

Table e-1 Demographics Parkinson's disease dementia vs those without dementia

	PD no dementia N= 14	PD dementia N= 21	
Age	72.5 (5.3)	74.7 (4.7)	$t_{34}=-1.33$; $p=0.191$
Female (%)	3 (20%)	3 (14%)	$\chi^2=0.21$; $p=0.650$
Years education	11.3 (1.9)	11.3 (1.9)	$t_{34}=0.04$; $p=0.970$
Duration of Parkinson's	10.6 (8.4)	10.0 (5.7)	$t_{34}=0.22$; $p=0.827$
Levodopa dose in 24 hours	591.7 (336.2)	767.4 (464.2)	$t_{34}=-1.25$; $p=0.220$
ChEI	0 (0%)	10 (48%)	$\chi^2=9.9$; $p=0.002$ *
Anti-psychotics	0 (0%)	3 (14%)	$\chi^2=2.3$; $p=0.126$
UPDRS III total score	34.9 (23.7)	51.8 (17.4)	$t_{34}=-2.46$; $p=0.019$ *
CAMCOG total score	89.1 (6.3)	73.2 (14.5)	$t_{34}=3.96$; $p=0.000$ *
MMSE score	27.3 (2.4)	22.3 (4.8)	$t_{34}=3.73$; $p=0.001$ *
Angle test	21.4 (20.4)	32.4 (25.8)	$t_{32}=-1.35$; $p=0.187$
Motion test	-0.2 (2.9)	3.4 (2.0)	$t_{32}=-4.26$; $p<0.001$ *
Best visual acuity decimal	1.2 (0.4)	0.8 (0.4)	$t_{32}=3.52$; $p=0.001$ *
Pareidolia noise task	2.6 (4.8)	5.8 (4.4)	$t_{34}=-2.05$; $p=0.048$ *
NPI total (AxB)			
hallucinations	0.5 (0.9)	2.6 (2.7)	$t_{34}=-2.84$; $p=0.007$ *
NPI TOTAL score	5.4 (4.5)	20.1 (16.4)	$t_{31}=-3.02$; $p=0.005$ *
CAF total	1.4 (2.2)	5.3 (3.7)	$t_{33}=-3.54$; $p=0.001$ *
MAYO total	1.1 (1.3)	2.4 (1.2)	$t_{33}=-3.09$; $p=0.004$ *

Data are mean (SD) or N(%). * indicates $p < 0.05$

CAF= clinical assessment of fluctuations scale; CAMCOG= Cambridge Cognitive Examination;

ChEI = Cholinesterase Inhibitor; MAYO= Mayo Fluctuation Composite Score; MMSE=Mini Mental State Exam; NPI=Neuropsychiatric inventory; PD = Parkinson's Disease; UPDRS III = Unified Parkinson's disease rating scale, motor subsection. The pareidolia task result is the number of pareidolias seen.

Table e-2 VBM results

Control > PD-VH

cluster	cluster size (vox)	cluster	voxel	xyz (mm)	
p (FWE)		p(unc)	T		
0.000	6153	0.000	4.995	46.5, 13.5, -30.0	R Temporal pole
			4.948	61.5, 4.5, 0.0	
			4.911	42.0, 7.5, -34.5	
0.018	1128	0.003	4.660	24.0, -70.5, -15.0	27% R V4, 26% FG1, 16% V3v
			4.067	21.0, -78.0, -9.0	
			3.719	39.0, -49.5, -27.0	
0.011	1278	0.002	4.557	7.5, -60.0, 15.0	R calcarine gyrus / precuneus
			4.377	-9.0, -60.0, 19.5	
			4.105	3.0, -57.0, 7.5	
0.084	696	0.016	4.466	13.5, 45.0, -7.5	
			4.418	3.0, 34.5, -9.0	
0.125	593	0.024	4.071	-27.0, -10.5, -15.0	L amygdala/hippocampus
			3.679	-33.0, -24.0, -10.5	

PD-non > PD-VH

0.014	1212	0.002	4.396	54.0, 9.0, -27.0	R Temporal pole
			4.204	39.0, 10.5, -39.0	
			4.082	49.5, -6.0, -27.0	

PD-non > PD-VH controlling for Camcog

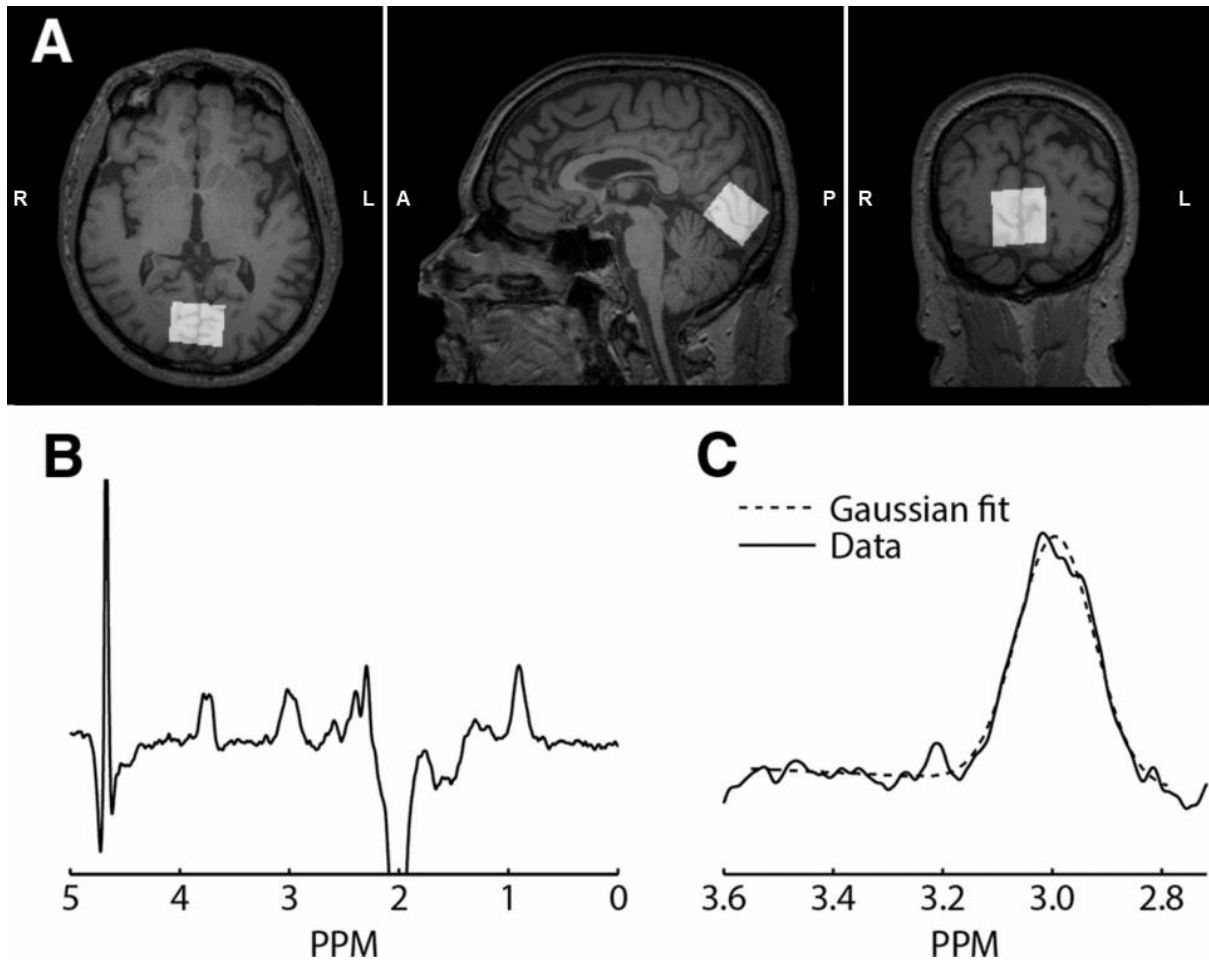
0.041	892	0.007	4.318	55.5, 10.5, -27.0	R Temporal pole
			4.086	39.0, 10.5, -39.0	
			3.891	39.0, 21.0, -42.0	

GABA-GM (controlling for age and con/PD/PD-VH)

0.080	682	0.014	4.828	4.5, -69.0, 7.5	66% R V1, 22% RV2
			4.181	10.5, -69.0, -1.5	
			3.339	9.0, -75.0, 15.0	

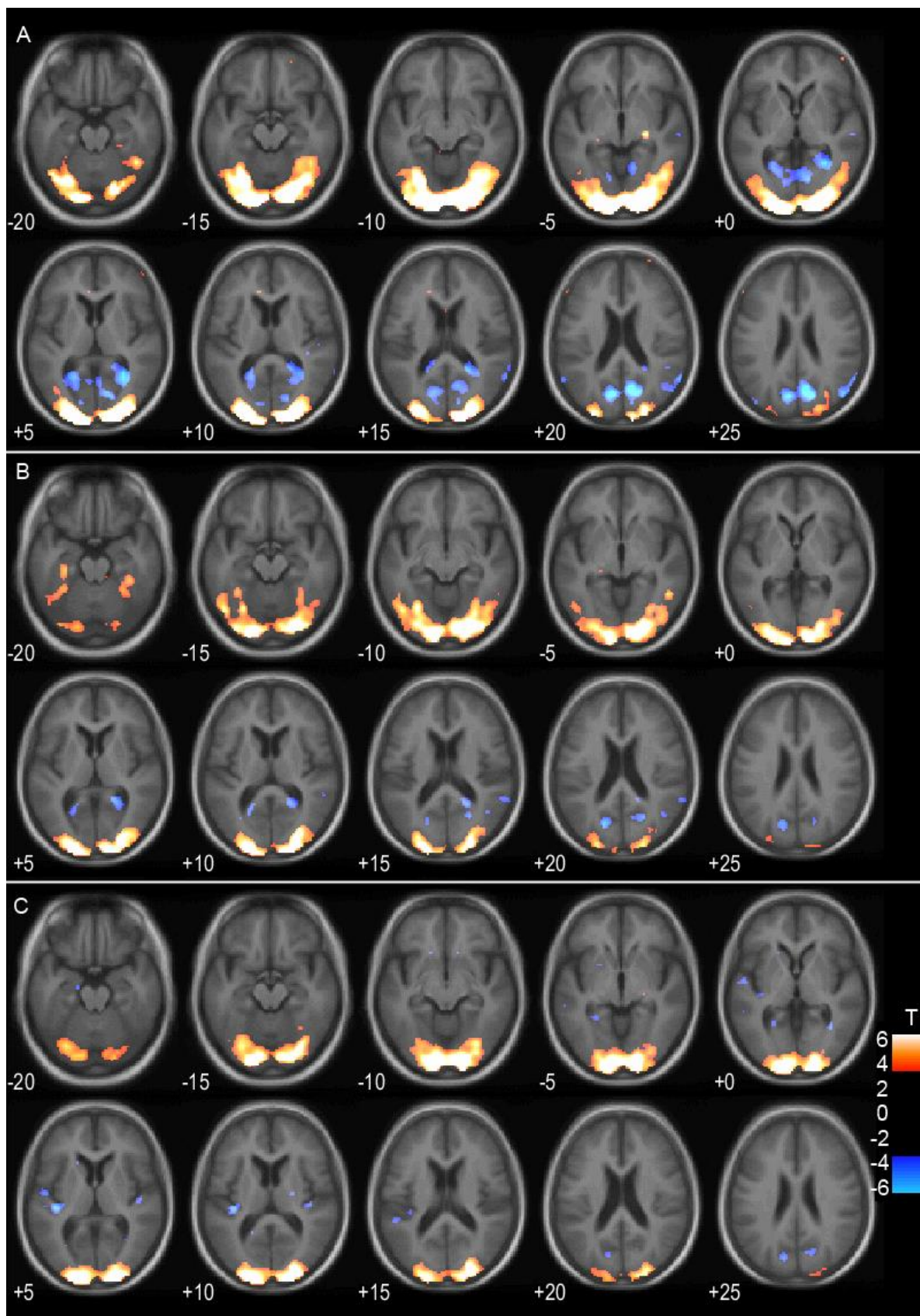
Supplementary figure e-1

A Typical location of the MEGA-PRESS voxel. B, Edited spectrum, including the GABA peak for quantification at 3 ppm. C, Expanded view of B, showing 3 ppm GABA peak and fitted Gaussian function used for quantification.



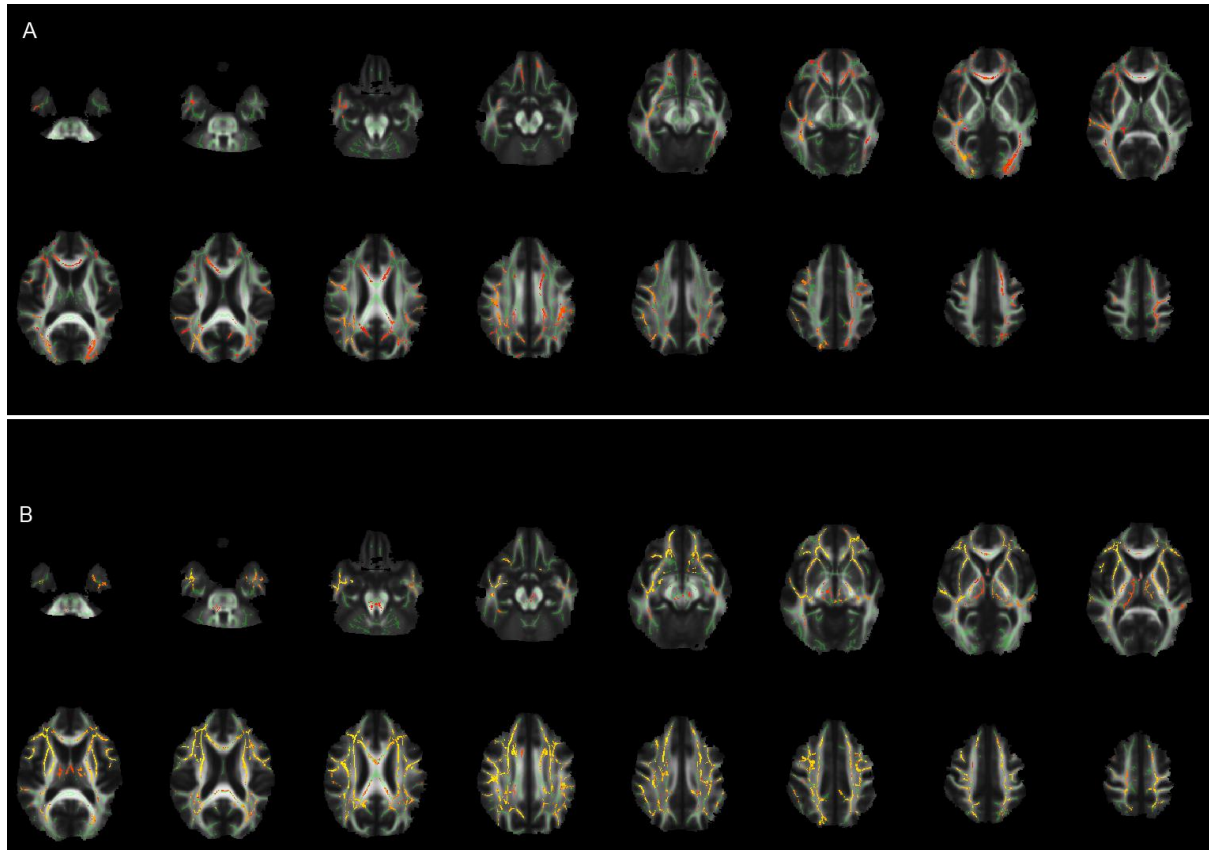
Supplementary figure e-2

Activation and deactivation to the checkerboard stimulus in A) controls, B) PD-nonVH, C) PD-VH. Voxelwise threshold of $p < 0.001$ uncorrected for multiple comparisons.



Supplementary Figure e-3 Group differences from TBSS analysis of diffusion data. A) regions where FA is lower in PD-VH vs controls B) MD is higher in PD-VH vs controls; Subject age was included as a covariate.

(radiological convention – L = R)



Supplementary figure e-4

Grey matter correlates of GABA+/Cr. Results are thresholded with $p < 0.001$ voxelwise (uncorrected for multiple comparisons). None of the clusters was significant ($p > 0.05$ FWE corrected)

