± 0.19	0.95 ± 0.18	0.94 ± 0.21	0.93 ± 0.16	1.01 ± 0.20	0.98 ± 0.16	0.99 ± 0.19
REC R WM	0.32 ± 0.14	0.35 ± 0.11	0.35 ± 0.08	0.34 ± 0.12	0.35 ± 0.08	0.34 ± 0.10	0.38 ± 0.11	0.37 ± 0.12
REC L WM	0.37 ± 0.11	0.37 ± 0.10	0.37 ± 0.10	0.36 ± 0.11	0.37 ± 0.10	0.37 ± 0.11	0.36 ± 0.07	0.36 ± 0.11

Region	Healthy Mean ± SD	AD Mean ± SD	lvPPA Mean ± SD	bvFTD Mean ± SD	nfvPPA Mean ± SD	svPPA Mean ± SD	PSP Mean ± SD	CBS Mean ± SD
Parietal								
PoCG R GM	8.12 ± 1.15	7.48 ± 1.25	7.29 ± 1.36	7.17 ± 1.11	7.20 ± 1.18	7.42 ± 1.39	7.00 ± 1.11	6.66 ± 1.12
PoCG L GM	9.06 ± 1.24	8.13 ± 1.22	7.85 ± 1.31	8.05 ± 1.17	7.93 ± 1.42	8.36 ± 1.37	7.71 ± 1.06	7.08 ± 1.32
SPG R GM	11.99 ± 1.50	10.83 ± 1.71	11.34 ± 1.53	11.21 ± 1.48	11.54 ± 1.45	11.83 ± 1.55	11.18 ± 1.49	10.42 ± 1.67
SPG L GM	12.17 ± 1.50	10.60 ± 1.58	10.76 ± 1.64	11.13 ± 1.47	11.17 ± 1.33	11.35 ± 1.36	11.31 ± 1.44	10.12 ± 2.06
SMG R GM	7.68 ± 1.04	6.54 ± 0.92	6.67 ± 1.14	6.65 ± 0.96	6.77 ± 1.09	6.97 ± 0.98	6.88 ± 0.92	6.49 ± 1.04
SMG L GM	8.31 ± 0.89	7.08 ± 1.02	6.95 ± 1.19	7.37 ± 1.07	7.15 ± 1.38	7.68 ± 1.22	7.59 ± 1.11	6.91 ± 1.24
ANG R GM	11.16 ± 1.21	9.42 ± 1.45	9.73 ± 1.41	9.82 ± 1.30	10.08 ± 1.24	10.12 ± 1.57	10.28 ± 1.34	9.92 ± 1.53
ANG L GM	10.29 ± 1.08	8.55 ± 1.48	8.40 ± 1.09	9.19 ± 1.21	9.08 ± 1.27	9.20 ± 1.22	9.56 ± 1.32	8.72 ± 1.60
PRCU R GM	6.81 ± 0.94	5.93 ± 0.88	6.16 ± 0.90	6.25 ± 0.85	6.40 ± 0.73	6.50 ± 0.75	6.25 ± 0.83	5.94 ± 0.87
PRCU L GM	6.81 ± 0.76	5.79 ± 1.00	5.87 ± 0.87	6.14 ± 0.92	6.21 ± 0.75	6.35 ± 0.91	6.20 ± 0.86	5.81 ± 1.11
PoCG R WM	11.08 ± 1.00	11.07 ± 1.32	11.61 ± 1.03	11.48 ± 1.41	11.34 ± 1.21	11.70 ± 1.16	11.40 ± 1.57	10.48 ± 1.39
PoCG L WM	11.95 ± 1.12	11.90 ± 1.33	12.39 ± 1.35	12.41 ± 1.48	12.26 ± 1.37	12.75 ± 1.12	12.37 ± 1.69	11.22 ± 1.67
SPG R WM	11.56 ± 1.20	10.96 ± 1.58	11.74 ± 1.70	12.14 ± 1.93	11.62 ± 1.43	12.34 ± 1.35	11.71 ± 1.83	10.46 ± 1.83
SPG L WM	11.30 ± 1.22	10.48 ± 1.19	11.27 ± 1.73	11.63 ± 1.81	10.94 ± 1.40	11.63 ± 1.22	11.46 ± 1.90	9.85 ± 1.81
SMG R WM	4.88 ± 0.72	4.68 ± 0.69	4.80 ± 0.61	4.89 ± 0.78	4.78 ± 0.66	5.02 ± 0.64	4.96 ± 0.79	4.52 ± 0.79
SMG L WM	4.73 ± 0.50	4.50 ± 0.60	4.76 ± 0.57	4.77 ± 0.75	4.49 ± 0.85	4.93 ± 0.66	4.91 ± 1.00	4.28 ± 0.64
ANG R WM	5.81 ± 0.62	5.39 ± 0.81	5.67 ± 0.51	5.73 ± 0.88	5.54 ± 0.69	5.78 ± 0.74	5.80 ± 0.77	5.50 ± 0.64
ANG L WM	6.04 ± 0.71	5.42 ± 0.83	5.73 ± 0.70	5.99 ± 0.95	5.49 ± 0.73	6.00 ± 0.75	6.11 ± 0.97	5.47 ± 0.76

Region	Healthy Mean ± SD	AD Mean ± SD	lvPPA Mean ± SD	bvFTD Mean ± SD	nfvPPA Mean ± SD	svPPA Mean ± SD	PSP Mean ± SD	CBS Mean ± SD
Parietal								
PRCU R WM	2.00 ± 0.28	1.86 ± 0.45	1.97 ± 0.27	2.01 ± 0.40	1.92 ± 0.34	1.98 ± 0.30	1.98 ± 0.41	1.84 ± 0.29
PRCU L WM	1.92 ± 0.31	1.76 ± 0.37	1.88 ± 0.30	1.93 ± 0.39	1.87 ± 0.31	2.00 ± 0.32	1.96 ± 0.38	1.70 ± 0.30
Temporal								
STG R GM	16.47 ± 1.78	14.20 ± 1.80	13.95 ± 1.96	13.99 ± 2.40	14.66 ± 2.24	13.32 ± 2.80	14.89 ± 1.82	14.43 ± 2.01
STG L GM	17.87 ± 1.78	14.88 ± 2.23	13.86 ± 2.17	15.51 ± 2.12	15.51 ± 2.32	12.91 ± 1.68	16.56 ± 1.80	15.64 ± 2.18
MTG R GM	14.35 ± 1.44	12.08 ± 1.57	12.23 ± 1.76	12.05 ± 2.31	13.11 ± 1.97	11.70 ± 2.76	13.31 ± 1.73	13.06 ± 1.93
MTG L GM	14.10 ± 1.35	11.06 ± 1.82	10.65 ± 1.74	12.02 ± 1.84	12.05 ± 1.74	9.61 ± 1.65	13.14 ± 1.56	12.49 ± 1.90
ITG R GM	12.46 ± 1.29	10.94 ± 1.26	11.14 ± 1.63	10.76 ± 2.05	11.56 ± 1.75	9.88 ± 2.36	11.74 ± 1.23	11.63 ± 1.23
ITG L GM	11.86 ± 1.28	9.69 ± 1.45	9.35 ± 1.66	10.31 ± 1.53	10.53 ± 1.41	7.62 ± 1.25	11.41 ± 1.27	10.90 ± 1.21
PHG R GM	4.80 ± 0.44	4.40 ± 0.48	4.54 ± 0.44	4.47 ± 0.60	4.59 ± 0.49	4.20 ± 0.65	4.57 ± 0.41	4.59 ± 0.42
PHG L GM	4.34 ± 0.44	3.89 ± 0.52	3.94 ± 0.36	4.08 ± 0.52	4.08 ± 0.45	3.46 ± 0.49	4.10 ± 0.38	4.11 ± 0.43
LING R GM	10.04 ± 1.42	9.33 ± 1.29	9.74 ± 1.17	9.48 ± 1.38	9.60 ± 1.34	9.81 ± 1.44	9.30 ± 1.33	9.17 ± 1.21
LING L GM	9.52 ± 1.42	8.93 ± 1.27	9.13 ± 1.16	9.08 ± 1.34	9.12 ± 1.18	9.25 ± 1.44	8.82 ± 1.42	8.85 ± 1.22
FFG R GM	8.18 ± 0.83	7.24 ± 0.78	7.38 ± 0.92	7.40 ± 1.06	7.57 ± 1.03	7.02 ± 1.32	7.56 ± 0.85	7.43 ± 0.83
FFG L GM	8.21 ± 0.85	6.95 ± 0.99	6.90 ± 0.92	7.46 ± 0.89	7.43 ± 0.85	6.29 ± 0.83	7.56 ± 0.72	7.35 ± 0.87
STG R WM	6.27 ± 0.76	5.94 ± 0.77	6.03 ± 0.63	6.17 ± 0.87	5.97 ± 0.78	6.05 ± 0.80	6.54 ± 0.76	6.16 ± 0.74
STG L WM	6.30 ± 0.85	5.98 ± 0.97	5.90 ± 0.86	6.37 ± 0.86	5.99 ± 0.82	5.79 ± 0.75	6.63 ± 0.84	6.23 ± 0.55
MTG R WM	11.57 ± 1.19	10.81 ± 1.25	11.18 ± 0.70	11.19 ± 1.48	11.36 ± 1.19	10.98 ± 1.65	11.71 ± 1.19	11.36 ± 1.07

Region	Healthy Mean \pm SD	AD Mean \pm SD	lvPPA Mean \pm SD	bvFTD Mean \pm SD	nfvPPA Mean \pm SD	svPPA Mean \pm SD	PSP Mean \pm SD	CBS Mean \pm SD
Temporal								
MTG L WM	12.95 \pm 1.24	11.45 \pm 1.49	11.84 \pm 1.02	12.60 \pm 1.40	12.17 \pm 1.32	11.25 \pm 1.21	13.10 \pm 1.55	12.54 \pm 0.96
ITG R WM	5.43 \pm 0.77	4.96 \pm 0.80	5.27 \pm 0.71	5.17 \pm 1.03	5.35 \pm 0.83	4.72 \pm 1.11	5.45 \pm 0.77	5.13 \pm 0.61
ITG L WM	4.54 \pm 0.69	3.83 \pm 0.72	4.07 \pm 0.80	4.29 \pm 0.73	4.18 \pm 0.84	3.23 \pm 0.58	4.57 \pm 0.62	4.30 \pm 0.52
PHG R WM	2.25 \pm 0.34	2.09 \pm 0.42	2.19 \pm 0.29	2.13 \pm 0.37	2.23 \pm 0.41	2.06 \pm 0.43	2.15 \pm 0.26	2.14 \pm 0.30
PHG L WM	1.70 \pm 0.27	1.52 \pm 0.33	1.55 \pm 0.27	1.64 \pm 0.32	1.67 \pm 0.34	1.41 \pm 0.28	1.69 \pm 0.24	1.66 \pm 0.26
LING R WM	5.26 \pm 0.70	5.21 \pm 0.87	5.67 \pm 0.80	5.57 \pm 0.79	5.62 \pm 0.89	5.60 \pm 0.77	5.73 \pm 0.86	5.24 \pm 0.82
LING L WM	4.63 \pm 0.81	4.76 \pm 0.83	5.11 \pm 0.76	5.14 \pm 0.85	5.18 \pm 0.88	5.00 \pm 0.74	5.34 \pm 0.85	4.83 \pm 0.83
FFG R WM	2.80 \pm 0.45	2.56 \pm 0.50	2.67 \pm 0.35	2.79 \pm 0.44	2.70 \pm 0.48	2.64 \pm 0.47	2.68 \pm 0.35	2.49 \pm 0.30
FFG L WM	2.85 \pm 0.37	2.53 \pm 0.48	2.61 \pm 0.43	2.88 \pm 0.46	2.77 \pm 0.54	2.56 \pm 0.44	2.87 \pm 0.46	2.58 \pm 0.30
Occipital								
CUN R GM	3.92 \pm 0.68	3.68 \pm 0.65	3.86 \pm 0.60	3.70 \pm 0.65	3.73 \pm 0.59	4.02 \pm 0.73	3.77 \pm 0.68	3.49 \pm 0.60
CUN L GM	3.20 \pm 0.64	2.93 \pm 0.55	3.07 \pm 0.60	2.97 \pm 0.62	3.00 \pm 0.57	3.04 \pm 0.56	2.95 \pm 0.63	2.84 \pm 0.57
SOG R GM	4.13 \pm 0.61	3.64 \pm 0.64	3.94 \pm 0.53	3.94 \pm 0.60	3.95 \pm 0.50	4.12 \pm 0.64	3.91 \pm 0.73	3.56 \pm 0.70
SOG L GM	3.79 \pm 0.52	3.31 \pm 0.60	3.48 \pm 0.57	3.57 \pm 0.64	3.65 \pm 0.49	3.62 \pm 0.58	3.54 \pm 0.66	3.29 \pm 0.59
MOG R GM	11.80 \pm 1.15	10.37 \pm 1.56	10.68 \pm 1.36	10.85 \pm 1.34	11.07 \pm 1.30	11.06 \pm 1.23	10.95 \pm 1.38	10.24 \pm 1.64
MOG L GM	11.30 \pm 1.28	9.79 \pm 1.48	9.75 \pm 1.51	10.51 \pm 1.37	10.44 \pm 1.01	10.51 \pm 1.22	10.44 \pm 1.46	9.74 \pm 1.56
IOG R GM	6.20 \pm 0.89	5.48 \pm 0.77	5.68 \pm 0.80	5.84 \pm 0.72	5.86 \pm 0.77	5.90 \pm 0.85	5.83 \pm 0.79	5.49 \pm 0.79
IOG L GM	6.28 \pm 0.80	5.47 \pm 0.79	5.39 \pm 0.80	5.89 \pm 0.72	5.85 \pm 0.73	5.97 \pm 0.75	5.83 \pm 0.74	5.55 \pm 0.78

Region	Healthy	AD	lvPPA	bvFTD	nfvPPA	svPPA	PSP	CBS
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Occipital								
CUN R WM	1.83 ± 0.31	1.96 ± 0.39	2.10 ± 0.39	2.04 ± 0.40	1.97 ± 0.33	2.08 ± 0.40	2.18 ± 0.45	1.95 ± 0.43
CUN L WM	1.51 ± 0.27	1.63 ± 0.33	1.81 ± 0.40	1.68 ± 0.38	1.65 ± 0.28	1.68 ± 0.29	1.74 ± 0.34	1.63 ± 0.30
SOG R WM	3.84 ± 0.48	3.82 ± 0.59	4.16 ± 0.61	4.12 ± 0.60	3.97 ± 0.46	4.17 ± 0.56	4.23 ± 0.69	3.85 ± 0.63
SOG L WM	3.35 ± 0.54	3.36 ± 0.53	3.67 ± 0.63	3.67 ± 0.56	3.53 ± 0.47	3.58 ± 0.49	3.76 ± 0.66	3.44 ± 0.46
MOG R WM	10.06 ± 1.10	9.50 ± 1.36	10.21 ± 1.28	10.28 ± 1.40	9.95 ± 1.00	10.33 ± 1.19	10.23 ± 1.38	9.77 ± 1.44
MOG L WM	10.10 ± 0.93	9.60 ± 1.37	10.43 ± 1.58	10.57 ± 1.46	10.01 ± 1.07	10.69 ± 1.32	10.50 ± 1.51	10.09 ± 1.53
IOG R WM	2.74 ± 0.35	2.62 ± 0.41	2.77 ± 0.35	2.84 ± 0.45	2.84 ± 0.44	2.88 ± 0.35	2.87 ± 0.40	2.67 ± 0.39
IOG L WM	2.90 ± 0.37	2.78 ± 0.44	3.02 ± 0.51	3.06 ± 0.52	2.91 ± 0.42	3.08 ± 0.43	2.98 ± 0.48	2.83 ± 0.54
Limbic								
CG R GM	8.32 ± 0.91	7.62 ± 0.87	7.74 ± 1.01	7.47 ± 1.03	7.85 ± 0.88	7.78 ± 0.93	7.79 ± 0.93	7.73 ± 0.88
CG L GM	8.65 ± 0.91	7.69 ± 0.92	7.62 ± 1.00	7.71 ± 1.08	7.80 ± 0.87	7.72 ± 0.99	8.07 ± 0.95	7.83 ± 1.04
CG R WM	9.49 ± 0.85	9.21 ± 0.90	9.32 ± 0.81	9.25 ± 0.97	9.19 ± 0.89	9.78 ± 0.77	9.23 ± 0.79	9.04 ± 0.93
CG L WM	9.25 ± 0.82	8.94 ± 0.95	9.08 ± 0.87	9.15 ± 0.92	8.87 ± 0.86	9.45 ± 0.74	9.13 ± 0.81	8.82 ± 0.76
Subcortical								
HP R	3.06 ± 0.25	2.61 ± 0.39	2.91 ± 0.27	2.72 ± 0.50	2.90 ± 0.38	2.60 ± 0.50	2.86 ± 0.37	2.95 ± 0.33
HP L	2.96 ± 0.21	2.46 ± 0.39	2.64 ± 0.27	2.66 ± 0.43	2.66 ± 0.32	2.25 ± 0.37	2.74 ± 0.32	2.83 ± 0.35
AMYG R	1.78 ± 0.17	1.49 ± 0.21	1.64 ± 0.18	1.52 ± 0.31	1.66 ± 0.25	1.41 ± 0.32	1.62 ± 0.20	1.67 ± 0.18
AMYG L	1.60 ± 0.15	1.30 ± 0.22	1.37 ± 0.17	1.38 ± 0.24	1.42 ± 0.20	1.04 ± 0.20	1.46 ± 0.18	1.52 ± 0.16

Region	Healthy Mean ± SD	AD Mean ± SD	lvPPA Mean ± SD	bvFTD Mean ± SD	nvPPA Mean ± SD	svPPA Mean ± SD	PSP Mean ± SD	CBS Mean ± SD
Subcortical								
CAU R	2.04 ± 0.25	1.87 ± 0.30	1.87 ± 0.33	1.52 ± 0.50	1.79 ± 0.32	1.80 ± 0.26	1.65 ± 0.36	1.78 ± 0.34
CAU L	2.11 ± 0.25	1.93 ± 0.31	1.91 ± 0.40	1.65 ± 0.48	1.75 ± 0.36	1.82 ± 0.35	1.74 ± 0.37	1.87 ± 0.33
PUT R	3.09 ± 0.44	2.78 ± 0.47	2.64 ± 0.58	2.37 ± 0.58	2.70 ± 0.42	2.61 ± 0.50	2.45 ± 0.39	2.66 ± 0.45
PUT L	3.01 ± 0.42	2.72 ± 0.49	2.50 ± 0.63	2.38 ± 0.55	2.52 ± 0.44	2.41 ± 0.48	2.44 ± 0.38	2.67 ± 0.46
ACC R	0.44 ± 0.04	0.39 ± 0.05	0.40 ± 0.06	0.34 ± 0.08	0.41 ± 0.05	0.37 ± 0.06	0.38 ± 0.06	0.41 ± 0.04
ACC L	0.49 ± 0.04	0.43 ± 0.06	0.43 ± 0.06	0.38 ± 0.09	0.44 ± 0.06	0.39 ± 0.06	0.42 ± 0.06	0.45 ± 0.04
PAL R	1.84 ± 0.11	1.88 ± 0.16	1.91 ± 0.15	1.80 ± 0.17	1.83 ± 0.15	1.91 ± 0.12	1.69 ± 0.13	1.80 ± 0.18
PAL L	1.80 ± 0.11	1.82 ± 0.15	1.85 ± 0.15	1.77 ± 0.19	1.75 ± 0.15	1.84 ± 0.12	1.63 ± 0.16	1.74 ± 0.18
THL R	5.47 ± 0.47	5.19 ± 0.50	5.17 ± 0.55	4.98 ± 0.56	5.21 ± 0.47	5.32 ± 0.52	4.93 ± 0.49	5.19 ± 0.40
THL L	5.70 ± 0.47	5.36 ± 0.52	5.24 ± 0.54	5.19 ± 0.57	5.20 ± 0.54	5.36 ± 0.54	5.05 ± 0.47	5.31 ± 0.42
BS R	9.99 ± 0.77	10.28 ± 0.84	10.35 ± 0.57	10.04 ± 0.91	10.03 ± 0.88	10.27 ± 0.86	9.12 ± 0.99	9.89 ± 0.87
BS L	8.84 ± 0.70	9.13 ± 0.77	9.21 ± 0.58	8.95 ± 0.83	8.92 ± 0.80	9.09 ± 0.80	8.14 ± 0.86	8.84 ± 0.76

Table S11: Significant permutation ANCOVA statistics for volume data, AD vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	F _{1,93} =43.98	<0.0001	1.35
INS L	F _{1,93} =52.35	<0.0001	1.51
Frontal			
SFG R GM	F _{1,93} =35.67	<0.0001	1.26
SFG L GM	F _{1,93} =43.46	<0.0001	1.39
MFG R GM	F _{1,93} =40.06	<0.0001	1.35
MFG L GM	F _{1,93} =62.46	<0.0001	1.67
IFG R GM	F _{1,93} =35.23	<0.0001	1.22
IFG L GM	F _{1,93} =37.43	<0.0001	1.27
OFGmid R GM	F _{1,93} =34.56	<0.0001	1.22
OFGmid L GM	F _{1,93} =30.63	<0.0001	1.15
OFGlat R GM	F _{1,93} =31.32	<0.0001	1.16
OFGlat L GM	F _{1,93} =43.79	<0.0001	1.37
REC R GM	F _{1,93} =13.57	0.0467	0.73
REC L GM	F _{1,93} =24.77	<0.0001	0.98
MFG R WM	F _{1,93} =15.19	0.0125	0.79
MFG L WM	F _{1,93} =22.94	<0.0001	0.97
Parietal			
PoCG L GM	F _{1,93} =13.46	0.0388	0.76
SPG L GM	F _{1,93} =22.14	0.0023	1.00
SMG R GM	F _{1,93} =30.21	<0.0001	1.17
SMG L GM	F _{1,93} =34.84	<0.0001	1.26
ANG R GM	F _{1,93} =34.82	<0.0001	1.26
ANG L GM	F _{1,93} =35.49	<0.0001	1.27
PRCU R GM	F _{1,93} =20.58	<0.0001	0.97
PRCU L GM	F _{1,93} =25.71	0.0023	1.08
Temporal			
STG R GM	F _{1,93} =37.31	<0.0001	1.28
STG L GM	F _{1,93} =48.88	<0.0001	1.45
MTG R GM	F _{1,93} =51.27	<0.0001	1.51
MTG L GM	F _{1,93} =75.13	<0.0001	1.84
ITG R GM	F _{1,93} =34.98	<0.0001	1.23
ITG L GM	F _{1,93} =57.24	<0.0001	1.59
PHG R GM	F _{1,93} =19.44	0.0034	0.91
PHG L GM	F _{1,93} =19.83	0.0034	0.91

FFG R GM	$F_{1,93}=36.21$	<0.0001	1.23
FFG L GM	$F_{1,93}=44.79$	<0.0001	1.38
MTG L WM	$F_{1,93}=28.57$	<0.0001	1.09
ITG L WM	$F_{1,93}=23.04$	<0.0001	0.99
Occipital			
SOG R GM	$F_{1,93}=13.32$	0.0376	0.77
SOG L GM	$F_{1,93}=15.62$	0.0171	0.84
MOG R GM	$F_{1,93}=21.73$	0.0034	0.99
MOG L GM	$F_{1,93}=25.03$	0.0023	1.07
IOG R GM	$F_{1,93}=17.80$	0.0046	0.88
IOG L GM	$F_{1,93}=23.10$	0.0034	1.02
Limbic			
CG R GM	$F_{1,93}=14.37$	0.0388	0.80
CG L GM	$F_{1,93}=24.53$	0.0023	1.05
Subcortical			
HP R	$F_{1,93}=46.62$	<0.0001	1.38
HP L	$F_{1,93}=55.25$	<0.0001	1.51
AMYG R	$F_{1,93}=57.72$	<0.0001	1.54
AMYG L	$F_{1,93}=66.32$	<0.0001	1.64
ACC R	$F_{1,93}=31.66$	<0.0001	1.15
ACC L	$F_{1,93}=40.54$	<0.0001	1.28

Table S12: Significant permutation ANCOVA statistics for volume data, lvPPA vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	F _{1,53} =20.84	0.0034	1.06
INS L	F _{1,53} =43.51	<0.0001	1.61
Frontal			
SFG R GM	F _{1,53} =15.58	0.0205	0.97
SFG L GM	F _{1,53} =24.57	<0.0001	1.21
MFG R GM	F _{1,53} =18.53	0.0091	1.03
MFG L GM	F _{1,53} =54.70	<0.0001	1.79
IFG R GM	F _{1,53} =16.07	0.0137	0.91
IFG L GM	F _{1,53} =30.33	<0.0001	1.28
PrCG L GM	F _{1,53} =16.68	0.0160	0.93
OFGmid L GM	F _{1,53} =18.40	0.0046	1.00
OFGlat L GM	F _{1,53} =39.72	<0.0001	1.51
Parietal			
SMG L GM	F _{1,53} =26.41	0.0023	1.22
ANG R GM	F _{1,53} =19.14	0.0068	0.98
ANG L GM	F _{1,53} =49.25	<0.0001	1.68
PRCU L GM	F _{1,53} =21.52	<0.0001	1.07
Temporal			
STG R GM	F _{1,53} =31.15	<0.0001	1.22
STG L GM	F _{1,53} =72.14	<0.0001	1.97
MTG R GM	F _{1,53} =28.47	<0.0001	1.21
MTG L GM	F _{1,53} =85.41	<0.0001	2.19
ITG L GM	F _{1,53} =44.09	<0.0001	1.61
FFG L GM	F _{1,53} =33.52	<0.0001	1.39
Occipital			
MOG L GM	F _{1,53} =19.00	0.0046	1.04
IOG L GM	F _{1,53} =18.49	0.0068	1.00
Limbic			
CG L GM	F _{1,53} =17.32	0.0125	0.98
Subcortical			
HP L	F _{1,53} =24.71	0.0023	1.22
AMYG L	F _{1,53} =31.30	<0.0001	1.36
PUT L	F _{1,53} =12.78	0.0467	0.90
ACC L	F _{1,53} =26.31	<0.0001	1.24

Table S13: Significant permutation ANCOVA statistics for volume data, bvFTD vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	$F_{1,158}=62.76$	<0.0001	1.54
INS L	$F_{1,158}=70.70$	<0.0001	1.63
Frontal			
SFG R GM	$F_{1,158}=43.13$	<0.0001	1.27
SFG L GM	$F_{1,158}=55.19$	<0.0001	1.44
MFG R GM	$F_{1,158}=41.34$	<0.0001	1.25
MFG L GM	$F_{1,158}=44.03$	<0.0001	1.29
IFG R GM	$F_{1,158}=40.20$	<0.0001	1.23
IFG L GM	$F_{1,158}=48.19$	<0.0001	1.35
PrCG R GM	$F_{1,158}=21.29$	0.0023	0.89
PrCG L GM	$F_{1,158}=30.94$	<0.0001	1.07
OFGmid R GM	$F_{1,158}=40.79$	<0.0001	1.24
OFGmid L GM	$F_{1,158}=36.35$	<0.0001	1.17
OFGlat R GM	$F_{1,158}=36.84$	<0.0001	1.18
OFGlat L GM	$F_{1,158}=58.61$	<0.0001	1.49
REC R GM	$F_{1,158}=31.06$	<0.0001	1.08
REC L GM	$F_{1,158}=33.32$	<0.0001	1.12
MFG R WM	$F_{1,158}=13.69$	0.0353	0.72
OFGlat R WM	$F_{1,158}=16.23$	0.0080	0.78
Parietal			
PoCG R GM	$F_{1,158}=28.06$	<0.0001	1.02
PoCG L GM	$F_{1,158}=28.67$	<0.0001	1.02
SPG L GM	$F_{1,158}=18.92$	0.0080	0.83
SMG R GM	$F_{1,158}=38.17$	<0.0001	1.19
SMG L GM	$F_{1,158}=25.84$	<0.0001	0.99
ANG R GM	$F_{1,158}=35.21$	<0.0001	1.15
ANG L GM	$F_{1,158}=29.29$	<0.0001	1.05
PRCU R GM	$F_{1,158}=16.51$	0.0080	0.77
PRCU L GM	$F_{1,158}=20.06$	0.0057	0.86
Temporal			
STG R GM	$F_{1,158}=42.44$	<0.0001	1.24
STG L GM	$F_{1,158}=51.60$	<0.0001	1.36
MTG R GM	$F_{1,158}=36.63$	<0.0001	1.17
MTG L GM	$F_{1,158}=48.96$	<0.0001	1.35
ITG R GM	$F_{1,158}=27.48$	<0.0001	1.01

ITG L GM	$F_{1,158}=44.66$	<0.0001	1.26
PHG R GM	$F_{1,158}=15.21$	0.0274	0.74
PHG L GM	$F_{1,158}=13.17$	0.0467	0.68
FFG R GM	$F_{1,158}=26.77$	<0.0001	0.98
FFG L GM	$F_{1,158}=35.33$	<0.0001	1.09
Occipital			
MOG R GM	$F_{1,158}=18.93$	0.0046	0.84
MOG L GM	$F_{1,158}=13.26$	0.0467	0.70
Limbic			
CG R GM	$F_{1,158}=24.78$	<0.0001	0.96
CG L GM	$F_{1,158}=29.34$	<0.0001	1.04
Subcortical			
HP R	$F_{1,158}=22.57$	<0.0001	0.89
HP L	$F_{1,158}=23.20$	0.0023	0.91
AMYG R	$F_{1,158}=31.96$	<0.0001	1.08
AMYG L	$F_{1,158}=42.96$	<0.0001	1.23
CAU R	$F_{1,158}=33.92$	<0.0001	1.13
CAU L	$F_{1,158}=27.85$	<0.0001	1.02
PUT R	$F_{1,158}=42.44$	<0.0001	1.26
PUT L	$F_{1,158}=36.86$	<0.0001	1.18
ACC R	$F_{1,158}=50.03$	<0.0001	1.37
ACC L	$F_{1,158}=53.99$	<0.0001	1.43
THL R	$F_{1,158}=28.92$	<0.0001	1.04
THL L	$F_{1,158}=27.87$	<0.0001	1.02

Table S14: Significant permutation ANCOVA statistics for volume data, nfvPPA vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	F _{1,87} =26.12	<0.0001	1.03
INS L	F _{1,87} =33.91	<0.0001	1.22
Frontal			
SFG R GM	F _{1,87} =29.08	<0.0001	1.13
SFG L GM	F _{1,87} =41.62	<0.0001	1.36
MFG R GM	F _{1,87} =35.10	<0.0001	1.24
MFG L GM	F _{1,87} =51.18	<0.0001	1.51
IFG R GM	F _{1,87} =34.11	<0.0001	1.24
IFG L GM	F _{1,87} =33.52	<0.0001	1.23
PrCG R GM	F _{1,87} =17.69	0.0091	0.82
PrCG L GM	F _{1,87} =29.55	<0.0001	1.08
OFGmid L GM	F _{1,87} =13.32	0.0445	0.76
OFGlat R GM	F _{1,87} =15.66	0.0091	0.82
OFGlat L GM	F _{1,87} =38.67	<0.0001	1.32
SFG L WM	F _{1,87} =15.66	0.0251	0.83
MFG L WM	F _{1,87} =21.46	0.0046	0.96
IFG L WM	F _{1,87} =15.40	0.0125	0.85
OFGlat R WM	F _{1,87} =16.21	0.0160	0.87
Parietal			
PoCG L GM	F _{1,87} =13.75	0.0433	0.74
SMG R GM	F _{1,87} =14.44	0.0365	0.77
SMG L GM	F _{1,87} =17.86	0.0046	0.89
ANG R GM	F _{1,87} =15.67	0.0217	0.78
ANG L GM	F _{1,87} =19.79	0.0046	0.94
Temporal			
STG R GM	F _{1,87} =14.96	0.0205	0.75
STG L GM	F _{1,87} =25.76	<0.0001	1.01
MTG L GM	F _{1,87} =33.61	<0.0001	1.20
ITG L GM	F _{1,87} =18.61	0.0046	0.90
FFG L GM	F _{1,87} =17.69	0.0057	0.82
Limbic			
CG L GM	F _{1,87} =18.71	0.0023	0.90
Subcortical			
HP L	F _{1,87} =21.11	0.0023	0.93
AMYG L	F _{1,87} =19.27	0.0057	0.90

CAU R	$F_{1,87}=13.78$	0.0490	0.80
CAU L	$F_{1,87}=24.36$	0.0023	1.06
PUT R	$F_{1,87}=16.75$	0.0091	0.88
PUT L	$F_{1,87}=25.35$	<0.0001	1.09
ACC L	$F_{1,87}=24.91$	<0.0001	1.05
THL L	$F_{1,87}=20.33$	0.0023	0.89

Table S15: Significant permutation ANCOVA statistics for volume data, svPPA vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	F _{1,74} = 45.14	0.0023	1.48
INS L	F _{1,74} =195.32	<0.0001	3.19
Frontal			
SFG R GM	F _{1,74} = 20.83	<0.0001	1.04
SFG L GM	F _{1,74} = 28.05	<0.0001	1.20
MFG R GM	F _{1,74} = 22.83	0.0034	1.08
MFG L GM	F _{1,74} = 22.36	0.0023	1.06
IFG R GM	F _{1,74} = 20.34	0.0034	0.98
IFG L GM	F _{1,74} = 24.90	<0.0001	1.11
PrCG L GM	F _{1,74} = 13.41	0.0456	0.78
OFGmid R GM	F _{1,74} = 32.24	0.0445	1.27
OFGmid L GM	F _{1,74} = 33.19	0.0445	1.29
OFGlat R GM	F _{1,74} = 22.89	0.0091	1.07
OFGlat L GM	F _{1,74} = 50.01	<0.0001	1.61
REC R GM	F _{1,74} = 18.19	0.0103	0.94
REC L GM	F _{1,74} = 41.79	<0.0001	1.47
Parietal			
PoCG R GM	F _{1,74} = 13.37	0.0445	0.78
SMG R GM	F _{1,74} = 18.64	0.0103	0.94
ANG R GM	F _{1,74} = 17.18	0.0103	0.90
ANG L GM	F _{1,74} = 23.82	<0.0001	1.09
Temporal			
STG R GM	F _{1,74} = 49.77	<0.0001	1.56
STG L GM	F _{1,74} =240.19	<0.0001	3.53
MTG R GM	F _{1,74} = 37.04	<0.0001	1.34
MTG L GM	F _{1,74} =231.90	<0.0001	3.47
ITG R GM	F _{1,74} = 43.40	<0.0001	1.47
ITG L GM	F _{1,74} =258.95	<0.0001	3.66
PHG R GM	F _{1,74} = 34.53	<0.0001	1.30
PHG L GM	F _{1,74} = 93.09	<0.0001	2.19
FFG R GM	F _{1,74} = 33.15	<0.0001	1.25
FFG L GM	F _{1,74} =152.00	<0.0001	2.80
MTG L WM	F _{1,74} = 49.44	<0.0001	1.58
ITG L WM	F _{1,74} = 86.69	<0.0001	2.12
PHG L WM	F _{1,74} = 33.34	<0.0001	1.25

FFG L WM	$F_{1,74}= 17.44$	0.0103	0.89
Occipital			
MOG R GM	$F_{1,74}= 14.38$	0.0376	0.82
MOG L GM	$F_{1,74}= 19.86$	0.0068	0.94
Limbic			
CG L GM	$F_{1,74}= 27.07$	<0.0001	1.15
Subcortical			
HP R	$F_{1,74}= 35.13$	<0.0001	1.32
HP L	$F_{1,74}=131.72$	<0.0001	2.61
AMYG R	$F_{1,74}= 50.30$	<0.0001	1.58
AMYG L	$F_{1,74}=237.02$	<0.0001	3.51
CAU R	$F_{1,74}= 23.22$	0.0023	1.08
CAU L	$F_{1,74}= 21.34$	0.0023	1.04
PUT R	$F_{1,74}= 22.70$	0.0034	1.08
PUT L	$F_{1,74}= 37.89$	<0.0001	1.40
ACC R	$F_{1,74}= 44.74$	<0.0001	1.51
ACC L	$F_{1,74}=100.62$	<0.0001	2.29
THL L	$F_{1,74}= 19.94$	0.0034	0.93

Table S16: Significant permutation ANCOVA statistics for volume data, PSP vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	$F_{1,79}=32.94$	<0.0001	1.23
INS L	$F_{1,79}=32.82$	<0.0001	1.23
CBL R GM	$F_{1,79}=15.00$	0.0160	0.78
Frontal			
SFG R GM	$F_{1,79}=19.97$	0.0057	0.96
SFG L GM	$F_{1,79}=21.45$	0.0023	0.99
MFG R GM	$F_{1,79}=17.31$	0.0125	0.89
MFG L GM	$F_{1,79}=20.40$	0.0068	0.94
IFG R GM	$F_{1,79}=25.55$	<0.0001	1.04
IFG L GM	$F_{1,79}=34.35$	<0.0001	1.24
PrCG L GM	$F_{1,79}=23.20$	0.0034	1.02
PrCG L GM	$F_{1,79}=34.72$	0.0023	1.24
OFGlat R GM	$F_{1,79}=15.37$	0.0376	0.83
OFGlat L GM	$F_{1,79}=33.94$	<0.0001	1.25
OFGlat R GM	$F_{1,79}=16.77$	0.0114	0.91
Parietal			
PoCG R GM	$F_{1,79}=19.54$	0.0023	0.94
PoCG L GM	$F_{1,79}=29.52$	<0.0001	1.16
Temporal			
STG R GM	$F_{1,79}=15.43$	0.0228	0.78
FFG L GM	$F_{1,79}=14.61$	0.0296	0.70
LING L WM	$F_{1,79}=15.29$	0.0228	0.87
Occipital			
CUN R WM	$F_{1,79}=13.74$	0.0296	0.83
Subcortical			
AMYG R	$F_{1,79}=15.59$	0.0114	0.77
AMYG L	$F_{1,79}=14.47$	0.0319	0.73
CAU R	$F_{1,79}=27.57$	<0.0001	1.14
CAU L	$F_{1,79}=23.70$	<0.0001	1.06
PUT R	$F_{1,79}=46.32$	<0.0001	1.52
PUT L	$F_{1,79}=37.44$	<0.0001	1.35
ACC R	$F_{1,79}=33.07$	<0.0001	1.23
ACC L	$F_{1,79}=35.33$	<0.0001	1.27
PAL R	$F_{1,79}=28.61$	<0.0001	1.19
PAL L	$F_{1,79}=27.18$	<0.0001	1.16

THL R	$F_{1,79}=26.03$	<0.0001	1.03
THL L	$F_{1,79}=39.82$	<0.0001	1.30
BS R	$F_{1,79}=17.23$	0.0114	0.92
BS L	$F_{1,79}=14.63$	0.0296	0.85

Table S17: Significant permutation ANCOVA statistics for volume data, CBS vs controls.

Region	F statistic	p value	Hedges g
Other			
INS R	F _{1,56} =28.98	<0.0001	1.33
INS L	F _{1,56} =51.79	<0.0001	1.82
Frontal			
SFG R GM	F _{1,56} =33.63	<0.0001	1.45
SFG L GM	F _{1,56} =33.13	<0.0001	1.46
MFG R GM	F _{1,56} =18.37	0.0068	1.06
MFG L GM	F _{1,56} =27.43	0.0023	1.30
IFG R GM	F _{1,56} =21.75	0.0034	1.13
IFG L GM	F _{1,56} =36.10	<0.0001	1.48
PrCG L GM	F _{1,56} =31.96	<0.0001	1.39
PrCG L GM	F _{1,56} =44.59	<0.0001	1.63
OFGlat L GM	F _{1,56} =18.80	0.0068	1.09
Parietal			
PoCG R GM	F _{1,56} =26.07	0.0023	1.27
PoCG L GM	F _{1,56} =39.34	<0.0001	1.56
SPG R GM	F _{1,56} =14.86	0.0285	0.94
SPG L GM	F _{1,56} =19.62	0.0057	1.11
SMG R GM	F _{1,56} =20.24	0.0068	1.10
SMG L GM	F _{1,56} =26.54	<0.0001	1.28
ANG L GM	F _{1,56} =20.49	0.0023	1.11
PRCU R GM	F _{1,56} =13.36	0.0376	0.90
PRCU L GM	F _{1,56} =16.27	0.0296	1.02
Temporal			
STG R GM	F _{1,56} =17.68	0.0125	0.99
STG L GM	F _{1,56} =20.30	0.0068	1.05
MTG L GM	F _{1,56} =14.98	0.0285	0.90
FFG L GM	F _{1,56} =14.99	0.0285	0.91
Occipital			
MOG R GM	F _{1,56} =18.43	0.0034	1.05
MOG L GM	F _{1,56} =18.19	0.0080	1.07
Subcortical			
PUT R	F _{1,56} =13.58	0.0479	0.95
ACC R	F _{1,56} =15.77	0.0331	0.99

Table S18: Significant correlations between CSF/serum NfL, CSF pNfH and total brain volume, GM and WM volume for bvFTD and AD.

bvFTD volumes	correlated biomarker	N	p value	Spearman's ρ
Total brain	CSF pNfH	84	0.0234	-0.29
Total WM	CSF pNfH	84	0.0186	-0.30
Total brain	CSF NfL	66	0.0016	-0.42
Total GM	CSF NfL	66	0.0183	-0.34
Total brain	serum NfL	92	0.0002	-0.40
Total GM	serum NfL	92	0.0114	-0.30
Total WM	serum NfL	92	0.0050	-0.33
AD volumes	correlated biomarker	N	p value	Spearman's ρ
Total brain	CSF NfL	43	0.0184	-0.42
Total brain	serum NfL	37	0.0208	-0.44

Total brain volume refers to gray and white matter volumes without cerebrospinal fluid. Rho is the age corrected correlation coefficient Spearman's ρ , Significance: $p < 0.05$. AD: Alzheimer's disease, bvFTD: behavioral variant frontotemporal dementia, CSF: cerebrospinal fluid, GM: gray matter, N: Number of participants included, NfL: neurofilament light chain, pNfH: phosphorylated neurofilament heavy chain, WM: white matter.